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DIGEST**



JUNE 01, 1984

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TOP OF THE MONTH

ANTENNA MOUNTS/ a peek at the mechanics involved in making your antenna system stay straight and true gets an editorial look this month. Part of the long term concern is the strength built into the mounting system and what happens as the system 'weathers.' Another, newer, concern is how do you cope with a satellite belt that is getting wider and wider all of the time? Older style 'push movers' may not be able to reach the full belt width as the belt itself becomes enlarged.

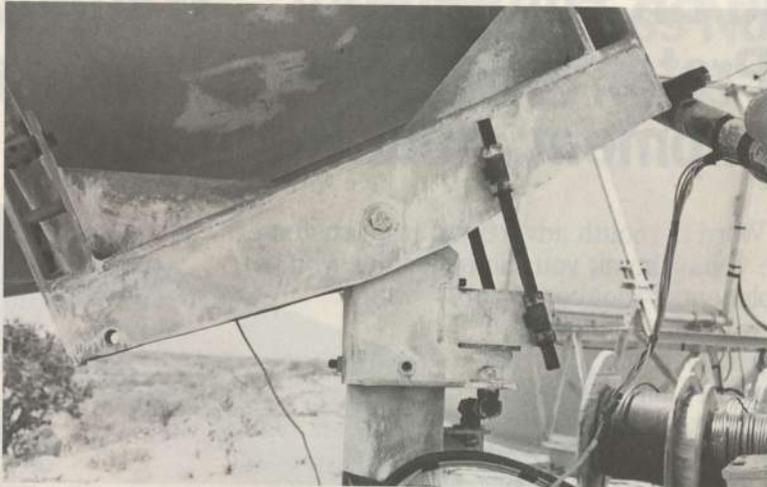
WITH the Niagara Falls STTI show coming up later this month (June 12/13/14 on the US/Canadian border) we felt it appropriate to talk about 'How' you attend a show to get the most from the show. Too many people attend and then somehow miss all of the really important stuff. We try to teach you how you spot the 'hidden goodies' this month.

COOP trots out a proposal whereby dealers will get together under CSD sponsorship to test and evaluate, and rate (!) equipment, in his Comments this month. Read it, especially if you plan to be in Niagara Falls where an open forum on just this subject is planned.

AND SMATV system planning continues with a look at the sometimes mysterious world of 'cable amplifier powering.' **PLUS**, we take a new look at some of the latest hardware in the rebroadcast world concentrating on a new UHF down converter from Sat-Tec.

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OUR COVER/ Thomas P. Harrington, one of the industry's quiet 'gentlemen'. Retired once, perhaps twice; father of **Coax Seal**. A brilliant career in chemical engineering, a graduate of 'Entrepreneurship U', nominated to the SPACE board in 1983, and, the industry's best 'Gem Finder' and most experienced show attendee (see page 50 here). To know Harrington is to have a fuller life.

COOP'S SATELLITE DIGEST



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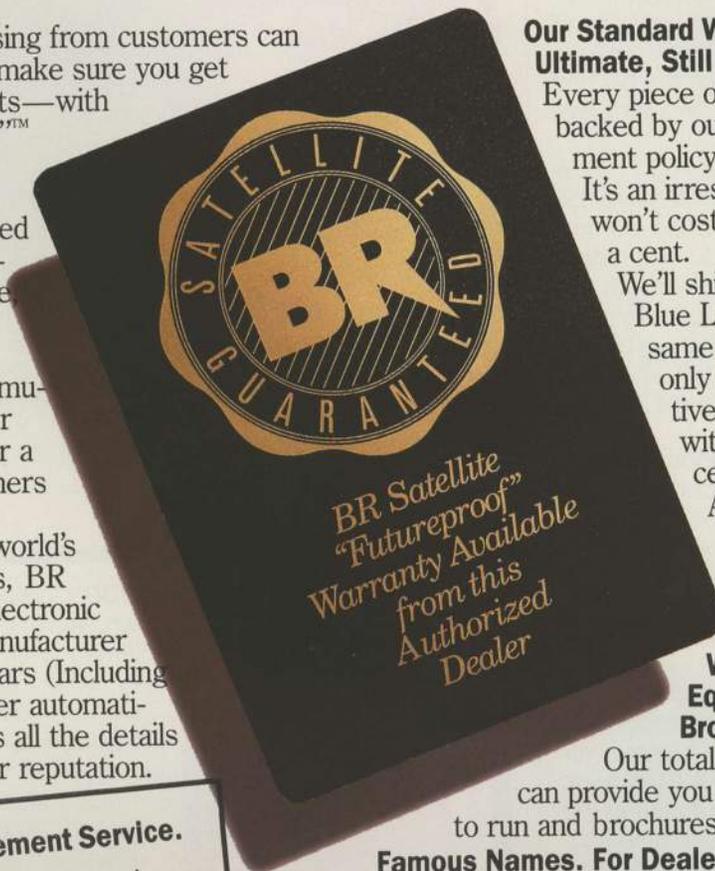
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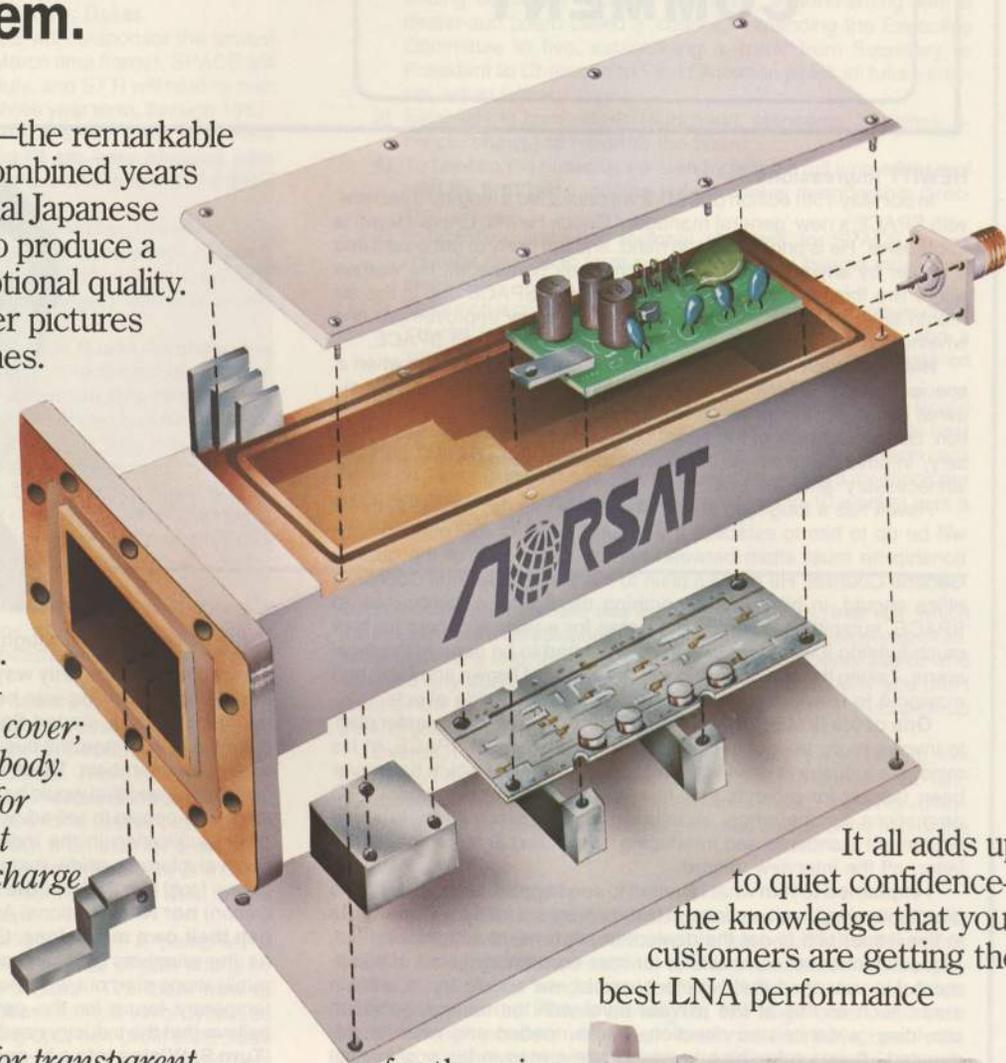
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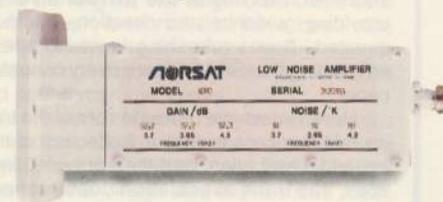
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COOP'S SATELLITE COMMENT

- HEWITT Impressions
- HBO CBD Update
- LET DEALERS SET STANDARDS

HEWITT Impressions

In our May 15th edition of CSD/2 we published a lengthy 'interview' with SPACE's new 'general manager,' Chuck Hewitt. Chuck Hewitt is impressive. He is bright, quick in mind, and not likely to get boxed into a corner by anyone who has not done their homework. He worries about two things; whether he can 'straighten SPACE out' in the six month time frame he has given himself to show improvement and whether he can get the industry to get behind him and SPACE.

His first crack out of the barrel occurred this past May 9th when a special Board of Directors meeting, which he called in Denver, considered his proposals for establishing 'priorities' for the trade association. Some members of the board considered the meeting 'unnecessary,' in advance. It will be interesting to see how many agree it was 'unnecessary' after the fact.

Hewitt has a tough job ahead of him. He told us, in CSD/2, that it will be up to him to establish the ground rules for the working relationship he must attain between his office and that of the outside General Counsel. He made it plain to me that the General Counsel's office should, in his mind, be nothing more than a 'contractee' to SPACE, submitting advance estimates for a year at a time on how much funding it would require to do what had to be done in the legal arena. Taking the check book out of the hands of Brown and Finn, and moving it to Hewitt's office could have interesting side effects.

One of his first priorities would be the creation of a 'master plan' to involve more people in the operational process of SPACE. In his mind, the industry is rich in talent at all levels; talent which has never been tapped for projects that run the spectrum from home TVRO promotions for the whole industry to special committees to study equipment standards and interfacing. We talked at length about the latter, off the interview 'record.'

I explained to him what I wanted to see happen; to get the dealers directly involved in an equipment testing program (see my **Comments** in this issue) and to get the dealers to put forward suggestions (i.e. requests) for better compatibility for inter-connecting pieces of equipment. He reasoned that 'where possible, we should try to work in areas such as this **at the private level** with the trade Association providing guidance and direction, where needed and when so requested.' It was refreshing to me to see a man in his position not advocating that SPACE have every concession in town including toilet paper.

Hewitt views the **ultimate role** of the trade association much like I do. His concept is that a trade association should bring together expertise and talent and then provide direction for it. **'But,'** he cautions, **'the trade association does not need to be directly involved in everything that is done.** That creates bottlenecks when everything must end up funneling through one or two individuals.' He envisions a 'lean and mean' trade association team and I don't think he is an empire builder.

He brought up the subject of publications. **'Do you think,'** he asked, **'Inside SPACE is a necessary publication'?** Inside Space goes to the Pioneer members and the Board. Some copies also sprinkle into various Congressional offices. Hewitt clearly is not intending that he become a publisher. He has taken a quick look at **SatVision** (the monthly SPACE Journal that seems to come out every other month) and he pondered whether or not it was breaking even. I



CHUCK Hewitt . . . a tough row to hoe.

assured him that the **only way** it could break even was if the accounting for the publication was being 'doctored' by the bookkeeping department. SPACE started **SatVision** because somebody wanted to compete in the magazine business, and because they wanted a forum to speak to members. **There is only one way** to make **SatVision** pay its own way and that would be a gamble; **hire** a professional editor and staff, **hire** people to sell advertising, and **go head-to-head** with every other publication in the industry. I'm not so sure, my own selfish survival interests aside, that is a wise course of action for SPACE to follow. I told him **'Neither the NCTA** (National Cable Television Association) **nor NAB** (National Association of Broadcasters) **try to publish their own magazines.** Sure, lots of trade associations do (such as the plumbers and air conditioning people) but invariably such publications start out with the best of intentions, and end up being a temporary forum for the **party-in-power** at the moment.' I didn't believe that the industry needed another magazine and I told him so. **'Turn SatVision into a bi-annual special publication,'** I suggested, 'coming out just ahead of the two SPACE trade shows each year. Make it a super-giant **program-for-the-conventions** and assign it to the convention department within SPACE. You still get a forum, you get a top-notch product that way, and with the enthusiasm surrounding a show you will **actually make money** on two special, show-related program-issues, where struggling along with the **monthly** overhead of an editor and staff, you will either not make money or just barely break even at best.' Some would consider those suggestions self-serving; they were not made from that perspective.

One of my suggestions that did evoke a positive response had to do with state and regional trade associations, I pondered why in **this industry**, unlike virtually any other I am aware of, we have one, national, trade association and **no state or regional associations.** Hewitt picked up on this. 'I believe that many of the problems the industry faces would be better dealt with at the local or state level,' he noted. 'The zoning situation may just be the tip of the iceberg,' he

STTI/SPACE Settlement Terms

As announced in our May 15th edition of **CSD/2**, the show battles are past. SPACE VP Chuck Hewitt and STTI's Rick Schneringer hammered out an agreement which was presented to the SPACE board for ratification May 9th and although there was a bare-quorum, a unanimous vote followed discussion and the show wars were over.

This year and this year alone, the show schedule will be as follows:

- 1) June 12/14: STTI's Niagara Falls 'Can-Am' show.
- 2) September 2/5: Joint sponsored STTI/SPACE show; Nashville.
- 3) November 18/20: STTI 'Pan-Am' show; Dallas.

Starting with 1985, STTI and SPACE will co-sponsor the annual Vegas gathering (within the February-March time frame), SPACE will hold its own annual gathering in June/July, and STTI will hold its own Nashville show. The contract covers a three year term, through 1987.

Schneringer, obviously 'high' on SPACE's new Exec VP Chuck Hewitt (see **CSD/2** for May 15th), said "I am very pleased with SPACE's selection of Chuck Hewitt. He is a fine fellow and a good businessman."

Discussions between Schneringer and Hewitt began early in April; first a several day session in Washington, then a meeting in Atlanta. They were hung up on the transition year and Schneringer credits his wife and business partner Gloria (Schneringer) with the breakthrough.

"She suggested that we co-sponsor the Nashville show, this year only, and that made it all possible," remembers Schneringer. He adds, "I think everyone is going to win on this one."

Hewitt had admitted privately that he may have had his 'new job' on the line with the negotiations. While it was not likely that he would have been terminated had he failed, he certainly stood to gain if he was able to get an agreement which the SPACE board would accept. Anxious to launch a complete overhaul of SPACE's inner chambers, getting the Schneringer problem resolved is bound to make his task

easier in the early days. The SPACE board met in Denver coincidental with the lightly attended **EXPO '84** (sponsored by **Channel Guide**). Hewitt had prepared a **60-page plus** agenda + exhibits packet for each director. Accustomed to being handed a **single-sheet** of paper with a bare-agenda outline at Board meetings, many of those on hand were 'overwhelmed' by the amount of material they were being asked to study, consider, and act upon. Hewitt sought to direct their attention to a diverse schedule of items, including:

- 1) Resolution of the SPACE/STTI matter;
- 2) Re-organization of SPACE (new three year terms for directors, ending consumer reps on the board, experimenting with a dealer-sub board called a 'council,' expanding the Executive Committee to five, establishing a 'track' from Secretary to President to Chairman to Past Chairman which all future officers would follow);
- 3) Establishing committees (education, standards, statistics, finance, shows) to report to the board;
- 4) To beef up the publications area by hiring a full time editor and staff for **SatVision**, putting out an annual membership directory;
- 5) Establishing state and regional 'chapters' for SPACE, to encourage dealers to form smaller groups to handle more local problems;
- 6) To launch a comprehensive educational program with multiple 'course levels,' accreditation for course completion, and a 'graduate level' of courses which would be administered through a separate, 'non-profit' corporation.

Forced to cut their Denver meeting short because many Board members had unrelenting airplane schedules, they did agree to next attempt bringing together a quorum at the Consumer Electronics Show on June 5th in Chicago. After typically 3 to 4 board meetings per year, the fast track from Hewitt (three meetings in 10 weeks) was a certain sign that SPACE was moving again.

suggested. I wondered if he meant that we are only getting notice, at SPACE, of a few of the actual situations where restrictive zoning is being proposed. 'Possibly. Or, what is ahead is far worse than what we have now.'

We talked about how you would get dealers to work together, in a state for example, to form their own 'state trade association.' 'Legislation is coming,' I noted, offering the recent bill introduced in Alaska (it attempted to ban TVROs; period) as evidence. 'There is only so much you can do from Washington when Idaho or Alaska decides they want such a bill passed. It is far more effective for a dealer organization made up of state constituents to fight such a bill than for a national-trade-association thousands of miles away to write letters and make telephone calls. Some state legislators resent being told what is right and wrong by someone from Washington'

I made the suggestion that his office prepare a 'pamphlet' (I avoided using the word 'book' or booklet because of past efforts by SPACE) which could be distributed to dealers. 'Tell them how to start a state trade association, give them a sample set of bylaws so they can avoid heavy legal fees in setting up a non-profit state trade association, and suggest to them how to conduct a meeting and get the ball rolling.' He liked the idea and made a note of the suggestion.

I would carry it a few steps further, now that I have had a few weeks to think about it. I know that several of the OEMs are working right now on some high quality videotapes illustrating everything from proper installation techniques to how to market systems. Such tapes would make excellent 'draws' for a state association 'dinner meeting.' I would even break loose some of the 300 hours (plus) of ready-to-watch **CSD** videotape for a state group such as this. Anything we can do, at the private level, to get such state trade associations off and running I am behind 100 percent.

Many of the OEMs and distributors also have excellent personnel in place whom I suspect would be delighted to come to a state 'dinner meeting,' sit at the head table, and after the usual speeches put on a live show about some aspect of being a better dealer. **Brent Gale**, out of **Echosphere**, for example is one very sharp engineer who is not afraid to stand in front of a bunch of people and explain why you can't run RG-59 between your LNA and your downconverter. There are

dozens more out there and this is the type of 'talent reservoir' which the industry has available, and which to date we have largely ignored. In the marketing end, there are people like **Hans Giner** of **Luxor** who can hold any audience enthralled while they explain why you don't meet a new prospective customer by popping out of a 1949 pick-up truck dressed in greasy coveralls.

Overall, I am 'high' on Chuck Hewitt. I wouldn't want his job, nor the difficult months he has ahead. He is a self-professed 'jock' who participates in quite a list of sporting activities. I don't think his volleyball game is going to get any better between now and the first of the year.

MESH Antenna Integrity

Well, the battles are starting once again; mesh versus solid. Canadian pioneer **David Brough** took computer keyboard in hand (see this month's **Correspondence** section) to draw our attention to the now infamous Las Vegas 'wind storm' that sent twenty or more antennas tumbling across the Riviera parking lot like sage brush, this past March. Brough ponders why mesh antennas that have been subjected to extensive 'wind-tunnel-type-tests' where testing results appear to 'prove' that wind blows right through 'mesh surfaces' should tumble over like their solid counterparts in Vegas.

There are many possible answers, of course. **Maybe** the antennas were not properly anchored to the parking lot; one bag of sand where four would have been better. Those possibilities aside, Brough raises a bigger question: how people who design and manufacture mesh surface dishes can expect to 'get away with flimsy mounts' and back support surfaces? He touches a sensitive area; lightweight antennas may well lack the structural strength to hold up in heavy winds or under ice loading even if they are stripped of their surfaces!

Paradigm conducted tests this past summer and those tests told us that high wind speeds (75 MPH) hitting the windward side of the dish result in almost as high winds (72 MPH) exiting the leeward side of the dish. Recent wind testing of a similar mesh antenna by **Conventional Satellite Systems** came to similar conclusions. The popular

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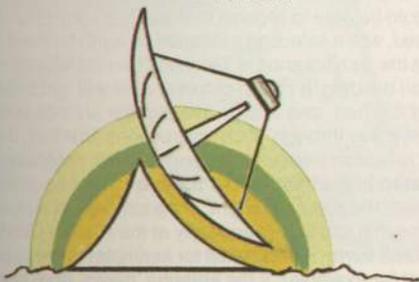


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COPING WITH DISH MOUNTS

NOT Very Popular

Perhaps the least glamorous, least interesting aspect of a TVRO is the collection of metal which we routinely call **'the' mount**. And, judging from the relatively small amount of competition within this 'sub-field' of TVROs, that interest also follows into the business community of TVRO as well. We suspect that if you deal in antennas your lack of interest in mounts may be rooted in your lack of understanding of the importance of a mount, and your inability to distinguish when a 'poor mount' may in truth be the cause of your 'poor antenna' system. We hope to correct your lack of interest, and your misconceptions, concerning mounts here over the next couple of months.

Let's list what a mount is supposed to do:

- 1) It is supposed to hold the antenna above the ground;
- 2) It is supposed to point the antenna in a very specific direction;
- 3) It is supposed to allow you to rotate or move the antenna from one specific direction to another specific direction;
- 4) It is supposed to hold the antenna above ground, pointing in one or more specific directions **under conditions** of heavy wind and perhaps ice;
- 5) It is supposed to be 'safe' under specified conditions, not be an 'attractive nuisance', and not be so heavy or unwieldy as to make antenna installation unusually difficult.

None of that appears, on the surface, to be an 'exciting part' of what we do. It also does not appear to require all-that-much technology since the celestial mechanics of pointing into space at a specific point are well known and quite easily understood. Why, then, do so many mounts supplied, with or for, so many antennas 'fail' to do their intended job? Perhaps, just perhaps, the celestial mechanics which appear to be 'so simple' on first inspection are more complicated than we have been led to believe.

TYPES Of Mounts

By category, there are but two types or families of 'mounts' which are suitable for TVRO use. Only one of these has gained any favor in our field because it has been shown to be the least expensive system to employ in mass produced antenna systems. This says, simply, that virtually every mount you are likely to encounter works on and follows exactly the same principles of celestial mechanics as every other mount you will ever find in the field. To the complete novice that may seem like an untrue statement since casual inspection of the mounting 'systems' employed would appear to suggest that there is a great deal of diversity out there. Some mounts consist of simple pieces of pipe with various attachments or arms; other mounts seem to be gigantic grasshopper or praying mantis 'forms' spread over considerable expanses of lawn. In the commercial and semi-commercial world, still others look like military vehicle shells about to spring to life. Examples are shown here.

The **'(modified) Polar Mount'** is the universally adopted antenna support system in our industry. There are reasons for this as we shall see. An unrelated family, which we shall pay no attention to here at all, is the **Azimuth Over Elevation** mount (abbreviated **Az-El**). One of the photographic examples here is an Az-El mount. Without being specific, we'll touch in general terms on 'why' the Az-El mount does not



interest us in the TVRO field.

Most people call the (modified) Polar Mount simply a Polar Mount. If you don't really understand why a Polar Mount is called a Polar Mount, then it is easy to drop the **(modified)** since you are not sure why a modified and an unmodified Polar Mount differ in the first place. We will hope, before we are done here, that while we will undoubtedly continue to call all (home TVRO) mounts simply 'Polar Mounts' that actually they had **better be** the 'modified' version or we don't want them in our yards at all!

TRACKING Through The Sky

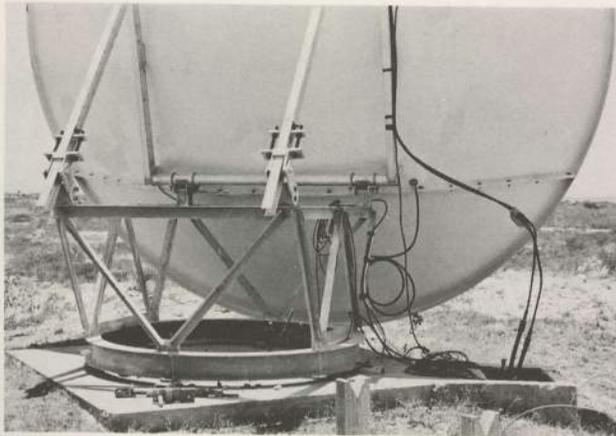
All of the satellites of interest to us are located in a specific 'flight belt' in the sky. We refer to that belt as the **'Clarke Orbit Belt'** and it is convenient to picture this 'belt' as a circular freeway or turnpike located directly above the earth's equator. The belt or satellite-freeway has certain physical parameters, for example:

- 1) It has a specified (and carefully calculated) **'height'** above ground (generally referenced as 22,300 miles).
- 2) It has a specific **shape** (circular, 'almost' the 'mirror image' of the Equator itself, only much larger in diameter, and in space).
- 3) It has a specific **'width'** (generally plus or minus 70 miles meaning the freeway-width extends 70 miles north and south of the equator).

From any location on earth, located at any latitude between approximately 80 north and 80 south, some portion of that 'belt' or freeway can be 'seen' **extending above the horizon**. Beyond 80 north and 80 south (ie. **closer to the north and south poles**, respectively), the considerable height of the arc (22,300 miles) is **still not sufficient** to allow an observer on the ground to **'look south'** (or 'look north' if south of the equator) and still **'see'** any portion of the belt. The belt is hidden behind the 'bulge' of the earth itself.

The belt, then, is an 'arc' in the sky from any suitable 'viewing location'. **If you can see the arc, your antenna can see the arc.** If there is a satellite located within that portion of the arc your antenna can 'see', and if that satellite is transmitting/broadcasting in your direction, you should be able to receive that satellite's signals. This is why you are advised, when selecting a location on earth for the dish, to avoid spots where the dish antenna is 'blocked' from viewing some (or all) of the arc. A tall building, a clump of trees, a hill will 'get between' your antenna and the belt, and microwave signals are not powerful enough to 'push their way through' such obstructions. In effect, if some portion of the arc is hidden from your antenna's view, reception from any satellites **located in that portion of the arc** will not be possible.

The primary job of the antenna mount, in the simplest of terms, is to affix the antenna so that it will point squarely at the (Clarke Orbit) belt 'arc' or 'arch' from one earth horizon (east for example) to the opposite earth horizon (west for example). If the antenna 'tracks' from one end of the belt to the opposite side or end of the belt, as seen from your location, you have a 'tracking mount'. And, any satellite meeting the criteria for operating power, operating frequency, and transmitting antenna direction will be received by that dish antenna.



AZIMUTH/ELEVATION MOUNT/ This AFC-Microdyne 16 footer is not a 'polar mounted' antenna. The elevation adjusts with the two (individual) diagonal bars coming from high up to the cage below. All thread 'fine tuning' allows the installer to peak the elevation where he wishes. The azimuth or east/west rotation is on 'Teflon® skids' and the entire cage rotates on the circular track at the bottom. To 'change birds' requires upwards of 30 minutes and two men.

MOST Basic Polar Mount

The most basic polar mount is simply a piece of pipe, stuck into the ground, so that it is perpendicular (at a right angle) to the earth it sits in. All alone, however, that piece of pipe is not really a mount; it is a 'stand for a mount' since the pipe has no special properties which allows an antenna connected to it to 'track' the Clarke Orbit Belt.

Common sense should tell us that a piece of pipe, stuck into the ground, 'topped' with a large physical structure such as a dish antenna will be subjected to considerable 'pressures' when the wind blows or the ice forms on the antenna. There is a 'strength' factor here which we will ultimately look closely at. Many antenna 'mount systems' either supply that piece of pipe, or the manufacturer of the mount gives you written specifications telling you how to select (locally) a suitable piece of pipe. They tell you how long the pipe must be, what the outer diameter of the pipe should be, and how strong (defined as wall thickness and pipe grade or 'schedule') the pipe must be. This is all important information and you should follow it precisely if you want your antenna to be capable of surviving strong winds and storms.

A satellite antenna, including 'mesh' types, is basically a giant sail. Depending upon the direction of the wind, the 'sail' is capable of catching a considerable amount of wind 'pressure' and as that wind

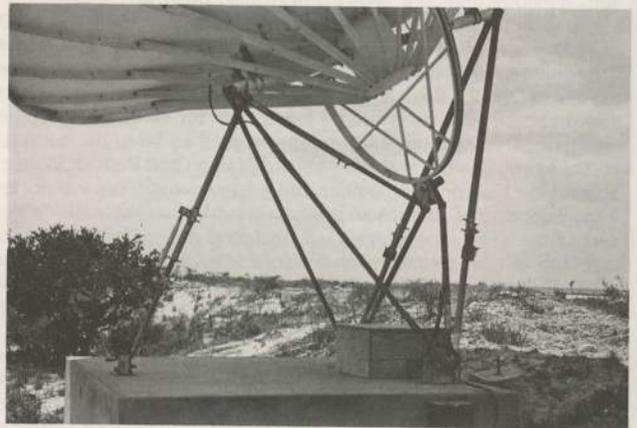


POLAR MOUNT/ 'modified.' Now perhaps the ADM 'grasshopper' mount looks a little more like the pipe mount you are accustomed to seeing. This (1981 vintage) SatFinder mount has everything in it the ADM grasshopper mount has.

pressure 'builds' the resistance of the 'sail' to that pressure increases. At some point the pressure built up on the sail surface exceeds the design limitations of the antenna and/or mount. Something 'gives' and the system fails. One of the more common points of failure is the pipe itself; either the pipe was not carefully selected for overall strength (the wall thickness is too 'light') or the pipe simply begins to 'migrate' or rotate around within the concrete stand it was mounted. A suitable solution to this problem is to add some 'grab rails' for the pipe; attach a pair or horizontal steel rods through the pipe down near the underground-base of the pipe so that they will 'dig in' to the concrete and prevent the pipe from spinning on its own axis.

Another equally common failure is the point of attachment between the pipe and the antenna's custom mount assembly. Many antenna mount 'systems' come with a 'collar' which allows you to slip the full antenna mount down over, and onto, the pipe. The collar has the same round shape as the pipe, but the collar's inside diameter is slightly larger than the pipe you have utilized for the ground-mounted piece. This allows you to 'drop' the collar section down over the pipe section. Normally, there are three or four heavy 'set screws' (actually 3/8" or larger bolts) which screw in through the collar and 'dig into' the surface of the pipe itself. The concept is that the set screws bind the collar to the pipe to prevent the collar, to which the antenna is attached, from twirling around on the pipe in a heavy wind.

These set-screw bolts usually thread through nuts welded onto the collar. The designer hopes that the flat, blunt-ended set-screw (bolt) will be tightened up sufficiently that it will 'dig' or 'gouge' into the



POLAR MOUNT/ 'modified.' This 20 foot ADM antenna may not look like the pipe or post mounting system you are accustomed to, but everything you have in a pipe mount is here as well. Can you spot the 'pipe equivalent' in the system?

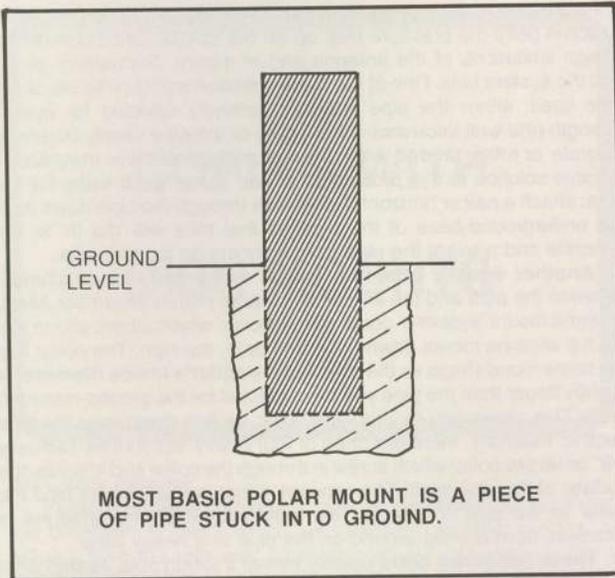
outer metal surface on the pipe, binding the two together. A system that uses a pair of these set screws is usually guaranteed not to bind in a strong wind; three may bind or they may gradually 'slip' allowing the antenna to rotate on the pipe. Four is no absolute guarantee that the collar will not slip at some wind speed.

Intelligent designs sharpen these set screws (bolt) tips to a point so that the set-screws have a sharp point to dig into the pipe surface rather than a blunt/flat surface that rides against a slightly convex pipe surface. Even that is no guarantee that the collar will bind to the pipe, and in winds of 40 MPH and higher even this can and will slip.

An even more intelligent approach is to drill a hole that allows you to insert a bolt through the collar, and then through the pipe. This is called 'pinning' and it provides a far stronger bond between the pipe and the collar. Don't do this yet, however; you only do this after you have the total antenna system 'tracking' the Clarke orbit belt since rotation of the collar on the pipe is part of the set-up exercise! Once the two have been pinned together, no additional 'fine tweeking' of the antenna's north and south adjustments will be possible. We'll return to that point later in this series.

LOOK Up

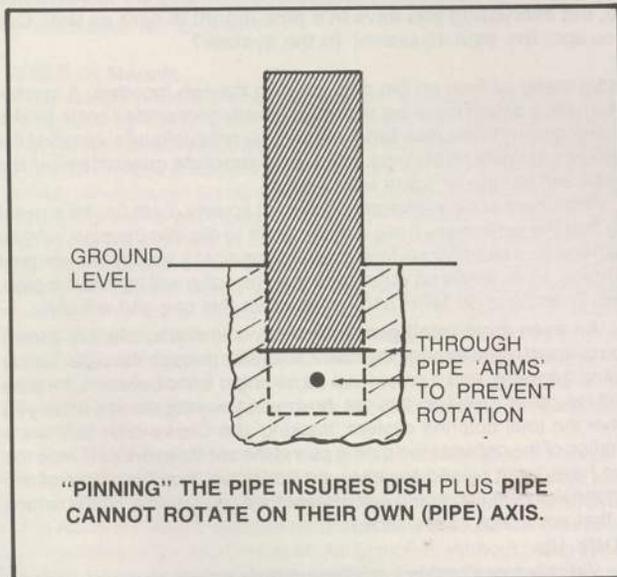
Virtually every working satellite antenna you ever saw, or are likely



to see, points 'up'; into the sky. Recall that the Clarke Orbit Belt is itself **above the equator** and if that is the 'freeway' where the satellites 'run', it follows that your antenna must also point 'up'.

The amount of 'up' is determined by your latitude; ie. how far north or south your location is from the equator. **Picture this.** You live **on the equator**. A satellite located at the same longitude as you would be directly overhead. Your antenna, therefore, to receive signals from that particular satellite, would have to 'lay on its back' and point straight up. Now picture this; you are located as far to the north (or south) as you can be, and still 'see' the Clarke Orbit Belt 'sticking up' above your horizon. Remember that microwave signals will not go through obstacles and if you are so far north that the satellite belt cannot be 'seen', the earth itself becomes an obstacle since the satellites will be 'below' your horizon. Now your antenna will be pointing almost directly at the horizon and the satellite signals **arriving at this far north or far south location will come to the antenna barely skimming over the horizon itself.**

This is called '**look (elevation) angle**'; the 'angle' which your antenna must point 'up' to in turn point at the Clarke Orbit Belt. And now we have a new requirement for the mount system; it must be capable of 'tipping' the antenna, at the appropriate 'look angle' to correspond to the angle that matches the location of the Clarke Orbit Belt.



SET SCREWS/ are intended to 'bite into' the pipe mount and hold the collar secure to the pipe **after the antenna's azimuth adjustment has been completed.** However, under heavy wind loading these set screws can slip.

Remember that from any location, the Clarke Orbit Belt will be an 'arc' or 'arch'. If you stand in your yard and look directly to the south, the arc will be highest (tallest) above your horizon in that (south) direction. **However,** because it is a giant letter U, upside down in the sky, as you turn and face to the southeast (or to the southwest) the location of that belt in the sky in those two directions will now be far lower down, **closer to the horizon** for you in those two directions. This should tell you that as your antenna plus mount 'scans the skies' from a location due south to a belt location east or west of south, **the antenna will be 'dropping' down,** closer and closer to the horizon itself.

Tracing this arch, from one horizon to the opposite horizon, through a 'maximum height' peak directly due south of your location, is the most critical part of your mount's design and installation. If you can make it do this, **properly,** you have 75% of the 'mount battle' won.

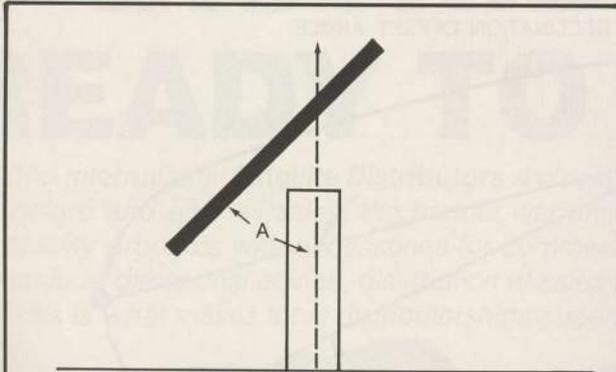
Now, the complication.

If we simply tip the dish back so that it will point into the sky at the intended angle for a satellite due south of us, and then we roll the dish left (east for north of the equator; west for south of the equator) we would **hope** that as the dish 'rolls' it will continue to 'track' the Clarke Orbit Belt. **Unfortunately, that is not what happens** unless we make certain modifications in the dish mounting system. There's that word; '**modification**'.

Another word for (antenna) elevation is 'declination'. That's one of those astronomy phrases and since telescopes were scanning the



PINNING/ by drilling a hole through the collar, and through one wall of the pipe, a heavy bolt can be inserted through the two 'pinning' the collar to the pipe. Now the opportunity for the collar to twist or rotate on the pipe is diminished.

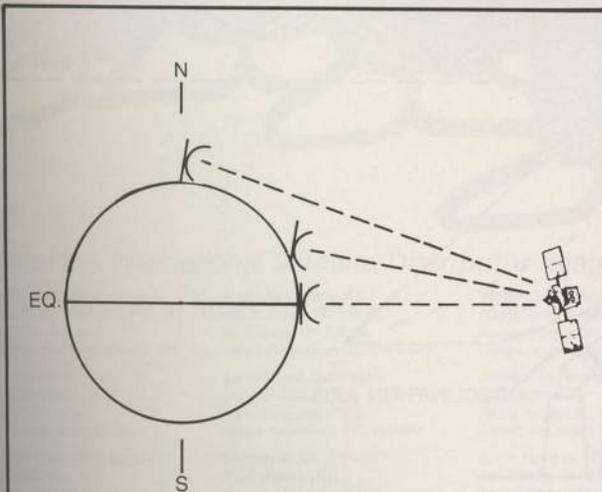


DISH MUST BE 'TIPPED' UP TO FIND CLARKE ORBIT BELT (A ANGLE); THE AMOUNT OF 'TIP' BEING A FUNCTION OF YOUR LATITUDE (DISTANCE NORTH OR SOUTH OF EQUATOR). THIS IS ALSO CALLED 'LATITUDE ANGLE', OR, ELEVATION.

skies long before satellite antennas, much of the early terminology from the visual astronomy world has followed us into the TVRO world.

A dish simply tipped back so that it points into the Clarke Orbit Belt and directly at a satellite due south of your location will for all practical purposes only point directly at the belt for a location due south of you. It will **not** 'trace the path of the belt' for satellites east and west of due-south. It may come close, but close is not good enough when you want to get high quality, maximized reception from each potential satellite source in the sky. If simply tipping the dish on its back to the appropriate 'look angle' is not sufficient, what 'modification' is required?

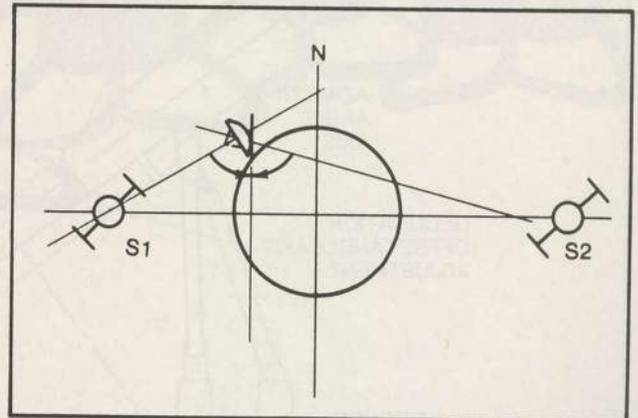
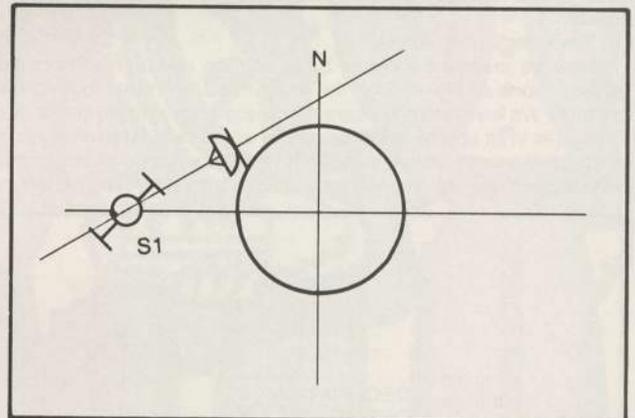
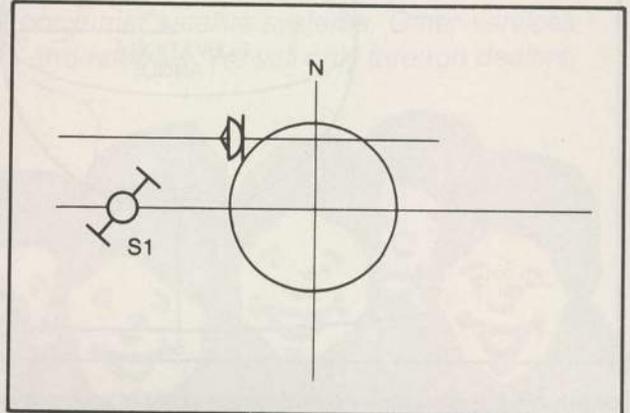
It is called 'declination offset' and it is a system that recognizes that from your location (any location) there are slight variations in the apparent actual 'shape' of the Clarke Orbit Belt, caused by the earth's equatorial 'bulge'. The belt, as seen from the ground, 'flattens out' slightly from the true circular 'arc' we would expect to find if we simply drew the earth and then made a circle around the earth's equator which was 22,300 miles higher than the equator.



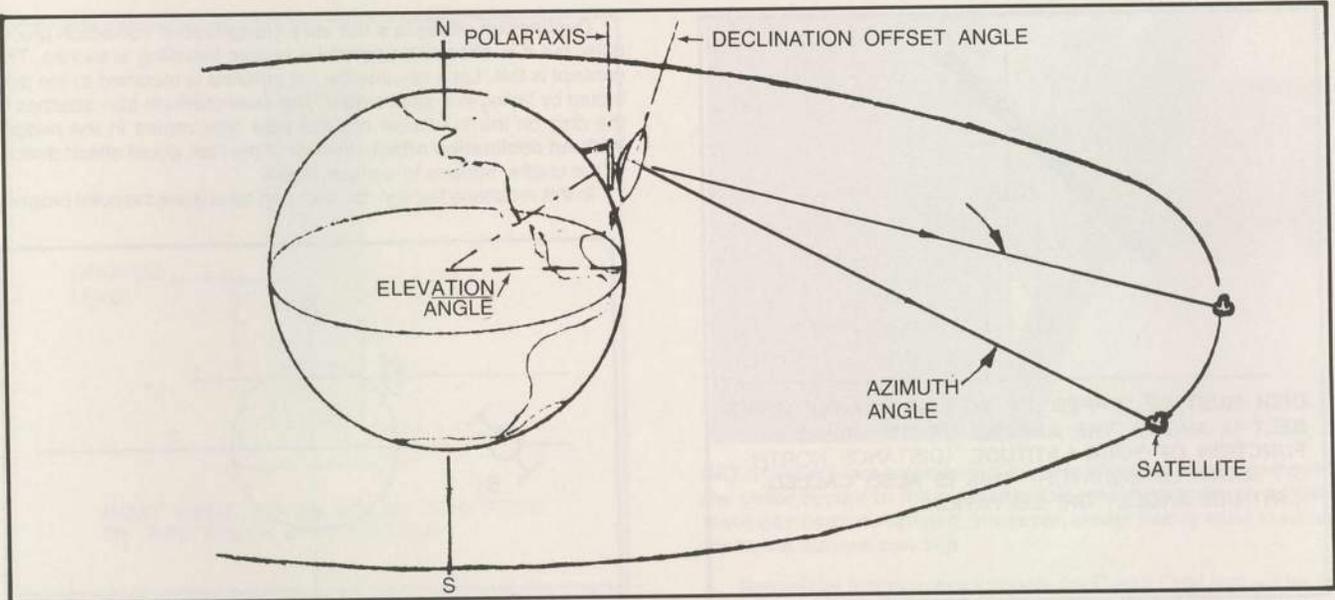
DECLINATION 'OFFSET' ANGLE IS A FUNCTION OF LATITUDE, FROM 0° AT EQUATOR TO 8.5° AT 75° NORTH OR SOUTH.

Declination offset is a not very complicated 'correction procedure' but it is often mis-applied by people installing antennas. The concept is this. Let's assume the full antenna is mounted to the pipe mount by laying in a steel cradle. The steel cradle in turn attaches to the dish on the front side and the pipe type mount in the middle. **Without declination offset**, the rear of the dish would attach directly to the cradle, surface to surface, **flush**.

In this mounting fashion, the dish can be adjusted to point properly



for a satellite due south, a satellite southeast or a satellite southwest; but, it cannot be adjusted to point properly **at all three** of these satellites by simply rotating the dish from east/west or west/east. The dish will 'cut its own arc(h)' in the sky and **that arc(h) will not align** with (match to) the Clarke Orbit Belt. **Examples are shown here.** The dish will 'cut across' the belt at a couple of points and for part of its travel from one horizon to another horizon the dish will point 'above' (higher than) the belt, and for part of its travel it will travel lower than



the belt. A dish that does this will catch certain satellites just fine; it will catch others with reduced performance **and it will miss still others totally.**

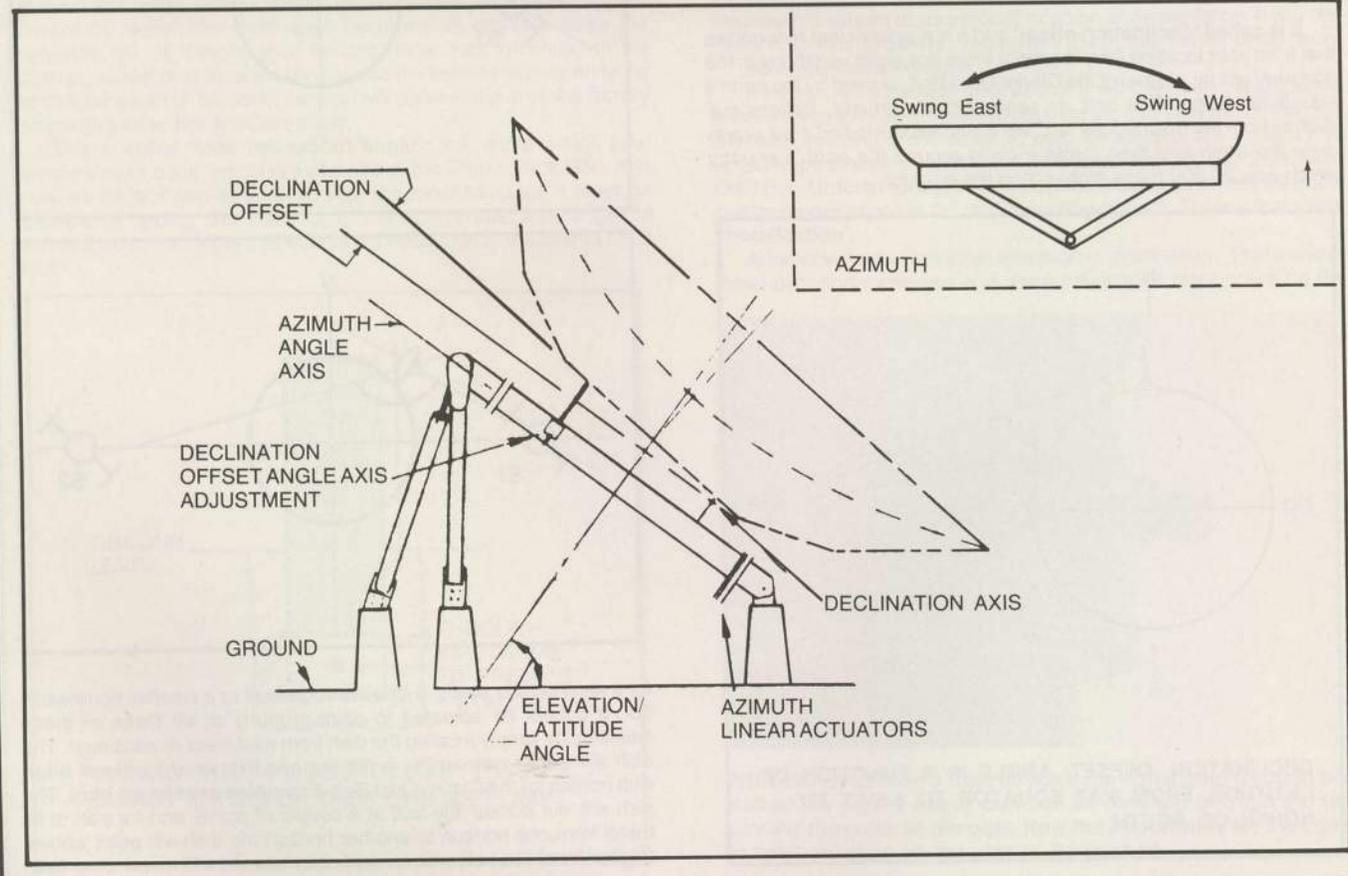
Enter declination offset.

Now we **modify** the mount by raising the end furthest from the equator (north end for north of the equator; south end for south of the equator). We leave the end nearest the equator snug to the cradle, but 'offset' (as in lift up) the opposite end by some calculated amount. In effect, as we do this, the end furthest from the equator 'pivots on' the end closest to the equator and we end up with an 'offset'; ie. the dish is

no longer parallel to its cradle. It is tilted as well as being tipped!

And this modification (ie. "**Modified Polar Mount**") is declination offset. This is not intended as a tutorial in celestial mechanics so **why this works** out for us is of no interest; only that yes, indeed, it does pretty much cure our tracking problem. Now the dish will come **very close** to tracing its own arc(h) in the sky which will **almost exactly match** the arc(h) of the Clarke Orbit Belt.

We said '**almost exactly**' and we don't wish to belabor just how precise the tracking will be after you have made this 'offset modification.' However, you should be aware that **it is possible to still be off**



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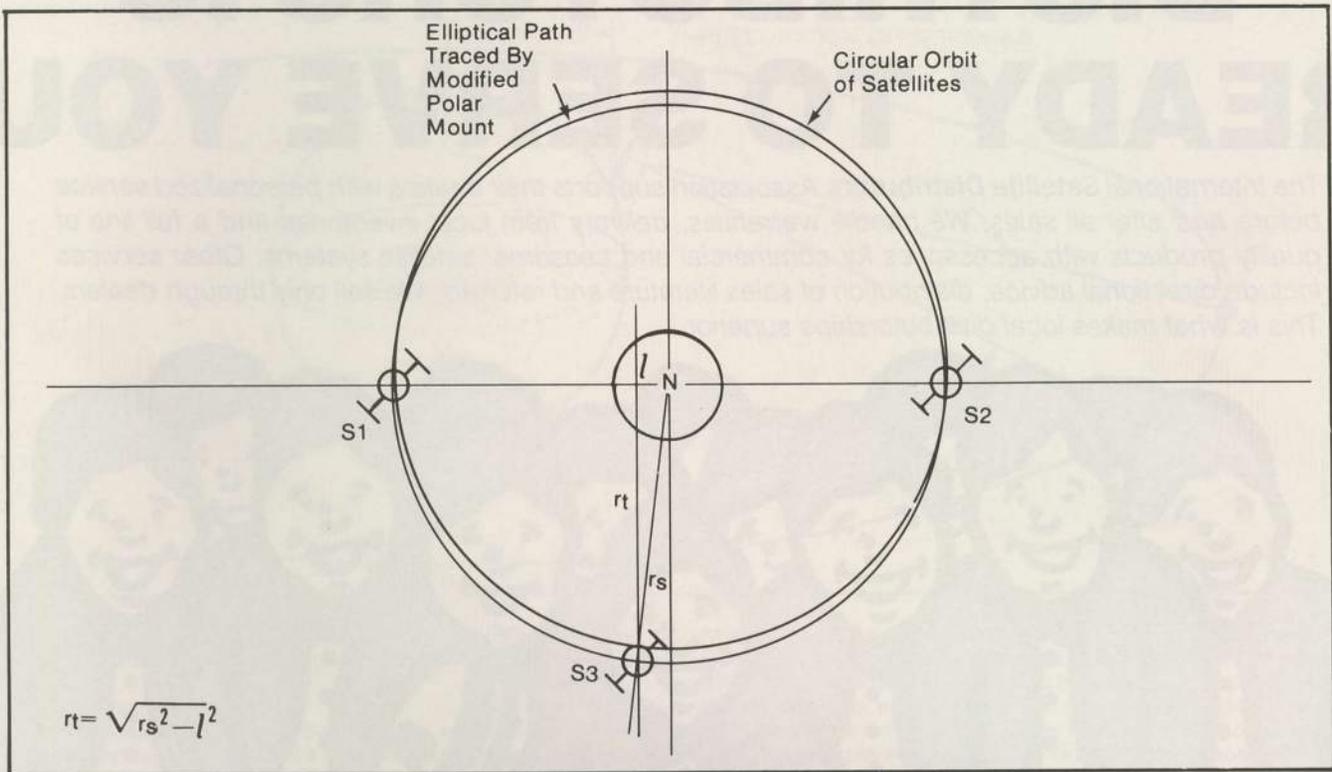
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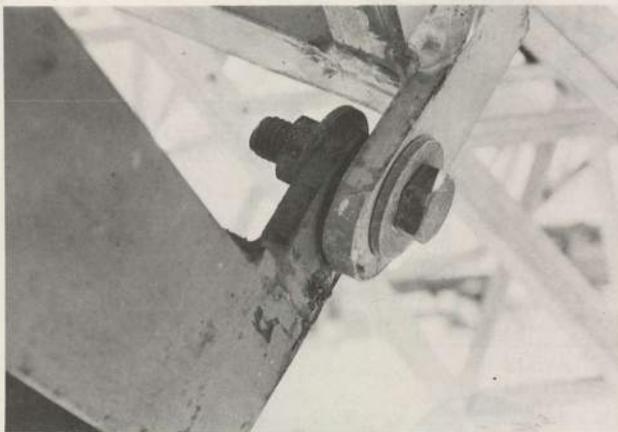
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by between 0.05 and 0.1 degrees in elevation **even with a perfectly designed and perfectly performing modified polar mount**. In other words, the technique of correcting your mount in this fashion is **not perfect** (if perfect would be 0.0 degree 'off') although your individually 'modified' mount may be working perfectly. For antennas **smaller than 25 feet** in diameter, this error range of 0.05 to 0.1 degrees is never going to be noticed since your antenna's 'beamwidth' is so much greater than 0.05 to 0.1 degrees that you will not even 'see' (as in notice) that type of imperfect 'tracking'. **For large antennas** (25 feet in size or more), yes, you can 'see' this type of built-in-error which comes with ALL 'modified' polar mount systems, and, some additional correction may be required.

HOW Much Declination Offset?

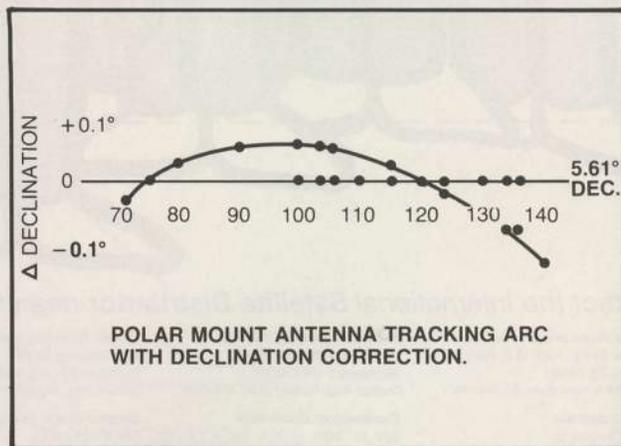
It is premature, yet, in our discussion of mounts to get into a detailed description of mount installation and alignment techniques; although we shall before we are finished. However, this would be a



HINGED END/ of the declination offset on a Hero dish. This acts like a 'hinge' on a door allowing the full antenna to pivot upwards for the declination offset amount required.

good point to provide a table which will become important to you, later, as you are grappling with the antenna installation steps and the mount.

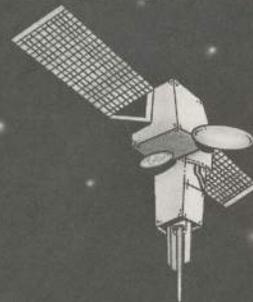
The table provided here is an angular measurement. It says to you that **when** you know your proper antenna-cradle 'tip' or 'tilt' angle (you do not know that yet; it is coming), you will then correct the tip or tilt at the rear (furthest-from-equator-end) of the antenna by some (stated) 'offset'. For example, if your look angle ultimately is determined to be **40.65 degrees** (that will, as we shall later see, correspond to a location that is **40 degrees** north [or south] of the equator), then



your 'declination offset' angle will be **5.63 degrees**. In the table presented here, you have your latitude in degrees (left hand column), your polar axis elevation (or tilt/tip angle) in degrees (center column) and finally the column of interest at this point, the declination/offset angle. We'll put them all back together before we get done.

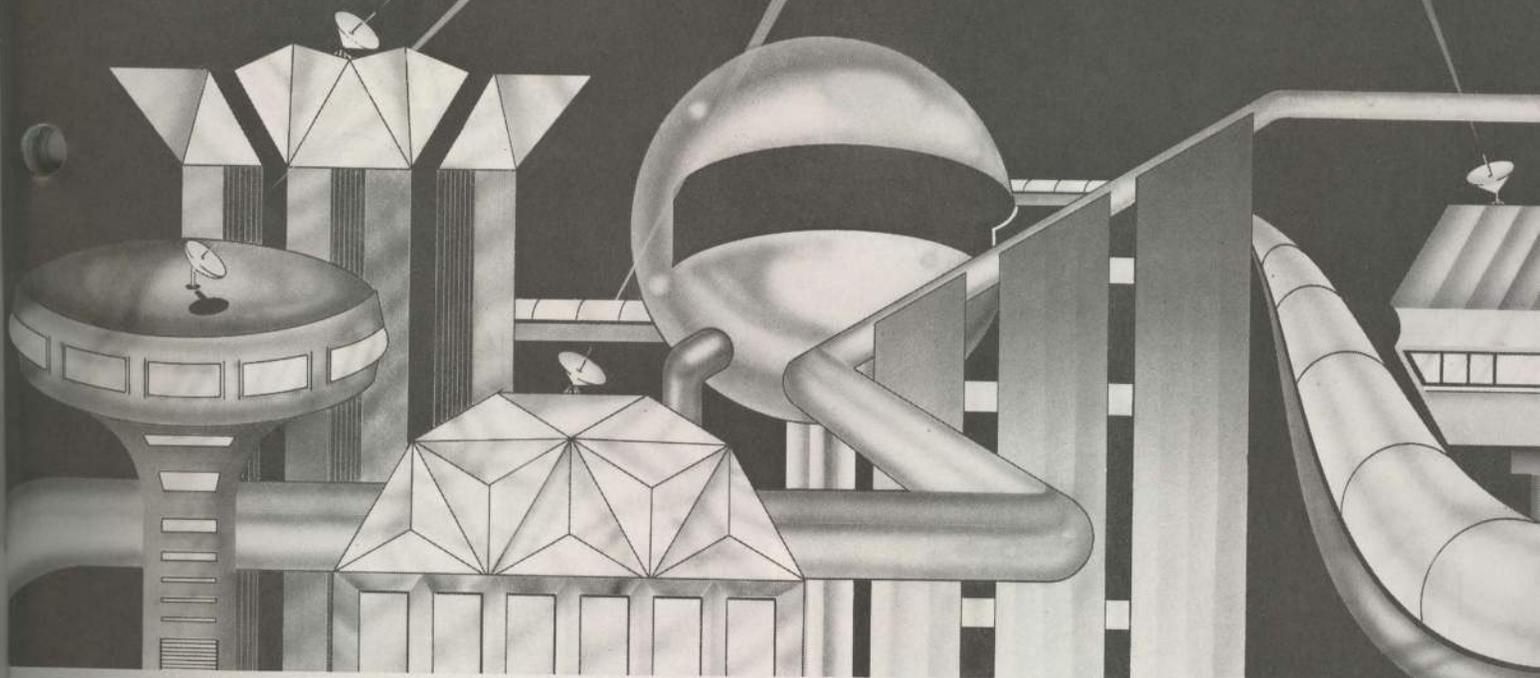
Most antennas you will encounter provide a relatively simple method to 'offset' the antenna's appropriate end. **All-thread rod** (that round rod that has threads from one end to the other) is welded or bolted into a position so that it sits between the antenna 'cradle' and

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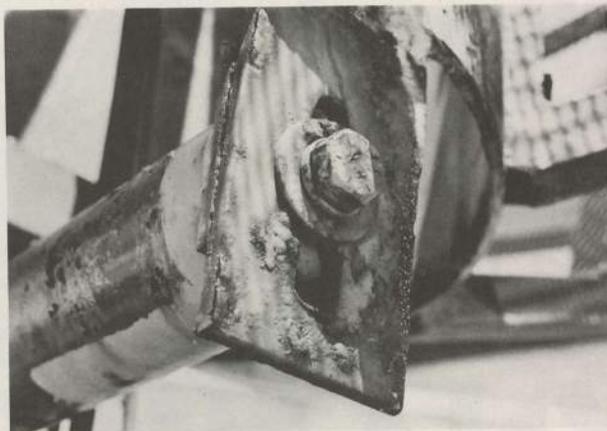
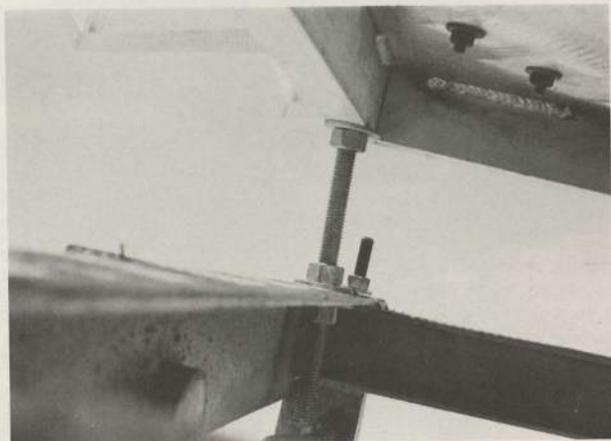
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the mount frame. Nuts, run up and down the rod, allow you to adjust the amount of 'offset angle' between the cradle and the mount frame. At the front of the antenna, as shown here, the entire equator-end of the dish is swinging inside of a pivot. It is like a giant door with hinges and the 'hinged end' is towards the equator. There is a considerable amount of 'stress' possible on these all-thread rods so you usually have a pair to adjust; each taking 50% of the weight plus stress of the antenna surface.

We'll deal with the tools of antenna measurement (inclinometer et al) later in this series, but must point out at this point that when you have **two offset adjustment rods**, each of which bears the load for roughly half of the antenna, that the antenna must be 'offset' using these adjustments **equally on both adjusting rods**. If, it turns out, that you measure 3.1 inches of distance between the cradle and the frame and that corresponds in your situation to the proper offset 'angle' as defined here, **on one side of the two rods**, you must have exactly the **same amount of distance** (3.1 inches) also showing on the second rod as well. The dish must end up 'flat', offset and tipped to be sure, **but parallel**, between the cradle and the frame. Otherwise your dish surface will in effect have a 'warped' shape which will cause you no end of tracking and performance-peaking problems as your attempt to make the system perform to maximum. We'll also return to that point.

MOUNT Stability

A piece of pipe, stuck into the ground in some concrete, is in all



TWO APPROACHES/ to setting the 'Offset Declination' or extra 'high-end-tip' of the dish to compensate for the Clarke Orbit Belt's true shape. In top photo, we have a set of all thread rods which adjust the top of the antenna away from the mounting frame. In the bottom arrangement, we have a slide-up slot and a single bolt that clamps the antenna's offset angle into a tight position (Hero above, Paradigm below).

FINDING YOUR PROPER ANGLES

This table will be especially important when we discuss, in **Part Two** of this series, the tricks associated with making an antenna 'track.' In the left hand column you have your own latitude in degrees (north or south of the equator). In the middle column you have your back-frame elevation angle (i.e. the amount your dish will tip forward for a satellite due south of your location). In the last column we have the magic 'declination offset' angle discussed in the text. Calculations courtesy of **South River Metal Products Company** (P.O. Box 394, Matawan, N.J. 07747; 201/566-7087).

| Your Location/ Latitude in Degrees | Dish Elevation/ 'Tip' Angle | Declination Offset Angle |
|---------------------------------------|--------------------------------|-----------------------------|
| 5° | 5.12° | 0.77° |
| 10° | 10.23° | 1.54° |
| 15° | 15.33° | 2.29° |
| 20° | 20.43° | 3.02° |
| 25° | 25.51° | 3.73° |
| 30° | 30.57° | 4.40° |
| 31° | 31.59° | 4.53° |
| 32° | 32.60° | 4.66° |
| 33° | 33.60° | 4.79° |
| 34° | 34.61° | 4.91° |
| 35° | 35.62° | 5.04° |
| 36° | 36.63° | 5.16° |
| 37° | 37.63° | 5.28° |
| 38° | 38.64° | 5.40° |
| 39° | 39.64° | 5.51° |
| 40° | 40.65° | 5.63° |
| 41° | 41.65° | 5.74° |
| 42° | 42.65° | 5.85° |
| 43° | 43.65° | 5.96° |
| 44° | 44.66° | 6.07° |
| 45° | 45.66° | 6.18° |
| 46° | 46.65° | 6.28° |
| 47° | 47.65° | 6.38° |
| 48° | 48.65° | 6.48° |
| 49° | 49.65° | 6.58° |
| 50° | 50.64° | 6.67° |
| 55° | 55.61° | 7.11° |
| 60° | 60.56° | 7.51° |
| 65° | 65.49° | 7.84° |
| 70° | 70.41° | 8.11° |
| 75° | 75.32° | 8.33° |
| 80° | 80.22° | 8.48° |

Note: An excellent tutorial guide to polar mount systems is provided by **South River**. Intended as an installation guide for many of their popular series mounts, it includes accurate, clearly illustrated examples of the entire mount system and how you make it work for a perfect tracking of the Clarke Orbit Belt. Their address and telephone number is given above.

honesty a pretty poor substitute for a suitable dish foundation. However, you can't knock success-ratios and a very large percentage of all antennas now sold for home TVRO installation employ just such a mount. Let's see why we make this statement, and what you might do to improve the situation.

Remember that when you have the dish mounted to the pipe, you have a large 'sail'; a device that catches wind. Arguments about mesh and solid antennas offering various degrees of wind loading aside, **there is always some loading when the wind is blowing**. When the wind blows on the dish, the dish resists the wind. If the force of the wind increases, sooner or later something in the mount system is going to have so much force pushing on it that it is going to 'give' or move. We have already touched on insuring that the pipe does not rotate **on its own axis** inside of its concrete pier; you insert some steel (rebar) pieces through the pipe to 'grab' the concrete and keep the pipe from twisting/turning on its axis.

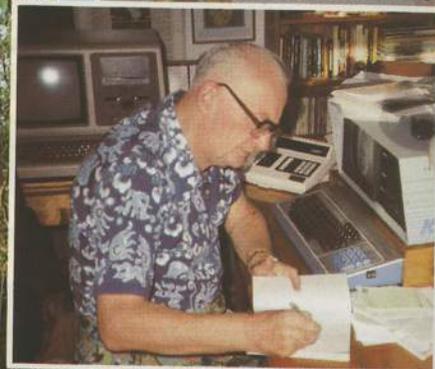
No matter what the pipe you have selected is, at some point that

Arthur C. Clarke: A Brilliant Prediction

The 4.8 meter under construction.



Arthur Clarke in his study.



Arthur C. Clarke (r.) with David Johnson of Paradigm and the new 4.8 meter Paraclipse.

12 years before the launch of Sputnik, 17 years before the first communications satellite and some 30 years before the first experimental broadcast satellites, Arthur C. Clarke published his now famous technical paper in the British scientific journal *Wireless World*.

In his article titled "Extra Terrestrial Relays" Clarke described with near perfect precision the very same telecommunications satellite system we use today. For his brilliant theoretical work, Clarke has received awards and honors from all over the world. The Clarke Orbit Belt is named for him.

In November of 1983 an international group of 29 industry-related people lead by publisher Bob Cooper, traveled from all over the world to Colombo, Sri Lanka where Clarke lives.

For 4 years Bob had championed the idea of industry representatives donating their equipment and energies toward the building of a satellite earthstation at Arthur Clarke's home.

The response from the industry was so unanimous and overwhelming that the gesture soon grew to include two systems for the Arthur C. Clarke Center for Modern Technologies at the nearby university, in addition to the system for Mr. Clarke's home.

We at Paradigm Manufacturing feel especially proud about being asked to participate in the journey and at having our equipment chosen as the hardware to be installed at Arthur C. Clarke's home.

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pipe will give away. It may not happen **until** the antenna has been 'stripped' from the mount (i.e. disappearing in the wind), or it may happen **before** the wind has stripped the antenna clean like a buzzard. It is the latter situation which begs discussion.

Pipe can, and if pushed hard enough, will, 'bend.' Sometimes the installer, not recognizing what he is doing, finds himself in a spot. The pipe length supplied, or recommended, is 8 feet. He finds he needs a ten foot length of pipe to be sure the antenna will 'clear' a fence or some other obstruction that presents 'look angle' problems. OK, stow the **8 foot piece** and go and buy a **10 foot piece** of the 'same exact stuff.' Yes, we all know it is now going to place the antenna 2 feet higher above the ground. But that can't hurt that much; **can it???**

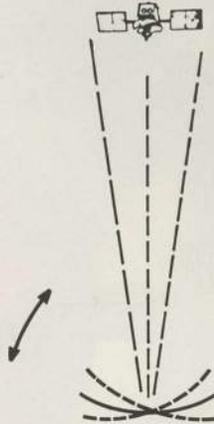
Let's assume the original pipe was going to be buried in the ground three feet. That left five feet above ground. Now let's assume we have a ten foot section of pipe and it will now be seven feet above ground. That is an above-ground increase of 2/5ths or 40%. What does **that** do to us?

Given the worst case (best cases don't get us in trouble!), we could now have 40% more wind load pressure on the pipe, at its weakest point (just where the pipe disappears into the concrete; **the fulcrum point**). Now, if the OEM building the antenna had calculated that with an 8 foot pipe the particular grade (schedule) of pipe would hold the antenna upright up to a 100 MPH wind (at which point he didn't promise anything!), **when we add 40% greater wind force** to the pipe with a two foot extension, we now have to reduce the pipe breaking point by 40%; **now we are at 60 MPH.** Humm.

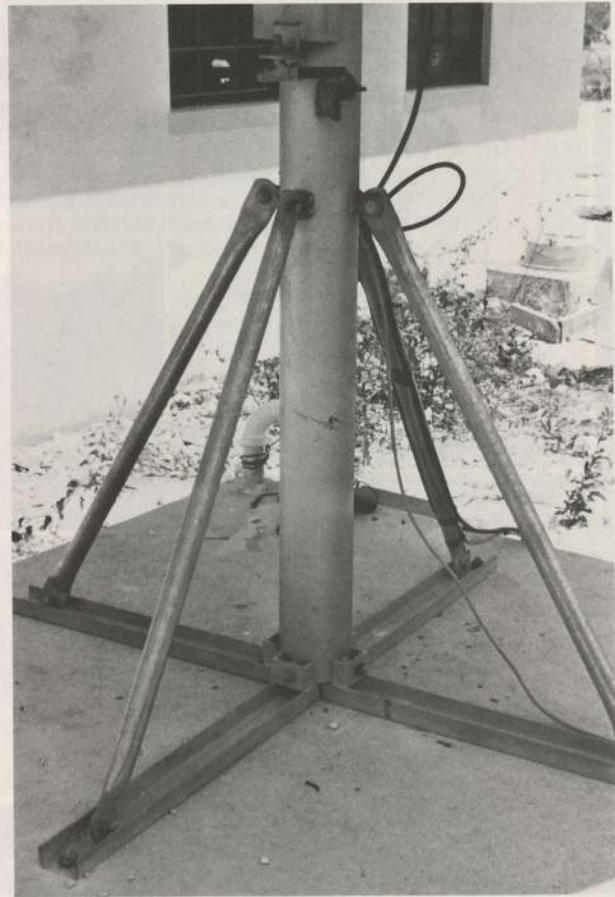
The pipe, **any pipe** supporting **any antenna**, is a pivoting fulcrum. That means it is like a long pry bar you might pick up to move a rock in your yard. Your logic tells you that if a **short** pry bar won't move that rock, you can find a **longer** pry bar; increase your own 'leverage,' and perhaps now move the rock. The very same principle exists here; raise the antenna up just a couple of feet, and the 'pry bar effect' on the bottom of the pipe, where it goes into the concrete (an unmovable object) just got greater.

Snap; the pipe creases, and the antenna falls to the side.

There are solutions of course. If you are good with calculations, you could select a replacement (longer/taller) piece of pipe which would have greater strength; in this case we'd like to see 40% greater (wall) strength to compensate for a 40% increase in 'pry bar leverage,' or pipe length above ground (the part below ground is not of concern at this point). Finding a stronger piece of pipe, one that will still allow you to slip the antenna's collar-mount over the pipe, 40% stronger, could



MOUNT STABILITY AFFECTS PERFORMANCE. IF THE MOUNT ALLOWS THE DISH SURFACE, OR FEED, TO 'WANDER,' THE NARROW FOCAL-BEAM WIDTH OF THE DISH GYRATES LEFT AND RIGHT, OR ABOVE AND BELOW THE BIRD'S LOCATION IN SPACE.



TUBULAR BASE SUPPORT/ South River mount for Harris Delta Gain antenna adds additional support to the 'pipe' to prevent 'the wobbles' under heavy wind loading.

be a good trip. There is another possibility, but we will leave the **exact** calculations to those who are comfortable with such things.

In our limited example, we have the pipe bending and failing because we have elevated the length of the pipe and raised the wind-load-sail 40% higher above ground. This has increased the wind loading (go higher and the wind blows harder), **and more important**, this has made our 'pry bar longer' so we now have greater 'leverage' being exerted on the bottom of the pipe at the 'concrete joint.'

There are two solutions commonly employed in the industry:

- 1) Strengthen the pipe by making it **rigid**. You can do this, if you are reasonably careful, by packing the pipe with some substance which is itself rigid. Concrete is a frequent choice; simply mix up some concrete which has 2,000 pounds or more 'busting strength' and fill up the pipe. That will (when the concrete sets) insure that the pipe will stand rigid under **most** to-be-expected forces.
- 2) Or, strengthen the pipe by giving it reinforcement. An example is shown here. The pipe itself, if strengthened as **South River** makes many of their mount products, has a set of steel support 'wings' or rods spotted to the pipe proper. This has the effect of stopping any side to side 'swaying' of the pipe under adverse wind loading conditions. While **the mount shown** is intended to be attached totally on top of a concrete pad, the same type of support system could also be adapted to an in-ground support 'pipe' as well.

There are two reasons why 'pipe wobbles' are to be avoided. First of all, if the pipe wobbles and sways in the wind, you will sooner or later

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The ultimate goal in designing a satellite dish is to create a reflector that is a "true parabola" - providing "near-perfect" efficiency.

Winegard engineers have developed the truest parabolic dish of any of the see-through category. Each petal, rib and outer ring is stretched-formed to a parabolic shape with specs so tight it took months to perfect the process.

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WHY SPEND HOURS ASSEMBLING AN ANTENNA WHEN YOU CAN DO IT IN MINUTES?

Winegard's 10-foot perforated dish is shipped in four quarters. Total weight is only 92 pounds. It's easy to handle and transport. All that's required for finished assembly is fastening the main ribs together with 16 stainless steel nuts & bolts; placing four tension-straps into the outer rim; and securing with 8 screws. Just a 20 to 30 minute job for two people.

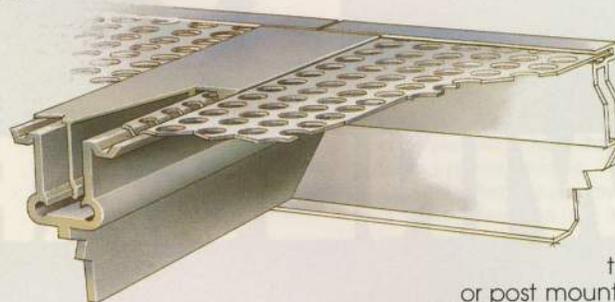
LIGHTWEIGHT BUT RIGID PERFORATED ALUMINUM

Not only is the Winegard perforated aluminum dish lightweight and easy to handle, but it is extremely rugged, durable and well constructed. You can actually see through the perforated petals which are constructed of .040-gauge anodized aluminum. The extruded aluminum main ribs, which provide the basic structural support, are 1/8" thick. The locking ribs are .070" thick and lock the perforated aluminum petals tightly in place. A double-walled outer rim provides an area to insert tension straps at all joints for perfect alignment and additional strength.

Wind-loading capabilities are outstanding with a wind survival rate of 125 mph. And, because the perforation eliminates 36% of the surface area and the anodized surface is pre-etched, the dish reflects very little heat into the feedhorn, keeping the noise temperature of the LNA down.

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Winegard revolutionized the outdoor antenna industry years ago with the introduction of anodized aluminum elements - now we bring this process to the satellite industry. The anodizing process actually penetrates the aluminum with a protective coating that resists rust and corrosion, virtually tripling the life of the aluminum. It's the only permanent protection against adverse weather and ideal for coastal (salt spray) areas.



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Write for detailed literature.



THE WINEGARD
CHROMSTAR "10"
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* U.S. Patent Pending

MOUNTS/ continued from page 18

have a failure of the pipe proper. That will require replacement of **at least the pipe**, and perhaps the entire antenna if the pipe bends so severely as to leave the antenna smashed into the ground or something else equally unforgiving. **The second reason** you don't want the pipe to have 'the wobbles' is customer viewing satisfaction. Sure, if the pipe fails, all viewing ceases. But, before it fails, the pipe will sway

back and forth and this will cause that precise alignment between the antenna's beamwidth (boresight) and the satellite the dish is supposed to be pointing at to vary. In effect, the picture will fade in and out (or 'pop' in and out) as the antenna sways about in the breeze. So no matter how or why you justify securing the pipe mount from 'the wobbles,' you have at least two good reasons to be a 'better installer' and do something about it before you leave the job site.

The series will continue in CSD.

Part 5: SMATV PLANTS/ Powering

AC Before RF

If the **basic premise** of distributing RF signals via coaxial cable is now understood, we must now move onto the sub-topic of powering our plant amplifiers. Recall that the coaxial cable plant is capable of carrying not only TV (RF) signals from the headend to the subscriber locations, but it is also capable of carrying an AC operating voltage from the one or more 'amplifier power supply locations' to the cable connected amplifiers.

Coaxial cable is a relatively good grade of power cable. If, it is also a relatively good grade of RF cable. In other words, the larger the physical size of the conductor(s) in the coaxial cable, the better it will also be in carrying AC voltage to run our plant amplifiers. All cable has something called 'loop resistance.' It is measured in 'ohms' which is the basic unit of resistance. Cable manufacturers usually specify 'loop resistance' as so many ohms or parts of ohms per 1,000 feet. Remember that RF 'losses' in cable are usually specified in so many dB or parts of a dB per 100 feet; and that the operating frequency or channel affects the dB loss per 100 feet.

The smaller the physical diameter of the cable, the greater the 'loop resistance' per (1000) feet. For example:

- 1) RG-59/U Foam / 3.98 ohms per 1,000 feet
- 2) .412 aluminum cable / 2.43 ohms per 1,000 feet
- 3) .500 aluminum cable / 1.68 ohms per 1,000 feet
- 4) .750 aluminum cable / 0.76 ohms per 1,000 feet

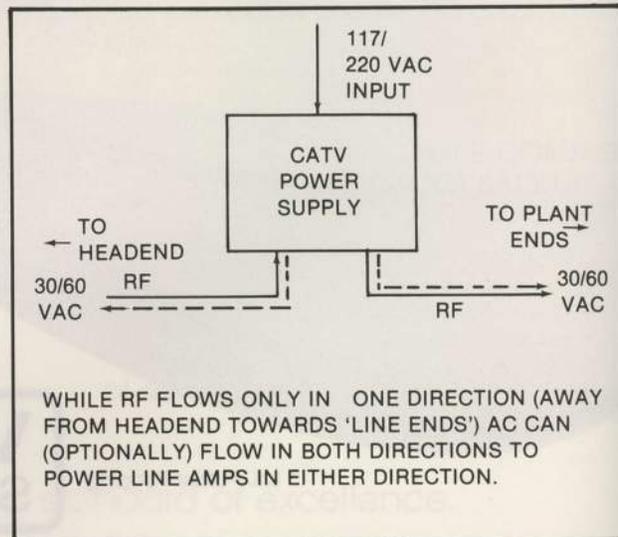
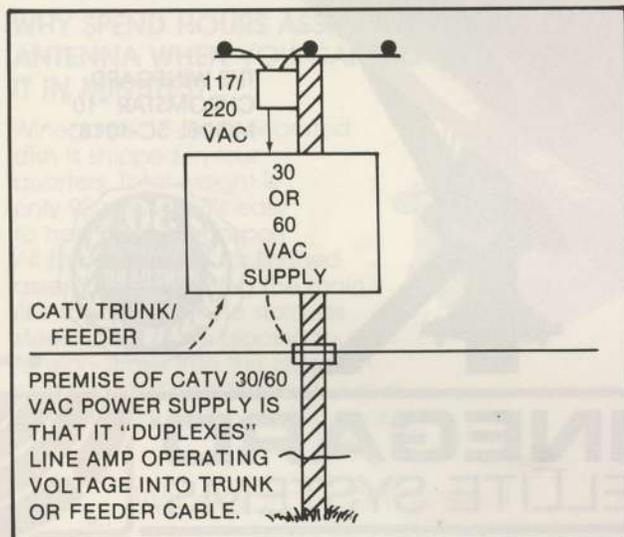
These are nominal numbers and will vary slightly from manufacturer to manufacturer. We'll return to this shortly.

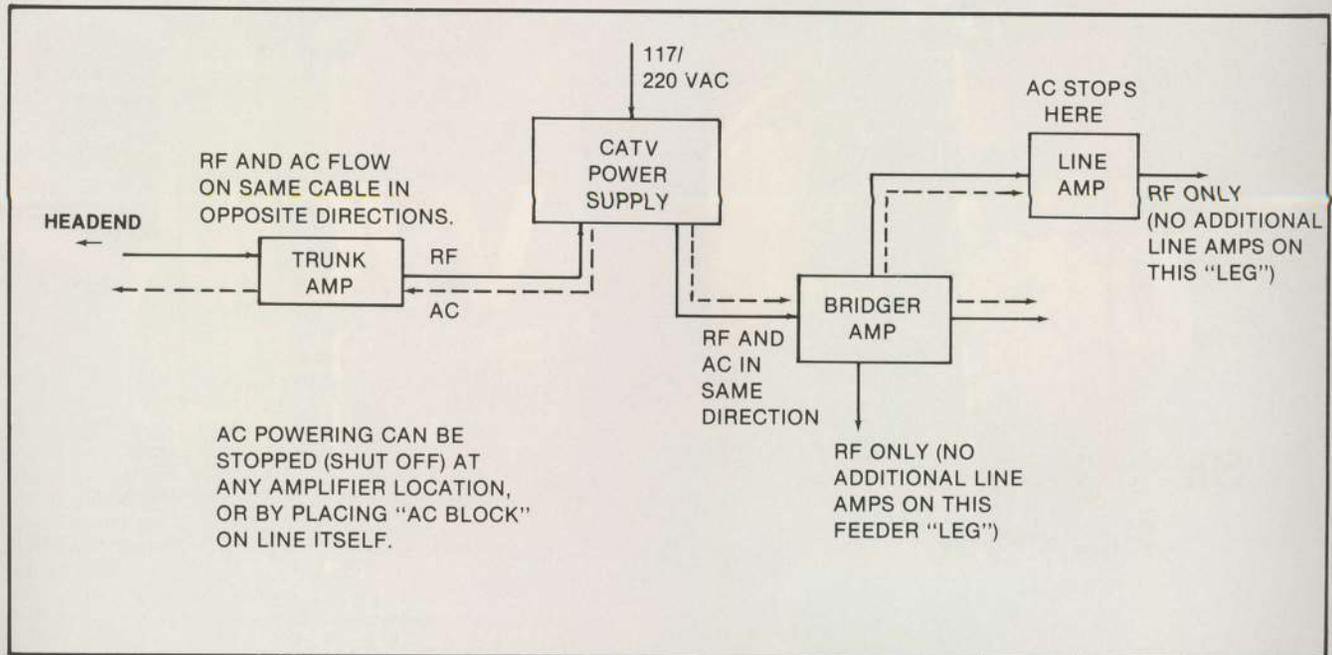
The basic CATV (SMATV) power supply provides either 30 VAC or 60 VAC to run the plant amplifiers. The power supply is housed in a weatherproof enclosure and typically mounts on a utility pole in the space between the top most power service lines and the somewhat lower telco/cable lines (see **CSD** for April plus the May portion of this segment). **To serve** the CATV power supply, the power utility must connect the primary or input side of the power supply to a power step-down or 'service transformer.' The power company will treat the CATV power transformer as a customer service point, just as they would a home. It may be metered (which would be read by the power company monthly so a bill can be computed), or they may accept calculations as to the actual (constant) current load of the power supply and forget the meter; billing you for the power used based upon the calculation.

The CATV cable line, typically a trunk line although it could be a feeder line as well, comes to the power supply and plugs in. The CATV line 'loops through' the power supply and goes on. As the CATV line 'passes through' the power supply, the 30 VAC or 60 VAC (secondary) voltage from the power supply is added to (or duplexed onto) the cable line.

Here the system designer has two options. Internal to the power supply are jumper bar connections. He can elect to send AC power both ways, that is, back 'up' the line in the direction of the headend, **and**, 'down' the line in the direction of the plant ends; or, in **either direction alone**. This option is important because you cannot always locate a power supply exactly where you would like to do so. Perhaps there are several blocks where the power company does not have or refuses to make available a 'commercial power drop' to your amplifier. So you have to go past the desirable point for the power supply and in doing so, you have an amplifier or two 'back upstream' from the power supply which must be powered, as well as those 'down stream.' We look at how that works separately.

When we elect to send power in both directions, we have RF





traveling from the headend to the ends of the plant in one direction (coming towards the power supply), and at the input to the power supply we have AC going in the opposite direction. No problem; the electrons don't realize they are going backwards and since they don't belong to any union you won't have pickets out there protesting.

The opposite (so-called output) port of the power supply has RF going on towards the ends of the system, and AC as well. Both are traveling in the same direction in this case. **In the example shown here** we have a few amplifiers spotted to show how the RF and power flows work.

- 1) Notice we have a 'trunk' amplifier ahead of the power supply (left hand side of illustration). The **RF flows** from left to right while the **AC flows** from right to left.
- 2) 'After' the power supply we have a 'bridger amplifier.' This is a special type of amplifier which extracts signal out of the trunk and then amplifies it in one or more output ports to connect to customer-service 'feeder lines.' The bridger amp doesn't amplify the **trunk** signal (if it did, it would be known as a 'trunk/bridger amp'); there is a very high quality 'directional tap' inside of the bridger which samples the RF signals present to 'feed' the 'feeder lines.' Note that AC power flows through the bridger on down the trunk (to right), as well as out of the bridger amp at the top towards a line (extender) amplifier. The line amp is a customer (feeder) line amplifier designed to boost the signal levels on the line which customers tap into. **The power stops** at this line amp because in our example there are no amplifiers beyond this point so we have no need to send AC power beyond here. We'll see how this works, shortly.

Now one of the design criteria for the AC powering 'portion' of the CATV/SMATV plant is something called 'voltage drop.' The premise is this:

Whenever AC voltage flows in wires, there is resistance to that flow from the wires themselves. AC voltage 'drop' is similar to dB 'loss' in cables. Just as coaxial cable 'loses signal' the further the (TV) signals flow through the cable, it also 'loses voltage.' The more cable you have between the voltage source (power supply) and the voltage load (amplifier), the greater the voltage 'loss'; or 'drop' as it is known in the trade.

Voltage drop concerns us because every amplifier in the system has some minimum voltage level at which it will function. A number like 18 volts is common to many types of amplifiers (assuming we have a 30 VAC powered amplifier system). Therefore we must know, in advance, how far we can carry the original (30 VAC) voltage before we end up with less voltage available than it takes to run an amplifier.

As you might guess, there are electrical formulae to help us figure this out in advance. **One of the ingredients** in calculating the voltage loss or drop is the **resistance** of the cable. And we have already discovered that cable manufacturers will tell us what the 'loop resistance' of the cable is in some increment such as 1,000 foot lengths. There is one other ingredient to calculating voltage loss or drop; the **current** being drawn or consumed along the way.

The formula first:

$$E = IR$$

If this is your first experience with electrical formulae, do not panic. This one is very basic and understanding it is very simple.

There are three ingredients in any electrical circuit.

- 1) Current, which is abbreviated **I**
- 2) Voltage, which is abbreviated **E**
- 3) Resistance, which is abbreviated **R**

The formula $E = IR$ tells us that the voltage (drop) in a circuit will be equal to the current being drawn through the circuit (I) times the resistance of the circuit (R).

We already know how to compute or calculate the resistance; if there is a certain length of cable (such as 1,000 feet) and we know in that certain length of .500 cable there is a 'loop resistance' of 1.68 ohms, then we have a total 'R' of 1.68 in our example circuit. Now, what about the other ingredient; **the current?**

Fortunately, every manufacturer of every CATV/SMATV line/bridger/trunk amplifier will tell us, on their data sheet, how much current the amplifier will use. That sounds easy enough; we take the current of the amplifier (say .5 amps) and multiply it times the resistance in the cable (say 1.68 ohms) and that will be our voltage drop ($1.68 \times .5$ or 0.84 volts).

Life is more interesting than that, however.

See our illustration headed '**Calculating Voltage Drop On Trunk and Feeder Lines.**'

Here we have created a segment of a small SMATV/CATV plant. In the upper left we have the (now) familiar power supply. For simplicity, we only show the 'output side' of the supply although we now understand that there could be another section of SMATV/CATV 'plant' to the left, on the 'input side.'

The power supply illustrated has a 30 VAC output and it has a total current capacity of 12 amps; a common type of power supply. Coming out of the power supply we have a .500 (inch) trunk line which extends 500 feet to a bridger amplifier (marked (2)). Following on beyond the bridger is more trunk cable which connects to a trunk amplifier



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You can tell at a glance!

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Because the HiTec 90+ is so widely accepted by the TVRO industry, these manufacturers want their distributors and customers to instantly recognize the Acme Screw version as being a product of the engineering and manufacturing capability which designed and produced the HiTec 90+ Ball

Screw Positioner. So our new Acme unit is a twin in most aspects.

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The Ball Screw positioner comes with the well known gold colored thrust tubes. The Acme Screw twin comes with silver colored tubes.

Which positioner has the Acme screw? Now, you can tell at a glance!

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SMATV/ continued from page 23

(marked (3)) and then after 1,000 more feet of .500 cable, to another trunk amplifier (marked (4)). Ignore, for now, the bridged outputs feeding the 'feeder lines' out of the top of the bridger.

The IR losses (i.e. voltage drop) will be most severe to the last trunk amplifier shown (4). Why?

Two reasons.

- 1) The cable distance between the power supply and the number (4) trunk amplifier is the greatest distance diagrammed. Since voltage drop or loss is a partial function of cable resistance, and cable resistance is a partial function of cable length, the more cable we have, the greater the losses.
- 2) In between the number (4) amplifier and the power supply, is trunk amplifier (3) and bridger amplifier (2). Both of these amplifiers ALSO use AC power. They consume current and you will remember that the formula for voltage drop is a product of the resistance (in the cable) to the amplifier **plus** the current drawn **along the way**. If we have amplifiers (2) and (3) drawing current **before** amplifier (4), we have two 'lumps' of voltage

cable **plus** 500 feet of .500 cable. The losses per 1,000 feet in .412 are 2.43 so we have 1.7 (1700') times 2.43 or 4.13 ohms loop resistance.

- 2) We also have the 500 feet of .500 which works out to 0.84 ohms. The sum of the two loop resistances is .84 plus 4.13 or 4.97 ohms.
- 3) The current drain per line amp is 0.25 amps and we have three line amps. That totals 0.75 amps.

Which brings us to the calculation.

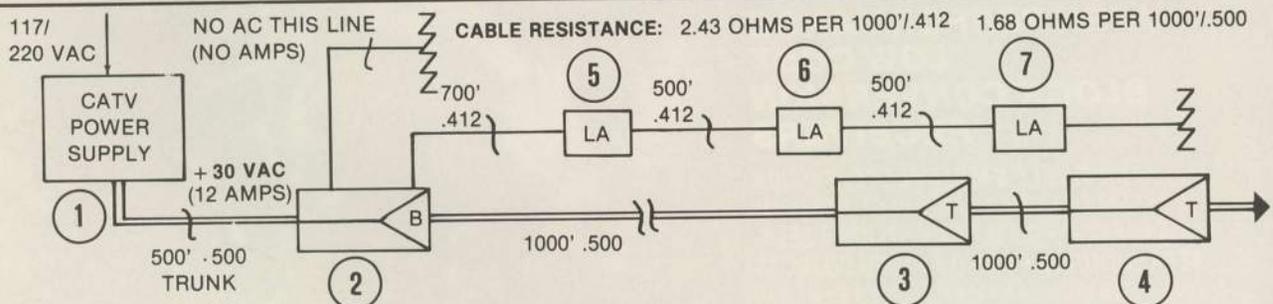
$E = IR$ or $E = 0.75 \text{ (amps)} \times 4.97$, or, $E = 3.73 \text{ volts}$.

What about the bridger amplifier? Is that not 'between' the first line amp (5) and the power supply? Does it not also use current? Did we forget it?

The bridger **is** between the power supply and the line amps. The bridger **does** use current. We did **not** forget it.

How's that?

Remember that the 30 volts we are using is AC; alternating current. That means it has two parts to its cycle; a 'positive' part, and, a 'negative' part. Those clever CATV plant amplifier design engineers are created power supplies which (in our example) only use half of the



TRUNK VOLTAGE DROP:

4 - TRUNK AMP CURRENT = .5 AMP
 3 - TRUNK AMP CURRENT = .5 AMP
 2 - BRIDGER AMP CURRENT = .4 AMP
TOTAL CURRENT = 1.4 AMPS (-)

(5) (6) (7) - (3) LINE AMPS = .75 AMPS (+)

IR LOSSES TO LINE AMP 7 =
 1700' .412 OR 4.13 OHMS
 (1.7 X 2.43); **PLUS**, 500;
 .500 (.84 OHMS).

$E = IR$
 VOLTAGE DROP = CURRENT (X)
 RESISTANCE
 $E = .75 \text{ (AMPS)} \times 4.97 \text{ OHMS}$
 $E = 3.73 \text{ VOLTS}$
 $E \text{ AT } 7 = 30 - 3.73, \text{ OR, } 26.27 \text{ VOLTS}$

IR LOSSES TO TRUNK AMP 4 =
 2500' .500, OR 4.20 OHMS
 (2.5 X 1.68).

$E = IR$
 VOLTAGE DROP = CURRENT (X) RESISTANCE
 $E = 1.4 \text{ (AMPS)} \times 4.2 \text{ (OHMS)}$
 $E = 5.88 \text{ VOLTS}$
 $E \text{ AT } 4 = 30 - 5.88, \text{ OR, } 24.12 \text{ VOLTS}$

CALCULATING VOLTAGE DROP ON TRUNK AND FEEDER LINES

drop in front of (4).

Now let's calculate.

On the left hand side of the illustration, we see that trunk amps (4) and (3) each draw 0.5 amps of power. And that bridger amp (2) draws 0.4 amps of power. We sum those current uses since they all affect the calculation for the voltage drop at/to (4). That is 1.4 amps of current.

To the right, we see that the loop resistance (IR losses) to trunk amp (4) is 2,500 feet of .500 cable. That's 2.5 (loss is in 1,000 foot measurements, remember) times the actual 'loss' per 1,000 feet, or, 2.5 x 1.68. That is a loop resistance of 4.2 ohms.

Now we have the two elements for our equation.

$E = IR$, or, $E = 1.4 \times 4.2$. That works out to 5.88 (volts). That means the voltage drop, caused by the resistance of the cable **and** the current drawn by the three amplifiers, will be 5.88 volts. If we started out with 30 VAC, then the actual operating voltage to the (4) trunk amplifier will be 30.0 - 5.88 or 24.12 volts. If the amplifier has a (manufacturer) specified 18 volt AC 'cut off,' you are safe here.

Now let's return to the other portion of this mini-system; the trio of line (extender) amps above the bridger, in the illustration. The process is repeated, with one **new** consideration.

- 1) The IR losses to the line amp (7) are found in 1,700 feet of .412

cycle; they have decided (in our example) to power all of the bridger and trunk amps with the **negative half** of the cycle, and all of the line amps with the **positive half** of the cycle. That means that we can ignore the current being used by the bridger since it is not in the same portion of the AC 'cycle' as the line amplifiers. Pretty clever.

That also means that we really have a 24 amp 'capacity' power supply, in effect. We can draw **12 positive amps** and **12 negative amps** before we 'saturate' the power supply. By having one type of amplifier using the negative side (trunk/bridger) and one type of amplifier using the positive side (line-extender amps) we can better 'balance' our power load factor on the power supply.

And the voltage drop to line extender amp number (7)? It is 30.0 - 3.73 volts or 26.27 volts to that amplifier. Again, on the safe side of the typically 18 volt minimum for such an amplifier (*).

* Not all line amplifiers follow this approach; check the specifications with each manufacturer before performing your own calculations.

So getting power to the amplifier equipment is no big deal. Just a few calculations and you know, in advance, how it will all turn out.

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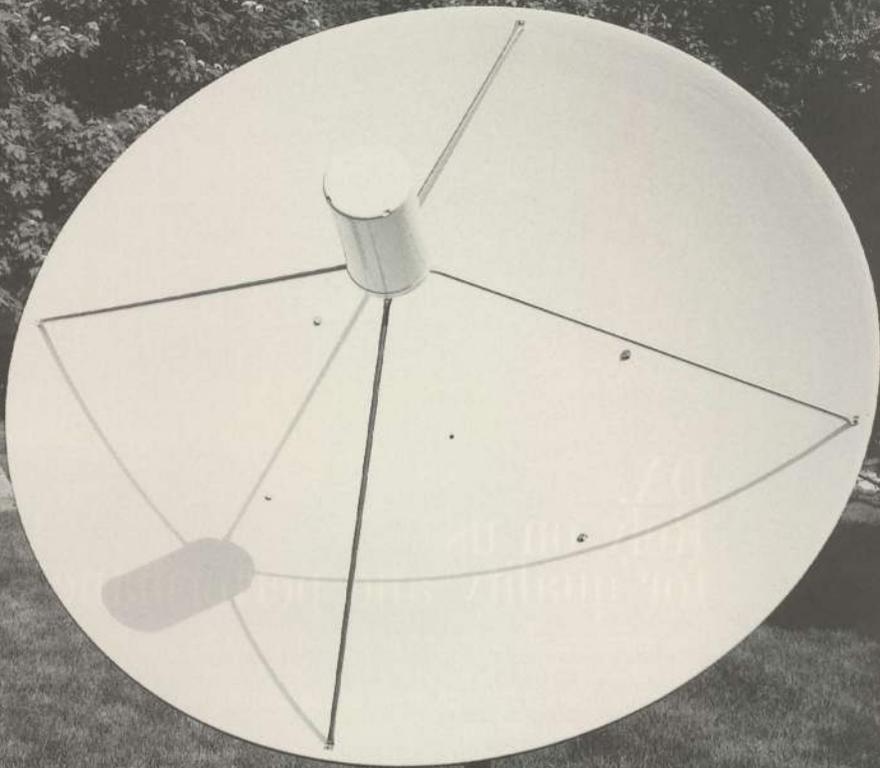
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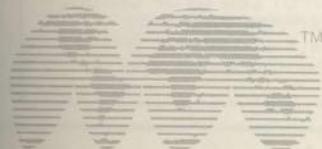
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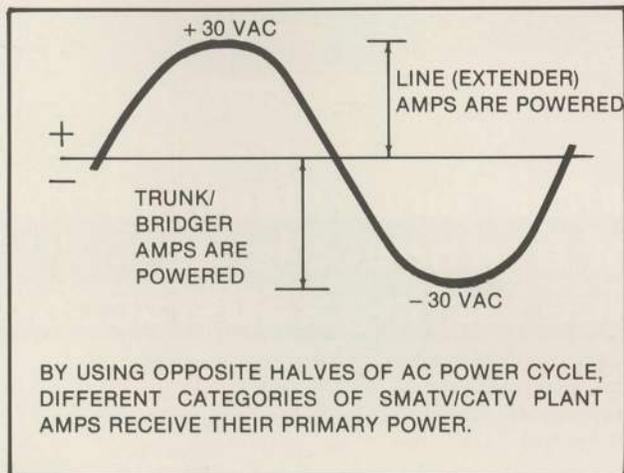
SMATV/ continued from page 26

Now, what are the dangers?

- 1) Maximum power supply capacity. All (CATV) power supplies have a maximum current handling capacity. 12 amps is common but there are other numbers.

It turns out that as you lay out a plant, you will usually run out of 'voltage' before you run out of current. That is, your total voltage drops will sum faster than your current loads so you usually end up either just even or slightly ahead in current as the voltage drop gets you.

- 2) Half cycle loading. We touched on this; you might be selecting amplifiers which power off of one, or the other, of the power cycle **halves**. It is possible to run out of negative half current before you run out of positive half current. You must calculate the total current consumed on both halves, or the total for each half, to be sure you won't be drawing too much on one or the other.



Again, it usually turns out that you won't do this to yourself since plant layouts all fall into pretty standard designs. The exception to the rule would be if you had many closely spaced high rise buildings requiring an unusual number of line amplifiers (extenders). The 'out' here usually is that you go into such a complex from your line with a single drop and then wire that facility with its **own mini-distribution system** and its own amplifiers. Typically, you will get power for those in-facility amplifiers from the local AC service, using amplifiers which have their own 117 VAC powering systems.

- 3) Hum bars. Anytime AC lines get upset, or somehow get cross-ways to your RF lines, you get an effect called 'hum bars.' That's when you have a faint white and a faint black (as in grey) bar chasing each other up (bottom to top) or down (top to bottom) on the screen. This can come from improper half cycle loading (drawing an imbalance of AC on one side or the other of the supply), from a defective power supply, or a defective filtering network in the inboard 30 VAC power supply inside of each (or any) amplifier.

Isolate the problem. Is it occurring on all of the amplifiers fed by a common power supply? Start at the supply. Is it occurring only in a segment? Start at the first amplifier where it shows up and suspect **its internal 30 VAC supply**. Once you screw up the RF with hum bar modulation, every amplifier down stream from that point may be affected.

- 4) Each amp has a power supply. Remember, this is not a DC powering system. The CATV/SMATV line amplifiers **operate from DC**, not AC. But, they get their DC from the 30 (60) VAC source sent through the cable. That means we have a rectifier network (turning AC into DC) inside of each of the line amplifiers. Individual rectifier circuits can (and do) go bad, affecting only that amplifier. When this happens, service may still continue down stream (after that amplifier) although if the failed supply takes out the RF amplifier operation in the affected amplifier, you won't have TV **pictures** beyond that point. We'll

deal with system trouble shooting in a separate part of this series.

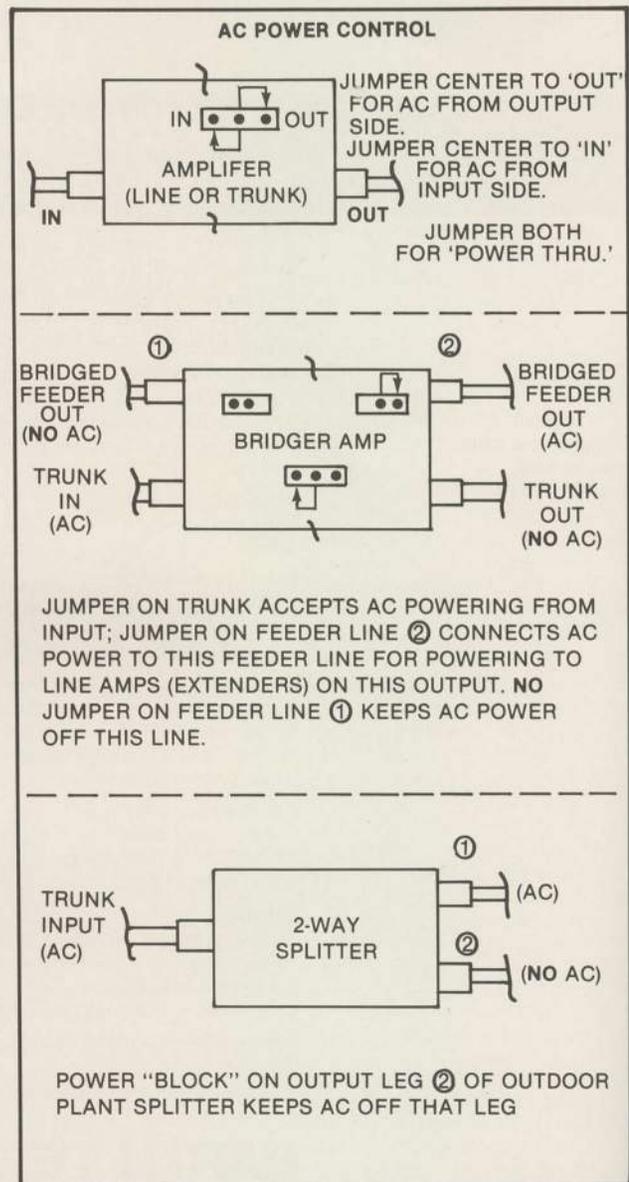
CONTROLLING The AC

If we have all of that AC (30 or 60 volts AC) running around in our coaxial cable plant, how do we protect ourselves and our customers from getting 'zapped'?

Remember that most states (and local municipalities) have ordinances which establish a 'voltage boundary'; anything above 60 (75) volts AC is considered a 'power distribution system' and to run wires about town with those excessive voltages on the wires requires that you act like an electric utility. That's why the cut off at 60 VAC for most CATV powering systems; to stay just under the limit.

Either 30 or 60 VAC can harm you. Especially if you are standing in a pool of water and the water is at 'ground potential.' Which is another way of saying "Don't mess around with CATV power supplies"; you can get injured or worse.

Since that AC is running up and down the trunk and feeder lines, we want to protect ourselves **and** our customers from getting jolted. Let's see how we control the AC. In the 'AC Power Control' illustration here, we first examine how the AC inside of an amplifier is routed. The amplifier will have some system to allow you to connect up an 'AC



routing line' internal to the amplifier. This may be a terminal strip with three screws, a switch with two or three positions, or a set of jumper wires or a plug-in jumpered-module. The idea is the same in all three.

- 1) The AC power might come **to** the amplifier from the input connector (RF), or it might come **from** the output (RF) connector.
- 2) The AC power may come **to** that amplifier and **stop there** (i.e. no requirement for AC power beyond that point), or, **it may go on**.

The concept is that you can connect, for AC purposes, the input (RF) to the output (RF) in one wiring position or switch or module plug-in position. Or you can accept power from the output connector but 'block' the input connector from power; or vice versa. In the end, **you decide** which way **you want** power to enter the amplifier, and what **you want** the power to do after it gets there.

In the real world most amplifiers are powered from their input side, and, they pass power through on 'down stream' towards the next amplifier in the line. The exception is the last amplifier in a line; by making the appropriate connection inside of the amplifier, you 'block' or shut off AC power to the output connector.

A bridger amplifier is a special animal, as we shall see next month. It goes **on** the trunk but it is not (by itself) a trunk amplifier. It is actually an 'active tap'; that is, it taps or sucks some signal out of the trunk, amplifies that signal with an amplifier and then splits that signal (typically) into two or four parts so that two or four separate 'feeder lines' can go from the bridger down two or four separate streets in the town.

In our example, we have the trunk coming in and the trunk going out. We have elected to make this bridger the last amplifier on this segment of plant so we have the 'jumper' connection hooked up so that the bridger gets power from the input, but does not allow it out the output. Then we have a pair of feeder outputs; one (top right) must have one or more feeder line amps on it since we have elected to connect the powering for that output port so that **AC will pass through**. The opposite bridged-output, upper left, has **no power through connection** telling us we will have no AC leaving through that port. The reason? The feeder line is so short that we will reach the physical end of that line before we need to install another (line) amplifier. No line amplifier; no AC power requirement.

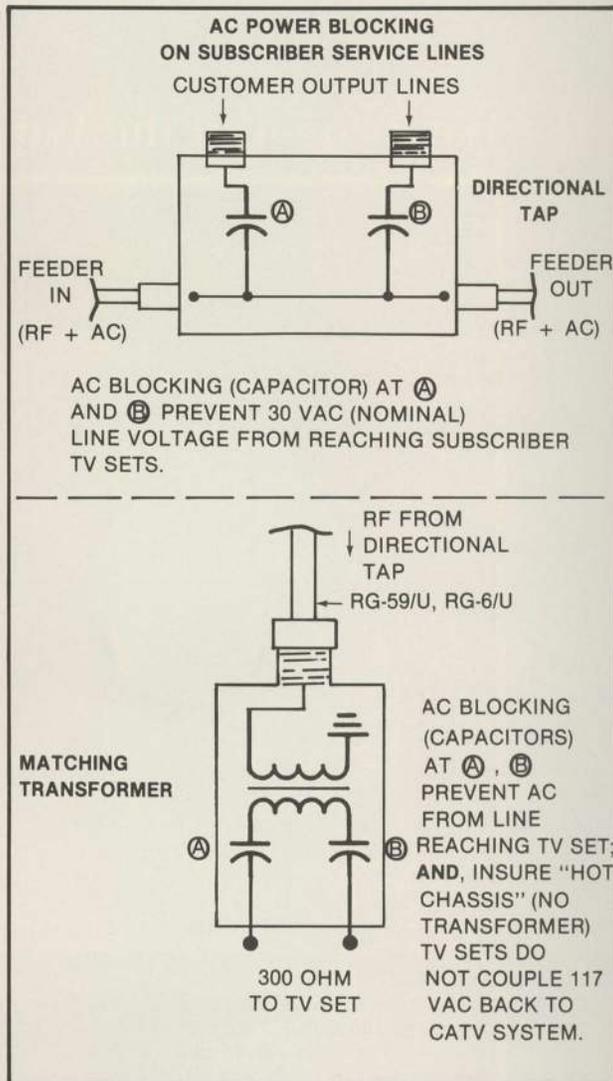
Then there are the passive plant devices; such as the two-way splitter shown. As we will see next month, we may have a trunk or bridger output which must be split to feed RF signals down two (or more) streets. You find these at street corners. In our example, we have the trunk line input (left) and two trunk line outputs. The passive (non-electronic) two-way splitter passes the RF (after splitting) into a pair of output ports. It **also** connects the AC to both ports as well.

Now, there are splitters like this available which have **internal** power cut off connections inside; in which case if you did not wish to have AC on **one** of the two output legs shown, you would lift the top and make the appropriate connection change. In our example, we assume this is not such a unit so we have installed a '**power block**' outside of the splitter, on the bottom leg, shown. This will **stop the AC** at this point, but allow the RF to continue on down the line. In this instance the RF would feed some number of homes or whatever, without any AC. In the case of a trunk, we might have another power supply feeding power back from the opposite direction at the next amplifier location on this particular leg, and to be 'double safe' with the AC system, we installed the power block so the two separate AC powering supplies can never get together even if somebody screws up at the next amplifier location on this leg. The key is a power block; a device that stops AC but allows RF to pass through.

Now, what about the customer? What protects his equipment?

The directional tap device which connects into the feeder line to suck out just enough RF energy to produce clean TV pictures inside the home has an 'AC isolation' network inside; a miniature power block which insures that no matter what happens, you don't get the 30 or 60 VAC service down the customer tap line to the TV set beyond. That's obviously desirable.

But there is one other opportunity for problems; **the customer's own television receiver**. That's because we have something called 'AC-DC' television sets; also known as 'Gutless Wonders' or 'Transformerless Sets.'

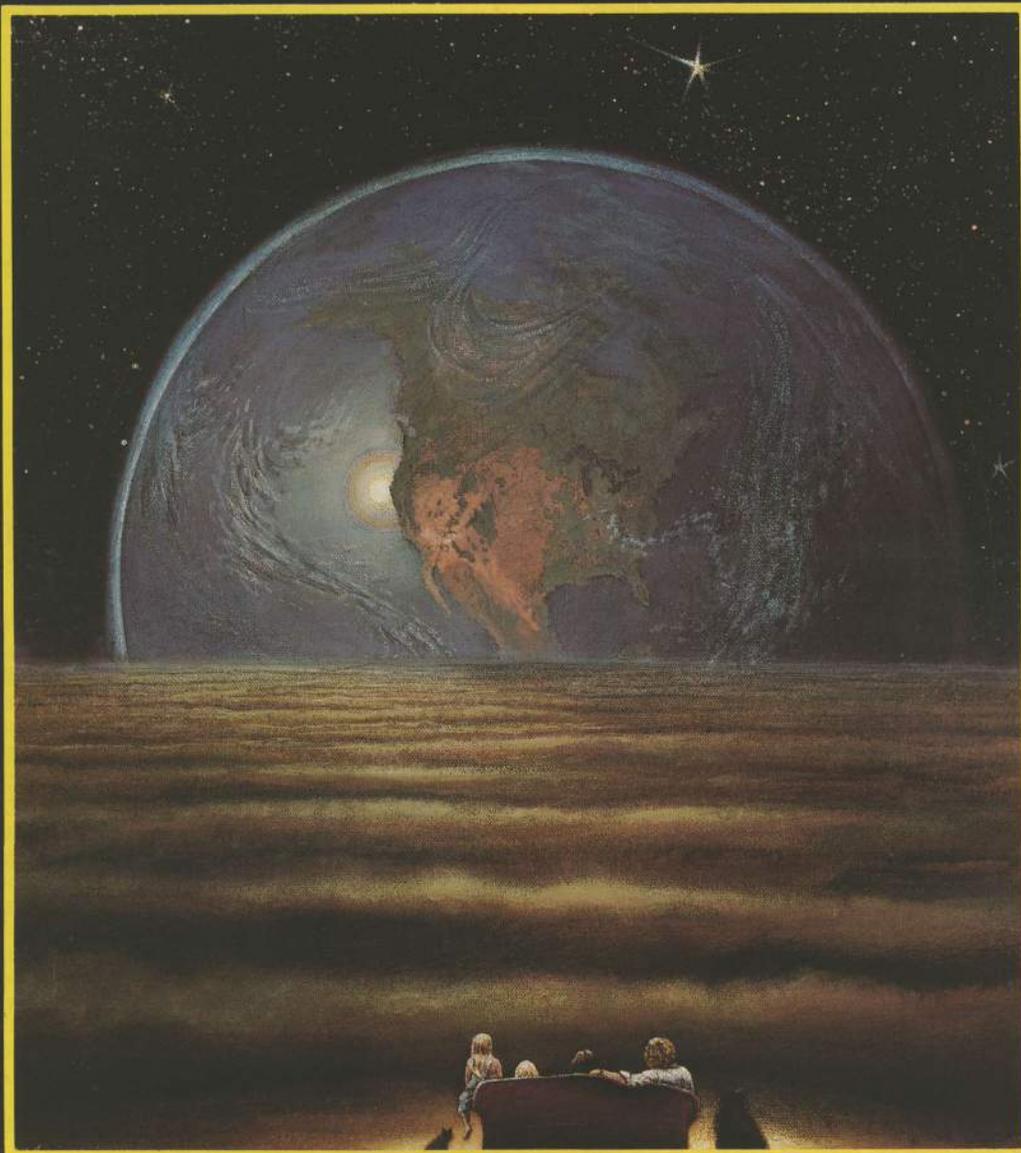


These TV sets have been designed so that one side of the TV (metal) chassis is hot. Hot means not-warm, but active with AC. You are right; that is not very bright, but they get away with it anyhow. Even UL approves!

Given the 'right' (as in **WRONG**) circumstances, the AC on the chassis can link back out of the TV set into your cable drop line and then back into the system. Assuming this doesn't injure or kill somebody, you have a problem. The best protection is to only buy (and use) high grade matching transformers to connect your 75 ohm coaxial cable line to the 300 ohm terminals on the back of the TV set. Such a transformer has a pair of built-in miniature blocking networks designed to insure that AC that might get into the drop line side of the 300 ohm connection does not get into the 75 ohm side. **As the illustration here shows**, the matching transformer has a 'balanced' 300 ohm side and an unbalanced 75 ohm side. The block could be on either side but we'll assume it is on the 300 ohm side for our illustration. When in doubt, ask if the matching transformers you have selected have 'AC blocking capacitors' inside. In other words, they cannot pass AC even if some happens to get onto the 300 ohm side.

Well, powering is quite a sub-subject within the CATV/SMATV planning exercise! We have touched on all of the important concerns here although this general overview is hardly a textbook, in such abbreviated form. Next month as this series continues in **CSD**, we'll look at the RF portion of the plant and how all of those trunk, bridger and line extender amplifiers layout for maximized service to your customers, and minimized plant costs for you.

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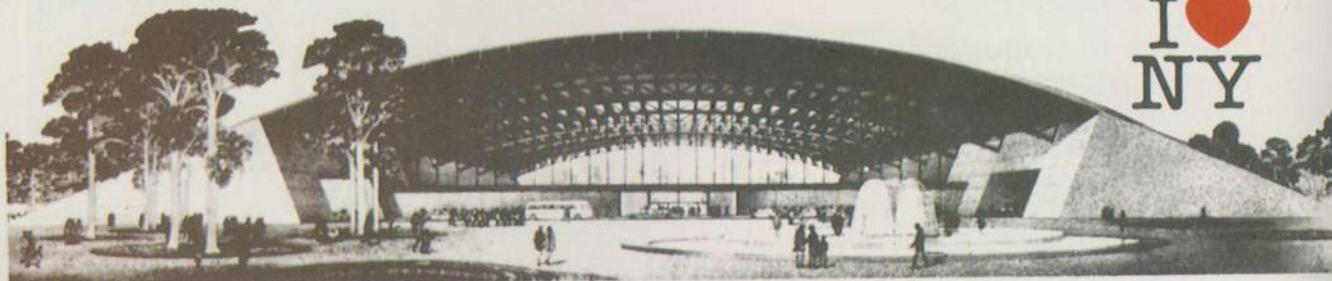
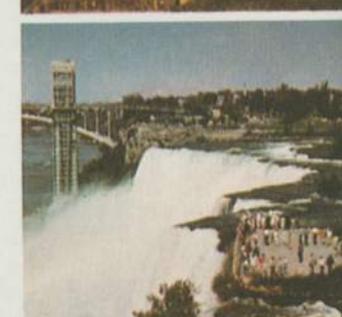
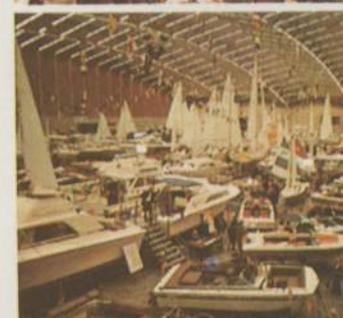
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Part 14: ROOTS OF TVRO

THIS SERIES traces the history of television broadcasting and regulation in the United States. The present TVRO 'boom' is directly fueled by the decisions of the FCC in the 1948-60 era; decisions which established for all time the present three-network (plus PBS) terrestrial television system. This approach to a national television grid in the US created the foundation which today is leading us into the TVRO 'age.' This series was originally published by Coop in the 1974/5 era when he published the cable industry's **CATJ** magazine. To appreciate our 'heritage' is to be better equipped for what will surely be some form of federal regulation of TVRO activity in the years ahead.

WHY CATV EXISTS

In the March issue of **CATJ** we recounted the history of FCC handling of television allocations. The Commission variously attempted to provide (a) one television channel service to every American home, (b) two television channels of service to as many of *these homes* as possible, and, (c) three, four or five (or more) channels of service to as many of *these homes* as possible.

With some pride (or ignorance), the FCC today points at the present state of the television broadcast industry with a "see how well we did" attitude.

Well, *the Commission did not do well*; not when you consider how *much better* they could have done. The Commission started with a clean slate in 1945-46. Unfortunately, they had very

poor information to work with, and as they say in the computer biz, "*garbage in equals garbage out.*" So in 1948 the garbaged allocations table came home to roost, frightfully close to Washington, D.C. (see March **CATJ**, Page 13). And that shut the industry's growth down.

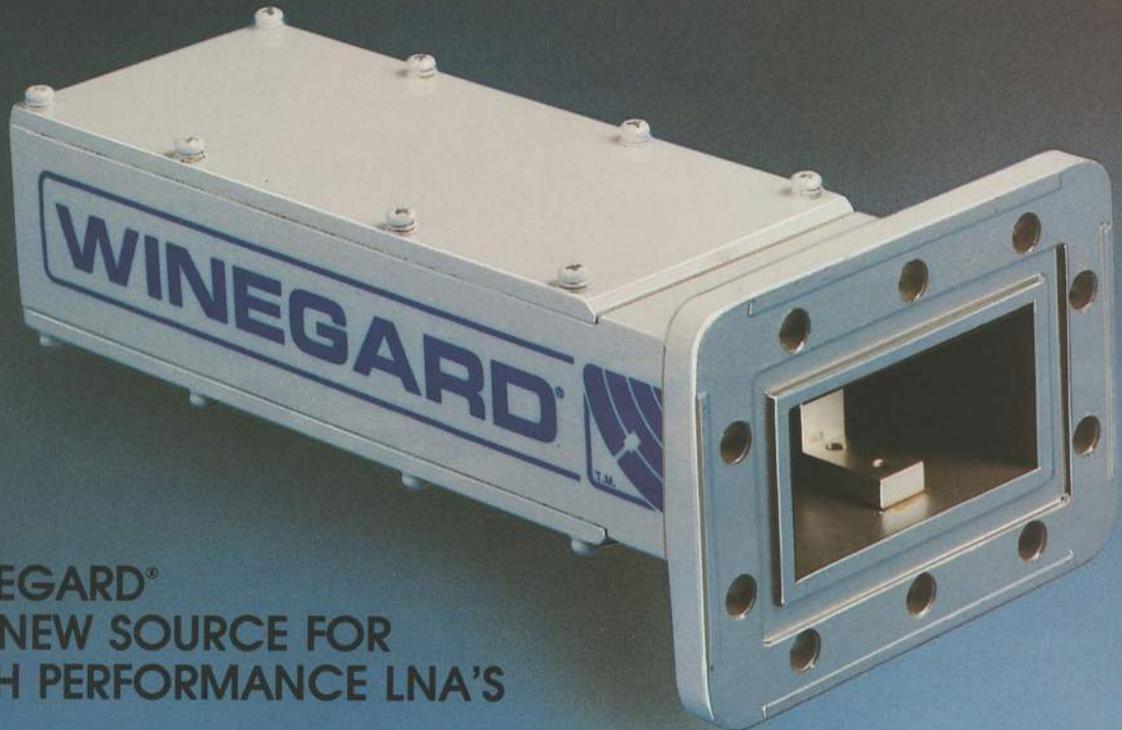
Then followed a period of nearly four years in which the Commission found every possible excuse not to get television moving again, finally deciding that a new allocations table would *have to be* based as a start on the then *existing* 107 television stations authorized and on the air. Once again, "*garbage in equals garbage out,*" and the allocations table released by the Commission in 1952 had plenty of garbage going in. For example:

- (1) **VHF and UHF channels were freely inter-mixed in many (most) markets, and the world was not then ready for UHF (some say it still is not ready!);**
- (2) **The Commission tried to build an allocations table around the concept that every area should have its own (local) television outlet; a false premise if there ever was one, because of the complete failure to consider the economics of building and operating a television station in Ely, Nv.;**
- (3) **Pressure from educational broadcast interests forced the Commission to give away many valuable VHF channels in markets where the VHF channel was much more important to the successful development of a viable, competitive local television service than it was (or would be) to the de-**

ROOTS CONTINUES/ page 42

CATV EXISTS BECAUSE THE FCC DROPPED THE BALL!!!

THE EXTRA EDGE



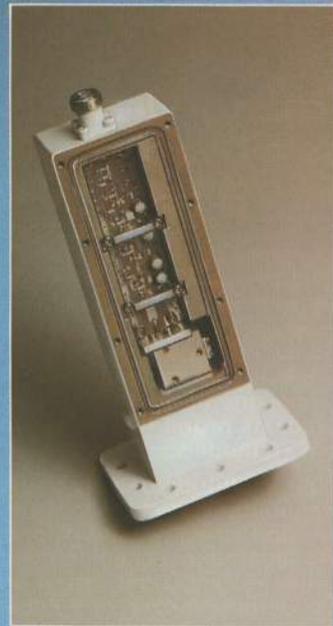
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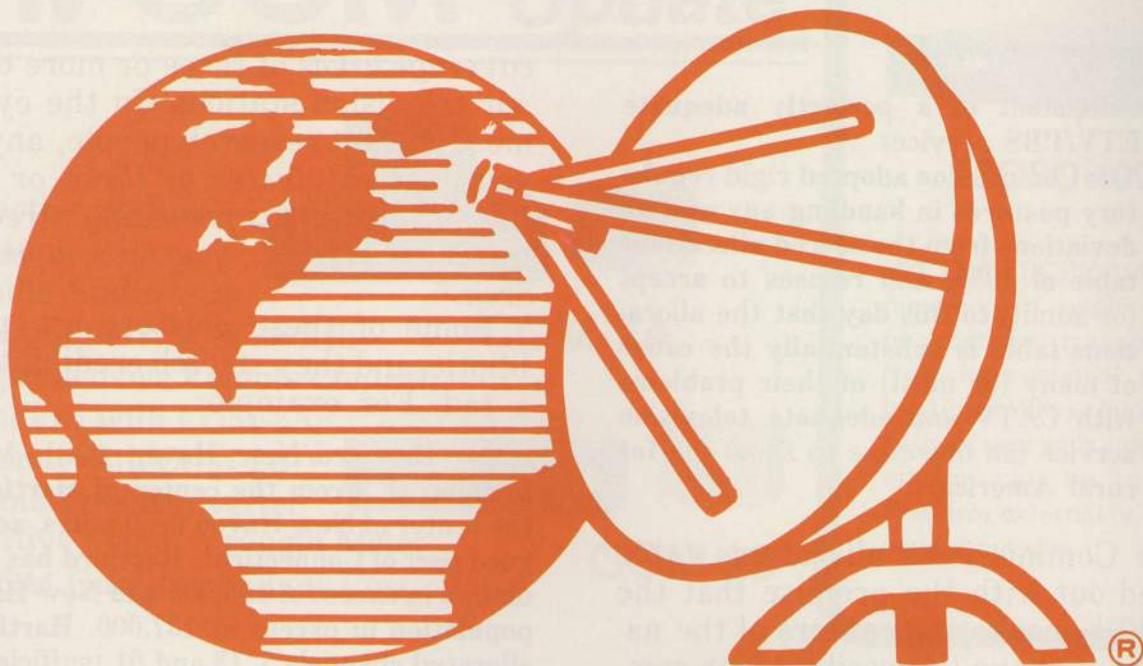
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ROOTS/ continued from page 38

velopment of a perfectly adequate ETV/PBS service;

- (4) **The Commission adopted rigid regulatory postures in handling any and all deviations from the sacred allocations table of 1952, and refuses to accept (or admit) to this day that the allocations table is substantially the cause of many (or most) of their problems with CATV and adequate television service (an objective to shoot at) for rural America.**

The Commission's allocations table started out with the premise that the top 140+ marketing centers of the nation should have (if possible) four commercial TV channel allocations. Where possible, these would be VHF allocations; where not possible, they would be UHF. Initially, VHF and UHF were mixed up on the (false) premise that UHF would work *just as well* as VHF. Now calculating the top 140+ marketing centers in the nation should be no big trick: simply take population centers, measure the economic activity in each, and rank them according to the people-dollars spent annually in each.

If the initial 140+ market centers the Commission worked with were ever defined for outside scrutiny, such a list has escaped our editorial research here at CATJ. We believe, however, it is *reasonable to assume* that the top 140+ market centers of 1949-1952 would *not* be the same as those which ARB, or others, set forth today. A market center in 1975 is variously defined as "the trading area served by one or more television broadcast stations." In a very real sense, the existence of trading areas in 1975 (i.e. market areas or market centers) is almost *wholly dependent* upon the combined

coverage areas of three or more on-the-air television stations. In the eyes of most market research people, anytime you have a "*cluster of three or more television stations providing three networks of service, you have a market area.*"

Some of these clusters are pretty idiotic, and they stretch credibility just a tad. For example:

(1) **Hartford/New Haven (Ct.)—Market number 21.** From the center of Hartford to the center of New Haven is 59 miles, across a good part of Connecticut. Hartford has a population in excess of 158,000 and New Haven a population in excess of 137,000. Hartford is allocated channels 3, 18 and 61 (sufficient for three network stations), while New Haven is allocated channels 8 and 59 for commercial use. When New Haven's 8 and 59 are grouped with nearby Bridgeport's 43, New Haven also has three commercial channels, again, sufficient for three network stations. But the market is inter-mixed (i.e. VHF and UHF), so channel 3 VHF became CBS, channel 8 VHF became ABC, and two stations (one serving Hartford and one serving New Haven) on UHF became NBC. The wide area coverage of the channel 3 CBS station and the channel 8 ABC station make this a single market in the eyes of people who calculate such things, even though NBC requires two UHF affiliates to cover the "market."

(2) **Harrisburg/Lebanon-York-Lancaster (Pa.)—Market number 53.** If you left Harrisburg, drove to Lebanon, headed south to York, back through Lancaster, to your starting point in downtown Harrisburg, you would travel 139 miles. The "market" has one ABC station (in Harrisburg), one NBC station (the only VHF station in the market), and three (count them friends!) CBS stations (one each in Lebanon, Harrisburg, and York). What makes this 139-mile round trip circuit a "market"? Probably the wide area coverage of Lancaster's channel 8, although its large VHF coverage area is filled-in by bits and

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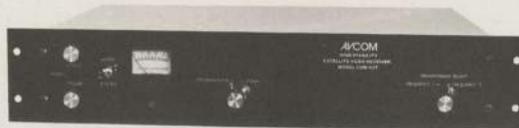


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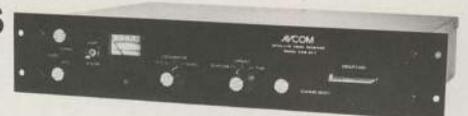
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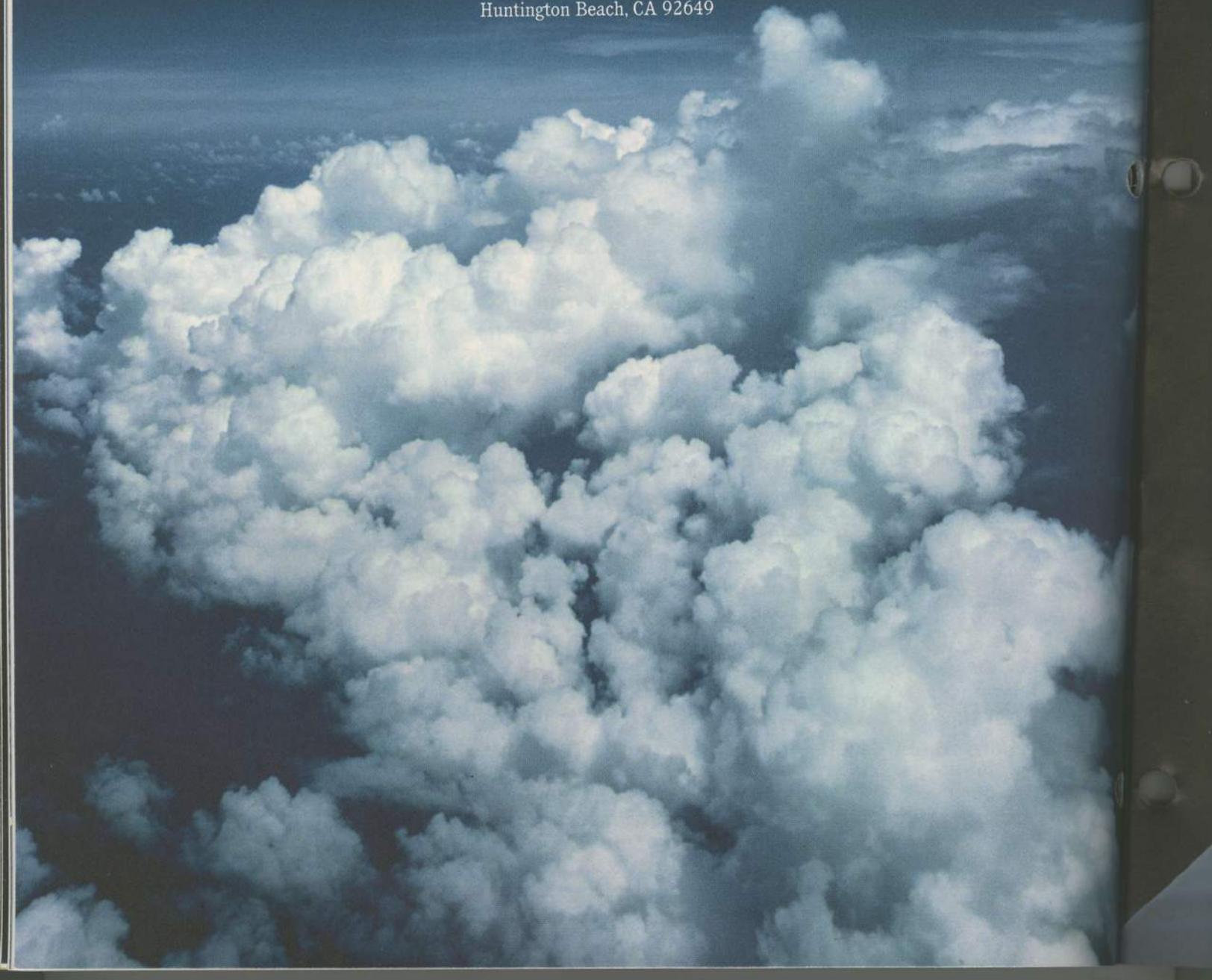
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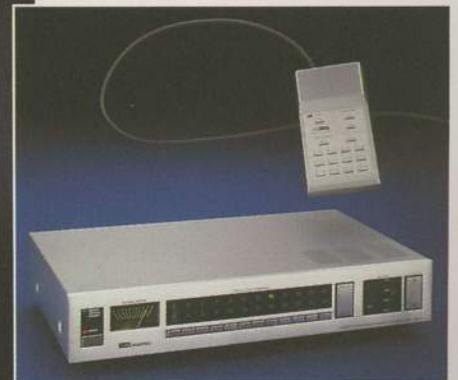
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ROOTS/ continued from page 42

pieces of up to three competitive network affiliates (CBS).

In the top 146 markets, there are 22 "markets" created by the happenstance location of VHF (or UHF) stations that provide the three basic network services, that include two or more distinct and separate communities with these communities located *50 miles or more apart*. (There is also the 30-mile separation of Plattsburg, New York and Burlington, Vt. — Market number 120 — where to travel between the two towns in the market you must ride a nine mile ferry across Lake Champlain!)

But the really gross misuse of federal power shines through in North Dakota, where the statisticians have created the "Minot/Bismarck/Dickinson Market" (number 136). For those who have never traveled this part of the world, about the fastest (i.e. good road) route from Minot to Dickinson is ~~through Bismarck. Now from Minot to~~ through Bismarck. Now from Minot to Bismarck is a mere 112 miles. On to Dickinson, however, is another 93 miles, *making a total of 205 highway miles* to travel from one of the three cities in the "market" to one of the other cities in the "market."

Naturally, even in North Dakota with tall towers, no *single station* can deliver Grade "A" pictures into all three towns. But the North Dakota broadcasters are pretty sharp. And it goes like this:

- (1) **KFYR, Bismarck, NBC operates two satellite stations. KMOT serves Minot with NBC programs (KFYR satellite), while KUMV serves north western North Dakota with KFYR-NBC pro-**

grams.

- (2) **KXMC, Minot, CBS/ABC operates satellite station KXMB, which serves Bismarck, and KXMD, which serves the same area as Bismarck's KFYR-operated satellite KUMV.**
- (3) **KDIX, Dickinson, ABC/CBS doesn't own any satellites (yet), so it just serves Dickinson and the surrounding wheat fields.**

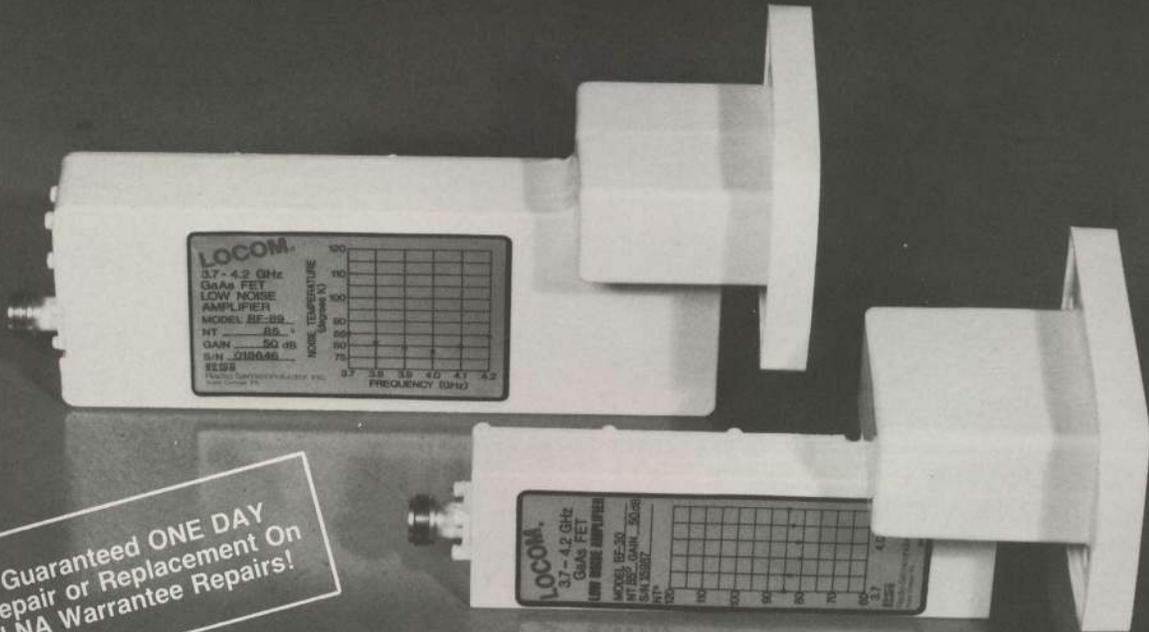
Now between KFYR, KXMC and KDIX, the Washington statisticians figure they have a *market*; even though dual-affiliates KXMC Minot (CBS/ABC) and KDIX Dickinson (ABC/CBS) may both be carrying CBS's *Maude* at the same time (thereby leaving the "market" without an ABC program for that period). To rub salt in the wound of the local residents, neither KXMC Minot nor KFYR Bismarck *even reaches into Dickinson* with as much as a Grade "B" signal, so the Dickinson part of the three-part market doesn't even have two (not to speak of three) network service. Naturally KDIX Dickinson does not reach into either Bismarck or Minot, so they ~~have at best two networks of service at~~ a time.

The examples of statistical misuse of "market designations" abound in the television allocations table. The Bismarck/Minot/Dickinson example is one of the most flagrant examples of misuse of statistical power. The FCC wants a *market* to be an area served by at least three networks of service. Obviously someone stretched a few *facts* in the North Dakota example; they traveled over a 205-mile highway route to find three stations that have three separate network affiliates *and called it a market*. What makes matters worse is that Bismarck has alloca-

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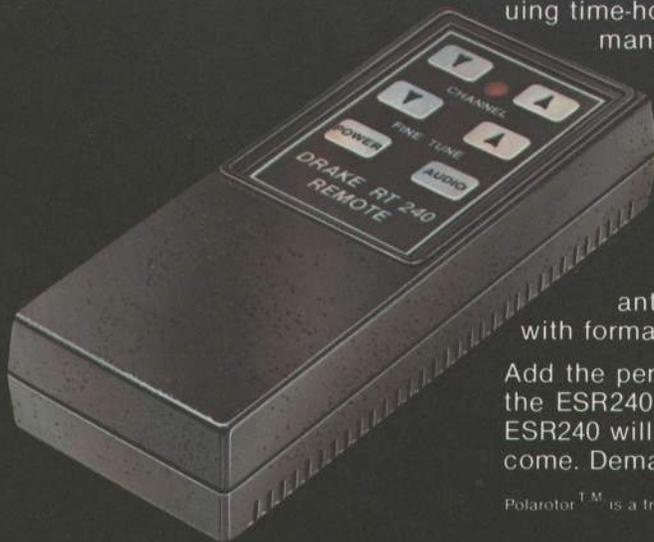
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ROOTS/ continued from page 46

tions for channels 5, 12 and 17 (i.e. one for each network), Minot has allocations for channels 10, 13 and 14 (i.e. one for each network), and Dickinson has allocations for channels 2 and 7 (i.e. one for each of two networks). *But as long*

as the FCC propagates the absurd definition of the 205-mile-long "market," none will ever see three networks of local service.

THIS series was originally created for CATJ magazine as an 'educational course' for Congress and the FCC. It documented, for the first time in print, the 'fall-out' resulting from FCC actions in television's formative years. It will continue in CSD.

THE SMART WAY TO ATTEND A TVRO SHOW

ANOTHER Opening/Another Show

The summer show for 1984; **Niagara Falls**, June 12, 13 and 14. The show promoter; **STTI**. Track record . . . good. Past history of the summer shows . . . most recent summer show was Minneapolis in June of 1983. That was billed as a Canadian-American event and it coincided with an announcement in Canada which seemed to clear, once and for all, the Canadian 'legal status' of **home TVROs**. Attendance was not up to national show standards and Canadian attendance was light.

The solution? Move the show to the northeast. History of shows in the northeast? No major show has **ever been there** before and, no major show has ever been held close to the populous Canadian east. **Prognostication:** the Niagara Falls show may turn out to be one of the surprises of the year. It looks good for an unusually heavy attendance.

Anyone who has attended a satellite industry trade show is aware that manufacturers and distributors are there **to sell**; dealers are there **to buy**, and 'spies are everywhere'! Not everyone has figured out **how you profit** from a show, **how you get** the most information and the most help for your particular business activity area from the one, two or three days you spend in the surging crowds. That's what this is all about; some practical tips on attending a show, and getting the most out of a show.

SEPARATING Value From New

Most product excitement centers around one of two words; **new**, or, **cheap**. The two usually do not happen at the same time, and if they do, that is one of those 'danger signs'. We'll explain why.

Let's deal with 'new' first. Most manufacturers who have an established product line will use shows to introduce new product. They may also be announcing the same 'new product' in their trade magazine advertising for the same month, and if that happens and if you have the trade publication(s) prior to going to a show, you can 'plan' what you want to see, or, pass up. If you are an established dealer, **if you handle a product in the area** which the new products fall, you should always obey the '**First Rule Of Showmanship**'. Which is? Always, **always** inspect **every new product** offered no matter how much you may believe it will not interest you.

An example. You sell receivers (most dealers do). You sell only Drake receivers and you like Drake receivers. It comes to your atten-

tion that Sat-Tec has a new receiver line. You once had a bad experience with a Sat-Tec so you are pre-disposed to simply ignore the new Sat-Tec product, passing it off with a shudder as you recall a previous experience. **That's a mistake.** No matter how much you **believe** you may dislike Sat-Tec products, you owe it to the survival of your business to at least look at the new product line. Maybe, just maybe, there is some significant change in the new product line and even if you don't want to deal with them again, you will be a smarter 'competitor' for having inspected their new product.

Which brings us to the '**Second Rule Of Showmanship**'; don't waste time looking at anything which does not **directly affect** your business. Let's assume you refuse to handle outboard modulators. You will only purchase and resell receivers with built-in modulators. As long as that is your philosophy, why even slow down when you are passing a booth which offers a (new) line of modulators? It simply is not 'product'. And that brings us to starting off with a master game plan.

Anyone who attends a show and stays two or three full days should never have time on their hands. If you find yourself sitting down wondering how you can kill a couple of hours, you have not properly prepared yourself to attend a show. You should be there to learn and from day break to midnight there are multiple opportunities to learn **wherever you turn**. Your real problem should be that you have to figure out an intelligent advance schedule for the limited time you have available!

There are four major sources of new information at any show. They are:

- 1) The **inside** exhibit booths,
- 2) The **outside** antenna displays,
- 3) The (scheduled) **seminar** sessions, and,
- 4) Informal **discussions**.

To that we must now add a new trend at shows; special one/two/three hour mini-seminars staged by various exhibitors, usually in a suite away from the exhibit hall area, where they will teach you (with sales pitches thrown in, of course!) about some special aspect of TVRO systems. The LOCOM training sessions during the Las Vegas



DON'T WASTE YOUR TIME/ talking with some antenna exhibitor if by 'day 3' their antenna is still not working!

show week this spring, where they scheduled training periods for people interesting in learning about block conversion and multiple-home (set) distribution techniques, is an example of this new trend.

There has been one other recent trend, which on the surface might not seem intended for you. Many of the manufacturers, recognizing that we now have a substantial 'trade press' group, have figured out that they can call a 'press conference' and make some important announcement and/or answer questions about their products or operation during a trade show. Some press conferences are just that; **press conferences for the press** and they will 'guard' the door to insure that only **real press people** get in. Others are not so selective and you can sit down at the back of the room and often learn about some important announcement 'first hand'. If you are really fortunate, the company holding the press conference may even be serving cocktails and goodies and you can 'skip a meal' by sliding in the door! The real value in getting into a press conference is that it will give you a special insight into the particular problems a supplier may be having. Luxor, at Las Vegas, 'laid it on the line'. The meeting was 'guarded' and you would not have gotten in without being recognized as a member of the press. But, **if you can slip in**, and if the firm holding the conference deals in a product that interests you, you will be one of the 'first to know' and it might give you a leg up on the competition in your area.

- 1) **Inside Exhibit Booths:** The exhibit booths are typically staffed by the 'first line' sales types; guys and gals that know how to romance you with their products, their charm, and their 'special deals'. A bit of advice here; anyone willing to give you a 'special deal' right there in front of anyone else within earshot is **not giving you** a very special deal.

Use logic. An established product, doing well in the marketplace, is being 'discounted'. Ask yourself 'why?'. If product delivery is 'tight' (in short supply), ask yourself 'why'?? twice. Then ask the guy with the offer:

- A) Does this include the **FULL** factory warranty?
- B) Can you **SHOW** me where I send the product when it breaks, for repair?
- C) Are the **CLOSING** out this product (ie. no longer making, or getting ready to discontinue that model's production)?

- 2) **Outside Antenna Displays:** Many people think the outside antenna displays are merely an 'extension' of the booths inside. **Not true.** First of all, some firms will **ONLY** take an outside area (skipping inside) if that is available from the show promoter. That means if you skip a close inspection of outside, you will **miss** some of the firms altogether. Next, other firms, especially those with antennas, will put all of the top people outside and maybe leave only a token staff of a perhaps not too knowledgeable person inside. Again, you have to go outside and hunt down the corresponding antenna display. **Even if** the outside antennas are **supposed to be** operated along with an inside booth, traditionally, firms that 'sign up late' for displaying at a show, when the exhibit hall area is full, will end up with an '**outside-only**' display. Many people believe the antennas are all that you will find on display outside in the antenna area. **Again, not true.** Traditionally, this is where you will find the majority of the new, innovative receivers as well! How's that? Well, many **new receiver designers** will align themselves with an antenna exhibitor, perhaps because they came in late or don't think they are ready for a big-time booth of their own. They'll provide a receiver or two, outside, and use the outside exhibit area as an opportunity to gauge the effectiveness of their product. The 'trick' here is to look closely at the receivers in use outside; when you see something you don't recognize, stop to investigate. When you see two or more people '**bent over**' a receiver outside, maybe they are looking closely at a **new receiver** or one that has been 'modified' in some special way. Stop, and find out what is going on.

The trick outside, since after a few minutes all antennas seem to slide into a big blur in the sun, is to **look for crowds of people**. Make the crowd bigger; join the crowd and find out what has attracted the interest. There is a second trick outside as well, to be practiced with other show-goers, **not with anyone associated with any of the exhibits**. As you wander about and find yourself standing next to a



GEM FINDERS/ like Peter Sutro (right) are the best 'operatives.'

'stranger', say to him (or her) "What's the **best looking** and **best working** (fill in size you like) antenna out here today?". In other words, turn everyone you talk to into an intelligence gathering operative for you.

- 3) **Scheduled Seminar Sessions:** You will find these in the printed program. The listing will usually give the title of the session, and the name of the presenter. It may also give the name of the firm he represents. This is a mixed bag. If you are new to the field, almost any session is worthwhile. If you have greater experience, you are looking for 'new ideas', not a re-hash of something you already know about. **The biggest and most exciting sessions** are traditionally put on the schedule the morning of the **opening day**, **just after** the lunch break on the opening day, and the **first thing** on the second day. The lesser-rans end up getting end-of day slots **UNLESS** the guy doing the session has asked for such a slot because he is working his 'booth' and the time-slot together. A firm that wants to 'hype' their session will often ask for an afternoon, day-two time slot hoping that during the first day, and morning of the second day, they can get enough people into their booth to 'shoo' them to the session they plan to do the second day.

Sessions have been roundly criticized for being 'too commercial'. This is because in the very early days of the industry, there was virtually no such thing as a 'commercial session'; all of the speakers were people who talked about the 'mechanics' of a TVRO, or the satellite system. They may have had a corporate or business interest in the field, but they rose above it for their session. Then some not so 'high plane' sessions worked their way onto the schedule and the 'purists' in the crowd complained that the sessions were turning into

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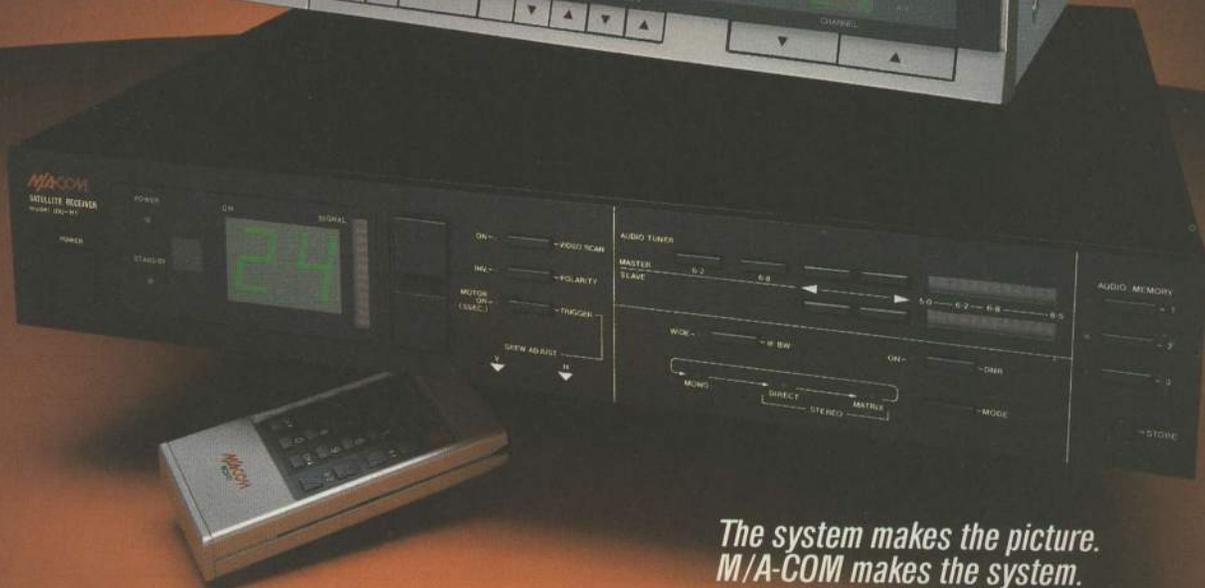
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TRADE SHOWS/ continued from page 51

'commercials'. Slowly, over the years the people presenting the sessions figured out **they were making a mistake** by being blatantly commercial, so they voluntarily toned their sessions down. There are some that still reek with the stench of commercialism, but in most you can learn quite a bit nonetheless.

Sessions run in the morning, before the exhibit hall opens, should be 'must go' for you. There is no better use for your time and they will prepare you for a busy day of 'booth intelligence gathering'.

To this we must add the new 'private seminar' system; firms that rent a suite and schedule (usually announced by signs in their own booth) regular sessions (60 to 120 minutes in length) on some special topic. These tend to be small (under 50 people typically) and if you are a 'question-asker' **this is the type of session** you should look for. In a small, informal gathering, you can really ask questions and get your questions answered. The 'system' for making such 'private seminars' well known is not yet perfect and it behooves you to ask other people around you "Hey, who is putting on any private in-suite seminar sessions here?". You might find out!

- 4) **Informal Discussions.** Anytime you are standing in line, sitting in the coffee shop, waiting for an elevator and you see someone else with a badge on, **say something** to them. "How's it going?" might be a good opening. A better one would be "**See any exciting, new product here?**". Pretty quick you will have the guy (or gal) 'calibrated' and you may find they know something about TVROs you don't know! Since a show is a giant 'learning curve exercise' anyhow, anything you learn that will make you better at what you do is a worthwhile experience.

Another good trick, if you are (say) selling KLM receivers, is to use a crowd-standing-together opportunity such as this to say in a loud voice "**anyone sell KLM receivers?**". You'll get a response or two. Move over towards them and start asking your own questions (such as "Do you know how to get the Sky Eye 5 to tune the lower channels?"). You will usually find that if the other guy doesn't know either, between the two of you, somebody who does know can be found. Again, what you are really doing is **spreading out your own intelligence gathering operation**, turning people you 'bump into' into 'operatives' for you.

SET UP DAY Blues?

Show goers are often advised 'Come Early and watch them set-up antennas'. The theory is that if you show up on 'set-up day' (such as the 11th for Niagara Falls), you will have the opportunity to 'watch' people wrestling with machines and steel and aluminum. The second part of that theory is that **BEFORE** the show starts, you will have a better opportunity to 'talk' with people.

That was, once, true. It is no longer true and here is why coming a full day early is no longer a wise investment.

- 1) Firms that exhibit now send in crews of antenna installation people three or even four days early. By the day before the



SUITES ON WHEELS/ good, quiet, places to talk . . .



ANTENNAS/ are often complete BEFORE you arrive . . .

show, a high percentage of the antennas are 'in', complete, and the crews are in some bar.

- 2) The antenna installation crews may NOT be the people you want to talk to, anymore. If the company is decent size, the guys installing antennas probably have experience limited to antennas, and their experience is just as likely to be limited to **THEIR** antenna. **You can't get a well rounded education** from a guy who **only puts together** Paracclipse or Winegard antennas.
- 3) Higher level technical people are beset with practical show problems: getting twenty-seven booths attached to their **6 foot dish**, running coaxial cable over **3,000 feet** of overhead tramways, tearing apart a motor drive that worked fine for seventy-four days before the show but **refuses to work** at the show, getting 120 volt AC **across an interstate freeway** without killing somebody, or getting killed; and so on. They, in spite of words written to the contrary, **do not want to answer** a question like "How come those guys over there use a 30 dB gain LNA?".
- 4) You should **not** be able to gain entry to the exhibit hall proper. The truth is that up until the actual morning of the day the show opens, **you can probably walk right in** because there is a steady stream of people going in and out hauling boxes, cables, something to drink, or chasing women. That would **seem like** an excellent opportunity to 'sneak in' and wander around the aisles where the equipment is being installed. **You will be disappointed.** There is nothing inside but chaos. Complete chaos. And even Maxwell Smart could not make sense of it. **You might get inside**, but you won't find anyone **that wants to talk with you except some other guy** that shouldn't be in there either.

Our advice? Come just early enough to pick up your registration badge late on the day before the show opens. Avoid the 'opening day line' at the registration booth, and go see the falls the day before if you have extra time!

LISTEN First

The **only time** you should speak up, early in the game, is when everyone else is quiet. That's when you ask "Anybody know how to make a Sky Eye 5 . . .". Otherwise, be nose! If you see three or more people gathered and talking, be a spy. Slide over and listen. If it is a private conversation, you'll figure out that quickly enough and you can move on. If not, here is a new opportunity to make an acquaintance and learn something.

There are certain people at any show who are literal fountains of information. They have some specialty they know a great deal about (**John Ramsey** of Sat-Tec on receivers, **Kingsley Hastings** of LOCOM on LNAs, **Doug Dehnert** of USS/Maspro on antennas and so on), or, they have a tremendous, broadly based experience history (**Bob Luly**, **Taylor Howard**, **Clyde Washburn**, **Jim Halley** and so on). People like Ramsey, Dehnert and Hastings can be found in their

respective booths. People like Howard and Washburn will probably not be found in their booths. We have a list here of people who, if you get the opportunity to meet them, (even if only to stand to the side and listen while they talk with others) you will benefit from having heard speak. They should **not become** part of a 'hit list', but you would do well to familiarize yourself with the list and then keep an eye out for their name badges.

HOSPITALITY Suites

Hospitality suites are relatively new to the TVRO industry; other business groups have been conducting 'all of their important business' in the suites for years.

There are two types of suites; those that back-up a booth (SFPC for example) and those that are really for after-hours hospitality. The first type, first.

Some firms **know** that they cannot conduct business in an 8 by 10 booth. **Odom Antennas**, as an example, will bring a motor home or two to a show and when you want to sit down and talk, they'll hustle you out of the crowd into the motor home; a 'suite on wheels.' A soft (or other) drink, a chance to sit down and relax, and an opportunity to talk without interruptions. It's good business. SFPC, for example, knows their financial program is complicated to somebody just learning about it. So they staff a suite with people who do know the answers, and they will even schedule mini-seminars at regular intervals in the suite. This is a cross between the 'private seminars' and the 'pure hospitality suite'. The booth may not be impressive to you; the suite probably will be.

After-hours hospitality suites are a mixed bag. Some firms make them 'off limits' **unless you have been invited**, and they pass out printed invitations from their on-floor exhibit or in the antenna lot. If you can't find an invitation, **and want to meet and talk with somebody in such a firm**, just go to the suite door and 'ask' to be let in. They are there for business, and if you explain that you want to talk business, you will usually get in. They are not there to offend anyone!

Other firms simply hold an 'open house' for a few hours although some open their suites at a certain hour and keep them open until the last free booze hound has stumbled out the door. A hospitality suite after 10 at night is probably no place to talk business; neither you (if you drink) nor the guy you came to see are in any condition to talk business anyhow!

Perhaps the best time to catch somebody associated with a firm that has a suite is **immediately after** the exhibit hall closes. Firm personnel usually gather for 30 minutes or so to discuss the day's activities, just after the exhibit hours are completed, and other than running a guy down in his room, this is your best shot.

FINDING Gems

Every show has some hidden away, quiet, 'gem'. Perhaps it is a product which escapes the attention of the bulk of the show goers; perhaps it is an announcement, made in the wrong place, and few hear it. The trick, since you are at a show to find things that can help your business, is to learn about these 'gems' while there is time left for you to investigate them properly.

Asking questions at every opportunity ("What's the MOST exciting thing you've seen (or heard) here"?) is a start. **There's a better way.** Some people have a special talent for searching out gems; they seem to be experts at finding things that most people overlook.

One of the most talented 'gem finders' in the trade today appears on our front cover this month; **Tom Harrington**. Dressed casually, but like the successful businessman he is, Harrington has learned through several decades of show going how to 'work a show', where to look for 'clues' leading towards gems, how to turn over a rock and find gold beneath. This word of advice concerning Harrington, and, people like them:

- 1) Do not ask them **before the second day** where the gems are. They need time to find them!
- 2) Don't force yourself on them for long conversations; if you tie them up too long (**five minutes would be a long time**) you are taking away from valuable gem locating time.
- 3) Share with them. One of their 'tricks' is to ask others what they have seen that 'looks good'. **Tell them something** and they will tell you something in return.

'BRIGHT PEOPLE' Guide

Finding 'the right person' to answer your question concerning some aspect of TVRO system design or operation can be frustrating. The list which follows includes **many** of the more experienced, 'brighter' people in the industry, or, simply those who have, by the school of hard knocks, been around long enough that they can (if they **don't have** your answer) steer you in **one-step** to someone who does. We take no responsibility for the completeness of this list, and no 'sleight' is meant for those who did not make the first such list **CSD** has prepared. We'll update it ahead of the next show-period as a guide to those who want to make the most of precious 'show time.'

Specialty Areas:

1) Antennas

Dan Berge (Continental Satellite)
David Brough (Commander)
Frank Casten (Paradigm)
Dale Curtis (Hastings)
Doug Dehnert (United Satellite)
Jamie Gowen (ADM)
John Kaul (Kaul-Tronics)
Lewis Larsen (Larsen)
Randall Odom (Odom)

2) Block Down Conversion

Mark Anderson (Anderson)
Hiro Sugiyama (DX)

3) LNA/LNB/LNCs

Kingsley Hastings (Locom)
Jacob Inbar (California Amp)
Yozo Satoda (Gould/Dexcel)

4) Marketing Assistance

Peter Aucoin (Spectrum)

5) Mounts

Roy Cohn (South River)

6) Receivers

Ted Anderson (Automation)
David Barker (KLM)
Norman Gillaspie (International/I.S.S.)
Ed Grotzky (Arunta)
Jim Halley (Intersat)
Andy Hatfield (AVCOM)
Steve Koogler (R.L. Drake)
John Ramsey (Sat-Tec)
Jon Spisar (Spisar)
Clyde Washburn (Earth Terminals)

7) Terrestrial Interference

Bill Johnson (Microwave Filter)

General (No Specialty)

George Bell (M/A COM)
Steve Bland (Hoosier)
Guy Cayton (National Microtech)
Robert Coleman (Spacevision)
Bob Cooper (Coop's Satellite Digest)
Guy Davis (Uniden)
Nelson Ethier (Commander)
Brent Gale (Echosphere)
Mike Gustafson (STTI)
Tom Harrington (Coax Seal)
Taylor Howard (Chaparral)
Robert Luly (Luly)
Chris Schulteiss (Satellite TV)
Peter Sutro
Rod Wheeler (Norsat)

Now, put on your best reading glasses and head into the crowds looking for badges that match up to these names!

KNOWING When To Back Off

Everyone wants to talk with a Taylor Howard or a 'Coop'. That

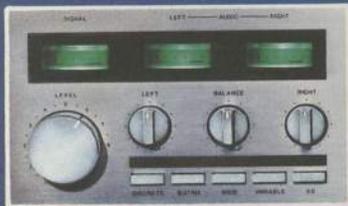
The ultimate combination of product innovation, user convenience and value . . . ALL IN ONE unit.

INTRODUCING . . .

The all new - All in One Super Satellite Stereo Receiver from Boman Industries.

Convenience and style combined with the latest in TVRO technology makes the Boman Model SR2500 the receiver to which others will be compared.

Audio Group



Left-Right audio channel tuning is adjusted by separate controls. A balance control is provided for attaining that perfect stereo effect.

Separate meters showing Signal Strength and Left-Right audio levels are provided with soft green illumination.

The pushbutton group consists of the "Discrete" and "Matrix" stereo buttons. Bandwidth is expanded by use of the "Wide" button. These three controls enhance the reception of all available audio transmissions.

The audio pushbuttons offer a choice of preset 6.8 tuning frequency for most video channels and variable audio for stereo or sub-carrier reception.

The Detent Volume control adjusts the volume and adds to the attractive design of the stereo section.

Function Group



The attractive display panel shows channel number and polarity position in a soft green color.

The 12 GHz button changes the operation of the SR-2500 from 4 to 12 GHz when used with appropriate 12 GHz hardware.

The Format button transposes the polarity mode when receiving signals from the few satellites with reversed polarity signals.

DNR function provides a filtering of background noise from the audio thus providing very high quality audio performance especially on weaker signals.

A Search button gives a fast scan of all channels and is of assistance during the initial alignment and orientation of the programmable moving control.

The Invert button is provided for reception of inverted video signals.

Satellite Selection Group



Satellite selection is accomplished with the 12 pushbutton pad. The interfaced control then automatically moves the antenna to the pre-programmed position.

Video Fine Tuning and Skew adjustment is made quick and easy using the dual function fine tuning control.

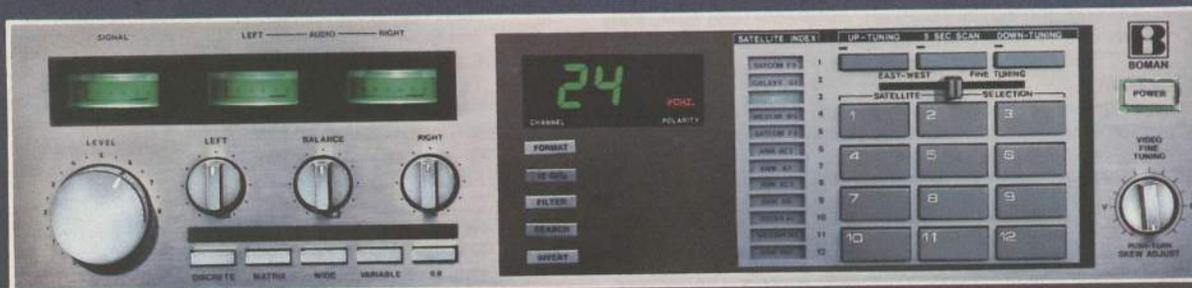


The "UP" - "DOWN" tuning buttons provide manual selection or scan of channels in 1 step or 2 steps and continuous operation. The 5 second Scan button allows the user to view each channel for 5 seconds during the 24 channel scan.

The East/West fine tuning control is used for that extra special antenna peaking which is sometimes required.

MODEL SR-2500

Use our toll free numbers to order yours today.



Other features found either inside or on the rear panel of the SR-2500 are:

- Automatic Polarity Switching.
- Command Tone Response: A "Beep" audio tone is heard when any of the Feather-Touch push-buttons is used.
- LNA/Down Converter power remains on when the unit power is switched off: No more LNA/DC warm-up drift.
- Integrated Channel 3 - 4 Modulator.
- 1 - 2 Step Channel Advance Switch.
- Separate Sub-carrier Outlet.
- IF Gain Control.
- Parental Guidance Switch.
- Remote Control Switch.

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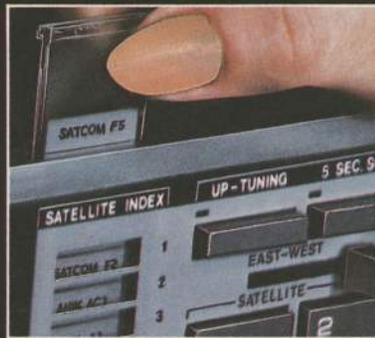
ALL IN ONE



STEREO SATELLITE RECEIVER



The *AUDIO GROUP* provides superior *Stereo* reproduction to ensure viewer satisfaction.



The removable *SATELLITE INDEX* assures constant Satellite identification while viewing.



The *SATELLITE SELECTION GROUP* provides dish movement and fine tuning along with channel selection and 5 second scan.

TRADE SHOWS/ continued from page 55

creates a situation where the people who have the information begin to feel 'pressed in', unable even to break away for the men's room! Yes, **you have** come a long distance to learn everything you can, and yes, **you have** one burning question you **MUST** get answers for. So does everyone else standing around, or in line to talk with, the industry's super-information-sources.

If you see a person on our 'priority-list' **walking down** a hallway and you think **this is your chance** to grab them for a minute, chances are they are walking down that hallway because they have someplace to go. And a time schedule to keep! **The courteous thing to do** is to offer to 'walk along with them' ("Can I walk along with you and ask a question?") rather than attempting to bring them to a halt in the hallway. Your chances of getting some time are far better this way. They have to walk to where they are going; they might as well be talking while they are walking! But if they stop, well, somebody at the end of their walk may be wondering what happened to them.

The same advice applies when you see someone on our list eating or obviously involved in a private conversation. Just step back and wait to see if the situation changes. None of these people are 'media stars' and this is not an autograph-seeking situation. Interrupting them while they are involved with others in a conversation is not only impolite, it is a good way to not get your question(s) answered.

One final courtesy. When you catch somebody who is hard to catch, you might ask "Do you have time for (three) (two) (one; plug in appropriate number) **questions?**". Let THEM qualify you up front by responding. If they have time for three, and you have three, they'll appreciate the courtesy of your asking. If they have time for one, and you try to drag it to three, you will be just like the guy that wants them to



FOR NEW COMERS/ ALL seminars are worthwhile.

RE-VISIT OF RE-BROADCASTING

Sat-Tec's Down Converter

stop in the hallway, rather than asking if he could walk along with them. They do have their own schedules to maintain and when you 'push', you start to inflict yourself into that schedule.

FOLLOW Up

This at-home bit of advice. The biggest, most common, most frequent, most often repeated **MISTAKE** people make at shows is to get all excited about something, **and then get home and fail to follow up on it.** A show is seldom a **complete** (educational) **course** in anything. You have merely opened the door a crack and if you are **REALLY** going to profit from a show, you should take the time while flying home to make a list of everyone you saw who gave you information or assistance which is either not complete, or, for which you are really grateful. Now, when you get home, sit down and write them a short note. If you are not a letter writer, even a one-line "Thanks for the help at Niagara Falls" **on the back of your business card**, mailed to the person who helped, will insure that the **next time** you need some help, **you are likely to be remembered.** Anyone who talks with lots of people at a show develops a 'blur' for individual names and faces. If you got some inside information from **Steve Bland** at **Hoosier Electronics**, let him know you appreciate it **AFTER** he gets home, with a simple note. Chances are he will be 'glad to see you' and ready to 'share more with you' at the next show **if you leave him with a positive impression.**

And, if you talked with somebody who **PROMISED** to send you some special information **AFTER** they returned home, **remind them of it.** Keep a note book of your entire show and write down everyone whom you asked to help you with more information. Then when you get home, drop them a business card or short note and both thank them **AND** remind them of your additional request. We guarantee you will get much better results this way than if you wait around for them to **remember** to send you what you asked for.

NO SHOW IS A BAD SHOW

TVRO shows have been beset with rain, ice storms, snow, high winds and labor strife. No show has ever been a bad show **IF** you are smart enough to treat the show as one of the great opportunities of your lifetime to 'get smart'.

Buy a spiral notebook and label it '**STTI Niagara Falls Show**'. Purchase the type you find with little pockets inside the front and rear cover and use the pockets as a place to keep business cards (front) and data sheets that have **special** information on them (rear). **Write down anything** you might later forget.

Start each day by allowing yourself an extra 30 minutes, in your room before you head out for the day, to review everything in the notebook to that day. **And then make a list** on a fresh page of the booths, events and people you want to see that day. During the course of the day, as events unfold, **go back and re-read that list**, modifying it as need be. Make this your daily 'battle plan' **and stick to it!** If you do these things, you will go home certain that every penny you spent attending the show was a wise investment and you did not, indeed, lose any money nor time by attending the show!

A Review

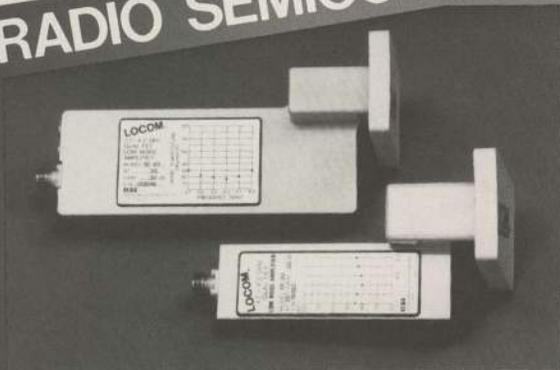
In our November, 1982 **CSD**, we reported on the complete system employed in the Turks and Caicos Islands for the distribution of TVRO signals to all of the population centers of the country, using both VHF and UHF (microwave) relay techniques to transmit the satellite delivered programs to individual homes. Subsequently, in our November 1983 issue we reported on a newly developed 'broad-banded technology' which transmits the still-FM format TVRO signals from one polarization of a single satellite (such as F3R) through the air in their block-down-conversion frequency spectrum (450-950 MHz in our test system) to home-style TVRO demodulator/receivers located in homes.

The art of 'sharing' TVRO reception is rapidly developing and recent tests for both technologies indicate that the equipment available to 'do the job' is improving each year. This is a re-visit to a

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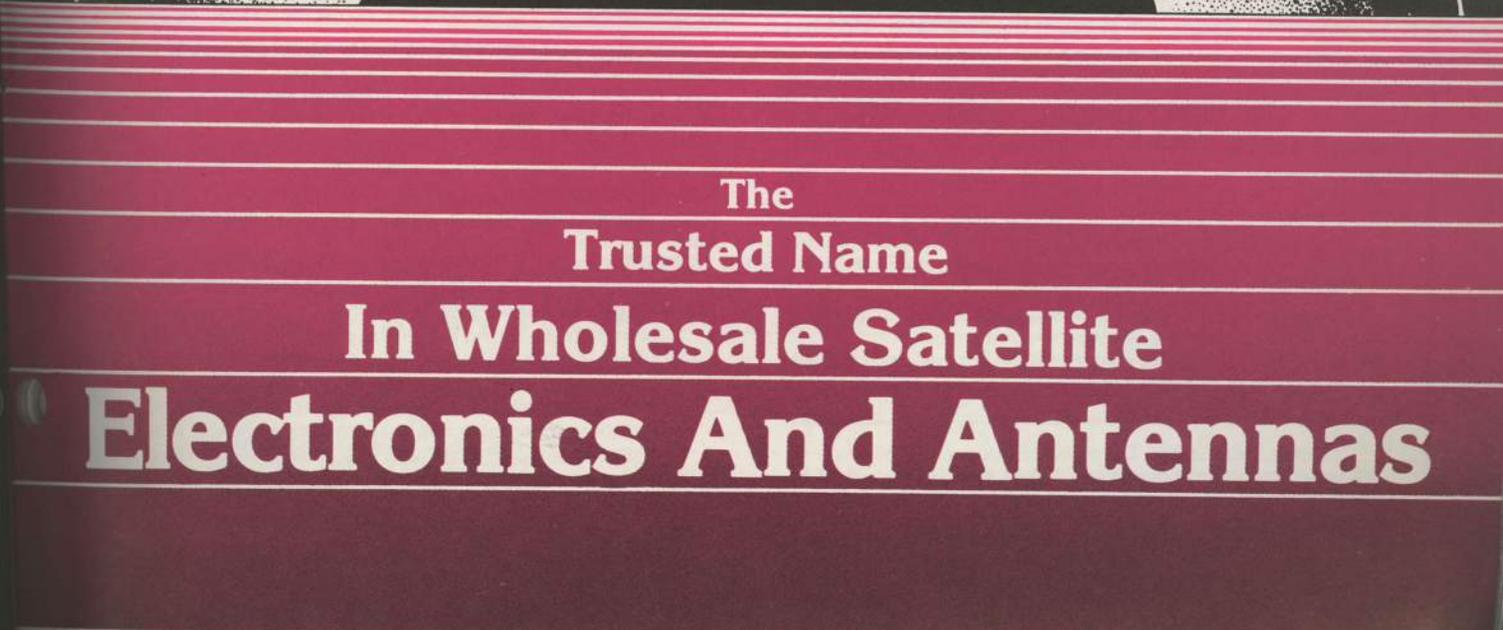


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RE-BROADCASTING/ continued from page 58

segment of that field; the transmission, using UHF frequencies in the 300 to 1,500 MHz region, of single satellite channels of service to viewers who are equipped with home style (suitable) UHF receiving antennas plus some form of frequency 'down converter' device to allow standard television receivers to tune-in the UHF range signals.

Here in the Turks and Caicos Islands, we distribute a trio of signals in the 400-450 MHz region. We have been utilizing ten watt (peak pedestal power) transmitters manufactured by **PC Electronics** (2522 Paxson Lane, Arcadia, California 91006; 213/447-4565) and have found these low cost (typically under \$800) rack mounting transmitters to be 'tough,' reliable, and suitable for low-cost signal sharing. Recent tests of another type of transmitter have begun and in a subsequent issue we will explain the problems we have had (not with the PC units, but the system concept) and how we have resolved those problems to our satisfaction. The PC units, by the way, are **now available** for most of the standard VHF (2-13) television channels as well, and a very substantial number are in use in Central America delivering **VHF channel service** to whole communities, and they too are fed by satellite receiving terminals.

In our case, while we DO use the standard VHF channels for program distribution (channel 4 on a 'national' basis, channel 7 for local programming within distinct island-communities), our 'premium program services' (i.e. those not paid for by commercial sponsorship) are distributed on channels such as 415.25, 427.25, 439.25 and 451.25 MHz. None of these four channels can be directly received by a standard television receiver (*) and this allows a 'form of security' for the system since the typical viewer cannot merely erect a suitable (UHF) television antenna and tune in the 'premium channels' without some type of 'frequency adapter' box. We call that unit a '**WIV Microwave Descrambler**' although the astute reader will notice that the only real form of 'scrambling' is the frequency of transmission; like MDS in the United States, there is no actual on-carrier scrambling taking place.

For the first 15 months of operation or so, after a suitable testing period, we were using a companion 415-460 MHz 'tuneable down converter' from the **same PC Electronics** which supplied us with the ten watt transmitters. We found the converters to be of high quality, experienced a less than 2% failure rate in a typical year of operation, and the average consumer was able to tune in each of the three channels with the front panel tuning knob (having set his or her TV receiver to VHF channel 3 or 4 as a suitable 'IF') with a minimum of problems. **However**, against the units was the following:

- 1) They were (and are not) 'cheap,' averaging \$80 each per unit;
- 2) The manufacturer 'insists' on silk screening his name and address on each unit and that of course leads to people attempting to bootleg the units by buying directly, thereby causing 'security problems' with the system;
- 3) The units have a type BNC input fitting which requires a \$2 adapter for feeding with standard RG-59/U cable, and every 'little' additional expense adds up.

We discussed all of this with **John Ramsey** of **Sat-Tec** during one of his visits to the island and together we 'blocked out' what we felt would be an 'ideal' custom-designed down converter for anyone who is attempting to use the 300-1,000 MHz frequency range for 'local television distribution.' We gave John the following 'desirable features' for our 'dream unit':

- 1) It should be fixed-tuned, **not knob tuned** and the installer should be able to pop the top off of the box and adjust some sort of 'hidden' control to set each of the in-use channels onto one of the down converter switch positions.
- 2) We wanted a minimum of **6 'UHF channels'** built-in to provide for up to that number of over-the-air channels.
- 3) We wanted a '**bypass switch**' built-in, so that when the customer turned to either a seventh position on the front panel

*/ Newer 'cable ready' TV receivers aside, a few of which **WILL** step-program all the way to 439.25 MHz because their nasty oriental designers didn't know when to 'pull the quartz synthesis' programming plug!



FRONT PANEL/ Sat-Tec 'WIV Microwave Converter' unit; six separate programmable reception channels.

channel selection switch, **or**, turned the unit's power off, he automatically came back to standard VHF channel reception.

With the PC units, you are converting your UHF channels (400-450 MHz) down to say channel 3 or 4. When the customer/viewer wishes to return to normal (local) VHF channel reception, you have to provide a switch ('A/B switch') to allow them to 'pass around' the converter box and to connect their standard VHF antenna to the TV receiver, direct. **The switch is another of those \$8 (up) items** and it requires cable jumpers and more fittings; all totally unneeded if the switching function was built into the down converter proper.

- 4) We wanted a **bandpass filter** built into the output channel and we wanted the output channel on channel 6 and only 6.

Channel 6, is by design, not in use and it will never be in use locally. That is **part of the reason** why we selected channel 6. We also found that with the PC units, it was possible to set the PC tuning control to say the 427.25 MHz channel and put that channel on the TV set's channel 4. Now we had 415.25 appearing on channel 2 and 439.25 MHz appearing (more or less) on channel 6. This allows the viewer to set the UHF converter for one output channel (427.25 equals channel 4) and then use his TV set remote control for stepping through the three microwave channels on channels 2, 4 and 6. That seems like a plus.

It is not.

First of all, the 12 MHz spacing between 415.25, 427.25 and 439.25 does not precisely align with the spacing between channels 2, 4 and 6. Channels 2 and 4 ARE 12 MHz apart but because of the 4 MHz wide guard band between channels 4 and 5, the space from 4 to 6 is **16 MHz**. Try explaining that to a customer who **INSISTS** their new \$800 color remote controlled TV receiver does not work properly on channel Z (439.25)!

Second of all, and this is the important one, we have found that we want to 'tier' (as in make something less than the full complement of UHF channels **available** to ALL subscribers to the system). With a tuneable converter, **the customer retains control of which channels are tuned in** and you cannot 'tier' service. **They** can always change their TV set IF channel (such as from 4 to 2 or 4 to 6) and 'tune in' anything you have in the air in the same general transmit frequency block.

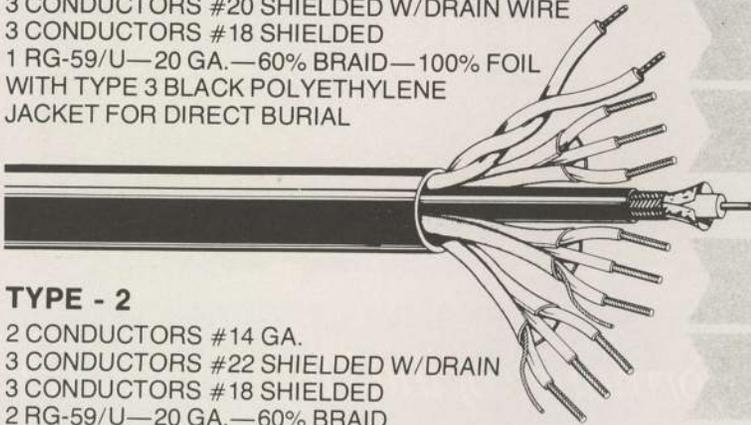
By placing all channels so that they come out of the down converter on channel 6, and then by building a bandpass filter (actually a high pass filter) in the (channel 6) IF output, you roll off or stop **any reception below channel 6**. That means they cannot set their converter to channel 6 and tune in the highest channel (439.25) and then tune their TV set 'down' to channel 4 and find the next lowest channel (427.25) and to channel 2 and find the bottom channel (415.25). **That puts control of tiering back into the hands of the system operator.**

- 5) We wanted a very **stable unit** which having been frequency/channel set by the system operator, could be placed inside a subscribing/viewer's home and forgotten. Service calls are not cheap and re-setting the 'secret pot control' inside of the converter is not a desirable use of one's time.
- 6) We wanted **additional system sensitivity** since we were finding that while the ten watt UHF transmitters were delivering excellent coverage out to 7-9 miles when coupled to suitable 'gain transmit antennas' (which are also available through PC Electronics), we were finding situations where we would like to

Satellite Total Control Cable

TYPE - 1

2 CONDUCTORS #14 GA.
 3 CONDUCTORS #22 SHIELDED W/DRAIN WIRE
 3 CONDUCTORS #20 SHIELDED W/DRAIN WIRE
 3 CONDUCTORS #18 SHIELDED
 1 RG-59/U—20 GA.—60% BRAID—100% FOIL
 WITH TYPE 3 BLACK POLYETHYLENE
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Motor Arm Voltage
14ga.

Polarotor
18ga.

Signal Line RG-59/U

Down Converter
20ga.

Motor Arm Sensor
22ga.

TYPE - 2

2 CONDUCTORS #14 GA.
 3 CONDUCTORS #22 SHIELDED W/DRAIN
 3 CONDUCTORS #18 SHIELDED
 2 RG-59/U—20 GA.—60% BRAID
 100% FOIL
 WITH TYPE 3 BLACK POLYETHYLENE
 JACKET FOR DIRECT BURIAL

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5,000-10,000 FT. @ 44¢ FT.
 10,000-50,000 FT. @ 42¢ FT.

COAXIAL CABLE

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|--------------------------------|-----------|
| RG-6/U (FOIL & BRAID) | \$ 65/M' |
| RG-8/U (95% BRAID-FOAM) | \$210/M' |
| RG-59/U (96% BRAID-PE) | \$ 89/M' |
| RG-59/U (75% BRAID-FOAM) | \$ 65/M' |
| RG-59/U (FOIL & BRAID) | \$ 49/M' |
| RG-59/U DUAL (FOIL & BRAID) | \$105/M' |
| RG-11/U (96% BRAID-PE) | \$210/M' |
| RG-213/U (96% BRAID-PE) | \$240/M' |
| RG-214/U (TINN. COPPER BRAIDS) | \$550/M' |
| RG-214/U (SILVER BRAIDS) | \$1300/M' |
| RG-217/U (96% BRAIDS-PE) | \$600/M' |

TYPE 'N' CONNECTORS

| | |
|--------------------------|-------------|
| UG-21/BU (MALE) | \$2.25/each |
| UG-21/DU (MALE) | \$2.00/each |
| UG-57/BU (DOUBLE MALE) | \$3.10/each |
| UG-29/BU (DOUBLE FEMALE) | \$3.10/each |
| UG-27/CU (RIGHT ANGLE) | \$4.45/each |
| UG-23/BU (FEMALE) | \$3.00/each |
| UG-58/AU (CHASSIS) | \$1.60/each |
| 'N' CRIMP MALE | \$2.10/each |

MULTI CONDUCTOR CABLE

| | |
|----------------------|----------|
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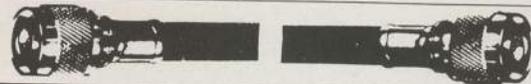
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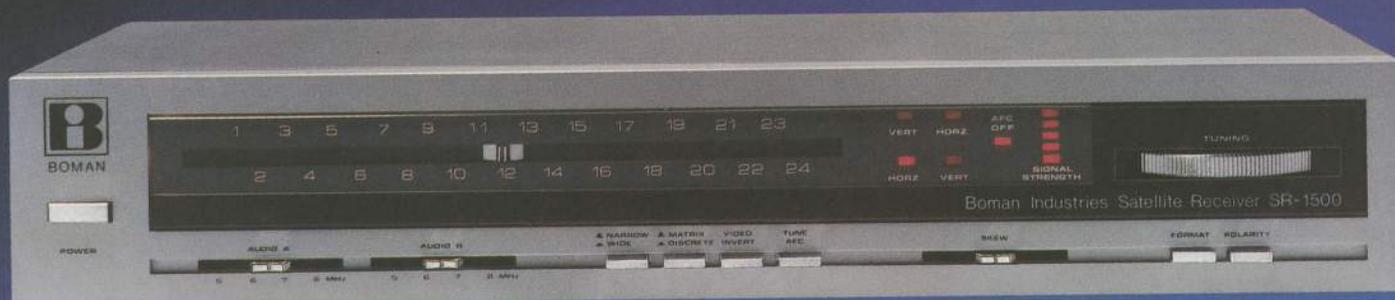
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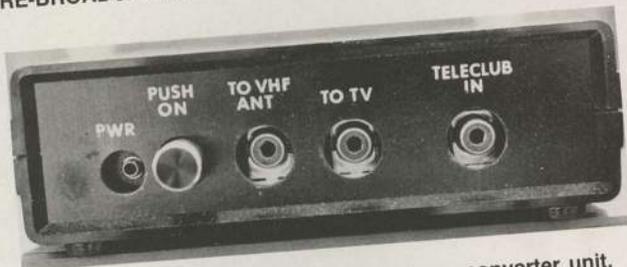
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RE-BROADCASTING/ continued from page 62



REAR PANEL/ 400/450 MHz range down converter unit. Separate inputs for VHF antenna, 400-450 MHz antenna, output at channel 6 (IF) and jack for wall plate mounting DC supply.

extend the coverage another few miles. Our suggestion was additional IF (channel 6) gain, and, a lower front end noise figure for better system sensitivity.

- 7) We also wanted 'F' fittings on everything, and a simplistic power supply separate from the basic down converter so that where the power supplies might fail (they were our only real failures with the PC units), we could replace the supply and not lose use of a full unit.

The units developed for us, and others in the same business throughout the Caribbean are shown here. And best of all, the price turned out to be around 60% of what we were paying for the PC Electronics units as well!

HOW They Work

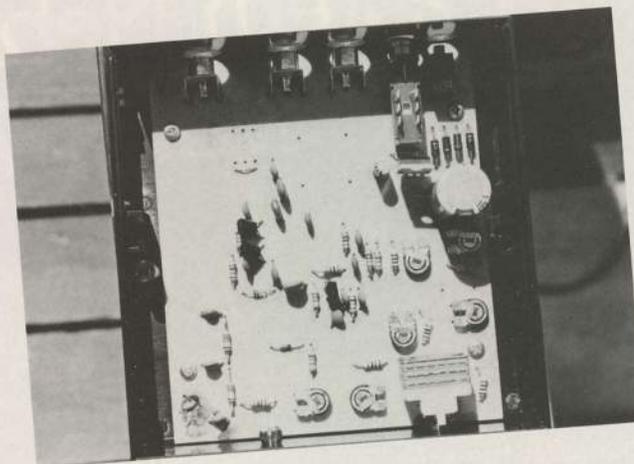
Our initial shipment, after some proto-types, was for 50 units. Out of that 50 units, two failed to function properly when unpacked for a failure rate of 4%. Another user, who had an initial shipment in the 2,000 range, reports a similar initial rate of failure. The failures were largely related to the oscillator and mixer circuits and without some specialized test equipment could not be 'field repaired' so were returned to the people at Sat-Tec for repair.

The proto-type units we received had all of the design features we have listed here and they had a **10 dB system-gain advantage** over the PC units when compared directly; using attenuators at the input to reduce the received signal levels to both units to the same input levels. The gain advantage was due almost entirely to the design of the mixer/IF section of the Sat-Tec units and there was **not a detectable difference between the noise figure of the two competitive units.** This means that you can get **some** additional 'range' out of the Sat-Tec units, or alternately, run longer lengths of coaxial cable between the receive antenna and the input to the down converter, and still produce equivalent pictures to the PC Electronics units.

(PC also supplies, at a \$20 premium, a down converter with an exceptionally low noise front end and we have tried a pair of these hopeful that they might result in superior performance in our 'fringe areas.' **No such luck;** we seem to be self limited by the 'antenna noise temperature' from the antenna system and the earth itself, even in the 400 MHz region [!]. With the relatively wide bandwidth of a TV signal, and the relatively noisy [noise temperature] antenna systems, even some special GaAs-FET ultra low noise pre-amplifiers [0.6 dB] made a much less than significant difference in fringe reception quality. The answer, if you are trying to really extend the fringe region beyond normal line-of-sight, is to concentrate on putting in tightly compressed (beamwidth) receiving antennas **which differentiate between the earth and atmospheric noise, and, the signal source;** then couple the antenna array to a suitable low noise mast mounted pre-amplifier.)

In our proto-type models we found two problems with the units from Sat-Tec. One, it would turn out, we created for ourselves. The second remains unresolved at this time.

- 1) We noticed a **sixty cycle hum bar** rolling through the video. We found the bar changed as we moved the DC power cord, coming from the AC outlet plug-in power supply around (the unit converts AC to a suitable DC voltage at the wall plug, ala the game and Chaparral type power supplies) the plastic cased unit. **We thought we were seeing** radiation from the DC line,



INSIDE/ clean lines, neat layout, good performance.

of some residual AC (60 cycle) into the circuits of the down converter. **Wrong.** It turned out that because we were plugged into a Sola (Constant Voltage) regulating AC powering system, installed to keep local power surges from frying delicate electronic equipment, we were **really seeing** the inability of the wall plug-in AC/DC supply to handle the slightly 'square-waved output' from the Sola system. Since virtually none of our viewers use Sola Constant Voltage transformers to power their units, this turned out to be a 'non-problem.'

- 2) We did notice an **echo or ghost effect** on the output video (RF) when viewed on the screen. By moving our finger around inside of the back plate of the down converter we could modify the 'ghost' telling us there was some amount of coupling between the 400/450 MHz range **input connector** and the channel 6 (82-88 MHz) **output connector.** In effect, we had UHF input signal leakage getting into the VHF channel 6 output, or vice-versa. **It turned out to be vice-versa** since the down converted and amplified channel 6 signal was far stronger, within the box, than the UHF input signal (typically). We suggested additional shielding, or greater physical separation between the two connectors, for the 'next run' of the special 'microwave descrambler' units.

Most of the units we received had a noticeable, but not objectionable amount of this 'coupling' between the two connectors. We field-fixed those that were objectionable (just a handful) with some brass shim stock which we bent into shields to solder over the 400/450 MHz input connector.

RECOMMENDATION

Those who would like to transmit one or more video signals, using conventional AM techniques (i.e. compatible with standard North American or other standard television) and who want a quality in-home down converter product to make the frequency conversion from your chosen operating channel (anything from 216 MHz up to 1,000 MHz) would do well to take your requirements to Sat-Tec (***) and the talented crew backed up by John Ramsey. The turn around was prompt, there was an on-going concern that the units worked as promised and a desire to give you good value for your money.

We understand that a newer version will offer **up to 12 separate 'microwave channels'** through the down converter, which simply means that you could stack up an entire set of service channels between the top end of VHF channel 13 and the start of UHF channel 14, and enjoy a measure of 'security' from the casual tuners-in. The unit is priced right, and Ramsey and Sat-Tec have figured out a very clever inside-of-box channel tuning system which will prevent even a moderately intelligent electronics person from figuring out how to pop the top and re-program the channels the unit tunes to. And best of all, it

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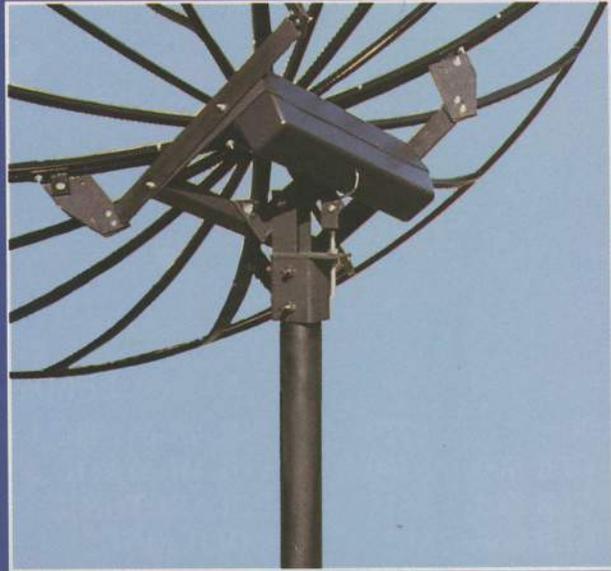
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RE-BROADCASTING/ continued from page 66

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SCPC



LOW COST FM/SCPC

ACTIVITY



by Marshall Foiles, VP5M

REPORTS

The concept of extracting non-video information from the many Clarke orbit satellites pre-dates the use of video since all of the early experiments were actually 'narrow band' or 'non-video' based. What is 'new' is the tremendous proliferation of non-video material, much of it informational or educational in content, now being fed via satellite worldwide on a routine basis.

Ours has become an intensive 'information based' society. Part of the proof of this is your own reading of **CSD twice per month**; we depend upon and often profit from the information which we find relevant to our business activities or lifestyles. The **transfer** of data, or information if you are not quite up to 'computer speed' yet, is becoming as important as **the creation** of data. In some quarters it has become even more important. And the satellite connection makes it all possible, worldwide, for exceedingly low cost.

Further proof of this can be found in the latest Intelsat proposals where they are now offering complete 12 GHz receive-only 'data terminals' using two foot dishes for around \$2500 (US). They claim that if the terminal is used within the hotter boresight footprint of the latest Intelsat V birds, such a two foot dish propped up on a table and pointing 'through' a glass window will spit out high speed data information relayed via satellite. What all of this has in common is that virtually all data of interest is transmitted using one or another 'narrow band' methods.

Our TVRO (video) terminals are all wideband systems; that is, we require between 15 and 30 MHz of 'information' to recreate on our screens a television picture (and the companion sound). On the other hand, a narrow band system requires only a fraction of this 'bandwidth window' (measured in mega-hertz or MHz) to transmit all of the contents of the message. The message contents may be audio (voice or music or both) or it may be some type of computer data code such as ASCII (pronounced ASK-KEY). Our concern at this time is not so much **how** you make intelligence out of the various codes as it is in **equipping you to receive** the basic transmissions in the narrow band format.

In our first column, in the May **CSD**, we talked about the various audio-narrow-band (FM/SCPC) services which are currently found on US domestic satellites. And we listed a 'starter set' of some of the services tuned in and identified to date using our Hero SCPC-66 receiver as diagrammed in our May column. We also noted that there is a shortage, at this time, of adequate receivers for narrow band FM/SCPC service and we guessed that not many would be willing to lay down the hard cash required to acquire one of the semi-commercial SCPC-66 receivers. In a way that was unfair since we are listing here, each month, a representative sampling of the services **which we are tuning in**, knowing that not very many readers will be willing, or able, to invest the kind of dollars required to enjoy the same reception.

This month we are showing a couple of ways you can 'explore' the world of FM/SCPC without investing your TRVO system equivalent in the project. **For well under \$100**, you can be enjoying FM/SCPC

reception **this evening!**

Naturally there are some trade offs involved if you are going to 'sneak into' FM/SCPC for less than the cost of a first rate FM narrow band demodulator. The primary trade offs are as follows:

- 1) You will have to tune the tuning dial far more carefully, even slowly, to separate the many station services listed here and found on satellite;
- 2) You will probably have to 'touch up' the tuning of the special adapter we will be describing, every 15 minutes or so, to compensate for the 'drift' of the adapter and the balance of the system;
- 3) You may not be able to 'separate' (as in pull-apart) all of the services when there are two or more which are located fairly close together within a transponder.

Still, for less than \$100 (and as little as \$25) you will in short order be listening to these wonderful and elusive narrow band audio type services and you will be well on the way to an entire new level of 'satellite exploration'.

BASICS First

Most of us have a good grasp that when a TV signal is transmitted via satellite (relay), the video carrier has a certain frequency and that the video information (detail, color, et al) 'spread out' from that carrier frequency. This is the primary reason why a video signal utilizes so much of a transponder; there is so much information being transmitted that it cannot all be 'crammed into' a tiny or narrow bandwidth. We are also aware that an audio signal, such as a sub-carrier, occupies a far smaller 'width' in the spectrum because there is far less information present. In fact, many audio sub-carriers can be crammed into a relatively tiny portion of the spectrum as anyone with a sub-carrier tuning system can attest to by tuning across the sub-carrier region of F3R's TR3 (with WGN video). As many as 15 separate audio sub-carriers have been found there at one time, all without interfering with one another nor ostensibly with the video carrier they companion to.

Imagine for a moment that you had a transponder filled with just audio sub-carriers. If they can have 15 (or more!) **share** the video transponder **with** WGN, how many do you suppose could be there if they **took away** the WGN video and filled the WGN **video area** with just audio sub-carriers? **Hundreds**. And that basically, is what FM/SCPC does. This is **NOT how** it works however, because the audio sub-carrier system depends totally upon the presence of the video carrier in the first place. We cannot simply 'take away' the video carrier and fill in the space vacated with audio-sub-carriers because the SUB carriers are 'sub' (as in 'attached to') to something; **that something is the video carrier**. The video carrier is the vehicle which the audio sub-carriers ride into space and through the satellite.

So if the system designers want to stack hundreds of 'sub-carrier-like' audio (or other narrow band) signals into a single transponder, without a video carrier present for them to 'ride along on', they must use a technique which allows each individual 'sub carrier' to stand alone; all by itself. This is not such a bad deal since it means that you can transmit **one** of these narrow band channels from an uplink in Charlotte (NC), **another** from an uplink in Minneapolis, a **third** from an uplink in Dallas, and so on; each stands alone and each occupies a tiny portion of the spectrum within a transponder.

The bad part, for you, is that your TVRO receiver **depends upon** the video carrier's presence to 'lock onto' a signal and stabilize your receiving system. That transponder you tune in is actually a 'signal reference' which the receiver latches to, to insure that your receiver does not 'drift away from' the signal. If the video is present, and the TVRO receiver has 'locked onto' the video signal and is holding it stable, then the audio sub-carriers that ride along with the video carrier will also be stable. In short, you can set your receiver to F3R's TR3, it will lock up on WGN, and then with your built-in audio sub-carrier detector or an outboard unit from Arunta, Drake, Maspro (etc.) you can tune in any TR3 audio sub-carrier you wish and it will also stay 'locked

in'.

When you establish a system to tune in an FM/SCPC signal, on a transponder where there is **no video** signal present, your FM/SCPC receiving system has nothing to 'lock onto'; the FM narrow band signals are very complicated to 'lock to' and so far there have been no 'low cost' techniques developed to overcome this problem. And in fact, that is a significant part of the cost in the (Hero) SCPC-66 dedicated FM/SCPC receiver; the 'locking system' that allows you to set the receiver tuning dial to **one particular** FM/SCPC signal, and come back hours later and still find it 'tuned in'.

The two techniques to be described here are minus this 'lock' function. How stable your reception will be will depend largely on the stability of your TRVO receiver's down converter. To the best of our knowledge, no exhaustive comparison testing has been done between different brands of down converters to determine which of those presently in the marketplace are 'stable' and which are not, given no video carrier being present to 'lock onto'. Perhaps as a few hundred people try the system we are about to describe, we will get reader feedback on which down converters seem to function best in this 'service'.

TUNING The IF

Your down converter, whether a stand alone unit at the antenna (ie. Drake) or an LNC package (ie. USS/Maspro) will send a 70 MHz (centered) IF signal indoors through the connecting (typically RG-59/U) cable. We will place something at the indoor end of that cable to allow us to feed the 70 MHz (centered) signal into a secondary tuning unit; one which will allow us to tune in the FM/SCPC stuff. We will spend less than \$100 to do this.

In our first diagram we have a typical system with an addition; the antenna plus LNA feeds signal to the antenna mounted downconverter. If your system uses an LNC, they would both be together at the feed. The important point is that you have a 70 MHz signal coming indoors in the cable. Note that this diagram shows a system which does **NOT** send DC operating voltage for the LNA (LNC) and down converter through the **same** cable. There are still some receiver systems in use that send the outdoor voltages through a separate line or set of wires.

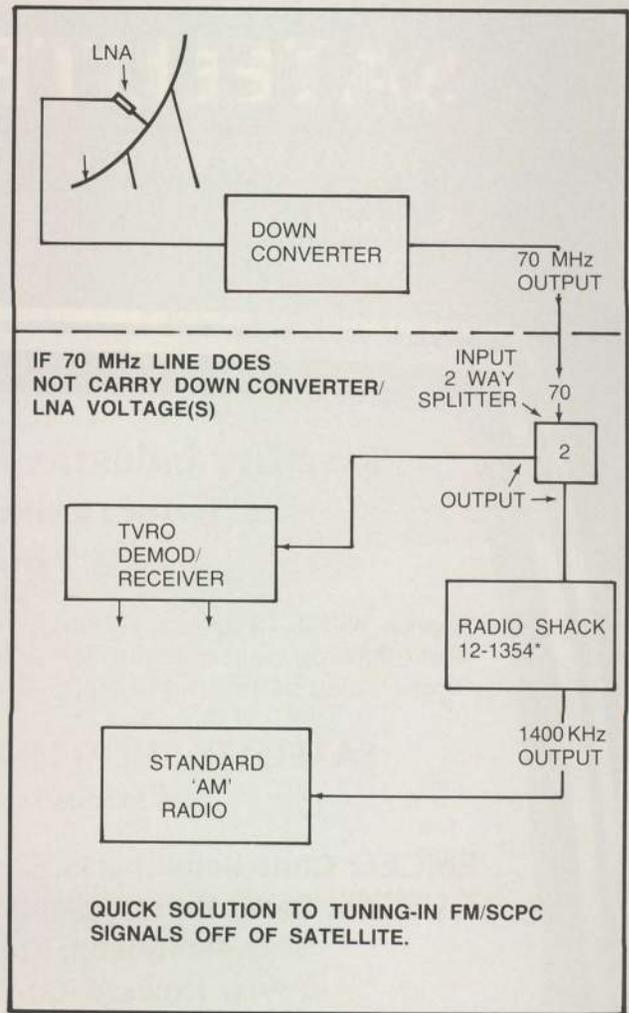
Indoors, we install a two-way HYBRID splitter. The input faces towards the 70 MHz input side or the antenna. We have two-outputs; one of which we connect directly to the TVRO receiver, and the other we connect to the 'FM/SCPC Interface Converter'.

The 'Interface Converter' is nothing more than a \$24.95 (last price shown) Radio Shack (Automotive) VHF-TV Sound And Weather Converter. This is a device that tunes two bands, the VHF (TV) low band and the VHF (TV) high band. The low band tunes from approximately 50 MHz to approximately 90 MHz. This means it tunes **through** our standard TVRO 70 MHz IF.

Remember that a 70 MHz IF is only **centered** on 70 MHz; it actually is wider than this, covering from 59 MHz to 81 MHz for a TVRO receiver with a 22 MHz wide IF and so on up to as much as 40 MHz wide. As the 70 MHz IF signal comes indoors from the down converter, it will be plenty wide enough to cover the entire 50-90 MHz spectrum we have an interest in here. Also remember that a full satellite transponder is 40 MHz wide, and the center of that 40 MHz width falls at 70 MHz while the low end falls at 50 MHz (70-20) and the top falls at 90 MHz (70+20). Yup; 20 plus 20 still equals 40.

If we have a receiving device that will tune across the 50-90 MHz band, we have an instrument which will allow us to tune in the individual FM/SCPC carriers! We'll return to this shortly.

In the second diagram, we have a system which also sends the DC operating voltage to the LNA/down converter/LNC via the same coaxial cable. That means we have 70 MHz (centered) signals **coming indoors from outside**, and we have a DC operating voltage **coming outdoors from inside**. One good way to blow up everything would be to connect the DC operating voltage intended for the outdoor equipment directly to the Radio Shack (or equivalent) 'Interface Converter.' So we need a system to keep the DC voltage going to the outdoor equipment, **but not to** the 'Interfacing Converter'. The device is called a 'directional coupler' and you will find them at the nearest MATV type store or wholesale house. You want one that is '10 dB down' or in other words, one that attenuates the incoming signal going



to the 'tap' output side by 10 dB while allowing the main signal to pass through essentially unattenuated to the TVRO receiver proper.

This directional coupler allows the TVRO IF signal from the down converter to pass directly to the TVRO demodulator; it allows the DC operating voltage to trace the **reverse path** back to the down converter (etc.) outside, and it isolates or prevents any of the DC power from getting into the 'Interface Converter'. Cost? Under \$5.00.

Now the Radio Shack model 12-1354 is intended for automotive use; it is supposed to allow you to sit in your car and tune in the audio portion of local TV broadcasts. That means it is an 'FM receiver' of some sort since your TV audio broadcasts are FM. Here is how it works.

The FM signals, tuned in from the local channel 2,3,4,5 or 6 stations, are down converted inside of the box to an FM-IF. Then the signals are amplified, and detected. That is, they are turned into audio. But the object of the 12-1354 is to allow you to tune in the FM TV audio on an **AM** radio. So they take the audio and connect it to a low power **AM transmitter** inside of the box. Yup, that sounds just like a TV modulator built inside of a TVRO receiver!

Then they tell you to connect the output of the 12-1354 box to a standard AM radio; **any standard AM radio**. Tune the AM radio to around 1400 on the dial (1400 kHz or 1.4 MHz) and there you will find the carrier from the 12-1354 box. If you have a local station near 1400, they give you a slug to tune to move the output AM signal coming from the box away from 1400 so you can find a clear, local, spot on your AM radio dial.

To operate the system, you tune the master TV tuning dial on the

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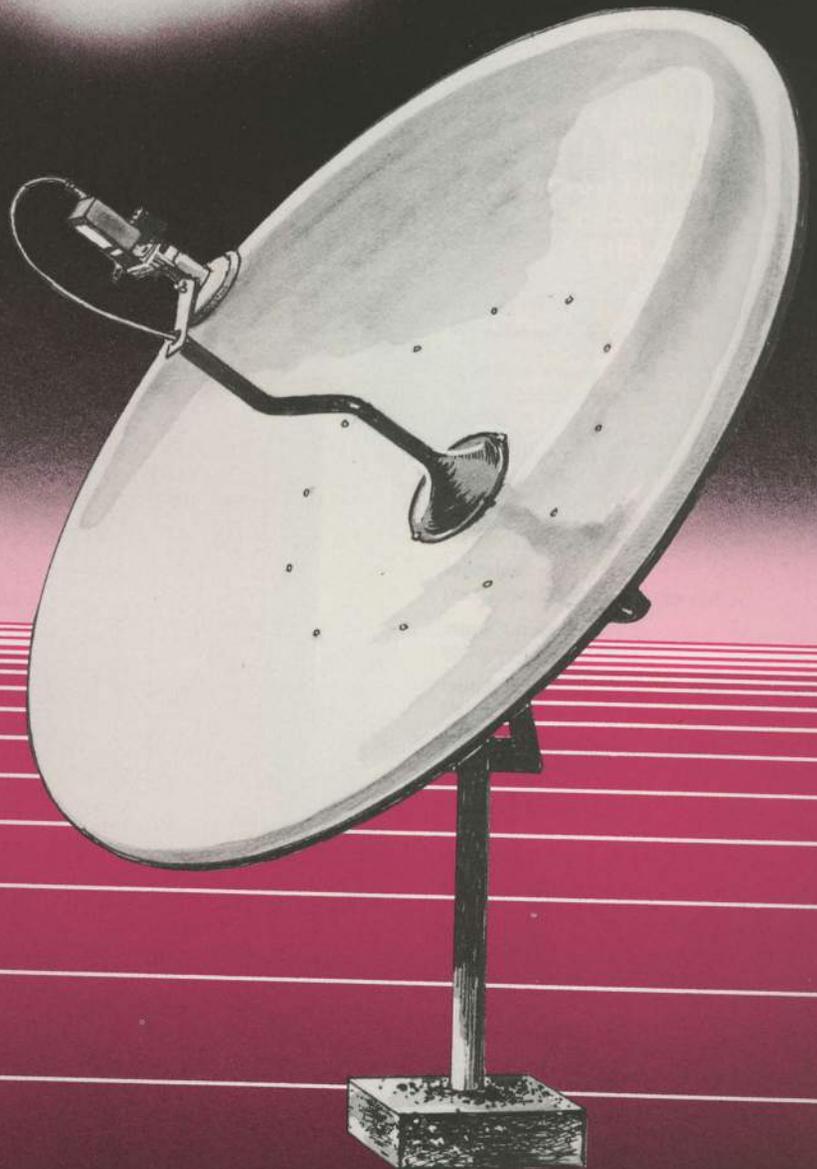


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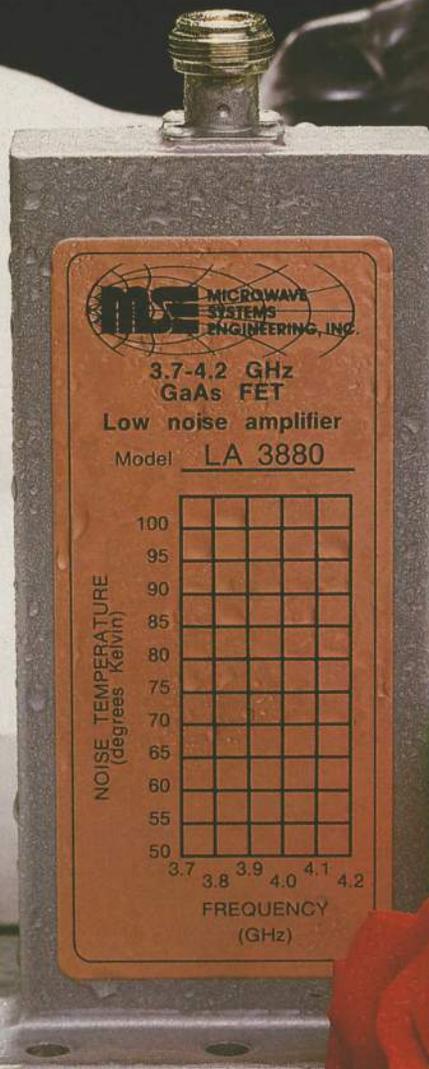
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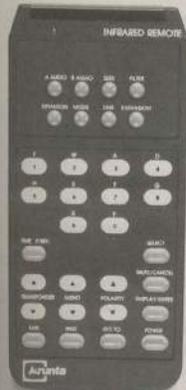
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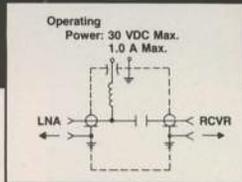
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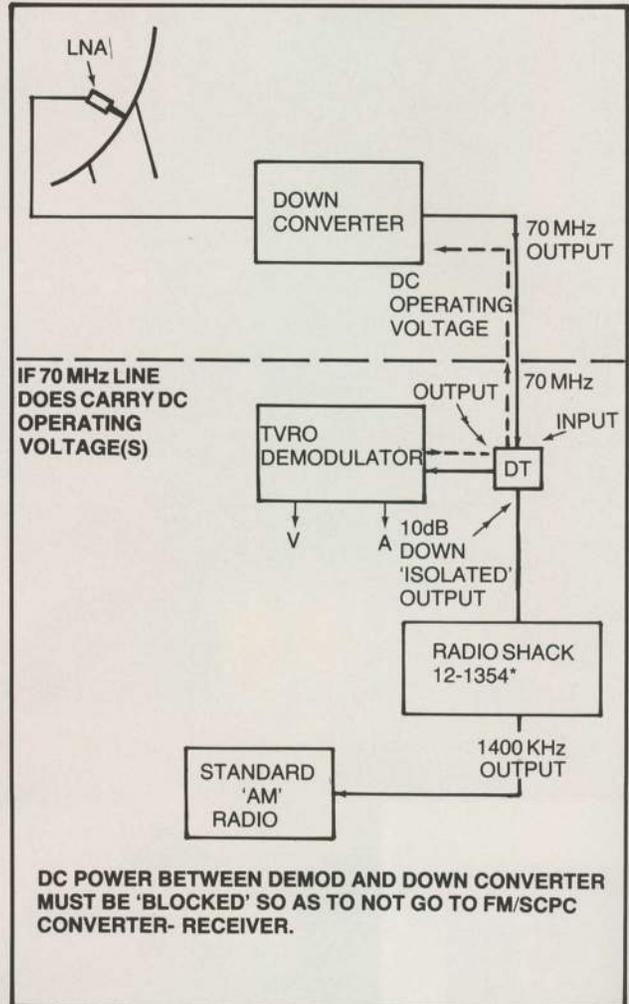
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SCPC/ continued from page 71



12-1354 to the correct operating frequency of your desired FM/SCPC signal. The audio from that signal will appear on your AM radio at or near 1400 kHz. That's it. Not very complicated although since the 12-1354 was intended for automobile use, you will have to find 12 VDC from your TRVO receiver as well (such as the often-provided optional voltage line of the back of your receiver; **CAUTION**...be sure the voltage here does **NOT exceed** 13.8 VDC or you could blow up the Interface Converter!). Complete installation instructions for the 12-1354 are included in the box.

There is one other possibility here if you are into the big bucks (such as spending \$69.95 or so) and you don't wish to fool with finding 12 VDC for the 12-1354. Go to the same Radio Shack store, or Sears Roebuck or some other 'high quality' electronics emporium and ask to see their 'Multi-Band/TV Sound' receiver. Most stores now offer you a portable receiver with built in power supply, speaker and batteries which tunes directly the TV band signals for channels 2-6 (that's the band you are interested in), and, channels 7-13. One caution here; you will need to purchase such a high quality receiver with a built-in connection for an outdoor antenna. Your 'outdoor antenna' will be the piece of RG-59/U that comes from the directional coupler or signal splitter output side, and if you want to be very pure about it, put a small matching transformer on the end of the cable before connecting the coax to the typically 300 ohm antenna terminals on the 'multi-band' receiver.

Operation

The Radio Shack 12-1354 or the Multi-Band receiver(s) is de-

Michigan Tunes In The World With Hastings!

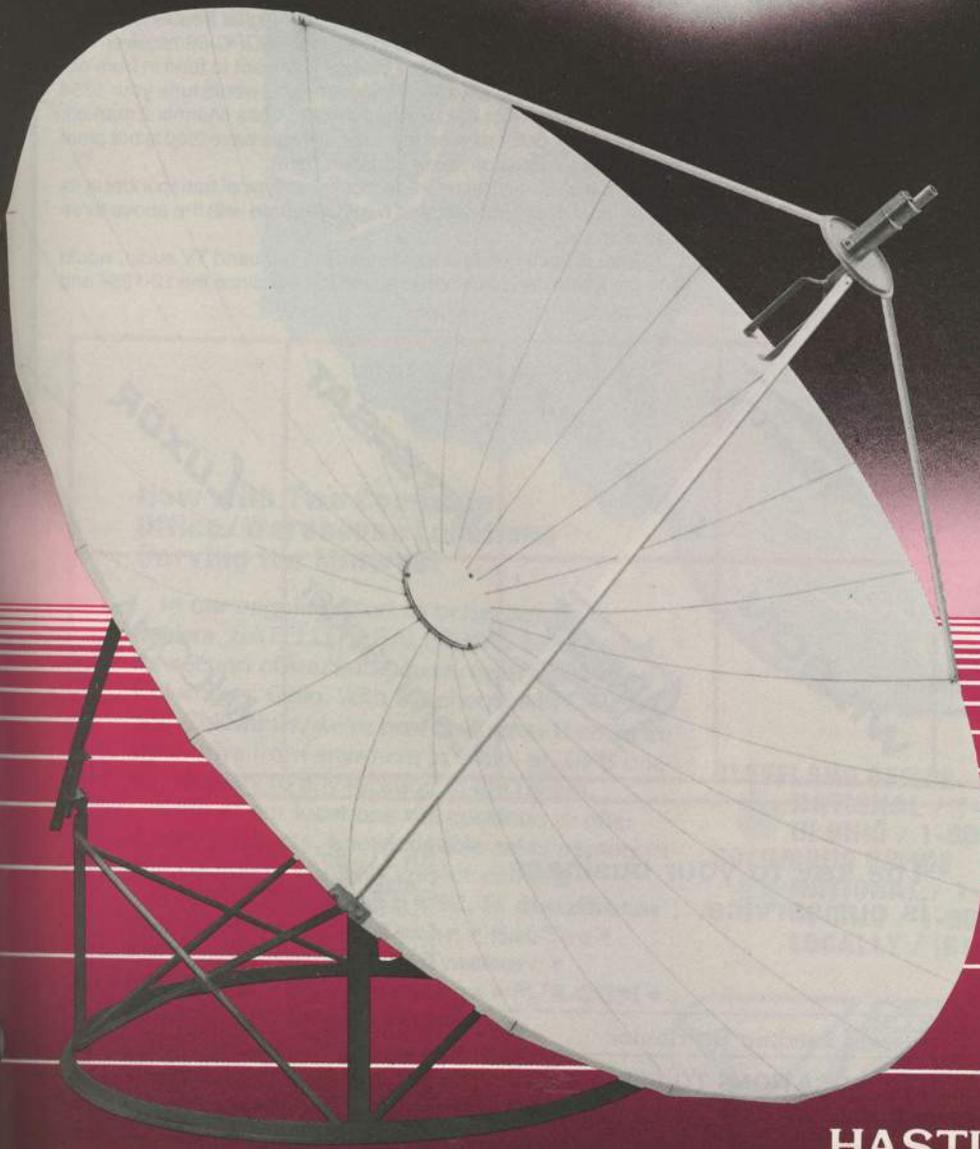
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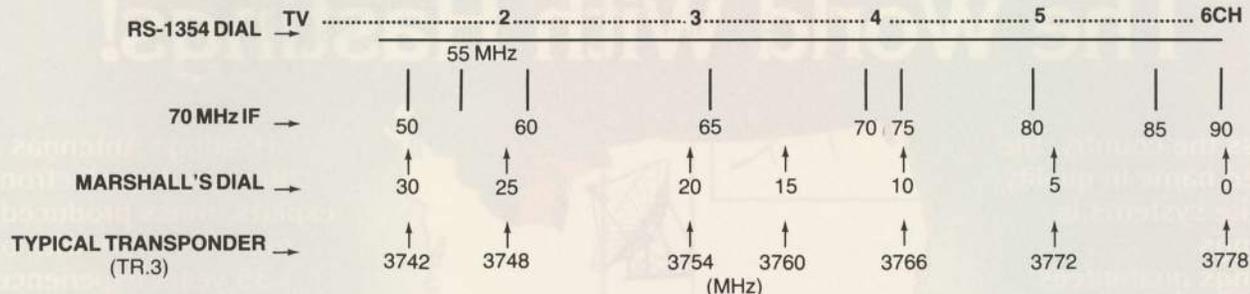
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HOW TO RELATE YOUR TUNING DIAL TO THE RECEIVER SYSTEM YOU ARE USING. RS-1354 DIAL MUST BE PRECISELY SET FOR EACH INDIVIDUAL SIGNAL (TOP LINE). TV AUDIO RECEIVER (SEE TEXT) TUNES DIRECTLY ON '70 MHz IF' OR SECOND LINE. HERO SPC-66 TUNES LINE THREE. LINE FOUR SHOWS TYPICAL 40 MHz WIDE TRANSPONDER AND RELATION OF FREQUENCY TO TOP THREE 'SCALES'.

signed to recover FM signals that are typically around 150/200 kHz wide. The narrow band FM/SCPC signals, on the other hand are closer to 60 KHz 'wide'. That means you will be getting lots of extra fidelity but you also may be getting extra noise with this system. And if you are tuning in an FM/SCPC signal which is close in frequency to others on the same transponder, you may experience some problems separating the two (or three) signals. But then again, the price is right.

Shown here is a diagram which perhaps will assist you in determining how my monthly listings correlate to where you should tune in your receiver dial to find the same signals I am reporting about. The top line is the (as marked on the unit) Radio Shack 12-1354 tuning dial. The next line down is your 70 MHz IF, which as we know really is a 50-90 MHz IF as the signal comes indoors from the down converter or

LNC.
The third line down is my own 'dial', the digital frequency tuning system we use with our CSD modified Hero SCPC-66 receiver system. If you see a listing of some service you want to tune in from our tables, and the listing says 25, that means you would tune your 1354 tuner to the region just below where the 1354 has channel 2 marked. (Note: The dial calibration on the 1354 units we have tried is not great so you may experience some variation here).

The bottom line is the reference for you; a typical transponder at its original 'GHz' frequency, as that would compare with the above three reference lines.
(Note: A multi-band receiver, tuning in low band TV audio, would have the same dial calibration as the top line since the 12-1354 and

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the TV audio tuner/receiver are essentially the same type of gadget. The TV audio receiver is simply more complete, and ultimately perhaps a tad higher in quality.)

There are alternate methods to accomplishing this 'trick.' Some people have taken high quality FM tuners (tuning 88-108 MHz) and they have modified the oscillator so that the tuner now tunes 60-80 MHz (that's **part of the 'band'** anyhow). You also must modify the input RF stages of the tuner as well, when you do this, since they were designed to tune 88-108 MHz; not 60-80 MHz. Overall, the quickest, cheap way to get into FM/SCPC is as outlined here. You will discover, as we have, that there are considerable performance variations between different down converters in this service (the Drake seems to work very well, for example). You will also discover that while our listings are considerable here in this column monthly, that we are in any **single month** barely scratching the surface of the hundreds of special audio networks which are available on 'the bird'. Which brings us to this month's new listings as well as some updated changes from last month.

This Month's Listings

The following listings show you where you can find the (typically) 60 kHz wide FM/SCPC services with a narrow band FM receiving system such as either the Hero SCPC-66 receiver, **or**, the 'home brew' systems described in this month's column. Not all services will be found operational 24 hours per day and many maintain irregular hours within the 24 hour day part. Our designations are as follows:

- 1) **N** = known to be less than full time
- 2) **MN** = MAY not be transmitting full time
- 3) **S** = schedule times, examples given
- 4) **SE** = special events, such as baseball game coverage only
- 5) **22.3** = example only; shows tuning system indication for SCPC-66 receiver per the explanation and table appearing in this month's column. **See table for clearer understanding.**

Many transponders have one or more unmodulated carriers present; i.e. these carriers are always (or nearly always) 'up' but no audio or data has ever been noted. Most services that are not full time will keep their carriers operational between the actual 'broadcasts.' When you tune across an unmodulated carrier, you simply find receiver 'quieting' (i.e. the static noise disappears and the sound from the speaker becomes 'quiet'), which will abruptly turn into programming at the scheduled time. An example of the latter would be Mutual Radio News which may send news at 00, 15, 30 and 45 minutes (past the

hour) and if the newscast lasts five minutes, then that particular audio channel SCPC service would be active from 00 to 05, 15 to 20, 30 to 35, and 45 to 50.

| Satellite | Transponder | Designation | Service/Description | SCPC-66 Tuning Voltage |
|-----------|-----------------|-------------|--|------------------------|
| F1R | 15(V) | | VOA reported here last month now moved; location unknown | |
| W4 | 2(V) 4(V) | MN | Mutual Radio | 1.5 (*) |
| | | N | Alabama Information Net | 22.6 (*) |
| | | N | Minnesota Radio News | 27.8 (*) |
| | | | National Public Radio | 32.0 (*) |
| T1 | 1(V) | | All FM/SCPC use of this transponder now gone | |
| W3 | 2(4)(H) | N | Kansas Radio News | 2.3 |
| | | N | Cosell/Harvey feeds | 3.0 |
| | | N | Atlanta Braves Radio Net | 3.3 |
| | | N | Oklahoma News Network | 3.8 |
| | | N | Aggie's Net (shared) | 3.8 |
| | | N | Transtar Radio Net | 12.4 |
| | | N | Transtar Radio Net | 12.7 |
| | | N | UPI News | 28.5 |
| | | MN | WRAL (Raleigh, NC) | 10.0 (*) |
| | | MN | WFBR (Baltimore, Md) | 11.6 (*) |
| | | N | Mississippi Radio Net | 12.0 (*) |
| | | N | Louisiana Radio Net | 12.6 (*) |
| | | N | South Carolina Radio Net | 13.8 (*) |
| | | N | Brownfield Radio Net | 14.8 (*) |
| | | N | Louisiana Radio Net | 19.8 (*) |
| | | SE | KC Royals Baseball Net | 21.4 (*) |
| | | N | Oklahoma Radio Net | 22.8 (*) |
| | | N | Georgia/Braves Radio Net | 23.5 (*) |
| | | N | Radio Z-100 (Portland, Or.) | 21.2 |
| | | N | Arkansas Radio Net | 24.5 |
| | | N | North Carolina Radio Net | 27.7 |
| | | N | Mississippi Radio Net | 29.5 |
| | | N | Louisiana Radio Net | 30.0 |
| MN | UPI Total Radio | 31.7 | | |
| 7(13)(H) | MN | MN | BBN Religion Net | 19.7 |
| | | MN | BBN Religion Net | 19.9 |

Next month; this list grows plus a special look at some truly 'unusual SCPC signals' and services which show up in the strangest places!

*) Indicates new service during last 30 days.

INDUSTRY AT LARGE

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NEW ENERGY SOURCE?

I'm one of those guys who's been voicing that "oft-repeated tale" about screen dishes not offering much in the wind-resistance department when windspeeds increase over the mid-30's region. That's why your "aside" as part of your evaluation of the Hero antenna (see CSD March/84 - page 44) on the recent tests conducted by Paraclypse was so interesting to me. Like you, I had tended to believe that at a certain speed, the holes in the mesh "filled up", resulting in an equivalent to a solid surface.

I sort of had this idea reinforced a few years ago while building a McCullough (or should I say Swan?...why don't I just say McCullough-

Swan?) spherical. It happened about 30 seconds after we finished spending 2 hours truing up the dish in a hot sun and had just raided the fridge for a cool brew. We always thought it was just a little gust of wind that reduced our prized handiwork to little more than kindling, but thanks to the recent results of the Paraclypse tests, well, now we know for sure that it wasn't.

After all, if (as reported) a 75 mph wind can hit the front of an antenna and exit at the back at no less than 72 mph, we know that really the antenna was only absorbing the equivalent of 3 mph winds, right?

From what I can gather, what we've really done is discovered a

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whole new "force", and one that preys particularly on mesh antennas. No one has yet been able to see it, but apparently it is most often accompanied by high winds, flying pieces of your neighbor's tarpaulin, and other assorted debris. Which is a nice thing, because it makes it a lot easier to tell when you might be "in for it".

I've seen this force exerted on a few other antennas (a lot of them screen) in the few years I've been in this business, the latest being at the recent STTI show at the Riviera in Las Vegas. Actually, it happened pretty quickly. We didn't really notice it at first, but suddenly, and without warning it hit. (I guess there was a little wind, but it seemed to be quite low - no more than a 30 mph gust!). All of a sudden we saw "Brand P's" antenna keel over and go crashing headfirst onto the parking lot. In succession, and quick as you could say "Mesh antennas don't catch the wind!" no fewer than a dozen other antennas were subjected to the same force and bit the dust.

I might add, sir, that not all of the antennas were mesh (about half of them were), and it now appears that the "Force" does not prey **solely** against that type of product alone!

As an antenna builder myself - and one with a conflict of interest, since we build a solid-surfaced dish spun aluminum dish - I have always been intrigued by this wind problem. Mostly because I've seen what kind of damage the wind, uh "Force", can do when it gets a little angry! The people I turned to (some even called themselves "engineers") gave me that "holes-filing-up" routine. **Boy, am I mad!** I recall one of them even taking me to a "snow fence", a wood-slatted fence they erect during the winter to keep the snow from drifting out onto the roads. Even though in this case the slats were an inch or more apart, I could see that in front of the fence there was actually no snow. Instead there was a big pile of it several feet high a few feet to the opposite side. **Foolish me**, letting this guy con me into thinking that the slats actually broke up the force of the wind. Come to think of it, that guy was from the government, and you know how those guys can lie...

Boy do I have a lot of apologizing to do!

You see, I've been going around telling people all this time that most of the people who build screen dishes build them wrong. Most screen dishes I've seen seemed to be about as flimsy as Gary Hart's

electoral platform, and although you could see through both, I didn't see how either could hold up when the going got rough. Most mesh dishes have mounts you could practically bend with your bare hands, and this told me that the majority of manufacturers were actually deluding themselves (and their customers) by their assurance that the wind would pass on through. Of course, 2 minutes after the start of the season's first ice storm this all changed, and I'm sure, so did the status of a lot of mesh antennas at the same time. The way I figured it, if you were going to build a mesh antenna, the only thing you really had going for you was the fact that visibility was considerably reduced. For all intents and purposes, I told them, the "wind thing" was a myth. Indeed, **I also said** that mesh had other disadvantages:

- 1) It had to be somewhat larger than a solid-surfaced antenna because it lacked reflector integrity because "flat spots", "puckering", and other irregularities deviated from the true parabolic (or other) shape it was intended to follow for maximum efficiency. Most of the time when you find a mesh antenna that performs as well as a solid-surfaced antenna you know that what you really have is **just a lousy solid-surfaced antenna**.
- 2) I told people that microwave interference was not always totally attenuated by the holes in a mesh antenna (of course this is also true with certain fiberglass or thermo-plastic antennas that also use mesh or screen as a reflective surface!).
- 3) I said that people who buy mesh antennas had better consider whether or not they **ever wanted** K-band reception. That's because the holes in a mesh antenna, while just barely adequate for C-band reception, would yield only one thing at 12 GHz. Practice.

But I'm getting a little off-topic, aren't I? What we really need is for someone to shed some light on this subject and to try to track down this mystery "Force" that we've now discovered that attacked all those mesh antennas at Vegas.

There are a lot of unanswered questions that are crucial to the survival of this industry. Such as: 'Was it the same force that attacked the solid antennas there or are we dealing with another alien in this



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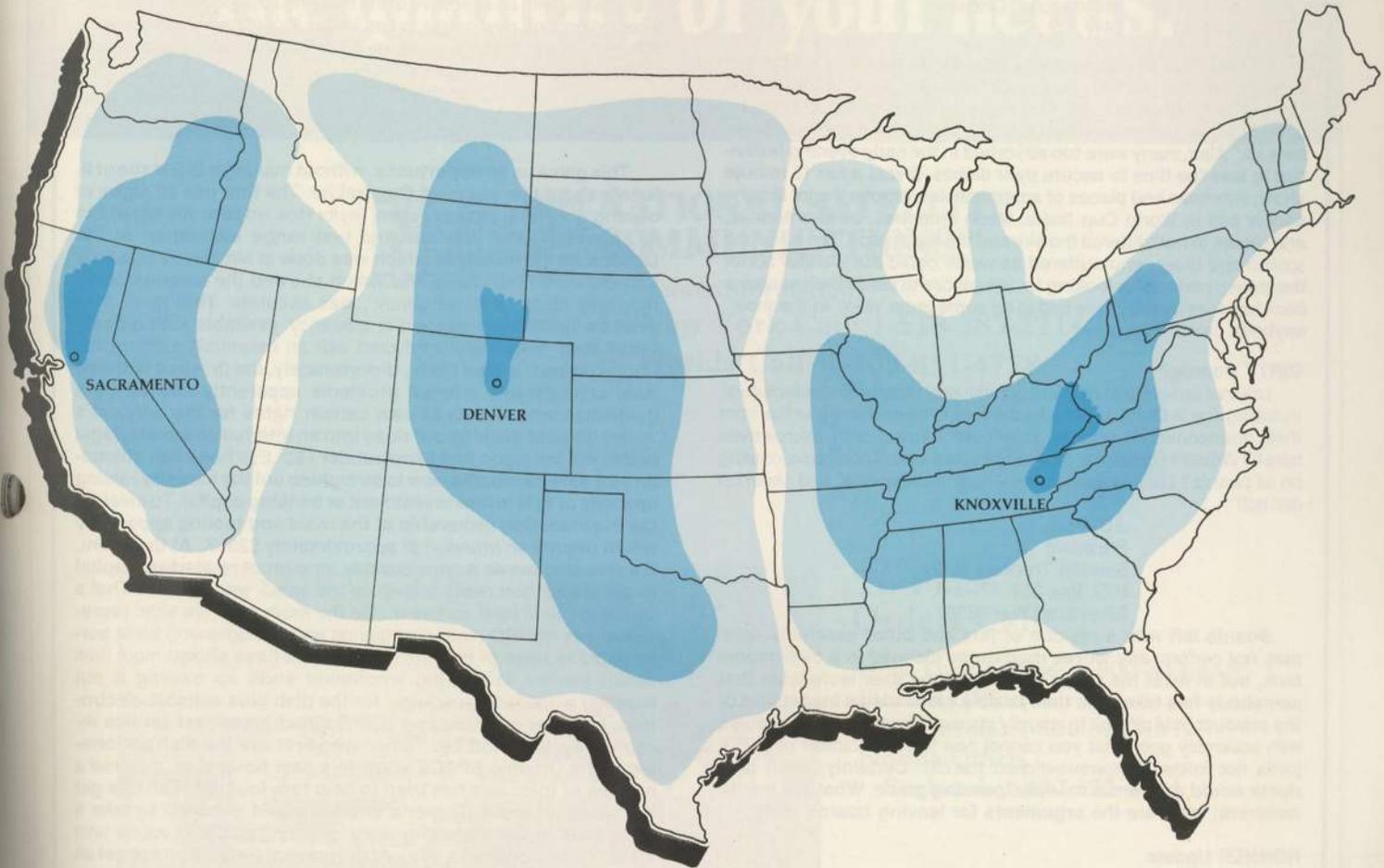
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instance as well"? What, if any, are your suggested remedies (long term and short term)? Is this the type of thing we could get a technical committee at SPACE to tackle? Could we perhaps get Rick Brown to lay a multimillion dollar lawsuit against it?

Please help.

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Brother Brough speaks with a straight tongue. The PA system announcements on the Riviera Hotel speaker repeatedly warned "The weather bureau is forecasting winds to over 50 miles per hour and all STTI Show exhibitors are warned to tie down their antennas in the back lot." **Alas, many were too absorbed in the early evening festivities to take the time to secure their dishes. It was a fun 15 minute show; antennas and pieces of antennas blew across the lot like the soccer ball in World Cup finals. Mesh antennas, solid antennas, and pieces to both littered the sky and the landscape. The force had spoken and those who suffered its wrath could but wander about the strewn parking lot looking for the pieces to patch their systems back together again. There had to be some great 'video' in 'the show'; anybody catch it on tape?**

DIRTY Boards?

I cannot believe that many of our industry receiver manufacturers, including one in Ohio, do not take the time to clean the solder flux from their downconverter boards. Aren't we dealing with microwaves here!!? Would it not also be nice to see some kind of conformal coating on all boards? Let's at least make it 'look professional' and clean up our act!

J.B. Pratt, III
President
Satellite Trackers N.W.
P.O. Box 357
Silverdale, Wa. 98383

Boards left with a residue of flux and other assembly 'aids' may not perform any worse than those cleaned in a hydrosonic tank, but at least the clean boards tell the user/technician that somebody has taken the time to do a close visual inspection of the product (it is difficult to visually inspect a board that is so coated with assembly gook that you cannot see the correctness of solder joints nor follow microwave-etched traces). Certainly, such products would not earn a 'mil-spec' passing grade. What say manufacturers; what are the arguments for leaving boards 'dirty'?

ROHNER Update

I thought CSD readers might be interested in learning of the latest legal status of J. P. Rohner & Associates (plus the other firms operated by Rohner). The Iowa Department of Justice filed a Consumer Fraud lawsuit against Rohner in May of 1983 (as reported in CSD). Negotiations for settlement continued with Rohner and his attorney during the summer of 1983. Late in the summer Rohner's attorney quit the case and the negotiations with the state legal people came to a halt. Subsequently Rohner appeared in court acting as his own attorney and a hearing held January 19th of this year considered several motions prepared by Rohner. Early in February Rohner received a favorable ruling from the court concerning his motions (**not his case, yet**) and the Department of Justice for the State of Iowa is now preparing to pursue the case once again. Anyone who has claims they wish to take against Rohner for faulty (TVRO related) merchandise should IMMEDIATELY contact Ms. Onita Mohr, Consumer Protection Division, Department of Justice, Hoover Building (Second Floor), 1300 East Walnut, Davenport, Iowa 50319. Those needing to seek additional information should call 515/281-5926.

William Oakley
709 W. Madison
Herrin, Il. 62948

Rohner's activities have been perhaps 'over-reported' in CSD.

Basically, if you were part of the customer base for he or his firms, you already know how to have the State of Iowa represent you in the on-going legal matters. If not, you are unlikely to be 'affected' by this notice since you are not apt to encounter him nor his products in the marketplace again, anytime soon.

QUADRALITE Problems

I have had several telephone calls from dealers who, like me, have experienced problems in getting delivery of QuadraLite dish products even after submitting pre-payment for the (4.5 foot) antennas. I recently talked with an executive of the firm who advised me that the firm received enough new orders in Las Vegas to 'get back into the swim' of things. Thank you for your efforts on my behalf and please continue to keep the industry on an even keel.

Tom Arkfeld TV Co.
16233 Camelback
Victorville, Ca. 92392

This gives us an opportunity, without making a BIG issue of it, to talk about the 'status' of QuadraLite. The firm has all signs of owning a 'winning product'; even Taylor Howard recently agreed to us, privately, that the antenna test range evaluation of the QuadraLite 4.5 foot dish, which was done at Microwave Specialty Corporation in San Diego and which showed the antenna could rightfully claim "80% efficiency", was accurate. That there may even be 'another few percent in efficiency' available with a finely tuned feed (tests were conducted with an essentially stock-model Chaparral feed) is also likely. Unfortunately, the firm has suffered from considerable internal problems apparently caused by a gentleman who claims to own certain rights for the antenna's 'mold'. Without sticking our nose into an internal corporate, legal battle, we can report that firm founder Rich Eye has been attempting for several months now to straighten out the mess by raising upwards of \$1M in new investment or banking capital. To clear up the in-contention ownership of the mold and tooling apparently would require an infusion of approximately \$200K. At that point, the firm also needs a considerable amount of re-start-up capital to get production really rolling on the small 'wonder dish'. That's where the \$1M total comes in. On the more positive side, representatives of HBO (both engineering and management) have participated in tests of the 'wonder dish' and have shown more than casual interest in helping whomever ends up owning it put together a 'marketing package' for the dish plus suitable electronics, as a low-end Galaxy-1 (CBD) direct broadcast service reception system. And Ted Turner, who first saw the dish performing at the Orlando SPACE show this past November, ordered a number of them and has tried to help firm founder Rich Eye get his affairs in order. Turner's efforts helped get HBO to take a close look at the dish (they were, understandably, skeptical until Turner pushed on them a little). At the present time, efforts to get all of the problems straightened out have been concentrating in the investment banking world headquartered around New York City. There is a 'sleepier' here; a not inconsequential investment opportunity (\$1M we estimate to start, with another \$1M likely before it really turns the corner by the first quarter of 1985) and perhaps some CSD reader, unlike the New York investment bankers who are excited but cautious, is in a position to 'help'. Calls should go to Rich Eye at 214/675-1436, or Ken Schaffer at 212/371-2335. We are NOT in the business of recommending investments, but properly handled this one has all of the potential of becoming a barn burner.

PIGGY BACK LNAs?

The short note and photo concerning the low (low) noise MSE LNA and piggy-back downconverter appearing in CSD/2 for April 15th caught my attention. This is far from a complete report but these are my observations to this point. I, too, was intrigued by the MSE 70° LNA which I saw demonstrated against a competitive brand 100° degree LNA at Vegas, using a pair of QuadraLite 4.5 foot dishes and a 4 GHz A/B switch. I returned home and purchased four of the units from Star-Corn of Oklahoma City. The improvement over our (name brand) 100 degree LNAs was, in some cases, dramatic. Of the four MSE

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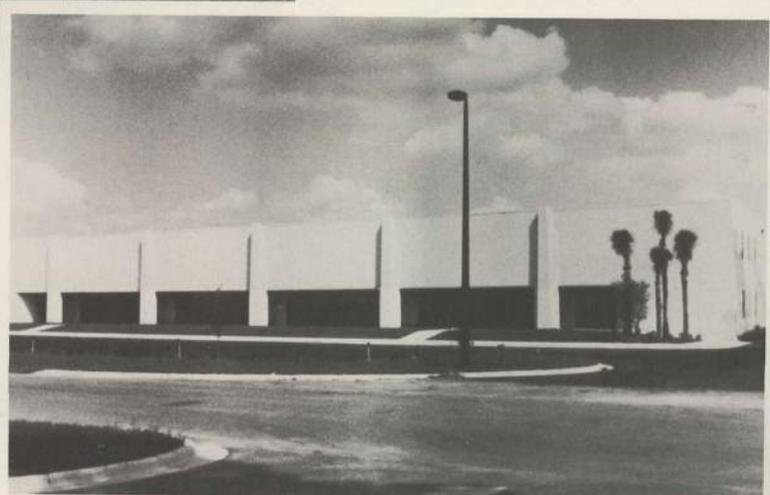
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LLNAs (low-low noise amplifiers) I purchased, two went down to 55° while none was spec'd at over 64°. Still, on three different systems, Satcom F3R had sparklies on a number of transponders. Galaxy 1, and most of the Westar 4 and 5 transponders were very clean. Two of my Sat-Tec receivers have the newer 'compact downconverter' and I have been connecting them to the LNA directly using a UG/59/U Male to Male barrel connector. Results, this way, have been good since typically this replaced 12 feet of cable between the LNA and the downconverter to the rear.

Shortly thereafter I received my first **Regency SR-3000** receiver (on order since January) and tried it out. It's a nice receiver and the sparklies on F3R using the small QuadraLite antenna were 'softer' than the Sat-Tec R5000 system. However, when I direct-connected its downconverter to the MSE LNA, I found unstable tuning on some channels and blanking (receiver going into oscillation) on others. Inserting only a short length of cable (6 inches RG-58/U with type BNC fittings and N adapters) between the LNA and the downconverter did not adversely affect the picture quality (ie. sparklies) but it **did eliminate** the unstable tuning on some channels and the 'blinking' on the others.

I have a pair of theories for consideration:

- 1) Direct coupling between the MSE LNA and the Regency down-converter results in some erratic impedance mis-matching to the MSE LNA. I tried a California Amplifier 100° LNA and with direct coupling to the Regency DC, no problem. I repeated it with another Cal Amp 100° LNA and again no problem. I did not try another MSE unit, however.
- 2) The Regency has more than sufficient gain to handle a 40 dB LNA such as the MSE (and probably a Hytek as well), and perhaps too much for direct coupling. Coaxial lines, even 6 inches of RG-58, at 4 GHz are great devices for isolating and smoothing out impedance mis-match caused reflections.

While I was in Las Vegas I talked at length with **Dan Hopson** of Hopson Electronics in Sherman, Texas. Dan, like me, is a former FAA electronics engineer so it is fair to say that we both come from the same school; and not a bad school at that. He pointed out that lacking

an isolator to 'marry' the LNA to the dish (as **CSD** has pointed out in earlier articles), you can run into LNA front-end stability problems. Those same problems can in turn adversely affect the noise figure performance of the LNA when it is moved from one model dish to another, or even two dishes of the same model but in different locations. In particular, Dan referenced the flat (circular) plate on the center pedestal of the Hastings 101/2 PF dish which is closer to the LNA than the center of the dish. He wondered if that plate might not reflect energy back into the feed/LNA? Without it, signal bounces back and forth and presto . . . standing waves, frequency sensitive 'hot' and 'cold' spots and Lord knows what else. I have **not noticed this** with the QuadraLite small dishes, but they are curved right to the very center of the dish. With the QuadraLite, sensitivity throughout the band appears uniform and I have already 'raved about' the quality improvement.

Stan Jeffcoat
Jeff's Electronics
612 S. 10th Street
Yukon, Ok. 73099

Jeffcoat, a frequent 'technical correspondent' to CSD started with the industry at the first SPTS show back in 1979. More recently, he has contracted with STTI to 'police' the antenna lots at STTI shows. Stan is a bright man with plenty of practical experience as the above shows. LNAs still bother us. We, like Dan Hopson, worry that when you take away the isolator in the front end of an LNA, you eliminate a 'safety valve' between the first GaAs-FET amplifier stage and feed of the dish. That 'safety valve' insures that no matter how strange the dish surface may seem, to the LNA, the LNA's gain and low noise characteristics will not be adversely affected. If you manufactured LNAs and you also manufactured the feed and the dish, you could insist that all three only be used together. Then you could design into the isolator-less LNA whatever 'compensation' as might be required to 'smooth out' the LNA performance, in the feed and/or the dish surface. When you toss an LNA into the world without an isolator and you

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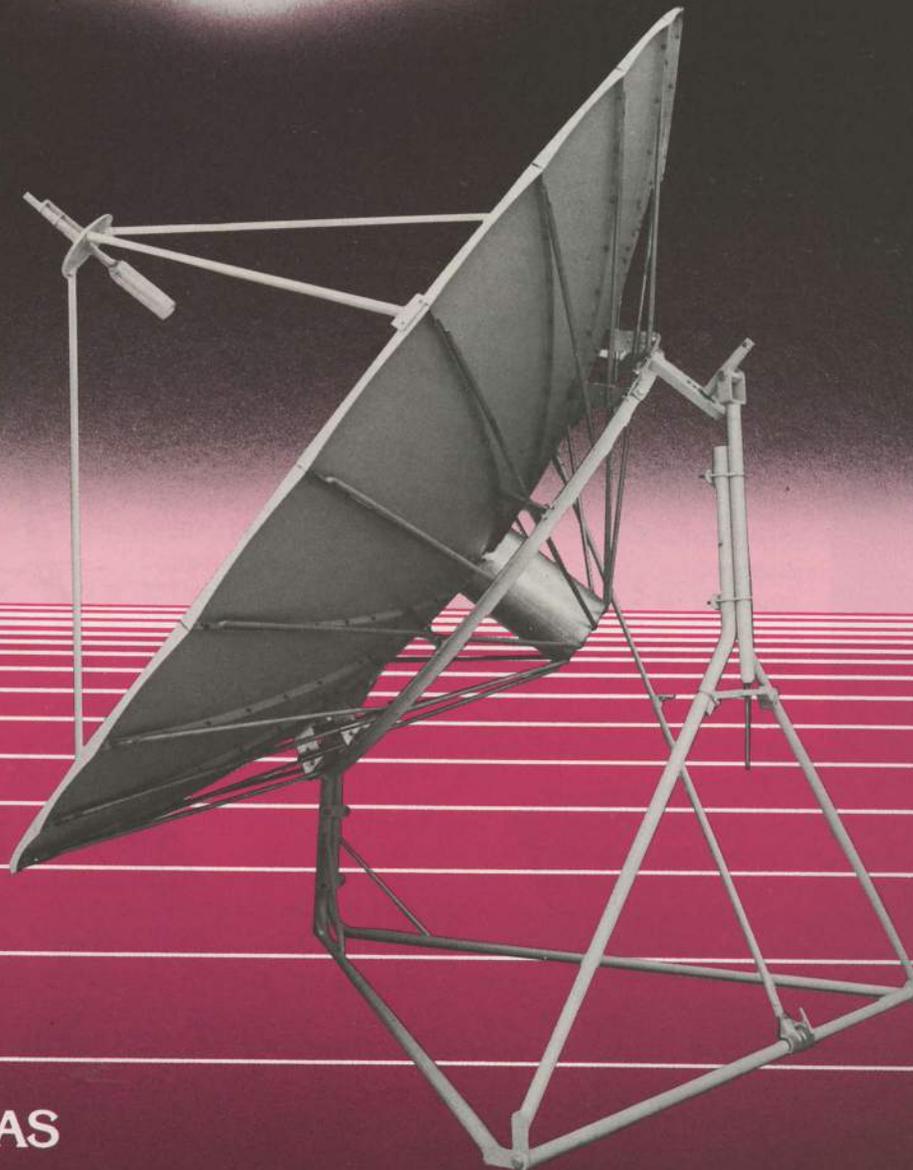


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expect it to be used on any dish in any location under any condition, it is a little bit like sending a 21 year old into the world after keeping him locked in a dark room since birth and expecting him to cope with the world. He might do fine; or he might not.

Why an MSE LNA directly attached to the Regency SR-3000 downconverter should cause erratic tuning of the receiver, and downconverter oscillation, bothered us until we deduced that not only is the input without an isolator on the LNAs in question, the output may also not be perfectly 'back matched'; that is, it must not have as good an impedance match across the full 500 MHz band as the Regency downconverter would like to see. We said in CSD last fall, when the subject first came up, that MSE "is onto something here" and "what they are doing certainly bears watching." Their approach to provide their OWN piggy back downconverter to mate directly with their OWN LNA is possibly their solution to the problems reported and we look forward to the opportunity to test some of their systems here in the islands. Perhaps Dr. Konishi of Uniden/Unisat would like to comment on what may be happening here with the LNA devices that get their ultra low noise by eliminating an input isolator?

ADDITIONAL Lowrance BDC Data

Here is some additional data for the new Lowrance Model BC 70 block downconverter system, as first shown in Las Vegas. The system takes in the full 3.7 to 4.2 GHz band and outputs in the 950-1450 MHz band. There is 12 dB of BDC system gain overall. An internal DC bypass allows powering the LNA through the BDC. The oscillator is a 'dielectric stabilized' unit with an LO stability of ± 0.9 MHz maximum. The LO is on the high side (5150 MHz) and input and output VSWR (worst case) is 2:1. Operating voltage is +15 to +20 VDC with 100 mA of current required. The noise figure is 15 dB 'typical'.

Michael Render
Product Manager, Satellite Communication
Lowrance Electronics, Inc.
12000 E. Skelley Drive
Tulsa, Oklahoma 74128

There is at least one receiver manufacturer in Europe who might do well to talk with Lowrance about allowing Lowrance to supply them with BDC units! (The long expected Birkill receiver, first shown last September in Birmingham, England has been 'tied up' getting into production at least in part by some production problems relating to the BDC portion.) Lowrance has a very interesting new approach to home receiver systems; you can configure their System 70 package so that you have a single conversion system (70 MHz IF), or, you can sell it that way initially and then go back in later and 'upgrade' the system to a BDC system so the customer can connect additional receiver(s) to the same antenna. We like the idea and we suggest dealers who have been torn between single conversion and BDC take a close look at the Lowrance package; we expect others to follow the Lowrance lead in this area in the future.

8 FOOT/ Not 9 Foot!

Reference is made to CSD/2 for April 15th and the photo appearing on page 17. The B.E.S.T. (square) antenna which you reported as being 9 feet in size was actually an 8 foot square model! True, it may well have the equivalent surface area of a 9 foot round dish but the performance we measure is at least the equivalent to a 55% efficient 10 foot round dish (39.5 dB). This was done at a St. Louis test range where at 4.0 GHz they actually found the gain to be 39.6 dB. If Coop was impressed with the performance of the dish and he thought it was a 9 foot square, what does he think now that he knows it was an 8 foot square?

Jim Nease
Nease Construction Co.
516 W. 33rd
Hays, Kansas 67601

Coop is 11.1% (1/9th) more impressed than he was originally.

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using a kit of electronics which requires about six hours of assembly time, should investigate the No. 3005 system from Bradley Marshall, Ltd., 325 Edgeware Rd., London W2 1BN, England. The price (in pounds) is about £130 plus postage and handling (**editor's note:** about \$200 US). And this observation concerning the AFRTS service at 1 degree west; recently the signal has increased here in England by about 1.5 dB on video and as much as 10 dB on the audio.

Michael Stone
Baugh Farm
Church Lane
Downend, Bristol, U.K.

We would expect an even more dramatic improvement in AFRTS may be just around the corner with a new Intelsat V bird scheduled for 1 west before August. We hesitate to warn readers AGAINST ordering via mail from the U.K., from North America, but do suggest that a letter of inquiry in advance of sending off dollars or pounds to the U.K. might be advisable. How about some sources for Teletext kits in North America? Any out there?

REPRINTS Wanted

I recently became interested in purchasing a home TVRO system and was sent a portion of a reprint from **Coop's Satellite Digest** for June 1983 in which **CSD** rated the various antenna dish mover and control systems. In that review, **CSD** rated the **Houston Tracker** as being 'one of the better' control systems. Would it be possible to purchase reprints of other articles which review and rate other portions of the home TVRO system? I am interested in having a full opportunity to carefully select the best of what is available and feel that your equipment reviews would be an excellent starting place.

Gene Van Orden
4336 40th Street
Grandville, Mi 49418

CSD reprints are created by the firms whom we write about, not by CSD. Naturally we do not expect firms about who's pro-

ducts we have little good to say to make reprints, so when CSD is reprinted (with our permission) it is usually because some product has 'worn well' in our testing and review process. More important, unlike other publications in the industry, we do not encourage readership by 'consumers' and the material in CSD and CSD/2 is intended for 'our trade' and not for the ultimate-end-users. We end up with a 'smaller' total circulation that way, but those who receive CSD are 'serious dealers/sellers' of equipment whom (we hope) approach their day to day business activities with a professionalism that will continue to make our industry one of the fastest growing industries in the world today.

COUGH UP Your 2 Degree Specs

I sent the following letter to M/A COM regarding the manner in which they seem to have decided to handle the '2 degree spacing' controversy with their 10 foot (Prodelin) dish. I believe that if more dealers would write similar letters to firms such as M/A COM, we might as dealers ultimately be more sure of our '2 degree ground' when the birds begin to bunch up on us.

M/A Com, Inc.
Mr. L. Gould, Chief Executive Officer
7 New England
Executive Park
Burlington, Ma. 01803

Re: 2 degree spacing on 10' Prodelin dish

Dear Mr. Gould:

My husband informed me that M/A COM did not make a statement on the matter of 2 degree spacing while he attended the Las Vegas show. As satellite dealers, and as M/A COM stock holders, we are very concerned that there was 'no statement'.

Mr. R. Raybon, in a telephone conversation of March 23, 1984, informed me that there is no statement regarding the 2 degree satellite spacing forthcoming. Mr. Raybon stated that M/A COM has no control over the installation and accuracy of the polar mount, etc., and therefore could not stand behind the (spacing) integrity of the 10 foot Prodelin dish.

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(Intersat)
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We feel that a 'conditional statement' could have been provided and we understand there is a statement for the 12 foot Prodelin and its use with 2 degree spaced satellites. We need an explanation on M/A COM policy because we feel the 2 degree spacing is very important as a sales issue to our TVRO business.

Trudy de Blok
SAT LINK, Inc.
Star Route B, Box 990
Orange Beach, Al. 36561

M/A COM may be 'more honest' than some of the competition when they are reluctant to put forth a written statement that their 10 foot dish will produce unconditionally interference-free pictures when all satellites end up spaced 2 degrees apart and there is no inter-leaving of opposite polarization match-ups between adjacent satellites. Careful studies, done by careful people, over several years suggests that very few, if indeed any, 10 foot aperture dish antennas will be capable of 'unconditional interference free reception' when satellites are 2 degrees apart and using the same polarization scheme. Those statements probably cannot be made for dishes ANY smaller than 12 foot in diameter, and even there, the type of feed and the surface accuracy of the dish will cause some dishes even this size to be a problem. We wrote one year ago that 2 degrees was going to be bothersome. Nothing has changed and those making claims for 'smaller dishes' functioning at 2 degree spacing are either 'adjusting' test results to suit their needs, they don't understand the nature of the problem, or, they have some newly discovered magic which they have not shared with the rest of us to date!

NORTH To No Look Angle!

How does the enclosed photo look to you? This is a photo off-screen of reception on The Movie Channel (TR5, F3R) taken at Mould Bay in far northern Canada. How far north? Try 76.2 north (and 119.3 west) for size. The antenna was one of our Paraframe Communications 4.85 metre dishes and the look angle was 4.4 degrees. The LNA

was an M/A COM 100 degree, the receiver a Standard Communications unit and the outside temperature was -38 F!

Jim Vines
Paraframe Communications
611 Farmview Rd.
University Park, Il 60466

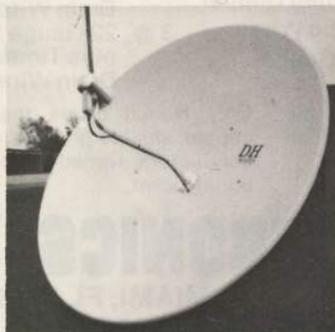


You were cheating, Jim! The M/A COM LNA may have been rated at 100 degrees K at 70 degrees F but at -38F we calculate it would have an equivalent noise temperature of around 89 degrees. That's a tough way to get an LNA cooled for lower noise performance. What's the record for 'furthest north' TVRO? Anyone beyond 80 degrees north (for a bird that had better be almost due south)!

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HARD to find a 12 GHz DBS system 'off-shelf' in some segments of Europe and Middle East since German ZDF-II service cranked up on ECS Spotbeam East April 1. 'Mad scramble' for 4 and 6 foot dishes, 11/12 GHz hardware resulted from Israel to Moscow when beam, centered on Bulgaria, began delivering typical 8 hour program day. Many countries, such as Israel and Egypt, have such limited local television fare that quality service from Germany is highly desired. Equipment suppliers in Europe were caught unprepared and unable to meet demand even though it probably totals less than 1,000 'instant terminals!

RCA has asked FCC for permission to modify still-being-planned/constructed SATCOM 6 to increase power to ten watts (from 8.5 watts max now), extend operational life to 12 years from present ten year forecast (thus reserving their orbit space for 12 rather than 10 years). RCA has also asked FCC to approve F-6 beaming six of the 24 C band transponders to northern Africa and Europe. **Ten watts versus 8.5 is not significant**; relatively modest **0.5 dB** increase in on-ground signal strength.

BLOOM may be of some segments of 'satellite rose'; analysis in recent high-level industry meetings suggest wholesale development of 'space segment' may have matured faster than need. Ground segment, meanwhile, is 'rosey' with some forecasters even suggesting home TVRO industry will account for \$1,600,000,000 (\$1.6B) in retail-level sales during 1984.

FCC has settled squabble over us of Westar and Spacnet orbit spots. Spacenet, if it flies as scheduled, will be located at 120 west (it is both C and Ku band bird) while Westar V will **shift slightly** from 123 west to 122.5 west. Before decision, W-5 was scheduled to move this summer from 123 to 119.5 west.

HIGH level segments of US government, including Department of State, are proposing that 1963 Intelsat accord giving Intelsat (Comsat) certain competition-free-'rights' be re-examined. Similar proposals years ago resulted in break-up of AT&T terrestrial communications monopoly.

LATEST Intelsat V series bird, F-9, was scheduled for launch May 24th via Atlas-Centaur rocket system. After check-out, the bird is

presently scheduled to perch at **1 west** where it will replace much older IV-A series bird. On the present bird is much-watched **AFRTS** feed going to Europe and Africa plus Middle East. If it all works, users of AFRTS in those areas may see 1.5 to 3 dB improvements in signals by mid-July.

OKURA COMPANY, well known Japanese trading firm, is talking about purchasing 'interest in' U.S. Satellite Broadcasting DBS system. Dollars being discussed are in \$40M region. USSB is one of FCC approved DBS systems but to date has shown it is having difficulty finding funds needed to get system operational. They originally planned mostly non-scrambled '4th network' approach to programming, hoping to serve a loosely inter-connected (via satellite) network of TV stations coast to coast, and, individual home terminals.

RECENT European economic studies of cable TV, given wide publicity in UK and elsewhere, paint 'gloom and doom' forecasts. Many who had serious thoughts about investing in cable's development in Europe are now backing off. DBS in Europe, meanwhile, looks not so good either as two leaders, France and England, continue to experience budgetary and political delays that threaten 1980's start of effective systems.

U.S. 1985 FY budget shows no let up in **military** spending on satellites and sub-systems; DOD wants to acquire 6 new birds in 1985 with start-up funding for 22 more.

SLIGHTLY more than \$1M has been awarded in contracts for two firms to study 'feasibility' of VOA (Voice of America) adopting DBS delivery techniques for both radio and television services worldwide.

TRANS-Atlantic videoconferencing, via **underseas cable** rather than satellite, given green light via AT&T. Using compressed video techniques (essentially a form of 'slow-scan TV' interconnection), service from New York City to London now possible.

SPACENET 1, 24 transponder satellite scheduled for May 22nd launch via Ariane, is for sale. They are asking \$350,000,000 for total bird; anyone seriously interested will undoubtedly await final positioning and check-out of bird before taking possession!

FIRST video on routine basis on Galaxy 2 (72 west), AFRTS for Europe, Middle East destinations seen there, apparently to feed US military installations in Caribbean and Greenland. Transponder is 20, is 20.

TELECOM Canada offering videoconferencing between 8 Canadian cities and a total of 22 US cities. Rates around \$1,200 for an hour are expected.

FCC study for most recent quarter of 'bird loading' shows some gains, some losses in transponder use. RCA added 15 active transponders from end of '83 study while COMSAT/Telestar was biggest loser with only 40% of their transponders in use. Overall average of all birds has 56% of all transponders in use.

FRANCE, on-again about French language DBS, now says they **WILL** launch TDF-1 late in 1985 and the TDF-2 bird in the first six months of 1987. TDF-1 was too far along to stop some months ago when questions arose about French commitment to DBS (they have been leaning towards a 'national cable system') but TDF-2 seemed 'stoppable.' Now France says 'Yes, it will fly.'

RECOVERY of WESTAR VI and Palapa B, imagined but not seriously considered, may happen after all. Technical aspects are being carefully worked out but legal questions raised now seem



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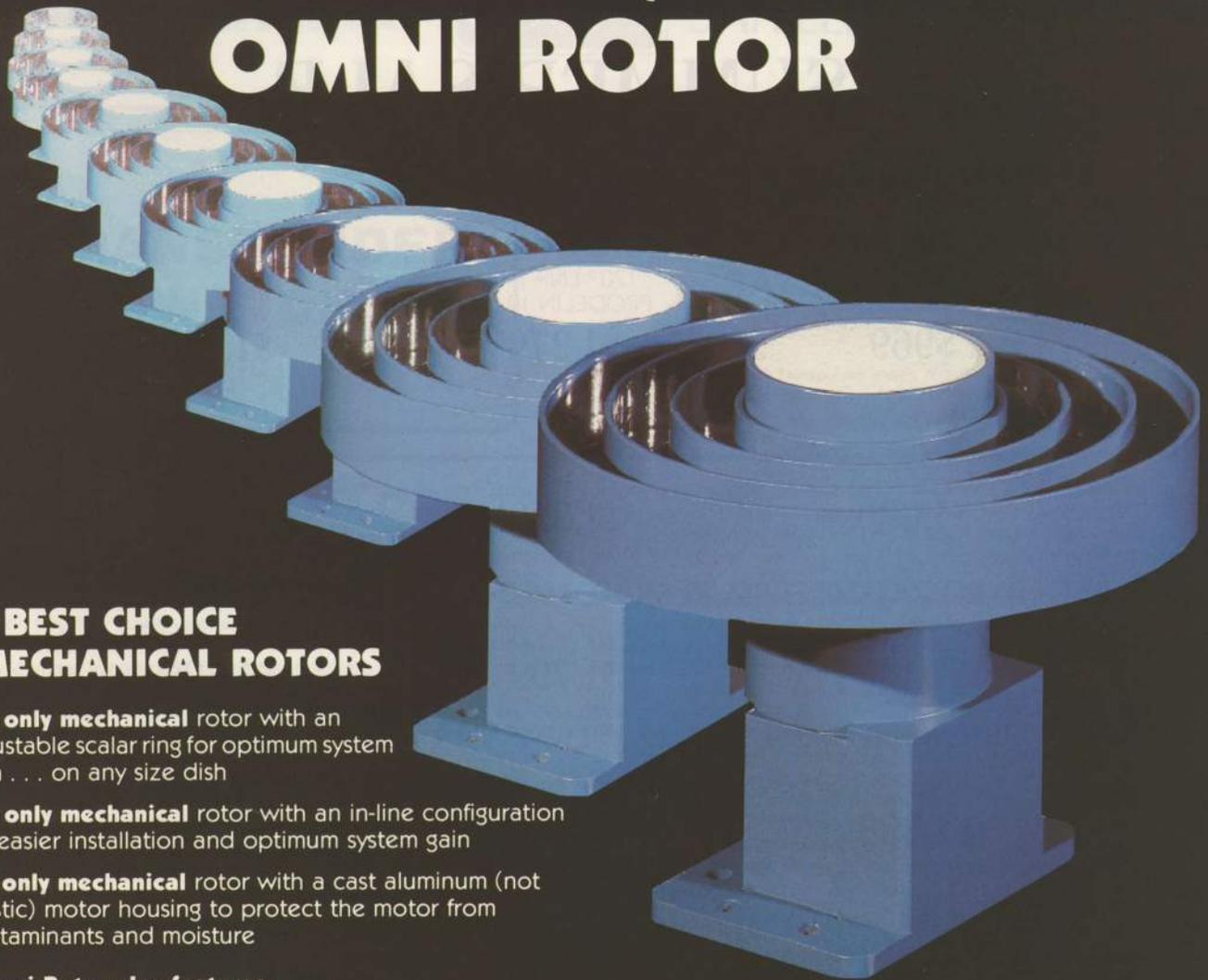
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TRANSPONDER WATCH/ continued from page 94

almost as insurmountable as did the technical problems three months ago. It will be a 'first,' if it happens.

CHINA now seems sure it will launch 'DBS' bird, probably with two channels nationwide and designed to serve dishes down to 6 feet in size, before 1988. Serious final planning underway and likely prospects for satellite hardware do not include any US firms.

WEST GERMAN satellite, scheduled for launch in mid-87, may have five channels of 20 GHz television downlinking on board for use as experimental relay service for Germany's new CATV systems.

STTI has announced last three show dates for 1984 year; **June 12-14** in Niagara Falls; **September 2-5** in Nashville, and, **November 18-20** in Dallas. Information from 305-396-2574.

EQUATORIAL's 2 foot receive-only data-dish-terminals now going in at rate of 100 per month; they recently awarded contract for construction of an additional 4,000 terminals and 'hope' to have an ultimate market 'greater than 100,000 terminals.'

USCI efforts to raise money not going well. Firm apparently had installed around 11,000 interim-DBS terminals using interim ANIK (C) service through 1 May. Their initial order for 11/12 GHz LNC units was 25,000 of which half had been delivered by mid-April from Orient. They recently awarded a contract to trio of Japanese firms for approximately 40,000 additional LNC units.

COMSAT Technology Products President William Perigard, ultimate 'boss' at AMPLICA division, reports Amplica's 'attempt to break into 4 GHz home TVRO market' has "contributed substantially to firm's losses." AMPLICA line of LNAs is reported running far ahead of projections, and, profitable.

SelectTV moved early in May from Westar V to Comstar D4. Firm cited move away from W5 for cable services, and if it is on D4, cable systems and SMATV equipped with 'multi-beam-feed-type' antennas can select programming from D4/F3R/G1 with greater ease than from W5 service.

HARRIS will sell you a 2-degree-certified 11 meter 60.4 dB gain 11/12 GHz dish for a modest \$110,000. If that is too rich for you, their 6.1 meter with 54.8 dB of gain at 12 GHz will only cost \$20,000.

OPERATION Uplink is the name given to the Republican National Committee's fundraising effort that is being conducted via satellite. First video-conference-to-raise-bucks began at end of April. 'Some work' for 4 GHz equipped downlink operators may result as political campaigns heat up through summer. **SPACE** is coordinating a program which targets 'certified downlink operators' for a piece of the political spending 'storm.'

CANADIANS will get to watch 'The Nashville Network' on Canadian cable TV systems. CRTC approved 'TNN' as one of the US programming services that **could be carried** within Canada, seeing no competitive service being viable from Canadian program sources.

LOSS of Westar 6 and Palapa birds could have occurred because part of the exit-cone-nozzle, through which fuel gases pass at tremendous heat and pressure, may have simply 'fallen off.' Theories continue to abound as researchers wrestle with assuring that whatever happened, it does not happen again.

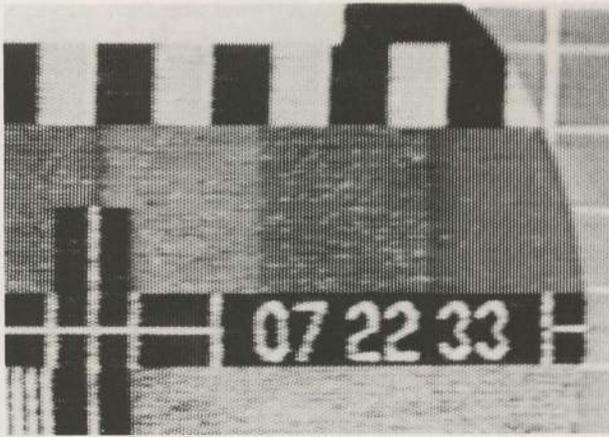
COMTECH claims their new 5.5 meter wide and 2.6 meter high offset-fed antenna WILL meet the FCC's new 2 degree spacing requirements.

SKYCHANNEL, English scrambled but commercially sponsored 'Super Station Europe' began service into new 'test CATV system' in Munich, Germany. System hopes to reach 5,000 homes by end of 1984.

ANIK C-1 bird, originally scheduled for launch from Shuttle this month, will now not go until around the middle of 1985. ANIK cited the payload assist module (PAM) problems that 'lost' Westar and Palapa birds earlier this year as reason. Entire Shuttle 'manifest' list for balance of the year very much in limbo with likely prospect that any birds scheduled for Shuttle launch between now and September will not go as scheduled.

COMSAT after another \$100M in funds by going to international 'debentures market.' They say it will be used for new investment in new Intelsat grade birds 'and other ventures' (such as the DBS program still scheduled to begin this fall).

PAKISTAN would like to 'join satellite technology world' by 1987



and wants to launch their own satellite by that date using own launch capability.

FRENCH TELECOM 1A, bird expected to finally replace long-ailing Symphonie bird(s) at 11 east, now scheduled for launch via Ariane early in August. Same Ariane launch will also carry up ECS-2, second European 11 (12) GHz bird.

MAINLAND China may be shopping worldwide (and specifically within Europe) for DBS bird scheduled for late 1987 launch, but they plan to launch it themselves using same launch system that put their STW-1 experimental 4 GHz bird into space during April. STW-1 is at 125 east and is reported to have a single television channel on board. Anyone seen it on the ground yet?

LATEST round of announcements for expansion of Russia's Intersputnik (Gorizont) satellite system lists new up/downlinks to be built in Syria, Nicaragua and Yemen.

NASA has described plans to launch satellite that would 'unfurl'

giant 300 foot wide reflector (dish) once it was on station over the equator. Beams would be so 'potent' that personally carried 'transceivers,' ala the Dick Tracy 'Wrist Watch Radios,' would be practical. No funding yet on this one.

IN case you overlooked it, this is the '50th anniversary' for the 1934 Communications Act, which has endured essentially unchanged for five decades. **Where would we all be** if the technology had remained that static during the same 50 year period!

COOP/ continued from page 5

theory, **before** such testing, was that when you had high winds, the 'mesh surface filled in'; that is, the wind struck the small wire strands in the surface, deflected at an angle and set up secondary wind-eddy currents around each wire strand. And those secondary eddy currents created a new 'surface' that filled in the holes in the mesh, causing the dish to in effect 'fill up' and become the physical equivalent of a solid surface at higher wind speeds. That **was** the popular theory.

Brough's argument may be stretched in Correspondence this month since nobody took the time to inspect **each** of the antennas that were tumbled in the Vegas wind storm to see if those that tumbled were properly weighted to the ground to begin with. We did hear of some that bent over on their mounts (meaning the mounts were too flimsy for the wind-loaded-antennas) but here again, were these regular mounts such as you might install in a customer's home, or, were these special 'high-gloss-painted' show mounts using lightweight materials to reduce shipping and handling costs for the show set-up? We don't know, and it is probably too late to go back now and reconstruct the individual failure causes.

Even if you dismiss the Brough letter as 'cute' but not substantial, you have to admit that many of the lightweight antennas now being offered do not **'appear to have'** good structural strength. For some time the mesh folks have been concentrating on telling us how their mesh surfaces will **stay-in-place** up to so many miles per hour of wind; perhaps what they **should have been measuring** is what

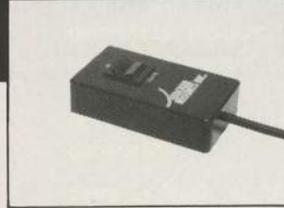
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amount of wind it takes to collapse or damage their rear support system, or that crucial dish-to-mount assembly.

We had two very stormy days here in the Turks and Caicos back early in March. Our wind speed indicator recorded a peak gust of 72 MPH one day and afterwards we found sections from a 20 foot mesh antenna ripped loose from the support struts. We fixed them with new attachments to the struts and then a week later we got another storm which peaked at 83 MPH. This time we lost 8 mesh panel sections from the same dish. At the same time a 12 foot (Paracclipse) antenna didn't lose a single 'clip.' Nor did the mount suffer any damage. The same wind storms caused the motor drives on two solid twenty foot dishes to 'drag,' a couple of degrees off of the original boresight, but did no structural damage to either of the solid surfaced antennas.

What does all of this prove? **Absolutely nothing!** While the antennas are clustered close together, strong and gusting winds here on the beach tend to be very sharply defined; get behind a building or row of vegetation and the wind speed drops drastically. The twenty foot that sustained the damage both days was totally in the open; the 12 foot Paracclipse was partially shielded by a building. Again, **this proves nothing**, except the frustration that goes with making 'snap judgements' about antenna integrity under heavy wind conditions.

I don't think we know all of the answers yet. I do think that firms designing mesh surface antennas, where the temptation to lighten-up the support and mount structure is great, would do well to subject their products to bonafide wind tunnel testing. **We need to know more than we now know.**

CORRECTION

In the **May CSD**, in writing about the way that the two new pieces of SPACE/STIA legislation were introduced to the industry (page 72), we reported that "The twin bills were as much a surprise to the majority of the Board of Directors as they were to the other 1,680 people in the banquet at Las Vegas." We went on to note that "... **to the best of our knowledge, only Directors Dushane, Howard, Behar, Dalton and Johnson had any fore-knowledge of the bills...**". Strictly speaking, **this is true.** However, it turns out that several of those just

listed were only told about the bills, and the satellite feed topic 'contents,' barely hours before the event took place. In other words, they did not participate in the decision making process that led to either the bills being submitted nor to the arrangements for the satellite fed round table which announced the bills.

Johnson, in particular, is concerned that the industry be aware that the decisions surrounding the bills introduction did not run by him in advance and that **when** he did finally learn the details, the feat was accomplished and beyond any 'discussion.'

HBO Update

I would be a fool to tell you exactly when HBO is planning to announce their 4 GHz DBS program. Because I don't know, and as of the date I am writing this, **they don't know either.** However, I can tell you that the 'signs are' **they hope** to announce their 4 GHz DBS program using Galaxy at the National Cable Television Association (NCTA) meeting over the period June 3-6 in Vegas.

When they actually announce, give or take a few weeks, is not the least bit important. That's a detail we can live with. Some of the other details are going to cause the fur to fly in our industry.

You would like some insight as to those details, I am sure. And that's where I have several problems. My 'contacts' for this information are in a jeopardy position; first of all, they work within the HBO structure. They have certain confidentiality responsibilities to their employer. I like these guys (no prejudice here, there are simply no gals involved) and I don't want to see them called on the carpet for confiding in me. The second problem is larger; **until** the final nail is in place, the actual format of the CBD service is not in concrete. In fact, I see enough 'loose ends' as I approach their announcement date that I will not be surprised to find that they make some fine tuning adjustments **after** the announcement as well.

So much for the excuses. Now, what is coming?

1) Programming. I 'expect' (that means I am making educated guesses; NOBODY has disclosed anything 'inside' to me!) that

COOP CONTINUES/ page 103

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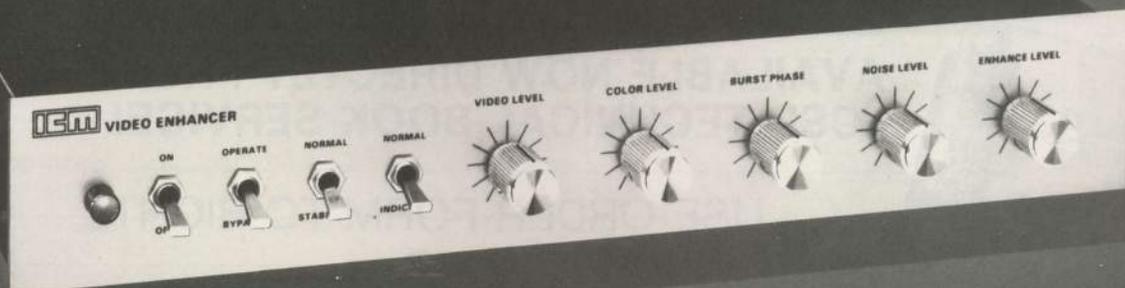
ceiver problems. Features include four audio outputs, four corrected video outputs, optional plug-in RF converter, fade to black capability, copyguard stabilizer and one volt peak video indicator.

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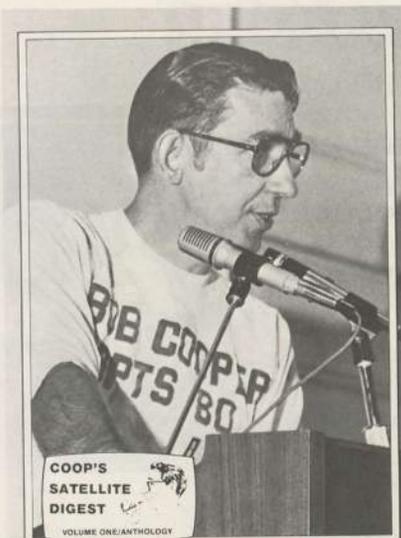


COOP 24 TIMES!



DO THE BASICS of home TVRO baffle you? Do you wonder how LNAs or down converters or antennas evolved as they have? Do you understand why **Taylor Howard** is the 'dean' of the industry's engineers? **CSD ANTHOLOGY** has it all sorted out for you. We have taken the first two years of **CSD** (October 1979 through September 1980; October 1980 through September 1981) and we have created 'CSD ANTHOLOGY'; Volumes one, and, two. From the very first day of our industry (**officially** recognized as **October 18, 1979**) forward, CSD Anthology follows (and leads) the developments which shaped the industry we know today. From LNA design work (by Bob Coleman) to antenna designs by Oliver Swan, the very basic roots of TVRO are laid out for you in typical 'Coop-Style.' Twenty-four times, month after month, for the full first two years of our industry.

CSD ANTHOLOGY/ Volume One is a true collector's item. During the first year of the industry, **everybody shared their secrets!** Can you imagine that the basis for virtually ALL of today's single-conversion receivers was told to the world by designer **David Barker** in June of 1980; he actually printed in CSD **his schematic and his circuit board** for the 'image rejection mixer'! He, in effect, gave away a multi-million dollar design 'secret' and that promptly launched a myriad of receiver suppliers in the business (including KLM, which Barker later became associated with). Or, can you believe that English experimenter **Steve Birkill** detailed the basis for the Chaparral '**Super Feed**' in CSD for February 1980, telling everyone how to build a 'scalar horn,' and that in June of 1980 Taylor Howard and Bob Taggart introduced a production model of this same feed design (our first review of the Chaparral appeared in the July 1980 issue of CSD)? How about this one. South Carolina's **Robert Coleman** told people **how to build an LNC** in the January (1980) issue of CSD and we published a circuit board designed by Coleman for this purpose; and it would be some 14 months later when Dexcel displayed the first production model LNC! **Almost everything you use and know today** started sometime in 1979-80 or 81; and it was **ALL in CSD**, not only first, but with sufficient detail that you could duplicate the work on your own work bench!



TO ORDER/ CALL 305/771-0505 or TURN BACK ONE PAGE

CSD ANTHOLOGY/ Volume Two is everybit as exciting as Volume One. Starting with the October 1980 issue, we see complete details for building a two-stage NEC GaAs-FET LNA. The fellow who shared this information was another pioneer; **Norman Gillaspie**. The same issue reports on the start-up of a 'new' firm that was going to revolutionize home TVRO sales; **National Microtech**. In the November 1980 issue Taylor Howard issued a 'warning' to dealers who were installing LNAs without bandpass filters; something called 'out of band' noise was making the then popular 120 degree units act like 180's or 200's. Naturally Taylor had a solution to the problem! In the December issue we were concerned with **Sat-Tec** receivers that 'lost their alignment' between the factory and the dealer; we told readers how to 'field-align' a Sat-Tec R2A receiver for best pictures. In February of 1981 we first reviewed the **Washburn/Earth Terminal** receiver. Way back ... in February 1980 CSD carried the first advertisement for the Washburn (Earth Terminals) receiver; **only \$2995!** Terrestrial interference reared its ugly head in 1981 and in the July CSD we explained what it was and how it could be cured. **Microwave Filter Company** read the report and started producing 'TI' filters; once again, **CSD got somebody started in the TVRO hardware business!** And so it was issue in . . . and issue out, during all of 1979, 80 and 81; **people helping people** start a brand new industry.



COOP/ continued from page 99

we will find Disney, The Nashville Network, WOR, WTBS, CNN, CBN, Cinemax, HBO and . . . Showtime in the Galaxy One package. That's nine channels and WOR may not make it if Turner raises a fuss (I suspect he will).

- 2) **Equipment.** I 'expect' there to be a shortage of equipment for the descramblers initially. I think that M/A COM's corporate people have finally realized that Linkabit (which M/A Com owns) designs great scramblers and descramblers, but they are not up to speed for volume production of units. I further expect that the descramblers we will initially see offered will ONLY be available in a Japanese built-for-M/A COM 4 GHz receiver. That means that if you are a distributor for M/A COM, or are a M/A COM dealer, you may have an inside track for six months or so.
- 3) **Interfacing.** HBO just completed a series of visits with six home TVRO receiver manufacturers. They wanted to know what the problems were in sending you, **the dealer**, a box which would descramble the nine channels of signals and expecting you to interface that box with the various receivers now in consumer hands or on your shelves. What they found was that **even** the 'best' of the present receivers lacked at least one 'Linkabit' refinement. Others were not so fortunate. In the best case, the baseband audio available in a top of the line receiver required different deemphasis. In the worst case, major surgical changes would be required to get the required 'Linkabit compatible' video out of the box. This really means that very few (if indeed any) of the present receivers can simply 'plug into' a stand-alone (outside of receiver) box that HBO will supply. That will make it tough on dealers to sell the HBO nine channel DBS service **unless** they are **also selling** M/A COM receivers which will have the Linkabit package built in.
- 4) **Timing.** This is the dangerous ground because when you publish a date, and you miss it for whatever reason, people suspect your credibility. Don't suspect; sometimes the best plans get stuck in engineering snafus. **I like the date May 1, 1985.** Not to **start** the CBD program, perhaps, but as a date when virtually all 9 of the services we are now discussing would themselves be 'scrambled' on Galaxy 1. Some will scramble sooner, of course. The program should **start** quite a bit sooner than this (magic) date. But **until** all nine or so services are scrambled, what do they **really** have to sell?
- 5) **Together.** Which brings us to the obvious devious point; if they are going to scramble these nine channels over on G1, why would anybody who knew what was happening bother to subscribe to the service if the same service is also available on F3R **without** scrambling? The answer is obvious. May 1st, if realistic, is a date when HBO, Cinemax, and at least Showtime **would be scrambled on F3R.** Maybe not CNN or WTBS, but they are not the 'heavyweights' of the package anyhow. What about The Movie Channel, since leaving even one fulltime premium service unscrambled might be enough to cause some people to simply pass by the scrambled CBD offering? **It too would be scrambled,** and there is a **chance** it could be part of the package as well, on Galaxy.

This may be a lot of information for you to assimilate all at one time. Let's recite the basic 'headlines' so you can test your reading comprehension.

- 1) Nine channels in all with the surprise addition of Showtime.
- 2) A shortage of equipment and M/A COM using Japanese built receivers that have the descrambler circuits built-in will dominate the marketplace early on (simply because **they** WILL be available).
- 3) Problems with interfacing older or present series receivers, but expect that to sort out by early 1985 so that virtually any new receiver can be connected to an optional outboard descrambler.
- 4) The program will be in an 'announced-but holding' state during most of the balance of 1984. Tests will be made, but don't expect any real activity that impacts on you before December or so of this year.

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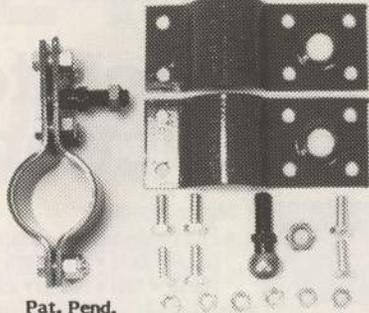
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- 5) The real kickoff for the program will come when all of the fulltime premium programming firms have their scrambling systems installed and operational; on both F3R and Galaxy 1 if that fits their transmission format. **We like** the date May 1, 1985 **but like any forecast**, it is subject to the ability of the suppliers to deliver the required equipment:

Now, when the 'formal' announcement comes, we'll see whether I get a passing grade or not. Four out of 5 would be passing in my book.

The most confusing part I have saved for last. Who gets to sell this package?

HBO is not announcing it first at the 'cable show' by accident. Cable operators, if they are interested and if they qualify, will get the first right of refusal to sell and install CBD service packages in their areas. Hey, cable guys send big bucks to HBO every month. You'd do the same thing if you were in their shoes!

Does that freeze you, the little guy selling home TVRO terminals around the fringe of the local cable system, **out in the cold?** Maybe yes, maybe no. **Yes if** the cable guys are aggressive, far-sighted and decide they can service an entire rural county or two with their service trucks just as well as they now service the town with their cable lines. **Maybe no** if they are realistic and decide that for a few bucks per home per month they would be better off passing up the opportunity and allowing you to do it. Or there may be a happy medium; **they will 'market'** (as in sell) the service and they will contract with **you** (or your competitor down the street) to sell and install the hardware itself.

This is obviously the toughest part of the entire deal. It is going to be hard enough on you to 'lose' the present 'free premium services' as a marketing tool when you are selling TVROs. Sure, you'll 'try' to explain that there are still 100 or so channels up there and 'who wants those nasty movies anyhow?', but down deep **you know you will be hurt.** Even I sneak a look at HBO now and again. It will be even tougher if HBO somehow gets you into a position where not only have they taken away your movies, but they are allowing some guy down the street (such as the cable operator) to sell them in competition to you. What's to stop the cable operator from **selling terminals** that include the premium service channels? Nothing. That will, of course, put you at a disadvantage. But before we go off half cocked and start screaming anti-trust, **let's sit back a month or two** and watch just how interested the cable operators REALLY are in selling this add-on service. I'm betting that most of them will pass it up, having their hands full 'in town' and wisely staying away from the rural countryside and the service problems that entails.

SPACE's HR.5176? Doesn't that help? No, not at all. All the SPACE Bill would do is force HBO if they scramble to offer their scrambled service to private home terminals. At a fair market price. And what do you think CBD is all about? **It is HBO** offering their scrambled service to private terminals **at a fair market price.** Wouldn't HR.5176 force HBO to allow **you** to sell their service, perhaps **along with** the local cable guy? No, that is not what it says and that was not even considered when it was drawn up. So HR.5176? Getting it passed will **not help** you one bit.

Yes, there are unknowns in all of this. That's what makes our life so interesting; we don't have all of the answers, yet, and probably when we do we'll lose interest in TVRO anyhow because the challenges will be gone!

OFF Again

It seemed like one of those 'neat ideas' when I first heard it. I was listening to **Doug Dehnert** of USS/Maspro as he talked.

"... and there are around 150 U.S. personnel stationed there and they have this 30 foot dish which they are using on F3R to bring in the six hot horizontal transponders that spot beam into Hawaii." Doug was telling me about an island in the Pacific; an island far beyond Hawaii where a particular branch of the U.S. Government maintained a special 'outpost' with a specific duty assignment. He cautioned me not to mention the name of the island nor the specific duty assignment, as he related what they were doing.

"... and off this 30 foot dish they have some pretty clean pictures from WTBS, Showtime west coast, CNN, and transponder 22's service. I think they may have the feed improperly mounted... here, take a look at this videotape." And we sat and viewed a tape shot by one of the guys on the base as he took us on a 'video-tour' of the 3 mile long island as well as all around, through and inside of the 30 foot monster

dish they had scavenged through some military scrapping program. I told Doug it was interesting.

"... and they are presently rebroadcasting the off-satellite service from WTBS over the island to the barracks, the officer's quarters and the service clubs. They are using some high power MATV type amplifiers as transmitters and some five element yagi antennas."

He had my interest. **Would I like to fly with him to this unnamed island to install some first class equipment? Do ducks like the water???**

We put the trip off several times; first we went around the world together on the Sri Lanka expedition and then there were the winter and spring shows. Finally Doug either had to go or forget the project. So on May 18th Doug and I flew west out of Los Angeles bound for Hawaii. In the 747 hold we had antennas, a nifty new transmitter which developed ten watts of power on **each of three** VHF channels (you connected up a trio of MATV/CATV modulators on channels 2, 4 and 6 at the input, and out of the output you have ten watts peak pedestal power on **each** of the three channels, **all at once!**), a slug of LNAs and receivers, and a clever package I put together on Provo to allow us to re-broadcast one of the WTBS sub-carrier services over the island on VHF channel 3 so the military and scientific guys could enjoy stateside background music as well.

Touching down in Hawaii, we would lay over less than 15 hours. Dehnert had a busy schedule arranged; some guy from Tahiti was to meet us there. He had been playing around with a 16 foot dish in the South Pacific and wanted us to give him some pointers on getting better pictures out of Intelsat. We were also going to visit at least one 12 foot home installation in Hawaii before leaving the AM of the 19th for our secret island.

"**You have to be cleared by the base commander in advance or they won't let you on the airplane at all,**" Doug had explained. "There are no tourists on this place; Holiday Inn has not reached there yet!". **We had our clearance,** and in fact I expected there would be quite a welcoming committee since Doug and I were bringing these folks three channels of television plus a new FM radio service in our 'suitcases.'

Naturally this is being prepared prior to our actual take-off. Those who are ham radio operators in the crowd may have caught me 'on the air' from this secret place on May 20 and 21; the call was K6EDX portable KH3. Well, there goes the secret place! Anyhow, I will be anxious to share with you what F3R pictures look like some considerable distance south and west of Hawaii when we re-join you here on these pages next month. I have been convinced for a couple of years that the Hawaii spot beam on F3R, and perhaps other birds as well, should be providing useful service over a considerable region 'beyond Hawaii' in the Pacific. Now I will have had the opportunity to see just what it looks like first hand. Just a 'typical' long-weekend jaunt to a tiny island half way around the world to keep you informed of how our industry is exploding!

DEALER Self-Help

One of the quickly dismissed pieces of business at the March Las Vegas SPACE Board of Directors meeting dealt with the establishing of technical equipment standards or ratings. The question arose 'What was SPACE doing or going to do about establishing standards for equipment performance and interfacing compatibility?'. A short history lesson.

Back in 1979 Andy Hatfield discovered, as he set out to manufacture TVRO receivers under his AVCOM banner, that LNA powering connectors were not uniform. In those days nobody had yet figured out that you could power an LNA by sending DC up the coaxial cable (Avantek, as I recall, was the first to do this) so we had two 'wires' going to each LNA; one was the coaxial cable (through the now standard N fitting) and the other was some type of two or three wire powering cable. Each time you wanted to swap out an LNA, between say Avantek and SCI or whatever, you had to stop, solder in a new type of powering plug, and then proceed with the swap out. Clearly this was not a very good way to do business and Andy urged the LNA folks to adopt a 'standard powering plug.' The suggestion was sound but the parties involved never got around to agreeing on 'what type of plug' should be **the standard.** Fortunately for all of us, in short order

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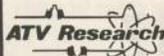
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they created the duplexed cable approach (power plus RF in the same connector) and since we were all using type N fittings (there being no other REAL choice for 4 GHz) the problem solved itself.

Then in 1980 an early SPACE Board asked itself 'Are there not areas where cable and connector standards could be adopted to make equipment inter-changing easier?'. Not everyone used 'F' fittings, for example; some were using RCA fittings. Audio and video outputs on receivers used a multitude of different jacks and plugs (this is not resolved even today) and in that era we also had no built-in receiver modulators so everytime you installed a receiver you had an outboard modulator you also had to wire in.

So a 'Technical Committee' was formed and onto it, as I recall, landed AVCOM's Hatfield, Earth Terminals' Washburn, Sat-Tec's Ramsey, myself and a fifth who eludes my memory at the moment. The Technical Committee got off to a rocky start; at least two of the members of the committee not only did not see 'eye to eye,' they were barely speaking to one another. Engineers who disagree often carry their disagreements over to all social contact levels between one another and we had a classic case of this on the committee. Needless to say a committee that included two guys that refused to talk with one another was doomed to begin with. And there were other problems as well, best forgotten now.

The committee did nothing. It could not even meet as a group of five because of the personality differences between at least two members so we had the strange situation where first three or so would meet to discuss standards, and then three more would meet to discuss the same thing. The first three and the second three included only one common person. Not very productive as you can imagine.

The 'Technical Committee' soon lapsed into a non-entity. In the years that followed, when SPACE needed some 'technical advice,' they leaned on either Taylor Howard or Clyde Washburn for outside opinion (outside meaning 'outside of the SPACE office in Washington'). No further attempt was made to deal with 'things technical' at the SPACE Board level.

There are real conflicts within SPACE in trying to deal with technical or equipment 'standards' at all. The first conflict is that the Sherman Anti-Trust law prohibits competitors from 'conspiring' to set 'standards' which might have the effect of reducing the 'options in the marketplace.' In other words, if there are three guys manufacturing left-handed-widgets and they get together and decide that all left-handed-widgets will have a green stripe on them in the future, that is a violation of the 'Sherman Anti-Trust' Act. You can see how far a SPACE technical committee would get if it really attempted to set 'output connector standards' for receivers. (In fairness, there are 'ways around' this sort of problem but you have to have 'cordial relations' between the participants to obey the letter of the law; we did not have such relations on the early SPACE Technical Committee.)

End of history lesson, except to re-state that at the March SPACE Board meeting the matter of establishing technical 'standards' or even 'guidance' for the industry drew negative responses from the Board.

If SPACE cannot or will not deal with 'standards,' who might? SPACE is the only game in town, right? Not true.

There is NASDA, the group headquartered in Salt Lake City which has been attempting to penetrate the dealers. They want the dealers to be a strong and vocal group within the industry. NASDA would do 'standards' if they could ever get off the ground.

And, there is NASEM. You probably have not heard about NASEM; that's short for (the) National Association (of) Satellite Equipment Manufacturers. NASEM was formed with one primary objective; to establish equipment technical standards. With SPACE officially bowing out of the standards mess, this looks like a suitable task for a group such as NASEM. They claim this is their only interest. I think that is a sufficient challenge that if NASEM really did this job right, they would have all they could say 'Grace,' over for several years into the future. One thing bothers me about NASEM; the word 'manufacturers.' I would rather the 'M' stood for 'merchandisers' or 'marketeers' or something that dropped it a level below the OEMs (original equipment manufacturers). Most of the people now participating in NASEM are, indeed, 'Manufacturers' with a capital 'M.'

I talked at length with several dealers in Las Vegas and we wondered how the dealers might be better assured of both the equip-

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ment integrity and the equipment compatibility when they purchased. The best concept I heard came from an Illinois dealer, **Roger Sellers** of TWS Electronics in Roscoe. Sellers asked what seemed like an innocent enough question:

"If the manufacturers cannot fairly evaluate the equipment because they are the people responsible for designing and building it, does it not make more sense to have the people who are purchasing the equipment do the evaluation?"

In other words, shift the evaluation process from the OEM to the dealer; **let the dealers** create a 'Technical Committee' and **let them establish the rules** of testing and the recommendations for connector and cable interfacing. I instantly liked the concept.

The dealers are the people who are directly first-affected by equipment that does not perform 'as advertised,' or, 'as represented.' The dealers are the people who are first-affected when a manufacturer decides to stick an F fitting on an audio output jack on the back of a receiver (when few modulators commonly used have F connector audio inputs). The dealers have the most to gain, or lose, by being 'surprised' by a piece of equipment which comes out of the box either defective, or, not readily usable because of some connector problem.

"The first problem is to get the dealers organized," suggested Sellers. "Don't we have enough organizations already?" The answer of course is yes, we do. Perhaps too many. "If SPACE doesn't want to get involved, how do we get a program like this off the ground?" he again asked. I had a suggestion.

At the forth-coming Niagara Falls show there will be hundreds of dealers present; perhaps thousands. I suggested we put together a 'Forum,' for open discussion and debate, during the STTI Niagara Falls show. I volunteered to 'chair' the session since I have a certain amount of experience in keeping order in an unruly atmosphere.

"Let's hear what everyone has to say, let's hear all of the gripes and problems first," I suggested. "Then let's form a totally non-political (meaning **not** SPACE, **not** NASDA, **not** NASEM) pure and simple 'Technical Committee.' "We'll set out a list of written goals between the Niagara Falls convention and the next STTI show in Nashville, in September. Then we'll make a presentation to the full dealer world in Nashville with our recommendations for a totally independent, non-political, 'Technical Committee.' Perhaps, after we get it going, it may make sense to link it in some way to one or more of the established groups, such as SPACE or NASDA or NASEM. Perhaps not. Why start something THIS important and saddle it with political problems at the outset?" I suggested.

So that is the plan. I (meaning CSD) am prepared to offer 'space' (as in operating room) for creating a small testing lab. At no charge. I (meaning CSD) am prepared to use whatever persuasive powers as I might have to get test equipment manufacturers to loan the 'Technical Committee' the equipment we will need to function. At no charge. I (meaning CSD) am prepared to publicize the work of the 'Technical Committee' and supply office time and materials to print up any literature we need to keep everything properly documented.

I see this as a volunteer effort; we can keep the stigma of misusing funds out of the 'mix' by simply not generating any funds! It's hard to misuse something you don't have to start with. I have many other ideas on how this can work effectively, fairly to all concerned, and **not turn into** a 'vendetta squad.' But I prefer to keep my own prejudices and bias under wraps for now until we have held our first 'organizational meeting' in Niagara Falls.

Two years ago, perhaps even one year ago, we could not have seriously considered such a project. **The first dealers** we had, in the 1980 era, **were smart guys;** they had to be technically smart to make the early 'equipment' plug together and work, under usually adverse conditions. Then as we matured we went through a stage of people who thought they were dealers, but who usually had no concept of the technical side of the business. Today, as we continue to mature, we happily have a new mixture of both; those who understand the technical problems and who have test equipment and operational knowledge, and those who are strong on marketing but weak on engineering. Many of the more successful dealerships today are partnerships; one fellow handles the technical side, and the other handles the sales.

Out there we must have enough technically minded people to make up a committee of bright, straight-thinking people. I guess we will see in Niagara Falls. Regardless of your technical abilities, even if

you have none, **you probably do have** some strong opinions about how a well run 'Technical Committee Program' might make life easier for you. **I invite you to be with us in Niagara Falls** to help us get this off the ground.

EXPLANATION Owed

Way back last fall when 20 or so representatives of our industry flew out of San Francisco for Tokyo, on our around the world junket that included a six day stay with **Arthur C. Clarke** in Sri Lanka (see **CSD** for January, 1984) I had made special arrangements to rent a reasonably high quality ENG type video camera to shoot some videotape of the Sri Lanka portion of the trip. It turned out that Utah dealer/installer **David Lyman** had one of the new JVC combo camera-recorder-on-your-shoulder systems with him as well, and Microwave Specialty's **Carl Grindle** lugged along an older style 1/2 inch video deck and a purportedly portable color camera. So we were well equipped for whatever might cross our paths.

After battling customs and arguing the equipment through numerous stops, we ended up in Sri Lanka ready to cover the installation of the twenty foot ADM dish, the 16 foot Paraclypse and the 25 foot Hero. Kevin did most of my camera work and kept trying to talk me into trading off some of our own WIV cameras for 'just one' like the JVC we had with us. **It was** a very nice three tube camera and the color tape we brought back looked very good.

My original plan was to do a quick edit and then to air the tape as an industry special, via satellite, sometime late in January. I had talked SFPC's **Bill Young** into 'sponsoring' the program by getting him to agree to pay for the editing time and the air time. I had talked Utah's **George Mitchell** into coming down to southern Florida to spend three days with me locked up in an editing facility putting the hours of tape together into something cohesive. It was all go until I discovered, upon returning, that the STTI/SPACE thing had blown into a full scale war and at least **some** of the people were trying to put **some** of the blame on SFPC and Young because he had befriended STTI's Rick Schneringer. I didn't want to fuel those fires and felt that **anything** that SFPC did at that time was going to be gasoline on a fire so I begged off with SFPC and put the tapes away in a file drawer.

Next I thought about showing the tapes in Canada at the first Expo in Vancouver, but without SFPC's financial backing for the editing there was no way I could pay for three or four solid days of post-production editing plus George Mitchell's tab or expenses. George was offering to do it just for expenses because he is that kind of guy but I couldn't figure out where the other 'thousands' to put together a 90 minute program were going to come from. So the tapes, once again, sat in a drawer.

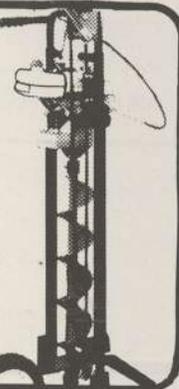
Then I thought I might get the tapes edited in time for Vegas, and played with that for a few weeks before I realized that there were two problems here; one was 'which show' and the second was 'where would I find four days to edit them?'. So once again, **back in the drawer**. I showed some excerpts to a few industry folks who were down to Provo this past winter but it is hard to follow hours of tape shot randomly when it has not been edited together, and after a few

COOP CONTINUES/ page 112

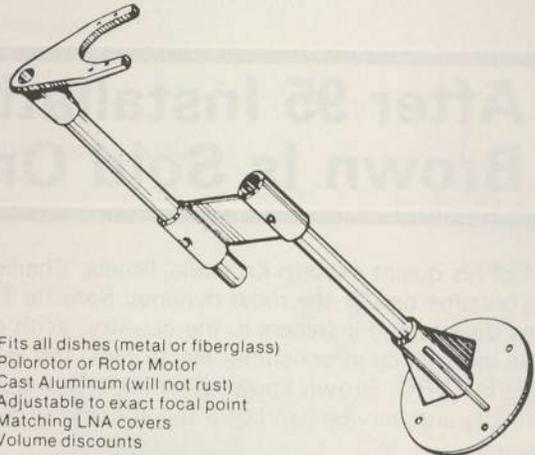
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WHAT ABOUT INSTALLATION?

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HOW DO YOU SELL AGAINST THE COMPETITION?

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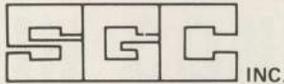
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COOP/ continued from page 109

minutes of each tape it was plain to me I was forcing them to watch my home movies. **Back into the file cabinet drawers.**

Then in mid-April I had a telephone call from Arthur C. Clarke and he wanted me to send 'the tape' to some people in Washington. Clarke was here in the states in early May to participate in a ceremony in the District of Columbia (we were invited but when I found out it was a 'formal' affair I instantly said 'no thank you!'), and then to spend two weeks in California working on the final workups for his new movie 2010. There was no such thing as 'the tape'; there were a half dozen tapes, all as originally shot by Lyman and Kevin. But not 'the tape'; I had five days to get 'the tape' to Washington, and returned to Provo half wishing I had never shot any tape. It is difficult to say 'no' to Arthur C. Clarke, so I would give it the old college try. And I'd do it using the WIV video tape editing gear.

With five days of editing ahead of me I dug in and within 30 minutes knew I was in **real trouble**. The Panasonic 3/4" editing gear wasn't working right. In another sixty minutes I knew trouble had to be spelled with a capital 'T'; it quit working altogether! I had Marshall dig into it and he reported back; somehow we had taken a voltage surge and had blown someplace between 3 and 8 digital-type-circuit ICs. No way to get them repaired or replaced on Provo. And the editing system was totally down.

Wife Susan volunteered to take the 280 pounds of machines (plus edit controller) to Florida on the next available flight. I wrote a panic note **begging** the repair people to get **at least one** of the two decks turned around in 48 hours. When Susan returned with the one unit 48 hours later, we plugged it in and . . . you guessed it. It didn't work.

While she was gone I began playing with our WIV news editing system. We shoot news tape on 1/2 inch because nothing else makes sense for us here. We edit news on a Panasonic 1/2" editing system which never previously edited together more than perhaps 4 minutes of tape at a time. It is a very neat little system (the 8500 package) but probably not designed for heavy production editing. While Susan was away, I had played with a piece of music out of our library written by English Comedian **Benny Hill**. It is a little Hill-ditty about sticking your finger in your ear and solving all of your problems. I had laced together the 2 minute 13 second audio from Benny Hill with some very carefully chosen extracts from Sri Lanka shot tape. **It amused me** to have Benny Hill singing in a Cockney accent and Arthur C. Clarke sticking his finger (or telephone) in his ear to match the music lyrics. I especially loved Paraclypse's **David Johnson's** antics that I found to fit to the Hill music.

With no working 3/4 system, there was no way to boil down the massive Sri Lankan tapes to something that would suit the request Arthur C. had laid on us for the Washington reception. So I said '**what the H . . .**' and made them a dub on a portable 3/4" ENG machine from the 1/2" master, and fired it off. **As I write this** I have no way of knowing whether all of those big wigs sat around in their black tie outfits and watched Arthur C. stick his telephone/finger in his ear while Benny Hill sang, or not.

You, on the other hand, **probably did have the opportunity** to sit around in your living room drinking beer and watching the very same thing. I liked the piece so much that I submitted it to **Joe Koelsch** at **NOVA Video Productions** for use in his May 30th/June 4th **Satellite Showtime 84** program on F3Rs TR22.

Not satisfied with defacing the Sri Lanka expedition with Benny Hill limericks, I am now finishing up a second piece that is done to the country and western tune "**Wasn't That A Party.**" The participants in this 3 minute 24 second musical number get so smashed drinking whiskey, gin and beer that they steal the local police car and then have the audacity to drag race the local cops down main street. The video I have chosen to go with this piece is straight out of our industry's files that stretch back more than 8 years. I found one piece of video tape shot when Bob Luly was underneath his Umbrella antenna in San Jose in the summer of '80 that is a perfect fit for the line in the musical number "**Maybe it was the whiskey, maybe it was the gin, but there under my kitchen table I saw Joe talking to my old Tom Cat . . . and the cat was talking back . . .**"

The Sri Lankan tapes . . . meanwhile . . . are **back in the file cabinet drawer.**

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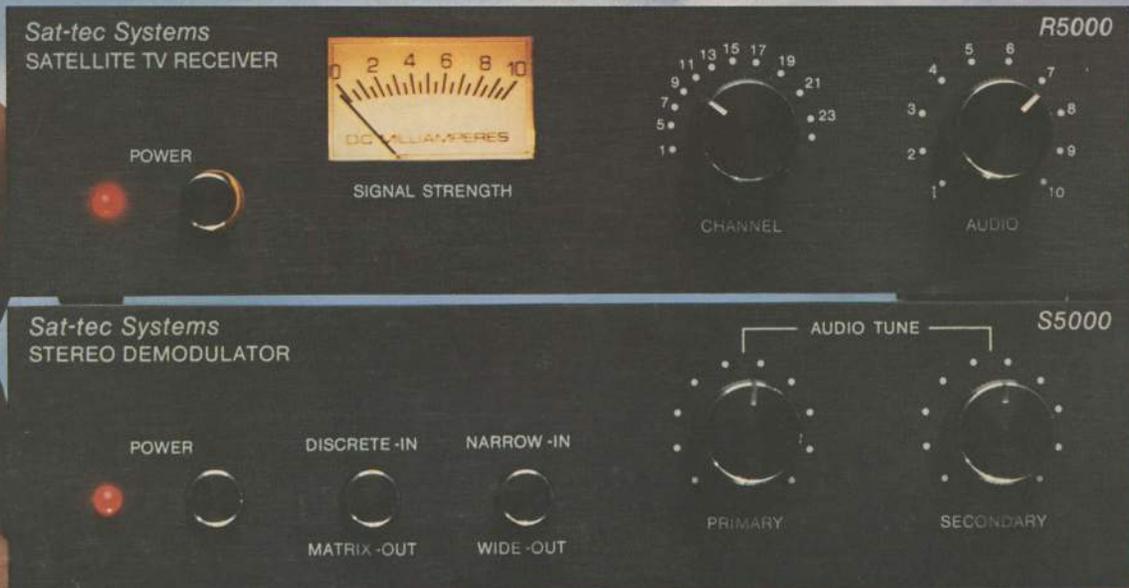
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