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Bob Cooper's

APRIL 15 2003

SatFACTS

MONTHLY

Reporting on "The World" of satellite television in the Pacific and Asia

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Impedance bumps can wreck your day

Is terrestrial DVB worth the effort?

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✓ Two new bird launches!
✓ Observer Reports

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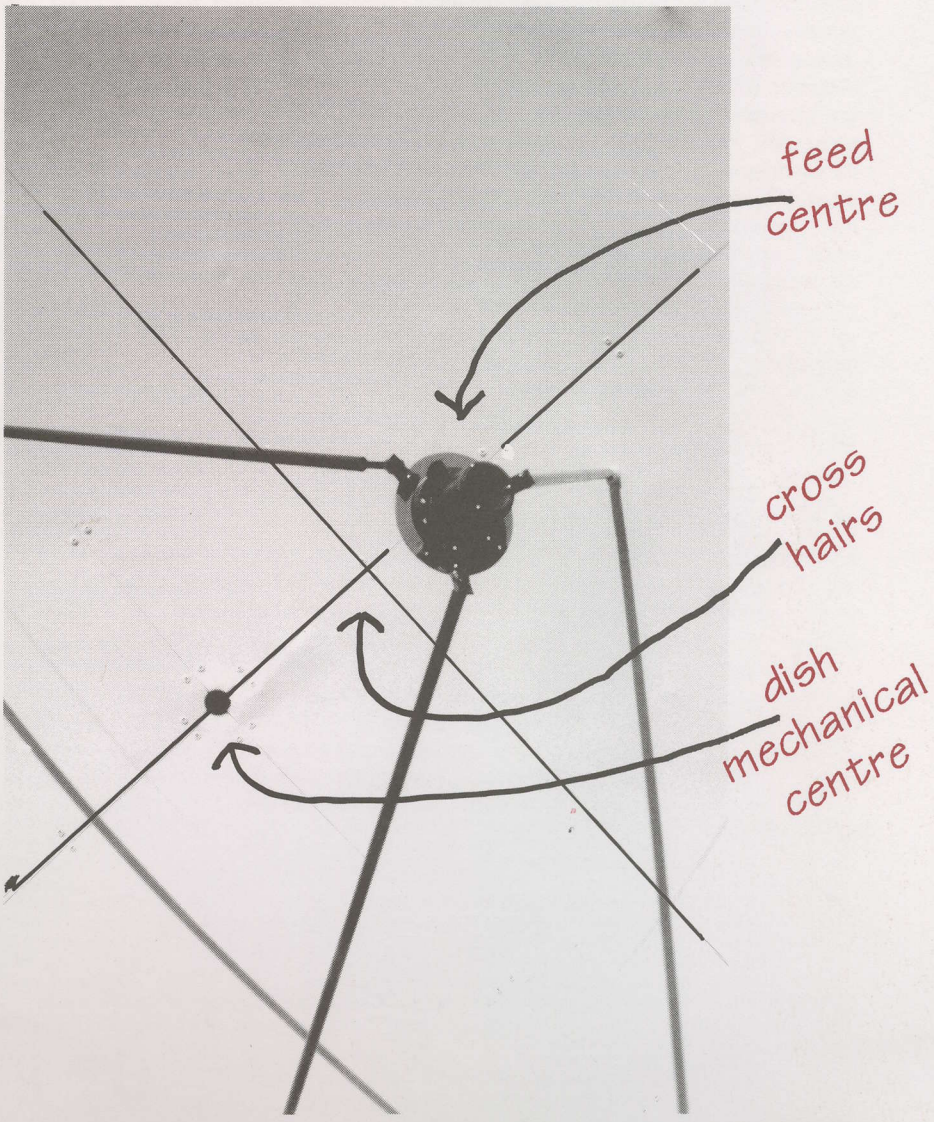

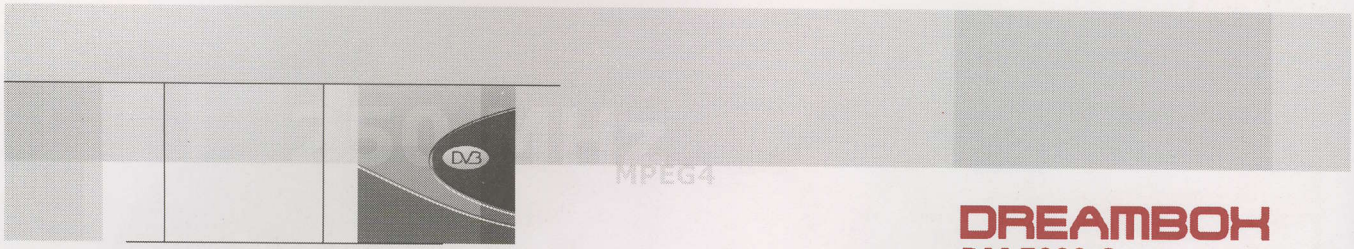

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DM 7000-S

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- V.24/RS232 Interface
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- unlimited channel lists for TV/Radio
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is published 12 times each year (on or about the 15th of each month) by Far North Cablevision, Ltd. This publication is dedicated to the premise that as we are entering the 21st century, ancient 20th century notions concerning borders and boundaries no longer define a person's horizon. In the air, all around you, are microwave signals carrying messages of entertainment, information and education. These messages are available to anyone willing to install the appropriate receiving equipment and, where applicable, pay a monthly or annual fee to receive the content of these messages in the privacy of their own home. Welcome to the 21st century - a world without borders, a world without boundaries.

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our NINTH year!

COOP'S COMMENT

April 15, 2003

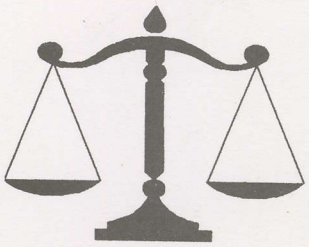
Anyone exposed to the current television coverage of the war in Iraq has to be, if nothing else, awe-struck by the level of sophistication and technology now routinely taken almost as a given. Cruise Missiles fired from ships in the Indian Ocean, then travelling at high-sub and low-super sonic speeds for as long as six hours under guidance from a network of GPS satellites, typically landing within a target centre no larger than your family car, speaks volumes about the "cleverness" of mankind.

Enter "wireless TV camera" into Google or some other search engine on Internet and watch the 50+ pages with ten listings per page format on your PC. Reasonable high quality colour TV cameras physically smaller than the ball-point pen you carry in your pocket married to 50 - 200 milliwatt 2.4 GHz transmitters powered by a 9 volt battery with the ability to send picture and sound over distances as great as 3km - for under US$100. Such gadgets are no less awesome than the Cruise Missiles. Perhaps in their way they are more awesome - remember the Cruise Missiles cost US$1,000,000 each.

A large number of Chinese firms have in the last two years developed an original R & D (research and development) capability which is daily closer to turning that nation into what I suspect will be the next great technology centre on this planet. The road to original R & D is a difficult one to travel. When a country is struggling to feed its people, as for example North Korea is at the moment, the limited resources available are virtually never "wasted" on goals that do not produce immediate results and alleviate such maladies as famine. At the turn of the last-last century (1899 - 1900) virtually all original research was conducted by Universities in Great Britain, Germany and France. Corporate research consisted of nothing more complex nor demanding than working out better ways to reduce the cost of producing manufactured goods. The first privately funded, corporate, research facility in the world was AT&T's Western Electric. "Inventions" (totally new products conceptualised) in 1900 did not attract industry nor investment because "inventions" were seldom if ever a finished design ready for some enterprising gamble-taker to turn into something you could hold in our hand or expect to do useful work. Industrialists, those who put money into creating new products, were 100 years ago far removed from speculative activities. I am reminded of how great the Western Union telegraph company once was (and certainly was in 1900). A man named Bell took his "voice by wire" device to the owners of Western Union and tried to entice them to purchase his patent invention rights for what even at the time was a modest amount; US$100,000. The Western Union folks, who already had most of America operating within a wire network for telegraph purposes, and who could with Alexander Graham Bell's invention quite rapidly turn telegraph-only into voice-plus-telegraph, debated the offer for less than a day and then sent Bell on his way. Not one member of the Western Union board had sufficient vision to see "how" or "why" anyone "needed to *talk* directly with someone else - when they could send a permanent record message via telegraph."

Research and development, purely for the sake of expanding man's knowledge of something, is a new speciality of the Chinese who characterise their efforts as "basic research." Bell's "basic research" was not done in a fancy laboratory funded by deep pockets. It was done in a converted loft using tools and equipment he fashioned from discarded materials intended for totally different original purposes. Often the best "basic research" comes from someone who is so far removed from the pristine laboratory that his (or her) mind is not cluttered by cohorts constantly providing reminders "why" something conceptualised "*simply cannot work.*"

Electronic gadgetry, whether a Cruise Missile or a complete TV camera and transmitter the size and shape of a ball point pen, remains one of the few areas of human endeavour where one individual, alone night after night in a garage workshop, can create something which totally changes the course of human development. What have *you* invented recently?



LETTERS

CNBC's advertising rates

"With CNBC service on PAS8 now encrypted, one wonders whether the mighty General Electric Company has informed CNBC advertisers (who pay rates based upon the total size of the audience) that the number of potential viewers is now decimated and that only subscribers to Asian and Pacific DSTV services will in the future be able to see their adverts? And whether CNBC has cut their advertising rates to reflect the much smaller audience they now serve? My guess would be they have not done this in the hope they can keep this information 'hidden' for a few years while they slowly build back towards (but never to) the level of viewers prior to encryption. Would anyone at CNBC care to answer; my bet is we will hear nothing from them on this matter!"

Siam Global, Bangkok

Uplinking from Saipan

"I have been asked to create a study of the possibility to uplink 60 channels of television via satellite (using either Intelsat or PanAmSat) to do a split service consisting of 'distance-learning/education' and normal cable (TV) service to a neighbouring island. They are asking for an 'F1' system and I do not know what this is; do you? "

Leslie Debrum, Saipan, Western Pacific

History of TVRO?

"I was the first fellow in the country of Greece to install a TVRO system, more than 20 years ago. At the time we installed large antennas to 3m and remember meeting some of the Americans plus UK's Steve Birkill while attending early UK satellite shows. I did well in the business installing private dishes until in 1989 the mayor of our city decided for political reasons to connect several dishes to low power terrestrial TV transmitters to 'share' the programming with the community; end of my business! His effort attracted much interest and pretty soon all across northern Greece people had installed terrestrial relays of satellite programmes sourced from world-wide programmers. I have the October 1984 'Anniversary Issue' of Coop's Satellite Digest which nicely traces the early days through that year from the 1970s. What I would like to do is meld that information to an update that takes the reader to the present time, reflecting on the changes that have taken place and the reasons for these developments. Are there sources out there - has anyone written a complete history of TVRO and if yes, what might it's title be?"

Zacharias Linagas, ziangas@compulink.gr

Coop's Satellite Digest continued until early 1987 and post that point in time there has been no counterpart to serve as a reference source. Several people have thought about doing exactly this - to date it has not been done.

3m dish in NZ?

"Any sources of 3m dishes in NZ?"

Frank C, NZ

Brand new? Unfortunately , no; used yes.

PROGRAMMER PROGRAMMING PROMOTION UPDATE

APRIL 15, 2003

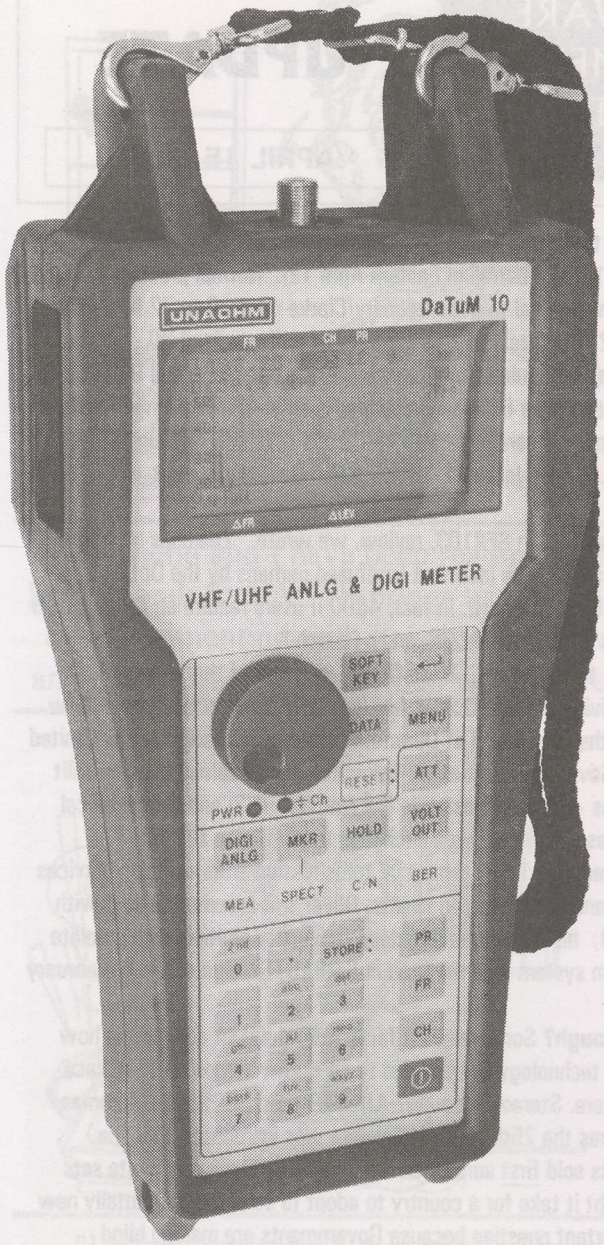
MATV Movie & Entertainment Channel began service March 23 on AsiaSat 3S using DVB-FTA (4110Hz, Sr 11.230, FEC 3/4). This is a Chinese (Cantonese, apparently) channel with a significant stock of Chinese films and if = IF - it stays FTA, could be a significant reason for Chinese immigrants throughout the Pacific to invest in a home dish system (typically 2m in Australia, 3m in New Zealand). Same Mux contains two other services (TVB origin) one of which at presstime has recently become CA. MATV movies are typical Chinese shoot-em-ups.

Imparja's B1 Hz link. We've had our exchanges as past SFs have reported. The most likely time for them to 'play games' with - of all things - their linking frequency, is during an AFL event carried by the station. There are now three separate frequencies they seem to like: 12.360, 12.370 and 12.380 (your own LNB may find these up or down 1-2-3 MHz from the actual frequency - merely a slight variation attributed to your LNB, not them). Resulting in 12.370, for example, likely to be for you someplace within the range 12.367,12.368, 12.369, 12.370, 12.371, 12.372 or 12.373.). On Sunday March 30, for example, they were on 12.380 during AFL coverage, changed for NRL, changed again at end.

Westlink via Aurora. This channel 23 (not 32 as misprinted) service now routinely links Perth Access 31 (terrestrial) to satellite Thursday evenings, then Friday evening through sign-off Sunday. It is FTA and includes some very enjoyable programming. What is missing here is a better quality off-air pickup as the UHF channel analogue reception they begin with is flawed by a "P4" graininess. Westlink advises SF, "Because the FTA channel is community not-for-profit and has no money this is uplinked at no cost (to Access 31). The signal is pulled from a domestic terrestrial antenna and uplinked 'as is' - warts and all!" Solution would be better quality off-air reception antenna system at Westlink's Aurora channel uplink site. Surely there is someone in WA who will donate the correct equipment and time to improve this signal quality? Everyone benefits because this is a dedicated FTA service which needs the support of dish installers throughout Australia (and it falls between GWN on Aurora ch 22 and WIN on Aurora 24)! Contact is Jon Underwood as JUnderwood@dlgrd.wa.gov.au. If you elect to take this on, shoot some photos of your work and we'll publish same here in SF.

Collecting $$m from Murdoch. Los Angeles law firm Milberg Weiss Bershad Hyne and Lerach has been successful in forcing News Ltd to fork over US$30m to United States holders of failed Galaxy. Litigants had held US$600m in Australian issued bonds so essentially they received 5 cents on dollar from News Ltd. The law firm was in Australia late in March drumming up business for what it calls "no risk suits" brought against companies that lose investor's money through fraudulent activities. The law firm is a heavy hitter, claims to have collected more than US$30B in last five years with suits pending against Enron, Global Crossing, WorldCom and British based Cable & Wireless.

Rumour time. April edition Hills (NZ) e-mail advisory to clients includes statement, *"Some news just in, Maori Television Service will be available on Optus B1 very soon."* This would, perhaps, be inside the TVNZ 12.456(.483)Vt MUX but more likely as a new programme channel within Sky NZ bouquet, perhaps - perhaps, FTA like TVOne and TV2. Sky NZ doesn't give up their position willingly and right now they control the ether waves. More importantly, Grant Allan, "*advising Maori TV on engineering issues*," tells SF, *"Maori TV has not yet finalised transmission and distribution arrangements and while it is possible we look at DTH coverage for remote areas, this will become clearer once negotiations over our transmission platform are complete."* Interpretation? Hills seems badly premature.



DaTuM10 Terrestrial Digital and Analogue Television Instrument

- **Automatic Digital signal measurement.**
- **Simultaneous view of Seven channels.**
- **Spectrum Analyser with variable Spans, MAX, MIN, FREEZE and Dual markers.**
- **Auto Carrier to Noise ratio measure.**
- **50 memory 7 program Data Logger.**

DaTuM10 is a new hand held TV Signal Level meter that measures 45 to 860 MHz Analogue and Digital, COFDM and QAM. The signal levels of any 7 channels can be shown simultaneously in the new histogram function. Spectrum Analysis and Expanded Spectrum with 2 Markers enable a broad range of detailed and specialised measurements to be made. A moulded rugged Rubber Holster protects the DaTum10 against knocks and falls. The keypad has been designed for use even in humid and dusty environments and a Pulse Encoder knob speeds function selection.

It detects Digital from Analogue, automatically adjusting the signal level read to Digital Channel Power and tuning to the centre of the channel. Measurements include Signal Level, D.C.P., Carrier to Noise Ratios, Vision to Audio Ratio, and Bit Error Rate estimation. The graphic LCD can be read in darkness or daylight. Clear Menus guide the user through functions which include mast or line amplifier powering and Data Logging. DaTuM10 employs precision signal level detection circuitry (superior to AGC detection) that reliably measures signals as weak as 20dBμV and provides Peak and Average detectors.

Internal Ni-MH battery life can be extended with optional external batteries and the instrument can recharge whilst still being used from the mains switch mode power supply included or 6V DC.

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2.4 GHz "fun"

"I have been experimenting with 2.4 GHz equipment using external (outdoor) directional gain antennas. At the typical 30-200 milliwatt power levels available with off-the-shelf units, paths as long as 4 km (line of sight) are practical and repeatable. This requires 60 to 100cm dishes and a feed which of course functions in the 2.4GHz frequency region. Transmission line losses from the 30-200 mW transmitters/transceivers are very high using RG6 which means the line length should be kept as short as practical at both the transmit and receive end. I have also experimented with a 1 watt 2.4 GHz amplifier, very briefly, and was astounded with how much 'more signal' it produced at 4 km than the stand alone 'barefoot' units. Most of my efforts have been directed at receiving via satellite ethnic services which can then be 'shared' using 2.4GHz with friends and neighbours. There is no 'commercial activity' here - merely an intense interest in the developing technology and a desire to be a part of it!"

MG, New Zealand

HSMM (high speed multimedia) radio links using RLAN (radio local area network) technology is exploding world-wide. NZ and Australia allow various low radiated power non-licensed transmitters or transceivers (which is a combination transmitter and receiver) to operate as they come out of the box - no paperwork. However their output power is, as noted, quite low (200 milliwatts seems to be 'high' for these products) and their use without a license is only 'legal' when the manufacturer's provided integrated antenna (typically a small credit-card size 'patch antenna') is employed. The patch antennas are not very effective but usually adequate for the intended RLAN application - which is to give a PC the ability to be physically moved from room to room in a house or building without the annoyance of having to be connected via cable; hence, "wireless LAN." Many of the products available, typically between NZ/A$100 to $200 via cut-rate Internet sources and e-Bay, plug directly into the PC using an unused slot. RLAN products are typically spread spectrum, using 22 MHz of bandwidth (IEEE standard 802.11b). Video is possible provided the PC has been configured to process video. World-wide there are 14 of the 22 MHz wide channels starting at 2.412 GHz and ending at 2.484 GHz in 5 MHz steps (2.412, 2.417, 2.422 and so on). Totally separate from this are 'wireless' (colour) TV camera products created for security system applications. These are standard wideband FM modulation, typically using some of the same channels as RLAN, with transmit powers of 30 - 100 mW. These cameras through Internet sources are typically sub US$100 which is pretty cheap when you consider it includes the colour camera, and, a 2.4 GHz range TV transmitter (including FM subcarrier audio typically at 5.5, 6.0 and 6.5 (MHz) audio subcarrier frequency. The distance "claimed" for clear line of sight (LOS) with these gadgets is up to 3 km but is of course transmit and receive antenna gain sensitive. Most TV camera packages also include a companion FM receiver and both transmit and receive side have dip-switch settable channel selection. The same 1 watt (and even some 2 watt) external amplifiers used for RLAN can be used for wireless cameras as well. Go to a library and request a copy of QST Magazine for April 2003; p. 28 for a good overview of the RLAN aspects of this "revolution."

HARDWARE EQUIPMENT PARTS UPDATE

APRIL 15, 2003

Launches. AsiaSat 4 to 122E scheduled within launch window 00.09 > 01:21 UTC April 11 (10:09 > 11:21 Australian Eastern April 12). Normal procedure would have it transferring from elliptical to geostationary/Clarke orbit 30 to 72 hours after initial launch, drift to 122E and test signals possibly as early as April 20 - but more likely later. InSat 3A was scheduled from French Guyana between April 9 (UTC), to **93.5E**; 12 standard C-band (plus 6 "expanded-upper" - as in 4.5 GHz range), and six Ku band on board; unknown coverage pattern on C-band (this will be roughly half-way between As2 [100.5E] and InSat 2E/3B [83.5E]). Daily updates at www.apsattv.com.

Strong 4800 II correction. In SF#103, review, we wrote, "Zee uses an Irdeto format CA package ..." which was incorrect (confused perhaps by the Optus Globecast use of Irdeto II, on our part). In fact, 4800 II users require an Aston v1.05 CAM, not Irdeto for Zee TV on AsiaSat 3S, and a "patch."

One of us appointed to NZ board. Brian Oliver, manager of the Auckland University satellite receiving station 'Unisat' has been chosen as one of seven New Zealanders to serve on the new Board of Directors for Transmission Holdings Limited (THL). Under a Labour Government initiative, Television New Zealand is being split into two separate groups - the broadcast side (TV One and TV2) and the technical arm (THL) which provides the nation-wide backbone transmission system interconnecting more than 900 TVNZ terrestrial transmission sites and also services a number of Australian and Pacific region clients. Oliver will assume the post with the new board on July 1; his innovative Auckland University multiple-dish satellite receiving and distribution system was featured in SatFACTS Volume 1, # 6 (February 1995).

How long is long enough? Some relevant facts from the USA concerning how long it takes for a new technology to be added to consumer homes, or to replace something previously there. Stereo TV sound? After 19 years, 69% of US homes have it. Colour TV? It was the 25th year after colour was introduced that the number of colour TV sets sold first surpassed the number of black and white sets sold. So - how long might it take for a country to adopt to something as totally new as DVB-T? It is an important question because Governments are making blind assumptions about when they can shut down the existing analogue transmitters thereby *forcing* viewers to DVB-T. Ten years from introduction? Twenty? Twenty-five? The UK still "believes" it can shut down analogue in 2006, barely 6 years from DVB-T being introduced. These are serious questions Australia and New Zealand must also work out before rushing headlong into a DVB-T ONLY environment.

Tahiti's French pay-TV service, Telefenua, privately owned, is closing/has closed leaving 4,500 set-top boxes quite useless after 8 years of operation. Service carried 18 programme channels including CNN using Austar funded MDS hardware.

Halftone photos and PDF files. SF#103 volunteered to forward (e-mail) copies of the German reports concerning hacking of Irdeto from PC Direckt publication. That "offer" was withdrawn April 3 and between the 3rd and 8th (alone) we received 90+ requests for these files. They are in excess of 12 Mb and while interest in having them is high, it is no longer practical to deal with these requests (p. 14, SF#103). *Sorry.* About the lousy halftone (illustrations) in #103. In more than 9 years of publishing, we have never experienced the degree and extent of printer / technical problems as this past issue. All we can promise is, within our human capability, it will not - no, *should not*, happen again!

OK ... so why should **YOU** advertise in SatFACTS???

"My friend and I have been reading SatFACTS from day one and I have a complete set. Each month SatFACTS brings us new challenges and we are inspired to educate ourselves by experimenting with new concepts. Each time, we learn something from our mistakes and our successes. And when we fail, we look forward to the next issue to help us along."

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Reviving C-band dishes for C & Ku use

When Sky Australia closed down their original analogue feed, hundreds of 1.8m and larger dishes became redundant. Subsequently when Aurora replaced HABCSS analogue service, dishes in the up to 3m range became equally redundant. Meanwhile in New Zealand, 3m and larger (up to 4.2m) dishes originally put into service at motels and other locations for the analogue HABCSS ABC service through Optus A-series went "dark" as the services disappeared. There are thousands of dishes, up to 4.2m in size, scattered throughout Australia, New Zealand and the Pacific Islands located at, and, west of 180 east. Many of these are candidates for refurbishing and retrofitting for either C or Ku band service. And the price for many of these is often very attractive: "Come and get it!"

Virtually all of these dishes are "prime focus" which means the dish is a true "parabola" (1, below). This is not the same as an "offset" dish which, as a design standard, entered the satellite world at a later date more or less simultaneously with the introduction of widespread digital transmission technology. Prime focus (PF) dishes vary in size from one-piece 1.1m upward to tens of meters in diameter, assembled from multiple panel sections. One piece dishes typically do not exceed 4m in diameter simply because they become too large to move from location to location or handle (install) when they arrive at a destination. There are several rules of thumb at work here:

#1/ Once a dish must be assembled from two or more "sections/segments" the accuracy of the finished project becomes more at risk.

#2/ Any dish, without respect to its size or the number of pieces involved, can be "out of shape" (warped, bent) and when this happens the pointing accuracy and the realised gain with the dish suffers.

#3/ Most dishes, even one piece, can be "field adjusted" to "proof" or "prove" the dish symmetry.

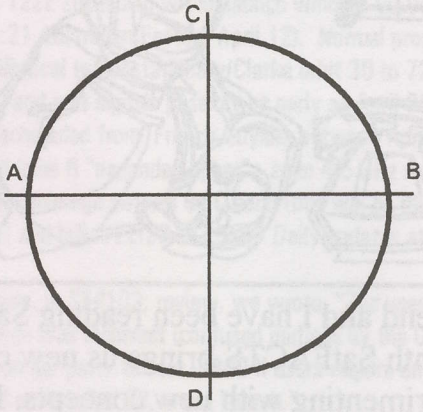
#4/ As the size of the dish is increased, the opportunity for reduced gain increases because of errors in assembly or "dish proofing." In other words, it is easier to mess up a 3.6m surface than a 2.3m parabola because of carelessness or because the parts you are working with are distorted (not capable of being adjusted to represent a true parabola).

#5/ As the number of pieces making up the surface (and mount) increases, the chances for a dish resulting with reduced gain increases. In other words, a 4 piece dish can be 400% more difficult to "adjust/proof" to maximum performance than a one-piece reflector surface.

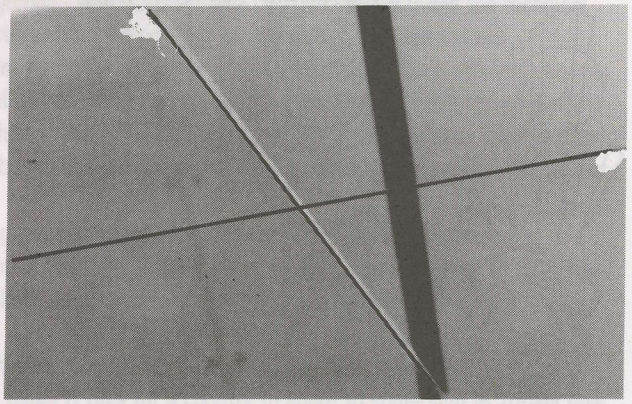
And finally,

#6/ As the frequency of use increases (such as C to Ku), the surface accuracy required increases. The "proofing" exercise, where you "prove" the parabolic shape, requires 3x (300%) greater accuracy at Ku band (12 GHz) than it does at C-band (4 GHz). Which is another way of saying what may be a tolerable (acceptable) error in assembly at C-band becomes quite intolerable when the same dish is used at Ku band.

1/ Parabola: "an open plane curve formed by the intersection of a cone with a plane parallel to its side, resembling the path of a projectile under the action of gravity."



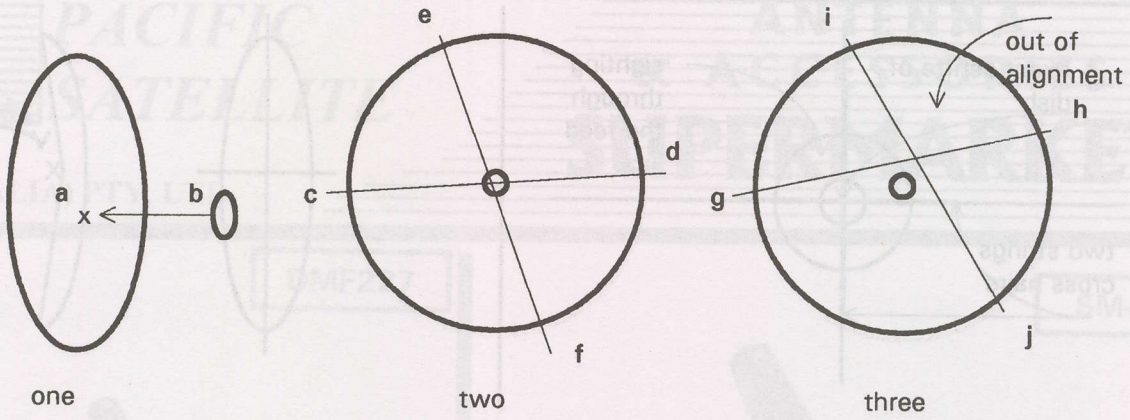
Distances A > B and C > D should be equal. Make sure you are measuring from the exact same "edge" point for all four locations.



"Stringing" a dish. Find 12 o'clock and run a "taunt" string to 6 o'clock; then with a new piece of string, 3 o'clock to 9 o'clock. Where the two strings cross is on the "focal point line" for the dish and the two strings should just touch one another - one should not be even mm from the other at the crossing point (nor should one "push" the other by laying against it). This crossing point will / should align with dish electrical centre, and, at "top end," the feed point centre.

Parabolic reflector

Some basics. In *any* satellite dish system, the parabolic shaped portion is a "signal catcher"; a *passive* device to intercept (catch) and then reflect the intercepted energy to something called a "focal point." If geometry is not your thing, simply think of the reflector surface as a rebounder; any



Ideally, the centre of the feed looks directly at the centre of the dish (# one, a>b). When the dish is appropriately "strung" the 12-6 o'clock string crosses the 3-9 o'clock string directly over the centre of the dish when viewed from directly in front (c>d, e>f in # two). When a dish is deformed, the string crossing when viewed from directly in front of the dish does not "fall directly over/above" the centre. In drawing three, which is purposefully not proportional to focus on a possible warped dish segment, the lines (g>h, i>j) cross above and right of the centre of the dish.

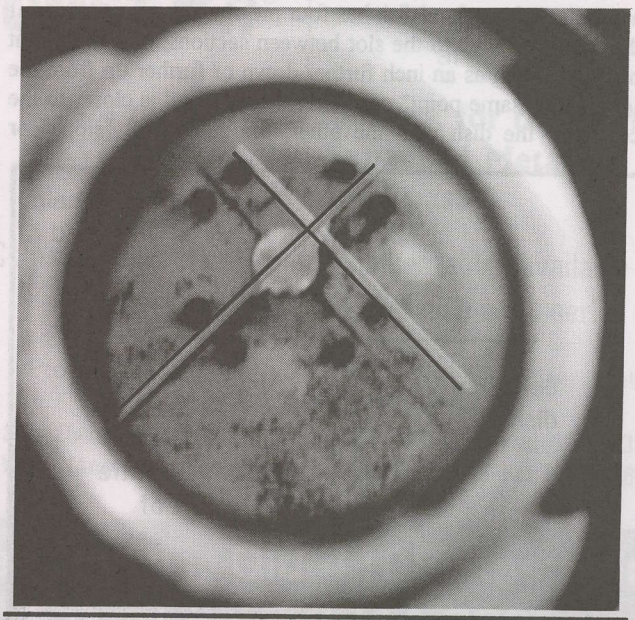
microwave energy striking it is bounced from the reflective surface in a new direction. The constantly-curving reflector surface is designed so that all of the energy ends up at one central point; *the focal point*. But this "magic" occurs only when the surface of the reflector follows very closely the geometric "parabolic curve." Deviation in this curve (errors in the surface of the dish) cause the captured energy to focus someplace else - not the "focal point." Yes, it is still captured and still reflected - but not to where it is supposed to go and therefore not to the feed antenna.

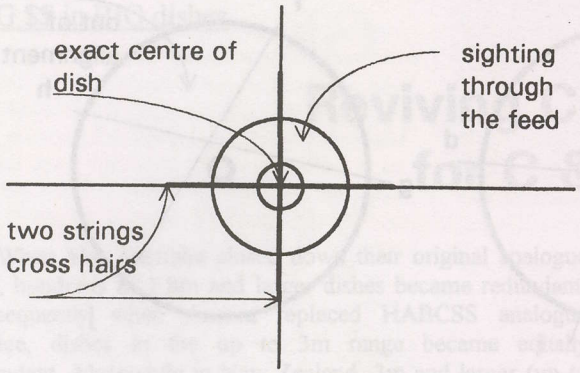
Such misdirected intercepted energy is lost to the system because at the focal point is the feed antenna, connected to the LNB (low noise block downconverter). If the misdirected microwave signals don't end up at the feed, they simply fail to make a contribution to the overall signal level available. Therefore a dish when assembled (or reassembled) should be "proofed" after assembly and as required readjusted to make it as close to being "parabolic" as possible. Remember, any deviation from parabolic will reduce the gain and under some circumstances will distort (redirect) the pointing direction for maximum signal (i.e. the *centre* of the reflected energy will come from someplace other than the exact center of the reflector surface).

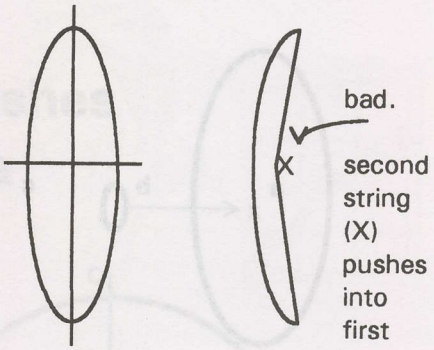
Proofing

There are several steps you can take with very simple tools and only limited experience to "prove" your dish. It starts with a roll of string. The string is a visual tool which when used with our eyeballs and the instructions appearing here will

Sighting through the feed support (left), at and past the cross hair strings, to the centre of the dish. Ideally, all three measurement points are in a line. But they seldom are initially (right). What we see is the cross-hairs are "high" and to the "right" of the dish mechanical centre when camera sees what eye saw.







Ideally, if you place yourself directly behind the feed and "look through it" you will see the "cross hairs" of the crossing strings and then behind the cross hairs the centre of the dish - often indicated by a "hole" at the exact dish centre; everything "aligns" perfectly indicating (1) the dish is a perfect parabola, (2) a feed placed at a point in line with the cross hairs and centre of the dish will capture all of the dish's reflected energy. The strings at the crossing point should just lightly "touch" one another - not be separated (by 1mm or heaven forbid 10cm) nor should one string "push hard" into the second string pushing it out of shape. If your dish has 3-level alignment, *stop*; you are there!

produce several important tips about the "shape" of the dish. Remember - *shape is everything here.*

If the string is pulled taunt (under tension) and installed between 12 o'clock > 6 o'clock, while a second string is installed between 3 o'clock > 9 o'clock, the two strings will "cross" at the approximate (or exact) centre of the dish. There are two things to observe at this point:

#1/ Where the strings cross should be precisely in line between the centre of the feed and the centre of the dish. This "cross hairs" marks the centre of the parabola reflector. That's observation number one.

#2/ Where the strings cross, they should touch very lightly. One should not be pressing against the other (thereby distorting the straightness of the pushed-against string).

There are some precautions as the string is installed. Common mistake number one - as the string last touches the rim or edge of the dish and heads across the dish surface to the opposite side, both ends of the string should last have contact with the dish rim or surface at precisely the same points. For example, a four piece dish has four pie-shaped segments and if the string "falls" into the slot between sections, one end might being as much as an inch further down or further up from the (opposite) "same point" on the dish. If one end is closer to the centre of the dish than the other, the string will "slope" or "slant" and destroy the accuracy of the cross hairs measurement.

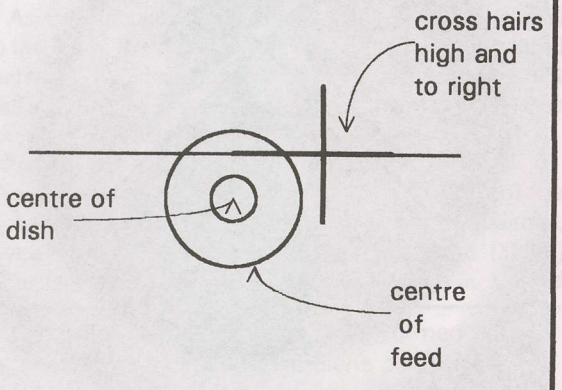
Cross hairs misplaced?

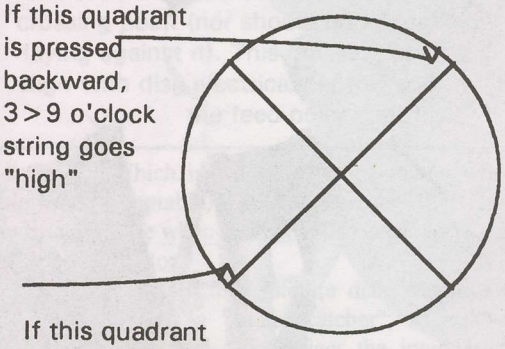
What if the cross hairs don't fit exactly into the centre of the dish (as indicated by the typical hole in the centre - if none is there, make your own exact-centre mark for measurement purposes)?

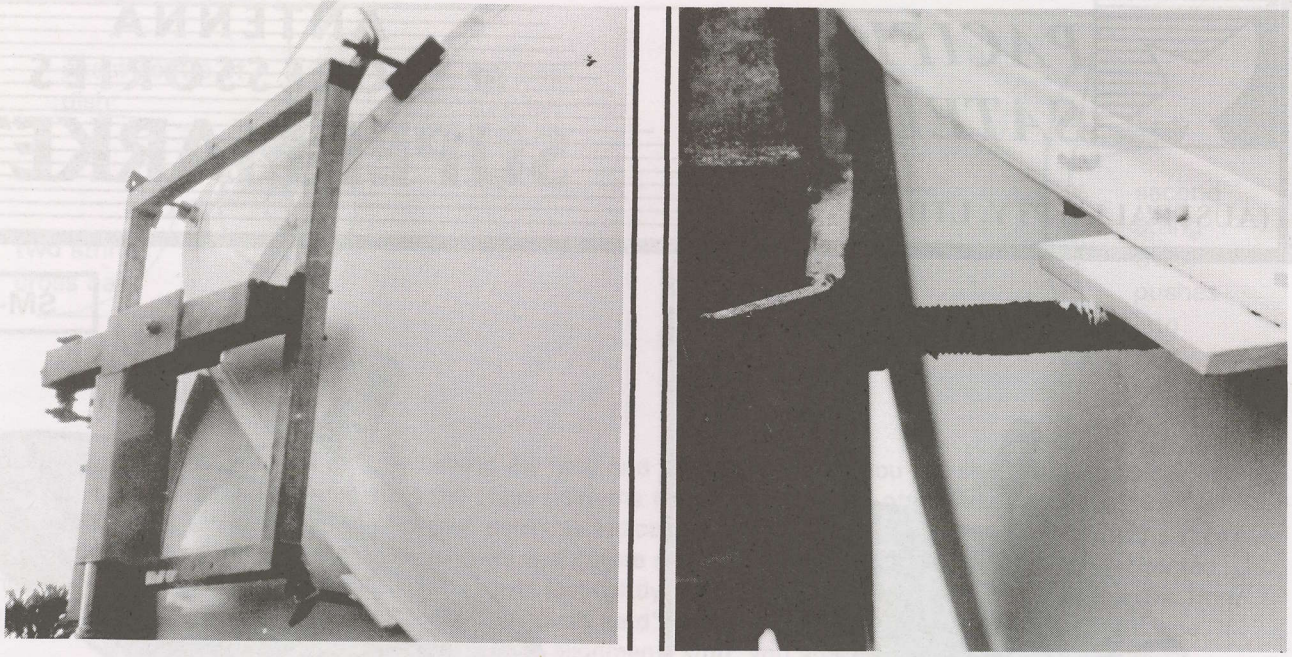
Let's assume the cross hairs meet not in the centre but rather above the centre and to the right of centre. What does it mean?

The dish is warped. Portions of it are forward of where they should be; other portions are behind where they should be. In our example (below) we are diagramming a four-piece dish which has a series of bolts attaching the four segments (pie pieces) together. And, behind the dish , there are bolts which hold the dish to the mount (p. 10, photo). Some of these bolts provide a measure of adjustment which directly affect the way the dish's surface is formatted. It is possible, with some dishes, to make adjustments to the dish surface positioning how far "forward" or back different segments of the dish are located. Even in a one piece dish, it can be "stressed" (moved against its will) by tightening or loosening these "mounting bolts."

All dish surfaces, whether segments (such as quarter-section parts) or one whole part can be moved relative to other portions of the surface by simply cranking on locking nuts.







This particular (3.8m) four piece dish has a flange connecting each dish segment "quadrant" (1/4th of total surface) to mounting frame (left). The all-thread has double nuts (and washers) and the distance from the mount to the dish surface can be "tweaked" at each of the four locations (right). By adjusting the nuts, relative spacing between frame and rear surface can be varied which in turn changes cross hairs in front.

This gives the installer a way to correct for the cross-hairs being out of alignment with the centre of the dish. Why is it important to have the cross hairs in the centre?

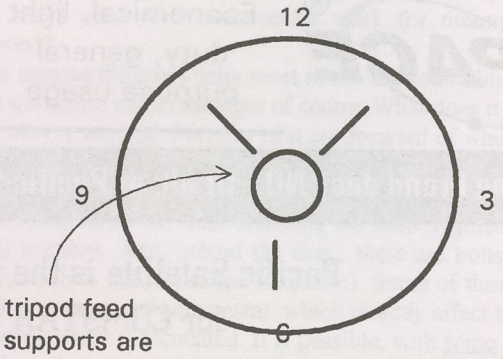
There are two measurements here with the strings. The first, reflected by the distance between the strings, tells you how much "out of parabolic" the dish surface may be. To correct this so that the strings come directly into very light contact with one another requires some adjustment of the dish surface; either the rear panel bolts or the connection bolts which hold individual pie sections together (or in the case of our four-segment dish shown above, both of these adjustments back and forth between the two). There are some precautions here as well.

As the adjustments in our example 4-segment dish are made, the relative location of the strings changes rapidly. One full turn on the nut at the rear of a 3.6m dish can change the distance between the two strings (readjusting the strings by 1/4"/ 7 > 8mm). As this adjustment takes place, and the distance between the two strings changes, the cross hair point is also moving. As the distance between the two strings becomes smaller, and they touch, one of the two may begin to "push" on the other. This is a time to stop, disconnect the string that is being pressed, and the string is rerun so it is now on the opposite (inside to outside or outside to inside) of the second. As soon as the strings begin to touch and one forces the other to move against its natural lay-line (right hand diagram, p. 8), all accuracy of the measurements is lost and you need to free up the strings before continuing.

The first adjustment is to make the strings just touch - this proves (after a fashion) the parabolic shape of the dish. Well, almost.

Now the tough part. There are three separate "tools" here - the hole or mark you have made at the centre of the dish, the cross hairs of the two strings, and the "focal point" of the feed.

Feeds have a support - either a bent upside-down "J" type of single rod support, or three (or four) dish-surface-staked arms

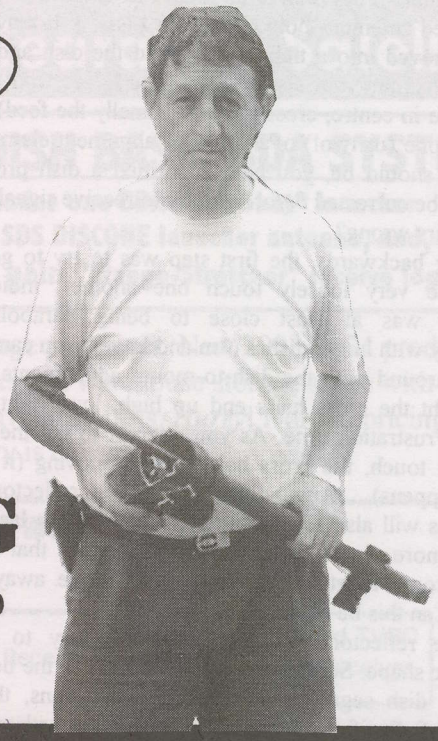


tripod feed supports are intended to position the feed in exact centre

which come together at the feed location. Their purpose is #1) to stay out of the way of the parabola's reflected microwave signals, and, #2) support the feed at the precise focal point. This support system presumes the focal point is centred out in front of the dish - an equal distance from 12, 3, 6 and 9 o'clock on the dish rim. Ideally, you position yourself (your eyes) directly behind the feed support so you can "look through" it into the cross hairs (p. 7, left bottom) and then at the centre mark/hole on the dish reflector proper. This may only be practical if you are stringing the dish and making dish adjustments while the antenna is rolled over, essentially pointing straight at you (i.e. the horizon). Larger dishes in particular are very difficult to align if they are already at an elevated look angle (i.e., pointing skyward which places the feed so high up that even with a tall step ladder you cannot get behind it to look through the feed mount). And the LNB (and/or the feed itself) may have to be taken off the feed mount to allow you to "look through."

An alternative to being top side above the feed mount and looking back through the cross hairs to the dish centre is to get *behind* the dish, and place your eyeball(s) up against the hole.

ME?



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Now what you see is #1) the dish centre hole, #2) the cross hairs and #3) the centre of the feed itself, in that order (p. 7, bottom right). They should all align (cross hairs in the middle of the feed antenna - hole going into LNB;). It may require a mirror shoved into a tight spot behind the dish and then you somehow squint your eyes to allow you to see what the mirror sees (hole in centre, cross hairs and finally the feed). In either case, if one (or two!) of the trio of alignment elements is not where it should be, you have identified a dish problem that needs to be corrected *before* you try to receive signals.

Cross hairs wrong?

Going backwards, the first step was to try to get the two strings to very loosely touch one another, indicating the parabola was at least close to being parabolic. Often, especially with larger dishes (3m and larger) you can do this by futzing around with the dish-to-mount adjustments but try as you might the cross hairs end up high, low, right or left of centre. Frustration time. As you attempt to get the strings so they just touch, the cross hair point is moving (it is part of what happens). Any adjustment to the reflector-to-mount apparatus will also realign the cross hairs. With larger dishes, two or more pieces, what usually happens is that as the two strings come together, the cross hairs move away from the centre. Can this be resolved?

The reflector-to-mount adjustments try to achieve a parabolic shape. So too, any adjustments with the bolts joining separate dish segments together. Bryon Evans, the original owner of Pacific Antennas in NZ and with more dish experience than perhaps anyone else in the Pacific, often suggests that when you have a multiple-section reflector that will not "string-to-parabolic," that you roll the dish up so it points straight upwards into the sky (as if you were on the equator and pointing at a satellite dead overhead). Then, "loosen all of the bolts/nuts that attach individual segments together and with several people 'shake the dish very vigorously'. It will often settle into its own unforced parabolic shape. 'Retighten the bolts and recheck the strings' " is his advice.

If one or more dish segments is actually warped (no longer has its design shape), no amount of "shaking" is likely to correct the problem. So assume for the moment after all of this trying, the dish simply refuses to assume a parabolic shape as the strings would measure. What are your options?

#1/ If you haven't paid for the dish, don't!

#2/ If the dish is one piece, find a hard totally flat surface (such as a level concrete driveway) and lay it down *face first*. Inspect the rim (edges) where it touches the ground. You will find some portions of the rim are elevated (don't touch the ground/concrete drive for example). Measure how much "gap" (space) there is between the rim and the known-flat surface. If it is 6mm or less, the dish is still acceptable for C-band use. If it is 2mm or less, it will still function on Ku (and C) band(s).

#3/ If the dish is 2 or 4 piece, even if you have already loosened the bolts holding the segments together and "shaken" the dish, do it again - this time with the face down. When the bolts are loose enough to allow the dish segments to move independently, use several (strong!) people to reshake it again (being very certain the surface where the dish is face down is in fact totally level/flat). You may be able to "rejiggle" the surfaces back such that the rim is flat against the ground (or within 2mm if for Ku, 6mm if for C in the worst case) and the bolts can now be retightened and the dish will "hold" the "rejiggled shape." Once this is done and the dish is back on the mount, restring to verify nothing moved in this exercise.

Rule of thumb: If the cross hairs are dead centre and the two strings are from barely touching to not over 6mm apart, you have a goer for C-band (2mm for Ku). And if either the spacing is *more than* 6/2mm and/or the cross hairs is not dead centre?

Strings improperly spaced

Even with a one piece, chances are you can locate a spot (or two or three) on the reflector to dish mount where heavy duty thick washers can be placed between the mount frame and the rear of the dish to "distort" the reflector-to-mount mechanics and "force" the strings into a just touching / within 6/2mm configuration. With a four piece such as shown here (p. 10, top), each quadrant of the dish has a mounting "tab" or plate. This long bolt has an adjustment range of several inches and as you force the dish forward or backward by adjusting these nuts, the strings will literally race to new positions. Hint: Moving the reflector out (towards the front or feed) causes one or both strings to move out as well.

Getting the strings to be just touching as they cross is the easiest challenge. Maintaining the cross hairs at the centre of the dish when viewed through the feed and to the dish centre (hole) is the tough part.

Cross hairs in wrong spot

Recall there are three separate items to be placed in alignment in the cross hairs test:

#1/ The hole or mark you have made in the exact centre of the dish

#2/ The cross hairs (where the two strings cross over one another)

#3/ The feed (mount).

You can "sight" this trio from either end. If there is a hole in the centre of the dish and you can get to that hole with an eyeball, this is by far the least cumbersome. If you cannot get your eyeball to the hole but you can place a hand mirror there and then squint at the hand mirror from the side, that's almost

Non-round (Paraclipse 4.6m) dishes can be strung as well. This one has a 30mm gap where strings cross; correctable, but a major effort and way out of "limits" for Ku band use.

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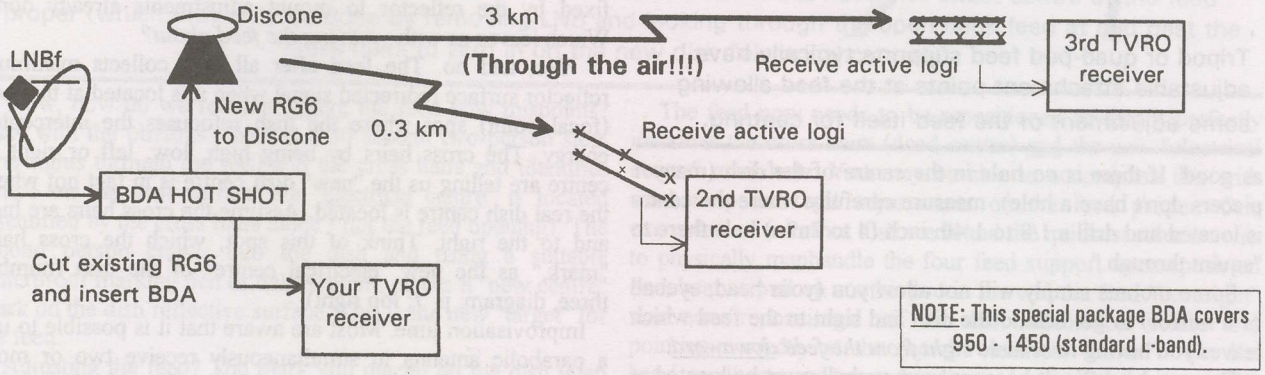

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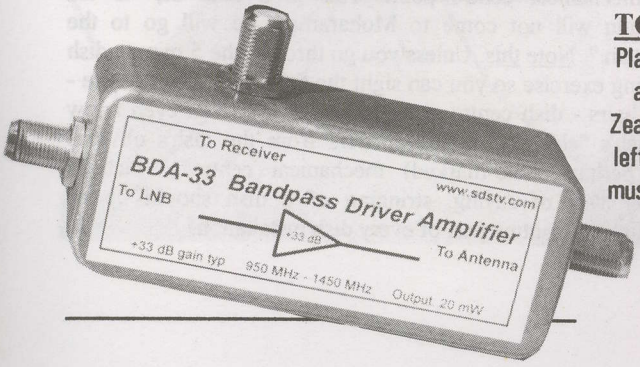

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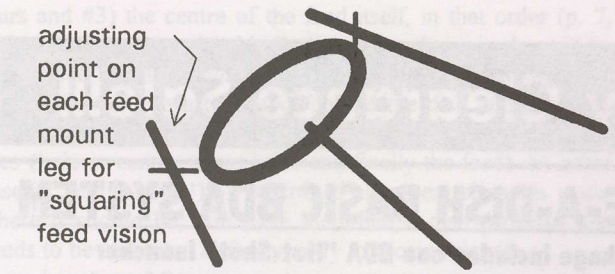
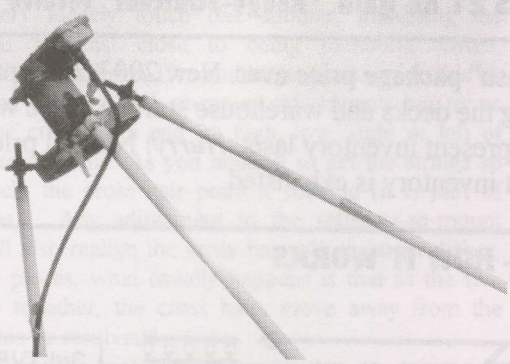




Tripod or quad-pod feed supports typically have adjustable attachment points at the feed allowing some adjustment of the feed itself for centring.

as good. If there is no hole in the centre of the dish (many 1 piecers don't have a hole), measure carefully where the centre is located and drill a 1/8 to 1/4th inch (4 to 7mm) hole there to "squint through."

Some mounts simply will not allow you (your head, eyeball or a mirror) to get behind the dish and sight to the feed which leaves you having to *reverse sight from the feed downward*.

This can be difficult because your eyeball must be located at the point where the LNB probe will ultimately be located when sighting. What happens if you eye is "off to the side?" Nothing aligns, even when the three elements of the system are dead perfect centred.

So to "sight" from the feed the LNB cannot be in place; possibly the feed as well although if you have a way to temporarily or permanently mount the feed first, open-neck construction will create a "sighting tube" through which you can peer to see where the cross hairs and the dish centre fall (p. 7, bottom right). Many feed mounts (such as the tripod or three legged feed support shown here) come together with a method of attaching a "feed support ring" and perhaps the feed, less the LNB. The feed support ring is a large hole (big enough for the feed to mount to it) and while this is not quite as "perfect" as mounting the open necked feed and sighting from feed neck-to cross hairs- to dish centre, it will do.

Cautions. Your eye is the "measurement tool" here. Where you place your eye determines the accuracy of the exercise. Position your head so the feed support ring or the open necked feed perfectly inscribes the hole (or mark) at the centre of the dish. It is dead centre (ignore the cross hairs for now). Now refocus your eye(s) and note where the cross hairs fall. If the dish is perfectly aligned, the cross hairs will be dead centre as well, falling directly over the dish centre mark while you retain your head position that has the feed support ring or open neck feed still perfectly inscribing the dish centre point/hole.

Reminder: You do this after you have adjusted the dish surface so that the two strings which form the cross hairs are just barely touching one another. *First* we get the parabolic shape correct, *and then* we worry about where the apparent focal point centre is with the dish.

If everything aligns, you will obtain maximum dish gain with this particular antenna. *You have just proofed the antenna!* Usually you won't be this fortunate.

As previously mentioned, anything you do to the reflector-to-mount attachments will shift the location of the cross hairs. So while you are adjusting the dish to get the strings in harmony (just barely touching one another) the cross hairs is flitting about moving up, down, left and right. This is all a bit of a frustrating anticlimax if you have spent hours/days getting the strings so they barely touch one another because as you will with some pain learn you cannot go back now and starting readjusting the dish to move the cross hairs back to dish-centre without causing the two strings to either widely separate or forcing one to press down (or up) on the other (diagram, p. 8, top right).

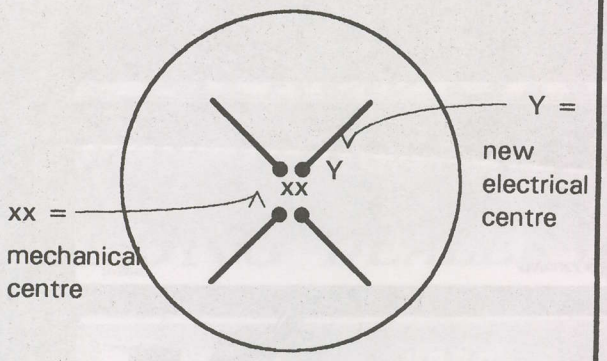
Let's analyse where this leaves us. If we touch the reflector to mount adjustments, bad news; not an option. On the other hand the centre of the dish is "fixed" and the cross hairs is fixed by the reflector to mount adjustments already done. Which leaves us with - *moving the feed about?*

Yes, and no. The feed after all only collects maximum reflector surface redirected signal when it is located at that one (focal point) spot where the dish refocuses the intercepted energy. The cross hairs by being high, low, left or right of centre are telling us the "new" dish centre is in fact not where the real dish centre is located. Assume the cross hairs are high and to the right. Think of this spot, which the cross hairs "mark," as the new "electrical centre" of the dish (number three, diagram, p. 7; top right).

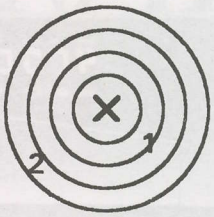
Improvisation time. Most are aware that it is possible to use a parabolic antenna to simultaneously receive two or more different satellites (such as B1 at 160E, B3 at 156E) because while the dish may be pointing at only one of these satellites the signals from the second will also be caught, reflected and refocused as well. Only - *and this is a big only* - they don't arrive at the dish from "straight ahead" - rather they come in at a side angle and because of this angle they will have a focus point of their own which is significantly different than the first satellite. SF has run descriptions of dishes with two (or more) feeds which do this full time - each feed is mounted where the focal point for one particular satellite occurs.

When the cross hairs are high and to the right (or any other point which is not dead centre), you compensate for this "dish error" by purposefully pointing the feed off centre and then pointing the dish at the point (in azimuth and elevation) where the strongest signal is found.

If you have done the relatively simplistic cross hairs measurement properly, resulting in the dish having an artificial (not as designed) "new electrical centre," simply readjust the feed so that it inscribes the new point rather than the (original) dish mechanical centre point. This is a case of, "If the mountain will not come to Mohammed, he will go to the mountain." Note this. Unless you go through the 5 minute dish stringing exercise so you can sight the focal point/feed centre - cross hairs - dish centre, there is no way you can even know the dish's "electrical centre" differs from the dish's obvious (and perhaps hole-marked) mechanical centre. Which is another way of saying, stringing of a dish should be an essential and routine part of every dish installation.



How much signal loss?



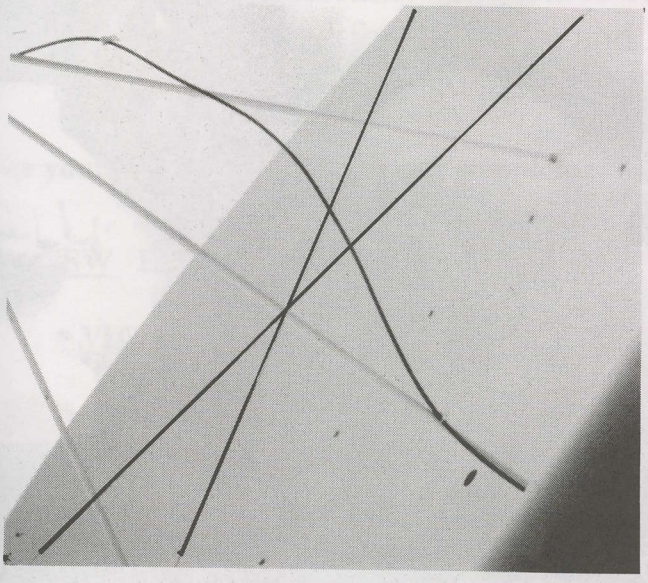
Maximum feed pickup when cross hairs align with "X." 1 loses 1-1.5 dB; 2 loses 1.5 - 2 dB.

Tri or quadpod legs offer opportunity to physically "abuse" the supports to redirect cross-hairs focal centre from logical/normal mechanical centre ("xx" in diagram above, left) to track to new "electrical centre" ("Y"). In (scalar design) feed above (right) , when looking from dish at cross-hairs and feed behind cross-hairs, the cross-hairs should fall directly into centre of feed ("X" in above). If the cross hairs fall away from centre ("1" and "2" above, right), feed becomes less efficient and overall gain of the dish falls off. Solution? Repoint the feed (a mechanical adjustment) to place cross-hairs into exact centre of the feed proper (which may only be done by removing LNB and looking through the open neck feed at and past the cross-hairs to zero in on the new dish "electrical centre)."

Now, how do we readjust where the feed now mispoints? Start with the obvious which is a 30 second two-person step. One sights through the feed and the cross hairs and identifies where on the dish surface the "electrical centre" is located (identified by the cross hairs alone - not the feed opening). The second person crawls into the dish and using a suitable waterproof marking pen or dab of paint, places a "new centre" mark on the dish reflective surface. This is the new "target" for the feed.

Adjusting the feed? The mark you placed on the dish is an exact replacement for the mechanical centre (where perhaps there is a hole). You could drill a new 1/4"/7mm hole here for dish-to-feed sighting if you wished.

Disclaimer: Some "strings" shown in photos have been "highlighted" with photo touch-up techniques as string used was "pink" which does not translate well in transfer from colour photos to black/white.



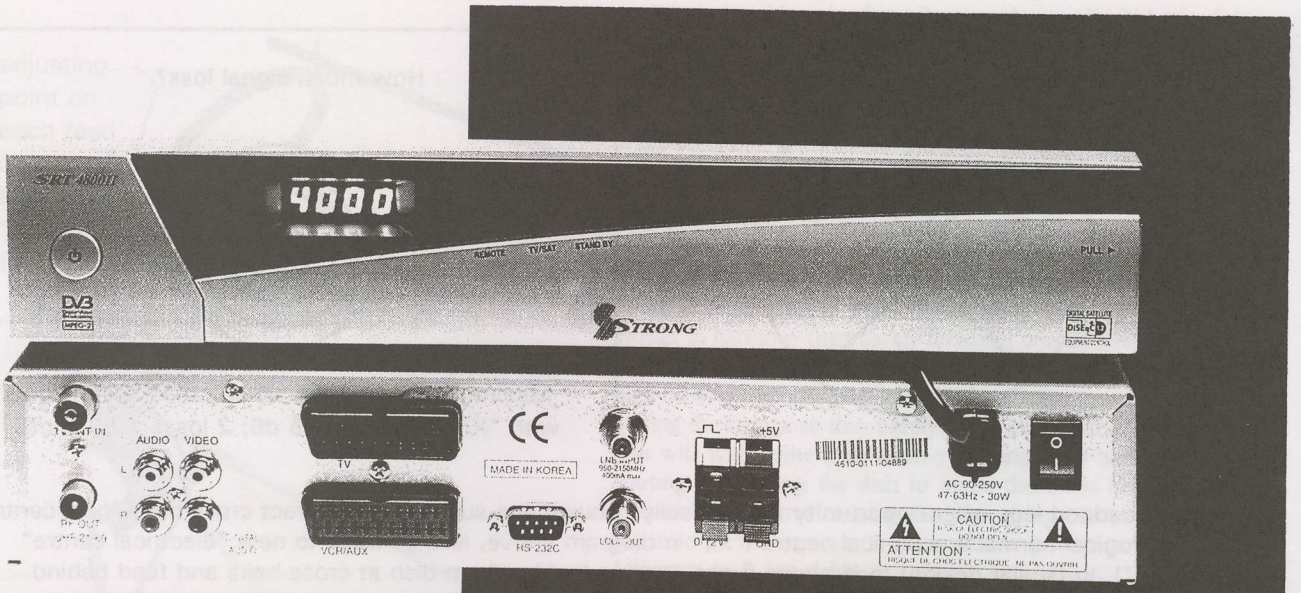
The feed now needs to be repositioned so that it perfectly inscribes the cross hairs (dead centre) and the new "electrical centre" mark/hole. You may be able to accomplish this with washer spacers and adjustments on the feed proper. One example - on a Patriot dish we found the quickest solution was to physically manhandle the four feed support arms (push on one, beat or pull on another) so in the end the feed "boresight" was now repositioned off the dish mechanical centre and pointing correctly at the (new) "electrical centre." On Ku band, an illustration (above) indicates how much "more signal" you can achieve when the feed is properly cross-haired centred with the electrical centre of the dish; it is not inconsequential.

If you have an operating dish and leave it "on target" (pointing at a satellite) and then make this string-measured adjustments, expect to have to reposition the dish elevation and azimuth when you are done because if the cross hairs indicate a new "electrical centre" and you readjust the feed to that point, the dish will now be mispointing by whatever your adjustment distance worked out to be.

The offset challenge

You cannot "string" an offset dish simply because it is not a full parabolic shape. The physical shape of the offset represents a portion of parabola. Picture a perfectly round orange which is cut exactly in half and the orange meat removed. What is left is a "shell" - a parabola. Now cut a pie shaped wedge out of the half-shell from the mechanical centre to the edge. This represents the essence of the offset dish - a segment cut out-of a full parabola.

Verifying an offset requires some precision measurement skills supported by an understanding of the mathematical formulae involved. Computer modelling of offset (also known as "spherical-sectional") dishes allows fine tuning of the reflector surface on a case by case basis. However, this is not a stand-alone effort as each time the reflector surfaced is modified (shape, height, width) a companion change must be made in the design of the feed. A common mistake with offsets is to select an incorrect feed as the feeds for an offset must by design be made as a "match" for the spherical surface.



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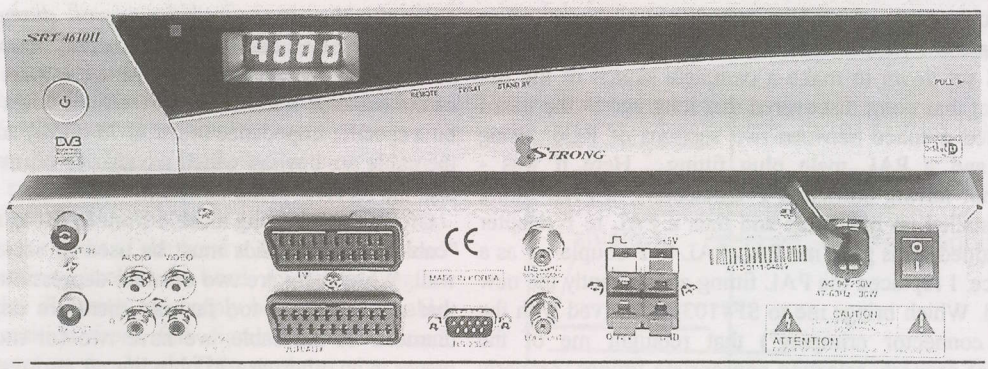

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TECHNICAL TOPIX

Cable connectors - again

"SF#103 was very timely. I had begun installing a new IRD and was trying to recover a narrow band (under 5 megasymbol) CA service. Nothing was happening so I checked the service with a second and then third receiver both of which indicated it was present and strong. On advice, I suspected the LNB since many older models are known to have a high 'phase noise' problem which can adversely effect recovery of narrow Ms services. Still no joy. Desperate to find a solution, I sat down to make a complete sketch of the full system and at that point discovered that long ago in the past I had fabricated a splice between two sections of RG6 using connectors and a PAL male plug fitting. Here it was - apparently not having sufficient F connectors, a PAL fitting had been installed on one cable and then a PAL to F adapter fitting was added. This gave me PAL-PAL to F coupler -F as a 3-piece splice. I replaced the PAL fitting and instantly the new IRD worked. Which brings me to SF#103; it arrived with the article ("F connector crimping") that retaught me of the importance of properly selecting appropriate fittings, properly installing such fittings. SF through the years has attempted to give detailed guidance concerning signal splitters and fittings when installed in a digital environment. I now know why you continue to emphasise this seemingly mundane factor and encourage others to pay more attention - *as I will now do* - to this information."

F K, NZ

PAL connectors for the unwary were originally created in 1936 in support of the pioneering BBC-TV analogue channel in London. Various forms exist including those that must be assembled by tightening a tiny screw which is supposed to grasp the cable's centre-conductor. The screw becomes an "electrical part" of the centre conductor at that point.

Coaxial cable works properly when it is symmetrical from end to end, with precise dimensions for the centre conductor (it is always the same diameter and of the same composition), the insulating material separating the centre conductor from the wrap around metallic shield, and the woven or foil shield material. Anything that distorts the cable's dimensions changes the electrical properties at the point of distortion.

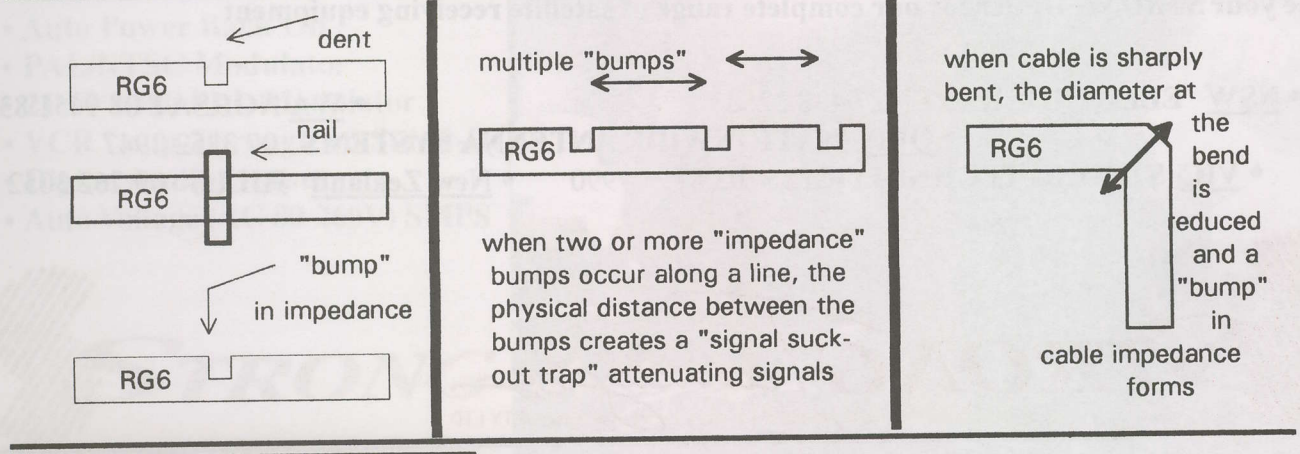
Cable that is deformed by an external pressure changes electrical parameters at the point of deforming. For example, (below), a nail or wire brad is driven over the cable to hold it against a wall. The cable fastener device should only be "snug" to the cable, not pounded in so far as to create a depression in the cable's outer jacket. When there is a depression, at that point your 75 ohm cable becomes something other than 75 ohms. The "75 ohm rating" is the "cable's characteristics impedance" which is created by the physical diameter of the centre conductor, the spacing of the centre conductor from the outer shield portion, *and the overall diameter* of the cable shield + centre conductor + insulating material. As we shall see, the cable impedance has a direct impact on the efficiency of the cable as a transmission medium when it is supposed to be a specific impedance (such as 75 ohms) and at both ends of the cable are devices which are also 75 ohms (the LNBf at the top, the receiver at the bottom).

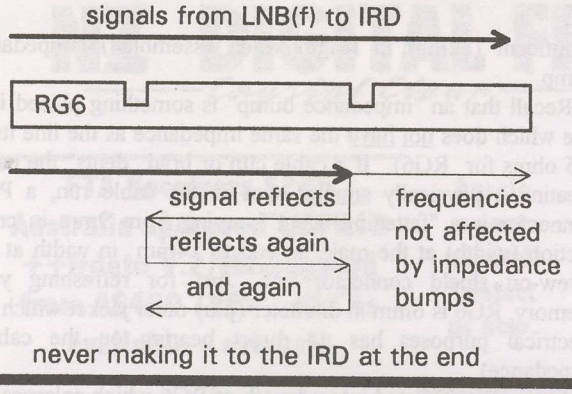
Often when running a cable from LNBf to receiver, multiple "cable clips" or brads must be used to secure the cable to a wall. When there are two or more depressions created by clips that are driven in too far and therefore depress the natural diameter of the cable, we have two (or more) *non-75 ohm pieces* in an otherwise 75 ohm line. A curious effect results.

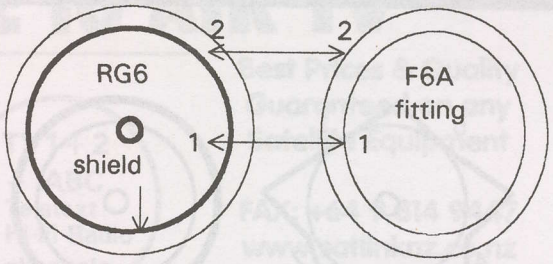
The physical cable between the clips is 75 ohms but at each end is a cable-diameter-dented piece. The length of cable between these two "dents" assumes a new electrical property called "mismatch"; that is, while this piece of cable may still be 75 ohms, going into and out of it are lower impedance points. These non-75-ohm points "resonate" with and through the segment between the two depression points creating a "signal trap." What's that?

Every piece of cable normally passes all frequencies (such as 950 - 2150 MHz or the LNBf L-band portion) with more or less predictable efficiency. But in this dent-on-both-ends segment, *some* of the frequencies passing through are momentarily stopped. The exact frequency or band of frequencies where this happens is determined by (1) the depth of the cable dent or depression, and, (2) the electrical length of the cable segment between the two dents.

Once "stopped" from passing past this point, a Ping-Pong electrical effect follows. Some of the energy within this unfortunate frequency band bounces *backwards*, up the line towards the LNBf. When it reaches the dent nearest the LNBf, it bounces again and restarts again towards the IRD. It "Ping-Pongs" between the two dents which results in only a portion of the total energy at this affected frequency reaching







F fitting should have 2 ferrule (rings) one of which slides under shield (1) and one above (2)

the IRD. We can accurately say, "between the two dents, the signal corresponding to the electrical length of cable between the depressions is 'sucked out' of the line."

It is not necessary for the line to be dented with an external device (such as a cable clip) for this undesired result. When RG6 or other flexible cable is abruptly (sharply) bent to go around a corner, at the point of the bend a "crease" forms and the cable doubles over on itself at the bend. As the drawing on p. 18 (bottom, right) illustrates, a sharply bent piece of cable has an abrupt transition from full diameter to a creased less-than-full-diameter at the bend. This produces the same undesirable effect as using cable clips or wire brads to fasten the cable and driving them in too far. *Why?*

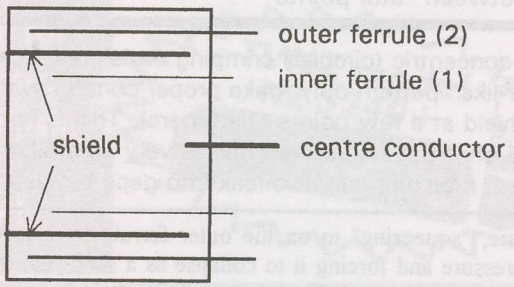
Because this is a change in the cable's physical diameter and characteristics. If you have installed a line down through a wall and made two or more sharp bends along the way, you will create the same scenario that results from making dents with two or more overdriven cable clips/brads.

Real world. One or more transponders in a multi-transponder set (such as Sky NZ or Foxtel/Austar use) is "down in level" for no obvious reason. It *might be* the LNBf, but after you change it, the same result. Next most likely? A cable-created "frequency suck out."

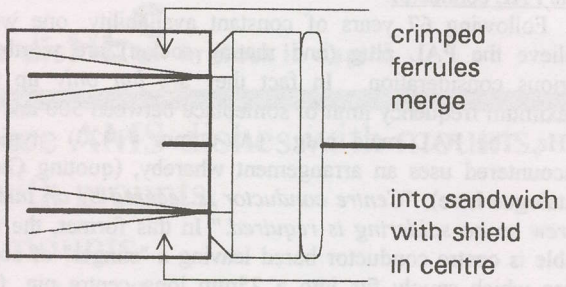
The connector interface

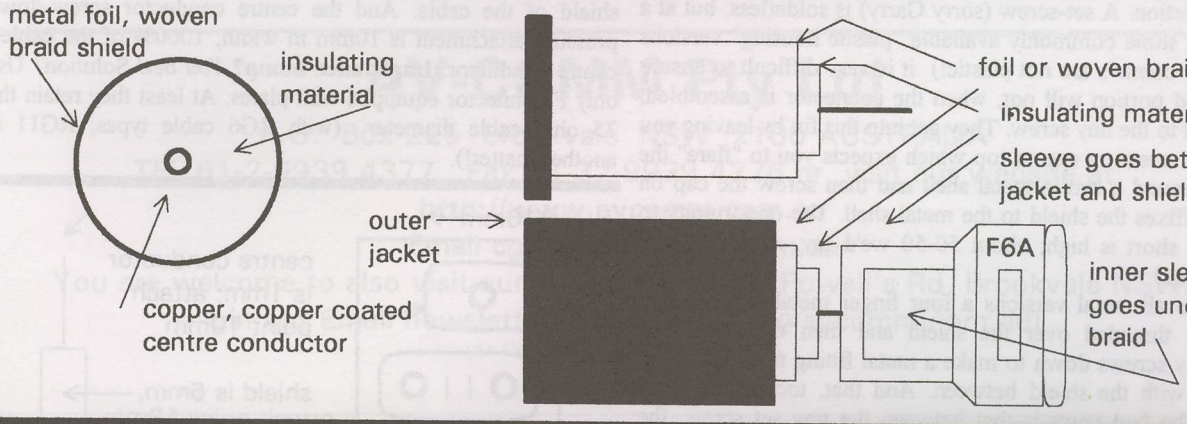
An absolutely *perfect* connector is a precise impedance match for the cable to which it is connected. There is no such thing except in a laboratory environment but connectors like the F6A or Av-comm's P1005 come close enough for field work.

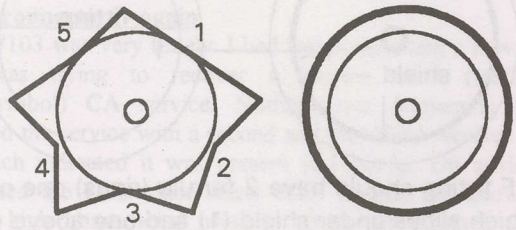
Drawings here illustrate how a connector such as the F6A is married to the cable without creating an "impedance bump." With any F series connector, there should be as a minimum 2 "ferrules" (concentric rings attached to the body), one of which will slide in under the shield and the outer of which will slide over the shield, *between* the weatherproofing jacket and the outside of the shield. The crimping tool should also be



When crimping tool is closed under pressure, the outer ferrule collapses inward onto the shield and makes a "sandwich" of the two ferrules plus the shield forming a "75 ohm match" at connector.







and - moisture can leak
in between "star points"

Non-concentric (circular) crimping tools creating a "star-like" pattern only make proper contact with the shield at a few points (1 - 5 here). This is not a 75 ohm transition, and, unless very carefully sealed, moisture can also leak into gaps between.

concentric, "squeezing" in on the outer ferrule by placing it under pressure and forcing it to collapse as a sandwich made up of the outer ferrule, the shield material (whether foil or braid) and the inner ferrule.

A word about coupler or splice F fittings. If the insulating material you see inside looks like "clear plastic," don't use it for L-band (satellite) purposes. The very best use a Teflon insulation and those with a whitish insulating material are generally acceptable. Like any other product, if there is a way to make it cheaper, somebody will.

The PAL connector

Following 67 years of constant availability, one would believe the PAL plug (and mating socket) are worthy of serious consideration. In fact they are *but only* up to a maximum frequency limit of someplace between 500 and 900 MHz. The PAL male plug (Av-comm #1420) typically encountered uses an arrangement whereby, (quoting Garry's catalogue here), *"Centre conductor is secured by an internal screw so no soldering is required."* In this format, the RG6 cable is centre conductor bared leaving a "stinger" of copper wire which snugly fits into a 25mm long centre pin. Once seated, the installer uses a tiny (jeweller style) screwdriver to tighten a "set screw" which secures the centre conductor in place. And now the danger zone.

Variants of the "basic" PAL male plug use a number of techniques for securing first the centre conductor and then the shield portion. A set-screw (sorry Garry) is solderless, but at a price. In some commonly available "plastic housing" versions (no - Av-comm's are not plastic!) it is very difficult to ensure the shield portion will not, when the connector is assembled, short out to the tiny screw. They get into this fix by leaving you a plastic screw on cap or top which expects you to "flare" the shield around a brittle metal shell and then screw the cap on which affixes the shield to the metal shell. The opportunity to create a short is high; about 50-50 we'd say. And that's the good news!

In the all-metal versions a four finger metal compression piece is threaded over the shield and then the metal cap hopefully screws down to make a metal fitting to metal shield contact with the shield between. And that, too, is the good news. The bad news is that between the tiny set screw, the diameter of the fitting (13mm) and the likelihood you will short the shield to the centre pin, the PAL male plug is a significant (32mm in length when assembled) "impedance bump."

Recall that an "impedance bump" is something placed in a line which does not have the same impedance as the line itself (75 ohms for RG6). If a cable clip or brad "dents" the cable creating a physically smaller spot in the cable run, a PAL connector is a "fattening agent" varying from 9mm in cross section (width) at the male tip end to 14mm in width at the screw-on shield connector end. Just for refreshing your memory, RG6 is 6mm in diameter (plus outer jacket which for electrical purposes has no direct bearing on the cable's impedance).

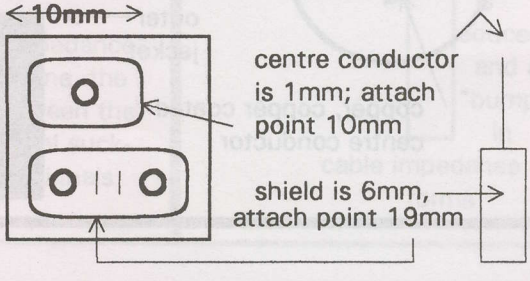
Any object inserted into a length of RG6 which enlarges (or reduces) the diameter of the cable and/or modifies the size-ratio relationship between the outer (shield) conductor and the inner (centre wire) conductor will distort ("bump") the line impedance at the point of installation.

When the centre conductor is inserted into a pin on a PAL male connector, and held in place with a screw, this changes the diameter of the original centre cable by as much as 300% . For the length of the PAL male connector (32mm typically) this impedance bump distorts the flow of signals. At some operating frequency between 500 and 900 MHz, this 32mm "impedance bump" begins to become an appreciable "chunk" of a wavelength, creating signal reflections (diagram, top left, p. 19). If for some reason two or more PAL fittings were in a line (such as a PAL male plug joining to a PAL female socket/plug), you would now have 32 + 32 (mm) of "bump" which is sufficient at L-band (950 - 2150 MHz) to essentially shut the line down as a suitable signal carriage device.

Yes, there are PAL solder-on connectors (marginally better because they reduce the opportunity for shorting internally in the plug) and even PAL crimp-on connectors (!). Does soldering or crimping make the plug/socket more suitable for satellite L-band use?

Not at all. The *diameter* and *length* of the fitting(s) is still an "impedance bump" no matter how the centre conductor and shield are attached. Anything that enlarges or reduces the dimensional relationship of the original 75 ohm cable, inserted into - attached to - the line will create an unwanted "impedance bump."

Which brings us to a "tidy installation" ending in a plastic wall plate holding a female fitting. A nice finishing touch. Take a wall plate and turn it over. Typically, two screws and a "V-shaped" clasp to attach the shield, a single screw + embedded base for the centre conductor (illustration, below). The shield portion is 19mm across - over 300% as wide as the shield of the cable. And the centre conductor screw-down pressure attachment is 10mm in width; 1000% of the cable's centre conductor. **Impedance bump?** *You bet!* Solution? Use only F-connector equipped wall plates. At least they retain the 75 ohm cable diameter (with RG6 cable types; RG11 is another matter!).



SatFACTS Pacific/Asian MPEG-2 Digital Watch: 15 April 2003

Bird	Service	RF/IF &Polarity	# Program Channels	FEC	Msym	Receivers and Errata
Thcm3/78.5	SkyChAust	3695/1455H	up to 3	3/4	5(.000)	CA (#1, 3); FTA audio #2 (dm)
	Indiavision	3685/1465H	1	3/4	6(.830)	Tests Jan 2003; not permanent
	MRTV-Myn	3676/1474H	1	2/3	6(.000)	erratic service
	Korean Central	3665/1485H	1	2/3	3(.367)	Global footprint; changes 02/03.
	TARBS ME mux	3640/1510H	12TV, 12 radio	3/4	28(.066)	CA + 2 FTA(A1TV, IRB3)(DM)
	Ch Nepal	3626/1524V	1	3/4	15(.556)	New 03/03; FTA
	Mahar mux	3600/1550H	11TV, 1 rad	3/4	26(.667)	Thai + Indian services; FTA (DM)
	SE asia Mux	3569/1581H	2+ TV	3/4	12(.500)	MRTV3, MRTV (DM)
	RR Sat mux	3551/1600H	8TV,10 radio	3/4	13(.333)	3TV, 5radio currently in use (DM)
	JAIN TV	3538/1612V	1TV	3/4	3(.300)	PIDs 4132/4133
	PTV1 +	3521/1629V	1TV, 1 radio	3/4	3(.333)	frequency change
	TARBS	3520/1630H	12TV, 12 radio	3/4	28(.066)	Feeds to TARBS Australia and PAS-8 (DM)
	TVK Cambodia	3448/1702H	1TV	1/2	6(.312)	FTA
	TARBS/Th5	3480/1670H	12 TV+radio	2/3	26(.667)	3FTA: TV5, VTV4m ATN Bangla (DM)
	KCTV/Korea	3424/1726H	1TV	2/3	3(.366)	Not 24 hour
	Thai Global	3425/1725V	up to 7?	2/3	27(.500)	FTA (reaches SE Australia)
InSat 2E/83	ETV mux	4005/1145V	6+ TV	3/4	27(.000)	Several ETV now here; wide beam
-	Hyd Dig 2E	3910/1240V	1	3/4	5(.000)	SCPC, OK E. Aust. wide beam
	Kairali TV	3699/1451V	1	3/4	3(.184)	SCPC, OK E. Aust wide beam
	Indian mux	3643/1507V	3	3/4	19(.531)	New 07/02; corrections 12/02
	ETV Mux#2	3485//1665V	4+TV	3/4	27(.000)	Several new ETV here; Asia beam
	Sky Bangla	3430/1720V	1TV	3/4	6(.000)	New - November 2002
ST1/88E	MMBN	3632/1518V	12TV	3/4	26(.667)	Nagravision, some FTA; erratic
NSS6/95E	Tests	12.600H	?	5/6	30(.000)	Test signals noted January 2003
As2/100.5E	Shandong TV	4070/1080H	1TV	3/4	6(.811)	New - October 2002
	Euro Bouqt	4000/1150II	6TV, 21r	3/4	28(.125)	FTA TV + radio
	5-Star Med	3951/1199H	3TV	3/4	13(.185)	Macau MUX
	Reuters News	3905/1245H	1TV	3/4	4(.000)	Was 3923H; sometimes FTA
	WorldNet	3880/1270H	4+/28radio	1/2	20(.400)	FTA; multiple audio services
	Hubei/HBT	3854/1296H	1	3/4	4(.418)	FTA SCPC, teletext, 2 radio
	Hunan/SRT	3847/1303H	1	3/4	4(.418)	FTA SCPC, teletext
	Guan./GDT	3840/1310H	1	3/4	4(.418)	FTA SCPC, radio APID 81
	In. Mongolia	3828/1322H	2	3/4	8(.397)	FTA: #1 Mongolian, #2 Mandarin
	APTN Asia	3799/1351H	1	3/4	5(.632)	Sometimes FTA; also 3895Vt
	Reuters/Sing.	3775/1375H	1	3/4	5(.631)	FTA & CA
	Liaonin/Svc2	3734/1416H	1	3/4	4(.418)	FTA SCPC, radio APID 256
	Jiangx/JXT	3727/1423H	1	3/4	4(.418)	FTA SCPC, teletext, radio APID 81
	Fujian/SET	3720/1430H	1	3/4	4(.418)	FTA SCPC, + radio APID 80
	QinghaiTV	3713/1437H	1	3/4	4(.418)	FTA SCPC, + 2radio (APID 80)
	Henan/Main	3706/1444H	1	3/4	4(.418)	FTA SCPC, + radio
	Egypt/Nilesat	3640/1510H	7+, radio	3/4	27(.850)	Thru TARBS Aust, occ. FTA
As2/100.5E	Macau MUX	4148/1002V	5TV	3/4	11(.850)	5 chs TV, FTA, some tests
	Feeds	4086/1064V	1	3/4	5(.632)	FTA SCPC feeds
	Dubai MUX	4020/11430V	4+, radio	3/4	27(.500)	FTA including sport
	Jilin Sat TV	3875/1275V	1	3/4	4(.418)	FTA SCPC, + radio
	Shanghai BN	3846/1304V	1	3/4	4(.800)	V1110, A1211 + 2 radio ; FTA Jan 2003
	HeiLongJian	3834/1316V	1	3/4	4(.418)	FTA SCPC
	JSTV	3827/1323V	1	3/4	4(.418)	FTA SCPC, + radio
	Anhui TV	3820/1330V	1	3/4	4(.418)	FTA SCPC + radio
	ShaanxiQQ	3813/1337V	1	3/4	4(.418)	FTA SCPC, radio APID 81
	Guan/GXTV	3806/1344V	1	3/4	4(.418)	FTA SCPC, radio APID 257
	Fashion TV	3795/1355V	1	3/4	2(.533)	Now Viaccess version 2 CA
	Myawady	3766/1384V	1	7/8	5(.080)	FTA SCPC - difficult to load
	Saudi TV1	3660/1490V	7+/tests	3/4	27(.500)	FTA MCPC; Yemen, MBC Europe tests
As3S/105.5E	Telstra I-Net	12.596V	no TV	5/6	30(.000)	Signal useful for dish testing - no TV
	Zee bouquet	3700/1450V	10TV	3/4	27(.500)	Mediaguard (SECA) CA; 2 FTA
	Macau MUX	3713/1437H	2TV	3/4	5(.868)	New June 2002; low res MUX
	Arirang TV	3755/1395V	1	7/8	4(.418)	FTA SCPC; audio now OK
	Now TV +	3760/1390H	up to 81V	7/8	26(.000)	CA + NOW, B'berg, Indus FTA
	Star TV	3780/1370V	15(+)TV	3/4	28(.100)	NDS CA (Pace DVS211, Zenith)
	Star TV	3860/1290V	21(+)TV	3/4	27(500)	NDS CA (Pace DVS211, Zenith)
	Star TV	3880/1270H	20(+)TV	7/8	26(.850)	NDS CA (Pace DV211, Zenith)
	HK Mux	3900/1250V	2+TV	7/8	27(.895)	FTA PAL + occ. feeds and CA
	Star TV	3940/1210V	7(+)TV	7/8	26(.850)	NDS CA as above
	CNNI	3960/1190H	8(+)TV	3/4	27(500)	PowVu CA; new SR Apr 29
	StarTV	3980/1170V	12+TV	3/4	28(.100)	NDS CA (Pace DVS211, Zenith)
	Star TV	4000/1150H	9(+)TV	7/8	26(.850)	NDS CA w/ 4(Chinese) FTA
	Sahara digital	4020/1130V	8TV	3/4	27(.500)	New Sr, Dubai MUX
	Sun TV	4095/1055H	1	3/4	5(.554)	"History Channel" testing SCPC
	TVB Mux	4010/1040H	3	3/4	11(.230)	MATV Chinese movies FTA; + CA
	CCTV bqt	4129/1021H	4(+) TV	3/4	13(.240)	moved from 4115
	Zee Bqt #2	4140/1010V	8(+) TV	3/4	22(.000)	Mediaguard (SECA) CA
Cak1/107.5	Indovision (S-band)	2.536, 2.566, 2.596, 2.626	33(+) TV	7/8	20(.000)	NDS CA using RCA/Thomson, Pace IRDs
T'Kom/108E	IndoBqt	3460/1690H	up to 6	3/4	28(.000)	also 3586H/17.500, 3496H/19.615
C2M/113E	TPI	4185/965V	1	3/4	6(.700)	FTA SCPA; NT/NC only
	Anteve	4144/1006V	1	3/4	6(.510)	change from 4055V; FTA SCPC

Bird	Service	RF/IF & Polarity	# Program Channels	FEC	Msym	Receivers and Errata
(C2M)	**Indo Mux**	4080/1070H	5+ TV	3/4	28(.125)	Global TV - frequent changes in lineup
	Indosiar	4074/1076V	1	3/4	6(.500)	FTA; solid on 3.5m in New Caledonia
	SCTV	4048/1102V	1	3/4	6(.618)	FTA SCPC; NT/NC only
	Indone.Mux	4000/1250H	6+TV	3/4	26(.085)	unstable platform - testing?
	Satelindo	3935/1215H	1TV	3/4	6(.700)	Test card only reported
	Bali TV	3926/1224H	1TV	3/4	4(.208)	Returned to air Nov. 2002; V33, A36
	Indo. MUX	3880/1270H	3+ TV	7/8	28(.121)	FTA; Sr, FEC change 01/03
	GlobalMUX	3760/1390H	up to 11 TV?	7/8	28(.121)	Test cards (11); new Sr, FEC -1/03
	Brunei/Sing	3733/1417H	1TV	3/4	6(.000)	FTA; share time, Brunei-23hrs,Sing1h
	TBN/Trinity	3727/1423H	1 TV	3/4	3(.000)	New PIDs 02/03: V177, A180
	Unknown	3605/1545H	1TV	3/4	2(.900)	Tests-multi-screen, may have no video
	RCTI	3473/1677H	2	3/4	8(.000)	FTA SCPC, Australia, NC OK
	Myawad TV	3706/1444H	1	3/4	5(.924)	may be test; svc has been erratic
Je3/12	Miracle Net	3996/1154V	3 up to 6	5/6	22(.000)	PowVu, some **FTA** (ch # 1,3)
	Asian bqt	3960/1190V	up to 8	7/8	30(.000)	CA & **FTA** NTSC: Japan, Taiwan
Je2A54	**BYU tests**	3.915/1245V	2	3/4	3(.703)	Part-time; Sr change 03/03
MeaSs2	New Mux	12.532H	17	3/4	41(.500)	New Sept 2002; unknown source
	Astro Mux	11.602H	up to 17TV	3/4	41(.500)	Aust East beam - **3 FTA** + 14 CA
	VTV MUX	11.522Vt	3 TV	3/4	9(766)	WA only? Skew path, intended Asia
B3/156	**Mediasat**	12.336V/T2	13TV, 8radio	2/3	30(.000)	Hungary now CA; BVN FTA
	Aurora	12.407V/T3		2/3	30(.000)	Aust, NZ 90 cm
	Aurora	12.532V/T5		3/4	30(.000)	Aust only; changein FEC
	Aurora	12.595V/T6		2/3	30(.000)	Possibly Aust + NZ; FEC change
	Aurora	12.657V/T7	data only?	3/4	30(.000)	Aust only; in transition
	Aurora	12.720V/T8		3/4	30(.000)	Aust only; - smart card p. 26
	Austar	12.313H/T9	iTV + here	3/4	30(.000)	Austar Interactive + demos); p. 29, SF#97
	Austar/Optus	12.376H/T10		3/4	29(.473)	CA, subscription available Australia
	Austar/Foxtl	12.438H/T11		3/4	29(.473)	CA, subscription available Australia
	Austar/Foxtl	12.501H/T12		3/4	29(.473)	CA, subscription available Australia
	Austar/Foxtl	12.564H/T13		3/4	29(.473)	CA, subscription available Australia
	Austar/Foxtl	12.626H/T14		3/4	29(.473)	CA, subscription available Australia
	Austar/Foxtl	12.688H/T15	(some FTA ra)	3/4	29(.473)	CA, subscription available Australia
B1/160	**ABC NT fd**	12.258V	1TV, 3 radio	3/4	5(.026)	V832, A833; occ. drops power 10dB
	ABC feeds	12.317H	1	3/4	6(.980)	also 12.326, 12.335; ex PAS8 Ku
	Net 7 service	12.397H	1	3/4	7(.200)	Full schedule less commercials
	Central 7	12.354H	1TV + 1 radio	3/4	3(.688)	V1280, A 1281; occ. 2nd TV ch
	Imparja mx	12.379H	2TV + 8 radio	3/4	5(.424)	V1024, A1025, P1024; also try 12.360, 12.380
	7 digital feeds	12.397H	1TV	3/4	7(.200)	Occ digital feeds, FTA
	Feeds to NZ	12.411V	1 TV	3/4	6(.111)	NTSC; sport feeds USA-Aust-NZ.
	Sport feeds	12.420V	1	3/4	6(.110)	Weekend footy feeds reported-FTA
	Mediasat#3	12.424H	3+ TV	2/3	19(.800)	
	TVNZ DTH	12.456/483V	4+TV	3/4	22(.500)	FTA 4 channels (TVNZ x 4)
	Nine Net	12.512H	1 TV typ.	3/4	5(.632)	testing digital feeds; Sr may be incor
	Sky NZ	12.519/546V	7TV/7TV	3/4	22(.500)	NDS CA, subscription available NZ
	Sky NZ	12.581/608V	6TV/6TV	3/4	22(.500)	NDS CA, subscription available NZ
	Sky NZ	12.644/671V	9TV	3/4	22(.500)	NDS CA, subscription available NZ
	ABC HDTV	12.603H	5TV	7/8	14(.300)	also 12. 626, 643, 670, 688, & 706H
	Sky NZ	12.707/733V	8+TV	3/4	22(.500)	NDS CA, subscriptions available NZ
	Mix 106.3	12.574H	1 radio	3/4	1(.851)	Radio SCPC; was 12.570Hz
P8/166	**ABC A-P**	12.284H	1TV, 2 radio	5/6	5(.858)	Feed, Adelaide; not permanent; was 12.301Hz
	TARBS3	12.326H	13TV + radio	3/4	28(.066)	TPG/EurodecMDS CA, occ. FTA
	TARBS	12.526H	13TV + radio	3/4	28(.066)	TPG /Eurodec MDSCA, **radio FTA**
	TARBS2	12.606H	13TV + radio	3/4	28(.066)	TPG/Eurodec MDS CA; **TRT FTA**
	TARBS5	12.646H	testing	3/4	28(.066)	TPG/Eurodec MDS CA
	TARBS4	12.726H	13TV + radio	3/4	28(.066)	TPG/Eurdec MDS CA; **Thai TV, FTA**
	JEDI/TVB	12.686H	11+ TV	3/4	28(.126)	June 2002-Irdeto-2 CA
	ABC A-P	4180/970H	2TV, 2 radio	3/4	27(.500)	Dateline west; east PAS2, 3901
	Disney Pac	4140/1010H	typ 6 TV	5/6	28(.125)	PowVu CA
	NHK Joho	4060/1090H	7TV, 1 radio	3/4	26(.470)	PowVu CA & **FTA**; subscription avail
	FOX MUx	4040/1110V	up to 5TV	7/8	26(.470)	was PAS-2, previously 2992Vt
	ESPN USA	4020/1130H	8+TV, data	3/4	26(.470)	PowVu CA; ch 11 DCP-CCP bootload; new FEC
	Discovery	3980/1170H	8 typ.	3/4	27(.690)	PowVu/CA (some audio **FTA**)
	CalBqt/Pas8	3940/1210H	up to 8TV	7/8	27(.690)	PowVu CA & **FTA (EWTN +)**
	CNBC HK	3900/1250H	up to 7TV	3/4	27(.500)	FTA at this time
	FilipinoMUX	3880/1270V	up to 8TV+radio	3/4	28(.694)	**Myx FTA** V1960, A1920 + radio FTA
	TaiwanBqt	3860/1290H	12TV + 30 r	5/6	28(.000)	Mixed FTA & CA; Taiwan Hallmark, STC
	CCTV Mux	3839/1311H	up to 4	3/4	13(.240)	PowVu FTA, replaces PAS-2 svc
	TVBS-N	3836/1314V	**1FTA**, 4+ CA	3/4	22(.000)	Difficult because of CCTV cross pole
	EMTV PNG	3808/1342V	1 + 2 radio	3/4	5(.632)	was As2; PowVu CA
	CNNI	3780/1370H	3, up to 5 TV	3/4	25(.000)	PowVu, CNN/CNNI now CA
	Discovery Asia	3769/1381V	Upto 5 TV	3/4	13(.240)	PowerVu, Asian MUX
	MTV	3740/1410H	8	2/3	27(.500)	#2, 8 **MTV China FTA (V0385, A0386);** rest CA
P2/169E	P2/169	12.281V	2+ TV, radio	2/3	27(.500)	PowVu CA, WIN, ABC NT
	WA PowVu	12.637(.5)V	4TV, 8 radio	1/2	18(.500)	PowVu CA, WA only - D9234
	NBN-TV	4126/1024V	1TV	3/4	3(.075)	V1160, A1120; requires 3m+ dish NSW
	TARBS	4087V	9TV + radio	3/4	21(.000)	Occ FTA (Syria, Al-Manar) TARBS input links
	TVB(S)	4020/1130V	1TV	3/4	6(.620)	feeds to (USA) pay-TV
	Feeds	3966/1184V	1	2/3	6(.620)	PowVu (FTA) occ feeds
	Feeds	3957/1193V	1	2/3	6(.620)	PowVu (FTA) occ. feeds
	Feeds	3929/1221V	1	3/4	10(.850)	PowVu (FTA) occ sport feeds
	Feeds	3912/1238V	1	2/3	6(.620)	PowVu(FTA) occ. feeds
	Feeds	3898/1252V	1	2/3	12(.000)	PowVu (FTA) occ. feeds
	Middle East	3836/1314V	4 typ	3/4	13(.331)	**02/03: Now ALL Irdeto 2 CA**
	Feeds	3803/1347V	1	3/4	6(.000)	PowVu (FTA) occ sport feeds
	BBC +	3743/1407V	3	3/4	21(.800)	**BBC FTA**, others nominally CA

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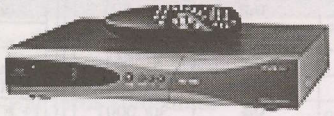

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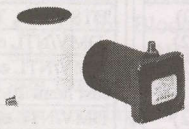

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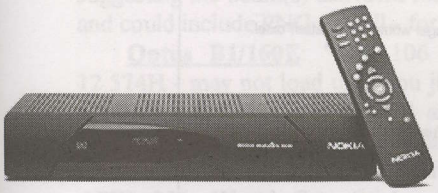

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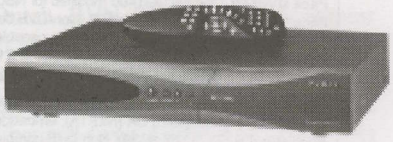

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SatFACTS Digital Watch: Supplemental Reference Data / April 2003

Bird	Service	RF/IF & Polarity	# Program Channels	FEC	Msym	Receivers and Errata
(PA8/169E)	Feeds	4040/1010H	1	3/4	10(.850)	PowVu occ FTA feeds
	7thDayAdv.	3872/1278H	1	3/4	6(.620)	Sat, Sun 0030, 0900+UTC?)
	Feeds	3868/1182H	1	2/3	6(.620)	FTA (occ sport); also try 3863,Sr6.100
	Feeds	3939/1211H	2 (typ NTSC)	2/3	6(.620)/7(.498	FTA-typ NTSC-occ sport, live Shuttle
	Cal PowVu	3901/1249H	up to 8	3/4	30(.800)	PowVu CA + **FTA** (BBC gone)
	HK bouquet	3850/1300H	up to 8	2/3	24(900)	was 4148Vt; some **FTA**
	occ feeds	3776/1374H	1 typ	3/4	5(.560)	occ feeds, typ FTA; also Sr 5.600
	Korean Bqt	3771/1379H	1	3/4	9(.041)	Korean MUX, reload 02/03
I702/176E	RFO Poly	4027/1123L	1TV	3/4	4(566)	SE spot beam
I701/180E	TNTV	11.060&11.514	9	3/4	30(.000)	east spot; 10TV + r each, vertical pol.
	Canal+Sat	11.610II	16TV, 1 radio	3/4	30(.000)	1+ **FTA**, Mediaguard; also 10.975 weak
	TVNZ	4195/955RHC	1	3/4	5(.632)	DMV/NTL early vers., occ feds, typ ca
	TVNZ/BBC	4186/964RHC	1	3/4	5(.632)	DMV/NTL early vers. occ feds, typ ca
	TVNZ	4178/972RHC	1	3/4	5(.632)	DMV/NTL early vers., occ feds, typ ca
	AFRTS DTS	4175/975L	3 TV, 3 radio	2/3	3(680)	'DTS' **radio, TV audio FTA** some IRDs
	TVNZ/Aptn	4170/980RHC	1	3/4	5(.632)	DMV/NTL early vers. occ feds, typ ca
	TVNZ/feeds	4161/989RHC	1	3/4	5(.632)	DMV/NTL early vers., occ feds, typ ca
	RFO-Canal+	4086/1064L	4TV, radio	5/6	12(.041))	east hemi 20.5 dBw thru 2003+; new Sr
	TVNZ/feeds	4052/1098RHC	1	3/4	5(.632)	DMV/NTL early vers.,occ feeds, typ ca
	TVNZ feeds	4044/1106R	1	3/4	5(.632)	SCPC, mixed CA and **FTA** feeds
	NZ Prime TV	4024/1126L	1	2/3	6(.876)	PowVu CA; Auckland net feeds
	NBC to 7 Oz	3960/1190R	1	7/8	6(447)	CA, Leitch encoded
	WorldNet	3886/1264R	1TV, 37 radio	3/4	25(.000)	New Feb 2002; very strong NZ, Pacific
	Ioarana	3772/1378L	1	3/4	4(.566)	FTA SCPC; East Hemi Beam-Tahiti
	TVNZ	3846/1304R	1	3/4	5(.632)	SCPC, mixed CA & **FTA**, feeds
	10 Australia	37691381R	4	7/8	20(.000)	PowVu CA & **FTA; #3 TBN**
	USA feeds	3749/1401R	4?	?	26(400)	16-QAM (not MPEG-2 compatible)

MPEG-2 DVB Receivers: (Data here believed accurate; we assume no responsibility for correctness!

Aston Simba 201. Embedded SECA (Zee, Canal +); review SF#97. MediaStar 61-2-9618-5777.
AV-COMM R3100. FTA, excellent sensitivity (review SF May 1998); new version Sept. '99. Av-COMM P/L, 61-2-9939-4377.
AV-COMM R3100(A). FTA, good sensitivity, ease of use exc (review SF May 2002). See above contact.
Benjamin DB6600-CI. FTA, Foxtel/Austar w/CAM+card. Autosat Pty Ltd 61-2-9642-0266 (review SF#72)
eMTech eM-100B (FTA), eM-200B (FTA + CIx2), eM210B (FTA + 2xCI + positioner); KanSat 61-7-5484 6246 (review SF#89)
Humax F1-CI. Primarily sold for TRT(Australia), does (limited) PowerVu (not Optus Aurora approved).
Humax ICRI 5400 (Z). Embedded Irdeto + 2 CAM slots; initial units had NTSC glitch, now fixed. Widely available, SF#76.
Humax IRCI 5410 (Z). Adaptable version capable of holding multi-CA systems (SF#98, 99). WIdely available.
Hyundai-TV/COM. HSS100B/G (Pacific), HSS-100C (China) FTA. Different software versions; 2.26/2.27 good performers, 3.11 and those with Nokia tuners also good; later 5.0 not good. SATECH (V2 26)
Hyundai HSS700. FTA, PowerVu, SCPC/MCPC. Review SF March 1999. Kristal Electronics, 61-7-4788-8902.
Hyundai HSS800CI. FTA, Irdeto (with CAM) + other CA systems, PowerVu, NTSC. Kristal Electronics, above; review SF#63.
MediaStar D7. FTA, preloaded w/ known services, exc. software (review SF July 1998). MediaStar Comm. 61-2-9618-5777
MediaStar D7.5. New (May 00) single chip FTA; review June 00 SF. MediaStar Comm. Int. 61-2-9618-5777
MediaStar D10. FTA and Irdeto embedded CA. VG receiver; see review SF#96, August 2002. Contacts immediately above.
MultiChoice (UEC) 660. Essentially same as Australian 660, not grey market contrary to reports. Sciteq tel 61-8-9306-3738
Nokia "d-box" (V1.7X). European, FTA, may only be German language, capable of Dr. Overflow software. SF#95, p. 14.
Nokia 9200/9500. When equipped with proper software, does Aurora, pay-TV services provided software has been "patched" with "Sandra" or similar program. See SF#95, p. 14, SF#96 p. 15. SatWorld 61-3-9773-9270 (www.satworld.com.au)
Pace DGT400. Originally Galaxy (Now Foxtel+Austar). Irdeto, some FTA with difficulty (Foxtel Australia 1300-360818). Units being replaced with UECs.
Pace DVR500. Original DGT400 modified for NBC (PAS-2)/RSA use, with CAM equivalent to DGT400 but more reliable.
Pace "Worldbox" (DSR-620 in NZ). Non-DVB compliant NDS CA including Sky NZ, no FTA; similar "Zenith" version.
Panasat 520/630/635. MCPC FTA, Irdeto capable, forerunner UEC 642, 660. Out of production, spares fax ++27-31-593-370. No longer wotrk with Austar/Foxtel.
Panasonic TU-DS10. FTA + Irdeto CA; one of 2 IRDs approved by Optus for Aurora, but never available in Australia.
Phoenix 111, 222. PowVu capable, NTSC, graphics, ease of use. (111 review SF#57). SATECH(below)- 222; terminated
Phoenix 333. FTA SCPC, MCPC, analogue + dish mover. Detailed SF review SF#51. SATECH 61-3-9553-3399.
Pioneer TS4. Mediaguard CA (no FTA), embedded Msym, FEC, only for Canal+Satellite (AntenneCal ++687-43.81.56)
PowerVu (D9223, 9225, 9234). Non-DVB compliant MPEG-2 unless loaded with software through ESPN Boot Loader (see below). Primarily sold for proprietary CA (NHK, GWN+ PAS-2 Ku, CMT etc). Scientific Atlanta 61-2-9452-3388.
Prosat 2102S. FTA SCPC/MCPC, NTSC/PAL, SCART + RCA. Sciteq 61-8-9306-3738.
SatCruiser DSR-101. FTA SCPC/MCPC, PowVu, NTSC/PAL. (Skyvision Australia 61-3-9888-7491, Telsat 64-6-356-3749)
SatCruiser DSR-201P. FTA SCPC/MCPC, PowVu, NTSC/PAL, analogue, positioner - (Skyvision - see above).
Strong Technologies SRT2620. SCPC, MCPC FTA, exc sensitivity, ease use, programming. Review SF#91 (ph. below).
Strong SRT 4600. SCPC, MCPC, PowerVu; exc graphics, ease of use, review SF#64. Strong Technologies 61-3-8795-7990.
Strong 4800. SCPC, MCPC, embedded Irdeto+ CAM slots, Aurora. Strong Technologies 61-3-8795-7990.
Strong 4800 II. SCPC, MCPC CAM slots x 2 for Aurora +, Zee, Canal +. Strong Technologies (above); review SF#103.
Strong 4890. SCPC, MCPC, 30Gb PVR, 2 CAM slots, DiSEqC 1.0, 1.2 (review SF#84); Strong Technologies, # above.
UEC642. Designed for Aurora (Irdeto), approved by Optus; w/new software, C-band FTA; faultyP/S. Norsat 61-8-9451-8300.
UEC660. Upgraded UEC642, used by Sky Racing Aust., Foxtel-limited FTA. (Nationwide - 61-7-3252-2947); P/S problems.
UEC700/720. Single chip Irdeto built-in design for Foxtel; unfriendly for FTA. Power supply problems, seldom sold to consumers; propensity to fall off back of trucks.
Winersat DigiBox 200. C + Ku basic receiver but includes Teletext for NZ TVOne, 2 VBI. Satlink NZ, fax 64-9-814-9447
Xanadu. *DVB compliant special-priced receiver for members of SPACE Pacific (Av-comm Pty Ltd, tel +61-2-9939-4377)*

Accessories:

Aurora smart cards. New v1.6 now available, 1.2 no longer available for RABS. Price now A$105, Sciteq 61-8-9306-3738.
PowerVu Software Upgrade: PAS-8, 4020/1130Hz, Sr 26.470, 3/4; pgm ch 11 and follow instructions (do not leave early!)

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AT PRESS DEADLINE

AsiaSat 4 launch (p. 4, here) was to be "televised" on website (http://asiasat.com). First customer is REACH; Winnie Pang of firm advises, "No, we do not plan to offload existing customers from AS2 (or 3S) to As4; this new satellite will have its own clients." Reports of reception tests please to skyking@clear.net.nz. (DL)

AsiaSat 2/100.5E: "Not TV but there: Speedcast Internet service 4087Hz, Sr 7.500, 7/8." (**Bill R**, Australia; Also on As3S 3820V, Sr 22.500, 3/4 - Ed.) "Iraq war feeds sometimes noted 3966Vt, Sr 5.632, 3/4 FTA." (**Bill R**, Australia) "Hubei/HBT audio services Chutian Radio and Hubei People's radio have new APIDs: 34 and 35 respectively." (**Arnold**, NT)

AsiaSat 3S/105.5E: "Another source for Bloomberg TV Asia - 3880Hz (WorldNet), Sr 20.000, 1/2; PIDs V7460, A7420." (**Sammy**, PNG: Actually, not true. WorldNet sources their programming from many places including an hour or so daily from Bloomberg. What you saw was WorldNet carrying Bloomberg - Editor)) "Test card 3920Hz NTSC analogue is now gone (was Phoenix Chinese)." (**Sammy**, PNG) "Sahara National + Sahara Uttar Pradesh testing FTA 4020Vt, Sr27.500, 3/4 (Dubai mux)." (**Arnold**, NT) "TVB 8, MATV, 4110H FTA, Sr 11.230, 3/4 while same MUX TVB Xing He is CA)." (**Sammy**, PNG)

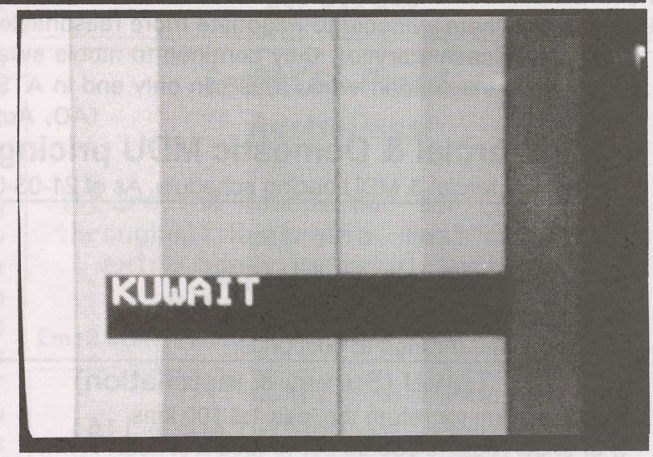
Intelsat 701/180E: "California>Australia 3769RHC (Sr 20.000, 7/8) has been 'bridging' Pacific with HRT 1, Duna TV often in FTA format." (**NS**, SA)

Intelsat 802/174E: "NE Asia beam 11.638V, PowerVu, AFN mux Sr 28.000, 3/4 launched with European version programming." (**Shawn**, Korea)

JcSat2A/154E: "BYU-TV change Sr to 3.703 (from Sr 3.425), 3/4 on 3915V." (**Bill R**, Australia)

Optus A3/164E: "Unknown reason for tests - this inclined orbit (+/- 3.5 degree) 'spent' satellite now carrying various services FTA (of course your dish has to be able to track the satellite's movements!): 12.501H, Sr 30.789, 3/4 TRT International, BVN-TV, SET Asia + TRT FM and Voice of Turkey (all nominally FTA on B3, 12.336Vt). Also, normal CA WIN-TV has appeared from time to time on 12.340V, Sr30.000, 3/4 (VPID 1236, APID 1537)." (**AZ**, WA: Most of the reports come from Central and Western Australia suggesting the beam(s) activated may not be national coverage and could include PNG as well - for what it is worth -Ed.)

Optus B1/160E: "Mix 106 (FM) Canberra reported 12.574H - may not load until you jiggle the input frequency 1 MHz at a time between 12.570 and 12.578 (mine loads at 12.574 with Sr 1.851, FEC 3/4) and/or enter APID of 4195; FTA. " (**Bill R.**, Australia) "12.522H, Sr 6.110, 3/4 VPID 306, APID 256; World Cup Cricket highlight feeds." (**Bill R**, Australia) "Corrected FEC for ABC South, ABC Northern muxes on 12.626H and 12.643H - now 7/8." (**AZ**, WA) "Unknown new radio 12.336V, 30.000, 2/3 APID 562, RNW3." (**Bill R**, Australia)



War time. Iraq war feeds into Pacific on Intelsat 701 through USA (3769RHC, Sr 20.000, 7/8) gives New Zealand, Australia their own reporter's "connection" for evening newscasts.

Optus B3/156E: "Dutch BVN-TV has begun regular programming on 12.336Vt Media/Globecast MUX (Sr 30.000, 2/3), FTA VPID503, APID 643)." (**IF**, Queensland) "Many changes in Foxtel (Austar) channel line-up; one casualty of many, 'STC/Soundtrack Channel' (was Austar 54)." (**NS**, SA) "Med-TV within Globecast Mux (12.336V) is now CA - had to happen!" (**DM**, NSW)

PanAmSat PAS2/169E: "Briefly - I suspect; Syria TV and Al-Manar TV are FTA on TARBS inward bound mux 4087V, Sr21.000, 3/4." (**NS**, SA) "NBN World (Philippines) FTA 4126, Sr 3.075, 3/4 V1160, A1120 but barely locks on 4m so

WITH THE OBSERVERS: Reports of new programmers, changes in established programming sources are encouraged from readers throughout the Pacific and Asian regions. Information shared here is an important tool in our ever expanding satellite TV universe. Photos of yourself, your equipment or off-air photos taken from your TV screen are welcomed. TV screen photos: If PAL or SECAM, set camera to f3.5-f5 at 1/15th second with ASA 100 film; for NTSC, change shutter speed to 1/30th. Use no flash, set camera on tripod or hold steady. Alternately submit any VHS speed, format reception directly to SatFACTS and we will photograph for you. Deadline for May 15th issue: May 3 by mail or 5PM NZT May 5th if by fax to 64-9-406-1083 or Email skyking@clear.net.nz.

Another Australian installation firm in financial strife?

"SatFACTS for December (#100, p. AA) reported on an effort led by a WA group to seek greater compensation from Foxtel / Austar contract installation firm Comet and published their rate schedule as currently paid and (at the time) proposed for installers. I am not certain how that came out, but fellow installation contractor ATS working for Austar has now cut down their payment schedule to installers (see below). These installers primarily work in rural areas where travel times are more significant than the work-time on a job. At one point many of us in outback Australia worked for this firm; most of these have now left because they simply cannot make a living at the rates being paid. ATS is probably the victim caught in the middle here - unable to negotiate more reasonable pay schedules from Austar (which as we all know is significantly cash starved), they continue to nibble away at the pay schedule for the ground troops who do all of the installation work. This can only end in ATS becoming a part of history in Australia pay-TV."

(AO, Australia)

Commercial & Domestic MDU pricing structure (Austar-ATS)

Draft commercial & MDU pricing schedule. As of 21-03-02

Installation	Units	Sub-contractor Rates	Total
Hourly rate for **approved** MATV contractor	1	$ 35.00	
Parts passed through at cost price.			
Travel (Survey & Installation)			
$0.42 per km for return trip less 1st 100 kms	1	$ 0.42	
For snow regions $35.00 per hr less first hour.		$ 35.00	
Surveys			
Short form survey	1	$ 35.00	
Up to 19 rooms	1	$ 70.00	
Over 20 rooms	1	$ 140.00	
Travel is in addition to the above prices less 1st 100 klms			
Service Calls			
Including first hour (6am-6pm)	1	$ 35.00	
Travel is in addition to the above prices less 1st 100 klms			
After hours			
After hours and Saturdays.	**Loading**	**Call out min charge 3 hrs**	
Time and a half plus travel with a minimum of 3 hours.	1.5	3 $ 35.00	$ 157.50
Sundays and public holidays			
Double time plus travel with a minimum of 3 hours.	2	3 $ 35.00	$ 210.00
Christmas, Easter			
Triple time plus travel with a minimum of 3 hours.	3	3 $ 35.00	$ 315.00

Imparja's B1 12.360/370/380Hz Mux (Sr 5.424, 3/4)

The PIDs shown here from an eM100 IRD. These settings produce Imparja TV as video but varying audio in what appears to *include* the following Aurora channels (*not* in Imparja MUX sequence). Ch 35-Caama/8KIN Alice Springs; Ch 36-Teabba Radio Darwin; Ch 37-5PY Umuwa; Ch 38-2CUZ Muda Aboriginal (Bourke); Ch 39-PAKAM Pilbara & Kimberly Aboriginal; Ch 40-PAW Pintubi Anmatjere Warlpiri Radio; Ch 41- Arrow; Ch 42- 8HA (900AM) Alice Springs; Ch 43- Mulba; Ch 44- BIDJARA.

Decimal Settings	VID	PID	PCR
Imparja TV	1,024	1,025	1,024
Info TV	1,024	1,041	1,040

Dccimal Settings	VID	PID	PCR
Radio 1	1,024	1,056	1,024
Radio 2	1,024	1,057	1,024
Radio 3	1,024	1,058	1,024
Radio 4	1,024	1,059	1,024
Radio 5	1,024	1,060	1,024
Radio 6	1,024	1,061	1,024
Radio 7	1,024	1,062	1,024
Radio 8	1,024	1,063	1,024
Radio 9	1,024	1,064	1,024
Radio 10	1,024	1,065	1,024

not much hope for smaller dish systems." (**D. Leach**, NSW) "NBN not here on Orbitron 12'; too weak." (**BW**, NZ)

PanAmSat PAS8/166.5E: "Hallmark Taiwan testing FTA 3860H, Sr 28.000, 5/6) VPID 430, APID 431." (**Arnold**, NT) "OK - now Z Channel (Asia/Japan) is totally gone from 3880H!" (**Sammy**, PNG) "MTV China in English 3740H, Sr 27.500, 2/3 V289, A290." (**Jergens**, NZ: MTV SE Asia same, V385, A386 in English - Ed.) "NASA-TV first-time available into Pacific; 12.366H (NE Asia beam), Sr28.860, 3/4 V1281, A1282 but Viaccess 2 CA, unfortunately." (**Charles**, Taiwan)

Thaicom 3/78E: "Scratch Nepal on 3554V; replace with Ch Nepal 3441V, Sr 3.333, 2/3. Also, ATN Bangla now on 3418V, Sr 3.333, 2/3." (**Arnold**, NT) "Now there is Nepal 1 3626V, Sr 15.556, 3/4 VPID33, APID34 - symbol rate suggests larger bouquet." (**Sammy**, NT)

Soapbox: "I am a devotee of extending satellite signals using microwave equipment on the ground. I have the ability and software to create high quality printed circuit boards for those doing 2.4GHz range experimentation and would like to be in contact with others doing similar creative work. We have a small dish farm in our backyard to receive ethnic channels which we are only to happy to provide for the cost of a smile!" (MG, Wellington region. Readers in southern part of North Island may contact us using header "Microwave" at skyking@clear.net.nz and we will forward your contact to MG). "I have been offered a relatively new design of Taiwan built DVR which allows amongst other things four separate images to be put up on the screen from four different channels. Can I use this with my satellite installation?" (**PS**, Auckland: If you were connected to a CA service such as Sky NZ, it can only produce the one channel which your set-top box is decoding. Until you select a new channel through the IRD, it will not process a separate video signal. Two, three, four, sixteen -in -one displays require all channels to be displayed to be FTA. Sorry - scratch that one!) "What image are you currently loading to the d-box2? My mail will not accept files over 5Mb; I have a Nokia with 2 x AMD>" (AF, Australia). (We suggest http://www.ump2002.net/index.php?path=images20/index.php) "In crossing streets (SF#103, p. 20) our particular system uses ALCAD model 212 'Sat I.F. Processor' module, one at each end (Tr and Rcv). From the incoming satellite L-band (width) the module selects just one (up to) 36 MHz width transponder and does an ultra linear transposition to a locally authorised 'L-band' linking frequency. This L-band selected transponder is then sent through the SDStv.com BDA Hot Shot amplifier on this authorised frequency, radiated across a street to an SDStv.com active Logi receive antenna and then into a second ALCAD 212 processor with the reciprocal parameters programmed in. This reconstituted original L-band frequency is then connected to a standard RG11/RG6 cable network feeding receivers located throughout the high-rise facility. And this ensures the normal parameters of the original transponder are accurately reflected in the SDStv.com fed building which is not physically connected to the actual satellite dish." (**EF**, Australia) "Poor journalism? Article appearing in Melbourne Herald Sun late March headlined '$50m pay-tv pirates rule the airwaves" included photo described as 'satellite set-top box' when in fact it is Millennium DTS (Surround sound) decoder and is shown sitting atop pile of other Hi-Fi gear in a Melbourne shop!" (**AIM**, Victoria) "http://www.hotchip.com.au site offering UEC DSD 900Z (zapper) for A$380 but with proviso: 'Product currently not in stock; expected arrival date towards end of May 2003.' If you go to website and enlarge receiver image, you might see it is a South African Multimedia device." (**Franklin**, NSW) "Letter from customer reads: 'I live by the seaside and whenever there is an outboard motor coming near my dish, reception is distorted. When neighbours operate electric motors or skill saw, same effect. What can I install to filter this unwanted interference? Charlie Chan." (**GW**, PNG: Answer is [#1] If not using quad-shielded cable from LNB to STB, replace; [#2] 'live by the sea' is another way of saying, 'everything corrodes here quickly'. Replace all F fittings, eliminate all splices from LNB to STB; [#3] Use a 12-gauge shotgun to eliminate the interference at the source! No, there is no filter to do this.)

AT Sign-off

Picking up where we left off ...

On this page in March we recounted some of the reasons why a New Zealand study group, scheduled to make a full report to Government in June, should (and must) come to the inevitable conclusion that citizens of this country have at least two choices when it comes to television reception. One of the choices being, free access to a free to air television service that includes each of the national networks which were originally created to provide just that - *free to air reception.*

If Rupert Murdoch would have his way, all free to air television would be shut down - world-wide - and only pay TV would be available. Furthermore, he would own all of the pay-TV systems providing service. That is, without exaggeration or fantasy, the "game plan" of News Ltd, his master operations vehicle. Imagine if you can all television in the UK, America, Japan, Australia and New Zealand owned and controlled by News Ltd. That would be in excess of 140 million homes each paying News Ltd the dollar equivalent of US$40 per month to receive in year 2010 a package of television channels created and transported from London to satellites serving each of these countries.

US$5, 600,000,000 each month; US$67 billion per year. All terrestrial TV has been shut down because cowardly and greedy governments in each of these countries has been coerced into replacing terrestrial analogue with satellite digital somehow fantasising that by ending terrestrial analogue they will gain back many hundreds of megahertz of prime VHF and UHF spectrum space which they can then resell for a fee to equally greedy telecommunication firms.

In each of these countries, legislation is adopted which allows News Ltd to be the sole source of television; the former terrestrial networks faced with decreasing audience shares and increasing overheads have finally thrown in the towel and signed on as customers of News Ltd which in turn promises only to "include their channel" in a package of services. Without firing a single shot, without ever directly engaging the terrestrial broadcasters, News Ltd has successfully managed to shut down terrestrial TV as a viable delivery mechanism.

There is no fantasy here. Already in New Zealand less than two years after TVOne and TV2 became a part of the Sky NZ pay-TV offering, rooftop TV aerial sales have plummeted in excess of 50%. In the USA, where satellite is some years ahead of New Zealand, the last major creator of rooftop reception equipment (Channel Master) has notified dealers and distributors it is on a three year withdrawal pattern; all TV aerial products will cease being manufactured by 2006.

What News Ltd wants is for there to be no options - of any kind - for the viewers. Yes, people will complain and yes a few will be "hold outs" but sooner than later essentially every home will agree to pay tens of dollars monthly to continue receiving the presently available TV offerings.

And this is the issue which New Zealand's Government must deliberate after the requested comments are filed sometime in June. Whether to blindly allow News Ltd owned and controlled Sky NZ to continue down this path of total domination of home TV viewing, or, to adopt legislation which at least establishes the *possibility* of a viewing option for the public.

That option would be this. Giving homes the chance to consider purchasing their own satellite TV reception system and continuing to receive free to air television in a free (no monthly equipment rental or service charge) format. Or, as Murdoch wishes, to sign up with Sky and agree to an annual (self renewing) contract that will tie the home to 12 payments a year to News Ltd - forever.

New Zealand's Government could grant citizens this option very simply and very quickly. It takes two simple steps:

1) Adopt legislation which makes it mandatory that Sky NZ, when carrying free-to-air TV services (including but not limited to TVOne, TV2, TV3, TV4, TAB, Prime) transmit these channels "in the clear" using the international DVB standard format.

2) Use the broad reach and "power" of Government owned and operated TV and radio networks to create an "educational campaign" supported by suitable Post Office distributed printed material explaining to viewers that they do have a choice - they are not limited to paying Sky NZ $200 or more to have a Sky system installed followed by monthly forever payments of $17.29 to "rent" Sky's reception equipment just so they can continue to have access to their existing free-to-air terrestrial TV channels.

The concept that people could and in fact would purchase (rather than rent from Sky) their own satellite TV reception system might seem unrealistic because of the equipment cost. This is the wrong reason to discard such a possibility simply because once there is the framework to allow such a purchasing option, marketplace competition will quickly handle the cost factor. If I wish to purchase 1,000 DVB standard Chinese built set-top boxes today, they will cost US$40 each. By the time a 60cm dish, a LNBf, some cable is added to the set-top box, US$80 would be maximum cost. Now double that for Kiwi dollars ($160), double that for importer and dealer mark-ups and we have NZ$320. Throw in $80 for installation, and it is NZ$400. *That's today*, before there is stiff marketplace competition and we see prices tumble.

At Sky's $200 (or greater) installation fee and $17.29 per month, it takes under 12 months to pay for a $400 own-it-yourself system. It is all about choice; the opportunity for viewers to elect if they wish not to become a lifetime slave to $17.29 monthly payments to Rupert Murdoch.

Sky's desire to get the $17.29 package into homes is driven by their technology. Once a home has Sky's ($17.29 monthly) "free to air" package installed, it is simply an 800 toll free call to have other Sky channels added to their TV screen. For a larger monthly fee of course. When Government refuses to make it possible for homes to own their satellite system (Sky of course will not sell you their equipment), by not mandating that the free to airs will be equally free to air via satellite, it looks bad for Government; as if they are somehow in league with Sky and News Ltd.

Suppose we awoke tomorrow to find all Government roads had been sold overnight to Rupert Murdoch and just leaving our driveway would now cost us a toll fee? Our television channels are our invisible roadways through the atmosphere and taking them away is a no less serious change in our lifestyle. Government should not be about creating monopolies for "favoured" multi-billionaires.

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Hard Core (Serious) "How to do it" References

☐ Tech Bulletin (TB) **9402**: MATV (master antenna terrestrial) systems - wiring up a home, motel, hotel, camp site from one set of antennas - $15 all regions

☐ TB **9404**: Home Satellite Dish Systems. "Newbie" trying to work out what all those terms means and how a home system goes together? Perfect. $15 all regions

☐ TB**9405**: Satellite to Room Systems. Combining MATV (9402) with satellite (9404) to distribute satellite TV reception to multiple outlets - 2 to 1000+! $15 all regions.

☐ TB**9301**: Terrestrial Antenna Systems to eliminate co-channel interference, stack for additional gain. $15 all regions.

☐ TB**9302**: (Terrestrial) Weak Signal Reception Techniques; off-air TV reception to 300km+. Seriously detailed. $15 all regions.

☐ TB**9303**: UHF - Big Antennas for 300km reception over ground! Seriously detailed. $15 all regions.

☐ TB**9304**: Identifying and eliminating noise interference from fence lines, signs, electrical appliances. How to cleanup marginal TV reception. $15 all areas.

☐ TB**9305**: Cable TV - the basics. How a cable system works, how you can build one! $15 all regions.

☐ **Nelson Parabolic Manual**. The "bible" of building your own 13 foot dish from scratch. Serious stuff for dedicated builders. $15 all regions (supply limited)

SOFT CORE - recent back issues of SatFACTS (while supply lasts)

☐ **SF#93** (May 2002) - European Piracy, hundreds of piracy web sites - $10 all regions.

☐ **SF#96** (August 2002) - Nokia BDM, Faster Channel Zapping with Nokia - $10 all regions

☐ **SF#98** (October 2002) Humax mods, Nexus PC Card, Low power FM broadcasting - $10 all regions

☐ **SF#99** (November 2002) FunCARDS - how they work, software mods for Humax - $10 all regions

☐ **SF#100** (December 2002) d-box2 BIG report! AC3 Surround Sound for Nokia, PanAmSat's Terrorist Problem - $10 all regions

☐ **SF#101** (January 2003) d-box2 conversion to Linux, SA power supplies - $10 all regions

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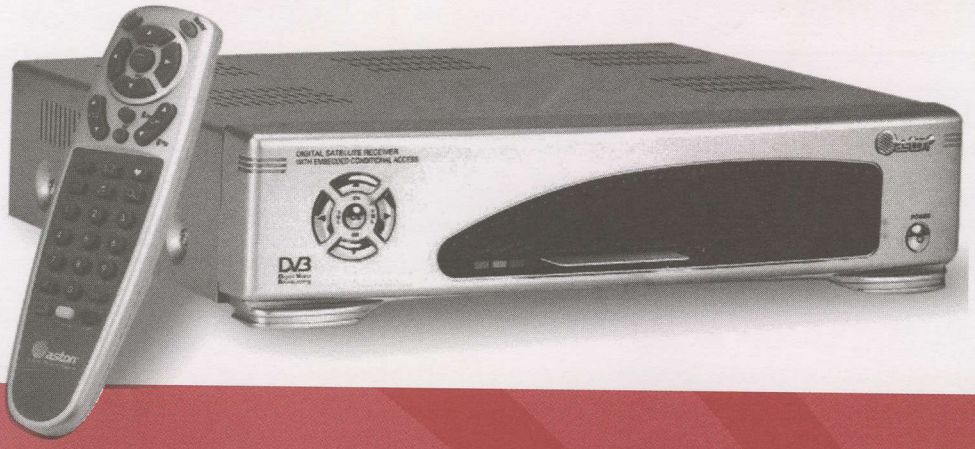

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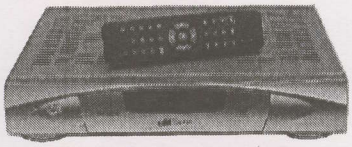

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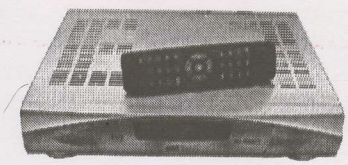

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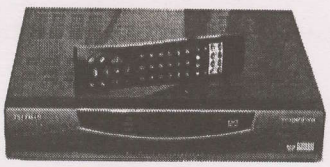

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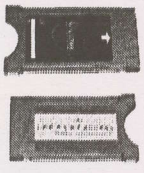

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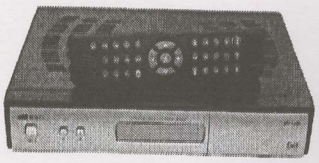

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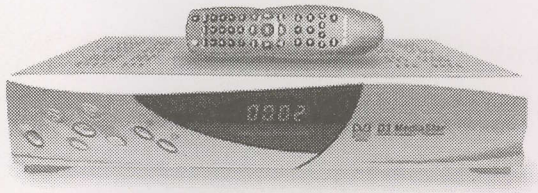
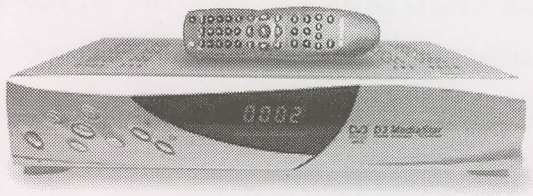


D2 with Iredto 2.06 cam



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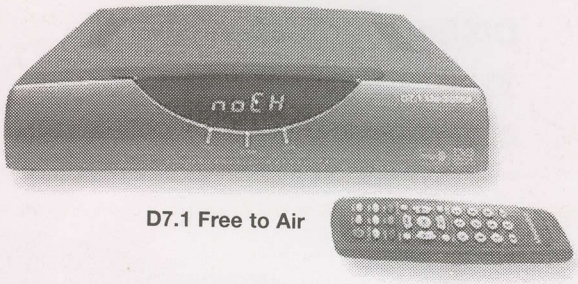

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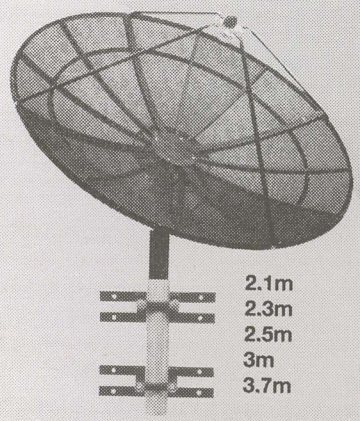

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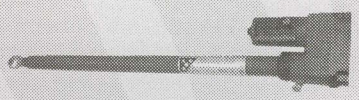

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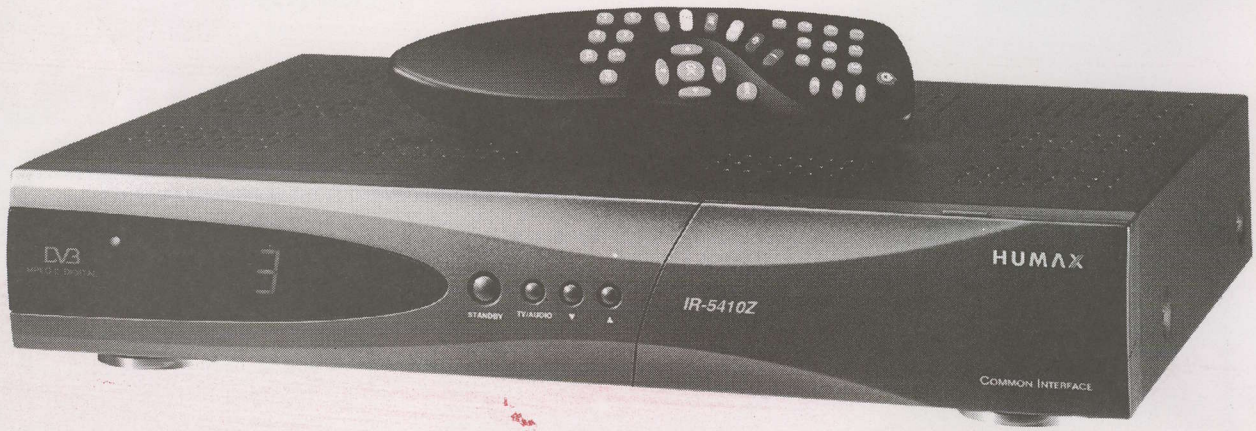

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