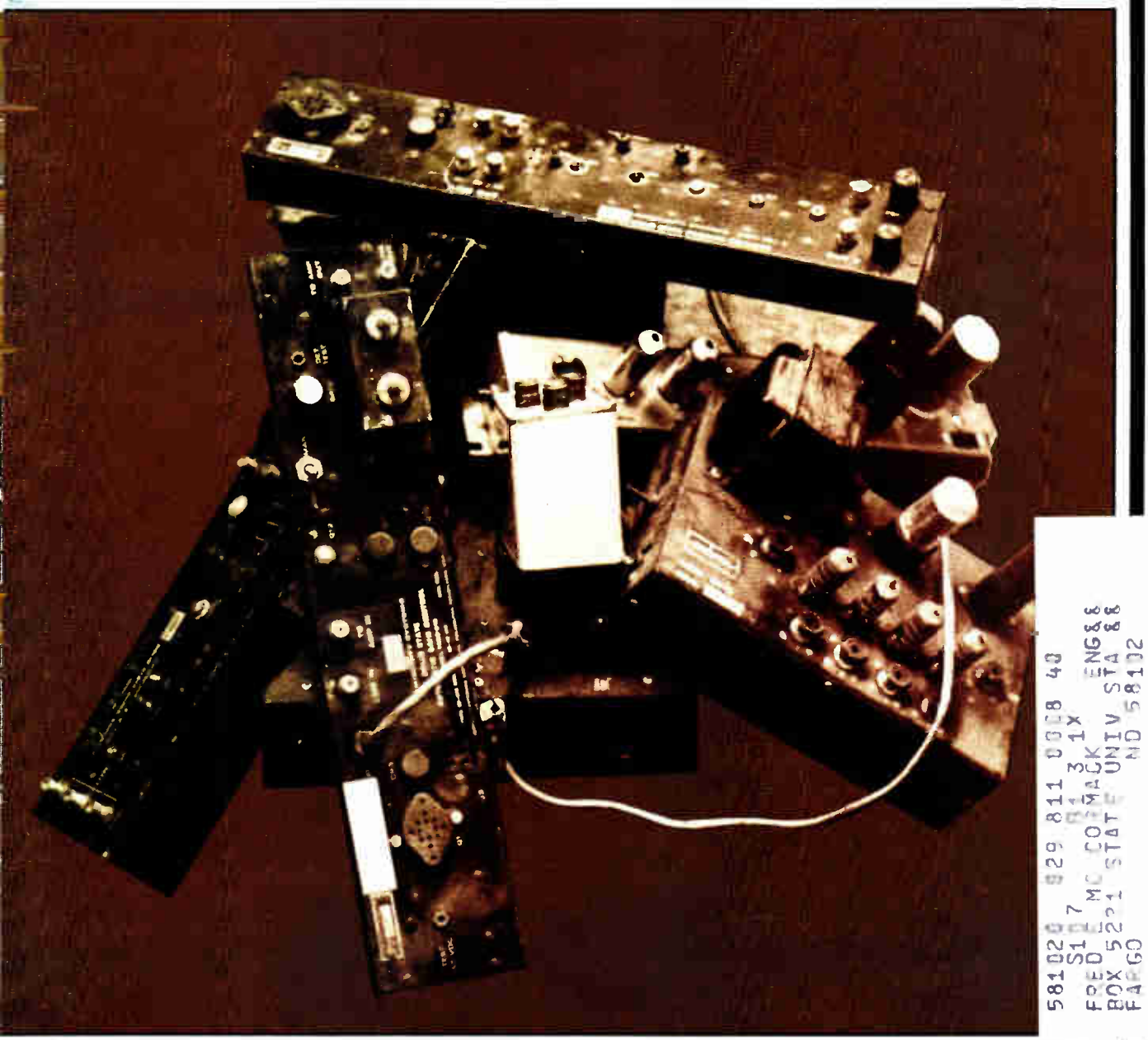
C-ED

Special Convention Issue
30-Year Cable Scrapbook

PLUS—
Aerial Signal Leakage
NCTA Engineering VP Ken Gunter Interview



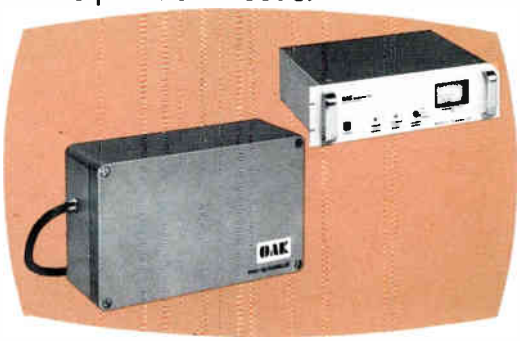
Communications-Engineering Digest
Reporting the Technologies of Broadband Communications

May 1978
Volume 4, No. 5

OAK PRESENTS THE MINI-CODE NEWS

Oak CATV Division has announced the new Mini-Code—an effective and economical answer to CATV and MDS premium needs.

This technologically advanced decoder, offered in set-top or wall-mount format, works in your existing 12-channel or MDS system.



Use it in tandem with the Oak Mini-Scrambler, at a remote site, or with the Mark II Scrambler at the head-end.

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C-ED News at a Glance

WASHINGTON, D.C.—**Jack Benton**, a nationally-recognized expert on electronic fund transfers **will deliver** the **keynote address** on the technical program **at Cable '78** in New Orleans. See *C-ED* page 18.

WASHINGTON, D.C.—The **FCC will hold** an oral **panel discussion** on May 10 **regarding** the **UHF noise figure on television set receivers.** An organization called the Council for UHF Broadcasting (CUB) has been petitioning the commission to require lower noise figures on UHF tuners. Comments must be received by May 5.

WASHINGTON, D.C.—On May 19, the **first meeting on cable system leakage is scheduled with** the **FCC, FAA and** concerned **cable** industry personnel. The order of business will be primarily to define the individual cooperative roles each party will assume.

NEW YORK, NEW YORK—"Wholesale review and revision of the Communications Act is the wrong way to go about things" stated John Murphy, the number two Democrat on the House communications subcommittee. **Murphy and Van Deerlin break on Rewrite**. See C-*ED* page 18.

WASHINGTON, D.C.—A **meeting of** the **NCTA subcommittee on videocassette standards and good engineering practices will convene during** the NCTA **convention.** See C-*ED* page 19.

WASHINGTON, D.C.—**"Significantly viewed" network affiliated stations are no longer assured absolute protection** under the nonduplication rules. This action came as a result of an action at a recent open meeting of the Federal Communications Commission. See *C-ED* page 18.

WASHINGTON, D.C.—The **NAB maintains** a **study confirms** that **local television stations would lose viewers if cable systems were not restricted** in importing distant signals. The study, conducted by Wharton, EPA, Inc. of Philadelphia was filed with the FCC on March 15. The NAB also said the on-going study will show that audience loss would lead to reduced revenues and subsequent reduction of the stations' ability to serve the public. See *C-ED* page 19.

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Page 32

Page 46

Page 50

FEATURES

DEPARTMENTS

OPINION

Cover: Our convention cover portends the thrust of this year's NCTA convention in New Orleans. See page 46 for more cable nostalgia.

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Editor's Letter

Welcome to this special edition of *C-ED*. Special, because it's our NCTA convention issue. This year's show marks the 30th anniversary of cable, and to commemorate it, *C-ED* put together "A Cable Scrapbook" for our readers. We went back and looked at old files and pictures. Pictures of cable equipment artifacts whose inventors long ago probably never even dreamed of satellite technology or fiberoptics and laser beams. We found in various archives photos of cable's early pioneers without whom we most likely would still be the captive audience of broadcasting's limited over-the-air channel capacity. Please find this nostalgic look at cable on page 46.

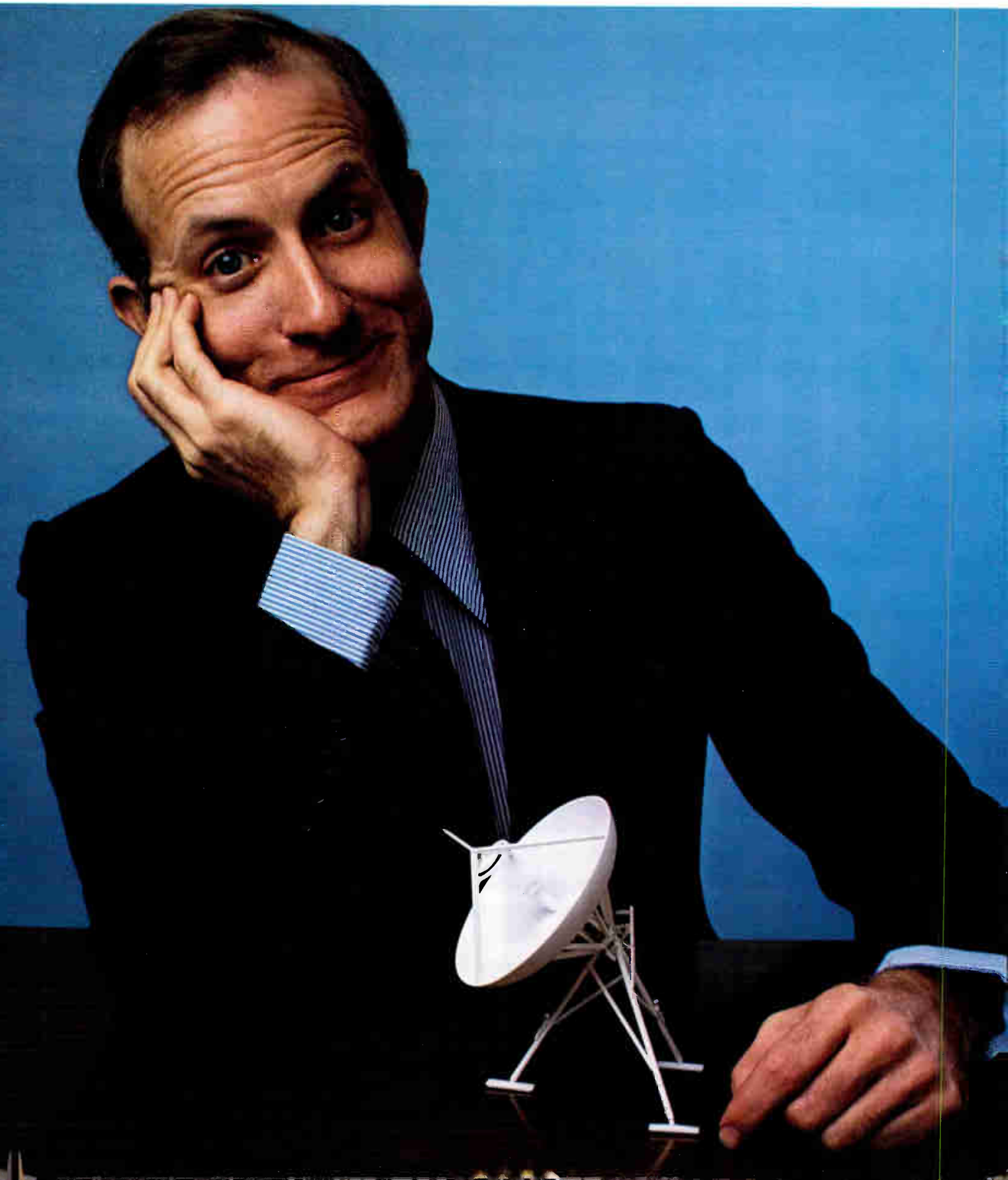
We wrapped this pictorial look at the past around the present—with an exclusive *C-ED* interview with NCTA engineering chairman Ken Gunter. The executive vice president of UA-Columbia Cablevision talks frankly about the problems engineers face and the hopeful prospects of future technology. You'll find Mr. Gunter on page 50.

From the past and present, *C-ED* has some very interesting reading on future developments. Like Colorado Video's slo-scan that will be used for UPI's *Newstime*, which is scheduled for launch July 3. Also, Part II of Digitial Communications' paper on putting two video channels on a single transponder concludes this issue. You'll find both stories on pages 30 and 26, respectively.

Finally, a word of congratulations to SCTE president Bob Bilodeau and HBO's Bob Tenton for their selection as this year's recipients of the NCTA's top engineering awards. Naturally, we confess a little bias about Bob . . . Bilodeau, that is. And knowing of Bob Tenton's outstanding work, well, we just couldn't be more delighted.

Paul A. FitzPatrick

HBO DOES SOMETHING ELSE TO



GET YOU AN EARTH STATION!

Too often, the job of building your own earth station can turn into a time-consuming burdensome task of technical, legal and financial forms.

That's why Home Box Office has developed an Earth Station Application Service to speed up your system's entry into satellite pay cable.

With the help of the top technical specialists in the field we can cut through the red tape and get your earth station into operation.

SOMETHING ELSE FOR TECHNICAL INFORMATION

Upon approval from you, we will initiate the frequency coordination process with a leading communications engineering firm.

Your site information will be confirmed. Interference studies initiated. And the calculations of your earth station's performance provided. If you haven't yet selected your equipment, we will provide performance factors for various configurations to assist you in making that selection.

Upon completion, the results will be sent where you direct.

SOMETHING ELSE FOR LEGAL ASSISTANCE

If you don't have FCC legal counsel, we can recommend one. Acting as your counsel, they will prepare all the applications and associated exhibits which will be forwarded to you for your review and signature.

Then the signed application will be submitted to the FCC. HBO will monitor the progress of the application and do everything possible to expedite its approval. If you choose to use the services of our recommended FCC legal counsel, for most applications their charges will be approximately $300.

SOMETHING ELSE FOR ENGINEERING SUPPORT

Experience. Since 1972, we've helped hundreds of affiliates deliver HBO programs to their subscribers with the finest video and audio signals.

Expertise. Our network operations staff specializes in the continuing "state-of-the-art" development of video and audio transmission and cable technology.

SOMETHING ELSE FOR FINANCIAL ASSISTANCE

HBO's staff is ready to work with you on the dollar-and-cents aspects of your earth station.

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The standard cost for the engineering and technical services including all showings, earth station performance calculations, and completion of FCC documents is $1,200. This also includes the assembly of all pertinent data into an approved format enabling you to have your legal counsel submit it to the FCC.

So by using our Earth Station Application Service you can save money, effort, and most important, time.

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In New York, it's Peter Frame (212) 556-4241; in Dallas, Bill Hooks (214) 387-8557; in San Francisco, Don Anderson (415) 982-5000.

HBO

Good System Personnel Are Still "Blue Sky"

By Glenn Chambers
SCTE Eastern Vice President
American Television and
Communications Corp.
Englewood, Colo.

The CATV industry as a whole is enjoying a period of tremendous growth. Systems are expanding their service areas, new franchises are being awarded, new systems are being built and old systems are being rebuilt and upgraded. Everywhere you look there is growth and change. New technology is expanding even faster than our systems. Yet in the midst of all this frantic activity and growth, a problem is rapidly becoming more apparent.

We have a shortage that, if steps are not taken to reverse it, will become a problem for all of us. It is not the usual shortage of money, materials or technology, but the shortage of good, trained technical personnel. Some engineers have been predicting this for several years, but could not seem to arouse much interest. Too many management people took the attitude that the problem, if indeed there really was a problem, would resolve itself if ignored. Unfortunately, not only did the shortage *not* disappear, it is becoming even larger than the pessimists had predicted.

In the last year, I have discussed this shortage with several companies, both system operators and manufacturers. It seems that we have all been hit equally hard. One very large company stated recently that they presently have 116 job openings which they have been unable to fill. According to one of their representatives, they have been forced into open piracy of the employees of other companies. This company, like most of the others, at least has 20-20 hindsight. Their lament is that they did not recognize the trend sooner and start preparing. Good employee training programs, started a few years ago, would have provided many of the trained people that we need today.

Combine the shortage of trained technical personnel with the rapid advances in CATV technology and even the most short-sighted person must see the trend. Within a very few years, many of our old "Blue Sky" ideas such as smart taps, addressable converters, fiberoptics, data transmission via cable, status monitoring, load monitoring and all kinds of ancillary services will be fairly common. Digital techniques and the use of microprocessors will become standard. Our system technicians must somehow acquire the knowledge to install and maintain this equipment. They will also have to fill the vacancies left in our systems by normal churn.

Acquiring bodies capable of being trained does not appear to be a problem. Running an ad in the local newspaper will usually bring them out in great quantities. The biggest problem then is in getting them trained to the point of being effectively productive. After that, it is a matter of helping them to grow into higher and higher levels of technical competency. As most everyone knows, on-the-job training produces excellent results. Unfortunately, it also has some major drawbacks, the prime one being the length of time necessary to acquire the experience. Combining on-the-job training with formal classroom or home study courses can help to reduce the time dramatically, plus giving the technician greatly expanded knowledge.

There are many ways in which management and engineering people can help to bring technical employees up to the competency standards needed by our industry. Most of the ways do not cost a great deal of money. What little they do cost is more than made up by the improved knowledge and attitude of the employee. Some common methods include:

- Supporting technical education through the support of technical organizations such as the SCTE or IEEE. These groups sponsor many excellent technical seminars during each year in various parts of the country.
- Setting up employee educational assistance programs to help pay for home study and resident courses. Many of the newer employees simply cannot afford the entire cost of a course.
- Actively encouraging employees to attend technical seminars and job related courses. Monetary incentives and promotions from within are excellent ways to encourage participation in, and completion of, the courses.
- Setting aside a couple of hours each week for classes in the system. The classes can be taught by system personnel or by an outside instructor.
- Working with and supporting local technical and trade schools to develop more and better CATV courses. A lot of schools welcome industry engineers and managers act as technical advisors.

Any and all of the above suggestions can be made to work. The only limiting factors would be the imagination and expertise of the persons setting up the programs.

Glenn Chambers

1978 SCTE Officers and Directors

WASHINGTON, D.C.—The newly-elected officers (or re-elected officers) of the Society of Cable Television Engineers are president, Robert Bilodeau, Suburban Cablevision; eastern vice president, Harold Null, Storer Cable TV; western vice president, Gayheart C. Kleykamp, UA-Columbia Cable; secretary, Judith Scharf, Tele-Communications, Inc.; and treasurer, Edward Horowitz, Home Box Office, Inc.

Regional directors include Frank Bias, Viacom Communications; Glenn Chambers, ATC; Bruce Uerling, Studio Electronics, Inc.; William Ellis, Sangamo Inc.; John Weeks, Weeks & Associates; James Grabenstein, Potomac Valley TV Cable; and John Morovich, Middletown, New York.

Members of the directors at-large include: Larry Dolan, Mid State Communications; Ben Forrester, Scientific-Atlanta, Inc.; Kenneth Gunter, UA-Columbia Cable and Tom Olson, TOMCO Communications, Inc.

Judith Baer remains executive director for SCTE.

Judith Scharf, new secretary for SCTE.

Tom Olson, new director at-large.

SCTE Upcoming Meetings

May 20: New England SCTE chapter will meet in Portland, Maine to discuss technical and business strategies. Contact Bill Hinton at (603) 743-2234.

May 22-23: The Virginia Cable TV Association and the SCTE will host technical programs in Roanoke, Virginia. Contact Allan Kirby at (804) 595-4491.

June 6-7: The Illinois-Indiana CATV Association and SCTE will host two days of intensive technical programs on TVROs, construction, installation and FCC inspections. Contact Bill Ellis at (812) 853-7689.

June 12-13: The Fourth Annual New York State Technical Seminar will be held in Albany, New York. Call Jim Emerson at (315) 682-2670.

Fourth Annual New York Tech Session

ALBANY, NEW YORK—On June 12 and 13, the Fourth Annual New York Cable Television Seminar wil be conducted at the Empire State Plaza Convention Center in Albany. Kenneth Foster, SCTE member and chief of the telecommunications division for the New York State Commission on Cable Television, is the program chairman. Scheduled sessions include various aspects of CATV engineering plus a session on safety.

Jim Emerson, SCTE member and sales manager for Northern CATV Distributors, is working with Foster on coordinating the session. For additional information, call Emerson at (315) 682-2670.

SCTE Membership Drive

WASHINGTON, D.C.—SCTE's 1978 membership drive will introduce two new mailing pieces to be distributed to all CATV systems in the United States. One brochure describes what SCTE individual membership is all about and answers questions from the field. A simplified membership application will be included in that brochure.

The second mailer will be directed specifically at bringing in more SCTE sustaining members. This brochure will again answer questions, dispel myths and make a point of explaining that operating companies are eligible.

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Versatility In CATV Studio Design

By Steve Sedoff, Hitachi Denshi America, Ltd., and Jerry Levy, Didier/Denver Denver, Colorado

Those of us who have spent any time at all in this crazy business reserve the right to reminisce occasionally about the good ole days of the one-inch VTRs. Solid machines when they did perform, but the trick was in getting them to consistently do what they were originally intended to do. Interchange was generally an unexpected surprise, especially when the local superintendent had a particularly good tape he wanted to play on your system using your machine. Through the magic of electronics, it always seemed that the more important the playback was the worse the interchange became. Editing was simply out of the question as was the correction of skew error since time base correctors were either unavailable or prohibitive in cost. The one-half inch recorders really weren't much better because although they were one-fifth the weight of their one-inch counterpart, no two manufacturers were compatible. Interchange was often difficult between two identical machines. Then Sony had to spoil everything by introducing the EIAJ format, and for a year or two, all one-half inch manufacturers were compatible. Then just as everyone was getting comfortable Sony introduced the ¾-inch U-Matic videocassette, indeed a revolutionary breakthrough in jukebox technology. Its success was inevitable, everyone became compatible again and the industry as a whole breathed what seemed like a universal sigh of relief. Years later we are mysteriously still adhering to this format even though it seems a little ironic that we now think nothing of spending $10K or more for a TBC to correct the $4K U-Matic

With electronic news gathering the end-user discovered that he could take a battery-operated, portable camera/VTR, videotape city-council meetings, news, sports and the like and have immediate

Steve Sedoff of Hitachi Denshi demonstrates a new portable color camera.

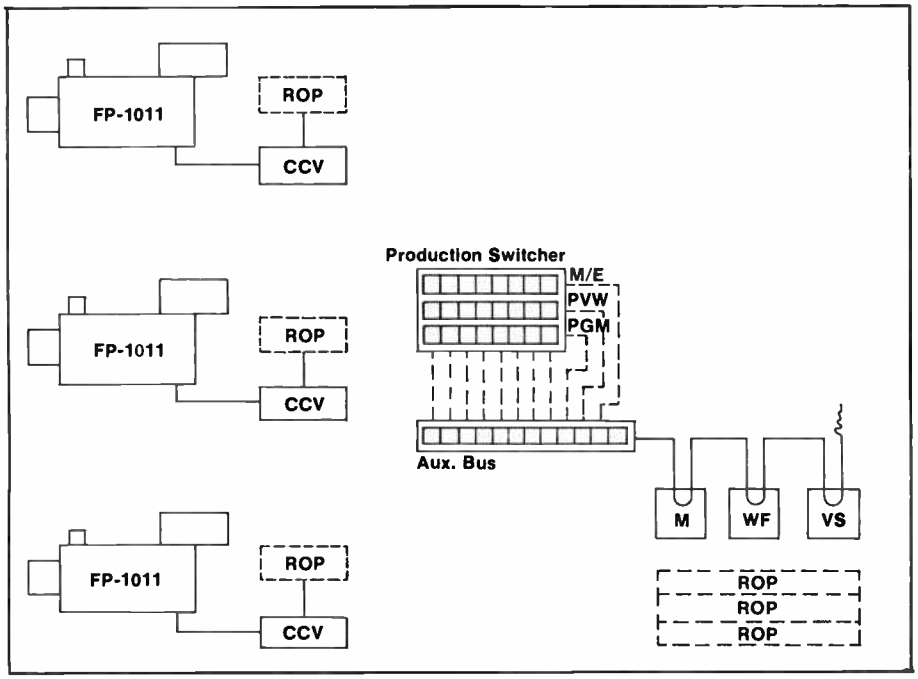
playback capability. This new use of video was and still is unique not only in its immediacy but also in its cost-effectiveness. All of these breakthroughs and trends, however, also had something in common: they allowed little time for discussing studio camera technology and its relationship to the basic color television studio in other than broadcast station facilities. So, we'll take a moment or two and evaluate some ideas and concepts which may be of interest to the cablecaster in 1978.

What Your System Should Accomplish

Like any other television system user, the cable operator who purchases or is contemplating the purchase of video facilities has already established programming and budgetary criteria which must be met. This is no small task in view of the fact that new cable franchise applications in the medium to large metropolitan areas seem to offer the subscriber a varied programming format, much of which is local origination. In order to be responsive to these parameters, though, the supplier of equipment must have a very clear understanding of just what the system is expected to accomplish and for how much. Once this has been established, the supplier or cable operator develops a system flow chart which depicts all audio, video and pulse signal paths throughout the system. Done correctly, this document should identify other, but equally significant, items like potential timing problems that arise when signals are looped and relooped to the point of degradation, termination points, etc. Whether the chief engineer has already drawn up such a document is not the real question here. As suppliers, we should feel compelled to do so for fear of omitting a piece of equipment here and there. I might add that most of my associates in this business consider this not only good engineering practice but also an insurance policy of considerable worth.

Since we now have a better handle on what the system is supposed to do, let's briefly review a little of the past and some of the present history of television cameras since they are the heart of a video facility.

One of the most interesting developments during the past several years has been the sophisticated growth of the $10-20K class multi-purpose color television camera. But camera technology wasn't always that far ahead of itself when compared to the days of the DXC-5000 or IVC-100 era. In the case of the DXC-5000, it was the apparent intent of Sony to market a relatively low-cost, single tube camera for use with a lone VTR and monitor. Since it had a camera control unit as part of the package, it also seemed suitable for multi-camera use in a studio environment. Suitable, that is, until you tried to match them under split screen conditions. Although the camera sold extremely well, subsequent versions did reflect such changes as external paint pot controls to give it the studio flexibility it needed.



System flow chart

International Video Corporation's contribution to the camera market was quite unique in that they offered a completely self-contained color television camera. That is to say that all of the camera's electronics, sync generator and encoder were housed in the camera head, and AC power need only be applied to the head to make pictures. The camera had several inherent problems right from the start in that the cameras were quite large, could not be genlocked together and even if they could, no two ever looked alike long enough to do a production, much less a remote. But then everyone was having problems with unstable encoders, internal or external, and so remotes weren't as neat as they sounded. In due time, however, most of these problems were ironed out as technology marched on.

Just as the auto industry has had to respond to consumer demands for more compact and efficient equipment, Hitachi was similarly addressing the same problems in both camera and tube designs to make some of these forbidden applications more feasible. One very clear example of Hitachi's ongoing technology program was its development and utilization of the now revolutionary Saticon tube. Apparently designed to succeed the more conventional types of pickup tubes, the Saticon has exceeded all performance expectations in the following areas:

- depth of modulation is approximately 45 percent better at 400 TV lines
- unlike plumbicons, Saticons are interchangeable for red, green and blue channels
- do not require extended red versions
- greater sensitivity
- negligible flare and reduced lag
- less expensive to replace
- no shelf life.

In short, these tubes offer exceptional performance characteristics under a wide range of television applications.

Because of the studio camera's importance in creating the proper end-result, the camera selected must meet the production criteria of each individual facility. In other words, will the cameras be for studio use only or will they have to pull double duty and be used for remotes as well. In either case if versatility is what is needed, Hitachi's FP-1010 self-contained color camera with three Saticon tubes and optional OP-1010 Operation Panel fits the bill. The key to this cost-effective approach to multi-camera productions is its self-contained configuration. The OP-

1010 provides not only genlock capability between cameras but also adjustment controls for master pedestal, color temperature and black and white balance. By using the proper camera cable, it can be located up to 300m (1000 feet) from the camera head with external adjustments for cable compensation. In short, two FP-1010 camera systems described above can be easily housed within two portable carry cases (peripheral equipment included) for completing a tele-production facility that is at home indoors or outside.

If a more traditional or permanent studio camera is needed, the most ideal choice in this class would be the FP-1011. It too is equipped with three Saticons and has a full complement of self-contained options. Unlike the FP-1010, the FP-1011 comes with a full camera control unit requiring external drives and a full remote operation panel to enable complete operator control over the camera to include RGB. Thus, if your studio productions require the ability to chroma key, this camera chain would be a most realistic selection.

The remote operation panel of the FP-1011 also has special significance to the overall engineering control design of the studio in that it establishes a "color shader" position capability. In its ideal version, the "color shader" concept is most effective if the video switcher specified has a remote electronics nest with provisions for an additional auxiliary bus. These additional video signals consist of all the raw inputs to the production switcher plus re-entries from the mix/effects amplifier(s), preview and program outputs. Since these new sources are all timed out within the nest itself, they are now made available at a remotely located panel consisting of a single row of lit pushbuttons. Operating independent of the production switcher, the output of this auxiliary video bus feeds a good color monitor, waveform monitor and NTSC vectorscope. It also provides the video engineer with an excellent technical reference for all inputs and outputs to the production switcher. Camera shading is greatly simplified, and troubleshooting is quicker since all signals are already timed out. There is an additional advantage in that these auxiliary bus signals can be independently routed elsewhere without tying up a bus from the production switcher.

More often than not, audio production facilities do not get the attention they warrant, even though they are part of the studio. Aside from the equipment itself, the audio flow chart is just as important as its video counterpart and deserves distribution and processing attention as well. Being the fundamentalist that I am, I typically look for a total manufacturer of all the audio components and treat it as a sub-system. Ampro Corporation, for example, offers stereo or monaural mixing consoles in a variety of sizes, cartridge machines, turntables, preamps and furniture, all at reasonable prices. More importantly, an Ampro audio system can be ordered in your desired configuration. For a slight additional charge Ampro will assemble, pre-wire and quality control the entire system before shipping it in modular form. All the installer needs to do is reassemble the system and basically plug it in. This is a very unique service, and should represent a considerable savings in both time and money to the user.

In the end analysis, who is to say what does or does not constitute a "good" system? I would be the first to admit that some or all of the ideas presented here are acceptable to some but not others. Regardless of the brand of equipment you choose, an effective video facility, a good programming format and devoted personnel will all work together to gain subscribers and advertisers alike, and isn't that what it's all about? **C-ED**

JERROLD X-p

...Your **Pay-TV** and

Considering Pay-TV? Subscription? Per Program? Or combinations of the two? You should see Jerrold's dynamic working displays for the X-panded family of STARPACK™ security systems.

After consulting with major CATV system operators, Jerrold has X-panded STARPACK to include:

1. Outdoor descramblers – with electronics outside the home – for single-level (one specific group of programs) and two-level, combination services. Model SRD.

2. Indoor descramblers – incorporate preamp for low drop levels . . . single-level and two-level services . . . built-in self-destruct, anti-tamper mechanism. Model SD.

3. New addressable descramblers – inherently two-level . . . for use with a library of feature films or other premium services . . . to offer two simultaneous subscription services, two simultaneous per-program services, or a combination of both services. Model SRD-Addressable.

4. Simple indoor control unit – attractively styled, inexpensive two-level device . . . straight-through operation of any STARPACK descrambler for VHF channels . . . or with a set converter for all CATV channels. Model SC.

5. Midband indoor control units – functionally the same as Model SC . . . plus a two-channel midband converter. Can be used to add one or two scrambled channels to a fully loaded 12-channel system. Or can be used as a stand-alone Pay-TV converter. Model SCCU.

6. Set Converter/STARPACK control unit – Combines functions of Model SC and set converter Model SX . . . allows use of any CATV channel for pay with only one box in the home. Model SX-STARPACK.

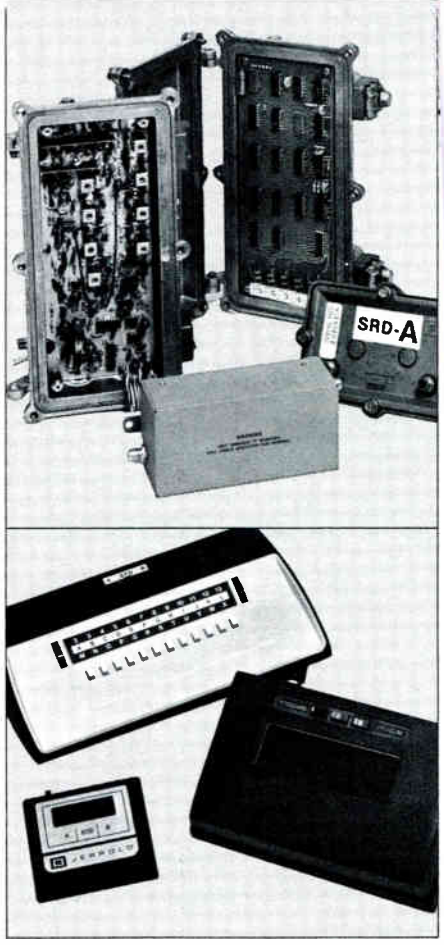
ALL STARPACK Pay-TV security systems use a positive scrambling technique to suppress video sync information for any CATV channel within the 54-300 MHz range.

The headend signal is scrambled directly at RF by adding 6 dB of additional attenuation to the signal path during the sync interval. A separate modulated RF carrier is sent out on the cable system as a reference for the individual descramblers . . . used to reconstitute the scrambled video.

With Jerrold's popular outdoor descramblers, the descrambling electronics is in a rugged, weather-proof, RF-sealed housing for strand, eave or pedestal mounting – inaccessible to the subscriber. All indoor descramblers contain a self-destruct, anti-tamper device to prevent theft of services . . . and equipment.

Every STARPACK system – indoor, outdoor or addressable – uses attractively-styled control units that are perfect companions to the Jerrold line of push-button set converters.

Only STARPACK combines all of these important features: low-cost two-piece configuration for signal and equipment security . . . to prevent loss of services and protect your Pay-TV revenue; broadband operation for compatibility with existing CATV systems and existing converters . . . and for inventory flexibility from system to system; and upgradeable product family from single and multiple levels – all the way to individually addressable descramblers!



ands

Set Converter options.

We've X-panded your distribution system options too . . . with a new Mini-Bridger (45 dB gain) and a new line extender (36 dB gain) that can serve as a low-cost Mini-Bridger in certain applications.

And we've X-panded our COMMANDER III family with a new demodulator.

All of the new Jerrold X-pandables will be on display in New Orleans at the 1978 NCTA Show. We hope to see you there.

Thinking about CATV set converters? Jerrold offers the most complete line available . . . anywhere. That's just one of the reasons why 75% of the subscribers using CATV converters have Jerrold units at their finger tips.

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Commission Revises Nonduplication Rules

WASHINGTON, D.C.—As a result of an action at a recent open meeting of the Federal Communications Commission, "significantly viewed" network affiliated stations are no longer assured absolute protection under the nonduplication rules. (In the past, the term "significantly viewed" has pertained to signals viewed off-the-air for at least three percent of total weekly hours and having a net circulation of 25 percent.)

In a five-two vote (Washburn and Lee joined forces in dissent), the commission has in effect shifted the burden of proving harm in signal duplication situations from the cable operator to the broadcaster. The commission, however, will hear waiver requests from stations requesting special consideration on signal carriage issues.

Jerry Jacobs, deputy cable bureau chief, explains, "From now on if you're in a carriage situation in which you have both a priority (network) station and a significantly viewed station, they will be considered to be of *equal* priority." Chairman Charles Ferris indicated that the nonduplication rules have been troublesome and commented that requiring cable systems to carry distant signals that are significantly viewed but to block them out when they duplicate signals of local stations makes the commission look "ridiculous." The rules, according to Ferris, seemed to speak with a "forked tongue."

Foreign Delegates to Attend NCTA Convention

WASHINGTON, D.C.—Delegates from twelve countries will attend the International Technical Standards Meeting at the New Orleans Convention. Members from eleven European nations and Japan will attend meetings at the International Electro-Technical Commissions' cable distribution systems committee, co-hosted by the NCTA at the Broadcast Cable and Consumer Electronics Society of the IEEE in New Orleans.

The commission, based in Geneva, Switzerland, sets worldwide electronic and telecommunications technical standards used in international treaty and trade negotiations.

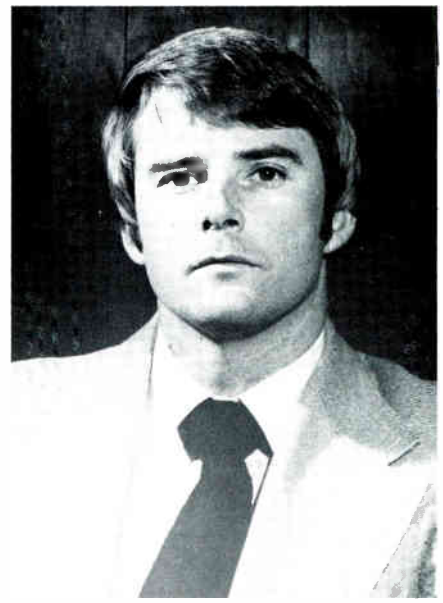
Delegates from Belgium, Canada, Denmark, Finland, France, Japan, the Netherlands, Norway, Sweden, Switzerland, the United Kingdom and West Germany will attend the New Orleans meeting.

Cable Engineers to Ponder At-Home Electronic Fund Transfers at NCTA Convention

WASHINGTON, D.C.—Jack Benton, a nationally-recognized expert on electronic fund transfers, will deliver the keynote address on the technical program at Cable 78, the cable industry's 30th anniversary convention.

Benton's address, scheduled for the technical program's opening session on Monday, May 1, will examine cable television's potential role in offering electronic funds transfer as a home service, outline the regulatory hurdles EFT faces and offer a political forecast for federal and state action.

"EFT service, already widely used by banks in metropolitan areas, may not be technically too far off for consumers in their homes," stated NCTA engineering vice president Robert A. Luff. "Cable operators should be aware of the strong consumer movement toward EFT and of some tremendous regulatory and political barriers which must be broken."



Jack Benton will deliver the keynote address at Cable 78.

Murphy Breaks With Van Deerlin on Rewrite

NEW YORK, NEW YORK—John Murphy, the number two Democrat on the House communications subcommittee, recently told the New York Cable Club that "wholesale review and revision of the Communications Act is the wrong way to go about things." The New York City congressman further stated that "a rewriting of this magnitude cannot be done well with only a small staff, with a relatively small budget, and with too little time to secure the widest possible range of views on many vital, and certainly very controversial issues. If everything is attempted at once, nothing will be accomplished."

The ranking Democrat on the Van Deerlin subcommittee said the rewrite project, if done properly, will "require many years of hard work" and noted that he's concerned about the interim.

While the rewrite process is underway, perhaps for as long as five to ten years, important communications problems will remain unresolved and will continue to grow and to fester. Murphy told his audience "the development of cable legislation is one of them [problems]." The New York lawmaker also took advantage of the occasion to indicate his concern with the way the legislation is being drafted. "The draft is promised for June 1, but I do not know what it will say.

Murphy further told the Cable Club that even though "it may be too early to formulate a specific separations policy . . . it is not too early to endorse the principles of separation . . . it would be a serious mistake to permit cable operators to accumulate analogous power" similar to that of the broadcasters

NCTA Videocassette Subcommittee Will Meet In New Orleans

WASHINGTON, D.C.—A meeting of the NCTA subcommittee on ¾" videocassette standards and good engineering practice will be held during the NCTA Convention in New Orleans.

This committee was formed a year ago to draw up standards and good engineering practices relating to ¾" videocassette operations. These areas will cover film to tape transfers, cassette duplication and cassette playback.

All attending are invited to submit to the committee information regarding their cassette operations and, in particular, cassette quality reports, cassette requirements for operation of automated and manual systems, and types of equipment used for measuring audio and video signals.

The date, time and meeting room for the session will be announced at the convention.

NAB Files on Economic Inquiry, Deintermixture

WASHINGTON, D.C.—In comments filed with the Federal Communications Commission pursuant to the economic relationship between broadcasting and cable television, the National Association of Broadcasters maintains a study confirms that local television stations would lose viewers if cable systems were not restricted in importing distant signals.

The study, conducted by Wharton, EPA, Inc. of Philadelphia, was filed with the FCC on March 15—the closing date for comments on the economic inquiry. (For NCTA's position on the matter, see "News Report," *CableVision* 3/27/78.) The NAB also said that it is confident the on-going study will show that audience loss would lead to reduced revenues and subsequent reduction of the stations' ability to serve the public.

The broadcasting association revealed the most significant findings of the report are:

- liberalization or elimination of distant signal limitations would reduce substantially local station audiences in small, one-and two-station markets;
- audience loss generally would be most substantial for network affiliates during the early fringe time period (4:30-7:30 p.m.);
- independent station audiences would be "devastated" if the distant signal limitations were liberalized or eliminated;
- tightly regulated cable television is beneficial to UHF stations;
- importation of distant independent stations fails to increase cable penetration substantially;
- cable carriage of additional distant signals increases viewing in cable households; and
- cable penetration can be expected to be twice as high in upper-income areas.

The association also maintained that its own research indicates 92 percent of the viewers who watch network programs on a local station stay tuned for the local news compared with 61 percent who watch network programs on a distant station.

In a second filing made to the FCC on March 21, the NAB said that without congressional approval, the commission cannot remove a VHF television station from a market in order to promote the growth of UHF. Such action is known as deintermixture.

Robert Bilodeau and Robert Tenten Receive 1978 NCTA Outstanding Engineering Achievement Awards

The National Cable Television Association will present its 1978 Outstanding Engineering Achievement Awards to Robert Bilodeau of Suburban Cablevision and Robert Tenten of Home Box Office.

The awards, which go annually to one engineer for outstanding achievement in system operations and to another for contributions in design and/or manufacturing, will be presented at the cable industry's 30th anniversary convention in New Orleans, April 30-May 3.

Robert Bilodeau, Suburban Cablevision's engineering vice president and a company founder, will receive the operations award for innovative design, efficient application of new technology and efficient management of resources and personnel.

"Bob Bilodeau's achievements at Suburban, which have helped the system grow in only four years to become the largest system in New Jersey, are a prime example of what management/technical cooperation can accomplish," stated NCTA president Robert Schmidt.

Bilodeau is a 27 year veteran of the cable industry. In 1951, he and his father founded TeleCable of North Adams, Massachusetts, where he served as president and general manager. In 1965 he joined Jerrold Electronics Corporation as a field engineer, later serving as director of field engineering and finally as technical director of the CATV division. He remained with Jerrold until the founding of Suburban Cablevision in 1972.

Bilodeau is president and a charter member of the SCTE, and a long-term member of NCTA's engineering committee. He currently serves as secretary of IEEE's Broadcast, Cable and Consumer Electronics Society and as chairman of the Cable Advertising Committee.

Bilodeau is also vice president and a director of the New Jersey CATV Association. He has been a major contributor to NCTA's measurements and signal leakage publications and has written several technical papers.

Robert Bilodeau

Robert Tenten

Robert Tenten, Home Box Office's director of engineering development, will be honored for his work in securing FCC authorization for the use of cable-pioneered small aperture receive-only earth stations, a technology developed through a cooperative effort by many in the cable industry.

"Small aperture earth station technology has put new program diversity within financial reach for most cable systems," said Robert Schmidt, "and Bob Tenten, more than any other individual, was the persuasive force who moved the FCC to approve its use."

Prior to joining HBO in 1972, Tenten served as chief engineer at Sterling Communications, the parent company of Manhattan Cable TV, and worked at Bell Telephone Laboratories in electronic PBX development and transmission system engineering.

Tenten is a graduate of RCA Institutes and holds a B.S.E.E. degree from the Brooklyn Polytechnic Institute. He is a member of the SCTE, SMTE, IEEE, the NCTA engineering committee and is chairman of the NCTA WARC subcommittee. Tenten also serves on the NCTA satellite committee and several CCIR subcommittees.

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A Time Compression Multiplex System

By Donald Kirk, Jr., chief engineer
Digital Communications, Inc.
St. Petersburg, Florida

There is an additional step which we can take to improve the signal ratio of the TCM system. Note that before each line of video is read into the common output line, the entire line is in storage. The maximum peak-to-peak amplitude of the line could have been determined as it was written into the store. This information can be used to increase the gain of the transmitter modulator and reduce the gain of the receiver video amplifier by equal amounts for any video line having less than the maximum allowable amplitude. The result will be no change in signal at the receiver, but the received noise will be attenuated.

This possibility is shown in block diagram form in Figure 4. Here the S/N enhancement circuitry has been shown separated from the TCM circuit. In this arrangement the incoming video signal is alternately stored in one of two stores.

As a particular line of video is written into storage, its peak-to-peak amplitude is monitored. As that line of video is read out of storage the results of the monitoring process are used to set a digital attenuator such that the amplitude of the line will be increased to the maximum that can be accepted by the transmitter. A code word to tell the receiving end of the system how to set its attenuator is inserted in the digital portion of the TCM format.

At the receiving end of the system, the sync timing and the instruction code words are recovered directly from the common line. An instruction generated from the code word is used to set a digital attenuator to remove the results of the extra deviation inserted at the transmitter. In doing this, it brings the signal back to the proper level and reduces the noise power introduced by the satellite link.

This enhancement process could, of course, be used in other applications such as line-of-sight microwave or video tape recording.

Figure 5 shows one attempt to divide video waveforms into categories which could be designated with a 4-bit digital word. The approach used here was to divide the problem into two parts. First, an off-set voltage was picked as the average amplitude of the signal measured from black level. Two bits were used to describe this off-set. Then, the peak-to-peak variation around this off-set was given a two-bit designation. To use this with the signal enhancement circuit described, the instruction generators at the transmitter and receiver ends of the system would control both a four level current generator and a four level digital attenuator.

The amount of signal to noise improvement which can be achieved with this circuit cannot be calculated. It must be determined through subjective tests. We have no reason to feel that a given amount of noise power will have an equally degrading effect in a high contrast portion of the picture and a portion of little contrast.

The circuit can, of course, remove much more noise power from a low contrast picture than it can from one with large changes of light level. It is interesting to note that for a video stream in which the wave forms shown in Figure 5 were equiprobable, the measured reduction in noise provided by the enhancement circuit would be 5 dB.

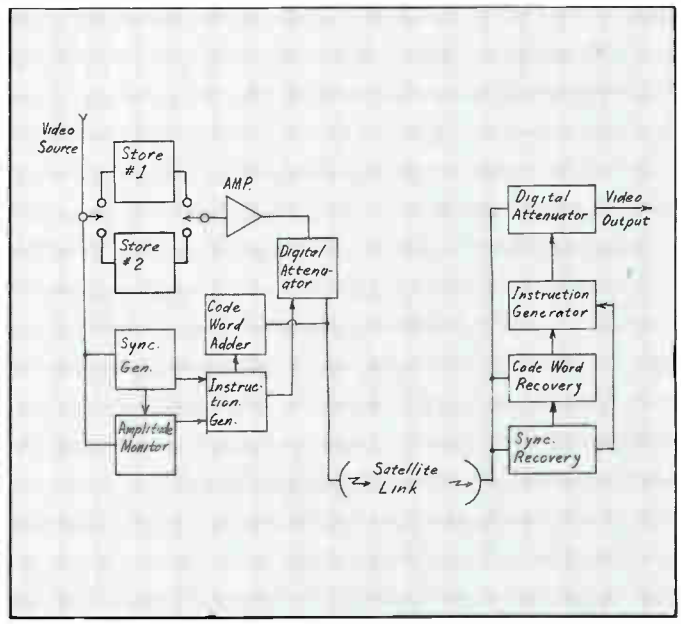


Figure 4: S/N enhancement circuit

A Video and Data Application

The usefulness of the TCM approach is not limited to the transmission of two video programs over one transponder channel. In the example discussed, a digital stream representing two audio channels was interspersed with the two video signals. The different signal sources accommodated by a time compression multiplex system may have greatly differing information rates. The time allotted to each source will be approximately proportional to its information rate. The system is flexible in that it can use different modulation processes to achieve different error performances for the various subchannels.

For example, a low data rate channel requiring excellent error performance might be handled as Binary frequency shift keying. At some increase in error rate and a worthwhile improvement in signaling speed a channel could use Quaternary or M'ary FSK. For high values of M the channel error performance would be limited by phase equalization requirements unless a high correlation exists between adjacent symbols, thus limiting the ringing or overshoot introduced by large transitions in a channel

(Conclusion of a Two-Part Series)

The first part of Digital Communications' article (see C-ED, April issue) featured various approaches to frequency division multiple access. Digital's time compression multiplex system and the application of the TCM to two video channels. The conclusion of the article, featured in this issue, focuses on S/N enhancement, video and data application and two-way application.

of poor equalization. It is the high intersymbol correlation of a video signal which allows us to increase M without bound and transmit video in its analog form on a TCM system.

To investigate the versatility of the TCM approach let us try to design a system which can intermix a standard video channel, its companion sound channel, and a low data rate digital channel (of the order of 10^5 bits/sec.)

Make it a further requirement that we be able to receive the digital channel with an inexpensive receive only earth station. The cost of an earth station for receiving satellite signals is determined by its G/T figure of merit. This term, usually expressed in dB/°K is simply:

$$G/T = 10 \text{ Log } G_{ANT} - 10 \text{ Log } T_S, \quad \text{where}$$

G_{ANT} is the power gain of the receiving antenna and T_S is the noise temperature of the system determined primarily by the input low noise amplifier used (LNA).

For a typical receive-only video terminal using a 15-foot dish and a 150°K LNA the G/T rating would be 21.5 dB/°K.

To achieve a low cost receive terminal for our low data rate channel we would like to use a 4-foot dish and perhaps a 750-1000°K LNA. For this combination the figure of merit would be around zero dB/°K.

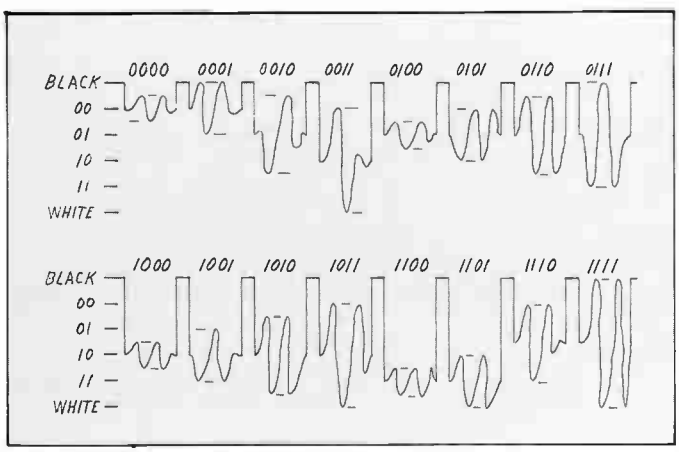


Figure 5: Video signal categories with four-bit designations

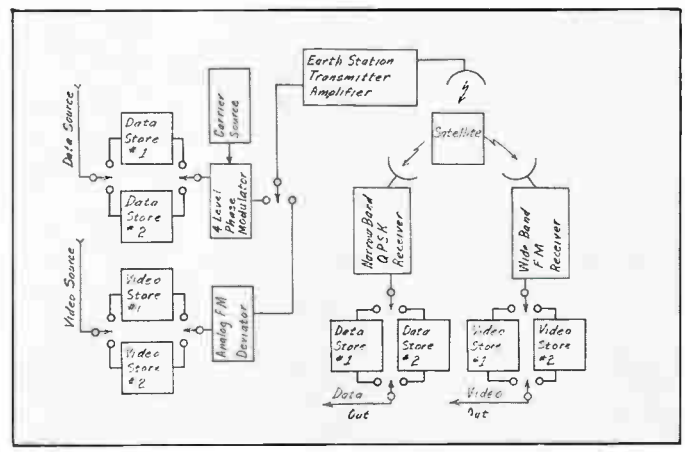


Figure 6: Data plus video using TCM system

Let us assume some system parameters and see how they affect the performance which can be expected. First, assign to the video channel three-fourths of the available time and allow the remaining one-fourth for the data channel. This means that in the video receiver the top base band frequency will no longer be 7.87 MHz as it was in the example using two video channels. It will be reduced by a factor of 1.5/1 to 5.25 MHz. The noise performance of the video channel will be improved by 30 Log 1.5 for reduced base band frequency and by 20 Log $\frac{12.75}{10.13}$ for increased possible deviation. These combine to predict a S/N of 51.6 dB for the single channel with data compared to the 44.4 computed for two video channels.

Now let us select Quaternary phase shift keying as a modulation method for the data channel. Allow a receive bandwidth of B receive where B rec=0.75 f data is the data rate transmitted. Since data is only transmitted during ¼ of the time:

$f_{data} = 4 \times 10^5$ Bits/sec. for our assumed input data rate of 10^5 bits/sec.

The receiver bandwidth is

$$B = 0.75 \times 4 \times 10^5 = 3 \times 10^5 \text{ Hz}$$

Assume that the Quadraphase modulation is differentially coherent and that a carrier to noise ratio of 14 dB will give adequate error performance. We can now compute the required figure of merit for the data service station.

Recall that the carrier to noise ratio of a receiving earth station is given by:

$$(6)\quad \frac{C}{N} = \frac{G}{T} - L_D - K + EIRP_{SAT} - 10 \log B, \quad \text{where}$$

G/T is the receiving figure of merit
L_D is the total loss in the down link
K is a constant -228.6 dBW/°K
$EIRP_{SAT}$ is radiated satellite power, and
B is the receiver bandwidth.

For the video link we have been considering with B=36 MHz. we assumed a C/N of 12 dB when G/T was 21.5 dB/°K.

For the same satellite, we can rearrange (6) to give the required figure of merit for data channel as:

$$(7)\quad G/T = C/N - 66 + 10 \log B.$$

From this we have

$$G/T = 14 - 66 + 54.77 = 2.8 \text{ dB/°K}.$$

To use a 4-foot receiving dish, we would need a 750° K LNA.

Figure 6 shows the block diagram of a combination video and data system using TCM. Since different types of modulation are proposed for the two different types of input, the two streams are essentially separate until they feed a final transmitting amplifier. Both of the streams use angle modulation.

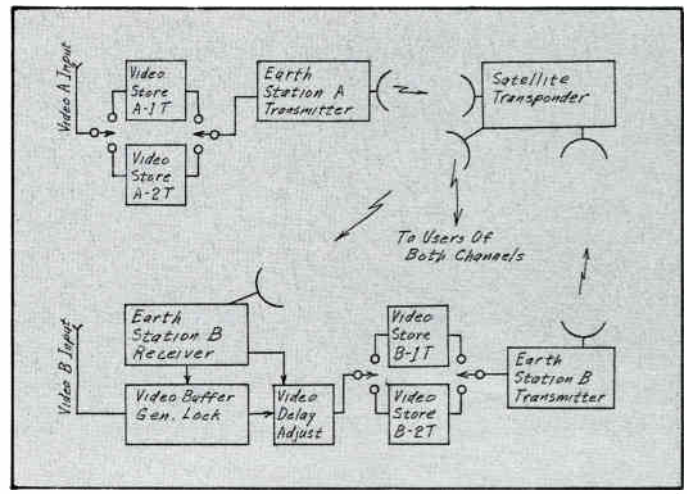


Figure 7: Two-way video transmission using TCM

There must be one connection between the two streams having to do with timing. It would probably be easiest to take system timing from the video side. This might cause some buffering problems on the data side which would require pulse stuffing to adjust the data rate to go with a store switching time set by the video.

At one receiving site a small dish and a narrow band receiver would receive the data signal. A number of possibilities exist for recovering timing. Recall that the beginning of the data stream of interest corresponds to switching off an FM signal which was shifted to a frequency representing black level of the video and switching on a DQPSK signal centered in the receiver passband. This should afford a start toward achieving a sync signal.

There is no particular requirement that the data subchannel be located in the center of the transponder passband. The location of a data subchannel might well be chosen to avoid interference from a similar channel on the same transponder channel of an adjacent satellite.

At a second location a larger dish and a wide band receiver are used to recover the video traffic. Analog stores spread this time compressed signal and deliver it at a real time rate to the output line.

Two Way Application

In the previous example, the actual interleaving of the signals took place when they were a radio frequency form on their way to a transmitter. The signals were actually separated in the radiation downlink from the satellite. By an extension of this idea we can use TCM to achieve two-way video communication via one satellite channel.

There are two sets of timing requirements: the first stems from the fact that the two signals are completely independent in timing; and the other from the fact that the transmission paths via the satellite are not fixed in length. To solve both of these, we start

by nominating one video source as master and the other as slave. As shown in Figure 7, we locate a receiving ground station at the slave B location. At the master station, we transmit time compressed bursts of A video starting and stopping during blanking interval. Station A's transmission must have with it a digital group for audio and sync purposes.

At station B, we receive A's transmission and compute when B's transmitted burst would have to occur to fit on an interleaved basis. A time guard band must be provided to accommodate motion of the satellite relative to the two ground stations. We have two options to make provisions for B's commutating switch. A time base corrector can be used to genlock B video to A video. It does this by storing a video frame and adding or deleting a blank line during the vertical interval as necessary to accommodate absolute differences in sync frequency. This is an expensive device, and it may be preferred to simply increase slightly the time guard band allowed and transmit extra B samples to avoid crosstalk from the commutating switch. The total guard band time allowed must take into account the fact that the time delay introduced in the transmissions from both stations is not constant. The satellite may be moving toward station A and away from station B. In this case the transmission from A will appear to arrive too early and that from B, too late. The time guard band must be large enough to prevent the last part of a B transmission from overlapping the start of an A transmission. This requirement is relatively easy to meet. A more severe requirement is that between one transmission burst and the next. The distance should not change enough from either station to alter the phase of the recovered color subcarrier more than an acceptable amount. The distance from an earth station to a satellite of relative longitude L and latitude H is about:

$$r = 26500\ (1 - 0.295 \cos H \cos L)^{1/2}$$

If the satellite is at H = 30°, L= 50°, and it changes station by 0.1°, its distance will change by about 7.5 miles. For a satellite which keeps station to ± 0.1°, the worst case change of range will be 15 miles, and the change in difference of distance from two earth stations will be about 5 miles. Thus, the worst case change in loop delay is 160 microseconds, and for difference in delay, the change is 27 microseconds. If the satellite drifts through its extreme positions in a one hour period, the rate of change of loop delay is 4.4×10^{-8} sec/sec. and the rate of change of delay difference is 7.5×10^{-9} sec/sec.

The rate of change of loop delay controls our ability to achieve proper color carrier once per field. With the rate of change of delay computed above, the color carrier would shift in phase by about 1° in 1/60 sec.

The rate of change in delay difference controls how much the time guard band between two interleaved transmissions can change in the time required to send a signal up to the satellite and get a reply back. This time is about 0.28 seconds, and in that time the delay difference could have changed by about two nanoseconds for the example given.

The time compression multiplex system described here is in a developmental status. A number of possible configurations must be built and tested before its full potential will be known. Subjective tests of picture quality in the laboratory and transmission tests over satellite paths must both be made before system parameters can be finalized. **C-ED**

Colorado Video Helps *Newstime* Fly

By Toni Barnett
Managing Editor

Colorado Video, Inc., based in Boulder, Colorado, is a small company with 13 years experience in the CCTV industry. The company specializes in television technology in unusual areas: lab instrumentation, industrial processing and control, and narrowband communications—slo-scan video.

Colorado Video will supply the necessary devices to United Press International to provide an audio/video news service called *Newstime* via the RCA Satcom II satellite. UPI's *Newstime* will fly on the bird beginning July 3rd.

This will be a slo-scan process that will combine a rapid succession of news photos with audio commentary. The *Newstime* service will be a 24-hour-a-day, seven-days-a-week operation, and the 15-minute-long programs will be updated at least five times daily.

UPI is setting up a complete production studio in Atlanta, close to Southern Satellite System's satellite up-link. SSS will "piggyback" the *Newstime* signals on WTCG's transmission system. The video output from the *Newstime* studio will be fed to a video compressor supplied by Colorado Video.

The video compressor, CVI's model 201A, is a solid state sampling scan converter which accepts standard, composite TV signals and reduces the video bandwidth to the audio range. Sampling format is one sample per TV line, starting in the upper left corner of the raster and forming a vertical "row." The output of the 201A is a "slow scan" signal with a line rate identical to the field rate of the wide band input signal (60 lines/second) and scans vertically from top to bottom. The frame rate is an eight-second period and scans from left to right.

The output signal is DC coupled and follows the convention of whites being positive going. The sampling process provides a high quality, slow scan, narrow bandwidth TV signal with excellent grayscale translation, freedom from spurious shading and accurate geometry.

A special feature of the 201A is a "real time" monitor output signal that displays the sampling "row" and the resultant slow scan video waveform superimposed on the input video. This will allow the UPI operator to ascertain at a glance the amount of frame left to be converted, the amplitude of the slow scan output signal, and the quality of the output signal in terms of noise, shading, etc.

The slo-scan process will transmit the video at about one five-hundredths of the original video signal. At this rate, it will take approximately eight seconds to transmit one full picture. UPI's slo-scan video signal will be sent from its studio via CVI's video compressor to a 7.5 MHz subcarrier at the Atlanta earth station. The signal will then be combined with the WTCG video and audio signals and fed to the earth station transmitter.

The slo-scan signal will be transmitted from the RCA Satcom II satellite to a ground station, through a conventional receiver to a de-multiplexer to CVI's video expander. The expander is designed to translate UPI slow scan TV transmissions to standard EIA video format for distribution by CATV systems. The picture update will be in the form of a horizontal "wipe," left to right, for a period of 8.5 seconds.

The 275S video expander produces a monochrome image; however, it may be genlocked to local signals for special effects or "colorization." (A color retrofit package is anticipated in the future.) Resolution is approximately 270 lines and grayscale capability is 64 levels (6-bit encoding).

A solid state digital memory is used for picture storage and plug-in circuit cards are used throughout to simplify maintenance.

CVI's 201A video compressor

The expander will produce an output video signal which matches the studio video output. This standard TV signal will then be fed into a cable company's channel modulator for distribution throughout the system.

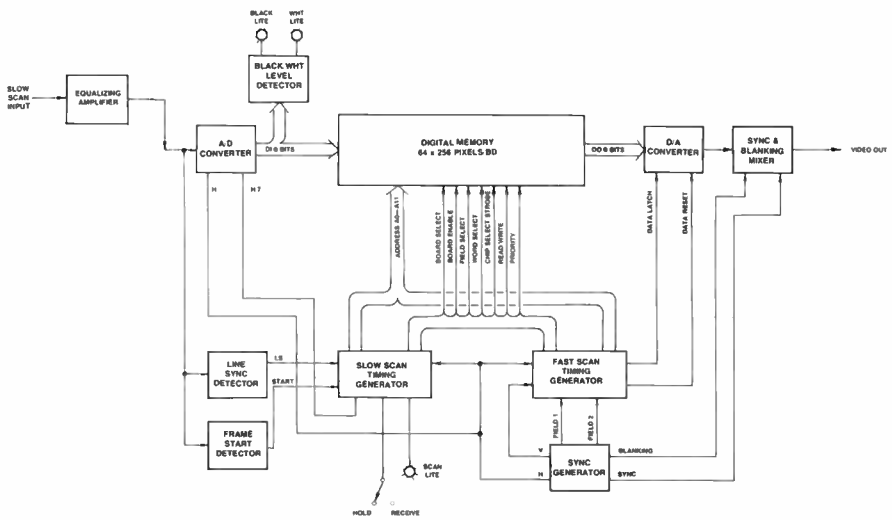
Glenn Southworth, CVI's president and sales manager, stated, "The 275S is designed with eventual conversion to full color in mind."

The equipment a cable operator must have in order to pick up the *Newstime* service varies. If a cable system is already carrying WTCG, he needs only the proper subcarrier demodulator and the video expander unit. The video expander costs about $7,500. A cable system with an earth station that doesn't carry WTCG will need a receiver for transponder 6.

The 275S video expander

If a cable system doesn't have an earth station, it will need a complete earth station, demodulator and video expander —costing approximately $40,000.

According to Glenn Southworth, "UPI will use black and white video images at first. If there is good public acceptance and demand," Southworth added, "UPI may expand to pseudo-color broadcasts."



Simplified block diagram of the 275S video expander

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The remarkable Scientific-Atlanta 6250 falls about $7,000 short of the price you might normally pay for a comparable high quality demodulator. But it doesn't fall short in engineering and performance. We've sold over 300 6250 Demodulators since its introduction a year ago. In fact one group of station engineers wrote, "we are amazed at your demod's performance," after comparative bench tests against a unit close to the $10,000 range.

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Aerial CATV Leakage Measurements

By Robert V.C. Dickinson, president
E-Com Corporation
Stirling, New Jersey

Over the past several years the possibility of CATV interference to aircraft navigation and communication services has become a major concern. For the past 18 months activity has become widespread with concern in all areas. The major result of this concern has been the recent FCC action under Report and Order Docket 21006 of July 27, 1977, which has put additional bounds on CATV signal carriage, leakage and monitoring. An important fact to note, however, is that the current concern and program of detection and protection is based largely upon theoretical considerations of what the leakage might be with some number of leaks of such intensity etc. In a nutshell, concern about this possible problem is in order and so are the preventative measures. To date, however, little has been done to correlate the theoretical with the practical.

A CATV system is generally a rather complex network and since actual leaks, according to Murphy's Law, bear little resemblance to theoretical leaks some measure of actual system leakage is essential to quantify the real-life interference potential. As this concern was developing in the fall of 1976, I became involved as a member of the interference sub-committee of the NCTA engineering advisory committee. Since the interference sub-committee was heavily involved in replying to the FCC notice of proposed rule making (Docket 21006), a lot of thought was given to ways of quantifying the problem in order to make reasonable responses to the FCC. In addition, it was desirable to give any possible guidance to the industry on controlling system leakage. I and my son Ed, also of E-Com Corporation, are both private flyers. As a matter of fact, we own a Mooney Executive, which is a four-place, 200 HP, single engine, retractable landing gear airplane. New navigation and communications radios, which are used for instrument flying, had just been installed in the Mooney. A little thought on the subject produced a plan for employing the plane and radios for fly-overs to measure actual leakage from CATV systems.

There were a number of possible ways to measure and record the leakage. At Viacom, Frank Bias and his engineer, John Huff, used a modified field strength meter in the airplane and a voltage-to-frequency converter feeding a cassette tape recorder. This was played back on the ground, the frequencies reconverted to voltages and plotted on a chart recorder. Some runs were made over the western part of the country using this system.

Bob Dickinson in the Mooney with the chart recorder used in the measurements.

In the Mooney, the decision was made to employ frequencies for measurement within the range of the communications equipment (118-136 MHz). Using this approach, single frequencies could be separated from adjacent channels in the rather crowded electro-magnetic environment of the New York City area. Since the aircraft was equipped with two Narco Com 11B radios, one of these was converted to provide an output from the AGC buss. This output was applied to a Hewlett-Packard model 680 chart recorder. The DC offset of the AGC voltage was balanced out so that the useful range of the AGC could be spread across the entire five-inch width of the chart. The receiver and chart recorder combination was then calibrated on the bench to provide a reference between input terminal voltage and the chart recorder trace location. This set-up allowed a dynamic range of at least 90 dB starting from the noise threshold of the receiver, so that all signals could be recorded (even those which were below the squelch level of the receiver). The installation of this equipment in the Mooney was quite simple since the receiver was already part of the aircraft radio complement. The chart recorder required an inverter for primary power. Both the inverter and chart recorder were placed in the rear seat area of the aircraft so that the operator could work with a little more space in the two seats behind the pilot rather than the single seat to the pilot's right. Some runs were made without a separate operator, and in this case, the chart recorder was simply placed on the right hand seat and strapped down within full view of the pilot. Two antennas are available for use on the communications radios, one on top of the fuselage and the other on the bottom. This allowed evaluation of any shielding effects from the plane.

A Meaningful Evaluation

In order to make a meaningful evaluation of the signal strength in the air some sort of a calibration run, including the effects of the aircraft, antenna, antenna location and direction of flight, was required. This calibration was achieved by use of a dipole antenna in the clear wavelengths above the ground. The dipole was excited with a signal generator at a known level. Flights were then made in various directions over and near the site to make a point source calibration. The ground reflectivity and reflections from buildings, etc. affected the signal received at the aircraft; however, the changes noted were well within the "non-precision" limits of the overall experiment.

Calibration runs as well as measurement runs are usually made at about 1000 feet above the terrain. At this altitude a number of sources may be received at once and yet it is easy to discriminate various areas of a normal CATV system.

Early flights in the New York area with Bob Bilodeau of Suburban Cable also employed a Tektronix spectrum analyzer and a ComSonic Sniffer. Operation with the spectrum analyzer gives so much information and so many unidentified signals that it is almost impossible to work with. Add to this the fact that the signals continually vary in level even in less time than it takes to sweep the screen, and you have a situation where the tendency is to increase the resolution and look at one signal only and wish that you had a way to record it. At this point the use of the communications receiver and chart recorder is a simple and straightforward way to make the measurements and recordings. The use of the Sniffer with a fixed antenna and preamp was not

implemented although it appears to be a reasonable alternate approach. A number of flights were made around Manhattan with Alan Hahn of Manhattan Cable Television, as well as occasional flights to Harrisburg, various New Jersey systems, and general passes over cable systems thought to be carrying channels A and B, which are in the aircraft communications band.

Making the fly-over of an actual system is not difficult. Cooperation between the aircraft and someone at the headend is desirable. The first order of business is to make the calibration fly-over and to make certain that the correct signal is being received in the aircraft. The person on the ground should, on command, turn the generator off and on or the modulation or use whatever identification means has been decided upon. Communications between the plane and the ground is most easily handled with walkie-talkies, but if these are not available, certain aircraft channels can be used for this purpose.

Pre-flight planning of the measurement route is essential. The CATV system engineer can provide the best information on where to fly, what to expect, and how to interpret the data. Although landmarks can be given to the pilot, the best way to fly the preplanned route is to have someone in the plane who is fully familiar with the area give directions to the pilot and make notes on the chart when various landmarks are passed. The chart recorder used in most of the Mooney flights included a market track drawn by a second pen on the edge of the chart. An external pushbutton allowed ticks to be inserted. The number and configuration of the ticks can be related to notes taken to identify various events. As a rule, continual notes are made on altitude, airspeed, and the like to allow better data correlation during the analysis phase.

Varying results have been obtained in fly-over of various systems. Certain newer systems have shown almost no measurable leakage while some of the very old systems show a very large amount. At present, the critical level seems to be a field strength of 10 microvolts per meter which is considered to be the threshold for objectionable interference by the FAA.

The general feel from the fly-overs that were done would indicate that a system that has been around for a while may show some areas where this value is exceeded and a very leaky system will exceed it quite generally. Fly-overs of this sort, therefore, can be quite valuable to system operators carrying signals that could be (now or in the future) in conflict with FAA usage. It well may be that a request for waiver is the desirable approach to paragraph 76.610 or 76.611 and in this case fly-over measurements would be good substantiating evidence.

The FCC has recently been given approval for a study to further investigate these effects. This study will include attempts to correlate ground and fly-over measurements. Similar work can reasonably be done by system operators as well who are so inclined, and the availability of such information may help the industry reduce these problems in the future.

For the future, the Mooney is expected to be used for continuing fly-overs. Thought is being given to using a multi-channel chart recorder and to instrumentation of other functions such as altitude, air speed, direction (from the VOR receiver) and distance (from the DME). These last four channels could also be done digitally, perhaps with greater ease. For those with interest in doing their own fly-overs, a call to either my son or me will yield any information that we have from our experience with our system over-flights. **C-ED**

A Special Report

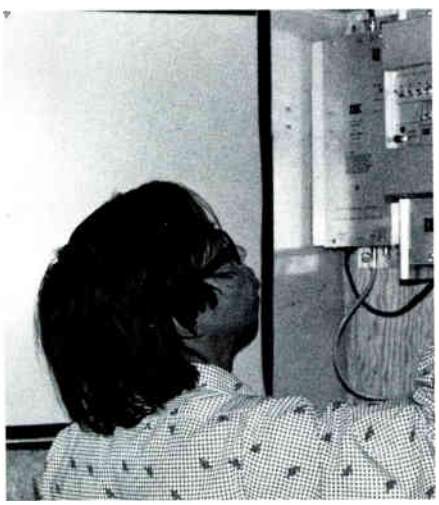
Addressable Taps Come of Age

By William L. Shaffer
Contributing Editor

The February and March issues of C-ED featured an in-depth look at Delta-Benco-Cascade, Ltd.'s Intelligent Addressable Tap. The article (a two-part series) detailed the theory of operation, system component operation and various methods of controlling and jamming premium television channels. The story also presented detailed schematics of addressable tap installations and applications.

For our convention issue, C-ED was on the scene in Winnipeg, Canada to gather first-hand information on the latest on-line applications of D-B-C's addressable tap.

The Intelligent Addressable Tap was invented by Stern Telecommunications Corporation, Winnipeg, Canada in 1975, and developed by Delta-Benco-Cascade, Ltd., Ontario, Canada. In 1976, D-B-C designed the LSI (Large Scale Integration) chip—a development that brought about the ultimate success of the addressable tap. D-B-C then produced an outdoor addressable tap to service single-family homes. These taps could also service premium channels.



A.K. Chan, designer of the addressable wallplate, examines the power supply for the wallplates installed in an elevator at the Winnipeg system.

Ultimately, D-B-C developed addressable wallplates for multi-unit dwellings. "We wanted a system whereby service could be quickly and expediently turned off and on," stated Philip A. Allman, head of field engineering for D-B-C's Vancouver facility. "With the development of our addressable wallplates," Allman added, "we have provided a service that can be switched on or off at the drop of a hat."

Addressable Taps Come First to Winnipeg

In November 1977, the first addressable wallplates were installed in an apartment skyscraper in Winnipeg, Manitoba, Canada for customers of Greater Winnipeg Cable TV. Control was initiated at Greater Winnipeg's headend facility. Service to the viewer was accomplished via an eight-digit number system on the telephone switchboard. The method of control in this system used a manual keyboard and encoder.

Since this first installation, addressable wallplates have been installed in two more apartment buildings in Winnipeg. D-B-C has also developed six more prototypes that are being installed in the MacClean-Hunter system in Toronto.

Addressable Taps Arrive in U.S.

Addressable wallplates were installed in a Gainesville, Florida, system in a residential building on the University of Florida campus. "Because of the residential turnover on a college campus," exclaimed Allman, "this will provide a great opportunity to monitor the success of the service." In April, ten more buildings on the college's residential complex were wired. If, after a three-month trial period, the addressable tap service works out to the Gainsville systems' satisfaction, its entire system will be wired with addressable taps.

The Battle of Costs

The main objection to using the addressable tap seems to be the expense involved. Ordinary wallplates in an apartment building cost about $2.00-2.50. The addressable wallplate (which controls basic cable service) costs $25. To control pay-channels, a switchable trap is added, costing an additional $10. The cable company pays for the wallplates, but it can recover expenses by charging the customer for the cable service.

There are three methods of control for the addressable taps or wallplates:

- manual keyboard and encoder—$2,500. The cost per subscriber is small and can serve the entire cable system.
- data terminal using a magnetic cassette memory in manual numbers but stored in the printout—$8,500.
- mini-computer stores all codes on memory reels—at least $20,000. Combining the use of the headend, encoder and peripheral costs—about $20,000-30,000.

A mini-computer system is expected to be used in the Gainesville, Florida, system by the end of the year. The apartment complex in Winnipeg uses the manual control approach.

In explaining the economic virtues of addressable taps, Allman declared, "There is greater economic savings in the quick connect/disconnect service of the addressable tap vs. sending someone out into the field. Most systems tend to backlog their connects and disconnects of cable service. This results in service not being turned off when the customer has moved and free service for as long as a month or more for customers who are not paying. Meanwhile, irate new customers wait for their cable service to be connected. The systems will then send out men with large numbers of connects and disconnects to do all at once. Most cable systems don't have the vaguest idea of the costs involved. It can run anywhere from $3.00 to $22.00 for each call, depending on wages, truck expenses, etc. With the addressable tap system, one man at the system's office can connect or disconnect instantly with no time lapse. You pay for the taps and that's it."

For the theory, design and application of D-B-C's addressable tap, see the February and March issues of *C-ED*.

How many of these CATV hybrid IC's do you remember?

1

Born 1970/Deceased 1973

4

Born 1976/Deceased 1977

7

Born 1971/Deceased 1973

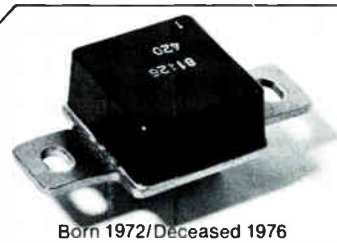
2

Born 1973/Deceased 1977

5

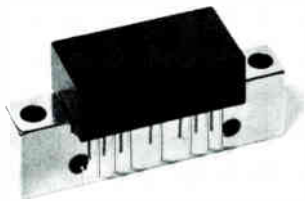
Born 1970/Deceased 1973

8



Born 1972/Deceased 1976

3



Born 1975/Deceased?

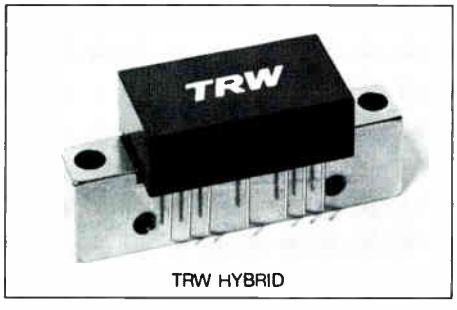
6

Born 1973/Deceased 1974

9

Born 1975/Deceased 1976

1, 2 and **3.** This manufacturer has already phased out two hybrids. How long will the third one last? **4.** This one looked like the real thing. But it didn't work like the real thing. If you got stuck, we're sorry. **5** and **6.** The manufacturer changed these from doorknobs to oblongs, but it didn't change the fact that they didn't work very well. So they weren't around very long. **7.** Another look-alike that didn't work alike. **8** and **9.** This manufacturer started with a square, then switched to a quickie-copy, and then walked out. Leaving you with amplified problems.



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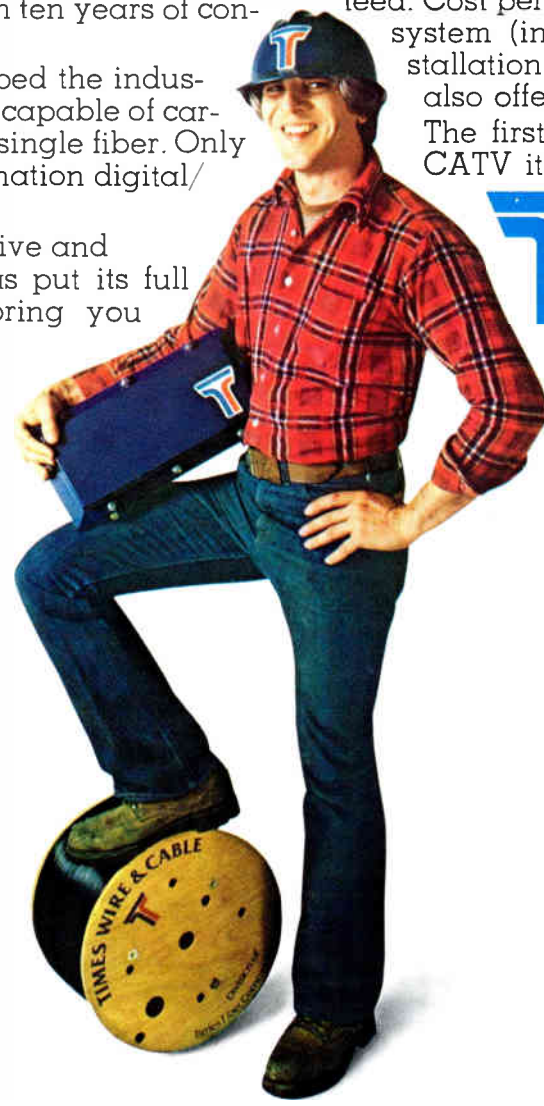

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27TH ANNUAL CONVENTION NATIONAL CABLE TELEVISION ASSOCIATION

Rivergate Convention Center • New Orleans, Louisiana • April 30—May 3, 1978

Sunday, April 30

11:00 am 1:00 pm	**Exhibits Open**
3:00 pm 7:00 pm	**Exhibits Open**
10:00 am 7:00 pm	**Registration** Concourse
1:00 pm	Opening—Olympic Marching Band
1:20 pm	**Chairman's Address** Beisswenger Award Presentation
1:40 pm	**Keynote Address** Tip O'Neill NCTA president Robert Schmidt to introduce: Philip Verveer, Chief, FCC Cable Bureau
2:30 pm	**Exhibit Hall Cable Cutting**
5:00 pm 6:00 pm	**Exhibitors' Reception**

Monday, May 1

9:45 am 6:00 pm	**Exhibits Open**
7:00 am 6:00 pm	**Registration** Concourse
8:15 am 9:45 am	**Lead-Off Session** **Engineering Management** Co-Chairmen: Kenneth Gunter UA-Columbia Cablevision, Inc. San Angelo, Texas Robert A. Luff vice president—engineering National Cable Television Assn. Washington, D.C.
	NCTA Technical Up-Date NCTA Engineering Committee Chairman: Kenneth Gunter UA-Columbia Cablevision, Inc. San Angelo, Texas
10:15 am 11:45 am	**Fiber Optics** Chairman: James W. Stilwell Communications Properties, Inc. Jenkintown, Pennsylvania "A 4.2 km Operational Fiber Optic Communications System," Frederic N. Wilkenloh, Comm/Scope Company, Catawba, North Carolina; and Dr. Marshall C. Hudson, Valtec Corporation, W. Boylston, Massachusetts "Linear Laser for CATV Application," C.J. Hwang, General Optronics Corp., S. Plainfield, New Jersey "An Eight Kilometer Fiber Optic CATV Supertrunk System," Whitworth W. Cotten and Dr. C. Richard Patisaul, Harris Corporation, Melbourne, Florida; Donald G. Monteith, Cablesystems Engineering, London, Ontario, Canada "Optical Fiber Communications, Technology and Applications," Ira Jacobs, Holmdel, New Jersey, Bell Telephone Labs.
10:15 am 11:45 am	**Two-Way** Chairman: Kevin D. Gossman Teleprompter Corporation Rochester, Minnesota

"Technical Considerations in the Design and Operation of a Two-Way CATV System in a Major Market Area," G.C. Kleykamp, UA-Columbia Cablevision, Inc., San Angelo, Texas

"The Rockford Two-Way Cable Project: Existing and Projected Technology," James B. Wright, Rockford, Cablevision, Inc.; Dr. Martin P. Block and Robert E. Yadon, MSU-NSF-Rockford Two-Way Cable Project, Michigan State University, E. Lansing, Michigan

"The New Urban Market: Paving the Way for Two-Way Telecommunications," John D. Fannetti, City of Syracuse, Syracuse, New York

"Technical Aspects of Two-Way CATV Systems in Germany," F. Kraus and R.M. Schnee, Heinrich-Hertz-Institut, Berlin, Germany

12:00 noon **Luncheon**
Grand Salon
New Orleans Hilton
Speaker: Ernest F. Hollins
M.C.: Dan Aaron
Awards: Jerry Green and Outstanding Engineering Achievement Awards
Head Table: Board and Convention Committee

Tuesday, May 2

9:45 am – 6:00 pm **Exhibits Open**

8:15 am – 9:45 am **Education and Training**

Co-Sponsored with SCTE

Moderator:
Tom Polis
Magnavox CATV Systems, Inc.
Manlius, New York

"A Crying Need—Training and Continuing Education," Fred E. Furnish, General Electric Cablevision Corp., Decatur, Illinois

"Diagnosing Cable System Faults," Kenneth L. Foster, New York State, Commission on Cable Television, Albany, New York

"Technical Personnel—Buy Them, Steal Them or Raise Your Own?" Glenn Chambers, American Television and Communications, Corp., Appleton, Wisconsin

8:15 am – 9:45 am **Advanced Techniques**

Chairman:
Frank Bias
Tele-Vue Systems, Inc.
Pleasanton, California

"The Characterization of Video A/D and D/A Converters for Cable Television Applications," Bryan F. Smith, Computer Labs., Inc., Greensboro, North Carolina

"Microprocessor for CATV Systems," Ernest O. Tunmann and James F. Roche, Tele-Engineering Corp., Framingham, Massachusetts

"Application of SAW Technology to the CATV Industry," Alex Best, Scientific-Atlanta, Inc., Atlanta, Georgia and Tom A. Martin, Anderson Labs., Bloomfield, Connecticut

10:15 am – 11:45 am **Microwave and Earth Stations**

Chairman:
G.C. Kleykamp
UA-Columbia Cablevision, Inc.
San Angelo, Texas

"From Satellite to Earth Station to Studio to S-T-L to MDS Transmitter to the Home; Pay Television Comes to Anchorage," Richard L. Vega, Telecommunications Systems, Inc., Baltimore, Maryland

"A Time Compresion Multiplex System for Multiple Video and Data Distribution for Existing Satellite Channels," Donald Kirk, Jr., Digital Communications, Inc., St. Petersburg, Florida

"Low Cost Microwave," Dana Atchley, Microwave Associates, Burlington, Massachusetts

10:15 am – 11:45 am **Testing and Maintenance**

Chairman:
Richard C. Hickman
Cox Cable Communications, Inc.
Atlanta, Georgia

"A Reliable and Reproducing Technique for Evaluating the Shielding Effectiveness of CATV Apparatus," Warren L. Braun, P.E., ComSonics, Inc., Harrisonburg, Virginia

"Improving Reliability of Drop Wire Connectors," John M. Hood, Cablesystems

	Engineering, London, Ontario, Canada "Channel Response Measurements Made Easy," Gerald L. Bahr, Mission Cable TV, Inc., San Diego, California "Cable Television Inspections by FOB Field Engineers," John Hudak, Federal Communications Commission, Washington, D.C.
12:00 noon	**Luncheon** Grand Salon, New Orleans Luncheon Speaker: FCC Chairman, Charles Ferris M.C.: Bob Schmidt Head Table: State/Regional Presidents
6:30 pm	**Reception**
7:30 pm	**NCTA Annual Banquet** Fairmont Hotel Entertainment: Frank Gorshin, Entertainer and Impressionist Awards: Larry Boggs, Idel Kaitz, and the IEEE Delmer C. Ports Award

Wednesday, May 3

9:45 am 12:00 noon	**Exhibits Open**
7:00 am 12:00 noon	**Registration** Concourse
8:15 am 11:45 am	**Systems Operation** Chairman: Nick Worth Telecable Corporation Norfolk, Virginia "Interphasing Cable Television and Broadcast Subscription Television," Early D. Monroe, Jr., Federal Communications Commission, Washington, D.C. "AGC/ASC Design," Bert Arnold, RCA/Community Television Systems, N. Hollywood, California "Co-Channel Protection Limitations of the Circularly Polarized (CP) Antenna-Array," Steven I. Biro, Biro Engineering, Princeton, New Jersey "Developmental Approaches for an Existing Cable System," Fred Ciccone and Dean Adrian, Manhattan Cable TV, New York, New York "Basic Acoustics for the Cable Television Studio," W. Sherwood Campbell, P.E., American Television and Communications Corp., Englewood, Colorado "Low-Cost System Status Monitoring," D. Stevens McVoy, Broadband Technologies, Inc., Columbus, Ohio
8:15 am 11:45 am	**Hands-On Demonstration** Co-Sponsored with SCTE Chairman: Ralph Haimowitz Indian River and Palm Bay Cablevision Sebastian, Florida Participating Associates: John Weeks Avantek Inc. Santa Clara, California Bob Welsh Wavetek Indiana Inc. Beech Grove, Indiana Raleigh Stelle Texscan Corporation Indianapolis, Indiana Cliff Schrock Tektronix, Inc. Beaverton, Oregon Harry Sadel Sadelco Inc. Weehawken, New Jersey Larry Dolan Mid State Communications Beech Grove, Indiana Carl Hensley ComSonics, Inc. Harrisonburg, Virginia
12:00 noon	**Luncheon** Grand Salon New Orleans Hilton Luncheon Speaker: Lionel Van Deerlin, Chairman of the House Communications Subcommittee Awards: Outstanding Committee Chairmen Head Table: Newly-elected Officers, Board and Committee Chairmen

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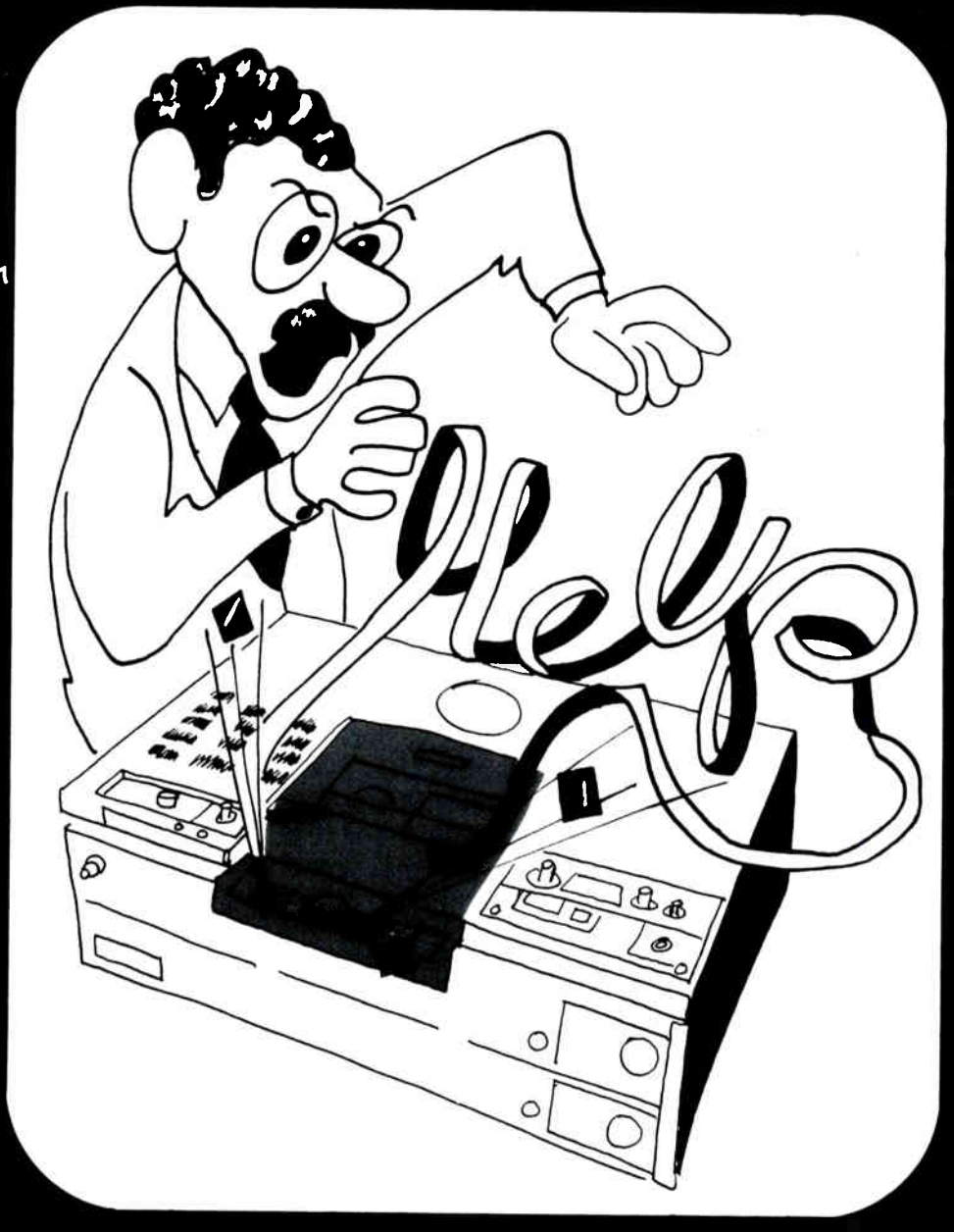

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quality video modulation. The authors also discuss both the technical and cost considerations of systems interfacing with TVRO terminals and CATV headends incorporating these new designs.

"A Reliable and Reproducing Technique for Evaluating the Shielding Effectiveness of CATV Apparatus," Warren L. Braun, P.E., ComSonics, Inc., Harrisonburg, Virginia

The CATV industry has long needed a reliable and reproducible technique for evaluating the shielding effectiveness of CATV apparatus. The author will describe an operational system capable of swept frequency integrity measurements in excess of 150 dB, over a frequency range of 5-300 MHz, a technique which does not require a screen room. Results of data obtained will be presented.

"Improving Reliability of Drop Wire Connectors," John M. Hood, Cablesystems Engineering, London, Ontario, Canada

One of the weak links in our CATV systems for years has been the 59/U drop connectors when they have been installed outdoors. This will be shown by the analysis of service call records and thousands of radiation reports indicating the same kind of problem.

This presentation will describe new concepts that are designed to solve these problems. Design objectives for the new connector have been to improve the mechanical and electrical parameters with simple installation procedures for all weather conditions. The method of assessing the economics of this new connector will also be discussed.

"Channel Response Measurements Made Easy," Gerald L. Bahr, Mission Cable TV, Inc., San Diego, California

By employing a tracking generator/receiver system (such as an Avantek sweep system) and incorporating a local oscillator with a double balanced mixer, you can develop a side band analyzer that greatly facilitates the requirement to measure and make adjustments to headend equipment, including video modulators.

This technique allows the channel response measurement to be made in the presence of other carriers, thus negating the requirements to turn the system or headend off while making these measurements.

The paper gives details as to how to modify the earlier model Avantek so they can perform this task, with block diagrams showing the correct hook up of equipment and pictures of the measured results.

"Cable Television Inspections by FOB Field Engineers," John Hudak, Federal Communications Commission, Washington, D.C.

This paper discusses the considerations of selecting a system for inspection, the responsibilities of various FCC field units, and in general terms, the technical procedures followed. Included is information regarding FOB tests to resolve conflicts concerning the point at which degradation of a TV signal is introduced, i.e., TV station, path, CATV system. Also, the cable operators responsibilities in assisting with the inspection are outlined.

"Interphasing Cable Television and Broadcast Subscription Television," Early D. Monroe, Jr., Federal Communications Commission, Washington, D.C.

This paper will address: the technical, compatibility, signal carriage problems between cable systems and BSTV, how interphasing can be accomplished, circumstances under which piracy can occur, and what can be done to minimize piracy.

"AGC/ASC Design," Bert Arnold, RCA/Community Television Systems, N. Hollywood, California

This paper describes a unique AGC/ASC design which is capable of being cascaded in every amplifier in a CATV system without the problems associated with conventional AGC/ASC designs. The paper presents a block diagram with discussion and measured results in a cascade.

"Co-Channel Protection Limitations of the Circularly Polarized (CP) Antenna-Array," Steven I. Biro, Biro Engineering, Princeton, New Jersey

This paper deals with how to obtain adequate co-channel protection with CP antenna-arrays. After illustrating the basic polarization and phasing discrimination properties of the CP antenna-array concept, the discussion will focus on the radiation pattern characteristics of various antenna-array types and configurations. The presentation concludes with the publication of co-channel protection test data, obtained during recent field measurements and observations.

"Developmental Approaches for an Existing Cable System," Fred Ciccone and Dean Adrian, Manhattan Cable TV, New York, New York

The paper will present, with the aid of audio-visuals, an analysis of the development of Manhattan Cable TV's programming effort, and the technical requirements needed to implement that effort.

A brief history of our unique system will be followed by a discussion of the new demands placed upon us, focusing particularly on those demands placed upon the transmission facility.

In conclusion, we will discuss the ways that each of our growth problems are being dealt with within our ten-year-old system. This includes partial automation, portable infrared links and signal processing equipment.

"Basic Acoustics for the Cable Television Studio," W. Sherwood Campbell, P.E., American Television and Communications Corp., Englewood, Colorado

This tutorial paper shows how to calculate the optimum reverberation time for a studio, based on its volume and whether it will be used for voice or music. Also given is the calculation of the actual reverberation time, based on the studio's volume, surface area, surface materials and contents. Using three typical local origination size studios as examples, methods for improving reverberation time are given.

"Low-Cost System Status Monitoring," D. Stevens McVoy, Broadband Technologies, Inc., Columbus, Ohio

CATV system managers and owners have for years sought an inexpensive means for monitoring the performance of cable systems. A new system has been in operation for nearly a year that monitors both the downstream and upstream direction. This new status monitoring system provides a display at the headend, for each point monitored, signal level vs. frequency data (response curve) of the downstream plant.

To be discussed are the theory of operation of this system, details on circuit implementation of the status monitors, block diagrams of the data collection hardware and microprocessor software capabilities.

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The Optimum Combination — Digital Frequency Display, Analog Level Display
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A unique sample-and-hold detector actually locks onto video sync peaks or CW carrier levels — accurate to ±1 dB and unaffected by video content.

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Measures 0.1% to 10% system hum level directly without additional equipment or special set-up — ±1 dB overall accuracy.

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AC-DC Voltmeter	Calibrated for sine or square-wave AC (RMS) for measuring system power, and for DC to check amplifier test points.
Spectrum Analyzer	Displays any portion of the CATV spectrum on a service scope, and includes front-panel sweep width and scan rate controls.
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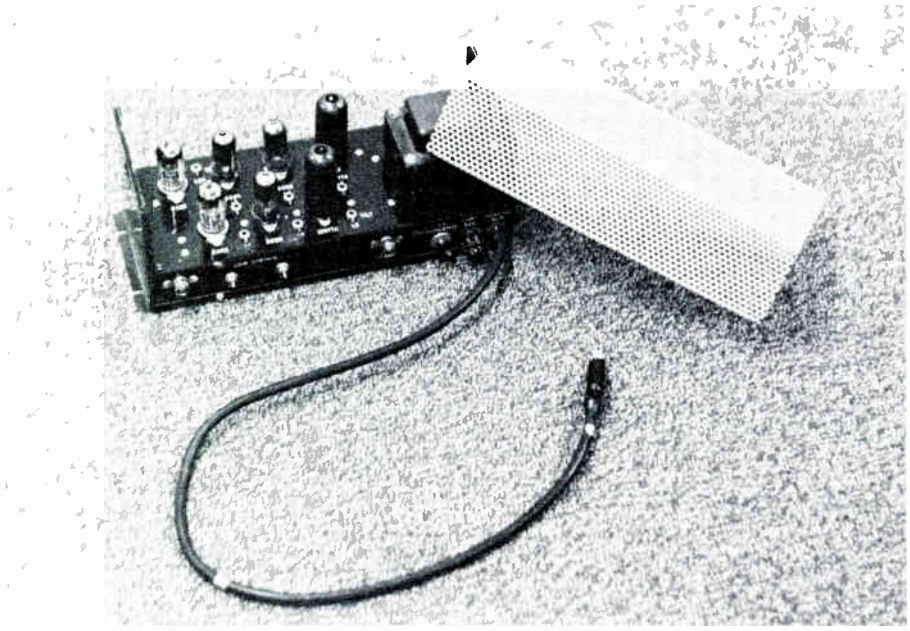
30 Years of Cable

A Cable Scrapbook

A LOOK AT THE WAY WE WERE

Featured above are the original CATV pioneers. Front row (left-to-right) are Charles Clements, Ben Conroy, Frank Thompson, Gene Schneider, Al Kosminsky, Albert Ricci, Jack Crosby and Robert Tarlton. Back Row (left-to-right) are Fred Stevenson, Bill Daniels, William Adler, Glenn Flinn, Bruce Merrill, Martin Malarkey, E. Stratford Smith, Archer Taylor, Sanford Randolph and Edward Whitney. Not shown are Milton Shapp, George Barco and Fred Lieberman.



Broadband amplifier—tube type.

Splitters.

If anyone has seen NCTA general counsel Stu Feldstein, would you please let him know what this is.

Left: Seated are (left to right) Fred Stevenson, Glenn Flinn, Bill Dalton, Sanford Randolph, Charles Clements, Al Kosminsky, Larry Boggs, Jack Crosby and Bill Adler. Standing are (left-to-right) Frank Pryor, Bill Daniels, Frank Thompson, John Morrisey, Holland Rannells, John Walson, Carl Williams, Al Ricci, George Barco, Dean DeVoe, Paul MaAdam, E. Stratford Smith, Gene Schneider, Archer Taylor, Larry DeGeorge, Lee Stoner, Ralph Shepler and unidentified.

Len Ecker is presently manager of technical services for Jerrold Electronics Corporation, Hatboro, Pennsylvania. His CATV industry experience goes back to 1950, when an organization that wanted to install a cable system in Williamsport, Pennsylvania, needed an engineer. Ecker was intrigued by the idea and went with that system as chief engineer, designer, construction supervisor; he implemented all facets of the job. He became part owner of the system—Vicoming Television. Vicoming, no longer in existence, was sold to Milt Shapp in the early '60s and was incorporated into the other two systems in Williamsport to make one large system.

Looking back over close to 30 years in cable, Ecker has noted several important technological events. For example, "The first cable systems were basically single-channel. Within a year or two, the systems went broadband, carrying all of the lowband channels 2 through 6. Shortly after that, they added FM to the systems. About 1958 or so systems went full 12 channels; in 1962 systems went to solid state strand-mounted equipment. "In 1966 we went push-pull (in excess of 12 channels), noted Ecker. "We could have used push-pull prior to 1966 but it wasn't readily acceptable. The advent of the channel commander processor, two-way capability, local origination, the use of aluminum sheath cable, and the surfacing of the FCC were all important events."

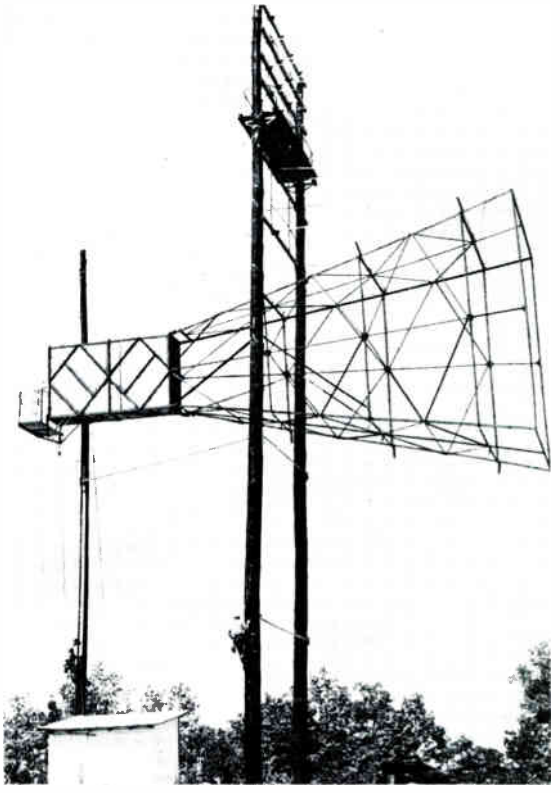
Ecker also noted that the first cable systems in Pennsylvania and Oregon came into existence because local appliance dealers couldn't sell TV sets because there wasn't any TV signal. Bob Tarlton, who started the system in Panther Valley in Williamsport, Pa., was one such dealer who couldn't sell TV sets. That's how he, Ecker recalled, and Milt Shapp got together—to create a need for television sets. It seems that every cable system in Pennsylvania that first year or so was built by an appliance dealer, including guys like Marty Malarkey and Johnny Walson.

The Jerrold executive related some interesting anecdotes. "I'm probably one of the few engineers in cable that carry the fang marks of a rattlesnake," says Ecker. "I very foolishly went to the headend of a cable system on a Sunday afternoon to escape from my family. I went up in bedroom slippers and spent about an hour-and-a-half relaxing and watching television. I decided to go back home and stepped out the door onto a stone step where a rattler was sunning himself. And bang, I got hit. We had telephone communications, so I went in and called the local emergency squad, then lay perfectly still on a cot we had up there. I spent about three or four days with a leg about four times its size."

Ecker has since recovered and is doing well in Hatboro, Pennsylvania.

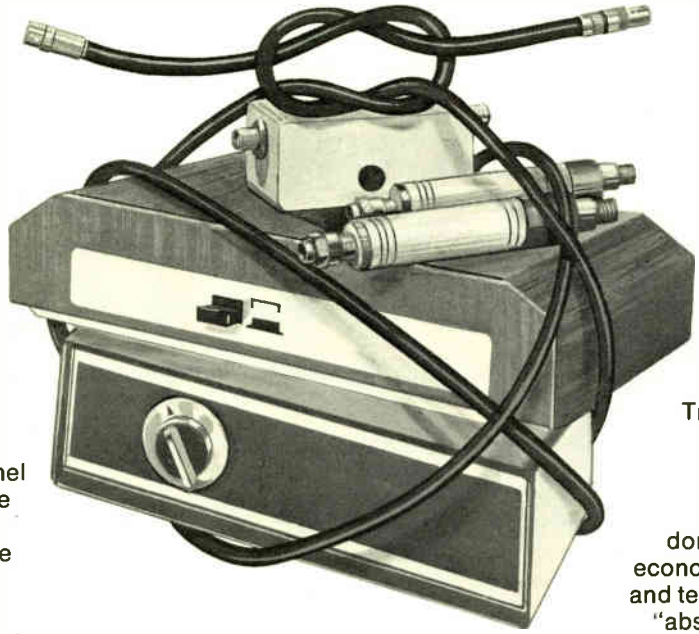
(Cont'd on page 55)

Marty Malarkey (left) and Milt Shapp.



Jerrold's horn antenna.

Negative vs Positive Systems
Audited vs Unaudited Systems
Cable Traps vs Descramblers
Lowest Overall Costs vs
Lowest Front End Costs
Single Channel or Multi-channel



Negative vs Positive System

There's no doubt about it . . . the Negs have it over the Pos. The greatest deterrent against theft of service is to not allow the premium channel into the home where it can be reconstituted . . . to trap the signal of all non-payers at the pole where it is least subject to tampering.

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Cable Traps vs Descramblers

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Bridging the Engineer

Kenneth Gunter is a key individual who has helped the industry develop from its infancy to the current highly sophisticated state of the art involving computers, satellites and a host of other technological advances.

Gunter is executive vp of UA-Columbia Cablevision in San Angelo, Texas, and is responsible for overseeing both fiscal and technical aspects of UA-Columbia's operations. In addition, he is chairman of the engineering committee at NCTA.

He began his work in cable television in 1958, when he initiated

C-ED: What's your background when it comes to engineer training and where did you go to school?

Gunter: Well, I'm a strange hybrid of both a management and engineering personality. My education is in the form of a humanities degree from Rice University. I actually have a major in English, but through my junior high, high school and college career I was very active in amateur radio. When I was 12 years old, I was the youngest ham operator in Texas for awhile. My family has always been in electronically oriented businesses—retail appliances and electronic wholesale parts merchandising. I built and operated the first FM stereo station in San Angelo in 1963. So I've had a lot of exposure to the scientific aspects of this business and, at the same time, I do have a lot of different interests. I think that my background in the humanities has helped me develop my management viewpoints. The technicians and engineers in the business who have not had an opportunity to do that have tended to become overspecialized, not only in their knowledge, but in the way their personalities have developed. I think we need two things in this business: we certainly need engineers who can conceptualize and operate in management areas and we certainly need more managers who can cross the boundaries into engineering. It is true, however, that the manager is a more versatile man, and he has not had a big problem, from the standpoint of intellectual versatility and assertiveness, in becoming more domineering in engineering matters, whereas the engineers seem to be somewhat stifled in that respect. He doesn't assert himself as well as a manager. He is not inherently that kind of personality. He does not normally operate in that kind of intellectual environment. He tends to stick to himself inwardly and with others of his type. I think that has really hampered his development as a motivating and shaping force in the industry.

C-ED: Your official title is executive vice president?

Gunter: Yes. Of UA-Columbia Cablevision, based in San Angelo, Texas. And at NCTA it's chairman of the engineering committee.

C-ED: Will you continue to be chairman of the committee for the rest of this year after the convention?

Gunter: Bob Hughes has asked me to. I'm seriously considering it.

C-ED: What should the NCTA be primarily concerned about? In engineering?

Gunter: In engineering matters it should be concerned primarily with the regulatory, legislative and political lobbying efforts. Secondarily, close on the heels of that, they need to be concerned with operator advisory services for our smaller members. Not all of our member companies are MSO's with large engineering staffs.

C-ED: Let's talk about the big problems for the engineering side of the business. I would suspect that because of the fines and forfeitures authority given the FCC in the last month, that this will mean that the smaller system or even the bigger system is going to have to really tighten things up technically, because this will be the obvious thing that they can go after them with. Are you familiar with what they can do in the FCC in terms of slapping on a fine?

Gunter: This isn't the first time they've had the right to inspect and fine a system operator. I don't think it's going to be that much of a problem because, first of all, the FCC is not really staffed to police any one industry as well as it should. The broadcasters themselves traditionally never really had much looking over their shoulders. CB today is the most infamous of all of the commission's problems. They can't even police them. I don't

ing/Management Gap

construction of the San Angelo, Texas system. His 20 years of experience in CATV includes management engineering design and maintenance of CATV and microwave systems.

Gunter was directly responsible for UA-Columbia's entry into satellite communications in 1975, when the company became the first cable company to distribute programs via satellite.

C-ED's Washington Bureau Chief Brian Lamb was able to get together with Ken Gunter and discuss some of the engineering problems facing the industry.

think we should rely as an industry on the fact that the FCC is understaffed, but that is one element in answering the question. And I don't think that the FCC has really ever abused its right to extract forfeitures from any operator. I don't think they traditionally have in the broadcast industry or in telephony, and I don't think anyone but repeated offenders would be fined in cable television. I believe if we find ourselves on the list of frequent violators perhaps we deserve a fine. The FCC technical rules are just not unreasonable.

"Without properly trained technicians . . what's the use of having optical fibers and complicated earth stations . . .?"

C-ED: What do you consider from a Washington-NCTA standpoint are the biggest problems when you sit back from your systems and look at the problems in the engineering world?

Gunter: This first year as chairman of the engineering committee I've tried very hard to let the committee members themselves address the technical questions. I've tried to be more active on behalf of engineering in the political area. I think that one thing—the image of the engineer in cable television—needs to be changed for the better. The engineering personalities tend to be herded into responsibilities that are not as glamorous, let's say, as in the management ranks; and as such, they tend to take on the appearance of second class citizens in some of the corporations and larger organizations we have. I don't think that is necessary or fair. I'm not trying to promote a technocracy, but there should be a better balance between management and engineering forces.

C-ED: How much of this is the engineers' fault themselves?

Gunter: A lot of it is due to the basic characteristics of the engineering personality. First of all, he's an intense, studious, and austere fellow almost by definition. He's not as personable, as outgoing, and as politic as a management-oriented person. And so to that extent at least, he leads with his own chin. He asks for some of the relegations to the less visible positions in his company and perhaps in the industry.

C-ED: Are the engineers in the cable business active enough for your taste?

Gunter: They're active enough in an academic sense. Any convention you go to you'll see engineering personalities start siding off into their own discussion groups discussing mostly engineering and technical matters. SCTE is a good example of the kind of binding force that we have in the industry among engineers, but it rarely addresses any topic except engineering. Management problems never seem to emerge.

C-ED: Should SCTE address other topics in your opinion?

Gunter: Well, I'm not sure it should. That's why I'm working so hard with the NCTA engineering committee to utilize the NCTA as a medium to bring the engineer more out of his shell and into the spotlight of the industry where he belongs. SCTE probably is best defined as an engineering forum for engineers alone.

C-ED: What's your opinion of the job SCTE does?

Gunter: I think SCTE has been a fantastic organization for the engineering camp. It has succeeded, frankly, where NCTA has failed.

C-ED: Could they improve in their operation? And what would you recommend?

Gunter: Well, actually, if they had more resources and more money they might do a somewhat better job, but they've gotten tremendous mileage out of what they had to work with. I have very little complaint about SCTE.

C-ED: What about the state of engineering in the cable business. You sometimes hear complaints that the workmanship is shoddy.

Gunter: It is vastly improved from the earlier years I remember, and I've been in this business for 20 years. The industry is still young. If I looked at some of the first systems I built I would judge them to be poorly engineered, but we did the best with what we had to work with. That excuse, today, of course, is no longer valid. The manufacturers in our industry have brought forth tremendous innovations and high quality construction techniques into cables, amplifiers and our passive devices. So really, the badly engineered systems are becoming a thing of the past. I think most of the momentum is coming from within the industry. I don't think

the FCC rules themselves, although they're quite fair and reasonable constraints to place on the industry, have had that much to do with the turning up of the quality curve that we see now. I think it has come from within.

C-ED: What's in the crystal ball for the future? As you go through, say, the next ten years, what are the kind of things that will change in engineering in your opinion?

Gunter: The new technologies like satellite transmission and fiberoptics will very likely dominate the scene. I would say that there will be as many or more changes in the personnel and the approaches we take to engineering in this industry. I think we focus too much on the hardware changes alone in the engineering side of the business. It's going to mean very little to us if we continue to have all the space-age innovations we've seen in the last few years if we don't have people to keep up with the pace. Without properly trained technicians, good instrumentation, and people who know how to use it, what's the use of having optical fibers and complicated earth stations and whatever else we imagine might happen in the next few years? We must have skilled people. One of the biggest shortcomings in the business right now is highly trained people.

C-ED: Let's talk a little bit about the technology. What is going to happen to earth stations?

Gunter: Well, already since April of 1975, when we announced our plans for the first earth station which was actually physically installed and turned on in September 1975, we have moved almost subconsciously from a one-channel device to what is obviously going to be a multi-channel device. I think three years ago very few of us really thought that we would have more than just a pay television circuit running through the satellite. I'm sure now that for one thing, even with the HBO question resolved about which satellite they're going to be using in the next five or ten years, we're still seeing only the tip of the iceberg on the number of channels that will become available through only one earth station. I feel confident in my own mind that, in the next three years, you're going to see many of our single earth station headends expanded into double earth station headends so that we'll have two-bird capacity.

"I think that . . . the image of the engineer in cable television needs to be changed for the better."

C-ED: What's the rough estimate of putting in a two-bird capacity if you already have a single-bird capacity?

Gunter: Depending upon how much redundancy we bought the first time around in the form of extra LNA s, extra receivers, and standby switching, I would guess that if you just added a 4½ meter dish, you would probably spend $15,000. If you added an extra LNA of the proper noise figure for most of the continental United States, you'd spend an additional $3-4,000. So, for somewhere between $15-22,000 turnkey I'm sure you could equip a fully redundant second earth station and have not only electronic overlap in your system but fixed orientation towards two satellites.

C-ED: What about fiberoptics? Do you feel that your systems will ever use fiberoptics?

Gunter: I'm sure that in the future I'll be using fiberoptics; first in the area of point-to-point interconnections between either headends or remote sites, perhaps in the form of supertrunks between cities or in townships. But I do think that we're getting off in a storm at the moment in optical fibers. I don't think that the state of the art in optics is mature enough to really begin to talk seriously about operational systems in the industry.

C-ED: Any predictions when the state of the art will be at a point where there will be widespread use of fiberoptics?

Gunter: We'll have to take into consideration two things: present pace of the development of the art as well as the potential application for the fibers when they're ready to sell to operation systems. I would guess if you combine the two in the curves as I see them now, you're talking about something in the next three-five years. However, there will have to be distinct advantages over conventional RF systems. UACC won't use them just because they are niftier.

C-ED: Do you feel in the next ten years there will be an end-to-end fiberoptic system in the cable industry?

Gunter: All the way to the subscriber?

C-ED: All the way to the subscriber.

Gunter: I think it's possible that in the next ten years you could, at least in theory, do a headend-to-subscriber optical system. I'm not sure right now until I hear more about the capital costs of that kind of system how soon you'll see it replacing our present RF distribution systems. If the capital cost is higher for optical, it must be justified by greater revenue possibilities of some kind.

C-ED: As the technology improves, do you anticipate that the cost of doing a system in the major urban markets will be such that they will be more attractive to more MSO's?

Gunter: Well, again, the cost that we lay out to build any market has to be inevitably linked back to the revenue possibilities of that market. If the regulatory picture improves, if we succeed at the NCTA level in pressing our fight for deregulation to the point where we have almost unlimited ability to import the signals to really exploit the market so that the price for the services can be commensurate with not only the marketplace itself, but the range of services we're offering, the bigger markets will then be more feasible than they are now. The manufacturers in this business have already done a wonderful job in controlling costs. Large scale integration and microelectronics is doing a lot to stabilize costs in the face of a spiraling inflationary economy. Cable costs

have remained almost constant in a very volatile metal and labor marketplace. The only real increases, of course, in construction costs in any market, large or small, has been in the area of labor, and that's the one big factor that's going to press construction costs upwards.

C-ED: You've often stated that engineers waste a lot of time when they get together in groups. Is this true when they get together in the NCTA and the SCTE?

Gunter: I think a lot of engineering meetings end up in futile argument. There is no question that they do resolve some very useful engineering questions in the academic sense, but I would guess that a group of engineers in this industry would take two to three times longer to solve a problem near and dear to their profession than it would a similar group of management types because, first of all, engineers love to argue. They love a debate. I'm not saying that managers aren't capable of long protracted argument, because I've witnessed those too, but if I were to give you just a generalized opinion of which is the more verbose, which one wastes more time in getting to the point, it is definitely the engineer.

"... in the next three years, you're going to see many of our single earth station headends expanded into double earth station headends ..."

C-ED: Any solutions to that problem, any way to streamline the process?

Gunter: We have had a little experience with this problem in our engineering committee this first year. We have some very talented engineers on that committee. I would guess that the 12 members of my committee are among the best engineering brains in the industry. And I've already had a little trouble refereeing engineering arguments there, because they do erupt into time-consuming discussions that don't really lead quickly to a solution of the problem that we're after. In that sense, that is another reason why I personally try to avoid becoming involved directly in the pure engineering arguments on the committee. I try to stay a little aloof to that and manage just the parliamentary habits, and to then enunciate what the committee comes up with to our board of directors in a better way than has been done before. I think that's my real value. It's not in arguing engineering topics with people who know more about engineering than I know.

C-ED: If you stay on as chairman, what changes would you like to see happen for the engineers to improve the climate for the engineering part of cable for the next year?

Gunter: Well, the problem for Year Number 2 will be a continuation of the problems for Year Number 1. This first year that we've spent has certainly not been enough time to undo the tradition of 30 years in this industry. A lot of the things we're working on are symbolic in terms of improving the prestige of the engineering person in this industry. One is in the area of awards. I think that at the New Orleans convention, after we have made this attempt to turn the engineer around in the industry and gain more acceptance, you'll see that there will be less of the engineers getting off into their own little corner and getting their awards in a place you can hardly find unless you have a map of the hotel; you'll find that the engineers will be consorting more with the management types. I am on the convention committee, and we've made a strong effort to involve engineers and management on the same panels. In fact, there will be a panel at this year's convention in New Orleans which will address the subject of how the manager and the engineer should interface in system operations. One thing for the second year, which you'll see happen, will be some assurance that engineering personalities will be given consideration for some of the key industry awards. For instance, the Larry Boggs Award has always gone to a management person. But there's nothing in the rules that says the Larry Boggs or any other prestigious NCTA award for services during the past year couldn't go to an engineer for an engineering achievement. The engineering community has never had representation on the awards committee, but the board has now very graciously consented to give us a crack at that and to allow engineering representation on the awards committee.

C-ED: Is the present NCTA board in a good frame of mind to begin to accept your suggestion of more recognition and stature for engineers?

Gunter: Years ago I was very critical of the NCTA board for being so inbred and self-serving. Lately, there has been dramatic improvements in the willingness of NCTA leadership to consider the needs of its entire membership. In particular, the independent or small operator has a stronger voice, and our associate members, the vendors and professionals, are more influential in NCTA affairs. This past year, I sensed a real empathy from the board for attention to the engineering needs of the industry, and I predict the support will increase even more next year.

C-ED: You seem to straddle the fence between engineering and management areas as well as anyone in our industry. Do you recommend that others try to do the same?

Gunter: All I can say is that it has worked well for me personally, and in the particular climate we have developed at UACC. There are times when the dual roles I play cause a kind of identity crisis for me internally and, I'm sure, for others in my company. But I'm certain of one thing: every CATV organization needs at least one key person who speaks both languages well, and can interpret one in the light of the other. It may be possible to achieve the same result through a close association of two or more engineers and managers acting as a team, but even that approach has its limitations. We simply need more technical minds who can think simultaneously in terms of management goals. I can only hope that by breaking down some of our old tendencies to treat engineers as tools of management, rather than equals, we will spawn more "manageers." C-ED

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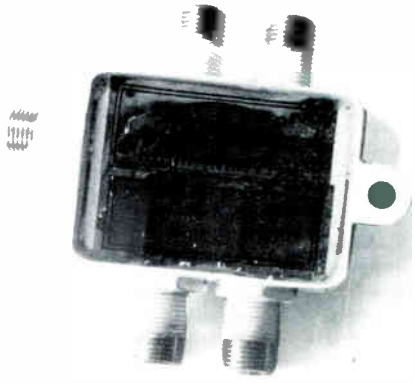

Model 602-S, 2-Way Splitter

Frequency range	5-300m Hz
Return loss	20db min.
Isolation	30db min.
Insertion loss	3.3db max.
Response flatness	± .1db

Model 654-S, 4-Way Splitter

Frequency range	5-300m Hz.
Return loss	20db min.
Isolation	30db min.
Insertion loss	6.3db max.
Response flatness	± .1db

600 SERIES FOAMED AND SEALED OUTDOOR SPLITTERS AND GROUND BLOCK

The LECTRO 600 Series are designed to give continuous service even under the most severe mechanical and environmental conditions. Each unit is housed in a zinc plated steel can with high quality plated brass waterproof connectors. The entire unit is foam filled, painted and all seams sealed with epoxy resin. This not only assures an absolute moistureproof unit, but also assures consistent performance regardless of abuse by holding each part exactly in place; thus eliminating most maintenance and giving years of trouble-free service.

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(Cont'd from page 48)

Doug Dittrick, when cable was young.

Weather information center.

Below: Seated (left to right) are Pat Hughes, Al Stern, Ben Conroy, Fred Ford, Bob Tarlton and Frank Valentine. Standing (left to right) are Bob Clark, Bob Magness, Irving Kahn, Jim Palmer, Bob Weir, Al Kosminsky, Harry Butcher, Jack Crosby, George Barco, Al Ricci, Warren Fribley, John Rannels, John Morrisey, unidentified, Ed Whitney, Archer Taylor, Frank Thompson and Bruce Merrill.

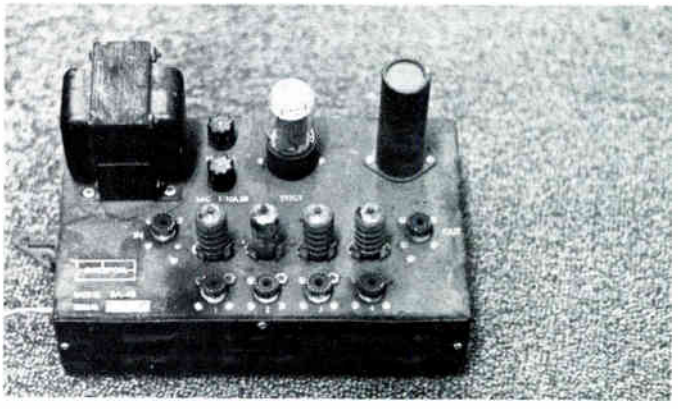
"Back in the early days, we had a 400-foot tower in Uvalde, Texas. We tried to get signals from San Antonio, about 90 or so miles away. Obviously, we had our antennas way up on top of the tower. Now, down in that part of the country, you get a lot of buzzards, big old buzzards that roost on your antennas, and there's enough of them up there that they can damage your antennas, because they are pretty big old birds. We were trying to figure out various ways to get these things off of there, including firing rifles and so on. The way that we finally succeeded in doing this was getting ahold of an old Navy outdoor loudspeaker. We sent a twisted phone pair up the tower, put the loudspeaker at the top, hooked up the radio and hooked into the audio of one of the TV stations we were carrying. That blared them out. The only thing that did it was the audio from the TV station, so maybe it was the commercials that drove them away."

Ben Conroy has come a long way in cable television from blaring buzzards off the top of antenna towers in Uvalde, Texas. After his initial involvement with the Jerrold franchise in Uvalde, Conroy soon found himself investing in other systems, including ones in Effingham, Illinois, and Cotulla, Texas. In 1966 he got together with Jack Crosby, Gene Schneider and Glen Flynn to form General Communications and Entertainment (GenCoe). This combination of properties was later merged into Livingston Oil Company of Tulsa, Oklahoma.

In 1968, however, Crosby and Conroy found themselves in disagreement with the oil company and bought back their properties in Uvalde and Del Rio, Texas. They then formed Communications Properties Inc., and were able to expand the company by floating a public issue. With the money raised, they were able to acquire new systems, including Tower and Communications in Ohio and Fred Lieberman's Telesystems based in Philadelphia. With acquisitions and new construction, CPI has evolved today into a 48 to 50 system company with close to 300,000 subscribers.

Conroy sees the major changes in cable over the last 20 some years centering, for the most part, on advanced technology. He numbers satellite technology and the resultant ability to carry non-broadcast material, as well as fiberoptics, as few of the significant technological developments.

Probably the most significant change the CPI executive and cable pioneer has seen, though, is the sheer growth in the industry. "There's just been a whole bunch of us who have been involved and knew each other in the old days, and it was a little different in those days. I'm not so sure it wasn't a little more fun."



Old Entron tube amplifier.

Philco booth.

Coming into the cable industry in 1952 after a start in small town radio broadcasting, **Bruce Merrill**, president of Merrill Cable Equipment Company, has endured most of the hardships that have affected the cable industry and predicts a rosy future for it. "I predict," he says, "that during the next 30 years cable will become the predominant communications medium in the country. The technology will develop to the point where all systems will be interacted. We will approach the wired nation concept."

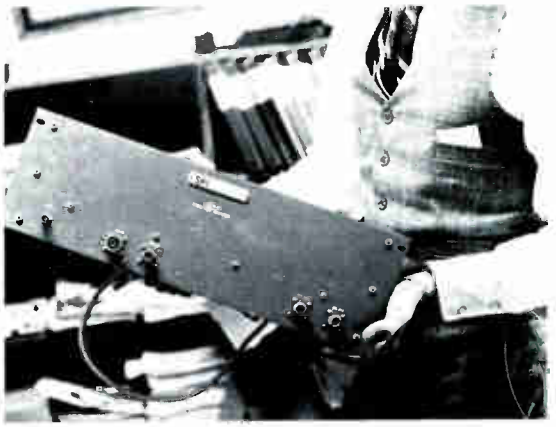
During the first ten years, cable, Merrill says, had virtually free rein to operate. Yet, when the broadcast industry became nervous in the '60's, cable's freedom was severely curtailed. "Probably," says Merrill, "the single most damaging thing the broadcast industry did to cable outside of the freeze was the ban against the importation of distant signals. In our earlier years, we were able to import signals at will, and that made it much easier to expand. When they stopped us from doing that in the early '60's, that's what damaged the growth of the industry."

Merrill believes, however, that things have improved substantially since 1966. "We still have a ways to go," he says, "but if we could break the shackles on the importation of signals and on duplication, or at least put the onus on the broadcasters to prove that they are being damaged by these rules, then I think we'd be back where we were in the early '60s. The market would regulate the rate at which we could expand." Merrill adds, "All we need is legislation to set us free; we don't need legislation to help us."

Technologically, Merrill views the development of solid state equipment as singularly important to the advancement of cable. He says that it "enabled us to do things we never could have done before." He adds that for his company "most of the significant things that have happened have been technological; that concept hasn't changed a great deal from the early stages."

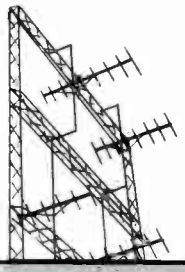
Corner reflectors.

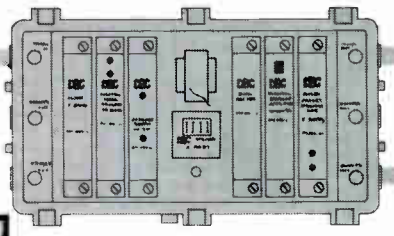
The first person to correctly identify this device will receive a free subscription to C-ED *and* CableVision.



SKL amplifier.

Chuck Walsh (left) and Marty Malarkey.





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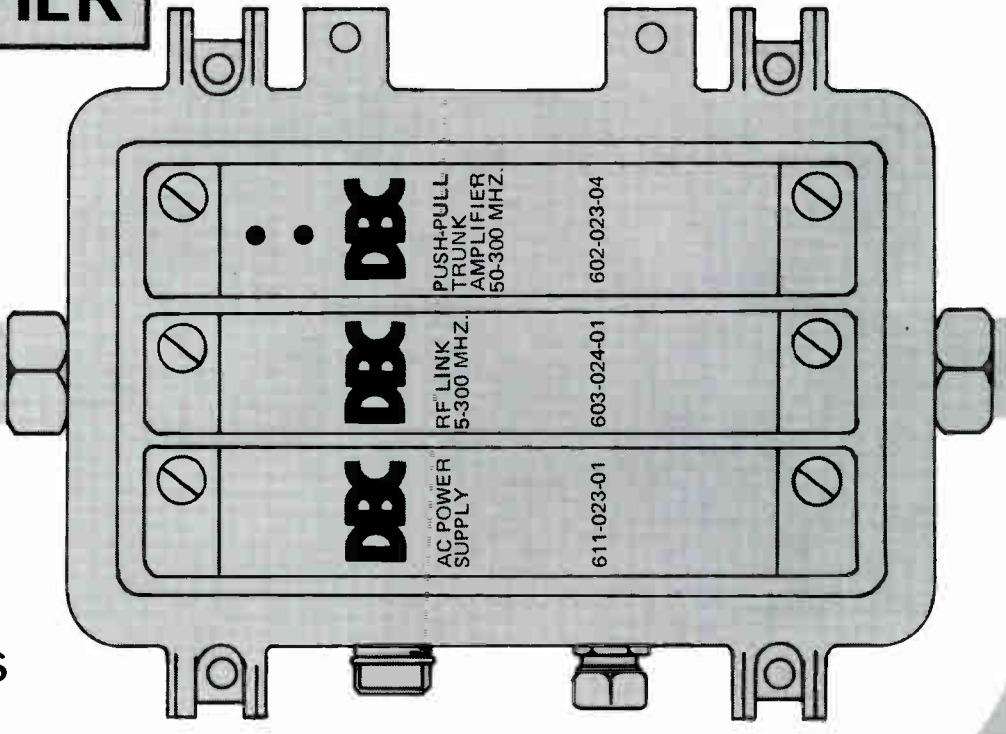

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Power Supplies

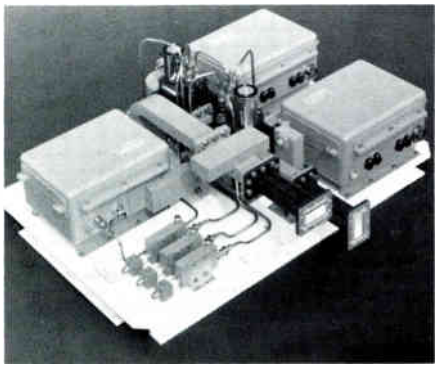
LNR's Tridundant™ Provides 3.7 to 4.2 GHz Frequency Reuse in Alaska

LNR Communications has been awarded several contracts by RCA Alascom to supply NC4-45DP dual polarization Tridundant™ systems for frequency reuse. The Tridundant™ systems have been delivered and installed at the Lena Point, Bartlett and Eagle River satellite earth stations in Alaska.

LNR's Tridundant™ system provides this capacity with two on-line amplifier channels and a single amplifier as backup to both. An alarm from either of the on-line units will cause the backup to be automatically inserted in its place. This one-for-two backup assures high circuit availability at a considerably reduced cost compared to a dual one-for-one backup system. Any of the NC4 series may be used for this system.

A channel select panel contains all of the switching, control functions and indicators. Automatic fault sensing and switchover logic assures uninterrupted service. Manual or telemetered override is also provided.

For more information, contact LNR Communications Inc., 180 Marcus Blvd., Hauppauge, New York 11787, (516) 273-7111.



Spectron Introduces Portable Datascopes

Spectron Corporation has introduced two new lightweight, portable Datascope data communications test instruments for use in field troubleshooting.

The two new models—D-301 and D-302—feature large storage capacity and speeds up to 72 Kbps (D-301) and 2.5 megabits per second (D-302). Both units feature a large, all-electronic buffer in place of tape.

The two new data communications diagnostic instruments help pinpoint problems in system hardware and software by showing exactly what was sent and received over the data link. System operation is shown in full detail, making errors caused by software bugs, equipment malfunctions or line troubles immediately visible, and reducing time spent in troubleshooting.

For more information, contact Spectron Corporation, 344 New Albany Rd., Moorestown, New Jersey 08057, (609) 234-5700.

Standby Power for Distribution Systems/Headends

Communications Distribution Corporation has introduced the Lectro Products model 30/60-12A standby power system for CATV distribution systems. The unit employees plug-in PC cards, metered battery voltage and output current.

The standby system will supply 30 or 60 volts AC output at 720 watts, utilizing a 24 volt input battery supply for minimum cost at maximum reliability.

Also new from Communications Distribution is a standby power system for headends. The Lectro Products model 115-6A standby system immediately switches on to provide 115 volt AC power at 720 watts when primary power fails. The unit is designed for maximum reliability with minimum cost by using 24 volt battery input.

For additional information, write Communications Distribution Corporation, 120 Collins Blvd., Athens, Georgia 30603, or call (404) 353-1159.

New Thumbwheels Offer LED Lighting At Lower Cost

The first digital thumbwheel switches with LED lighting have been introduced by the The Digitran Company. The company has stated that these switches are priced at half the price of comparable switches.

The new switches—designated the 43000, 44000 and 45000 miniswitches—also feature snap-together assembly. They are available in most popular codes and come in front-mounted or rear-mounted versions. Direct solder or optional PC mount (pin) terminations are available. For further information, contact The Digitran Company, 855 S. Arroyo Parkway, Pasadena, California 91105.

Test Equipment

Low-Cost 500 MHz and 1 GHz Frequency Counters Introduced

A versatile series of professional quality, low-cost 500 MHz and 1 GHz frequency counters—designed for reliability and high accuracy in communications, engineering labs and general electronics applications—has been introduced by Davis Electronics.

Covering the entire frequency spectrum to 1000 MHz, the Davis CTR-2A series of wide range VHF-UHF frequency counters combines a 50 MHz (100 MHz in model CTR-2A-1000) counting range with built-in prescaler and preamplifier. A period measurement option is available to further extend usefulness of the CTR-2A series.

Superior features include 8-digit display, built in VHF-UHF preamp and prescaler, high stability TCXO time base, automatic input limiting, protected input, and automatic Dp placement. Selectable gate times are 0.1 and 1 sec. (10 sec. optional), with resolution to 1 Hz (or 0.1 Hz with 10 sec. option). Available low cost options are oven crystal, 12V DC operation, 10 sec. time base, tilt handle, oversize digital display and period measurement.

For further information, contact Davis Electronics, 636 Sheridan Dr., Tonawanda, New York 14150, (716) 874-5848.

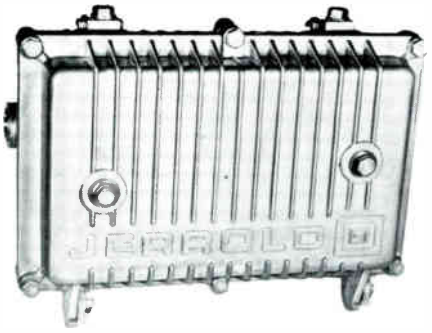
Passives

Jerrold Introduces Mini-Bridger, X-Pendable Chassis and Power Pack

At the 1978 NCTA Show in New Orleans, Jerrold Electronics Corporation will introduce a new mini-bridger with 45 dB gain. Designated the JLE-5, this new mini-bridger is interchangeable with any intermediate/terminating bridger-type (SJA-5) amplifier for new CATV systems, drop-ins, rebuilds or extensions.

Another new member of Jerrold's X-panded JLE-family is a high-gain (36 dB) line extender. This JLE-6 line extender can also serve as a low-cost mini-bridger to stretch a feeder line without adding an additional line extender.

The new power pack, designated SJSP-60, is capable of supplying fully loaded one-way or two-way stations. Primary input-voltage ranges are: 40 to 50 rms remote and 50 to 60 rms local, at 50/60 Hz. Output voltage is 27V DC, +0.25 50/50 Hz. Output voltage is 27V DC, +0.25 V.



RMS Introduces New Splitters and Couplers

RMS Electronics, Incorporated, has introduced a new series of two-way and three-way splitters and directional couplers for apartment, house, hotel, school, hospital or any multi-unit TV hook-up installations.

The units are miniaturized in size 1-7/8" L x 1-1/8" W x 5/8" D including F-61A terminals. Made in a totally moisture-proof and shielded die-cast housing with "chromate plating," these units are suitable for both indoor or outdoor installations. The units were specifically designed to fit into the new RMS "Hide-A-Way" maulding duct #HW-108 and HW-208.

Phone collect for additional information, (212) 892-1000.

Microwave

Hughes AML Receivers Extend Coverage Capability for CATV

A wider coverage area for CATV systems using Hughes Aircraft Company's AML local distribution microwave equipment is promised by means of a 19 dB improvement in second-order intermodulation products recently made in all Hughes' current AML receiver models.

The 40-channel receivers, available in both indoor and outdoor versions, have the same performance features as the earlier models they replace, including phase-lock operation on some models and synchronous cross-modulation in excess of 90 dB.

In addition to its availability on all new AML receivers, the improvement is available on a retrofit basis for customers with earlier models. For further information, contact Hughes Microwave Communications Products, P.O. Box 2999, Torrance, California 90509, (213) 534-2146.

Fiberoptics

Times Fiber Develops 7 dB/km Fiberguide Optical Waveguide

A new graded index optical waveguide with an optical loss of 7 dB/km at 800 nanometers has been developed by the Fiber Communications Division of Times Fiber Communications, Wallingford, CT. Designated the GA7-100, this new multimode waveguide has a bandwidth of 250 MHz-km at the -3 dB optical power points.

According to Times, GA7-100 is a glass-core/glass-clad optical waveguide manufactured by a method that achieves a 100,000 psi tensile strength.

For additional information, contact Times Fiber Communications, 358 Hall Ave., Wallingford, Connecticut 06492, (203) 265-2361.

Low Cost Fiberoptic Data Link

A new, low cost fiberoptic data link is available from Valtec Corporation. Designed as a "turnkey" system, the model RSH-D1 is an asynchronous full duplex link which can handle data rates to 20 KBPS.

A standard, 25-pin, computer type connector is used for electrical input and output signals. Power is obtained from a wall outlet. Fiberoptic connectors are mounted on the link which mate directly to Valtec's PC-10 fiberoptic duplex cable. Transmission to 300 feet (100 meters) is standard.

For further information, contact J. Morris Weinberg at Valtec Corporation, West Boylston, Massachusetts 01583, (617) 835-6082.

Miscellaneous

Modification Kit Replaces 20520 MOT Chip In Theta-Com XR2HM

A new modification kit for the Theta-Com XR2HM amplifier has been designed by Broadband Engineering. The kit was designed to alleviate the ever-increasing problems of delivery on the round 20520 Motorola R.F. I.C. chip used in the module. Broadband not only replaces the two chips with one readily available chip, but also improves the specifications for the module.

Broadband has also designed a modification kit to replace the R.F. I.C. chip used in the Anaconda 2033T/2130 amplifier. This Mod-Kit can be installed by a technician in 15 minutes.

For more details on these products, contact Broadband Engineering, Inc., 1525 Cypress Dr., Jupiter, Florida 33458, (800) 327-6690 or in Florida, (305) 747-5000.

New Video Display Offers Higher Resolution

A new 6½ inch, flat screen video display monitor, the Tektronix 634, offers improvements in resolution, brightness level, brightness uniformity, and geometric distortion, while interfacing easily with other system components.

Worst case resolution of the 634 is 1100 lines (1400 lines nominal) at 100 cd/m^2 (30 fL) (shrinking raster measurement). This is equivalent to 660 lines worst case and 840 lines nominal at a 90 percent modulation index. This high brightness and resolution means a greater black to white range for better grayscale images.

For more information, contact Tektronix, Inc., P.O. Box 500, Beaverton, Oregon 97077, (503) 644-0161.

How One Cable Manufacturer Is Cutting Utility Bills

Have you checked your power consumption bills lately? Surprised how they continue to increase—significantly? At this year's NCTA Show, Jerrold will show you how you can reduce your power bills for trunk-line equipment by at least 7 percent, and perhaps as much as 50 percent.

Those significant savings can be coupled with an unsurpassed level of reliability to ensure uninterrupted delivery of basic CATV and premium-program services to your subscribers.

One of the featured products in the Jerrold booth in New Orleans will be a new "Super Switcher" SJSW-60 (or 30) power pack. This energy-miser innovation can significantly reduce power consumption for individual mainstation amplifiers and for complete CATV systems. It also incorporates all the benefits of Jerrold's patented Adaptive Power Control by being able to operate over an extremely wide dynamic voltage range—ignoring overvoltages and transients, with no interruption in services to subscribers.

CATV system operators have frequently experienced equipment (or total system) failures as the result of external disturbances such as power-line surges or lightning storms. Few operators realize most external disturbances must first generate longitudinal sheath currents along the coaxial cable.

The problems of longitudinal sheath currents have never been minor. Those problems are compounded by system growth, both in the length of distribution plant and in the number of CATV and pay-TV services provided.

How do external disturbances generate disruptive voltages or currents inside a shielded coaxial cable?

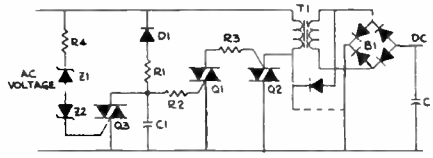
Whenever current flows in any cable sheath, a voltage drop will result since cable sheaths have finite resistivity. This voltage drop will couple with the normal system voltage (adding to or subtracting from the system voltage). Coupling is therefore a direct result of longitudinal sheath currents on the outside of the coaxial cable.

There are two primary types of longitudinal sheath currents which can be induced into a CATV system. The first is the overvoltage transient or surge current. It is usually large in magnitude, but short in duration. These less-than-a-second current surges may result from lightning storms, residential load switching or power company problems such as arcing faults or power switchovers.

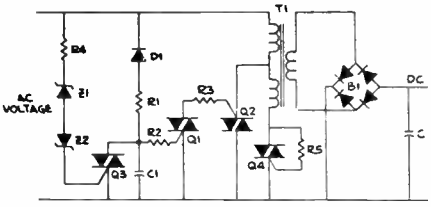
Of much more serious concern for CATV systems is another form of longitudinal sheath current. It's lower in magnitude than a surge current; but it may last for much longer durations—from a few seconds to several hours. This "steady-state" disruptive current can reduce system reliability by decreasing the CATV equipment's "engineering margin" of operational safety. It is this type of disruptive current that can lead to a power outage during a storm or even on a clear, sunny day.

Traditional Protection

How have CATV amplifiers traditionally been protected? AC input power is transformed to DC by regulating-type power supplies incorporated in the amplifiers. Traditionally, these built-in DC power supplies have been protected from



Half-Wave



Full-Wave

The new "energy-miser" switching power packs are shown here.

AC overvoltage damage by: fuses, circuit breakers, surge protectors and "crowbar" circuits. (It was assumed these devices protect power supplies and RF modules from voltage transients.)

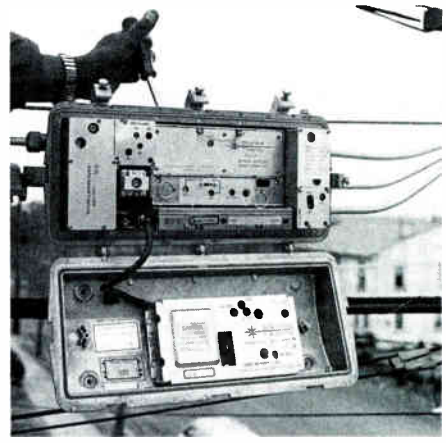
In certain amplifier locations and in some geographic locations, the traditional protective circuits have helped to *reduce* module damage—but at the expense of substantially heavier maintenance costs involved in the replacement of fuses, surge protectors, etc.

It is interesting to note that certain geographic areas of the country have always required heavier, and hence more costly, preventive maintenance schedules for CATV distribution systems. This is because these locations experience numerous power discontinuities, caused by common grounding problems through certain kinds of soils or by unpredictable hostile environments where severe lightning storms are not infrequent.

Adaptive Power Control

Jerrold's concern for energy conservation surfaced in 1975 at the NCTA Show when they first introduced Adaptive Power Control, a patented circuit innovation which automatically adapts to—and compensates for—overvoltages and transients, with no interruption in amplifier performance. At this year's show, Jerrold will introduce the new SJSW-60 (or 30) switching power pack. It combines the reliability and protective features previously achieved with Adaptive Power Control, and does so with *significantly reduced power*.

The new "Super Switcher" SJSW-60 (or 30) power pack combines additional energy-miser innovations—to further reduce power consumption at least another 7 percent and perhaps as much as 50 percent on a complete CATV

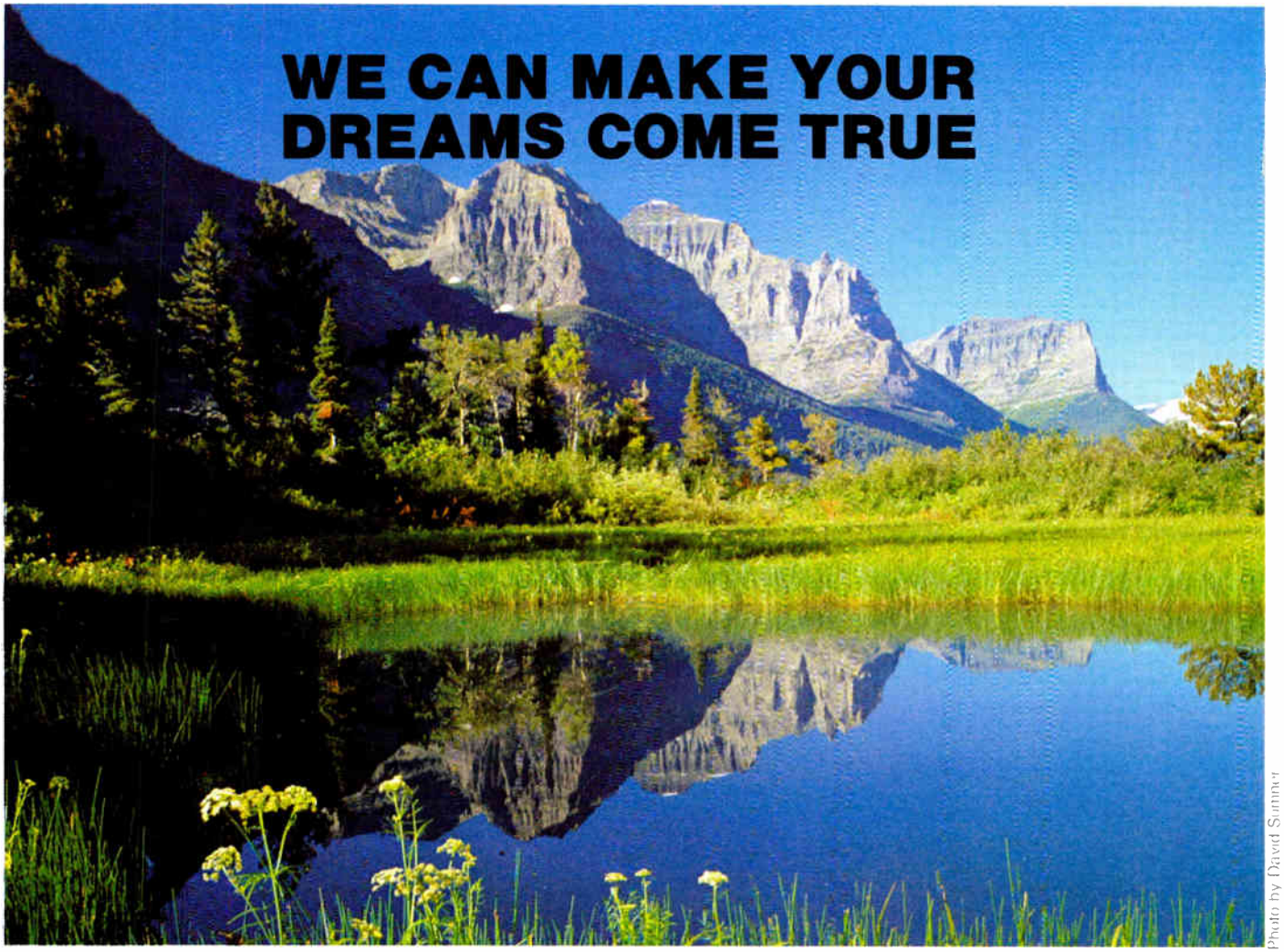


Jerrold's new power packs can be installed in any Starline Twenty amplifier.

system—with a field-proven continuous, regulated DC power supply that will withstand overvoltages up to 150 volts peak, while continuing to operate with normal DC output. This means: (1) no loss of service to subscribers; and (2) no wasted energy and expenses—for manpower or gasoline—handling fuse replacements in the field.

For CATV systems with ten-year old distribution amplifiers or for yet-to-be-installed Starline 20/300A systems, the new energy-miser power packs will reduce power bills, ensure reliable delivery of basic and premium services, and eliminate maintenance problems and service costs associated with fuse replacements or replacements of expensive modules in the field.

C-ED would like to thank Rob Corrao, CATV marketing manager for Jerrold Electronics Corporation, for providing us with this energy saving article.



A ONCE-IN-A-LIFETIME CABLEVISION OFFER

Once upon a time, several weary cable TVers pondered a far away dreamland. It had beautiful high mountain lakes, rugged snow-capped mountains, lots of light, fluffy snow. Then one day, **colorado and the west** magazine arrived at their office.

Page after beautiful page of pictures of lakes and mountains and streams captured their imagination. As did stories about white water rafting, backpacking and skiing.

Trouble was, they couldn't get away to their Rocky Mountain dreamland . . . They just had too much work to do. At least, they said to themselves, we've got the next best thing . . . **colorado and the west**. The next day, another dream-come-true magazine came in the mail. It was called **CableVision**, the top cable industry publication. As always, it was packed with timely news and feature stories.

And since the cable people couldn't be everywhere at once, they again had the next best thing . . . **CableVision**.

This Cable Fable has been brought to you by Titsch Publishing, which can make your dreams come true for only $21.50 a year. All you have to do is fill out the subscription card on page 24. And for less than 6¢ a day, you'll get beautiful **colorado and the west** magazine PLUS **CableVision**. We think that's a pretty good deal.

But like all good deals, our offer is limited—so subscribe to **CableVision** and **colorado and the west** magazines—right away. Our offer expires June 15.

Better yet, stop by the Titsch Publishing Booth 708 at the NCTA Convention. And we'll give you another good deal—beautiful posters of the Rocky Mountains.

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Portland's Firemen Learn via Cable

By Toni Barnett
Managing Editor

Portland, the City of Roses, is well known for its unique, even somewhat fanatical attitudes toward issues such as clean air, the bottle bill, community planning, and now, a video cable system. Many MSO's will remember Portland's attempt four years ago to institute a franchise for a system then touted as the most innovative system in the world. Unfortunately, the timing of its substantial requests coincided with the slump the industry experienced in 1974, and for generally political reasons, the city council has not had the nerve to open up the subject of a franchise again.

Last year the fire bureau began planning a program of training using cable TV. Without the existence of cable within Portland, however, it was decided to construct a specialty plant. The general design, to be cost effective, had to be unique since the basic plant would cover 47.5 miles with only 31 subscriber drops. C.B. Schrock and Associates undertook the design. Conventional designs using a low level trunk system and high level feeders were replaced with a single intermediate level distribution system. By using 34 dB spacing, and an upper frequency limit of 120 MHz, amplifier spacings of 6600-feet apiece were possible. Taps were installed directly on the intermediate system to service each fire and police station.

General system specifications are eleven forward and four reverse 6 MHz channel. The design has a worse case S/N of 48 dB forward and 45 dB reverse. System crossmod is better than 46 dB.

Dick Kohler of the Bureau of Electronic Services for the city coordinated all of the planning phases including bid package preparation. Kohler's foresight in providing multichannel capability insures that future city services such as two-way voice channels, video surveillance of city facilities and city data services can be accomodated.

The first planned use of the system will be a talk back system for use by the fire stations. A central video studio will be used for cablecasting all training. Each firestation has an audio return transmitter. The instructor sees each response using a time division audio multiplex scheme on a video terminal at the central studio. The entire talkback system was custom designed especially for cable classroom work.

The Portland cable system is an example of a practical, cost effective approach to providing special services by coaxial cable. If the town were already served by cable, the incremental cost of the fire training system would be exceptionally low. The present approach, even including the cost of the cable plant, will pay for itself by keeping firemen in their stations, on call, during training.

it isn't easy to improve the Century II trunk amplifier... BUT WE DID!

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- *microprocessor-controlled status-monitoring system*
- *AGC reverse amplifier module — 5-30 MHz*
- *2-way mother-board with built-in filters*
- *redundant power supply module*
- *improved performance specifications on mid-split systems*
- *high-gain trunk and bridger modules*
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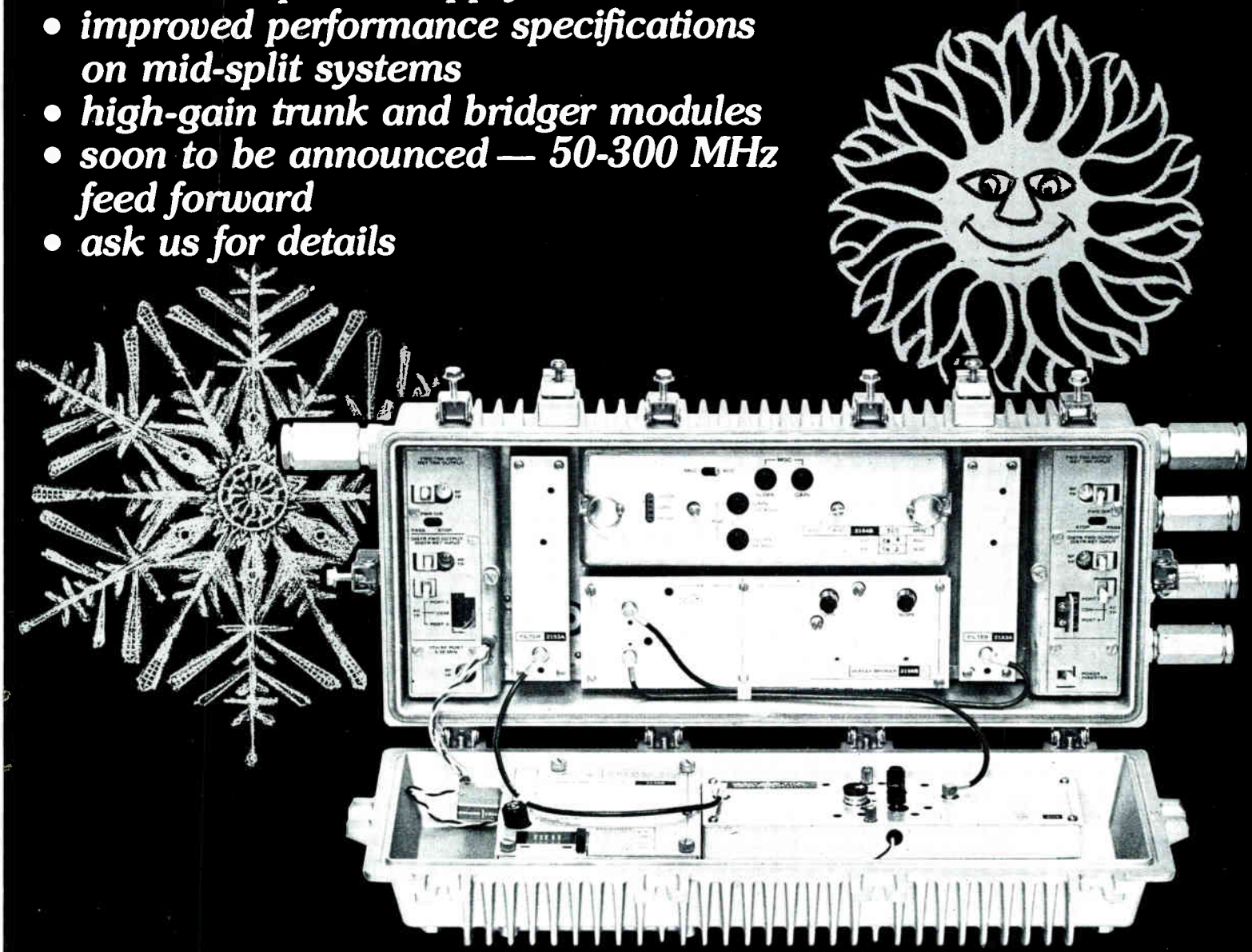

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Uniformity of Technical Training—Is It Possible?

By Kenneth Hancock, director of engineering, CCTA

This time of year when many of us are attending the convention and trade show in New Orleans and wandering either starry-eyed or somewhat cynically around the trade show full of new "goodies," it is useful to wonder just how many of the new concepts will be used in the field to the best advantage.

This brings us to what, in Canada at least, is the difficult issue of training. Training standards vary greatly from system to system and across the country. Many of the larger MSO's employ a full-time training staff, with a well-designed curriculum, aimed at the equipment in use in the systems that they control. Regular training sessions are held and in many instances, technicians and engineers are evaluated and classified as having reached specific levels.

At the other end of the scale, many small systems do their training on a completely informal basis, usually "on the job" from the other technicians. There is little opportunity to gain new and up-to-date information except from the sometimes infrequent visits of suppliers' technical representatives. It is almost impossible to obtain a broad-base of sound technical knowledge with which to evaluate new products and procedures.

These are the two extremes and in practice the majority of systems fall somewhere between the two. The fact that, in Canada at least, we do not have a national training program with specified levels of attainment leads to major variations in technical standards and reliability of systems, to technical personnel "poaching," and to perhaps an unreasonable reliance on the training courses organized by suppliers. Supplers' training courses, while being extremely useful, cannot be expected to provide a fully critical analysis of the equipment that is being covered. After all, the supplier has to make a living as well.

What is the solution to the problem of "patchy" training for engineers and technicians in the cable industry? In Canada we have tried a number of approaches, none of them 100 percent successful.

Considerable time and money was spent a few years ago by the CCTA in attempting to devise a "road-show" type of training program that could move from province-to-province in a trailer, giving training courses to systems on a wide variety of hardware, including microwave and studio equipment. This project never got off the ground for the simple reason that the requirements for training varied so much from system to system and it was impossible to devise a program that would satisfy the majority of CCTA members.

The next approach was to attempt to define levels of training, tied in with classifications of both engineers and technicians. For each classification a level of training and knowledge was defined with a curriculum to meet these requirements. The ultimate intention was for the CCTA to hold certification examinations on a national basis. The advantage of such an approach was that a specific title such as "chief technician" would mean essentially the same from coast-to-coast. This would have considerable advantages both for management and the employee. Employees would have targets to aim for and the satisfaction of reaching a certain level. Employers would know what to expect when they were employing a specific grade of technician or engineer.

This concept ran into difficulties of acceptance for a number of technical and labor-relation reasons.

Undaunted by the failure of these approaches, the Canadian Cable Television Association is now tackling the problem of training at two levels. The first of these is to encourage the presentation in technical and community colleges of courses aimed at the cable television industry. The second approach is to hold, on a national basis, a number of technical seminars each year, using the tutorial approach to cover a specific subject such as "underground plant" or "new services." These are designed for the widest possible audience and have so far been very successful.

In Canada the approach of assisting the technical colleges in devising suitable programs, and making this information widely available to members, is gaining some ground.

In addition to these approaches, the CCTA supports the tutorial type of meetings organized for technicians by the Society of Cable Television Engineers and its affiliates.

We don't pretend that any of these approaches is the final answer to the problem of training, and we would certainly welcome comments from readers who have ideas on improving the standard of training in our industry on a national basis.

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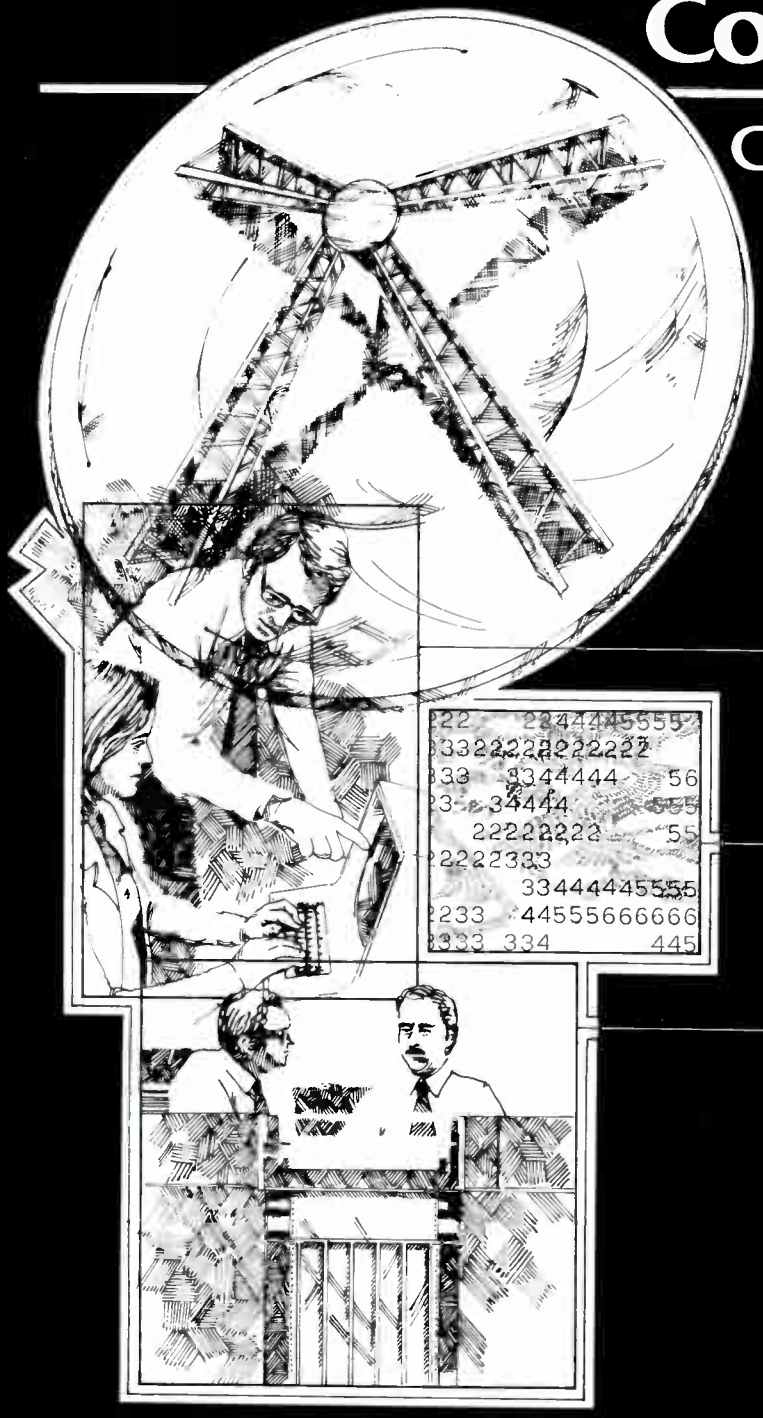

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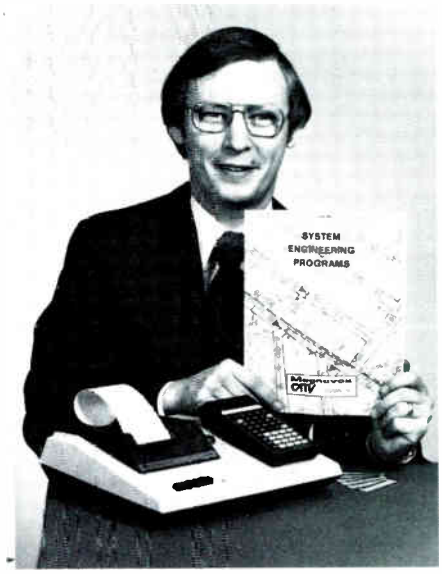
Magnavox Offers Simplified New "Hands-on, Do-It-Yourself" CATV System Design Program

A simplified, new "hands-on, do-it-yourself" approach to CATV system and extension design—which puts required knowledge into a convenient format and enables all calculations to be performed automatically—is now available from Magnavox CATV Systems, Inc.

The new approach utilizes a Magnavox step-by-step guidebook, "Systems Engineering Programs," a Texas Instruments' model 59 card programmable calculator with five design programs pre-recorded on magnetic cards, and a TI PC-100 thermal printer.

Since the book is set up in a training-type format, the designer can actually train himself while doing programs. Using this approach, a qualified designer with specifications and strand routing can design as much as 50 percent more than previously possible by conventional techniques.

Information on the new program is available from Magnavox CATV Systems, Inc., 133 West Seneca St., Manlius, New York 13104.



Tom Polis of Magnavox CATV Systems, proudly displays key elements of his simplified new Magnavox approach to CATV system design engineering. His guidebook, "System Engineering Programs" is used with the TI model 59 card programmable calculator, the TI PC-100 thermal printer and the program magnetic cards (right).

New Flyer Details Standard and Special Multi-Wire Cable Assemblies

A full line of multi-wire cable assemblies for telephone and communication requirements is detailed in a new flyer from Gr-Electronics, Inc.

For a free copy, write Gr-Electronics, Inc., 5005 Chase Dr., Downers Grove, Illinois 60515.

Brochure from Monroe Electronics Features Components for Tone Signaling

Monroe Electronics, Inc. has developed a series of components for use in the field of tone signaling. They have issued a four-color brochure which covers the use of their low cost circuit cards to assemble a system.

Also shown are partially wired enclosures and factory engineered complete systems in the field of high speed tone signaling.

This brochure is available at no cost by contacting Monroe Electronics, Inc., 100 Housel Ave., Lyndonville, New York 14088.

New Product Guide From Digitran Company

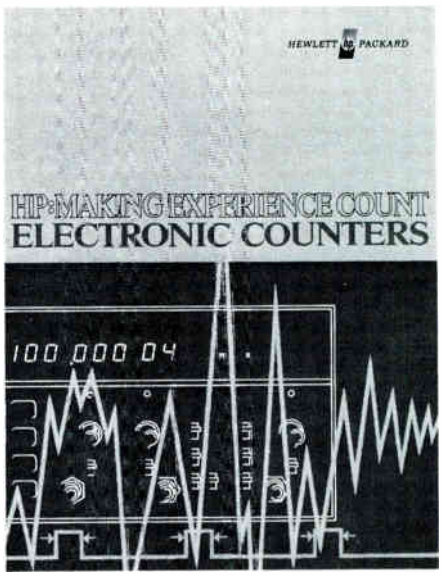
A new six-page product guide from The Digitran Company highlights characteristics of nine digital switches for industrial and commercial users, plus low profile keyboards. Products include general purpose thumbwheel and level switches, Digitran's new LED-lighted thumbwheels, and 12- and 16-array miniature keyboards. For a copy of this brochure, write Robert R. Ryder, The Digitran Company, 855 S. Arroyo Parkway, Pasadena, California 91105, (213) 487-4600.

Electronic Counter Selection Guide

This new six-page, four-color selection guide from Hewlett-Packard summarizes specifications and characteristics of 15 counters in HP's electronic counter line. Included are models from simple, low-cost, "frequency only" counters to sophisticated high-speed universal and microwave counters.

Described are two new microprocessor controlled models: model 5342A microwave counter for automatic measurements to 18 GHz, and the model 5370A universal time interval counter with a resolution of ±20 picoseconds. Said to be the highest speed counter available, the 5370A can make a full 11-digit reading in one second up to 100 MHz.

Selection Guide "Electronic Counters" is available from Hewlett-Packard free of charge by writing to the Inquiries Manager, Hewlett-Packard Company, 1507 Page Mill Rd., Palo Alto, California 94304, (415) 856-4234.



H-P's new electronic counter selection guide

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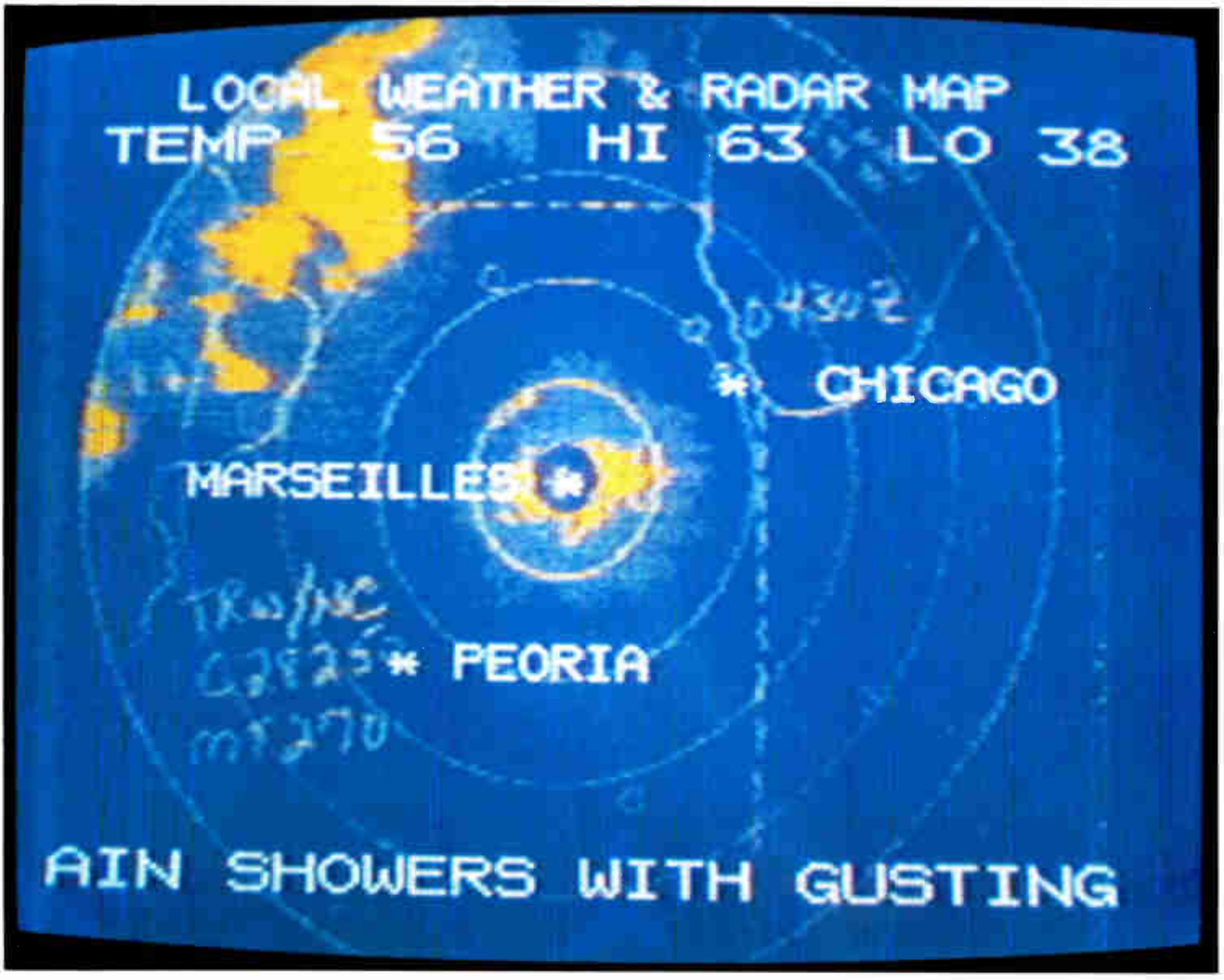

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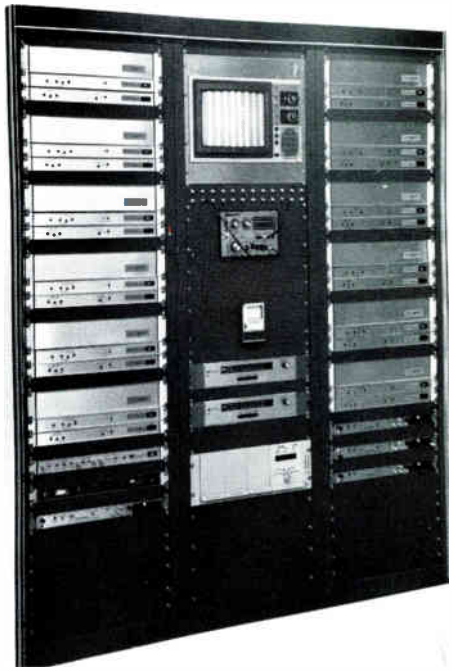

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