

CEED

Communications Engineering Digest/The Magazine of Broadband Technology

September 1983

High Rollers:

Cable, DBS, SMATV, STV, MDS
Piecing together the
communications puzzle

Special satellite focus
**TECH II: Multibeam Earth
Station Antennas**

Bonus:
Reader Response Cards
in this issue

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Reader Service Number 2

A. D. Little Recommends Jerrold for Philly System

BALA CYNWYD, PA—Noted research and consulting firm Arthur D. Little Inc. was hired by Comcast Corp. to recommend equipment vendors for Comcast's proposed Philadelphia cable system.

In a 136-page report, Little recommended Jerrold Division of General Instrument more often than any other company. According to the study, Little considered, in assessing each vendor's equipment:

- product features and capabilities;
 - soundness of technical approach;
 - compatibility with other system components;
 - risk of unavailability of the product when needed by Comcast;
 - ability to satisfy capacity requirements of a large subscriber population as projected in Philadelphia; and,
 - estimated cost per subscriber.
- For two-way subscriber response (IPPV) services, deemed to be the most important

facet, Little looked at Jerrold, Pioneer, Oak, Tocom and Zenith equipment. Recommended was Jerrold's "Starcom 450 addressable converters with the Starvue SV-A modular attachment for IPPV because of this system's technical elegance, low risk of unavailability and relatively low cost," the report said.

And while the research found one-way addressable converters from Jerrold, Oak, Scientific-Atlanta, Tocom and Zenith "were

considered to be viable for Comcast's Philadelphia system," the company recommended use of Jerrold's Starcom 450 one-way addressable boxes because of the best integration of the recommended IPPV system with the one-way boxes.

E-Com, Jerrold and Tocom general purpose digital systems were considered, with Jerrold again getting the nod. The report found Jerrold's Communicom/Metronet system "qualified and attractive" because of its response to innovation, high capacity and flexibility to meet new needs.

Equipment from

CableBus Systems, Jerrold, S-A and Tocom was evaluated for home monitoring services, with Little reporting "each of these vendor's systems would be well-qualified" in Comcast's Philly operation. But, Little added, Tocom, because of its experience and capability, would be the first choice to be used for both security and energy management. Apart from energy management, though, Little said Comcast should itself choose "among these home security system vendors based on its own judgment concerning features, cost and terms of purchase." □

It's nice to hear a third party confirm what we've been working for all along.

When a noted research and consulting firm was asked to recommend equipment suppliers for Comcast's proposed Philadelphia cable system, they recommended Jerrold. They recommended Jerrold more often than Scientific-Atlanta. More often than Oak, Zenith, Pioneer, TOCOM, E-Com, or Cablebus Systems combined!

They said our addressable systems have "technical elegance." Plus "low risk of unavailability and relatively low cost."

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Jerrold.
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Reader Response Cards now offered in this issue.

COMMUNICATIONS NEWS

St. Louis satellite gathering **12**
 The fifth annual Satellite Communications Users Conference discusses international applications and new technologies.

INTERFACE

Future plans for "Futorex" **18**
 Jones Intericable subsidiary Futorex announces test of cable-based games and information network.

FEATURE

The communications puzzle **29**
 The competition to cable—DBS, SMATV, STV and MDS—is trying to fit into the marketplace. It's a time for high rollers.

TECH II: The Satellite Spacing Dilemma **33**
 A quick look at two-degree spacing and a chart listing satellites presently using and scheduled to occupy both C-band and Ku-band slots.

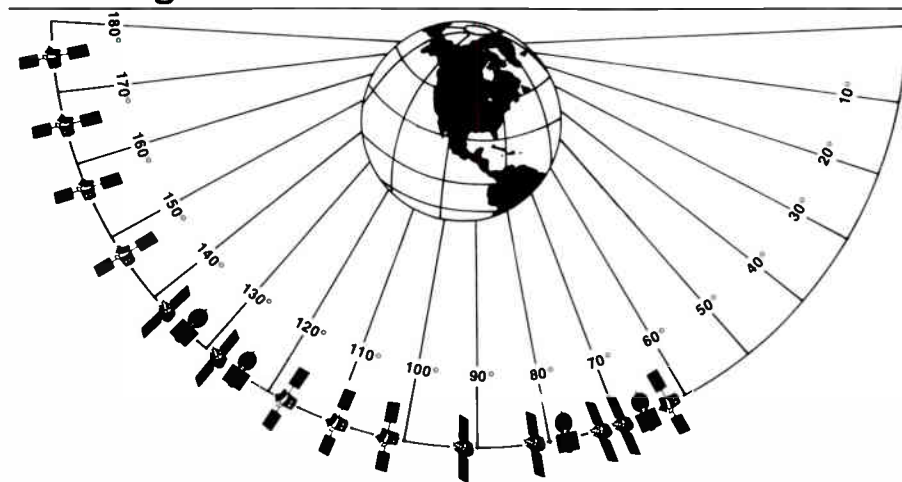
Multibeam earth station antennas **34**
 A listing of manufacturers offering this product.

COVER STORY

A reliable option **47**
 Cablesystems Pacific has developed Biznet, a data transmission service, for its customers in Portland, Ore.

TECH EXCHANGE

Examining noise factors **61**



The above chart indicates the orbital positions assigned to proposed North American direct broadcast satellites by the International Telecommunications Union this past summer. U.S. slots, identified by the symbol-----, are at 175°, 166°, 157°, 148°, 119°, 110°, 101°, and 61.5° w. Canadian slots, represented by-----, are at 138°, 129°, 91°, 82°, 72°, and 70.5° w. The four slots assigned Mexico, symbolized by-----, are at 143°, 136°, 127°, 78° and 69° w. See Cover Story on p. 29.

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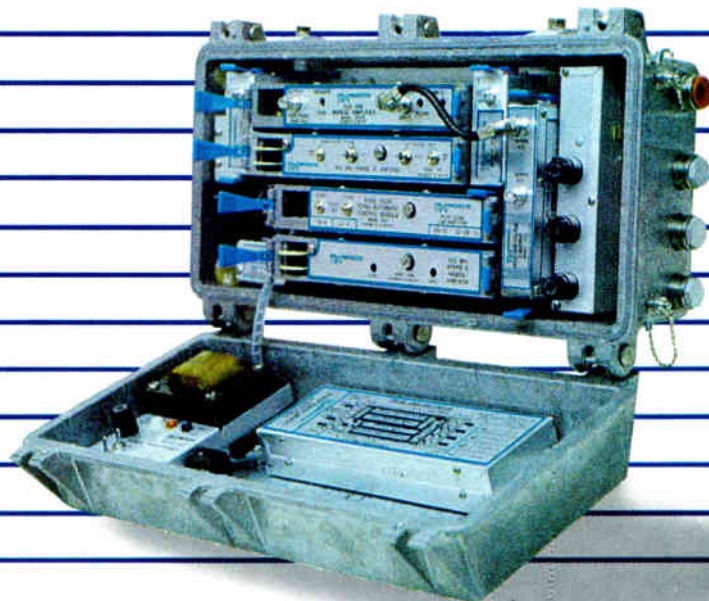
Photographer Rob Stuehrk captured the idea of trying to piece together the many different technologies that make up the communications marketplace today. For all the players, it is a time of high stakes and many gambles, especially for the newer technologies. Putting the puzzle together took a lot of time, too.

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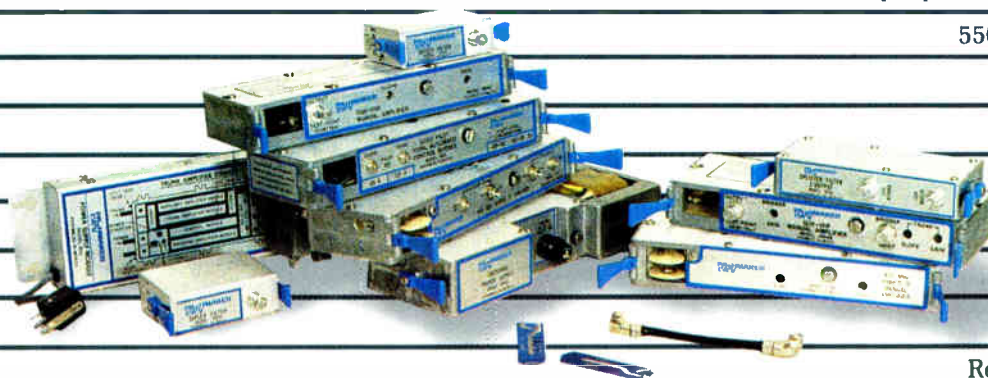
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Reader Service Number 4

Radio paging captures cable's attention

Among the 28,000 or so applications the FCC has received in response to its proposal for nationwide paging are applications from various cable TV entities, including proposals from Cox Communications; Tribune Cable Communications and United-Tribune Paging Corp.; Daniels & Associates through American Radio Communications Ltd.; and United Paging Corp., a wholly-owned subsidiary of United Cable Television Corp. Other contenders for radio paging licenses include television, FM radio stations and radio common carrier companies as well as a joint venture between MCI Airsignals, Metromedia, American Express and Communications Industries. The FCC has allocated the 900 MHz frequency for cable radio paging, the subcarrier frequencies for FM radio paging and the aural baseband spectrum for broadcast television paging. While companies in all three of these industries propose to use different means to connect the "pager" with the recipient, United Paging plans to relay the customer's message to its uplink facility in Denver or to C-SPAN's uplink in Washington and from there uplink the message to Satcom III-R. The message will then be downlinked from Satcom III-R to a cable earth station and routed to the recipient's paging device. Due to recent advances in the technology of portable radio devices, nationwide paging services could potentially provide the customer with one-way data transmission as well as with the standard "beeper" paging fare. While the FCC is expected to use some form of comparative hearing process to choose nationwide paging licensees, it has not yet specified what selection process will be used. Applicants believe paging licenses will be granted in the spring of 1984.

Rattling info

Southern Bell is understood to be planning to use fiberoptics in all its new residential installations starting in 1985—much earlier than anyone supposed. The news has rattled at least one top-10 MSO into considering the long-term value of its investment in the transport side of cable. Though the telco installations are for voice only, they position Southern Bell to move into video transfer. One MSO with a lot of building to be done is said to be wondering about the residual value of its plant in 1998 when its 1983 franchises come up for renewal. The MSO is believed to be considering a redefinition of its business as packaging and distribution only.


Merger negotiations cut-off

Negotiations to acquire S.A.L. Cable Communications by Cable TV Industries have been terminated, according to officials from Cable TV Industries. This July 11, Cable TV Industries announced that it had reached an agreement in principle to acquire S.A.L., the Melville, N.Y.-based cable hardware distributor. The acquisition, which was valued at \$7.2 million, would have involved the trading of nine-tenths of a share of Cable TV Industries common stock for each S.A.L. share and the purchase of 632,000 shares held by S.A.L. Cable Chairman and President Alan Scheinmen. Mark Engler, president of Cable TV Industries, cited differences in company goals as the primary reason for the break in negotiations. He elaborated, "After considering our respective goals and the best means for achieving them, Cable TV concluded that it is in the best interests of the company and those of its shareholders to terminate the negotiations."

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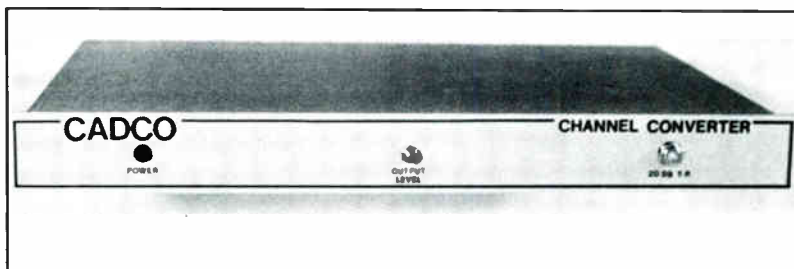
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- Output level 60dBmV max.
- Hybrid Amp
- Input levels 10 to 20 dBmV



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Reader Service Number 6

September 1983/7

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DCR-4000

Order Service Number 5

 GOULD

Seminars

September

7-9: The second annual **Great Lakes Cable TV Expo** will be held at the Indianapolis Convention and Exposition Center. Contact Shirley Watson, (618) 249-6263; or Claude Wells, (312) 693-9800.

8-10: The Eastern Show, the annual convention of the **Southern Cable Television Association**, will be held at the Georgia World Congress Center in Atlanta. Contact (404) 252-2454.

11-14: The International Cable and Satellite Television Exhibition and Conference sponsored by the **Society of Cable Television Engineers**, the **Cable Television Association of Great Britain** and the **Electronic Engineering Association** will be held at the National Exhibition Centre in Birmingham, England. Contact Mark Voss or Mike Loughlin, (713) 463-0502.

12-13: **Phillips Publishing Inc.** is sponsoring its third annual DBS conference at the Madison Hotel in Washington. Contact Diane Pontisso, (301) 986-0666.

14-16: **Magnavox CATV Systems** will hold a field training seminar with its Mobile Training Center in Detroit. Contact Laurie Mancini, (800) 448-5171; in New York, (800) 522-7464.

15: The **Public Service Satellite Consortium** will hold a seminar on "Buying Your Earth Station: Making the Right Decisions" at the Shoreham Hotel in Washington. Contact (202) 331-1154.

19: A DBS conference sponsored by **Satellite Week** and **Television Digest** will be held at the Vista International Hotel in Washington. Contact Barbara Pratt or Jonathan Miller, (202) 872-9200.

19-21: **Magnavox CATV Systems** will hold a field training seminar with its Mobile Training Center in Detroit. Contact Laurie Mancini, (800) 448-5171; New York, (800) 522-7464.

20-22: A **Jerrold** technical seminar will be held in Syracuse, N.Y. Contact Diane Bachman, (800) 523-6678 or (215) 674-4800.

21-22: A seminar on Advanced Local Telecommunications sponsored by **Probe Research Inc.** will be held in San Francisco. Contact (201) 285-1500.

24-27: The annual conference of the **International Institute of Communications** will be held at the Americana Aruba on the Caribbean island of Aruba. Contact the IIC in London, 01-388-0671.

25-27: The fall convention of the **Kentucky CATV Association** will be held at the Marriott Resort in Lexington. Contact Patsy Judd, (502) 864-5352.

26-27: **Phillips Publishing** will sponsor a local area networking seminar at The Shoreham Hotel in Washington. Contact Diane Pontisso, (301) 986-0666.

26-28: The annual convention of the **Minnesota Cable Communications Association** will be held at the Radisson South Hotel in Minneapolis. Contact Mike Martin, (612) 861-1166.

27: A meeting of the **International Association of Satellite Users** will be held at the Twin Bridges Marriott Hotel in Washington. Contact Donna McCaughey, (703) 437-5457.

27-29: A **Jerrold** technical seminar will be held in Quebec. Contact Diane Bachman, (800) 523-6678 or (215) 674-4800.

October

2-4: The annual convention of the **Pacific Northwest Cable Communications Association** will be held at the Sheraton Hotel in Spokane, Wash. Contact Hank Sexton Jr., (206) 357-9381.

3-5: The third annual conference on videotex sponsored by **Ohio State University** will be held at the Hyatt Regency Hotel

in Columbus. Contact W. Wayne Talarzyk, (614) 422-5725.
3-7: A **Community Antenna Television Association** advanced technical training seminar co-sponsored by the **Texas Cable Television Association** will be held at LaQuinta Motel in San Antonio, Texas. Contact (305) 562-7847.

4-5: The sixth annual convention of the **Ontario Telecommunications Association** will be held at the Hotel Triumph Sheraton in Toronto. Contact (416) 481-4446.

4-6: A **Blonder-Tongue** MATV/ CATV/LPTV/TVRO technical seminar will be held at Caesar's World in Atlantic City, N.J., in conjunction with **L-C-A Sales**. Contact Craig Kemper, (201) 679-4000; or L-C-A, (914) 961-4700.

4-6: LPTV East, sponsored by the **National Institute for Low Power Television**, will be held at the Sheraton Washington (D.C.) Hotel. Contact Darlene Geller, (203) 852-0500.

5: A seminar on "Cable TV Law" sponsored by **Paul Kagan Associates** will be held at the Capitol Hilton in Washington. Contact (408) 624-1536.

5-7: **University of Wisconsin—Extension**, Department of Engineering & Applied Science is conducting a tutorial on "Community Antenna Television Service: Equipment Availability, System Design, Terminology." Contact Francis P. Drake, (608) 263-7427.

6-8: The national conference of **Women In Cable**, "Cable in Context: The Challenge of Change," will be held at the Colonnade Hotel in Boston. Contact Charles Self, (202) 296-7245.

8-10: The '83 Sat Expo sponsored by **Xorrox Corp.** and **University Graphics Inc.** will be held at the Red Lion Inn, San Jose, Calif. Contact Andy Gibbs, (408) 978-8212; or Lloyd Covens, (303) 759-1099.

10-11: The annual convention of the **Iowa Cable Television Association** will be held at Stouffer's Five Seasons Hotel in Cedar Rapids. Contact Neil Webster, (319) 252-1343, or Jon Lash, (319) 395-7801.

November

7-9: A **Community Antenna Television Association** basic technical training seminar co-sponsored by the **Southern Cable Television Association** will be held at the Master Host Inn-Midtown, Atlanta. Contact (305) 562-7847.

Looking ahead

Oct. 30-Nov. 2: Joint convention of the Subscription Television Association and the National Association of MDS Service Companies, Century Plaza Hotel, Los Angeles.

Nov. 1-3: Atlantic Cable Show, Convention Hall, Atlantic City, N.J.

Nov. 1-4: International Videxpo '83, Acapulco, Mexico.

Nov. 7-9: The ninth annual Scientific-Atlanta satellite communications symposium, Hyatt Regency-Atlanta Hotel, Atlanta.

Nov. 29: The International Association of Satellite Users, Twin Bridges Marriott Hotel, Washington.

Dec. 11-12: NCTA's National Cable Programming Conference, Biltmore Hotel, Los Angeles.

Dec. 13-15: Western Cable Show, Anaheim Convention Center, Anaheim, Calif.

Jan. 18-20: Texas Show, San Antonio Convention Center, San Antonio, Texas.

March 5-7: Society of Cable Television Engineers Cable-Tec Expo '84, Opryland Hotel, Nashville, Tenn.

Standard's Agile 24:

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Reader Service Number 17

Ash trays and installations

Last week I had cable installed in my new house and watched these two technicians climb around and string cable to the two outlets I requested. Naturally, it started to rain and these guys moaned about it, but still went on with installing the drop and stringing the wire under the gutter. They were real careful about not trekking any mud or anything else into my house and said I could have their truck if they were both struck by lightning while they were on the pole. I was impressed by their knowledge of the cable industry and their interest in *CED* when I told them that I was no fool about cable television and showed them my publication. I've had cable installed four other times and each technician that came out to do the job was so ill-mannered and ignorant of cable technology that I didn't want to tell him I worked in the cable industry. The area in which I live now is a new build and the technicians told me they were installing cable from 8:00 a.m. until 10:00 p.m. each night, trying to meet the demand.

Nevertheless, I was pleased with the quality of their work and their interest, particularly in the stereo hook-up that I had them connect. They said the cable system didn't offer this service although a number of their customers had asked about it. I suggested they talk to their supervisor again and show them the kit that I had that they could use. Being subcontractors to the cable company, they said they didn't carry much weight with the system, but they said they would recommend the product. I appreciated their interest and enthusiasm.

I got the same kind of enjoyment out of CATA last month. By all comparisons with other shows I have attended, CATA was quite different. With a relaxed approach and less of an emphasis on sell, sell, sell, the attendees were more at home in the kind of family atmosphere that CATA seems to create. Indeed, many of the attendees brought wives (or husbands) and kids and there was plenty of time to enjoy the resort-like surroundings.

Plenty of time was also devoted to technical seminars in which channel bandwidth compression, cable antennas for less dollars and new technology on fiber optics were discussed. On the exhibit floor, many companies were claiming that while no real definite sales were completed at the show, many leads were developed that salespeople planned to follow up after the convention was over. One exhibitor said that "ash trays and trash cans" were great selling tools because they got the operators into the booth. Different approach. Terri Johnson, director of national cable sales for Keyfax, said her business was doing well, but it wasn't because of trash cans.

"A lot of small operators are using Keyfax," she noted. "Keyfax is telling the operator that he has a new audience out there: businesses, schools, the hearing impaired, computer nuts. For many system operators, cable offers the only sophisticated communications service in their market."

CATA Executive Director Steve Effros essentially echoes Johnson's comments. Although the association is getting larger, and now counts membership among many of the largest MSOs, the thrust in CATA's purpose remains the same—serving the small markets of cable. Effros added that the two types of cable systems—urban vs. non-urban—are becoming "two different industries."

Our goal at *CED* is to serve "both industries" and all of cable television, for that matter. And while we can't be all things to all people, we have expanded our editorial scope to focus in on a variety of different topics, industries and businesses.

This issue, for example, we give a quick overview of the competing technologies to cable; principally DBS, SMATV, STV, MDS. We call this feature, which begins on p. 29, a *CED Reaction Paper*, in which we request your opinions and your responses. We've created another new section this issue called *Tech Exchange* (on p. 61), which is designed as a page where each month, or as often as we receive letters and papers, we will run a response by someone in the industry who wishes to express his or her views that may be different from that expressed by one of our contributing writers. This is your book; we'd like to hear from you.

And for the first time ever, we've incorporated reader response numbers and cards within this issue. We think this offers a tremendous service to both our readers and our advertisers and we have had a great deal of success in terms of responses with the initial test in the Summer issue of *CED Reports*, our product showcase supplement to *CED*. We will continue to offer reader response cards in *CED Reports* and do the same in *CED*. We hope you'll find the service helpful.

Gotta get back to the TV set. Until next month.



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West Coast Bureau 101 North Robertson Boulevard, Suite 206, Beverly Hills, California 90211, (213) 659-3965

St. Louis satellite gathering

Fifth Annual Satellite Users Conference focuses on international and DBS markets

ST. LOUIS—Capitalizing on the theme of World Communications Year and with a heavy Australian accent underscoring his remarks, Richard Butler, secretary general of the International Telecommunications Union, kicked off the fifth annual Satellite Communications Users Conference.

Butler's speech focused on the international aspects of the communications revolution in which he reviewed the progress of World Communications Year and the results of several international conferences on communications—the recent Geneva summit of the ITU and the Region II Administrative Radio Conference on Broadcasting Satellites.

However, Butler drew particular attention to the disparity of potential opportunities in satellite communications. "Of the 590 million television sets in use around the world today, three quarters of them are in less than 10 countries," he stated. Butler suggested that communications users should expand into new international markets that are waiting for such ventures to be conducted jointly with representatives from their own respective countries.

The international flavor of the conference was also in evidence during the last day of the three-day event when Edward Seaga, prime minister of Jamaica, delivered an address via live "tele-mission" to the attendees. The prime minister discussed opportunities available to American businessmen via the Caribbean Basin Initiative, President Reagan's plan to encourage economic development in the Caribbean. Jamaica was one of the 101 exhibitors at the conference.

According to D'Arcy Crooks, one of the Jamaican representatives present, Jamaica is offering the services of Jamaican International Promotion Ltd., a shelter-like organization that permits foreign firms to manufacture products in the country without starting up a new company, saving overhead costs and staffing. The proposal is essentially a joint venture arrangement in which Jamaican International would serve as the manufacturer's representative within the country.

"It's like moving into a furnished house, Crooks intimated. He added that "we're getting inquiries, but so far nothing specific."

Among the other speakers who participated in the 28 panel sessions and roundtables were Rep. Daniel Akaka (D-

HI), co-chairman of the Congressional Space Caucus; Lt. General James Abrahamson, director of the U.S. Space Shuttle Program; Steve Dorfman, president of Hughes Communications; and Richard Colino, director general-elect of Intelsat. Among the panel activities were discussions on satellite technology trends; financing satellite systems and networks; satellite radio networks—profiles, problems and policies; regional, intercontinental vs. international satellite systems; Ku-band satellite systems; and voice and data networks.

The conference was specifically geared to satellite communications of new technologies and international markets with the majority of exhibitors ranging from the leading earth station manufacturers to private cable-oriented companies. Several manufacturers announced new products during the show, specifically Harris Corp., Scientific-Atlanta, Anixter Communications and Alcoa-NEC.

Representatives from Harris were promoting the company's latest hardware to be used with the Ku-band.

"We recently signed a contract with NBC (which will use the Ku-band to transmit network signals) and Comsat General, so we're showing off the equipment the two companies plan to use," said one company salesman.

S-A was highlighting its new Series 9000 2.8- and 3.2-meter dishes. The series features a new feed rotation design, which allows polarization to be aligned from the edge of the dish. Simpler installation is an additional feature.

Alcoa-NEC displayed its new .6-meter dish to be used with high-powered DBS satellites, but a company spokesman said the main thrust of the conference was to promote its integrated system.

Anixter Communications displayed its improved hydraulic-steerable antenna, which incorporates a multibeam system, allowing up to five prime focus feeds for a 5-meter antenna and three feeds for a 4-meter dish.

First day events also brought announcement of the Hospital Satellite Network. The network, using satellite time and uplink facilities from Bonneville Satellite Corp., will be beamed initially to some 50 subscribing hospitals beginning Dec. 1. Most of the programming, according to Thomas Rasmussen, the HSN's vice president, will be directed at health professionals, but patients also will be provided with selected motion pictures and specially-produced patient education programs. Rasmussen said the multimillion dollar contract takes effect Nov. 1, but would not identify the satellite to be used for transmission.

Irl Marshall, conference director of the *Satellite Communications*-sponsored event, estimated that approximately 3,000 people were expected to attend, many of them potential commercial users of DBS systems.

Opposing outage refunds

New Jersey Cable Television Association disagrees with OCT over giving refunds when service is lost to outages

TRENTON, N.J.—The New Jersey Cable Television Association is fighting a proposed rule by that state's Office of Cable Television that would require refunds from operators to cable subscribers who experience service interruptions.

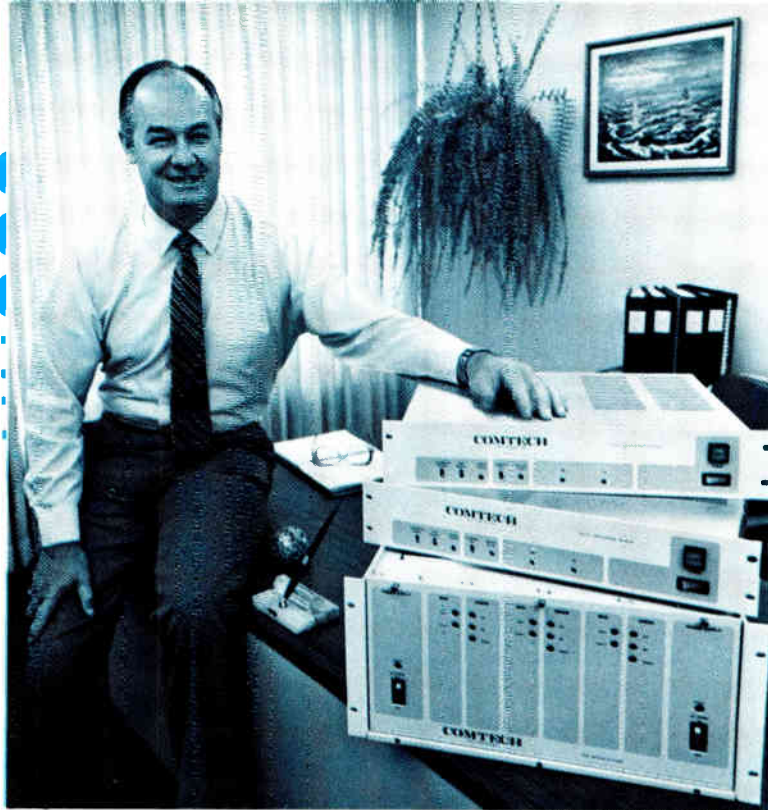
The rule would entitle a subscriber to a day's credit or refund as the result of an outage that exceeds six hours. The six hours, according to Chad Russell, a regulatory officer at OCT, represents an average household's daily viewing.

Thomas Kelly of the Cranford law firm Holzapfel, Perkins and Kelly, counsel to the NJCTA, said, "We oppose the concept of refunds and have spoken out against them on a number of occasions. Service outages are built into the rates. Public utilities are not required to refund for lost service."

When originally proposed in 1981, the provision would have mandated refunds for any outage, including weather-caused interruptions and downed power lines resulting from a traffic accident. But, Kelly stated, opposition from the NJCTA, which represents most of the cable operators in the state, forced the change. The current proposal would exempt operators from liability when the outage is caused by a third party. "The office of Cable Television seems to think there is never a justifiable reason for an outage," Kelly said.

A 30-day comment period will begin in August. Then OCT will consider revisions and forward the proposal to the Board of Public Utilities for final action this fall. The most recent revisions have centered around responsibility for claiming credit. Originally, a subscriber would have been

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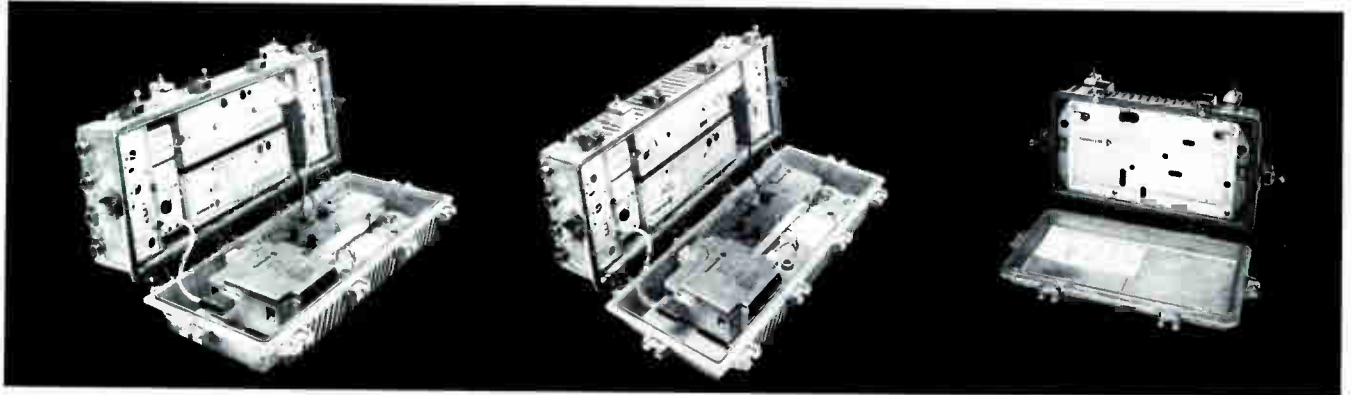


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	Cross Modulation	-102dB	-96dB	-88dB	
Bridger	Output Level	+47dBmV	+49dBmV	+49dBmV	
	Composite Triple Beat	-74dB	-70dB	-70dB	
	Cross Modulation	-74dB	-70dB	-70dB	
Line Extender	Output Level	+47dBmV	+49dBmV	+49dBmV	
	Composite Triple Beat	-74dB	-70dB	-70dB	
	Cross Modulation	-74dB	-70dB	-70dB	

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required to notify the operator in order to receive credit. But the final version may place the burden on the company. "This puts the operators in the position of having to grant refunds to people who were on vacation, not aware or not concerned about an outage," Kelly said.

Jim Guliano, supervising technical analyst at the OCT, essentially agreed with that assessment and believes some sort of customer notification to the company will be required in the final version. But Guliano rejected the idea that utilities are free from crediting customers who lose service. "Water is metered, gas is metered, electricity is metered. If you don't get service you don't have to pay.

Tribune slates new employee training

MSO to implement corporate-wide human resource development program using corporate trainers

MAHWAH, N.J.—Tribune Cable Communications has joined the growing ranks of MSOs instituting corporatwide training programs for human resource development, with courses created by specialists.

The nation's 38th-largest MSO has contracted with Robert Gross Associates of Stamford, Conn., to develop system-wide training for customer service representatives, their supervisors, direct sales personnel and perhaps technical workers as well. The first Tribune Cable system to implement the program will be Albuquerque Cable TV Inc., which is set to begin on-site training in September.

According to Gary MacGregor, Tribune Cable's marketing director, Robert Gross Associates already has trained two of the MSO's employees to serve as "corporate trainers." Lee Wilson, formerly Albuquerque credit manager, will be responsible for implementing the training program at Tribune Cable's 15 systems. Jim Lazor, formerly upstate New York regional coordinator, is developing employee manuals that detail policies and procedures stemming from the program.

Wilson currently is visiting other systems that have instituted similar training programs, including Vision Cable, Jones Intercable and the northern region of Capital Cities Communications.

He later will accompany Gross to the first two Tribune Cable systems scheduled to receive on-site training—Albuquerque in September and the new-build in Tampa, Fla., early next year. Gross will serve as the primary trainer; Wilson then takes over the training duties as the program is extended to all Tribune Cable systems spread throughout 12 states. MacGregor estimates it may take through the end of 1984 to implement the training systemwide.

Tribune Cable first attempted this type of training in-house, according to Mac-

Cable should be subject to the same principle," Guliano said.

Regulations requiring refunds from companies to subscribers are rare. In Rhode Island, subscribers are entitled to a refund after a 24-hour service interruption; it is the responsibility of the subscriber to notify the operator in order to receive credit. New Jersey, as most states, currently allows operators to handle credit or refunds on an ad hoc basis.

Guliano explained that the proposal grew out of what he termed the unusually high incidents of outages among certain operators, especially older companies. He said the proposal would encourage systems to better maintain their plants.

Gregor. "Yet there really wasn't a dedicated, 100 percent commitment to the program," he added. "The effort was sporadic."

Tribune Cable's training program will start with customer service reps and direct sales personnel. Depending on the results and the interest level, the company may extend the program to include technical people as well. "Ultimately, we want a consistent program throughout for all contact-type personnel. It may even include construction people in new-builds," MacGregor said.

The training of customer service reps will take three days on-site, followed by an 80-day program for direct sales personnel. Therefore, trainer Wilson initially will spend about two weeks training employees at each system. He also will be available to go back and "fine tune" if needed.

In addition, Wilson will train the office manager in each system to continue to serve as a trainer for customer service reps, while the sales manager or director of marketing will become the contact person for direct sales personnel after formal training ends.

Product knowledge will be a key element of the program, MacGregor said. In addition, Tribune Cable employees will be taught how to deal with stressful situations through techniques such as role-playing.

The training has three aims: To make each system a place where people want to work, where they find their jobs interesting and worthwhile; to increase sales activity; and to cut back on churn.

"Essentially, we want people to be comfortable with the knowledge they have and to have the tools needed to deal with situations that come up," MacGregor said. "We've reached our (initial) penetration in many systems. In order to increase our subscribers, we need sharper skills."

Texscan expands

Hardware company increases character generator market-share with Compuvid purchase

PHOENIX—In keeping with the corporate strategy so clearly demonstrated by its May acquisition of GTE's Sylvania division, Texscan has purchased yet another cable hardware manufacturer in an ongoing effort to expand its market base and increase its product offerings.

Last May, Texscan captured the attention of the cable industry and momentarily interrupted many manufacturers' pre-NTCA preparations by its unforeseen acquisition of GTE's Sylvania division. This August, Texscan made news again with the announcement of its purchase of Computer Video Systems, the Salt Lake City-based character generator manufacturer best known for its Compuvid product line.

According to Texscan officials, the acquisition of Computer Video Systems makes Texscan the largest manufacturer of character generators for the cable industry. The acquisition also augments the company's existing product line with the addition of new products in the areas of teletext and commercial insertion. Said one sales engineer for Texscan, "They had products we didn't have, so Compuvid will complement our inventory of equipment."

The merger plan is similar to the one used with Sylvania in that Computer Video Systems will retain its name and continue to distribute products under its own logo for at least the short term. The Compuvid character generator line, however, will be marketed by a combined sales staff which will also sell Texscan/MSI products.

According to Carl Pehlke, Texscan's chairman, the deal had been under negotiation since June and was finalized on July 5. Pehlke stated that "the acquisition gives Texscan the most complete line of character generator products available to the CATV market and establishes Texscan as the world's largest manufacturer of character generators."

The acquisition was paid for with an undisclosed amount of Texscan stock.

In addition to its purchase of Computer Video Systems, Texscan announced the first major U.S. sale of its TRACS remote addressable converter system to Tampa Cable Television, a Tribune Cable Communications system.

The TRACS system, which will be installed outside the subscriber's residence either on the cable strand itself or inside a locked compartment, will be used to prohibit theft of service and to provide some 116,000 homes in the Tampa, Fla., area with 120 channels of cable programming. TRACS will also provide Tampa Cable Television subscribers

various two-way services, including favorite channel storing, multiple viewer response functions, pay-per-view programming and home security monitoring. Texscan officials claim the system can also be used as a disaster or weather warning system.

Along with the TRACS System, which will be equipped with Texscan's Vital Signs™ status monitoring devices, Tampa Cable will purchase from Texscan 450 MHz equipment, test equipment and a character generator system to be delivered in September. —Constance Warren

Venturing overseas

Comcast Corp. forms joint venture with British company to tap London market

BALA CYNWYD, Pa.—Eyeing the London-area cable TV franchises that will be awarded later this year, Comcast Corp. last week announced its plans to form a joint venture with a British firm to apply for those franchises and to operate cable TV systems in the U.K. Comcast would maintain an operating role in the systems, with its British partner controlling the majority interest.

Company officials want to keep the identity of the prospective partner and the financial terms of the venture secret until later this month, when the application deadline for the first 12 pilot systems draws near. Assistant Treasurer Bernard Gallagher described the company as "a major British entertainment and leisure firm." He said that firm is not yet involved in cable TV in Britain, nor is it in the TV rental or film production business.

"We see the U.K. as a very good cable market," Gallagher said. "It has good density and a relatively high standard of living. TV is not unpopular there. And there's also interest in interactive services."

Comcast officials believe companies that go in and do a good job with the pilot systems in the London area will be in a good position when that country's cable authority carves up the rest of the country.

Gallagher said Comcast and its partner have no plans to get into programming services and instead will focus on operating systems. The joint venture is Comcast's first overseas project.

Several other U.S. companies announced plans earlier this summer to get into Britain's infant pay programming industry. HBO has joined with Fox, Columbia, CBS and Goldcrest Films and TV to form a pay TV service, while Paramount, Universal and MGM partnered with Rediffusion, Visionhire, Plessey and The Rank Organization in a similar venture. That leaves Disney as the only major film production company in the U.S. without an equity interest in pay programming in the U.K. —Sally Russell

NewsSweep

■ Caguas Cable System of San Juan, Puerto Rico, has signed an agreement to purchase approximately \$2 million of Magnavox CATV cable hardware. The 440 MHz equipment will be used for a new build on which construction is scheduled to begin this August in Caguas. The equipment purchased includes distribution equipment, Magna 7500 headend equipment and Magna 6400 addressable converters equipped with Magnavox's recently introduced signal scrambling technique, Encrypted Encoding™.

■ The first direct two-way interactive video-conference between the U.S. and the Soviet Union was accomplished through the use of two domestic and three international satellites, according to Bonneville Satellite Corp., the company responsible for engineering the July 20 two-way transmission. The one-hour program originated from the production studios of Gostel Radio in Moscow and from the campus of the University of California in San Diego and featured educational films for children as the topic of discussion between the U.S. and Soviet participants. Bonneville Satellite said it used transponders 8-D on Westar V and 3-D on Westar IV and three international satellites to downlink the feed from California to Dubna, a town located near Moscow, and to uplink the return feed from Lvov in the Soviet Union to San Diego. According to the company, the return feed required an additional "bounce" in West Germany, due to previously booked Intelsat traffic from Europe.

■ Anixter Communications has raised its strand and hardware prices by approximately 8.5 percent, due to a combination of factors, including a 6 percent price hike in domestic hardware manufacturers' products, a 10 percent increase in the cost of foreign strand manufacturers' equipment and concomitant escalating freight charges. Despite these strand and hardware price increases, which became effective August 15, Anixter plans to maintain current inventory levels.

■ GTE Business Communications Systems has established a new headquarters in Reston, Va. The move, first announced last year, will involve the re-location of the company's headquarters' staff and portions of its manufacturing, marketing and field operations departments to the Tech Park building located at 12502 Sunrise Valley Drive, Reston, Va. 22090.

■ Andrew Corp. has published a new edition of its general catalog, called the "Antenna Systems/Catalog 32," which features re-organized coaxial cable and power rating sections and increased coverage of broadcast and earth station products. Among the new listings included in the 208-page volume are: Grasis® towers and equipment shelters (Andrew acquired Grasis Corp. this year); ultra-high performance antennas; multiband antennas; elliptical waveguides; 1.8-meter antennas and various transmission line products. System planning data and technical information are provided.

■ Microwave Filter Co. split its stock two-for-one this past July 18, thereby raising the total number of its authorized and issued shares outstanding to approximately 2.2 million. The split succeeded the company's previous two-

for-one stock split by little more than a year. MFC officials expect the split to encourage swift trading as its June 1982 split did.

■ LNR Communications has been awarded a contract to provide video exciters to Microdyne Corp. These exciters, which permit simultaneous transmission of up to three audio channels with the video signal, will be incorporated into transportable Ku-band satellite uplinks now being constructed for Video Star Connections. According to LNR, these uplinks will be the first of their kind to be used exclusively for teleconferencing.

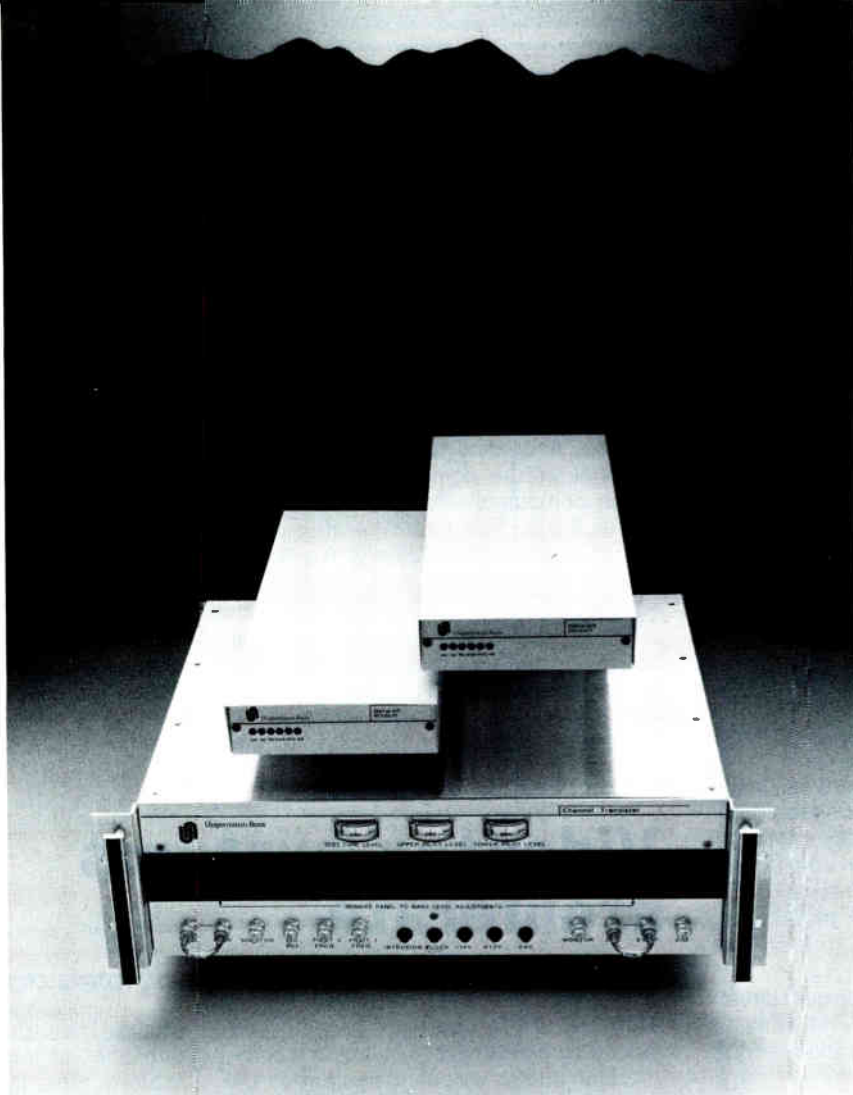
■ MCI Communications Corp. has declared a two-for-one stock split in the form of a 100 percent stock dividend to stockholders of record as of July 29, 1983, payable Aug. 19, 1983. At the company's annual meeting last month, stockholders approved an amendment to the company's certificate of incorporation to increase the number of authorized shares of common stock from 200 million to 400 million.

■ Commco Construction Co. has signed a contract with Sammons Communications Inc. to construct aerial extensions and implement electronic upgrade of the cable television system in Clinton, Okla. Commco also signed a contract with Group W Cable Inc. of Mobile, Ala., to build aerial and underground extensions for the Mobile cable television system. Commco currently is constructing a dual trunk, dual feeder system, with an institutional loop, for the Group W Cable Inc. system in Torrance, Calif.

■ Digital Equipment Corp. and Synercom Technology Inc., a mapping information management software vendor, have agreed to cooperatively market Synercom's mapping information management systems and Digital's VAX™ 32-bit superminicomputers. The agreement calls for the two companies to coordinate strategic marketing, sales calls, trade show displays, advertising, demonstrations and technical support efforts. Digital and Synercom have identified their target market as those organizations that produce and retain maps and related geographic data as part of their normal operations, with telephone companies and utilities among the list of prospective typical users.

■ Carrier/Echo system performance testing is now available from ComSonics Inc., Harrisonburg, Va., according to Don Runzo, supervisor of field services. This performance test provides indications of poor return loss within a cable plant which can degrade system performance to the subscriber. In addition to visual degradation, the effect of cable system echo may impede the rate that digital data information can be transmitted.

■ Contel, one of the nation's largest independent telephone companies, has agreed to market and service AgriStar, the electronic information, communications and on-line data base system of AgriData Resources Inc. In announcing the venture, James L. Carroll, vice president for Contel in their 12-state Midwestern Central Region, and Richard Weening, chief executive officer for AgriData, jointly stated that, "this agreement will help farmers, ranchers and agribusinesses to employ state-of-the-art computer and telephone technology to manage their businesses and improve their profits." Contel will act as sales and user support agents for the AgriStar service through its operating companies. AgriStar, an electronic business information service for farmers, ranchers and agribusiness, will be sold together with data terminals and printers.



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HotelTech for \$1,000 per month. The terminals within each room are also leased at \$30 per month and are linked into the in-house unit via coaxial cable and can access remote databases by phone line, allowing the guest to seek information not furnished by the hotel.

HotelTech plans to introduce its service initially in the San Francisco area, where the company is based, although it is not known whether its service will compete with Informart's Teleguide (see story above). TravelHost has already installed over 100 in Chicago's Midland Hotel and more than 60,000 in most of Quality Inn's hotels.

Hotels to test PIRCS

United to help test in-room communications service

SCOTTSDALE, Ariz.—United Cable's 60-channel franchise here will participate this fall in the trial run of a proposed interactive system for the lodging industry offering entertainment, information and transactional services to guests.

An October launch is planned for the test, which will be conducted by International Anasazi Inc., a hotel services firm based in Phoenix. The company developed the system, known as PIRCS (Personal In-Room Communication Ser-

vice). The test will run for at least 90 days.

United Cable has no financial interest in the venture. Its role will be to supply the system with 20 broadcast, pay and basic channels and video processing equipment. No test site has been announced.

On its own, Anasazi will supply about 30 services to the system. Under the concept, each TV set at the site will be hooked up to two microprocessors, a 60-channel converter and a keypad. Most of the services coming from Anasazi will be alphanumeric showing listings of entertainment events, airline schedules and restaurants in the Scottsdale area.

The initial interactive elements to be tested will be video games, where guests in one room will be able to compete with guests in another room. Also on tap: database retrieval and room service calls.

United Cable President Fred Vierra said the company agreed to participate in PIRCS for its short-term potential as a way for cable operators to bring services to hotels and motels. But he added that the interactive elements could have an immediate impact on the industry as well.

"We're talking about some exciting concepts, like using a credit card to rent a car, schedule a flight, check out of a hotel. If the hardware and software work in the hotel room, then arguably it could happen in the home. It has the potential to get cable into hotels in a real big way. But this has applications on a much broader scale," Vierra said.

No prices have been set.

New digital network planned

1986 is target date for international network

NEW YORK—The recent meeting in Geneva, Switzerland, of the International Telecommunications Union has produced significant results for a new totally digital telephone network.

The Integrated Services Digital Network, as the network is called, has developed standards and is presently working out the remaining unresolved technical requirements, expected to be issued in 1984. ISDN's goal is to have standard desktop terminals that interface with any of the world's many telecommunications networks to perform a variety of voice and data functions.

The concept of creating a worldwide digital network and being able to connect to nearly all computer and telecommunications systems through one type of channel was developed by ITU's International Consultative Committee for Telegraphy & Telephony.

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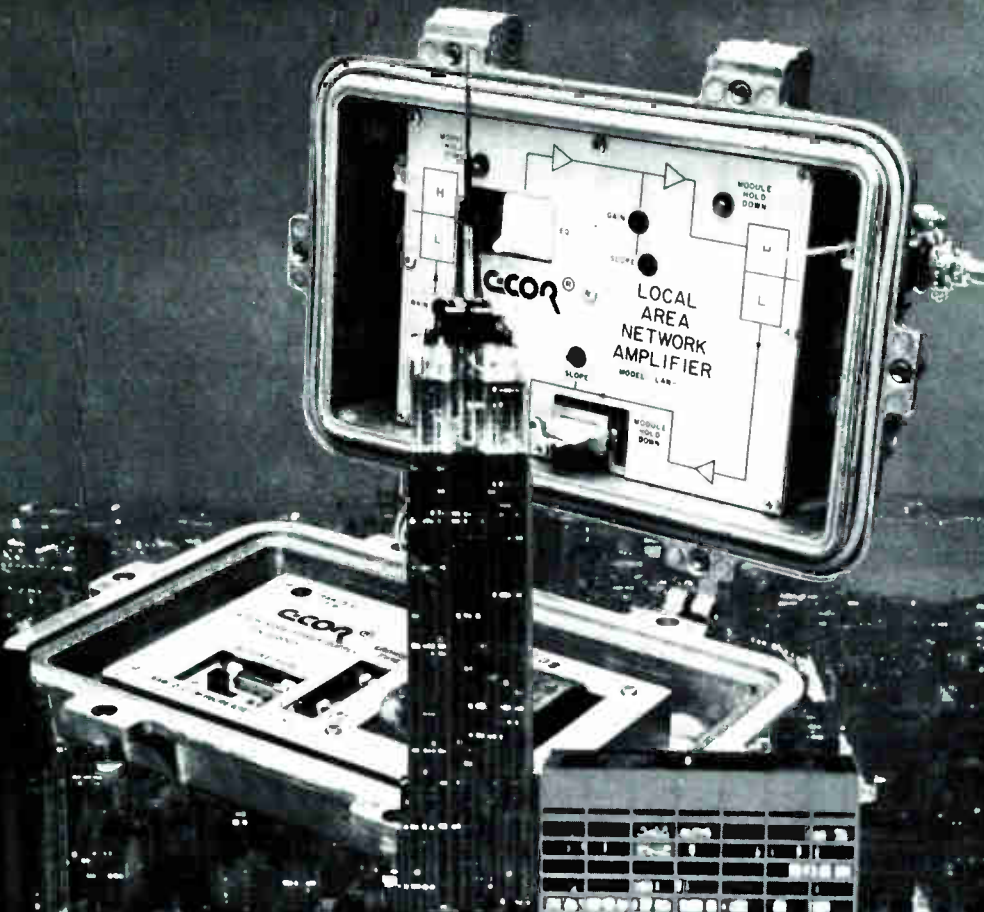
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Download

News briefs on business communications

■ **Venture Development Corp. predicts that the total voice-mail market for hardware and services will expand at an annual rate of 185%, to more than \$2 billion within four years.** Private automated branch exchanges (PABX) systems, which will grow at a projected annual rate of 416%, will ultimately account for close to \$1.5 billion. PABX-based systems can automatically record and store messages and will take business away from stand-alone voice mailboxes which cannot provide these services.

■ **Satellite Business Systems' three parents, Aetna Casualty & Life, Comsat and IBM have agreed to add another \$120 million to their present combined \$591 million investment in the company.** SBS expects to lose about \$120 million for the third straight year, but company officials are expecting to achieve profitability by 1986. That goal will be through expansion of services and the addition of three new Ku-band satellites and 20 earth stations to its existing network by 1987.

■ **Western Union has announced that it is providing the nation's first teletext service between 25 major U.S. cities and between the U.S. and West Germany.** The company received approval from the FCC and is capable of transmitting the 2.4-kbit service to any of the 1.5 million Telex subscribers worldwide through interconnection with Western Union's Telex operation. The service will run through a new circuit-switching center in New York City that establishes real-time connections between Telex-compatible word processors or electronic typewriters. The switching station contains a buffer to handle the speed difference, convert the code and route messages originating from a teletext terminal to domestic and overseas Telex stations. Three companies are offering the terminals: Olympia USA Inc., Siemens Corp., and Royal Business Machines.

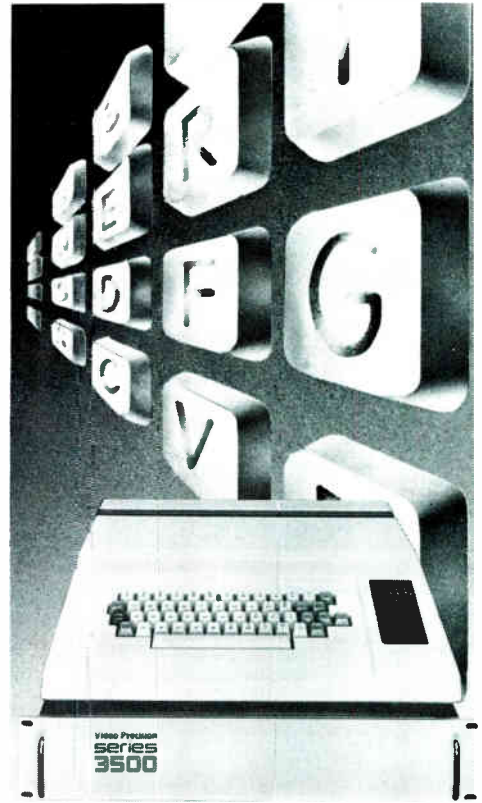
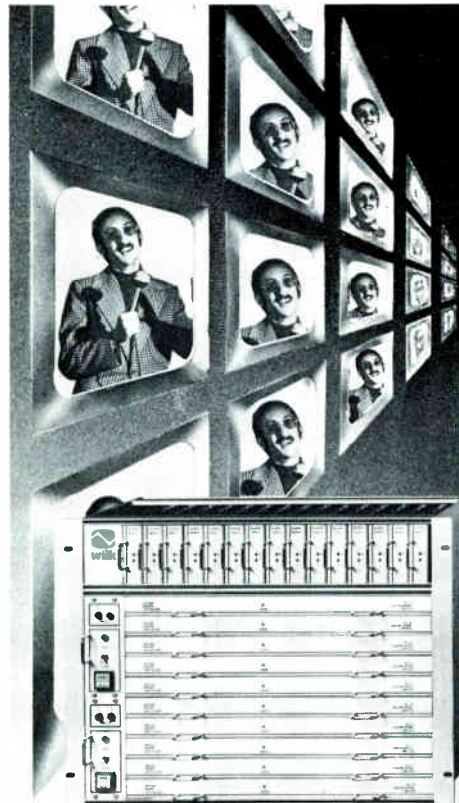
■ **A Federal District Court Judge for the District of Nebraska has enjoined the Nebraska Public Service Commission from enforcing its cease and desist order issued in May.** That order required Cox Cable of Omaha to cease operating Comline, the cable company's high speed digital data transmission service. In making his decision, Judge Richard Robinson determined that Cox had demonstrated "a strong probability of success" in its assertion that the FCC has preempted regulation in this area. Further, Robinson stated that Cox had shown "a substantial likelihood that the NPSC will impermissibly burden interstate commerce if it mandates a regulatory scheme that significantly impedes Comline's planned interconnect with interstate systems." The case has been returned to the NPSC for a decision on state law questions, but Robinson will make a final resolution on the federal aspects. Cox Cable President David Van Valkenburg said the company "will proceed aggressively with our business consistent with the court's decision."

■ **Mountain Bell has filed a complaint with the New Mexico Corporation Commission to stop Albuquerque Cable TV from offering data transmission services it claims com-**

pete with telephone-delivered services. The telco wants the commission to investigate whether Albuquerque Cable is offering common carrier services without a certificate of public convenience and necessity and whether the cable company can offer competitive services with the telephone company. Cable systems are deregulated within New Mexico and Mountain Bell is concerned about the potential business it could lose due to Albuquerque's data service.

■ **A record-breaking 72-hour satellite-delivered "live" videoconference broadcast**

to 17 sites in 15 cities across the United States was recently completed with great success by the Intervideo Network of Los Angeles. More than 4,000 people viewed the two-weekend long videoconference which was held under the auspices of The Forum, a San Francisco-based enterprise presenting a new program by the founder of the EST Training, Werner Erhard. Intervideo, working in concert with Videonet, provided complete privacy for the 72-hour broadcast event utilizing the ORION Encryption System, a patented device recently developed to ensure complete security



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Reader Service Number 46

September 1983/23

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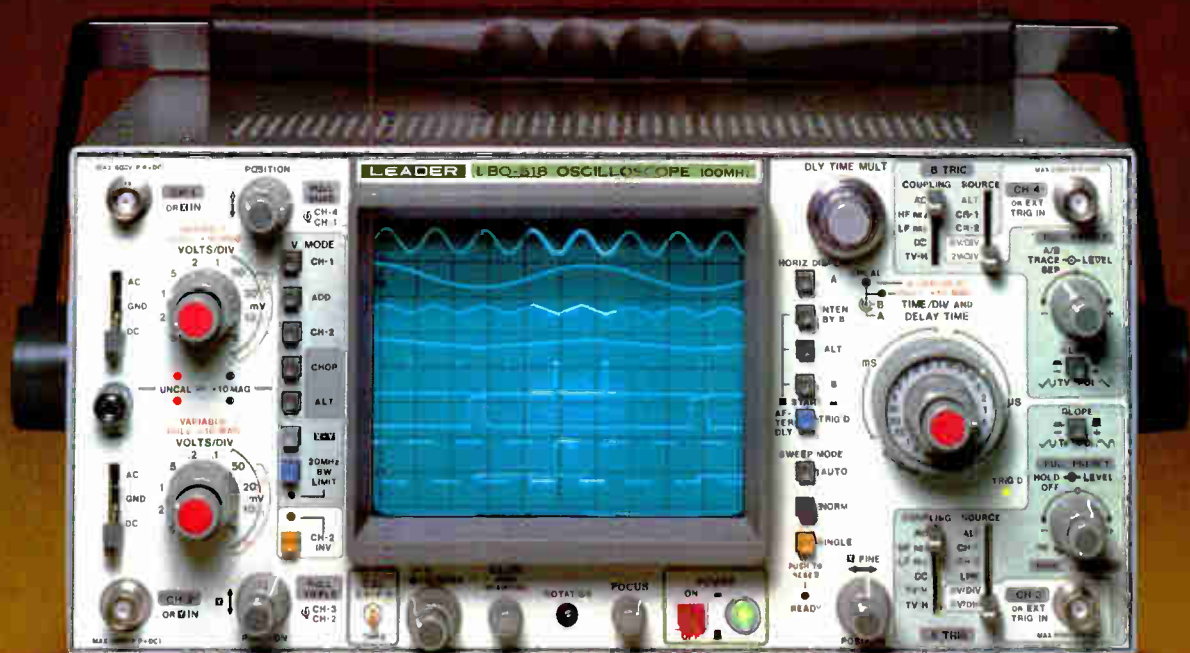
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Leader's LBO-518, 100-MHz oscilloscope provides more user benefits and much greater value than the TEK 465 – the 100-MHz oscilloscope that previously was the industry standard.

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Leader's LBO-518 combines the features and performance required

by senior engineers with the ease of operation wanted by field service engineers. Other important features include triggering ease, probe design, ease of maintenance, very rugged construction, and more. Contact Leader to discover all the advantages of the LBO-518.

FEATURES	TEK 465*	TEK 2235*	LBO-518	USER BENEFITS
Channels	2 plus 1 trigger view input.	2 plus 1 trigger view input.	2 plus 2 additional calibrated inputs.	4 inputs allow you to measure more data, more accurately, from more channels, simultaneously.
Horizontal sweep speed	2nS/div. max.	5nS/div. max.	2nS div. max.	2nS/div. displays a complete cycle of a 50-MHz sine wave. Provides better signal resolution.
Maximum vertical sensitivity	5mV/div.	2mV/div.	0.5mV div.	0.5mV/div. lets you view very low signal levels without external amplification.
Accelerating potential	18kV	14kV	20kV	Higher accelerating potential helps you view fast events, even at low rep rates.
Uncalibrated warning lights	Yes	No	Yes	Reduces operator error, and results in more reliable measurement data.
CH-1 output	Yes	No	Yes	Drives low-sensitivity instruments (i.e., freq. counter) without external amplifiers.
Delayed time base triggering	Int./Ext.	Int. only	Int./Ext.	Int./Ext. gives you more control of delayed sweep start and reduces jitter.
Independent delayed trigger coupling and source controls	Yes	No	Yes	Lets you select CH-1, 2 or 4 as the trigger source with AC, LF or HF reject and TV-H coupling. Enhances triggering versatility.
B-ends-A mode	Yes	No	Yes	Reduces display flicker and increases trace brightness in the alternate time base mode.
Illuminated graticule	Yes	No	Yes	Needed when photographing waveforms.
Size	1470.00 cubic inches	1205.12 cubic inches	1077.30 cubic inches	LBO-518 easily fits under most airline seats.
Price	\$3140**	\$1950†	\$2295 Mfg suggested LIST price	The LBO-518 costs far less than the industry standard it replaces.

†Price quoted via telephone 3/83. Specs published in 1/83 Tektronix brochure.

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Competing Technologies: DBS, SMATV, MDS, STV

Piecing together the communications puzzle

A CED reaction paper

On the board, all these services look good. Even Low Power, that much maligned, but highly sensitive service that still awaits an official sendoff, looks good. But that's where it all stops. Where do these services fit in when one looks at the total communications, or telecommunications, puzzle? Should cable operators be worried about the new services—principally DBS and now, multichannel MDS, as competition threatening to take away valuable subscriber markets and dollars? And what about SMATV, the so-called "cream skimmers" within cable franchises? Are they a foe the "public" cable operator must forever contend with? Or an industry that will last for a few short years?

Everyone can ask questions, but are there any good answers? The fact of the matter is that right now, there's both an attitude of who's been franchised and who hasn't and wait-and-see what happens. NCTA President Tom Wheeler stresses increased marketing on the part of the cable operator to make the public more aware of cable television, not "cable without the cable," or "cable without the wire." Getting cable deregulated and freed from many of the regulatory burdens is equally important. But cable operators cannot afford to take a reactionary approach. The industry must set the pace in program and information delivery and the first order of business in tackling competition is identifying all the pieces to the communications puzzle.

One place to start is with subscription television, perhaps the first competitor to cable. Alas, it would appear that time may be running out for many of these STV outlets, which reaped high revenues during the days when cable TV had virtually zero penetration in the major markets. STV came in and quickly and efficiently started beaming pay television service to program-starved customers. These days, however, the STV industry is seeing more and more of its operations permanently close up shop because their subscriber counts have steadily and rapidly declined as cable penetration has increased. Some cable operators and financial analysts have written off STV, but it still flourishes in select markets that

can withstand competition by several different pay TV or communications sources. Los Angeles is one example.

L.A. aside, what does the STV outlet in a smaller market do? With a strong association fighting for its members' rights, the potential for its continued existence lies in alliances with low power stations, public broadcasting stations, cable systems and DBS operations.

By turning a LPTV station into a full-time STV operation, the potential for revenue is higher, particularly in the rural markets, according to several industry analysts. Getting cable operators to carry the service as a pay TV tier offering is another example and the same would go with DBS services, particularly those services that do not intend to provide any of their own programming and contract out for such services. (United States Communications Inc. (USCI) is one DBS company that will follow this plan.) In addition, the STVA (trade association for STV) advocates using public TV stations as additional STV outlets "to encourage the greater diversity in pay TV programming."

Rural impact

Service to the rural market by STV might be a good alternative for them, but it is also a principal market for DBS, LPTV and to a lesser extent, MDS. What does this mean to the cable operators? A common notion among the latter group is that the rural market is relatively unimportant in terms of total penetration. That is untrue. To quote Steve Effros, executive director of CATA, speaking at its recent annual convention, "The rural operator is the backbone of the cable industry. These are the guys who are making money, not the major market operators."

The rural market for cable is of necessity important. But it is more often neglected by the franchisee because it is too difficult and too costly to wire those scattered homes. Thus, the homes are often bypassed by the cable operator and are forced to seek other forms of communications systems to satisfy their programming demand. Enter LPTV, STV and DBS and private cable. This market is ripe for them. Indeed, according to predictions by various DBS companies and communications analysts/observers, the potential

for growth among these consumers is great, approaching two to four million by 1990. That doesn't sound like a lot when one considers the total number of CATV subscribers at present (30,636,000 by year end 1983) and *CableVision* predicts 59 million by 1990, but the DBS totals represent the equivalent of subscriber totals of the top MSOs today. Furthermore, these are subscribers that cable has lost and most likely will never attract. But DBS will not settle for just a piece of the rural puzzle; it intends to hit the urban markets as well, cutting into cable's marketshare and that of the other technologies. Joint ventures with the "underdogs" vs. cable may occur as the "newer" technologies set their sights on cable's customary subscriber base. The aphorism that the high cost for what amounts to only a handful of services provided by DBS will not be attractive to subscribers is not valid. Cable subscribers are steadily paying more for their services, taking multi-pay packages, tiered basic services, additional outlets and other items, and are approaching that magic \$45 per month. On the average, a cable subscriber taking basic and two pay services is paying approximately \$26 to \$28 per month, similar to the charges that several DBS services—Satellite Television Corp. (COMSAT) and USCI—plan to charge.

To top it off, DBS just got another shot in the arm with the results of the Geneva conference of the International Telecommunication Union, which assigned satellite slots for the United States. "The prospects for direct-to-home satellite broadcasting here in the U.S. have never looked brighter," stated Direct Broadcast Satellite Corp. President Wilbur Pritchard. "The U.S. got substantially everything that it set out to get in Geneva, which means that our industry will be able to forge ahead as planned."

Forging ahead is exactly what it plans to do. Already, one company is making plans to launch this November 15 and broadcast to 26 states in the Eastern half of the country. USCI, which received major financial support from Prudential (approximately \$54 million), is set to beam programming off Canada's Anik C-3, launched by the Space Shuttle Challenger in June. USCI will offer five channels of



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Reader Service Number 22

TECH II

Satellite Spacing Dilemma

- Multibeam Feed Antennas**
- Satellite Spacing Scorecard**



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Solving the satellite spacing dilemma

Laying the groundwork for what the telecommunications industry anticipates as potential demand for increased satellite communications, the Federal Communications Commission last April authorized the construction and launch of 19 additional satellites in its move to two-degree spacing. This will reduce the space between current satellite positions to accommodate the latest positions.

Although official plans call for the controversial two-degree spacing plan to go into effect within ten years, users and manufacturers are now beginning to develop procedures and new blueprints to adjust their satellites and receiver equipment. One target date when two-degree would go into effect is as early as 1987. Under the FCC's plan, the orbital slots will increase as C-band satellites proliferate and merge into three-, two-and-a-half- and ultimately, two-degree slots. The plan is designed so that all C-band birds will eventually occupy two degrees in the geosta-

tionary arc. However, according to FCC staffer Joe Harcarufka, only the market will be able to determine how quickly the satellite industry will move to complete two-degree spacing.

"Personally, I don't see all this demand for satellites right now," admitted Harcarufka. "When spare transponders on Satcom IV still haven't been sold, one wonders where this explosive business is. People are looking more for positions at this point."

The positioning of the new birds has essentially been established, with only several unassigned slots left in the C-band. Ten satellites are scheduled to be launched between the end of this year and mid-year 1986. In order to prevent the obsolescence of existing satellites and the thousands of earth stations presently in use, the FCC adopted a phase-in approach to give satellite users time to make the required signal adjustments.

"The move to two degrees will happen when necessary," Harcarufka

said. "We're not going to two degrees right away; it depends on real growth in satellite demand. Obviously, users want to maximize the life of their current facilities, and we want to allow them the chance to amortize existing equipment."

There will be no phase-in plan for Ku-band satellites, which will move to two-degree positions immediately. Presently, only three slots are in use, all by Satellite Business Systems, and some question whether opening up more space on the C-band will prolong the development of the higher band. However, many users are optimistic about the eventual migration of satellites to the Ku-band once space on the C-band is used up. Indeed, of the 19 satellites approved by the commission, 14 of them are slated to use the Ku-band or act as hybrid birds. (A hybrid bird is one that can take both four and six and 12 and 14 satellite bands on the same platform; i.e., use both C-band and Ku-band.) The potential for Ku-band lies in direct broadcast satellites and other

Product profile:

Multiple beam feed antenna systems

The **Mark Antenna Division of Anixter Communications** offers a multi-beam feed system for Anixter Mark 4- and 5-meter antennas. The system, which can accommodate as many as five prime focus feeds, is designed to receive simultaneous programming from satellites spaced four degrees apart. The system's shallow F/D (focal length-to-diameter) ratio allows off-access feeding which helps maintain high-efficiency and consistency levels. This feed system is available in a complete Anixter Mark antenna package or as a retrofit kit for existing Anixter antennas.

Mark Antenna Multi-Beam Typical Gain Performance

	4-meter system	5-meter system
4° off-boresight	40.5 dBi	44.0 dBi
8° off-boresight	—	43.0 dBi

Antenna Technology Corp. manufactures both multiple beam, the Simulsat, and triple beam, the Trisat, antennas.

The Simulsat can accommodate 20 feeds to receive signals from as many as 20 satellites within a 60 degree capture angle. Both C- and Ku-band operation are possible. All three sizes of the Simulsat—7-, 5- and 3-meter versions—were range-tested at Comtech Antenna Corp.'s antenna range. Results indicated that the Simulsat can see from Galaxy 1 (135° W) to Satcom IV (83° W) with performance characteristics equal to similar-sized parabolic antennas. Another test result showed uniform radiation pattern performance on all feed positions for all three Simulsat models. The antenna system features a reinforced fiberglass reflector with an aluminized fiberglass reflecting surface, accommodates most LNA's and LNC's and can endure winds up to 125 mph.

34/September 1983

	Simulsat-7	Simulsat-5	Simulsat-3
Gain (4 GHz)	47 dBi	44 dBi	41 dBi
Frequency	3.7-4.2 GHz	3.7-4.2 GHz	3.7-4.2 GHz
Beamwidth	0.8°	1.0°	1.5°
Adjacent satellite, isolation	22 dB	25 dB	20 dB
Polarization, isolation	25 dB	25 dB	+25 dB
Capture angle	60° +	60° +	60° +
Reflector size	7 meters x 12 meters	5 meters x 7 meters	3.3 meters x 5.5 meters
Min. satellite separation	2°	3° (currently); 2° (early 1984)	2°
Weight	19,000 lbs.	3,600 lbs.	N/A
Sidelobe performance	29-25 log θ	32-35 log θ	32-35 θ

Another Antenna Technology multiple beam antenna is the Trisat. This antenna can receive signals from up to three antennas. Both a four- and five-meter version of the Trisat are available. Trisat specifications are listed on page 42.

continued on page 42

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TECH II

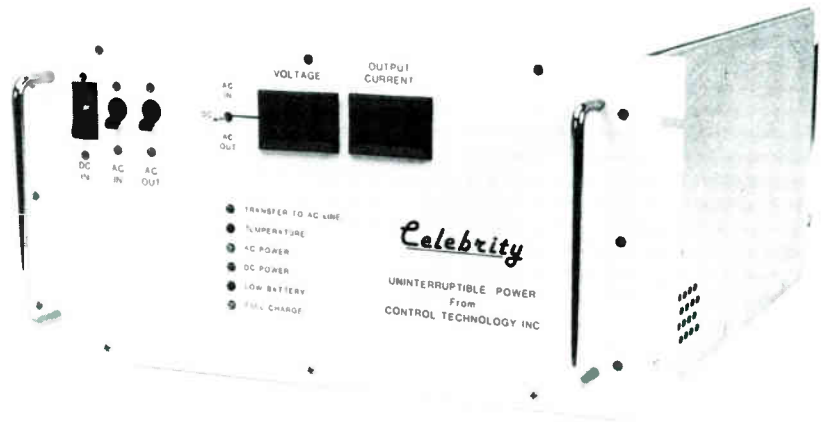
birds for data transmission, according to some estimates. However, interference is possible within this band, noted Harcarufka, especially in areas where rain is heavy, but data transmission to antenna sites in the Western part of the U.S., where the climate is generally dry, would be an effective use of the Ku-band.

Judging by the types of companies planning to launch satellites into the Ku-band, data transmission could figure highly. For example, GTE plans two satellites scheduled to launch in May 1984; Southern Pacific Satellite Co. will launch Spacenet I and II in 1984 and Spacenet III is intended to be a hybrid bird; and Advanced Business Communications Inc. has two satellites scheduled for late 1986 and early 1987. (A complete chart of C-band and Ku-band allocations appears on p. 38.)

Reaction among satellite companies has generally been positive, allowing new opportunities and positions for existing carriers and new players. Positioning next to satellites presently in use, and serving the cable industry in particular, was deemed very important to a number of companies readying birds. Presently, Hughes Communications' Galaxy I satellite, which was launched in June and scheduled to become operational later this year, lies next to Satcom III-R, and American Satellite Co., which plans a hybrid bird to be ready by late 1985 or early 1986, is also situated three degrees away from Cable Net I. In addition, Southern Pacific's Spacenet I is 2.5 degrees from Westar V.

Such adjacencies tend to highlight the possibility of using multibeam antennas to pick up two or more signals through one earth station. The technology of the dual beam parabolic antenna was developed by Norm Weinhouse for Hughes Communications. Presently, a number of companies (they are profiled beginning on p.34) offer dual and multi-beam antennas, but it is to Hughes' credit that the concept of shared signals through one earth station was created.

According to a paper prepared by Weinhouse, the antenna feed system he designed can be retrofit to existing parabolic reflector earth station antennas where two separate feed horns offset from the boresight would be used to receive two completely independent beams emanating from satellites located from three to five degrees apart on the geostationary arc. Weinhouse claims that with a



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TECH II

Satellite Spacing Scorecard

C-band

Orbital positions	Carrier/satellite	Launch date
67	RCA/Satcom II-R or VI	Aug. 1983 or May 1986
69	Southern Pacific/Spacenet II	Sept. 1984
72	RCA/Satcom II-R or VI	Aug. 1983 or May 1986
74	Hughes/Galaxy II	Sept. 1983
76	AT&T/Telstar	
78.5	Western Union/Westar III or Westar VI	Jan.-March 1984
81	Amsat/ASC I or II	Sept. 1985 or March 1986
83.5	RCA/Satcom IV	
86	Western Union/Westar III or Westar VI	Jan.-March 1984
88.5	AT&T/Telstar	
91	Southern Pacific/Spacenet III	March 1985
93.5	Hughes/Galaxy III	
96	AT&T/Telstar	
98.5	Western Union/Westar IV	
101	Unassigned	
104.5	Canada	
108	Canada	
111.5	Canada	
113.5	Mexico	
116.5	Mexico	
119.5	Western Union/Westar V	
122	Southern Pacific/Spacenet I	April-May 1984
125	AT&T/Telstar	
128	Amsat/ASC I or II	Sept. 1985 or March 1986
131	RCA/Satcom III-R	
134	Hughes/Galaxy I	
137	Unassigned	
139	RCA/Satcom I-R	
141	Unassigned	
143	RCA/Satcom V	

Ku-band

Orbital positions	Carrier/satellite	Launch date
69	Southern Pacific/Spacenet II	Sept. 1984
71	Unassigned	
73	Unassigned	
75	Unassigned	
77	RCA/K-I, K-II or K-III	May 1985, Jan. 1986 and Aug. 1987
79	Rainbow/RSI I or II	Aug. or Nov. 1986
81	Amsat/ASC I or II	Sept. 1985 or March 1986
83	ABC/ABC I or II	Dec. 1986 or Feb. 1987
85	USSSI/USAT I or II	Feb. 1984 or Aug. 1984
87	RCA/K-I, K-II or K-III	May 1985, Jan. 1986 and Aug. 1987
89	SBS/SBS IV	Aug. 1984
91	Southern Pacific/Spacenet III	
93	Unassigned	
95	SBS/SBS III	
97	SBS/SBS II	
99	SBS/SBS I	
101	Unassigned	
103	GTE/GSTAR I	May 1984
105	GTE/GSTAR II	Aug. 1984
107.5	Canada	
110	Canada	
112.5	Canada	
113.5	Mexico	
116.5	Mexico	
117.5	Canada	
120	USSSI/USAT I or II	Feb. 1984 or Aug. 1984
122	Southern Pacific/Spacenet I	April-May 1984
124	SBS/SBS V	Summer 1984
126	RCA/K-I, K-II or K-III	May 1985, Jan. 1986 and Aug. 1987
128	Amsat/ASC I or II	Sept. 1985 or March 1986
130	ABC, ABC I or II	Dec. 1986 or Feb. 1987
132	Rainbow/RSI I or II	Aug. or Nov. 1986

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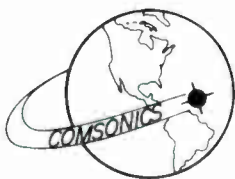


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American Cable Consultants and Construction

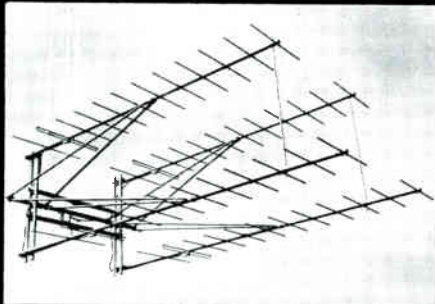
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Richard Glover
Reader Service Number 29

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Phone: (503) 253-2000

good parabolic reflector, a feed system using Hughes' design should be able to realize 60 percent overall efficiency, or less than 0.5 dB scanning loss, at a maximum beam separation of five degrees.

Other manufacturers have developed antennas with spherical- or torus-shaped reflectors that are capable of multibeam reception. One such company is Antenna Technology Corp., which builds and sells Simul-sat, capable of accommodating up to 20 different feeds in either C-band or Ku-band modes.

A profile of the dual and multibeam antennas available begins on p. 34.

Multibeam Callbook

Anixter Communications

The Mark Antenna Division
2180 South Wolf Rd.
Des Plaines, Ill. 60018
(312) 298-9420

Antenna Technology Corp.

8711 Pinnacle Peak Rd.
Suite C-103
Scottsdale, Ariz. 85255
(602) 264-7275

Comtech Antenna Corp.

3100 Communications Rd.
P.O. Box 428
St. Cloud, Fla. 32769
(305) 892-6111

M/A-COM MVS Inc.

63 Third Avenue
Burlington, Mass. 01803
(617) 272-3100

Microdyne Corp.

P.O. Box 7213
Ocala, Fla. 32672-0213
(904) 687-4633

Miralite Corp.

1331 East St. Gertrude
Santa Ana, Calif. 92705
(714) 641-7000

SatCom Technologies Inc.

2912 Pacific Drive
Norcross, Ga. 30071
(404) 448-2116

Scientific-Atlanta Inc.

4311 Communications Drive
P.O. Box 105027
Atlanta, Ga. 30348
(404) 441-4100

Superior Satellite Engineers

P.O. Box 1149
Roseville, Calif. 95661
(916) 791-3315

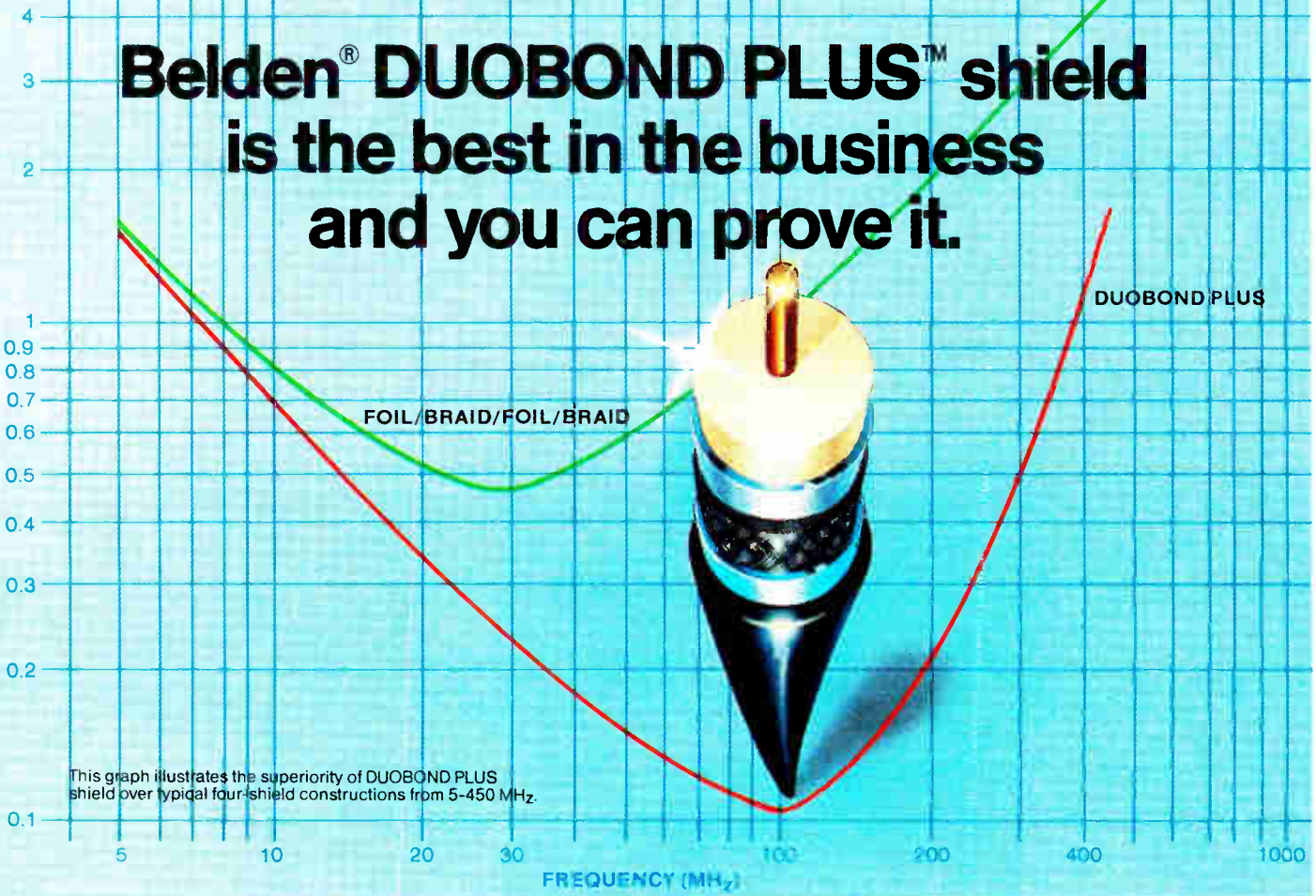
Wilkom Inc.

East Gate Industrial Park
P.O. Box 167
Pocahontas, Ark. 72455
(501) 892-8056

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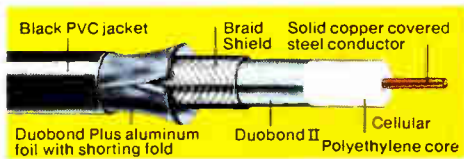
Belden® DUOBOND PLUS™ shield is the best in the business and you can prove it.

TRANSFER IMPEDANCE (MILLIOHMS/METER)



This graph illustrates the superiority of DUOBOND PLUS shield over typical four-shield constructions from 5-450 MHz.

New DUOBOND PLUS drop cable shield can keep performance up and costs down in your CATV operations. Using a unique foil/braid/foil configuration, DUOBOND PLUS shield delivers greater shielding effectiveness than typical 4-shield constructions. It's also smaller in diameter, easier to terminate, lighter weight and more flexible.



Greater shield effectiveness.

As the transfer impedance data above shows, DUOBOND PLUS shield offers far superior shield performance to even the foil/braid/foil cables on the market today. The key to this effectiveness is the use of our unique shorting fold in our outer foil shield. This shorting fold along the longitudinal edge effectively reduces slot radiation normally experienced with traditional overlapping foils.

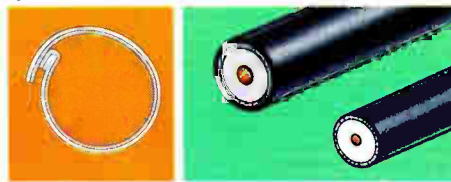
This protection from signal ingress and egress helps you meet the current FCC requirements limiting radiation from your CATV system. Try it in your toughest interference locations. You'll find that DUOBOND PLUS shield offers the kind of performance you—and your customers—demand from a CATV drop cable.

Easy termination.

Unlike foil/braid/foil/braid cable constructions, the DUOBOND PLUS cable shield does not require expensive oversized connectors. The cable is made to standard industry size to use any popular, commercially available connectors (RG 59, .242" O.D./RG 6, .275" O.D.). Also, the inner foil of the DUOBOND PLUS shield is bonded right to the cable core. That

means there's no chance for foil pushback and the signal leakage that frequently results from pushback.

DUOBOND PLUS shield features a unique shorting fold in the outer shield. This fold gives metal-to-metal contact for reduced slot radiation effect.



DUOBOND PLUS shield offers better shielding than this bulkier, more expensive foil/braid/foil/braid cable. The larger cable also requires special, non-standard connectors.

Cables with the DUOBOND PLUS shield are available in RG 59, RG 6 and RG 11 constructions—messengered, non-messengered and flooded versions. And all cables with DUOBOND PLUS shields are 100% sweep tested from 4 to 450 MHz with a minimum return loss of 23 db for RG 59 and 26 db for RG 6. Call Belden for assistance in selecting the cable that's best for you. You'll see that DUOBOND PLUS shield can keep profit and performance up—and costs down—in your CATV cable operations.

Electronic Wire and Cable, Attn: CATV Sales Dept., P.O. Box 1980, Richmond, Indiana 47374. Phone: 317-983-5200.



BELDEN

Reader Service Number 31

CUT OUT AND MAIL

Belden, Electronic Wire and Cable
P.O. Box 1980, Richmond, IN 47374. ATTN: CATV Sales Dept.

Yes, I'd like to know more about drop cable with the DUOBOND PLUS shield.

- Send me a free DUOBOND PLUS shield sample. Send me your catalog.
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	Trisat 4-meter	Trisat 5-meter
Gain (uniform)	42.3	44.0
Frequency	3.7-4.2 GHz	3.7-4.2 GHz
Beamwidth	1.3	1.0
F/D	.42	.38
Foundation	2.5 yd. concrete pad	4.5 yd. concrete pad
Wind loading survival with 2-inch radial ice	67 mph	67 mph
Without ice	120 mph	120 mph
Mount	AZ-EL	AZ-EL
Reflector configuration	6 piece penta	3 piece sectional
Weight	500 lbs.	1300 lbs.
Conversion kit F/D requirement	.33-.55	.33-.55
Min. satellite spacing	4°	4°

Comtech Antenna Corp. offers a multiple feed system available in a complete package with the company's 3.8- or 5-meter antenna or as part of a retrofit kit for Comtech antennas already in the field or for other manufacturers' antennas which meet specific F/D requirements. The system accepts signals from a maximum of three satellites spaced four degrees apart. According to Comtech, sidelobe levels that meet FCC licensing requirements will minimize possible interference from future satellites to be spaced two or three degrees apart. This will allow for continued reception from satellites separated by four degrees. Range testing and other procedures have also been performed on the system to minimize gain loss between the center and offset feeds. Comtech antennas can be purchased with single-, dual- or triple-feed configurations.

Comtech Triple/Dual Feed System

	With 3.8-meter antenna	With 5-meter antenna
Frequency	3.7-4.2 GHz	3.7-4.2 GHz
VSWR	1.3:1 max.	1.3:1 max.
Isolation between ports	35 dB min.	35 dB min.
Gain @ 4 GHz		
center feed	41.3 dB	44.4 dB
offset feed	41.1 dB	43.7 dB
Half-power beamwidth		
center feed	1.43°	1.12°
offset feed	1.47°	1.18°

M/A-COM's "Multi-Satellite™" dual- and triple-beam feed systems operate with most standard parabolic dish antennas, requiring only a single adjustment to rotate the feed cluster for installation and alignment purposes. M/A-COM's dual-beam system receives signals from two adjacent satellites within a four degree arc, while the triple-beam receives signals from three adjacent satellites within an eight degree arc. Each feed is equipped with its own orthomode transducer, which can be adjusted independently for polarization alignment. The gain performance of the multi-satellite feed is a function of the diameter and F/D ratio of the antenna, with F/D ratios

of .30 or greater recommended for the dual-beam model and .38 or greater for the triple beam.

Typical Gain Performance

Diameter meters	Gain to Multi-Satellite dual-beam antenna (F/D = .35)	Gain to Multi-Satellite triple-beam antenna (F/D = .38)	
		center beam	side beam
3.0	39.9 dBi	39.9 dBi	39.3 dBi
3.7	41.6 dBi	41.7 dBi	41.0 dBi
4.5	43.4 dBi	43.5 dBi	42.6 dBi
5.0	43.9 dBi	44.3 dBi	43.3 dBi

Microdyne Corp. offers a multiple satellite feed system, the MSF-16, which allows a five-meter Scientific-Atlanta or Microdyne antenna to receive signals from a maximum of five satellites simultaneously. Installation of the feed system on existing Microdyne antennas requires only the replacement of the feed support hardware spars and brackets and, consequently, can easily be performed in the field. The company claims that the feed system permits reception of signals from two or more adjacent or near adjacent satellites on one reflector with no perceptible loss in antenna gain. The system features 4 GHz or 12 GHz reception with Microdyne antennas easy to retrofit for simultaneous 4 GHz reception. The MSF-16 can receive signals from satellites spaced four degrees apart but has not yet been tested for reception of signals from satellites separated by two or three degrees. Microdyne currently offers computer programs to assist the operator in determining whether a multiple satellite feed system will meet his specific requirements.

The MSF-16 Multiple-Satellite Feed System

Isolation between beams	better than 20 dB
Reception	4 or 12 GHz
Gain loss	
4° off-boresight	.5 dB
8° off-boresight	±3.5 dB

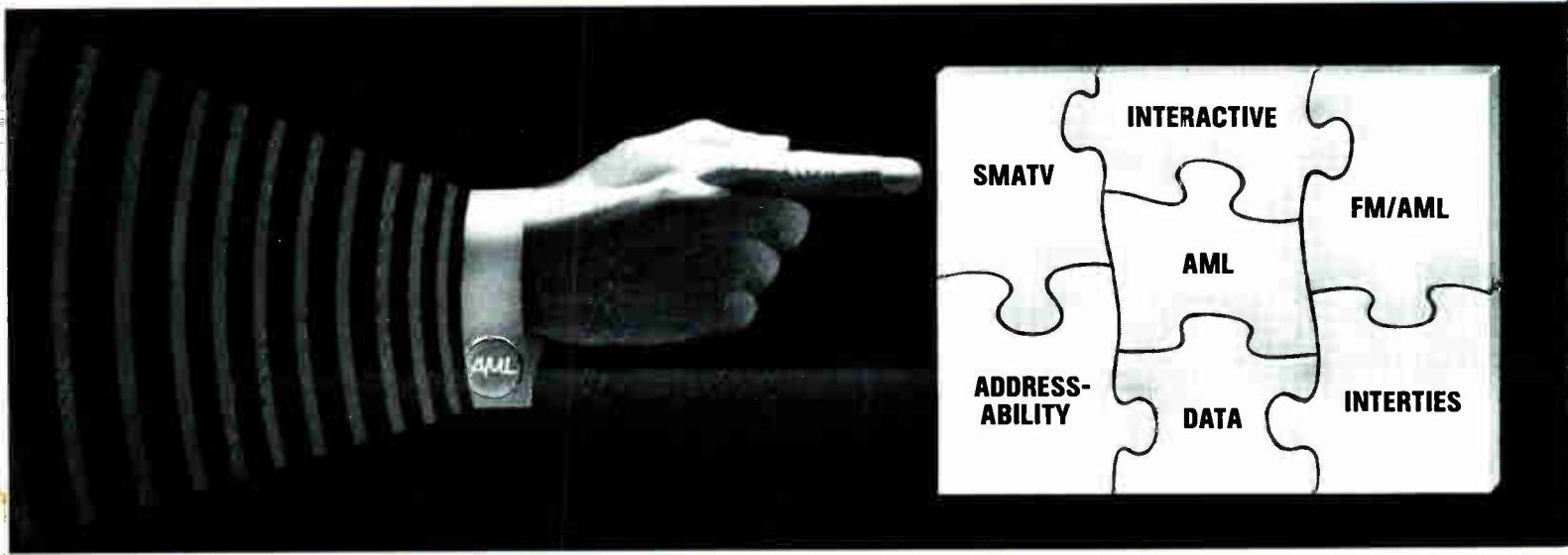
Miralite Corp. provides a dual-beam feed system for satellites spaced eight degrees apart and a triple-beam feed system for access to three adjacent satellites spaced at four degrees intervals. Both systems are included as part of Miralite's "Multisat®" 3.7-meter antenna system or are available as retrofits for existing Miralite 3.7-meter antennas. The Miralite feed systems can accommodate as many as three orthomode couplers. Both systems feature low off-scan signal loss, four fiberglass feed support struts constructed from an aircraft-quality aluminum alloy to minimize signal loss, a pole polar mount, a fiberglass feed cover and an adjustable feed rack for precise signal tuning.

	Multisat dual-beam system	Multisat triple-beam system
Frequency	3.7-4.2 GHz	3.7-4.2 GHz
Gain	41.8 dBi (@ 4.0 GHz, 66% efficiency)	41.8 dBi (@ 4.0 GHz, 66% efficiency)

SatCom Technologies Inc. distributes the Torus multiple beam, multiple band antenna, which is manufactured under an exclusive license from Comsat by Radiation System Inc. (RSI), the parent company of SatCom Technologies. By dedicating a feed to each satellite, the Torus can receive signals from as many as 25 satellites within a 50 degree orbital arc simultaneously. The Torus employs an

continued on page 45

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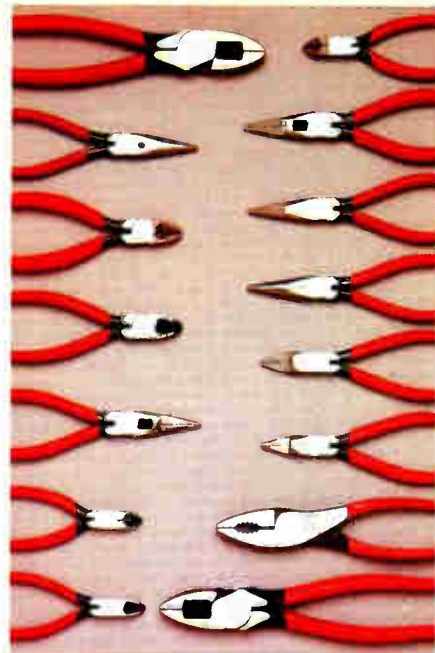
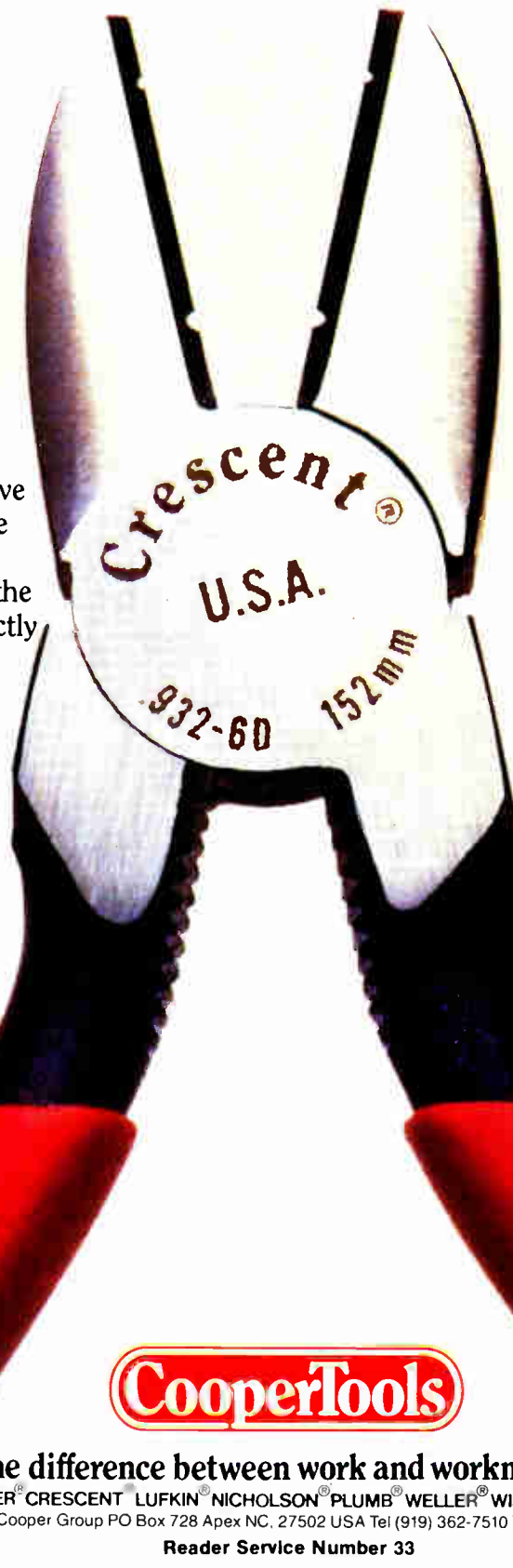
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Reader Service Number 33

continued from page 42

offset design to provide a gain equal to that of 4.5- and 7-meter parabolic antennas with lower sidelobes, thereby reducing interference from terrestrial microwaves or from adjacent satellites as close as two degrees apart. The system is comprised of high-strength aluminum panels designed according to an RSi proprietary "AccuShape" metal contouring process and is available in 4.5- and 7-meter sizes with feeds for receiving signals from both C- and Ku-band satellites. The Torus operates in either the 3.7—4.2 GHz or 11.7—12.2 GHz frequency range.

	Torus 450TC	Torus 700TC
Frequency (GHz)		
receive	3.7-4.2	3.7-4.2
transmit	5.925-6.425	5.925-6.425
Gain, midband		
receive	43.5 dBi	47.3 dBi
transmit	46.1 dBi	49.7 dBi
VSWR	1.3:1	1.3:1
Beamwidth at midband		
receive -3 dB	1.15°	.75°
-15 dB	2.25°	1.50°
transmit -3 dB	.75°	.50°
-15 dB	1.45°	1.05°
First sidelobe level	-15 dB	-15 dB
Radiation pattern	Meets FCC Docket 81-704	
Antenna noise temp. (ref. omt port), typical		
10° elevation	36° K	35° K
Cross-polarization discrimination		
1 dB beamwidth	-30 dB	-30 dB
Power-handling capability	5kW CW	5kW CW
Isolation between ports	35 dB min.	35 dB min.
Reflector size	36' w x 15' h	56' w x 23' h
Equivalent diameter	4.5-meter	7-meter
Reflector construction	12 panels	27 panels
Polarization adjustment	360°	360°
Net weight	5,500 lbs.	10,000 lbs.
Wind loading at 32° F		
operational survival	30 mph gusting to 60 mph 125 mph, no ice—87 mph with 2-inch radial ice	
Pointing accuracy		
Wind 30 mph gusting to 45 mph	.035° rms	.035° rms
Wind 45 mph gusting to 60 mph	.070° rms	.070° rms
Temperature range	-40—+140° F	-40—+140° F

Scientific-Atlanta's dual-beam feed for 4.6-, 5- and 7-meter Scientific-Atlanta earth station antennas is available as either a retrofit kit for antennas already in the field or as part of a complete antenna package. The feed simultaneously receives signals from two adjacent satellites spaced 3-4 degrees apart without adversely

affecting the antennas' 32-35 log Θ sidelobe characteristics. Each feed is equipped with dual-polarized orthomode transducers to permit independent polarization adjustments.

Scientific-Atlanta Dual-Beam Feed System

	4.6-meter system	5-meter system	7-meter system
Frequency	3.7-4.2 GHz	3.7-4.2 GHz	3.7-4.2 GHz
Gain @ midband	42.4 dBi min. @ 3.95 GHz	43.5 dBi min. @ 3.95 GHz	46 dBi nominal @ 3.95 GHz
Isolation between beams	20 dB minimum in the same polarization		
Satellite spacing	3-4° (within conti- guous U.S.)	3-4° (within conti- guous U.S.)	3° (within conti- guous U.S.)

Superior Satellite Engineers makes a multi-beam feed system, the model MBF1010, for use with most 5-, 6- and 7-meter parabolic antennas. The feed system allows the antenna to receive signals simultaneously from Comstar B-4, Galaxy 1 and Satcom IIR and from as many as 96 transponders on four adjacent satellites. Each feed within the system is individually adjustable around three axes. According to the company, the system provides absolute focal length integrity.

The MBF1010 Multi-Beam Feed System

Type	point source	Max. off-boresight (recommended)	+/-4°
Frequency	3.7-4.2 GHz	Max. off-boresight capability	+/-6° (12° total span)
Isolation	1.25	Weight	16 lbs.
Insertion loss	.15 dB	Mount	strut or button-hook
Off-boresight loss	.8 dB @ 4°	Capacity	4 dual feeds (96 total transponder capacity)
VSWR	1.25	Antenna(s)	4.5-7 meter, .3-.38 F/D

Wilkom Inc. manufactures a multiple feed system for use with Microdyne, Scientific-Atlanta, M/A-COM Prodelin, Andrew, Comtech, Odom and Hughes antennas. The multiple feed system can receive signals from as many as five satellites within 16 degrees of geostationary orbit. The system is fully adjustable in all planes, allowing for fine adjustments in positioning. A four-legged support is included with the system. Wilkom also will tailor its system to operate with antennas from other manufacturers not listed above.

Wilkom Multiple Feed System

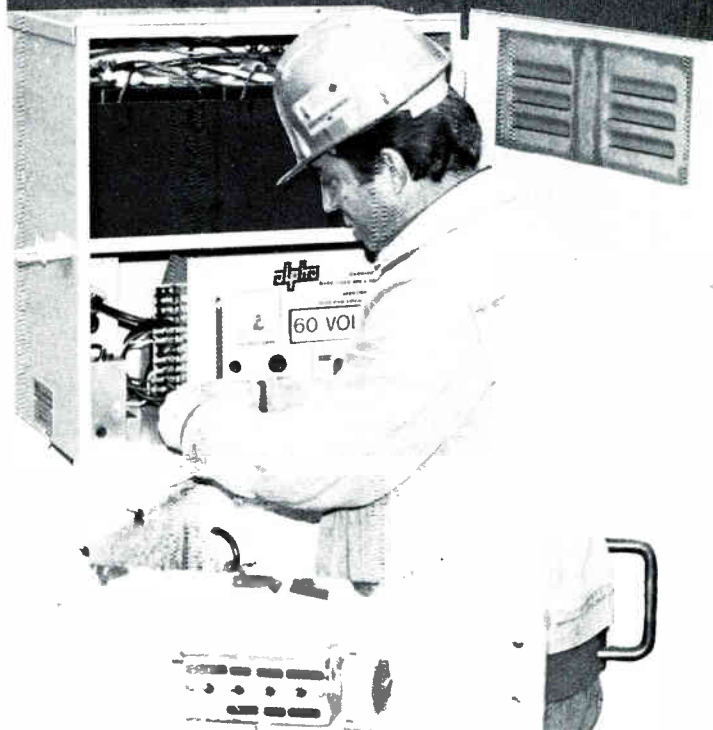
Gain	
4° off-boresight	.5 dB down from antenna gain
8° off-boresight	≤ 2 dB down from antenna gain
Port-to-port isolation	> 40 dB
Beam isolation	> 20 dB

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Micro-Sat s/e inc.
Marietta, Georgia
TEL: 404-971-1021

R. Alan Communications
Indianapolis, Indiana
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A & M Communications
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A Reliable Option

Cablesystems Pacific's data transmission service "Biznet" is making an impact in the city of Portland, Oregon

"How do you convince someone who has done something one way all his life that there is a better way, a reliable option?" According to John Rivenburgh, institutional network coordinator for Rogers' Cablesystems Pacific in Portland, Ore.—the cable industry's second broadband data loop—you show them. For close to 100 users in the city of Portland and perhaps for the cable industry as well—and in spite of recent storms on the common-carrier regulation front—Rivenburgh and Rogers' Portland system have been demonstrating exactly how the option of selling data transportation services over a broadband loop can and does work.

The opportunity to prove broadband's ability to move data in Portland actually began in 1976 when the city issued an RFP specifying bandwidth allocation to business communications. At that time, no MSO responded. After regrouping for an extensive commissioned ascertainment, the city's second RFP was answered with several MSO proposals in January 1980. However, it wasn't until May 1981 that Rogers' design proposal was chosen for both residential services on the east and larger side of town and data and business communications throughout the entire city.

System design

"It was not a real unusual design as proposed," said Rivenburgh of a dual 330 MHz subsplit residential system and a single, smaller B Cable, mid-split at 300 MHz.

In terms of mileage, the residential side would pass 125,000 homes over a 940-mile network; the institutional city-wide franchise—now known as "Biznet"—would build out at completion to 235 miles. But, by the time the city's cable regulatory commission and Rogers had agreed on a plan of action, hardware suppliers had gone to market with 420 MHz and both parties headed back to the drawing board to negotiate what Rivenburgh now calls an "integration proposal."

Using 420 MHz technology, Rogers configured the first four tiers of the

proposed residential service on the A-1 cable, offering 62 channels subsplit with 57 downstream and 5 upstream, and put a franchise-specified developmental fifth tier, along with all institutional services, on the second cable by dedicating a midsplit 120 MHz to the fifth tier and 300 MHz to institutional services. In essence, the company proposed building a 420 MHz dual cable network throughout the residential and institutional franchise territory in lieu of the more costly dual plus single net.

"From our standpoint," says Rivenburgh, "this allows us to increase the coverage of institutional services almost five-fold. We now have 940 miles of institutional network on the east side, and the same on the west. In other words, our institutional services pass every single home in the franchise area, not just the standard I-Net list of schools, hospitals, etc."

In an interview with *CE* several months ago, Rogers' Vice President, Engineering and Technical Services, Nick Hamilton-Piercy, ranked business communications as "an opportunity with profitability just below that of pay-per-view programming and certainly ahead of videotex and home security." According to Rivenburgh, Rogers' commitment in the Portland area "without question" is and was from the start beyond just the traditional city institutional loop.

With an RFP requiring a self-supporting cabled business communications network—one which could not be subsidized by residential network service revenues—the city itself took a firm stand on the issue, and today forms a substantial core of the users on Portland's Biznet.

MSO commitment

Although it declared a net loss of \$12 million in fiscal '82, Canadian-based MSO Rogers Cablesystems Inc. obviously is not entering the field of cabled business communications with timidity. Already operating cable data and video networks in its Portland and Toronto, Ontario, systems, Rogers presently is engaged in designing similar networks in its recently-awarded Minneapolis franchise area as

well as some smaller systems in southern California. In addition, planning is underway for interconnection of Rogers' Portland data loop with franchises outside Cablesystems Pacific east-side residential and city-wide institutional network and a recently-awarded Multnomah County, Ore., franchise, as well as with Storer's west-side Portland franchise.

Recognizing what its annual report describes as "short-term sacrifice for medium- and long-term gain," Rogers' expansion into the U.S. cable market constituted a potential 1.7 million homes and an on-line subscribership of 650,000 at year-end '82. However, further expansion was stifled in February '83 when one Rogers U.S. operating company, a partnership with United Artists Communications, was dissolved with a subsequent division of subscribers to be effective August 31, 1983. The company is expected to lose approximately 300,000 subscribers.

Rogers spends a considerable amount of money (2.5 percent of its Canadian-regulated revenue on a continuing basis) on research and development and its in-house engineering arm, Cablesystems Engineering (CE)—the group responsible for the Portland Biznet design—in order to undertake a range of activities relating to new applications of broadband technology. In addition to contract research work for various departments of the Canadian federal government, CE also has been responsible for the development and implementation of a variety of new service concepts including Cablesystems' two-way security alarm and interactive system currently being installed or operating in most of the company's U.S. systems.

In fact, it well could be said that the top-10 ranked MSO approaches nothing with timidity and Senior Vice President, Programming and Planning, Phillip Lind, bore this out when questioned on the subject of continued aggressive pursuit of new U.S. markets and services. In light of the UA/Columbia partnership dissolution and net losses on 1982 operations, Lind's comments could be seen as very positive indeed.

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On the subject of cable's ability to market broadband data transmission services, Lind described the MSO's philosophy with guarded optimism. "We were remotely interested at first and have become increasingly interested as the prospects have developed. At the outset, we didn't expect anything in terms of profitability. Under contract not to subsidize the Biznet with residential network services, we couldn't afford to sink huge dollars into it. On the other hand, what we've been seeing is a pretty receptive market. We've had a higher sales volume than we thought we'd have."

Indeed, the city of Portland, with its increasingly service-based economy and concentrated geography, could be seen as an ideal test market for the MSO, already committed to building an even more extensive residential and business network in Minneapolis. According to Lind, the biggest problem encountered thus far involves the issue of common-carrier regulation of broadband data loops.

"It's a really ironic situation," Lind said. "All of a sudden, the so-called little BOCs are crying that their local rates are going up and they should be protected from competition. At least AT&T was an easily-identifiable target."

Describing a new element in the equation by which MSOs must measure the feasibility of data transportation services, Lind called the possibility of ultimate PUC regulation and the mandate on the part of cable operators to legally fight the issue in the courts "a very heavy strain on a new business."

"My sense is that the BOCs are on a bit of a roll... saying how poor they are. We're going to have to let the history of their earnings show up for a couple of years before anyone can properly assess that they're just as well off as the AT&T system ever was."

As far as Network Coordinator John Rivenburgh is concerned, the BOCs forced to finance local service on their own when the AT&T divestiture becomes effective January 1984 will open up new opportunities for Biznet. Because the small-to-medium-sized business or professional institution—Biznet's target account—will no longer be able to look to

one vendor, i.e., Bell, for both local and long distance communications services, the mentality of the marketplace will become more receptive to cable as a medium for data transportation.

"The user is becoming more accustomed to having an outside operator, like ourselves, offering solutions to their communications needs," and the AT&T divestiture will open things up still more, Rivenburgh intimated.

"The downside in implementation of these services is that cable companies don't have any history in providing data services and only a minimal amount in videoconferencing," he added. "So whereas you might have a great service on the testing board, its acceptance is a long-term process."

Thus, part of the answer in getting businesses interested in using Biznet is for Rivenburgh to get them to experiment—compare the efficiencies of using the cable system as a data conduit over the phone system. The second part is to intensify marketing in this arena to awaken potential users to this new service and use the results of the experiences as testimony to Biznet's capabilities. The marketing approach Cablesystems Pacific maintains in Portland combines defining a specific need for its services and/or potential user group prior to the introduction of new service offerings with a low-risk initiation of services; i.e., the experiments.

Working smarter, not harder

"Because Portland is a 'show-me' town, we decided to provide a series of demonstration projects," said Rivenburgh, who spent his first six months on the job in Portland concentrating on market research. With each of three demonstration projects commencing in February 1982, Biznet introduced three new services.

In essence, a demonstration project was set up with an interested potential user whose needs for data transmission services were pre-defined and whose motivation for making a change (from telco to cable) was understood up front. Cablesystems Pacific then installed the client and provided free service for a 90-day trial period with the understanding that, on deciding to sign on with Biznet, the client would be responsible for installation costs.

Biznet's first demonstration project, for a group called Data Processing Authority, introduced the point-to-point data service. The DPA, a time-sharing service bureau for city and county government agencies, represented a qualified prospect by virtue of the city government's vested interest in a broadband loop and the DPA's numerous locations being located primarily within

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More than a year later, the DPA is experiencing a 75 percent improvement in their pole-to-pole response time and an approximately 100 percent reduction in recoverable and non-recoverable errors as compared with their past experience with the telephone company.

Biznet's second major demonstration project targeted another potential user market with a different set of requirements. First Interstate Bank, a bank known for its aggressive utilization of electronic data transfer, now has connected eight of its branches to Portland's Biznet; by next February, all 33 of their branches within the CP franchise territory will be on line.

"Some of my initial users are becoming my best sales people; I do a lot of referrals at this point," Rivenburgh said, with respect to introducing the broadband data services. He has found experience to be in line with expectations in that when both the type of service requirement and the criteria are used in judging those services, all users are unique. While a government agency may be focusing on cost first, reliability second, a banking institution will most likely demand high reliability. If quantity of service calls and/or number of customer service personnel are any indication, the broadband data medium has found a home in Portland.

The services

Not yet two years into the business, Cablesystems Pacific now is offering five

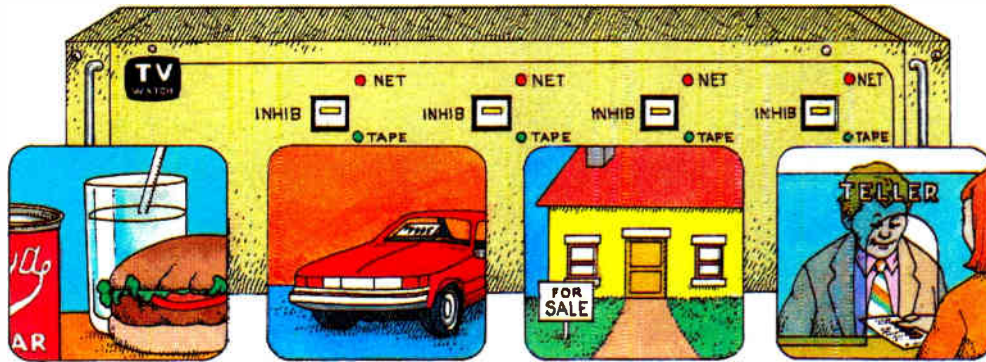
specific data services in the Portland market and the current planning process will introduce new services—such as electronic mail—when client demand dictates.

Introduction of new services on a graduated basis allows CP both the advantage of time to tailor the service to client needs and significant reduction of financial risk. CP purchases equipment—primarily modems, amplifiers and line extenders—as they add users to the network. "We're not building a whole new network," Rivenburgh is quick to point out. "We activate where we find clients. There are two approaches. You can activate the whole network and, on completion, go look for users. Or you can do it on a graduated basis, stretching out that activation time frame. It's just a cash flow decision."

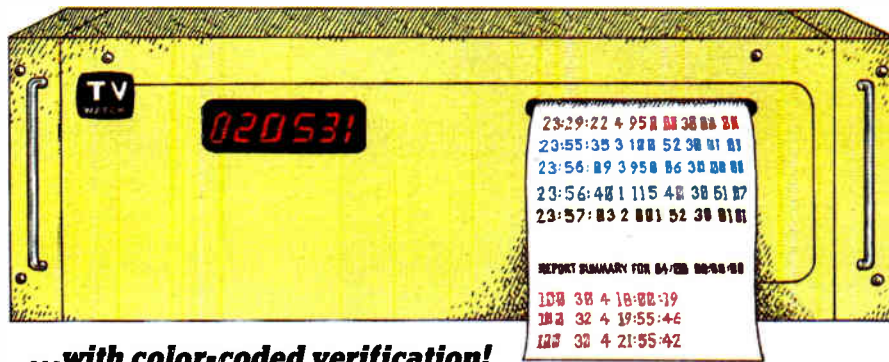
Cablesystems Pacific's decision to opt for 420 MHz dual cable plant over the original system proposal essentially enabled them to overlay the data network on the entertainment plant, reducing capital outlays on construction, plant and equipment concurrent with adding capacity. While Biznet as such is not subsidized by cable entertainment services in Portland, CP's exposure to large financial losses almost is nonexistent, and present CP projections put a profitable "return on investment" in Biznet approximately four to five years from start-up.

Perhaps the more significant cost allocations to Biznet accrue in the area where Rivenburgh spends most of his time—developing and marketing new

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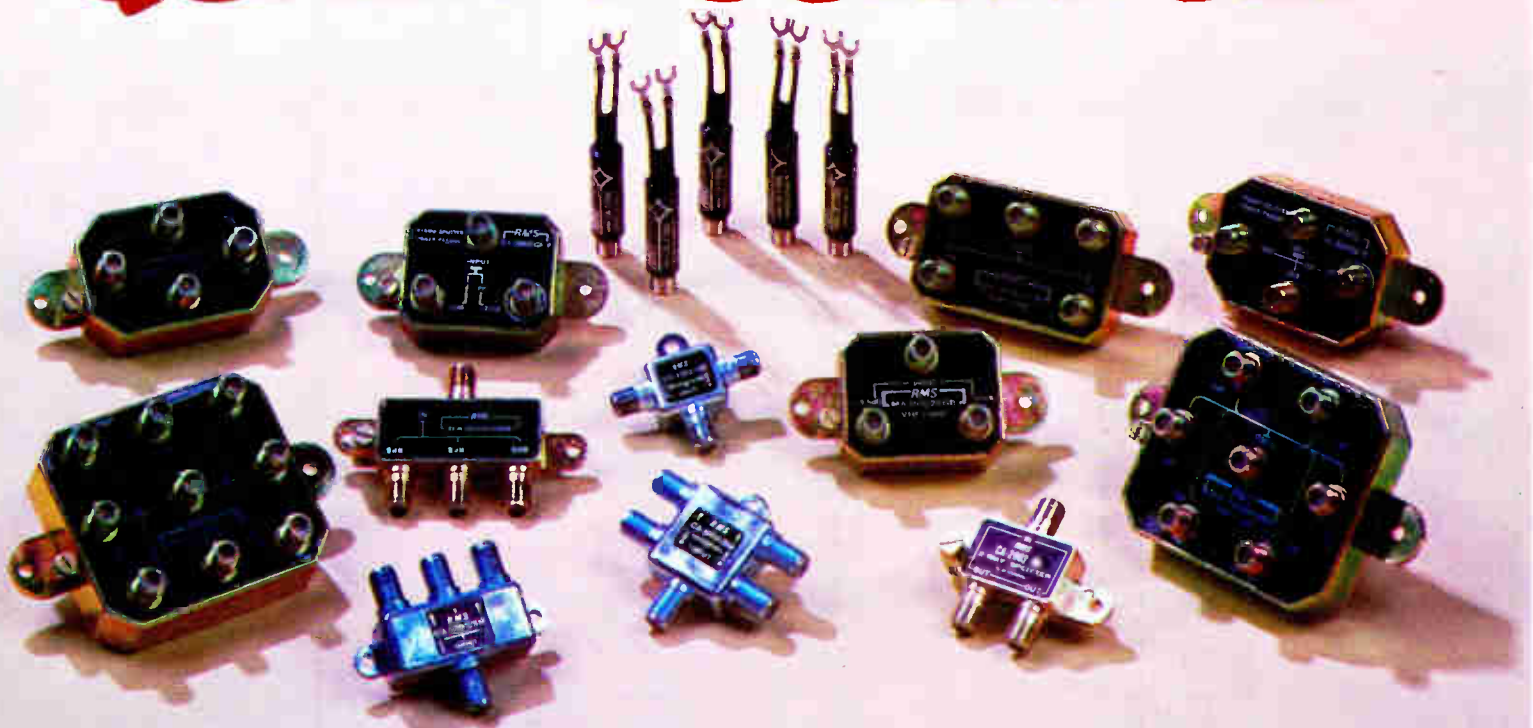
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services. The five services currently offered by Biznet include point-to-point, point-to-multipoint, packet-switched, videoconferencing and a 5-megabit high-speed frame grabbing service. In order to offer any of these services, CP's data network is equipped with C-COR amplifiers (residential services are accomplished with Jerrold amps). And where no feeder to a particular client location exists off the data trunk, line extenders are run.

According to Rivenburgh, much time was spent determining channel allocations for the various categories of service offered now and in the future. A major consideration in these allocations was the fact that while upstream communications on the A-2 trunk line could be accommodated in the mid-split range, the feeders' upstream transmissions would have to be in the subsplit range, insofar as mid-split line extenders were not on the market at the time engineers were putting the design together.

Two channels, T-7 and T-9, are reserved for upstream point-to-point or point-to-multipoint services operating at 9600 baud. All frequency translation from the upstream to downstream channels (located 156.2504 MHz above the upstream bandwidths) occurs at the headend. Thus, data traveling to the headend from, for example, a bank branch location, pass at T-7 through the feeder (if the branch is on a feeder) to the trunk and on to the headend, where the signals are translated to Channel H (or 21) at 163.25 MHz for downstream transmission.

At the present stage of operations and for the foreseeable future, Rivenburgh said the company believes allocation of these data lines and one headend to process signals will be sufficient to handle demand. But three sites have been identified as potential locations for hubs, should traffic become heavy. One of the unknowns at this point, Rivenburgh noted, is just how error-free the system will be once the data channels begin to fill up. Right now, the system's performance has been outstanding, allowing the company to guarantee users a bit error rate of better than 10^{-7} .

Rivenburgh said use of the subsplit for upstream data transmission has not proved to be problematic so far, since very few users are on feeder lines and all ports are terminated to protect the system from ingress. He also noted that data signals have turned out to be much less sensitive than video signals to accumulated noise in the network. "We found that the carriers are very stable over a very long distance," he said.

The cable company uses an entirely different set of criteria from those of the phone company in setting rates for the

point-to-point and point-to-multipoint services. Whereas the phone company charges according to types of lines and distances of communications, the cable company determines its rates according to transmission speed and number of user locations. While it is hard to compare rates of the two entities, Rivenburgh said the typical point-to-point cable customer operating at 9600 baud would be charged about 20 percent less than he would using phone lines, if the distance covered was about half the width of the city. If, on the other hand, the user was transmitting to a point very close at hand, he might be paying a little more for the cable line than he would for phone lines.

The T-8 upstream channel between the two channels allocated for point-to-point and point-to-multipoint at low and medium speeds is designated for another class of service which is just about to go on-line with the first experimental users. This service, classified as a "packet switched" data service, will permit users to access a number of data sources, thereby providing much more versatility than the point-to-point and point-to-multipoint modes.

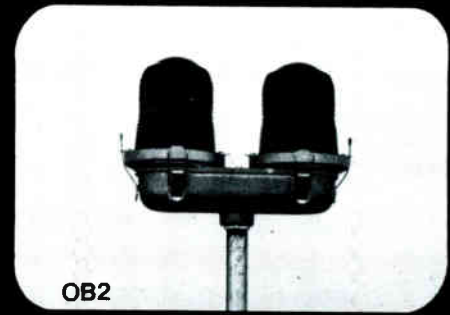
Cablesystems Pacific is installing Sytek's Network 2100 packet switching system to accommodate this service. A typical user of this service might be a physician who would need to be able to access a variety of sources for billing, claims processing, medical research information, patient records, etc. to meet all his requirements. Electronic mail would also be available through the packet switching mode.

The Sytek system, employing special modems with collision-detect capability as well as multiple access versatility, relies on a 16-bit controller and switching equipment at the headend. Users can access the system using simple English-language commands, with no need for special codes. The system takes care of determining whether the users are qualified to gain access to the sources from which they seek information.

Initial users on this service will be a large Portland hospital and a clinic and perhaps two other medical offices. Installations began this month, Rivenburgh said. The hospital will be providing billing claims processing and patient scheduling services in the initial phase of operations.

As for the other two services currently offered on Biznet—videoconferencing and Reuters data retrieval—other medical institutions have been the primary users of videoconferencing so far while stock brokers have been hooking up to Reuters. Explained Rivenburgh, "We provide a fair amount of videoconferencing for the medical community just using our addressable (Z-TAC) decoder, pick-

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ing up conferences, scrambling them and putting them at different sites." The hookups have been one-way on cable for the video, with a return path via phone lines designated for Portland area participants' input into discussions going on at locations in other cities. "We do about four or five conferences averaging three or four hours a conference every month," he said. The videoconferencing takes place on A-2 cable channels in the standard video ranges, avoiding the bandwidths assigned to Portland area off-air television stations.

Rivenburgh said the Reuters service, satellite-delivered and downloaded at a rate of 5 megabits, is currently received by about 25 stockbrokers scattered around the city. These are among the first Reuters customers in the country to get their service via cable.

Along with these standard services, the cable company has also been performing various functions on the A-2 cable on an ad hoc basis, including providing links for sporting events and other affairs where remote data or video feeds are required.

Another important service still on the horizon is T-1 high speed data transmission, for which channels T-10 and T-11 in the upstream have been set aside. The company is currently in discussions with potential users, but Rivenburgh declined to specify a time frame or potential customer base for the proposed service.

Hardware concerns

The availability of appropriate equipment and the willingness of manufacturers to supply and, in some cases, modify equipment to meet the company's needs is a key factor to the success of Biznet. "In the areas we're operating in—the lowband, like 5 to 30 MHz—we've made an extra effort with this network upfront to make it as tight as possible," Rivenburgh noted. "Clients may recommend different (hardware) features, but we actually maintain and supply all the interface equipment—modems, modulators for videoconferencing, etc.—unless the equipment meets spec, and we've got some fairly stringent tests and specs, we're not going to put *anything* on our system."

The company currently uses Scientific-Atlanta headend equipment and expects to purchase S-A T-1 modems when it begins offering the high-speed data service. AMDAX modems typically are provided to users of the point-to-point and point-to-multipoint service.

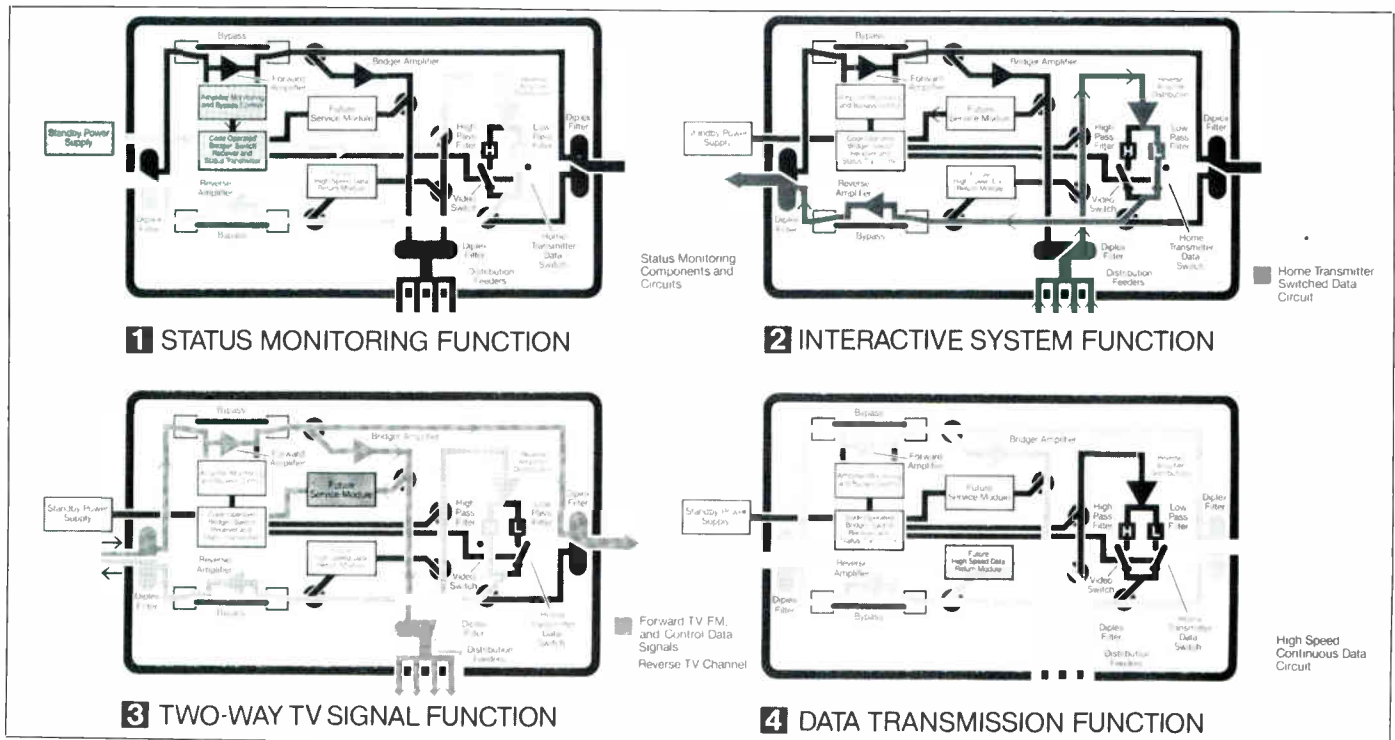
The company currently is involved with Wang in developing a frequency-synthesized modem which, among other things, would reduce bandwidth usage on a per-data circuit basis. Remote and local loop-back capabilities, also available in a multipoint configuration and the ability to run tests on a particular remote site without affecting other sites, are other features Wang is testing on the company's network.

According to Rivenburgh, the company's philosophy on retaining ownership of modems (or modulators in the case of videoconferencing) has passed the test of operating experience. Because the company buys modems as they add users to the network, capital expenditures are more easily managed and, from a network control and security perspective, modem ownership is a time-saving expedient. Also, because most users are familiar with digital data transportation, the diagnostic and test procedures they have used in the past would not translate to RF.

As the industry's second major data communications network—and the first to be operated as a stand-alone business and not subsidized by entertainment service revenue—the Biznet scorecard looks good. With close to 100 users less than two years from start-up, the company expects to be employing between six and 10 people by next year.

"Our biggest problem at the outset wasn't engineering, but marketing," said Rivenburgh, "That's where I spend most of my time now."

Biznet is set up as a limited partnership in much the same way as the company's residential cable service company. Sixty percent is owned by the fully-owned Rogers U.S. operating company—Rogers U.S. Cablesystems Inc.—and 40 percent by a group of partners. **CED**



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Editor's note: As with many publications, there is a page (or pages) that give the magazine's readers a chance to sound-off. Some of these sections are letter pages, others allow one writer "at-large" to submit a piece. As is the case in the engineering business, there is never one right way to build a system or install an earth station. Therefore, there is some disagreement among our readers from time to time on the

points expressed by our contributing writers. Thus, this column was born. It will appear when we have material from our readers that bears publication. This month's contributor is Harold Katz, Stern Telecommunications, who responds to Jay Staiger's article from the June 1983 issue of CED. We appreciate any input from you, our readers, on this topic or any topics appearing within these pages. Thanks.

Examining Noise Factors

By Harold W. Katz
VP, Broadband Communications
Stern Telecommunications Corp.

Two of the most common concepts in CATV engineering are the device noise factor, F , and the effective noise factor, NF , of a cascade of unity gain sections. However, one still finds many incorrect statements concerning the definition of F and its subsequent use in deriving the equation for a unity gain section.

Occasionally, F is stated as equal to the difference between the signal-to-noise ratio at the input to a system and the signal-to-noise ratio at the output of the system. At other times one finds the definition as the amount of thermal noise added to the input noise of the system. Neither one is a correct description of noise factor. Furthermore, the usual formula, NF , for unity gain sections is an approximation to a more complete description that takes into account the noise factor of coaxial cable, which is normally not considered.

These observations were reviewed in greater detail in a paper presented by the author at the 1983 NCTA conference in Houston. The present paper is presented to summarize the results for a more general audience and to comment on several aspects of the subject that appeared in an article by Jay Staiger—"A Mathematical Trip Through the Return System Jungle"—in the June 1983 issue of *CED*.

Noise Figure Defined

Figure 1 is a network model which defines the noise factor F . A resistor R at the same temperature as the network serves as the noise source matched to the network. The output noise power N_o is measured across a matched "noiseless" load to assure that the total output noise is due only to the input noise and the network. The noise factor F is a dimensionless number relating input to output noise such that:

$$N_o = FGKTB$$

where G = matched power gain of the network

KTB = input noise power in watts, where

T = absolute temperature in °K

K = 1.38×10^{-23} Watt-sec/°K

B = bandwidth in cycles/sec

Equation 1

The output noise power due to the input noise is:

$$N_1 = GKTB$$

Equation 2

Therefore the noise power N_2 contributed by the network is:

$$N_2 = N_o - N_1 = (F-1) GKTB$$

Equation 3

Equation 3 shows that the noise due to the network is governed by $(F-1)KTB$ and

not $F(KTB)$. The minus one in the expression is very significant particularly when low noise amplifiers are employed whose F is comparable to one.

If the input noise power n_i is due to a source other than r_o , then the total noise output power N_o is equal to:

$$N_o = N_i G + (F-1) GKTB$$

Equation 4 is simply the sum of the input noise multiplied by the network gain plus the noise contributed by the network.

If S_i is equal to the input signal power, then $GS_o = S_o$ is the output signal power. Therefore the output signal-to-noise ratio S_o/N_o from equation 4 is:

$$\frac{S_o}{N_o} = \frac{S_i}{N_i + (F-1) KTB}$$

Equation 5

Equation 5 indicates that the noise factor is not equal to the difference between the output and input signal-to-noise ratios but rather depends on the absolute level of the input noise and power. The equality is true only for the case in which the input noise is due to a resistor which is at the same temperature as the network; i.e. if $N_i = KTB$. In this case equation 5 reduces to:

$$\frac{S_o}{N_o} = \frac{1}{F} \times \frac{S_o}{N_o}$$

Equation 6

The equations above are in terms of absolute power levels. Equation 1 can be converted to the more common CATV form, where power is measured with respect to 1mv across 75 ohms,

$$N_o \text{ dBmV} = F + G - 59$$

where F = noise figure in dB

G = gain in dB

T = 68°F

B = 4MHz

Equation 7

In summary, equations 1 and 5 are the correct version of the earlier statements of the definition of noise figure.

Unity Gain Section

Figure 2 is the typical model of an amplifier with gain G and noise factor F followed by a cable whose gain is defined as $1/L$, where L is the power attenuation factor. In order to calculate the effective noise factor of this combination, the input noise power to the amplifier is again taken as KTB . The total noise power at the

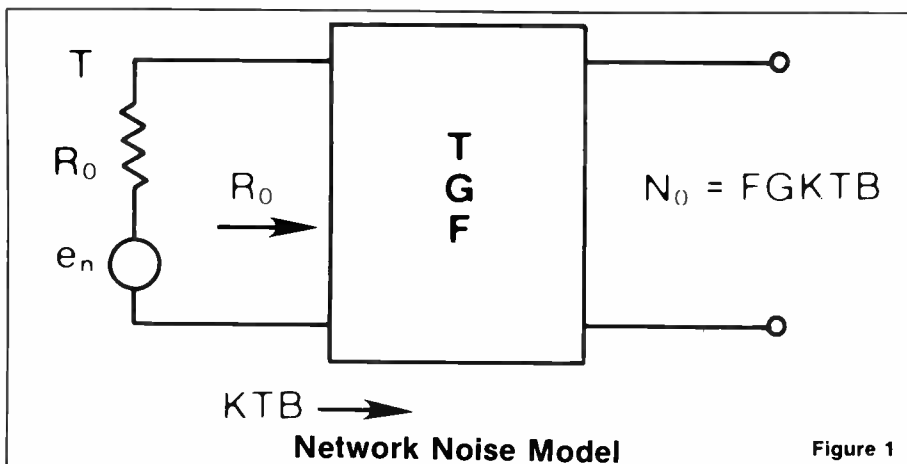
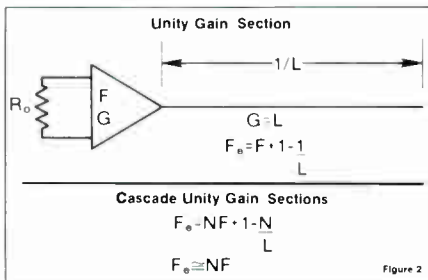


Figure 1



output of the cable is the sum of the input noise, the amplifier noise and the cable noise. The latter is due to the noise generated by the distributed resistance of the cable. As shown in the NCTA paper, this leads to a noise factor for the cable: $F_{\text{cable}} = 1/L$

Equation 8

The effective noise factor for Figure 2 can then be calculated from the standard cascade formula:

$$F_{\text{eff}} = F_1 + F_2 - 1/G_1 + F_3 - 1/G_1 G_2 - \dots$$

Equation 9

Therefore, for a unity gain section with $G=L$,

$$F_{\text{eff}} = F + 1 - 1/L$$

Equation 10

When L is large and $F > 1$, then $F_{\text{eff}} = F$, which is the noise factor commonly used for a unity gain section. The significance of Equation 10 can be seen when one

considers the extreme case of a noiseless amplifier with an $F=1$. The effective noise factor is then $2-1/L$ rather than 1 as would be anticipated from the standard formula.

Unity Gain Cascade

If Equation 10 is substituted into Equation 9 for a cascade of N sections then:

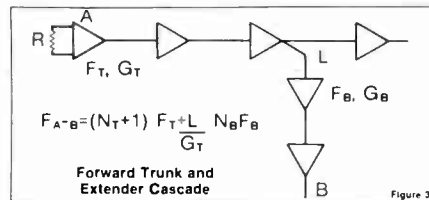
$$F_e = NF + 1 - N/L$$

Equation 11

For practical values encountered in a CATV system, equation 10 is very well approximated by the standard formula:

$$F_e = NF$$

A more interesting case occurs in a typical trunk cascade followed by an extender leg as shown in Figure 3. The calculation of the noise figure between the input point A and the end of the



extender leg B usually assumes that each amplifier/cable section is adjusted for unity gain. However, this is not the case for the attenuation between the trunk

amplifier and the input to the first extender or bridge amplifier; i.e., the trunk amplifier gain G_T is not equal to the loss L . The noise factor associated with the attenuation L is similar to the cable; i.e., $F=L$. The calculation of the noise factor between A and B as derived in the NCTA paper is

$$F_{ab} = (N+1) F_T + L / G_T N_B F_B$$

where N = Number of trunk amplifiers
 F_T = Noise factor of trunk amplifier
 G = Gain of trunk amplifier
 N_B = Number of extender amplifiers
 F_B = Noise factor of extender amplifier

Equation 12

If the loss factor L is less than G , then the effect of the extender amplifiers on the noise factor F_{ab} is less than that which is normally calculated. This offers a possible trade-off between noise figure and intermod distortion in the extender legs.

Another case of interest is the calculation of the upstream noise as shown in Figure 4. An effective noise factor cannot be calculated for this situation, since the return noise must include all of the trunk amplifier and all of the extender legs. A noise factor is an inconvenient method for describing the noise build-up. It is more desirable to calculate the resultant return *continued on page 66*



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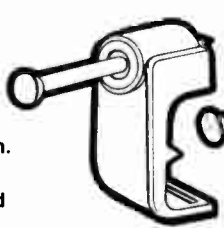
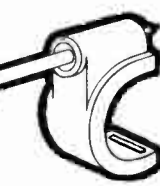
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Product News



The Harris D1200 PBX family

Harris increases data rate

Harris Corp. has increased the data transmission capabilities of its D1200 PBX through the addition of a two-pair interface, which permits direct digital data switching between the PBX lines at a rate of 9600 baud. The PBX system, which automatically selects a baud rate from 110-9600, is able to transmit data from port to port in a digital format, thereby eliminating the need for modems. A line driver box located near each terminal extends transmission distance up to 4,000 feet, well beyond the RS232 50-foot cable limit. The D1200 also has automatic route selection, station detail message accounting and tandem networking functions.

For more information, contact Harris Corp., Digital Telephone Systems Division, (415) 472-2500.

Zenith introduces three products

Zenith Radio Corp. has introduced three new products: a space screen 45 projection console featuring a 45-inch diagonal power driven black matrix screen and two high-resolution color video monitors.

The Zenith TV console, model PV4555P, employs a new screen design to increase the viewing angle to 70 degrees and a patented self-converging picture tube system to correct distortion caused by picture convergence. Other features of the system include a double horizontal viewing angle, a remote "computer space command 5400" control system, a picture tube with patented high-potential electron guns for keeping the picture sharp and a four-piece sound system.

Zenith's 19- and 25-inch color video monitors offer 425 and 450 lines of horizontal resolution respectively. Both units use a high-resolution chassis with the same advanced circuitry used in

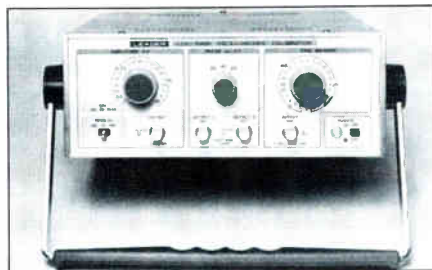
computer monitors. The monitors also feature Zenith's advanced color sentry control system for combining six picture and color control subsystems, a component TV tuner that offers 157-channel capability (including cable), a source selector, a stereo audio amplifier and an Allegro speaker system.

For more information, contact Zenith Radio Corp., 100 Milwaukee Ave., Glenview, Ill. 60025, (312) 391-8181.

Century III develops new test set

Century III Electronics International has developed a portable feedforward automatic balance test set that detects and checks the relative balance and distortion of Century III 4000 series feedforward CATV trunk amplifiers. Known as the model 9600, this test set verifies the balance of an operational amplifier and, during normal field operations, provides a "go/no go" indication of a properly working amplifier. The 9600 also can be used as a diagnostic testing device before trunk amplifiers are placed in the field. The system can operate over a wide temperature range and is comprised of a crystal oscillator, a double balanced mixer with high isolation, a broadband indicator with 60 dB dynamic range and digital switching circuitry.

For more information, contact Century III Electronics Inc., 610 Neptune Ave., Brea, Calif. 92621, (714) 671-2800.



The 390 video switcher, editor interface

Video switcher/editor interface

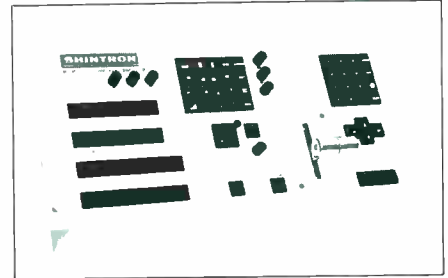
A collaborative effort between Shintron Co. and WNEV-TV-7 in Boston has resulted in the development of a component video switcher and editor interface, which allows editing, effects and post-production techniques to be performed on M format and Beta Cam tapes. This unit, called the model 390, is a triplicated production/post production switcher with a built-in tandem micro-processor-controlled command system that can perform standard operational functions and handle SMPTE and in-house time codes. The model 390 also features a RS-422 standard interface port.

For more information, contact Shintron Co. Inc., 144 Rogers St., Cambridge, Mass. 02142, (617) 491-8700.

Nexus designs low-cost modulator

Nexus Engineering Corp. has designed a low-cost television modulator, the Nexus VM-1, for the small system operator. The modulator's front panel controls and LED indicators facilitate "setting-up" in the field, while its SAW filtering, advanced circuitry and clean output help ensure reliable operation.

For more information, contact Nexus Engineering Corp., 4181 McConnell Drive, British Columbia V5A 3J7, Canada, (604) 420-5322.



Leader LOC-7005 oscilloscope calibrator

Leader introduces calibrator

Leader Instruments' LOC-7005 oscilloscope calibrator is comprised of three outputs: an amplitude output for calibrating the vertical attenuator, a time market output for measuring the time base and a fast rise time square wave to check the pulse response and rise time. The unit, which costs \$1,395, is small and versatile, making it particularly useful for those service and calibration facilities that maintain their own field service and general purpose oscilloscopes. A two-year warranty is offered with the system.

For more information, contact Leader Instruments, 380 Oser Ave., Hauppauge, Long Island, N.Y. 11788, (516) 231-6900.

Amplica receiver FCC certified

Amplica Inc. has received FCC certification for its new RC-10 option M satellite receiver system. This system contains a dual output capability feature, which allows users to connect the receiver directly to a conventional TV tuned to channels 3 or 4 or to a video monitor. Aside from its dual capability feature, this modulated version of the RC-10 is comprised of the same components as Amplica's RC-10 receiver.

For more information, contact Amplica Inc., 950 Lawrence Drive, Newbury Park, Calif. 91320, (805) 498-9671.

Rank distributes telecine system

Rank Precision Industries Inc. is distributing a new solid-state telecine system manufactured by Rank Cintel Ltd. of Britain. This system, with applications for PAL, NTSC and SECAM TV systems, costs 50 percent less than competitive products with more complicated refine-



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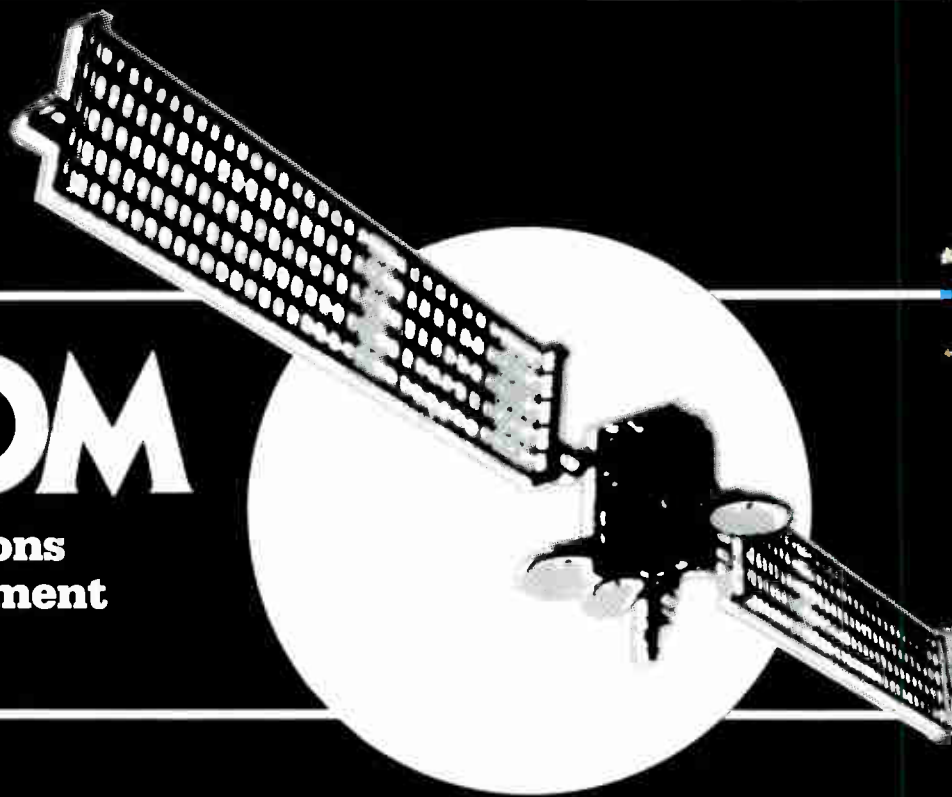
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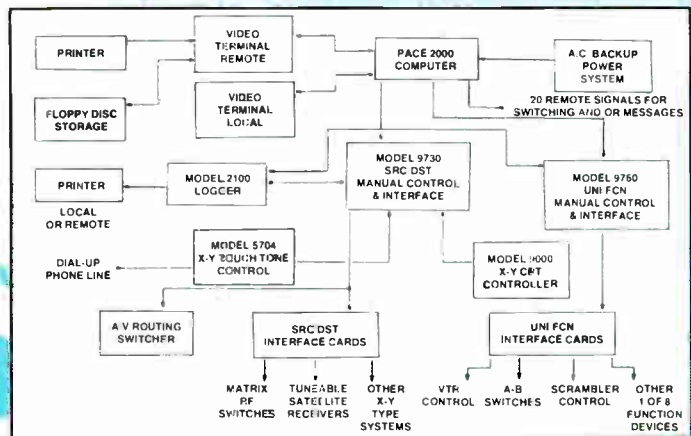
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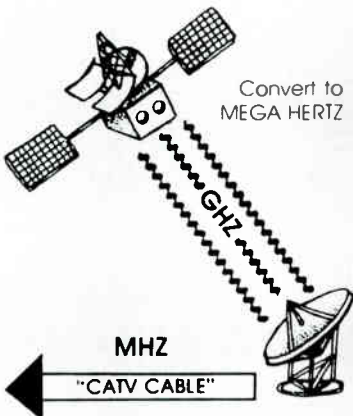
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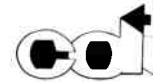
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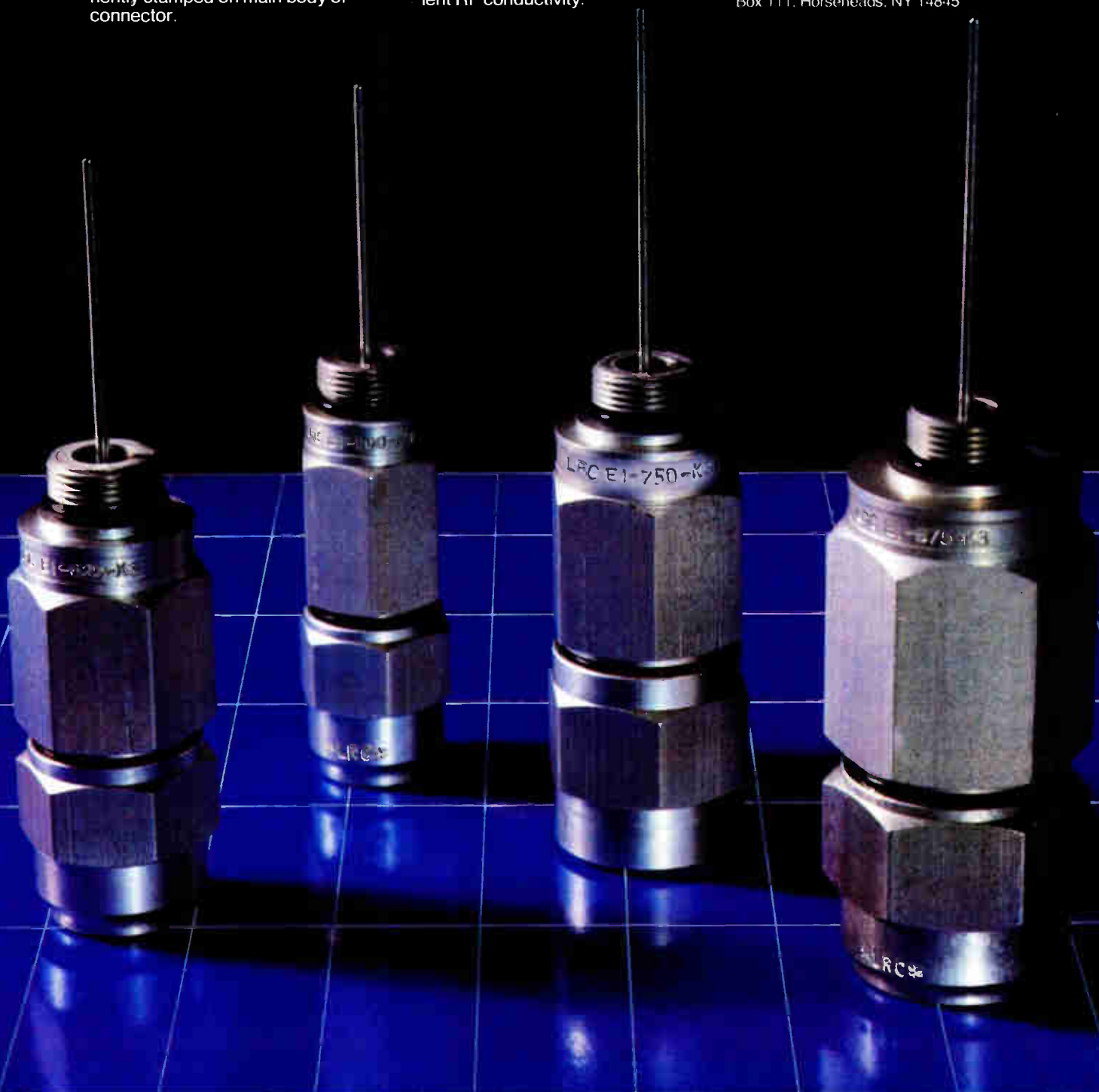
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People News

Muraskl taking over as manager of the division's technical support group. In their new positions, Airhart is responsible for field operations for the company's microwave and satellite systems while Muraskl provides technical support and performs cost analysis for the division's operations and marketing personnel in addition to overseeing FCC applications and renewals.

■ **Pioneer Communications of America Inc.** has named **Robert Adler** "salesman of the quarter." Adler, central regional manager for Pioneer, exceeded his sales quota for the term by 120 percent.

■ **Weston Instruments**, a test and measurement equipment manufacturer, has appointed **Bernard Gropp** manager of applications for analog products, with responsibility for all aspects involved in marketing the company's analog panels, portable meters and related products. Gropp, a 32-year veteran of Weston, most recently served as the company's manager of product engineering.



■ **James Crenca** has been named vice president of **Comsearch Applied Technology Inc.**, a Comsearch subsidiary specializing in electromagnetic interference analysis and measurement services for commercial and governmental applications. Crenca's duties include business development, overseeing and conducting training seminars and working with the U.S. Government on various projects.

■ **Sorenson Co.** has promoted **Francis Gurl** to company manager and appointed **John Zaghi** engineering manager. As company manager, Gurl, formerly Sorenson's business manager, is responsible for the company's overall operations and profitability. Prior to joining Sorenson, Gurl spent 22 years with Raytheon Co. in engineering and production managerial positions.

Zaghi, who joins Sorenson as engineering manager, is responsible for the design and development of the company's new products and for providing technical services and training in new technology.

■ **Joseph Dolinski** has been appointed manager of the **Cable Television Division of Winegard Co.** Prior to this appointment, Dolinski was the division's engineering manager. In his new post, Dolinski will retain his previous engineering duties while taking on additional responsibilities for overseeing the design and development of the company's full line of cable TV equipment.



At **TOCOM Inc.**, **Arthur Johnson** was named marketing support manager, addressable systems, and **Carl Weidman** and **John Cummings** were promoted to director of marketing and sales manager of cable security, respectively.

As marketing support manager, Johnson assists in national field sales and service support activities for the company's 55 PLUS line of addressable systems and terminals.

In his new post, Weidman oversees the product management of TOCOM's cable security product line and 55 PLUS line of addressable systems and also directs the company's customer support, communications and technical publication activities.

Cummings, who was promoted from regional sales manager, is now responsible for national marketing and sales of TOCOM's cable security headend equipment and dwelling unit equipment and for supervising the company's security customer support services.

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Signal	Day	Start/Stop	Alert Tone	Transponder	Signal	Day	Start/Stop	Alert Tone	Transponder																																																																																																			
Satcom 3R					MTV: Music Television 24 hrs. None 11																																																																																																							
ACSN-The Learning Channel	Weekdays	6 a.m./4 p.m.	192*/#	16	National Jewish Television Network	Sundays	1 p.m./4 p.m.	None	16																																																																																																			
	Weekends	6 a.m./1 p.m.			Nickelodeon	Daily	8 a.m./9 p.m.	311*/# (E, M, C) 519*/# (P) 749*/#	1																																																																																																			
ARTS	Daily	9 p.m./12 a.m.	311*/# (E,C,M) 519*/#(P)	1	PTL		24 hrs.	None	2																																																																																																			
Cable Health Network		24 hrs.	361*/#	17	Reuters	Weekdays	4 a.m./8 p.m.	None	18																																																																																																			
CBN		24 hrs.	414*/#	8	Showtime		24 hrs.	576*/#	12 (E,C) 10 (M,P)																																																																																																			
Cinemax		24 hrs.	None	20 (E,C) 23 (M,P)	Spotlight		24 hrs.	None	4																																																																																																			
CNN		24 hrs.	024*/#	14	USA Blackout Network	Varies	295#	601*/#	22																																																																																																			
CNN Headline News		24 hrs.	635*/#	15	USA Cable Network		24 hrs.	601*/#	9																																																																																																			
C-SPAN		24 hrs.	None	19	WGN		24 hrs.	None	3																																																																																																			
Daytime	Weekdays	1 p.m./5 p.m.	307*/#	22	WTBS		24 hrs.	None	6																																																																																																			
ESPN		24 hrs.	048*/#	7	The Weather Channel		24 hrs.	None	21																																																																																																			
Eternal World Television Network	Daily	8 p.m./12 p.m.	762*/#	18	Satcom 4																																																																																																							
HBO	Daily	24 hrs.	None	24 (E,C), 13 (M,P), 22	BizNet	Weekdays	7 a.m./2 p.m.	None	15																																																																																																			
HTN	Daily	4 p.m./4 a.m.	207*/#	16	Bravo	Daily	5 p.m./6 a.m.	None	2																																																																																																			
Modern Satellite Network	Weekdays	10 a.m./1 p.m.	243*/# 421*/#	22	Business Times on ESPN	Weekdays	6 a.m./8 a.m. (P)	048*/#	6																																																																																																			
The Movie Channel		24 hrs.	None	5	FNN: Financial News Network	Weekdays	7 a.m./7 p.m.	975*/# 738*/#	2																																																																																																			
<table border="1"> <thead> <tr> <th colspan="3">Major Communications Satellites Serving North America</th> </tr> <tr> <th>Location:</th> <th colspan="2">Satellite</th> </tr> <tr> <th>Degrees West Longitude</th> <th>Present</th> <th>Future</th> </tr> </thead> <tbody> <tr><td>67</td><td></td><td>Satcom 6 (May 86)</td></tr> <tr><td>69</td><td></td><td>Spacenet 2 (Sept. 84)</td></tr> <tr><td>72</td><td>Satcom 2R (Sept. 8)</td><td></td></tr> <tr><td>74</td><td></td><td>Galaxy 2 (Sept. 83)</td></tr> <tr><td>76</td><td>Comstar D1 & D2</td><td>Telstar 302 (1984)</td></tr> <tr><td>79</td><td>Westar 2</td><td></td></tr> <tr><td>83</td><td>Satcom 4</td><td></td></tr> <tr><td>88.5</td><td>Comstar D3</td><td>Telstar 303 (1985)</td></tr> <tr><td>91</td><td>Westar 3</td><td>Spacenet 3 (Feb. 85)</td></tr> <tr><td>94</td><td>SBS-3 (dual Ku/C Band)</td><td></td></tr> <tr><td>96</td><td>Telstar 301</td><td></td></tr> <tr><td>97</td><td>SBS-2 (Ku-band)</td><td></td></tr> <tr><td>99</td><td>Westar 4</td><td></td></tr> <tr><td>100</td><td>SBS-1 (Ku-band)</td><td></td></tr> <tr><td>103</td><td></td><td>GSTAR A-1 (1984)</td></tr> <tr><td>104.5</td><td>Anik D-1</td><td></td></tr> <tr><td>105</td><td></td><td>GSTAR A-2 (1984)</td></tr> <tr><td>108.5</td><td></td><td>Anik C-1 (1984)</td></tr> <tr><td>109</td><td>Anik B</td><td>Anik D-2 (1984)</td></tr> <tr><td>112.5</td><td>Anik C-2</td><td></td></tr> <tr><td>114</td><td>Anik A-3</td><td></td></tr> <tr><td>117.5</td><td>Anik C-3</td><td></td></tr> <tr><td>119</td><td>Satcom 2</td><td></td></tr> <tr><td>122</td><td></td><td>Spacenet 1 (May 84)</td></tr> <tr><td>127</td><td>Comstar D4</td><td></td></tr> <tr><td>131</td><td>Satcom 3R</td><td></td></tr> <tr><td>135</td><td>Galaxy 1</td><td></td></tr> <tr><td>136</td><td>Satcom 1</td><td></td></tr> <tr><td>139</td><td>Satcom 1R</td><td></td></tr> <tr><td>143</td><td>Satcom 5</td><td></td></tr> </tbody> </table>					Major Communications Satellites Serving North America			Location:	Satellite		Degrees West Longitude	Present	Future	67		Satcom 6 (May 86)	69		Spacenet 2 (Sept. 84)	72	Satcom 2R (Sept. 8)		74		Galaxy 2 (Sept. 83)	76	Comstar D1 & D2	Telstar 302 (1984)	79	Westar 2		83	Satcom 4		88.5	Comstar D3	Telstar 303 (1985)	91	Westar 3	Spacenet 3 (Feb. 85)	94	SBS-3 (dual Ku/C Band)		96	Telstar 301		97	SBS-2 (Ku-band)		99	Westar 4		100	SBS-1 (Ku-band)		103		GSTAR A-1 (1984)	104.5	Anik D-1		105		GSTAR A-2 (1984)	108.5		Anik C-1 (1984)	109	Anik B	Anik D-2 (1984)	112.5	Anik C-2		114	Anik A-3		117.5	Anik C-3		119	Satcom 2		122		Spacenet 1 (May 84)	127	Comstar D4		131	Satcom 3R		135	Galaxy 1		136	Satcom 1		139	Satcom 1R		143	Satcom 5		National Christian Network	Daily	24 hrs.	073*/#	7
					Major Communications Satellites Serving North America																																																																																																							
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139	Satcom 1R																																																																																																											
143	Satcom 5																																																																																																											
					The Playboy Channel	Daily	8 p.m./6 a.m.	869*/#	12																																																																																																			
					SPN		24 hrs.	429*/#	3																																																																																																			
					Trinity Broadcasting Network		24 hrs.	None	17																																																																																																			
					Westar 5																																																																																																							
					ARTS	Daily	9 p.m./12 p.m.	None	12D																																																																																																			
					BET	Daily	8 p.m./2 a.m.	406*/#	12X																																																																																																			
					Daytime	Daily	1 p.m./9p.m.	307*/#	12D																																																																																																			
					Satellite News Channel		24 hrs.	None	4X, 6D 7X, 8X, 9X																																																																																																			
					SelectTV		24 hrs.	840*/# 619*/#	3D																																																																																																			
					Spotlight		24 hrs.	None	11D																																																																																																			
					The American Network	Daily	15 hrs./day	None	10X																																																																																																			
					The Disney Channel	Daily	7 a.m./11 p.m.(E, P) 6 a.m./10 p.m. (C) 8 a.m./12 p.m.(M)	None	6X(E,C) 5X(M,P)																																																																																																			
					The Nashville Network	Daily	9 a.m./3 a.m.	866*/# 674*/#	9D																																																																																																			
					WOR		24 hrs.	None	2D																																																																																																			
					Galaxy 1																																																																																																							
					SIN		24 hrs.	819*/#	6																																																																																																			
					GalaVision	Weekdays	4 p.m./4 a.m.	None	20																																																																																																			
						Weekends	24 hrs.																																																																																																					

Orbital slots and launch dates often change without notice

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5-NF A-F, mid band	-75db	1.0db	-5db	-1db
5-NF G-I, mid band	-75db	1.5db	-6db	-1db
5-NF 7-13, high band	-75db	2.0db	-10db	-2db
5-NF J-W, super band	-70db	3.0db	-15db	-3db



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