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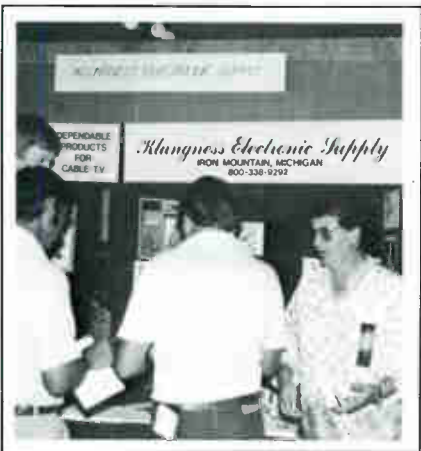
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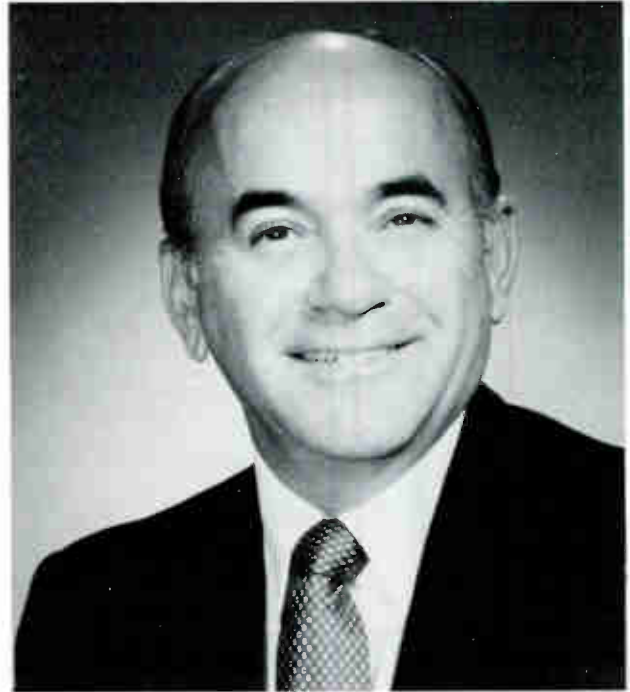
ABOUT THE COVER

An impressive lift-off of the GALAXY I launch featuring the coverage of this event by Wayne Sheldon, Chairman of the CATA Engineering Committee, who represented CATJ at the invitation of Hughes Communications.

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There's No Business Like Show Business



Peter Athanas
President of CATA

Now that the Community Antenna Television Association's CCOS-'83 (CATA Cable Operators Seminar 1983) in Hot Springs, Arkansas is over, it might be a good time to reflect on all of the shows that the cable television industry is experiencing these days. There's no question that CCOS-'83 was a success! The membership learned from it, the staff is happy that it's over, and the Board of Directors considered that it went off very well. But what are all the trade shows and meetings in the cable industry about, what is their purpose, and do we have too many of them?

Well, in the first place, there are at least three distinct types of meetings taking place in the industry today. The first type is the traditional meeting of the State Association, Regional Association, or in the case of CATA, our CCOS — a meeting where cable operators get together to learn about the latest technology, happenings, lobbying, and to talk to each other, visit, share their experiences and, coincidentally, have a good time. Over the years,

these meetings have also included small displays by the various suppliers to the industry which helped cable operators learn more about what's going on in terms of equipment, supplies, and software.

The second category of meeting is the training seminar. These are the more formal classroom type trainings that get much more detailed. CATA's technical training program, as well as many of the programs put on by the SCTE and CTAM, would fit in this category. They are probably the most useful type of program for the cable industry, particularly in the technical area right now, since improvements are desperately needed in our technical capabilities. Of course, the more complex the marketing chore for cable television, the more we are going to need those same type of training seminars for our managers as well, and that's what CTAM is doing right now.

The third type of meeting and the one I'd like to focus on here for a moment is the trade show. These are the shows that are getting bigger every year, that

are drawing in more people, and that are putting tremendous burdens on the suppliers of the cable television industry because of the cost and the number of trade shows now taking place around the country. Why are they happening? Well, of course, the biggest one, the annual NCTA Show, started out as an association meeting — a get together of the members of the association to conduct their business. That's no longer true since most of the business is done in small back rooms or prior to the big show. It's gotten so big that some suppliers in the process of throwing parties and gala events are spending hundreds of thousands of dollars to entertain a crowd in the thousands. Other trade shows, such as the upcoming Eastern Show, the Illinois/Indiana Show, the Western Show, and soon the Atlantic Show, in part grew out of association meetings, but in another way developed because of a need for financing by some local and regional associations. In either case, that financing is now being accomplished through the mechanism of having a trade show. It's gotten to be too much — shows are getting too big — people are milling around in such large crowds that there is no longer an opportunity

to share information, to sit down, visit, and learn from each other. We are starting to be treated like cattle — shipped from one place to another in buses — thrown onto a floor with thousands and thousands of square feet of exhibits and everyone thrusting a drink in your hand. We think it's time for some restraint.

A recent development is the specialized trade show combined with a training meeting or seminar. That's what the SCTE is doing with its technical tech expos, and they seem to be a good idea. It gets the right people in the right place to see the products that they need to see and learn about them in a technical setting. The same might happen with CTAM's annual meeting where the software suppliers could appear and deal with the marketing questions that would be specifically appropriate for the marketing people at the CTAM Show. However, a big, overall show with everybody there, all vying for the attention of cable operators, seems to be a thing of the past. We would suggest that all of the cable associations take a closer look at what's happening and give both the operators and the suppliers a break. □

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Readers' letters - 2

Melvyn E. Shlank writes from Orange, CT, to express his concern over the effects of the upcoming orbital changes which will include 2 degree spacing of C-Band satellites. He writes:

"Recently I have spoken to several satellite antenna installers who are based in the immediate area, and they all seem to think that there will be no

problem with 2 degree spacing with respect to the size of the receiving antenna.

"With my technical knowledge, especially as reinforced by several items which I have read in the trade press recently, it is of concern to me however as I have gotten the feeling that the smallest dish that may be useable will be four meters or more."

On the same subject, but without the same anxiety, Bill Elmendorf of Lebanon, IL, writes to ask whether I have a constructional design or kit for an LNA in the 75 degree region. He goes on to say "... do you agree that a 1.5 or 2 metre dish, with a low temp LNA/convertor, would be the route to go now in view of the newer birds coming out with more power?"

Antenna size. It isn't such a long time since 3 meters was a novelty. Then for a while every low cost TVRO antenna was 3m or 10ft. Now we have 6ft dishes being marketed for home TVRO, while 11 or 12 to 16ft is recommended for the more serious private user or SMATV system.

Ignoring for the moment the "two degree" problem, the antenna must be specified according to the worst case, the most difficult satellite and transponder the user wishes to yield adequate reception. The hottest transponder on the hottest satellite might be close to 40 dBW at your location, but if the weakest you wish to receive, along with all its subcarrier services, its lower power TWTA and less favorable antenna set, is sending you only 33 dBW then it's 33 dBW you must design for. You must decide whether good pictures on 4 transponders with a 6-foot dish are worth having 13 transponders sprinkled with salt and pepper and 7 transponders looking like a snowstorm.

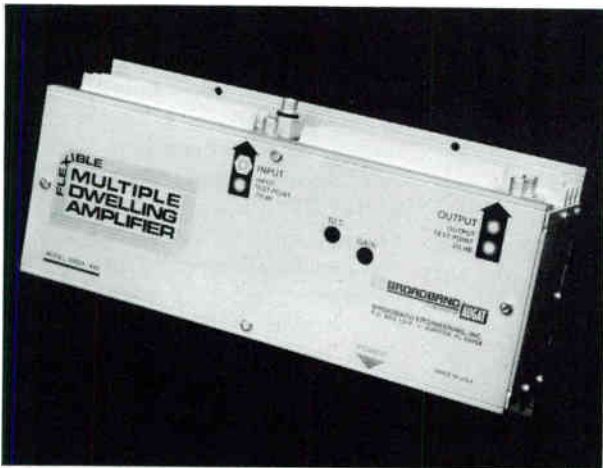
Then again, really good LNAs are

more affordable than ever, and permit some reduction in antenna size before "diminishing returns" set in.

A 40 dBW transponder into a receiver with 27 MHz noise bandwidth and a true extended threshold of 7.5 dB requires a system with a minimum G/T of 9.5 dB/K. This can be obtained with a range of antenna gains and system noise temperatures, e.g. 30 dBi and 110K, 32 dBi and 180K, 34 dBi and 280K. Now 30 dBi corresponds to a 1-meter dish (don't expect any more than 55% efficiency from such a small antenna at 4 GHz). But the noise temperature of the 1-meter dish at (say) 30 degrees elevation might be as high as 50K. So to achieve that 110K system temperature you're going to need a 60K LNA. That's some costly electronics for a little dish (assuming you can get such an LNA.)

The optimum trade-off for the 40 dBW transponder might work out at a 1.6 meter dish and a 120K LNA. But how many transponders deliver 40 dBW? Now consider the weakest transponder you want, which might be 33 dBW, and its video deviation might be low on account of subcarrier loading, so you decide you need 10 dB carrier/noise ratio, even with the extended threshold receiver, to improve the video S/N. Put those figures into the computation and you come up with a G/T of 19.5 dB/K, 10 dB higher than the previous value. That's

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10 times power ratio.

You could achieve that with 42 dBi (3.7 meters) and 180K (150 LNA), or 40 dBi (3 meters) and 110K (80 LNA). Here's where you have to be careful with antenna specs. Some manufacturers seem to claim incredibly high efficiency figures for their antennas. You would be well advised to stay with the established names when buying a "home" antenna — Prodelin and ADM are well respected in this league. Newer products with proven performance are the Paraclype and the revolutionary Harris Delta-Gain antenna. 100 degree LNAs are a bargain at present — their pricing should soon reach down to the 90 degree spec, but if your calculations point to a lower noise temperature requirement you might be better to increase antenna size instead — you're less likely that way to encounter problems due to antenna noise being higher than expected.

Now suppose you decide to drop that 3 dB margin over threshold. So you're looking for a system with G/T of 16.5 dB/K. You 42 dBi (3.7 meter) antenna now needs a system noise temperature of 250K (120 LNA with room to spare). The 40 dBi (3-meter) system is also well within spec with the 120 LNA. An 8ft antenna will give a gain of 37.5 dBi, requiring an 85 degree LNA. Decibels gained with LNA noise temperature are expensive dB in small dish systems. Here at least it looks like the 3-metre is the best choice.

Again, perhaps that 33 dBW transponder isn't worth risking hassle from the neighbors over a 3-metre dish. Most of the others are around 35-36 dBW in your area. So aim for G/T of 14.5 dBW. That you can do with an 8-foot, 120K system. But you might just be disappointed in the results so close to threshold.

All the necessary equations to work out these trade-offs can be found in back issues of CATJ, especially this column for November 1978 and April 1980. The great unknown is usually the transponder EIRP. Here is where the local dealer's experience is of real value. He has installed a variety of systems in your own local area, and has gone through his own learning process (we all make mistakes at first) to arrive at the package he is confi-

dent to recommend.

"No problem" seems to me part of the American way of life. Does anyone believe it, or does it reveal a more optimistic outlook than we enjoy back here in Europe? Or is it some kind of magic to make the impossible happen? There must be that slightest shadow of doubt when even the most experienced local dealer says 2 degree spacing will be "no problem", just as when he says the sparklies all over the TV in his showroom will not infect your tube when he puts that same 6-foot system in your garden.

4 GHz TVRO in North America has become an unofficial DBS. And being unofficial, there are no safeguards or securities built into the industry that services it. The industry must police itself. There are a lot of people in there for a fast million, and never mind integrity or the future of the industry. And it is left to the industry journals to shoot down the cowboys. In my splendid isolation here in the Forest of Dean, I am in no position to tell you who to avoid — I can only try to give you some of the technical know-how to know what should look good, and why.

To me it is clear that two degree spacing and less-than-3-meter antennas don't mix. Microdyne's David L. Alvarez published a splendid paper in CATJ January 1981, detailing his tests to establish carrier to interference and antenna beamwidth criteria relevant to satellite spacing. He concluded that in a worst case situation with interfering satellites spaced three degrees each side of the target satellite, transmitting on the same frequency but with 5 dB greater EIRP, there would be no perceptible interference in a 3-meter TVRO terminal.

Extrapolating from Alvarez' data, it would appear that severe interference would result in the circumstances described, if the adjacent satellites were each two degrees away from the wanted satellite, but that if the interfering satellites' EIRP were reduced by 5 dB, so as to be equal to that of the wanted satellite, then interference would be just perceptible in the 3-meter terminal. Removal of one of the interfering satellites (3 dB improvement) would render the interference imperceptible.

Alvarez supposes the interfering

downlinks to be co-channel with the wanted transmission. In the case of satellites placed with alternating channel/polarization allocations (e.g. a new Westar between two Satcoms) it would seem that 3 meters and two degrees could co-exist, and that in some cases a smaller antenna could successfully be employed.

If that sounds to you like a lot of ifs, ands and buts then perhaps you should play safe and go for a 12 foot antenna. I think many people will be surprised at first by just how well the six and eight foot merchants handle two-degree spacing, especially when they demonstrate the most favorable transponder combinations on each satellite. The difficult ones will soon come to light, and reveal the need for the larger dish. And we must not neglect the work being done right now by antenna designers, attempting to reduce main beam width on small antennas, or to introduce nulls at positions corresponding to two degree orbital separation. This R & D could well yield a new class of small antenna engineered for the two degree environment. How long before someone announces the **interferometer feed**?

No simple answer here, but a lot of factors to discuss, consider and reconsider. I hope the discussion will have shed a little light.

To answer Bill Elmendorf's other question, I decided not to go into print with my 75 degree LNA design. The problem here with current devices is that the circuits require RF tweaking, necessitating swept gain and noise temperature displays to achieve the ultimate performance. And since most folks contemplating a "kitchen table" LNA don't have access to Hewlett-Packard's 8970A, 346B and a microwave sweeper, they end up with an unstable 120 degree unit with large gain variations through the band — they'd have done better to go to Amplica (etc.) . . . Thanks, Bill, for a nice letter.

William Wright, Chief Engineer of Auburn Cablevision, Auburn, N.Y., writes: "The purpose of this letter is to ask you for the formula used in computing sun outage, (a) duration, (b) severity, (c) date, (d) time. I have attempted to get this information on this side of the Atlantic but so far have met with no success."

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William, the basic formulas were published in my CATJ column for November 1979, available as part of CATJ's "Indexed Volume" set. Briefly, they permit conversion of local mean time to Greenwich mean time, derivation of Greenwich hour angle at midnight (using almanac data), conversion to Greenwich hour angle at time of interest, then local hour angle and conversion to sun's azimuth and elevation. It is possible to work the formula backwards, given satellite azimuth and elevation from your location, to find date and time at peaks of outage.

Assuming you can handle mean times and hour angles, and have access to almanac data (US Naval Observatory), here are the "reversed" formulas to derive solar declination (dec) and local hour angle (lha) from elevation (el), azimuth (az) and latitude (lat):

$$\sin(\text{dec}) = \frac{\sin(\text{lat}) \sin(\text{el}) + \cos(\text{lat}) \cos(\text{el}) \cos(\text{az})}{\cos(\text{lat}) \cos(\text{dec})}$$

$$\cos(\text{lha}) = \frac{\sin(\text{el}) - \sin(\text{lat}) \sin(\text{dec})}{\cos(\text{lat}) \cos(\text{dec})}$$

Duration and severity are more of a problem, as they depend upon several factors, including antenna aperture (hence beamwidth), station latitude, satellite EIRP, solar flux density and receiver noise threshold. As a general rule, in middle latitudes with a 3-meter antenna the outage will last for some 24 minutes on the worst day, and will occur on 7 days before and 7 days after that peak occurrence, in each of two periods per year, close to the vernal and autumnal equinoxes. This for any one satellite from a given earth station. Larger antennas result in shorter outages. A satellite close to the station's meridian will suffer outage around noon-time. The further the satellite is stationed west of the station, the later in the afternoon will be the time of outage.

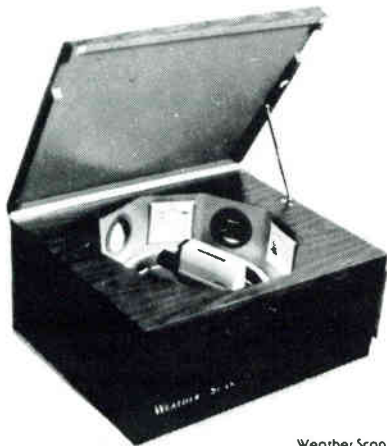
Severity is related to the question of duration: the estimates given above of duration (in minutes per day and days each side of peak) are based on perceptible degradation with a typical 3-meter terminal and a typical 4 GHz satellite. Total wipe-out will of course encompass a correspondingly shorter

period. I intend (when time permits) to develop a computer program to predict solar outage for any location and satellite, in any year.

Before closing this month, I must give a plug to a little book called "The World of Satellite Television" which forms an excellent introduction to our subject for almost anyone. While aimed at the totally non-technical, it describes clearly and concisely all the concepts necessary to understand what purchasing, installing and operating a TVRO terminal are all about. There's a good section on non-US systems, and even those well-versed in satellite TV will learn something here. Meticulous care and a nice touch of humor have gone into the wealth of illustrations throughout the book, and I strongly recommend it to anyone wanting to introduce new staff, their wives, potential customers, (etc) to TVRO.

"The World of Satellite Television" by Mark Long and Jeffrey Keating is published by The Book Publishing Company, Summertown, Tennessee. Price is \$8.95. □

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Glyn Bostick and his team of microwave interference fighters have incorporated the ongoing FILTERED EARTH STATION articles into a 200 page reference manual. Available now, for the first time, the ASTI HANDBOOK shows in detail how to avoid and/or suppress terrestrial interference—even at “hopeless” TVRO sites! ASTI works, and it can save you money. Order now and take advantage of pre-publication price!

What Is ASTI?

Terrestrial interference (TI) is fast becoming a major economic consideration for the installers and operators of TVRO earth terminals. Thousands of dollars, even hundreds of thousands, may be at stake when the earth station is turned on—only to discover that TI is degrading or altogether preventing reception of desired satellite signals.

The purpose of this volume is to introduce ASTI — the avoidance/suppression approach to eliminating TI — to the 3.7-4.2 GHz TVRO industry. Conscientious application of ASTI will reduce the possibility that TI will be encountered at turn-on, increase the probability that unavoidable TI can be suppressed, and enhance the effective operating quality of the TVRO system.

The authors, as designers of microwave filter networks and other TI-suppression techniques, have had ample opportunity to test ASTI — it works! Measured over a period of time, the costs are substantially lower than any alternative, especially in terms of dollars saved when the initial or only site can be made operable. Furthermore, both cost and complexity of filtering to eliminate TI are lowered considerably when the essential aspects of ASTI are employed.

About the Authors:

Glyn Bostick is the founder, president and chief engineer of Microwave Filter Company, Inc. Mr. Bostick, who writes CATJ's monthly "Filtered Earth Station" articles, has been designing filters to suppress interference at CATV systems and TVRO earth stations since 1967.

John Fannetti is MFC's senior technical consultant and head of the company's Field Service Division. He has 30 years of engineering and earth station troubleshooting experience.

William Johnson, chief engineer of R&D, has de-



signed many of MFC's CATV and TVRO products. Mr. Johnson earned his BSEE at Syracuse University and is currently engaged in graduate studies there.

Contents Include:

The TI Avoidance/Suppression Approach; Why Satellites; TI Sources; TI Symptoms; Selecting the Antenna for Least TI; TI Susceptibility of Other TVRO Components; How to Select a Site; The Pre-Installation Site Survey; Defensive Installation; Use of Artificial Shielding; Filtering the TVRO; Filtering Special TVRO Systems, SMATV Techniques; Standard TVRO and Satellite Data; Formulas and Derivations...

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Mr. Steven D. Dorfman, Mr. E. J. Grayer, and Mr. Eddy Hartenstein at Mission Director's Center, Cape Canaveral, Florida awaiting Galaxy 1 launch.

3-2-1 IGNITION

By: Wayne Sheldon
Chairman
CATA Engineering Committee

It was a surprise and great pleasure to me to be invited by Hughes Communications to represent CATJ Magazine on an all expense paid trip to the launch of Galaxy I.

From our arrival at the Orlando Airport to our hotel accommodations to the prelaunch cocktail party and banquet at the Buena Vista Palace to the tour and launch the following day, the entire event was carried off with the great grace and style customary at Hughes functions.

Among those present at this gala were Hughes Communications officials, the owners (or their representatives) of the various transponders, and members of the trade press. At the prelaunch celebration banquet, we were greeted by Steven D. Dorfman, president of Hughes Communications. Clay T. Whitehead, former president of Hughes Communications was praised for his efforts and guidance in getting the company to its present position in the communications industry, but speeches were few and

very short as this was to be an evening of food, fun and entertainment.

The following day, prior to the launch scheduled for 6:30 PM, we were all treated to a guided tour of the facilities at "The Cape," not on the public tour buses, but on four plush, private buses and with NASA personnel as guides. When we arrived there about 2:30 PM, our bus was boarded by a NASA employee named "Rocky" Raab, who acted as our tour guide. This gentleman gave a very lively interesting and witty explanation of everything in the area. The first thing he did was to straighten us out on the name of the place. He informed us that, while there was some confusion during the renaming after President Kennedy's death, this real estate is and always has been Cape Canaveral. Along with the Cape Canaveral Air Force Station, the John F. Kennedy Space Center is located here. Period. ▶

The tour wound past some of the historical launch pads and we were given information on their earlier use. He informed us that it is cheaper to just abandon an obsolete launch facility than it is to tear it down and start over. Some of the reinforced concrete pads are in excess of 30 feet thick and the block houses that housed the technicians had roofs in excess of 40 feet thick, enough to protect the people if the rocket fell directly on top of it, then blew up. You simply don't tear something like this down in an afternoon.

A major part of this tour was the launch pad and support areas for the launch of the space shuttle. Words fail to describe the awesome size of the equipment. All I can say is that it is HUGE.

Some of the things pointed out by our tour guide:

The water tank used to flood the launch pad at lift off holds half a million gallons of water and is completely emptied in 20 seconds. This places a pad of water three feet thick under the rocket and shuttle at lift off. The water is used, not to protect the pad from the heat as much as it is to protect it from accoustical energy which breaks the concrete. The noise is so powerful that it would kill anyone close by. **No one**, except the shuttle crew, is allowed within three miles at lift off.

The fiberglass insulating rod on top of the tower is several feet thick and is eighty feet long. There is a series of cables going from the top of this down to the ground, much like the guy wires on a tower. This is for lightning

protection. The cables form an umbrella like shield to protect the shuttle and tower from damage during a storm.

He told us that if something goes wrong during lift off, there is no escape for the shuttle crew. They must be five minutes into the mission before they can safely return to the runway. If something goes wrong prior to ignition there is an escape route that gets the crew to safety in 15 to 20 seconds.

We next stopped at the assembly building where the shuttle and rocket are assembled. This building covers several acres, is almost sixty stories tall and is completely hollow inside. Rocky said that it took almost two years to learn how to ventilate this building so that under certain weather conditions, it would not cloud up and rain inside. To put things in perspective, he pointed to the flag painted on the side of the building. It looked small, but he said that "each star is six feet high."

After final assembly and test, the completed rocket shuttle assembly is hauled intact to the launch pad. You have probably seen pictures of this machine called the "crawler." but seeing it up close is mind boggling. The hauling surface is equivalent to three football fields. The road this thing travels on looks like a divided highway. There are two caterpillar like tracks on each corner. Each track has 57 pads and each pad weighs a ton, a total of four hundred fifty six tons — just for its tracks. This behemoth is propelled by two 2500 horsepower diesel electric generators and travels at approximately one mile per hour. According to our guide, "it gets about eighteen feet

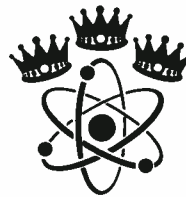
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per gallon, but according to the EPA, depending on road conditions, your driving habits and weather, this may vary and, of course, it will be less in California.”

As launch time was drawing near, we next proceeded to the viewing area. The press area is only 6,000 feet from the launch pad. Our guide informed us that the owners and dignitaries went to a safe area, but that since we, the press, were expendable, we got close up seats.

While waiting for the launch time, Rocky explained the function of NASA and its involvement in domestic satellites. NASA is responsible for the satellite during assembly to the rocket and up to the point that the second stage booster is disengaged. Then it is turned over to the owner and NASA has absolutely no more responsibility and as far as they are concerned, no matter what happens later, if it gets this far, it is a successful launch. NASA is prohibited by law from making a profit, so the owner of the satellite is charged for the exact cost of all the hardware and labor used. No charge is made for the use of the facilities.

The question of insurance came up. We were told that NASA has the insurance on the actual launch, and after the separation from the second stage, the insurance is up to the owner of the satellite. After several launches, someone asked the question, is there a time between these two where neither is responsible? It turns out that there is about three-quarters of a second where this is true. Now they have a multimillion dollar insurance policy that has a life duration of that three-quarters of a second. Lloyds of London is getting rich.

The countdown proceeded smoothly until about the ten minute mark when it was discovered that some of the range safety equipment was not working properly. The launch was put on indefinite hold until this could be fixed. While we were waiting, Rocky explained the major concerns. There are only certain times, called windows, that a satellite can be launched. Because all the cooling equipment and solar panels are not yet working, the satellite can only withstand certain durations of sunlight and darkness. This is achieved by launching at certain times so that the orbit is in the proper amount of sunlight and darkness; hence, the “windows.” These vary from as little as two minutes up to almost an hour in length.

The next problem is that the rocket can only be left loaded with fuel for about one and a half hours and still function properly. The intense cold of the liquid oxygen cools components, freezes valves, cools the solid fuel in the strap-on boosters so that it does not burn properly and many other unkind things. If the rocket sits on the the ground fully loaded with fuel more than the maximum allotted time, the flight is cancelled, the fuel is unloaded, the rocket is allowed to warm up and stabilize for several days and then the whole process starts over. For this particular flight there were three possible windows.

The first window of approximately 20 minutes duration came . . . and went with no word on how long the repairs would take. The second window was only two minutes long and started at 7:04. The tension began to mount as the third window was approaching the maximum time limit for the fuel load. Because of this, only about ten

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Hughes Communications' executives and guests at pre-launch celebration.



Mr. Terence F. McGuirk of Turner Broadcasting Sys., Inc., Mr. Steven D. Dorfman, President of HC at NASA Tour



Post-launch Clambake Celebration

minutes of the third window was available for launch. At a few seconds after 7:00 the word came down that the problem was resolved and that the countdown could resume and just like you see on TV, everything went smoothly. When the controller said, "Ignition," there was a small puff of smoke, then a large ball of fire as lift off started. Watching these things on TV is a kind of ho-hum situation, but being there is a real thrill. It's amazing how quickly that big thing lifted off. Then the sound hit us. It wasn't as loud as I expected, but it had a low rumble that could be felt more than heard.

About one minute out, the first six strap-on solid fuel boosters were ejected. This was plainly visible to the naked eye and we watched them tumble toward the ocean long after the main rocket was out of sight. Reports came back that everything was working flawlessly and that it went into the first orbit as planned. Later in the evening we were informed that the satellite was placed into the elliptical transfer orbit where it would stay for about four days before being placed in the synchronous orbit. We then returned to the hotel for the post launch feast and festivities.

UPDATE August 4

According to a Hughes spokesman, everything is working flawlessly. All the transponders are exceedingly healthy and performing up to all expectations. The footprint is almost as anticipated and all readings are within about 0.2 db of predictions. The transponders were scheduled to be turned over to the owners on August 9.

I have been unable to learn what some of the owners plan to do with their transponders. Turner, HBO and Viacom have given no comment. Group W has announced the formation of their all local sports programming network. For this they will use four transponders for six local and regional areas with a national overview. SIN will have their normal programming and Galavision on their two transponders, and C-SPAN will be here now.

What this means to the average operator is that he will need to spend some more money for another antenna or at least a multiple feed for an existing dish. There will be more programming to put on an already loaded system and so forth. For those who have existing or planned channel capacity, this will be a fine opportunity for additional programming. □

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Washington Update

Steve Effros, Executive Director, CATA



CONGRESSIONAL UPDATE — Where do we go from here on Copyright and Deregulation?

The good news is that this article will not take up this entire issue! We will be able to get on with some of the many other things that are going on in the industry. But, since most of the calls coming into the Washington Office have to do with activities on Capitol Hill, we thought we would give you a quick recap of what is going on. The answer, at least as far as what is happening publicly, is not much.

As you know, S.66 is now history. It has been adopted by the Senate and we have had our time of basking in the glory of that victory. It does us little good, however, if we are not able to accomplish a similar victory in the House, and that is going to be a lot more difficult. No bill has been introduced in the House as yet. The problem is not with the cities. While it is true that there is a significant group of cities lobbying under the banner of the U.S. Conference of Mayors who are opposing the agreement reached between the NCTA and the National League of Cities, and, while it is also true that the

NLC is slowly backing away from support of the "compromise agreement", none of that poses a significant problem to passage in the House. The fact is that the agreement, as embodied in S.66, is a pretty reasonable compromise between the competing interests, and, if that were the crux of the fight in the House, we are confident that we would prevail. However the real battle lies elsewhere.

The so-called "telephone issue" is at the heart of the hold up right now. The telcos are continuing to spread the "big lie" we outlined to you several issues ago. To give you the flavor of this thing, Tom Bolger, the Chairman-Designate of the mid-Atlantic Bell regional holding company (BOC) gave a speech recently to the Great Lakes Conference of Public Utilities Commissioners. He described S.66 as "... the most dangerous obstacle to reasonably priced basic rates in the post divestiture world". Now that is sheer nonsense. He went on to say that "... I don't mind if the cable industry is deregulated. More power to them if they can get that through Congress. But if they are deregulated and allowed to participate in the common carrier business,

deregulate us too. Otherwise, cream-skimming will begin again."

Of course what the telcos are saying in Congress is that because of the recent divestiture decision and the decision by the FCC to eliminate so-called "access charges", local telephone rates will be going up. To date local phone companies have applied for about \$7 Billion in increases and that has the politicians on Capitol Hill **VERY** nervous. But to suggest, as Bolger does, that cable data transmission or "bypass" competition at the local level will have **ANY** significant effect on local rates, let alone be the "... most dangerous", is absurd. However, as you are all well aware, logic and fairness are not strong points on Capitol Hill. Congress is running scared of the telephone company and when that happens, we all suffer.

The bottom line is that until there is some resolution to the supposed impending threat of massive local telephone bill increases, we are not going to get any satisfaction in the House. Toward that end, several Congressmen and Senators have already introduced bills to deal with the problem. None of those bills has anything to do with cable, although we hear that at least one of them may have a cable amendment tacked on to it before it's all done. If, and it is a **big IF**, the telephone cost issue is settled by legislation in the relatively near future, then we can get on with the cable deregulation bill. Another possibility is that the telcos and cable can reach some agreement on the underlying issue of competition in the data and bypass business and that the compromise would be incorporated into a cable bill in the House. Either way, the bottom line is that until the pressure is off of Congress on the "telephone issue", we will not be likely to see a cable bill.

Unfortunately the problems don't end there. To be sure any compromise would be difficult. But the cable industry and the telephone industry generally recognize that despite all the hype, the amount of money involved in cable data transmission in the future, regulated or unregulated is not going to have a significant impact on either industry. Thus, hopefully, a compromise can be reached. That still doesn't mean we will get a bill. The other stumbling block is the demand by Communications Subcommittee Chairman, Tim Wirth, that any cable bill include provisions to deal with what he perceives as the problem of third party access. That's leased access. If you have been reading this material over the years, you will know that we have been pointing to this issue for a long time as one that was eventually going to present a problem for the industry. It is our view that the industry can live with some limited form of leased access. However the form of that access is very difficult to define. We should not give up our First Amendment rights to editorial control over our channels! At the same time, we should assure that cable does not create a "bottleneck" to communications access if, in fact, we are a

monopoly service (which in most cases we deny we are). The details — the mechanics — are very difficult to solve. It is even more problematic because while the Subcommittee Chairman thinks this is a major issue, we are finding that very few of his colleagues agree with him! We are in a position where many Subcommittee members are telling us we are crazy to agree to any form of leased access, and that they will not support such a proposal, while at the same time we are told that the Chairman will not support a bill that does not have those provisions in it! Clearly something has to be done about this conundrum before we will see any action on a cable bill!

And finally, if we get through all of those roadblocks, we will see a cable deregulation bill introduced in the House. Then we will get to debate the main issue of deregulation. Ironically, by then, some of the cities that are now so vocally against a cable bill may "see the light". The fact is that if they don't, they will probably lose a lot of what they want anyway as the telcos and the State agencies take over the regulation of anything involving cable that even looks like a common carrier type service. We find it incredible that the major urban areas don't see that the precise things they are trying to "protect" by blocking cable legislation are the same things the cable industry will be prevented from doing by State agencies if there is no bill!

Let's take an example or two so that you can understand this point and convey it to your local authorities. Almost every major urban area involved in granting a cable franchise today is insisting that the cable operator construct a system that includes an "institutional loop" to allow the city to hook up its buildings for computer interaction and to allow for the offering of data transmission services in the downtown areas. However it is precisely those services that the telephone companies are complaining comprise unfair competition because they are offered outside the traditional common carrier regulated mode now imposed on the telephone companies. Their response in Nebraska; Oregon, New Jersey, New York, Connecticut, New Mexico, and elsewhere has been to go to State authorities and ask them to stop the cable operator from offering "unregulated" services in competition with the telco. In the main, it is expected that the States will grant the wish of the telcos. That will end "institutional loops" before they begin! Cities that think they are about to get "free" data service links are in for a big surprise! The only way that will happen is if the States are prohibited from interfering with the development of such services, and that is what one portion of S.66 is all about.

In any event, from this short overview, it should be clear that we are going to have some tough going before we see a cable deregulation bill in the House. We are going to need every bit of support we can get from all segments of the cable industry to accomplish our goal, particularly since if this effort is

not successful by the end of the year it will become that much harder because election-time will grow near — the “crazy season” in Washington. All operators, big and small, MSO and single independent are working together to win passage of an S.66-like bill in the House. If you need information on what you can do specifically, in addition, of course to continuing to contact your representatives, call the Washington Office.

YES, VIRGINIA, WE ARE WORKING ON COPYRIGHT LEGISLATION TOO!

CATA is not giving up in its efforts to get redress from the recent CRT decision imposing a 3.75% surcharge for the viewing of independent signals in smaller markets. We still reject the notion that folks outside the largest urban areas should be treated as second class citizens when it comes to the question of television viewing. Two bills are now before the House that would deal with the issue. One, the “Synar” bill (H.R. 2702) was introduced by Rep. Mike Synar of Oklahoma. The other, introduced by Texas Congressman Sam Hall (H.R. 3419) is better known as the “Turner” bill since it is being backed by Ted Turner and has also been introduced in the Senate. Copyright subcommittee Chairman Kastenmeier has announced that a tentative date for hearings has been set for October 20 on the two bills. CATA supports both. We are asking you to do the same. By somewhat different mechanisms, which we have described in previous issues, both bills would allow for additional carriage of distant television signals without the imposition of the 3.75% surcharge.

Coincidentally, we have also not given up on seeking other ways around the CRT decision. A second effort at the Copyright Office to get them to interpret the rules to allow for additional carriage (see our explanations of the “CATA loophole”) have met with the same non-answer as the first go-round. The Copyright Office simply refuses to answer the question until after the Court of Appeals rules on the NCTA’s legal challenge to what the CRT did in the first place. Now while we don’t see any connection between the court case and a ruling by the Copyright Office on the interpretation of the law, they are using that case as a convenient excuse to avoid making any definite statements. Since the oral argument in the CRT Court case is coming up on Sept. 21, we will just have to wait and see what happens. There is no legal way we can force them to move any faster! As to bringing any other suits to clarify the issue, we have run out of legal ways of doing that since the only way we can test the rulings in Court is for some cable operator to “violate them first, and the Copyright Office has decided not to collect the surcharge revenue until after the case is over. Thus, we can’t even “create” a violation and then get a test! We will keep you informed of developments as they happen.

THE CABLE IDENTITY CRISIS — IT’S NOT JUST LIMITED TO CITY COUNCILS AND SUBSCRIBERS!

Do YOU know what services you offer on your system? It’s embarrassing to note, but apparently the question has to be asked because of recent experiences that indicate that cable operators themselves are not really sure sometimes.

As you know, we have been saying for a long time that the cable industry has severe problems regarding the perceptions others have of us. This extends to the regulatory authorities who are demanding 120-channel, bells and whistles systems regardless of economic viability to the social engineers who think that the video medium will solve all of our urban ills. It also, of course, goes in the other direction to the STV subscriber who thinks he or she is hooked up to cable. The confusion is only going to get worse as we see the dawning of the multi-channel MDS era and the mass merchandising of Direct Broadcast Satellites.

None of this is new. We warned you in the late ‘70s that program suppliers such as HBO, with the massive nationwide publicity they were generating would create identity problems for cable systems. It is still true today that subscribers say they are “hooked up to HBO” as opposed to understanding that they are hooked up to a cable system which offers various program services including something like HBO, or some other “Pay” channel.

The problem is going to get worse! New ad campaigns from the program suppliers are on the way such as “I want my MTV” which is being rolled out by Warner to promote MTV. The Music Television folks have decided that one way to get you, the cable operator, to carry them on your system is to instigate consumer demand. We can’t argue with that — they are probably right, and we expect other programmers to do the same. CNN and the Playboy Channel come to mind. But such campaigns are certain to also create problems for us as we, as cable operators, try to maintain the identity of the system as opposed to the specific offerings on the system.

Naturally, our first responsibility is to be sure that we know ourselves what we are offering to the public! This comes up because apparently a recent effort by Multichannel News to do a survey of cable operators ran afoul when the numbers came back cockeyed. They did a little research and found that cable operators they were talking to were not as familiar as they should be with the formal names of the program channels they were carrying. Thus operators confused The Nashville, Network with Country Music Television. The result was that CMT appeared to have more subscribers than TNN when exactly the opposite is actually the case! How can you sell your services to subscribers when you don’t even know them yourself?

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Now we know that the "alphabet soup" is getting pretty thick with all of the different services that can now be offered. And in some cases those names and services are changing or dropping just as fast as they appear. But please, folks, make an effort! Pretty soon we will have three different options for viewing "music-type" television. We already have three news channels. There are several financial reporting channels and the list grows longer. Of course we are also losing some. Cable Health Network is merging into Daytime and The Weather Channel may not make it through the storm (see article, this issue). But the point to be made here is that if WE are not clear on what we offer, how can we expect anyone else to be?

The industry is going into high gear with the effort to create a positive image for cable television. We must all work toward that end, and the work begins at home.

This Month's Dose of Cable Reality:

THE WEATHER CHANNEL STORM FRONT — WHOSE PROJECTIONS DO YOU BELIEVE WARNER'S DEFICITS — BELIEVE THEM!

Well, here we are again with this month's installment of cable reality. If anyone is unsure about how speculative the cable television marketplace is, just read on!

It seems that John Coleman, the weatherman turned cable programmer and Landmark Communications, the backer of his "The Weather Channel", have managed to reach the eye of the storm that has been brewing about them for the past several weeks. But as we all know, the eye of the storm means that while it may be calm at the moment, there is a big blow all around you and at best you are only half-way through the problem. The problem, by the way, is pretty clear-cut. Landmark claims that when it got involved with Coleman he agreed that the estimated losses for the first year of operations, according to published reports, would be around \$924,000. Now that is not an overwhelmingly bad figure for a start-up operation. Unfortunately the actual losses are running about \$850,000 per MONTH! The Weather Channel has reportedly lost over \$7 million in its first year of operation, and Landmark indicated that it wanted to get rid of Coleman for poor management. Coleman's response was to get a Court to stop Landmark from throwing him out — at least temporarily. He claimed that he had not gone "one penny" over budget. Well, all we can say is there certainly is a difference between the two when it comes to the projections! Now there has been a temporary halt to the fight with Coleman being given the right to go out for an unspecified period of time and look for a new backer. Clearly Landmark wants out. Several market analysts indicate they think Coleman will have a lot of trouble

finding a new backer, and therefore there is lots of speculation that the Weather Channel itself may not "weather the storm". We'll just have to wait and see.

Another storm that seemed to calm down and is now in full fury again is the attempt to merge The Movie Channel and Showtime. The owners of those services, Warner/Amex and Viacom, had come up with a plan, along with Paramount, MCA and Warner Bros., to combine the two services in order to create a stronger competitor for HBO. Allegedly both services would have continued but under joint management and control. The Justice Department said it did not like the deal because the movie companies would in essence be dealing with themselves and could have frozen out competitors (read HBO). The potential partners went back to Justice with a revised deal that would have included, in essence, a consent decree to assure that they were not taking unfair advantage of their vertical and horizontal integration. Justice has now said no for a second time.

This is yet another episode in the continuing saga of the major movie producers trying to get into the pay cable business. The last major effort was Premier, which was also scotched by the Justice Department. The folks over at HBO must be getting drunk on all the champagne they must be drinking following all these rulings! While the nascent partnership could theoretically challenge the Justice Department decision by going ahead and taking on a law suit over the issue, it is unlikely.

Another programmer who has foundered on the rocks of insufficient financing is TeleFrance, which has announced that its programming, seen on SPN, will cease because of lack of funds.

And finally, in the funding department this month comes Warner/Amex. Boy, did they ever make a mistake. In 1979 in their winning bid for the Pittsburgh franchise, they estimated total construction costs of \$47.8 million. Actual construction costs through 1982 exceed \$80 million and they aren't finished building yet. Oooops.

Warner has been in the financial news a lot lately. Their new Chief, Drew Lewis, keeps saying that they are not a "troubled company" but the parent company, Warner Communications, has posted a whopping \$283.4 million second-quarter loss primarily because of its losses in the home video-game market (Atari). Both Standard & Poor's and Moody's have lowered their ratings and rumors have been floating lately that American Express is not too excited about the whole thing. As a matter of fact, American Express had said specifically that they had no intention of throwing more money into their cable venture, but late in July they changed tunes and announced an infusion of \$100 million into the company with \$50 million coming from American Express and another \$50 million from Warner Communications. They plan to raise a total of \$490 million through a combination of the additional cash

and limited partnerships for their New York City and Milwaukee builds. To give you some idea of how expensive it really is to try to build urban cable systems with all the bells and whistles that have been promised, Warner/Amex has already gone through an \$800 million line of credit and now expects its expenditures to build the big-city systems to reach \$1.3 Billion. Meanwhile, they posted a 1982 loss on the cable ventures of \$46.5 million and expect to see more red ink at the end of this year to the tune of over \$60 million. Somebody over there had better get "troubled" about all that very soon! It sure troubles us — after all, the rest of the cable industry — you know, those of us who built "traditional" cable systems outside the urban centers, are now faced with city councils demanding that we match the extravagances of those money gobblers. We have to make sure that those folks start hearing the truth about what is really happening in the big cities.

FCC ELIMINATES FINANCIAL REPORTING FORM

If you are holding your breath waiting for the mail to arrive to get your FCC Financial Reporting Form so you can spend untold hours trying to figure out how to fill it in, you can breathe now. The Commission has decided to eliminate the reporting form completely. We still have to fill in the 325 form and particularly the EEO material. But the complex financial reports are now a thing of the past.

CABLE PROPERTY TAX — CAN YOU PROVE A CONVERTER DOESN'T HAVE A 15-YEAR LIFE?

If it's not one thing, it's another! Rob Marshall, the ever-vigilant and super-effective Executive Director of the Mid-America Association, brought this one to our attention so we figured it was only fair to let him explain the problem in his own words. This article comes from the June 20 issue of his newsletter:

Within the past year cable operators have faced property tax problems in all four of our states and we're not alone. The most pressing problem is in Kansas where the method of evaluation has been unilaterally changed from original cost less depreciation to a trended cost based on twenty year lives for towers, antennas and microwave equipment, fifteen year lives for distribution plant, and seven years for local origination and test equipment. It seems no one has attempted to collect historical evidence related to cable television equipment sale prices, useful lives or obsolescence. We have been generally limited in negotiations with personal property tax officials to primarily word of mouth best guesses without documentation. On attempting to collect historical sale prices, equipment generations, and so forth from manufacturers, suppliers, cable operators and their home offices we have discovered such records are not readily accessible, if they exist at all. We have talked with marketing departments, accounting and tax departments, engineering

departments, repair facilities and a host of others without much result.

We believe the collection of this information is critical to obtain fair and reasonable property tax valuation in Kansas, and that once collected it would prove valuable for the cable industry nationwide. Can a bureaucrat whose idea that converters have a fifteen year life and whose distribution equipment category includes pressure taps prevail because our industry can't produce hard evidence to demonstrate his ideas about cable system equipment are at best uninformed (and not unique among his colleagues)?

Please call Rob Marshall (913) 887-6119 if you have any material you think might be useful or know of someone who might — or if you or someone you know would be willing to take the time to help develop it. We need it yesterday!

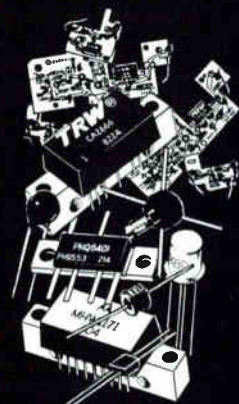
We agree totally with Rob. The information he is trying to develop can be extremely useful for the entire industry and it is an effort we should all participate in. This is particularly true of the CATA Corporate members who are likely to have some of that data from studies done in other states. While Rob will be developing a model for the Kansas fight, it will be made available to any state groups needing it. Let's all pitch in on this one and give Rob a call! (PLEASE DON'T call the Washington CATA Office on this — get together directly with Rob — we have enough trouble!) □

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Quality and Innovation

At first glance, the dish is the most impressive item in the Satellite receiver system. Its' form is unusual to the cable technician who is used to seeing aluminum rods on his antennas, and is generally regarded as dark and mysterious, and yet many cable systems in the country have a large parabolic screen to receive weak TV signals. The problem is one of scale: at microwave wavelengths, the 10' antenna is almost identical to a screen parabolic 250' square at channel 7, and the operation is very similar. Most explanations of the operation of receive antenna's use formula's based on transmit antennas, noting that the functions are identical. This is quite accurate — it's also confusing as hell! Let's try it this way.

What is gain? When we deal with amplifiers, the answer is obvious: put power in; get more power out. But an antenna is a passive device. We can not get more power out than we put in.

Antenna gain is a measure of the directive efficiency of the antenna when compared to a simple point source antenna (Figure 1).

Simply stated; unlike an amplifier, you never get more out of an antenna than you put in; but you do get more than you would receive with a simple dipole; this difference is the gain. The basic reason for gain on a satellite antenna is that the area is much larger than a dipole, and you are collecting all of the signals falling on the antenna into one point (Figure 2). The

operation is fairly straightforward, much like the complex operation of your shaving mirror. There are, however, some points to be considered.

The performance of an antenna has several items which are tied to basic physics, and can not be ignored.

Some examples:

— A 4.5 meter antenna has a theoretical maximum possible gain of 46.1 dB at 4GHz.

— (The actual gain at a top industry performance of 70% will be 44.6dB)

— The beamwidth of a properly designed 4.5 meter antenna at 4GHz will be 1.1° to 1.3°.

These items are **theoretical limits** which can be approached by good manufacturing techniques, but cannot be exceeded. So, if someone offers to sell you 4GHz, 4.5 meter antenna with 52dB gain, beware.

ANTENNA TYPES

There are many ways to make an antenna for microwave frequencies, but only a few are used in Satellite reception. The most common are Parabolic reflector, Spherical reflector, and Horn Parabolic. Others, such as Lens, Cylinder, etc., are occasionally used for experimental purpose, but rarely employed in practice.

The parabolic reflector dish (Figure 3A) is the most common antenna, and

exhibits the following characteristics. Without going into mathematics, the Parabolic shape concentrates the energy falling on it into one point, and the shape is optimized in the boresight direction.

The Spherical reflector is similar, (Figure 3B) but is not optimized in one direction. The reduced efficiency is offset by the fact that the energy falling on it concentrates at a point determined by the direction of the source. Because of this, a Spherical may be used on several Satellite simultaneously.

The Horn parabolic (Figure 3C) is a section from the outer edge of a theoretical large parabolic dish. The use of this section trades the small size of actual antenna against the theoretical beamwidth of the large parabolic. The Horn is used where very good sidelobe rejection is required.

FEEDHORN

Thus we have an antenna of 4.5m diameter, which (if we could collect all of the signal falling on it) would have a gain of 46.1dB (which means that it collects 40,738 times the power that you would collect with a point source antenna). All of this signal is reflected to the focal point, where the

by
Karl Poirier
Vice President of Engineering
Triple Crown Electronics, Inc.

EVERYMAN'S SATELLITE

Part III

The care and feeding of
Satellite Antenna's (and
sundry related subjects)

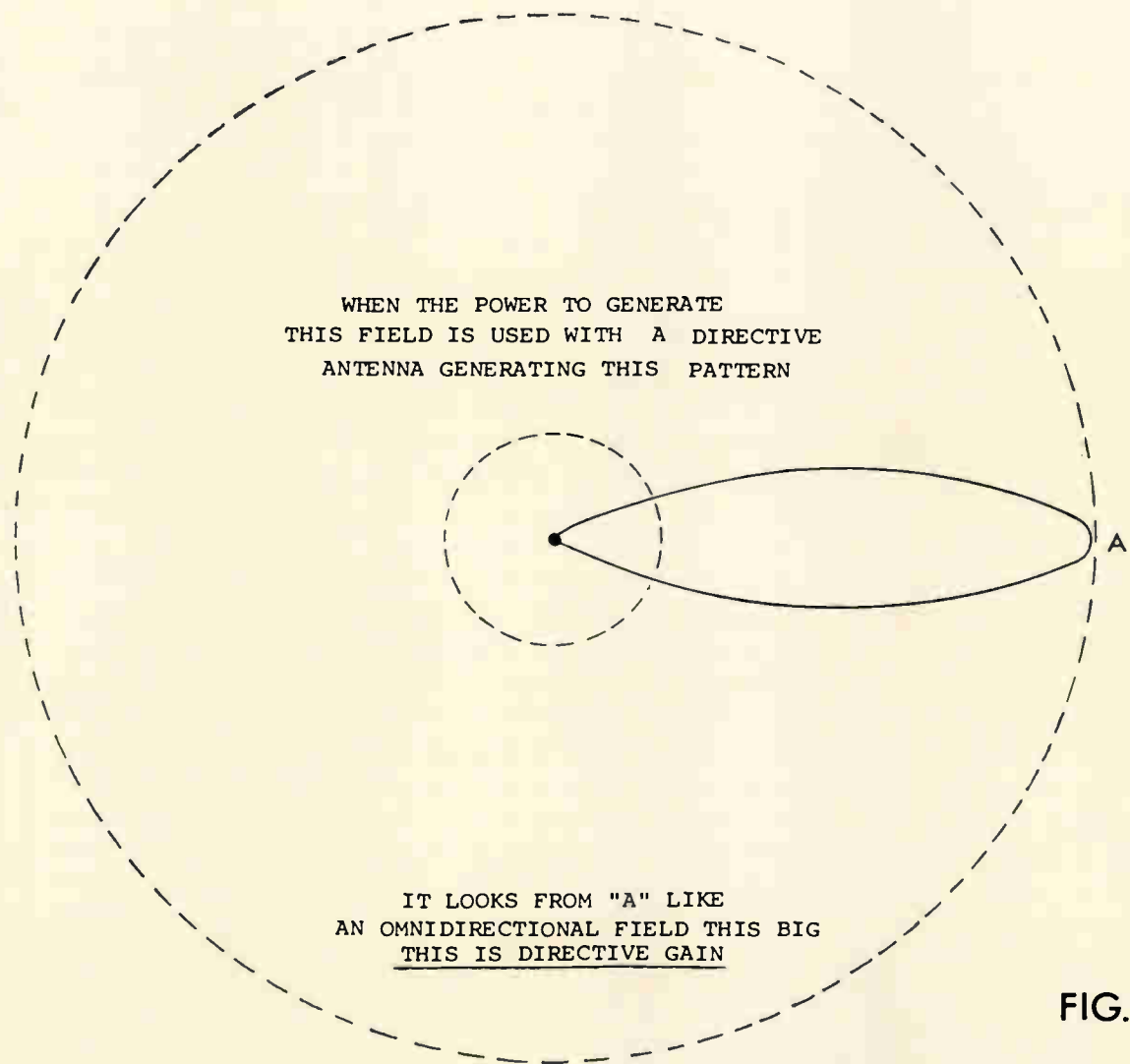


FIG. 1

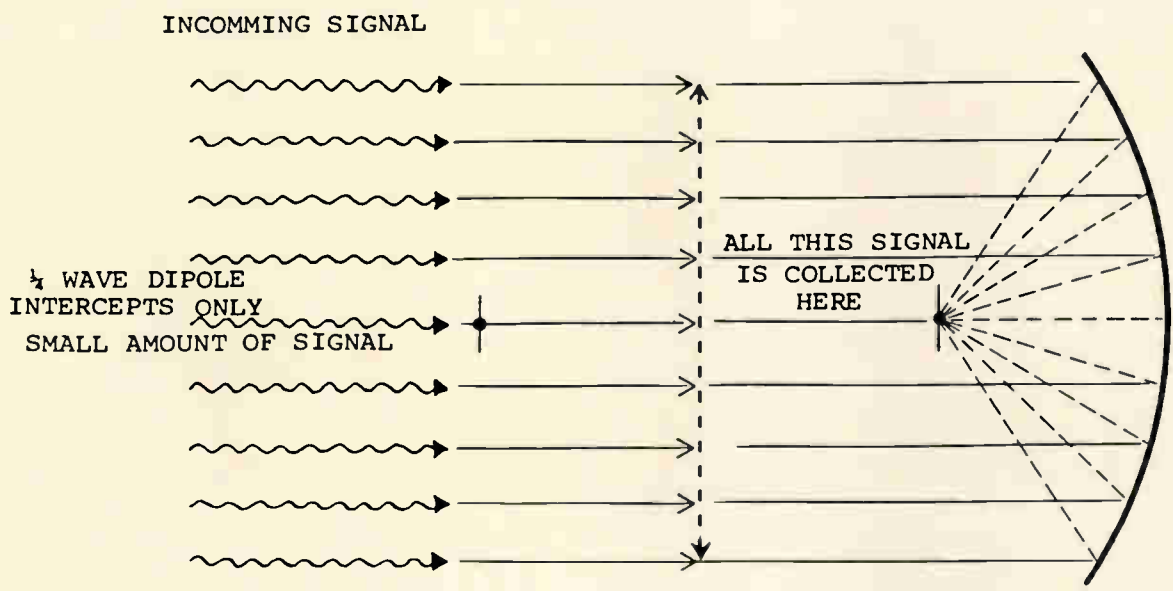


FIG. 2

GAIN OF PARABOLIC OVER DIPOLE

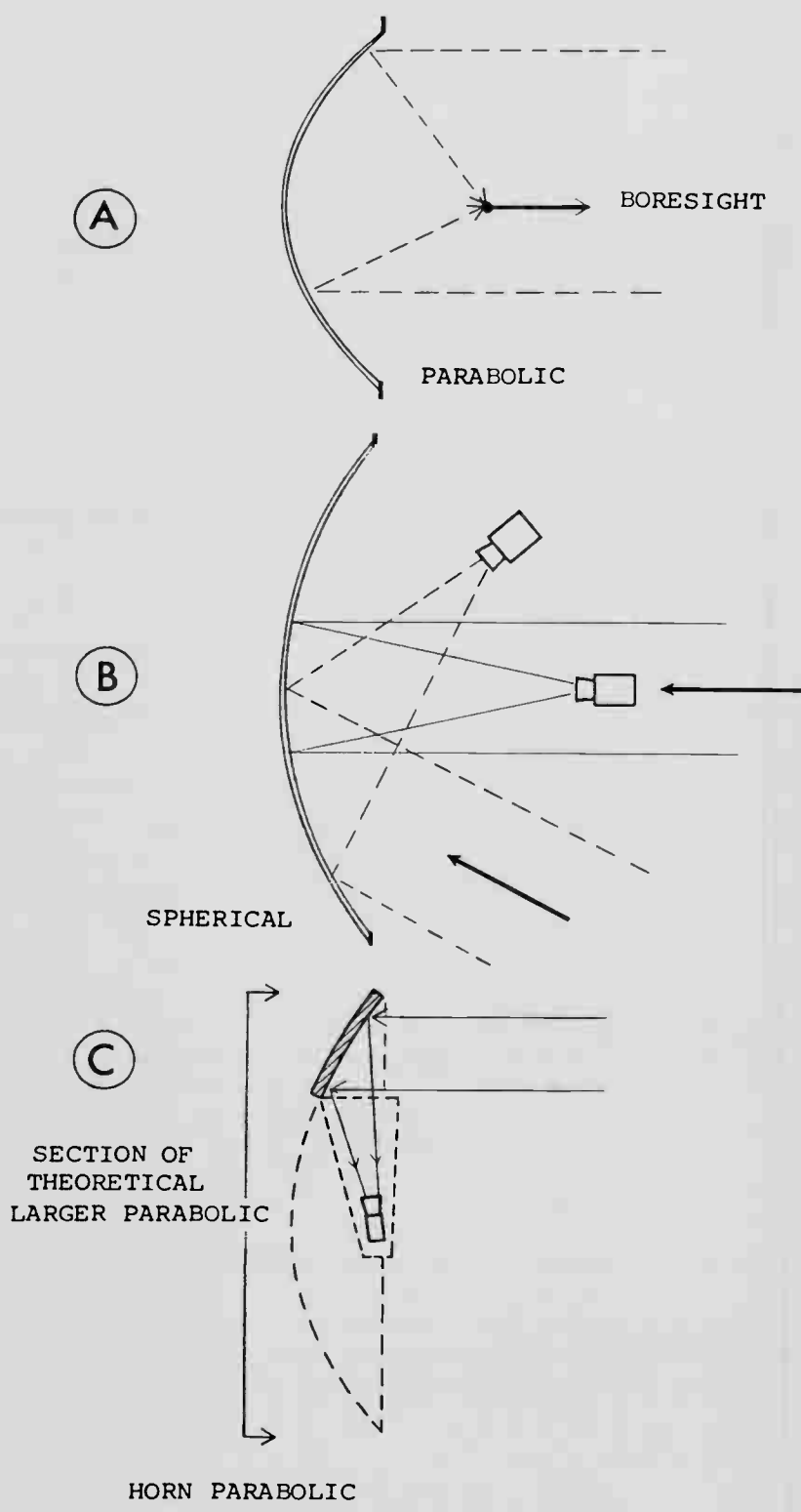


FIG. 3

collection is situated. Here lies the first major problem.

The signal power at this point is so low, that the noise generated by the earth, trees, houses, etc, can seriously impair the performance. We must collect as much signal as possible from the dish without collecting noise from around the edge of the dish. We would like to collect the signal with a feedhorn which looks at the entire dish, right to the edge and then stops suddenly (Figure 4). This is, in practice, impossible. The feedhorn is an antenna, much like the YAGI used with the VHF screen, and this performance would require an antenna pattern with a square edge (somewhat impossible). We must trade off some view of the edge of the dish, to reduce the over the edge noise. Thus we lose the benefit of the outer edge and reduce the gain by 1-2dB. This is the major contributor to the reduction of gain from the theoretic maximum.

FEED SYSTEMS

In actual practice, feed systems have seen more designs, both calculated, and empirical, than any other part of the system. The constant search for a way to see the very edge of the dish, and nothing further has been interesting, to say the least.

Feedhorns, and feed systems come in an almost infinite variety, but several basic proven designs are most common. The only reliable guide to be offered is this: buy the feed and antenna as a matched set from a manufacturer with test range capability. Most of the "This looks interesting, let's try it" designs leave something to be desired, and especially, can not be counted on for repeatable — dish to dish performance.

Assuming a properly designed and installed antenna and feed, we must now amplify and distribute the microwave signal. The first item in the microwave distribution system is the low noise amplifier (LNA). The purpose of this unit is twofold: first, to amplify the weak recovered signal with low noise contribution, and to elevate the level to overcome line losses to the receiver. These are two distinct functions and indeed, the LNA contains two distinct amplifiers. The first amplifier is a Ga As FET



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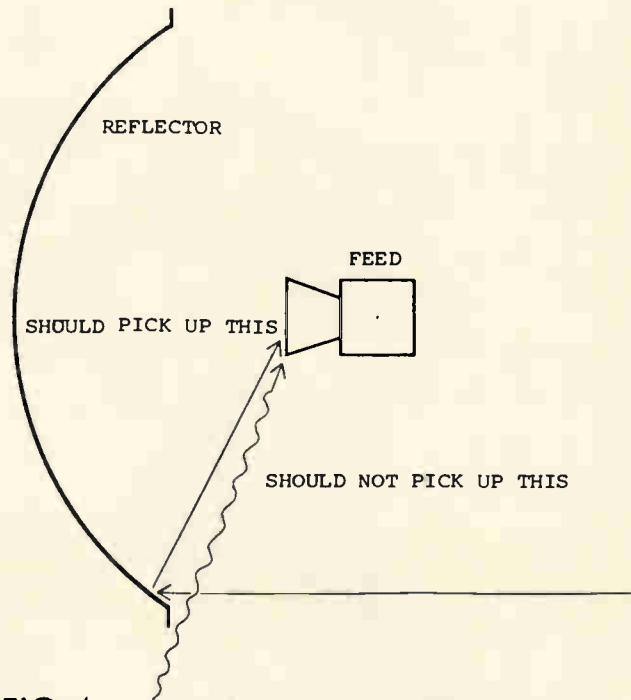


FIG. 4 THEORETICALLY PERFECT ANTENNA FEED

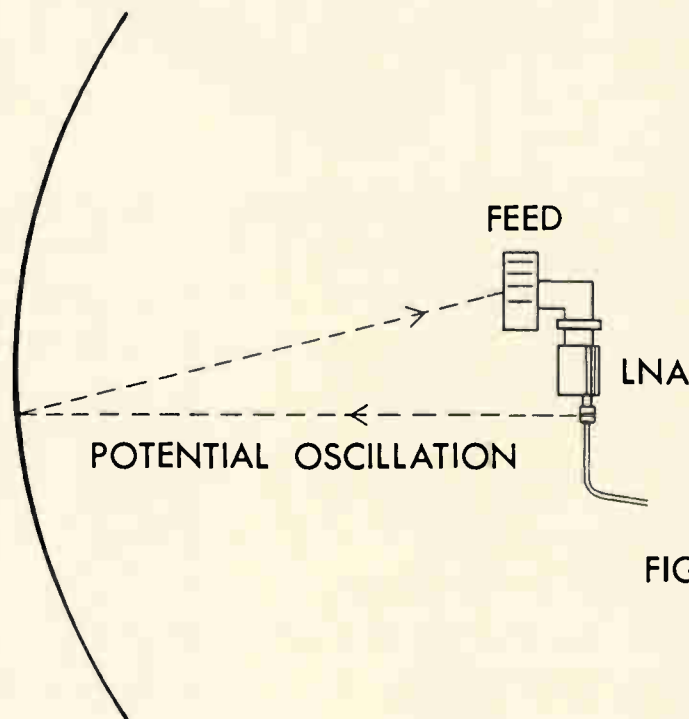


FIG. 5

low noise stage, followed by a bipolar high gain stage. Most high quality LNA's will do the required job for a cable headend, but two primary points should be considered.

By its nature, a low noise stage operates high on the curve towards oscillation. The LNA would like nothing better than to see its own input. Typical gains of 50dB over a

length of 6'' are difficult enough to handle. When the LNA is placed at the focus of an antenna, (Figure 5) any signal leakage from the output can easily reach the input and your

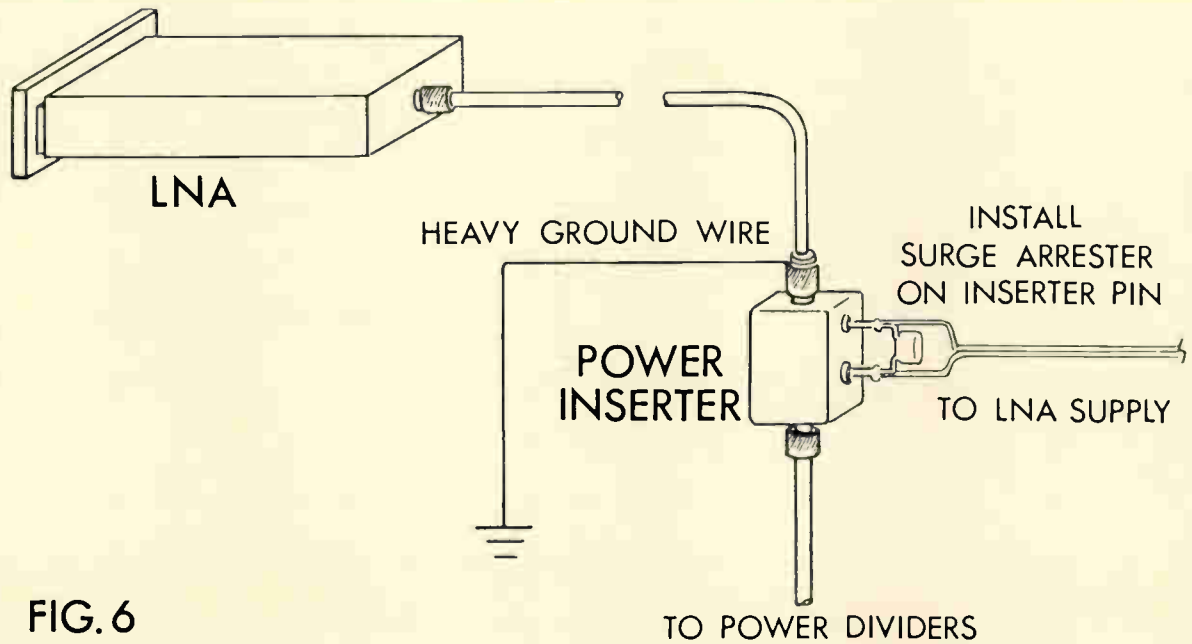


FIG. 6

high quality amplifier becomes a low quality oscillator.

Somewhere between the LNA, and the power dividers, is a good location to insert the LNA power. Any good quality power inserter will suffice but

bear in mind the LNA, antenna, and cable are prone to lightning. It is recommended that some lightning protection be installed directly at the power inserter, and that the cable jacket be well grounded (Figure 6).

POLARIZATION

Perhaps the most misunderstood aspect of Satellite reception is polarization, and again we can perhaps use the analogy of the VHF TV antennas.

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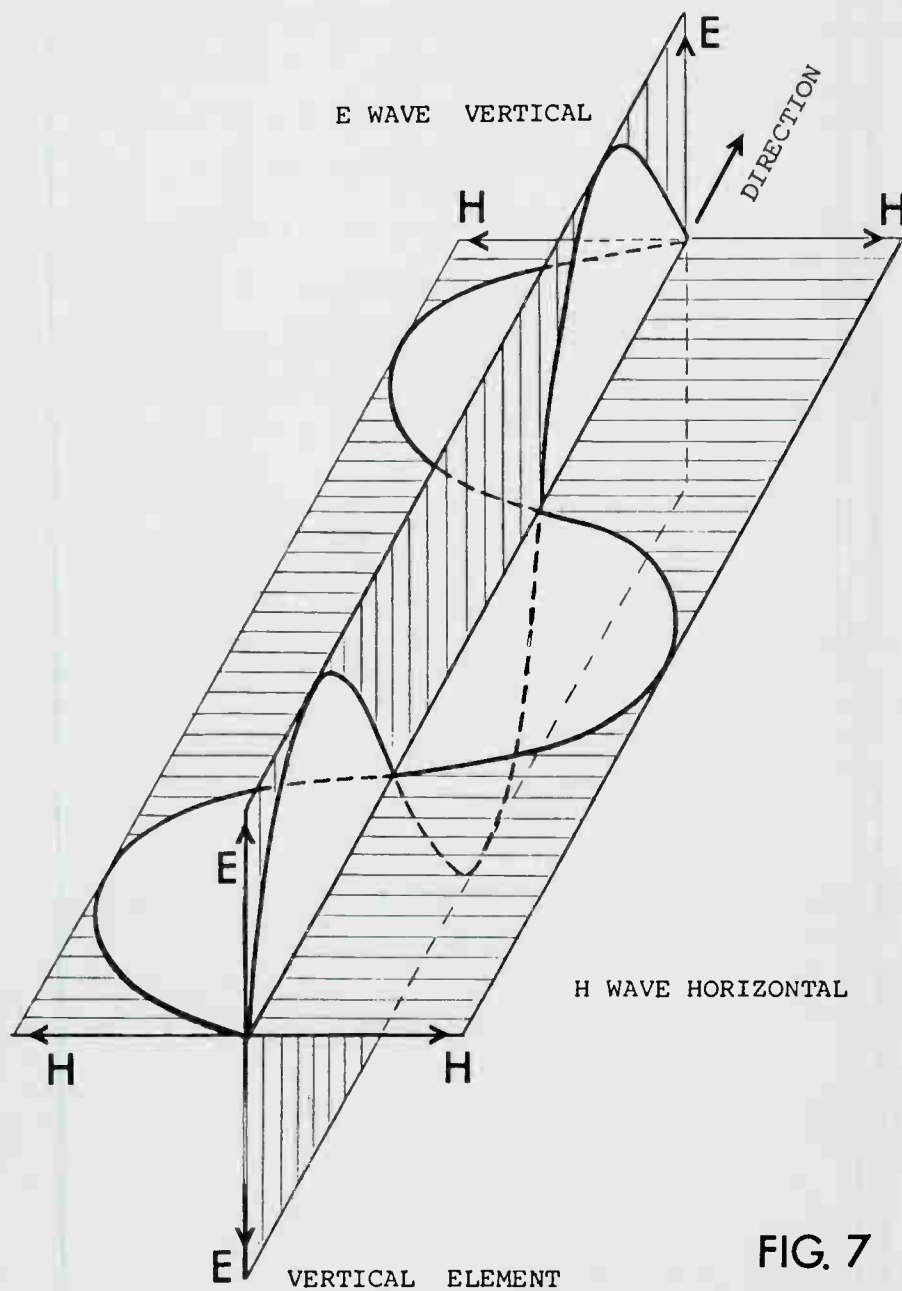


FIG. 7

A radio wave travelling through space has two distinct fields (Figure 7). As the wave propagates, an electric field is generated at the right angles to the direction of travel. A magnetic field is also generated at right angles to the direction of flow, and at right angles to the electric field.

The direction of the electric field in relation to the earth's surface iden-

tifies the polarization. If the electric field is perpendicular to the earth, (I.E. VERTICAL) the polarization is called vertical. If the electric field is parallel to the surface (horizontal), the polarization is called horizontal.

Before getting too complicated, let's look at the case of TV antenna's. A television transmit antenna has elements in a **horizontal** pattern. This generates an electric field which is **horizontal**, because the

electric field (E Field) is generated along the length of the element (Figure 8A). To receive this signal, the receiver antenna must have its elements in line with the incoming E Field (elements horizontal). If the receive TV antenna were installed with the elements vertical, the signal would be reduced by 25-30dB. The vertical element will not accept the horizontal wave front. This allows for an interesting possibility.

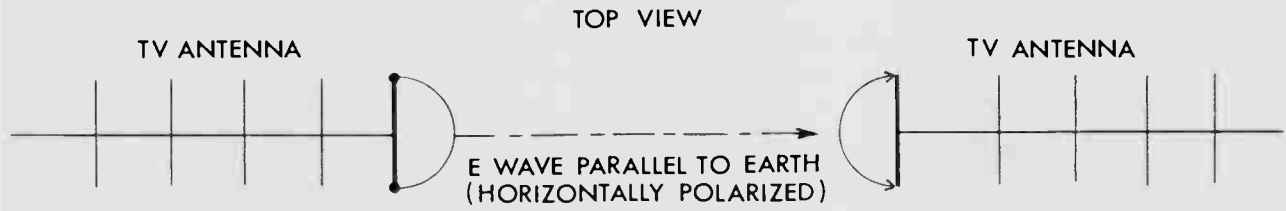


FIG. 8A

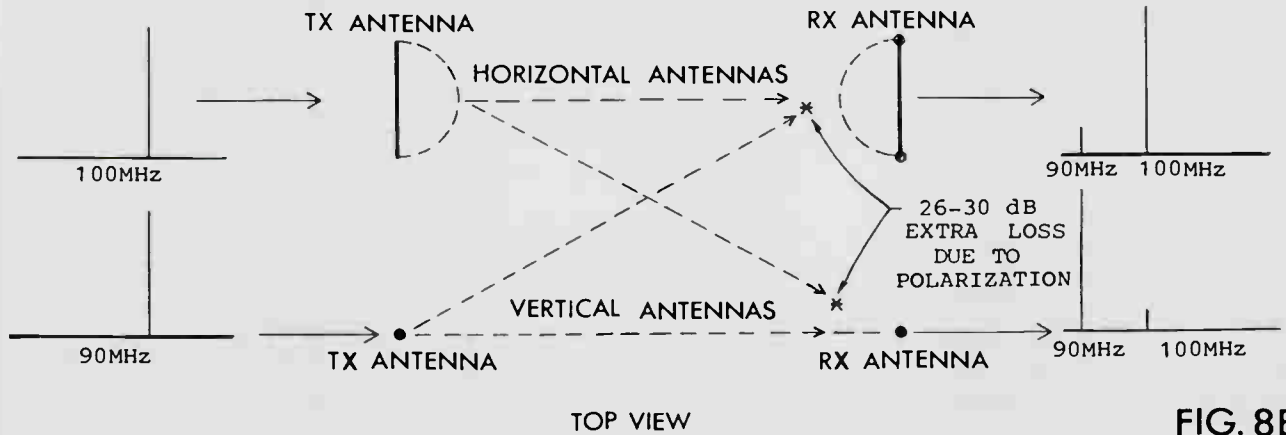


FIG. 8B

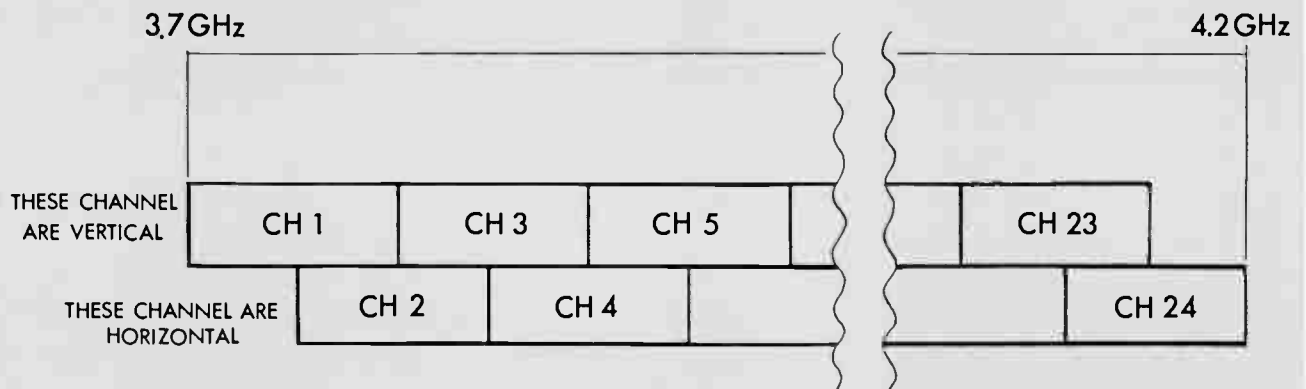


FIG. 9

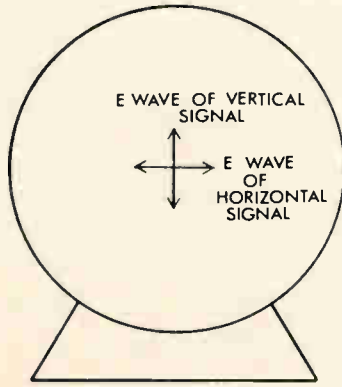


FIG. 10A

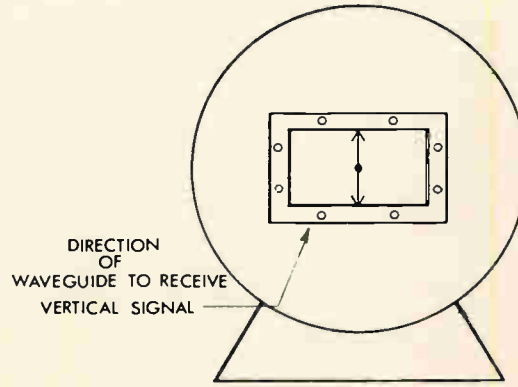
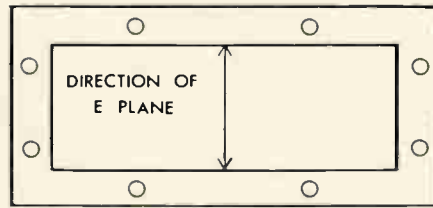


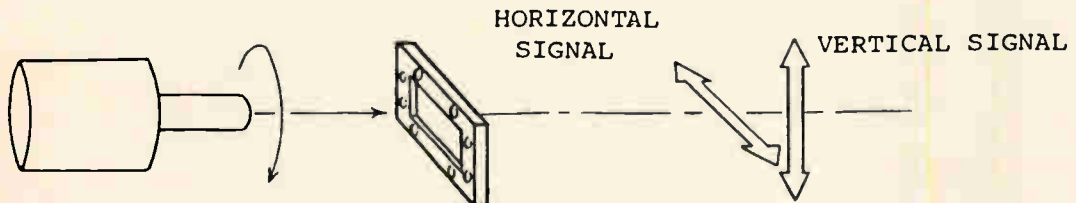
FIG. 10B

LOOK INTO DISH FROM FOCAL POINT



WAVEGUIDE FLANGE

FIG. 10C



ROTATE WAVEGUIDE TO SELECT SIGNAL

FIG. 11A

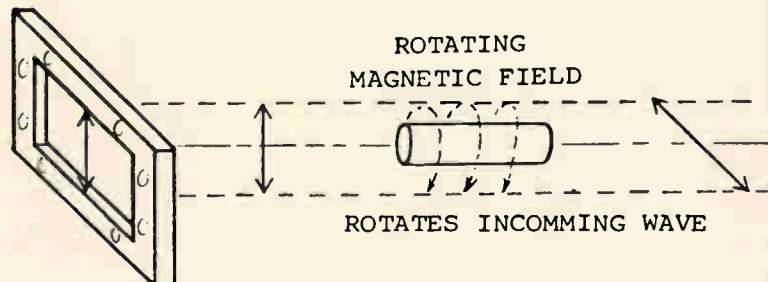


FIG. 11B

continued on page 34

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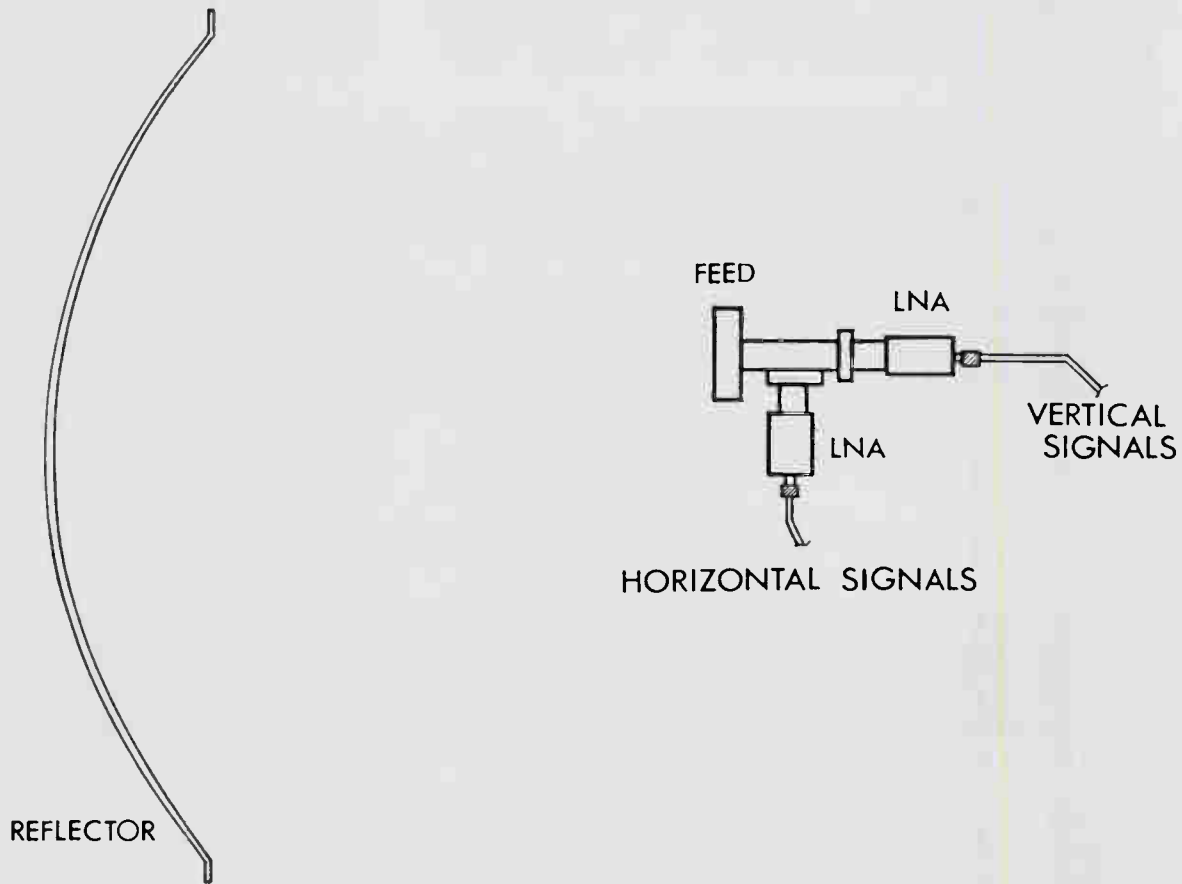


FIG. 12 DUAL POLARIZED ANTENNA SYSTEM

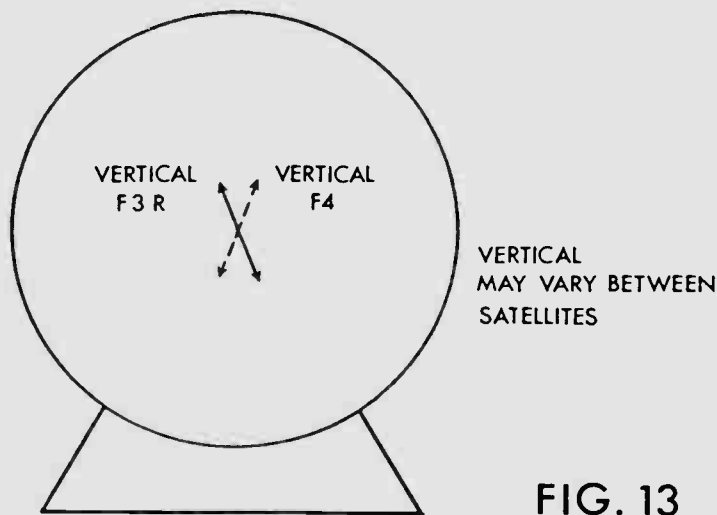
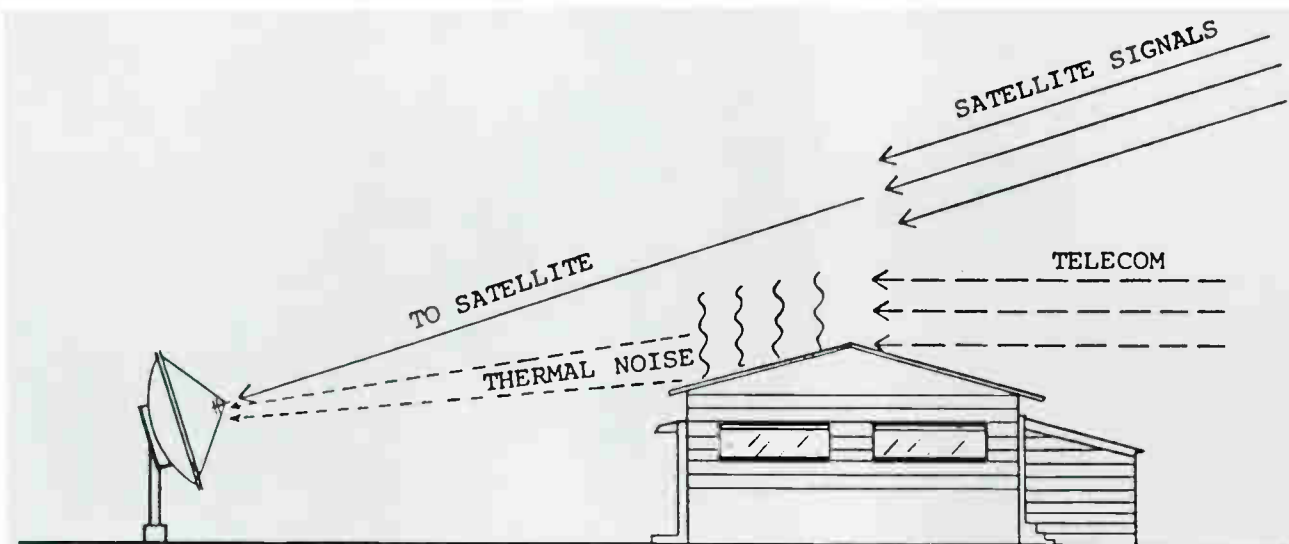


FIG. 13

If two signals on close frequencies are to be received and separated, it is possible to transmit them on two polarizations and receive on two separate polarizations, using the polarization effect to help separate the signal (Figure 8B).

This is what we do with satellite signals. The signals from the satellite are spaced close together (so close in fact, that they overlap) and alternately polarized vertically and horizontally (Figure 9), and this is approximately what happens. The signals strike the reflector (dish) and focus at the focal point. At this point, the electric field of the vertical polarized signals are basically vertical. (I say basically — more on this later). Figure 10A shows the view at the focal point (if you could see signals).

Now if we spend more time on the $TE_{1,0}$, $TE_{1,1}$, TM , and transverse



ANTENNA MUST BE LOW TO AVOID TELECOM
BUT MUST HAVE CLEAN LOOK TO SATELLITE

FIG. 14

electro-magnetic propagation modes . . . well maybe not. Let's just establish that the **short direction** in a rectangular waveguide is the E plane (Figure 10B).

The waveguide will carry a signal whose electric field is in the E plane,

and will reflect a signal when it is not. To receive a satellite signal it is necessary to align the wave front and the waveguide (Figure 10C).

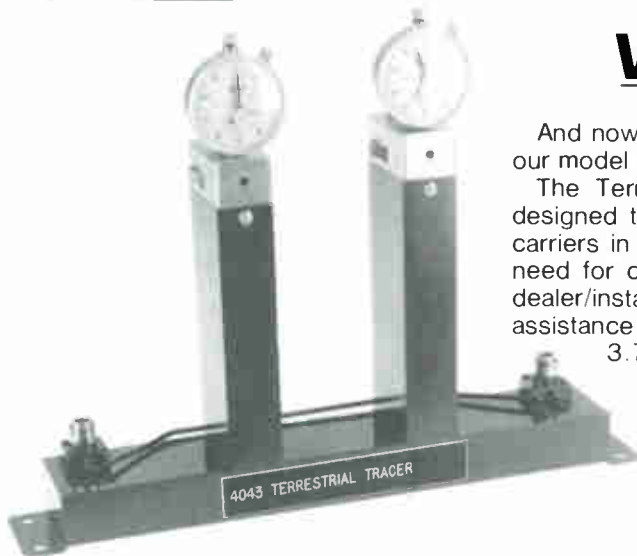
To select a signal from two polarizations, it is necessary to align the desired wavefront with the wave-

guide of the LNA in one of two ways.

1. Physically rotate the waveguide or pickup,
2. Electrically rotate the signal.

continued on page 42

You've Got Terrestrial Interference... We've Got Filters!



And now we've got the "Poor Man's Spectrum Analyzer" — our model 4043 Terrestrial Tracer!

The Terrestrial Tracer is a tunable, calibrated wavemeter designed to identify the frequencies of interfering microwave carriers in the 3.7-4.2 GHz band. As such, it eliminates the need for costly frequency coordination surveys: Any TVRO dealer/installer equipped with the Tracer can now, without other assistance, determine the exact frequency of each and every 3.7-4.2 GHz carrier interfering with his system.

So don't buy a microwave spectrum analyzer, don't pay for frequency coordination surveys, and don't call the phone company — just plug the Terrestrial Tracer into the TVRO system and read those interfering frequencies yourself!

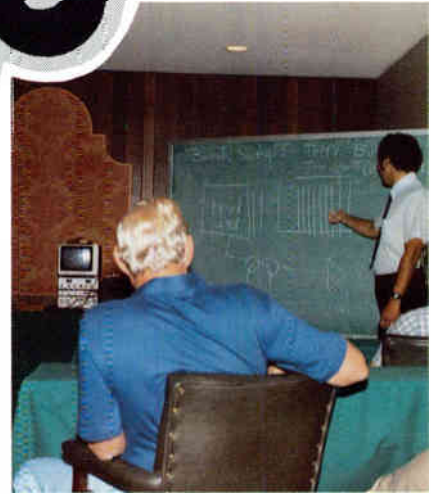
- The Terrestrial Tracer is also an excellent tool for **teleconferencing** — we can tell you how...
- No TVRO dealer/installer should be without a Tracer — ask about our easy **Rental Plan**...
- Attend one of our **TI Seminars** and we'll show you how to eliminate your interference problems...
- If you're really in a bind, ask about our **Field Service Division** — we now make "house calls"...

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CCOS '83



A Smashing Success



CCOS '83 — Hot Springs, Arkansas — is now history and added to the list of memorable CATA seminars. Comments from the participants, and especially those that have loyally attended the past seminars, were that they were pleased with all the arrangements, appreciative and complimentary of the quality and subjects of the seminars, and interested in the new products and services presented on the Exhibit Floor. From surveys taken over the past few years, the planning committee takes into consideration suggestions from every segment of our attendance — participants, exhibitors, and convention planners — to arrange and schedule sessions, exhibit time, socials, etc. in a manner efficient for the allotted time and conducive to remaining within the limits of the three-day seminar.

Much discussion has taken place in regard to the total number of days involved in the CCOS schedule; to give adequate time to the exhibitors and to allow a meaningful schedule of sessions, the present configuration of days has been approved for future planning. But these are things that we need to hear from the participants about — so, if you haven't completed your survey and mailed it, please do so! We need to know how you feel!

Comments concerning the presentation of the various sessions, both management and technical, have been glowing, and this certainly could be borne out by the number of attendees in each session. It would seem then that CCOS '83 parlayed its time into some of the most accepted sessions yet, with the interest in the materials presented running high. As the ses-

sions were audio-taped, there was much interest in orders for these tapes so that the information could be taken back to their systems, replayed for their own benefit and that of their employees. This ran true of the technical sessions, as well as the management sessions. Interestingly, the management sessions ran very high in their attendance, and this was consistent throughout the three full days of sessions.

To review information concerning the sessions (see schedule **CATJ August 1983**), for those of you who might not have attended but would still like to have the information, these audio tapes are listed on the Insert Card with a convenient order blank.

The first technical session entitled "MAKING A CLEAN SWEEP OF

IT" was presented on three occasions, all well attended, and covered testing and sweeping systems with various types equipment. The "COMMON CABLE SYSTEM PROBLEMS", another very well attended session, followed the first sweep session and covered problems as implied by the title, focusing on signal leakage. The technical session on Converters, moderated by Ralph Haimowitz (direct from the pool at the last minute due to a mix-up in the speakers' schedule), with pinch-hitting very competently done by Gordon Kelly, Zenith Radio Corporation, ended up being a very informative and active session with Ron Polomsky, General Electric CATV Products, completing his session on Channel Bandwidth Compression, adding to the converter session, and coming in with brief information on the Com-band equipment.

As the technical sessions progressed, Wayne Sheldon, Chairman, CATA Engineering Committee, presented a very interesting session on improvised antennas, and information on how to build your own. Chris Papas, FCC Field Specialist, has set up an area in the Exhibit Hall for operators to stop by to visit, with an invitation to tour the FCC Van that was parked outside the hotel. As Mr. Papas went through his information, the group in session retired to the van for a complete tour, complete with question and answer time. Mr. Papas gave a thorough explanation of the FCC technical standards and procedures, with proof of performance information.

Glyn Bostick, Microwave Filter Co., a personality well known to the cable industry, and someone that CATJ readers depend on each month, gave a session on TVRO signals in cooperation with Bruce Uerling, Tele-Communications Inc., on receiving by earth stations under difficult situations, which creates the need for filtering, better siting, shielding, etc. This was a very informative and active session, and one where the material presented is invaluable to the cable operator.

Management sessions were so well attended that it substantiated the committee's opinion that cable

operators ARE wanting to know more and more about efficient operation. Nancy Jahnel, Group W Satellite Communications, presented the first session on training office employees, allowing the group in attendance to retain the hand-out materials she passed. As this session concluded, the group took a break and then went into the "BUYING & SELLING CABLE SYSTEMS" material offered excellently by Don Russell, Communications Equity Associates, and John Whetzel, Northland Communications. This material was so well accepted that the demand for the audio record of this session ranks among the top!! As the afternoon sessions reconvened, Steve Effros, CATA Executive Director, gave his WASHINGTON UPDATE, resulting in questions regarding the House version of S.66 and other matters facing the cable industry in regard to legislation and regulations. This session is in high demand, and the operators always depend on Steve's ability to translate into understandable language what's going on in Washington!

Scrambling by the programmers is a hot subject — this session was packed!! Bob Zitter from HBO reported on their progress in testing on the West Coast, which should become fully operational at the first of the year, with the East Coast being tested in December and/or January, with full operation planned for April. Lynn Watson, SHOWTIME, described their efforts in their scrambling project, and they too have a projection for scrambling after testing of June 1984. The bottom line seems to be that the testing will be done with results acceptable and the bugs worked out before full operation is approved. Along the line of tiering and packaging, in the absence of the scheduled moderator, CATA Director David Fox, Steve Effros moderated the session, turning the program over to the newly appointed Vice Director, Richard Gessner, who discussed the subject from a cable operator's point of view; representatives from ESPN and TBS, who are negative towards tiering, gave their corporate views, with THE DISNEY CHANNEL voicing their approval, from a corporate stand.

Again, Nancy Jahnel, Group W, presented an office training program dealing with the creation of a profitable local ad sales program being instituted on the cable systems. Another very helpful and well accepted session! Adult Entertainment — mentioned as a problem to cable operators to know what to do about this programming — discussion followed concerning the moral issues involved and the problems that arise with adult entertainment within the community. Even among the adult programmers, there is a definite structure as far as levels go, so there is a lot of discussion among this faction.

It is never known how the conversation is going to go with the Open Forum, and this year's session was no exception to that — Steve Effros and Ralph Haimowitz were available to conduct this session, and when the group got warmed up, the discussion seemed to go to DBS and its effect on the industry — broadcast FM interference on cable — MDS — LPTV — SMATV — etc. All of these different variations of television service are of prime importance to the operators as the list of these services grow.

In cooperation with CABLE GRAPHIC SCIENCES, Richard Kirn made a presentation on daily news print on cable systems, even exploring the classified ad section. In direct relation to the news print on cable, Bruce Blair, ESPN, and Steve Richey, Teltran, Inc., presented a program on the development of ad slots on cable. It was reported that some of the ads were excellent, and again, this was a highly informative and worthwhile session.

All of these sessions were taped, and these can be obtained by ordering through the taping service; the information is listed on the insert card. (Also available by popular request are tapes covering the 1982 CCOS seminar in Nashville.)

SALES REPORTED ACTIVE

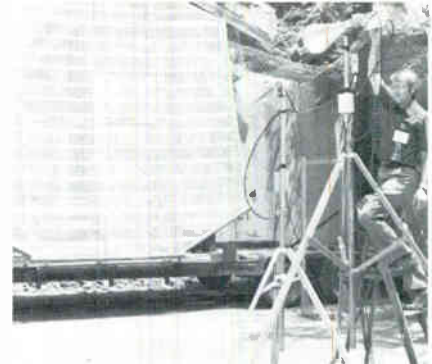
The schedule is always arranged so that the Exhibit Hall is open when the sessions are not underway, thereby giving the exhibitors an opportunity to attend the sessions and participate in the instruction, as well as the learning. The exhibitors have told us in the



Turner Broadcasting System booth featured CNN and CNN Headline News services;



New faces from the Washington CATA office - (left to right) Ellen Adams and Debbie Raabe.



McCullough Satellite Equipment, Salem, Arkansas, again furnished equipment for live feeds to the Exhibit Hall.



Gene Barnett and J.D. Pierce, Ind-Co Cable TV, furnished the dish for live feeds.



Triple Crown Electronics, Ontario, Canada, brought the head-end equipment for the Exhibit Hall set-up.



Chris Papas, Field Specialist for the FCC.



CableGraphics had a very interesting service to offer and brought their equipment to one of the technical sessions.



Glyn Bostick, Microwave Filter, conducted a technical session, along with Bruce Uerling, on TVRO interference and manned his booth during the exhibit hours.



Zenith and their cable products were new to CCOS this year, and CATA welcomed their support; they also participated to pinch-hit on the converter session.

past that they appreciate the opportunity to be considered for attending the sessions, and to give them an opportunity to display and discuss their wares when the attendees are free from the sessions.

In checking with the various companies to get a cross-section of their sales, most have reported that their sales and business was GOOD; we know of many of the operators who waited until CCOS to talk with their favorite vendors about equipment and take advantage of the show to do their buying. Evidently, it made quite an impact, because sales and buying

were reported very active. There were some vendors who, though they did not write any orders, reported that they were not discouraged because their contacts at CCOS were considered good because of the intangible results that filtered in throughout the year. The bottom line is that the vendors were happy — with their contacts, sales, hours, etc. Again, the planning committee complied with their request not to be scheduled over a weekend, so the exhibits were closed on Friday night. Next year again, this request will be met for the convenience of all concerned.

CATA has to take their hat off to the exhibitors who were most cooperative as far as set-up was concerned — participation in the various sessions — assisting in the technical set-up — hospitality functions — and for being there to present the newest in technological product and services to our CCOS attendees. While the number of actual operators cannot reach that of major shows, the number of subscribers that our operators represent is **very significant**, and if anyone stopped to examine some of the names and systems those names represented, you would have

been aware of some of the largest groups in the country. As a point of information, CATA now represents by way of its members — regular and corporate — over eight million subscribers!! That makes for a good, strong independent voice in the cable industry!!!

CCOS '83 NOT ALL WORK AND STUDY

As with past meetings, worked into the schedule were some very lovely social events. Some for the whole group, and others for the ladies and young people. Yes, they are considered important too, because the CATA concept is the family concept, and the spouses and young people will always be a part of our planning. **GROUP W's** Welcoming Reception on the 7th floor Pool Deck got the whole thing off to a good start; the cool breezes and good food (those fish balls were super!!), along with the ice cream station, made for a delightful repast in the early evening. **HOME BOX OFFICE** has traditionally entertained the ladies and young people with tours and sight-seeing. The ladies were taken on the Three-Capitol Tour, and even though the day was hot, the group came back reporting of a very interesting tour and a delightful lunch. The Magic Springs Amusement Park and treats from MacDonald's took care of the young people, so they returned tired but happy. That same evening, **HBO** had an evening of hospitality for the whole group, along with a beautiful variety of foods and treats, and entertainment including a band and featured singer, who involved the crowd in her performance — Gene Barnett from Ind-Co really hammed it up with her. Someone told him if he got tired of the cable business, he could go into show biz. She also gave Steve Effros a bad time — Lucia's a good sport though and the remarks about "seeing him again" only added laughs to the crowd when Steve's face got a little red.

A great country band (yes, they did sound like **Alabama**) with a featured singer, Mrs. Arkansas 1982, Teresa Gray, did the entertaining at the **WARNER AMEX** cocktail buffet, complete with balloons and lots of good food. Our cooperating

hospitality sponsors are always so generous in the delicious buffets and treats that they provide that you can depend on gaining weight while you're at CCOS. We appreciate all their efforts.

The ladies were entertained at a Brunch and Style Show that was a huge success; the brunch specialties were delicious, and the fashions just beautiful. Teresa Gray also entertained for this group, and involved four of our ladies in a musical presentation. We appreciated their sportsmanship to go onto the stage for this fun — thanks to Gerta Witherspoon, Dorae Dahm, Lucille Dodson, and Arlene Athanas for being the back-up singers for that number. While the ladies were being entertained with fashions, the young people were enjoying a pool party with cook-out; water and kids and hamburgers all seem to go together, so it doesn't take much imagination to know they had a good time.

The **SHOWTIME** suite was a very popular place each night — Eva Stamm from their New York office and Lynn Watson (new CATA Associates' Vice Director) from the Dallas office, provided a "hot spot" for after hour entertainment. Kim Olson, a musician regularly entertaining at the Disneyland Hotel in Anaheim, provided the singing and music throughout the evenings, and then, Jason Randal, from Los Angeles, amazed the group each night with three different displays of magical ability — he was absolutely amazing and blew everyone's mind. **SHOWTIME** has brought these outstanding performers to various shows across the country, and we certainly were pleased that our group was considered for their entertainment as well.

THE DISNEY CHANNEL had a most prestigious character in their booth on Wednesday — none other than Mickey Mouse himself. All the attendees, young and old, found themselves posing with Mickey for a souvenir picture, and he was great to wander around and visit with people all over the hotel. There was a bunch of surprised people around the pool when Mickey arrived on the deck — our attendees had been specially invited to have their pictures taken with Mickey, so they knew he was going to

be there. Other hotel guests did not, so they were very surprised.!

Tours of the interesting places around Hot Springs were taken, and it was found that there are many unique and entertaining attractions in the area. Hot Springs was a very hospitable town, and our group was received with great cordiality and graciousness, typical of the Southern attitude.

WAS CCOS '83 THE BEST?

Each time as we conclude and wrap up a CCOS, we feel that it was the best. Maybe this was too!! But what we know is that the sessions were important, and worthwhile, and valued, and that's what this whole thing is about. When we come together annually, there is a lot of business that your CATA Officers and Directors and Staff accomplish, and only a short time to do it. CATA's annual CCOS is an important meeting for many reasons — the educational and instructional — the exchange of information, ideas, and problems among the cable operators — the accomplishment of CATA directives from the membership — the melding of the Officers and Directors with staff for pursuit and definition of goals — the renewal of many long and cherished friendships.

For those of you that did attend, we thank you for your support and interest in our endeavor to present a seminar worth your time and effort to travel to; we appreciate your input as we begin work on next year and plans for subsequent years. Thank you for being a part of our CCOS '83.

For those who did not attend, we hope that you will consider joining us another time; again plans include worthwhile and informative sessions and an exhibit hall worthy of your time. Make your plans now for July 15-19, 1984 (arrival and first session on Sunday with departure on Thursday), at the Tan-Tar-A Resort, on the Lake of the Ozarks, Osage Beach, Missouri. Charter flights to Osage Beach will be arranged from St. Louis, and possibly Kansas City, both major air gateways, and more information concerning that and flight arrangements will be developed as the plans are formulated. We look forward to seeing you all there for another CCOS — More in '84!! ▶

SPECIAL ACKNOWLEDGEMENTS

OUR THANKS TO . . .

HOSPITALITY & SPECIAL EVENTS

GROUP W SATELLITE COMMUNICATIONS for the Welcoming Reception HOME BOX OFFICE for the Evening of Hospitality, the Ladies Tour and Lunch, and the Youth Trip to Magic Springs

SHOWTIME ENTERTAINMENT for the gracious hospitality suite and the outstanding entertainment THE DISNEY CHANNEL for bringing Mickey Mouse for a photographic session for all the participants and their families

TURNER BROADCASTING SYSTEM for the Sandwich Buffet in the Exhibit Hall

WARNER AMEX SATELLITE ENTERTAINMENT for the cocktail buffet and entertainment, as well as their hospitality suite

EQUIPMENT & TECHNICAL SET-UP

MCCULLOUGH SATELLITE EQUIPMENT, Salem, Arkansas, for an earth station and satellite feed IND-CO CABLE TV, INC., Batesville, Arkansas, for an earth station

TRIPLE CROWN ELECTRONICS, Mississauga, Ontario, Canada, for the head-end

BOB MAUS, Resort Cable TV, Hot Springs, Arkansas, for providing the materials for the drops into the exhibit hall

KURT BESTER, Chief Technician, Southern

Wisconsin Cable Co., Lake Geneva, Wisconsin, for providing his time and expertise in the technical set-up and operation of the exhibit area

SPECIAL EQUIPMENT

CHRIS PAPAS, FM/TV/CATV Specialist with the Federal Communications Commission for bringing the FCC VAN for the CCOS participants to examine and for providing a technical session

FACILITIES

THE ARLINGTON HOTEL and its convention planning staff for tireless and concerned cooperation on our meeting requirements and functions

UNIVERSAL CONVENTION SERVICES for their cooperation in working with the staff and the vendors to develop the Exhibit Hall

PERSONNEL

CATA STAFF . . . from the Washington Office, **Debbie Raabe** and **Ellen Adams** for assistance at the registration desk, (it was great to meet them and have them with us!) from the Engineering Office, **Ralph Haimowitz** for his tireless work on the program development, organizational responsibilities in the planning of CCOS '83 and his usual good-natured troubleshooting as problems arose; (the big fella can't be beat!); from the Oklahoma Office, to my loyal and trusted Executive Assistant **Diane Howard**, for her precise and meticulous organization and implementation of the entire registration procedures, and

to **Lori Biggers** for assisting her; and to **Phyllis Crumpler** and **Dianna Johnson** who comprise the CATJ Art Department for their help in the production of promotional materials, convention paper supplies, signs, and photographic support. Special thanks go to **Mildred Fox** — better known as "Little Bit" — wife of District #3 Director David Fox. While David was unable to be with us this year (and all of us missed having him there), Mildred came and assisted us in the registration area and whenever and wherever we needed some extra support. We have always been able to depend on her assistance and appreciate her taking time away from her vacation to assist. My personal appreciation is extended to all of the above who worked with me in the planning and organization of the CCOS '83 program; my special appreciation goes to our CATA President, **Peter Athanas**, for his encouragement, counsel, and suggestions, as well as to the CATA Executive Director, **Stephen R. Effros**.

On behalf of the entire CATA Staff, appreciation is extended to the Officers and Directors who work with us throughout the year, providing critique and suggestions as the plans progress for another CCOS. Most importantly, to those of you who were there, and have been year after year, our thanks to you who continue to make CCOS a memorable occasion for all of us on the CATA staff. We hope to see you next year!

Celeste Rule Nelson □

KNOWING YOU HAVE THE BEST

in cable technical information



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Address _____

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NON MEMBER

(Must Furnish System Name)

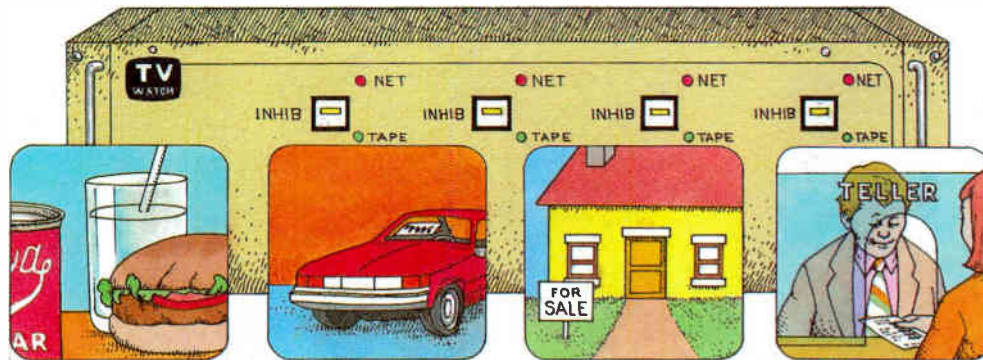
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- \$40.00 Enclosed for 3 Years

- \$18.00 Enclosed for 1 Year
- \$50.00 Enclosed for 3 Years

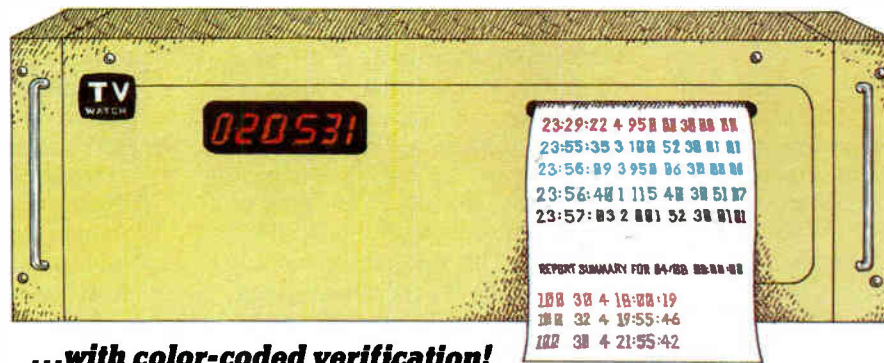
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And The Stationmaster cannot be fooled when it comes to true verification either. Because The Stationmaster inserter tells the verifier if only part of a commercial block ran.

The Stationmaster is so logically integrated you don't have to be an engineer to operate it. It even comes pretested and rackmounted.

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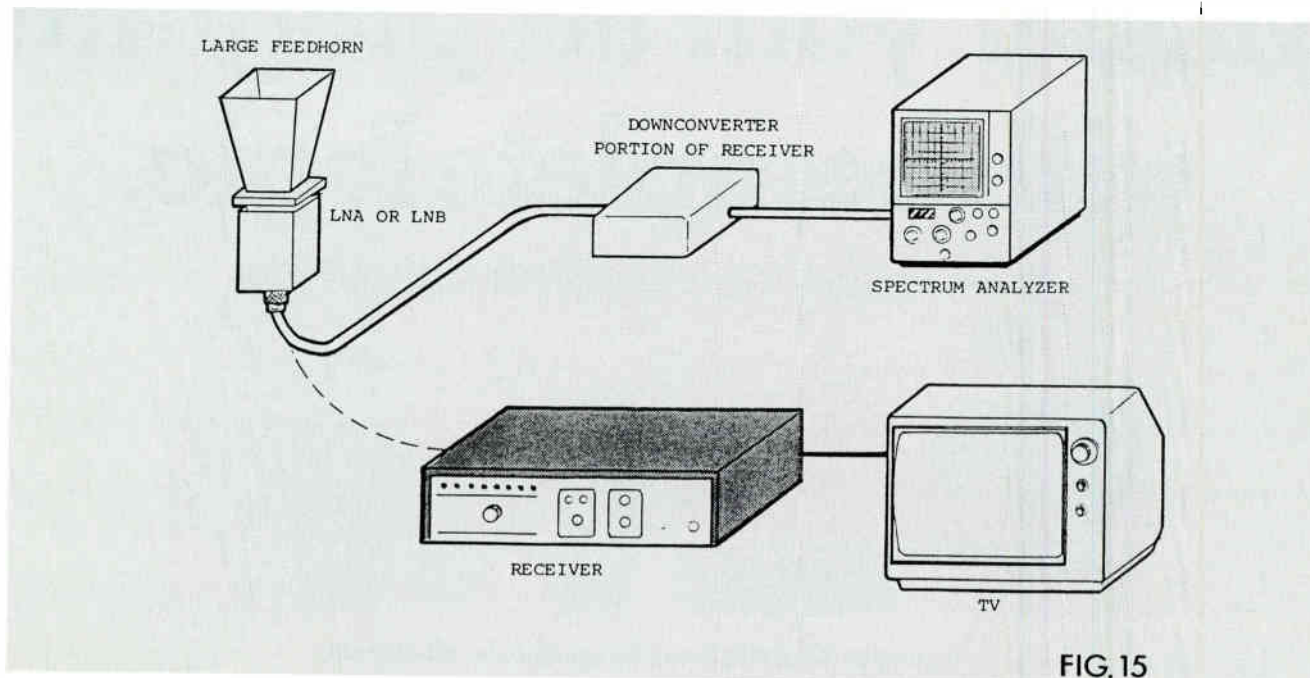


FIG. 15

continued from page 35

Most LNA rotator systems will mechanically move the LNA so that the rectangular waveguide selects the appropriate wave front (Figure 11A).

This is usually accomplished by rotating the entire LNA, using anything from a TV antenna rotor, to very complex gear or belt motor systems. Some more recent systems rotate only the microwave pickup point, rather than the entire LNA. If the LNA can not be rotated, or this is too mechanically involved, there are two other methods.

First:

It is possible, to leave the LNA fixed, and to electrically rotate the incoming wave. This is done by passing the signal around a ferrite, which has a magnetic field rotating around its axis. This requires no parts, but does require tricky regulation of the magnetic field to ensure correct, constant polarization (Figure 11B).

Second:

An orthogonal mode coupler and two LNA's can be installed. The orthomode separates the two polarizations, and feeds each to its own LNA simultaneously. It is only necessary to select which LNA output you wish to use (Figure 12).

One major disadvantage of any fixed polarization, either single, or dual is that vertical isn't always (neither is horizontal). The angle at which you view the satellite combined with the satellite transmission antenna alignment result in an effect called *skew*. This means that the actual horizontal or vertical may vary from one satellite to another as the antenna is moved across the arc. It is wise to employ a system which incorporates some fine tuning capability, in order to accurately position the wavefront (Figure 13).

It should also be remembered that any system other than physically rotating the LNA, introduces an element (pickup, ferrite etc.) ahead of the LNA. This element has finite loss, and this loss must be added to the LNA noise figure. For example, a ferrite rotator of 0.5dB loss will make a 120° LNA look like a 170° LNA.

SELECTING THE INSTALLATION SITE

Site location of a TVRO is the major contributor, or solution to, two significant receive problems; Telecom interference and antenna noise.

— Telecom interference occurs when signals from a telephone or common carrier microwave link reach the TVRO antenna.

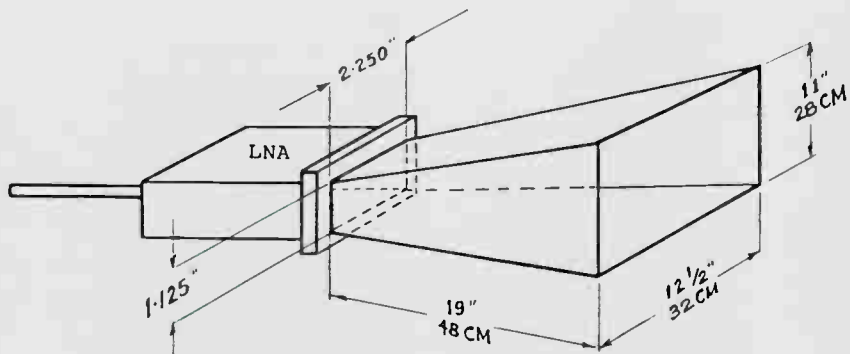
4GHz Telecom signals are in the television satellite band, and are much higher in power than Satellite signals.

— Antenna noise occurs when any object such as trees, rooftops, etc. are near the edge of the beam pattern.

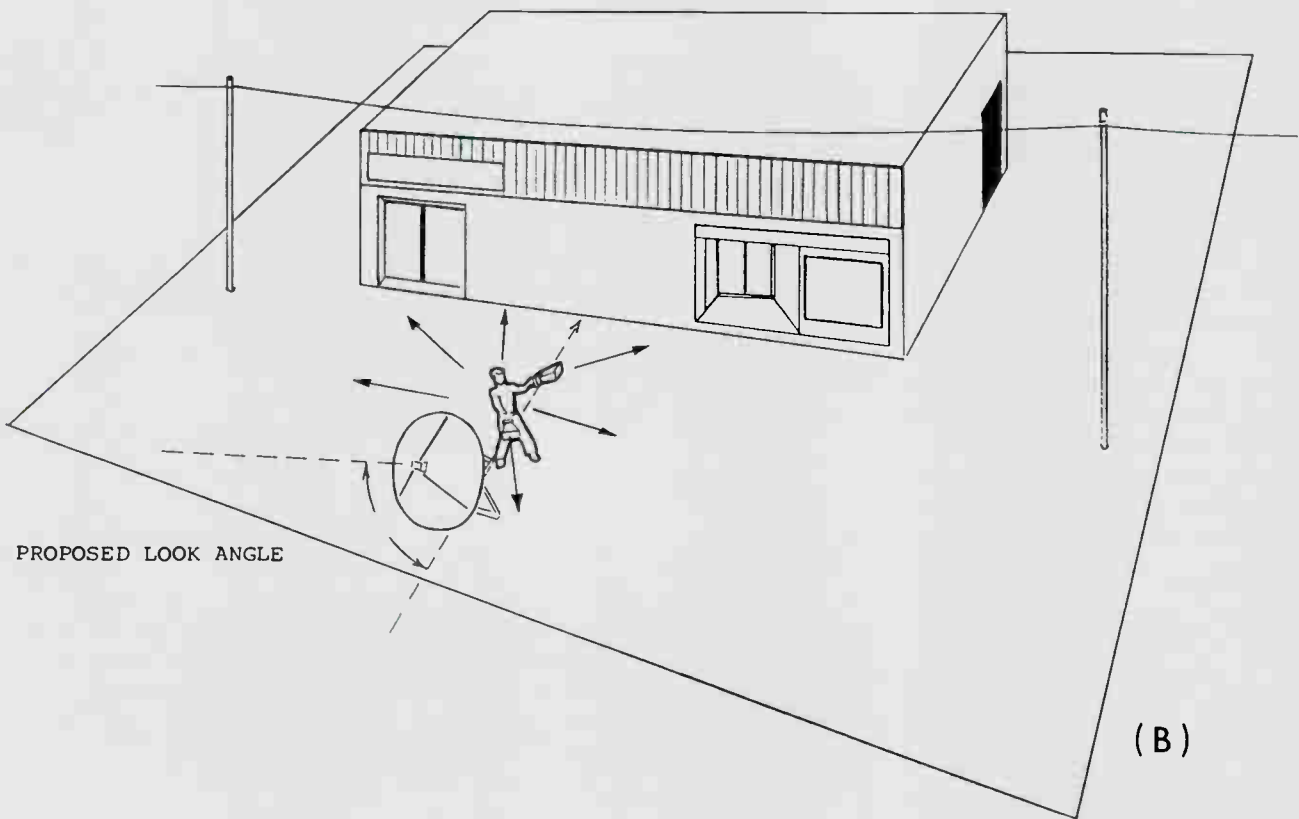
In most cases, the approximate receive site has already been determined (I.E. your property or head end location). There are, however, some things which can be done to avoid these problems.

Telecom interference can be avoided by two simple rules: keep the antenna site as low as possible, and avoid overhead power lines. By keeping the antenna low, surrounding buildings, etc. help to shield the receiver from the Telecom signals which travel horizontally. When doing this, it is important to locate the antenna so that all desired Satellites can be seen while maintaining at least 10° clearance from rooftops etc. (Figure 14).

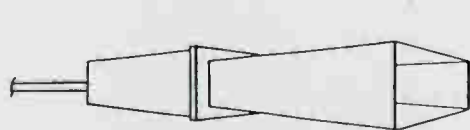
Any object closer than 10° to the antenna beam will contribute some noise to the system. This noise power will vary with proximity to, type object and antenna size. In fact, the smaller antenna, which needs all the noise protection it can get, also has the wider beamwidth, making protection more difficult. If, after selecting the installation site, Telecom interference is encountered, there are



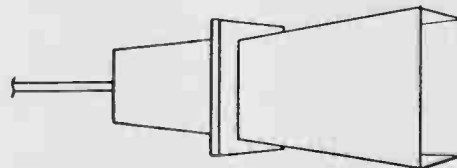
(A) DETAIL OF SEARCH HORN



(B)



SCAN ONCE LIKE THIS



REPEAT LIKE THIS

FIG. 16

several possible solutions which can be investigated. The simplest approach is to move the antenna even a few feet. To this end, it is often wise to install the antenna on temporary mounting until you are satisfied with the performance. It is also possible to shield the antenna from Telecom by placing a sheet of metal in the proper location. This can be determined by simply walking around the antenna carrying a 3-4' square sheet of tin and observing pictures. Remember that the wavelength at 4GHz is so short that moving 4 feet is equivalent to moving 100' at ch. 7.

This simple test with minimum equipment will show the presence of Telecom interference in most cases. The set-up can be one of the two methods shown depending on available equipment. (Figure 15). The search horn is a microwave antenna with a gain of approximately 18dB over isotropic (theoretical). Construction can be any handy material (even foil covered cardboard) (Figure 16A). This test is performed as follows. With the spectrum analyzer, observe the downconverter output for any carrier breaking through the noise. With the television set, observe any motion or black on the screen. (Severe Telecom will blank the noise completely).

Stand in the proposed receive antenna location, observing the test equipment, and holding the search horn with the **long edge horizontal**, (Figure 16B) scan all directions especially sideways from the proposed look angle. Scan along any power lines passing overhead. Turn horn so that short edge is horizontal and repeat. If no change in the television screen or spectrum analyzer is observed, site is **probably** clear of high level Telecom.

So the overall installation then becomes determined by three factors: a location which avoids Telecom, avoids obstructions, and still provides a clear look at the desired satellites.

A more comprehensive study of Terrestrial interference is available in GLYN BOSTICK'S excellent series "MICROWAVE FILTERING" published in CATJ.

One more very important word about the installation site. In any

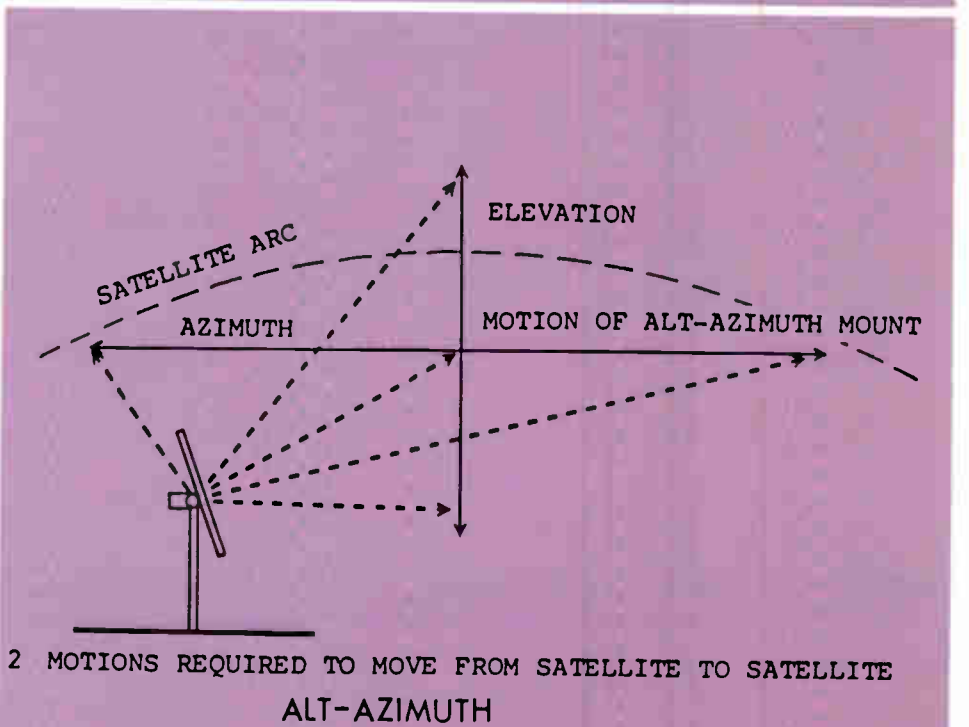
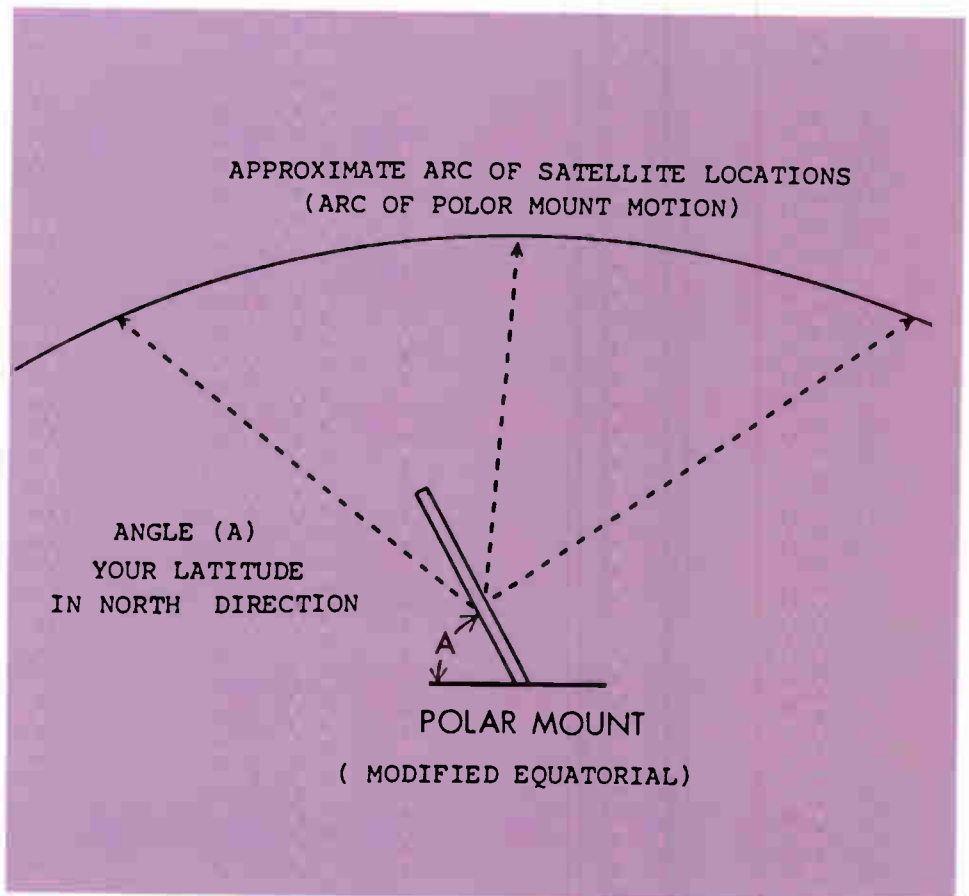


FIG. 17

situation, especially in a motorized home system, the antenna should be surrounded by a fence (low enough not to obstruct the beam,) to protect the equipment and people. There is a high theft risk with LNA's in particular, as these can not be usually home made. More important; KIDS love to climb! Just imagine a kid in your antenna assembly when you decide to watch Satcom 4 for a change!

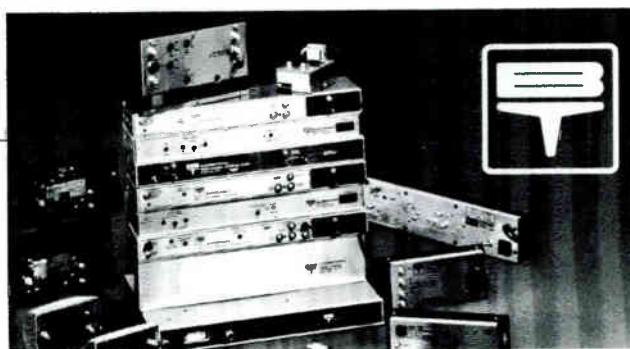
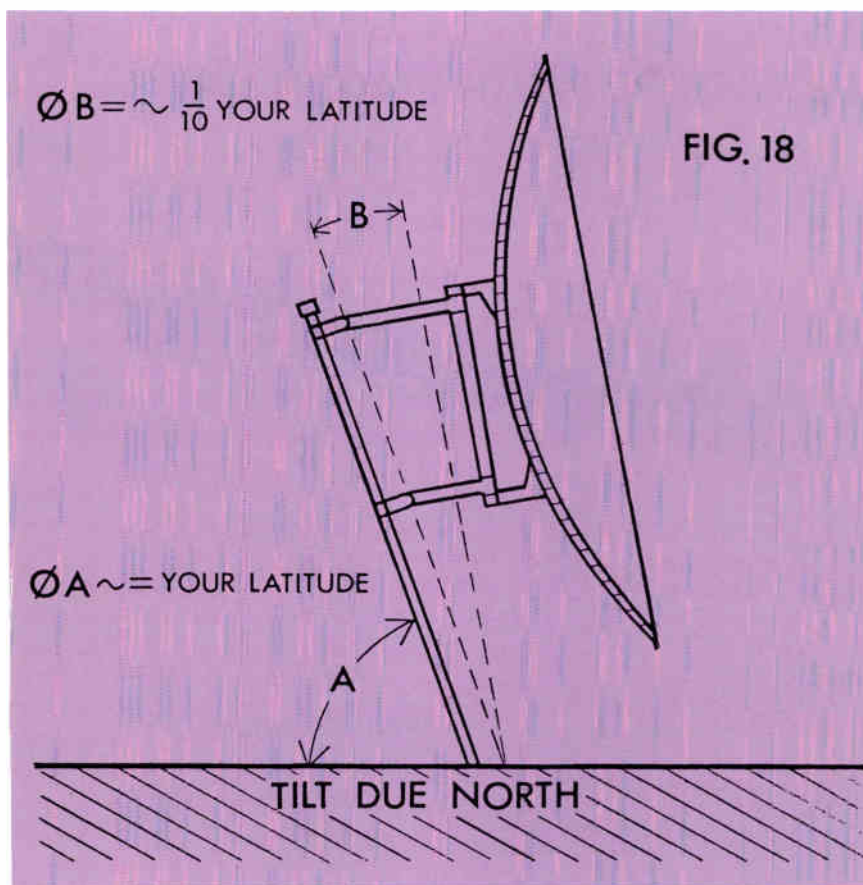
Antenna mounts come in various forms but the most common home system employs the Polar or modified equatorial mount. Alt-azimuth and Hybrid mounts are most commonly employed for cable or Telecom installations. The Polar mount has the advantage that it will allow a reasonable good sighting on all Geostationary Satellites with only one motion (Figure 17).

The concept of the Polar mount involves inclining the vertical axis of the alt-azimuth mount to an angle approximately equal to your latitude. This allows (when properly aligned) the antenna to be moved along the satellite arc by moving the azimuth axis only. The technique was first discovered hundred's of years ago to make the equatorial telescope mount for astronomy. A true equatorial mount on an antenna is perfect for a radio telescope but must be modified for satellite reception. The why and how of these modifications are quite involved, but can be simplified for most applications. Basic set up for a polar mount (which can be later fine tuned for perfect tracking) are as follows:

1. Incline the vertical axis in a true North/South direction. If using a compass be certain to apply the proper magnetic correction.
2. Offset the antenna azimuth bearing so that the antenna rotation about the azimuth is looking **down** by approximately 1° for every 10° of latitude (Figure 18).

This will give a polar mount which tracks reasonably.

Many long and detailed articles have been written on the calculation for proper Polar tracking, and could not be adequately covered here. In the next part of this series, we will examine the distribution of signals as well as the SMATV basics. □



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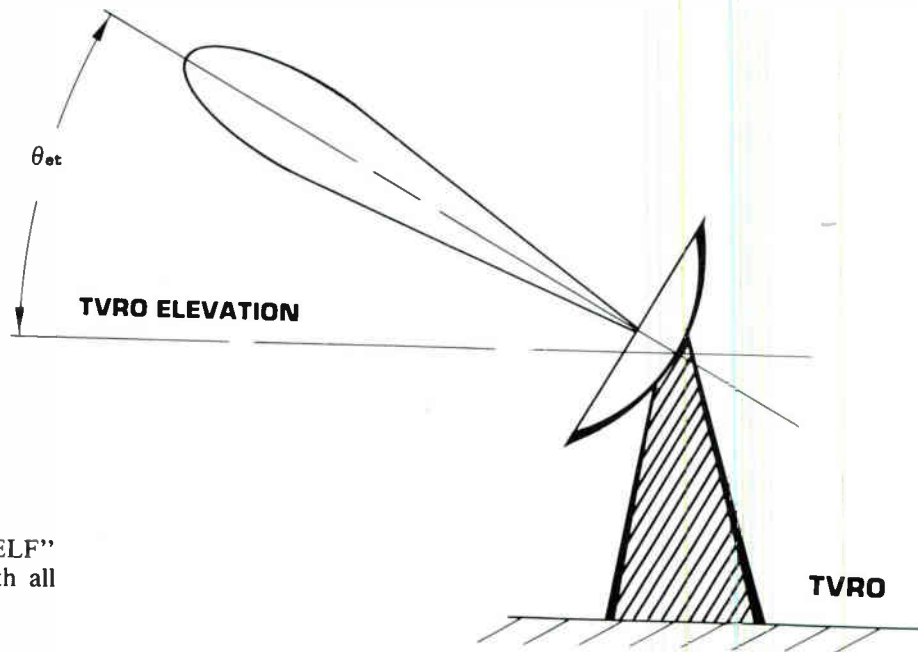
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Return of
THE FILTERED EARTH STATION #16
 Terrestrial Interference Avoidance

A Comprehensive Approach



By: Glyn Bostick
 Microwave Filter Co., Inc.

AFTER THE "DO-IT-YOURSELF" SURVEY OR: What to do with all this data.

Last Time

A simple TI measurement kit was described along with instructions on how to calibrate and use it to measure the frequency and signal strength of microwave interference.

This Time

We'll give a step-by-step method for analyzing the survey data in order to predict interference level at the downconverter.

The General Method

We'll first ratio the interference to satellite signal strength to determine the **relative** interference: the interference (in db) relative to the satellite signal strength. After all, this is what causes picture degradation — not the **absolute** interference level.

Next, we'll correct this level to account for the fact that, while the satellite signal is received at the peak of the dish lobe (maximum gain direc-

tion), the interference comes in at a lower gain point: on a side or back lobe, for example.

The result will be the interference, relative to satellite signal, seen at the **downconverter**.

The Survey Data

Recall that the survey identified certain unwanted carriers and measured their frequency, strength and direction of arrival at the TVRO site.

We are going to perform certain calculations for each direction. We may have several frequencies from a given direction. It's not necessary to calculate for each frequency, although the frequency will be important for purposes of predicting which channel will be affected.

So, for each direction of arrival, perform the following calculations:

Normalizing The Interference

Here we ratio the interference level to the satellite signal level. For simplicity, satellite signal strength is assumed to be -120 db (Watts/Square meter) and this number is advised, unless you know (or calculate) the signal strength at your site. **Subtract** satellite signal strength from the interference, expressed in the same units. For example, if interference was measured as -130 db (Watts/Square meter):

Relative interference
 $(RI) = -130 - (-120) = -10$ db
 or, the interference is 10 db **weaker** than the satellite signal.

Another example: Suppose interference is measured at -100 db (Watts/Square meter):

Relative interference
 $(RI) = -100 - (-120) = +20$ db
 or, the interference is 20 db **stronger** than the satellite signal. ▶

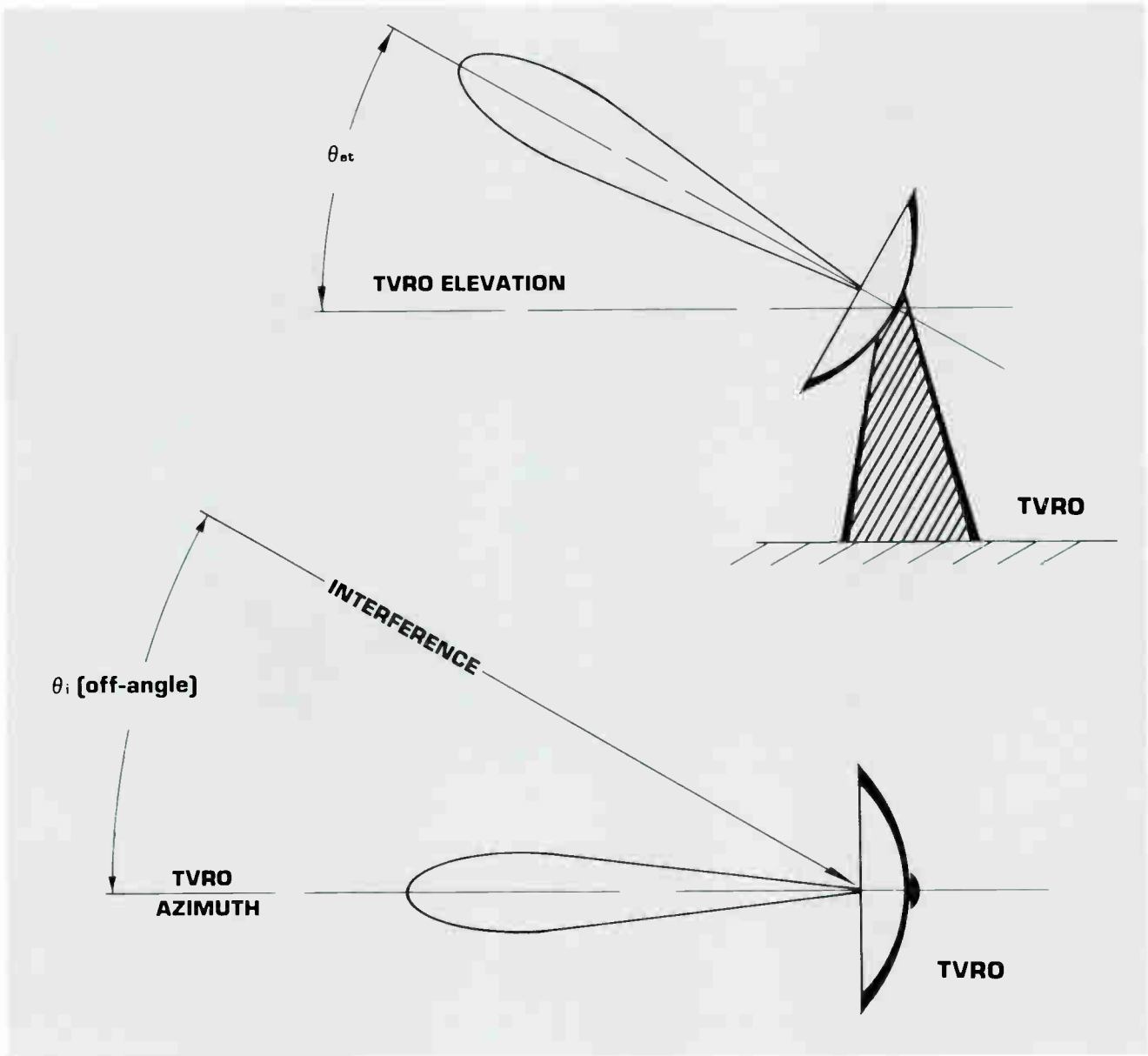


ILLUSTRATION # 1

Geometric Nomenclature for Calculating D, the pointing correction

$$D(\text{db}) = -25 \text{ Log } \theta'_i$$

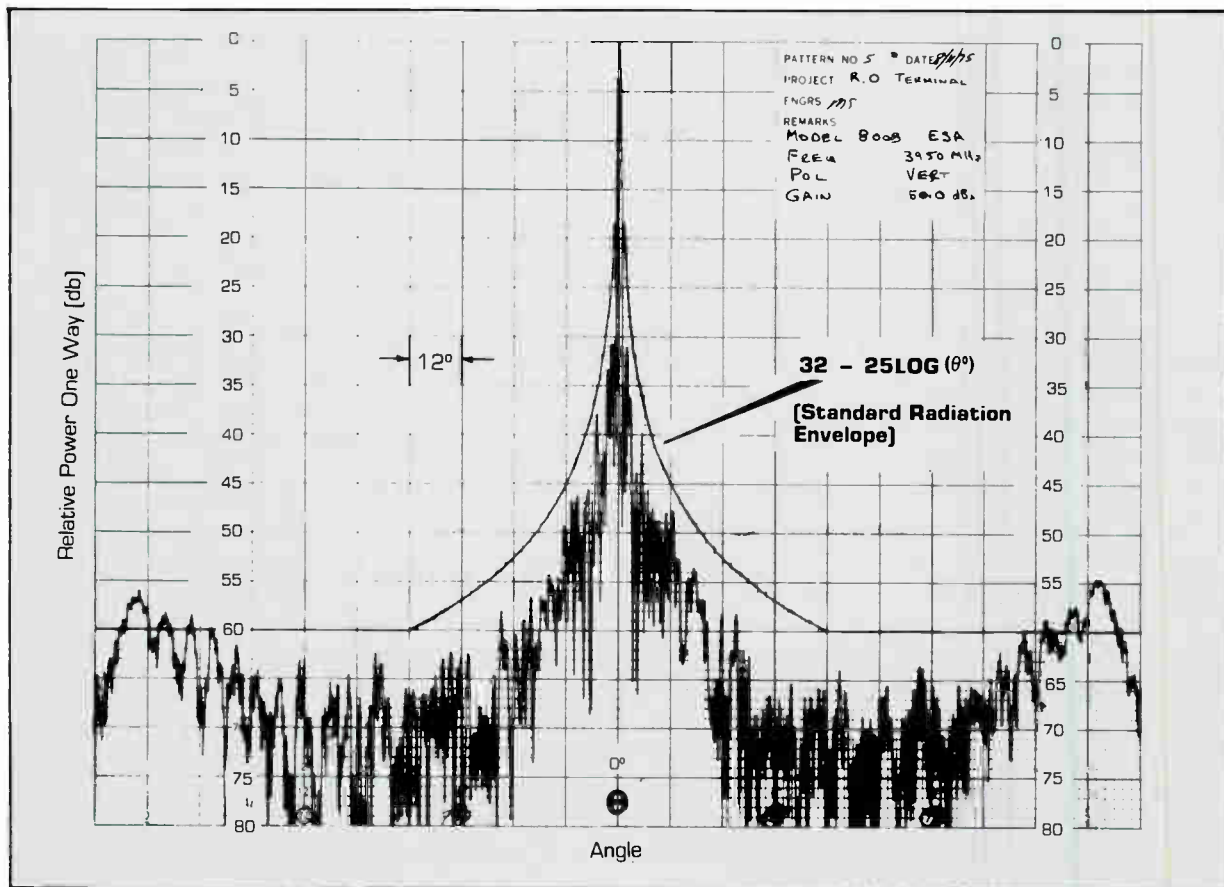
$$\theta'_i = \text{Arc Sin } \sqrt{\text{Sin}^2 \theta_{et} \text{ Cos}^2 \theta_i + \text{Sin}^2 \theta_i}$$

Pointing Correction

We must now adjust the RI figure to take account of the fact that the two signals (interference and satellite) are arriving from two different direc-

tions and their "gain paths" to the downconverter will be different. The illustration shows the Standard Radiation Envelope, as defined by the

FCC. This shows how much gain we lose at off-angles. We have to compute the effective interference off-angle in order to adjust the RI figure.



Let's define the interference off-angle θ_i as:

$$\theta_i = \text{ARCSIN} \sqrt{\text{SIN}^2 \theta_{et} \text{COS}^2 \theta_i + \text{SIN}^2 \theta_i}$$

Where:

θ_i is the off-angle of the interference (with respect to TVRO beam azimuth)

θ_{et} is the elevation angle of the TVRO

Having determined θ_i and θ_{et} we can compute the correction:

$$D \text{ (db)} = -25 \text{LOG} \theta_i$$

and add it to the RI figure.

Example:

We have a relative interference figure $RI = 10 \text{ db}$, the relative azimuth (with respect to TVRO beam pointing) of the interference is $\theta_i = 20^\circ$ and our TVRO elevation $\theta_{et} = 30^\circ$. Then,

$$\theta_i = \text{ARCSIN} \sqrt{\text{SIN}^2(30^\circ) \text{COS}^2(20^\circ) + \text{SIN}^2(20^\circ)}$$

$$= \text{ARCSIN} 0.581 = 35.53^\circ$$

$$D \text{ (db)} = -25 \text{LOG} (35.53^\circ) = -38.76 \text{ db}$$

So, the relative interference at the downconverter RID:

$$RID = RI + D = +10 \text{ db} + (-38.76) = -28.76 \text{ db}$$

Or, the interference, as seen at the downconverter, is 28.76 db weaker than the satellite signal (which would give you no problem, incidentally).

Next Time

At this point, you know the frequency and relative level at the downconverter of the interfering microwave carriers. Next time, we'll show how to study these levels, to predict picture degradation and how to choose the appropriate means of suppression such as IF traps, microwave filters, blocking screens or a combination of these.

Acknowledgements

Many thanks to Bernadette Andaloro for "carrying the mail on time" again, to John Greatrex for sketches, and to David Bostick for quick stat work to meet our deadline. □

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

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

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

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

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

NEW PRODUCT REVIEW

AUGAT[®]

AUGAT[®]

AUGAT[®]

**OUT-OF-HOME ADDRESSABLE
SECURITY IS NOW A REALITY**

Last year, theft of CATV service translated into an operator's nightmare of losses estimated at \$200 million. The reason: as long as data goes into the subscriber's home, no matter how sophisticated the Pay-TV security system might be, it becomes vulnerable to illegal tampering techniques.

Vitek Electronics, Inc., a subsidiary of Augat Inc., announces the integration of its well-known on-the-pole security concept with addressability—VITAP.

The VITAP Solution

VITAP is a fully addressable subscriber tap which finally gives CATV systems the vastly improved security they need. Because VITAP provides immediate revenue protection, it has the potential to significantly increase a CATV systems' profits.

With little or no additional expense to the subscriber, VITAP gives CATV operators the control where they need it—at the headend. This allows CATV operators greater programming flexibility in a cost efficient way.

VITAP makes addressability a practical reality for these reasons:

- 1) It dramatically reduces signal piracy because there is nothing that can be tampered with inside the home.
- 2) As an addressable tap, it can make Pay-Per-View viable and reliable.
- 3) It immediately improves auditing and billing procedures because the systems' computer tracks all service and program changes.
- 4) It allows operators to begin or stop any combination of services to selected subscribers, from the headend, without sending service personnel to each individual home.
- 5) It will ultimately allow cable systems to get into two-way services, such as electronic banking and home security.

An Engineering Breakthrough

Utilizing time-tested equipment and a rugged, innovative technology, VITAP is designed for maximum protection even in a hostile environment. CATV transmissions can now be completely protected, without interference from either the weather or tampering.

VITAP greatly reduces maintenance service calls and equipment retrieval costs, and is compatible with any equipment already in use.

Even converting existing one-way cable equipment to VITAP's two-way transmission service is possible.

Whether the subscriber is an individual home with one TV or an apartment complex, reception will always be clear.

Using VITAP, CATV operators can protect their revenues and enhance their profits. Best of all, they can broaden the subscriber base by tailor-tiering programming to capture larger audience groups segmented by viewer interest.

How VITAP Works

VITAP uses on-the-pole selective "re-modulation" of existing, non-encoded CATV video carriers on a channel-by-channel basis. Unlike interfering carriers, VITAP does not require additional energy due to the use of negative modulation. This modulation is near the line-scan rates within APC pull-in range, resulting in maximum damage to unauthorized channels. To even further discourage "experimental" descrambling of such signals, the phase of the VITAP signal is periodically reversed, field-by-field, using a pseudo-random generator with a rather long sequence (days). VITAP is also virtually transparent when passing authorized audio and visual signals, as well as all scrambling and addressability schemes in use. This feature further demonstrates the vulnerability of addressable descrambler techniques.

Designed with two-way cable ability, VITAP has a unique, high isolation "reverse transmission gate" built into it, allowing simplified two-way reverse transmission conditioning of a one-way plant already in use.

VITAP is available in two models:

- 1) Strand-mounted 4 subscriber model, with power supplied up the subscriber's drop or by way of the 60 VAC cable supply.
- 2) Eight subscriber unit, which runs from the 120 VAC main via a 120V to 24V transformer.

Both types require an assigned address, from 0 to 65,000, upon installation. Headend control allows removal of unpaid channels from each subscriber's drop.

Downstream communication is via a 256K band, 73/74.5 MHz data carrier situated between channels 4 and 5, with other carrier frequencies and data rates available. The transmitter is part of the headend mounted "digital/RF interface," connected with a modem back to the customer-supplied billing and the overhead computer system.

Utilizing elaborate filtering for harmonic and sideband control, the data transmitter prevents patterning off home receivers. This carrier is also trapped at each tap as well, and doesn't enter the home. A non-volatile EE ROM memory maintains a complete set of current-authorized channels in the "digital/RF interface," which outputs 50-60 dBmV. This is sufficient RF to combine directly with the CATV headend.

Oscillator pile-up in the CATV trunk is prevented by using TRF technology in the data receiver of each tap. Demodulated data is fed to a digital card which then performs address and parity recognition.



Unauthorized channels have their individual modulators (Pat. pending) pulsed by a unique pseudo-random generator. This causes irreparable damage to the respective video signal, and no amount of "descrambling" can restore the image. Because microprocessors do not exhibit sufficient mean-time-between-failure (MTBF), developmental models of the VITAP use "B" series CMOS. Vitek is developing a custom LSI using a rugged technology (already proven in under-the-hood automotive applications) to further reduce part construction and to increase MTBF.

VITAP is a negative, hard security system that minimizes the amount of hardware placed in the home. It also saves money for customers with more than one TV receiver as only one drop is required, unlike converters which require one drop per set.

VITEK ADDRESSABLE SYSTEM INFORMATION SHEET

SYSTEM FEATURES

- Mounted out-of-the-home
- One-way addressable
- Two-way upgradable
- 4 port pole, pedestal, or strand mounted
- 8 port apartment versions
- System transparency allows use of VITAP in conjunction with other addressable systems
- 64 channel capacity
- 5 independent pay channels
- Midband tier (A-I)
- Powered from the individual drop cables
- Service shut-off
- Interfaces with existing headend computing equipment
- No change of existing headend equipment required
- Longer than the standard tap for rebuild splice-ins

PRELIMINARY COST

- Overall cost of four ports: \$250
- Headend costs: (A) Smart Controller: \$10,000 (approx.) (B) Complete billing and controlling system (up to 5-10 thousand subscribers): \$20,000 (approx.)

VENDOR LOCATION

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

SYSTEM VITAP®

Showcase

LRC PRESSURE TAP

LRC Electronics, Inc., Horseheads, New York, has introduced the LRC Pressure Tap for use in coaxial cable area networks. This innovation tap can be adapted for almost any size or type of coaxial cable without the use of additional tools.

LRC Electronics feels that its new product will eliminate the problem of short circuiting found in other taps. The LRC Pressure Tap features a cutting tool which works from the side of the cable, removing pieces of insulation and braid without hitting the center conductor. A contact pin is designed to be pushed over the center conductor of the cable and make contact. The tap's all-metal construction assures the radiation integrity of the coaxial system.

LRC developed the tap in response to the demand for an uninterrupted pressure tap that requires no additional training of its end users, and is cost-effective in application.

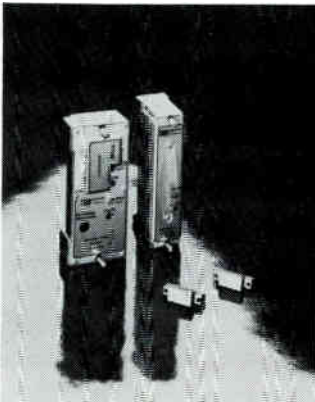
LRC Electronics is a subsidiary of Augat. They are located at 901 South Avenue, Horseheads, New York 14845. Telephone (607) 739-3844.

MAGANVOX ANNOUNCES NEW DEVELOPMENTS IN "COST-EFFECTIVE" TECHNOLOGY

Magnavox CATV Systems, Inc. has introduced two new products; these two new offerings are Power Doubling™, a micro-chip technology capable of boosting output power by 100%, and the Magna 6400 Addressable Converter System which features Encryptic Encoding™, a new signal secure scrambling technique. According to C. Richard Mullen, Magnavox CATV vice president of marketing and sales, the new developments demonstrate the company's ability to "combine state-of-the-art technology with cost-effectiveness."

Power Doubling micro-chip technology is available in two retrofitable plug-in modules which work in the existing Magna 440 amplifier chassis and housing. Mullen said that this allows for easy upgrade of conventional hybrid systems to Power Doubling.

According to Mullen, Power Doubling offers cable systems double the output power for the same low level of composite triple beat distortion. A minimum 6 dB improvement is achieved in composite triple beat and cross-modulation specifications over conventional hybrid systems. This translates into a 3 dB increase

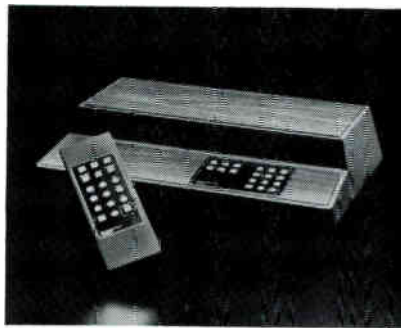


New from Magnavox CATV Systems, Inc., Power Doubling™ is the micro-chip technology that boosts amplifier output power by 100% or more. Power Doubling is accomplished through two retrofitable plug-in modules.

in output capability.

Power Doubling's principal component feature is the distortion reducing post amplifier which utilizes precise impedance matching techniques. The system is optimized for a response flatness and superior thermal design that permits a significantly higher output in a single hybrid I.C. system.

Power Doubling also makes existing amplifiers more "transparent." A superior design pre-amplifier lowers noise by at least 2 dB from conventional systems, to a figure of 5.7 dB or better.



The Magna 6400 Addressable Converter, from Magnavox CATV Systems, Inc., offers addressability, security and reliability in a full-function RF design. The remote control unit operates over a wide range of angles and distances.

Mainstation and line extender gain is increased. System upgrades to 440 MHz are facilitated, with no need of bandwidth compression techniques.

Power Doubling allows longer trunk cascades, thus eliminating costly HRC and "hubbing" requirements. Mullen said,

"As further evidence of its cost-effectiveness, we have determined that Power Doubling can be installed for up to \$600 per mile less than alternate feed forward technology."

According to Mullen, the company's other new offering, the Magna 6400 Addressable Converter System, combines advanced digital techniques with proven RF circuitry, to provide "maximum cable system security."

The system's key feature is Encryptic Encoding, a highly developed scrambling technique which improves on typical sync suppression methods. Based on sophisticated microprocessor technology, all Encryptic Encoding components are completely synchronized from the system controller. Mullen said, "This ensures that components that are not part of the system cannot defeat the system."

Encryptic Encoding is fully dynamic — the cable operator can change the authorization code on a random basis. In-channel recovery information is also well encrypted, making it useless without the key data needed to decipher it.

The Magna 6400 system controller is continuously sending to each converter authorization data generated either from the customer service software module or from an external billing computer.

The Magna 6400 computer maintains separate data bases on system subscribers and converters. The subscriber data base contains personal information such as name and address; the converter data base tracks the authorization status and service status of each converter in the system.

According to Mullen, the Magna 6400 Addressable Converter is a state-of-the-art, full-function RF design, comprised of an easy-to-use 4 digit fluorescent display and a compact, powerful remote control unit. Capable of tuning 64 channels, Mullen said that the converter offers many viewer benefits including a parental control option, favorite channel designation, and last channel recall.

By using a novram rather than ram or a PROM, the Magna 6400 addressable converter can preserve system and subscriber data during power outages.

For more information, write Magnavox CATV, 100 Fairgrounds Dr., Manlius, N.Y. 13104 or call toll free 800-448-5171 (in New York State 800-522-7464).

SADELCO INTRODUCES NEW HI-LO 2ND GENERATION, HAND-HELD SADELETTE SLM

Sadelco has introduced a second generation of the original hand-held Sadelette Signal Level Meter. The new

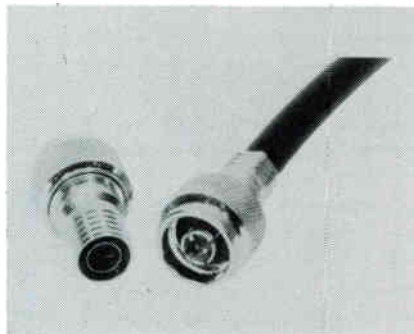
Sadelette allows the selection of any two channels up to 300 MHz, and offers the same accuracy and 1dB resolution on its 10 segment LED Bar Graph Display. The user can measure any two channels or pilot carriers up to 300 MHz with this easy-to-operate, low-cost, hand-held SLM. The original and the new Sadelette are now equipped with a custom carrying case and batteries.

For additional information and a free color brochure contact: Sadelco Inc., 75 West Forest Avenue, Englewood, N.J. 07631, (201) 569-3323.

GILBERT ENGINEERING INTRODUCES NEW "N" MALE CONNECTOR LINE

Gilbert Engineering, Phoenix, Arizona, has introduced a line of "N" Male Connectors with fast crimp installation, assuring reliable termination — **NO SOLDERING**. The NEW "N" Male Connector features an attached 5/8" crimp ring providing ease of installation, superior cable retention, excellent strain relief, and greater shielding.

The all brass construction of the "N" Male Connector assures superior electrical performance, while the bright acid tin plating provides good resistance to corrosion. A high grade silicone rubber gasket provides an interface seal. The slim design of the Gilbert body allows easy application of shrink tubing.



Gilbert is offering the "N" Male Connector for several different cable configurations, including RG 214, RG 213, RG 8, and RG 11. Crimp tools are available which crimp both the center contact and ferrule. Gilbert also manufactures complete Cable Assemblies using any of these cables. All of the Cable Assemblies are 100% R.F. tested.

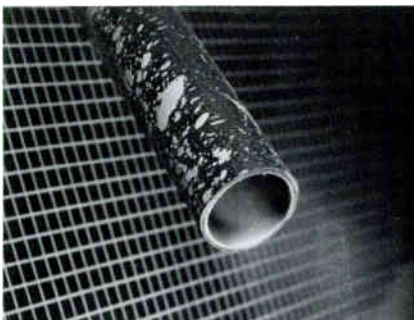
Cable Assemblies range from 1' - 100' in length and start at \$8.49. Delivery is stock to 4 weeks.

For further information on pricing, contact GILBERT ENGINEERING, P.O. Box 23189, Phoenix, Arizona 85063 or call TOLL FREE: 800-GILBERT. In Arizona, call 602-245-1050.

POLELINE ADDS NEW PRODUCTS

Poleline Corporation, subsidiary of RMS Electronics, Inc., is proud to announce that it is the sole distributor of Omni-Shrink™ heat shrink tubing in the CATV industry. It is available for use over cable and connectors from .412" O.D. to .875" O.D.

Omni-Shrink™ is a fully patented butyl heat shrink tubing that cleanly peels off the connector without leaving a carbon or mastic residue. The non-dripping adhesive/sealant system used is specifically formulated to resist dripping, yet forms an effective water tight seal. The seal is complete when the flow of adhesive is exposed completely around the circumference of the shrunk tubing ends.



When properly applied, Omni-Shrink's unique materials resist splitting and the propagation of splits occurring from rough cut ends and knicks. Its excellent weatherability allows for Omni-Shrink's usage at temperature extremes of between -40° and 125°F.

Special care is taken in the manufacture of Omni-Shrink™ heat shrink tubing to minimize longitudinal shrinkage. Shrinkage is limited to a maximum of 10% of the cut length.

Omni-Shrink™ heat shrink tubing is manufactured exclusively in CATV industry for Poleline Corp. by Radiation Dynamics Inc. a wholly owned subsidiary of Mansanto Company.

Also being introduced by Poleline is the Tuff-Box™ series of apartment house security boxes. Made of a revolutionary design in durable plastic, these security boxes are lightweight and stronger than traditional metal boxes.

Tuff-Box™ is available in three (3) basic sizes, however, custom sizing is available on special quantity orders. Because of its plastic composition, Tuff-Box™ is non-corrosive and withstands ultra-violet sun-ray deterioration "almost forever."

To enhance its tamper-proof characteristics, Poleline Corp. has added outside metal plates on either side of the cover to prohibit unauthorized access to the tamper-proof screws. The dome-like shape of the cover enables the installer to loop cables within the box, eliminating any damage to the cable during hookup of directional taps or hybrid splitters.

Tuff-Box™ comes complete with a pre-mounted plywood mounting board, tamper-proof screws, preset knockout holes, and "O" rings.

COMSONICS INTRODUCES 1-YEAR REPAIR WARRANTY, 3 LEVELS OF FAST SERVICE

HARRISONBURG, Va. — ComSonics, Inc., a leader in the CATV repair industry for over 10 years, announced here today it has initiated a "Zero Defects Program" that enables it to offer 12-month repair warranties along with three new levels of fast service.

Carl Hensley, Vice President of Internal Operations, said the new warranty applies to all extended bandwidth line equipment as well as solid-state, TVRO and test gear. It begins with standard modifications and component replacements and includes surge protection, complete testing and high-rate pulsed burnin.

"The result," he said, "is repaired equipment with extended life that exceeds original manufacturer specifications."

With the new warranty program, ComSonics has also initiated three levels of quick repair turnaround.

"UltraSonic Service" is intended for extreme emergency situations. It assures customers that equipment will be professionally repaired and shipped in two days or less.

"SuperSonic Service" is the company's emergency repair system. It is designed to have equipment repaired and returned in five days or less.

"ElectraSonic Service" is the firm's normal fast repair system. It is designed to have equipment repaired and returned in 14 days or less.

"It's no secret that equipment failure and slow repair service equate to subscriber churn and higher costs due to high inventories," Hensley said. "With our new warranty and fast levels of service, we feel we are meeting a real market demand by helping operators control these costs."

For more information, contact ComSonics at P.O. Box 1106, Harrisonburg, Virginia 22801. Or call, toll free 1-800-336-9681.

Classified

FOR SALE

Complete CADCO Headend, Channels 2 thru 11. Excellent working condition. \$3250 or best offer. Also converters 15-8, 17-7, 41-4, 13-6. Call Robert Watson - (912) 953-3800.

FOR SALE: Satellite Receiver, Gardiner Comm. Model 4110, Crystal Synthesized, 24-Chan., Like New, Have All Papers, Manual. \$1400. R. Carey (619) 275-4174.

DO YOU OFTEN WISH THAT THE SMITH COMPANY WAS THE SMITH & SMITH & SMITH & SMITH COMPANY?

Business people often find themselves doing so many things that just one of them isn't enough. So hire some of the needy and disadvantaged young people of America this summer to help you. Hiring them can also help you in another very important way. Because a business that hires economically disadvantaged youth during the summer may get as much as an 85% tax credit on the first \$3,000 of wages you pay them. Write the National Alliance of Business at P.O. Box 7207, Washington D.C. 20044. And support your local summer-jobs-for-youth programs. You'll be doing something for yourself, for your business, for your community, and for the needy youth of America, too.

LET'S GET ALL OF AMERICA WORKING AGAIN.

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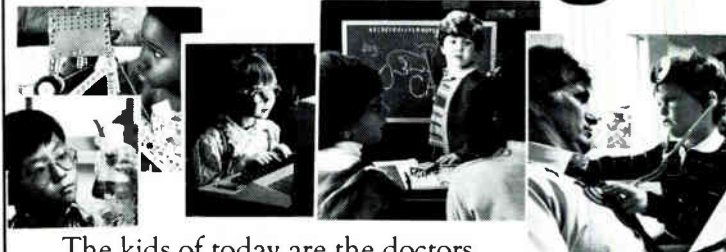


ATTENTION! SYSTEM MANAGERS — TECHNICIANS NEEDED

Excellent opportunity for system managers and technicians for our systems in Colorado, Texas, and Oklahoma. Need qualified personnel for these Southwestern locations; good working conditions and opportunity for the right people who want to work and stay actively involved in the cable business. These systems have good equipment to work with and offer excellent situations to grow in the cable business. If interested, send resume to the box number indicated below.

Box 71080
c/o CATJ
4209 N.W. 23rd
Suite 106
Okla. City, OK 73107

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CATA offers three types of memberships:

- 1.) Systems — paying regular monthly dues based on number of system subscribers.
- 2.) Associate Members — pay an annual fee.
- 3.) Individual Members — pay an annual fee.

NON MEMBERS may also use the Classified section at the rate of 50 cents per word with a minimum charge of \$20.00. Add \$2.00 for blind-box. Non-members should include full payment with the ad insertion.

Deadlines for all Classified Advertising is the 1st of the month for the following month's issue.

Address all Classified material to: CATJ, Suite 106, 4209 N.W. 23rd, Oklahoma City, Okla. 73107.

ADD UNLIMITED PAY CHANNELS TO YOUR SYSTEM WITHOUT LOSING YOUR INVESTMENT IN CONVERTERS.

Now, That's The Ticket!



If you're like most cable systems, you've spent almost \$225,000 on converters. Don't throw away that investment! With Eagle's Descrambler, you can add 15 tiers of service and unlimited channels to your system using your present converter.

Write Your Own Ticket!

Whether you're adding one pay channel, 15 pay channels, or 15 tiers of service with 120 channels, Eagle's Descrambler can handle it all. Select only what you need. In the future, channels can be added to the headend scrambler with our simple plug-in module. The headend unit integrates with all manufacturer's modulators and processors and is compatible with all Standard/HRC/ICC configurations.

The Best Show In Town

Eagle's Descrambler is compatible with all single channel output converters and is factory tuned for channel 2, 3, or 4. The descrambler

has no information on the audio making it ideal for AML transmission.

Private Audiences Only

There are no subscriber controls with Eagle's Descrambler and our unique sync suppression scrambling insures maximum security. In addition, we've developed a tamperproof identification matrix to eliminate concerns about theft of service.

Future Attraction

Addressability? It's coming. Eagle's Descrambler will be ready for addressability when you are . . . and the descrambler will be perfectly compatible with our addressable unit. Across the board, we're working to protect your investments.

Add pay channels . . . maximize your converter investment . . . prepare for addressability . . . Eagle's 15 Tier Descrambler. Now, That's The Ticket!



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MAIL ADDRESS: P.O. Box 2457, Syracuse, N.Y. 13220
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