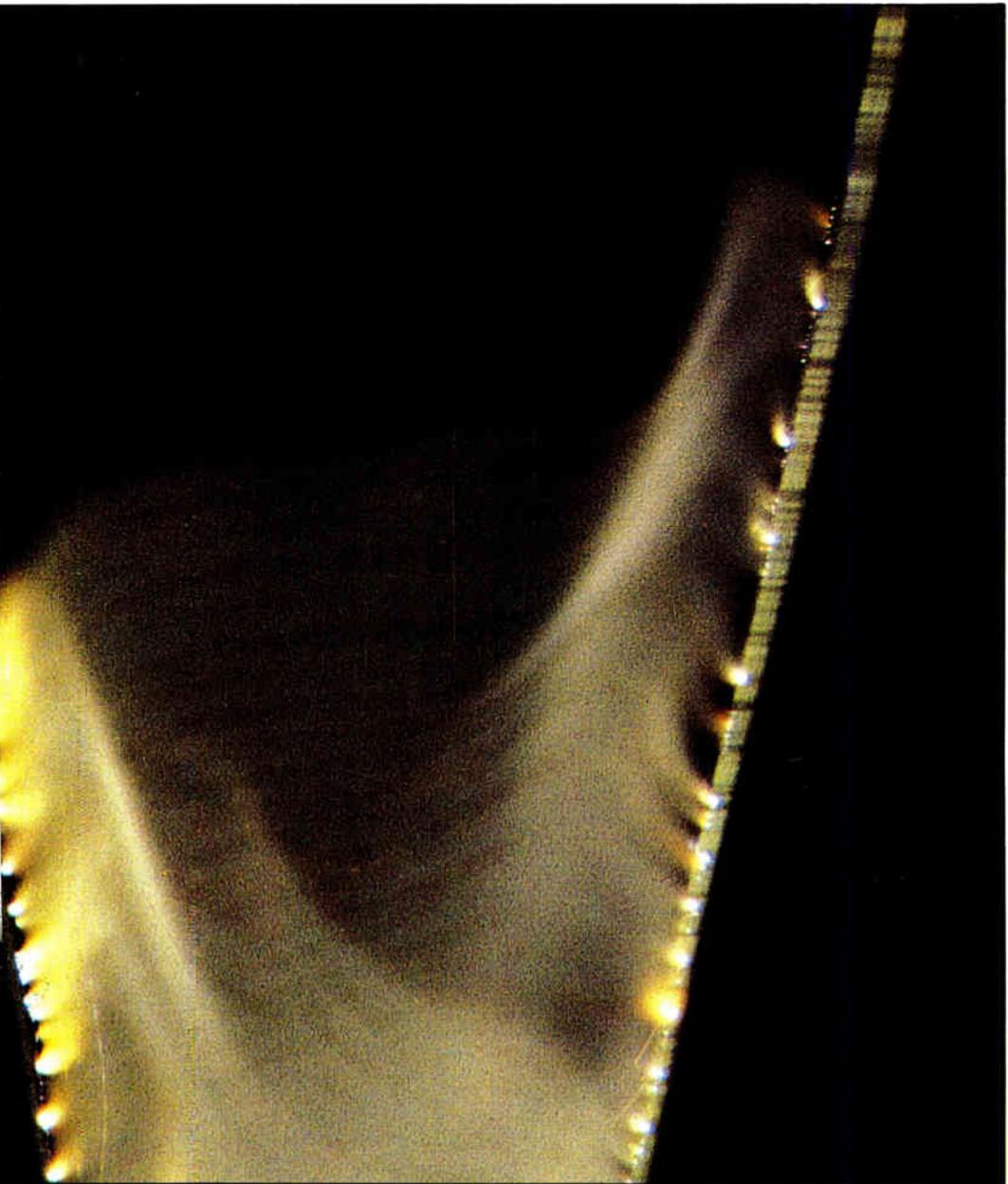


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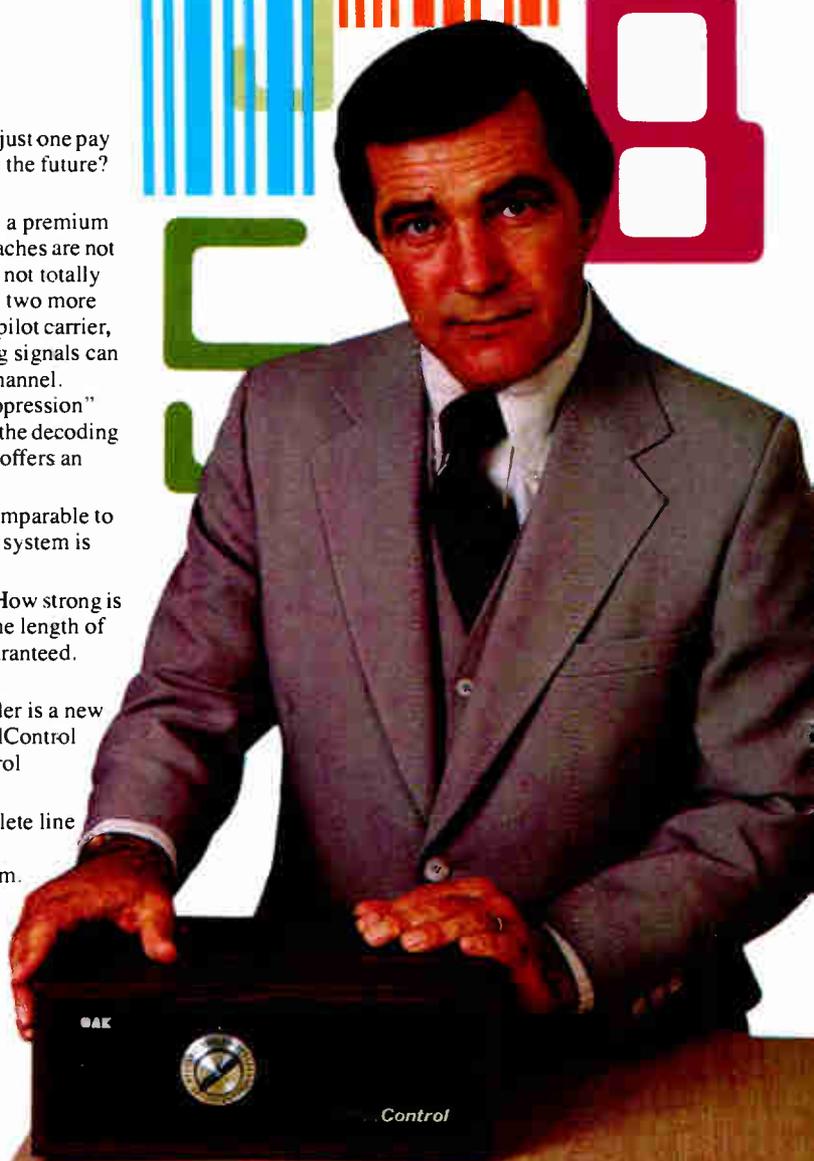
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Communications-Engineering Digest
Reporting the Technologies of Broadband Engineering

April 1980
Volume 6, No. 4



**Oak stages a seminar in print.
Session 2...**

Six steps to becoming a decoder expert.

Step 1. Evaluate your pay TV system needs. Do you want to offer just one pay channel, or are you planning to add a second or third pay channel in the future? This will impact on the decoder or converter/decoder you select.

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Step 4. Compare warranties and the companies backing them. How strong is the written warranty and is it offered equally to all buyers? Check the length of coverage, services covered and what service turnaround time is guaranteed. Did the company selling and backing the decoder actually build it?

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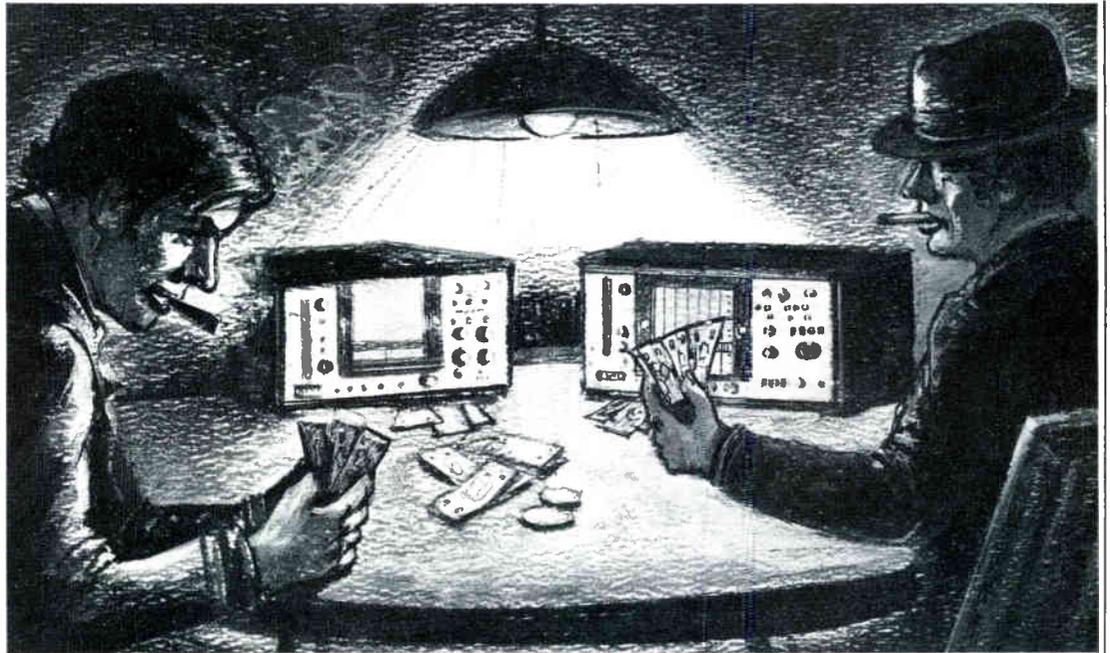
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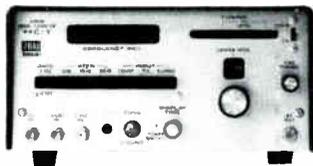
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The VSM-5A is wanted for complete spectrum analysis requiring phase lock and narrow resolution bandwidths. This instrument is capable of all FCC proof of performance measurements except system flatness.

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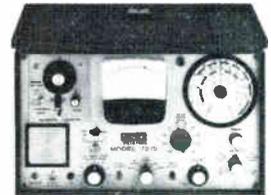
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C-ED News at a Glance

PISCATAWAY, NEW JERSEY—With the **installation of a 5-meter antenna and the necessary terminal devices** at RCA Princeton Labs, a new '56-PLUS' satellite system for **wideband data transmission** began demonstration operations in the beginning of March, 1980. The main purpose of this demonstration, which will be operating through a duplicate Scientific-Atlanta installation in downtown Atlanta, is to show potential RCA customers a broad spectrum of 56-PLUS capabilities.

56-PLUS is a wideband data service providing high-quality transmission by satellite to high-speed data users between dedicated earth stations. This service is particularly attractive to customers who send a lot of data between several locations. Up to 96 low-speed channels can be transmitted on only one 56-KBPS circuit. It is six times faster than a voice-grade line, is highly reliable with an availability exceeding 99.95 percent, and is also very accurate having a bit error rate of 10^{-7} or better.

Applications such as networking are greatly enhanced by the use of 56-KBPS circuits. The same high-quality signal can be transmitted simultaneously to an unlimited number of stations or can send different data streams to a diversified number of widely separated locations.

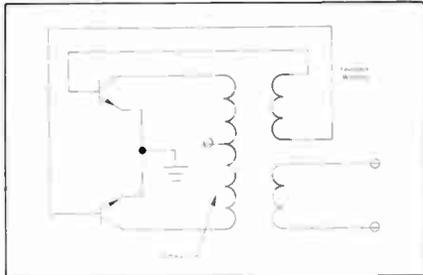
J. Preston Brown, Manager, 56-PLUS Services for the Commercial Communications Services group of RCA Americom, describes this type of circuitry as a natural progression in the evolutionary growth of intercity telecommunications. Mr. Brown states, "Fifty-six Plus is very attractive to the high speed, big-volume data user with widespread locations. Cost savings are significant for this type of user. Compared with Dataphone Digital Service (DDS) for example, which charges by the mile, costs by satellite are appreciably lower because we only charge a modest fixed monthly fee calculated on the number of circuits and locations to be used. With satellite usage, the higher the multi-point volume the greater the savings. This contrasts to 'by the mile' landline circuit charges where costs increase in direct proportion to the distance covered."

Mr. Brown emphasizes this. "With one 56-KBPS circuit and two RCA earth stations, you can save over 15 percent monthly on coast-to-coast transmissions compared with DDS . . . add another circuit and save even more . . . with a larger and larger number of additional circuits the savings become quite considerable."

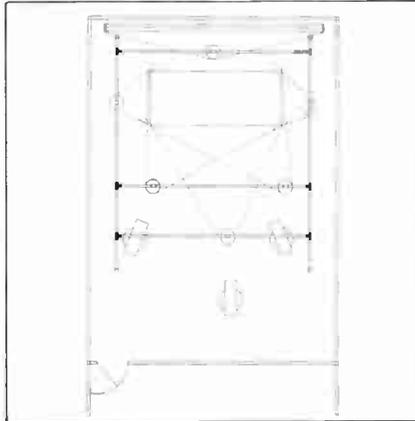
WASHINGTON, D.C.—**The FCC's UHF Comparability Task Force has released two reports concerning improvements to UHF television service**—"Indoor Television Antenna Performance," by R.G. Fitzgerald of the U.S. Department of Commerce, and "New Technical Opportunities for UHF Television Transmitters," by C.C. Cutler of Stanford University.

The UHF Comparability Task Force in the Commission's Office of Plans and Policy was established in response to a Congressional request to **determine ways by which UHF television service could become more competitive with VHF TV.** UHF service is hindered by several technical and economic disadvantages, known collectively as the "UHF handicap."

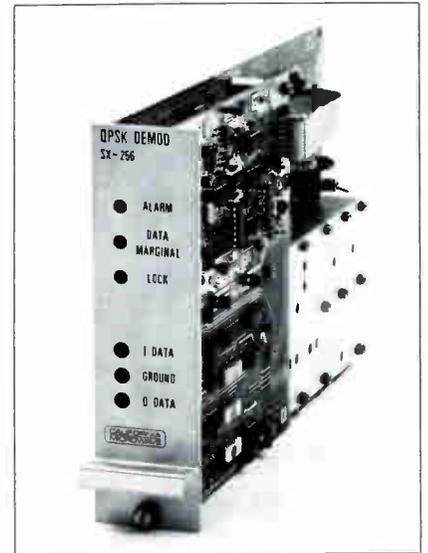
Both reports are being placed in the FCC proceeding, Improvements to UHF Television Reception (Gen. Docket 78-391). Comments on these reports are due to April 28 and replies by May 26.



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Cover: A Jacob's Ladder, in which a continuous series of electrical sparks, each rated at 15,000 volts, jumps across a three to five inch gap. Shown here in a 1/4 second timed exposure. Photo by Brad Hamilton. Transformer courtesy of Denver Public Schools.

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Editor's Letter

Two items of note this month. First of all, Dr. Gary S. Tjaden of Cox Cable Communications delivered a lengthy address to a group of computer scientists at Northwestern University. The title of his presentation was "Cable TV: The World's Largest Distributed Processing System." Dr. Tjaden's aim was to spark interest in research and consultation at an academic level, and to provide an impetus for the development of computer/data transmission networks. At one point in his lecture, describing S-A's new fifty-two channel set-top unit, Dr. Tjaden said, "The thing I want to impress upon you is, this component is starting to look like a computer terminal. It has a keyboard input, digital displacement microprocessor on the side." He then went on to describe a few of the unit's other characteristics.

It seems to us that Dr. Tjaden's efforts are on the right track here. In order for the cable industry to develop to its full potential in the field of data processing, it's going to need some special research. The problem is, computer scientists don't know much about cable.

The second item of note was a symposium on cable TV sponsored by the Rural Electrification Administration, Department of Agriculture. The REA is comprised of rural telcos, many of which are looking at cable with an eye toward establishing integrated telephone/coaxial systems. The symposium provided information on nearly everything about cable, from basic cable, to marketing, to information on available government loan programs.

More on that in future issues.

For the present, we give you the April power issue of C-ED, with two companion pieces on standby power systems.

Paul A. FitzPatrick



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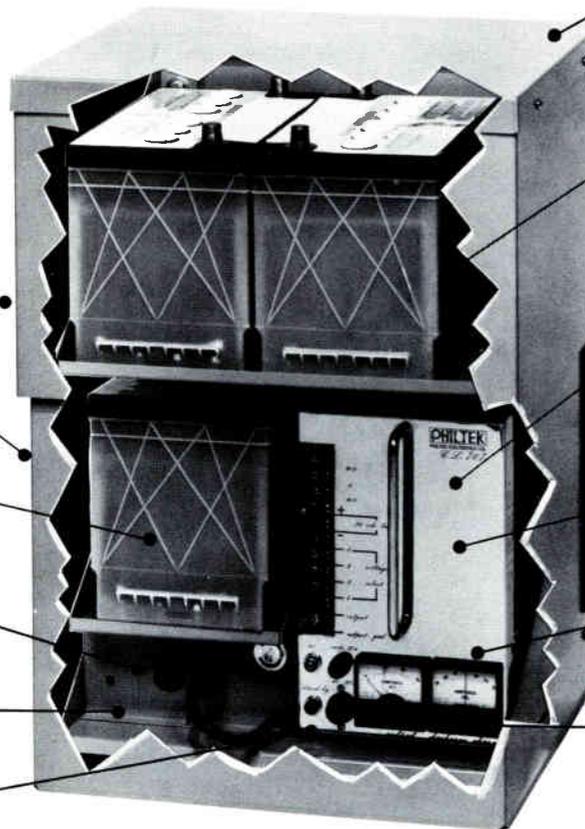
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Tenten to Lead SCTE Senior Member Committee

Robert Tenten, Director of Engineering for Manhattan Cable Television in New York City, will chair SCTE's new Senior Member Committee. The purpose of the committee is to establish requirements and a method of selection for elevating active members to senior members. Additionally, they will annually review potential candidates and establish a forum for announcing the new senior members.

Before joining Manhattan Cable, Tenten was Director of Engineering for Home Box Office, primarily responsi-

ble for technical aspects of the terrestrial and microwave transmission systems. Tenten is a member of IEEE, SMPTE, and a senior member of SCTE. He is a graduate of the Brooklyn Polytechnic Institute, and the RCA Institute.

The five members who fill the SCTE's Senior Member Committee will be announced at a later date. The committee will then also announce a program of complete criteria, guidelines, and screening procedures on June 1st.



Robert Tenten

Gardner to Chair SCTE Scholarship Committee

Michael J. Gardner, an operations engineer with Cox Cable in Oklahoma City, will chair the newly-established SCTE Scholarship Committee. The purpose of the committee is to encourage consideration of cable television engineering as a very dynamic and viable career opportunity. Additionally, the committee will assist SCTE members who are already employed in the industry in furthering their education.

During his nine years in the cable industry, Gardner has served in various capacities: installer, technician, chief technician, and systems engineer. Currently he is serving for his second year on the SCTE Board of Directors. As Region 3 Director, his area includes Iowa, Kansas, Missouri, Nebraska, North and South Dakota, and Oklahoma. Gardner holds a second-class FCC radio-telephone license. In 1979, after four years with

SCTE, he was named a senior member.

Plans for the cable industry's first national scholarship program, and committee to administer the program, were announced last January. The ambitious program will take a minimum of \$20,000 annually to reach SCTE's goal of helping at least two people in each state complete their education and join the cable industry, plus assist SCTE members as well. Gardner will select five SCTE members to fill the committee at a later date. The immediate goal of the committee is to determine the direction the scholarship program is to take. The on-going responsibility of the committee will be to distribute scholarships. Additionally, the committee will have a program designed by June 1st which will outline guidelines for disbursement of monies to be awarded to the students and SCTE members.

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Effective Communication: Putting Your Best Foot Forward

April 28-29, 1980, in Memphis, Tennessee, SCTE will sponsor a seminar designed to further management development in the cable television industry, and to offer participants an exciting adventure in education.

Cable television is an important part of the growing world of communications, a field that is SCTE members' business; their bread and butter, their future. Logically, to be successful, they need to be effective and efficient communicators. To achieve that goal, SCTE has tailored this meeting to help its members "put their best foot forward," in audio-visual aids and oral presentations. Each morning's general session on methods and techniques will teach basics. Then there will be the opportunity to apply the new skills in small, group break-out sessions. To improve audio-visual presentations, participants will be creating their own

transparencies, and the oral presentations made, based on classroom instruction, will be videotaped for viewing and critiquing. The program will be as follows:

Monday, April 28th: General Orientation, by Dr. Richard Hartsook, University of Alabama. Audio-visual Workshop, by Dr. Robert Sepe, University of Alabama, along with a representative from Kodak. How to Make Transparencies, by a representative from the 3M Corporation. Preparing Audio-Visual Presentations will be the subject of a break-out session.

Tuesday, April 29th: Oral Communications, by Dr. Susan Beckley, Sammons Communications. Oral Presentations will be a break-out session.

The featured luncheon speaker on the 28th is Dr. Tom Jonas, a communications specialist from the University of Wisconsin. As a special treat on the 29th, participants will see their very own oral presentations on video tape in living color over the lunch table.

Registration fees will cover all

sessions, workshops, and materials, two luncheons, a hospitality party, breaks, and refreshments, as well as the certificates of completion. Continuing education units will be awarded for this special SCTE seminar.

Preventative Maintenance Seminar Slated

June 5th and 6th, the SCTE has scheduled a seminar dealing with Preventative Maintenance. The presentation will be given at the Empire State Plaza in Albany, New York.

For an operator, taking care of a cable system should be a top priority, and an on-going concern. Unless the system and equipment are in prime condition, operators are losing customers, and that means losing valuable revenues. The most efficient way to handle system problems is to institute a full preventative maintenance program. Taking measures that will insure systems against any major problems is extremely important, and these easy to follow steps are, in the long run, much

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Kansas City Office

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and Chapter News

more economical than having unexpected major repair bills.

SCTE realizes the importance of preventative maintenance, and has prepared a program tailored to fit all the needs and answer all the questions. Topics include: Preventative Maintenance Aspects of Construction, Head-End Considerations, Techniques for Extended System Life, Sag and Stress, Sheath Currents, Standby Power, Surge Protection and Testing, Operations Techniques, System Spares, Development of a Preventative Maintenance Program, Trunk Preventative Maintenance, and Repair and Retro-fit.

Manufacturers, suppliers, users, and managers will be there to relate their experiences and give their advice on the most practical, efficient preventative maintenance methods. Interaction is scheduled throughout the two days by speakers and the audience. Continuing education units will be awarded for meeting participation. Registrants will have the option to

request University of Alabama or New York State credit upon registration.

Registration fees will cover all sessions, workshops, and materials, two luncheons, a hospitality party, breaks, and refreshments, as well as the certificates of completion.

For further information on SCTE meetings or committee activity, contact Jane Rudden and Susan Queeney at the SCTE Washington Offices, (202) 293-7841.



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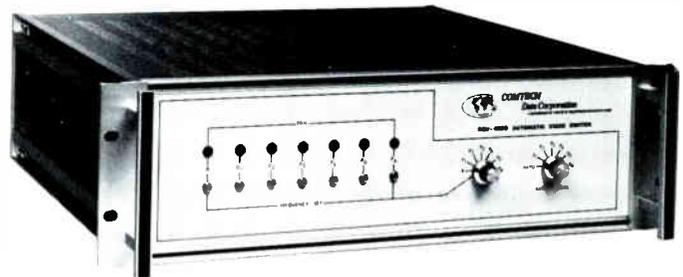
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MDS Issues Considered

WASHINGTON, D.C.—Multipoint Distribution Service is finally getting some attention from the Federal Communications Commission on some of the issues surrounding the service.

Reallocation of the 2500-2690 MHz band for additional MDS channels is one of the areas being considered by the Commission. Also under consideration is a rulemaking notice whereby the Commission proposes technical standards for acceptable interference and geographic spacing between MDS sites operating in the 2150-2162 MHz band. Comments are being sought for the establishment of similar technical standards for MDS, IFS (Instructional Fixed Service) and OFS (Operational Fixed Service) operation in the 2500-2690 band.

Some controversy arose among the Commissioners when an MDS construction permit for San Pedro, California, was granted to R.L. Mohr doing business as RadioCall Corporation using the current technical standards but with a condition attached that the grant would be subject to the new standards proposed.

RadioCall's application was opposed by two licensed MDS stations; Microband Pacific Corporation, Los Angeles, and Metrotel Corporation, Anaheim. The opposition alleges that an MDS station in San Pedro will cause unacceptable co-channel interference within their service areas.

The common carrier bureau decided to grant the San Pedro application because according to the existing standards the San Pedro station would not cause any interference or the interference would not be unreasonable. However, a condition was attached that the San Pedro station would be subject to the proposed technical standards.

Commissioner Anne P. Jones objected to the condition and cited it as "inequity" to grant an application under old standards but make it subject to new standards. Commissioner Joseph R. Fogarty agreed with Commissioner Jones.

The condition was dropped from the grant until a decision is made to determine which standards would apply to existing MDS stations.

The final issue brought before the

Commission was a Notice of Inquiry Proposed Rulemaking to amend the procedures for processing competing MDS applications. The Commission is inquiring into alternative procedures in determining who shall receive an authorization where mutually exclusive applications are involved.

The present procedure used, comparative oral evidentiary hearings before an administrative law judge, is considered costly and time consuming for both the FCC and the application.

The staff proposes three alternatives to the comparative hearings: paper hearings, still considered as costly and time consuming but to a lesser degree; a lottery, more fair because licensees are mostly equally qualified; and an auction, which would provide an incentive that the public interest be served.

As soon as auction was mentioned, Commissioner James R. Quello immediately brought up the question of fees. Collecting fees for services has been a problem plaguing the Commission and Quello regards bidding for a MDS station as a problem of equal, if not greater magnitude. One major question is precisely where the money from the auction would go. Chairman Ferris responded that it isn't a problem yet and it's an area where comments are being sought.

Regardless, Quello still favors the paper hearing proposal. Commissioner Abbott Washburn with Chairman Jones concurring objected to the "conclusory statements" made regarding each of the three staff proposals. Specifically, Washburn noted, "Overall public interest would be enhanced by a lottery," and "we believe that public interest can best be served by an auction" as non-objective opinions rather than statements of fact.

Chairman Ferris found nothing disagreeable with the statements and he does believe that "public interest can best be served by an auction." He said an auction is a good "market mechanism" and "it would encourage effective use of spectrum."

The Commission voted in favor of seeking comment on the proposals with editorial changes to the "conclusory statements." In fact, the Commission was favorable toward all the MDS issues presented.

Retail Credit Terminal Market to Reach \$1.1 Billion by 1989

NEW YORK, NEW YORK—Terminals and other equipment used to facilitate Electronic Fund Transfers (EFT) in the retailing industry should represent a market of \$1.1 billion in 1989, concludes "Financial Services in the Retail Environment" (#706), Frost & Sullivan analysis of the market.

Payment services and banking services use these devices, with the former employing authorization devices and CPU-CPU interfaces, and the latter, automated teller machines (ATM) and Customer/Merchant Operated Terminals (MOT).

Retailers installing both payment services and banking services equipment are department stores, supermarkets, apparel and accessory shops, liquor stores, drug stores, and hotels and motels. Building materials outlets, gas stations, furniture stores and auto repair service shops should confine their usage to payment services.

The 298-page study anticipates these trends during the study period in retailing use of EFT equipment:

- A reduction in the use of MOTs because of high merchant labor costs;
- An increase in self-service terminals operated by customers with increasing use of ATMs;
- Long-term financial services moving to the point-of-sale with emphasis on debit-card paperless transactions. This will utilize retail point-of-sale terminal systems interfaced to a bank's financial network.

From a current base of about 8,000 units, the payment terminal market is predicted to record by 1989 total shipments of 142,213 units (new and replacement), for a volume of \$366 million.

Authorization devices will account for 132,843 units, a market of \$196 million, while the higher-unit cost CPU-CPU interfaces will ship 9,370 modules for a market value of \$170 million. The 1989 installed base is estimated to be 95,600, comprising 89,500 authorization devices and 6,100 CPU-CPU interfaces.

Banking terminals will be dominated by the purchase of Automated Teller Machines (ATM), with an estimated buy of 24,086 ATMs for a total of \$749 million. MOT shipments are projected at 33,335 units for a much smaller market of \$82 million.

For optional peripheral equipment used with terminals, magnetic card readers should attain a volume of \$24

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million by 1989. Large department stores, apparel shops and supermarkets are expected to install 6,100 IPOS CPU-to-CPU interfaces, with an average of 20 terminals per installation. However, if banks use optical coding on their cards, this market will not materialize.

The concentrator market will be substantially larger, estimated at \$75 million in 1989. This is based on one concentrator per 150 terminals, with traffic generated from lease-line terminals and CPU-to-CPU interfaces. Each concentrator is estimated to cost \$75,000.

Total retail transactions are forecast to expand to 94 billion in 1989, an average annual rise of 3% from the 68 billion recorded in 1978. Cash transactions are seen to increase to 67 billion, credit actions to 11 billion, and check and debit/check guarantee transactions to 10 billion.

The F&S study notes that thrift institutions are evolving from a "shopping goods" orientation based on a small number of locations with a large number of accounts to a "convenience goods" philosophy tied to a large number of locations with a small number of accounts. The addition of NOW/checking services by the thrifts will accelerate the need for a larger number of convenient customer service points.

Commercial banks expect financial terminals in retail stores to increase profitability by diverting transactions from branch tellers to more cost-effective delivery systems.

All banks' profitability should be enhanced by:

1. Attracting new relationships with profitable account balances;
2. Diverting transactions from traditional branch tellers to more cost-effective distributed facilities;
3. Reducing the number of full service branches required;
4. Retaining current balances, otherwise lost to competitive institutions.

FCC Approves Signal Leakage Amendments

WASHINGTON, D.C.—The Federal Communications Commission voted in favor of a rulemaking proposal to add frequency channelling requirements and restrictions and to require monitoring for signal leakage from cable television systems using aeronautical radio frequencies.

The proposed amendments to the existing rules were presented to the Commission by Dr. Robert Powers, former chairman of the FCC Advisory

Committee on Cable Signal Leakage, and now deputy chief on the Research and Analysis Division of the Office of Science and Technology.

Powers said the existing rules required cable systems to know which frequencies in their respective neighborhoods were allocated to aeronautical services and aeronautical and marine emergency radio services, and to use an offset procedure to avoid interference with those frequencies. Powers noted that not only are these rules not very good for controlling interference but it is "burdensome for the FAA, FCC and the cable operators" to be required to know which frequencies were being used for aeronautical services in what areas.

The proposed rules would require that cable systems test signal leakage on a routine basis using ground-based measurements or simpler airspace measurements with values chosen by the Advisory Committee.

"New cable systems seem quite clean," Powers said. With better cables and connectors, the signal leakage has been minimal. Since the present rules were adopted, only three cases of cable TV leakage by aeronautical receivers had been detected and only one of those caused interference to aeronautical communications.

Randy Nichols, cable television bureau chief, said there were over 40 applications filed recently by cable systems stating their intent to use aeronautical frequencies. Under the existing rules, the FCC would have to check their files (which Nichols said are incomplete) to see which of the proposed frequencies are used by aeronautical services in the area proposed by the cable systems. Because of the incompleteness of the FCC files, the same frequencies would have to be doublechecked against the FAA records, Nichols said.

Rather than require advance notification from the cable systems of intent to use aeronautical frequencies, the new rules propose that cable systems submit a statement that leakage tests had been made and integrity criteria met. The new rules also propose that the cable operator define a circle which encloses the entire cable plant, existing or planned, giving the coordinates of the center of the circle and its radius in kilometers for which notice was being given.

Also included in the new rules is a proposal raising the threshold power

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level which would eliminate much of the difficulty of avoiding aeronautical frequency interference. The present requirement in the communications bands is 100 kHz plus the cable system's frequency tolerance, whereas in the radionavigation bands the requirement is 50 kHz plus the tolerance. The FCC proposes reducing the requirement to 45 kHz in both cases and notes that this proposed reduction of the offset requirement would eliminate about 80% of the existing problems of choosing appropriate frequencies for cable operations.

The present rules and procedures would continue to be used temporarily by older systems that cannot meet the new requirements. An unspecified time period would be given to older systems to improve their leakage performance to comply with the proposed rules and if they couldn't comply they were not to use the local aeronautical frequencies.

New systems who want to use the aeronautical frequencies would have to abide by the new rules. The systems would have to be built so that no interference is caused and monitoring would have to be made on a routine basis—the entire cable system at least once every three months—to insure there is no signal leakage.

In all cases, existing cable systems or new systems, the FCC would retain the authority to shut off service if a cable system caused interference.

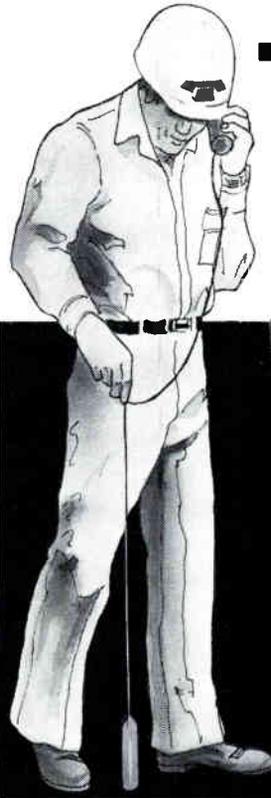
K-Band Frequency Conversion Subsystem Slated for Westar

HAUPPAUGE, NY—LNR Communications, Inc. has recently delivered, to Digital Communications Corporation, the K-Band Frequency Conversion Subsystem for the Bit Error Rate Test Set for use with the Western Union Advanced Westar Satellite Communication system. The Frequency Conversion Subsystem features low phase noise and flat group delay over a wide bandwidth for high bit rate digital service.

The Frequency Conversion Subsystem receives, from the test set, a 1700 MHz carrier, QPSK-modulated by a 125 megabit/sec data stream. The modulated carrier is then up-converted in the Frequency Conversion Subsystem to K-band and transmitted via the uplink to the Advanced Westar Satellite.

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FCC Approves PBS-WESTAR Link-up

By Pat Gushman,
Washington Bureau Chief

The shared use of satellite transmission facilities will become increasingly fashionable as well as practical now that the FCC has given Western Union and the Public Broadcasting System permission to work together. Now that the Commission has given its approval, Western Union will be able to install and operate equipment at Public Broadcast System terminals for program distribution purposes and possibly message-type communications via its WESTAR domestic communications satellite system. And this, according to Western Union, is just the beginning.

The initial locations for this newly created "shared use" will be Washington, D.C., where Western Union has requested authority to establish and operate one transmit video channel and one receive video channel of communication. In New Orleans and Houston, Western Union plans to install and operate one receive video channel. It has also requested, subject to availability and technical feasibility, to use the earth station terminal equipment of all three licensees on an occasional use basis without the installation of additional equipment.

It was three years ago that the FCC granted PBS and 13 noncommercial educational television broadcasters authority to build a number of earth stations. At the same time, it authorized Western Union to provide satellite transponder service to PBS, enabling PBS to establish its nationwide interconnection for program distribution. To date, the PBS network now consists of some 110 noncommercial television licensees.

Western Union estimates its operating costs for the Washington, D.C., terminal at \$523,200 over a three year period; \$150,000 for the New Orleans facilities and \$213,100 for Houston, over the same period. Western Union says its plan will substantially allow it

to provide the public with wider programming choices and program diversity, help reduce the costs of the public broadcasting system, maximize the use of existing frequency-cleared earth station sites, and expand the number of transponders that can be simultaneously accessed, thereby increasing the number of services that can be channeled through a single terminal.

The American Satellite Corporation, RCA American, AT&T and others had opposed the plan. They contended, among other things, that FCC precedent and the fact that any grant of authority be conditioned on the requirement that CPB/PBS make facilities available to other carriers on similar terms. They also questioned whether the plan would jeopardize the tax exempt status of public broadcasting licensees, whether it amounted to a subsidy for Western Union, and whether grant of the application would transform public broadcasters into common carriers.

The FCC said it viewed the proposal as a lease of physical space, similar to arrangements commonly entered into by broadcasters and other licensees whereby they lease space on their transmission towers to licensees in other services. Under the arrangement, both Western Union and the broadcaster could operate simultaneously and both would have to be licensed to their respective facilities. Therefore, it said, the essence of the independent relationship between Western Union and the broadcasters will be preserved by keeping Western Union's services entirely separate from those of CPB/PBS.

The FCC, in examining CPB/PBS' role in providing access to its earth station under traditional tests of common carriage, found that CPB/PBS was not involved in indiscriminately offering a communications service for hire to the public. For example, the 1978 Public Telecommunications Financing Act specifically requires CPB/

PBS to provide access to its satellite facilities and services to other non-commercial users and educational programming entities on a preferred basis. In view of this, the Commission said it could not be concluded that PBS licensees would be engaged in common carrier services. It said Western Union would be operating its own earth station transmission facilities and would be required to apply for and acquire a call sign and license, as well as assume all the concomitant licensee responsibilities, before it would be allowed to establish full-time communications channels through PBS earth stations.

The proposal, which the FCC said appears to represent an imaginative and effective means of improving the utilization of existing satellite facilities, is not too dissimilar from the arrangement being worked out between CTM Communications Technology Management, Inc., and the Cable Satellite Public Affairs Network. CTM, the research and development firm headed by former NCTA President Bob Schmidt is moving ahead with plans to install multi-antenna uplinks on the C/SPAN site near Washington, D.C., thus enabling CTM to transmit and receive "simultaneously and sequentially" over all three domestic satellite systems.

Schmidt told C-ED the plans call for an investment of \$750,000. "The C/SPAN Board has given us the green light on leasing land and part of the facilities," Schmidt said. "We see ourselves as definitely requiring the capability to get up and out of Washington with any data, information, or even entertainment services we want to offer the industry. We do not intend to be a common carrier, but we are looking for joint users."

C/SPAN president Brian Lamb confirmed there is an "agreement in principle" to lease land, tower space, and a portion of the transmitter shelter, but he said final negotiations have not been completed.

Part One of a Special Two-Part Series.

Characteristics Of A Standby Power System

By Charles Turner, President, Control Technology, Garland, Texas.

In 1849, a few nuggets of gold found in the pan of a lonely Alaskan prospector sparked a gold rush. About 100 years later American technology sparked another opportunity for enterprising individuals to strike gold, this time by providing television programming to remote areas there-tofore denied by distance and topography. Although the pioneers of that era 30 years ago found more lead than gold in their pans, those that have persevered through the many years of burdensome government regulations, court decisions, and hardware and program development, are in position to pan a considerable amount of gold over the years immediately ahead.

As almost everyone in the cable industry knows, the technological expansion in the 1980's will surpass the total accomplishments over the past 30 years by a wide margin. We have seen intense competition for franchises in previously non-cable markets over the past two years, with proposals featuring 60, 80, and 100 or more channels of programming and communications. The demand for greater system reliability is also being heard from all sides.

Although "system reliability" is composed of many elements, the loss of service during a thunderstorm when the TV set continues operating is one of the hardest to explain to the average subscriber. As program offerings continue to expand, the demand for standby powering of the head end and distribution system will continue to increase. It is doubtful if any viable franchise proposal in the near future will not feature standby power as a cornerstone of system reliability. Standby power equipment is rapidly coming of age. It no longer has its production roots in the "garage shop" or the under-capitalized, shoestring, Mom and Pop corporation. Although most companies manufacturing such equipment are not the electrical or electronic giants in the industry, a second generation of engineering people have all but replaced the original or first generation entrepreneur. Some of these second generation technicians have broadened the search for improved reliability by pursuing the design of batteries and battery charging equipment and have begun employing computer age electronic components in the design of their hardware.

From the user's standpoint, there are several basic design approaches,

and all have some advantages and some disadvantages. From a functional standpoint, Figure 1 illustrates a typical standby power system. Certainly the design of the various blocks and to some degree the arrangement of the blocks can be significantly different from one manufacturer to the next. Virtually all standby power supplies utilize a ferroresonant (constant voltage) transformer as the primary power line conditioner. Batteries and a battery charger (some manufacturers choose to call this a "battery conditioner") are necessary elements in all designs and because of their importance are discussed in greater detail below. Most of the variation in design from one manufacturer to the next occurs in the design of the inverter and control logic. Inverters can generally be grouped into one of the following classes:

A. Saturating Inverter

The saturating inverter design is the simplest and therefore the least susceptible to catastrophic failure. Since the output transformer itself is part of the oscillator, a short circuit on the output magnetically short circuits the feedback winding and the unit simply stops oscillating. When the short circuit is moved the inverter resumes

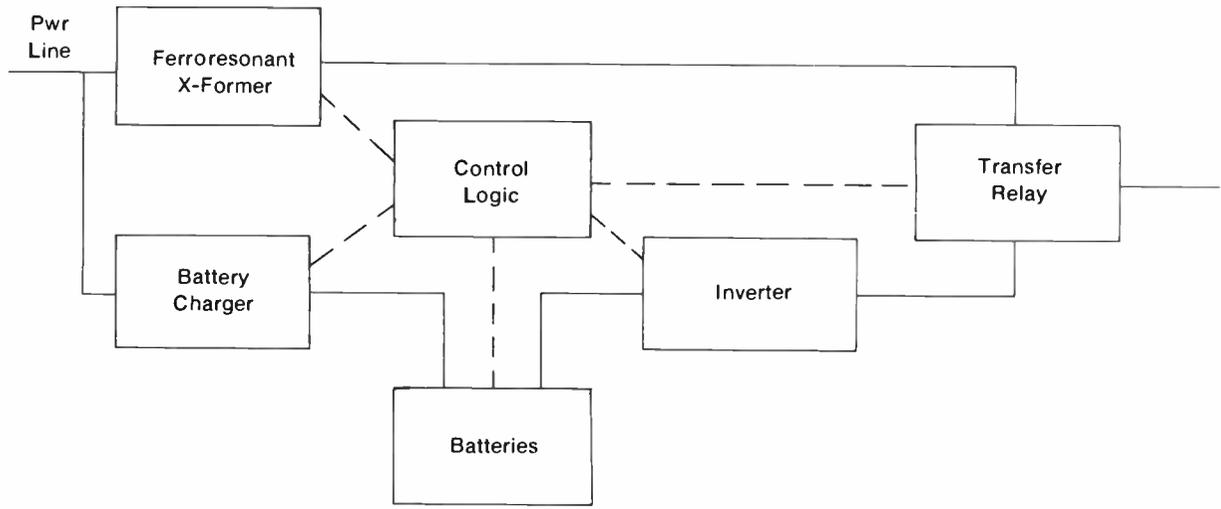


Fig. 1

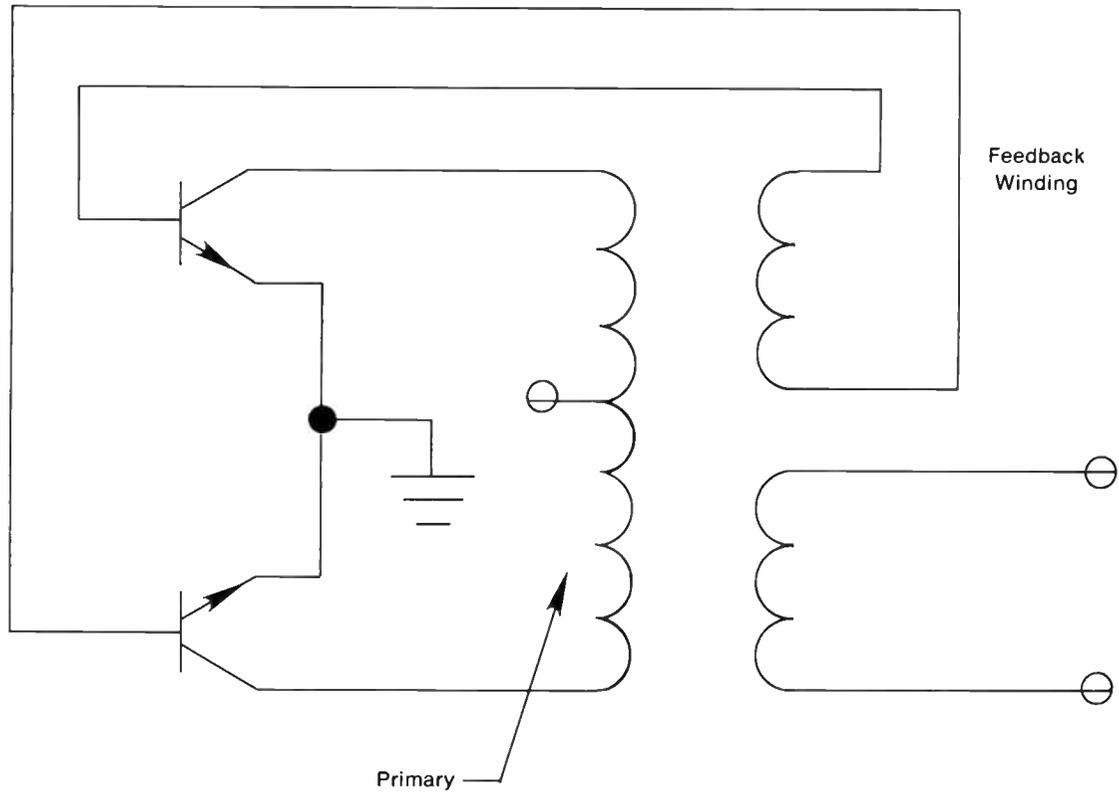
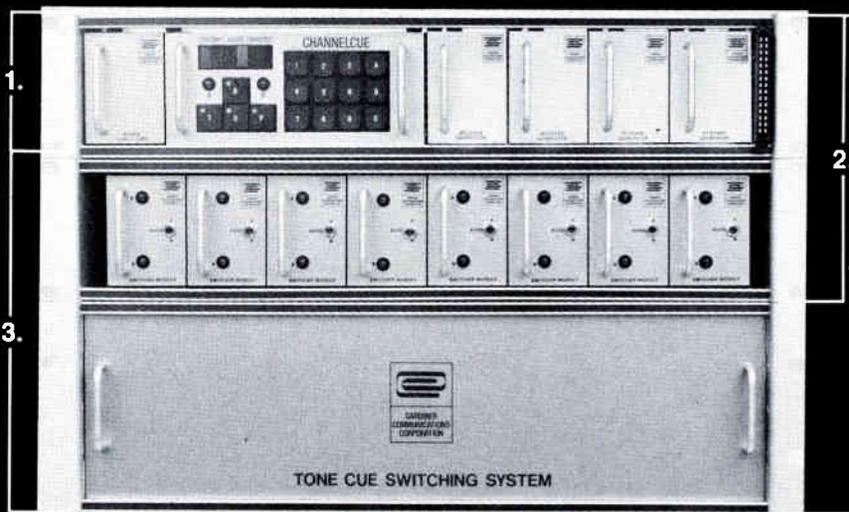


Fig. 2

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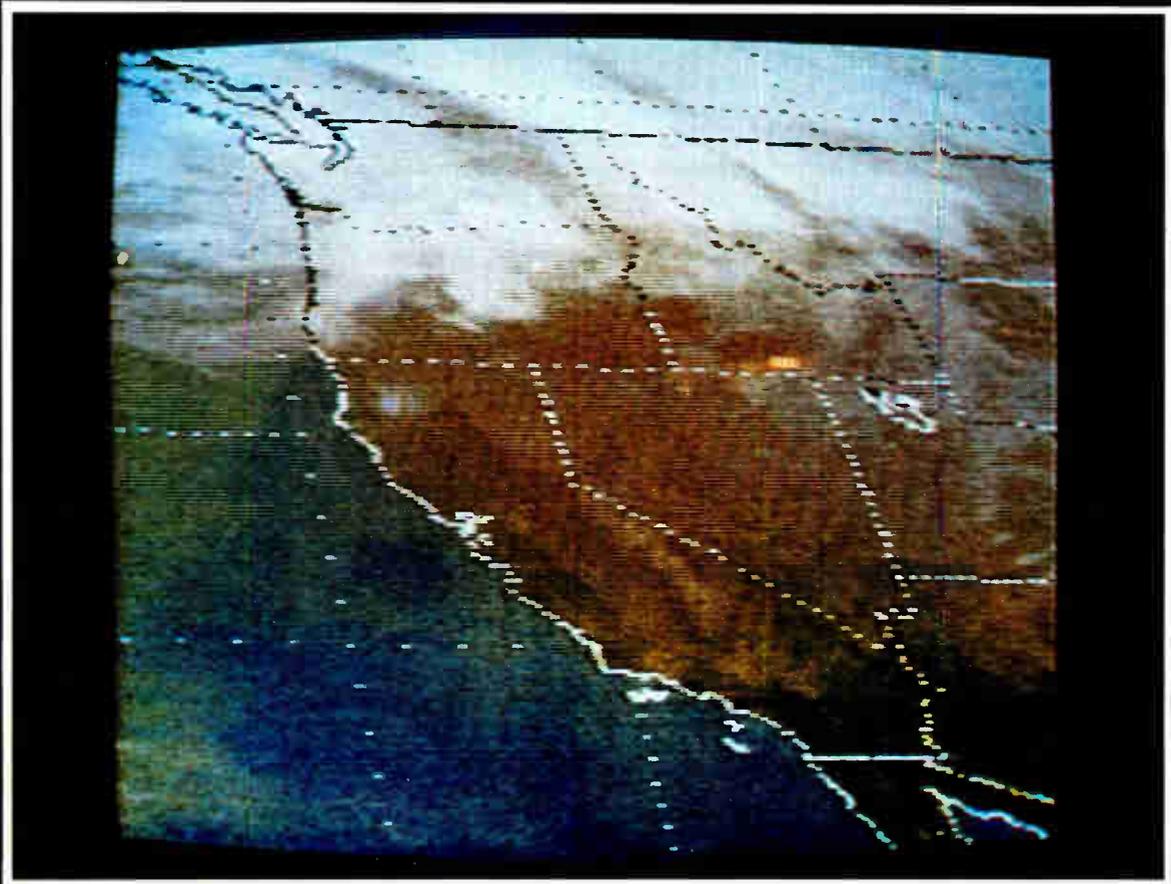
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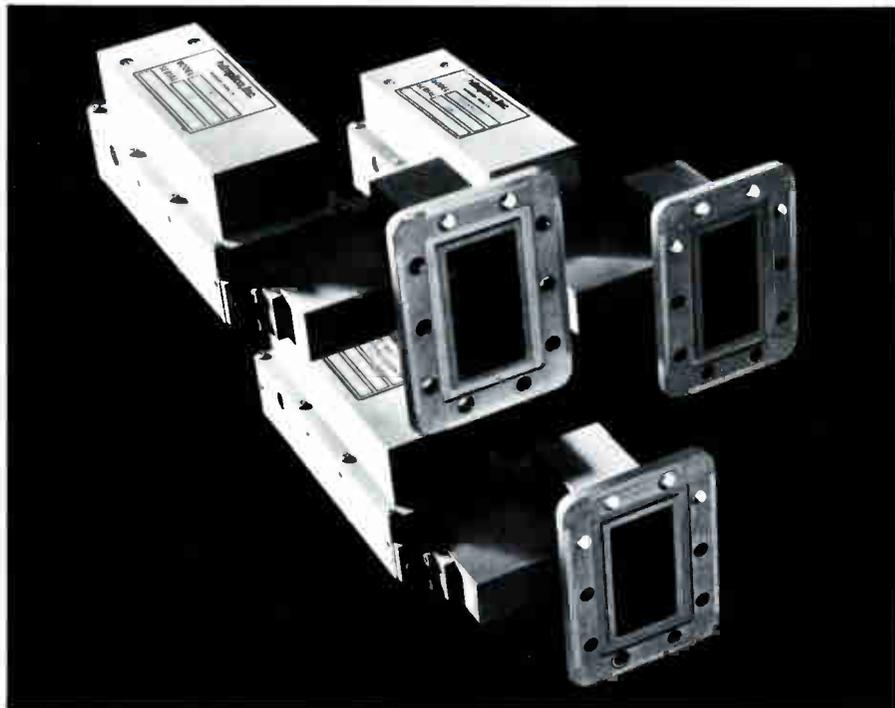
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Output Power @ 1 dB Gain Compression	+10 dBm minimum
Intercept Point	+20 dBm minimum
Input VSWR	1.3 maximum
Output VSWR	1.5 maximum
Input Power/Current	+15 to +25 Vdc @ 110 mA nominal
Input Connection	CPR229G
Output Connection	Type "N" Female
Weatherproofing	Provided
Mating AC or DC Connector	Supplied

Model No.	Noise @ +23 C
728CWNL	100° K (1.3 dB)
729CWNL	120° K (1.5 dB)
730CWNL	150° K (1.8 dB)
731CWNL	180° K (2.1 dB)
732CWNL	225° K (2.5 dB)
733CWNL	289° K (3.0 dB)

NOTE:
For -18 to -30 Vdc add (-1) to model number.
For -40 to -60 Vdc add (-2) to model number.
For 115 Vac add (-3) to model number.

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RUSH!

Selecting A Standby Power Supply

By Peter G. Kelsey, General Manager, Kelcee Communications, Mississauga, Ontario.

Selecting a standby power supply unit for a CATV system is rather like buying insurance. If the policy does not pay out on your claim, its insurance value was nil, and if your standby power supply units fail to operate when you need them the most, you bought the wrong standby insurance!

Reliability is defined as the probability that the unit will operate consistently, under all environmental conditions in your region, to the parameters assumed in your system powering design. Reliability of operation is the single most important feature of any standby power supply.

Mean-time-to-failure (MTTF) figures can be calculated through component and circuit design analysis, or from long-term testing, but these are invariably quantified by the environmental and operating conditions under which they apply and can be radically altered by the change of even a single component or design parameter.

A more valid assessment can generally be made between products, by comparison of the quality of design and manufacture, together with an evaluation of the unit performance at its operating extremities.

Service and maintenance is essential on a regular basis for all standby power supplies, the frequency of inspection being dictated primarily by the quality and type of battery utilized and the ability of the power supply charger circuit to optimize battery performance. Over the life of the product, inspection, maintenance and battery replacement costs can exceed the initial capital costs of the standby

power supply itself. Check the unit you propose to use for battery accessibility, corrosion effects due to battery out-gassing, and the extent to which troubleshooting must be carried out in the field instead of on the bench in relative comfort.

Installation: The cost of installing standby power units is a one-time expense and therefore less critical than maintenance/inspection considerations in product selection. However, units which allow the electronics to be installed after the basic cabinet has been mounted obviously make the installers' job easier and facilitate servicing.

Batteries: "Low maintenance" automotive batteries are best suited to CATV type applications. Use 27C (12 inch) batteries in preference to 24C (10 inch) batteries wherever possible. For only a small increase in price and battery weight you can increase your standby capability by up to 50 percent.

Battery Charging: Battery cells start to charge when a voltage of approximately 2.05 volts/cell is applied, but may not reach full charge unless 2.15-2.17 volts/cell are applied. Maintaining the charging voltage continuously at levels above 2.17 v/cell will initially provide an increase in available battery standby time but, if maintained continuously, will cause a significant reduction in battery life. Thus, while it is unwise to maintain the charging voltage at levels above 2.17 volts/cell continuously, a boost or equalizing charge at 2.35 volts/cell periodically (every 60 days) for a few hours will "freshen" your batteries to "new" condition, optimize the available battery standby time, and increase battery life.

Some standby power supply manufacturers provide both a sustaining (2.16 volt/cell) and an equalizing (2.35

volt/cell) charge voltage, to permit periodic battery equalizing. Others rely upon a single fixed charge voltage that must necessarily be set at a compromise level.

Most manufacturers include a current-limiting feature in their charging circuit. Maximum charge rates of 5 to 6 amps are typical and will provide a full recharge in less than 24 hours. Maximum charge rates significantly below this figure may result in recharge times as long as 72 hours. Recharging at rates above 7 amps is not necessarily harmful to the batteries but may cause out-gassing and loss of fluid in high ambient temperature environments.

Low-Voltage Cut-Off: Excessive deep-discharging of batteries can cause irreversible damage to one or more cells. When battery volts fall to 1.75 volts/cell the remaining reserve capacity is negligible. For maximum battery efficiency and life, be sure your standby power supply isolates the batteries from the load at or above this level.

Output Power: Power-passing coils in CATV amplifiers are typically rated at 6 amps rms. Assuming the power supply feeds both up and down the line, a maximum capacity of 12 amps is required per power supply at 60 volts rms. In practical applications, the system designer may find that cable loop resistance limits the number of amplifiers served from a given power supply due to cable voltage drop, before the full current-carrying capacity of the power supply has been utilized.

Output Voltage: The range of allowable input voltages that trunk amplifiers and line extenders in use today will accept, without malfunction, varies from a limited 50 to 60 volts to a broad 33 to 60 volts. The acceptable range for your amplifiers will have a

significant effect upon the cost of providing standby power capability.

Assuming an allowable minimum input voltage of 40 volts to the last amplifier powered, and a power supply output voltage of 60 volts, the system can tolerate a maximum voltage drop along the cable of 20 volts. If the minimum output voltage of the power supply is only 51 volts (nominal less 15 percent) the tolerable cable voltage-drop will be 11 volts—almost a 50 percent reduction.

A system using a standby power supply whose minimum output voltage is never less than 60 volts minus five percent (57 volts) will deliver power to approximately 33 percent more amplifiers than one having a minimum output voltage of 51 volts (60v minus 15 percent), with resultant savings in the number of power supplies required and the associated installation/maintenance costs.

Blackouts: When total loss of utility power occurs, the power supply must transfer to the standby mode. Transfer times vary from manufacturer to manufacturer, from 15 m. sec. to 100 m. sec., with 30 m. sec. as a typical average.

In a prolonged blackout, battery volts will fall steadily from a fully charged condition of 2.16v/cell down to the pre-selected low-voltage cut-off

voltage of 1.75v/cell. The power supply output voltage immediately prior to cut-off (31.5 volts for a 36 volt battery system) is generally the voltage on which all system design should be based.

Brownouts: The majority of electrical equipment is designed to operate at any supply voltage within ± 10 percent of the nominal. Utilities therefore normally tend to ensure that end-user voltages remain within this tolerance.

In a "brownout" condition, utility input voltages may drop below 100 volts. Some standby power supplies are not designed to tolerate brownout conditions and will either transfer to the standby mode at a higher voltage (105 volts) or will fail to sustain the output voltage at the specified level during a brownout condition. Your standby power supply should sustain its output to at least the voltage level achieved in the standby mode immediately prior to battery low-voltage cutoff, without the necessity to transfer to the standby mode.

Transfer to battery operation at the higher input voltage has obvious disadvantages in terms of battery use and available standby time, but failure to sustain the output voltage above the design minimum for your system can cause malfunction of the last amplifier

in the power chain and possible complete loss of signal to the viewer.

Load Regulation: In addition to compensating for utility voltage variations, or battery voltage change, the CATV standby power must allow for the inherent voltage regulation of the power supply itself.

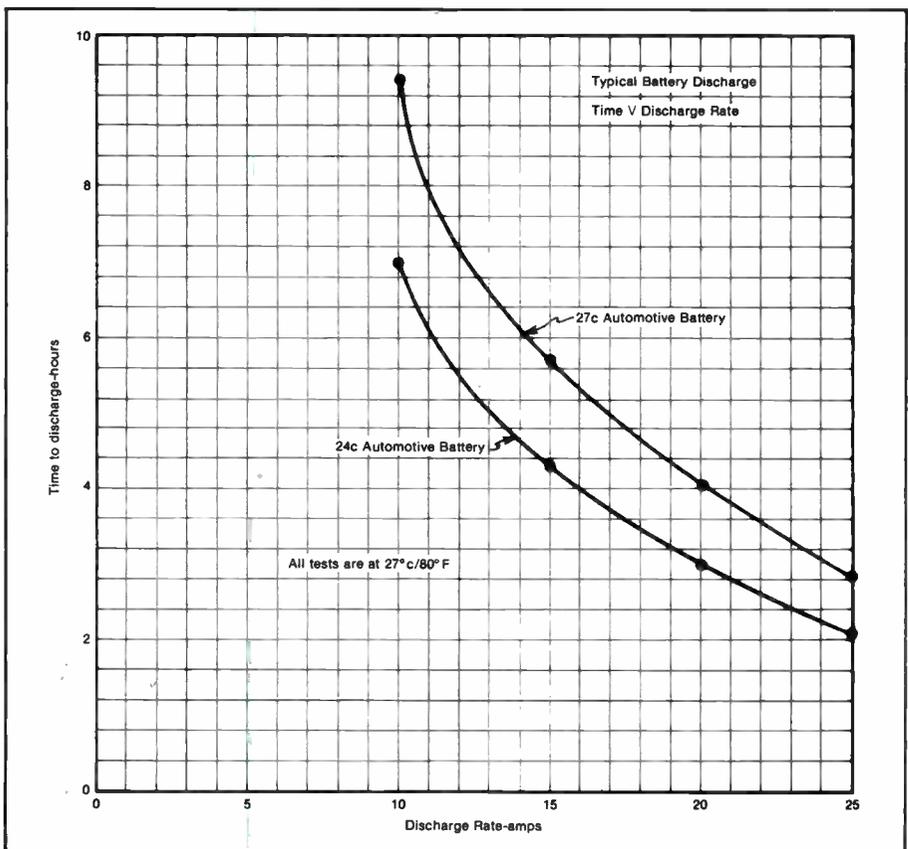
The equivalent resistance of the transformer primary and secondary windings introduces a voltage drop, proportional to load-current, that can range from five to fifteen percent of the nominal output voltage. This load regulation of three to nine volts for a 60 volt system is additive to any drop in output voltage due to low utility supply voltage or low battery volts, and could result in a power supply output at full-load (12 amps) as low as 42 volts—clearly unacceptable for CATV applications.

Ferroresonant Transformers: To overcome the problems resulting from input voltage variations and changes in load-current, manufacturers utilize one or more constant voltage, saturable core transformers designed to form a resonating circuit at the rated input frequency. With this design technique the variation in output voltage to input voltage and/or load current changes is sharply reduced.

The typical output from a ferroresonant power supply is a quasi-square wave. As the input voltage is reduced, the waveform tends to become increasingly sinusoidal in form but the true rms output voltage tends to remain relatively constant.

Inverters: When used in the standby mode, operating from the batteries, an inverter circuit provides a 60 Hz square-wave output. It is in this battery operated mode that manufacturers differ in their design philosophy. Some feed the inverter output directly to the standby power supply output, providing virtually a pure square-wave output, while others feed the inverter output into the ferroresonant transformer (or a second ferroresonant transformer) to take advantage of the latter's voltage regulating capability and provide a quasi-square wave power supply output comparable to that obtained in normal (utility power input) mode.

Basic Test Evaluation: To ensure reliable system operation, the system designer must know the lowest voltage (true rms) output that the standby power supply will deliver under worst system conditions; yet this basic in-



Battery Voltages	Volts/Cell		Volts/Battery Pack	
Number of batteries:	-	2	3	4
Nominal output voltage:	2.0	24.0	36.0	48.0
Recommended charge voltage:	2.15-2.17	25.8-26.0	38.7-39.0	51.6-52.1
Recommended equalize voltage:	2.33	28.0	42.0	56.0
Recommended low-volt cut-off:	1.75	21.0	31.5	42.0

formation is frequently difficult if not impossible to ascertain from manufacturers' specifications. For most products currently available, this worst case condition is obtained in the standby mode, operating from the batteries, under full-load current (12 amps) conditions.

A simple, effective test can be carried out to aid in this determination. With batteries fully charged by the standby power supply battery charger, using the higher "equalizing" charge voltage if available, transfer the power supply to the standby mode and measure the true rms output voltage with no-load applied. Apply a load, such as to cause full-load current (12 amps) to flow in the output circuit and record the output voltage. Leave the power supply in battery mode until the battery voltage drops to just above the low-voltage cut-off figure (not less than 1.75 volts/cell) and again record the true rms output voltage.

The above test will provide (a) the no-load to full-load voltage regulation, (b) the variation of output voltage with change in battery voltage, (c) the combined effect of (a) and (b), and in addition will indicate the length of standby time available at the environmental temperature at which you carried out the test.

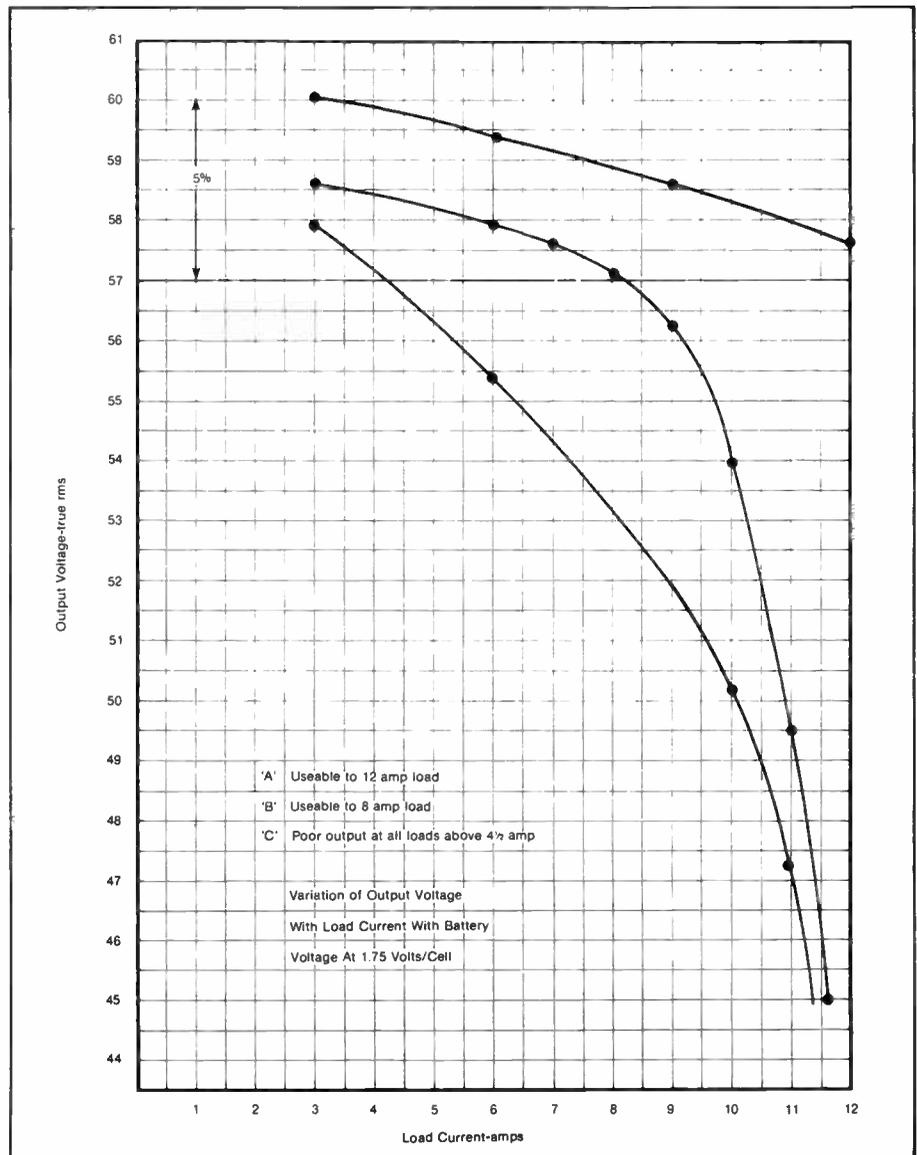
Additional useful information can be obtained by varying the load from zero to twelve amps with battery volts just above the cut-off voltage. Units with an unacceptable performance at their rated 12 amp output may have acceptable performance at a lower output load rating. Similarly, by monitoring the output voltage with a full 12 amp load current as battery volts are reduced, a graph of battery volts versus output voltage can be obtained. In this manner an acceptable minimum output voltage can be obtained at the expense of a higher "low-voltage cut-off" level and shorter standby time.

Other Specifications and Features: Manufacturers' product literature and

data sheets generally include information on: stability of inverter frequency (which varies from manufacturer to manufacturer); the number of batteries required/used—two, three or four; and the percent of efficiency of operation. It should be noted that a high efficiency of operation fails to benefit the user if the unit has poor output voltage regulation. Benefits of higher efficiency and/or increased number of batteries must reflect a significant increase

in useable standby time as measured above, to be of any value to the user.

Ability to recover from a brief short-circuit without the necessity of replacing fuses or resetting circuit breakers is a useful feature and a boon to maintenance technicians. Similarly, capability to limit short-circuit currents to a level that will not be harmful to amplifier power-passing coils and the coaxial cable, is most desirable. **C-ED**

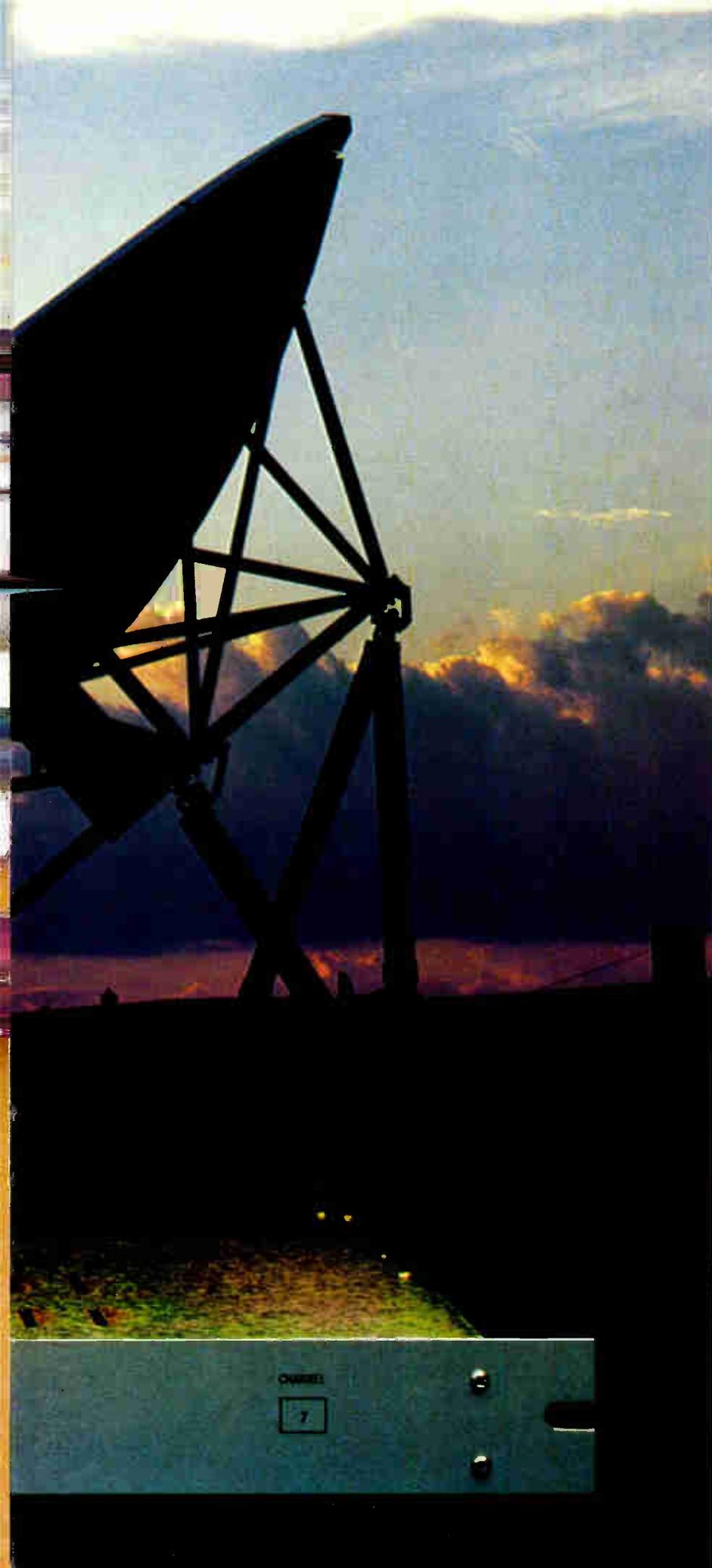




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Buying A Video Production Studio

by William E. Lucas,
Video Consultant, Salt Lake City, Utah.

Editor's Note: William E. Lucas is a video consultant and chief video engineer for TV Specialists, Inc., Salt Lake City. He has designed, installed, and maintained many studios throughout the western U.S. His current activities include consulting special modifications, designing installations, and training personnel. He also heads up a video maintenance department.

The impact of video production for distributing information within the organization is becoming ever more a viable means to gain impact, improve comprehension, and keep an ongoing outflux of ideas.

There are many questions that need to be asked when buying a production studio. This report addresses those questions in the interest of helping you decide what is needed to do your job.

What Type of End Product is Required for Distribution?

The number of copies being made becomes important when choosing your tape format. Large amounts of capital are spent in tape, tape players, and duplicating machines.

If only one to five copies are required, then all formats are good. It becomes a matter of what quality and market you are shooting for (broadcast, inner office memorandum, small audiences).

If large audiences are targeted, then ½" tape offers the most for your money. Since ½" is already represented in the consumer home, it offers the lowest investment in tape, tape players, and duplicating machine costs. However, ½" is not a good format in which to produce.

Acceptable End Product Quality?

Broadcasters don't like "color under" type of VTRs. The ½" and ¾" fall into this category. They prefer the "direct" type, the 1" and 2." Everyone wants the best quality possible, so it comes down to how big your budget is. However, you should not be discouraged by the color under formats. They are very effective in obtaining quality video if good production practices are followed.

Location of Viewing Audiences?

If you have to carry your means to play your program to different locations, then you'd better buy a light, small video player. The half-inch format is by far the best choice for this application. If the tape is being used between existing studios, then the format chosen for best quality is used.

How Experienced is the Production Staff?

If you are new to the business, then careful selection of your dealer is wise in order to get good sales and technical assistance. This is particularly true if there will not be a full time technician working on the production staff. Good technical assistance *will be needed*.

A good dealer is of utmost importance to insure that you will be advised on current market conditions. The video market is moving so rapidly that all purchasing of equipment must be reevaluated on a six-month basis, to prevent paying more than necessary or buying obsolete equipment.

What Technical Assistant will be Needed?

Good service assistance on all equipment purchased must be guaranteed to keep all investments working. You may find that the good deal you got was not such a good deal when it takes three months to get the unit fixed.

All video tape recorders require ongoing maintenance to keep their performance at maximum level. All non-mechanical equipment requires periodic alignment to maximize performance. All cords require ongoing inspection to ward off inconvenient failures during production. Ongoing training on good production and post production practices for proper setup is needed to maximize the end tape quality.

What Tape Format to Go With?

The two most important areas affecting the end picture quality are the camera and the video tape recorder. Therefore, choose your recording format with great consideration.

All prices quoted are approximate.

Two-inch video tape recorders have been the work-horse of the broadcast industry. They offer the best picture quality. Presently, the industry is moving away from this format since the introduction of the new 1" VTRs. These machines require the most expensive tape on the market, around \$125 per 60 minutes. They need much room, a staff of technicians, and pneumatics, (Vacuum Air). The cost of a fully equipped 2" VTR is \$125,000. Because of the move away from the 2" in the industry, I do not suggest consideration of this format.

Type C one-inch is the new "in" format to go with if the budget allows. Studio and field versions are available. The one-inch format records the video information in the "direct" method. This means that the color and luminance are directly put on the tape as they are received. Less video processing is necessary with this format, and less is better when it comes to video.

With the necessary option of the time base corrector in the player, excellent video is reproduced. Multiple generations as far down as seven are possible with good results. Any broadcast house will be happy to accept a program recorded on this format.

Tape costs are \$60 per 60 minutes. The studio version is \$75,000 and the portable without a TBC is \$45,000. This type of VTR should be purchased in systems specifically aimed at the broadcast market or where an investment in excess of \$300,000 is available.

Three-quarter inch tape is the most widely used format in the industrial area. If you are spending less than \$300,000, this is the format to choose. Studio and field versions are available.

The ¾" format records the video information in the "color under" method. This means that color is converted to a lower frequency and added back to the luminance (B&W) to allow for slower, smaller tape recording.

With the highly suggested option of the time base corrector in the player, excellent video is reproduced. Multiple generations as far down as five are possible with good results. If you watch your perimeters carefully, most broadcast markets will accept programs recorded on this format.

If the player is not being used for editing then the TBC is not necessary. This gives excellent video to an audience for the cost of only the player. If the program material is to be used on a large screen TV, or is being used for low quantity distribution, then go with this format. Also, if mass distribution in the ½" format is going to be used, then ¾" is a good format for producing. This is the way most industrial houses go.

Tape costs are \$30 per 60 minutes. The studio VTRs which can be time base corrected cost between \$3,200 and \$7,500, not including the TBC. The field versions sell for about \$3,200, and the non time base correctable players sell for about \$1,800.

Some studios will buy ¾" without TBCs for their tape players. This is sufficient for small budgeted houses. Obtaining third generation is possible with this format. Unfortunately, the quality is not always the best. Special effects are almost impossible without TBCs.

Half-inch VHS-BETA is the new consumer tape format. It offers the lowest investment for tape and tape recorders on the market. For mass distribution of program material this format should be considered.

The ½" format records the video information in the "color under" method. As explained above, the color is converted to a lower frequency and added back to the luminance (B&W). However, because this has been done to such a great extreme, this format does not lend itself to multiple generation capabilities. About two generations are the limit.

Time base correctors can be used on this format, but it does not seem too practical to spend a minimum of \$7,000 for a TBC to put it on a recorder that costs only \$800 to \$1,400 when you would only pick up one more generation.

Tape costs are \$20 per 120 minutes. There are studio versions for around \$1,500; portable versions, around \$1,200; consumer versions, around \$1,200; and portable, consumer versions, around \$1,000.

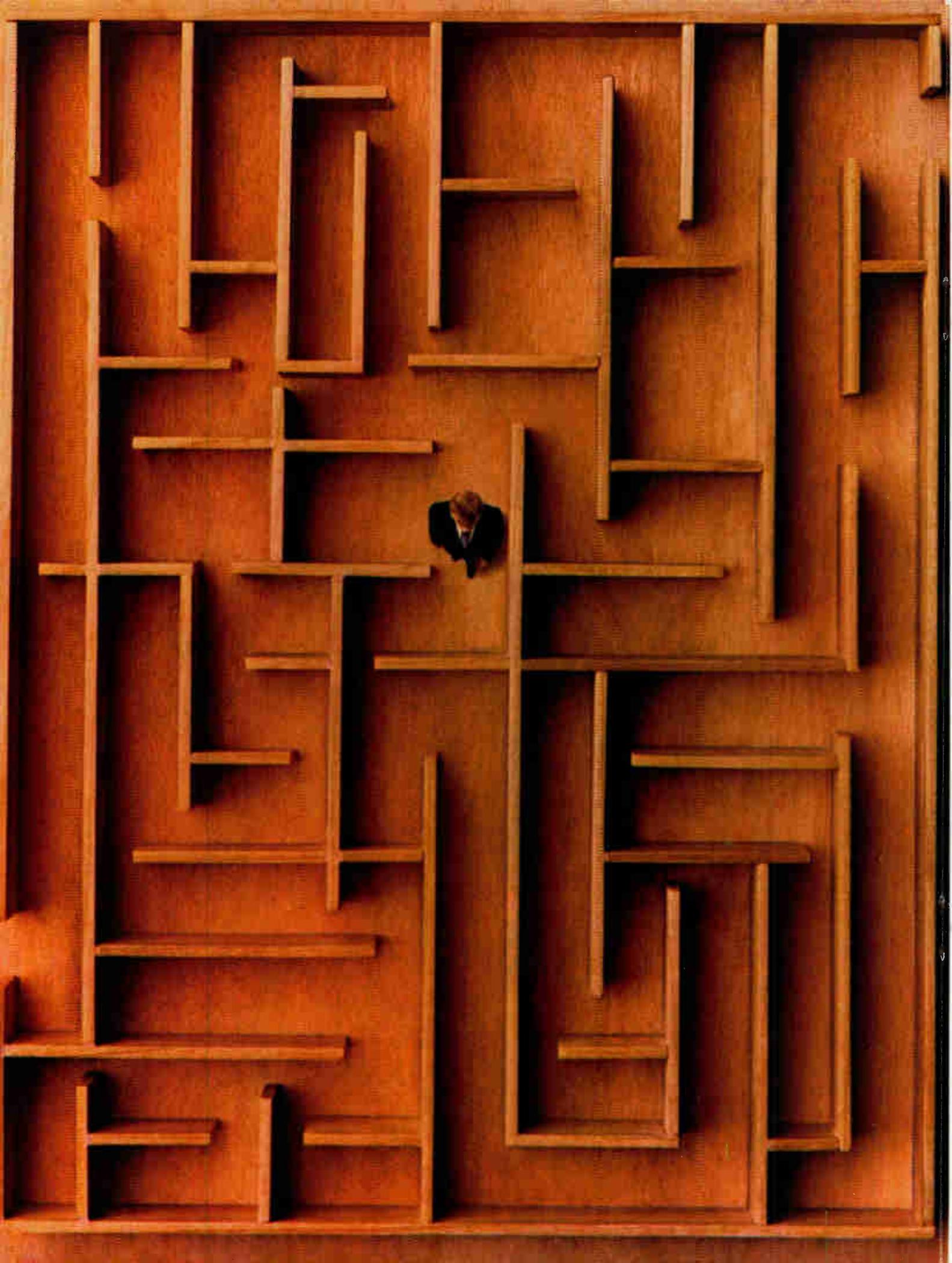
The portable, consumer versions are the lightest, smallest VTRs available, and are good for portable viewing of program material. Because many customers already have these VTRs, you might not need to carry a player around. Also this format allows personnel to take program material home for viewing at their own time.

Color Cameras

The two most important items which will affect the end picture quality are the camera and video tape recorder. Therefore choose your camera with great care.

Three Gun Color Cameras

Three gun color cameras offer the best clarity available on the market. Keep in mind that the better the camera, the better the first tape will be, and the better the end distributed program will be. Money spent on a good camera is not wasted.



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Where Experience is Fact.

You can buy three gun color cameras with a myriad of different types of pickup tubes. SATICONS are good for studio production where there is plenty of lighting available; under these conditions, they offer excellent picture quality. PLUMBICONS are good for multiple-use cameras, where studio and on-location production is a necessity. They offer excellent sensitivity and picture quality. VIDICONS are good for film chains, they tend to hide the grain of film. NEWVICONS are good for low light, and resist burn-in problems.

Three gun color cameras will have many features that will be appreciated after you go into production. Most have Gen-Lock capability, which allows you to sync up to outside sync sources. Color-Bars are good for setup of perimeters. B-G/R-G, is good for registration. Switches valued at plus 6, plus 9 and plus 18dB give you the ability to shoot under existing lighting.

If you are shooting for broadcasters with your production, buy the three gun camera. Also, if your budget allows for an expenditure over \$150,000 you should buy three gun cameras.

Fully equipped three gun color cameras cost between \$10,000 and \$55,000. The lens may cost as much as the camera body. Look for qualified service from your dealer when buying this high quality of a camera, if you don't have a full time technician on your staff.

Two Gun Color Cameras

Two gun color cameras are a second runner-up for color picture clarity. If the money isn't there for 3 gun cameras, then this is a good place to look to.

Two gun color cameras work on the principle of one gun for the luminance channel (green), and one gun for the chroma (color) channel (blue and red), via a color strip filter across this gun.

You can buy two gun color cameras with a number of types of tubes. The same rule goes for two gun cameras as with three gun cameras. Look for the features that match the production conditions that you will be finding yourself under.

Two gun cameras range in the area of \$5,000 to \$18,000.

One Gun Color Cameras

One gun color cameras do well in producing good video pictures. If the budget is low, below \$80,000, then this is where you want to be.

One gun color cameras work on the principle of using strips of color across the tube to tell the difference in colors that are coming into the tube. Because of this, the resolution is not as high as the one or three gun cameras. These cameras have seen the most erosion of pricing in the industry due to the consumer market.

You can buy these cameras with or without low light sensitivity, auto iris, auto zoom, external sync input, built-in color bar generator, or self contained power. You name a price between \$800 to \$5,000 and there is a camera to fill the tag.

Great care must be taken when looking at these inexpensive cameras so as not to purchase a camera that will not perform to your needs.

(Continued on page 40.)

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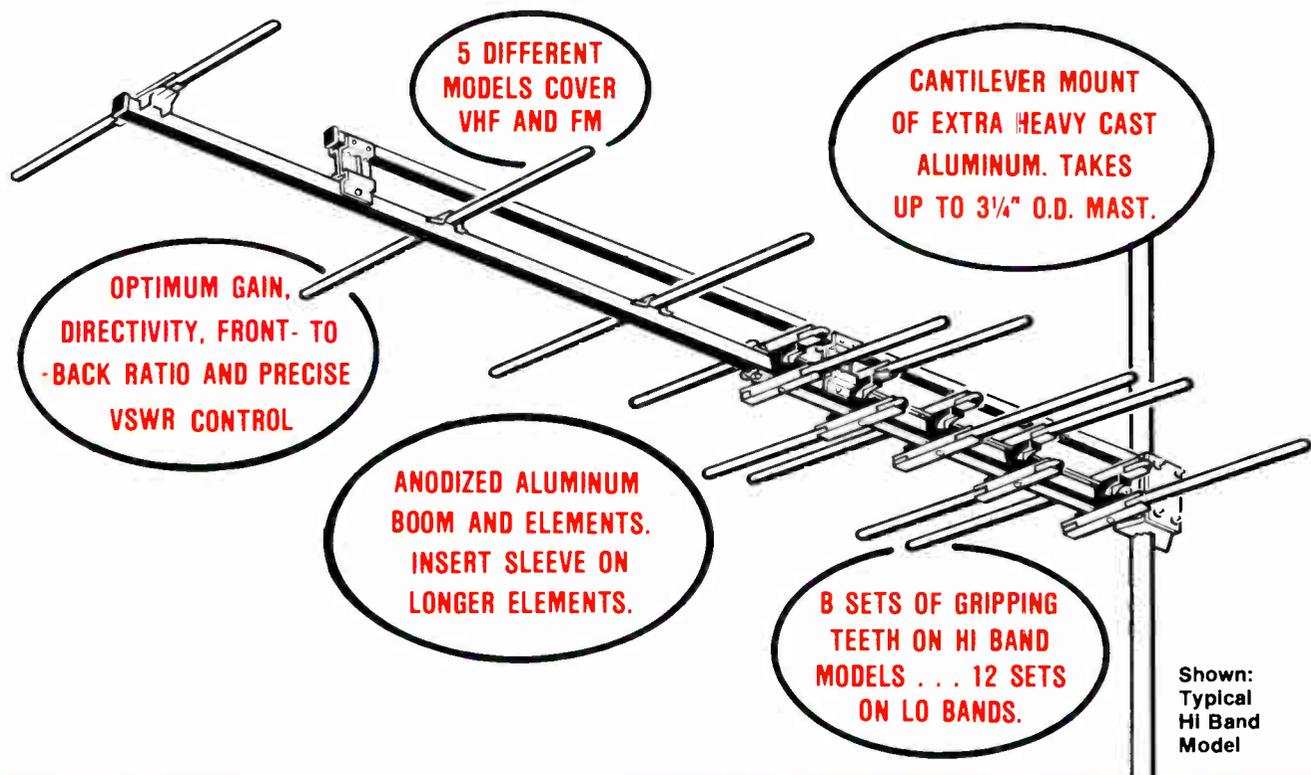
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CATV SYSTEMS, INC.

(Continued from page 36.)

The Production Studio: Special Effects

Will all your mixing of program material be done live? Or will you want to be able to mix tape to tape, or tape to live production? These questions are not important for studios budgeted above \$200,000 but they become extremely important for studios below \$100,000.

To do live mixing from camera to camera, no special equipment past the special effects generator is required. But when you want to add past recorded information from tape then you need time base correctors for each tape source.

Time base correctors range in cost from \$7,000 to \$40,000 depending on the requirements you want from them. Therefore when you want any special effects from tape players past assemble and insert editing, be prepared for the expense of TBCs.

Special effects generators come in many shapes and sizes. The one you want depends on the level of experience you have with them. If your studio is small, then a simple six input basic wipe, fade, and key, SEG will do the job. They cost between \$2,000 and \$4,000.

If you have had some experience in SEGs or anticipate what you want to do with them, then look for features like mat generators, multiple wipe generators, chroma keyers, three bus input selection, down stream effects preview, built-in color generators, and sync generators. These run around \$5,000 to \$20,000.

A word to the wise—look for SEGs that do special effects with non-composite video (no sync). Most strip the sync as soon as it enters the SEG, and this will prevent funny sync from coming out of the SEG when you mix live video with a non time base corrected video tape.

Post production special effects with multiple time base corrected video tape recorders are the easiest to do. With this setup, during production each camera has its own VTR running on it. Then at your leisure you can choose the edits and special effects as the VTRs play back the recorded information. If you don't like something you did, you only need to back up the VTRs and do it again. This is a valuable trick for post production of on-location tapings where you have no control over what is going on.

Post Production Editing of Video Tape Recorders

There are a number of ways to edit tape for post production. The smallest system would assemble edit tape to the desired end product by queuing up each segment and running both the recorder and player, then performing a crash (hopefully vertical interval) edit. This is very slow, inaccurate, and is not suggested for any serious studio production house.

From there you would buy an editing console from the manufacturer of the VTR or special editor from a specialty house. These allow previewing of the edit points, assemble or insert editing. Some with the use of SMPTE time code even use computers that allow you to log in each edit point of the program before the tape is sent moving.

Editing tape consoles range in cost from \$2,000 to \$50,000. What to buy depends on the volume of tape editing and the budget level you have.

Monitors

It is a rule of thumb that you need at least one monitor for each video input and output. It is not necessary to have color

input monitors, but it is nice. The output monitors should be color. It is recommended that the input bus contain a high resolution monitor, an under-scan pulse-cross monitor, and test measurement monitors. The size of the monitor would depend on the distance of viewing and clarity you require. Monitors come in a myriad of sizes, features, and prices.

Black and white monitors come with the following features:

- 3-5" in a rack for \$1000
- 2-9" in a rack for \$700
- 1-14" in a rack for \$400
- 2-9" U.S./P.C. in a rack for \$900

Because there is no Shadow Mask in a B&W TV, all are good for high resolution.

Color monitors come with the following features:

- 3-5" in a rack for \$2,200
- 2-9" in a rack for \$2,500
- 1-12" in a rack for \$1,500
- 1-17" in a rack for \$3,000
- 1-12" High resolution U.S./P.C. for \$4,500
- 1-17" High resolution U.S./P.C. for \$5,500

There are two definite levels of resolution in color monitors. The lower type is restricted to approximately 250 lines of horizontal resolution. The consumer TV is this type. The high resolution color monitor has a special picture tube that allows approximately 400 lines of horizontal resolution.

Time Base Correctors

Time base correctors are required to correct inherent problems that tape recorders have. They are necessary for multiple generation of programs, and are required to sync up a VTR to an external sync source. Any studio of any size must have at least one time base corrector; and preferably one for each video tape player.

Time base correctors correct for velocity error and skew error. Velocity error is caused by the random movement forward or back from the relative reading point where the information is to be read off the tape at any given moment. Skew is the tension of the tape against the video drum assembly. If there is error in tape tension, which there always is, then the head coming into the tape will either be too slow or too fast at the beginning of the tape.

When making copies of programs without TBCs, those errors are added on top of each other to a point where the program is no longer usable due to time base error. The observed effect is a bending at the top of the picture or color distortion.

What features to purchase in the time base corrector depend where it is to be used. If it is being dedicated to a VTR, then minimum features are needed; for example, no video processing. They range around \$8,000 to \$14,000.

If the TBC is being used as the final video processor before mass duplicating, then a good TBC with video enhancement and noise reduction should be used. They range around \$20,000.

If you are looking for stop motion special effects, then a TBC with frame memory is needed. They range around \$35,000.

Titling

Titling can be done by two methods, one is using cards that have been hand designed and are looked at by a camera that is fed into the key input of the SEG. The other method is to purchase a titling typewriter that inserts the letters directly

into the key of the SEG, or inserts on top of the video as it is looped through itself.

Whether you should buy a titling typewriter depends on how much titling you have to do. It is obvious that making cards takes a great deal of time. Which titling typewriter to purchase depends on what features you want. A no frills titler with four pages will cost around \$1,300. A titler with different character sizes and colors will go for around \$5,000 to \$20,000. You may want many pages of memory for on-going titling or common captions that are used again and again. They range in the area of \$10,000 to \$70,000.

Any time more than one person is involved in recording a video production, there is a need for those persons to be able to talk to each other. Each camera person must have communications, each producer and assistant producer, each sound man, and each special effects man must have communications.

Some video equipment has communications built in. All you have to do is plug in a head set. Stand-alone communications are also available. Check your dealer to find how much equipment you have to purchase to get your communications up and running. Head sets cost from \$40 to \$160. Stand-alone systems cost around \$1,000.

Test Equipment: Waveform Monitor

The waveform monitor is an important part of any studio. It should be purchased with the production equipment. With the waveform monitor the important perimeters of video can be checked. A few of concern would be: video level, set up, pedestal, white balance, gama, vertical and horizontal blanking width, helical head switching point, and signal to noise ratio.

If any one of these perimeters go out of tolerance, you will lose the ability to broadcast your production. Even in non-broadcast applications, these tolerances mean the difference between good video and bad video. The equipment cost here is around \$1,800. An oscilloscope may be substituted for low budgeted production houses, however they do require more experience to operate.

Vector Scope

The vector scope is used in color studios to balance the color from multiple color inputs. They will tell the hue, i.e., tint or deferential phase, and saturation, i.e., intensity or deferential gain, of any color input. By matching these perimeters between inputs, when special effects are performed, no noticeable tint or color level shift will be seen. Also the vector scope gives you performance checks on all color inputs. They cost around \$2,700.

Test Signal Generator

The test signal generator is used to pass a known waveform through a video processing piece of equipment. By checking any changes on the waveform monitor or vector scope the performance of that equipment can be verified.

Also when a program is put onto tape it is a good practice to record a known standard at its beginning. This will allow the adjustment of the playback equipment to the same setup that existed during recording. This is most helpful if a different studio than your own is playing your tape.

Test Charts

There is a list of test charts that you will be needing.

1. Resolution Chart. \$50

Necessary for setting up multiple tube camera for registration, aspect ratio, and checking resolution.

2. Chip Chart. \$100

Necessary to check true color reproduction of the color camera. It is read on the vector scope.

3. Log Gray Scale Chart. \$50 (Only good for one year)

Necessary to check gama, color balance, pedestal balance, video gain.

Light Meter

The light meter is an option that any good studio should have. It allows you to check for proper lighting, close up, far away, and from different angles. Proper lighting is a prerequisite for good video taping.

Not purchasing this test equipment or charts will cost you in one way or another. You will have to have someone outside of your production staff come in periodically and check these perimeters. Also between inspections, you will not be aware of drifting tolerances until they go out entirely. This may cost you in unacceptable program material, or programming that just doesn't seem to be going together due to technical problems.

Lighting

Lighting is an art of its own. There's simply not enough room here to discuss this in any detail; it is a subject that requires extensive study. However, I can review equipment requirements.

If you are filming small projects in the field, maybe all you will need is one spot light on top of your camera. These spot lights cost around \$100 for an AC version and \$500 for a portable DC version.

In the studio, the minimum is three lights with six being the best for good coverage. One directly in front, two front of and side to, two side to, and one for back lighting. Light kits cost between \$200 and \$4,000. Don't forget that those light bulbs have short lives, and once they are used they become shock sensitive. So have backups.

What type to buy? I suggest you get two spots and four floods. However, other variations may be more suited to your own particular needs.

You will need a way to suspend those lights. The stands get in the way. You can make a grid out of pipe, using C clamps to move the lights around on. Be sure to allow for switches and access to power source within the configuration. Each 1000 watt light draws 8 amps, and only two lights can be run on a 20 amp circuit breaker. Get the lights off the power line that supplies your studio equipment.

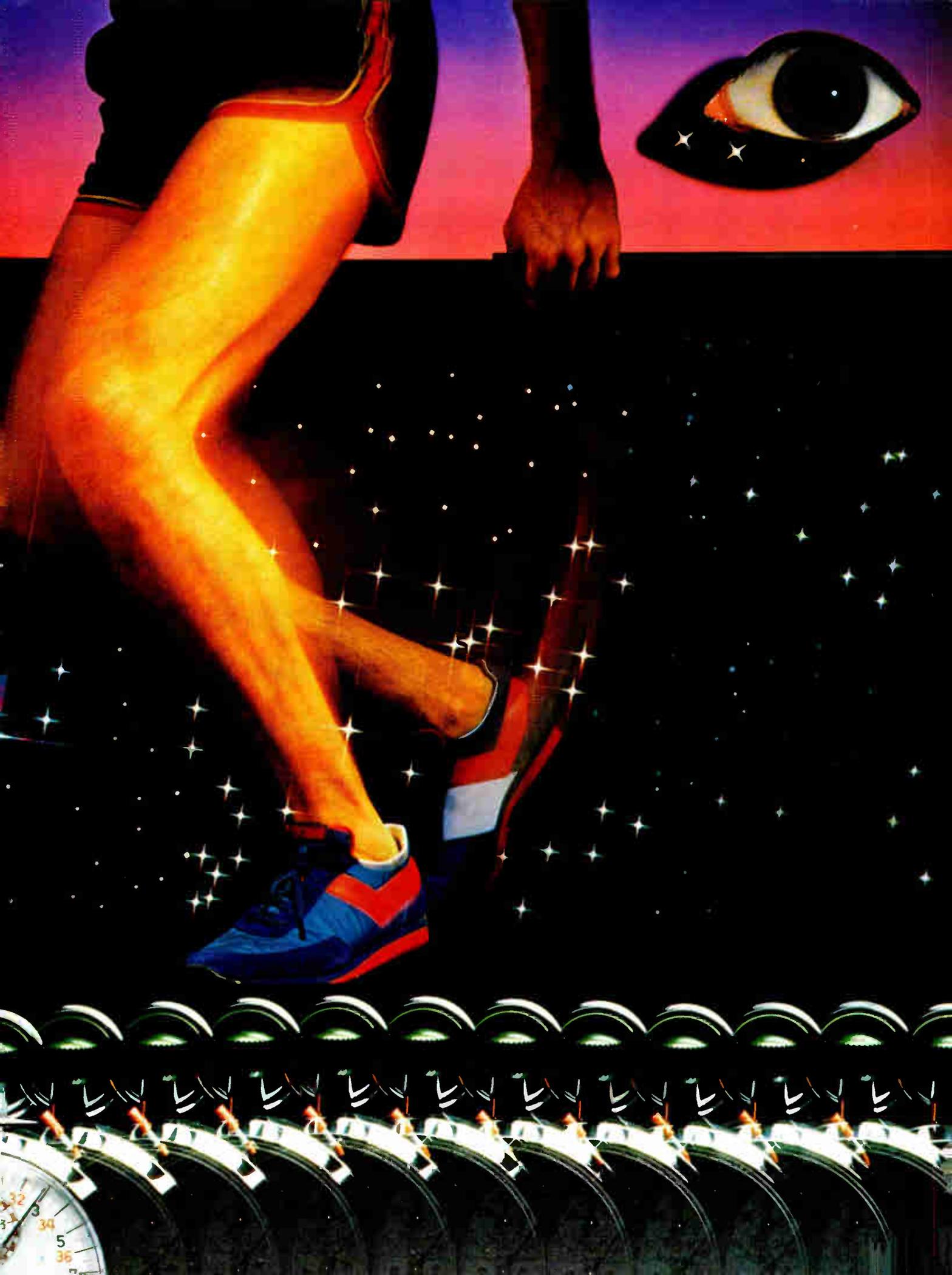
Audio

Audio is always the last thing to be thought of. But you had better take a good look at it too.

There are two major categories of microphones as far as the video production studio is concerned.

The first is the lapel mike. These are very small, and go unnoticed by the viewing audience. They are light enough that double miking right on the person's tie can be done with ease. A large number of these mikes can be carried in a small space. A word of caution: always have fresh spare batteries for these mikes. Cost is \$20 to \$150.

The second type of mike is the hand held. This mike can be attached to many different stands and booms for off hand





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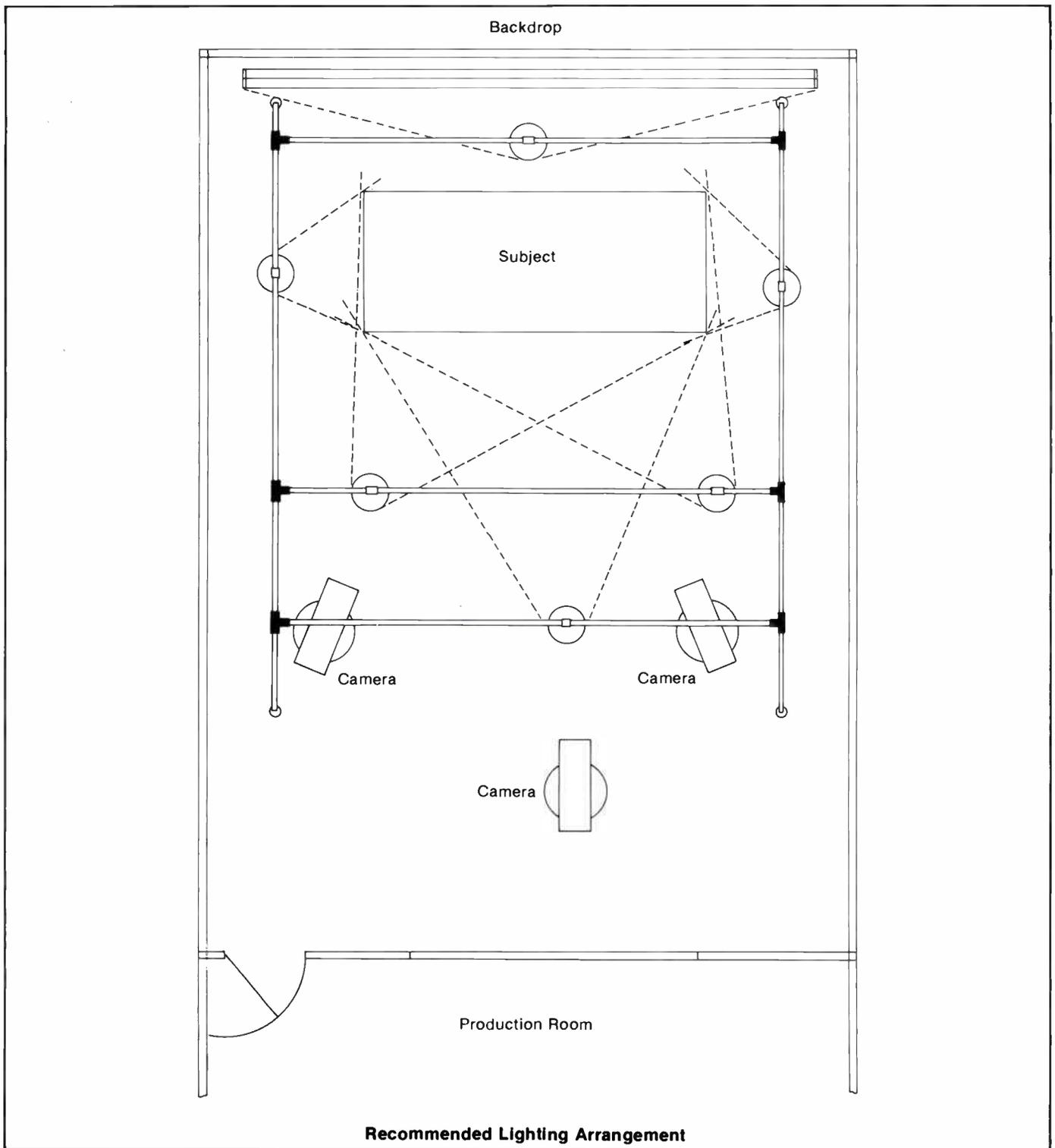
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Recommended Lighting Arrangement

operation. These mikes are used where exchanging of the mike between people is necessary, or where the mike is to be fixed in its location. Basically you use it when you are not putting a lapel mike on the person.

There are over a hundred types of hand held microphones. Which one to buy depends on the application. To go into this selection process I feel is out of the scope of this report. Consult your dealer in this area. Costs of microphones are between \$20 and \$400.

The cabling used may seem not important at first glance, but when you have a connector pulled apart you won't think

so any more. Buy good XLR connectors, and use rubber two conductor shielded cable at all times.

Microphone Mixers

Sound mixing is an art in itself. If you are going to produce a concert, you will need to hire a sound man. If all you are going to be doing is recording small audiences, say one to five people, then go for it on you own.

For a small production studio all that is needed is a mixer that can control each input to a desired level. Some means of viewing those levels will be necessary. One master VU meter

is a bare minimum. It would be better to have a VU meter for each channel. They cost around \$350 to \$500.

If you have ever heard a raspy voice contrast against a mellow one you might want a sound equalization mike mixer. Buy that feature if your budget will allow it. They range from \$1,500 and up to a full blown sound studio.

Don't forget the audio distribution amplifier. Your studio will want audio playback capabilities, your video tape recorders will want audio, your sound-only tape recorder will want audio. When you get into mass duplication each VTR will need its own source of audio. Cost: \$250 per 6 outputs.

Recording a program in the field presents its own problems. Most cameras have the ability to take one mike input, with AGC, Automatic Gain Control. The mike can be attached to the camera for on-the-move tapings or detached via an extension cable for on-camera interviews.

When you need multiple mikes in the field, it becomes a difficult story. Portable VTRs, (3/4" and 1/2") have only one mike input. Some manufacturers offer modifications to the portapack that allow for two mikes to be used. You might look at this option, around \$200.

If you need more than two mikes, or you have one channel tied up for SMPTE time code edit information and need more than one mike, then some type of portable mike mixer will be needed. Portable means battery operated. They cost from \$200 to \$1,500.

Camera Stands

The minimum feature camera stand has a pan and tilt. Stands with only these features have problems in giving a smooth movement, however. An improvement would be a stand with a spring for tilt movement. This spring helps balance the camera for up and down movement, but even with this addition, the motion may be slightly rough or jerky.

The better types of stands work on the principle of smooth movement not dependent on the user. They buffer the movement by fluids, gyros, or just massive counter weights. These types of stands should be purchased whenever affordable.

You should be able to walk away from the stand and see no movement in the position of the camera. Some low-cost stands have a tendency to fall over when the camera shifts forward.

Minimum feature stands cost around \$50 to \$150. Spring stands go for around \$200 to \$300. Fluid stands go for around \$400 to \$2,000. Counter balanced-fluid stands go for \$1,000 to \$10,000.

Closing Comments

The need to choose a good self servicing dealer can not be over-stressed, for it often becomes the most important thing when purchasing a studio system. I have seen dealers sell equipment that they have had for a while knowing it is obsolete and not caring about the purchaser. I have seen good deals go right down the tube when problems occur with a studio system that the dealer doesn't want to service because there wasn't any money included in the sale for after-the-sale service and setup that all studios need.

Get to know your dealer. Be sure that he has full time video technician, not a part time video and some other type of technician, for there is *no* way he can be qualified in this highly technical field. A good rapport between that technician and you may save you precious time and money some day. **C-ED**

Electroline Extra Broad Band Filters

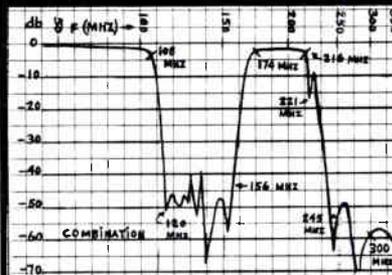
Electroline manufactures a full line of extra-broad-band filters (-60 db for 36 MHz) ideal for

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- ★ EXPANDED CABLE SERVICE
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plus other filters for

- ★ SIGNAL PROCESSING
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- ★ SIGNAL COMBINERS & SEPARATORS

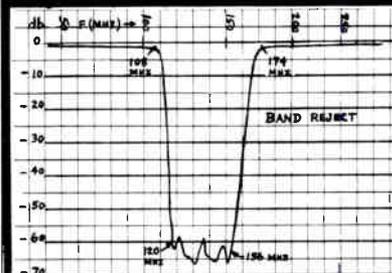
COMBINATION MID & SUPER BAND REJECT FILTER



Typical Insertion Loss

0-100 MHz	0.5 db
108 MHz	1.5 db
120-156 MHz	40.0 db
174-216 MHz	1.8 db
221 MHz	17.0 db
300 MHz	50.0 db

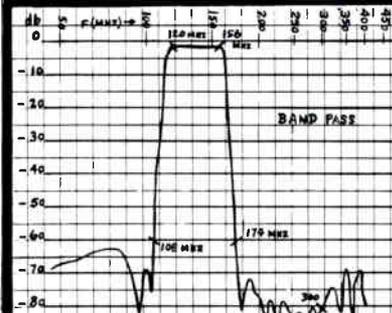
THE BAND REJECT FILTER



Typical Insertion Loss

0-108 MHz	0.5 db
120-156 MHz	58.0 db
174-400 MHz	1.0 db

THE BAND PASS FILTER



Typical Insertion Loss

0-108 MHz	60.0 db
120-156 MHz	1.8 db
174-400 MHz	60.0 db



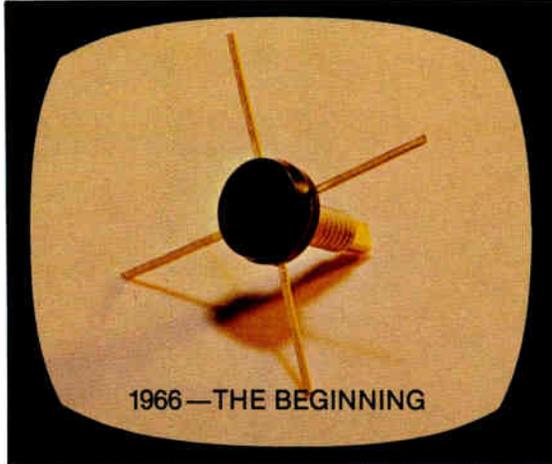
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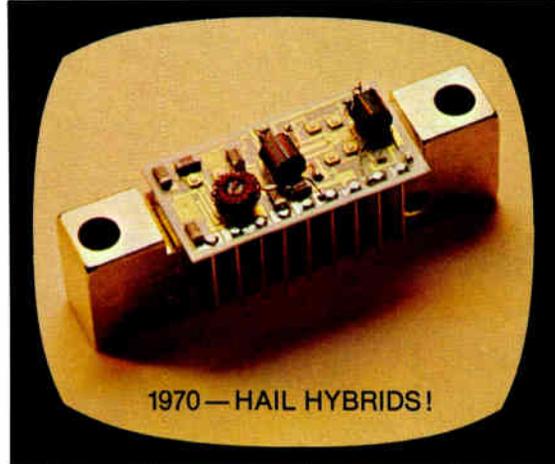
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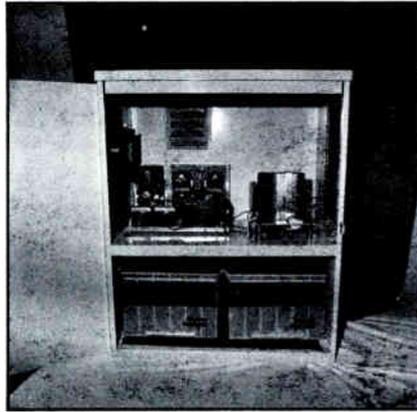
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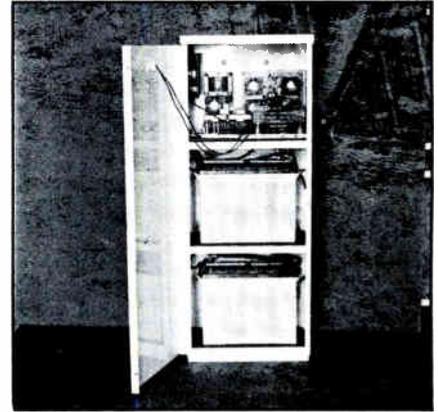
LECTRO PRODUCTS CATV Standby Supply



SV-L-4-60-BC



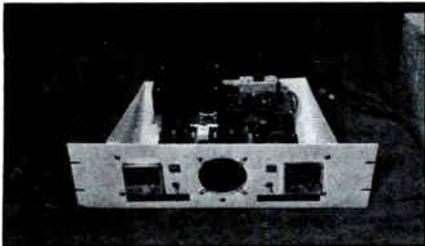
SV-S-4-60-BC



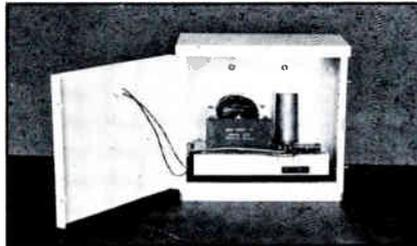
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- Power supply status indicators
- Metered battery voltage and output current
- Surge protection to power transistors, 115V AC input and 30/60V AC output
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Input	95-135VAC, 60 Hz 840W
Output	14A @ 30 or 60VAC
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Efficiency	90% full load
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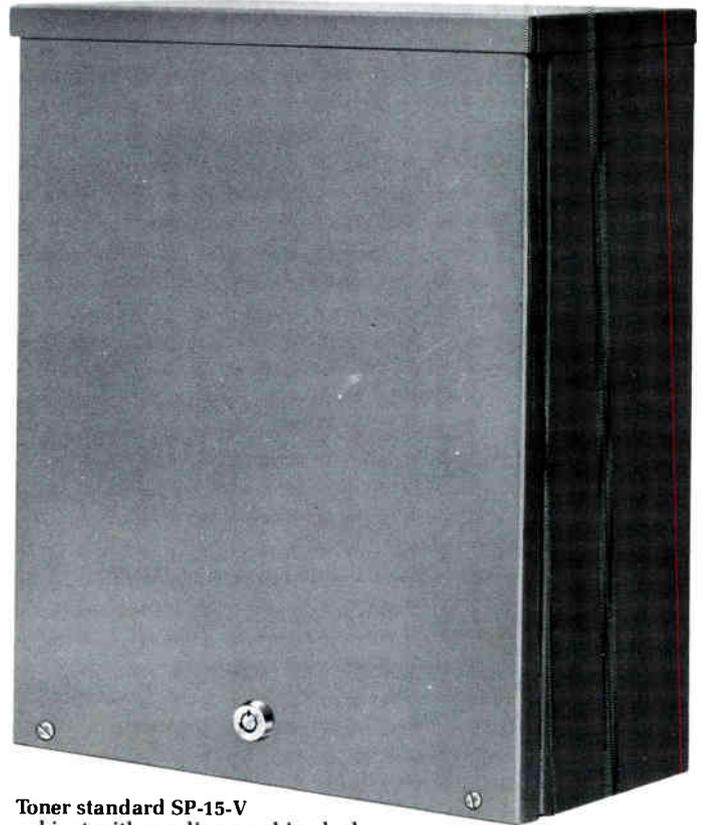
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Toner standard SP-15-V cabinet with vending machine lock.

Here's one of our best sellers: The SP-15-V—15" x 12" x 6" shown with vending machine lock.

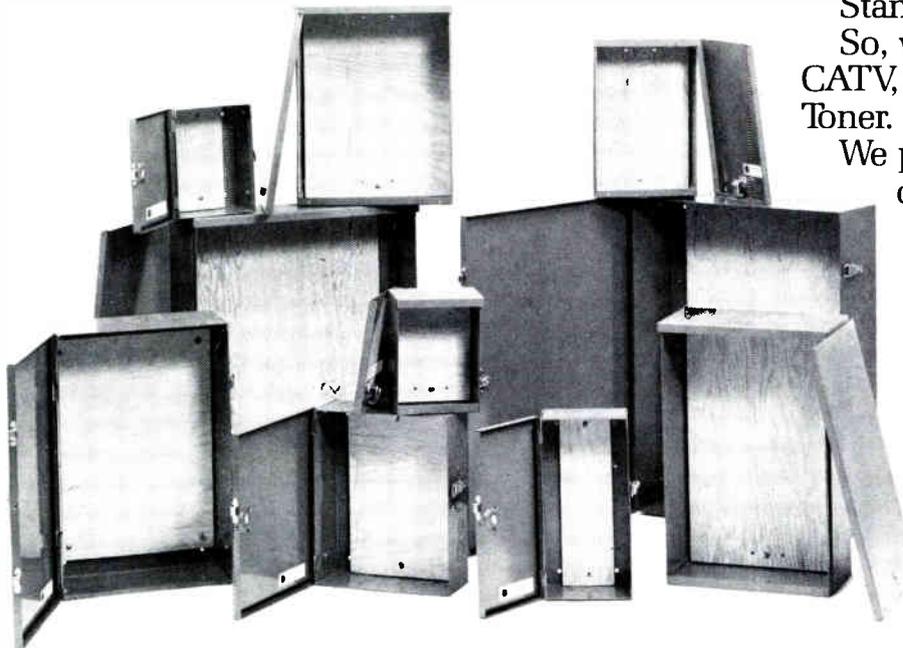
Has a 3/8" plywood backboard, as all Toner cabinets do.

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Cable Programming for April

Signal	Day	Start/Stop	Alert Tones	Satellite/ Transponders	Signal	Day	Start/Stop	Alert Tones	Satellite/ Transponders	
C-SPAN (times approximate) Mondays 9:00 a.m. to 6:00 p.m. Tuesdays 10:30 a.m. to 6:00 p.m. Wednesdays 9:30 a.m. to 6:00 p.m.			195' /#	F1, #9	Modern Talking Pictures		12 pm-5 pm (weekdays) 7 am-12 pm (weekends)	048' /#	F1, #22	
			Thursdays 9:30 a.m. to 6:00 p.m. Fridays 10:30 a.m. to 5:00 p.m.		Newstime		24 hrs.	276' /#	F1, #6	
CBN		24 hrs.	No	F1, #8	Nickelodeon		10 am-11 pm (weekdays) 9 am-11 pm (weekends)	749' /#	F1, #11	
ESPN Monday thru Thursday 6:00 p.m. to 4:00 a.m. Friday, 6:30 p.m., to following Monday, 4:00 a.m.				F1, #7	PTL		24 hrs.	No	F1, #2	
Front Row		2:30 pm-2:30 am	481' /#	E,C F1, #12 P,M F1, #10	Reuters		4:00 a.m. to 7:00 p.m. Monday thru Friday	No	F1, #18	
HBO	1	6:00 pm- 1:50 am	Program	F1, #24	SPN		429' /# auto switch to commercial, 10 pm-8 pm on/off respectively		F1, #21	
	2	5:30 pm- 1:19 am	729' /#	F1, #22	(Mon.-Sat.)		517# end SPN, begin HTN			
	3	5:30 pm- 1:02 am	Scramble	F1, #23	24 hrs. (Sun.)		517' end HTN, begin SPN			
	4	5:30 pm- 1:27 am	835' /#	F1, #20	Showtime	1	3:30 pm- 2:30 am	576' /#††	E, C, F1, #12; P, M, F1,	
	5	3:00 pm- 1:29 am	Duplication			2	2:45 pm- 2:25 am			
	6	2:30 pm- 1:19 am	940' /#			3	3:30 pm- 3:30 am			
	7	6:00 pm- 1:57 am	Take-2 E.			4	3:30 pm- 2:30 am			
	8	5:00 pm- 1:00 am	592' /#			5	12:45 pm- 2:49 am			
	9	5:00 pm- 1:20 am	Take 2 W.			6	1:00 pm- 2:14 am			
	10	6:30 pm-12:58 am	681' /#			7	3:30 pm- 2:30 am			
	11	6:00 pm- 2:34 am				8	3:30 pm- 3:30 am			
	12	12:30 pm- 1:00 am				9	3:15 pm- 3:00 am			
	13	11:30 pm- 1:33 am				10	3:00 pm- 3:01 am			
	14	5:30 pm- 1:30 am				11	3:30 pm- 3:00 am			
	15	5:30 pm- 1:02 am				12	1:15 pm- 2:27 am			
	16	6:00 pm-12:58 am				13	1:00 pm- 3:00 am			
	17	6:30 pm- 1:50 am				14	3:30 pm- 2:25 am			
	18	6:00 pm- 1:25 am				15	3:30 pm- 3:00 am			
	19	3:30 pm-12:49 am				16	3:15 pm- 2:57 am			
	20	2:30 pm- 1:27 am				17	3:30 pm- 2:11 am			
	21	6:00 pm- 1:55 am				18	3:00 pm- 3:27 am			
	22	5:00 pm- 1:21 am				19	12:45 pm- 2:55 am			
	23	5:00 pm- 1:41 am				20	1:30 pm- 2:30 am			
	24	5:30 pm- 2:44 am				21	3:30 pm- 2:38 am			
	25	5:30 pm- 1:29 am				22	3:30 pm- 3:30 am			
	26	3:30 pm- 2:13 am				23	3:15 pm- 3:47 am			
	27	2:30 pm- 1:58 am				24	3:30 pm- 3:08 am			
	28	6:30 pm- 1:28 am				25	3:30 pm- 3:00 am			
	29	5:00 pm-12:45 am				26	1:15 pm- 3:21 am			
	30	5:00 pm- 1:30 am				27	1:30 pm- 3:02 am			
						28	3:30 pm- 3:13 am			
						29	3:30 pm- 2:41 am			
						30	3:15 pm- 3:11 am			
HTN		8 pm-10 (11) pm	517' /#	F1, #21	SIN		9:00 a.m.—1:30 a.m. (Weekdays) 11:00 a.m.—1:30 a.m. (Saturday) 9:00 a.m.—11:15 p.m. (Sunday) April 27th 24 hrs.	No	Westar II #6	
KPIX (time permitting)		2-4 hrs. per day	No	F1, #1	Star Channel		9:30 am-2 20 am	311' /#E. 519' /#W.	F1, #5	
KTVU		7 am-1 am (weekdays) 7 am-4 am (weekends)	No	F1, #1	Trinity (KTBN)		24 hrs.	No	F1, #14	
MSG Sports			438' /#†	F1, #9	WGN		5:42 am-3 (3:30) am (Mon.-Thurs.) 24 hrs. Sat. & Sun. Ends 3 am on Sun.	No	F1, #3	
Due to the nature of NBA and NHL playoff scheduling, MSG is unable to give exact on/off times in advance. Operators are advised to monitor the Monday night scheduling segment from 6:00 to 6:30 EST, and proceed on a day-to-day basis.					WOR		24 hrs.		F1, #17	
					WTBS		24 hrs.	No		F1, #6

E = eastern
C = central
M = mountain
P = pacific

All program times are listed for the eastern time zone, unless otherwise noted.

† Commercial substitution 601' /#; Thurs. baseball 706' /#.
†† On-line 679' /#; off-line 753' /#; access 843' /#.

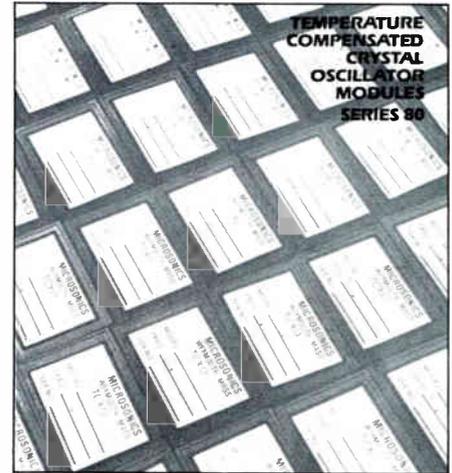
Temperature Compensated Crystal Oscillators

A detailed brochure that describes a line of temperature compensated crystal oscillator modules is being offered by Microsonics of Weymouth, Massachusetts.

The Microsonics Brochure of Temperature Compensated Crystal Oscillator Modules, Series 80 provides complete specifications on TCXO modules in commercial and MIL-SPEC grades with frequencies from 250 KHz to 60 MHz and ten temperature stability options.

The six-page fully illustrated Microsonics Brochure includes information and graphs describing the theory of operation of TCXO modules. A description of applications is also provided.

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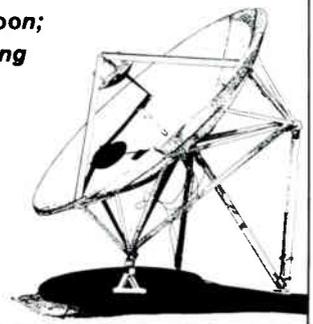


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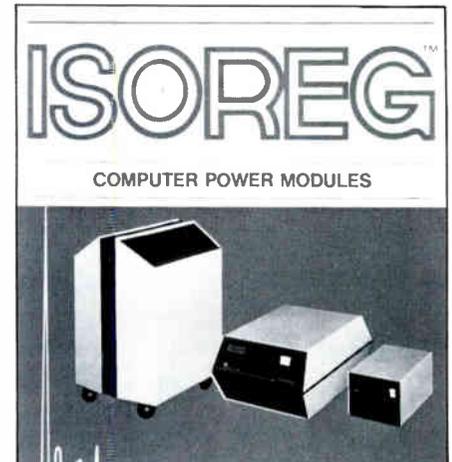
Voltage Regulating and Isolating Devices Described in Catalog

A catalog describing voltage regulating and isolating devices for use in computers, instrumentation, process controls, and communication equipment is being offered by Frequency Technology, Inc., TDC Division, of Littleton, Massachusetts.

The Frequency Technology ISOREG™ Computer Modules Catalog describes voltage isolating and regulating devices that eliminate garbling and destruction of computer data by irregularities on the supply line. It lists more than 70 models with ratings from 250 VA to 25 KVA single phase and from 7.5 to 75 KVA three phase. Also described are models for 50 Hz power systems.

The 26-page catalog is fully illustrated with photos, graphs, and performance curves. Details are provided on numerous unique features, including regulation bandwidth of -25 percent to +15 percent of normal, protection against extreme fluctuations, and noise filtering capabilities.

The Frequency Technology ISOREG™ Computer Modules Catalog is available free from Frequency Technology, Inc., TDC Division, 410 Great Road, Littleton, Massachusetts 01460.



Technical Education Catalog

Comprehensive catalog describes a complete curriculum of technical short courses providing extensive hands-on experience for engineers, scientists, technicians and engineering managers. The package contains information on scheduled courses throughout the United States and Europe covering such topics as: Microprocessor Software and Interfacing; PASCAL Programming; Distributed Processing; Computer Communications; Interactive Computer Graphics; Digital Image Processing; Structured Programming and Voice I/O for Computers. Integrated Computer Systems, Inc., 3304 Pico Blvd., P.O. Box 5339, Santa Monica, California 90405, (213) 450-2060 or TWX 910-343-6965.

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CANADA THRU: Electroline TV Equipment, Montreal, Quebec

Become a Consultant

A six page brochure describes the contents of the "How to Become a Successful Consultant" kit written by Dr. Steven Tomczak, President of S.T. & A., a Los Angeles engineering consulting firm. Six manuals, two cassette tapes and a set of Consultant Update reports show an engineer how to start or expand his own consulting practice. A very strong emphasis is placed on how to get new prospects and clients for an engineering consulting practice. For example, one tape contains conversations between a consultant and potential clients demonstrating how to get new accounts. A second tape is on the legal aspects of consulting. The report titles are: How To Get Prospects; How to Turn Prospects Into Clients; Making the Decision: Sole Proprietorship, Partnership, Corporation; Negotiations and Fee Determination; Tax Savings for Consultants; Twenty Start-Up Projects to Do in Your Spare Time. \$39.95, S.T. & A., P.O. Box 480530, Los Angeles, CA 90048.

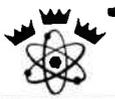
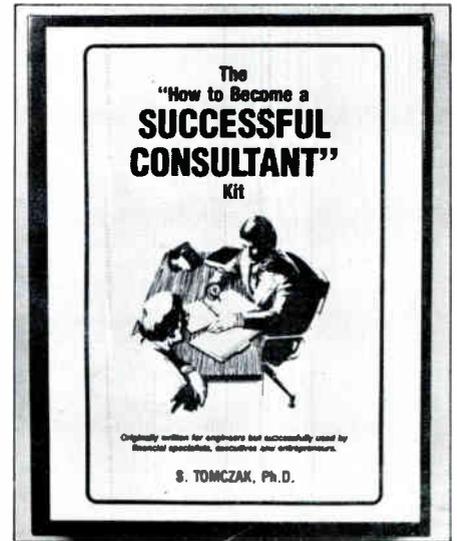
An Introduction to Digital Integrated Communication Systems

324 pp., 200 diagrams, January 1980, casebound, 216 x 135mm, ISBN 0 906048 14 By H. Inose, University of Tokyo.

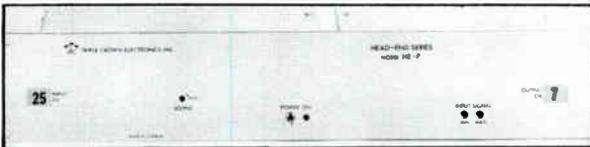
Today, the digital art provides a substantial and growing amount of both transmission and switching, and it is clear that in the long run digital communication will supplant both analogue transmission and analogue space division switching.

Professor Inose's own invention of time slot interchange has been essential to this triumph of the digital art. Now, through support derived from the Marconi International Award, which he received in 1976, he has written a book that clearly presents the philosophy and techniques of digital communication and illustrates these with examples of actual and projected standards and systems.

The book explains clearly the overall impact of a single digital art that is replacing the formerly different and divergent arts of transmission and switching. It explains in detail all of the key features of digital communication,



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In both its appearance and utility, this drop box is ideal for the professional who offers quality cable installation. The long life model DB46, made of galvanized steel, has easy entrance access at top or bottom and also allows outside access for individual control. The weatherproof 4" x 4" x 6" box comes complete with mounting screws, 3/8" backboard, and locking hasp and is economically priced at only \$5.75.

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including switching and transmission, and tells how these features have a place or are embodied both in standards and in particular systems in many countries.

The author has worked closely in the field of communication for many years. He is now director of the Computer Centre at the University of Tokyo, having previously gained experience with American communication through spending various periods at Bell Telephone Laboratories.

Caterpillar Package Generator Sets

Caterpillar Package Generator Sets provide "Plug-In Electric Power," according to this new direct mail piece. Placed on any reasonably level surface, the units can begin delivering trouble-free power as soon as the power lines are connected. Available in sizes from 50 kW to 500 kW at either 50 Hz or 60 Hz, these package generator sets are designed to provide on-the-job performance as soon as they are received. To see some of the applications for these Cat Generator Sets, ask your Caterpillar Dealer for a copy of Form LEDX1619.

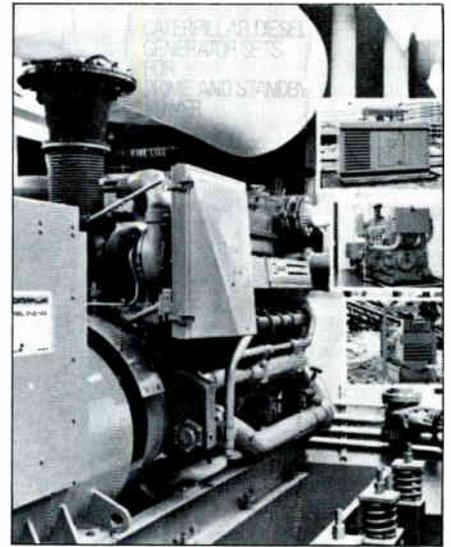
Philips Test & Measuring Instruments, Inc. Announces Availability of 1980 Catalog

Philips Test & Measuring Instruments, Inc. (PTMI) has announced the availability of a comprehensive new catalog which contains information, technical specifications and illustrations of all current Philips products marketed by PTMI in the United States and Canada. The catalog is available free-of-charge.

The listing groups products by category for reader convenience. These include: oscilloscopes, counters and counter/timers, pulse generators, as well as the company's new logic analyzer and logic scope.

In addition, the extensive list of PTMI sales offices and service locations in the United States and Canada, and an international listing of Philips sales and service centers is included.

To receive a free copy of the catalog, write to: Philips Test & Measuring Instruments, 85 McKee Drive, Mahaw, New Jersey 07430



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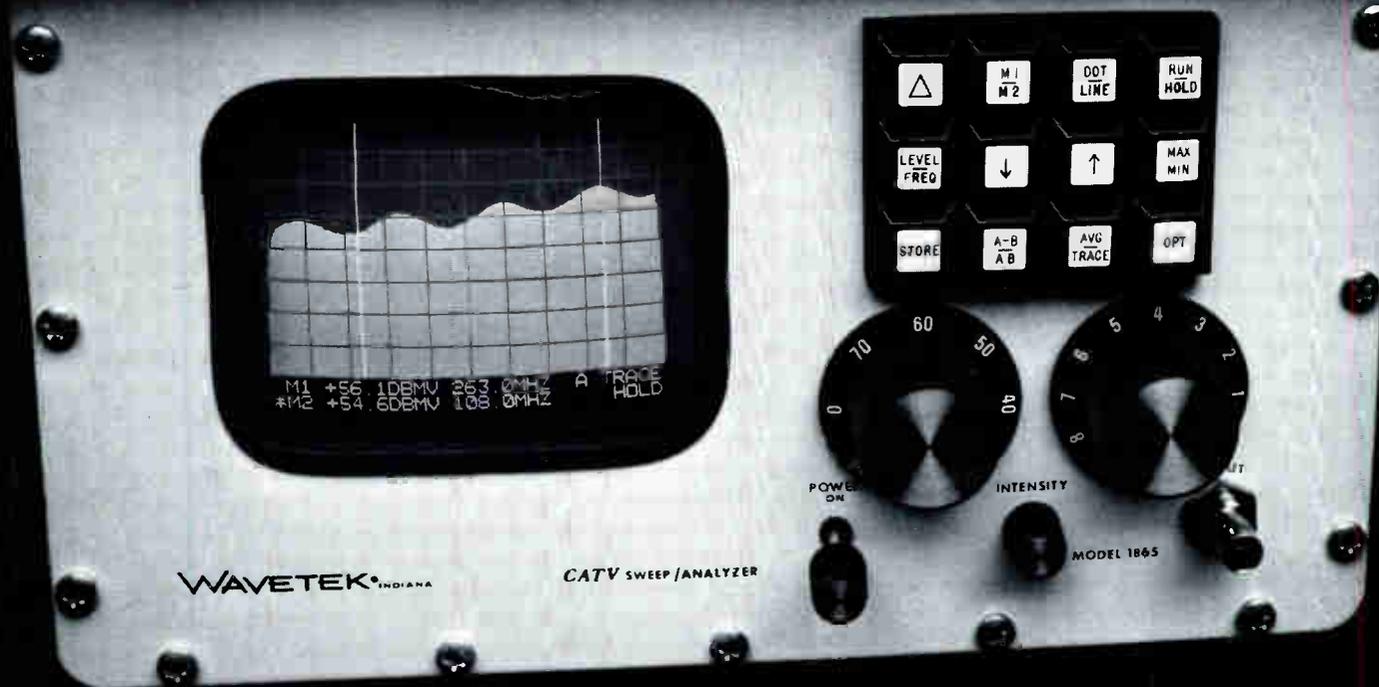


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**We predict this new program
will sweep the nation.**



It's the Model 1855/65 Sweep, Recovery System, an action-packed display of Wavetek ingenuity and microprocessor precision.

Here's the plot: You hand one of these to your system technician, then watch how fast it sets up, how accurately it

portrays your system performance, how easily he can balance your trunk.

What will the home viewers think? They won't see a thing, thanks to the unique combination of high speed (down to 1 millisecond) and low level. However, they'll probably notice a steady improvement in your signal. The star of the show is our microprocessor control. It takes care of most of the setup that used to take so long. Digital signal processing lets the display continuously refresh itself for a bright, accurate



picture of the most recent sweep. There's a future option planned for storing the display on magnetic cards or tape. Sweep this fall, rerun next summer.

Alpha-numeric readouts on the screen give amplitude, frequency, even deviation

between peak to valley. You haven't seen anything this easy to understand since Sesame Street. The price of the basic Model 1855/65 is \$6450. How's that for a happy ending?

To carry this (no copyright) program on your system, call toll-free 800-428-4424; in Indiana, call collect (317) 783-3221, CATV Dept., Wavetek Indiana, P.O. Box 190, 66 North First Ave., Beech Grove, IN 46107.

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subcarrier demodulators, modulation format and IF bandwidth variations. For more information, contact Harris Satellite Communications Division, Antenna Operations, P.O. Box 1277, Kilgore, Texas 75662, (214) 984-0555.

Miscellaneous

Texscan Theta-Com Converter

The Texscan Theta-Com CATV Division announces a new MDS down converter Model TDC-1. The TDC-1 features a choice of VHF output frequencies channels 2-6.

The unit is designed for close range installations and features crystal controlled frequency stability, single side band image corrected noise figure of 8 dB, gain of 17 dB, and a convenient antenna orientation test point.

The down converter is powered by Model TCSDC power supply. The TCSDC power supply employs a UL approved Class II transformer and

features automatic shut off in case of excessive current drain. The automatic shut off system employs an LED fault indicator to warn the installer or customer of the excessive current condition. The power supply automatically resets after the fault is removed.

Price and Delivery: \$59.50 for commitments of 5,000 pieces or more. The price includes both the TDC-1 down converter, the TCSDC power supply and all mounting hardware. Demonstration units are available upon request. Orders are being taken now for delivery in May, 1980.

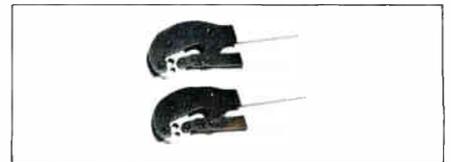
Cable Equipment

Cable Prep Tools Improved

The Ripley Company Communication Tools Division has made a number of improvements in its line of Cablematic cable preparation tools. The Dielectric Coring tool series CCT-

2412, CCT-2500, CCT-2750, CCT-2875 and CCT-21000, are now all supplied with a "T" handle for ease of handling and are designed to be used on all foam dielectric cables including the new improved low loss 3rd generation gas injected dielectric. The cable preparation tool SST-A for stripping most foam-poly cable has also been improved to handle all 3rd generation low loss cable with tools available for cable sizes .412, .500, .750, and 1000. The SLM stripping tool for sealmetic cable has been improved to cover both the old 8 mil cable and the new 12 mil cable.

A new updated catalog is now available. For complete information, contact the Ripley Co., 46 Nooks Hill Rd., Cromwell, Connecticut 06416, (203) 635-2200.



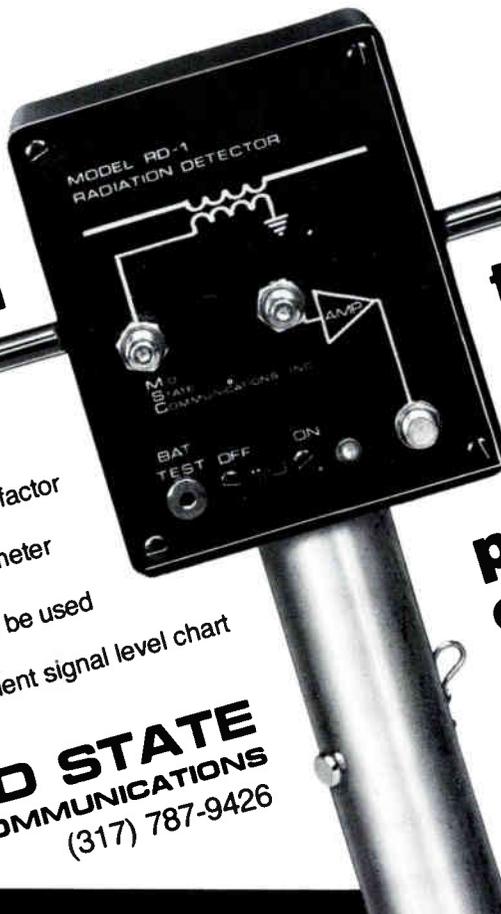
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CATV Recruiters

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Chief Technician

Chief Technician for fast growing Cable Television System in Rhode Island. Must have FCC first class license or equivalent and be familiar with all aspects of signal processing, A.M.L., earth station, L.O. and cable technology. Managerial possibilities open to person with proper qualifications willing to relocate to area. Excellent fringe benefits. Send resume to Chief Tech, P.O. Box J, Lee, MA 01238.

Immediate Openings Available
for Bench Technicians experienced in repairing all types of electronic equipment used in the cable television industry. Contact:

Cablevision Equipment Company
3838 Cavalier
Garland, Texas 75042
(214) 272-8551

Quality Control Technicians

UA—Columbia has immediate openings for Quality Control Technicians in the San Antonio, Texas system. These unique positions monitor and test all technical performance of the San Angelo system; a progressive 35-channel fully two-way system employing dual TVROS, 9-hub AML and eventual 3,200 miles of distribution plant. Quality Control Technicians operate independently from the system technical personnel and management - reporting all results directly to UA-Columbia headquarters. Accordingly, applicants must have strong technical skills in CATV testing and maintenance and due to minimal direct supervision, must be self-starters and highly responsible. Salary commensurate with experience and background. Send resume or contact: Bob Luff, V.P. Engineering, UA-Columbia Cablevision, 26 W. Concho, San Angelo, TX 76903, (915) 655-0634.

Help Wanted

Communications Engineer

Excellent opportunity with a new firm specializing in two-way information services via cable for individual having five years technical experience.

Challenging and innovative work involves cable, earth stations and microwave design and implementation with state-of-the-art application.

Ability to apply technical analysis in the development of new cable services is a must. Salary open. Contact: Communications Technology Management, Inc. 6861 Elm Street McLean, Virginia 22101

United Cable Television Corporation

CONSTRUCTION SUPERVISOR

-Immediate Openings-



Experienced people needed to coordinate construction activities at various systems. Among job duties are:

- 1) Working with utility companies on pole arrangements.
 - 2) Keeping construction work on schedule.
- Salary commensurate with ability. Please send resume to:

United Cable Television Corporation
ATTN: P. McDonough
7995 F. Prentice Ave.
Englewood, CO 80111
(303) 779-5999

THE COMPANY

Cable Atlanta, Inc. is a new company which was formed to provide cable television services to the City of Atlanta and parts of Fulton and Dekalb Counties, Georgia.

The company's ownership is a combination of an experienced cable operator and local Atlanta citizens. This ownership structure will enhance the company's stated and strong orientation toward customer service and community involvement.

DIRECTOR OF ENGINEERING

THE JOB:

The Director of Engineering will be responsible for the technical operation of the cable TV system which includes responsibility for the direction of 60 employees in four functional areas.

The effective performance of the Engineering Department is vital to the provision of excellent customer service and the Director of Engineering will have that as his/her paramount objective.

Manpower planning, training, and utilization will be the foundation of the day to day operation. The Director of Engineering will be expected to continually monitor and modify the procedures and methods being used in the Engineering Departments to ensure the best quality service to the subscribers at the lowest possible cost.

THE CANDIDATE:

The successful candidate will possess an engineering degree and a wide range of experience in cable television or an allied field. He/she will have the ability to balance day to day operations and requirements with long term planning and development. Compensation will be commensurate with qualifications.

Noel Bambrough, President
Cable Atlanta, Inc.
National Bank of Georgia Building
34 Peachtree St., NW
Atlanta, Georgia 30303

Cable Atlanta, Inc. is an equal opportunity employer



Micro Constructors, Inc.
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Expanding construction contractor, presently doing turnkey operations, in need of experienced Supervisors and a Project Manager. Salary - Vacation - Insurance - Co. Vehicle - T/E - Hospitalization - OTHERS. Only experienced need apply! Send resume or call Personnel Dept. (614) 283-2076.

CABLE TELEVISION TECHNICIANS NEEDED IN COLORADO'S FINEST SKI RESORT & OUTDOOR AREAS.

Must be EXPERIENCED, can-do quality-oriented field technician who can accept a rapid growth opportunity with excellent pay and benefits.

Send resume and salary history to:
 R.E. (Gene) Cornwell
 Regional Manager
 Summitt Cablevision
 100 Granite St., P.O. Box 299
 Frisco, Colorado 80443



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Help Wanted

Help wanted: CATV construction personnel needed immediately. Openings in all phases of construction. Top wages. Send resume in confidence to or call: Gest, Inc.
 4028 S. 36th St.
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 (602) 268-8821

EXPERIENCED CATV PERSONNEL

Mountain States Video, Inc., a joint venture of United Cable Television and Daniels & Associates, is in the process of building an 1800+ mile system in the Denver Metro area. We are now seeking qualified personnel for the following positions.

- Construction Supervisors
- Chief Technicians
- Bench Technicians
- Trunk Technicians

For further information and interview consideration, please contact Roy Gienger, Project Manager, at 5200 S. Quebec, Suite 303, Englewood, Colorado 80111, or telephone (303) 771-5895.

Director of Engineering

Recent promotions have created vacancy in midwest region of rapidly growing MSO. Require experience in system maintenance, headend and satellite equipment. Current plant covers 250 miles with additional 180 miles of new construction. Salary commensurate with experience. Call (313) 481-0510 and ask for Mr. R.E. Duncan, or send resume in confidence to:

216 E. Michigan
 Ypsilanti, Michigan 48197
 Attn: R.E. Duncan

Chief Engineer

UA-Columbia Cablevision is seeking a Chief Engineer with strong management skills for its San Antonio system. The system is a progressive 35-channel/fully two-way dual trunk-single feeder, employing dual TVROs, 9-hub AML and eventual 3,200 miles of distribution plant. This is an excellent opportunity for an experienced Chief Engineer desiring to move into a challenging engineering/management position with a major MSO. Salary commensurate with experience and background. We are an Equal Opportunity Employer. Please send resume or contact Bob Luff, V.P. Engineering, UA-Columbia Cablevision, 26 W. Concho, San Angelo, TX 76903, (915) 655-0634.

SENIOR TECHNICIANS (CATV)

Two Positions Available

Must have 3-5 years cable experience. Salary range (April 1):

- \$16,560-18,259, no 1st or 2nd class license
- \$17,056-18,805 with 1st or 2nd class license

Qualified applicants phone collect:
 Bob Wilson
 UA-Columbia Cablevision of Texas, Inc.
 (512) 222-9912

Or, send resume to:
 Director of Personnel
 415 North Main Avenue
 San Antonio, Texas 78205

UACC is an Equal Opportunity Employer

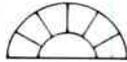
CATV Corporate Engineer

Growth oriented Texas based MSO is seeking an experienced CATV technician to perform a variety of technical duties. Applicant must be experienced in headend maintenance and have a first class FCC license. This is a staff position reporting to the Vice President of Engineering. Excellent salary and benefits, limited travel. Send resume or call: Bob Carter, Vice President/Engineering Southern Cablevision Corporation
 P.O. Drawer TV
 Bryan, TX 77801
 713-846-4704

Help Wanted

Chief technician needed by Dynamic Cablevision located in the suburban Pittsburgh area with 11,500 subscribers. Part of a fast-growing MSO. Experience necessary. Full range of benefits including health, life insurance, retirement plan and tuition refund program, vacation and paid holidays. Call (412) 461-2804.

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Sonic Cable TV, an expanding independent cable TV company located on the beautiful central California coast, has the following opportunities:

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- Design Engineer with a minimum of two years recent experience in design of two-way systems plus rebuilds.

Company offers excellent fringe benefits and salary. Interested applicants should send resumes in confidence to:

General Manager
Sonic Cable TV
P.O. Box 1205

San Luis Obispo, CA 93406

Sonic Cable TV is an Equal Opportunity Employer

Equipment for Sale

1300 - TOCOM Playmate Converter - Descrambler, Model DCF 1002T - H2 and I-1. These converters range in age from 90 days to 1-1/2 years. We ship guaranteed clean and in good condition. \$16.00 each and we pay freight. Also 1-TOCOM MOD PTV-s CH-I Scrambler. CONTACT:

Bill Little,
Franklin Cablevision
915-562-4291
Ft. Bliss, TX.

FOR SALE

1974 F-350 Ford Truck with Lift-Off aerial bucket Model 10-28-BPF with 2.5 KW Onan electric start generator. For more information, call (315) 252-7563.

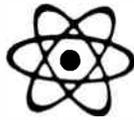
Surplus Cable

Thirteen miles of Times.750 underground trunk. Immediate delivery. Contact Lenard Ford Jackson Cable TV, Inc. (504) 641-8422

For Sale

Ditch Witch R40 trencher with backhoe and plow. Like new. Call (614) 685-2597, Bylesville Cable Co.

Business Directory



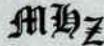
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CLASSIFIED RATES AND INFORMATION

Effective April 1, 1980, classified rates for CableVision and C-ED will be \$40 per column inch, non-commissionable and payable in advance by check, money order, Master Charge or VISA. There will be a billing charge of \$2 additional for those ads not paid in advance.

Ads needing special attention (screens, photos, etc.) will be 10% additional. Add \$2 for blind box numbers to cover processing and mailing.

For further information, please contact Patty Kay at (303) 573-1433.

★ Jim Smith, Vice President of National CATV Sales for **TOCOM, Inc.**, has announced the promotion of **Sid Prothro** to Sales Manager for TOCOM Systems, CATV Market.

In his new capacity, Prothro is responsible for the marketing and sales management of TOCOM's Two-Way Security and Communications Systems to CATV operations throughout the United States.



Sid Prothro

★ **Michael Peyton** and **Cecil W. (Jack) Riley** have been hired as satellite and microwave project engineers by **United Video, Inc.**, it was announced by Tom Keenze, United manager of operations and engineering.

Peyton was an internal auditor and business development officer for the Woodland Bank of Tulsa from 1978 until he joined United. He was graduated Magna Cum Laude with a Bachelor of Business degree in accounting from Chaminade Catholic University of Honolulu, Hawaii in 1978.

A career U.S. Navy officer, Peyton joined the service in 1958 where he began his training and career in electronic engineering. He was site manager for the Navy's largest satellite facility in Hawaii and area operations management officer for the largest communications station in the world from 1974 to 1978. He was graduated with distinction from Officers' Candidate School and was awarded the Outstanding Performances Award by the Defense Communications Agency in 1978.

Riley was a regional technician for the Tulsa Division of Televised Instruction for the Oklahoma State Regents for Higher Education from 1977 until

joining United. He was responsible for the operation and maintenance of numerous microwave stations, broadcast stations and studios, and 20 television receiving locations.

Riley joined the Air Force in 1956 and obtained his electronic engineering training and collegiate education while in the service. He retired from the Air Force in 1977 after working with various communications equipment at sites around the world.

★ A reorganization of the field sales management staff of **TRW Electronic Components Group** has been announced by Steve O'Connor, Vice President, Sales for TRW/ECG.

"The reorganization is designed to meet the changing needs of the marketplace and to more effectively utilize a number of the highly competent people within the organization as well as to improve TRW's current high level of customer service," Mr. O'Connor stated. "It also positions us for the sales and organizational growth we anticipate in the coming years," he added.

Frank Cavalier is appointed Manager, Direct Sales and will have responsibility for direction and supervision of the TRW direct sales offices in the U.S. Approximately one-third of the 50 TRW domestic sales offices are company operated.



Frank Cavalier

James Feijoo is appointed Manager, Rep Sales and will have an equivalent responsibility for the 34 TRW sales representatives' offices and their activities. More than half of the TRW/ECG domestic sales are generated by these sales representatives.

Dom DeLorenzis has been appointed Manager, Distribution, suc-

ceeding Mr. Feijoo and will have broad responsibilities in the supervision and direction of the TRW/ECG distributor network. These will include distributor appointments, terminations, policy planning and implementation, forecasting and the establishment of sales quotas. In addition, he will interface between the field sales offices and the distributor marketing management of the TRW divisions.



James Feijoo

"All three men have had a long association with TRW and are extremely familiar with our markets and our products," Mr. O'Connor stated.

Frank Cavalier, has been with TRW for 15 years, most recently as Manager, Southern Region, a position he took upon his return to the U.S. after successfully completing a four-year assignment as European Sales Manager.

James Feijoo, formerly Manager, Distribution for the TRW/ECG field sales organization has been with TRW since 1969 in various marketing management positions. His previous affiliations included Dickson Electronics, Sprague Electric and Bendix Corporation.

Dom DeLorenzis was Manager, Distribution Planning for TRW/ECG for the past five years and has more than 15 years experience in distributor marketing. Before joining TRW he held distributor management positions with Bourns, Burndy and Cannon.

★ **John R. Paulbick** has joined **Valtec Corporation**, Communication Fiber-optics, as an application engineer, it was announced by Richard A. Cerny, director of marketing. Paulbick will define and coordinate the application of turnkey fiberoptic telecom-

munications systems to customer requirements.

Bringing a solid engineering background in telecommunications to Valtec, Paulbick worked for Central Telephone Company (CENTEL) of Nevada for the past 10 years. Most recently he was the CENTEL fiberoptic project engineer on the installation of Valtec's 4.2 kilometer fiberoptic link between the MGM Grand Hotel and CENTEL's central office. The link, installed in 1977 for demonstration purposes, is functional today carrying PABX trunking. Paulbick monitored

and maintained the link for the past two years.

While at CENTEL, Paulbick also held positions as technical support engineer-network switching, transmission engineer, switching engineer, radio and data engineer, and T-carrier engineer.

In making the announcement, Cerny noted that "Mr. Paulbick's extensive experience in telecommunications will be a valuable asset to Valtec. The telecommunications market now represents the fastest growing application for our fiberoptic cables and

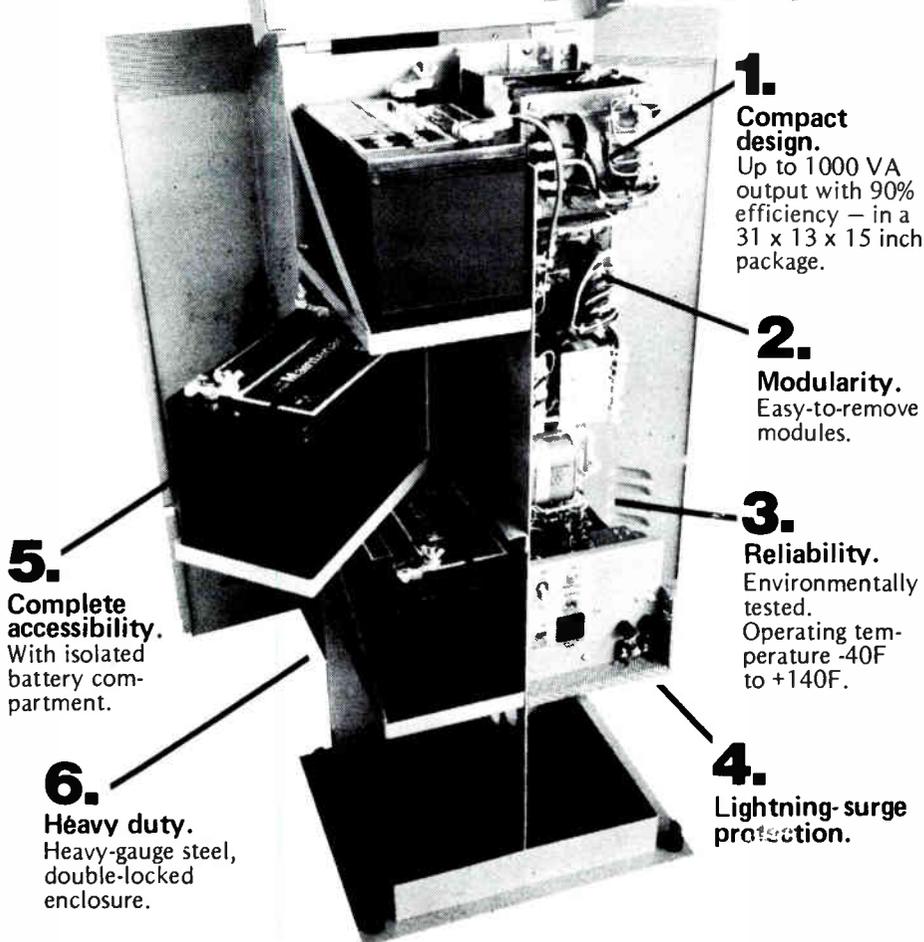
systems."

Paulbick has relocated from Las Vegas to Holden, MA with his wife Diane and their four children.



John R. Paulbick

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★ Mr. D. Atha, president of **Delta-Benco-Cascade Ltd.** of Rexdale, Ontario, Canada, announces the promotion of **Zygmunt C. Zara, M.Sc. P.Eng.** to the position of chief engineer.

Mr. Zara has experience gained in telecommunications, radar and CATV systems in Europe, Asia, Australasia and North America. He was previously manager of CATV distribution products at DBC.

In addition, DBC has announced the promotion of **Mr. Alan Sobryan** to the position of manager of technical services. Mr. Sobryan will be responsible for system planning and technical field services.

★ **Jim Stafford** has recently been promoted to the position of vice president of operations for **CableData** of Sacramento, California. He joined the company in the spring of 1979 as director of operations.

Stafford's extensive background in the cable industry includes six years as operations manager and division manager for ATC in Denver. At Cable Data his responsibilities will include the timely production and distribution of bills and management reports for the 750 cable systems they serve.

★ **Magnavox CATV Systems, Inc.**, Manlius, New York has appointed **Richard A. Schrader** to the new position of manager of human resources. He is responsible for plant personnel recruiting, training and facilities safety. In addition, he is assisting wage and salary administration.

Schrader is a graduate of Broome Community College, Binghamton, New York. Prior to joining Magnavox CATV, he was associated with Bunker Ramo, Singer Link Division and McIntosh Laboratory.

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