Bob Cooper's

DECEMBER 15 1995

SatFACTS

MONTHLY

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Editor/Publisher:
Robert B. Cooper
(ZL4AAA)
Office Manager:
Gay V. Cooper
(ZL1GG)

Reaching SatFACTS
Tel: 64-9-406-0651
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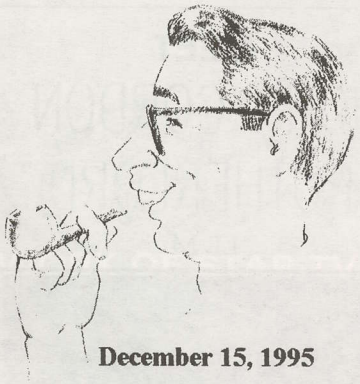
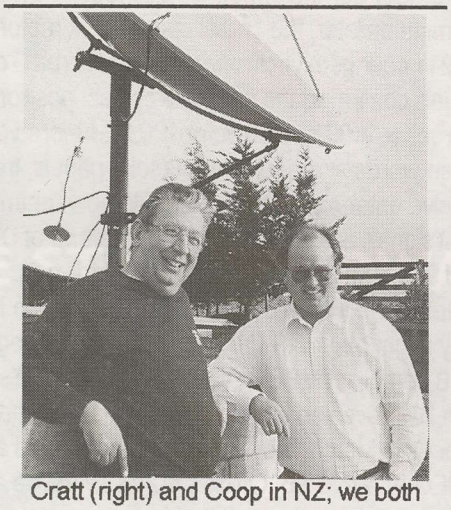
COOP'S COMMENT



December 15, 1995

Transition. The DTH business is experiencing a period of complex change here in the Pacific. It was just a year ago that PAS-2 began supplying limited test card and experimental service (CMT was the first, at the time FTA analogue). And just 15 months ago that G1's RAJ and G2's ATN first appeared in our skies. It was only a year ago that if you wanted satellite TV, you had to be some kind of nut or very desperate for video.

AV-COMM Pty. Ltd. has been supplying satellite TV equipment to nuts and desperate people for close to a decade now. It began as a labour of love for Garry Cratt, and only very recently has the effort turned into a real business. Garry quickly realised that early users of satellite equipment were 20th century do-it-your-selfers, and, on a budget. Australia's passionate affair with Ku band service and its policies restricting use of C-band international feeds virtually eliminated any hope that normal commercial practices would drive this industry. "Industry?" Hardly; just a few thousand people out of a population base of 16 million or so who had found something more exciting to do with their spare time (and cash) than collecting stamps.



Cratt (right) and Coop in NZ; we both need more exercise.

Suspecting that PAS-2 could change his business life, Cratt produced 25,000 copies of a 1995 catalogue that shortly became the hardware bible of a budding industry. Perhaps the 1995 AV-COMM catalogue introduced more people to the world of satellite TV than any other single effort ever mounted in the Pacific.

The nature of the business at AV-COMM is in transition, more and more of it is commercial in nature and the 1996 catalogue reflects this change. But hardly to the exclusion of the private user. Cratt, more than perhaps any other supplier to the satellite world in the Pacific, recognises the importance of the "enthusiast"; any person who owns and uses a satellite dish driven by desire, not necessity. For AV-COMM, catering to these individuals is good business and he has witnessed many who begin with a single backyard dish mature into installing dealers or even SMATV and cable system operators. It is this internal transition that has directed Cratt's attention to the more commercial hardware aspects of the industry.

More than any year to date, 1996 is to be one of considerable industry transition. In fact, it may well turn out to be the first year where we can honestly say, "*there is an **industry** here*." Garry Cratt is one of a handful of pioneers who stuck with a disorganised cadre of enthusiasts to turn us into an industry. Good job Garry - may you continue to grow in 1996.

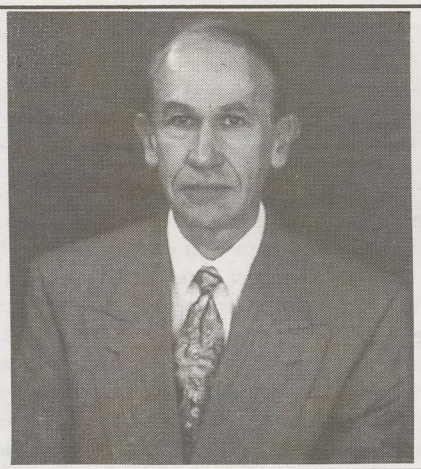
In Volume 2 ◆ Number 16

Departments

-ON THE COVER-

It's a dirty, cold, sometimes wet job but something has to do it. The antenna feed you select must match the characteristics of your dish and reject noise and interference from mother earth and terrestrial sources. Selecting a feed with the right characteristics may be more complex than you thought (p.6).

MEET
JOHN GORDON RUTHERFORD
LL.M.



John Rutherford (Civic Enterprises, Christchurch) is consumed with "beating the system." His professional lives (there have been many) have focused on unravelling closed shops, fighting monopolies, and applying technology to manoeuvre around roadblocks. A pioneer in private airline operation, his attention turned to telecommunications. Rutherford's legal skills as a patent attorney led him into the mysterious world of hybrid communications; the marriage of telephone, data, video and remote control systems. PacSat was one result; a cable TV consortium (Greymouth, Gisborne, Whangarei in NZ) using a Rutherford patented microwave delivery technique he calls 'Cellular Vision'. Share his unique perspective at SPRSCS January 26 and put your thinking cap on!

PROGRAMMER PROGRAMMING PROMOTION UPDATE

DECEMBER 15, 1995

AsiaSat 2 was successfully launched by China's Great Wall Industry Corporation Long March 2F rocket on 28 November per the announced schedule. One hour and 53 minutes later, the critical apogee kick motor fired lifting AS2 in near geosynchronous transfer orbit. Telemetry signals confirmed the satellite's correct position shortly thereafter. AS2 should be at 100.5E before you read these words and deployment (solar panels, transmit and receive antennas unfurling) should now be underway. Test signals are expected before the end of December (beacon at IF of 952.5 and 950.5 MHz, horizontal; see SF#11, p.6).

Deutsche Welle officials in Australia late in November denied earlier reports they might begin AS-2 transmissions in analogue pending large scale rollout of DVB compliant MPEG receivers. AV-COMM's Garry Cratt reports his meeting with DW revealed their Intelsat 180 lease (sharing WorldNet TR13; IF 1175) expires in March, they will renew it until June and could delay start of 24 hour MPEG until mid '96. Officials from DW will be attending SPRSCS in January, more straight answers at that time.

RAJ-TV has been actively operating in 1/2 transponder format but no verification this is a permanent fixture (G2, TR R6). Individual halves are centred on 3660/IF1490 and 3688/IF1462. Signals of each half are not balanced (1490 is stronger) and the best is -1.5 to 2dB from their previous full transponder operation.

ATN is now operating half transponder as well (G1, TR R6) with operating frequencies of 3686/IF1464 and 3661/IF1489. Again, 1464 is the stronger of the two by several dB (same programming as former ATN service). ATN Prime at press-time seems to be going into programming around 1100UTC. A well tuned 3.7m dish would produce ATN in full transponder right at threshold level in New Zealand; with half transponder service, a dish of at least 5m will be required.

JSAT advises SF that JCSAT-3 will not function from NZ/Australia with a Ku uplink although Ku downlink is designed into bird. Any southern hemisphere programmer wishing to use JCSAT-3 (several are talking to them) would uplink on C-band, be cross strapped inside of bird and come back to us on Ku.

Australian ATVI is carried on Rimsat G1(IF 1325) legally, says Rimsat's VP Tim Brewer. ATVI has contract to use AsiaNet transponder during its 'off hours' and thus reaches Indian homes in large quantity via this routing. Uplinking of ATVI is being done from Palapa B2P ATVI service by Rimsat at Subic Bay.

Measat 1, Malaysian domestic satellite, should be testing from 91.5E by early to mid-January. Very little has been published or announced concerning this one, C-band coverage pattern looks similar to Palapa B2P which means OK into northern Australia; reports solicited.

Palapa B2P, now inclined orbit at 113E (SF#15, p. 2), is likely to be moved to 134E (becoming more inclined by the month) after C1 is operating at 113E.

Mubahy Philippines Satellite Corp 30 TR C-band + 12 TR Ku band bird scheduled for December (1996) launch is likely to go to 144E; lots of potential here (SF#10, p. 21).

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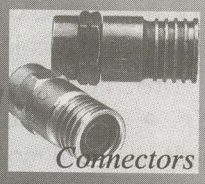
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HARDWARE EQUIPMENT PARTS UPDATE

DECEMBER 15, 1995

Not in my backyard. Chinese spy satellite (designated FSW-1), weighing 2041kg and size of compact car, is losing 5km altitude per day and expected to encounter sufficient upper atmosphere drag to pull it back to earth as early as March. Satellites and debris fall earthward weekly but this one is so large, and unfortunately equipped with Challenger style heat shields that it will survive virtually intact until it hits ground. FSW-1 was launched October 8, 1994, was supposed to return to earth on command from Chinese ground control operators for recovery of shield protected satellite camera high density film. Alas, it refused to respond to commands and turned from controlled to free fall. If it hits your house you could probably strike a bargain with Chinese who presumably still want film back.

"Real" Dish Crane. In SF#15 (p.4) we reported North Carolina firm Universal R&D was originator of tool that allows one man to safely lift dishes to 3.7m up sloping roof or terrain and place on pole mount. Gourmet Entertaining's Jim Roberts did some digging; seems the honest to gosh "first" creator of a dish crane is L.S. Engineering (110 Crocker St., Avoca, Iowa 51521; tel. 712-343-6676). Further, L.S. is looking for a South Pacific firm to licence for building their dish lifting tool.

AV-COMM's dual-band, dual-mode feedhorn (SF#14, p.4) is delayed; firm hopes to have working models available for delivery during SPRSCS. Garry Cratt advises, "(Prototypes of) *C-band version has been working for several months; it is not the designing that takes the time, but rather organising to have all of the speciality parts manufactured.*"

Straight Galaxy poop. "Mole" from Galaxy clandestinely advises "real facts" concerning status of Galaxy MPEG service. We paraphrase report:

"*Galaxy is using* 65cm dishes for Sydney, Adelaide, Melbourne; other capitol cities are 75cm (except Darwin, Hobart); two-types at present; Hills/Concentric with voltage switching dual pole 1dB nf Marconi LNBF, and, Microage/Winegard with same type of LNB manufactured by CalAmp;

"*Third week in December* is internally scheduled 'roll-out' for DTH after which there will be no more 'pre-installs'; current rate (early December) is 400-600 DTH systems nationally per day [works out to average of 11,000 per month-ed.];

"*There is no software problem* that causes a 3 to 4 second delay (SF#15, p.1). There is small 1 to 1.5 second delay which is normal for DVB reconstruction (GI Digicipher had same 'problem');

"*PACE DGT400 receiver*, specific for Galaxy, has external PCMCIA slot at rear for conditional access module, requiring jumper cables. Cables are radiating 25 MHz CPU clock signal which has harmonics well into VHF/UHF TV bands. This wipes out subscriber's off-air terrestrial reception but typically has no ill effect on satellite delivered signals. This is a significant unresolved problem.

"Conditional access and encryption software transmitted to homes has proven to be highly unstable with frequent drop outs to subscribers."

Related report. Steve Sharp (Palantir Communication Consultants.) reports "*Installer Menu PIN access for DGT 400 is 4252* (SF#15, p.24)."

See No Evil

WHAT YOUR FEED SEES: The Secret To A Successful Dish

Imagine you are using an inexpensive pair of field glasses and looking at the moon. With limited magnification power, the field glasses fill your eyepiece to approximately 50% with the moon's surface. The balance of what you can see is deep space beyond the moon.

Now imagine you are using a modest telescope which is capable of magnifying the moon's image to the point that all you see is the centre portion of the moon's surface. You can pan (side to side motion) the telescope on the mount and 'travel' across the moon's surface from one edge to the other, as well as 'tilt' the telescope (up and down) on the mount to 'travel' from the top edge to the bottom edge.

Finally imagine that you can adjust the range of your telescope such that the full circle of the moon precisely fills your viewfinder. There is no 'deep space' showing around the edges, and, you are not clipping or missing any of the edge area either.

The feed on your satellite antenna should function just like the third example:

1) It should 'see' the full surface of the dish;

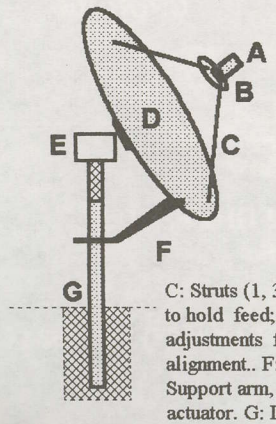
2) It should not look 'over' the edge of the dish (at the ground behind and around the dish).

Optical and Electrical

Our optics example almost perfectly describes the challenge facing the designer of a satellite antenna feed (antenna) system. The dish (moon) is a source of reflected energy that originated at the satellite. The parabolic shaped reflector has two functions in the system. The first and most important is to intercept the microwave frequency energy radiated from the selected satellite, turn it around (by reflecting it back towards the satellite) and because of the precisely shaped surface focus the reflected energy to a single spot ('point') in front of the reflector. The second function of the reflector is to block (as in 'get in the way of') any ground 'noise' which might otherwise reach the feed antenna.

The reflector when properly 'pointed' looks directly at the satellite's location above the equator. The feed, when correctly positioned, 'points' directly at the (centre of) the reflector. Thus the feed antenna, absent a reflector, would point towards the ground.

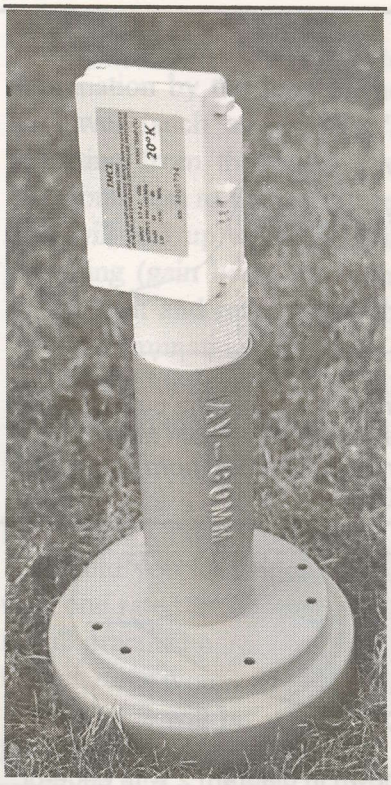
The ground (whether dirt, water or heavy vegetation) is a source of microwave noise. If you have access to a spectrum analyser, you can demonstrate this fact to yourself by connecting your feedhorn and LNB together, and then connect a short length of coaxial cable from the spectrum analyser to the LNB. Now turn on the analyser and point the feedhorn antenna straight up, into the sky. Hold it there and adjust the analyser for maximum sensitivity. Next slowly rotate the LNB + feed antenna downward so that it ends up pointing at the ground proper. As a further demonstration, sit the feedhorn directly on the ground with the feed mouth (open part) directly pointed into the ground. On the analyser you should see the bottom trace line come



C: Struts (1, 3 or 4) to hold feed;. E: adjustments for dish alignment.. F: Support arm, dish actuator. G: Dish mounting pipe.

Newcomer to Satellite TV? Start Here.

The satellite dish **(D)** is a totally passive part of the reception system; no wires attach to it, no electricity flows in or through it. It is a focusing 'mirror' that intercepts satellite signals, bouncing or refocusing them to a single 'point' in front of the curved dish surface. At this 'focal point' is the *real antenna*, called a feed or feedhorn **(B)** . And attached to the feedhorn is the LNB (**A**; low noise block downconverter) which does operate on electricity. The LNB is a signal booster, or amplifier, increasing the received signals more than a million times before sending them indoors to the balance of the receiver. The feed is like a horse wearing blinders; by careful design it "sees" only the surface of the dish and that's important. If it sees over too wide an arc, it also sees the earth (ground) behind the dish. Noise (not desirable) comes from the ground and is to be avoided. If the 'blinders' are too tightly formed, the feed sees only the centre of the dish and misses the signal coming from the edges. Selecting a feed with "perfect vision" for your dish is essential.



Earth noise is around 300 degrees K(elvin) or an LNB noise temperature of 3.08dB. Your 20K LNB pointing up at 45 degrees sees noise of 0.29dB in comparison.

up, higher on the screen, indicating that it is now measuring noise; earth noise.

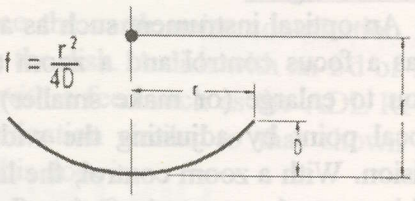
A feed, when mounted on a dish, that sees beyond the edges of the dish proper (i.e., like our binocular experiment where the moon only filled a part of the field of vision), will add the noise from the earth around the dish to the signal reflected from the dish proper. This noise will degrade the quality of your reception significantly. Selecting the correct feed for your particular "dish curve" is therefore essential.

Focal Length (f) to Diameter (d) Ratio

Not all reflector (dish) antenna surfaces follow the same precise 'curvature' formulae. If you know how (you will - hang on) to measure a reflector surface with a simple tape measure, and can multiply and divide, you have the tools required to determine the precise focal length (f) to diameter (d) ratio (f/d) for any dish. All feeds are designed for a specific (or range of) f/d ratios. The trick, once you know the f/d for your particular reflector, is to locate and then use the feed which has been designed to work with the f/d range that includes your reflector. By selecting the wrong feed, you could easily (a) have a feed that sees beyond the edges of the dish surface to the ground below (which means it will pick up earth noise; the binocular example), or, (b) sees only the centre of the reflector which means you will not be receiving and using the full dish surface to capture satellite signal energy (the high power telescope example)

Before we can calculate the f/d, we must know the precise focal length. Focal length? That is the point where the dish you are using will focus the energy out in front of the reflector surface. When we know the focal length, then we can calculate the f/d. The focal length is found using the formulae in figure 1.

1) Measure the dish radius (from the exact centre of the dish in a straight line to the curved-up edge of the dish; "r" in diagram 1)



To Calculate Focal Length (Diagram 1)

2) Measure the depth ("D" in diagram one), which is from the inside surface at the centre of the dish straight up (out) until you reach a point that is equal to the same curved edge of the dish. Here's a trick: Lay a straight edge across the dish from the 3 o'clock to the 9 o'clock position. Use the dish-side edge of the straight edge to represent the point equal to the top or outer curved edge of the dish. Now measure from that point to the exact centre of the dish and you have D.

And, follow the formula: f (focal length) is equal to the radius squared (multipled by itself) divided by 4 times the dish depth (D). Let's take a practical example:

1) A 3 metre dish has an r of 1.5 metres;

2) And it has a depth of 0.75 metres

We square r (1.5 times 1.5) and it is 2.25. Now we multiply 4 times 0.75 and it is 3. To find f (focal length) we then divide 2.25 by 3. The answer is 0.75metres.

At this point we are ready to calculate the f/d (*). We need to know this because all feed antenna manufacturers specify the performance of their feeds as a range of f/d numbers. Ideally, you will select a feed that has your dish f/d exactly in the middle of its own range of f/d.

The f (focal length) of the dish is known from our calculation: 0.75 metres. The diameter of the dish is the distance from one edge to the other edge: 3 o'clock to 9 o'clock, straight across the dish. In our example it is 3 metres. The f (0.75) divided by the diameter (3.0) is .25. Therefore this particular dish would require a feed with an f/d range that includes .25 (which, incidentally, would be a very difficult feed to design).

*/ Don't be confused by the two different d/Ds here. Small d (d) is diameter while big D (D) is depth. We use the D to calculate the focal length and then discard it in favour of the d which we use to calculate the ratio of focal length to diameter.

The Wrong f/d

An optical instrument such as a pair of binoculars has a focus control and a zoom control that allows you to enlarge (or make smaller) any object at the focal point by adjusting the width of the field of vision. With a zoom control, the larger you make the object at the centre of the field of vision, the narrower the field becomes. You cannot duplicate this continuous zooming action with a satellite feed; it is designed to provide a set "degree of magnification"; i.e., it comes out of the box to match a certain "field of view" and changing this (f/d) is not easily done in the field.

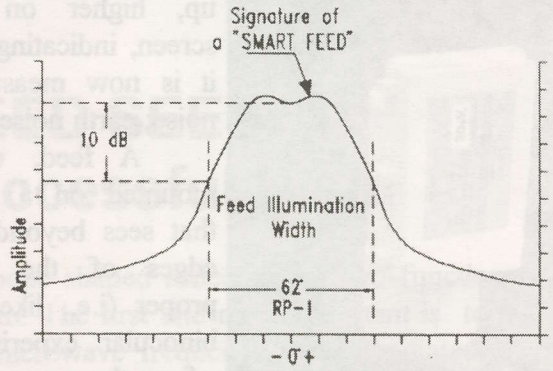
A "smart design" feed looks at the dish surface with a "square nose" (see diagram 2). The blunt or flat end represents equal "feed antenna gain" over some number of "degrees" either side of dead ahead (centre). However, like any "directional" (works best in one direction) antenna, the feed then loses gain either side of the blunt nose. The designer can play with how wide the blunt nose is, and, how much less gain the fed antenna will exhibit some number of degrees either side of the blunt centre. But he cannot design the feed such that it looks at all of the dish surface with a blunt nose, and then suddenly has no gain at the edges of the dish. This is called the "feed taper" which translates to best gain at the (blunt) centre, and less and less gain away from the centre towards the edges of the dish.

Most designers try to achieve a fed that has 10 dB less gain at the edge of the dish than at the centre of the dish, and they also try to make the blunt noise as "wide" (in degrees) as possible. In diagram 2, the feed has a blunt full-gain centre of approximately 20 degrees vision, and then on either side from the blunt maximum gain point to the edge of the dish the "gain" of the feed falls off (drops) by 10 dB. This means:

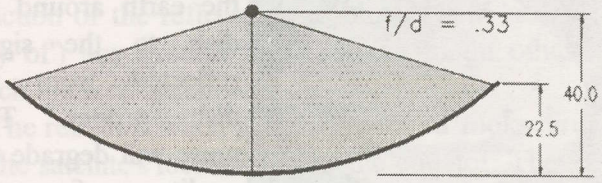
1) That signal striking around the edges of the dish and reflecting towards the feed will be 10 dB weaker than signals striking the centre of the dish and bouncing back directly into the blunt nose centre on the dish;

2) In the worst case, earth noise will be -10dB (i.e., 10 dB weaker) at the point where the feed looks just over and beyond the edge of the dish than it would be if the earth noise came to the feed at the blunt nose (centre) point of the feed's pattern.

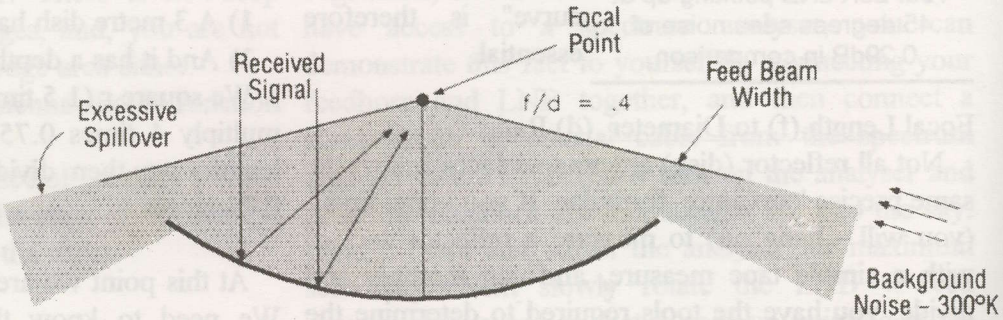
Trade offs. If you could make the blunt nose wider, then the "gain" of the feed at the edges of the dish would be greater and earth noise would be received with greater strength. This is called "over illuminating" (seeing beyond the edges of) a dish. If



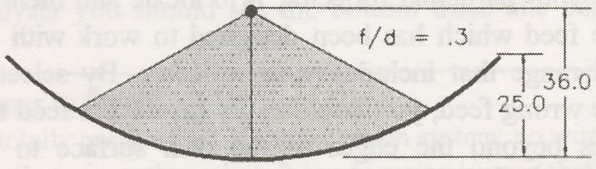
Blunt nose at centre of feed antenna pattern is signature of a "Smart Feed." Note gain at edge of dish (62 degree illumination) is -10dB from blunt end. (Diagram 2)



In this example (f/d = .33), feed antenna illuminates reflector surface as shown in diagram 2 with edge-of -dish feed gain at -10dB. (Diagram 3)



Here dish is over illuminated with feed that sees beyond dish edges to ground beyond; earth noise pickup is incresed, reception is degraded. (Diagram 4)



With under illuminated dish, feed's -10dB points are well in from dish circumference thereby losing overall system gain as outer portion contributes little. (Diagram 5)

you make the blunt nose narrower, then the illumination by the feed of the edge of the dish will be lower (such as -15dB). This means the signal reflecting from the outer portions of the dish will contribute less to the overall received signal and your dish will end up with less gain than it is capable of providing (gain being the sum of all signal captured by the dish and reflected to the feed). This is called "under-illuminating" the dish.

Proper illumination of a dish is shown in diagram 3; over illumination in diagram 4 and under-illumination in diagram 5.

Purposeful Under-Illumination

Would you knowingly replace your present LNB with one rated at 300 degrees Kelvin? Of course not; for all practical purposes most if not all of your noise free pictures would all but totally disappear!

AsiaSat 2 will be at or below 5 degree look angle for New Zealand, under 3 degrees in Fiji, and gradually better to the west. A satellite dish that will look at AsiaSat 2 with an elevation angle of 20 degrees or less will have earth noise appearing in the feed. The closer the feed is to the horizon the greater the noise will be. At the horizon (0 degrees look angle) earth noise will be 300 degrees Kelvin or more.

You can reduce the earth noise contribution by under illuminating the dish. A dish with an f/d of .3, for example, fed with a feed such as the ADL RP1, will have an illumination similar to that shown in diagram 5. What this does is:

1) The feed sees only the centre 62% of the reflector surface; the balance of the reflector becomes a non-gain adding "shield" against the ingress of terrestrial noise; a "ring" of protection for the feed.

2) The dish gain will be reduced (by several dB) but earth noise will be reduced even more and as a result your carrier to noise ratio (the signal to interference) will be enhanced.

On purpose under-illumination is a key tool in dealing with other forms of terrestrially created interference; such as comes from microwave links operated by telecoms in the 3.7 to 4.2 GHz region in your vicinity, and, airport radars.

Remember that the real antenna is the feed horn device, not the reflector, and if you can somehow keep the unwanted energy (noise of TI - terrestrial interference) from the feedhorn, you are way ahead.

Artwork appearing here courtesy of ADL, Simi Valley, California with thanks!

Share Your Wealth

NARROWBAND: DISTRIBUTING AUDIO SIGNALS

The expanded narrowband (audio) spectrum available to you via satellite begs sharing. And the easiest way to "share" is to connect the audio coming out of a satellite receiver to a radio transmitter. You may be able to cover your neighbourhood with one or more of these audio services for less than A/NZ$150.

In many regions of the world satellite delivered radio programming has completely changed the face of "networking" and thousands of radio transmitters now operate virtually (or completely) unattended with most of the programming coming in via one or more satellite relays and localism (in the form of hard disc or tape cartridge stored commercials and announcements) injected into the mix of programming on command from subaudible "tone cues." AsiaSat 2, now preparing for regular operation at 100.5E, will carry several dozen audio only services ranging from all news networks to a wide variety of musical services. Some of these services will be designed for commercial radio networking, others will be formatted for cable and DTH in-home subscribers.

Virtually any audio source (including the aural portion of TV programming) can be connected to the input of a radio transmitter for coverage of just your home, your immediate neighbourhood or an entire town (*).

The most basic radio 'station' consists of a small number of separate units. If your programming source is the audio received from a satellite source, everything but the actual transmitter and transmitting antenna is eliminated. A transmitter operating within the FM broadcast band (typically 88 to 100 or 108 MHz) is a logical choice since shirt pocket FM radios are inexpensive, readily available, and transmission range for even very low powers is attractive.

And the best part: All of the component parts will seem very familiar to anyone who is comfortable with a satellite DTH installation. You will be using the same cables, connectors and techniques you have already mastered for DTH.

Range And Products Available

A 100 milliwatt (mW) FM transmitter connected to a suitable antenna will cover an amazing distance; typically up to a kilometre if you are not trying to force the signal through a tall hill. Transmission coverage in the FM broadcast frequency range (88-108 MHz) is basically 'line of sight' which suggests that the simplest way to increase the range is to elevate the transmitting antenna higher above the ground (or selecting an elevated site to install it). A transmitting antenna 10 metres above ground connected to a 300mW transmitter will easily cover 5km 'line of sight' to a typical in-car FM radio.

FM transmitters in the 100 milliwatt range are available from a number of sources (**) and in many countries they are licence-free (i.e., can be taken directly from the box and put on the air as no licence is required [***]). Most such units have a built-in vertical whip (transmitting) antenna and may be licence free only if you use the antenna supplied; if in doubt, check your local regulations. If your regulations don't restrict the transmitting antenna to the whip supplied, replacing it with a home style FM 'yagi' receiving antenna (used for transmitting) will increase your transmission range by a factor of ten or more. The replacement of the whip supplied antenna is simple enough:

1) Open the case and locate where the transmitter output is connected to the whip antenna;

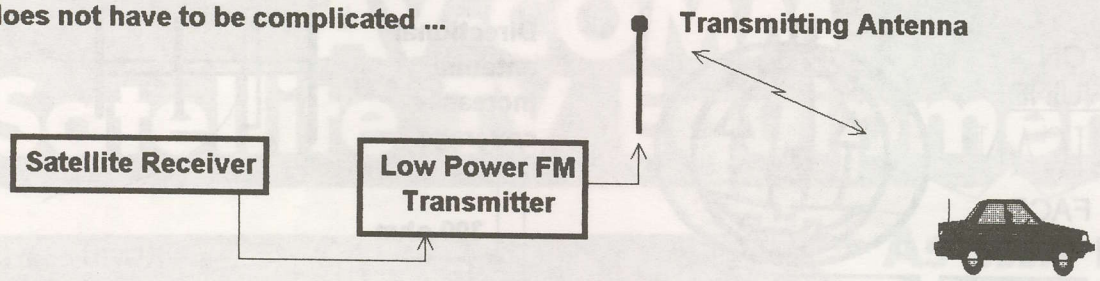
2) Carefully disconnect the whip (typically with a small soldering tool to remove a connection);

3) Take a piece of RG-6/U or larger (such as RG-11/U) coaxial cable and solder the centre conductor to the point where the whip was previously connected;

4) Now solder/attach the shield of the coax to the 'ground plane' (if in doubt where this is, obtain advice first!) of the transmitter circuit board as close as you can locate the ground plane to the coax centre conductor connection point;

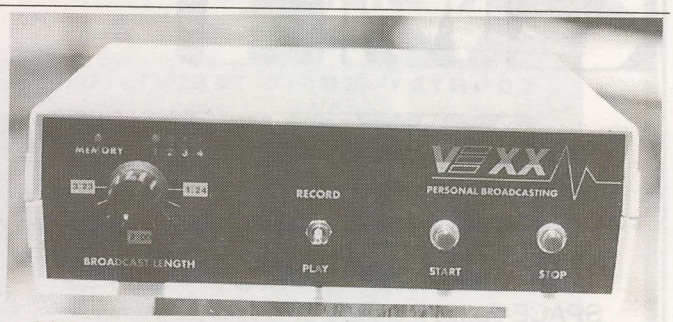
5) Run the coaxial cable to an FM outdoor type 'gain' receiving antenna, typically on a mast above your house/shop;

*/ Before rushing out to install your own radio transmitter, ascertain how your national regulations apply. The information presented here provides technical guidance but does not deal in depth with the question of licensing.

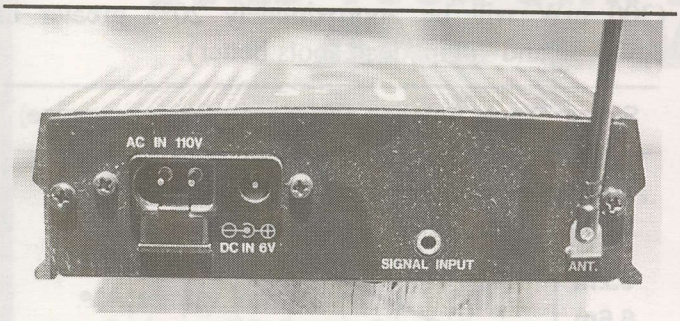


Audio from satellite receiver modulates low power FM transmitter which radiates signal

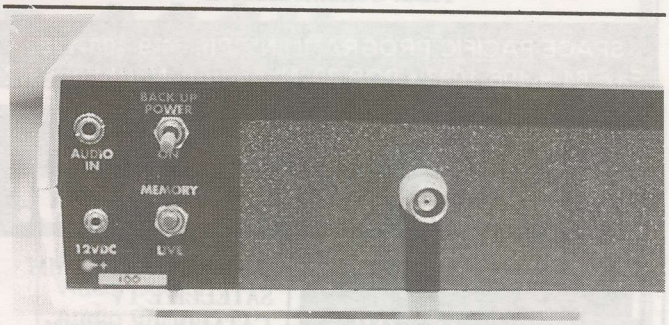
This 100mW FM band (88-108 MHz) transmitter has a built-in whip transmitting antenna (see text for additional range) and front panel frequency adjustment. Simply find a clear frequency and adjust the transmitter to that dial location (source: Av-Comm Pty Ltd.). Yes - it does stereo too.



300mW Vexx transmitter was originally designed for repetitous public service 4 minute message (for tourist information) using internal solid state memory audio 'loop'. In low power FM use it will accept direct satellite audio. Transmitter is approved for non-licensed use in NZ. (source: Vexx Digital FM)



Plug in audio source, connect power (runs on adapter providing 6 volts DC) and go.



Plug in audio, connect +12VDC and operate. Unit is factory adjusted for frequency.

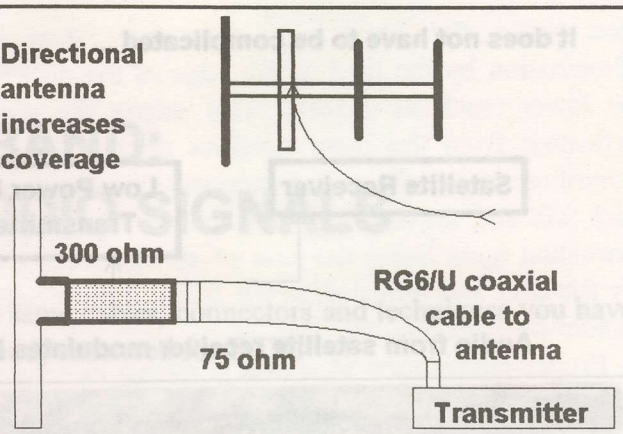
6) If the FM receiving antenna is designed for direct 75 ohm (coaxial cable) connection, hook it up. If not, connect it through an outdoor style 75 ohm to 300 ohm 'matching transformer' (such transformers will easily handle 300mW of transmitter power without problems). This is shown in diagram form on page 12. If you only require coverage of your home, the built-in whip antenna will allow you to wander about the house and yard with a shirt pocket FM radio and take your favourite satellite sounds (or TV audio) with you! And there is no reason why you cannot install several transmitters, each on its own frequency within the 88-100 (108) MHz band, and each connected to programming from a separate satellite (audio) receiver. There is no rule that says you must stay sitting in front of a TV set to enjoy the sounds of satellite.

Range

If you own a cordless telephone (extension), you are already acquainted with dead spots and coverage to be anticipated at VHF. You can be guided by this practical experience as the range of a 100mW "wireless FM broadcaster" equipped with its own whip antenna will be similar. Just moving the unit

/ **AV-COMM Pty Ltd, PO Box 225, Balgowlah, NSW (Australia); **Vexx Digital FM Ltd**, 18 Spencer Rd, Browns Bay, Auckland; **Satpacific Satellite Systems**, 8A Dee St., Timaru (NZ).

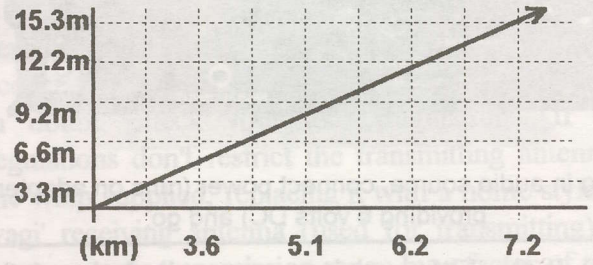
***/ Australia allows FM band transmitters up to 10 watts in power in rural areas, lower power in suburban areas with minimal licensing requirements while New Zealand allows approved transmitters of up to 300mW to operate in the 100 MHz region with no licence at all. Check with equipment suppliers for details.



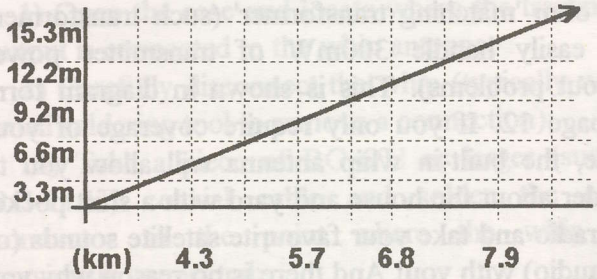
(and whip antenna) to a higher location on your home or shop will usually improve the range.

Logic suggests, however, that replacing the no-gain whip with a suitable outdoor antenna, and installing the antenna on a mast on your roof (or some other suitable 'high' point) will greatly increase the range. There is a trade off; an outdoor antenna requires transmission line and that line will have loss. To realise the additional coverage power of an outdoor, elevated antenna, carefully select low-loss cable. Here is what you can expect with 100mW of power (300 mW will be approximately 20% greater in coverage and 'fill in' dead spots better):

Simple Dipole Antenna (360 degree/circle coverage)



4 element gain antenna in favoured direction



If you live in an area where specified transmitters (such as the Vexx unit in New Zealand) are licence-free, by combining the built-in digitally stored message loop with a satellite fed programme service, you could even start up a neighbourhood radio station using the message loop for announcements that inject themselves on 'cue'.

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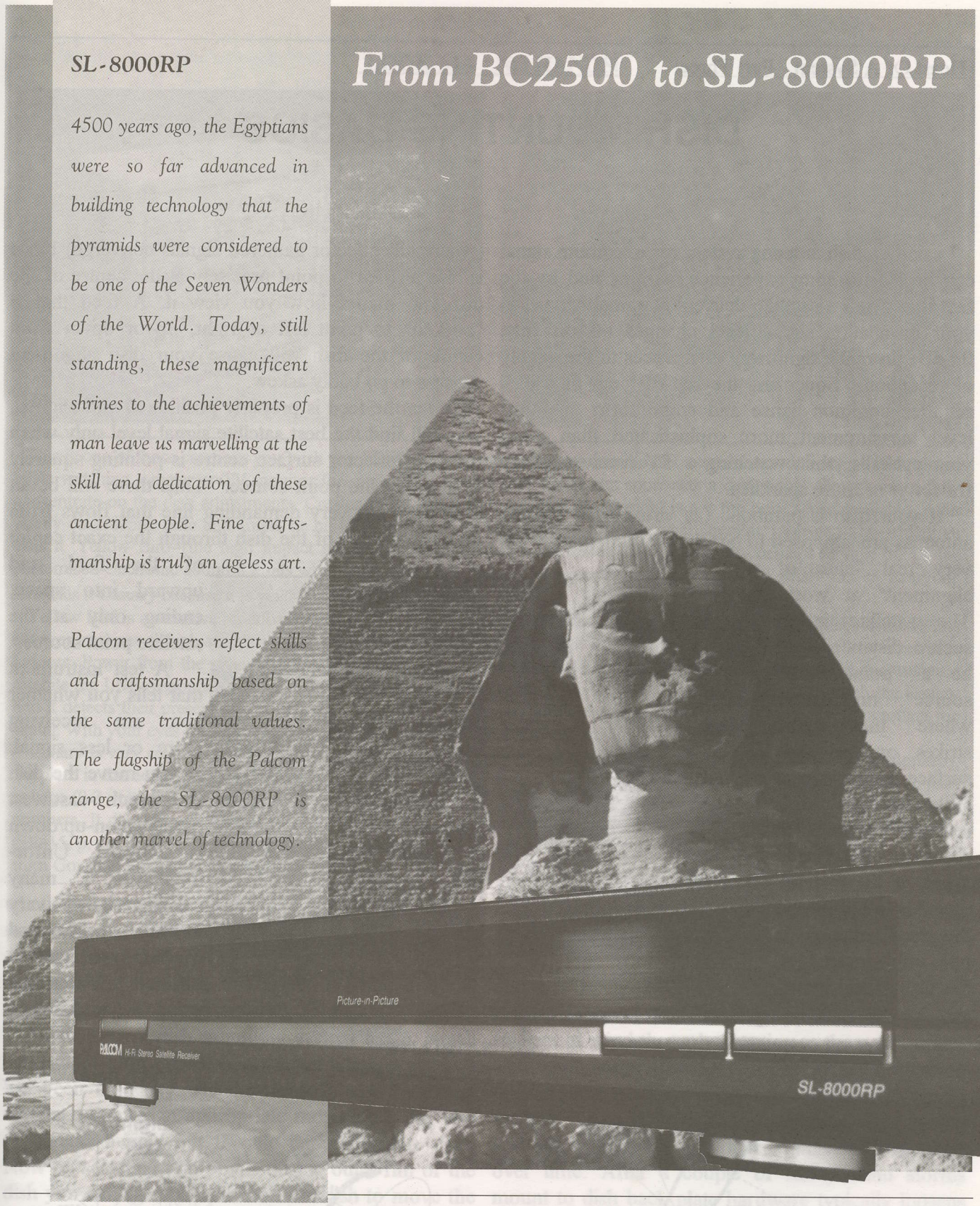
From BC2500 to SL-8000RP

SL-8000RP

4500 years ago, the Egyptians were so far advanced in building technology that the pyramids were considered to be one of the Seven Wonders of the World. Today, still standing, these magnificent shrines to the achievements of man leave us marvelling at the skill and dedication of these ancient people. Fine craftsmanship is truly an ageless art.

Palcom receivers reflect skills and craftsmanship based on the same traditional values. The flagship of the Palcom range, the SL-8000RP is another marvel of technology.



Its unique moving Picture-in-Picture feature permits the viewing of two channels at the same time (on one TV or two) or watching one channel whilst recording another. Mix images from satellite and terrestrial TV, satellite TV with VCR playback or satellite TV and security camera output with a choice of picture size for each image source.

The weakest signals may be viewed using the Palcom low threshold tuning facility producing improved video and audio performance.

A built-in antenna positioner provides access to all current satellites

500 Channels • 2 Tuners • 3 IF Inputs • Weak signal Video and Audio processing • HiFi 1600 • Stereo Audio processing (surround) • On Screen Display in 6 languages • Channel Naming • Satellite Naming • LNB Naming • Decoder Naming • 16 Local Oscillator presets (adjustable) • 22kHz Tone Switching • Global and Fine Ferro/Skew adjustment • Alphanumeric Channel List • Favourite Channel Function • 16 Preset External Decoder configurations • Internal VideoCrypt ready • Timer / Priority switching for TV and VCR

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Heart Of A System - Part Three:

DISH MOUNTING BASICS

Peaking a dish antenna system for maximum signal can be a frustrating experience, complicated by the fact that when a satellite delivers marginal service to your installation signal level changes of less than 0.5dB can make significant differences to the quality of reception. "Squeezing the last dB" out of a dish requires common sense and some form of signal level measurement more sophisticated than using your eyeballs while watching a TV receiver screen for fewer or more sparklies.

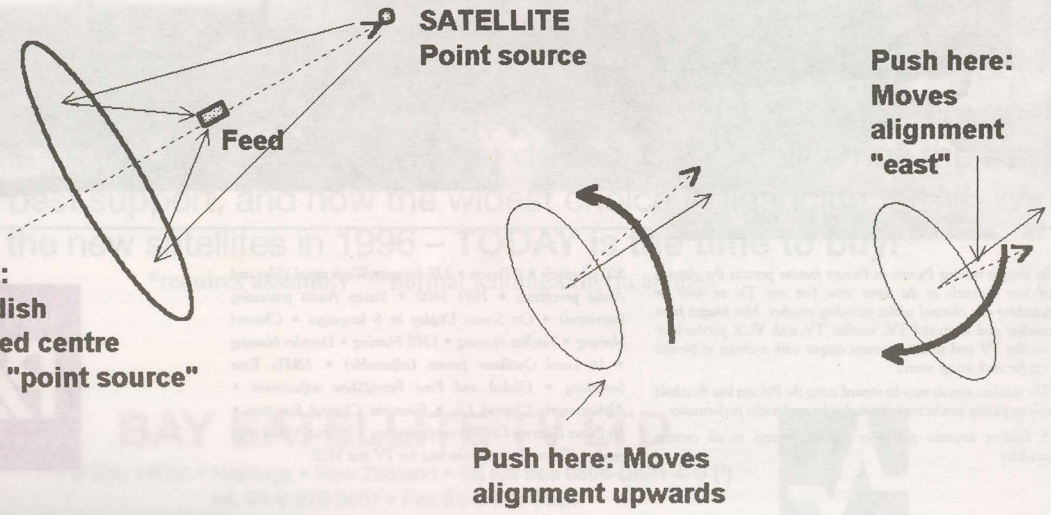
If your dish is parabolic (as virtually all C-band antennas are supposed to be) there are imaginary but very real "lines of alignment" at work. The satellite is at such a distance as to be a "point signal source"; no matter where the signal strikes on the dish surface the signal strikes the dish reflector surface at precisely the same angle. If the installer does his job properly, the feed antenna is not only located at the dish "focal point" (where all reflector gathered signals converge) but it is also aligned to point precisely at the centre of the dish, no matter how you view it. A feed that is "cocked" to point left or right, up or down from centre of the dish will cause your dish alignment process to go badly askew.

When the feed is properly positioned and aligned, you will find the best satellite signal level only when the dish reflector surface centre is pointing squarely at the "satellite point source." Thus there will be an imaginary but very demanding line that flows from the exact centre of the dish through the exact centre of the feed and upward into space, ending only at the satellite point source.

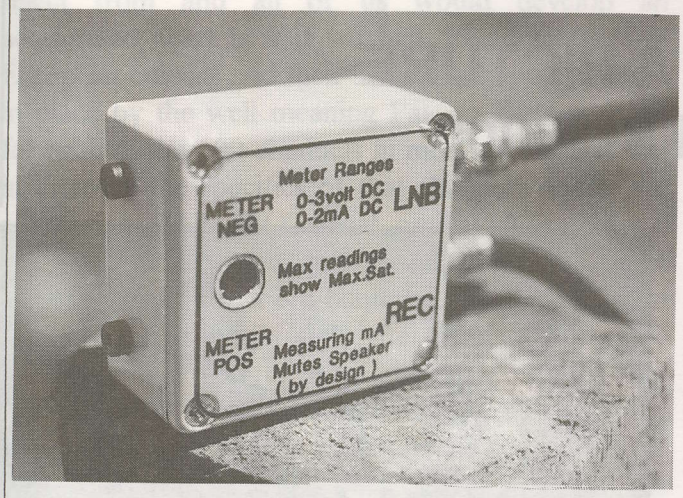
A test instrument that tells you whether you are receiving more or less signal, as you move the dish in azimuth -east/west or elevation-up/down is essential. Unfortunately, many satellite signals vary in level as transmitted on their own and it is difficult to determine

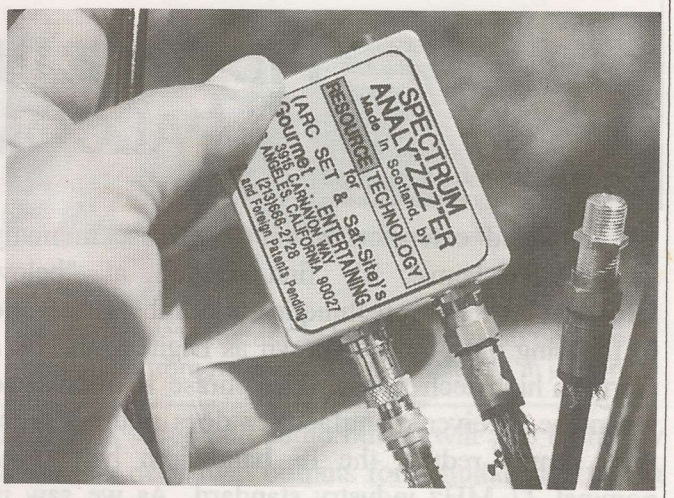
LIFT up (elevation change)

PUSH from side (azimuth change)



LOOK MA - NO HANDS!





This is one of those creations you wish you had thought of yourself. Anyone who has ever attempted to align a dish, alone, while watching a meter or TV monitor for some indication of 'best signal' can appreciate a device that allows you to fully concentrate on the dish adjustments. Creator Jim Roberts well understands eyesight is not the only 'sense' available. After briefly considering taste and smell, he hit upon sound as an indication of relative signal strength. Dish-pert Tim Alderman calls it 'Yellow Bird' (the high impact metal case is an unmistakable vivid yellow). Roberts, perhaps keying off of the customised electronic sound it emits when your dish finds one or more signals, calls it a Spectrum Analy"zzz"er. Everyone else calls it **Canary** because it is yellow and it sings.

Yellow Bird is a sensitive broadband (950-1450 MHz is included in its bandwidth) detector. It installs anyplace in the IF line between receiver (which supplies 13-18 volts for the LNB) and LNB/feed. Say you put it at the dish even if the receiver is indoors. Power from the receiver passes through Yellow Bird to the LNB. When you move the dish and it encounters a satellite the LNB responds sending signals down the coax line to the receiver. Along the way they pass through the Canary and it detects their presence. A squeal ("ZZZ") emits from the tiny in-built speaker. The louder the squeal, the stronger the signal. With your eyes fully on your adjustments, you simply peak for loudest "ZZZ."

Canary is very small (60 x 55 x 30mm) and rugged. It can install right at the output of the LNB (jumper cable supplied), anyplace in the down line, or inside. Two tip-point meter jacks allow you to plug in virtually any low-cost multi-meter to read voltage (0-3 volts DC) or current (0-2mA). This kills the "ZZZ" from the speaker while you study or write down the meter numbers. It doesn't care whether signals are C or Ku in origin, analogue or digital. It sings the same song. With Arc-Set (SF#15, p. 19) and Yellow Bird in your vest shirt pocket, you are a fully equipped satellite teckie. **Canary**: Under US$100 from Gourmet Entertaining, 3915 Carnavon Way, Los Angeles, Ca. 90027; fax 213-666-2442, tel. 213-666-2728.

whether the signals change you see is because of something you have done, or because the picture content has changed (thereby causing a spectrum analyser, for example, to display a reduced signal level display; see boxed material, above).

Virtually any dish mounting system has a small element of 'slop' (movement), even when every bolt has been tightened. By purposefully not tightening the last 1/2 turn on appropriate mounting bolts, you can create a rigid but flexible under pressure dish. Now by selecting two points on the outer rim of the dish you can (gently!) push on the dish to move the reflector up or down (a change in elevation) or left or right (a change in azimuth). However you are measuring the signal at the point, as you push observe the change in signal level. Getting under the dish and lifting upwards changes the elevation; pushing from one side changes the azimuth. Of these two "tests," a dish equipped with an actuator for Clarke Orbit Belt tracking can duplicate the azimuth pushing and pulling but not the elevation "tweaking."

A fixed (non-motorised) dish is anything but unconditionally stable after installation. Mesh surface dishes designed for tracking transmit all of the stresses of wind through vibration to the pole mount. The metal parts located where the mount secures to the dish back plate are subject to constantly changing stresses. These stresses cause the metal parts to flex and this works bolts and their companion nuts loose over time. After a couple of heavy wind storms mount to dish back plate hardware typically loosens just enough to allow the dish to "droop' (change in elevation) or rest left or right (change in azimuth) of its original aligned position. Naturally the signal degrades as a result of this change in alignment. An installer may be able to reduce this wind load dish realignment degradation by double nutting key locations; a subject we will visit in SF#18.

Part Two of TED Receiver:

PICTURE IN A PICTURE- PALCOM SL-8000

Threshold extension is a buzz phrase in many advertising claims. SF first looked at "below threshold" reception techniques in numbers 4, 5 and 6, focusing on a device known as Digitex built by a German high tech house. The phrase is often used when the receiver manufacturer does nothing more than simply reduce the IF bandwidth below the nominal 27 MHz industry standard. As we saw in SF4 and 5, reducing the bandwidth also reduces image detail and typically distorts sync as well resulting ion pictures that may have fewer apparent sparklies but the trade off is that they "jitter" (vibrate rapidly). It is not a good trade.

In SF#15 we reviewed with the help of Tokyo resident Harald Steiner the Palcom SL7900-RP and determined that however they do it, Palcom has a below threshold receiver that actually does improve the picture clarity without introducing image vibration.

The SL-8000RP is the top dollar model in the line. For weak signal performance, a user would be hard pressed to tell the 7900 from the 8000 SatFACTS received for test through New Zealand distributor Bay Satellite. Nothing in the 8000 makes it work better (or worse) than the 7900. But the 8000 costs significantly more money.

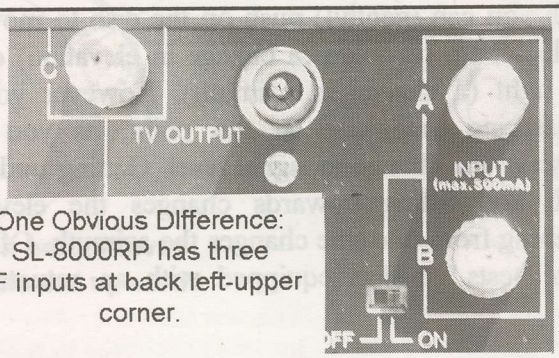
The reason is in four words: Picture In A Picture. 'PIP' is hardly new to home TV systems; many VCRs offer this feature as do higher priced home TV receivers. The object is that you have the ability to watch one TV programme 'full screen' while simultaneously inserting a second programme image in a corner (you select the corner with commands) of the screen. What makes the 8000 unique in our world is that both images can be satellite and if you have the appropriate dish feed or multiple dishes the corner image can be coming from (a) the same polarity on the same satellite as the primary image, or, (b) the opposite polarity on the same satellite, or, (c) another satellite through a second dish. So in effect you have two satellite receivers inside of the 8000 and their outputs are 'married' on the screen such that either one can be the main image and the other will automatically become the secondary corner image. And, because both are processed with the Palcom threshold extension demodulator circuitry, it is a bit like owning two SL-7900RP receivers. Suddenly the SL-8000RP top end price no longer seems so extravagant.

PIP - NHK (PAS-2) with CNN in (right hand lower) corner box insert. You can command the box around the screen and select virtually any input source.

Three IF Inputs

The major outside apparent change between the 7900 and 8000 is that the top end unit has a trio of IF inputs. Inputs A and C are used when you wish to view two signal sources simultaneously. Inside there are two tuners and using the remote control commands you select which input goes to each tuner.

As with the 7900, the 8000 comes out of the box pre-programmed by the factory with 500 European satellite TV channels in place. If you want to feel very down for several hours, scroll through the channels and read the on-screen designators for each channel on the screen; all 500 of them. Some of us



One Obvious DIfference: SL-8000RP has three IF inputs at back left-upper corner.

in the Pacific would be ecstatic to have 5 channels to select from and all of us would develop an accelerated heart beat if we had 50. Pity our poor European cousins and their 500 already programmed in place by the well meaning Palcom factory. Alas, for each of the 500 channels in memory there is also in memory the specifics of that channel's audio, the appropriate LNB 'LO' (local oscillator) frequency, the IF frequency and more. And since all 500 of these channels are at Ku band, before you can even do a quick run through the receiver must be reprogrammed (on at least one memory channel position) with C-band information.

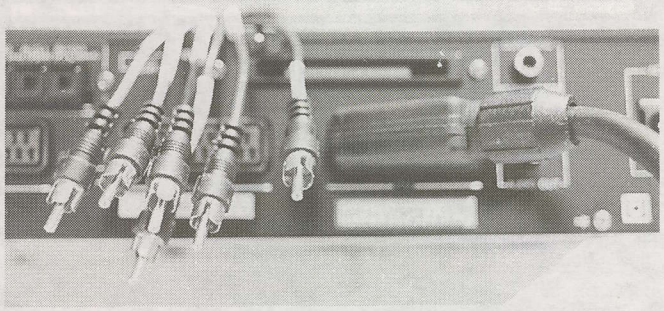
This is not anyone's fault, merely a fact of life. You will not take either Palcom receiver from the carton and have pictures instantly. You are forced to at least study portions of the (excellent) manual before you can even find C-band (*). To test PIP you must reprogram a minimum of two memory positions with new C-band information; each memory channel holds the information required to locate and recall a single transponder. PIP works by selecting one memory position for the primary image and a second for the PIP (corner) image. Once you have them on screen (it does get faster with practice!) you can switch the corner insert to full screen (and the full screen to the corner) with a single remote button stroke. The audio always follows the primary image.

Suggestions For the 8100

Undoubtedly there will one day be an SL-8100RP. We have a few suggestions for that unit's designers:

1) Give us non-SCART lead RCA jack outputs (in addition to the SCART leads) for the video and the main (right channel) audio. SCART leads are not common out here yet, and even if they were, because none is provided with either receiver there are dashed expectations as you open the box and slowly realise you cannot plug it in and make it play because lacking a SCART lead there is no way to extract video and audio for a monitor or modulator.

*/ Programming for Pacific satellites will now be made easier because Palcom distributors are being equipped with a (model IR-100) wireless data transfer intelligent remote control. After one receiver has been thoroughly reprogrammed for Pacific region use, that receiver's memorised satellite by satellite, transponder by transponder settings are transferred from the IR-100 to every successive receiver in one magic burst of data. This will allow Palcom dealers to reprogramme an existing customer's receiver with all of the settings for new satellites and new transponders with a five minute (or less) service call. Life just got better.



SCART lead "Monster Cable" is required to get video and audio from receiver; it is not included in carton.

This extra video and audio output will also be handy when you need twin outputs for simultaneous taping and modulating and do not have SCART cords available.

The back deck of the 8000 has separate SCART cord outputs for a TV set and a VCR. In effect, you can send one tuner through the TV set SCART cord and the second channel through the VCR SCART line. Think about that for a moment: The top performance of the SL-7900RP, times two, from a single receiver. Now, if you were building a SMATV system you could double up two full-time programme channels through the same receiver, customise each transponder with the TED and other command options, and give the SMATV system two complete TED processed transponders for the price of the 8000. Now, if we could squeeze a third tuner inside the case ...

Wrap Up

These are excellent receivers. If there is a weakness, it is human nature - the uncontrollable urge to rip open the carton, plug it in and make it play. When the 7900 or 8000 unit goes through a Pacific area distributor (**) who pre-programs it for Pacific satellites and transponders, you can do this. Further, any dealer handling even a few of these units per year will undoubtedly consider having the IR-100 data transfer unit in his shop so as to be able to update his "master" with new satellites and transponders for quick downloading to infield customer units.

If there is a better receiver out there for the middle and top-end consumer in the Pacific, we have yet to test it.

**/ Present distributors are Bay Satellite Limited (PO Box 14050, Hastings, NZ) and Av-Comm Pty. Ltd. (PO Box 225, Balgowlah, NSW 2093, Australia).

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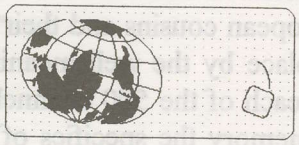
Access
Committ**E**



A trade association for users, designers, installers, sellers of private satellite-direct systems in the Pacific Ocean Region

The average TV viewer has absolutely no concept of what satellite television is, how it works, what can be received with a home dish system. That is unfortunate because before you can "sell" the programming services available, first you must sell the concept.

The SPACE Pacific booklet "*SATELLITE TELEVISION: All You Need To Know*" was created to simplify the task of any DTH equipment seller in explaining the concept. It has been modestly successful and there is room for improvement.

During SPRSCS, SPACE is sponsoring a 3 week promotional campaign using Auckland's FM Country Radio station. The radio station is co-hosting the SPRSCS Country Music Television "live stage show" Saturday January 27 at SPRSCS and leading up to the event it will be promoting a listener contest with a complete home dish system (and CMT subscription including D9222 receiver) as a grand prize. CMT's Jo Thompson will draw the lucky winner from the entry barrel during her stage show. In this way FM Country Radio will be promoting and encouraging listeners to attend the January 27th "Open Public Day" at the trade show. We anticipate a crowd of up to 5,000 country music fans (and others) for the event. And every one of these people is a potential buyer of a DTH system because of their interest in country music.

Alas, we are barely denting the potential marketplace. Where to from here? Several dealer members believe the answer is local advertising and at least one distributor, Bay Satellite, agrees. By providing dealers with an "advertising allowance" each time they purchase product (antennas, receivers, component parts) from Bay Satellite, the firm helps to fund local newspaper and radio advertising for the dealer. Again, a good start but is it enough?

SPACE has carefully researched national advertising in relevant print media (such as television guide publications) for both Australia and New Zealand; even a modest budget for four full pages spread through a 52 week period (such as at 143 week intervals) is well into "five figures" (i.e., $XX,XXX) for each country. A relevant question is, "Lacking the multiple channel English language programming of Palapa C1 or AsiaSat 2, are we really ready to conduct 'mass' advertising?"

Splinter markets, groups such as Hindi speaking Indians, Tamil speaking Sri Lankans and Indians, Mandarin speaking Chinese or the Japanese may not be reached most cost effectively through television programming guides. Any ethnic group of even modest size has its own "newspaper" in both Australia and New Zealand and through these pages you are likely to reach a target audience for (ethnic directed) DTH system advertising. Unfortunately, most ethnic groups cluster in major cities and most DTH dealers are in more rural areas. So you end up with ethnic markets located where the dealers are not, and vice versa. This makes it difficult to mount an advertising campaign that assists even a majority of the dealers. In smaller towns, which is where most dealers operate, they already know how to find the

BENEFITS OF BELONGING TO SPACE

SPACE is people, just like you, striving to create a satellite television receiving world in the Pacific Ocean Region. SPACE is firms who may compete in the marketplace, but realise that before we worry about competition we must create the marketplace. SPACE is a trade association embodying all levels of DTH (direct to home), cable (including SMATV) and rebroadcast services. There is room for you, your firm in SPACE because in unity and co-operation there is strength. There is an "industry" here, just as in other portions of the world satellite television has become the leading provider of telecommunication services. To query membership, see request card on page 30 in this issue of SatFACTS.

handful of local ethnic people who reside there; they don't really require a massive advertising campaign.

Then there is the "attitude" challenge. Although SPACE support from Installer/Dealer members is excellent (the largest category of membership at this time), a majority of these firms say they are involved with TVRO "at this stage" to "be in on the ground floor." A majority still do not believe they have anything to sell, or enough to sell to make a business. Those who are actively marketing systems are tapping into the ethnic market; in New Zealand and Australia the NHK service, for example, has been responsible for the majority of private home systems sold during the past 90 days. The Indian/Tamil market is proving more difficult to turn on, perhaps because the best signal of all (RAJ-TV) is in fact Tamil language and the vast majority of Indians are not conversant nor comfortable with that language. The Mandarin (Cantonese) market, sizeable and usually able to afford purchases such as the home dish system, is too new to measure yet as CCTV has been commercially available for only one month. The Chinese we have surveyed rate the programming very highly, appreciate there is no monthly fee, but balk at having to pay more for the IRD than typically the balance of the system (antenna, motor drive, LNB, feed et al) cost them. A dealer who honestly explains that the S/A D9222 IRD is possibly only "interim technology" is further disadvantaged by the situation. When S/A no longer supports the D9222 format, the receiver won't be good for much but as a museum piece.

These are some of the practical problems facing today's first wave of TVRO sellers in the Pacific. Strong signals loaded with programming from AsiaSat 2 and Palapa C1 will alleviate many of these problems but the exact coverage and the precise services to be offered in the (south) Pacific beams of these two satellites is still an unknown.

SPACE has scheduled a marketing forum for Saturday January 27th for members attending SPRSCS '96. At that forum we will share concerns, suggestions for more effective marketing of our systems, and hope to arrive at a consensus of membership opinion as to how we will proceed as a unified body during 1996. Between now and "the show" we encourage you to formulate your own thinking about this critical aspect of our industry's immediate future. And we'll see you at "the show" where all of this will come into better focus.

WITH THE OBSERVERS

AT DEADLINE

Observer David Leach (Newcastle, NSW) reports a telephone conversation with AsiaSat 2 the evening of 6 December; they plan to have STAR TV, DW, (Chinese) Military radio services on C-band, a single Ku (encrypted) transponder operating by "late January." Keep your eyes glued to 100.5E for the first signs of this new satellite!

New programmers for PAS-2 include Bloomberg Information Television (MPEG, C-band) and Taiwan Asia Space Cable (TASC) on the Ku China Beam footprint. PanAmSat claims to have contracts with "more than 40 TV programme providers" and includes in the list another new one: Disney. The Disney Entertainment Channel is currently being introduced to cable TV systems in Taiwan and other select Asian markets. Obviously most of these programmers are using MPEG format of one form or another and their presence is only known if announced by either the programmer or PanAmSat. Bloomberg Information Television is a business service similar in concept to ABN and ANBC. Most of the MPEG services are using the Scientific Atlanta hardware and 1.5 protocol. There are two versions of this: TDM which simply means two or more separate programmers can occupy the same transponder simultaneously and be received (if authorised) by the D9222 (TDM format) receiver, and, FDM which allows only a single TV programme per carrier. The D9222 receivers are unfortunately available as either TDM or FDM and TDM is the most common format. Television Corporation of Singapore, however, initially selected the FDM format (it uplinks itself from Singapore) and thus D9222 receivers in use for other services (such as ABN) cannot be co-authorised for TCS since their FDM format will not "play" on the TDM format receivers. Got that?

Observer **Anthony Williams** (Geelong, Victoria) reports JCSAT's Hawaii beam service on 3980/IF1167 is P1 on a KTI 3.7m dish and Echostar SR8700 receiver. He also finds the B2P services (always marginal) on (IF) 1320, 1290, 1250 and 1170 have steadily improved in quality over the past four weeks; possibly because this satellite has gone into an inclined orbit configuration (SF#16, p.2). It will be interesting to compare the signals on changeover day (forecast sometime in late February-March) when C1 replaces B2P.

Regarding appearance of Australian Television International (ATVI; SF#15, p. 26), normally on B2P but seen of late as well on Rimsat G1 Asianet (IF 1325). Rimsat's **Tim Brewer** advises this is being done under contract, the ATVI service is picked up at Subic Bay (Rimsat) uplink site and relayed onto G1 for those day parts when Asianet is not operating.

Australian Far North Observer **Shane Wilson** (Mareeba, Qld) agrees that all I2180 signals are now of better level and grades WorldNet as P5 "*in wide IF position of Cherokee receiver.*" He ponders since I180 is the same bird whether Intelsat uplinks have simply upped their to-satellite power levels. He also reports AZTV on Gorizont 25 (103E) as P2; is this the APNA service Shane? Brian Oliver with the Auckland University 7.3m dish has also recently seen signs of the APNA service from 103E but at very low levels. JCSAT-3's (Hawaii beam) test card is P2 at his location.

David Pemberton (NSW) is the first Observer to report use of the Palcom SL8000-RP receiver. He notes, "*It is great!*" His report includes watchable reception from New South Wales on PAS-2 Ku China beam service for three analogue transponders; most impressive. He believes the China beam IF 1034 frequency previously used by Orient Satellite Communications (SF#12, p.24) is not where their new MPEG feed is located; he finds Sylmar test card on that IF now in analogue. He also found Reuters on Ku IF of 1482 (vertical) feeding out of Japan and finds feeds into Australia now common on Ku. Apparently more Observer time should be spent on PAS-2 Ku by more people; there is activity there!

China Central Television (CCTV) source **Harry Guo** (Westlite Electronics, 117 Peninsula Rd., Maylands, WA 6051, Australia; tel [61][9]-370-5573; fax [61] [9])-272-3060) reports a special offer between now and 31 December; any owner of an S/A MPEG D9222 receiver purchased before 30 November can have the receiver authorised for CCTV reception without charge. The application form for this free-CCTV-turn-on is available from Harry or by fax from SPACE Pacific

GONE but not forgotten. General Instrument Digicipher service on Optus B1 for Galaxy has ceased, running this announcement on all programme channels for the last 6 hours of transmission. Now that it is gone we can report the service was totally clean on a 2.1m dish in New Zealand (where this photo was taken) from March to close down. Unfortunately, the NTL/Pace/Iredito service on Optus B3 is several dB below threshold on the same system.

WITH THE OBSERVERS

Reports of recent changes in satellite operations, programmer sources, equipment changes are encouraged from readers throughout the Pacific Ocean Region (POR). Information shared here is a valuable asset towards increasing our collective knowledge and understanding of the POR satellite 'universe'. Off-screen, system, personnel photos are encouraged. Off-screen photos: Set camera to f3.5 to 5, use ASA100 speed film, shutter speed to 1/15th second (PAL, SECAM) or 1/30th (NTSC); do not use flash, hold camera stable after focusing on screen. Alternately, record on any format VHS tape and send tape to SatFACTS for photographing. Deadline for January SF #17 is 5PM January 4; you may fax reports to 64-9-406-1083. Observers will gather at Technicians and Testing Room at SPRSCS January 23-27; see you there!

SOLUTIONS

FOR A NEW ERA OF SATELLITE TELEVISION

AND A WONDERFULL CHRISTMAS GIFT IDEA FOR THE WHOLE

CMT
COUNTRY MUSIC TELEVISION
PACIFIC

CMT the only all video, all country music channel available worldwide, providing a non-stop playlist of chart topping and hot new country music

TMZ
GLOBAL MUSIC NETWORK

24 hours a day, 7 days a week **TMZ** is the music video entertainment network dedicated to **"all music", "all the time!"**
If it's new, if it's hot, if it's in the forefront of the music scene you'll see it and hear it on **TMZ**

STAR NETWORK TV

If it's worth watching it's on **STAR!** Asia's leading satellite television network.
An exciting non-stop mix of entertainment, sports, movies music, news, and information from all over the world

ABN
ASIA BUSINESS NEWS

Business and financial information with a totally Asian perspective. Live, authoritative news along with world class journalism, **ABN** delivers a competitive edge every business day.

傳訊電視 CTN
CHINESE TELEVISION NETWORK

Bringing to the worldwide Chinese community fast accurate and current information.
CTN's Zhong Tian channel broadcasts the latest world news, financial information and events of interest.

CCTV

China Central Television provides Mandarin {Cantomese} and English programming featuring movies, sport, opera, news and

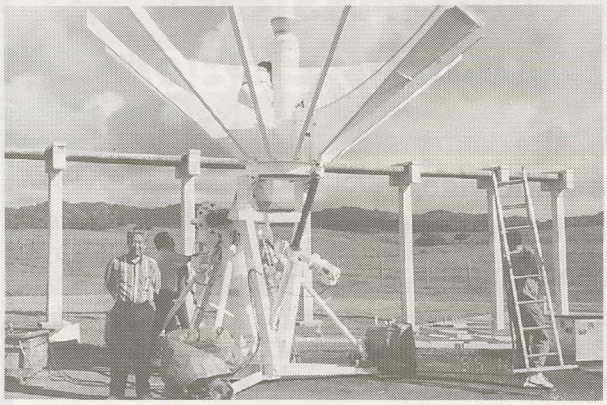
SUBSCRIPTIONS, DECODERS, & TVRO HARDWARE TO ENABLE YOU TO RECEIVE THESE CHANNELS ARE AVAILABLE FROM:

TELSAT COMMUNICATIONS LTD.

TM

17 Westhaven Grove, P.O. Box 1537, Palmerston North, New Zealand
Tel: (06) 356-2749 Fax (06) 355-2141 Int'l +(64) 6-355-2141 Cellular (021) 454-945

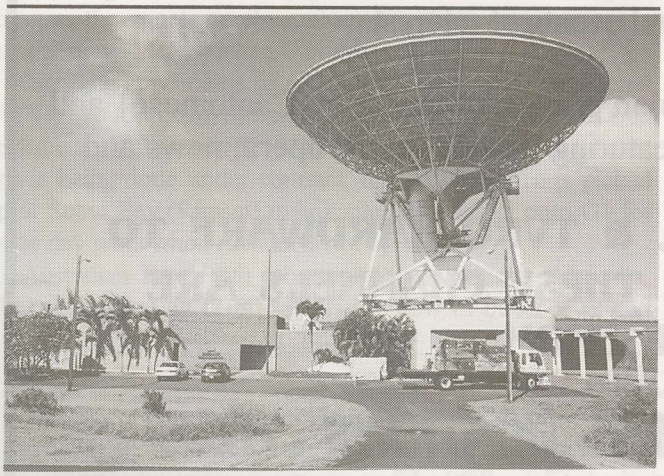
FUN and GAMES At Commissioning of JCSAT-3



Japan's JCSAT-3 satellite (128E), launched at the end of August and seen testing C-band (South) Pacific coverage as early as October 7th (SF#14, p.22) continues to be seen with a test card on the Hawaii spot beam (IF 1166) at a P2 level on 3.7m dishes and larger throughout the Pacific. Tests for the (south) Pacific beam have not been reported on C-band since October 7th although Ku-band tests have been reported by a number of Australian observers ((SF#15, p.24; IFs 1028, 1100/1108 horizontal). JSAT has not yet made public full plans for use of the 128E satellite although the Japanese press is reporting that a consortium including Etochu, Mitsui Bussan, Nisson Iwai, Sumito Shouji and JSAT will launch a "*50 channel MPEG digital service in April 1996*" for Japan proper on Ku. Sources also advise that US firm Hughes, operator of the DirecTV Ku band DBS service in North America and a partner in a new DBS service for South America, is planning a DirectTV (Asia) service using JCSAT-3 in 1997. Hughes, according to American reports, has purchased 42.5% of the new Asian service with Mitsubish Shouji the majority (Japanese) partner. DirecTV (Asia), according to Japanese reports, will provide "*50 channel DTH service to New Zealand, Australia and portions of Russia and India.*" This Ku beam also includes coverage of New Caledonia and Vanuatu within the 35 dBw contour.

During the October 7th commissioning, a 4.5m Ku "Fly Away" (designed to be hauled to a remote spot for uplinking as airplane baggage) terminal was installed at GE Americom in Hawaii. For approximately one hour, viewers were treated to an impromptu 'tour' of the impressive site through the 4.5m antenna. **Hiromu Fukase**, Adviser to Vice President of JSAT, was on the team and if you saw the testing on October 7th, Hiromu was the chap driving the fork lift tractor. Our thanks to Hiromu for providing the Hawaii GE Americom test-day photos shown here.

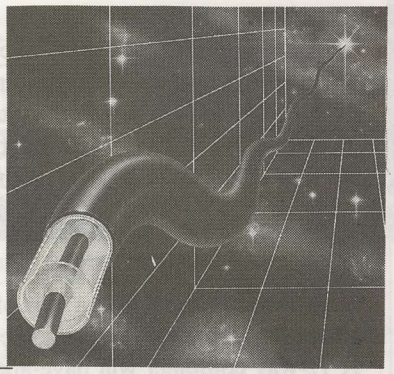
Top left: Construction of 4.5m fly away with Hiromu Fukase (left). Top right: Sunset photo of GE Americom site (Sunset Beach Earth Station) with 4.5m in right foreground, to left much larger permanent antennas. The look angle from Hawaii to JCSAT-3, incidentally, is 6 degrees. Bottom left: 30m uplink antenna at GE Americom (formerly GTE) Sunset Beach earth station on Oahu. Bottom right: A pleased-with-the-test-results Hiromu Fukase; those who saw the October 7th impromptu site tour (shot with a rented 8mm high band camera) will appreciate the significance of the forklift!

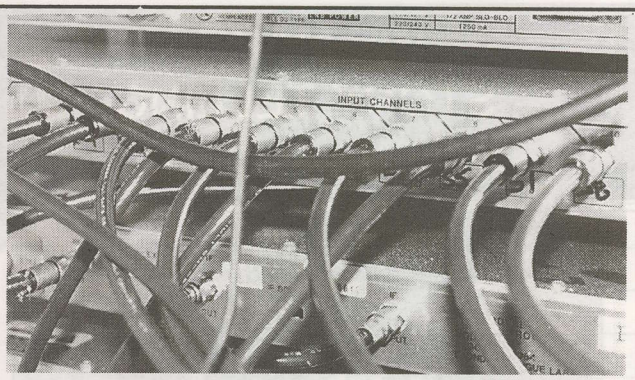


(64-9-406-1083) just say you wish the CCTV application form. Note; this expires 31 December!

We look forward to meeting Observers in the Technicians and Testing Room at SPRSCS January 23-27 where **Robin Colquhoun** will be performing detailed testing on a wide range of receivers including the Palcom units.

THE CABLE CONNECTION





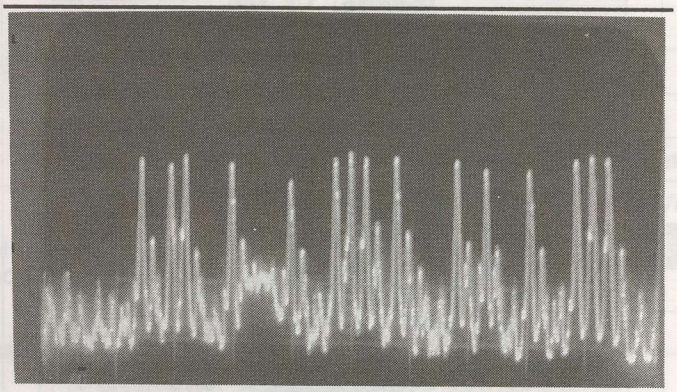
Channel combiner (here, Winersat WPC-12) allows multiple channels to be combined "cleanly."

A cable system headend is a "balancing act." Separate programme channels, perhaps a mixture from off-air and off-satellite (through modulators) are combined in a manner to ensure they do not interfere with one another inside the confines of the cable system spectrum. However, care must also be taken to see that the system itself does not generate interfering signals.

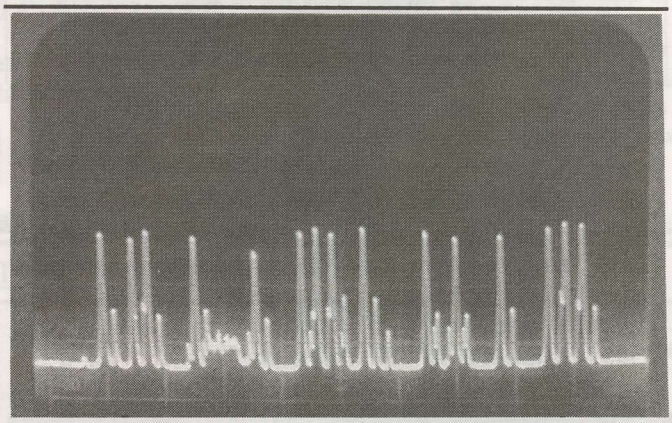
A cable plant (system) is a mixture of passive (signals flow through without amplification) and active (signals are amplified) devices. Any amplification device is capable of generating new (unwanted) signals. Amplifiers are speced by the designer for maximum input and maximum output versus the channel "loading" (number of TV carrier signals being amplified simultaneously). Most amplifiers require that you reduce the output level as you increase the channel loading because as you add more carriers the amplifier's available output power is being divided by more and more separate carriers.

Having "clean pictures" at the output of the headend is essential; every active device following the headend adds distortion products to the combined channel spectrum and this distortion is cumulative; i.e., the more active (amplifier) devices the carriers pass through on their way to subscriber homes, the greater the distortion product(s). At some point as the carriers are repeatedly amplified and re-amplified, the build up of distortion products becomes significant enough that subscribers notice "beat signals" (typically appearing first as a weak herringbone pattern on some or all channels in the system). Further into the plant, the level of the distortion graduates from noticeable to "objectionable." For all practical; purposes, this point is where the cable system is in trouble; further extension of cable lines requires more amplifiers and as you add additional amplifiers the distortion products only become more severe.

Because distortion products are cumulative (i.e., becoming slightly more enhanced after each new amplifier), logic should suggest that as you leave the headend facility every effort should be made to reduce distortion to an absolute minimum.

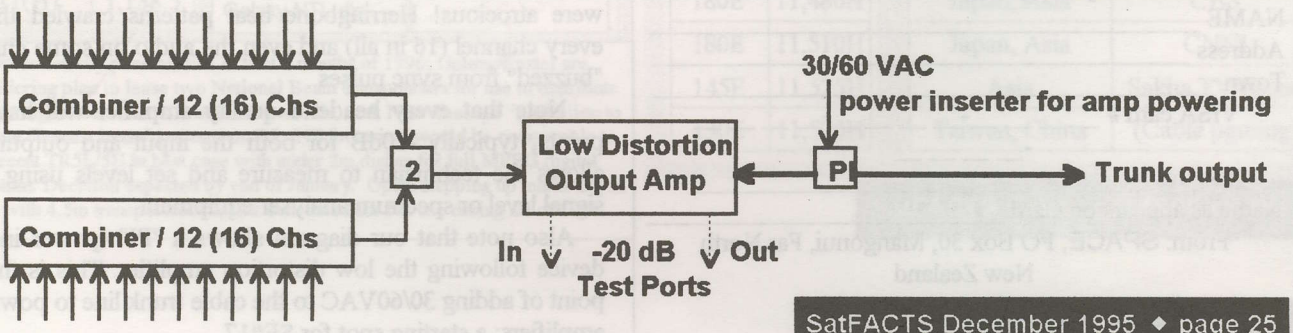


Overdriving input to headend output amplifier produces amplifier distortion products (unwanted new signals that will "beat" [interfere] with real TV carriers; see photo below).



Reducing input levels to headend output amplifier, and/or backing off gain of output amplifier eliminates undesireable beats.

In the photos here, a 12 channel combiner (top) brings together the output of 12 separate channel processors or



modulators. In the diagram we show a pair of 12 channel combiners bringing a total of 24 cable channels into a two-way mixer, producing 24 channels on the same cable. Of course each of the cable channels has its own frequency assignment to ensure that frequency diversity exists within that piece of cable. In theory, a TV set connected to the output of the two-way combiner device could tune all 24 channels separately.

Combining signals, first in a 12-way (16 way is also common) and then with a pair of 12-ways recombined into a total of 24 channels on a single cable, is costly to signal level. A 12-way combiner will have approximately 16dB of through loss for each combined TV channel; a modulator that produces +105 dBuV will appear at the output of the combiner with 110 - 16 or approximately 94 dBuV in level. Now when the 12-way is mixed with a second 12-way in the two-way mixer, channels drop an additional 4dB (or more). This leaves us with 24 channels, each at a maximum level of 94 - 4 or 90 dBuV.

The greater the "combined" output level of the headend, the further we can travel in coaxial cable before the signal requires amplification. A headend "high output" amplifier that brings all of our channels back to the +110 dBuV region is therefore desirable.

Enter the game of "specmanship"; which amplifier do you select for this purpose. Since the headend output amplifier establishes the initial percentage of "distortion" for the entire cable TV plant, this is not a place to "go cheap." If you select an amplifier with inadequate distortion characteristics, you are generating distortion at the headend which will only be amplified (made worse) by each succeeding amplifier station in the cable plant.

Low distortion headend amplifiers fall into several categories reflecting a range of circuit designer options available to minimise distortion. The industry has adopted a number of "buzz words" to describe low distortion circuits. "Hybrid IC (integrated circuit) circuitry" is one; "Feed forward" is another and "power doubling" (similar to push-pull) is often used to describe a technique of maintaining low distortion and high output capability. Normally, it is difficult to have low distortion and high output in the same circuit.

In the twin photos on page 25 we see the unfortunate impact of distortion products. This is a sweep of a CATV headend operating over the 50-300 MHz region. In the top spectrum analyser photo, the number of carriers present (ranging from high to low level) is almost beyond numerical counting (many carriers are beating together to form some of the 'pips'). The second (lower) photo shows the same headend after the output amplifier was replaced with a hybrid IC unit and the inputs and outputs balanced (set to the correct levels per the manufacturer's instructions). The subscriber pictures with the system operating in the top spectrum analyser displays mode were atrocious! Herringbone beat patterns crawled through every channel (16 in all) and even the audio on some channels "buzzed" from sync pulses.

Note that every headend quality amplifier will have test points; typically -20dB for both the input and output. This allows the technician to measure and set levels using either signal level or spectrum analyser equipment.

Also note that our diagram shows a "PI" (power inserter) device following the low distortion amplifier. This is the first point of adding 30/60VAC to the cable trunk line to power line amplifiers; a starting spot for SF#17.

SatFACTS PACIFIC OCEAN ORBIT WATCH: 15 December 1995

IF Freq
1,475
1,425
1406/1425
1,375
1346/1372
1,325
1288/1300
1,275
1218/1249
1,225
1161/1183
1110/1115
1038/1060
998/985

Gz25/103	G1/130	Gz18/140	G2/142	Gz21/144	P169/Vt	P169/Hz
DublTV	RAJ(X2)	DublTV	ATN(X2)	DublTV		
Muslim	SunMovie	Muslim	JJAY			
					CMT/CBS	ABN/CTN/CCTV
APNA	Test Video		(vacant)			
					MTV/b	Discov/b
	AsiaNet//ATVI		EagleNet			
					ESPN/b	OccVid
	Test Video		EMTV	Moscow 2		
					TNT/Cart	AsiaFeeds
	SunMusic		Udaya			
					Prime/TMZ	CNN (X2)
						NHK
					ANBC	Fil.Ch/d
					Bloom./d	(data)

JCSAT-3 / 128E

Hawaii C-band beam on IF 1166 (Hz) widely seen. Ku testing is planned but no schedule announced (see p. 24 here).

IF Freq	180/RH	180/LH
1,432	Keystn	
1,388	MPEG	
1,325	MPEG	
1,310	MPEG	
1,277	NBC/e	
1,256	Keyston	
1,223	CBS/e	
1,179	W'Net	
1,137		
1,105	RFO	1092/data
1,054	(data)	Canal +/d.
1,021	Aust 9	Aust.9
988	NZ/dig.	
980	NZ/dig.	
972	NZ/dig.	
964	NZ/dig.	

November 1995 NOTES

►/b is B-MAC (NTSC or PAL depending upon service)
►/d or /dig. is some form of digital (MPEG)
►Intelsat I180 includes right and left hand circular transmissions (separate)
►/e indicates some form of analogue encoding (such as Leitch system on I180) for which there is no readily available decoder►(X2) indicates 1/2 transponder format with typically two programmes present
►Ku IF's for A3 and B1,3 satellites (below) are for standard LNB LO of 11,300

ANBC indicates reception on 3m or smaller antenna

TNT/Car underline indicates subscriptions may be available/SF#10, p.18

I177W/I177E/I174E

IFs of 984 & 963 carry many international news feeds in right hand circular (I177E, 174E); on I177E, IF of 973 carries AFRTS in B-MAC, left hand circular with AFRTS radio subcarrier. 177W now 513 bird, new FTA video activity seen daily.

Ku BAND ACTIVITY UPDATE

A3/B1TR	IF Freq
1(V)	977
5L(V)	1,193
5U(V)	1,218.8
7L(V)	1,344
7U(V)	1,370
10(H)	1,075.75
11(H)	1,138.5

B3: 155.9E	B1: 160.0E
	Tab radio; data
ETV>0000UTC	Occ.Video, news
	Occ.Video
TVO>1200UTC	ABC Nation./b
	SBS Nation./b
Galaxy NTL digi	
Galaxy NTL digi.	

Satellite	RF Freq
PAS-2	12,334H
PAS-2	12,695V
PAS-2	12,732V
177W	10,980V
177W	11,015V
177W	11,510V
180E	11,480H
180E	11,510H
145E	11,525H
130E	11,525H

Coverage Beam	Service Report
NE Asia	PAS-2 Sylmar
NE Asia	Analogue Feeds
NE Asia	Anologue Feeds
Japan, Asia	US Net feeds
Japan, Asia	NBC News
Japan, Asia	
Japan, Asia	CBS
Japan, Asia	CNNI
Asia	Sakha TV/occas.
Taiwan, China	(Cable pgming)

Optus activity possibilities in first 6 months of 1996: Galaxy/Foxtel are considering plan to lease two National Beam transponders for use to distribute Galaxy digital services to whole of Australia, and, New Zealand in addition to present "banana beam" patterns on B3. NZ footprints would be comparable to present TR5L/5U in best case with under 2m dishes for full MPEG digital reception. Decision expected by end of January. Optus stepping up marketing in NZ with 4.5m transportable uplink scheduled for NZ use during all of 1996.

Second Report:

SOUTH PACIFIC REGION SATELLITE & CABLE SHOW

Update On "The Show of Shows" Programme

As this issue of SatFACTS Monthly goes to press, SPACE Pacific's South Pacific Region Satellite & Cable Show (January 23-27, University of Auckland Tamaki campus) has run out of exhibit hall space (all stands taken) and available seating will be close to capacity by show opening date. Attendees will be treated to the widest variety of off-satellite programming ever assembled in the (south) Pacific including new programmers The Music Zone (TMZ), Bloomberg Information (BI) and others that will be announcing their new services during January - March. With AsiaSat 2 now safely launched, there is the expectation that test signals from this new carrier will also be first seen during the show. In the seminar session department, US Dish-Pert Tim Alderman is expected to conduct sessions covering a variety of topics including a one hour question and answer session for those who need special system installation problems solved. AND - Gourmet Entertaining's head scientist Jim Roberts will be on hand to teach you how to align dishes for full Clarke Orbit Belt tracking. It doesn't get any better than this and promises to be "*The Show of Shows*!"

SPRSCS EXHIBITORS

Augat (LRC) Pty. Ltd. / AUSTCO Communications [CATV Associates] / AV-COMM Pty. Ltd / Bay Satellite Ltd. / Electronic Communication Solutions Ltd (Leathams) / Country Music Television / Far North Cable TV Ltd. / Fibernet New Zealand Ltd. / Gold Star / Gourmet Entertaining / Maser Technology Group (on behalf of General Instrument, Comm Scope, Channell Communications) / Mark Long Enterprises / Nationwide Antenna Systems Speciality Products Pty. Ltd. / Signal Master / Satellite Direct / Telsat Communications Ltd. / SPACE Pacific Ltd. / Southstar Media / Uniden NZ Ltd.

Brands Represented (Through Exhibitors)

ADL / Alpha Technologies / American Fibertek / Amphenol / ANTEC / Asia Business News / Augat-LRC / Baylin Publications / Benjamin / Blonder-Tongue Labs / California Amplifier / Channell Communications / Chaparral / CHY / C-COR / China Central Television Network / Chinese Television Network / Communications & Energy Corp. / Country Music Television / (RL) Drake / DH Satellite / Dynalink / Echostar / Eagle / EXFO / Gardiner / General Instrument / Gilbert / Global / Gold Star / Gourmet Entertaining / Jebsee / KingRay / KTI / Mark Long / Norsat / OLEX / Optical Cable Corp. / Orbitron / Pace / Palcom / Paraclipse / PDX Antenna Master / PX: Trans Electric Co. / PPC / Regal / Scientific Atlanta / Seavey / Siecor / Sony / Standard Communications / STAR Net / Star TV / The Music Zone / Times Fibre / Tektrew / Universal Electronics / Texscan Corp. / Winersat

WEDNESDAY JANUARY 24: "Basic Technology Day." Designed for first-timers and those who need a brush up on their working knowledge of the technology behind satellite and TV distribution systems. Five sessions (begin 10AM, end 4:30PM). Exhibit Halls open 12-1:30, 4:30-6:30PM.

THURSDAY JANUARY 25: Opening day featuring report on present, future satellites (Mark Long), sessions on DVB Compliant Receivers, Dish Selection Criteria (Norman Bruner, Paraclipse), Feed Selection, Test Equipment & Use, Dish Tracking Techniques (Jim Roberts), Packaging of DTH Systems for Mass Sale, MMDS: Wireless Cable TV, Business Uses of Satellite, Role of Enthusiasts in TVRO Marketing, and, Programming Competition. Sessions from 10AM to 4:30 PM; exhibit halls open 12-1:15PM, 4:30 - 6:30 PM.

FRIDAY JANUARY 26: "OPTUS: The Neighbourhood Satellite System" (John Humphrey), CATV and SMATV Headend Design, SMATV System Design, SMATV and CATV Line Powering, Fibre Optic Technology Overview, Special Equipment for AsiaSat 2 and Palapa C1, PAS-2/AsiaSat2/Rimsat/Palapa, Cellular Television, Television Receivers for the Information Superhighway, Neighbourhood Cable TV. Sessions from 10AM to 4:30PM, exhibit halls open 12 - 1:30PM, 4:15 - 6:30PM. Technicians and Testing Room: Working With S/A D9222 Receiver and the Authorisation Stream.

SATURDAY JANUARY 27: "Open Public Day" with Country Music Television stage show 1PM. Exhibit halls open 10AM - 4PM (Note: Exhibitors have option of not opening this day). "Best Receiver Shoot-out" T&T Room. SPACE Member meetings.

LAST CHANCE REGISTRATION: SPRSCS '96

This is it; your last opportunity to register and attend the South Pacific Region Satellite & Cable Show January 23-27 in Auckland. Hundreds have already done so - delegates from throughout the Pacific and Asia will be on hand to experience the latest in satellite and cable technologies. Australia will be exceptionally well represented with attendees from every state and region. Our exhibit halls have sold out and leading suppliers from the entire world will be on hand to show you the latest in hardware. Two completely separate sessions will run January 25 and 26: One for those with an interest in technical detail, the second for those with an eye on the bottom-line management. In the Technician & Testing room, special sessions to explain the S/A D9222 IRD operation. And - US Dish-Pert Tim Alderman (SF#14, p.10-13), including an hour of "**Tim Live On Stage**" where he answers your difficult install questions.

REGISTER HERE FOR SPRSCS '96

Registrant Number One:
Name _____
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City/Town _____ (State)_____ Country_____
Telephone Number _____ Fax Number _____

Registrant Number Two:
Name _____
Company (if applicable) _____
Mailing address _____
City/Town _____ (State)_____ Country_____
Telephone Number _____ Fax Number _____

HOW TO PAY? WHERE TO SEND IT? SEE CARD BELOW.

COMPLETE AND RETURN THIS CARD PORTION ALSO.

What Is The Cost?

✓ If you or your firm is NOT a member of SPACE Pacific, the four day fee is $225 per person. This includes all sessions January 23-26 plus entry on January 27th for 'Open Public Day'.

✓ If you are an individual member of SPACE, your cost is $150; if an Installer/Dealer or higher level member, $175.

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- ► By VISA (ONLY) card using the form below.

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SatFACTS December 1995 POR OBSERVER REPORTING FORM
(Please FAX [64-9-406-1083] or mail to arrive by 05 January)

Tell us what you are seeing or using for equipment that is 'new' in the last 30 days. Information submitted is collected for possible use in "With The Observers" (p. 22 here).

• NEW programming sources seen since 1 December (please include receiver 'IF' or satellite transponder number): _____

_____

•Changes in signal levels since 1 December: _____

_____

•Equipment changes, my terminal, since 1 December: _____

_____

• Description your equipment: _____

_____

Reporter's Name: _____

Address: _____

Contact phone and/or fax numbers: _____

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There are four levels of SPACE Membership available and each level defines your privileges. Individual, Installer/Dealer and Cable TV levels receive attractive discounts on goods and services from select Importer/Distributor members; you can actually save far more money in discounts than your annual membership fee! PLUS - members help draft and participate in trade association policy (special SPACE Member sessions at SPRSCS '96 in January for this purpose). Simple return this card for a full "Invitation To Join SPACE"; no obligation!

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