Horizon HD-S2 Satellite Signal Meter

As Easy to Use as Its Older Brother

The HD-S2 is the successor of the HDSM USB PLUS - the satellite signal meter TELE-satellite presented in issue 10-11/2007. At that time the meter was not compatible to DVB-S2. But now of course it is! But this is not the only improvement Horizon have introduced in their new meter. We will address the novelties later in the report but first we would like to emphasize that the most important characteristics of this meter - its ease of use, has been preserved. We could repeat the title of the report in which we were describing its predecessor: "even a total dummy can use it". It still holds true!

As with all other Horizon meters, when the HD-S2 is delivered, its internal battery needs to be charged for about 8 hours. Power supply is built-in so you only need to link up the included mains lead to charge the internal battery. You can also use the DC car charger lead to top-up the charge. When fully charged, it serves for more than 8 hours at maximum load. This is possible thanks to the modern Lithium-Polymer (Li-Po) battery. The battery is accessible through a flap door on the underside of the meter, so it is possible to replace it in the future or disconnect it if you think you will not use the HD-S2 for some time.

The front panel consists of two F connectors, LCD screen with backlight and a four button keypad. There is a plastic cover that is attached to the front panel. The meter is well protected from rain drops when used in the field. The output F-connector which probably will not be used very often is protected with a rubber cap. Rain has no chance to get inside the instrument.

Another "layer of defense" against hostile environment is the nylon carry case. It has a practical pocket on its side and a quick start guide on the inner surface of the flap. Velcro openings allow you to connect cables without removing the meter from the bag. Neck strap of adjustable length lets you free both of your hands to handle a satellite dish.

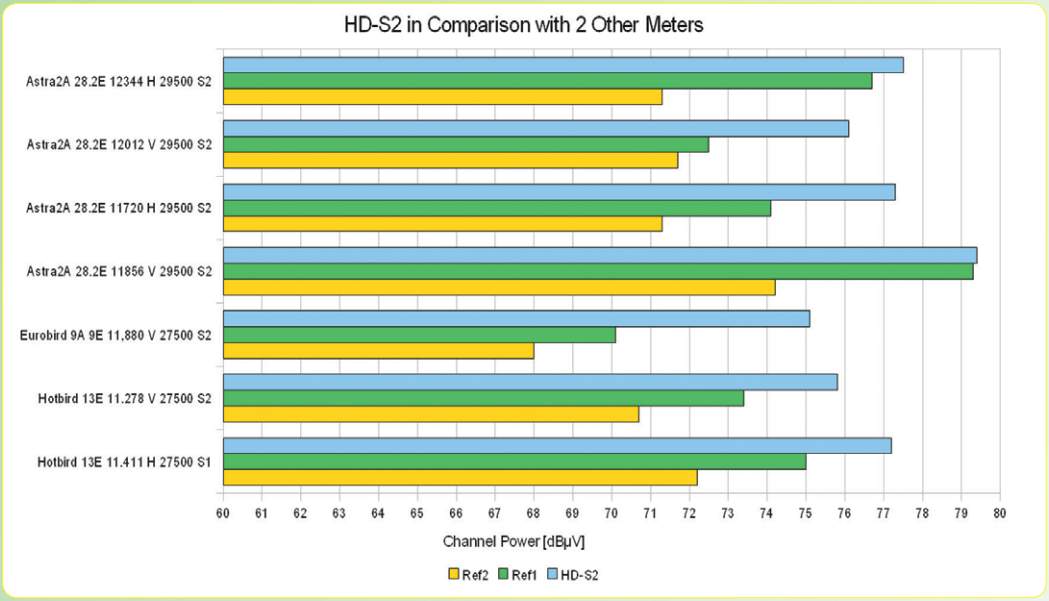
Usage

If you are familiar with any other type of Horizon meters – a satellite, cable or terrestrial one, you really do not need much time to figure out how to operate their new HD-S2. The up arrow takes you to the setup menu and the down arrow to the regular operation. Up/down buttons are used to navigate the

menu and left/right ones to select option/value for a given menu item.

There are twelve menu items in the Setup Menu: Backlight (on/off), Clicking (on/off), Brightness (0...15), Contrast (0...50), Sleep (1...30 minutes or always on), Language (English, French, Indonesian, Spanish, Italian, German, Dutch, Polish, Swedish, Danish, Norwegian, Croatian), RF power units (dBµV/dBm/dBmV), LNB voltage (zero or 13/18V), Defaults, Azimuth (Mag/True), Firmware version and a list of European Cities.

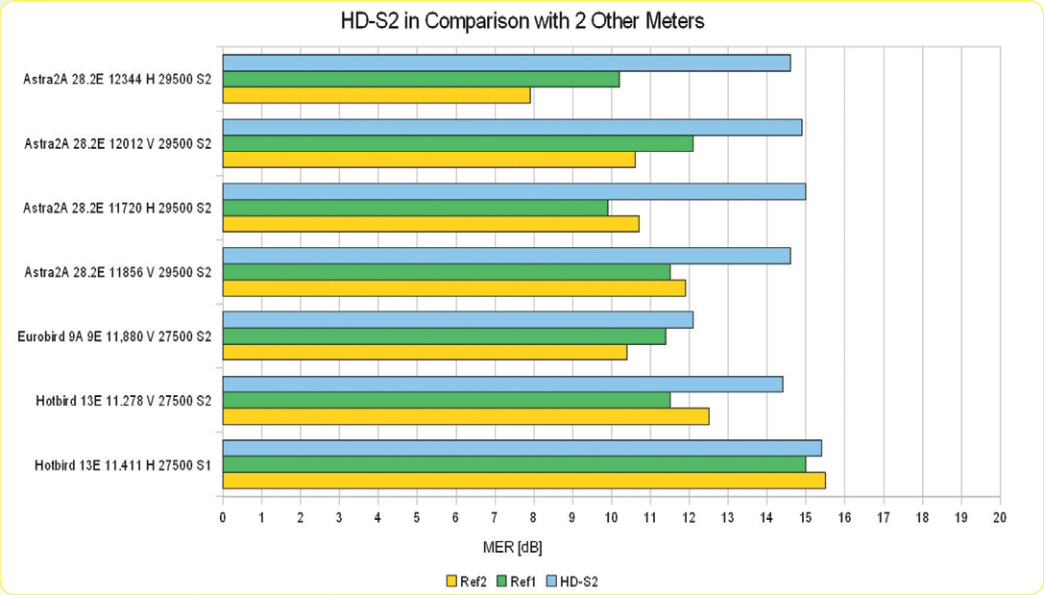
The last item requires some explanation. The Horizon HD-S2 can calculate the satellite dish elevation and azimuth any given satellite. In order to use it, you have to select your location. The menu option "Eur Cities" indicates which lookup region is loaded. Choosing a city close by to your location speeds up the process. Depending on your choice the dish azimuth will be calculated related either to geographical or magnetic pole.



When everything is set accordingly to our preferences, we can leave the Setup Menu by switching the meter off. Now we can connect the LNB output to the INPUT connector on the HD-S2 front panel and switch the meter on with the down arrow button. After the welcome screen, the meter displays the signal search screen. At the top, there is a satellite name and below a signal strength bar and channel power value in dBµV (or the other units set in the Setup Menu). With left/right arrows, you can change the satellite and once the satellite you are interested in is displayed, it is time to start turning round the dish.

While sweeping the dish, you do not have to look at the HD-S2 display because it generates beeps. They change in pitch and repetition rates depending on signal strength. It is very easy to detect the right position of the dish just by listening.

As soon as the meter locks to the received signal, the padlock symbol on the screen is displayed as locked and an additional bar is shown. It presents Modulation Error Ratio (MER). Its value in dB is shown just below the bar. MER is measured with 0.1 dB resolution which is more than enough to precisely align the dish. However, Horizon did



one step more. After pressing the arrow down button, we can see a magnified (zoomed) display of signal strength and MER. The readings are even more sensitive to changes in antenna position than before.

Another arrow down press and we can see Bit Error Rate (BER) for DVB-S signal or Derived Bit Error Rate (DER) for DVB-S2. If this is not enough, we can leave the signal search screen (with the up arrow button), and select the Spectrum item in the main menu. The Horizon HD-S2 will then show us a part of the spectrum with the channel under test in the screen center. Above the spectrum a number of parameters is presented in an alternating way: center frequency, frequency span, LNB polarization and 22 kHz signal presence. In low signal level conditions, we should use the neighboring menu item: Spectrum with a magnifying glass symbol.

Another interesting menu item we can visit is the Constellation. As you can expect, it displays signal constellation diagram (QPSK, 8PSK or APSK – depending on signal). Additionally, LCD reads signal frequency, symbol rate, modulation, FEC, IQ swap and presence of pilots (DVB-S2).

The HD-S2's default list of our test sample contains 20 transponders from the 13 most popular European satellites. The units shipped to other regions of course will show the respective popular satellites. Horizon's web page www.horizonhge.com contains a download subpage for the HD-S2, from where in future these country specific lists can be downloaded.

However, if you are not happy with their list, you can as well generate your own list. There are four DVB-S and another four DVB-S2 custom transponders the user can program himself. They are accessible in the Customize menu item. You define here all necessary parameters: LOF frequency, 22 kHz signal, transponder frequency, symbol rate, FEC (can be left Unknown = Auto), LNB voltage, IQ swap and pilots (for DVB-S2 only; can be left as Auto).

An important feature of the meter is its ability to send DiSEqC commands. The HD-S2 is compatible with DiSEqC 1.0 and 1.1. In separate menu items, you can select one of the 2 satellites, one of the 4 satellites or one of the 16 satellites. Moreover, the Horizon HD-S2 can send appropriate commands to drive dual horn systems in which you select not only one of the two satellites but also the sub-band and polarization. Unfortunately, you can not use HD-S2 to control DiSEqC motors.

If you think that's everything the HD-S2 can do for you, you are wrong. For example, it has special menu items specially for testing the Internet-via-Satellite service Astra2Connect which searches for the transponders dedicated for

Log Entries

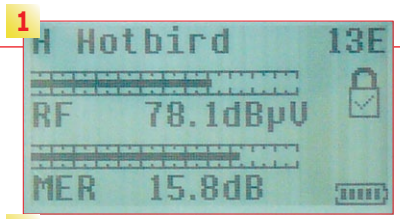
ID	Name	Longitude	dBm	dBuV	dBmV	Locked	Pilots	IQ Swap	MER	QBER	Nominal Freq kHz	Measured Freq kHz	Nominal Sym. Rate	Mea Sym
00009-001	V Hotbird 13E	13.0E	-37.65	71.1	11.10	Y			15.9	4.677300E-004	11199000	11200963	27500	2
00009-002	H Hotbird 13E	13.0E	-36.85	71.9	11.90	Y			15.1	6.000000E-008	11410000	11412363	27500	2
00009-003	V Hotbird tp124	13.0E	-36.35	72.4	12.40	Y			14.9	5.858730E-003	10992000	10993433	27500	2
00009-004	H Hotbird tp125	13.0E	-36.95	71.8	11.80	Y			14.1	5.701860E-003	11013000	11014205	27500	2
00009-005	V Hotbird tp126	13.0E	-37.5	71.7	11.70	Y			14.0	3.613100E-004	11013000	11014206	27500	2
00009-006	H Hotbird tp127	13.0E	-37.15	71.6	11.60	Y			13.6	9.672500E-004	11054000	11055715	27500	2
00009-007	V Hotbird tp128	13.0E	-36.95	71.8	11.80	Y			14.8	1.200000E-007	11075000	11076440	27500	2
00009-008	H Hotbird tp129	13.0E	-37.5	71.7	11.70	Y			14.2	5.598350E-003	11096000	11097218	28000	2
00009-009	V Hotbird tp130	13.0E	-37.25	71.5	11.50	Y			15.0	6.532850E-003	11117000	11117970	27500	2
00009-010	H Hotbird tp131	13.0E	-36.75	72.0	12.0	Y			13.1	5.322470E-003	11137000	11138694	27500	2
00009-011	V Hotbird tp132	13.0E	-37.55	71.2	11.20	Y			15.2	6.147380E-003	11158000	11159476	27500	2
00009-012	H Hotbird tp133	13.0E	-37.15	71.6	11.60	Y			14.4	4.838330E-003	11179000	11180185	27500	2

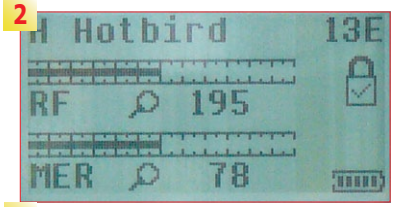
Export (.csv) Close

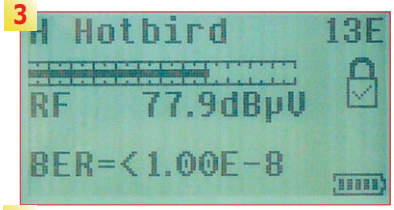
Horizon's HD-S2 internal memory content viewed with the Log Reader application after running Log All function with a HOTBIRD 13E satellite signal

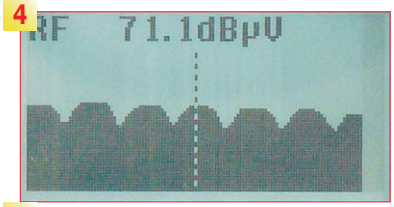
	A	B	C	D	E	F	G	H	I
1									
2	ID	00009-001	00009-002	00009-003	00009-004	00009-005	00009-006	00009-007	00009
3	Transponder	V Hotbird 13E	H Hotbird 13E	V Hotbird tp124	H Hotbird tp125	V Hotbird tp126	H Hotbird tp127	V Hotbird tp128	H Hotbird
4	Longitude	13.0E	13.0E	13.0E	13.0E	13.0E	13.0E	13.0E	13.0
5	RF dBm	-37.65	-36.85	-36.35	-36.95	-37.5	-37.15	-36.95	-37
6	RF dBuV	71.1	71.9	72.4	71.8	71.7	71.6	71.8	71
7	RF dBmV	11.10	11.90	12.40	11.80	11.70	11.60	11.80	11.
8	Locked	Y	Y	Y	Y	Y	Y	Y	Y
9	Pilots								
10	IQ Swap								
11	MER	15.9	15.1	14.9	14.1	14.0	13.6	14.8	14
12	QBER	4.677300E-004	6.000000E-008	5.858730E-003	5.701860E-003	3.613100E-004	9.672500E-004	1.200000E-007	5.59835
13	Nominal Frequency kHz	11199000	11410000	10992000	11013000	11013000	11054000	11075000	1109
14	Measured Frequency kHz	11200963	11412363	10993433	11014205	11014206	11055715	11076440	1109
15	Nominal Symbol Rate kBd	27500	27500	27500	27500	27500	27500	27500	280
16	Measured Symbol Rate kBd	27500	27500	27500	27500	27500	27501	27500	280
17	Standard	DVB-S1	DVB-S1	DVB-S1	DVB-S1	DVB-S1	DVB-S1	DVB-S1	DVB-
18	Code Rate	QPSK 5/6	QPSK 5/6	QPSK 2/3	QPSK 3/4	QPSK 3/4	QPSK 5/6	QPSK 3/4	QPSK
19									
20									
21									
22									
23									
24									
25									
26									

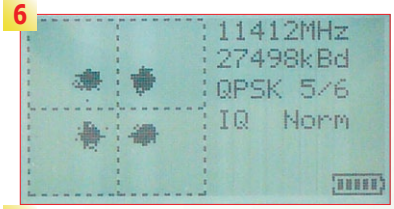
The HD-S2 log can be exported to a csv file and then imported to any spreadsheet editor

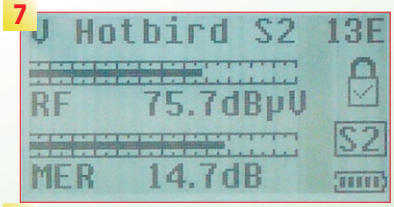


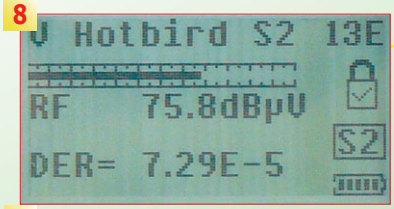


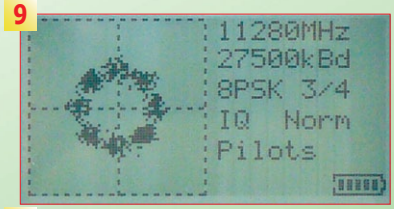


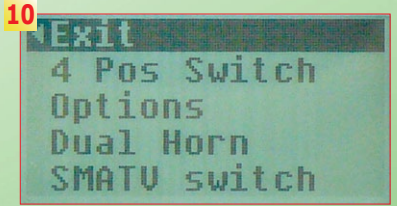












this service. Another rather unusual function is the LNB drift measurements which can be used for example to check if the LOF drift is the reason of loosing the signal in a reception system. Furthermore, the HD-S2 can even test a LNB/cable for short/open circuits.

Finally, it can log the measurement results in the internal memory. Using the Log Reader application for PC downloadable from Horizon's website you can view the stored results as well as transfer them from the HD-S2 to your PC in an ASCII file format.

More exotic functions like SCR Output test and Histogram Function will be available via downloads from Horizon web page. They will extend the versatility of the meter for the real specialists. 21 V LNB supply is needed for SCR (Single Cable Router) and HD-S2 has no problem with that. It has a special menu item: LNB 21V.

Performance

To verify the meter's accuracy, we compared it with 2 other higher class instruments – more complex and much more expensive than the HORIZON HD-S2. As you can see in the graphs, the HD-S2 readings were a little bit on the optimistic side, always giving superb readings.

However, if you use the meter for antenna alignment - what is after all its main application - the HD-S2 gives exact figures for installation. You will always tune your reception systems for maximum signal strength and quality. With one meter the maximum is at MER = 11.5 dB and with the other at MER = 15 dB. But you get the maximum at exactly the same dish position.

More important is that the meter reacts very fast: both in locking to the signal when you turn the dish and in showing signal quality changes when you fine tune it. Moreover, MER readings are quite stable if the antenna is not moving. These features are more important for a practitioner than absolute accuracy.

1. Locked to a DVB-S signal from HOTBIRD 13E

2. Magnified strength and quality readings for precise antenna alignment

3. BER measurement

4. Simple spectrum analyzer

5. Spectrum view after span has been increased

6. QPSK constellation diagram (DVB-S)

7. Locked to DVB-S2 signal from HOTBIRD 13E

8. DER reading of DVB-S2 signal

9. 8PSK constellation diagram (DVB-S2)

10. DiSEqC sub menu

Expert Opinion

Jacek Pawlowski
TELE-satellite
Test Center
Poland

+

Lightweight, compact and easy to use satellite antenna alignment meter. Practical bag. Very good battery. Unexpectedly many features in an apparently simple instrument. Fast locking and reacting to signal changes.

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DiSEqC 1.2 and USALS not supported.

TECHNICAL DATA

Manufacturer	Horizon Global Electronics Ltd.
Phone	+44 - 1279 417005
Fax	+44 - 1279 417025
E-mail	sales@horizonhge.com
Web page	www.horizonhge.com
Model	HD-S2
Function	Antenna Alignment Meter
Input frequency	950~2150 MHz
Compatibility with frequency bands	C, Ku and Ka
Modulation	DVB-S, DVB-S2 and DSS
Signal level	40dBµV to 110 dBµV
Symbol Rate	1~45 Msps
LNB supply	250 mA nom., 750 mA max.
Number of pre-programmed satellites	up to 4000 (horizontal & vertical polarization)
Power supply	100~240 V, 50/60 Hz, 0.8A max. 12 V DC, 1.5 A max.
Operational time when fully charged	8 hours typ.