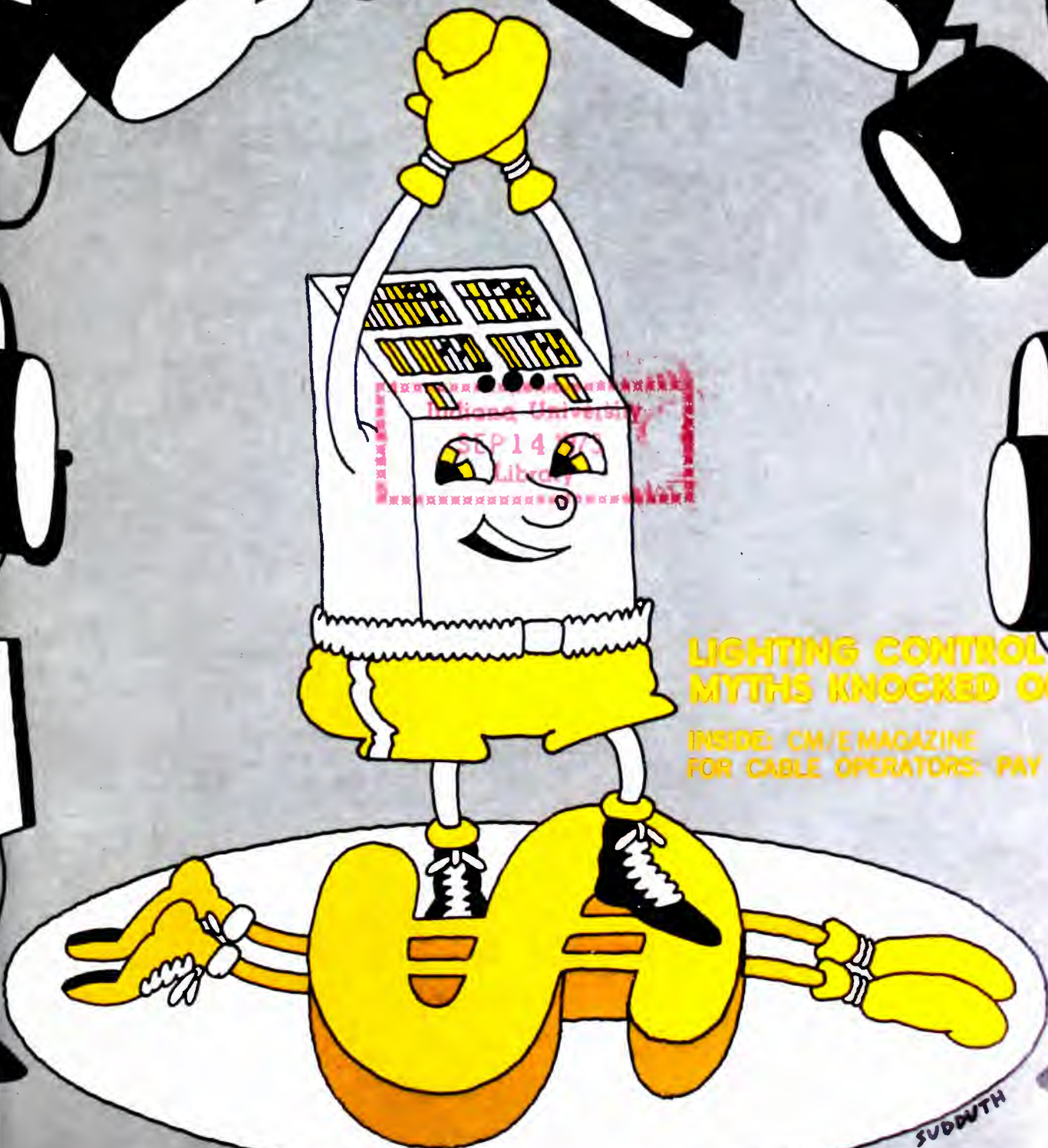


FEBRUARY 1972

BM/E

BROADCAST MANAGEMENT/ENGINEERING

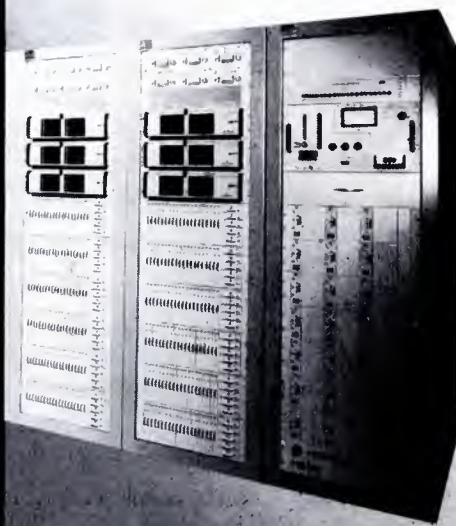


**LIGHTING CONTROL
MYTHS KNOCKED OUT**

**INSIDE: CM/E MAGAZINE
FOR CABLE OPERATORS: PAY TV**

SUDWTH

If you are planning a broadband communications switching and distribution system you should talk to DYN AIR.



That's right. DYN AIR specializes in the switching and distribution of broadband signals to 100 MHz. Our 70-MHz computer controlled microwave I-F switching system distributes television and other information to all major universities in Indiana . . . and several other installations are now being completed with similar equipment.

Large DYN AIR video switchers, some with bandwidths to 50 MHz, are being used to route information from orbiting satellites, Mars and Moon probes and a variety of other aerospace functions. Our standard video and audio switchers have been used for years in commercial, industrial and educational television. And most of our installations are based upon off-the-shelf equipment.

Standard logic cards are available from stock for ease of assembling most computer interface and machine-control subsystems. These cards mount in a universal frame which utilizes wire-wrap connections to establish the required interface functions. Numerous manual control options are also available.

DYN AIR switching equipment is also based upon a building-block philosophy with the various types of switch, amplifier and power supply circuit cards all being stocked items which can easily be assembled in standard mounting frames. Practically any input-output configuration or capacity is possible with this planned approach and with the numerous crosspoints required in many systems, the economics of using standard modules can offer substantial savings.

Shouldn't you talk to DYN AIR? Give us a call today. Or if you prefer, drop us a note and we'll send literature.

DYN AIR ELECTRONICS, INC.
6360 FEDERAL BLVD., SAN DIEGO, CALIF. 921
PHONE: (714) 582-92

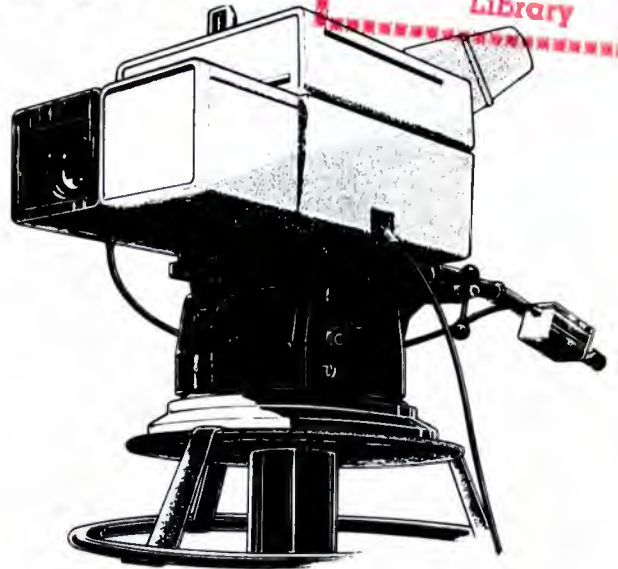
Circle 100 on Reader Service Card

DYN AIR

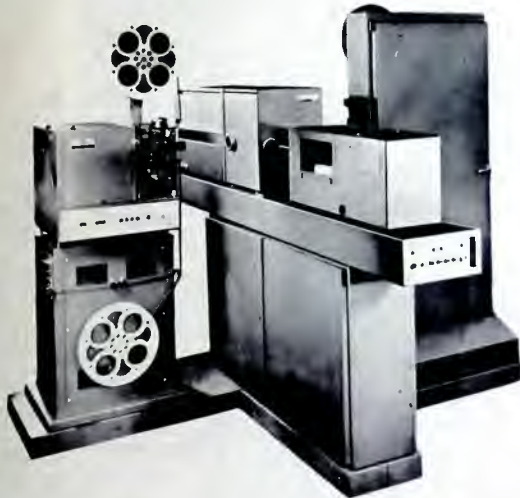
Marconi. Products for the professional broadcaster.

MARK VIII AUTOMATIC COLOR CAMERA

Automatic Line-up
Dynamic Centering
Uses three lead oxide tubes with light bias/ACT
High sensitivity (75fc @ f4)
Wide range of lenses
Lightweight, around 100 lbs. with lens
Half-inch camera cable
Built in auto-test facility



Indiana University
SEP 14 1973
Library



COLOR FILM CHAIN

16 mm film
60 slide capacity
Unique multiplexer for on-line cuts
Automatic operation
Four-tube camera
Electronic masking as standard
Quartz halogen lamps

55kW UHF TRANSMITTER

(paralleled arrangement pictured)

All solid state 5W drive
High gain five cavity klystrons, vapor cooled
Varactor modulator
Linearity corrections extend into sync. region
All power supplies built in
10 thru 40 kW powers also available

15kW VHF TRANSMITTER

Four second on time from cold
Only three tubes
Entirely self-contained including diplexer
Air cooled, single external blower
Uses IF modulation



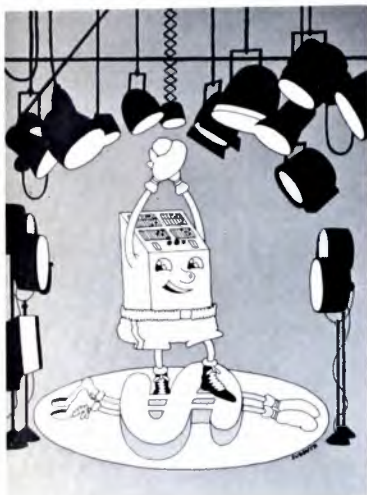
IN ADDITION all Marconi TV transmitters feature full color performance with the high stability needed for remote control/unattended operation and minimal, infrequent routine maintenance. Parallel or working/standby schemes are available.

MARCONI ELECTRONICS INC.

500 EXECUTIVE BOULEVARD, ELMSFORD, N.Y. 10523 • (914) 592-4500 • TWX 710-567-1230 • TLX 137376
And at: 2303 LOUIS RD., PALO ALTO, CALIFORNIA 94303 • (415) 328-1957 • Cables: EXPANSE PALO ALTO

Circle 101 on Reader Service Card

FEBRUARY 1972/VOLUME 8/NUMBER 2



Lighting controls call for an investment, but the end result should be lower operating costs—if you're skeptical, turn to page 18.

**BROADBAND
INFORMATION SERVICES, INC.**
200 Madison Ave.
New York, N. Y. 10016
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Hennessey and White**

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NEWS

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Satellites Would Slash Network Costs, Says MCI Lockheed

Linking studios of 374 television stations across the nation via satellite would cut about 60 percent from annual networking costs, according to a proposal made to the three major networks by MCI Lockheed Satellite Corporation of Sunnyvale, California. Annual cost of the coaxial cable service now used is about \$70 million, MCI Lockheed says its service would cost about \$28 million a year, and would give expanded inter-studio programming to more than 80 percent of the U.S. population. The service would be in the four- and six-GHz bands, asked for by the networks. However, MCI Lockheed believes costs would be even lower at 12 and 14 GHz. The firm has filed an application with the FCC

for permission to build a domestic satellite system.

Cable TV Info Center To Aid Cities

The Urban Institute has formed a Cable TV Information Center at 2100 M Street NW, Washington, D.C., to help cities realize the great potential of CATV. The center, under direction of W. Bowman Cutter, will provide legal, technical and community planning aid to cities requesting it. Center is funded by grants of \$2½ million from Ford Foundation and \$½ million from the Markle Foundation. A staff of 30-35 including field representatives will be set up.

Cable and Videocassettes To Get Joint Exhibition in France

A two-section international marketing group will put on a large-scale exhibit in Cannes, France, from March 5 to 10, 1972, designed to bring together administrators, program planners, equipment makers in cable television and in the videocassette and disc field. The cable part of the show is called "Micab," for "Marche Internationale De La Television par Cable." The videocassette section is "Vidca." Last year's edition of Vidca drew 1200 participants from 31 countries, with 625 corporations represented. Advance inquiries, according to the management of the show, indicate more than 2000 registrations for 1972, representing 1000 corporations. American cable and videocassette equipment makers can get further information from J. Nathan, Suite 1103, 250 West 57th Street, New York 10019.

Ampex High-Speed Copying In Use by NET Television

Copying broadcast-quality video tapes at rates up to 50 times as fast as "real time" recorder-to-recorder copying, an Ampex ADR-150 system has gone into use by NET Television, Inc., Ann Arbor, Michigan. The ADR-150 copies by imprinting

magnetically onto the slave from a high-energy master tape. Five one-hour copies can be made in about six minutes.

Goldmark Communications Part of Kinney

Dr. Peter Goldmark, upon his retirement from CBS Labs, has formed Goldmark Communications Corp., 1 Automation Plaza, Norwalk Conn. 06850. Kinney Services Inc., is the majority owner.

Goldmark Communications, which includes Joseph L. Stern, former v-p of engineering for CBS Television Services, will concentrate on cable TV, domestic satellites, electronic publishing and delivery of programmed educational-informational material for TV use in the home. Dr. Goldmark's emphasis will be on expanding the service of today's cable TV systems. Kinney Services, which recently acquired TeleVision Communications Corp., has announced it will change its corporate name to Warner Communications Inc. (Warner Bros. pictures is part of the conglomerate.)

Visual Electronics Out of Chapt. 11

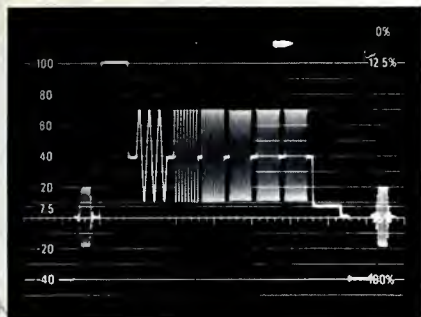
Visual Electronics Corp., and its subsidiary, V.E. Labs, is no longer under supervision of the court as of last month. Slightly over \$3 million was deposited with the court to pay off indebtedness (creditors will get 25 percent of claims). James Tharpe, president, said the company would return aggressively to regular operations. A tax loss carry-forward of \$16 million means future profits can be retained. The efforts of V.E. Labs has been concentrated during the last 18 months in the areas of audio and custom intercom, Rapid-Q tape cartridges, video switchers, and titlers. During that time, some dozen group owners have purchased audio consoles, ten major intercom systems were installed, and six major video installations have, or will be, made. Visual's subsidiaries in other fields including CCTV were not under Chapt. 11.

continued on page 8

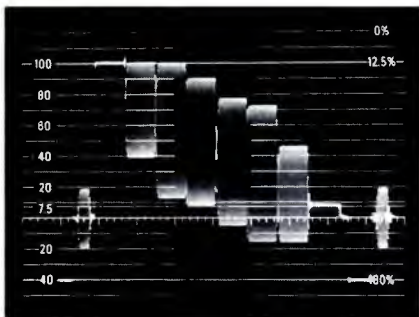


Fingerprints via satellite. Ampex engineer checks clarity of fingerprint images after they were transmitted via satellite from California to Florida.

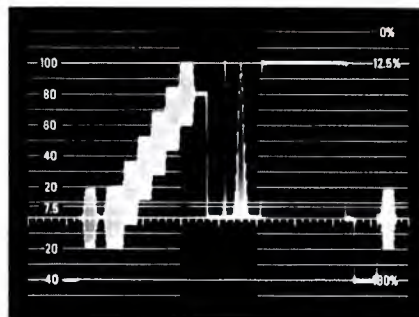
remoting your transmitter?



LINE 18 FIELD I MULTIBURST
(REDUCED AMPLITUDE)



LINE 18 FIELD II COLOR BARS



LINE 19 FIELD I, II COMPOSITE
TEST SIGNAL (WITH SUBCARRIER)

we're ready when you are . . .

Going to remote your VHF transmitter soon? You will need test signals, monitoring equipment and technical information, and we are ready to help you with all three — now. TEKTRONIX Television Products are available *now* to provide the exact test signals required for insertion in the vertical interval (FCC 73.676 [f]). The required "suitable test signals" are generated by the TEKTRONIX 147 NTSC Option 1 and the 140 NTSC Test Signal Generators.

You will be required to delete signals or noise already existing on lines 18 and 19 "prior to the insertion in the vertical interval of locally generated test signals (FCC 73.676 [f])". The 147 meets the requirements with automatic fail-safe protection and automatic bypass capability.

"Off-the-air facilities must include a demodulator, a visual waveform monitor, a picture monitor . . ." and "where any portion of a station's transmissions are in color, a color monitor and a vectorscope or other instrument . . . will be required . . ." (FCC News #6712). The 650 Color Picture Monitor, the 529 Waveform Monitor and the 520 Vectorscope more than fulfill the video monitoring requirement.

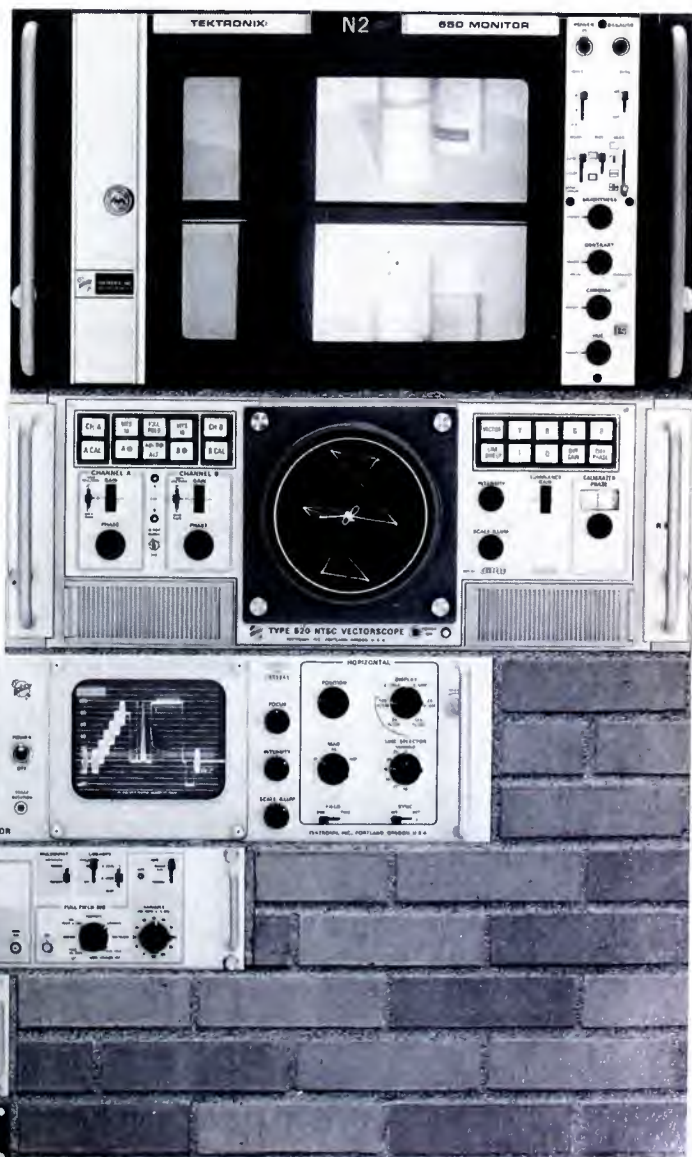
To simplify your Chrominance/Luminance gain and delay measurements, we are ready to provide the new 137 Chrominance/Luminance Gain Normalizer. Ask your TEKTRONIX Field Engineer for Television Products Application Notes describing the signals and monitoring requirements.

- R147 Option 1 NTSC Test Signal Generator \$2900
- R140 NTSC Test Signal Generator \$2150
- 650 Color Monitor \$2500
- R520 Vectorscope \$2850
- R529 Waveform Monitor \$1575
- 137 Chrominance/Luminance Gain Normalizer \$345

U.S. Sales Prices FOB Beaverton, Oregon
Tektronix, Inc., P. O. Box 500-A, Beaverton, Oregon 97005, U.S.A.

TEKTRONIX®

Television Products



TEKTRONIX®
committed to
technical excellence

**BUILD ON
A SOLID
FOUNDATION**

Circle 103 on Reader Service Card

Gates circularly polarized FM antennas.



Gates' circularly polarized antennas combine mechanical ruggedness with transmission reliability. They are constructed of a special brass alloy to withstand corrosion from salt-laden air and industrial gases.

Performance-proven Gates antennas are available with one to sixteen bays. Accessories include 300 watt or 500 watt heaters, radomes, and automatic heater control systems for protection against icing. Null fill and beam tilt are also available.

Select the right antenna from the four circularly polarized antennas offered by Gates: Dual Cycloid for high power; Dual Cycloid II for medium power; Dual Cycloid III for low power and the Directional Dual Cycloid antenna.

For complete details, from the leading supplier of FM antennas, write Gates Radio Company, 123 Hampshire Street, Quincy, Illinois 62301.



Circle 104 on Reader Service Card

NEWS continued

More "Birds" Flying For Intelsat

Launch of two more satellites in the series being put aloft by Intelsat is greatly expanding the international telecommunications service of that public corporation. The latest birds, belonging to the Intelsat IV series, have considerably larger capacity than earlier models. Antenna coverage can be wide beam or spot-beam on command from the ground. From 5000 to 6000 telephone circuits are available with average antenna configuration, and the maximum is about 9000; television and data capacity are in proportion. The satellite is about 17 feet tall, and weighs about 1500 pounds in flight.

Thermal Duplication Goes On Line for CCTV Copying

In another forward step in high-speed videotape duplication, The Vidicopy Company of Sunnyvale, California, announced installation of a thermal duplication system for chromium-dioxide tape. Equipment was produced by Consolidated Video Systems of Santa Clara, California, and will be used in making copies for closed-circuit television systems. The duplicator is format-independent, copies tape programs in all widths up to one inch, and on cassettes as well as open reel. Thermal duplication, a contact system exploiting the temperature characteristics of chromium dioxide tape, has been developed largely by the DuPont Company, as described in earlier articles in *BM/E*.

Community Groups, Station Operator, Agree on Program Changes

A coalition of 19 community groups representing Mexican-Americans, Blacks, and Indians, in Albuquerque, New Mexico, has won from station KQEO-AM, in that city, agreement on a series of changes in program planning intended to give the minority groups better representation in what is aired by the broadcaster. The station had been charged with failing to carry a single program of interest to the Chicano community, or any Spanish language program; with severely restricting public affairs programming; and with restricting religious programs to Protestant content. The

agreement was reached with the help of the Office of Communication of the United Church of Christ. Frank Martinez, Albuquerque attorney, was counsel to the coalition.

Kodak To Give Videofilm Seminar

The Eastman Kodak Company has announced a series of five-day videofilm seminars at the company's Marketing Education Center in Rochester. The seminar will cover every aspect of producing color film specifically for use in commercial, public, and cable television, with hands-on laboratory sessions of both TV and film equipment.

Fee for the five-day course is \$150. Dates set for the first half of 1972 are January 17-21, February 28-March 3, March 20-24, and April 17-21. Additional informa-



tion and application forms can be had by writing Carl Sipe, Eastman Kodak Company, 343 State Street, Rochester, N.Y. 14650.

FCC Declines to Rule Against News "Pressure" by Government

Community groups are pleased when their leverage shifts a broadcaster's stance (preceding item). A recent FCC ruling suggests that private groups must accept the fact that pressure can also legitimately come from government officials or public figures, and that the broadcaster must be free to exercise his judgment in responding within the general framework of the Fairness Doctrine and overall program balance. The National Citizens Com-

continued on page 13

RCA

PRIME TIME

How to look better for \$33,459 a year less: Cost effectiveness and the TCR 100.

The first eight RCA TCR 100 Cartridge Tape Recorders are installed. The reactions of users have been enthusiastic. Deliveries on the second production run began in January and are continuing.

Stations are not only increasing their flexibility and improving their "image," they are also saving money.

The exact savings of a "Cart" over a reel to reel machine varies with individual stations, but calculating a rough estimate is not too hard to do.

Begin with the cost of headwheel wear. There are two factors: headwheel life, and the duration of head to tape contact.

The RCA TCR 100 uses the new RCA Alfecon II headwheel, which gives significantly longer life than anything else available. Typical life is in excess of 500 hours (one of our stations reached 3001 hours). If you're not using RCA Alfecon II, average life of your headwheels is probably a lot less. Ask your engineer what you are getting.

As far as head to tape contact is concerned, the "Cart" has contact for 32 seconds on a 30 second commercial. The reel to reel machine needs a leader, a color check, and a trailer, none of which the "Cart" has. Because of this, it takes about 140 seconds of head to tape time for a reel to reel machine to play that same 30 second commercial.

Based on this shorter head to tape contact, RCA has calculated a typical annual cost in this area of \$930.75 for the "Cart", \$4,217.75 for an RCA

reel to reel machine with Alfecon II heads—a saving of \$3287 (based on 150 commercials a day).

Another big item is manpower cost. It takes one man about six seconds to run a commercial on a "Cart" machine. The same commercial takes the same man 155 seconds on a reel to reel machine.

A typical station hour (10 tape commercials) will take 60 seconds of his time on a "Cart", 25.8 minutes on a reel to reel machine. That is a sav-

ing of 8.2 hours over a 20 hour program day.

Based on these figures, and a manpower rate of \$8 an hour, RCA has estimated manpower cost of \$973 a year for the cartridge machine and \$25,112 for the reel to reel machine—a saving of \$24,139. In addition, if you are doing spot reels, another 20 man hours would be required for assembly each week. That is another \$9320.

(continued on page 3)



The trickiest part of your station may be the one with no moving parts.

For getting the best signal possible to a viewer's TV screen, there is nothing more important than your antenna. And in spite of its apparent simplicity, the antenna can be the cause, and the cure, of many of broadcasting's most difficult problems.

Most broadcasters put up an antenna, give it an occasional paint job, and leave it alone. They see no reason to change the antenna unless they change the whole system. So antennas get neglected while the rest of the station receives constant attention. The problem is, that even though the station may remain the same, the community around it often is changing rapidly. A road goes in, a building goes up—an antenna can be made obsolete by changes that go on around it.

The changes that are taking place in many areas are also changing trends in antenna design. What are these changes and trends?

For a number of reasons, most stations were co-sited in Europe from the beginning. This made logical Circle 106 on Reader Service Card

sense where the government controlled the media.

But in the United States, commercial broadcasting produced just the opposite situation. Competition between stations kept them apart—each looking for a better location.

Now, space limitations, especially in urban areas, are creating a trend towards multiple systems.

There are a number of different types of multiple station systems. There are antenna "farms", where many antennas (and transmitters) are located on a favorable site. There is "diplexing" where two transmitters share a common antenna. And there are stacks and platforms.

The earliest multiple system was the vertically stacked five station tower on the Empire State Building in New York.

In Dallas, Sacramento, Baltimore and elsewhere, a platform is used to support three VHF antennas. Smaller platforms are used if only UHF antennas are involved. And in Chicago, a combination of a platform

and vertical stacking tower is used atop the 100 story John Hancock Center Building.

The complexity of these new systems has created a need for many new types of antennas. There are, for example, more than 21 different types of Pylon antennas. Most of them have been designed with the aid of a computer, and were tested at RCA's antenna farm located in Gibbsboro, N. J.—the largest such facility in the world.

To keep you current with what is going on, we have listed below a short glossary of popular antenna types.

The antenna needs of every station are unique, so the design and installation of an antenna is usually a custom job. A large system may require a staff of as many as 150 fabricators, engineers, draftsmen, and field personnel.

RCA has the experience and facilities to design, build, and install your entire antenna system—large or small, AM or FM, VHF or UHF.

POPULAR ANTENNA TYPES

TRAVELING WAVE
Top acceptance for Highband VHF. Easier to maintain, more clarity, less "ghosting". Over 100 installed.



ZEE PANEL AND BUTTERFLY
Designed for tailored patterns. Ideal for stacking, can be omnidirectional.



VEE-ZEE
Directional or Omnidirectional. Can be stacked around tower below top mounted antennas. Beam tilt and fill can be designed into vertical patterns.



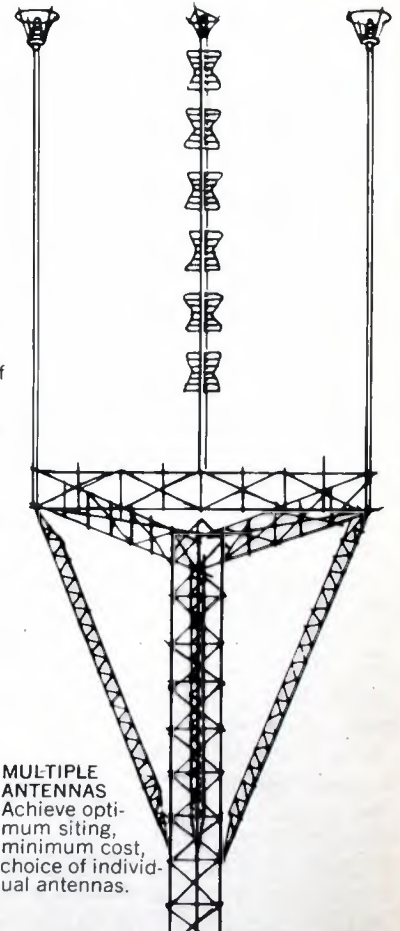
STACKED ANTENNAS
Combinations of Pylon-type antennas with super turnstiles afford economies.



SUPER-TURNSTILE
a popular VHF antenna. Features low wind load and may be diplexed for use by 2 stations.



PYLON
Most popular current UHF antenna. Excellent circularity. Available for "peanut", "skull", or "trilobe"; patterns for UHF.



MULTIPLE ANTENNAS
Achieve optimum siting, minimum cost, choice of individual antennas.

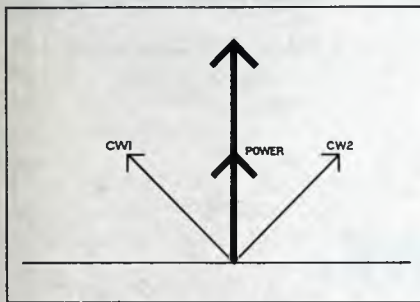
RCA PRIME TIME

Some of the questions you had about Ampliphase but were afraid to ask*

What is Ampliphase? Since 1957, RCA AM Transmitters have used the "Ampliphase" system for producing amplitude modulation.

Ampliphase stemmed from a concept called "outphasing" which was used in Europe before the war. Advances in solid state technology have greatly enhanced the performance of the system, and made its advantages much more attractive.

Basically, "Ampliphase" is a system that uses two CW transmitters combined. The change of phase relationship of the CW transmitters generates amplitude modulation.



As an improvement to the outphasing system, permitting positive peaks of modulation without overmodulating negative peaks, RCA developed and added a drive regulator to the system. Thus the name "Ampliphase".

Why is it better? The Ampliphase system requires no modulation transformer—a prime source of trouble. The modulation transformer also limits both high and low frequencies. In fact, there are no audio transform-

ers at all in the Ampliphase system. Eliminating all audio transformers gives the transmitter a cleaner signal over a wider frequency range.

Typical specifications for an Ampliphase transmitter are: Response is $\pm 1\frac{1}{2}$ dB from 30-15,000 Hz. Distortion is less than 1.5% from 50-15,000 Hz, and less than 1% from 50-10,000 Hz. Noise is conservatively 60 dB below 100% modulation.

How has solid state changed Ampliphase? Solid state circuitry eliminated more than 30 tubes over previous transmitters, resulting in a smaller, compact design, less power consumption and lower maintenance. The all solid state exciter is broad-banded, with no tuned circuits, and requires only $5\frac{1}{4}$ inches of rack panel space. In addition there is a built-in phase meter which eliminates the need for external test devices.

How does Ampliphase compare in terms of cost? Let's compare the RCA BTA-5L 5kW transmitter with a typical plate modulated transmitter. The Ampliphase system contains no high power modulators. This saves power, that would be wasted due to the inefficiency of these stages.

Power Consumption		
Modulation %	"Ampliphase"	"Plate Modulator"
0%	9.0kW	10.7kW
Average	10.0kW	11.9kW
100%	13.0kW	15.6kW

Ampliphase requires approximately 2kW less power for average mod-

ulation, saving up to \$438 per year. (Based on 20 hour day, 3¢ per kWh.)

Ampliphase saves you tube costs by conservative design. The final RF amplifier of the BTA-5L has a total plate dissipation of 10,000 watts (two 3Cx5000H3 tubes). Typical 5kW plate modulated transmitters have only 2500 watts of plate dissipation (one 3Cx2500F3 tube). Plate-modulated transmitters also require two additional high powered modulator tubes, while the Ampliphase system has no modulator tubes. An Ampliphase transmitter's tubes should last at least twice as long as those of the plate-modulated transmitter, saving approximately \$250 per year in tube cost. These two items alone result in a saving of more than \$6800 over a 10 year period.

At what power levels does RCA offer Ampliphase transmitters? Ampliphase was originally developed for high power installations. The simplicity of the solid state Ampliphase exciter permitted application of the system to lower power transmitters. At present there are more than 300 RCA 5kW, 10kW, 50kW, 100kW, 200kW and 250kW medium wave (broadcast band) and short wave Ampliphase transmitters in worldwide operations.

Circle 107 on Reader Service Card

*For everything you wanted to know but were afraid to ask—Call your RCA Representative.

How to look better ... (continued from page 1)

But more important is what sort of time is saved. Because the "Cart" can be loaded and programmed for up to two hours, (using as many as 22 tape commercials) it can be left unattended for useful periods of time. The operator is then free to do useful work of another sort. He can be producing programs, commercials, or promos—income producing activities he wouldn't be able to do in the scattered bits of free time he would have while working a reel to reel machine.

Purchasing a TCR 100, then, could pay back the cost difference of a reel

to reel machine in a little over a year, and save the entire initial investment in slightly more than 4 years based on manpower and headwear savings alone.

That is, of course only part of the saving. Users have found that one cartridge machine can free-up 2 or 3 reel machines for production work.

Scheduling of commercials can be made more flexible, and in some cases the number of commercials that can be run is greatly increased.

When 18 candidates entered the Louisiana Democratic Primary for

Governor, WAFB-TV in Baton Rouge was flooded with announcements. They reported that it would have been impossible to handle the campaign with the previous equipment. With this year an election year, many stations may have the same opportunity.

RCA representatives can help you to analyze your operation and the cost savings and income producing potential the TCR 100 can effect for your station.

Circle 105 on Reader Service Card

RCA PRIME TIME

"Let RCA rework your Ampex Mark X Headwheel"

RCA Broadcast Systems is providing a factory reconditioning service for the Ampex Mark X highband headwheel panels used on model VR-1200 and VR-2000 video tape recorders.

The reconditioning features the use of RCA's new headwheel material Alfecon II, which has remarkably increased the life of RCA headwheels.

Approximately 50 TV stations using RCA recorders with the new headwheel material have attained more than 1000 hours of operating life. One station, KENI, Anchorage, Circle 108 on Reader Service Card

Alaska, has reported a record 3001 hours of operation.

The maximum charge for RCA reworking an Ampex headwheel is \$990, and the job has a 200 hour warranty.

The program will bring the potential savings of longer RCA headwheel life to Ampex users for the first time. A mailing has been sent to selected customers, and orders are being taken.

RCA representatives will be happy to give you further information or assistance in placing your order.



[Alfecon II headwheel
on RCA recorder.]

Products in the news.

Solid state high gain, low distortion audio amplifier. RCA's new BA-48A amplifier produces 50 watts RMS (300 Watts peak) at a distortion of less than 0.5% from 20 to 20,000 Hz. Ideally suited for critical monitoring applications, it is capable of driving 4, 8, and 16 ohm speakers or a 70-volt line.

Solid state components give the unit compact size, simple circuitry, low heat dissipation and low power consumption.

The BA-48A is one of a complete line of RCA special purpose amplifiers for distribution, program, pre-amplification, AGC signal and processing, limiting, and monitoring—all with built-in power supply.



Circle 109 on Reader Service Card

Two new additions to RCA audio console line. Two new totally solid state, moderately priced consoles (starting at \$1,595) have been added to the RCA audio line. The BC-18A, with 8 input mixers, handles up to 32 input sources (20 high level). The BC-15A is a 5-input mixer for up to 20 inputs (11 high level). Both models are available in mono, dual channel and stereo.

Each console is a self-contained audio control center, featuring push-button input selection, high quality step-type attenuators, telephone type lever switches, a ten watt monitor amplifier, a cue amplifier, speaker muting relays (with space for additional relays), a cue speaker, and a self-contained power supply.

With these two additions RCA has more than 30 audio consoles available.



Circle 110 on Reader Service Card

RCA's new shock-resistant mikes. Smooth response, lightweight, a slim silhouette and high resistance to shock are features of RCA's BK-14A and BK-16A microphones. Newly designed shock and isolation filters assure high quality, noise-free speech and music pickups.

Both microphones are omnidirectional dynamic types with replaceable cartridges and may be hand held or stand mounted. The BK-14A is recommended for outdoor use, with special screening against wind and pop noises.



Circle 111 on Reader Service Card

RCA PRIME TIME

mittee for Broadcasting (NCCB) asked the FCC to issue a declarative ruling to prevent any similar event in the future, after allegations that the content of a Dick Cavett show had been altered as the result of a call from the Executive Office of the Government. The FCC, in denying the NCCB petition, said that "the democratic process depends upon the right of holders of . . . conflicting views to seek and achieve publication of their views . . . there is no impropriety in either administration-spokesmen or anti-administration spokesmen participating fully in the democratic process."

First CPs Granted for New FM Translator Service

The first three construction permits for operation of FM radio translators, a new service created by the FCC in September 1970, were granted by the FCC in December 1971. WRVB-FM in Madison, Wisconsin; KQMU in Salt Lake City, Utah; and KSL-FM, also in Salt Lake City, will build translators, with a peak output power of one watt in each case, to improve their signals in, respectively, Viroqua, Wisconsin; Evanston, Wyoming; and Brigham City, Utah. Translators are "repeater" broadcast stations of low power that receive and rebroadcast a station's signal in an area where it is weak. Under the FCC rules, translators in areas west of the Mississippi, except central and southern California, can use up to ten watts of peak output power.

The Debt We Owe David Sarnoff is Immense


Many men played essential roles in the growth of broadcasting in this country, but David Sarnoff, who died December 12th at the age of 80, did more than any other to make broadcasting big, to turn it into a powerful social agency with a multitude of rewarding careers and business opportunities. He knew what he was doing; he understood the cultural and financial potentials of broadcasting and sought to realize them with the most exceptional energy, intelligence, and persistence. For those reasons, every broadcast enterprise of today owes him a special debt. Electronic communication seems about to take over new and even greater territories of service. Without the first

great expansion in which Sarnoff was so effective a leader, these later ones would be inconceivable.

FCC Briefs

Community groups challenging license renewals must file timely petitions and must also present data of substance bearing on the question, or they will not get a hearing: a number of recent FCC actions have reaffirmed these policies. For example: Justicia, a community group in Fontana, Calif. requested a time extension on November 29, 1971, the last day on which a petition to deny the license renewal of KLXA-TV, in that city, could be filed. The FCC denied the request. In Fremont, Ohio, a group representing Spanish-speaking citizens charged blatant racial discrimination by radio station WFRO, but the FCC denied the group a hearing, saying that the facts did not support the charge. . . . In another action that somewhat eased the broadcaster's position with respect to public groups, the FCC ruled on December 16, 1971 that a *broadcaster may request the name and address of any person asking to see the station's public files*. This amended an earlier ruling of November 3, 1971, which forbade a broadcaster to ask for the name and address. . . . Off-Track Betting Corporation (OTB) of New York asked, and got, a declaratory ruling authorizing a *TV or cable station to broadcast the final race of a day at a given track*. The broadcaster or cablecaster may also run replays of portions of other races, together with the results and prices paid. But, said the FCC, broadcasting a full program of races from a race track would conflict with its 1964 policy statement on broadcasting horseracing information. . . . Non-commercial UHF stations got an extension of time to April 30, 1974, to comply with recently-adopted *rules on remote control operation* which specify five transmitter inspections a week. The old once-a-week rule will continue until that date. Commercial UHF stations, however, must meet the new rule after April 30, 1972. . . . AT&T and other major telephone companies, were notified that they may not require subscribers to put in duplicating connection arrangements for supplementary brand-name devices, when such connections are not needed for corresponding telephone company equipment. This would eliminate the additional costs to subscribers which had been im-


continued on page 45



Broadcasters' Choice:

A77 Mk. III-B

Spotmaster/Revox



\$699

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

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

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

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

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

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

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INTERPRETING THE **FCC** RULES & REGULATIONS

Renewal: Part II Existing Licensees

Last month *Interpreting The FCC Rules* examined in detail the Commission's disposition toward renewal challenges and the standards of performance utilized in the comparative hearing process. Evaluating its 1970 "Policy Statement Concerning Comparative Hearing Involving Regular Renewal Applications"¹ in light of recent Court decisions,² we find the Commission placing a greater and greater burden of performance on the renewal applicant. This month's column will consider Commission requirements for renewal applications generally, and its attitude and practices toward existing licensees who face no competing applicants—where a similar trend of performance burden is emerging.

Although relatively few broadcasters face competition at renewal, this fact does not eliminate the very real threat of facing Commission sanctions, which include: 1) letter of censure, 2) monetary forfeiture, 3) short-term renewal, or in rare instances, 4) a revocation proceeding, or 5) a combination of two or more of the above. Sanctions are generally levied for violations of Commission rules in the broad area of programming, employment practices and advertising.³ Such sanctions are imposed by the Commission to both spur the licensee to a better performance and spur potential competitors to challenge by weakening the existing licensee's standing before the Commission.

Commission Policy and Proposals: Programming

In its *Notice of Inquiry and Notice of Proposed Rule Making*⁴ relating to license renewals, the Commission set out certain proposals designed to promote the fulfillment of public interest obligations by the licensee. Indeed, these proposals elaborated upon and extended the 1970 "Comparative Hearing Policy Statement" and raised the spectre of Commission sanctions in event of non-compliance. Said the Commission:

Programming is the essence of service to the public, the principal ingredient of which is the diligent, positive and continuing effort by the licensee to discover and fulfill the needs and interests of his area.

¹ 22 FCC 2nd 424 (1970).

² Especially *Citizens Communications Center v. FCC*, Case No. 24,471, decided June 11, 1971.

³ Technical violations are also sources of Commission sanction. Because they are so varied and numerous, technical violations will not be treated in this article.

⁴ Docket No. 19153, Adopted: February 17, 1971, Released: February 23, 1971.

Although the "Ascertainment of Community Needs" policy has been treated in this column before, we cannot stress too strongly the importance of making intensive efforts to meet this requirement. The Commission emphasizes that a showing made by broadcast applicants in response to Section IV-A or Section IV-B will not be acceptable unless there is assurance that the applicant has proceeded through four essential steps: 1) consultation with community leaders and laymen, 2) obtaining suggestions from community leaders, 3) evaluation of community needs, and 4) relating proposed programming to community needs as they have been evaluated.

The Commission has emphasized that there is a distinction between community needs, problems, and issues, and the preferences of a prospective or actual audience about broadcast programming. To assure that a broadcast proposal is responsive to community needs, the Commission requires consultation with a representative range of groups. Broadcasters would be wise to contact a wide range of leaders and individuals in community life—public officials, educational, religious, entertainment media, agricultural, business, labor, professional, non-profit and civic organizations, and others who speak for and embody the interests of a community. In this manner, the applicant will have a better basis for determining the total needs of the community.

Efforts to determine community needs must be adequately documented. Leaders and individuals consulted must be identified by name, position, and organization. There must be sufficient material available to assure that a careful investigation of the community was made and that meaningful results were obtained. Experience of an applicant or interviewers in a particular community or in broadcasting in general is insufficient unless coupled with an adequate survey or investigation of the community.

As a second element of the showing on community needs, an applicant is required to list in his application all *significant suggestions about community needs received through consultations with community leaders and individuals*, whether or not it is proposed to treat them in the proposed programming service. The listing of suggestions as to community needs should include those which the applicant decides not to meet in preparing his program schedule.

The third step required of an applicant in making a programming showing is to make some subjective evaluation of the various suggestions received in the investigations made with respect to community needs. An applicant may be required to justify the evaluation of the relative importance of suggestions received and how these evaluations are reflected in the formulation of program proposals. Initially, at least, it is not essential to show why some community needs found will be treated in a proposed programming service and why others were not. Applicants should be prepared to do so in the event there is need to respond to a request for enlargement of issues.

The fourth requirement of a proposed programming showing is relating *what* programming service is proposed to meet *what* needs. In other words, a relating of the programming service to the needs of the community as they have been evaluated by the applicant.

The Commission has stated that an applicant may wish, in addition, to survey his listening public as to the types of *programs* they prefer. Once again, it is

continued on page 47

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Circle 115 on Reader Service Card

Introducing a new cast



from the TCG-1425A Character Generator

To the station manager:

The TCG-1425A is TeleMation's cost-effective answer to your titling problems. It lets you get more mileage out of fewer people. And, with its colorized and edged characters, it puts you miles ahead of your competition. Your promos get more mileage, too, because the 1425A automatically synchronizes itself to the video source—lets you run promos and credits over remote or network feeds without gen-locking.

Worried about how to edge out the competition with your election coverage? Let the 1425A do it for you with its random access, 50,000-character disc memory—backed up by the limitless capacity of our upcoming audio cassette storage device. If you wish, we can even interface with large computers.

We give you more features, more sophistication, more flexibility and more attractive characters than you can get with our chief competitor's equipment—at a

saving of more than \$5000.

Beef up your image—buy a TCG-1425A.

To the production manager:

The TCG-1425A gives you a perfect program of production values. Two accessory storage systems ensure maximum versatility. The TDM-1425 random access disc memory, for example, offers you an unmatched 2000-line storage capability, 1/60 second access time and the ability to spit out a full-page display in just 1/4 second. More than 142 full "pages" of information can be stored with line-by-line random access. A cassette memory system for archival storage, soon to be available, will let you put statistical information, such as election returns or sports data, on audio cassette for replay through the disc whenever desired. Keyboard control buttons are color coded and grouped for easy operation by untrained personnel.

With its built-in video switcher and automatic color synchronization to the selected source, a single TCG-1425A can

serve both operations and production departments, producing eye-appealing matted, colorized and edged letters to spice up your taped commercials and on-air presentations. Horizontal crawl, vertical wipe, vertical roll and flash are all standard features with the TCG-1425A.

You get outstanding editability, too—with display editing functions such as copy-up/copy-down, hop-left/hop-right, snake-up/snake-down, automatic page and line centering and open-line/close-line (for erasing mistakes without resetting full lines). All this plus a handy extra line for composition preview. And a handsome keyboard that will either mount in a console or stand on its own.

Beef up your productions—buy a TCG-1425A.

To the chief engineer:

Our new TCG-1425A character generator and its many options have been engineered as a system. You get complete system integrity and single-source re-

of characters



sponsibility. Built into the TCG-1425A is a solid-state switcher which permits selection between two video sources. The source selected is routed through the matting amplifier while the other source is bypassed through an equivalent delay circuit. One of the sources even has a fail-safe metallic-contact bypass.

Options include edging, colorizing, 1000- or 2000-line random access disc memory, and an operator's control panel for on-air presentation of stored data. The all-around edging is accomplished electronically. Synchronization is automatic and instantaneous when operator switches between video sources. The subcarrier regenerator and burst logic let you colorize over either color or monochrome sources, with hue, saturation and lumi-

nance all operator-controlled. TeleMation-designed-and-built, the disc memory can be random-accessed line-by-line either from the keyboard or the operator control panel. It uses flying heads for wear-free, clog-free, trouble-free operation. Beef up your picture - buy a TCG-1425A.

To the news director:

What could be more convenient than a keyboard right in the news room! You can compose copy, correct it, edit it, delete it, transpose it, update it, store it and even air it. And you can use the 1425A's vertical-roll mode as an electronic prompter. This keyboard calls your edited copy out of the disc memory and presents it in highly

legible form. (Our easy writer is an easy reader, too.)

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Circle 116 on Reader Service Card

All The Things You Could Gain With A Television Lighting Control System... But Were Afraid to Try

By Herbert R. More

If you are frightened by the **myths** about TV lighting control, it could cost you money, audience respect and advertising agency acceptance. The **facts** about TV lighting control lead you to economy in production, a more professional product, and high marks from viewers and advertisers.

Myth: A television lighting control system is expensive, complicated, and unnecessary for a well-managed facility.

Fact: All three statements are wrong.

First, such a system is not expensive. Most systems pay for themselves by slashing the high costs the station is now paying in show preparation—and that includes even the simple shows like the evening news or a panel program.

Second, a lighting control system need not be complicated. The big city network stations and most major college facilities have jazzy systems that can perform all kinds of dazzling technical lighting tricks. But most commercial, educational, and CATV facilities have simpler requirements and virtually any engineer, lighting director, or technician can run these lighting systems after a few hours of training.

Finally, no really well-managed television station goes for very long without some kind of lighting control system. They need a system to upgrade the television product, to meet the demands of the market for local programming and locally produced commercials and to complete the basic equipment list every good station needs.

You can get adequate television lighting without a control system. But you can never produce really good lighting without one.

Myth: The local station can get by perfectly well with adequate lighting, using no control.

Fact: Any station makes more money, influences

people better, with the good lighting a control makes possible.

Adequate television lighting is simply throwing enough foot-candles of illumination on the set to allow the camera to function and pick up some sort of picture.

Good television lighting also demands sufficient illumination, of course. But it has the added requirements of balance and freedom from shadows, distortion and flatness.

Balance, in television lighting, means simply that the colors and intensities of the side lights, back lights, and key lights are adjusted so as to give a pleasing and artistic effect. In a news or public affairs program, good balance would highlight the faces of the performers. For a children's show, a brighter level with more variation would be desirable.

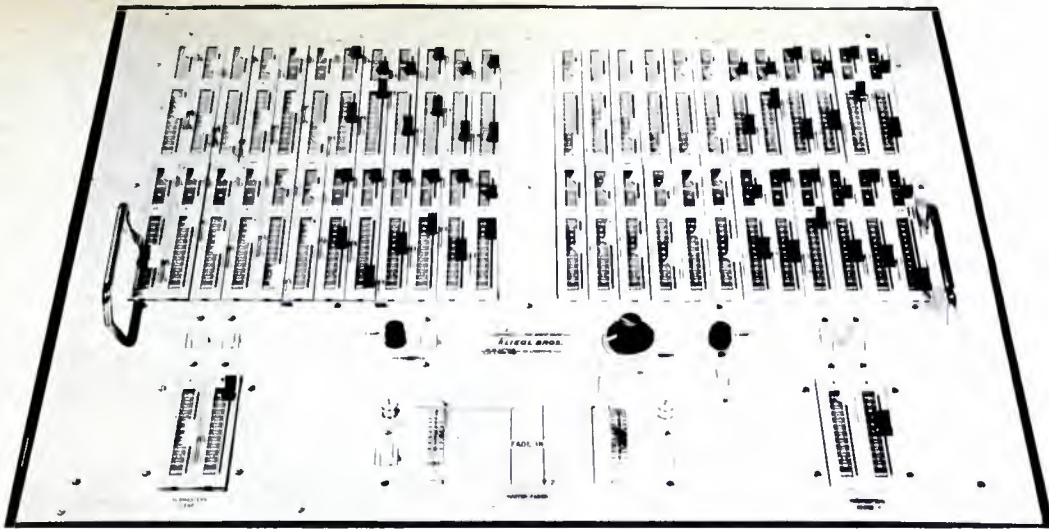
Video problems may often be the result of poor lighting. It is possible to have the Kelvin temperature of the light within the limits set by the camera manufacturer and to have enough foot-candles of illumination but nonetheless unsatisfactory quality in the resulting picture. This is almost certain to be caused by studio lighting that is unbalanced. It's usually impractical or impossible to adjust the intensities of light correctly without some dimmer control. That's why we say that stations without control can get adequate television lighting—but never good lighting.

Myth: Glare and contrast are video problems.

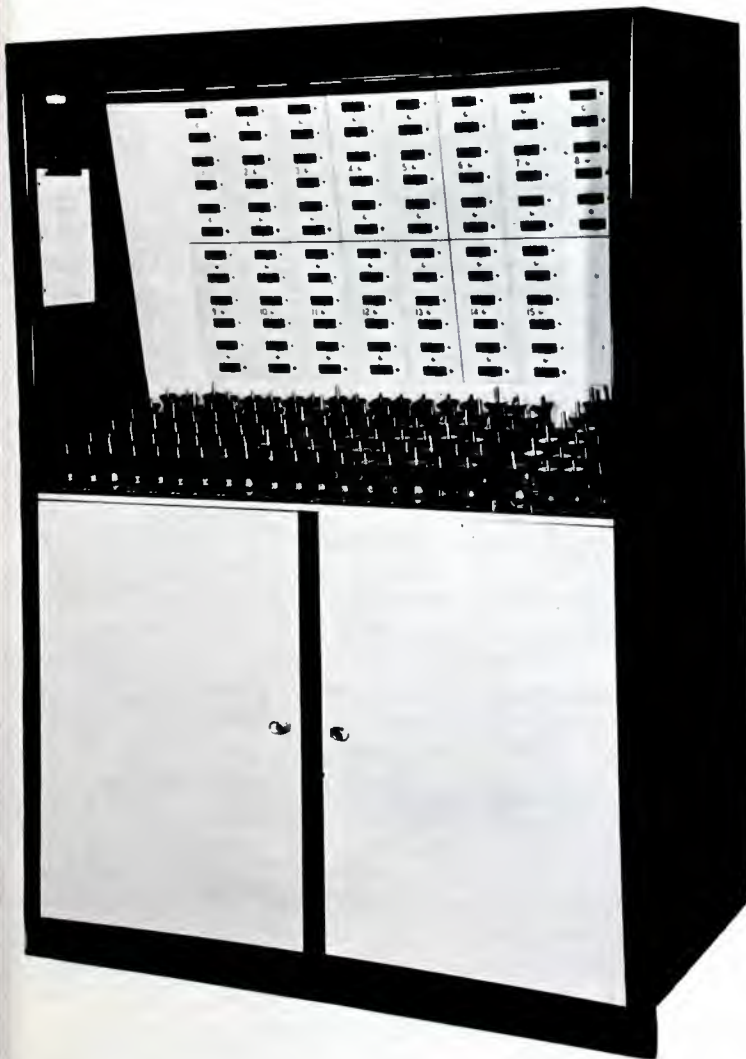
Fact: Not at base. Light control is the real cure.

Glare and contrast are video problems that people sometimes try to correct by iris-ing down on the

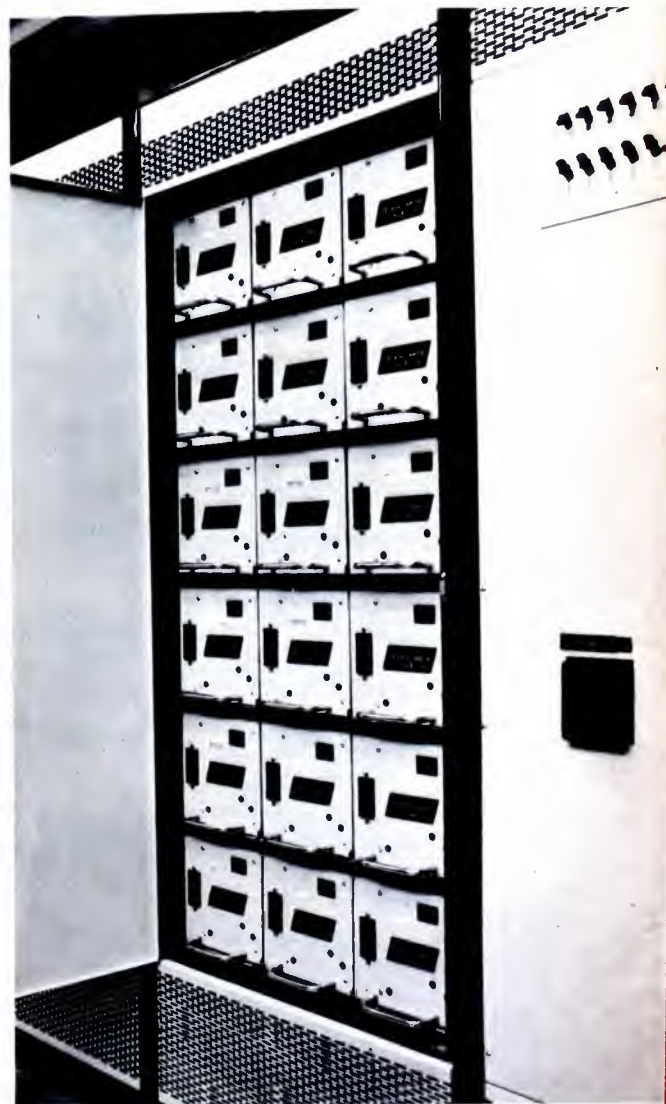
Mr. More is vice president, Television Division, Kliegl Bros., Long Island City, New York.



A control console with potentiometer controls. These are grouped into a two-scene, four sub-scene arrangement, which is frequently sufficient for local programming and commercials. This console could be mounted on a wall or built into a desk.



This patch panel contains all cold patching circuits. Both 20 amp and 50 amp circuits are included in the board.



A typical dimmer bank will consist of rows of plug-in dimmer modules. These are the SCR type widely used throughout the industry.

camera, but they should be corrected with lighting, which is the root of the trouble.

Remember that the camera sees *reflected* light, not incident light. So the light reflecting from a person, prop, or scene has to be adjusted.

For example, if your camera is showing you glare from the head of a bald man, the best way to correct the problem is to reduce the backlight on the man almost to zero.

Or, if a guest on a panel show wears a grey suit and you're broadcasting against a background of the same value, it's likely that you'll lose the guest against his background. To correct this, short of changing his clothes, it's best to adjust the intensity of the back light upward so the grey-suited figure is clearly defined.

Myth: The best way to get rid of shadows is to send an employee up and down ladders, moving and reaiming fixtures (while everybody else waits).

Fact: The best and cheapest anti-shadow technique is carefully levelled key or fill light.

Shadows are almost always caused by the wrong placement of fixtures or the wrong intensities of light.

You can sometimes get rid of shadows by adding additional spots or flood lights and then filtering their output with a spun glass or mosquito screen filter. This produces a nice soft, glare-free light. But it also reduces the overall light level of those fixtures by a 30-50 percent drop in foot-candles. You lose control of the light both in level and in focus. You can't get, for example, a 10 percent drop in level with this technique and the light is so diffused by the filter that you can't aim it—it simply bathes the scene in light.

A second method used to get rid of shadows may be compared to taking a treatment so painful that you may prefer the disease. This involves adding additional fixtures to your light plan or reaiming the existing fixtures in the studio. It's a time-consuming process because someone has to keep scurrying up and down ladders to get at the fixtures and aim them. Everything and everyone waits for the man on the ladder—including the engineer, director, or lighting designer who has to check the results.

The simplest, cheapest way to eliminate shadows is to add carefully levelled and focused key or fill light where the shadows exist. The light must be dimmed to an intensity that softens or removes the shadows, but still maintains good illumination and good modelling. This can only be done with a well-designed control system.

Myth: If you dim the intensity of your lights, you lose the Kelvin temperature required to maintain a good picture.

Fact: Not so.

This old saw is one of the hardest myths to eliminate. As a practical matter, it just isn't true and really never has been true.

When color TV was first introduced, the motion picture cinematographers got into the act and made a big issue over the fact that the movies had established a standard of 3400° Kelvin for all color motion picture productions.

What they forgot to tell us, however, was that motion picture film, particularly in the Technicolor system, had a fixed emulsion characteristic. The television cameras do not have such a characteristic and can easily accept a wide range of Kelvin temperatures.

Some of the networks, in fact, have established 3000°K as their camera standard, and use 3200°K lamps on dimmers. That gives them a built-in acceptable variance of $\pm 200^\circ\text{K}$ without affecting skin tones, or other critical colors.

Most cameras—certainly all the newer ones—will accept even wider variations in Kelvin temperature and still offer an excellent picture. With all that, the only light you ever have to be concerned about, in terms of Kelvin, is the key light. Back, fill, and other lights may be dimmed or intensified over a wide range without appreciably affecting skin color.

Finally, if your video operator is still hung up on the idea of dimmed lights affecting the Kelvin, think of this. You have to drop 33 percent in light output before you get a 200° change in Kelvin. Thus, if you dimmed a key light set at 300 foot candles all the way down to 200 foot candles, you would still not begin to noticeably affect the video.

Myth: The costs of preparing a simple show like the daily news would be higher with a lighting control system than without one.

Fact: A control system saves you money on almost any show.

The first reason nearly every show is more expensive without light control is the man we put on the ladder to correct shadows. A lighting control system doesn't totally eliminate climbing the ladder to adjust fixtures, but it severely reduces the need for it. With a control system, you can raise or lower the intensity of any light to an acceptable level. And you can do it in a few seconds, right in your control room. That obviates the constant need to move or re-aim fixtures.

While the man is on the ladder adding spun glass filters or turning fixtures on or off, an entire production crew has to wait.

The second reason it's more expensive is the limitation it puts on your broadcast or taping facilities. You can never get good television lighting without a control system and you can never do any kind of sophisticated cueing. You can't cross-fade from one cue to another. You can't smoothly change the color of the background in a panel show. You can't cut studio downtime to the bone if you're using primitive methods for lighting your shows.

Perhaps most important for some stations, you can't really do effective commercials for local advertisers if your cueing, set-up, and light-changing facilities are slow and cumbersome. The savvy advertisers, and certainly the ad agencies, will demand more than that.

Myth: A lighting control system has a lot of fancy components.

Fact: A lighting control system has just three elements.

A lighting control system consists of the dimmer bank, a patch panel, and a control board. Since the

selection of each of these elements is so critical I will discuss each one separately.

Dimmer Bank. Dimmers supply the power in a television lighting control system.

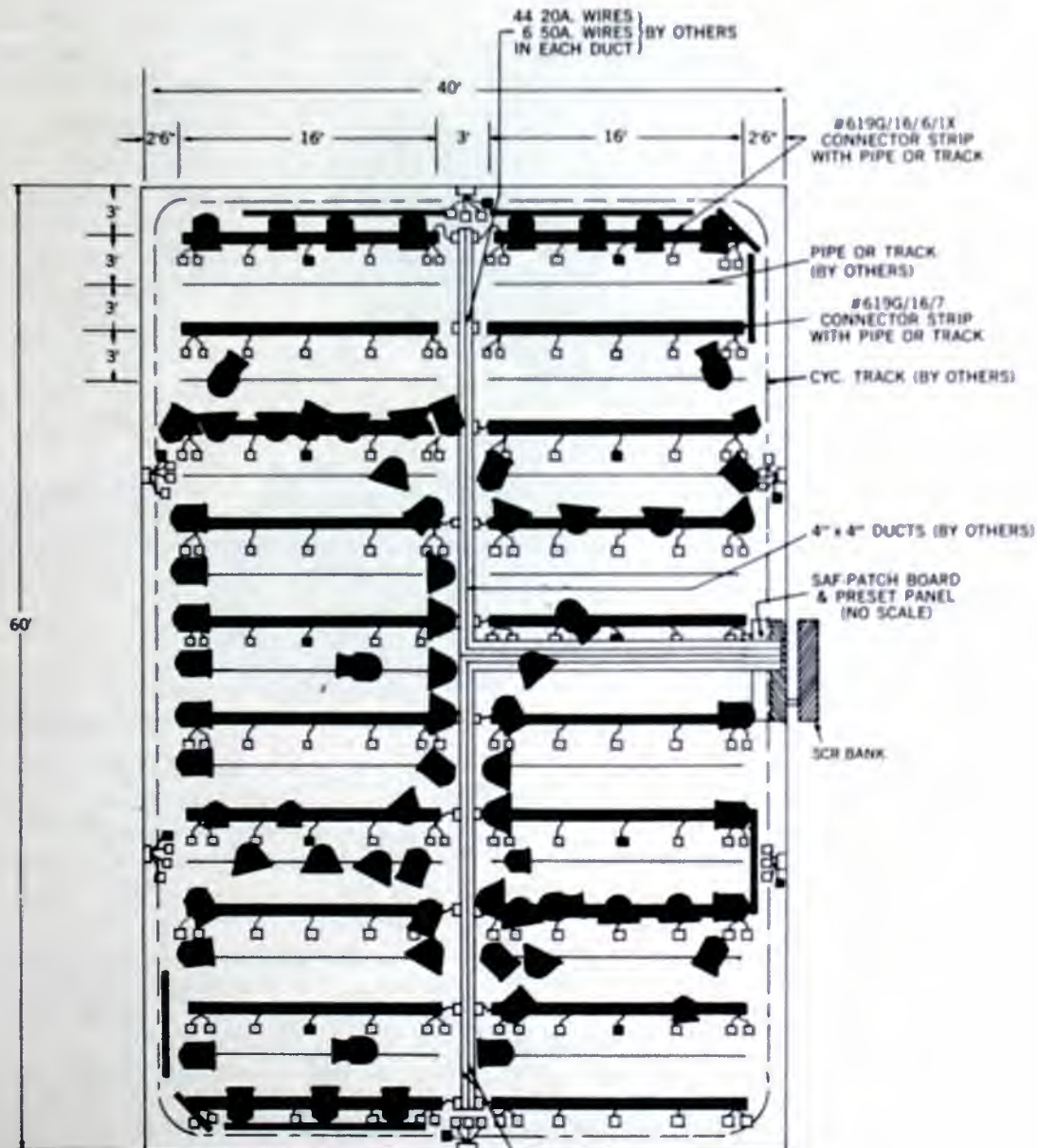
I won't bore either you or me with a long discussion of the history of dimmers and of the various types that have come and gone. Of interest to us now is the single type you are most likely to select if you buy a dimming system. It's called an SCR dimmer because the key component is a silicon controlled rectifier.

SCR dimmers were introduced by Kliegl Bros. in





the late fifties. Now, a number of manufacturers offer them. While they vary from vendor to vendor, they all have excellent efficiency, no moving parts, good speed of response and a small package for the power they deliver.

When you go shopping for dimmers some of the specifications to look for are voltage regulation, line and load regulation, and automatic current limiting.

Voltage regulation restricts changes in the dimmer output when there are variations in the incoming line voltage. A good dimmer will be voltage regulated to ± 1 volt for a ± 10 volt change in the incoming line.



LEGEND

			
1357 P6/W 6" KLIEGHLIGHT (QUARTZ) 1000 W.	3451 16" SCOOP (QUARTZ) 1000 W.	3508 6 3/4" FRESNEL (QUARTZ) 500/ 750 W.	3525 8" FRESNEL (QUARTZ) 1000 W.

A television package lighting plan shows all the fixtures in place and is drawn to scale. This particular package allows for four medium and two large production areas in the 40 ft x 60 ft studio.

A good combined line and load regulation should be within 2 volts of the dimmer's rating.

Most, but not all, manufacturers provide automatic current limiting. Some dimmers shut off when they're overloaded. Others continue to function but do not permit additional currents through the unit. In either case, current limiting is mandatory insurance against a catastrophic breakdown.

Myth: It's easy to figure how many dimmers you need.

Fact: You will do well to get help from a light manufacturer or a consultant.

Deciding how many dimmers you need and the capacities you should select takes some careful thinking. Our best advice is don't try to do it yourself. Call in the manufacturers, or some consultants, but by all means get some help. Most SCR dimmers are available in 2, 3, 6, and 12 kW sizes and you can select the wrong number and the wrong capacities without even trying hard.

Dimmers are stacked in a bank which may be 6 ft high, 4 ft long and 2 ft deep, in a station with 18 dimmers and a main breaker. The dimmer bank should be located someplace other than the studio floor . . . a remote location is a good idea because dimmers tend to create some a.c. hum and because there's no need to have that rectangular hunk of equipment using up valuable floor space.

The patch panel. It would be a nice world if every spotlight, fresnel and flood in the studio had its own dimmer. Some systems approach that utopia, but most systems must group a number of lights on a single dimmer. The equipment used to connect the dimmer outputs to specific lighting circuits is the patch panel.

There used to be all kinds of patch panels, but the industry has now pretty much standardized on the cord-and-plug style. The only caution here is to be sure to get the "cold patch" type . . . that is, the kind that doesn't allow some unthinking character to make a hot patch, singe his fingers and turn your hair grey.

The patch panel is also a large piece of equipment, but you'll want to have it in the studio or near the control room, since patching—or connecting various dimmers to lighting circuits—may be done quite frequently.

The control console. The thing that makes the whole lighting control system work is the control console.

The console displays rows of potentiometers which are associated, through the patch panel, with certain lighting circuits. The lighting director adjusts his light intensities by simply moving the appropriate potentiometer to a higher or lower level until he has what he wants.

In a simple type of preset system, two separate rows or scenes of potentiometers are used. The operator presets—or slides the potentiometer levers to the correct levels—in advance of the cue. When the cue is called, he activates an entire row (or scene) of potentiometers by pushing a button or pulling down a fader. The fader brings the light in gradually, the button does it instantly.

That, essentially, is it. There may be lots of other goodies on this control board which allow you to pull off all kinds of neat lighting tricks, but if you understand those tricks, you don't need this article.

Myth: A control system costs a small fortune.

Fact: The cost is proportionate to the needs and size of the studio.

There are two ways to buy a lighting control system.

You can get the pre-engineered "packages" available from most major vendors. Or you can have the control manufacturer design a special system just for you.

You don't need me to tell you that the package system is going to cost you less than a custom job. You may end up needing a specially designed system because of your unique requirements, but I strongly urge you to start with one of the package systems as your first choice.

The prices vary from system to system, of course, but here are some rough guidelines. In the package systems listed below, *everything is in the price, including the required number of fixtures*. If you've got fixtures in your studio, chances are you can shave a number of dollars from these prices.

For a Studio Size:	The Control System Costs:
20' x 30'	\$ 8000
40' x 60'	\$ 28,000
60' x 72'	\$ 42,000
80' x 100'	\$179,000

You've noticed, of course, that as the size of the studio increases, the price does too. That's not automatic, however, because it isn't so much the *size* of the room that counts as it is the *level of sophistication*.

For instance, if you have a relatively large studio and relatively simple needs, chances are good that one of these packages can be slightly re-designed and even cut down to meet your reduced requirements.

Incidentally, a number of vendors now have available special packages for ETV and for CATV.

Finally: If I want to investigate the possibilities of a lighting control system for my facility, what do I do first?

First: Get help.

Your lighting control equipment should be engineered to meet your present and future needs. You probably know all about your station, but there are people in the world who know a lot more than you do about television lighting control systems.

The two most likely sources for help are lighting consultants and/or the equipment manufacturers.

Most equipment manufacturers will be willing to come in and survey your needs at no charge. The good ones (and I confess to just a touch of prejudice here) won't try to burden you with a lot of gear you don't need. But they will tell you candidly and quickly the level of equipment you will require and what it will accomplish for you. If you're working with one of the major firms, it's likely that they will have a competent lighting man in or near your area.

BM/E

Shopping for lenses? Compare Canon!

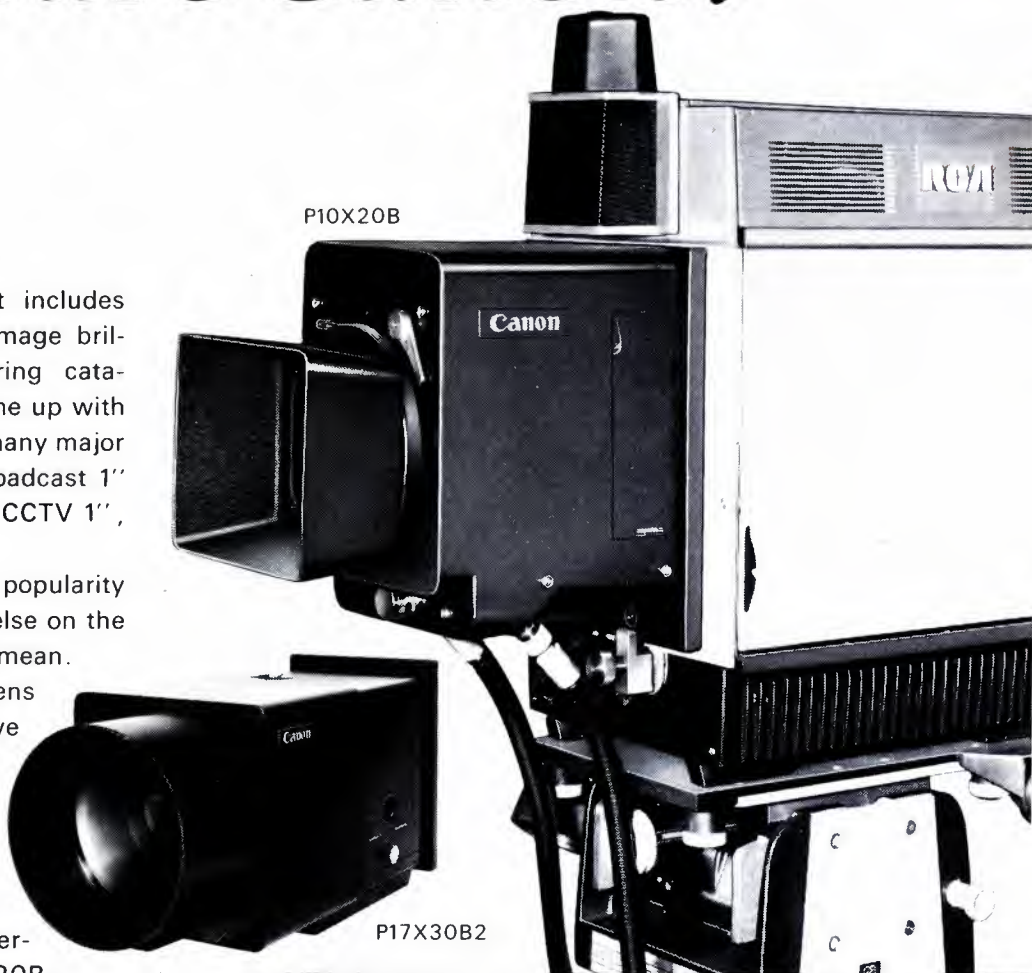
Draw up a checklist that includes price, specifications and image brilliance, then start comparing catalogues. You'll probably come up with the Canon answer, like so many major camera producers—for broadcast 1" or 1 1/4" PLUMBICON® or CCTV 1", 2/3" vidicon.

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
1 1/4" 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
1 1/4" 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

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Canon

Circle 117 on Reader Service Card

The Monthly Magazine Goes Local

At WBAP-TV, Fort Worth-Dallas, A Two-Man Team is Permanently Assigned to "Texas '72", A Monthly Half-Hour Magazine Program Produced by the Station. It Has Paid Off in Audience Praise and Advertising Revenue.

FOLLOWING NETWORK PRACTICE in presenting a regular "magazine" program can pay off for any station that has the time, talent and money to product its own program. That is the message we get from the experience of WBAP-TV, Fort Worth-Dallas, with "Texas 72," (last year, of course, "Texas 71"), a half-hour monthly which takes the full time of a two-man production team and has won plenty of audience praise and a satisfying amount of advertising money.

The program takes up such diversified topics as Texas highway patrol training, small towns, contract fishermen, Indians, old folks and fat ladies. "Texas 72" concerns itself with Texas life, yet does not limit itself by the boundaries of the state; for the June 1971 program, the team went to Germany with the Texas Air National Guard for segments on the Guard's mission in Germany. In Braunfels, a quaint German town, and in its namesake in Texas, New Braunfels, the team took a look at German-American culture, the third largest cultural group in Texas.

Covering such a wide range of topics naturally keeps the heat on the two-man production team headed by Lee Elsesser. Elsesser is the producer of the program, which has won awards for its outstanding contributions to conservation as well as the Sigma Delta Chi award for the best documentary in Texas last year.

Elsesser and Special Projects Cameraman Jimmy Darnell are usually the entire production crew. However, on occasion other reporters from WBAP's news department have contributed segments for the show, which may be devoted entirely to one subject or to as many as three integrated or divergent subjects.

The "Texas 72" team shoots film, then writes the script, making extra trips for additional footage, when necessary. Darnell often shoots more than 4000 feet of film, and usually uses about 1200 for a single "Texas 72" program.

Elsesser handles the Uher tape recorder and conducts the interviews, while Darnell shoots the film using a Bell and Howell silent or an Auricon sound camera with a Cine Voice Yoder conversion. When use of the sound camera is impossible, the WBAP team uses the Bell and Howell approach. Synchronizing sound and video in such cases often is difficult, according to Elsesser, but timing is occasionally perfect. For example, in a segment on today's cowboys in Texas, a calf squealed obligingly just as the film showed a branding scene—although Elsesser was using a wild sound track at the time.

In production, "Texas 72" goes directly from



Lee Elsesser works with the director, center, and switcher in taping a 30-minute show, which was produced as a three projector piece on WBAP's TS 51 switcher, the largest ever built by RCA.

film to videotape. Since no work print is made, no further lab work is required. Instead, Elsesser and Darnell edit the program as a triple projector piece, running audio on one projector and video, sometimes with sound, on the other projectors. With this method, a producer can electronically dissolve from one projector to another, half-lap and blend sounds.

Some magazine segments require as long as three months to shoot at irregular intervals. Newsmen Bill Tippit and Tom McDonald did a 30-minute show on the Big Thicket, a 300,000-acre area in central Texas which produces a confluence of woodlands, including hardwoods, palmettos and cypress, often hung with wild orchids. The newsmen took a canoe trip down the Neches River, interviewed conservationists who want to make the area into a state park and lumbermen who do not, in addition to attending a Congressional hearing and supervising construction of a topographical map of the area.

A 30-minute segment on the Texas oil industry, now being loaned to educational outlets, was equally time-consuming. Elsesser and his photographer travelled more than 1500 miles in Texas, looking into the possibility that the state's oil reserves will not meet the rapidly increasing demand for oil and gas.

The most difficult show produced by Elsesser

was a feature on country singer Charley Pride. Cut into seven segments, the 12-minute feature employed five different stop-action sequences produced with an Ampex 200 recorder.

In producing its television magazine, WBAP's commitment—in terms of time, talent, and money—has been unyielding. Counting two full-time salaries, travel, and production costs, Elsesser estimates each show costs close to \$5000, not including air time.

Production of WBAP's television magazine requires high technical sophistication, according to Elsesser, because of the in-depth approach of the program and because of the format. Elsesser explains: "Obviously the main feature of the television magazine is not an elaborate production. In this type of format, we strive to combine news and entertainment without going too far in either direction. The television magazine is not a variety show, although we have focused on local entertainment groups, and it is not a monthly news show, although the program has spotlighted breaking news. Somewhere in between is fertile ground for the television magazine."

In the Dallas-Fort Worth market, WBAP's magazine has proved a successful program with viewers. In fact, one viewer applauded the program's objectivity, writing, "Keep that up and Mid-America, Spiro Agnew, and I, will get off your back. **BM/E**



Texas '72 producer, Lee Elsesser, center, talks with David Straus, a San Antonio businessman who instigated the San Antonio River Beautification Project. Cameraman Jimmy Darnell shot the sequence in San Antonio.

How To Get Into Four-Channel Broadcasting

By Lawrence Gahagan

The last of three articles by an FM station operator describes the hardware and software available for quadrasonic (-' phonic, etc.) broadcasting.

IF YOU'RE PLANNING to start four-channel stereo broadcasting, you can't look to a broadcast manufacturer's rep for equipment, nor to a record distributor for recordings. Instead, you must go to most of the sources of supply directly. This article tells you what's available and where to find it.

Decoding and monitoring

This is the end, but also the beginning. Until you have a four-channel monitoring system, you really won't be able to start four-channel broadcasting. Sure, it's possible to broadcast four-channel without knowing what it sounds like, but there are too many variables for me to recommend this procedure. You'll want a decoder for whatever system of encoding you use, plus some of the others that your listeners may choose.

Electro-Voice EVX-4: This is the original decoder for the E-V matrix system, described in previous *BM/E* articles (July, November, and December, 1971). Soon to be surpassed by a model that will also decode the CBS system, the original EVX-4 decodes (separates) broadcasts and records encoded with the Electro-Voice matrix system (Stereo-4) and also provides an enhanced (artificial) four-channel effect with many two-channel stereo recordings. If you broadcast with the Electro-Voice matrix system, you can augment your four-channel tape and record library by including stereo recordings that decode effectively with the EVX-4. It's available through hi-fi stores at \$59.95 and, under the Realistic label, from Radio Shack stores at the same price. Electro-Voice sells the units directly to broadcasters at distributor prices that vary depending on the quantity. Heathkit markets a kit version.

Sony SOD-1000: The decoder for CBS SQ (Stereo Quad) is manufactured by Sony. As previously noted in *BM/E* (November 1971), SQ is a matrixing system for discs with no hardware available for broadcasters. However, SQ discs reportedly can be inter-

mixed with other matrixed discs in four-channel stereo broadcasts. Optimal recovery of the four channels is achieved with the Sony decoder, which has been announced, but (as of this writing) has yet to appear in hi-fi stores. Other SQ decoders are also on the way.

Sansui QS-1: Sansui's decoder is sold as a "Quadphonic Synthesizer," emphasizing the ability of a matrix decoder to create four-channel sound from conventional stereo recordings. At \$199.95, this unit is considerably more expensive than the Electro-Voice for similar performance (though matrix parameters are slightly different). However, it is a considerably more complex unit, offering a number of operational features of possible interest to the home listener (such as compensation for different types of programming). Other features may be of more interest to the broadcaster: individual VU meters for the four channels and easy balancing amongst the four. Like the E-V decoder, this is a currently available hi-fi store item. It will decode E-V encoded discs as well as Sansui encoded discs.

Japan Victor Corp. CD-4: This is the decoder for the JVC disc, a discrete four-channel record that cannot be broadcast directly. A technical curiosity until November 1971, the JVC disc promises to be a serious contender for four-channel stereo with the announcement by RCA that it will press records with JVC encoding. No firm date has been set, however, for appearance of the RCA records.

This encoding is clearly incompatible with any other system, so the broadcaster will have to employ the decoder with all turntables on which the JVC disc will be played. Since the JVC system uses a 30 kHz subcarrier encoded on the record, turntables will have to be outfitted with phono cartridges with 45kHz response (to accommodate the fully-modulated subcarrier). JVC offers such cartridges at \$25 and \$35. The decoder is an additional \$60 or \$110, depending on extras (similar to those on the QS-1). Although the units are not currently available in this country, it may be possible for broadcasters to



This decoder from Sansui can create four-channel sound from conventional stereo records as well as decode E-V or Sansui encoded records.

obtain equipment from Japan if JVC encoded discs become available first. Both hardware and software are now on the market in Japan.

Koss K2+2: To listen to four-channel stereo through any of the decoders above, you can add a stereo amplifier and an extra pair of speakers to an existing stereo monitoring system. However, with headphones, you have to start from scratch. (Believe it or not, four-channel headphones are available; even more surprising is the fact that they do work.) The Koss four-channel headphones at \$85 are probably more of a technical curiosity than a broadcast tool. (In order to notice the absence of one channel, for example, you will probably have to turn off the other three channels). However, four-channel headphones are an attention-getter, and we've used them effectively in four-channel demonstrations. At this writing, the K2+2 is not in hi-fi stores, but available from the manufacturer, Koss Electronics, Inc., 4129 No. Port Washington Ave., Milwaukee, Wisconsin 53212.

Dynaco Quadaptor: In addition to the Dynaquad decoder, there are a number of other passive decoding matrices sold as "house brands," often at the same hi-fi stores that sell the Dynaco. All of these differ from the previously discussed decoders in that they are wired into speaker circuits exclusively. If used in a broadcast station, such a unit could come *after* the station's muting relays to provide absolute muting of all four channels without complicated expansion of the muting relay deck. (See *BM/E*, December 1971, for information on avoiding this problem with the E-V decoder.) The primary advantage of these decoders is low price (\$30 or less) which is some compensation for the fact that even when used with properly encoded materials, it is next to impossible to achieve separation between the two rear channels.

Recordings

The best source of recorded material for matrixed



The E-V decoder alongside a turntable and two stereo hi-fi amplifiers.



The E-V encoder.

four-channel broadcasts are discs that have been encoded with the matrix system you are using. The recording engineer will already have checked mono and stereo compatibility; broadcast use—especially cueing—is easy; and the discs (when new) will be technically superior (especially in noise) to mass-produced tape. If you confine your four-channel broadcasts to encoded discs, you won't need four-channel tape equipment and an encoder.

At this writing the largest record companies are just announcing their plans for four-channel discs. CBS has made good on its promise to offer at least 50 records encoded by the SQ process by the end of the year with their announcement of 52 titles, of which approximately half are from the Columbia catalog. SQ releases on Vanguard and Ampex account for the rest. In spite of earlier denials, RCA seems to have opted for the JVC disc, and it is said that the entire RCA catalog will be offered in this form, though it will surely take some time to accomplish this task. Many encoded records (generally using the E-V system) are being produced today by smaller companies.

Ovation Records, in Chicago, owned and operated by two-channel stereo pioneer Dick Schory, produced its first encoded disc almost a year ago; now its whole (small) catalog is available in encoded form. Stations should contact C. A. "Bud" Doty, Ovation Inc., 1249 Waukegan Road, Glenview, Illinois 60025, (312) 729-7300.

Project 3 is Enoch Light's record company, and its catalog is heavily weighted to his material. All four-channel material (about a dozen items) is available to broadcast stations in encoded disc (\$2.21), discrete tape (\$7.00), or Quad-8 cartridge (\$3.10). Stations should contact J. Michael Tumelty, Project 3, 1270 Avenue of the Americas, New York, N.Y. 10020, (212) 765-9760.

Command has some other Enoch Light material and selections from other artists available on encoded discs. Command is distributed by ABC Records in New York and Los Angeles.

Quad Spectrum is produced by Alshire, the *101 Strings* people, and their four-channel offerings lean toward this origin. Four E-V encoded releases are available at this writing with more promised by the time this appears in print. Stations should contact Ricardo Ceja, Alshire International, P.O. Box 7107, Burbank, California 91505, (213) 849-4671.

On a number of other labels you can find at least a few encoded recordings. These include Crewe, Crest, Evolution, Avant, Radnor, and Stereo Dimension. However, a good portion of the recorded material for an encoded broadcast can come from a station's existing stereo library by careful selection of existing recordings that create a realistic "surround sound" effect when played through a decoder.

Discrete four-channel recordings are available on reel-to-reel tape and tape cartridge. Vanguard has a library of four-channel reel-to-reel tapes that include classical, MOR, and rock. A hundred more titles are available on RCA's quad-8 cartridges; however, these produce substandard broadcast quality, especially when used with a matrix encoder.

Recorders and encoders

Although broadcasting the encoded disc requires no new equipment in order to get four-channel on the air, most four-channel broadcasters will want tape equipment, not only for playback of pre-recorded tapes but also for production of live four-channel recordings. Ampex, Scully, and the other major manufacturers of professional quality reel-to-reel tape equipment, have been producing four-track recorders for some years (though most are designed for ½-in. tape). At much lower cost, a broadcaster can choose a semi-professional home recorder with excellent specifications and adequate durability for the foreseeable demands of four-channel broadcasting. Such recorders are manufactured by Astrocom-Marlux, Telex, Sony, and Teac. Equipment by the latter two manufacturers, which is widely available, will be discussed in detail.

The Sony 854-4, at \$1600, is the top-of-the-line unit, and the only one with 10½-in. reel capability, though this feature is considerably more awkward to use than on typical broadcast machines. The Sony 654-4 at half the price is probably a better value for the typical broadcaster, since it seems unlikely that there will be any requirement for 10½-in. reels of discrete four-channel recording. (All commercially-produced four-channel tapes are supplied on 7-in. reels, and longer recording times can be achieved with any of these machines by the use of thinner tape.)

Next in price is the Teac recorder TCA-42 at \$700. Although the package is somewhat cumbersome (three cabinets) for portable use, it becomes a very handy studio machine when equipped with the CT-412 cradle at \$14.50. The machine is available in playback only as the TCA-40 for \$365, making it the lowest-priced of the semi-professional four-channel decks.

The lowest-priced record machine is the Sony 366-4 at \$500. Though it lacks solenoid-operated controls (and hence remote control capability), it has been used successfully by many four-channel broadcasters.

Unless you transmit your four-channel broadcasts over two separate FM stations (see *BM/E*, December 1971, for a discussion of this technique), you will need an encoder to process the output of any four-channel tape deck and create the (complex) two-channel signal that your console and transmitter are accustomed to. Equipment to do this is made by Electro-Voice, Sansui, and Gately. It varies in price from \$800 to less than half that amount. Since all of this equipment is subject to modification as encoding parameters change (and this is going on right now), you should be careful that the unit you select is adequately protected against rapid obsolescence.

Notwithstanding the threat of technological upheaval, four-channel broadcasting has grown from isolated experimentation a year ago to daily programming on a number of stations. As more and more stations get on the four-channel bandwagon, the likelihood of its widespread acceptance is greatly increased.

BM/E

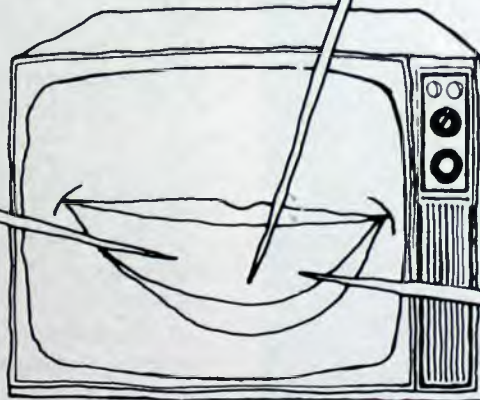
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"Our only regret is that these units were not available sooner."

"Every one of our 17 units has operated perfectly from original turn on."


"The quality of reproduction of these receivers...is more than adequate for all but the most exacting monitoring functions."



Unlike color sets intended for home use, this receiver is equipped to accept RF or bridged direct video and audio line feed without the need for costly adaptors. For under \$400, you get every non-critical monitoring function you can ask for — picture, sound, live or tape, color or monochrome. It's especially suitable for monitoring needs backstage, for the band, for the audience, and similar applications.

For complete details, send the coupon. We'll show you cold cash reasons why RCA's commercial color TV is your best answer.



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Please furnish further information about RCA commercial color sets for broadcast monitoring purposes.

Name _____

Title _____

Station _____ Phone _____

Address _____

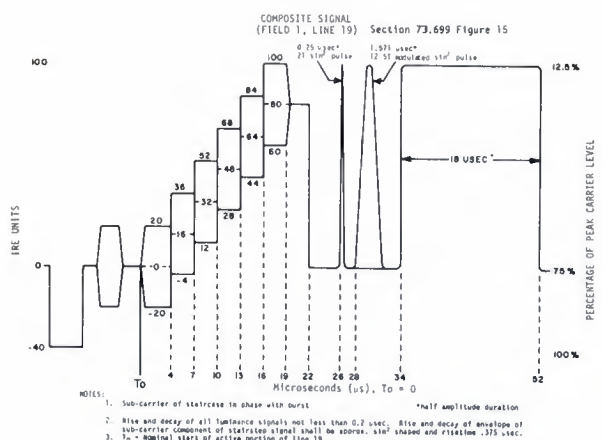
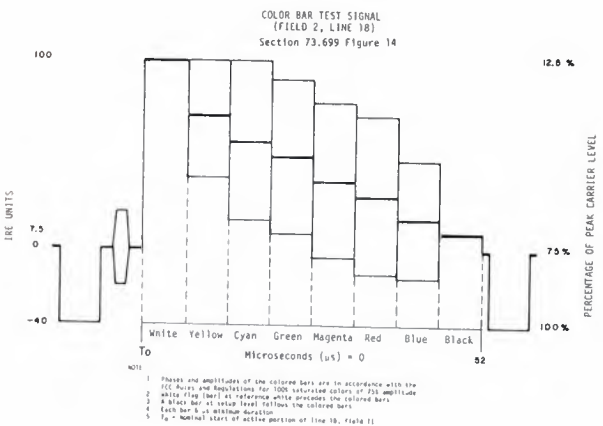
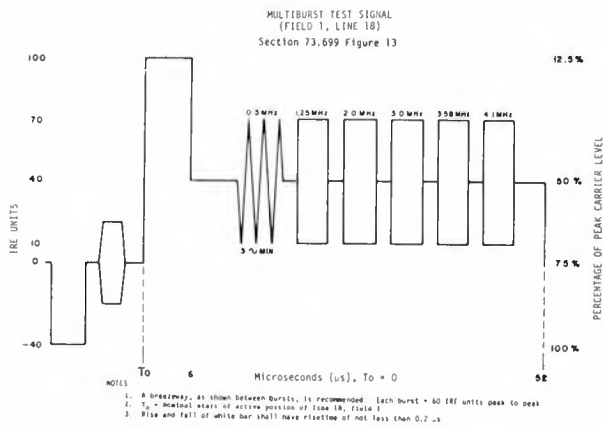
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Test Signals For Monitoring Remotely Controlled TV Transmitters

By Charles W. Rhodes

Section 73.699—Test Signals



The Federal Communication Commission's authorization of remote control operation of unattended VHF TV transmitting requires the insertion of special vertical interval test signals by the broadcaster.¹ UHF stations, operating under remote control, will be required to insert these test signals by April 30,*1972. This has created a substantial increase in interest in test signal generation and insertion equipment and in waveform monitoring techniques.

The test signals to be used are shown in FCC §73.699, Figs. 13, 14 and 15 reproduced here. They are: multiburst; color bars; and a composite test signal carrying a modulated staircase, 2T sine-squared pulse and bar with a 12.5T modulated sine-squared pulse. These test signals have been specified not just in name, but also as to specific amplitudes and timing arrangements. These were recommended by the Electronic Industries Association, Broadcast Equipment Section, pursuant to the FCC First Order and Report of March 17, 1971, Docket 18425. These recommendations were made in the light of the specific problem at hand, namely monitoring off-the-air transmitter performance. The objective was to ascertain whether the radiated envelope of the picture signal conforms to the present rules. The major problems faced by the EIA were:

1. Preventing any deterioration in the picture or sound due to the test signals, i.e., flicker or buzz or apparent movement caused by VITS;
2. Reducing, as far as possible, the effects of quadrature distortion in the monitoring demodulator;
3. Simplifying the use of the test signals operationally; and
4. Detecting and isolating distortions in the STL.

The EIA filed its comments on May 17, 1971. There were many other comments filed, but no replies to the comments were filed. The FCC substantially adopted the EIA proposal concerning the composition and timing of the test signals on August 20, 1971.

The new composite test signal

The concept of a single line VITS has been around for some time.² Packed into one line are test signals sensitive to all known forms of distortion, linear and non-linear. It is obviously easier to observe one line than to watch over four. The big concern is: While a change in waveform of the composite signal indicates a change in performance, is the change (measured in terms of the rules) serious

*Pending general availability of suitable generating and insertion equipment.

Charles W. Rhodes is manager of the Television Products Development Group for Tektronix Inc.

enough to warrant a trip to the transmitter? A careful analysis can help the engineer decide. The multi-burst and color bar signals can be examined in detail whenever a change is noted in the composite test signal to interpret the change in terms of the rules. (Fig. 1 shows the test signal waveform.)

Line 19 is a busy line. The staircase signal has five risers and its peak amplitude is limited to 80 IRE. Five risers of sensible width are about all there is room for (and practical as proven in practice in Europe). The subcarrier level is 40 IRE to help overcome the masking effects of noise in measuring differential phase and differential gain. The limit of 80 IRE in staircase amplitude is required by the language of the present rules [§73.682 (a) (iii)] concerning VITS. While it is common practice to permit the peak of subcarrier of network VITS to reach 110 IRE, it is also true that many stations delete these VITS. Therefore, it cannot be ascertained whether any significant complaints of intercarrier buzz would occur if the subcarrier peaks were to continuously reach (or, in practice, at times exceed) 110 IRE.

Were the peaks of the subcarrier to reach 120 IRE, this could result in carrier cutoff and a serious intercarrier buzz. Under the rules, these test signals must be radiated while the transmitter is operated under remote control. Action of some processing amplifiers under conditions of low average picture level (APL) increases video gain, hence may drive the subcarrier peaks substantially above 100 IRE.

There are two neat applications for the portion of the 80 IRE stairstep free of subcarrier for transmitter engineers:

1) The adjustment of the peak white clipper. If it clips accurately at 100 IRE, the bar will be 100 IRE while the staircase ideally is at 80 IRE. Decreasing the white clip level will, in effect, bring down the observed difference in levels and this is readily apparent in Fig. 2.

The lack of any subcarrier during the last 2 μ s of the 80 IRE step provides improved clarity of the exact amplitude of that step and eliminates quadrature distortion which will depress the first 3 μ s of the 80 IRE step as in Fig. 3. The extent depends upon the demodulator.³

2) Non-linearity in the transmitter causes chrominance-luminance cross modulation. Its effect may be similar to quadrature distortion in the demodulator. It can accurately be measured at the transmission line diode and compared with the results through the demodulator.

This staircase test signal can measure burst phase errors:

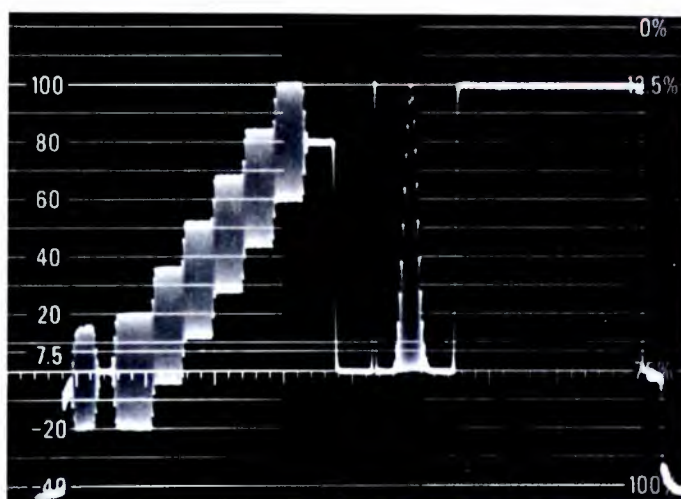


Fig. 1. Composite test signal inserted on Line 19.

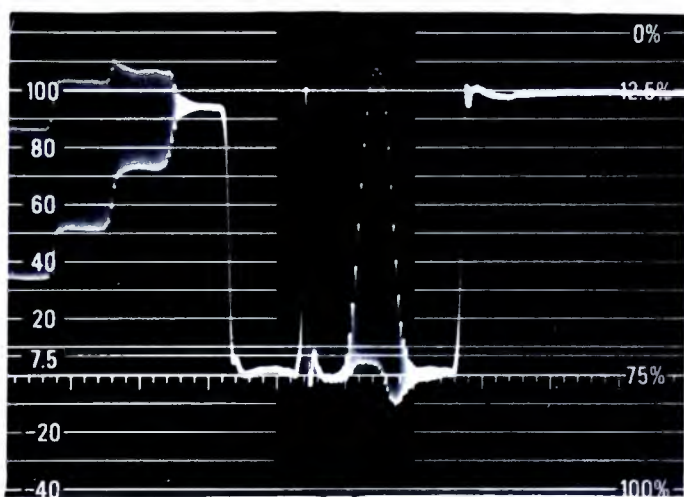


Fig. 2. White clipping level incorrect, 80 IRE staircase peak now at 95 IRE.

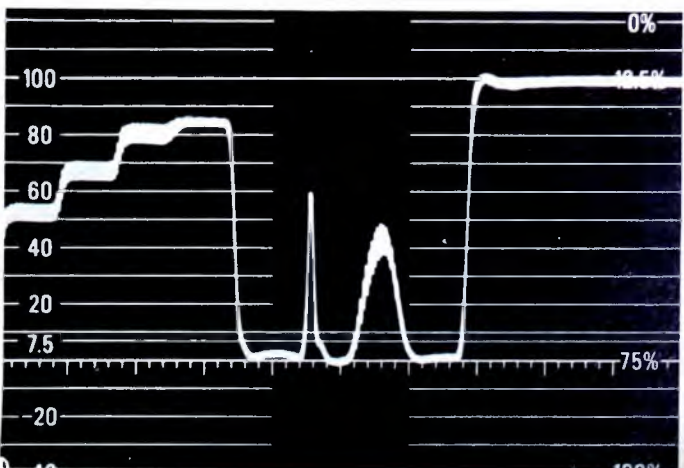


Fig. 3. Quadrature distortion depresses 80 IRE staircase while subcarrier is present. IRE response used.

- a) in burst regeneration in the stabilizing amplifier at the transmitter,
- b) being phase shifted as a result of improper clamper operation, and
- c) other causes??

The amplitude of the staircase subcarrier and its mean level are initially the same, and the subcarrier is in phase with burst at the inserter. Changes in their relationship are not due to differential phase or differential gain. They are "static errors," if unaffected by APL; "dynamic errors," if caused by APL variations. Transmitters may be APL sensitive; demodulators we have tested are not APL sensitive.

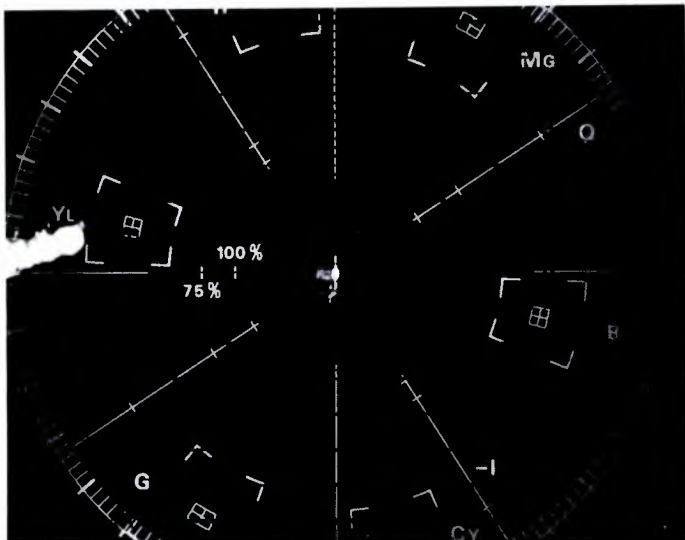


Fig. 4. Differential phase $\sim 5^\circ$ and differential gain $\sim 20\%$ are indicated by vector display of staircase subcarrier, composite test signal.

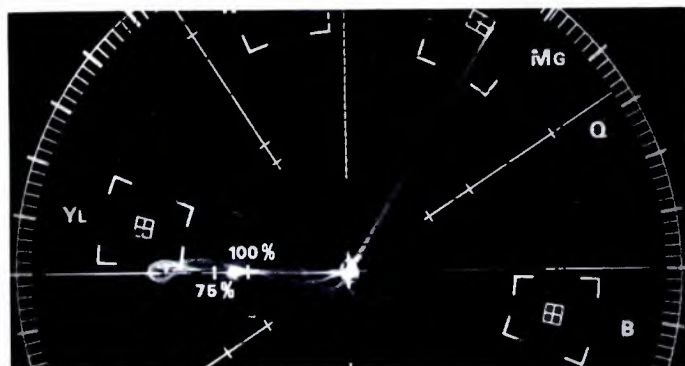


Fig. 5. Subcarrier component, 12.5T modulated sine-squared pulse on vector display.

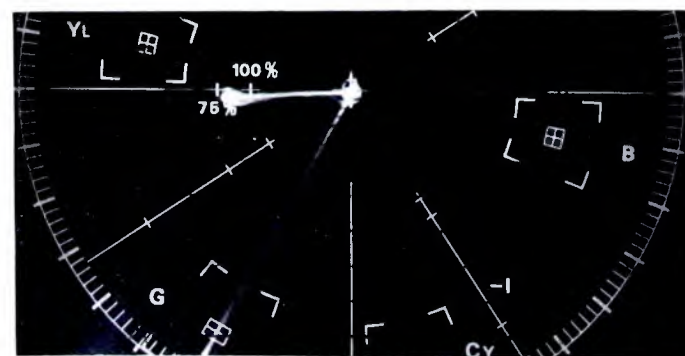


Fig. 6. Subcarrier phased to green to indicate signal source at transmitter.

In routine monitoring of the staircase signal, it does not appear necessary to perform detailed differential phase or differential gain tests. Inspection of the vector display of this signal shows differential phase and differential gain directly. Fig. 4 shows the effects of differential phase as phase rotation, and differential gain as radial displacement of the dots near burst. The signal dot at 56° (near edge of screen) Fig. 5 is produced by the subcarrier component of the modulated sine-squared pulse. This phase is not specified in the rules. In the Tektronix 147 generator, the subcarrier phase of the modulated sine-squared pulse may be preset away from burst.* This permits coding the source of the signal being observed. For example, on Field I, signals come from STL input \equiv magenta phase as in Fig. 5; Field II signals may come from transmitter input at, say, green phase as in Fig. 6. These particular phases are considered the least likely to cause any interference in the picture.

The 2T sine-squared pulse is especially useful in observing both frequency response and group envelope delay. Where it is peaked with respect to the bar, frequency response is peaked; often between 1-3 MHz. When its peak is below the bar, there is high frequency rolloff in this range. More important, however, is its ringing and overshoot characteristics. These tell what multiburst can't about delay distortion. When this pulse is asymmetrical, there is delay distortion, or, you could have close-spaced echoes due to multipath problems at the monitoring site. A k factor graticule may be used with this 2T pulse, as in Fig. 7; however demodulator quadrature distortion gives rise to somewhat similar waveform distortions. This is clearly evident in Fig. 7. Unlike the 1T pulse, used to date by the networks as a VIT signal, the 2T pulse should make it through your STL and transmitter, in the absence of quadrature distortion, with its amplitude, relative to the bar, unchanged.

The 12.5T modulated sine-squared pulse shown in Fig. 8, provides sensitive indication of amplitude-frequency response errors which occur above the region where the 2T pulse is less sensitive, namely from 3-4 MHz—the chrominance frequencies. Thus, the modulated sine-squared pulse detects problems in relative chrominance/luminance gain and delay which cause saturation errors and color misregistry.

The multiburst can detect relative chrominance gain errors, i.e. peaking at 3.58 MHz vs the white flag, but it cannot detect relative chrominance delay. This delay distortion is more or less covered by the present rules in §73.687, (5). In any case, this delay distortion, shown in Fig. 9, may give rise to color misregistry. This is perhaps most objectionable on colored lettering. Try a close-up of red letters against a white background. The red will generally "run" or "bleed" toward the right, i.e. chrominance delay. The modulated sine-squared pulse originated in Germany. On continental Europe (where the color subcarrier is 4.43 MHz and video bandlimit is 5 MHz) they use a $2.0 \mu\text{s}$ half amplitude duration (h.a.d.) pulse called 2OT.

*Thanks are due to Hans Schmid of ABC for this clever concept.

A 20T pulse for NTSC would be $2.5 \mu\text{s}$ (h.a.d.). It would occupy at least $5 \mu\text{s}$ of the test line and be less sensitive to delay distortion. The composite test signal (§73.699, Fig. 15) had a 12.5T modulated sine-squared pulse. This pulse is nearly twice as sensitive to delay distortion and occupies less of the test line.⁴

Fig. 10 is a nomograph which is needed to actually deduce the gain and delay distortions from the waveform display. From a monitoring point of view, one notes the values of y_1 and y_2 when scope gain adjustment makes $y_{\text{max}} = 100$ IRE. $y_1 =$ first peak, and $y_2 =$ second peak of baseline ripple in IRE units. To make measurements without the nomographs requires some algebraic exercise or a measuring set. The latter introduces calibrated gain and delay distortion. The dials are manipulated to eliminate the distortion(s), i.e. flat baseline, as in Fig. 8, on the waveform; distortion is then read off the dials. This is obviously very convenient as it readily detects changes in performance.

A simplified form of gain (only) normalizer is currently in production at Tektronix, Inc., With the gain (error) normalized $-y_1 = y_2$, the delay distortion is:

$\tau = 10 d$, where $d =$ p-p baseline ripple in % peak signal amplitude, or $(y_1 - y_2)$. Use of a gain normalizer permits accurate measurements of delay distortion. In Fig. 9, using the gain normalizer, delay = -120 ns.

The bar signal occupies the remaining $18 \mu\text{s}$ of the line. Its transitions are controlled by a 2T sine-squared filter. This pulse should, therefore, pass through an ideal system without distortion.* Line time tilt, smear and streaking may be measured in addition to furnishing a reference white level. Generally a k factor graticule is desirable. This is shown in Fig. 11.

Note that no setup is used on this test signal. This makes burst phase and gain errors, which are not due to differential phase or differential gain, measurable and simplifies all other measurements. In the case of k factor measurements of the 2T pulse and bar, a new graticule is desirable, probably having larger k factor limits than 2%, 4% and simplified for zero setup.

The color bar and test signal for monochrome transmissions

The rules provide for only one difference in the test signal for monochrome transmission [§73.676 (f) (1) (ii)]; namely, that the chrominance component of the color bar, Fig. 14, Line 18, Field II shall not be radiated. During periods where no burst is radiated, the 3.58 MHz oscillator continues to function in many receivers (i.e. a.p.c. loop-type receivers). This would result in asynchronous demodulation of the chrominance in the VITS. In some receivers, color killer circuits may be misadjusted or inoperative or may not even be present. Under these condi-

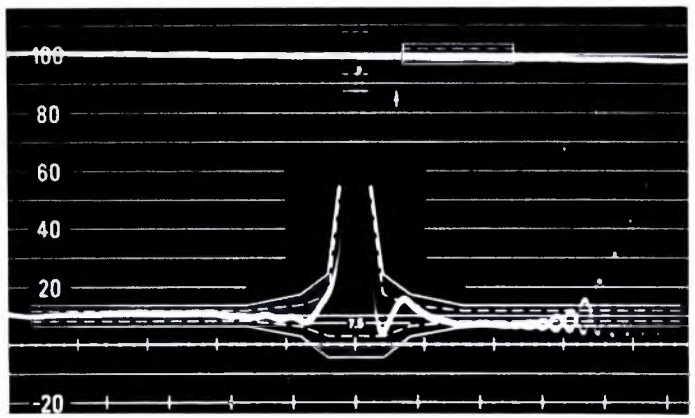


Fig. 7. 2T sine-squared pulse. Quadrature distortion causes asymmetry in rise and fall; pulse narrowing at 50% points.

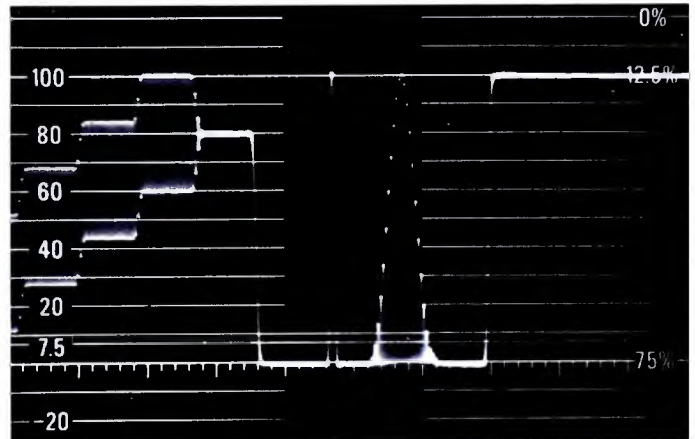


Fig. 8. Modulated 12.5T sine-squared pulse at input to transmitter. Note 100 IRE peak, flat baseline.

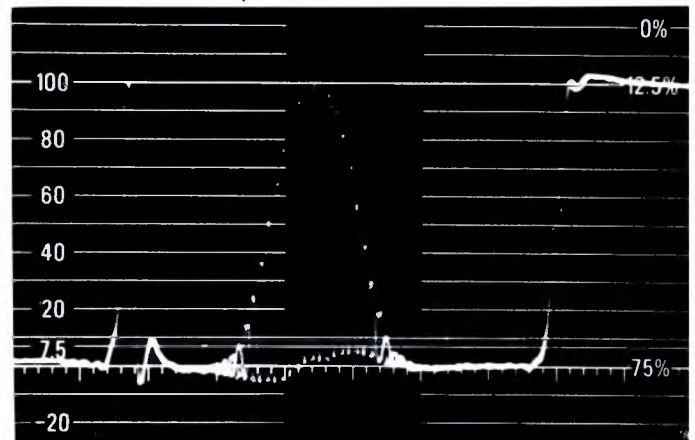


Fig. 9. Delay distortion of 12.5T pulse -120 ns, chrominance delay.

tions, the asynchronously detected chrominance may cause flicker, or other effects, to the annoyance of some of the viewing public. This problem is potentially much more severe in the case of color bars than with the other test signals. As there was no point of running this risk, it was recommended by the EIA that the color bar chrominance not be radiated during monochrome programming.

If the chrominance is not to be radiated during black-and-white transmissions, why carry the luminance part? There is a very fundamental need to maintain the average luminance of each field at the same levels.⁵ This has long been recognized in VIT

*Linear phase distortion due to vestigial sideband transmission will introduce some distortion to the bar.

MODULATED SIN² PULSE APPLICATION NOMOGRAPH
12.5T 1.57 μsec h.a.d. FOR 525/60 STANDARDS

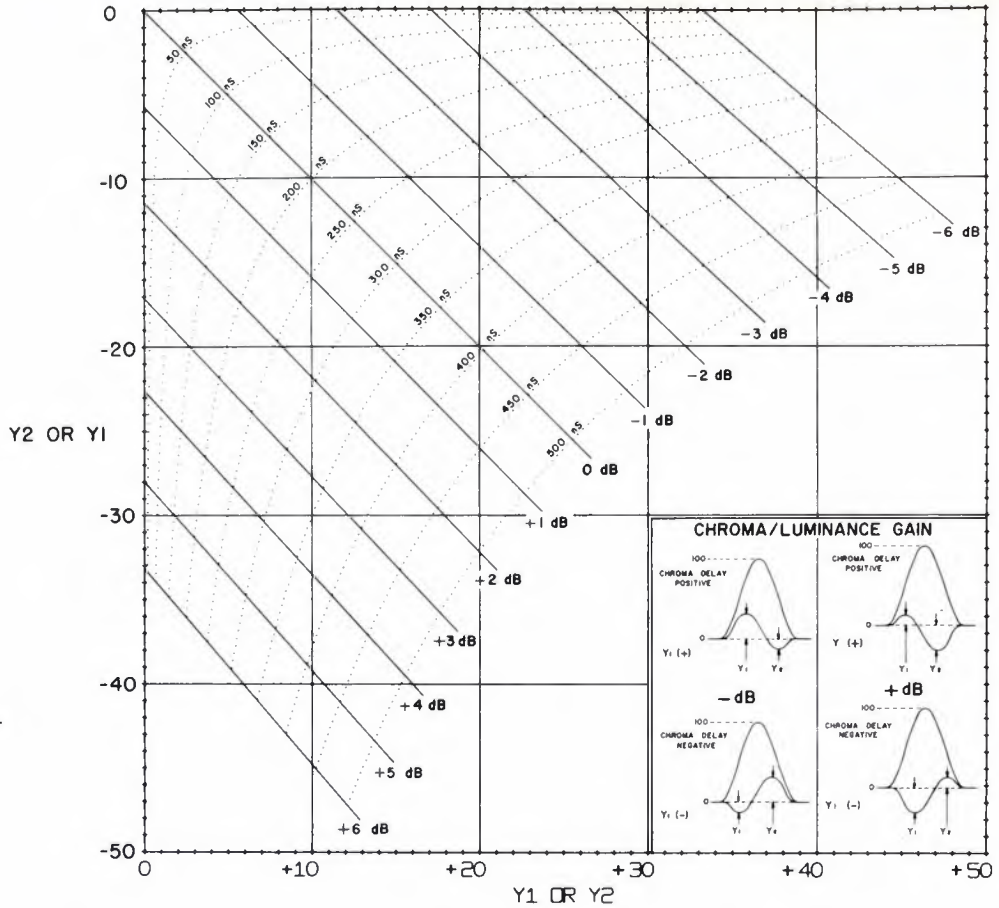


Fig. 10. Modulated sine-squared application nomograph.

signals. It is one reason network VITS repeat multiburst on Field II. Receivers having mean-level a.g.c. may flicker where the average level of VITS differs significantly from field-to-field. At 30 Hz, a slight fluctuation is discernible.

So much for the negative. On the positive side, this color bar signal includes peak white reference before the colored bars and a black reference level following them. These two references are always useful. Note that the white flag in multiburst and color bar bars are adjacent on the displayed TV picture but on opposite fields thereby reducing flicker.

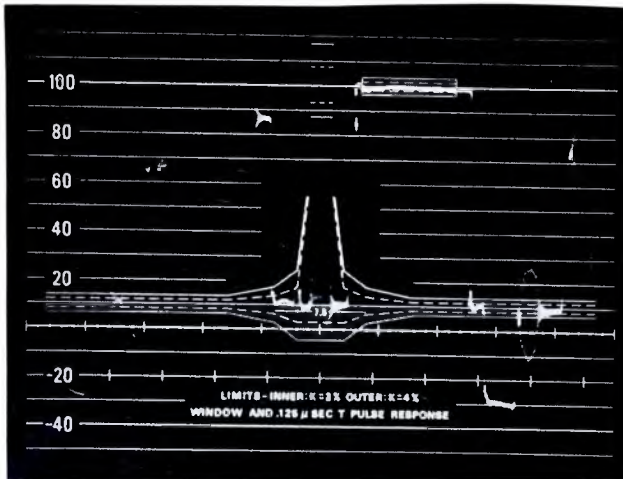


Fig. 11. Line time linear distortion, tilt measured on k graticule; k = 2%.

This form of color bar is a single line test signal. The color bar (§73.699, Fig. 14) is standard as regards the color bars which are 75% amplitude, 100% saturated, and their setup is 7½%. As both reference white and black are useful to transmitter engineers, they are included with the colored bars in the manner which has become standard in Europe for some years now. (In Europe, color bars always have a peak white, not a 75% gray bar, and they always include reference black following the blue bar.) Color bar VITS are frequently used abroad. Their distinctive display on the vectorscope is readily interpreted in terms of go/no-go limits which, in the case of outer boxes, are the FCC limits.

Next issue: The modified multiburst and checking a demodulator.

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CME

CABLE MANAGEMENT / ENGINEERING

FEBRUARY 1972

Status Report:

Premium TV to Get Real Test in 1972

Premium TV to Get Real Test in 1972

Pay TV is an idea whose time has come. Just what, how, and how much, will shake out on the proving grounds in 1972. The proving grounds will be hotels-motels and cable TV.

The first hard proof that the notion wasn't a pipe dream came when Paul Klein, president, Computer Television Inc., revealed that closed circuit showing of top films at the Gateway Downtowner Motor Inn in Newark, New Jersey (begun in June 1971) drew a 37 percent share of the television audience. That is, 37 percent of those who watched TV at the motel each evening paid \$2.50 to see a Computer Cinema presentation. Skeptics might argue that this is expense-account pay TV. Nevertheless, the rush was on.

Trans-World Productions, the closed circuit TV division of Columbia Pictures, announced on October 6, 1971, the beginning of Tele/Theatre at the Regency-Hyatt House in Atlanta. One-thousand rooms are now equipped to receive top movies on the TV screen.

In late December, Time Inc. announced it had taken a minority interest in Computer Television Inc. Expansion plans included equipping 10,000 rooms in 1972 with pay TV. The hotel-motel operation is being handled by Computer Cinema, a division of CTI. Paul Klein says he expects to see a substantial cable TV experiment get underway in a metropolitan area by September of 1972.

The first real test of pay TV, or premium TV (as many prefer to call it to avoid waving a red flag), in cable is expected to come from cable operators who have signed up to go with Optical Systems Corp. Geoffrey Nathanson has been delivering rousing blue-sky speeches on extra service TV—which he calls private channel TV—for several years now, but at the California Cable Television Association Convention in San Diego last November, he showed that he had his feet on the ground by exhibiting a working system. All holders of a special card could unscramble a premium TV picture by inserting the card in an Optical System "Black Box."

Nathanson told us five major cable systems would be using his method in 1972. By the time this issue is in print, the identity of the systems will be known—one in Pennsylvania, one in Canada, and three in California. The first is expected to commence operation by April. A major manufacturer is producing the decoding equipment—50,000 units will be installed in 1972. This will grow to 200,000 in 1973, Nathanson said, and 18 systems are expected to be operating in 1973. (Presstime note: Cox Cable Communications has leased a channel to Optical Systems

in three systems—San Diego, Santa Barbara, and Bakersfield.)

Trans-World, also, is moving into cable TV in a major way. William Butters, general manager, says the company has signed contracts with ten major MSO's and that 5,000 CATV homes will be equipped for a pay channel in 1972. This figure could easily expand into the millions according to Butters.

Also during 1972 the Gridtronics system of Television Communications Corp. will finally begin operations. (Gridtronics' concept was first disclosed in 1969 at the NCTA Convention.) The first test is scheduled to take place at TVC's Winter Haven, Florida, system. TVC doesn't expect any gigantic demo—it won't be tried in Akron—but rather the concept will be tested in ten smaller markets.

Likewise, Athena Communications, a division of G-W, which announced an encoder-decoder system last spring, will test pay TV. It is expected to commence a trial in an Athena-owned system in Jefferson City, Missouri.

Unveiled at the California show was a pay TV system called TheatreVisioN developed by Laser Link Corp. The set owner can activate the special program he has selected by inserting an electronically-coded ticket into his set top adapter. The ticket is obtained ahead of time. While in the adapter, the ticket is literally melted down so it can't be reused.

In January, a separate company, TheatreVisioN Inc. was formed with movie producer Dore Schary as president. Plans for over-the-air pay TV (UHF) and pay cable were announced.

Interest of the motion picture industry in CATV can be judged by the people that showed up at a Winter Haven demo. On hand were executives from Columbia Pictures, Paramount, 20th Century Fox, United Artists, and Warner Bros.

The year 1972 is the first that pay TV could make it since it wasn't until 1971 that everything came together. The FCC has laid down the ground rules for pay TV and has said they applied to cable TV. The equipment became available, as just described. Perhaps most importantly, the economically-pressed motion picture producer has decided it is time to try pay TV. The motion picture industry is interested in anything that will increase its revenues. Many of the films it produces turn out to be losses because movie attendance is poor. Only the few that turn out to be blockbusters keep the industry afloat. Network TV doesn't provide the salvation because the networks themselves have gotten into the pro-

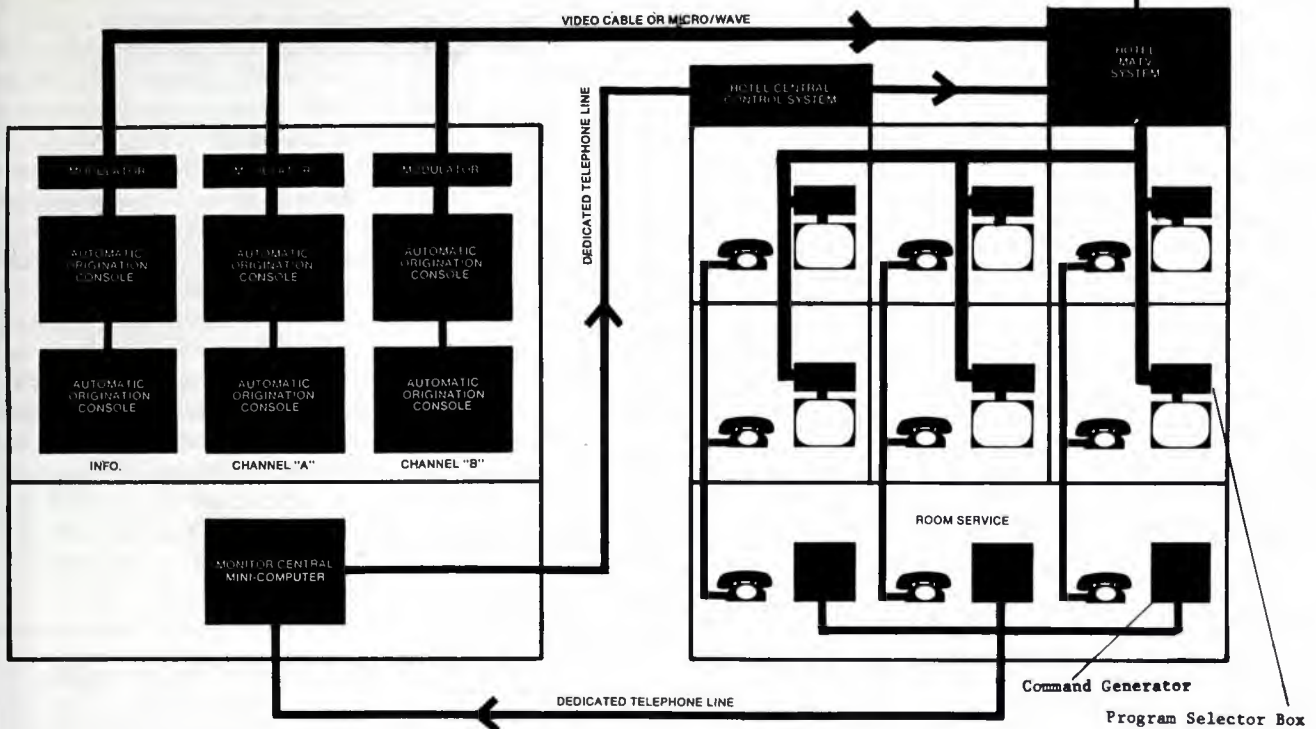


Diagram of Trans-World pay TV system for hotels.



Coded ticket which self-destructs is electronic "key" in TheatreVisioN system.



Simplicity is feature of Athena system. Encoder is located at headend. Decoder is a modified Gamut 26 converter.



Optical Systems' "black box" uses a plastic card. Pin holes control photocells which activate an unscrambler.



William J. Butters (right) of Trans-World Productions demonstrates the operation of Tele/Theatre for Jerome S. Hyams (left) of Columbia Pictures Industries and Al Kelley of Atlanta's Regency-Hyatt House. Each decoder can be "addressed" individually.

duction act.

When Trans-World Productions announced its entry into the hotel-motel Tele/Theatre business, it pointed out that of all movie theatre patrons, 74 percent are under 30 years old. Other percentages are 30-39, 13 percent; 40-49, 6 percent; 50 and over, 7 percent. Hotel guests represent a new market because 43 percent are in the 35-49 age group. Similarly, cable TV subscribers fall in this older age group.

The numbers Hollywood deals in are unusually big. If it costs \$2-million to produce a picture, box office receipts have to be \$10 million to reach profitability. This requires an audience in excess of five million. If the product costs \$5 or \$10 million, box office receipts have to multiply accordingly. (The average attendance at movies is 25 million a week—less than half that of the 30's and 40's.)

Receipts from hotel-motel and cable markets won't amount to anything in 1972, (probably less than \$1 million), but the stage can be set for real growth in

'73. If eventually 3 or 4 million homes want private channel TV, it could up movie receipts by 15 to 20 percent.

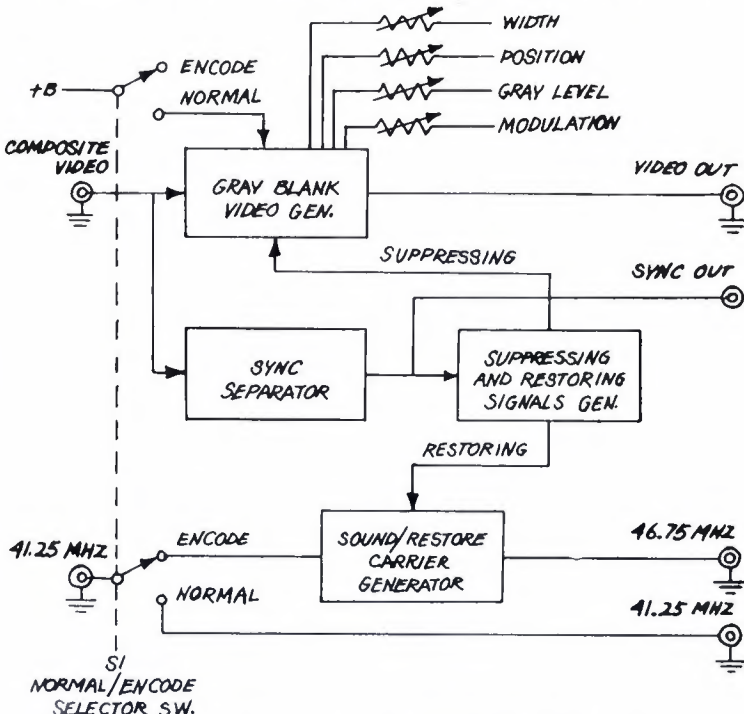
Should these figures begin to be approached, it would mean a revitalized movie industry. To avoid losing its share of audience, the networks would have to step up their activities—either paying more for movie rights or producing more themselves. Thus, the climate is set for heavy growth. The movie producer stands to take in 40 percent of all of these receipts according to some sources. Eventually the cost of movies to cable systems will follow the patterns established for theatre owners which is based on a sliding scale.

Just how much extra cable subscribers will pay for better TV fare is not known. One can't extrapolate the hotel-motel experience. Most spokesmen indicate the movie fare is going to have to be four-star. CTI used in its Newark experiment Twentieth Century Fox's *Patton*, *MASH*, *Butch Cassidy and the Sundance Kid*, and *Tora Tora Tora*.

Removed Sync Scrambles Picture; Decoder Puts It Back

One of the private-channel systems proposed for cable television, the EnDe-Code system described by Athena Communications Corp., has a look of simplicity and economy.

The encoder works on the signal entirely in the IF frequencies. It replaces the horizontal sync, blanking, and vertical sync pulses with "gray blank video," a steady voltage midway between black and white. This is modulated on a 45.75 MHz carrier and converted to the RF output in the usual way.



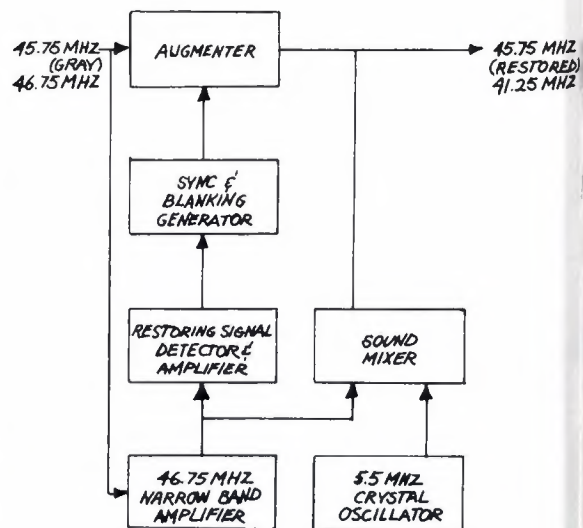
Block diagram of encoder which generates gray blank video, converts the 41.25 MHz sound to 46.75 MHz and puts out video restoring pulse.

removal of the sync pulses prevents receiver without a decoder from reassembling the picture.

The encoder also takes the frequency-modulated 41.25 MHz sound IF and shifts it to 46.25 MHz. The shift of the sound IF makes the sound unavailable at a receiver without a decoder.

The encoder, in addition, amplitude modulates on the 46.75 MHz carrier a series of pulses that are used in the decoder to restore the video sync.

The decoder reverses the encoder processes, it puts the sync back in the video, reshifts the sound IF back to 41.25 MHz, using a crystal-controlled oscillator on 5.50 MHz, and converts both IF signals to a convenient RF channel for delivery to the TV set. The whole decoding process goes through without any demodulation of sound or video information.



Block diagram of decoder which provides restoring signals.

Athena spokesmen indicated they would try films that didn't necessarily make it big at the box office.

More systems will try varying prices for the events to see if they can determine what relationship pricing has on viewership.

Nathanson, of Optical Systems, emphasizes that his services will offer more than movies. He's after sporting and cultural events, such as the opera, as well as educational programs. William S. Butters, vice president and general manager of Trans-World Products, says Tele/Theatre's closed-circuit telecasting will include major sporting events and championship prize fights, and other "blacked out" football and basketball games.

No one expects equipment to be a major problem, but it may cause serious headaches for those who are pioneers.

There are two approaches:

- one-way systems
- two-way systems.

In the former, the operator sends the signal down

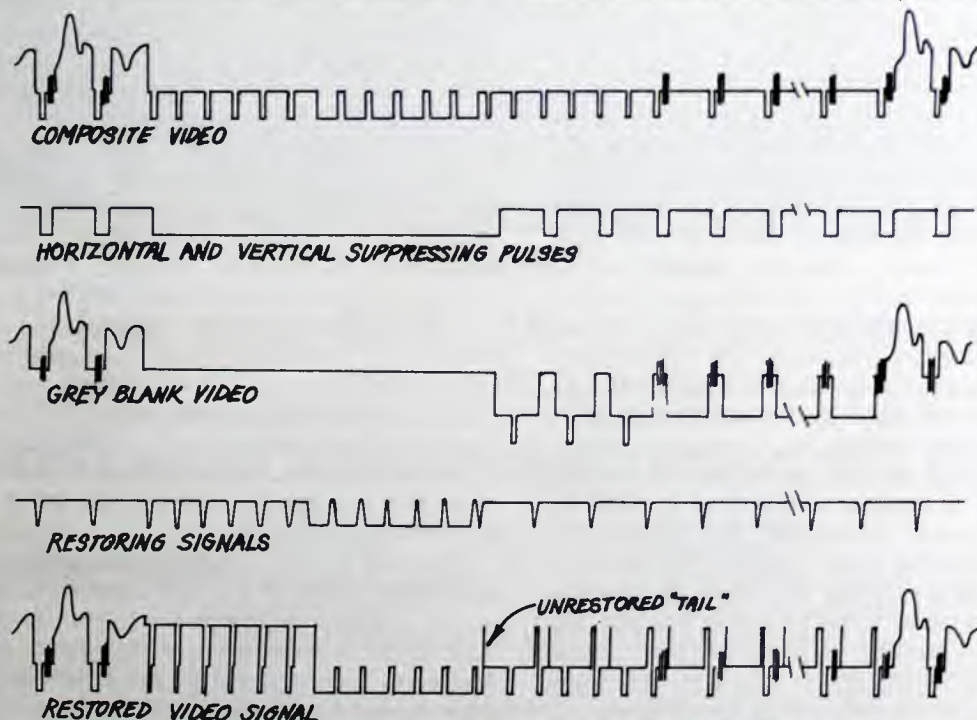
the line and the viewer can see the program if he has taken a prior action, such as subscribing for the extra service ahead of time. This could be unlimited viewing as a result of having rented a black box that would either a) pick up a signal transmitted on a channel outside the TV band (low-, medium-, or superband), or b) decode a scrambled signal on an unused regular channel. In the latter two-way mode, the subscriber initiates the service and a central office is advised that a subscriber is viewing the premium channel. Most likely this would be a computer monitoring and registering the subscriber's tuner setting. Early in the Newark motel experiment, the Downtowner's "room status" communications system was used. Direct-current signals were fed from the room to a display board if the pay channel was being viewed (beyond the ten minutes free preview). A clerk noted that fact and the customer was billed. At the Regency-Hyatt House, the guest called in on the phone for service. This information was recorded by a command operator.

There are a number of refinements in the detail of the system as described by Athena. For example: the restoring signal (see drawing) is a slightly modified sync that is band-limited to 200 KHz before it is put on the 46.75 carrier by amplitude modulation (30% depth). This filter, and the narrow-band circuits in the decoder, delay the restoring signals approximately 5 microseconds. A compensating advance for the restoring signals is built into the encoder.

Abraham M. Reiter, director of advanced engineering, Athena, describing the system at the NCTA Convention last July, specified these advantages of the system as a whole: a) no adjustment of the TV receiver can possibly restore picture or sound without the decoder; b) no commercially-available standard equipment will decode picture or sound; c) al-

though the basic functional program of the decoder is quite simple, construction and alignment of a decoder from parts would require sophisticated equipment and considerable electronic skill; d) the proprietary nature of the system will deter unauthorized manufacture and distribution.

He further pointed out that the system can be applied to any TV channel, and operates completely within that channel: the system can be installed without changing any hardware at the headend or at the subscriber's end. As to the cost of the decoder, a vital factor in the acceptability of any such system, Athena followed the principle that manipulating video and sound signals on modulated carriers and at low level would be simpler, less expensive, and more effective than manipulations that require demodulation.



Waveforms of encoded and decoded signal show how suppressing pulses (second row) alter the composite signal with a steady voltage midway between black and white (third row).

Major Results of the Gateway Downtowner Motor Inn Test

Sixty-five percent of all occupied rooms viewed some television during the study. Of these, 37% viewed and paid for a Computer Cinema movie. This figure represents 25% of all occupied rooms viewing and paying for Computer Cinema movies—a figure which is understated since rooms vacated late in the day were considered occupied, though no one was in the room when a movie was being shown.

Hotel occupancy increased during the test period from 48% to 63%, an increase so desirable that the hotel requested Computer Cinema to continue after the test and paid about \$23.00 per room per month for this service.

A survey of guests indicated an overwhelming attitude favoring the system. Sixty percent of Computer Cinema viewers had not gone to a theatre for six months prior to being questioned, while 44% had already seen a movie which they paid for at the hotel, viewing it again because of the comfort, availability and accessibility of movies in hotel rooms.

Computer Cinema fared well against broadcast television under all conditions. Though football did detract from the Computer Cinema audience, "Miss America" and "Miss Universe" did not. Finally, during "Premier Week," the week networks display their new season's programs, Computer Cinema took a whopping 25% share of the hotel audience (compared to only 22% for CBS, 19% for ABC and NBC, and 15% for all others combined).

What This Means

The terms of a standard Computer Cinema lease specify that, for the system and service of Com-

puter Cinema, a hotel will pay \$5 per room per month, collect \$2.50 for each movie shown and pay Computer Cinema 60% (or \$1.50) of that figure while retaining the rest. In return Computer Cinema bears the cost of installation, maintenance, replacement and repair of the system and regularly supplies films and promotional materials.

Since the Newark survey showed that, conservatively, 25% of all occupied rooms viewed Computer Cinema, this figure may be applied to the above costs for various hotel/occupancy situations.

For example, a 200-room hotel with an 80% occupancy will pay \$5 per room per month, or just under 17¢ per room per day, for the system and service. That comes to just under \$34 per day for the entire hotel. Now, 25% of the occupied rooms were shown to watch Computer Cinema. That's 40 rooms (25% of 80% of 200 rooms) at \$1.00 (40% of \$2.50) per room for the hotel to keep, or exactly \$40. A little subtraction shows that without even counting increased occupancy benefits, the hotel is making at least \$6.00 per day on the system.

A 350-room hotel with a 65% occupancy level pays 0.17×350 , or \$59.50 per day, for the whole hotel. It receives 25% of 65% of \$350, or about \$57.00 per day, for the operation of the system. Subtraction here indicates that the hotel must pay \$2.50 per day to maintain Computer Cinema in the entire hotel. If only one additional room is sold as a result of Computer Cinema, it will wipe out this expense and show a daily profit.

How about a poor occupancy rate? A 600-room hotel with a 50% occupancy pays \$102 a day for the entire hotel. It takes in, on the other hand, \$75 a day. This indicates a loss, per diem, of \$27. Selling only three additional rooms as a result of Computer Cinema will more than cover this expense.

Obviously, cable system requirements can't be satisfied that way. CTI equipment systems for 1972 include a dedicated computer which will read the status of the guest's set top converter. This converter, a modified 13- or 26-channel unit, will send back to the computer, on the hotel's room status system, a digital code signifying that channel A, B, or regular TV, was being watched. (In addition, this status system feeds back information on the condition of the room as reported by the maid. The same lines are used to send a wake-up message to the guest, or to inform him that a message is at the desk.) Mark Schuben of CTI says it would be no problem to operate this system on New York's Manhattan Cable television plant since Manhattan has an extra cable in its conduits for two-way messages.

The Trans-World system is a one-way system that can selectively address an individual set-top converter. K'SON equipment described by *BM/E*, May 1971, is used. Normally, the special TV channel is jammed by coded signals. But when a subscriber orders a program (by mail, by phone), the headend computer is programmed to omit the code for that subscriber unit and a clear signal comes through. Obviously a computer can manage both delivery and accounting transactions.

CTI and Trans-World require some kind of on-line processing, but subscribers need pay only for what they actually elect to see.

The approach by Optical Systems and Theatre-

VisioN uses a ticket which is purchased prior to an event's happening. These tickets are coded for a specific program or a series. Optical Systems' card has holes in it which activate a photo-cell control circuit. TheatreVisioN's card is sandwich-like with an embedded pattern that electromagnetically triggers the decoding circuitry. These electronic key cards will be sold from a variety of sources—from box offices to the corner grocery store. Optical Systems' card "expires" whenever the coding combination at the headend changes. TheatreVisioN's card literally melts into an unusable form. Nathanson reports some 65,000 different codes can be entered into Optical Systems' card, and he doesn't worry about old cards being reused.

The Gridtronics' system offers two modes: a simple midband converter, or a scrambler/converter. Operation of the Athena system is described on pages 4-5. A blanket subscription fee is required for both these systems.

The field is full of rumors that such a piece of equipment doesn't work well since it is sensitive to shock, changes of temperature, etc. In this early stage of the manufacturing of equipment, we assume equipment problems will occur. It will behoove the cable operator to thoroughly investigate cable reliability or its proneness to failure. On the other hand, if the cable operator leases a channel, he will have no worry on this score.

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(More on this subject next month.)

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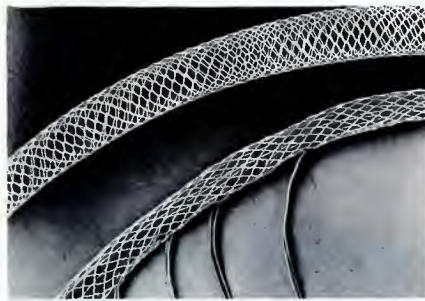
left and right, to show the two audio signals; 4) stereo display, left signal on vertical and right on horizontal; 5) FM multipath. \$219.95 KENWOOD. **275**

Selective RF preamplifier/attenuator has three FET amplifier stages, six tuned circuits. SPA-1 provides very high selectivity, is designed to eliminate adjacent channel interference in commercial receivers for background music in the FM band. Gain range is +10 dB to -35 dB, response is down 18 db at ± 600 KHz. McMARTIN. **276**

Video demodulator supplies a means to monitor and measure transmission of a VHF visual transmitter. Gates Double Sideband Diode Video Demodulator is completely solid state, includes an electronic vertical interval or line-rate zero chopper with remote control provisions. Video response is within 0.2 dB over 5 MHz, RF input needed is 80 to 250 milliwatts into 50 ohms, output is 1 volt peak-to-peak, adjustable ± 2.5 dB, into 75 ohms. GATES. **277**

Universal tap-off for MATV systems has adjustable isolation so it can be used in any part of system. Omni-Tap has potentiometer for setting isolation between 12 dB and 23 dB, comes in 300-ohm and 75-ohm versions, has insertion loss of not more than 0.75 dB at VHF and 1.5 dB at UHF. \$3-\$4. JERROLD. **278**

Heat-shrinkable PVC mesh tubing holds flexible electrical cable bundles



permanently in place. Shrink-Net has a large diamond mesh making multiple breakouts easy; it shrinks up to 50 percent in a few seconds on application of about 200°F from a heat gun or other source. TEMPLOCK. **279**

Electronic security "listening" system allows user to hear sounds in the "protected" area by dialing number of phone there, from any outside location. The Listener includes a sensitive microphone and high gain amplifier at the protected location; the phone there does not ring, nor must the receiver be off for operation. \$275. MOUNTAIN WEST ALARM SUPPLY. **280**

Self-adhering ads, for attachment to truck sides, are 12 in. x 36 in., in four colors. Quick Ads have themes promoting cable TV, can be removed at any time and put back (if kept clean). \$4.00. (\$0.75 for a 3 in. x 9 in. version). QUICK ADS. **281**

De-emphasis amplifier removes the high-frequency pre-emphasis applied to data signals before broadcasting, telemetering, etc. Cybertran ACS-120R has two switch-selectable roll-off characteristics (6 or 9 dB/octave), and selectable corner frequencies. Passband is 10 Hz to 2 MHz; output 5 volts rms into 50 ohms, input can be 0.5 to 5 volts rms. AMF ELECTRICAL PRODUCTS DIV. **282**

Motorized zoom lenses for TV cameras are compact and lightweight, do not need a lens supporter. The V5X20R and J5X15R are designed to fit 1-in. and 3/8-in. vidicon cameras, respectively. Sealed construction minimizes motor noise. Focal length of V5X20R is 20-100mm—maximum aperture 1:2.5; J5X15R, 15-75mm focal length, 1:2.1 maximum aperture. CANON. **284**

continued on page 36

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PRODUCTS

Wideband gain controller is a two-quadrant transconductance multiplier, divider, squarer, square rooter. The GC101 controls gain over a 60 dB range with 0.1 dB accuracy, 0.4% harmonic distortion; delivers ± 10 volts at 10 mA; has response from DC to 12 MHz at unity gain and from DC to 70 KHz at 60 dB gain. Noise is 130 mV in a 20 KHz bandwidth and 6 μ V at -60 dB gain. BURWEN LABORATORIES. **290**

Sweep oscillator for testing microwave radio links delivers flat IF and RF signals to a remote device under test. Model 8605A is a CW and delta-F source covering 47-100 MHz IF band, plus any one, two, or three RF bands in the 1.7 to 13.25 GHz range. Outputs are flat to 0.01 dB. \$3865 to \$6775. HEWLETT-PACKARD. **291**

Television modulator has integral sideband response filter which allows adjacent channel operation in cable systems without external filters. TX-4B "Dyna-Mod II" has maximum RF output of 500,000 microvolts, adjustable over 20 dB range in 1 dB increments; separate audio and video inputs. It generates output on any standard VHF channel (or other frequencies on special order). \$1250. DYNAIR ELECTRONICS. **292**

Counters for testing broadcast/communications equipment give choice of four frequency ranges: 50 MHz, 200 MHz, 512 MHz and 3 GHz. Models 6050 and 6150 have digital readout,



remote programming, BDC coded output. Model 6050 can be battery operated. Low range can be expanded to higher by changing internal PC plug-in cards. \$770 to \$2995. SYSTRON DONNER. **293**

Circuit tracer checks up to 12 leads at one time. Pathfinder 12 gives meter readout identifying leads and checking continuity, in or out of sequence. W. H. BRADY. **295**

Shipping case holds up to ten filmstrip canisters, four cassettes, one 5 in. tape

cel and up to ten 12 in. phono records. Plio-Magic Shipping Case is made of a durable plastic, has tight closure to keep out dust and moisture. PLASTIC REEL CORP. 296

audio spectrum analyzer has 24 meters, for simultaneous reading of 24 center frequencies 1/3 octave apart from 62.5 Hz to 12,500 Hz. ARA-411 also has built-in amplifier with 0-volt, 18-watt output, and high-level and microphone inputs. \$2000. COMMUNICATIONS COMPANY INC. 297

AC light and power plant can be

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Pin-point aerosol nozzle provides spray application to minute localized areas of PC boards, instrument cir-



cuits, recording heads, etc. Cobra Extension Nozzle is substituted for regular valve on aerosol can. MILLER-STEPHENSON CHEMICAL. 294

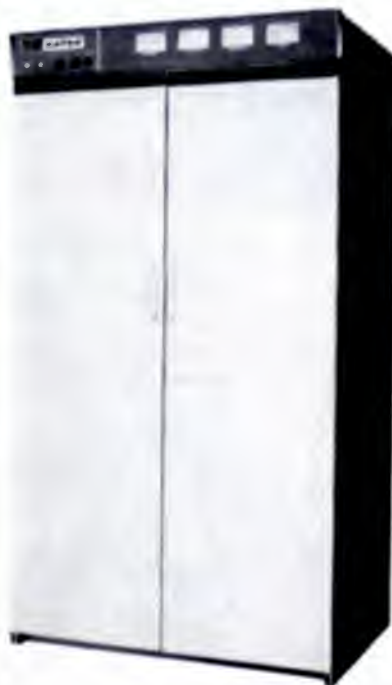
RF sweep comparator makes amplitude measurements to 0.01 dB, phase to 0.2°, from 100 KHz to 110 MHz. Model 8728A sweeps the measurement range, is many times faster than fixed-frequency measurement. HEWLETT-PACKARD. 299

Portable VTR for cassette tapes, and matching video camera, weigh together less than 15 pounds. VTC-710 videocassette recorder and VC-730 camera operate from rechargeable batteries or from AC power. System has instant playback viewfinder monitor, using 1/2-in. tape for 20 minutes recording time. Audio and video are recorded simultaneously. SANYO. 300

RF milliwattmeter is passive, non-terminating, directional, can be left in line during normal operations. Thru-Line Model 4330 uses plug-in elements to cover range from 60-2300 MHz, with power range selectable at 200 mW or 800 mW. Forward or reflected power is measured by rotating control. \$125. BIRD ELECTRONIC. 301

AM-FM signal generator covers 0.4 to 484 MHz. Model SMDA has guaranteed S/N ratio of 120 dB/Hz continued on page 38

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PRODUCTS

at 20 KHz from the carrier, for adjacent-channel selectivity measurements, six internal modulating frequencies; or external modulation can be used. Generator frequency can be swept by a DC voltage. Incremental tuning is calibrated in KHz. \$5400. ROHDE AND SCHWARZ. 302

Acoustic cable fault detector weighs only 2¾ pounds. Model 651103 has hermetically sealed acoustic pickups, with detachable handles, mounted in cast aluminum housings for ruggedness. \$700. JAMES G. BIDDLE. 303

Color film-chain system for TV has three-tube color pickup, multiplexer, 16mm projector, 35mm slide projector.



tor. System can also accept opaque artwork, overhead transparencies and small three-dimensional objects. MARCO VIDEO SYSTEMS. 304

Clarifications

In October's *Broadcast Equipment* we described the JVC FV-3500 color VTR, but showed a picture of the PV-4500, which is monochrome. Both units are available.

In the November report on the Audio Engineering Show, we referred to a four-channel pan pot shown by Quad 8. We have a letter from Jon Kelly, marketing manager for Audio Designs, pointing out that his firm's four-channel pan pot was the most recent model shown there. Sorry for the omission.

In January, the article "Studio On Wheels" locates WGNV erroneously in Yonkers. The station's address is Box 591, Newburgh, N.Y. 12550, (914) 561-2131.

Crystal-controlled motor for the Arri 35mm camera has all electronics, including out-of-sync Sonalert, within the motor housing. Low weight, a quarter-pound less than previous Arri constant speed motor, makes possible

continued on page 42

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*TV station user list available upon request.



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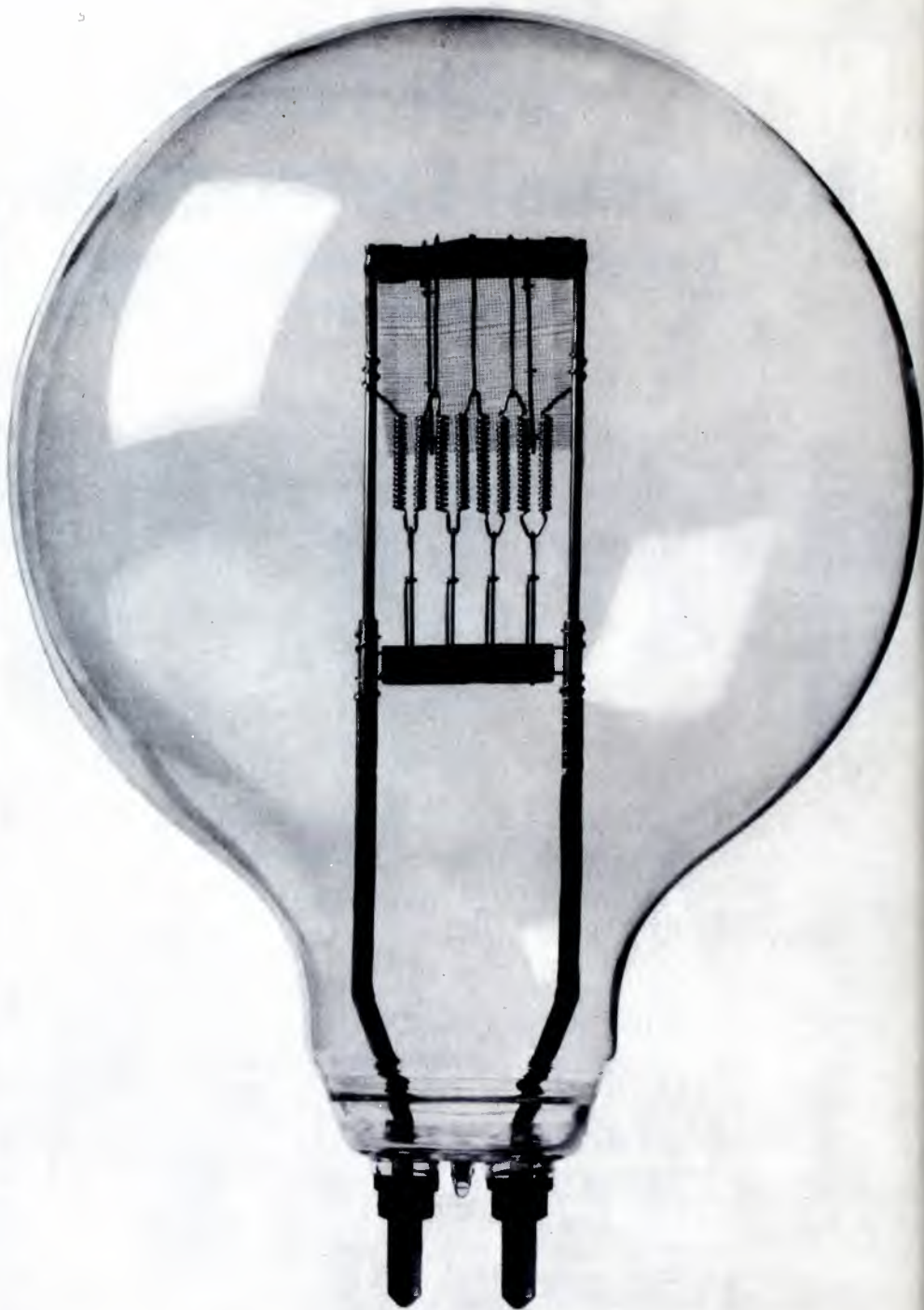
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SEE THE TELEMET MODEL 3550A REMOTE V.I.T. TEST SIGNAL PACKAGE AT NAB, 72.

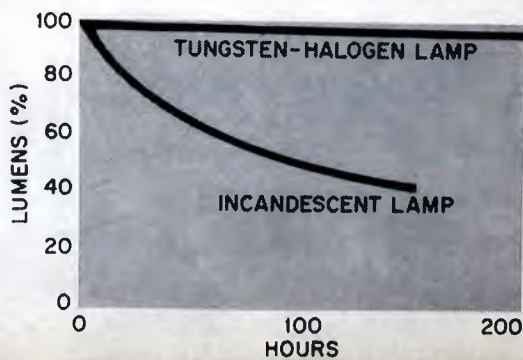
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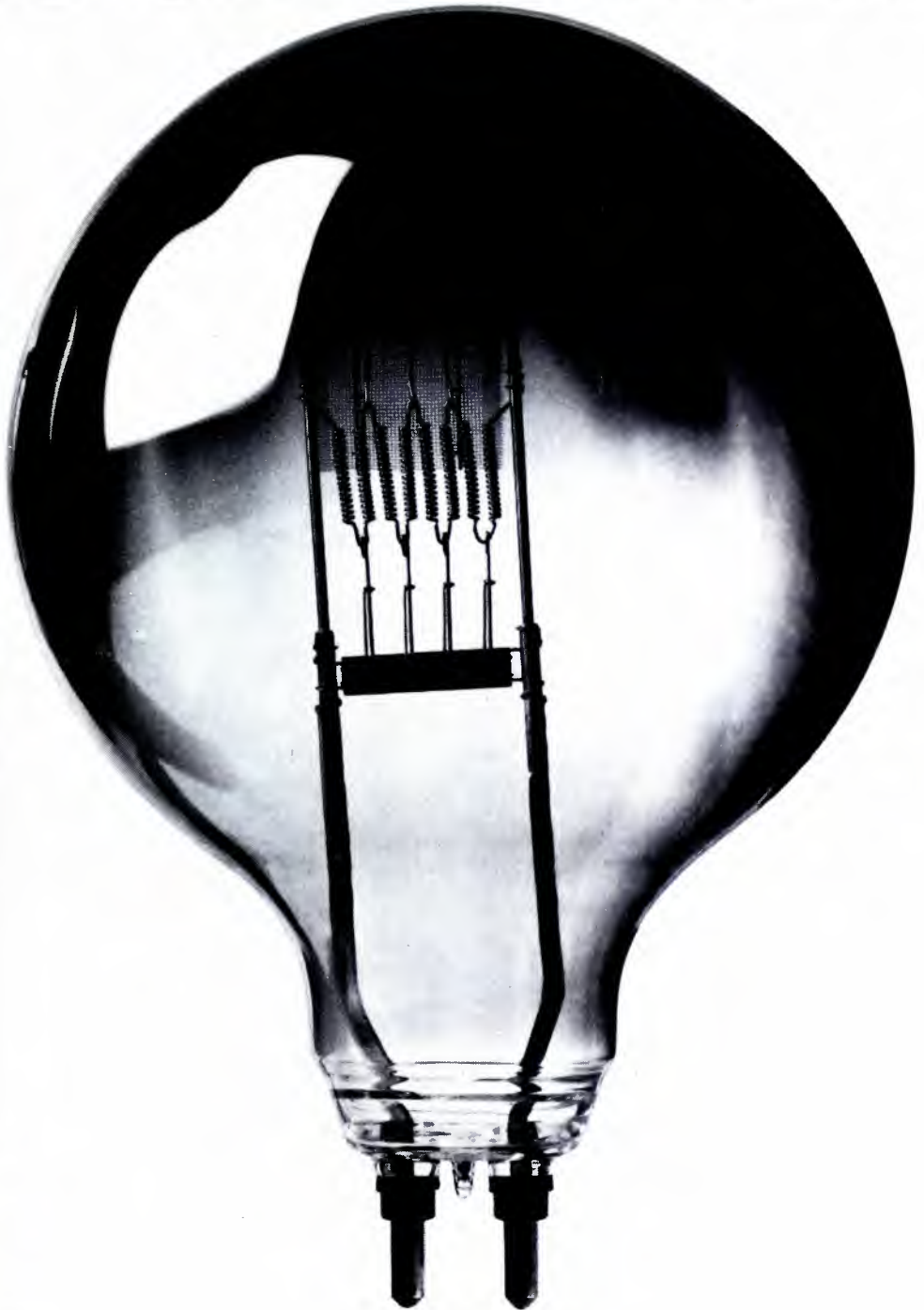
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idling with the studio lights or camera settings. You get constant color rendition on color film and save money on print correction.

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PRODUCTS

crystal-controlled hand-held shooting. Sync accuracy is 15 parts/million, current drain is less than 2 amps at full load, from standard 16-volt battery. CINEMA PRODUCTS. **305**

Thin-film hybrid RF amplifiers measure only 0.15 in.³ for the electronics, 0.26 in.³ for the heat sink. Models TV1001 and TV1003 are aimed for significant gain with very low second and third order distortion. TV1001 covers 40 to 300 MHz, with maximum gain of 29 dB, and the TV1003 covers 2 to 130 MHz, with maximum gain of 17dB. TV1001, \$100; TV1003, \$80. RAYTHEON. **306**

Audio console has 18 inputs, 8 outputs with line or mike on each input. User can specify echo, equalization, pan pots, mute and solo switches. Post echo send is available and echo return can be assigned to any buss. Change from tracking to overdubbing is easy, because of independent 16 x 4 monitoring system. \$5999 to \$15,999. QUANTUM AUDIO. **307**

Sweep generators have complete sweep oscillator, attenuator, and up to seven frequency markers, single or harmonic. Model 1204 covers range 0 to 500 MHz in a single band, with bandwidths from 200 Hz to full 500 MHz. Model 1205 covers range from 0 to 1500 MHz in three bands, with sweep widths from 200 Hz to 600 MHz. 1204, \$1095; 1205, \$1395. TELONIC INDUSTRIES. **308**

Digital timer stopwatch is two-faced, can be read from both front and rear. ADRL two-faced timer can be had with either 3- or 4-nixie-tube display, can be interfaced with audio or videotape recorders and cart machines. \$225 up. TELEVISION EQUIPMENT ASSOCIATES. **309**

Digital electronic clock/calendar shows time to tenths of a second, day, and month. Model 1500 has automatic correction for leap year and months of varying length. Has LED readout, BCD output, automatic reset to zero when power is lost, front-panel setting. NATIONWIDE EQUIPMENT ASSOCIATES. **310**

Microphone support is rigid, adjustable, has either a heavy-weight desk-top base or a flange mounting base. Model US-4 (flange base) and Model SB-2 (weight base) have fixed boom length of 12¾ in. and an extension boom that increases length to 21¼ in. Vertical adjustment is 180 degrees; US-4 rotates 120 degrees; SB-2, 360 degrees. ATLAS. **311**

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The style of this long-awaited publication, although conversational and informal (it reads as easy as a novel), teaches the terminology peculiar to the broadcasting industry. Actual case studies, taken from the author's own experience, add realism and practical guidance. Destined perhaps to become the classic of the industry, this complete and com-

prehensive text is a must for every person now working in broadcasting, as well as station libraries, broadcasting schools, teachers, and students.

Edd Rouff, broadcaster, educator, and administrator, is a veteran of more than twenty years in the business of radio broadcasting. He has worked as a disc jockey, newscaster, political reporter, news director, salesman, assistant to the president of the McLendon chain of radio stations, and also as a general manager and owner. In addition to his current duties with McLendon, Mr. Rouff is an instructor in Radio Station Management at Southern Methodist University.

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Six-page brochure on diesel-electric system gives complete specifications on DES-45, 40 KW model, with voltage and frequency regulation, power ratings, fuel consumption, etc. Allis-Chalmers. **202**

Bulk erasers for magnetic tape are covered in brochures, including models for hand insertion of reels up to 2 in. by 14½ in., and a belt-conveyor model capable of erasing thousands of reels per hour on a continuous basis. Ferranti Electric. **201**

"Communique" on general character and potential of cable television, puts emphasis on need of cable operators for high-quality color equipment. Cohu. **203**

"Test points," service application notes, cover setting dark current in vidicon tubes, testing video and chroma amplifiers with sweep signal, and setting 4.5 MHz trap. RCA. **205**

Expandable frequency counters, and universal counter-timers are subjects of two six-page brochures with complete specifications, options, applications, etc. Systron-Donner. **206**

"Application Notes for EIA Standard RS-232C" is a booklet on service characteristics and transmission facility characteristics of the interface between data terminal equipment and data communication equipment, using serial binary data interchange, the subject of the standard named. Booklet is available from EIA, 2001 Eye St., N.W., Washington, D.C. for \$2.60 a copy.

Cross-reference lists and specifications of complete semi-conductor line are covered in 64-page book, together with applications-oriented tables and applications wall chart. International Rectifier. **207**

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FEBRUARY, 1972—BM/E

posed by the telephone companies when subscribers bought the devices, such as automatic dialers and automatic answering units, from outside suppliers, rather than from the telephone companies.

Business Briefs

Hubert J. Schlafly and Jack Kent Cooke, respectively president and chief shareholder of **TelePrompTer Corp.**, announced jointly an amicable agreement to halt the lawsuits and proxy fight "that have occupied the energy of both sides for a number of weeks" . . . **Laser Link's** five-channel CATV relay transmitter has won FCC type acceptance, that company reports . . . A joint enterprise of **New York University** and **American Television and Communications Corp.**, one of the largest cable companies, is the establishment of the **Community Access Center** in Reading, Pa., which will aid community groups in developing cable programs, and monitor and schedule requests for cable time. Facilities and personnel of **Berks TV Cable Company**, Reading, affiliated with ATC, will be used in the project . . . **Alcom Advertising**, New York, has produced what is said to be the first "Cel" animation recorded directly on videotape, a ten-second spot advertisement for **Stern Brothers** department stores. Cooperating in the project were **D&R Productions**, New York animation firm, and **Video-com Inc.**, Dedham, Mass., videotape production facility . . . **Television Information Office**, 745 Fifth Ave., New York, has available a booklet (35¢ each, 100 for \$27.50) reporting studies five and six of the **Committee on Nationwide Television Audience Measurement** (Contam), showing good agreement between Nielsen figures and careful telephone surveys . . . **The Magnavox Company, CATV Division**, will offer to cable personnel in cities across the country selected courses from the **Magnavox Training Center** program, aimed at helping relieve the cable industry's scarcity of technical personnel. Information: **J. B. Emerson**, Magnavox CATV Division, 133 West Seneca Street, Manlius, N.Y. 13104 . . . **The Ampex Videofile** system, which transmits high-resolution picture material over a 150-KHz bandwidth by a speed/bandwidth conversion, has been used to send fingerprints of

continued on page 46

EECO's new low priced modules provide fast electronic indexing/editing of video and audio tapes...

A pair of these versatile, solid-state instruments offer you the advantages of efficient, accurate electronic indexing and editing — at a cost that's tailored to tight budgets! They're compact (about the size of a large card file box) and easy to use. They can be placed on a table, bench or rack-mounted side-by-side. Whatever your video tape editing needs — commercial, closed-circuit, cable or educational TV — it'll pay you to check into the economies afforded by EECO's new "Mini-Modules"!

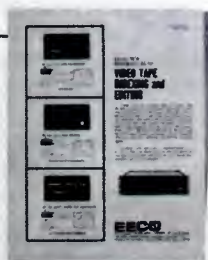
BE 520 EDIT CODE GENERATOR is used to record real or elapsed time on video or audio tape in standard SMPTE edit code format. Although the code is normally recorded while scenes are actually being shot, it can also be added to pre-recorded tapes. Simple to operate, yet versatile, this low-cost instrument provides accurate scene indexing for rapid retrieval.



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NEWS continued from page 45

excellent quality, via satellite link, from California to Florida, according to a report from that company . . . **GBC Closed-Circuit TV Corp.**, reported record sales of \$2,034,362 for the six months beginning June 1, 1971, up 24 percent from last year . . . **Crown International**, Elkhart, Ind., suffered a loss estimated at \$1 million or more in a plant fire Thanksgiving Day. By setting up temporary production facilities, the company was able to resume shipments within a few weeks . . . **English Electric Valve Company**, Chelmsford, Essex, has won the order for 10-kw klystrons for UHF television transmitters installed in several Japanese cities by Shiba Electric Co., of Japan . . . **RCA** announced factory reconditioning service for Mark X high-band headwheel panels of **Ampex VR-1200 and VR-2000** videotape recorders, to be carried out at the RCA Camden plant. Heads will be refurbished with Alfecon II, new long-life material. Previously, only RCA's own videotape machines were serviced . . . **Robert W. Hawkinson**, president, **Belden Corp.**, predicted that sales of the wire and cable industry would be up 10 percent in 1972, with the expected spurt in CATV to supply a good part of the increase . . . The **Audio Engineering Society** will hold its 42nd convention at the Los Angeles Hilton Hotel, May 2-5, 1972. Engineers who want to present papers should send titles and abstracts to Leon A. Wortman, Ampex Corp., 401 Broadway, Redwood City, Calif. 94063. Exhibit information: Jacqueline Harvey, AES exhibit manager, 124 East 40th Street, New York 10016 . . . **Fairchild Industries**, Germantown, Md., has bought KLIF, a 50-kw-daytime, 5-kw-night-time AM station in Dallas, with FCC approval. Seller was the McLendon Corp., . . . Voters in Delray, Florida, approved by 3 to 1 the grant of a cable franchise to **TelePrompTer**, bringing to 19 the franchises held by that firm in Palm Beach County . . . **Henry W. Harris**, president of **Cox Cable Communications, Inc.**, said that earnings for 1971 would be 20 percent ahead of 1970; he said his firm would spend at least \$60 million in the next five years on construction. . . . **Tele-Communications, Inc.**, Denver, reported record sales of \$9,-161,718 and earnings of \$498,975 in the first nine months of 1971, both exceeding the totals for all of 1970. . .

emphasized that this is *supplementary to* and apart from the survey of community needs. Here again, valid sampling methods are expected. The Commission indicates that the latitude a station has to specialize in one type of entertainment programming (such as classical, country and western, rock 'n roll, soul music, talk and discussion) increases as the number and diversity of stations in its community increase.

Pursuant to the goals espoused by adoption of the "Programming Section" (IV-A), the Commission has also adopted rules to require 1) *broadcast notice* of the manner in which the public may express opinions about broadcast service and 2) the maintenance of a *local public file* of opinions received by licensees.⁵ In addition, it has revised publication rules (Sec. 1.580) so that the public will have increased opportunities to participate in the formulation of licensees' programming decisions.

The Commission stated that it:-

... does not condone the practice of community groups waiting until long after an application for renewal of license has been filed before raising any complaints they may have concerning a station's policies or program practices. Complaints concerning a licensee's hiring or employment practices should be brought to the attention of the licensee and/or Commission immediately upon their occurrence, and this can be done any time during the license period. Likewise, community groups can and should take any complaints they may have concerning a licensee's programming or program policies to the licensee at any time during the license period. Such practices should serve to encourage better relationships between the licensee and concerned community groups. The practice of waiting until long after a renewal application is filed before seeking correction of alleged past derelictions of a licensee (which it has been given no prior opportunity to consider) is disruptive of the Commission's processes.

Hence, the Commission has and is currently taking affirmative action in order to stimulate broadcasters to both promise more and meet their promises with performance. In its actual renewal processes, the Commission will likely pay particular attention to the following: 1) the applicant's fulfillment of community tastes, needs and interest, and, particularly, his attention to community feedback; 2) the applicant's performance during the past renewal period in the critical programming categories (e.g., local programs, news, public affairs, etc.); 3) the applicant's programming proposals in his past renewal application as compared to his actual programming during the past renewal period; and 4) any information suggesting violation of the Act and/or Commission rules and policies.

Policy and Proposals: Employment Practices

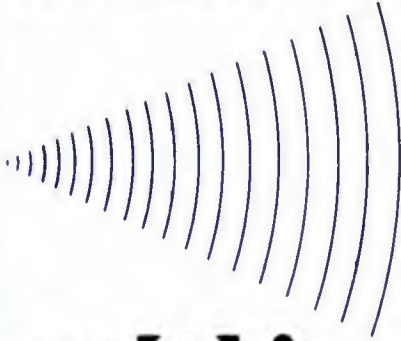
Aside from the broad programming requirements, the Commission may, via its forfeiture power, impose sanctions for discriminatory practices in employment. The Commission has adopted rules which require that all broadcast stations with *five or more full time employees* establish, maintain, and carry out a positive, continuing program of specific practices designed to assure equal opportunity in every aspect of station employment policy and practice.

To implement this latter provision of its Rules, the Commission requires that each of its permittees and

⁵ Educational broadcasters would be exempted from these proposed rules.

continued on page 48

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fm
antenna
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and this..



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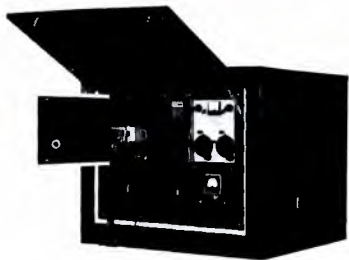
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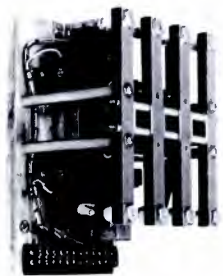
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FCC RULES continued from page 47

licensees adopt programs which will:

- a) Define the responsibility of each level of management to insure positive application and vigorous enforcement of the policy of equal opportunity, and establish a procedure to review and control managerial and supervisory performance;
- b) Inform its employees and recognized employee organizations of the positive equal employment opportunity policy and program and enlist their cooperation;
- c) Communicate the station's equal employment opportunity policy and program and its employment needs to sources of qualified applicants without regard to race, color, religion or national origin, and solicit their recruitment assistance on a continuing basis;
- d) Conduct a continuing campaign to exclude every form of prejudice or discrimination based upon race, color, religion or national origin from the station's personnel policies and practices and working conditions;
- e) Conduct continuing review of job structure and employment practices and adopt positive recruitment, training, job design and other measures needed in order to insure genuine equality of opportunity

In addition, it is contemplated that broadcast application forms be revised so as to provide specific sections wherein applicants for renewal or new facilities or for acquisition of facilities will have to state what specific practices will be followed in order to assure equal employment opportunity for Negroes, Orientals, American Indians and Spanish surnamed Americans in each of the following aspects of employment practice: recruitment, selection, training, placement, promotion, pay, working conditions, demotion, layoff and termination. The "employment" section need not be filled in if the station has less than five full time employees or if it is in an area where the relevant minorities are represented in such insignificant number that a program would not be meaningful, in which case a statement of explanation will be required.

Commission Policy and Proposals: Advertising

Commission sanctions might also be taken at renewal, though not limited thereto, for a station's failure to eliminate any "false, misleading or deceptive advertising." In this regard, the Commission directs particular attention to the fact that licensee responsibility is "not limited merely to a review of the advertising copy submitted for broadcast, but the licensee has the additional obligation to take reasonable steps to satisfy himself as to the reliability and reputation of every prospective advertiser and as to his ability to fulfill promises made to the public over the licensed facilities." Though it does not like to make judgments whether particular broadcast advertisements are false or misleading and generally defers on these matters to the FTC, the Commission may act in a clear, flagrant case. An Advertising Primer, outlining deceptive advertising regulations, is currently being explored with the FTC and would be of immense value to broadcasters.

Moreover, the Commission operates under a commercial policy which stipulates a normal commercial content of 18 minutes in each hour with specified exceptions permitting up to 20 minutes in each hour during no more than 10 percent of the total weekly hours of operation. A further exception would permit up to 22 minutes where the excess over the 20 minute ceiling is purely political advertising. **BM/E**

* FCC 61-1316, 11839 (\$11:402).

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402-342-2753*

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"Newsmen looking for TV or CATV position in small market. Experience includes 2 of top 12 markets and 50,000 watt AM/3-station TV network. If you can use traffic or rep experience, wife also available. Art Blair, 4616 Lindell, St. Louis, Missouri 63108. 314-361-0195."

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NEW FOR 721 S.E.C. Solid State Audio Modules designed for AM, FM, TV, Recording Studios. 5 Output Audio DA-\$70. 5 Output Audio DA (balancing transformer outputs)-\$110. 10 Input Active Combining Network-\$35. Microphone Preamp-\$55. Line Amplifier-\$65. 10 Watt (RMS) Monitor Amplifier-\$70. 2A 24VDC Supply Module for all above modules \$70. 19" X 5 1/4" Wired Module Tray (holds 9 modules and 2A supply)-\$180. 19" X 1 3/4" Wired Module Tray with 1.5A 24VDC Supply, (holds 2 modules)-\$125. Modules also will plug into any standard 22 contact edge connector. FREE BROCHURE! SYSTEMS ENGINEERING COMPANY, P.O. Box 49224, Atlanta, Ga. 30329, 404-237-4464.

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IGM Automation System #300 including: Brain, silence sequencer with alarm bell program logger. 2 IGM 14" reels. MaCarTa #2408 Carousel, 2 MaCarTa #108 Cartridge machines, time announcer, tone generator/filter. Price: \$8,000. f.o.b. KWFM, Tucson, Arizona. Phone: AC602-624-5588. Mrs. Much.

"FREE" 70-second SPOTsHOT cartridge to broadcasters. No-strings—"try before buy"—offer. Request on your letterhead. Limited number of "freebies" so hurry! COLUMBIA BROADCAST SERVICES—POB 822 Columbia Station, Columbia, Maryland 21043.

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Wanted immediately, one good used 250 watt AM transmitter or operable 1,000/500/250 watt transmitter. Unit must be licensable. Call Ron Taylor, collect at WMOA Radio, Marietta, Ohio. (614) 373-1490.

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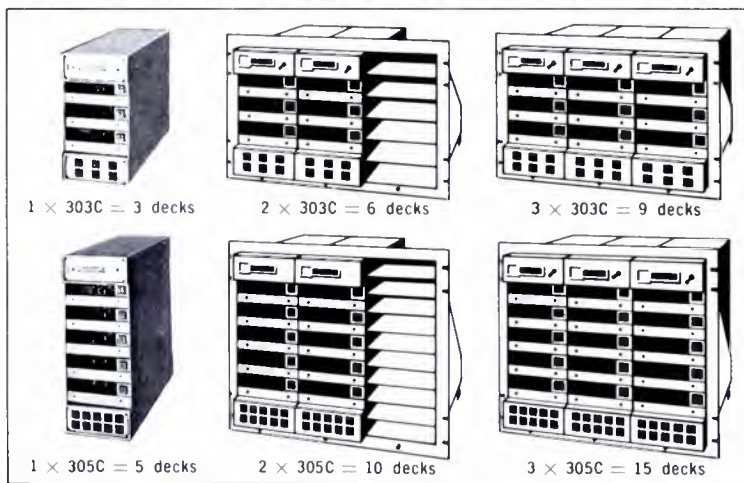
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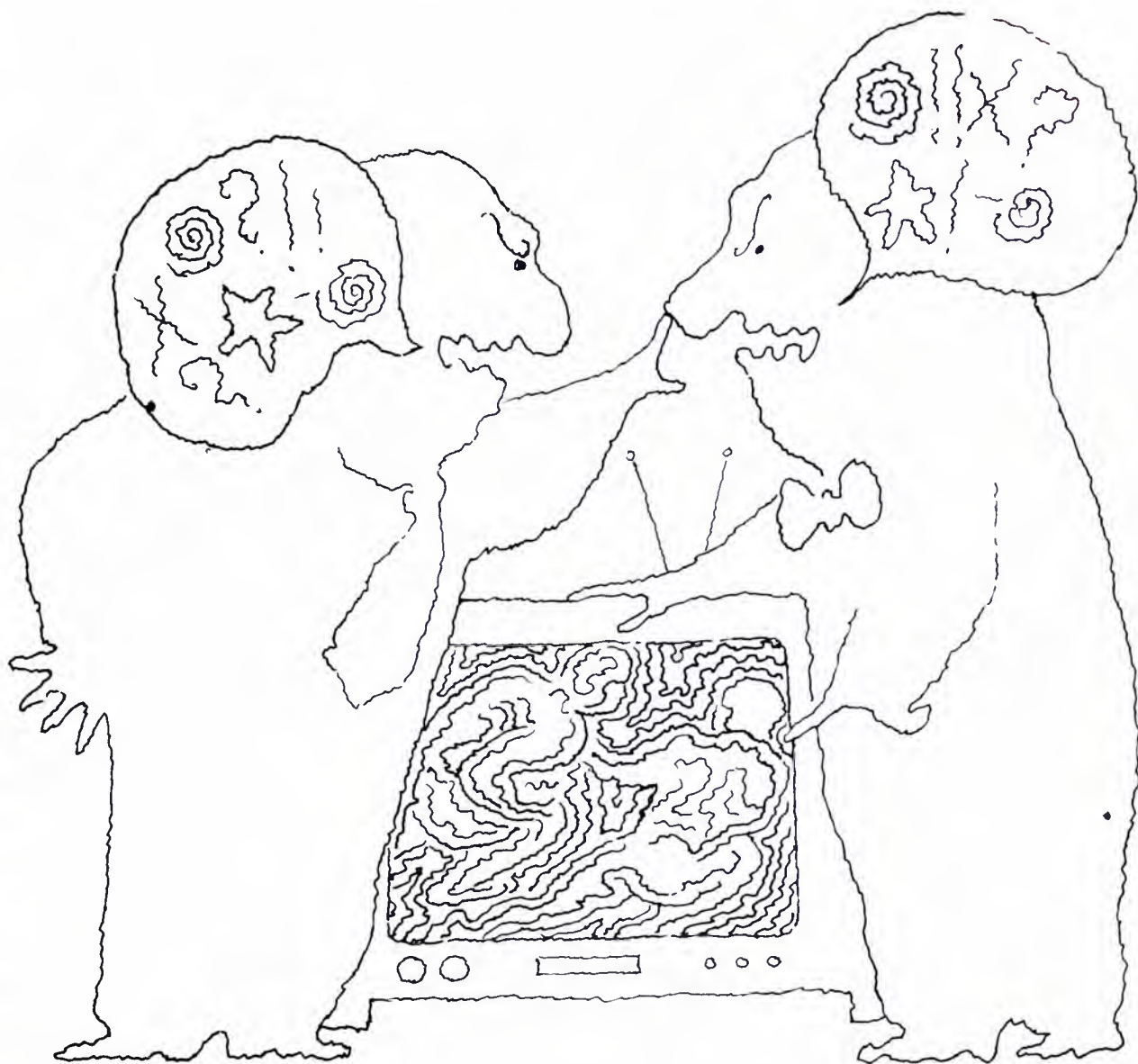
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