The World's Largest Satellite Magazine

SatcoDX CD-ROM included

B 9318 E

TELE SATELLITE INTERNATIONAL

€ 6,50
£ 4.95
EE: EEK 99,-
AU: AU$ 9.50 incl GST
ZA: R 39-95
NG: Naira 400

10-11 2006 26th Year Nº 195

The Truth About Video Compression

FortecStar
Mercury II
Digital FTA Satellite Receiver

GT-Sat
LNB Series with just 0.2dB Noise

SatcoDX
New Satellite Footprints in Last 2 Months

TechnoTrend
NEW: DVB-S2 Card

Dr. Farrag
Is it a Helmet? No, it's a Multifeed Luneberg Antenna

Monster Antenna

"Five-meter dish for sale, disassembled"

ENG CD

www.**i-topfield**.com

We Serve Multimedia.

Twin Tuners with Dual Decoding (PIP)
Dual Recording and Playback simultaneously

TF4000PVR Plus

TF4000PVR Plus

Digital Satellite PVR

Now, you can enjoy more attractive functions with TF4000PVR Plus!

Dual Recording and Time-shifting simultaneously
2 Common Interfaces for CONAX, CRYPTOWORKS, IRDETO, NAGRAVISION, SECA & VIACCESS

TOPFIELD®

Topfield Co., Ltd.
Hanseo Bldg, 246-3, Seohyun-Dong, Bundang-Ku, seongnam, Korea, 463-824
Tel: +82 31 778 0800 Fax: +82 31 778 0801~2
www.i-topfield.com Email: info@i-topfield.com

Topfield Europe GmbH.
Oskar-Jäger-Str. 170 D-50825 Köln Germany
www.topfield-europe.com Email: info@topfield-europe.com

Exclusively for TELE-satellite Readers
SatcoDX "World of Satellites"

SatcoDX's "World of Satellites" Software contains the technical data from every satellite transmission worldwide

SatcoDX Software Activation Code

SatcoDX Software Activation Code Version 3.10:

93GE192A5GA8191DEB63GC2C66CB99E5

Valid until the publication of the next issue of TELE-satellite magazine

Download SatcoDX Software here:

www.TELE-satellite.com/cd/0612/eng

Step by Step Guide to Get SatcoDX Software Running on Your Computer:

1. Download SatcoDX Software Version 3.10 from the above URL, or install from CD-ROM

Note: if you have already installed Version 3.10, you do not need to do it again. Check your currently installed version by clicking the HELP button, then ABOUT. The third line tells you the version installed on your computer

2. Enter the Activation Code by clicking LICENSE and then REGISTRATION. After entering Activation Code click VALIDATE KEY and EXIT. Now you are ready to download the newest satellite transponder data anytime you want, provided your computer is connected to the Internet and is allowed to access FTP.

Note: SatcoDX Software also runs without Activation Code, or with an outdated Activiation Code. However, the satellite data on

display will be either from last time you performed an update, or from the time when original software has been compiled. By default, each SatcoDX software contains the set of satellite data as current as when it was compiled and put together.

TELE SATELLITE INTERNATIONAL

Main Address:
TELE-satellite International
PO Box 1234
85766 Munich-Ufg
GERMANY/EUROPA UNION

Editor-in-Chief:
Alexander Wiese
alex@TELE-satellite.com

Published by:
TELE-satellite Medien GmbH, Germany

Design/Production
TELE-satellite Hungary Kft
Nemeti Barna Attila

International Advertising
Alexander Wiese
alex@TELE-satellite.com

CITY Advertising
Monika Szabo
m.szabo@TELE-satellite.com

Subscriptions Services
See Page 50

Newsstand Distributors
TELE-satellite English Edition
Australia: Europress
Austria: Pressegrossvertrieb PGV
Bahrain: Al-Hilal Publishing
Canada: Disticor
China: LSG Derong Trade Co.
Estonia: As Lehepunkt
Finland: Rautakirja Oyi
Greece: Hellenic Distribution
Ireland: Eason & Son
Israel: Steimatzky
Kuwait: Kuwaiti Group for Publishing
Latvia: SIA "Preses Serviss"
Lebanon: Levant Group
Malta: Miller Distributors
Nigeria: Newsstands Distribution
Norway: Narvesen Norge AS
Oman: Dar Al-Atta'a Est.
Philippines: Emerald Headways
Qatar: Dar Al Sharq Printing
Saudi Arabia: Saudi Distribution
Singapore: Pansing Distribution
South Africa: MCS - Caxton
Sweden: Svenska Interpress AB
Thailand: Infosat Intertrade
UAE: Emirates Printing Publishing
UK: International Press Network
USA: Prestige Periodicals

ISSN 1435-7003

Printed in SPAIN/EUROPA UNION

www.TELE-satellite.com/eng

Member of Distripress

Chess®

OS click-clack High Quality Dish

- -hinged LNB-Arm
- -partial, pre-assembled mounting
- -very easy quick-installation
- -even lacquered HQ-Reflector
- -very robust mounting, made of steel
- -incl. 2 pole fixers
- -manual

65/85cm
Aluminium/Steel

www.click-clack.eu

..partial, pre-assembled mounting

self-arresting and hinged LNB-Arm..

0,2dB

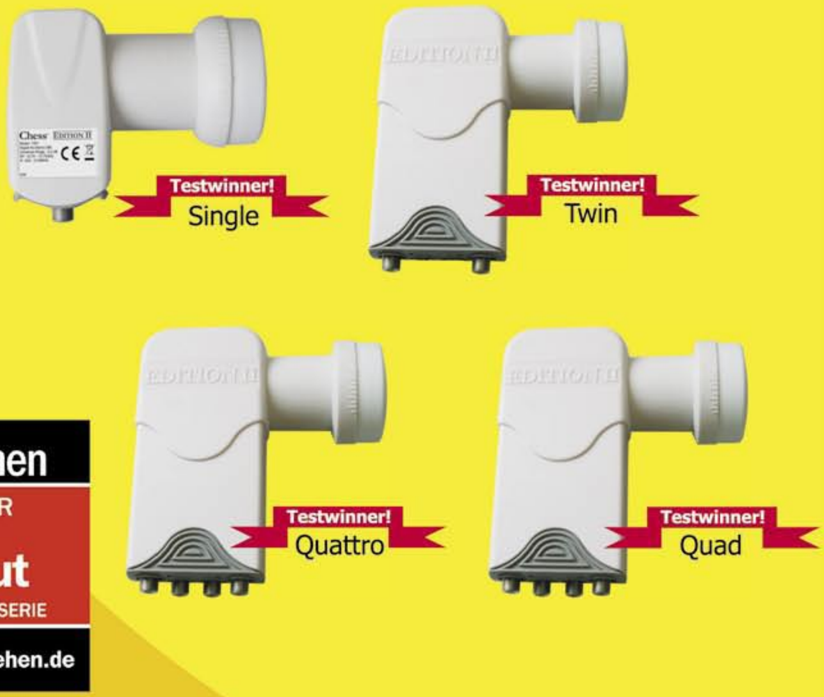
mit Slide Down Protector

READY FOR HDTV

Garantie 3 Jahre

Chess Edition II Universal LNB Series

Single | Twin | Quattro | Quad



DIGITAL fernsehen
TESTSIEGER
6.2006
sehr gut
CHESS EDITION-II-SERIE
www.digitalfernsehen.de

The Testwinner!

The whole test from SATELLIT and Digital Fernsehen at
www.max-communication.de
Telephone: +49 4101 6060-0

low noise figure 0,2dB (typ.) | water-proof shielding design with Slide Down Protector | low Power consumption | 3 years warranty

CONTENT

FORTEC STAR MERCURY II
Digital FTA Satellite Receiver 14

TECHNOTREND S2-3200
PC Card.................18

PROMAX TV Explorer
Digital/Analog TV, Satellite and Cable Signal Analyzer 20

GT-SAT GT-LST40/ GT-T40/GT-QD40/ GT-QDCIR40
LNB's 24

Dish Installation
Global Positioning System (GPS) helps with antenna alignment..........................28

Mini Satellite Antenna
A multifeed Luneberg antenna by Dr. Farrag.................30

Satellite Transmissions
New Satellite Footprints in last 2 months at SatcoDX 34, 36

Big Dish
"Megastructures"
5m dish 38


Dear Readers

In the last issue of TELE-satellite we focused on video resolution, in other words, how many pixels are transmitted. We also mentioned that there are some channels that transmit only one pixel instead of four and that receivers simply take this one pixel and repeat it four times. The provider ends up saving 75% in pixel transmissions.

But there's more. In this issue we want to take a closer look at video compression. Instead of transmitting every pixel one after the other, they are compressed so much so that only general information is actually transmitted. This is like saying, "Dear Monitor, please take some red pixels and put them in the upper corner, take a few blue pixels and place them in the lower corner and please don't ask where exactly the yellow ones should go." The more compression that takes place, the more imprecise the picture will be on the TV screen.

In the meantime, there is a third category of TV program that really takes the art of omission to its finest level: these would be the newly surfaced channels in Europe that carry still images that change only once every few seconds. These images are used mostly to promote toll telephone numbers. The level of information here tends to be near zero, both in the picture that we can see (programming content) and also in the transmitted technical signal.

Not only that, every channel category would have its own entry in the channel list of a satellite receiver and that's where I begin to wonder: if still images are going to be listed as TV channels, what is the difference between TV and the Internet where banner ads appear as still images?

It would seem that two technologies are merging together that really don't belong together. I define a TV channel as a "moving picture" that is in a quality that suits my monitor. The worse the picture quality and the less movement there is in the picture, the less the channel has to do with TV. Why would something like this even appear in the channel list of my receiver alongside "real" TV channels?

It would be nice if future receivers had the capability to select the technical quality of a transmission. I would like to see expanded scan options: in addition to selecting "All" and "FTA-only", what about an "HQ-Only" option? This would mean high quality with a minimum 1 Mbps bitrate and a resolution of at least 704x480 pixels.

It would make me happy to see only "real" TV channels!

Sincerely,

Alexander Wiese

P.S.: My favorite radio station of the month: Radio Atlantida on Hispasat at 30W (12.149V, A-PID 5203) with endless old and new hits from Spain.

Basic Functions: What is an LNB – and what is it for? 10

Feature: Circular or Linear Polarization 12

Antenna Technology: Luneberg lens "reloaded" 32

DYI Multiband: Multiband Reception Siberian Style................42

Video Quality: Video Quality in digital TV, Part II 46

MPEG 4:2:2: DXers Dreams Finally Come True.......................48

ADVERTISERS

ARION........ 7
CABSAT........51
CSTB-2007........26
DIGITALL WORLD........ 5
DOEBIS........8,9
DVB SHOP........23
DVB WORLD 2007........12
EMP........22
EYCOS........27
FORTECSTAR........35
GT-SAT........33
HORIZON........31
JAEGER/WEISS........37
KATHREIN........25
MAX-COMMUNICATION........ 4
MOTECK........49
OPENTECH........52
PANSAT........41
PANSAT........43
PROMAX........45
SADOUN........44
SMARTWI........47
SPACECOM........17
SPAUN........29
STAB........15
STARSAT........21
STATE MICRO TECHNOLOGY........39
TECHNISAT........11
TELE-satellite CITY........40
TOPFIELD........ 2

DOEBIS GmbH & Co. KG

Dr.-Günter-Henle-Str.4
D-56271 Mündersbach

Fon: +49-(0) 26 80 98 79-0
Fax: +49-(0) 26 80 98 79-19

Email: info@doebis.de
Web: www.doebis.de

What is an LNB – and what is it for?

Heinz Koppitz

Satellite signals are very weak. That's why we need a parabolic antenna to focus them and a low noise block, also known as LNB or sometimes LNBF, universal LNB or feedhorn mounted in its focal point to collect them. But what exactly happens inside this small component?

Eletronics

The low noise block is the actual heart of the satellite antenna. Basically, it's a cavity resonator which receives at one end the focused satellite signals that are reflected from the antenna and then processes these signals. Similar to an organ pipe it oscillates and triggers internal dipoles which convert the transmission energy into electrical signals. An additional electronic switch amplifies these signals before they are sent to the coax cable and converts them into a lower frequency in order to minimise signal loss in the cables.

Even though the descriptions may sound like there is a big difference between individual models, most currently used LNB types use the same technology, the major distinguishing factor being the noise figure which has been reduced to the theoretically lowest possible value of 0.3 dB in the most recent models. A universal LNB is used to divide the Ku band – which is predominantly used in Europe – into two partial frequency ranges.

Each LNB can only be used for a single frequency band, because the S, C and Ku bands each require different cavity resonators. There are also individual types for linear and circular signals, which mainly differ in the way the internal dipoles are arranged.

The power supply for the electronic switch is of particular interest. The power is provided by the receiver and transmitted over the coax cable. The coax cable therefore not only transmits the reception signals from the antenna to the receiver, but also the required operating power from the receiver to the LNB (together with additional control signals).

Switching features when changing channels

Transponders have one of two different polarisations (horizontal/vertical and left/right circular, respectively). That's why the receiver has to tell the LNB the polarisation for any given signal, so that the appropriate dipole can be activated. The voltage of the power supply takes care of this: 14 V activate the vertical polarisation, while 18 V activate the horizontal polarisation. Even though DiSEqC has developed into a very powerful control tool with more than 256 commands, it is still not used for switching between the polarisation levels.

A universal LNB features a second switching mode for the extended Ku band. Since the frequency range of satellite receivers is not wide enough the actual frequency range has to be split up into two partial ranges. Switching between these ranges is controlled by a 22 kHz signal which the receiver also sends to the LNB when selecting a certain channel. This 22 kHz signal is also used as carrier frequency for DiSEqC control commands in more complex system configurations. These DiSEqC commands serve for controlling multiswitches and antenna motors (see issue 189).

Various designs

There are several design types for different purposes. The table lists the most common LNB types for the extended Ku band and indicated how they are used:

Type	Connections	Fixed assembly	Motorised dish	Multifeed
Single LNB	One receiver	One satellite	Yes	2 – 4
Twin LNB	Two receivers	One satellite	No	2 – 4
Quad LNB	Four receivers	One satellite	No	2 – 4
Quattro LNB	Multiple users	One satellite	No	2 – 4
Octo LNB	Eight receivers	One satellite	No	2 – 4
Monoblock 2	Two receivers	Two satellites	No	2, fixed
Monoblock 4	Four receivers	Two satellites	No	2, fixed
Monoblock 8	Eight receivers	Two satellites	No	2, fixed

Single LNBs are suitable for individual reception. The reception principle of a single LNB is also included in flat antennas. If the receiver comes with DiSEqC 1.2 and features the commands required to control a motorised dish, a single LNB in combination with a dish motor allow you to receive signals from any number of satellites. This makes for a very elegant configuration, except for the time you have to wait until the antenna has moved to the right position when selecting a channel from a different (i.e. not currently tuned into) satellite.

All other designs are only suitable for fixed antennas. Twin, quad and octo LNBs are intended to support two, four or eight receivers. Each of these receivers is connected to the LNB with an individual coax cable, thus allowing signals to be received independently for each of these receivers.

A quattro LNB with a switched output delivers all four possible signal configurations (horizontal/vertical and low/high band) simultaneously and is not suitable to be connected directly to a receiver. Its output signals are connected to a switching matrix. With the help of matrix cascades and intermediate amplifiers it is then possible to connect any desired number of receivers to this system.

Multifeed for professionals

Multifeed means receiving signals from more than one satellite simultaneously with a fixed satellite antenna. The advantage of such a solution is that switching between satellites takes place very quickly. However, several disadvantages or restriction are associated with multifeed reception:

Due to the reduced reception efficiency it is necessary to go for a larger dish.

Not more than four satellites can be selected.

The possible orbital range comprises not more than +/- 10 degrees (less rather than more). Satellites must be spaced at least three degrees apart from each other

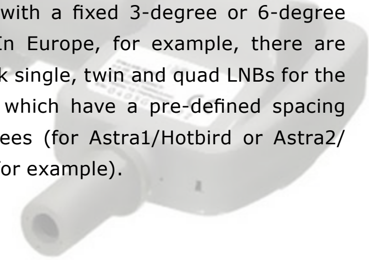
A DiSEqC command is required for switching between signals.

If more than one receiver is to be connected a signal matrix is required.

It can be difficult to properly adjust the antenna.

Practical monoblock LNB

This dual LNB is the simplest solution to achieve multifeed reception for two satellites. This design consists of two independent LNBs in a single case. The two LNBs can be automatically addressed with any DiSEqC 1.1 receiver. However, they are only available for satellites with a fixed 3-degree or 6-degree spacing. In Europe, for example, there are monoblock single, twin and quad LNBs for the Ku band, which have a pre-defined spacing of 6 degrees (for Astra1/Hotbird or Astra2/Astra3A, for example).

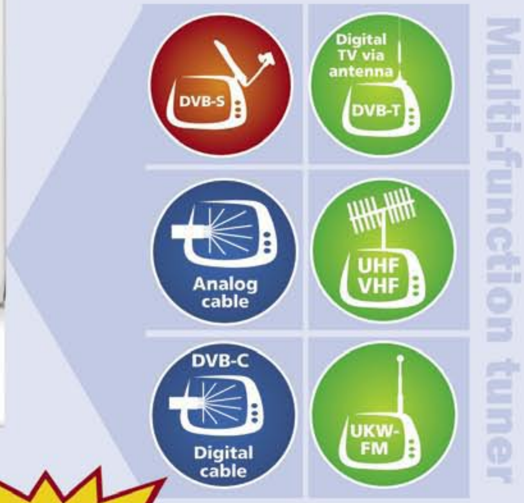


WORLD'S FIRST!

TechniSat **HD-Vision 32/40**

World novelty!

The first HDready LCD-TV with an integrated multi-function tuner as a standard feature for all digital and analogue transmission modes (satellite, terrestrial, cable)! Possibility of mixing the programme positions of analogue and digital programmes!



32" + 40" zero pixel error guarantee

Discover the new all-rounder of the digital quality TV.

The new HD-Vision 32/40 with 81/102 cm visible LCD image is HDready and disposes of an integrated multi-function tuner for all digital and analogue transmission modes by means of which it is even possible to mix the programme positions of analogue and digital programmes. For pay TV and pay radio it has a Common Interface and a Smartcard reader. A multitude of connection options such as 2x HDMI and USB 2.0 as well as free-of-charge value-added services, for example the free program information service "SiehFern INFO", AutoInstall, the ISIPRO programme-list manager and the automatic software update turn the HD-Vision 32/40 into a real all-rounder.

TechniSat
MultyMedia TS 1

DVB-T/S Combo Box, CI, CONAX, 12/230 V

TechniSat
SkyStar 2 TV

DVB-S PCI card

Visit us at MATELEC in Madrid/Spain 24-28th of october 2006 hall 7 D 420
or at Satkrak in Krakau/Poland 26th-28th october 2006

Please do not hesitate to contact us!

TechniSat DIGITAL
DAS ORIGINAL

TechniSat Digital S.A.
Mediacenter Betzdorf
11, rue Pierre Werner
L-6832 Betzdorf/Luxembourg
www.technisat.com
Mail to: international@technisat.com
Fax: +352 710 707 959

2853 09/06

Circular or Linear Polarization

Peter Miller

If you studied the satellite charts, you probably noticed that the majority of Ku-band transponders operate with linear polarization (vertical or horizontal) while the majority of C-band transponders - with circular polarization. Is there any reason for that or simply someone has started this way and all the other followed?

Yes, there is. But before we try to explain that, let's tell first a few words about the polarization in general. Electromagnetic wave is a combination of electric and magnetic fields. They always appear simultaneously. The electric field vector is perpendicular to magnetic field vector and they are both perpendicular to the direction of wave travel. In figure 1 the electromagnetic wave is traveling upwards.

Now if there is no phase shift between electric vector and magnetic vector, we have linear polarization. We call the polarization vertical or horizontal depending on the orientation of the electric vector with respect to the equator plane..

If there is a ±90° shift, we have circular polarization. 90° shift (positive or negative) means that when electric field reaches its maximum, the magnetic field is equal zero and vice versa. You can see this in figure 1. Theoretically, if we have other values of phase shift (neither 0/180° nor ±90°), we have elliptical polarization, but this is not used in satellite transmission so we do not want to discuss it here. Depending on the sign before 90°, we have either right hand circular polarization (RHCP) or left hand circular polarization (LHCP).

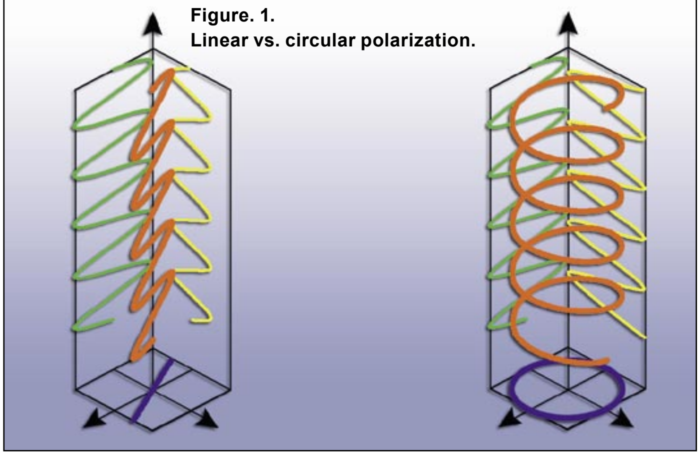


Figure. 1.
Linear vs. circular polarization.

Now, it is generally easier to manufacture a good performance LNBF for the linear polarization signals than for the circular. That's why the majority of Ku-band LNBF use linear polarization.

One of the well known disadvantages of linear polarization is the necessity to adjust the skew of LNBF depending on your geographical location. This is not needed for the circularly polarized signals – you just install such LNBF in your dish focal point and that's it.

Another less known but probably more important factor is the sensitivity of linearly polarized signals to the Farraday's rotation caused by earth's magnetic field. Rotation of EM vectors has no effect on circularly polarized signals. The Faraday's effect decreases rapidly with frequency and is practically negligent for Ku-band but not for C-band! That's why, using linear polarization in C-band is rather risky. This may be even more important when we need to cover the areas close to the earth magnetic poles.

The providers decide what area they want to cover. If the area of interest has a big chance of having bad weather condition (rain, snow) or is located at high latitudes (what means longer paths through clouds), they would rather choose C-band. As you probably know, C-band is less sensitive to bad weather conditions than Ku-band. And because the C-band is sensitive to the Faraday's effect, the circular polarization is a better choice.

But if the area is located in medium latitudes and the dish dimension is of major concern (like in big European cities), Ku-band would probably be the choice. Since we do not have to worry about the Faraday's effect here, linear polarization will make it easier to provide the end users with high performance LNBF's.

So, as you can see, there is a reason behind this or that polarization choice. This is always about ensuring the highest reliability of reception.

Fortec Star Mercury II

FTA Receiver with Unique Extras

Once again Fortec Star has added a new receiver to their North American lineup. The new model Mercury II was introduced to the world at the Sat Expo 2006 in Atlanta, Georgia, USA. It is a simple FTA receiver that includes a number of extra features that make it more fun to use for the user. Naturally, we wanted to take our magnifying glass and have a closer look at what makes this new box tick.

At 300 x 210 x 60mm (11.8 x 8.3 x 2.4 inches), it is a typically sized receiver. Its silver-colored front panel sports eight silver, horizontally placed buttons that can be used to control and program the receiver should the remote be lost somewhere in the cushions of the couch. The four-digit green display located in the center of the front panel displays the current time or the currently selected channel. What is unique is that when you switch to a new channel, the channel number is displayed for a moment and then the current time reappears. The current time can be entered in manually or you can have the receiver extract the correct time from the data stream by selecting GMT to "on" in the Time Setup menu. Just keep in mind that time data may not always be available from every transponder.

The rear panel comes with all the standard connectors that you'd expect to find such as an IF input with looped-through output, video and analog stereo audio outputs on three RCA jacks, a VHF modulator output that can be switched between Channel 3 or 4, a terrestrial TV antenna/cable input that is looped through to the modulator output when the Mercury II is in standby mode and also an RS-232 serial interface. But there are also a number of pleasant surprises on the connector panel: not only will you find an S-Video output and a digital audio output, there is also an additional set of three RCA jacks that provide component video outputs (Y, Pb and Pr). There's even a main power switch; something you might not find on other receivers.

In contrast to the silver color of the receiver, the included universal remote control is mostly black. The underside of the remote is shaped so that it sits comfortably in your hand. It comes with all of the standard buttons including a numeric keypad, ring buttons for volume and channel control, an "OK" button along with Info, EPG, Exit and Menu buttons positioned to the left of the ring buttons. Since this is a universal remote, it can be programmed to operate other electronic equipment such as a TV, VCR or DVD player. This is a convenient feature allowing you to control almost everything with just a single remote control. There are even extra buttons on the remote for controlling typical features found on a VCR plus an Edit button that lets you conveniently edit a channel (add to a Favorites list, lock it, delete it, rename it, etc.).

Everyday Use

The receiver comes with a power cord that is fitted with a standard North American plug. The power supply itself is rated at 100-120 VAC/60 Hz so don't try plugging it into a wall socket in Europe or other parts of the world that supply 220 VAC; you might blow it up.

When you turn on the box for the first time, the user is initially asked to select the desired menu and audio languages. For the menu language you can choose between English, Arabic, Croatian, Czech, Danish, Dutch, Farsi, Finnish, French, German, Greek, Hungarian, Indonesian, Italian, Norwegian, Polish, Portuguese, Romanian, Russian, Serbian, Spanish, Swedish and Turkish.

With the languages selected, the next screen to appear is the Installation menu. From here the user can set up the satellites that are to be received. You can select the proper local oscillator frequency (LOF) from a list or enter it manually if the LOF you need is not in the list. From this screen an antenna motor – be it DiSEqC 1.2 or USALS – can also be activated. If you don't have an antenna motor but instead have multiple antennas or a multifeed antenna, the receiver's DiSEqC 1.0 and 1.1 protocols allow this box to work effortlessly with these types of antennas.

Most new receivers that appear on the market come with an extremely powerful scan function. This Power Scan, also included in the Mercury II receiver, lets you perform a satellite scan without knowing any transponder parameters in advance. It will find all active digital DVB transponders on a satellite and then scan each of those transponders for any TV and radio channels. Considering the capabilities of a Power Scan, this would seem to be the next logical step after a satellite has been activated. While the included transponder data may be up to date, new transponders may have appeared since the transponder list was loaded into the receiver. A Power Scan would quickly identify any of these newcomers and add them to the transponder list. Simply put, a Power Scan is by far the easiest way to keep your receiver's transponder and channel data up to date.

The Power Scan in the Mercury II can be conveniently accessed directly from the remote control and can be customized in a number of different ways. Instead of running a full range scan, the user can restrict the scan to a single polarity, the start and end frequency can be specified, the scanning steps can be set to 4, 6, 8, 10, 12 or 15 MHz and the scan itself can be set to look for FTA-only channels or all channels. There is also a "Locking Speed" option that offers the choices "detailed", "quick" and "normal". If you are only interested in scanning for transponders with symbolrates over 10 Ms/sec., then the "quick" option would be the best choice. "Normal" would be best for symbolrates over 5 Ms/sec. and "detailed" should be selected if you want all symbolrates; even those less than 5 Ms/sec. It goes without saying that a "detailed" scan would take more time to complete. Also, the scanning steps selected would also dictate how much time would be needed for a scan.

To test the Power Scan function, we pointed our dish to Intelsat Americas 5 at 97 deg west and opted to do a "detailed" scan in steps of 4 MHz. During the scan, any transponder that was found was displayed in a list. The Power Scan screen also displayed the current frequency that was being scanned as well as a progress bar at the bottom of the screen. After all active transponders were found, the Power Scan then searched


THE BEST SAT MOTOR
Stab ®
ITALY
Stab - USALS ®
UNIVERSAL SATELLITES
AUTOMATIC LOCATION SYSTEM
3 YEARS WARRANTY
HH90
HH100
HH120
EASIEST TO INSTALL! EVERYTIME!
ONLY STAB USALS® MOTORS
WITH MAXINTELLIGENCE™
PRECISION CALIBRATION:
GO TO THE SATELLITE
ACCURATELY EVERYTIME!
STAB S.r.l.
Via Seminiato, 79
44031 Ambrogio (Fe) - ITALY
Tel. +39 0532 830739
Fax +39 0532 830609
www.stab-italia.com
www.stab-usals.us
info@stab-italia.com

each of the transponders for any channels. A scan from 11.7 to 12.2 GHz on both polarizations required about 12min 51sec to complete.

The receiver has enough memory to hold up to 6000 channels and as many as 100 satellites. The manufacturer claims that the Mercury II can handle signals with symbolrates from 2-45 Ms/sec. We found that the Mercury II can do much better than that. We tested the receiver on a 1.374 Ms/sec signal and are happy to say that this box did not hesitate for one second to lock onto this signal.

Pushing the OK button on the remote displays the channel list with the video of the currently selected channel shown in a window. The Channel Switch feature will determine what happens to this inserted video when you scroll up or down in the channel list. If Channel Switch is set to "direct", the channel video will change every time you scroll to another channel in the list. If it is set to "delayed", the video will not change until you find the channel you want and press the OK button. This delayed feature would be attractive if the Mercury II is connected to an antenna motor. In this way the motor will not move until you find the channel you want and press OK. In "auto" the receiver will automatically detect whether it should be "direct" or "delayed".

Naturally once there are a number of channels stored in memory, you would want to organize them in some logical manner. Although the Favorites lists are pre-named, these names can be changed to something more suitable if needed. There's also a special Favorite list that goes by the name "Fav7". If there are certain channels that you want to store but at the same time don't want anyone else to know about, simply put them in the "Fav7" list and activate the Fav7 lock in the Lock menu. Once in this list, they are completely hidden from view by others and are not even displayed in the normal channel list.

The satellite sort function is also interesting: satellites can be sorted alphabetically or by position. But there is also a "default" setting whereby the first two satellites in the list will always be IA5 and Galaxy 10R. All the satellites after that will be listed alphabetically. This is a logical feature considering that IA5 and Galaxy 10R are the two most popular satellites to point your antenna to here in North America.

Another fascinating feature is the Channel Backup function. At first you might think that this involves uploading your channel list to a PC. But, no! Not this time! Activating Channel Backup will take your existing organized channel list and back it up to the receiver's internal memory. You can now Power Scan other satellites, upload new receiver software, perform a factory reset of the receiver, etc., and then restore the backed up channel list by selecting Channel Recovery. This will take the current channel list and replace it with the backed up channel list. In other words, the channel list will be back to what it was before.

The Recall button on the remote doesn't just switch between the last two channels that were viewed; instead, the last 10 channels will be displayed in a list from which any one of them can be selected.

The Mercury II still has some additional goodies to help make this box more exciting. For example, multi-picture mode lets you display multiple channels (4, 9, 13 or 16 pictures) on the same screen. One of the images will have live video while the others will be still images.

The Mercury II also has a reminder function: when properly set up in the Timer menu, the receiver will remind you when a selected program is about to start. There are a number of other features such as picture-in-graphics, a data transfer function (receiver to receiver or receiver to PC), display of the provider name in the Antenna Setup menu (Satellite Identifier), display of channel numbers based on a providers numbering system (SID) plus more. If it should happen that you can't find anything to watch on TV, there's always the video games Tetris and Push Push to keep you occupied. And let's not forget the detailed user manual written in both English and French.

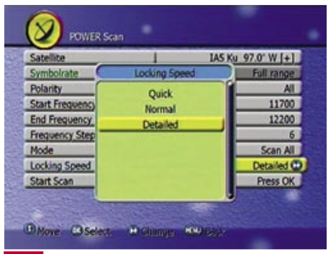
TECHNIC DATA

Manufacturer	Fortec Star Communications, Mississauga, Ontario, Canada
Fax	+1-905-602-5289
E-mail	fortecCA@fortecstar.com
Model	Mercury II
Function	Digital FTA Satellite Receiver
Channel Memory	6000
Symbolrate	2-45 Ms/sec.
SCPC Compatible	yes
C/Ku-band Compatible	yes
USALS	yes
Hard Disk Drive	no
DiSEqC	1.0, 1.1, 1.2, 1.3
Video/Audio Outputs	3 x RCA
Component Video Outputs	3 x RCA (Y, Pb, Pr)
S-VHS Output	yes
Digital Audio Output	yes, S/PDIF
Power Supply	100-120 VAC, 60 Hz
Power Consumption	40 Watts max.

Channel edit

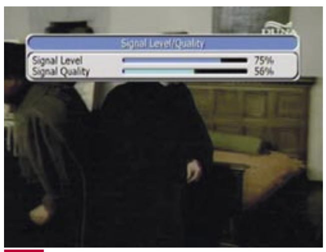
Multi picture

Channel list



Power scan

Info bar



Signal Quality

Expert conclusion

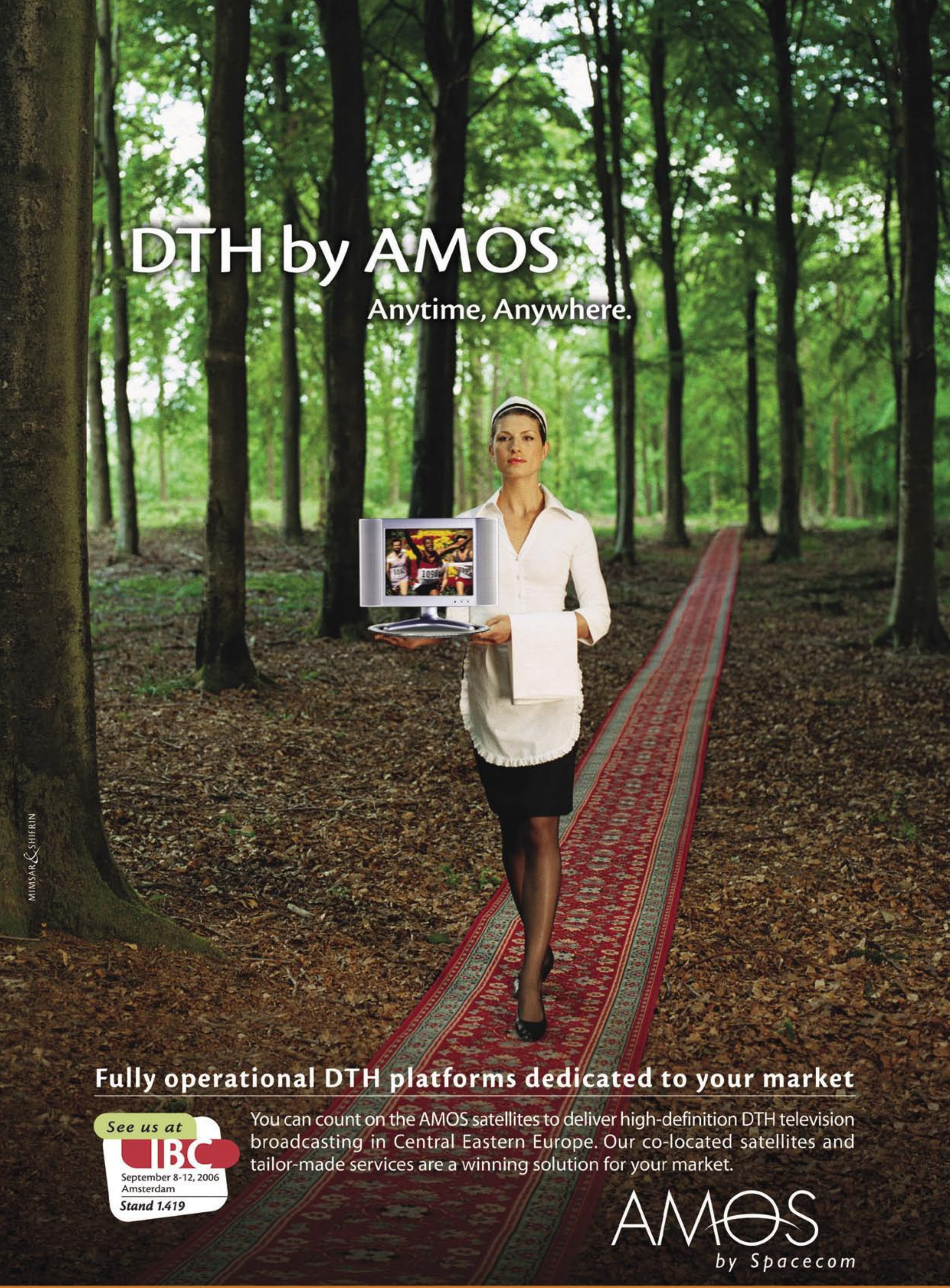
Ron Roessel
TELE-satellite
Test Center
North America

+

Despite being an FTA-only box, the Mercury II comes with features you'd expect to find in higher end units. The Power Scan function is extremely versatile in that most of the scan parameters can be customized to what you need. Plus its component video outputs and digital audio outputs make for higher quality TV viewing.

-

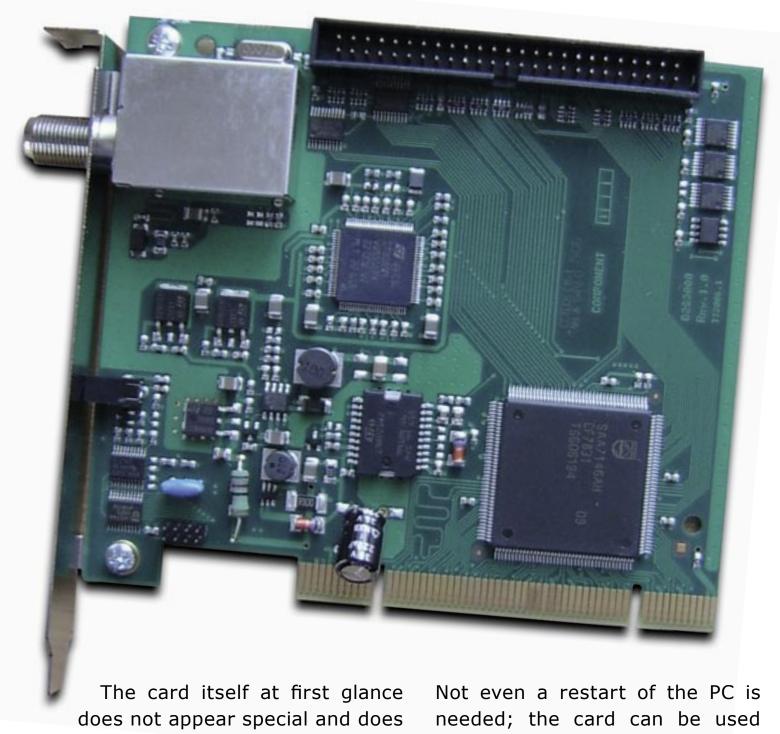
The receiver does not have a universal power supply and thus is not designed to be used outside of North America. This is supported by the fact that it also only provides an NTSC output. Also, many of the features mentioned above were only added after the production receivers were shipped. A software upgrade would be necessary to add all of these features.


DTH by AMOS
Anytime, Anywhere.
MIMSAR & SHIFRIN
Fully operational DTH platforms dedicated to your market
See us at
IBC
September 8-12, 2006
Amsterdam
Stand 1.419
You can count on the AMOS satellites to deliver high-definition DTH television broadcasting in Central Eastern Europe. Our co-located satellites and tailor-made services are a winning solution for your market.
AMOS
by Spacecom

TechnoTrend S2-3200

Inexpensive HDTV on Your PC

While many of the larger TV networks are slowly catching on to the HDTV idea, the necessary receivers are very hard to find much like the proverbial needle in a haystack. After introducing the first DVB-S2 set top box in a previous issue of TELE-satellite magazine, it only makes sense to take the next step and introduce in this issue the DVB-S2 PC card. The German company DVBSHOP distributes this model worldwide exclusively under the model number S2-3200. TechnoTrend needed to delay the release of this new card to the market because the required MPEG-4 chips were simply not available. Fortunately, the manufacturer used this extra time wisely by developing software that is truly bug –free and problem-free.



The card itself at first glance does not appear special and does not give you any idea as to what its potential really is. The first thing you notice would be the satellite IF input and the IR receiver. A 50-pin connector for use with an optional CI interface is also visible. The included remote control is somewhat small in size but after getting used to it, it will let you control the card without any problem. The detailed user manual for operation of the TechnoTrend Media Center Software can be found on the included installation CD in PDF format.

Everyday Use

The installation of the card and associated software is nothing more than plug-and-play. After plugging the card into an empty slot and turning the PC back on, Windows immediately recognizes the new hardware and asks for the appropriate driver. As soon as this is taken care of, all that remains is the installation of TechnoTrend's Media Center software. Not even a restart of the PC is needed; the card can be used immediately. On the hardware end, TechnoTrend recommends a 1 GHz Intel Pentium 3 for normal DVB-S; for HDTV content it should be at least a 3.4 GHz Pentium or AMD 3500+/Dualcore with a powerful graphics card (AGP or PCI Express with a minimum of 64 MB RAM). Microsoft Windows XP is also required. The S2-3200 needs a PCI slot all by itself; if you also use the optional CI interface, you will need a second empty slot. But this will let you easily insert all the different CI modules in the back of the PC.

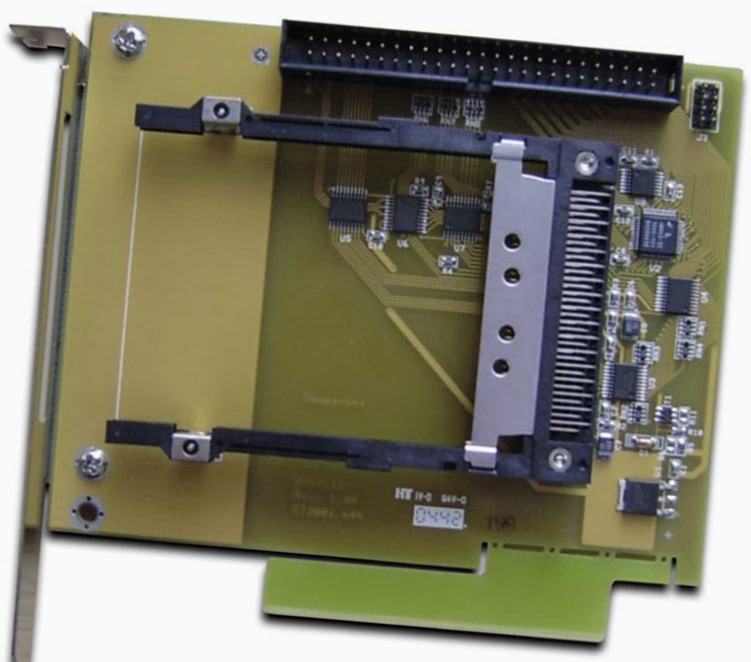
The included software is actually divided into two parts: the first is the TechnoTrend Media Center for TV reception and the second is a tool for reception of data services such as Internet via satellite. The Media Center comes preprogrammed with a nearly complete channel list for the Astra position (19.2° east) in Europe. This channel list is conveniently sorted by provider allowing you to easily find all of your favorite programs. If you want to receive other satellites besides Astra, this is easily accomplished via the Channel Search menu. A total of 141 European, Asian and American satellites are preprogrammed into memory. The fact that the transponder data of a few of these satellites might not be all that up-to-date, is more than made up for by the sheer number of satellites available. Editing or adding new transponder data to any satellite is simple. Every possible local oscillator frequency (LOF) is also freely selectable. In addition to a manual transponder scan, an entire orbital position can of course also be scanned; an 80-transponder satellite required roughly nine minutes for just such a scan.

The integrated DiSEqC 1.0 protocol lets you use this card with up to four individual LNBs. The DiSEqC 1.1 protocol, that would have allowed up to 16 LNBs to be controlled, is unfortunately not available. If you have a DiSEqC motor that you can call your own, the integrated DiSEqC 1.2 protocol lets you also operate your motor with this card. In general though, actually using one of these motors with the card may not be a good idea. The 14/18-volt control voltage for the LNB is derived from the 5-volt supply voltage on the PCI bus. The motor would use this same voltage and could overwhelm the card.

The Media Center software is divided into three sections: in the upper left side you will find the Control Bar from which all available functions can be activated with a single click. On the right side is the channel list and in the center is of course the TV screen from which you can view the currently selected channel.

Thanks to the preprogrammed channel list, the user can get started immediately after the installation with the first channel appearing on the screen in less than two seconds. For a PC, this switching time is actually quite good; switching between two channels on the same transponder required just under one second while switching between two different transponders took just about two seconds.

The EPG is especially appealing in that it could make some owners of normal set top boxes turn green with envy. The EPG needed just a few seconds after switching to a channel to gather all of the necessary EPG data. This data, including expanded EPG info (assuming the provider makes this data available) can



then be logically arranged with just the push of a button.

Thankfully, the EPG window lists all the other channels and has already downloaded the EPG data. Now a simple push of a button displays the selected data.

Should the telephone ring while enjoying an evening in front of the TV or if someone should ring the doorbell and pay you an unexpected visit, the integrated Time Shift function lets you pause the program you were watching and continue it after you have taken care of business. With the help of the Timer function, numerous programs can be marked in advance for recording. Both weekly and daily timers are supported. Of course, this will only work if the PC happens to be turned on at the time the recording is supposed to take place.

The TechnoTrend manufactured tuner is sensitive although it does have its problems with narrow-band SCPC signals. Our 1.3 Ms/sec. test transponder could not be scanned; only with signals starting at 4 to 5 Ms/sec. the S2-3200 could play along.

After exploring all of its basic SDTV functions, we naturally wanted to finally check out its HDTV reception. We quickly found the HD services from the German Pro7 and Sat1 channels and in less than two seconds, the channels were on the screen with outstanding picture quality. Thanks to the CI interface even encrypted programs such as the German Premiere HD PayTV package can be received.

While the playback of SDTV transmissions put hardly any workload on our P4 3.7 GHz processor, the much higher requirements for HDTV reception were clearly recognizable. As long as no other programs were open aside from the Media Center, audio and video could be synchronously displayed without any problems. But as soon as additional programs were started that put an added load on the CPU, the quality of the HDTV picture paid a price.

TechnoTrend certainly cannot be held responsible for this considering the PC in our test lab lies at the bottom end of the power scale.

If you have an AC3 or Dolby Digital stereo speaker system linked to your PC, you can naturally enjoy crystal clear audio along with your super sharp picture. Contrary to other S2-DVB set top boxes, the TechnoTrend Media Center even has no difficulty recognizing the British Sky Digital and BBC transponders on Astra2 at 28.2° east. First class documentaries in high-quality HDTV are no longer an obstacle.

In addition to TV reception, the Media Center also comes with the ability to play back a variety of video formats on the PC and thanks to the integrated picture-in-picture function (PIP) you can even watch TV in a small window while playing back a video. Annoying commercial blocks can thus be easily skipped over.

The CI expansion module allows the S2-3200 to also receive PayTV services in addition to free TV. The three CI modules we tested (Alphacrypt CI with a Premiere card, Viaccess CI and Irdeto CI) functioned perfectly.

The Media Center Software comes with a separate menu selection that gives the user the ability to program every button on the remote control to their liking. Because of this, it is necessary to "teach" the remote before its used for the first time and to save all button settings. Once this is taken care of, the remote control is much more fun to use thanks to the individual button programming.

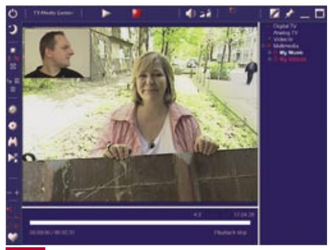
In addition to TechnoTrend's Media Center software, a number of extra programs are available that can be used with this card. For DXer's out there that simply can't do without their ProgDVB, you can rest easy because it works very well with this card. Even HDTV programs in S2-DVB can be presented despite the lack of support in ProgDVB. The data application that in this case operates in the background as a Tuning Helper makes it possible. If DVBViewer is your program of choice, you will not be disappointed either. This program also worked very well together with the S2-3200.

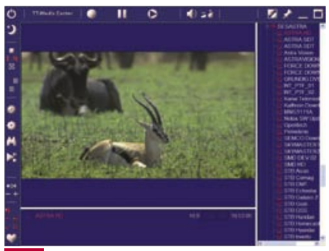
In this issue of TELE-satellite we looked at different MPEG 4:2:2 reception possibilities and with that in mind it certainly made sense to put the S2-3200 under a microscope and check this out very closely as well. It didn't take long at all for us to realize that the TechnoTrend Media Software could not handle MPEG 4:2:2 reception but thanks to ProgDVB all is not lost. Even other programs that have been used for MPEG 4:2:2 feed reception worked quite well with this card in our tests.

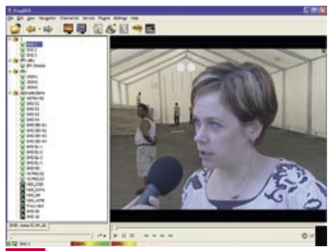
TECHNIC DATA

Distributor	DVB-Shop, Germany
Telephone	+49-34954-31960
Fax	+49-34954-49233
Internet	www.dvbshop.net
Model	S2-3200
Function	PC card for reception of DVB and DVB-S2 signals in SDTV/HDTV
Channel Memory	Unlimited
Satellites	141
Symbolrate	4-45 Ms/sec.
SCPC Compatible	yes, starting at 4-5 Ms/sec.
USALS	no
DiSEqC	1.0 and 1.2
EPG	yes
C/Ku-band Compatible	yes

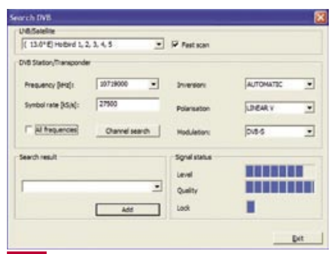

Media Center Software


Picture in Picture


HDTV Reception in DVB-S


MPEG 4:2:2


SAT1 HD in DVB-S2


Channel Scan

Expert conclusion


Thomas Haring
TELE-satellite
Test Center
Austria

+

The TechnoTrend S2-3200 is a multifaceted card that despite being introduced only a few weeks ago has already made quite an impression. TechnoTrend used the waiting time for the necessary chips very wisely and is thus able to offer a perfectly functioning software package. The presentation of HDTV programs in DVB and DVB-S2 functions correctly, and on top of all this, DVBSHOP offers this card at a very attractive price.

−

None

Promax Prodig-5 TV Explorer

Thomas Haring

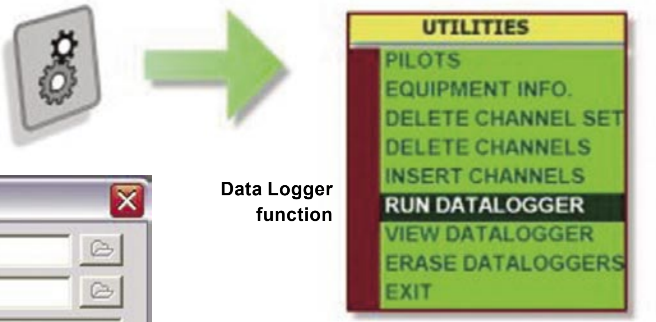
In the last issue of TELE-satellite magazine, we introduced the basic functions of the Prodig-5 TV Explorer from Promax to our readers. Over the past several weeks we took a closer look at the various details of this unit and want to present them to you in this report. Fortunately the manufacturer also recently released a new software update for the TV Explorer. This gives us the opportunity to tell you about the changes that Promax implemented with this update.

Software update

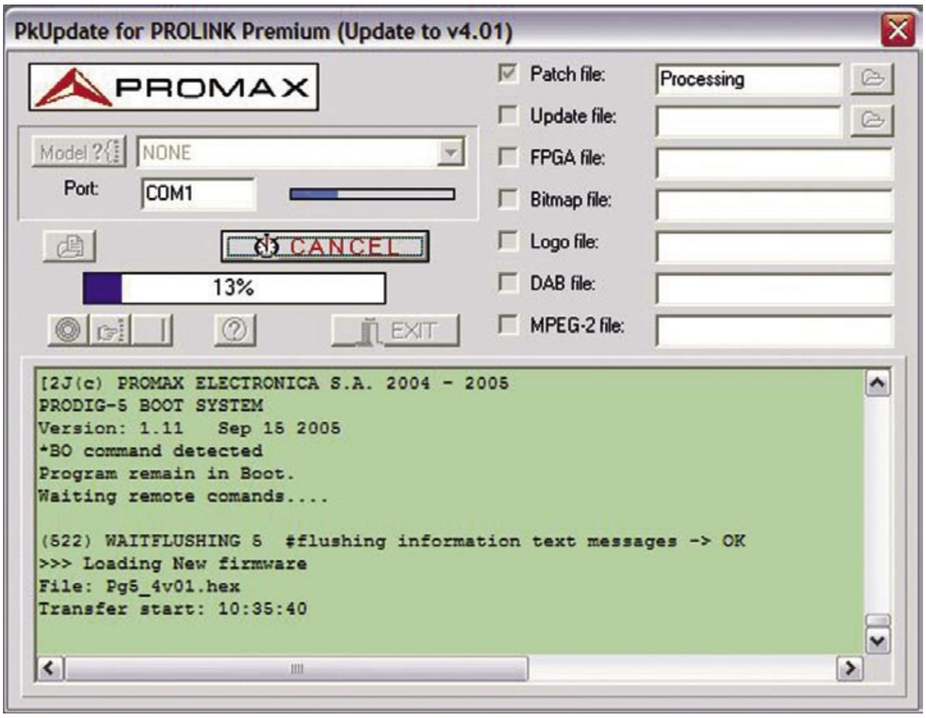
Thanks to the RS232 connector on the Prodig-5 and the PKUpdate tool, Promax can easily improve the unit's functions by releasing new software updates. The new software as well as the upload tool are available free of charge on the manufacturers website www.promax.es. The update itself is simple Plug&Play; just connect the unit to your pc via the RS232 port, start the upload tool and transfer the new software to your Prodig-5 TV Explorer. For those of you that are not so experienced, Promax includes step-by-step instructions in the update tool.

Datalogger

The Prodig-5 TV Explorer comes with a Datalogger function; a feature included with all other Promax products as well. Professional installers will immediately know what we are talking about: after installing a new satellite dish, the customer or your boss would want to have a written report showing all the measurement results and providing proof that everything was installed correctly. By pressing just one button, you can now easily activate the unit's Datalogger function. This feature stores all measurement results (Power, C/N, BER, MER etc.) and prepares them for output, either on the built-in display or via RS232 and the PKTools software on your PC. With this function it is possible to measure the signals from different antennas and even to check the signal quality in different apartments, if you happen to be building up your own small TV network. The PKTools software can also be found free of charge on the manufacturer's website www.promax.es



Data Logger function



Software update via RS232

IF-Test

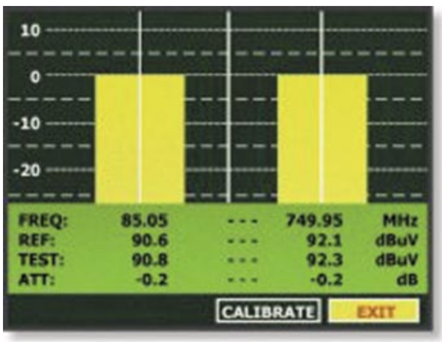
In a large apartment building it's not only for aesthetic reasons to share one common terrestrial antenna and satellite antenna. And if you build up your own small cable network you don't even need a receiver on every connection box to get all of your favorite channels. The IF test or Attenuation test enables you to determine the quality of a SMATV cable network before installing the head-end equipment. In this way you can identify the quality of already existing cable installations or the maximum loss you'll experience before you have to buy and install the other equipment. The test is performed in combination with the RP-080 signal generator. It creates four different output signals, two of them in the terrestrial range (85-750 MHz) and two of them in the satellite range (1000-

STARSAT TRADING L.L.C.
P.O.Box: 42291, Dubai-U.A.E
Tel: +971 4 2289293
Fax: +971 4 2287765
E-mail:starsat@eim.ae

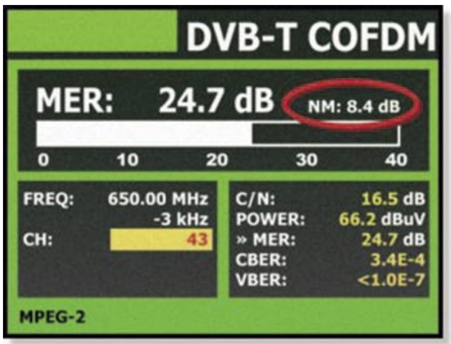
2150 MHz). The Prodig-5 is now directly connected to the signal generator and the unit will save these values as calibration default. In the next step the Prodig-5 can now be connected to every available connection box so that the current signal can be easily compared to the default one.

Noise margin measurement

Promax has added this new and very clever option to the Prodig-5 TV Explorer with the last update (4.02). The unit can now perform a noise margin measurement, which means that it calculates the maximum loss of the MER (in dB) so that the signal still can be received without distortion. With this new function, Promax offers for the first time a way to measure the bad weather reserve of a satellite dish.



IF-Test



Noise margin measurement

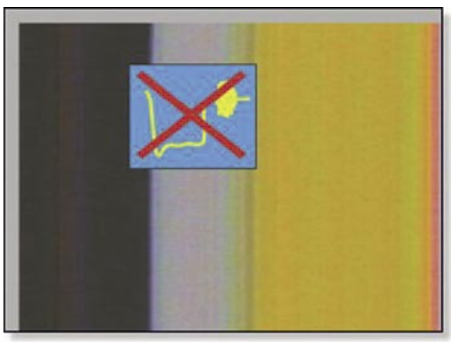
Automatic detection of saturation

Amplifiers and overly powerful head-end outputs can cause saturation in analogue SMATV cable networks. The Prodig-5 helps you to detect this problem by indicating it with a small symbol in the upper left side of its display and to fix it by reducing the gain of the amplifier or the head-end output signal. Furthermore, you can determine the maximum allowable gain, so that even in case of some unexpected higher gain no saturation will occur. While displaying black/white signals, the symbol will always be displayed since these signals don't contain any color information.

HDTV

Of course the Prodig-5 TV Explorer can measure HDTV channels and transponders, but with some limitations: Because of the built-in tuner, only transponders using the DVB standard can be processed, DVB-S2 is not supported. However, the compression type (MPEG-2 or MPEG-4) doesn't really matter, the unit can measure MPEG-2 signals as well as MPEG-4 but for MPEG-4 it can only display Power and C/N while for MPEG-2 Power, C/N, BER, MER etc. are available. The HDTV picture itself can't be displayed either for MPEG-2 or MPEG-4 but since we're not talking about an HDTV receiver but a satellite gauge that's really ok.

We strongly recommend that you install the software update. The manufacturer did an excellent job and the update provides you with some new and very useful functions.



Automatic detection of saturation

GT-Sat GT-LST40/GT-T40/ GT-QD40/GT-QDCIR40

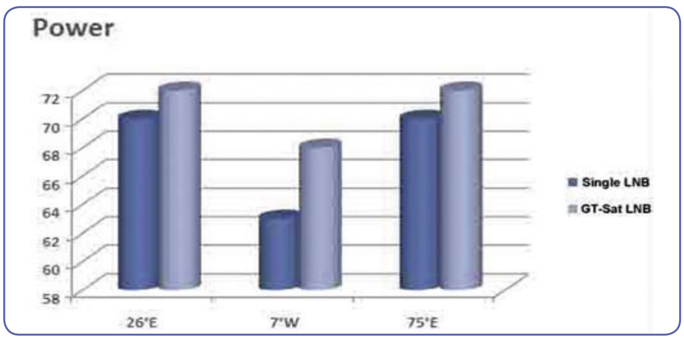
High Quality LNBs for Every Application

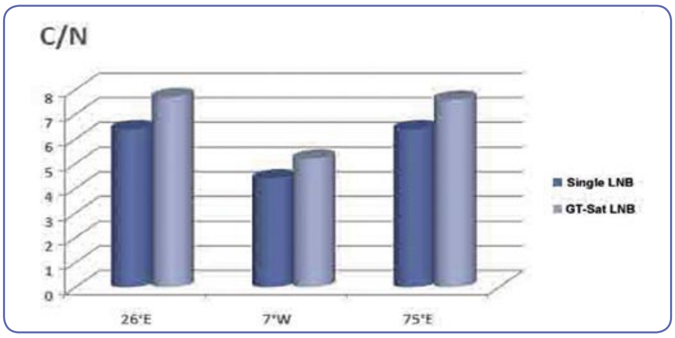
GT-Sat LNB series

Over the past few months, dozens of new LNBs found their way into our test center and while we had to reject most of them because they were of very poor quality, we were pleasantly surprised by the LNB series from GT-Sat in Luxembourg. We were not only impressed by the high quality manufacturing but also because of the various LNB types within the series. What other manufacturer offers a complete series of single, twin, quattro and quad LNBs for linear and circular polarization? We decided to take a closer look at them so that we can tell you all what they are all about.

At first glance, the grey and white colored LNBs look very inconspicuous but you can easily recognize that it's a high quality product. The LNBs are solidly built and the housing is absolutely waterproof. The feed itself is protected by a solid cover that is also resistant to high temperatures. While the single version is equipped with a plastic cover to protect the connecting cable from weather, all the other models are equipped with a solid cover to prevent moisture from reaching the connectors. All of the linear polarized models are available with 40mm and 23mm feed diameters so you can use them on any standard offset dish. They are also ideally suited for use on multifeed antennas. Furthermore, the single LNB is being offered in both straight and angled versions. LNB makers would love to market their LNBs with a "0 dB noise figure", but, of course, we all know that this is impossible. GT-Sat knows this too and markets their LNBs with a 0.2dB noise figure. The input frequency range for the linear model is between 10.7 and 12.75 GHz with the output frequency (IF) between 950 and 2150 MHz using local oscillator frequencies (LOF) that are 9.750 and 10.600 GHz. The circularly polarized models can only receive signals in the upper frequency range that lies between 11.7 and 12.75 GHz with an output frequency of 950 to 2000 MHz and an LOF of 10.750 GHz. Each model comes with a conversion gain between 56 and 60 dB. Polarization switching is controlled by the LNB supply voltage where a voltage of 11~14VDC is used for vertical/left circularly polarized signals and 16~20VDC is used for horizontal/right circular signals. The cross polarization isolation is very good at 25 dB and switching between low and high band is simply done by using a 22 KHz signal. The manufacturer claims an operating temperature range from -40° to +70° C, so you should be able to use the LNBs either in ice cold Siberia or piping hot Dubai without having to worry about temperature related problems.

Thus far we've only told you what the manufacturer states these LNBs can do. But the only way to really find out their capabilities was to put them to the test, and that's exactly what we did. We performed several tests in our Austrian test center on weaker signals such as those on EUROBIRD2 at 26° east, NILESAT at 7° west and LMI1 at 75° east and compared them to a single LNB that has been in use in our test center for the past several months and has surprised us again





Russian TV on EUTELSATW4 at 36° east (circular polarized

and again with very good reception results. We installed both LNBs on a properly aligned motorized Kathrein CAS120 dish. First the GT-Sat LNB had to prove its abilities and we were quite surprised with the results (power and C/N) as can be seen in Table 1. The GT-Sat performed better than our old LNB in all frequency ranges. Especially interesting was the difference in the horizontal high band on EUROBIRD 2 at 26° east. Additionally, we were also able to measure higher c/n values on the weak horizontal transponders on NILESAT at 7° west. This LNB allowed us to view these signals for the very first time. With the old LNB, the signals appeared on our analyzer as peaks but they could not be viewed. Further tests on LMI1 at 75° east were also very positive. Here we were once again surprised with the quite high c/n values that we were able to measure. Next we checked out the capabilities of the GT-Sat LNB on the weaker signals of the ASTRA2D satellite at 28.2° from our test center in Munich, Germany using a one-meter dish and were yet again pleasantly surprised with the results. In the end we can safely say that GT-Sat offers a high-quality, very sensitive LNB with a realistic noise figure of 0.2 dB.

GT-Sat not only manufactures LNBs for the reception of linearly polarized signals, but for circularly polarized ones as well. Circularly polarized signals are actually quite common in parts of eastern Europe and North America. From our test center in Vienna, Austria, it was nearly impossible to receive the circularly polarized signals from EUTELSATW4 at 36° east with a 1.2m dish and so we were quite eager to give it a try with the GT-QDCIR40. From the outside, this Quad LNB looks quite similar to its linear cousins and it is available in both single and twin models. We first installed it in the focal point of our dish and rotated the antenna to the 36° east position and were amazed at how much better the signal levels had suddenly become. We knew that using a linear LNB for circular signals would result in some signal loss, however we would have never believed that this loss would be so high. Even when we moved the LNB out of the focal point and installed it next to a linear LNB, we were still able to receive the channels from EUTELSATW4 at 36° east with exceptional signal quality. The linearly polarized LNB was used for reception of all the other European satellites. The GT-QDCIR40 can switch between left and right polarization by using the 14/18V control signal. This worked very well during our tests and contrary to the linear models, both left and right circular polarizations could now each be individually received with maximum signal strength.

Expert conclusion

Thomas Haring
TELE-satellite
Test Center
Austria

+

GT-Sat, with its new line of LNBs, now has something for everyone. It doesn't matter if you need a single, twin, quattro, quad or even a circular LNB, you will always find the correct LNB for your application. The manufacturing quality is very good and the noise figures we measured matched that in the technical data sheets provided by GT-Sat.

-

For the moment GT-Sat does not offer any of its LNBs with a flange type of connector and therefore they cannot be installed on prime focus antennas.

TECHNIC DATA

Manufacturer	GT-SAT International SARL, Luxemburg
Fax	+352-26432204
E-Mail	info@gt-sat.com
Model	GT-LST40, GT-T40, GT-QD40, GTQDCIR40
Function	LNB series for linearly and circularly polarized signals
Input Frequency Range	10.7~11.7 GHz/ 11.7~12.75 GHz linear bzw. 11.7~12.75 GHz circular
Output Frequency Range	950~1950 MHz / 1100~2150 MHz
L.O. Frequency	9.75GHz / 10.6GHz linear bzw. 10.75GHz circular
Conversion Gain	56-60dB
Band Switching	22 KHz
Polarization Switching	14/18V
Noise Figure	0,2db (Typ.)
Connector	75 Ohm F Type (fem.)

Global Positioning System (GPS) helps with antenna alignment

Heinz Koppitz

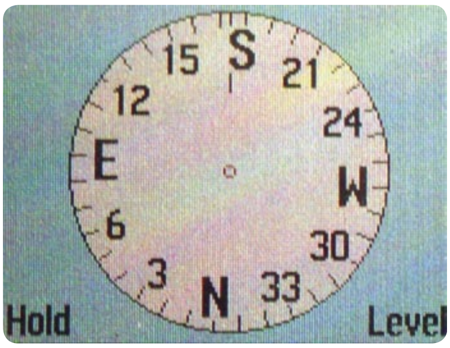
GPS is satellite-based in a similar way as satellite broadcasting. As a worldwide positioning system it has – on the face of it – nothing to do with the reception of television and radio stations, and yet it can be a very helpful tool for precisely positioning the antenna southward. All you need is a mobile GPS receiver, the kind of which is also frequently used by hikers and fishermen.

Therefore, this reports intends to explain the GPS system in general and to detail its application for adjusting a satellite antenna. In addition, we have tried to discover any weaknesses of this booming technology by testing an anonymously purchased mobile GPS receiver.

How GPS works

The Global Positioning System was installed back in 1995 by the US military. Contrary to geostationary broadcast satellites, GPS uses orbiting satellites which are positioned at 20,000 km above ground, way below the equatorial broadcast satellites at an altitude of 36,000 km. In order to guarantee permanent reception at any given location on earth, the system comprises a total of 24 satellites which circle above earth in precisely pre-defined and coordinated orbits. Consequently, a GPS receiver has to switch between different GPS satellites to maintain continuous reception of positioning signals. What might look like a disadvantage at first sight is in fact one of the major benefits of GPS, because the reception situation is the same all over the globe, no matter whether you're located in the middle of the Pacific Ocean, the centre of Paris or on a US highway. Only buildings, rocks and tall trees are able to impair reception.

GPS satellites send a huge amount of data, the most important of these being the positioning data and the current time. By processing the data of at least three GPS satellites a GPS receiver can then determine its location. Horizontal data, i.e. the degrees of longitude and latitude, are most accurate and help to determine one's location worldwide – in most cases with an accuracy of less then 10 meters!



The original aim of the GPS system was to locate injured GIs who should be able to determine their position as a "waypoint" so that rescue helicopters could then track and retrieve them. In the meantime, GPS receivers have become smaller and have developed to be genuine microcomputers which are able to use the incoming data for much more than mere positioning tasks. The data that are received second by second are permanently compared with each other so that the GPS device can effectively determine whether an object moves, at which speed and in which direction. As a sort of by-product this results in accurate compass information which comes in handy for aligning satellite antennas.

Antenna alignment with GPS

The exact south needs to be known for correctly aligning a dish (or the exact north, if you live in the southern hemisphere). The compass rose of a GPS receiver indicates this direction and can be taken over directly for a rough alignment of the antenna. In a similar way, the azimuth of a satellite can be directly displayed – provided there is an additional directional arrow. Most GPS receivers feature a helpful tool with which a waypoint can be defined with a specific distance and a specific compass point. This way the azimuth of the required satellite is entered directly on the receiver and the waypoint of the satellite can thus be calculated with the help of the "go to" command. The directional arrow then appears on the compass rose.

Please note our software tool that can be downloaded from www.TELE-satellite.com/fxpos.exe: you simply enter your own position, which can be obtained from the GPS receiver, and let the tool calculate the correct azimuth.

There is one drawback, however: directional arrows only show up during movement. As soon as the GPS receiver becomes stationary, the directional arrow becomes unstable. Some receivers (like the GARMIN Vista C we tested) feature a built-in magnetic compass to alleviate this problem. The magnetic compass is synchronised according to the measured satellite data and displays the compass rose even when the GPS receiver does not move. This, however, only works outside and iron, like in a dish mount pole, interferes with the correct display.

However, there are some tried and tested ways to use the directional arrows for the alignment of a satellite dish:

(1)
Going with the GPS device towards the compass rose direction close to the antenna location (in an area that is visible from the antenna location) and marking the path with a pole or a cord. The antenna is than aligned according to the direction of this pole or cord.

(2)
Aligning the antenna to a specific reference point in case of an unrestricted view. This reference point has to be previously defined as a waypoint and the compass rose points in this direction. The waypoint can be in any given distance, but must have the required azimuth (0° for north, 180° for south, or satellite azimuth).

(3)
The alignment precision can be increased by moving towards the reference point with the GPS receiver and observing the reference point very closely. The antenna can then by aligned along this direction with the use of binoculars.

Additional GPS features

We used the “Vista C” GPS device by GARMIN for our antenna alignment and while we were at it, we also performed some additional tests with this receiver. The results were excellent – as long as we are talking about processing GPS data only. Unfortunately, the manufacturer has opted to throw in some additional and – in same cases – unnecessary features which made handling this equipment all the more complicated. Some features we have come to know from far simpler models were hidden behind not so user-friendly menus.

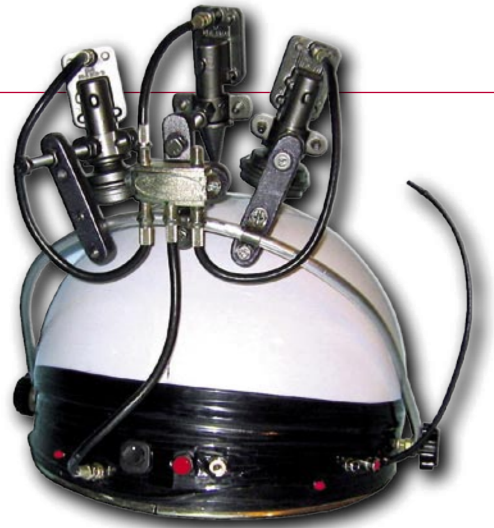
This tool is also designed for use in cars, but isn’t too suitable for this purpose. The display is small and difficult to read for the driver and the capacity of the built-in memory is too limited to allow loading comprehensive road maps. Routes calculated on a PC are not taken over properly and routing errors occur when the unit re-draws predefined routes.

Rather than games using valuable resources we would have preferred a manufacturer focus on known weak points: the display should be antireflective and its brightness could still be increased by a step or two. The font is also in need of a revision as special characters (such as the German umlaut) still are not displayed correctly in the text editor as well as in the location search bar.

For the alignment of an antenna a simple GPS device should do, as long as it features waypoint projection. These days, most basic models come with this feature, which makes them the perfect choice because they are both less expensive and more reliable to use than fancy GPS gadgets with loads of additional features.

The helmet antenna

A multifeed Luneberg antenna by Dr. Farrag



The back of the helmet with the hidden satellite receiver (below) as well as the DiSEqC switch for the three LNBs

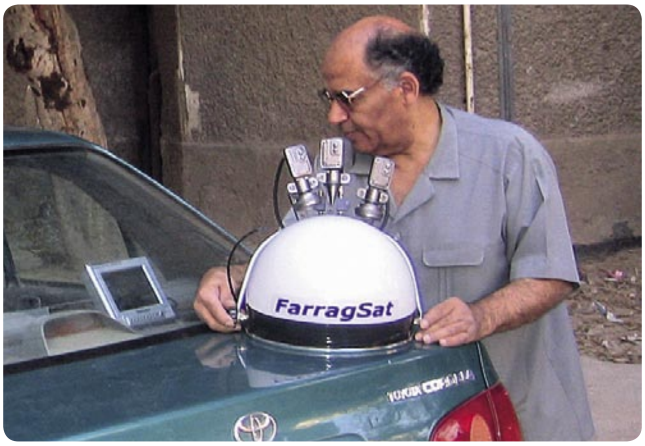
TELE-satellite readers may already know Dr. Farrag: a few issues ago (in no. 191, to be precise) we reported on the globe antenna of the Egyptian medical doctor. This antenna was based on the principle of the Luneberg lens, which will be dealt with in the subsequent report.

A close-up of the mounting construction for several LNBs

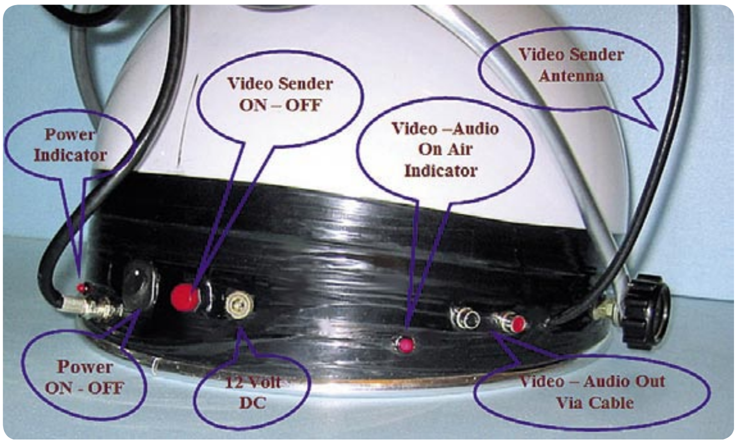
Dr. Farrag has not stopped experimenting and finally discovered the motorbike helmet. How come? Well, its shape is similar to that of a globe and it has just about the right size. So with a little bit of DIY the LNB was mounted according to the Luneberg lens principle and the whole construction was soon ready for a first test. And would you believe it, Dr. Farrag was actually able to receive NILESAT, ARABSAT and HELLASAT in his hometown of Cairo.

The reception quality is sufficient for regions in which satellite signals with 49 dbW or more are available.

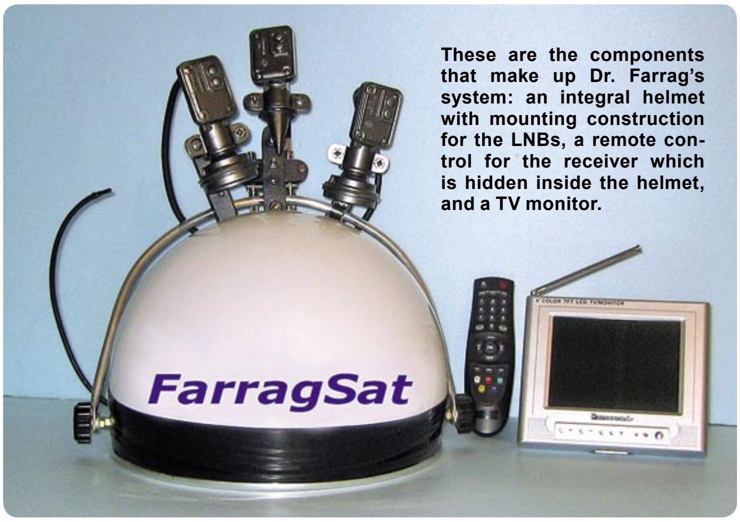
Dr. Farrag has of course further improved his helmet dish and even integrated a satellite receiver into the padded layer of the helmet, thus giving a new meaning to the term 'integral helmet'. With the help of an additional – and of course also integrated – video transmitter he is able to receive satellite signals without wiring the helmet to the TV set. An innovative design for mobile use.



Dr. Farrag finetuning his own invention – an integral antenna. Thanks to a built-in video transmitter no cables are required for connecting the antenna to the TV set or inside a car



Connection panel of the 30 cm helmet dish



These are the components that make up Dr. Farrag's system: an integral helmet with mounting construction for the LNBs, a remote control for the receiver which is hidden inside the helmet, and a TV monitor.

Dr. Farrag with his sons and additional designs of his globe antenna.

CHOOSE HORIZON Satellite Meters for a reliable solution!

Horizon Digital Terrestrial Meter

HDTM

- Displays Signal Strength (R.F level) and Pre and Post BER together
- Fast and accurate Pre BER in real time for easy pointing of aerial via built in COFDM. PASS and FAIL indication in real time.
- 32 pre programmed transmitters (via website) or all channel step through
- Audible tune-in, with back light
- Automatic constellation
- RF input range 167-862 MHz
- Input dynamic range –72dBm~-20dBm
- Input connector BNC. Input imp 75 ohms. Loop through
- Built in universal charger 100-240 V Ac / 12 W. Intelligent charger (CE approved) with delta V delta T detection. Fast charge, then Trickle
- Run time with full charge: Minimum 5 hours from 2.4 Ah NiMH battery
- Computer interface: Serial port (Com 1-4) for upgradeable software on transmitters.
- Supplied with leather case, mains lead, programming lead, car lead, IEC to BNC adapter and 2 off 10db attenuators

Horizon Digital Satellite Meter

HDSM

- Signal Strength and BER displayed together
- 32 Transponders or 16 satellites, horizontal & vertical
- Audible tune-in, with back light
- DVB, C&Ku band, Mpeg, V Sat compatible
- Run time with full charge (single LNB): Minimum 3 hours from 2.4Ah NiMH battery
- Figure of 8 mains input connector. 2.1 mm Female PSU plug for external charge via supplied car charger
- LNB short circuit protection 500 mA automatic limiter
- RF input range 950- 2150 MHz
- Computer interface: Serial Port (COM 1,2,3 or 4) for
- Upgradeable software on satellite settings
- C/N (carrier noise) is displayed in dB
- Quality (Pre B.E.R or bit error rate) locks on faster making it easier to lock on to the satellite initially typical lock in less than 100 mS
- Instead of "found" to indicate lock of correct satellites actual B.E.R can be displayed. Feature available in set up mode
- Diseqc switch commands available in submenu

MINISAT

- Cost effective
- Small and Compact
- Measure two sats at same time
- Self powered via rechargeable NiMH batteries
- Powered via built in batteries, charger or receiver
- Large graphic LCD display for all information
- Quick access keys for most functions
- Can generate 22 K tone and DiSEqC and high or low voltage for LNB
- Supplied with NiMH batteries, mains charger, car charger, 2 x F to F leads and leather carrying case
- Option in setup for various defaults including different languages

HORIZON

For a reliable solution!

www.horizonhge.com

DEALERS AND DISTRIBUTORS WANTED

Speed up your installations call now on +44 (0)20 8344 8230 or email sales@horizonhge.com

Luneberg lens “reloaded”

Peter Miller

One of my professors used to say: everything important in electronics has been invented in the first half of XX century and what we are doing now is only the implementation. Maybe it is not absolutely correct but surprisingly many methods and techniques that are finding their way to the market today, have their deep roots in those old days. Due to dramatic advances in technology, things that were very hard or prohibitively expensive to manufacture at the time they were devised, are now relatively easy to build.

R. K. Luneberg described his invention in 1944. Luneberg lenses have been used as reflectors for radar rays for many years. They were rather difficult to manufacture and expensive. When DTH satellites appeared in the sky, the interest in Luneberg lenses increased. Apart from the radar application (reflectors or beacons), the Luneberg lenses can serve as very interesting omni directional satellite antennae. The lens is in fact a sphere made of dielectric material. However this material can not be the same in every part of the sphere. Close to the surface, the material should have the dielectric constant equal to 1 ($\varepsilon_R = 1$, i.e. the same as the air) and at the center of the sphere equal to 2. The change should be smooth. Ideally, the dielectric constant should vary as follows:

$$\varepsilon_R = 2 - \left(\frac{r}{R}\right)^2$$

where r is the distance of the given point from the center of the sphere and R is the radius of the sphere. Figure 1 shows how the dielectric constant of the interior of the sphere should change.

In practice, the above ideal is approximated by a number of onion-like layers of different dielectric constant as shown in figure 2.

The number of layers and their thickness vary between different manufacturers. The larger the number, the closer one can approximate the ideal solution. However the air gaps between the layers deteriorate antenna performance, not to mention the increased cost. So usually the number of layers is limited to about 10 (7...13). The central small ball is be made of material of $\varepsilon_R = 2$and the most external layer of material of $\varepsilon_R = 1$. The traditional materials used for this purpose are expanded polystyrene (EPS) foam, foamed glass, and other cellular materials. The dielectric constant is adjusted by controlling the bulk density of the foam. Today, also other materials are under consideration. However, there are still technical problems to get uniform dielectric constant in every point of one layer. Each layer is created in a hemispherical mould and then assembled.

Now when the radio waves penetrate the sphere, they are refracted and focused on the opposite side of it. See figure 3. Focal points of the waves coming from different satellites are located in different positions. So we can mount a number of LNB’s around the sphere. We can also use a single LNB movable around the lens. This solution can be very useful when making tracking antenna. Very practical modification of the full sphere is the hemisphere equipped with the reflector (flat piece of metal). Its main advantage is lower weight. As you can see in figure 3, we again get radio waves focused in one point. It is worth mentioning that we can set up the hemisphere with the reflector horizontally (as shown in the figure) or vertically. The real antennae are constructed in such a way to have their focal points not on the surface of the (hemi)sphere but above it. A practical figure in commercial solutions is 1.25 R from the (hemi)sphere center.

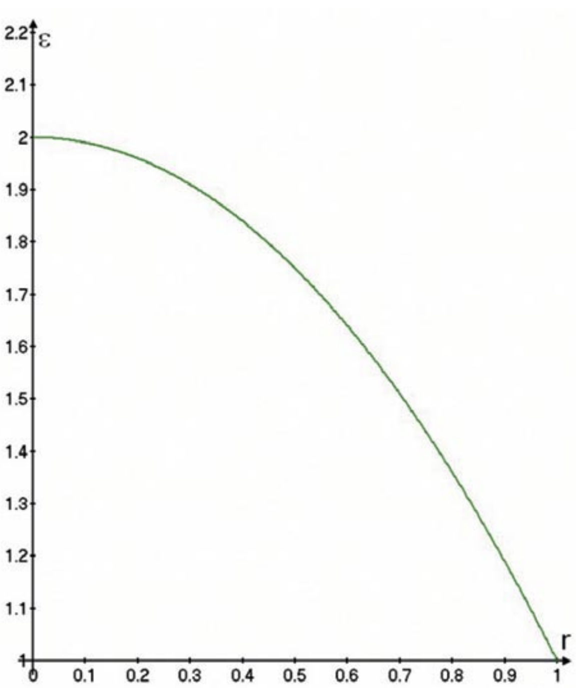


Fig. 1. Dielectric constant as a function of the radius for Luneberg lens.

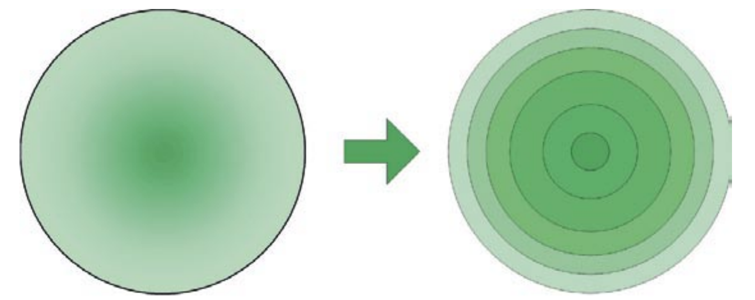


Fig. 2. Luneberg sphere and its practical implementation.

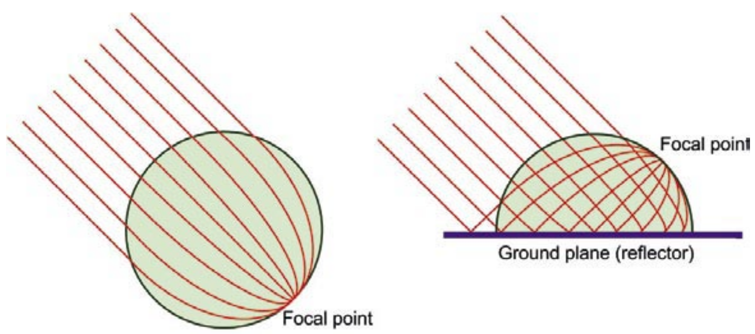


Fig. 3. Focusing radio waves by the Luneberg sphere and hemisphere.

About 15 years ago, a number of articles appeared in press all over the world explaining the principle of operation of Luneberg lens. It seemed that this antenna would conquer the world in no time. Its main advantage was a very wide range of reception angles (120° or so) - it could cover all visible satellites without any problem. However it was expensive, difficult to manufacture and very heavy in comparison with the regular motorized dish. For example, the antenna of diameter 45 cm weighted 20 kg and 70 cm model could be as heavy as 70 kg!

Today, with new material technologies, the manufacturers can halve the mass or even divide it by 3. So you can expect around 10 kg for 45-55 cm model and about 35 kg for 70 cm. There are even advertisements about 80 cm antenna weighting only 25 kg. This is a big improvement but you still need a rather solid support for that.

But how to compare the performance of Luneberg lens antenna to the traditional dish? Well made lens can have the gain performance close to the theoretical maximum for the aperture size. And indeed, the comparison of the published specifications shows that Luneberg lens of a given diameter has only slightly smaller gain than the offset dish of the same size. For example, 50 cm lens will perform similarly to 50 cm offset dish.

In small Luneberg lens, you cannot use typical LNBF's to receive satellites which are 3° or 6° apart. You will need narrow profile LNBF's or you will have to choose the satellites which are more distant. Simple calculation shows that if you have 40 cm Luneberg lens and 7 cm wide LNB's which are located 1.25 R from the lens center (i.e. 50 cm) you can not receive 2 satellites that are closer than 8°.

Moreover, a typical LNBF viewing angle is intentionally made rather sharp to avoid picking noise from outside of the dish. If you return to figure 3, you will see that in this case the rays are coming from a wide angle. So, we can say that to achieve maximum performance of a Luneberg lens antenna, one must carefully select the right LNBF's.

Conclusions

Contemporary Luneberg lenses are lighter and much cheaper than their predecessors. They are still not so easy to manufacture, and mainly the smaller models are available (40-50cm).

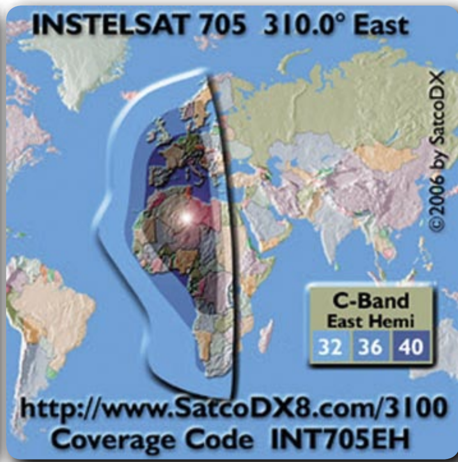
If you think about replacing 90 cm Wavefrontier or motorized dish with Luneberg lens, better wait a moment. Small models are not enough sensitive and the big ones are either very heavy or simply not available yet.

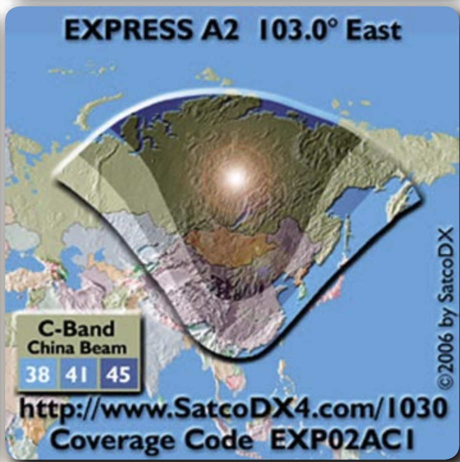
However, if you need a portable antenna for strong satellite reception on the camping location, such antenna may be an interesting option. Luneberg lens, especially the hemisphere version, could also be an option when you need to hide your antenna due to aesthetic reasons. You can put it on the flat roof and nobody will ever know that you receive satellite TV.

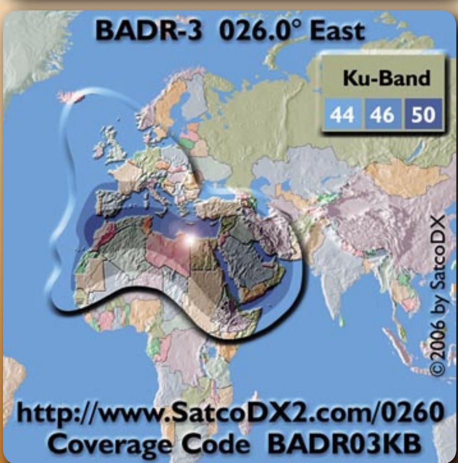
Several small and not so small companies are making research on this kind of antenna. New materials and new assembly ways are being tested. Dielectric material is not necessarily produced in the die-cast helmet-like shapes as described above. We should not be very surprised if we are offered a full scale, lightweight and reasonably priced antenna that can match performance of 90-120 cm dish in a year or two.

New Satellite Footprints

in last 2 months at SatcoDX

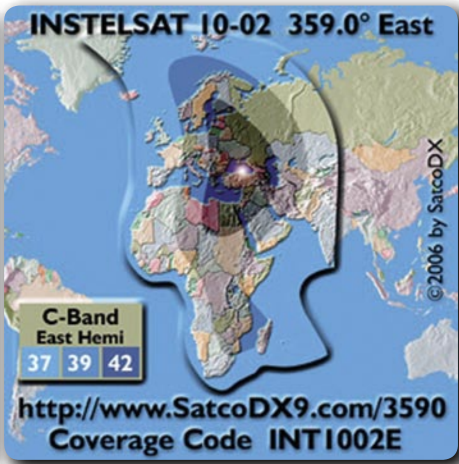


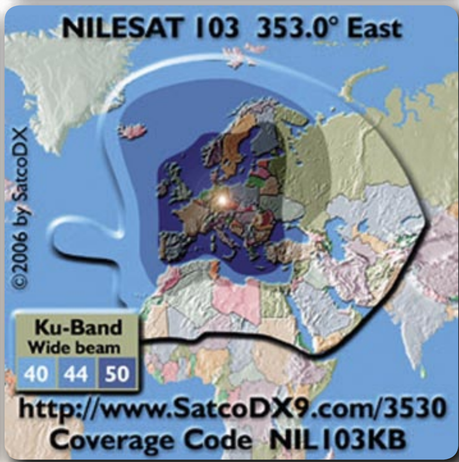


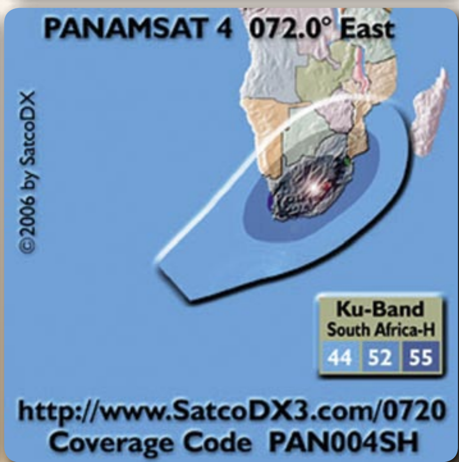


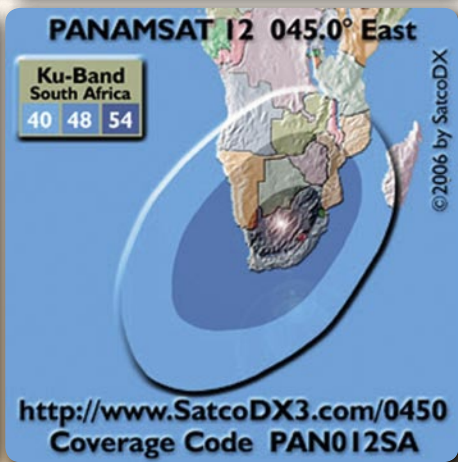
New Satellite Footprints

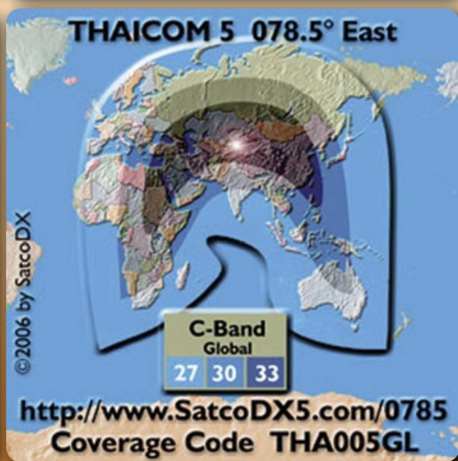
in last 2 months at SatcoDX











„Megastructures“

Ingo Salomon

That's the name of a program on the National Geographic Channel and my neighbors keep telling me that I watch this program far too often. Then there are the other neighbors that are convinced that I work for the KGB. All I really want to do is watch TV!

It started a little over a year ago. I came across an ad in my local newspaper: "Five-meter dish for sale, disassembled". In two hours I was at their door-step, 170 km from home. But to my horror, half of it was missing and it turns out that it was a 15-year-old homemade antenna that was totally rusted. It belongs in a scrap metal yard. But since I was already here, I haggled with the seller on the price and ended up dragging everything with me back home.

The pieces of this antenna gathered dust at home for another year – 18 bent support arms with 18 deformed aluminum panels, three LNB holders and several unidentifiable pieces. And the center section was missing entirely. So I fashioned the center section myself with an outside diameter of 260mm and an inner diameter of 145mm. Every 20° was flattened and holes were drilled so that support arms could be attached. This I had to take care of myself.

Next it was time to assemble everything on the ground with the help of a 2-meter circle. After that the dented aluminum panels were straightened by passing them through a press and then everything was put together with 486 screws.

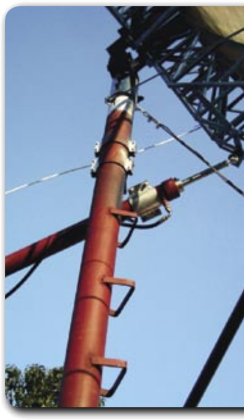
That was only the beginning since such an enormous antenna would need a correspondingly stable mast. I took sections of 150x150x6mm construction steel and welded pieces together to form a six meter mast. The next problem: how to set this all up vertically. In other words, who would want to be 8.5 meters off the ground to install an LNB? The answer was to use a hydraulic lift to move everything into place. What? The clothesline is in the way? No problem, just chop it down.

Naturally, the entire assembly had to be motorized.

Ingo with his homemade five-meter dish.

The center section of the antenna with the 18 attachments spaced 20° apart.

All of the support arms are now installed; next comes the installation of the aluminum reflector panels.



An actuator welded to the mast serves to move the antenna.

Why go through all this effort if only to be fixed on one satellite? Ridiculous. And so another hydraulic cylinder with 4000Kg of force was needed so that this gigantic dish could be controlled by just one person.

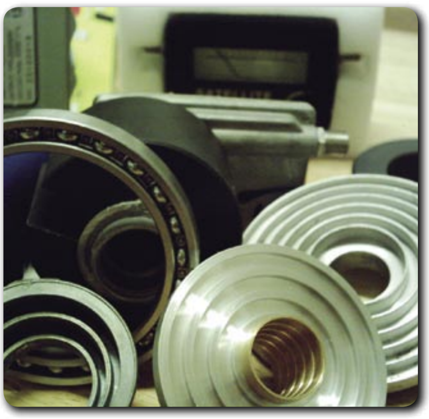
Of course I wanted Ku-band reception as well as C-band reception so I cut off the end of an offset Ku-band LNB and extended it with a copper pipe and held it together with a polypenco or vesconite connection. And so that the C-band LNB can be rotated, it was inserted in a ring of ball bearings. A 65mm diameter ring was ideal for the C-band.

What did this all cost me? I only paid 100 Euros for the antenna and then another 300 Euros for those parts I had to come up with myself. And then there was all the time working on this project as well all the help and patience from my family.

So now the big question: what can I receive with this monstrosity? From where I am in Johannesburg, South Africa it would be the C-band satellites Intelsat 903 at 34.5° west, NSS7 at 22.5° west and Atlantic Bird at 5° west. This large dish is not all that ideal for Ku-band reception although I am able to get the analog channels on Hotbird at 13° east.

It only took me four weeks to assemble the entire antenna. Its total weight amounts to 525Kg, not including the cement. Can you build an antenna like this yourself? The answer is "yes"! Those weak C-band signals are now so strong that rain and clouds no longer have any affect on my picture. For me this entire project was well worth it!

A hydraulic life raises the antenna to the vertical position.



The LNB and feed is fitted with ball bearings. If you can turn and mill yourself, you have a definite advantage.

Ingo on the milling machine. Without professional equipment like this, a do-it-yourself antenna of this size might not be possible.

The assembly of the reflector is complete; it can now be raised into position.

Advertising in the TELE-satellite CITY

Monika Balázsné-Szabó
Advertising Manager

Tel.: +36 . 30 . 9336 277
Fax: +36 . 1 . 788 1043
m.szabo@TELE-satellite.com

www.**pansatusa**.com

Record & Play

Anytime
Anyplace

Pansat 6000HXC

Digital Satellite PVR

- 2 Tunner Input
- USB v2.0
- Removable HDD
- PC Upload Ready
- Conax Embedded
- 2 Slot CI

Pansat®
Leading Satellite Technology Since 1983

Panarex Electronics
11672 Tuxford St. Sun Valley, CA 91352 USA
Tel: (818)768-5161, Fax: (818)768-5191 www.pansatusa.com E-Mail: pansatusa@cs.com

Multib、and Reception Siberian Style

Nickolas Ovsyadovsky

In the previous issue of our magazine we described, how easy it can be to build a combined C and Ku-band feed. All it took was an empty vegetable can, a copper tube and some enthusiasm. In some parts of the world C-band reception can really be exotic, while in other it remains the main source of satellite reception. And there the problem is mirrored – it's no longer "how do I add a C-band LNB to my system", it's "how do I get more channels, if there is a chance to have a Ku-band LNB added".

C-band was used for decades first in Soviet Union, then in Russia to forward the signal of main channels such as Perviy Kanal and Telekanal Rossiya to terrestrial transmitters all over the largest country on Earth. As the satellite industry developed, more Ku-band satellites started to appear, at first - outside of Russia, but then also on important Russian positions, such as 40 deg. East, 80 deg. East, 90 deg. East and so on. But it's still too early to put the good old C-band into a grave. Main broadcasters don't hurry to switch the bands, and this means that at least in the Eastern parts of Russia C-band remains the basis.

In European part of Russia normally it's not a problem to get at least 2 main and 2 local channels from the TV tower somewhere nearby. If the signal from it is too weak, the easiest solution is to install a small dish with Ku-band LNB and point it to 36 degrees East, to Eutelsat W4 satellite, which covers European part of Russia with pretty strong signal. "Tricolor" package, which only requires the potential viewer to buy a special receiver with a built-in Z-crypt module, currently includes 10 channels. There is no subscription fee, but the channels had to be encrypted due to copyright reasons. Another option would be to subscribe to a real PayTV package from the same satellite.

However, the situation becomes much less bright and shiny once we cross the Ural mountains on our way to the East. Eutelsat W4 is no longer receivable, recently launched PayTV project from Bonum 1 at 56 degrees East requires at least 1 year subscription to be ordered, and might seem too expensive for an average TV viewer. This is exactly where combined reception from both C and Ku-band comes into light, and becomes much more attractive, then a few thousand kilometers to the West.

Of course, professionally manufactured combined C-Ku band feeds do exist and can easily be bought in the nearest satellite shop, but what fun is it to spend almost 100 Euro on something that can easily be constructed with your own hands ? Most Russians still do love to experiment, because the times when they simply had to are not too far in the past yet. Just 20 years ago almost everything you can imagine was much simpler to build yourself then to buy. And even when the situation changed dramatically, a lot of people still like to spend their time constructing unique and amazing things, some of which become really valuable inventions. Satellite reception in general and combined C-Ku-band feeds in particular is no exception.

Just take a drill and two LNBs

If you take an already existing monoblock C-band LNB with a built-in feedhorn, adding Ku-band to it can be as simple as drilling a hole and attaching a Ku-band LNB to it. This is how Sergey from Omsk built his combined unit:

Two regular LNBs – for C-band (top) and Ku-band (bottom)

First we have to take off the protection cap from the Ku-band LNB

Then we have to drill a lot of small holes around the edge of the C-band's feed rear end

Next step is to carefully take out this piece of metal ...

... and to attach the Ku-band LNB to it

After some finetuning, in less than 2 hours, Sergey could double the amount of channels he received by adding Ku-band to his system.

Move the LNB, not the dish

But who says that you have to drill anything at all? Another very interesting invention comes from Aleksey, who mounted one LNB on top of the other, and when he wants to switch bands, he simply selects the needed "position" on his receiver. The actuator, attached to the LNB holder, does the rest:

This is how the LNBs are mounted ...

... and the actuator is connected

Ready-to-use multiband reception system

So, as you see, it's not that hard at all. You don't have to be Albert Einstein to invent something like this. And compare the pleasure from going to the shop and buying something that everybody else can buy with creating such unique solutions with your own hands!


The Best is Best
Technology, Quality, Service
Pansat
3500S
DIGITAL SATELLITE RECEIVER
CONAX/SD MEMORY CARD INTERFACE
0000
OK
EXIT
MENU
Pansat 3500S
• Conax Embedded
• SD Memory Slot
• Smart Search
• UHF Ready
• Component Out
• Real Time Clock
• Universal Remote
Pansat
2700A
DIGITAL SATELLITE RECEIVER
0000
▼ CHANNEL ▲

Video Quality in digital TV, **Part II**

Peter Miller

Video resolution is one of the major factors influencing the quality of video as discussed in the first part of this article. Everybody who played with the picture resolution of his/her PC monitor, will agree with that immediately. The greater the resolution, the better the picture sharpness – that's simple. However there is yet another factor of similarly high impact – the compression level used during digitalization of the original signal.

Compression level

Now, some explanation for the less advanced readers. Compression is the conversion of the original digital signal in order to reduce the number of bits necessary to convey information. Most of the PC users are quite familiar with the compressed files. When you use applications like Winzip or Winrar, you perform lossless transformation. "Lossless" means that after the decompression (unzip, unrar), you get exactly the same file as the original. In digital TV, the MPEG-2 compression is used. It is a lossy compression. After the decompression, something similar to the original is recreated but not identical. If you ever converted the bitmap picture (with .bmp extension) to the jpeg picture on your computer, you also did a lossy conversion. When converted back to the bitmap format, the picture will not be identical with the original. The differences can be almost impossible to detect with a naked eye, or not so negligible if you set very high compression level in your graphic application. An example is shown in figure 1.

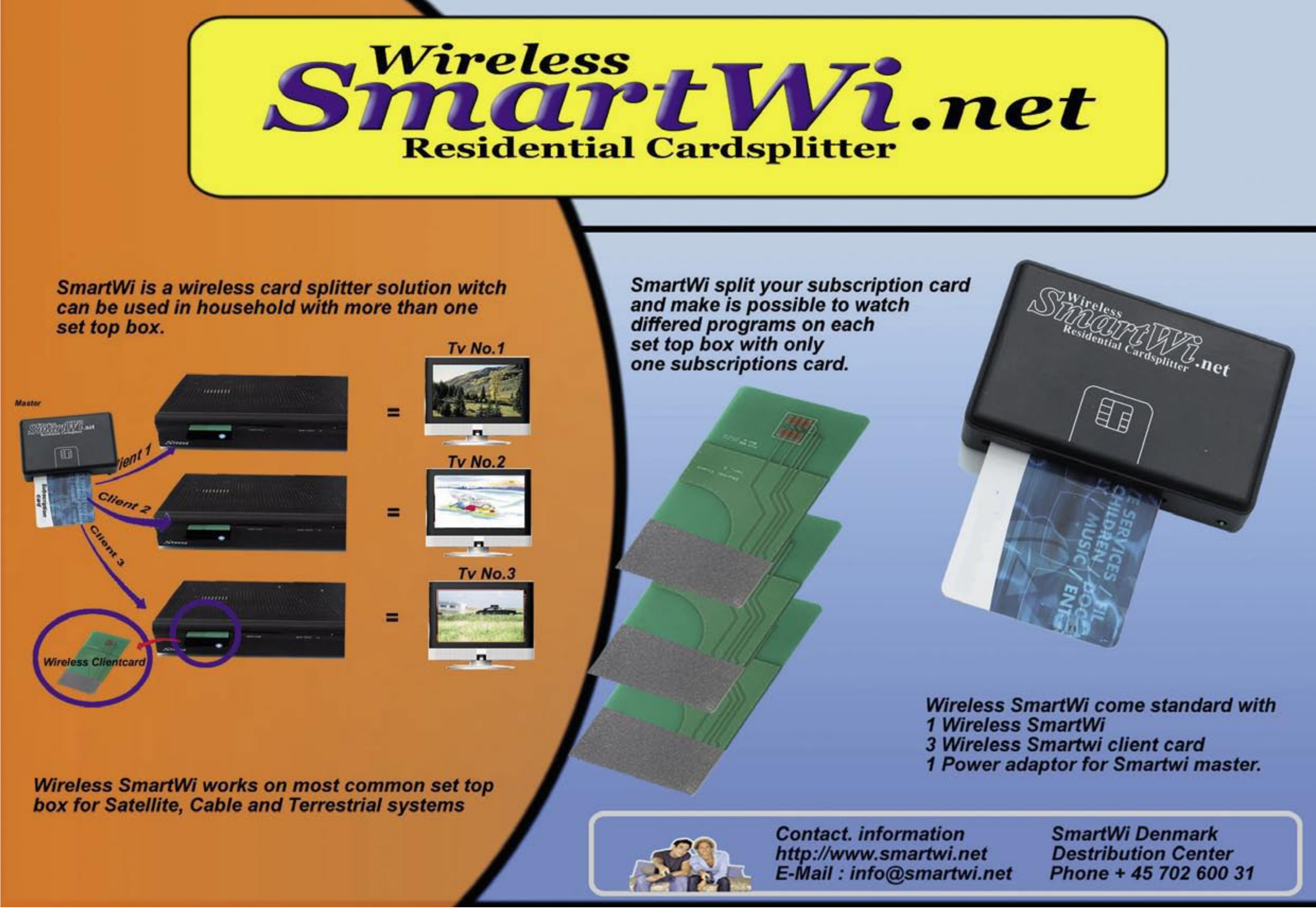
Also in an MPEG-2 headend, compression can be set at various levels. In this way, the operator can trade video quality vs. required bit rate. So, the bit rate of the video stream can tell us a lot about the compression level and thus the quality. The higher the bit rate, the better quality. It may be interesting to compare digital TV signal to the regular DVD. Movies on commercial DVD's are recorded with the top MPEG-2 resolution (720x576 for PAL), have maximum bit rate of 9.8 Mb/sec and average bit rate around 4 Mb/sec.

Fortunately, since some time now, you have been able to find out the average bit rates of different channels (and also their picture resolution). Big thanks for that to the clever staff of www.satcodx.com! Visit their webpage, and you will discover that not too many of the available in Europe channels can match the quality of DVD. Of course, there are premium movie, sports, or leading national channels that offer even higher bit rate than a typical DVD, but the majority of the FTA channels available in Europe, oscillate around 2.5 Mb/sec (examine Hotbird at 13° East or Astra 1 at 19.2° East). Some of the channels are even below 1 Mb/sec. Apparently, for some providers, the level to which they are ready to decrease the video quality, does not exist!

For the less experienced readers, we should explain that to maintain top quality of video in MPEG-2 TV channel, the bit rate should be 5 Mb/sec or even more for the very dynamic content (like scenes from a sports event or an action movie) and can go down to perhaps 2 Mb/sec for the more static content like "talking heads" programs. The guys from SatcoDX did a good job by providing us the average channel video bit rate sampled on different days at different times. When you click the bit rate value on their chart, you can see all the values measured on different days and times.

What are the symptoms of too low bit rate? In the static scenes, you may observe the readability deterioration of small details and distortion on the edges of objects. Too low bit rate is even more unpleasant in dynamic scenes. In such case, you can see square blocks of pixels near the edges of a moving object. There are people so sensitive to this kind of distortion that they refuse to watch such channel!

Heavily compressed picture



Chroma sampling format

MPEG-2 signal broadcast to our houses from satellites is always in 4:2:0 chroma sampling format. MPEG-2 standard allows for other formats too. Namely they are: 4:2:2 and 4:4:4. Without going into too much detail, we can say that the higher the second and the third digit, the better resolution of color information and thus better video. At the same time, the higher bit rate is needed to transmit the same content. So, while 4:2:2 is sometimes used in the feed signals, 4:4:4 is practically not used for broadcast. The subjective tests have shown that there is difference between 4:2:0 and 4:2:2 pictures but it is not big enough to justify additional bandwidth consumption. That's why your biggest chance to find 4:2:2 signal is in feed transmissions. Feeds are quite often supposed to be stored and/or edited before the final broadcast. For example, some graphic may be added to the original picture. 4:2:2 signal gives an operator extra quality margin for inevitable distortions caused by edition. Keep in mind that only some feeds are transmitted in 4:2:2, the rest is in "regular" 4:2:0. The majority of commercially available receivers cannot handle 4:2:2 format, but some can. You find a separate article about how to receive 4:2:2 in this issue of TELE-satellite.

Other factors

Are there any other factors influencing video quality? Of course, there are, but the two already mentioned: resolution and compression level are definitely the most important ones. These parameters depend only on the provider. Unfortunately, the viewer can do nothing to improve resolution or compression level.

It is a bit better with parameters like power and footprint of the transponder, FEC and symbol rate of the signal. These parameters influence the overall signal quality (not only video). Although we can not change them, we can replace our dish with a bigger one or use better LNB and in this way, to some extent, compensate for low power, high FEC or off-center location. This will improve also our video quality - especially if our signal quality is on the edge. As to the symbol rate, theoretically the smaller the symbol rate the narrower the bandwidth occupied by signal and the better chance to achieve high C/N ratio. However, it depends on the receiver tuner design and may not work this way. So, some receivers may perform better or worse with low SR signals. In other words, we also have some influence here – we may use a better receiver.

The receivers also differ in the quality of their output stages: the digital-to-analog converters and filters. Poorly designed receivers have worse video quality. If you see similar distortion or noise on various channels, you probably have problem with the quality of your receiver back-end or maybe with the connecting cables. Of course, this may be also caused by the bad quality TV-set (or its improper settings). To find out the reason, you may want to experiment with different signal sources (DVD player, another satellite receiver), use different video inputs and cabling.

Some 10 years ago when MPEG-2 systems were quite new, some video related problems were arising due to the first generation MPEG-2 processors used in those days receivers. If you have a very old set-top-box, some of your video problems may have such origin. Software upgrade may sometimes help (if still available). By the way, it is very interesting if a similar situation will happen again with the first generation of MPEG-4 processors. After all, they are made by humans...

Conclusion

Although there are potentially many factors that influence the quality of video in digital TV, the two most important ones are: the picture resolution and the compression level used by the provider. When you want to asses the video quality of your system (especially with the beautiful, brand new, high resolution flat panel TV) choose wisely the channel on which you do the evaluation. Visit www.satcodx.com and select the channel that has the highest resolution (720/704x576 for PAL or 720/704x480 for NTSC) and the highest bit rate (which means small loss of information and small distortion during MPEG-2 compression).

Perhaps we could even formulate a rule of thumb for what we can expect depending on the bit rate. Assuming the maximum resolution, for a dynamic channel (sports/movie), we should get the following video quality: excellent for 5 Mb/sec, very good for 4-5 Ms/sec, good for 3-4 Ms/sec, fair for 2-3 Ms/s and poor for less than 2 Ms/sec.

MPEG 4:2:2 - DXers Dreams Finally Come True

Thomas Haring

EBU Feed in MPEG 4:2:2 with high data rate

Most of our readers will certainly associate the term MPEG 4:2:2 with "expensive" and that would be no surprise. Up until now a professional MPEG 4:2:2 receiver would set you back at least US$ 2000. For those of you who have no idea what MPEG 4:2:2 is all about, we'll give you some background information: for quite some time now, the EBU (European Broadcasters Union) has been transmitting their feed signals on EUTELSAT W3A at 7° east. Back in the good old analogue days the picture was freely receivable; only the sound was encrypted using the Sound-in-Sync standard. Today it is the video signal that cannot be displayed with common receivers; the audio is available without any problems. So while the analogue DXer was able to get news, sports and other live feeds in best picture quality but with no sound to his living room, today the TV screen remains dark while we hear brilliant audio.

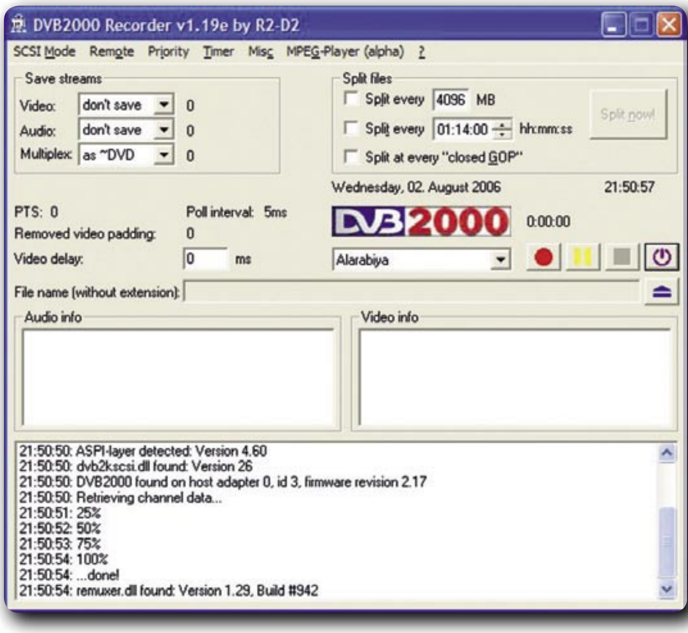
So what happened to the EBU feeds when they changed from analogue to digital transmission? Well, the answer is quite simple. While the MPEG 4:2:0 standard became common for end users, the EBU started to use MPEG 4:2:2 for their transmissions, which of course can't be processed by simple living room receivers.

Unfortunately, there were very few people that could afford to buy professional MPEG 4:2:2 equipment. So, some clever hobbyists noticed that the SCSI connector on the very common d-Box1 in use in Europe, especially in Germany, could be used to transfer audio and video to your home PC. The initial work for all the experiments that followed was done by the great programmer Uli Hermann, who reprogrammed the dBox1 software and distributed it to all other users. Now that there was finally a way to transfer the data from the box to the PC, the only thing missing was the proper codec necessary to handle MPEG 4:2:2 signals. After the correct one was finally found, MPEG 4:2:2 feeds could now be displayed on the PC using the DVB2000Recorder software. However, there were some limitations: The feeds could not be seen in real time, because they had to be streamed to the PC for a few seconds first, until playback could start. Furthermore the transfer rate of the SCSI bus reached its limitations when feeds with signal rates of 10 Mb/sec or above had to be transferred. This resulted in audio and video distortions. The first step had been taken; but there were many more steps remaining.

The next step was to try and improve the data transfer rate. If the transfer rate of the SCSI port is too slow, what about putting the receiver directly into the PC to take advantage of the faster PCI slot? A number of third-party software programs were developed for these cards such as DVBViewer andr ProgDVB. The original manufacturer's software did not support any of these special features even though the hardware could handle it.

A few years ago the old idea of transferring audio and 4:2:2 video from a receiver to the PC and processing it there was rediscovered when the German manufacturer Dream Multimedia introduced its Dreambox receiver. Its fast 100 Mb/sec Ethernet port can easily handle the high data rates and transfer it error free to a PC. There are various programs available on the Internet that can do the job.

The various ways I've discussed thus far do all more or less work flawlessly, but there's one problem with all of them: you have to sit in front of your PC to watch anything. If you've ever tried to do that, you'd know that it's not really comfortable and that it would be much better to watch the channels on your big home TV. It's at this point that the latest developments in this area become interesting for you.



DVB2000Recorder software for the d dbox1

Stream live video on your PC via the Dreambox

Some time ago the company Quali released its first HDTV receiver and some clever users soon discovered that this receiver can also handle MPEG 4:2:2. It seems that the manufacturer did not intend to implement this function, but who cares if it's just working. A few issues ago we introduced this receiver and its possibilities to our readers but at that time there was still one problem: The Quali-TV QS1080 IRCI was not all that cheap. Since then a few months have passed and HDTV according to the DVB standard has been replaced with HDTV channels in DVB-S2. Suddenly the price for those old HDTV receivers that could no longer be used dropped significantly. Today you can get one of those for about 130€ on the Internet. As we already reported in TELE-satellite issue 05/2005, the receiver’s tuner is not very sensitive, but it's good enough to get the EBU feeds. Furthermore, a small distorted line is visible in the lower and the upper part during MPEG 4:2:2 but that doesn't really interfere with viewing. At the moment the Quali-TV QS1080 IRCI is a cheap way to get MPEG 4:2:2 on your home TV but be careful: in a few months the storehouses will be empty and the price will increase again.

MPEG 4:2:2, is it worth the money?

Well, there are certainly hundreds of feed channels available all over the world in MPEG 4:2:0, but there is no other satellite that transmits so many different feeds in one place like the EBU feeds on EUTELSAT W3A 7° east. Because the EBU never changes FEC or symbol rate, clever people created an extra satellite entry in the receiver with just the EBU feed transponders and after performing a satellite scan, they can channel surf through all the currently active EBU feeds.


Quali HDTV receiver showing a feed in MPEG 4:2:2

The signal quality on the EBU feed transponders when compared to other end user signals is excellent. That is really no surprise considering that the EBU uses bitrates from 4 to 10 Mb/sec. If you perform a direct comparison of studio produced material, of course analogue transmissions would have the best video quality (it's quality equals about 210 Mb/sec) but right behind it are MPEG 4:2:2 signals with about 10 Mb/sec. It's clear, sharp, has great colors and even high-speed action does not affect the perfect quality. The quality of the digital signal for the end user however is quite the opposite: it has a foggy look to it and the colors are not nearly as brilliant. This of course is no surprise since most broadcasters use bitrates that are about 3 Mb/sec or less.

In the end, we are convinced that now is the ideal time to get in touch with MPEG 4:2:2. The receivers are very cheap and the video quality is outstanding.

Exhibition Preview

- **28 - 30 September 2006: SatExpo 2006**
  Space and Advanced Telecommunications
  Vicenza Trade Fair, Vicenza, Italy
  www.satexpo.it

- **9 - 13 October 2006: Taitronics Autumn**
  Taipei International Electronic Autmun Show
  Taipei World Trade Center (TWTC), TaiWan
  www.taipeitradeshows.com.tw/taitronics/

- **18 - 20 October 2006: EEBC 2006**
  Eastern Europe Broadband Convention
  Exhibition Centre "KievExpoPlaza", Kiew, Ukraine
  www.eebc.com.ua

- **26 - 28 October 2006: SAT KRAK 2006**
  International Satellite Exhibition
  Centrum Targowe, ul. Klimeckiego 14, 30-706 Krakow, Poland
  www.satkrak.com

- **23 - 26 November 2006: CeBIT Broadcast + Satellite**
  International Trade Fair and Conference for Broadcast, Cable & Satellite for Turkey, South East Europe and the Middle East
  World Trade Center, Yeşilköy, Istanbul, Turkey
  www.cebit-bcs.com

- **5 - 8 February 2007: CSTB**
  International Exhbition and Conference for Cable and Satellite TV, Satellite Communications, HDTV
  Crocus Exhibition Center, Moscow, Russia
  www.cstb.ru

TELE-satellite International Magazine is published worldwide in 16 languages:

العربية · Indonesia · Български · Deutsch · English · Español · Français · Ελληνικά · Hrvatski · Italiano · Magyar · 中文 · Nederlands · Polski · Русский · Türkçe

Subscriptions to TELE-satellite Magazine without CD-ROM:

USA:
Disticor Direct
PO Box 2165
Williamsville, N.Y. 14231
Tel 1-877-474-3321
US$37.50 / Year

Canada:
Disticor Direct
695 Westney Rd South
Suite 14
Ajax, Ontario
L1S 6M9
CAN$48.45 / Year

Powerful Combination:

TELE-satellite International + SatcoDX's CD-ROM "World of Satellites"

Europe:
TELE-satellite
PO Box 1331
D- 53335 Meckenheim
GERMANY
Fax +49-2225-7085399
Euro 57.50/year

UK:
Sat Europa M&D
6 Anson House
Canute Road
Southampton
GB-SO14 3GL
Hotline 0845-130-3111
£27/year

North America:
TELE-satellite
PO Box 2622
North Babylon
New York 11703
USA
Fax 1-631-422-4318
US$ 49/year (to USA)
US$ 55/year (to Canada)

China:
Aluo-sat Co., Ltd
PO Box 001-390
ShenZhen 518001
CHINA
Fax: +86-755-82173350

Note: A one-year subscription includes six issues of TELE-satellite International magazine plus the updated SatcoDX CD-ROM with each issue.*) The CD comes with the full version of SatcoDX's "World of Satellites" and includes the database update license.
Fax or mail this order form to the TELE-satellite subscription center nearest you:

SUBSCRIBE NOW

Name ....

Company ....

Address ....

City, ZIP ....

State ....

Tel ....

E-mail ....

Payment ☐ Credit Card ☐ Check Money Order

Card # ....

Exp. Date .... Security Number (see back of card)

Name on Card ....

Date ....

Signature ....

*) Except subscriptions with Disticor Direct

OPENTEL

www.opentech.co.kr

Personal Video Recorder New ODT 7200CPVR

* Conax CAS Embedded Digital Terrestrial Personal Video Recorder
* 2nd and 3rd channels recording while watching 1st channel
* Dual Decoding (Picture in Picture)
* USB 2.0 support for PC interface
* Electronic Photo Album supported (Slide show supported)
* Recording Capacity : 40GB ~2TB
* Time Shift Function with a Live Channel
* DVB Subtitle Supported
* MP3 Supported
* Screen Capture

Satellite : Twin-PVR, FTA, CI, Irdeto, Viaccess,Cryptoworks, Nagravision, Conax Cable :Twin-PVR, FTA, Conax Terrestrial ; Twin-PVR, FTA, Conax, Viaccess

OPENTECH INC.
13F., SJ-Technoville 60-19 , Gasan-Dong ,
Geumcheon-Gu, Seoul,
Korea 153-801
Tel:+82-2-3397-0600 Fax:+82-2-3397-0685
E-mail : overseas_sales @opentech.co.kr

OPENTECH MIDDLE EAST
P.O BOX 18033,LOB6-112,
JEBEL ALI FREEZONE, Dubai, U. A. E.
Tel : +971 4 8873717
Fax : +971 4 8873718
E-mail : overseas_sales @opentech.co.kr

OPENTECH EUROPE
Ludwig-Erhard Strasse 1a
D-65760 Eschborn, Germany
Tel : +49 (0) 6196 9020 20
Fax : +49 (0) 6196 9020 29
E-mail : germany_sales @opentech.co.kr