Sept. 9- 4pm

Bob Cooper's

SEPTEMBER 15 2000

SatFACTS

MONTHLY

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

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55 Years ago- Arthur C. Clarke "invented" DTH

"Digital TV" is a fantasy, a lie

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- ✓ Latest Hardware News
- ✓ Latest SPACE Pacific Reports
- ✓ Cable TV Connection

Vol. 7 ◆ No. 73
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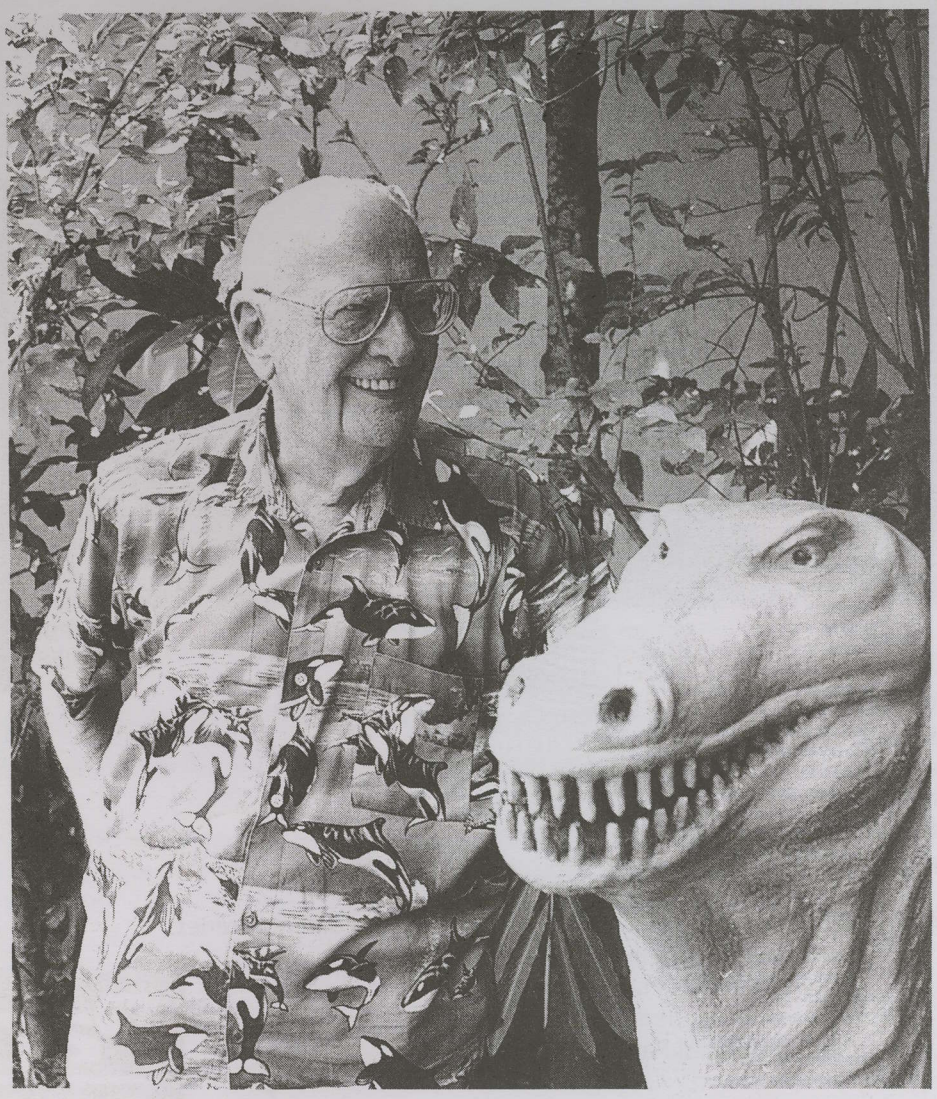
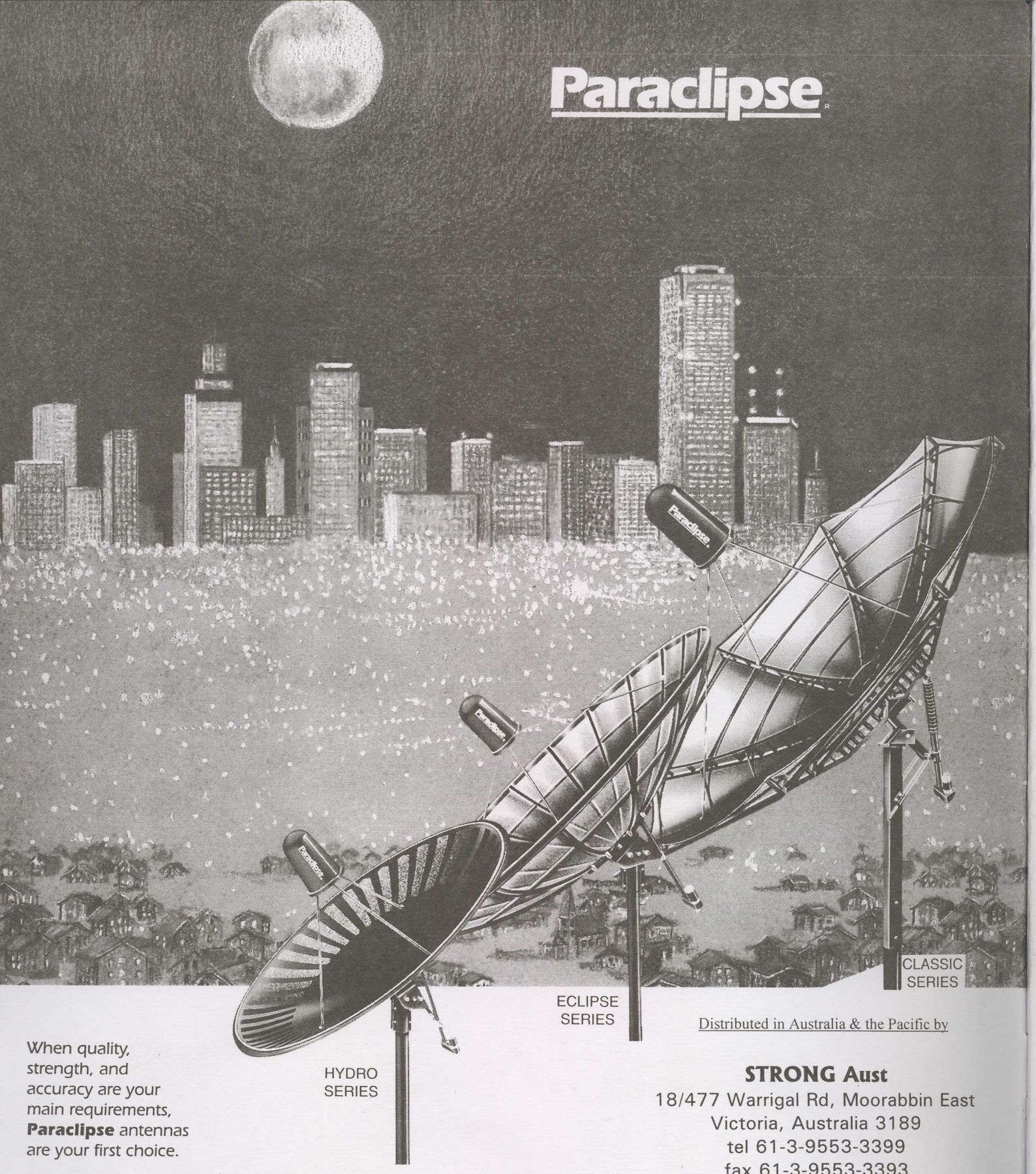


Sir Arthur Charles Clarke - the man who "invented" satellites



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(updated September 15, 2000)

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SPACE Pacific Report (# 9901, 9902, 9903, 9904)

The television programme, direct to you from digital master on E240 VHS tape, PAL format of course. Show 9901: "It is your signal, too" and "Fun and games with the spectrum analyser." Show 9902: "Feeds and LNBs" - understanding how products differ. And, "Mark Long's Thumbnail History of home satellite TV" featuring the real pioneers of the 70s and 80s! Show 9903: "Dish antenna critique ," why some dishes work better than others, plus Mark Long on installing your own dish, and, Richard Brooks on PVRs. Show 9904: "Who buys DTH systems?" explores the marketplace, plus, "Understanding Tiny Parts" looks at connectors, line-amps and splitters. Four hours as currently running on Mediasat - digital mastered to you for the exceptional price of $55 including shipping and two bonus items - "Satellite Television (The Booklet)" featuring material by Sir Arthur C. Clarke. In stock, shipped within 72 hours. (No SPACE discount)

Shows 9905, 9906, 9907, 9908 & 9909

The television programme - the latest releases (as broadcast Sundays on Mediasat). As above. Show 9905: Robin Colquhoun and the Dr Overflow software for the Nokia; Show 9906: How the uplink works - possibly the best programme topic ever created. Show 9907: Part two of uplink. Show 9908: Instructor Mark Long's "Digital Basics." Show 9909: Mark Long's "Installation Basics" with emphasis on Ku service. Shows 9905, 6, 7 & 8 **now being shipped.** $60, no SPACE discount.

TB 9402 MATV Systems

FTA terrestrial to multiple outlet sets. With DVB-T coming, this excellent step-by-step guide to proper master antenna system design and installation will prepare you for the far more complex world of distributing MPEG terrestrial digital signals around a home, multiple dwelling unit, motel or hotel. Basics of analogue distribution still apply - even with digital! Ltd Qty $10 (SPACE discount)

TB 9404 DTH Systems

Direct to Home: Satellite System Installation Techniques. There are many-many NEW people getting into home satellite system installation. And we receive several calls each day asking us to point them at a "basic tutorial" that will explain how a home dish system works, how you install it for proper performance. This is it. Without question, the very best *quick* tutorial on what a home dish system is, how it works, where the problems develop. If you are new to the DTH field, buy this and commit it to memory. Very slight New Zealand bias, not enough to hurt its value world-wide. And if you are looking into multi-set installations such as motels and hotels and condominiums, also order TB 9405 'SMATV Systems' (below; the pair make it painfully clear where mistakes are commonly made). Also see SatFACTS October, November, December 1999 - for RF Distribution System articles. TB9404 originally prepared by Coop for an Asian DTH technology conference, LtdQty $10 (SPACE discount).

TB 9405 SMATV Systems

Satellite to room - Commercial SMATV (Satellite) Dish Installations. The easy part is the satellite dish or dishes. The difficult challenge is getting all of those signals - including the terrestrials - balanced and into every room and each TV outlet at the proper level. If you plan to do multiple-outlet systems, start here with this Coop written tutorial. LtdQty and only $10 per copy while they last! (SPACE discount)

Nelson Parabolic Manual

The Nelson Parabolic TVRO Manual. If you are the type of person who wants to build your own dish (up to 3.7m in size), or, you simply want to understand why some dishes work better than others, this step-by-step "how to build a dish" manual is the "Bible" of an industry. Nelson Ethier was a perfectionist and brilliant with hand tools. It shows here - the ultimate backyard project! Half original price at $15, LtdQty, SPACE discount applies.

SPACE Pacific Order Form (also see SPECIAL PACKAGES on reverse side)

Please send the following:

☐ SPACE Pacific Report - 9901-9904/ $55 (no discount); ☐ Shows 9905-9908/ $60 (no discount); ☐ Package deal - 9901-9907 (**2 tapes**)/ $105 (no discount); ☐ TB9402 - MATV/$10; ☐ TB 9404 - DTH Systems/$10; ☐ TB 9405 - SMATV Systems/$10; ☐ Nelson Parabolic TVRO Manual/$15. Total of order - $_____. If current SPACE member, multiply by 0.7 (70%) and write discounted total here: $_____

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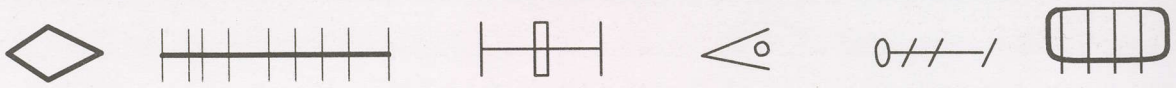
SPACE Pacific Terrestrial TV Reference Materials



Each of these editions researched, created by "Coop" to help you solve tough aerial problems

TB 9301	**Tech Bulletin 9301**. *Co-Channel & Antenna Phasing*. How to grow a single antenna (Yagi, broadband antenna) into a complex array to greatly increase gain, sharpen receiving pattern to eliminate co (same) channel interference. Totally hands-on, very practical, up-to-date. Go from novice to professional!
TB 9302	**Tech Bulletin 9302**. *Weak Signal Reception Techniques.* If one cut-to-channel (Yagi) antenna won't do the job, will 2, 4 or 8??? How about 16? Stacking antennas, mating with carefully selected masthead amps, is an art. This explains how to do it for professional results up to 300 km from TV stations.
TB 9303	**Tech Bulletin 9303**. *UHF - The Frontier*. Using parabolic style antennas surfaced with low-cost poultry mesh, build UHF dishes up to 40 feet in size to extend UHF off-air reception out to 300 km. And - learn the tricks to "squirt" signals from a hilltop to a valley below using low-cost receiving equipment.
TB 9304	**Tech Bulletin 9304**. *Beating Noise Interference & Combining Cross-Pole Signals*. When TV and FM signals are weak, man-made interference from appliances, power lines can kill reception. Step-by-step instruction for identifying, locating, fixing noise sources + unique method of combining cross-pole TV signals.
TB 9305	**Tech Bulletin 9305**. *Cable Television - Fact & Fiction*. The story of how a cable TV system is designed, built, operated. The perfect "So this is how it works!" report. Who knows - you might even like the concept so well you take out a mortgage on your home and wire your town!
Lost Art	**Lost Art of Rhombic Antennas** *-27 dB of gain VHF & UHF*. Everything you need to know to build the most sensitive VHF-UHF receiving antenna ever created. Rhombics are used for virtually all long haul military circuits. Includes super-Rhombic LaPorte design. 300 km? A piece of cake!
40' Dishes	**20 to 40' Poultry Mesh (Chicken Wire) Parabolics**. Complete instructions to build UHF-TV off-air reception antenna system combines low cost reflector materials with Redwood or other durable "struts." 20 to 25 dB of gain, out to 300 km UHF reception. A backyard project with earnings potential.
Half-Bolics	**World-Famous Frias Half-Bolic Reflector**. Amazing design allows simultaneous reception over sizeable arc of transmission locations. City grade (80 dBuV) reception from distances of 280 km on VHF (45 MHz) through UHF (900 MHz). This is huge, but easily the best all-around deep-deep fringe antenna system.
NOTE!	**NEW to ABA Terrestrial TV Blackspots?** Order TB9301/9302/9303/9304/9305 "Special Package" below ($40) to quick cram ALL of the problems associated with "ABA Proof" of Blackspots!

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☐ TB9301/9302/9303/9304/9305 - $40 -or- ☐ Rhombic/ 20-40' Dishes/ Half Bolics - $50 -or-

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MONTHLY

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This publication is dedicated to the premise that as we are entering the 21st century, ancient 20th century notions concerning borders and boundaries no long define a person's horizon. In the air, all around you, are microwave signals carrying messages of entertainment, information and education. These messages are available to anyone willing to install the appropriate receiving equipment and, where applicable, pay a monthly or annual fee to receive the content of these messages in the privacy of their own home. Welcome to the 21st century - a world without borders, a world without boundaries.

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COOP'S COMMENT

September 15, 2000

Just in passing. This issue of SatFACTS begins out 7th year of publishing. My how time flies. Speaking of which - read how it all began starting on page 8 this month.

Not just in passing. Digital TV. Any kind of digital TV. There is a terrible, inexcusable hoax being perpetrated upon the citizens of the world. It is called "digital TV."

Digital TV can be totally wondrous. But for digital to be anything more than a cheap substitute for 625 line PAL analogue, at reduced picture quality from the analogue, it must be digital from the TV camera taking the pictures to the display screen on the distant receiver. If there is even one "analogue link" in the chain, the true advantages of digital are lost.

Austar and Foxtel do not deliver "digital TV" to homes. Nor does Sky NZ, BSkyB in the UK. Nobody delivers "digital TV" because not one satellite set-top box allows the digital data stream to "thruput" to the TV receiver. The digital IRDs have a built-in analogue UHF modulator and/or they send analogue video through SCART or RCA connections to either a TV receiver or VCR.

There is no digital thruput interface (output) on the satellite IRD because even if you had one, what would you do with it? *Plug it into your TV set?* Not likely as you have never seen a TV receiver (nor a monitor) with a digital data input socket. The only place such a TV set or monitor exists today is in America where their prices begin at US$4,995 and go up to over US$30,000.

But it is not the lack of a digital thruput which deserves discussion - it is the reason why. There is no digital linking between a satellite IRD and a TV receiver because the people who own the programming want it that way. *It is all about copyright.*

Digital, we are told, is "perfect *copies* every time." None of the hang-ups and artefacts of analogue. A VHS tape, dubbed too many times, becomes unusable. A digital format tape, the digital data stream on a DVD, has all of the technical characteristics of an original. There is no degradation when "copied." And that frightens the copyright owners so badly that they have - to date - been totally successful in convincing IRD makers, TV set designers, to leave out the capability to link directly in the digital data stream. Because if you can link it from an IRD directly to a TV set, with no analogue steps in the way, you can record it as a digital signal as well. Every digital copy becomes a digital *master*.

DVD (digital versatile disc) is a case in point. DVD players don't output in digital for the same reason; *copyright*. So the picture one sees from a DVD player is linked to the TV set as an analogue output, complete with all of the analogue artefacts we were promised would be eliminated with digital. DVB-T, already in the UK and USA, coming January 1 to Australia, will be analogue TV sent via a digital data stream. That means analogue quality for twice or thrice the price of our existing analogue service, but not the digital quality we have been promised. Not even in HDTV form (more lines - yes, better quality, no).

The world has gone digital-TV-crazy. The world has been, is being, badly misled by digital - mania. We have been told to expect "theatre style video" and an end to analogue problems. This is a lie, a fantasy, created by TV broadcasters who have discovered the only *real* advantage of digital is for cheaper transmission systems, for them. For the rest of us, copyright owners have the final say - which is "no!".

-ON THE COVER-

Sir Srthur C. Clarke and friend "Tyrone." It is double-nickel time. Geostationary satellites, DTH, TVRO - it is all 55 years old this October 1st. The man who made all of this possible, his views and his predictions (p. 8).

LETTERS

Skyking?

"I am trying to figure out where publisher Bob Cooper's 'Skyking' e-mail address originates. Can you tell me?"

George Jacobs, Bethesda, Maryland, USA

Skyking was first a radio serial in the USA (1946 - 1954) and then a TV serial. On TV, actor Kirby Grant played the part with two teenagers Chip and Penny. His aeroplane, the 'Songbird,' was a major part of the plot as they flew throughout the western USA to run down bad guys. Coop's wife Gay, knowing his devotion to old-time radio serials on cassette tape, selected 'Skyking' for his e-mail address. End of mystery.

C-band offset?

"Living near Melbourne, I use a 1.8m prime focus for As2. Would it be possible to use a smaller dish (such as 1.2 or 1.6) on C-band? My concerns are sufficient gain and instability with windage. My backyard is too small for a larger dish, the present one is too small for European Bouquet and WorldNet reception. Oh yes, very much enjoyed the Saturday "Open Day" at SPRSCS 2000; it was good to see the goodies available live and in real time!"

Peter Watkins, Victoria

Offset dishes at C-band to have gain equivalent to your 1.8m would need to be more than 3m in height (!). Offsets have less gain per square cm of surface area than prime focus, but for low cost mass production and quick installation are the suitable choice for firms such as Foxtel and Austar.

Permission granted

"I am Secretary of the Antenna Technicians Association Inc in Australia and noticed two articles in SatFACTS which we would like to reproduce on our web site as news of interest to the industry. They are, 'Comet Installation Moves on New Zealand' and 'Australian Legislation threatens FTA industry.' Many of our members are satellite TV installers and would benefit from this information. And we can also place a link to our web site as well."

Les Ray, Antenna Technicians Association Inc.

Unhappy viewer

"4 Star Satellite TV (NZ) Ltd installed a 2.4m disk with remote auto control system that receives 4 satellites. I'm not happy with the set-up and would like reassurance concerning the following: (1) To record a satellite program, must I leave the satellite switch on? (2) Should the video recorder not cut in on the set time and turn on the satellite to record the program? (3) If I want to watch the satellite, why do I have to switch on my video?"

G. Dekock, Mt Roskill, Auckland

Some receivers will switch on at a set time, yours does not. The video must be on because the satellite receiver loops through for purposes of recording - there are other wiring options available.

PROGRAMMER PROGRAMMING PROMOTION UPDATE

September 15, 2000

New trend? HBO Asia, the most popular movie service and grandpa of them all, is throwing in the towel for India, Bangladesh, Pakistan and the Maldives. Rampant piracy, gross under reporting of (cable TV) subscriber counts all add up to, "there must be a better way." The service is migrating to an advertising supported movie service drawing from film libraries of Paramount, Sony, Time Warner and Universal. Does that mean FTA? No, not at this time as subscriptions through cable will still be collected. If this works, a similar service for Taiwan will follow.

TVSN, mainstay FTA service on Aurora (12.407Vt) , closed on Aurora September 4 and gave no explanation.

History TV. Sun-TV, China, has begun FTA SCPC service to Chinese cable headends following blueprint established by USA's The History Channel. Service is on 4095/1055Hz, Sr 5.554, 3/4 As3S.

Knowledge Channel on PAS-8 is one of first users on vertical side which favours portions of Australia, Asia. Frequency is 3706, Sr 3.200, 3/4. Channel is affiliated with Filipino ABS/CBN .

Jazz Radio has launched within Deutsche Welle bouquet on Hotbird 5, *no* - no present plans to extend the popular audio network to Pacific but we can all hope!

Dutch programmer BVN advises they are talking with European Bouquet and others hoping to arrange 24 hour per day satellite service to South Africa and Asia-Pacific sometime in 2001. BVN is an export programming service with three sponsors including short-wave broadcaster Radio Netherlands, produces 6 hours daily currently, would expand to 24 hour service before becoming available in Pacific.

ZEE TV for Australia and NZ, 12.532Vt, was scheduled to begin CA status August 15th - did not. Slow delivery of (UEC) receivers for service blamed; operators say they will switch to CA "as soon as receivers are delivered and available to installers." Heavy TV advertising underway on Triangle TV, Auckland - $1,090 install.

Success of Aurora project? Some numbers from Australian government records. Sky Channel - 8,500; Imparja - 7,500; Victoria + NSW education - 3,400; SMA (Satellite Music Australia) - 2,500; Commonwealth Bank group - 2,200 and so on to total more than 45,000 (UEC) receivers. Smallest group appears to be RPH (Radio for the Print Handicapped) at 420. Pricing? First 642s landed at US$310 each, ended production sub-US$200 but unfortunately A$ to US$ had nose dived in same period so actual price reduction to distributor was "small."

Dr Overflow dead. German/Eastern European creators of advanced software for Nokia IRDs, called DVB2000 project, are calling it quits, blaming pay-TV hackers. Death threats, hacking of DVB2000 site sealed the deal. Related? Rolf Deubel, aka "Mad Max," reported now working for Irdeto folks out of London.

Lemon Electronics dead. German creators of "Volksbox" digital + analogue IRD have run out of money, closing doors.

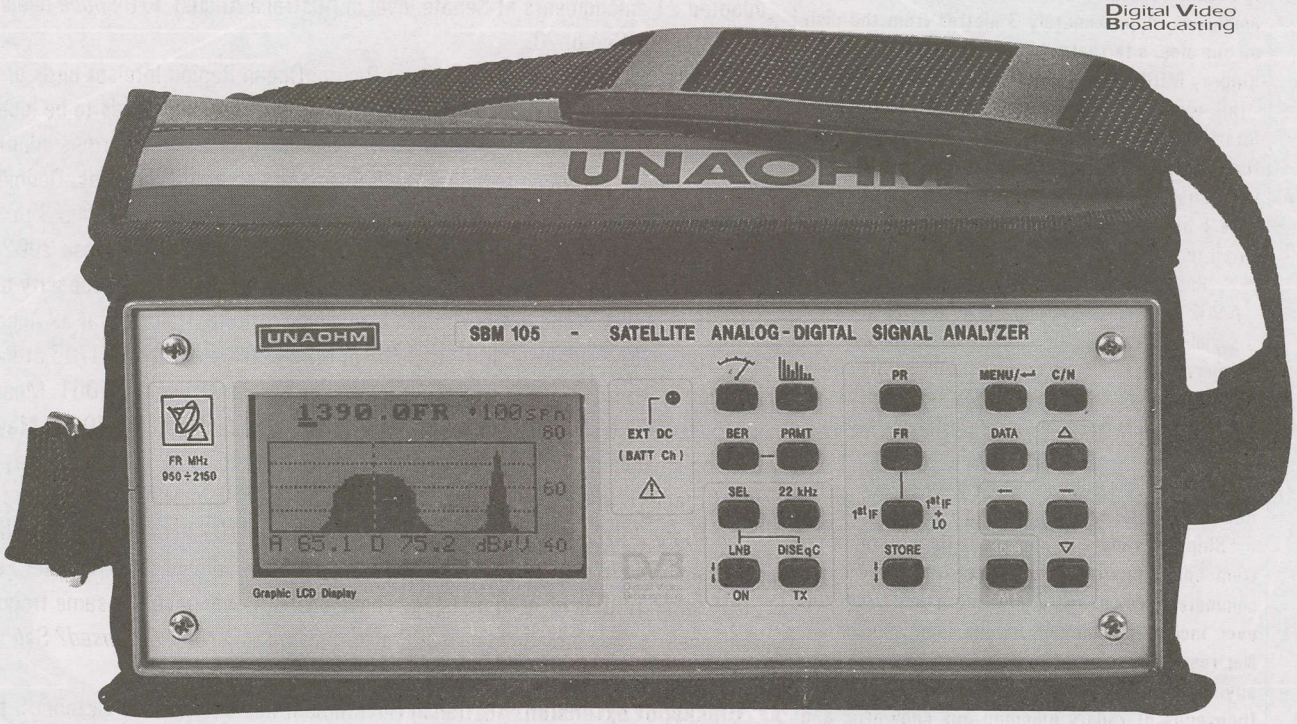
C + Ku warning. SF71/July, p. 8, reported unique dual band (C + Ku) single throat feed displayed during SPRSCS by China's SVEC. This warning - there are several versions out there, none offer polarity skewing and most have limited Ku resonance ranges ("Smallear" for example covers 11.7 - 12.2 only, on Ku).

Looking for work? Telstra-Saturn fibre optic + coax network construction underway in Christchurch, Auckland. BICC General is providing cables, Connectics construction in Christchurch; Stephenson Construction in Auckland. Both systems will build out essentially all of the respective metro areas over two year period, good opportunity to get in on ground floor of this NZ$1 billion project! In Australia, SRS and Comet heavily advertising for satellite installers - "*experience in the trade preferred, but not essential.*"

Better results from smaller dishes

Peaking dish and LNB after Locking the data stream provides more stable viewing results than analogue cross pole measurements. If you are still relying on analogue measurements for digital signals, may we point out a better way?

DVB Digital Video Broadcasting



Unaohm has developed Digital Signal Quality Meters for QPSK Satellite, QAM MATV and Cable and OFDM Terrestrial TV.

Four different QPSK Signal Quality measures are employed

- Digital Signal to Noise Ratio (=Modulation Error Ratio)
- Bit Error Rate at three different points
- Centre Frequency Offset, abbreviated to CFO
- Power index, a relative signal level indicator

Digital Signal to Noise Ratio is a comparison between Total Signal Power and Total Noise Power within a multiplex, real time. Digital SNR is a simple Digital Signal Quality measure that covers almost the entire range of signal qualities in one range.

Bit Error Rate measurements:

1/ Channel BER (CH BER)
2/ Post Viterbi (pV)
3/ Reed Solomon Uncorrected (RU)

CH BER and pV errors display exponentially due to wide error range. For example, BER of 1.4 E-6 has 1.4 errors in every 1,000,000 bits. CH BER in the E8 range indicates a clean signal, almost no Viterbi activity, a similarly low pV error rate and zero RU count. CH BER in the E2 range indicates a poor quality signal as indicated by activity in pV and RU indicators. As RU is a count of damaged data packets after the RS stage, any RU errors indicate compromised signal quality.

Centre Frequency Offset (CFO) shows how far the Centre Frequency of a multiplex is out. As the input to a receiver is altered by a Local Oscillator in the LNB, if L.O. frequency is not exact the tuning of the receiver might need to be adjusted to Lock a troublesome signal. CFO can be a surprisingly useful tool as it can be quite difficult to pick the centre of say a 27MHz wide transponder, even on a Spectrum Analyser!

Power index (PWRi) provides a LOW, OK or HIGH relative signal level indication. As actual signal level is not as important in the digital domain, PWRi is a useful part of Unaohm's Digital Signal Quality measurement armory.

These Digital Signal Quality measurements are provided in addition to analogue measurements that vary from one Unaohm instrument model to another. Let us show you how much an Unaohm Digital Signal Quality instrument can improve your link reliability.

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King of the "rays"

"A Sky NZ digital subscriber had a complaint - one group of channels missing or breaking up. I knew the uplink data stream had been corrupted on occasion, checked first with others to see if the problem was isolated. It was. I checked the receiver and card - all fine. Then the alignment of the 60cm dish with a meter where I found a nasty bunch of noise at L-band IF 1250 MHz, both vertical and horizontal. As I moved to the back of the dish, the noise amplitude changed rapidly in amplitude. Approximately 3 metres from the dish on one side, a terrestrial TV aerial equipped with a Kingray MHW24 masthead amplifier. Sure enough - this was the cause, creating over 100 dBuV of interference at 1250 MHz. I checked the board on the Kingray, no signs of corrosion but replacing it with another cured the problem. This is the first time I have seen a VHF(UHF) masthead creating satellite interference!"

Robert Hepple, Westronics, Whakatane, NZ

A VHF (UHF) masthead amplifier generating an L-band signal is rare but totally understandable. Amplifiers running at high gain often create much higher frequency "LO" type signals which at a distance of 3 metres would easily clobber the satellite LNB(f) by feeding through the 12 GHz stages straight into the L-band section. Any other similar reports out there?

Radar interference in Hong Kong

"Shipping radars in and about Hong Kong are a tremendous unwanted source of interference. As commerce grows, more and more ships and an ever increasing amount of sea lane congestion. Net result - no ship of any size can navigate here anymore unless it has radar on board. With thousands of radars pumping out kilowatts, and constantly moving at sea around the shorelines, interference comes and goes with great regularity. I am not so sure this is progress - perhaps it is time to reintroduce wooden hull schooners and do away with the current technology iron hulled merchant ships!"

David Weaver, Satellite Television Rentals, Hong Kong

Ideal IRD additions

"Further to SF#72, suggested list of changes, additions for improved IRDs. First, a (new) menu to independently adjust the audio volume on the modulated RF output and the SCART/RCA socket outputs. When you have two TVs connected to the dish, one via SCART or RCA and the other through the modulator, the variable audio level of most IRDs adjusts both outputs simultaneously. SCART (whether feeding a VCR or nearby TV set) should be independent of volume through modulator. (2) A 'menu-disable' selection for the on screen volume and other settings through the SCART. Anyone making a tape from SCART while watching on modulated RF does not want to see the on screen display permanently recorded on the videotape."

Al, Queensland

"OK, so why can't we have TV video + programme audio on appropriate RCA or SCART sockets while simultaneously accessing a companion radio service through RCA or SCART? On Euro Bouquet, for example, why not capability to access DW video and audio while at same time getting SRI/WRN from the same IRD?"

Carl Samuels, Auckland

HARDWARE EQUIPMENT PARTS UPDATE

September 15, 2000

"Facilitating" (now) illegal. Copyright Amendment (Digital Agenda) Bill 2000 adopted 21 amendments at Senate level in Australia August 17th; *none* dealing with our concerns. See p. 20.

Intelsat Pacific changes. Present Pacific Ocean Region Intelsat birds are at 174E, 177E and 180E. Big changes are coming - with Intelsat birds to be located at 85E, 157E, 174E, 176E, 178E and 180E. Yes, the 180 region swarm is adopting 2 degree spacing (between satellites) rather than the present 3 degrees. Double yes, those attempting to use this swarm on C-band with dishes smaller than 3 to 3.7m are going to be in trouble. Target date for the changes: 2002. Add to these 2002 effective changes a partnership with China's SinoSat for a C-band capacity at 110.5E as well (6 C-band transponders reaching into Australia as far as Alice Springs at 30 dBw). The schedule: I602 to 178E in May 2001, replaced by I705 at same location in February 2002. At 85E, I601 moves here in November 2001. Meanwhile at 157E, I602 will move here in February 2002 to be replaced by I709 in May 2003. Coming up sooner, I702 presently at 177E will move to 176E over a four day period this October (2000). Next to move will be I602 to 178E in May 2001, to be followed in February 2002 by I705 to 178E. The 180E bird? I701 here will become the "Regional Spare" and all customers now there will be moved to 178E after February 2002 when I705 is located at 178E. Those on 180E will have the same frequency assignments they now have on 180E after moving to 178E. *Confused?* See table, p. 31 here.

Blackspot extension. Australian Government has extended to October 6 filing of "expressions of interest" for funding of self-help Blackspot retransmission services. Details from 1800 680 841, or www.dcita.gov.au/tvfund.

D9223 caution. When Japanese Entertainment Television (JET) went out of business, a number of their SA IRDs became available at what seemed like bargain prices. There is this caution concerning ANY second-hand SA IRDs. *Each* receiver is issued through PanAmSat for use with a *single* programmer. Even though the original owner paid for the unit, it may not be used on any other service without the written approval of the first programmer. Sometimes getting this approval, and having the IRD moved to a new programmer, is next to impossible. The original programmer has to agree, the new programmer has to agree, then PanAmSat has to agree. This can take weeks (months) to locate the right people and get sorted. It is *not* simply a matter of getting the IRD reauthorised for a new service - authorisation cannot, *will not* happen until everyone involved signs off - including the original owner of the IRD. Why so complicated? Could be SA wants it that way to discourage receiver second-hand-trading, and to 'force' you to buy a new unit for *each* new service - from them, of course!

Remember Orion 3 and 139E? The 6 channel C-band + Ku bird was to provide small dish (65-90cm) coverage to entire Pacific region on Ku but Delta III launch failure prevented proper satellite separation 22 minutes after lift-off. They now believe they know why failure occurred - defective "brazing" (process used to connect two pieces of fuel line tubing together) caused combustion chamber breach stranding Orion III in a low earth orbit from which it could not be lifted into geostationary levels. Orion III was abandoned after attempts to boost it higher, insurance collected, no replacement ever announced.

Cheaper DVB-T set-top boxes for Australia. Australian standard calls for Dolby AC-3 stereo audio, but this will add A$100+ to cost of decoders. Now a new Minister of Communications dictum ruling that MPEG-2 audio be employed, against wishes of FTA terrestrial broadcasters who opted for Dolby system.

Installing dealers with their hair down

"Who can you trust?" from SPRSCS Melbourne

Think of a group therapy session; one topic leader and more than a hundred "patients" filling a room with sharp criticism of the industry we all work within and the problems we encounter on a frequent basis. This session was designed as a forum to allow installers and installing dealers to vent their frustrations with the way things presently are in the satellite industry. Directly and indirectly, the "distributor - installer/dealer" relationship came in for more than half of the 90 minute session discussion.

"*The distributor is not bound by any law* or regulation to sell any product for a specific price nor to just a segment of the market - such as installers. He or she has but one responsibility - to make a profit and stay in business. The distributor alone can decide who to sell to, at what price. If he or she does not like the way you look, smell, or do business, they are within their legal rights to hike the price to you as a mild hint that you are not welcome there."

"*The distributor is not in the business* of policing what happens to his product after it has been sold. If he sells to cowboys and refuses to appreciate your steady, repeat business by giving you a better price than the fresh-off-the-street cowboy, first you should speak up and show your displeasure. If that fails to get you better pricing and more consideration for your repeat business, go elsewhere."

For one Queensland installer, frustration was at the boiling point. "*I ordered out the UEC receiver* and drove 3 hours to the job site. The receiver failed straight out of the box, so I drove back to my shop; one entire day shot to hell. With a replacement under my arm, I drove the same distance again and once again the replacement failed within 5 minutes of coming out of the box. Day two shot. On the third day, I finally got a receiver that worked."

The dealer expected sympathy. What he got was a dose in common sense.

"First, you had no business heading out on a 3 hour drive to do an install with only a single receiver. Second, you certainly could have and should have checked the receiver before you made the trip - especially when you had no backup unit. Third, after being burned by a bad IRD, you go back with a replacement and make the very same mistake all over again!"

Realising his mistake, he tried to shift the blame to the (well known) distributor and the equally well known receiver. "What kinds of distributor sends out units before they are checked?" he asked.

The answer broke up the tense room atmosphere. "*One who makes the same mistakes you made!*"

Cowboys and Indians

"*A cowboy is a cowboy by definition.* He has no experience or very little experience, and he is not qualified to be doing satellite TV system installs on his own - at best, he should be an apprentice. His workmanship is second rate, he uses the wrong parts and installs them in an incorrect or unsafe manner. And his charges tend to be either way too low or way too high. Worst of all, he probably thinks he is doing an adequate job and would not agree his workmanship is second rate."

And the five most difficult subjects were ...

- Why do distributors make it so easy for 'cowboys' to buy equipment at trade prices?
- How do I compete with people who sell lesser grade equipment based solely upon price?
- When potential customers ask how long a particular FTA service will 'last,' what do you say?
- How do we deal with a single-source IRD such as the UEC 700s and the very flexible pricing quoted?
- When a cowboy hits a consumer, takes the money and runs, and won't service the installation,

But most distributors sell equipment to cowboys at trade pricing. Does that not encourage these inexperienced people to continue to sell second rate systems which result in a black mark on all of us?

"*How can we get distributors to respect* our professional status and convince them they should stop selling the equipment we purchase from them for customer installs to the retail trade for the same price we are charged?"

But, as was repeatedly pointed out, "*the distributor is in business for himself.* He can set any prices he wishes to anyone he wishes. From his perspective, everyone is a potential customer."

"*The distributor is not required* to sell only to the trade. His primary responsibility is to make a profit, to stay in business, to be competitive.

"*The distributor is not in the business* of setting policy, what will be done with the parts he sells after he sells them. How they are used is beyond his control (see SF#72, p. 1)."

"*Could there not be legislation* to force the distributor to require a tax number before he sells at 'trade prices'? And lacking a tax number, the buyer must pay retail price?"

"*Suppose ten professionals went to a distributor* and said, 'look - we want you to honour the professionals by respecting that we buy in quantity from you, and then have to resell what we buy. We have a dilemma. Either you protect us from retail buyers who come in here to buy at the same prices we do, or all ten of us are going to form a buying co-operative and import our own antennas, LNBs and receivers. This is an important issue to us because every time you sell to a retail customer at trade pricing, you are taking business away from us."

And in response:

"*That will not work with some ethnic groups*, such as Indians, who depend upon people of their own ethnicity for advice, best price, installation assistance. The distributor knows these people are retail customers, but he also knows they will bring in dozens of friends and acquaintances as long as they get a good deal from him."

And a case in point:

"*I went to an Indian customer to quote a system*. He insisted in providing his own receiver which right away cost me $200 in profit on the system. But of course he expected me to programme it for him, even though he bought it from a distributor at a trade price! So I am sitting there programming this DSR receiver when the Indian whips out a copy of SatFACTS with a suggestion; 'Use the table here to set it up'! When I had completed the installation and presented my bill, he grabbed SatFACTS again and found an advertisement for the actuator. 'Here, it is $299, not $350. You are charging me too much!'" (1)

"*I was asked why my 2.4m quotation* was 50% more money than the Cowboy's quote for a 1.8m. I tried to explain that it was not safe to install a 1.8m on the side of a house using a low strength Foxtel/Austar grade mount that was intended for 65cm dishes, as the cowboy was proposing. Next I was told the 1.8m was 'more than big enough' for the European Bouquet on C-band, that the 2.4m I was proposing was 'too big' with the strong suggestion that I had chosen a larger antenna just to make more money."

"*The cowboys don't pay tax*, or at least don't pay GST on their labour content. I keep running into situations where a cowboy has asked for a check to pay for the equipment and cash for the labour portion - the customer was told he could 'save some money' by paying part of the sale in cash."

"*So much about our business is hype*, driven by the people of Foxtel and Austar who have turned this into a Hollywood production. There is an atmosphere here which attracts people who don't like to play by rules. And there is the black magic element to it all - plucking digital television signals out of thin air from a satellite tens of thousands of kilometres away in space. It is all fantasy, a shell game. Now you see it, now you don't. Unfortunately, this is the aluminium siding and beach front land in Queensland con game of the 21st century. Anyone who wants to build a solid business for the long haul has to realise that professionalism comes only from experience and experience depends totally upon knowledge."

"*When you down grade the satellite system* you sell to one satellite, single polarity for the fewest possible dollars, you are playing the cowboy game yourself."

"*If a person consistently under prices* the market norm, business failure is inevitable. The seller offering prices below the market norm, if selling equivalent equipment, has the same costs for raw materials as the competition. His only opportunity to price 'below market' is to undercharge on his labour content or perhaps by cheating on the GST. This never works long term, at best they gain a short term advantage. Sooner or later the laws of economics, just as rigid as the laws of physics which govern satellite TV system design, will apply and the operator will go out of business.

"*I would like to make mention of the way Garry Cratt* of AV-Comm handles retail buyers. First he produces a retail brochure which automatically goes to anyone who is unknown to him as a professional in the trade. Next, he questions people to validate their status and if they do not measure up, they simply don't get trade prices. I have had cowboys call me because they know I qualify to purchase from Garry at trade pricing, begging me to buy the products for them at my trade price discount. Of course I refuse to do so."

Support for the faint of heart

"There is hardly anything in this world that somebody cannot make a little worse and sell for a little less. And those who consider price alone are this man's lawful prey."
John Ruskin, 19th Century Philosopher

Product support

How much technical support are installers receiving from their distributor? The technical faults for various receivers are legendary, the fixes often remain unknown even two years after a product has been introduced.

"*My record is 9 Pace decoders* before I got one that worked for a single customer install!"

"*The customer seldom sees anyone but you*, the installer. When you have one, two or three consecutive IRD failures out of the box, in front of them, it is only natural they lose confidence in what they have decided to purchase - even before it works. When products fail to work as intended, it is the installer that gets the black marks."

"*All too often*, the importer seems not to understand the product. They simply bring it in, say 'here it is' and hope for the best. I realise they are disadvantaged if the original equipment manufacturer (OEM) has also failed to supply appropriate technical support materials but our only recourse is to go back to the distributor. This tells me the distributors are not demanding the level of technical support they are entitled to from the offshore manufacturers."

"*Radical model changes every six months* is a bad policy. The distributors are not taking proper responsibility for ex-models when they are unable or refuse to support them with technical help and repair. How do I explain to my customer that the guy I bought off of - who my customer never even heard of - won't give service any more or support the broken set with a replacement because they no longer exist in commerce?"

"*The distributor tells me*, 'buy a new one,' but that is totally unreasonable and our customers will not accept that as an answer. I don't blame them. The obsolescence factor is far too short for someone who spent $700 - $800 for a piece of equipment less than one year ago."

"*The TV set repair industry* has done an excellent job of documenting faults and pinpointing typical failure points in hundreds, thousands of TV set brands and models. You can locate up to date part number trouble shooting instructions for virtually any TV set ever sold. I have never been able to obtain even a schematic diagram for a satellite receiver. Our industry has totally failed in this area and with the lone exception of a regular receiver trouble shooting column in UK magazine Television, there is no ready source of assistance."

To which we made a suggestion. From mid-July on our SatFACTS web site (httpo://www.satfacts.kwikkopy.co.nz), "page two," is a listing or faults seeking solutions as contributed by industry members. We must report that in the first three weeks, virtually nobody has made further contributions to the listing - either faults or solutions. If you are really serious about the sharing of trouble shooting information, this is at least a place to start the task of bringing it all together.

1/ As was discussed at this SPRSCS session, SatFACTS discourages distributors advertising prices here. We cannot *demand* they not use prices, but dealers who find this happening can put pressure on distributors to not include pricing or to list only "Suggested retail price."

The debt we *all* owe ...

Sir Arthur C. Clarke
"Godfather" of an industry

Some debts are never properly paid; *this is one* that should be acknowledged.

Arthur Charles Clarke was born in Minehead, England on December 17, 1917, the first son of a father who was on a World War 1 battlefield in France at the time. Arthur's father and mother came from post office families which as World War 1 closed was busy reinventing itself to cope with the arrival of wireless communications. The British post office was made responsible for telephone and telegraph circuits, and the BBC when inaugurated in 1922 would trace its ancestry to the same government department. Prior to being conscripted and sent off to France, Charles Wright Clarke was an 'engineer' for the post office. Mother Nora had been a telegraphist. It was hardly surprising that first son Arthur would take an interest in the infant telecommunications industry even if his father and mother abandoned their "post office family" status and became farmers, a lifestyle Charles augmented by becoming a subcontractor in support of the growing telephone system operated by the PO.

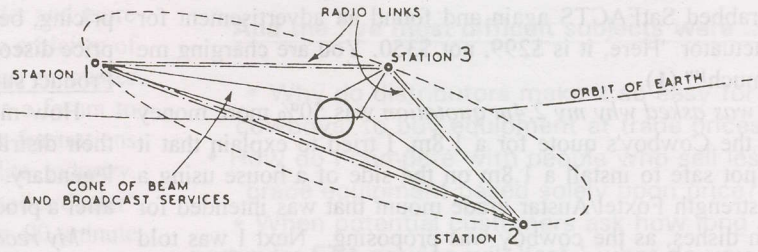

Fig. 3. Three satellite stations would ensure complete coverage of the globe.

Arthur was 13 when Charles died from lung damage sustained from poisonous gas attacks on the battlefield in France. As the eldest, Arthur became the man of the house and at an age when most young men are discovering the world he was expected to make major contributions to the family's well being which now included four children.

But Arthur Charles Clarke was no ordinary child entering puberty. In 1934, age 16, he wrote a letter to the then struggling British Interplanetary Society:

"*Please could you send me particulars* about your society, as I should very much like to join it. I am extremely interested in the whole subject of interplanetary communications, and have made some experiments with rockets. I am sixteen, have an extensive knowledge of physics and chemistry and possess a small laboratory and apparatus with which I can do some experiments in this line."

Mixing sulphur, saltpetre and charcoal in his mother's kitchen pestle and mortar, Arthur created fireworks on the family farm. When that challenge was beaten, he conceived larger devices theoretically capable of rising several miles above earth. By attaching one such rocket to a balsa wood model plane created by a friend, he theorised the rocket would carry the model to a great altitude from which it would gently glide back to earth. He had not reckoned with the great heat of the rocket exhaust nor the flammability of the balsa wood model!

At age 17, Arthur conceived a light-beam transmitter and receiver using a photocell salvaged from a piece of defective equipment. 'When the light was shone on the photoelectric cell, every word spoken into a carbon microphone could be heard in the earphones.'

A relative was an avid reader of science fiction stories, and from the mid 20s onward a small but insatiable subset of culture eagerly anticipated each new issue of Amazing Stories and others of the era. Arthur was but 11 when he discovered this "other world'; it would more than any other influence impact his life.

October 1945

World War 2 was over and the Allied forces were racing to catalogue the thousands of scientific developments which Germany had put to use in the fighting. German developments in the field of unmanned rockets were especially intriguing, as London and the south of England had discovered much to British dismay when V-series bombs rained down on the English countryside. Arthur C. Clarke had spent the war years attached to various advanced scientific projects where he met and worked with creators of radar and other war-borne telecommunication wonders. Now in his 20s, the man-boy who frightened his family and neighbours with gunpowder rockets and delighted his siblings with radio related breadboard experiments had crossed a new plateau of creativity.

A rapidly developing scientific writer, with his finger on the pulse of new technological developments, Arthur C. Clarke was becoming a recognised if not yet respected name in scientific circles. That was about to change.

In October 1945, English publication Wireless World devoted four pages to an analysis created by Arthur which for the first time married two separate disciplines; rocketry and radio. "Extra-Terrestrial Relays" with the subtitle "Can Rocket Stations Give World-Wide Radio Coverage?" opening a new door for scientific exploration.

In "ETR," Clarke drew first on his knowledge of German rocketry developments postulating that with the correct design a "space station" could be elevated to what we now know as geostationary orbit. During WW2, Clarke had finely honed his skills as a mathematician. "ETR" is primarily about the "math" of "launching rockets to geostationary orbit" and once there, creating a "radio relay system" to broadcast back to earth.

"ETR" appeared in print and attracted essentially zero-feedback. From readers or the science community. A lesser known Clarke follow-up piece in Wireless World attracted only slight response.

Indirectly, "Extra Terrestrial Relays" established a "Clarke formula" which would serve him well for more than five decades. You begin with pure science - facts you know to be true, with a sound basis in mathematics. Then you marry two or more seemingly unrelated facts into a new hypothesis where

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Dual CAM Sockets (PCMIA)	NA	•	NA
Dual input Analog Receiver (low Threshold)	NA	NA	•
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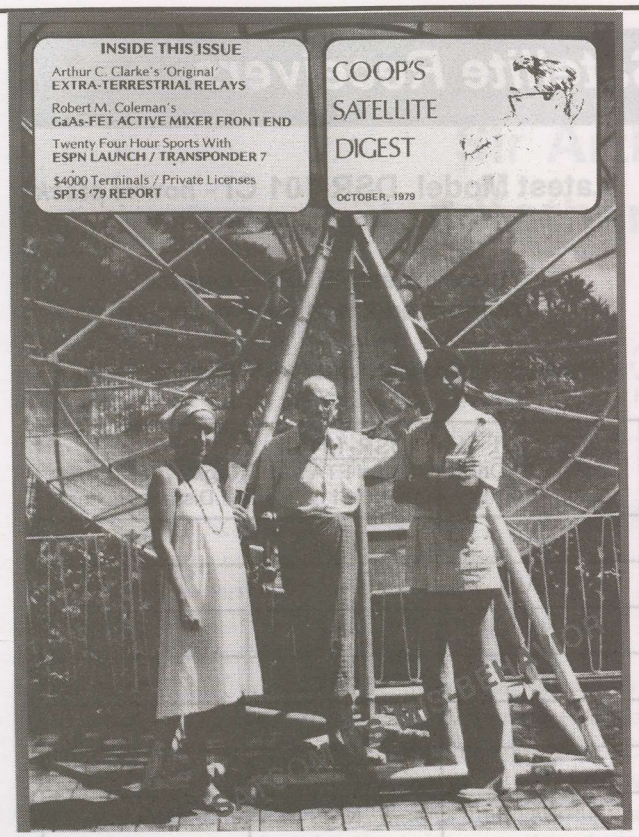


Arthur C. Clarke (centre) at home in Sri Lanka with a 15' screen mesh dish provided to him by the Indian government in 1976 when the (Indian) SITE experiments were underway; the very first "*home* satellite dish" in the world.

the sum of the facts extends man's capabilities far beyond anything previously attempted. "ETR" drew first on the rapidly developing world of rocketry and then from Clarke's own personal experience with "millimetre wave(length)s" which he was exposed to first hand during WW2 radar trials and development.

"*Millimetre waves had the totally new ability* to be tightly focused to create very precise illumination patterns, not unlike the light-beam transmitter of my youth. With appropriate transmitting antennas, you could select a coverage area such as one city, one country, or one continent provided only that your transmitting antenna was capable of having line-of-sight paths to the intended receiving locations."

If that seems 'basic' today, it was a totally new concept in 1945. Generating radio transmission power at millimetre wavelengths (frequencies beyond 2,000 megacycles or 2 GHz today) was a dream, not yet realised. But radar development had proven the value in tighter and tighter beams, and our next generation Ka band (18/28 GHz) satellites now being built will refine that art even more precisely.

In "ETR" Clarke first defined the parameters of the millimetre wave service. "*Assuming the use of 3,000 Mc/s waves*, mirrors about a meter across would beam almost all of the power to the earth. Larger reflectors could be used to illuminate single countries or regions for the more restricted services." He used his mathematical skills to illustrate that while a single extra-terrestrial relay transmitter from a height above earth of 35,900 kilometres could "see" approximately half of the earth's surface, "(three) stations could be arranged approximately equidistantly around the earth and the following longitudes appear to be suitable:

30E - Africa and Europe
150E - China and Oceana
90W - The Americas."

Clarke takes no credit for "discovering" the geostationary orbit belt ("*others had identified such a height, directly above the equator, prior to me*"), but "ETR" for the first time focused on a use for this belt in space.

"*It will be observed that one orbit*, with a radius of 42,000 km, has a period of exactly 24 hours. A body in such an orbit, if its plane coincided with that of the earth's equator, would revolve with the earth and would thus be stationary above the same spot on the planet. It would remain fixed in the sky of a whole hemisphere and unlike all other heavenly bodies would neither rise nor set."

His illustration in Wireless World (p. 8, here) made it dead simple to comprehend. His mathematics were correct, and his "vision" of how microwave frequency range transmissions would be generated on earth, focused through a parabolic "mirror" (transmitting antenna) pointing at the geostationary orbit position of the "relay station" was spot on, as would ultimately be verified 25 years hence with the first television relay satellite launched.

"*Small parabolas about a foot in diameter* would be used for receiving at the earth end and would give a very good signal / noise ratio. There would be very little interference, partly because of the frequency used and partly because the mirrors (antennas) would be pointing towards the sky which could contain no other source of signal. A field strength of 10 microvolts / metre might well be ample, and this would require a transmitter output of only 50 watts."

We take all of this for granted today, 55 years after the Wireless World article first proposed extra-terrestrial relays. We accept the numbers because they are the ones that work for the services we try to create. It is important to realise that in 1945, 3,000 megacycles (MHz today; 3 GHz) was about as attainable as 250 GHz remains today. Yes, we have gravitated to 50 watt transponder power levels and yes, 1 foot / 30cm region dishes are well within the range of our daily experiences with the current technology. And with minor adaptation, 30E, 150E and 90W are centres for major geostationary satellite "swarms" just as Clarke predicted. And he saw each "relay" as a "signal repeater" creating no programming of its own - merely receiving, changing to a new frequency and rebroadcasting what it received from earth (uplink) stations. If that seems very similar to today's satellite system, there is good reason.

Vision

Arthur C. Clarke has been variously applauded as a scientist, a mathematician, and a visionary. He is less comfortable being tagged as a "science fiction writer" although for most people who recognise his name, it is science fiction that immediately comes to mind. "*What I try to do is to take science fact and say* - 'what if *this* science fact and *that* science fact were merged into a single postulation? *Then* what would we have?'" During the especially productive decades from 1950 to 1990, he was variously awarded virtually every science and writing award created by mankind to recognise excellence, including the Marconi Award (1982). More recently, his native country made a minor but significant change in his stationary and business card; Arthur C. Clarke is now *Sir* Arthur C. Clarke.

More than 50 published books (both fiction and non-fiction), hundreds of television programmes and a memorable group of motion pictures later (including 2001, 2010), Clarke approaches his 83rd birthday from his adopted home in Sri

Lanka with a list of writing and mass media projects "in process" which would daunt a man half his age.

Meanwhile - in TVRO

Sir Arthur's involvement with home TVRO (that's "television receive only [dish systems]") was natural given his prognostication of 1945. In 1976, the country of India borrowed an American satellite (ATS-6) for six months to conduct what they called "SITE Experiments." These 860 MHz (not quite L-band, actually a part of the UHF-TV band) transmissions demonstrated the feasibility of delivering educational materials to schools scattered throughout the Indian subcontinent. Someone involved remembered Clarke's 1945 Wireless World article, knew he lived south of Indian in Sri Lanka, and arranged a 15 foot mesh dish with a UHF-TV preamplifier and 860 MHz feed as an 'honorarium' (see October 1979 Coop's Satellite Digest front cover, left). No, it was not "millimetre wave satellite reception" but in 1976 this was a fair approximation.

By 1984, 'TVRO' was big business in American and rapidly gaining elsewhere as well (see SF#68, p. 32 for review of first Australian TVRO in 1980). In the United States, C-band home dishes systems had passed the 100,000 per month level and Coop's Satellite Digest arranged a trip for 25 people to fly from America to Sri Lanka to participate in the dedication of a new Arthur C. Clarke Centre For Modern Technologies at the University of Moratuwa. Like any good "guests," the Americans making the trip (along with some Japanese and Canadians) took gifts; a trio of "big dishes" to be installed by the group (a 16' Paraclipse - see right, a 20 feet ADM and a 25 foot Hero).

Writing in the closing paragraphs of "Ascent to Orbit - A Scientific Autobiography - The Technical Writings of Arthur C. Clarke" he said:

"*At this very moment*, after much massaging in my word-processor, the Act setting up the Arthur C. Clarke Centre is being translated into Sinhala and Tamil. The first buildings should be ready by November 1983, just in time to receive a U.S. delegation ... (including) three 16-25 foot TVRO earth stations, one of which will be set up on the roof of my Colombo house, while the other two will be installed at the University and ACC."

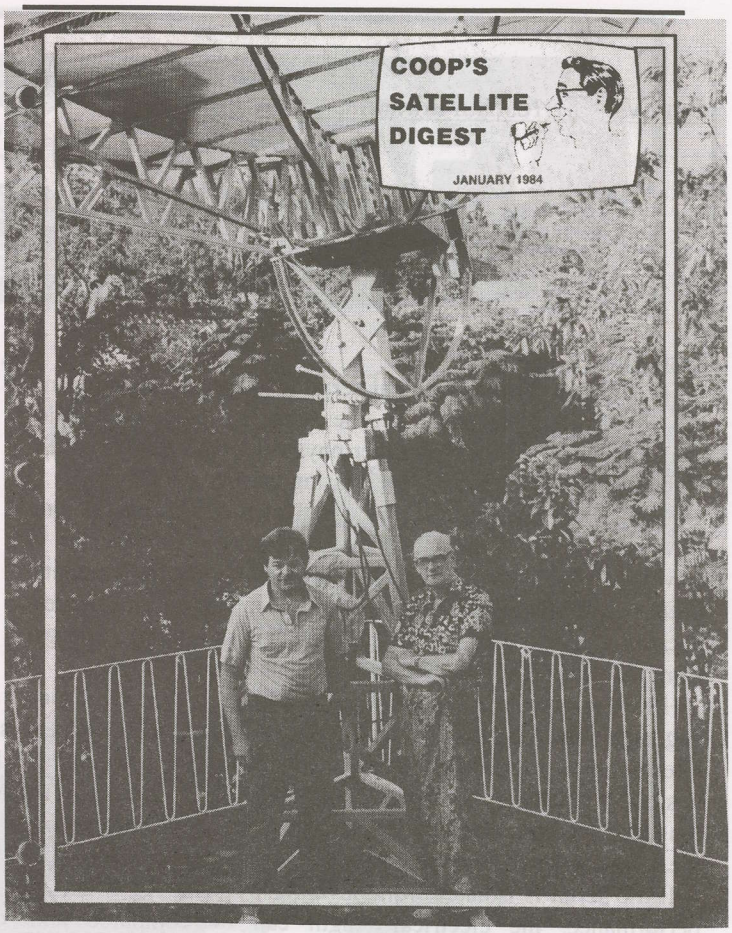
In a still later postscript dated January 20, 1985, he closed with:

"*I am happy to say that the friendly American invasion* went very well, despite transportation and other problems. Often working through the night, the enthusiastic visitors set up their three earth stations, which are a priceless asset to the technology of the country. I would like to express my gratitude to the principal donors: Dave Johnson (Paradigm Manufacturing, Inc.), Bob Behar (Hero Communications); and, James Gowen (Antenna Development and Manufacturing, Inc.)."

Seven years later, Clarke in completing his "How The World Was One" ("The Turbulent History of Global Communications") would revisit the 1984 "invasion." He wrote (Chapter 35 - titled "Coop's Troop"):

"*By the end of the eighties, however,* the uninhibited, Wild West days of the geostationary orbit were over; the big corporations had called in their lawyers to clean up the frontier, and to jail any outlaws they could catch. It cost millions to build and launch communications satellites, and millions more to feed their voracious appetites. Those who benefited from them could hardly expect to have a free joy-ride forever.

"*Today, millions of law-abiding citizens* pay their decoder fees and are presented with such a choice of news and entertainment as no other age has ever imagined. And they are doing it with smaller and smaller dishes. Even the traditional parabolic dish may soon be replaced by flat plates full of electronics that can fool the incoming signals into thinking that they are focused into one spot. So, early in the 21st century, the parabolic dishes which sprouted mushroom-like over much of Europe and the Americas during the 1980s will have gone the way of the horizontal aerial wires between the chimneys of the 1930s."



Eight years later - same location, different (16') dish (this one was Paraclipse horizon to horizon mount C-band), with Paradigm founder David Johnson.

Gay Cooper of SatFACTS with Arthur in his home in Sri Lanka during a recent visit. He still played a mean game of table tennis.

Part VI - Terrestrial antennas - how they work

Broadbanding Antennas & Measurements Inside Buildings

Resonance

The first job of the terrestrial aerial is to capture signal from the passing wavefront(s). It does this by having metallic elements which are of the proper physical length to "resonate" with the electrical length of the passing waves.

The physical length of the aerial elements varies as the wavefront frequency varies; 55.25 MHz for example has a wavelength of 5.44 metres. Fortunately, the aerial elements need only be *half* that length to be resonant - 2.71 metres because a half-wave antenna absorbs almost as much energy from the wavefront as a full wave antenna.

However, the electrical length of 1/2 wave in space (the air) is greater than the same frequency wavelength which has been intercepted by a metallic aerial element. So our *physical* aerial is slightly smaller than the electrical free space wave - 2.57m long for an aerial assembled from 10-12mm tubing rather than the 2.71m length of the same signal in free space.

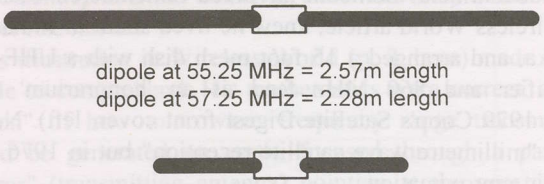
If the aerial is isolated from anything which might affect its performance, the electrical length can be computed and accepted as correct. However, it is rare for an aerial to not be located near other metallic or reflective objects and the proximity of these "foreign" objects will have a "loading effect" on the aerial. This "loading" will make the calculated aerial length vary, longer or shorter. An aerial so effected will have a new "resonant frequency," modified by the proximity of the foreign objects.

How important is resonance? If the antenna is not resonant (electrically of the same length as one-half wavelength of the passing wave front), it captures only a *portion* of the signal. An antenna exactly at resonance will have the current at the output terminals in phase with the voltage taken out of the air; the definition of resonance. If the aerial is too long for the wave front, the current phase maximum falls behind (lags) the voltage (called inductive reactance). Conversely, if the aerial is too short for the desired frequency, the phase of the current comes ahead of the voltage peak (called capacitive reactance). In other words, only resonance traps maximum signal for passing on to the transmission line heading for the TV receiver.

The antenna has an impedance (such as 75 ohms or 300 ohms). By definition, antenna impedance is measured at the point where the transmission line connects and impedance is simply the ratio of (signal) voltage to (signal) current at the electrical operating frequency of the aerial.

If the antenna is not properly resonant at that operating frequency, the ratio of signal voltage to signal current changes at the transmission line connection point. An antenna designed to have a 75 ohm impedance can only exhibit that impedance at the design frequency. So lacking resonance, we have a new ratio of voltage to current and therefore we have a new "impedance" for the antenna.

A lack of resonance reduces the signal pickup from the antenna, and creates a new impedance at the transmission line connection point. An antenna designed to produce maximum signal at 55.25 MHz and delivering a 75 ohm impedance at that frequency will still intercept another TV signal on 62.25 MHz but two things happen:



1) Because the antenna is "too long" for the 62.25 MHz wave, the "gain" (signal voltage) picked up is reduced, and,

2) Because the antenna's impedance is 75 ohms *only* at the original design frequency (55.25 MHz), it will be significantly changed at 62.25 MHz.

With a new impedance at 62.25 MHz, the 75 ohm (impedance) transmission line connected to the antenna transfers only a portion of the 62.25 MHz signal to the television receiver. The rest is left behind, at the antenna, because of "mismatch."

All of those elements

Virtually all TV aerial installations have two or more channels available. The aerial must somehow show resonance for *each* channel to be received. This is no simple task given that while it might be possible to construct two, three or more separate "single channel antennas" on the same boom support structure, each optimised for a single TV channel, when all of those pieces of metal try to function in close proximity to one another - as if the others were not even there - you have a disaster. Metallic elements from one antenna, sharing the same support boom, interact with elements for other channels, causing "loading" between elements, changing the electrical length of one another, and shifting the impedance away from the original intended design.

Solutions - there are several - are always a compromise, lesser performance for any single channel in exchange for more channels without objectionable interaction.

Relationships

The "fit" is far from perfect, but it happens that "harmonic" relationships do exist between band I and band III electrical wavelengths. For example, in the diagram above we see that an electrical half-wave dipole for 175.25 MHz (TV channel 6, Australia and channel 4 NZ) is 0.813m long. Further, that a dipole for band I 57.25 MHz (Australia channel 1) is 2.49m long while a half wavelength for 55.25 MHz (NZ channel 2) is 2.57m long.

Note that 3 times 0.813 is 2.439m, within 2% of the correct length for 57.25 and within 5% of 55.25. Is that close enough to build an antenna that responds properly to both band I and

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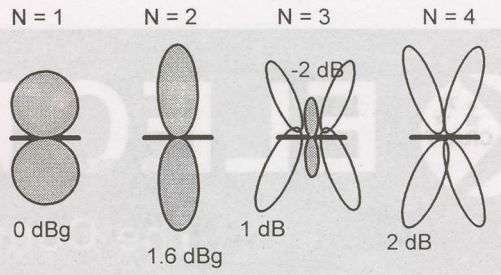
band III? The answer is yes, and no. Yes, close enough, but no, not without some new design problems.

Recall that a half-wave element is directional, with a major "lobe" at right angles to the elements (right, N = 1). If the same element is longer than 1/2 wave it loses resonance and the impedance match goes to heck in a hand basket. But, at multiples of 1/2 wavelength the gain "comes back" and the impedance - well, that's a different story.

For example, if the element is a full wave long (N = 2, right), the "gain" of the dipole goes from 0 dB to 1.6 dB and the front pattern narrows - becomes sharper. That's all good. But if N = 1 = 57.25 MHz, then N = 2 = 114.5 MHz. There is *no* TV channel at 114.50.

When N = 3 (171.75 MHz), the normal forward pattern gain becomes -2 dB (2 dB less than a resonant dipole) but up pop a pair of 1 dB gain lobes at angles to the right and left of the depressed front lobe. That's usually not good.

And when N = 4 (229.0 MHz), the front lobe is totally gone, leaving the two "pigtail" lobes off to the side each with 2 dB of gain. That is also not good. The "antenna" illustrated is a simplistic 1/2 wavelength driven (dipole) element operating by design at 57.25 MHz (Australian channel 1). About the only



place this would be useful is where you have an (Australian) channel 1 in one direction and 20-30 degrees off of centre, an Australian channel 6 (or in NZ, a channel 2 at 55.25 and a channel 4 off to the side). In most areas, the TV transmitters are close enough together that when the antenna is pointing at one, it is pointing at all for that region.

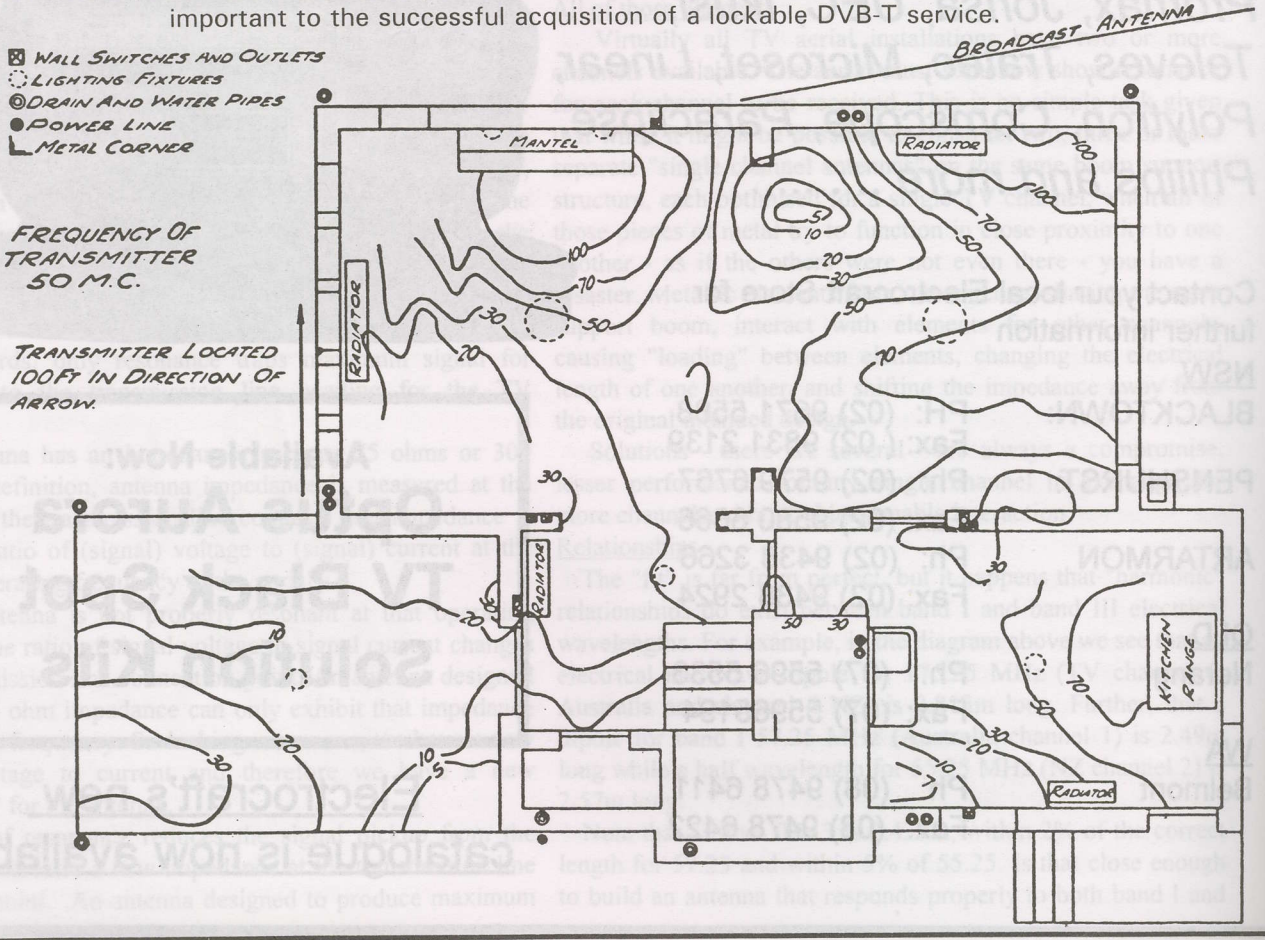
The illustrations don't properly convey that *in between* the front lobe of N = 3 and the twin side lobes, there is one heck of a "gain hole" that is down by as much as 15 dB for the N = 3 signals. It is that "hole" that most challenges the installer, not the 1 dB gain side lobes that squirt out off of the centre.

This tells us that a band I antenna, designed for one or at most two channels, is not likely to provide useful gain, *in the correct direction*, for band III reception. If one happens to

Penetrating a building with VHF signals

Although no survey has ever been produced for New Zealand, between 30 and 35% of all Australian TV equipped homes depend upon indoor ("set top") aerials for reception. With the advent of DVB-T services, indoor antennas may prove to be a major stumbling block for consumer acceptance of the new services. Here, in two charts, measurements made in a single home by RCA engineers utilising two separate VHF signals penetrating the home from two different directions - one in the 45-50 MHz range, the other near 70 MHz. At band III and UHF, the "signal islands" become significantly more erratic and unpredictable.

COMPARE this 45/50 MHz set of measurements against the companion (right) 70 MHz tests in the same home. Where you would place the (digital DVB-T) TV set equipped with a set-top aerial would be very important to the successful acquisition of a lockable DVB-T service.



work, it is because the band III signal is strong (to very strong) and even if it is degraded by 15 dB or more, it is still strong enough to work for you.

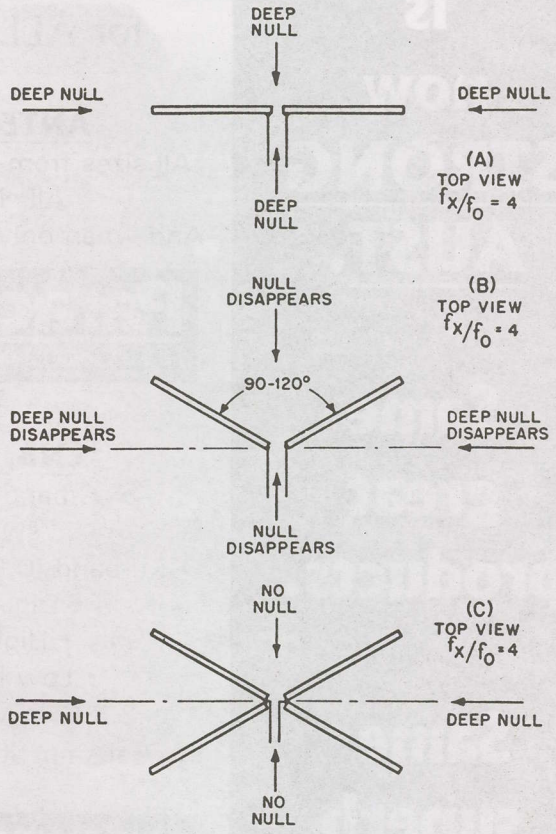
One solution

There are ways to correct for the centre null even at N = 3 or 4. The dipole elements can be bent in, towards the station, by approximately 60 degrees. In the first case (right), the dipole is straight as you would normally expect and there is a deep centre null. Now, simply bend the two 1/4 wave sections inward (middle illustration, right) and now we have a "fan" shaped dipole and the N = 3 and N = 4 *null* simply disappears!

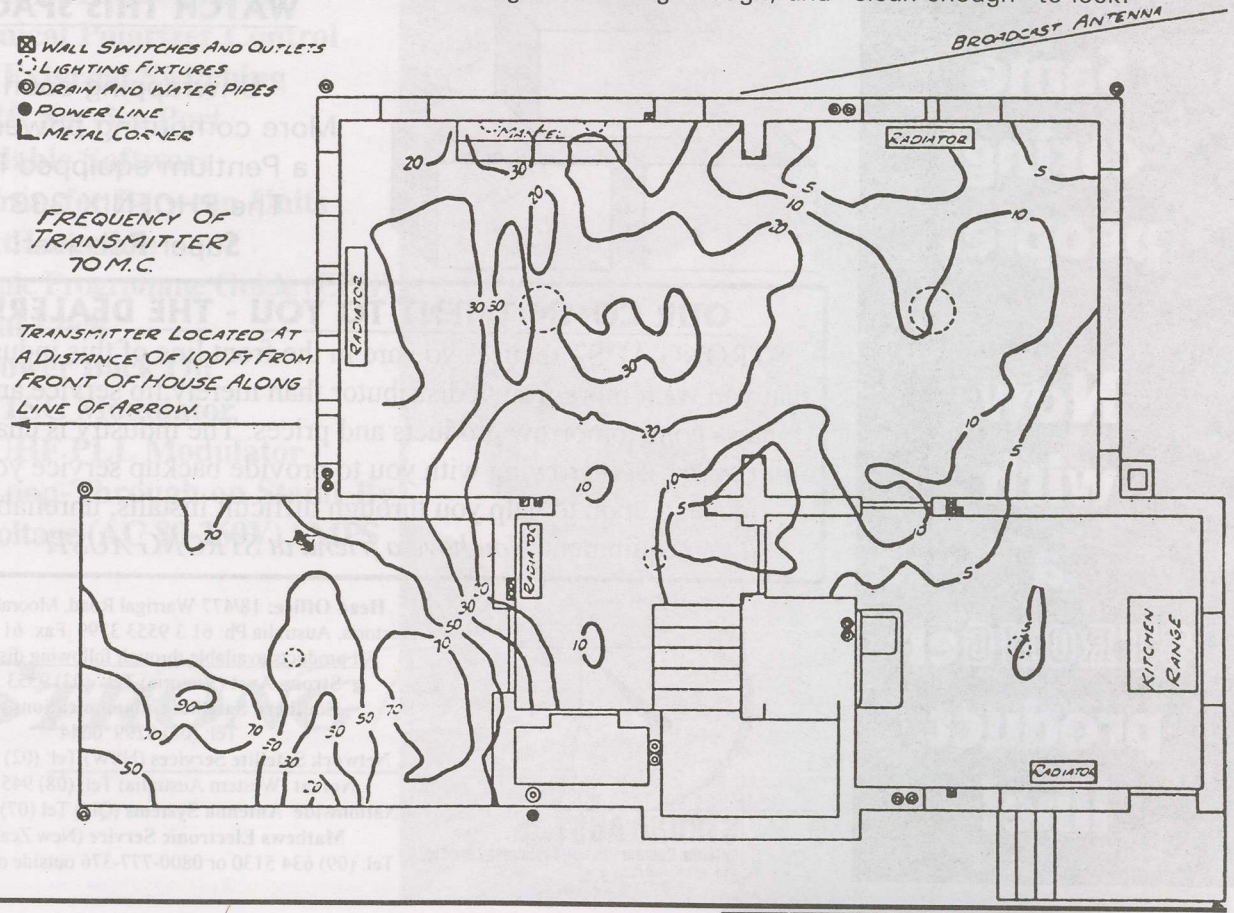
Unfortunately, the impedance of the antenna has been significantly altered by bending the elements inward; now 800 ohms or so (hardly a suitable match to either 300 or 75 ohm lines). Remember - capturing the energy from the passing wavefront is step one, transferring the signal into a transmission line that matches the impedance of the antenna is the next challenge.

There is another problem with bending the elements in, fan-style. *The normal deep side nulls are gone.* The solution to this is to double the dipole elements as in the bottom drawing to the right. Now we have four dipole elements, a "fan" as it were, two per side, each tilted inward 60 degrees or so. What this does is re-establish the symmetry of the dipole, reduce the impedance to a region of 150 ohms, and recreate the deep side null. Amazing what can be done by bending some elements into a new form! This antenna design, by the way, is called a "conical" and many variations appear world-wide.

It must be pointed out that this tilting of the driven (transmission line) connected element works only with a single, split 1/2 wavelength element. A folded dipole element, which nominally has a 300 ohm impedance for a specific



VARIATION of signal strength with frequency, and direction of building "entry" from transmitter source will play a significant role in whether a DVB-T signal is strong enough, and "clean enough" to lock.



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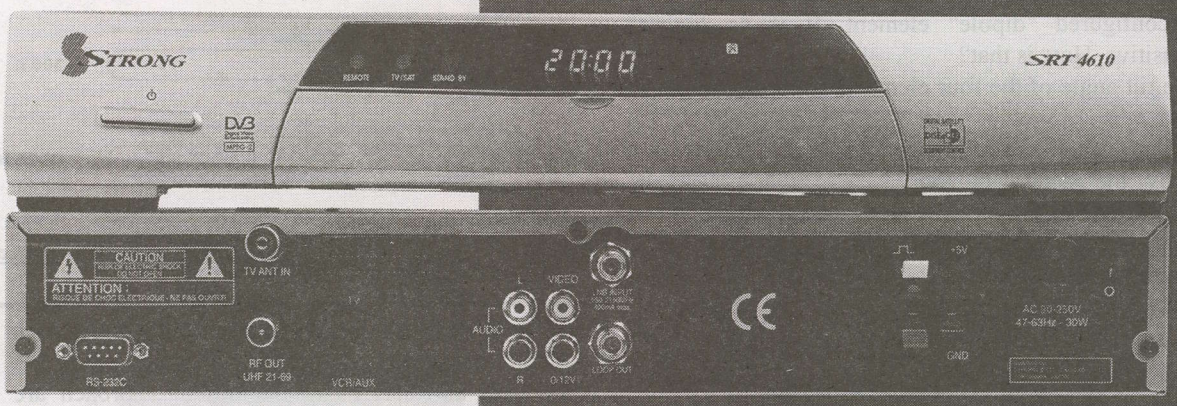

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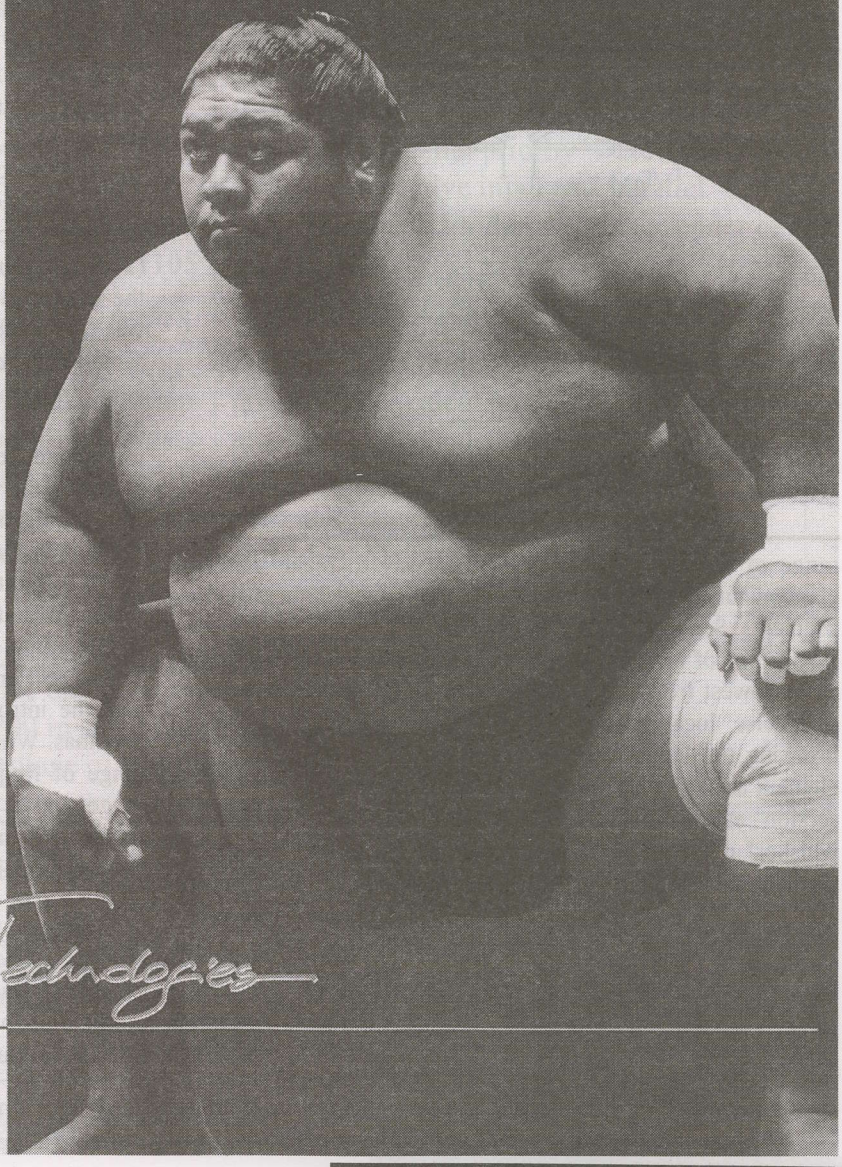


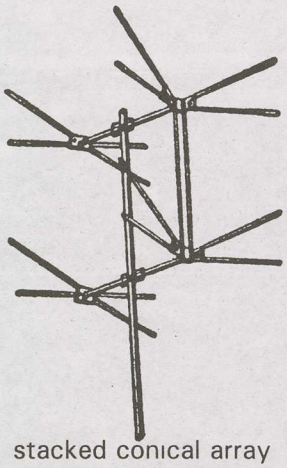
STRONG Technologies

< p. 15

resonant frequency, does not behave in the same manner when tilted (see right).

There is one more very considerable advantage to this reshaped, reconfigured "dipole" element. It is no longer frequency sensitive. How is that?

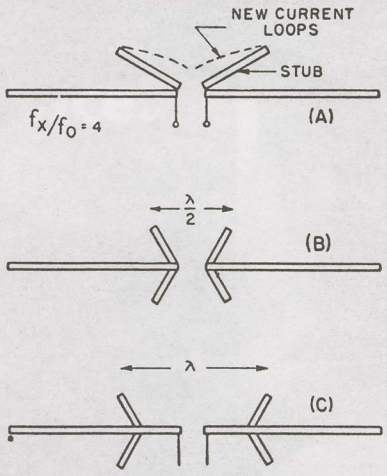
Well, if the tilt angle of the four elements is 60 degrees, the feed impedance is 155 ohms on average from the frequency determined by the length of the elements (1/2 wave at the lowest channel to be received) to essentially the top end of band III. If the tilt is changed to 94 degrees, the impedance drops to 100 ohms with descending values in between these two extremes.



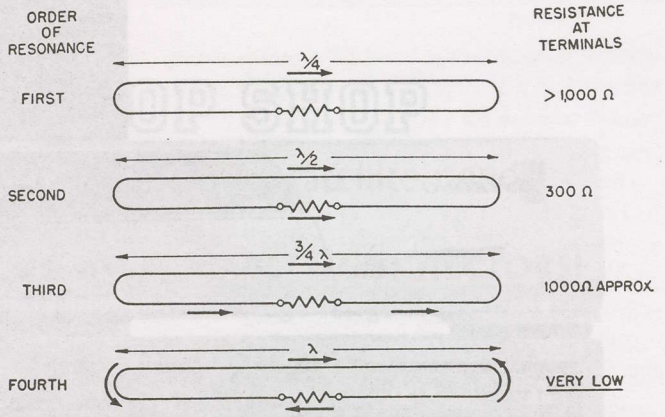
stacked conical array

Tilting the elements offers a new way to correct for the resonance and impedance restrictions of straight rod or tubing elements. What the designer is trying to do here is make the elements independent of resonant electrical length, to maintain a designed-for impedance (so as to match the transmission line) over a wide range of frequencies.

The "secret" to the conical is the "V-beam" design elements that taper inward towards the feed point have a built-in impedance matching network, forcing a "match" over a wide range of channels. There is another way to make a N = 1 element function for N = 3; divide the longer element up into segments. See diagram above.



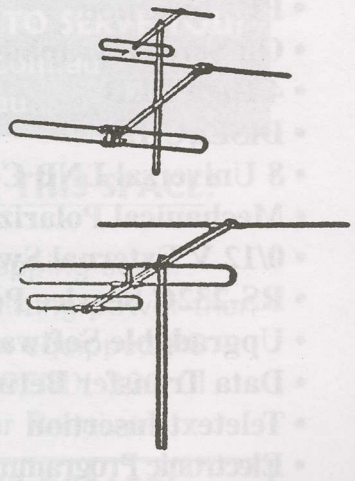
A "stub" of metal, typically not over 1/16th wavelength long at the lowest frequency, when placed on the long dipole rod at a precise location and tilted has the electrical effect of breaking the longer rod up into a long (1/2 wave, resonant) element at the lowest frequencies and a much shorter resonant section at the highest frequencies. The tilted short "cat whisker" piece creates a very high shunt negative reactance at the antenna terminals for the lower frequency wave. Following the "path of least resistance," the lower frequency wave prefers to travel down the longest rod for the full length; it seeks its own resonant length. At the same time, the higher frequency (N = 3 or 4) signal finds the cat whiskers appearing at the end of a cycle which effectively decouples the longer sections to the end from the circuit. The result is the N = 1 signals use the full dipole, the N = 3 or 4 signals use only the portion from the centre (feedline connection point) up to the cat whiskers. Each



finds a "resonant" proper impedance section for current flow to the transmission line.

Practical antennas using the design approach are quite critical to "tune" and are easily adversely affected by nearby metal (such as the antenna mast). What the original designers did was prove that two widely separated wavelengths *could* share the same aluminium elements more or less as if each band (I and III) was a separate antenna. But band III gain was temperamental, and it was difficult to broadband the system to work over the full band III range (175 to 216 or 230 MHz).

Another approach was to stack two separate antennas, one for band I and one for band 3, joining the two dipoles to a common transmission line (top, below). This in turn led to placing the band III dipole on the same boom as the band I, at the front, connecting the two dipoles together on a common transmission line (right, bottom).



Both had the disadvantage that band I and III dipoles were only optimised for a single channel and at most you had a dipole + a reflector (5 dB of gain) - but only on the channel where the dipole was resonant. For other same-band channels, lesser gain and poorer impedance match. And, the interconnection between band I and band III dipoles was challenging because the band 1 (N = 1) length tried to act like N = 3 at the same time. This turned the band I portion into a band III antenna with "split reception lobes," not unlike the problem (and N = 3 pattern shown) on p. 14, here.

The real answers remained elusive for several design years past the introduction of the conical and band I + III mixed antennas. What the market required was good gain over a wide range of frequencies, good impedance match over the same range, and as sharp a front lobe pattern as could be created to reduce the undesirable effects of multipath (ghosts arriving from secondary directions).

Strangely, the conical had most of these characteristics but only when 2 or 4 "bays" were stacked (one above the other, in vertical fashion). These were very large antennas and the public didn't want anything that threatening hovering over their homes! The answer would be spelled "log" or "logi."

Note: This series will skip our October issue and resume in November's SatFACTS.

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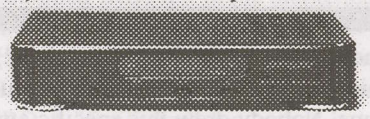

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Facilitate - learn to live with it

The industry had scant warning - we "discovered" the status of "Copyright Amendment (Digital Agenda) Bill 2000" July 16, too late for the July SF. Posting a full review of the implications on our Web Site July 17th, we went to work contacting the office of the bill's sponsor and reported same on our web site (http://www.satfacts.kwikkopy.co.nz).

The bill was adopted in final form August 17; it began life in 1998 and is in fact not a new law but revision of the (Australian) Copyright Act of 1968. Full impact of what it means can only be found by marrying the text of the amendment adopted August 17 with the original Act.

The amendments total 71 pages in fine print of which approximately 5 affect our industry. The purpose of the amendments involves bringing Australian copyright law into the 21st century - something much needed. The amendments' content has been fine tuned since 1998 to reflect the latest in encryption technology as employed to protect the legal owners of copyrighted material. That includes making copies from magazines or books at your local library copy machine, down loading audio files from Internet web sites, dubbing unauthorised VHS or digital copies of rental movies

We must realise this was not a law change directed specifically at pay-TV capable receivers. And last minute changes in the law to exempt us from coverage were never really possible because a change in a basic definition ("facilitate") would have had repercussions throughout every aspect of the copyright protection challenge.

Our problem - *and it is a real one* - is language which suggests that anyone who provides equipment which "facilitates" accessing conditional access pay TV transmissions could be charged with a criminal act. The same "facilitates" applies to making copies at the local library copy machine (merely having a machine available to make copies is to "facilitate the violation of printed copyright") or selling a black box which defeats one of the analogue VHS tape anti-copy systems. Nobody drew this specific amended law to "catch" people who are stealing pay-TV or selling equipment that makes this possible. "Facilitate" is a broad net thrown into the water and like many tuna nets, it will catch virtually anything that tries to swim through.

Circumvention devices

The law attempts to identify any activity which directly or indirectly reduces the protection afforded to a copyrighted object. The Act itself is the protection, guaranteeing the rights holder that nobody can benefit from their works except through commerce created by the rights holder.

A "technological protection measure" is any system (electronic or simply a set of rules) that prevents unauthorised use of copyrighted material. It is illegal to:

a) "make a circumvention device capable of circumventing, or facilitating the circumvention of, the technological protection measure;"

b) "Sells, lets for hire, or by way of trade offers or exposes for sale or hire or otherwise promotes, advertises or markets, such a circumvention device;"

c) "distributes such a circumvention device for the purpose of trade, or for any other purpose that will affect prejudicially the owner of the copyright;"

d) "exhibits such a circumvention device in public by way of trade;"

e) "imports such a circumvention device into Australia for the purpose of (selling, letting for hire, distributing, exhibiting in public);"

f) "makes such a circumvention device available online...".

A "qualified person" is allowed to acquire circumvention devices provided they give a statement of their reason for

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being qualified. After careful reading, we see no 'loop hole" here. Well, perhaps there is one.

Section 116A, (3) (vi) allows you to trade in a "circumvention device" provided:

"(vi) stating that a work or other subject-matter in relation to which the person proposes to use the device or service for a permitted purpose is not readily available to the person in a form that is not protected by a technological protection measure."

Translation? The IRD you wish to purchase is *only available* with a CI or CAM slot; you can't buy it any other way.

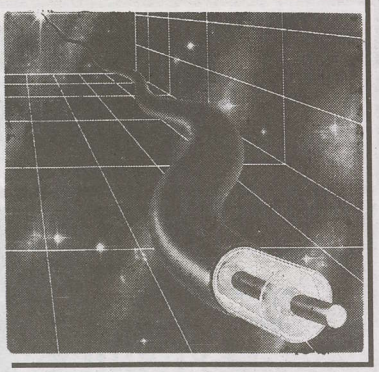
It will be argued-

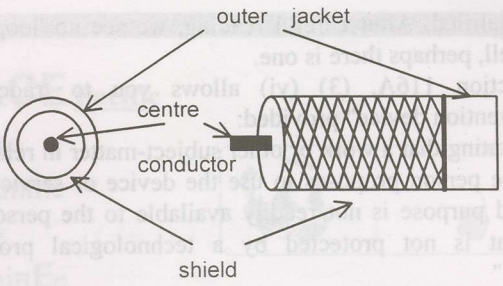
... by those who would like to see only the Optus Aurora approved CAM-equipped IRDs left in the marketplace that any other IRDs for sale after the measure becomes law (6 months) are "illegal" because they "facilitate circumvention" simply because of the CI or CAM slot. Not so. It is not the CAM *slot* that makes the IRD a "facilitator" but rather it is the CAM itself *plus the card.*

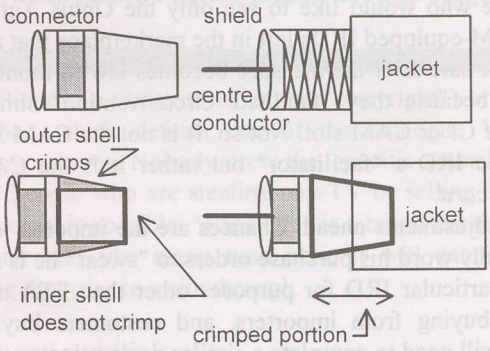
There are adjustments ahead. Chances are the importer will need to carefully word his purchase orders to "swear" he is not importing a particular IRD for purposes other than FTA use. And dealers buying from importers, and customers buying from dealers will need to complete a similar declaration.

We anticipate a "power play" by those who think their Optus Aurora approval gives them special status and will report here any such efforts to further reduce competition in the marketplace. And as for those dealing only in CAMs and cards - well, chances are you are out of business or will be forced to find more creative ways to continue to supply your grey market products. At the very least, obtain a copy of the new law, read it, and seek legal advice.

The CABLE Connection







Coaxial cable & connectors

Think of coaxial cable as a special purpose tollway built to specific physical requirements. This tollway "moves" radio frequency signals, not vehicles, but it does this efficiently only when the vehicles are of a specified size.

The vehicle is a radio signal (or signals) and their size is measured by something called "units of impedance." As long as the "impedance" of the cable matches the "impedance" of the entrance and exit plazas at opposite ends of our tollway, the radio frequency vehicles move efficiently from one end to the other.

Coaxial cable "impedance" is determined by several factors: The size of the centre conductor, the size of the "shield" section of the coaxial cable, the spacing between centre conductor and shield, and, the ratio of the diameter of the centre conductor to the diameter of the shield. Sounds complex, but as you don't have to manufacture the cable, it is of passing interest.

Or is it? When you place a connector onto coaxial cable, you are creating an "entry" or "exit" on or off ramp for the tollway. Logic should tell you the entrance and exit ramps must have the same identical characteristics as the cable itself or there will be interruptions in the flow of the radio frequency signals.

Our most common cables (such as RG-6) have an "impedance" of 75 ohms. Remember - impedance is determined by a number of factors and if you change one or more of these ingredients, you modify the impedance of the "line" at the entry or exit ramp. If you are driving on a tollway with three lanes of traffic in your direction, and encounter an exit ramp with only one lane of traffic, there is the likelihood of "congestion" while up to three lanes of traffic attempt to merge into the single exit lane.

Coaxial cable connectors are potential lane congestion at entry and exit ramps because they *can* introduce a new impedance to the tollway.

The perfect connector, installed properly, introduces no "impedance bump" to the tollway. The cable's impedance and the connector's impedance (yes - connectors have an impedance) are the same value, such as 75 ohms. Not all connectors are 75 ohms, and even if the one you have chosen is 75 ohms, unless it is "installed properly," that 75 ohm design impedance can be modified during installation.

Our "F" series fittings make use of the coaxial cable's own centre conductor for the fitting proper. Remember the centre conductor size is one part of the impedance equation. On the other hand, the second ingredient - the shield portion of the cable - inside the cable is replaced at the connector by a metallic "shell." And as a part of the installation process, the "shell" is subjected to strain and stress using that tool of all tools - the "crimper." The "F" fitting has been designed to mate with the coaxial cable in a very precise manner. When the cable is properly prepared for installation of the fitting, a short segment of the shield is bared by removing the outer weather jacket on the cable.

Similarly, a specified length of centre conductor is "bared" and when the connector and cable are "one" the centre conductor becomes a "pin" allowing the connector to make electrical contact with the piece of equipment. There are two cautions concerning the centre conductor:

1) Make it too short, and it fails to mate (push into) the female receptacle (the centre conductor is called "the stinger" and like many electrical devices, has a male and female counterpart), or,

2) Make it too long and it not only goes into the female receptacle but actually can push *through* it and out the other side, creating a potential impedance mismatch within the female connector.

The real danger point with an F fitting is the way the shell (see drawings, above) settles into the coaxial cable during installation. Most (not all) F fittings have a tapered outer shell, slightly smaller at the end which ends up buried beneath the cable's weatherproof jacket (9mm) than the opposite end where the "screw on nut" is located (10mm). And, some F fittings have a two layer tubular shell - the outer portion slides *under* the weatherproof jacket but *on top of* the cable's shield while an inner non-tapered shell slides *under the cable shield* but on top of the (typically) white coloured insulation material. This shell barrel + shell barrel forms a sandwich, trapping the cable's shield material between two concentric layers of metal.

Preparing the cable for the fitting, and pushing (forcing) the fitting on such that the shield is properly sandwiched is only a part of the installation. Which brings us to that favourite tool - the crimper. For the crimping tool to be effective, it must have the ability to compress (squeeze) the outer shell barrel of the fitting inwards. You are actually deforming the outer shell, forcing it to become smaller, with the inner shell retaining its design dimensions. Think of the crimper as a hammer, applying equal pressure over the full length and width of the

first level shell - the one that slides between the weatherproof jacket and the cable's braided shield until a tight sandwich is created; "crimped" outer shell + cable braid shield + inner shell. This "crimping pressure" forces the cable's braid shield and the connector's one or two metal barrel shells to become "wed" as one solid piece.

The object here is to form a solid electrical connection (metal to metal), but to not destroy the very finite relationship between the braided shield of the coaxial cable and its centre conductor. Remember - the impedance of the cable must be maintained ("matched") by the connector(s) and to do this, the connector must have the same physical characteristics (measurements) as the cable itself, *after installation.*

For every brand and variety of cable (braid only shield, braid + foil wrap shield, braid + 2 foil wraps, two braids + two foil wraps - so-called "quad shield" - there is a purpose designed connector. A connector for quad shield cable is not the same as a connector for a single braid + foil wrap cable. Select the incorrect connector, and while you may be able to "force" it onto the cable, you will create an impedance mismatch (or worse - including an electrical short between the foil braid and the centre conductor). Just because you may be able to force a connector onto a piece of cable and "crimp" it does not mean you have retained the impedance of the line through the connector.

Connector selection is every bit as important as cable selection. Moreover, for every family of connectors there is a specific crimping tool design. If you are using the wrong crimping *tool* for the connector and cable chosen, chances are you are creating impedance "bump" problems with each fitting installed. Do some careful research before settling on these parts - and use the correct matching parts.

SatFACTS Pacific/Asian MPEG-2 Digital Watch: 15 September 2000

Bird	Service	RF/IF &Polarity	# Program Channels	FEC	Msym	Receivers and Errata
I704/66E	Sky News +	3805/1345R	4	3/4	22(.520)	Sky News 24 hr, sport, feeds; **some FTA**
Ap2/76E	Hmark/Kermt	3720/1430H	4	5/6	29(.270)	PowVu, typ. CA
	Channel "I"	382301330V	1	3/4	3(.570)	Tests, FTA
	TVB8 +	3849/1301H	4	3/4	13(.238)	PowVu, CA
	AXN	3920/1230H	up to 8	7/8	28(.340)	Tests, promos, **ch 5 FTA**
Thcm3/78.5E	**MRTV**	3666/1484H	1	2/3	4(.442)	FTA; difficult to load (NTSC)
	Mega +	3640/1510H	12	3/4	28(.056)	Mega Cosmos here; new Sr
	Mahar/DD1	3600/1550H	up to 8	3/4	26(.661)	USA religion chs FTA
	TRT +	35501600H	2+ TV, radio	3/4	13(.330)	3 Angels USA + 9 radio
	PTV2	3420/1730V	1	3/4	3(.366)	FTA, new service, testing
	TV Maldives	3412/1738V	1	1/2	6(.312)	FTA (reaches SE Australia)
	Thai Global+	3425/1725V	up to 7?	2/3	27(.500)	FTA
Insat 2E/83E	**DD2**	3910/1240V	1	3/4	5(.000)	SCPC, testing MPEG-2
	DD tests	3929/1221V	1	3/4	5(.000)	SCPC, weaker than 3910 above
ST1/88E	Taiwan Bqt	3509/1641H	13	3/4	23(.450)	MCPC, **sometimes FTA**, 2 adult chs
MeSt 1/91.5E	**Malay. TV3**	4147/1004H	1	3/4	7(.030)	CA but occ. FTA
As2/100.5E	**Euro Bouqt**	4000/1150H	5TV, 19r	3/4	28(.125)	FTA (TV5 teletext)
	Reuters	3909/1241H	1	3/4	5(.632)	occasional feeds, **some FTA** MPEG2
	Hubei/HBTV	3854/1296H	1	3/4	4(.418)	FTA SCPC, teletext
	Hunan/SRT	3847/1303H	1	3/4	4(.418)	FTA SCPC, teletext
	Guan./GDTV	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 A-O	3799/1351H	1	3/4	5(.631)	mostly 4:2:2 SCPC (news feeds)
	WTN Jer/Lon	3790/1360H	1	3/4	5(.631)	Mostly CA; **some FTA**
	Reuters/Sing.	3775/1375H	1	3/4	5(.631)	**FTA** & CA
	WorldNt/US	3764/1386H	1 + 20 radio	3/4	6(.100)	FTA; up to 20 radio channels
	Liaonin/Svc2	3734/1416H	1	3/4	4(.418)	FTA SCPC, radio APID 256
	Jiangx/JXTV	3727/1423H	1	3/4	4(.418)	FTA SCPC, teletext, radio APID 81
	Fujian/SETV	3720/1430H	1	3/4	4(.418)	FTA SCPC, + radio APID 80
	Hubei TV	3713/1437H	1	3/4	4(.418)	FTA SCPC, radio APID 80
	Henan/Main	3706/1444H	1	3/4	4(.418)	FTA SCPC, + radio
	Egypt/Nilesat	3640/1510H	6+, radio	3/4	27(.850)	Thru TARBS Aust, subs now OK
As2/100.5E	**Feeds**	4086/1064V	1	3/4	5(.632)	FTA SCPC feeds
	TVSN	4033/1117V	1	3/4	4(.298)	Occ. **FTA**, not same as Aust. version
	Sky Racing	4020/1130V	up to 3TV	1/2	18(.000)	(Irdeto) CA; **1 & 3 occ. FTA**
	EMTV	4006/1144V	1TV, 2 radio	3/4	5(.632)	PowVu CA; poor signal level
	Jilin Sat TV	3875/1275V	1	3/4	4(.418)	FTA SCPC, + radio
	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
	ShaanxiQQQ	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	3796/1354V	1	3/4	2(.533)	FTA SCPC,
	MSTV	3791/1359V	1	3/4	4(.340)	FTA SCPC
	Feeds	3785/1365V	1	3/4	5(.632)	FTA & CA, feeds
	Myawady	3766/1384V	1	7/8	5(.080)	FTA SCPC - difficult to load
	SABe	3742/1408V	1	3/4	3(.300)	SCPC - now regular programming
	Saudi TV1	3660/1490V	1 (?)	3/4	27(.500)	FTA MCPC
As3S/105.5E	Zee bouquet	3700/1450V	9TV	3/4	27(.500)	Mediaguard CA, **ch 8 FTA**
	ETV Bangla.	3749/1401V	1TV	3/4	4(.340)	PowVu but FTA at this time
	Arirang TV	3755/1395V	1	7/8	4(.418)	FTA SCPC; audio problems (see p. 29)
	Now TV	3760/1390Hz	1	7/8	26(.000)	Now operational FTA
	Star TV	3780/1370V	17(+)TV	3/4	28(.100)	NDS CA (Pace DVS211, Zenith)
	Star TV	3860/1290V	14(+)TV	3/4	27(500)	NDS CA (Pace DVS211, Zenith)
	Star TV	3880/1270H	12(+)TV	7/8	26(.850)	NDS CA (Pace DVS211, Zenith)
	CNNI	3960/1190H	4(+)TV	3/4	26(.000)	PowVu CA; some **FTA** feed channels
	Star TV	4000/1150H	7(+)TV	7/8	26(.850)	NDS CA (Pace DVS211, Zenith)
	Sun TV	4095/1055H	1	3/4	5(.554)	"History Channel" testing SCPC
	CCTV bqt	4115/1035H	4(+) TV	3/4	19(.850)	was analogue; now FTA MCPC
Cak1/107.5E	Indovision (S-band)	2.536, 2.566, 2.596, 2.626	33(+) TV	7/8	20(.000)	NDS CA using RCA/Thomson, Pace IRDs; new services added June
Sinosat/110E	**CCTV2**	3889/1261Hz	1	3/4	3(.000)	FTA SCPC, difficult to load
C2M/113E	**TPI**	4185/965V	1	3/4	6(.700)	FTA SCPA; NT only
	News Asia	4071/1079H	1	3/4	14(.043)	May only be test; NT+Asia only?
	Anteve	4055/1095V	1	3/4	6(.510)	FTA SCPC; NT only
	Space TV	4000/1150H	11TV, radio	3/4	26(.666)	CA, sometimes **FTA**
	C Net Taiwan	3760/1390H	11TV, radio	3/4	26(.666)	CA, subs available **-10 radio FTA**

Bird	Service	RF/IF & Polarity	# Program Channels	FEC	Msym	Receivers and Errata
(C2M/113)	**RCTI**	3475/1675H	1	3/4	8(.000)	FTA SCPC, Australia OK
JcSat3/128	Miracle Net	3990/1160V	3 up to 6	5/6	22(.000)	PowVu, some **FTA** (1,3)
	Asian bqt	3960/1190V	up to 8	7/8	30(.000)	CA & **FTA** Ntsc: Japan, Taiwan
L AP1/130	**THT+NTV**	3675/1475L	2 + 2 radio	3/4	12(.000)	inclined orbit +/-3.5 degrees
MeaSat 2	Astro Mux	11.478H (+)	up to 7TV	7/8	30(.000)	Aust east coast beam; also 11.664Hz
	Mediasat	11.540Hz	1+TV, tests	3/4	30(.800)	regular operation shortly
Op B3/156	Mediasat	12.336V	5TV, 3ra, Inter.t	2/3	30(.000)	CA, **some FTA, Herbalife**
	Aurora	12.407V		2/3	30(.000)	cvrs Aust, NZ 90 cm; CA
	Aurora	12.532V	Inc Zee, ATV	2/3	30(.000)	cvrs Aust, NZ 90 cm; CA
	Aurora	12.595V		3/4	30(.000)	CA, $105 smart card required (p. 28)
	Aurora	12.720V		3/4	30(.000)	CA, $105 smart card required (p. 28
	Austar/tests	12.376H		3/4	29(.473)	Austar I-TV tests
	Austar/Foxtl	12.438H		3/4	29(.473)	CA, subscription available Australia
	Austar/Foxtl	12.564H		3/4	29(.473)	CA, subscription available Australia
	Austar/Foxtl	12.626H		3/4	29(.473)	CA, subscription available Australia
	Austar/Foxtl	12.688H	(some FTA ra)	3/4	29(.473)	CA, subscription available Australia
Op B1/160	**ABC NT fd**	12.256V	1TV, 3 radio	3/4	5(.026)	FTA, Sydney -30 minutes time zone
	Central 7	12.354H	1TV	3/4	3(.688)	FTA, purpose here unknown
	News feeds	12.367H	1	3/4	5(.424)	FTA
	Sky NZ	12.518/546V	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	12.644V	9TV	3/4	22(.500)	NDS CA, subscription available NZ
PAS8/166	**ABCInterch**	12.312H	1	3/4	6(.978)	PowVu, FTA, news feeds
	ABCInterch	12.321H	1	3/4	6(.978)	PowVu, FTA, news feeds
	ABCInterch	12.330H	1	3/4	6(.978)	PowVu, FTA, ABC Melbourne feeds
	TARBS	12.526H	12+ TV	3/4	28(.067)	TPG /Eurodec CA, occ. FTA
	TARBS2	12.606H	6+TV	3/4	28(.067)	Tests, inc. ESPN, see TARBS above
	JEDI/TVB	12.686H	11+ TV	3/4	28(.124)	Irdeto CA, **some FTA** tests
	Boomerang	12.725H	5 TV	7/8	25(.728)	CA, subscriptions avail Australia
	NHK Joho	4065/1085H	6TV, 1 radio	3/4	26(.470)	PowVu CA & **FTA**; subscription avail
	ESPN USA	4020/1130H	7+TV, data	7/8	26(.470)	PowVu CA; ch 11 DCP-CCP bootload
	Discovery	3980/1170H	8 typ.	3/4	27(.690)	PowVu/CA (some audio **FTA**)
	CalBqt/Pas8	3940/1210H	up to 8TV	7/8	27(.690)	PowVu CA & **FTA (EWTN/EB Net)**
	CNBC HK	3900/1250H	up to 7TV	3/4	27(.500)	FTA at this time
	Feeds	3854/1296H	1	3/4	6(.110)	occ. feeds, inc. Mediasat Sydney
	CNNI	3780/1370H	3, up to 5 TV	3/4	25(.000)	PowVu, FTA at this time
	MTV	3740/1410H	8	2/3	27(.500)	CA; #7,8 **FTA feeds**
	Lakbay TV	3813/1337V	1	3/4	5(.044)	FTA, Filipino, irregular schedule
	Knowledge	3706/1444V	1	3/4	3(.200)	SCPC, aff. ABS-CBN, tests
PAS2/169	Pv Bouquet	12.290V	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
	HK PowVu	4148/1002V	up to 8	2/3	24(.430)	PowVu CA; some **FTA**
	Fox Bouquet	3992/1158V	8TV/data	7/8	26(.470)	Pv, CA/FTA (**Fox News USA, sports**)
	Feeds	3942/1208V	1 or 2	2/3	7(.497)	PowVu (FTA) occ feeds
	Feeds	3934/1216V	1	3/4	10(.850)	PowVu (FTA) occ. feeds
	Feeds	3926/1224V	1	3/4	13(.091)	Mediasat links, 7th Day Adv. 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
	Feeds	3812/1338V	1	3/4	6(.620)	PowVu (FTA) occ feeds
	Middle East	3778/1372V	4	3/4	13(.331)	FTA, testing CA, "threatening"
	CCTV Pv	3716/1434V	5 typical	3/4	19(.850)	PowVu FTA; # pgm chs varies
	Feeds	4138/1012H	1	3/4	6(.620)	FTA SCPC/MCPC, news and sports
	7thDyAdv	3872/1278H	1TV, 4+ audio	3/4	6(.620)	Sat, Sun 0930 UTC typ.
	CNNI HK	3996/1154H	1	3/4	9(.998)	reverse link HK/Atlanta, feeds, FTA
	"1"/Korea	3980/1170H	1	3/4	4(.420)	FTA SCPC, tests(not full time)
	Feeds	3867/1183H	1	2/3	6(.618)	FTA (occ. sport feeds)
	Feeds	3939/1211H	2 (typ NTSC)	2/3	6(.620)/7(.498)	FTA-typ. NTSC-occ. sport, shuttle
	Cal PowVu	3901/1249H	up to 8	3/4	30(.800)	(PowVu) CA+**FTA**
	Feeds	3854/1296H	1	2/3	6(.620)	(PowVu) occ. feeds
	Disney	3804/1346H	3	5/6	21(.093)	PowVu CA
	Satcom 1-6	3743/1407H	up to 5	7/8	19(.465)	currently FTA, lowlevel, Mid East fds
I702/177E	AFRTS	4177/973LHC	8TV, 12+ rad	3/4	26(.694)	PowVu CA
I701/180E	**TNTV**	11.060V	9	3/4	30(.000)	Testing new pay-TV service, east beam
	Tele Fenua	11.168V	4	3/4	10(.100	Tests, may be off
	Canal+ Sat	11.610H	16TV, 1 radio	3/4	30(.000)	Mediaguard CA, one **FTA**

Bird	Service	RF/IF & Polarity	# Program Channels	FEC	Msym	Receivers and Errata
(I701/180E)	TVNZ	4195/955RHC	1	3/4	5(.632)	DMV/NTL early version, occ feds, typ ca
	TVNZ/BBC	4186/964RHC	1	3/4	5(.632)	DMV/NTL early version, occ feds, typ ca
	TVNZ	4178/972RHC	1	3/4	5(.632)	DMV/NTL early version, occ feds, typ ca
	TVNZ/Aptn	4170/980RHC	1	3/4	5(.632)	DMV/NTL early version, occ feds, typ ca
	RFO-Canal+	4086/1064L	4TV, radio	5/6	13(.347)	east hemi 20.5 dBw, to be 15.5 soon
	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
	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	3765/1385R	6	7/8	29(.900)	PowVu CA & **FTA; #3 TBN**

BOUQUETS - FTA vs. CA: FTA (free to air) services appear as SCPC (single channel per carrier) and within MCPC (multiple channels per carrier). FTA services here are shown **bold face**, when FTA is occ(asional) or only for a portion of MCPC bouquets, **bold face** appears in right hand column. PowVu stands for Scientific Atlanta PowerVu which is accessible even when FTA only when the IRD has been software-designed to process SA's unique version of MPEG-2. SA IRDs, such as D9223, can be equipped with MPEG-2 standard or may only be capable of receiving SA's version of MPEG-2, even for FTAs services. SA offers an over-the-air software update for existing non-MPEG-2 versions of the receiver (see bottom of this page). Not all receivers automatically receive MPEG-2 transmissions which have variations of the MPEG-2 software "standard." In Mediasat's Optus B3 service, for example, Thasi5 is difficult to load for some IRDs unless you enter the PID numbers for the service. PID numbers are discussed in our web site (http://www.satfacts.kwikkopy.co.nz). Not all IRDs can deal with PID entry - virtually all 1999 and 2000-new models will do this. In tables, "# Programme Channels" indicates the total number of video + accompanying audio the IRD should load if you load the bouquet. Most IRDs ask you if you wish to load "FTA Only?" or "All including CA." Typically, load "all" even if you cannot routinely access CA services.

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

ADI MediaMate. FTA, NTSC+PAL outputs. (Pacific Digital Sys. Pty Ltd, tel 61-2-8765-0270)
AV-COMM R3100. FTA, excellent sensitivity (review SF May 1998); new version Sept. '99. Av-COMM Pty Ltd, 61-2-9949-7417.
Benjamin DB6600-CA. FTA, Foxtel/Austar w/CAM+card. Autosat Pty Ltd 61-2-9642-0266 (review SF#72)
Grundig DTR1100. Mfg by Panasat (SA), very similar to Panasat 630; out of production, Irdeto capable. See Av-COMM above.
Humax F1-CI. Primarily sold for TRT(Australia), does (limited) PowerVu (not Optus Aurora approved).
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, 61-7-4788-8906.
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. Int. 61-2-9618-5777
MediaStar D7.5. New (May 00) single chip FTA; review June 00 SF. MediaStar Comm. Int. 61-2-9618-5777
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. Tricky to use.
Nokia 9200. When equipped with proper CAM, does Aurora, pay-TV services provided software has been "modified" with Dr Overflow or similar program (www.BAKKERELECTRONICS.COM- Note: This site shut-down by Mindport early November - may not be functioning!). Reported factory 12 mo. warranty. Peter Older, tel 61-3-5133-7911, mobile 61-0418-386287
Nokia 9500/9600. Numerous versions for different world parts; not distributed in Pacific but assistance from Av-Comm Pty Ltd.
Nokia 9800. Latest single chip version, with CI and Irdeto capable. No software for Pacific, Asia; not recommended.
Pace DVS211. NDS CA (no FTA) for Star Asia, previously used for Indovision. (Solution 42, 61-2-9820-5962)
Pace DGT400. Originally Galaxy (Now Foxtel+Austar). Irdeto, some FTA with difficulty (Foxtel Australia 1300-360818)
Pace DVR500. Original DGT400 modified for NBC (PAS-2) affiliate 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.
Pacific Satellite DSR2000. Advises no longer current model (see. p. 2, here); Clone of Mediastar D7 (see above)
Panasat 520/630/635. MCPC FTA, Irdeto capable, forerunner UEC 642, 660. Out of production, spares fax ++27-31-593-370.
Panasonic TU-DS10. FTA + Irdeto CA; one of 2 IRDs approved by Optus for Aurora, but no longer available in Australia.
Phoenix 111, 222. PowVu capable, NTSC, graphics, ease of use. (111 review SF#57). SATECH(below)- 222 out of production
Phoenix 333. FTA SCPC, MCPC, analogue + dish mover. Detailed SF review Nov. 1998. SATECH 61-3-9553-3399.
Pioneer TS4. Mediaguard CA (no FTA), embedded Msym, FEC, only for Canal+Satellite (AntenneCal ++687-43.81.56)
PowerCom. FTA, PowVu, NTSC, excellent sensitivity. NetSat 61-2-9687-9903.
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.
Praxis/DigiMaster 9600 MKII/9800AD. FTA, PowVu+analogue, withdrawn from sale in Pacific (was Skyvision-below)
Praxis 9800 ADP. FTA SCPC/MCPC, PowVu, analogue, positioner. SF review Dec '98; withdrawn from Pacific sale (below).
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 61-2-6292-5850, Telsat 64-6-356-3749)
SatCruiser DSR-201P. FTA SCPC/MCPC, PowVu, NTSC/PAL, analogue, positioner - review this issue (Skyvision - see above).
Skandia SK888 (aka DigiSkan-SMS). FTA MCPC, Irdeto CAM+software upgrade. Out of production; Skandia 61-3-9819-2466
Strong SRT 4600. SCPC, MCPC, PowerVu; exc graphics, ease of use, review SF#64. SATECH 61-3-9553-3399.
Sky 21/SJ 3000ci. Claims "clone" Hyundai HSS800ci; if so, poor copy. Runs very hot, reportedly burns up smart cards
UEC642. Designed for Aurora (Irdeto), approved by Optus; limited other uses. Nationwide 61-7-3252-2947.
UEC660. Upgraded UEC642, used by Sky Racing Aust., Foxtel-limited FTA. (Nationwide - above); power supply problems.
UEC700/720. Single chip Irdeto built-in design for Foxtel; unfriendly for FTA. Power supply problems, not sold to consumers.
Xanadu. DVB compliant special receiver for members of SPACE Pacific (Av-comm Pty Ltd, tel +61-2-9949-7417)
Yuri HSS-100C. FTA, clone of Hyundai, V2.27 software custom to Australia (Nationwide-above).

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, 7/8; pgm ch 11 and follow instructions (do not leave early!)

SatFACTS Pacific/Asian FTA ANALOGUE Watch: 15 September, 2000

BIRD/ Location	RF/IF & Polarity	Service	Errata
I703/57E	3808/1342R	Udaya TV	
	4052/1098R	WorldNet	VOA subcrs.
	4178/972L	MTA Inter.	
I604/602/60E	4166/984	various feeds	
I704/66E	3765/1385R	tests	
	4015/1135L	Mongolia	(SECAM)
PAS4/68.5E	3743/1407V	RTPi	(+ radio subcr)
	3864/1286V	BBC World	
	3907/1243H	Sony TV	Hindi
	4034/1116V	Doordan	(various)
	4087/1063H	CNNI	
	4110/1040H	TNT/Cartoon	
	4113/1037V	Series Ch.	
	4182/968H	MTV	
PAS7/68.5E	3470/1680V	test signal	
LM1/75E	3980/1170V	various	(Madagascar)
Thaicom3/78E	3871/1279H	TVT	
	3760/1390V	Army TV	
	3685/1465V	MRTV	
	3685/1465H	VTV	6.6, 7.02
	3616/1534V	ATN	
	3576/1574V	ATN Bangalr	Bengali
	3554/1596V	test card	
	3536/1614V	Punjabi TV	(occ service)
	3507/1643V	RAJ-TV	
	3489/1661H	Vasta Music	occ tests
	3465/1685V	RAJ-TV	
Expres 6A/80E	3675/1475R	RTR	(global beam)
InSat 2E/83E	3481/1669V	Sun TV	
	3562/1588V	Vijay/Asianet	aud. 5.5/6.6
	3599/1551V	JayaTV	
	3810/1340V	DD1-Tamil	"
	3850/1300V	DD1-National	"
	3930/1220V	DD2 Metro	"
	3970/1180V	Teluga 1	"
	3998/1152V	sport feeds	"
	4035/1115V	Sun TV	"
	4060/1090V	Surya/Sun TV	"
	4093/1057V	DD7	"
ChnStr1/87.5E	3880/1270H	occ feeds/ card	P4 NSW, Ntsc
ST1/88E	3550/1600V	test card	
	3582/1568V	Nila TV	(vintage TV)
CIS S6/90E	3675/1475R	RTR1	P3 NSW
	3875/1275R	Orbita 1	
	3916/1234R	RTR II	
	3935/1215R	Orbita II	
MeSat-1/91.5E	3710/1440H	VTV1,2, 4	
	3880/1270H	RTM-1	
Chinasat22/98	3900/1250H	tests	+ 3940/1210
InSat 2B/93.5E	4165/985H	India Metro	NSW on 3.7m
	4080/1070V	DD7 (Tamil)	
	4070/1080H	DD9	
	3970/1180V	DD9 (Kan.)	
	3882/1268V	DD1	
	3840/1310V	DD?	
	3762/1388V	DD4	
AsSat2/100.5E	3660/1490V	feeds, tests	
	3680/1470H	feeds	
	3860/1290V	feeds	

BIRD/ Location	RF/IF & Polarity	Service	Errata
(As2/100.5E)	3885/1265H	WorldNet	VOA subcrs
	3960/1190H	CCTV4	
	3980/1170V	RTPi	(radio gone)
CIS S21/103E	3675/1475R	RTR	
	3875/1275R	Vrk Apt	
ASs3S/105.5	3660/1490V	Urdu TV Net	6.6, 7.2 audio
	3680/1470H	CETV	
(temp FTA)	3800/1350H	Star Sport	NTSC
(temp FTA)	3840/1310H	Channel [V]	NTSC
	3900/1250V	AlphaTV Punja	
(temp FTA)	3920/1230H	Phoenix Ch	NTSC
	3940/1210V	Zee India	
	3980/1170V	Zee TV	
	4020/1130V	Sahara TV	6.2, 6.8
	4100/1050V	PTV2/World	
T'kom1/108E	4000/1150H	tests	
PalapC2/113E	4160/990H	(France) TV5	
	4140/1010V	Brunei + feeds	
	4120/1030H	MTV Asia	
	4080/1070H	Herbalife	+ tests
	4040/1110H	CNBC	
	3970/1180V	CNNI	
	3880/1270H	Aust ATN7	
	3840/1310H	TVRI	tests
	3742/1408V	RCTI	English subcr
AsSat1/122E	3677/1473V	Test card	& 3933/1217H
ChinS 6/125E	4085/1065V	feeds	seldom seen
JcSat3/128E	3768/1382V	feeds	occ., P5 NZ
	4085/1065V	test card	NTSC. 6.8 aud.
Ap1A/134E	4160/1050V	CETV	
	3980/1170V	CETV1	
	3900/1250V	CETV2	
Ap1A/138E	4160/990H	CCTV7	
G25/140E	3675/1475R	ORT Moscow	+/-3d. inclined
	3875/1275R	feeds, tests	
LMAP2/142.5	3675/1475L	occ. tests	+/- 3 deg inc.
Gorizont 33	3675/1475R	tests	+/- 1.2 deg inc
	3875/1275R	RTR	pgme audio 7.5
Ag2/146E	3787/1363H	GMA	P1/2 s. eqtr
Me2/148E	4080/1070H	test card	occ. use
PAS8/166.5E	3880/1270V	test card, feeds	not full time
	3865/1285H	Napa test card	not fulltime
PAS2/169E	3940/1240V	Napa test card	
1802/174E	4166/984R	Feeds	
	4177/973R	Feeds	
I702/177E	4166/984R	Feeds	inc. KBS Korea
	4187/963R	Occ. feeds	
I701/180E	3810/1340R	Occ. feeds	
	3841/1309L	RFO	East Beam
	3845/1305R	Occ. feeds	inc. from USA
	3930/1220R	USA net feeds	**FTA** & encrypt

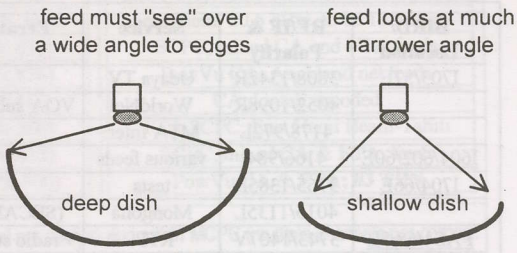
"Unusual" CA formats

PAS4/68.5E	3785/1365V	Discovery India	BMAC
	3860/1290H	ESPN India	BMAC
Ap2/76E	3960/1190H	HBO Asia	GI Digicipher2
C2/113E	3930/1220H	Filip. Peo. Net	GI 1.5 MPEG
Ap1/138E	4100/1050V	ESPN	BMAC
PAS2/169E	4028/1122H	ABS/CBN	GI 1.5 MPEG

"Deep" and "Shallow" dishes - what is the difference?

Parabolic dishes all look as if they might have been "cut from the same mould." And in fact, a "parabola" is a geometric form first employed by the Ancient Greeks. Expressed as a geometric term, it is "*an open plane curve formed by the intersection of a cone with a plane parallel to its side.*" If that is too complex to conjure in your own mind, think of a soup dish.

Arthur C. Clarke (see p. 8, here) first termed the use of a parabolic shape as he envisioned geostationary orbiting satellites as a "microwave mirror." He meant to convey the image that any (microwave) radio energy striking the surface of the "mirror" would be reflected and focused to a common, central point.



The primary advantage of a parabolic antenna (or any of its close cousins including the Ku band "offset" dish) is its simplicity. It is a "mirror" catching passing microwave radio waves, redirecting these waves from the direction they originated to a new "focal point." If focal point bothers you, imaging a hand held magnifying glass positioned so that the sun's rays pass through the lens shaped glass and focus at a single spot beyond the glass. All of the sun's rays intercepted by that specially shaped piece of glass are "bent" into a single concentrated beam, or ray. The heat that results is the sum of all of the heat from each individual solar ray passing through.

Microwave radio energy is a close cousin to the sun's rays; merely a different (longer) wavelength. If you could create a piece of glass which acted on microwaves the same as it focuses sunlight, you'd have one very high gain microwave antenna! The concept is that any singular ray passing through the glass is not very strong, but if you can "phase" (add together) each of these weak rays into a combined ray the sum of their individual energies becomes very large. Or in the case of sunlight, very "hot" - hot enough to start a fire.

The parabolic "dish" focuses microwaves "backwards." Radio signals intercepted by the reflective surface are turned around and sent back towards the point from which they originated. Because the surface of the "dish" is curved, forming that "dish shape," energy striking anyplace on the surface ends up "focused" in a tight central location - the "focal point." This concentrated energy is the sum of all of the individual, "weak" microwave "rays" intercepted by the dish's reflective surface.

The shape of the dish determines where the "focal point" (convergence of concentrated energy) is located. If the dish is essentially flat we call the dish "shallow" - think of a soup dish with "short" sides. A shallow dish has a gradual "side taper" and this creates a focal point that is a considerable distance out in front of the reflective surface. Now, if the sides are steep, the side taper is more rapid and this creates a focal point that is closer to the dish; a "deep dish."

A shallow dish requires a "feed antenna" that looks more or less "straight ahead" because the reflective surface is all in front of it. A deep dish requires a feed that can "see" out the "side" of its mouth because the dish is closer and the edges appear off to the side. Whether a dish is "shallow" or "deep" has a major impact on the feed you select. A "shallow dish" feed installed on a "deep dish" "sees" only a portion of the parabola's surface; a "deep dish" feed installed on a shallow dish "sees" not only the parabolic surface but beyond, off to the side where there is no reflector at all. And that is not good. It would be akin to using a 10" magnifying glass to catch the sun's rays but only using 6" of the available size. How do you know your feed is the correct one? In October.

TUNING IN THE INDUSTRY'S TV PROGRAMME

SPACE Pacific, the Asia-Pacific industry membership trade association, has produced (and continues to produce) a series of one hour television programmes. These "SPACE Pacific Report" shows, hosted by Bob Cooper, cover a range of topics of interest to installers and enthusiasts. Show numbers and content are as follows: **#9901-** Spectrum Analyser techniques, **#9902-** Feeds and LNBs, **#9903-** Dish antenna designs and problems, **#9904-** The dish marketplace, and, "tiny parts," **#9905-** Dr Overflow (Nokia) software, **#9906-** How the uplink works (tour of RCA's Vernon Valley site), **#9907-** Uplink Two, including uplink transmitters, **#9908-** Digital Basics (Mark Long), **#9909-** Real World Installs (Mark Long), **#9910** - Installing a polar mount dish and signal level test equipment, **#9911** - "SPIN" (the hidden side of satellite). **#0012** - First Report from SPRSCS 2000 (recorded in Melbourne June 28, 29 - "Ideal IRDs," more), **#0013** - Second Report from SPRSCS 2000 (recorded in Melbourne June 29, 30 -"ABA Blackspot session"), **#0014** - Naughty Nokia from SPRSCS 2000; **#0015** - The DVB-T Tangle from SPRSCS 2000 (Eric Fien). "Report" is broadcast by Mediasat on Optus B3, 12.336Vt, ad-hoc channel 3(*) (Sr 30.000, FEC 2/3) with the following coming-weeks schedule: **Sunday September 17** - Show 9904, 0200-0300 UTC (1400 NZT, 1300 AEST, 1000 Western Australia; repeats 0700 UTC/7PM NZT, 6PM Sydney, 3PM Perth). **Sunday September 24**- Show 0014 (Premiere Showing), repeats same time as September 17; **Sunday October 1** - Show 0012, 0200-0300 UTC (1500 NZST, 1300 AEST, 1000 Western Australia repeats 0700UTC/8PM NZ, 6PM Sydney, 3PM Perth); **Sunday October 8** - Show 0014 (2nd showing), same times as October 1; **Sunday October 15** - Show 0013, same times as October 1; **Sunday October 22** - Show 0015 (Premiere Showing), same times as October 1. (* - Mediasat may pre-empt showings, check other bouquet channels - such as 5 - if not on 3.) SPACE Pacific Report has also been broadcast by Westlink, Aurora service on Optus B3, vertical (12.595, Sr 30.000, FEC 3/4 - requires Optus Aurora card but is otherwise FTA). Westlink will again carry SPACE Pacific Report when new shows currently in planning are produced and available; details here in October (will start after November 1). In the event of schedule changes (*), SPACE Pacific attempts to pre-announce which show(s) will appear through the SatFACTS Web site prior to each weekend (http://www.satfacts.kwikkopy.co.nz). SPRSCS 2000 sessions taping scheduled for play on Mediasat and Westlink are currently in "editing production" for presentation starting late in September, then October-November. Sponsorship of SPACE Pacific Report. In general answer to queries - AvComm, Satech and Sciteq have contributed corporate funding to make possible the production of the first set of nine SPACE Pacific Report programmes. Additional funding from Ikusi Australia NZ Pty Ltd. has been received for final production of show 9910. Funds derived from sale of VHS tape copies are also an important element in meeting the (A)$1,300 overhead of each show. Mediasat and Westlink donate the time to broadcast the programmes, and both are to be commended for this support. Sponsorship of shows is available to commercial groups; contact Bob Cooper (e-mail Skyking@clear.net.nz; tel 64-9-406-0651).

WITH THE OBSERVERS

AT PRESS DEADLINE

Arirang's digital audio problem. We reported here in past months numerous Observer problems with Arirang TV audio (As-3, 3755Vt, Sr 4.418, 7/8). We NOW have their full attention on this issue and they are asking for reports (what brand, model IRDs) are giving poor audio results. Contact Esther Lee, fax + +822-3475-5306 or e-mail estherlee@arirangtv.com. Today.

ApStar 2R/76E: Channel NewsAsia tests on 3687Vt, Sr 6.111 (also reported 6.610), 3/4 with NTSC and PAL versions.

AsiaSat 2 / 100.5E: "APTN switching between 4:2:2 and FTA on 3799/1351Hz, Sr 5.631, 3/4" (**D. Pemberton**). CCTV-4 analogue shut down on 3960Hz.

AsiaSat 3S/105.5E: SUN TV History Channel, partially sourced from USA, is on 4095/1055Hz, Sr 5.554, 3/4 FTA, intended for Chinese cable TV systems. Bangladesh's ETV, supposed to be SA PowerVu, has been FTA (3749/1401Vt, Sr 4.340) carrying soccer, Rugby tests (**K. Browning,** NZ).

AsiaStar A/105E: Reportedly has turn on "southern beam" (1.478L, 1.480R) which should be powerhouse at least into WA, NT; still no reports on NE beam (1.473R, 1.475R) or NW beam (1.488R, 1.490L) - all Sr 1.840, FEC 1/2.

Gorizont 25/ 140E: "Signal into NSW is slightly better at this location than previous 103E, but polarisation seems to switch between RHC and LHC" (D. Pemberton, Australia). Gz25 replaced Gz22 at this location, both are/were significantly inclined orbit (4.8 degrees). LHC is standard, but satellite shows erratic signs when crossing over low side.

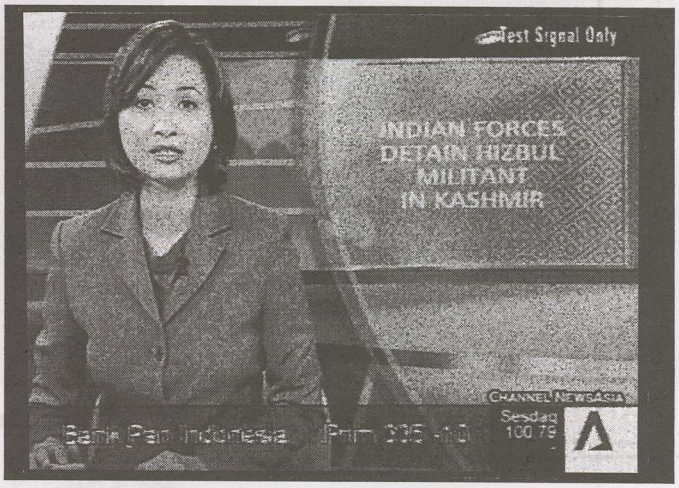
Intelsat 701/180E: Telefenua 5 channel MUX may be shut down on 11.168Vt beaming Tahiti. Related - frequency correction for TNS MUX to Tahiti is now 11.060Vt. Ioarana is reported on 3772/1378RHC, Sr 4.566, 3/4 on what appears to be western beam. "RFO Polycast now 3771.9/1378.1RHC, Sr 4.566, 3/4; RFO-Canal+ 4086/1064 LHC, Sr 13.347, 5/6" (**Grant Waldref**, Tahiti). Yes, and Canal+ will reduce EIRP from 20.5 to 15.5 at anytime - perhaps before you read this. "TNTV has test at 4152/998 LHC, Sr 2.532, 3/4" (**Francis,** Cook Islands).

Intelsat 702/177E: Scheduled to move over 4-day period to 176E as part of new "Pacific swarm" alignment, during October (see p. 31, here).

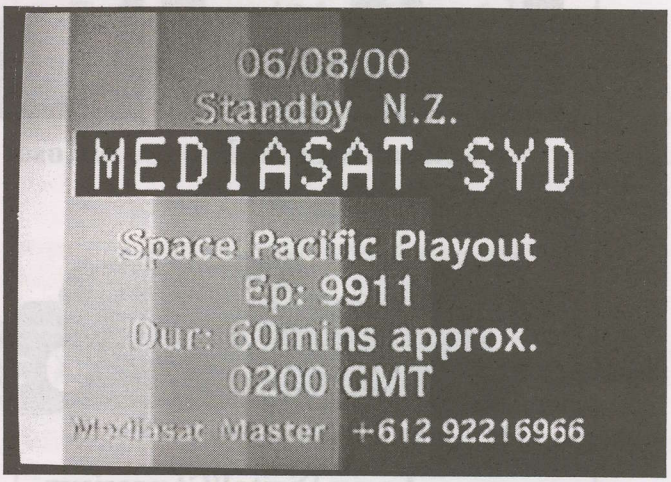
LMI 1/130E: "4Mb data stream (1 TV channel) available here for US$8-10,000 per month," contact Vladimir Litveneko fax ++7-095-253-99-06 or email dir@intersputnik.com.

MeaSat 2/148E: More powerful tests, up at least 2dB from prior reported, 11.540Hz, scheduled for mid-August did not happen. Signals still there on 11.478, .540 and .664(all Hz).

Optus B1/160E: Aurora 12.407Vt has joined 12.532Vt by adding NZ to original Australia only coverage; 90cm dish or smaller. 20 TV channels defined (7 not in use) and included FTA TVSN (#1) until it left Aurora on September 4, plus 20 radio (FTA only #20, ref tone). However, with Aurora smart card, 11 radios play. Zee Music is latest addition to Zee TV MUX within 12.532Vt transponder.



ChannelNewsAsia (Palapa C2, 4071/1079Hz, Sr 14.030, 3/4 [Vpid 33, Apid 34]) promises FTA service with regular operation in September. Below - SPACE Pacific Sunday 1 hour show on Mediasat.



Optus B3/156E: Herbalife now part of Mediasat bouquet 12.336Vt, was B1 analogue.

Palapa C2M/113E: "As of late August, scan produces these MPEG signals in NSW: 3618Hz, Sr 6.000, 3/4; 3760Hz, Sr 26.662, 3/4; 3916Hz, Sr 3.050, 3/4; 4000Hz, Sr 26.662, 3/4; 4075Hz, Sr 14.030, 3/4; 4095Hz, Sr 5.632, 3/4" (**D. Leach**, NSW).

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 October15th issue: October 5 by mail (use form appearing page 34), or 5PM NZT October 6th if by fax to 64-9-406-1083 or Email skyking@clear.net.nz.

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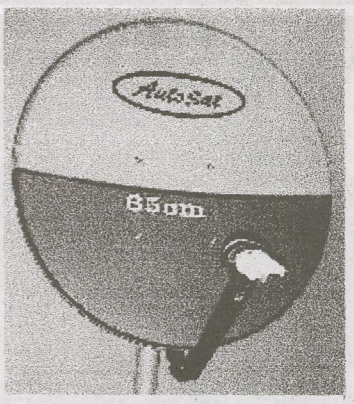
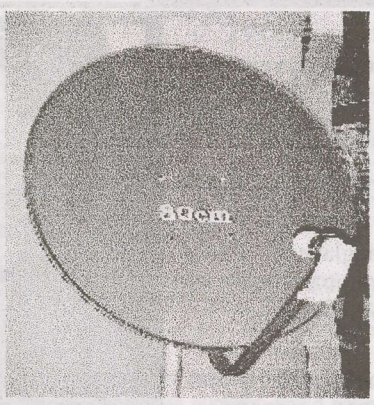
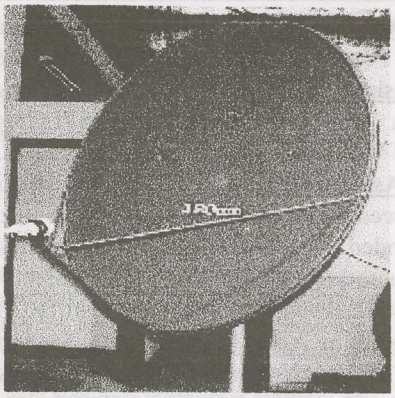


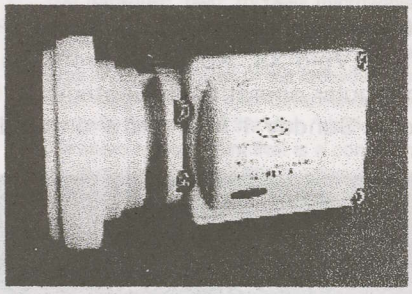
65cm Ku offset dish



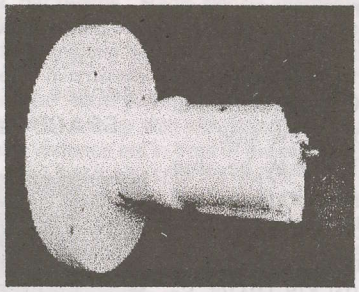
80cm Ku offset dish



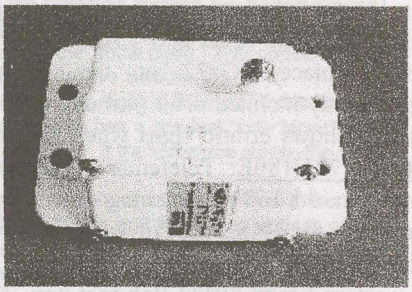
120/150/180cm Ku dishes



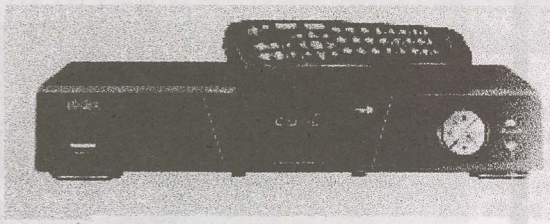
Autosat Ku LNBF



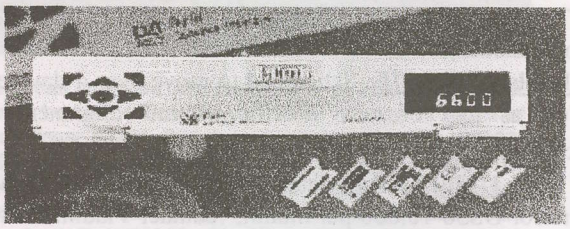
Autosat C LNBF-dual



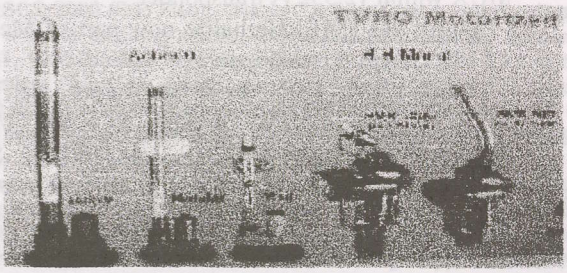
Autosat C LNB-single



Logix Digital/CI receiver



Benjamin Digital/CI receiver



12"/18"/24"/36" heavy/regular actuator

Positioner

Autosat = quality*(product+service+price)

Intelsat announced changes for Pacific + Asian regions

Location	Satellite	October 2000	May 2001	November 2001	February 2002	May 2003
180E	I701	I701	I701	I701	I701 as spare	I701 as spare
178E			I602	I602	I705 as primary	I705 as primary
176E		I702 from 177E	I702	I702	I702	I702
174E	I802	I802	I802	I802	I802	I802
157E					I602	I709
110.5E	SinoSat C-band	SinoSat C-band	SinoSat C-Band	SinoSat C-band	SinoSat C-band	SinoSat C-band
85E				I601	I601	I601

Present "Pacific swarm" Intelsats at 180, 177, 174E are to be respaced from 3 to 2 degrees as above, shifting I702 at 177E to 176E this October, opening up a 2 degree space for I602 (later I705) at 178E. In February, 2002, the present traffic on 180E/I701 will shift to I705 at 178E making 180E an "in orbit spare" after that date. Yes, that would appear to include TNTV, Tele Fenua and Canal + Satellite on Ku band from 180E as well (tens of thousands of dishes to be repointed by February 2002!).

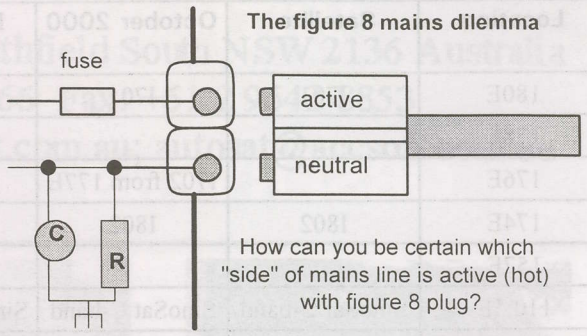
PanAmSat PAS2/169E: Telstra Big Pond Internet now on 12.281Vt. Korean Arirang TV testing on 3793/1357Vt, Sr 4.400, 3/4. NAPSA2 with Seventh Day Adventist (our Sunday) feeds on 3926/1224Vt, Sr 13.091, 3/4 (**B. Richards**) .

PanAmSat PAS8/166.5E: "SF is right - only way to get CMT to play for authorised D9223s is to go to ESPN Bootloader ch. 11 for software update. Once done, as SF reported (July, p. 32), FTA EWTN is lost but at least CMT works again!" (**Hendriks**). "Mediasat test card out of Sydney here at 3854/1296Hz, Sr 6.110, 2/3; also some pre-Olympic feeds" (**Nolan**, Australia). "Filipino Lakbay TV runs a few hours a day, FTA, 3813/1337Vt, Sr 5.044, 3/4" (**Welsby**, PNG). "Knowledge Channel start-up FTA 3706/1444Vt, Sr 3.200, 3/4 - note this IS vertical," ABS/CBN 11 ch CA bouquet 3880/1270Vt, Sr 26.050, 7/8 (D. Pemberton).

Thaicom 3/78.5E: "Channel of Hope, religious, new on 3600/1550Hz, Sr 26.662, 3/4" (D. Leach, NSW).

Errata: Olympic feed alerts - **Bill Richards,** and **David Pemberton** suggest PAS-2 3860/1290Vt, Sr 27.686, 2/3 (4 PanAmSat channels Sydney), 4083/1067Vt (Sr 12.208, 2/3 - 1 PAS Sydney) and 4110/1040Vt, Sr 27.686, 2/3 (4 PAS Sydney); PAS-8 4180/970Hz, Sr 26.050, 7/8; Optus B1, 12.390 and 12.420Vt, Sr 6.620, 3/4. Olympic coverage will be largest single use of satellites in history - we'll try to update daily on http://www.satfacts.kwikkopy.co.nz. Nokia's new 9450 FTA receiver pdf file brochure available from thore@jacobsons-t.se. Foxtel's "version" of terrestrial HDTV in Australia found at http://www.foxtel.com.au/corporate /htdocs/corporate5.htm with links. DISH tests at 148W apparently over, bird moving to more easterly location. "Still trying to find someone at ABS-CBN who will talk with me about private home subscription - any help?" (**Alex Nicdao**, anicdao@ozemail.com.au). 103E Russian location/bird renamed Express 9, was Stationar 21. Not new bird.

AT Sign-off



More about SMPS and mains leads

Our report in SF August #72 asking that MPEG-2 IRD designers pay more attention to the marketplace has drawn considerable response which we share here.

"A detachable power lead is a good concept, but a figure-8 lead as suggested by a conference attendee is a bad choice. Most figure-8 (2 core) leads have a non-polarised plug, allowing the installer or customer to plug in either way around. Internally, the IRD will have a fuse in series with one lead and possibly a high megohm galvanic coupling resistor and capacitor (connecting to the case) in the opposite lead. With this design (which is also common to VCRs), the fuse can end up being in the neutral lead while the case is reverse-connected to the active lead through the capacitor and resistor. When an IRD uses a figure-8 lead, it is possible to see a tiny spark when inserting a coaxial plug from a grounded antenna (such as a terrestrial).

"An IEC lead is a much safer approach, even if the earth is not connected from the chassis socket to the case, because the active and neutral are always the correct way around. An IEC lead also gives the manufacturer the option of using mains noise filters which use a ground return."

In SF#72, we reported overwhelming support for detachable mains leads for IRDs. Anyone who has attempted to locate an IRD into a consumer TV/VCR cabinet and found the hole(s) at the rear too small to fit a mains plug through can appreciate the logic here. Additionally, having the ability to disconnect the IRD for rebooting without having access to the wall located mains plate (often buried behind the cabinet) is another reason for a detachable mains plug at the IRD.

Perhaps there is a way to deal with the detachable mains line and correct many of the SMPS problems simultaneously, as this reader suggests:

"The conference discussion regarding SMPS which I have watched two times on Mediasat suggests to me that unconventional thinking may be required to gain the support of manufacturers who seem bent on cutting power supply costs no matter what the downside may be.

"One of the major sources for RF radiation (in an SMPS) is the transformer. For mains isolation (and safety), there has to be a transformer of some type. Most designs run the transformer at high frequency.

"Perhaps the SMPS design should be broken into two parts - an external 24Vac 1Amp external plugpack that is outside and the balance of the parts inside. The mains isolation is achieved at the plugpack and this reduces or even eliminates the safety concerns which we now have with 'raw' 240Vac where people can get shocked. By having a small lead and plug that connects the plugpack to the IRD rear apron, we now also have a way to 'detach' the IRD from the mains for rebooting or during initial installation.

"By using an AC plugpack (rather than DC), the first stage of the internal-to-the-case SMPS would be a rectifier bridge and smoothing capacitor. This has the advantage of keeping the plugpack simple and offers the further advantage of keeping any RF (interference) that might radiate from the cord connecting the plugpack to the IRD from occurring.

"The 50Hz plugpack will also act as a filter to any high (or very high) frequency noise either entering or leaving the SMPS.

"By using a plugpack, different ratio transformers could be created for the various countries where the AC mains voltage is unique; Australia's nominal 240 but more often 254-260VAC mains, for example. This would have to be less expensive than redesigning IRD power supplies with an expanded safe operating range just for Australia."

And still another suggestion.

"Why don't the IRD manufacturers take a look at the power supply modules now common to personal computers. The ATX type used in Win98 computers, for example, might have several advantages:

"They are commonly available and if they break down, it is easy enough to obtain and fit a replacement.

"They are cheap which seems to be the primary incentive for a manufacturer to select anything!

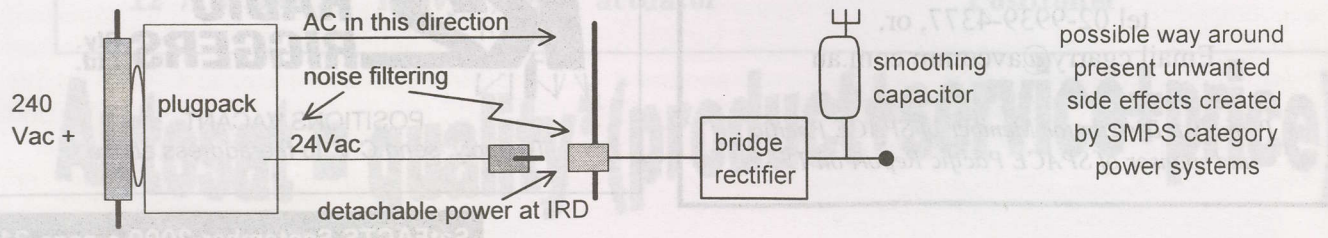
"They are well screened and are fan cooled;

"The common power supply rating is 250 watts, whereas the typical satellite IRD is but 30 watts - there won't be much stress here;

"They accept the IEC power lead.

"There is one slight challenge - the LNB supply (14/18v). However, a well shielded DC to DC up-converter could be built into the IRD to run off either the +5 or +12 volt rails. This is occasionally done in VCRs to provide the 30V tuning voltage from a 12 volt rail."

So - is the *present* SMPS design the *only* way to reduce power supply costs and increase utility of the IRD in a world marketplace? Obviously not. Now, let's hear from some IRD designers who have answers to this still serious problem.



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• Changes (signal level, transponder, programming content) in pre-existing programming sources since September 1st: _____

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• OTHER (including changes in your receiving system): _____

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CLIP and POST - Updated Pay TV Lists for Pacific

Austar + Foxtel +Optus (51 channels will typically load on UEC 642; Optus B3, 12.376Hz, 12.438Hz, 12.564Hz, 12.626Hz and 12.688Hz): (1)TV1, (2) SHOW(time), (3) ENCR(ore), (4) FS1 (Fox Sports 1), (5) ARNA (arena), (6) [V] (channel V music), (7) NICK(elodeon), (8) DISC(overy), (9) FS2 (Fox Sports 2), (10) LIFE(time), (11) CMDY (comedy channel), (12) NGEO (National Geographic), (13) MAIN (event - PPV and promos), (14) CMT (Country Music TV), (15) SKY (Sky Australia racing), (16) No ident (Austar promo), (17) MOV1 (Movie 1), (18) MOVX (Movie Extra), (19) MOVG (Movie Greats), (20) C7S (channel 7 sports), (21) C7S2 (channel 7 sports #2), (22) ODSY (Odyssey), (23) MTV (Music TV), (24) SKYN (Sky News), (25) TCM (Turner Classic Movies), (26) TWC (The Weather Channel), (27) CNBC, (28) WMOV (World Movies), (29) TVSN (Television Shopping Network), (30) CNNI, (31) ESPN, (32) OVAT(ion), (33) OH!, (34) RAI (Italy), (35) ANT(enne, Greece), (36) BBC, (37) FOX, (38) FOX (duplicate), (39) UKTV, (40) HALLmark films), (41) FX, (42) KIDS, (43) FOXN(ews - USA), (44) C7O(lympics #1 for Foxtel), (45) C7G (2nd channel 7 Olympics, for Foxtel), (46) DIS(ney), (47) CNNF(inancial news), (48) NHK (Japan), (49) SKYN(ews), (50) C7O(lympics #1, for Austar), (51) C7G (2nd channel 7 Olympics, for Austar); plus, 24 radio service channels ending with #25 - "Tone" which in fact usually is not.
Sky Network (NZ) will typically load as follows: 12.518Vt (1) Sky Movies, (2) Cartoon Network, (3) ESPN, (4) Sky News, (5) Fashion TV, (6) Weather, (7) Arirang TV - Korea: 12.546Vt (1) TCM, (2) Granada UKTV, (3) Sky Sport, (4) National Geographic, (5) CNBC, (6) ETTV - Taiwan, (7) SETN - Taiwan; 12.581Vt (1) Mosaic, (2) Sky 1, (3) Hallmark, (4) Sky Sport 2, (5) Animal Planet, (6) CNN, (7) National Radio, (8) Concert Radio: 12.608Vt (1) Juice TV, (2) Trackside, (3) Discovery, (4) Prime TV, (5) Sundance Movies, (6) Radio ENG (production links), (7) NHK; 12.644Vt (1) Sky Movie, (2) Nickelodeon, (3) TV3, (4) Sky Sport Extra, (5) Sky Box Office, (6) TV3 (duplicates 3), (7) TV4, (8) Phoenix TV - Hong Kong, (9) CTV - Taiwan.
Aurora Platform appears on Optus B1 on 12.407Vt (Australia + NZ), 12.532Vt (Australia + NZ), 12.595Vt (Australia), 12.720Vt (Australia). **Mediasat** appears on 12.336Vt Optus B1, Australia + NZ and could be on Measat 2 Ku full-time by the end of September.

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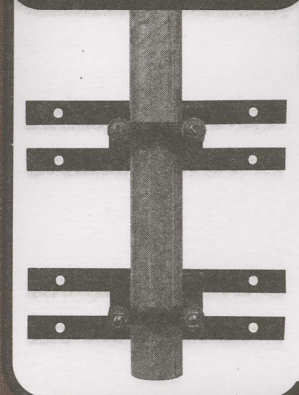

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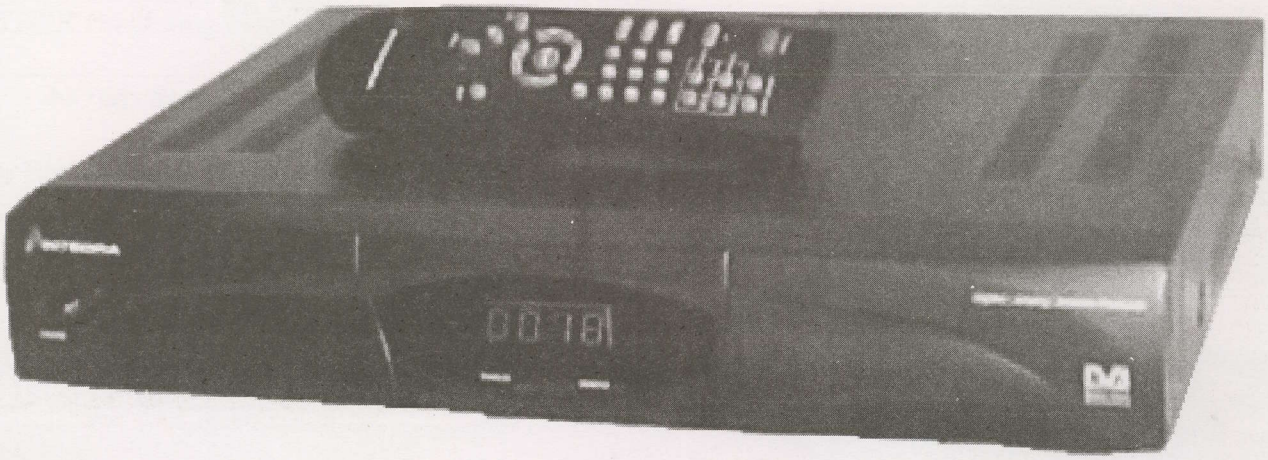

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- DVB Common Interface (Viaccess, Nagra Vision, Conax, CrytoWorks,Irdeto,)

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