The PaySaver REWARD

Your pay-channel services are meant to be paid for.
Not stolen. Not tampered with. Not pirated.
Yet you know signal theft is taking place and costing you money.
Now you can trap the pirates and recapture lost profits.
With the proven VITEK PaySaver.
PaySaver is compatible with virtually every converter/descrambler.
PaySaver is mounted outside the home to securely trap your scrambled signals.
PaySaver is easy to install and practically invisible on the strand.
Most important, PaySaver pays for itself quickly—by turning pirates into payers.
So install PaySavers with your "basic only" subscribers....
Watch the orders come in from "new" pay-tv customers....
And reap your just rewards.

YE$ .....I want to reap the benefits of PaySaver.

☐ Have a representative call with samples **and** my free VITEK PaySaver money clip.

☐ Please call with a quotation for ____ PaySavers to protect Channels _____

Name _____

Title _____ Telephone _____

Company _____

Street _____

City, State, Zip _____

AUGAT® VITEK

Quality and Innovation

Vitek Electronics, Inc., 4 Gladys Court, Edison, NJ 08817 (201) 287-3200

Looking for a 450 MHz rack-mounted head-end amp?
Need a 450 MHz instrumentation amp?

With Broadband's VFA-450 you get both.

Broadband's new VFA-450 is a rack-mountable, wideband amplifier designed to help you in several ways:

As a two-way head-end amplifier: You can use it in your system's head-end to buffer your head-end equipment. At the same time it can provide for sweep or other signal injection and recovery of return signals in sub-, mid-, or high-split trunk systems.

As a one-way head-end amplifier: By simply removing the plug-in filter or terminating the return recovery port, you can convert the VFA-450 to one-way operation.

As an instrumentation amplifier: The VFA-450 is perfect for sweep systems, bench-test situations and field sweep applications. For field sweep use it can be powered by 24 to 30 volts DC.

The unit is available in any gain from 20 to 40 dB. Higher gain versions are suitable for use in distribution systems where rack-mounting is called for.

Broadband-engineered and guaranteed, the VFA-450 is equipped with push-pull hybrid circuitry to deliver maximum output with minimum distortion. Tough and dependable, it offers state-of-the-art performance and flexibility.

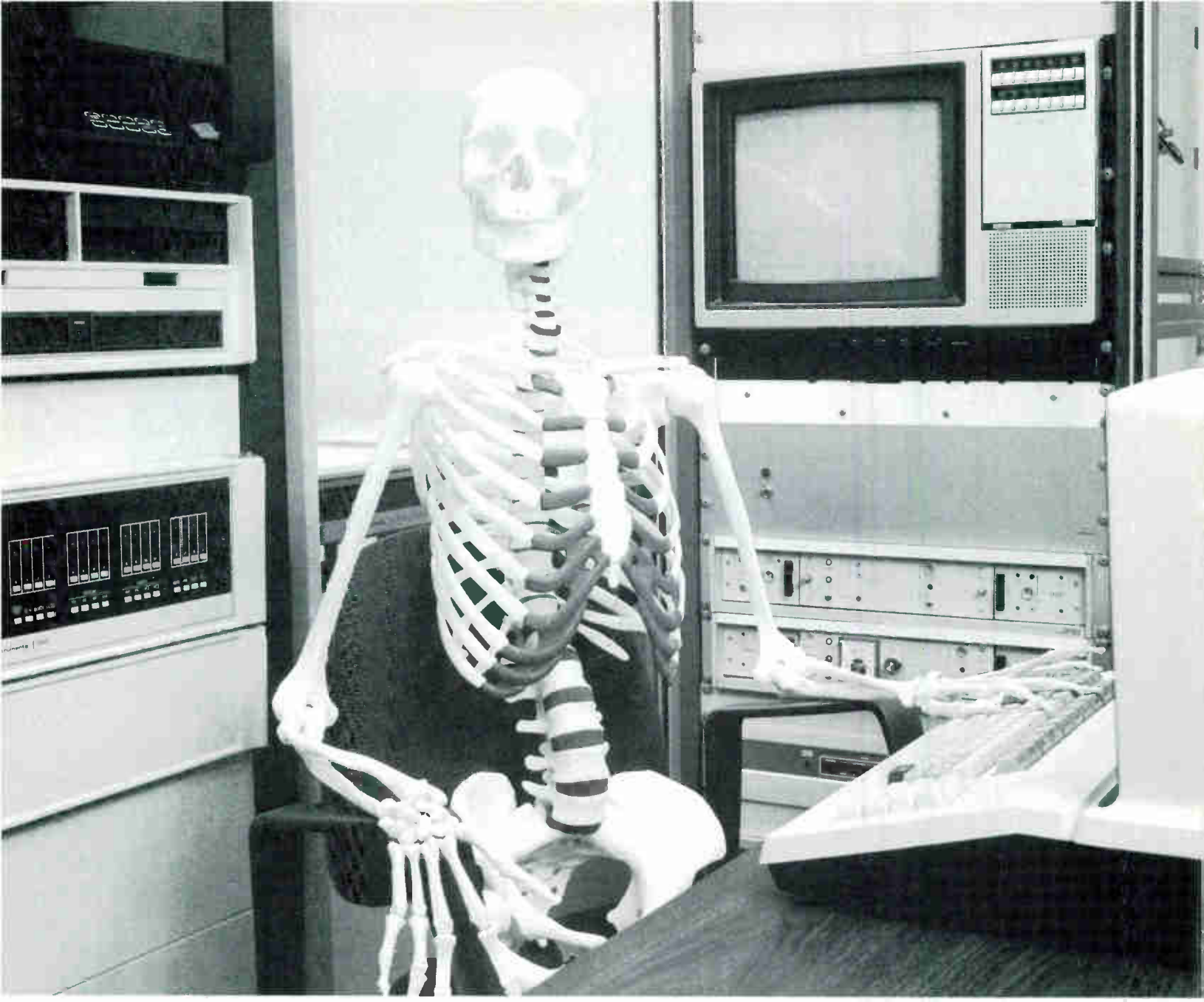
For additional information on specifications or pricing, call us toll-free at 800-327-6690, or write Broadband Engineering, Inc., P.O. Box 1247, Jupiter, Florida 33468.

Features

- Forward bandwidth to 450 MHz.
- 20 to 40 dB gain.
- Push-pull hybrid circuitry.
- Sub-, mid- and high-split capability through use of plug-in diplex filter at output.
- Capable of full channel loading at design bandwidth.
- Plug-in pads and equalizers.
- Variable gain & slope controls.
- -20 dB test points at input and output.
- Response equalization for flatness adjustment.
- -12 dB directional coupler for insertion of sweep or other signals at the output.
- 120 volt AC or 24/30 volt DC powering. DC powering may be connected permanently as standby power in case of AC power failure.
- ±.2 dB flatness.
- Return loss 18 dB minimum.
- Three levels of surge protection.

Distributor inquiries are invited.

AUGAT® BROADBAND
Quality and Innovation



No bones about it!

Software support is critical. Whether you're using a service bureau or your own in-house CATV computer system. So it's important you deal with a company who's geared to support you *after the sale.*

Anytime you've got a problem or question, or just need some advice, you should be able to immediately talk to a CATV pro. Someone with fast, accurate answers—to get you back on track in minimal time.

That's why our SMART™ computer is the CATV industry's number one choice for in-house data processing. It's backed by toll-free customer hot lines, trained software support specialists, and our own staff of CATV programmers. All with one purpose in mind: to keep your SMART™ computer running efficiently and trouble-free.

For more information call toll-free: 800-523-5947; in PA, 800-492-2512. SMART comes in configurations to accommodate any size cable company. It's available with Subscriber Billing and Work Orders, Inventory Control, General Ledger, Accounts Payable, and Addressable Converter Interfacing.

***SMART* features hardware from Texas Instruments**

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cable equipment, inc.
969 Horsham Road/Horsham, PA 19044

CATJ VOL. 11 NO. 2

CATJ, The Official Journal for the Community Antenna Television Association
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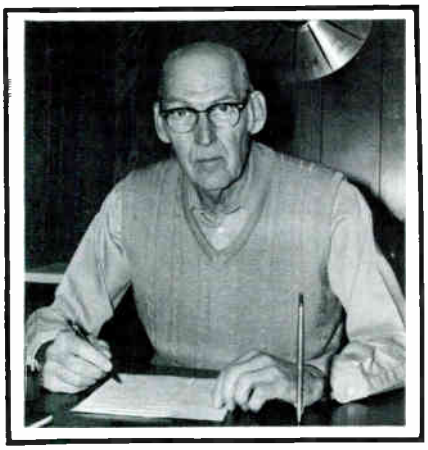
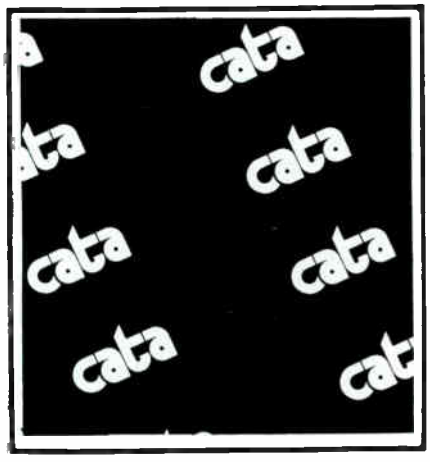


See page 12

See page 32



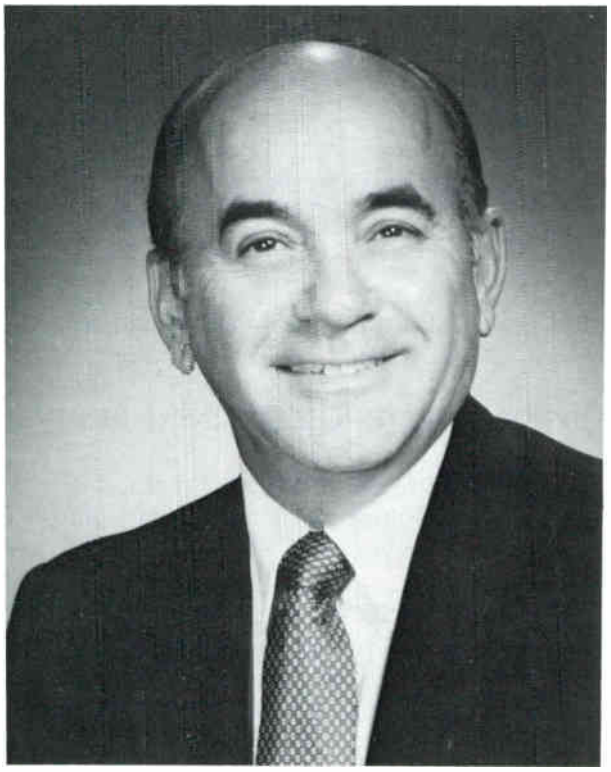
See page 6

TABLE OF CONTENTS

ABOUT THE COVER

One of CATA's cable pioneers, G.H. "Bunk" Dodson is featured in this second of a series of dedications to outstanding members. He is pictured here with one of his loves, his Mooney.

catatorial



Peter Athanas
PRESIDENT OF CATA

Broken Promises Broken Dreams

The Legend of a Faulty Process

The announcements in recent weeks by Drew Lewis, the President of Warner Amex Cable, are just the beginning. What CATA has been writing about and warning about for many years is coming true. The big city "Urban Broadband Communications System" promises and dreams are now breaking up on the shoals of reality. This really comes as no surprise to any student of the cable industry on the process we have been forced to endure to build our systems.

The unfortunate period we are about to go through was forseen — the warnings were adequately sounded, but the major players in the drama were unwilling and in part unable to do anything about it. They were all caught up in a syndrome — a process of major city franchise grants that virtually guaranteed that this would be the outcome.

From the cable operator's viewpoint, the quest for the major cities was part hope and part dream. The assumption underlying it all was that **". . . he who owned the wire would somehow ultimately make substantial profits."** In part this assumption was based on a **"monopoly"** mentality which was clearly wrong. Another ingredient was the assumption that numerous new services — from electronic banking and shopping to pay per view — would be instantly successful as soon as they could be offered to the public. Thus the engine — the dream, was powered by technology. If we could technologically do something it would be commercially successful. Unfortunately, as some of us pointed out all along, the fact that we may be able to technically deliver something that does not mean that the consumer will want to pay for it.

Additionally, the big companies were driven by their own financial, stock market needs. It was, all in all, a bad combination.

The cities, on the other hand, were stuck with a process, franchising in a political arena, that was and remains totally unsuitable to deal with questions of emerging technologies and business. The **"more is better"** syndrome was fueled by a subculture of "consultants." They found themselves forced into the position of promising they could get **"more"** which unfortunately became the **"standard for success"** in order to get hired by the city officials who then allowed the consultants to write requests for proposals that invited and encouraged "bidding wars". After that process was completed, the city officials generally either voted for the **"highest"** bidder, or the one with the most political clout. In either event, the decision could not be characterized as **"informed".**

We have now reached the end of a cycle. The promises will be broken — they must be. They were totally unrealistic from the start. The dreams will be shattered. Cable is not a panacea in the communications marketplace — it cannot and will not **"right"** all the **"evils"** perceived in the broadcast, telephone, or newspaper industries — it is just one part of the larger whole. We must play by all the same economic ground rules that they do despite what city cable administrators, or consultants, or access advocates may think. There is still no such thing as a **"free lunch"!**

So where do we go from here? Who do we blame? Who do we charge with trying to back out of their promises? Who shall we penalize and insist that **"a deal is a deal?"**

CATA would suggest that there is ample "blame" on all sides, and the only one likely to be penalized is the citizenry which **wants** cable television. A far more fruitful course is to change the process that has created this problem. The cable industry cannot do that by itself. The city officials cannot do it by themselves. A third party, Congress, must step in to break the vicious cycle that now threatens to extend from the big urban broadband system wars to the renewal process of the more traditional, successful and consumer accepted cable industry. We must not let that happen.

Even the experts in telecommunications of the National League of Cities recognized that the process had to be altered by Congress to protect the beneficial growth of cable for their citizens. They supported the concepts now embodied in H.R. 4103 before the inevitable politicization of the issue — just as happens in the present franchise process, itself took hold.

It is unfortunate that we have had to go through this period before finally getting to the point of recognizing that the current process **does not work.** It will have to change if the communications structure of the United States including the interrelationships of cable satellite, telephone, data, computer transfer and the like, is to continue its world leadership position.

Those changes are now starting to take place. They will either be dictated piecemeal by administrative agencies and the Courts, or Congress will assume its proper role of legislating order out of the growing chaos. We would prefer the latter. One way or the other, the communications structure of the future is now being forged in the crucible of publicity over broken promises and broken dreams created by a process inadequate to the task.

We do not make excuses for the companies who now find themselves forced to admit massive error and overzealous hype. Nor do we find comfort in the politicized, uninformed, greed orientated decision making of local officials. Both are victims of a process that must now be changed. □

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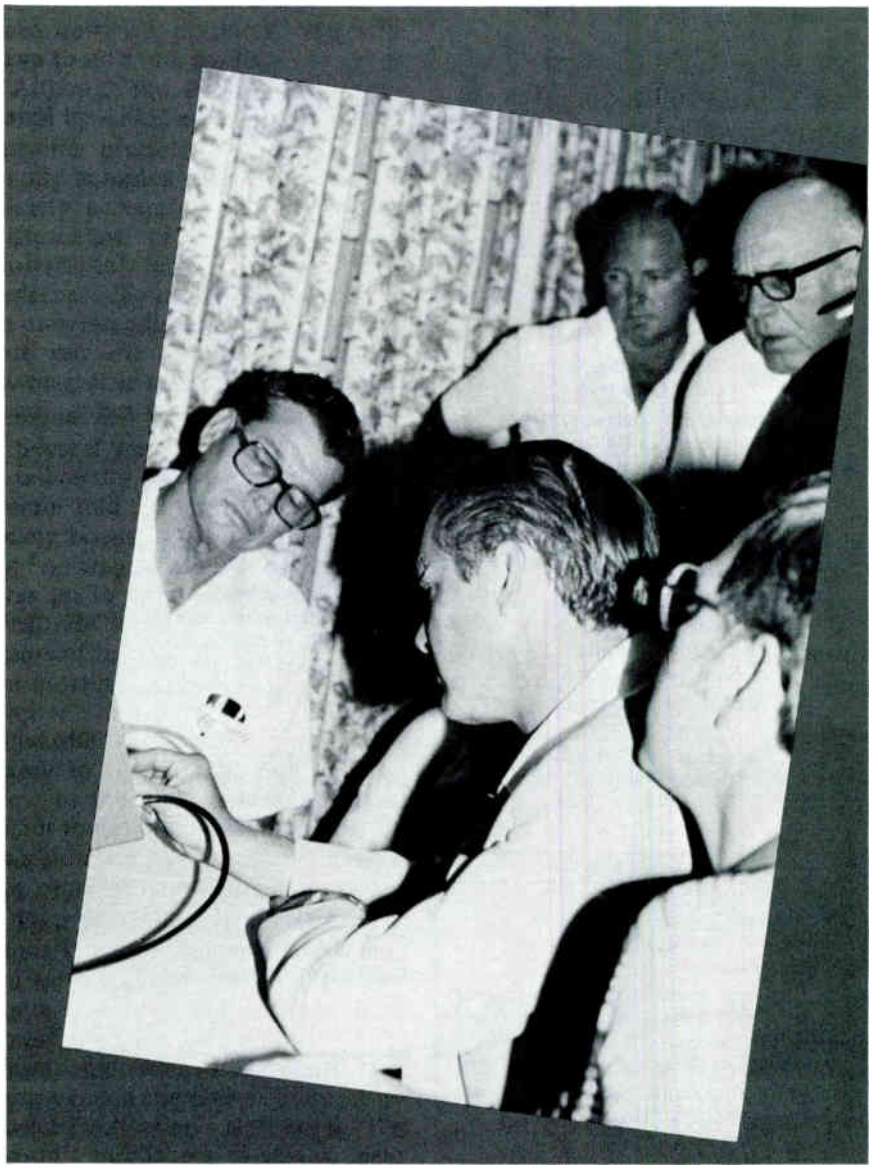
CATA ANNOUNCES NEW SEMINARS SCHEDULE

The CATA Engineering Offices, headed by CATA's Chief Engineer, Ralph Haimowitz, has announced a new schedule of technical trainings for the first six months of 1984 as well as a new program for "in house" training. As you all should know by now, the CATA Engineering office conducts seminars throughout the United States for cable television installers, techs, and engineers interested in improving their skills. The "Basic" training, suitable for novices, installers, installer techs, and system techs with less than 2 years experience runs for three days and covers a variety of subjects from signal sources through headends, house drops, trunk systems, distribution system, connectors and the like. CATA brings in test equipment so that the attendees can actually use the equipment that is being explained and experiment with it under laboratory conditions. We also supply calculators and special class materials for all attendees. The "Basic" seminar has been refined over the last two years, and we think it is safe to say it is one of the best in the industry. It is suitable for the training of new employees as well as improving the performance and understanding of existing employees. The Basic Seminar is now tentatively set for April 18-20 in Seattle, Wash. and in Chicago on June 13-15. The cost is $175 for CATA members and $200 for non-CATA members.

The Advanced Seminar is appropriate for System Techs, Chief Techs, and Engineers. It starts out with a review of the fundamentals, but quickly proceeds to system design concepts, problems/failures, test measurements, test equipment and the like. It too is now a three day course with optional additional lab time in the evenings. The Advanced Seminar is now scheduled for Feb. 20-22 in Wichita, Ks., Mar. 7-9 in Orlando, Fla. and May 9-11 in Phila., Pa. There may be a switch in the Philadephia training depending on the demand — since there are lots of new builds going on in the area, and since a lot of companies have promised to train local people, our seminar may switch to a Basic to accommodate that need if the local cable operators so wish. The Advanced Seminar costs $250 for CATA members and $275 for non-members.

Both seminars have limited registration. We can only handle a certain number of people at the lab



sessions at any given time. So "registration is first-come, first served." If you know now that you want to send some of your technicians to one of these seminars, it would be a good idea to contact the Florida or Oklahoma offices for reservations now.

A new dimension is also being added to the training seminar program. For 1984 CATA will be "offering the seminars on a private basis" as well. That is, if a company wants to it can put together its own group of technicians, or offer a training in a city for new technicians — pursuant, in some cases to promises made in franchises to train new people. The CATA engineering office will have a limited amount of time available to fit in these private seminars. A flat fee will be charged, and, again, the fee will be based on limited attendance — up to 20 or 40 for the Advanced, and up to 50 attendees for the Basic. If you are interested in this program you had better call Ralph in the Florida office (305) 562-7847 immediately. The CATA Corporate members have already been informed of this new program by mail, and the interest is high — some want to conduct a seminar on premises (which makes things much cheaper) for all of their techs. Others want to schedule Ralph into a new franchise situation where he can start the training of local people. Again, we have a limited time in which we can do these seminars and at the same time continue the regular offerings as well. Scheduling will be done on a first-come, first served basis.

It has always been a goal of CATA to serve as many of the needs of our members as we can. Certainly in the past several years the legislative goals often talked about have been a high priority. But we must not forget the other needs of our system members — this runs the spectrum from technical to programming to administrative. The Technical Training program has been designed to help "satisfy" the ever-growing need for more and better technicians in the cable television industry." It will only serve that goal if it is used. That's up to you. ►

BASIC SEMINAR

TOPICS

SIGNAL SOURCES
Broadcast TV
Satellite TV
Microwave Transmission
Local Origination

HEADEND
Antennas
Preamplifiers
Receivers
Processors
Modulators
Filters
Combiner

TRUNK SYSTEM
Coaxial Cable
Trunk Amplifiers
AGC/ASC
Two-Way Systems
Powering

DISTRIBUTION SYSTEM
Bridgers
Line Extenders
Distribution Taps
Splitters/Couplers

SUBSCRIBER MATERIALS
Taps
Drop Cable
Transformers
Grounding Blocks
Set Top Converters
Splitters/Couplers
Apartment Amplifiers

HOUSEDROP
Aerial Installation
Underground Installation
Tap Selection
Multiple Outlets
Bonding & Grounding

CONNECTORS
Connector Types
Cable Preparation
Proper Installation
Signal Leakage

FINDING PROBLEMS
Signal Level Meters
Common Cable Problems
Finding Faults

OPERATING PROCEDURES
System Maps & Symbols
Recording Information
Subscriber Relations

LABORATORY
Equipment Identification
Installing Connectors
Measurements With SLM
Troubleshooting

ADVANCED SEMINAR

TOPICS

FUNDAMENTALS REVIEW
Decibels/dBmv
Formulas
Logarithms

OPERATIONAL REQUIREMENTS
FCC Technical Standards

SYSTEM PROBLEMS/FAILURES
Common Cable Faults
Sheath Currents
Impedance Mismatch
Radio Frequency Interference
Signal Leakage

EQUIPMENT
Spectrum Analyzers
Sweep Generators
Sweep Transmitters
Sweep Receivers
Signal Leakage Detectors
Fault Finders

TESTS AND MEASUREMENTS
Spectrum Analysis
Bench Sweeping
System Sweeping
Proof of Performance Tests
Isolation
Return Loss Measurements

SYSTEM DESIGN CONCEPTS
Coaxial Cable
Active Equipment
Passive Devices
Grounding & Bonding
Powering
System Noise Limitations
Crossmodulation
Intermodulation
Hum
Reflected Signals

FREQUENCY SPECTRUM
Spectrum Conflicts
Channel Expansion
Frequency Restrictions

LABORATORY

A special hands-on laboratory where the attendees actually perform tests and measurements using signal level meters, spectrum analyzers, and sweep generating systems will be conducted from 7 to 10 pm on the first and second days of the seminar.

CATA CATV TECHNICAL TRAINING SEMINAR
HOTEL INFORMATION

A block of hotel accommodations has been set aside for each seminar at the hotels indicated. Please make your own reservations directly with the hotel by completing and mailing in the hotel reservation form below to the appropriate hotel. For telephone reservations, be sure to include the information that you are attending the CATA CATV Technical Training Seminar to receive the special room rates as indicated. Hotel reservations must be received two weeks prior to seminar start date to guarantee rates shown.

BASIC

SEATTLE, WASHINGTON
APRIL 18-20

Best Western Airport Inn
20717 Pacific Highway South
Seattle, Washington 98188
Phone: (206) 878-1814
The Best Western Airport Inn is located off of the 200th Street exit on I-5. Turn left on Pacific. Free hotel van from airport.
S - $32.00
D - $38.00

CHICAGO, ILLINOIS
JUNE 13-15

Best Western Arlington Inn
948 E. Northwest Highway
Arlington Heights, Illinois 60004
Phone: (312) 255-2900
The Best Western Arlington Inn is located on Highway 14 between highways 53 and 83. The hotel has limited airport courtesy van service between 7am and 8pm with advanced appointment.

ADVANCED

WICHITA, KANSAS
FEBRUARY 20-22

Holiday Inn Medical Center
1000 North Broadway/US-81
Wichita, Kansas 87214
Phone: (318) 267-6211
The Holiday Inn Medical Center is located 1 mile West of I-35 via 2nd Street. Free air port courtesy van.
S - $39.00
D - $44.00

ORLANDO, FLORIDA
MARCH 7-9

Ramada Inn South
8700 South Orange Blossom Trail
Orlando, Florida 32809
Phone: (305) 851-2330
The Ramada Inn South is located at Highways 17, 92, and 441 off the Florida Turnpike. Free airport courtesy van.
S - $32.00
D - $38.00

PHILADELPHIA, PENNSYLVANIA
MAY 9-11

Best Western Monticello Motor Lodge
Black Horse Pike
Bellmawr, New Jersey 08031
Phone: (609) 931-0700
The Best Western Monticello is located at Exit 3 of the New Jersey Turnpike on the North Black Horse Pike (Route 168). 5 miles by taxi from Philadelphia International Airport.
S - $36.00
D - $45.00

CUT HERE

HOTEL RESERVATION FORM

Please reserve the following room requirements in the name of the company or individual shown:

NAME: _____ TELEPHONE: _____
(Company or Individual) Area Code

ADDRESS: _____
(P.O. Box or Street No.) (City) (State) (Zip)

NUMBER OF ROOMS: _____ OCCUPANCY: SINGLE DOUBLE

ARRIVAL: _____ DEPARTURE _____
(Date) (Time) (Date)

SEND DIRECTLY TO HOTEL CATA CATV TECHNICAL TRAINING SEMINAR

REGISTRATION INFORMATION

TO enroll in a CATA CATV Technical Training Seminar,
PLEASE:

1) Complete the form below.
2) Enclose a check payable to CATA in the appropriate amount.
3) Mail the form and your check to:

CATA Technical Seminars
4209 N.W. 23rd, Suite 106
Oklahoma City, OK 73107

Get Your Registration In Today To Insure A Reservation.
Attendance is limited to 50 people at Basic and Advanced Seminars to provide proper laboratory experience.

GENERAL INFORMATION

All technical sessions begin at 8:00 am and end at 5:00 pm each day. Morning and afternoon coffee breaks and all of the required materials for the technical seminars are provided by CATA. Hands-on laboratory sessions will be held from 7 to 10 pm on the first and second days of the Advanced seminars.

CUT HERE

REGISTRATION FORM

SEMINAR FEE STRUCTURE

	BASIC	ADVANCED
CATA MEMBERS	$ 175.00	$ 250.00
NON-CATA MEMBERS	$ 200.00	$ 275.00

NAME OF COMPANY _____

MAILING ADDRESS _____
(P.O. Box or Street Number)

_____
City State Zip

PERSON TO CONTACT _____

TELEPHONE NUMBER _____

Please reserve _____ seats at the Basic / Advanced Technical Training Seminar in _____
(Location: City & State)

ATTENDEES WILL BE:

_____ _____
_____ _____
_____ _____

WE are / are not CATA MEMBERS

Enclosed is a check in the amount of $_____ to cover registration fees.

Microdyne's 1100 BDC Block Downconverter and 1100 DCR Receiver

Now — Lower your headend costs and increase system margins with Microdyne's C-Band Block Downconverter

If you're planning on carrying a lot of satellite TV channels simultaneously, we can reduce your cabling and headend equipment costs while increasing your system margins.

Our 1100 BDC reduces the 4 GHz satellite signal to the UHF range right at the antenna. That means you can use lower-cost 75-ohm cable and fittings for the run to the headend.

And because of the lower frequency there's less line loss, so you can make longer cable runs and still have high system margins.

More channels equal more savings

Once at the headend you can use less expensive power splitters, again because of the lower frequency. And if you're carrying a lot of channels, you know that the cost of splitters can add up quickly. With our block downconverter, the more channels you carry, the more money you save.

Teamed with our best LNC Receiver

We teamed our state-of-the-art block downconverter with an equally advanced receiver — the 1100 DCR. Standard features include a PROM-controlled double-conversion frequency synthesized tuner for the best possible image rejection, noise figure and temperature stability; automatic polarity switching; and remote control capability.

Compatible with S-A Receivers

We don't usually mention the names of our competitors in our ads, but in this case it's appropriate. Our 1100 BDC block downconverter is a direct replacement for Scientific-Atlanta's 360 Series and can be connected directly to S-A's 6650 receivers.

So if you have been having trouble getting an S-A block downconverter, use ours. We don't mind if you mix brands — it just may convince you to try the rest of our TVRO equipment.

Backed by Microdyne

Of course the 1100 BDC and 1100 DCR are backed by our generous service policy and comprehensive customer support. And they are readily available through our nation-wide system of Authorized Distributors.

If you would like more information on how our C-band block downconverter can help save you money, contact our Marketing Department today at (904) 687-4633. Ask for our new TVRO brochure. We'll send it to you free, along with the name of your nearest Microdyne distributor.

Microdyne Corporation

P.O. Box 7213 • Ocala, FL 32672 • (904) 687-4633 • TWX: 810-858-0307

LOGIC CIRCUIT LOGIC

By: Steven K. Richey, President
TelTran, Inc.
Azle, Texas

The Logic circuit or Timer that controls the circuits that we have discussed in the last two issues is the subject of this month's article.

We start by taking a 60hz sine wave from the AC supply and passing it through LC1a, a 2 input NANO Gate with a built in Schmidt trigger which outputs a very good symmetrical 60hz square wave, IC2 a 4018 divides the 60hz by 3 to give us 20hz and then the 4017 IC3 divides the signal again by 10 developing a 2hz signal which we use for a clock.

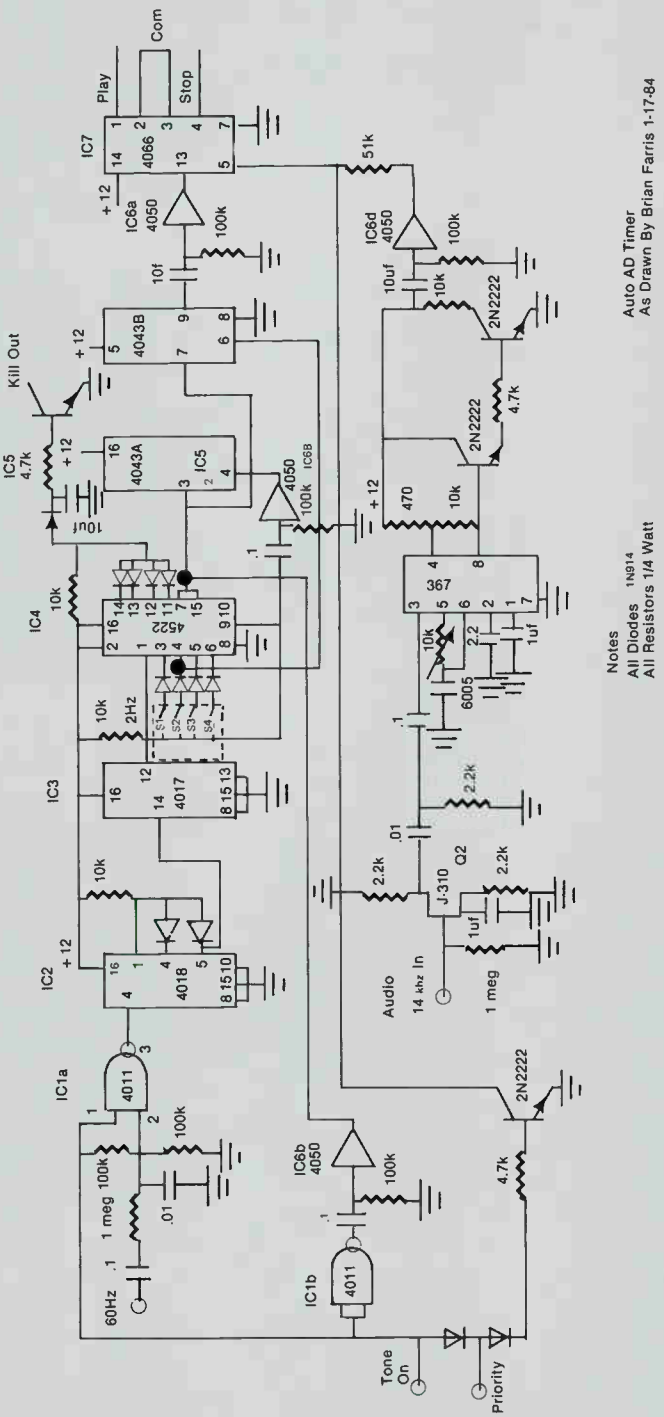
IC1a will not output a square wave until 12 volts is applied to pin one and 6 volts along with the 60hz AC is applied to pin 2. We get this voltage from the output of the Tone decoder board when the tone circuit is activated. The application of a voltage starts the Timer which in turn activates the rest of the circuit.

Most of the services allow a 5 second tape roll period at the beginning of the AD Spot so you cannot switch immediately upon receipt of the control tone. IC4 is a dual divide by 16 counter with BCD outputs. By using a switch, diode and resistor Network on the output we can build a programmable divider that will have an output that is adjustable from 1 to 8 seconds for the first output and then another output every 8 seconds from then on until it is turned off and reset.

FIGURE 1

1 S_1	2 S_2	4 S_3	8 S_4	time
X	X			1
		X		2
	X	X		3
			X	4
	X		X	5
		X	X	6
	X	X	X	7
X	X	X	X	8

IC4 Truth Table X = Switch Closed



When a voltage is received from the tone decoder board it starts the clock which when 2hz is applied to IC4 it begins to count. A pulse is generated and sent to IC5b a set reset Flip Flop whose output goes and stays high causing IC6a to generate a pulse which when fed to control input 13 on IC7, a CMOS switch connects pins one and two together and starts the VCR in the play mode. At the same time IC4 continues to count and when the count reaches the preset number (ours are set for 6 seconds) a signal is outputed which is used to create a pulse in IC6b and then cause IC5a, output to go and stay high. This output is connected to the Video Board which causes it to switch the Video.

As we mentioned earlier IC4 is a dual counter, the second counter counts the 8 second pulses that continue to come from the first section and exactly 120 seconds after

Continued on page 22

The original officers and directors of the Community Antenna Television Association upon its incorporation in Oklahoma City, outside the existing CATA office of today, January, 1974.

Left to right: Warren Fribley, Kyle Moore, Ben Campbell, G.H. "Bunk" Dodson, and Bill Risden.

Bunk Dodson: CABLE PIONEER

by Kathleen Sheldon

Giles Hubert "Bunk" Dodson served as an officer of the Community Antenna Television Association (CATA) from the time it was organized until his resignation in July, 1982. Elected secretary-treasurer at the time CATA was founded, he was the last of the original officers and directors to hold an active position.

Bunk told us he was practically born with his unusual nickname. He said, "The story I get — my dear old auntie came to stay with Mother when I was born, and she started calling me Little Bunker. That evolved down to Bunk and it's been that way ever since. I tried to drop it for years, and finally gave up. If you came to Sayre (Oklahoma) and asked for Giles Hubert Dodson, probably hardly anyone would know which Dodson that is . . . I don't know what possessed her to give me that handle."

By whatever handle he is called, Bunk Dodson is one of the forces that began and has sustained CATA. One of the founders, he recalls that many independent cable operators had talked among themselves for quite some time about their lack of representation and influence in the industry and

with the government agencies. Many operators wanted an association that addressed their specific needs, problems and interests. Bunk knew that the desire for such a group and the formation of it were a long way apart. He had been instrumental in the organization of regional cable associations and was very much aware of the time, effort and money that would be required to form a new national group.

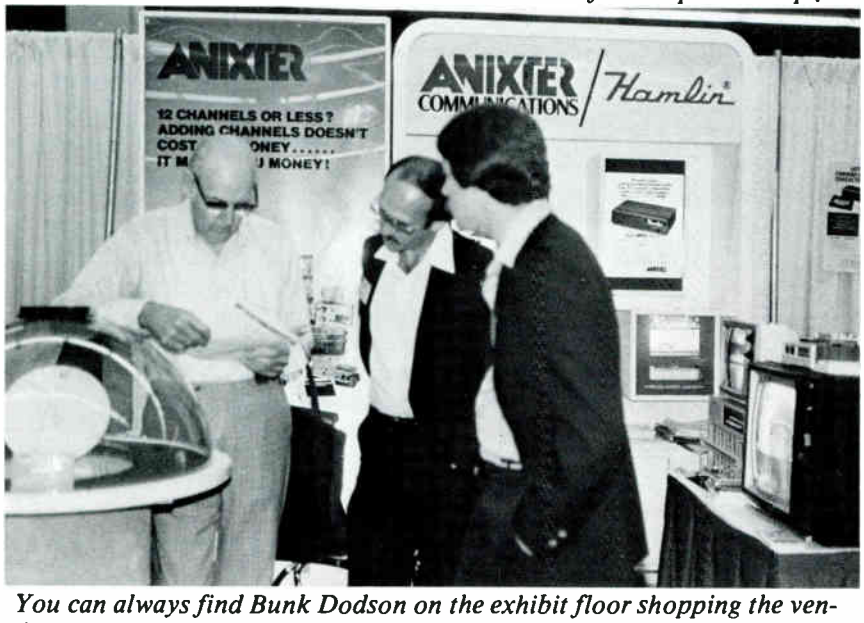
His resistance was turned around when he and other cable operators were called to Washington, D.C. by the NCTA in the early 1970's to lobby for a copyright bill which they quickly saw would be detrimental to the cable industry as a whole and to the small operators in particular. He remembers that he and Kyle Moore sat in a hotel room in Washington, D.C., talking about the bill and their experiences in the Capitol, about the special needs of the small operators and their lack of an organized voice in the industry.

Finally Kyle said, "Let's start that association we've talked about. These guys are not working for us at all."

Bunk says he told Kyle, "It's an insurmountable job. I don't see how we can do it. We're trying to run our business and all that, and it will take somebody's time and effort to do it." Kyle answered that if Bunk would back him, he'd just take off from business and get it started.

Taking a break at Dorate Inc. with Doreen Roed, Bunk Dodson, and John Lord, Dorate's chief engineer.

Celeste Rule Nelson and G.H. "Bunk" Dodson taken upon the occasion of their partnership.



You can always find Bunk Dodson on the exhibit floor shopping the vendors for his cable supplies.

"So, we sat there and agreed on it." says Bunk.

The NCTA was to have paid their hotel bills, but when it was time to check out, Kyle and Bunk took care of their own expenses. After the Washington experience, they didn't want to be obligated to the NCTA!

There was a good turnout for the organizational meeting in Dallas in July, 1973. Some who attended were not as interested in forming a new association as they were in having a stronger voice in the NCTA. but after a great deal of discussion with NCTA officials who were there in force, it became apparent that this wouldn't happen, and so, says Bunk, "We formed (CATA) . . . right there, and started putting it together."

Soon after that Kyle and Bunk opened and furnished an office in Oklahoma City for the association headquarters, and, says Bunk, "Kyle practically quit his business. He was on the road at his own expense . . . and got the thing going." He adds, "It was time" for this association.

CATA was chartered in January, 1974 with less than 40 members. Today its membership represents more than eight million cable television subscribers and exerts a strong influence through its Washington office and its technical training program.

In addition to having been a founder of CATA, Bunk was co-founder with Kyle Moore of Televi-

continued on page 18

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continued from page 14

sion Publication Inc. to publish CATJ magazine. They saw that there was a lack of good technical information available to cable operators, and one of the first projects they undertook after the formation of the new association was to look for a vehicle to disseminate this information. The idea was to share technical data and help cable operators get their jobs done as efficiently and economically as possible. Bob Cooper was brought in because of his experience in the writing and publishing fields, and CATJ Magazine was established with the three men as partners. "Bob contributed a tremendous amount to the association," says Bunk. "He was a power."

Today, as a result of sales and transfers, the magazine is published by Television Publications Inc. which is owned equally by G.H. Dodson and Celeste Rule Nelson.

Bunk is an intelligent, inventive, innovative and hardworking man, a pioneer in the cable television industry. The groundwork for his success as a cable operator was laid decades before he built his first cable system. While attending high school in Sayre, Oklahoma, during the late 1920's, he became interested in radio, building receivers and teaching himself all about this new way of sending and receiving signals over the airwaves. At that time nearly all the radios were operated with the old A, B and C batteries. Bunk says he has been with radio from its infancy and loved every minute of it. His technical and business expertise became obvious when he opened the Dodson Radio Sales and Repair Shop in Sayre in 1929 at the age of fifteen!

A resume of his jobs, duties, businesses, positions and services during the next five decades would read like an encyclopedia of electronic occupations.

After high school "the big city beckoned" and he moved to Oklahoma City. He worked for Montgomery Ward Company, Firestone and others where he helped set up and operate radio repair departments.

In the late 1930's Bunk returned to Sayre and again opened his own radio sales and repair shop which was later expanded to include television set sales and service. Never one to put all his time and energy into a single project, beginning in 1941 and during World War II, Bunk headed the National Youth Administration School in Sayre. He wrote the course, taught classes and provided job placement for graduates. This was an important contribution to the war effort, as the purpose of this class was to teach students, predominantly women, electronics skills so they would be qualified to work on aircraft communications and navigation radios, thus freeing men for military service. The aircraft plants weren't used to the idea of women who knew which end of the screw driver to pick up, so Bunk had some difficulty placing his first students in industry. However, plants in Oklahoma City and Fort Worth, desperate for labor, agreed to try some, and it wasn't long before their personnel directors called to say they would take all the NYA students he could provide!

In the mid 1940's Bunk was licensed by Motorola Corporation to service two way radios. In addition he was a Rural Electrification Administration inspector, required to inspect the wiring in all new residences. This work kept him on the road during the post war boom, and at the same time he maintained

Mr. & Mrs. G.H. Dodson — "Mama" and "Bunk" upon his resignation from the CATA Board in 1982 at the Opryland Hotel in Nashville.

Bunk Dodson and his long-time office manager, Oleta Spurlin.

The Officer and Directors gathered around the meeting table during Mr. Dodson's term as Secretary Treasurer.

his radio shop back in Sayre at night.

All this hard work and activity was heading Bunk right towards the cable television business. By the early 1950's, he had added television sets to his shop line and learned how to repair them, but reception in Sayre was marginal at best.

Thirty years ago television viewing was sweeping the country, and the Dodsons and their neighbors in Sayre wanted to enjoy this new entertainment. Bunk had seen the community antenna system in Elk City, Oklahoma, and he thought a similar system would be a good idea for Sayre, and who was better qualified to build it, but Bunk? This was 1954 and others were not quite so progressive. He looked around for a location for his antenna, but high places on the Western plains of Oklahoma are scarce. With a brilliant idea, he went to the City Council and asked for permission to put an antenna on the water tower. The city fathers shrugged their shoulders at this idea and said to go ahead if he wanted to — television reception and crazy ideas were Bunk's domain, not theirs; they didn't want to be involved!

"So we started in business," says Bunk, "and we actually operated . . without a written franchise" until last year when a new city attorney said they should have one, and it was granted by a vote of the citizens of Sayre.

After getting initial permission from the city council, Bunk went to the bank to borrow some money to build his system. The banker was starting to write up the note when he looked at Bunk and asked what he was going to do with the money.

Bunk said, "I'm going to build a cable system."

The banker said, "What is a cable system?"

Bunk explained that he was going to run a cable all over town and tie people's sets to it and charge them for it.

Bunk continues the story: "He says, 'Do you think anybody'll pay for this?' I says, 'I sure do hope so.' Anyhow he says, 'I'll tell you what, I'm kind of new here, and I hate for people to be laughing at me for making a loan for things like this. Just let me run this through the board. I'm sure it'll be all right. You come back in the morning, and we'll finish it up.' The next morning he called me. I knew I had a problem when he called. I went down and he apologized. 'Bunk.' he said, 'the board turned it down.' They thought it was a hairbrained idea. They didn't want to get involved . . . That's when I went home and starting building my own equipment on the kitchen table."

This lady, Doreen Roed, works with Mr. Dodson in his workshop on assembly and repair of equipment

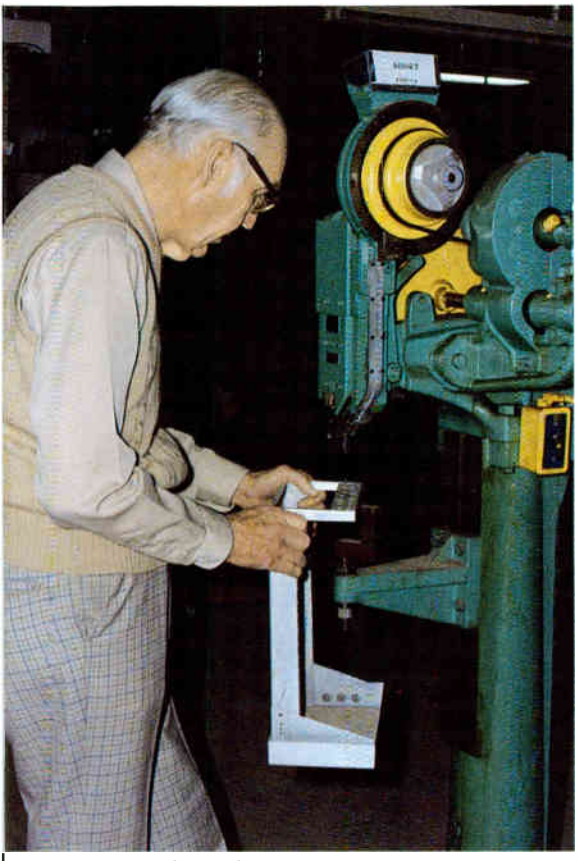
Lucille Dodson and Ardith Schmauder off on one of the ladies tours during CCOS

Mr. Dodson and his computer operator bookkeeper Ann Passmore

Bunk worked night and day building equipment and installing that first cable system. Income from the TV set sales and service shop helped with business and living expenses. He hired a young man named John Lord at $7.00 a week to help with the work after school and on Saturdays. John was in junior high school at that time and was very interested in electronics. He worked along with Bunk, helping to build the systems and learning the business. Today he is the chief engineer of the Dodson cable systems.

The antenna was installed on the water tower, (eventually it was moved to a tower site east of town) and before long the first subscribers were connected, including the banker and city council members. At that time Bunk offered his subscribers a choice of rates. They could pay an $85.00 connection fee and $3.50 a month, or they could pay $7.00 a month, but no connection charge. The banker chose to pay the $7.00 a month because he didn't think the cable system would stay in business long enough for him to get his $85.00 worth. He continued to pay the $7.00 monthly until he died many years later! (This payment plan was in effect for ten years.)

Once the momentum had picked up and the first system was built, Bunk went on to build others, not only in Oklahoma, but in New Mexico, Kansas, Colorado and Texas as well. Today Dorate Incorporated, the Dodson cable operating com-



Bunk Dodson - the insatiable tinkerer - always interested in working the machinery and equipment.

One of the loves of his life — Bunk Dodson's "Mooney".

Mr. Dodson visiting with fellow Oklahoma cable operator, Joe Bain, at CCOS.

pany, owns systems in nine communities and serves more than 12,000 subscribers.

The Dodsons have two family corporations, Dorate Incorporated and Dorate Intrastate. Bunk is President of both and his wife, Lucille, is Secretary-Treausurer. Their son, Russell, is Vice President and their three daughters, Charlotte Mosley, Darla Cox and Jeanne Dodson sit on the board of directors. A long time employee, of more than 30 years, Oleta Spurlin, is the only non-family member of the board. As the corporation's financial officer, Lucille investigates the investments and studies the reports. Bunk says he couldn't operate without her careful attention to these details. Lucille jokes that her main job is as the company "parts boy" as it falls on her to run parts between all the systems within driving range.

Long ago the manufacturing plant outgrew the kitchen table and became a fully operating facility in Sayre, at times producing all of the equipment needed for a cable system except the cable. Bunk designed his equipment for specific needs, but all of it is compatible with that put out by other manufacturers. In developing and building his own equipment, Bunk often was the first to pioneer and use a new idea. His systems were the first to use modulators at the headend; they used directional couplers long before they were in general use, and the system in Cordell, Oklahoma had an emergency alert warning in operation in 1959. While he never sold equipment to other cable operators, he has built systems for others and has sold some of the systems he built for himself, and his equipment is in use in those systems. Many of his original ideas and innovations have been adopted by the rest of the industry. He has phased out the production of passive equipment because it is no longer economically feasible to produce, but his company is still building amplifiers, modulators and some specialized equipment. His designs have stood the test of time. All his technicians are experienced in the operation and upkeep of the Dodson designs. The cabinets he built years ago for the tube equipment are now being used for all his solid state equipment. As a result, updating and state of the art changes, when called for, have been made with minimum effort.

Looking after so many different aspects of the cable television business might be too much for a lesser person, but Bunk Dodson is a man who can keep track of many activities and ideas at one time. He is never idle; up at five every morning, he often works on into the night. "The truth is, I like to work," he says.

He learned to work at a young age when, as a child, he helped around the family-owned grocery store. After his father's death, his mother continued to run the store, and when Bunk was in the eleventh grade, he quit school in order to help his mother. Through the years he has been involved in a number of businesses. In addition to others mentioned in this article, he owned a radio broadcasting station and a welding supply company. He taught electronics at Sayre Junior College, where he has taken all the aviation courses offered. Early in his career he took a correspondence course in electronics from California Institute of Technology where many of the things he had learned from experience were reinforced and organized into theory. In his never ending pursuit of new technologies, information and ideas and to keep up with changing technologies, he has attended many technical seminars offered around the country.

When he was considering the purchase of a WANG computer for his business, Bunk asked about a maintenance contract and software. Both were very expensive, so he asked the salesman to call his boss and tell him he had a cash sale for a computer on the condition that the purchaser and another person could be trained for maintenance of the unit. This was arranged, and Bunk and son Russell took a course in

continued on page 23

Richey (continued from P. 11)

the Video is turned on the second counter in IC4 goes high and with Q1 outputs a OFF signal back to the Tone Board shutting everything down.

When the control voltage goes high the output of inverter IC1b goes low and when the control voltage goes back low the output of IC1b goes high which creates a reset pulse at the output of IC6c. When the reset is applied to IC5 the outputs go low and when applied to IC4 all counters are reset to 0 preparatory for a new sequence.

When we make the Video tape we place a 14khz tone at the end of each commercial. FET Q2 is connected across the Audio from the VCR. The .01 in ufd capacitor and 2.2K resistor on the output of Q2 form a high pass filter passing the high freq on to the 567 Phase Locked Loop. When a 14Khz tone is present on the tape it will cause the output of the 567 to go low. Transistor Q3 and Q4 functions as inverter and to match the 5 volt output of the 567 to the 12 volt logic level required by the reset of the circuit. IC6b forms a pulse circuit which when fed to pin Five of IC7 causes pin 3 & 4 to be connected together and stop the VCR. Transistor Q5 when biased on by the high control signal from the Tone board disables the stop pulse by grounding them through the 51K resistor. This allows the VCR to run until the Video is turned off and then to stop at the end of the next ad, cued up and ready to roll at the next signal.

Next month we will look at the complete unit with pictures circuit board art works and a few updates. □

continued from page 21

Chicago with WANG company technicians. A similar arrangement was made for him to attend a programming school in St. Louis, and he then developed his own programming.

Bunk has given generously to the cable industry and has been active in many trade associations. He is a member of the prestigious Pioneers, an exclusive group of persons who were involved in the early development of the cable television industry. He enjoys participating in their annual dinner and program which is always an elaborate black tie event.

He was a director of NCTA during the late 1960's. He was a charter member and director of the OKT Association (Oklahoma, Kansas and Texas.) Later the Texas cable operators separated from that group to form an association that could address itself more to state issues, and operators from other states were interested in joining with the OKT. So out of this group, the Mid-America CATV Association evolved, and Bunk was the first president and a charter member. Cable operators from Oklahoma, Kansas, Colorado and Nebraska now make up the Mid-America group. Bunk was also a founder, first president, and director of the Oklahoma Cable Television Association, and a member of the New Mexico and Texas Associations.

One way Bunk manages to keep on top of all his businesses and activities is by flying. He purchased his first airplane for business purposes in 1961. At that time he didn't plan on flying alone, but depended on others to pilot him around. This, however, was not always the most convenient arrangement, and when one of his system manager-pilots died suddenly of a heart attack, he decided the time had come to learn to fly himself. As it turned out, earning his license on this 67th birthday, just two years ago, was one of his most exciting and proudest accomplishments. His airplane is a Mooney, a four place craft that cruises at an air speed of 200. "I want something that will get over the ground," says Bunk. "It's business, and we're trying to get somewhere." The Mooney serves his purposes so well that he has owned four of them.

To illustrate the speed and convenience of flying, he tells about a recent trip to see someone in Burlington, Colorado, the site of his most distant cable system. "It's five hundred miles by road," he says, "which is an all day drive. I can fly it in two hours. I had to go up there awhile back to see someone. Left here at seven o'clock in the morning, and at eight in the morning, their time, (we have an hour's difference) I was sitting on the doorstep waiting for him. We talked about our business, and I was back home for lunch!"

Russell Dodson, Bunk's son, is also a pilot. He is the manager of the Dodson cable system in Cordell, Oklahoma, and is an electronic tinkerer just like his dad. He grew up in Bunk's workshop, watching, learning, absorbing and helping out. All of this must have been as natural to him as breathing, and he didn't realize how extensive his knowledge of electronics was or how strong his aptitude for it was until he went into military service. There, because of his background and as a result of aptitude tests, he was assigned as a radar instructor at the same time he was taking boot camp training. He spent his four year military career in Biloxi, Mississippi, as a radar instructor and developed some of the course work and educational materials used. After his discharge he was offered a civil service position in Fort Sill, Oklahoma as an electronics instructor. He worked there until the early 1960's when he decided to join his father's business.

Life is not all work and no play in the Dodson family, Bunk and Lucille met while in high school and have been married 49 years. One of their favorite enjoyments is square dancing and Bunk is the recent past president of the Red River Rounders which holds square dances in Sayre one weekend a month. On other weekends you'll find them spinning and twirling in one of the nearby towns. When traveling they take along their square dance outfits and hunt up a square dance. "We make instant friends that way," says Bunk.

They have raised four children, and during the early years Lucille was a full time mother and homemaker. After the children were grown, she became closely involved with the family business as Bunk's valuable assistant. She enjoys traveling and usually accompanies Bunk to association meetings.

Even more she enjoys visits to see their family. They have ten grandchildren and seven great grandchildren. Bunk says he is looking forward to some great great grandchildren!

They are a close family and whenever possible the senior Dodsons and their four children celebrate special occasions together, but it is seldom possible to get all the grandchildren and great grandchildren in one place at one time.

Bunk and Lucille are active members of the First Christian Church where Bunk is an elder and has served as chairman of the board several times. Lucille is involved with the Christian Womens Fellowship and has served as president a number of times. Another of her activities is with the Philanthropic Educational Organization, a select group of women who support scholarships for needy women at a college they maintain in Missouri. Lucille referred to this group as the PEO, and Bunk, with his typical good humor, said that at their house "PEO stands for Papa Eats Out" while Lucille attends the meetings.

The Sayre Chamber of Commerce also benefits from Bunk's service. In every community where he has a cable system, he supports the Chamber of Commerce and sees to it that the local manager takes an active part in local civic clubs.

Cable operators and, especially, CATA members have many reasons to appreciate Bunk's contributions to the industry.

Of him, Celeste Rule Nelson said, "He's a unique person and I'm proud he's my partner and my friend. I think his reputation in the business speaks for his integrity, and he draws unprecedented respect from people who know him and those who know of him . . . He is truly a gentleman of remarkable talents and personality." □

The Development Of TVRO Systems

Karl Poirier (right) and David Emberson (left) of Triple Crown Electronics, both frequent contributors to CATJ.

by Karl W. Poirier
TRIPLE CROWN ELECTRONICS INC.

The delivery of program material to CATV/LPTV rebroadcasting operations via Satellite is a relatively new concept, and was almost unheard of ten years ago. One of the major obstacles of this type of service was the cost and complexity of telecom style satellite receive systems. Only when equipment designed specifically for CATV/LPTV operation appeared, did the modern multi-channel satellite fed cable system become viable. We will examine some of the receive system design concepts which make this possible.

INTRODUCTION

The general science of Satellite Television communications has been, for most of its existance, the domain of large telecommunications manufacturers, and has been handled generally as an extension of land based microwave technology. Only in recent years, have manufacturers specializing in Satellite receive systems appeared. Even more current developments have resulted in receive systems being supplied by the original manufacturer of the low noise component of the system. This change is the result of several factors, of which two primary reasons are: —

- — the difference in **basic system requirements** between terrestrial telecom/space communications, and television receive only operations,
- — the **allowable system cost** for a television receive only (TVRO) system vs. a common carrier telecom link.

BASIC SYSTEM REQUIREMENTS

When discussing differences in system requirements, it is important to realize that telecom operating policies, as well as performance requirements, must be considered. Generally speaking, Voice and Data have higher priority than television, and, with the exception of Network programming, more emphasis is placed on redundancy, standby etc., (Fig. 1) for voice and data circuits.

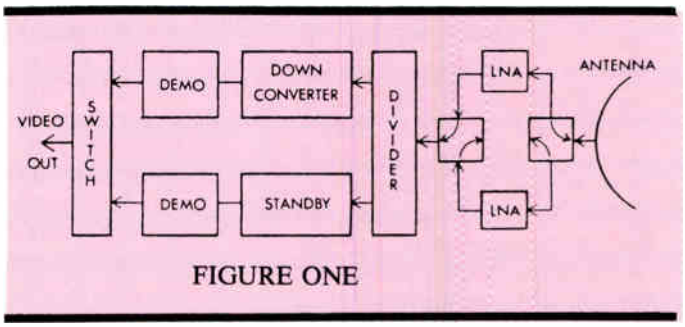


FIGURE ONE

In addition, because of required bandwidth, a microwave link may carry one television circuit, or up to 1800 voice circuits. This results in a differing customer service base, as a link may provide mass one way communications to millions, or two way direct communication to 1800.

Another important difference between telecom and TVRO is site location. Most TVRO sites are adjacent to the television coverage area, whereas telecom repeater equipment is quite often difficult to access. This places a much higher emphasis on reliability for terrestrial telecom systems. From the technical performance aspect, there are basic performance requirements which are essentially identical, particularly in the IF to baseband chain of processing. The primary difference lies in the input selection and conversion processes, due to the received power levels. There are, however, performance requirement differences throughout the system.

ALLOWABLE SYSTEM COST

The second primary reason for the shift from Telecom to TVRO manufacturers concerns the marketplace. The market for TVRO in Canada lies in two area's of television distribution. These are Network up/downlink, and local distribution (CATV/LPTV), and again, the operating policies of the parties involved (ie. Network, Government, Teleco), tend to place higher priority on Network distribution than on CATV/LPTV signals. The Network thus has more operating capital, and higher need for reliability. The CATV/LPTV operator has the same desire for reliability but less operating capital, and must sacrifice such niceties as spare paths, primary backup power, hot transfers etc.

The only real answer to the reliability question available to the CATV operator lies in low cost, interchangeable components, and system flexibility (Fig. 2).

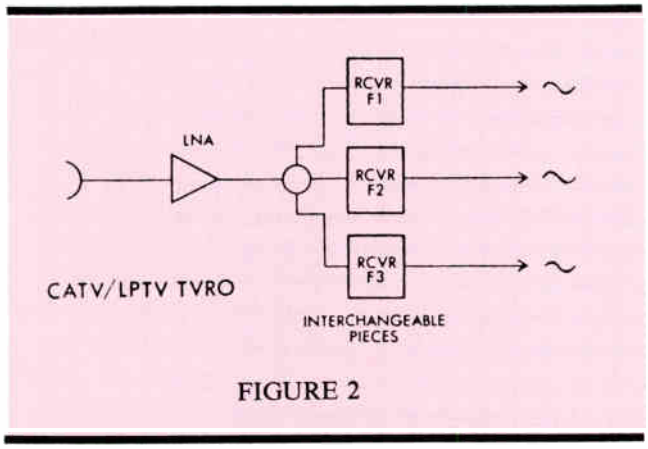


FIGURE 2

TVRO VS. TELECOM PERFORMANCE: FRONT END

As stated earlier, the primary operating difference between terrestrial and SPACE receivers lies in the operating received power level. The received power at receive antenna feed for a terrestial link at 4GHz under typical conditions may be – 10 to – 30dB. A CATV TVRO with 4.5m antenna will be – 80dB.

This low power level requires that the signal be amplified with a low noise figure amplifier (LNA) before any processing. The Telecom signal is usually filtered, isolated, and fed directly to the first conversion. The first item in the TVRO chain usually has a noise figure of 1.2 to 1.5dB, whereas the first active in the Telecom chain, plus filter loss, will normally be 6-8dB (Fig. 3 and 4).

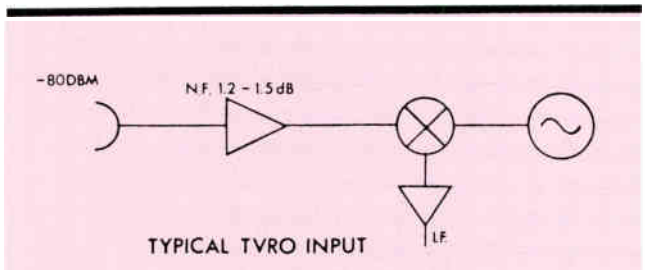


FIGURE 3

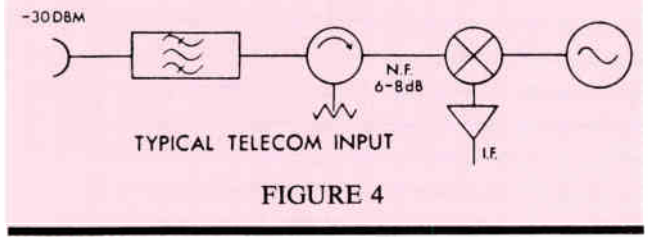


FIGURE 4

Thus a TVRO receiver is essentially a Telecom receiver with the addition of a low noise amplifier to the input, which presents an immediate increase in cost and complexity.

Typical TVRO vs. Telecom Receiver

In a standard Telecom microwave receiver, the entire processing chain, from microwave input to 70MHz output consists of 5 parts: a. Waveguide channel filter; b. waveguide isolator; c. waveguide mixer; d. phase lock oscillator source; e. 70MHz preamplifier.

What we have is a basic single conversion receiver weighing 6KG and pricing $4000.00 (Fig. 5). In fact, the two major concerns of satellite systems are not even addressed, but are rather designed out. For example, the image problem is resolved by alternate path frequencies so that no image signals exists. The noise figure problem is eliminated by the high level signals on the link.

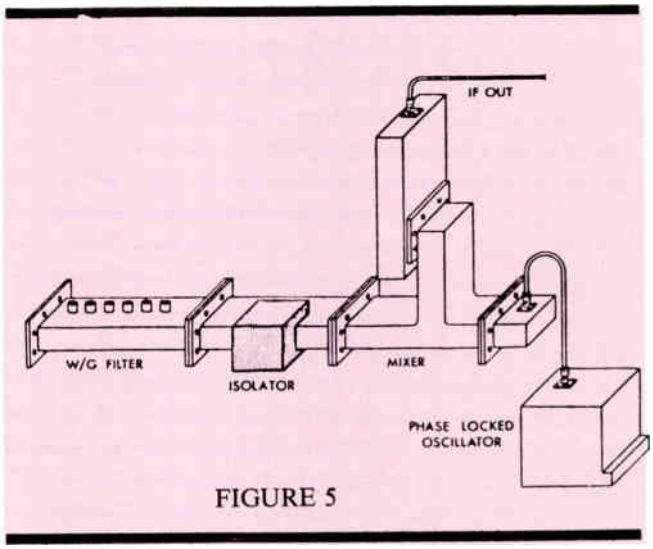


FIGURE 5

We are left with a receiver which is very basic and quite satisfactory for Telecom use, but requires extensive rethinking for TVRO use.

An example of Telecom style receiver can be explored in the small air transportable system purchased by Telesat in the late 70's for telephone/television service to resource camps.

The receiver portion of this system was essentially a single conversion telecom receiver, with the addition of an LNA. The LNA was located within the receiver housing, and was fed by waveguide from the antenna. Tuning was accomplished by replacement of channel filters and re-alignment of local oscillator. Later versions incorporated agile receivers, but maintained the internal LNA and waveguide.

The TVRO receiver requires that we address the problem from a different set of priorities. Because reliability is more often in the form of path redundancy, the receive chain for a network TVRO or Telecom link is usually built as a single channelized assembly with little or no field tuning or rechannelizing capability. Rechannelizing normally involves replacement of input filter and local oscillator source, as well as trimming the

mixer for the required frequency.

In the CATV/LPTV receiver, the redundancy is usually in the form of equipment replaceability, and this normally requires frequency agility for receive equipment. Thus a basic design concept difference is immediately applied to the problem.

In the last few years, it became obvious, even to Telecom manufacturers, that television receive only installation required frequency agility. In keeping with tradition, however, the new receive systems were designed around the standard single conversion front ends with the addition of tracking or variable preselection. The construction and design were still mainly military/telecom style, and the cost remained quite high. It was, on the whole, the TVRO manufacturer who developed what is today accepted as the standard television satellite receiver. This receiver differs substantially both in concept and in operation from what was available in the past.

The trend towards reduction of cost and increased performance began with the LNA. The television receive only system is designed to operate with a lower initial G/T than telecom systems. The entire receive chain is optimized to conserve G/T rather than to brute force high levels through large expensive antenna's. G/T is optimized by prime focus feeds, which eliminate losses ahead of the low noise stage. The prime focus feed became the most common method for TVRO systems. The signal is received by the LNA with no sub-reflector losses and relatively low side-lobes due to the lower blockage ratio of the Neutonian feed. The concept of feeding the signal to the LNA through 50' waveguide was on the whole, unacceptable to the TVRO manufacturer. 50' waveguide equal 0.5 to 1dB loss which makes a 120° LNA appear to have a noise temperature of 170° to 225°k. It appeared that a significant G/T improvement was obtainable by placing the LNA at prime focus. The next phase saw the elimination of all microwave wiring, by moving the first conversion to the prime focus area and this led to the LNB system.

Low Noise Block Converter (LNB)

The low noise block converter consists essentially of an LNA, in which has been incorporated the first frequency converter which would normally be found in the receiver. The benefits from this system are important especially to the Pay TV operator. Because the signal is converted to a lower band, there is no need to transport microwave signals into the receiver. This allows lower cost cable and connectors and is especially important at 12GHz where cable losses are very high.

The signals present in the entire microwave band are block converted to wide band of frequencies in the area of 1GHz, which has lower loss and requires less complex splitters. These signals are individually processed to select a desired channel from the band. This method is certainly the most effective way we have today of receiving the ANIK C 12 GHz signals, and is rapidly becoming popular for 4GHz multi-channel installations. There are however, two major points of difference between the LNB and LNA systems which must be considered.

FIRST: Whereas the LNA is simply an amplifier, the LNB requires that a frequency converter including oscillator be placed outdoors where it is subject to drastic temperature variations. To this end, systems such as dielectrically stabilized oscillators must be employed.

SECOND: There has not, as yet, been standardization of LNB output frequencies, although there is strong support for the FCC recommendation of 950-1450MHz. Present systems, however, may output anywhere from 270 to 1800MHz, and in fact some systems convert the 12GHz band to 3.7-4.2GHz band, and employ a standard 4GHz receiver. For this reason, unlike LNA's, LNB's are not necessarily compatible and exchangeable. This can lead to difficulties when trying to find replacements during system outage.

THE MODERN TVRO RECEIVER

Ignoring for now, the block downconversion systems (LNB, LNC) it may be worthable to examine the frequency plans involved in the basic downconversion systems in use today.

The normal receive system involves 1) conversion of the desired channel to IF, and 2) rejection of adjacent channels at IF frequency. In order to facilitate the conversion, some pre-selection is often employed, as well as input amplification. These two functions are normally performed by a low noise amplifier (LNA). In theory, any system of conversion which converts the desired channel to IF will suffice, but this falls short in practice.

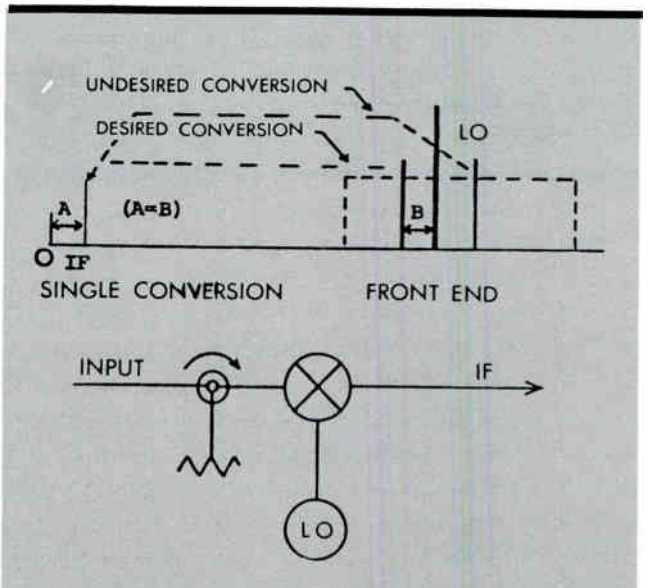


FIGURE 6

More often than not, the prime consideration when designing this type of conversion, is the effect of unwanted oscillator products, and conversion images.

(continued on P. 28)

Letter

Dear Celeste,

It was interesting to see the pictures that you had on page 30 of the December 1983 issue of CATJ.

The proper caption for those should have been, "A Self Inflicted Wound!"

At one time in my life I designed antennas. Virtually all of them were dish type. All of them were steerable. The wind tunnel data that we had showed that all dish type antennas had large wind loadings. These loadings varied through a great range during high wind conditions. The variations were due to the antennas being pointed in different directions with respect to the relative wind.

For just safety, and longevity, reasons we wanted to stow (or lock) our antennas in a position when they were not in use. Sensibly we wanted to have this position the one with the least wind loading. All of our wind tunnel data showed that this was when the antenna was pointed directly straight up.

We don't experience many hurricanes here in Southern California. We do get some pretty high Santa Ana winds though. At one time we had 80 MPH winds for more than 12 hours, with gusts to over 100 MPH. We didn't have a dish antenna then. Now that we have a dish we are ready to re-orient it if we ever have winds over 80 MPH.

If the antenna at the Kauai Cable TV company had been oriented straight up when the winds got to 80 MPH, in all probability, the antenna would have gone through the hurricane without any damage. A short message on their character generator would have told the subscribers why they were not seeing HBO, etc. Face it they all knew that there was a hurricane. No one would have complained.

Yours truly

Jon Lippitt □

(continued from P. 26)

Some basic design rules are: (a) the local oscillators used to convert the desired channel must not interfere with any other channel in the band; (b) the products of the local oscillators (ie. 2nd, 3rd, 4th etc. harmonics) must not fall within the input frequency band, nor in the IF band; (c) the IF image must not affect the desired conversion.

To clarify the reasoning behind these rules, let us examine the two basic conversion systems employed in modern commercial receivers. First, **the single conversion receiver.** (Fig. 6)

The single conversion receiver employs a single local oscillator located at desired input channel ± IF frequency. This oscillator may be fixed in frequency for single channel receivers, or tunable across the band 3.7-4.2GHz ± IF frequency for agile receivers.

This system has several advantages in that only one oscillator is used, and, therefore, no intermodulation problems, and normally no harmonic problems can occur. There are however, two major areas of difficulty, which required careful design and construction to prevent problems.

(1) Unless the IF frequency is higher than the receive band is wide, the local oscillator will usually be within the receive band. As the 4GHz receive band is 50MHz wide, any IF frequency below 500MHz will result in the LO operating within the input band. For example, a 70MHz IF frequency will result in the local oscillator falling in the second adjacent channel. This is only a problem when more than one receiver is operated on a common antenna or in a common location. To help overcome problems, most single conversion receivers employ an isolator in the input line ahead of the mixer. This reduces the level of local oscillator leakage by 18-20dB.

(2) A single conversion to an IF frequency which is less than a half of the input bandwidth (ie.70MHz) will result in both the desired channel and the image being converted. To prevent this, two techniques may be employed.

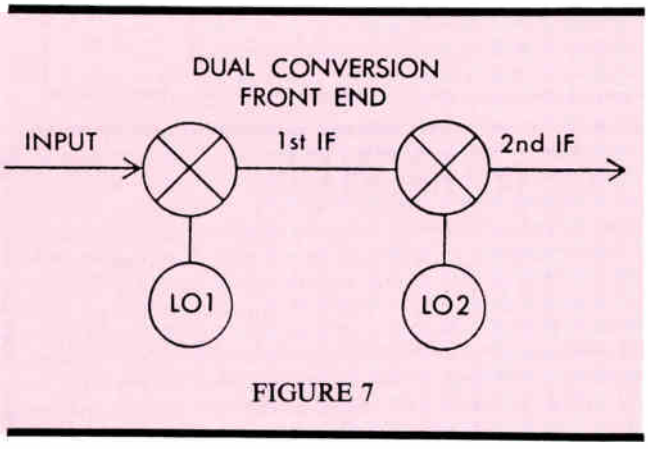


FIGURE 7

The first technique is input tracking pre-selection. In this method, only the desired channel is allowed into the mixer, and thus no image is converted.

The second technique involves the use of image reject mixing. In this method, the input is applied to two mixers, so arranged so as to produce phase cancellation of the undesired conversion (image). This method is quite satisfactory for fixed (single channel) conversions, although some difficulties in design are evident for multi channel (agile) reception. Most of the problems can be overcome by the use of dual conversion. (Fig. 7)

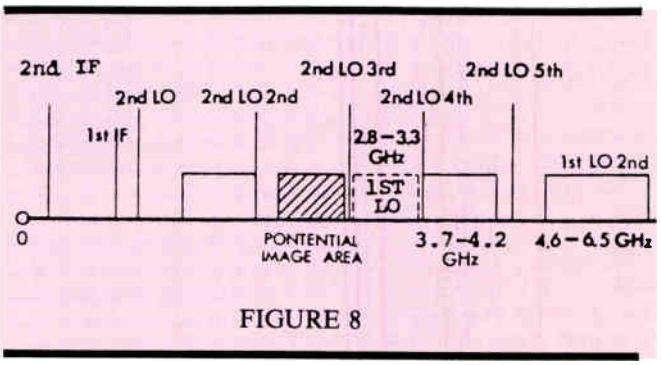


FIGURE 8

The Dual Conversion Receiver

The dual conversion allows the first local oscillator (ie. the one most likely to leak out the input connector into other receivers) to be outside of the receive band. The second oscillator is required to convert the first of interim IF to the final second IF. Both oscillators can be selected to minimize effects of harmonics and intermodulations.

Dual conversion allows the selection of local oscillator and IF frequencies which insure that no image is produced. This is easily completed by selecting a first IF frequency higher than the total receive bandwidth (ie. for 3.7-4.2 bandwidth, a first IF located at 500MHz or higher will not produce an image).

The dual conversion receiver is normally designed with the first LO and first LO harmonics well clear of the 3.7-4.2GHz band. This can be accomplished by selecting a first IF band at approximately 900MHz. This requires a first LO of approximately 2.8-3.3GHz. In this case, even if the LO is generated via a double or triple oscillator, the next harmonic will clear the receive band. (Fig. 8) ie. 2.8-3.3GHz LO generated as second Harmonic of primary. 1.4-1.65MHz oscillator will result in harmonic third LO at 4.2-4.95GHz.

The second conversion oscillator is also selected so that its harmonics are also clear of 3.7-4.2GHz. It is important to note that at the low receive power of satellite signals, even 7th, 8th and 9th harmonics can cause problems.

The dual conversion has far fewer problems with input leakage, as there should be no signal in the receive band to leak out. The problems are more in a class of engineering design in order to minimize the effects of having two high frequency oscillator in the system.

Improved Performance

The primary trust of the modern TVRO receiver can

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Performance/Cost Trade-offs

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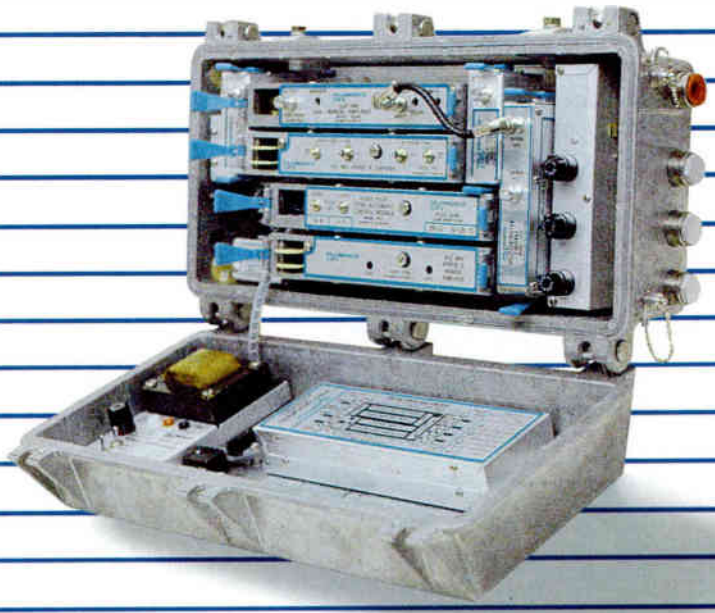

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be summed up as follows: to extract the **maximum** performance from the system at minimum cost. To this end, some basic design criteria are introduced into the television receiver system.

The received signal is processed with equipment designed to maximize performance. The techniques of threshold extention have been applied to improve the end performance under high loading conditions. In particular, the techniques of FM compression have become more common in the improvement of dynamic threshold. The FM compression methods have the added advantage of removing the EDW so that clamping becomes less critical. Dynamic thresholds in the area of 10dB under three high level subcarrier loading are now common and static thresholds approaching the 7dB level are the norm. (Fig. 9)

The FM compression techniques also provide increased headroom for maximum peak to peak baseband. Normally, the receiver is designed to accommodate pre-emphasized video (CCIR REC. 405) which has high frequency components up to 13dB higher in level than the LF baseband.

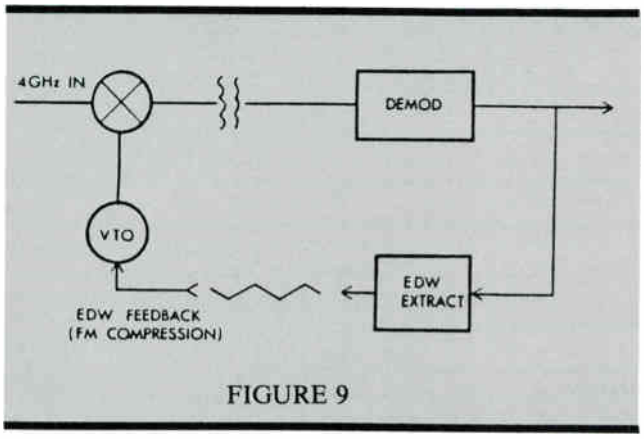

FIGURE 9

With the addition of high rate data, such as employed in computer controlled excryption, the data overshoots can result in 3-6dB increase of high frequency peak to peak level. A 3-6dB increase in headroom may be required to prevent data clipping.

In the search for improved, low cost performance, we see advances such as: — Synthesized tuners; Surface accoustic wave filters; Active discriminators; Dielectrically stabilized oscillators and many more to come.

The basic design of the modern TVRO receiver incorporates several unique concepts. The downconverter is normally an integral unit providing tuned and preselected 70MHz IF out. The functions of mixer, local oscillator 1st IF, 2nd conversion is contained in a single module. In some cases, part of this function is contained in the low noise package (LNB). One major design which differs from the telecom style, is multiple function interconnect. For example the tuning oscillator may, combined with the demodulator section, become part of the dispersal rejection circuit. Individual blocks can be made to work in combination to augment or indeed replace other blocks. The telecom style of one block per function is not nearly as cost effective. (Fig. 10)

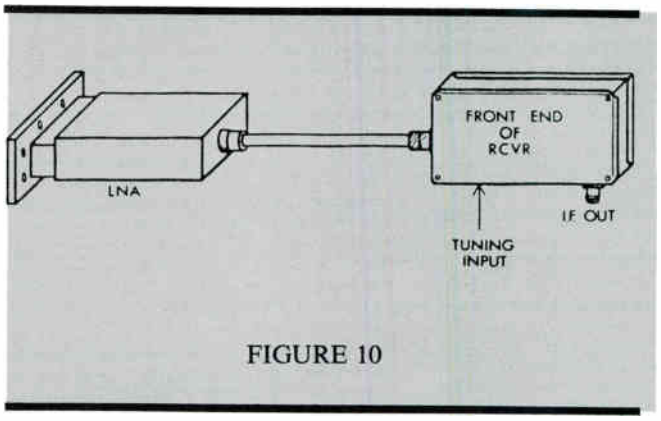

FIGURE 10

The modern television (TVRO) receiver is a self contained assembly including everything from LNA power supply to possibly television modulator in a single functional package. This allows simple, fast replacement in

OOPS! CORRECTION PLEASE.

Vitek's address was listed incorrectly in CATJ's January 1984 issue in the article "Filter Networks to Facilitate Outside Sales" p. 36. Please excuse our error and find the correct address below as it is listed in each issue in the Associate Roster:

VITEK ELECTRONICS, INC.
4 Glady Court
Edison, NJ 08817
(201) 287-3200

time of failure, as well as overall manufacturing cost reduction. The operator can carry one or two pieces as spares, knowing that even an untrained technician can perform the replacement and set-up. (Fig. 11)

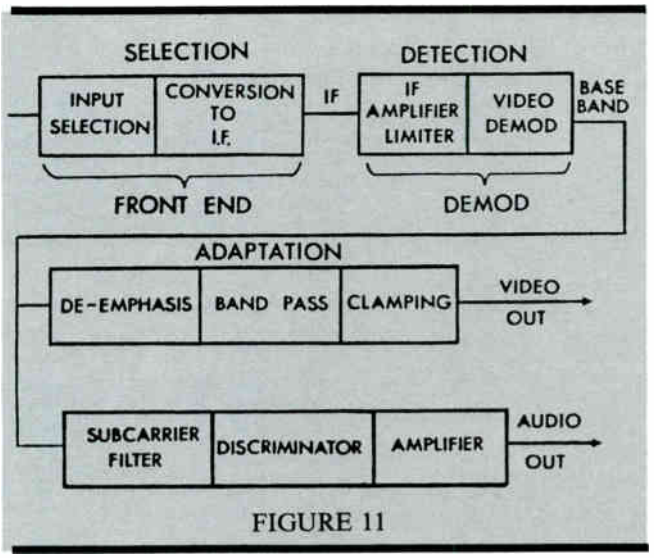

FIGURE 11

In fact, the average CATV satellite receiver costs less than the phase locked oscillator used as a sub-assembly of the typical telecom receive link.

CONCLUSION

The CATV/LPTV TVRO receiver is designed to provide high quality, cost effective performance through three basic design concepts.

a) The television receiver extracts all available G/T from the system by: —
   (1) Eliminate the waveguide between LNA and feedhorn
   (2) Improving feedhorn efficiency
   (3) Employing prime focus feed systems

b) The television receiver makes best use of available G/T by: —
   (1) employing threshold extension
   (2) feedback FM compression
   (3) active discrimination

   and many other innovations in circuit design.

c) The television receiver maximizes cost efficiency by: —
   (1) agile tuning for sparing and replacement
   (2) incorporating functions (such as LO, mix, filter) rather than dealing in completely separate sub-assemblies.
   (3) incorporating integral television modulator and LNA power supplies into complete easily replaceable packages. □

Reprinted from the Satellite Communications Conference 1983

CABLE TECH'S FILTER COOKBOOK

REMOVING HIGH FREQUENCY RESPONSE OF TRAPS

BY: Jean DICKINSON
Glyn BOSTICK
Microwave Filter Company, Inc.

SUMMARY

The high frequency, spurious response of current bandstop filters, or traps, becomes more serious to system performance as the cable band continues to be extended upward — superband (216-300 MHz), hyperband (300-450), and, tomorrow . . . ? These spurious responses can be removed by combining the typical filter into a network with bandsplitters.

HIGH FREQUENCY TRAP RESPONSE

Most CATV trap designs, for pay TV or undesired carrier removal, consist of capacitor-inductor circuits which "misbehave" at higher frequencies: have one or more second, or "spurious" responses. With the present trend to widen the bandwidth of CATV systems, the threats to system performance become more numerous and serious: even traps designed for the traditional "hi-band" (174-216 MHz) can give second responses at hyperband (300-450 MHz) and even at the top of super band (215-300 MHz). These spurious responses can usually be removed by "bracketing" the trap between two splitters to allow it to perform normally and to block the higher frequency responses.

EXAMPLE

An example illustrates the technique. Figure 1 is a spectrum analyzer sweep of a channel 3 deletion filter designed on L/C principles. Note that it has additional (undesired) attenuation at the top of superband (approximately 295 MHz) and at about 460 MHz — just above hyper-

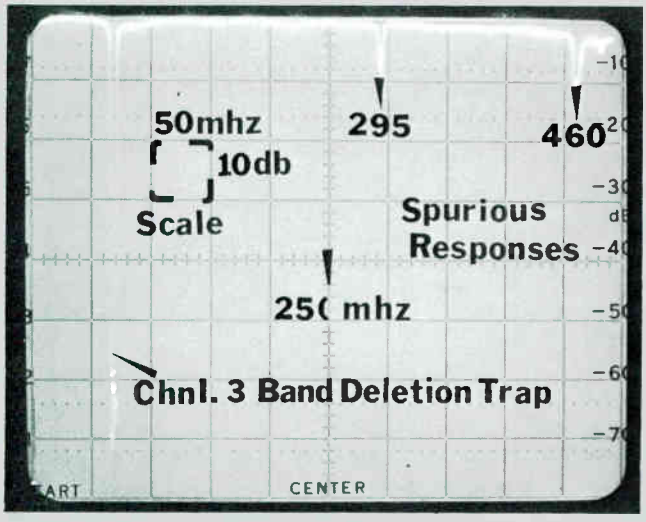

FIGURE 1

Sweep of Channel 3 band deletion trap show spurios responses at 295 (Superband) and at 460 MHz.

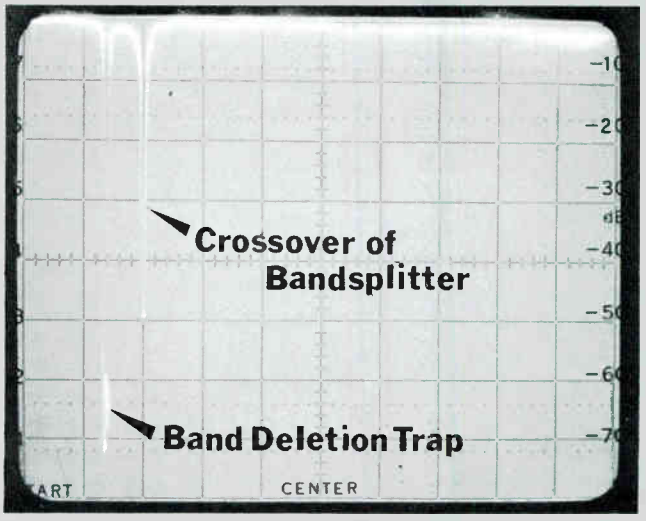

FIGURE 3

Sweep of the Channel 3 band deletion trap between bandsplitters to remove spurious responses at higher frequencies.

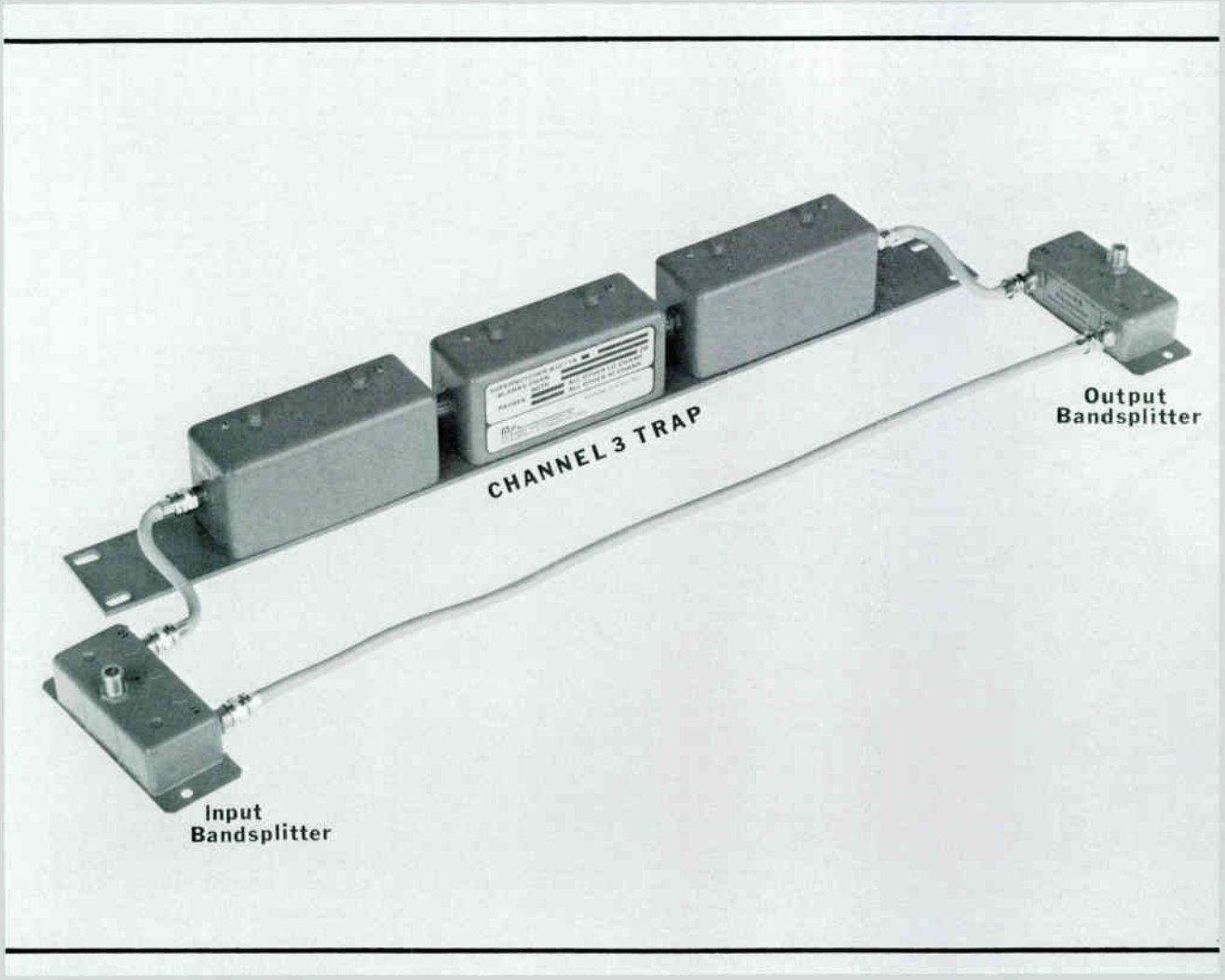

FIGURE 2

Typical arrangement of a trap between bandsplitters to remove high frequency, spurious responses.

band.

In Figure 2, the trap has been placed in a transmission line which connects the low frequency ports of two bandsplitters. The high frequency ports of the bandsplitters are connected with a jumper. The designed cross-over frequency of the bandsplitters is 98 MHz. Therefore the higher frequency behavior of the trap cannot be seen at the common port of the output bandsplitter. Figure 3 is a spectrum analyzer sweep of the network shown in Figure 2. Note that the trap's spurious responses have been suppressed.

DESIGN NOTES

The cross-over frequency of the bandsplitters must be **above** the trap's design frequency. See CATJ, December 1982, for the "COOKBOOK" design method for bandsplitters.

Note that the high pass filter portion of the bandsplitter must be "flat" to the CATV system's highest operating frequency. Most bandsplitters designed by the above method will have this desirable characteristic. Since some spectrum will be lost at the bandsplitter cross-over, one must carefully choose the design cross-over frequency.

ACKNOWLEDGEMENTS

Many thanks to Carol Ryan for helping us meet our deadline, Bill Louise for the spectrum analyzer tests, Dave Skeval for the photo and Chris Bostick for "filter cook" sketch. □

S.J. BIRKILL ON EXPERIMENTAL TERMINALS

FIVE YEARS:

58 issues of "Experimental Terminals"

I began writing for CATJ in 1978, on the strength of my experiments in satellite TV reception with small antennas. At that time nothing smaller than 4.5 meters was contemplated for domsat reception, so an 8 ft dish for Intelsat reception was indeed small!

CATA invited me (along with other TVRO freaks) to the 1978 CCOS to talk about my work, and to demonstrate the phase-lock loop demodulator which I used for narrow-band signal recovery. This series began in October of that year, when I was given a virtual *carte blanche,* provided I appealed to those in the CATV industry who were interested in satellite TV, either professionally or as "backyard" enthusiasts. (In those days home TVRO did not exist as an industry; it was something for hams to tinker with in their spare time. Cable programmers, far from seeing it as a threat to their livelihood, were quite unaware of any direct to home potential.)

October 1978

In that first "column" I set out to describe the PLL demodulator, in sufficient detail for the reader to duplicate it. (In fact the circuit, in some form, appeared three times in that issue of CATJ — the version in my column was the one that worked)! I began with a little personal background and some excuses for my presence. I introduced readers to the prospect of international as well as domestic satellite viewing. And I embarked on a series of low-level, rambling technical tutorials that were to characterize my material for most of its five-plus years until today.

November 1978

The emphasis here was on the calculation of downlink power budgets, starting with EIRP, antenna aperture and LNA noise temperature, taking in Boltzmann's constant, noise bandwidth and FM threshold, and coming up with G/T and carrier to noise ratio. I also presented some rather fine computer-drawn curves (not mine) for the derivation of look angles from latitude and longitude difference.

December 1978

We then went further into the properties of frequency modulation systems, covering along the way Carson's Rule, effective noise bandwidth, FM improvement factor, pre-emphasis and the derivation of signal to noise ratio. I closed with some details of Atlantic Ocean satellites in the Intelsat, Symphonie and Soviet series.

January 1979

The tutorial continued with a discussion of energy dispersal and the need for video clamping. For the first time a reader's contribution was featured, a video demodulator based on the NE564 as used by Tay Howard, and in due course by most of the first generation "home TVRO" receiver manufacturers. Coverage of the international satellite scene was expanded, with a look at the Pacific Ocean Region satellites and their visibility limits over North America.

Russia's Molniya satellite system was described (though with some inaccuracies in orbital representation), and I presented a list of satellites planned for the Soviet "Statsionar" geostationary system.

The Intelsat transponder frequencies were listed for comparison with those of Satcom and Westar, and I covered briefly the various incompatibilities in transmission formats: channel frequency, sense of FM, audio (subcarrier/SCPC/sound in syncs), line standard, color system and polarization.

February 1979

The tutorial this time took readers through prime focus and Cassegrain feeds and f/D ratio, leading to a detailed constructional description of my own experimental antenna feed, incorporating selectable (V/H linear or RH/LH circular) polarization, variable beamwidth and a hybrid-mode scalar horn with choke plate, a technique subsequently adopted throughout 4 GHz TVRO.

March 1979

Block schematic and outline description of my experimental receiver with 450-950 MHz block IF, sync reinsertion, variable bandwidth and on-screen spectrum analyzer.

April 1979

Orbital congestion was the topic, leading to a discussion of the merits of Ku-Band (12 GHz) operation, and comparisons with C-Band. Three current Ku-Band systems were described.

May 1979

12 GHz receiver techniques (waveguide, microstrip, fin-line), the image-rejection mixer, G/T curves.

July 1979

Introduction to S-parameter design. A complete constructional project, with microstrip artwork, for a two-stage bipolar LNA, 20 dB gain, 3 dB noise figure.

August 1979

No new "Experimental Terminals" column, but I contributed a short item to "Technical Topics" on the possibility of British VHF TV being received in the USA (via the ionosphere) during the coming winter of sunspot maximum.

September 1979

Here's where we started getting technical again. This was the first of a two-part tutorial on using simple equipment to make usefully accurate measurements of fundamental equipment RF performance parameters. Noise temperature was assessed with reference to ground and sky noise.

October 1979

This time G/T was obtained directly using solar or stellar noise sources.

November 1979

I described the steps necessary to predict the sun's azimuth and elevation, from accurate knowledge of terrestrial co-ordinates and local time. Polar mount geometry was touched upon, and the parabolic torus reflector was introduced, as the optimum fixed antenna for multiple satellite access (sphericals were very popular at that time).

Somehow, my contribution spilled over into "Satellite Technology News", where I provided updated footprints for Satcom F1, and described the operational pattern of Russia's first and brand new Atlantic geostationary bird, subsequently identified as Gorizont-2. My initial estimates of Gorizont transponder frequencies proved to be in error, and were corrected in a later issue.

December 1979

Another constructional feature, this time a single stage GaAs FET LNA, to achieve a noise temperature in the region of 150K when used ahead of the July 1979 bipolar design. Diagram 3 contained a printing error, corrected in CATJ February 1980.

January 1980

Microstrip: simple principles, practical design curves, examples.

February 1980

Circuit schematics for add-ons to the original narrow-band PLL demod, including video amplifier and clamp, audio demodulator and output.

March 1980

Here I presented seven maps of the USA, with superimposed contours of azimuth and elevation to a range of popular satellites, domestic and international.

April 1980

The downlink equation was revisited, with the emphasis on a graphical approach to determining optimum system specification at any location.

May 1980

Alternative audio demodulator, GaAs FET biasing options, simple CMOS bias inverter.

June 1980

Beginning a series on Satellite Systems of the World, I described in detail the Russian inclined orbit Molniya system *(Orbita),* and its potential for continuous high quality reception throughout the USA, as it beams Moscow TV to Siberia from an apogee 40,000 km above Hudson's Bay. This seems to have ►

created quite a stir, as enthusiasts throughout America tuned in to Moscow to watch the blacked-out summer Olympic Games. Molniya is still used today by language teachers in the USA, as a source of live Russian programming.

July 1980

The second in the "Systems" series, this one described Comstar.

August 1980

My first attempt at a geostationary catalog, this was printed in tabular form, from my own handwritten original.

September 1980

Continuing in tabular vein, I presented a double-page spread showing all 4-GHz transponder frequencies, world-wide, to enable translation to equivalent US (24-channel) transponder numbers. Also included was a description of the Franco-German Symphonie satellite system, though its unique left-hand circular polarized downlink was not emphasized.

October 1980

Intelsat: three generations of satellite, ten birds in view of the USA. Footprints, visibility zones, half and full transponder formats, TV audio by subcarrier and SCPC.

November 1980

The Video Format: differences between international line standards and color systems, decoder block schematics, how to achieve compatibility.

December 1980

The Spherical Antenna: comparison with the paraboloid, two illumination modes, further advocacy of the offset parabolic torus reflector.

January 1981

Anik C: footprints, satellite schematic, full and half transponder frequencies, DBS possibilities.

February 1981

Constructional feature: A low-cost first local oscillator on microstrip, for a block-conversion receiver.

March 1981

Design of pyramidal horn feeds for dish antennas. Formulas, graphs, example.

April 1981

Satellite Systems of the World: Statsionar. I returned here to a subject of some considerable personal study: the Soviet geostationary satellites. The three classes of spacecraft were described, along with locations, footprints, frequencies and off-screen photos. A rare spectrum analyzer shot of the period shows simultaneous operation of all six transponders aboard the Atlantic Gorizont.

May 1981

I turned my attention at this point to readers' letters. One reader in particular, who asked so many awkward questions that to reply direct would have used the time I had available to write for CATJ. So I set about trying to answer him in print, in the hope that some of his queries would have arisen in the minds of others.

June 1981

Continuation of replies to readers' questions.

July 1981

TVRO Receiver Design Options. Criteria for selection of intermediate frequencies; dual conversion or image rejection, remotely tuned or block conversion. Agile UHF PLLs, block downconversion for direct distribution, private cable, etc.

September 1981

Circuit suggestions from a reader: the quadrature demod for FM TV; more letters answered; review of Intelsat domestic lease services; and a bias inverter using just four components.

October 1981

Experiences with the MC1357P as a demodulator. Suggestions for Intelsat SCPC audio recovery.

November 1981

The first appearance of my circular chart of geosynchronous satellites in orbit.

January 1982

The geometry of linear polarization, and the reason for, and magnitude of its apparent rotation at locations away from the satellite's meridian.

February 1982

The modified polar mount. Derivation of axis and declination angles to enable accurate tracking of geostationary arc.

March 1982

Systems: SBS

April 1982

Teflon slab circular polarizer for the Chaparral feed horn.

May 1982

Miscellaneous problem areas discussed in response to readers' requests.

June 1982

The London installation: a 3-meter system in the West End, specifically engineered for Gorizont reception.

July 1982

Systems: Advanced Westar. This program was subsequently cancelled, though the hardware still flies as part of TDRSS — it seems probable that TDRS east will offer transatlantic service via its ex-Advanced-Westar transponders.

August 1982

Some personal developments: an explanation of why my planned US immigration failed to materialize.

September 1982

Anik C: changes in the program, to offer early-entry DBS capability to the USA. Review of Mexican and Argentine transponder usage on Intelsat.

November 1982

Annual update of the geostationary satellites chart.

December 1982

Ku-Band reception techniques reviewed: block schematics, Konishi LNC, offset paraboloid antenna.

January 1983

The inclined geosynchronous orbit: the nature and magnitude of the declination tracking required to access satellites having no north/south stationkeeping (e.g. Symphonie, Gorizont). Intelsat lease updates.

February 1983

Microcomputer program for antenna pointing: Basic listing for Sinclair ZX81 (Timex ZX-1000) to print out el/az and HA/Dec look angles and slant range to all visible satellites from a specified location.

March 1983

Subreflector antennas: they are not all Cassegrainian. Comparison of splash-plate backfire designs with classical Cassegrain and Gregorian geometries; graphical design of Cassegrain subreflector.

May 1983

Introducing Satellite TV Antenna Systems Ltd. Demonstration for the BBC in London. Visit to the STTI show at Las Vegas.

The Editorial and Art Staff of CATJ wish to extend our appreciation to Steve Birkill for his meticulous efforts and dedication to his monthly presentations in our magazine. We look forward to his occasional offerings as his busy schedule permits; the CATJ door is always open to Steve Birkill and you can expect to see more of him in our book. We couldn't let this opportunity go by without publicly extending our gratitude and high regard for this most unusual and talented technologist. Mr. Birkill has added much to all the readers and his influence is keenly recognized. We thank him for his work on our behalf and look forward to seeing his material in the future and wish him the best of success in his new venture.

June 1983

Europe: methods of TV program delivery for the new European cable markets. OTS, ECS, Intelsat V spot beams, TDRS C-Band payload as a transatlantic system.

July 1983

More tutorial: Relation between noise figure and noise temperature. Noise figures of cascaded networks.

August 1983

Readers' technical queries answered: propagation disturbances at 4 GHz.

September 1983

Readers' technical queries answered: 2-degree spacing, small antenna/LNA trade-offs, prediction of sun outage.

November 1983

Annual update of geostationary satellites chart.

December 1983

CAST-83: Review of major UK satellite and cable exhibition. Provision of the live satellite feeds.

January 1984

European Cable TV distribution: 2 channels per transponder? Penalties of half-transponder working. The potential for an immediate medium-power DBS service for Europe, at a fraction of the cost of the WARC-77 high-power systems.

February 1984

All the listed material may be accessed via CATJ's classified indexed Volume series.

It is time for a change. Increasingly I am asked to contribute to other publications. The various demands on my time continue to mount, and regrettably the pressure of work now prevents me from continuing with a monthly column for CATJ. I believe I have a loyal following among this journal's readers, though I am sure there are other contributors to CATJ at least as well qualified as myself to cover satellite-related topics of relevance to CATV.

I intend in future to submit occasional items for publication here, perhaps two, three, or four times per year, though no regular schedule will be followed. I hope CATJ's full-time editorial staff will judge them worthy of inclusion. My thanks to CATJ for putting up with my presence for over five years. □

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Detection and Correction

SIGNAL LEAKAGE LOG

This Signal Leakage Log satisfies the requirements of the FCC Rules and Regulations, Part 76, Subpart K, Paragraph 76.610(d). Although the log is intended for recording cable television signal leakages in the Aeronautical frequency bands (108-136 MHz and 225-400 MHz), it may be used by cable system operators to record all system signal leaks and insure an effective on-going signal leakage detection and correction program.

When using this log for recording signal leakage in the Aeronautical Frequency Bands, the log sheet must remain in the file for a minimum of two years.

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CATJ
4209 N.W. 23rd, Suite 106
Okla. City, Okla. 73107

LETTERS

Ms. Celeste Rule Nelson
Managing Editor
CATA/CATJ

4209 N.W. 23rd,
Suite 106
Oklahoma City, OK 73107

Dear Ms. Nelson:

I am writing in response to the "catatorial" in the October 1983 issue of **CATJ** which chronicled the development of Pennsylvania Educational Communications Systems or PECS. The system was described as the largest microwave interconnect system in the world, linking 27 cable systems in the two way mode, servicing over 500,000 subscribers. The article extols the efforts of the Pennsylvania cable industry for building the physical system and Penn State University for committing its resources to programming.

It goes on to stress the fact that the network was a cooperative effort between private enterprises and cable TV operators and did not involve government in any way, shape or form. It terms remarkable the fact that government funds were not used to build the network nor were franchise or other government requirements the motivating force behind completion of the system. The most disturbing part was your statement ". . . it should also come as no surprise that the consensus is that government could have never accomplished through regulation what is now a reality." Perhaps this is true in Pennsylvania.

New Jersey also has a CATV interconnect, the Cable Television Network ("CTN") which interconnects 27 systems by microwave and hardwire feeds. The single channel reaches over 900,000 subscribers in approximately 450 municipalities with systems still being added. The CTN concept was born out of one individual's desire to create a television identity for New Jersey. That individual is John P. Cleary, Director of the New Jersey Office of Cable Television ("OCTV"). Having worked in the broadcast industry for over 30 years, Mr. Cleary was appointed as Director of the OCTV in 1973. It did not take him long to recognize cable television's potential for accommodating the viewing interests and needs of New Jersey residents. The State lacked a commercial VHF TV station and received inadequate coverage from the New York and Philadelphia markets.

In 1976, Mr. Cleary began to give serious consideration to a CATV interconnect. By 1978 it became obvious from the franchise activity that cable television was going to expand at an unprecedented rate in New Jersey and thus the interconnect began to gel.

Under Cleary's direction, it was the State Government which applied for and received a NTIA grant in excess of $350,000.00 to conduct a feasibility survey and finance partial construction of a statewide interconnect. The OCTV also made application for and received the requisite microwave permits from the Federal Communication Commission. However, the grant award was contingent on matching funds and funding was scarce. As an alternative, Mr. Cleary **convinced** the cable industry to take over the entire project with the provision that 25% of the air time could be used for commercial broadcasts, leaving 75% dedicated to educational and community service needs.

There is no evidence to indicate that the industry would have developed such a project on its own. Conversely the Cable Television Network became a reality primarily because of the efforts of the Office of Cable Television and it's Director, John P. Cleary. There were a few dedicated cable operators who worked hard on the project once it was turned over to the industry. Nonetheless, the government accomplished through innovation and perseverance what is now a reality.

New Jersey led the nation in cable growth and development for a number of years and is still considered a national forerunner. Many multiple system operators were attracted to the State because of its' innovative and healthy regulatory policies. Again, it was the government which created this unique regulatory environment that successfully fostered the growth of cable television in this State.

Very truly yours,

James P. Guiliano,
Supervising Operation Analyst

P.S. The Cable Television Network now carries programming 24-hours a day.

Mr. Peter Athanas
President
Community Antenna Television Association, Inc.

4209 N.W. 23rd Street
Oklahoma City, Oklahoma 73107

Dear Pete . . .

I have just returned to my office after an absence of some weeks; and I am now getting caught up with my accumulated correspondence and reading of trade journals and the like, including (very happily) the October, 1983 issue of **CATJ.**

I want to thank you for your kind remarks relating to the PECS/PENNARAMA project, as well as your own personal sentiment expressed for Joe Gans and me.

We are very proud of our project and are looking forward eagerly to rendering the informational and educational services to the people of this Commonwealth. This could not have been possible without the cooperation of fellow cable system operators in Pennsylvania; and their response to the challenge has been heartwarming . . . to say the very least!!!

My very sincere appreciation and kindest regards.

Cordially yours,

George J. Barco, President □

Showcase

BLONDER-TONGUE INTRODUCES NEW HETERODYNE MODULATOR

Blonder-Tongue Laboratories has announced the availability of its new ESHM (Stock No. 5928) audio/video modulator. The ESHM is an all solid-state heterodyne unit that generates modulated visual and aural RF carrier output on any single VHF, Midband or Superband channel for use in a CATV, SMATV or Private Cable system. The

ESHM requires only standard baseband video and audio inputs. It also has excellent modulation qualities for use with character generators.

The heterodyne conversion system provides superior vestigial sideband selectivity for use in adjacent channel color systems. The modulator uses a SAW filter to provide flat group delay and maintenance-free bandpass characteristics.

The ESHM has a removable converter module (slide-out drawer), which permits qualified service personnel to quickly and easily change channels in the field without opening the modulator housing or removing the entire modulator from the headend rack.

A combined IF loop-thru accommodates the use of an alternate source of combined IF, as well as IF scrambling equipment for PTV. Separate aural and visual IF loop-thrus, available as an option, can be provided for the ESHM in order to use alternate scrambling systems.

The ESHM accepts standard NTSC signals (Sync negative, 0.5-2.5 p-p) from video sources such as a satellite receiver, video tape recorder, TV demodulator, or TV camera. All level controls and modulation indicators are located on the front panel for ease of operation, and all connectors are at the rear for easy interconnection.

Blonder-Tongue Laboratories, Inc. is a leader in the design and manufacture of a complete line of high quality signal processing products for reception enhancement of MATV, CATV, TVRO Earth Station, and home television systems; and encoding and decoding equipment for (STV) Subscription Television and (LPTV) Low Power Television systems. For more information, contact Blonder-Tongue at One Jake Brown Road, Old Bridge, N.J. 08857, or call (201) 679-4000. •

WGN SLATES 100 MOVIES AND 23 BASKETBALL GAMES FOR FEBRUARY

A February schedule of 100 movies and 23 basketball games was announced today by WGN, the Chicago Super-Channel.

Headlining the lineup is the WGN Movie of the Month, "Which Way Is Up?" starring Richard Pryor and Lonette McKee. The 1977 film is an outlandish comedy that tells the story of an orange picker who accidently becomes a union hero.

Also slated by the Chicago Super-Channel are "A Case of Rape" starring Elizabeth Montgomery and Ronnie Cox, "Bullitt" with Steve McQueen, "Hunters Are For Killing" starring Burt Reynolds, the classic crime adventure "Bonnie and Clyde" featuring Warren Beatty and Faye Dunaway, and "Firepower" with Sophia Loren.

In addition WGN will air "Hawaii" starring Julie Andrews and Max Von Sydow, "The Eyes of Laura Mars," with Faye Dunaway and "The Howling" starring Dee Wallace and Patrick Macnee.

A February schedule of 23 college and professional basketball games includes five double headers and two triple headers.

Double headers include February 1 matchups between Purdue-Northwestern and Fordam-Notre Dame; February 11 games with Wisconsin-Indiana and Michigan State-Michigan; February 18 matchups of Ohio State-Iowa and Indiana-Northwestern, and February 22 battles between Dayton-DePaul and Michigan State-Ohio State.

Triple headers will be aired on February 15 (Loyola-DePaul; Minnesota-Wisconsin; Pittsburgh-Notre Dame) and February 25 (Marquette-Notre Dame; Illinois-Purdue; Iowa-Minnesota).

WGN, the Chicago SuperChannel is a satellite service of **United Video, Inc.** Other UVI services include WFMT, fine arts stereo, the Electronic Program Guide (the EPG), Seeburg Music, Moody Bible Network, Satellite Music Network and Zephyr Weather Transmission Service. For more information, contact United Video at 1-800-331-4806. •

Schedule of Jerrold Technical Seminars - 1984

Jan. 10-12	Anaheim, CA	July 10-12	Williamsport, PA
Feb. 14-16	Orlando, FL	Aug. 21-23	Denver, CO
March 20-22	Chicago, IL	Sept. 18-20	Atlanta, GA
April 10-12	Dallas, TX	Oct. 16-18	Columbus, OH
May 8-10	Boston, MA	Nov. 13-15	Spokane, WA
June 19-21	Kansas City, MO	Dec. 4-6	Philadelphia, PA

For information, contact: Kathy Stangl, (215) 674-4800 x357. •

Anyone intending to cover the 1984 Political Conventions in Dallas, TX or San Francisco, CA and plans to use RF transmitters and/or wireless microphones of any type, power or frequency is requested to contact the Chairman of the Frequency Coordinating Committee:

Mr. Richard Harvey
CBS Inc.
555 West 57 Street
New York, NY 10019 •

RMS ADDS TO MANUFACTURING FACILITIES

RMS Electronics, Inc. announced today the purchase of a 51,000 square foot building in Hoboken, New Jersey. This new facility will provide the additional space required at this time for the company's fast-growing ferro-resonant manufacturing subsidiary, Kenyon Magnetics. Kenyon Magnetics manufactures ferro-resonant transformers for the company's Power-King™ Power Supply Division. Kenyon's expanding field of products includes ignition transformers for the heating industry as well as some very highly sophisticated custom magnetic components for military and commercial telephone applications. Management at RMS also indicated that a substantial portion of the new plant facility will be used as a warehousing outlet for Poleline Corporation, its distributor operation. The New Jersey facility will be the third warehousing outlet for Poleline Corporation, with several others planned in the not too distant future.

BROADBAND ENGINEERING INTRODUCES VRA-200 RACK-MOUNTABLE RETURN AMPLIFIER

Jupiter, Fl. — Broadband Engineering introduces the VRA-200, a rack-mountable return amplifier for two-way CATV and data networking systems. It is designed for use with the firm's new forward headend amplifier (VFA-450), eliminating the need for an outdoor trunk amplifier in the headend.

With a bandwidth of 5-200 MHz, the VRA-200 is available in gains ranging from 20 to 40 dB. It uses the latest push-pull gold-metallized hybrids. The unit has input and output 20dB down test points and can accept an equalizer or low pass filter at either input or output.

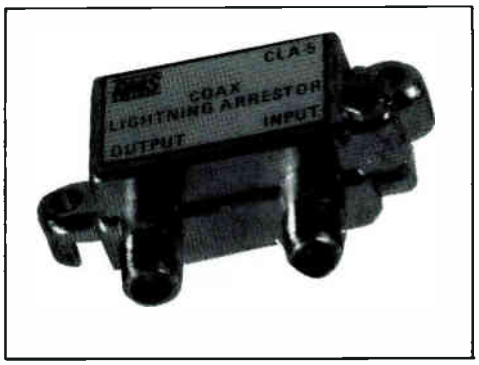
The VRA-200 also features tilt and gain controls and three levels of surge protection. It is powered by 120VAC, with standby DC-powering capability.

A subsidiary of Augat Inc. of Mansfield, Massachusetts, Broadband also manufactures house-drop, apartment and trunk amplifiers for CATV distribution systems. The firm is a leading manufacturer of replacement electronics and is the CATV industry's largest independent supplier of replacement components.

For more information, contact Broadband Engineering, at P.O. Box 1247, Jupiter, Florida, 33458, or call (305) 747-5000.

RMS ANNOUNCES COAXIAL CABLE LIGHTNING ARRESTOR

RMS Electronics, Inc., CATV Division, proudly introduces a new product . . . COAXIAL CABLE LIGHTNING ARRESTOR, Model #CLA-5. The #CLA-5 has a 1000 Volt capacitor and built-in ground block. It is designed to provide protection from lightning and electrical surges that may easily damage expensive home video equipment, as well as resist power surges that can upset equipment. The #CLA-5 will work on all VHF/UHF Systems including Outdoor Antennas, Master Antennas, Cable TV, etc. and accepts RG59/U or RG6/U Cable fitted with "F" connectors. The Coaxial Cable Lightning Arrestor is die-cast with gold anodized plating; its dimensions are 2 1/2" L. x 1 5/8" H. x 3/4" D. The unit has a protective finish so that it may be installed indoors or outdoors. A special screw is preattached to the unit for grounding.



RMS COAXIAL CABLE LIGHTNING ARRESTOR

For more information, contact RMS at 50 Antin Place, Bronx, New York, 10462 or call (212) 892-1000. •

COMSEARCH APPLIED TECHNOLOGY ANNOUNCES NEW TESTING LABORATORY

Comsearch Applied Technology, Inc. (CAT), announces the opening of its new research and testing laboratory in Herndon, Virginia. The laboratory is equipped with the latest state-of-the-art computer controlled test equipment and is providing testing services for Electromagnetic Compatibility (EMC) and Electromagnetic Interference (EMI) applications. CAT specializes in testing radio frequency equipments such as TV and computing devices, industrial heaters, medical equipments, telephone network terminal equipments, and land mobile equipments. Testing may be performed to FCC Regulations such as Parts 15, 18, 68 and 90. In addition, CAT tests military equipment to the various military standards for EMC and EMI and can perform TEMPEST certification testing.

Along with the laboratory operation, CAT operates three fully equipped vehicles for field electromagnetic measurements. These include electromagnetic site surveys, radiation hazard and specialized interference measurements to enable our technical staff to develop corrective actions for existing problems. A mast is included in the mobile equipment which allows measurements up to a height of 50 feet. Temporary test towers up to 200 feet can be erected.

"The response by industry and the government to our laboratory capability has been most gratifying", says Les Polisky, President of CAT. "It is our intention to provide the best technical services in a timely manner at competitive prices".

CAT is a subsidiary of Comsearch, Inc. based in Reston, Virginia. Comsearch, Inc. offers a wide range of professional engineering services for communications systems, and also has an office in Richardson, Texas to provide nationwide services for terrestrial microwave point-to-point systems.

For more information, contact:

Jack J. Crenca
Vice President
Comsearch Applied Technology
(703) 620-6300 •

Showcase

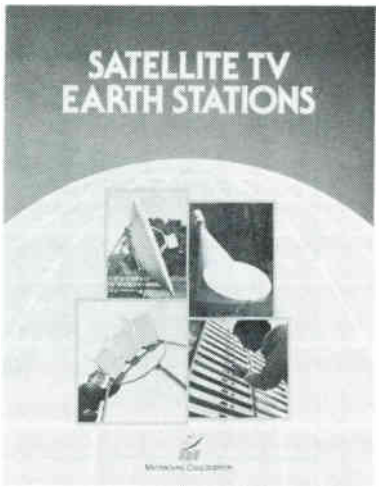
NEW MICRODYNE BROCHURE DESCRIBES COMPLETE LINE OF TVRO EARTH STATION EQUIPMENT

A new six-page, three-color brochure describing Microdyne's complete line of TVRO earth station equipment is now available.

The brochure features simplified block diagrams showing the components required for a typical TVRO earth station using either a Low Noise Amplifier (LNA) or Low Noise amplifier/ Converter (LNC) system.

Along with the block diagrams are photos and descriptive information about each piece of equipment, which includes antennas, a multiple satellite feed system, receivers, block downconverters, modulators and an audio subcarrier demodulator.

A free copy of the brochure may be obtained by writing on company letterhead to: TVRO Brochure, Microdyne Corporation, P.O. Box 7213, Ocala, FL 32672. •



C-COR INTRODUCES CABLEPORT 7100 SERIES DATA PRODUCTS

Beaverton, OR — (January 4, 1984)— C-COR Electronics, Inc. of State College, PA, has extended its line of CablePort (TM) 7100 Series Narrowband Modems for two-way broadband coaxial network applications with the introduction of the Model 7140 Synchronous Data Modem. According to Clifford B. Schrock, President of C-COR Electronics' Data Products subsidiary, Beaverton, OR, the firm expects to begin production of the Model 7140 in January '84, and will ship a block converter (frequency translator) shortly thereafter.

The CablePort (TM) 7100 Series of low-cost, high-performance "narrowband" modems provides point-to-point and multi-drop capabilities. The synchronous modem complements two models in the CablePort (TM) line which are already in production.

The Model 7120 Voice Modem offers audio response up to 10kHz for music and off-premises extension and by-pass telephone applications. The Model 7130 Asynchronous Data Modem provides medium-speed data transmission up to 19.2 kB/second. The Model 7140 operates at speeds up to 9.6 kB/second. All operate in Simplex, Half-Duplex and Full-Duplex modes.

Design attributes of the 7100 Series include high spectral efficiency with 25 kHz channel spacing for increased capacity in most applications, excellent operation on systems with marginal C/N figures, and a wide frequency range to accommodate sub-split, mid-split, and high-split system configurations. The units feature modular construction to enhance availability and service.

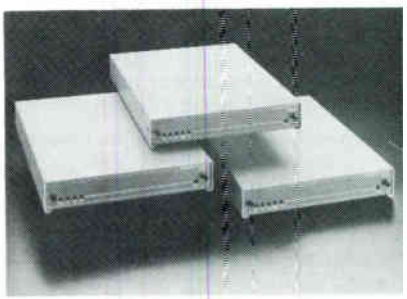
They are attractively styled for office environments and can be readily adapted for rack-mounting.

C-COR says its CablePort (TM) 7100 Series represents a price breakthrough in the broadband data products market. Single-unit prices are $675.00 for the 7120 Voice Modem and $625.00 for the 7130 Asynchronous Modem. The 7140 Synchronous Data Modem is priced at $650.00. Quantity discounts are available.

In addition to its 7100 Series of data products, C-COR's Data Products subsidiary has in the development stage a low-cost networking system to serve the home computer and small office environment, as well as a computer-controlled integrated CCTV system for shared-channel remote control of video cameras in surveillance and monitoring applications.

C-COR also manufactures a broad range of distribution and monitoring equipment and provides engineering services for cable television, data transmission and institutional cable systems.

CABLEPORT 7100 SERIES DATA PRODUCTS



For more information and literature about C-COR data products, contact Rod Cozort, Sales Manager-Data Products at 8285 SW Nimbus Ave., Suite 131, Beaverton, OR 97005, 503/644-0551 or call C-COR headquarters toll-free 1-800-233-CCOR — in PA call 814-238-2461. •

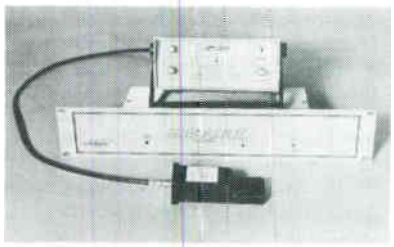
COMSONICS INTRODUCES SNIFFER II DETECTOR

A modified and improved version of the widely acclaimed SNIFFER signal leakage testing device was introduced by **ComSonics, Inc.**

Dubbed the SNIFFER II, the unit offers seven new features which, ComSonics said, makes it the best, most cost-effective detector on the market today.

SNIFFER II has an updated transmitter design for easy rack mounting. All cables exit the rear of the housing.

It is the only unit of its kind that will accept a complete battery charge while attached to a vehicle's electrical system.



Another new feature is variable level squelch which allows level adjustment from .06 to 20 microvolts. This feature can be used alone or in conjunction with the tone muting.

SNIFFER II also has a variable RF level on the transmitter for adjustment to plus or minus 5 dB. Improved transmitter shielding has integrity in excess of 100 dB.

For more information, contact ComSonics, Inc., P.O. Box 1106, Harrisonburg, VA 22801. Or, call toll-free: 1-800-336-9681. •

Distributors	Manufacturers	Service Firms
D1—Full CATV equipment line	M1—Full CATV equipment line	S1—CATV contracting
D2—CATV antennas	M2—CATV antennas	S2—CATV construction
D3—CATV cable	M3—CATV cable	S3—CATV financing
D4—CATV amplifiers	M4—CATV amplifiers	S4—CATV software
D5—CATV passives	M5—CATV passives	S5—CATV billing services
D6—CATV hardware	M6—CATV hardware	S6—CATV publishing
D7—CATV connectors	M7—CATV connectors	S7—CATV drop installation
D8—CATV test equipment	M8—CATV test equipment	S8—CATV engineering
D9—Other	M9—Other	S9—Other

Associate Roster

Note: Associates listed with * are Charter Members.

Alpha Technologies,
1305 Fraser St. D-G,
Bellingham, WA 98225
206—671-7703
(M9, Standby Power Supplies)

AMCOM, Inc.,
Bldg. E, Suite 200,
5775 Peachtree-Dunwoody Rd., N.E.,
Atlanta, GA 30342
404—256-0228
(S9, Brokering & Consulting)

* **Anixter Communications**
4711 Golf Road,
Skokie, IL 60076
312—677-2600
(D1)

Apple/Store
Rte. #1, Box 156,
Beaver Dam, WI 53916
414—885-6249

The Associated Press,
50 Rockfeller Plaza,
New York, NY 10020
212—621-1513
(S9 Automated News SVC)

Automation Techniques,
1550 N. 105th E. Ave.
Tulsa, OK 74116
918—836-2584
(M9)

Avantek, Inc.,
481 Cottonwood Dr.,
Milpitas, CA 95035
408—946-3080
(M8, 9 TVRO Components)

Av-Tek, Inc.,
Box 188,
Aurora, NE 68818
402—694-5201
(M8)

BEI
P.O. Box 937,
Olathe, KS 66061
800—255-6226
(M9 Character Generators)

Ben Hughes Communications
P.O. Box AS,
Old Saybrook, CT 06475
203—388-3559
(M6, 9)

Blonder-Tongue Labs, Inc.,
1 Jake Brown Rd.,
Old Bridge, NJ 08857
201—679-4000
(M1, 2, 4, 5)

Broadband Engineering, Inc.,
P.O. Box 1247,
Jupiter, FL 33458
1-800—327-6690
(D9, M4, S9)

Budco, Inc.,
4910 East Admiral Place,
Tulsa, OK 74115
1-800—331-2246
(D9, Security & Identification Devices)

CATEL,
4800 Patrick Henry Dr.,
Santa Clara, CA 95054
408—988-7722

* **C-COR Electronics, Inc.,**
60 Decibel Rd.,
State College, PA 16801
814—238-2461
(M1, 4, 5, S1, 2, 8)

CCS Cable
P.O. Box 14710,
Phoenix, AZ 85063
602—272-6855
(M3)

CableBus Systems,
7869 S.W.
Nimbus Avenue,
Beaverton, OR 97005
503—543-3329
(M1)

Cable Graphic Sciences,
7095 N. Clovis Ave.,
Clovis, CA 93612
209—297-0508
(M9 Character Generators)

Cable Health Network,
1950 Spectrum Circle
Suite B-310
Marietta, GA 30067
404—952-4620
(S4)

Cable-Text Instruments,
Div. of Telpar, Inc.
P.O. Box 796
Addison, TX 75001
214—233-6631
(M9 Generators)

Capscan, Inc.
P.O. Box 36,
Adelphia, NJ 07710
1-800—CABLETV or 222-5388
(M1, 3, 4, 5)

Comm/Scope Company,
P.O. Box 1729
Hickory, NC 28603
1-800—438-3331
(M3)

Communications Equity Associates,
851 Lincoln Center,
5401 W. Kennedy Blvd.,
Tampa, FL 33609
813—877-8844
(S3)

Comprehensive Cable Enterprises
206 Westminster Ct.
Madison, WI 53714
608—249-3442
(S1, 2, 4, 5, 7, 8, 9)

Computer Video Systems, Inc.,
3678 W. 2105 S. Unit 2,
Salt Lake City, UT 84120
1-800—453-8822
(M9)

COMSEARCH INC.,
11503 Sunrise Valley Drive,
Reston, VA 22091
703—620-6300
(S8, S9, Earth station placement frequency coordination)

ComSonics, Inc.,
P.O. Box 1106,
Harrisonburg, VA 22801
1-800—336-9681
(M8, 9, S8, 9)

DF Countryman Co.,
1821 University Ave.,
St. Paul, MN 55104
612—645-9153
(D1, S1, 8)

The Disney Channel
500 S. Buena Vista,
Burbank, CA 91521
213—840-5080
(S4)

Ditch Witch,
P.O. Box 66,
Perry, OK 73077
1-800—654-6481
(M9)

The Drop Shop Ltd., Inc.
Box 284,
Roselle, NJ 07203
1-800—526-4100 or
1-800—227-0700 (West)
(D3, 4, 5, 6, 7, 8, 9, M5, 6, 7, 8, 9 Plastics)

Durnell Engineering Inc.,
Hwy 4 So.
Emmetsburg, IA 50536
712—852-2611
(M9)

Associate Roster

Eagle Com-Tronics, Inc.,
4562 Waterhouse Rd.,
Clay, NY 13041
1-800—448-7474
(M9 Pay TV Delivery Systems & Products)

Eastern Microwave, Inc.,
3 Northern Concourse,
P.O. Box 4872,
Syracuse, NY 13221
315—455-5955
(S4)

Electroline TV Equipment, Inc.,
8750-8th Ave.,
St. Michel,
Montreal, Canada
H1Z 2W4
514—725-2471
(M4, 5, 7, 9, D7, 9)

Electron Consulting Associates,
Box 2029,
Grove, OK 74344
918—786-5349
(M2, D1, S1, 8)

Elephant Industries,
P.O. Box 3626
N. Ft. Myers, FL 33903
813—995-7383
(M9)

ESPN,
ESPN Plaza,
Bristol, CT 06010
203—584-8477
(S9)

Franey & Parr of Texas, Inc., (Formerly Doherty & Co.),
One Turtle Creek Village,
Suite 524,
Dallas, TX
214—528-4820
(S9, Insurance)

Gardiner Communications Corp.,
3506 Security St.,
Garland, TX 75042
214—348-4747
(M9 TVRO Packages, S1, 2, 8)

General Cable Corp.,
1 Woodbridge Center,
P.O. Box 700
Woodbridge, NJ 07095
1-800—526-4385
(M3)

Gilbert Engineering Co.,
P.O. Box 23189,
Phoenix, AZ 85063
1-800—528-5567 or
602—245-1050

Group W Satellite Communications,
41 Harbor Plaza Dr.,
P.O. Box 10210,
Stamford, CT 06904
203—965-6219
(S4)

Ind. Co. Cable TV, Inc.,
P.O. Box 3799
Hwy. 167 N,
Batesville, AR 72501
501—793-4174
(D1)

H & R Communications,
Rt. 3, Box 102G,
Pocahontas, AR 72455
1-800—643-0102
(M2, D1, S2, 3, 8)

Harris Corporation,
P.O. Box 1700,
Melbourne, FL 32901
305—724-3401
(M2, 9, S2)

Heller-Oak Communications,
105 W. Adams St.,
Chicago, IL 60603
1-800—621-2139 * 7600
(S3)

Home Box Office, Inc.,
12750 Merit Dr.
Dallas, TX 75251
214—387-8557
(S4)

* **Hughes Microwave Communications Products,**
3060 W. Lomita Blvd.
Torrance, CA 90505
213—517-6233
(M9)

KMP Computer Services, Inc.,
703 Central Ave.,
Los Alamos, NM 87544
505—662-5545
(S4, 5)

Karnath Corporation,
2001 Westridge,
Plano, TX 75075
214—422-7981 or 7055
(S1, 2, 8, 9)

Katek, Inc.,
215 Wood Ave.,
Middlesex, NJ 08846
201—356-8940

Klungness Electronic Supply,
P.O. Box 547,
107 Kent Street,
Iron Mountain, MI 49801
1-800—338-9292
1-800—682-7140 (Mich)
(D1, 8, S2, 8)

* **Jerry Conn Associates, Inc.,**
P.O. Box 444,
Chambersburg, PA 17201
1-800—233-7600
1-800—692-7370 (PA)
(D3, 4, 5, 6, 7, 8)

LRC Electronics, Inc.,
901 South Ave.,
Horseheads, NY 14845
607—739-3844
(M7)

Lash-Ade Company,
P.O. Box 147,
Guntersville, AL 35976
205—582-6333
(M9 Cable Protector, S9 Equipment Repair)

Larson Electronics,
311 S. Locust St.,
Denton, TX 76201
817—387-0002
(M9 Standby Power)

Lemco Tool Corporation,
Box 330A,
Cogan Station, PA 17728
1-800—233-8713
(M8, 9 Tools)

Lindsay America Inc.
P.O. Box 15775
1202 B West 19th St.
Panama City, FL 32405
904—769-2321

Lindsay Specialty Products, Ltd.,
50 Mary Street West,
Lindsay,
Ontario, Canada K9V 4S7
705—324-2196
(M1, 2, 4, 5, 7, 9)

M/A Com Prodelin, Inc.,
P.O. Box 100
Claremont, NC 28610
704—459-9762
(M2, 3, 7, S2)

Magnavox CATV Division,
100 Fairgrounds Drive,
Manlius, NY 13104
1-800—448-5171 or
1-800—522-7464 (N.Y.)
(D4, 5, 7, M4, 5, 6, 7, S3, 8)

McCullough Satellite Equipment,
Route 5, Box 97,
Salem, AR 72576
501—895-3167
(M2, 9, D3, 4, 6, 7)

Microdyne Corporation,
471 Oak Road,
Ocala, FL 32672
904—687-4633
(M9 Satellite TV Receivers)

* **Microwave Filter Co.,**
6743 Kinne St., Box 103,
E. Syracuse, NY 10357
1-800—448-1666
(M9 Bandpass Filter)

Mullen Communications Construction Co., Inc.,
P.O. Box 1387A,
Green Bay, WI 54305
414—468-4649
(S2)

Distributors	Manufacturers	Service Firms
D1—Full CATV equipment line	M1—Full CATV equipment line	S1—CATV contracting
D2—CATV antennas	M2—CATV antennas	S2—CATV construction
D3—CATV cable	M3—CATV cable	S3—CATV financing
D4—CATV amplifiers	M4—CATV amplifiers	S4—CATV software
D5—CATV passives	M5—CATV passives	S5—CATV billing services
D6—CATV hardware	M6—CATV hardware	S6—CATV publishing
D7—CATV connectors	M7—CATV connectors	S7—CATV drop installation
D8—CATV test equipment	M8—CATV test equipment	S8—CATV engineering
D9—Other	M9—Other	S9—Other

Note: Associates listed with * are Charter Members.

National Farmers Union Property & Casualty Co.,
12025 E. 45th Ave.,
Denver, CO 80251
303—371-1760
(D9, Insurance Service)

North Supply Company,
600 Industrial Pkwy.,
Industrial Airport, KS
66031
913—791-7000
(D1, 2, 3, 4, 5, 6, 7, 8)

National Farmers Union Property & Casualty Co.,
12025 E. 45th Ave.,
Denver, CO 80251
303—371-1760
(D9, Insurance Service)

North Supply Company,
600 Industrial Pkwy.,
Industrial Airport, KS
66031
913—791-7000
(D1, 2, 3, 4, 5, 6, 7, 8)

Octagon Scientific, Inc.,
4 Adler Drive,
East Syracuse, NY 13057
315—437-4405
(M9)

Phasecom Corp.,
6365 Arizona Circle,
Los Angeles, CA 90045
213—641-3501
(M1)

Power and Telephone Supply Company, Inc.,
530 Interchange Drive
N.W.,
Atlanta, GA 30336
1-800—241-9996
(D1)

Quality RF Services, Inc.,
825 Park Way, Suite 3,
Jupiter, FL 33458
305—747-4998
(M4, S9)

RMS Electronics,
50 Antin Place,
Bronx, NY 10462
1-800—223-8312
1-800—221-8857 (Poleline)
(M4, 5, 6, 7, 9)

Sadelco, Inc.,
75 West Forest Ave.,
Englewood, NJ 07631
201—569-3323
(M8)

Scientific Atlanta, Inc.,
3845 Pleasantdale Rd.,
Atlanta, GA 30340
404—449-2000
(M1, 2, 4, 8, S1, 2,
3, 8)

Showtime/The Movie Channel, Inc.
1633 Broadway
New York, NY 10019
212—708-1600
(S4)

Satellite Syndicated Systems, Inc.
P.O. Box 470684
Tulsa, OK 74147
918—481-0881
(S9)

Superior Electronics Center,
2010 Pine Terr.,
Sarasota, FL 33581
813—922-1551
(M4, S9)

TVC Supply Co., Inc.,
1746 E. Chocolate Ave.,
Hershey, PA 17033
717—533-4982
(D1, 2, 3, 4, 5, 6, 7, 8)

Teledac, Inc.,
1575 Taschereau Blvd.,
Longueuil,
Quebec, Canada J4K 2X8
514—651-3716
(M9 Character
Generators)

Tele-Wire Supply Corp.,
7 Michael Ave.,
East Farmingdale,
NY 11735
516—293-7788
(D1, 2, 3, 5, 6, 7, 8, 9)

* **Texscan Corp.,**
3102 N. 29th Ave.,
Phoenix, AZ 85017
602—252-5021
(M9 Bandpass Filters)

* **Times Fiber Communications,**
358 Hall Avenue,
Wallingford, CT 06492
1-800—243-6904
(M3)

Tocom, Inc.,
P.O. Box 47066,
Dallas, TX 75247
214—438-7691
(M1, 4, 9 Converters)

* **Toner Cable Equipment, Inc.,**
969 Horsham Rd.,
Horsham, PA 19044
1-800—523-5947
In PA. 1-800—492-2512
also 1-800—523-5947 (PA)
(D2, 3, 4, 5, 6, 7)

Triple Crown Electronics, Inc.,
4560 Fieldgate Dr.,
Mississauga, Ontario,
Canada L4W 3W6
416—629-1111
Telex 06-960-456
(M4, 8)

Turner Broadcasting System,
1050 Techwood Dr.,
Atlanta, GA 30318
404—898-8500

Tyton Corp.,
P.O. Box 23055,
Milwaukee, WI 53223
414—355-1130
(M6, 7)

United Press International,
220 East 42nd St.,
New York, NY 10017
212—682-0400
(S9 Automated News
SVC.)

United Video, Inc.,
3801 South Sheridan Rd.,
Tulsa, OK 74145
1-800—331-4806
(S9)

Viewstar, Inc.,
705 Progress Ave.,
Unit 53,
Scarborough,
Ontario, Canada M1H 2X1
416—439-3170
(M9 Cable Converter)

Vitek Electronics, Inc.,
4 Gladys Court,
Edison, NJ 08817
201—287-3200

Walsh, Walsh, Sweeney & Whitney, S.C.
P.O. Box 1269,
Madison , Wi. 53701
608—257-1491
(S9)

Warner Amex Satellite Entertainment Corporation,
1211 Avenue of the
Americas,
New York, NY 10036
212—944-4250
(S4)

* **Wavetek Indiana,**
5808 Churchman,
Beech Grove, IN 46107
1-800—428-4424
TWIX 810—341-3226
(M8)

Weatherscan,
Loop 132,
Throckmorton Hwy.,
Olney, TX 76374
817—564-5688
(D9, Sony Equip. Dist.,
M9 Weather Channel
Displays)

Western Towers
Box 347,
San Angelo, TX 76901
915—655-6262/653-3363
(M2, 9 Towers)

Winegard Company,
3000 Kirkwood Street,
Burlington, IA 52601
1-800—523-2529
(M1, 2, 3, 4, 5, 7)

Zenith Radio Corp.
1000 N. Milwaukee Ave.
Glenview, IL 60025
312—391-8195
(M1, 6) □

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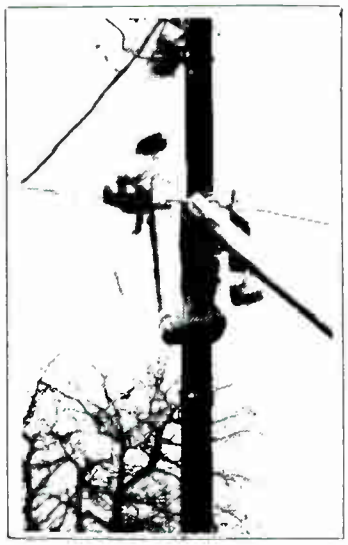

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Okla. City, OK 73107

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