



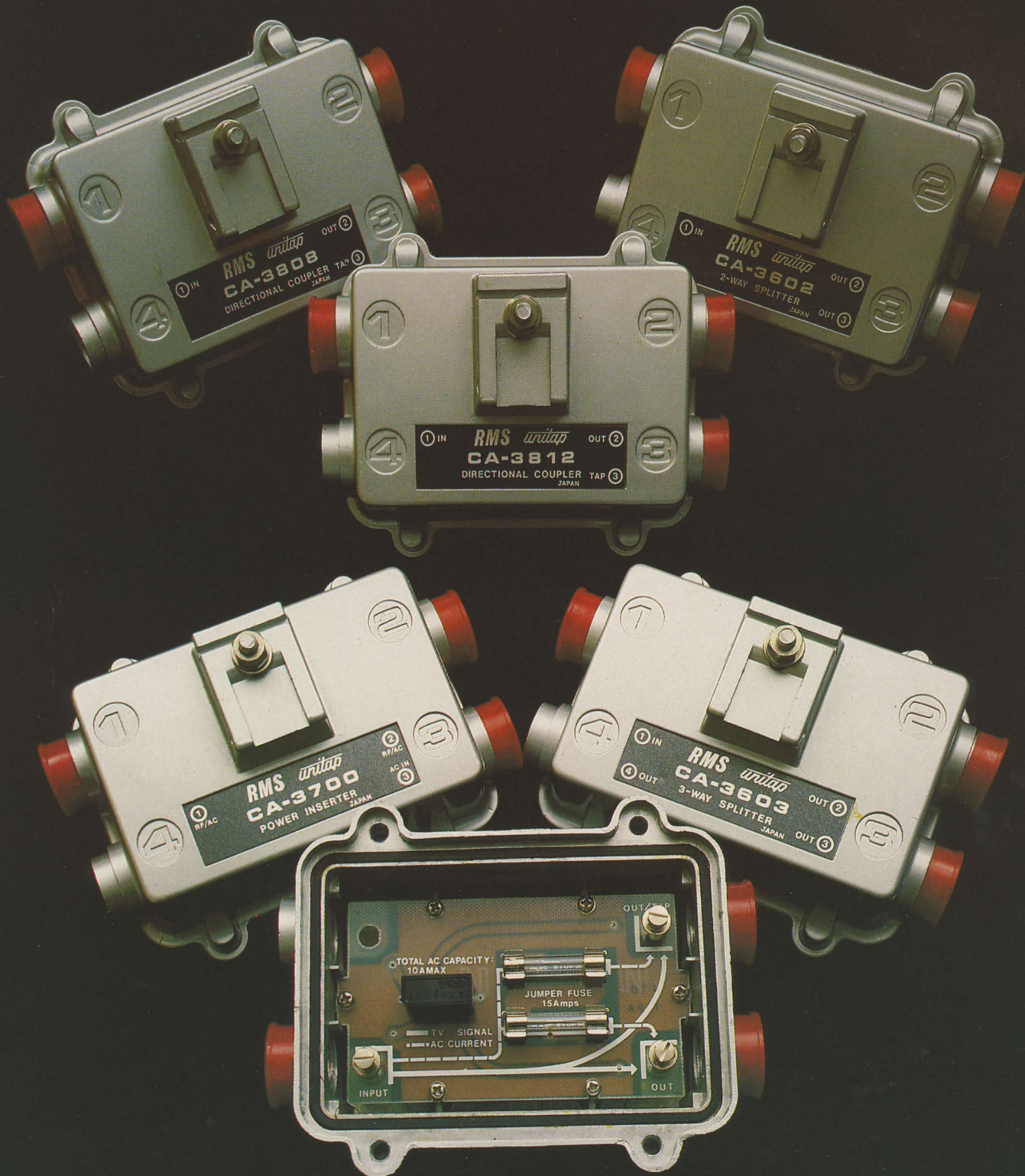
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MAY  
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CATJ



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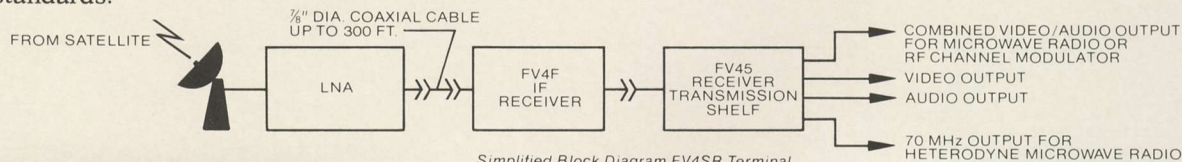
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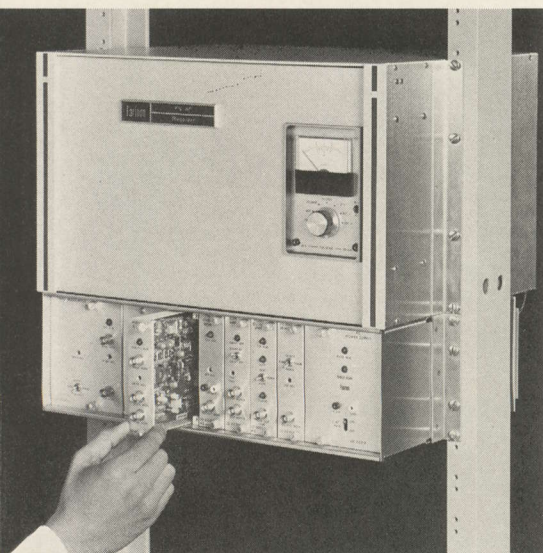
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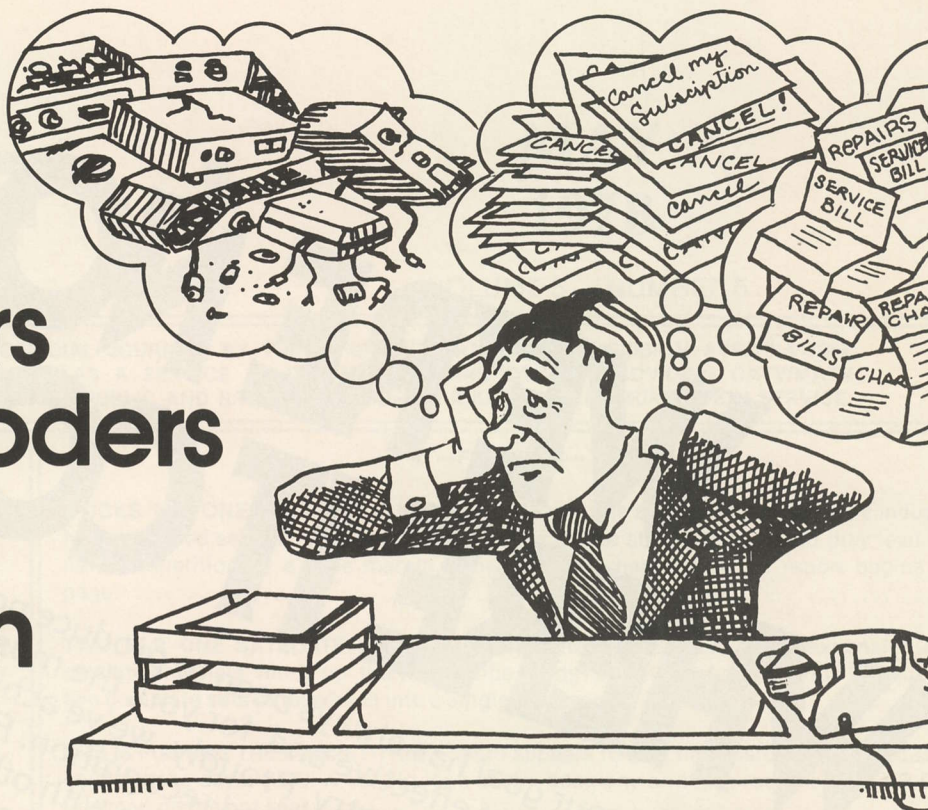
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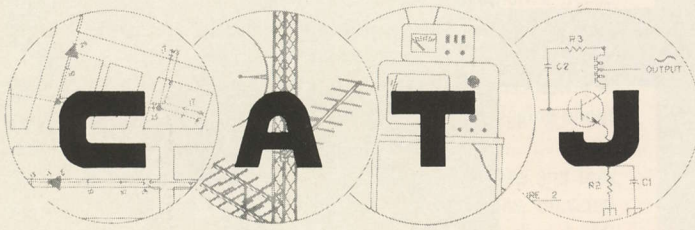
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VOLUME 5 — NUMBER 5

PUBLISHED MONTHLY, AS ITS OFFICIAL JOURNAL, BY THE COMMUNITY ANTENNA TELEVISION ASSOCIATION, INC., OKLAHOMA CITY, OKLAHOMA, AS A SERVICE TO ITS MEMBERS AND OTHERS PROVIDING CATV/MATV SERVICE TO THE TELEVISION VIEWING PUBLIC AND BROADBAND VIDEO/AUDIO DATA COMMUNICATION SERVICE.

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#### —FEATURES—

**STICKS 'N STONES/BUT HBO IS NUMBER ONE**—In one short year the pay-cable industry has multiplied several hundred fold. Home Box Office started it all. . .and they lead the new competition by a wide margin. Where is HBO headed? A full report begins on page. . . . . 20

**TWO FOR ONE SATELLITE VIDEO**—With satellite transponder 'time' expensive and satellite channels 'filling up' the time is ripe for development of a technique to squeeze two complete sets of television into a single transponder. Donald Kirk, Jr. . . . . 32

**RMS IS PUSHING THE COMPETITION**—There appears to be a new 'barometer' of industry health these days; RMS. A candid look at the company and its products with VP Don Edelman on the hot seat . . . . . 44

**CATJ LAB LOOK**—at the TOMCO D-1000 (low cost) demodulator. Now that low-cost microwave is shaking down here's a product to take your off-air signal to baseband for microwave transportation. . . . . 50

**CCOS-78**—The 'other' national gathering is scheduled for July 16-19 with plenty of operational and technical surprises including TVRO terminals down to six feet in size. First (and last) chance to (pre) register . . . . . 67

#### —DEPARTMENTS—

CATA-torial (Kyle D. Moore on REA Funded CATV Systems) . . . . . 6

TECHNICAL TOPICS . . . . . 53

A New 'Threat' To CATV?  
A Capacitor Is A Capacitor  
Noise In Off-Air Signals  
Critical of CATA-torials  
FM For Copyright Measurement Techniques

COOP'S CABLE COLUMN (Smaller Terminals Re-visited) . . . . . 57

SATELLITE TECHNOLOGY NEWS . . . . . 59

THE MOVE? May 31st.  
CATV TVRO Statistics  
F2 To F1 Move Data  
Moving Day Hints  
Adding WESTAR II (with new maps)  
WESTAR and ASN—when and where?  
Motel/Hotel Movies Via The Bird  
Et Tu Ku?  
More On MBS Audio Terminal S/N

CLASSY-CAT ADVERTISING . . . . . 67

Associate's Roster (where to find top notch suppliers) . . . . . 71

Associate's Showcase (new products and services) . . . . . 71

#### —OUR COVER—

**Ten foot TVRO terminals.** With proper system engineering they work and work well. Oklahoma CATV system operators and guests saw a two-day demonstration recently of this CATJ Lab (WF92) portable terminal. It took us about an hour to set it up and display signals and we didn't hurry. Try that with your 4.5 meter or larger terminal! See Coop's Cable Column this issue, page 57.



# CATA "TORIAL

KYLE D. MOORE, President of CATA, Inc.



## REA Funded Rural CATVs?

There is a bill kicking around in the House (HR 10769) which has a number of staff and management people really jumping through the hoop at the Department of Agriculture. It has nothing to do with crop loans or quotas or parity. It has to do with cable television.

**HR 10769** proposes to expand the definition of a REA **telephone** system. The bill is short, and to some people very sweet. It would change the relatively narrow definition of a telephone cooperative that can qualify for a REA loan so that a rather than being a rural **telephone** co-op it could call itself a "rural communications co-op" and qualify for loans to build CATV type systems in certain categories of rural areas.

The whole project has been kicking around for several years; and this year the heat is on. In fact if one talks to the right people in the Department of Agriculture one perceives that there is plenty of pressure on right now to get this bill onto the floor and through the House in very short order.

**HR 10769** has received only a minimum amount of publicity to date. Although the concept of changing the REA (Rural Electrification Association) lending rules to allow the REA to process funds for cable television system construction has been out in front for discussion for at least five years, when this bill came along a strange quiet fell over the Washington scene. Suddenly hardly anyone wants to talk about it. Even to the point of avoiding comment when directly asked about the language **and intent** of the bill. Silence can be golden. . . and it can be deadly. When you are trying to sneak something through without creating much of a stir it is probably golden for the bill sneaker and deadly for those who find out about it after the horse has left the barn.

**REA loans federal money.** The original concept was to make it possible for rural America to have electricity when rural America was too spread out for normal investor owned electric utility companies to wire out into the boonies a mile or ten miles to get a bulb burning in farmer Brown's milking house. REA does not **give** money away; they never have. They simply take federal money and loan it out over a very long pay back period and at very low interest rates. If you take long enough to pay back a loan, and can amortize the cost of a project over a long enough period of time, virtually anything is economically feasible. This country loaned billions to the Russian government during the second world war and they have still not paid it all back. Those billions made it economically feasible for Russia to join us in the war against Hitler. The Russians and farmer Brown's electrified milk house have at least one thing in common; the REA that made the bulb work in the milk house presently allows

the co-op 33 years to pay back the money it borrowed from REA to get electricity to the pump house. World War II was over in 1945 so the Russians have the balance of this year to pay up their debt if they have REA terms.

Of course once electricity got into the boon docks the REA people began to look at other possibilities. Telephones seemed like a good bet and so after a few years of electricity-only the REA loan authority was expanded to include telephone service. Again, if you can take 33 years to pay for something and the interest being charged is only 5 percent it makes one big-big difference as to where you can afford to supply service. If you doubt that, blow the dust off of your CATV cash flow and debt amortization tables and figure out how many homes you would **really need** per mile to make it feasible to provide say 12 channel VHF service with 33 year money at 5%.

There are many good arguments for expanding REA lending authority into "tele-communications". Unfortunately there is alot of blue sky in this practice as well. The 'kind' of people who have been pushing this proposal fall into two camps; the existing telephone and/or electric co-operatives that have their plants basically paid for (and are therefore looking for ways to grow), and, those blue sky characters who believe a coaxial cable into a farmer's home is the basic ingredient required to bring 'civilization' to Farmer Brown. The latter group talk about things we long ago dismissed as impractical for CATV. Services such as 'health care', library inter-connections, emergency assistance, shopping by TV and on and on have simply failed to materialize in the **real** world; although the blue sky people seem to have an endless supply of late 1960 era TVC's around to study for "ideas". It all made great magazine copy in cable's blue-sky days; it makes sick reading today.

**Both groups are pushing hard** in Congress. Both groups want to see federal funds made available for the wiring of rural America for telecommunications. At the moment, perhaps because so few people know either about the bill or the 'rush nature' of its mission in the Department of Agriculture, there are virtually no groups pushing against the bill to prevent its passage.

The bill probably has considerable political overtones. The farmers are anything but happy these days and it is certainly not out of line to **suggest** that if the present administration could point with 'pride' to a new piece of legislation that 'promised to bring big city television and telecommunications to the farmers of America. . .' the present administration might gain a point or two with the unhappy farmers. Besides once the bill is passed, the Administration doesn't have to deliver anything. . . that's up to the co-ops.



The bill is so inexact at this stage it is difficult to fault its particulars. You **might** object to the premise that rural America needs better access to mainstream America communications, but it is difficult to find fault with a bill about which very little is known other than its premise. And it is the fact that very little is known, **or can be ascertained**, that bothers us the most. In our digging about in early April here is what we learned.

- 1) The bill would allow "Cable TV Co-Ops" to be formed and they would qualify for these REA 33 year and 5% loans, provided the primary community to be served had no more than 1,500 residents.
- 2) Or, if there **was** a primary community of more than 1,500 people (say 5,000), and it could be shown that without that primary community there could or would be no 'population center' from which the proposed 'Cable TV Co-op' could 'branch out', then under **special showing** such larger-than-1,500 population primary communities would qualify.

The intent of the legislative change in REA funding procedures is to get television type services into rural America. The top limit of 1,500 people could be argued several ways to Sunday but it is worth noting that most of the present REA funded **telephone co-ops** have fewer than ten telephone service subscribers per telephone cable mile. In fact only 1/8th of the loans are to co-ops with over ten homes per mile as a full plant average. (It may well be that these **1/8th of the loans** make up the **majority** of the loan funds outstanding; REA seems unable to provide us with that data.)

Now as to who would qualify for such loans. It could be:

- 1) **A brand new company** formed strictly to provide cable television type services (that would **not** exclude you as a cable operator as we understand the **intent** of the bill), or,
- 2) **A company already** in the telephone business that wishes to form a CATV operating division, or,
- 3) **A company already** in the electric business that wishes to form a CATV operating company.

As presently proposed it is about as broad as it is long. And the 33 year and 5% carrot has a certain amount of appeal.

As noted, it is difficult to be against a broad premise such as this, especially when as we presently understand the 'intent' of the bill a fellow **could** qualify for a loan without being in the REA telephone or electricity business. If the bill **really** means to allow rural people to create cable-TV-**only** cooperatives to bring cable television services into rural areas, **it might be** the best thing that has ever happened to rural cable. **On the other hand**, if the bill really means to **limit** (either by language or administration of the lending procedures) those loans to **existing operators** of REA telephone or electrical systems (or to firms that agree to provide say telephone and cable TV together in a presently unserved telephone area), then we have quite another proposition.

**Our suggestion is this.** Lots of rurally-interested cable people **need** to **contact** their own representatives in Congress **promptly**. Each cable operator needs to ask his Congressman to obtain for him a copy of both the language of HR 10769 and a copy of the Department of Agriculture 'report' and 'recommendations' on this bill. After you receive this material study it and form your own opinion. If you see any chance of this bill getting through with limitations placed on who can qualify for the loans (limitations that would exclude cable-only-cooperatives standing alone from telephone and/or power cooperatives), then our mission is clear. Most of us can support a bill that brings 33 year loan terms and 5% money to rural cable TV, **provided** these loans do **not** forbid cable only companies from qualifying. **But**, if it turns out this bill is **really** intended to create a **monopoly** for rural telephone or rural electricity companies in the cable area, then the bill must be opposed. You'd better move promptly however. Every sign points at this piece of legislation being well 'greased' and once it starts sliding down the track it may well move with great speed.

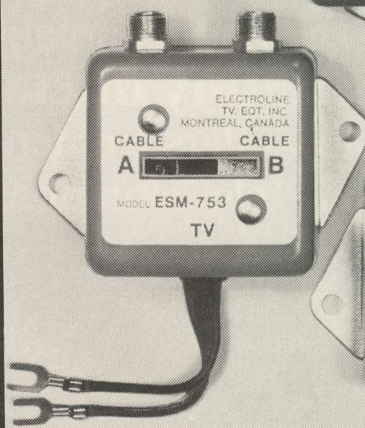
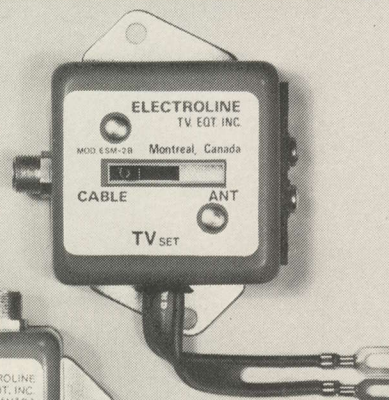
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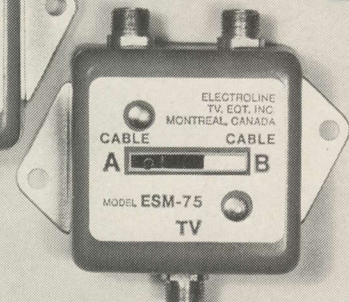
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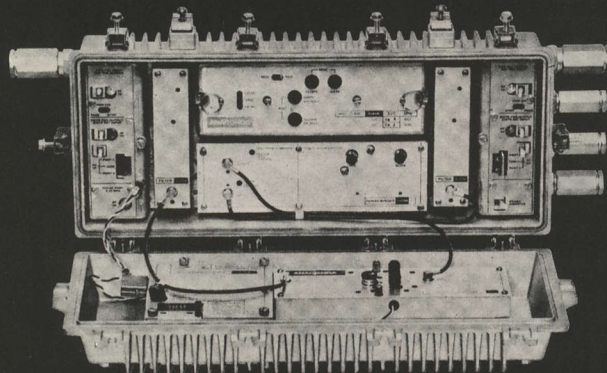
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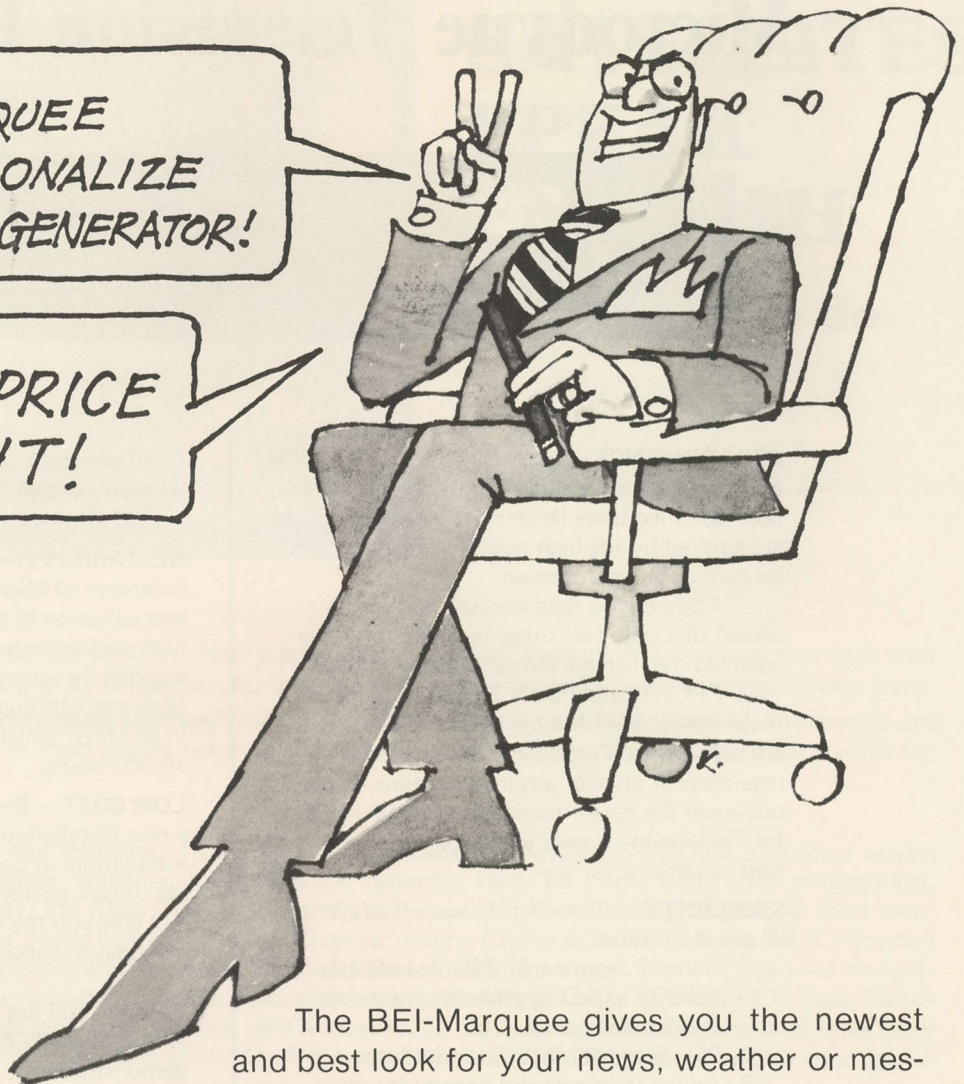
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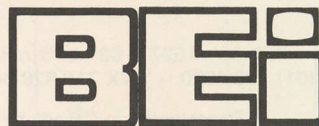
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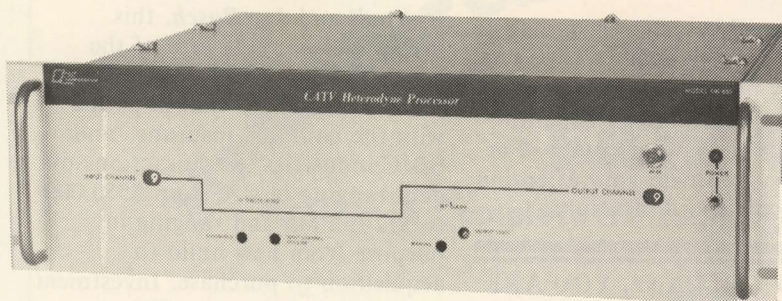
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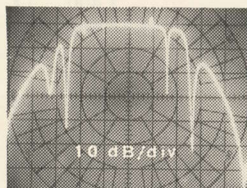
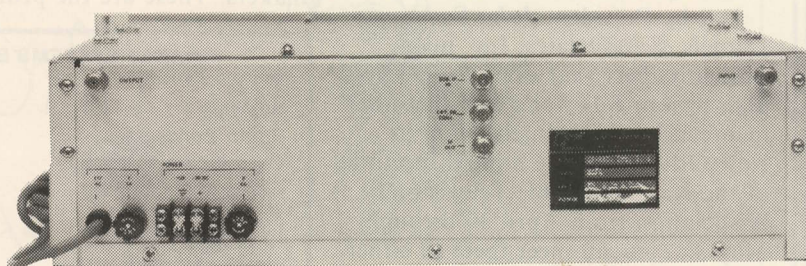
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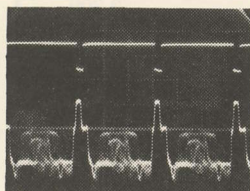
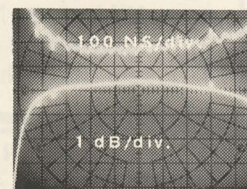
### QB-650 EXTRA'S

- any channel conversion
- no forbidden conversions with UHF converter head
- provisions for non-dup. switching built in at IF.
- standby DC powering standard
- output level safeties, (instant switching with loss of AGC)



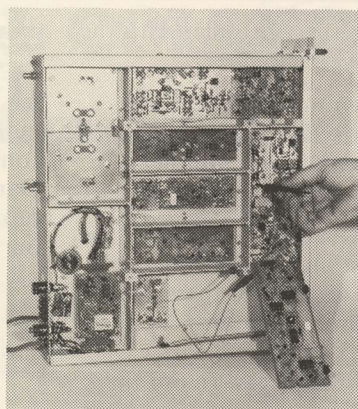
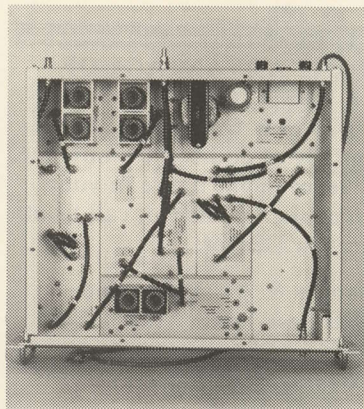
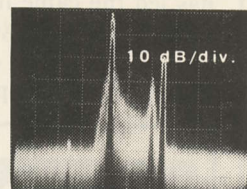
### SPECTRUM CONTROL FOR STUDIO QUALITY PICTURES

- tight adjacent channel filtering
- flat passband
- low delay distortion



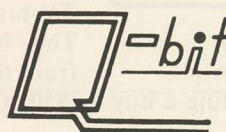
### ABSOLUTE LEVEL CONTROL

- dual AGC system, picture and sound
- noise-immune, sampling-keyed AGC system
- 60 dB composite AGC control



### RELIABLE OPERATION AND SERVICEABILITY

- functional modules with F-fitting interfaces.
- easy module change out, or individual testing
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# ...The Source in Cable TV...

## Daniels & Associates, Inc.

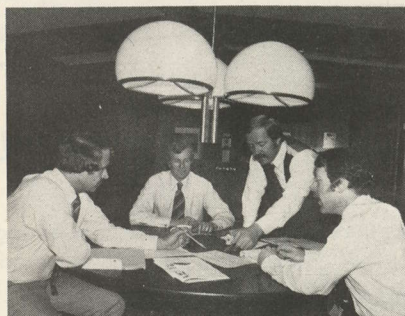
### 20 YEARS AGO, CABLE TV PIONEER *Bill Daniels*

founded the first firm dedicated exclusively to the financial and brokerage end of cable television. Through the years the company has enjoyed a most successful history having consistently led its field as the biggest and best cable TV brokerage firm in America.

Led by President *John Saeman*, Daniels & Associates, Inc. just posted its best year ever. You should plan to join Bill, John and the other members of the Daniels' team in New Orleans for the annual meeting of the National Cable Television Association from April 30 through May 3. You can meet them in either Booth 201 of the Rivergate Convention Center or, during regular Hospitality Suite hours, in room 2735 of the New Orleans Hilton (across the street from the Rivergate, through door #5).

### THE BROKERAGE DIVISION

of Daniels & Associates, Inc. has led the cable industry's statistics since it began. Divided geographically among four dynamic, financially astute professionals, the



Left to right: *Jim DeSorrento, Bob Brown, Bob Holman and Hugh McCulloh.*

United States is continually "searched" for opportunities in cable. The process of handling a buy

or sell of a cable system is a complicated, analytically structured, thoroughly professional undertaking.

But, as in any business situation, the bottom line is what counts. For that reason, we invite your attention to this recent record of results.

**I**N NEW ORLEANS, YOU ARE invited to meet the Match-makers. These are the professionals

\$10 million). Buyers include people new to the industry as well as long-time CATV investors. This experienced team consistently enjoys the highest volume of sales in its field.

### ALSO IN NEW ORLEANS AND OF

interest to cable operators will be the *Investment Services Division* of Daniels & Associates, Inc. Led by *Steve Halstedt* and *Jay Busch*, this investment banking arm of the company placed some \$40 million during a recent 12-month period with the banking, insurance and SBIC industries in transactions of debt ranging in size from \$550,000 to \$12 million and ranging in purpose from new build to acquisition to purchase. Investment Services can help you with any financial questions you may have.

### CABLE SYSTEMS BROKERED BY DANIELS AND ASSOCIATES SINCE JANUARY 1977

Systems	Mi. of Plant	Homes Passed	Subscribers
South Bend, IN	1,000	75,000	30,000
Carrolltown, PA	150	11,000	6,400
Ceres, CA	30	4,000	2,000
Augusta, ME	110	9,400	7,000
Huntington, WV	237	24,000	11,000
Homestead AFB, FL	17	2,900	1,700
Seaside, CA	74	7,100	4,800
Mt. Union, PA	45	2,500	2,400
Bunkie/Oakdale, LA	48	2,800	1,400
Rio Vista, CA	10	1,200	640
Albuquerque, NM	60	5,000	—
Dillon/Mullins, SC	69	4,400	2,150
Cheraw, SC	34	2,400	1,125
Marion, SC	20	1,100	835
Kent-Reverna, OH	140	11,000	2,600
Ithaca, NY	320	17,000	16,500
Newark, NY	100	7,000	3,200
Sun Valley/Ketchum, ID	45	4,500	3,400
Salem/Lisbon, OH	63	7,600	3,500
Franklin/Patterson, LA	99	7,500	4,450
Lake Isabella, CA	100	5,000	3,500
Homestead, FL	65	7,000	1,700
King City, CA	30	3,000	2,000
Coraopolis, PA	98	10,000	4,900
<b>TOTAL</b>	<b>2,964</b>	<b>232,400</b>	<b>117,200</b>

who put together the seller with the qualified buyer:

*Bob Brown* in the West.  
*Hugh McCulloh* in the Midwest.  
*Bob Holman* in the Southeast.  
*Jim DeSorrento* in the Northeast.

Today, Daniels & Associates, Inc. is the biggest and best of the cable TV brokers because of these four. They have brokered transactions from the smallest of systems (\$50,000) to the largest (more than

**T**O TAKE ADVANTAGE OF THE BEST, take a few moments in New Orleans to discuss, confidentially of course, just how the Daniels' team might figure in your future in cable. Or, visit or call us at our offices in Denver:

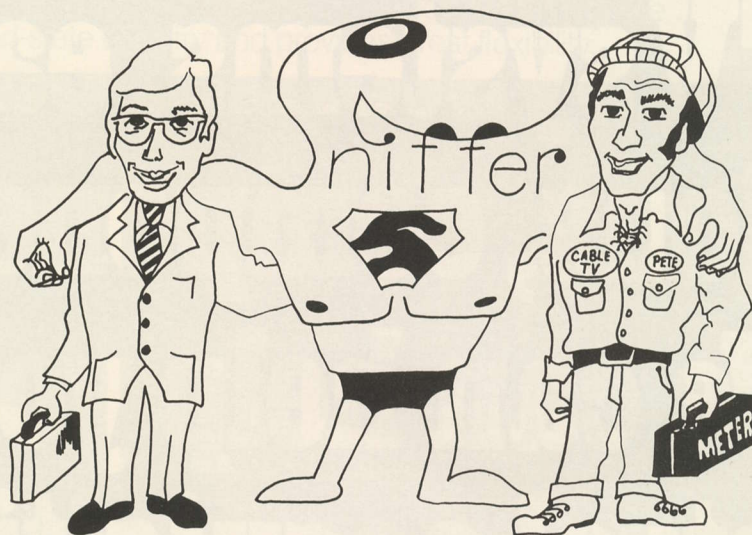
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# Mr.Sniffer Can Be A Mighty Useful

## .. FRIEND ..

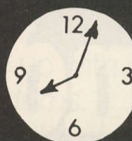
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**We can help you  
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costs and turn a profit.**

**We're Microwave.**



**At Microwave Associates,** we're doing something about one of your prime concerns. CATV system acquisition costs.

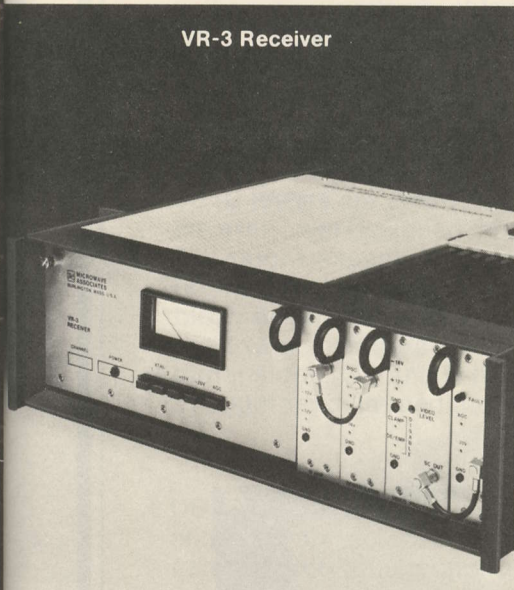
With over 25 years of solid-state microwave technology behind us, we can offer you an unbeatable combination of high quality and low price in CATV equipment and systems. That means a complete, turnkey system or any of the individual components you may need for backup or expansion. You'll find that with a Microwave Associates CATV installation you can count on equipment reliability, low maintenance, and long service life. It's an excellent investment.

How do we give you a price advantage? For example, there's the VR-3 CATV satellite video receiver. This single-channel unit is a genuine bargain at under \$4000.

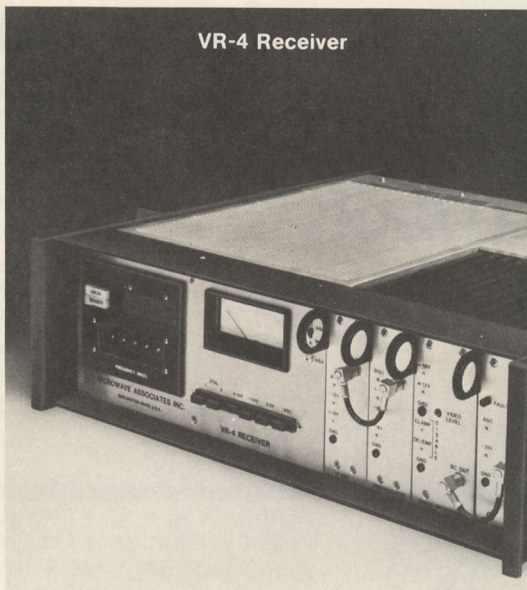
Now we've just introduced the VR-4 all channel satellite receiver that sets a new standard of excellence. At \$6500, you'll find that it has the others beat hands down in performance and versatility.

We also have a new, low cost CARS Band FM microwave system. It's the MA-12X transmit/receive system that incorporates state of the art, field proven, solid-state circuitry and provides great flexibility.

VR-3 Receiver



VR-4 Receiver



MA-12X System



Through innovative design and engineering, we've come up with a quality system that costs *one third the price of similar systems*.

For long-haul relay, the MA-12G and FML systems are the standards of performance in the industry.

Whatever your CATV needs, Microwave Associates can fill them economically . . . from total, custom designed satellite and terrestrial systems to individual components.

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Microwave Associates, Communications Equipment Group, Northwest Industrial Park, Burlington, MA 01803, (617) 272-3100.

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Southwest (214) 234-3522, Rocky Mountain  
(816) 891-8538, Western (408) 733-0222,  
Midwest (612) 831-3920, North Central (617) 358-5054,  
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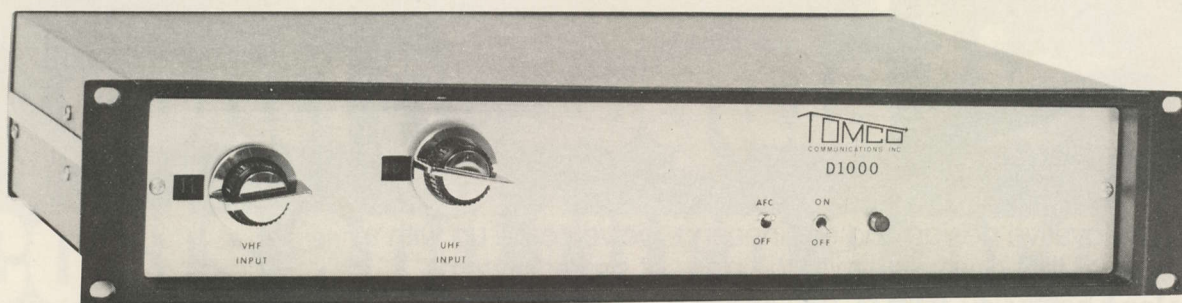
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# **LOW COST DEMODULATOR MODEL D-1000**

**The new TOMCO D-1000 DEMODULATOR was designed with the low cost microwave system in mind. If it's in your mind to save money on an all-channel UHF and VHF demodulator, consider the D-1000.**



## **FEATURES**

- Tunable to any VHF or UHF channel (2 thru 83)
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**There's a word  
for this kind  
of tower.**

# STOUT

Chances are your CATV headend, or microwave site will never experience this kind of adverse weather. But it's good to know that should the forces of nature ever combine to load up your tower with ice and wind, it can take it in stride.

**USTC towers are stout.** Big and beefy. . . perhaps they are even 'over-designed' for the normal kind of loading you might expect. There's a reason. It's called 'ab-normal loading'. The kind you get when big winds blow, or four days of freezing drizzle and fog turns the tower members into two or three times normal dimensions. Or, and it happens, when you get both . . . together or immediately following one another.

USTC builds stout towers, stout VHF log antennas and stout six meter aperture TVRO terminals. Nobody can give you an unconditional guarantee that under any and every abnormal loading condition your tower or antenna structure will stay in place. But if you want the stoutest cost-effective construction in the industry with more than a decade of field-proven performance to back it up. . . you need to talk with the stout folks. That's us. USTC.

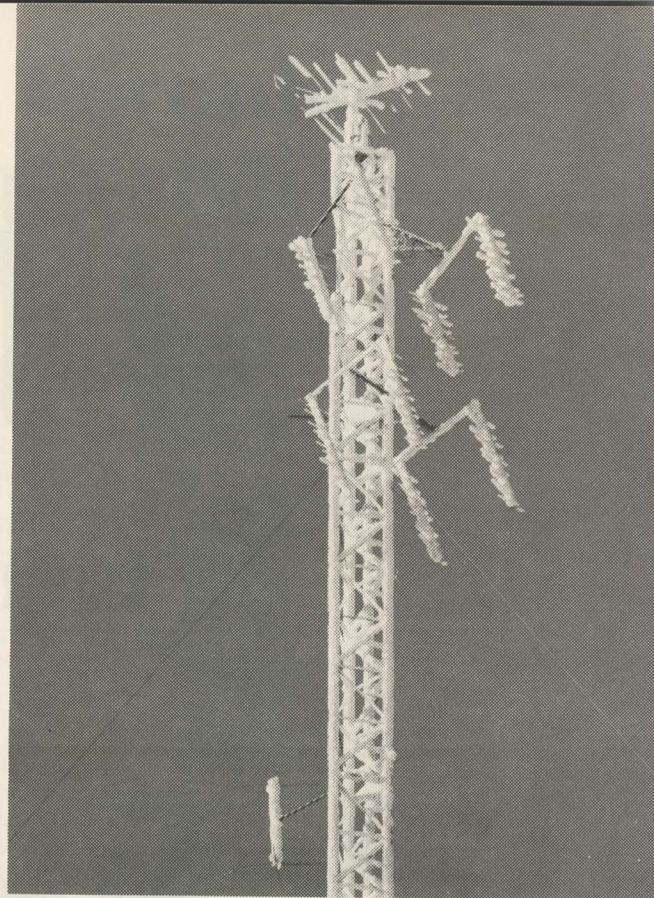
**ATTENDING NCTA NEW ORLEANS?**  
See the USTC SAT/FLECT II TVRO terminal in operation at the AmeriCom Satellite Network (ASN) Booth (#1016) on WESTAR II and meet the USTC gang there!

United States Tower and Fabricating Company not only builds (and installs) towers and antennas that can take it. . . we stand behind every product we produce. And that's one very-stout guarantee.



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P.O. Drawer 'S', Afton, Ok. 74331

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**K. & K. Cable T.V., Corp.**

R.R. #2 • E. 14TH ST. • DEVILS LAKE, N.D. 58301 • (701) 662-2325

January 12, 1978

Mr. Danny Weathers  
U.S. Tower and Fabrication Company  
P.O. Drawer 'S'  
Afton, Oklahoma 74331

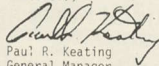
Dear Danny:

Enclosed is a photograph taken of your USTC 400 foot tower installed for us here in Edmore, North Dakota. The photograph was taken on December 20th, two days after a fluke storm had stopped. For about four days we had temperatures in the 20-30 degree F range with a constant fog and drizzle. When the precipitation stopped, we then had winds up to 40 MPH on December 18th and 19th.

I am sure you can see why a person might be worried about how much ice and wind a tower can take. If you will recall, I lost a tower (from another manufacturer) three years ago and I really have no desire to go through that experience again.

Although we experienced some apparent antenna damage, I must say that USTC builds and installs one heck of a tower!!!

Sincerely,



Paul R. Keating  
General Manager  
K. and K. Cable T.V. Corp.







**INVITES YOU TO**

# **UP <sup>LINK</sup> OUR BIRD!!!**

Here's an invitation. Point your TVRO antenna **our way**. Over here at 123.5 degrees west where WESTAR II is located. And plug-in to the 'Great Headend In The Sky'...the AmeriCom Satellite Network!

**Imagine having your headend 22,300 miles above the equator!** Where you can choose any one or all three of the greatest independent TV stations in the nation today. **Take Los Angeles channel 11 (KTTV)**. . .Dodger baseball, tennis and the best of syndicated programs and movies. Or, **take Chicago channel 9 (WGN)**. . .140 Chicago Cub home and away games, Chicago Bulls basketball and the highest rated non-network programs in America today! Or **plug into the 'Big Apple'**. . .**New York City's channel 9 (WOR)** with Mets baseball, Islander and Ranger hockey, soccer and great big-market movies in prime time!

**PLUS**—plug into our headend and have the option of 'Channel One', a great economical approach to first run (**'G and PG' only**) features the whole family can enjoy! And backing up these great movies are sports, financial news and special events only seen on Hollywood's 'Channel One'.

**Take one, two, three or all four ASN** program channels. Deal with one supplier, and sign up only for one year at a time (no long, drawn out contracts with ASN!). Plus—you can lease a terminal anyway you want it. Turnkey, parts only, you name it, we are here to provide full service at low-low lease rates you have to see to believe! Select the equipment you want from name brand suppliers you know and respect. We take the black box mystery out of satellite programming and we connect you to our 'Great Headend In The Sky' to make your cable system the most profitable system possible.

**AmeriCom Satellite Network, Inc.**

Frank Merklein, President—P.O. Box 9340, Marina Del Rey,  
Ca. 90291 (213/822-7762)

Bill Bauce, Dir. Marketing—6350 L.B.J. Freeway, Suite 148,  
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# TerraCom offers you the only family of satellite earth station receivers in this world.

Everyone's earth station receiver needs aren't the same. That's why TerraCom offers you more choice in receivers and controls than anyone else in this world.

Four different, but compatible, receiver models in both 4/6 GHz and 12/14 GHz bands, a family of switching units to protect against receiver and low noise amplifier problems (that also give you a variety of bridged and multiple outputs), plus a test transmitter you can purchase or lease for testing receiver performance directly.

And only TerraCom builds a versatile channel selection unit for remote control operation either through a wire interconnection

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or by a normal telephone call to the receiver or through the satellite to the receiver as part of the satellite transmission.

Many combinations are available. For example, a TerraCom system can provide automatic protection for up to eight receivers (of all models) with just one programmable backup receiver.

With a selectable channel priority. And it allows manual remote override channel control of any one of the receivers.

There's a lot more to the TerraCom earth station story, like up-link transmitters, excellent customer service (same-day dispatch of free loaner equipment), a two-year

warranty, high performance, low price

and easy maintenance.

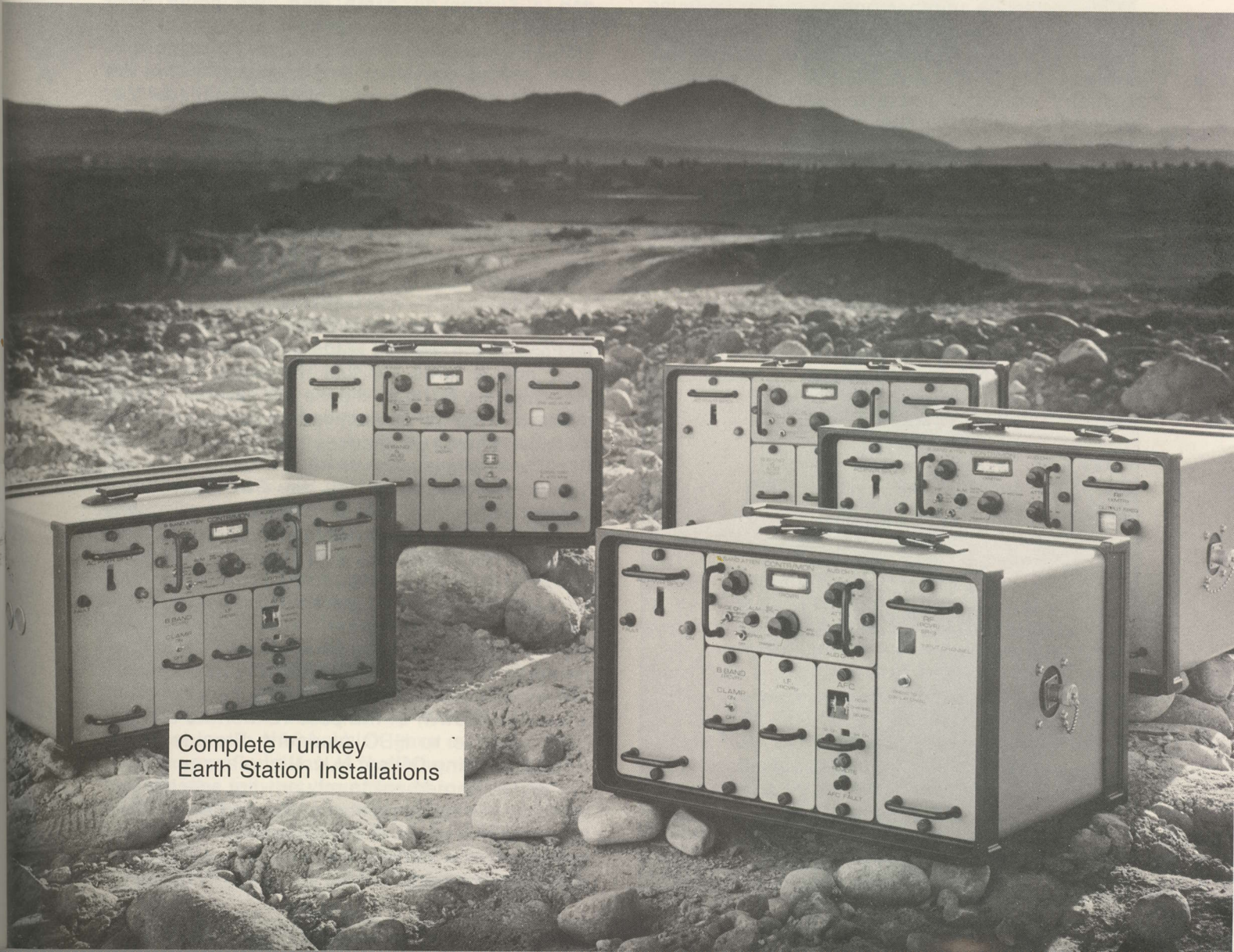
But see for yourself. Whether you need receivers that are fixed tuned or tunable, or programmable channel selection with either single or dual conversion units, or combinations of these models working together, you can see them when you visit our operational satellite earth station in San Diego. Call Bruce Jennings or Bob Boulio at (714) 278-4100. Let us show you some equipment that's out of this world.

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**Complete Turnkey  
Earth Station Installations**



## Numero Uno Responds

# STICKS AND STONES MAY BREAK THEIR BONES BUT WORDS WILL NOT TARNISH HBO. . . BECAUSE THEY ARE NUMBER ONE

When you are number one everyone else in your field just naturally takes shots at you. They admire your position, wish they were where you are, and human nature being what it is most anything you say to defend yourself comes out sounding badly.

**Home Box Office is number one.** By every measurement stick and according to their own figures. They got to be number one primarily because they have the corporate muscle to dedicate a considerable sum of money to the pay cable experiment, to ride it through years of technical and industry political problems, and to hold the vision that ultimately they would succeed. They are successful, and every indication is that they will stay that way.

The numbers tell the story best. HBO has grown from 195,000 pay cable subscribers on September 30, 1975 (when the first satellite transmission began) to over a million HBO homes at the end of December in 1977.

Our primary concern here is not that HBO is number one, or even whether they will stay number one. The past is the past. . . it is the now and

the future that count. Where is HBO going? Are they happy with their present rate of growth, their present program scheduling, and their present format? Or are there changes in the wind?

HBO made the decision to go to the satellite in the spring of 1975. As Board Chairman Gerald M. Levin recalls:

**"In making the satellite decision we had to abandon a successful game plan. We could have continued to confine ourselves to the northeastern states where we had an extensive terrestrial microwave hook up operating. And had we stayed in the northeast we would have achieved operational (i.e. financial) break-even by the fourth quarter of 1975; or approximately on our third anniversary."**

Making the decision to forget about breaking even in 1975 (or 1976 as it turned out) was a tough one. It's a little bit like putting in a second string quarterback when you are tied in the fourth quarter. It's a gamble that might not pay off.

Levin again:

**"Obviously we had to justify (to Time, Inc.) the commitment to satellite delivery. And we had projections which we had made at the time. Looking back now it turns out that the projections were meaningless. Not only did we not have any precedents to base our projections on but subsequent developments in the industry that were unforeseen in 1975 had big impacts on our subsequent growth. To cite just one example. . . the FCC approval of smaller earth stations. In retrospect our projections were low, as were the projections of everyone else involved. The carriers, the suppliers of earth stations and most of all the industry itself was simply not up to understanding the satellite commitment in 1975."**

HBO may have learned a lesson about projections. That being that the CATV industry may always be basically unpredictable. To a question about the growth of the past 12 months coming as a surprise to HBO planners, President and Chief Operating Officer N.K. Nicholas remarks:

**"We've learned not to rely on very specific predictions. The actual number of new TVRO terminals fell within the range of our expectations. And I believe the CATV industry has adapted very nicely to satellite technology. . . ."**

### HOME BOX OFFICE QUICK-FACTS

Company	Home Box Office, Inc.
Address	Subsidiary of Time, Inc. Time & Life Building Rockefeller Center New York, N.Y. 10020
Telephone	212-586-1212
Officers	Gerald M. Levin, Chairman N.J. Nicholas, President James O. Heyworth, Senior VP Austin O. Furst, Senior VP Winston H. (Tony) Cox, VP George W. Gilbert, VP
Service	Pay cable programming via SATCOM
Uplink	Vernon Valley, N.J. (RCA)
Programming	7-12 hours per day (weekends expanded schedule)
Transponder Use	On SATCOM II 20 (west), 24 (east) After SATCOM I move, 22 (west), 24 (east).
Subscriber Base	Over 1,000,000



If projections of the past are not very important to HBO, how about projections into the future? Levin again:

**"Historically it has been HBO's policy not to make our projections public. This remains such a rapidly changing business that nobody's interests are really served by turning it into a guessing game. Our goal is to see the entire cable industry accessible to satellite services. One general observation might be that the cost of a satellite terminal is no longer out of reach of even the smallest cable system. HBO has small, independent affiliates with as few as 500 basic subscribers and their own earth stations".**

HBO has recently positioned itself with terminal suppliers Hughes and Scientific Atlanta so that if a cable system operator is interested in (and willing to sign) a contract with HBO, some **very** special prices are possible on 'HBO offered' terminal packages. It may not yet be to the point where the cable operator will receive a **gift** of a terminal, but some of the pricing we have heard does come very close to the 'gift-taxable' region.

#### **The Stink**

Back in November at the California fall show it became apparent that there was something uneasy in the relationship between HBO and satellite supplier RCA. By early in January that uneasiness had grown and a gap had developed between the two, HBO, to put it bluntly, was out shopping for the best deal it could find for satellite transponder rental. And because RCA is not the only domestic satellite operator around there developed a 'bidding war' between RCA and Western Union. At stake was the future home of at least this generation of CATV programming-via-satellite suppliers.

Senior Vice President James O. Heyworth on the turbulent early winter period just passed:

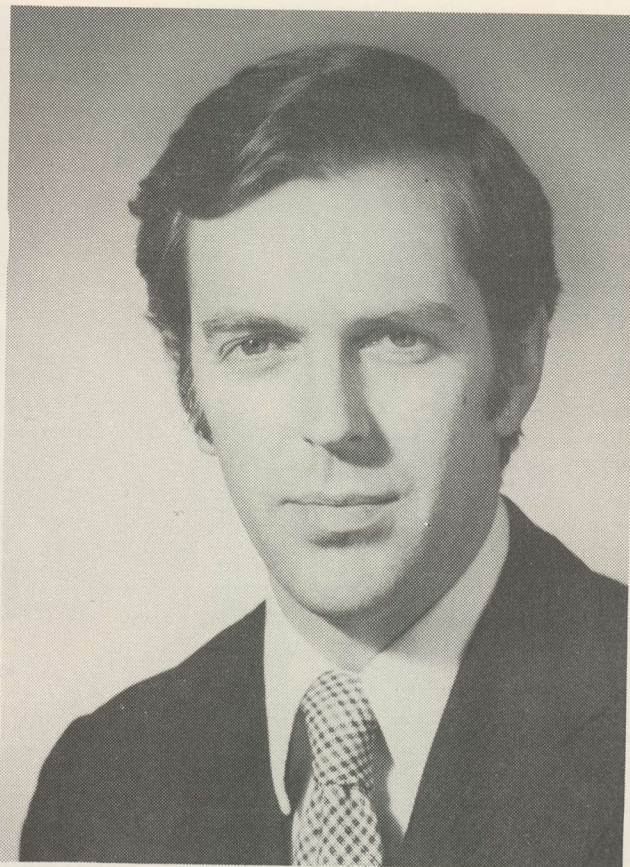
**"There were many factors prompting us to take a careful look at the long-term satellite situation."**

Levin on the same subject:

**"What really happened was that we had the opportunity, for the first time since the industry moved to satellites, to look at our commitment with the benefit of some hindsight. Our concern was how our interests and those of the cable industry could best be served over the long term. Basically, what was important to us was:**

- 1) long term continuity of service,
- 2) emergency protection, and,
- 3) flexibility to develop new opportunities in partnership with the cable industry.

**"We decided to reinforce our commitment by asking for new satellite time bids for three transponders rather than two, and for a ten-year period. Initially we were attracted by Western Union's agreement with NASA which gave us assurances as to the configuration of the Advanced WESTAR satellite. We felt that if we moved to WESTAR the shift would stimulate development of more cable services by providing the industry with greater channel capacity. As it turned out we received the kind of assurances we were after from RCA Ameri-**



OPERATIONS VP James O. Heyworth

**Com and a better understanding on their part, we think of the objectives and requirements of the cable industry."**

During that uncertain period of January there was much speculation as to what an HBO move to WESTAR might mean. For example and as the press of that period reported there was the **possibility** that had HBO moved, chief-satellite competitor SHOWTIME might have been left 'behind' largely by itself (for the moment) on a 'vacated satellite'. There was even speculation that such a move might work to the advantage of HBO, at least in the short term. Heyworth on the truth of the matter:

**"SHOWTIME simply was not a consideration during those negotiations. As a matter of fact because SHOWTIME had not yet begun satellite service when all of this was taking place it was our understanding that they would not have had a termination liability. Therefore they too could have switched to WESTAR had they wished to do so."**

Heyworth and others at HBO do admit that had there been a split bird situation as a result of an HBO move to WESTAR that cable commitments to satellite service expansion **"...might have slowed down for perhaps a 12 month period while all of the affected parties examined the alternatives."** In the end however it turns out to be at least a two-bird industry anyhow with ASN now available on WESTAR. And as Heyworth points out **"...some operators are now planning applications for a second TVRO for WESTAR..."**





After RCA and HBO 'made up' and everything settled back down to the **bulk CATV traffic staying on SATCOM**, the next big HBO satellite event turned out to be the expansion of HBO services to yet a third transponder. HBO presently utilizes a rather 'unique' arrangement of transponders, perhaps the result of their being 'first' to sign with RCA for such CATV use. Two separate transponders feed the same programming fare, with the western time zones fed three hours behind the eastern time zones. The net result is that **Rocky** is shown at 7 P, eastern and 7 PM pacific, **but on two transponders**. For some time HBO transponders have been 20 (west) and 24 (east). However, after all CATV traffic moves to RCA's SATCOM F1 satellite (a move to be accomplished the last week in May) HBO will end up with transponders 22 (western zones) and 24 (still eastern zones). And what happens to 20?

Well, HBO has had a "self-protection" transponder (22 now, 20 after the move to F1) for some time. No-one seems certain how it all happened (perhaps least of all RCA) but in their initial deal with RCA the Home Box Office folks managed to wangle out "dibs" on a third transponder.

Now with a new ten year contract between HBO and RCA, the HBO hold on the third transponder (20 on F1) strenghtens. HBO has plans for it, down the road a ways. The industry is filled

with rumors as to what HBO **might plan to do** with a third transponder. Levin on what it amounts to:

**"First of all the third transponder provides self-protection in the event of a failure of one of the other two transponders."**

HBO is obviously cautious. But that kind of caution costs money. And behind that "self-protection story" is the almost solid guarantee of RCA that in the event of a failure they'd make the knocked out channel good, somehow. Logic suggests, and it has for some time, that HBO has plans that involve it needing a third transponder for their own use. Levin on that subject:

**"We expect this to be our developmental channel for new programs and services, and we'll offer it to other users as well. For example, we have offered use of this transponder to a non-profit cable corporation (that is now forming) which would like to offer cable audiences gavel to gavel coverage of the U.S. House of Representatives. In a situation such as this we'd only pass along our actual costs to such users so we'll not be acting as a common carrier."**

The industry has been ripe with "suggestions" as to what HBO might ultimately be doing with its third transponder. The suggestions run the gamut from a Time-Life news service to a second level of pay cable. Intertwined into this however must be noted the presence of UA-Columbia's



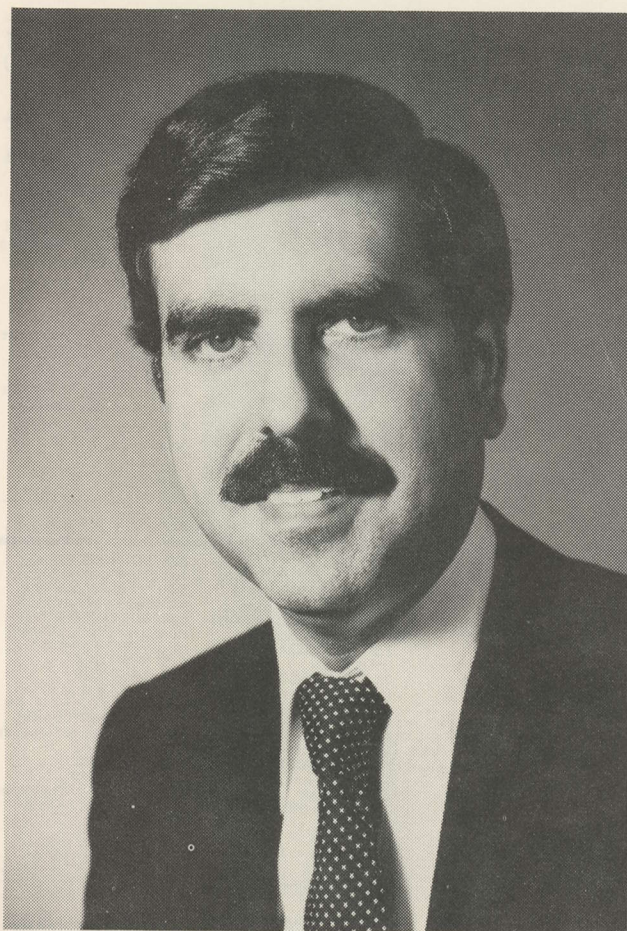
Madison Square Garden Events telecasts which have been on the third transponder since last September. As an HBO representative notes "It is very unlikely that we would not extend the arrangement with UA-Cablevision for another year if UA wanted it extended. After all they are users of the HBO pay cable services and we'd not want to lose their affiliation."

Translation? Madison Square Garden Events is a hybrid "per-event" offering. It has met with considerable success to date and this suggests strongly that Levin is telling it straight when he describes the third channel usage as "primarily for developmental new programs and services". Perhaps the answer that will ultimately surface will lie in the "per-event" area. Events too good, or too expensive to produce unless viewers agree to a sur-charge for their specific showing. **Perhaps.** . .but for now we'll all have to wait to see what develops.

The January issue of CATJ presented an in-depth look at the most serious challenger of HBO's well recognized number one spot; SHOWTIME Entertainment. SHOWTIME personnel Jeff Reiss and John Sie made no bones about why they feel their different-than-HBO pay cable programming package is superior to HBO's in that January report, fairness dictates that HBO should have some response time.

Affiliate relations VP Tony Cox on the SHOWTIME statements.

**"SHOWTIME seems to be attempting to position itself differently from HBO as a matter of marketing strategy. We expect that no matter what HBO does, competitors (whether SHOWTIME or others) may try another approach and try to convince prospective cable system affiliates that 'Hey, we are different!'. Being different is fine as long as it is also better. We feel this is a strategy more geared towards selling affiliates than subscribers. We admit to our share of mistakes, but we feel that through trial and error and through sophisticated and on-going research that includes listening carefully to our affiliates and their (and our) subscribers for over five and one half years that we are indeed responsive to what it is our viewers want. The result**



HBO CHAIRMAN and chief executive officer Gerald M. Levin

is our present programming strategy, which, according to what we have learned, is the one that works best for subscribers. For instance, we believe consistency is important. HBO subscribers know that new programming will premiere each Friday, Saturday and Sunday night. This makes it easy for them to use their program guides to track other opportunities to see these programs at their convenience. They can expect set times for our prime-time programs each night. Consistency allows subscribers to develop a habit structure that makes the service convenient to use. SHOWTIME's more random scheduling of movie requires subscribers to constantly check the program guide lest they miss a first play."

Cox's arguments are good and we believe sound. With access to both services on a regular basis, we have to admit that we are more apt to "miss" a first play on SHOWTIME than we are on HBO. Being first isn't everything, but we have also noted during the first month of SHOWTIME on the bird that we are more apt **not** to catch up with a later repeat showing of a SHOWTIME feature than we are with a repeat showing of an HBO feature. Perhaps in time we'll get smarter in using the SHOWTIME schedule but for now Cox is dead right on.

On the subject of program guides (a topic SHOWTIME believes they have won hands down), Cox again.





## LIZA MINNELLI ROBERT DENIRO NEW YORK NEW YORK

Liza Minnelli and Robert DeNiro star in "one of the great screen romances of all time" (N.Y. *Daily News*)—a torrid and tender tribute to the era of the Big Bands. He's a brash and amorous saxophone player; she's a singer belting her way to the top. Martin Scorsese (*Taxi Driver*) directs this vivid eye-and-earful of music in a time of post-war promise. *Adult language.* (PG-2:17) April 9,13,16,18,21,26

## April 7-9

Friday 7

Saturday 8

Sunday 9

5:30 **SHOUT AT THE DEVIL**  
Lee Marvin, Roger Moore and Barbara Parkins (PG-2:08) p.18  
8:00 **CATSKILL COMEDIANS ON LOCATION**

Premiere. Where the biggest names in show biz get started. Joey Bishop hosts. p.9

9:30 **THE ISLAND OF DR. MOREAU**  
Fantasy horror tale with Michael York (PG-1:44) p.5  
11:30 **SHOUT AT THE DEVIL**  
Entertaining action-adventure film (PG-2:08) p.18

2:30 **THE CAR**  
Sci-fi horror (PG-1:35) p.10  
4:30 **NEIL SEDAKA**

Music's unique performer. p.7  
6:00 **BOXING CHAMPIONS**  
Light heavyweights p.6  
7:00 **'77 BASEBALL '78**

Great footage p.7

8:00 **SIDEWINDER 1**

Premiere. Mud-and-guts adventure (PG-1:37) p.9

10:00 **LOVE AND DEATH**

Limited engagement begins. Woody Allen (PG-1:25) p.11

11:30 **NEIL SEDAKA**

*Standing Room Only.* p.7

1:00 **THE CAR**

James Brolin (PG-1:35) p.10

3:00 **BORN LOSERS**  
Tom Laughlin (PG-1:53) p.15  
5:00 **'77 BASEBALL '78**

A look back—and ahead p.7

6:00 **BORN LOSERS**  
Hoodlums terrorize a California town (PG-1:53) p.15

8:00 **NEW YORK, NEW YORK**

Premiere. Liza Minnelli and Robert DeNiro (PG-2:17) p.8

10:30 **THE NIGHTCOMERS**

Haunting version of *Turn of the Screw* (R-1:35) p.5

12:15 **NEW YORK, NEW YORK**

Torrid and tender tribute to the big band era (PG-2:17) p.8



## Catskill Comedians Hosted By Joey Bishop

Featuring Corbett Monica

Joey Bishop takes us on a hilarious *On Location* trip to that most famous talent showcase, the Catskill Mountains! From the Imperial Room of the famous Concord Hotel (the world's largest night club) Joey reminisces, performs and introduces us to six incredibly versatile comics—proof of why this is the breeding ground for the top talent! April 7,10,15,18,23,28

## SIDEWINDER 1

A mud-and-guts flick about moto-cross and the big money bikes that win it all. Michael Parks, Marjoe Gortner and Susan Howard race for the prize through ruts and fences, over dirt tracks and hills while they learn to live a life filled with "success." Great action! *Strong language.* (PG-1:37) April 8,12,16,22,28



9

"HBO's guide is designed to make it easy to find information about programs and to create excitement as well. Again, I perceive SHOWTIME's guide as more oriented toward selling affiliates than subscribers. It is handsome and it creates a good first impression. But it is not easy to use; the subscriber has to work hard to find information about what's on."

Again we have to throw in with Cox. Admittedly one month of SHOWTIME does not allow us to claim to be expert with their service, but when you check the date and time for a SHOWTIME feature you stand only a small chance of finding that feature explained on the page with the date and schedule listing. If you really want to find out what 'Jabberwocky' is all about (the title certainly doesn't tell you much!) you have to flip back to page 3 of the SHOWTIME schedule to check the master "Feature Films" table of contents. That tells you to go (in the case of Jabberwocky and the April schedule) to page 5 to read the capsule summary of the feature.

The HBO guide, on the other hand, lists the page number on which the feature film (or other feature) is capsuled immediately after each date and time listing. If "The Car" doesn't ring a bell, you know from the listing that if you turn to page 10 for the April guide you will see what this feature's theme is. It is, as Cox says, "easier to use". (SHOWTIME could correct this very easily; simply start listing the feature explanation page number after each listing as HBO does. It makes excellent sense.)

Cox has more to say about the HBO approach as compared with the SHOWTIME approach.

"HBO plays off new programs over a four-week period because our research indicates that's the most effective way. The SHOWTIME system compresses some of its features into two or three week periods in order to serve the artificial goal of avoiding 'spillover' into the following month. We think that's a restriction that irritates more viewers than it impresses."

Other SHOWTIME 'claims' also raise the hackles on Cox's back:

"A careful analysis by one of HBO's new affiliates has recently borne out our contention that SHOWTIME's 'perception of value' argument just doesn't stand up. It is a fact, for example, that new subscribers joining HBO after the first week of any month are not exposed to significantly more new product than they can expect in subsequent months. And no one should be misled by SHOWTIME's claims that it shows as much new material in a month as we do. SHOWTIME offers 12 to 14 new programs each month. And HBO presents between 20 and 23. Fifty percent more. And those are the facts!"

Humm. Claims and counter claims. One suspects as much money is being spent on wooing new affiliates as is being spent on signing new subscribers for the affiliates in this portion of the industry!

Cox is not ready to stand down from his soap box yet.



"There is one more point made by SHOWTIME which I would like to refute. And that is the 'claim' that HBO is oriented towards large systems and MSOs. The facts are that more than 42% of HBO's affiliated systems have fewer than 5,000 (basic) subscribers. We wouldn't keep adding regional managers and creating sales and marketing programs if we just had the interests of the MSOs and large systems in mind. It is the smaller system that needs and most often requests the marketing support, as well as legal, engineering, regulatory and other advice."

As the January SHOWTIME report discussed, much has been made of the ability of the pay-cable service to not only attract subscribers but to keep the subscribers. They call it 'retention' and each firm up and operating in this field has his own story of what is good or bad about retention. For the record, SHOWTIME in our January report claimed their retention was superior to HBOs; that HBO customers come on the line heavy and then drop off. This has been a problem in the past. Cox on this subject:

"Our penetration has increased since the end of 1976 from 22.3 to 27.5 percent of the basic (cable) subscribers and from 10.6 to 13.8 percent of all homes passed. That's significant, not just for now but for the future of pay cable. I don't believe we have yet begun to explore the upside potential for pay television."

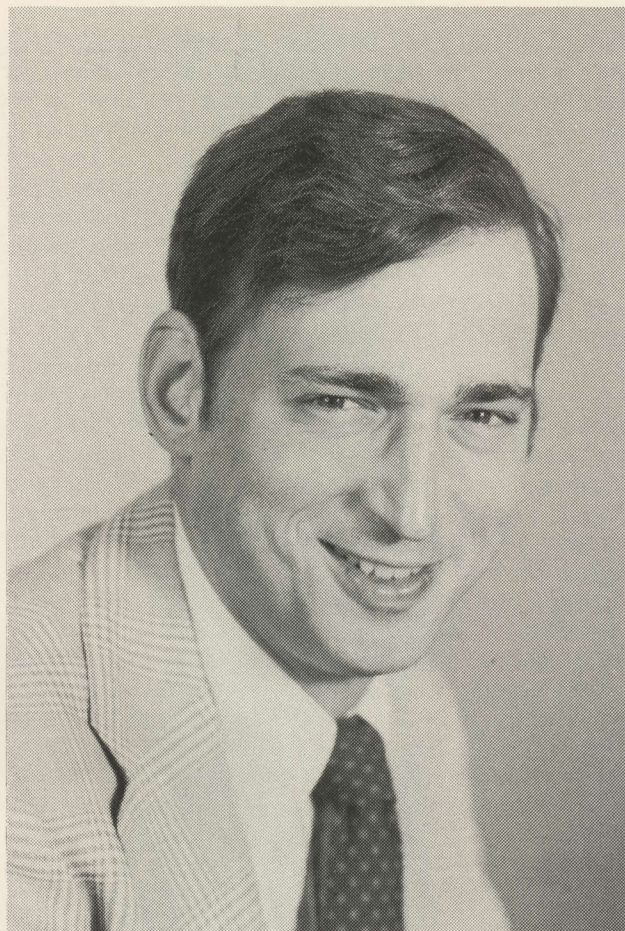
Where does Cox place the credit for this upsurge?

"The big difference is the people who run the systems. They have become believers and they are making stronger and better efforts to sell and maintain subscribers. The partnership between HBO and our affiliates is paying off. We are plowing money and the experience we have gained back into the marketplace. We have a whole new generation of marketing, new affiliate training programs, and new people coming on board to work with the affiliates. The payoff is going to be more and more subscribers."

Cox sounds sincere, and very upbeat. He believes in what it is HBO is doing, and that may be a key. There is a 'band wagon' starting to move and there have been enough operators who are doing significantly better than others have done in the past in selling and retaining pay cable customers than those who are not doing so well are beginning to recognize that **maybe** it is something they **are** doing (or not doing) that makes the difference.

Someone who had more time than we to research the question wondered aloud whether or not HBO was 'eating up titles' faster than they were being replaced with new product. If that was true, the obvious would eventually happen; HBO would run out of product. One bit of research indicated that HBO had 'run through' 140 'titles' on their schedule since September of 1977. Is there a danger there? Senior Vice President for programming Austin O. Furst:

"HBO introduces four feature films or entertainment specials each week. If you look at 52 weeks in



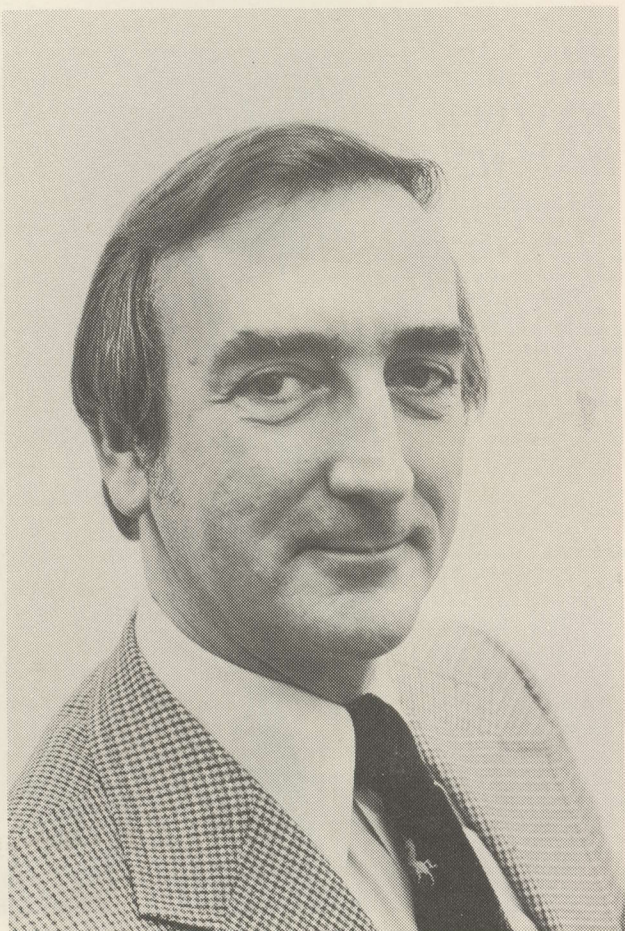
PROGRAMMING VP Austin O. Furst

a year that amounts to 208 features a year. However this includes three-to-ten year old films, classic older films, foreign films and other programs such as our own 'On Location' and 'Standing Room Only' productions. Are we eating up product faster than it is coming down the pike? No. Emphatically no. Actually, we are looking seriously at expanding our own production because of the high levels of viewer satisfaction we have with such programming."

As noted at the outset, when you are number one there are plenty of people who want to take shots at you. **One of the rumors** making the rounds this winter and spring is this one. HBO is not profitable; that is a book keeping fabrication. Like we said, that's been the rumor. We put it to Chief Operating Officer Nicholas.

"It is preposterous to even suggest that Time, Inc. and its auditors Ernst and Ernst would 'cook the books', in any fashion for any activity for any reason. Certainly during its first four years HBO lost money as a startup business. In 1976 the loss did amount to several million dollars. In 1977 however the turn around was dramatic. We did become profitable and the important thing is the way that was achieved. It was done not only through operating efficiencies but also through subscriber growth and a much better grasp, through experience, of how to make this business work in terms of programming, marketing and customer services."





NETWORK OPERATIONS director George W. Gilbert

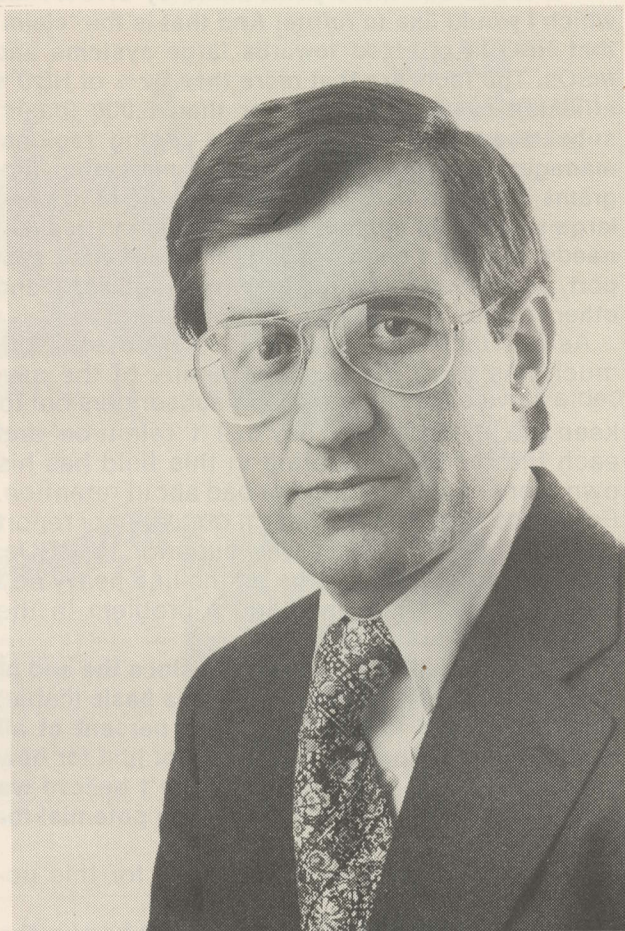
So put the rumor to rest. When HBO and Ernst and Ernst says HBO is profitable, that's the way it is. Period.

Another commonly heard rumor is that Time, Inc. has HBO 'on the block' and is building the HBO operation up for a 'planned sale'. Group Vice President J. Richard Munro who heads up the Video Group at Time, Inc. on the chances of this happening to HBO:

**"Time Inc's history has been in the broadcasting business for over twenty years and still operates a profitable station in Grand Rapids, Michigan, as well as being a major supplier of syndicated television programming. In cable, when it sold some of its systems to ATC, Time, Inc. acquired a substantial interest in ATC which is now in the process of being merged into Time, Inc. The Manhattan system, which Time, Inc. retained when it sold other systems to ATC, is one of the industry's great turn around stories. HBO is part of a Video Group that just came off of its most successful year ever (1977) and it is an increasingly important part of the Time, Inc. corporate structure."**

So is HBO being 'groomed for sale?'. Read the response as you will, to us Munro seems to be committed to the future growth of HBO as a part of the Time Video Group.

How does HBO feel about the emergence of competition for cable affiliates on the bird? We



PRESIDENT and chief operating officer N.J. Nicholas

asked hard questions about what HBO saw as the chances for success of say the Home Theater Network (see **CATJ for February 1978**) or the regional Fanfare (see **CATJ for March 1978**). Obviously HBO has something at stake here; the HTN approach **might** have some bearing on what HBO could do with their third transponder and the Fanfare approach is in direct competition for cable subscribers in at least five states. Gerald Levin's response:

**"At the risk of sounding Pollyanna-ish, we have always believed that a choice of services is good for the cable industry and that what is good for the cable industry ought to be good for HBO. We are quite willing to take our chances competitively, since we know that our approach not only is working now but it leaves us optimum opportunity for future development and expansion. We do see the rationale for second level movie packages but we don't think that in the long run they will satisfy most viewers. We also view regional sports as a viable pay cable opportunity because we went through that phase of development ourselves. As we become a national service, however, our approach to sports programming had to change. Our present view is that regional and local sports probably could best be used as a basic service to attract basic cable customers and to generate revenue through advertising"**



Which simply says Levin, at least, is not certain one movie a night for say \$4.00 a month is going to be all that viable long term, and, he thinks sports (ala Madison Square Gardens) is **best used** to simply make cable's basic product stand out from the basic over the air product.

What about the AmeriCom Satellite Network (ASN)? Here they are going up on a brand new (for cable) 'bird' (WESTAR II - see CATJ for April 1978). Operations VP Heyworth:

**"We understand that some operators are planning their second terminals now. We anticipate cable oriented services being transmitted on both WESTAR and SATCOM and it will happen whether ASN makes it or not."**

And then there is that old bug-a-boo called motels, hotels and places where the public gathers. HBO (and all other pay cable) contracts **prohibit** the cable operator from serving these places with pay-cable service, primarily because the movie rights people say 'no' they do not want cable serving these locations. With the Ed Taylor announcement (see **Satellite Technology News** this issue) of the new arrangement between Holiday Inns of America, Southern Satellite Systems, Bell and Howell and Twentieth-Century-Fox it would appear that the movie rights people did the right thing to hold out. **Now** they have, through Taylor's new format, a package developed **exclusively** for motel showing with satellite delivery. HBO might consider this one-upmanship on the part of Taylor and group however. HBO obviously would like to be able to authorize their affiliates to sign up motels and the like. Heyworth on this subject:

**HBO has been negotiating with the major motion picture distributors for rights that would enable the HBO package to go to motels served by affiliates. We expect to make an announcement on this project quite soon."**

Perhaps by or in New Orleans is how we read that.

Finally there is the security question. Nobody in the business seems very worried, today, about private TVRO terminals springing up in the back yards of America and stealing signals. But there is at least one other 'weak link' in the chain and that is MDS systems. HBO, as do a few other pay product suppliers, has contracts with Multipoint Distribution Services operating in the 2,100 MHz range. These MDS systems serve a wide range of customers including motels and hotels and apartment groups with HBO programming, fed either via terrestrial or satellite systems. And where the cost for a private satellite terminal is still in the \$10,000 or so range (assuming someone bought everything new and on the open market) the cost for a 'boötlegged' MDS converter and antenna is well under \$500. If the would be thief is only interested in the product, the MDS rip-off seems to be the easiest way for him to go if he has an MDS operation in his area. President Nicholas on the 'problems' presented by non-secure distribution systems:

**"This problem is difficult because it is not unique to cable, pay-cable or even MDS. It is a part of a trend in American behavior patterns that extends from ducking under subway turnstiles to the use of little black boxes to defeat the Bell system long distance charges by some pretty prominent people. To a large degree it must be coped with through legal and moral persuasion. HBO does act, through its legal counsel, to support efforts to pass and enforce theft of service statutes. Through our engineering staff we try to keep abreast of all engineering remedies. We do not see the likelihood at this time of uplink scrambling on satellite feeds. As for MDS, we certainly do insist that our affiliates exercise diligence in protecting the product from unauthorized interception. Generally an affiliate has every bit as much incentive to protect the integrity of the service as we do in wanting it to be protected. For every dollar lost, the typical affiliate loses half of that dollar. It has been proposed, and we are now considering, adding people to our staff who are trained in all aspects of the security issue. Such people would be available to our affiliates to help out as the need arose. As a last resort we could, conceivably, discontinue service to an affiliate if he did not police his own local area."**

And so there you have it. HBO is king of the mountain and showing all of the inherent strengths of a leader in the field. From all appearances they are dedicated to growth which is for at least the near term future the name of the pay cable game.

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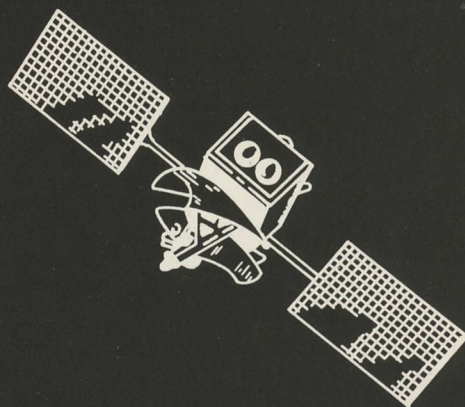
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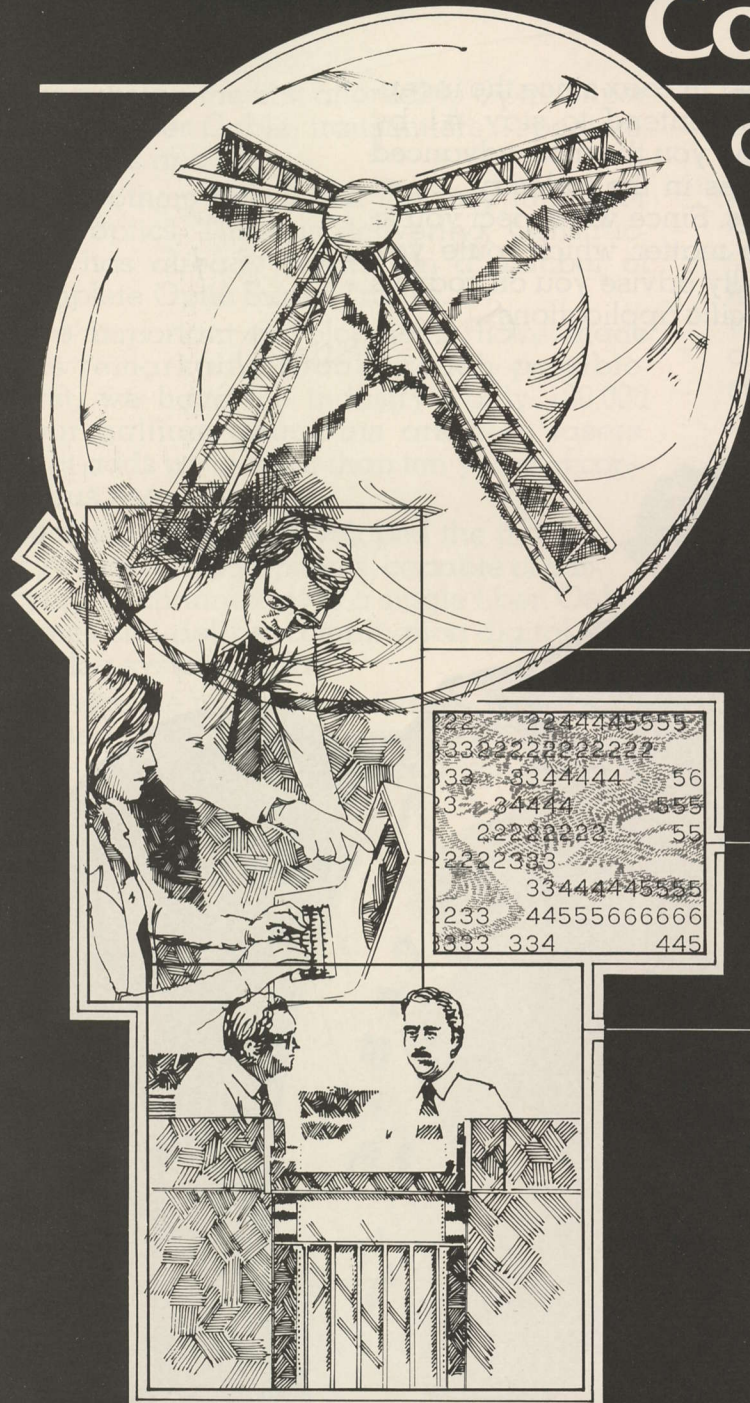
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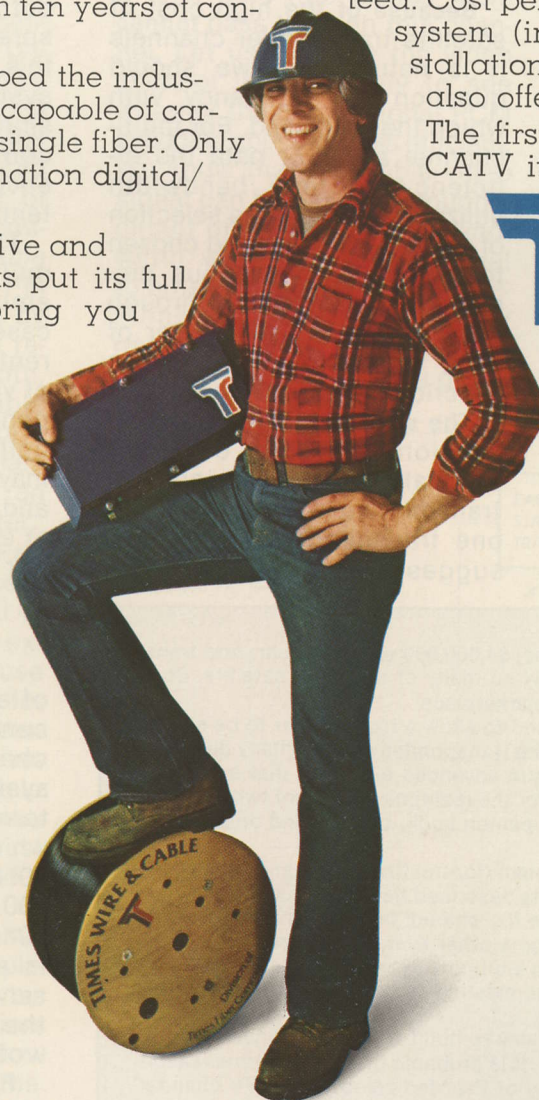
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# One Transponder/Two Video Channels

## "TWO FOR ONE VIDEO" MAY BE THE WAVE OF THE FUTURE FOR SATELLITE DELIVERY OF CATV PROGRAMMING

by  
Donald Kirk, Jr.  
Digital Communications, Inc.  
St. Petersburg, Florida

### Introduction

Starting with WESTAR I in April of 1974, four domestic satellites have been placed in geostationary orbit to serve miscellaneous customers in the continental United States. They make available a total of 72 transponder channels, each of 36 megacycles bandwidth, for transmission of various kinds of signals. A number of services including multi-channel telephone and high rate digital data transmission have developed to use these channels. At present, one of the fastest growing users of satellite channels is the CATV industry with its need for color video transmission.

Because of the high cost of satellite transponder channels it is natural that we should question the efficiency with which they are used. For multi-channel audio or data the efficiency of time bandwidth utilization controls the selection of the multiplex method chosen to assemble the various signals for transmission through a common path. A number of such multiplex systems are described in the literature.

The situation for video transmission is more complex. Several systems which can transmit two video signals over one transponder channel are suggested in the literature,

but none of them are in widespread use. It is the purpose of this paper to propose another system called Time Compression Multiplex which may overcome some of the problems encountered by the earlier systems.

The permissible cost of a multiplex system can be examined by considering the case of an operator who is currently delivering one channel of video via one satellite transponder to N earth stations. To deliver a second channel he may lease a second transponder and provide a second receiver at each earth station. The cost per earth station C is then:

$$C = R + \frac{T}{N}$$

where R is the cost of a receiver and T is the present value of a transponder channel. A useful multiplex system should have a receiving terminal cost of less than C which is in the range of \$1.7 x 10<sup>4</sup> to \$4.4 x 10<sup>4</sup> as N varies from 300 to 100. (Assuming R = 4 x 10<sup>3</sup> and T = 4 x 10<sup>6</sup>). If a value is assigned to spectrum conservation as well as to hardware the allowable terminal cost would be considerably larger.

Frequency division multiplex, or Frequency Division Multiple Access as it is called in Satellite circles, has been widely used

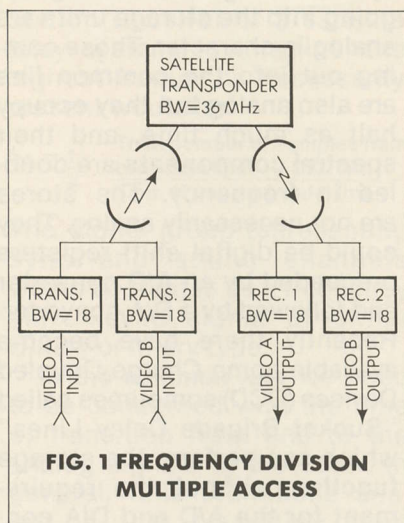
Transponders lease for (round figures) \$1,000,000 each per year. And transponder capacity is finite; there are only so many of them per satellite. Such conditions normally lead to a "seller's marketplace".

Several 'schemes' have been advanced to allow a transponder to be shared or multi-utilized by more signals than the transponder was originally designed to 'transport'. The latest such technique advanced suggests that a satellite transponder (or channel) may be used for the real-time sharing of two separate video (television) signals with two companion audio carriers and one or more low data rate digital channels.

The Time Compression Multiplex System (for multiple video and data distribution) using existing satellite channels described here by its creator, Donald Kirk, Jr., is a more advanced technique for 'shared' facilities than others proposed or in use at this time. Unlike some other systems that require special TVRO receivers, the Time Compression Multiplex System of Kirk requires a receiver add-on. Which simply means the existing receiver is not antiquated in the process.

As CATV use of satellites grow pressures build for more economical utilization of the transponders themselves. It is probable that within some reasonable time frame (say 5-7 years) the day of the 'dedicated to one TV channel' transponder will be a thing of the past. Kirk presents here the latest technology to achieve that goal.





for transmitting a large number of telephone signals over a single transponder channel. **Figure 1** is a block diagram showing how this technique might be used to carry two video channels with one transponder. Unfortunately, when two independent signals are passed through the satellite channel the average power output must be reduced by something of the order of 6 dB to reduce the intermodulation products to acceptable values. In addition, the FM deviation must be reduced by about 8 dB because of the reduction in available bandwidth. For performance comparable to a single channel system with a 15 foot dish, a two channel system would require an antenna of over 50 ft. diameter.

**Other approaches** to Frequency Division Multiple Access experience the same signal to noise ratio problem. For example, let the proposal be to use two 6 MHz AM channels instead of the 18 MHz FM paths. The noise bandwidth of the receiver is now less, but there is no FM improvement, and the back-off in satellite power must be greater to prevent intermodulation problems.

**The intermodulation problems** of Frequency Division Multiple Access can be eliminated by going to some time division system in which the two information streams do not use the transmission path simultaneously. In order to examine the available Time Division Multi-

plex possibilities we need to first establish the data rates involved.

### Channel Capacity

Conventional sampling of a 5 MHz video channel and use of an eight bit PCM code yields a data rate of 80 Megabits/sec. or 160 Megabits for two video channels.

**Application** of Shannon's Theorem for a band limited channel in the presence of white noise (1)  $R = B \log_2 (1 + S/N)$  bits/sec. to a satellite down-link of bandwidth

$$B = 36 \text{ MHz}$$

and a carrier to noise ratio

$$S/N = 12 \text{ dB}$$

yields a limit for the information rate of

$$R = 146.7 \text{ Megabits/sec.}$$

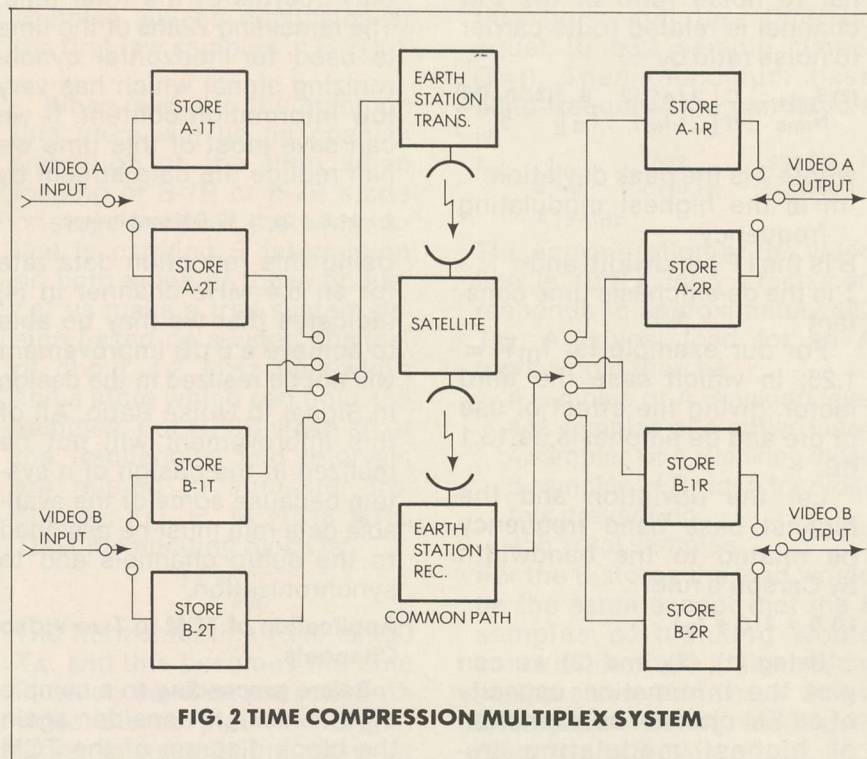
**Clearly**, two signals requiring a total data rate of 160 Mb/s **cannot** pass through this channel. Let us examine the video channel more closely to see whether the conventional PCM encoding approach was efficient. We know that a useable video signal can be passed through a circuit of about 4.2 MHz bandwidth with a delivered signal to noise ratio of about 46 dB P-P/rms. Reducing this to an rms/rms value of 37 dB and using (1) again we find that the great-

est data rate which the video channel can have is 51.6 Megabits/sec.

**Two different approaches** have been reported in the search for a more efficient method for encoding a video channel. In one approach the video signal is stored and examined at the transmitting end of the system. To the greatest extent possible, redundancy is removed from the signal, and what is left is encoded and transmitted.

In the **second approach** alternate frames of each video signal are deleted at the transmitting terminal and the remaining frames are time interleaved for transmission on a common path. At the receiving end the incoming data is stored and made available to a computer which is programmed to predict what the missing frames probably were.

**Using the first system**, good picture quality has been reported with data rates of 33 to 43 Megabits per channel. Two channel operation over a single transponder with a 15 ft. receive dish has been demonstrated. Some picture degradation is reported with the second approach. With each of these systems some costly storage





and computational hardware is required.

### The TCM System

If the second system is modified somewhat we can avoid the necessity for omitting part of the incoming data at the transmitting terminal and predicting its probable value at the receiver. **Figure 2** shows an arrangement in which alternate blocks of data from a video input, A, are stored in two stores A-1T and A-2T. The same treatment is given a second signal, B. The stores are read sequentially into a common path in the order shown. The reading speed is twice the real time writing speed used to record the data in the store. Thus, in the common path, time is apparently compressed to half its real value, and spectral components of the incoming signals are doubled in frequency.

At the receiving terminal the process is reversed. The signals are read into the stores at high speed and read out into separate lines in real time. We will call this complete process Time Compression Multiplex (TCM).

To investigate the ability of a satellite channel to carry the TCM signal, recall that the signal to noise ratio of the FM channel is related to its carrier to noise ratio by

$$\left(\frac{S_{rms}}{N_{rms}}\right) = \frac{C}{N} \left[ 3 \left( \frac{\Delta f}{f_m} \right)^2 \frac{B}{f_m} \right] \left[ \frac{(2\Delta f_m T)^2}{3} \right]$$

where  $f$  is the peak deviation  
 $f_m$  is the highest modulating frequency

$B$  is the IF bandwidth and  
 $T$  is the de-emphasis time constant

For our example let  $f_m T = 1.25$ ; in which case the third factor, giving the effect of use of pre and de emphasis, is 13.1 dB.

Let the deviation and the highest base band frequency be related to the bandwidth by Carson's rule.

$$(3) B = 2(\Delta + f_m)$$

Using (1), (2), and (3) we can plot the information capacity of an FM channel as a function of highest modulating fre-

quency. This has been done in **Figure 3**. For the single channel case where  $f_m = 4.2$  MHz, we have an excess channel capacity of about 17 Megabits. For the dual channel case assuming  $f_m$  of 8.4 MHz the excess channel capacity is about zero. (In both cases we are assuming that the required data rate for the analog channel is 51.6 Mb/sec. as previously calculated.) For  $S/N \gg 1$ , we may restate Shannon's Theorem, (1), as

$$\begin{aligned} R_1 &= B \log_2 (S/N)_1 \text{ and} \\ R_2 &= B \log_2 (S/N)_2 \quad \text{By subtraction} \\ \frac{\Delta R}{B} &= \log_2 \left[ \frac{(S/N)_1}{(S/N)_2} \right], \text{ where } R_1 - R_2 = R. \end{aligned}$$

$$\text{Then } \Delta R \cdot 10 \log_{10} 2 = S/N \text{ in dB,}$$

is the relation between excess channel capacity expressed as bit rate and available noise margin expressed as  $S/N$  in dB.

It can be seen that unless the data rate of the two channel TCM system can be somehow reduced, the system will have no noise performance margin.

The previous computation which indicated that a video channel could represent a data rate of as much as 51.6 Mb/sec. assumed that all times were equally important in the video signal. This is not necessarily true. The active portion of the video scanning line occupies only 108/ths of the total time. The remaining 22/ths of the time is used for horizontal synchronizing signal which has very low information content. If we can save most of this time we can reduce the data stream by

$$2 \times 51.6 \times 22 = 17.5 \text{ Megabits/sec.}$$

Using this reduction data rate for an 8.4 MHz channel in (4) indicates that we may be able to achieve a 6 dB improvement will not be realized in the design in Signal to Noise Ratio. All of this improvement will not be realized in the design of a system because some of the available data rate must be assigned to the audio channels and to synchronization.

### Application of TCM to Two Video Channels

Before proceeding to a sample system design consider again the block diagram of the TCM

system in **Figure 2**. The signals going into the storage units are analog in character. Those coming out into the common line are also analog but they occupy half as much time, and their spectral components are doubled in frequency. The stores are not necessarily analog. They could be digital shift registers preceded by an A/D converter and followed by a D/A converter. Recently there have become available some Charge Coupled Devices (CCD) sometimes called "Bucket Brigade Delay Lines" which can perform the storage function without the requirement for the A/D and D/A conversions. In these devices an amount of charge proportional to the analog input voltage is shifted through the cells of the device in response to a clock signal. When this charge eventually flows through an output resistor it reproduces the analog input voltage but delayed in time. By having available two clock frequencies one may place a line of video in store at one rate and read it out of store at a different rate.

For either the digital or the analog the data is acquired by a sampling process, and the time between samples can be no greater than the Nyquist interval or  $T = 1/2 f_m$  sec. There is no requirement that samples of the input signal be taken all the time. During the sync interval the value of the signal is known, and no samples need to be taken. This reduces the total number of samples to be transmitted and thus reduces the maximum frequency in the common line.

There is also no requirement that the two clock rates be related by a 2:1 factor. The clock which reads information out of store and into the common line is chosen to be fast enough to move the required number of samples in the available time leaving enough time to insert a small data stream containing the two sound channels, system sync, etc. The common line of **Figure 2** corresponds to the Earth Station Transmitter—Satellite Transponder—Earth



Station Receiver of a satellite relay system. In this line, the highest frequency necessarily present would be

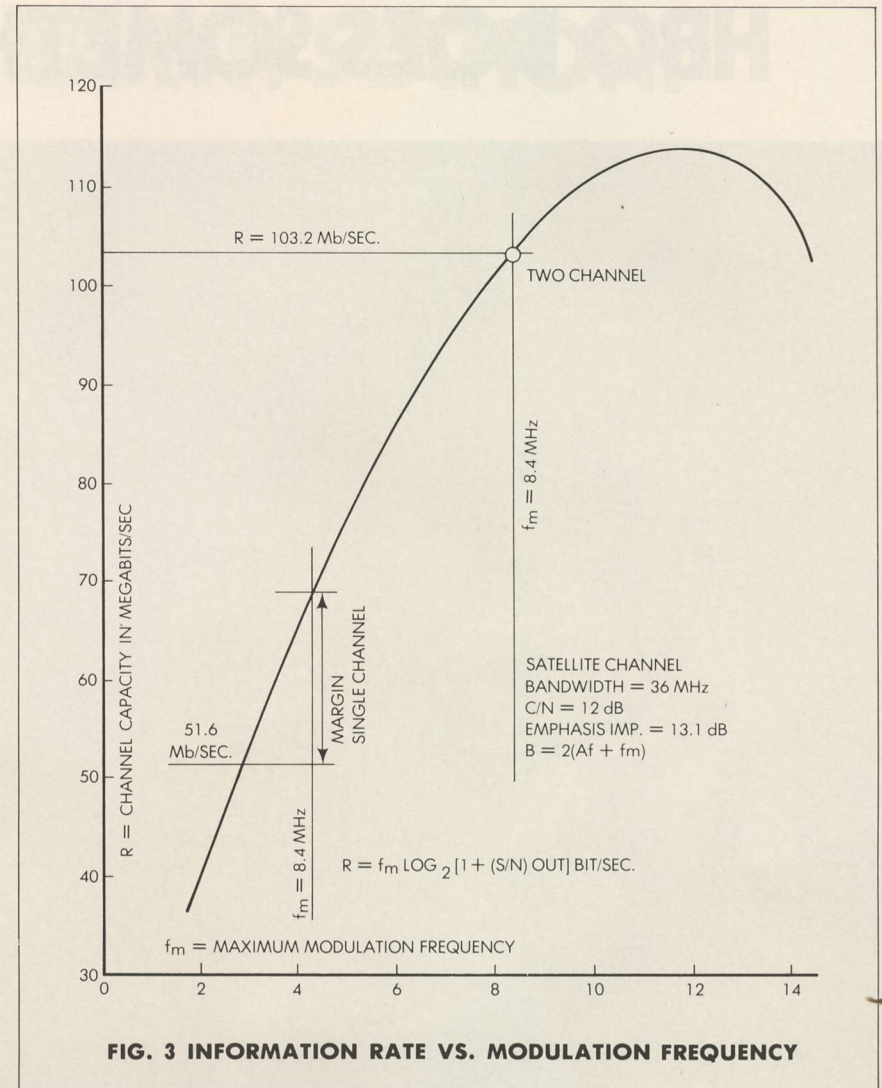
$$f_m = \frac{1}{2} \frac{\text{Total number of Samples from two video lines + DIGITAL}}{\text{Time of one horizontal line}}$$

The digital group representing sync and sound channels would be treated as a frequency shift keyed signal of either Binary or M'ary type.

In the common line we need to be concerned with the time of transition from one of the analog signals to the other. In general, it is limitations arising in this transition time which have restricted the usefulness of Pulse Amplitude Modulation Systems to which the TCM system may be compared. Limitations in the phase response of the common line can cause a sudden amplitude transition to be accompanied by a precursor or tail (ringing or overshoot). By this mechanism, cross talk between channels is created.

We can avoid half of the problems of this cross talk by making the transition from one analog signal to the other during the sync interval of one of the signals. At the receive end of the system, we will generate and reinsert clean sync in this channel. Thus the effects of the cross talk will be removed. In the general case the two video signals will have no fixed relation between their sync times. Thus, while the above fix works for one master channel (to which system sync is keyed), it is of no help for the slave channel. For the slave channel the problem may be avoided by transmission of a small amount of additional information.

In Figure 2, let the samples stored in Store A-1T be taken from Channel A video starting and ending during A blanking. Then add a few samples of B video taken from the B line just preceeding the samples used to fill store B-1T from the B line (with a pause in loading during B sync time). Load a few extra samples of B video after the complete line is loaded. (These



samples will be duplicates of the first few samples in B-2T).

When read into the common line there will be no channel transition at the time when loading of B-1R or B-2R starts or stops because the common line is carrying B information on both sides of these points. Let us make a trial system design based on a video channel of about 4.2 MHz bandwidth and a store which can hold 455 samples. For NTSC video all of the frequencies and intervals are related to a master frequency,  $F_M = 14.31818$  MHz. The time building block is:

$$T_A = \frac{7}{F_M}$$

The horizontal line time is  $130 T_A$ , and this becomes the time in which we must read out both video stores plus the digital store. In loading the store let

this horizontal line time be equal to 532 sample times, ( $T_{SI}$ ). Then, maximum base band frequency we can handle is

$$f_m = \frac{1}{2 T_{SI}} = \frac{532}{2 \times 130 T_A} = \frac{532 F_M}{2 \times 7 \times 130} = 4.19 \text{ MHz}$$

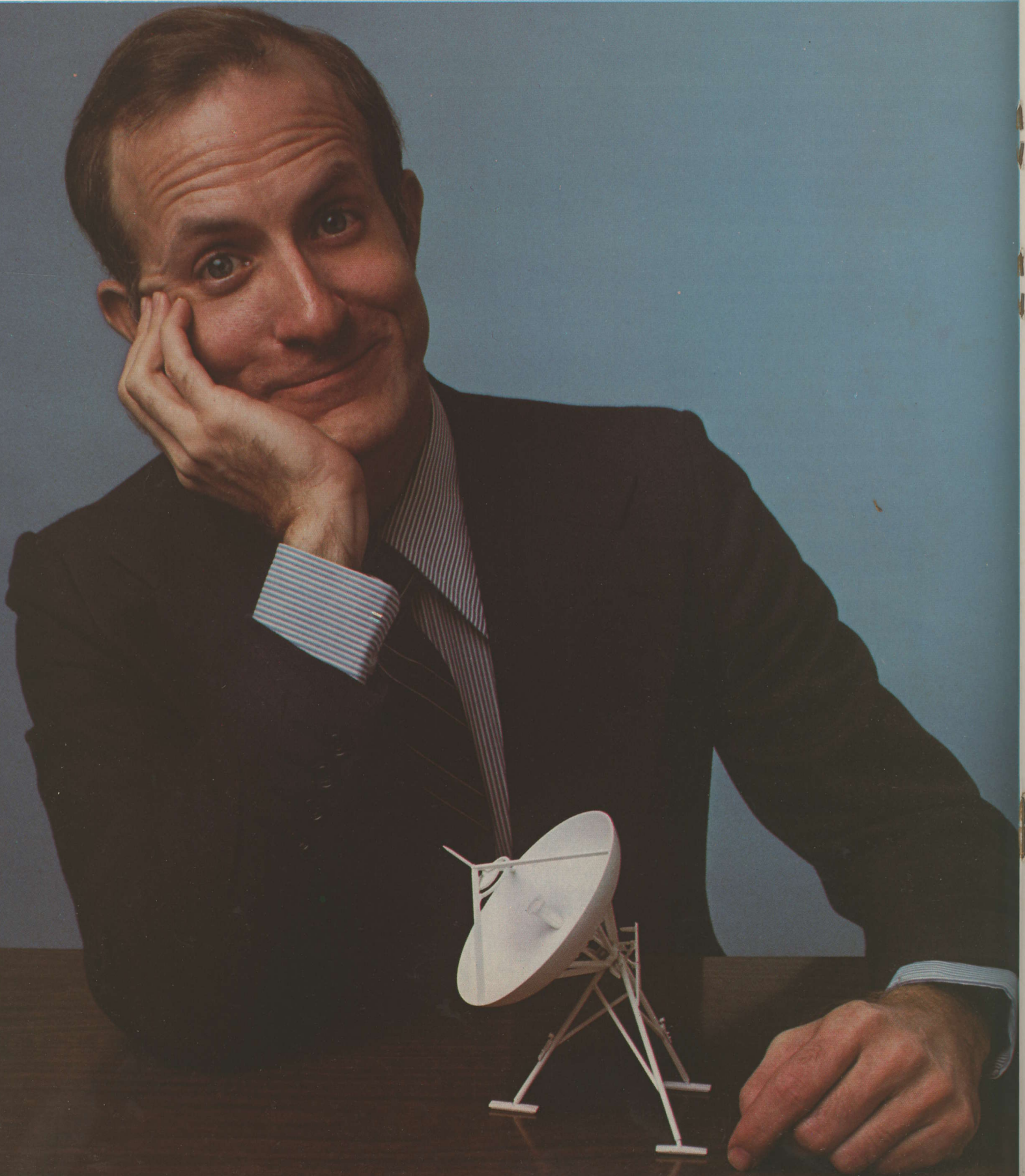
The active portion of the video line is  $108 T_A$  long which corresponds to approximately 442  $T_{SI}$ . A typical load for an A store would then be:

- 4 samples of A Blanking level
- 442 samples of A active video
- 4 samples of A Blanking video
- 5 samples of B video for cross talk prevention
- 455 Total samples

For the B stores the load would be the same except that the 8 samples of blanking would come somewhere in the middle of the store, and there would be a pause during loading in response to B sync.



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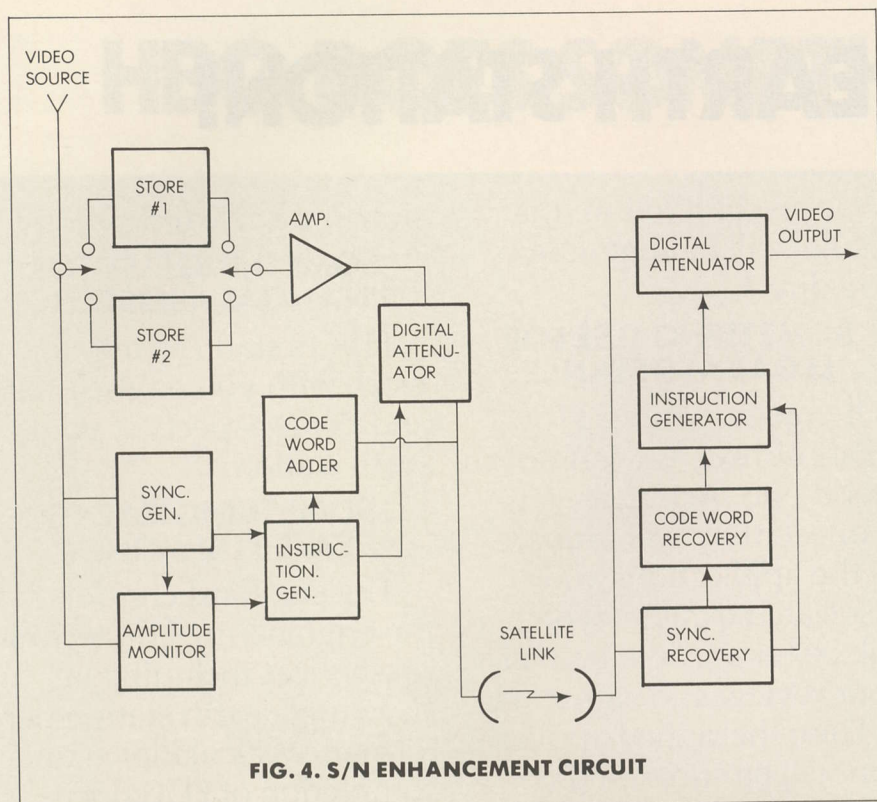


FIG. 4. S/N ENHANCEMENT CIRCUIT

When the samples are read out into the common line, let us use the following sample assignment:

- 455 samples from A-1T
- 455 samples from B-1T
- 32 sample times for Master sync.
- 10 sample times for A/B Sync difference
- 16 sample times for A audio PCM
- 16 sample times for B audio PCM
- 16 sample times—Spare at this time
- 1,000 Total sample times

The sample time into the output common line is

$$T_{SO} = \frac{130 T_A}{1000}$$

We can now calculate the maximum base band video frequency which must be transmitted over the satellite as

$$f_m = \frac{1}{2 T_{SO}} = \frac{1000}{2 \times 130 T_A} = \frac{1000 F_M}{2 \times 7 \times 130} = 7.87 \text{ MHz}$$

One may well object to a system design which calls for sampling at the Nyquist interval. Note, however, that this is an internal problem which may be resolved by using a larger number of cells in the store. The ratio of the top frequency in the

video input to the highest frequency presented to the satellite transmitter base band is:

$$\frac{f_m \text{ video}}{f_m B - B} = \frac{532}{1000} = \frac{4.19 \text{ MHz}}{7.87 \text{ MHz}}$$

If a store with 910 rather than 455 cells had been used this ratio would have stayed the same. Sampling rates within the multiplex equipment would have doubled and the digital samples would have been twice as long in terms of sample times but the same length in real time.

The numbers chosen for the example come from an attempt to design around an existing CCD storage device of 455 cells which may be driven at sampling rates as high as 16 Megasample/sec.

Let us compare the noise performance of this two channel TCM system with that of a conventional single video channel over a satellite transponder. The path of interest is the downlink and we will use a carrier to noise ratio of 12 dB for the TCM system. For the single channel system the C/N will be increased to 12.8 dB to take into account the fact that a receiver of 30 rather than 36 MHz bandwidth is often used in current practice. A relation-

ship which is frequently used is

$$(5) \frac{S_{p-p}}{N_{rms}} = \frac{C + 20 \text{ Log } \Delta f + 10 \text{ Log } B - 30 \text{ Log } f_m + 10 \text{ Log } 6 + EW}{N}$$

Where the emphasis weighting factor is 13.1 dB.

For the single channel case where

$f = 10.5 \text{ MHz}$  peak deviation and

$f_m = 4.2 \text{ MHz}$  highest base band frequency the result is  $S/N = 50.2 \text{ dB}$

For the two channel TCM system the applicable factors are:

$\Delta f = 10.13 \text{ MHz}$ ,

$f_m = 7.87 \text{ MHz}$ ,

and the result is  $S/N = 41.7 \text{ dB}$

The single channel system would normally transmit video with sync having a maximum amplitude of 160 IRE units (including maximum color signal). In the TCM system the sync signal would be regenerated and added at the receiving end. Thus, the maximum P-P value for its video would be 140 IRE units. A 1.2 dB improvement in S/N can be realized by taking advantage of this. In addition, a portion of the transmitter deviation in the single channel case was attributable to the sound subcarrier which is not needed in the TCM case. If a 1.5 dB adjustment is made for this the result is:

single channel	two channel
$S/N = 50.2 \text{ dB}$	$S/N = 44.4$

### S/N Enhancement

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



but the received noise will be attenuated.

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

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

At the receiving end of the system, the sync timing and the instruction code words are recovered directly from the common line. An instruction generated from the code word is used to set a digital attenuator to remove the results of the extra deviation inserted at the transmitter. In doing this, it brings the signal back to the proper level and reduces the noise power introduced by the satellite link. This enhancement process could, of course, be used in other applications such as line of sight microwave or video tape recording.

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

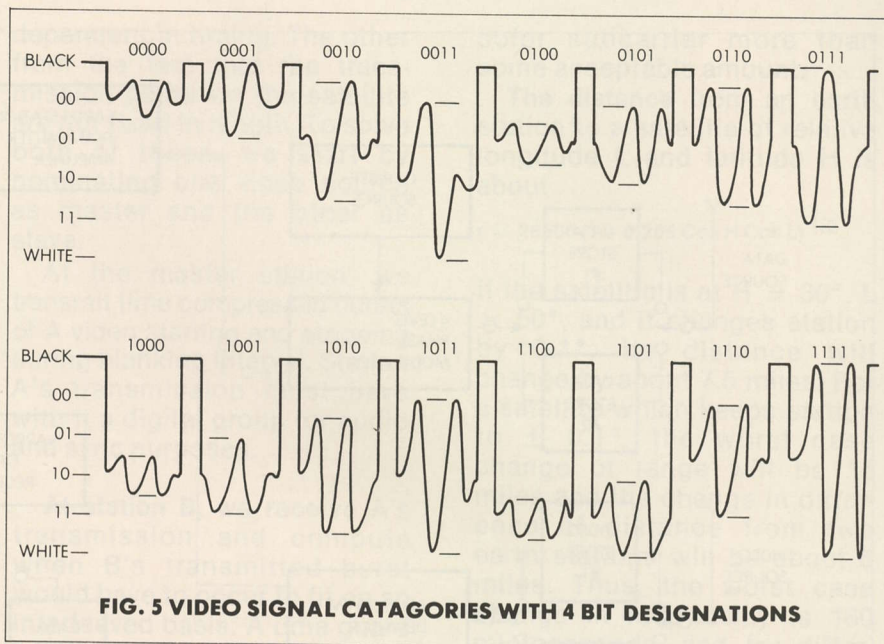


FIG. 5 VIDEO SIGNAL CATEGORIES WITH 4 BIT DESIGNATIONS

The amount of signal to noise improvement which can be achieved with this circuit cannot be calculated. It must be determined through subjective tests. We have no reason to feel that a given amount of noise power will have an equally degrading effect in a high contrast portion of the picture and a portion of little contrast. The circuit can, of course, remove much more noise power from a low contrast picture than it can from one with large changes of light level. It is interesting to note that for a video stream in which the wave forms shown in Figure 5 were equiprobable the measured reduction in noise provided by the enhancement circuit would be 5 dB.

#### A Video and Data Application

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

error performances for the various subchannels.

For example, a low data rate channel requiring excellent error performance might be handled as Binary Frequency Shift Keying. At some increase in error rate and a worthwhile improvement in signalling speed a channel could use Quaternary or M'ary FSK. For high values of M the channel error performance would be limited by phase equalization requirements unless a high correlation exists between adjacent symbols thus limiting the ringing or overshoot introduced by large transitions in a channel of poor equalization. It is the high intersymbol correlation of a video signal which allows us to increase M without bound and transmit video in its analog form on a TCM system.

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

Make it a further requirement that we be able to receive the digital channel with an inexpensive Receive Only Earth Station. The cost of an earth station for receiving satellite signals is determined by its G/T figure of merit. This term,



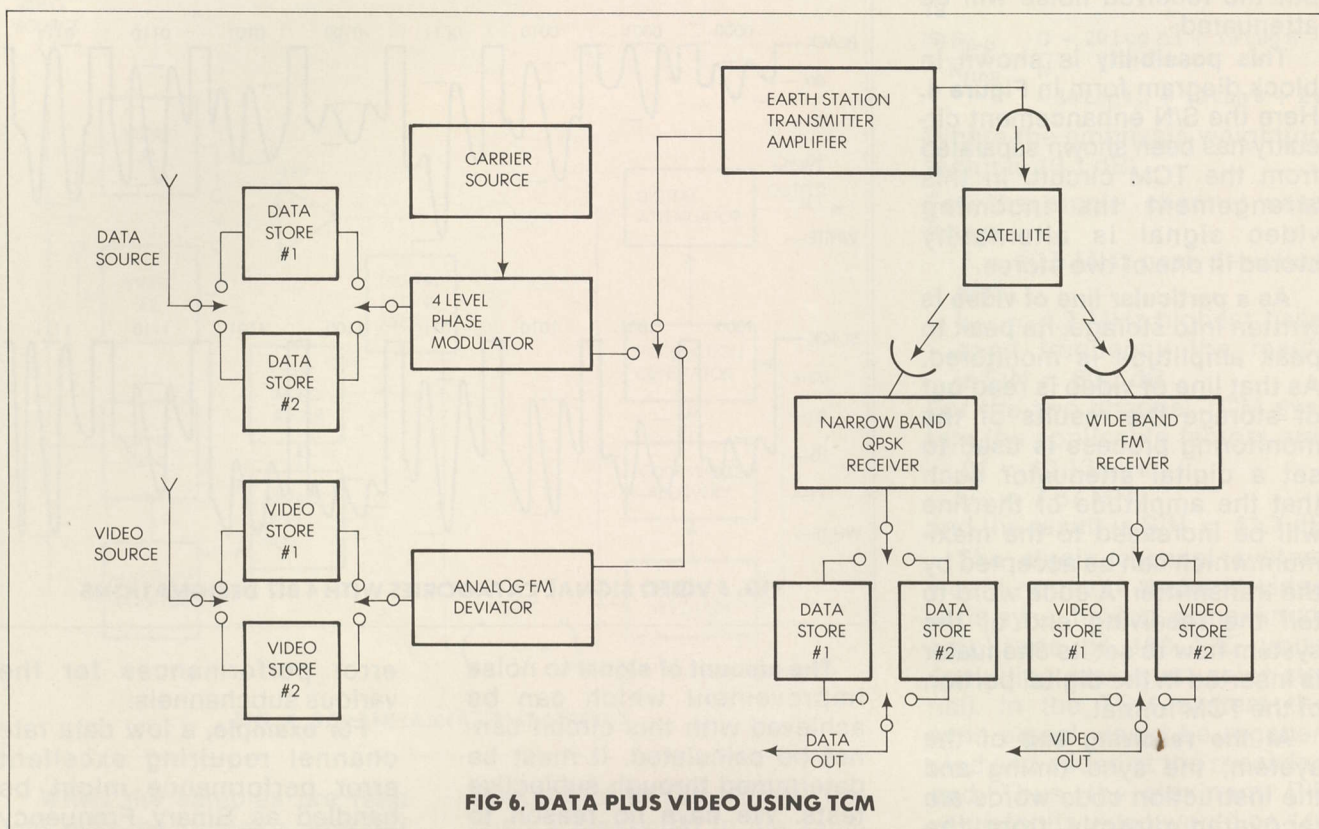


FIG 6. DATA PLUS VIDEO USING TCM

usually expressed in dB/°K is simply:

$G/T = 10 \log G_{ANT} - 10 \log T_s$ , where

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

For a typical receive only video terminal using a 15 ft. dish and a 150° K LNA the G/T rating would be 21.5 dB/°K. To achieve a low cost receive terminal for our low data rate channel we would like to use a 4 ft. dish and perhaps a 750-1000° K LNA. For this combination the figure of merit would be around zero dB/°K.

Let us assume some system parameters and see how they affect the performance which can be expected. First assign to the video channel 3/4 of the available time and allow the remaining 1/4 for the data channel. This means that in the video receiver the top base band frequency will no longer be 7.87 MHz as it was in the example using two video channels. It will be reduced by a

factor of 1.5/1 to 5.25 MHz. The noise performance of the video channel will be improved by 30 Log 1.5 for reduced base band frequency and by 20 Log 12.75/10.13 for increased possible deviation. These combine to predict a S/N of 51.6 dB for the single channel with data compared to the 44.4 computed for two video channels.

Now let us select Quaternary Phase Shift Keying as a modulation method for the data channel. Allow a receive bandwidth of  $B_{receive}$  where  $B_{rec} = 0.75 f_{data}$  and  $f_{data}$  is the data rate transmitted. Since data is only transmitted during 1/4 of the time

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

The receiver bandwidth is

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

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

Recall that the carrier to noise ratio of a receiving earth

station is given by

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

G/T is the receiving figure of merit

$L_D$  is the total loss in the down link

K is a constant -228.6 dBW/°K  
EIRP<sub>SAT</sub> is radiated satellite power, and B is the receiver bandwidth.

For the video link we have been considering with  $B = 36$  MHz, we assumed a C/N of 12 dB when G/T was 21.5 dB/°K. For the same satellite, we can rearrange (6) to give the required figure of merit for our data channel as

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

From this we have

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

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

Figure 6 shows the block diagram of a combination video and data system using TCM. Since different types of modulation are proposed for the two different kinds of input, the two streams are essentially sep-



arate until they feed a final transmitting amplifier. Both of the streams use angle modulation.

**There must be** one connection between the two streams having to do with timing. It would probably be easiest to take system timing from the video side. This might cause some buffering problems on the data side which would require pulse stuffing to adjust the data rate to go with a store switching time set by the video. At one receiving site a small dish and a narrow band receiver would receive the data signal. A number of possibilities exist for recovering timing. Recall that the beginning of the data stream of interest corresponds to switching off a FM signal which was shifted to a frequency representing black level of the video and switching on a DQPSK signal centered in the receiver pass band. This should afford a start toward achieving a sync signal.

**There is no particular requirement** that the data subchannel be located in the center of the transponder passband. The location of a data subchannel might well be chosen to avoid interference from a similar channel on the same transponder channel of an adjacent satellite. At a second location a larger dish and a wide band receiver are used to recover the video traffic. Analog stores spread this time compressed signal and deliver it at a real time rate to the output line.

### Two Way Application

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

dependent in timing. The other from the fact that the transmission paths via the satellite are not fixed in length. To solve both of these, we start by nominating one video source as master and the other as slave.

At the master station, we transmit time compressed bursts of A video starting and stopping during blanking interval. Station A's transmission must have with it a digital group for audio and sync purposes.

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

color subcarrier more than some acceptable amount.

**The distance** from an earth station to a satellite of relative longitude L and latitude H is about

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

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

**The rate of change** of loop delay controls our ability to achieve proper color synchronization by sending a burst of color carrier **once per field**. With the rate of change of delay computed above, the color carrier would shift in phase by about  $1^\circ$  in 1/60 sec. The rate of change in delay difference controls how much the time guard band between two interleaved transmission can change in the time required to send a signal up to the satellite and get a reply back. This time is about 0.28 seconds, and in that time the delay difference could have changed by about two nanoseconds for the example given.

### Conclusions

The Time Compression Multiplex System described here is in a developmental status. A number of possible configurations must be built and tested before its full potential will be known. Subjective tests of picture quality in the laboratory and transmission tests over satellite paths must both be made before system parameters can be finalized.





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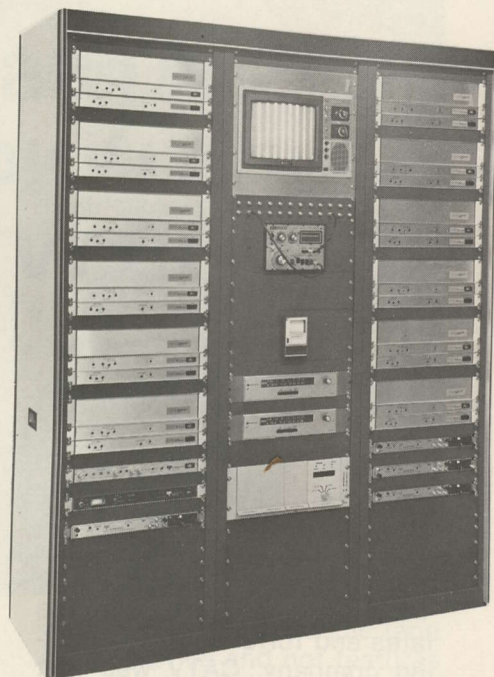


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In most fields of endeavor it is possible to pick out an overall leader and watch their ups and downs and assign an 'industry health scale' to the fates and fortunes of the leading company. CATV was that way many years ago but, as all things change from time to time, so too have the CATV 'health barometers' changed through the years.

**RMS is our candidate** for industry barometer for the latter years of the 70's decade. The firm has now been into CATV long enough (since January 1972 in a big way) to have all four feet firmly on the ground, to develop within its selected sphere of influence a very comprehensive product line, and, to shake down the marketing and warehousing and delivery aspects of their business. And it happens that RMS is in a product area which, if you follow closely, their shipments tell you a great deal about the general state of the industry—its expansion, its growth and its entree into new service regions.

**As RMS goes, so goes the industry.** If you don't believe that to be so, try to build new cable plant without using at least one product which RMS makes.

RMS passive CATV electronics began as CAMA Electronics in 1968. CAMA, under Don Edelman's guidance grew to the 6-700,000 dollar per year

level by 1971 when Edelman made a deal with Arthur Fink of RMS to create a CATV Division for the well established New York firm. RMS's Fink wanted into CATV, perhaps he saw the growth potential for home television receiving accessories peaking out and CATV as the growth industry of the future. Edelman had a firm grasp on passives, and he especially liked the established relationship RMS had with Japan. The RMS connection with Japan went back some 18 years into the mid 50's, and during that long relationship RMS had ironed out all of the bugs that off-shore production brought with its advantages of lower per unit cost.

Few can dispute the prominent position RMS now occupies in the industry in the passives region. The firm builds quality products (see CATJ April, 1976 for a detailed report on several RMS products), stands behind them and is very aggressive in the marketplace. Does the sales oriented image bother Edelman?

**"We are not ashamed of being a sales oriented company. Some companies build beautiful products, engineered to the Nth degree and then they sit on the shelves waiting for people to discover them. My philosophy has always been to: one, only take orders for products we can ship because you can't make**

**money on orders unless you can ship; and two, to be very aggressive with your sales efforts"**.

As the industry has changed and king-pin suppliers have changed positions through the 70's decade, RMS has come on strong to virtually dominate the total passives market. Edelman suggests their success has been 'dumb luck', but he says it with a boyish grin that tells you he really knows better.

**"There is always a temptation to rush in when you see an established supplier losing position or prestige,"** notes Don, **"and our future has always been built on our ability to move on something quickly. But I have to be cautious as we grow to see that our people don't slip into the same habits that have cost previous leaders in the industry to lose their position through carelessness. I know this sounds trite, but I honestly believe the customer is King. If you ever lose sight of the fact that your whole world depends upon his being happy with your product, your service and your price, you are at that pont headed down. We remember our own humble beginnings, and frankly we think we still have a long ways to go. I'm not an easy man to please, and I push our people pretty hard."**

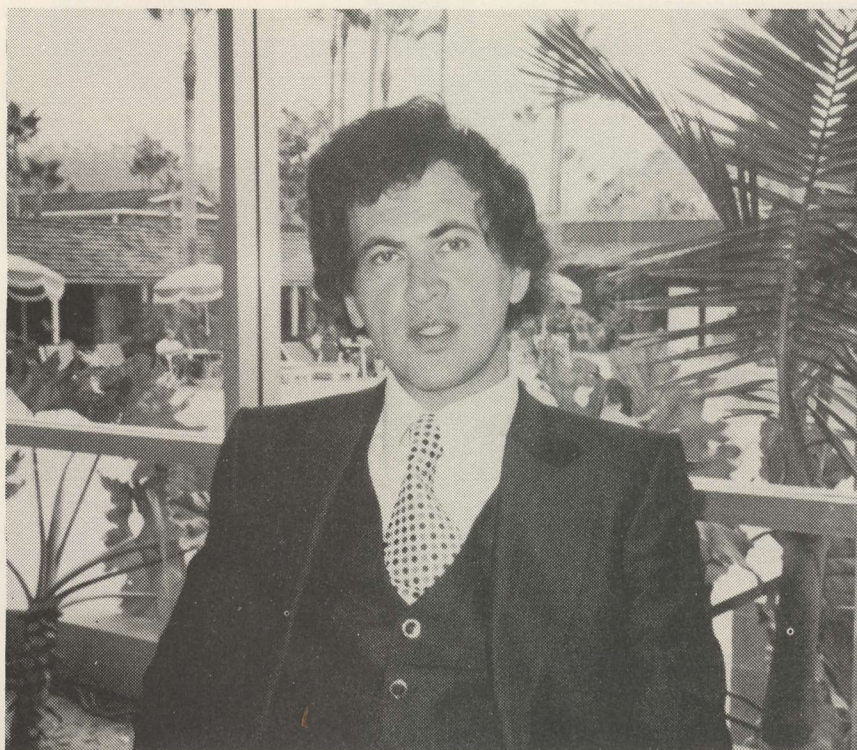
The passives world lost most of its pizzazz or sparkle back in the 60's when volume oriented producers climbed into the fray with both import-licenses swing-



ing. Many of those firms have now gone on to other things and suppliers that offer everything from soup to nuts in CATV have an understandable problem focusing month after month on passives when they also offer antennas, amplifiers and modulators...to name a few of the many products available from full line houses.

**"Our whole world is passives. When a better way comes along to do something, we are more apt to see it first, and then do something about it because every working minute of every working day our whole staff is living, breathing, and selling passives. And because we are a small company, in terms of staff, when a suggestion or idea for improvement comes along it is a short distance to the top of the line to get the proposal considered. We don't have to weigh R and D money in passives versus R and D money in actives, or antennas or what have you. It's a simple yes or no question here."**

RMS appears to know their customers well and to have an active dialogue going on passive components all of the time. **"Many of the best suggestions...no, most of the best suggestions come from the customers"** notes Edelman. **"When something is suggested that turns out to be feasible we crank the proposed product into our daily telephone calls to our clients. We get their feelings and feedback, and then we feed all of the data collected into our engineering group. From there we go to Japan for an advanced small run that will in turn allow us to test both the product and the market. Again we go back through our customers and those who made comments or suggestions about the particular device end up getting an opportunity to field test it for us. Then after everyone concerned is convinced the product is worthwhile, we do a detailed market study, commit to the product's manufacture in some quantity, and then and only then, when we have it back here on the shelf, do we go into the marketplace with our sales effort."**

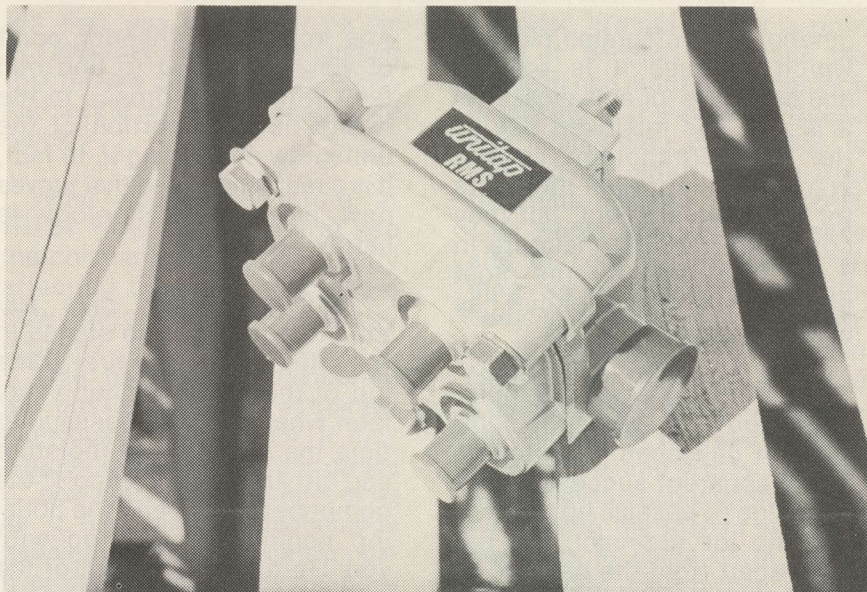


In a field where many CATV system users have been burned from time to time with "product announcements" that were not backed up by product availability, it is a most appealing approach to new product entry.

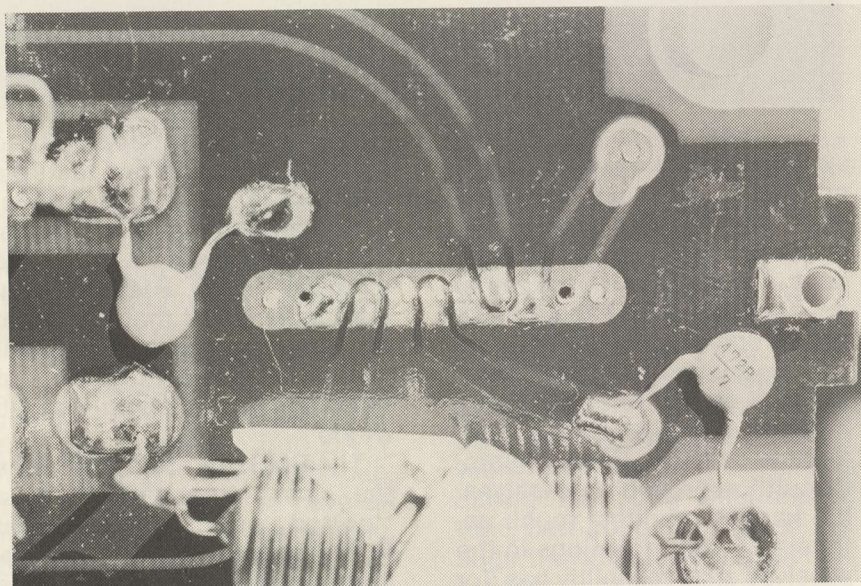
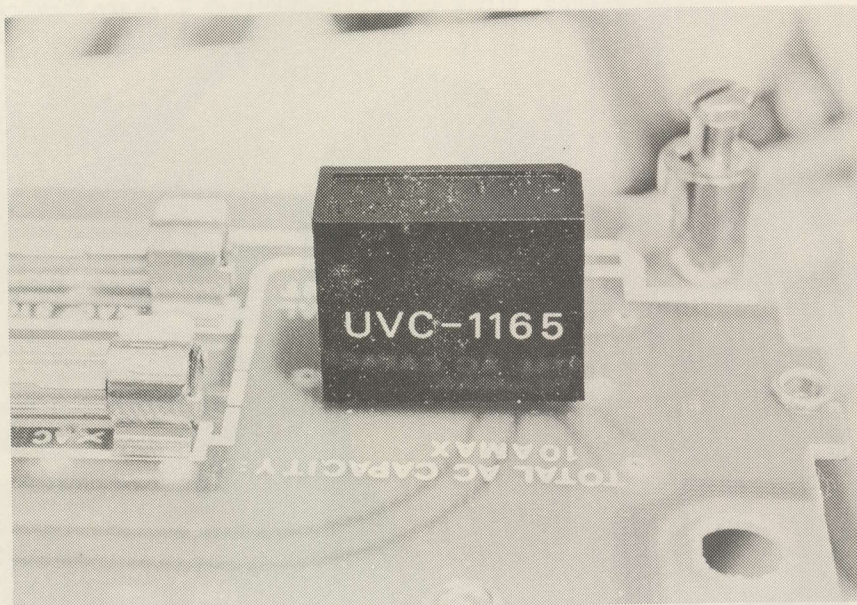
Still, mistakes do get made. People are, after all, human. A recent example was the introduction of the RMS "Micro-Circuit" approach to passives. It's hard to manifest much enthusiasm for innovations in the passives area; reliability has (for the most part) become so good

with passives that people tend to shop price and not features anymore. A common comment heard amongst operators discussing passives is "they are all alike". Well RMS had undoubtedly heard that comment too, and since passives is their whole ballgame they set out to do something about that 'attitude'.

The RMS literature describes the new "Micro-circuit" as a **"potted 'chip' manufactured in the configuration of an integrated circuit"**. Early releases went so far as to call the confi-







**CONTROVERSIAL NETWORK**—the 'similar to an IC' potted circuit that performs the RF functions mounts to board and is soldered from underside.

guration an "integrated circuit", which because it is passive and **not** active (or active/passive) **it is not**. The mistaken use of the 'IC' terminology caused some uncomfortable moments for RMS, we suspect, but they corrected the nomenclature in a big hurry and for the most part, the slip of the tongue has been forgotten.

The concept is (for the moment) unique, and while the competition has been snipping at it, the apparent success of the re-designed passive equipment utilizing the approach has set RMS apart from the balance of the passive industry once again.

And from an engineering point of view, it is hard to find real fault with this approach to the hybrid network portion of the units now employing it. In fact, it is a rather nifty idea that proves new passives technology is hardly dead at all!

Passives usually give you the most grief at two stages in their life. When they first come out of the box, and then years later when with the passage of time the intrusion of moisture and dirt and the decaying of the component parts and the housing begins to catch up with you. Getting by the "out of the box test" is basically a matter

of quality control. Anytime you are ordering in passives and experiencing 5% or greater defect rate right out of the box, it is probably time to find another supplier. Gratefully most passive suppliers recognize this problem and take extra pains to insure that it does not happen.

**Longevity is another matter.** People who buy a passive product that works properly out of the box but gradually deteriorates with age seldom recognize the problem for several years. Then its too late to complain although you can always take your next order to another (new) supplier.

RMS, with the "Micro-Circuit" approach to their Unipower series of passives, decided to take the bull by the horns and give the "client" (Edelman's preferred word for users of RMS CATV Division products) something extra to consider when he was making a passives buy decision.

"There are two kinds of stability in passives" notes Don. "Electrical stability is a problem if a unit gets too much moisture in it, or the unit gets dropped or knocked around, it gets too hot or too cold or it sits on the cable line and vibrates. We looked hard at why these problems came up, and what could be done to minimize them and the 'Micro-Circuit' was the result. What we have done here is simply place the hybrid network into a housing and then we epoxied it so the network stays in the same kind of environment all of the time. This eliminates just about all of the problems in the field with electifical specifications."

**Mechanical stability is the other problem.** How do you insure that a passive unit, hanging out there in the wind and rain and dust and so on doesn't 'leak' junk inside? It's a tough problem because the user, the guy who installs it or the last guy into the unit for whatever reason, is really more critical to the way the unit seals than anything you might normally do at the manufacturing end. All of the passive suppliers have been fighting this one since

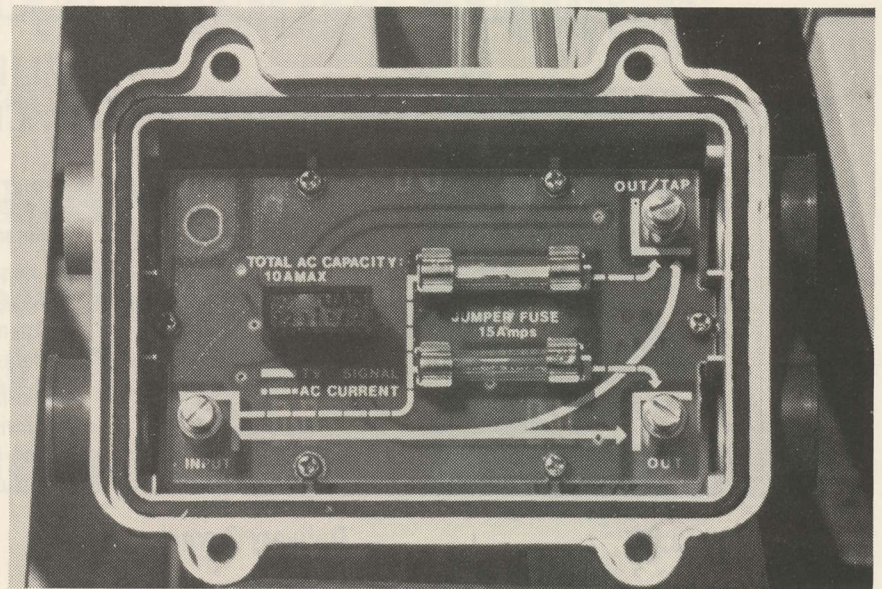


the first piece of passive gear went on the pole or on a hunk of strand'.

Needless to say every passive manufacturer has his claims and counter claims about why his housing is the best, most immune to the ingress of crud and the most foolproof to install and keep operating. The RMS approach is to use heavy die-cast aluminum housings, acrylic coated to withstand corrosion. Even the strand wire clamps are coated with acrylic. To hold the unit 'shut' most firms in the field have gone to stainless steel hex bolts (four in the case of RMS which are held 'semi-captive' to prevent their being dropped to the ground from an aerial position and lost). RMS says their hex bolts will withstand 200 pounds of torque pressure before they snap, which is a bunch of torque for a common 3/8 inch hex wrench. The bottom line is the unit seals tightly and that not only helps keep moisture and other problem agents outside, but it also helps insure that the box does not allow the egress of RF energy (thereby leading to radiation problems).

Edelman clearly wants his firm to lead the competition in innovation and the direct sales approach. **"When we can't beat them with technology we'll do our best to out market them"** he notes. **"I am not ashamed to make a profit because a profit is the best incentive there is for a firm to constantly do a better and better job with better and better products."**

The RMS line of Superfit Connectors is an example of the later. **"I think of the Superfit Connectors as a 'major-minor line'. We know there are no connectors any better available, although honestly there are others as good. So we approach these connectors as an OEM (original equipment manufacturer) that sells a wide line of passives that won't work unless they have fittings. We didn't make fittings, and it seemed logical to me that when you are talking to a client about passives you should be talking to him about connectors as well."**



INSIDE RMS UNIPOWER unit; fuses protect separate legs on this hybrid splitter, miniature 'network' is black epoxied unit to left center.

RMS buys very large quantities of connectors, they say, and this allows them to use the connectors as a 'marketing tool' to assist in the sale of their passives. **"The one thing I wanted to do with connectors was make them more easily understood, and, have them available the way we have off-the-shelf availability on passives."**

To do this RMS has created a connector catalog that looks less like a connector catalog than a new car catalog in the sense that every connector has its own page. The observation is that other connector catalogs look and function like high level engineering data sheets. **"A fellow has to have a degree to figure out what he needs; I felt that was a mistake so we put together a connector catalog that people can use more easily and locate what they need more quickly"**.

What about the future at RMS? How does the firm see the constantly evolving industry affecting their own place as a new barometer of industry growth?

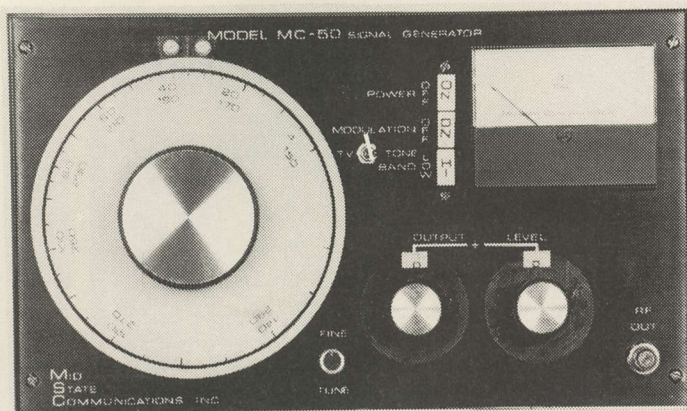
**"We have been considering the possibility of an extremely high quality A/B switch. It may happen quite soon. Fiber optics...now you might not think of us as a high enough technology house to be able to look seriously at this new area, but you have to keep in mind our Japanese**

**manufacturing facility and its very-very long record of quality work. We feel eventually there will be passives required that have to handle fiber optic signal transmission. We want to be able to accommodate that when it happens."**

And the smart tap. Two years, no, three years have now passed since the first smart tap technology entered the CATV world. Yet inspite of the monstrous sums poured into this area for R and D, there has been very little (if in fact any) buying interest on the part of cable system operators in the concept.

**"People are interested in it because it makes alot of sense"** notes Edelman. **"But it still is not cost effective for the cable operator. We did look at it, right after it became apparent the concept had merit. Our approach in looking at it was to be able to offer something better. But in the end we didn't go into it at that time because of the price. This whole concept still needs alot of conditioning and prodding; we are willing to let somebody else be the pioneer here. At the present pricing region (\$60-\$80 per tap) it is simply too expensive. Now perhaps the market will accept that kind of pricing for taps, and if they do, then we'll re-evaluate our position. But I'm betting the market waits for the price to come down and if the market waits that means RMS is going to wait as well."**





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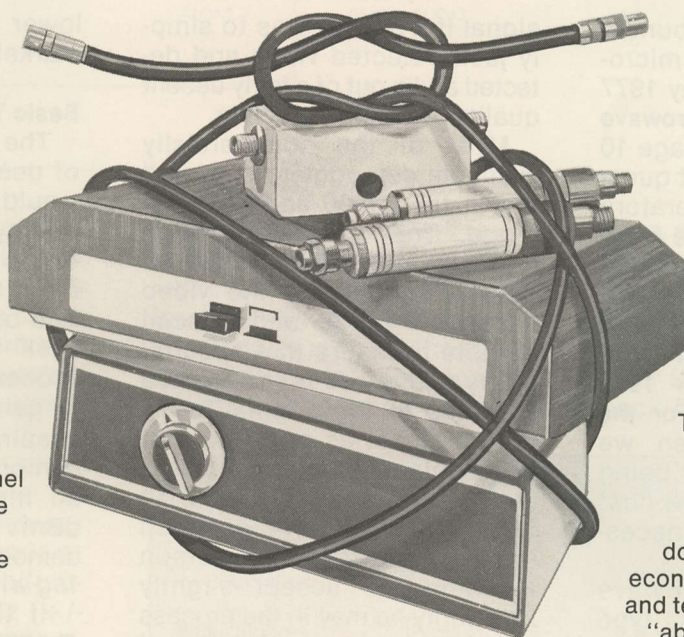
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# Negative vs Positive Systems Audited vs Unaudited Systems Cable Traps vs Descramblers Lowest Overall Costs vs Lowest Front End Costs Single Channel or Multi-channel



## Negative vs Positive System

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## Audited vs Unaudited Systems

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## Cable Traps vs Descramblers

If "they" don't pay . . . reconnect the cable trap . . . on the pole! Recovery and replacement of descramblers is time consuming, costly and may require legal action.

Descramblers can also be "loaned out" depriving you of additional income . . . but VITEK Cable Traps stay put . . . **on the pole!**

## Lowest Overall Cost vs Lowest Front End Costs

You get what you pay for, so don't be misled by the apparent economies of (POS) descramblers and terms like "self-amortize" and "absorbed costs". The larger the installation, the more economical VITEK Cable Traps become. You save on maintenance and service calls, recovery or replacement of equipment and in the end, there is nothing more foolproof and reliable than a VITEK Cable Trap to prevent theft of service . . . and that's what PAY TV Security is all about.

If you're successful, you'll outgrow the short-term economics and inadequacies of descramblers as others have and change over to VITEK's Cable Traps.

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# TOMCO'S D-1000 LOW COST CATV DEMODULATOR

### An Answer

When the first announcement of low-cost CATV microwave appeared in the May 1977 issue of CATJ (see **'Microwave For \$2400 A Channel?'**, page 10 May 1977) one of the first questions asked by many operators was "now the microwave is so inexpensive, what can be done to bring down the cost of the peripheral equipment?". A fair question, repeated in some depth in the November 1977 CATJ (see **'Microwave For the Masses'**, page 47) when we looked at the progress being made with both the low-cost FM microwave and the necessary attachments.

The basic FM microwave system, unlike the AM(L) type microwave, must be modulated with a 'baseband' signal; that is, one that has not yet attained an RF (radio frequency) status. A video signal voltage with a counterpart audio signal voltage (either separately, or combined with the audio on a 4.5 MHz subcarrier) fills that bill. But alas, the typical off-air receiving site keeps everything at RF, or in the best case IF, and seldom do most headend sites process incoming RF signals all the way 'down' to baseband.

To get the incoming TV channel to baseband requires a demodulator, which is another word for a television receiver (perhaps without the visual display CRT and the audio display speaker). Seemingly a reasonably good start could be made on getting a baseband

signal if a person was to simply jack detected video and detected audio out of a fairly decent quality television receiver.

Most of the commercially available demodulators around are in the \$1000 and up price range. They offer very high quality video (and audio) recovery, shaping of the video baseband signal and special circuits to insure that spectral purity and phase is maintained as close to the original transmitted signal as possible. But like so many things in life there are costs associated with being so pure, and common sense suggests that if a person is willing to accept slightly less purity he may in the process shave considerable bucks off of the cost of the equipment.

The new TOMCO D-1000 (all channel) demodulator takes an in between stance to this problem and for those who have begun the task of shopping for a more reasonably priced demodulator (for microwave baseband feeds or for whatever reason you might have) the "under \$500" price tag should be of interest. The D-1000 is a familiar-looking member of a now considerably enlarged family of RF/IF signal processing units. Rack mounting, like the SR-1000 (see CATJ for October 1975) and SR-2000 units, the D-1000 appears to have been designed to do what the cable operator most needs done at a cost considerably

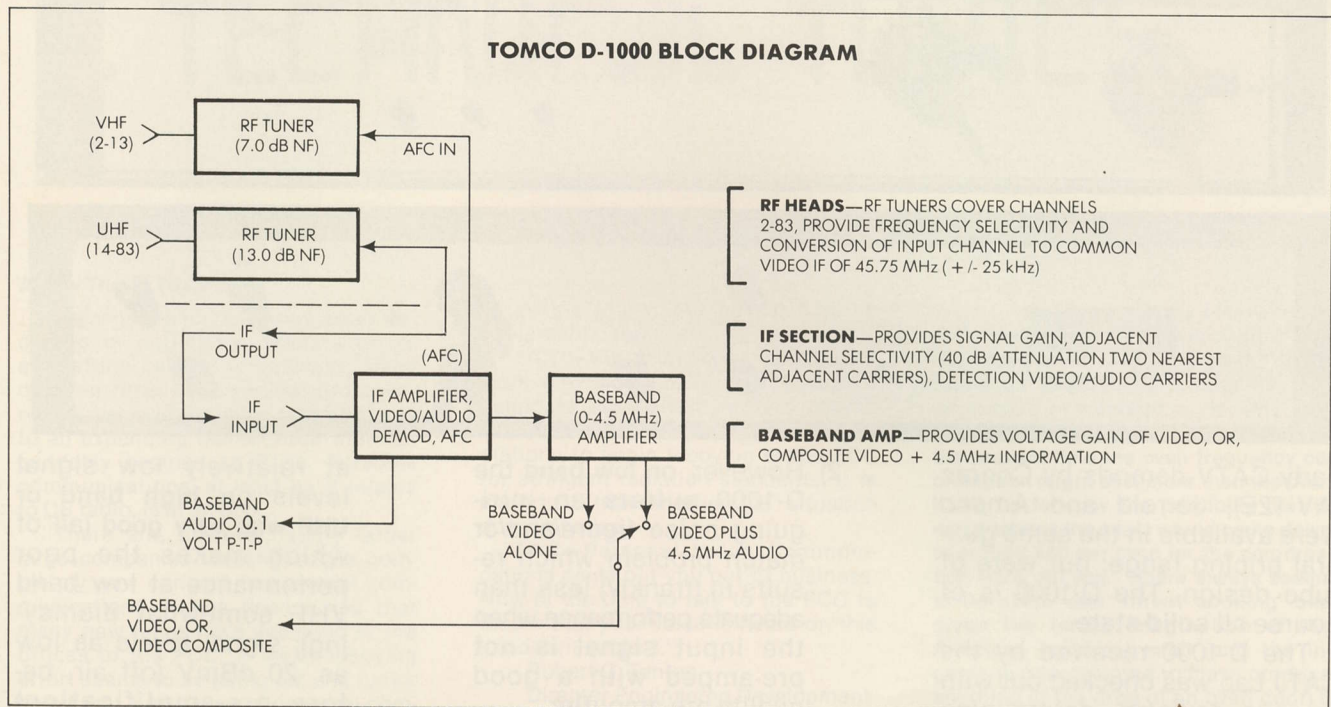
lower than other units on the market.

### Basic Tuner Format

The D-1000 follows the type of design approach which one would recognize in any high quality off-air receiver, and up to the point of demodulation, in most CATV signal processors. The off-air signal (VHF 2-13 or UHF 14-83) is turret-tuner processed to an IF range where IF gain, bandpass filtering and shaping takes place. The tuner/demodulator will function over an input signal range of -20 dBmV to +25 dBmV with the demodulated video output holding within  $\pm 0.5$  dB.

If the interior shots of the D-1000 have a ring of familiarity about them, the layout follows most other TOMCO gear and the circuit boards are largely an 'off-shore' product subtly modified and adapted to fulfill the circuit requirements at hand. The baseband outputs available are either (a) baseband video out of one (F) jack and baseband audio out of another (RCA type) jack, or, (b) baseband video plus a 4.5 MHz subcarrier audio out of the same (F) jack. The user selects which of the two formats he requires with a switch on the back of the demodulator panel. The unit takes the processed signal in through the antenna input (F) jack, through the RF tuner (which takes it down to IF) and then back out through another (F) jack on the rear panel.





Then with a short jumper of RG-59 you go back into another (F) jack marked IF which sends the signal speeding on its way through the IF system and IF to baseband demodulator. In this way you could utilize the D-1000 for certain IF to baseband functions employing externally available IF signals and bypass the RF tuner built into the unit. The input to the IF amplifier (/demodulator) centers on 45.75 MHz (+/- 25 kHz) and anyone contemplating using the unit as an **IF input demodulator** for other IF sources in the headend should first ascertain that the IF signal available has a 45.75 MHz video carrier frequency.

The power consumption of the unit points up rather dramatically where all of the hungry consumption of AC power is with most television receivers. Since the unit is for all practical purposes a TV receiver **less** the CRT video display and the speaker audio display, there is a comparison to be noted when one notices that the total power consumption of the D-1000 is 10 watts maximum. Obviously it could get by at a remote, power sensitive site with very little operating power required.

The D-1000 has been brought to the 'market place' largely in response to the crying need for relatively low cost demodulator equipment for those systems getting into low cost FM microwave systems. The last

time a unit of similar specifications was available in the marketplace at a price of under \$500 was back around 1974 when Setchell Carlson produced their DEM919 unit. If one goes back further than the DEM919,

#### TOMCO D-1000 DEMOD

<b>Model Number—</b>	D-1000
<b>Input Channels—</b>	2-13, 14-83
<b>Noise Figure—</b>	7 dB max (*) VHF 13 dB max UHF
<b>Selectivity—</b>	Greater than 40 dB rejection lower adjacent audio, upper adjacent video
<b>Input Level Range—</b>	-20 dBmV to +25 dBmV for 0.5 dB video output level stability
<b>AFC Range—</b>	Video IF output held to +/- 25 kHz with AFC loop
<b>Differential Gain—</b>	+/- 0.5 dB (**)
<b>Differential Phase—</b>	+/- 1 degree maximum (**)
<b>AGC Approach—</b>	Sync tip reference, 'noise immune'
<b>Video Output—</b>	1.0 volt peak to peak
<b>Audio Output—</b>	Baseband audio, or, 4.5 MHz subcarrier at +30 dBmV level
<b>Power Required—</b>	115 VAC, 60 hertz, 10 watts
<b>Manufacturer—</b>	TOMCO Communications, Inc., 1077 Independence Avenue, Mountain View, California 94043 (415/969-3042)
<b>Price Range—</b>	under \$500

\*—See text for comments on low band VHF performance; \*\*—Not verified by laboratory tests.





early CATV demods by Conrac (AV-12E), Jerrold and Ameco were available in the same general pricing range; but were of course all solid state.

The D-1000 received by the CATJ Lab was checked out with an eye towards determining whether it met its published specifications (see table here). We recognized going in that we were not going to be looking for \$2,000 performance in an under-\$500-box, and with that caveat in mind here are our observations.

- 1) The D-1000 has surprisingly good selectivity **on high band** (by measurement 6 dB better in rejection of lower adjacent audio or upper adjacent video than the Lab's DEM919 unit);

- 2) However, **on low band** the D-1000 suffers an intriguing noise figure/and/or match problem which results in (frankly) less than adequate performance when the input signal is not pre-amped with a good quality pre-amplifier.

In actual fact the use of any demodulator which is intended to provide a baseband signal to drive microwave should always be as a part of a full signal processing system. If you would install a pre-amplifier, or bandpass filters, or traps ahead of a signal processor for local processing of a channel at the headend, the same type of approach should be employed ahead of a signal demodulator.

- 3) **Performance of the D-1000**

at relatively low signal levels on **high band** or **UHF** was **very good** (all of which makes the poor performance at low band VHF somewhat dismaying); signal levels as low as -20 dBmV (off air, before pre-amplification) were reasonably suitable for baseband microwave inputs at high band VHF, and levels of -10 dBmV at UHF were also very acceptable.

- 4) The output video level, within the AGC window of the RF portion of the unit, stays in the 1 volt peak to peak range. However there is no video level output control on the D-1000 which would under some operating circumstances be desirable.

## Opportunity

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## Of The Decade



# TECHNICAL TOPICS

## A New Threat To CATV?

"Citizens Band radio has been declining in popularity. Manufacturers are getting out of the business; many of them have been forced into bankruptcy because of over commitments to an expanding marketplace that has suddenly seemed to fizzle. Personal communications, at least as it relates to CB radio, is at an ebb.

"There are, however, some rather large companies investigating a completely new concept in personal communications. It has been noted that many new faces have appeared at the offices of the FCC. A major lobbying effort seems to be going on, and rumor has it that a new type of personal communications systems is the reason for the activity. Everyone seems to be rather closemouthed about what is actually going on, but some sources indicate that it revolves around video and a personal microwave system. There also appears to be a counter-lobbying effort by certain large common carriers who fear the same interference problems that CB has brought to CATV and the broadcasters.

"The original suspicion was that some manufacturer would get into mass production of a Gunplexer. This, on further investigation, has turned out not to be the case. Based on some of the individuals seen at the FCC, it would appear that there is a strong tie-in with video cassette manufacturers. There is an undercurrent which seems to be flowing through the manufacturers of closed circuit television cameras and monitors. Manufacturers of charge coupled devices are talking about \$50 black and white television cameras. The video cassette manufacturers are projecting such large volumes that their expected pricing is at the \$500 level.

"The main thrust of this system comes not from the expected communications manufacturers, but rather from the people who make microwave ovens. A strong tie-in is expected between the camera, the video cassette machine and the dual purpose cooker/transmitter which is soon to come out of the development labs of certain microwave oven manufacturers. There has been an apparent breakthrough in modulation technology which will allow—with minor modification—direct video and audio modulation of a microwave oven. Some wags say that there is a great deal of interest expressed by certain food packagers who expect to produce low cost cooking shows, and in fact will pay for pro-

gramming that might be supplied by equipment purchasers.

"**MON**—the Microwave Oven Network may soon be in our future. It behooves all those who have or plan to have microwave equipment or earth stations to begin lobbying at the FCC for stringent radiation standards. It is important that another CB situation does not arise.

"**PVC**—Personal Video Communications could put you out of business. Now is the time to talk to the FCC to insure that your voice is heard on this important subject."

Robert C. Tenten  
Director Engineering Development  
HBO - Home Box Office  
New York, New York 10020

**We too, Bob, have heard rumblings of such a move afoot. Let's face it. . .the CB fiasco has a number of mass production electronic firms against the wall. They are desperate. . .and would probably try anything to get the cash rolling again.**

We also have been told, by a very reputable frequency coordination firm, that they have been asked "to study" what would be required for "frequency coordination of microwave ovens". One wag (as you noted) told us that while at the present time the oven frequency coordination might cost more than the oven itself, he foresaw the possibility that in mass volume the costs would come down to around \$50 per oven for the coordination work. Ah yes. . .there always seems to be some new 'threat cooking' and given the fertile imagination of the American technical mind (and the ingenious oriental mind to mass produce anything at the drop of an oven door) it pays, as always, to keep our guard up.

## A Capacitor Is A Capacitor

"Reference your December issue and the feature article 'Super 17 Is Off'. Do your readers really need such basic instructions in general trouble

**When your picture is really lousy and the phone is ringing off the hook, who's going to explain to your subscribers about the few dollars you saved on that last receiver?**

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shooting and then an illustrated guide to changing a capacitor?

The main lesson here is that receivers can fail and they can take a while to fix; so if you want to sleep at night get yourself a spare tuneable receiver with remote or automatic change-over. LNA's are less reliable than receivers so perhaps you had better have a spare LNA as well. \$10,000 worth of spares costs only \$150 per month in depreciation and interest charges (amortized over ten years). A system should consider that \$150 a month as a form of insurance.

There are a couple of mistakes in your article on 4 GHz passives. The 'ultimate match' is not 40 dB. What you meant to say is that a 40 dB return loss representing a VSWR of 1.020 is about as good as we can realize with practical components. I doubt that isolation in the power divider is all that critical particularly when feeding receivers with RF (pre)amplifier stages which help isolate the local oscillator from the input port. Isolation problems can be helped by using resistive pads if necessary, either at the input to the power divider or at the input to the individual receivers. As you said in the article, most installations 'have power to burn' after the LNA.

The definition given for amplitude balance is also incorrect. Phase and amplitude balance specs deal with the comparison of output phase and amplitude at the various output ports. Some power divider applications require that the out-

puts from the various ports be very closely the same in both phase and amplitude; i.e., that a power divider intended to divide input power into two equal halves should indeed do that and present the same output amplitude and phase at both output ports.

The same December issue also has some references to RCA operating two video channels through a single transponder using reduced deviation for each video channel. This 'split channel' operation was, I believe, first demonstrated by (Canada's) Telesat on one of their Anik satellites a couple of years ago. The main problem was inter-modulation spill over into adjacent transponder channels. This may be acceptable while the adjacent channels have some 'robust' traffic on them that can stand the intermod noise from the adjacent 'split TV channel'. Other problems were the ones you cited; reduced system performance due to reduced deviations, and the requirement for special split-channel receivers.

Any comment from RCA on their experience with the intermod problem?"

I. Switzer

Switzer Engineering Services  
Limited

Mississauga, Ontario

Our 'definition' of amplitude balance suggested that in 'GHz lingo' the use of this term could be related to our use of the term 'flatness'. We agree with Mr. Switzer's comments, but believe the GHz people may not be as clear on how they use the term as Mr. Switzer is on how he uses the term! As far as getting 'a comment' from RCA on the experience they have had with adjacent channel 'spillage' when a single transponder is 'loaded' with two separate sets of video, we expect that RCA will pass. To date they have played everything about their 'birds' exceedingly close to the vest and have been reluctant to publish anything much beyond 'they are up there', and, 'they work'. However, we never stop trying and perhaps one of these days RCA will turn loose some of the technical people on the CATV industry with some answers to the many questions posed to them by the CATV industry.

#### Noise In Signals

"We are experiencing electrical interference in two of our low band channels and would appreciate receiving any suggestions that you may have. Our headend is approximately 50 feet from two-way radio stations utilized by our local power company and police department. Could these stations possibly be the problem?"

Robert S. Anderson  
President  
Camp Cable Television  
Mau No Ka Oi, Hawaii

Electrical interference normally appears as elongated black streaks or bars randomly placed throughout the screen; horizontal in position. Certain types of electrical interference appear as both black dashes and white dots often

'clustered' in one area of the screen (such as lower portion). The techniques to be employed in locating the source for such interference were covered in some detail in CATJ for May 1974 (page 8). If you are unable to locate a copy of that report, a Xerox copy is available from CATJ for \$1.00. Two-way radio interference, on the other hand, generally consists of a 'filmy appearance' over the full screen with moving diagonal 'cross hatching' lines (the cross hatching lines move in relation to the modulation present from the radio transmitter causing the interference). This particular subject was also covered in some detail in the same May 1974 issue (page 19) and again a copy is available for \$1.00 (Xerox). Two-way radio interference is generally obvious because it comes and goes when the transmitter is keyed on and off. Electrical interference is most pronounced when the power line insulators are dry and blowing dust has built up on the insulators providing a 'discharge path' for the electrical energy on the power line. Dust is not the only cause of 'power line leaks' of course; poor grounds on power poles are also a potential problem. One nice thing about dust build up on insulators however; when it rains and washes the dust away the noise problem usually clears up for a few days or until the dust blows back onto the insulators. And that's a clue to you of your particular problem.

#### Critical At Renewal Time

"I wanted to take this opportunity (while renewing CATJ) to voice my displeasure at editorials critical of telephone companies. As an employee of Bell of Pennsylvania I can see the other side of the pole rental issue. Please be aware that your entire readership does not share your editorial opinions."

Kurt A. Nelson  
Rockledge, Pa.  
19111

Indeed we do not expect everyone to agree with our editorial opinions. Quite the contrary, if everyone did agree there would be little reason to waste space voicing such opinions. Editorials, hopefully, play some part in (1) establishing industry opinions and (2) alerting non-industry people of the positions of this industry. These pages are always open to opinions rather than our own and we welcome other opinions which we will always pass on here.

#### FM For Copyright

The U.S. Copyright Office has decided that their handling of 'FM station registration' for copyright purposes needs to be re-addressed; especially where cable operators are carrying broadband FM signals.

The initial rules required that you were to list all of the FM signals carried by your system. Because many broadband carriage systems had no accurate way to determine which FM signals were really present at any given moment many CATV systems supplied the Copyright Office with a full listing of every FM station in the United States

## TELEVISION TRANSMISSION/ CATV ENGINEER

HBO, the leading satellite television network to the cable industry, has a requirement for an experienced engineer with video/audio transmission and CATV security background. Applicant will be based in New York with 25% travel. Responsibilities include direct technical and engineering interface with HBO affiliates and the HBO sales affiliate group. Additionally, will provide departmental representation at various industry seminars and CATV associations. This position offers an excellent starting salary with growth potential. Resumes may be sent to:

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and Canada. This made the point with the Copyright people that their rules were out of phase with the real world, so they went back to the drawing boards.

Under the latest 'ruling' the cable operator carrying broadband FM signals is required to list any and all FM signals carried by the system when:

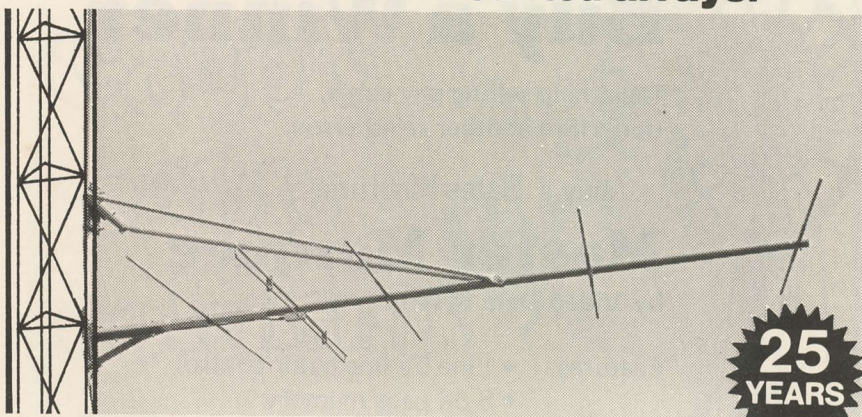
- 1) The FM station has a signal level of 50 microvolts (or more) across 75 ohms, "as measured at the base of the tower/pole/mast";
- 2) The measurements are to be made using a field strength/signal level meter, or spectrum analyzer, before signal pre-amplification, at the base (or bottom) of the down-line extending from the off-air FM antennas to your FM broadband processing equipment.

All of which sounds very neat and tidy until you go out and try to do this. The first problem one runs into with a run of the mill field strength meter is the IF bandwidth of the meter. Virtually all quality CATV FSM/SLMs have a bandwidth in the IF of between 600 and 800 kHz. FM channels are spaced at 200 kHz which means that between 3 and 4 FM 'channels' can sneak into the IF passband of the meter at the same time, within the 3 dB bandwidth points of the meter. That simply means you lack the FSM/SLM 'resolution' required to separate the FM stations to really determine which stations you are reading out on your meter. Just because you read 50 microvolts doesn't mean much... that could be the sum of several different FM carriers present. Then assuming you do sort this out, you have to extrapolate the meter reading signals into specific FM signals (by call letters, and location). The meter does not help much... even if you have one that gives you an audio display of the signals measured, since with 3-4 FM signals inside of the IF bandwidth all being detected and audio-displayed at the same time you have an almost hopeless mish-mash of audio present which normally you cannot separate well enough to "read" call letters.

A spectrum analyzer helps if it has sufficient 'resolution' to read carriers spaced 200 kHz apart... but that still leaves you with the problem of identifying by call letters which of the carriers are 50 microvolts or better. The bottom line is that there is no FM-only field strength meter around in the CATV world that also has built into it audio display so you can measure and listen to a single FM channel at a time.

So much for the basic problem of complying. There are others however. One big problem is deciding when to make your measurements. FM signals have a way of propagating over distance at odd times and at considerable signal levels. Just as an example, to make some tests for a CATJ Lab project we put up a simple dipole antenna at 30 feet and set up a chart recorder on the IF signal level coming through a popular brand FM tuner. We spent three weeks monitoring a 200 mile distant 100 kW FM station with this set

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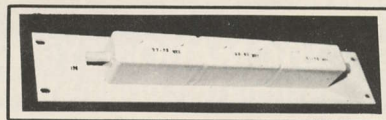


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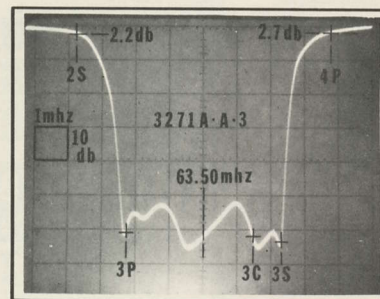
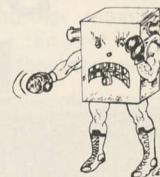
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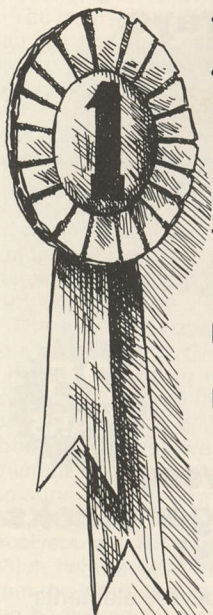
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up, and working the chart recordings backwards against a calibration level we found that during the 504 hour test period we had:

- 1) **18.5 hours (3.6%)** 100 microvolt or stronger signals
- 2) **71.0 hours (15.1%)** 50 microvolt or stronger signals.

If you have a gain FM antenna at some height above ground you can expect to find FM signals from some distance to be at the 50 microvolt or higher level perhaps 30-40% of the time. So what you do, ignore these 'quite often but not consistent' signals?

The Copyright Office, unfortunately, just does not seem **capable of understanding** that rules created in Washington may not make any sense to the people who are forced to implement the rules. So what is the best suggestion?

If the Copyright Office is after you to supply a **modified list** of FM stations you carry, based upon the "50 microvolts at the bottom of the tower" formula, we suggest that you either take it up with

**Mr. E. Paul Dunn, Licensing Specialist, U.S. Copyright Office, Library of Congress, Washington, D.C. 20557.**

Or, go into town and purchase/beg/borrow/steal, take out on loan one of the cheap FM table model radios and:

- 1) **Hook your FSM to your FM antenna** and find an easily-identified strong local FM station. Measure its level in dBmv.
- 2) **Take a VTVM** (in AC voltage position) and hook the VTVM across the speaker leads of the radio. Set the volume to some comfortable level and leave the volume control alone.
- 3) **Put a pad** in the FM downline and **adjust the level of the strong local FM signal** down to where it reads 50 microvolts on the FSM/SLM.
- 4) **Connect that signal** (with the pad in line) to the FM radio and re-adjust the FM volume control so you have a good reference audio level on your VTVM (i.e. such as 1 volt on voice peaks).
- 5) **Now take the pad out** of the line and start at the bottom (or top) of the FM dial and go through the full FM spectrum. Stop whenever you find an FM signal that kicks the VTVM up over your reference point set with the pad in the line on the local station, check out the station call letters and write them down on your list.

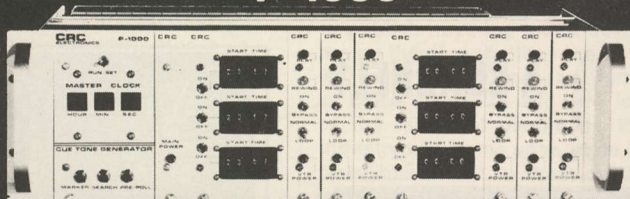
It is not a 100% foolproof technique, but it is one way to more or less comply with the requirement. It's also a good way to kill a Sunday afternoon.

There is another scheme you can use if you have access to an FM tuner with a **squelch control** on it.

- 1) **Set the squelch control** so that the receiver squelch just 'breaks' on a signal that is 50 microvolts or higher
- 2) **Disconnect the pad** and go through the full dial stopping with each station that breaks the squelch, putting them down on your list.

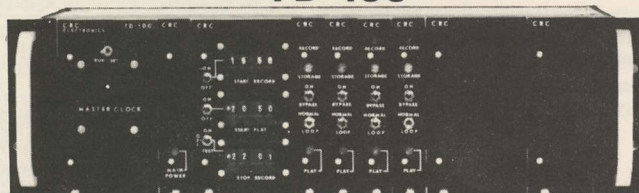
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## Revisiting 'Smaller'

In our March column we talked about some of the changes underway within the industry with TVRO antenna size. And we noted that a number of people and firms were 'playing with' (playing can be serious work as well as fun type stuff) dishes of 3 meter size (10 foot) and in some cases even 8 foot and 6 foot.

Then in our April issue, on page 44, we talked about the impact of the slightly hotter WESTAR II footprint on the new AmeriCom Satellite Network CATV project. By the way, if you **believed** our WESTAR II "footprint map" appearing on page 44 for April, and ran out and made some plans around that footprint, better check Satellite Technology News in this issue for a revised footprint.

The plain facts are that if:

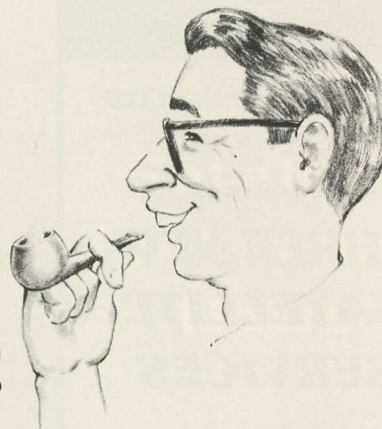
- 1) You are **only concerned** with having a terminal that is out of the sparklie noise (i.e. **above** full threshold), **and**,
- 2) You have **average** or perhaps **no** terrestrial **interference** at your proposed site, **and**,
- 3) You can beg, borrow or steal a **100 degree Kelvin LNA**, **and**,
- 4) You are located **inside** a 35/36/37 dBw footprint of any of the present 3.7-4.2 GHz transponders . . . **then you can**
- 5) Get by very nicely with a **ten foot** Prodelin (or Andrew, etc.) dish.

As a matter of fact, if you are in the 37 dBw contour of WESTAR II, with the same other requirements, the picture (and sound) on a **6 foot** dish is only ever so slightly sparklie. And you **could** sit and watch (i.e. follow the text) on a **4 foot** dish in the same situation.

Now the FCC addresses terminal antenna size as a function of antenna pattern; or the ability of a given antenna to provide a certain degree of directivity. The December 1976 rules allowed us to **drop** to a 4.5 meter size antenna **provided** our antenna met something called the 32 minus 25 log theta curve **and provided** our terminals were so designed as to provide a **3 dB margin** between the actual level delivered to the receiver (C to N) and the **start** of noise degradation. At the moment the smallest antenna **that is FCC approved** for this service is a 4.5 meter antenna (well, there's **one** horn antenna **slightly** smaller than this). But there **are** a couple of outfits working on a **12 foot** antenna which they say if properly illuminated (that means the feed is cleverly designed) and if shrouded (that's a metal rim around the circumference to shield against terrestrial noise and interference contributions) could indeed meet the FCC requirements for 32 minus 25 log theta. In fact, . . . there is at least **one** knowledgeable source that says a **ten foot** with the proper type of prime focus feed **and feed support** could also meet the 32 minus 25 log theta curve.

OK. . . so it's possible to meet the FCC's pattern requirements with something **smaller** than a 4.5 meter antenna.

# Coop's cable column



**bob cooper editor in chief**  
**CATJ**

What about the C to N problem? Again, in the right type of (36 or 37 dBw) footprint region, the 12 foot will certainly make the 3 dB above threshold requirement and **perhaps** a 10 foot would as well. It all depends on the state of the LNA art; or, how low can you **afford** to go with your LNA noise temperature?

The CATJ Lab has been in the thick of looking at **smaller** than 4.5 meter antennas for some months now. Utilizing our WF92 Development License we've been popping up at various places with transportable 10 (and 6) foot antennas, a 100 degree SCI LNA and various receivers. During the last week in March we had the opportunity to show off in **public** the operation on our Prodelin 10 foot terminal mounted on the back of a flatbed truck. The occasion was the

Oklahoma Cable Television Association's annual spring meeting; a meeting during which Oklahoma operators hosted around 50 of the state's elected legislators to a cocktail party and dinner. Oklahoma operators wanted to acquaint the state's law makers with the changing face of community antenna television systems and they needed a terminal to **demonstrate** the satellite signals.

**Now let's face facts.** Hauling a transportable 4.5 meter terminal around is a big pain in the neck. The Andrews rig, which leases out for around \$2500 a month plus travel costs is one way to do a show and tell but there is nearly one day of set up and tear down time after each showing. A ten foot, on the other hand, can be designed onto a

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lightweight boat trailer then can be towed to the site by a standard sized car or pick up truck. If you are very clever about the way you design the trailer with hand winches and outriggers for stabilizing the trailer you can go from stepping out of the pull vehicle to acquisition of satellite signals in **about 30 minutes time**. We've been there, we know. And a ten foot will transport down the highway quite nicely without being over long or over tall or over wide. It's a one man job and that's hard to say about anything much bigger. Plus the antenna can stay in one piece during transit.

### So who would want to do such a thing?

Anyone who wanted to demonstrate what satellite reception was all about. That's who. Or anyone who needed to run site feasibility surveys for terrestrial interference from existing 3.7-4.2 terrestrial users.

While we were parked at the Oklahoma City motel where the Oklahoma operators put on their two day show we attracted a fair amount of attention from curious non-cable people. "What channel do you operate on?" was a common question. You have to be into CB to appreciate how ridiculous that question is. "Channel 19" was our usual response. **One fellow showed alot of common sense.** It turned out he operates a string of KOA camp grounds throughout the south. "What would you charge me to bring that down to (name of KOA site) for a weekend?" he asked. We told him we couldn't do that, we weren't in the commercial TV-for-hire business. "That's too bad" he responded "because I think we could collect a dollar a trailer/camper per night for first run movies piped to the slots with my MATV system" he noted. "I'd handle the security and collections" he offered "and on a good weekend I've got around 5,000 slots filled". Humm. Pretty good numbers for a 'movie theater on wheels'. Obviously what the man needs is a **permanent TVRO** installation, not one of the here today and gone tomorrow systems on wheels. And he probably is not unique in this regard. Can you see the KOA Kampgrounds all across the country putting up Marquees out in front that they change daily or weekly, announcing something like:

"Here Tonight—THE BAD NEWS BEARS and SLAP SHOT...\$1.00 per camper...".

The man might have a million dollar idea. And one very nifty way to "sell" such installations would be to equip yourself with a ten foot portable terminal like the CATJ WF92 Developmental terminal and take the product to the campgrounds and trailer parks for a little on-site "testing". Are you listening Cliff Gardiner? (We'd sure hate to see Cliff get stuck with those 100 terminals he says he's ordered!!!) A really smart man **wouldn't** sell the terminals to the campgrounds or trailer parks; **he'd lease and maintain them for a piece of the night's gate.**

Smaller terminals. The smaller they get, the more places they can be utilized. If a ten foot produces great pictures (it does...ask any of the many suppliers who saw ours function in Oklahoma late in March), and a six footer produces just slightly degraded pictures, what about an eight foot? It works just like you expect, sort of between the two. And you can haul an 8 foot around on a quick-put-up mount in the back of a long bed pick up truck. **You don't even need a trailer!**

Smaller terminals. They are coming, although probably **not** for CATV. Not very soon anyhow. Remember our treatment of translators fed by FM microwave (i.e. satellites) in the March CATJ? Well, a very ambitious program involving a well known national Christian group may surface before you read this. **A total of 600 UHF translators fed by satellite**, linked to North Carolina by SATCOM and/or WESTAR. And the emphasis will be on **12 foot** receive terminals, designed so they do meet the 32 minus 25 log theta curve.

Smaller terminals. At the 10 foot level they are on the verge of sparklies with a 100 degree K LNA; but above it by a few tenths of a dB to 2 dB in a 35/36 dBw EIRP contour area. LNA technology, as we saw in the April CATJ, is hardly static. Each time the noise figure/noise temperature gets lower it means better and better pictures with smaller and smaller dishes. SCI now advertises that a 100 degree Kelvin LNA is 'a standard product' and we happen to know they recently shipped some in the 70-80 degree Kelvin region. **Look out six foot terminals, here come the sparkle-free pictures!**

A man can put together a trailer mounted portable ten foot system with a 100 degree LNA, and tuneable receiver and the balance of what he needs for under \$10,000 (not including the trailer). It took the CATJ Lab some 100 plus days to get delivery on our Prodelin ten foot antenna, feed and mount. We're betting that delivery today is starting to really stretch because now the cat is out of the bag that ten footers work well. And, following the format outlined in this column for April, a man can get a license for such an 'under-sized' terminal under the Developmental Licensing program.

Smaller terminals. If you are reading this in New Orleans you need to sniff around a little bit. Things are happening **below** the 4.5 meter level and you need to stay abreast of these fast paced changes.

And if you couldn't make it to New Orleans to see what this show has to offer, may I suggest you plan on making the CATA CCOS-78 Show in Oklahoma in mid-July (see announcement in this issue of CATJ)? Because there you will see terminals down to six feet in size playing with receivers never before seen in public. It all says on the bottom line that smaller is cheaper and with each drop the "buying base" broadens out. It's a fast changing world...welcome to it!



## THE MOVE? May 31st

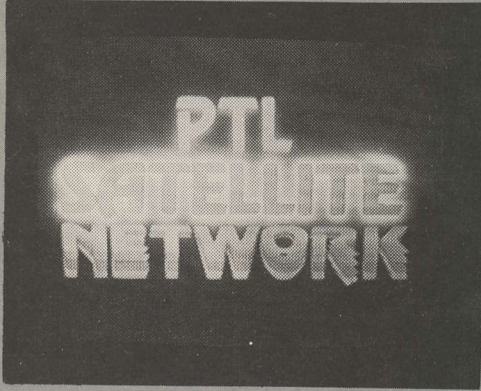

The formal date for the transition of all present SATCOM II CATV program supplier users to SATCOM I is now set for **May 31st**. And there are a number of changes involved so pay close attention to what follows:

- 1) **Some present users of F2 will end up on slightly different channels/transponders on F1.** For example, **after the move:**
  - A) **SHOWTIME will be on transponders 10 (west/mountain) and 12 (central, east).** 10 will also be the spot-beam shot at Hawaii.
  - B) **HBO will switch from 20/24 on F2 to 22/24** with 22 being west/mountain and 24 being central/east. In doing this HBO picks up spot beam capability on 22 for Hawaii.
  - C) **Madison Square Garden Events will swap to 20.**

A new and updated F1 transponder list follows here.

- 2) **Transponder 4 is broken.** Yes, we know one of the **big** reasons for switching to F1 from F2 **was** that over on F2 transponder 12 is broken and that eliminates 1/12th of the horizontal capacity of F2. RCA has known for a very long time that transponder 4 on F1 was also broken but they neglected to tell very many other people that. So F1 is a 11 transponder (horizontal) bird also.
- 3) **RCA will be double feeding signals to both F1 and F2** for a period of approximately one week, starting 'for sure' on May 31st and perhaps as early as May 28th. **But not all signals will be double fed.** As things now stand HBO 20/24 on F2 will be double fed to F1 on 22/24 respectively, SHOWTIME 4/10 on F2 will be double fed on 12/10 respectively. There is no more capacity at **Vernon Valley** to double feed **any other** signals. WTCG/WTBN however may be double fed via the Pt. Reyes, California RCA uplink station; the F2 transponder six would be received at Pt. Reyes, and turned around and fed from Pt. Reyes to F1 (there is no double feed capacity at **Atlanta's** uplink site).
- 4) **Test signals** on transponders 20/22/24 (color bars initially, perhaps later expanded to programming material) **began** on a regular basis through F1 on Monday the **27th of March**. This means that you can read this, and then run out and adjust to F1 if you desire... if color bars is what you want.
- 5) **Alaskan traffic on F1** will convert to the horizontal channels (even numbered if you are new to this game) on F2 with the exception of the video traffic, which will stay on vertical 23 on F2 (where it has been for some time).

So there you have the moving day plan and the problems associated

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there with. Well, at least some of the problems!

### The F2 to F1 Move —Latest EIRP Patterns

When CATJ published the SATCOM I and II EIRP (dBw) contours in our January issue (see **Coop's Cable Column**, page 40) we passed along to you the latest RCA maps we had in our possession. It turns out that **when** you get to SATCOM I sometime after the middle of May with your own TVRO antenna you will find a newer set of EIRP 'footprints' awaiting you than we published in January.

The new footprints are important enough that we are publishing them (all four footprints for all four of the F1 antennas) here. This data, relayed to us from RCA, is the pattern of F1 **after** RCA moved the satellite on its axis so as to put more signal into the eastern portion of the U.S.A. In satellites system engineers talk about

something called the 'bore-sight' of the downlink antenna. That is just what you might expect it to be; 'the point on the ground' where the center of the pattern is located (i.e. the highest EIRP). With four separate transmitting antennas on F1 you could get into some debate as to the actual bore-sight if you tried to pin it down too closely; each antenna is slightly different. For our purpose we'll talk about the **apparent** 'bore-sight' for the so-called **Northeast Reflector** (transponders 2, 6, 10, 14, 18, 22). We show both the new pattern for **this particular** antenna-transponder-set and the old pattern. If you are really interested in other 'old' patterns, go back to your January CATJ.

In **map one** we have the old antenna pattern for F1 on the NE Reflector. You will note the old 36 dBw EIRP footprint sort of pointed NW by SE with a center in Idaho. In **map two** you will note that with the new F1 footprint on this particular antenna-transponder set the

### CATV TVRO STATISTICS—MAY, 1978

Applications Filed/FCC	Jan. 1978	Feb. 1978	Mar. 1978
1) 11 meter	0	0	0
2) 10 meter	0	1	0
3) 6 meter	12	10	12
4) 5 meter	28	20	14
5) 4.5 meter	13	17	8
<b>Total Apps</b>	<b>53</b>	<b>48</b>	<b>34</b>
Cost Max.	\$61,172	\$78,050	\$56,500
Cost Min.	20,000	21,555	19,935
<b>Avg. Cost</b>	<b>37,166</b>	<b>36,289</b>	<b>36,901</b>
Channels Requested	161	147	88
Average Channels	3.03	3.06	2.6
Requesting WTCG	40	36	23
Requesting CBN	41	33	26
Requesting HBO	37	38	21
Requesting MSGE	29	19	7
Requesting SHOWTIME		6	7
<b>Avg. Cost Per Channel</b>	<b>\$12,266</b>	<b>\$11,859</b>	<b>\$14,192</b>
<b>TVRO's Licensed/FCC</b>	<b>39</b>	<b>27</b>	<b>48</b>

Note: Data compiled from FCC sources, adjusts forward one month with each issue.



# UPDATED TRANSPONDERS—SATCOM I and II

This list shows the 'before the move' and the 'after the move' transponder groupings for RCA SATCOM I (135.8 degrees west) and SATCOM II (119 degrees west) channels.

Transponder/Channel	SATCOM II	SATCOM I(*)
2	PTL	PTL
4	SHOWTIME east	broken
6	WTCG/WTBN	WTCG/WTBN
8	CBN	CBN
10	SHOWTIME west	SHOWTIME west
12	broken	SHOWTIME east
14	Trinity (**)	Trinity
16	not in use	FANFARE (***)
18	not in use	KTVU (****)/HTN (*****)
20	HBO west	Madison Square Garden
22	Madison Square Garden	HBO west
24	HBO east	HBO east

And the explanations. \* - SATCOM I listings are for June first and after. \*\* - Trinity scheduled to start May 1st on 14 although whether it will be 4-6 hours per day or 24 hours was not determined at press time. \*\*\* - FANFARE has a June 1st start date for initial service 7:30 PM CDST. \*\*\*\* - KTVU is not scheduled to start until August 1st. \*\*\*\*\* - HTN (Home Theater Network) would like to start June 1st although RCA feels that it may be several days later because of the conflict with the F2 to F1 move date.

36 dBw EIRP contour runs almost east and west (tipped slightly from NE to SW). The apparent center of the 36 dBw footprint is now roughly on the Michigan peninsula between Lakes Superior and Michigan. On a spot basis, New York City with the 'old' pattern had a signal level of around 33.1 dBw while with the new pattern the level is approximately 35.6 dBw. That's a healthy 2.5 dB improvement. Another area for reference might be Tampa, Florida; previously it was approximately 31.7 dBw and now it will be approximately 32.6 dBw. Or, Los Angeles. Previously it was to be

approximately 35.5 dBw and now it will be approximately 34.1 dBw.

**How does all of this compare with F2?** That's what really counts here since we never had service from F1 under the 'old' pattern anyhow. Here are a few cities chosen to reflect some F1 and F2 comparisons. If you are not close to any of these, use the maps in January CATJ to compare to the maps here to find your own numbers(\*).

Similar maps are presented here for the Northwest Reflector (transponders 4, 8, 12, 16, 20, 24; **map three**), the Southwest Reflector (transponders 1, 5, 9, 13, 17, 21; **map four**) and the

Southeast Reflector (transponders 3, 7, 11, 15, 19, 23; **map five**). The vertical transponder sets will be important one day soon as these 12 transponders are where the next generation of CATV service channels will go.

**\*A full set of two-color maps, covering the new SATCOM I patterns (4 maps), SATCOM II patterns (4 maps), ANIK III (at 114 degrees west) and WESTAR II (at 123.5 degrees west) is available, for \$10.00 from: CSSC, P.O. Box 20335, Oklahoma City, Oklahoma 73120. Enclose payment with order.**

## Moving Day Hints

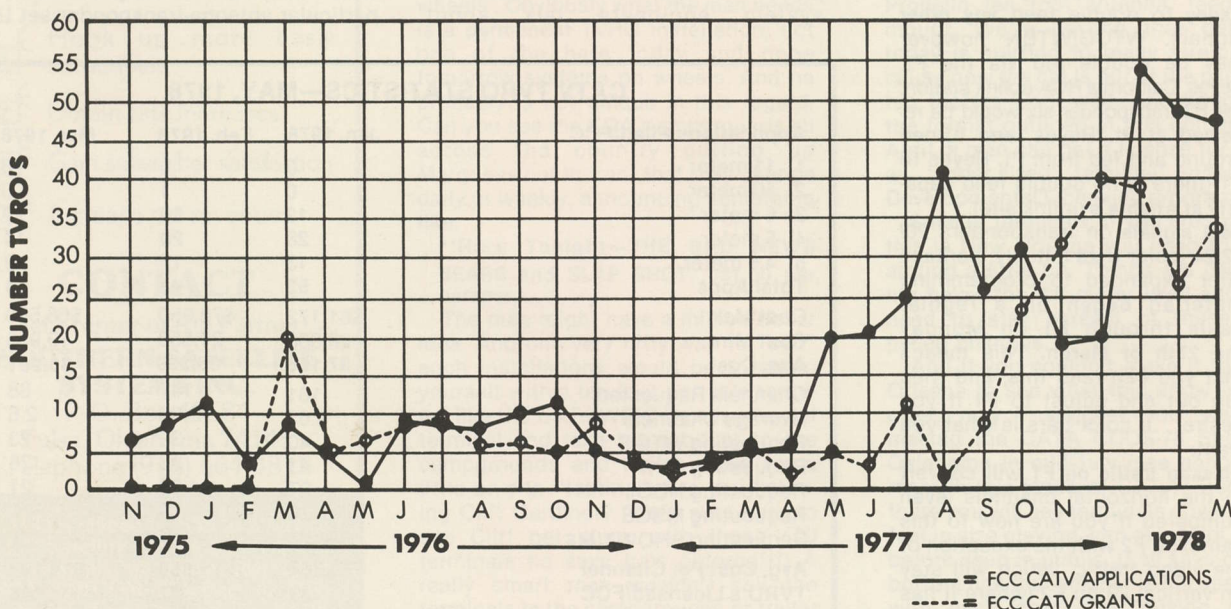
No two antenna moves are going to be similar. As the associated material here reports, users of SATCOM II will generally find equal or better signal levels from SATCOM I if they are located in the eastern 2/3rds of the United States, slightly inferior signal levels if they are in the western 1/3rd of the United States.

In several test moves at the CATJ lab Site (with both a six meter terminal and a 3 meter terminal) we found several things which may prove helpful to you.

- 1) **Logic tells you** that SATCOM I at 135.8 degrees west is going to be 'to your right' if you are facing south, from where the antenna points for SATCOM II.
- 2) **Logic should also tell you** that because F1 is further west than F2 that it will be lower down (or closer to your horizon) than F1.
- 3) We found that our polar mount antenna, which should track (once set) across the full satellite belt without major changes in elevation (up and down) adjust-

## TVRO DEVELOPMENT PROGRESS—THRU 2/28/78

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ments **does require some touch up** between F2 and F1. In fact we had a 3-4 dB carrier to noise ratio the first time we simply 'swung west' for F1; although it took only a minute or so to tweak in the elevation adjustment for F1. The message here is that if you have a polar mount it will probably be necessary for you to be prepared to tweak upon the elevation adjustment after you have swung the azimuth adjustment to 135.8 degrees west.

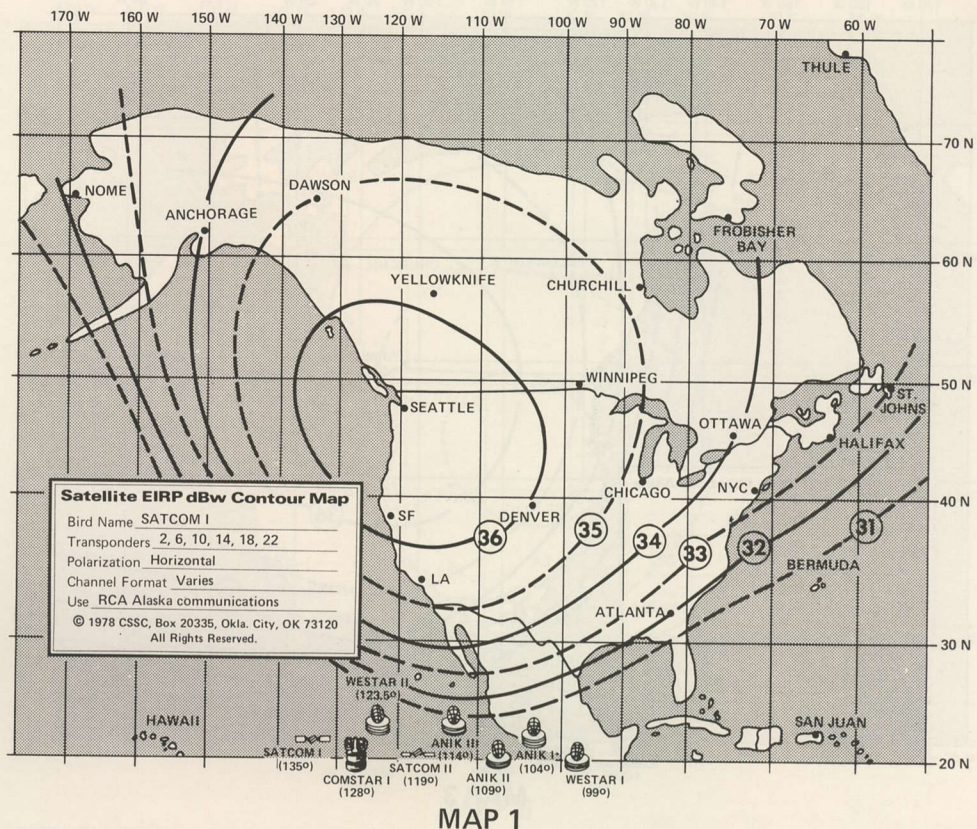
- 4) **We recommend** allowing at least **one full hour** for polar mount system changes, perhaps **several hours** for azimuth/elevation mount changes. The best sequence to follow, we feel, is to make the azimuth adjustment first **and then crank down** on the elevation adjustment.

- 5) **Before** you get to the moving day go out and very carefully **study your mount** and what is required. Look **closely at everything** that is going to move when you start the move to be sure that as you swing the azimuth and/or elevation that you will not run the antenna into some non-moveable object such as a support rod or permanent mount fixture. There are going to be some isolated problems here because some antennas were not properly installed reference the due south line.

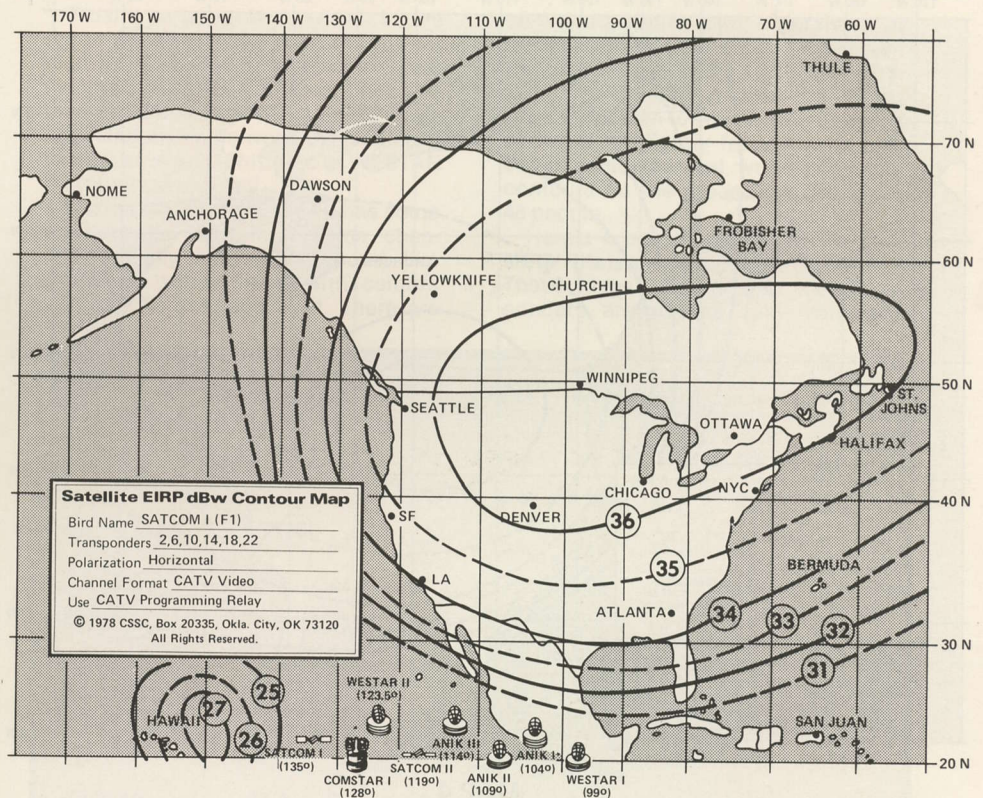
- 6) **As you 'head west'** we find it is best to **move slowly from bird to bird** as you go. For example, if you break the move up into **steps** and readjust the elevation **each time** you swing further west to another bird with the azimuth you can end up much closer to F1 than if you simply take it all in one big jump. How's that? Well **the first stop or step should be WESTAR II** at 123.5 degrees west. It has video up on transponders 5, 7, and 12 a good part of the day and if you move first from F2 to WESTAR II, the 4.5 degree move will be a small bite to take. Adjust the azimuth first, touch up the elevation **and then take a deep breath and head for COMSTAR I** at 128 degrees west. This bird has no video but plenty of SCPC carriers (with lots of C/N) typically on transponders 5 and 16. Again **adjust the azimuth first and then touch up the elevation**. Take another deep breath and then head for the big jump to 135.8 degrees by adjusting the azimuth first and then the elevation.

You should be able to do all of this without a transit and a 'sight line', but if it makes you feel better you could go out ahead of time and place a transit **directly in front of the antenna on a line from the antenna towards F2**. Go out a hundred feet or so and drive a stake on the 119 degree heading for F2, and then move west to 135.8 degrees west and drive another stake.

**Go west young man... and good luck!**



MAP 1



MAP 2

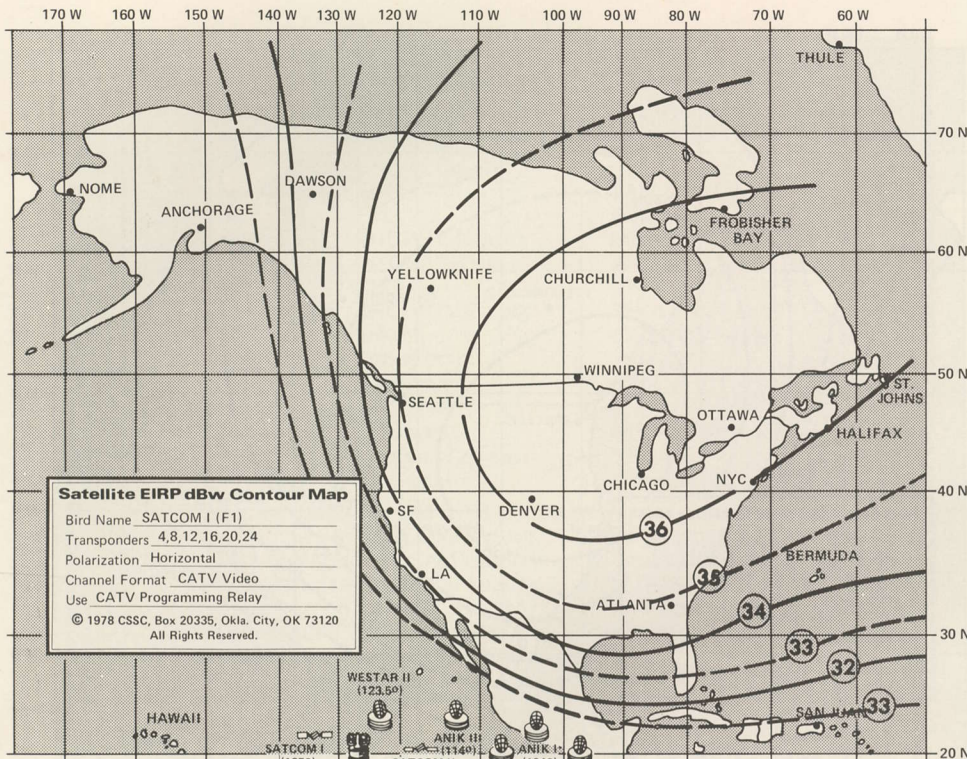
#### Adding WESTAR

Last month's feature report on the novel offering from the AmeriCom Satellite Network discussed what delays a system might expect if they wished to add the legal capacity to receive CATV programming via WES-

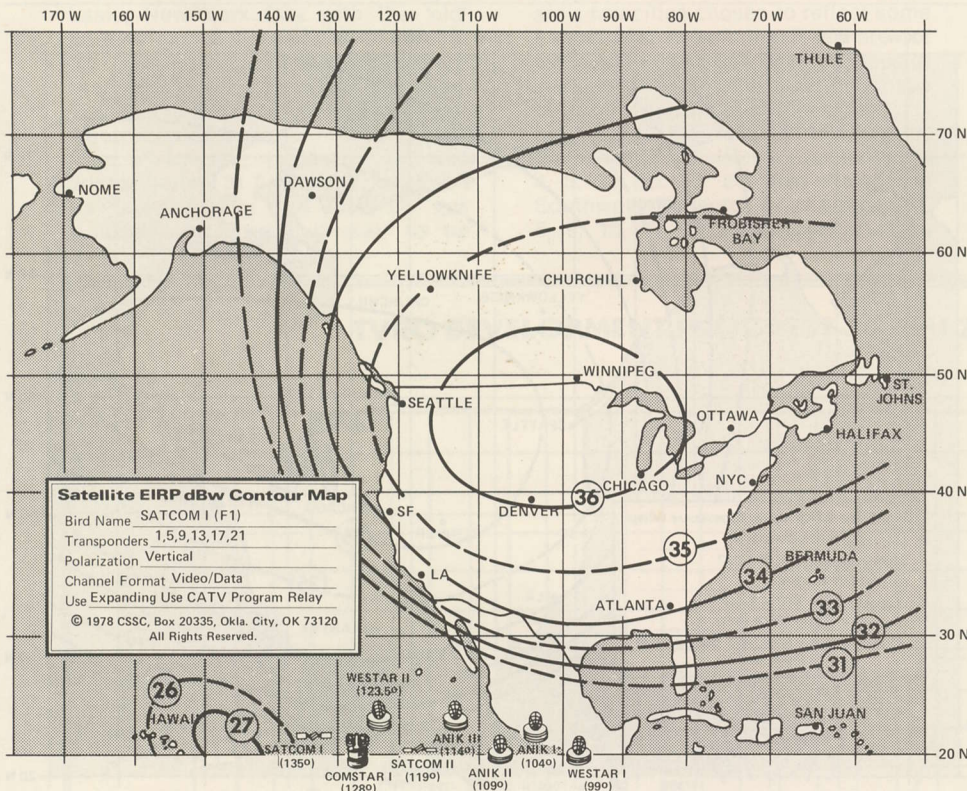
TAR (II). Here is how we see it at this time:

- 1) **A system not yet to the FCC** with a formal construction permit/license application for a terminal should modify their initial appli-





MAP 3



MAP 4

are herein prepared. Consequently the C/N calculations for (name of) satellite) are not necessary here because they will **exceed** the C/N calculations stated here by \_\_\_dB."

The idea is simply that there is no FCC requirement that you go through long, laborious calculations for **both** SATCOM and WESTAR, **only for the satellite with the weaker footprint**. If that one makes the minimum C/N required, logic says (and the FCC buys) that you will also make it with the stronger satellite as well.

Now if you are already licensed or have a CP heading for a license, what must you do to get additional permission for the addition of KS21?

a) **First complete a form 403**, asking for a modification of your existing CP/license to add KS21 as a 'point of communication'. On form 403 check the modification box in question 2 (c), under question 4 put in KS21 under question 4 (6), and in question 10 explain "To add KS21 as a point of communication for delivery of CATV programming material."

b) If you will utilize a terminal **identical** to your existing SATCOM terminal, and you are located in an EIRP area **equal to or better than SATCOM**, you can avoid the next steps by simply writing a cover letter referencing your earlier SATCOM application/CP and explain that the C/N studies you did for SATCOM are equal to or bettered by the WESTAR application by virtue of your being in an EIRP area that is equal to or better than the SATCOM EIRP present at your site.

c) **However**, if your EIRP level is lower with WESTAR, or you plan a terminal with different parameters (i.e. different antenna gain, LNA noise temp, receiver threshold, etc.) then you need to go back and prepare all of the technical C/N and S/N computations for WESTAR.

Basically the Commission is concerned that with WESTAR (as with SATCOM) that you will be able to develop a first class signal/picture with the terminal you plan. However, if you did your frequency coordination properly initially (virtually everyone did) you are **already clear** for the full satellite arc (70-135 degrees west) for **interference**, and you will reference that clearance in your cover letter as well as all of your financial, corporate tree and so on supplemental data for the **add-on WESTAR application**.

You will **not** receive a new or second license in this process; you will simply end up with your present CP/license **modified** to specify **two terminals instead of one**.

#### WESTAR II and ASN

During the first scheduled public showing of the new AmeriCom Satellite Network programming (April 30th-May 3rd) ASN will be utilizing some

cation to include points of communication for WESTAR II (KS-21 are the 'call letters' of the bird).

- 2) Your application calculations of expected C/N and S/N **can be** done in detail **only for the weaker** of the bird EIRP's in your area and then the stronger of the two

can be referenced with an explanation more or less as follows:

"The (name of satellite) satellite has a predicted EIRP of \_\_\_dBw over the proposed TVRO site location, and as such it is \_\_\_dB (the actual number) stronger than the satellite for which calculations



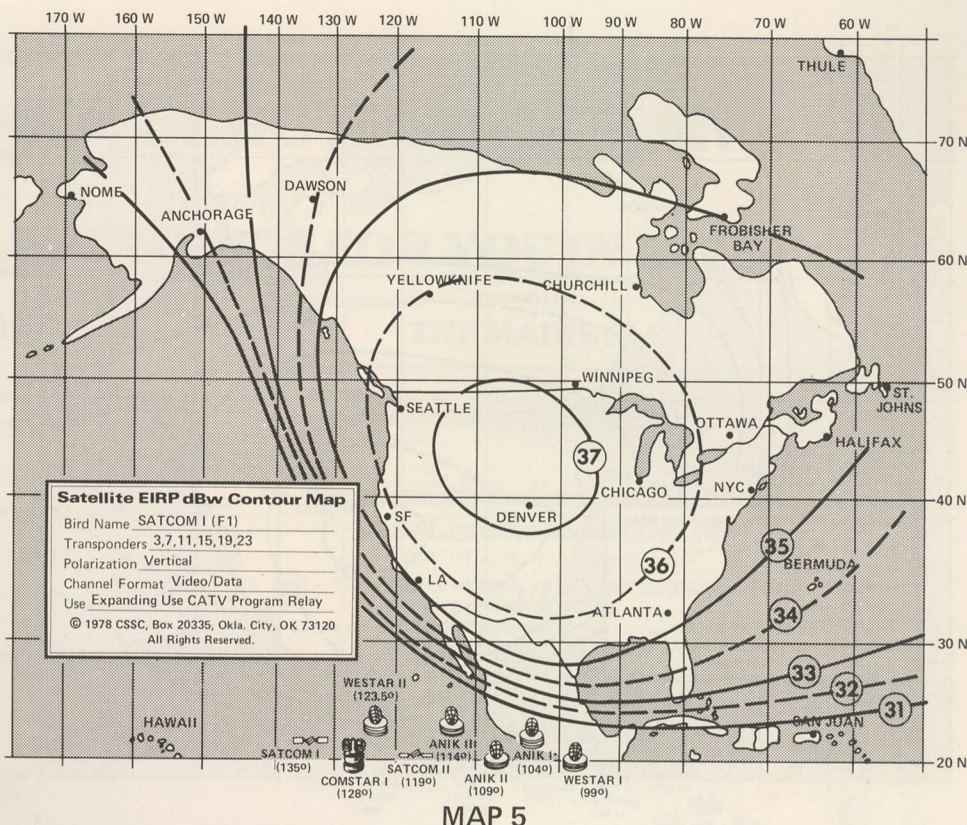
'temporary' transponder assignments from Western Union. The transponders in use for the April-May 'testing period' will be 1, 5, 7 and 12 on WESTAR II (located at 123.5 degrees west).

Many have asked **when** ASN's KTTV (Los Angeles), WGN (Chicago) and WOR (New York) might be up on the bird during the NCTA show. ASN would naturally like their 'test period signals' to be available during that portion of the NCTA exhibit hall day when there is maximum traffic. Because of the limited nature of the 'tests' however it is unlikely that Western Union can accommodate ASN on more than say four hours per day during the NCTA meet (all of this will be worked out for full time, 24 hours per day use, **when** ASN goes on regular satellite schedules this summer). **So which four hours are most likely?**

Western Union points at the 5 PM to 7:30 PM EST time slot as their 'busy period'. This is that period of the day when the various network news shows are sending late news actualities back to New York via WESTAR II and these news feeds often amount to as many as six transponders of material at any given instant. Couple that with the regular WESTAR II full time clients and you have a dial full of signals. So logic says that **between 4 and 6:30 PM CDST** in New Orleans it is **unlikely** that you will see the four ASN channels operating through WESTAR II. **This points at the period during the afternoon hours (before 4 PM CDST) and after the dinner hour (6:30/7 PM CDST) as the most likely periods when ASN's four channels will be 'up'.**

After the NCTA show the ASN signals will continue to be available on a four hour per day basis. ASN promises to provide a program schedule (i.e. which hours and what transponders you can find what signals on) for the months of May, June, and July. Then on either 1 August or 1 September the 'testing period' will be over (sooner if enough systems get equipped for the signals ahead of that date) and ASN will go full time on their permanent transponders.

Western Union is having to do some real bird load juggling to accommodate ASN on WESTAR II. For example, Western Union is currently in the midst of a heavy internal program which involves detailed planning and analysis for the eventual launching of 'advanced WESTAR'. This program pretty much ties up six of the WESTAR II transponders either full time or long enough each day (and in particular during the busy traffic periods) that **those six transponders (out of a total of 12) are not available. That leaves six.** Add to this the four that ASN needs, then mix in SIN and Robert Wold and the networks use of the WESTAR II services for news feeds and you have a very complicated and difficult scheduling problem. It all points out how badly the new two-for-one technology is needed (see feature report this issue).



MAP 5

Finally on page 44 for April, in the report on ASN, we printed a footprint map for WESTAR II. It turns out that map was primarily the figment of some Western Union advertising type's mind. Any relationship between the published map and the real footprints of WESTAR II is purely accidental.

It turns out that WESTAR II has some **very strange** footprints. Some channels actually look (from above) like a pair of 'squint eyes' with centers towards the east and west. There are

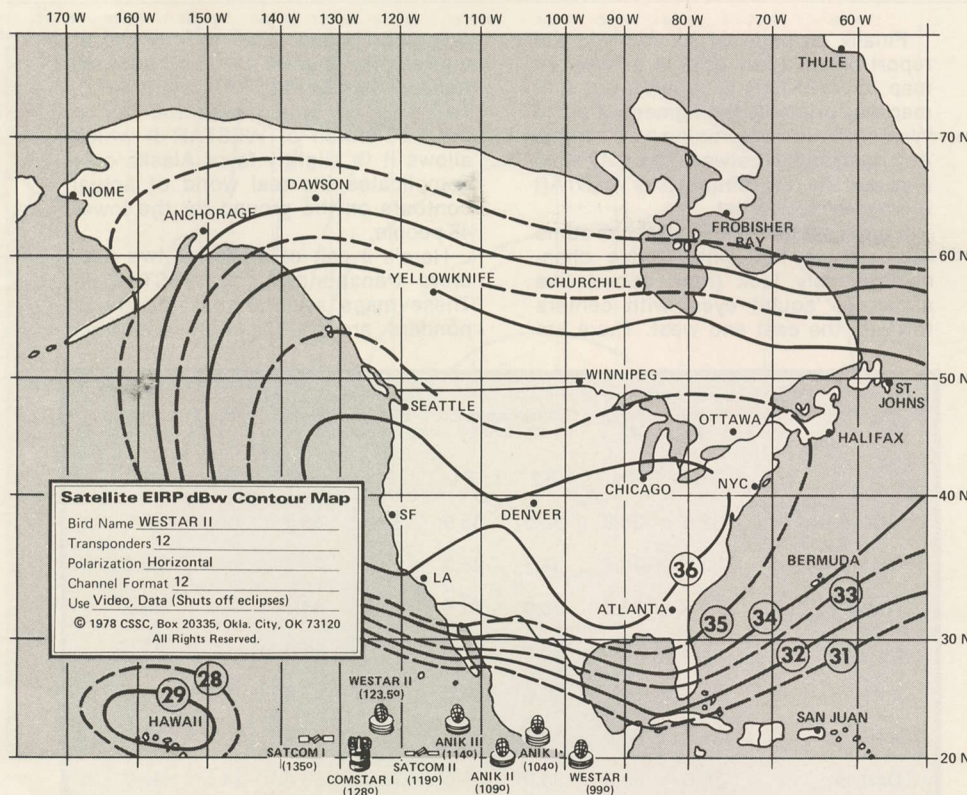
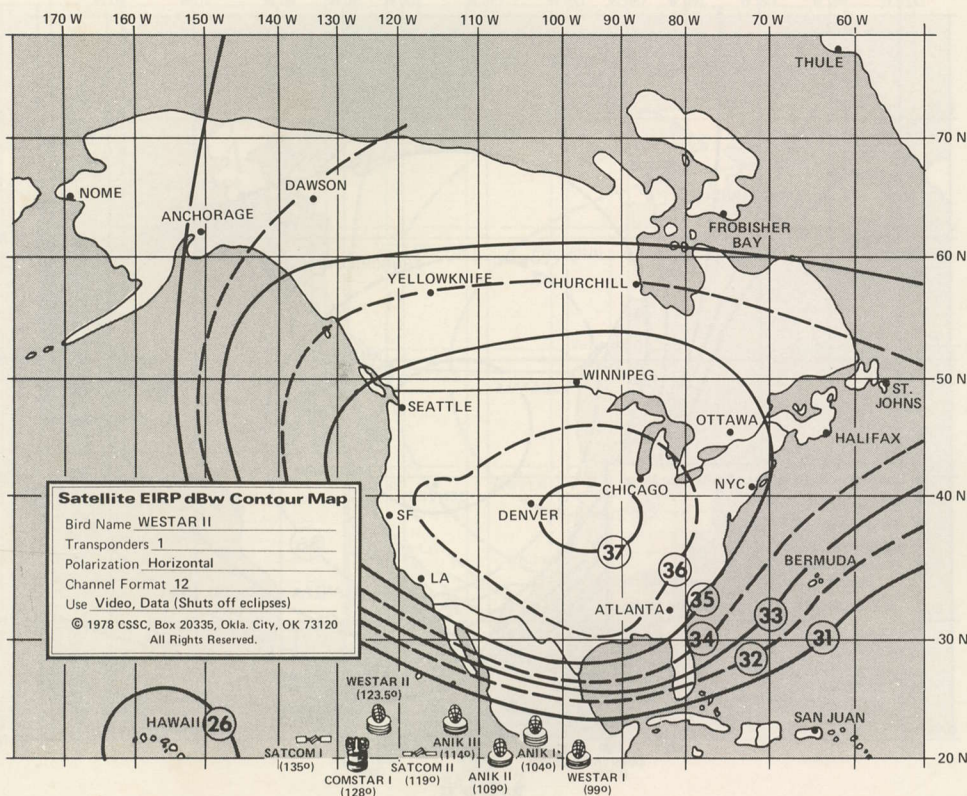
on-ground signal level differences at a given site as great as 1.5 dB **between transponders** on WESTAR II (and WESTAR I is no better); and the 'rolled over' condition of WESTAR II which allows it to slightly favor Alaska only complicates the real world of actual contours on the ground for the lower 48 people.

Here's a pair of maps for two discrete transponders on WESTAR II. These maps assume that the transponders are getting fully saturated

City	Transponders 2,6 10,14,18,22		Transponders 4,8, 12,16,20,24		Transponders 1,5, 9,13,17,21		Transponders 3,7, 11,15,19,23	
	F2	F1	F2	F1	F2	F1	F2	F1
Boston	32.5	35.8	33.5	35.9	32.8	35.5	n/u	35.5
Washington	33.0	35.5	34.7	35.8	33.0	35.3	n/u	35.5
Atlanta	32.8	34.3	36.0	34.8	33.4	34.1	n/u	35.2
Miami	29.6	31.4	35.0	32.3	30.0	31.0	n/u	33.0
New Orleans	33.0	34.0	36.0	34.3	33.6	33.6	n/u	35.1
Chicago	35.0	36.0	35.7	36.0	35.0	36.0	30.0	36.5
Denver	36.0	36.0	36.0	36.0	36.0	36.0	34.5	37.0
El Paso	34.4	34.1	36.0	34.1	34.8	33.9	33.5	36.0
Los Angeles	34.5	34.1	34.3	33.0	34.1	33.8	35.4	35.4
San Francisco	35.3	34.8	34.1	33.5	35.0	34.6	36.3	35.8
Seattle	36.0	35.6	34.9	35.0	36.0	35.5	36.8	36.4

n/u—Indicates under F2 antenna signal was below 30 dBw footprint level and was therefore 'not useable'.





with the power uplink signal. It might be worthwhile to know that WESTAR II transponders 1 and 12 are the 'off-loading' transponders; when the moon eclipses the satellite from the sun and the transponders on WESTAR II must exist without full solar power for some period of time, transponders 1 and 12 are shut down to conserve battery

current. For this reason full time, 24 hour per day, 365 day per year services cannot be placed on either transponder 1 or 12.

#### Motels/Hotels Via The Bird

Southern Satellite Systems Ed Taylor has completed arrangements to

put his satellite system common carrier technology to work for the delivery of first-run movies to motels throughout the country. The ownership package of the new firm includes Taylor's Southern Satellite Systems (10%), Holiday Inns of America (30%), Bell & Howell (30%) and Twentieth Century-Fox (30%).

The participants of this venture are intertwined in several other satellite program delivery operations and it gets a little complex trying to keep it all sorted out. For the record:

**Ed Taylor's SSS** is the operator of the common carrier company that brings to more than 1,500,000 cable homes the programs of Atlanta's WTCG. **Ed Taylor's SSS (10%) and Holiday Inns of America (90%)** are owners of a second (common carrier related) company that is scheduled to bring up San Francisco/Oakland KTVU, Home Theater Network and the Illinois Institute of Technology starting around August 1, 1978.

**Twentieth Century Fox** has an ownership interest in the terrestrial pay cable system **PRISM** (in the Philadelphia area), and a similar interest in **FANFARE** (the southwest region satellite pay cable delivery system that begins operations on SATCOM transponder 16 on June first).

**Bell & Howell** is the only firm with an ownership interest in the new (yet unnamed as we go to press) motel/hotel pay programming via satellite company that has no prior satellite/pay programming experience. Here is how it will apparently work.

- 1) The new company will utilize a transponder on SATCOM I to distribute first-run movies nationwide. The movies will be intended for motel and hotel showing.
- 2) The new (unnamed) firm will have **Dick Galkin** (with Time-Life cable properties in the 1962-1968 era) as its chief operating officer.
- 3) The firm has released 80 motel/hotel locations to a frequency search/coordination company to expedite the license applications for the new TVRO terminals. The terminals will be 4.5 meters in size (or larger where required), will follow all existing CATV terminal technical specifications and guidelines.
- 4) Taylor expects that because of the typical location of most hotels and motels that these 80 initial applications will not all 'fly' through the frequency coordination phase. Out of those that do, the firm is looking to find a minimum of 40,000 motel/hotel rooms which can be served. 'Turn-on' of the service will begin when there are 40,000 rooms installed and ready to go. A tentative target date is late in 1978.
- 5) The initial 80 sites have been chosen because most of them can function as cluster receive sites. That is, because of the nature of motel/hotel locations there are many sites where a



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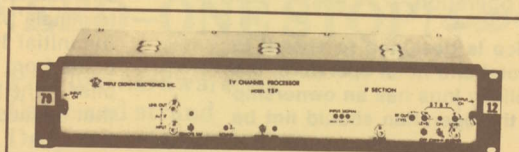
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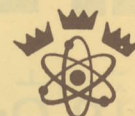


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MAY 1978



single earth receive terminal can bring down programming for two or more motels and hotels. Once on the ground at the site the programming will be 'relayed' to the additional motels/hotels in the area (i.e. those 'off-site') via either **low cost FM microwave** (they have been talking with Microwave Associates) and/or via cable. Use of relatively new '**FM on cable**' modulation techniques is also being seriously considered by the operation.

The service is designed to appeal to all of the motel and hotel operators; the fact that Holiday Inns has an ownership position in the operation should not be

confused with the goal of the firm to serve all motels and hotels in a city or community.

- 6) The operation is being headquartered out of Ed Taylor's SSS office in Tulsa, where all initial planning, engineering and procurement has been handled to date.
- 7) The firm is already in the marketplace looking for quotations on 4.5 meter or larger systems for approximately "100 first phase terminals". Taylor believes that the initial 100 or so terminals will come from "just about every supplier in the field". He is concerned that because the present delivery

cycle for receivers, LNAs and to some extent TVRO antennas is running so long that this "additional burden of terminals" may well prove to be the 'straw that broke the camel's back' in the hardware area for the summer and fall of 1978.

At the present time order-to-delivery cycles for TVRO terminals are running in the 90 plus day region. Receiver and LNA manufacturers have been hard pressed to maintain even that schedule with new CATV terminals going in at the rate of approximately 50 per month. With the addition of **not only** the new motel/hotel systems but the new WESTAR II program from **AmeriCom Satellite Network**, and the strong likelihood that an ambitious national program involving 600 **satellite to trans-lator sites** may also be underway (see **Coop's Cable Column**, this issue), the hardware crunch which has been very real for some months can only get worse.

- 8) After the initial sites (to achieve the 40,000 or more initial motel/hotel rooms required) are underway the **next phase** of the program is likely to be handled through a smaller number of suppliers. The ultimate number of actual terminals installed will peak out at more than 500 and fewer than 1,200 according to knowledgeable sources. The reason for the wide 'number range' is that it will be some time before the number of **cluster sites** that can be served will be accurately known. Taylor talks in terms of "two terminals being installed per day" during 1979.

Preliminary (and they are just that—very preliminary) bidding by some of the nation's TVRO suppliers indicates just how much **lower** these hardware packages **might go** when there are such large single-buyer numbers involved. One source tells us that a prominent supplier of 5 meter TVRO's has offered his **antenna portion** for "under \$5,000 each"; a healthy discount from the present prices being paid for the **same antenna** by CATV buyers purchasing one or a few at a time.

- 9) There is a place in this sun for **cable television systems**. The intent of the motel/hotel operation is to simply put their special movie channel into as many motel and hotel rooms as possible. According to Ed Taylor 33% of the nation's Holiday Inns are presently "behind cable" and 12.5% of the Holiday Inns already have cable service. Holiday Inns, however, tend to be much like cable service; many of the original Inns are located in smaller communities where television service is poor so **their percentages** do not reflect the balance of the motel/hotel industry. Hilton Inns for example are basically 'down-town' and 'airport' located and cable as a general rule does not cover this type of location.

# in'no·va'tor

( in'ō·vat·ōr )

n. One who begins or starts something new.

LRC Electronics has been the innovator of many CATV connector and connector related developments. LRC was first with the hex crimp and the attached ferrule hex crimp on connectors. A problem in the European market led LRC to the development of the entry extension connector, another first. LRC was also first with 1/4 inch crimp rings. And when the need for tamper proof traps became evident LRC was first with the Security Shield.

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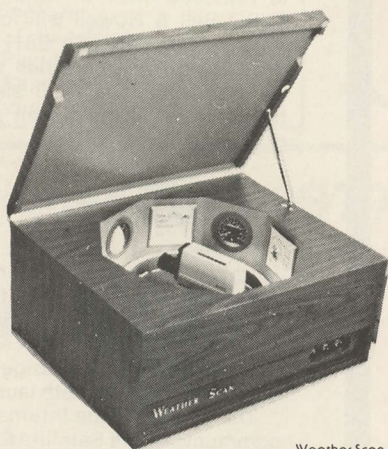
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Staple guns

**Same Day Shipment— Help When You Need It**

(since 1949!)

Call or write: DAVCO, Inc., P.O. Box 2456  
Batesville, Arkansas 72501  
501-793-3816

## First In Reliability



Weather Scan III

Impressive quality...surprisingly low price. Just \$2695 for the most reliable unit available (at any price!).

We have been in the cable television business for 23 years...and providing weather information systems for the past 16 years. We know what you need and we know how to manufacture it. For reliability and performance.

The Weather Scan III comes complete with Sony AVC-1400 camera with separate mesh vidicon and 2:1 interlace sync. Includes Time, Temperature, Barometric Pressure, Wind Velocity, Wind Direction, plus four card holders. Compact cabinet is just 38" wide, 23" deep and 14" high. For complete information call or write.



# Weather Scan, Inc.

An R.H. Tyler Enterprise

Loop 132 and Throckmorton Hwy. Olney, Texas 76374 Ph. 817-564-5688



The new firm will make 'one pass' at the CATV industry very shortly, attempting to get cable firms who either now have or do not have satellite reception capabilities involved in the program. If you **have** an earth terminal in or **planned** for installation **this year**, and, you pass with cable Holiday Inn or other motels, you might be able to 'cut a deal' to provide terminal reception service **and** distribution service of the motel/hotel movie channel (such as on mid-band as it must be in a secure mode) to the local "inns". If you **do not have a terminal**, and have been holding off getting one, you still may wish to talk with Taylor and his crew since there is another program wherein they will procure the earth terminal for your

site, put it in, and then lease it's use back to you for around \$150 per month. In the deal you will provide the motel/hotel locations with the special movie channel, and then use the terminal for other reception services as **you** see fit. It might be the least-dollar-spent way (yet) to get into the terminal business at your location. It takes 200 motel/hotel rooms (up) to play in this program however so calculate accordingly.

- 10) The motels and hotels will be paying **20 cents per room per night** for the service **when** an earth terminal must be provided. If the motel/hotel opts to provide their own terminal (some may) it will cost them **16 cents a room**

**per night** for the service (all lodging rooms are counted in this).

Might the system expand to other places of 'lodging'? The big hang up here, as it has been for some years, is the way the movie industry 'looks at' the various 'markets' it perceives for its products. They are interested in getting **maximum return** for **each showing** of their product naturally. To some people a hospital, for example, or a mobile home/camper park catering to 'transients' may well end up 'looking like' a motel or hotel (see **Coop's Cable Column**, this issue). If that is the case, these additional locations will also be in on the plan.

- 11) This will be a '**movies only**' package; **no sports**.

Could this not be a SHOWTIME type of offering. It turns out that the new firm did indeed talk with the folks at SHOWTIME and HBO (as two examples) but in the end the decision was made to go on their own **without** the programming services of one of the established satellite delivery firms. Which brings up the question of transponders.

As everyone by now is aware, SATCOM I horizontal transponders are spoken for. Does that mean that the new service will be going up on a **vertical** transponder? The answer is a qualified '**no**'. The new service for motels and hotels will **probably** share with an existing transponder leasee; a user that does in fact mix sports and movies into a pay cable channel package. The sports portions will not be taken however by the motel and hotel people.

Finally for those who might wonder how Bell & Howell fits into this program, be advised that B&H is already maintaining under contract approximately 1,600 motel/hotel cartridge tape deck movie systems. This 'old fashioned' method of movie distribution will naturally 'fall out' as this new satellite delivery mode takes hold. Bell & Howell recognizes this, and as each tape deck is replaced with a 'little' 4.5 meter TVRO Bell & Howell will lose a maintenance customer. So B&H will be the firm doing the **installation** of the new terminals, and they will **also maintain** the terminals. That's their part in this project.

#### Latest Intelsat IV-A

Following a disastrous launch attempt at Cape Kennedy on last September 29th (when the Atlas-Centaur rocket blew up seconds after launch) the **8th** active **Intelsat IV-A** satellite was successfully placed into geo-stationary orbit after a January 6th launch.

The newest of the International Telecommunications Satellite Organization birds is parked at **297 degrees** (or, 63 degrees **east** of the prime meridian) where it serves the Indian Ocean region. Intelsat officials report the 'Indian Ocean Region' has exhibited the most rapid growth of communications (via satellite) of any region of the world with a 'twenty percent growth in circuit use during 1977'.

# MOD-KITS

Broadband offers the largest selection of Mod-Kits in the industry and can offer the system operator an easy and cost effective method to use his mid or super band for applications such as extra channel capacity or Pay-TV.

**NEW**

- \* SA-1 Push-Pull To 300 MHz
- \* ST-20 Single Ended To Push-Pull
- \* Kaiser Phoenician To Push-Pull
- \* Many Others—Come See Us At Booth 112

**PLUS**

The Most Complete Stock Of 100% Tested Replacement Components In The Industry

\*Toll Free 800-327-6690

**N.C.T.A. BOOTH 112**

**B**ROADBAND  
ENGINEERING, INC.

1525 Cypress Dr.  
Jupiter, Fla. 33458



**CLASSY-CAT advertising is handled as a no-charge membership service of and by CATA. The rules are as follows:**

- 1) Any member of CATA (member-system, Associate member, individual member) qualifies for CLASSY-CAT advertising space free of any charge (limit 50 words/numbers per issue);
- 2) Member-systems pay regular dues to CATA on a monthly basis; Associate members pay a one time annual fee; "Individual" members pay a one time annual fee of \$25.00 per year.
- 3) CLASSY-CAT advertising is also available to non-members at the following rates: **50 cents per word** with a minimum per insertion of \$20.00. A charge of \$2.00 per insertion is made for blind-box numbers or reply service.
- 4) **Deadlines** are the 15th of each month for the following month's issue.
- 5) **Terms** for non-members is **full payment with order** (no invoicing).
- 6) **Address** all CLASSY-CAT material to: CLASSY-CAT Advertising, CATJ, Suite 106, 4209 NW 23rd Oklahoma City, OK. 73107.

**OVER 50 3/8 inch** strand vice clamps (type you slip strand cable into). . .will swap even for a like number of 1/4 inch strand vice clamps or pickle splices. Let's trade. David Fox, Fox TV Cable Cable, Box F, Gilbert, W. Va. 25621.

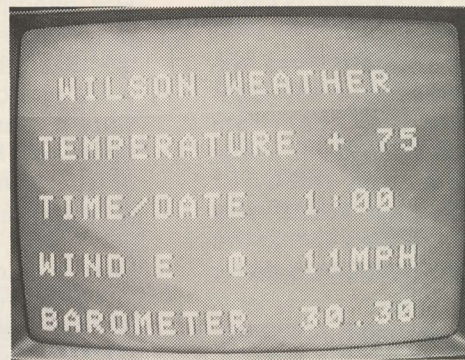
**FOR SALE**—Texscan Spectrum Analyzers Model VSM—1 with TBC—12. Used one season. Special low prices. Sold in lots or singles. Box S-32978, c/o CATJ, 4209 N.W. 23rd, Suite 106, Okla. City, OK 73107

#### HELP WANTED

Large Mid-Western Cable System needs experienced technician/installer to service two systems totaling 100 miles of plant. Position offers good salary and benefit package. Send resume and salary requirements in confidence to:

Chief Engineer  
Indiana Cablevision  
815 E. Pennsylvania Ave.  
South Bend, Indiana 46618  
Equal Opportunity Employer

## color RDC DIGITAL WEATHER CENTER



# \$1500

All units are equipped SRM (\*), a Richey Development Corporation technology exclusive! (\* - Screen Refresh Memory).

**NOW** - after two years of design and testing Richey Development Corp has in production the CATV industry's first **really low cost**, high quality completely digital "Weather Center". The DWC-1 has standard features which others (costing far more) offer only as options. The DWC-1 features an identification line (see photo of off-screen display), the temperature, time and date, wind direction, wind speed and barometric pressure. All units have **multi-color** display as a **standard** feature!

**This is a well designed**, thoroughly professional CATV system Weather Center. For example, the sync is crystal controlled. Program cards are plug-in and you can rearrange as you wish the sequence or order of weather information displayed. High reliability is the keynote to this unit that has been in development for more than two years. There are no motors to burn out (or to forget to lubricate!), no vidicon tubes to burn out or burn-in. The weather sensors are magnetic relays for long-life operation. And should anything happen to the sensors, they are in-expensive (\$75 for the pair) and easily replaced.

**AND** - if you want to go super-first-class, the DWC-1 mates with the RDC **DMC-1 Digital Message Center**. . .now available with two pages of memory that sequences with the DWC-1 display.

#### RICHEY DEVELOPMENT CORP.

# rdc

6920 Melrose Lane  
Oklahoma City, Ok. 73127  
(405) 495-3953

## Not Bigger Than 1977

# CATA'S CCOS-78 HAS A FEW OPENINGS

#### An Invitation

The Community Antenna Television Association proudly announces 'open registration' for the CCOS-78 (seminar) is now open. But there are several 'cautions' involved. CATA's Cable Operators Seminar (CCOS) is now into its third year. This year's meeting will be held July 16-19 at Fountainhead Lodge near Eufaula, Oklahoma (pronounced U-fall-la), some 70 miles south of

Tulsa. Fountainhead Lodge, also the site of CCOS-77, plus the companion state-run lodge Arrowhead will accomodate a maximum of perhaps 600-700 cable people. Which brings us to the first 'caution':

**Approximately 400 of the accomodations are already taken.**

During CCOS-76 the cable industry was exposed to the **first** public demonstrations of



smaller-than-9 meter TVRO terminals; two 4.5 meter terminals were installed by Prodelin, Inc. and Andrew Corporation, and the whole thrust of the CCOS-76 program was the feasibility of small earth terminals.

During CCOS-77 the cable industry was exposed to the **first** demonstrations of low-cost microwave equipment; commercial gear from Microwave Associates and companion low-low cost microwave designed and built by the CATJ Lab and Steve Richey. Both small earth terminals and low cost microwave are now in daily use in the industry. **So what, one might ask, will CCOS do for an encore in 1978?**

What we will **not** do in 1978 is reveal any startling **new** (that's the key word) forms of technology. What we will do is shake up the world quite a bit with some important refinements of some not very old technology. For example:

- 1) Operating at CCOS-78 will be a wide range of TVRO terminals. So what's new about that? Well, **there will be operating television receive terminals of six foot size (1.83 meter), ten foot size (3.0 meter) and of course some of the 'big' jobs up to 20 feet (6.0 meter). Yup, things are getting smaller all of the time.**
- 2) Operating at CCOS-78 will be the widest array of TVRO receiving equipment ever assembled in one spot at one time. There will be not only the commercial receivers from virtually every supplier to the industry but **there will also be some homebrew receivers.** English (private) TVRO experimenter par-excellance **Steve Birkill** is scheduled to be on hand with his vast experience in designing and building private TVRO terminals (**see April CATJ**) and he will participate in Seminar sessions which will explore **how a private terminal can be put together using brand new technology for under \$1,000.** Yup, things are getting less expensive all of the time.
- 3) **Audio receive terminal systems** will be on hand, utilizing antenna systems down to the four foot size level. The audio receive terminals promise to get down-right prolific and even cheap in the coming 12 months and while you may have no immediate application for an AP, UPI, etc. audio feed in your system at the present time the technology involved here will fascinate you.
- 4) **And low cost microwave.** Well, we have scheduled for appearance a Bob Richardson who has spent the past 14 months developing **more than 100 operating circuits** utilizing the Microwave Associates Gunnplexer transceiver packages. Richardson is bringing out a '**Gunnplexer Handbook**' this summer, and his experience in turning the basically cheap (or low cost) Gunnplexer gear into **really inexpensive** short-haul microwave for video, audio or data will reflect the current state of the Gunnplexer art in the world today. Yup, there is alot of

new knowledge in this area these days and it will all be at CCOS-78.

If none of this grabs your yagi we have more. For example, how about a series of Seminars detailing everything you ever wanted to know about finances and small CATV systems (but were afraid to ask, or did not know who to ask)? **Gary A. Dent** from Texas will hold forth on topics such as "**How to determine the true market value of your CATV system**", and "**How to prepare a (written) presentation for a banker/lending institution**", and, "**How to prepare for a rate increase request**", and, "**How and when to refinance a system that is paid off**" and much-much more. This session will have a study guide workbook in addition to the Seminar session itself, to help you follow along with the course.

**Want more?** Well, Arizona's **Oliver Swan** will be back and this year Oliver will have an "**Oliver Swan Consultation Room**" where you can take your small system problems. "Doctor" Swan will be "open for consultation" several hours each day, and the "Swan Consultation Room" will be set up with operating Swan constructed very-very-very low cost CATV headend and plant equipment Oliver will help you build for your own system (remember Oliver is the guy featured in the March 1977 issue of CATJ who actually **averages** ten cable homes **per mile** in his rural Arizona cable systems, and he makes money at it too!!).

And there will be the third-year repeat of the **CCOS Lab Room** where operators may bring in equipment and problems for expert assistance in repairing the equipment, aligning the equipment and generally learning about sweep set ups, and all of the latest and best test equipment available in the industry today.

More? There is much more. But rather than take up valuable space detailing the program schedule it might be better to concentrate on some of the functional changes we have made in CCOS in 1978. For example:

- 1) **There will be no kit construction this year.** Don't ask why... just be glad that's the way it is.
- 2) **The Seminar schedule has been re-arranged** (details in June) to allow you free afternoons to visit the Exhibit Hall area (which will be some 40% larger this year). Seminars will be held in the morning periods and there will be shorter one-topic Seminars in the early evening periods.
- 3) **The annual CCOS Bar-B-Que** will be held **Wednesday evening the 19th of July.** No 'talent show' this year, but we do have a most exciting entertainment special planned for the evening of the Bar-B-Que.

#### **What Next?**

All of those people who attended CCOS last year (CATA member systems and then non-members) have already been directly contacted regarding 'accomodations space' at CCOS-78. The space left over is the space which is now



being offered to the balance of the industry on a first-come, first-served basis.

There are only two places to stay in the wilds of eastern Oklahoma which will allow you to be close enough to the CCOS-78 action to participate. These are the state-run Lodges Fountainhead and Arrowhead. At this writing the CCOS-78 location (Fountainhead) is virtually filled up. **Additional accommodations are available at Arrowhead Lodge**, a 25-30 minute drive from Fountainhead. No, there are **no** motels or other accommodations nearby. This is wild country with more deer and quail than people.

Therefore **attendance at CCOS-78 is accommodations-limited**. When all of the places to sleep are gone, that's all she wrote. To register use the form here and mail it off **promptly**. Requests for accommodations arriving **after** all Fountainhead and Arrowhead rooms are filled will simply be returned. (Note: There are virtually unlimited camping and trailer accommodations however on the Lodge grounds.)

#### Great Event

If you have never attended a CCOS, and you are looking for a totally unique and useful experience in broadening your cable television information base, CCOS is for you. CCOS runs on a 'Seminar' concept bringing the best experts on a given subject in the world into the CCOS forum to teach **you** about their specialized subject. Seminar sessions often run about 50% prepared material and 50% questions and answers from the Seminar registrants. There is ample opportunity for give and take between the 'experts' and the cable people on hand.

**CCOS runs a family atmosphere environment.** Many operators bring their families, and allow them to enjoy the boating, swimming, fishing, hiking, horseback riding, trailing, tennis and golf that is right on the lodge grounds. We arrange the schedule so you have time to enjoy these attractions with your family and the informal country setting of the rustic lodge makes for an ideal vacation time for all hands. On top of this the lodge rates for accommodations are generally as low or lower than comparable accommodations anyplace in the United States today.

**CCOS has been building in size every year**; last year was a "capacity" event at this same location, so naturally there will be more people who want to come this year than can be accommodated. In 1979 CCOS moves to south Central Wisconsin.

**A few notes about transportation.** With your "Registration Accepted Packet" and schedule we'll provide you with **all** of the details you need. However if you plan to **fly** to CCOS, your termination in Oklahoma should be **Tulsa**. CCOS will again have ground transportation from the Tulsa airport to Fountainhead Lodge available. However, if you are not able to get into Fountainhead Lodge for accommodations and are placed at Arrowhead Lodge, you **will** need to plan on renting a car at the Tulsa airport because you will need it to get back and forth from Arrowhead to Fountainhead on a daily basis.

**Do not attempt to make housing accommodations directly** with either Fountainhead or Arrowhead Lodge. **All** accommodation arrangements are through CATA and they will be handled as part of your registration procedure.

#### CCOS-78 GENERAL REGISTRATION APPLICATION FORM

I wish to register for CCOS-78 July 16-19, 1978 at Fountainhead Lodge, Oklahoma.

☐ I am a CATA member who missed the deadline; \$55.00 enclosed (make out to CCOS-78) per person (\*).

☐ I am not a CATA member but am registering prior to June 1st, 1978; \$100. enclosed (make out to CCOS-78) per person (\*).

☐ I am not a CATA member, and have missed the June 1, 1978 pre-registration deadline; \$150. enclosed (make out to CCOS-78) per person (\*).

\*—Only those attending the Seminar sessions/Exhibit Hall/Bar-B-Que need to register. **Wives and children are exempt from any charges except** for the optional CCOS-78 Bar-B-Que for which tickets will be available at CCOS.

NAME \_\_\_\_\_

Company \_\_\_\_\_

Address \_\_\_\_\_

Town/City \_\_\_\_\_ State \_\_\_\_\_ Zip \_\_\_\_\_

Telephone Number (\_\_\_\_) - \_\_\_\_\_

Total number of people you will bring: \_\_\_\_\_

Check off type of sleeping accommodations desired: No. of people in party \_\_\_\_\_

☐ Camping/trailer spot ☐ Single room ☐ Double room ☐ Twin bed room

RETURN TO: CCOS-78  
Suite 106, 4209 NW 23rd  
Oklahoma City, Ok. 73107



# CATA ASSOCIATES

In recognition of the untiring support given to the nation's CATV operators, and their never-ending quest for advancement of the CATV art, the COMMUNITY ANTENNA TELEVISION ASSOCIATION recognizes with gratitude the efforts of the following equipment and service suppliers to the cable television industry, who have been accorded ASSOCIATE MEMBER STATUS in CATA, INC.

## C-COR Passives

**C-COR Electronics, Inc.** has added a 12 dB and a 16 dB directional coupler to their assortment of mainline passive devices. The new couplers are similar to their 8 dB models and are designated (respectively) the SM-430-D-12 and SM-430-D-16. Entry ports are standard 5/8 24 and they accommodate center conductors up to 0.172 inches in diameter with center seizure terminals.

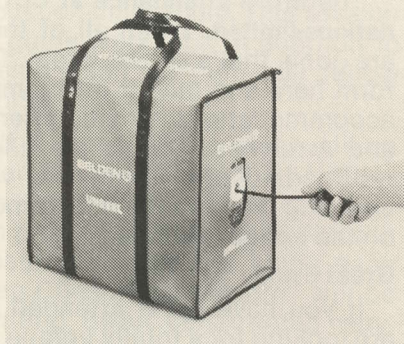
The units are physically small (3.5 x 3.5 x 2 inches), are suitable for aerial or pedestal mounting, and will handle 12 amps of power passing (10 amps for -70 dB hum mod). Power is blocked by snipping a wire. Full information from the firm at 60 Decibel Road, State College, Pa. 16801.

## Drop Cable Sling

In the 'why didn't somebody think of this before' department, **Belden Corporation** (2000 S. Batavia Avenue, Geneva, Illinois 60134) has just announced a special limited-time available vinyl carrying case for Belden's Unreel dispenser cartons for drop cable.

The case (shown here) has carrying straps and a tough vinyl case that protects the Unreel carton from needless wear and tear. Cable plays out dangle and dirt free through a slotted opening in the sling.

The best part of all is the price on the carrying sling/case. **It's free.** For a limited time (not specified) for each 25,000 feet of Unreel packaged cable



ordered (that covers Duofoil, Doubond, Doubond II cables) you receive one of these handy carrying cases. Better get a move on before the supply runs out.

AmeriCom Satellite Network, Inc., 6350 LBJ Freeway, Suite 148, Dallas, TX (S4) 214-341-4502  
 AEL, INC., CATV COMMUNICATIONS DIV., P.O. Box 552, Lansdale, PA 19446, (M1, S2) 215-822-2929  
 Anixter-Pruzan, Inc., P.O. Box 88758, Tukwila Branch, Seattle, WA. 98188 (D1) 206-251-6760  
 Avantek, Inc., 3175 Bowers Avenue, Santa Clara, CA. 95051 (M8) 408-249-0700  
 Belden Corp., Electronic Division, P.O. Box 1327, Richmond, IN. 47374 (M3) 317-966-6661  
 BESTON ELECTRONICS, INC., 903 South Kansas Ave., Olathe, KS. 66061 (M9 Character Generators) 913-764-1900  
 BLONDER-TONGUE LABORATORIES, One Jake Brown Rd., Old Bridge, N.J. 08857 (M1, M2, M4, M5, M6, M7) 201-679-4000  
 BROADBAND ENGINEERING, INC. 1525 Cypress Dr., Jupiter, FL. 33458 (D9, replacement parts) 1-800-327-6690.  
 CCS HATFIELD/CATV DIV., 5707 W. Buckeye Rd., Phoenix, AZ. 85063 (M3) 201-272-3850  
 C-COR ELECTRONICS, Inc., 60 Decibel Rd., State College, PA. 16801 (M1, M4, M5, S1, S2, S8) 814-238-2461  
 COLLINS COMMERCIAL TELECOMMUNICATIONS, MP-402-101, Dallas, TX. 75207 (M9, Microwave) 214-690-5954  
 COMMUNICATIONS EQUITY ASSOCIATES, 651 Lincoln Center, 5401 W. Kennedy Blvd., Tampa, FL. 33609 (S3) 813-877-8844  
 COMM/SCOPE COMPANY, Rt. 1, Box 199A, Catawba, NC 28609 (M3) 704-241-3142  
 ComSonic, Inc., P.O. Box 1106, Harrisonburg, VA. 22801 (M8, M9, S8, S9) 703-434-5965  
 C R C ELECTRONICS, INC., P.O. Box 855, Waianae, HI. 96792 (M9 Videotape Automation Equipment) 808-668-1227  
 DAVCO, INC., P.O. Box 861, Batesville, AR. 72501 (D1, S1, S2, S8) 501-793-3816  
 DF Countryman Co., 1821 University Ave., St. Paul, MN 55104 (M2, S1, S8) 612-645-9153  
 EAGLE COM-TRONICS, INC., P.O. Box 93, Phoenix, N.Y. 13135 (M9 Pay TV Delivery Systems & Products) 315-695-5406  
 EALES COMM. & ANTENNA SERV., 2904 N.W. 23rd, Oklahoma City, OK. 73107 (D1,2,3,4,5,6,7,S1,2,S7,8) 405-946-3788  
 FARINON ELECTRIC, 1691 Bayport, San Carlos, CA. 94070 (M9, S9) 415-592-4120  
 FEDERAL BROADCASTING CO., 600 Fire Rd., Box 679, Pleasantville, N.J. 08232 (D9, S9)  
 FERGUSON COMMUNICATIONS CORP., P.O. Drawer 871, Henderson, TX. 75652 (S1, S2, S7, S8, S9) 214-854-2405  
 FRANK L. CROSS & ASSOCIATES, INC., 5134 Melbourne Dr., Cypress, CA. 90630 (M9) 714-827-0868  
 GILBERT ENGINEERING CO., P.O. Box 14149, Phoenix, AZ. 85063 (M7) 602-272-6871  
 G T E SYLVANIA, 3046 Covington Rd., Marietta, GA 30062 (M1, D1) 404-993-1510  
 HUGHES MICROWAVE COMMUNICATIONS PRODUCTS, 3060 W. Lomita Blvd., Torrance, CA. 90505 (M9) 213-534-2146  
 HOME BOX OFFICE, INC., 7839 Churchill Way—Suite 133, Box 63, Dallas, TX. 75251 (S4) 214-387-8557  
 ITT SPACE COMMUNICATIONS, INC., 69 Spring St., Ramsey, N.J. 07446 (M9) 201-825-1600  
 JERROLD Electronics Corp., P.O. Box 487, Byberry Rd. & PA. Turnpike, Hatboro, PA. 19040, (M1, M2, M4, M5, M6, M7, D3, D8, S1, S2, S3, S8) 215-674-4800  
 JERRY CONN ASSOCIATES, INC., P.O. Box 444, Chambersburg, PA. 17201 (D3, D4, D5, D6, D7, D8) 717-263-8258  
 LARSON ELECTRONICS, 311 S. Locust St., Denton, TX. 76201 (M9 Standby Power) 817-387-0002  
 LRC Electronics, Inc., 901 South Ave., Horseheads, N.Y. 14845 (M7) 607-739-3844  
 Magnavox CATV Division, 133 West Seneca St., Manlius, N.Y. 13104 (M1) 315-682-9105  
 MICROWAVE ASSOCIATES, INC., 10920 Ambassador Drive, Suite 119, Kansas City, MO. 64153 (M9 Microwave Radio Systems) 816-891-8895  
 MICRODYNE CORPORATION, P.O. Box 1527, 627 Lofstrand La. Rockville, MD. 20850, (M9 Satellite TV Recs.) 301-762-8500  
 Microwave Filter Co., 6743 Kinne St., Box 103, E. Syracuse, N.Y. 10357 (M5 Bandpass Filters) 315-437-4529  
 MID STATE Communication, Inc., P.O. Box 203, Beech Grove, IN. 46107 (M8) 317-787-9426  
 MSI TELEVISION, 4788 South State St., Salt Lake City, UT. 84107 (M9 Digital Video Equip.) 801-262-8475  
 NORTHERN CATV DISTRIBUTORS, INC., 8016 Chatham Dr., Manlius, N.Y. 13104 (D1) 315-682-2670  
 OAK INDUSTRIES INC./CATV DIV., Crystal Lake, IL. 60014 (M1, M9 Converters, S3) 815-459-5000  
 PRODELIN, INC., 1350 Duane Avenue, Santa Clara, CA. 95050 (M2, M3, M7, S2) 408-244-4720



# MEMBER SHOWCASE

## New products and services

from the industry are the life-blood of the continual expansion and progress by the cable TV system operators throughout the world. Products and services reviewed here are new or 'recent' from CATA Associate Member firms; always good places to do business!

### Extended AML Capability

Hughes Aircraft Company's **Micro-wave Communication Products** (Division) has created a 19 dB improvement in second-order intermodulation distortion products in the latest version of AML receivers.

The new 19 dB improvement is available as standard equipment on all new AML equipment (40 channel, indoor or outdoor versions), and, can also be incorporated as a retro-fit into previous AML equipment produced prior to the development of the improvement. And the improved specifications are added with no increase in cost for the new production units.

The improvement is said to 'significantly increase the distances that can be covered by AML fed cable systems'.

### Hughes Now 24 Hour

The Microwave Communication Products division of Hughes Aircraft now has a 24 hour, seven day-per-week emergency telephone service number. Hughes AML and satellite receive system customers can find trained service engineers ready, willing and able to offer over the telephone trouble shooting assistance, and provide emergency shipment of needed replacement parts

and modules by calling 213/534-2170. Do **not** use this number for routine calls to Hughes.

### Broadband Expands

Broadband Engineering, Inc., the people who provide instant shipment of replacement parts and components for CATV amplifiers and a line of state-of-the-art modules for older style CATV line amplifiers, has expanded into new and larger quarters. The firm is now located at 1525 Cypress Drive in Jupiter, Florida (33458) and has inaugurated a toll free telephone number service (1-800-327-6690).

Q-BIT Corporation, P.O. Box 2208, Melbourne, FL 32901 **(M4)** 305-727-1838

RADIO MECHANICAL STRUCTURES, INC., P.O. Box 1277, Kilgore, TX 75662 **(M2, M9, S2)** 214-984-0555

R F SYSTEMS, INC., P.O. Box 428, St. Cloud, FL 32769, **(M2, M6)** 305-892-6111

RICHIE DEVELOPMENT CORP., 6920 Melrose, Oklahoma City, OK. 73127 **(M1, M4, M8, S8)** 405-495-3953

**RMS CATV Division**, 50 Antin Place, Bronx, N.Y. 10462 **(M5, M7)** 212-892-1000

Sadelco, Inc., 299 Park Avenue, Weehawken, N.J. 07087 **(M8)** 201-866-0912

Scientific Atlanta Inc., 3845 Pleasantdale Rd., Atlanta, GA. 30340 **(M1, M2, M4, M8, S1, S2, S3, S8)** 404-449-2000

SCIENTIFIC COMMUNICATIONS, INC., 3425 Kingsley Rd., Garland, TX. 75041. **(M4 Low Noise & Parametric)** 214-271-3685

SITCO Antennas, P.O. Box 20456, Portland, OR. 97220 **(D2, D3, D4, D5, D6, D7, D9, M2, M4, M5, M6, M9)** 503-253-2000

Systems Wire and Cable, Inc., P.O. Box 21007, Phoenix, AZ. 85036 **(M3)** 602-268-8744

TERRACOM, 9020 Balboa Ave., San Diego, CA. 92123 **(M9 Microwave Earth Stations)** 714-278-4100

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**Theta-Com.**, P.O. Box 9728, Phoenix, AZ. 85068 **(M1, M4, M5, M7, M8, S1, S2, S3, S8, AML MICROWAVE)** 602-944-4411

**TIMES WIRE & CABLE CO.**, 358 Hall Avenue, Wallingford, CT. 06492 **(M3)** 203-265-2361

Tocom, Inc., P.O. Box 47066, Dallas TX. 75247 **(M1, M4, M5, Converters)** 214-438-7691

TOMCO COMMUNICATIONS, INC., 1077 Independence Ave., Mtn. View, CA. 94043 **(M4, M5, M9)** 415-969-3042

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VITEK ELECTRONICS, INC., 200 Wood Ave., Middlesex, N.J. 201-469-9400

**WAVETEK Indiana**, 66 N. First Ave., Beech Grove, IN. 46107 **(M8)** 317-783-3221

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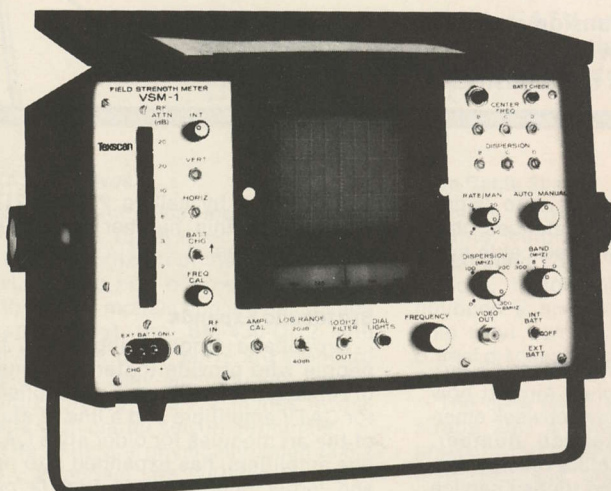
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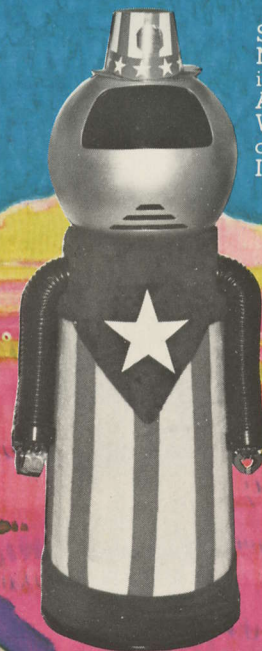
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