Bob Cooper's

JUNE 15 2003

SatFACTS

MONTHLY

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

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Hop	%Loss	IP Address	Node Name	Location	Tzone	ms	Graph	Network
1		209.101.119.162	MULTI HOMED US BACKBONE	CALIFORNIA US	-08:00	78	-x--	US BACKBONE
2		10.33.250.58	PANAMSAT NAPA IP GATEWAY	NAPA, CALIFORNIA		83	x	(private use)
3		216.139.171.178	PACIFIC IP GATEWAY	NAPA, CALIFORNIA		86	x	(private use)
4		202.87.128.134	YOUR COMPUTER	YOUR ISLAND, PACIFIC		621	x	(private use)

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3.0m for Cook Islands,
3.6m for Tahiti

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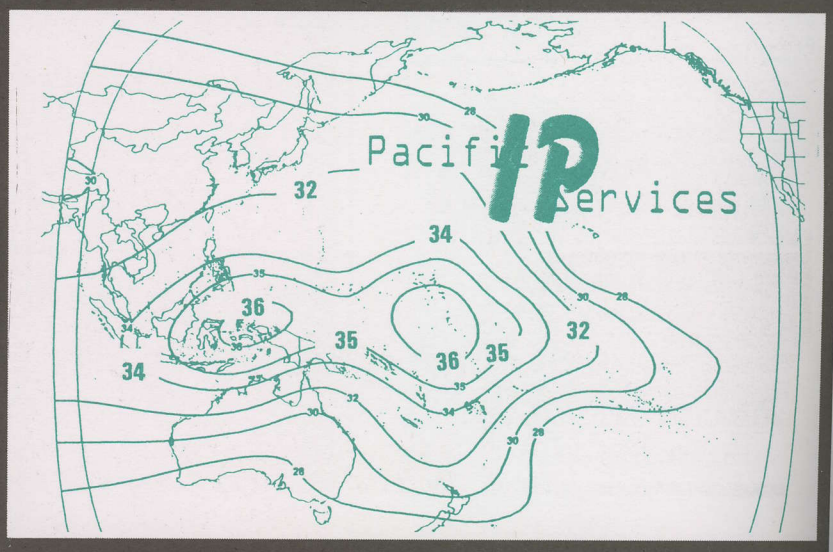

www.pacificip.com
Tel : +687-772266
Fax: +687-269676

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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.

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

Reaching SatFACTS
Tel: 64-9-406-0651
Fax: 64-9-406-1083
Mail: PO Box 330
Mangonui, Far North
New Zealand
Email -Skyking@clear.net.nz

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our NINTH year!

COOP'S COMMENT

Bit error rate (BER). The MPEG-2 "standard" establishes 3.456 Mbit/s as the "data rate" for "film/broadcast" television. Programming with a higher rate of motion (a sporting event, for example) has a MPEG-2 "standard" of 4.608 Mbit/s.

FEC. Forward Error Correction. For a 36 MHz bandwidth transponder, the total data stream size (# of Mbit/s) is established by the forward error correction (FEC) chosen. If the FEC is 1/2, the maximum symbol rate (the sum of all material carried by the transponder) is 30 Msym/s. If the programmer elects to increase the FEC to 7/8, the maximum symbol (data) load increases to 60 Mbit/s. PanAmSat routinely likes to use higher FECs because this allows them more "data room" in a given transponder width.

At FEC 1/2, which equates to 30 Mbit/s, if the programme data stream is 3.456 Mbit/s, the total capacity of the 36 MHz is 30 divided by 3.456 creating 8(.681) programme channels. If the programmer elects FEC 7/8, the maximum number of programme channels at 3.456 Mbit/s per programme channel is 60 divided by 3.456 or 17(.362). However, increased FEC rates require "additional FEC overhead" - Mbit/s set aside to operate the FEC system, so the actual number of Mbit/s available is significantly less (it works out to 48.382 Mbit/s for 7/8 FEC). At FEC 1/2, the original 30 Msym/s is reduced proportionately to 27.647 Mbit/s.

Lost? *Confused?* Stay with me.

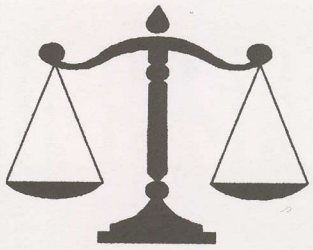
When we were living in an analogue world, our "threshold" was defined as the point where sparklies (noise) just began to be visible. In the MPEG-2 world, "threshold" is where all reception stops because the receiver's forward error correction is no longer able to cope-with and correct the quantity of data stream errors received.

Data stream errors are simply bits of information which "don't fit" the format; think of a wayward data bit as one that tells the receiver it is "a red pixel" in the middle of a sea of blue. The receiver's firmware programming says - "*Hey - wait a minute! This is a blue scene - there should not be a 'red' pixel in here*" and FEC is told to correct the mutant data bit - back to blue. The firmware "counts" the number of data-bit-errors occurring over a predetermined time span and when there is one too many (i.e. the errors exceed some firmware established 'maximum') the receiver's processor is told to stop working. And you get a full blue screen!

Now the important point. It is (computer) programming built into the receiver which establishes the maximum number of errors in a predetermined span of time. Back in the analogue days, when a "pixel" was lost or destroyed by noise or some other contaminant, we had a sparklie. If the picture was truly bad, we had lots of sparklies - *but we still had video*.

As analogue was being phased out some clever folks worked out "threshold extension" systems which took each bad analogue sparklie and reworked it by comparing the sparklie's information to the pixels left, right, above and below. If they were all "blue" then the threshold extension corrected the sparklie and made it blue as well. When you started with a 3 dB C/NR analogue signal (7 to 8 dB C/NR being threshold for no sparklies in a quality analogue receiver), after "correcting" several thousand sparklies the image was - well, washed out. But essentially much better than without threshold extension.

So here is a challenge. "Threshold" (resulting in no reception) with digital is established by a set of human-created "written rules" in the processing instructions. Where does it say that we cannot accept a lower grade image, one with pixel errors we can actually "see," that is - digital threshold extension? Can there not be a "threshold defeating program" built into receivers to allow them at user option to accept pixelations of the video rather than the complete turn off of a blue screen? We think there is an "inventive opportunity" here. Analogue "sparklies" were acceptable, terrestrial "snow" was acceptable - why not "digital pixelations?"



LETTERS

Those cross hairs

"Regarding using strings and their cross hair point to determine the electrical or mechanical centre of a dish (SF#104); I am not clear on one point. The electrical centre is a new term to me - I understand it is below where the strings cross but exactly where below? The article states you sight through the feed and then the cross hairs. Does this mean the feed is where it is supposed to be if the dish is not deformed?"

QR, Australia

In a perfect dish with a perfect feed, if you placed your eyeball behind the dish and looked through a hole drilled in the exact (mechanical) centre of the dish at the feed, you would see the cross hairs appearing squarely in the middle of the feed. Or, if you climbed to the feed and looked back through the feed and directly at the cross hairs, they would cross at the precise mechanical centre of the dish. If the dish is deformed, and/or if the feed is not in the centre of the dish, at best only two of these points will align. The first step should always be to try to correct the dish and feed such that these two align. If they can be corrected to do so, the cross hairs will now also be dead centre. When that fails - as it often does, go to the feed and run a taunt tape measure from the very edge of the feed to the rim of the dish, at two or three points (say 12 o'clock, 4 o'clock and 8 o'clock). The distance from the edge of the feed to the rim of the dish should be identical to within a couple of mm. If not, try to reposition the feed so that these three measurements are equal in distance. This places the feed centre at the dish centre. Now resight and see if the cross hairs now align. If they do not align from feed-cross hairs-dish (looking down at the dish) the new place on the dish where the feed plus cross hairs do align is your new (replacement for mechanical) "electrical centre" of the dish.

"Many, many thanks for your April report on reviving old dishes. I had been given a pretty rough 4.5m dish and then within days April SF arrives. After three days of stringing, moving bolts, some choice language and focal point changes my revamped dish plays CCTV with a C/NR of 15 dB and before the article instructions it didn't play it at all! The article certainly paid for my year's subscription to SF."

Paul Burton, Waipu, NZ

"Very possibly the best article ever published in SF and I have virtually the complete set!"

IF, Queensland

One man's April Fools is another man's treasure.

DiSEqC as a standard?

"If it is increasingly common for installers to use multiple antennas (or a single Toroidal antenna) for multiple antennas and an antenna switch at the STB, would it not make sense for STB designers to include some sort of automatic programmable switching method? A standard DiSEqC switch could be used or even 0/12 volts to operate a (coaxial) relay to switch between antennas (or feeds)."

NS, Victoria

Reader/observer David Mitchell, NSW, reports a 90cm Toroidal loaded with 8 LNBf's covering I701 west to Measat 2; nearest physical separation is PAS-2 to PAS-8 (6mm). Toroidal may have now, finally, "arrived." Try autosat@accsoft.com.au; 90cm at A$176.

PROGRAMMER PROGRAMMING PROMOTION UPDATE

JUNE 15, 2003

Newspapers via satellite. Here's a very innovative new twist to the question, "*What has satellite done for me, recently?*" The answer." *It can deliver you a hard copy 40 page exact replica of more than 120 world newspapers in approximately two-minutes time for a typical fee of US$5.*" Garry Cratt has introduced this innovation in Australia and New Zealand (using a B1 signal barely 0.2 MHz wide) and a similar signal through Apstar 2 serving most of Asia. A USB receiver (fed from an appropriate 1.2m dish), a (very) narrow band B1 TR1 carrier, a low phase noise PLL LNB, Pentium computer, colour touch screen, printer, stapler and credit card reader makes up the "Kiosk" installed at airports, hotels, high traffic mall locations. The user selects the current edition of any newspaper, slides in his or her card, selects the desired paper, pays the fee and in around 120 seconds is handed a completely printed, assembled satellite delivered copy of that day's paper. Pretty neat! Information? Contact Newspoint, PO Box 42, Fairlight NSW 2094 or Av-Comm Pty Ltd at cgarry@avcomm.com.au.

A sequel. US Senators holding a preliminary hearing on the desirability of News Corp "child" Fox News acquiring the world's largest satellite pay-TV operation (USA's DirecTV; US$6.6 bn) was highlighted by several Senators "fawning" (look up the word) over Rupert's Fox News service. One Senator, gushing, told Rupert, "*My wife would die without her fix of Fox News every day!*" Do you think Fox/News Corp will have difficulty gaining US approval for purchase? Think again.

Money problems. Australia's ABC announcing end to ABC Kids and ABC Fly; short A$7m, will also cutback on news coverage. Government cut ABC funding - something had to "give" and it all comes down to "politics - as usual."

Imparja's "musical PIDs." Taking the latest PIDs off of the web will not solve the station's problems with commercial installers serving pubs in CBD Sydney and Melbourne. Why? These guys don't rely upon nor use the web postings - they have their own system of updating customer receivers (p. 31, here).

Preview. Garry Cratt (Av-Comm) in Sydney has taken our lead article and created his own answers to receiving WorldSpace (p. 6, here) using a 2.2m dish and circular feed. Details in a future issue of SF!

S 20
Satellite Digital and Analogue Television Bit Error Rate Meter

The S20 is a new hand held Digital and Analogue satellite TV instrument for 920 - 2,150MHz. Measurements include True Bit Error Rate, Signal Level, Digital Channel Power, Digital Carrier to Noise Ratio, Spectrum and Expanded Spectrum; all presented on an wide screen graphic Liquid Crystal Display. Some routine measurements are executed Automatically, whilst others are simplified. An optional Network Identification Table card will automatically identify satellites and their orbital slots from data stream info. The case is protected against falls and blows by a moulded rubber holster and the keyboard has been designed to withstand dusty and humid hostile environments.

Menus guide users through selection of functions that include powering an LNB, Programming QPSK reception parameters and Data Logger programming. Different parameter settings can be stored in 100 Program memories.

Those familiar with Unaohm's pioneering SBM105 Satellite BER meter have judged the S20 an instant hit.

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.

Accessories included are the mains power supply/ battery charger and the moulded rubber holster.

S20, exciting Sat TV instrumentation that needs neither a mortgage to buy it or a sherpa to carry it.

- **QPSK true BER and Digital C / N.**
- **Digital and Analogue measurements.**
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- **MAX, MIN & FREEZE Hold functions for special signal analyses.**
- **View any 7 transponders simultaneously.**
- **Data Logger records Signal Level.**

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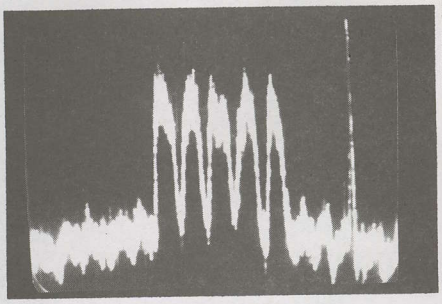
Extra signal?

"Cakrawarta S-band (SF#105, p. 22). There is also a strange (typically stronger than TV) carrier that jumps about in frequency and level on my Spectrum Analyser. It appears to be around 2.4 GHz. Could it be terrestrial? Photo enclosed."



Jamien, NSW

We noticed some similar carriers (as shown on right hand side, above) when running our S-band tests. The 2.4 to 2.458 GHz range is allocated world-wide for spread-spectrum unlicensed services typically used for RLAN or wireless computer interconnection networking. A spread spectrum signal will appear to be jumping or moving about on your analyser because the time (scan) period of the analyser is 'out of sync' with the frequency hopping energy bursts from the spread spectrum transmitter. The S-band Cakrawarta LNB(f) makes a dandy tool for expanding your spectrum analyser's functions to this most interesting terrestrial band of frequencies (see pg's 19-20 here).

TVNZ - explain?

"I am confused by why TVNZ has TV One and TV2, twice, on 12.456Vt B1. Why do they tie up four channels with this?"

Leroy Angle, Auckland

TVNZ originally "owned" 1.5 full B1 transponders. When they and Sky agreed to allow TV One and TV2 to be within the Sky bouquet, the regional advertising TV One and TV2 do became a problem. Originally, Auckland (and northward) advertisements appeared within all Sky TV One/TV2 receivers. This alarmed Wellington and South Island advertisers who correctly saw their TV One/TV2 advertisements as being restricted to terrestrial coverage. So to settle this, TVNZ traded access to a full TVNZ transponder to Sky (which SKY has used to expand their own bouquets), retaining 1/2 of one transponder only. This has the technical capacity to carry up to 8 TV programming channels. Four of these are in 24 x 7 use providing TV One/TV2 programming with Wellington (southern North Island) commercials and all over again providing the same programming with South island advertising for SKY viewers - just as they divide the terrestrial service. Of late, TVNZ has been testing a fifth programming channel, using infomercials as a programme source, and it is possible they might - if a reason arose - grow that to a maximum of 8 programme channels in the future. All of this 12.456 is of course FTA. Eight programming channels within 1/2 transponder is the maximum current technology will allow which limits the "commercial opportunities" available to TVNZ.

DVB-T DiSEqC switching?

"Regarding SF#105's report on DVB-T in UK; if it is now common for two or more receive antennas to be employed for DVB-T reception, why don't the STB manufacturers adopt DiSEqC or some similar switching method so the correct antenna is always (automatically) connected for each terrestrial channel?"

Jerrold, NSW

Are there any DVB-T STB manufacturers who offer multiple antenna switching? Seems like common sense.

HARDWARE EQUIPMENT PARTS UPDATE

JUNE 15, 2003

C1 launch: **Was scheduled between day this publication closed and normal mailing date; specifically, June 11-12 UTC between 22:36 and 00:01. If on schedule, it's all over now - 11PM to 12 midnight NZT (see. p. 10. here).**

For reference: Cakrawarta's S-band transmit frequencies and the L-band translated frequencies using a standard 3.650 GHz local oscillator LNB(f) are as follows: 2525Hz - 1115L; 2565Hz - 1085L; 2595Hz - 1055L; 2625Hz - 1025L; 2655Hz - 995L. Because the LO is above S-band, just as the C-band LOs at 5.150 are above C-band, the transponders are in reverse order within L-band (highest is lowest at L, lowest is highest at L).

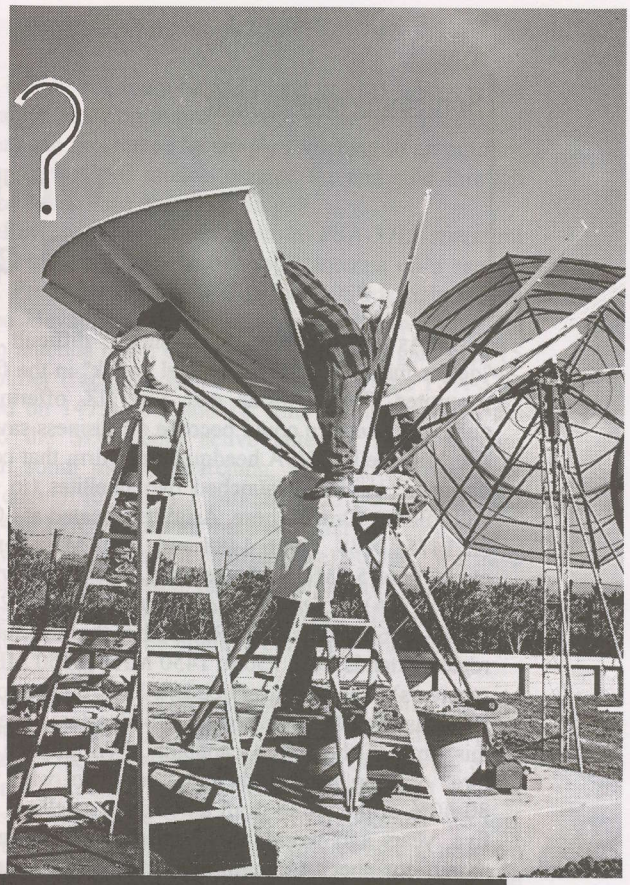
According to Warren's Consumer Electronics Daily, in the USA Rent-a-Center is offering 15 models of 42-inch to 57-inch widescreen HDTVs from seven brands for $34.99 to $44.99 per month on a 30-month contract. Some 25,000 HDTVs were being rented as of March 31, up from 11,000 at the end of last year. The company plans not to buy any more "analogue" projection TVs, but they're still renting 186,000 of them at $29.99 to $39.99 on a 27-month contract. Compare those prices (times 1.4) to what Australian centres are currently charging for HDTV and DVB-T equipment rentals!

Hype or fact? The Australian DBA group reports as of March 31, the number of digital terrestrial television receivers (STBs and HDTVs) sold to retailers at 70,500 units. The estimation is based on sales to retailers by DBA Members - Sony (SDTV), Thomson (SD-STB), Grundig (SDTVs), TEAC (SD-STB), DGTEC (HD-STBs & SD-STB) & Strong (SD-STBs). The figure does not include sales of the UEC SD-STB & Zinwell SD-STB (both brands generally supplied by antenna installers). On March 31, 2002 the same group had trouble identifying 15,000 DVB-T products "in the field." Surely the year-later number is larger but that much larger? Doubtful. Separate report says 53,000 DVB-T "homes." What's the answer Peter - was the April 1 - March 31 DVB-T sales number 470% as great this year than last???

Mystery feeds? Two transponders (12.610Hz, Sr 25.220, FEC 2/3 and 12.646Hz - some say 12.648Hz- same numbers) appeared "due north of New Zealand" for several alert observers May 23-25 (again starting June 1), easily 60cm dish quality. A Nokia in hands of Craig Sutton (Nelson) identified sources as "Intelsat SA LAX 3" and "LAX-MNCD001." Steve Johnson, (south) Auckland found signals 2 dB hotter than Sky NZ's best. Investigation suggests I804 (176E) using 52 dBw NZ footprint (spotbeam 1) operated by Thailand based SATTEL who admit they will be conducting tests through October of iPSTAR Internet "Gateway Connections." iPSTAR is Thailand public stock owned firm planning launch of their own Ku-band Internet connectivity satellite "in 2004" and this "test" is to convince NZ Government there is an option available other than ill-thought-out 3.5 GHz terrestrial links now being planned to service rural regions of country (video conferencing, long distance learning, telemedicine). Spotbeam 2, also available, pushes 51 dBw into all of Australia and Australia's Telstra plus Hong Kong's PCCW (operates NOW TV on AsiaSat 3S) are "partners" in venture.

May 2003 "Autumn Bargains" promotion from Jaycar Electronics pushing gold, silver, emerald "wafer cards" and "Phoenix Type Smart Card reader" and reprogrammer kit. Disclaimer? "(Neither) *Jaycar Electronics nor Silicon Chip Magazine can accept responsibility for the operation of the device, its related software, or its potential to be used for unlawful purposes.*" Australian hacking just went mainstream.

ME?



WRITE SOMETHING FOR SATFACTS???

"Sure, I see poor quality installs every day I'm in the field. And I could set some guys straight - but I'm no writer!"

LET US TEMPT YOU. Minimum $100 REWARD (*) for any 500 word "report" published. That's one typewritten page and it doesn't even have to be done on a keyboard (handwriting we can read and interpret is just fine!)

"OK, I'm not happy with the bad rap satellite installers get. Maybe if I sat down I could help people correct their mistakes."

DISH MOUNTS. Motor drives. Cabling techniques. Weatherproofing. Dish alignment with simple tools. Multiple feeds - one dish. Resolving terrestrial interference. Power supply trouble shooting and repair. Marketing FTA systems. How PIDs w[illegible]. Long cable run options. Multiple-outlet installations. Polarity tracking across the belt. Integrating terrestrial and satellite - one cable. Understanding signal measurement tools (**).

* - Gift certificates from $25 to $250 redeemable at Av-comm Pty Ltd; the more comprehensive your "report" the larger the reward!

** - Whatever you do best, know best. But if you really want to see our "master list" contact SatFACTS at the address below.

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Something new to hear

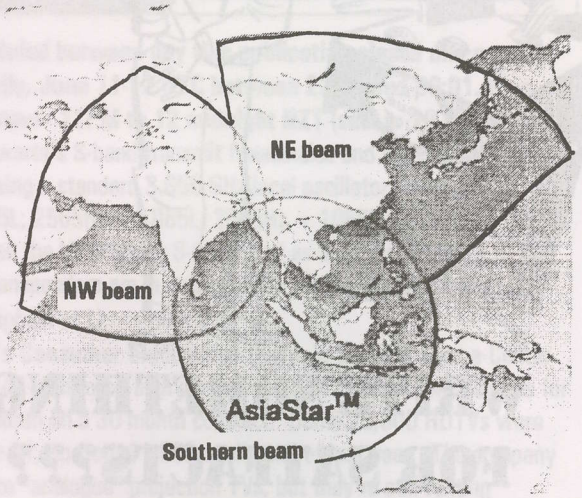
WorldSpace's 105E CD-quality Radio Bird

As it becomes increasingly difficult to make a "dealer-installer" business model "work" in the face of heavily promoted Foxtel/Austar and Sky NZ offerings, a unique audio-only service could become a "business saviour" for you. WorldSpace is a USA headquartered firm that conceptualised, designed, built and launched two satellites (to date - a third will follow). One of these, AsiaStar, located at 105E, transmits on 1475, 1478, 1480, 1488 and 1490 MHz (or, 1.475 GHz, etc.) These 5 "MUXes" use *right hand circular* (1480 - Tr4, 1488 - Tr5) or *left hand circular* (1475 - Tr2, 1478 - Tr3, 1490 - Tr6) polarisation. Remember that the standard L-band region extends from 950 to 1450 MHz (2150 MHz for modern receivers). The basic service is a 128k/bit stereo "CD quality" transmission although not all broadcasters take advantage at this time of the stereo capability. WorldSpace is a "bus for hire" offering bandwidth to broadcasters who wish to reach 30-40% of the globe from an orbiting satellite. Twenty, even five, years ago world broadcasters such as the BBC had to string together a complex network of short-wave and terrestrial links to get their programming to individual areas. With WorldSpace, they leapfrog over dozens of previous "terrestrial hops" and go directly from satellite to individual home or community receivers created specifically for the WorldSpace service.

AsiaStar has three separate transmit beams and coverage from each is designed to serve a segment of the earth. Not all services broadcast to all three beams. The "Northeast beam" runs in a wedge from 105E north to Bangladesh and beyond well into Northern Russia, east to the Kamchatka Peninsula, and back to the equator near Singapore. The "Northwest beam" covers a small corner of NE Africa, cuts north-eastward through Saudi Arabia to the Black Sea, east to eastern India and back to the equator. For the majority of SF readers, it is the "southern beam" that is of interest.

The published map shows it reaching south only as far as the NW coast of Australia and the WorldSpace web site further explains the satellite does not "cover Australia." It stops some 2,500 miles west/NW of northern New Zealand but as we report here, there are indications (not much, we admit) of signal there.

WorldSpace receivers (see models and sources, p. 8) come with a built-in "microwave patch" antenna - slightly larger than a playing card with a rotating support allowing "pointing" of the "array." As you might suspect, the gain of such an antenna, especially when the

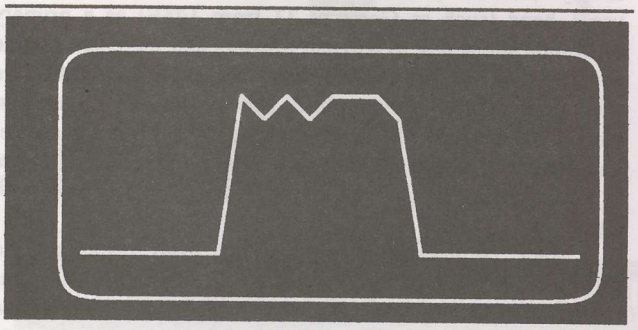


AsiaStar 105E coverage map (based on receiver-mounted patch antennas) is "not encouraging." *The real coverage* - is actually unknown. One way to find out is to "look" (listen; if you can see 105E, you may have signals).

Freq/Polarity	Service	Audio PID	Format
1478.224LHC	WRN English	1,302	News, features
	BBC World Asia East	1,416	News, features
(1)	All India Radio	1,417	Hindi/Asia
	AMI	1,444	Mandarin/English
1480.524RHC	Radio Voyager	1,133	Music/News
	Bob	1,200	Modern rock
	UPop	1,201	Contemporary
	24x7	1,202	Dance
	Potion	1,203	Urban Adult
	Up Country	1,204	Country
	Macstro	1,206	Classical
	Riff	1,207	Jazz
	Swiss Radio Inter.	1,300	Mixed service
(2)	Radio France	1,301	Mixed service; French
	CNN audio loop	1,303	testing
	Bloomberg TV Asia	1,304	News, English
(3)	Bloomberg TV Japan	1,305	News, Japanese
	CENI	1,306	Information
	Sat Global Harmony	1,314	Multilingual
(4)	MTV Indonesia	1,401	Music
	BorNeo Wave Ch	1,408	Music; OFF 13 May
(5)	RRI Pro 3	1,413	Mixed service
(5)	Trijaya FM	1,414	Mixed service

(1)/ Hindi, (2)/ French, (3)/ Japanese, (4)/ Bahasa + English, (5)/ Bahasa. Balance are *believed to be* totally English language. Note: At presstime, 7 channels on 1.480 and 1 on 1.478 were FTA.

SF's Seth Cooper with SDStv.com 21 dB gain (dBg) "active logi" connected to Avcom PSA-37D spectrum analyser (powering the logi amplifier) chases the AsiaStar signal from our 172.30.32E east location.



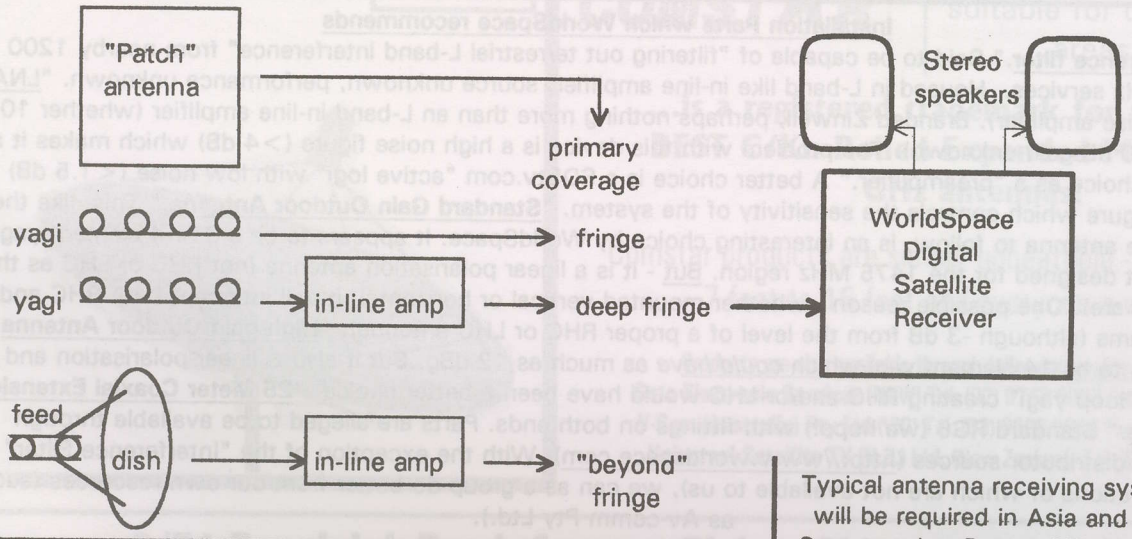
The 1702 signal on a linear SDStv.com "active logi" and Avcom PSA-37D spectrum analyser - this is what a digital telephone mux (and WorldSpace) "looks like."

receiver is installed indoors behind metal or clad siding, is not high and rather amazing improvements in the performance of the receivers can be created by simply switching to an outdoor mounted antenna. Two models created for and sold through WorldSpace dealers are described on p. 8.

Our effort began with an Avcom PSA-37D spectrum analyser and a SDStv.com "active logi" antenna on a second story deck. From northern New Zealand, 105E is right on the nine degree elevation line and essentially "due west." The SDStv.com antenna has 6 dB of passive antenna gain plus 15 dB of amplifier ("active") gain - 21 dB total. The PSA-37D was centred on 1475 MHz and 18 volts applied through the analyser to the SDStv.com active antenna. Bingo. Instant signal, with some modest searching, at 10 dB C/NR. Way more than enough for the Sr 1.840 and FEC 1/2 (very robust) signal on 1480 LHC. Is this all there is to that?

There was. This was <u>not</u> WorldSpace! Rather, we have stumbled across a 1480 MHz region Intelsat MCPC telephone circuit originating at 178E (Inmarsat). The SDStv.com logi antenna "did not seem to be pointing correctly" and that *should* have been a warning.

Next we moved the SDStv.com logi to a 3.8m dish still anchored on 107E. Strange results followed. No definite peak in the signal, in fact we were actually better off moving away from the parabolic dish (where of course we pointed the logi "at" the dish) and to the side where by repointing the logi "north" we were back in the 10 dB C/NR region; now we <u>knew</u> we were not dealing with WorldSpace, after all. Some careful looking revealed other L-band region signals as well, none from WorldSpace (Optus series birds, for example, transmit in the 1545 - 1559 MHz region - all quite identifiable with an SDStv.com active logi plus spectrum analyser). Of course the 3.8m dish already had an S-band feed on it and the proper position for the logi was more or less where the metal of the S-band feed and the tripod metal feed support legs were located. It was the old story - "two objects cannot occupy the same spot at the same time." Ultimately, by removing the S-band feed we were able to locate a 4 dB C/NR signal which would in fact be WorldSpace; success of a sort 2,500 miles



Typical antenna receiving systems as will be required in Asia and Pacific. Contacts: Les Davey, VP-Regulatory, idavey@worldspace.com (he is in Melbourne)

<u>Parameters</u>: WorldSpace uses a proprietary digital radio standard known as 'Digital System D'; MPEG-2/layer 2.5 (i.e. MP3).

Contacts including equipment sources

WorldSpace Asia (Australia) tel 61 3 9693 8555; fax 61 3 9693 8535; e-mail csaustralia@worldspace.com. Receiver brands and models: **AGH**: WSSE-11. **JS Information**: DAR-2000 & JSRA-WSO110. **BPL**: Celeste. **Polytron**: PWS-1. **AMI**: ASR-WS201. **Hitachi**: KH-WS1.**Panasonic**: RE-WS10. **Sanyo**: DSB-WS1000. **JVC**: FR-DS-100 (out of production, some still in distributor hands). Singapore dealers in receivers (abbreviated listing): Meyers - Fairdinkum (fax 0065) 6235 5443; Vinson's (fax 0065) 6237 1231; Wavelength Communications Pte Ltd. (fax 0065) 6334 3017 & e-mail elkon@wavelength.com.sg.

E/SE of where the system operator said "all reception should quit."

So what kind of gain and what type of "feed antenna" does make sense for "beyond fringe" (diagram, p. 7)? At 1480 MHz, a 60cm dish can in theory produce 15-16 dB gain; not as much as the SDStv.com "active "logi. A 1m dish will produce around 24 dB of gain, similar to the gain of the SDStv.com active logi. A 2m dish will produce around 32 dB of gain while a 3.6m dish will produce approximately 37 dB of gain at 1480 MHz. But there is a caution. The feed.

C (S and Ku) band feeds are carefully engineered to place the edge of a dish around -10 to -12 dB reference the *centre* of the parabolic antenna. There are no similar design feed antennas presently available for 1.480 (AsiaStar) GHz. What this says is that when you try to position a feed such as the 3 or 4 element yagi offered through WorldSpace distributors (see box below), in front of a dish of any size, at the focal point, you will not properly "illuminate "the dish surface. In a phrase, it won't work- very well. In fact, contrary to the WorldSpace technical advice on their web site, a simple two element yagi (consisting of a driven element - where the coax attaches - and a slightly longer "reflector") would be significantly closer to matching the "feed pattern" required for this application. There is some basic research to be done here, to create a suitable retrofit feed for L-band (WorldSpace). Moreover, the AsiaStar satellite is circular (like Intelsat), not linear. Our SDStv.com logi, any of the 3 or 4 element (or larger) yagi antennas sold through WorldSpace distributors are linear - *only*. All of the elements are in a straight line - meaning that at best you will "leave 3 dB of signal behind" while trying to receive a circular polarised signal with a linear polarised antenna of any type. One approach we were not able to try - taking a "microwave patch antenna" created for the WorldSpace service, sticking it into some sort of weatherproof container, and using it as a feed antenna in front of a suitable dish. Yes, the "patch antenna" is designed for circular polarity reception and while the "beamwidth" (reception pattern) is not published, it might be a better feed antenna than say a two-element linear polarised yagi stuck in front of a dish (reflector). One WorldSpace source suggests this approach.

Other "L" band satellite signals

The WorldSpace allocation below 1,500 MHz (1.5 GHz) is unique. Most satellites with L-band capability are higher, above 1,500 MHz. As noted, Optus A and B series use 1.545 - 1.559 GHz. InMarsat which "talks with satellite phones" (that 'jerky-motion video' from Iraq is an example of this) is typically between 1.530 and 1.548 although some extend to 1.560. Our 178E locating of signals very close to 1.480 are simply "unlisted" (but there!) in references. The Russians also use L-band (such as Gorizont 33 from 145E) as a primary communications link to Russian trawlers and merchant marine vessels. You will find the "Volna" service at 1.5363 GHz; we often ponder "why Gorizont birds stay in service" so long past their C-band useful life as the inclined orbit becomes greater and greater. Volna is the answer - even wandering in a figure 8, it still functions quite well for the Russian's marine needs.

Reception

Many commercial establishments from restaurants to professional offices already have a "background sound system" in place. In practice, a WorldSpace receiver installation could be connected to the audio input line of that system (subject to some possible impedance matching transformers to balance the levels) and you would "be away" with 24 hour, CD quality, programming. Study the programming list (p. 6, here) and you'll see some interesting business-service-location options which might suit clients in your trade area, signal willing.

Installation Parts which WorldSpace recommends

"**Interference filter**." Said to be capable of "filtering out terrestrial L-band interference" from nearby 1200 - 1600 MHz services. Housed in L-band like in-line amplifier, source unknown, performance unknown. "LNA" (low noise amplifier). Branded Zinwell, perhaps nothing more than an L-band in-line amplifier (whether 10, 15 or 20 dB gain unknown). The problem with this device is a high noise figure (>4 dB) which makes it a poor choice as a "preamplifier." A better choice is a SDStv.com "active logi" with low noise (<1.5 dB) noise figure which controls the sensitivity of the system. "**Standard Gain Outdoor Antenna**." This, like the alternate antenna to follow, is an interesting choice by WorldSpace. It appears to be a 3 or 4 element yagi, no-doubt designed for the 1475 MHz region. But - it is a linear polarisation antenna (not RHC or LHC as the signals are). One possible reason - whether mounted vertical or horizontal, it will intercept both RHC and LHC beams (although -3 dB from the level of a proper RHC or LHC antenna). "**High gain Outdoor Antenna**." Appears to be 14 element yagi which *could have* as much as 12 dBg. But it also is linear polarisation and a suitable "loop yagi" creating RHC and/or LHC would have been a better choice. "**25 Meter Coaxial Extension Cable**." Standard RG6 (we hope!) with fittings on both ends. Parts are alleged to be available through dealer/distributor sources (http://www.worldspace.com). With the exception of the "Interference Filter" (specifications of which are not available to us), we can as a group do better from our own resources (such as Av-comm Pty Ltd.).

What is your experience with creating office/home/store background sound systems? Share them with SatFACTS readers and be rewarded! See announcement on page 5, here.

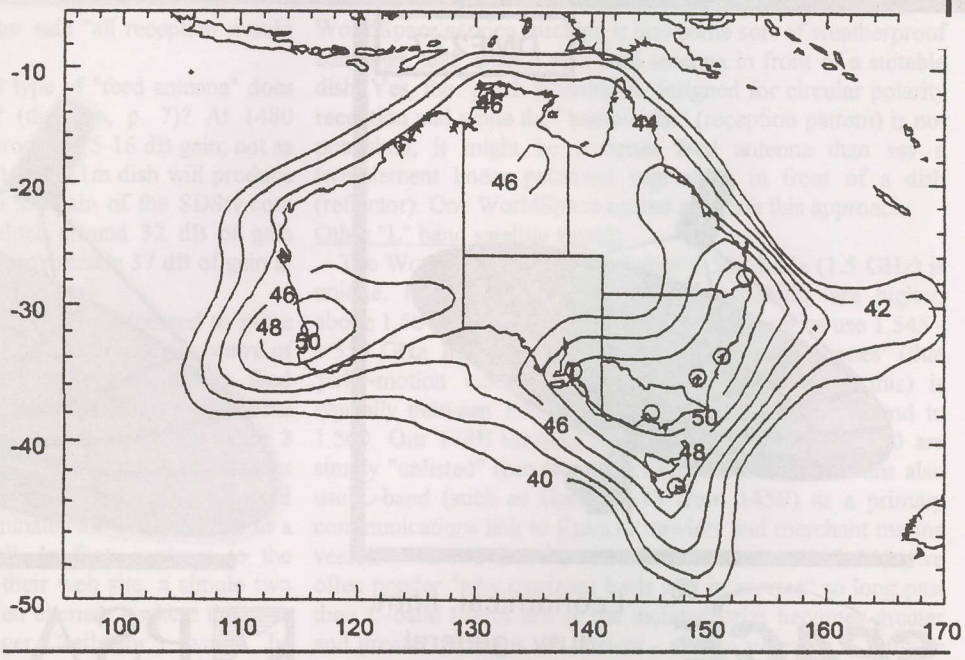
Getting Closer - The C1 for B3 Switch

The launch date is upon us. Some rules. A satellite must pass three launch phase plateaux before it is ready for testing and until this has been accomplished, we don't have a new satellite."

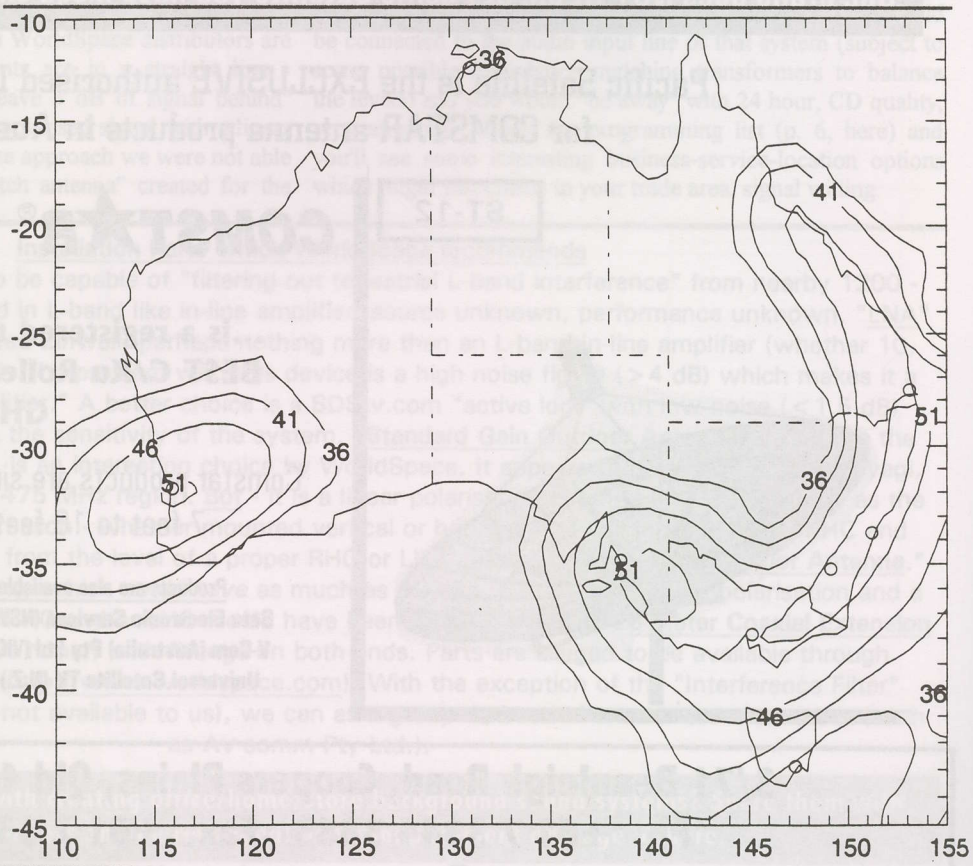
C1 is being launched from French Guyana (an enclave located on the Northeast coast of South America). The initial launch phase places the satellite into "low earth trajectory" which means it circling the earth rather rapidly at an altitude in the hundreds of miles region. The next phase places the satellite into an "elliptical orbit" which at one extreme is in the region of 36,000km above the earth while in the opposite extreme remains in the hundreds of kilometres region. Phase three boosts the low altitude end so the satellite is now close to or at 36,000 kilometres. At this altitude, it circles the earth more or less once each 24 hours; it is geostationary or nearly so.

Now at operating altitude, the satellite will "drift" to a *test location* - in the case of Optus C1, most likely 152E. The elapsed time from lift-off at French Guyana to resting in a test location varies from 5 days to 5 weeks with 2 weeks about average. From the testing location the satellite will be "deployed" - the full complement of solar panels unfurled and locked into position, the "attitude" of the satellite adjusted using on board miniature thruster rockets (so that it points down towards the segment of the earth which it is planning to serve). Now, finally, full "sweep testing" of the satellite can begin.

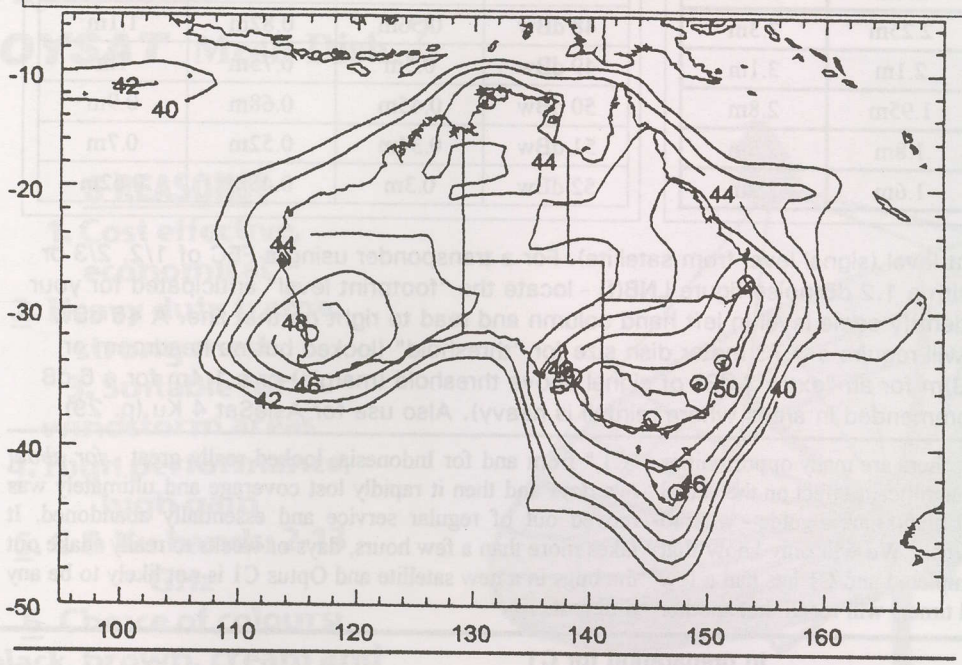
Sweep testing allows the linearity and power of each individual transponder (24 in all on C1) to be accurately measured, from the ground, to



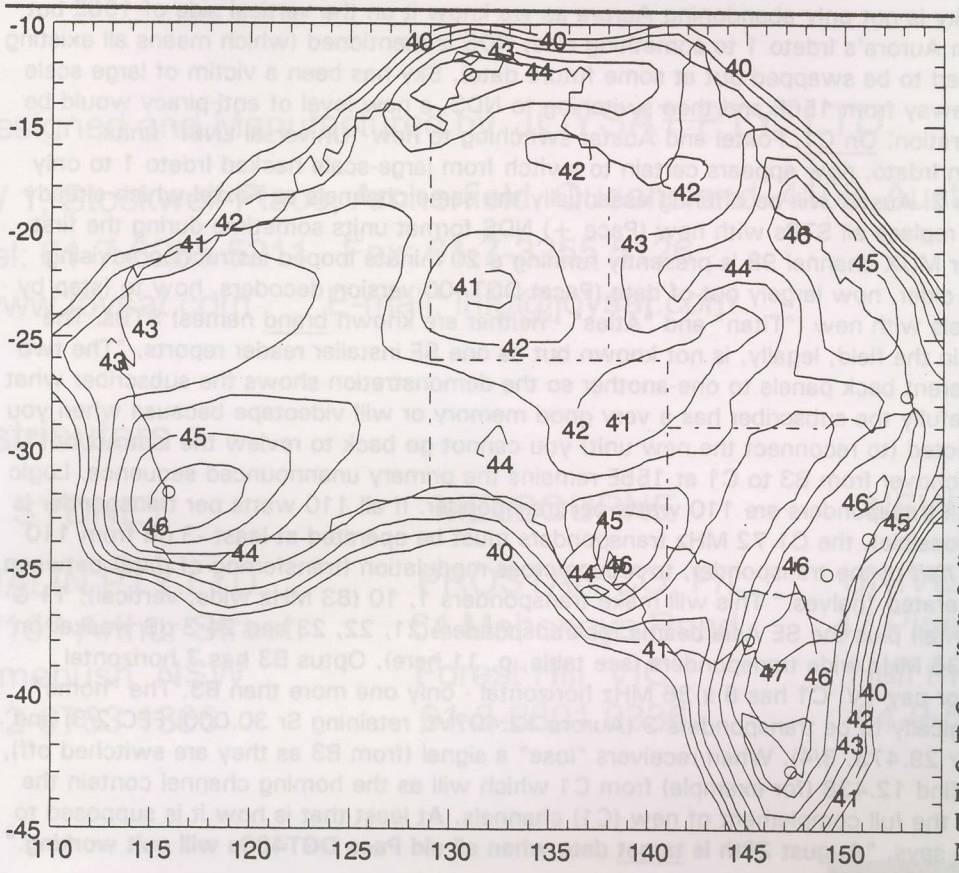
NATIONAL "B" - predicted pattern for C1 (above) is 10 dB "hotter" in Darwin, 8 dB hotter in Townsville, 12 dB better southern Tasmania than presently used B3 "High Performance Beam" (below).



TR #	B3	C1	C1 Beam	7	12(.658)V	12(.567)V	NA/NZ	14	12(.626)H	12(.438)H	NB
1	12(.281)V	12(.305)V	NA/NZ	8	12(.720)V	12(.607)V	NA/NZ	15	12(.689)H	12(.478)H	NB
2	12(.344)V	12(.367)V	NA/NZ	9	12(.313)H	12(.647)V	NA/NZ	16		12(.518)H	NB
3	12(.407)V	12(.407)V	NA/NZ	10	12(.376)H	12(.709)V	NA/NZ	17		12(.518)H	NB
4	12(.470)V	12(.447)V	NA/NZ	11	12(.438)H	12(.296)H	NB/EA	18		12(.558)H	NB
5	12(.532)V	12(.487)V	NA/NZ	12	12(.501)H	12(.358)H	NB/EA	19		12(.638)H	NB
6	12(.595)V	12(.527)V	NA/NZ	13	12(.567)H	12(.398)H	NB/EA	20		12(.700)H	NB



NATIONAL "A" predicted pattern (above) is modestly hotter in Perth (+2 dB), Alice Springs (+3 dB), Sydney (+4 dB) than B3 "National" (below) but down 2 dB on Queensland coast and equal in Tasmania.



determine if the satellite is functioning properly. During "linearity testing" unmodulated carriers are transmitted on the uplink side to the satellite, then turned around and frequency converted within the satellite to the respective downlink channels. By measuring the strength and "flatness" of each transponder, ground technicians can verify the readiness of the satellite - transponder by transponder. Once a transponder has passed "sweep testing" it is ready to receive digital or analogue "modulated" transmissions. Elapsed time to this point: 3 to 6 weeks from launch.

C1 will complete testing and be repositioned to 156E where, transponder by transponder, all existing B3 transponders will be turned off at the exact instant that C1 takes over that transponder's "traffic" (signal). The transfer of traffic from B3 to C1 is a major undertaking and is likely to require 24 hours or more between the first transponder transferred and the last. As B3 and C1 can "fly in tandem" approximately 70 miles apart for days or weeks, there is no reason why the traffic must be moved from B3 to C1 in any particular (short) period of time. With approximately 70 miles separating the two "tandem birds" only the very largest receiving dishes (those ten metres and larger) will be able to "tell them apart" with receive antenna positioning. On a 65cm or even 3m, they will appear as a "blur" - as if they were one satellite.

The maps on these two pages compare the existing coverage from B3 to the expected coverage from C1. "Expected" is the operable word here as between the original design at Matsushita in Japan and the

Footprint Level	Dish size for threshold	+3 dB margin	+6 dB margin
33 dBw	3m	4m	5.8m
34 dBw	2.7m	3.6m	5.1m
35 dBw	2.4m	3.2m	4.5m
36 dBw	2.1m	2.8m	4m
37 dBw	1.8m	2.4m	3.6m
38 dBw	1.65m	2.25m	3.3m
39 dBw	1.5m	2.1m	3.1m
40 dBw	1.35m	1.95m	2.8m
41 dBw	1.2m	1.8m	2.5m
42 dBw	1.1m	1.6m	2.2m

Footprint Level	Dish size for threshold	+3 dB margin	+6 dB margin
43 dBw	1.05m	1.45m	2m
44 dBw	0.95m	1.3m	1.8m
45 dBw	0.85m	1.16m	1.6m
46 dBw	0.73m	1.03m	1.4m
47 dBw	0.62m	0.9m	1.2m
48 dBw	0.56m	0.82m	1.1m
49 dBw	0.5m	0.75m	1m
50 dBw	0.45m	0.68m	0.9m
51 dBw	0.34m	0.52m	0.7m
52 dBw	0.3m	0.45m	0.62m

DISH SIZE versus footprint level (signal level from satellite). For a transponder using a FEC of 1/2, 2/3 or 3/4 and a dish equipped with a 1.2 dB noise figure LNB(f) - locate the "footprint level" anticipated for your area (from maps here), identify same level in left hand column and read to right on that line. A 46 dBw footprint, for example, will require a 0.73 meter dish size for "threshold" (locked but no headroom or margin) reception; a 1(.03)m for an "extra 3 dB" of signal above threshold (margin) or a 1.4m for a 6 dB margin (6 dB margin recommended in areas where rainfall is heavy). Also use for AsiaSat 4 Ku (p. 29).

operating C1 satellite from 156E, there are many opportunities for a slip-up which could have a significant effect on the actual coverage from C1. Therefore our map(s) are a guide - what to *expect* but *not what to depend upon.* We will only know that after the B3 to C1 transfer is completed and C1 has had a few weeks to operate on its own. Old timers will recall that another "C1," from and for Indonesia, looked really great - *for about two days* and then it rapidly lost coverage and ultimately was moved out of regular service and essentially abandoned. It takes more than a few hours, days or weeks to really shake out the bugs in a new satellite and Optus C1 is not likely to be any different.

In preparation for C1

Exactly how (and when) the B3 for C1 switch will take place is still a matter of "commercial sensitivity." But there are clues. **Sky** (racing channel services) for example, is known to be planning to stay on B3 but at its' new location (152E). Installers have been alerted to expect a massive short-time-frame antenna repointing assignment suggesting Sky is not only abandoning Aurora as we know it on the vertical side of 156E but very possibly a switch from Aurora's Irdeto 1 to something else; NDS is mentioned (which means all existing Sky receivers will also need to be swapped out at some future date). Sky has been a victim of large scale piracy and by switching away from 156E and then switching to NDS, a new level of anti-piracy would be built-in to their operation. On C1, Foxtel and Austar switching to new "Universal LNBf" units.

Austar, destined to retain Irdeto, now appears certain to switch from large-scale hacked Irdeto 1 to only moderately hacked Irdeto 2. Austar will be offering essentially the same channels as Foxtel which already has announced plans to replace all STBs with new (Pace +) NDS format units sometime during the first quarter of 2004. Austar MUX channel 98 is presently running a 20 minute looped instruction advising existing viewers with the older, now largely out of date (Pace) DGT400 version decoders, how to (step by step) replace their models with new ("Titan" and "Atlas" - neither are known brand names) STBs. The number of DGT400s still in the field, legally, is not known but as one SF installer reader reports, "The two new IRDs have totally different back panels to one-another so the demonstration shows the subscriber what to do for each brand. Hopefully the subscriber has a very good memory or will videotape because when you have the PACE disconnected (to reconnect the new unit) you cannot go back to review the instruction!" The detail behind the switchover from B3 to C1 at 156E remains the primary unannounced sequence. Logic suggests the following. All transponders are 110 watts per transponder. If all 110 watts per transponder is employed (unlikely but possible), the C1 72 MHz transponders must be operated at least -3 dB from 110 watts (55 watts) for *each half* of the transponder, to reduce cross modulation (transferring of data) between the two independently operated "halves." This will make transponders 1, 10 (83 MHz wide, vertical), 11 & 20 (72 MHz wide, horizontal) plus the SE Asia beams for transponders 21, 22, 23 and 24 3 dB weaker on the ground than the 36 MHz wide transponders (see table, p. 11 here). Optus B3 has 7 horizontal transponders, all used for pay-TV. C1 has 8 x 36 MHz horizontal - only one more than B3. The "home" frequencies for C1 are logically to be transponders 3 (Aurora 12.407Vt, retaining Sr 30.000, FEC 2/3) and 14 (12.438Hz, retaining Sr 29.473, 3/4). When receivers "lose" a signal (from B3 as they are switched off), they will search for and find 12.438 (for example) from C1 which will as the homing channel contain the network loading table for the full complement of new (C1) channels. At least that is how it is supposed to work! When? One source says, "**August 29th is target date when all old Pace DGT400s will quit working.**"

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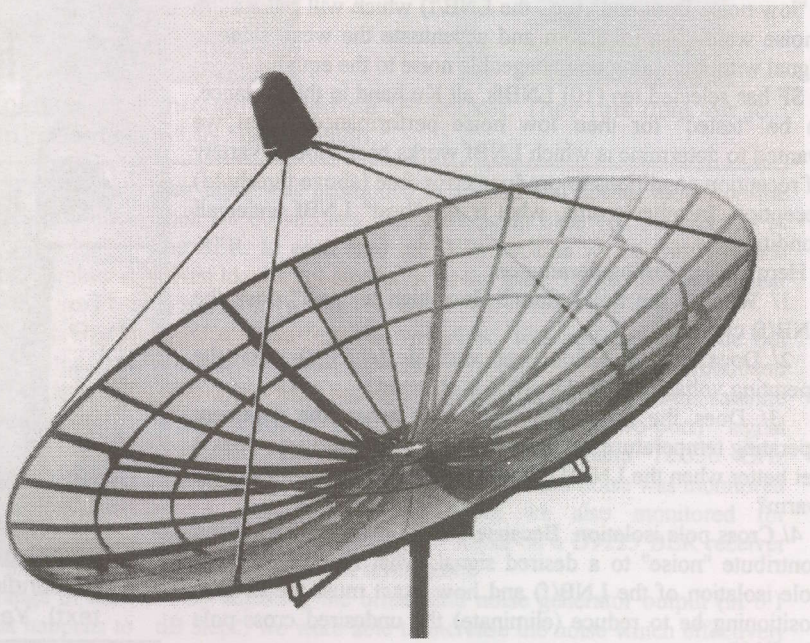

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Part two - LNBf evaluation

How do you tell a good one from a not-so-good?

In SF#105, we looked at the parameters involved in creating a "low noise front end" (i.e., the LNB/f) which will reduce the "noise wall" to a minimum and accentuate the weak satellite signal without adding unmanageable noise to the equation.

SF has selected ten (10) LNBfs, all Ku band in this instance, to be "tested" for their low noise performance. What we wanted to determine is which LNBf works best under a variety of reception conditions to produce error-free (above threshold) reception. In other words, what is the "best" LNBf under all conditions?

Here are our testing parameters.

1/ What is the noise floor? How high a "wall" does the LNB(f) create?

2/ Does this noise floor/wall vacillate (change) when the operating voltage (14 or 18 volts) is changed?

3/ Does the noise floor/wall vary when the "ambient operating temperature" of the LNB(f) is modified - i.e., does it get better when the LNB(f) is cool and worse when it becomes warm?

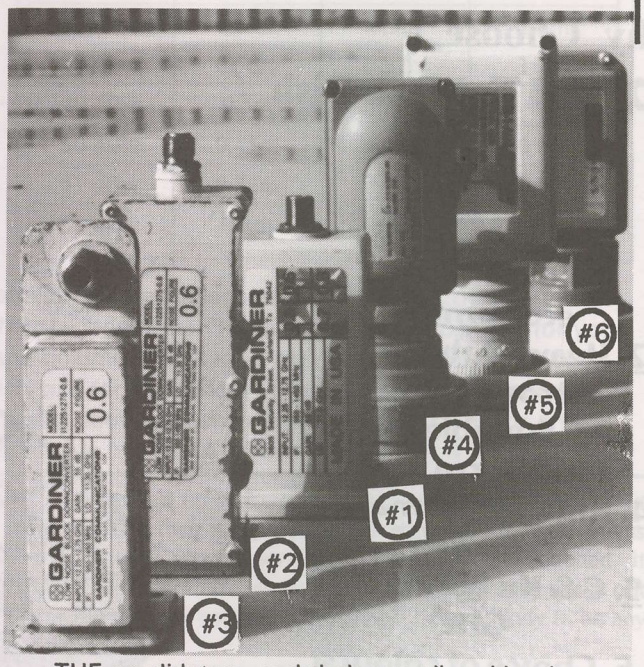
4/ Cross pole isolation. Because a cross polarised signal can contribute "noise" to a desired signal, what is the true cross pole isolation of the LNB(f) and how exact must the LNB(f) positioning be to reduce (eliminate) the undesired cross-pole signal(s)?

These caveats. We selected three LNB products (all from Gardiner Communications because those are what we had on hand) and three LNB(f) products because those are the ones shipped to us by SF readers for test. There are dozens more, some probably outstanding in performance, most probably not so outstanding (the LNB(f) products we tested were - how do we say this "tactfully? - "marginal" when compared with the straight LNBs). Additional test results will appear in a future issue.

Methodology

There are many ways to conduct these tests and we elected to do what we did based upon the amount of time available for testing and the likelihood that each of the six units tested would be comparable using this set of tests. There are other methods, including use of a "Noise Figure Test Meter" which, setting aside the NZ/A$40,000 cost of such a device, would have been desirable as well.

To test the noise wall/floor, we began by establishing a "reference noise wall" to which all devices would be compared. This is done with a broadband noise test set - which actually creates noise of a known (and measurable) quantity. The next step is to select a suitably high quality signal which would become the "reference test signal;" Globecast on B3 vertical, 12.336. Because this signal is in the 12 dB C/NR (carrier to noise) region from a 1.2 metre dish at SatFACTS, there is plenty of headroom here. Finally, the noise equation read out device - a Scientific Atlanta D9223 receiver which creates Bit Error Rate (BER) measurements on the selected transponder (and programme channel source). In actual fact, two D9223 receivers connected so that one of the two provides a constant reference source unrelated to the actual



THE candidates - and their overall ranking (see text). Yes, three Gardiners "lead the pack."

measurements (this second receiver allows us to monitor the received signal level throughout the tests and if there is a measurable change in the incoming Globecast signal, we can see that change quite separate from the actual LNB[f] being measured at the time.). This is diagrammed.

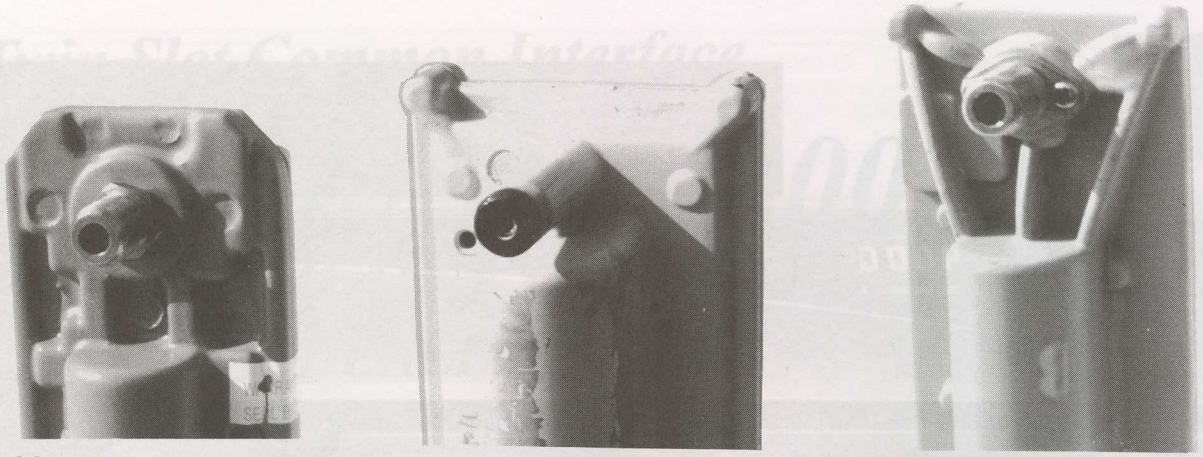
For the LNB devices (three Gardiner brand) a similar procedure was used substituting a prime focus dish for the 1.2m offset and a Chaparral (brand) "Super Feed" (designed for 12.25 - 12.75 GHz).

The parameters

Most noise-figure-test-set measurements are done at ambient (room) temperature. LNB(f) devices painted white reflect most of the direct sunlight (reducing absorbed heat from the sun to a minimum practical) but others have various shades of blue or grey. Any colour other than white absorbs more solar energy than white. Why does that matter?

Heat in any low noise amplifier device changes the conditions of the amplifier. Heat originates within the LNBf from the electrical current consumed by the electronic amplifier parts (transistors, bulk-gain stages, voltage regulators); see SF#105, p. 14. A theoretically perfect LNBf would generate no heat and be functional at zero degrees K(elvin). With no electron movement there is no heat and with no heat there is no internally generated "amplifier noise." Such a *theoretical* LNBf would have a noise temperature of "0 degrees K" (0.0 dB noise figure).

The LNBf outer shell is more than a moisture protective wrapping; those often strange looking "fins" and protrusions are heat dissipating utensils. Heat generated within the amplifier by the movement of electrons has to go someplace for if it remains in and nearby to the actual amplifying transistors, it will increase the "noise temperature" of the



MOST common ingress for moisture and outside air is through the female "F" socket. They rate here left to right from "poor design" to "best design."

LNBf. Equally, if the outer shell does not dissipate (move) heat away from the circuits inside, or if it alternately becomes heated by the sun's rays, we have a LNBf which no longer functions as it might have originally done "at room (ambient) temperature."

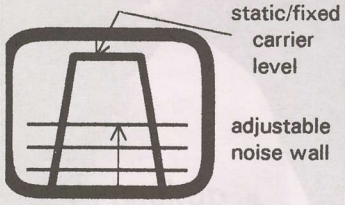
There are several ways to measure the effects of heat. One is to validate the noise figure of the LNBf at various outer shell temperatures (which can be determined with a probe attached to the shell). Another is to force the shell temperature down (lower) from the "ambient temperature" while measuring the amplifier performance and then reverse the procedure forcing the shell temperature up while a new set of measurements are made.

If - as we did - you are constantly monitoring the BER (bit error rate) of the LNBf while subjecting it to a range of shell temperatures, then you can "plot" on a graph what happens to the performance as the shell temperature changes. We did this in a very crude but suitable fashion. First the BER was measured on our test reference signal at ambient temperature (between 22 and 25 C). Then plastic bags packed with chipped ice were wrapped around the LNBf case and the BER observed as the shell temperature dropped to the minimum which the ice wrap could create. In each case the BER improved indicating the amplifier "liked" a lower shell case temperature. The (by now melted) ice wrap was removed and the LNBf allowed to regain ambient temperature levels. Now a hair dryer was positioned in a stand and hot air blown on the shell for 60 seconds, while we again observed the changes in the BER. In each case the BER became worse, verifying the LNBf liked a hot environment the least. Those numbers appear in our table (p. 18).

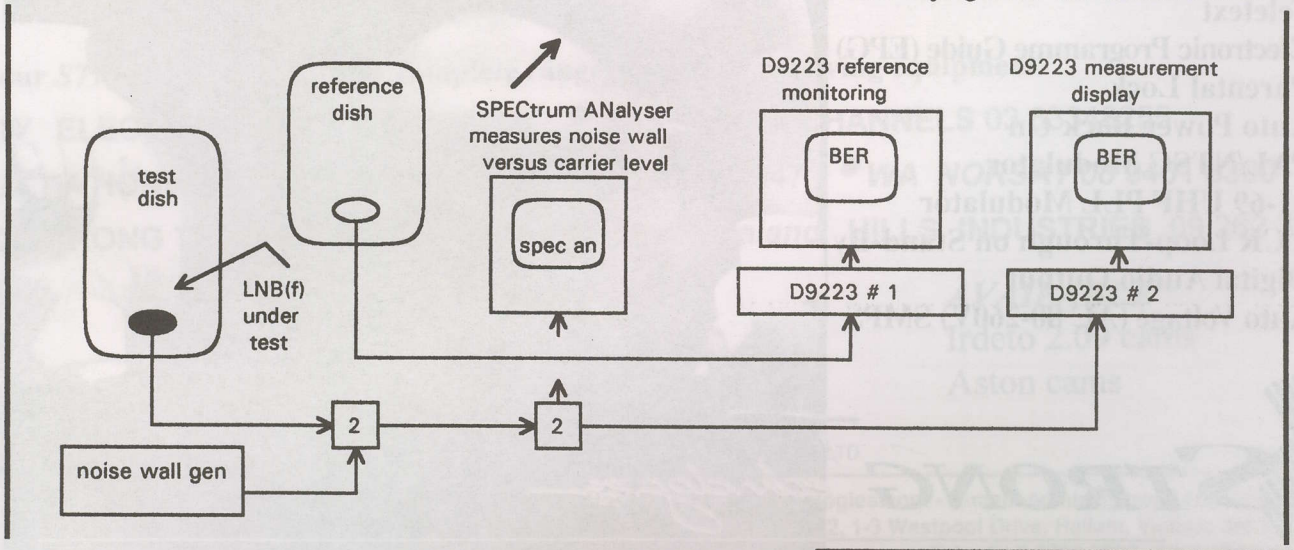
Our noise test, shown below, was equally simplistic but suitable for the challenge at hand. An L-band broadband (900-2,000 MHz) noise generator was mixed with the satellite signal through a precision two-way (two-port) signal combiner. The combination of the L-band 12.336 GHz Globecast transponder and the broadband noise was monitored on a spectrum analyser while we also monitored for verification the same 12.336 signal on a D9223 BER receiver set up parallel to the test system.

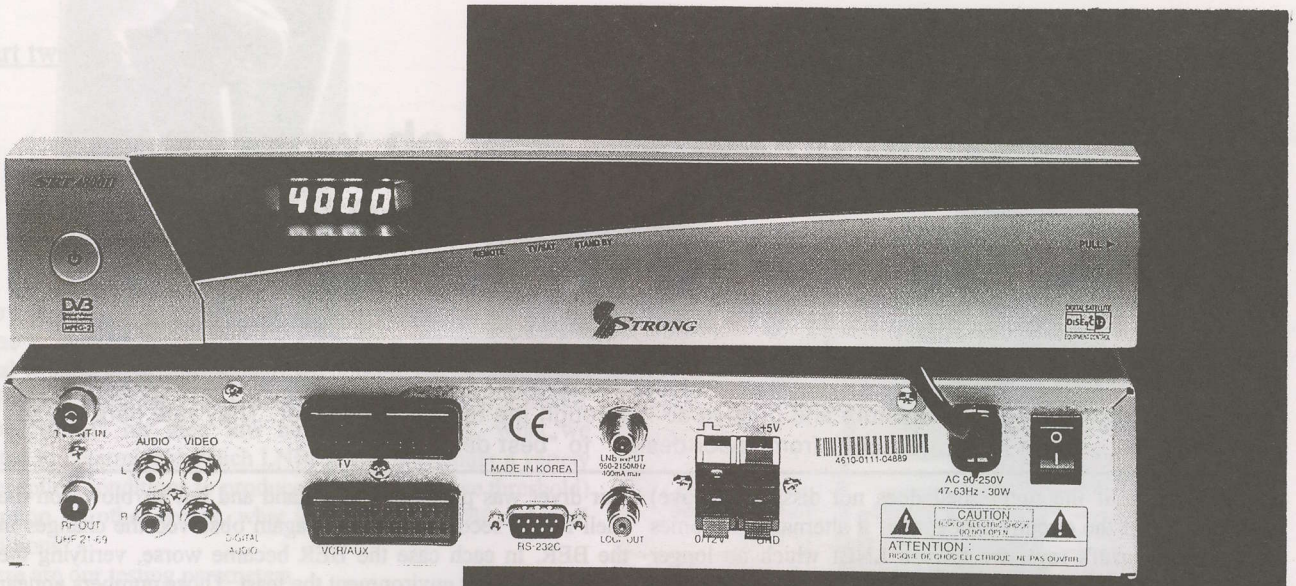
By adjusting the broadband noise generator output (in 0.1 dB steps) we were able to increase the noise which effectively reduced the carrier to noise ratio. The spectrum analyser readout when combined with the noise generator output level told us how many dB of carrier was required for each LNBf before the D9223 metering receiver lost "lock" on the 12.336 signal. Lock is a very precise point with the D9223 and as the only variable was the amount of injected noise, our table (p. 18) shows the number of dB of carrier required with a specific LNBf (or LNB) to maintain lock. The LNB(f)/LNB with the lowest amount of carrier to noise while still maintaining "Lock" would be judged the "most sensitive" of all.

Adjustable "noise wall" level injected at L-band establishes C/NR for tests.



SPEC AN monitoring system





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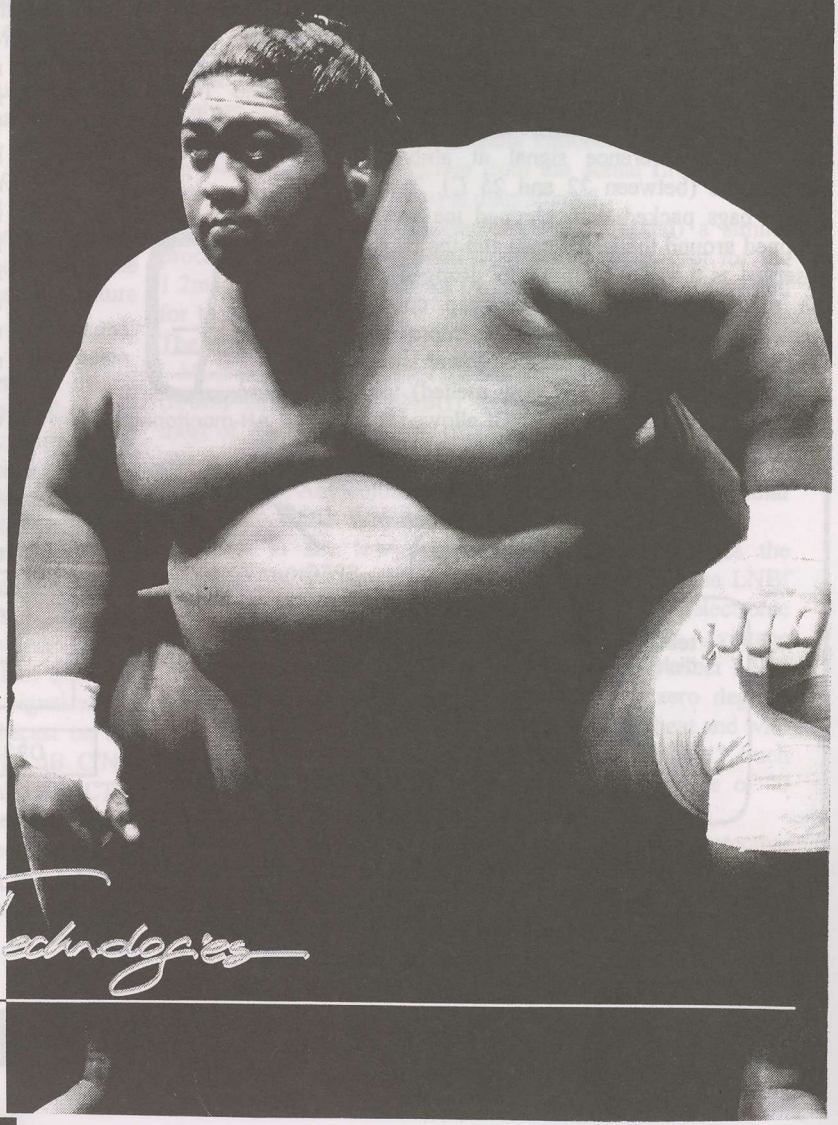

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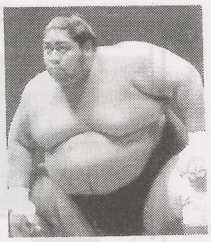

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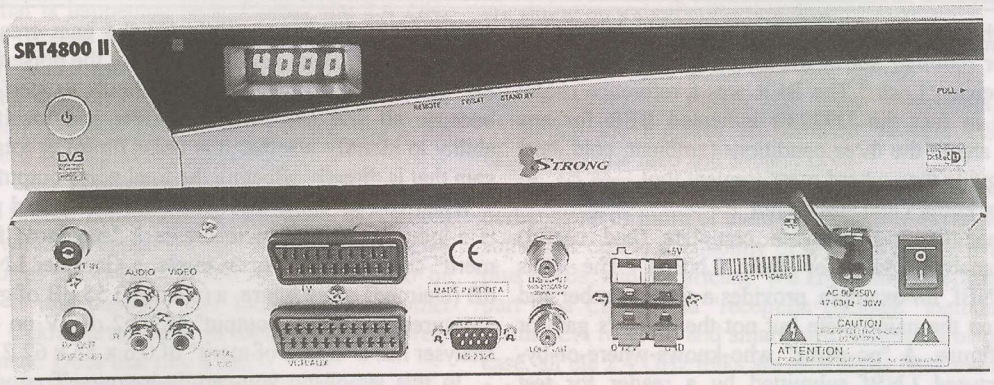

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Brand/Model	Claimed Nf/gain (n=nominal)	22-25C Lock level	Cold Lock Level	Hot Lock Level	Current draw / Output noise	Gap between cold/hot
Hills AE29	??/1.2db,50 dbn	7.8 dB	7.1 dB	8.6 dB	82mA, 65.7 dB	1.5 dB
No Name	??/1.2dB,50dBn	7.9 dB	7.0 dB	8.8 dB	94mA, 72 dB	1.8 dB
Taiwan BK525	1.0dB,??/50dBn	7.6 dB	7.0 dB	8.3 dB	118mA, 74 dB	1.3 dB
Gardiner Rectangular	0.7 dB, 58 dB	6.4 dB	6.1 dB	7.0 dB	142mA, 61 dB	0.9 dB
Gardiner Mini	0.6 dB, 55 dB	6.2 dB	5.7 dB	6.9 dB	146mA, 62 dB	1.2 dB
Gardiner "old"	0.6 dB, 55 dB	6.5 dB	6.1 dB	7.0 dB	162mA, 60 dB	0.9 dB

In each case the real measurement that matters is the number of dB of carrier required above the injected broadband noise to maintain receiver "Lock." The BER was a reference useful for testing but in fact the D9223's indicated BER for any LNBf/LNB for any of the three conditions (ambient, cold, hot) was more of a guide than a hard measurement tool.

What we did not know - and still do not

Not all manufacturers provide complete (and useful) measurement analysis data for their LNB(f). The Hills DIGI-1-AUS LNBf, for example, provides a serial number and "type" (AE29) on the name plate but not the device's gain or claimed noise figure. A "no-name" who-knows-where-or-by-whom manufactured LNBf submitted by a reader for test likewise contained only the barest amount of information (SN211006268). A third "made in Taiwan" labelled LNBf gave us the model number (BK525) and claimed noise figure ("1.0 dB Nf") but nothing else.

Some of this is just plain sloppy management by the manufacturer; in other cases it is a deliberate effort to keep the buyer in the dark regarding even the "*claimed* specifications" of the device. What we like to do with a series of tests such as this is to establish a "ranking" of the various devices tested (i.e., "this is the best, this is the worst") for each of the test situations. And we also like to create a "figure of merit" table which takes into account a number of measured factors in creating a ranking.

We could (and did) measure the point of "Lock" and "No lock" with the noise generated system detailed here. We could also measure the amplifier's "total noise output" using a standardised LNBf operating voltage (15 volts), and, the amount of current drawn (consumed) by the device.

"Total noise output" is a direct indication of two factors. Using a suitable spectrum analyser, you can measure how much noise comes out of the LNBf/LNB when 15 volts is applied and the LNBf feed or LNB face plate flange is "terminated" in a suitable low noise material (such as microwave absorbing plastic). This is a "no signal" condition; the LNBf/LNB is not connected to a parabolic reflector.

Two factors: The first is the noise figure internal to the LNBf/LNB. The lower the internal noise generated, the lower the "total noise output" provided we are comparing LNBf/LNB devices of similar or identical gain. The noise generated in the device times (x) the gain creates the "total noise output." When you do not know the noise figure (and/or the gain) of the device, it is difficult to perform this test because all you can measure is the end result without the ability to identify whether it is noise figure or total LNBf/LNB gain that is directly affecting the total noise output.

When you do know these manufacturer stated parameters, it is a simplistic equation to create a "standard" for "figure of merit" comparisons. For example, a Gardiner LNB with a 0.6 dB (claimed) noise figure, a (claimed) 55 dB of gain creating a measured "total noise output" of 62.2 dBuV on our spectrum analyser has a "figure of merit" of 0.6 x 55 x 62.2 or 5075.52.

In this simplistic you-can-do-it-yourself equation, various LNBf/LNB devices can quickly be "rated" for anticipated performance. Yes, the lower the "figure of merit" number, the better the likely performance. There is one obvious problem with this approach - a low gain LNBf (such as 40 dB) will incorrectly skew the figure of merit downward although our experience is that the total noise output magically goes up when the LNBf gain is too low, partially compensating for the lower overall gain. In the table below, right hand column; the closer the "overall rating" to zero, the better the performance.

Other parameters

Seemingly if we can determine the "best low signal level" versus "highest BER" LNBf/LNB, we'd have a handle of selecting product. Unfortunately, there is more to life than BER testing. One of those unmonitored factors is "BER contribution" from "*cross-pole*" signals - increasingly (with Optus C1) an important consideration. When a satellite utilises the same frequency spectrum twice - once for vertical signals and once for horizontal, any "leakage" of the opposite (undesired) polarity will have a direct negative effect on the BER. It is the job of the tiny "antenna probe" built into the LNBf/LNB to separate the two. This requires a totally unique testing regime than that employed here - the results of which will appear in a future issue. Not all probes are created equal!

So - which is best???

Setting aside the prime-focus Gardiner LNBs, none of the three tested are better than average. The best of the trio? Taiwan's BK525 produces the best BER and is least susceptible to hot/cold variations. There are better LNBf devices out there - the trick is to identify them!

Model	Rating Cold Performance	Rating Hot Performance	Rating Moisture Ingress	Skin Temperature efficiency	Overall rating - LNBf	Overall rating - LNB
Hills AE29	(+)0.7	(-)0.8	0.9	0	(+)0.8	
No name	(+)0.9	(-)0.9	0.6	(-)2	(+)0.4	
Taiwan	(+)0.6	(-)0.7	0.9	(-)0.5	(+)0.3	
Gardiner Rectang.	(+)0.3	(-)0.9	0.8	0		(+)0.2
Gardiner Mini	(+)0.5	(-)0.7	0.9	0		(+)0.7
Gardiner "old"	(+) 0.4	(-)0.5	0.9	(-)0.5		(+)0.3

TECHNICAL TOPIX

2.4 GHz Spec An?

"I have been experimenting with 2.4 GHz (13cm) wireless cameras, antennas and amplifiers and after being a heavy user of a spectrum analyser that covers all of L-band (including to 2 GHz) I feel very short changed with no way to 'visually see' and 'measure' what is happening here. I recall the 2.4 GHz special analysers offered by Avcom of Virginia that were advertised in SatFACTS but they are so expensive 'out here' that I need a better answer. Is there a cheaper way to get 2.4 GHz coverage than springing for a special analyser that at the moment I only need for experimentation?"

Grady J, NSW

There is. Some firms sell a 2.4 to 1.2 (range) downconverter which accepts 2.4 at the input and then delivers 1.2 GHz at the output. However these tend to be big-buck items. It just happens that Indonesia (and other regions that use Cakrawarta) have an inexpensive and very suitable replacement. Does that ring a bell?

The Cakrawarta S-band LNBs and their S-band feeds are a perfect tool for this application. Most spectrum analysers will power an LNB and as shown (below) you simply bolt the S-band feed onto the S-band LNB and you have instant down conversion. You also have a very sensitive front end! A typical S-band LNB has a noise temperature of around 50 degrees K - certainly not the 17 to 20 we expect with C-band but still very good for most applications. And 40-50 dB of gain. When you turn that into a downconverter, using the S-band feed as your "antenna," we have found you can detect with the analyser 30 milliwatt 2.4 GHz video links well past LOS (line of sight), through hills and buildings. In fact, when we are within a few hundred metres of the 30 mW 2.4 GHz transmitter, we have to place the S-band feed "face down" towards the ground or risk driving the analyser display clear off the top end scale!

Gardiner manufactured a quality S-band LNB but now that California Amplifier has taken over, as Peter Merrett of Sciteq advises, "*You might as well be trying to get a special deal from the devil; they are hopeless!*" That does not mean that some firms do not still have some Gardiner NOS (new-old-stock) S-band LNBs sitting on a shelf however. As for the feed, well another challenge. ADL made a good one as well; Norm Bruner (ex-Paraclipse, now Patriot) advises, "*When Patriot bought ADL there were many uncatalogued feed parts there and frankly we have never made the effort to work out what is on hand.*" We 'think' that means - "Don't ask us for an S-band feed." Again, perhaps some firms bought some of these quality ADL S-band feeds and as 'NOS' they are sitting on a shelf collecting dust.

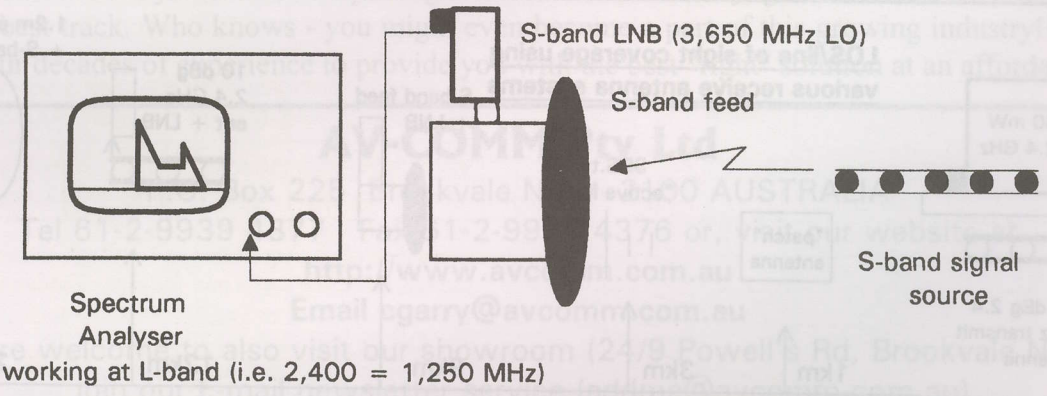
Which brings us to the one area of the world where S-band LNBs and S-band feeds are still in use. Yes, Indonesia. Steffen Holzt of Pacific IP (New Caledonia) advises, "Although the logistics are difficult, around US$100 will usually buy the feed and S-band LNB."

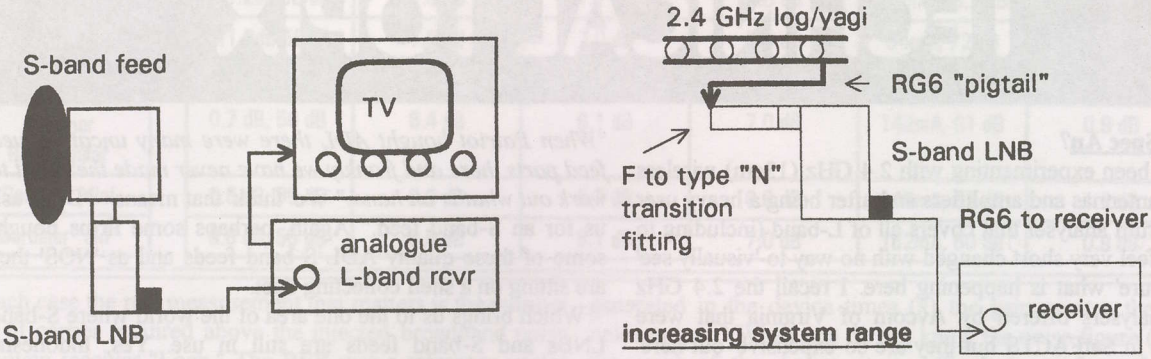
SatFACTS has around 50 subscribers in Indonesia - perhaps one or more of them (or in nearby PNG) will give us some tips on (1) availability of the Cakrawarta S-band feeds plus LNBs, and (2) pricing. We know they are usually sold as part of a Cakrawarta "reception package" including a NDS format CA receiver and smart card. Believe it or not - in this case, all the 2.4 GHz folks are after is the feed and LNB!

2.4 GHz downconverter

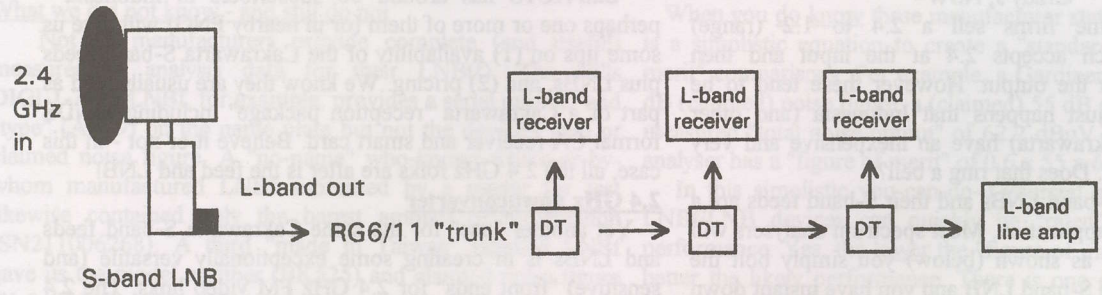
Yet another "use" for the same Cakrawarta S-band feeds and LNBs is in creating some exceptionally versatile (and sensitive) "front ends" for 2.4 GHz FM video links. The 2.4 GHz "channels" assigned for low power video use range from 2.400 to 2.483.5 GHz. With a 3.65 GHz LO (local oscillator) a 2.45 GHz wideband FM signal will appear at 1200 MHz which is of course compatible with analogue format L-band receivers. Around a year ago ex-Strong Australia Pty Ltd was closing out the end of run Palcom 7800/7900 series of analogue receivers at pricing in the A$200 region. Additionally, virtually everyone in the industry has at least one (or a dozen!) ex-useful 950 - 1450 tuning analogue receivers with various features that would make them very handy when creating 2.4 GHz systems.

The standard 2.4 GHz video receiver products are stripped down low gain and not very sensitive devices (what do you expect for under US$30 - retail!). By using a Cakrawarta style S-band LNB which down converts the 2.4 GHz signals to the 1.2 GHz region, you can now employ a far more sensitive (and versatile) FM video receiver with the capability of varying the IF bandwidth to suit the actual modulation bandwidth of the tiny, low power, 2.4 GHz camera-transmitters (SF#104, p. 4).





S-band front end / L-band receivers

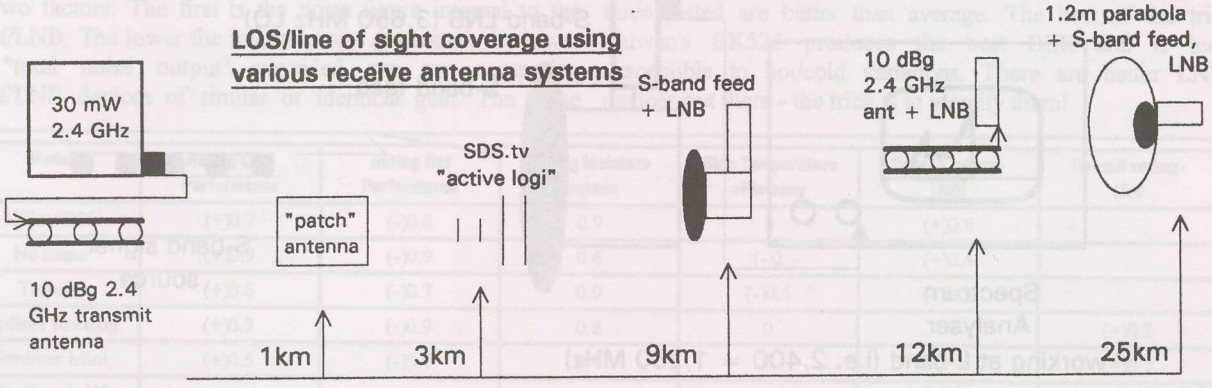


S/2.4 GHz to L-band downconversion and distribution system

Once you begin thinking about 2.4 to 1.2 conversions an entirely new set of parameters come into play. For example, the 40 to 60 dB gain found in a S-band LNB plus the 50 degree Kelvin noise figure changes all of the rules about how far you can extend the coverage of even a low power (30 mW) 2.4 GHz video format transmitter. Using a standard S-band feed as the receive antenna, feeding into a Gardiner S-band LNB, we found 9km LOS very reliable (below). Replacing the S-band feed with a commercially available 10 dBg (claimed - not measured) 2.4 GHz receive antenna, 12km LOS was solid. Then by placing the S-band feed and Gardiner LNB on a 1.2m parabolic dish, 25km was equally solid. All of this with a very modest 30mW 2.45 GHz video transmitter feeding into a 10 dBg (claimed gain) yagi as a transmit antenna. The higher power 200mW (or heaven forbid - 1 watt!) 2.45 GHz region transmitters / amplifiers would significantly improve these results.

Now suppose you have a 2.4 GHz video link client who wants multiple receiver/monitoring locations in an office or shop. The answer is to use a S-band LNB to downconvert the 2.4 to 1.2 GHz and then wire the building / complex with RG6 or RG11 and L-band directional taps (diagram above; source L-band distribution system parts through Lacey's Australia [tel 61-3-9783 2388) or Melbourne Satellites [tel 61-3-9738 0888]). Could you skip the L-band directional couplers / taps and simply use standard L-band splitters? *Shame on you!* At the first splitter (2-way) half of the available signal voltage ends up at receiver #1 and the second half goes on to the second splitter where half of the half now goes to receiver #2 and what remains (1/4th less line losses) goes to receiver #3 where again the available signal voltage is cut in half again. If this is double-Dutch, you need to order SF's Tech Bulletin 9405 (p. 32 here) and study why using line splitters is <u>not</u> an acceptable solution to multiple outlets.

LOS/line of sight coverage using various receive antenna systems



Multiple feeds - one dish?

"Avcomm has supplied me with two dual polarity L1551 LNBs, two F1381 feedhorns to mount on their F200 dual satellite adapter plate for reception from PAS-2 and PAS-8. Since the diameter of the scalar feedhorns is 205mm and their centres would be 205mm apart, they would be 102.5mm off centre on a 3.7m mesh dish.

"1/ Would placing the LNBs centres at 102.5mm laterally off the focal point be compensated by the 205mm diameter scalar rings of the feed horns for satisfactory reception?

"2/ Or would it be preferable to cut up to 55mm off one side of both scalar ring feedhorns to bring their centres closer together? This way the minimum distance between the LNB centres would then be 150mm - i.e. 75mm off of the focal point?

"3/ Can I presume each feedhorn will only collect energy reflected from about half (or less) of the dish?

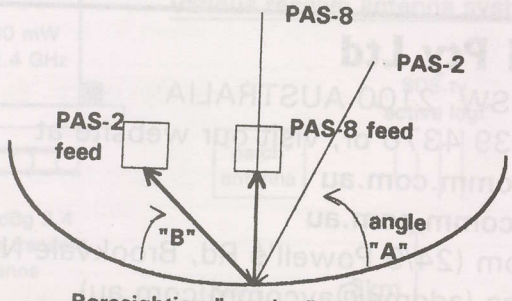
"4/ Since the primary function of the feedhorn is to channel (reflected) energy into the LNB while the scalar rings equalise the pattern of the E and H fields, how far off focal point can be tolerated?"

RB, NZ

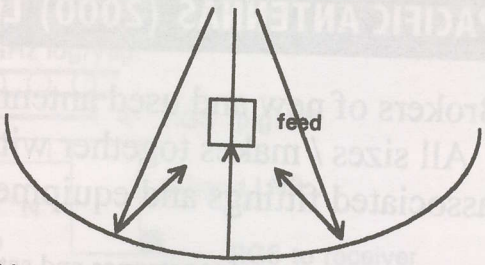
Cut nothing from either feed at this point. In a two-bird situation with dual feeds *if the two satellites are of equal signal level*, the dish is typically positioned not at either satellite (although that is one option) but rather half way *between* the two; boresight is at 167.5E in our PAS-2/8 example. Any off-boresight signal will still be captured by the dish reflective surface, but because "signal boresight" is from off centre (i.e. the dish boresight does not align with any satellite) the two signals arrived at the dish's curved reflective surface "at an angle." That "angle" is reproduced (replicated) when the signal from off boresight strikes the reflective surface and heads off back towards the front (feed area) of the dish. This means the "new" focal point for that particular signal is no longer on the mechanical boresight line but rather it is left or right of that line on an "arc" that is the same as the dish's mechanical focal point.

This places the location for the PAS-2 feed *left of centre* on the arc (when viewed from behind or above) and the feed for PAS-8 *right of centre* for the same reason. The feed locations are reversed (PAS-2 is *now* west of PAS-8) because of the reflection angle created by the off-boresight pointing dish.

If PAS-8 is weaker for you than PAS-2 (which indeed it would be in NZ), you could place the dish's mechanical boresight directly on PAS-8 for maximum signal and the PAS-8 feed would be in the normal focal position indicated by the feed support struts. Then PAS-2, stronger than PAS-8, would be weaker than it would be if the dish mechanical boresight was halfway between the two satellites but only by something less than 1 dB. However, the physical (mechanical)

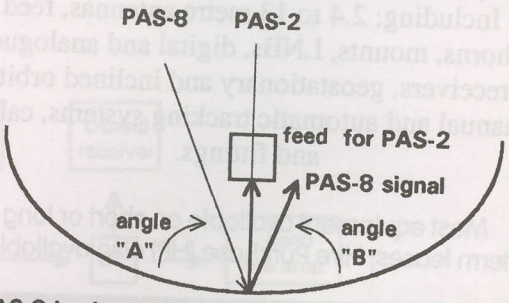


Boresighting "weaker" satellite



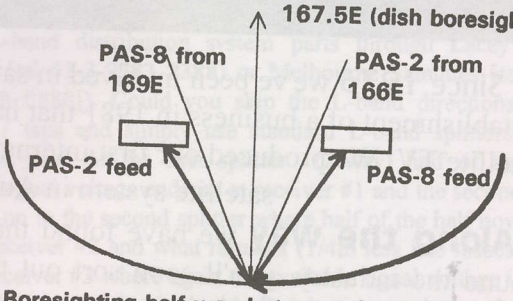
Dish's curved (parabolic) surface reflects to centre

WHEN the dish is pointed directly at the satellite, all energy striking the dish is reflected to the focal point - which is where the feed should be positioned.



PAS-8 is already coming off of dish - right of centre

When the dish is pointed at PAS-2, it ALSO receives PAS-8 but because the dish centreline (boresight) is left of centre, the reflected PAS-8 signals are driven RIGHT of centre (angle A - the approach angle equals angle B - the reflection



Boresighting half-way between the two satellites

When dish is to receive two closely-spaced satellites, the dish "boresight" (centreline") *may be* pointed half way between the two satellites. Now the feed for each is "flipped" because of the reflection angles from the dish's curved/parabolic surface; PAS-8 is on the right, PAS-2 is on left.

distance between the centre of the two feeds is the same with either approach - determined by the 3 degree satellite to satellite spacing.

What is often overlooked in "visualising" this situation is the curved reflective surface of the dish. The angle of "arrival" of the signal, when it strikes the reflective surface, will always be equalled by the angle of "reflection" ("B" in diagrams here). There is a small (0.5 to 1 dB) "loss" with either approach which argues the weaker satellite should be boresighted (left).

SatFACTS Pacific/Asian MPEG-2 Digital Watch: 15 June 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	3/4	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	4000/1150H	6TV, 21r	3/4	28(.125)	FTA TV + radio
	Sichuan TV	3946/1204II	1TV + radio	3/4	4(.420)	New April 2003
	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, tclctext, 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)
	Hcnan/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(.626)	FTA as of May 01, 2003
	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 8TV	7/8	26(.000)	CA + NOW, B'berg, Indus FTA
	Star TV	3780/1370V	7(+)TV	3/4	28(.100)	NDS CA (Pace DVS211, Zenith)
	Star TV	3840/1310H	7(+) TV	3/4	27(.500)	Star News India (Eng) **FTA**; V514, A648
	Star TV	3860/1290V	5(+)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) In transition 06-2003
	Star TV	3920/1230H	4+ TV	7/8	26(.850)	Star Sports Asia (+), **FTA** PAL; V512, A640 English
	Star TV	3940/1210V	6(+)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	6+TV	3/4	28(.100)	NDS CA (Pace DVS211, Zenith)
	Star TV	4000/1150H	8(+)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
	Pakistani TV	4108/1942V	1+TV, radio	3/4	6(.666)	New June 1, 2003
	CCTV bqt	4129/1021H	4(+) TV	3/4	13(.240)	moved from 4115
	Zee Bqt #2	4140/1010V	8(+) TV	3/4	27(.500)	Mediaguard (SECA) CA
Cak1/107.5	Indovision (S-band)	2.535, 2.565, 2.595, 2.625, 2655	33(+) TV	7/8	20(.000)	NDS CA using RCA/Thomson, Pace IRDs; **2.535 has 2 FTA**
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
	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,Singlh
	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
Jc3/12	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
Jc2A54	**BYU tests**	3.915/1245V	2	3/4	3(.703)	Part-time; maybe CA sometimes.
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,11radio	2/3	30(.000)	5+ FTA; Abu Dhabi, JCTV tests
	Aurora	12.407V/T3		2/3	30(.000)	Aust, NZ 90 cm
	Aurora	12.527V/T5		3/4	30(.000)	Aust only; change in FEC
	Aurora	12.594V/T6	2+ radio (only)	2/3	30(.000)	Possibly Aust + NZ
	Unknown-Aurora?	12.657V/T7	data only?	2/3	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
	SBS Mux	12.420H	3+ TV, 2+ radio	5/6	12(.600)	Also 12.456 (or .452) same params; SBS HDTV +
	TVNZ DTH	12.456V	4+TV	3/4	22(.500)	FTA 4 channels (TVNZ x 4); teting 5th ch May 2003
	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
	NET +	4121/1029V	1 TV	3/4	4(774)	NET25 + FTA; new PIDS April; reload
	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**)
	CalBqu/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	5/6	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)	3m up (NZ), 1.8m up Australia
	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
	PAS mux	3743/1407V	3	3/4	21(.800)	**test card FTA**, others nominally CA

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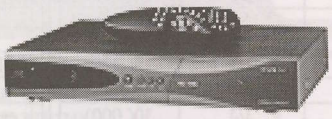

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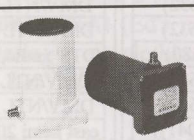

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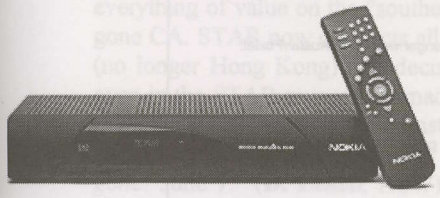

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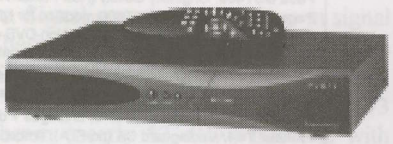

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SatFACTS Digital Watch: Supplemental Reference Data / June 2003

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
I804/176E	**iPSTAR**	12.619H	1	2/3	25(.220)	Tests, late May start; also 12.646H
	RFO Poly	4027/1123R	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	11.610H	16TV, 1 radio	3/4	30(.000)	1+ **FTA**, Mediaguard; + 10.975 weaker
	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 & **TBN-JCTV FTA**
	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!)

WITH THE OBSERVERS

AT PRESS DEADLINE

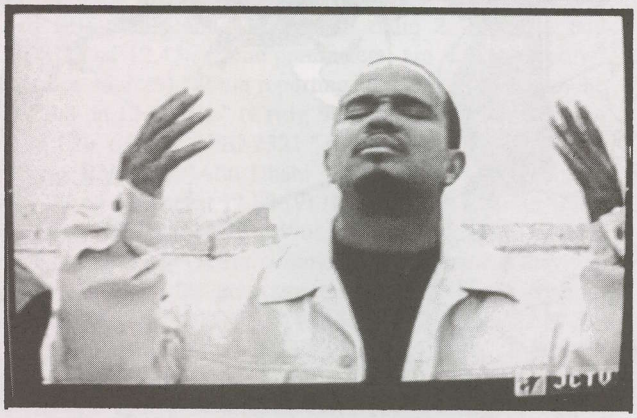
"Target" C1 operational date? Try August 29 but actual switch from B3 is scheduled prior. As this issue goes to press, the "countdown" for launch is running but the actual launch has not taken place. If it fails? MAJOR problems for expansion of Australian pay-TV .

ApStar 2R/ 76.5E: "New SCPC 3.843Hz, Sr 4.780, 3/4 is called 'Celestial Movies', CA PowerVu; by far strongest Ap2R transponder here - 40% on 1.8m." (**DM**, NSW)

AsiaSat 2/100.5E: "FTV/Fashion TV is going to stay FTA (3.796Vt, Sr 2.626, 3/4) for now launching a second 'X-rated' version in CA format." (**Benjamin**, WA) (Ed's note: X-rated 'fashion'? When did wearing no-clothing become 'fashionable'???) "Sichuan TV has left 3.946Hz; occ. feeds now." (**TK**)

AsiaSat 3/105.5E: "Pakistani TV analogue switched off (4.100Vt) June 1, replaced by new digital service on 4.108Vt, Sr 6.666, 3/4; Radio Pakistan APID208, Text 273." (**David Leach**, NSW) "PTV National promo 4.090Vt, FTA, Sr6.666, 3/4." (**Kami**) "STAR mux 3880Hz appears to be in transition; test cards only at times; 3840Hz (Sr 26.850, 7/8) has new lineup." (**DL**, NSW) "STAR News (FTA) moved to 3.780Vt, Sr 28.100, 3/4), PIDs 514/648 (English)." (**Opac**, NSW) "Zee TV muxes 3.700Vt/ 4.140Vt Sr now 27.500 (3/4)." (many) "STAR Sports - several changes, not necessarily a good sign. Analogue service (3.800Hz) with some English (5.94) - some Mandarin (6.2 + 5.58, 5.76) sound tracks has over past few months gradually reduced the English content. Now, June 1, it is all English again. Wait - there is more. On June 4, STAR Sport English appeared on 3.920Hz FTA PAL (analogue is NTSC) - Sr 26.850, 7/8, VPID 512, APID 640 English (and 641) plus STAR Sports South (513/644 and 645) which is CA. Likelihood 3.800 analogue NTSC may be shut down and 3.920 presently FTA turned to CA. Not a good sign." (**GC**, NSW) (Ed's note: When As3S replaced As1, the As3S FTA analogue STAR Sports channel presented a problem as the new satellite opened this channel to a much wider area. The apparent intent with the (analogue) FTA service is to reach (mainland) China and Taiwan although the Mandarin language is not widely used in Taiwan (but NTSC is!). At this point everything of value on the "southern beam" of As1had already gone CA. STAR now conducts all uplink muxing in Singapore (no longer Hong Kong) and decisions as to what is FTA, or even in the STAR muxes, are made there. *Our* best "guess" is the FTA PAL digital will not last long and the future of the analogue NTSC FTA is equally in jeopardy.) "*It's* (digital) *gone!* June 7." (**D. Leach**, NSW) (Ed's note: 3920Hz STAR Sports appears to have been 'test' only - not of STAR Sports but rather of 3.920 and as Sports is FTA, it was a convenient test source only - like a 'moving' test card'!)

InSat 2E/83E: "3.580Vt Aaj Tak, 3.572Vt Headlines Today, 3.615Vt Jaya TV -surprisingly they make it into Australia on zone beam." (**B. Richards**)



MUSIC saviour. JCTV is new Trinity Broadcasting Network (TBN) shot at collecting the hearts and minds of "Chistian Youth" - testing on Globecast (B3 12.336Vt; V501, A540) and fed via I701 (3769RHC); both FTA. To encourage continued service, in NZ call (04) 902 7777; Australia 04 03 113645.

InSat 3A/93E: "Test cards 3745 and 4.065Vt." (**ShD**) "DD National 3745Vt, audio 5.5 P3." (**B. Richards**, Aust.) (Ed's note: Many [many!] Indians moving from Thaicom et al to InsSat 3A.)

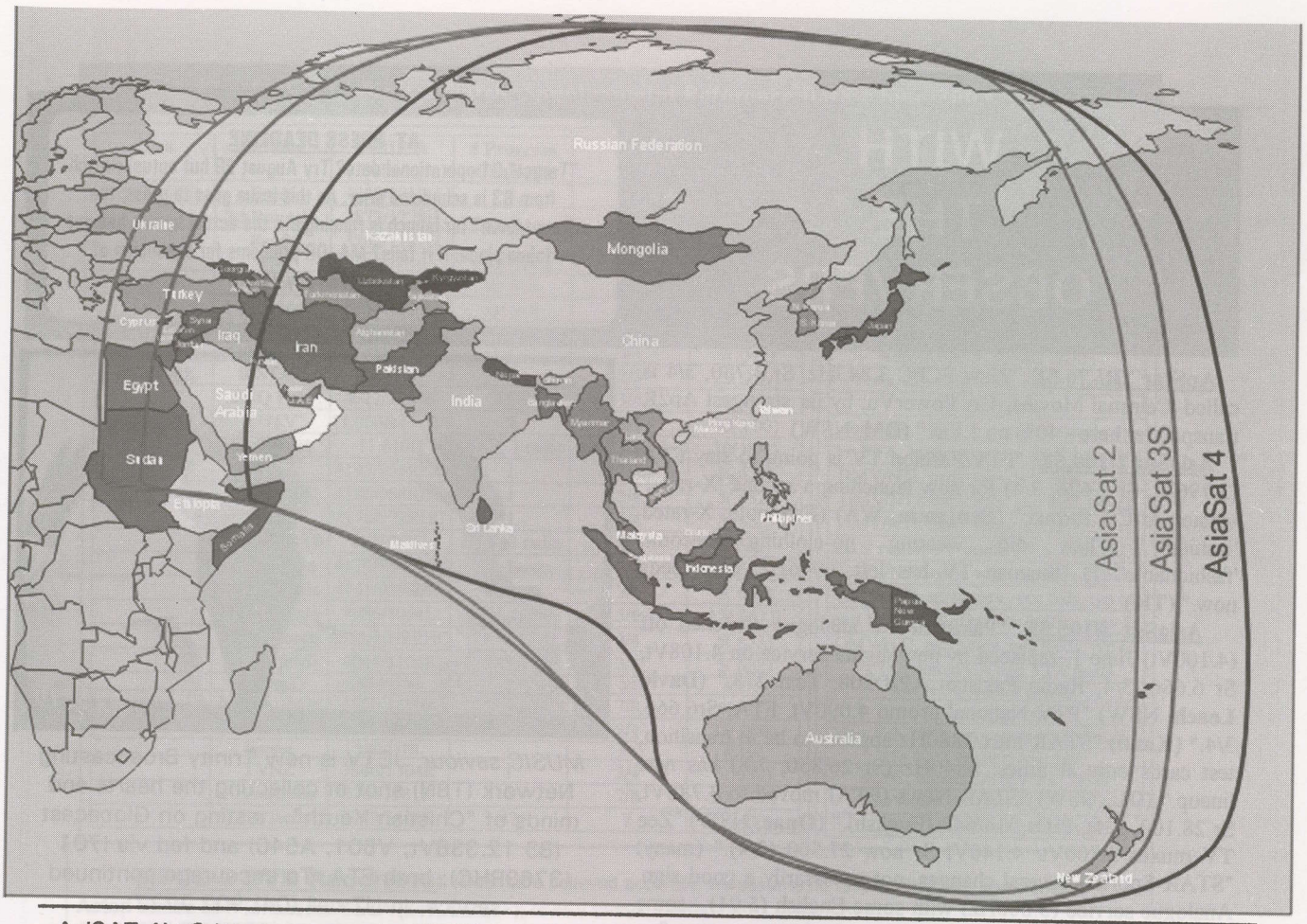
Intelsat 701/180E: "Canal + bouquet (11.610H) new smart cards now being issued, old cards will cease working sometime around 1 July. Five new channels including TCM-Export (began life as TCM Australia) is French only; (plain) TCM is English and French, selectable audio channels. Also new, Mezzo TV (10.975, VPID 163, APID 92; 'serious music' including classical; briefly FTA). Of interest in TV New Caledonie reports, around 10 minutes provided in English by Fiji TV News. Signal report - annual drop in signal noted *every* winter now here, down 2-3 dB from peak levels in January-February." (**Francis Kosmalski**, Auckland; **NS**)

Intelsat 804/176E: "12.619, 12.646Hz, Sr 25.220, 2/3 discovered testing spotbeam (nearly 53 dBw) into NZ with video test cards originating Los Angeles; off-air May 26th but operator iPSTAR suggests they will be back with Internet data shortly, possibly before you read this report." (**Craig Sutton**, NZ). (Ed's note: 4:2:2 June 6, California fed; off again June 7.)

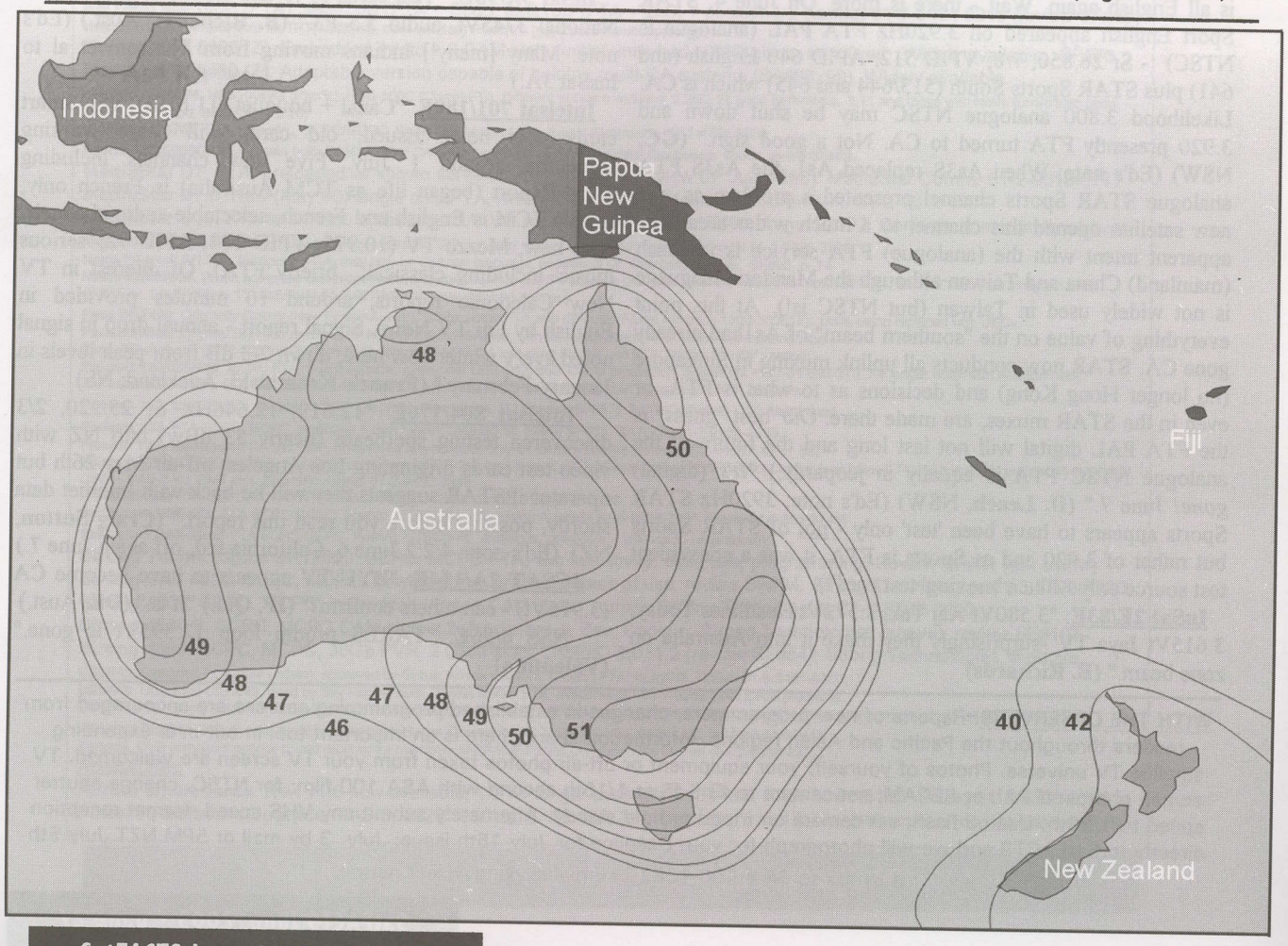
JCSAT 2A/154E: "BYU-TV appears to have become CA (3.915Vt) - can others confirm?" (**IF**, Qld.) "It is." (**DE**, Aust.)

NSS 6/96E: "TARBS promo loop 12.595Vt is gone." (**Valentino**)

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 July 15th issue: July 3 by mail or 5PM NZT July 5th if by fax to 64-9-406-1083 or Email skyking@clear.net.nz.



AsiSAT 4's C-band compared to 2, 3S (above) and Ku-band footprints (below) as projected prior to launch. On Ku, 49 - 51 dBw will make 65cm dishes "sing" whereas for NZ, 1.6m dishes (see table, page 12 here).



Optus B1/160E: "TVNZ 12.456Vt (NZ beam) testing 5th programme channel using infomercials as source. Something coming?" (**Craig Sutton**, NZ). (Ed's note: TVNZ admits"something" but will not reveal what! We suspect they are simply determining 'bandwidth/compression' limits of their 1/2 transponder; PIDs515/653) "SBS has launched 12.420Hz, Sr 12.600, 5/6 mux containing 3 TV and 2 radio services. PIDs 102/103 bring up 'SBS EPG' with weather for Australian cities, news headlines plus guide; PIDs 163/85 is SBS-TV; PIDs 162/83 is 'SBS World News Digital TV' while audio PID 201 is SBS Radio and 202 is SBS radio 2. All FTA and 12.437Hz and 12.456 (same parameters) are due up shortly." (numerous sources) "Some reporting 12.452Hz which may be correction on 12.456Hz." (**Craig Sutton**, NZ) "Digi Radio on 12.610, 626, 643Hz; APID 2321." (**Charles**)

Optus B3/156E: "Abu Dhabi TV seems to have replaced MED-TV on Globecast 12.336Vt (PIDs 1861/1824) or it has gone CA); JCTV (V501, A590; offshoot of TBN) is also testing and seeking 'viewer comment' to determine if they will stay here and pay for programme channel." (**Craig Sutton**, NZ) "Aurora update: 12.407Vt (Sr 30.000, 2/3-T3), 12.527Vt (Sr30.000, 3/4 - was 12.532-T5), 12.720Vt (Sr30.000, 3/4-T8), and 12.594Vt (Sr30.000, 2/3-T6) which loads only two radio channels. Ex-Aurora T7 (12.657Vt, Sr30.000, 2/3) has no loading table and may be only data." (**AI**, NSW)

Palapa C2M/ 113E: "Using 2.7m mesh, Polarotor feed, found 10.970Hz (Sr 28.125 and 3/4) loading with 8 services including infamous Metro TV. Right at threshold here - can

anyone in eastern Australia see this?" (**Alex Z.**, WA) "All test cards are gone from 3.760Hz." (**Benjamin**)

PanAmSat PAS2/169E: "Enjoy Filipino NBN (4.126Vt, Sr 3.075, 3/45; VPID 1160, APID 1120); their chief engineer advises by September-October they will become CA and only be available via TARBS; drat!" (**G. Welsby**, PNG) (Ed's note: There is an interesting situation shaping up with the TARBS-plague disease. It seems they routinely purchase joint rights for Australia and NZ but of course PAS-8 Ku does not serve NZ. So programmers have the legal right under their TARBS contracts to demand coverage into NZ 'within 30 day notice period' or TARBS loses NZ rights. All of this is academic if there is nobody to replace TARBS with NZ service since TARBS only stands to lose NZ rights if there is another provider standing by to take them over. With NZ as small as it is, and with Sky NZ providing NHK/Japan and some Chinese service channels, the likelihood there will be a serious TARBS competitor in NZ is very small indeed - but it does exist.) "3.958Vt, Sr 6.571, 7/8; ESPN-PT-standby tennis match feeds." (**B. Richards,** Aust.) "Church feeds 4.054Hz, Sr 5.420, 1/2." (**B. Richards**)

PanAmSat PAS8/166.5E: "3.716V, Sr 3.260, 7/8 (ouch!) with Reuters + APTN/APTN barely makes it on 2.6M." (**JW**, Melbourne; **B. Richards**) "Filipino channels NET25 and Inc (4.121Vt, Sr 4.773, 3/4) have apparently replaced uplink with new more powerful transmitter," (**GG**, Australia) (Ed's note: PIDs also changed - you may have to reload again.)

Thaicom 1A/ 120E: "Test card 3.746Hz, Sr 5.758." (**BA**) (Ed's note: They may be feeling slightly 'crowded" with AsiaSat 4 now functional from 122E!)

Thaicom 3/78E: "Somali Radio now on 3.551Hz, Sr 13.330, 3/4, APID 7217/SID35 has Somali Radio." (**B. Richards**, Aust.)

Soapbox: "Worried faces at Foxtel - cable + satellite seems to have stalled, actually has lost subscribers in current quarter for first time. They seem convinced that by offering more services, including NVOD (near video on demand) movies, their growth will restart - when C1 is available and new services are possible." (**IF**, Qld.) (Ed's note" New NDS STB will offer hard drive recording and ability to 'pause' programming with NDS CA format - they plan to add 53 new channels of which majority will be NVOD, for an increase in subscriber cost of course. Target date is 'first quarter/3 months 2004.) "Two Hong Kong firms have been slapped with civil monetary fines after admitting they were providing STAR TV, CNN, Turner Asia, ESPN, Discovery and NGEO to private homes and clubs in area using imported Indian, Thailand, Filipino, Malaysian and Indonesian (NDS and SECA format) STBs. Charges were based upon copyright law as currently it is not illegal to 'receive foreign services' in HK; only to 'sell them for a profit'." (**CS**, HK) "Reference C1 questions: There are 4 Ka band (18-20 GHz) transponders of 33 MHz bandwidth, another 4 X-band (7 GHz region) transponders of 60 MHz bandwidth and six UHF (300 MHz region) voice and data channels of which 5 are 5 kHz width and one is 25 kHz - the latter six easily received (once the frequencies are determined) by anyone with a UHF mode FM scanner and a modest antenna (U.S. forces also commonly employ similar frequencies for handheld shirt-pocket size radios . The X-band 60 MHz transponders will doubtless be the 'workhorses' of the Australian military system, Ka transponders will have highly concentrated/small footprint use and UHF will be final link to military personnel on foot. Will any of this be encrypted? Only time will tell." (**BJ Bingham**, SA) "My theory is Optus will close down (another) Aurora channel after Sky (racing) moves with B3 to 152E leaving 12.407Vt from Belrose (Sr 30.000, 2/3) and 12.527Vt (Sr 30.000, 3/4) from Lockridge." (**Sebastian**) "Fiji TV's plan to expand their Fiji-1 commercial channel plus a new non-commercial public channel to the entire country using a Ku spotbeam on I701 (similar to that used by Canal +) has run into stubborn local political opposition. Fiji-TV asked for a ten year guarantee of no-competition in exchange for investing millions of dollars in the new nation-wide system - government officials and local groups are divided on proposal and for now it is in limbo." (**Brent**, Suva) "iPSTAR, Thailand, conducting tests on I804 (p. 4, here) will offer 4 Mbps download and 2 Mbps uplink rates using Sydney teleport and fibre connections to NZ." (**B. Goodman**, Sydney) (Ed's note: Without direct-to-ISP service into NZ, their plan is a loser because the regional ISPs that most need the connection are typically beyond fibre-connection inside of NZ.) "Correction: It is AsiaSat 2 Dubai mux and AsiaSat 3S Sahara that share same parameters (4.020Vt, Sr 27.500, 3/4) - not Nilesat on As2!" (**IF**, Qld) (Ed's note: Shame on us for unconscious typo!) "It won't make any difference but there is opposition to Murdoch's buyout of DirecTV. 'Center for Digital Democracy' worries News Corp. will become the key gatekeeper for satellite programming and will use that leverage to mold distribution in FOX's favor'. Surely Rupert wouldn't do something that dastardly!" (**Bryan, USA**) "School of the air by NSW Government now providing two-way satellite educational services." (**IF**, Qld.) "Reference pricing on DVD players and recorders: Harvey Norman is now advertising a DVD-recorder for $999, claiming it is '$500 off recommended retail'." (**NS**) "SF tried - nobody bit. Access 31 (Aurora 23) still P4 off air!" (**IF**, Qld.) "German court has ruled Dream Multimedia TV GmbH with 'Magic Module CI' does not violate intellectual (copyright) laws there; DreamBox price now Euro475 shipping included until present stock is sold (info@dream-multimedia.co.za)." (**RD**, RSA)

AT Sign-off

Imparja's problem is our problem

For some years NT television station Imparja has been available through Aurora to homes located (1) inside of the ABA defined "service area" of the station, or, (2) through self-help community "translators" approved by the ABA, or, (3) on a one-by-one ("black spot") basis receiving service *after* ABA approval on a case-by-case basis. Imparja consists of two video service channels and up to 8 radio and operating as it does from a rural (indigenous) portion of Australia a significant amount of its total content is aimed at rural (including Aboriginal) viewers.

Imparja is unique in Australian television for it provides indigenous service (programming) which no other Australian broadcaster wants to deal with. For much of Imparja's television and radio day, there is no money (profit) in their service. Imparja also supplies a comprehensive "work training" program to teach broadcasting skills to indigenous NT residents.

Imparja by its "out back" location must somehow connect its 2 TV channels and 8 radio channels to Sydney where the Aurora uplink mux is lashed together. They do this by employing a relatively low power Ku uplink (Optus B1, 12.380 nominal) to transmit "in the clear" their composite TV and radio broadcast services for Sydney to pickup, turn around and insert into the Aurora mux.

The first problem. Imparja is an affiliate of both the 9 and 10 networks and because the ABA defines their service area as being limited to the Northern Territory, Imparja is uniquely licensed to carry various weekend sporting events which are otherwise only available from pay-TV service providers Foxtel and Austar. Imparja has access to these events because its ABA defined satellite and terrestrial coverage area lays beyond normal Foxtel/Austar coverage.

But 12.380 is FTA and some clever installers have worked out they can install suitable reception systems in CBD Sydney and Melbourne (or elsewhere) and provide access to these otherwise available-only-on-pay TV events. The installers could do the same thing using the Imparja Aurora signal and either a MOSC (smart card) or a card imported from an authorised Aurora-Imparja location. But that would be clearly "illegal" and the installers know this. On the other hand, the 12.380 service is ostensibly FTA and who says you can't have FTA reception in downtown Sydney?

Meanwhile well to the north several PNG (Papua New Guinea) cable systems are also dependent upon this 12.380 "feed" for their only access to Australia 9 + 10 programming. For PNG viewers, this is perhaps the most important service channel of them all - it speaks *Australian English* to a population which decades ago was a political part of Australia.

The second problem. Imparja is under official notice from the sporting event folks they must "do something" to secure their 12.380 feed because the folks who "own the sporting event rights" in Sydney and Melbourne are very unhappy when a pub or restaurant promotes **"(name of event) here!"** and the reception is not going through (or generating revenue for, say,) Foxtel. Imparja has been told to "secure the feed signal or lose the sporting events."

Imparja's options are limited. If it scrambles (goes CA), there is a very large capital investment for encoding equipment, and more important, because encoding requires more bandwidth (transponder space) than FTA (the encoding data is itself a bandwidth eater), Imparja will end up spending significantly more money just to link back to Sydney for Aurora. So recently Imparja has begun playing a "PID game." The PIDs are the numbers included in the transmission which causes the receiver to lock up on and display the selected service. "Musical PIDs" (that change daily, hourly, weekly) is one way to lock out receivers which don't have the capability to readjust PIDs, or the guy operating the receiver is not bright enough to re-enter the new PIDs when they change.

A number of web sites have begun the practice of posting the PID changes as soon as they are noted. Many receivers, including Nokia IRDs, will automatically find the PIDs and with the correct remote control prompts display the current PID numbers.

"One hotel manager tells me each Friday afternoon they receive an email from the guy who installed their satellite system listing the new PIDs, frequency and so on. I was shown instruction on how to change the PIDs on their receiver and asked him how they got away with showing Imparja (and Central Seven) in a public bar without getting into trouble. He said, '*there is some type of legal loophole that allows us to show the Imparja or Central 7 video while we tune in a local radio station for the sound*'."

Bars routinely pay Foxtel upwards of A$300 per month for access to the same game(s) using the pay-TV provider. So this is, for the moment, an economic issue - it costs less this way.

By not using Aurora cards ("imported" from a legitimate Imparja rural coverage area, or MOSC-Gold cards) the pubs believe they are immune from legal prosecution (getting caught with the "wrong card" is a definite law breaking activity).

Musical PIDs is not a CA event - it is Imparja trying to stay ahead of people who would turn-a-buck on their mandatory link back to Sydney and Aurora. Imparja's Tim Mason explains to SF, "*PID changes are not aimed at individual enthusiasts but only those commercially exploiting our* (linking) *signal. By continually publishing and promoting* (the latest PID numbers) *you are only advancing the day when* (the feed) *will be blacked out for everyone. On the other hand, if it all went quiet for a few weeks* (the latest numbers disappeared from the web sites), *we could probably settle back to a fairly fixed configuration* (static PIDs)."

Tim's exchanges with SatFACTS revealed some other interesting aspects of operating the NT service. We all recall that Imparja at one point tried to expand their coverage area into Tasmania (and elsewhere) by actively promoting their Aurora reception package. It comes as something of a revelation to learn, "*I can confirm we are unable to gain any commercial benefit with either national or local advertising from our 'out of area' service. It is a condition imposed upon us by the ABA who refuses to 'count' viewers beyond our ABA defined coverage area(s).*"

Translation. The ABA tells each station exactly (and precisely) what its coverage area includes. If a station has a 100 foot tower and 1 kilowatt of power (for example), only the homes located within the ABA predicted "coverage area" will "count" for that station's "reach" or service. Homes served outside of that ABA defined coverage area, no matter how they are reached, are simply not counted. This means there is no commercial incentive to improve the station's coverage area beyond the geographic region proscribed by the ABA. No, PNG homes delivered by "pirate cable" (Tim's descriptive term, not our own!) have no commercial value whatsoever to Imparja. Never mind there are 2,000/4,000/8,000 such homes out there! Therefore, the station's advertising revenue "base" is set to a maximum by ABA definitions of coverage area, totally destroying any reason for Imparja to seek to expand their service area. A home located in NSW, in a "black spot" and approved by the ABA for Imparja reception via Aurora, is not going to be counted by the ABA for Imparja's commercial benefit. In fact, the terrestrial station which is *supposed* to serve that "black spot" (but does not) continues to get paid for delivering a 9 + 10 audience when in fact it is Imparja delivering the home.

It is something of a wonder that management at Imparja has tried to be so aggressive in reaching new homes - homes they will not be paid to serve by the advertisers. This little understood "ABA function" (defining the limits of what stations shall be paid to serve) is yet another reason why the entire ABA fruit tree is rotten to the core because it creates totally artificial, bureaucratic zones for each station. Australia should be alarmed of the way the ABA functions and the roadblocks it creates when normal citizens are merely trying to access viewable television. *Shame on the ABA.*

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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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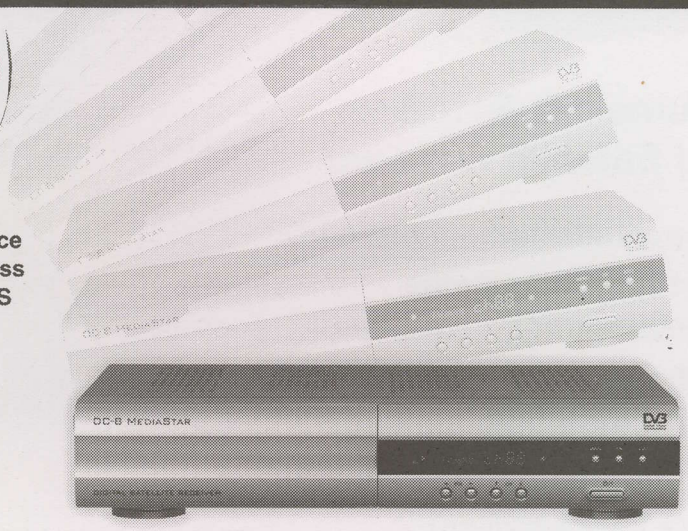

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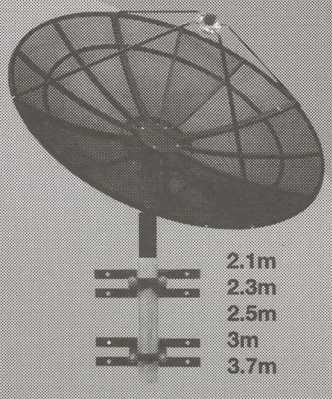
MediaStar Communications International
24 Bosci Road
Ingleburn NSW
2565 Australia

Tel: 02 9618 5777
Fax: 02 9618 5077
Opac@bigpond.com.au

MediaStar High Performance



2.1m
2.3m
2.5m
3m
3.7m

Heavy Duty Frame
Stronger Mesh

11300 MHz L/O
Dual and Quad Output

Mustang Actuators
18", 24", 36", 56"

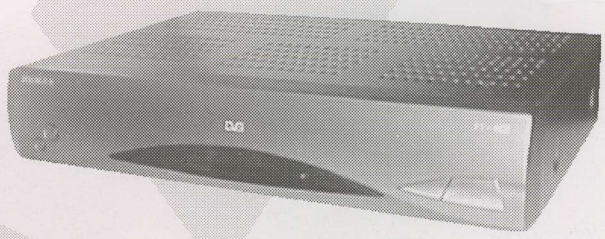
Aston Cams

EZ2000+
Positioner

Making communications shine. MediaStar

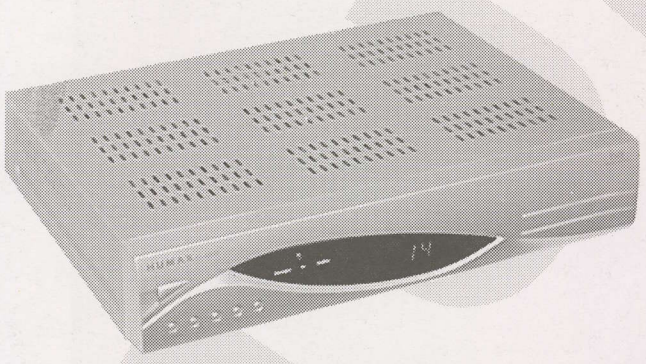
Humax IR-5410Z
Digital Satellite Receiver

- Software upgradable from home PC
- Australian specific software
- Latest software FREE on the web
- Channel/Transponder data upload/ download to PC
- Embedded IRDETO (compatible with all IRDETO 1 & 2 services)
- Digital Audio Output
- DiSEqC 1.0 switching
- DiSEqC 1.2 positioning
- 22kHz Switching
- 4:3 or 16:9 aspect ratio



Humax F1-ACE
Digital Satellite Receiver

- Software upgradable from home PC
- Latest software FREE on the web
- Channel/Transponder data upload/ download to PC
- DiSEqC 1.0 switching
- DiSEqC 1.2 positioning
- 22kHz Switching



Humax F1-4000T
Digital Terrestrial
Set Top Box

- Software upgradable from home PC
- Australian specific software
- 4:3 or 16:9 aspect ratio

SCITEQ
Pty Ltd ABN 34 009 235 090

Sciteq Pty Ltd
Phone: +61 8 409 6677
Fax: +61 8 9309 3737
email: sales@sciteq.com.au
web: http://www.sciteq.com.au