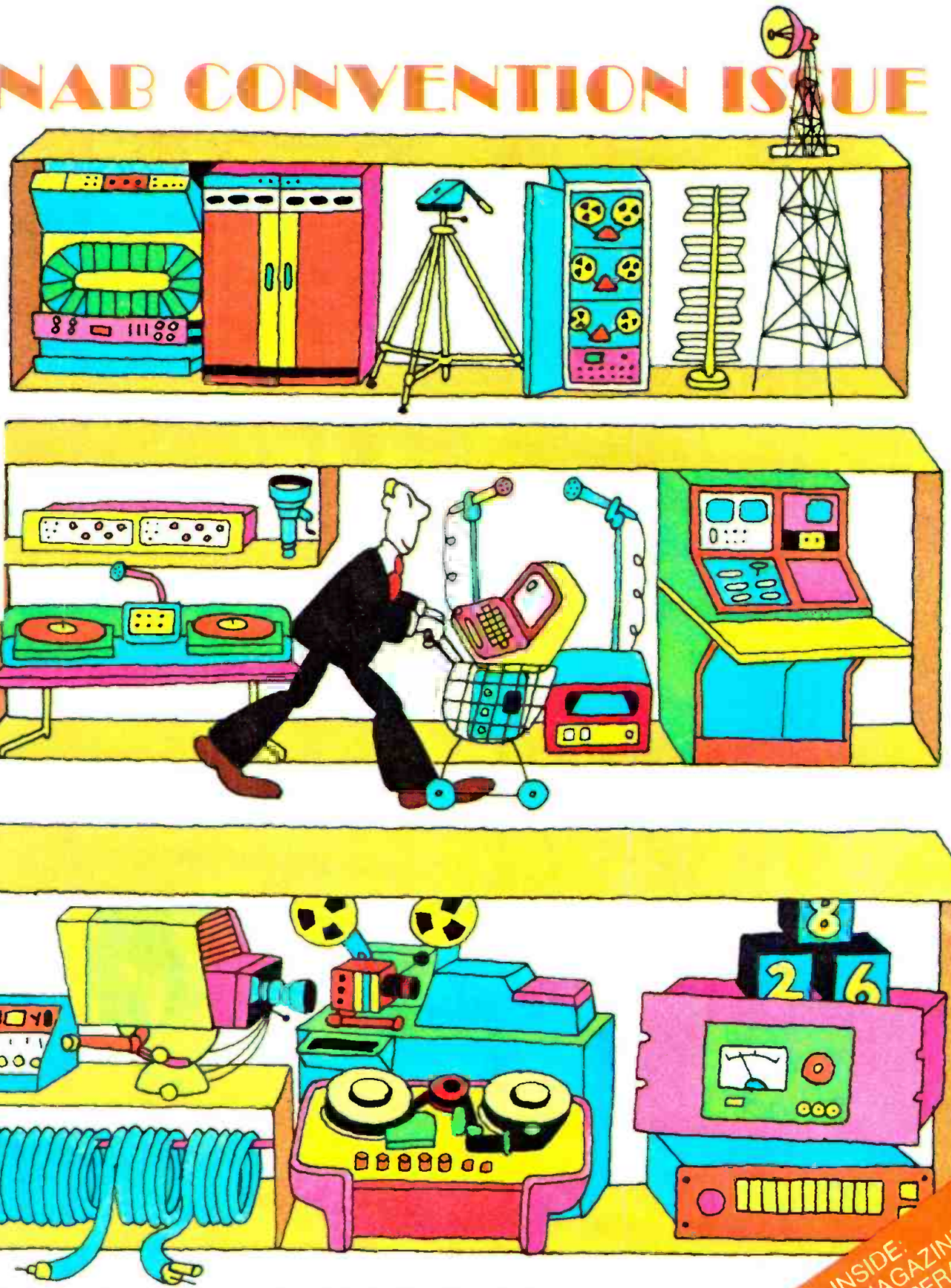
APRIL 1972

BM/E

BROADCAST MANAGEMENT/ENGINEERING

NAB CONVENTION ISSUE



NAB '72: CONVENTIONEERS—80%—HAVE SPECIFIC BUYING PLANS
SEE SURVEY, PAGE 19

INSIDE:
CM/E MAGAZINE
FOR CABLE OPERATORS
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You've just seen 3M's Color Dropout Compensator do its job.

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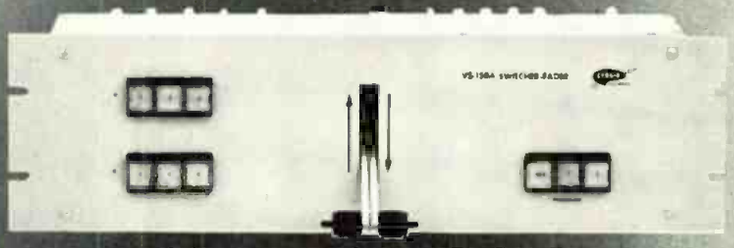
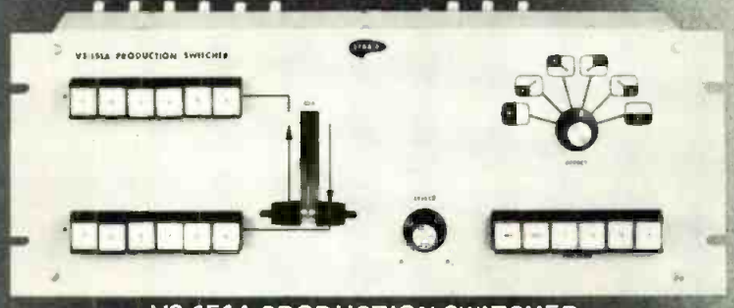
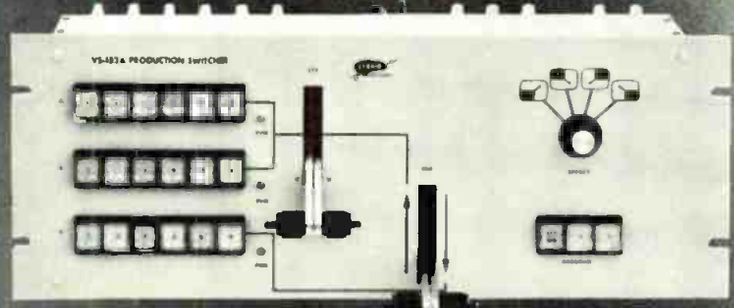


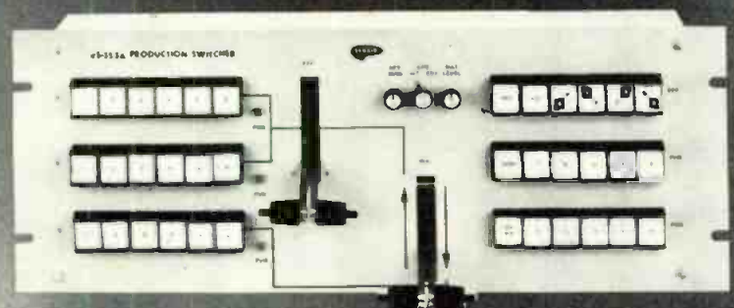
VS-150A VIDEO SWITCHER-FADER



VS-151A PRODUCTION SWITCHER



VS-152A PRODUCTION SWITCHER



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How? You'll find out quickly when you check the prices of comparable equipment of other manufacturers. For the same capability, you will pay from two to three times as much. And you probably won't get the quality and reliability of DYNAIR equipment.

On DYNAIR program switchers you won't find cheap, troublesome sliding fader potentiometers; we use quality gear-driven, locking split-lever controls. Nor will you find other inexpensive and unreliable components. The 150 Series uses the latest silicon solid-state devices available – over 80 percent of which are in integrated-circuit form – the same quality components and temperature-compensated circuitry used in our broadcast and aerospace equipment. Fully color delay compensated too.

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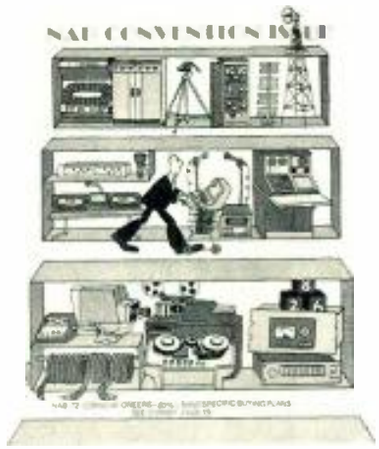

Most of the attendees at the NAB Convention '72 won't have a shopping cart, but they will come with a shopping list. See survey, page 19.

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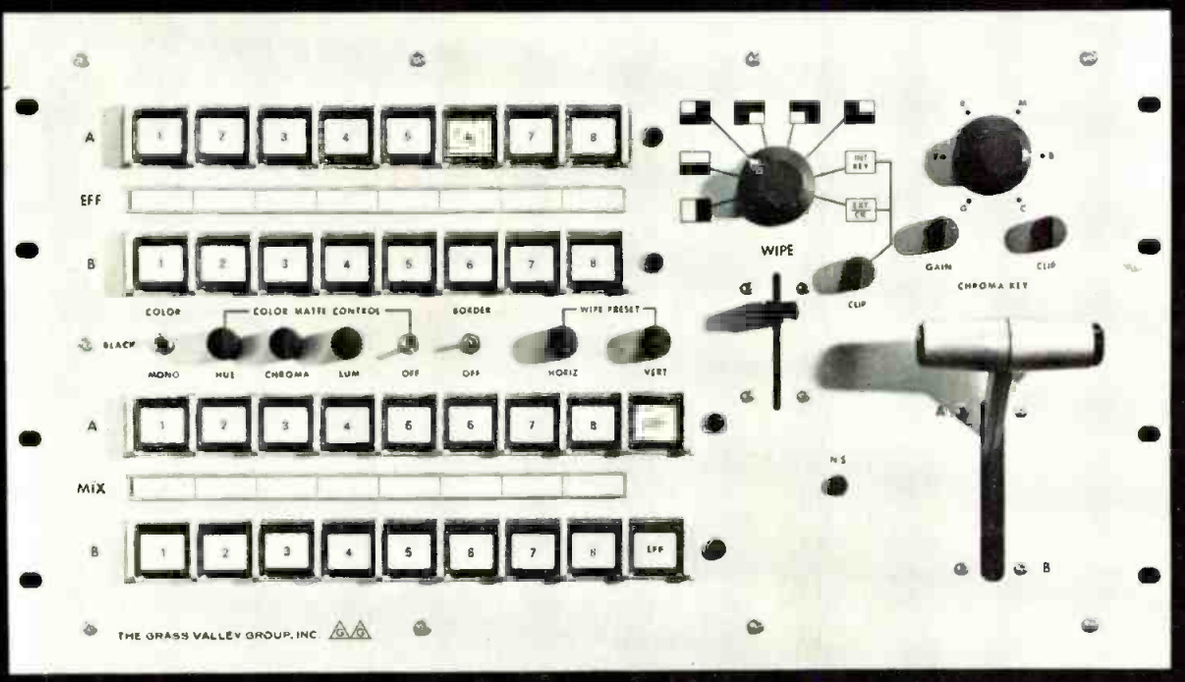

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BROADCAST INDUSTRY NEWS

U.S.-Chinese Men And Equipment Join To Cover Nixon on TV

The live television coverage of President Nixon in China, which showed us such previously unthinkable events as Mao and Nixon smiling at each other on camera, depended on transportable earth satellite stations flown in from the U.S. At Peking a WUI-2 station, product of Western Union International, beamed the signals to the Intelsat satellite over the Pacific; at Shanghai, a corresponding RCA station did that job. Some of the other American equipment used there were nine Norelco TV cameras taken over by network TV men; an LTV Electrosystems 33-foot "dish" antenna for beaming the signals; and Jamieson processors for color film.

The Chinese TV system carried the signals from one point to another in China, and the American visitors praised the skill and cooperativeness of the Chinese technicians.

TV Broadcasts With Captions For Deaf Only Demonstrated

The TV time system devised at the National Bureau of Standards, Boulder, Colorado, to disseminate accurate time throughout the U.S. (*BM/E*, October 1971, p. 6) allows the sending and receiving of captions in electronic code on the bottom line of the TV screen. This code can be translated into visual messages superimposed on the picture with a special adapter. Captioning broadcasts for the deaf is a possible application. The piggyback signals cause no interference with normal viewing. On February 16, WMAL-TV, Washington, D.C., demonstrated this by putting the code on the ABC network show "Mod Squad" for students at Gaullaudet College.

Parker Calls FCC "Supine" Before Senate Committee

The main unleasher of the license-challenging forces, Dr. Everett C. Parker of the United Church of Christ, told the Senate Subcommittee on Constitutional Rights that "monopoly" in radio, television, and newspapers is prohibited by the First Amendment and should be eliminated by vigorous government regulation. Defining what he called necessary access to broadcast media, he said that the ". . . media themselves have an obligation to seek out and give voice to all significant viewpoints reflected in the area of service." He charged the FCC with a lack ". . . of the desire to regulate . . . (it is) a supine agency which refuses to take the actions with which it has been charged by Congress."

Subtitles for the deaf can be added to TV sets with a simple converter.

AMST Guardedly Endorses CATV Rules, Wants Copyright Action

The Board of Directors of the Association of Maximum Service Telecasters, meeting in Dallas, noted that AMST had originally accepted the CATV "compromise" reluctantly, with the understanding that agreement on copyright issues would be part of the package. With the issuance by the FCC of the new CATV rules in advance of any decisions on copyright regulations, the AMST directors called for prompt agreement on statutory copyright language to be recommended to Congress. They also called for reconsideration and modification of "some" (unspecified) of the CATV rules.

Color Sales Shot Up in 1971 to All-Time Record

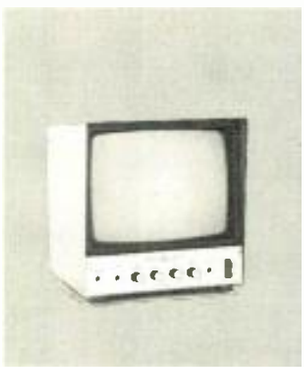
Sales of color sets in 1971, at a total of 7,256,700, were 39% over sales for 1970 and an all-time record, says an EIA report. Consumer electronics altogether had an excellent year, with monochrome TV up 7.9%, radio sets up 5.7%, phonos

continued on page 8

Now showing...the New Reliables

Five inch monochrome assembly features three 5" units in rackmount configuration. Small size requires less rack space than similar units and permits monitoring of 3 separate video signals. High quality, all-purpose monitors with Setchell Carlson UNIT-IZED® plug-in circuit modules.

New 10" monochrome video monitors offer horizontal resolution of 640 lines or better plus 100% solid-state circuitry for long-life reliability. Unit is available in rackmount or in attractive metal cabinet. A 12" model is also available.



In addition to 640-line resolution, the 16" monochrome monitors have all major operating controls located on the front panel for ease of operation. Front-panel screwdriver adjustments for vertical linearity, vertical height, and focus provide protection against accidental misadjustment.

Nineteen inch monochrome video monitors offer traditional Setchell Carlson quality, including exclusive UNIT-IZED® plug-in circuit modules for easy maintenance. Horizontal resolution is 640 lines or better. Available in rackmount or attractive cabinet models.

Professional quality 19" color video monitors offer broadcast quality at a modest price. Horizontal resolution is 300 lines (color) and all set-up controls are located behind a hinged front panel to prevent accidental misadjustment. Also available in 25" model.

The 23" monochrome video monitor offers excellent picture quality and attractive styling at a modest cost. Circuitry is 100% solid-state and the horizontal resolution is rated at 640 lines or better. Monitor has a variety of applications due to multitude of professional-quality features.

Regulated circuitry in the 25" color monitor provides extremely stable operation and prevents raster size or brightness deviations due to line voltage fluctuations. Horizontal resolution is 300 lines (color). Set-up and operating controls are front-mounted for ease of operation.

"Educator" Monitor/Receiver, 23" monochrome model, is designed specifically for educational and training applications. Controls are front-located. Tamper-proof control compartment door with lock is optional. Horizontal resolution is 600 lines or better with video signal input. Also available in 25" color model.

The Color "Educator" is a 25" model offering big-screen, sparkling color — 300-line (color) resolution — plus big-room audio. Designed specifically for educational and training applications, the "Educator" series Monitor/Receivers offer the utmost in reliability, flexibility, and ease of operation.

Setchell Carlson's solid-state UHF/VHF television receiver and RF demodulator provides a high-quality composite video signal and separate audio signal, assuring excellent monochrome and color picture quality. It is ideal for video recording and as a signal source for video monitors.

The quality and reliability of Setchell Carlson products is legendary. SC Electronics pioneered the concept of modular circuit construction. Every Setchell Carlson product features this concept in our UNIT-IZED® plug-in circuit modules, assuring operating dependability and maximum ease of maintenance. One hundred percent solid-state circuitry means maximum stability, long-life, low power drain, and a minimum of heat. Every feature in a Setchell Carlson product is meticulously designed to give you outstanding performance at a modest cost.

For many years, people involved in many different facets of broadcasting, closed circuit television, medical training, industrial TV applications, custom remote installations, and in the field of education have been able to depend on Setchell Carlson quality and reliability. It has become a tradition. We know that whatever your application, you will find a product to fit your need in the Setchell Carlson line.

Let your SC Electronics dealer give you a showing of . . . The new Reliables. Or, write to us for more information. Remember SETCHELL CARLSON, where quality is a tradition.

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up 9.9%, and tape players (on incomplete figures) estimated at 17 million units, also a record. The uptrend in color sales apparently carried over to 1972, with January dealer sales up 34% over January 1971.

Two-Billion Market Seen for CATV by 1976

The CATV industry will hit $2.2 billion by 1976, says Creative Strategies, Inc., marketing analysis firm of Palo Alto, California. According to an in-depth report on the industry recently issued by CSI (and available from them for $360), revenues from manufacture of CATV equipment should rise from $72 million in 1971 to $340 million in 1976, with the biggest increase between 1972 and 1974. Remainder of the $2.2 billion total includes CATV operating revenues, construction outlays, etc.

Broadcast "Clipping" Service Opens in Denver

Omnibus Communications Corp., which makes audio and video copies of material put on the air, announced opening of new headquarters at 5475 Leetsdale Drive in Denver. Transcripts, videotapes, kinescopes, audio tapes and photoboards are used for permanent record of ads, talk programs, news, or any other broadcast material, as needed by advertisers or others.

SMPTE Sets Technical Topics for N.Y. Convention

The Society of Motion Picture and Television Engineers announced topics of technical sessions for its convention April 30 to May 5 at the New York Hilton Hotel. Calvin Hotchkiss of Eastman Kodak, New York, program chairman, said that the overall theme would be "The New Filmmaker." Separate sessions will cover film production techniques, lab practices, TV production, TV systems, CATV systems, cartridge and cassette videoplayers, sound equipment, theatre projection, education in motion picture technology, photo instruments, and high speed photography.

Technician Braves Freeze 825 Feet Aloft to Fix Antenna

The very thought is enough to chill the blood: going to the top of an 825-foot antenna tower, in the dark, with 35-mph winds and a temperature of 18 degrees, to repair a cable fault. Technician Larry Will of New Jersey's Public Broadcasting Authority did just that when a cable failure on the Channel 52 station antenna tower threatened to black out a scheduled basketball game. Will took an hour for the trip, working with a flashlight and a nine-inch monitor to find the breakdown. He found it—and the fans got their game. Bravo.

National Organizations Support Long-Range Money for CPB

Delegates from 30 national organizations, making up the Advisory Committee of National Organizations of the Corporation for Public Broadcasting, voted January 11 to endorse efforts of CPB to obtain long-range financing from Congress. The organizations covered a very wide spectrum of interests, from the National Association of Manufacturers to the U.S. Conference of Mayors, from the American Bar Association to the Girl Scouts of America. The delegates also voted to support H. R. 11807, bill introduced into the House by Rep. MacDonald (D.-Mass) which covers some aspects of long range financing.

Clarification

In the article "Talk Is Big in New York Radio," page 17, January, we stated the station ratings were: WABC, WCBS, WOR, WINS, WNEW, and WMCA. This was based on the July/August ARB estimate, total cume. In the October/November ARB, the ratings had changed and WOR wrote us claiming it was number two total cume, or number one with adults 18 or over. WMCA had slipped to 13th with six music stations intervening.

Business Briefs

TelePrompTer and **Hughes Aircraft** announced a $30 million eight-year financing arrangement with Western American Bank (Europe) Ltd. to finance continued development of the Manhattan Cable system and Theta Cable of California, as well as refinancing of existing plant . . . **Lockheed Missiles and Space Co.** (subsidiary of Lockheed Aircraft Corp.) heads a consortium of 15 companies, including Japanese and European firms, in building an Intelsat V-type communication satellite test vehicle, an earth-bound brother of the "bird," with a 92-inch mesh antenna for transmitting and receiving just as in space

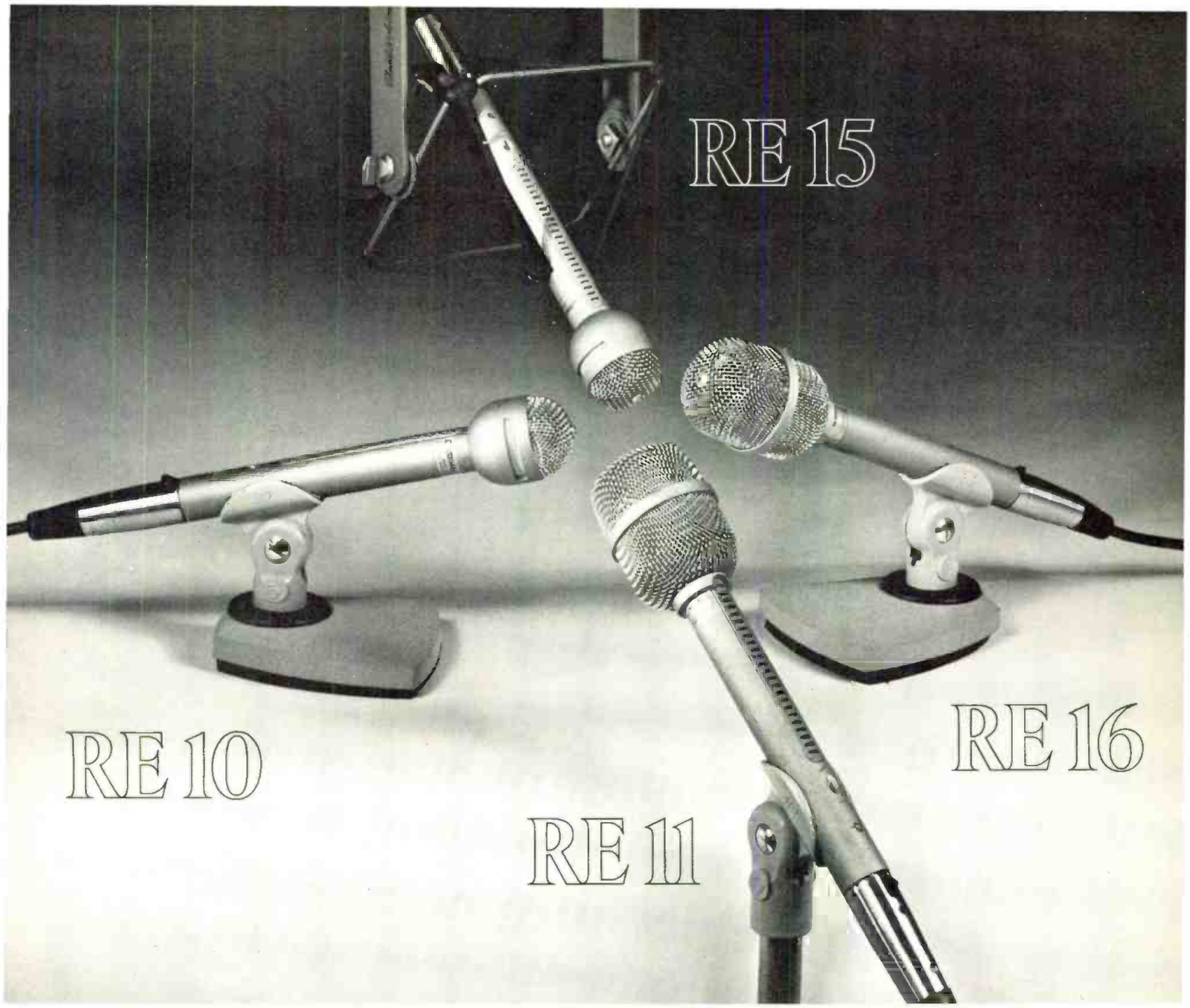
Premier Cablevision Ltd., of Vancouver, reported net earnings for 1971 of $2,056,032, against $1,465,948 in 1970. Premier, one of the largest cable conglomerates in North America, has systems in Vancouver, Fraser Valley, Victoria, and Toronto . . . **Combined Communications Corp.** of Phoenix, Arizona, has bought for about $30 million in cash and debt discharges a number of the properties of **Mullins Broadcasting Company,** among them KBTV in Denver; Barbre Film Productions; KARK-TV, Little Rock; and Electrical Products, Inc., Albuquerque . . . **Tele-Communications, Inc.,** Denver, bought **Com-West Inc.** which operates cable systems in Oklahoma and Minnesota with a total of about 10,000 subscribers.

Information Transfer, Inc., Newark, N.Y., engaged **GTE Sylvania** to build complete cable systems totalling about 100 miles in Newark, Clyde, Palmyra, and Lyons, New York . . . **"Charles Blair's Better World"** is a television series produced by **Koplin-Grinker Productions,** New York, with Charles Blair, interdenominational leader of Denver's Calvary Temple, as host. Premiering on KBTV, Denver, on February 1, the series includes background material and inspirational interviews with artists, sportsmen, scientists, statesmen, ". . . to capture man in all his facets . . ."

TNT Communications, Inc., New York, will install six giant TV screens in the new Louisiana Superdome in New Orleans to show the audience instant replays of the sports action on the field. The system, called "TNT Supervision," is CCTV with Eidophor projectors capable of 7000 lumens output

Systems Wire and Cable, Inc. said that earnings for the first quarter of the 1972 fiscal year were $3.76 per share, up from $3.21 in the same period last year and about 10 percent over projections . . . **Cypress Communications,** Los Angeles, marked up sales of $5,313,800 for the six months ended December 31, 1971, against $4,835,200 for the same 1970 period; earnings were $421,000 and $44,700, respectively, for the two periods . . . **Sterling Manhattan Cable** in New York expanded public service and political programming with free-time offers to all bona fide candi-

Continued on page 10



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The new RE10 is the economy version of the RE15. The same concept and quality, but for slightly less rigid requirements. And the RE11 is the lower cost twin to the RE16.

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dates in the upcoming primary and general elections; carriage of noncommercial WLIW, Channel 21 on Long Island, which has many educational and cultural programs; and regular interviews with political candidates on "In And Around Manhattan," news program.

A **school of broadcasting** will be initiated by WDAT, **Daytona Beach,** with free courses for students of **Bethune-Cookman College,** which serves Black students primarily. On-the-air personalities, news coverage and writing, commercial copy, sales, engineering, management, will all be covered, along with all requisites for the third-class FCC license . . . **AEL Communications Corp.** announced a strand-mapping contract for GE Cablevision, Schenectady; a turn key contract with Greater Humboldt-Dakota City Cable TV in Humboldt, Iowa; and strand-mapping and engineering for Athena Corp., New Bedford, Massachusetts.

Kalart Victor Corp. sold a number of its Tele-Beam Large Screen Projectors to New York State for use in State universities at six locations . . . **Theta-Com,** Los Angeles, announced completion of its first 20-channel AML transmitter. Previous systems in operation and on order ranged up to 16 channels . . . **Metromedia, Inc.** of New York had revenues of $153,407,078 and earnings of $7,681,588 for the year ended January 1, 1972. Corresponding figures for the previous year were $158,891,998, and $5-833,860.

WMAD-FM, **Madison, Wisconsin,** went stereo February 21, with new studios and transmitter equipment . . . **Kaiser CATV** will build a 100-mile, $400,000 cable system for **Metro Cable** in Loves Park, Illinois . . . **Telestrator Industries,** Chicago, reported sale to CBS-owned-and-operated TV stations of the Telestrator Electronic Graphic Systems, which allow the user to write or draw directly into a live or taped TV program.

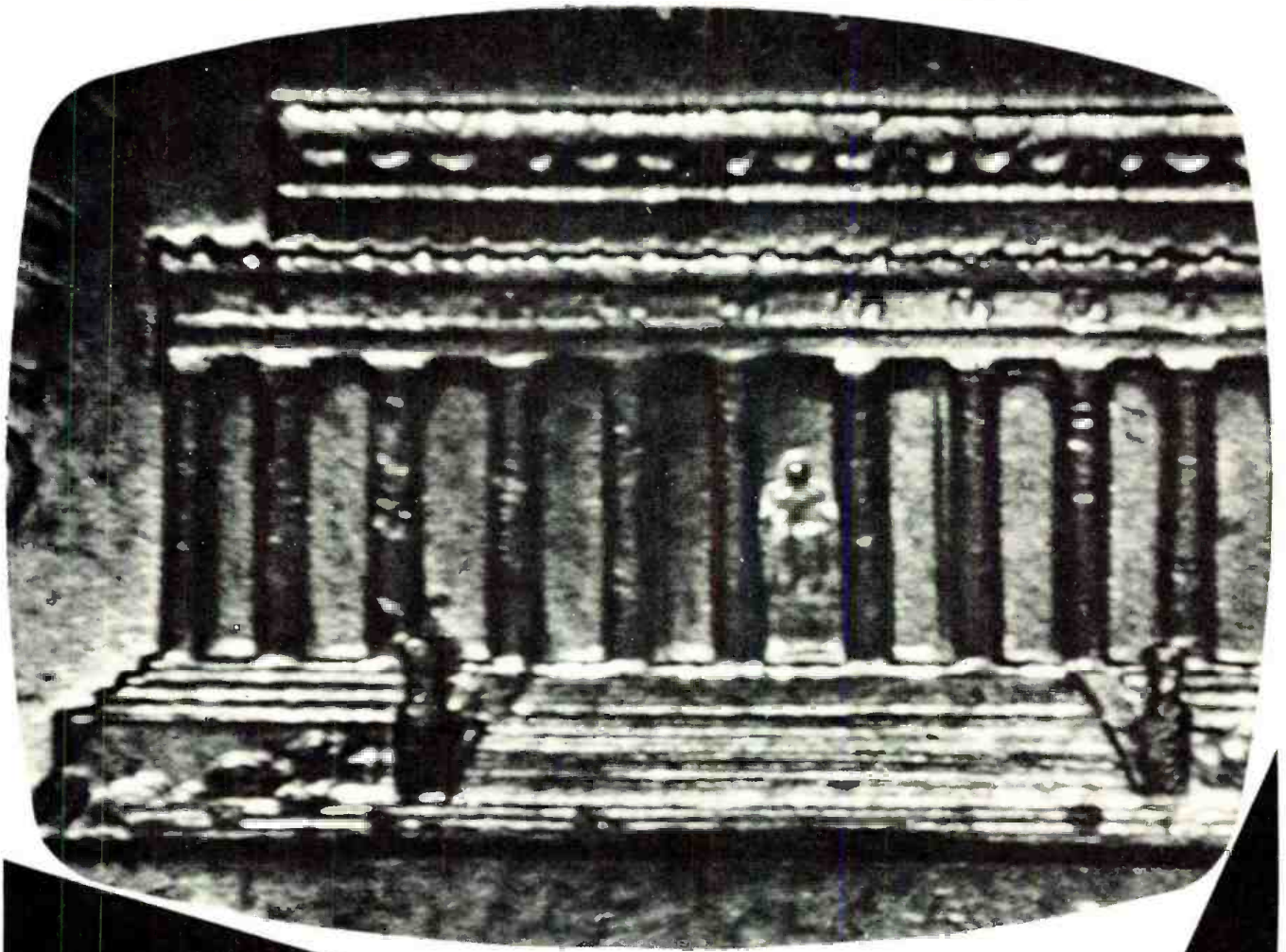
Oak Electro/Netics, Crystal Lake, Illinois, is forming the Oak CATV Division to manufacture and market cable TV equipment. Oak is the maker of the Gamut 26, 26-channel set-top converter used by Sterling Manhattan in New York, and elsewhere . . . **SJR Communications,** Suburban Station Building, Philadelphia, will syndicate a number of program services for FM stations, including 100 hours of MOR music, 100 hours of classical, and a nostalgic music series . . . **Educational station** WIPR-TV in San Juan, Puerto Rico, bought about $1.3 million of new **RCA** equipment to go to full-time color, including cameras, high-band tape recorders, switching systems, consoles, film systems.

CableVision Properties, new firm in Denver, bought a cable system in Fallbrook, Colorado, from **Pala Mesa Cablevision.** System has 32 miles of plant, 1400 subscribers. Broker was Daniels and Associates, Denver . . . **Berkeley Cablevision,** Martinsburg, West Virginia, has engaged **Good Communications, Inc.** of Philadelphia as subscriber-increase representative.

A Missouri State CATV Association emerged from a meeting January 26, 1972 in Jefferson City, and was named the "Missouri Broadband Communications Association." Don Eggebrecht of St. Joseph Cablevision was elected president; Dan Healey of Jefferson City, vice president; Dean Peterson of Carthage, secretary; and Jim Adkisson of Sedalia, treasurer . . . **Magnavox Video Systems,** Torrance, California,

continued on page 68

DID YOU KNOW THAT LINCOLN IS ON THE BACK OF A PENNY?



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INTERPRETING THE **FCC** RULES & REGULATIONS

New Cable Rules: Part I Signal Carriage

In February 1972, the Commission adopted its most extensive CATV rules since February 1966, thus lifting its protracted "freeze" of some six years on cable's growth in the major markets. Numbering over 400 pages of regulations, explanatory material, and appendices, the *Cable Television Report and Order* (FCC 72-108, in Dockets 18397, et al) is necessarily detailed and comprehensive and does not lend itself to quick and easy interpretation. Accordingly, the following treatment of rules pertaining to signal carriage attempts to reduce same to portions for ready application by both cablecasters and broadcasters.

For purposes of determining the parameters of signal carriage, the Commission has divided television markets into the following categories: 1) the top-50 markets, 2) the top 51-100 markets or the second-50, 3) the markets below 100, and 4) those markets not within 35 miles of any television station. The top-100 markets are referred to as "major" markets and those below 100, yet still within 35 miles of a television station, are termed "minor" markets.

Cable systems in communities *partially* within a 35-mile zone are treated as if they are *entirely* within the zone. *Exception:* A system in a top-100 market community is treated as within the zone of a station licensed to a designated community in another major market only if the 35-mile zone of the station covers the entire community of the cable system. In those instances where there is an overlapping of zones to which different carriage rules are applicable, the rules governing the *larger* market will be followed.

"Significantly viewed" stations are the subject of considerable discussion in the ensuing treatment. For clarification, a "significantly viewed" full or partial network affiliate is one which has at least a three percent share of viewing hours and at least a 25 percent net weekly circulation. An independent station is "significantly viewed" if it has at least a two percent share of viewing hours and at least a five percent net weekly circulation.

In rare cases where the cable system is identified primarily with one major market and some of the local signals come from an overlapping major market (e.g., Washington and Baltimore), the cable operator is permitted and, upon appropriate request, required to carry a signal from one major market to another if he can demonstrate that such signal, regardless of distance or contour, is "significantly viewed" over-the-air in his cable community. Likewise, the rule is applicable to overlap between smaller and major markets. Yet a cable system located in a designated community of a major television market may carry the signal of a television station licensed to a designated community in another major market only if the *designated community* in which the cable system is located is *wholly* within the specified 35-mile zone of the latter, major market station.

Derived from the American Research Bureau's 1970 prime-time households ranking, the list of top-100 markets is a constant and, therefore, is not subject to revision. The Commission further classifies signals according to those *required* to be carried and those *permitted* to be carried, as follows: 1) signals that a cable system, upon request of the appropriate station, *must* carry, and 2) signals that, considering market size, a cable system *may* carry.

Top-50 Market CATVs

Cable systems in the top-50 markets are *required* to carry the following signals: 1) signals of all stations licensed to communities within 35 miles of the cable system's community, 2) all "significantly viewed" signals, 3) all Grade B ETV's, and 4) all translators of 100 watts or higher power within the cable community.

In addition, systems in the top-50 markets are required to provide a minimum service of three networks plus three independents.

In addition to the authorized complement of signals, operators in the top-50 markets will be permitted to carry two *additional, independent* "bonus" signals. Yet any distant signals that have been imported to meet the authorized complement (a 3-3 service level) will be deducted from the additional signals permitted. For example, market X (a top-50 market) must meet a service requirement of three networks and three independents. If stations are carried, via 1) signals from the same market, 2) signals within 35 miles of the cable system, and 3) those "significantly viewed," and the cable operator reaches a service level of three networks and two independents, he would be permitted to import 1) one distant independent to reach the required 3-3 service level, and 2) one distant independent as a "bonus." *Note:* The one "bonus" independent is determined by subtracting the number of signals imported, i.e. *one*, to meet the mandatory service level from the number of "bonus" signals permitted, i.e., *two*.

Second-50 Market CATVs

Systems in the second-50 markets are required to carry the same basic signals as those in the top-50 (see first paragraph under "Top-50 Markets," above). In addition, they must carry a minimum of three networks plus two independents.

If the above complement of signals is not available via 1) stations within 35 miles, 2) stations from the same market, and 3) stations meeting the viewing test, the cable operator is permitted to carry distant signals to reach the required level of service. As in the top-50 markets, systems in the second-50 may bring in two additional independent signals,

continued on page 14

FCC continued from page 12

but these are subject to a deduction of signals imported to meet the required 3-2 service level.

Minor Market CATVs

As in the major markets, minor market systems are required to carry the following signals: 1) signals of all stations licensed to communities within 35 miles of the cable system's community, 2) all "significantly viewed" signals, 3) all Grade B ETVs, and 4) all translators of 100 watts or higher power within the cable community.

Minor market systems must meet a minimum service level of three networks plus one independent and are *not* permitted to import distant signals beyond this 3-1 level.

CATVs Outside All Television Markets

Cable systems outside the zones of any TV stations are required to carry 1) all Grade B signals, 2) all translator stations of 100 watts power or greater licensed to the cable community, 3) all ETVs within 35 miles. and 4) all "significantly viewed" signals, even when the station does not provide a Grade B contour signal to the cable community.

There is no minimum service standard, as required for major and minor market systems, for systems outside all TV markets. Such systems are permitted to carry any number of distant network affiliates and independents.

Leapfrogging

In selecting signals, major and minor market cable systems will be required to carry the closest *network* affiliates or the closest such in-state station. *Independent* signals, if they come from the top-25 markets, must come from one or both of the two closest markets. If independents are chosen from stations beyond the top-25, operators may exercise freedom of choice in their selection. Systems carrying a third independent signal will be required to choose a UHF station within 200 miles or, if such a station is not available, a VHF signal from the same area or any independent UHF signal.

Basic leapfrogging restrictions are suspended when 1) because of program exclusivity rules, a program is not available on a regularly carried independent station, or 2) the programming carried on the regularly carried independent is directed primarily to the local interest of viewers in the distant community (e.g., local news or public affairs.) In such cases, the cable operator is permitted to import from *any* other station (including network affiliates) *any* non-protected program and may carry the program to its conclusion.

Educational and Foreign Language Stations

For purposes of fulfilling the needs of what is generally considered a "select audience," the Commission both *requires* and *permits* additional carriage of ETVs and foreign language stations. Specifically, a cable operator *must* carry all ETVs which 1) are located within 35 miles of the cable system, or 2) place a Grade B contour over the

continued on page 16

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FCC continued from page 14

cable community. Furthermore, foreign language stations, not counted as part of the distant signal quota, *may* be imported in *unlimited* numbers. If a station broadcasts predominantly in one language, such station may keep out a distant signal broadcasting *in the same language* so long as the former can sustain its burden of proving that it will be affected adversely.

Program Exclusivity

The Commission provided for exclusivity for both 1) network programs, and 2) syndicated programs. Stations with priority (i.e., a stronger grade of off-air signal) would thus be assured of exclusive presentation rights to both network and syndicated progams.

With respect to *network* television programming, a broadcaster of a higher priority station may request a cablecaster to refrain from *simultaneous* duplication of its network programming. Most saliently, the Commission has limited its rule to cover "simultaneous," rather than "same-day," protection. *Note*: Exclusivity does not apply to foreign language stations.

With respect to *syndicated* programming in the top-50 markets, the rules prohibit cable systems from carrying syndicated programs (defined, essentially, as "nonnetwork programming sold in more than one market") on imported stations, if they have been notified by a local station that it is carrying the program. The restriction applies for one year in cases of first-run syndicated programs and for the run-of-the-contract in exclusive contract arrangements for showing by a station licensed to a designated community in the market.

Exclusivity rules pertaining to the second-50 markets are more complicated. Basically permitting greater accessibility of programs and shorter terms of exclusivity, the rules echo those in the top-50 markets which require notification by the broadcaster and restraint by the cablecaster when a station licensed to a designated community in the market runs a syndicated program under an exclusive contract. However, the Commission lists the following exceptions:

(1) For off-network series programs:

(a) Prior to the first nonnetwork broadcast in the market of an episode in the series;

(b) After a first nonnetwork run of the series in the markct or after one year from the date of the first nonnetwork broadcast in the market of an episode in the series, whichever occurs first.

(2) For first-run series programs:

(a) Prior to the first broadcast in the market of an episode in the series;

(b) After two years from the first broadcast in the market of an episode in the series.

(3) For first-run, nonseries programs:

(a) Prior to the date the program is available for broadcast in the market under the provisions of any contract or license of a television broadcast station in the market;

(b) After two years from the date of such first availability.

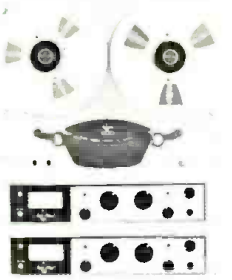
continued on page 82

Tape-Athon THE INDEX OF PROFESSIONAL STUDIO EQUIPMENT

Model 900

LOGGER

Tape-Athon's broadcast LOGGER is ideal for radio stations and communications centers, combining performance, dependability and low investment in a field-proven unit. Speeds down to 15/32 ips permit 409 recording hours per channel with up to 8 channels / 8 tracks available.



LOGGER

Circle Number 150 on Reader Service Card

Model 900

RECORDER

A truly professional recording system, the 900 will perform virtually any audio assignment in the studio. Mechanically and electronically the 900 has proven itself in hundreds of installations. Uses all reel sizes to 10½", has dual capstans for smoother tape movement, 30 to 15,000 Hz response, sensitive to 25 Hz cue tone and speed combinations of 3¾-7½ or 7½-15 ips. It operates so smoothly it can handle ½ mil tape.

Electronics are solid state, of course, with automatic reversing and reel torque compensation.

RECORDER

Circle Number 151 on Reader Service Card

MULTIPLEXING

Here's a pair of easy ways to broadcast background music for fun and profit. Tape-Athon's PROGRAMMER and CHANNEL CASTER both have 4 tape transports with a capacity of over 800 different musical selections. With the PROGRAMMER, you have built-in timing circuits that permit an infinite variety of mixing for specialty music during the broadcast day. It's complete with 7-day ON-OFF clock, VU meter, monitor speaker, and 40 watt amplifier. The CHANNEL CASTER is equipped with six inputs and an intersperser to mix music and ads or other spot announcements. Both are available with Tape-Athon's extensive music library on a sale or lease basis.

MULTIPLEXING

Circle Number 152 on Reader Service Card

AUTOMATION

This low-cost Tape-Athon CHANNEL CASTER CAROUSEL allows any station to automate for a modest investment. The CCC is a two-tape transport system (expandable) with a cartridge Carousel unit that can be interspersed with the music. This allows local ads to be aired with news, weather, ID, or any other promo material. This complete program package is priced at only $4285.00 in mono, and $5285.00 in stereo.

AUTOMATION

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Tape-Athon Corp. 502 S. Isis Ave., Inglewood, Calif. 90301 • (213) 776-6933

Visit Tape-Athon at NAB—Booth 236

What you SAVE on Cohu's Color Film Camera can go toward updating more of your studio...

The 1500 will interface with your present optical multiplexer.

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SEE **COHU** AT NAB BOOTH 324

COHU ELECTRONICS, INC
SAN DIEGO DIVISION

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NAB Conventioneer '72 Has Buying List With Him

MOST EVERYBODY SAYS the economy is on the upturn. Most everybody definitely includes broadcasters. This means more broadcasters are going to the NAB Convention, April 9-12 (Conrad Hilton, Chicago), than last year. About 12 percent more, based on a sample survey by *BM/E*.

And, to the great pleasure of broadcast equipment distributors, attendees—owners, managers and engineers—are going to look seriously at specific items of equipment that they intend to buy before the year is out. Eighty-two percent will look at specific equipment and, of those, 89 percent have buying plans.

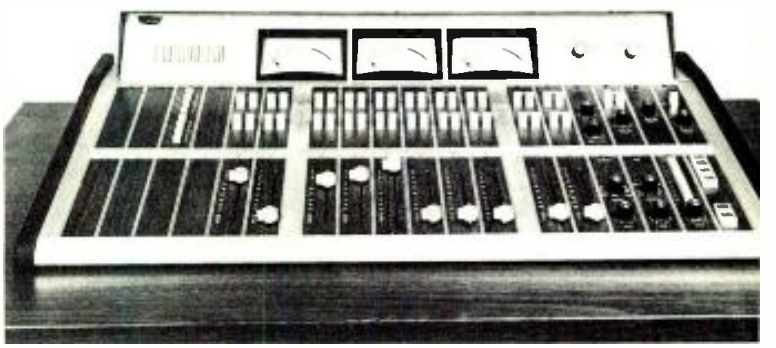
This strong interest in new equipment has been revealed by *BM/E's* "Panel of 100" survey made in late February. We polled two such panels (a random selection of our readers) and got a surprisingly heavy response—both in the number of replies (35 percent) and in the interest shown in new equipment. The purpose of the poll was to find out who was going to the NAB Convention and whether or not they had buying intentions. A brief recap of results follows.

A full 66 percent of our respondents intend to go to Chicago this year. That's about 12 percent more than the 54.5 percent that went last year. More specifically, 77 percent of our panel with TV interests are going; 54 percent of those only in radio. (Half of our respondents* represent radio stations only, and half TV or TV and radio.)

From the TV reader survey, eight out of ten managers will go, and two-thirds of all engineers—about 10 percent more than last year. It's the radio broadcasters who are going to turn out in greater numbers—managers, primarily. Last year only 30 percent of the managers polled went; this year 65 percent will.

In response to a key question—"Will you be looking at any specific new equipment?"—82 percent said "yes." Virtually everyone involved with TV is searching out specific items. Of those affiliated with radio, 69 percent have something definite in mind. Slightly over half are looking because of expansion plans; slightly under half are looking to replace existing gear.

Some of the radio equipment that needs to be replaced is providing marginal performance now,



Audio equipment will be of keen interest to both radio and TV broadcasters. Above is a new compact McCurdy SS 7500 stereo console. Below is the Gates Studioette 80, a four-channel mono console.

our panel said. But stations are looking for more than replacement. They are interested in new equipment that will lower operating costs.

Not very many attendees plan to actually buy on the convention floor—only nine percent will have purchase orders in hand. But 80 percent said they'd possibly buy later. Only three percent had no buying plans (these were radio stations, except for one TV station which said it was planning no major-expense purchases this year).

The average budget for TV stations represented by our panel for 1972 is $300,000 per station. For radio, the capital expense budget is slightly under $25,000.

Where will all the money go? The products of *greatest* interest to TV broadcasters are in order of write-in mention:

- new transmitters
- remote control gear for such transmitters
- cartridge VTRs
- color cameras
- audio consoles

* Actual breakdown of panel: TV (plus TV with radio interests) owners or managers, 10; chief engineers, 25; radio owners or managers, 20; chief engineers, 15.

Cartridge VTRs will be one of the hottest items at NAB. Ampex calls its ACR-25 a cassette unit.

Overall Interest in Radio Equipment

Product	Percent Interested
Tape recorders/players	95%
Consoles, mixers	60
Audio controls	57
Turntables	57
Audio processing equipment	55
Microphones	52
FM antennas	43
FM transmitters	40
Automation gear	40
Speakers	37
Modulation monitors	32
Frequency monitors	29
Remote pick-ups	25
Loggers, etc.	25
Transmission lines	23
AM transmitters	20
Towers	20

Overall Interest in TV Equipment

Product	Percent Interested
TV cameras	80%
VTRs	60
Character generators	50
Video switchers	50
Remote control gear	50
(Transmitter only)	43
Audio console	50
Enhancers	43
Film chains	43
Monitors	40
Automation	37
Lighting	37
Proc amps	28
Tape editors	25
Towers, trans. line	17

Highlights of the NAB Program

To celebrate the NAB's Golden Anniversary, the NAB Convention, Sunday, April 9th, through Wednesday, the 12th, has a full complement of management and engineering sessions. Speakers include U. S. Treasury Secretary John B. Connally (Monday), CBS Vice Chairman Frank Stanton (Tuesday), FCC Chairman Dean Burch (Wednesday), and NASA Administrator James C. Fletcher (Engineering Luncheon, Tuesday). A Distinguished Service Award goes to evangelist Billy Graham, and an Engineering Award to John Sherman, director of engineering of WCCO, Minneapolis.

A broadcaster who made the trip to Peking with President Nixon (name not announced at press time) will describe at the engineering conference luncheon on Monday how the TV job was done in China. At the engineering session that afternoon, an FCC/industry joint panel will field hot questions on government-industry relations. At Tuesday afternoon's engineering session, a panel on quadraphonic sound will bring together proponents of discrete and matrixed systems for a toe-to-toe slug-fest (and some demonstrations). In addition, the engineering sessions will include papers on a wide variety of subjects that reflect the current state of the art in radio and television.

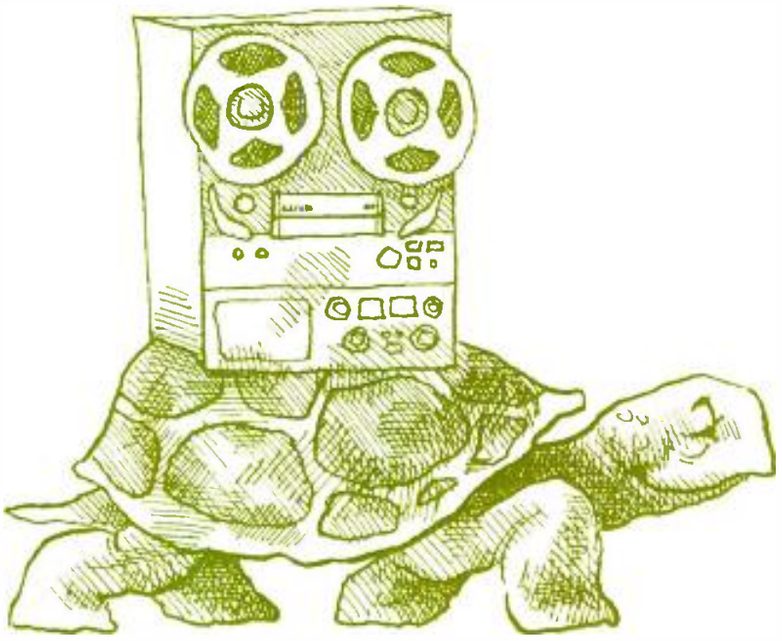
The National Association of FM Broadcasters has a four-day meet, April 6 thru 9, with an address by FCC Commissioner Robert T. Bartley at the Pioneers Breakfast, Sunday morning the 9th at 8:30 (all FM broadcasters invited), and a series of awards for FM stations' promotions.

Two other broadcasting associations will meet just preceding, or concurrent with, the NAB Convention. The Association of Maximum Service Telecasters has scheduled a series of meetings, including a Technical Committee meeting at 9:30 a.m. Sunday at the Sheraton-Blackstone Hotel, the annual Board of Directors meeting at 2:30 p.m. on Tuesday at the Conrad Hilton, and an Annual Membership meeting at 9:30 a.m. on Tuesday, also at the Hilton.

- video switchers
- film chains

Given a list of products, with instructions to check off product areas of specific interest, we find color cameras still to be of broadest interest. A whole new generation of cameras, such as the RCA TK-44-B, the Norelco PC 100 and the IVC 500, has appeared and engineers want them. VTRs come next. On a percentage basis, more engineers are interested in remote control equipment for transmitters than transmitters themselves—apparently some want to make the present transmitter do. Actually, most everything is of interest. Towers, for example, are of interest to 17 percent. A run-down of the number of TV broadcasters interested in selected items is tabulated.

Radio broadcasters are *most* interested in FM equipment in general—automation gear, transmitters and consoles. They are curious about what cassette players will be shown. From a breadth-of-interest point of view, just about everybody is interested in a tape recorder/player (95 percent). From a relative point of view, 40 percent are interested in automation gear and FM transmitters. Depth of interest in selected items of radio gear is shown in the table.



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If it goes on the air . . . get it on tape! And the best way to get it on tape, for the record, is with a Metrotech logger.

Slow? And how. Speeds of 5/16, 15/32, 15/16 or 1 7/8 . . . with frequency responses covering the voice spectrum. At 5/16 a 10½" reel of ½ mil tape will record over 300 hours. That's 12 days . . . unattended!

Sure? You bet. Every Metrotech logger combines advanced engineering with heavy-duty construction, assuring trouble-free operation and long life. Features — simple straight line threading, three motor drive, accessible. Solid State Electronics . . . to name just a few.

Extras? All you need or want. Choose single channel with automatic triple reverse; 2 channel with automatic reverse; or 4 channel, one direction. Remote controls, tape counters, voice operated relays . . . and a host of other options.

Why a Metrotech logger? For permanent record. Of scheduled or unrehearsed programming. Documentation of advertising exposure. Monitoring.

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NAB '72 Exhibits

Booth numbers are keyed by halls in Conrad Hilton Hotel. 100 Series—Exhibit Hall; 200 Series—West Exhibit Hall; 300 Series—Continental Room; 400 Series—North Exhibit Hall.
Our preview information was obtained from the manufacturers; some exhibitors are not listed because their booths were not confirmed at press time or they preferred to announce new products at the Convention itself.

ABTO Incorporated (Booth 401)
Gear that **color-encodes black-and-white film;** complete telecine chain to **convert the coded black-and-white to color.**

Addressograph Corp. (Booth 205)
Continuous total **copy system** for fast copies of logs, schedules, spots, scripts, etc.

Alford Manufacturing Co. (Booth 212)
Antennas for FM. TV, and ITFS; diplexers; coaxial switches; RF measuring equipment.

Amco Engineering Co. (Booth 422)
New styling concepts in modular instrument **consoles,** cabinets and enclosures; low silhouette broadcast consoles.

American Data Corporation (Booth 418)
Computer services for broadcasters and CATV systems.

American Electronic Laboratories, Inc. (Booth 242)
New 12 kw and 25 kw FM transmitters, the FM-12KD and FM-25KD, are the highlights, with automatic power output control, automatic filament voltage control, VSWR protection built in.

American Electronics, Inc. (Booth 402)

American Telephone and Telegraph Co., Long Lines Department (Booth 247)

Ampex Corporation (Normandy Lounge)
One of the featured units will be the ACR-25 broadcast **cassette videotape recorder/player,** with a capacity of up to 25 commercials or other spots, each running from 10 seconds to six minutes. For the first time in several years, all Ampex products will be in the same booth area: broadcast, CCTV, audio, magnetic tape, etc.

Andersen Laboratories, Inc. (Booth 405)
Video **delay lines;** studio processing equipment.

Angenieux Corp. of America (Booth 102)
Lenses for film and TV cameras.

Arriflex Corporation of America (Booth 318)
Full line of **16mm film cameras;** film sync audio recorder.

Ball Brothers Research Corp. (Booth 129)
New black-and-white and color **monitors,** in a variety of sizes.

Belar Electronics Laboratory, Inc. (Booth 239)
Shown will be the full line of type-approved AM. FM and TV frequency and modulation **monitors.**

Berkey-Colortran Inc. (Booth 123)
Lighting equipment in a wide variety of types; dimmer equipment at all power levels.

Bird Electronic Corp. (Booth 323)
Neither blower air nor water is needed to cool the new **5 kw load resistor** that will be on display. It was designed especially for remote and automated operations. with two transmitters on a combiner; in this service the Model 8785 Load can take reject load of TV transmitters to 33 kw power and FM to 20 kw power.

Borg-Warner Corp., Ingersoll Products Division (Booth 218)
Cabinets for broadcast gear.

Robert Bosch Corporation (Booth 304)
Fernseh TV studio **color cameras** and accessories.

Boston Insulated Wire and Cable Co. (Booth 243)
Wire and cable products for broadcasting and CATV.

Broadcast Computer Services (Booth 329)
Computer systems for traffic and accounting in broadcasting and CATV.

Broadcast Electronics Inc. (Booth 307)
Tape **cartridges, automatic playback systems, consoles,** audio **amplifiers.**

continued on page 24

New two-tone console from McMartin.

Portable stereo audio mixer from Television Equipment Associates has 16 channels.

Aristocart cartridge from IGM for stereo use.

Nets agreed on Norelco for China coverage

Norelco cameras were deployed exclusively.

ABC provided 2 PC-70's 1 portable

CBS provided 4 PC-70's 1 portable

NBC provided 3 PC-70's 1 portable

"Technical quality of coverage was excellent."

Television Digest, February 28, 1972

Norelco
PHILIPS BROADCAST EQUIPMENT CORP.
A NORTH AMERICAN PHILIPS COMPANY

See the Norelco First Family of color cameras at the NAB

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NAB '72

Broadcast Data Base (Booth 423)

Broadcast Facsimile Network Inc. (Booth 342)
Facsimile receivers and transreceivers; the Selectafax system for transmission of facsimile material by broadcast stations and CATV systems on a subcarrier.

New "printa" sign from Reynolds


Self-cooling RF load from Bird

Broadcast Products Inc. (Booth 230)
Complete **broadcast automation systems,** tape recorders, time and logging instruments.

CBS Laboratories (Booth 303)
New FM **Volumax,** with positive peak control combined with flat high frequency response; Mark III **image intensifier;** new **distribution amplifier** with 16 outputs; **Vidifont** titling unit.

CCA Electronics Corp. (Booth 234)
New for 1972 is a complete line of solid-state **remote pickups** and **STL** equipment, AM **monitoring equipment, remote control,** audio **consoles, cartridge** equipment; also automatic **loggers, network joiners, electronic clocks.** Also shown will be representative AM and FM broadcast **transmitters**—1 kw, 5 kw, and 25 kw AM. and 3 kw, 10 kw and 25 kw FM.

Camex Corp. (Booth 406)

Central Dynamics Corporation (Booth 322)
Automation devices; video **switchers; VTR editing** systems; Marconi **test** gear.

Century Strand Inc. (Booth 120)
Lights, lighting **controls,** accessories.

Chrono-Log Corp. (Booth 229)
TV automated **switching units; digital** video **clock** for putting time display on existing monitors.

Cohu Electronics Inc. (Booth 324)
Featured will be the new Model 1500 broadcast color **film camera;** the Model 2830 monochrome **studio camera.** Included among a wide variety of terminal equipment will be the new 9501 **Mini-Switcher** for video. Also, color sync generators, film chains, etc.

Collins Radio Company (Booth 214)
FM **transmitters,** AM transmitters, **automated systems** for programming control; equipment for **audio control.**

Colorado Video Inc. (Booth 336)
Narrow-band TV equipment; video test equipment.

Coltape Div. of Columbia Pictures Inc. (Booth 411)
Fuji videotape.

Commercial Electronics, Inc. (Booth 103)
Color TV cameras, including a two-tuber.

Compu-Net Inc. (Booth 309)

Conrac Corporation (Booth 105)
TV **monitors,** all sizes, black-and-white and color.

Continental Electronics Mfg. Co. (Booth 200)
High power AM broadcast **transmitters.**

Cox Data Systems Inc. (Booth 410)
Computer services for broadcasters and CATV systems.

Data Communications Corp. (Booth 421)

Datatron, Inc. (Booth 408)
Videotape-editing equipment.

Delta Electronics Inc. (Booth 208)
Shown will be the "Trio" for **monitoring on-the-air operating impedance of transmission lines:** the Model OIB-1 impedance bridge, the CPB-1 common-point bridge; and the RG-1 receiver/generator.

Dynair Electronics, Inc. (Booth 217)
Switching and distribution equipment for broadband signals; bandwidths to 100 MHz; systems assembled with standard logic cards. New **demodulators** will be on display, including Dynatune II, and units with provision for remote control.

Eastman Kodak Company (Booth 108)
The "Kodak Videofilm Express"—a complete telecine-film processing chain, with processor in van outside the hotel—will take interviews of visitors at the booth and replay them on monitors in booth after processing.

Effective Communications Systems Inc. (Booth 316)

Electronics, Missiles and Communications (Booth 314)
TV **translators** and transmitters; 2500 MHz equipment.

Fairchild Sound Equipment Corp. (Booth 315)
Introduced at the show will be a pioneering group of extra-reliable **integrated control modules (FICBM)** for broadcasting, with op-amps, integrated circuits, and do-it-yourself kits for those who like to do their own wiring. In addition, there will be self-powered "black boxes"—plug-in preamplifiers, tone generator, and automation filter. Also—complete new line of "Integra III" IC components, with a console built using them. Another new item is a plastic fader with splash-proofing.

continued on page 26

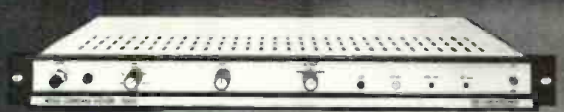
A Chroma Keyer for Composite Signals?

Impossible!

CBS Laboratories did it. Developed the first practical Chroma Keyer for composite signal. Now, with the new NTSC Chroma Keyer you can: Key from a composite color video signal. Record on video tape and play back for post-production editing and keying. And tape talent when convenient and later key in the background material. Now, key your newsman over a network feed without that color-edge crawl.

Keys at the output of the composite program switcher and requires no separate RGB switchers.

Edges are sharper and clearer because the CBS Laboratories Chroma Keyer eliminates color-edge crawl. The NTSC Chroma Keyer is a production tool that will save you time, save you money . . . and open up a whole new realm of programming possibilities. To discuss your station's requirements, call (203) 327-2000 or write:



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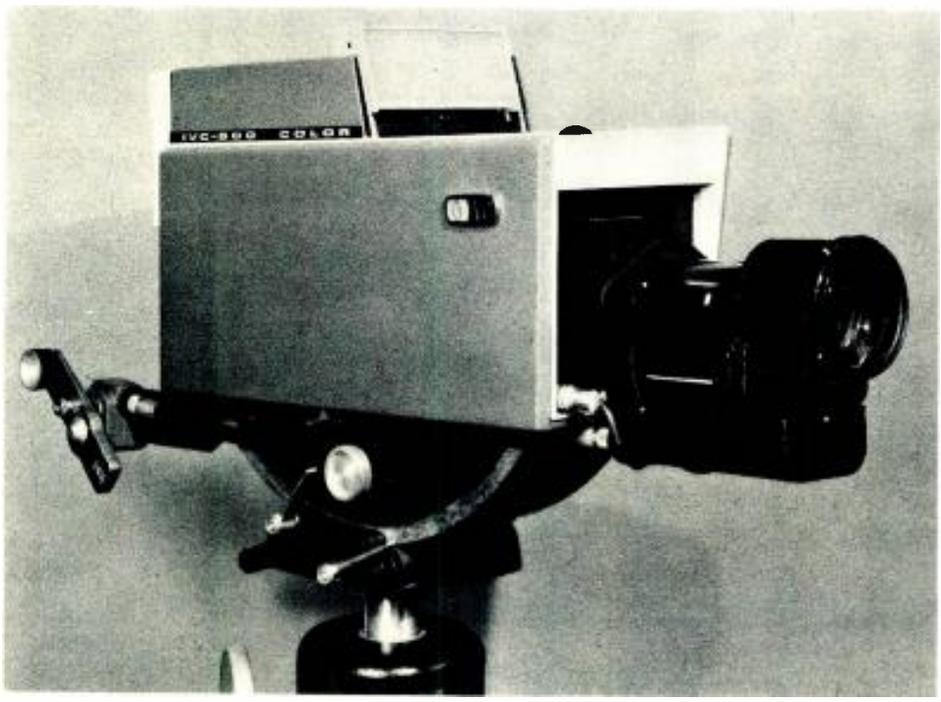
A division of Columbia Broadcasting System, Inc.
227 High Ridge Road, Stamford, Connecticut 06905

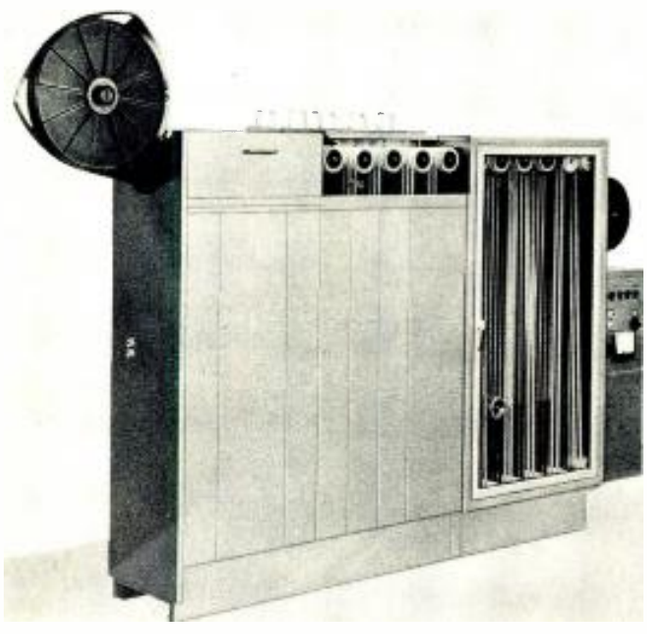
Circle 114 on Reader Service Card

CBS character generator console for Vidifont



Silicon diode vidicon color camera from IVC

Three-step full reversal film processor from Technology Inc.



Fidelipac Div. of TelePro Industries (Booth 411)
Tape **cartridges** and cartridge systems for broadcasters and CATV operators.

Filmline Corp. (Booth 126)
Film processing.

Imero Fiorentino Associates (Booth 114)
Studio lights and **lighting** design.

Fort Worth Tower Co., Inc. (Booth 327)
Antenna towers for CATV and broadcasting systems, all sizes.

GTE Sylvania Inc. (Booth 335)
TV studio lighting with tungsten halogen lamps.

Gates Radio Co. (Booth 221)
The Studioette has been updated: its successor, the Studioette 80, is a new **four-channel monaural audio control console,** handling 13 inputs. It is 24 inches wide, has adequate switching facilities for medium and smaller stations; or it can be used as a production console or second-studio console in large stations. Also to be shown: A new 50kw medium-wave AM broadcast transmitter using patented "pulse duration" modulations; Compact Criterion **tape cartridge playback;** complete line of **FM transmitters,** from 10 watts to 40 kw; Criterion 80 cartridge system; line of circularly polarized FM antennas; and other broadcast products.

General Electric Co. (Booth 101)
Color **film cameras** for TV, complete **automation** systems, video switchers.

Grass Valley Group, Inc. (Booth 115)
Complete TV **automation system; video switching** and processing equipment; **sync generators;** special **effects generators;** other TV line and terminal equipment.

Gray Research (Booth 228)
Tone arms, turntables, preamplifiers, audio **equalizers,** studio furniture.

Harwald Company (Booth 237)
Film processing equipment.

Innovative Television Equipment Inc. (Booth 337)
Camera **pedestals** and other accessories.

International Good Music, Inc. (Booth 246)
A first for IGM will be the new

continued on page 28

western union

Telegram

IPM220J NYK

AT 075YY528355 03/15/72 07:02P EST
FROM: IPM220J NYK
ICS IPM220J

CAROLE KING AND LOU ADLER
ODE RECORDS LA CALIF

DEAR CAROLE AND LOU

CONGRATULATIONS ON FANTASTIC SWEEP OF GRAMMY AWARDS. EVERYONE HERE AT SANSUI EXCITED AND VERY PROUD THAT YOU HAVE CHOSEN THE SANSUI SYSTEM OF FOUR CHANNEL SOUND REPRODUCTION FOR YOUR FOUR-CHANNEL RECORDS. ON BEHALF OF ENTIRE SANSUI STAFF HERE ARE MY BEST WISHES FOR YOUR CONTINUED GOOD HEALTH AND SUCCESS.

H TADA VP SANSUI ELECTRONICS CORP WOODSIDE NY

IPM220J NYK

SF-1201 (R5-69)

NAB '72

"Aristocart" **tape cassette system** with reduced wow and flutter, steadier phase. Also to be shown are complete working audio control and programming systems, for stations from smallest to largest markets. In addition, IGM will audition its music formats in the music audition area on the third floor of the Essex Inn.

International Microwave Corp. (Booth 407)
Microwave transmission systems for remote programming and **STL's;** microwave transmission of programs for network distribution.

International Tapetronics Corp. (Booth 203)
Totally new is a broadcast-oriented cassette system, with design features that allow system to perform most of functions of a reel-to-reel system with automatic cueing as found in cartridge equipment. The complete line of single and multiple deck cartridge units will be on display.

International Video Corp. (Booth 238)
For the first time, IVC will show electronic editing through the time base on the IVC-900 **videotape machine.** Other firsts are: the IVC 500A **camera,** an upgraded version of the IVC-500 color camera with silicon diode tube in the red channel; and the IVC-240, a completely redesigned **film chain.**

Jamieson Film Co. (Booth 328)
Film processing equipment.

Jampro Antenna Co. (Booth 225)
"Penetrator" **circularly polarized FM antennas,** and "Performer" elliptically polarized antennas, are highlights of the exhibit.

Jerrold Electronics Corp., CATV Systems Division (Booth 320)
A wide variety of CATV line and terminal equipment; complete CATV systems.

Johnson Electronics Inc. (Booth 240)
SCA receivers, tuners, amplifiers, field strength **meters,** multiplex demonstrators.

Kliegl Bros. (Booth 111)
Studio lights; complete lighting systems; lighting controls.

LPB Incorporated (Booth 412)
Audio **consoles,** audio signal **processors,** low-power AM broadcast

continued on page 30

NAB '72

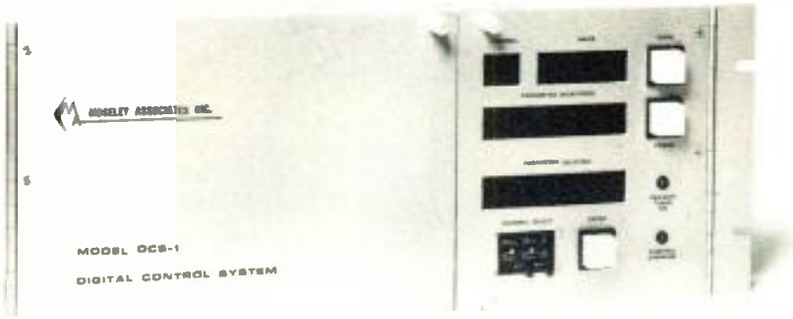
transmitters, including "carrier current" transmitters.

Listec Television Equipment Corp. (Booth 312)
New items will be: Mark V **cam head** for TV cameras; **new remote control equipment** for TV cameras. Also: Vinten camera mountings and accessories.

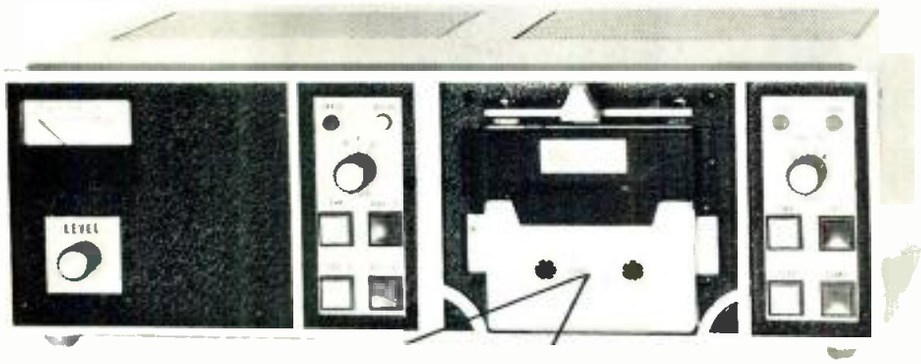
Marconi Electronics Incorporated (Booth 306)
Automatic color cameras, color film chains, high-power TV transmitters, UHF and VHF; test equipment.

Marti Electronics, Inc. (Booth 222)
Remote control and telemetry equipment; aural STL's; automatic digital **logging systems;** audio **amplifiers** and processing equipment.

McCurdy Radio Industries Inc. (Booth 310)
Radio broadcast, TV and ETV audio equipment; mono and stereo consoles; TV consoles; **audio switchers, amplifiers,** accessories.



Digital remote control unit from Moseley.



Audio cassette players are of interest as cost-saving equipment. Here's International Tapetronics'.

Rohde & Schwarz gain and delay test set has been modified for 12.5T pulse.

McMartin Industries, Inc. (Booth 232)
An emphasis on plug-in modules for flexibility and serviceability and a "new look"—beige panels with wood trim—characterize the exhibit. Equipment highlight is the "Console Corner" with new B-500 Series **five-channel production console,** and with B-800 Series **eight-channel consoles** introduced last year. Also: TBM-3700 **combination FM frequency and modulation monitors,** with self-calibration; and the TBM-1000B **relay receiver.** In addition, there will be a representative showing of other RF and audio units, including mixers, RF amplifiers, etc.

Memorex Corp. (Booth 305)
Chroma 90 quadruplex videotape; full line of other video and helical scan tapes; the CMX computer-assisted video editing system.

Microwave Associates Inc. (Booth 117)
New in the line is the PA-220 **20-watt RF power amplifier** for TV relay requirements of broadcasters. It operates in the 1.9 to 2.1 GHz range, and is designed to be driven by a 2-watt transmitter as exciter.

Mohawk Wire and Cable Corp., (Booth 403)
Wire and cable for broadcasting and CATV.

Mole-Richardson Co. (Booth 326)
Quartz studio **lights,** up to 10 kw; **stands,** accessories etc.

Moseley Associates Inc. (Booth 224)
A new **digital system for remote control of TV broadcast transmitters,** the "D" Series, will be unveiled. It uses BCD digital techniques and is fully integrated. In addition, Moseley will show aural STL's, automatic **logging equipment, remote pickup** equipment, and other items.

Nagra Magnetic Recorders, Inc. (Booth 406)
Professional portable and miniature **audio recorders.**

North American Philips Co. (Booth 334)
AKG **microphones;** Philips turntables and disc **pickup cartridges.**

Nortronics Company, Inc., (Booth 340)
Magnetic **recording heads** and accessories; maintenance equipment for video and audio recorders.

Paillard Inc. (Booth 330)
Bolex Pro-16 **camera,** fully automated for single and double sound

continued on page 35

RCA

PRIME TIME

Can you afford the future?

Things are moving so fast in this business that buying tomorrow's equipment today is not just a matter of good business—it is a matter of survival. You can't buy equipment just to use today without the likelihood of problems tomorrow. But what is tomorrow's equipment?

Last year, RCA began an extensive survey of present needs and future trends in the broadcast business. The survey was conducted by several teams of specialists, interviewing over 150 stations, spotting trends and discussing how these stations could best take advantage of recent equipment developments.

The first real results of this research are being shown at this year's NAB show.

Profit now, profit later

We found ways in which stations could prepare for the future while making considerable savings right now. The TCR-100 Cartridge Tape Recorder, for example, does exactly that. It is one of many "future compatible" pieces of equipment RCA is showing at an exhibit called "Tomorrow Systems Today", at NAB.

There are four areas of focus, tape, film, the studio, and transmitters. In each, products are available today that are designed to fit into master systems of the future. This kind of planning allows broadcasters maximum flexibility. Profitable improvements can be made now, with minimum risk of obsolescence.

The future of tape

Increasing use of tape in TV broadcasting and the trend to shorter commercial segments called for a more reliable and efficient means of on-air presentation. The TCR-100 Cartridge Tape System copes with these operational realities. Cost effective studies by RCA have shown savings in excess of $33,000 a year over reel-to-reel machines of comparable quality.

The TCR-100 is the first step in the area of a totally automated interactive system. It can be programmed to cue up or be cued by reel-to-reel equipment, film projectors and other remote sources. In short, the TCR-100 permits maximum utilization of manpower and equipment.

The studio of tomorrow

Another trend is automation of camera operation. The latest improvements and accessories for the RCA TK-44B bring it a step closer to hands-off operation. It will be shown this year with automatic iris, automatic white and black balance features. All in all, it will demonstrate better quality with less reliance on manual operation.

Tomorrow's transmitter today

In transmitters, there are a number of new developments. RCA will be showing, for the first time, the TT-50FH parallel highband transmitter with stable, solid-state circuitry for enhancing reliability.

RCA also invites you to take a look at computer control for TV transmitters. You will see automation by computer of routine functions with emphasis on monitoring by video data display, logging, and fast correction of certain malfunctions. This advance in technology permits much more efficient remote control of transmitter operation.

The future of film

For the TV station that shows a lot of film, RCA is introducing a new TK-28 Film Camera. It is available with either vidicon or lead-oxide tubes and includes automatic control of white and black level plus preselectable color correction. It brings to film operations the same order of quality, circuit simplicity and hands-off operation that the TK-44B provides in the studio.

RCA's exhibit at this year's NAB reflects a concern with the evolution towards new methods of station management. For every major area of station operation RCA will be showing equipment compatible for the future, that offer a potential for immediate savings. This gives broadcasters opportunities for cost effective operation right now without fear of obsolescence as part of an integrated plan for future growth. We'll be happy to discuss it with you at the RCA exhibit. The future begins today.

Circle 180 on Reader Service Card

SPECIAL NAB PREVIEW

View of tomorrow...ala "Cart"

Visitors to the RCA exhibit will witness an on-the-spot documentary describing station experiences with the TCR-100 Cartridge Tape Recorder. In a video tape report, several users tell how they employ the "Cart" machine, how it solves their present problems, and what potential they see for the future.

The Problems of Today

Reports from more than fifteen stations who have installed the TCR-100 reveal many similar experiences. They speak of the growing number of tape commercials and shorter segments, the pressures of production, and spot reel preparation. They talk cost savings, manpower requirements, freeing up two, three or four reel-to-reel machines for production. They examine reliability, operations and maintenance. And they come to a common conclusion: They couldn't get along without their "Cart" machine.

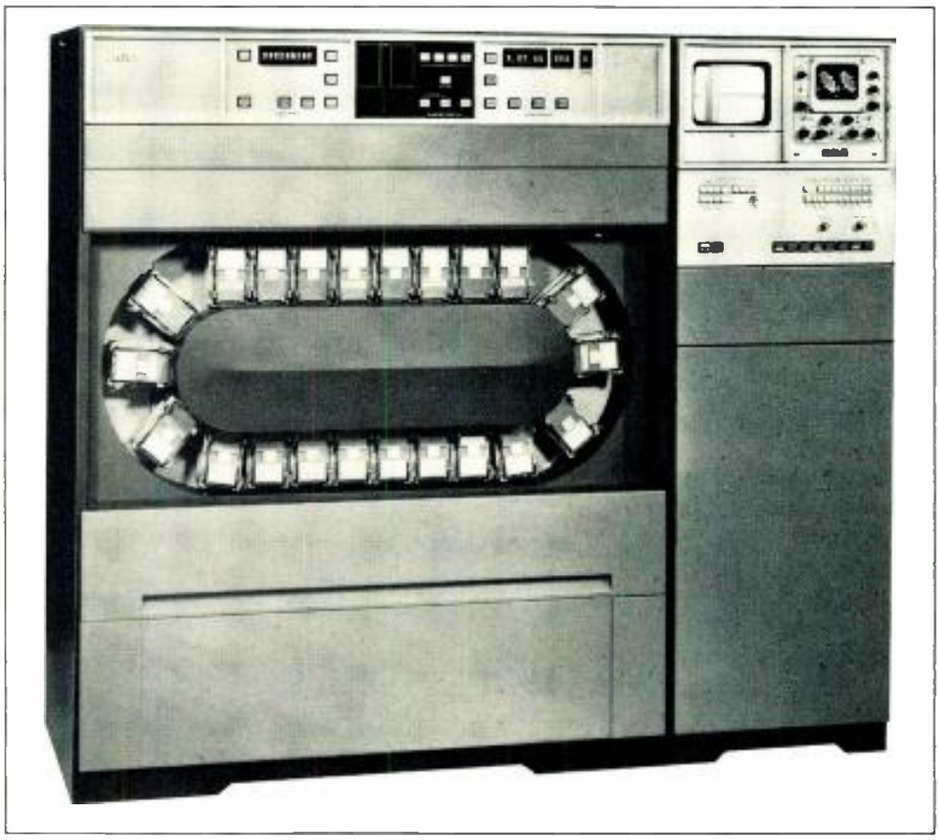
The Possibilities of Tomorrow

What of the future? Most TCR-100 users see the "Cart" machine as a step-by-step evolvement to automation. Initially, it permits all tapes in a single break to be grouped and played in automatic sequence. Another step utilizes its ability to cue and be cued by other picture sources —film projectors, reel-to-reel recorders, and other remote feeds. This can result in an automatic station break or an automatic programming segment, such as the late night movie. Finally, they see the "Cart" machine as a part of a totally automated system to play tapes on call—with the advantage of easy up-to-air changes.

Two for the Show...

Two TCR-100's will be demonstrated in the exhibit. The first will carry the user experiences. A second will be turned over to visitors for hands-on operation and evaluation. Also highlighted will be a number of new cartridge accessories—including the RCA reloadable cart, an electronic editor, and an electronic program identification system (EPIS). The editor provides programmable edit points at one frame intervals and is designed for simplified update of cartridge commercials. The EPIS accessory records an 8-character alphanumeric code on the cart's cue channel following the start of message cue. Readout of the identification code of carts in both decks is presented on the machine's monitor. A built-in computer terminal output offers further verification possibilities.

Demonstration of latest improvements in RCA reel-to-reel recorders —TR-70C and TR-60A—complete the presentation of Tomorrow Tape Systems.



Circle 181 on Reader Service Card

Tomorrow's transmitters today: computers, solid-state, remote operation.

Computers

RCA will be demonstrating the use of a mini-computer for remote control of TV transmitters and for automation of certain critical functions.

The computer has three basic applications. It can monitor and record. It can effect certain controls and it can make certain decisions.

All of the transmitter logging now required by the FCC can be done with the computer. It can also maintain surveillance of a variety of functions for constant evaluation and future analysis. Using high-speed binary data transmission, more information can be displayed at the remote location than by any conventional remote control system.

While modern TV transmitters are extremely stable and self-sufficient, a computer can provide automatic checks on performance and further increase reliability. As an example, a computer can compute efficiency and print out a warning when it detects a fall-off in tube performance. Also, information on transmit-

(continued from page 2)

ter overloads can be stored and analyzed to spot potential trouble.

A computer can actually perform some functions more effectively than a human operator. It can constantly compute VSWR on the output transmission line and raise a warning flag if a predetermined limit is exceeded.

Can a computer make decisions? In a sense, yes. It can sense certain malfunctions and make predetermined corrective adjustments. It can determine whether to switch to a standby power generator—or whether to shut down the whole transmitter. And it can trigger alarms when something is wrong.

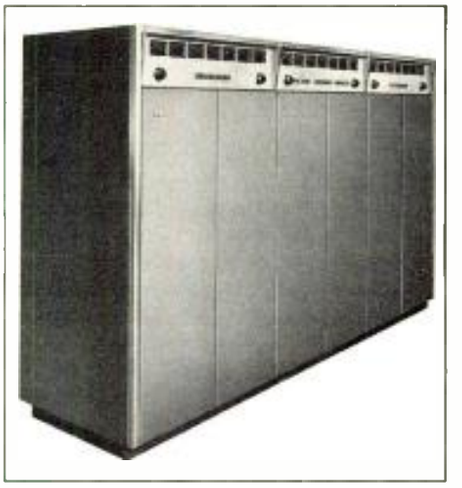
The computer system shown at RCA's NAB exhibit will use a Video Data Terminal, a printer for automatic logging and a mini-computer.

Solid-State and Remote Operation Made Simple

The TT-50FH parallel highband transmitters are the most completely solid-state VHF color TV transmitters ever made. With solid-state diode modulation at carrier frequency, and only two tuned visual amplifier stages, there isn't much tuning to do. The control logic is also solid-state. There are only 6 tubes in the TT-50FH, and only two tube types.

Highband VHF stations requiring 25 kilowatts of transmitter power or less will be interested in the "alternate main" mode of operation of the TT-50FH transmitter. In this mode, either 25 kW transmitter is used to deliver full visual and aural power to the antenna while the other remains available as an identical standby unit with full power capability. Each 25 kW transmitter is actually smaller than the driver alone of previous generation transmitters, so two complete transmitters will usually fit into the space now occupied by one. Switching between transmitters can be controlled remotely with but a few seconds to turn on the standby for full power operation. The result is the ultimate in transmitter on-air reliability.

That's tomorrow's transmitters, today. Since many RCA transmitters actually run 20 years, it had better be.



Circle 182 on Reader Service Card

Telecine for tomorrow...new quality and flexibility

This year RCA is announcing a new generation of telecine equipment keyed to the needs of tomorrow's film operations.

Hands Off Color Film Cameras

A new color film camera, the TK-28, brings to film a new order of circuit simplicity and automatic handling of film quality. It's the kind of performance previously associated only with live cameras of the quality of the TK-44.

The TK-28 is a three-tube camera with precision prism optics. It is available for use with either three vidicon or three lead-oxide tubes.

A new pre-selectable "Chromacomp", RCA's system of color masking, enables correction of everyday vagaries in film quality. It can give a boost to low saturation color films, compensate for different film stocks, and correct color errors that may be present in incoming film. As with live cameras, "Chromacomp" correction is achieved without degrading gray scale. In addition, master gamma circuits in the TK-28 are switchable for further instantaneous correction of poor quality films.

Circle 183 on Reader Service Card

Automatic control of white level is accomplished by an internal neutral density filter wheel. This new system acts instantly—correcting as much as a 2 to 1 change in light level in about one-tenth of a second. Automatic black level is also included.

At the exhibit RCA will demonstrate both vidicon and lead-oxide tube versions of this new camera, along with all of its automatic features.

New Multiplexer for 4-in, 2-out Systems

A new TP-55B Multiplexer will open new possibilities for space saving cost effective telecine systems of the future. It permits multiple systems configurations from a very simple one-projector, one-color camera system all the way through an interactive four-projector, two color camera island. In addition solid-state logic in multiplexer control makes readily adaptable to future automation plans.

Medium Cost Color Film Camera

RCA will also be showing a medium priced color film camera, the TK-610A. It is a middle priced companion to the new TK-630 live color camera and forms a broadcast quality package for limited budget installations.

The TK-610 features automatic control of both white and black level. It also includes many servicing features, such as deflection yokes which allow replacement of tubes without realignment. It is now being offered for use in both PAL and PAL-M television systems as well as NTSC.

TK-28

RCA PRIME TIME

Tomorrow's studio–better pictures with less work

The big news for tomorrow's studio is the TK-44B with still more features for 1972. RCA will be demonstrating new techniques for automatic iris, automated white balance and for black balance which sets itself every time you cap the lens.

These new techniques make this camera easier than ever to set up and operate. For instance by focusing the camera on a standard white portion of a scene and pushing a button, white balance is automatically set up in a matter of seconds. This means that variations in color temperature from scene to scene need no longer result in shifting fleshtones. Add automatic black balance plus automatic iris to ride video level without the assistance of an operator, and the TK-44B comes closer than ever to the automated camera of the future, where finest quality pictures can be produced with little or no technical manipulation.

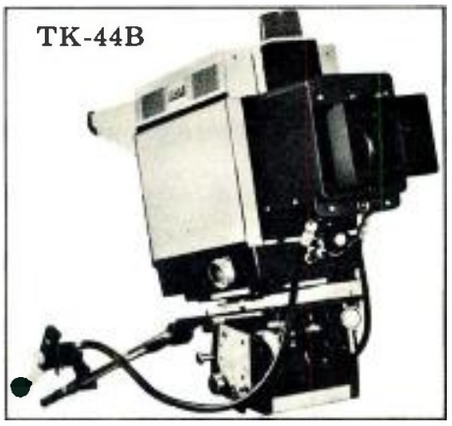
The TK-44 Color Camera has always been a dynamic design. It was originally conceived to keep pace with the state of the art even as the state of the art moves forward.

In 1969 RCA introduced the original TK-44A.

In 1970, a new colorplexer, miniature camera cable and new equalizer were introduced along with improved camera cable and a joystick control panel, which permits one video operator to handle as many as six cameras.

The news in 1971 was the extended sensitivity mode which included bias light to reduce lag and RGB coring to minimize noise. Also added were a scene contrast compression system to bring out overall picture detail in extremely high contrast scenes, and a dynamic resolution accessory for high definition pictures with stop action recordings and moving chroma-key effects.

Today's TK-44B benefits from all the above plus the new automated additions.


TK-44B

In the NAB "studio of tomorrow" one of the TK-44B's will be shown with a new shot box setup, where a number of shots can be preset automatically. For standard situations, like newscasts, this can automate camera movements—pan, tilt, zoom, as well as raising and lowering the pedestal.

New "Middle Priced" Color Camera

Along with the latest TK-44B and its accessories, RCA is showing for the first time an all new medium priced color camera—the TK-630. Priced in the "less than $40,000" range, it includes many of the distinctive qualities that have made the TK-44 one of the standards of the industry. The blend of these qualities along with new design ideas results in a color camera capable of producing quality broadcast pictures at moderate cost.

The TK-630 uses three 25mm, separate mesh, lead-oxide pickup tubes with extended red channel performance. A unitized dichroic prism


TK-630

completes the optical system. The camera, camera processor, encoder, horizontal and vertical image enhancer, automatic color corrector are of one integrated system design—all from one manufacturer.

Other prominent design features include automatic control of white-pulse-gain stabilization and zero-delay pulse timing, subtractive registration, a 6-position optical filter wheel, removable-remotable viewfinder, and an optional "Chroma-comp" color masker for color correction without affecting gray scale.

The TK-630 is truly outstanding in terms of performance per dollar.

Circle 184 on Reader Service Card

Talk to us at NAB about "Future Compatible" broadcast equipment...
Tomorrow Systems Today

RCA PRIME TIME

filming; EBM 16mm camera for 60-Hz sync, crystal sync; a variety of Super 8 cameras and projectors, silent and sound.

Pentagon Industries, Inc., (Booth 415)

Phelps Dodge Communications Corp. (Booth 122)
Coaxial **cable** and accessories; special gear for broadcasters.

Philips Broadcast Equipment Corp. (Booth 325)
Complete line of Norelco **TV cameras,** PC-72; new telecine **chains;** TV transmitters; wide variety of audio gear.

Potomac Instruments, Inc. (Booth 209)
Shown will be the full line of **antenna monitors, phase monitors, digital adapters;** resolution to 0.1% current ratio and 0.1% phase angle, without modulation effects.

Power-Optics, Inc., (Booth 424)
Remote control of TV cameras, and auxiliary equipment; servo control of broadcast lenses.

QRK Electronic Products (Booth 235)
Tape **cartridge systems;** Rek-o-kut continuously-variable speed and other turntables; tone arms.

Q-TV Sales and Dist. Corp. (Booth 116)
"Q" prompter systems, video and cartridge; crawl systems; prompter accessories.

Quick-Set, Inc., (Booth 211)
Camera **pedestals, dollies,** wall and ceiling mounts; **tilting** heads, cam-link heads, special-purpose mounts.

RCA/Communications Systems Division (Booth 100)
Among the new items: an improved TCR-100 tape **cartridge** system, shown in hands-on set-up for visitor operation; new **film camera,** PK-28, three-tube, with choice of Vidicons or Plumbicons; new TV **studio camera,** TK-44B; and a complete computer-controlled **remote-control** system, set up for simulated operation. Also: TV transmitters, audio gear, microwave relay equipment, TV antennas and transmission lines.

RCA Electronic Components, (Booth 119)
Power tubes, klystrons, vistacons, vid-
continued on page 72

Spotmaster

SNEAK PREVIEW!

We're unveiling the most exciting family of new products in Spotmaster history at NAB. Console yourself . . . it won't be long now!

$50.00 OFF

Ask about special $50.00 Discount Certificates. They're good for a limited time on all Spotmaster cartridge units and systems.

'Round and 'round they go . . .

Don't Miss Spotmaster's TURNTABLE TRIO

- Studio Pro B Turntable
- Stereo BE-402 Tonearm
- TT-22 Turntable Preamp

Announcing the Big Spotmaster/NAB Giveaway!

FREE ten/70 CARTRIDGE TAPE EQUIPMENT

April 9—Ten/70 Stereo Record-Playback
April 10—Ten/70 Mono Record-Playback
April 11—Ten/70 Mono Playback
April 12—TT-22 Turntable Preamp

Come to Booth 307, Continental Room, during NAB and register daily for the big Spotmaster giveaway. It's a great opportunity to win our top line tape cartridge equipment . . . a value of more than $3,200! **Only NAB members are eligible.**

Then see the entire 1972 Spotmaster line, including our new "Mini-Giant" multiple cartridge players that let you mix and match 3, 5, 6, 9, 10 and 15 decks in one expandable package.

Single cartridge machines on display will range from our low-cost 400 series (starting at just $440) and classic 500C series . . . to the incomparable Ten/70. See them all—mono, stereo, delayed programming, compact and rack-mount models.

SEE YOU AT NAB!

Booth 307, Continental Room

Introducing

The Spotmaster/Revox A77 Mark III-B, a new reel-to-reel stereo tape deck with broadcast quality performance and dependability, all the features you want . . . and a budget-pleasing price!

EARLY BIRD SPECIAL

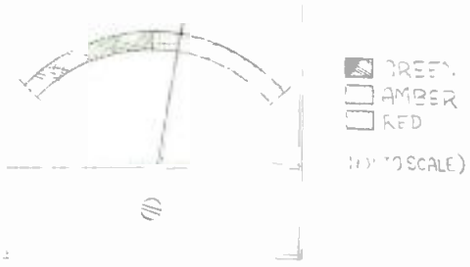
Limited quantities of special commemorative coin struck for the 50th anniversary of broadcasting—now a collector's item—will be available at the booth on a first-come basis. Ask for yours.

BROADCAST ELECTRONICS, INC.

A Filmways Company

8810 Brookville Road, Silver Spring, Maryland 20910 • (301) 588-4983

Audio File: Compressors, Consoles and Operators



by Eric Small

The VU meter is the most maligned instrument in audio, but it continues to be used as the unchallenged arbiter of levels at most broadcast facilities. The modulation monitor does get an occasional glance, and the peak flash light stands guard to warn of overmodulation, but the man with his hand on the attenuator is still staring (hopefully) at the VU meter. I doubt if a complimentary article about the VU meter has been written since the 1930's. It was designed to monitor the level of program transmission circuits—period. A VU meter is not a loudness indicator, nor do its readings bear much relation to peak modulation for either AM or FM.

The VU meter is vulnerable to criticism because its indications have to be interpreted subjectively. Giving an operator instructions like "peak music at 0 VU and speech at —3" is absurd, especially in a rock format. What part of the music should peak at 0 VU? The loudest part? How do you find what the level of the loudest part will be? Can the meter be permitted "occasional" peaks into the red? The pre-emphasis curve makes the VU meter even less useful in FM. A high note that hardly moves the meter can overmodulate. A VU meter jumps around a lot and an operator, especially if he's a combo man, does not have time to pay much attention to a wildly dancing meter that he doesn't know how to interpret anyway. The final blow to the VU meter as an operating tool in broadcasting comes when it is used in the compressor limiter system. A few minutes spent watching a modulation monitor alongside the console VU will convince anyone that it doesn't matter one iota whether the VU meter peaks at —3 or 0. Neither reading will have the slightest effect on what comes out of the transmitter. The compressor wipes out all such small variations.

A rock station using a modern compressor, such as the Audimax, must ask some fundamental questions about what output levels are desired from the console. Can changing the console attenuator settings over the "normal" operating range affect modulation? If modulation could be affected, would it be desirable to do so? What causes the kind of distortion that is most audible on the air?

If the station compressor is one of the sophisticated broadcast types, and if it is properly adjusted, changing its input level (the console output) slowly over a range of 20dB will have little effect on the modulation. If the level change is made abruptly it will be heard, but the compressor will, depending on its time constants, restore original level. Most rock stations desire to maintain the highest average percentage modulation possible without overmodulating or creating excessive distortion. That is why the compressor and peak controller were installed in the first place. The only way levels could be adjusted and have any effect on modulation would be to locate attenuators after the compressor. And the only direction that adjustment could be made would be downward. I have always felt, based on a lot of radio listening, that the most noticeable kind of distortion comes from beating the daylights out of the compressor and peak controller. The common causes seem to be improper adjustment of the processing equipment and/or grossly improper levels out of the console because of operator inattention. It bears repeating that in a system employing a sophisticated compressor, the operator has no control over average levels. The balance between announce and music can be controlled, but not the absolute level.

Proper adjustment of compressors and limiters could be the subject of an entire article. Hopefully the topic has been covered in the manufacturer's manual.

A very satisfactory means for insuring that the audio delivered to the compressor is always within the device's operating range is to monitor the gain control-voltage of the compressor instead of the audio voltage coming out of the console. The "level indicator" used is a large blank faced milliammeter with bands of color instead of a conventional scale. It is operated in series with the gain meter of the Audimax and has the same full scale deflection sensitivity. The scale area corresponding to approximately 2 to 10 dB of gain reduction is green, with from 2 dB of reduction to 10 dB of enhancement colored amber. The remaining areas are red. The operators are instructed to keep the meter swinging in the green, with any errors to be in the amber area. The results of this approach have been gratifying. Levels have been much more consistent and there have been far fewer incidents of compressor overload. The limiter is much better behaved now, since the levels it receives are more tightly controlled.

Some initial resistance to using the meter was expressed by a few of the operators because the needle deflected toward the left for an increase in level. The meter action could be reversed by using a DC amplifier operated as an inverter. At WOR-FM we felt this was an unnecessary complication. After a few weeks of operation (with the console VU meters disconnected) everyone became accustomed to the reverse action.

For a contemporary format station, I have found the compressor control voltage meter an excellent replacement for the console VU meter. It more realistically indicates the desired operating goals and is easier for operators to interpret. It should be equally effective in AM and FM operations. **BM/E**

Mr. Small is chief engineer, WOR-FM, New York, N.Y.

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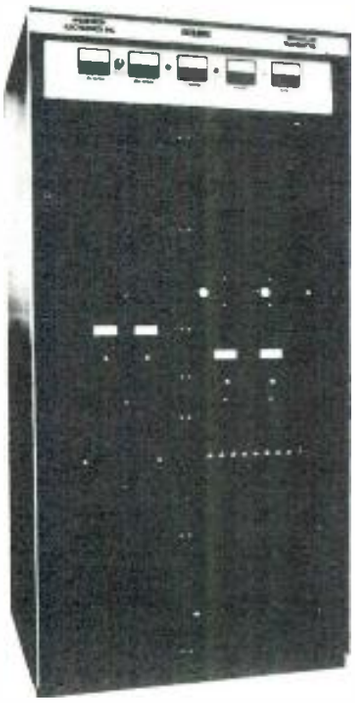
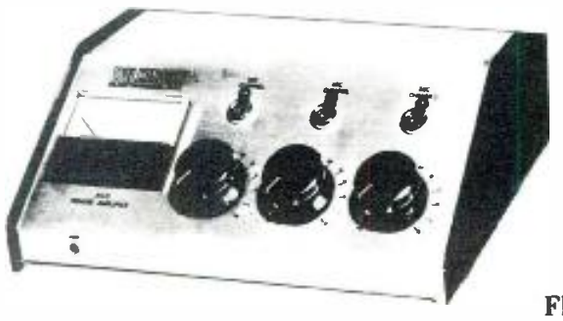


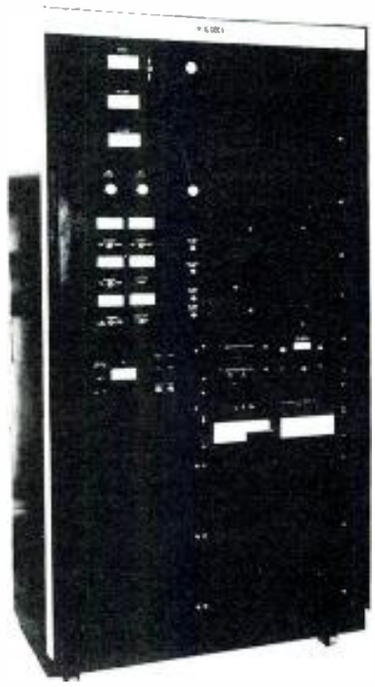
AM TRANSMITTERS - 250 W
1 KW - 5 KW - 10 KW - 50 KW

LIMITERS – Mono and Stereo

ACC AMPLIFIER – Mono and Stereo



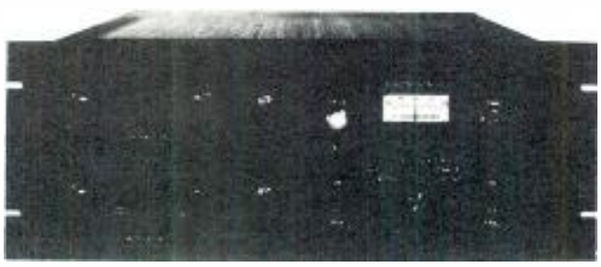
REMOTE AMPLIFIER



FM TRANSMITTER - 10W - 50W
250W - 1 KW - 2.5 KW - 5 KW
7.5 KW - 10 KW - 20 KW - 40 KW

MONAURAL CONSOLES

STEREO CONSOLES



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Color Cameras See Red

By Frederick J. Haines

One silicon diode vidicon and two Plumbicons* team up to produce what has been described as the finest colorimetry of any color TV camera available today.

NEW CAMERA TUBES have historically paced the development of better color television cameras. The lead-oxide vidicon (or Plumbicon*) is an outstanding example. In the relatively short period between 1965 and the present, this tube has become the standard broadcast color camera pickup tube, completely displacing the once commonplace image orthicon.

There were many excellent reasons for this rapid acceptance of the Plumbicon by camera designers and users. It has high sensitivity, unity gamma, small size, easy setup, low image lag, and low stable dark current. It is not as well known, however, that the tube has other less desirable properties—such as low depth of modulation and particularly a limited response to red light. These limitations of the tube have generated intensive engineering efforts through the years, and camera designers have learned to partially compensate for these limitations by modifiying camera optics and circuits. The Plumbicon's red sensitivity has been improved recently through the addition of sulphur to the lead monoxide target layer. Although this extended red version of the tube provides improved reproduction of red colors, red colorimetry has remained a compromise at best, and the tube suffers from increased lag.

The most interesting recent camera tube development is the silicon diode array pickup tube, most often called the silicon vidicon. It has excellent red response and thus will play a major and increasingly important role in broadcast color television cameras. As such it is not expected to displace the Plumbicon completely but to be teamed with it. With a silicon vidicon in the red channel and Plumbicons in the blue and green, major improvements in color reproduction and camera sensitivity have been achieved.

* Trademark N.V. Philips

Frederick J. Haines is with International Video Corporation, Sunnyvale, Calif.

Silicon tube construction

The evolution of the silicon vidicon tube is the result of two separate lines of technological development. Both vacuum and solid-state physics have contributed to this advance in the evolution of image pickup tubes. From the point of view of the integrated-circuit designer, the electron beam scanning a photodiode array in a vacuum tube is only a hybrid device leading to the next most logical step. That is a fully integrated solid-state image sensor

Rudy Hughes, director of engineering, WCSC-TV, Charleston, S. C. "Our installation of three IVC-500 cameras was completed in mid-December, and we have been on the air with them regularly ever since. The colorimetry is absolutely superb with the red channel faithfully reproducing all shades of red. Our light level requirements have been reduced because of the high sensitivity of the cameras making the normal working environment much more comfortable."

with self-scanning and video amplifier all on a common substrate.

However, for good reasons there will be a few more generations of pickup tubes and cameras before the self-scanned microcircuit sensor becomes a significant factor. Lack of funds for development and probable high cost are two of these reasons.

Silicon vidicons in use today are one inch (25 mm) in diameter and have a silicon diode array of the type described by Crowell, Gordon, et al., of Bell Telephone Laboratories. The tubes are physically the same as the 8507A separate mesh vidicon tube and use identical deflection coils, focus coil and socket. A ⅔-inch diameter silicon vidicon for closed-circuit use has recently been announced, but there seems to be no plan to produce a 30-mm diameter tube at this time. It would thus be very difficult to design a silicon vidicon tube into a camera which was originally based upon the older 30-mm Plumbicon.

The target is the key to the performance of the silicon vidicon. Typically it consists of an array of approximately 1000 x 750 silicon diodes which are scanned in the usual ½ x ⅜-inch raster area by the electron beam.

The diodes are formed on a ⅞-inch diameter wafer of N-type single crystal silicon. (See Fig. 1.) Boron or other P-type dopant is diffused through an array of holes which are cut through a previously grown surface layer of SiO_2 by a photolithographic process. Some manufacturers apply a semi-insulating layer over the surface between the diodes

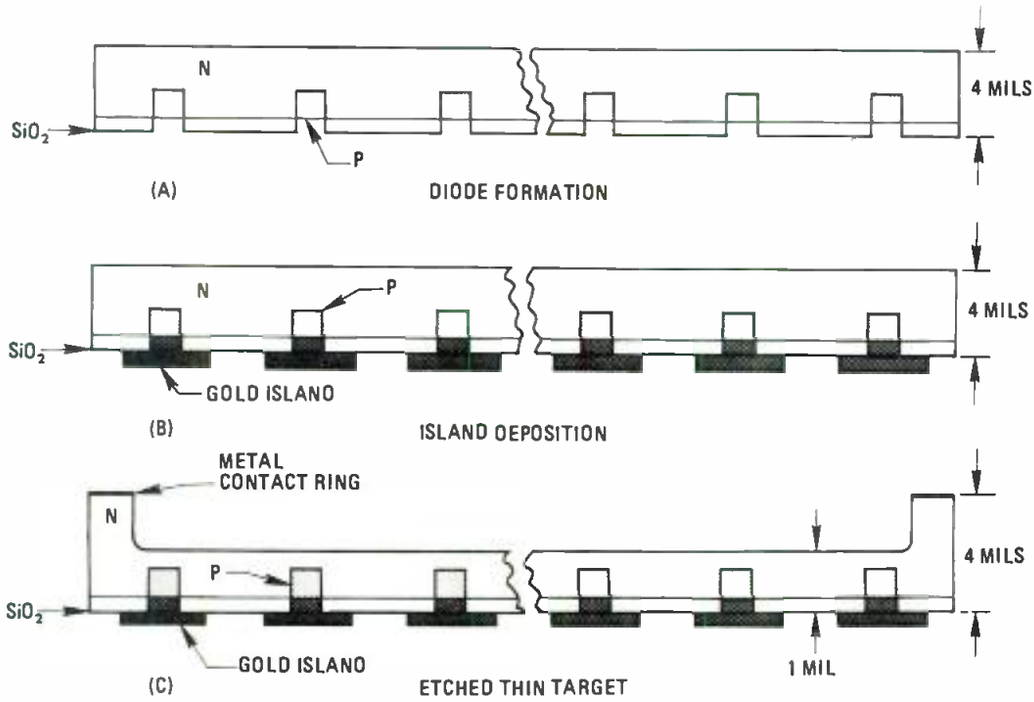

Fig. 1. Target of silicon vidicon is made by depositing array of 1000 by 750 diodes on wafer of N-type single crystal silicon.

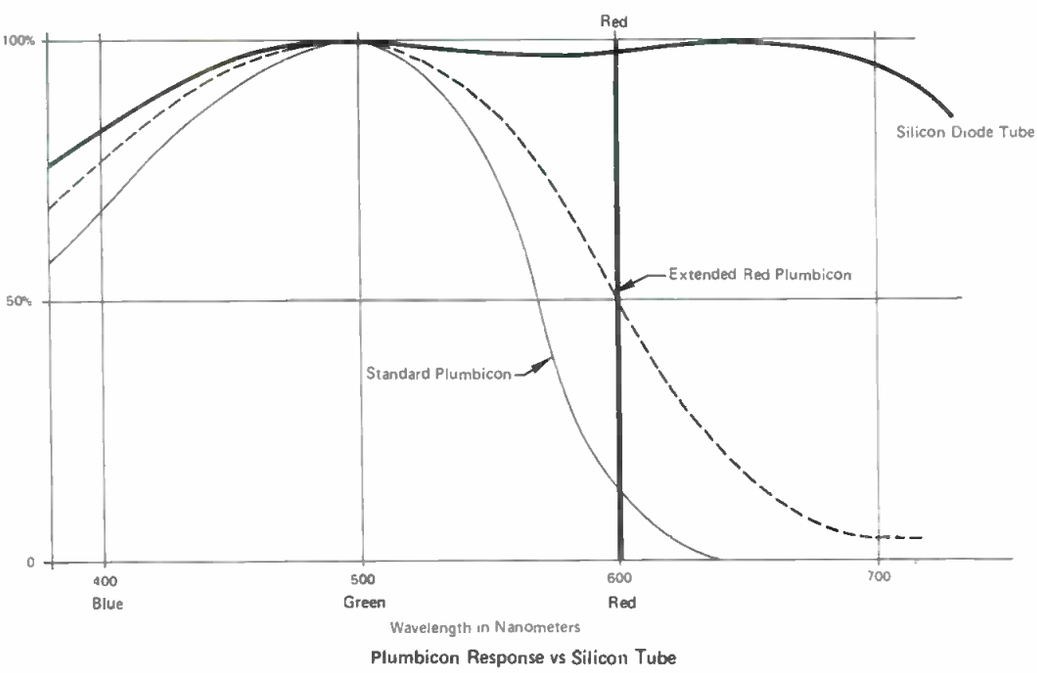

Fig. 2. Value of silicon pickup tube is evident by comparing its spectral response with Plumbicons. New tube is ideal for red channel in color camera.

Silicon Diode Tubes Must "Measure Up" For Broadcast Color Camera Service

The silicon diode vidicon is at present comparable in price to the one-inch diameter Plumbicon* tube. Specifically, a selected broadcast quality silicon tube from IVC lists at $2000. This compares to an XQ1070 Plumbicon tube at $1730. A selected CCTV grade silicon tube from IVC lists at $1500. These prices may decrease significantly during the next year or two as manufacturing techniques are improved, target yields increase, and production tubes become available from more manufacturers. Unlike the Plumbicon, it appears that competition among silicon vidicon tube suppliers will be keen. This cannot help but serve the best interests of the user.

Not all silicon tubes produced are usable in broadcast color cameras and there are three major tube characteristics which serve as criteria for selection by IVC for use in the red channels of color cameras.

1) Small blemishes which may be either white or black, and have a range of contrast from unnoticeable to unacceptable for broadcast camera use.
2) First-field residual lag after removal of an illuminating spot of light projected onto the target.
3) Tube dark current at the specified target voltage.

Each tube is screened for these three characteristics and classified as broadcast, CCTV, or unusable for color cameras.

Surface blemishes for an IVC color camera are controlled by precise specification which establishes limits. The tube raster is broken down into three zones: 1) A central circle equal in diameter to half the picture width, called zone one; 2) A larger central circle equal in diameter to the picture height, called zone two; 3) The remainder of the area outside zone two, called zone three.

Zone one is allowed a maximum of only two blemishes, either black or white, neither of which may exceed a specified size/brightness ratio. For example, if a blemish is four TV raster lines in diameter, its brightness cannot exceed 30 percent (where a peak signal current of 300 nanoamperes is 100 percent).

This specification was established in such a way that the blemish is not to be subjectively noticeable in the encoded picture on a professional 17 inch color monitor. Zones two and three are allowed a maximum of three and four blemishes respectively. No two blemishes may be closer in proximity than 16 TV raster lines in any direction.

Residual first-field lag for broadcast tubes should not exceed 25 percent after abrupt removal of a spot of light whose brightness is adjusted to cause a peak signal current of 300 nanoamperes. Of course the second, third and successive field residual lag is also specified, but it has been found that the first field residual lag characteristic has the greatest effect on subjective lag as observed in actual camera operation.

Dark current for the broadcast tube must not exceed a peak value of 10 nanoamperes and must be uniform within 5 nanoamperes over all the raster area.

It has been found in actual use in dozens of broadcast color cameras that the silicon tube meeting these specifications matches the Plumbicon tube very closely in terms of lag and dark current effects. CCTV grade tubes are allowed slightly more lag and a few more blemishes, but in any case the lag and blemishes are within limits that are fully acceptable in closed circuit television applications.

At least four well known tube manufacturers in the United States are producing silicon diode tubes at this time, and tube yields are improving at a good rate.

* T.M. N.V. Philips

to prevent the SiO_2 from accumulating a charge. Such a charge would hinder the electron beam's communication with the diodes during the scanning process. The semi-insulating layer is called a "resistive sea."

Another manufacturing technique calls for the deposition of metal islands over the diodes reducing the area of SiO_2 exposed to the electron beam to a minimum, thus preventing an excessive charge build-up.

After the diodes are formed, the wafer is etched to the proper final thickness of approximately one mil, and a metal contact ring is provided around the rim for contact to the target substrate.

Early silicon targets were known to have defective diodes which caused white or black spots depending upon the diode's failure mode. Today's production tubes, however, have remarkably few blemishes and those used in color cameras are selected at the factory for broadcast quality service.

Advantages of silicon tube

The silicon target offers a number of advantages. Evaporated targets, as used in ordinary vidicons and Plumbicons, tend to absorb impurities that degrade performance both during processing and later during use. These surfaces also tend to be permanently damaged by heat and by prolonged electron-beam bombardment (scan burning) and by intense illumination. The silicon target, on the other hand, is processed at high temperatures and is not damaged by heat, electron bombardment or intense illumination. This ability to withstand higher vacuum baking temperatures during manufacture makes it possible to attain a higher vacuum and thus a longer cathode life than ordinary vidicons or Plumbicons.

Essentially, the silicon target has all the advantages of the Plumbicon tube including comparably low lag and dark current, high sensitivity, better resolution, unity gamma, stability, life and price. In addition, the silicon vidicon has the broadest spectral response curve ever obtained in an image tube with both visible light and infrared response. The spectral response of the tube ranges from 350 to 1200 nanometers, well into the infrared region. (See Fig. 2.) This surprisingly wide spectral response in the red end of the color spectrum has resulted in accurate red colorimetry for the first time in cameras having Plumbicon-like performance.

It was inevitable that the silicon vidicon be teamed with a pair of Plumbicons in a three-tube

continued on page 80

Super 8 Is Coming!

By Charles Cyberski

Cheaper, simpler to use, and highly mobile, Super 8 film looks like the answer for budget-minded TV news and commercial production. While much present gear is designed for home use, some semi-professional equipment is becoming available. Demand will soon increase that availability.

WHILE THE TIME for Super 8 in broadcasting may not be here yet, it's coming so close that newsmen, engineers, and management can begin considering the exciting possibilities the miniature film has to offer. The record of technological breakthroughs in Super 8 in 1971 alone demonstrates the rate at which the format is developing. Eastman Kodak led the advance with new developments in available light movie photography, and followed up by unveiling two working prototypes at the SMPTE convention in Montreal: a Super 8 TV player, and a Super 8 sound cartridge projector. Polaroid was similarly active by demonstrating the feasibility of an instant processing movie film, and by filing patents for another Super 8 TV player. Equipment manufacturers also made their bid for professionalism in narrow gauge. Wilcam of California announced the first of a family of Super 8 single-system sound cameras, and Beaulieu announced the first truly professional Super 8 camera designed to work with Pilottone-type ¼-inch tape recorders for double system sound. Eumig and Fairchild Camera joined forces to market a completely automated Super 8 sound cartridge projector, and already film distributors have amassed over 17,000 sound and silent films in cartridges. And these are but a few of the things that have been happening in Super 8.

What's behind the push for Super 8? The answer lies in a complex of factors: the American trend toward miniaturization, the pressures for economy in film operations, the growing use of film in business and education, the popularity of compact automatic cameras, and finally, the possibilities of a miniaturized publishing format for home video systems. (Kodak recently reported over three million Super 8 projectors in use.) All these factors have combined to force the development of Super 8 at an extremely rapid rate. Furthermore, all these technological advancements have a bearing on the broadcast industry in one way or another, since broadcasting is intimately involved with film. The case is stated simply: *Super 8 is a natural format for broadcasting, because the TV screen is small.*

TV news will gain the most from Super 8. In the not-so-distant future broadcasters will find their regular programming challenged by the multiple choices CATV will offer viewers, and by what viewers will be able to play over their own sets with home video players. This will lead to increased emphasis on TV news, where the growth will occur. These improvements in TV news are expensive, and lower cost is one of the biggest factors in the move toward Super 8.

Film cost vs. size

The greatest expense in news operations is raw film stock. Super 8 is half the width of 16mm and, for the same amount of time, is approximately half the running length. This means a saving in raw stock ranging from 25 to 50 percent. On the average, Super 8 equipment is also lower in cost, though not quite to the 50 percent point. Processing costs are also reduced, since, for example, 20 minutes of Super 8 amounts to approximately half the length of 20 minutes of 16mm. Also, with the narrower gauge, less processing chemicals are used.

But Super 8 promises more than basic economy: Another advantage is its unparalleled automation capability. Although the Kodak Super 8 cartridge has some limitations in professional situations, it has been a strong contributing factor to Super 8 popularity today, and it has operational advantages that newsmen like. The film is entirely self-contained within the cartridge, making for fast camera loading in daylight. The standard cartridge contains 50 feet, or approximately 2½ minutes of film at 24 ft/sec. With the continuing improvement of new polyester film bases, even larger cartridge loads will soon be possible. The front of the cartridge has four distinct notches in addition to the film aperture and pressure pad. The upper notch sets the ASA exposure in automatic cameras for whatever speed or type of film is used. The second notch is a cartridge locator guaranteeing that the cartridge cannot be inserted backwards or upside down. The third notch indicates the chemicals required to process the particular type of film in the cartridge, and the fourth notch automatically sets a Type 85 A filter within the

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Charles Cyberski is a film and videotape engineer at KDUB-TV, Dubuque, Iowa, and co-director of Super 8 Research News with Dick Neville of WGN-TV, Chicago. They publish a monthly research report available for $3.00 per year from P.O. Box 1166, Dubuque, Iowa 52001.

camera for tungsten or daylight, depending again on the type of film. This virtually foolproof system eliminates many common errors such as incorrect loading or threading, incorrect filtering, and incorrect ASA settings, and it allows the cameraman to operate faster in critical news situations.

Automatic exposure systems have been controversial for years, but their growing acceptance has come from the many refinements they've received in professional and semi-professional Super 8 cameras. Although there will always be some exceptional situations of spotlighting or backlighting where a manual override will be necessary, the cameraman will find the auto exposure systems in Super 8 cameras an invaluable aid. They free his hands and mind from computing and setting exposure, and are especially helpful in pans or zooms, or situations where lighting is erratic or unstable. Such exposure systems promise speed and accuracy difficult to match with hand or eye.

Motorized zoom lenses are another refinement Super 8 has popularized in the film-making industry, and this addition is a sure step toward improving the appearance of most news film. Early cameras were simply equipped with a motor zoom, but now the more sophisticated models have the option of motor or manual, or the choice of several zoom speeds. The Beaulieu 4008ZM2 referred to earlier comes with an 8 to 1 Angenieux lens and a continuously variable motor zoom from 2 to 12 seconds.

Sound on Super 8

Other attractive features in Super 8 cameras are lighter weight and smaller size, features especially important to the man that carries the camera every day. Smaller size also allows the newsman a new degree of access and mobility, and directs less attention to him. Efficient motors allow as many as 12 to 15 cartridges to be exposed on a single battery.

Several single-system Super 8 sound cameras are now available, and more are promised by manufacturers in 1972. Wilcam of California opened the market with a Minolta D10 modified to take 200-foot loads of SO-240 Ektachrome, supplied prestriped by Kodak. Wilcam is also offering a modified Bolex 160 which is priced to sell under $1000. The Beaulieu 4008MZ2 is equipped to work with any of three different double-system sound systems: Synchor-Pilot, E.T.S., and Erlson. Optasound has brought its own type of double-system sound to the Super 8 market. Recorder units use perforated ¼-inch or cassette tape for sync. Simple camera modifications allow any electrically-driven camera to be used in the system. In Europe, Agfa is now supplying Super 8mm magnetic double sound system editing.

It's in the editing room that the biggest adjustment will be needed in the change to Super 8. There newsmen have the closest contact with film, and that is why a change of format size will psychologically seem exceptional. Yet with the modern editing equipment, the change needn't be that rough or tough. Super 8 splicing and editing equipment is modeled after much of the standardized 16mm gear, and some has innovations. One Super 8 splicer for example offers precise motorized scraping, making this portion of the editing process faster and easier than it is in 16mm operations.

More good news in Super 8 is simpler single-system sound editing. In 16mm magnetic sound film, there

One of the new breed of telecine gear is the Wilcam Super 8 TV projector, based on a Bolex SM 8 and available through TeleMation. One version has still-frame capability for precise cueing.

is a 28 frame picture-sound separation, or a time lag of approximately 1.2 seconds. In Super 8, the picture-sound separation is only 18 frames or 0.75 seconds. The sound is nearly 50 percent closer to the picture, making cleaner and tighter editing possible.

One of the biggest drawbacks in any film operation until now has been the amount of processing time. Newsmen are literally "in the dark" until their story has been processed. For this reason videotape has made inroads into news reporting—with its attractive instant replay feature. However, videotape cannot offer color at the cost film can, nor does it have the portability of film gear, nor flexibility in editing. Just the same, the film industry is taking steps toward reducing the time newsmen have to wait to see their story.

Here again, Super 8 is providing one of the fastest answers. Once the leader is through the processor, a Super 8 story is out and ready to go in 50 percent of the time it takes for the same 16mm story! Nearly all processors being manufactured today for broadcast applications are coming equipped to handle Super 8. Polaroid is also hard at work on another exciting development in the film industry: instant processing movie film. The company has already demonstrated the feasibility of such a film, but has announced no marketing plans yet. However Polaroid has stated when and if a marketing decision is made, they would be definitely interested in the TV news field.

Film processing as a sideline

Processing 8mm film also opens up an entirely new source of income for TV stations, with the realistic possibility of processing Super 8 film for general consumers, high schools and colleges. One of the biggest advantages behind the new Kodak Ektachrome films is that they can be locally processed more easily, thus giving consumers faster and more attractive film service. Kodak SO-105 Super 8 which has been on the market for a year or two now is entirely compatible with the standard ME-4 process used for newsfilm, and the process for the new high-speed Ektachrome is reported similar with the exception of a special bath-buffer required for removing the Rem-Jet anti-halation backing.

Using Super 8 in news photography will lead to an entirely new world of newsfilm sources. Because of the low cost of basic Super 8 cameras, a station could easily afford to equip its entire news staff, or possibly even all personnel, with cameras for on-the-spot coverage. Though not all of these people would necessarily be trained photographers, the important footage would still be available in critical situations, and automation of cameras and cartridges would make most film usable. Another whole new field of sources is the amateur Super 8 crowd. While much Super 8 gear carries the stigma of amateur, this connotation is sometimes overly harsh. Many of these cameras have features that one couldn't find on a 16mm camera for even twice the price. An amateur's 8mm film was valued in the investigation of President Kennedy's assassination in 1963, and NBC's first Super 8 news story, showing the removal of survivors from the burning ship Yarmouth Castle in 1965, was shot by an amateur. The growth of film study in high schools and colleges in recent years has produced a generation of young people who are quite familiar with the tools of the film maker. And some of the fims produced by these people show an acute awareness of what is really going on in situations of controversy or news interest. A station equipped for Super 8 could make wise use of all these resources in the community, and add substantial documentation to its newscasts.

What about film quality?

Super 8 print quality has been improving at a rate similar to that witnessed during the evolution of 16mm in the 50's and 60's. In 1969 Super 8 had already matched the quality of 16mm from 1964. Today the finest Super 8 film available is Kodachrome II, and on the tube it's hard to tell from a lot of the 16mm. In fact, because of Kodachrome's projection contrast, it often looks better than a lot of 16mm news film.

Super 8 print technology is also moving ahead rapidly. Kodak now offers a special fine-grain, low-contrast Ektachrome film (7252) for original production. It yields high-quality Super 8 duplicates of reasonable grain and proper contrast. Geo. W. Colburn Labs in Chicago now offers several lab services for Super 8 originals—A and B rolling with individual exposure corrections, fades, lap-dissolves, overlay titles, and spliceless printing. The demand for large quantities of Super 8 prints has developed a whole new laboratory industry in reduction printing, and equipment is available for printing two rows of Super 8 reduction prints on 16mm stock, or four rows of prints on 35mm stock.

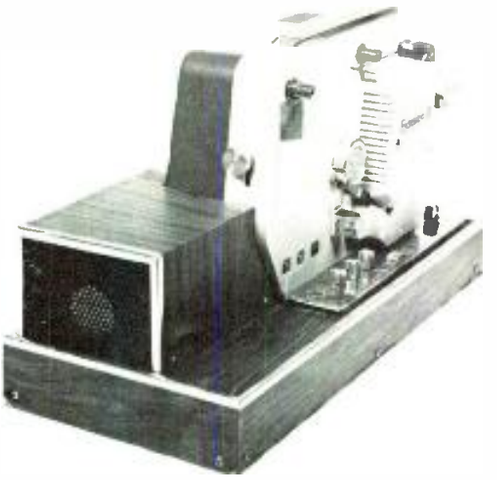
Other Scenes in Super 8

While long-haul airline passengers have had movies for years, it hasn't seemed feasible to show films on short flights. Now Super 8 cassettes will be used for just that purpose. Inflight Motion Pictures Inc. has made an agreement with Project 7 Inc. and CTVC Inc. to develop special programming for short flights. The projector is a recent Inflight development called IMPAK, a Super 8 cassette system which shows a short film, rewinds and stops automatically. Production runs are expected by summer 1972.

Not everyone is enthusiastic about Super 8 in broadcasting. Sheldon Nemeyer, manager of Newsfilm Equipment and Sound Services at NBC, is cautious. He recently ran a test and evaluation of the medium which included forced use of Super 8 under daily news pressure for several weeks in New York City. He feels available equipment is not of the rugged professional caliber obtainable in 16mm. He also notes that double-system sound is awkward for hard news, where speed requires single-system sound.

It's also obvious that CATV is or will be a large market for Super 8, due to its inherent economy and simplicity. While news and commercial production will make first use of the narrow medium, the day may soon approach when entertainment programming will be available in Super 8.

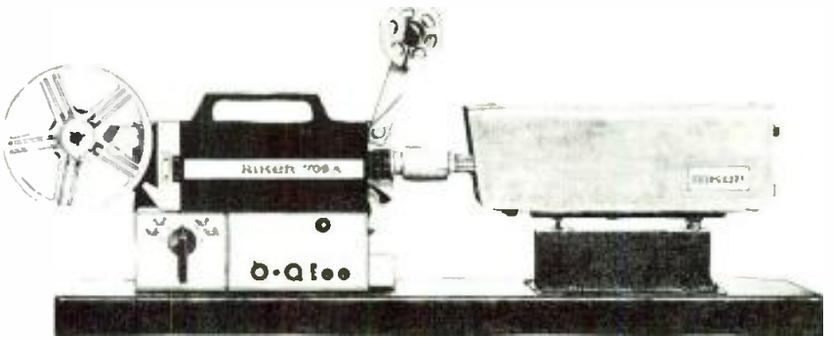
Canon DS-8 is a double Super 8 camera with zoom lens and auto or manual modes.



Optasound's Super 8 TV projector handles up to 800 feet of film, has semi-automatic threading, forward and reverse projection.

Existing light capability (down to 7 footcandles) is claimed for the Kodak XL55 Super 8 camera, when used with Ektachrome 160 Type A film.

The Beaulieu Super-8 with Beaulieu Optivaron wide-angle 6-66mm zoom lens, f1.8, sells for $999. Features include macro motorized focusing to 1mm and lap-dissolves and superimpositions.



Super 8 film chain from Riker Communications, Inc.

Wilcam/Minolta quality Super 8 camera.

Immediately following Kodachrome originals and reduction prints in quality is the standard Super 8 news film, designated as SO-105 in cartridges, and SO-240 pre-striped for single system sound on 200-foot spools. Even here Kodak is promising further improvement with hints that a better Super 8 newsfilm is on the way. Moreover, the new Ektachrome 160 Super 8 film, despite its increased sensitivity, has an apparently finer sharpness than the SO-105.

Magnetic sound is rapidly becoming the standard for Super 8 films, and current improvements in magnetic coatings are bringing Super 8 sound up to a nearly equal par with 16mm optical sound. Moreover, magnetic sound gives more flexibility in film production with ease of recording, erasing, fading, and mixing on current Super 8 sound projectors. Super 8 prints also have the chance of wearing better than most 16mm, because most Super 8 sound prints also have a magnetic balancing stripe on the

opposite side of the frame. The two slightly raised tracks thus form a protective rail separating layers of film, greatly reducing film wear, scratching, and cinching.

Already numerous Super 8 projectors have been modified for use in a TV telecine chain, and many stations around the country and the major networks have experimented with these on the air. At NBC when an important news story is available on Super 8, it is virtually common practice to use it. Both General Electric and Norelco demonstrated Super 8 color chains at the 1971 NAB show in Chicago.

TeleMation showed a Wilcam-modified projector at NAEB. Riker Communications Inc. has modified the Eumig unit to work into a TV camera. The company claims absolutely no drift, a problem that has been encountered.

Automation is next

The possibilities for Super 8 in engineering are truly exciting. Until now, film in broadcasting has resisted any considerable degree of automation because of its sheer bulk. With Super 8 being a mere 25 percent of 16mm's size, cartridge automation is realistic and feasible. Consider the impact the endless loop audio cartridge has had on the broadcasting industry, or the professional developments now under way in the cassette field.

Eastman Kodak has been leading the efforts to unscramble the proliferation of Super 8 cartridges on the market, and it looks as if that company is making some headway. Two major equipment manufacturers, Fairchild Camera Corp. and Eumig of Austria, have adopted the Kodak projection cartridge for their standard, with magnetic sound, plus 18 advance. Eumig and Fairchild now market a Super 8 sound cartridge projector that is totally automated. The film cartridge—with a capacity from 50 to 400 feet—is inserted in the projector, and with the touch of a single button, the film is threaded and projected. At the end of the reel, the film is automatically rewound: 400 feet in less than a minute. The unit is also equipped for complete remote control and instant re-cue/replay.

A weakness of TV film is its vulnerability to handling and threading: It picks up wear, tear, and dirt. Cartridge film commercials would never be touched or exposed to handling. To run a commercial or series of commercials, the cartridge would be inserted in the projector for fast automatic threading and cueing. After the commercial had run, it would either cue up to the next on the reel, or automatically rewind itself back in the cartridge, freeing the projector for another cartridge. And yet the Kodak cartridge is so designed that it can easily be opened any time for service or loading. Inside it contains a standard Super 8 reel—entirely compatible with all other Super 8 equipment.

Actually, there are a surprising amount of commercials around in Super 8 already, as reduction prints of 16mm commercials, because the format has also been used for sales presentations—with the same cartridge and projector. Super 8 commercials also present something for sales and management to consider. Since production costs can be cut substantially, savings can be passed on to advertisers, leaving more money to invest in air time. Because of their small size, Super 8 commercials are convenient for distribution, and occupy little storage space.

Another new field for Super 8 is feature films. With the announcement of a prototype Super 8 TV player, Eastman Kodak made its bid in the home video race. Actually the race is somewhat broader than that, because the first markets to develop will probably be large businesses, institutions, and colleges, with homes coming in as prices fall. But Kodak is opting for Super 8 as *the* format of the future. It offers unparalleled compatibility around the world, and complete system flexibility. The same film can be projected from a cartridge or reel for large screen presentations, or can be run through a telecine chain for display on a video system. Color production is far less expensive than any system using a color TV camera, and the equipment is more simplified. Kodak envisions Super 8 as an ideal miniaturized publishing format, and already producers and distributors are going to the idea. Over 17,000 sound and silent films are now available in Super 8, with or without the cartridge. Polaroid and Fuji have also announced Super 8 TV players.

With the massive amounts of film available on 35mm and 16mm, and rapidly improving quality of reduction-printing techniques, one may soon see entire film libraries in Super 8. If this trend continues, another supply of programming material will be suddenly opened to television. The economy of Super 8 in this field could well be the dollar-relief TV programming is in need of. Reduction prints cost less, take up less space, require less maintenance in cartridges, and could cut shipping costs to one quarter of what they are now for 16 mm.

What can broadcasters do now? Support Super 8 research. The growth of Super 8 so far has been in response to a demand. As has been demonstrated, Super 8 has a fantastic potential for the broadcasting field, but further demand is needed. Manufacturers will continue tailoring Super 8 equipment for broadcasting, *if* they see the industry is interested. When you take a long, hard look at the challenges facing the broadcast industry today and tomorrow, can you afford not to consider the innovations Super 8 can bring to broadcasting? **BM/E**

Want More Info?

To obtain more information about Super 8 equipment, circle number(s) on Reader Service Card.

Beaulieu (camera)	210
Canon (DS-8 camera)	211
Canon/Bell & Howell (projector)	212
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REFLEX VIEWING through a 135° rotating mirror shutter. No beam splitter. **No loss of light at the film plane.**

FULLY AUTOMATIC THRU-THE-LENS METERING with manual override control. F stops visible in the viewfinder. Instant open and return diaphragm for fast focusing.

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REGISTRATION PIN MOVEMENT. Assures perfect framing.

ELECTRONICALLY GOVERNED MOTOR. Insures accurate sound speed.

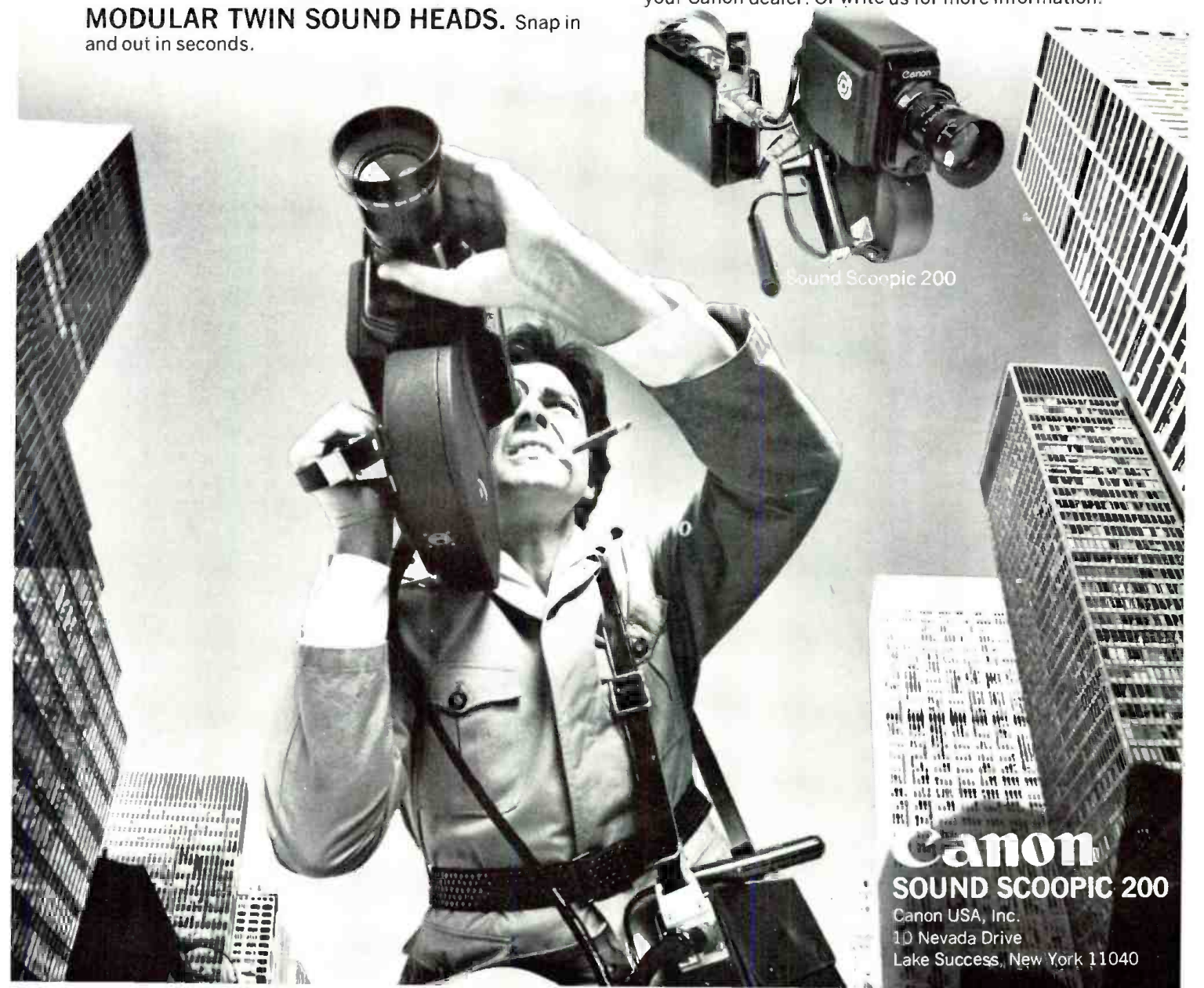
MODULAR TWIN SOUND HEADS. Snap in and out in seconds.

LIGHT WEIGHT. 12 lbs. 6 oz. Including body with film chamber, lens, exposure system, sound heads and take-up spools.

LOW PROFILE bottom load design for 200 feet daylight spools. Shoot from cars, doorways . . . anywhere.

AND MORE. A 6 lb. 14 oz. over-the-shoulder amplifier/camera power pack in a single unit. With advanced automatic gain control with manual override. VU meter. Dual mike input. And a fast rechargeable battery that powers the camera, meter and amplifier through 2000 feet of film. Recharges in under 5 hours. Batteries interchange in seconds.

Feature for feature, Canon Sound Scoopic 200 adds up to getting the news faster than ever. See it in action at your Canon dealer. Or write us for more information.



Canon

SOUND SCOOPIC 200

Canon USA, Inc.
10 Nevada Drive
Lake Success, New York 11040

How We Went About Designing A New Color Film Camera for TV

An interview with David Cooper, Advanced Development Engineer, Cohu Electronics.

Deflection circuitry is dc controlled and size stability is ensured by 0.1% stable sawtooth generators. Paint, sensitivity, and black level can be controlled remotely.

THE DESIGN OF COLOR FILM CAMERAS was set early in the color game. But unlike live color cameras, which have been updated continuously to take advantage of the very latest technology developments, film cameras have changed very little. The most recent new design to appear is the 1500 Series color film camera introduced by Cohu Electronics. It follows to reason that this camera should reflect many improvements. *BM/E* interviewed designer David Cooper to learn more about these advances.

Dave, live color cameras have advanced considerably during recent years. Which of the various technological developments have you found to be of greatest benefit in designing a state-of-the-art film camera? Perhaps most important are the vast strides that have taken place in semiconductor devices. These innovations include field effect devices for low noise preamplifiers, and gated sample and hold circuits; devices which permit the design of extremely high loop-gain feedback circuitry for greatly improved color balance and registration stability; and analog and digital integrated circuits which can be applied to generate advanced, but compact circuitry.

Another notably improved technology is that of optical coatings. Computer-assisted dichroic filter design has greatly improved colorimetry control, while new anti-reflection coatings have done much to eliminate the problems of flare and ghosting. Also most salient is the technique of image enhancement, which permits the application of both vertical and horizontal aperture correction without the addition of significant noise.

Dave, we understand that a great many of these techniques have been applied in the Series 1500. How did you go about designing this camera? We asked the broadcasters. We made a market survey in which the opinions of broadcasters from approximately 30 domestic television stations were sought to determine what kind of film camera design the market would most like to have. From this survey it became apparent that although the existing film cameras were capable of excellent performance,

many improvements were wanted. Prominent among them were improved stability, longer tube life, reduced complexity, improved colorimetry, more effective automatic functions, ease of setup and operation.

You mean that you developed your design to counter problems with existing cameras?

Yes, to a great extent. We gave much consideration to existing camera designs, both to their good points and their bad points. For example, investigating the three-tube variety of color cameras versus the four tube type (which uses a separate luminance channel as one method of obtaining less critical registration), it was evident that recent improvements in tube/yoke technology, advances in solid state devices, and contour enhancement techniques, would provide a three-tube camera configuration which would optimize both performance and economy.

I can see that with one less color channel the camera will be less complex and not so costly to maintain, but you said the four-tube camera was less critical to register. Aren't you sacrificing performance for economy?

Not at all. In fact, the modern three-tube type gets the best of both worlds. Improvements in yoke and tube manufacturing technology make possible the existence of three color channels with extremely similar geometries. This is of fundamental importance if good registration is to be obtained over the entire picture area. Advances in solid state electronics have permitted the development of feedback deflection circuitry with extremely high loop gains to obtain better than .1% registration stability.

Further, by using contour enhancement, a technique in which the detail signal is extracted from the green channel and then added equally into all three channels, the sharpness information is obtained from a single channel in such a manner that no significant noise is added. These techniques not only permit good registration to be obtained, but they ensure that it is maintained even though registration accuracy is less critical.

What steps were taken to overcome the problems of poor colorimetry and inconsistent colorimetry between cameras?

We have a new optical system design that uses computer-matched dichroic mirrors and trim filters for precision colorimetry control. An extremely high efficiency anti-reflection coating is applied to all critical surfaces, and any surface that is not directly involved in the imaging process is angled to reflect scattered light outside the optical path. These techniques give extremely accurate and reproducible colorimetry, while minimizing flare and ghosting. Incidentally, the optical system has a minimum peak transmission of 60% in each channel.

Do the computer-designed optics help to reduce poor colorimetry and flesh tone errors?

Yes, to a very great extent. But many problems also occur in the manufacture and processing of color film and some could occur through color balance instability in the camera. In the 1500 Series, white balance stability is ensured by a white level pulse and a 90 dB control loop. Black level stability is obtained through the use of complementary junction techniques. As a result both white and black levels are stable to less than one IRE unit.

What about the color film errors?

A good insight into the various kinds of color film errors can be obtained from Dáán Zwick's article in the February 1971 issue of the *SMPTE Journal*. In this article various kinds of errors were analyzed in a wide variety of popularly available color films. This evaluation showed that the most serious variation was in skin color with additional significant variation appearing in black level density and white level.

To correct for problems of white balance and flesh tone errors a painting technique is used whereby red, green and blue channels are unbalanced to compensate for the poor film and to provide an acceptable color presentation. The usual problem with the painting technique is that in applying it the basic camera color balance is destroyed. For this reason a unique

feature was designed into the 1500 Series called "instant paint."

What is "instant paint?"

The "instant paint" system is a set of red, green and blue gain controls which are activated by a pushbutton to correct for colorimetry errors as they occur. When good film reappears these controls can be instantly de-activated by pushing the same button. This returns the camera to its original color balance condition.

Does this solve the problem of black level density variations?

No, but most cameras have automatic black level control circuitry. One unfortunate side effect of these circuits is a tendency to correct a picture that does not contain any black information. This overcorrection can mar the picture reproduction to such an extent that it is less preferable than the original uncompensated picture. To prevent this the 1500 Series has a black inhibit control which defines a minimum film density level which can be recognized as intended to be black. For densities above this level the automatic control circuit ceases to function. In the evaluation of a wide range of test material it has been found to give minimum overcompensation so that the corrected rendition is still preferable to the uncorrected one.

You said earlier that one of the adverse comments obtained during your field survey pertained to short tube life and the resulting increase in maintenance costs. Why does this occur, and what have you done about this problem?

Short tube life can result if the selected camera tube is not used in an optimum manner. In other words, the life of a given tube will be improved if the tube can be operated in a manner which does not demand more in the way of performance than it is capable of giving. In the 1500 Series the vidicon tube was selected over more expensive types of image converters because it has more than sufficient sensitivity for this application and, in addition, has superior resolution, colorimetry and dynamic range. Dynamic range is of great importance in a film camera, where in order to obtain an output contrast ratio from the camera, say 40:1, the camera tube must be able to cope with an input contrast ratio of something approaching 240:1. The average vidicon has a gamma of 0.65 and is ideally suited for the handling of high contrast ratio inputs. As I said before, the vidicon is considerably less expensive than its lead oxide brother and has longer life and acceptable lag performance when properly operated. We have a highly efficient optical system so that the camera gets plenty of light; that means the camera tube can be operated under low target voltage conditions that reduce dark current and tend to give longer life.

A separate mesh vidicon, such as the 8507A, was selected for use because the separate mesh provides a more uniform resolution and better overall shading. In addition, this tube employs magnetic focusing, which also provides better resolution and shading uniformity than the electrostatic versions.

Is automatic sensitivity the same as automatic target voltage control?

Only partly. The automatic sensitivity control in the Series 1500 is a combination of target voltage control and light control with a neutral density filter wheel. When a change in sensitivity is required the target voltage reacts first because this can occur more rapidly. Then the automatic sensitivity circuit senses the change in target voltage and adjusts the neutral density filter wheel in order to bring the camera illumination to the point which returns the target voltage to the best range for low lag and long life. In addition, we get the speed of the automatic target voltage control and the accuracy of the automatic light control. its original value. Thus the vidicons are operated in

This combined automatic sensitivity circuit has a reset function which is activated when the picture fades to black. The reset causes the target voltage and filter wheel to return to an intermediate position to avoid picture blooming when illumination reappears.

Since you have already applied limits on the automatics to cover unusual situations, I guess they are pretty effective?

Correct. The function of automatic control circuitry is to replace the operator in ensuring the reproduction of good quality video from an unattended camera. However, the automatics do not have the advantage of the intelligence of the human operator and are, therefore, guided only by relatively simple rules. In providing these rules the designer attempts to give the automatic circuitry the capability of handling average situations and some unusual situations, with completely satisfactory results. In the 1500 Series this philosophy is applied to provide a good basic "hands off" capability. Incidentally, the automatic functions are remote controlled.

How can today's technology make set up and operation easier?

In many ways. For example, new linear deflection circuitry lets you set the registration with extremely good accuracy in two or three minutes. Operational amplifiers provide non-interactive DC control techniques. Feedback control circuitry can greatly simplify video level adjustment so that accurate color balance can be performed in a few moments. In the Series 1500 these techniques have been combined with a logical adjustment sequence to permit complete re-tubing and set-up in 20 to 25 minutes.

Operationally, these new circuits ensure continuously reliable performance with infrequent need of readjustment. Combine this stability with good automatics and essential remore functions, as well as color bars, sequential waveform monitoring and the instant paint facility, then you have an easy-to-use camera. These setup and operational conveniences are fundamental in the Series 1500 Color Film Camera design. **BM/E**

Veni, Vidi, Vidicue

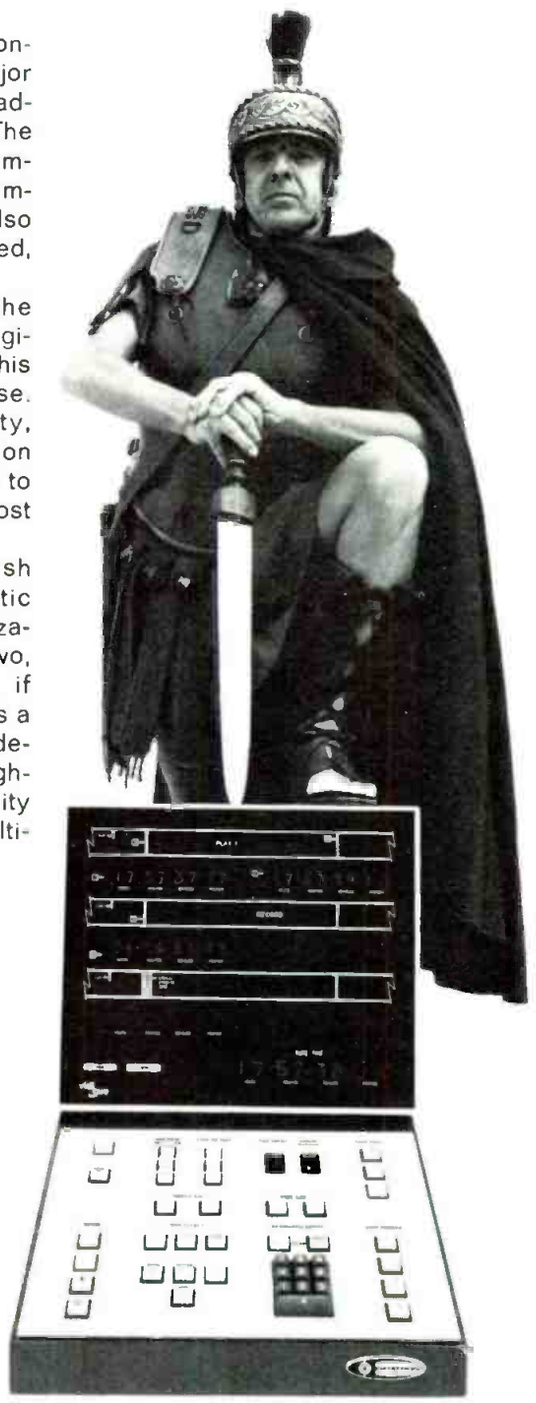
(We came, we saw, we edited)

Hail Vidicue!

Our new Vidicue editing and control systems have conquered major VTR problems for both the broadcaster and production facility. The Vidicue features precise, economical control of program and commercial construction . . . while also presenting a highly sophisticated, computerized editing capability.

Moreover, Vidicue gives the broadcaster the flexibility to logically add to his basic system as his requirements inevitably increase. And for the production facility, Vidicue lets the editor perform on tape what he had only been able to do on film in the past due to cost and technical restrictions.

How does Vidicue accomplish this? Vidicue offers automatic search and cue, frame synchronization, and editor control of one, two, or three recorders (or more, if desired, on an optional basis). As a universal editing system, it is designed to interface with any high-band broadcast recorder, quality helical, or servo-controlled, multi-channel audio recorder.



Four basic modes of operation are performed: **Cue/Preview** control of a single machine. **Sequential Edit** enabling the precise assembly of scenes on the record tape from the playback. **Insert Edit** of new material into a prerecorded tape. And a unique **A • B Roll** that eliminates the necessity of prerecording special playback tapes in proper sequence, thus saving a considerable amount of time and money.

Edit point entry is accomplished from three sources — keyboard, tape, or computer. And Vidicue's simplified controls and graphic simultaneous display of all edit points make editing easy and save time.

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How a Small-Market Radi
Covered a Presidential New

When President Nixon came to dedicate the Rathbun Dam in south-central Iowa, the event was not quite as momentous as the President's mainland China visit, nor were transglobal communication facilities involved. But radio station KCOG in Centerville did a first-class all-day news job in covering the occasion using only equipment such a small-market station would be likely to have. Ingredient of success was news savvy, knowledge of community resources, and hard work—these qualities were supplied mainly by 27-year-old Bill Purkis, the station's only newsman employee, who spends half of his day selling!

On July 31, 1971, President Richard M. Nixon descended from the Air Force One helicopter at the edge of Rathbun Lake to officially dedicate the 11,000-acre man-made body of water, the largest in the state. For a majority of those in the area, the lake is a source of great pride and promises much—not only as an end to floods by the overflowing Chariton River, but for beautiful scenery and a prosperous tourist business.

Centerville, five miles away, has a population of 6531 and is the largest city within 45 miles of the lake. KCOG is the only radio station with the distance, and broadcasts on 1400 KHz at 500 watts daytime and 250 watts nighttime. We had to cover the celebration and cover it completely. July 31 was to be the greatest day in the history of the station.

We learned only nine days before that the President was coming. Apparently we were the first news media officially notified (a result of careful pre-planning). We received a phone call from

---

Mr. Purkis is news director, KCOG, Centerville, Iowa.

Station Story

By Bill Purkis

KCOG's competition the day the President came to Centerville.

Washington, D.C. at 9:30 a.m. on July 22 and within 30 seconds had our scoop on the air. The story we gave the Associated Press was on the wire within seven minutes. They were already printing the bulletin as Iowa Governor Robert Ray was receiving the word by phone at a Governors' Conference in Nebraska. I learned this because we too were on the phone, attempting to interview him. When he finished his call, I was able to get the interview and had it on the air before 10 a.m.

Later that day I learned White House Secret Service advance men were due in Centerville and, after their arrival, we attempted to get an interview. I was informed that we weren't even supposed to know that they were already there beginning work, but by then everyone knew because we had carried the story of their impending arrival. That attitude on their part continued throughout the nine days.

There were a number of interesting things taking place which we knew of, but because of "security," we were told not to broadcast them. For example, telephone crews were installing a microwave antenna for a telephone hook-up, but we could not talk on the air about it—even though it was plainly visible to everyone in the area.

KCOG, with eleven employees, has a mobile studio, a news car, and our general manager's houseboat. We are equipped to broadcast (with our Marti remote unit) from any of the three. Because we planned to broadcast from a variety of places during the Dedication Day, we arranged with our sister station, KJAN, in Atlantic, Iowa, to send three men, a couple of microphones, and their Marti unit which is on the same frequency as KCOG's.

Before it was known the President would speak, the Army Corps had approved our using the mobile studio, and assigned us a spot to the right-rear of the large covered speakers' platform. After the announcement, our location was changed three times, the last time just hours before the dedication. We were informed by the Corps that we could not use our own microphones in front of the speakers' podium, but could hook into their sound system. Then the White House advance men said their sound system would be used and we were to hook into it, if there were enough outputs left after stations from

Another Style in Covering the President:
WBTV and WBT Respond to Billy Graham Day in Charlotte, North Carolina

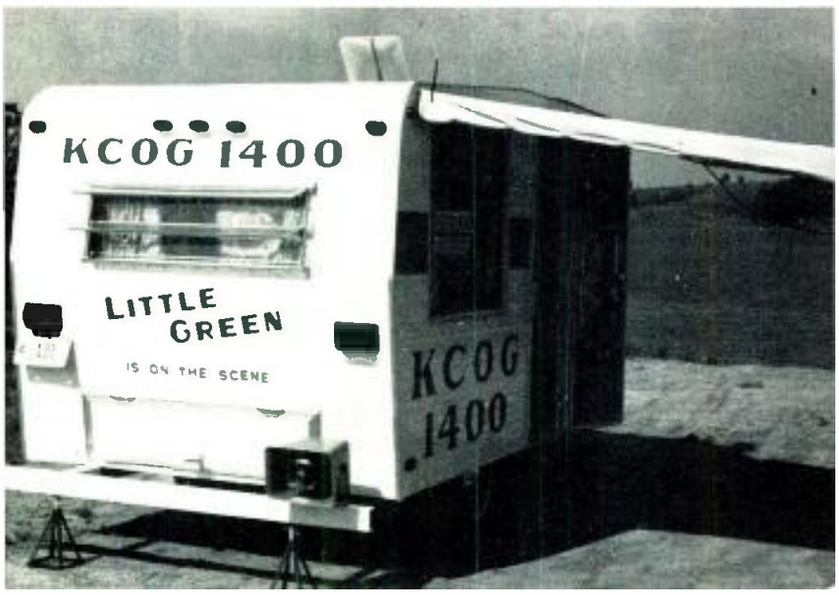
In September 1971, President Nixon came to help in that city's tribute to its famous native son, his friend Billy Graham. The events covered by local television station WBTV and the sister radio station, WBT, included the President's arrival at the airport, the motorcade to the Charlotte Coliseum, the 2½-hour ceremony there with its presidential speech, and the President's departure at the airport that day.

The two stations produced not only a running news coverage but also, simultaneously, a 90-minute special for post-event broadcast. At the airport, therefore, were two film crews to get double coverage of the President's arrival. Three film crews recorded the motorcade, and another film crew was stationed outside the Coliseum to get the arrival. The ceremony itself was double-taped on videotape.

At the airport departure, a film crew covered and managed to get a short interview with the President—the only visually-recorded interview.

In all, more than 6700 feet of film were processed and edited that afternoon (in addition to the more than five hours of videotape). This took two large editing facilities—the station's regular air videotape editing system and the editing system of Jefferson Productions, commercial videotape production firm affiliated with the stations.

As major broadcast operations in a prosperous, medium-sized market, WBTV and WBT have a sizeable complement of equipment for on-the-spot coverage: 10 sound cameras, 12 radio-equipped cars, two portable walkie-talkie systems and 35 television news employees. The manpower and equipment were on hand for the job; but getting it done well and on time obviously took extensive pre-planning and highly-skilled deployment of forces on the crucial day.



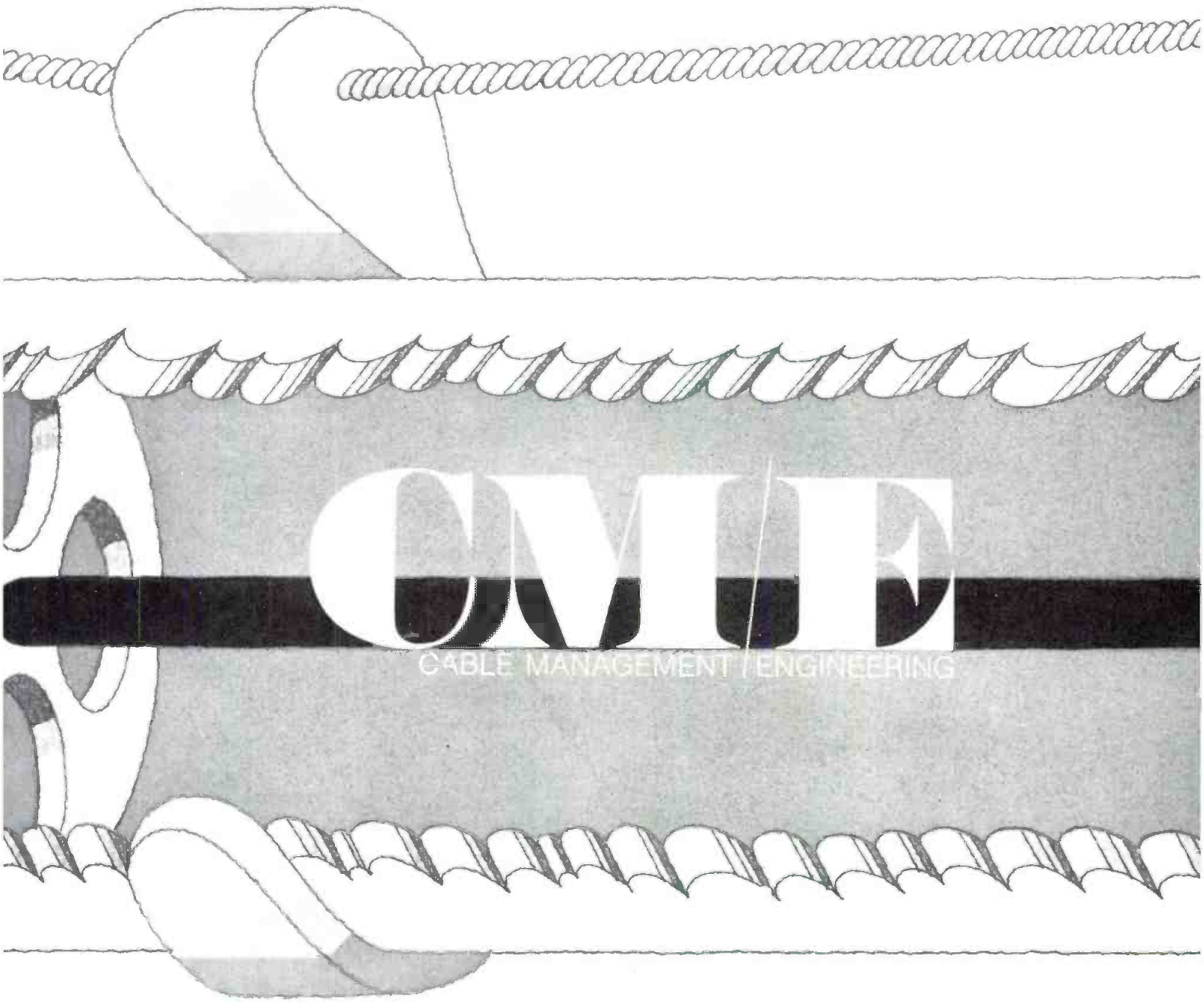
KCOG's mobile studio that went to the lakeside for the dedication. Below is general manager Red Faust's houseboat—and sometimes KCOG's floating studio.

the larger cities got theirs. The strain then began to set in and we "quietly" mentioned to them that, while not the largest, we were the home station. After a few "talk to Joe," "talk to Sam," "talk to Fred's," we were able to receive assurance we would have a reserved output.

Up until then, there were no phone lines within three miles of the speakers' platform, so we decided to use the Marti. Later telephone crews from throughout the state arrived and installed numerous lines. We decided to proceed with our plans, but reserved a B-1 phone line at the lake for emergency purposes. This was done because the communications men from the White House could give no assurance that we would be able to use the Marti. We were told that power to our equipment would be cut off if it interfered with theirs. While we had no argument with them on this, they did not test their equipment to allow us to find out if there would be a problem until 6 p.m. the night before the dedication. None developed. We did cause some interference in their PA system from a Citizens Band radio we had installed in the mobile studio, but this was corrected with a filter before they discovered what had been causing their problem.

During the big day, KCOG carried live broadcasts from the lake beginning early in the morning, then switched to live coverage of the arrival of the President at the Ottumwa airport, 45 miles away, then back to the lake for his arrival there and the ceremonies. Following this we switched to Ottumwa for his departure and then back to the lake for coverage of the large boat parade, both from the shore and from the houseboat which was in the parade. Immediately following the parade, we switched to the Appanoose Country Club in Centerville for the Governor's Luncheon and carried the various

continued on page 81



APRIL 1972

Broadband Cable Television Systems for the Future: The Akron Installation

All You Ever Wanted to Know About Production: Camerawork

All You Ever Wanted to Know About Production—Part Six—Camerawork

by Douglas Gratton

Camerawork is an essential factor in television production. When it is bad, it usually draws so much attention to itself that not even Sir Laurence Olivier's golden voice and inspired acting can move the audience past an off-center, soft, unfocussed close-up. But when the camerawork is good, well, nobody notices. That is to say, nobody but the director, producer and everyone who knows the score! So, what every cameraman MUST know...

Basic shots:

ECU	(Extreme Close up) From eyes to mouth	
CU	(Close Up) Top of head to below chin	
MS	(Medium Shot) Top of head to mid-chest	
LS	(Long Shot) Top of head to feet	
1 S	(One Shot)	One person
2 S	(Two shot)	Two people
3 S	(Three shot)	Three people

Got the idea?

Pan: Director's instruction to move panning handle to either left or right

Tilt: Director's instruction to move panning handle up or down

Zoom: Director's instruction to move zoom lens control either in or out.

So remembering that a cameraman is addressed by his camera number and *not* by his name, a typical snatch of Control Room dialogue would be as follows: "One, pan left to two shot... Three, close-up reaction shot... One, focus... stand-by to take one... take one... Two, loosen out to three "shot... etc., etc... "

You see, it's fast, effective and, above all, economical in terms of time. A good Control Room operation has the same "feel" as a hospital operating room or air-traffic control center. There is no time for casual chat replete with unnecessary adjectives. A real-time event is unfolding which has to be controlled by a team of specialists who share a common language. By the way, the cameraman should not speak. Good cameramen, like little boys, should be seen and not heard. Remember, the director's representative in the studio is the floor manager, and it's the floor manager who will tell the director that the studio is on fire!

Now, some hints on techniques:

1) If the director asks a question to the cameraman, then, *after having checked that he is "off air."* the cameraman can answer either "yes" or "no" by shaking or nodding his camera.

2) If the director wants a close-up and if he does not know the cameraman is at the end of his zoom lens, then *after having checked that he is "off air."* the cameraman can indicate that he is at the end of his zoom by quickly flicking the zoom control mechanism until the director notices it in the Control Room.

3) Always keep a wax or Chinagraph pencil handy to every camera since the director may wish to set a specific eye-line or special effect split screen, and the cameraman should mark the precise composition on the face of his viewfinder monitor.

4) Every cameraman should know the MOD (minimum operating distance) of his camera. Every lens has its MOD, so all shots under the magic figure (usually 4 feet or so) will be out-of-focus.

5) A good cameraman does more than just look at his viewfinder monitor. He should check out such factors as the set ("is that drape going to be pulled down by the sandbag," "is there enough product for the demonstration?") and, of course, tell the floor manager *before* the disaster happens

6) To locate a shot, it is sometimes better to raise your head away from the monitor and look around the studio then go into the shot with the camera. It can be rather like the game of "pin-the-tail-on-the-donkey" as you pan slowly around trying to find a close up reaction shot of the moderator while the director is gently screaming at you.

7) Get to know when your tally light is on...and off. Sometimes you can hear the relay go "click." Sometimes the ragged director in the Control Room will not be able to give you any warning when he switches you "on air." Also buttons have been known to be pressed accidentally! (See World War III and last.)

8) Practice composition and focus...and get your best friend to stand up and sit down 600 times (in close-up, it's still the hardest camera movement of all!), and watch as many professional live shows as possible and see how the big boys do it...and all the mistakes that they still make! And when you want to study composition, watch the film men! Practice *blindfolded* the operation of your camera until it's second nature to you (wow, I'm beginning to sound like a Marine D.I!) so that you are so groovy with your camera that you only have to think about focus, composition and speed. That last one is very, very important. It separates the man from the boy. If you sat in a Control Room and watched the professional cameraman come off one shot and go on to another, I think you'd get dizzzzzy! Learn to use not just your arms when you operate a camera. The secret in driving a motor bike is not in the steering...it is where you put that center of gravity called your bottom. Well, it's the same with a television camera...it's best operated when you use your arms, legs and your forehead.

And now, some other tips of an admin. nature:

1) Try to get your headset modified so that you hear program sound in one ear, and director's talk-back in the other orifice.

2) Never "burn in" your tube by pointing the camera at a studio light for any real period of time.

3) Do not expect to eat / smoke talk / dream when you run a camera. It's a full-time job and it needs all your concentration. If you had too many beers for lunch, then tell the floor manager and he will call the break.

4) Keep a small clipboard handy, so that you can make a "shot list" if the cruel and demanding director forces you. (That's where the Chinagraph pencil and shot abbreviations will come in handy.

5) When you have nothing else to do...*stand by your camera and keep your headset on!!!!*

6) When you have occasion to leave the studio etc., *always* stop-down your camera and cap-up the lens.

O.K.? Good luck! *CM/E*

Broadband Cable Television Systems for the Future.

By Malcolm M. Ferguson

Details on TeleVision Communications' CATV system that has been installed in Akron, Ohio.

Will cable TV sell in cities where the potential subscriber can already get quite acceptable reception for a number of TV stations? The evidence appears to be no—if redistribution of existing signals is the only service. Thus, to make CATV viable in these big city areas, the system must be capable of performing many other diversified services. Obviously the goal in providing these extra services offers greater incentive for potential subscribers to connect to the system and to generate new sources of revenue as a result.

- A few examples of such services might include:
- A newspaper service with either facsimile or electrostatic print-out in the home;
- An alarm facility. . .to include circuits for fire, police, burglary, etc.;
- An audience or community analysis service for the pre-testing of commercials in conjunction with national advertising agencies;
- A local merchandising service complete with an automatic "buy" signal that can be generated within the customer's home and read out at a strategically located headend by means of appropriate electronic receiving and computing devices;
- A meter-reading service for utility companies;
- Various community service channels, including a weather channel, a local news and sports service, a UP or AP news service, a stock exchange service, etc.

Most companies now holding or vying for a franchise in a metropolitan market have found it incumbent to propose many, if not all, of the above services in order to enhance their chances of being awarded the franchise and to comply with its commitments.

Once the decision has been made to build a large city cable communications system, it then becomes necessary to determine how these new services can best be accomplished.

A brief review and description of CATV equipment that is available on the U.S. market follows.

Amplifiers that are on the market provide for a passband of 40 to 270 MHz depending upon the particular manufacturer. The distortion products of currently available amplifiers characteristically permit the cascading of 30 of these units more or less before degradation of picture quality becomes discernable.

A number of amplifiers include push-pull circuitry to provide additional suppression to second order products. Therefore, it is possible to transmit as many as 32 NTSC video-plus-sound television channels through such an amplifier. Of course, a set-top converter is required to permit the subscriber to receive any non-standard frequencies.

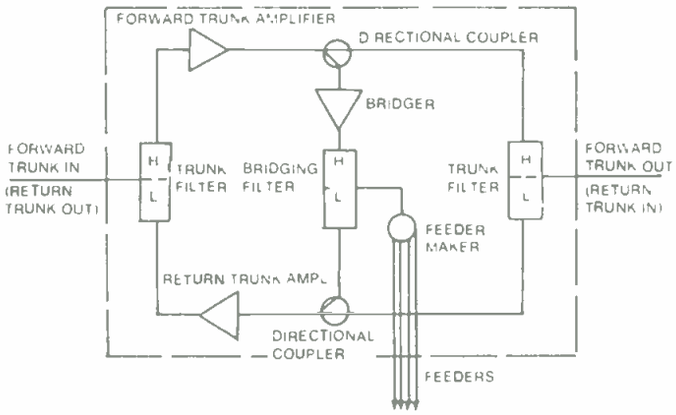
Simplest two-way CATV amplifier

Possibly the most popular approach to two-way system design is the method detailed in Fig. 1 which employs the spectrum between 30 and 54 MHz for the cross-over filter. Typically, the system has a bandpass of 54 to 270 MHz in the forward direction (32 television and sound channels, in addition to the FM band) and 5 to 30 MHz (one television and sound channel plus 19 MHz of data) in the reverse direction. The reason for the popularity of this design is that it only requires one cable and therefore is relatively less expensive to install. There are three key disadvantages of this type system: 1) Insufficient bandwidth greatly restricts the number of video and sound channels that can be accommodated in the reverse direction; 2) Due to the relatively narrower bandwidth assigned for the cross-over filter, the likelihood of group delay distortion is much greater, particularly in systems requiring a long cascade for the trunk system; 3) It is not possible to receive more than 12 channels in the forward direction without a set-top converter necessary to "tune in" the non-standard frequencies.

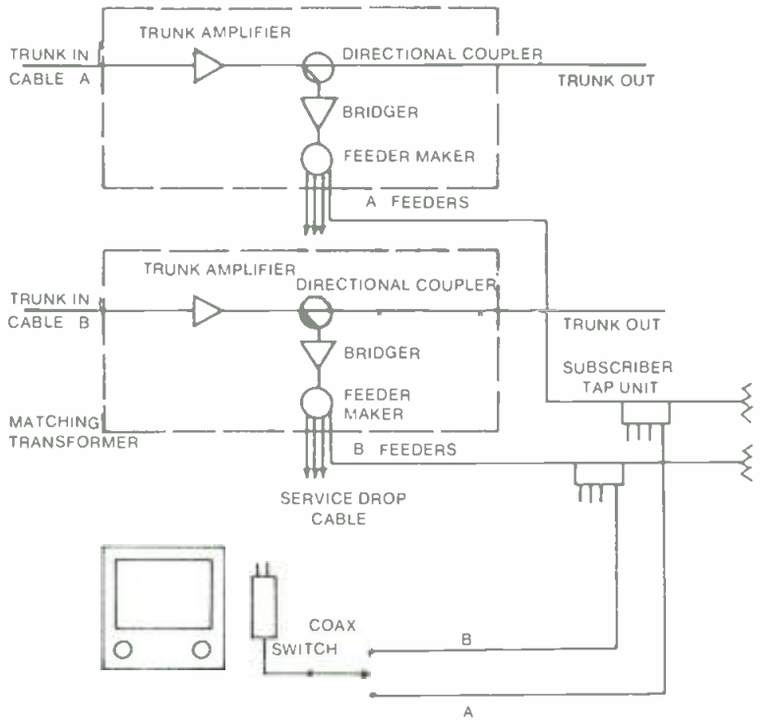
The dual cable concept

By installing a dual cable system with an A-B switch mounted at the subscriber's television set, it is possible to deliver as many as 18 television signals and yet avoid the requirement for the set-top converter. (The foregoing assumes that there are no direct pick-up problems as caused by high power VHF television broadcast stations located nearby.) While it is approximately one-and-one-half times

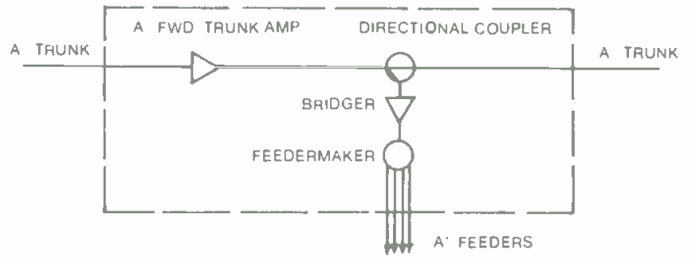
Mr. Ferguson is director of engineering, TeleVision Communications Corp., a division of Warner Communications.

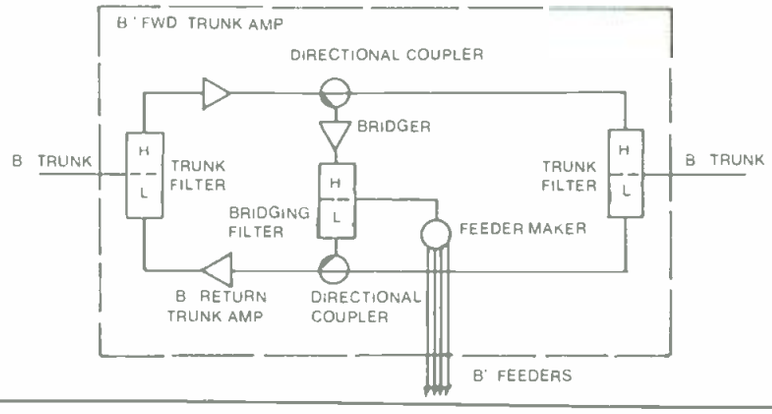


Simplest two-way CATV amplifier



Dual cable two-way CATV system.





The Akron system

more expensive initially to install a dual cable system, subscriber installation costs are much less due to the fact that a set-top converter is not required and thus, by the time the system is 50 percent saturated, its initial higher cost has been overcome. Moreover, as the system continues to acquire subscribers, the cost of the dual cable system as compared to the single cable system plus necessary set-top converter becomes more and more favorable.

TVC's Akron system

There are many possible two-way system designs, many of which were described in a paper by Andrew W. Bernhart of Jerrold Electronics Corporation presented at the NCTA Convention, July 1971. The system that follows was selected for TeleVision Communications Corporation's CATV communications system that has been installed in Akron, Ohio.

Because of the availability of numerous off-the-air signals to the owner of a television set with a moderate cost antenna, it was determined that the largest number of television channels and other programming possible within reason must be carried on the CATV system in order to be able to sell the subscriber in Akron. By selecting a dual cable system in Akron, it is possible at this time to deliver 18 NTSC television signals to the subscribers without the necessity of installing a converter at each television set. It was always anticipated that at whatever date in the future it becomes desirable and economically viable to implement two-way communications, converters would be provided for cable A. By selecting the proper converter module, as many as 30 channels could be provided on cable A alone. In choosing the dual cable design approach, it is possible to maintain the capability of delivering 30 NTSC television channels to the subscriber on cable A without any degradation to the picture quality due to group delay as is possible in a "normal" two-way CATV system. In the Akron system, cable A is designated as the traditional high-quality CATV cable.

At the time that cable A is made operational on a 30-channel basis as defined above, cable B will have retro-fitted with the spectrum of 108 to 174 MHz assigned for the cable B cross-over filters; this design permits the forward transmission of 14 channels between 174 MHz and 260 MHz. It should be noted that seven of these channels may be "tuned-in" on the standard U.S. television set without the requirement of the set-top converter. The cable B trunk system in the reverse direction will have a bandwidth capability from 5 MHz to 108 MHz and would be capable of transmitting 14 NTSC television channels.

Cable B feeder system would have a forward bandwidth of 40 through 260 MHz which is more than adequate to transmit the 14 NTSC television channels coming from cable B trunk. The return bandwidth capability of cable B is 5 to 30 MHz, capable of transmitting one NTSC television channel plus 19 MHz of data bandwidth.

We expect that most of the return video requirements will be from schools, hospitals and commercial operations and could be easily connected to the trunk system.

The Akron system is in front of 120,000 potential subscriber homes and is 950 street miles in length. In order to minimize long cascaded trunk systems, it was necessary to install two antenna headend systems. By doing this and using large one-inch low loss trunk cable, the longest trunk line amplifier cascades do not exceed 25 units.

The two headends are separated by 7.6 cable miles and are interconnected with a single, one-inch, two-way trunk. Seven NTSC channels are converted to sub-low-channel assignments between 7 and 45 MHz and are transmitted to the second headend. The return bandwidth capability of this interconnecting trunk will be from 54 to 108 MHz. This special interconnect trunk was installed in order to make locally-originated and other non-off-the-air programming available to both the headends. Also the return portion of the interconnect trunk system will permit central collection and processing of data information as well as return video signals.

The system's operating specifications are set forth as follows:

1) The outgoing forward system specifications for signal quality us measured at ths subscriber's terminal are:

X MOD=50.6 dB
S / N ratio=43 dB

2) The upstream reverse system specifications have signal quality as measured at the headend:

X MOD=67.3 dB
S / N ratio=44.6 dB

3) A signal that is generated at the furthermost system extremity, then transmitted to the headend over the return system, and back again over the forward system, will conform to the following specifications:

X MOD=49.4 dB
S / N ratio=40.6 dB

The installment of a separate "return-only" cable at the strategic forward trunk splits in cable B to prevent the noise generated by all of the amplifiers within the system from arriving back at the headend on one master trunk. By installing the plant in this manner, smaller portions of the city are connected to the headend, preventing the mass accumulation of noise.

Suppliers are projecting that two-way interactive terminals, including the basic converter module located within the modem, with channel selection by means of a keyboard conveniently located beside the television viewer's chair,will be available in early 1973. The keyboard will, of course, also be capable of performing many other functions, such as calling up information retrieval, audience polling, electronic calculators, etc.

It is very difficult to forecast precisely what future demands will be placed on a two-way CATV communications system. However, it is believed by the author that the design of the Akron system has the capability of meeting immediate requirements and the flexibility of being modified to fulfill future needs. **CM / E**

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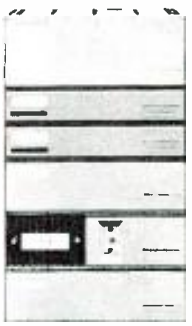
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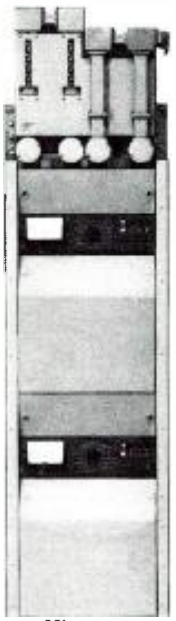
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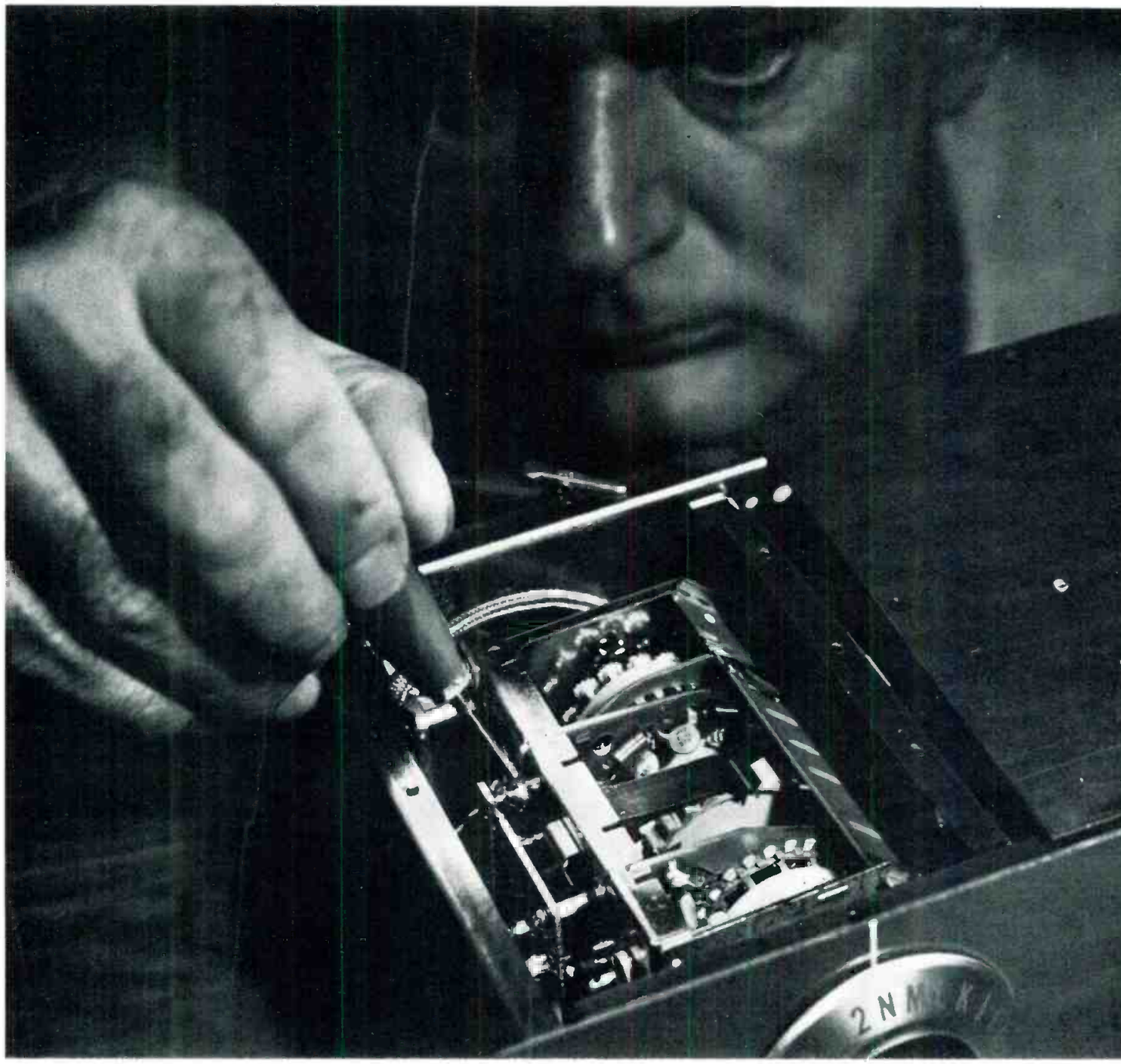
Circle 176 on Reader Service Card



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BROADCAST EQUIPMENT

Videotape recorder/player for color uses ½-in. tape, has simple assemble edit capability. Model VR-420 uses two motors, eliminating scanner belt, a rotary transformer (no slip rings), and a tracking meter. Resolution is 300 lines in mono and 230 lines in color. Single frame can be held for up to five minutes without serious picture degradation. S/N ratio is 42 dB. A standard 7-in. reel runs 60 minutes. $1200. AMPEX. **275**

"Coreless" electric motors are noiseless in operation and work smoothly on low voltage. Cylindrical rotor has

very low inertia, peak efficiency up to 90%, and very flat torque-speed ratio for small speed change with load variations. Motor is aimed for sound reproduction equipment, image information equipment and high precision measuring instruments. CANON. **276**

Portable receiver for TV and FM sound runs on standard "D" cells. "Video-Voice" is cubical in shape, about 6 inches on a side, brings in FM band and audio of VHF TV band. $29.95. CONCEPT PLUS. **277**

Video delays are packaged in small metal boxes, 4½ x 2½ x 1¼ inches, with BCN connectors. Silver Star delay units include switchable unit with infinitely variable delay time from 10 to 165 ns, with ± 4 ns trim. Variable unit can be cascaded with fixed delay units of 50, 200, 500, and 1000 ns up to a maximum delay of 4000 ns. $22 to $150. TELEVISION EQUIPMENT ASSOCIATES. **278**

CATV taps are available in both convertible or non-convertible models; the latter are less expensive but demand a choice between aerial or underground use. Taps of both classes are available with either 2 or 4 outputs, are claimed to be the first taps to meet proposed FCC specifications. ANIXTER-PRUZAN. **279**

Boom microphone minimizes subsonic low-frequency transients resulting from rapid boom movements or wind. Model SM5C is a unidirectional dynamic microphone with a 100-Hz hi-pass filter to keep low-frequency disturbances from overloading input stages or degrading s/n ratio. $267. SHURE BROTHERS. **280**

Time-based institutional programmer provides 48-hour control of 48 program channels. Sealectroboard® matrix board uses program pins to connect two or more contact decks. Each deck may be interconnected in a variety of ways, eliminating patchboards and multipoint switches. SEALECTRO. **281**

Coaxial step attenuators cover frequency range dc to 18 GHz, can be cascaded (two units) for a total of 69 dB attenuation, adjustable in 1 db steps. Series 180 has 1.2 dB insertion loss at 18 GHz and less at lower frequencies, VSWR of 1.60 or less. Attenuation is accurate to about 0.5 dB or less over the frequency range. GENERAL MICROWAVE. **282**

Low-cost color camera for TV uses a Plumbicon camera unit. CEI-280 is a full NTSC color system, with all electronics remotely controlled, including color balance, registration,

and other engineering functions. A separate panel controlling lens iris, master gain, master black level and paint pots can be mounted near the camera or at a distance. Viewfinder displays a variety of video signals, including a choice of two external sources. $17,950. COMMERCIAL ELECTRONICS INC. **283**

Phono pickup arm is made of a lightweight alloy and is equipped with an easily-removable cartridge head shell. Adjustments are available for

arm height and stylus pressure. It has a 4-ft pre-wired audio cable, and is normally supplied with a Y940 stereo cartridge, but will accept any cartridge conforming to EIS or JIS standards. BROADCAST ELECTRONICS. **284**

Modifications to Sony VTR's convert them to vertical interval editors with increased production flexibility. Sony Models 320 and 320F are enabled to make video only, audio only, or video/audio edits, using the same audio track. In addition, lockup time can be cut to one second. TELEVISION ASSOCIATES. **294**

Noise reduction system claims reduction of hum, hiss and crosstalk in recording by more than 30 dB. DBX 187 has four channels, uses straight-line decibel compression before recording to complimentary expansion in playback. Uses are multi-track recording, stereo mixdown, telephone line transmission and echo systems. $1950. DBX INC. **296**

Dimmer pack system for studio lights includes six 2400-watt fully filtered solid-state dimmer modules in a compact housing. Colortran Dimmer Pack weighs 60 pounds, can be remotely controlled by Control Pack unit. Adding Master Pack provides proportional cross-fading, pile-on mastering of presets, independent master and grand master. BERKEY COLORTRAN. **298**

Reverberation unit has three decay times, six electro-mechanical decay lines, each tuned differently. Reverbertron is 3¾ in. high and 7 in. wide, is isolated against building rumble and environmental noise. It requires −30 dBm input; has S/N ratio of 65 dB, and equalization with bass, midrange and control presence peak selection, high end rolloff. There are local and remote selection of three degrees of reverberation. FAIRCHILD. **299**

continued on page 56

PRODUCTS

Circle cutter for cable access holes cuts precisely-placed holes in about one-fourth the time needed to do the job by hand. Cutter holds the plastic end cap firmly in position, including caps for all Preformed splice cases from 2.00 in. to 9.5 in. in diameter. PREFORMED LINE PRODUCTS. **285**

Low-light-level TV camera has 50,000-1 automatic light range. The 2850 Series is completely automatic, with an f/1.4 lens, and has light range controls remaining fully operational for brightness from 0.5 footlambert to 25,000 footlamberts. It can be aimed directly at the sun without damage, then be turned to a low-light area and perform perfectly. Horizontal resolution is 700 lines in the center, 600 in the corners. COHU. **286**

Transmitter color phase equalizer and waveform corrector provides continuously variable smooth curve and discrete correction for both amplitude and phase. Model D-701 improves performance of transmitters already equipped with video or IF delay equalizers, removes suck-outs, resonances, reflections from mismatches, streaking, smearing, etc. Adjustments can be made during program using VITS as reference. $3700. DATATEK. **287**

Heat-shrinkable sleeves for compression splices have internal coat of thermoplastic sealant, on polyolefin tube. SPC Sleeves rated for 600 volts, shrink over splice while internal sealant melts and floods entire splice surface. COLE-FLEX. **288**

Optical multiplexers allow extremely rapid "on air" transfer between projection sources. 5000 Series uses electric motor drive coupled to independently guided mirrors for transfer time on the order of 50 msec. Models are available for three inputs, or four inputs. $1255 to $2600. LAIRD TELEMEDIA. **289**

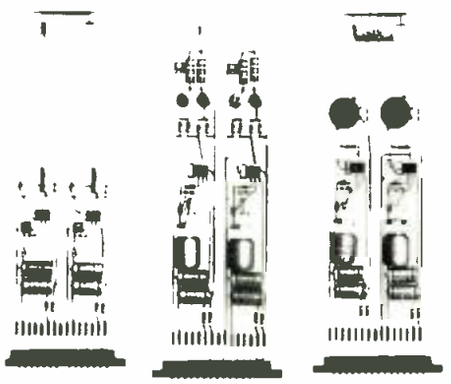
Interval switcher/special effects generator accepts six video inputs, produces a wide variety of wipes, split

screen effects, self or internal keying, monochrome matting, etc. Model MEA-7300 Production Switcher will make wipes and split screens with

any keying or matting mode, and will key, wipe, or split-screen a monochrome signal into a color signal without loss of color burst. $2985. GBC CLOSED-CIRCUIT TV CORP. **290**

Transmission loss and return level test set allows one-man cable completion tests. Model 9041 measures transmission level from +12 to −48 dBm with 0.1 dB accuracy. Echo and return loss are measured from 10 dB of return gain to 50 dB of return loss. WILTRON COMPANY **291**

Amp/preamp/limiter on plug-in card, one of series of professional audio units, automatically prevents overload, eliminating need for pads at mic preamp. Model 725AL uses op



amps in integrated circuits, on card 2½ inches high for 3½-inch file, with PC connector. Others in series are line amplifiers, mike, tape, and phono preamps, summing or mixing amplifiers, etc. FAIRCHILD SOUND EQUIPMENT CORP. **292**

Tape cartridge player-recorder has touchbar operation, built-in audio switcher. Century Series puts all electronics on a plug-in circuit board, has three inputs to record amplifier. Three units can be mounted side by side on standard rack. $430 for playback. SPARTA. **293**

Time base corrector accessory for the VPR-7900 closed-circuit videotape recorder produces highly stable signal. Model TBC-790, added to the VPR-7900, cuts jitter to ±30 nanoseconds in monochrome and ±2.5 nanoseconds in color. Optional additions include a direct NTSC color module to correct color phase errors, a color dropout compensator that fills dropouts from the previous line, and an automatic velocity compensator to cut line-by-line color errors. $9500 and up. AMPEX. **295**

NEW LIT

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More than 350 **intrusion and fire alarm products** are covered in 64-page catalog, "Space Age Security," including simple "open loop" systems, ultrasonics, radar, infrared and other intrusion detectors, with application notes and specifications. Mountain West Alarm Supply Co. **200**

"Teacher's Guide To Television" is published twice a year, with comprehensive study guides, bibliographies, questions and answers, etc., on upcoming television programs of educational interest. Subscription (two issues): $3.00 (quantity discounts). Write: Teacher's Guide To TV, P.O. Box 564, New York 10021.

RF test instrumentation, including field intensity meters, current probes, noise meters, interference analyzers, "sniffer" leak detectors, as well as antennas and other microwave components, are completely described in 16-page brochure. Singer Instrumentation. **201**

Shield beads which are slipped over leads to attenuate RF interference are covered in brochure giving physical specifications and frequency-vs-attenuation curves. Fair-Rite Products Corp. **202**

Brochure gives specifications of voice **powered telephones** with built-in buzzer systems. Cob Industries, Inc. **203**

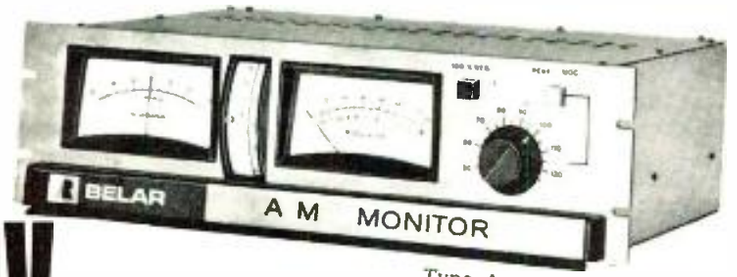
Video-audio switchers that eliminate patch cables, meet EIA (RS-170) standard, are covered in data sheet, with specifications. Marco Video Systems. **204**

Two bulletins "System 108/1-17 plus 4," describe **picture digitizer series,** which convert any continuous-grey-tone image on film or TV screen into digital signal with 256 grey levels, at digitizing rate of 200 kHz. Spatial Data Systems. **205**

"Electronic Test Equipment Rental Guide" discusses in detail comparative advantages and disadvantages of purchasing, renting, or rental/purchase of electronic test instuments. Rental Electronics. **206**

Design and applications of **switching regulator power supplies** are topics of technical article reprint. Trio Laboratories. **207**

now... a company that has AM, FM and TV frequency and modulation monitoring systems.



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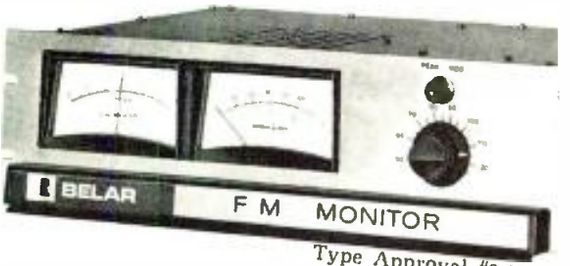

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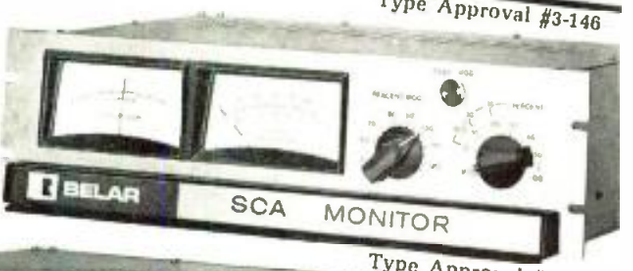

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Circle 122 on Reader Service Card

CROSS-TALK

(and reader feedback in general!)

The crunch on space has kept out of the magazine for several months all letters from readers. But we beg readers not to be discouraged: *keep them coming*. No magazine can keep on the track over a long period of time without strong feedback from its readers. We get that feedback not only from letters, but from your comments on readers' service cards, and in the readership survey questionnaires. Please use all these communication lines to the fullest extent to express your approvals, criticisms, and unfulfilled needs for material. Following are brief comments on a few of the letters and questionnaire responses on hand at the present time.

Letters

Mr. R. C. Peavey, executive director of TAGER, the educational television combine now active in the Dallas-Fort Worth area in Texas, wrote to explain that *nine* educational institutions in the area are joined in the TAGER program, not just SMU as our article in the October 1971 issue, "University Extension Via TV," might be interpreted to mean. . . Mr. Charles H. Crutchfield, president of WBT-WBTV in Charlotte, North Carolina, took exception to a part of our editorial in the June issue, "Sustaining Free Electronic Journalism." To our plea for more intelligence applied to news stories, more involvement, he countered that "bias" should be kept strictly out of news reports; polls show that large segments of the American public distrust both broadcast and printed news, and this distrust, said Mr. Crutchfield, can be removed only by strictly "factual" reporting. He further objected to our defense of "editing" in news reports, recognizing the necessity for some editing but citing the case of the controversial CBS broadcast, "The Selling of The Pentagon," in which the editors allegedly connected a person's answer to a different question from the one actually eliciting it. *Our counters to Mr. Crutchfield:* We are in total agreement on the necessity of news reports to be "true;" more intelligence and involvement means getting *all* the relevant facts and telling the *whole* story as nearly as possible; we are also in total

continued on page 62

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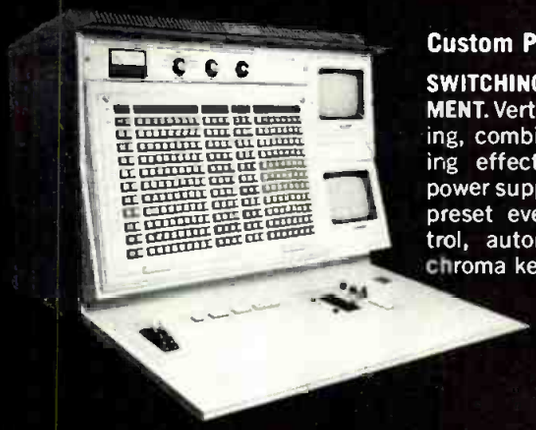

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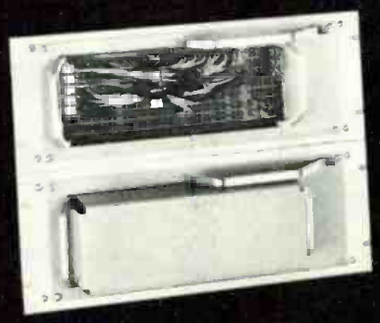

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Circle 125 on Reader Service Card

CROSSTALK

agreement in condemning "editing that distorts the facts in any way or creates a misleading or false context (but we're ever mindful that we're forever editing material down to size—just as we are doing now to these letters—and our selectiveness does filter out some context. . . . For the record, readers, be advised we get frequent letters from Mr. Fred Weber, executive vice president, Rust Craft Broadcasting, whenever we editorialize "what ought to be" in broadcasting without also adding that cable operators have the same responsibility. . . . Mr. Arthur A. Jablonsky, chief engineer, KXOK, tells us about a young man, born blind, who has a sharp mind and excellent hearing and wants to get into electronics. He asks if we or any readers know of a way he can get training. If you can help, please write Mr. Jablonsky at 4255 West Pine Blvd., St. Louis, Missouri, 63108. . . . Mr. Robert Pickett, station manager, WPXY Radio, Greenville, North Carolina, lists a large number of projects he would like to see covered, such as inexpensive but good quality and dependable mixers, line amps, remote amplifiers, remote or mobile broadcast facilities (see January 1972, "Studio on Wheels," Mr. Pickett), church and sports equipment; studio ideas such as phono recording facilities, wireless microphones, reverb equipment, etc. He wants how-to articles on these and other similar subjects with specific brands and model designations, costs, etc. He wants us to establish an "idea hunt" for ways in which other station operators have solved these and similar problems. That idea hunt, Mr. Pickett, has always been a constant part of this magazine's activities and we are delighted to have this chance to restate its importance emphatically: We are eager for any and all material on how station operators have solved equipment, organization, or technical problems and will welcome such material in any form, from short notes with a block diagram to complete articles.

Here is a recent exchange of letters that gave us pleasure. (Several other magazines in the field published the original request from Mr. Worley and the photo he refers to, but had to ask readers to help.)

Dear BM/E: *(Oct. 13, 1971)*

Enclosed is a photo of an FM exciter that was given to us that we are trying to identify. It has no identifying marks, serial numbers, or trade names. The output tube is a 5686. It has a provision for stereo. The unit is well built with quality components and

continued on page 64

NEW FROM RANK FOR 72

Taylor Hobson's flarefree lens

VAROTAL 30 produces perfect pictures without a rayshade. The range extender operates from your panning handle holding perfect focus while you change from one shot to another.

With a 56° angle of view, minimum object distance is eighteen inches. For remote broadcasting you get the widest angle in the TV world.

There are seven different control systems to choose from and it gives you the ability to change from servo to manual, or vice versa in less than one minute off air time.

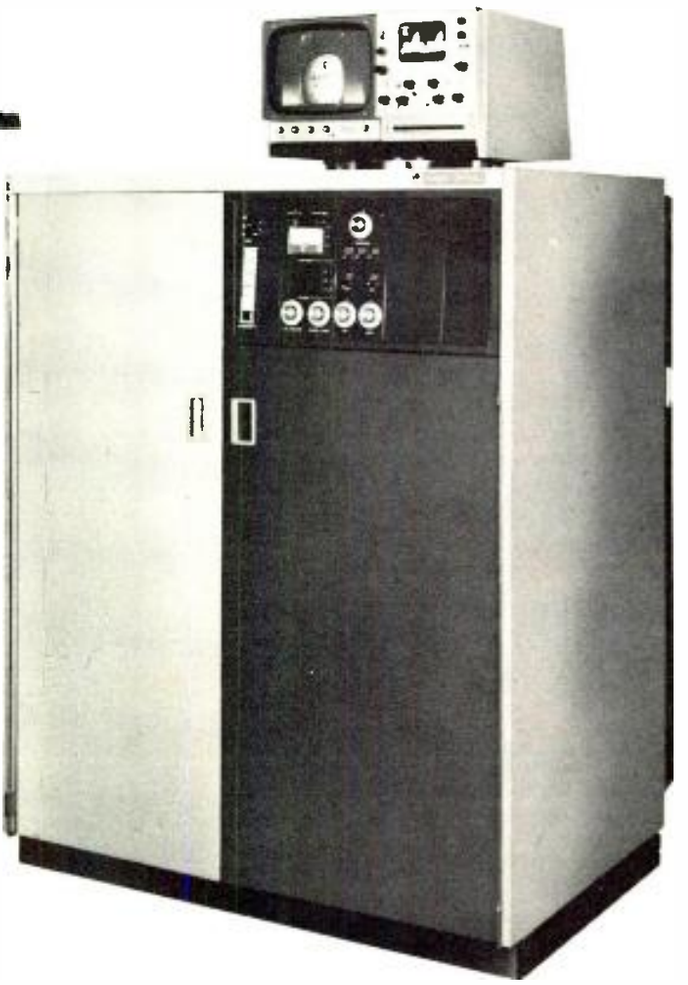
And that's not all. We want to show you that Varotal 30 achieves more than any other TV lens in existence.

VAROTAL 30
See it at NAB-Booth 317

RANK CINTEL

photoconductive telecine

CINTEL TELECINE is an entirely new approach to telecine for film chain use. It accommodates film reels up to 20" in diameter, film loops and slides. Modular construction permits simple extension from uniplex tc multiplex format. It used Bauer 16 and 35 mm television projectors fitted with Cintel automatic lamp houses.
And there is much more.



See it at NAB-Booth 317

or

Write for complete information and prices

RANK PRECISION INDUSTRIES, INC.

New York 260 N. Rt. 303 West Nyack, N.Y. 10994 (914) 358-4450
Illinois 411 Jarvis Ave. Des Plaines, Ill. 60018 (312) 297-7720
California 5926 E. Wash. Blvd., Los Angeles, Calif. 90040 (213) 685-8590

Circle 128 on Reader Service Card

CROSSTALK

cleanly laid out. If you can help us identify the manufacturer and/or obtain schematics, we will be very grateful.

Mark C. Worley
Transmitter Supervisor
KAMU-TV
College Station, Texas

Dear Mr. Worley: *(Nov. 4, 1971)*

From the tube lineup and panel layout, your unit looks to us like an exciter in the 900 Series of FM transmitters built by Standard Electronics Corp., Freehold, N.J., in the early 1960's.

Here are a couple of letters that were a little tougher. We are answering them herewith but, hopefully, some of you can be more helpful.

Dear BM/E:

We have a Raytheon RA-1000 transmitter that has what seems to be a built-in characteristic. All engineers counseled seemed to have no answer for why this unit recycles for apparently no reason and in no set pattern. For days it may not go off the air, then it may cycle 20 times in one day. Perhaps some engineer may have solved this problem in the past.

Hugh M. McBeath
Owner-Manager
KJBC
Midland, Texas

Dear Mr. McBeath:

Perhaps your transmitter is trying to tell you something. As far as we know, Raytheon hasn't made a broadcast transmitter in some 20 years, so you must have an elderly rig. As you probably know, old-timers take frequent naps. Why don't you consider a well-earned retirement for your transmitter and hire some fresh blood?

Dear BM/E:

My FM is Class-A, 2.6 kW, two-bay system, side-mounted, on AM 150 ft. tower. Since we are located in flat-central valley of California, some say to reach out to areas beyond 22 air miles can't be done; others that it should be easy. Unfortunately, nobody seems to give the reasons or possible solutions. Of course, manufacturers say new antenna system, but that is costly unless some definite improvement in this fringe signal could be assured—maybe to the mountains which really aren't that close. Or additional height on the flat-lands. If any FM'ers have any ideas, would be grateful for information. Transmitter: Bauer 607-A; Antenna, two-section Jampro type JA2-B; Tower, 150 ft. from transmitter, strung on pole braces with AM; AM slant-line feed, mid-point 50

continued on page 66

We were 5 years late

It was a matter of pride. And integrity. And an awareness that we'd better have a damned good product before entering the tough and competitive U.S. market.

So for five years Fuji Film proved its broadcast videotape; made it the best magnetic recording material in the Far East. Best enough to have captured better than 75% of that market. And that's good.

ColTape liked the Fuji story so much we recently began distributing its H701 videotape in the U.S. And the response has been tremendous. So much so that we are now introducing our new High Energy tape about five months ahead of schedule.

Come to Booth 411 at the NAB and you'll have a chance to see our standard H701 videotape in use, as well as our new High Energy H721 broadcast videotape—available for delivery Fall 1972.

John Dale, Chuck Schneider and Bob Jones will be there, too. Live. Come early.

and 5 months early.

A DIVISION OF COLUMBIA PICTURES, INC.

COLTAPE

EXCLUSIVE DISTRIBUTORS FOR

FUJI FILM VIDEOTAPE

NEW YORK (212) PL 1-4400 HOLLYWOOD (213) 462-3111

CROSSTALK

ft. up tower. Maybe somebody in the flat-lands, and a similar situation, would have a solution.

John McAdam
Owner-Manager
KLBS AM/FM
Los Banos, California

Dear Mr. McAdam:

You seem to be already getting blood from a turnip, with a 2.6 kW at 150 ft. You can calculate the exact field-strength contours with the curves in the FM section of Part 73 of the FCC Rules and Regulations. If it still appears you aren't getting out as much as you should, there are several possibilities. The antenna may be misadjusted, the transmitter may not be making power, or there may be standing waves on the feedline. Do you have proper decoupling between AM and FM at the tower?

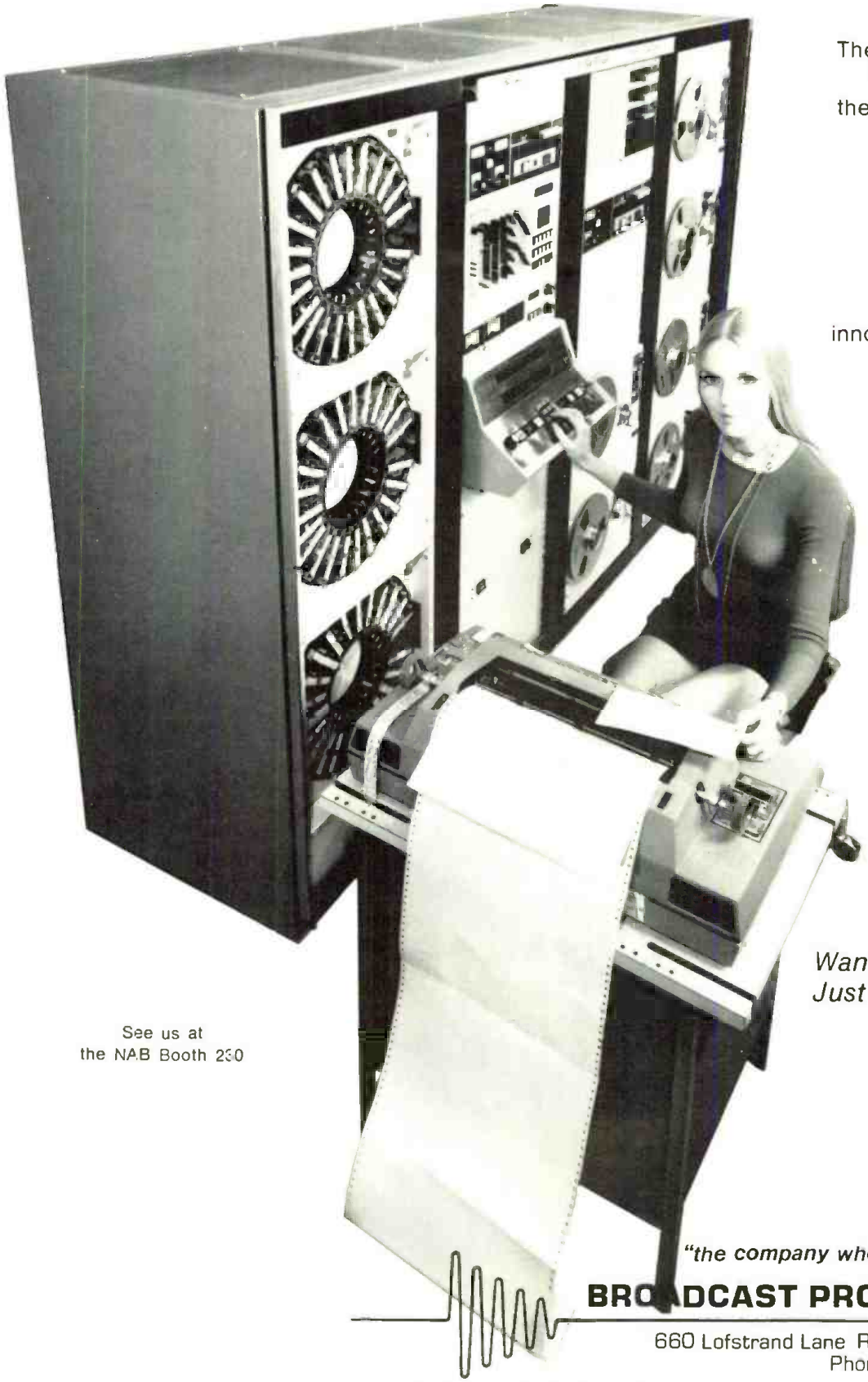
Naturally we also take pleasure in expressions of approval—and we *do* get them: "I still find your magazine extremely informative . . . Thank you for such profitable reading," Joseph A. Grady, chairman, Dept. of Communications, St. Charles Borromeo Seminary, Philadelphia; "I would be remiss if I did not take the time to thank you for your most informative magazine," Robert K. Lynch, Robert K. Lynch Productions, Atlantic Beach, Florida; "Your editorial (June) was excellent," J. Cummings, El Granada, California; "Just a note to let you know I think your Sudduth cover illustrations are great," Ludwell Sibley, Stanford, California.

From readers' service cards: "They are *all* good articles," "Making ITV Accountable was very good;" "Overall your coverage is very good;" "Good issue!"(December 1971).

More specifically, our emphasis on audio gets many kudos. The series on quadraphonic broadcasting has been very popular—although some purists object to what's happening. We deeply appreciate suggestions for articles that some of you make—Jim Stevens, your request on "Super 8" is in this issue. Sometimes we anticipate your requests. Bud Sunkel, general manager of WIAI, wrote right after he got his January issue: "It's true . . . the best things in life are free. Thanks for the complimentary copies of *BM/E*. Here I sit with plans for a Marti mobile unit . . . and here I sit with desires and associated problems relative to telephone shows . . . and in the mail comes the January issue of *BM/E* with answers to both . . . thank you."

BM/E

anyway you look at it ...she's some kind of system!



The new AR-2000 series Total Automation. It's the ultimate . . . the most advanced system for any format from "Rock to Bach."

But then— it's what you would expect from the innovators in automation. You have to see it to believe it.

Want a closer look? Just write or call:

See us at the NAB Booth 230

"the company who makes it!"

BROADCAST PRODUCTS, INC.

660 Lofstrand Lane Rockville, Md. 20850
Phone: (301) 424-4700

Circle 136 on Reader Service Card

NEWS continued from page 10

appointed sales and service dealers across the United States to represent its low-cost, single-tube color television camera.

Association News

NAB . . . Richard W. Chapin, board chairman of the NAB, will head a seven-man NAB group that will meet with FCC representatives to explore possible new procedures for problems unique to radio broadcasting. Other members: Sam W. Anderson, KFFA, Helena, Arkansas; Harold Krelstein, Plough Broadcasting, Memphis; Stanley McKenzie, KWED, Seguin, Texas; Dick Painter, KYSM, Mankato, Minnesota; Lee Smith, WKY, Oklahoma City; and J. F. Tennessen, KFKA, Greeley, Colorado . . . Another NAB committee, with eight members, will consider the association's future goals and direction. Chairman is Richard Dudley, president of Forward Communications, Wassau, Wisconsin. Five others are members of the NAB Board of Directors: A. M. Ockershausen, William D. Shaw, Phillip Spencer, Earl W. Hickerson, and Peter Storer. Also appointed to the committee were Richard Barron, the WSJS Stations, Winston-Salem; and Clayton Brace, KOGO, San Diego . . . At its winter meeting in Marco Island, Florida, in January, the NAB Board of Directors, in addition to initiating the ad hoc committee noted in the preceding item, recommended a strengthening of the government relations department to help with the many problems facing the industry. The Board also voted support for Congressional sentiment against any siphoning off of "free" sports programs to pay TV. A number of other moves were aimed at increasing NAB effectiveness and service.

CCTA . . . The Board of Directors of the Canadian Cable Television Association, meeting January 25 in Montreal, made the following recommendations aimed at strengthening the Canadian program production industry: 1) Simultaneous substitution on cable of local TV programs, which duplicate distant signals, at cable company expense; 2) Non-simultaneous substitution at broadcaster expense; 3) Commercial deletion as a permissive option; 4) Plans for purchasing Canadian programming from TV-broadcast stations for first-run and rerun over cable; 5) Rerun of newscasts. The Board noted that these proposals, which were within the scope of the CRTC cable policy issued in July 1971, would strengthen Canadian programming more than any formula based on contributions from cable revenue.

People

O. Leonard Press, executive director of the Kentucky Educational Network, was elected chairman of the board of directors of Educational Television Stations, a division of the National Association of Educational Broadcasters . . . **Charles F. Klein** is the new director of system development for the Cable Television Division of Television Communications Corp. . . . **Edward J. Donahue** was appointed to the national sales organization of the Communications and CATV Division of Essex International, with responsibility for CATV, wire and cable products in the North Central states.

James R. Glenn was named manager of sales services for the cable and equipment group of Superior Continental Corporation . . . Stations WHLI and WHLI-FM, Hempstead, Long Island, announced the appointment of **Norman J. Stern**

continued on page 70

Our new telephone can save you money on remote broadcasts.

The Bell System's new phone is the simplest equipment yet for originating remote broadcasts.

This set, called the Portable Conference Telephone, plugs directly into a standard telephone jack installed at the broadcast site. It is equipped with two broadcast-quality microphones.

No amplifier is needed. No preamp. In fact none of your station's equipment is needed at the site—and that means no technician need be sent to operate it.

Your reporter simply carries the 19-pound set with him, plugs it into the jack and an AC outlet, dials your studio and is ready to go on the air. By using regular telephone lines, you avoid the expense of special audio channels.

Between remotes, this phone won't loaf on the shelf. For staff meetings, its built-in speaker allows as many as 30 people to listen to a telephone conversation—and the microphones allow them to join in. On an executive's desk, it can permit hands-free talking and listening.

Call your local Bell Telephone representative for details of how this new phone can work for you.

We are continually working to improve service and help you do your job better.

In this case, when you have to broadcast from remote locations.

AT&T and your local Bell Company.

NEWS

berg as vice president, engineering . . . Telex named **Arthur I. Bruns** to the position of sales administrator of the Broadcast and Industrial Products group . . . **Charles R. Duke,** a 33-year veteran of the broadcast industry, was named a vice president of the G. E. Broadcasting Company, operator of WSIX radio and TV stations in Nashville.

R. T. Callais is the manager of a new division of Theta-Com, SRS (Subscriber Response System), the two-way cable system developed by Theta-Com . . . Philips Broadcast Equipment Corp., subsidiary of North American Philips, has appointed **Warren Charles** director of sales for the Audio Systems Division, with responsibility for sales of all the broadcast, CCTV and audio equipment under the "Norelco" trade name.

FCC Actions

The FCC acknowledged a defeat at the hands of the U.S. Court of Appeals in the D. C. District when the Commission asked for comments to aid in developing guidelines for **broadcast editorial advertising.** The Court had said that a broadcast licensee could not maintain a "total flat ban on editorial advertising," and asked the FCC and the industry to develop reasonable regulations for such broadcasts. Comments were to be returned to the FCC by March 8; presumably a preliminary set of procedures will be announced before too long . . . The FCC said TV comic Pat Paulsen, who filed in the New Hampshire Republican primary as a presidential candidate, is a bona fide candidate whose appearances, even in entertainment programs, obligate the carrying stations to give **equal time to all other presidential candidates.** On the other hand, President Nixon's network appearances for his economic program did not, said the FCC, give the Democratic National Committee the right to a prime-time reply under the Fairness Doctrine. Explanation: the Congressional rules on "equal time" nowhere specify that a candidate must use his air time "politically" to invoke the rule. On the other hand, the Fairness Doctrine applies to the broader program balance, and is satisfied if the station presents the major contrasting viewpoints in reasonable balance over a period of time. **BM/E**

Build from the bottom... by starting at the TOP!

If excavation is in your job picture, then start at the top — with Ditch Witch superiority — and build a sound foundation beneath your underground fleet.

Ditch Witch is TOPS in its class — with more sales* of trenching vehicles than all of the competition put together!

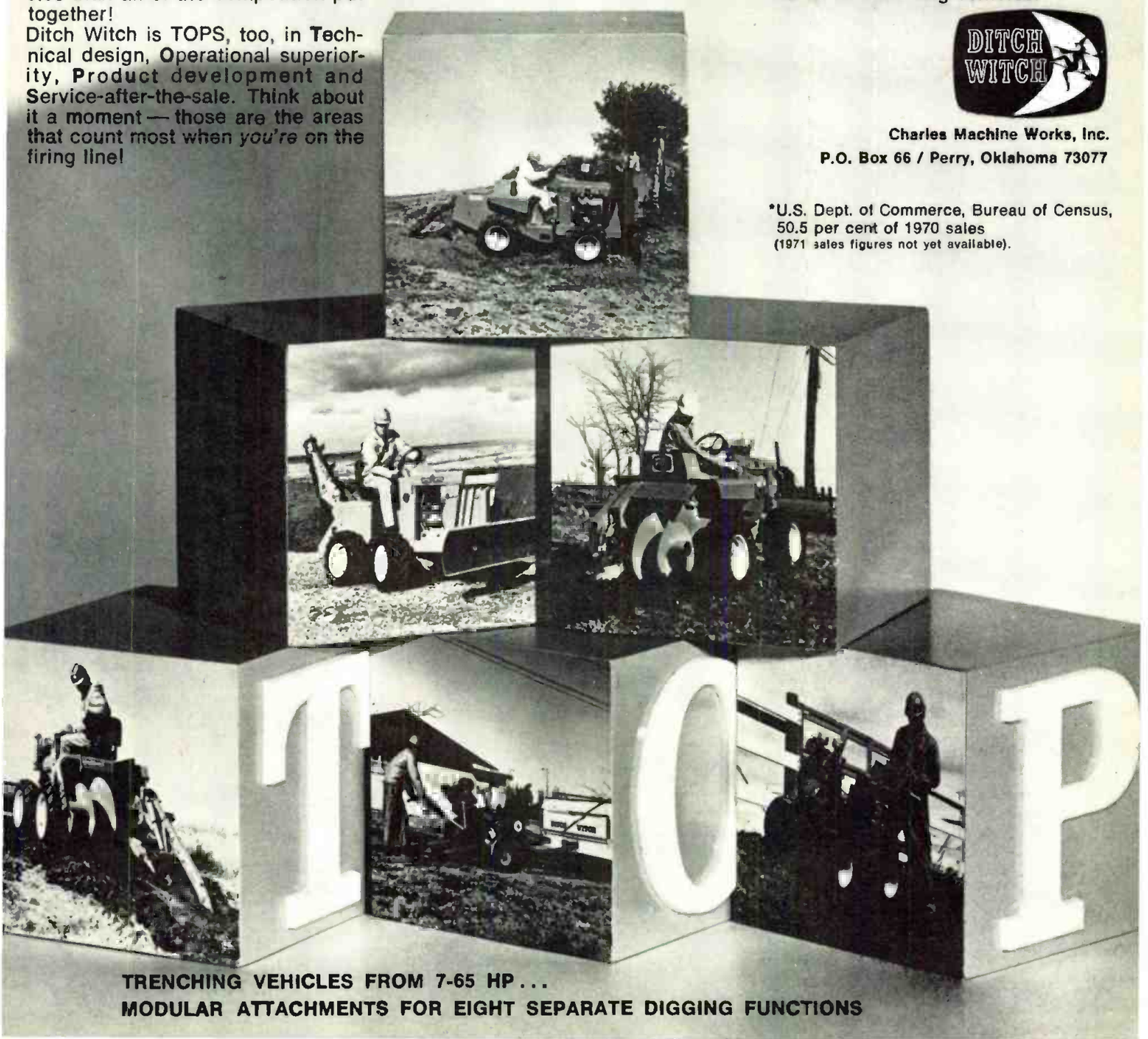
Ditch Witch is TOPS, too, in **T**echnical design, **O**perational superiority, **P**roduct development and **S**ervice-after-the-sale. Think about it a moment — those are the areas that count most when *you're* on the firing line!

And the Ditch Witch "building block" concept of modular digging allows you to match your requirements exactly with the right horsepower and the right machine. Start with the 7-HP C series and add capability as the job demands it . . . or start with the mighty R65 and build an entire digging fleet with Ditch Witch modular attachments. Whatever your own particular needs, you'll get the same TOP performance from America's TOP producer of trenching vehicles.

DITCH WITCH

Charles Machine Works, Inc.
P.O. Box 66 / Perry, Oklahoma 73077

*U.S. Dept. of Commerce, Bureau of Census, 50.5 per cent of 1970 sales
(1971 sales figures not yet available).



TRENCHING VEHICLES FROM 7-65 HP . . .
MODULAR ATTACHMENTS FOR EIGHT SEPARATE DIGGING FUNCTIONS

NAB '72

continued from page 35

icons, test equipment, microphones, magnetic tape.

Rank Precision Industries Inc. (Booth 317)
The **Varotal 30 television lens** is a new design with 56° field of view, an 18 in. minimum object distance, and 10:1 zoom ratio, combining wide-angle, narrow angle, and close-up shots in one lens. The Taylor Hobson design has three plug-in modules for zoom, focus and iris. Also, the Cintel **telecine,** for film reels to 20 in. diameter, simple extension from uniplex to multiplex.

Raytheon Data Systems Co., (Booth 107)
Complete **microwave radio systems** for STL, inter-city relay, educational TV nets. System engineering, path surveys, complete installation and maintenance.

Recortec, Inc., (Booth 341)
Machines for **cleaning,** restoring video and audio tape.

Revox Corp., (Booth 420)
Audio magnetic tape recorders.

Reynolds Printasign Co. (Booth 332)
Graphics for TV art.

Richmond Hill Laboratories Inc., (Booth 202)
Line of switching equipment, video terminal equipment.

Rodelco, Inc. (Booth 402)
VHF and UHF TV **exciters, transmitters, translators.**

Rohde and Schwarz Sales Co. (USA), (Booth 241)
Among the many test instruments for broadcasters to be shown are the new companion units, the SPIF **pulse bar and signal generator,** and the SPAF **color gain and delay test set.** The generator produces 2T/20T or T/20T sine-squared pulses. The test set gives a direct numerical readout of chrominance gain or loss, and delay, when reading the signal from the generator, with independent compensation of gain and delay.

Rohn Communication Facilities Co., (Booth 113)
Towers for TV, FM, AM antennas.

Rowe International, Inc., (Booth 223)
Background **music systems,** player units, tape libraries.

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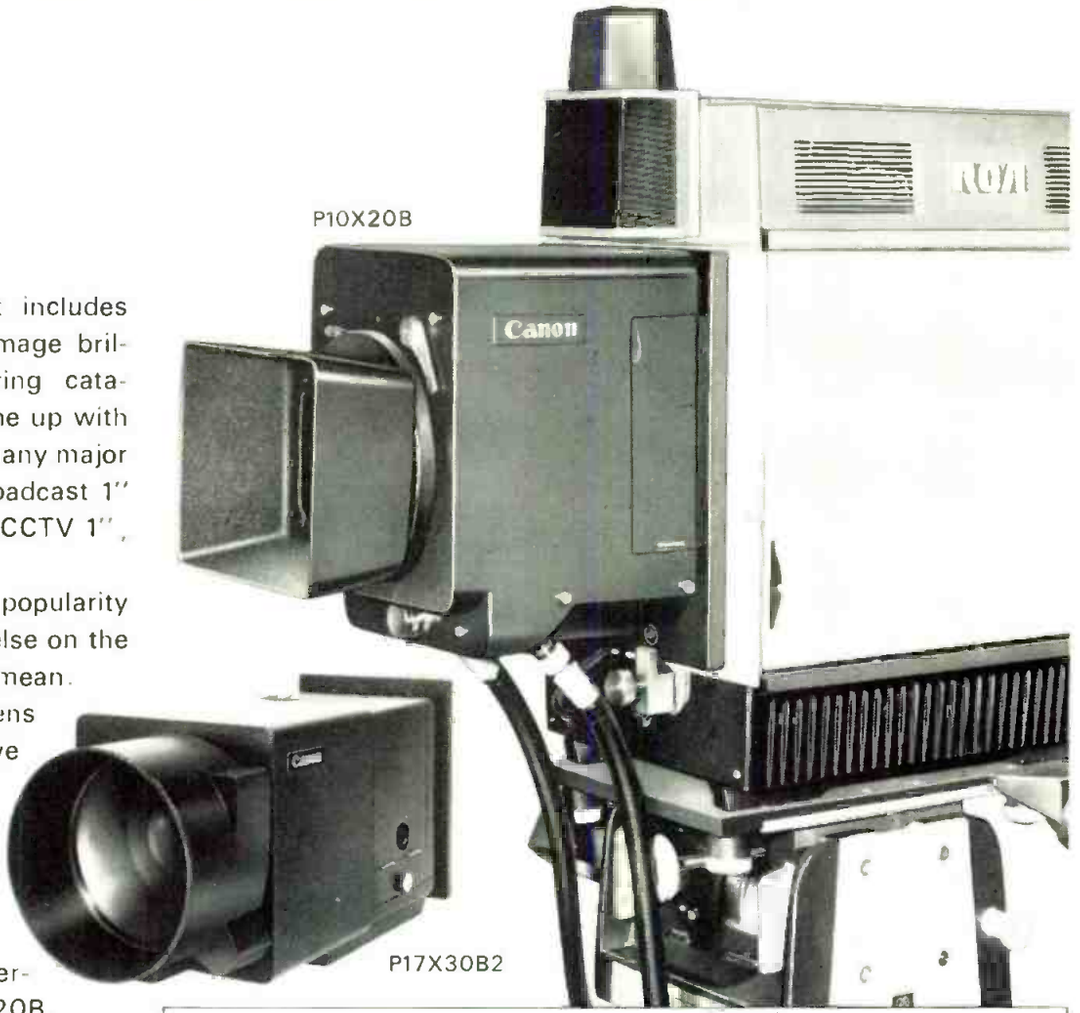
Shopping for lenses? Compare Canon!



Draw up a checklist that includes price, specifications and image brilliance, then start comparing catalogues. You'll probably come up with the Canon answer, like so many major camera producers—for broadcast 1" or 1 1/4" PLUMBICON® or CCTV 1", 2/3" vidicon.

Stack these two Canon popularity favorites against anything else on the market and see what we mean. The Canon TV Zoom Lens P17X30B2 has an impressive 1:2.5 relative aperture at focal length range (440-500mm), in spite of its 17X zoom ratio. At 30—440mm it's a remarkable 1:2.2, offering the same performance as our P10X20B, specially designed for maximum versatility with three different range extenders.

Both are ideal for a variety of situation, including dim lighting and open areas like field events.

Here are some other examples of the wide Canon line:

Manual				
	Name	Range of Focal Length	Zoom Ratio	Maximum Relative Aperture
1¼"PLUMBICON	P17 x 30B2	30—500mm	1 : 17	F 2.2
	P10 x 20	20—200mm	1 : 10	F 2.2
1" PLUMBICON	PV17 x 24B	24—400mm	1 : 17	F 1.8
	PV10 x 16	16—160mm	1 : 10	F 1.6
	PV10 x 15B	15—150mm	1 : 10	F 2.0
1" Vidicon	V10 x 15	15—150mm	1 : 10	F 2.8
	V6 x 16	16.9—95mm	1 : 6	F 2.0
	V5 x 20	20—100mm	1 : 5	F 2.5
	V4 x 25	25—100mm	1 : 4	F 1.8
2/3" Vidicon	J10 x 13	13—130mm	1 : 10	F 2.8
	J 6 x 13	13—76mm	1 : 6	F 1.9
	J 5 x 15	15—75mm	1 : 5	F 2.1
	J 4 x 12	12.5—50mm	1 : 4	F 1.8
Servorized/Motorized				
	Name	Range of Focal Length	Zoom Ratio	Maximum Relative Aperture
1¼"PLUMBICON	P10 x 20B4	20—200mm	1 : 10	F 2.2
1" Vidicon	V10 x 15R (DC)	15—150mm	1 : 10	F 2.8
	V6 x 16R (AC/DC)	16.9—95mm	1 : 6	F 2.0
	V4 x 25R (AC/DC,EE)	25—100mm	1 : 4	F 2.5

® N.V. Philips of Holland

NAB '72

Rust Corporation, (Booth 233)
Digital remote control system with built-in limit alarms; modular construction allows expansion to incorporate various alarm and telemetry functions. Also: digital readout remote control with 52 control and 24 telemetry channels, operable through same half-duplex link or microwave subchannel link as status alarm system: low-cost chart **logging systems** for remote or local control.

Sarkes-Tarzian, Inc., (Booth 104)
Automation equipment, special effects.

Schafer Electronics Corp. (Booth 215)
Automation systems for TV and FM broadcast; music services.

Shibaden Corporation of America, (Booth 404)
Equipment for **CCTV systems.**

Shively Laboratories, Inc. (Booth 331)
TV **antennas,** coax **transmission lines,** combiners, multiplexers, coax switches, dummy loads, filters, reflectometers.

Shure Bros. Inc., (Booth 206)
Professional **microphones,** mike **mixers,** disc **reproducers,** tone **arms,** accessories.

Skirpan Lighting Control Corp., (Booth 319)
Dimmers and controls for **lighting systems;** modular control systems; related accessories.

Soll, Inc., (Booth 339)
Design and planning of broadcast stations; consulting services on station design; construction and installation of studios, transmitters, towers, and buildings.

Sony Corp. (Booth 219)

Spantronics Engineering, Inc. (Booth 333)
Digital remote control equipment

Sparta Electronic Corp., (Booth 225)
Featured will be the new Century Series of **modular tape-cartridge units,** and a new **low-power or stand-by FM transmitter,** Model 600. It has a solid-state exciter, a single 4C350B tetrode, and provision for plug-in stereo and SCA modules, all in a cabinet 55 inches high. Also shown will

continued on page 76

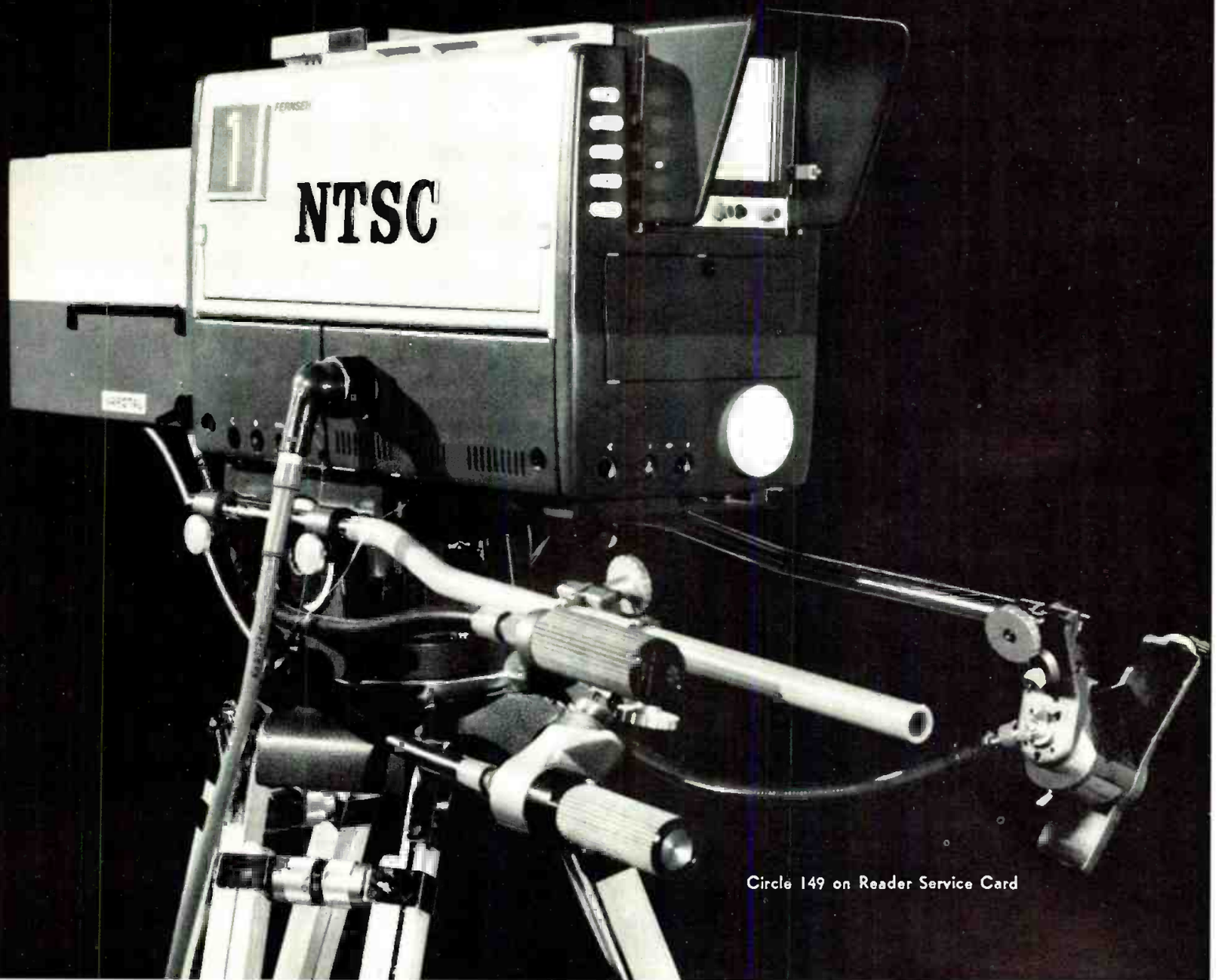
Fernseh will now sell, ship, and service its TV cameras from all over America. And you will like it.

We've combined the quality of Fernseh TV cameras and studio equipment with an entirely new American sales and service organization. It's now quite easy to get the KCU-40. The 3-tube color TV camera that revolutionized European production techniques. High light sensitivity. High signal-to-noise ratio. Tiltable viewer. And one-quarter or one-half inch camera cables that make the KCU-40 an ideal lightweight camera for both studio and location use.

We're ready with a full team of specialists to give you all the service, parts and technical help you'll need. Plus, a complete line of products including telecine cameras, standards converters, special effects equipment, and video recording systems. So now, you can get the quality and dependability of Fernseh TV equipment from an American company with an office near you:

Chicago Headquarters (312) 681-5000
Houston (713) 681-8461
Los Angeles (213) 398-0777
New York (516) 921-9000
San Francisco (415) 583-9470
Toronto (416) 252-3761

FERNSEH
Division of Robert Bosch Corporation.



Circle 149 on Reader Service Card

NAB '72

be examples of the complete Sparta broadcast line. Sharing the booth will be the sister companies, Jampro, Bauer, and Vega.

Spindler and Sauppé, Inc., (Booth 311)
Film chain **slide projectors** for TV: seven models, for color or monochrome, uniplex or multiplex, sequential or random access, with capabilities to 96 slides.

Stanton Magnetics Inc. (Booth 210)
Magnetic disc pickup cartridges.

Step Corporation (Booth 114)

Storeel Corp., (Booth 207)
Storage systems for television equipment and accessories.

Systems Marketing Corp., (Booth 220)
Main feature will be the DP-1 **digital programmer and switching system,** which will program up to 80 events per hour for 24 hours.

Systems Resources Corp., (Booth 121)
Character generators for TV.

Taber Mfg. and Engineering Co., (Booth 338)
Audio **tape recorders, heads** for audio recorders, test tapes.

Tape-Athon Corp., (Booth 236)
rofessional recorders/reproducers; automation for broadcast mainline and SCA programming; slow-speed loggers; background music library.

Tapecaster TCM, Inc., (Booth 227)
Tape cartridge systems; audio **amplifiers** and processing equipment.

continued on page 78

2500 kW output

Now—only two tubes are required in the power amplifier stage of a 2500 kW, 100% modulated long, medium or shortwave broadcast transmitter

Shown below are two EIMAC X-2159 developmental tetrodes, the most powerful tubes in the world. A single X-2159 has an anode dissipation of 1250 kW. Two tubes provide a carrier power of 2500 kW, 100% amplitude modulated.

Here is a technological breakthrough permitting a very high power broadcast transmitter to be built, having a single output stage. Now, for the first time, 5 megawatts output, or greater, is practical. Substantially less capital investment is required; driver stages, power supplies, control circuits, cabinets, and floor space may be substantially reduced when these high gain tetrode tubes are employed.

For full specifications on the new EIMAC X-2159 contact any of the more than 30 Varian/EIMAC Electron Tube and Device Group sales offices throughout the world.
Or the EIMAC Division of Varian
301 Industrial Way, San Carlos, California 94070.

Eimac division varian

4CX5000A
Shown for
size comparison.

Circle 172 on Reader Service Card

NAB '72

Technology, Inc., (Booth 116)
A new **pedestal for smaller TV cameras with great versatility** has instant change from crab to tricycle steering, counterbalance weights added or removed for load from 30 to 185 pounds. PD-18A resulted from basic study of needs of smaller studio cameras. Also shown will be the new **three-step, full-reversal film processor,** the Advanced Labmaster. Models are available for 16 through 105 mm film (LM9-63), or 16 and 16/35 mm film (ALM-R3).

Tektronix, Inc., (Booth 109)
Featured will be **test-signal generators** for remote control systems, (new Model 149 has three signals including color bars required for remote transmitter operation), **color monitors,** chrominance/luminance gain normalizer, **waveform monitor, vectorscope,** as well as complete line of general and special purpose oscilloscopes and broadcast test gear.

Tele-Cine, Inc., (Booth 118)
TV camera lenses, film chains, processing and switching equipment, monitors, audio equipment.

Teledyne Camera Systems, (Booth 229)
Introduced will be the new Telefilm Recorder for **transferring color tape to color film,** using a new camera, the DBM-64B, and Conrac, Tektronix, CBS, Maurer, Auricon auxiliary equipment.

TeleMation, Inc., (Booth 127)
Features will be the new TSG-3000 digital color **sync generator,** TCE-3000 digital color **encoder,** TCG-1425A character generator, VDR-1000 **instant replay unit.** Also: wide variety of other video line and terminal equipment.

Telemet Div. of Geotel, Inc., (Booth 213)
Test gear and **demodulators** for remote operation will be highlighted, including the VIT Test Package 3550-A1 (meeting FCC requirements) and 4501-A1 demodulator.

Telestrator Industries, Inc., (Booth 128)
Character generators for TV. Also introduced will be the just-developed Electromotion system of producing motion pictures with still cameras, plus electronic editing.

Telesync Corp., (Booth 226)
Prompter equipment, crawl equipment, front projection systems.

Television Equipment Associates, (Booth 106)
Highlight will be the new Magnatek **Videotape Evaluator;** it profiles video dropouts and edge damage in nine minutes for a one-hour tape, simultaneously cleaning the tape to remove most dropouts. Some other products: video **delay modules;** visual **comparator** for color monitors; portable 16-channel audio **mixer;** low-cost **character generator;** noise and distortion **meter;** and others.

Telex Communications Div. (Booth 308)
Broadcast audio **tape equipment; headphones.**

Time and Frequency Technology, Inc., (Booth 414)
TV and aural monitors; featuring the TFT Model 701 TV monitor, and the Model 702 aural monitor, which reduce spurious signal and intermodulation product reception by omitting the RF amplifier; also **automatic loggers,** digital **clocks.**

United Research Laboratory Corp., (Booth 313)
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Wilkinson Electronics Inc., (Booth 201)
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World Video, Inc., (Booth 321)
Color **monitors,** waveform monitors.

COLOR CAMERAS continued from page 41

color camera to take advantage of the best characteristics of each tube type. There is no advantage in using silicon vidicons in the blue and green channels, and the slightly higher tube cost of silicon vidicons coupled with no clear advantage, dictated the hybrid tube complement. The chief disadvantage of all Plumbicon color cameras, deficient red response, has thus been resolved.

Hybrid color cameras

The IVC-150 and IVC-500 live color television cameras are the first production models to adopt the silicon vidicon tube in their red pickup channels. Performance, especially accurate color rendition of red objects of slightly different hues, is remarkable. At recent trade exhibit demonstrations of these new cameras, red colors which no one would dare place before an all-Plumbicon camera have been perfectly reproduced on the monitors. The orange reds and bluish magentas typical of lead-oxide tubes are no longer a problem.

In addition, because the silicon tube is up to seven times more sensitive than a Plumbicon in the 600 to 700 nanometer range, overall camera sensitivity has been doubled compared to an all-Plumbicon camera. Thus, camera performance at low light levels is no longer limited by noisy reds. The additional sensitivity enables the cameras to give studio performance at 50 to 150 foot-candles, equivalent to all Plumbicon versions of the camera at 100 to 300 foot-candles. Even at 10 foot-candles incident illumination, the noise and lag are quite reasonable, making the cameras attractive for remotes and sports pickups. Operation is particularly impressive with fluorescent and other non-incandescent scene illumination containing very little red energy. The high sensitivity of the red tube allows the camera to be rebalanced by simply advancing the red channel gain control, restoring good color rendition.

Both cameras have special color optics and masking amplifiers to match the characteristics of the tubes.

Acceptance of these cameras has been excellent and they have been found to be easy to operate and reliable in broadcast studio service. The Model 150, most suited for the CATV and sophisticated CCTV markets, costs less than $15,000 in its self-contained version, while the IVC-500, a professional broadcast camera, is less than $30,000 including tubes, encoder, contour generator, CCU, cable and a Rank Taylor Hobson Varotal XX 10:1 servo-iris zoom lens. **BM/E**

1. E. I. Gordon and M. H. Crowell, "A Charge Storage Target for Electron Image Sensing," Bell System Technical Journal, November 1968, pp. 1855-1873.
2. M. H. Crowell and E. F. Labuda, "The Silicon Diode Array Camera Tube," Bell System Technical Journal, May-June 1969, pp. 1481-1528.
3. A. J. Woolgar and C. J. Bennett, "Silicon Diode-Array Tubes and Targets," "The Royal Television Society Journal, Vol. 13, No. 3, May-June 1970.
4. "Tivicon Image Tubes from Texas Instruments," Bulletin CB-142, Texas Instruments Incorporated, Dallas, Texas.
5. R. E. Johnson, "Application of RCA Silicon Diode Array Target Vidicons," Camera Tube Application Note AN-4623, RCA Corp., Lancaster, Pa. 17604.

SMALL MARKET RADIO continued from page 54

speeches. Then it was back to the lake for live coverage of parachute jumping and hydroplane boat races. These events ran back-to-back and required four remote set-ups; the two Martis at the lake, a B-1 phone patch at the country club, and the airport coverage.

For the airport coverage we were able to receive a live feed from KBIZ radio in Ottumwa, an essential since all of us were in service at the lake. One of the KBIZ men was lucky enough to get a short interview with the President on his departure.

In addition, the three men from KJAN handled the houseboat assignment and obtained interviews with area Queens, who were riding in the boats, for insert during the parade broadcast. Our sales personnel aided in doing a variety of tasks including some interviewing of persons in the 30,000-plus crowd. For help at our main studios, we kept a secretary there all day and, during the time the President was at the lake, two announcers were on duty. One handled the board and the other taped the activities and edited excerpts of President Nixon's speech to feed to other Iowa and Missouri stations. The rest of the personnel worked out of the mobile studio at the lake until the President departed. Then part of the crew immediately left for the country club.

The biggest asset for the day was pre-planning, both in what we had done before it was known the President was coming, and the work done later. This included setting up *all* our equipment a day in advance. While the days leading up to the big day were hectic, the broadcasts did go relatively smoothly. As noted, the mobile studio was given three different assigned spots. On the surface, it sounds like no problem, but it required our rounding up about 150 feet of electrical cord and 200 feet of microphone cable two days before the dedication and *burying* it. Before the studio moves, we had been placed next to a special outlet box that had not only an AC outlet, but also a PA output. At this location, we would have been in view of the television cameras and news photographers as they took pictures of the dedication. KCOG had no objection, but the White House did.

Because it was a presidential visit, special news credentials had to be obtained. It involved submitting our names, addresses and birth dates on station letterhead signed by the general manager, Red Faust, to the temporary White House press office. I thought with the passes maybe we would be allowed in areas others could not go, or be able to get closer. As it turned out, the general public could get nearer and the passes actually limited the newsmen to certain areas.

The wisdom to be gained from KCOG's presidential coverage is the necessity for extensive preplanning with the equal necessity of hanging loose and staying flexible. It was a great experience, one any small station would enjoy . . . about once every ten years . . . **BM/E**

FCC continued from page 16

(4) For feature films:

(a) Prior to the date such film is available for nonnetwork broadcast in the market under the provisions of any contract or license of a television broadcast station in the market;

(b) Two years after the date of such first availability.

(5) For other programs: One day after the first nonnetwork broadcast in the market or one year from the date of purchase of the program for nonnetwork broadcast in the market, whichever occurs first.

Furthermore, a cable system in the second-50 markets may carry any *distant* signal syndicated program unless 1) the operator claiming exclusivity protection has an exclusive contract, and 2) the "syndicated" program is to be broadcast during prime time.

In all cases, the burden of notification is on the broadcaster to assert exclusivity by identifying to the cablecaster, at least 48 hours in advance, 1) the name and address of his TV station, 2) the title of the program or series to be protected, and 3) the dates of the run of exclusivity. The cable operator has the right to request that such information be supplied no later than the Monday prior to the calendar week in which the program is to appear. In addition, the broadcaster is required to contract for *thorough* exclusivity of the syndicated program

within his market. He must contract for exclusivity of same against 1) other TV stations within the market, 2) cable carriage of the program via a distant signal, and 3) cable origination of the program via, for example, a leased channel presentation.

Exclusivity requirements in overlapping markets are shrouded in detail. The broadcaster is permitted syndicated program protection of his major market station from another major market only if the latter designated community lies *wholly*, not partially, within 35 miles of the former's designated community. Signals on a "significantly viewed" station are not entitled exclusivity, nor need any of its programming be "blacked out" to protect stations in the designated communities in the market.

Recognizing that exclusivity and market overlap is a most complicated area of the rules, the Commission decided to teach-by-example by presenting the Washington-Baltimore illustration:

> A Washington station, even if significantly viewed in Baltimore, would have no right to preclude carriage of its syndicated programs on a distant signal (e.g. from Philadelphia) carried on a Baltimore cable system, because Baltimore is a designated major market community that does not fall wholly within 35 miles of Washington. A Washington station could preclude carriage of a protected program on a distant signal being carried on a Washington cable system and on other cable systems located within 35 miles of Washington (except on a cable system in Baltimore). In Laurel, Md., which lies between Washington and Baltimore, a cable system could carry both Washington and Baltimore signals, would protect the programming of neither against distant signals. Assuming that a smaller television market community were located wholly or partially within the 35-mile zone of Washington, a Washington station would be entitled to top-50 market exclusivity protection in that community. If a community fell wholly or partially within 35 miles of both a top-50 station and a second-50 station, the one year preclearance period would be applicable, and the cable system could be called on to protect the programming of stations from both markets in accordance with the requirements respectively applicable to those markets."

Where both a top-50 and second-50 market overlap a community, stations from the former would receive top-50 protection (preclearance and run-of-the-contract) while stations from the latter would receive less binding second-50 protection.

Grandfathering

The new rules are not binding to signals carried or authorized to be carried prior to March 31, 1972. Any signals authorized or grandfathered to one system in a community may also be carried by any other system in that community.

The foregoing attempts to bring into clearer focus the salient points of the Commission's recently adopted cable rules. As this treatment serves merely to analyze and interpret the 400-plus pages of prose proffered by the Commission, it, of course, is no substitute for legal counsel.

Next Month: A digest of those cable rules pertaining to operating requirements, technical standards, and non-broadcast channels will be framed. **BM/E**

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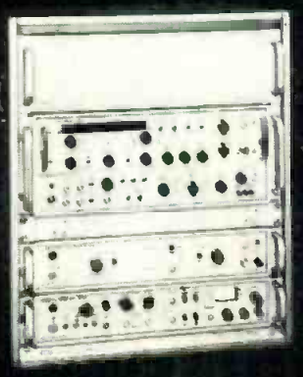

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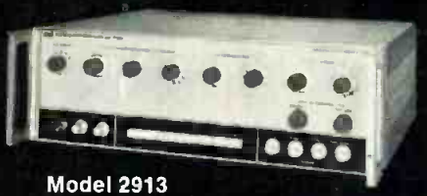

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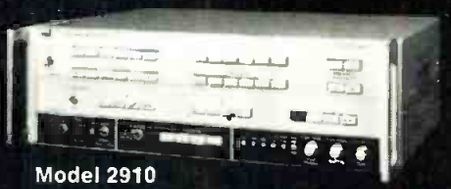

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