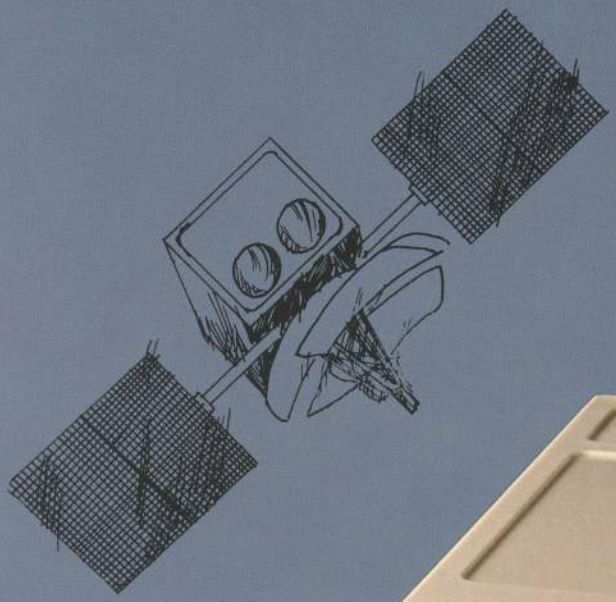
CATJ

FEBRUARY
1978

OFFICIAL JOURNAL
OF THE
COMMUNITY ANTENNA
TELEVISION ASSOCIATION



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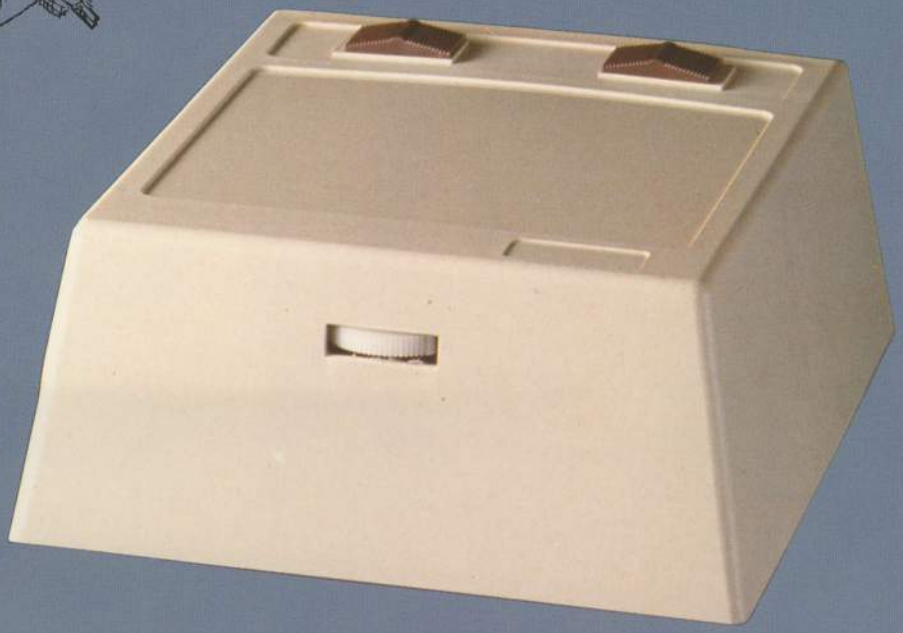

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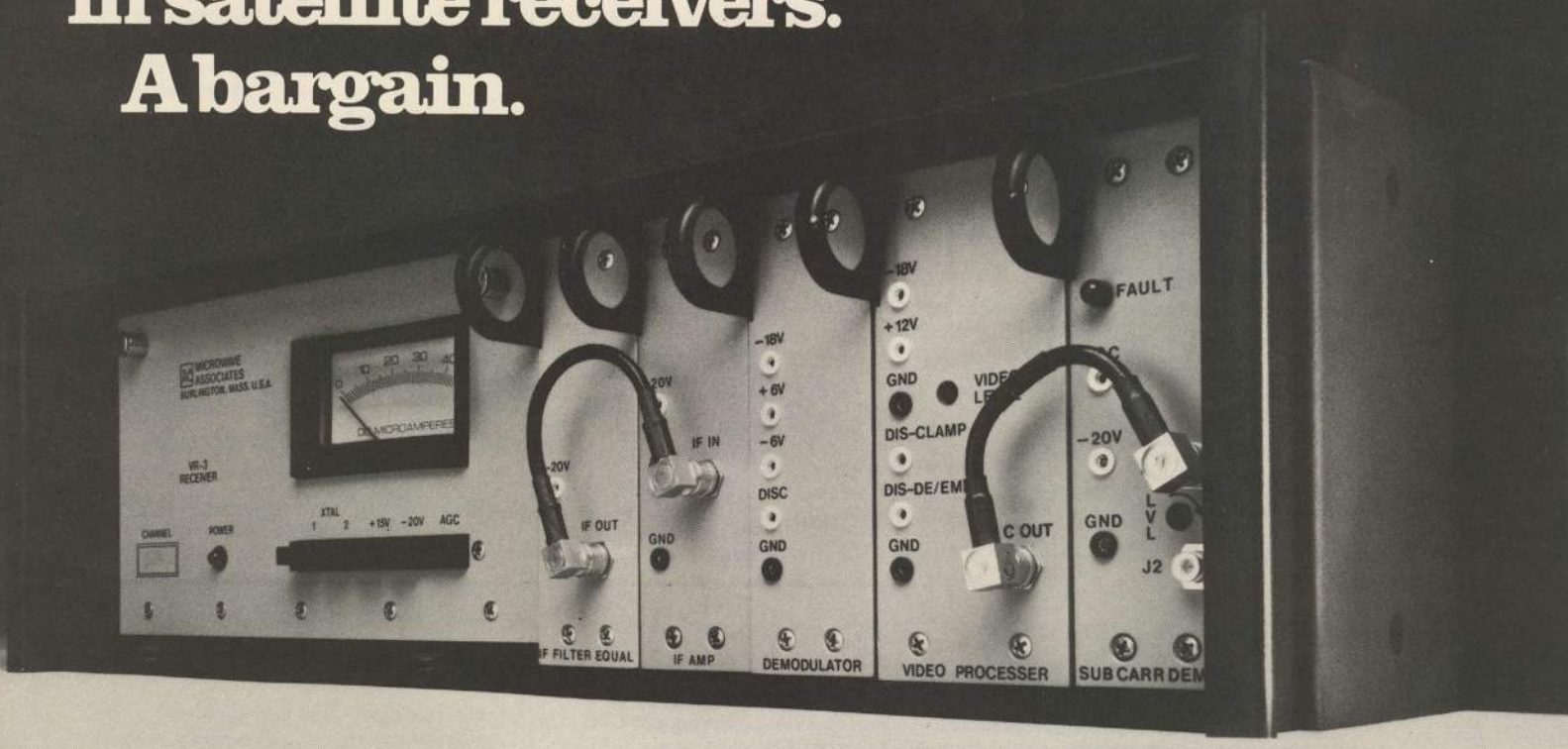

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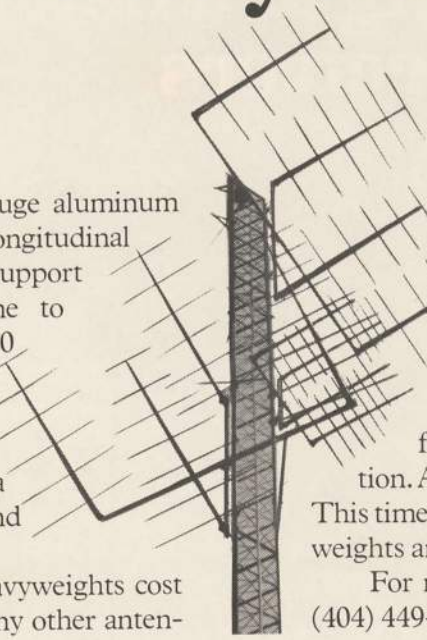

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Europe: 1-7 Sunbury Cross Centre, Staines Road West, Sunbury on Thames, Middlesex TW16 7BB, England,
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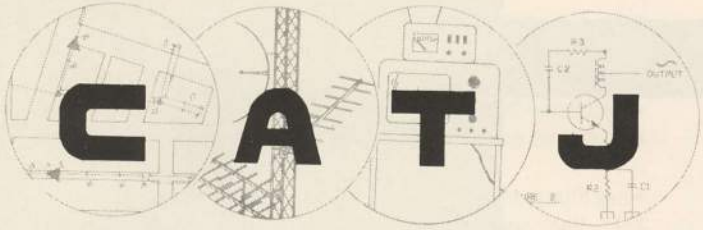

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—OUR COVER—

Low Cost Microwave. We haven't forgotten about it! CATJ contributing editor Steve Richey holds the latest AFC'd version of the GunnPlexer do-it-yourself low cost microwave during field trials at the CATJ Lab early in January. The four foot dish over his shoulder was our transmit antenna. A two-part construction series will begin in April. Watch for it.

CATA-torial

KYLE D. MOORE, President of CATA, Inc.

The Danger Ahead

Within the industry at the moment there is an uneasiness such as afflicts the creatures of the forest just prior to a storm. That uneasiness is complicated by our limited vision and our own individual 'health signs'. For most the pulse is strong and we exhibit no visible illness nor do we see any clearly defined threat. **But the uneasiness persists.**

An uneasy industry is an edgy industry—one short of temper and quick to grasp any rumor or change in pulse as proof that our uneasiness is valid. Once you've been through a devasting fire, the first new whiff of smoke is sufficient to rekindle the adrenalin flow.

There is smoke is the air. And a perceptive eye will probably trace its origins to the nation's capitol.

We've been through Washington fire storms before. Cable rules in 1972, copyright in 1976, poles/fines and forfeitures in 1976 and again in 1977 are but the most recent afflictions to beset the industry.

Let's try to locate the cause of the current smoke drifting up from the banks of the Potomac. **One possible source** is the still-smoldering pole/fines and forfeiture bill. During the fall session on the hill, this fire died and almost went out; the victim of a shortage of the one ingredient which is so essential to keeping all camp fires stoked and burning in Washington. A lack of time. During the summer and fall of 1977, a strange set of fire tenders kept pouring fuel on this fire; first NCTA speaking on behalf of the nation's big city system operators carted in the fuel for the pole portion of this strange 'mixed-creed' bill, alternately followed by the FCC blowing on the embers and the NAB tossing occasional small containers of gasoline on behalf of the fines and forfeiture provision of the 'mixed-bill'. When the fall session of Congress adjourned, the staff of Senator Ernest Hollings picked up the campfire embers and moved them into the good Senator's office where through the bowels of winter they kept the sparks aglow with an occasional handful of Washington's own patented fuel—paper.

During the Congressional lull while the fire of poles/fines and forfeitures barely glowed, the smoke from the fire that overhung the nations's CATV operators blew away and many system people had the first opportunity to move in, out of the smoke, and inspect the fire close-up. Not surprisingly, quite a few found that during the heat of the fall fire they had been blinded by the intensity of the flame and thickness of the smoke. The **Oregon Cable Communications Association** Board of Directors was one such group that took a 'new look' at the embers. And they decided that perhaps they had been mis-lead by the fire tenders of the fall into believing they needed this fire at all.

Aside from the obvious dislike most if not all CATV system operators share for the fine and forfeiture portion of the bill the pole portion on closer re-inspection by the Oregon group proved to be unacceptable. The Oregon Board found "...**the present bill** (SI547) **now in Senate Committee is stripped of intended industry objectives and does not represent legislation constructive to the Cable Television Industry**..." They further found "...**concern** (with) **the inherent detrimental aspects of the bill, specifically state pre-emption of the rate setting formula and exemption of Public Utility District and co-operative pole owners**..."And the Oregon group advised their own Senators of their re-evaluation and their withdrawing of support for the bill "in its present form".

The bill is a disaster of course. It is a mixed marriage of expediency; the big city system builders claim without federal pole legislation they cannot build the biggie systems while the smaller, or more rural, system operators see no benefits from the pole legislation and only years of hardship under **premature** fines and forfeitures. The groom seems to have an endless supply of wood to fuel the fire while the bride protests she is neither cold nor pregnant. There has been plenty of kicking and screaming in the aisles of the church over this one.

Even the rationale for expediency has evaporated. If the big city operators **were** persuasive with their cries for 'immediate relief' from the pole attachment monster in 1976 (they said they would perish **'within months'** without instant relief) the fact that they have **not perished** in the interim 20 months weakens their case.

But the fire burns on. Kept alive by a dogged determination on the part of some staff members of Senator Hollings and the FCC's festering determination to be both the judge **and** the executioner. **"Why are you opposed to fines and forfeitures?"** the Hollings staff asks. The response is straight forward and consistent. **"The FCC has an anti-cable bias that goes back more than a decade. This bias will never allow the FCC to operate with the proper restraint that an impartial agency is supposed to exhibit. Fines are a rational approach to** deliberate **abusers of** reasonable **rules, but only as long as the rules are based upon law and they are practiced without discrimination".**

"You are arguing rule abuses and this law deals with policy. If you want the rules changed, go to the FCC; don't confuse rules with

policy. The Congress sets policy, and policy is simply a plan designed to influence future decisions and action. Congress is no place to deal with rules!".

And with that the really strong advocate of fines and forfeitures in Senator Hollings' office dismisses you and your pleas for empathy and understanding.

It's the age old game of Congress being much too busy with game plans to be concerned with the conduct of the game itself. "Tell your beef to the umpire".

Only the umpire is biased. We know it. We can prove it. But unless we want to take the umpire to court (which is not always practical nor affordable), we are simply battling a 3-alarm fire with a squirt gun. A case in point.

On December 22nd Wallace E. Johnson, Chief of the Broadcast Bureau of the FCC released a decision regarding a cable TV system in Guam. The decision related to translators which Guam stations are systematically and possibly with malice situating throughout the island of Guam. The translators (on VHF channels) are getting into the TV sets of cable system subscribers and every bit of evidence we have seen convinces us that the translator signals are simply being picked up by the TV set's inner wiring **after** the cable service has delivered first class signals to the end of the cable drop. The result is something we all know as co-channel interference; a beat or mixing between the cable delivered signal and the translator signal on the same TV channel. After reviewing the same evidence we reviewed, Broadcast Bureau Chief Johnson found the cable system operator "guilty" of crying wolf. The language of the Johnson decision was laced with perfect examples of the inherent bias of the FCC towards cable. Phrases such as the following appear in the decision:

"The naked allegation that operation of the proposed translator will cause interference to a cable system. . .is clearly insufficient to warrant serious consideration."

And, "Elementary prudence to prevent or reduce the possibility of interference can be taken without any significant investment on the part of the cable system".

Or, "(the cable system's) contentions are speculative and premature. . .".

One must assume from the instant case that Johnson is either a poor engineer, or, if he once was a competent engineer, his tenure at the Commission has dimmed his abilities to weigh elementary-grade evidence. **His language,** in either case, **is offensive to cable** and it illustrates perfectly the anti-cable bias that permeates too many levels of the Commission.

Given this type of condition it is impossible to support **"Senatorial policy"** which simply re-enforces and strenghtens the **"rules of the umpire".** There is still only one right approach to the bias problem at the Commission; a piece of legislation that directly addresses the unique problems of cable, setting down hard and fast **"'policy"** that tells the **"rulemakers"** just how far they can go in the cable area. Any other approach simply pours more fuel to the smoldering fires and contributes to the instability and uneasiness of the cable television industry and the public it serves.

Life (Support) Utilities?

An ugly decision was handed down late in December at the Public Utilities Control Authority for the State of Connecticut. No good can come of it and if the worst fears come to pass it may well serve as a 'model' for other states to re-look at CATV rate increase problems.

Getting a rate increase for cable is a sick problem. We began as free business people setting our own rates and taking our own chances in the marketplace. Sometimes we set our rates too low, and sometimes we set our rates too high, but it was always **we** who set our rates and **the customers** who determined whether we are right or wrong.

When the FCC moved in on cable in 1972 **they** set out that 'before a CATV system could obtain a federal Certificate of Compliance' for its operations, the franchise or agreement between the cable operator and the community area served **must** provide that rate changes be subject to franchising authority approval. This federal mandate of Washington stayed with us until mid-1977, but by then the damage had been done. All of the systems who felt obliged to 'toe the mark' and get their franchises in order for the 1977 compliance deadline went ahead and got their franchises re-worded. For many this was the start of a procedure where gradually the free enterprise system under which cable had grown became a 'quasi-public-controlled' municipal-enterprise system.

In Connecticut the state **liked** the concept of 'rate regulation' and it empowered its new PUCA with the authority to review rates and pass upon them before a (Connecticut) CATV system could make any subscriber increases. On June 6, 1977 TelePrompTer Corporation (Danbury Division) filed an application with the PUCA to raise its base rate from $7.95 to $9.25 per month. A hearing was scheduled by the PUCA for October 26th. After the (October 26th) hearing a subscriber went to the State Consumer Counsel and asked for authority to intervene. The subscriber alleged that the Danbury system had (1) deleted the AP News Service, (2) Hartford's Channel 18 had been deleted, and, (3) 'access' to the local 'access channel' was poor. The PUCA set an additional hearing date for November 14th to hear the new 'evidence' against the Danbury system.

The result of all of this was a 12 page 10,000 + word decision that probably has TPT wondering why any sane company would be doing business in Connecticut.

The State's PUCA found that:

1) **CATV rates are subject to the same rate base structures which govern rates for 'essential utilities' such as electricity and the water.**
2) Pay TV revenues **are to be included** in the system's normal subscription revenues for the purpose of determining a 'rate base'.
3) **The system's method** of allocating overhead to Corporate headquarters **was severely criticized** under the theory that the system "is essentially built and as a consequence it does not require ongoing support from the corporate headquarters".
4) **The system's bookkeeping methods** for handling taxes were found inadequate, and expenses for same incurred at the corporate office were questioned. In effect the PUCA found **the Corporate office liable** for whatever errors the local system might stumble into, and they set the ground work to 'pierce the corporate veil' of the Danbury Division.

On the bottom line TPT's Danbury system got a smaller-than-requested rate increase, but in so doing they probably wish they had never asked in the first place. The precedents set by the PUCA decision are many, and none are good. In Connecticut it is obvious that cable rates will from this time forward be determined along the same general lines as utilities that are 'essential to life'. The State board determined that a 'rate of return of 11.99% **as adjusted by the authority'** would be 'fair' for TelePrompTer's Danbury operation in the future, and set the new rates accordingly. If that alone does not seem incredulous, it is worth recalling that ". . .as adjusted by the authority. . ." includes the PUCA discounting those items of 'New York corporate office overhead' which **the authority** does not like. In the Danbury system (and others owned and managed by TelePrompTer) these 'discounted items' might well add up to substantial legitimate expense items which when discounted will make the 'acceptable 11.99% return' far lower in actual fact.

So how is your rate increase request going?

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Each is a fixed tuned, stand alone receiver specifically designed to reduce the cost of adding TV channels to existing or new CATV Receive Only Terminals. Yet, they offer the same video, audio and related performance specifications as Microdyne's widely accepted Model 1100-TVR(VT) receiver, including the standard 8.0 dB C/N threshold extension feature.

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If you could do it without appreciably increasing your costs . . . would you? Of course you would . . . but *can* you? Of course you can!

VITEK's New Multi-Channel Traps are the answer for both new and existing systems. You already know VITEK's Cable Traps (the industry standard) are the best for Pay TV Security. They prevent theft of Pay TV Service *at the pole*. . . .

Now, with VITEK's Multi-Channel Traps, you have the recognized advantage of having cable-traps on the pole plus the added advantage of being able to offer Multi-Pay service.

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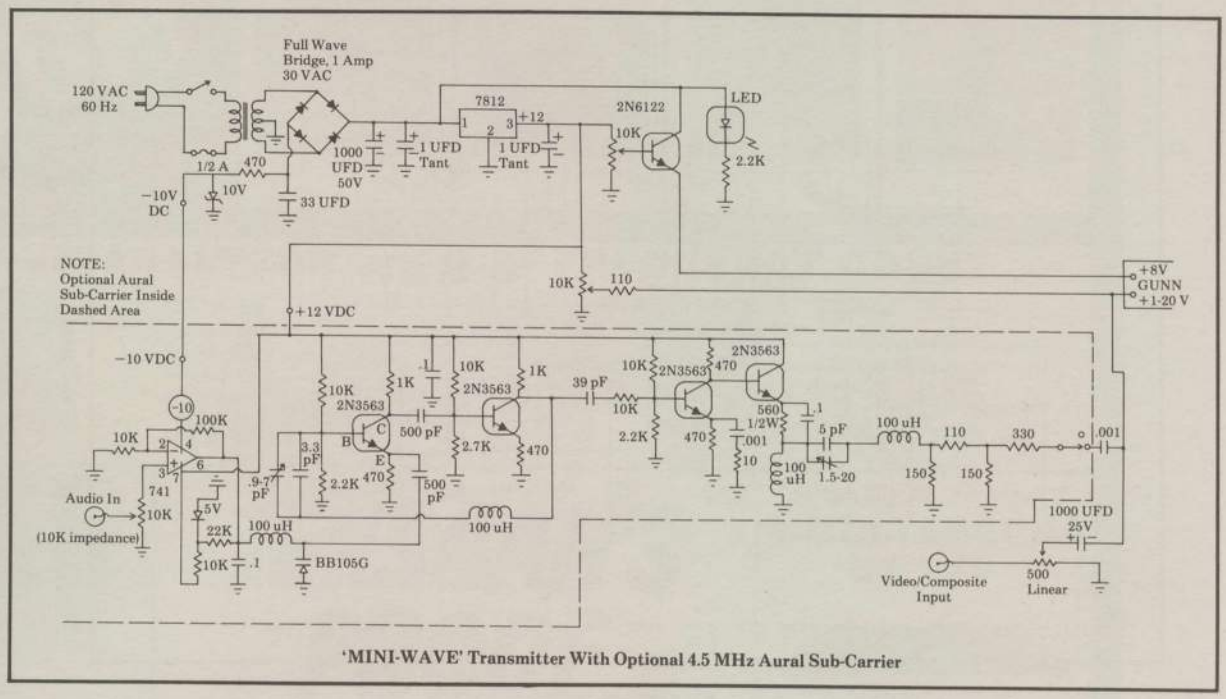

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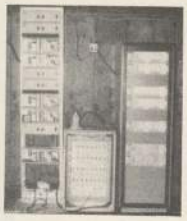

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- Storage Interface

Performs all FCC tests except system flatness

FREQUENCY COUNT

TFC-7
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- Stripper/Preselector Integral
- −5 dBmV Sensitivity
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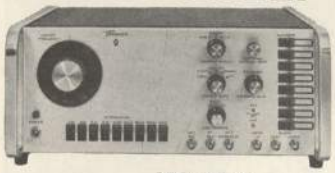
BENCH SWEEP



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DU-720 Large screen, 12" — AC or DC coupling P7 phosphor standard, 1 mV/div. sensitivity

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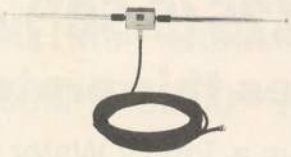
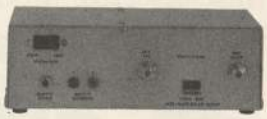


RADIATION DIPOLE

AFS-1

Radiation dipole kit contains antenna, fibreglass mast sections, calibration chart which includes downlead loss.



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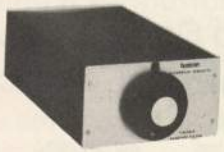
VSX-92

Preamp has 29 dB gain from 40 to 890 MHz, with 7 dB noise figure and flatness of ±1 dB. Operates from internal rechargeable battery.



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Eliminate preamp overload with 3 or 5 section filters. Available with 3 or 5% bandwidth. Low insertion loss.

SWEEP RECEIVER

9550R
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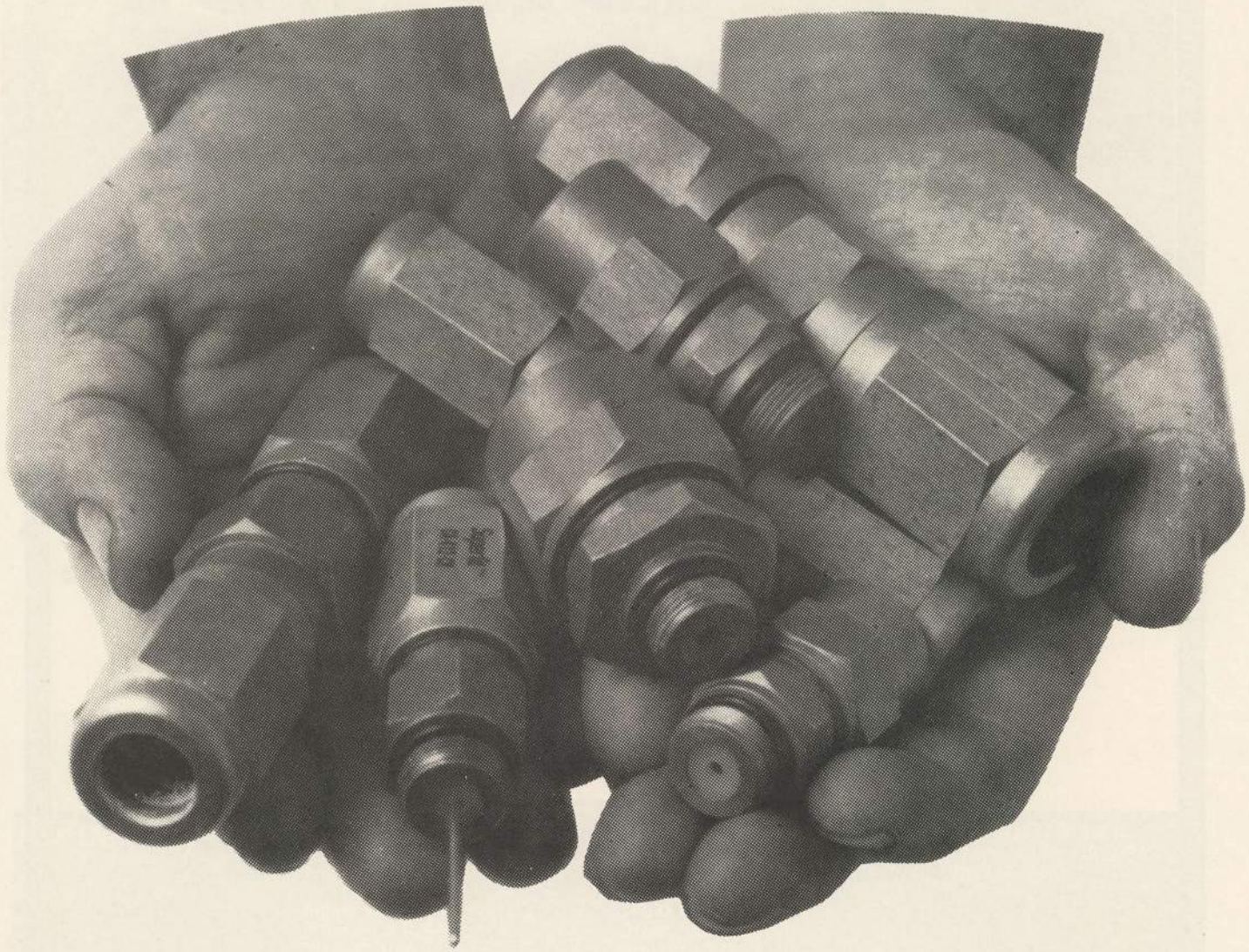

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Calculated To Save Time And Money

FIVE PROGRAMMABLE CALCULATOR PROGRAMS FOR CATV SYSTEM DESIGN AND OPERATION

by
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York Cablevision Ltd.
Don Mills, Ontario
Canada M3A 3L9

Programs For All Seasons

In the August 1977 issue of **CATJ** a cable operator explained how he has programmed an SR-56 calculator to do elementary system layout for placement of tap-off devices on feeder lines. **York Cablevision Limited** has been utilizing Hewlett Packard programmable calculators for routine and special CATV system layouts for quite some time.

The programs to follow cover four separate everyday CATV applications utilizing either the HP97 or HP67 calculators, or the HP25/HP25C models. Included are programs for:

1) **Tap selection** (built around the Sylvania 2 and 4 way multi-taps), using the HP97 or HP67;
2) **Tap selection** (built around the Sylvania 4 way multi-taps), using the HP25/HP25C;
3) **Trunk levels** with the HP25/HP25C;
4) **AC powering** with the HP25/HP25C, and,
5) **System distortion calculations** with the HP25, or HP67 or HP97.

The assumption with all of these programs is simply this. That you understand calculator programming fundamentals, and that given the proper instructions you will be able to implement the programs listed.

Tap Selection Program—Sylvania 2 and 4 Way Multi-Taps

This program is designed for the Hewlett-Packard **HP97** or **HP67** programmable calculator. It allows the operator to quickly and accurately select 2 and 4 way Sylvania multi-taps assuming the footages between tap locations are known. It will also:

—Determine 10dB distribution equalizer locations automatically

—Allow use of both .412 and .500 cable

—Deduct the appropriate tap insertion losses

—Calculate required equalizer and pad values for line extenders

—Allow cable loss alone to be calculated and subtracted from level registers

—Allow flat loss for splitters and directional couplers be subtracted

—Recall at any time the levels at ch. W, ch. 2, the footage of .412 and .500 cable accumulated and total flat loss

—Automatic initializing to the start of a line (i.e. the output of a line extender)

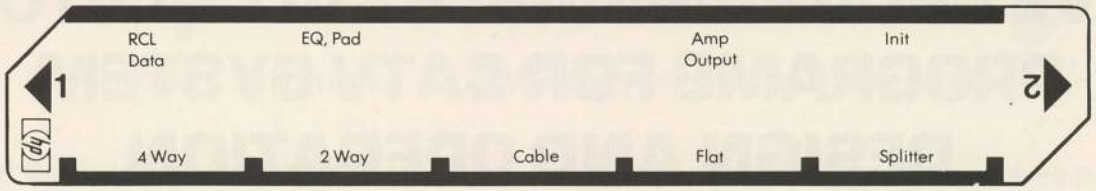
—Allow initializing program to output levels other than that in the calculator memory

It is assumed that the user is fully familiar with the HP67 or HP97 calculator and can operate, program and record programs and memory cards.

Setting up the Calculator for Your Case

1) **Key** in the program
2) **Record** the program on a magnetic card and clip the corners if you forsee no need to change it and wish to protect it from accidental erasure

Labels for User-Defined Keys



Memories and Explanatory Notes

R_A	0.0181	Attenuation per foot of .412 cable at 300 MHz (ch. W)
R_B	0.39779	(Attenuation at ch. 2) ÷ (Attenuation at ch. W)
R_C	47.0	Amplifier output at ch. W. (Modify as necessary)
R_D	0.82320	(Attenuation of .500 cable) ÷ (Attenuation of .412 cable)
R_E	0.597	This constant is used to determine proper equalizer value
R_O	—	ch. W. register
R_1	—	ch. 2 register
R_2	—	Running total of .412 cable
R_3	—	Running total of .500 cable
R_4	4.9	Another constant for determining equalizer value. It sets the input tilt after equalization to 4 ± 0.9dB
R_5	10	Distribution equalizer value and also used in insertion loss calculation for decimal relocation
R_6	—	Running total of flat loss
R_7	20	Minimum amplifier input for pad value calculation (modify as necessary)
R_8	6.6	Distribution equalizer loss at ch. 2; fractional part (0.6dB) is deducted from ch. W
R_9	12	Minimum tap level at ch. W (Modify as necessary)

RSO	35.00030003	
RS1	32.00030003	The 10 secondary registers are made to perform the duty of 30 registers; the first two digits correspond to tap values; the next non-zero digits correspond to 4-way tap insertion losses and the last non-zero digits are for 2-way tap insertion losses.
RS2	29.00030003	
RS3	26.00030003	
RS4	23.00040003	
RS5	20.00060004	
RS6	17.00100005	
RS7	14.00170009	
RS8	11.00280013	
RS9	8.00000026	

3) With an indelible marker, **print** the label names on the program card
4) **Store** the minimum tap level in register R_9. If you wish to operate the line extender amplifiers at a level other than 47 dBmV, store the new output level in register Rc
5) Similarly, if you operate at an output tilt of other than 7dB, modify step 125 accordingly.
6) Store the attenuation per **foot** of .412 cable in register R_A.
7) Divide the attenuation at ch. 2 by that at ch. W and store this ratio in register R_B
8) Divide the attenuation (at ch. W) of .500 cable by that of .412 cable and store this ratio in register R_D
9) Store the remainder of the constants in the register as indicated on the following listing and record the memories on a data card

Program Operation

1) Load memory and program cards
2) Press "Init" (fE) to initialize program to the output level of a line extender
3) If a different level, say that of a bridger amplifier, is desired, key in the level and press "amp output" (fD). The calculator will set the level 7dB lower at ch. 2
4) Key in the footage of .412 cable to the first tap and press either "4 way" (A) or "2 way" (B) to determine the required tap value
5) If .500 cable is used, make the footage negative by pressing CHS and press "4 way" or "2 way" as usual

NOTE: The calculator will, before selecting a tap value, test for the necessity of a 10dB distribution equalizer by subtracting ch. W from ch. 2. If the difference exceeds 2dB, 10.0000000 is displayed and program execution halts. Press R/S to resume calculation for the required tap value. (6.6dB will be subtracted from the ch. 2 register and 0.6dB from the ch. W register).

6) If you wish to subtract cable attenuation only without having a tap value selected, key in the footage (CHS if .500 cable) and press "cable" (C)
7) To deduct flat loss for a directional coupler, key in the loss and press "Flat" (D); the new level at ch. W will then be displayed
8) When a tap cannot be placed because of insufficient signal, the calculator will display the level at ch. W
9) In 7) and 8) where ch W is displayed, ch. 2 may be found by pressing $X \gtrless Y$
10) For a summary, press "RCL Data" and the calculator will print (HP97) or display in sequence (HP67) the following:

Level at ch. W
Level at ch. 2
Accumulated .412 cable
Accumulated .500 cable
Total Flat Loss

11) When it is determined that a line extender is required, you may find the equalizer and pad (attenuator) values required by pressing "EQ, Pad" (fB). (The

level at channel 2, after equalization, will be 4 ± 0.9dB lower than ch. W. This "reverse" tilt, together with 3dB "wired" in the RF modules, will give the resultant 7dB output tilt; the mid-stream variable attenuator allows fine tuning to get the exact tilt).

12) When a 7dB 4-way or a 4dB 2-way tap is displayed, it does not commit the operator to use it since no flat loss is deducted for these terminated taps.

You may continue to enter further cable footages (see step 6) or request the levels at that point by pressing R/S.

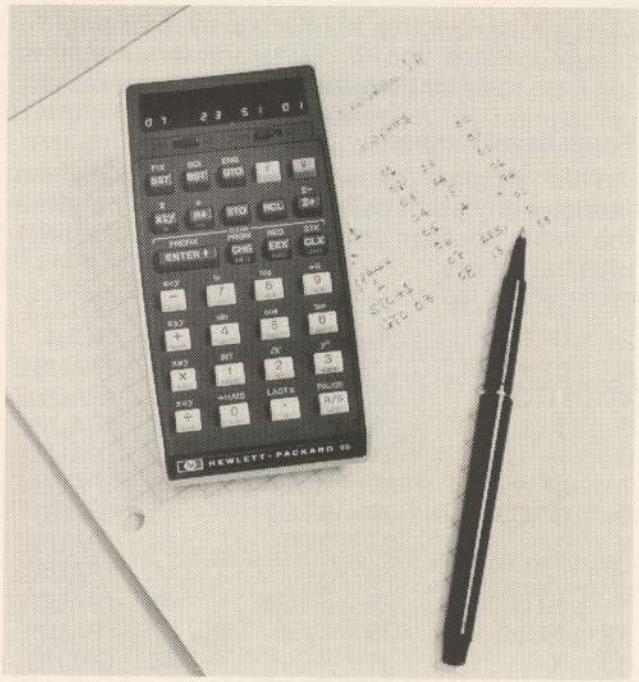
HP25/25C Tap Selection Program for Series 3800 Sylvania 4 Way Multi-Taps

This program allows the operator to enter footages of cable and have the calculator automatically calculate the loss of cable, the appropriate tap insertion loss, deduct these from the channel W level register and finally display the tap value to be used. Due to the limited number of program steps available, the calculator will not display the exact tap value; simply choose the nearest tap value lower than the number displayed. The program also allows cable loss alone to be deducted from the channel W level register. Automatic resetting to the output of a line extender is provided also.

Program Listing

1	fFIX2	18	GTO33	35	1
2	gX=O	19	3	36	GTO40
3	GTO48	20	—	37	RCL3
4	RCL 1	21	fX < Y	38	GTO40
5	X	22	GTO35	39	RCL4
6	gX < 0	23	3	40	STO-O
7	GTO45	24	—	41	R↓
8	STO-O	25	fXL<Y	42	R↓
9	RCL O	26	GTO32	43	fFIXO
10	RCL 7	27	3	44	GTO00
11	—	28	—	45	STO+0
12	RCL 2	29	fX < Y	46	RCL0
13	fX < Y	30	GTO37	47	GTO00
14	GTO39	31	GTO46	48	RCL5
15	6	32	1	49	STO0
16	—	33	.		
17	fX < Y	34	7		

Register	Content	Comment
R_0	ch. W	You may, of course, choose to have this memory contain the level at any frequency by storing the appropriate attenuation in R_1
R_1	.0175	Attenuation of cable per **foot**
R_2	25.999	Used for tap selection—DO NOT CHANGE
R_3	2.8	Insertion loss of 11dB tap
R_4	0.4	Insertion loss of 26, 29, 32 and 35dB taps



R_5	47	Line extender output—modify to suit
R_6	Unused	
R_7	12.5	Minimum tap level + 0.5 dB (don't forget to add the 0.5 dB). Modify to suit

Program Operation

1) Key in the program, switch to run mode and press f PGRM or GTO 00.
2) Store the memory contents as outlined above.
3) Press 0, R/S and the calculator will display 47 indicating that it is now set to determine tap values.
4) If you wish to start at a level other than that stored in R_5, key in the new level, press STO-0 and continue as usual.
5) To determine a tap value, key in the footage of cable to the tap location and press R/S. Choose the nearest tap value lower than the number displayed. Cable and insertion losses are automatically subtracted.
6) To deduct cable loss only, key in the footage of cable, make this value negative by pressing CHS, and press R/S. The level at channel W will be displayed.
   (Note: Tap values are displayed as integers and the ch. W level is displayed with 2 decimal places).
7) To deduct flat losses of splitters and directional couplers, key in the loss and press STO-0.
8) If insufficient signal exists to place a tap, the calculator will display the level at ch. W (see note in part 6) (above). If the line is to be terminated at this point, you may test for the possibility

of placing a 7dB tap by pressing 7-. Place the 7 dB tap if the result is greater than the minimum tap level.

Trunk Level Program

This program allows you to calculate the levels at any point between two amplifiers given the cable footage from the previous amplifier plus flat losses.

1	gX = 0 (1)	19	RCL7	37	GTO23
2	GTO25	20	RCL2	38	RCL4
3	gX<0 (2)	21	X	39	fPAUSE
4	GTO34	22	STO-5	40	fPAUSE
5	3	23	RCL3	41	fPAUSE
6	—	24	GTO00	42	fPAUSE
7	gX = 0 (3)	25	RCL6	43	fPAUSE
8	GTO38	26	STO3	43	RCL5
9	3	27	2 (4)	44	fPAUSE
10	+	28	—	45	fPAUSE
11	STO7	29	STO4	46	fPAUSE
12	RCL0	30	4 (5)	47	fPAUSE
13	X	31	—	48	GTO23
14	STO-3	32	STO5		
15	RCL7	33	GTO23	R0:	0.0112 (6)
16	RCL1	34	STO + 3	R1:	0.0094 (7)
17	X	35	STO + 4	R2:	0.0044 (8)
18	STO-4	36	STO + 5	R6:	32 (9)

OPERATION

1) Press 0, R/S to initiate program
2) Enter number of feet of cable and press R/S to obtain level of channel W (300 MHz)
3) For flat loss, enter number of dB's loss, chs and press R/S for level at channel W
4) At any time, the levels at channels 13 and 2 are found by pressing 3, R/S (the number 3 means you want 3 levels)

Notes

1) This conditional test senses if you want to start a new set of calculations.
2) This test senses if the number entered is negative, indicating that it is flat loss.
3) This conditional test senses if you have entered the number 3, indicating your desire to know all three levels at channels W, 13, and 2.
4) 2 is the level difference or tilt between channel W and channel 13. Modify to suit your case.
5) 4 is the tilt between channel 13 and channel 2, modify if necessary. (If you add or subtract any steps, make sure to change the step numbers following the conditional test).
6) Loss per foot of cable at channel W.
7) Loss per foot of cable at channel 13.
8) Loss per foot of cable at channel 2.
9) Output level of amplifier at channel W.

AC Powering Program

This program will calculate the voltage at any point along the trunk line if footages, currents and loop resistance are known.

1	gX = o (1)	14	RCL2	27	CHS
2	GTO19	15	X	28	RCL0
3	gX<0 (2)	16	STO-6	29	GTO07
4	GTO27	17	RCL6		
5	STO + 4	18	GTO00		
6	RCL1	19	0	RO:	.0022 (4)
7	X	20	STO2	R1:	.0007 (5)
8	STO + 2	21	STO3	R2:	≤R
9	R↓	22	STO4	R3:	≤I
10	STO + 3	23	STO5	R4:	≤750
11	gNOP (EEX) (3)	24	RCL7	R5:	≤412
12	gNOP (3)	25	STO6	R6:	Voltage
13	gNOP (÷)	26	GTO00	R7:	60 (6)

Operation

1) To start, press 0, R/S; the calculator will display 60 (the power supply voltage)
2) Enter the current draw at the next point, key in the footage of cable and press R/S. The voltage drop is calculated and the voltage at the location is then displayed. When entering the current, be sure to add both trunk/bridger requirements and line extender draw. (If you go on to another station, any previous results become invalid and should be ignored as the voltage drop in preceding lengths will increase).
3) Repeat step two until termination.
4) If a length of .412 cable is used, make the cable footage negative by pressing chs.
5) To: Recall total resistance: RCL 2
   Recall total current: RCL 3
   Recall accumulated footage of .750 cable: RCL 4
   Recall accumulated footage of .412 cable: RCL 5

Notes

1) Tests for program initiation or restart.
2) Tests for .412 cable.
3) Normal mode of calculation assumes current will be entered in amperes; if you wish to use milliamperes, key in the bracketed steps in place of the three gNOP statements.
4) Loop resistance per **foot** of .412 cable.
5) Loop resistance per **foot** of .750 cable. (Modify 4 and 5 to suit your type of cable).
6) Power supply voltage.

A Different Approach to System Distortion Calculations

The following program may be used in either the **HP25** calculator or the **HP/67** or **HP97** cal-

culator with several changes. It does not offer anything revolutionary, it simply allows the operator to improve his "feel" for the distortions which are cascaded in a CATV system.

I have long felt that "dB's", while enabling simplified loss calculations in trunk and distribution lines, interfere with one's ability to understand distortion calculations. This method, I believe, helps. The program may also be used for cross modulation and triple beat calculations (either composite or individual).

Program Listing (for HP25/25C)

1	ENT↑	10	STO 1	19	X
2	2	11	fLAST	20	GTO 12
3	0	12	R/S	21	RCL 0
4	STO 0	13	gX<0	22	÷
5	÷	14	GTO 21	23	g10x
6	g10x	15	RCL 1	24	RCL 1
7	EEX	16	X	25	g 1/x
8	2	17	flog	26	X
9	÷	18	RCL 0	27	GTO 12

Program Operation and Explanations

To start, key in the program, switch to run mode and press GTO 00 or f PGRM to set the program counter to the top of the program. Next, key in the maximum permissible level of distortion for the example or system for which you wish to perform calculations.

For example: For cross-modulation or composite triple beat, -50dB would be a possibility, or for individual triple beat, -75dB could be used.

Taking -50dB for cross-modulation, key in this sequence:

50 CHS R/S

The calculator will display the number 100.00; now, whenever you key in a distortion level, the calculator will convert it to a voltage ratio and divide by the maximum distortion voltage ratio, multiply by 100 and show you the resulting percentage.

If you key in -57dB, the answer will be 44.67%, indicating that -57dB represents 44.67% of the maximum distortion margin. The formula for this example is:

$$\%\,\text{distortion} = 44.67\% = 100\% \times \left[\frac{10^{\left(\frac{-57}{20}\right)}}{10^{\left(\frac{-50}{20}\right)}}\right]$$

The program allows rapid and automatic conversion from % distortion to dB's and back again. Try pressing R/S about six times and see what I mean.

When the calculator converts 44.67% back to dB's, it performs the following calculation:

$$20 \log \left[\frac{44.67}{100} \times 10^{\left(\frac{-50}{20}\right)}\right]$$

Line 13 in the program is a conditional test which determines the correct sub-routine. If negative, a number is assumed to be in dB's and formula (1) is applied; if positive, the number is a percent and formula (2) is used. The most significant advantage of this program is in dramatically demonstrating to the user where in his system his distortion is taking place.

Example 1:

Take: 25 trunk amplifiers, each at -91dB cross modulation
1 bridger amplifier at -59dB and
2 line extenders, each at -64dB cross modulation.

To solve this:

Keystrokes	Display	Comments
91 CHS R/S	0.89%	Contribution by Each Trunk Amp
25 x	22.28%	Less than a quarter of the margin of distortion consumed by the 25 trunk amplifiers.
R/S	-63.04dB	The trunk's distortion in dB's
R/S	22.28%	Back to %
59 CHS R/S	35.48%	More than a third of distortion available is contributed by the bridger
+	57.76%	Sum of trunk and bridger distortions
R/S	-54.77dB	Above expressed in dB's
R/S	57.76%	Back to %
64 CHS R/S	19.95%	A fifth of maximum consumed by 1 line extender
2 x	39.91%	The distortion of two line extenders
R/S	-57.98dB	Line extender distortion in dB's
R/S	39.91%	Back to %
+	97.67%	Sum of line extenders, bridger and trunk; no margin to speak of remains
R/S	-50.20dB	Bottom line-a hair better than maximum permissible

The above keystroke sequence assumes that you are very familiar with the four level stack and RPN system of the HP calculators. If unsure, do simple conversions and record intermediate results on paper, leaving the totals to the last. (Before adding the distortions of additional amplifiers, be sure that the distortion accumulated is shown as a percent).

Example 2:

Problem: If one has 22 trunk amps at -91dB and 1 bridger amp at -61dB, at what output level may 2 line extenders be run?:

Keystrokes	Display	Comments
91 CHS R/S	0.89%	Distortion of 1 trunk amplifier
22 x	19.61%	Distortion of the 22 trunk amplifiers
61 CHS R/S	28.18%	Bridger distortion
+	47.79%	Sum of trunk and bridger
CHS 100 +	52.21%	Total distortion less the contribution of trunk line and bridger (100 -47.79 = 52.21)
2 ÷	26.10%	Maximum permissible distortion per line extender
R/S	-61.67dB	Conversion to dB's

By examining the specifications for the line extender to be used and applying the familiar "2

for 1" rule, the output level may be quickly determined.

E.G. For -64dB cross modulation at 48dBmV output, the output level would be:

$$48 + \frac{(-61.67 - (64))}{2} = 48 + 1.17$$

$$= 49.17\text{dB}$$

Practically, you would operate this amplifier at 49dBmV output.

Program Listing for HP67/96

LBLA	fX<0?	X	X
fF?2	GTO 1	flog	RTN
GTO 0	RCL 1	RCL 0	LBL 1
RCL 0	X	0	2
÷	RTN	STO 0	÷
g10^x	LBL0	÷	STO1
RCL 1	ENT	g10^x	fLAST
1/x	2	EEX	RTN

N.B.: **Before** recording the program, set flag 2 by pressing f STF 2; in this way, when you press A, the calculator will "sense" that the program is being used for the first time and will set up memories 0 and 1. After this, it will operate similar to the HP 25 program. (The "set" condition of the flag will automatically be recorded with the program).

Part Two

BUILDING A SUPER-ANTENNA FOR LONG HAUL OFF-AIR APPLICATIONS

From The Base Line

In the first installment of this series we dealt with the design and operational principles for any parabolic antenna intended to function on an over-the-horizon VHF or UHF radio path. The proper location of the antenna, vis-a-vis the direct path or great circle path to the transmitter, and the selection of a proper site for the antenna was covered in some detail. Anyone contemplating construction of such an antenna system as described here should by all means review part one of this series before giving serious consideration to the construction details to follow.

The base line is the key to proper antenna orientation. The base line is a carefully constructed and survey point running across the intended antenna site which lies perpendicular to the direct or dead-on heading of the intended signal. Once the base line has been found, following the instructions given in January, it is then necessary to establish a rigid reference system all along the base line from which the precise locations of the footings for the tubular support pipe piers are determined. **See diagram 6.**

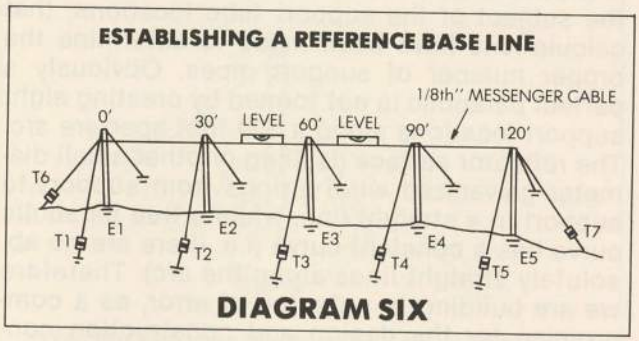
Utilizing the three points initially established (per diagram five appearing in January), metal stakes are placed at locations E1, E3, and E5 as shown in diagram 6. Two additional stakes are located halfway between stakes E1 and E3 (i.e. E2 in diagram 6) and stakes E3 and E5 (i.e. E4 in diagram 6). These stakes should be 4-7 feet tall, preferably 1 to 1-1/2 inch OD steel so that under tension they will not bow or bend. When driven into the ground they should be made perpendicular in both planes by using a carpenter's level.

The Frias Half-Bolic Antenna

This is part two of a three part series detailing construction and operation of very large tropospheric scatter half-parabolic antennas. The antennas described here have been designed by CATV and broadcast engineer **Ing. Antonio Frias Ramirez** of Baja California, Mexico. They have been operating in that region of Mexico south of San Diego (and down the Baja peninsula) for several years bringing San Diego and Los Angeles off-air signals over paths as long as 174 miles (see **January 1978 CATJ**).

The antennas described here are capable of delivering 28/29 dB of forward gain (reference a tuned dipole) at the high end of the VHF band (channel 13); with slightly lower gains at low band VHF and slightly more or equivalent gain in the UHF region. The principles behind the antenna's performance are detailed in the January issue.

This series will conclude in the March CATJ with final construction details and information on selecting and tuning the focal point or feed antenna.



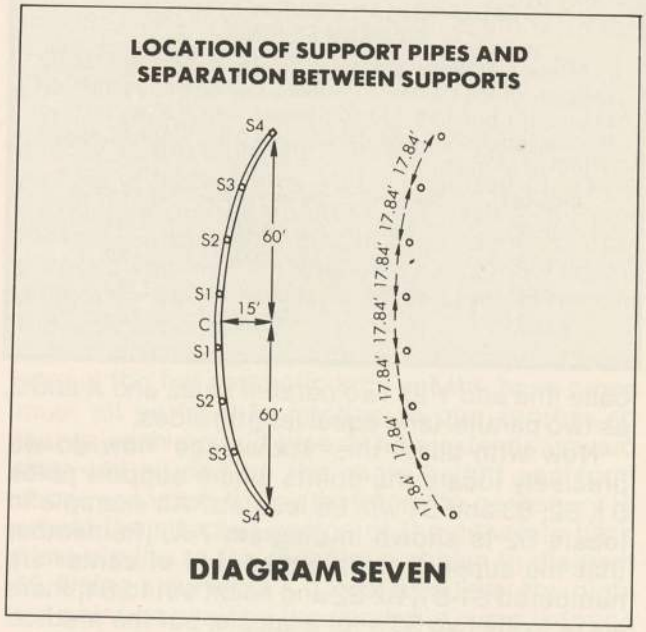
Now extend a length of 1/8 inch strand or messenger across the line of stakes as shown in diagram 6 (drill a hole through the same point in each stake so the messenger can pass through unimpeded) and anchor on both ends as shown, under tension. The stakes and messenger must be adjusted so that the wire-line is perfectly level (again, use a carpenter's level atop each of the spans as shown) and taunt. This secure (messenger wire) base reference line will now be utilized to plot the location of each of the piers for the support pipes or tubes for the half-bolic.

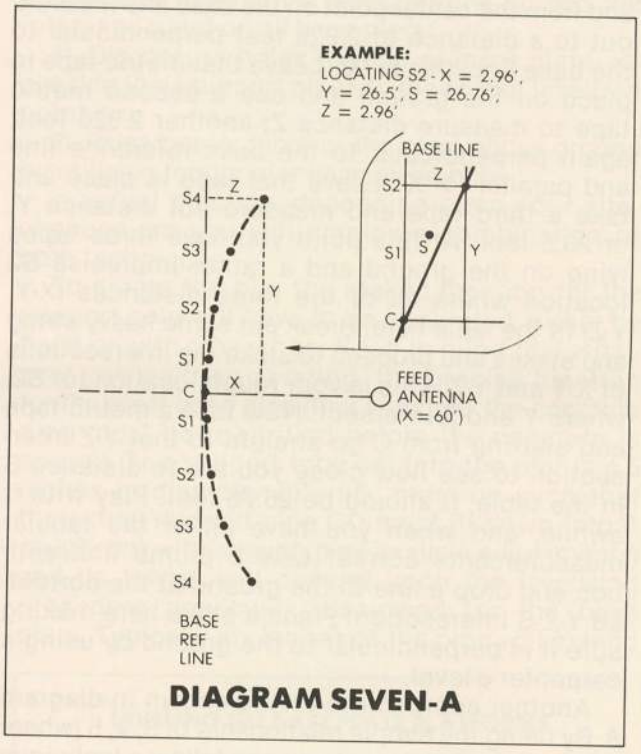
To The Arc

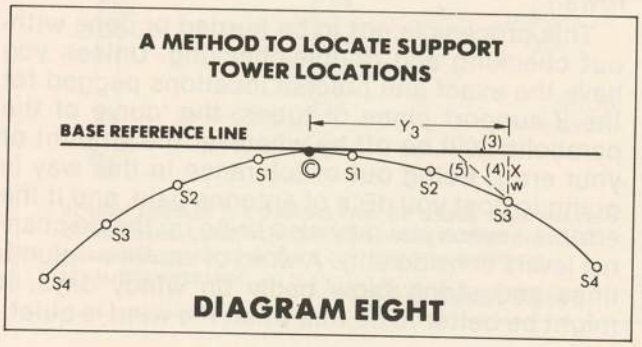
The parabolic 'arc' or curvature is determined by following **diagrams 7, 7-A and 8** plus the table to follow. Basically, what you are doing is starting off from the exact center of your base reference line (point 'C') and using it **plus** the base line itself as a reference to locate the point on the (now) imaginary parabolic curve where the 8 support poles or tubes will be situated. No pole or tube is at the center point ('C'); rather it sits exactly halfway between poles marked S1 (those **two** that come along the curve immediately left and right of the center point).

Diagram 7 shows the objective; eight pole locations spaced equi-distant apart along the parabolic arc to be created using the base reference line as a measuring point; each pole location being 17.84 feet from the next (and the preceding) pole locations. Note in diagram 7 that if you start **at the center** (C) point and go forward along a line perpendicular to the base reference line **15 feet,** you can then create a second line that is **parallel to** the base line (and perpendicular to the center crossing line) and **go 60 feet in either direction** to run smack into the two S4 pole locations.

Diagram 7-A brings this down to elementary geometry. From the table here we know the distance **'X'** (the distance from the base line center point perpendicular to the base line and forward towards the transmitting station signal source); we know the distance **'Y'** (the distance from the line that runs perpendicular to the base reference line straight through the focal point antenna location, to the support pole location) and we know the distance **'S'** (the straight line distance—ignoring the parabolic curve—from the center point C to the pole location). We also know the distance **'Z'** since we have a perfect rectangle with the







RECTANGULAR COORDINATES FOR DIAGRAM SEVEN-A

These distances are given in the hundredths scale because of the fractions involved. Conversion to the U.S. equivalent requires you to convert 16th's of an inch to decimal equivalents on the basis of 0.0625 inches equals 1/16th of an inch.

Distance S	Distance Y	Distances X and Z	Support Pole
8.92'	8.90'	0.33'	S1
26.76'	26.50'	2.93'	S2
44.60'	43.60'	7.92'	S3
62.44'	60.00'	15.00'	S4

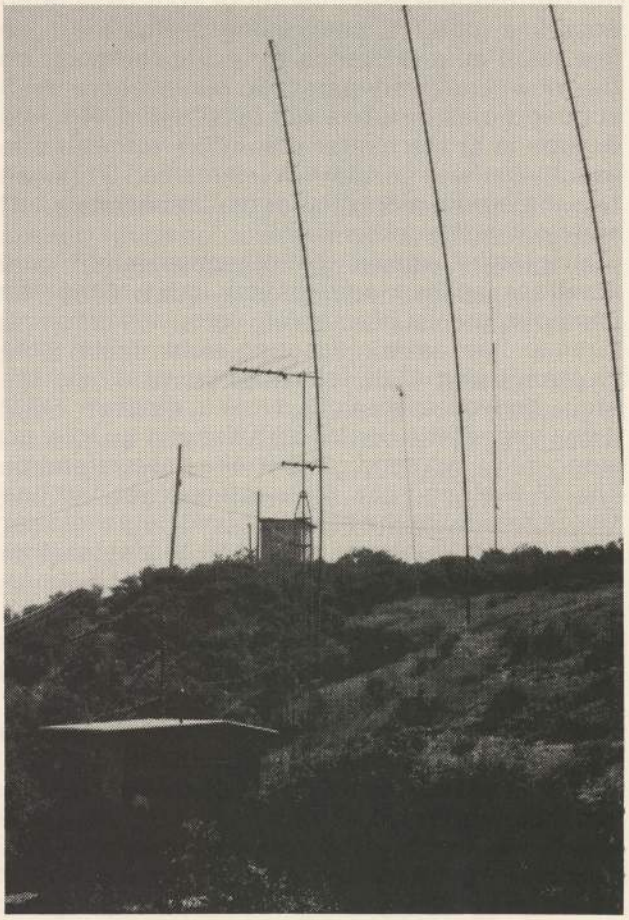
base line and Y as two parallel sides and X and Z as two parallel (and equal length) sides.

Now with all of this 'knowledge' how do we precisely locate the points where support poles S1, S2, S3 and S4 will be located? An example to locate S2 is shown in **diagram 7-A.** (Remember that the support poles **either** side of center are numbered S1-S1, S2-S2 and so on out to S4; there are actually two S3's for example, but the method of finding one is the mirror image of finding the other.) Start by using a metric measuring tape and from the center point on the base line measure out to a distance of 2.926 feet perpendicular to the base line; **this is 'X'.** Leave that metric tape in place on the ground and use a second metric tape to measure **distance Z;** another 2.926 feet, again perpendicular to the base reference line and parallel to 'X'. Leave that tape in place and take a third tape and measure out distance Y, or 26.5 feet. At this point you have three tapes lying on the ground and a rather imprecise S2 location where all of the three distances (X-Y, Y-Z) fit the table here. Break out some heavy string and stakes and proceed to stake the **intersections** of X-Y **and** Y-Z. This is your **rough** location for S2, where Y and Z intersect. Now take a metric tape and starting from C go straight to that Y-Z intersection to see how close you are to distance S in the table; it should be 26.76 feet. Play with it awhile, and **when** you have all of the tabular measurements correct take a plumb line with bob and drop a line to the ground at the **corrected** Y-Z-S intersection. Place a stake here making sure it is perpendicular to the ground by using a carpenter's level.

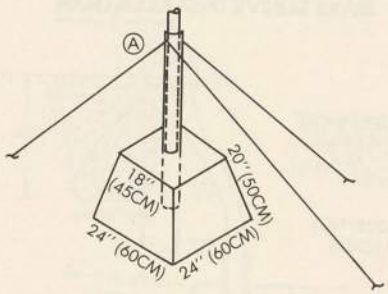
Another approach to this is shown in **diagram 8.** By using the simple relationship of 3, 4, 5 (where 4 is the X or Z distance) you can follow a technique utilized for centuries by farmers in planting crop rows.

This process is not to be hurried or done without checking and double-checking. Unless you have the exact and precise locations pegged for the 8 support pipes or tubes, the 'curve of the parabolic' will be off by whatever the amount of your error. Being out of tolerance in this way is going to cost you dB's of antenna gain, and if the error is severe you may also bring up the co-channel levels considerably. A word of caution—plumb lines and string blow badly on windy days; it might be better to do this when the wind is quiet.

It should be pointed out here, before leaving the subject of the support tube locations, that calculations have been made to determine the proper number of support pipes. Obviously a **perfect** parabolic is **not** formed by creating eight support locations along a 120 foot aperture arc. The reflector **surface** (lashing or other small diameter galvanized wire) strings from support to support in a straight line, while a **true** parabolic curve has a **constant curve** (i.e. there are no absolutely straight lines along the arc). Therefore **we are** building in a degree of error, as a compromise for the design and construction considerations. The **maximum error allowed** is that error that results in deviation from a perfect parabolic curve of not greater than 1/16th of a wavelength at the highest frequency in use. At channel 13 (211.25 MHz) this is an error of not more than 9 Cm. **The actual error,** on paper and assuming no construction errors, turns out to be 10 Cm. This means the efficiency of the antenna is somewhat compromised at the highest frequency of interest, or 211.25 MHz. To correct for this one could install more support pipes, thereby lessening the out-of-tolerance reflector surfacing. For example, if the full arc were divided up into eight straight-line segments by using **9** support poles or tubes, the error would be reduced so as to be under the 9 Cm (or 1/16th wavelength) tolerance specification. However the cost increase would



PARABOLIC ON HILLSIDE in Tijuana shows focal/feed antenna (left, center) at height equal to base of reflector screen higher up on rise.



CONCRETE BASE FOR PARABOLIC SUPPORT PIPES; PIPE INSERTED INTO CONCRETE BASE SERVES AS ANCHOR POINT, KEEPING CONCRETE FROM CHIPPING OR SPLITTING. POINT A (TOP OF PIPE) SHOULD BE LEVEL FOR ALL 8 BASES; ADJUSTED TO COMPENSATE FOR TERRAIN IRREGULARITY.

DIAGRAM NINE

become approximately 11% and for around 0.3 dB of additional signal at channel 13 it is simply not a very cost effective trade.

Just as more support tubes reduce the error (with an increase in cost), there can be a reduction in cost (and an increase in error) by reducing the number of tubes. For low band VHF, where the 1/16th wavelength tolerance at channel 6 is considerably greater (in terms of physical distance error) an antenna of this physical size could be constructed with **as few as** five support poles or tubes (resulting in four reflector surface spans) with no objectional degradation to the performance. The difference however becomes more pronounced when the same antenna must also function efficiently for high band signals, and the eight support pole or tube model has been selected as a reasonable compromise for both low and high band operation.

At UHF we have two separate problems presented. Not only is the parabolic surface tolerance no longer adequate for **optimized** performance, but the reflector surface lashing (or other) wire **spacing** (i.e. the physical space **between** parallel reflector surface wires) is now also not optimized for UHF. You can calculate your own 'maximum allowable error' for optimized performance by keeping the 1/16th wavelength tolerance maximum in mind as a design criteria. The wire to wire spacing for UHF must be on the order of approximately 2 inches for the reflector surface to act as a 50-60% efficient reflector surface to the shorter wavelengths. **The antenna design detailed here utilizes 4 inch wire to wire spacing** (which is adequate for VHF). The performance of this array at UHF is therefore less than optimum. However, offsetting this non-optimum design performance is the considerable size or capture area at UHF. The net effect of using this antenna at UHF is that the antenna's performance falls off because of parabolic curve tolerances and reflector surface spacing, **but it goes up** simply because of the capture area. The net effect is that at UHF the antenna has a gain in the low 30's (i.e. 31-32 dB or more gain over a reference dipole); whereas if optimized the gain for an antenna in this size range (120 foot aperture) could be in the 40-42 dB region.

The Bases

The purpose of the base is to provide a rigid anchor to the eight support tubes. By installing a piece of heavy (thick wall) galvanized pipe into a concrete pier **(diagram 9)** and having the pier recessed into a hole dug in the ground for this purpose you have an anchoring assembly which cannot give away when pressures are exerted on the base assembly.

Not all terrain is level (in fact seldom is it level across the **full** parabolic arc); yet the base pipes must all be level in relation to one another so that as each support pipe or tube extends upward they will all end up the same height and form above sea level. It may therefore be necessary to adjust the size and design of the concrete base piers similar to the technique shown in **diagram 10.** Using a surveyor's transit as a level the highest point on or along the parabolic curve is found and this base pier becomes the reference base pier for the other seven. There are two techniques possible to maintain a levelized line across the reference point on all base piers:

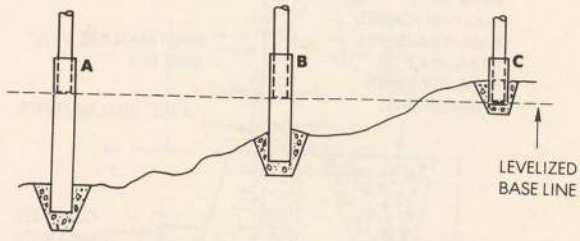
1) Dig deeper holes for one or more piers, recessing their support pipes to the proper levelized point, or,

2) Raise one or more of the piers above ground by utilizing longer pier galvanized pipe.

In actual practice, depending upon your site, chances are you will employ a combination of both techniques.

To create the pier the staked location for the support pole will have to be excavated, either by hand or with a backhoe. Keep in mind that whatever you do in excavating, the precise location for the steel base pipe (that sets into the concrete pier) must be re-verified before the concrete is poured. The support tube set into the pier is 4.5 inches in diameter (it's I.D. must be such that the actual support pipe OD must fit down into it snugly but with enough play to allow adjustments) and its length will depend upon the levelizing procedure previously discussed for the base piers. **Typically** six inches of the pipe will extend

LEVELING THE BASE PLATE PLATFORMS



ROUGH TERRAIN IS COMPENSATED BY USING BASE PLATES OF DIFFERING LENGTHS; LEAVING SLIGHTLY LONG UNTIL ALL BASES ARE COMPLETED, THEN CUTTING OFF TO REFELCT LEVELIZED BASE LINE.

DIAGRAM TEN

above the pier (see diagram 11 to follow). It has been found that it is best to weld a 'cap' onto the bottom of the pier-set support pipe to prevent the ingress of water and moisture from below. It will probably be impossible to keep all moisture out of all of the system, however, and to prevent rusting galvanized pipe is recommended where practical. Another technique is to install or cut a small 'weep' hole in the base of the pipe and run a lateral line (as in a septic tank system) away from the pipe to drain off any moisture than will collect.

When the base pipe has been positioned and the position re-verified it should be temporarily 'guyed' into place at the proper inclination and enough concrete poured to stabilize the pipe. Allow enough time for the concrete to 'set' and then go back and **re-verify once again** the location of the pier-pipe, the inclination and then you are ready to build a form (or whatever technique you use) to complete the base support.

The assumption here, with the material presented including the matter of making the vertical pier-mounted support pipe straight up and down, assumes you are building your half-bolic on a site where you have a natural frontal slope or fall away. As pointed out last month the parabolic in the form described here is really just the upper half of a true parabolic and the focal point is 60 feet out in front, and at the bottom (level) of the screen reflector. **If the ground falls away** so that by the time you reach 60 feet forward of the reflector (the focal point) your focal point antennas can be mounted at least two wavelengths above ground (the real ground) and still be level with the bottom of the antenna, **you are home free.** If, on the other hand you cannot mount on the edge of a hill where the ground slopes, you have several other choices including accepting a lower antenna gain. One approach is to raise the center some distance above ground by 'leaning' the vertical support pipe pier back away from the focal point. The impact here is that you have not a 'half-bolic' but rather perhaps a 5/8ths or 3/4-bolic by virtue of having **raised** the electrical center of the reflector surface above ground **by the forced curvature** of the design.

If you try to force this 5/8ths or 3/4 curvature with the support pipe in the pier **vertical,** you'll have some problems as shown in diagram 10-A. The bottom line is that you cannot have a **vertical support** and then try to bend the tube or mast two different ways in one length. So to bring the focal point up above (flat) ground you start off with the support tube **at a slight angle** at the base itself (bottom half of 10-A). The exact angle will vary from site to site; in theory it should be equal to the tangent angle at the point where the 63 foot support tube drops into the pier support. In the real world the angle should be in the area of 3-7 degrees inclination.

MECHANICS OF SUPPORT MASTS

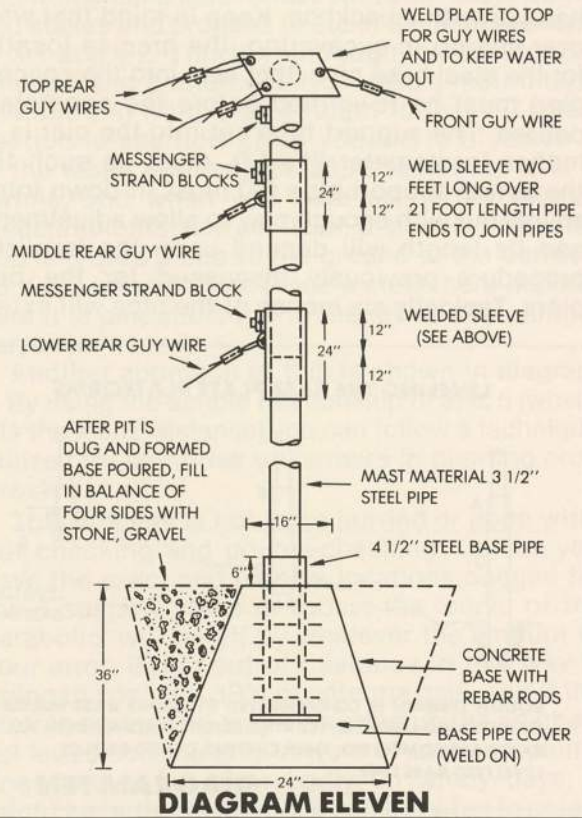
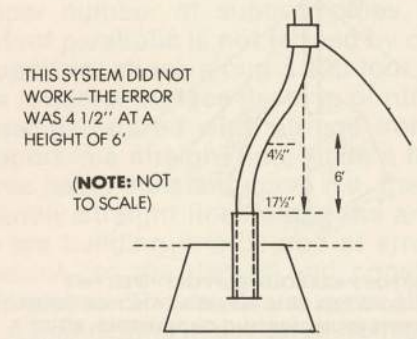
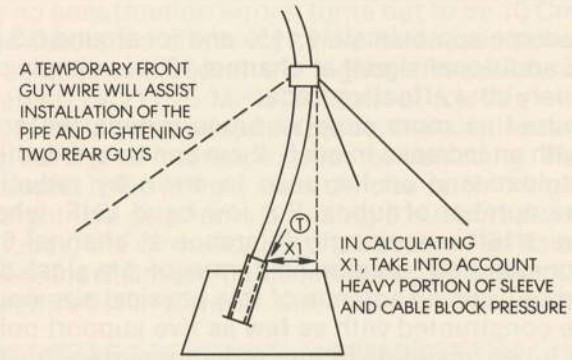


DIAGRAM ELEVEN

BASE SLEEVE INSTALLATION

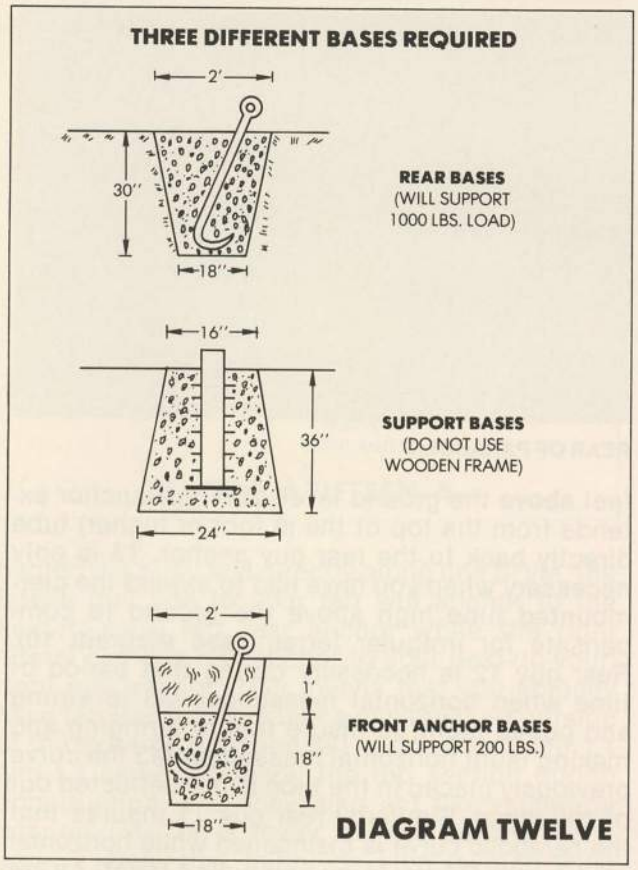


IN A NORMAL BASE ONLY THE MIDDLE AND UPPER PORTIONS OF THE BOTTOM PIPE CURVES TO FORM THE PARABOLIC ARC.



THE UNKOWN QUANTITY WILL BE THE INCLINATION OF THE BASE TUBE. IT IS PROBABLE THE CORRECT ANGEL WILL BE EQUAL TO THE ANGEL AT THE PARABOLA AT POINT T.

DIAGRAM TEN-A



The Front Guy Wires

The front guy wires, like the pier supports (and the back guy wires) must have set-in-concrete anchors. The design of the anchors in each case is predicted upon the amount of pull or force that will be exerted on them by the combination of the 'bowed pipe-parabolic' and whatever reasonable wind and ice loading might be experienced at the site. Construction of all three types of piers/anchors is shown in **diagram 12.** If your location is subject to heavy winds with ice you might wish to beef up the rear (anchor) bases and the front anchor bases by making the concrete piers larger than shown. What is considered adequate for a hill or mountain top in Mexico may not be adequate in Montana!

In selecting the proper anchor location for the front or forward guy, what we are trying to **do** is to locate a point on the ground to which we will tie our forward guy. That point must be exactly perpendicular to the parabolic arc. To find the perpendicular it is first necessary to find the tangent that passes by the point on the arc. The tangent is found with the following equation:

$$\alpha = Tg^{-1}\sqrt{\frac{a}{x}}$$

a = Focal Distance
x = Coordinate of the pipes

Diagram 13shows how this is computed for S3, or the third support left and right of the center point. If this method is carried on, we have the following locations pinned down for each of the four front guy wires for each of the four support poles left and right of center:

S1 = 4.24 degrees
S2 = 12.453 degrees
S3 = 19.967 degrees
S4 = 26.565 degrees

In the real world it is difficult (if in fact even possible) to measure angles accurately in the field. Therefore we can reduce these angular measurements to distances. Now to utilize the following distances properly, do the following:

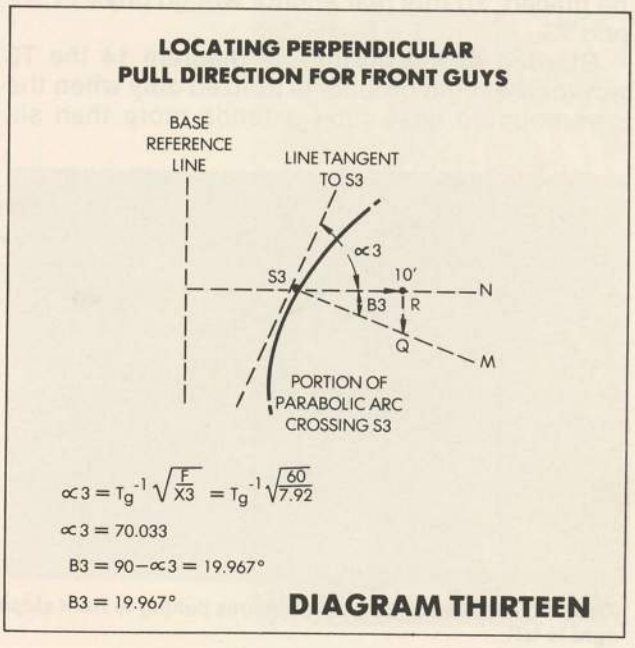
1) Create a perpendicular line to base line which passes **through** the support pole location **(S3 in diagram 13);**
2) Go 10 feet forward of S3 (towards the transmitting station) along the newly created perpendicular line and mark that point with a stake; at R.
3) Create a second perpendicular line through point R, this one **perpendicular to** the line (S3) to N and using the table that follows select the appropriate distance to point Q (from diagram 13). **Stake or mark point Q.**
4) Now trace a line from the appropriate S point (S3 in this case) through point Q and select from the table to follow the distance from S(3) through point Q (shows as S-M on diagram 13) to the front anchor location.

The proper direction or location for the guy anchor established, the same procedure is followed for each of the eight support pipes or tubes. The location along the line S( )/M of the anchor (i.e. the **distance in front of** the support pipe base) is given in the following tables as dimensions Md.

LOCATING FRONT ANCHORS FOR DIAGRAM THIRTEEN

Support Pole	Guy Angles	Distance R/Q	Dimension Md (*)
S1	4.24 degrees	0.74'	40'
S2	12.45 degrees	2.20'	40'
S3	19.97 degrees	3.63'	40'
S4	26.57 degrees	5.00'	40'

***-dimension Md is distance from pole support base, along line S ( ) / M, to anchor location.**



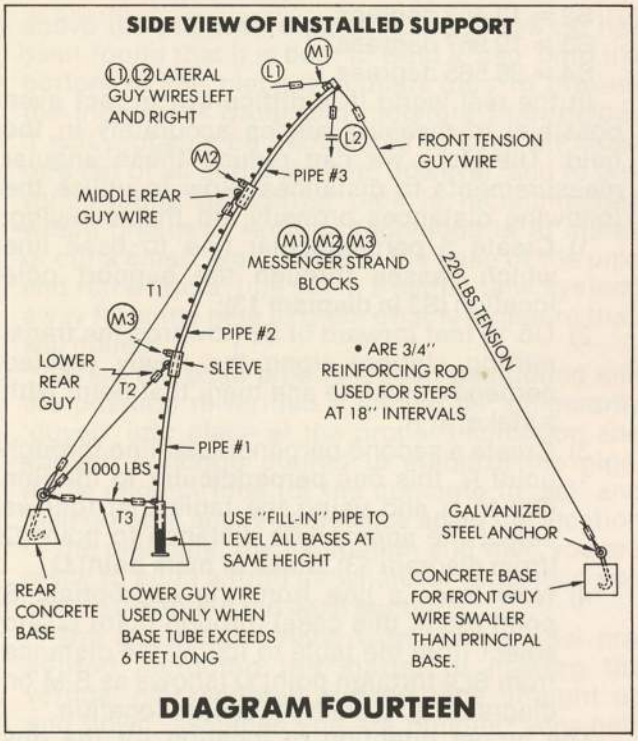


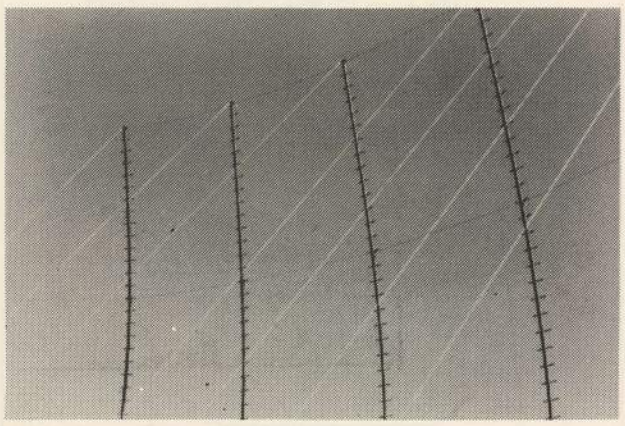
DIAGRAM FOURTEEN

The Rear Guy Anchors

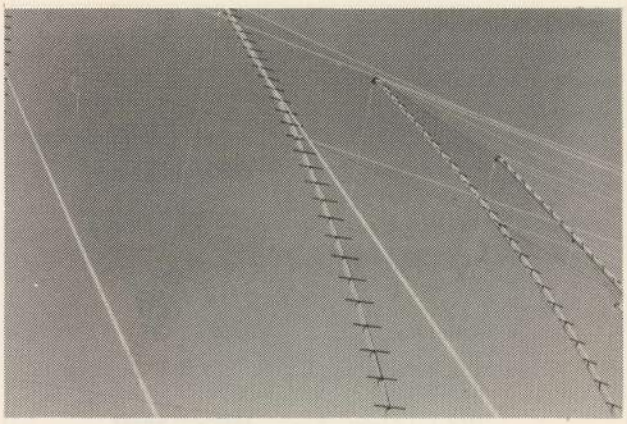
The rear guy wires perform double duty. In **diagram 14** you see rear guys T1, T2 and T3 (which obviously go directly to the rear) and lateral guy wires L1 and L2 (which also go to the rear, although not so obviously). The front tension (guy) wire to the forward anchor also is shown.

Refer back to diagram 13 and the exercise which located the proper position for the front guy wire. By taking the same S(3)/M line which created a perpendicular-to-the-bow of the parabolic-arched-tube and extending that line (S-3 to M) **backward** in a straight line **behind** the antenna you will have located the direction or line **on which** the rear anchor for each support pipe will be placed. To this rear anchor will go guys T1, T2 and T3.

Starting at the bottom, in diagram 14 the T3 guy (nearest the ground) is utilized **only when** the pier-mounted base tube extends more than six



FRONT OF PARABOLIC—top guy wires pulling to front slope right to left.



REAR OF PARABOLIC

feet **above** the ground level. This guy anchor extends from the top of the (6 foot or higher) tube directly back to the rear guy anchor. T3 is only necessary when you have had to extend the pier-mounted tube high above the ground to compensate for irregular terrain **(see diagram 10).** Rear guy T2 is necessary during that period of time when horizontal messenger M3 is strung and pulled taunt; to insure that in stringing and making taunt horizontal messenger M3 the curve previously placed in the tube is not deflected out of tolerance. Similarily rear guy T1 insures that the parabolic curve is maintained while horizontal messenger M2 is strung and pulled taunt. As we shall see, T1 also has an important function in the alignment process.

Lateral guys L1 and L2 are primarily an aid during construction although you will probably wish to leave them in place after the antenna is completed. These lateral guy wired do not go to the guy anchor directly behind the support pole; as shown more clearly in diagram 11 a flat metal plate is welded to the top of the top pipe or tube section. The plate not only caps the support tube to prevent rain and moisture from going down inside, it also provides 'ears' to which L1 and L2 **(in diagram 14)** can be attached. As you stand

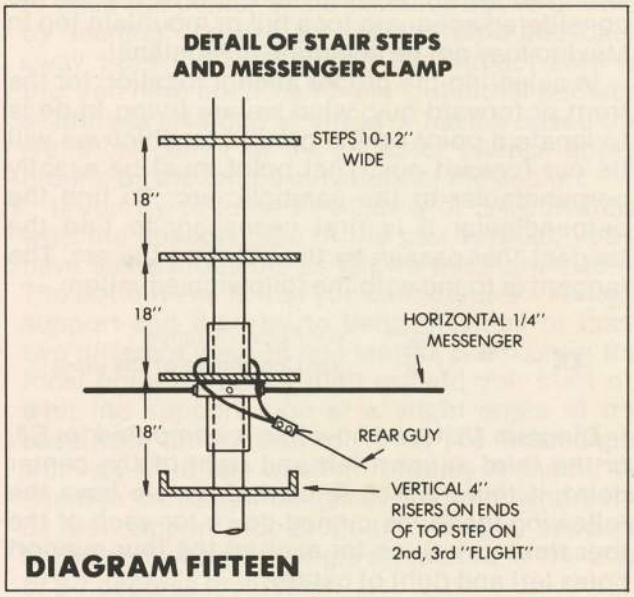


DIAGRAM FIFTEEN

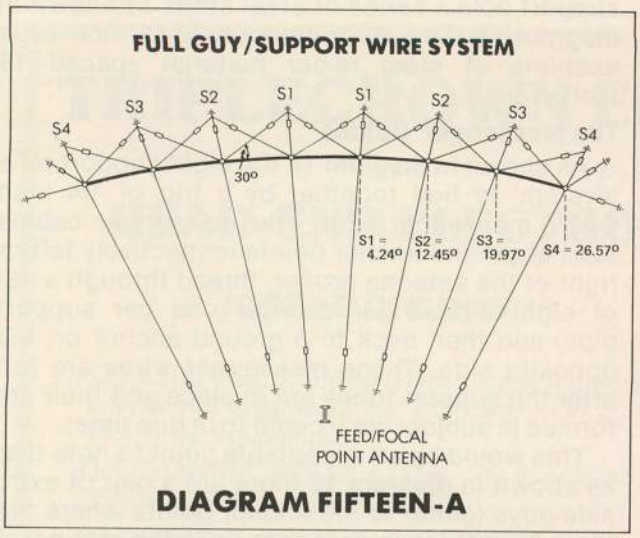


DIAGRAM FIFTEEN-A

LOW BAND LA at 100 miles, off of Tijuana Half-Bolic.

behind the array and directly along line S( )/M, the lateral guy line to your left will anchor to the next-(to-your) left rear anchor while the right lateral guy line will anchor to your next-(to-your) right guy anchor. This means that you actually have ten rear anchors since one must sit outside of the extreme right and left of the array itself. L1 and L2 serve to steady the top section during construction, and they also act like miniature 'star-mounts' on a tower to take up any 'corkscrew' strain that might develop in high wind after construction.

This shows more clearly in **diagram 15-A.** The distance to the rear for the rear guys is not critical, although antennas built in Mexico have commonly utilized from 50-100% of the distance given as dimension Md for the front guys.

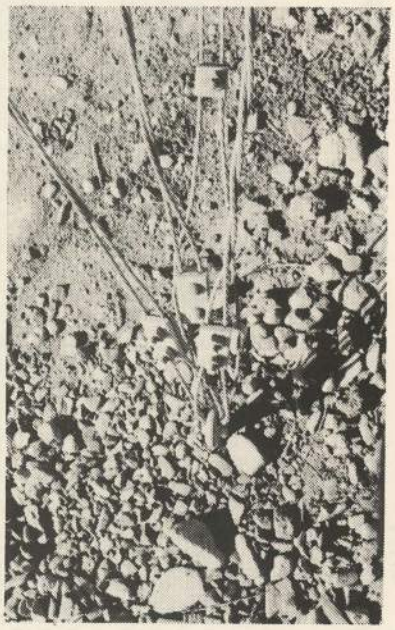
The Support Pipes

The construction of the eight support pipes or tubes is pretty much self evident in diagrams 11 and 14. However some additional data is required, and, an understanding of the principles involved will be useful to anyone duplicating the antenna array.

If a pipe or tube is pulled into the arc-form with a tension (guy) wire attached to its top while the base is firmly anchored, an almost perfect parabolic curve is formed. This is a fairly safe statement as long as the amount of bend introduced into the pipe or tube is not severe; or so severe that the thickness of the pipe or tube is not elongated (i.e. it stays uniform under the bowing pressure). In the real world this hypothetical assumption is never quite valid; there is always some error in the parabolic curve due to the non-uniform pressures exerted on the pipe or tube, and the internal physics of the tube or pipe itself.

After considerable experience with this technique in Mexico, it has been found that the **angle** of the (front) tension wire does not visibly influence the form of the arc (and therefore the distance along line S( )/M in diagram 13 is not critical although it should be the same for all pipe support tubes). Experience has also shown that the **error** is always towards the front (i.e. the out-of-parabolic 'dent' leans towards the focal point antenna) and it normally occurs about 3/4 of the way up the height of the pipe.

Not all pipe will act in the proper manner and for this reason it is suggested that some tests be performed prior to purchasing all of the pipe required for the 8 support tubes. (The best way to perform a test is to select three lengths of pipe of a type that you believe will handle the job, construct one support tube as described, and test it for parabolic curve under the conditions described here.) The pipe chosen for the antennas constructed in Mexico are standard 21 foot (long) sections of 3-1/2 inch outside diameter (OD) thick wall (1/4 inch) galvanized. The three sections are joined at two joints **(see diagram 11)** by welding a sleeve over the joint. The sleeve is 24 inches long and it should have an inner diameter (ID) just enough larger than the 3-1/2 inch OD of the support pipe to allow the sleeve to extend over the support pipe. The sleeve should have 12 inches of support either side of the welded joint.



TYPICAL REAR ANCHOR for guy lines; rocks cover concrete pier.

PLACEMENT OF HORIZONTAL MESSENGER STRAND SUPPORT AND END GUYING OF MASTS #1, 8

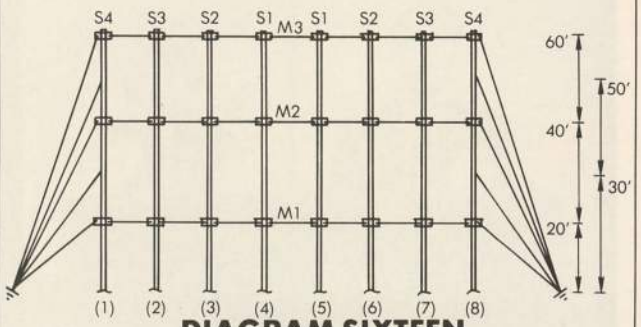


DIAGRAM SIXTEEN

Three standard three bolt messenger clamps are fixed to the support pipe at the 20, 40 and 60 foot points. Before fastening these messenger clamps, however, select one end of the 63 foot long tube as the top and weld in place the top cover as shown in diagram 11. Fix the top most messenger clamp directly below the top cover and then measure down from the messenger groove exactly 20 feet; this will be the location for the middle messenger clamp. Now go down exactly 20 more feet and this will be the location of the bottom messenger clamp. This should leave just under 23 feet remaining to the bottom of the support pipe. The 'extra' three feet **will insert into** the pier-mounted 4-1/2 inch OD support pipe so that when you are done there will be 60 feet of support tube or pipe extending above the pier top.

To climb the poles to construct the antenna and perform maintenance thereafter we start approximately 10 feet above ground and weld onto the (designated by you) backside of the support pole a series of steel steps as shown in **diagram 15.** The steps may be 10-12 inch wide sections of steel re-bar material spaced 18 inches apart.

The Messenger 'Guides'

As shown in **diagram 16** the eight support-pole 'system' is tied together by a trio of 1/4 inch CATV messenger wire. The messenger cables start at ground anchor points respectively left or right of the antenna proper, thread through a set of eight messenger clamps (one per support pipe) and then back to a ground anchor on the opposite side. These messenger wires are run after the support tubes are in place and their arc formed (a subject we'll come to in due time).

This would be an acceptable point to note that as shown in **diagram 16** there are a pair of extra side-guys (going to the anchor points where the three horizontal messengers tie to the ground) at the 30 and 50 foot levels of the two end tubes.

Briefly (we'll return to the subject later) the horizontal messenger strands are threaded through the 8 messenger clamps, pulled taunt and secured. This does several things for the mechanical integrity of the antenna system. The 'anchoring' at the 20, 40, and 60 foot levels (plus having the respective messenger runs firmly anchored on each end at ground anchors) prevents the 'structure' from sliding or sloping or falling sideways. Because of their strength the messenger lines also absorb much of the eventual pressures that will be placed across the 'face' of the array by the stringing of the horizontal lashing wire reflective grid.

However with these advantages comes some dis-advantages; a point we'll begin with in the third and concluding portion of this series next month.

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American Television and Communications Corporation offers a growth opportunity for experienced cable TV engineers who want to become part of the company's aggressive management team.

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American Television & Communications
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Englewood, Colorado 80110
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System technician with solid construction abilities needed to maintain new 65-mile system under spring construction in Minden, Louisiana. Send resume to:

Minden Systems, Inc.
P.O. Box 985
Minden, Lousiana 71055

Or, telephone A/C 315-371-1258

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- PHASE LOCK CONTROLLED CONVERTER. . . accepts IF and converts to desired channel locked to reference signal.

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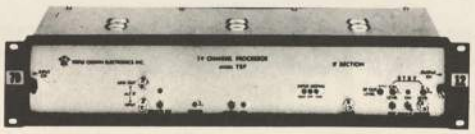

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LOW COST SIGNAL LEVEL METERS

LM-13

The LM-13 is an installer-middle tech type meter. Its operation is very simple, and it operates from throw away or rechargeable batteries. The standard LM-13 measures the video carriers of channels 2 through 13. This meter also has provisions for adding a 13th channel if you have a pay channel or pilot carrier you wish to measure. A leather carrying case is available.

$225

DT-9R

The DT-9R is an improved version of the DT-series introduced five years ago. It is basically a combination ohm meter and two channel signal level meter. The units are available in any two channels desired from 30 to 300 MHz. It is easy to use and a real value at $169. Quantity prices available. Delivery for channels 2 and 13 is normally two weeks.

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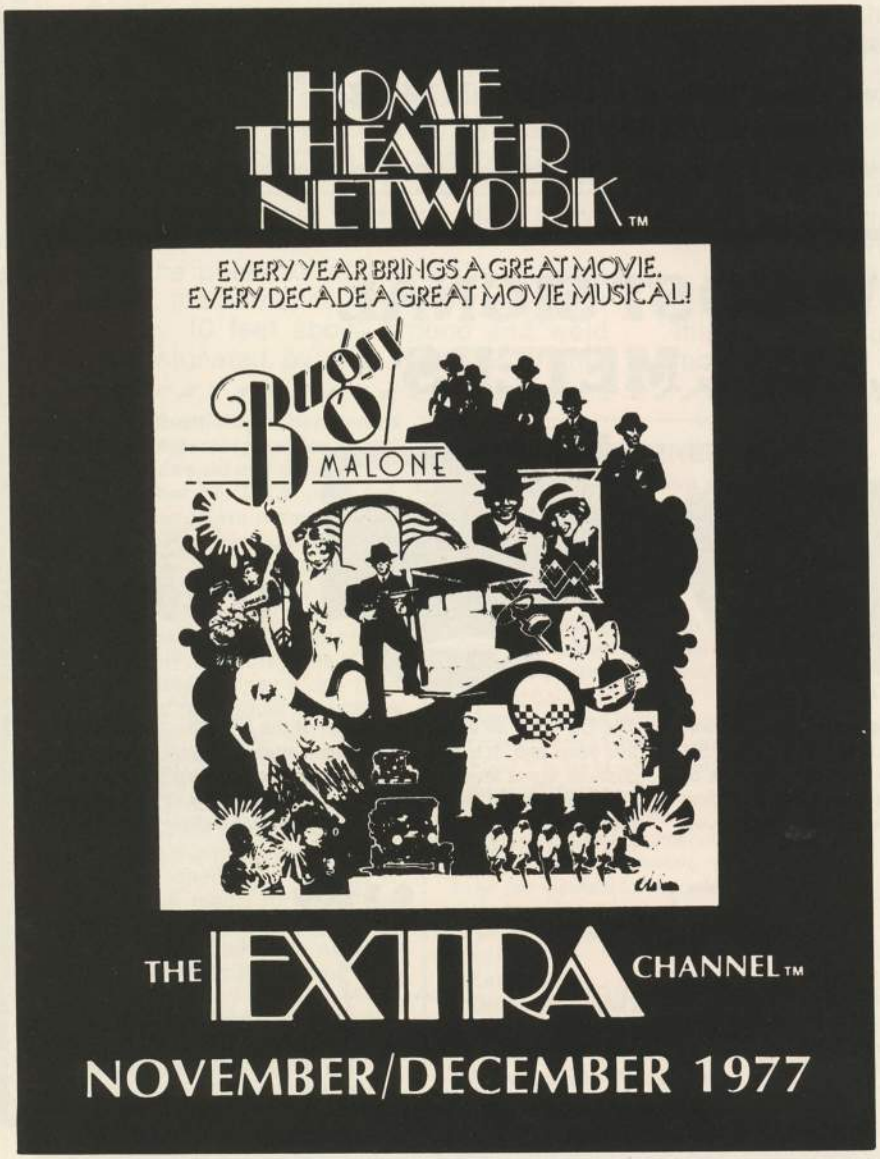
174 S. FIRST AVE., BEECH GROVE, IND. 317-787-9426

Another Approach To Small Town Pay

HOME THEATER NETWORK HAS UNIQUE SHARED APPROACH TO EXPENSIVE TRANSPONDER TIME



What's A Nice Kid Like You. . .
. . .Doing On 'The Bird'?

The pay-channel-cable concept is new enough, and unpredictable enough that virtually anything **may** work, sometime, somewhere. Or at least that's the way it seems to 'read' if you follow the successes (and failures) of the various schemes employed to date designed to increase the subscriber's outward-bound-flow of cash (towards of course the cable company).

Since it all began more than 17 years ago (that's right. . . 1960), paying extra money for either special programs or special channels has seemingly been through every possible testing situation and has met with every possible degree of success and failure.

The two 'big' national efforts, HBO and SHOWTIME, package a selection of movies and entertainment specials (and some sports in the case of HBO) into a grand premium channel for which the typical consenting viewer pays an extra $8-10 per month. In San Jose, California cable subscribers pay more like $10 for **just** a basic service. . . which **also** happens to include a 'movie channel' that everyone gets **as part of** their 'basic service'. In a hundred or more 'small towns' video tape cas-

settes of first-run on pay-TV movies are bicycled in and out at the approximate rate of $5-$6 per month for a new movie each week.

And there has been any number of other 'schemes' employed.

Inspite of all of the activity in the pay-channel area, the majority of the **systems** still offer no such service. So there remains a substantial number of uncommitted systems out there, many of whom are gearing up for the addition of a pay channel service soon; if not this year, by the end of the decade. And comes now yet another alternative to the program, one which reports an unusual degree of success in 'test' situations in the New England area. That service is the **Home Theater Network,** owned principally by a communications conglomerate owner of moderate size headquartered in Maine. Home Theater Network (or HTN) is an operating subsidiary of **Diversified Communications Inc.** (DCI); a mainly-in-Maine company that owns television stations (two), radio stations (three) and a host of publishing companies (ten). DCI also owns a number (twenty-one) of CATV systems scattered throughout rural Maine (11 towns), New Hampshire (9 towns) and Massachusetts (1 town). DCI's cable operating firm, **New England Cablevision,** is captained by an accountant-turned cableman by the name of Peter M. Kendrick. Pete entered the cable business through the doors of Continental Cablevision's Concord, New Hampshire system where he served first as General Manager in 1969.

DCI's home-grown pay-cable concept is in operation in the New England Cablevision systems; with programming originating at the Westbrook, Maine offices of the firm and then being tied to the various NEC systems through a mixture of common carrier and CARS band terrestrial microwave. On or about August first of this year HTN will go 'nation-wide' via satellite. And that's why we are interested in what they do and how they do it, because soon (if not already) Home Theater Network will be knocking on your cable door asking you to become a part of their 'national network for pay-cable'.

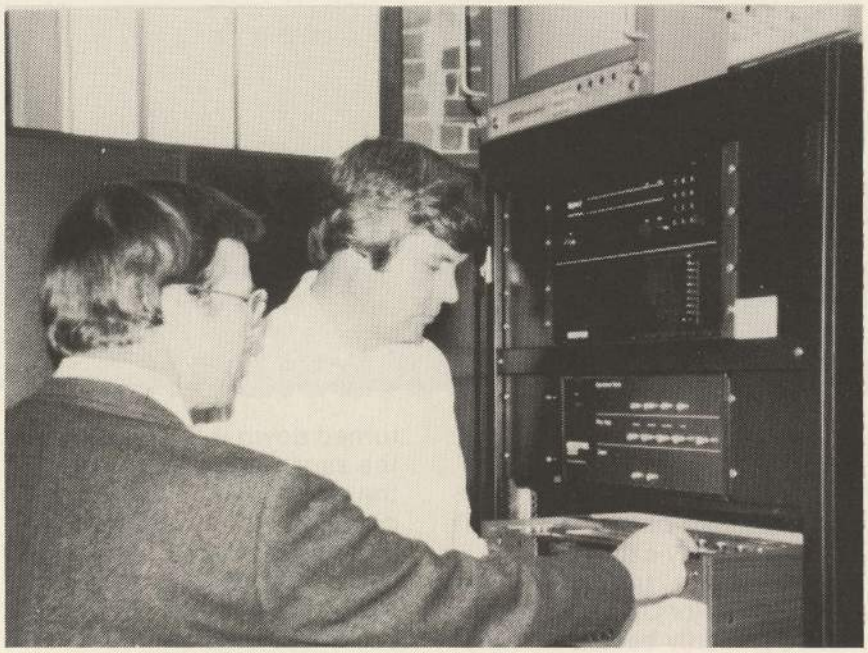
HOME THEATER NETWORK QUICK-FACTS

Company	**Home Theater Network, Inc.**
Address	465 Congress Street Portland, Maine 04101
Telephone	207-774-6334
President	Peter M. Kendrick
Service	Five nights per week, G of PG movie piggy backed on KTVU transponder for two hours
Satellite	SATCOM I, transponder 18, starting with KTVU start (8-1-78)
Uplink	With KTVU, from San Francisco
Programming	Monday-Friday, 2 hours per day

HTN differs from HBO, or SHOWTIME (or Optical or Bestvision) primarily because it runs **five days per week** and offers (or will offer on the satellite) **a single movie selection per night.** HTN programs during the weekdays only, and via satellite it will come up on the new San Francisco-Oakland transponder 'channel' occupied by independent KTVU for a two hour stint five days per week at 8 PM Eastern time (which is of course 7 PM in the Midwest). The marketing emphasis will be in the two Eastern-time-zones and while people in the Mountain and Pacific zones will not be turned down if they really want the service, first-run movies (at the rate of one per day on a five day a week schedule) at 6 or 5 PM in the evening probably does not make a great deal of sense. That's not to say that some systems in these time zones might not try it anyway, or that some might even tape-delay the service. But such possibilities do not figure heavily into HTN plans of the moment.

So what is a modest level MSO (around 14,000 subscribers) headquartered in Maine doing 'playing producer' of not only its own pay-cable channel, but also going out for admittedly expensive transponder time to enlarge its family into all of the states east of the Rockies? Obviously they hope (and plan) to make some money

WESTBROOK, ME. headend tower for New England Cablevision with microwave parabolic that interconnects system with Mt. Washington (N.H.) relay point for HTN pay channel movies.



PETER M. KENDRICK, President of Home Theater Network and New England Cablevision (left) with Lee K. Stanley.

with the venture. What are their chances of success in a business that will, by the time they make their 1 August debut on SATCOM already have no fewer than three satellite delivered pay-cable services available?

The key to the HTN program is Pete Kendrick; a man who is quiet, not given to the often show-bizzy facade that accompanies the pay-cable business. Kendrick has telescoped several decades of practical cable experience into his nine years in the industry having moved through the Continental operation first at Concord and then at Jackson, Michigan (where his local origination programming won numerous awards including the Outstanding Cablecasting Award of 1973); and then at New England Cablevision from 1974 to the present. Pete has been largely responsible for the growth of New England Cablevision, staying out of the 'big markets' and concentrating instead on building a 'network' of small systems (the smallest is 130 subscribers) in areas of New England where a basic cable service is required. Pete's approach to pay-cable programming for his nearly 14,000 basic service subscribers has been along the same conservative lines that he followed in New England Cablevision's growth; use the best quality equipment and maintain the systems within a nat's eye of perfection by employing some of the best management and engineering talent in the industry.

The Home Theater Network satellite fed service will differ slightly from that service now being offered to NEC subscribers. The primary difference will be the number of features offered per day; on their terrestrial system HTN offers two features per night (on the five night a week format) while the satellite service will offer one. The HTN arrangement with Holiday Satellite Systems (the common carrier offering KTVU) is unique in the new satellite-delivery industry; at 8 PM Eastern each evening during the weekday-week HSS will **drop** two hours of KTVU programming and go into a 'scrambled mode'. The scrambled signal will be the HTN movie offering for that night. At the cable system if you are a user of KTVU, you will have two choices at that point; do nothing in which case the subscribers will simply see a scrambled program on their screen, or, jack the scrambled signal out of the line, de-scramble it with a piece of apparatus provided to you by HTN, and then feed the signal out to your subscribers on another (premium) channel.

If all of this sounds a little complicated, you might consider the costs for alternative methods of feed and delivery. First of all there is the price consideration, which we'll come back to shortly. The subscriber pays a flat $3.95 per month for this 'extra-channel'. At a level that is slightly less than half of most premium channel rates, obviously there is a balance point between how much you take in and how much can be spent to get the programming in house and then back out to the cable home. By contracting with Holiday Satellite Systems for two hours per weekday of transponder time, the normal $100,000 per month transponder bill (the going rate for full time use of a transponder) comes down substantially. And by offering fewer movies, the cost of the programming also comes down. Substantially. On your side of the fence, **if** you are already on-line to carry KTVU, you have your receiver bought (we'll assume you already have the terminal in place). So your additional investment for HTN service to your system is minimal.

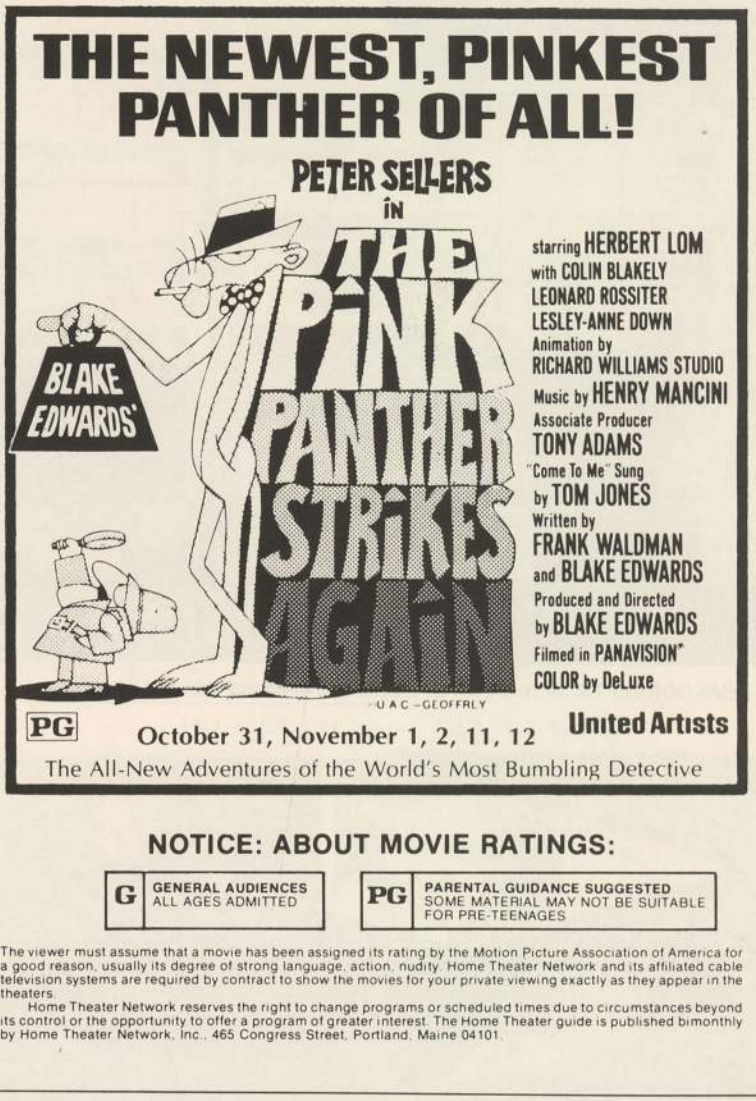
Let's talk about the HTN results to date before we go any further with the mechanics. Talking about the results almost dictates that you also talk about the service itself, since an understanding of the latter plays upon the results one might expect to achieve.

First of all HTN plays only "G" and "PG" movies. Kendrick's concept is that **every** movie shown should be a movie that **every** member of the family can sit down and enjoy. **"My premise is that if the cable operator is willing to accept a lower profit dollar for his pay-cable operation on a per home basis, we'll reach** more **homes with the service; especially in the middle and lower income subscriber home areas."** Kendrick believes in his product, and the vitality of the service.

"My benchmark is to select movies which the customers will not only be able to watch, but will watch often two or three times and then come into the cable office at the end of the month and thank us **for having shown them".**

Is the HTN service strictly a 'family movie channel'? No, not entirely. But the word 'family' certainly does creep into the program selection in all areas. There are no sports offered but other 'family' specials such as the Johnny Mathis Christmas Show are scheduled. And the scheduling, for the satellite feed, is of considerable interest. There is a 'premier' or new release each Monday night. The feature repeats on Tuesday, Wednesday and following Friday. On Thursday HTN brings back for a single 'encore showing' one film that appeared as the premier film 11 to 12 weeks prior. That's it, simple, uncluttered and straight forward.

"When you mix up the cost of the film product, the transponder costs, and general operating overhead, the blend is to keep the service simple and the costs low so the appeal is to as broad a base as possible. We've found that if we make an effort to fit our 'Extra Channel' (which is the name HTN uses within its own systems, for the service) **into the viewing and living patterns of our subscribers, we have much better acceptance of the service. We try to make the 'Extra Channel' part of the average person's weekday routine. They come home from work, eat dinner, get the house in order and then around 8 Eastern or 7 Central they are ready for television."** What about the weekends? **"People watch more television on weekends than at any other time of the week. But the routine is different. Much of it is sports viewing and it is daytime viewing. Saturday nights and Sunday nights are much less routine; people have life styles which don't make television a routine or sure thing on either evening".** In a word, television is not as likely to be a habitual thing on weekends; not the way it is during the week nights.



NOTICE: ABOUT MOVIE RATINGS:

G	GENERAL AUDIENCES ALL AGES ADMITTED
PG	PARENTAL GUIDANCE SUGGESTED SOME MATERIAL MAY NOT BE SUITABLE FOR PRE-TEENAGES

The viewer must assume that a movie has been assigned its rating by the Motion Picture Association of America for a good reason, usually its degree of strong language, action, nudity. Home Theater Network and its affiliated cable television systems are required by contract to show the movies for your private viewing exactly as they appear in the theaters.

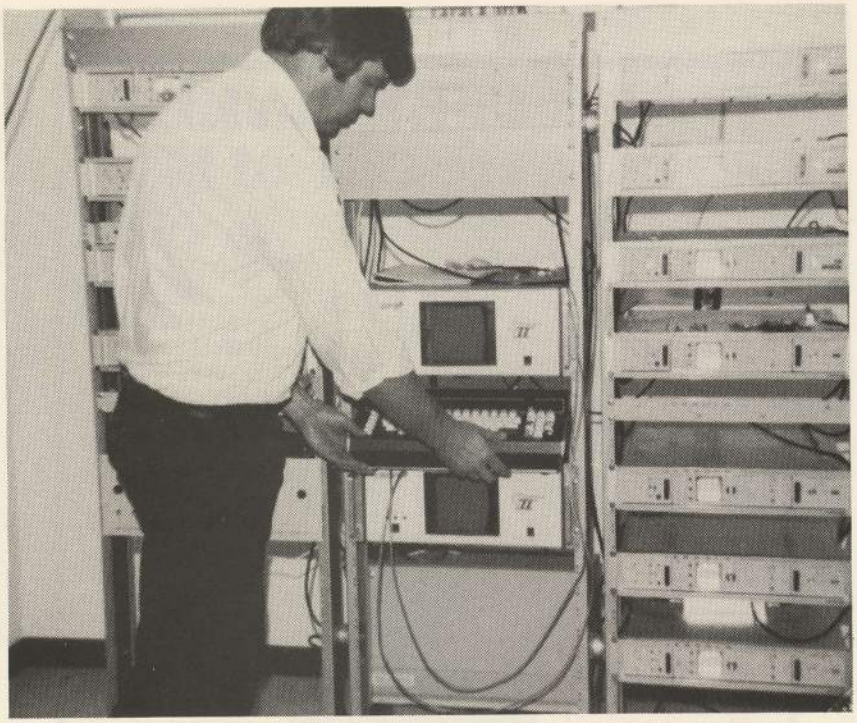
Home Theater Network reserves the right to change programs or scheduled times due to circumstances beyond its control or the opportunity to offer a program of greater interest. The Home Theater guide is published bimonthly by Home Theater Network, Inc., 465 Congress Street, Portland, Maine 04101.

So there are four to five films per month premiered (the exact number being a function of the number of Monday-starting-weeks in the month), plus each Thursday night the viewer has a repeat showing of a movie previously offered 11 or 12 weeks prior.

And how does it work? Apparently very well, although experience in this phase of the industry tells us that what works well in one town may flop in another, and vice versa. **"The experience has been that in a 'mature' system where the service is initially offered, between 26% to 50% of the homes subscribing to the cable will take the service when it comes on. This number will grow to around 70% in a few years time."** Humm. Pretty good numbers.

"In a new system where the service is offered at the same time as the initial or basic service, we've had slightly higher numbers. Westbrook, Maine was running at 75.9% at the end of December for example". In other words, nearly 76% of the basic service subscribers were opting to pay an additional $3.95 per month at the time of sign up to also get the 'Extra Channel' service.

Kendrick has marketed the service in New England Cablevision homes by making direct mailings to each home passed by the cable service supplemented by newspaper advertising. Once the service is established, up and running, he maintains a modest 'Extra Channel'



SYSTEMS CONCEPTS, Jerrold gear in Westbrook headend with GM Lee K. Stanley

LEE K. STANLEY, GM for Westbrook system with switcher designed and built by NEC Chief Engineer Oliver Roberts. Systems transmit Microkmetics Radar Weather (map) on movie channel when movies are not shown as free service to subscribers.

movie announcement box ad on the television page of the newspaper in the area.

When the sur-charge for the premium channel drops down to the $4 range, one is tempted to re-consider just what it is the service really amounts to. As long as it is a $8-$10 sur-charge and the percentage of response is in the 12-15 percentile range there can be little question that pay-cable is primarily a service for the minority; those who can afford it, and who (as Jeff Reiss of SHOWTIME likes to say) 'perceive its value'. But when the price comes down, it begins to look more and more like a back-door entry into the rate-increase arena; without the hassle of getting rate increase approval from the franchising authority. And when a system gets into the 70 percentile acceptance region with the 'Extra Channel' service, an accounting comparison could possibly be drawn between a flat rate increase for the whole system, and, a 'selective increase' for say the 70 percent of the subscribers opting for the 'Extra Channel' of service.

Kendrick notes **"I think at the very least one could conclude that Home Theater Network's combination of prices and film quality would result in the highest possible saturation in any given market in the country".** Kendrick makes another point or two about the 'affordable aspect' of the $3.95 rate. **"Maine"** he notes **"has a higher percentage of the state's budget than any other state going out for welfare assistance".** He's simply saying that taken as a state, Maine people have less money to spend on 'luxuries' than people elsewhere.

The film selection process is a one man operation; Kendrick again. **"I have been receiving screening cassettes for some time now and for nearly a year I've been viewing them at home on a Sony 2000 machine. I purposefully look at them in the same environment as our customers and to do so I give up similar alternatives that our subscribers might have available; such as watching other television offerings, reading a good book or a magazine and spending time with my family. Aside from my own subjective opinions I pay attention to as many outside comments as possible, looking for a wide variety of movie reviews and summations in a wide selection of magazines."**

Getting a new pay cable operation off the ground, on the initial small scale set up by New England Cablevision for its own systems, has been no simple task. Initially even getting the opportunity to buy the movie product was a hassle. **"As we have grown and as our HTN satellite story has spread more and more distributors**

have made screening cassettes available to me, sooner", he reports. What about the type of bargains he is able to strike with the distributors for the product?

"I am not hard-bargaining, as I'm sure the larger pay-cable exhibitors are. I do ask for concessions when I feel a movie is over priced in comparison with other movies of similar appeal and quality. Some distributors are fexible and have made allowances, others have not. I will always remember and appreciate later those who have been exceptionally good to work with in these formative months. I really get a big charge, a thrill, when a movie concludes that I'm sure most people will like and will thank us for presenting. And I'm super-pleased when its one that perhaps did not do very well at the box office and thus may have been available at more reasonable pay-cable release pricing. (By getting such a response to a lower priced feature) **allows me to go ahead and spend more money on a higher priced movie; one which often turns out to be no better received in the home than the bargain priced feature."**

As the film selection 'agent' for all of the HTN affiliated systems, Kendrick's biggest single responsibility is finding four or five high appeal G or PG offerings per month. "(With the currently available movies) **I don't think I'd want to have to be finding eight or nine G or PG movies for one month's schedule. There are simply not that many out there that are truly good and universal in their appeal. I'm looking for no more than five per month, and I'm looking for the right schedule or sequencing for the series to make it be a first rate offering for a full month. I'm sort of like the surfer looking for the perfect wave. I'm always looking for that perfect month. I haven't found it yet but I'm convinced that I'm doing something useful and important by trying each month".**

Has New England Cablevision had any operating experience with other pay formats in any of their systems? **"Our daily ratio of disconnects for HTN programming runs 1/10th that of one of our systems where we have a competitor's product at the $8.95 level".** Kendrick measures the number of homes that sign up for the service versus the number of homes who ask that the service be disconnected. The ratio of the incoming to the outgoing is his 'daily ratio'. On the bottom line he says he loses ten on his $8.95 pay channel for each one he loses on his $3.95 pay channel.

"I think there's every good reason why the larger MSO's should consider offering the HTN package to their subscribers, even when they already have one of the more expensive pay-channels available. In many of the larger systems handling pay the percentage of homes taking pay against those who take the basic cable service is as low as 9-10%. That simply says that 90% of their 'captive audience' **is saying** 'no' **they do not want the higher priced pay channel product. The representatives of the higher priced pay cable services will say that the average is closer to 20%** (i.e. versus 10%), **but they arrive at those sort of penetration numbers only by including systems** (in areas such as New Jersey and Long Island) **where the pay package is the** only reason **why cable is purchased at all. I can't come close to providing these systems with the dollars per subscriber served, but HTN will give them 3 or 4 times as many pay-cable-option subscribers so we end up with the same**

dollar volume, **perhaps even more. What the HTN package can do that the higher priced services cannot do is to get beyond, well beyond, that 30% plateau which seems to be the top of the scale for even the best pay cable systems. If we can do as well as 75.9% in a low income state like Maine, we do just as well in other areas as well. The very simple answer is that a system should offer** both services **at the same time. Let the subscriber seek his own level. At least with the HTN option you don't preclude pay cable as an option from a high percentage of your subscriber homes to begin with."**

Kendrick, for his mild manner, gets pretty tuned up on his own soap box when he gets started. Is he running scared?

We don't think so. **"The satellite service will be viable when we have 100,000 homes taking the service,"** notes Kendrick. **"Based upon our present experience, if we can get in front of 300,000 homes with the service, I'd say we could expect to have 1/3rd or 100,000 of those subscribing to HTN as an absolute minimum".** A system does not have to be using KTVU to take advantage of the HTN offering of course. It will simply be the piggy-back style carriage for HTN and any system with a receiver for the KTVU transponder (whether full time available or just available for those two hours per day on weekdays when HTN will be 'up') could become an HTN affiliate.

We wondered about the reaction to KTVU losing two hours per day on weekdays to HTN scrambled movie delivery. **"We've only had a few complaints and they have been minor"** notes Holiday's Ed Taylor. **"What we are really doing is taking KTVU off during a portion of their broadcast day when they are largely into off-net and oft-repeated situation comedies and other syndicated material that most systems already have one or more times a day. How many times a day can you sit and watch Hogan's Heros?"** Taylor may be right, but only time will tell.

And pricing. If the customer pays $3.95, what does the cable service pay for the service per home? **"I'd rather not see it in print although it is pretty generally known",** notes Kendrick. If you think in terms of a 50-50 split of the $3.95 fee you won't be far off.

Over the period of the next several months the last pieces for the HTN satellite service package will be falling into place. The equipment for the uplink video origination site must be selected, procured and installed. Elaborate marketing and scheduling efforts must be put forth and hundreds if not thousands of systems (ultimately) must be contacted. Through all of this the on-going business of running a growing MSO, providing on-going movies for the current HTN terrestrial fed system and keeping tabs on the fast paced and always changing satellite business must occupy the mind of one Peter M. Kendrick.

The service **is** different and it **is** unique. The format is rigid for the moment but Kendrick admits that if a better way comes along to do the job, he'll be the first to give it a try. Through it all Kendrick often repeats his most sincere conviction; **"I do see our service as the small operators best answer to pay."**

The Problem:
Having to replace "F" fittings.

The sad part of this problem is that it almost always comes to your attention by way of a subscriber complaint call. And replacement of loose, corroded or leaking fittings is usually on a one-at-a-time basis. And you know what those service calls cost you.

The problem involves two of your biggest concerns: subscriber satisfaction and operating costs.

The Solution:
Start with LRC "F" fittings.

LRC designs and manufactures "F" fittings that offer a long list of advantages. Features like *full-length attached crimp ring* for easy, quick and sure installation. LRC "F" fittings are *cadmium plated* for corrosion protection and this plating provides the best compatibility with cast aluminum housings. Other features include *attached ferrules* and *hex crimp* for a sure cable grip.

To learn all the advantages, talk to the Connector Specialists at LRC.

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CANADA THRU: Electroline TV Equipment, Montreal, Quebec

STN Statistics

The statistical data reported in this segment of CATJ each month is based upon data released by the FCC. Of this data it appears that the reporting is accurate with one **possible** exception: the 'TVRO's Licensed by FCC' line (last line in statistics box). **Other** sources of data such as COMPUCON indicate that the FCC has been less than 100% accurate in reporting TVRO terminals processed **and** licensed. It is taking some digging to verify these numbers but an effort is underway. In the interim, the data released by the Commission is tallied and reported as received.

During the past four months (September-December, 1977) the following trends have solidified:

a) The **average** projected **cost per terminal** lowered in September and has stayed quite static in the last quarter of 1977, near $36,000.

b) After a high of **3.04 channels per application** in September, the number of TVRO 'program channels' dropped off to under 2.5 channels per application in October, but has been climbing steadily since that period. This month's 2.7 channels per application is the second highest average on record.

c) The average cost-per-channel (i.e. the total cost of the TVRO divided by the average number of channels per TVRO) has dropped below $14,000 for the first time this reporting month, reflecting on the continued decline in TVRO hardware costs.

d) Inspite of the FCC's relaxation of antenna size to apparent 4.5 meter diameter minimums, the bulk of 'the market' is for the 'intermediate sized' antennas. During the last four months of 1977, the following antenna statistics come forth from FCC records:

Antenna Size	Number Applications
11 meters	0
10 meters	7
6 meters	27
5 meters	45
4.5 meters	24

During the last four months of 1977 the FCC received 103 applications for TVRO systems and processed (according to **their own** data) the same number: 103 applications.

The F2 to F1 Move

As discussed at some length in the January "Coop's Cable Column" (see page 40) the RCA decision to switch all CATV traffic from SATCOM II (code named 'F2') to SATCOM I (code named 'F1') makes the most sense for RCA and for the long term growth of CATV satellite communications; **and so it will be done.**

The actual date for the move is not yet firm, but in no event will it be sooner than March 1. There are currently two schools of thought at RCA, and a firm decision will not be made until about the time this ends up in the mails to you. The current thinking is **(1)** it will be done **on the first of the month,** regardless of how that may fall, **or,** (2) it will be done in the middle of the week with no particular regard to the first of anything.

RCA will be calling in all of their customers (i.e. HBO, SHOWTIME, CBN, SSS, PTL and so on) around the first of February with a 'tenative game plan'. The response to that 'tenative plan' (which will include one or more suggested transfer dates) will then determine the final decision on a firm date. After the firm date is selected and agreed to by the RCA transponder rentors, the next step will be meetings between RCA and the TVRO suppliers.

RCA will outline to the suppliers the exact mechanics of the move, provide a schedule of 'test transponder signals' which will be on both F1 and F2 for the several days either side of the moving date and the sequence in which the various uplinks will be moved.

Keep in mind that not only must CATV and other receiving terminals move from 119 degrees west (F2) to 135 degrees west (F1), but all uplink terminals (from Atlanta to California, New York to Alaska) must also transfer. RCA will provide 'double feeds' to some of the transponder channels during the transfer so that when you move from F2 to F1 you will promptly pick up signal for say HBO or SHOWTIME (as examples; not firm yet) although other transponder uplink sites such as Atlanta (for WTCG) **may not** be 'double fed'. Inevitably there will be some 'lost time' for **some** sites on **some** transponders.

Then your earth terminal supplier will communicate with you giving you all of the data he has received from RCA regarding the move; **and that should allow you to make the switch in the proper sequence at the proper time.**

Now if the move does **not** take place early in March (whether that is on the first or later on the month) CATJ will provide to TVRO users and others

CATV TVRO STATISTICS—FEBRUARY, 1978

Applications Filed/FCC	Oct. 1977	Nov. 1977	Dec. 1977
1) 11 meter	0	0	0
2) 10 meter	3	0	0
3) 6 meter	5	4	11
4) 5 meter	14	9	11
5) 4.5 meter	9	6	4
Total Apps	**31**	**19**	**26**
Cost Max.	$96,412	$96,000	$67,224
Cost Min.	27,600	21,456	25,243
Avg. Cost	**35,807**	**36,328**	**36,843**
Channels Requested	74	46	70
Average Channels	2.38	2.42	2.7
Requesting WTCG	27	14	24
Requesting CBN	22	11	20
Requesting HBO	13	15	17
Requesting MSGE	8	3	9
Avg. Cost Per Channel	**$14,625**	**$15,011**	**$13,645**
TVRO's Licensed/FCC	23	32	40

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

interested through these pages a full set of moving instructions from RCA. However **your best source of information will be your terminal supplier;** he will have what there is to know as soon as the details become finalized.

Who is likely to have problems? Aside from local weather problems (moving a ten meter dish in an ice storm is guaranteed to be a pain!), there are two potential problem areas. If you are in the northeastern USA your elevation (above the horizon) will drop with F1 since it is considerably futher west than F2. In portions of New England the horizon angle (assuming a flat earth southwest of you) drops to around 11-12 degrees. If you have buildings, trees or a hill in that direction and you have some blockage you've got problems. (You should not have these problems however if you did your system planning properly when you initially put in the system.) The only other problem one is likely to experience is with **some** ten meter dish installations. There is an **unconfirmed fear** that **some** foundations may have been improperly placed in the early days of ten meter dish installations and that **some** of the dishes **may not** be physically capable of moving that far west. Chances are you already know this if you are so affected and the answer is either pouring a new foundation and moving the ten meter antenna to the new foundation, or, perhaps (if you are 'lucky') getting some retrofitting assistance from the antenna supplier to allow you to modify the antenna azimuth adjustment range on the spot. RCA tells the 'story' of an early large dish installed in Juneau, Alaska where when the terminal moved from the Intelsat system to the domestic system **they** had to build a new pad (foundation) and bring in some large cranes to move the antenna. So don't feel too bad if it happens to you. . .even the pros make mis-calculations on occasion!

All in all it promises to be a fun-filled period of time with a certain amount of confusion on all sides. **If** the move occurs late enough for us to obtain the RCA data in advance and mold that into some suggestions we have worked out on our own, **you'll see it here in March.**

Alternate Bird Programs

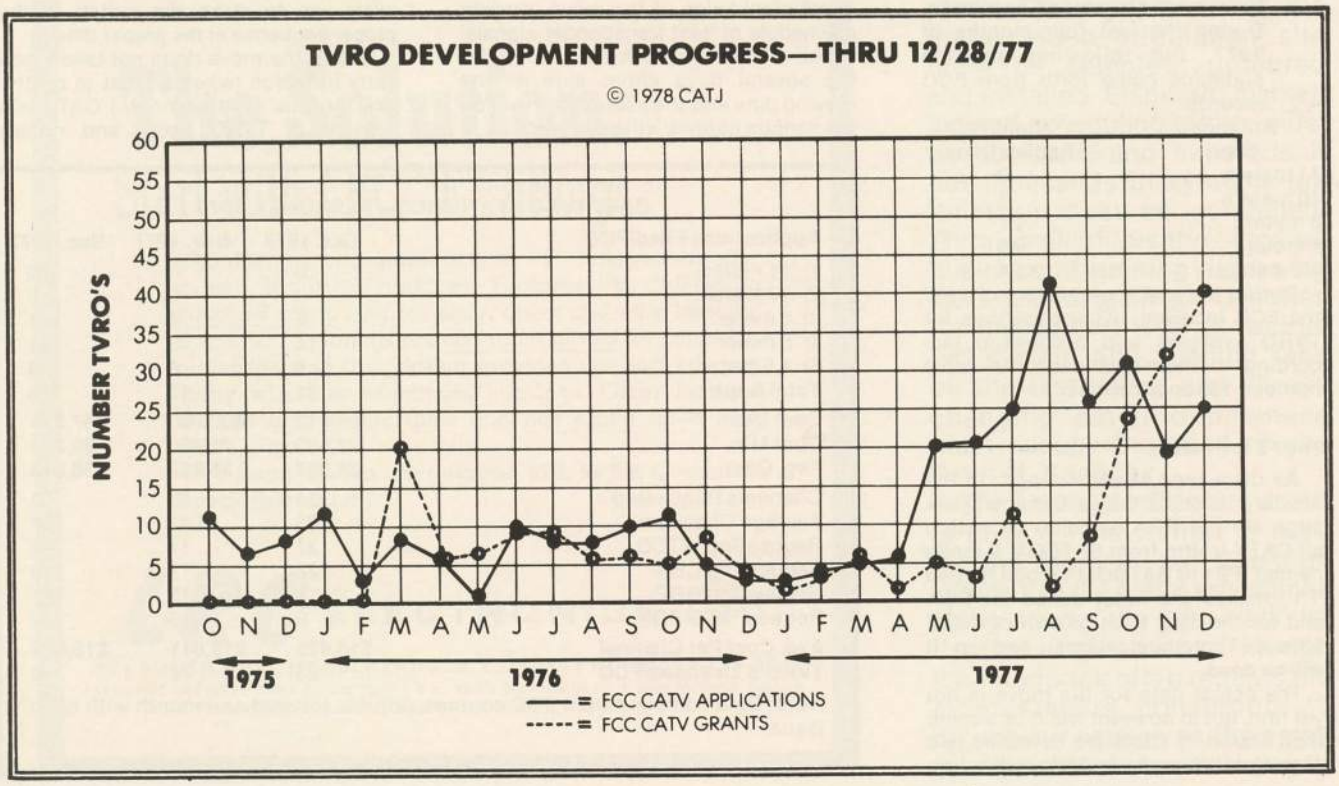
Rumors have been circulating through the CATV industry for some months that (1) '. . .it is now possible to get the agreement of the Spanish International Network (SIN) to carry their programming on CATV systems', and, (2) '. . .one day **soon** there will be the ability to carry (some) (selected) (all) of the programming available on ANIK III, from Canada, on U.S. CATV systems. . .'.

Because such permission might have considerable impact upon the way CATV systems buy and use TVRO terminals we have endeavored to check out the rumors. Here is what we have found, and what we believe to be the status of these 'additional programming prospects' today, early in 1978.

SIN—The Spanish International Network has been utilizing WESTAR (II) (transponder 3; 5 on 24 channel receivers) for program relay to affiliated (U.S.) stations since early fall; prior to that SIN was making limited use of SATCOM II. The heaviest use of WESTAR II is on weekends when sporting events (bull fights, soccer, etc.) are carried live out of Mexico to SIN affiliates across the United States.

There is one CATV system reportedly now using (or about ready to use) SIN on a three-month 'experimental' basis. **Owensboro Cablevision** (of Owensboro, Kentucky) is taking 'selected' (their option) SIN programming from WESTAR for distribution to cable subscribers. Harold Sagraves of Owensboro reports that the system is paying a flat 'trial fee' of $300 per month for use of the selected programs, mostly sporting events. Owensboro has two separate TVRO antennas; one 10 meter and a smaller 4.5 meter. The 4.5 meter antenna is dedicated to WESTAR at the moment. Owensboro **also has** an agreement with Robert Wold (productions) which has been known to distribute selected programs via WESTAR II. The Owensboro/Wold agreement allows for Owensboro Cablevision to carry (on cable) ". . .any programs distributed by Wold by satellite which have not been cleared for broadcast by television stations in the Evansville market. . .". To date there have been no such programs available.

ANIK—Perhaps the most fascinating programming source 'just beyond the reach' of legal cable carriage are the three ANIK channels. The ANIK III bird (located at 114 degrees west) operates on a 12 channel format with French language television on transponder **8** (15 on a 24 channel receiver), English and various far northern dialects on transponder 10 (19 on a 24 channel receiver) and additional English on 12 (23 on a 24 channel receiver). These three channels are programmed for 18-plus hours per day. The French language television is uplinked from the Montreal origination



studios and is very similar to the CBC French channels throughout Canada. Approximately 50% of the French channel programming is original French material, the balance is English language material dubbed into French.

Not **a great deal** of the transponder **10** programming is 'in dialect', although there is some most days in a language 'foreign' to 'southerners'. You run into the 'Carol Burnett' current series (usually a couple of days or even weeks ahead of their U.S. release dates) and a fair sampling of Canadian produced situation comedies and news programs. Transponder **12** is more (CBC) network material plus news feeds from Vancouver, Toronto-Ottawa, Halifax and other Canadian locations.

At certain times each week, such as for Saturday's "Hockey Night In Canada" all three channels on ANIK run the same program simultaneously. On non-scheduled occasions transponder 4 (7 on 24 channel receivers) is utilized for network feeds to get around terrestrial microwave conflicts.

The rumor for months has been that an enterprising U.S. system operator was 'negotiating for selected program rights' for use of programs from ANIK on his system. Without identifying the operator involved, the negotiations seem to have broken down on a pair of fronts. The Canadian authorities, we are told, **were interested** for awhile and then they dropped their interest. The U.S. FCC, we are told, simply said "Get permission from the Canadians first", perhaps knowing that such permission was extremely unlikely (and thereby dodging the issue at the U.S. level).

The major problems with carrying Canadian programming center around the typically 'earlier release' of U.S. programs by Canadian stations (i.e. the Carol Burnett Show seen in the states on Sunday evening is released over ANIK at 7 PM EST on Thursday, or three days early), and, the lack of any authority for **any Canadian** CATV systems to use **any** of the ANIK signals. When the U.S. operator who **was** in active negotiation last summer **agreed not to carry** any U.S. programs at all (thereby negating the early release problem and argument), the ANIK authorities decided that they had no authority to barter the programs out afterall. End of the series and story.

The 'current theory' is that **perhaps** the French language channel, which is operated by Quebecois personnel, presents the best chance for bridging the permission problem. As an ANIK map here indicates, the 32 dBw contour for ANIK III extends down well into the mid-section of the United States. With a 120 degree K LNA and a six meter dish, TVRO sites on or above this contour are typically out of the sparklies (even if not by much). Several dozen 'tests' conducted by existing sites seem to confirm that French language transponder (8/15) is from 0.7 to 1.0 dB 'stronger' in most locations than the two English language transponders.

But for now the future of ANIK programming within the United States, on cable systems, **seems dim indeed.**

American Satellite Network— Phase Two

As reported in **Coop's Cable Column** for December, one of the 'louder' announcements made in San Diego in November during the WCTS gathering was an announcement by a group calling themselves the **'American Satellite Network'.** ASN, they said in San Diego, proposed to lease four transponders on WESTAR II to provide to cable system operators the satellite delivery of three independent TV stations and one 'pay cable' type channel. Careful reading of the December report would indicate that many people saw several 'flaws' in the plan.

The latest word from ASN is that they intend to be up on WESTAR II on or about **the first of May,** on three (not four) transponder channels. A spokesman for the company reports that they have decided that initially they will not opt to become a 'common carrier' for their service, but rather will allow Western Union to handle the carriage of the signals. The primary reason for this approach, they say, is to cut down on the amount of time required for the necessary approvals that must come through the FCC. **"By allowing WU to be the carrier here we feel that we can shorten up the time frame considerably and be in operation much sooner"** he noted.

The latest plan, dependent they say only upon Western Union accepting the arrangement of being the carrier, will provide the following services:

1) One transponder carrying Los Angeles channel 11 (**KTTV,** an indie; this had originally been slated to be Los Angeles channel 5);
2) One transponder carrying San Francisco/Oakland channel 2 (**KTVU** which is **also** scheduled for carriage on SATCOM through Holiday Satellite Systems);
3) One transponder carrying Chicago channel 9 (**WGN,** an indie, is **also** slated for carriage at some undetermined date on SATCOM with several carriers promising service).

In addition to that, ASN says they have developed a two-channels-per-transponder technique which will allow them to program movies (double features) on Tuesday, Thursday, Saturday and Sunday by doubling up with one of the three indie-channel-transponders. Their technique is **not** similar to the system reported in this issue, as developed by CBS, according to an ASN spokesman.

ASN says they have the necessary financial where-with-all to operate at a 'loss' for three years, that they anticipate a reluctance on the part of cable operators to use their service 'until we prove we are stable and established' (any operators using the service would have to install a dedicated terminal for the WESTAR II bird since all present CATV 'traffic' is on SATCOM).

The rates being quoted are flat-per-subscriber regardless of the number of subscribers on the system; 15 cents per subscriber for the first indie taken, two indies for 25 cents and all three for 30 cents per month. The double-feature movies four nights per week is not priced at the present time.

Systems interested in learning more about the proposed service can contact **Bill Bauce** at 9104 Moss Farm Lane, Dallas, Texas 75243 (214/341-4502).

Transponders Update

In the apparently never ending saga of musical transponders, the month of January proved true to form; changes are still taking place and they probably will (if not monthly, at least often) until the industry settles down (see Coop's Cable Column, this issue).

Here is the latest rundown (current only to presstime) and where everyone thinks they are or will be for the month of February (first number is transponder number, listing thereafter is user):

2 PTL (*)
4 SHOWTIME east/central **(**)**
6 WTCG/WTBN
8 CBN
10 SHOWTIME mountain/west **(**)**
12 'Broken'
14 Trinity Broadcasting (***)
16 FANFARE (on F1) **(****)**
18 KTVU/HTN (on F1)
20 HBO mountain/west
22 Madison Square Garden
24 HBO east/central

*—Their start date was moved up to February 1 at **PTL,** it had been scheduled

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earlier (January 1). **—SHOWTIME will begin fulltime service on transponders 4 and 10 on March 7th. ***—Trinity Broadcasting (another religious channel) is now set to begin transmissions on February 15. ****—FANFARE has decided not to start service unitl June 1, **or** the start of the first month **after** RCA switches all CATV traffic from F2 to F1 (see Satellite Technology News, this issue), which ever comes first. KTVU with piggy-back Home Theater Network carriage on transponder 18 is still scheduled to start **around 1 August.**

1978 Launch Schedule

The National Aeronautics and Space Administration (NASA) has announced its 1978 launch schedule; 25 new satellites to be sent up from the Cape during the year including ten that are communication satellites.

Scheduled for launch in January was another of the Intelsat series **(Intelsat IV-A/F3),** apparently slated for operation at 19.5 degrees west longitude. Another of the Intelsat birds (Intelsat IV-A/F6) is scheduled for launch this month (February).

The first Japanese broadcasting satellite, **BSE,** is due for launch in March. This satellite, developed by Toshiba and General Electric, will operate in the 12/14 GHz bands with a powerful ground level EIRP of 55.5 dBw. **This satellite will test direct to the home broadcasting for Japan,** the first such **extensive** tests undertaken by any nation.

In April, **Comstar C,** another in the Hughes designed 4/6 GHz ATT/GTE family of communication satellites will be launched. In June, the Japanese government has reserved a second launch spot in the year's schedule as a 'backup' for the **BSE** (broadcasting) satellite, should either the earlier March launch or the bird itself prove less than optimum.

Finally in November, a **Telesat D** satellite for Canada has a spot in the launch schedule. This bird, when launched and tested will be renumbered ANIK-B, operating with 12 4/6 GHz 36 MHz wide channels and 6 12/14 GHz 72 MHz wide channels with a 4 GHz downlink dBw of 36 dB and a 12 GHz downlink dBw of 47 dB utilizing spot beams on the 12 GHz downlink. This is an RCA design bird.

Other communication satellites due to launch in 1978 on a non-private nature include **FLTSATCOM-A** for the U.S. Navy (January), **Sesat-A** (a NASA bird that will provide ocean-swell monitoring and the latest generation of weather information) in May, **Transat** for the U.S. Navy in September and **FLTSATCOM-B** also for the U.S. Navy in November.

The **Orbiting Technology Satellite** that blew up after launch on September 13, 1977 will hopefully be replaced by a backup satellite (OTS) on a late April launch. Also newsworthy is the first use, this year by NASA, of NASA's new **'Modular Multi-Mission Spacecraft'** frame. The NASA concept is to shave overhead in the satellite launching system by designing the MMMS package so that there is one basic 'core' design (powering system and propulsion system) around which specific and specialized communication and other satellite 'packages' can be placed. This 'plug it in and turn it on' technology is a bridging step towards the space shuttle program to come in the early 1980's when future birds, or parts thereof, may be taken up and assembled or dis-assembled in space for servicing purposes.

Triple Satellite Capacity?

A group of Bell Lab researchers have proposed a different approach to the next generation of communication satellites, although their plan is most suited to two-way communications.

Bell suggests that rather than tying up transponders (or whole birds) which attempt to cover all of relatively large land masses (such as North America) **all of the time and simultaneously,** that a 'scanning/spot beam' system be employed. Under the Bell concept a transponder channel would 'sweep' across all of an area, such as the United States, much as an electron beam sweeps from side to side on a picture tube. The footprint would see only perhaps 1% of its total coverage area at any instant in time and would sweep across the United States (for example) in 0.01 seconds time. In that period of time individual ground stations would send and receive their communications with each station being 'addressed' by its own unique (as in telephone number) 'code'.

Through a combination of the sweeping beam and sharply focused spot beams considerable 'frequency re-use' would be practical says Bell Labs; they predict the 'capacity' of a 'single transponder channel' would **increase** from 15,000 telephone conversations to perhaps 50,000 telephone conversations, simultaneously. Bell also noted in the announcement that they felt the new service, if established, should operate in the 11-14 GHz region (14 GHz up, 11 GHz down we assume) where they suggested 'small antennas, 3 meters (10 foot) in size would provide all of the signal gain required'.

It has been known for some time that Bell's stranglehold on long haul 'private' communication circuits, such as the land or microwave line systems now carrying the bulk of private message traffic is ultimately in some jeopardy unless Bell reacts to the rapid growth of satellite technology. The latest announcement from Bell, which was punctuated with numerous references to "currently available technology" and "systems now being designed to produce the goals of the announcement" suggests that Bell's plans are more than plans.

Alaskan Small Terminals

Experience with Alaskan small earth terminals (which have been in longer by up to a couple of years than our own) is educational if not directly comparable to TVRO sites in the lower 48.

CATJ talked with one field technician charged with the responsibility of maintaining six of the small terminals and learned the following:

1) **The average site has a 30 day MTBF** (mean time between failures) life expectancy.

However, the Alaskan Bush Terminals do double duty with **transmit** as well as receive capabilities. Most of the problems (with one exception) have been associated with the transmit capacity of the systems.

2) Apparently none of the 4.5 meter terminals have been permanently installed on concrete pads.

The typical terminal sits inside of a wire mesh fence perimeter with the antenna mount held in place on leveled ground with around 200 sacks of sand (approximately 75 pounds per sack). Between the perma-frost problems (i.e. digging into the soil is difficult and the frost line extends down tens of feet) and the ability to obtain concrete of the proper mix in the remote locations, the sites have simply been 'plopped down' on the ground and weighted in place with the sacks of sand.

3) **Most of the sites** are located adjacent to a building (school house, store, etc.) where the equipment can be housed.

Few if any sites have their own equipment buildings; rather RCA Alaskom rents or leases a heated spot with electricity for the electronics equipment, and a land site adjacent to the in-place building for the antenna. One of the not so amusing stories involves a school house which depended upon a diesel generator plant (on premises) for power. The small terminal gear is housed in the school house. And when the school was let out for the summer break, off went the diesel power unit. The terminal stayed off for sometime until a technician could get by to diagnose the 'problem' and re-start the diesel unit.

4) **The primary problem** area has been the HPA (high power amplifier) TWT units that operate as the last amplifier stage in the uplink transmitter gear for the terminals. Cooling fans designed to keep the HPA within prescribed temperature limits were poorly designed and after a week or two of operation they managed to pile up as much as six inches of fine Alaskan dust all over the innards of the HPA!

Of interest is the fact that the problem was not diagnosed promptly; it took, according to our source, some six months before re-designed cooling units were available. In the meantime expensive HPA units managed to quit with great regularity.

5) **The second most common problem** (and one still not solved apparently) is with the SCPC (single channel per carrier) 'channel 8' demod modules.

The Alaskan system utilizes two separate channels (not to be confused

with transponders) for the bulk of the audio links. 'Channel 1' is designated for dial telephone service links while 'Channel 8' is designated for public health service (PHS). The channel 8 system is designed so that remote sites can summon instant medical advice on sort of an 'order link' interconnection with metropolitan health centers. The channel 1 "Maintenance Toll Service' (MTS) involved no special new technology (it is primarily an extension of existing telephone technology) but the PHS operation on channel 8 has been a frequent source of problems. One of the sites 'lost' three separate channel 8 modules during the first 11 months of 1977.

6) **Service for the systems** is provided on a 'module out/module in' basis.

The terminals are designed with multiple fault indication lights and alarms, and when a failure occurs the service person need only note which red light is on, remove the appropriate module, and insert another from the 'spare' stock. The system has worked very well from a field maintenance point of view and school teachers, native Eskimos, and diesel mechanics have been able to put faulted systems back into operation by following the simple 'red light' approach.

7) **Antenna and LNA failures have been few.**

There have been no known failures of the Andrew 4.5 meter antennas, and LNA failures are quite rare. The technician we talked with had experienced only one LNA failure for his six sites in well over a year, and he felt that failure was caused by a human error.

There is no particular 'bottom line' to this report except perhaps to note that aside from the problems noted, the first 30 or so Alaskan 4.5 meter terminals are managing to provide exemplary service under some very trying conditions; and, given the necessity of learning how to care for these terminals, the local inhabitants of the Alaskan 'bush country' seem to be coping with the new technology very well.

Satellite Beacons & Polarization

Both SATCOM I and II carry on-board CW (straight, unmodulated carrier) beacons on board which operate all of the time. The two beacons per bird are located at 3700.5 and 4199.5 MHz, or respectively 1/2 MHz above and below the lower and upper band edges at 3700 and 4200 MHz.

The beacons are difficult (if not impossible) to find with a field strength meter attached to the IF output spigot, but they can be 'logged' with the assistance of a spectrum analyzer that reads the 3.7 to 4.2 GHz range. Another option is to utilize a down converter (see **CATJ** for **May 1977;** page 29) that converts the 3.7 to 4.2 GHz range down to the UHF region covered by (for example) the Texscan VSM-2.

The primary uses for the beacons is to have a **stable reference signal** against which you can maintain long time measurements of satellite levels without being concerned about modulation present, and, for accurate antenna orientation.

There is some slight confusion amongst SATCOM users as to what the true polarization is of the 'horizontal' transponders. The problem centers on the reference point you use for 'horizontal'.

Because we live on what is purported to be a 'round globe', and because the satellite stays in one place, the aiming exercise for the initial orbital set up of the bird must use some ground point as a reference for establishing the polarization integrity. In the case of SATCOM II at 119 degrees west, the satellite 'looks at' a point **due north of its 119 degree west location** and says to itself "my horizon is due north of me". On the other end of the circuit, on the ground, if you are located along 119 degrees west and are looking due south, you are looking (with your TVRO antenna) at a signal **that is in fact** horizontally polarized,

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with respect to the level horizon in front of you.

However, if you are located further east, such as 100 degrees west longitude, the spot or point in the sky you are looking at is seen **from an angle** and the horizontally polarized antenna that looks true north is no longer horizontally polarized to you. If that bothers you, take a globe or basketball and hold it out in front of you; simulating the location of the satellite above the equator and your own location further to the east.

This means that the incoming wavefront from SATCOM II is not horizontal; it is canted. The feed antenna therefore must be rotated out of the true horizontal position (horizontal with respect to **your own** horizon) to catch maximum 'horizontally polarized signal' from SATCOM. But which way?

As you stand looking at the dish (with the bird behind you) to compensate for our **'eastward** position' you rotate the feed antenna **counter clockwise** to adjust to the true position. And if the bird is east of you? Just the opposite; rotate the feed (again as you stand looking at the dish with the bird behind you or over your shoulder) clockwise.

How important is all of this? Probably not worth more than a few tenth's of a dB (it will depend somewhat on the type of feed you have, and, your location; the further east you go with SATCOM I or II, the more important it becomes). But if you are verging on sparklies, it could be a most important few tenths of a dB!

Two Signals Per Channel?

CBS has demonstrated a new system of cramming a **pair** of full color video signals **into a single channel bandwidth** at the same time, and separating them out without impairment of either video signal at the receive end.

On December 4th CBS shot a pair of pro-football games (Detroit at Green Bay and San Francisco at Minnesota) from an uplink station located in the Chicago area back to network headquarters in New York via Westar II. The two signals were combined at video at the uplink site and shot to New York on transponder 4.

CBS calls the system 'STRAP' which stands for **'simultaneous transmission and reception of alternating pictures',** and that ought to suggest to you how the technology is accomplished. At the transmission end a pair of separate video signals are fed into a digitalized STRAP encoder, which is essentially a vertical interval switcher. The switcher alternates back and forth between the two signals at a field rate (1/30th of a second each) eliminating the even fields from one video signal and the odd fields from the other video signal. The remaining fields are then recombined and applied as modulation to the transmitter. When you view the resulting video on a monitor (see photo here taken off of the WESTAR II feed channel December 4th) it appears as two separate but equal video 'fields' (that's a TELSTAR 'game' commercial superimposed over an oil company commercial).

At the receiving end a STRAP decoder operates in a digital mode to break the received signals back into element by element code. After being digitalized the resulting video signals are alternate line separated into a pair of 'spigots' labeled (appropriately) 'Video One' and 'Video Two'. Then to make up for the 'lost lines' the STRAP decoder looks at the lines it does have, and makes up a missing line for each missing line by 'averaging' the video content of the lines just above and below the missing line. The averaging process involves taking the **first** element from the line **directly above** the missing line, the **next** element from the line **directly below** and so on, alternating back and forth making up a 'string of pearls' as it were until the missing line is re-constructed.

The tests done December 4th, perhaps largely for the publicity effect, had only a single audio (sub) carrier involved and the missing audio carrier was transmiited to New York via another circuit. With multiple audio subcarriers available on satellite feeds, however, simultaneous audio transmission presents no problems.

CBS is out looking for someone to manufacture the system at this time; they feel it will have a 'street cost' of between $5,000 and $10,000 per system package when offered commercially.

Down the road beyond the instant possibility of 'doubling up with two program channels on a single transmission channel' (and thereby cutting costs for everything from satellite feeds to microwave feeds, and preserving spectrum in the process), what does the technique hold in store? Most of the encoder and decoder apparatus are IC devices; and where there is a mass market for IC devices, the costs always tumble rapidly with 'customized' intergrated circuits manufactured for the task at hand. Will the TV of the future 'double up' with two program channels per RF channel? Only time will tell.

Farinon Single Channel TVRO

Farinon Electric (1691 Bayport Avenue, San Carlos, California 94070) has announced a new single channel TVRO receiver that has many interesting features. Model FST-4 receiver sells for $4,000, is modular in construction, and has full front panel metering. The metering system includes a field-calibrated C/N position which is set at time of installation and will thereafter maintain an accurate analysis of the C/N over a 3 dB range (very few CATV TVRO's experience a signal gradations beyond a dB or so in normal reception service).

Changing channels is a $200 item and involves swapping out a waveguide channel filter on the input and substituting a new crystal. An LO (local oscillator) metering position makes crystal substitution and tuning totally internal to the receiver system.

The unit will operate from 115/230 VAC or with optional power supply board/modules from 21,24 or 48 VDC (-). The receiver will hold two separate audio subcarrier detector modules which means that the user may have both 6.8 **and** 6.2 MHz aural subcarrier detection (600 ohm balanced output is provided on the rear of each module). Full detailed information is available from Farinon. Delivery is currently being made although a back order situation does exist.

INTERSPUTNIK UP DATE

The July 1977 issue of CATJ carried a report on the apparent status of

Russian launched and operated telecommunication satellites. Additional data from the CCIR updates the accuracy of the earlier published data.

1) The basic mechanism for the operation of Russian satellites is Intersputnik, a consortium of nations who have joined together to provide both the ground station links and the basic satellite package for use largely over the Asian continent.
2) Participants include People's Republic of Bulgaria, Hungarian People's Republic, German Democratic Republic, Mongolian People's Republic, People's Republic of Poland, Socialist Republic of Romania, Czechoslovak Socialist Republic, the USSR and Cuba.
3) Color television is transmitted following an FM format; the audio is transmitted by either of two different formats. In format 'A' the audio is time-division multiplexed into a sequence of duration modulation pulses which are located within the line blanking intervals of the video signal sequence. In format 'B' standard FM subcarrier deviation is utilized with a frequency offset of 7.5 MHz (our standard satellite sub-carriers are located at either 6.2 or 6.8 MHz offset from the video carrier frequency).
4) Voice or telephone traffic is handled with a single-channel per carrier (SCPC) format.
5) The uplink frequency range is 6.075 to 6.225 GHz while the downlink (or satellite to ground) frequency range is 3.750 to 3.900 GHz.
6) The figure of merit or G/T for the system is centered around 29 dB/K.
7) The EIRP for television transmission is 85 dBw while the EIRP for telephone channels is 57 dBw.
8) The maximum frequency modulation deviation is 15 MHz for video channels and 30 kHz for audio (telephone) channels.

Apparently the Intersputnik operators only 'count' earth stations equipped for **both** transmit **and** receive operation; there are six such stations at the present time with additional stations under construction. Receive-only stations are not tabulated.

The Intersputnik system apparently presently utilizes a pair of geostationary satellites. The first, Raduga, was launched on 29 December 1975. This satellite has a limited capacity of 6 (six) 36 MHz wide RF transponders with a 'lower' EIRP of 29 dBw and circular polarization.

The second satellite in this series (Statsionar-T) was launched into orbit on 26 October 1976. It rests at 99 degrees east and 0 degrees north (over the equator); or roughly over the western coast of the island of Sumatra, southwest of Kuala Lumpur, Malaya. This geo-stationary satellite has a 200 watt transmitter on board with antenna gain of 33.5 dB. The output bandwidth of the transponders on board is 714 MHz. This satellite is widely utilized for television (and other data) program distribution throughout the USSR and affiliated countries (exclusive of Cuba). Typical TVRO stations associated with this system are reported to have equivalent noise temperature of either 800 degrees K (!) or 1200 degrees K. Respectively, receive antenna gains of 30 dB or 23 dB (dishes **under** six foot in size) with video signal to noises of 55 dB and 48 dB are reported.

The primary difference in the Intersputnik system and the SATCOM/WESTAR/ANIK systems is the amount of transmitter power 'on board'. By operating with a considerably higher power transmitter at the satellite, the antenna size and gain requirements for the earth terminals is reduced considerably.

Super 17's Gradual Change

With Atlanta's WTCG going into more and more cable homes every week and the satellite delivered audience reaching the point where it equals or will shortly outnumber the direct Atlanta area audience, one might reasonable suspect that the programming emphasis on Super 17 will change.

Several interesting things are happening, and WTCG's staff is reacting with the type of innovation that should keep the Atlanta station high up in the viewing audience ratings in those towns where the station is seen.

First of all, the non-network stations have recently come off of the most prosperous year in their 30 years of telecasting. Many of the indies in the nation reported to the FCC net earning increases of 50% or more in the most recent reporting year (1976) and this obvious affluence is having an impact. The Sitcom program peddlers, the movie peddlers and others who have been dutifully calling upon the likes of WTCG all of these years are starting to see 'money in them thar hills'. Accordingly, they are saying things like 'your cost for this feature (or that Sitcom) is going to go up in the next year; **we've kept your costs down while you struggled to survive but now you are past that point'.** This means that **low cost** features and Sitcoms may shortly be a thing of the past for the indies.

With revenues up, and costs going up on the old standard syndicated shows (such as Lucy and Hogan's Heroes) the station programmers are faced with several options; continuing to buy the established product at inflated prices, buying more expensive programming which previously they could not afford, or, creating more of their own programming. . .now that they have the bucks to indulge in this sort of thing.

WTCG will, for example, offer **twenty more Atlanta Braves baseball games** in the 1978 season than they did in the 1977 season. That works out to around **one more** game per week during the season. WTCG is also expanding its (southeastern conference) basketball schedule this winter.

All of this happens because the station(s) are being seen in more homes and this translates to higher ratings and more bucks for advertising. But like any fluid situation, the costs continue to rise as well. For example, southeastern conference basketball games now go for around $15,000 (for the rights) per game. When you consider that such a game might drag out for a couple of hours maximum, that works out to $7,500 per hour for programming costs (before production and delivery costs).

The name of the game, as always, continues to be numbers.

Mutual Is Serious

The Mutual Radio Network and the Dallas Cowboys (pro football club) have announced a program for the 1978 football season. Using the facilities of Mutual, including the now pending small terminal satellite earth terminal feed network, Mutual will distribute simultaneous English and Spanish play-by-play broadcasts of the Cowboy games over a nine state area to some 250 radio network affiliates, as well as to stations in Puerto Rico and Mexico.

This is a four year program, and marks the first time an 'international radio network' has been put together by a major sporting team in the United States.

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TECHNICAL TOPICS

MORE—'Super 17 Is Off. . .'

"Congratulations on your December issue article 'EGADS—Super 17 Is Off'. We at Microdyne felt it was a well written report on the problems you had and the steps taken to rectify same. The encouraging point in the article was that it shows if the operator will consult the manufacturer's manual, employ good systematic troubleshooting techniques, the seemingly impossible task of field repairing complex electronic equipment can be accomplished and that engineers and technicians need not be awed by equipment used for satellite communications.

"It is unfortunate that the CATJ Lab site had this failure, but as we all know anything made by man can fail and even the best of equipment with good documentation can have problems. But with readily available factory support, some heads-up local talent and common sense most situations of this nature can be overcome.

"I would also like to point out that Microdyne maintains a 24 hour a day trouble line and although I generally appreciate not being called out of bed in the middle of the night, I really don't mind because that is part of the service we offer. And as far as the tantalum capacitors are concerned, we believe most of these 'time bombs' have gone off. As a matter of fact we don't use these 'pains in the neck' any more in our receivers. Our congratulations of a fine report to the industry, keep up the good work!"

George A. Bell
Microdyne Corporation
Rockville, Maryland

George—

The pleasure was all ours and by the way fellows we've had no further problems of any nature with the receiver mentioned in the report. We are still open to hear from others who have experienced problems with any TVRO receiver however.

Small System Questions

"I am writing this letter to CATJ for help because I haven't found anyone else to turn to for assistance. I own a small, rural cable system of some 12 miles back in the mountainous region of **(name of state deleted,** Editor). The reason for this letter is because I just heard that my system should be registered with the FCC and I should have a Certificate of Compliance; I have neither.

I started building this system around the end of 1975, serving the two townships of **(names deleted,** Editor); which had granted franchises to me. The people in these areas could receive only two stations, both of the same network (from two different cities). Thus the need was apparent for a cable system.

Most of the system uses 1/2 inch trunk along with Starline-I single ended gear. The headend uses Blonder Tongue UX-3 converters for the UHF channels for conversion to VHF, and strip amplifiers for the headend amplification and gain. I presently carry five channels, one from each network plus two on CBS, and, a local weather channel. On channel 13 the churches in the communities broadcast on cable their services.

My problem is how do I register a system that is up and going? Who do I contact? Will I have to change out my amplifiers to push-pull in order to qualify under the technical standards? Will there be penalties or fines when I 'come from under the bushel basket?' Other local operators, one with over 200 miles of plant, tells me to not even register. I think I should but I don't know how to go about doing it. Your help will be greatly appreciated."

Name Withheld
Someplace East of the
Mississippi (!)

Withheld -

Your problem is not unique. In fact we have received several dozen similar inquiries here over the past several months and have answered each as we answered yours (directly), **and will repeat here** (there appear to be a still fairly large number of unknown/unregistered systems out there).

First of all, until the FCC gets from Congress the power to assess fines and forfeitures, there are no fines or penalties for not registering. The FCC could (if they chose) **move against you through the Department of Justice for failing to register** (and a fine might be better than that) **but to date that has also not been done. However, if** (or when) **the FCC does get the authority of Congress to assess fines, you can be sure one of the first areas they will hit will be those systems who have failed to 'register'.**

Next, if you have fewer than 500 subscribers (499), you do not need a Certificate of Compliance. But you do need **to be** on file, **or in other words have registered, with the FCC. Under the March 10, 1977 rule changes pushed by CATA systems with fewer than 500 subscribers are now free to carry** any signals **they want, and they may build their systems** without **a federal permit/license/certificate. But** before **you pass the** 49 subscriber **mark you should be registered with the FCC. How do you do it?**

Send a letter (just a simple letter, although we suggest you send it registered mail with a return receipt requested so you have proof of delivery to the FCC) **to the** Cable Television Bureau, FCC, 1919 M Street NW, Washington, D.C. 20554. **And give them the following information:**

1) **The legal business name of your system, indicating whether the company is an individually owned business, a partnership, a non-profit cooperative, or a corporation;**
2) **The assumed or 'doing-business-as' name if any;**
3) **Your mailing address including your zip code;**
4) **The** (approximate) **date on which you intend** (or did) **begin serving 50 or more subscribers;**
5) **The name of each separate** (franchised or permit-held) **community which you serve with your system;**
6) **The call letters, channel of reception, and city of license of all TV stations carried by your system;**
7) **The number of subscribers you have at the time of 'registration'.**

That's all there is to FCC registration if you currently have 499 or fewer subscribers. The FCC is scheduled to consider moving the 499 number to 999 soon, perhaps before the first of March. If you have 1,000 or more subscribers after **the number moves to 999, you will be required to file a formal Certificate of Compliance application; which is another can of worms** (we'll be glad to help if you'll contact us here at CATJ).

Then there is the copyright question. The topic was discussed in the January CATJ (page 31). **What you need to do is to notify the** 'Copyright Office, Washington, D.C. 20559' **that you exist with the following particulars:**

1) **The name of your cable TV system (full business name);**
2) **Whether you are an individual owner, a partnership, a corporation or 'other';**
3) **The name of the community (or communities) which your system serves, including both incorporated and unincorporated areas;**
4) **The call letters, the channel and the city of license for all television stations, all AM radio stations and all FM radio stations you carry. If you carry broadband FM, for now** (although this is **about** to change) **simply put down 'We carry broadband FM'.**
5) **Your full name** (print or type), **your title** (such as owner, again print or type), **and your signature along with the date.**

Again we suggest that you file this via registered mail, return receipt requested

so that you have some proof of delivery.

Now what happens next? Well, the FCC will eventually acknowledge your registration and they will eventually send to you some report forms to fill out. Fill them out, and then each year thereafter as long as you are below the 499/999 numbers (which ever applies at the time) they'll ask you to 'verify' that no additional channels have been added (or if they have what they are) as well as to update your operations in terms of who you are (i.e. has the ownership changed during the past reporting year?), where you are (i.e. have you added one or more new franchise areas) and like that. As long as you stay under the 499/999 number (whichever applies at the time), they'll otherwise leave you alone. No annual tests are required for these smaller (exempt) systems, although the FCC reserves the right to require tests on demand if they get a bunch of complaints about your service.

The U.S. Copyright Office is supposed to be notified 30 days prior to your starting service to your first customer. They, unlike the FCC, consider you to be a cable system the moment you connect up that first paying home. So you need to file with them ahead of operation. And, when you add another signal you are also supposed to give the Copyright Office 30 days advance notice of your plans to add the signal (again, its call letters, channel and city of license). The Copyright Office is mass confusion at the moment and for this reason some of the procedures may change with time. When you send anything to this office it is wise to send it Certified Mail—Return Receipt requested. And then file away (i.e. retain) your signed receipts.

This material has been covered numerous times in the CATA NEWSLETTER; if you are a small system operator, and do not belong to CATA (Suite 106, 4209 NW 23rd, Oklahoma City, Oklahoma 73107) it is worth your while to inquire about system membership!

Solar Powercell Progress

The initially high cost of solar powered cells (designed to convert the solar light into useful levels of voltage to power equipment, or batteries for charging) has held back the large scale development of stand alone solar powered equipment systems except in those circumstances where the equipment is installed at locations some considerable (expensive to cross) distance from existing power-line-delivered service.

A recent report by the **Federal Energy Administration** suggests that one of the more dramatic drops in the price of such solar to DC cells in the history of the devices is on the horizon for the next two to three years. The FEA is openly forecasting that by 1983, street light systems will find that the initial cost of photovoltaic cells will be low enough that it will be cheaper to use the cells for the collection and conversion of solar power for street and highway lighting systems than it will be to utilize conventional power systems. Most recently a new school in Arkansas has decided to be totally powered by solar cells; the cost for a 250 kilovolt system came to $3.00 per watt. While still high by conventional standards, the price represented a 2/3rds drop in price over the standard photovoltaic cell costs of just one year ago.

Remote CATV sites, especially microwave sites, are likely to be among the first commercial users of 'low cost' solar cells for power and the industry watches the developments with considerable interest. At least one company in CATV has **explored** the possibility of solar powering (with batteries for nighttime use or alternately switching to regular commercial power at night) a line of line extender amplifiers.

The NICAD Memory

From time to time in CATJ articles dealing with NICAD battery operated CATV (test) equipment we have seen or made the off-hand reference that NICAD batteries should on occasion be thoroughly dis-charged to assist in their maintaining their 'memory'. Recently while going through some recent additions to the CATA/CATJ Library we stumbled upon a report in the September 1976 edition of the IEEE Spectrum which sheds some 'light' on the mysterious failure of NICAD cells.

People who have experienced problems with NICAD cells in CATV test gear report that when a cell goes bad it manages to drop to the charge level (typically 1.0 to 1.1 volts) from the fully charged level (typically 1.4 volts right after charging, dropping to around 1.25 volts per battery shortly after you begin to take current out again) in from 20-30% of the normal 'expected operating cycle'. In other words, the cell tests properly charged from a voltage standpoint, but from a current-available standpoint the cell simply does not seem to have the 'capacity' to hold its normal charge.

In the IEEE Spectrum report S.F. Pensabene and J.W. Gould report the problem is within the battery crystalline plate structure. The materials utilized in the two plates (positive and negative) end up in a powered-kind-of form within the cell and when the battery charges to full capacity the crystalline structure is markedly different from a cell that is dis-charged. The ability of the battery to hold a proper amount of (current) charge depends upon the actual crystalline formation.

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In cells which have the 'short-life-cycle' problem the solution is as follows:

1) **The cell,** which normally requires re-charging **at** the 1.0 to 1.1 volt level, must be dis-charged **beyond** that point. You can do this in your shop by removing the cell from the equipment, connecting a suitable resistor in series with the resistor (to ground) and allow the cell to dis-charge down to the 0.6 volt level. Select the resistor so that the battery's rated millampere per hour discharge rate is not exceeded. Most of these NICADs are rated at 500 maH, which means that they will discharge 50 mils of juice for ten hours (50 x 10).
2) **When** you reach the 0.6 volt level, **re-charge** the cell at **half rate.** That is, if your **normal** charge cycle is 10 hours, go to a twenty hour charge period and supply only half of the normal charging current. Monitor the charging current with a VOM.

When this deep dis-charge (re-charge) cycle is completed, check the battery for charge by checking the voltage and watch the operation of that cell for a time or two. What you are doing with such a cell is **forcing** the crystalline structure inside the battery **to resume** its 'original memory'. The two General Electric researchers who prepared the report for IEEE Spectrum noted that in bad cases they had to re-cycle the NICAD through two or three 'deep-dis-charge' and recharge cycles to get the memory to come back; but that most situations only required a single cycle.

There are other warnings contained in both the IEEE Spectrum article and the **Eveready Battery Application Handbook** and (GE) **Nickel-Cadmium Battery Application Handbook** (the latter is available from General Electric, P.O. Box 861, Gainseville, Fl. 32602). They are the suggestions that when a battery appears bad, check first to see if the polarity of the battery has switched. There is a form of NICAD failure where the + becomes the − and the − becomes the + terminal. Deep six any such cells. Next, trickle charging of NICADs seems to be bad news. So is constant charging (i.e. forgetting you have a unit on charge for more time than the rated charging period). It is better to take a discharged battery (or unit) that has gone to or below the normal recharge point (1.0 to 1.1 volts) and do a regular speed recharge than to use a piece of gear for an hour or so and then return it to an ays-on' trickle charge. If trickle charging is used, it should be at a **very slow** 30-50 hour rate (i.e. take full charge current capacity, divide by 30 to 50 and that determines the amount of charging current to be supplied.) Finally, if cells have been stored and not used for extended periods of time such as 3 to 9 months, **don't start re-use off by charging** before using them. Run them until they drop to a good dis-charge level and **then** put them in the charger.

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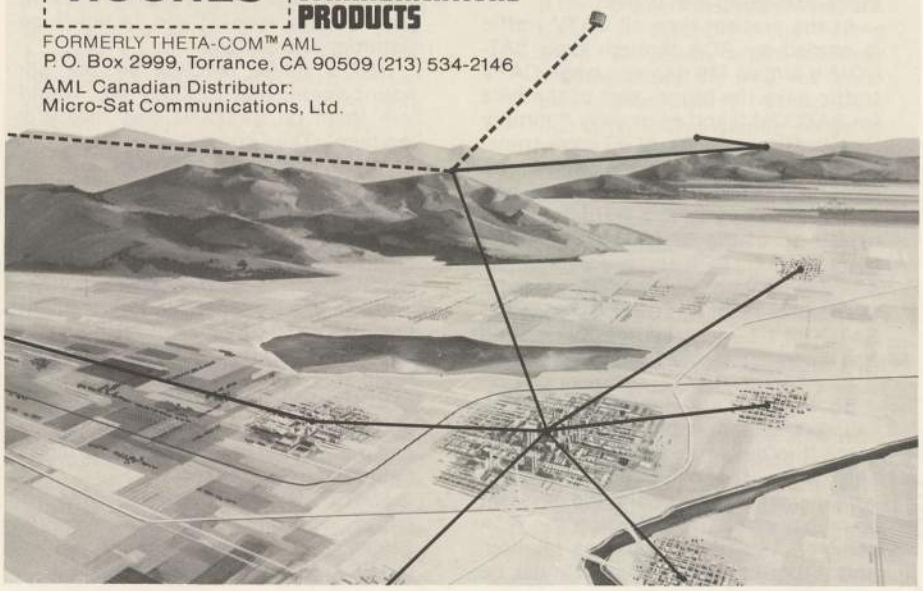

Coop's cable column

bob cooper editor in chief
CATJ

Still An Immature Industry

If a person snooped around way back in San Diego at the WCTS gathering, one heard a certain amount of high level bitching and complaining from the HBO corporate troops. Riding high on their first profitable period (see **CATJ** CATA-torial for December) HBO was plainly miffed at the SHOWTIME decision to 'go to the bird'. The sore festered at HBO through November and by December some of the insider newsletters that circulate in this industry were talking about HBO's dis-content. Some were even speculating that HBO might abandon the RCA SATCOM bird in favor of one of the two available WESTAR birds.

The speculation fed upon itself through December and by early in January, some of the newshounds in the industry were hot on the trail of what they considered big news. "As HBO goes so goes the industry" was an oft-repeated statement and it worked its way into print in several quarters.

Let's try to put some perspective on this whole business and attempt to determine just what is at stake here, if indeed anything is at stake.

At the present time all CATV traffic is carried by RCA through their SATCOM II bird at 119 degrees west. CATV traffic pays the bigger part of the bills for SATCOM II and as of early February that traffic consists of PTL on transponder 2, WTCG/SSS on transponder 6, CBN on transponder 8, HBO on 20 and 24 and Madison Square Garden Events on 22. All of the SATCOM II users (1) **pay money** to RCA for use of their respective transponders, and, (2) **will move** from the present SATCOM II bird to the SATCOM I bird sometime this spring (see report in **Satellite Technology News**).

So there exists between RCA (the seller) and the satellite transponder users (the buyers) a business relationship cemented by a formal written agreement (a contract) and the payment of money (the terms of using the RCA service). As with any businss relationship there has been, is, and must be in the future a concern and understanding on the part of RCA for the operating conditions faced by the SATCOM customers, and, equal concern and understanding on the part of the SATCOM customers for the operating conditions faced by RCA. In other words, **not everyone** can have **exactly** what they want **all** of the time; **some give and take is necessary as with all elements of life.**

HBO has apparently for years considered themselves the only viable, national source of pay-cable programming. Their 'satellite connection' has been a major (if not **the** major) contributing element to their recent growth and their now black-bottom-line profits. They pioneered satellite distribution, gambled big and now they expect to win big. And they deserve to do so.

Now along comes Viacom's SHOWTIME. It announces it has signed a deal with RCA for use of SATCOM II (I after the move). On the surface SHOWTIME seems like a quite comparable if not competitive service to HBO. Both will be up on dual transponders (thereby allowing time-zone-split feeds), both will run around 7 hours of programming per weekday evening and 12 hours on Saturday and Sunday.

HBO's initial reaction to the announcement that SHOWTIME would join them on SATCOM was basically 'ho-hum'. They knew it was coming, it hardly caught them by surprise. Or at least it shouldn't have caught them by surprise if it did. But **below** the intial 'ho-hum' and a kind of **"Gee we are glad you are going to be up there also. . . this strengthens the pay cable industry"** attitude was a deep seated resentment that SHOWTIME was in fact going to be on the bird. HBO, according to reports, took out that resentment on RCA. SHOWTIME's initial success in signing up satellite customers (CSI, Sammons and many other of lesser stature) didn't help matters any either.

First HBO told RCA that it was unhappy with the 'deal' RCA gave to SHOWTIME. The actual **tariff** charged by RCA to **all** of its customers is a matter of record; common carrier tariffs are set by the carrier **with the approval of the FCC.** SHOWTIME's agreement is for less-than-full-time use of transponders 4 and 10 so naturally because they don't use the bird 24 hours a day, they don't pay for 24 hours use. HBO, on the other hand has been quietly talking about making use of their transponders for purposes other than CATV feeds during the hours CATV programs are not being relayed (keep in mind HBO is owned by mass publisher-merchandiser Time-Life, Inc. and they have other divisions that might get some use out of the satellite relay). So the bottom line on charges is everybody gets the same deal because that is the way tariffs work. SHOWTIME could have HBO's rates, or vice versa, simply by using the **same number** of transponders in the **same way** for the **same amount** of time. Equals are equal in tariff matters.

So what was HBO picking on little old RCA about? Primarily it was the arrangement RCA made with SHOWTIME to allow **SHOWTIME** to utilize the new Vernon Valley, New York uplink site for production and tape playback. HBO does it's work from the caverns of New York City, goes through a combination of land (cable) and microwave links to get their uplink signal out to Vernon Valley for the lift to the bird. HBO decided SHOWTIME got an advantage they didn't have. To which RCA answered **"Hey, this was no gift. You knew we were going to build the Vernon Valley production and uplink baseband site and you could have had** (and presumably still could have if they wished) **space in that facility. SHOWTIME is paying for it, above and beyond their transponder costs."**

HBO at this point began to smell an opportunity to do more than create waves; they saw an opportunity to bring transponder tariffs down. And meanwhile the folks over at Western Union were watching all of these goings-on and trying to figure out how **they** could profit from the discord. They saw their chance and went to HBO with a 'sweet deal'; a reduction in tariffs for bird time. What they **initially** offered to HBO was a lower cost tariff based upon something called "pre-emption". That is, **if** HBO signed up for a pair of WESTAR transponders at the 'reduced tariff rates' in theory (and by contract), WESTAR could save HBO money provided HBO didn't "mind" getting "bumped" (or pre-empted) from time to time (whenever somebody with more bucks and an urgent need came along asking for transponder time). **No CATV service could stand around waiting to get bumped so Western Union then came back with an** unwritten **offer that said in essence:**

'We can't very well put in writing that we will never-never-never bump you off the bird under the pre-emptible tariff because then the FCC would see that this was **not** a pre-emptible tariff afterall. **So we'll just keep it as an understanding between us guys** that it will never happen, and we'll get a third WESTAR bird up

there to insure that we have the channel capacity to handle any conceivable traffic load during the term of the contract'.

Now before HBO or Western Union or somebody else decides the statement above is worthy of a lawsuit, let's set the record straight that nobody to **our** actual knowledge actually said **exactly** what we report above. However, in sorting out the separate statements of a number of sources, this is our best effort towards piecing together the jig-saw puzzle.

OK, so it all boils down to bucks. Bucks that the transponder **users** could save **if** they moved **off of** RCA's SATCOM bird(s) and **over to** Western Union's WESTAR bird. How many bucks?

The most immediate bucks involved are those that would have to be paid to RCA by the transponder users **who might** decide to move to WESTAR. Afterall, RCA has contracts with these people and if they decide to bail out of the contracts there are rightfully penalties involved. **A source at RCA** tells us that assuming such a move took place on June first, RCA calculates the penalties as follows:

(1) **HBO—$534,000**
(2) **CBN—$722,000**
(3) **SSS—$462,000**

Now what, you might ask, are CBN and Southern Satellite Systems (WTCG/WTBN) doing in this equation? Well, that gets down to your own back yard now. The folks at SSS and CBN have not been out of this discussion by any means. Neither HBO nor RCA nor even Western Union would let that happen.

Consider what would happen to you, as a user of one or more of the present services if say HBO **alone** moved to WESTAR. If you have your present terminal homed in on SATCOM and you are using HBO plus WTCG and/or plus CBN (which is a common lineup at the moment), where would **you be** if HBO changed birds **and the others stayed put?** Up the sky without an antenna, that's where; at least for one or two of the services. **You'd have to make a decision.** Switch your dish to WESTAR for HBO and forget about CBN and/or WTCG, or, leave it on SATCOM and forget about HBO. Humm, some tough decision. Of course there is another one. . .such as putting in a second dish, LNA and feedline. The 4.5 meter terminals may be inexpensive but they are not **that** inexpensive—yet.

So HBO and all of the other players have a delicate balancing act going. If only HBO moves, HBO loses. That's pretty obvious. **But** if HBO can take CBN and WTCG (plus perhaps others not directly involved in the frey yet) **with them to WESTAR,** that means you as a system operator have a less difficult decision to make regarding which bird **your** single TVRO antenna will point at.

Now let's get back to SHOWTIME; who says they are happy with their RCA arrangement, and have in fact moved their starting date up to March 7th on transponders 4 and 10. How do they feel about all of this? Wisely, perhaps showing the patience of Job, they have said nothing to inflame the argument or aid and comfort the contestants. They know that **if** HBO and CBN and WTCG (plus perhaps others not yet named) **do move** to WESTAR their own sales job of getting SHOWTIME on systems already set up or planning to be set up with a **single** terminal would become more difficult. Selling a system operator on adding a service which he already has an LNA and antenna for is one thing; but as HBO has found out, having two or three or more transponders on the same bird all offering something different to the cable system operator sure makes selling a service a whole lot easier.

This fact has not escaped HBO, one must assume. By reverse Polish logic, **if** they haul off CBN and WTCG and possibly others to WESTAR and leave SHOWTIME essentially by themselves on SATCOM, this has got to hurt the SHOWTIME competitive position with HBO. At least for a few years.

Through all of this inner tugging and pushing there has been an understandable amount of confusion going on in every office affected by the satellite CATV business. **HBO's Gerald Levin** is quoted as approaching the bird-switch matter as a **"business decision for the whole industry"**, which he explains means HBO is **"in the market-place looking for a ten year contract with** 'some' **satellite operator".** Levin, apparently personally convinced that "as HBO goes, so go the rest of the transponder users servicing CATV" has assumed the role of 'father-negotiator' of the CATV TVRO business. **"We are looking for the kind of arrangement which will enable the industry to take advantage of technological changes which may come about."**

Most everyone, including even RCA, seems to admit that regardless of how this turns out **"CATV tariffs are going to come down".** That means that Levin has, by very clever business tactics, set RCA and Western Union back at each other's throat with CATV standing outside watching to see which one has the best deal for CATV.

There is little question that the parties in this new game are serious. RCA brought Levin down to Cherry Hill, New Jersey, for a two-day head-to-head discussion and exhibit of future technology usually kept under wraps at RCA on January 18 and 19. Meanwhile over at Western Union, WESTAR II watchers couldn't help but notice an HBO feed on transponder 7 during the middle of January. After denying it was even there, WESTAR control personnel finally admitted **"some tests are being conducted".** Levin, it would appear, is attempting to build a case for whatever the ultimate HBO decision. He is banking on other transponder users **following HBO** to WESTAR **if** they make the move, or, if they don't move at least on having them in 'his camp' when this is all over. If HBO ultimately stays with RCA it appears likely the HBO action of this fall and winter will at the least result in a new set of lower tariffs for all CATV users in the future. RCA, anxious to keep **all** of the CATV business, has said repeatedly that they will **meet** any rates Western Union **"puts down on paper".** That's a clever tactic for RCA, knowing full well that Western Union is not about to get caught with something on paper that will bring the FCC into the act to investigate 'tariff violations'.

The whole exercise raises more questions than answers. For example,

1) If **some** of the CATV traffic moves to WESTAR and **some** remains on SATCOM, has the HBO 'game' **really** helped the CATV industry? Will active competition between two involved-with-CATV-satellite-carriers prove to be good for CATV at **this stage** of development, or will the split in programming availability simply make it more expensive for smaller CATV systems to get into the satellite game?

(Justifying one small terminal is one thing, justifying two separate small terminals is quite another. Bigger systems can certainly afford two small ones [the cost for two small terminals is still less than what many early ten meter terminal buyers paid for one 'big one']).

2) If **some** of the CATV traffic moves to WESTAR II, will that relaxation of load on SATCOM II mean that **a bird switch** (F2 to F1) **is no longer necessary,** at least now?
3) WESTAR II has a **12 channel** capacity, and some of these channels are already leased out. There is no way **everyone** now commited to SATCOM can fit into the smaller capacity of WESTAR. Is the industry moving ahead by transfering to a bird with more limited capacity, **or is it taking a step backward?** Some satellite systems users **must** stay behind on SATCOM; assuming Western Union is not ready for several years to replace the 12 channel WESTAR II with a bird having greater transponder capacity.
4) **What about the plans of the American Satellite Network** (see Satellite Technology News in this issue)? **If** they are serious, and **if** Western Union is serious about having them 'on board; where do **their 3 transponders** fit into the complex picture? Is it not possible hat **if** HBO and friends **do go** to WESTAR **that ASN will come over to SATCOM?** If the answer to this is yes, would not the presence of the ASN originated indie signals (Los Angeles II, San Francisco 2 and Chicago 9) on the ASN channels not suddenly strengthen the position of ASN **and SHOWTIME** over on SATCOM?

Egads! This may be getting a little out of hand. We're betting HBO never thought it would go quite this far.

Editor's Note: On January 30th HBO and RCA announced they had come to terms for on-going future use of SATCOM. And so the uncertainty of the future is removed. The new lower rates will be explored in detail in **CATJ** in **March.**

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.

Scientific-Atlanta (3845 Pleasantdale Road, Atlanta, Georgia 30340) has announced substantial new sales activity with their 5 and ten meter TVRO systems. SA will supply new 5 meter terminals to Hickory, North Carolina and Gilroy, California; and a new ten meter terminal to the San Juan, Puerto Rico system. Additionally, Tele-Communications, Inc. (TCI) has placed an order with SA for a total of 50 to 60 5 meter terminals to be delivered and installed over the coming three year period. The sale, totaling $2.3 million is one of the largest sales recorded to date by a TVRO supplier.

Jerrold Activities

Jerrold Electronics Corporation (P.O. Box 487, Byberry Road and Pennsylvania Turnpike, Hatboro, Pa. 19040) reports they are in the process of "significantly expanding the new Hatboro facility". The Hatboro facility, which now houses the Broadband Communications Group, will now provide Jerrold with a centralized location for all non-production relating functions. The major production facilities will continue to function in Nogales, Mexico and Chicopee, Massachusetts.

Jerrold also has announced that their firm has been selected by WOMETCO Communications, Inc. to supply the electronics for a new 300 mile, 20 channel capable system to be constructed for Columbia, South Carolina. The system to be constructed in Columbia will offer 7 channels of local origination as well as CBN/WYAH from Portsmouth, Virginia and Atlanta's ever-popular WTCG.

New Jerrold Extender

Jerrold Electronics Corporation (P.O. Box 487, Hatboro, Pa. 19040) has announced a new two-way capable line extender which they say is suited to use as a 'mini-bridger' for low cost, CATV system design. The JLE-300-2W provides a reversible, self-contained plug-in forward and/or return amplifier module and operates from 30 or 60 VAC.

Jerrold reports use of the JLE-300-2W offers the system operator a new alternative in designing new low cost systems, upgrading existing systems to 300 MHz capability, or extending customer service into new areas. Full technical details on the new unit are available from Jerrold at the above address.

RMS LIT AND CONNECTORS

RMS Electronics, Inc. (50 Antin Place, Bronx, New York 10462) has introduced a new line of connectors known as the 'SUPERFIT'® series. And there are a bunch of them; over 350 different connectors designed to connect up aluminum sheath, RG-59/U,

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, 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., 535 E. Indiantown Rd., Jupiter, FL 33458 **(D9, replacement parts)** 305-747-5000
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
ComSonics, 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
EAGLE COM-TRONICS, INC., 8016 Chatham Dr., Manlius, N.Y. 13104 **(M9 Pay TV Delivery systems & products)** 315--682-2650
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 Melboune 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)** 404-003-1510
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
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OAK INDUSTRIES INC./CATV DIV., Crystal Lake, IL 60014 **(M1, M9 Converters, S3)** 815—459-5000

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!

RG-6/U, RG-11/U cables with UHF, GU, N and BNC fittings. The line includes 180 pedestal splices, 90 degree right angle adapters, splice blocks, extension adapters, AC-DC power blocking adapters, surge protector and test point adapters and more.

Additionally, there is a line of cable preparation tools for the installation of cables. To get the full story on 'SUPERFIT'® connectors, you need the new 169 page RMS SUPERFIT® catalog. A copy is available for the asking from the RMS address given above.

Magnavox Appoints in Canada

Magnavox CATV Systems, Inc. (Manlius, New York) annouces the appointment of RF Communications, Ltd. of Toronto as its exclusive distributor for CATV equipment in Canada. RF will represent Magnavox for turnkey and bill-of-materials system installations, rebuilds and extensions and will carry the complete line of Magnavox CATV equipment.

RF Communications has represented Magnavox in Canada for approximately 4.5 years on a non-exclusive basis; maintains offices in Toronto (Downsview), Halifax, Montreal, and Vancouver.

ST-20 Mod Kit

Broadband Engineering, Inc. (Box 1247, Jupiter, Fl. 33458) now has conversion kits allowing you to modify Jerrold ST-20 single-ended distribution equipment (including SMM-S, SAM-S, SAS-S, SBM-S and SDH-S) to **push-pull operation.** The kit allows the operator to change out his own equipment to the advantages of push-pull (use of mid-band, longer cascades, better signal to noise, etc.) in his own shop. The new kits use an IC device for the amplifier gain block, feature lightning arrestors at both amplifier ports and transzorb protection of the IC unit. The chip operates at 22 VDC thereby improving the heat and power problem. Full information including pricing and availability are available from Broadband at the address given above.

C-COR Continues Busy

C-Cor Electronics, Inc. (60 Decibel Road, State College, Pa. 16801) has announced the following recent activity:

1) C-COR Olympia series amplifiers are being installed for Twin City Cable serving Helena and West Helena, Arkansas, replacing earlier equipment serving around 4,000 subscribers;
2) C-COR amplifiers (trunk and bridging) are being supplied to Tower Communications, Inc. for their systems in Defiance, Ironton, and Toronto, Ohio. This is part of a three-year system re-building program.

PRODELIN, INC., 1350 Duane Avenue, Santa Clara, CA. 95050 (**M2, M3, M7, S2**) 408—244-4720
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
RICHEY 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
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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
Toner Cable Equipment, Inc., 418 Caredean Drive, Horsham, PA. 19044 (**D2, D3, D4, D5, D6, D7**) 215—675-2053
Triple Crown Electronics Inc., 42 Racine Rd., Rexdale, Ontario, Canada M9W2Z3 (**M4,M8**) 416 743-1481
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UNITED STATES TOWER & FAB. CO. P.O. Drawer "S", Afton, OK 74331 (**M2,M9**) 918-257-4257
Van Ladder, Inc., P.O. Box 709, Spencer, Iowa 51301 (**M9, automated ladder equipment**) 712—262-5810
VIDEO DATA SYSTEMS, 40 Oser Avenue, Hauppauge, N.Y. 11787 (**M9**) 516-231-4400
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
WEATHERSCAN, Loop 132 - Throckmorton Hwy., Olney, TX. 76374 (**D9, Sony Equip. Dist., M9 Weather Channel Displays**) 817—564-5688
Western Communication Service, Box 347, San Angelo, TX. 76901 (**M2, Towers**) 915—655-6262/653-3363

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