Bob Cooper's

**SAT FACTS**

**-Oct. 1994/No.2-**

A monthly report on satellite positioning, programming, transmission formats and equipment of interest to retailers, installers, system planners in the Pacific Ocean Region. Mailed fast post on or about the 15th. 12 issues NZ$40 within New Zealand, US$40 elsewhere.  PO Box 330, Mangonui, Far North, New Zealand. Telephone: 64-(0)9-406-0651; FAX 64-(0)9-406-1083.

## PanAmSat PAS-2 PROGRAMMING MUDDLE

'Mixed signals' continue to radiate from PAS-2 (the satellite), and, spokespersons concerning the actual availability of programming channels on this new satellite. At the bottom of the quagmire of mis or no information is the root; the conversion to compressed digital video (CDV) transmission techniques.

Here are the most recent announcements:

CNNI/Turner International. In a FAX dated 13 September to a Noumea dish installer, Turner's Australian office claimed:

"CNNI will be active from November 1 with a **digitally compressed** signal (on PAS-2)."

Country Music Television/CMTV. In a FAX dated 28 September to a new Zealand commercial (FM) radio station operator, a spokesman stated:

"Our signal on PAS-2 will be **compressed digital video** and will primarily be targeted at subscription households served by cable networks, MDS systems and/or high powered DTH pay television services."

Chinese Television Network/CTN. In a press release dated 28 September PanAmSat announced the most (new) addition to their growing list of PAS-2 users:

"PanAmSat has signed a long-term agreement with the Chinese Television Network owned by a major Hong Kong consortium, for the distribution of Mandarin (language) information programming throughout the Asia Pacific region and to major cities in North America.

"CTN is leasing two multi-channel, per carrier (MCPC) **digitally compressed video** signals on PAS-2's C-band Pacific Rim Beam. With MCPC technology, PanAmSat is able to efficiently utilise satellite bandwidth and transmit several channels of programming on one transponder from the same site. Hong Kong Telecom will uplink CTN's programming using a dedicated PAS-2 antenna.

"CTN has reached the final stage of negotiation with many cable television operators in several major regions in SE Asia including Taiwan, Singapore, Hong Kong and Australia. Active marketing activities are being conducted to rapidly increase the distribution network to cover other territories under PAS-2's coverage area."

Note the key words **compressed digital (video)** in all three releases. For readers with no background in this developing technology see "CDV???" in this issue.

With the addition of (Mandarin) Chinese programming, the 'core language programming' to be available on PAS-2 now includes English, Chinese, Japanese, and Filipino.

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204 WERE THERE

# SCS '94 PHOTO ALBUM

*Birth of an Industry*


ORBITRON
Satellite Antennas
TELSAT COMMUNICATIONS LTD

**CDV??? What Is Digital Video?**

Coop's Technology Digest readers are referred to our August 1993 issue (9308) which described the transition to digital in detail.

Our present transmission system is termed 'analogue'. All terrestrial and satellite TV used 'analogue modulation formats' before the development of digital technology. In analogue systems, the amplitude of the carrier signal (amplitude modulation; AM) or the frequency of the transmission (frequency modulation; FM) is varied by the information being transmitted. Recovering and processing these changes in amplitude or frequency produces video (and audio) signals at the receiver. The carrier in analogue is always present and provides a 'reference signal' to a receiver.

Digital modulation begins by converting each picture element (pixel) to a '0' or '1' bit. The stream of bits required to make up a complete television frame (with 25 or 30 frames per second) includes megabytes of bits. A television receiver designed to demodulate variations in amplitude or frequency does not recognise '0' and '1' signals at all. The basic 'carrier' however is still present. Digital bits are modulated on the carrier using a number of techniques; QPSK is one such system in use.

So far we have a totally incompatible technique replacing an existing standard. Ideally, the receiver at the end of the chain would recognise '0' and '1' modulation and reproduce picture and sound. Until this is true, interim 'transcoder' devices will recognise the digital modulation and convert it to an analogue format TV signal which can then be displayed on an existing TV receiver.

That's digital video (versus analogue video) modulation. Now, digital coding of pixel elements makes use of the redundant nature of video pictures to allow a reduction in the signal's bandwidth. The bandwidth (i.e., how many megahertz of spectrum is required to send a complete picture plus sound) with digital format techniques actually goes up and down (i.e., gets larger, becomes smaller) as a function of the information transmitted. How? If there is no change in the video content between 'frame 1' and 'frame '2', the digital format utilises chip memory at the transmitter to stop most of the frame 2 information from being transmitted. Why send frame 2 at all if the content has not changed from frame 1? Indeed, why not send a short data burst that advises the receiver, *"Repeat frame 1"*?

In between there being no change from frame 1 to frame 2, and there being a complete change, we have grades of change. A shot of Paul Holmes has only one change between frame 1 and 2; his lips have moved slightly. In this situation the digital system isolates just the change (the new position of his lips) and sends only that change for frame 2. The rest of frame 2 is redundant to frame 1 and the digital system transmitter tells the receiver, *"Repeat all of frame 1 for frame 2 - except for the lips and here are just the changes for the lips."*

This is called compressed digital video (CDV). The compression is the elimination of redundant information; those portions of frame 1 repeated in frame 2 without change. In our example, if the original frame required 6.0 megabytes of data (and a bandwidth to match), frame 2 with 'no change' whatsoever might require 0.1 megabytes of data, and a much reduced bandwidth. Or if frame 2 only consisted of the change in the lips, perhaps 0.3 megabytes and slightly more bandwidth.

CDV is described by the amount of compression. If the picture is 'sampled' at a 1 to 6 rate, in theory the compressed bandwidth can be 1/6th of the original bandwidth. If the sample rate is 1 for 10, 1/10th. Engineers refer to the compression rate as a shorthand to describe how much compression is being used. At the same time, programmers refer to how many separate video programme channels can be compressed into the 'spectrum space' normally used by a single analogue carrier. A programmer such as John Fellet of SKY Network stating (see **CTD**: September 30, 1994) he is planning "5 to 1" means he expects to compress his SKY programmes so that 5 separate channels of video programming replace one (analogue) channel. The compression rate, and, the programme rate, are not necessarily the same thing.

It is true that by compressing the picture through the elimination of video scene redundancy there is a saving in spectrum use. The amount of compression possible, before there is picture degradation, depends

## CDV: TRUE and NOT TRUE

There are many misconceptions concerning how analogue receivers can be upgraded to CDV. In theory, the 70 MHz 'link' appearing on the rear deck of most satellite receivers seems to be a logical place to begin; simply take the receiver's 70 MHz signal and loop it through a 'transcoder'. Then, back into the satellite receiver.

**Fact One**: There are no transcoders on the market. Furthermore, none are expected before the third or fourth quarter of 1995.

**Fact Two**: Not all analogue receivers have adequate stability or response characteristics to process digital video signals to a transcoder. Therefore you or your customer may not be able to 'upgrade' to CDV with the existing receiver. Which receivers won't upgrade? We don't know yet.

**Fact Three**: Transcoders will initially cost big bucks; probably as much as existing analogue receivers. It may prove less expensive to start over with a CDV receiver.

**Suggestion**: Don't throw away analogue receivers; simply put them in storage as candidates for CDV transcoders at a later (end of 1995) date. If you want CDV before then, buy a CDV receiver.

totally on the nature of the video being transmitted. A gridiron or rugby match has fast paced action; all over the screen there are changes from frame to frame. The greater the change from frame to frame, the less use of redundancy possible. Thus the bandwidth, which is a function of redundancy, is greatest for fast changing video scenes; it is least for a testcard (which has no change at all).

The science of compression is not yet mature. Every month brings new developments, new claims for compression efficiencies. This has made establishing 'compression standards' very difficult since standards require a status quo in development. The first CDV 'chips' depended totally upon the chip's architecture for the compression scheme; new systems rely on off-line 'software' to fine tune the compression algorithms.

Companies who rushed in one year ago to design and produce 'CDV Chipsets' are now paying a price for being pioneers; their first-available chips are not compatible with the ever-improving software routines that work in tandem with the latest chips. Satellite receiver (transcoder) manufacturers are fearful of bringing out receivers which are married to a particular chipset; with the monthly improvements in software routines, a receiver that begins in engineering in October can be outdated by November, even before it begins to roll off the assembly line!

Programmers such as CMTV have to elect a point in time to say 'STOP!' and freeze the CDV technology at that point in time. This allows them to select a particular form of CDV and begin transmission in that format. This also creates a market for receivers that will use the CMTV signal at that particular point of CDV development. Most receiver suppliers now believe their CDV architecture must be 'open-ended;' that is, capable of being field upgraded or software upgraded perhaps with data transmitted through the satellite downlink itself.

## CDV: NOT ALL RECEIVERS ARE CREATED EQUAL

An analogue receiver is capable of receiving all analogue transmissions. A CDV receiver? It can be designed to receive CDV in MPEG-1, or, MPEG-2, or DigiCipher, or ... in any of several other customised formats. At this time you cannot purchase a receiver that will receive all forms of CDV. Some receivers claim they are 'compliant' between formats. *Compliant is not necessarily compatible.* Now - if a programmer encrypts his programming (i.e., adds an addressing 'protocol format' to the transmission), and has chosen Digicipher for his CDV system, even those with Digicipher receivers must also have the correct addressing. Thus the receiver must **(a)** be of the correct CDV format, and, **(b)** have the correct addressing protocols to receive the programmes of interest. **Cautions**: When somebody offers you that first CDV receiver, be cautious. It may not decode the programmes you want!

The past 15 months has been a frightening time for programmers who were ready to move to CDV, and for receiver suppliers who must supply the hardware to make this possible. All around the world there are hundreds of CDV guns 'cocked' and ready to fire; but most have remained in the cocked position out of fear of firing too early.

**The Advantages of CDV**

Is compressed digital video worth this hassle? The answer is an overwhelming 'yes!'.

First and foremost is the spectrum conservation. If 2 (or 5 or 10) separate programme channels can be transmitted using the bandwidth previously required for a single analogue video signal, that is very worthwhile. A satellite transponder can be used by as many as ten programmers; obviously this reduces the cost of transmission for each programmer. Net result? More programmers become available.

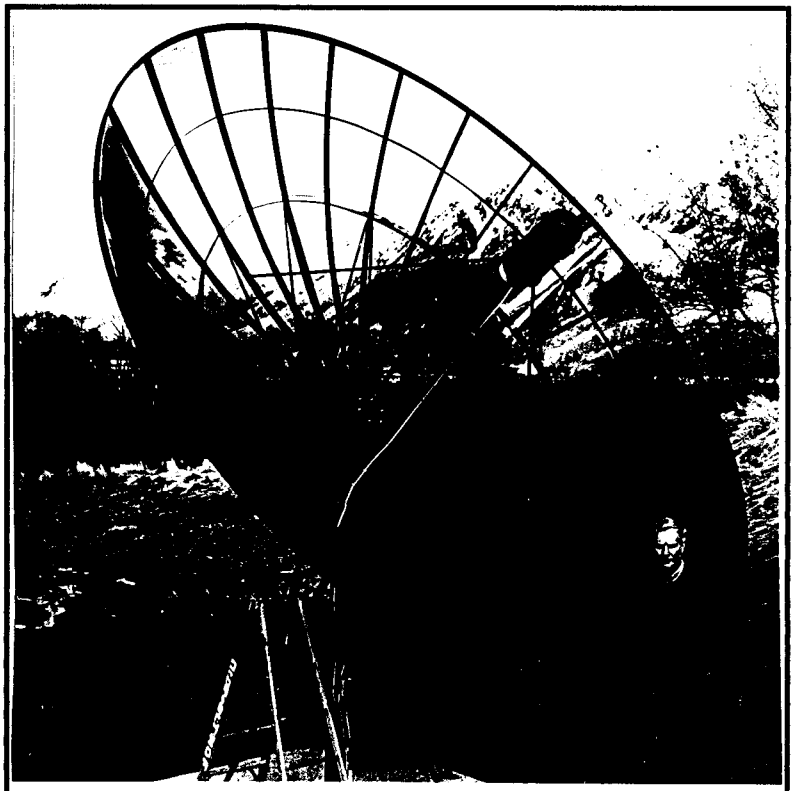
Secondly, there are system sensitivity advantages to CDV over analogue; digital signal processing requires smaller dishes for equivalent signal quality than analogue format. If an analogue picture requires a 3.0m dish, it is likely the same signal in digital will be as good or better quality with a 2.0m dish. That means more dishes will be sold; the audience will grow for programming.

Thirdly, digital format signals are easier for the programmers to 'direct to viewers' using specific subscriber addressing schemes. This means the programmers will gain a level of 'control' over who watches (and does not watch) their programmes which they are missing with analogue. The downside is that there will be less 'free to air' or 'fortuitous' reception with CDV; the upside is that because programmers gain this advantage, more programmers will be willing to risk going on satellite because they are more certain of being 'paid' by those who do watch. And that's good for us because with better controls and more programming available, we will sell more systems.

The downside? It's not here ... yet. Almost. But not quite!

**PAS-2: New Programmer Starts**

Country Music Television (CMT or CMTV) began feeding their 24 hour country and western music video service at 8:30AM local time on October 5. The first to report it operational on PAS-2 transponder 11/12 (vertical polarisation) was Brian Evans of Pacific Antennas; Whangaparoa. By the end of the 5th reports were in from Timaru to North Cape all reporting noise-free pictures (and stereo sound) on dishes from 3m upwards. Evans also tried out a 1.8m dish and found "*noise free stereo sound, some sparklies in the saturated reds and blues only*" indicating the intensity of the CMT signal. CMT already has one paying customer here; Kiwi Cable (Paraparaumu) has been an affiliate using VHS tapes sent from America for more than one year. Mark Marfeld



**NUMBER 100!** Kiwi dish pioneer Roger Keen (KM Electronics LTD, Timaru) with his 100th dish installed in 8 years, a 16' at Lilybank Safari Lodge, Lake Takapo. Keen is on the SPACE Pacific formation committee presently working to create the national trade association.

at Kiwi Cable reported their 5m dish had a CNR (carrier to noise ratio) in excess of 16 dB from CMT. CMT advised 'SF' directly, *"CMT will continue to be transmitted as an unencrypted analogue signal during the month of October and perhaps for some weeks into November. We will then overlap the permanent CDV feed and phase out the analogue feed."* SPACE, your trade association, is negotiating at this time for the ability to connect members to CMT's digital signal as soon as digital format receivers are available here.

PRIME (Sports) International, a Houston (Texas) based programmer initiated 'test service' at around 6PM on October 5th; also, for the moment, in NTSC analogue free-to-air. Prime's programming is all-sports (boxing, horse racing, auto racing, fishing et al) and the programmer is owned by US cable giant TCI and its affiliate Liberty. At presstime PRIME has been running on PAS-2 TR9/10 (3,980 MHz, also vertical) evenings from around 6PM local to near midnight local. Signal levels are -1.0 to 1.5 dB reference CMT; still without sparklies on a properly equipped 3m dish. How long this one will stay 'in test' in analogue (i.e., in the clear) is not known.

ABS-CBN, the Philippines uplinked digital video service (PAS-2, TR13/14, 4100 MHz) went into service full-time October 1. The present service is in Filipino, is being linked through PAS-2 to the USA where it is relinked via US domsat to cable TV and other customers there. This is a 'first' for the Pacific; a country that is creating a programming package of their own programmes sent via satellite to Filipino natives living abroad. 'SF' has an unconfirmed report that ABS-CBN also intends to use additional transponder capacity to link several programme channels from Manila into newly built cable TV systems on the (southern) island of Mindanao. All you need to be a part of this here is (a) a CDV receiver, and, (b) their 'authority' (i.e., they address your receiver 'code').

**'HAVE A PLAY' - The Danger**

Two terrestrial aerial suppliers have just brought out Ku band complete dish systems for (well) under NZ$1,000. AIMCO Aerials (09-274-6509) has a 1.5m Ku package with an apparent dealer cost in the $700 region while Hills Industries (09-262-3052) is offering a total of 11 Ku band 1.5m offset packages for NZ$850. The concept according to Max Trebilco and Ian Biddick is to give dealers interested in the new satellite technology an opportunity to *"have a play"* with inexpensive Ku band systems for *"under $1,000."* This is an admirable goal, and apparently most of the initially offered packages available were snapped up by dealers anxious to try out Ku band experimentation within days of the announcement.

The 1.2-1.5m Ku band dish size is adequate today only because of recent rearrangements of the Optus B1 satellite transponder loading and the enhanced transmission powers now being employed on TR5. This transponder is now in TR5-lower and TR-5 upper format; i.e., a pair of 27 MHz wide half-transponder signals. TR-5 upper is being reserved for eventual use by a full-time service, no identity on that one yet. TR-5 lower is being used daily for what the industry calls 'occasional feeds'. These are non-scheduled programmes, sent at the request of a client. Recently BBC World Service (for up to two hours per day), French language programming and other events have been seen on TR-5 lower, usually in the local morning hours.

The reassignment of TR5 to upper and lower formats is permanent; for now. The programming is not intended for home or commercial use, and Optus New Zealand's John Humphrey told 'SF':

*"If people are watching this now or in the future in any sort of significant numbers, it is my belief that the programmers using these OPTUS linking services would encrypt their programming. For example, when Cricket is sent over from Australia (*an event in the near future*), the New Zealand TV network ordering that feed will not be pleased if that programming is shown in public in its satellite format prior to it appearing on the New Zealand terrestrial network."*

Humphrey was positive about the dealers, *"Such as I saw and met in Hastings, having a play with the technology. I would not be pleased if dealers take it that next step and begin to offer similar packages to private homes or clubs. When OPTUS B3 comes on line next winter, it will have the technical capability*

*to serve private homes here with small dishes and a variety of programming. The present B1 programmes on TR5 is not such a service."*

Ian Biddick agreed with 'SF' and Humphrey that his 'flier' announcing the Hills $850 dealer-cost product should emphasise the 'Have A Play for your own technical education' approach. *"We don't want people coming back to us if the programming disappears or doesn't meet their expectations"* Biddick noted. However, some fliers were mailed prior to this statement to 'SF' and some dealers may, therefore, have received a slightly less precise explanation of the value of the new Hills package. AIMCO was less clear how they would describe the new packages (which reportedly will also include a 1.2m antenna option shortly).

**145 EAST-Summary**

A Russian Gorizont series satellite is presently active at 145 east, typically with MOSCOW 1 television (3675 MHz; TR1 minus). The 'schedule' for this satellite is intermittent, presently it is in inclined orbit requiring tracking; a new Soviet Express Class satellite is promised here during the first quarter of 1995. This could be an important satellite location for New Zealand by the 2nd quarter of 1995.

At 142.5 east, Asia Television Network (ATN) continues to pump out one or two channels of Indian/Middle Eastern music videos up to 24 hours per day. This is a RIMSAT operated satellite and it appears to be mostly stable in position although the signal level does vary without explanation. Check 3675 (-1) and 3725 (TR1) for these signals; good on a 3m.

At 139.9 east another Gorizont satellite continues to carry MUSLIM TV, a mostly religious experience of limited programming interest, on 3725 MHz. This satellite is in inclined orbit and must be tracked. When everything is peaked, expect CNRs in the 8dB region on a 3m dish. The audio is seldom usable because of a compression (compandering) technique (which can be sorted out with an appropriate receiver).

APSTAR 1 which in September was promising to operate from a self-assigned orbital position of 131 is now firmly located at 138 east after a lease agreement for this orbit space was reached with the Kingdom of Tonga. The shift from the 131 spot to 138 reportedly has caused some problems; signal into Singapore, which had been expected to be noise free on 2.4m antennas is instead noisy on 4m antennas. Bryon Evans of Pacific Antennas as well as the new Auckland University (7.3m) dish have searched carefully for any sign of APSTAR 1 here; no signals were detected. This is not a surprise since APSTAR 1 was never intended to serve south of the equator. APSTAR had planned to place two satellites at 131 and 134 east, thereby allowing small SMATV and CATV dishes to receive both satellites with a single reflector outfitted with a pair of offset feed/LNBs. In their agreement with Tonga, APSTAR has agreed to abandon their claim on 134 and APSTAR 2 will now be located at 87.5 east; a Chinese location. This is some 12 degrees beyond our western horizon; APSTAR 2 will have no value to Kiwi dish users.

Palapa B2P (113E) is reaching Auckland University's 7.3 metre dish with colour pictures and quality audio much to the delight of project manager Brian Oliver. This Indonesian satellite presently carries a selection of in-the-clear and encrypted programming using linear vertical and horizontal polarisations including English language ATVI (Australia), Asia Business News, CNNI, HBO Asia (B-MAC encrypted), ESPN (also B-MAC) and The Gold Network (Australia). Most of this programming is scheduled to move to Palapa C1 (118E) after its June 1995 scheduled launch. C1, by the way, includes direct New Zealand coverage in its predicted footprint at a level 5 dB stronger than the present PAS-2 signals.

**INTELSAT CLUSTER - Update**

A new Intelsat satellite (703) is due to be parked at 177 east, replacing old and tired 511 now there, within the next 30 days (assuming the launch is successful). 511 currently carries AFRTS in NTSC B-MAC as well as occasional video feeds for Korea and other Asian nations. The new 703 satellite signal is likely to be stronger, and of course will not require inclined orbit tracking. Of special interest is a Ku

band steerable spot beam capability on board. A South Pacific firm that does not wish to be identified at this time claims to have signed an interim lease (through June 1995) to use one transponder on this satellite for the specific purpose of distributing up to 15 compressed digital video TV programme channels to cable and SMATV headends. It is reported that a sizeable down payment has been made for this transponder capacity. The firm envisions a 'package' of programming, receivable on dishes down to perhaps 1m in size (in the digital format), that could be made available to DTH dishes as well. Information on this plan is under wraps for the moment because of 'commercial sensitivities.' Those with Ku band capabilities should check 177E after launch and safe arrival at that location has been confirmed. 703 will have Ku downlink bands available, as follows: 10.95-11.2, 11.45-11.7, 11.7-11.95 and 12.5 to 12.75 GHz. Yes, that does present a problem for Ku band LNBs designed for OPTUS (12.25-12.75 GHz).

Intelsat 703 (174E) has been very active (TR 24) sending Asian Games sporting event coverage non-stop for several hours daily from mid-afternoon onward.

October 15, 1994

When last we met in Hastings during SCS '94 there were those sceptics in attendance who thought it unlikely New Zealand had much of a future in the C-band satellite world. Our nearest major neighbour, Australia, hitched itself to the Aussat (now Optus) Ku band star back in the early 80s; surely New Zealand would do the same?

## COOP'S COMMENT

Timing. Aussat management had numerous opportunities during the 80s, and 90s, to bring New Zealand under the Aussat and Optus umbrellas. It never happened. At SCS '94, well-meaning *John Humphrey*, Optus NZ manager, suggested we continue to be patient and hinting (but hardly promising) that their B3 satellite, launched last August, could come on line for New Zealand. But not before mid to late 1995.

Timing. Sceptics at SCS '94 worried that few Kiwi viewers would put up with 3m and larger C-band dishes honed in on a handful of channels broadcasting Muslim religion or Indian music videos.

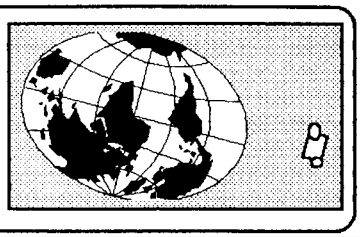
Since last we met PanAmSat PAS-2 has come alive with Country Music Television, Prime Sports, and ABS-CBN, with more promised shortly. Your trade association, **SPACE Pacific**, still exploring the best method of its own creation, has wasted no time in entering into discussion with these and other programmers to acquire programming access. The discussions continue on a near-daily basis as we work through a stack of side issues such as digital receiver sourcing and digital addressing protocols. **SPACE** requested and CMT agreed to simulcast in analogue and CDV their programming for as long as practical. All of this from a group that first met to discuss a trade association September 15!

Now we have programming. Soon we'll have digital receivers. Our C-band future is looking brighter each day.

# SPACE NOTES

A technical and marketing advisory memo to the membership from your industry trade association group

**SPACE Pacific Satellite Programme Access CommittEe**



## THE MOVE TO PAS-2

Here's the situation. By best estimates, there are approximately 350 commercial grade satellite dishes in New Zealand presently pointed at Intelsat 508 (180 degrees). Add to those 350 another unknown quantity of private, at-home dishes owned by those folks who always want to own the latest 'gadget'. The at-home dishes may or may not have dish movement capability; the commercial 5-7m size dishes almost universally do not have the ability to zip around the sky to other satellites.

NOW - the problem. These dishes tune in the present programme offerings of Intelsat 508. This includes WorldNet, RFO, those vidiplexed (two programmes on a single transponder) feeds and of course CNN. Of those choices, CNN(I) is the most universally watched and used. Where SKY is not available, CNNI via satellite is the motel/hotel/lodge's major news connection to the world. An advisory from Turner International says *"CNNI will remain on Intelsat 180* (in its present analogue, free-to-air form) *until January/February* (1995). *Starting on November 1st* (1994) *CNNI will begin a parallel feed on PAS-2. It will be a compressed digital video signal."*

OOPS. Can you imagine the disappointment of these commercial terminal owners when CNNI disappears from 508? There is a commercial opportunity here for the members of SPACE; an opportunity to go back to these dish terminal owners and help them with a solution to the loss of CNNI.

### Solution

With the rapid development of programming on PAS-2, including CNNI, the logical step is to repoint the dish; to PAS-2. A table in this issue shows the elevation and azimuth headings for seven New Zealand locations to locate PAS-2. BUT - before you begin this repointing activity, you will need a digital format receiver for the CNNI (and other PAS-2) signal(s). Your customer's analogue receiver won't work with the CDV. It could be close ... CDV receivers are just showing up in the marketplace overseas and to date none have entered the private-dish industry world of New Zealand. We'll let you know when they are available, where and for how much as soon as this information is clear.

### Planning Ahead

TODAY is a good time to begin work on a marketing plan; a promotion programme for your business that accurately explains these changes to the present dish owners, giving them clear and concise information about the new programming options on PAS-2, the need to repoint their dishes, and the need to replace their existing analogue format receiver(s) with digital format receivers. Some of your customers may consider a second (3.0 to 3.7m range) dish as a better way to add PAS-2, especially if they are taking WorldNet from 508. BUT be warned for those taking RFO that it also will be switching to CDV sometime after 1 January, so those users will also need a CDV receiver. NOW is the time for you to begin your own implementation of these changes.

SPACE, your industry trade organisation, is in the process of creating itself. A committee of six dedicated, experienced industry professionals is working weekly to build you a strong, effective trade association. ALL SatFACTS subscribers are automatically enrolled in SPACE as 'trial members' through March 31, 1995. With this issue to all readers are four pages (begins with "October 1994: What Is SPACE Pacific?" and ends with full page SPACE Pacific Interest Registration form). These are pages 14 to 17 with this issue. What to do with these four pages??? Copy them, show them to present dish owners, others with an interest in owning a dish. Help SPACE identify and reach every single dish owner in New Zealand (even if their dish is not presently operating). As we negotiate for New Zealand programming rights, the strength of numbers becomes very important to the successful creation of low-cost programming packages!

## TUNING TIPS FOR PAS-2

Because most New Zealand dishes now in operation (or stored) do not have polar mount or horizon to horizon tracking ability, finding PanAmSat PAS-2 at 169 will require some calculation before the actual moving begins.

**1)** Your reference point in the sky is Intelsat 508. The 508 signals are well known (see table this issue; page 20) and easily recognised by most installers.

**a)** As a reference for future use:

**1)** Using a protractor and string (as demonstrated by Barry Ward in Hastings), or, an inclinometer (sold at most *Placemaker, Mitre 10* and other builder supply houses), locate a flat reference point (typically a metal plate) on the rear hub area of the dish. Measure the inclination/elevation of the dish as it points at Intelsat 508. It should approximate:

Kaitaia/**48.61**; Auckland/**47.19**; Hastings/**44.26**; Wellington/**42.08**;
Greymouth/**40.35**; Christchurch/**39.43**; Dunedin/**36.72**

**2)** Using a compass placed on the ground directly behind the centre of the dish, drive two stakes in the ground with a string between the stakes. The string represents a straight line that aligns with the direction of the dish centre line. This is your Intelsat 508 heading; if you continued along this line and travelled upward into the satellite belt at your previously measured elevation angle, you would run directly into 508.

**2)** Now establish a new siting line from the rear stake towards PAS-2. How? Use the compass scale or a plastic circular (360 degree) protractor (as demonstrated by Barry Ward in Hastings) and with the compass or the protractor sitting on the ground at the rear stake, align either the compass or the protractor so 0 degrees is in line with your 508 heading. PAS-2 will be on a new azimuth line that is a known

## WHERE THE SATELLITE PROGRAMMES ARE LOCATED

Current satellites, look angles from New Zealand locations (pick one nearest to you)

| Location | El/Az | I508/180 | PAS-2/169 | Rim/142.5 | G'ZNT/140 | OpB1/160 | OpA3/156 |
|---|---|---|---|---|---|---|---|
| **Kaitaia** | EL | 48.61 | 49.01 | 37.88 | 36.33 | 46.89 | 45.33 |
| | AZ | 11.76 | 352.75 | 314.09 | 311.31 | 337.83 | 331.72 |
| **Auckland** | EL | 47.19 | 47.21 | 35.93 | 34.29 | 44.92 | 43.32 |
| | AZ | 9.23 | 350.87 | 313.66 | 310.93 | 336.57 | 330.71 |
| **Hastings** | EL | 44.26 | 43.74 | 32.51 | 32.09 | 41.29 | 39.69 |
| | AZ | 5.47 | 348.25 | 313.23 | 310.6 | 334.95 | 329.47 |
| **Wellington** | EL | 42.08 | 42.09 | 32.35 | 30.88 | 40.16 | 38.79 |
| | AZ | 8.37 | 351.72 | 316.53 | 313.78 | 338.59 | 333.11 |
| **Greymouth** | EL | 40.35 | 41.14 | 33.23 | 31.88 | 39.89 | 38.82 |
| | AZ | 13.07 | 356.85 | 320.95 | 318.02 | 343.71 | 338.12 |
| **Christchrh** | EL | 39.43 | 39.91 | 31.71 | 30.35 | 38.47 | 37.75 |
| | AZ | 11.01 | 355.05 | 320.04 | 317.14 | 342.23 | 336.79 |
| **Dunedin** | EL | 36.72 | 37.58 | 30.84 | 29.63 | 36.61 | 35.71 |
| | AZ | 13.47 | 358.18 | 323.54 | 320.58 | 345.71 | 340.34 |

**Base data, calculations courtesy Nigel Clough, 29 Matai St., Waikanae / 04-293-2058**

number of degrees west of your 508 heading. The chart here shows the heading information. Now let's change these numbers into 'offset degrees;' how far west of your 508 heading to PAS-2.

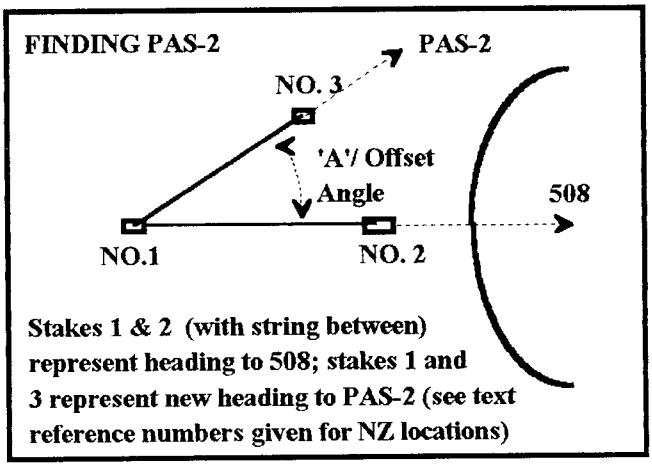
Kaitaia/**16.22 degrees west**; Auckland/**15.96W**; Hastings/**17.22W**; Wellington/**15.35W**; Greymouth/**16.22W**; Christchurch/**15.96W**; Dunedin/**15.29W**

Your third stake (with string from stake 1 to 3) should approximate the number of degrees at angle A (see diagram), from the location nearest to you, in the numbers above. Stake line 1 to 3 represents the azimuth heading for PAS-2; line 1-2 represents 508.

With the elevation to PAS-2 known, you can adjust from your 508 elevation as measured. If 508 is 42.08 elevation and PAS-2 is 42.09 elevation (as in Wellington), this .01 change will require no adjustment initially. In fact, no location in New Zealand is more than 0.86 degrees elevation change (Dunedin) between the two satellites; for initial 'spotting' of PAS-2, you will not need to adjust the elevation at all (except to confirm that when you moved west the required amount your elevation did not change on you, because of the mount's design).

**3)** Intelsat uses circular polarisation. PanAmSat uses linear vertical and linear horizontal. If the dish has a circular polarity feed, or is equipped with a 'Teflon Block' to convert a linear feed to circular, an adjustment will be required to the feed but not before initial spotting. Note: It is possible with a mis-adjusted circular feed to 'lose' either vertical, or, horizontal linear but not both simultaneously. You can work on the feed after the dish has been adjusted to PAS-2.

**4)** The best full-time reference signal on PAS-2 is ESPN in B-MAC. Check the ESPN transponder on 508 (lowest transponder on your receiver; below CNNI and the vidiplexed CNN/CNBC feeds) if you are not familiar with what B-MAC looks like. Then, set your receiver to CNNI on 508 and leave it alone!



**Stakes 1 & 2 (with string between) represent heading to 508; stakes 1 and 3 represent new heading to PAS-2 (see text reference numbers given for NZ locations)**

**5)** Begin your dish moving mechanics, using a TV receiver at the dish or a signal level meter as an indicator. With the receiver set at the 508 frequency for CNNI (3,845 MHz) you will be close enough to the ESPN B-MAC frequency on PAS-2 (3,850 MHz) to see it when your dish begins to boresight onto PAS-2. Once you find the first signs of the ESPN B-MAC signal, stop moving the dish and peak the receiver, fine tuning out the 5 MHz difference between CNNI's 508 frequency and ESPN's PAS-2 frequency.

**6)** Proceed with azimuth and elevation adjustments until you have the ESPN B-MAC signal level peaked in strength on your receiver or test equipment meter.

**7)** Now the feed. If it has a Teflon block in place, remove it. Don't panic if the signal drops (way) down; you'll correct this. If the feed is designed for circular, and it has a servo motor, adjust the motor for peak linear signal. If the feed had a Teflon Block, and it is now gone, loosen the nuts holding the feed in its 'collar mount' and carefully rotate the feed for best signal level.

If the feed is fixed / single polarity, you have now peaked it on the ESPN PAS-2 polarity. Schedule it for a change out with a polarity-switching feed that will receive both linear vertical and horizontal signals as the dish user will require both sets of signals.

**8)** Digital format signals on an analogue receiver depend to some extent on the number of video 'carriers' in the multiplexed group. The screen usually goes 'grey' (indicating a carrier signal), the signal level meter on the receiver goes up (as with analogue signals), and, there may be broken white 'dashes' on the screen that move about. Remember many PAS-2 carriers are digital (see reports in this issue).

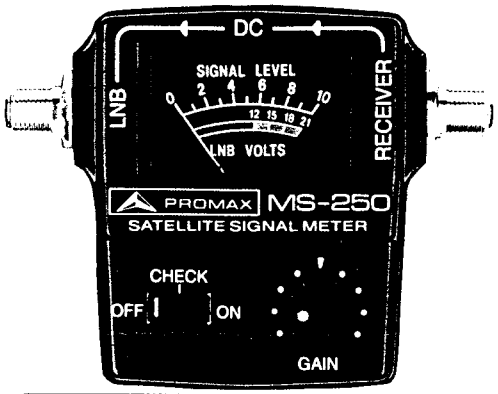
# Gough Industrial Traders

Providing reliable solutions through technology

PROMAX

# 4 LEVELS TO SATELLITE TV SIGNAL MEASUREMENT

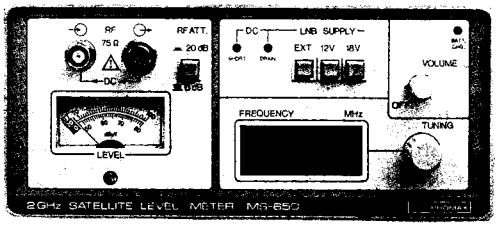
## LEVEL 1 - MS-250 SATELLITE DETECTOR



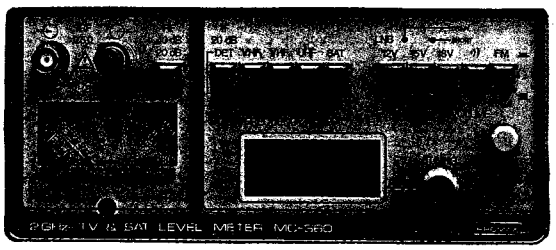

* Placed Between LNB And Receiver
* Broadband (950 - 2050 MHz) Signal Detection
* Analogue Meter & Audible Tone Indication
* Measurement of LNB Voltages Generated By Receiver

## LEVEL 2 - MS-650 SATELLITE LEVEL METER

* Frequency Range 950-2050 MHz
* Measurement Range 50-100dbµV
* Variable Internal LNB Voltage Source
* Operated By Batteries Or Mains
* Analogue Meter & Audible Tone Indication



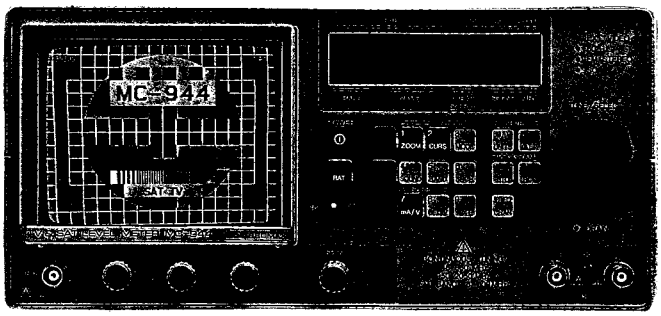

## LEVEL 3 - MC-360 VHF/UHF/SATELLITE LEVEL METER



* Frequency Range 44-856MHz/950-2050MHz
* Measurement Range 50-100 dbµV
* Broadband Detector For Antenna Pointing
* Variable Internal LNB Voltage Source
* Operated By Rechargeable Batteries Or Mains

## LEVEL 4 - MC-944 VHF/UHF/SATELLITE MONITOR/LEVEL METER

* Frequency Range 45-856 MHz/950-2050 MHz
* Spectrum Analyser
* 99 Memory Locations
* Synch. Pulse Display
* RS-232 Printer/Computer Interface
* Teletext Option

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GOUGH TECHNOLOGY

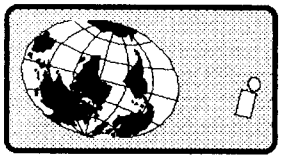
Precisely!

October 1994

- What is SPACE Pacific?
- What are the goals?

**SPACE** PACIFIC

**S**atellite
**P**rogramme
**A**ccess
**C**ommitt**E**e



PO Box 330, Mangonui, Far North, New Zealand
FAX: 64-9-406-1083 / TEL: 64-9-406-0651

**SPACE** Pacific is a trade association composed of members of the young New Zealand private satellite dish industry. SPACE grew out of the highly successful Satellite Cable Seminar '94 (SCS '94) organising trade show held in Hastings (New Zealand) September 14-16.

**SPACE** is in direct response to the sudden changes overtaking the Pacific Ocean Region satellite world. These 'changes' include:

✓ The appearance of new C and Ku band satellites from PanAmSat (169E), Rimsat (139.9E), Gorizont (142.5E and 145.0E); and the promise of additional new satellites from Asiasat (105.5E) and Palapa (118.0E).

✓ The rapid take up of compressed digital video as a transmission format replacing the various analogue schemes now in use.

✓ The scheduled activation of OPTUS B3 as a Ku band satellite of choice for direct to home (DTH) programmers into New Zealand in mid to late 1995.

Background:

Direct to home satellite services are totally new to New Zealand, although the first privately owned satellite dish system dates back to approximately 1981. Until 1994, the only satellites capable of transmitting video service into New Zealand have been operated by Intelsat (of late, primarily 508 at 180E). The new satellite launches, and those to follow in 1995, change this situation.

At the present time there are an estimated 350 privately owned dishes in the 5-7m size range installed at and serving motels, hotels, and private clubs. They primarily provide service from CNNI, WorldNet, RFO and a handful are also subscribers to ESPN's B-MAC encrypted service; all programming from Intelsat 508. Additionally, there are additional 'home dishes' typically in the 3-5m range but their quantity is unknown; not to exceed several hundred.

Until 1991, these dishes were the only means of obtaining service from CNNI and ESPN. After 1990, a terrestrial UHF broadcast encrypted service known as SKY Network has provided these two programming services to the metropolitan regions of New Zealand. Rural areas outside of SKY Network's terrestrial broadcast reach continued to find CNNI et al satellite reception the only means of receiving these programming services.

FOREGROUND:

The first problem facing New Zealand dish owners is the conversion of existing private dish systems from fixed mount service from Intelsat 508 to PanAmSat PAS-2. Most dishes presently in use were produced within New Zealand, are not of polar mount design, and their 'tracking' abilities

are unknown and possibly non-existent. This problem is complicated by the rapid emergence of compressed digital video transmission techniques. Thus:

✓ Existing dish owners will be required to repoint their dishes

✓ Existing receivers must be replaced with digital receivers

Reception tests using the early PAS-2 carriers indicates the footprint into New Zealand may exceed the forecast values by 2dB or more. Dishes in the 3.0 to 3.7m classes are universally reporting reception levels that exceed those forecast by PanAmSat prior to the launch of PAS-2.

ENTER SPACE:

Virtually every knowledgeable designer/installer of private satellite systems in New Zealand attended SCS'94. At this seminar there was a thorough airing of the problems facing the industry; from these discussions SPACE was 'born.'

SPACE has the following initial mandates:

✓ Provide an information clearing house to every facet of the new industry, including present dish owners

✓ Provide education to existing and new entrants into the private dish industry to improve their abilities to deal with practical system planning and installation challenges

✓ Search out ways of bringing into New Zealand programming from satellite programmers with SPACE acting as a marketing and management agent for these programmers to New Zealand dish owners

✓ Provide clear, concise, accurate information to the New Zealand populace at-large, creating an awareness of private (home) dish systems as a marketing tool for the industry at large

✓ Represent the industry before local and national government bodies

✓ Create and operate a mechanism to evaluate hardware intended for sale to the industry and provide ongoing guidance and advice to members of the industry concerning equipment

✓ Encourage the development of greater use of satellite services by educational bodies

✓ Create a professional certification programme for hardware system designers and installers to encourage standards of performance as a safeguard to system buyers

At this time SPACE is building a mailing list that will include all known present owners/users of private satellite dish systems. With a target date of 10 December, SPACE intends to notify those dish owners of the short-term changes in programming sources; away from Intelsat 508 to PanAmSat PAS-2. The same notification will explain what changes in existing dish systems are recommended, ballpark price of those changes, and offer to put dish owners in direct contact with one or more member firms which SPACE recommends to make these equipment changes .Later in December there will be distribution of a 'Satellite Changes Coming' booklet, and release of printed media reports for use in local and regional newspapers in New Zealand.

YOUR ROLE WITH SPACE:

...will depend upon your own area of activity. If:

✓ **Your firm is a programmer** using or intending to use PAS-2 or other C / Ku band satellites for service to the Pacific Ocean Region, we would like to talk with you about representing your programming in New Zealand. SPACE wants to be your contract marketing and authorisation arm here.

✓ If your firm manufactures, distributes or sells at resale equipment intended for the private (home) satellite industry in New Zealand, we offer to assist you in reaching the marketplace and arranging training seminar sessions for your personnel to speak directly to your market.

✓ If you are a private dish owner/operator, SPACE solicits your membership (*) and support. Through and with SPACE, you will enjoy access to programming, receive the most current information on satellites, their programming, and the equipment required to properly receive the many new programming options available.

✓ If you are a seller and/or installer of private dish systems, you are probably already aware of the objectives of 'your' trade association. If you are new to the industry, welcome aboard!

MEMBERSHIP LEVELS:

SPACE as a legal entity is underway as you read this report. Initially, a formation committee of six satellite experienced individuals representing satellite system users, equipment distributors, sellers and educators are involved in this exercise.

Subject to a final report and recommendation due February 1, 1995, SPACE will have the following membership categories:

✓ Dish owners/operators: Private
✓ Dish owners/operators: Commercial
✓ Equipment/hardware suppliers
✓ Programmers
✓ SPACE supporters (interested parties fitting none of the above)

*/ On an interim basis all subscribers to the industry trade publication **SatFACTS** are automatically 'Trial Members' of SPACE. On March 31, 1995, all of these individuals will be given the option of selecting their own membership status level and paying the required annual dues for one year.

RESPONDING TO SPACE:

You may register your interest in being a part of the development of **SPACE** Pacific by returning the form (next page) to us. Note that you have the option of registering your interest (and requesting regular updated information through SatFACTS), or, simply registering your interest without a subscription to SatFACTS.

for **SPACE** Pacific

Selwyn Cathcart (NZ FAX 64-(0)6-355-2141)
Nigel Clough (NZ FAX 64-(0)4-293-2058)
RB Cooper (NZ FAX 64-(0)9-406-1083)
Roger Keen (NZ FAX 64-(0)3-688-1580)
John Lynam (NZ FAX 64-(0)6-878-6022)
Brian Oliver (NZ FAX 64-(0)9-373-7481; attention Audio-Visual Unit)

# SPACE Pacific

## Interest Registration

PLEASE:

Complete, date and mail to **SPACE Pacific**, P.O. Box 330, Mangonui, Far North, New Zealand. Note that taking out a subscription to SatFACTS is optional!

This date _____

Your name _____

Company affiliation (if any) _____

Mailing address _____

Town/City _____

Telephone Number _____ FAX number _____

Please check where applicable

☐ I presently own / operate a private satellite TV 'dish system'

If yes:

☐ Which is used in a 'commercial' (motel, club) application

☐ Which is used in a private (home) application

☐ I presently install / sell private dish systems

If yes:

Approximate number installed to date: _____

☐ I plan to be active selling, installing dish systems

☐ We presently distribute hardware / equipment to the private dish industry

If yes: Your estimate of number of:

1) Commercial dish systems in New Zealand presently: _____

2) Private (home) dish systems in New Zealand presently _____

☐ We are a satellite programmer

If yes:

☐ YES - we would be interested in discussing SPACE Pacific representing our service(s)

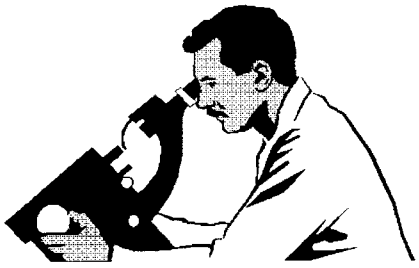
☐ I am none of the above ... but interested!

OPTIONAL - SUBSCRIPTION TO SatFACTS MONTHLY

☐ SIGN ME/US UP for 12 issues of SatFACTS MONTHLY, the Pacific Ocean Region's industry news and feature publication; and, make me a 'Trial Member' of SPACE Pacific through March 31, 1995 at no obligation or additional expense.

Instructions: Enclose NZ$40 within New Zealand, US$40 outside NZ, to SatFACTS.

# HELP SPACE IDENTIFY: PRIVATE COMMERCIAL DISH / HOME DISH OWNERS



OUR GOAL: To identify and contact each and every C-band dish owner (whether the dish is operating or not) in New Zealand. WHY? To alert each about the new PAS-2 programming options to be available, through **SPACE** Pacific, and to enlist their membership in SPACE to support this programme acquisition effort. Can you help us with full names and address of C-band dish owners? Every dish owner known to us increases your trade association's bargaining power with the new programmers. The greater our numbers, the greater our access to programming, and, the lower the prices for programming. **That's your incentive!**

| | |
|---|---|
| **Dish Owner** _____<br>**Address** _____<br>**Town/City** _____ | **THIS DISH DATA**<br>☐ Private (home)<br>☐ Commercial (motel, pub)<br>SIZE _____<br>Operating? _____ |
| **Dish Owner** _____<br>**Address** _____<br>**Town/City** _____ | **THIS DISH DATA**<br>☐ Private (home)<br>☐ Commercial (motel, pub)<br>SIZE _____<br>Operating? _____ |
| **Dish Owner** _____<br>**Address** _____<br>**Town/City** _____ | **THIS DISH DATA**<br>☐ Private (home)<br>☐ Commercial (motel, pub)<br>SIZE _____<br>Operating? _____ |

## SUBSCRIBE HERE TO SatFACTS MONTHLY

☒ My payment (NZ$40 within New Zealand; US$40 outside) to SatFACTS enclosed. Start my subscription with the very next issue!

NAME _____ Company _____

Address _____

Town/City/(Country) _____

**RETURN TO: SatFACTS, PO Box 330, Mangonui, Far North (New Zealand)**

# SatFACTS NEW ZEALAND ORBIT WATCH: OCTOBER 15, 1994



| TR # | Freq |
|---|---|
| -1 | 3,675 |
| 1 | 3,720 |
| 1+ | 3,725 |
| 1 -2 | 3,730 |
| 3 | 3,765 |
| 3-4 | 3,790 |
| 7 | 3,845 |
| 5-6 | 3,850 |
| 9 | 3,876 |
| 10 | 3,894 |
| 7-8 | 3,915 |
| 14 | 3,975 |
| 9-10 | 3,980 |
| 16 | 4,015 |
| 11-12 | 4,040 |
| 18 | 4,045 |
| 13-14 | 4,100 |
| 22 | 4,135 |
| 15-16 | 4,165 |
| 23 | 4,166 |
| 23A | 4,177 |
| 24 | 4,188 |

| G/102.7 | G/139.9 | R/142.5 | R/145.0 | P/169 | I/174 | I/177 | I/180 |
|---|---|---|---|---|---|---|---|
| Dub'l TV | | ATN | | | | | |
| | | | | | | | ESPNbm |
| | Muslim | ATN | | | | | |
| | | | | | | | |
| | | | | | | | Vidiplex |
| | | | | | | | |
| | | | | | | | CNNI |
| | | | | ESPNbm | | | |
| | | | | | | | Vidiplex |
| | | | | | | | Vidiplex |
| | | | | | | | |
| | | | | | | | Worldnet |
| | | | | PRIME | | | |
| | | | | | | | NHK/Enc. |
| | | | | CMTV | | | |
| | | | | | | | RFO |
| | | | | ABS/Dgtl | | | |
| | | | | | | | 9-Austrla |
| | | | | | | | |
| | | | | | NewsFds | | TVNZ |
| | | | | | | Afrts/bm | |
| | | | | | NewsFds | | BBC/CBS |

## SATELLITE IDENTIFIERS

**G** is Gorizont
**R** is Rimsat
**P** is PanAmSat PAS-2
**I** is Intelsat
**B** is Optus (Ku, below)
All C-band on 3.7m or smaller; all Ku on 1.2m or 3.7m (*)

## CODING KEYS

RFO **Free to air** (presently)
9-Austrla **Usually in clear**
Vidiplex **Not encoded, special equipment required**
ESPN/bm **Subscription required; available**
15-16 PanAmSat transponders

| TR# | Freq |
|---|---|
| 1V | 12.282 |
| 5V | 12.532 |
| 7V | 12.658 |
| 10H | 12.376 |
| 11H | 12.438 |

| A3/156 East | B1/160 East | Services | Notes |
|---|---|---|---|
| | Data, SCPC | TAB Radio, others in narrow band FM | Requires FM radio tuning receiver i.f. |
| Educational TV (afternoons) (*) | Lower: Occ. feeds Upper: Reserved | L: mornings busiest U: after Oct. 17? | Possible PAY TV on upper in future |
| Japan TV Service (11PM-1AM) (*) | Lower: SBS Upper: ABC national | | B1 signals marginal on dishes below 1.5m |
| | High Performance Beam | | Possible PAY TV in future |
| | High Performance Beam | | Possible PAY TV in future |

**Ku-band data contributors**: Robin Colquhoun (09-630-7127), Francis Kosmalski (09-849-3512)