COOP'S SATELLITE DIGEST

MARCH 01, 1985

INTERNATIONAL EDITION

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COOP'S SATELLITE DIGEST PAGE 1/CSD/3-85

TOP OF THE MONTH

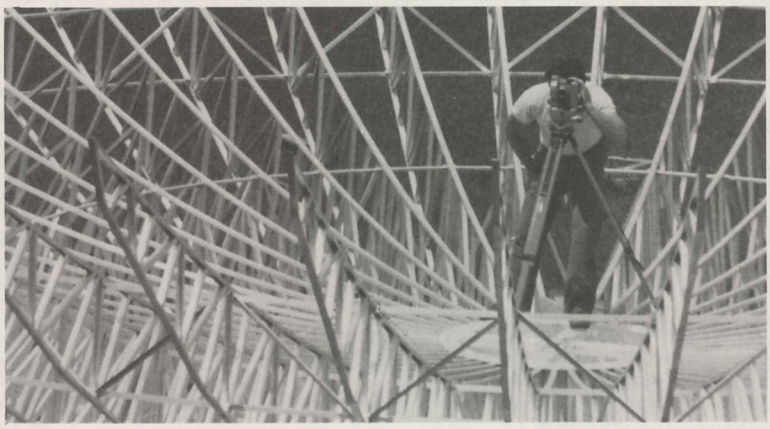
BACKYARDS. We think we know what they look like in North America; but have you considered that they may not be the same elsewhere? Ahmad Lee Khamsi of **'Earth Stations'** in Quito, Ecuador takes us on a 'tour' of some not-so-typical Ecuadorian 'backyards' in this issue. Eight and eleven are common 'numbers' there but they measure their antennas in metres, not feet!

MESH antennas. Paraclipse launched a significant segment of the antenna industry back in 1982. Now they are fighting hard to remain the leader. We look at some of the competition, in particular a **Genesis 10,** in this issue and ponder where the mesh antenna technology may be evolving.

LNA and downconverter testing. Can you do it in your own shop with a 'minimal amount' of test equipment? CSD Lab reports on one system in use and details how you can do your own 'grading' of these two pieces on your shop bench.

TAIWAN dish control system. One year ago any dish controllers made in Taiwan were ill-thought of. Not anymore and we find out why with the Astro-Pro Z-500 as our 'model.'

MARCH 01 1985



OUR COVER/ Ahmad Lee Khamsi of Quito, Ecuador with his 'Earth Stations' 42.6 foot Cassegrainian TVRO antenna, nearing completion for an Ecuadorian customer. Reception from G1, F3R, Anik-D and many others, literally 'on-the-equator'!

COOP'S SATELLITE DIGEST

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BR Introduce
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The ultimate TVRO system. It's not just a dream anymore.

Together, Panasonic and BR Satellite have made it a reality. Because Panasonic chose BR to be the first satellite distributor in the world to represent their new satellite equipment. It's the system of the future—and you can only make contact with it through BR.

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The CI-LNB

Panasonic's C-band low noise block down converter features an ultra stable ceramic local oscillator for minimum drift, a cast aluminum case and waterproof construction. The three stage GaAsFET RF amplifier provides excellent low noise specifications of 100°K, with low input and output VSWR and tightly controlled gain variation for superior quality satellite video reception. Also available in 85°K.

PENTEC/MTI ANTENNA POSITIONERS: Part of any great system.

Pair up your Panasonic equipment with a Pentec/MTI antenna positioning system. The 4100 gives you a nonvolatile memory that

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This high gain 10 foot mesh antenna gives you clear, brilliant reception. It assembles in 90 minutes and is UPS shippable, in just four boxes. Outstanding construction makes it both weatherproof and reliable.

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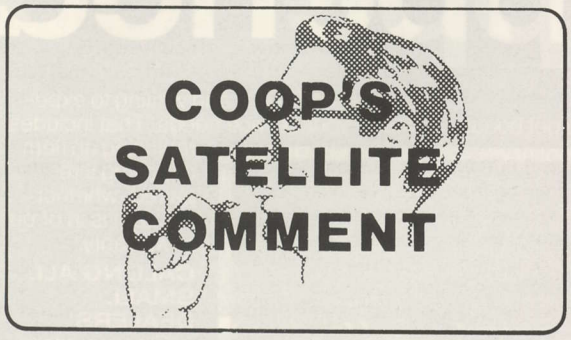


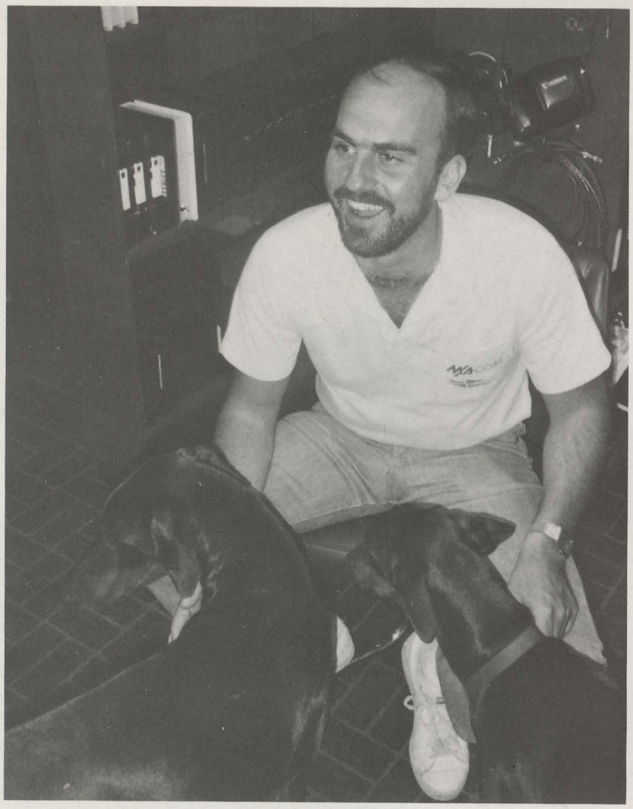
- **STEALING From HBO Et Al**
- **TV Advertising**
- **'MEDDERS' Re-Visited**

SHAUN'S Butcher Block

Shaun Kenny, the dealer who has invested his savings in creating **'Boresight TVRO Magazine'** for television has plenty of guts. Back in January Shaun introduced **'The Butcher Block Award.'** Here is the concept.

Shaun gets plenty of dealer feedback from viewers. They tell Shaun what equipment they like, and dislike. Shaun noticed that several pieces of equipment were being mentioned all too frequently and he decided to investigate the complaints. And he found that inspite of glamour type ads from some of the suppliers, the equipment they were shipping was 'junk.' He created 'The Butcher Block Award' to reward those who turned out junk.

Each week he stands in front of the camera and in his laid-back style announces a new nomination to the 'Butcher Block Award.' Putting his hands to work, he gently caresses the smooth wooden block in front of him as his mouth details the award system and the nominee for the week. After a couple of weeks of nominations, he awards' a prize.



SVS's GARY KISTINGER gets a good laugh as Shaun 'lowers the ax' **on the Janeil BDC unit in the 'Butcher Block Award.'** "Is THAT legal???".

Back on January 24th he set a Janeil block downconversion receiver unit on the block, placed protective goggles over his head and then picked up a large ax. Stepping back from the block, he swung a mighty swing and the ax caved in the top of the Janeil unit. Then he announced that the 'remains' of the BDC unit would be tastefully mounted on a miniature butcher block and sent 'to the Dushane brothers.'

"Is THAT legal???" wondered **Gary Kistinger** of **Satellite Video Services** as he sat in the WIV editing/control room with me one Thursday early in February reviewing Shaun's program on tape. I had voiced some concern to Shaun as well, since the fine line between 'libel/slander' and 'editorial comment' is often redrawn by courts bent on rewarding a damaged party.

In the case of the Janeil 'award,' Shaun told me he had given **Bob Dushane** an opportunity to 'reply' to his 'award' prior to his airing the program. Reportedly, Bob declined since he felt anything he said in 'rebuttal' might enhance the credibility of Shaun's award. Others may not be quite so anxious to avoid publicity.

Shaun feels that the 'award' is an appropriate 'recognition' for those OEMs who have produced equipment which has given dealers fits of grief through the years. Fortunately for many, his 'award' is concentrating only on currently-sold or very-recently-sold equipment. Our own industry past is filled with examples best forgotten now that the technology has improved.

Advocacy journalism is always plowing new ground and sooner or later somebody is going to object to having 'their rock' turned over. In the meantime Shaun's award and the weekly coverage **Boresight** is giving to the problems dealers face daily is building the program an ever-growing audience of both well wishers and nay-sayers.

30 Days To Go

There is always considerable industry excitement and momentum just prior to a 'major' trade show and the forthcoming STTI/SPACE (joint) show in Vegas that begins on March 31st is no exception. However, this one **is different.**

First of all, by sheer numbers this show will exceed anything this industry has ever seen previously. A record 500+ booths does not a show make but when you consider that the waiting list for booth cancellations is nearly half as large as the number of booths available, you begin to get some indication of just how large this industry is becoming.

Second of all, because of the sheer numbers the professional abilities of those structuring and operating the show will be taxed as never before. Vegas is never a totally pleasant place to hold a show; this one will create pressures on the STTI staff and the SPACE staff like never before. Organized bedlam is not much to look forward to but it is probably the best we can hope for. Anything better than that will be totally attributable to the **STTI staff** which brings experience to the consortium putting on the event.

But most of all, the Vegas show will reveal just who has survived the winter lean months and who will be making a 'run for the gold' in 1985. This will, for example, be the first show where Panasonic is 'out of the closet' and into the open. Will they try to outspend fellow-Japanese supplier Uniden with lavish parties and semi-official functions? If they do, it will be a no-holds-barred race for the top spot in 1985. We are betting that Panasonic takes a 'laid-back' and 'high-

road' approach to both the show and the industry; sort of 'quiet-class with dignity' rather than the Texas cowboy hats and sheriff badge approach of Uniden in 1984.

This will be a show where some of the traditional suppliers such as USS/Maspro reveal their 'strategy changes' in product line-ups for 1985. Stung by falling receiver prices in 1985, USS/Maspro will be revealing how they intend to stay in the market with an entirely new line-up of C band equipment. Others with a declining market share in 1984 will be doing the same thing; re-grouping engineering and trotting out boxes which perhaps follow the mid-84 established pattern of DX for example. If you don't recognize 'that format,' it starts with mid-range pricing and ends with high equipment performance and reliability.

This will also be a show where the 'fall-out' from the 1984 failure of the Japanese 12 GHz bird is evident; we'll see a considerable amount of 11/12 GHz receiving equipment, much of it 'semi-pro' and very professional in both appearance and operation. Most of all, we will notice that high performance 12 GHz equipment (mostly LNC/LNB designs) is now available at pricing which compares favorably with 4 GHz equipment with similar features. Digital, step-tuned 11 and 12 GHz receivers with a bit of consumer styling and a touch of CATV semi-pro operational simplicity will be the norm in Vegas.

There will be a few surprises likely in Vegas; for example, one old-line 4 (and 12) GHz receiver supplier who started out way back in 1975 selling $125,000 TVRO systems to cable firms is expected to unveil a 4 GHz **home** system. It won't be 'cheap' as we recognize cheap, but to counter the price these folks figure they have to receive for their system packages, they will attempt to go 'dealer direct' to beat the 20/30% which the distributor normally gets for handling products.

Several other new and almost-new names will be there and some of these are trying to figure out how they can introduce 4 GHz system packages at a show where they can't get booth space because the show sold out months ago. STTI has always tried to police non-show displaying, controlling the hotel suites allocation system to prevent people from doing 'end runs' and taking a suite in lieu of paying up front for booth space. Suites will be very visible at both the host hotel and other nearby hotels and you will, as an attendee, be bombarded with invitations to 'drop by' to see something new and different.

And then there will be those attendees who have come to Vegas to decide if the retailing of TVRO in chain and discount stores makes sense. **Radio Shack** has already admitted it wants to enter the 4 GHz world this year and other almost-as-well-known names will be there as well surveying what we do and how we do it. You may find yourself standing in breakfast line with a representative from Sony or Macy's or Zenith.

CSD has taken 4 booths; something of a record for us since we usually concentrate on the editorial rather than the selling aspects of a trade show. Sharing our booths will be **Boresight,** the innovative TV program our industry supports each Thursday at 9 PM on F4. One of the interesting things we will be doing is **'giving away'** renewals and subscriptions to CSD. No, we have not adopted the 'free distribution' policies of the competition; but times ARE changing. It works this way. **Sign up for a renewal** (regardless of when your subscription runs out) **or a new subscription,** and pay us our $75. Then we hand you a certificate which is good for **$75 in FREE merchandise** at booths such as Boman Industries, Satellite Video Services, National Satellite Communications (and others). In effect, **you get CSD at no cost to you.** This is good only at Vegas and we'll explain it to you at booths 124, 126, 128 and 130. We will also be using the booth as a 'mini-set' for Boresight interviews and displaying an entirely new line of professionally produced 'TVRO learning (video) tapes' which we feel will be exceedingly useful in training the considerable number of new technical/installer personnel this industry is going to need in 1985. The January 15th CSD/2 revealed in our 1984/1985 survey that more than 70% of all dealers expect to add new 'technical personnel' during 1985. That's a massive amount of training and an undertaking which dealers will need help with. We'll do our best with **special discounts** on tape pricing and that will also be explained to you exclusively in Vegas.

OK, I **am hyper** about Vegas because it will undoubtedly tell us where we are going in this unsettled year. Come by booths 124-130 and chat with me. Together we **will** survive 1985!

THROWING Stones

Back on January 17th on 'Boresight' **(*)** I used my 'commentary segment' to reveal how easily the American video consumer finds ripping off Showtime, HBO and other local cable services. There is no mystery about stealing cable serivce; the only mystery that remains to me is that **anybody at all** bothers to pay for cable since their 'security' is so, well . . . INsecure.

The head guy at The Movie Channel **admits** that they have **more than 5,000,000 US homes** illegally stealing premium service programming from cable. He didn't say TVRO, or MDS; he said **cable.** I have seen other estimates as high as 8,000,000 homes. How big it is matters not since even cable firms are quick to admit it is 'huge.'

Cable had an 8% growth in 1984; they are now into nearly 45% of all American homes. They expect to knock over the 50 percentile point before 1986. **I suspect they are already there and just don't know it.**

Cable is INsecure because cable is a lousy system. When cable was only strung along back lot lines on utility poles, a fellow had to brave the dangers of climbing a pole to get himself hooked up. When cable was only in small communities, the cable operator and his people 'knew' everyone in town and when they saw a piece of RG-59/U snaking off a pole and into a house, they were quick to recognize an 'illegal connection' when there was one.

Then cable moved into urban areas where many people live in condos (the affluent), apartments (the not so affluent) and the tenements (the poor). To serve a multiple-dwelling like this, the cable firm comes off the main line and into the building or project where they build a 'miniature cable system.' Inside **locked boxes** they install directional taps and signal splitters and do 'home run' drops from the boxes to the client's TV set(s). The home run lines are 59 or RG-6 and anybody with a handful of parts from **Radio Shack** can cut the 59 or 6 lines and stick in a directional coupler or splitter and run off to their own TV set with the ill-gotten signal.

CABLE LINES in built-up condo and apartment neighborhoods are virtually unprotected; just 'hook yourself up'!

Snaking cable lines all over tenements in Hoboken or West Los Angeles is one of those hazardous-duty jobs. A guy can lose his life or an arm or something equally valuable just being on the crew. People who live in these districts are often mean; very mean. Not many cable installers are willing to risk injury to prevent some guy with a six-inch knife from slicing into a neighbor's cable drop.

Of course of those 5,000,000 or more illegal cable hook-ups, very few have been earned with a six-inch knife. The truth is that cable theft is more of a blue collar and even white collar crime. That's why the cable industry went to state legislatures (19 with success by 1984) and the federal Congress to seek laws which make cable theft a crime. Until these laws were adopted, stealing cable was a moral offense, not a legal offense.

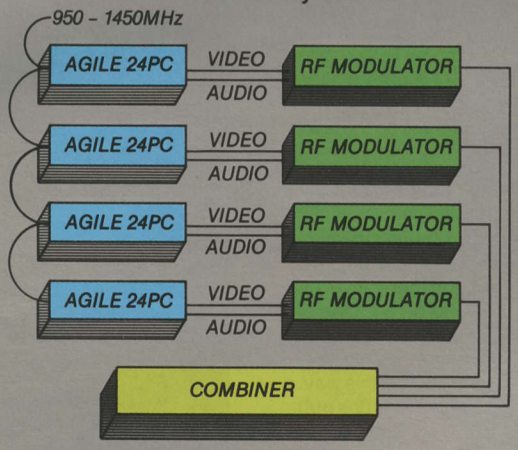
COOP/ continues on page 74

The Agile 24PC receiver comes with one outstanding accessory — the cable TV experience of Standard

There's a whole new market opportunity in SMATV systems serving hotels, motels, lounges and apartment complexes. But until now, getting started in private cable was tough. Good equipment was too costly for the average SMATV customer, and the available low cost receivers simply didn't measure up.

Standard's Agile 24PC receiver has changed all that, and that's a lot coming from the third largest, fastest growing name in commercial satellite receivers.

A lot of our Cable TV experience and technology went into the design of the PC. In fact the PC has features and performance not found in many commercial receivers. And when you consider the PC's very affordable price, all other SMATV receivers are left way behind.



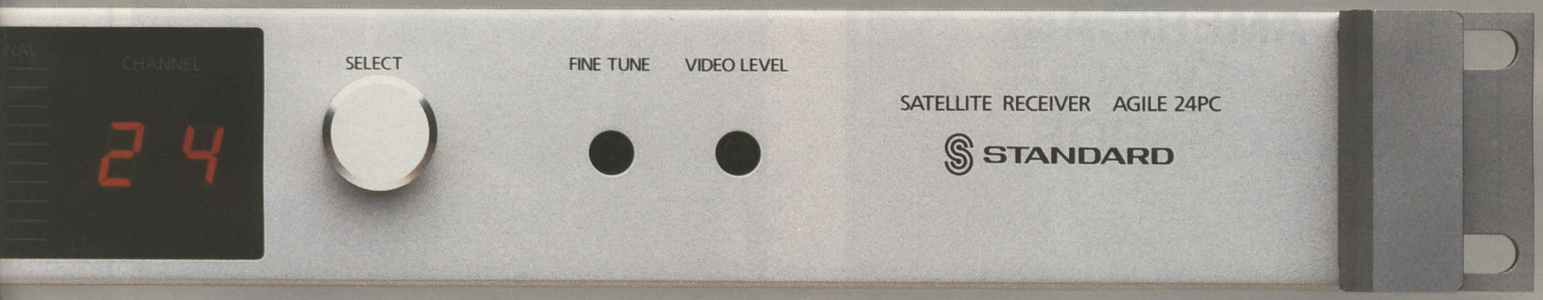
EXCLUSIVE LOOP-THROUGH DESIGN

The PC is the only true commercial grade receiver to feature the same active RF loop-through circuitry we developed for the cable TV industry. Loop-through design makes system expansion — the addition of new channels — simple and economical, with no need for expensive amplifier/dividers or splitters.

OUTSTANDING VIDEO PERFORMANCE

No other SMATV receiver can match the broadcast quality performance of the PC.

And no other SMATV receiver can match specifications like full 30 MHz bandwidth video, synthesized tuning of all 24 channels, dual block conversion, simultaneous dual audio (one of which is tunable through 5–8 MHz), active RF loop-



through **and** IF loop-through for simple addition of microwave interference filters.

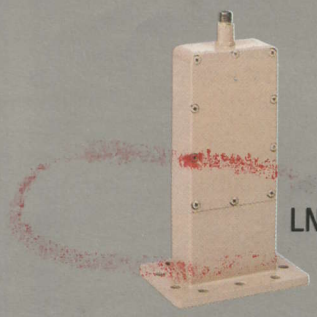
FROM THE PIONEERS OF LNBC TECHNOLOGY

Many SMATV receiver manufacturers would like you to think that block conversion technology is something new.

It's not.

We helped pioneer it back in 1979, and ever since, we've been using it in cable installations that require the quality, stability and installation flexibility inherent in Low Noise Amplifier/Block Down-converter systems.

So it's only natural that when we designed the PC we designed it with block conversion in mind.



LNBC 4

Our LNBC 4, like the PC, packs a lot of quality features — like 100°K and 85°K noise temperatures and a temperature stabilized dielectric resonator oscillator (DRO) for rock stable operation from −40°C to +70°C — all in a compact, economical package.

RELIABILITY WE STAKE OUR REPUTATION ON

The Agile 24PC is designed to provide optimum performance 24 hours a day, without adjusting, monitoring or servicing.

The PC has a tested mean-time-to-failure rate better than three times that of other low cost receivers. This is the kind of reliability that has earned Standard the reputation for being the most relied-on name in Cable TV.

WE'RE IN BUSINESS TO KEEP YOU IN BUSINESS

SMATV is the kind of new business that requires not only a superior product like the PC, but also a superior support program. Ours includes a full year warranty on all parts and labor as well as the marketing and technical backup you need to get your first or your fiftieth system up and running.

For more information on our new Agile 24PC, LNBC 4, or how to get started in realizing new profits in SMATV, call us toll free at 800/243-1357. (In Calif. 800/824-7766, ext. 275).

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AMERICAN TV IN ECUADOR

Would you believe satellite reception of American television, right on the equator? Well, it was finally achieved in 1984 and this is the story of more than thirty months of testing, trial and error, and ultimately high quality reception from a multitude of US and international sources in a region of the world which time and the satellite footprints seemed to have forgotten. And now Ecuador has not only satellite television from North America but it also has a rapidly developing satellite television antenna manufacturing industry.

Initial satellite reception testing was done using a variety of imported American antenna systems; a Vidare 20 footer, ADM 6.1 meter, Hero 7.5 meter and finally a Hero 9.75 meter. And the results were disappointing. The performance of the antennas was one thing; the poor construction techniques and the non-rigid construction was quite another.

by
Ahmad Lee Khamsi
Earth Stations
P.O. Box 9039 SUC. 7
Quito, Ecuador

Editor's Note: Ahmad Lee Khamsi has pioneered satellite television reception in South America's far-fringe regions. His goal was to create 'watchable quality' reception from the U.S. domestic satellites for what he hoped would become a cable television business in Ecuador. Khamsi started out with 20 foot antennas, first from Hero and then ADM. He soon learned that 20 feet was not enough although the information base he was creating would serve him well as his own experiments progressed. Next, to a 25 foot Hero and finally to a 30 foot Hero. He was still 'in the mud' although he was getting closer all of the time.

Unable to find a suitable 'larger' reflector surface and system anyplace in the world for a price which seemed reasonable to him, Khamsi spent the better part of a year traveling throughout North America 'going to school' on antennas. He had determined that if he needed a bigger antenna surface, he was going to have to build it himself, in Ecuador!

And he did it; with both 8 and 11 meter surfaces and ultimately a 13 meter surface, Khamsi was finally in the US domsat receiving business in Ecuador. And the results? Well, more than 30 US domestic satellite transponders all at or above threshold plus a larger selection of international reception from Intelsat and other birds (i.e. Gorizont). His story is one of dedication, and determination. The Khamsi's of the world are changing the world, right before our eyes!

THE AUTHOR/ taking a break from Theodolite setting of the support trusses.

I was on a learning curve; many trips to the United States, visits to terminals scattered throughout Latin America all suggested that at least useful results should be possible with a high quality 6 meter (20 foot) range antenna. Alas, it was not to be. As testing would later prove, the US Domsat signals this far south are at best unpredictable and the service we have is all on secondary or low level signal lobes radiating from the main transmit antennas. Such patterns or 'lobes' are little studied during antenna range tests of the satellite itself and the data available for them is either inaccurate or 'averaged' based upon main lobe peformance. As we would determine, the best predictions and the best predictors were usually wrong!

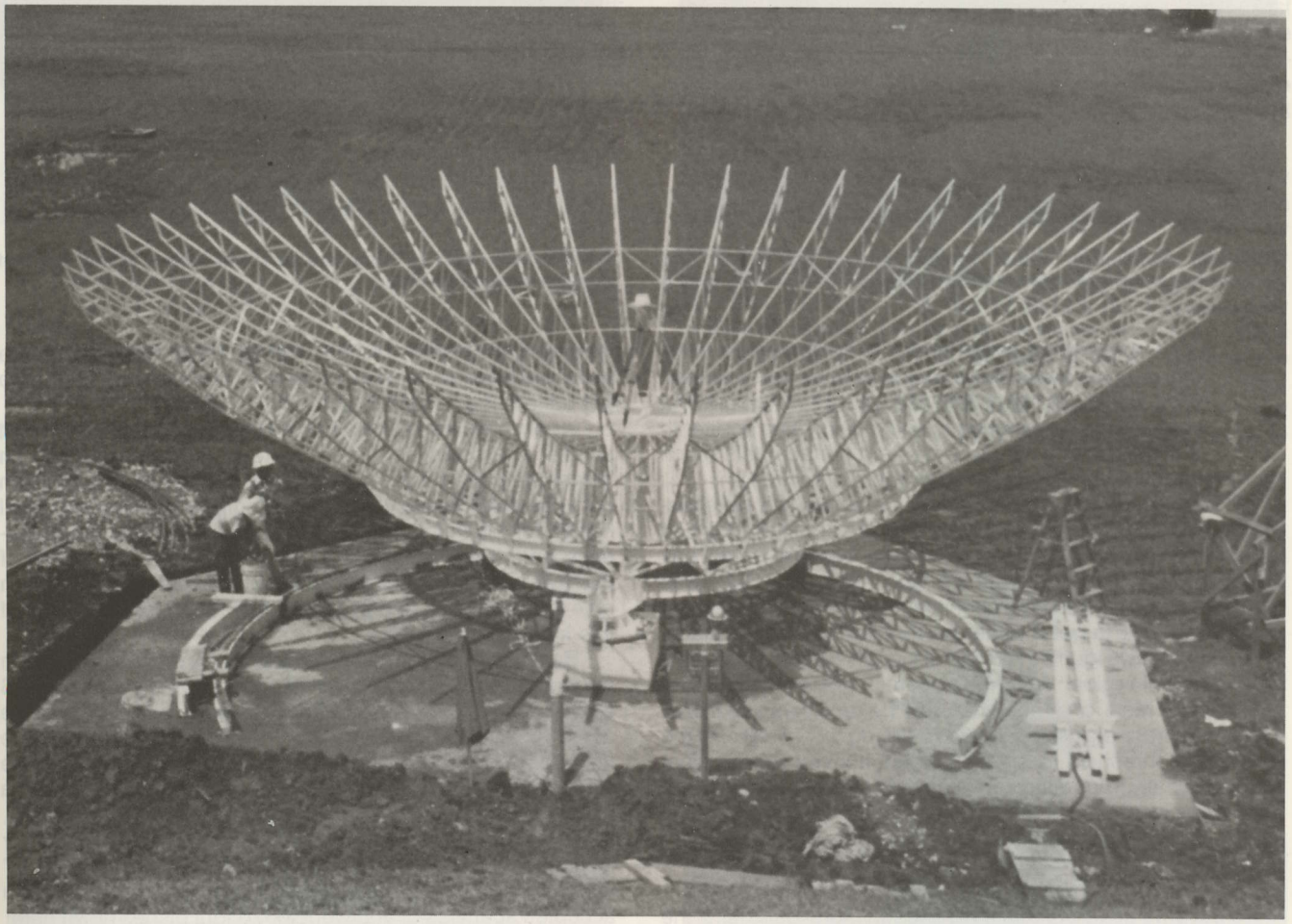
In thirty months of testing we have compiled a considerable wealth of data; not all of it negative. Because we were on the very edge of the deepest (satellite) fringe region of all, we never considered using any electronics which was not itself pushing 'the state of the art.' A wide variety of receivers and low-low noise amplifiers found their way to Ecuador during this 30 month period and there we quickly separated the performers from the 'also-rans.' For example:

1) The ADM twenty foot (6.1 meter) antenna was the best designed and won hands down for ease of assembly

and the ability to 'proof' it on site for maximized performance.

2) At the opposite extreme, the Vidare 20 foot antenna was by far the worst performer and although it could have and should have been relatively easy to assemble, it was not. To mount the extension skirt to the basic 16 foot surface the installer must drill through the fiberglass. Unfortunately, the original 16 foot surface did not conform to the parabolic shape (extreme warping) and by adding the skirt the contour only became worse. And the mount . . . well, was impossible.
3) In the receiver department, after extensive testing we found the best performer was always the AVCOM 3-RI or international version. When you are dealing with signals that are in the 3 to 7 dB CNR region (as we were until we completed our own antennas) the very smallest amount of system performance change can be readily noticed. It was here that the International version of the AVCOM stood up repeatedly as the best receiver of all.
4) And LNAs. I think we have seen, and tested, every 'super hot' and 'hot shot' LNA to come down the satellite trail during the past 30 months. I am convinced, now, that LNA noise temperature grading is often done with a blindfold on; that those ultra low noise (75 degree and down) units often do not perform as spec'd. What we have found is that California Amplifier 55 degree units, and Norsat units (the best, lowest noise available) are worthy performers. The Cal Amp 55 degree unit, in particular, seems to provide consistent 0.7 dB/K

NOT AN MTI/ This 100" screw driving a 20 ton jack moves the 13 meter dish 'around the track.'



UNDER CONSTRUCTION/ seven days a week, five weeks from start to finish. Note Theodolite is under 'hat' **in center; to keep it calibrated even in sun!**

ANCIENT civilization below, Intelsat above; the author and Ecuadorian employee Carlos Pinta found ancient pottery only 5 feet down.

AFTER THE DISH is lifted into position with a crane, the last section is put into place.

> G/T improvement over (other) 75 to 85 degree units. This may not seem like a very significant improvement when you are in North America with signal to burn, but when one is endeavoring to squeeze the last one-tenth of a dB out of a 13 meter system surface, this much improvement is quickly seen (and measured).

Following the initial antenna testing results, we were disheartened and close to giving up the project. Yes, we had satellite television and probably **some people** would pay **some money** to watch what we were receiving. But I was convinced that we could be consistently at or above threshold if we were able to get a better performing antenna in place.

Our first tests found a handful of signals (under 10) in the 3 to 5 dB CNR region. Watchable, barely; not enjoyable. The next level of tests, and refinements of the receivers and LNAs, produced **more signals** in the 3 to 5 dB region but still only the occasional threshold (or heaven forbid; above!) signal. What was especially frustrating here was that we were getting more and more signals with each improvement, but we were not making any of the signals truly watchable!

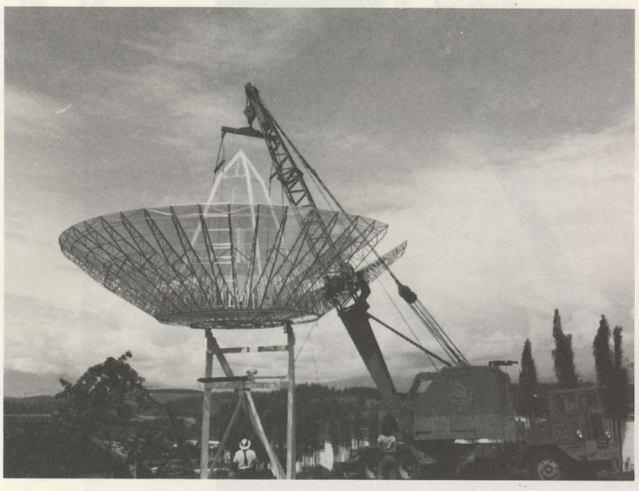
BUILD Our Own

It became apparent that if we needed more 'bulk gain,' the antenna was the obvious place to start. Knowing what the gain ranges were with the best of the 'small' (6 meter region) antennas, we could calculate with accuracy how much more gain (and therefore how much larger a surface) was needed to get us into the threshold and above region.

I took this data with me to the United States to search out people who could help me transform the raw data into an 'attack plan.' Perhaps the most helpful 'Guru' of all would turn out to be **John Seavey** of Seavey Engineering. Seavey is well known for his innovative 'feed systems' and with great patience and care he set out to tutor me in the fine points of microwave design and theory. Much of what we have been able to accomplish can be traced to the helpful assistance of this kind man.

Because of the extremely low signal levels being found in Ecuador (**never greater** than 18 dBw it would seem from US Domsat birds), our approach to antenna design would be along 'G/T Maximized/high gain' lines. In other words, we were less concerned with the ultimate pattern than we were with achieving a **quiet antenna noise temperature** with a **maximized amount of antenna gain** (surface efficiency). While all of this was going on, reception tests with the smaller dishes continued and we redefined the meaning of 'watchable' in Ecuador. It was beginning to appear that either you accepted sparklies or you went for 70 foot dishes down here!

In analyzing the performance trade-offs for the various types of feed systems available (prime focus, Cassegrain,



13 METER mesh surface version (both solid and mesh are offered) **lifts into the mount position with a crane.**

LOCAL ZONING? Fortunately major firms such as 'Texaco' **don't have to bother with such handicaps!**

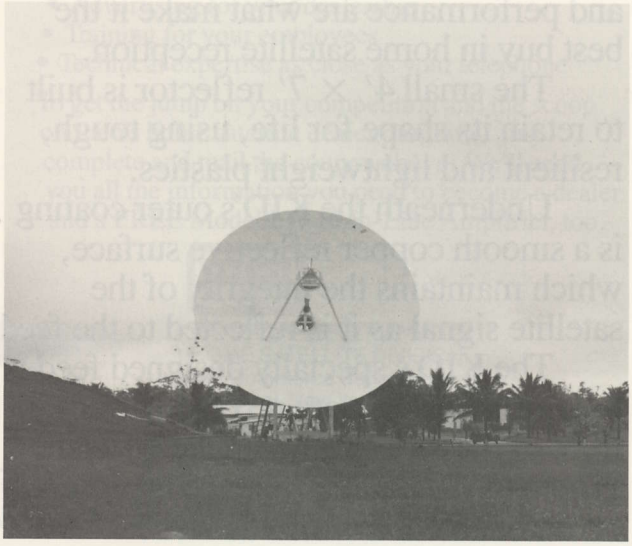
modified-Cassegrain) it became apparent that while the modified-Cassegrain was the most expensive design it would also produce the most consistent high performance. **Modified Cassegrain theory** suggests that you can achieve from **.25 to .5 dB higher gain** than the best of the prime focus designs. Other design considerations had to be made as well, trade-offs between structural strength and production costing littered my desk for months on end as every possible part in the antenna system was critiqued for its contribution to the final design.

This process resulted in the following antenna system:

1) Modified Cassegrain design feed with a **13 meter aperture,** faceted panels (less than 0.2 dB loss from fully parabolic), solid aluminum skin for maximized control of surface accuracy, an elevation over azimuth mount (a blend of user-friendly operating ease and extremely high wind stability), and, a completely motorized programmable positioner system.

Production of the design was a nightmare. Only those few readers who have first-hand experience with the 'skills' found in a 'developing nation' can have the slightest inkling of what we faced. Labor training, precision machining, raw material sourcing, production scheduling and design implementation all seemed at one time or another virtually impossible to solve. Suffice to say that many months **after** our target date for completion of the first prototype antenna, **we actually began the assembly** of the first antenna. Although I felt very comfortable with the design, we decided to go ahead and build the first antenna 'on the ground' so that the reflector surface could be readily proofed in segments, and as a whole. So much depended upon the absolute integrity of this reflector that there was no margin for error; no matter how small that error might be.

Assembly was . . . interesting. For those in our industry who are accustomed to assembling a small dish in hours, a five week (!) and seven day a week construction period may seem frightening. But time alone does not tell the complete story; **this 42.6 foot behemoth** has an RMS surface accuracy requirement of 0.40". This type of surface accuracy can only be attained when the surface is constantly 'monitored' with a Theodolite instrument. With this size antenna, 'sighting' the antenna across or in segments visually is a total waste of time. And because this was the prototype, the first of an entire new family of antennas, the prototype certainly did take longer to



pico kid

Our Shape Isn't the Only Thing that Makes Us Better...

Sure, the Pico KID's low profile shape is pleasing to the eye. But, its price and performance are what make it the best buy in home satellite reception.

The small 4′ × 7′ reflector is built to retain its shape for life, using tough, resilient and lightweight plastics.

Underneath the KID's outer coating is a smooth copper reflective surface, which maintains the integrity of the satellite signal as it is reflected to the feed.

The KID's specially designed feed is fully offset. There are no obstructions in front of the reflector to reduce efficiency. Where terrestrial interference is present, no other antenna works as well.

The Pico KID can look at all the satellites too, using its strong, lightweight, true polar mount.

To find out how you can put the Pico KID to work for you . . .
CALL TOLL FREE:
Eastern USA (800) 822-7420
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In California (818) 786-1335

PICO® PRODUCTS, INC.

PICO PRODUCTS, INC.
HOME SATELLITE DIVISION
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Please see us at SPACE/STTI Las Vegas Show, Booths 503 and 505, Palace, 6 & 7

Better Performance Means Better Dealer Profits.

PICO kid

FREE!
Complete and mail this coupon before April 30, 1985 to receive your FREE Model LA-10 In-Line Amplifier.

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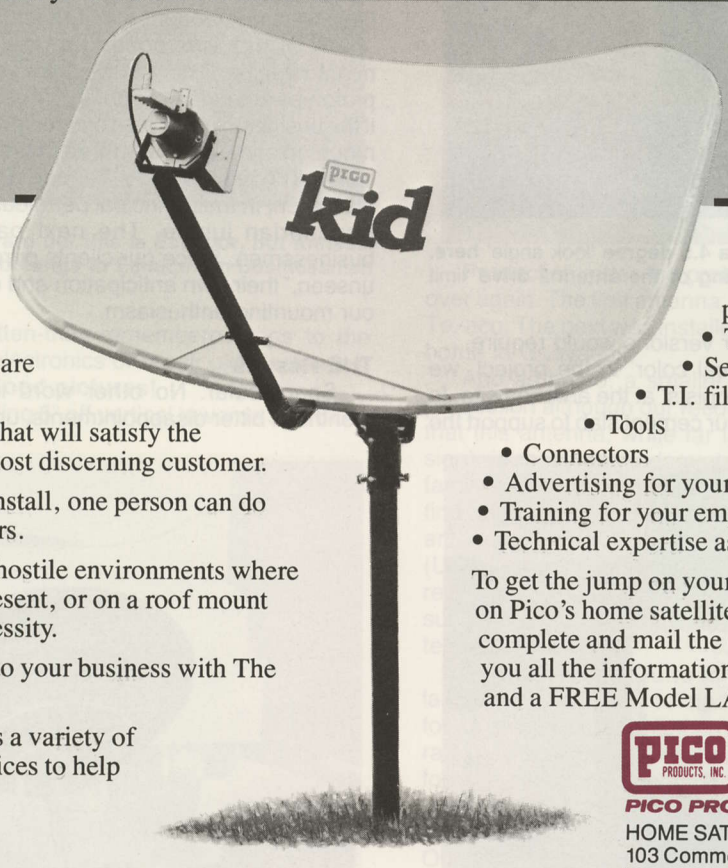

The Pico KID will outperform any home satellite antenna of the same size, and some that are a lot bigger too!

The KID has eye appeal that will satisfy the aesthetic whim of your most discerning customer.

It is light and so easy to install, one person can do it *right* in a couple of hours.

The KID can perform in hostile environments where ground interference is present, or on a roof mount where small size is a necessity.

Add prestige and profits to your business with The Pico KID.

Pico Products, Inc. offers a variety of TVRO products and services to help you operate your business profitably:

- The Pico KID
- Seavey feed line
- T.I. filters
- Tools
- Connectors
- Advertising for your dealership
- Training for your employees
- Technical expertise as close as your telephone

To get the jump on your competition and the scoop on Pico's home satellite dealer program, just complete and mail the coupon above. We'll send you all the information you need to become a dealer and a FREE Model LA-10 In-Line Amplifier, too.

PICO PRODUCTS, INC.®

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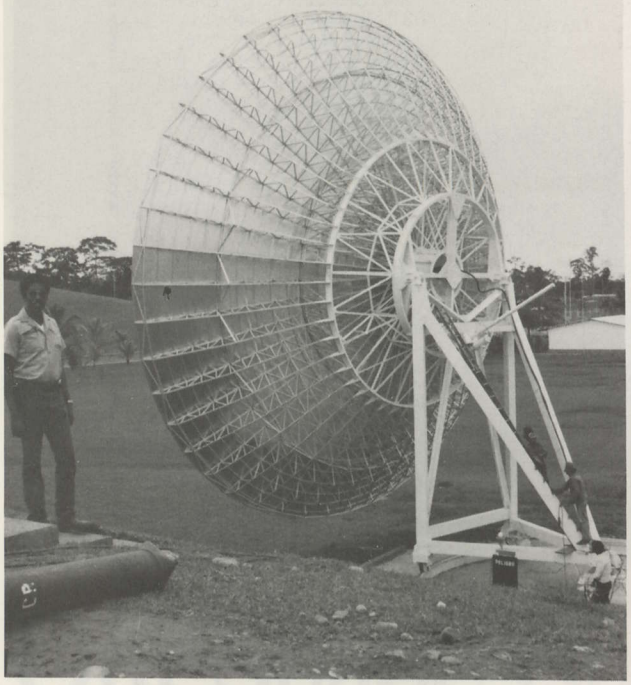
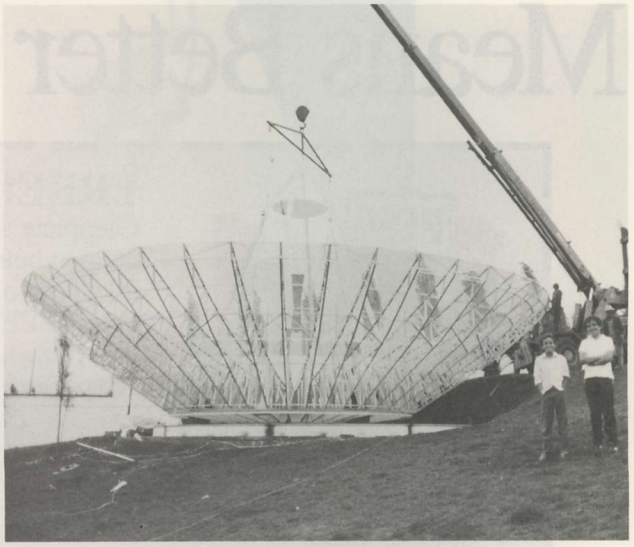
This Kid Means Business.



AFRTS signal from 1° west is at a 4.5 degree 'look angle' **here. Barry Scruggs oversees the setting of the antenna drive** 'limit switches.'

assemble or construct than later versions would require.

Meanwhile, to add some 'local color' to the project, we developed into budding 'Archeologists' at the antenna site. In the process of digging down for our cement slab to support the



8,000 pound reflector and mount, we came across some loose earth. This was a curiosity of course at some depth and we dug further until we discovered that beneath our modern instrument of international communications we had run into the remains of an ancient civilization! Ancient pottery, most quite well preserved, was found at a depth of five feet and more below the top soil. I must admit that for a short period of time this discovery brought a halt to further work on the antenna!

All of this was costing a great deal of money as you might imagine. The 'partnership' arranged, to build the first prototype antenna, was going to need some real 'sales' shortly if the business was to be a business at all. So a sales effort was mounted and eventually three of the 13 meter antennas were 'sold.' The first was to **Texaco Petroleum Company** for placement in their principal petroleum production camp in the Ecuadorian jungle. The next pair went to Ecuadorian businessmen. Since our clients purchased essentially 'sight-unseen,' their own anticipation and excitement only added to our mounting enthusiasm.

THE Results

Spectacular. No other word is adequate. After thirty months of bitter disappointments, untold tens of thousands of

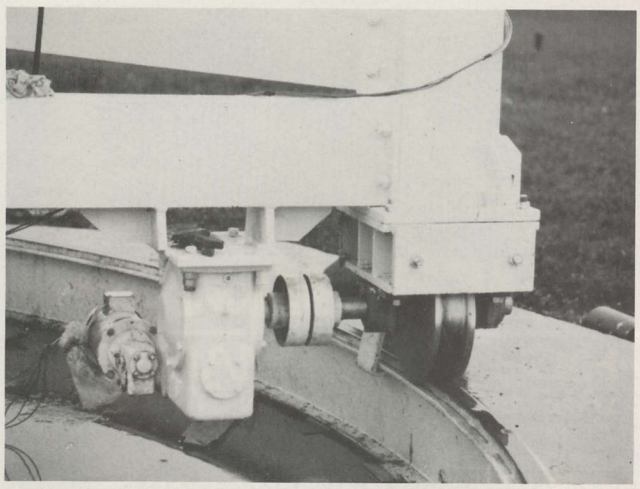
JACK ANDERSON on the screen/ AVCOM 3-IR on left. Can an Ecuadorian school sign up for the Young Astronaut Program?

NOT YOUR average backyard but this is Ecuador, not Kansas. This 13 meter installation belongs to Ecuadorian businessman Sidney Wright.

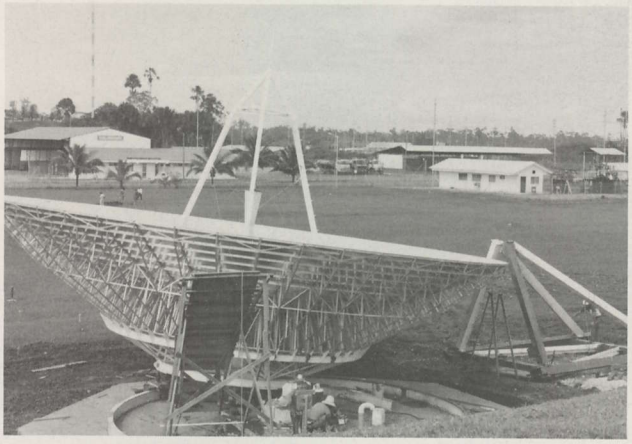
US dollars, better forgotten-than-remembered trips to the states to check out new electronics or repair old electronics, we finally had pictures. **Good pictures!**

With the reflector pointing 6° off vertical towards SATCOM F4, we began searching for our first US Domsat signals. A momentary 'delay' was caused by a shattering automobile jack which had been pressed into temporary service as a support. Repaired by replacement we hit our first black and white diagonal lines on transponder 19 (WPIX). Then to a rising chorus of 'Bravo!' we nudged the big surface a touch at a time until the black and white diagonal bars turned into chroma and then finally an image so clear that as the AVCOM III meter 'pinned' itself to the far right not even a hint of noise was apparent in the video. In short order we had performed a check on the other available F4 transponders here and determined that the 13 meter surface was achieving in excess of 3 dB additional gain than the best performance previously from the 9.75 meter Hero antenna.

Now we were in business; a suitable 'backyard' antenna for Ecuador would now be 13 meters in size (although we are now offering scaled down versions to 8 meters in size for the 'economy buyer'!) and suitable reception would be 30 or more noise-free US Domsat transponders plus a host of international signals from Intelsat.



ANTENNA DRIVE is your basic battleship design; tough and precision.

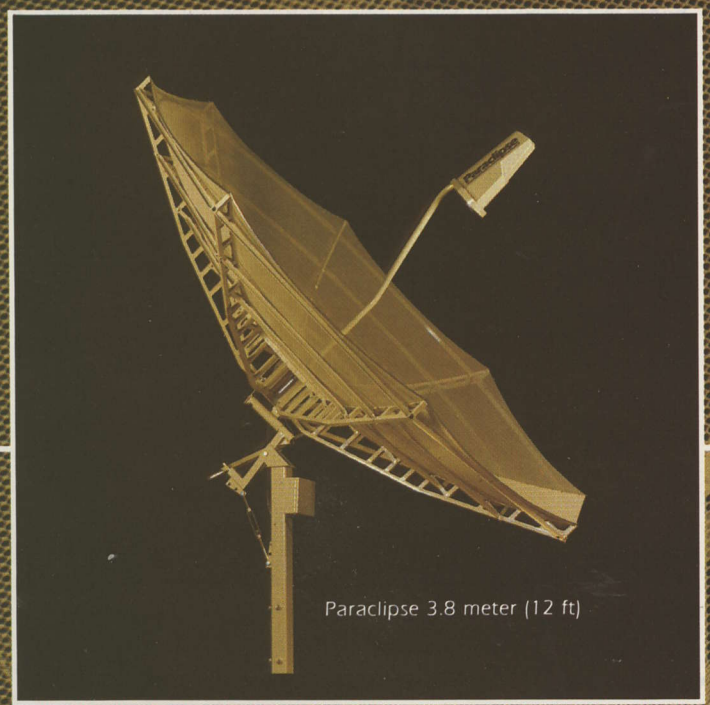


Production, after the prototype, began the frustrations all over again. The first antenna, as noted, went into the jungle for Texaco. The next was installed in Quito and the third went to a home in Guayaquil.

And as noted, a smaller 8 meter version is also now in production although our recommendation to our customers is that this antenna, while far less costly (using panelized design), is really only adequate for reception from the Intelsat family of birds (offering service from Brazil, Venezuela, Argentina, etc.). Can you imagine a part of the world where 'small antennas' are for Intelsat while the 'big antennas' are for the (US) Domsat signals! The 8 meter does provide marginal reception of course from the US services and as you might suspect, US reception is the 'panacea' of every Ecuadorian television viewer.

Earth Stations/Quito is now an established supplier of large aperture, highly refined antenna products and systems for all of the South American market. Given our present labor rates, we also feel that we could and will be a significant bidder for international systems worldwide since we can provide large antenna structures at prices which may be difficult to match in the US or elsewhere with higher skilled-labor rates. Our future in this business is indeed bright and when **you** are tuned into the **CBS Morning News** in your CONUS location you might remember from time to time that a small but growing cadre of television viewers 'way down south' on the Equator is also watching the same satellite feed with their own 'backyard' antennas!

Not Just Another Pretty Face



Paraclipse 3.8 meter (12 ft)

Mark Fator photographer

Paraclipse™

HIGH PERFORMANCE
SATELLITE TELEVISION SYSTEM

Paraclipse Inc. 3711 Meadowview Drive
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PIONEER MEMBER OF
SPACE

The term 'tuned feed' is a familiar, and frequently misused phrase in the satellite antenna industry. The theories behind the tuned feed concept are well tested and are proven to be sound. Its meaning is rather broadly interpreted and the appropriateness of its use is not always apparent. The question as to whether you actually get a tuned feed with a particular antenna is debatable.

We hope you will spend a few minutes reading this ad. Perhaps it will clear up some of the mystery about tuned feeds and allow you to draw your own conclusions.

A Measure of Performance

An antenna's performance is determined by how cleanly it can amplify the microwave signal (expressed as gain), without amplifying unwanted signal contamination (expressed as noise). Since noise is always present to some degree, it must be considered as part of the performance equation.

Greater gain, lower noise, means better performance. This equation of signal gain over noise temperature: G/T, is an antenna's measure of performance.

Feedhorns in General

Each feedhorn configuration is engineered to have an ideal focal length over antenna diameter ratio (F/D), where its optimum performance is achieved. Operation under any conditions other than these 'ideals' will result in a loss of performance.

Antenna manufacturers, with varying degrees of success, design their equipment to conform to these constants. Each antenna manufacturer must base his choice of feedhorn on how closely its specs match the requirements of his antenna.

The result is that todays' market offers literally hundreds of antenna designs that differ in shape, size, surface, parabolic symmetry and focal length over diameter ratios, while there are only a few different feed configurations available to choose between. This inequity creates a situation where some compromise in performance is impossible to avoid unless you have a true tuned feed.

Illumination, Over, Under and Perfect

If the antenna F/D ratio is flatter than the feedhorns optimum focal length over diameter ratio, or the feedhorn is positioned beyond the perfect focal length, over-illumination occurs. The result is a poor picture due to the excessive noise picked up from the perimeter of the reflector.

If the antenna F/D ratio is deeper than what the feedhorn is designed to accommodate, or the feedhorn is positioned short of its ideal focal length, under-illumination occurs. The result is wasted signal, a weak picture and poor performance from too little gain.

For the feed system to properly illuminate the parabolic reflector, it must be positioned at the exact focal point where the microwave signals reconvene. For maximum efficiency, the feedhorn F/D ratio must be tuned to match the antenna F/D ratio exactly.

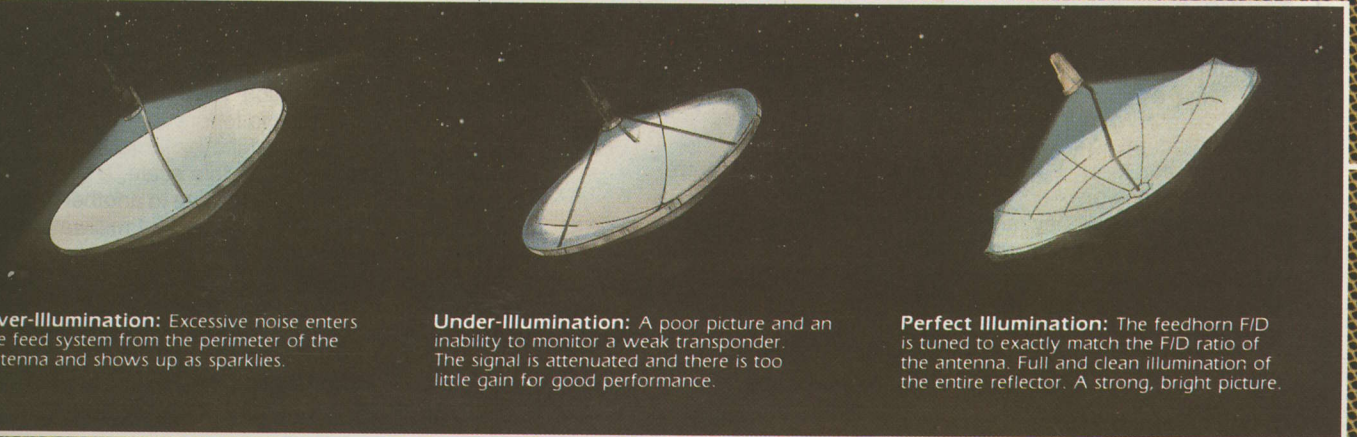
In the recent past, all you needed was a pretty good antenna and enough savvy to choose the right feedhorn. If you could demonstrate a picture, you sold equipment. If you sold equipment, you were in business.

At Paraclipse we think higher performance is everything, and we build our antennas accordingly. We've incorporated some subtle but important changes in the specifications of our feedhorns and have realized a significant reduction in antenna noise temperature.

After extensive research and development, range tests prove a 33% reduction in antenna noise temperature for the 2.8 meter Paraclipse and a 32% reduction for the 3.8 meter Paraclipse with the new tuned feed systems. Our focal length/diameter ratios are mathematically perfect and each feedhorn is truly tuned to properly illuminate the antenna reflector it comes with.

The new optimized feed system derives maximum signal strength with a minimum of noise. The result is a stronger, cleaner picture from even the weakest transponder, with greater gain and less noise. The only thing that has stayed the same is the price.

And to top it all off, we have a handsome new weather shroud that is molded in special Paraclipse colors. The new hood is made of tough, ultraviolet stabilized ABS plastic. It will protect the sensitive electronics from the long term effects of sun and weather, and it will identify your equipment as genuine Paraclipse.

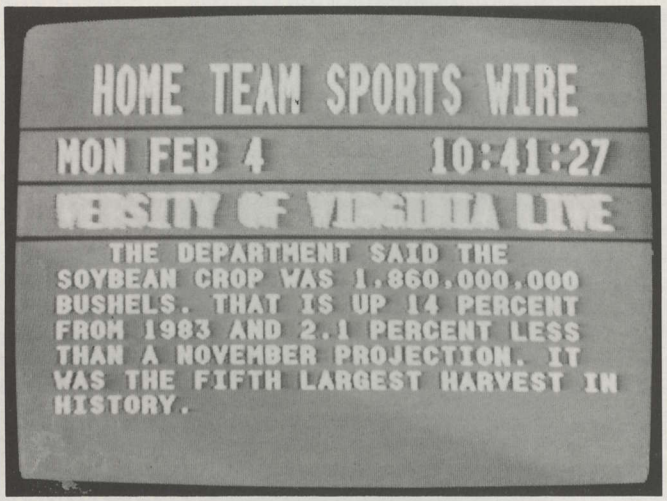


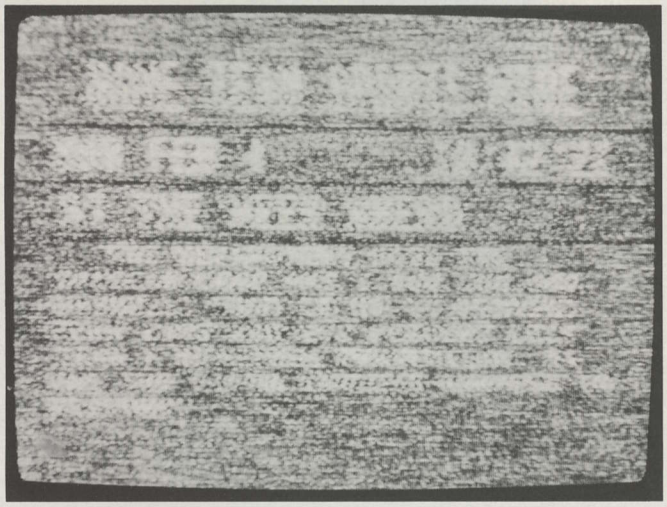
Over-Illumination: Excessive noise enters the feed system from the perimeter of the antenna and shows up as sparklies.

Under-Illumination: A poor picture and an inability to monitor a weak transponder. The signal is attenuated and there is too little gain for good performance.

Perfect Illumination: The feedhorn F/D is tuned to exactly match the F/D ratio of the antenna. Full and clean illumination of the entire reflector. A strong, bright picture.

'MEASURING' LNAs AND DOWNCONVERTERS





TR12 SIGNAL on Galaxy One is an especially good signal to use for LNA and downconverter tests since the video is 'bright' (saturated) **and stable through virtually all of the normal working hours** (i.e. daytime).

ABSOLUTE Numbers

"I know **this** is a better LNA because I get cleaner pictures on it". How often have you heard that statement in the TVRO world? Or, "This is a better receiver because I get fewer sparklies on The Weather Channel with it than with that 'XYZ' model."

Lacking a measurement system, lacking any standards for measurement, as an industry we have developed along 'better than' and 'worse than' lines. And to complicate matters, there has also been a tendency to skip over the fundamentals of microwave theory and practice in a headlong rush to get more systems installed in the shortest possible period of time.

Even manufacturers who should be careful with their specifications are often sloppy with numbers and this results in virtually no 'trace-ability' in the numbers we are given as 'absolutes'.

The TVRO industry is something of an 'anamoly' in electronics; we have virtually no hard numbers and virtually no test equipment to create hard numbers. Standards, if they exist at all, are largely borrowed from other industries such as CATV (the dBmV scale for example) or radio/television broadcasting (the dBw contours for satellite footprints, for example).

There are, however, 'relative tests' which TVRO service shops can do which will give the tester far more confidence in his testing than the present 'better than' and 'worse than' analysis so often practiced. The procedure for relative testing is that while you may lack the ability to grade a piece of equipment with absolute numbers (i.e. specific numbers such as 100° Kelvin for an LNA), you can at least measure the 'differences' between two or more pieces of equipment with a 'range of numbers' which have value to you, the tester. Let's see how that works.

TAKING Apart Specs

Manufacturers who do take the time to 'characterize' their own equipment will often supply you with 'specifications' which you will find useful if you understand what the numbers are supposed to mean. We'll look at a pair of such specifications here as an example.

The **Luxor Mark 2** receiver is a BDC unit which is preceded by a block downconverter. The Mark 2 receiver has a specified input frequency range of 950 to 1450 MHz. This tells you that at the downconverter, we have the 3,700 to 4,200 MHz frequency range coming from the LNA and at the output port of the downconverter we have an IF (intermediate [block] frequency [range]) of 950 to 1450 MHz.

Luxor also tells you what the input signal level must be, **within** the 950 to 1450 MHz range, to make the Mark 2 receiver perform properly. The specification is:

'Input level −75 to − -35 dBm". Now, what does that mean?

The Mark 2 receiver has a certain **minimum** input **power** requirement; it must receive, from the downconverter, a minimum amount of signal or the receiver will not properly process and demodulate the satellite transmission. Those numbers, **−75 to −35 dBm,** are absolute numbers. What is their heritage and how do they relate to a typical installation?

There are two scales which we frequently employ in TVRO. Both have the two magic letters 'dB' in them.

1) **dBm**/ is an absolute scale (like the temperature scale in farenheit or centigrade). In this scale, 0 dBm means that you have 0 'dB' signal relative to another absolute; 1 milliwatt. 0 is zero; there is exactly 1 milliwatt present when you have 0 dBm.

A signal that is between −75 (dBm) and −35 (dBm) is therefore from 35 to 75 dB **weaker than** a 1 milliwatt signal. Yes, that sounds like a very weak signal and in truth it does not

MEASUREMENTS/ continues on page 22

The Satellite Receiver You've Been Waiting For

Introducing the newest, most advanced remote controlled satellite receiver . . . the Regency SR5000.

We started with the latest in satellite receiver technology, using two microprocessors, block down conversion, and infrared remote control. Then, we topped it off by fitting it into a compact, stylish case of true "set-top" dimensions with a large, easy to read LED display. And that's just for starters.

Two Microporcessors and More

Satellite positioning, polarity, and skew can be programmed and selected automatically. All programmed information is stored in the SR5000's permanent, non-volatile memory. What's more, the Regency receiver features a built-in SAW resonator modulator with channel 2 or 3 output, descrambler loop, signal strength meter, and composite or baseband audio and video outputs. Not to mention the remote control . . .

Full Function Remote Control

Every Regency SR5000 comes complete with a full function infrared wireless remote control that's very easy to operate. It lets you select channels (direct access or slew), select satellite positions, raise, lower, or mute the volume, and fine tune the picture. All with only 20 keys.

Block Conversion

The SR5000's advanced design employs a block down conversion system so you'll be sure to have the best possible picture year round (The Regency block system is stable within 2MHz from −30 to +60°C). And it's ideal for selling multiple receiver systems.

The Price That Packs a Punch

Now for the good news. The SR5000, with all the features we've described, lists for $699.95. So your cost will be lower than receivers like the Drake 240, the KLM VIII, or the Luxor 9550. Yet the SR5000 is backed by Regency, a company that's been around since 1947, a company that invented the transistor radio in 1954, a company with an established reputation in consumer electronics. And the company that designed and builds the SR5000 in America.

If this sounds like what you've been waiting for call us for more information or the name of the nearest Regency distributor at 1-800-428-1950.

Regency®

Regency Electronics Inc. • 7707 Records Street • Indianapolis, IN 46226

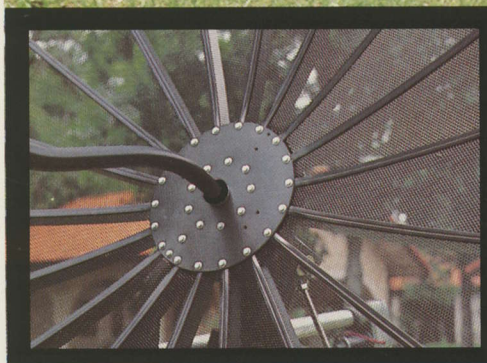
Look Beyond the Surface!

The Raydx antenna is unique!

The ribs and rim are precision formed of aluminum extrusions providing exceptional accuracy and structural integrity. Bronze bushings, stainless steel hardware and a cast aluminum mount assure years of trouble free satellite entertainment.

Attractive, blends well with the home setting, excellent performance, easy installation. What more could you want?

Install a Raydx Raydish antenna, Today!



"We pay attention to Quality"

RAYDX™

SATELLITE SYSTEMS, LTD.

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1/4/85

RAYDX™

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MEASUREMENTS/ continues from page 18

amount to very much; but fortunately it is an adequate amount of signal to make the Mark 2 receiver function properly.

2) dBmV/ is also an absolute scale. In this scale, 0 dBmV means that you have 0 'dB' signal relative to another absolute; 1,000 microvolts. 0 is zero; there is exactly 1,000 microvolts present when you have 0 dBmV.

We often see modulator output levels specified in 'dBmV'. A common number is +7 dBmV for example, which would simply be 7 dB 'more signal' than 0 dBmV.

THE dB?

Way back when, **Alexander Graham Bell** created a measurement system as he was devising the first telephones. He knew that signal levels or signal strengths, on telephone lines, were going to be important if engineers were going to plan complex telephone networks. His interest was in how 'loud' something sounded. So he discovered that when the loudness of a sound was 'doubled' that he could go back and measure the sound generator and calculate how much more 'power' was being used to create that sound. From this came the **'bel',** a unit of sound named after Mr. Bell. The 'bel' however turned out to be a very large increment of measurement (such as a foot is) so subsequently the 'bel' was divided into smaller increments of measurement; the **decibel** (which is to the bel what the inches are to feet). The decibel (or dB as it is abbreviated) was precisely **1/10th of a 'bel'.** Today we measure many things in decibels (or dBs). We measure very little in 'bels'.

The decibel system was originally just for sound, or how (much) loud(er) is 'this sound' than 'that sound'. The procedure was repeatable however and pretty soon the whole of communications was using some variation of the dB system. Here are two examples which are germaine to the TVRO world:

1) dBm/ 0 dBm is 0 (no) dB referenced to 1 milliwatt (of power). 0 dBm is, therefore, not 'no signal' or 'no power' but rather it is **1 milliwatt of power.** A signal that is twice as strong is +3 dBm while a signal that is half as strong is −3 dBm. A milliwatt of power is an absolute number; you can measure it with a 'wattmeter'. In a TVRO receiver data sheet you might see numbers such as "−75 to −30 dBm". In the data sheet for the Newton 2600 test set, you see its output power specified as −20 dBm or −40 dBm. A −40 dBm signal would be 40 dB weaker than 1 milliwatt or 1/10,000,000th of a watt, while a −20 dBm signal would be 20 dB weaker than 1 milliwatt or 1/100,000th of a watt.

Power measured in watts, works with the following 'pattern':

'A numerical change of 2 **is 3 dB. In other words, twice as much is 3 dB stronger while half as much** (the number divided by 2) **is 3 dB weaker. When we say that a signal's power is 10 times as much, we have increased the power by 10 dB; or if the signal is 100 times as strong, we have increased the power by 20 dB'.**

This is a **logarithmic function;** a dB is not one but it is a ratio between something before and after. Here are some benchmark numbers for the dBm or decibels referenced to (1) milliwatt:

dBm	Equal to
−60 dBm	1/100,000,000th of a watt
−40 dBm	1/10,000,000th of a watt
−30 dBm	1/1,000,000th of a watt
−20 dBm	1/100,000th of a watt
−10 dBm	1/10,000th of a watt
0 dBm	1/1,000th of a watt (or, 1 milliwatt)
+10 dBm	1/100th of a watt (or 10 milliwatts)
+20 dBm	1/10th of a watt (or 100 milliwatts)
+30 dBm	1 watt (or 1,000 milliwatts)
+40 dBm	10 watts
+50 dBm	100 watts
+60 dBm	1,000 watts

Just for the record, once we reach the **+30 dBm** region, convention is that we graduate from 'milliwatts' to watts. So what was dB**m** becomes dB**w;** or simply stated, **decibels referenced to 1 watt** of signal power. A satellite transponder operating with 5 watts of power is therefore specified in dBw or to be precise +6.75 (often rounded off to +7) dBw. A satellite operating transponders with 8.5 watts of power (i.e. transponders 3, 7, 11, 15, 19 and 23 on F3R) would be 8.5 watts referenced to 1 watt or +9.063 (often rounded off to +9) dBw.

2) dBmV/ 0 dBmV is 0 (no) dB referenced to 1,000 microvolts. 0 dBmV is therefore not no signal **voltage;** it is 1,000 microvolts of signal voltage or 1/1,000th of a **volt.** A volt is an absolute amount of voltage; you can measure it with an appropriate voltmeter type device. In a TVRO data sheet you will see numbers like +7 dBmV when the output of a receiver's built-in modulator is specified. +7 dBmV would be 7 dB more signal **voltage** than 1,000 microvolts and that happens to be 2,200 microvolts.

Voltage, measured in volts, works with the following 'pattern':

'A numerical change (in volts or parts of a volt) of 2 is 6 dB. Thus twice as much signal **voltage** (such as going from 1,000 microvolts to 2,000 microvolts) is a **6 dB increase** whereas a halving of the signal voltage (500 microvolts from the original 1,000 microvolts) is a **6 dB decrease** (i.e. −6 dBmV). If we increase the signal **voltage** by a factor of 10 (i.e. to 10,000 from 1,000) we have effected a 20 dB change'.

This is also a logarithmic function or scale; a dB is not unit-one but rather it reflects a ratio between something absolute or known and some new number which is larger (+ dB) or smaller (− dB). Here are some benchmark numbers for dBmV or decibels referenced to 1,000 microvolts:

LNA PERFORMANCE
1) **THRESHOLD**
   A) DETERMINE MINIMUM INPUT SIGNAL LEVELS REQUIRED FOR SPARKLIE-FREE SERVICE
   B) DETERMINE MINIMUM INPUT SIGNAL LEVELS REQUIRED FOR COLOR-DISPLAY (AS OPPOSED TO BLACK AND WHITE DISPLAY)

DOWNCONVERTER PERFORMANCE
1) **THRESHOLD:**
   A) DETERMINE MINIMUM INPUT SIGNAL LEVELS REQUIRED FOR SPARKLIE-FREE SERVICE
   B) DETERMINE MINIMUM INPUT SIGNAL LEVELS REQUIRED FOR COLOR-DISPLAY (AS OPPOSED TO BLACK AND WHITE DISPLAY)
   C) DETERMINE NON-LINEARITY OF DOWN-CONVERTER (MEASURING INPUT CHANGES VERSUS OUTPUT CHANGES)

dBmV	Equal To
−40 dBmV	10 microvolts or 1/100,000th of a volt
−20 dBmV	100 micovolts or 1/10,000th of a volt
0 dBmV	1,000 microvolts or 1/1,000th of a volt
+20 dBmV	10,000 microvolts or 1/100th of a volt
+40 dBmV	100,000 microvolts or 1/10th of a volt
+60 dBmV	1,000,000 microvolts or 1 volt
+80 dBmV	10,000,000 microvolts or 10 volts

Now the kicker. You have already noticed that in the dBm**V** 'scale' we move about 'twice as fast' as we do in the dBm scale; that whereas −20 dBm**V** is equal to 1/10,000th of a **volt,** that −20 d**Bm** is equal to 1/100,000th of a watt. There is another difference between the two as well.

Power, **watts,** is a measurement which is unaffected by the 'resistance' or 'impedance' of the circuit carrying the watts. Voltage is not. When we specify that a signal has +10 dBmV we have to know more about the system than just the voltage present; we must **also know** the 'impedance' of the line carrying that voltage.

In the TVRO/CATV worlds, virtually all of our cables are 75 ohm impedance (i.e. RG-59/U, RG-6/U). Therefore the assumption is always made that when we say a certain signal measures +10 dBmV that we are measuring that signal on a 75 ohm line. If the measurement instrument (such as a CATV/MATV signal level or field strength meter) is designed for 75 ohm measurements, but we are trying to measure signal voltage on a 50 ohm line (such as RG-213/U, or RG-214/U) the reading we get will be in error by the amount of 'impedance mis-match' between the designed-for 75 ohm impedance and the actual 50 ohm impedance of the line measured.

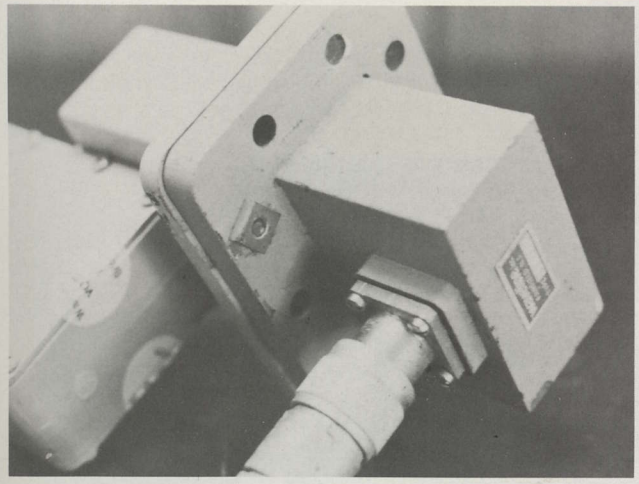
So the dB or decibel (1/10th of a 'bel') is a very convenient tool for a system planner or installer because it can be used to calculate or measure system performance. **Gains are + dBs** while **losses** (such as cable attenuation) **are − dBs.** We'll return to all of this subsequently.

LNA Measurements

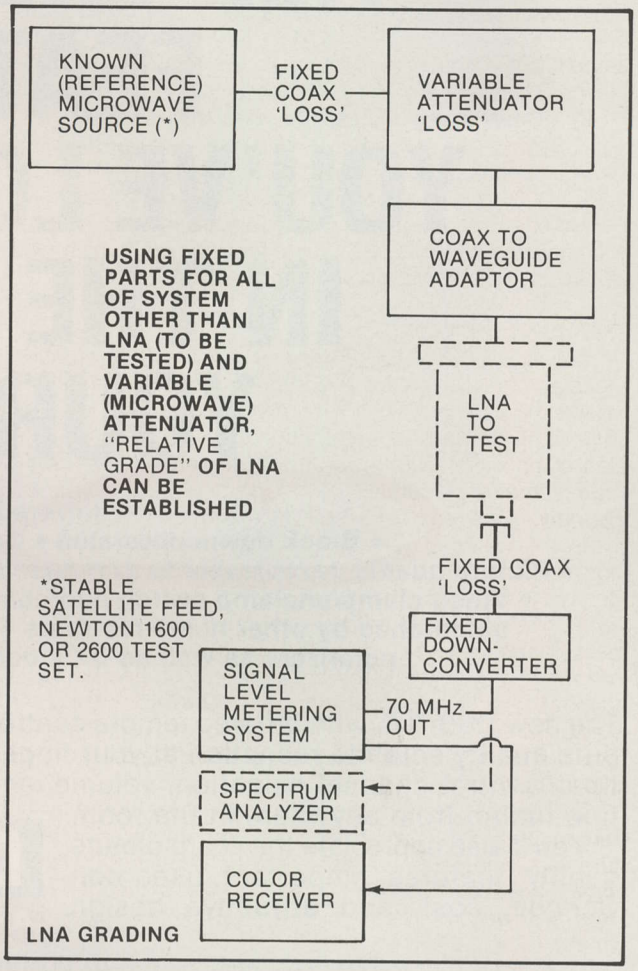
Low noise amplifiers, or LNAs, have two important 'absolute' numbers which interest us:

1) The amount of gain, measured in decibels (dBs)
2) The noise temperature, measured in degrees Kelvin (°K)

It would be useful if we had a way to quantify or 'grade' LNAs in the field, on a workbench, without the hassle of discovering an LNA is a sub-performer **after** you have hauled it into the field and installed it on a customer's dish. Let's see how we might go about this.



LNA is coupled into signal source using coax to waveguide adapter device.



To measure an LNA for absolute gain, we need some type of test system which measures 'dBs' in the frequency range of interest; 3.7 to 4.2 GHz. There are no such instruments available at prices lower than many thousands of dollars so that seems like an impractical approach.

To measure an LNA for noise temperature requires a noise system test set; again, a multi-kilobuck system which does not make much sense for the TVRO installer's shop. So is there some other way to 'quantify' an LNA on the bench?

It turns out there is.

Here is what is required:

1) A signal source, between 3.7 and 4.2 GHz, which is relatively stable (i.e. it does not vary up [+ dBs] or down [− dBs] more than a couple of dBs over relatively long time periods; such as a day or so).
2) A method of attenuating or reducing the signal to the LNA being tested which is 'repeatable' and 'accurate to itself'. That is, the ability to install the LNA in a test 'fixture' and then turn a knob or dial and accurately and repeatably reduce the signal going into the LNA, from the stable 'test signal source', while observing or measuring the performance of the LNA.

MEASUREMENTS/ continues on page 26

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MEASUREMENTS/ continued from page 22

3) And finally, some method of 'reading out' the change in performance of the LNA when the signal going to the LNA (and coming from the LNA) is reduced in level with our attenuation system (2, above).

Let's deal with these one at a time.

A satellite is a signal source. Certain signals on specific satellites are especially good, stable, signal sources; for example, TR12 on Galaxy 1, which spends most of the daytime hours transmitting a solid color field (or multi-color field) with graphics is quite acceptable for our purposes. Another suitable signal source would be a Newton Test Set; the 1600 or 2600 units for example. They create color bar modulated test signals in the 3.7 to 4.2 GHz band (see **CSD** for February 1985; **page 15**) and their output over long term periods is reasonably stable **(*).**

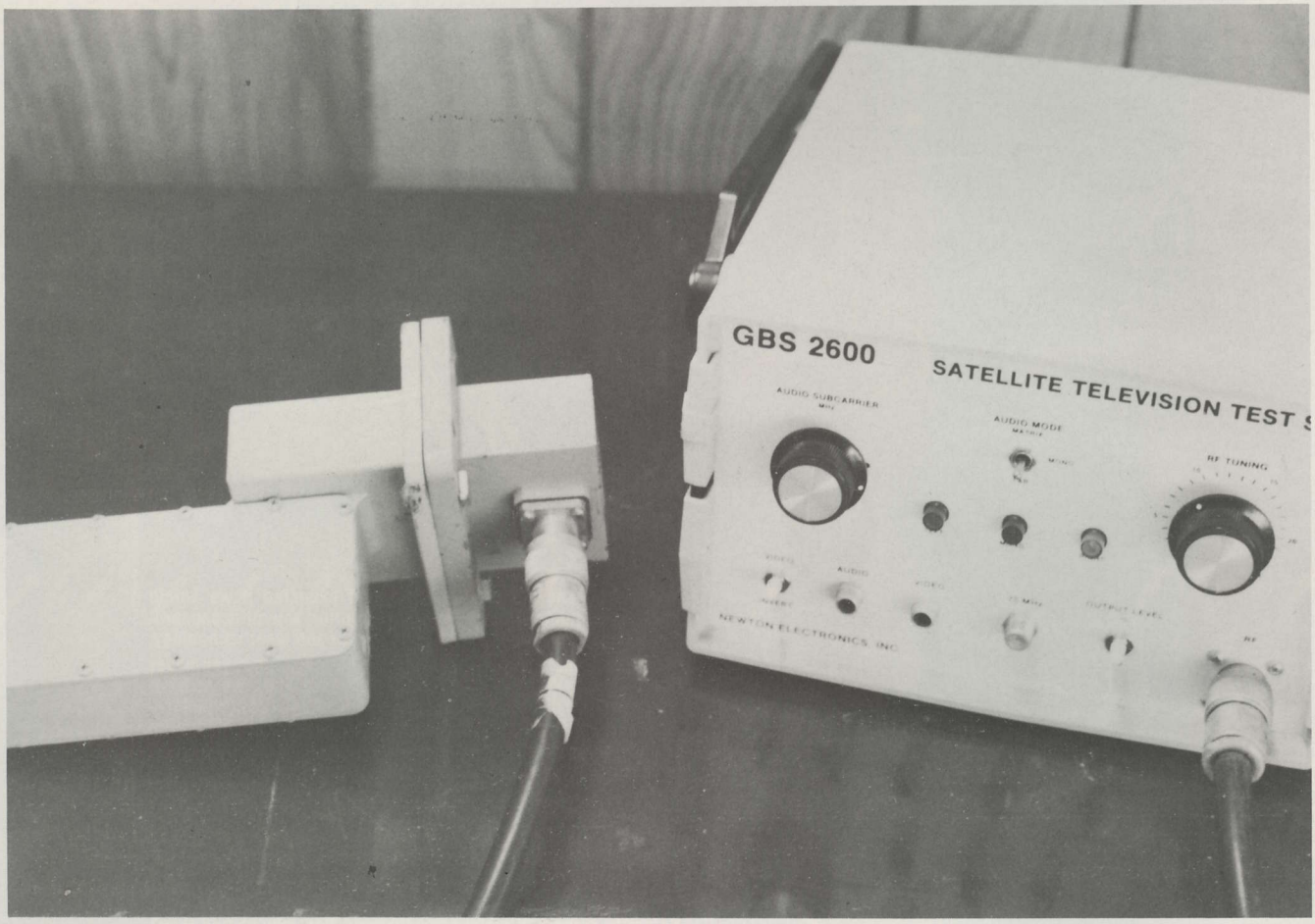
A step or variable attenuator is a signal **reducing device.** If you select an attenuator with the proper impedance (50 ohms) and the proper frequency range (good to at least 4.2 GHz) and the proper amount of attenuation 'range' (1 dB 'steps' and a total attenuation available of 40+ dB) you now have a tool with which you can 'degrade' the signal to the LNA, and reduce the amplified signal leaving the LNA, in a repeatable and accurate fashion.

A TVRO receiver, equipped with a signal level metering system, connected to a monitor, is a form of a 'signal read out' system.

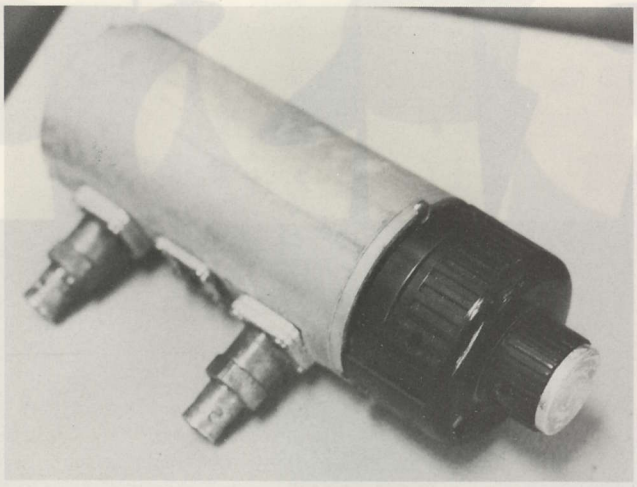
ATTENUATOR
1) **MUST** BE RATED 'TO' FREQUENCY RANGE OF INTEREST (i.e. 4.2 GHz)
2) **SHOULD** BE CAPABLE OF PASSING DC POWER FOR DOWNCONVERTER, OR LNA, IF PLACED INTO DUPLEX LINES
3) SHOULD BE CALIBRATED IN 1.0 dB STEPS MINIMUM WITH 0.1 dB STEPS AVAILABLE

Now let's put all of this together.

As shown here in diagram form, a stable signal (reference) source is fed into an LNA sitting on your test bench. The dish is anchored to Galaxy 1 and the receiver is set on TR12; or, the Newton test set is set on a transponder and its output is coupled to the LNA through the attenuator device(s). Then we connect the LNA to the downconverter through a second variable attenuator so we have some way to control the output level of the LNA as a means of determining the ultimate threshold sensitivity point for the LNA + downconverter + receiver. Finally, we read out the results on a TV screen, or on a spectrum analyzer which tells us the absolute signal **voltage** levels in the IF range going from the downconverter to the receiver proper.



TEST SYSTEM consists of known signal input (source), **controllable amounts of 4 GHz signal energy** (ahead of and after LNA) **and dedicated downconverter and receiver coupled to test monitor and/or spectrum analyzer.**



ATTENUATORS are placed ahead of LNA and after LNA to allow 'grading' of LNAs and downconverter units.

There is a modest learning and 'familiarization' curve here; you have to determine how **your particular test station** functions with various types and grades of LNAs. Our concern at this point is the LNA grading only; we'll move on to downconverter 'grading' shortly.

For the system to be valid, you should dedicate a specific receiver to the system at all times. Any cables installed for the system should be retained for the test system only; swapping cables around 'in a pinch' is a good way to lose your ability to come back to the system days later and still make meaningful measurements that you can relate to previous or past measurements. **Build the system for test purposes** and then leave all connectors, adapters and parts alone; **don't be changing them out!**

What are you looking for?

1) The attenuator ahead of your LNA is the grading tool for noise threshold; typically, as you crank in 1 or 2 or 3 dB of attenuation ahead of the LNA, you will see sparklies come up on the test system. In other words, you are reducing the signal voltage **to the LNA** with the in-front-of attenuator and there will be a point where your signal voltage is too low for the system to continue to produce noise-free pictures. That's your first 'grading point' and you would 'log' (as in record) that a certain LNA required 3 dB of attenuation before noise appeared on the screen **(**).**
2) The attenuator after the LNA is your grading tool for downconverter or bulk-gain threshold. Take all of the attenuation out of the first attenuator (i.e. 0 dB) and now proceed to dial-in attenuation in the second attenuator. This will take far more attenuation but at some point you will start to see fine-grain noise on the test monitor. That amount of attenuation tells you:
   A) How much loss you can stand between the LNA and the downconverter (i.e. in the cable or fittings that connect the output of the LNA to the input of the downconverter) and still be 'noise free'. This noise will not look like 'sparklies' (pure 4 GHz noise) as much as it will appear as 'fine grain noise' caused by an insufficient carrier to noise ratio at the input to the downconverter.
   B) And, it also tells you the apparent 'grade' of the downconverter itself; if the downconverter is particularly 'hot' you will see a 3 to 6 dB difference between it and one not so hot (i.e. you can crank in 3 to 6 dB more or greater attenuation on the hot downconverter than on the not so hot downconverter, before you start to see noise).

The first appearance of noise is an important point for performance testing but it is perhaps not as good a test as the **'last appearance of color'.** The color information is transmitted at a far lower level than the black and white information. Therefore, you will, as you make the signal weaker by increasing the attenuation, see a loss of color as a dramatic and sudden 'step'. It is far easier to notice this 'color loss' than it is to notice the slow, gradual disruption of the video with fine grained noise. Therefore when checking a unit, you should measure for **both** observation points; the **first signs** of noise, and, the **last signs** of (solid) color. Of the two, the loss of color will be a better 'measurement point' than the first appearance of noise.

Remember that this is not an absolute measurement; you cannot take your test results and directly correspond them to the manufacturer's ratings for the LNA or even the receiver. However, if the test system is left 'intact' and you don't make changes in the system, you can make your own 'relative measurements' in this manner and have complete confidence that the LNA you tested as 'hot' four weeks ago would again test the same way today.

DOWNconverter Measurements

In the LNA test system, we have every part in the system 'static' except for the LNA. The very same system, as diagrammed here, can **also be used** for the relative grading of **downconverters** except now we are placing a 'standard LNA' (an LNA set aside for just this test procedure and used each time the tests are done on downconverters) in line ahead of the downconverter(s) to be tested.

Now, the most important device in the system is the attenuator that precedes the downconverter. With everything 'fixed' in performance ahead of that attenuator, we are going to vary the amount of signal **at 4 GHz** coming **to the downconverter.** There will be a point, as you increase the attenuation on the dial-it-up attenuator where the downconverter performance 'crashes'; first noise and then a loss of color in the test signal.

Since the attenuator(s) are calibrated in so-many dBs of attenuation, you read off the dial the amount of attenuation required to cause the downconverter to show signal blemishes and that in turn becomes a 'grade' for that downconverter.

Not diagrammed here, an additional test for the downconverter is the measurement of acceptable cable lengths **between** the downconverter **output** and the **input** to the **receiver/demodulator.** Some receiver data sheets specify the maximum cable lengths allowed (before signal degradation) while others, if they specify anything at all, relate it to so many 'dB of loss'. By allowing the system to run without any attenuation ahead of the downconverter, you can measure the amount of cable by inserting a power passing attenuator **(***)**

MEASUREMENTS/ continues on page 30

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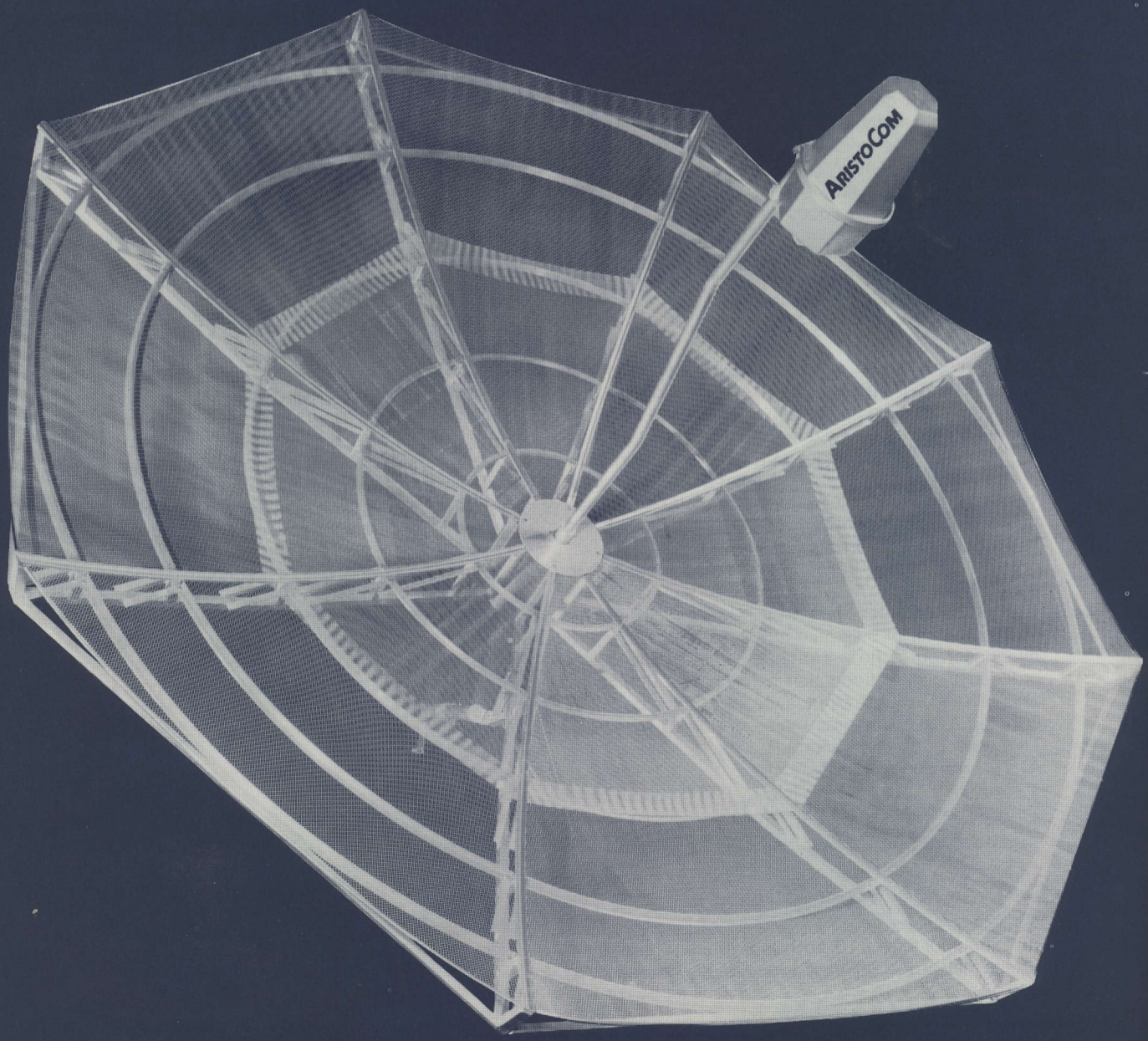
*/ Newton claims their output is ± 8 dB of the output specified. They do not spec the unit's output **stability,** short or long term, however.

**/ An attenuator that has 0.1 dB steps is useful here since the 1 dB steps may be too 'far apart' to accurately 'grade' LNAs in this fashion.

ARIST



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MEASUREMENTS/ continued from page 27

between the **output** of the **downconverter** and the **input** to the **demodulator.** If you find that 8 dB of attenuation is the maximum allowable, that in turn tells you the number you need to calculate the amount of loss in cable. A cable with 4.0 dB loss per hundred feet, at the highest IF frequency (90 MHz, 950 MHz or 1450 MHz) would then equal 200 feet of maximum cable between the two units. Remember that you must use the high end or the highest frequency for your IF to do this calculation properly.

IMPORTANT Numbers

Now that we realize that dBm and dBmV are not the same, and that the dBmV scale is used primarily to specify modulator or other outputs in TVRO **at 75 ohms** while the dBm scale is used primarily at the 4 GHz end of the circuit (where lines are **50 ohms** impedance), what else do published specs tell us?

Sometimes the people writing the specs get a little confused on their own; the Luxor Mark 2 and Skantic Mark One published specs, for example, tell us that:

"RF Output Level: 7 dBm"

This might be confusing if we assumed that they did anything else other than 'dropping' the 'v' on "7 dBm". (+) 7 dB**m** is a whole lot more signal than (+) 7 dBm**V** (by more than 50 dB!). In this case, we measured the output on a Mark 2 receiver to verify that it was, indeed, +7 dBm**V.**

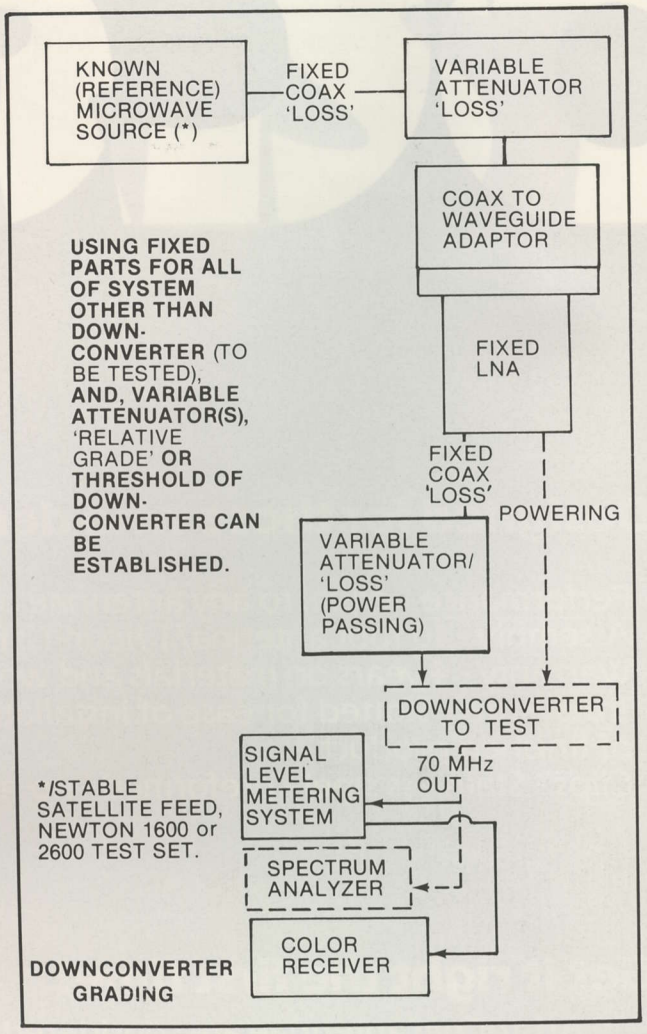
The same receivers specify the IF bandwidth in this fashion:

"IF bandwidth (3 dB) 25 MHz"

What does that mean?

In the final IF, just before the radio frequency signal is demodulated and turned into a 'baseband' video (plus audio) signal, there is a 'bandwidth factor' in the design. **Having a wider bandwidth** insures that all of the picture information transmitted by the uplink will be found in the recovered video. **Having a narrower bandwidth** improves the video (and audio) signal to noise ratio. When signals are strong and you have excess signal 'to burn', wider is better. When signals are weak and you are fighting the 'threshold point', narrower is better (down to some finite bandwidth where no picture detail remains).

When the IF is specified as '25 MHz at 3 dB' the designer is telling us that his 'filter' which establishes the bandwidth is 25 MHz 'wide' when you measure the 'sides of the filter' bandwidth at a point that is 3 dB below maximum signal through the IF. Most receiver manufacturers use this '3 dB bandwidth' point as a measurement spot and we'll see why when we return to this topic next month.



***/ Many receivers send either the downconverter operating voltage and/or the LNA operating voltage, or, the downconverter tuning voltage (in the case of 70 MHz IFs) through the coaxial line bringing the signal 'indoors' from the downconverter. With power 'on the line' **any attenuator you use** must be capable of 'passing DC power' or you will 'fry' the attenuator very quickly. If you cannot locate a power passing adjustable attenuator, try to locate fixed attenuators which are power passing (putting together various values such as 6 dB and 3 dB to arrive at an approximation of the maximum loss that can be sustained). Another approach is to simply connect 50 foot lengths of 59 or 6/U cable together, starting at 50 feet and working upwards, until you find a cable length where the pictures degrade. That, then, will become the 'don't-go-over' length for that particular downconverter/receiver combo with an LNA of XX dB gain.

TAIWAN Dish Control

The past 12 months have seen rapid 'strides' from Far Eastern manufacturers who have virtually taken over the lead in LNA supply, made serious dents in the 'Americanization' of TVRO receivers, and even now threaten to 'dump' untold quantities of mesh antennas into the North American marketplace. More than one year ago the first of the dish controller packages from the Far East appeared and most were exceedingly poorly created pieces of junk. Shortly thereafter, several (U.S.) receiver OEMs, anxious to have controllers to go with their receivers (and dishes in one case) also went 'offshore' to bring back Taiwan built dish controllers and actuators. Not all did well, most suffered from the poor workmanship which one often finds coming from Taiwan (or Korean) low labor-factor shops which move rapidly from sewing machines to popcorn poppers and TVRO pieces within a

DISH CONTROLLER/ continues on page 34

THE ROAD TO SUCCESS IS MEASURED BY SUPERIOR QUALITY

For any business the road to success is long and difficult. But measured by the quality of Superior™ aluminum mesh antennas, the road is shortened considerably.

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DISH CONTROLLER/continued from page 30

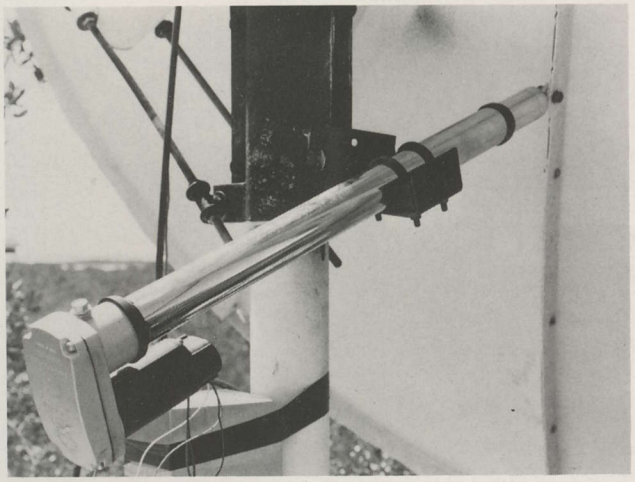
single week.

It was therefore with a virtually totally negative attitude against any dish controller product originating in Taiwan that we agreed with **Philip M. Shou** of **Pro Brand International** to test their controller package. It was more out of 'courtesy' to Mr. Shou that we agreed to test his package, certain that we would find it less than suitable for the North American TVRO dealer. And sure enough, about two weeks after we received the drive plus controller we received a telephone call from Mr. Shou advising us that due to a manufacturing 'error' there was a problem with the drive itself. A replacement was coming. And sure enough, again, within a few days of his call, we experienced exactly the type of failure Mr. Shou had called about. We took the drive off of the test dish and piled it with the controller in a vacant corner.

Then, as fate might have it, we found ourselves needing a drive and controller one day and no drive nor controller 'loose' for the project. Reluctantly we mated the newly arrived replacement drive from Pro Brand with the original controller and installed it on the dish to be tested. That was nearly five months ago. Since that time we have moved the package from a test dish at the Lab Test site to the home of **CSD**'s Marshall Foiles where any controller will get a maximum workout since Marshall is one of those "Let's see what is on G1 (when he is on F4)" or "Let's see what is on F4 (when he is on G1)" kind of people. Marshall has literally worn out four drives in the past year. None of which ever made it to these pages for review since if they fail the 'Marshall Test' we don't deem them adequate for review.

If you have the same concept of Taiwan products as we, you would have been just as surprised as we were to open the front page of the adequate instruction manual to find a **'Copyright Notice.'** For the unwashed, one places a 'Copyright Notice' on something one does not wish copied. To place a 'Copyright Notice' on a product originating in Taiwan is like hauling coals to Newcastle. Aren't the Taiwanese the 'most-prolific-copier' in the world today?

Well, you have to read further to discover that Pro-Brand says they have copied nobody with their controller; it is a piece of original engineering from start to finish. Shou writes in the manual **"The original software and circuitry of this unit were developed by engineers of Pro Brand International, Inc., while the cosmetic appearance of the unit was created by a renowned design house. . .".** Even the words are spelled correctly. Maybe THIS Taiwanese firm **is different** than many others we are acquainted with; the performance of the unit would tell.



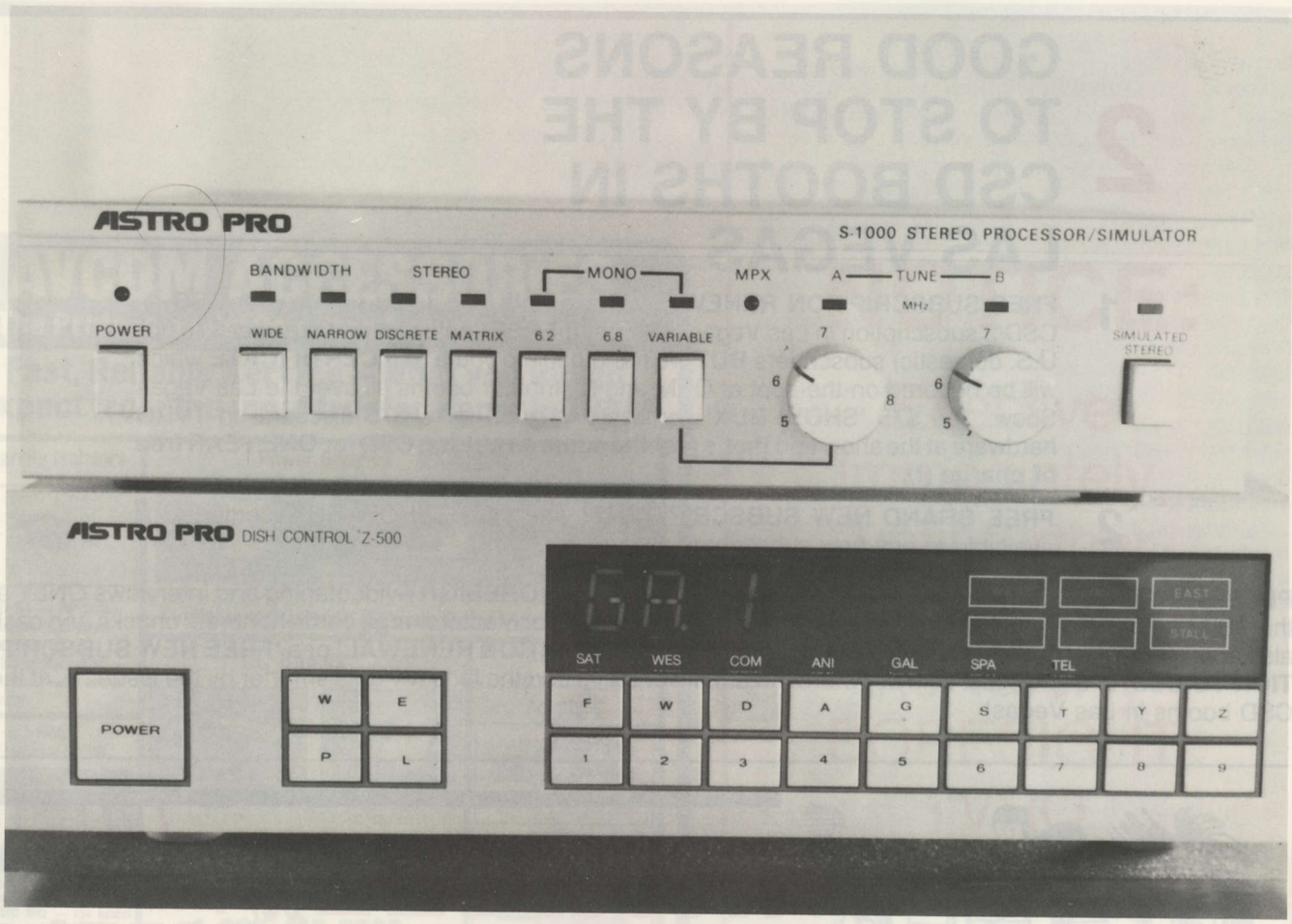
Z-500 MOTOR Drive is not made in the United States. The first one 'broke' **but the second one started a garden.**

CSD TEST: ASTRO PRO Z-500 DISH MOVER

FUNCTIONAL Features

The controller is microcomputer based. And there are 81 programmable antenna positions. That ought to be enough to hold us for awhile.

1) The front panel has 18 prominent soft-touch switches; the kind you brush against to activate. There are two



Z-500, and a companion 'stereo piece,' which Marshall insists we pour a can of Diet-Coke into before we complete our tests!

rows of 9 each, the bottom row being number 1 through 9 and the top row being labeled 'F', 'W', 'D', 'A', 'G', 'S', 'T', 'Y' and 'Z'. The T, Y and Z are for those families of birds yet to come and the 'D' is because even in Taiwan they read **Orbit** which insists on calling Comstar birds with a D based upon the old AT&T heritage.

2) The front panel has 5 additional, not associated, soft-touch switches; one is for E(ast) and one is for W(est) movement. One marked 'P' provides the user with a 'program key.' You use this to lock out a satellite, as we shall see. Then there is a key marked 'L' which stands for lock. And finally, a power on and off switch or 'key.'
3) The rear panel has terminal connections for a trio of sensor wires, and terminal strip connections for the 36 VDC motor drive. It also has a reset button should the automatic circuit ('stall reset') kick-in as a protection device, a 'hidden' reset button for the careless person who locks themselves out of something they didn't want to be locked out of, a pair of fuse holders (primary and secondary), a remote plug for wire extending control away from the unit proper and finally a key lock that allows the user to lock it up, literally, and not be faced with the worry that the dish will 'drift' to F4 TR12 as soon as the parents pull out of the driveway.

Lots of features, very nice indeed.

4) Finally, returning to the front again we also have a pair of large LED displays; the abbreviation for the satellite (**SA** for Satcom for example) and a number (**1** for 1). And six more soft-touch buttons which allow the user to lock in or lock out various birds plus indicators that the dish is at a 'limit' or that the dish has 'stalled.'

There are a lot of features here.

FUNCTIONAL Installation

The drive system is not a US product. Right on it, it says 'Taiwan.' Do they REALLY know how to make drives in Taiwan? Would it hold up? The first one certainly did not!

There are a pair of wires (heavier than the other trio) which connect up the drive motor to the controller. Remember this is a **DC** (not an AC) unit, and 36 volt at that. Most would agree that is a nice engineering decision. There are three smaller diameter wires which connect up the sensor or position reader. Pro-Brand's amply illustrated manual suggests #22 wire for the sensors up to 250 feet, #20 for over 250 feet. For the DC wiring, they suggest #16 for runs to 150 feet, #14 for runs from 150 to 250 and #12 for runs upward to 400 feet. Runs beyond this are not specified but wiring heavier than 12 is usually sold by the pound rather than by the foot anyhow.

The Z-500 (you knew they had a number for it; right!) retains its memory without power, should it be programmed and then the AC power drops. They say the memory cycle is two weeks and this requires an initial activation of 15 minutes

DISH CONTROLLER/ continues on page 38

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NOTICE:

Effective immediately, until further notice, the weekly BORESIGHT TVRO Program may be seen on transponder 20 (rather than 16) on F4 at 9:00 p.m. Eastern Thursday nights.

DISH CONTROLLER/ continued from page 35

to gain 'temporary use' of the memory; after 24 hours of 'charging' they claim the unit could last for up to a month. What about replacing the battery every few years? **There is no battery.** Very clever, these Taiwanese.

The unit is placed into memory in a straightforward manner; you clear the memory (if there is any) and push either the east or west button. As the dish moves you see the direction of movement with an arrow display. Starting on the east side, you program in the eastern limit-set (three buttons in sequence) and then repeat the process on the west limit. Now when (or if) the antenna reaches either limit, a 'Limit' light appears to tell the user he or she is as far as they are likely to go. If you program the system in the incorrect sequence, the machine tells you so with an 'ER(ror)' indication. As you go through and program the various birds, either an 'open' or 'closed' format applies. Closed means that birds such as F4, with potentially 'nasty programs' can be simply left out of the 'surface memory.' **They will be in the memory** but the user has to know the 'programming secret' to get to them. Obviously a customer would be well advised to lock-up his instruction book after he had the instructions down 'pat.' There is a particularly 'cute line' in the well written instruction manual which shows that Taiwanese writers have a sense of humor. The subject is how you get out of a locked mode.

look.' Even a brief glimpse of F4 TR12 is handled by the circuit. That may be overkill; 1/2 second of bare breast probably wouldn't harm a child's mind for life.

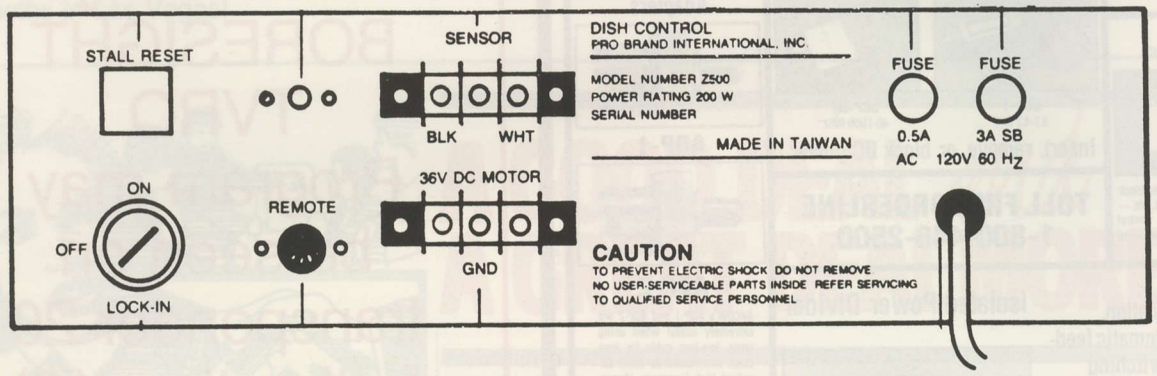
Operations

Well, if this box made in Taiwan does all of these things and it does them properly, it probably will bust quickly since even American built boxes this 'complex' seem to break at a rapid rate. **So we tried to destroy the box.** First we cycled it on and off rapidly for 24 hours. 'Take that you monster.' It came right back on when we stopped the torture test, oblivious to having been turned on and off some 1440 times in 24 hours. OK, take this!

Next we plugged electric drills and hair dryers and other nasty AC spike generating electrical gadgets into the SAME electrical outlet. We ran them on and off for awhile and cycled the Z-500 on and off at the same time. **We had a failure;** we burned up our 3/8 inch drill. The Z-500 just laughed at us. This was getting serious.

Marshall wanted to pour a can of **Diet-Coke** into the innards next but we decided that was probably an unfair test since we had not gone **that far** with any American controller (most failed after the 24 hour cycle test). We did pour a gallon of water down the extended tube-arm on the drive itself just to see if we could flood the thing out. We failed but started a nice garden under the dish in the process.

OK, we'd simply use it for a few months to see if Marshall



"If your child has decided to 'get even' **by inputting a code to lock you out. . . . ."**

and they proceed to tell you how to override the unfortunate lock-out entered. Do you suppose Taiwanese children are as devious as American kids?

Of course the locking system works in the **other** direction as well; the user/parent can lock the dish up on a single satellite so that nobody can play at all (**"Take Disney and LIKE it!"**). This involves that **key**-lock on the rear deck. Now, if the user doesn't fall down and lose his or her key while cavorting as the child is stuck on Disney, everything will be OK. And the clever folks have even created a system that makes it impossible for you to LOCK it up on a satellite which has previously been programmed as a 'Locked Satellite;' i.e. if F4 was taboo for **general operation,** it is also forbidden fruit for locking up on permanently.

Now we are certain Taiwanese kids are just like American kids!

There is more. There is a 'review' function which allows the user to automatically cause the dish to 'walk through the belt' as in scanning. Only as it does this it refuses to stop at any locations where the programmer has said 'Thou shalt not could burn it out. Surely it would glitch, forget where it was, land us between satellites or do **something wrong** in 60 to 90 days time. Nothing. Not one glitch. It just sat there and laughed at us with a peculiar oriental tone.

Marshall has no use for lock outs. We programmed some in and they worked like they were supposed to. Shari, his wife, locked him on G1 one day and hid the key. But that was a 'domestic squabble' not an equipment problem. Having a second key might be a good idea.

And it worked and worked and worked. It is still working. Marshall likes it, refuses to take it off his dish, and only wishes it was totally remote controlled so he could lay in bed and switch from F4 to G1 with a handheld remote control. He still wants to pour a can of Diet-Coke inside but only if we somehow manage to have a new Z-500 sitting in the wings to replace 'his Z-500,' should **that** torture test bring the machine down on its knees. Even he draws a line for the 'best-interests-of-science.'

Summary

This is a good controller. And a good motor drive.

DISH CONTROLLER/ continues on page 42

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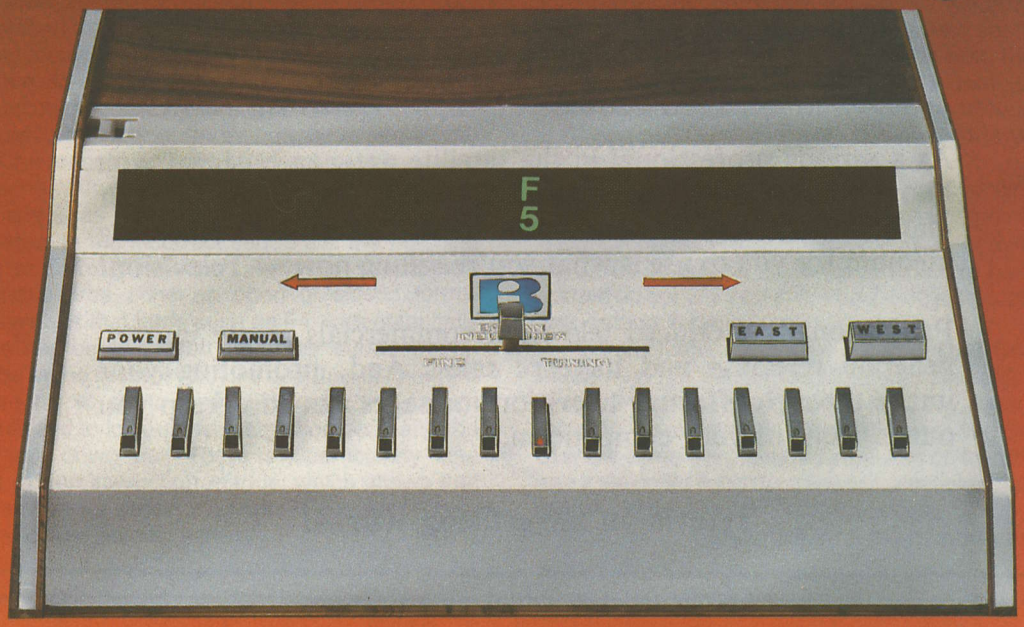

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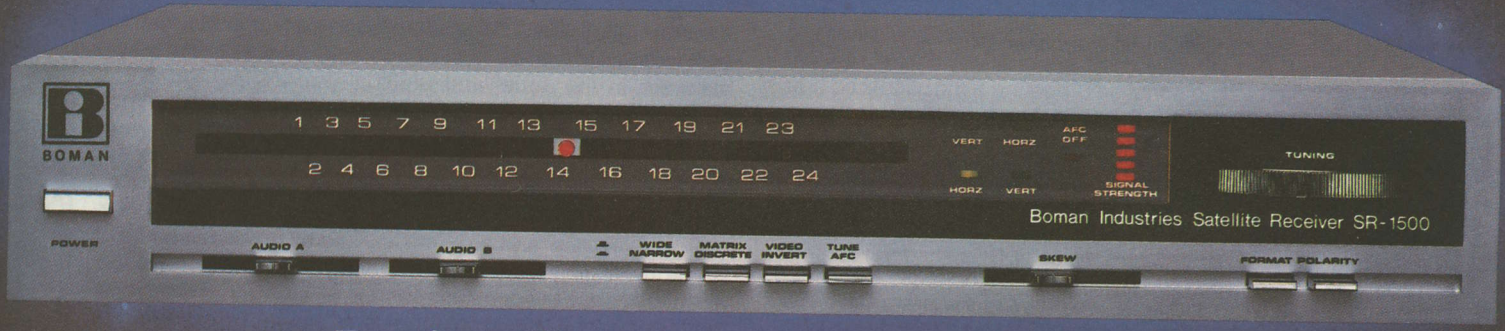

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DISH CONTROLLER/ continued from page 38

QUICK REFERENCE SPECS

Manufacturer: Pro-Brand International (PBI), 1629 Newberry Avenue, Columbia, SC 29210; 803/732-0027
Size: 296 MM wide x 250 MM deep x 85 MM high (it's time you learned the metric system!)
Weight: 5.5 kilograms (less drive of course)
Operating Voltage: 120 VAC primary, 36 VDC (motor drive) secondary
Power Consumption: 300 watts when moving the dish
Position Sensor: Hall Effect Sensor, 180 counts per inch of drive
Price: $265.00 dealer net (Quantity affects price, includes weather protected actuator)
Memory: Microcomputer based
Memory Retention: two weeks (we tested over 4 weeks)
Memory Positions: 81
Installation Manual: Far above average, missing only one essential bit of information; the full name, address and telco of the OEM (supplier).

Together, they are a better than good package. We did our best to destroy it and it kept on running. Most of the tests we did were in the 'cruel and unusual punishment' area and should have shortened the life cycle of a product like this. They did not, or, at least through the 121 day (and counting forward) test period to date, have not.

We have reformed our earlier 'strong opinion' concerning products made in Taiwan. Philip Shou has every right to his 'Copyright Notice' and now that his 'secret' is out of the bag, it will be interesting to see how long it may be before he has to try to enforce that notice. Yes, sooner or later, somebody out there is going to try to 'carbon-copy' his hardware and his 'software.' Dealers who have been looking for this type of unit (oh but that it had a totally wireless remote control available!) will do well to talk with the people at Pro-Brand International. Speak slowly, don't shout, because Mr. Shou understands English very well. And he certainly is not deaf. And if he is half as smart as his product, you will be dealing with a very savvy gentleman from Taiwan. **Welcome to the industry Mr. Shou!**

CSD TEST: GENESIS 10' ANTENNA

PRODUCT 'Ripening'

Early issues of **CSD,** dated in 1980, reveal that the industry was already keen on 'screen mesh dishes' even before there was much of an industry. But mesh dishes never really caught on, in a 'big way,' until Paraclipse came along late in 1982 with a well thought out design which combined the primary dealer-desirable features into a single mesh antenna product:

1) **Light weight** (reducing shipping charges and making physical handling easier on the installer)
2) **Small bulk** (again, reducing shipping problems and making antenna 'dry storage' less space consuming)
3) **Ease of assembly** (everything was relative in 1982; solid surface antennas were no joy to assemble either!)
4) **Opacity** (people were beginning to 'notice' TVRO antennas in yards and the start of the negative zoning laws was cropping up)
5) **Price** (solid meant more material, metal or fiberglass, and everything in life seems to sell by the pound; less weight had to mean less cost!)

There was one other 'Paraclipse advantage' in 1982; performance. Until the 'Clipse,' those few who had attempted mesh design antennas were forever fighting surface accuracy; a framework that refused to stay parabolic in shape, a surface on that framework which refused to lay in anything approaching a parabola. Paraclipse set the standard for 1983 and through a good portion of 1984 as well. But these were and continue to be evolutionary times and no product can 'stand still' in technology and expect to grow in the marketplace.

There have been many, many copies of the Paraclipse; some from off-shore (Korea in the fall of 1984) are nearly exact replicas. Some from on-shore make one or two design changes, call it artistic license or improved engineering if you will, to avoid the total 'copy look.' Still others appear at first blush to be Paraclipse copies but on closer inspection you begin to understand that all 'dark colored mesh antennas look alike,' no matter who their parents may have been.

The present 12 foot Paraclipse, the mainstay of the Paradigm Manufacturing Company antenna line since late in 1982, has stayed pretty much like the first production models for more than two years. Between 3 and 4% of all TVRO antennas sold in North America since 1983 are Paraclipse 12 foot antennas. And another 3-4% are antennas that look like Paraclipse (12 foot) antennas. This month we'll look at what a mesh antenna really is, and how it is evolving, with or without Paraclipse nameplates, into a new product which bares only minor resemblance to the original 'Clipse.'

NAMEsake

Perhaps the most unique feature of the original Paraclipse was the method created to attach the screen mesh reflective surface to the parabolic shaped support ribs. Previous efforts had riveted and screwed and stamped and slid the reflective mesh into or onto a framework. The 'Clipse' used a pair of metallic fasteners called 'clips.' One was shaped like the letter 'J' while another was shaped like the letter 'C' or 'U,' depending upon how you held it in your hand. Both 'clips' required some physical effort to install and to aid in that effort you needed either three hands and one very long arm, or two people, for many of the clips to be installed. You also were a step ahead if you had a pair of pliers or grips, some gloves, and thick callouses on your fingers.

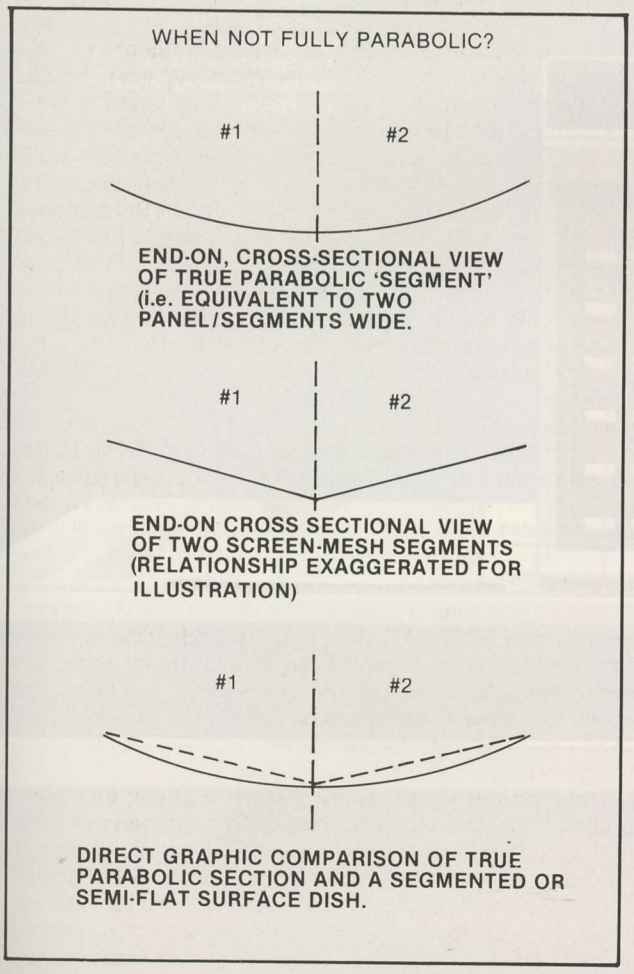
The clips were both a blessing and a curse; they were essential if the installer wanted the antenna to perform since the clips secured the reflective mesh to the parabolic-shaped framework. If the mesh did not 'adhere' closely to the surface of the parabola, the dish was not a dish at all and its 'focusing powers' were greatly diminished. So the clips made it possible for the installer to do the job 'properly.' It also made his job

more demanding because installing several hundred clips on a 12 (or 9) foot surface was (and still is) a lot of work.

Naturally, those who might want to copy looked for ways to reduce the amount of work involved with installing clips. Some, such as Conifer and ECI copied not; they created mesh surface antennas which assembled from pre-assembled panels with the mesh already in place. Others, such as HERO, were using sheet metal screws to attach the mesh. Still others, such as Winegard, would try their hand at preforming metal so that the individual petals or sections of the dish, ready to bolt together ala Conifer or ECI, would have the 'perfect parabolic curve' built-in.

Part of the confusion between sectionalized dishes (i.e. Conifer) and fully parabolic dishes (i.e. Winegard) involves sematics. A diagram here illustrates. A parabola can be thought of as a curved line that is never straight between any two points on its outer circumference. That is, in a true parabola, no matter how closely together one selects two points, those two points will never be in a straight line **with a third point** on that circumference.

Of course in the real world, such absolute precision to the parabolic form is neither necessary nor cost effective. Another approach, pioneered by **Robert Taggart** at Stanford University in the early 1970s, breaks the circular parabolic circumference up into some quantity of flat sections; straight lines as it were. This is best typified by the Conifer 12 foot antenna, earlier ADM petalized antennas, or a Hero antenna. Rather than create a true parabolic circumference, the dish is a series of segmented straight lines each making up a small portion of the full circle. If you take this approach, the dish surface is not true parabolic but it is close. The 'price paid' for such a design is typically on the order of 0.5 to 1.0 dB; there **is** less gain when the surface deviates from a true constantly-curved parabolic configuration, but not as much 'less gain' as you might suspect. **All of this is diagrammed here.**



You can preform, under pressure or with stamps and dies, **solid metal** to be an exact replica of a segment of a parabolic circle (example: the present generation ADM 10 foot antennas). You can preform, under pressure or with stamps and dies, **perforated metal** to be an almost exact replica of a segment of a parabolic circle (example: Winegard, American Metal Spinners). But how do you preform a **flat piece** of screen mesh into a shape that is identical to a segment of a parabola? The answer is you don't.

So you ship **flat** pieces of mesh surface and you create a framework, to hold the mesh, which is itself as close to being a parabola as is practical given manufacturing and field assembly techniques. Then you provide the antenna installer with the 'tools' necessary so that **as he attaches** this surface material to the framework, the flat mesh pieces are forced, by the framework below and the installation tools above, **to adapt to the parabolic curve.** The 'clips' are the tools.

Mesh sections or segments are reflective; that is, they are the material which the satellite signals strike and they are the 'focusing device' which re-beams the satellite signals towards the antenna feedhorn. Contrary to some novice notions, 4 GHz microwave signals do not fly or float or dribble through properly selected mesh surfaces. At 4 GHz, the mesh 'appears solid' to the signal and in fact no increase in antenna gain or efficiency will result if the same antenna is surfaced with solid aluminum material. **There is no advantage, electrically, to solid over mesh.** The only possible advantage of solid metal is that it may (and that is a conditional 'may') be more capable of being formed to the parabolic curve than the mesh material.

EACH Segment Identical

A single 'panel' or segment of a parabolic antenna should, in theory, be like all other segments. The designer has taken a 360 degree circle and he has divided that circle up into some even number of parts; such as 4 segments each representing 1/4th or 90° of a circle, or 36 segments each representing 1/10th or 10° of a circle. Or any number in between. If the designer is shaping his individual segments to follow the parabolic curve, such as Winegard's preformed perforated dish, there is no performance advantage to making more segments than necessary; four is a good number since it reduces the number of segments which must ultimately be bolted together in the field by the installer.

On the other hand, if the designer is utilizing **flat segments,** such as HERO, the greater the number of segments the better, since the non-parabolic **flat skinned segments** represent an 'error' built into each segment. As Taggart and others discovered more than 15 years ago, when you use flat segment petals, you had better make sure you have lots of them so that the 'errors' between your flat segments and your idealized fully parabolic curved desired surface(s) are minimized.

So you end up with panels or segments or sections, four or some quantity greater than four, making up your full 360 degree circumference for the parabolic dish. Now, how do these individual segments lash together to insure that the final,

GENESIS/ continues on page 46

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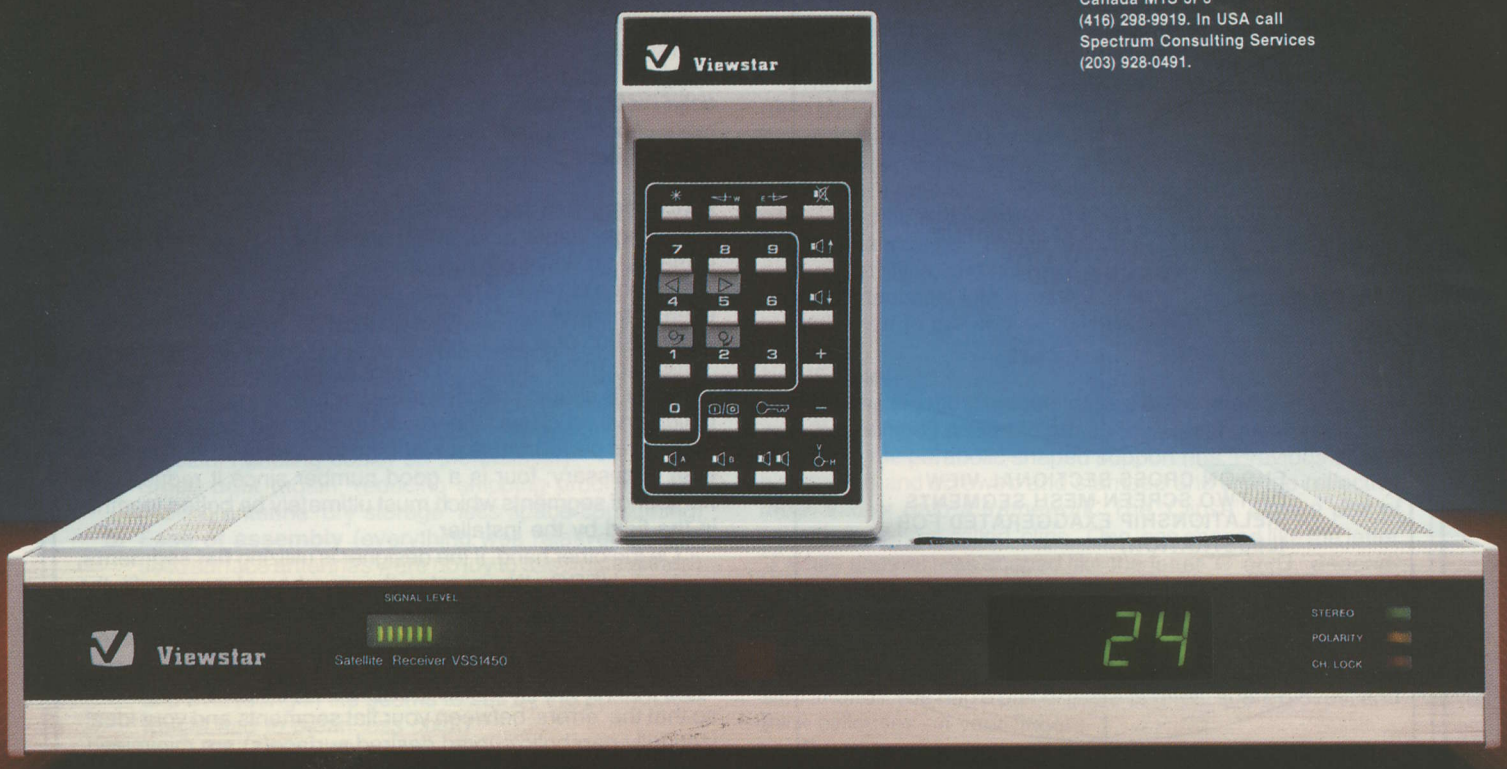

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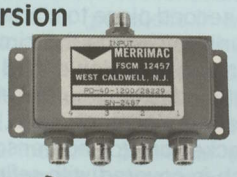
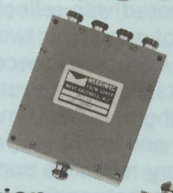
PD-20-3.95G	3.7-4.2	22/25	0.3	1.25/1.20	2	50	2-Way
PD-42-3.95GA	3.7-4.2	22/25	0.5	1.25/1.20	4	50	4-Way
PD-82-3.95GA	3.7-4.2	22/25	1.0	1.25/1.20	8	50	8-Way

Block Conversion Power Dividers Series PDB



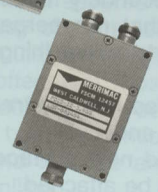
Merrimac Model No.	Freq. Range (GHz)	Isol. Min/Typ. (dB)	Ins. Loss (dB)	VSWR Input Output	Power Avg. (W)	Imp. In/Out (Ω)	Out-puts No.
PDB-40-850	250-1450	20/22	1.50	1.30	1	75	4-Way
PDB-20-850	250-1450	20/22	1.50	1.30	1	75	2-Way

Power Dividers Series PDI



Merrimac Model No.	Freq. Range (GHz)	Isol. Min/Type (dB)	Ins. Loss (dB)*	VSWR Input Output	Power Avg. (watts)	Imp. In/Out (Ω)	Out-puts No.
PDI-22-3.95G	3.7-4.2	60/65-70	1.0	1.25	1	50	2-Way
PDI-42-3.95G	3.7-4.2	60/65-70	1.0	1.25	1	50	4-Way

High Isolation Power Dividers with Built-in DC Blocks Series PDIB



Merrimac Model No.	Freq. Range (GHz)	Isol. Min/Typ (dB)	Ins. Loss (dB)*	VSWR Input Output	Power Avg. (Watts)	Imp. In/Out (Ω)	Out-puts No.
PDIB-22-3.95G	3.7-4.2	60/65-70	1.0	1.25	1	50	2-Way
PDIB-42-3.95G	3.7-4.2	60/65-70	1.0	1.25	1	50	4-Way

TVRO Isolators

Merrimac Model No.	Freq. Range (GHz)	Isol. Min/Typ (dB)	Ins. Loss (dB)	VSWR Input Output	Power Avg. (Watts)	Imp. In/Out (Ω)	Conn. Input Output
DIS-1100	3.7-4.2	18/20	0.25	1.20	1	50	N/A
CIS-1100	3.7-4.2	20/25	0.50	1.25	1	50	SMA Female
DIS-6150	5.9-6.4	20/25	0.50	1.25	1	50	N/A

Terminations Fixed Attenuators

Merrimac Model No.	Freq. Range (GHz)	Atten-uation (dB)	Atten. Accuracy (dB)	VSWR Input Output	Power Avg. (Watts)	Imp. In/Out (Ω)	Conn. Input Output
TN-6K	3.7-4.2	50 Ohm Termination	—	1.30	2	50	N Male
FAN-6-3K	3.7-4.2	3	±0.3	1.30	2	50	N Male Female
FAN-6-6K	3.7-4.2	6	±0.3	1.30	2	50	N Male Female
FAN-6-10K	3.7-4.2	10	±0.5	1.30	2	50	N Male Female
FAN-6-20K	3.7-4.2	20	±0.5	1.30	2	50	N Male Female

Power Inserter Model DC-1 DC Block Model DC-2

Merrimac Model No.	Freq. Range (GHz)	Isol. Min/Typ (dB)	Ins. Loss (dB)	VSWR Input Output	RF Power Avg. (Watts)	Imp. In/Out (Ω)	Conn. Input Output
DC-1	3.7-4.2	40/45	0.25	1.25:1	0.5	50	N Female
DC-2	3.7-4.2	N/A	0.25	1.25:1	0.5	50	N Female

*Above Theoretical

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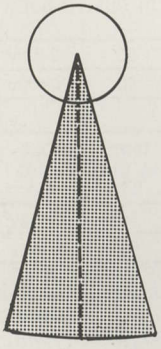
GENESIS/ continued from page 43

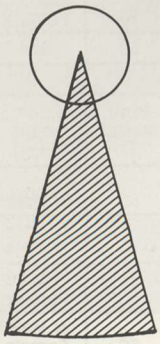
assembled product is still parabolic as its designer intended? That is a function of the center hub, the framework between the center hub and the outer circumference, and, the system employed to tie the outer circumference (ends) 'together' so that the final antenna product represents a 'stiff,' well fitting network of inter-locking segments.

SKINNING The Reflector

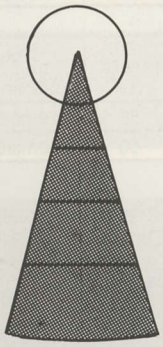
Since a mesh is as good a microwave reflector as a solid surface, provided the correct type and design of mesh has been chosen, and a mesh can be 'asked' to conform to something approximating a parabolic segment, the next trick is to insure that the mesh stays in place, forming that desired parabolic surface, long after the initial assembly. This simply means that any surfacing system must be 'torque-tight'; capable of retaining the reflective surface in the desired parabolic curve even when strong winds blow and ice coats the surface. This is no easy trick.



SEGMENTED PRE-ASSEMBLED SECTIONAL DISH (i.e. SUCH AS CONIFER) ELIMIATES 'CLIPS' BUT RETAINS FLAT (NOT FULLY PARABOLIC) SEGMENT SURFACING.



PERFORATED, PRE-FORMED SECTIONAL DISH (i.e. SUCH AS WINEGARD) ELIMINATES CLIPS, ACHIEVES PARABOLIC CURVE OVERALL **BUT MAY** SUFFER 'RMS' ERRORS.



CLIP ASSEMBLED SECTIONAL DISHES ACHIEVE CLOSE APPROXIMATION TO PARABOLIC CURVE BUT ARE LABOR INTENSIVE AND HAVE GREATER 'PARTS COUNTS' GENERALLY.

Between segments of a mesh antenna we have visible metal struts. A strut is the parabolic forming device; **it follows** the idealized parabolic curve from its center hub-attachment point to the outer circumference of the dish. One approach, taken by Hero, is to screen from the hub outward **attaching** the screen reflective surface to **two struts** (on either side of the screen mesh 'pie-shaped wedge'), using a fastener such as sheet metal screws. Another approach is to divide the mesh up into two or three partial-pie-wedges; a piece that starts at the center hub and extends outward part way towards the circumference; a second piece to start where the first one left off and extend further towards the circumference (or to the circumference) and on occasion a third piece that completes the 'run' to the outer edge or circumference. In this appraoch, two or three separate pieces of mesh, each relatively small individually, are tacked one to another so that a full segment or section of the dish is covered with reflective surface.

When the mesh is broken up, into two or more segments, **you have a joint;** a point where one piece stops and another starts. You also have joints along the struts but here the joints are **on metal;** the struts themselves form a very narrow segment of reflective surface and in truth the mesh on top of 'this' joint is merely a secondary reflective surface at that point.

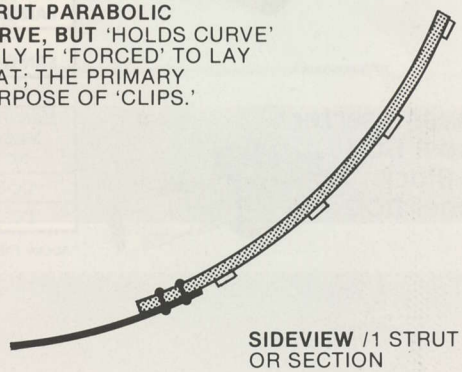
Rib supports that run perpendicular to the parabolic-curved strut supports did two things for the original Paraclipse antenna:

1) They provided **lateral strength** or rigidity for the dish 'segments,' and,
2) They offered new **surfaces to which** the reflective mesh could be attached.

By attaching the reflective mesh to BOTH the parabolic struts **and** the perpendicular ribs, Paradigm advanced the technology of the low-cost dish. And the era of 'clips' was born.

The clips, as shown here, secure the reflective mesh to these all-important circular/circumference supports and in the process of securing the mesh **force the reflective mesh to adhere** to a 'more or less' parabolic dimension that is perpendicular to the important parabolic struts. Antenna designs which allow the reflective mesh to 'support itself,' such as the HERO, are effectively parabolic in only a single 'direction'; the strut direction from hub to circumference. It is that added 'parabolic in the perpendicular direction' feature which ostens-

SCREEN MESH FOLLOWS STRUT PARABOLIC CURVE, BUT 'HOLDS CURVE' ONLY IF 'FORCED' TO LAY FLAT; THE PRIMARY PURPOSE OF 'CLIPS.'



SIDEVIEW /1 STRUT OR SECTION

ibly gives the Paraclipse and other similar antennas an added measure of efficiency.

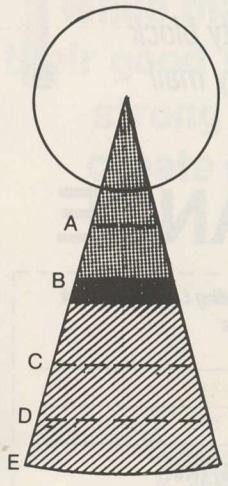
There are of course trade offs in each design and if one of these designs were truly superior on **all counts,** it would be the survivor today and the competitive designs would have folded in the ratings race. The segmented, pre-assembled dish (ala Conifer) or the segmented construct-it-yourself dish (ala HERO) have flat-within-a-section 'losses.' The perforated, preformed antennas (ala Winegard) appear in theory to be the best compromise (shipping bulk aside) but there **can be** 'RMS' errors in the surface which negate the apparent advantage of the design. The clip assembled sectional dishes may achieve superior parabolic surfaces (parabolic in two directions) but they are obviously more (assembly) labor intensive.

RMS errors are not unique to the preformed perforated surfaces. RMS error? Basically, it means that when a metal is formed and stretched there is a memory in the metal itself; the molecules in the metal took on a particular 'set' or 'form' **when the metal itself was formed.** By forcing the metal into a 'new' design shape under intense pressure, the molecules are told that they should 'lose' their memory; **or adapt to a new shape.** They resist this instruction but adapt to it reluctantly. When the pressure of the forming tool is 'released' the molecules in the metal recoil not unlike the vibrations of a rattlesnake after it has had its head severed from its body. That 'recoiling' is a last 'dying gasp' of the molecules to regain their former, 'comfortable' molecular form. This causes ripples in the surface and you can often 'feel' those ripples by taking your fingertips and gently rubbing them over a foot or more of the metal surface. You feel both the gentle, repetitive 'bumps' of the perforated holes **and** the rise and fall of the small 'waves' caused by the recoiling.

This surface error repeats itself throughout the full segment of the perforated dish surface in an almost rhythmic (predictable) pattern. It is that 'pattern' of repeated waves which creates the greatest 'loss factor' in a perforated style dish surface. Errors which did **not repeat,** which were isolated in occurrence, would not be nearly as damaging to the gain of the dish as errors which **repeat consistently** over the full surface.

HOW Important?

Now, which of these 'inherent problems' is a disaster?



CLIPS SECURE MESH TO CIRCULAR/CIRCUMFERENCE SUPPORTS (A,B,C,D AND E). MESH IS SHOWN IN TWO PIECES; FROM CENTER OUTWARD TO (B) IS THE INNER PIECE AND FROM (B) OUTWARD TO (E) IS OUTER PIECE. OVERLAP AREA NEAR (B) REQUIRES EXTRA ATTENTION TO MAINTAIN SMOOTHNESS.

CLIP-ASSEMBLED VULNERABILITIES

Which makes the difference between a good dish and a not-so-good dish?

All are potentially dangerous. And on occasion a designer who does not fully understand the limitations of these dangers will bring a dish to market which **is** a disaster. Early flat-paneled dishes with too few sections suffered low gain because so few points on the dish surface were actually within the parabolic tolerance required for a medium to high efficiency dish. Designers now break the dish into sufficient independent flat-paneled surfaces (such as HERO) that the 'gain penalty' paid by the designer is relatively minor (well under 1.0 dB from a theoretical 'perfect parabolic surface'). **High gain for the Hero antenna line attests to this factor.**

Failure to properly attach the flat mesh paneled subsections in a 'clip together' segmented dish such as the Genesis or Paraclipse is less of a designer error than it is an installer error; although poor performance is the result in **either case.** We may not 'like' installing those clips but if we have any amount of experience we know that unless we load the dish down with an adequate number of clips, performance does suffer.

The preformed perforated dishes **may** have an 'RMS error' built into the surface but this is usually not serious deterrent to reasonably good performance unless the designer and/or the installer fails to properly lock the circumference of the dish together around the outer rim. If the inherent 'RMS error' of the surface is compounded by a sloppily prepared locking ring at the circumference, we now have **two major negatives** against the dish; RMS error **plus dish 'warping.'** In effect, we end up with a 'contorted surface' that ripples **AND** bends.

Overall, there is no 'perfect design' yet evident in the mesh surfaced antennas. One antenna's distinct advantage is another antenna's distinct disadvantage and when the pluses and minuses of each approach are listed you end up at about the same spot. The ultimate test and the ultimate advantage, if there is one, goes to the antenna which was assembled in the field by the installer with the greatest skills and care.

GENESIS 10 Footer

Into this quagmire of conflicting antenna claims comes a relatively new 10 foot mesh antenna from **Genesis Manufacturing** (2810 Lawing Lane, Rowlett, Texas 75088; 214/475-4163). The Genesis might be considered a 'later generation' of mesh antennas from the general 'Paraclipse family.' Its creator is a **Doctor Carl Moody** who comes to the TVRO industry from a background of laser (light) technology.

Moody recently provided one of his ten foot mesh dishes to **CSD** for assembly and test and with the assistance of **Frank Abruzzo** and **Alli Lake** of **The Satellite Link** (a Fort Lauderdale, Florida TVRO dealer) we spent a lazy Sunday under the Florida sun assembling and testing this antenna product.

Moody's credentials seem adequate to the task at hand; he participated in the creation of early laser devices and obviously understands the highly refined technologies associated with precision laser optics. He relates that precision and the technology of light reflection and refraction to the microwave surface close tolerances required for a 'high tech' TVRO antenna.

There are a couple of 'differences' in the Doctor Moody version of a mesh antenna:

1) His product is **all aluminum.** There is no steel in the antenna, at all (save those plated bolts and nuts).
2) The **clips** chosen by Doctor Moody **are aluminum as**

GENESIS/ continues on page 50

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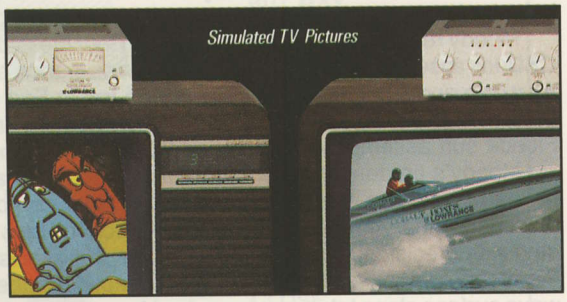

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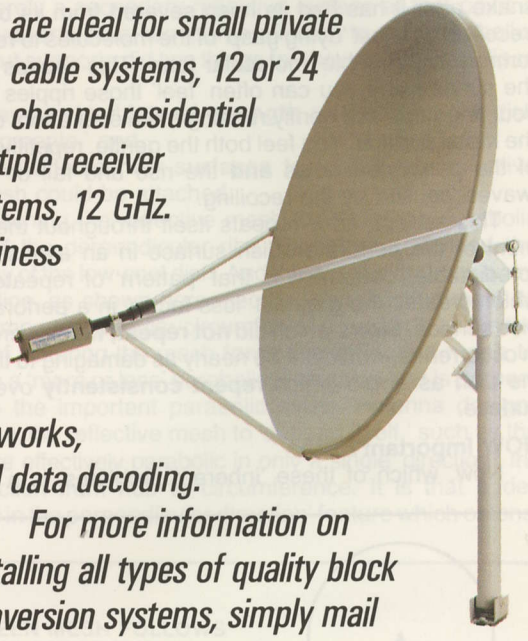

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GENESIS/ continued from page 47

well, and they bend to form during installation with only **light fingertip pressure;** no forming tools or heavy gloves are required to make these clips 'clip.'

3) The full antenna is **UPS shippable** and because of the all aluminum construction it is not as heavy as some of the previous antennas in the same family.

Abruzzo and Lake required two hours and ten minutes time to take the antenna from shipping carton to being ready to 'stick' onto the support pipe. They began by assembling the hub and struts upside down; the center of the hub faced towards the ground and they worked their way around the hub installing first the ribs and then the perpendicular supports which tie the hubs together. There are **five** such circular or perpendicular supports per section and the antenna surface is broken up into **eight** individual panelized segments.

When the rib-support assembly was completed, they flipped the dish over resting it on the flat back of the hub and proceeded to install the mesh surface. Doctor Moody has broken the mesh surfacing into two pieces per panel/segment; an inner piece which starts at the hub and goes out to the second perpendicular support ring and a second which becomes the surface to the outer circumference ring. **The ribs are 'slotted'** so that the individual reflective surface pieces **'slide into the slots'** at each parabolic rib. Abruzzo has learned that if he will spray the slots with some **WD-40** prior to attempting to slide the mesh surface into the slot that the process happens far quicker; the slight lubricant in the WD-40 does indeed speed things up.

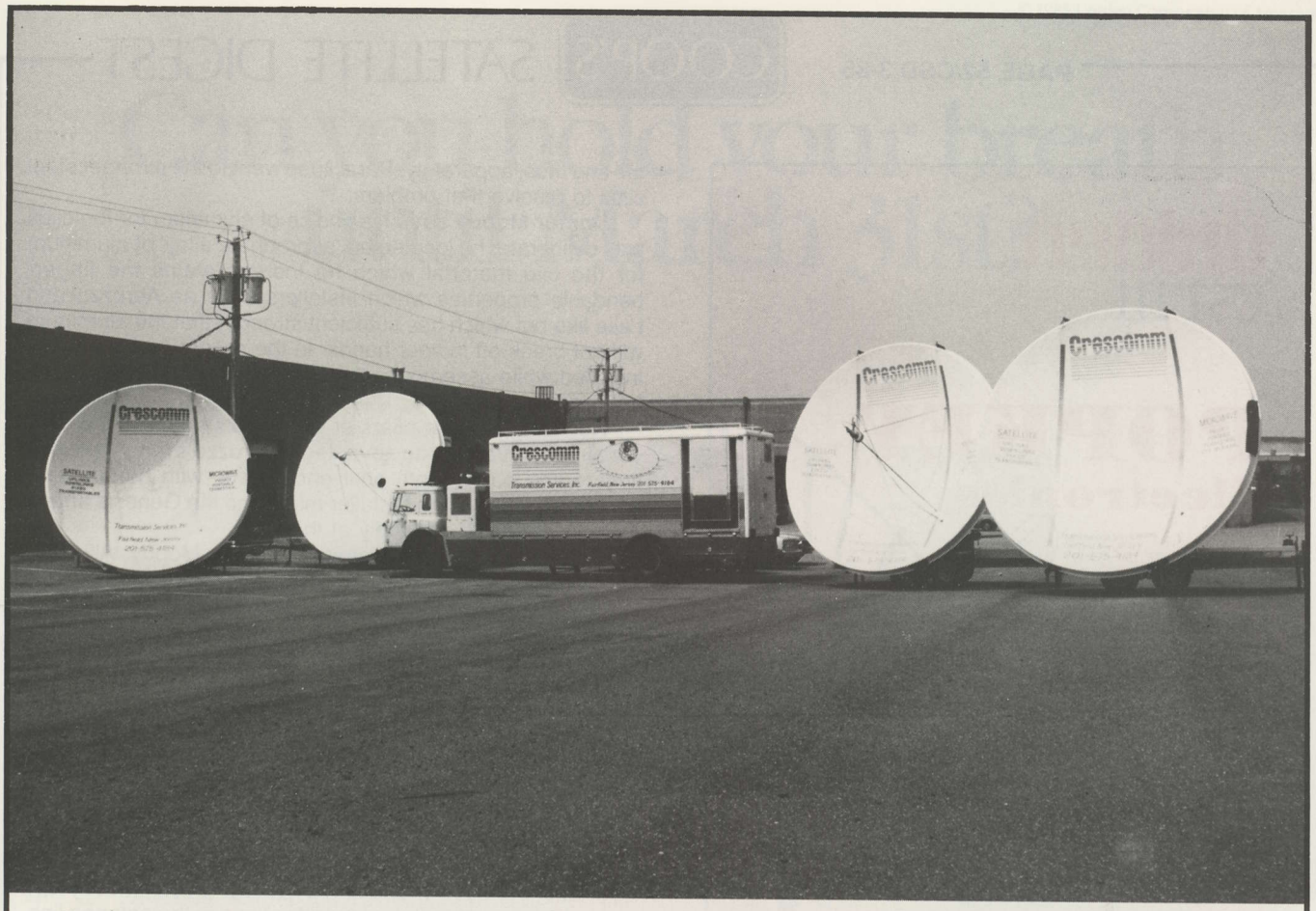
HUB STRUCTURE is assembled upside down on the ground, and flipped over for mesh installation.

As each panel of reflective material is fitted into place, Abruzzo and Lake were especially careful to see that the overlapping portion at the second-outward circumference ring laid very flat. The mesh is 'double-thick' here, from the two pieces which make up the full panel/segment surface. They secured the reflective mesh with three or four clips at this stage of the installation, similar to 'tack welding' metal when you are starting assembly of a project. Then when all of the mesh pieces were fitted and the full dish was surfaced, they went back to complete the assembly of the clips.

As a current-running segment on **BORESIGHT** illustrates **(*)** the aluminum clips **seem like** an advantage to the installer. Abruzzo, who has been a heavy user of Paraclipse antennas (and who continues to use this brand antenna in addition to the newer Genesis) reports that through the several year history of the Paraclipse, there was a period when the clips he received with the antenna were in fact aluminum. He also reports that at that time the clips had a tendency to 'break

ABRUZZO fits the inner piece of reflective mesh to the Genesis antenna.

WHILE one man could **install the all aluminum clips, if you have one above** 'feeding clips' **and one man below** 'fastening clips,' **the job goes much faster.**



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off' and thus, apparently, Paraclipse went to the stronger steel clips to resolve that problem.

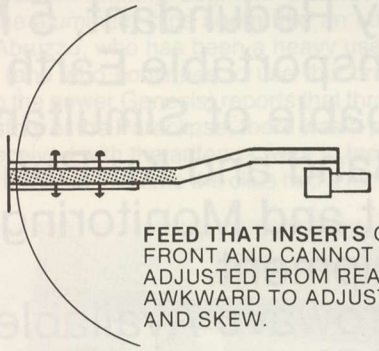
Doctor Moody says his choice of aluminum for the clips was deliberate; he located an 'appropriate alloy' of aluminum for the clip material which he insists retains the finger-bendable properties which installers such as Abruzzo and Lake like but which has sufficient strength that the aluminum will not break off in your hands. In the several hundred clips installed while assembling the Genesis antenna for test, we had **no clips** break off.

Not having to use pliers or other tools to install the clips certainly seemed like an advantage. Abruzzo's amply-bruised fingers and hands from past encounters 'with hundreds of Paraclipses' aside, the installer might find the Genesis antenna more installation friendly at that.

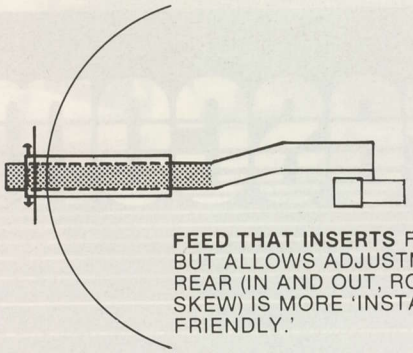
Once surfaced we watched as Doctor Moody, Alli Lake and Frank Abruzzo lifted the antenna to the top of an eight foot pipe mount which had been outfitted with the all aluminum support and mount mechanism of the Genesis. Abruzzo says this is typically a two man job and with a dish lifting mechanism it can be done by one man.

The feed for the Genesis is a buttonhook, prime focus of course. The feedhorn, LNA and support wires are installed first; the RG-213/U and polarization rotor wires fit down **through the tube** and exit the antenna at the rear. Abruzzo pointed out that the tube in the current Genesis antenna run was too small to allow **twin runs** of 213/U for those occasional dual-pole (twin LNA) installations which he favors for SMATV installations in South Florida; a point which Doctor Moody took under advisement for future modifications to the antenna line.

Abruzzo also pointed out the difficulty the feed presents to the installer, since it has to come into the dish from the front and all of the adjustment to the feed focal length is done at the front (it cannot be reached or adjusted from the rear). The focal



FEED THAT INSERTS ONLY FROM FRONT AND CANNOT BE ADJUSTED FROM REAR IS AWKWARD TO ADJUST FOR F/D AND SKEW.



FEED THAT INSERTS FROM FRONT BUT ALLOWS ADJUSTMENT FROM REAR (IN AND OUT, ROTATED FOR SKEW) IS MORE 'INSTALLER FRIENDLY.'

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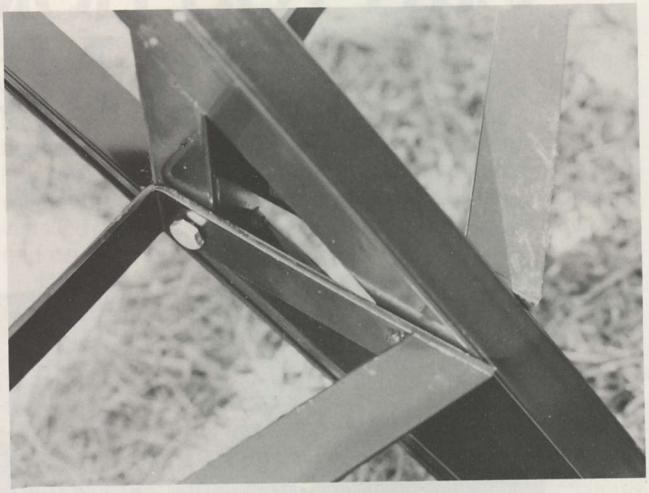
WD-40 is assembly aid to speed up sliding the mesh into channels on struts.



INTERLOCKING perpendicular supports tie the struts rigidly together.

length is set by sliding the tubular feed support in and out within a hub mounted larger diameter pipe that protrudes from the hub. Finger-tight set screws secure the two together at the selected focal length dimension. **You cannot do this adjustment from the rear** and as Abruzzo points out there are installations where it is very difficult if indeed even possible to get to the front of the dish to make this installation. The focal length, with practice, could probably be pre-set by measurement (although we all like to insure that this is the **correct measurement** by moving it in and out from that pre-set or measured spot). But **skew adjustment** is almost impossible to set by 'eyeballing' so there remains a requirement that you be able to reach the front of the dish. Doctor Moody also took this under advisement and promised to look into a modification which would allow adjustment of the focal length (and skew) from the rear of the dish.

PERformance

We had previously done some comparison analysis between the Genesis 10 foot antenna and a 12 foot Paraclipse in South Florida. The 12 footer, as well it should, was more than 1 dB 'hotter' than the Genesis. The added surface area alone would insure that, if both antennas were similar in design quality.

The tough signals in south Florida are channels such as The Weather Channel, WTBS and those that seem to be 'down' in most sections of the country. We found that Genesis had excellent gain and sidelobe performance for a dish of its size and doubt any dealers who try this antenna will be disappointed with the performance.

ERRata

Genesis says they are presently able to produce around 1,500 of these 10 foot antennas per month with increased production capacity in the planning stages. Doctor Moody has already been through several generations of outside 'metal work' sub-contractor suppliers and recently completed an in-house production facility which gives him full control over the antenna from start to finish. The antenna is available either 'bright' or 'coated' and the pricing to dealers is in the $450/$475 region 'bright' and about $100 extra for the powder coated finish version.

*/**Boresight** thru March 21st; Thursdays, 9 p.m. TR20 on Satcom F4.

There is no adequate assembly manual for the antenna as we prepare this report although one is in the works according to Doctor Moody. Hopefully, the manual will stress to the installer the importance of insuring the integrity of the interlocking rib structure to verify that each segment as well as the full dish maintains a true parabolic shape. And hopefully the manual will tell the installer that the clips are there for a **dual purpose;** to **secure** the reflective mesh to the surface AND to insure that the reflective mesh **follows** the quasi-parabolic curve of the perpendicular rib support pieces.

The Genesis is currently being sold through authorized distributors and the marketing plan is evolving to favor that approach. South Florida dealer Frank Abruzzo selected the Genesis to add to his line of antennas because of its assembly ease, good looks and performance. Other dealers will probably find those adequate reasons to give the Genesis consideration for their own installation packages.

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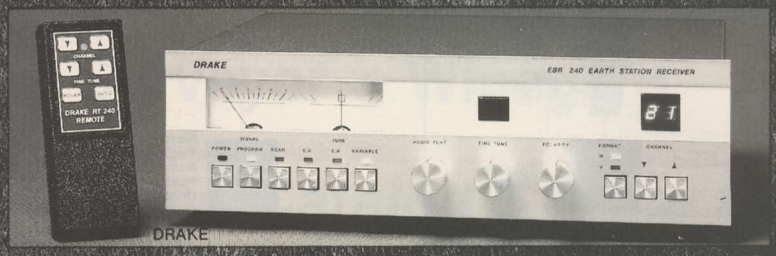

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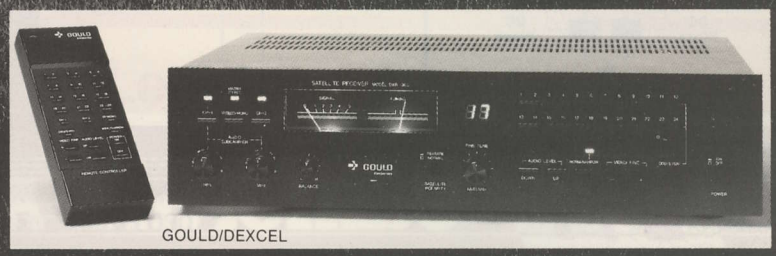

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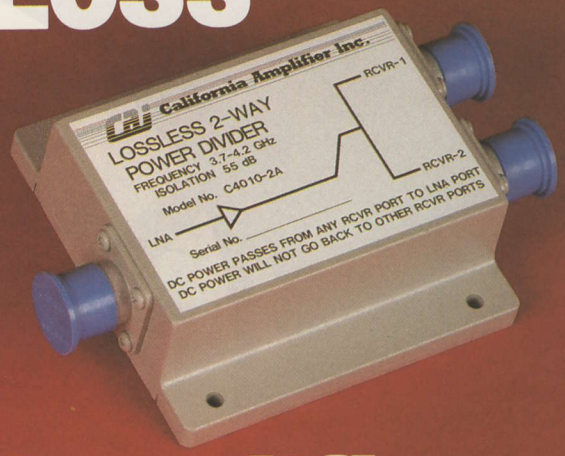

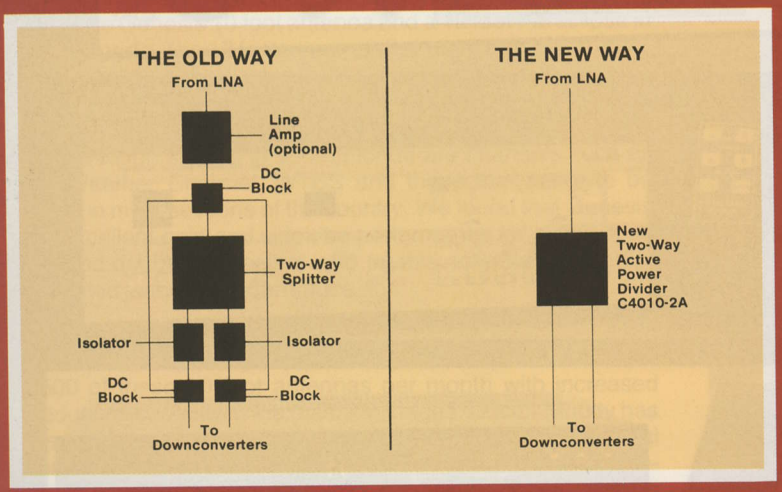

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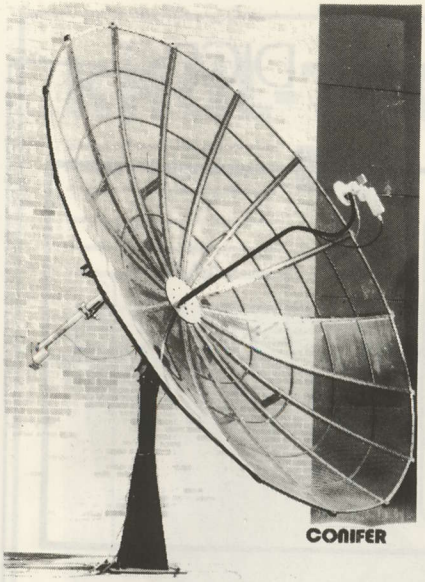

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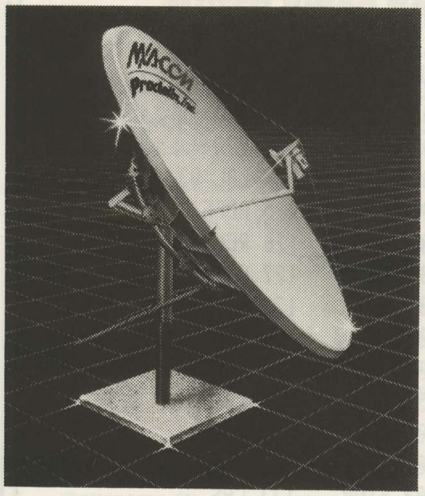

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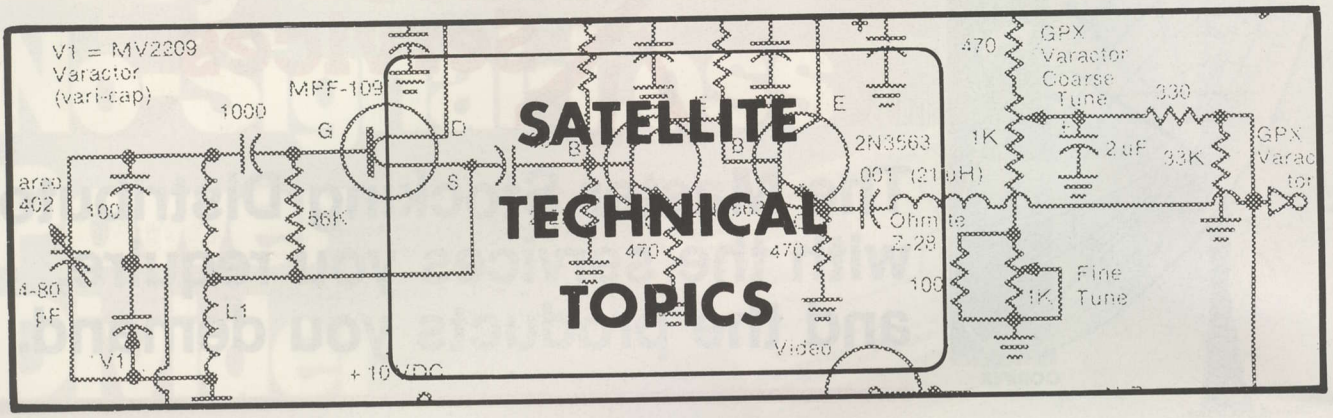

SATELLITE TECHNICAL TOPICS

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Just about everyone who has installed a satellite antenna has at some time or another fiddled around for several hours trying to find the elusive Clarke Orbit Belt only to find that 'someone' has moved it from where it is supposed to be(!), or that 100 degree LNA turned out to be closer to 1000 degrees. The average North American DOMSAT installer is usually able to circumvent the pointing problem after he has floated through the initial installation simply because with the amount of signal available in North America, and the great number of satellites now operating, it is pretty difficult to **not** stumble across a satellite once north has been established!

The rest of the world is a little different story, however. With signal strengths considerably lower and the number of available satellites fewer, the aiming problem can become considerably more difficult. Trying to find an Intelsat 20 dBw signal with a 12 foot dish and an 85 degree LNA doesn't leave much room for error.

The answer then is to have a listing for the location where the dish is being installed of the available satellites to that location; at what azimuth; and a reasonably accurate inclinometer will usually give the installer some chance for success. For several years this installer has used a modified version of the 'Geosat Program' first published in **BYTE** magazine in 1982. The primary disadvantage to this particular program is that it requires a relatively large computer such as the Apple II to run and it had several small, built-in errors. The output listing is very impressive for your prospective customer in say Brisbane; however, what happens when you display the run and your customer then asks what satellites would be available for a buddy who lives on Fiji? If you happen to have your Apple II machine with you (not likely), no problem. It was apparent to me that what the globe-circling TVRO installer really needed was a pocket-carried system to spit out pointing coordinates for anyplace on earth.

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 15 ASTO Y
 16 "E"
 17 ASTO X
 18 X=Y?
 19 XEQ 03
 20 AOFF
 21 "SITE LAT ?"
 22 AVIEW
 23 PSE
 24 "DEG.MINS SECS"
 25 PROMPT
 26 HR
 27 D-R
 28 STO 12
 29 "N OR S ?"
 30 AON
 31 PROMPT
 32 ASTO Y
 33 "S"
 34 ASTO X
 35 X=Y?
 36 XEQ 04

 37♦LBL 02
 38 AOFF
 39 "SAT LONG
 40 AVIEW
 41 PSE
 42 "DEGREES ?"
 43 PROMPT
 44 D-R
 45 STO 10
 46 "E"
 47 ASTO Y
 48 "E OR W"
 49 AON
 50 PROMPT
 51 ASTO X
 52 X=Y?
 53 XEQ 01
 54 AOFF
 55 RAD
 56 RCL 11
 57 RCL 10
 58 -
 59 X<0?
 60 SF 03
 61 STO 13
 62 COS
 63 RCL 12
 64 COS
 65 *
 66 ACOS
 67 STO 14
 68 TAN
 69 RCL 12
 70 CHS
 71 TAN
 72 X<>Y
 73 /
 74 ACOS
 75 STO 15
 76 FS? 03
 77 XEQ 07
 78 STO 16
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 81 ABS
 82 X>Y?
 83 XEQ 06
 84 RCL 16
 85 RCL 14
 86 COS
 87 6.61
 88 1/X
 89 -
 90 RCL 14
 91 COS
 92 RCL 14
 93 COS
 94 *
 95 1
 96 X<>Y
 97 -
 98 SQRT
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102 DEG
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121 CHS
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125 AOFF
126 RCL 11
127 CHS
128 STO 11
129 RTN
130♦LBL 04
131 AOFF
132 RCL 12
133 CHS
134 STO 12
135 RTN
136♦LBL 06
137 RCL 16
138 STO 15
139♦LBL 07
140 PI
141 2
142 *
143 RCL 15
144 -
145 STO 16
146 END
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  Brodhead, WI 608-897-2867
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  Englewood, COL out-of-state 800-423-6894
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  Prairie View, KS 913-973-2777
- SATELLITE VIDEO SERVICES, Rt. 1, Box 85-S
  Catskill, NY 12414 518-678-9581 or 800-528-3474
- SUN SATELLITE SYSTEMS, 905 E. Cumberland St.
  Lebanon, PA 17042 717-272-2064
- B & J ENTERPRISES, Rt. 4, Box 216-A
  Keyser, W VA 26726 304-788-0060
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- IVS, 1742 E. Edgemon
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  Evansville, IN 47710 800-457-3761
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The program displayed here was written from scratch to supplement the hard copy listing designed for the Apple II. It provides a ready reference system which works in either hemisphere with a minimum of button pushing or mental arithmetic. Once the initial longitude and latitude are entered, in response to prompts (degrees, mintues and seconds; leave seconds blank if unknown) the program will prompt for the satellite longitude in degrees. Once the "Degrees ?" prompt is answered, the look angle is displayed and then the azimuth. If an additional look angle is required for the same location, the R/S button on the calculator will prompt for satellite location only, computing the new look angle and azimuth. Restarting the program resets all parameters for a new terrestrial location.

Program steps 01 to 53 initialize the input data. Septs 54 to 104 compute the look angle and azimuth. Subroutines 01 through 07 convert the input data to negative values and azimuth to its reciprocal (for southern hemisphere and eastern latitudes). The program has been used extensively throughout the South Pacific and North America with excellent results. Readers with comments, improvements or requesting mag card copies of the program may communicate with the author at the address shown in the beginning of the report.

*/ Readers wishing to employ this program with a Hewlett Packard 41CV hand held calculator may want to consider sending $15 (US funds) to author Rhys-Williams at his address shown here. The author promises to send back to correspondents a magnetic card with the program, ready to insert into HP 41CV calculators.

INDUSTRY AT LARGE

CORRESPONDENCE, NOTES, REBUTTALS AND CHARGES . . .

CSD provides this industry Forum with the understanding that opinions, thoughts and "facts" published are from the writers, no liability for statements extends to the publishers. Address letters to CSD/Industry P.O. Box 100858 Ft. Lauderdale, FL 33310

Nothing To It

To a new dealer, looking at getting into the TVRO market, your magazine is like bread to a starving man. Especially your reprint of the **CSD Dealer Study** for July 1984; this was like discovering a gold mine!

My shop has always been proud of the quality of the products we sell and we take great pride in our service. I have been interested in expanding into the retailing of TVRO for more than a year but could not find any data, like your magazine, to insure that we continue to provide a quality product for our customers. Now we can and thanks!!!

Les Fischer
Fischer TV Sales and Service
7th and Market
Fulton, Mo. 65251

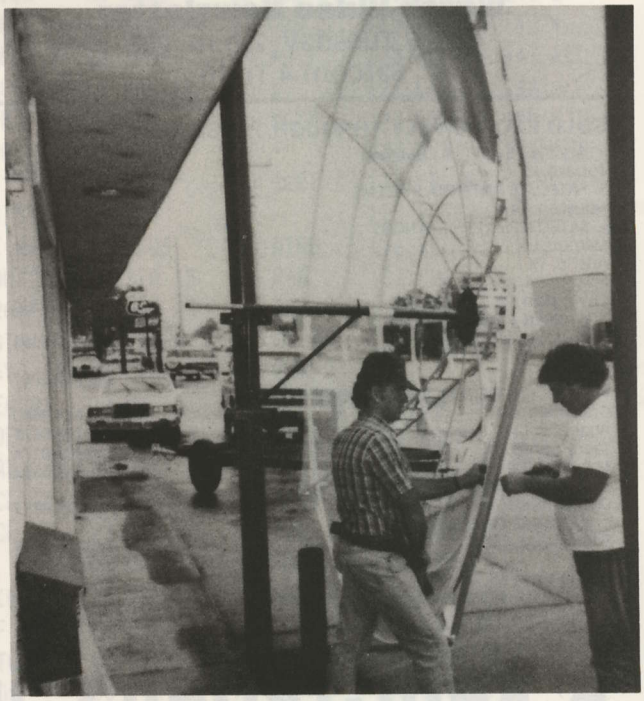
Fischer is one of nearly 300 prospective TVRO dealers who write to CSD each month **as a result of Coop's monthly column in** Radio-Electronics Magazine. **All those writing receive a no-charge data packet consisting of selected reprints from CSD** (such as the July 1984 Dealer Survey mentioned), **a recent issue of CSD + CSD/2, and, data sheets provided to CSD by some of the leading suppliers in the industry. This is our CSD effort to attract new,** qualified sales and service centers **into the TVRO industry and at our present rate of response from the** Radio Electronics **column written by Coop, we will top 3,000 in the first 12 months alone. Who says there are no new people left to attract into TVRO!**

DISH EYE Preventor

Enclosed you will find photographs of a simple device which has saved us countless hours when assembling Paraclipse antennas. We simply mounted a piece of pipe, horizontally, to our building. Now we assemble the Paraclipse dish in the 'vertical' position, rotating the dish on the pipe as we build it. It is an easy matter to slide the dish off the horizontal pipe and bolt it to the trailer upon completion. Obviously there is no need for ladders or anything else out of the ordinary as the rotation of the dish on the pipe allows ground level working on the entire antenna. This device was created by my partner George Sweatt.

There is one more observation which I have concerning Paraclipse-using dealers; **'dish-eye.'** Eventually I think all Paraclipse installers develop this syndrome which consists of crossed-eyes and a total loss of depth perception caused by placing thousands and thousands of those small clips on the antennas!

Mark Brandel (KF4EA)
and George Sweatt (WB4QJP)
Tropical Satellite Systems
P.O. Box 621
Okeechobee, Florida 33472



Very clever! If Paraclipse is 'on the ball' **they'll show up in Vegas with a specially prepared eye cleansing solution appropriately labeled** 'Dish-Eye.' **Small plastic containers of the stuff would make a great give-away at their booth and** 'Doctor Johnson' **could even give** 'free eye tests' **to dealers to see who qualifies for**

the stuff!

NOTHING But Noise

As a subscriber to CSD, I purchased the **'Hidden Signals On Satellite TV'** book this past November. It outlined various techniques used to recover audio from the SCPC signals on satellite.

My first thought was to acquire one of the Hero SCPC receivers; however as of mid-December the SCPC-10 (consumer or home version of the SCPC 66) was still not available at Hero, per Marlene Arkin, so I decided to build my own system following the diagram on page 78 of CSD for June 1984. No results. Using a ten foot dish, a Drake ESR-240 receiver, True-Spec 5 to 500 MHz signal splitter and a J.I.L. SX200 receiver, no signals were heard. Yes, I was on the appropriate satellites and the proper transponders but all I hear is noise. Can you help me find an answer?

Wildon A. Fowler
Rt. 1, Box 37
Hockley, Texas 77447

The diagram appearing on page 78 for June (1984) **displayed a hook-up for those who** DO NOT HAVE **an FM receiver which tunes the 50-90 MHz band. The concept, shown in the diagram, is that the IF band** (50 to 90 MHz) **must be frequency converted to a lower frequency, then demodulated. The demodulated signal that was once** FM **is now turned into** AM **and comes out in the standard broadcast band at about 1400 KHz so you can then** 'listen' **to the originally FM SCPC signals on a standard** AM **table radio. Fowler's J.I.L. SX-200 is a fine direct-tuning** FM receiver **which covers the 50 to 90 MHz band so he no longer requires the Radio Shack 12-1354 FM to AM converter/modulator. We hope others who have tried to copy SCPC FM signals as described in the** 'Hidden Signals' **book have not made the same mistake. When you have a receiver that directly tunes the IF band in question** (such as 50 to 90 MHz, centered on 70 MHz, as the Drake ESR-240 receiver provides), **you no longer have need for an** 'adapter' **such as the Radio Shack piece. And you are actually far better off this way since the Radio Shack piece approach is at best a** 'getting by' **technique with far less satisfactory results.**

MISLEADING Advertising?

The enclosed advertisement appeared in the Sunday **Los Angeles Herald** newspaper. They display a drawing of a Paraclipse antenna and they say the systems are for sale for $995. Now it is obvious to me that you may be able to get a 6 foot system with inferior electronics for $995 but you certainly are not going to get a system that includes a Paraclipse antenna for $995! And the advertisement says nothing about installation nor sales tax. Out of curiosity I called and spoke with a young lady. I found out you get a 5 foot dish with an Astron receiver, Polarotor 1, and 85 degree LNA from California Amplifier. The installation charge is between $250 and $400 plus tax. I asked how many satellites this system would receive and I was told ONE.

What a come-on! She told me a full 9 foot to 12 foot dish system would cost $3,000 or more plus $500 to $800 for the installation. Now that was more in line with what other dealers here are charging. Can't anybody do something about people (dealers) who advertise like this? It ruins the retail sales climate for other dealers because people who don't take the time to check out such low-ball prices, or who do not know enough to understand what they are getting for $995, remember only the price. I'm mad as hell and I'm not going to take this anymore!

Stanley A. Beckham
Vice President
Cox Satellite, Inc.
2209 Foothill Blvd.
La Canada, Ca. 91011

The offensive advertisement is shown here. The firm's name is 'Wholesale Satellite' **and frankly we doubt that very many serious customers would be misled by the advertisement; not in Southern California anyhow! Yes, the ad does mislead to the extend that it says things like** '150 channels' **and** 'adult X' **neither of which are available on a five foot dish pointed at Galaxy 1. At least the lady you spoke with did** 'fess up' **and tell you that this was a** one-bird **system. She also squared with you that the in-**

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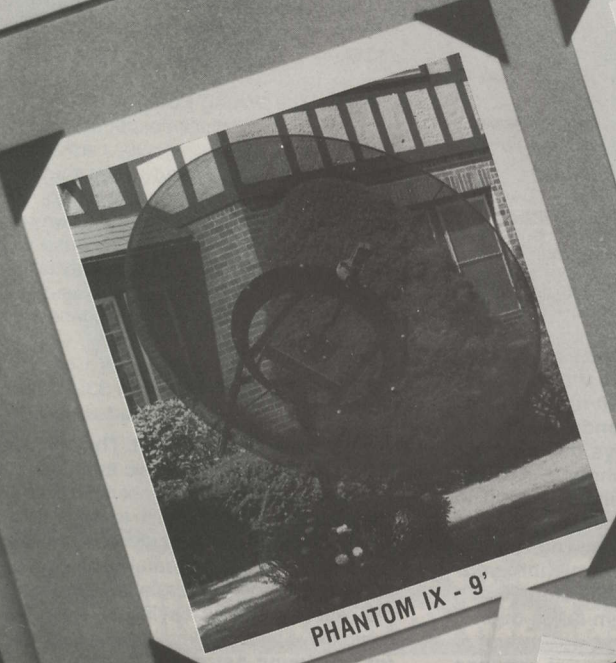
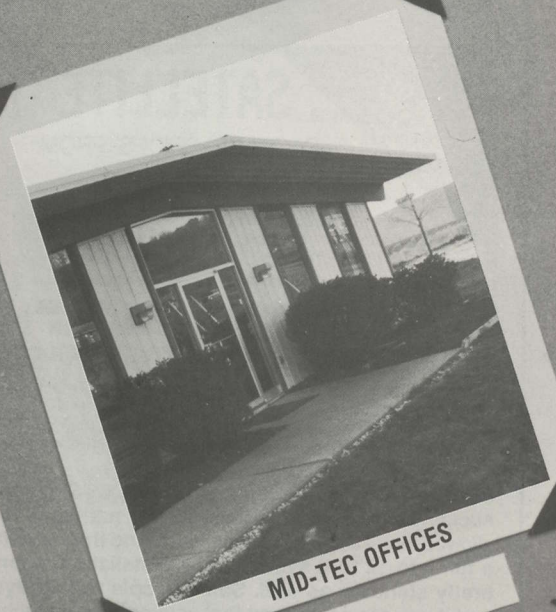
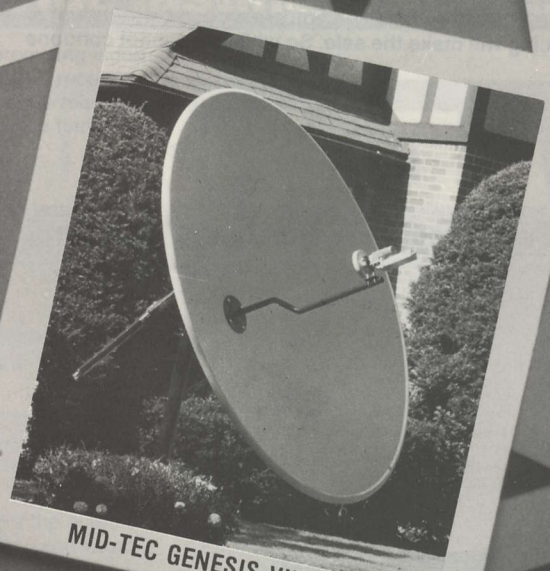


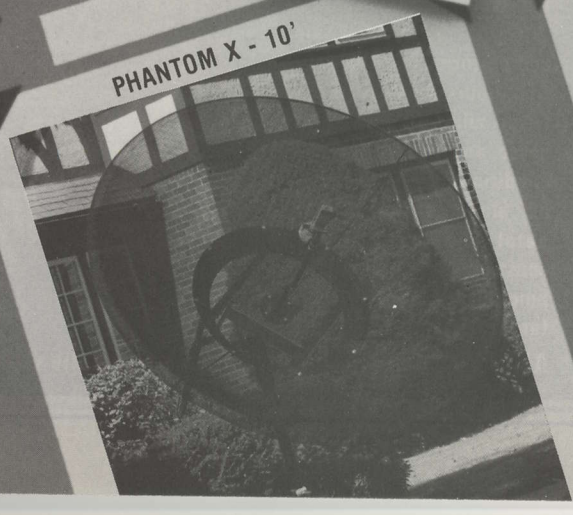
PHANTOM IX - 9'



MID-TEC OFFICES



MID-TEC GENESIS VIII - 8'



PHANTOM X - 10'

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stallation was extra; they could have saved 'that surprise' **until the sucker had the hook swallowed and had gone to their shop** (or allowed their salesman in the home). **And their $3000-up pricing for a full 9 to 12 foot system, plus installation, sounds like that is pretty standard as well. Some people will always buy on price and if you are convinced that** your **only sales technique is to sell on price, perhaps you need to reevaluate your line of work. The professional dealer sells** his knowledge **and** experience **and he charges extra for that knowledge and experience. You too can offer a $995 system and it may well get some people into your store who would not otherwise stop by. Once in the store, that's when** your **mastery of the equipment and system takes over. If** you **are good,** you **will sell them. If you are** not good, **no amount of low-ball pricing will make the sale. So while we cannot condone misleading advertising, there will always be some, someplace. Buying a TVRO is kind of like buying tires; very few consumers understand enough about tires to make an intelligent decision in a world of conflicting claims and tire** 'standards.' **In the end, it is the dealer or salesman who makes the recommendations which most customers accept and put their trust and faith in.**

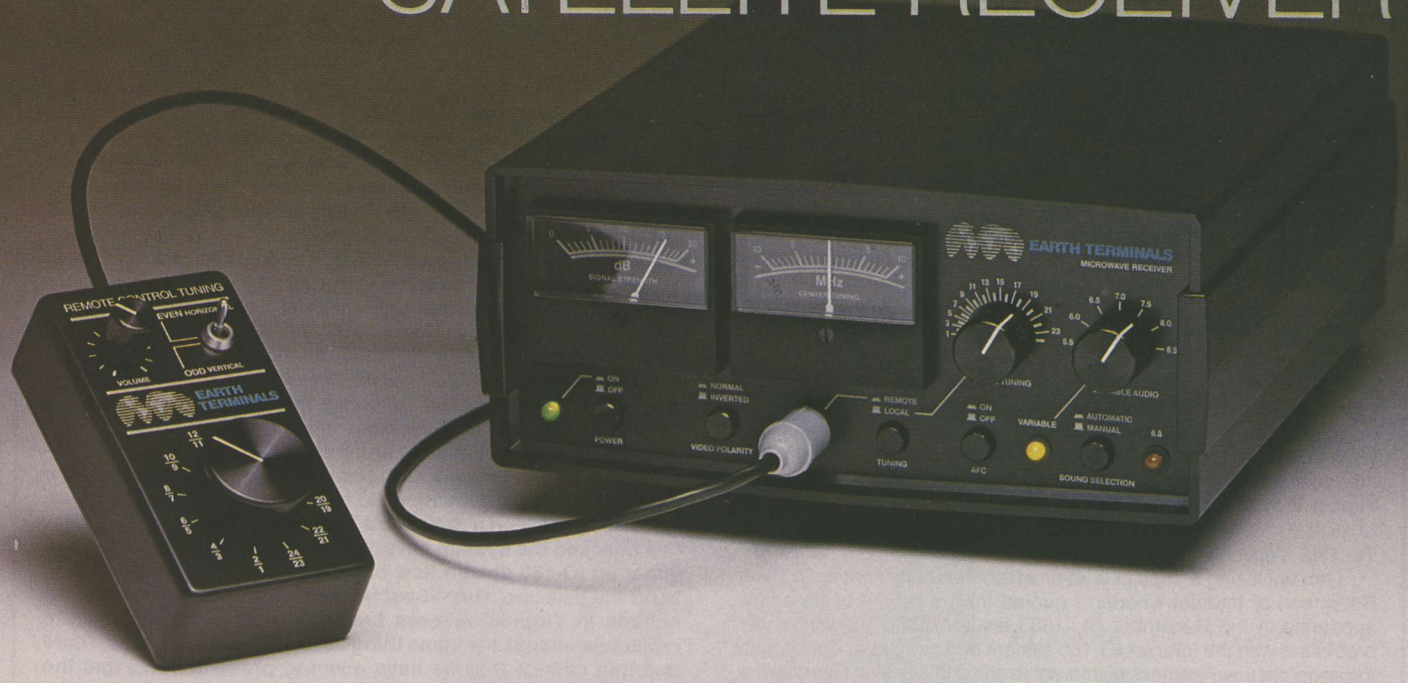
OFF ON The Wrong Foot

I asked the local newspaper to do a story on the Young Astronaut Program, which they did. Don't ask me why or how, but when the newspaper story appeared in print, they missed the entire idea that the Y.A.P. program is an educational tool. The story stated that Y.A.P. was a commercial venture and they wrote that dealers such as myself were headed for a bonanza because of the federal support of the project. Talk about a quick, sure way to kill a project! My face was red when it appeared in print and I wasted no time getting a letter published to straighten out the misconceptions.

Jim Nease
Satellite TV Co.
516 West 33rd
Hays, Kansas 67601

Jim's story did it alright. The paper said (among other things) "(the Y.A.P.) project is music to the ears and perhaps a sale for the business of Jim Nease, owner of Satelite TV company." **And,** "Nease claims selling a satellite dish to Hays' schools would be a break-even thing for him." **The story goes on to quote a teacher who suggests** "I got a pamphlet from a satellite company (but) the project seemed so commercialized (we were not interested) . . .". **Another school official was quoted as saying** 'If a satellite dish is to be purchased, competitive bids will be taken . . .". **Overall, not a positive first step for the Young Astronaut Program in Hays. Jim did go back the**

SATELLITE RECEIVER



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next week with a detailed letter which re-explained the project and it came out far better. However, the initial impressions left by the original story will probably follow Jim and the Y.A.P. project around central Kansas for quite some time.

Meantime the people at the Young Astronaut Program have been causing plenty of confusion on their own. Chapter Certificates have been slow to be processed, not everyone who answers the telephone at Y.A.P. headquarters in Washington seems to know what the project is REALLY all about and some of the information being given out over the telephone is more negative than positive sounding. Apparently the response from TVRO dealers has been much greater than the Y.A.P. folks anticipated and when coupled with a greater response than they were prepared for from the schools themselves, the system is temporarily bogged down in a bureaucratic snafu. Columnist Jack Anderson, who conceived and started the effort and who heads up the advisory board, has been made aware of these problems and we expect they will sort out shortly!

TO THE Top

I am enclosing a copy of a letter which I recently sent to Dr. Tom Robertson of Intersat wherein I quoted from a reprint of an article appearing in the December 01, 1983 issue of **CSD** magazine. My problem is with the Intersat IQ-160 system and more specifically, with the apparent unwillingness of Intersat to admit to a design flaw with the system and to do something about the apparent flaw.

Since writing my letter to Doctor Robertson, I have spoken with Jim Clarke of M/A-Com Omni-Spectra and he has assured me that the problem I am having is not isolated to my dealer (Eastern Shore Satellite Systems, Inc.) nor to this portion of the country; the problem is a consistent one across the country.

It is my hope that through letters such as this, and to SPACE, sufficient pressure will be brought to bare on Intersat by the members of the TVRO industry to correct any possible design flaws. If there is anything which **CSD** can do, I would appreciate your efforts. I do not want other 'unsuspecting consumers' to suffer as I have.

Kenneth E. Hudson
P.O. Box 41
Wallops Island, Virginia 23337

Hudson's problem apparently is with the interfacing between the IQ-160 and the pin-diode polarizer from Omni-Spectra. Hudson complains that when switching from one polarization (vertical) **to the other** (horizontal), **he experiences a slow deterioration of the horizontal side signals. The IQ-160 does this switching** 'automatically' **as the receiver steps through the channels. No probe moves in the Omni-Spectra feed; rather pin diodes are** 'switched' **as covered in some detail in** CSD **for** March 01, 1984. **Replacement of the Omni-Spectra unit did not clear up the problem, suggesting that the appropriate switching voltage** (generated in the IQ-160) **is not reaching the polarization switching device. Or, that the receiver does indeed generate the required voltage at the** instant **of switch-command but somehow this voltage is shifting after switching resulting in gradual deterioration of the signal after switching** (to horizontal). **The consumer** (Mr. Hudson) **is between a rock and a hard place; his installing dealer has checked the system several times and feels the problem is either an IQ-160 design flaw or unfixable. Intersat suggests he send** 'the defective' **Omni-Spectra unit back to Omni-Spectra but nobody in Virginia believes the Omni unit is at fault since a replacement does the same thing as the troublesome unit. There is a thin chance that we have a wiring problem here; that the appropriate leads** (two) **which carry the pin diode instruction** (switching) **voltages are somehow** 'crossed' **and leaking voltage between the two** 'active' **leads resulting in a break down of the pin diode switching instructions. We publish this letter to** highlight a growing trend **for** 'strange problems' **in the field to baffle both the user, his dealer and the original OEMs. For every problem there** is **a solution and we have a suggestion on solving such problems:**

1) Starting with an early issue, **CSD** will begin publishing 'strange problems' in a special magazine section. Dealers who have strange, seemingly unsolvable problems are asked to send in a complete description of the equipment and the problem. **Each**

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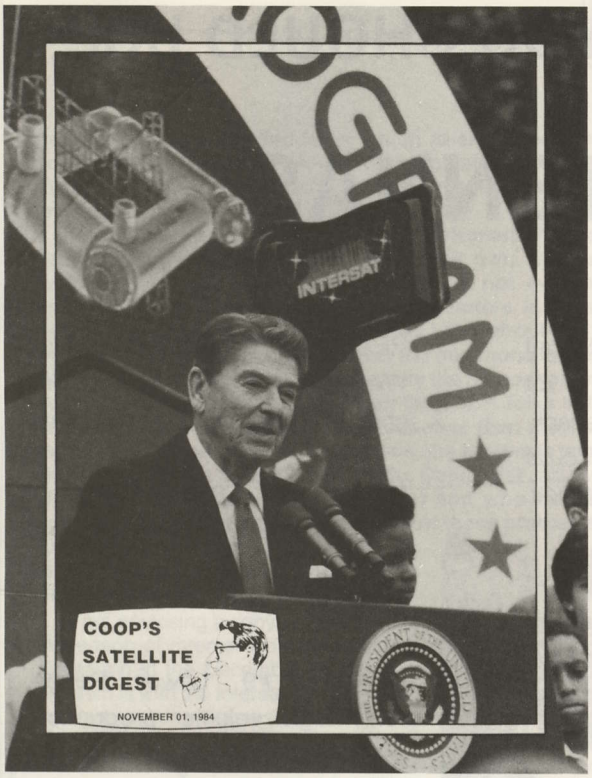

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CORRESPONDENCE/ continues from page 66

month we will select the best problem or problems for publication.

2) Then for the first and best answer solving the problem published, we will award a ($25) cash prize to the reader who supplies a solution.
3) Where a dealer has found a strange problem and worked out the solution on his own, CSD will award a $50 cash prize for submission of **both** the problem **and** the solution at the same time.

Only those solutions published or those problems and solutions published will be eligible for prize money. That's it; send in your problems and your solutions and we'll all get smarter!

TRANSPONDER WATCH

RECENT REPORTS OF ACTIVITY ON DOMESTIC / INTERNATIONAL SATELLITES

Send your reports to CSD Transponder Watch, P.O. Box 100858, Ft. Lauderdale, FL 33310. For late news, call (305) 771-0505.

STATE of Oregon is latest to require that TVRO equipment sold in jurisdiction be 'UL approved'. UL approval requires submission of units and backup engineering data to Underwriter's Laboratory. When UL finds equipment 'not acceptable', manufacturer must modify circuits as required or not sell where UL approval is required.

JAPAN will proceed to purchase one or more US built satellites and funding is likely to come from export banking arrangement in Japan.

SHUTTLE launch costs going up in October by 22.5%. The White House has adopted a new 'full-cost-recovery' program mandating that whatever it costs to fly the shuttle must now be borne by users. In past, government has 'subsidized' portion of Shuttle launch expenses. Full 'rental' of Shuttle will now run more than $82,000,000; split between individual users.

ZAPMAIL, the innovative satellite-linked two hour delivery service of Federal Express, lost $85,000,000 during first five months of operation. Not to worry; firm says they expected huge losses initially and coming up later this year will be customer on-premise (12 GHz) receive and transmit terminals to make service even faster.

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3 conductors #20 shielded w/drain wire
3 conductors #18 shielded
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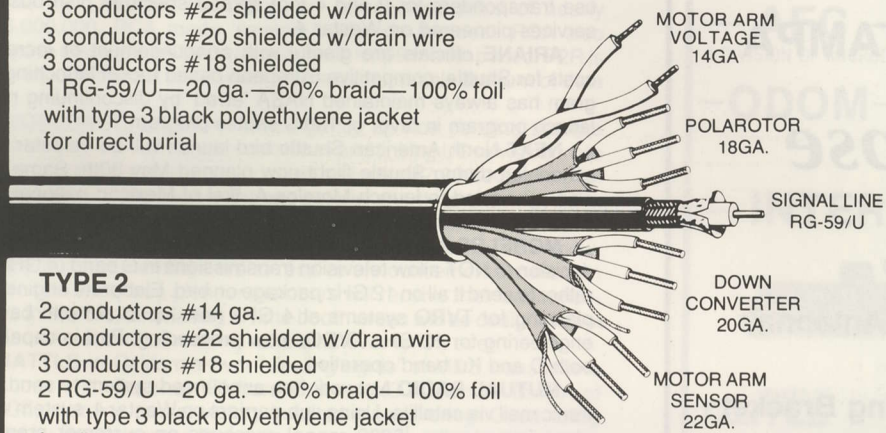
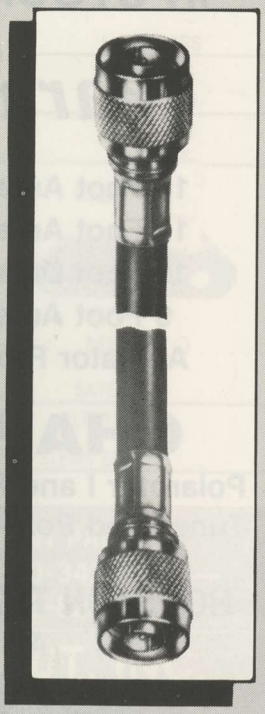
with type 3 black polyethylene jacket
for direct burial





TYPE 2
2 conductors #14 ga.
3 conductors #22 shielded w/drain wire
3 conductors #18 shielded
2 RG-59/U—20 ga.—60% braid—100% foil
with type 3 black polyethylene jacket
for direct burial

TYPE 3
2 conductors #12 ga.
3 conductors #22 shielded w/drain
3 conductors #20 shielded w/drain wire
3 conductors #18 shielded
1 RG-6/U—18 ga.—60% braid—100% foil
with type 3 black polyethylene jacket
for direct burial

TYPE 4
2 conductors #12 ga.
3 conductors #22 shielded w/drain wire
3 conductors #20 shielded w/drain wire
3 conductors #18 shielded
2 RG-6/U—18 ga.—60% braid—100% foil
with type 3 black polyethylene jacket
for direct burial

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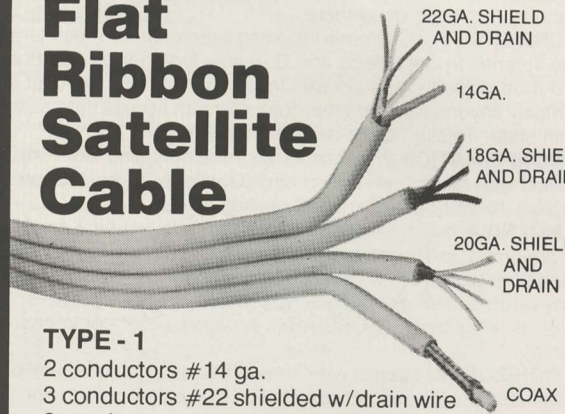
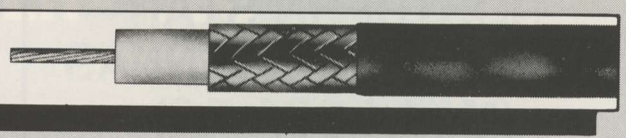
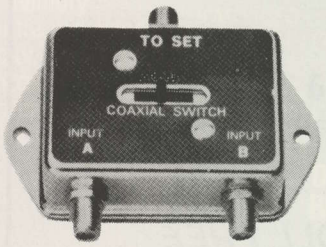
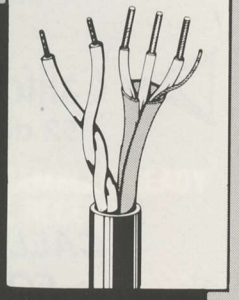


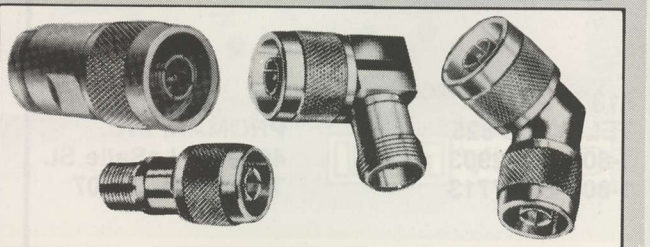
TYPE - 1
2 conductors #14 ga.
3 conductors #22 shielded w/drain wire
3 conductors #20 shielded w/drain wire
2 conductors #18 shielded w/drain wire
1 RG-59/U—20 ga.—95% copper braid

TYPE - 2
2 conductor #14 ga.
2 conductor #20 shielded w/drain wire
2 conductor #18 shielded w/drain wire
1-RG-59/U—20 ga.—95% copper braid
1-RG-6/U—18 ga.—95% copper braid









GALAXY 3 is sold-out; Equatorial communications agreed to purchase 12 transponders while MCI already owns 11. Equatorial will use transponders for 2 and 4 foot spread spectrum dish business services pioneered on Westar 4.

ARIANE officials are gleeful with announcement of increased costs for Shuttle; competitive European based rocket launching program has always maintained NASA 'erred' by discontinuing rocket launch program in favor of 100% shuttle program.

NEXT North American Shuttle bird launch will be Telestar 3 (D) scheduled during Shuttle flight now planned May 30th. Same flight also scheduled to launch Morelos-A; first of Mexican national communication satellites.

MORELOS plan for Mexico in state of confusion after apparent decision to NOT allow television transmissions in C band (4 GHz) but rather to send it all on 12 GHz package on bird. Elaborate engineering planning for TVRO systems at 4 GHz now 'up in air' with back-up engineering for 12 GHz TVROs now proceeding. Bird is capable of both C and Ku band operation.

MUTUAL RADIO Network has announced system to send electronic mail via satellite. Using sub-carriers on Westar 4, system would place inexpensive ($200 range) receivers on customer premises. Mutual radio net affiliates would receive sub-carrier from Westar 4, transfer data to their own (FM broadcast) sub-carrier for broadcasting to their normal coverage region. Individual terminals will have individual addresses.

SENATOR Barry Goldwater introduced resolution into US Senate **(S.35 is designation number)** calling on cities and states not to impede growth of TVRO by adopting unreasonable and restrictive zoning regulations for TVRO antennas. Support for motion is asked; details from SPACE at 703/549-6990.

MEXICAN based TVRO hardware production firm is 'challenging' Japanese manufacturers to compete with his labor and cost-per-unit rates. Az-Tek, Inc. with US offices in Douglas, Arizona (602/364-3427) says they can turn around new products in two weeks or less at full labor rate of under $5 per hour.

SPACE proposal to fund national consumer awareness advertising program for TVRO now in hands of joint awareness-budget committee group. Plans are to present 1985 budget (starts April 01) which includes funding for consumer awareness program.

JAPAN plans for domestic satellites still pointing at use of 30 GHz 'Ka' band rather than C (4 GHz) or Ku (12 GHz). Japanese contend that extensive use of 4 and 12 GHz frequencies in Japan precludes widespread growth of 'low-cost' receive terminals at two lower bands. No operating 30 GHz bird in orbit although limited testing with 'beacons' has been done there.

UNIVERSITY of California installing 9 meter and 6 meter terminals to tie libraries in San Diego and Berkeley together as first phase of state-wide unified database for University libraries. Concept is that ultimately anyone with personal computer can access data base from within state. Telstar 302 is bird carrying link.

CONFIRMATION that Soviets did trade out aging Gorizont bird at 14 west with newer generation bird (Gorizont 10) on 1 September. Gorizont 10 had been launched on August 1st.

MOLNIYA bird system of Russians made unusual switch from 'Programma 1' to 'Programma 2' 1 January. Both are Russian, internal national networks but '1' service which Molniya has distributed for many years is more akin to PBS type service in states while 'Programma 2' is akin to NBC/CBS/ABC services (less commercials, of course).

GORIZONT at 14 west went through 'unusual' operational pattern on January 23rd leading to speculation that either ground controllers lost bird briefly or another major bird change was taking place at 14 west. All services shut down for several hours and came back on one-at-a-time with obvious testing of facilities.

TDF-1, joint French-German bird which has suffered setbacks because of failures with 200 watt region TWTA amplifiers, now rescheduled for launch July 1986. TDF-2 rescheduled to sometime in 1988.

MARK-OFF RCA's first domestic 12 GHz bird as a potential candidate for Ku band DBS; Rainbow Satellite, Inc. has acquired the bird and will use it primarily for data transmissions.

RUSSIANS may have set 'record' back on January 16th by

launching six separate satellites with single rocket; no details available.

RCA has sold F2R bird to investment group that includes Philip Morris, Inc.; tobacco manufacturer. At reported price of nearly $246,000,000, RCA made 'several bucks' on the deal. RCA also agreed to lease the full bird capacity back for 99 month period. F2R is currently operational at 72° west with a considerable amount of data traffic.

WORLDNET, US Information Agency service sending satellite feeds to American Embassies overseas and linking US news sources with journalists overseas, has doubled budget to $7,000,000 for 1985. USIA plans two hour feed to Europe per day shortly and is negotiating to downlink within Europe on ESC-1 satellite (11 GHz).

SPACE changing policy for booth signups for June Tulsa show. SPACE pioneer members are to receive announcements mailed on March 15th while non-pioneer members will receive their announcements in March 19th mailing. Prime booth areas will be designated as 'Pioneer Area' and others will take whatever is left over.

BATTLE in California over 'viewing rights' of MDS transmitters continues with Attorney Richard Brown (NOT Richard Brown of SPACE) claiming partial victory in latest manuevering. Court ruling gained by Brown agreed that antenna in use by defendent had uses other than MDS and that mere possession of antenna was not an admission of MDS theft.

FCC 'study' suggests that international use of satellites will grow at a steady rate in future decade and they believe growth of uses will offset any market share that can be attributed to competitors to Intelsat, if such competition is ultimately allowed.

NEXT opportunity to 'shuffle' space-segment allocations and bird locations coming up in August when WARC '85 will meet in Geneva.

ALTERNATE to attending SPACE/STTI show in Las Vegas; 'Satellite Summit '85' sponsored by Satellite Week/TV Digest, Inc. will convene April 01 in Washington, DC featuring world leaders in satellite communications policy (information from 202/872-9200).

ANIK C1 satellite, placed on for-sale block by Telesat Canada, would be launched whether sold or not. If sold, buyer would take over

bird shortly after launch. If unsold by launch date, bird would go into orbit and be placed in 'storage orbit' inclined some 2.8° from normal Clarke Orbit from which it could be manuevered to operational position when sold.

AMERICAN CHRISTIAN NETWORK may get financing for up to 20,000 TVRO terminals to be located at Baptist and other churches nationwide from ITT Commercial Finance Corporation. ITT recently negotiated TVRO funding arrangement with Odom Antennas in Beebe, Arkansas as an assist to Odom antenna distributors nationwide, and has been financing floor planning for Paradigm Manufacturing (Paraclipse) antennas since mid-1984.

FCC says it wants to maintain cross-polarization on satellites spaced as closely as 2 degrees at 4 GHz. Present plans call for gradual tightening of the orbit belt from earlier 4 degree spacings to ultimate 2 degree spacing. At present time birds are spaced routinely between 2 and 4 degrees. Commission said it recognizes desireability of forcing immediately adjacent satellites to be cross polarized **but** ultimate bird to bird spacings and polarization question require 'additional study'.

SBS-6, future Satellite Business Systems bird now in planning and construction stages, may well have 10 horizontally polarized and 9 vertically polarized transponders each 43 MHz wide and each with 41 rather than 20 watts of power. FCC must approve proposal.

BALTIMORE Zoning case reached temporary end when City officials settled on compromises. Approved are 6 foot dishes, mesh or wire screen only; anything larger requires a waiver of zoning regulations. List of locations exempted from zoning requirements got longer to include schools, libraries, art galleries and museums, aquariums, planetariums, churches, hotels, motels, VFW and American Legion posts and housing for elderly and nursing homes. SPACE plans to appeal.

JAPAN, now shooting for May 1989 operational date with DBS satellite dubbed 'BSE-3,' has created a DBS promotional program to begin paving the way for public acceptance of new multi-channel service. They call themselves 'Japan Satellite Broadcasting, Inc.' and it has 188 member firms.

COOP/ continued from page 5

Cable firms have big problems with internal security; a guy making $3.30 an hour to hook up and disconnect customers **is tempted** when somebody offers him $20 or $100 to 'hook me up and forget about it.' A California cable firm recently cracked down on an organized employee ring and found that more than 10,000 homes had been hooked up in their franchise area by the ring which was stealing the cable firm's converters and supplies to make the hook-ups for a flat $100 fee. That was a cool $1,000,000 the ring took in with no overhead; they were even using cable firm vehicles to do their work! Worse yet, when the cable firm did an audit of its total system, they found illegal subscribers outnumbered legal subscribers!

Another hard-to-detect trick is to sign up for 'basic cable,' the typical 12 or 20 channel service, but **turn down the offers** for premium channels. The cable company **thinks** you are receiving **just the basic service,** at perhaps $9.95 a month, when in truth you are getting everything they have, without paying the premium fees. This works because the customer can walk into Radio Shack or any number of other stores and buy 'cable converters'; boxes that tune-in those mid and super band channels where many of the premium services are 'hidden.' Some cable services make a half-hearted attempt to scramble these premium service channels with an annoying audio tone and a series of lines that 'beat' across the screen. A $15 trap cures it and these traps sell all over most cable towns.

People moving in and out of apartments and houses present another challenge; the 'Jones Family' had cable but they moved. The 'Smith Family' moves in and finds the cable line still in place. The cable company, short handed and staffed by $3.30 an hour help, never gets around to disconnecting the Jones 'tap.' The Smiths watch cable for free, maybe forever, because of sloppy cable operations.

Cable's 5,000,000 plus illegal subscribers stealing HBO and Showtime and others represents a very significant bucket of lost revenue to the cable firms. If HBO et al average $10 a month, that says more than $50,000,000 a month or $600,000,000 a year is being lost

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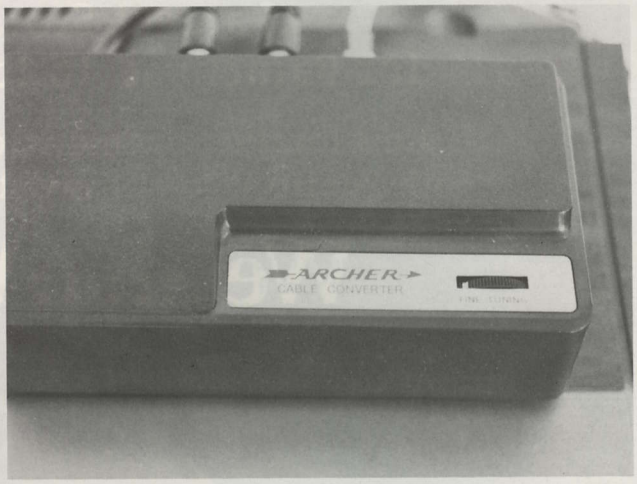
by cable firms. And since HBO and Showtime collect an average of 50% of each such premium dollar paid to the cable companies, they are collectively losing some $300,000,000 a year.

Nothing HBO nor Showtime are now doing will resolve this growing problem. Every foot of new cable laid behind apartments in urban and suburban areas increases cable's theft problems. Scrambling of the satellite feeds has no part in this scenario since the cable firms use HBO or Showtime descramblers to unscramble the signals before they place those signals into their cable plants for local distribution.

The number of real dollars lost by cable in 1984 **was greater than** the number of real dollars received by **ALL of the OEMs in our industry,** combined. In other words, dollar for dollar, cable theft was a 'larger industry' in 1984 than TVRO was at the OEM/importer level. Sobering numbers.



RADIO SHACK cable converters retail for $29.95 and allow the buyer to tune in virtually any cable mid or super band channel he wishes. And, most newer TV sets have 'cable ready tuners' **so even Radio Shack is not a required part in the theft of cable services.**

What does any of this have to do with HBO and Showtime's decision to scramble satellite TV feeds? Just this.

HBO and Showtime are, by virtue of their present cable affiliate agreements, leaving $600,000,000 plus laying on the ground this year because they are not willing to **enforce** their agreements with their affiliates. Those agreements very clearly insist that the cable operator 'protect from theft or unauthorized use' any HBO (etc.) programming provided to them. But when the cable operator can't handle the problem, nothing is done to punish him.

We, on the other hand, **are about to be punished** because **we** are not willing to lay down and roll over, dead, when HBO beckons and we don't snap to attention at the first blast of the whistle. HBO says we WILL accept THEIR plan for premium service bundling and premium service packaging, or else. Or else?

Or else they will simple scramble and leave us with nothing at all to watch!

So why should they be so 'hard' on us when they are obviously so 'soft' on their cable affiliates? Maybe it's because HBO and Showtime are themselves cable operators and they don't want to spend the money required, **at the system level,** to clean up their own security problem. Maybe the wrong guys are in the driver's seat here.

Maybe what should be done is that the people who are REALLY being hurt here, the movie producers, should jump up and down and scream that HBO and Showtime, through their lax affiliate policy, are allowing 5,000,000 or more US homes to watch premium movies without paying for those movies. Sure, the cable firms get hurt and HBO gets hurt and one would think that with $600,000,000 laying on the ground in 1984, they would do **something** about it. But maybe cable is too fat, so dumb, and so happy with life the way it is, that they don't **really care** about a lousy $600,000,000 or so.

I suspect that if the movie industry really woke up to this problem,

they would care. Because they are losing arond $150,000,000 themselves when 5,000,000 US homes tie into their local cable service channels without paying for it.

The next time a cable operator calls you or your customers 'a thief,' ask him about the 'illegal taps' on his system. Ask him about the President of The Movie Channel admitting there are more than 5,000,000 US homes 'stealing premium cable TV' and ask him what **he** is doing about collecting from **everyone** on **his system** who is watching **his service.** Before cable gets so involved in telling us how to run our business, maybe they should step back a few paces and see how their own is being run. Perhaps then they will stop throwing rocks at us long enough to realize that they live in a far bigger glass house than we do and any rocks they throw our way are apt to bust a few of their own panes in the process.

*/BORESIGHT TVRO Magazine airs each Thursday at 9 PM eastern time on RCA F4,TR20.

SHOWING Off

More and more dealers are telling me that they are past $500,000, past $750,000, even past $1,000,000 in annual retail sales of TVRO systems. They attribute their growth to a rapid rise in consumer awareness and their own ability to do well in their selected marketplaces.

I am also hearing more and more about dealers who are spending money on television advertising; it seems to come second only to newspaper and often ahead of radio. Certainly it costs more than radio and the dollars being spent here therefore add up faster.

Television advertising takes two forms; commercials created by the local television station (you grab a news cameraman and his Minicam and head for your store or somebody's yard where there is a TVRO), and, agency produced high quality commercials. Both cost some bucks to create although many TV stations will reduce the production rates (i.e. the costs associated with creating the commercials) if the dealer/advertiser will buy a 'package of spots' on the station.

I characterize commercials made by TV station crews as 'tire kicker' or 'used car' commercials. Some are good, most are not. You get the usual shot of the front of the store, a shot or two of inside the store, guys playing with knobs on equipment and the mandatory TV screen photos of ESPN, CNN and a handful of other generic channels. The audio copy tells the viewer that the firm is professional, offers a wide range of equipment choices, and offers financing terms. These are not usually very effective commercials although they probably pay their way.

A far better approach is to go out and find somebody with the necessary talents to create a commercial or series of commercials which establishes a mood for the viewer. Advertising is both message content (i.e. what is said) and 'image.' Used car commercials are basically 'what is said' commercials. Their image, if there, is actually negative because the **way** it is said turns off many qualified buyers. Viewers are, in a word, offended by the approach taken by the commercial. It is not very professional.

Creating **real** commercials, ones that linger in people's subconscious mind, is a real trick. It takes talent, and a feeling for what motivates the consumer. That kind of motivational creativity requires special people with special talents. And that costs extra dollars.

Not every 'market' (TV station broadcasting region) has people with those talents. I was therefore delighted to find a fellow near Orlando, Florida who has been creating some very special 'theme TV commercials' for dealers in Florida. **Joe Begalla** is his name and his firm is Management Resources Group **(*)**. Here's Joe's approach:

> **He creates a series of commercials which individually focus on the many pleasures of owning a TVRO; movies, sports, news, opera . . . you name it. He does the commercials with an opening and closing** 'visual theme' **so that they have** 'continity'; **each commercial is a part of a** 'series' **which builds an** 'image' **in the viewer/prospect's mind. In short, the first one is like opening up the foreward on a good book and getting engrossed in the contents described. Then the next four are like individual chapters, each telling the same message** (TVRO ownership is great!!!) **in a subtly different way.**

The visual effects are excellent and the audio copy is excellent.

Joe brought his series of five commercials to me to view one day recently and I ran them several times to make sure I fully understood each of the 'hidden' motivational messages he had built in.

Others will do this. Joe has done it first and he is offering this package of commercials under 'license' to one dealer in each 'market.' One dealer in Big Springs/Midland/Odessa, for example, would use these commercials under license or contract and nobody else would be allowed to do so. Within that 'market,' Joe is the creative arm of the dealer's television advertising program. You might see the same commercials, **customized for another dealer,** in the Amarillo market but not in Midland/Odessa/Big Springs.

Prices are 'up there' if you think in terms of standing you and your tech in front of the store shop window and mouthing 'come on down and see us' into the newsman's TV camera lens. But the impact of professional video commercials is so much greater and the results so much better that there is really no comparison between the two approaches.

Joe is onto a good concept and others who may have similar concepts will get equal time from me. Dealers need professional sales aids (Joe has a package of customized radio commercials as well and is working on some print media materials) and we encourage Joe and others to stay with it during 1985.

*/ Management Resources Group, 107 Virginia Avenue (north), Winter Park, Fl. 32789; 305/645-2611.

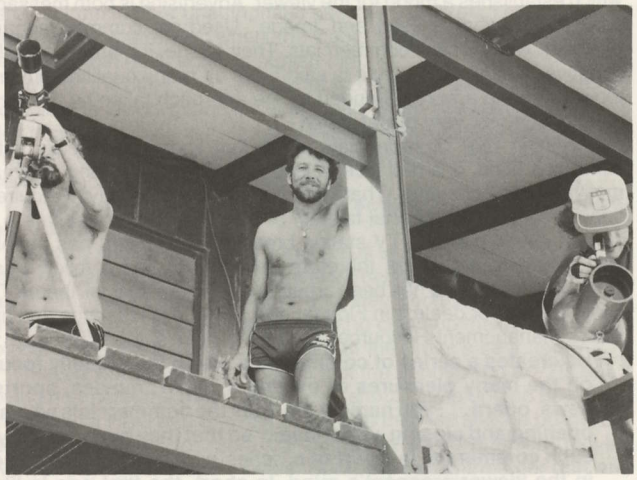
MEDDER-PIs

Last month I noted that since December 22nd **my white sandy beach** on Provo has been overrun with the nude bodies of dozens and hundreds of temporary tenants down at **Club Med;** a vacation resort that just opened on Provo.

Upon hearing this 'shocking news' quite a few of my 'friends' from the TVRO industry decided the only humanitarian thing to do was to hop on the first airplane heading south and help me defend the place from these sun-crazed nude interlopers. Among the first to arrive were **Jamie Gowen** and **Ed Randall** from ADM along with TVRO dealer **Greg Heifner** of Columbia, Missouri whom they conned into making the trip with them. Perhaps because Heifner has his own plane and could pilot them all the way had some bearing on their inviting him to tag along.

I appreciate the help since I was here alone and weakening steadily as each new day brought another herd of nudies bashing against my sand dunes and attempting to scale our fence. Fortunately the 'Medders' don't venture out at night so I had been able to stop defending long enough to eat and sleep myself.

Over a case of St. Pauli Girl brew we planned the next day's defensive actions. Heifner, a professional photographer, felt sure the



ADM's ED RANDALL (left), **Jamie Gowen, and Columbia, Missouri dealer Greg Heifner scan the beach for any signs of the** 'first wave' **of nudies from Club Med. Randall escaped Provo with a roll of undeveloped film he shot of** 'Medders' **frolicking in the sand and he promises to share prints** 'behind the ADM booth' **in Vegas.**

BORESIGHT

ON THE TUBE . . .

3/07

STEEL mesh versus aluminum mesh; what's the difference and how does that difference influence the dealer? Compare the two here, **and,** decide!

Your Industry's Weekly Video Showcase!

GIGGLES NEXT/ Missouri dealer Heifner waits his turn with the telescope as Gowen zeroes in on an unsuspecting Medder Nudie a half mile down the beach.

nudies would break and run if he shoved a 5 inch giant lens up their . . . well, nose. I assured him that cameras were not a deterrent since it was obvious to me that most of these crazed people actually enjoyed 'parading.' We retired early after introducing Jamie to 'Caicos Coffee' at the Third Turtle Inn and Ed 'volunteered' for the first day-watch. The sun was up at 6 AM and so was Ed. Spying no nudies on the beach directly in front of WIV, he started down the beach towards the much feared Club Med facility. Hours later he returned, worn, bedraggled, and smiling a lot. Actually it was hard to tell when he was smiling since he had developed a seemingly incurable case of 'giggles.' By this time I had one of Kevin's three wheelers running and Jamie took off for Club Med dodging the nude bodies now drifting down the beach in our direction. We held our hands over our hearts and bid brave Jamie a farewell. He might not return! Or worse yet, he might return with an incurable case of 'the giggles' just like Randall.

Jamie returned just in time to save Heifner from burning up his Nikkon autowind camera; a brazen hussy had paraded to directly in front of WIV and proceeded to remove her top and then the bottom of an already skimpy swimsuit in a not very tasteful display of flesh. Jamie reported **'hundreds and hundreds of them, lying** (laying?) **all over the beach in front of** 'The Med' **soaking up the sun's rays!'** I advised him that this is how they 'charged their batteries' and by noon the much feared invasion would come our way. Heifner had dunked his Nikkon in a pail of water to stop the steaming and Randall was sitting there giggling out of control. Was this the same Ed Randall who braved the back streets of Bombay in the fall of '83?

Well, this is not a pretty story and the intelligent thing for me to do is to report that by the time this particular trio left the WIV compound they had turned into blithering idiots. Some fool had suggested that they actually 'charge' the enemy fortress by walking into 'The Med' for an evening of up-close investigation. They did this while I, being the older and wiser of the quartet, stayed inside the compound to watch that week's **BORESIGHT** program (talk about loyalty, Shaun!). Randall and Gowen engaged in a game while 'crashing' the inner sanctum of 'The Med'; they tried to pick out the people they had seen earlier in the day, nude, now that most were fully dressed for eating (it is refreshing to learn that they don't eat in the nude). I have this visual image of Randall walking up to a lady and asking her to 'unbutton her blouse' so he could 'check to see if she was the same one he saw that morning.'

With Randall still giggling and Gowen begging to be allowed to stay another day Heifner and I loaded them into Heifner's plane **three days** after they stopped by to stay **one night.** I appreciate their concern and the concern of the others who have graciously 'volunteered' to come down to help me defend my compound. But in all honesty, I am not equipped here to tie people up or lock them in their rooms when they become incoherent. If you are going to volunteer for this terrible duty, you had better be strong, brave, **and blind!** Or you may be a giggling idiot when you leave . . . on a stretcher.

SR-X

FROM USS MASPRO

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Now SAT-TEC offers you a new dimension in satellite TV entertainment—freedom of choice.

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she watches her favorite program
he watches his favorite program
it's easy with SAT-TEC'S R-5100

R-5100—THE FIRST <u>AFFORDABLE</u> BLOCK RECEIVER THAT'S WORTH MORE

SAT-TEC introduces the first affordable block receiver that's reliable, too. The R-5100's new-generation circuitry delivers unsurpassed performance and picture quality. And it has features you won't find on many other units, such as the convenient A/B switch that automatically switches your TV from the VHF to the dish antenna. The R-5100 interfaces with the Polarotor I™, doubling your viewing capability, and a skew control easily adjusts the polarotor for optimum performance. AGC (automatic gain control) and AFC (automatic fine tune) are standard, built-in features that insure consistently sharp and clear pictures. Circuit boards are plated through, not just on the surface, for good, strong solder joints. A built-in crystal-controlled modulator gives you additional insurance of reliable performance. The downconverter is a commercial-grade unit with a DRO (Dielectric resonator oscillator) circuit that guards against signal fluctuations due to outside temperature variations. The result is superstable incoming signals for a beautiful picture.

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If you're seriously considering investing in a satellite TV system, consider the benefits the R-5100 block receiver can offer. You have the freedom to watch any channel you want, in peace, while everyone else does the same. You can even share a dish with one or more of your neighbors, thereby minimizing your investment while maximizing your TV entertainment.

Ask your dealer to show you the new dimension in satellite TV entertainment. Ask for a demonstration of the block receiver that's reliable <u>and</u> easy to own—the SAT-TEC R-5100.

SAT-TEC

SAT-TEC SALES, INC.

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Penfield, N.Y. 14526
(716) 586-3950
Telex 466735 RAMSEY CI