KWS VAROS 109

- *very fast spectrum analysis*
- *(almost) all transponders worldwide pre-programmed*
- *high resistance against short circuits during connection and disconnection*
- *huge plus for installers: log function for the measurement protocol*
- *unique SCR and JESS compatibility*


KWS ELECTRONIC
HIGH FREQUENCY TEST EQUIPMENT
SAT-RF [GHz] 10.846
KuL
22.08.12 17:09
BAT
DVB-S2
locked
SR 23000
CR=8/9 QPSK
LEVEL[dBµ
Video: Total 4
1 BBC HD
2 BBC One HD
3*ITV1 HD
4 6945
72.5
LBE
CBER
ER[dB]
6.4
PSI extraction ready!
DiSEqC V1.0
P4 V/Lo
Ilnb [mA] 140
VAROS 109
LNB
CHARGE
ANALYZ
MODE
LNB
OSD/VID
1
2 abc
3 def
4 ghi
5 jkl
6 mno
7 pqrs
8 tuv
9 wxyz
ESC
0
ENTER
SCAN
SAVE
RECALL
AV SET

The Smallest KWS Meter Comes with a Huge Range of Features

KWS Electronics is a traditional company that has been in the business of producing top-notch professional antenna measurement technology for 35 years. Their meters of the AMA and VAROS ranges are a by-word for ultimate measuring precision and with the VAROS 109 KWS is offering a handheld meter for professional installers for the first time.

Those in the know will confirm it: Every time an antenna installer arrives at a customer's place with a KWS meter in hand there is a sigh of relief. Even many laymen show confidence in KWS technology, and consequently also in a technician who uses such equipment, since they can expect first-rate service in such a case.

This is also the reason why many installation businesses not only advertise their range of services, but also the fact that they rely on KWS equipment. After all, not all installers can afford those meters since quality never comes cheap and top-notch meters carry a hefty price tag.

This is exactly where the brand new KWS VAROS 109 comes into play – never before was it possible to get hold of a genuine KWS meter at such an attractive price. And it's true, the recommended retail price of this measuring device is interesting enough for many amateur satellite DXers among the TELE-satellite readership as well. So keep your eyes glued to this report!

Every time an established manufacturer throws a so-called beginner's model onto the market we start hunting for features and functions which presumably were deleted from the specifications list in order to be able to keep the price as low as intended. If you are as wary as we are, we can assure you that the KWS VAROS 109 is an absolutely excellent meter for satellite installers that offers all functions you will need! No compromise here.

The KWS VAROS 109 arrived at our test center in a plain looking cardboard box. Out of that box came a bright-coloured hard case with robust locking flaps and a carrying handle in the blue colour associated with the KWS brand. This case is small, quite lightweight and very robust, so that the meter will be protected even at those rough and dirty construction sites.

Inside the case there is the KWS VAROS 109 itself, a charger, a miniature USB memory stick as well as a DIN-A5-sized printed manual. We noticed two things right away: The cable that is shipped with the meter in the bright KWS blue must be one of the best satellite cables that ever made it to our test center. It can easily be attached to an F-plug, is easy to bend and lead around corner yet sports a diameter of 7 mm. This alone is proof enough that we're talking about a top-notch manufacturer here, and about a first-rate product.

The second item we immediately fell in love with was the USB memory stick that comes with the package. It is used for data storage and almost all it consists of is the plug itself. Once it is hooked up to the meter it protrudes only a few millimeters from the device. This way users can get going right after unpacking and don't need to purchase additional equipment before starting their first installation job. If our opinion is anything to go by, this is how it should always be.

The fact that KWS supplies a printed manual is somewhat out of the ordinary too these days. In most cases, manufacturers provide a PDF manual for printing at home or for reading on the PC, but KWS begs to make a difference and we can only applaud that effort. Even though the KWS VAROS 109 is almost self-explanatory and thus very easy to use, the comprehensive manual includes a lot of useful information and also discusses features and functions many users would not consider in the first place.

The KWS VAROS 109 meter itself comes in a green and grey protective bag made of hard-wearing nylon. The screen and all buttons are additionally protected by a transparent plastic foil, which means the meter will easily survive dirt, dust and

TELE audiovision AWARD 01-02/2013

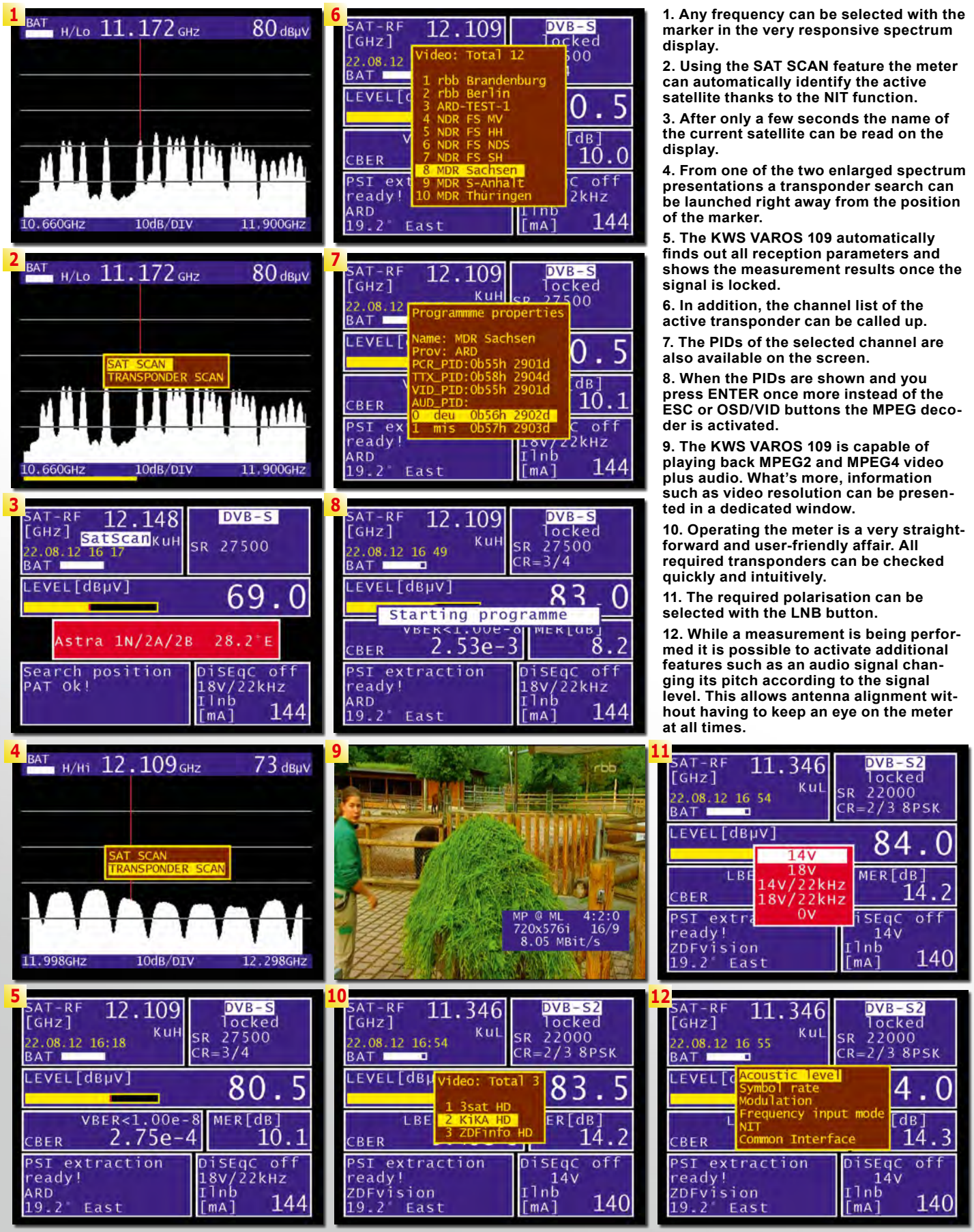
KWS VAROS 109
Extremely high-quality meter for everyday use by satellite installers

www.TELE-audiovision.com/13/01/kws

The KWS VAROS 109 in action on our roof: It's small, lightweight and convenient to carry along. It helps installers finish their job faster, and we too were able to correctly align a motor-controlled antenna as well as our C band antenna without suffering from neck pain the next day. We give top marks to the display, which is perfectly readable even in direct sunlight.

splashes of water in everyday use. This all adds up to show that the meter is designed for day-to-day installation jobs up on the roof or out at construction sites. The carrying strap of the bag can be adjusted in length so that the device can be carried on the shoulder or around the neck, and if you lean the meter against your stomach you can even use it hands-free.

The nylon bag is designed in a way that leaves only the HF input (designed to accept F plugs) accessible from the outside. In addition, the external power pack can be attached through a small



1. Any frequency can be selected with the marker in the very responsive spectrum display.

2. Using the SAT SCAN feature the meter can automatically identify the active satellite thanks to the NIT function.

3. After only a few seconds the name of the current satellite can be read on the display.

4. From one of the two enlarged spectrum presentations a transponder search can be launched right away from the position of the marker.

5. The KWS VAROS 109 automatically finds out all reception parameters and shows the measurement results once the signal is locked.

6. In addition, the channel list of the active transponder can be called up.

7. The PIDs of the selected channel are also available on the screen.

8. When the PIDs are shown and you press ENTER once more instead of the ESC or OSD/VID buttons the MPEG decoder is activated.

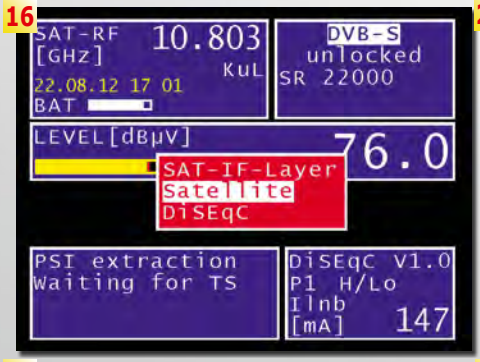
9. The KWS VAROS 109 is capable of playing back MPEG2 and MPEG4 video plus audio. What's more, information such as video resolution can be presented in a dedicated window.

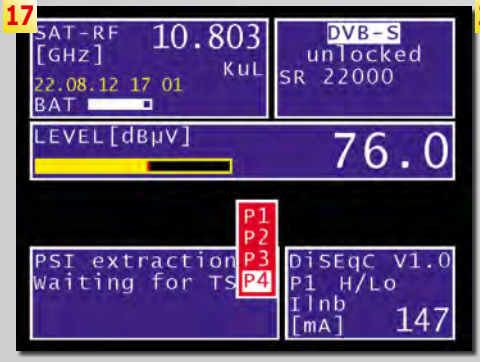
10. Operating the meter is a very straightforward and user-friendly affair. All required transponders can be checked quickly and intuitively.

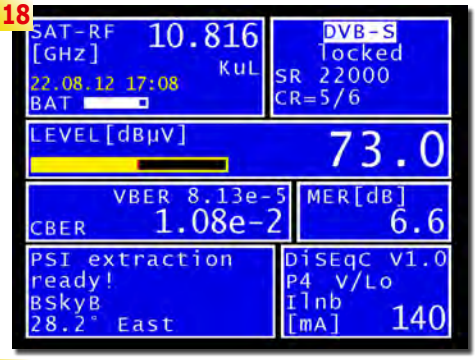
11. The required polarisation can be selected with the LNB button.

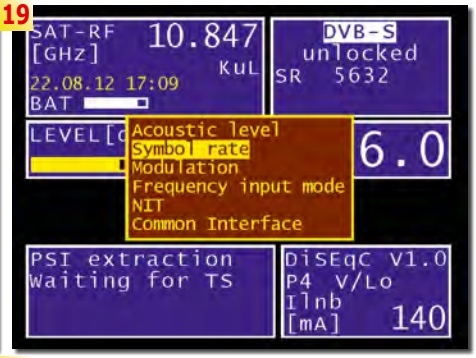
12. While a measurement is being performed it is possible to activate additional features such as an audio signal changing its pitch according to the signal level. This allows antenna alignment without having to keep an eye on the meter at all times.

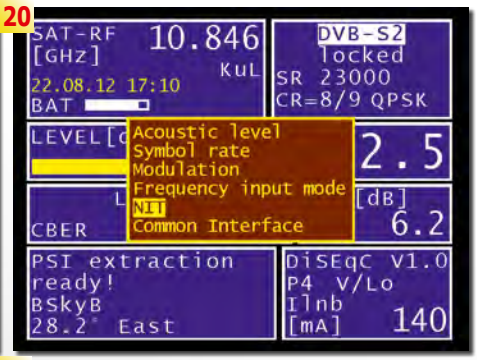
opening on the bottom side. The USB and DVI inputs are positioned on the upper side and protected by a Velcro cloth strip which can easily be opened and closed again. While it may appear a little peculiar that the KWS VAROS 109 comes with a DVI output as opposed to the HDMI output offered by most competing products, this turns out to be not such a bad idea after all: If you need

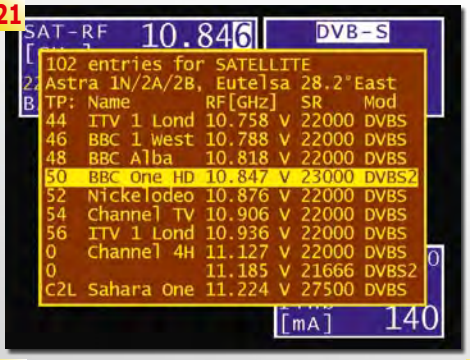


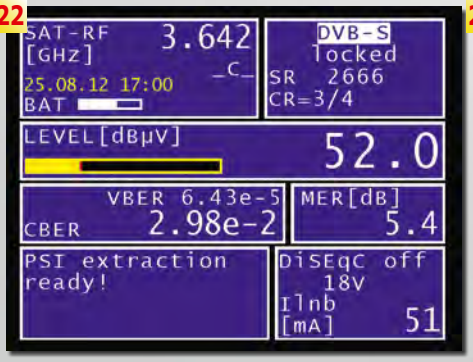


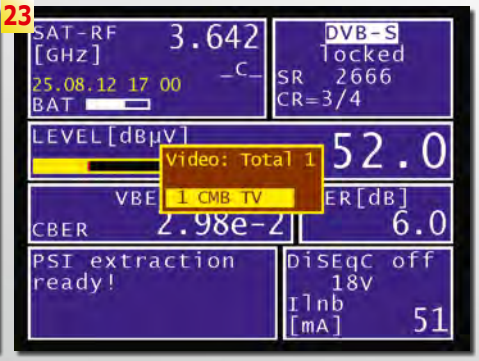












13. Obviously the KWS VAROS 109 comes with an internal memory. Up to 100 transponder entries can be stored, with the log function calling up an entry from the memory and saving the measurement result as an XML file to the USB storage medium.

14. All parameters can be adjusted in the main menu. Even though this gives you almost endless possibilities, the menu structure is very user-friendly and does not require consultation of the manual.

15. No compromise as far as the internal transponder list is concerned. KWS Electronic has supplied its KWS VAROS 109 with a complete transponder list for all satellites wordwide. This way installers will be able to meet all customer demands without having to research specific transponder data on the Internet beforehand.

16-17. DiSEqC is implemented in an exemplary way. In the DiSEqC menu you first select the required operating mode, with the second menu item changing according to the initial selection. In the example shown we have selected DiSEqC 1.0 and the second menu item correctly offers satellites 1 to 4 for selection.

18. When we test products, we test them real hard. This time we tried to challenge the meter's tuner with reception of ASTRA 28.2E using a much too small 60 cm flat antenna. Albeit, the tuner seemed to be happy with that and presented flawless video even with this very weak signal, characterised by a VBER of 1e-3 and a MER of 5.8 dB.

19. The BBC HD transponder uses a somewhat unfamiliar symbol rate of 23000. In order to save time this symbol rate can be added directly to a list of up to five symbol rates. The KWS VAROS 109 can then lock the signal more quickly since it does not have to try out all possible symbol rates one after the other.

20. If you're not quite sure which satellite you are currently receiving you can always count on the NIT function of the KWS VAROS 109. It works wonders and after a very short while will not only show you the name of the satellite but also all additional content of the NIT.

21. Rather than selecting a transponder by manually entering the frequency or by using the marker it is of course also possible to select it right from the internal transponder list. A real treat: Each transponder entry comes with the name of the most important channel next to it, so that you can find out more easily which transponder to choose.

22. Apart from the Ku band the KWS VAROS 109 is a valuable tool for the C band as well. Shown here is a measurement of NSS806 at 40.5W. There is only borderline reception of the 3,642GHz transponder, which means the BER and MER values are extremely bad.

23. Even though, the meter is capable of showing the channel. For C band reception and antenna sizes of 2 m and over it is paramount for the tuner to reliably process borderline signals as well without freezing. The KWS VAROS 109 turned out to be a brilliant performer and so we had our Mesh antenna aligned towards 40.5W after only a short time and were able to receive channels from South America.

to attach a HDMI device it is possible to use an inexpensive DVI-HDMI adapter, but if you prefer to use a standard computer monitor you will soon discover the DVI socket's worth, as PC monitors are way less expensive than TV panels.

The meter sports a metallic grey colour with green rubber protection on the sides. The front panel features a 5.7-inch high-resolution colour TFT display which offers excellent readability even in direct sunlight.

Right below the display there is the keyboard consisting of four arrow keys (Up, Down, Left, Right), a numeric pad right in the centre complete with the ENTER and ESC buttons, as well as four keys each to the left and right of the numeric key pad.

The function keys on the left side are:

- **ANALYZ**: Calls up the spectrum analyser.
- **MODE**: Calls up various special functions. This is a designation typical of KWS meters and if you have used a KWS meter before you'll be familiar with this feature.
- **LNB**: Different LNB configurations can be adjusted with this button, plus the DiSEqC features can be accessed from here as well.
- **OSD/VID**: This function key switches between measuring mode and MPEG decoder, which can process MPEG-2 and MPEG-4 transmissions.

The function keys on the right side are:

- **SCAN**: Various search functions and the transponder list for all satellites around the world are activated with this key.
- **SAVE**: Saves the active transponder.
- **RECALL**: Calls up a saved transponder.
- **AV SET**: Calls up audio and video settings.

In the upper right corner of the meter there is the On/Off switch. Press it and it only takes five seconds for the device to power up and become fully operational. This is a truly remarkable achievement, and together with battery power for 3.5 hours of continuous operation you definitely get your money's worth. Knowing that the KWS VAROS 109 will be ready in a few seconds will invariably result in switching off the meter every time it is not in use for a few minutes, thus further increasing battery time.

Catching a glimpse of our test center. KWS meters have longer service life than most other signal analysers, which is why the KWS VAROS 109 did not only have to prove its worth against currently offered competitors, but also against older professional KWS meters of the AMA series. All our comparisons showed that the KWS VAROS 109 passed with flying colours. Another bonus: If you've ever worked with a KWS meter before you'll never want to change your ways again.

You need to fasten the screws of the antenna on the pole before performing the next signal measurement? Turn your meter off! Screws are tight? Turn it on again and after five seconds you're ready to rock! We have seen many meters that seem to be taking forever to power up, and in those cases you probably keep them switched on all the time only to find out that once your lunch break is over you're out of power.

The KWS VAROS 109 is different, and even the specified battery life of 3.5 hours is not merely a theoretical indication, but a result we easily achieved during our test. We worked with the meter long and hard, often for hours on end, and we can happily confirm this more than pleasing battery capacity.

If you've ever worked with the larger KWS meters of the VAROS series you'll notice that the KWS VAROS 109 can be operated in exactly the same way so that installers knowing how to make full use of a VAROS 306 don't need to re-familiarise themselves with this new KWS meter. There are only two aspects

that differentiate the VAROS 109 from the VAROS 306: The new meter is designed for satellite signals only (that is to say, the DVB-S and DVB-S2 modulations) and it comes as a small handheld device. Other than that, all functions and features are available with the small meter as well, and they can be used just like with the VAROS 306. For aligning a satellite antenna the spectrum analyser function is the best starting point. Long before a usable signal brings up video or audio the spectrum will indicate whether or not you're on the right track. Once you get the knack of it you'll be able to identify a particular satellite simply based on its characteristic spectrum pattern. But even if you don't, there's no need to worry since the KWS VAROS 109 naturally comes with an NIT function that will quickly and reliably recognise the active satellite you're currently pointing to.

The spectrum analyser implemented in the KWS VAROS 109 was able to win us over right away. Even though it is a fully digital analyser it still provides a real-time presentation of the current spectrum. The refresh rate for the entire frequency space is approximately one second, which means the spectrum display will keep pace even with faster antenna movements.

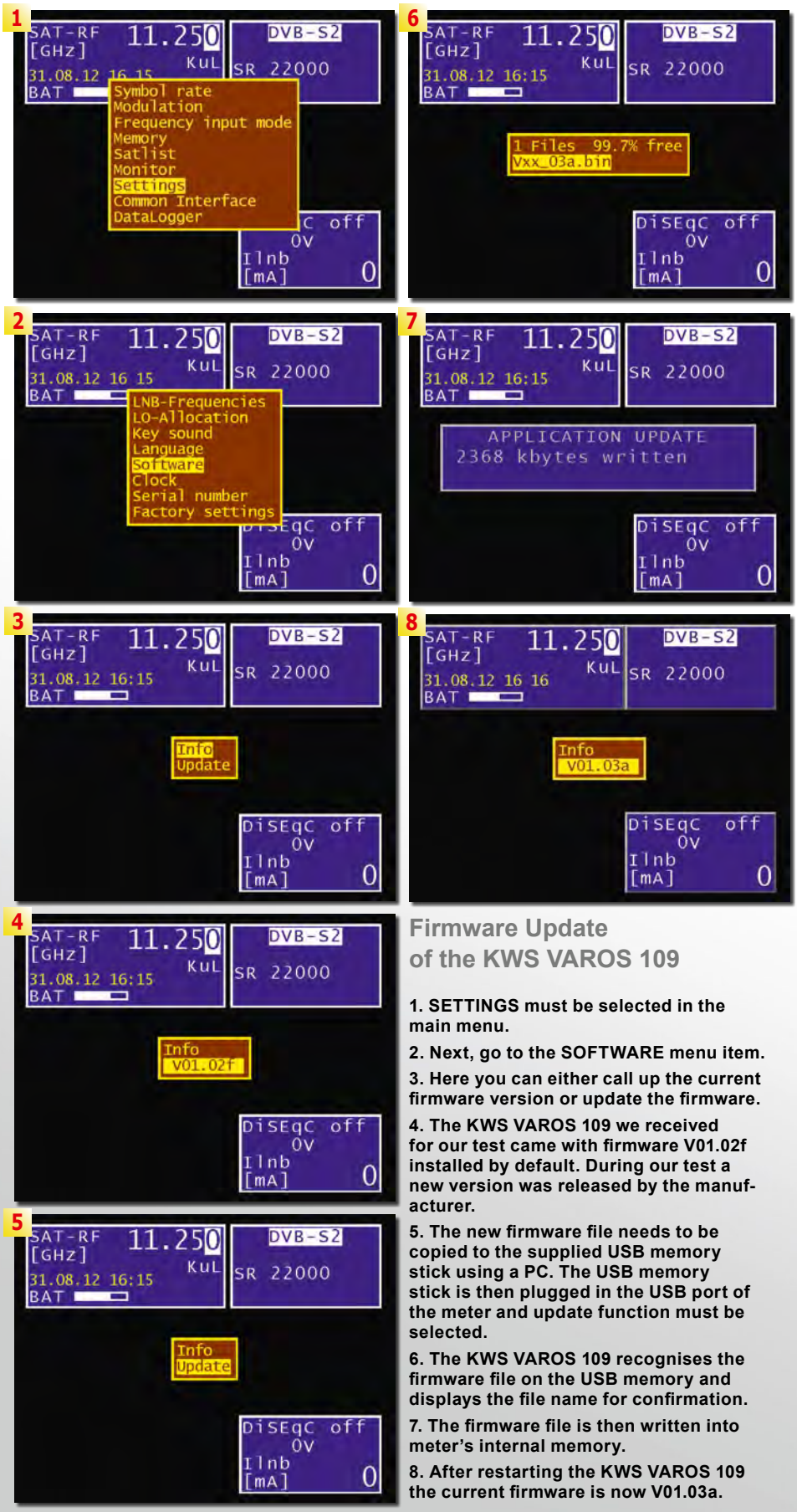
One of the benefits of a digital analyser is that it is possible to move a red marker using the Left/Right buttons with the effect that the corresponding frequency will be given out together with the signal level. Whenever you're in one of the enlarged spans the marker frequency can be used as the starting point for a signal scan without having to key in additional parameters. A touch of the ENTER button is all it takes.

This turned out to work absolutely flawlessly and for installers it is thus possible to select and analyse a transponder without additional preparation. While this is a single feature among many, it alone should make the KWS VAROS 109 the meter of choice for many professionals. After all, time is money, and the less hassle with a meter, the more business on any given day. What's more, DXers will also be delighted by that feature since it allows detection of feed frequencies in the spectrum, which in turn can be scanned and evaluated without mincing matters.

According to the manufacturer, the KWS VAROS 109 will happily process symbol rates from 2 to 45 MSym/s, and our test lent proof to that assertion. The meter is therefore perfectly suitable to deal with more exotic transponders and their frequently low symbol rates as well.

Professional installers will truly appreciate that the KWS VAROS 109 comes with a list of five pre-defined symbol rates that can be freely edited. These can be used to speed up an automatic search, even though it has to be mentioned that the meter can also determine the actual symbol rate all by itself. Just be prepared that the search then takes a little bit longer.

As the KWS VAROS 109 sports an almost complete transponder list for all satellite positions worldwide, manual detection should not be required all too frequently anyway. Instead, you can simply pick your desired transponder



Firmware Update of the KWS VAROS 109

1. SETTINGS must be selected in the main menu.

2. Next, go to the SOFTWARE menu item.

3. Here you can either call up the current firmware version or update the firmware.

4. The KWS VAROS 109 we received for our test came with firmware V01.02f installed by default. During our test a new version was released by the manufacturer.

5. The new firmware file needs to be copied to the supplied USB memory stick using a PC. The USB memory stick is then plugged in the USB port of the meter and update function must be selected.

6. The KWS VAROS 109 recognises the firmware file on the USB memory and displays the file name for confirmation.

7. The firmware file is then written into meter's internal memory.

8. After restarting the KWS VAROS 109 the current firmware is now V01.03a.

from the transponder list. And this is how it works: Select a satellite first, followed by the transponder on that satellite. Even though more than one hundred satellites are pre-stored complete with all corresponding transponders, the smart user interface nonetheless makes for a very swift selection process.

As always, it's the little things that make life so much easier for users: If you want to look at another transponder on the same satellite that satellite is already highlighted in the satellite list, as well as the currently selected transponder. So if you need to check various transponders of the same orbital position you need not go through the entire list again and again. Once again, time is money, especially if you use the meter professionally. In addition, the transponder list also shows the name of the first channel that is transmitted on that transponder, so that finding the right transponder on the list is more or less child's play. This is a truly unique feature and one that makes us wonder how installers could ever have done without.

Once a signal is locked the measurement screen gives out all required information without users having to switch between screen modes. Thanks to the high-resolution display the following measurement parameters can be presented simultaneously in a total of seven clearly structured display windows:

- Frequency window
Frequency
LNB type (Ku or C, for example)
Date and time
Battery status

- Parameter window
Modulation (DVB-S or DVB-S2)
Symbol rate
CR (code rate)

- Signal level window
Signal level (dBµV) as numeric value and as signal bar with peak memory function

– Bit error window
VBER (after VITERBI error correction)
CBER (before VITERBI error correction)

- MER window
MER (Modulation/error ratio)

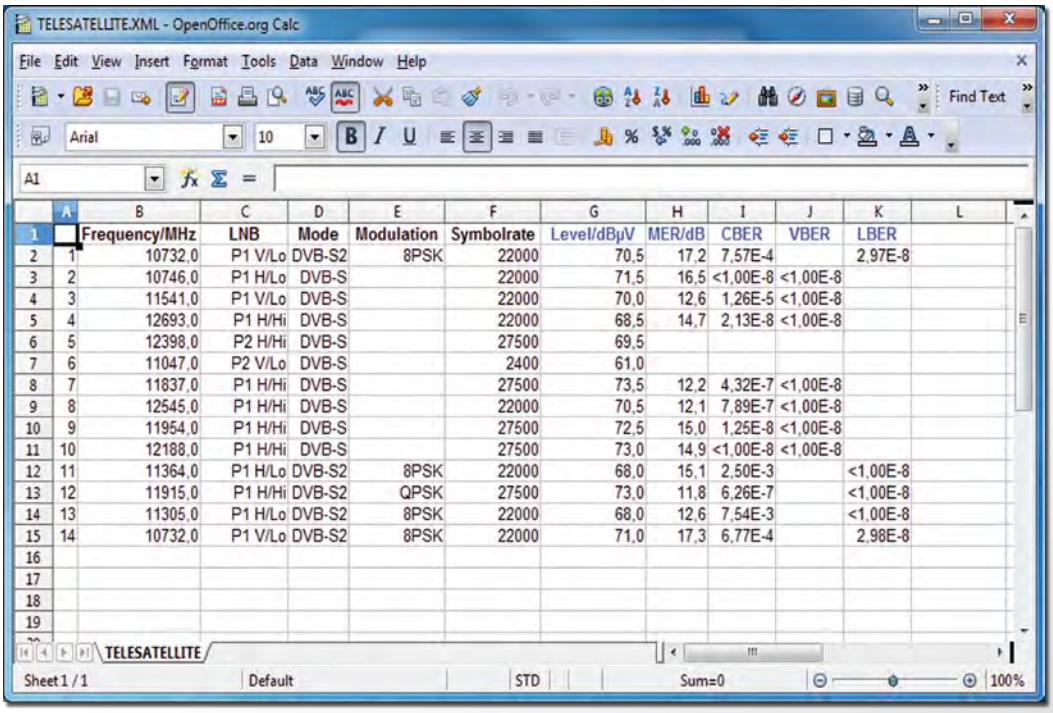
- MPEG window
NIT information: name of satellite and provider

- LNB window
LNB information: DiSEqC, polarisation power intake of the reception system (LNB, rotor, switches, etc.)

Using the OSD/VID button it is then possible to call up the channel list of the currently measured transponder. The Up/Down buttons are used to navigate within the list and the selected channel can be watched after a touch of the ENTER button. In addition to the live video the meter can also insert additional information such as channel bandwidth and resolution. Even the MPEG colour subsampling rate is shown as an extra bonus, making the KWS VAROS 109 all the more appealing to professionals and DXers alike.

Like other meters of the VAROS series, this handheld meter cannot present a constellation diagram. As far as the DVB-S and DVB-S2 modulations are concerned, this is not such a tragic loss since the BER and MER parameters already give a clear indication of whether or not a signal is OK.

Once again KWS clearly shows that it is a manufacturer with valuable expertise, since it only implements those features in the KWS VAROS 109 that are actually required for installers of satellite dishes. Incidentally, during our extensive test we did not think of a single feature or function we would



	A	B	C	D	E	F	G	H	I	J	K	L
1		Frequency/MHz	LNB	Mode	Modulation	Symbolrate	Level/dBµV	MER/dB	CBER	VBER	LBER	
2	1	10732,0	P1 V/Lo	DVB-S2	8PSK	22000	70,5	17,2	7,57E-4		2,97E-8	
3	2	10746,0	P1 H/Lo	DVB-S		22000	71,5	16,5	<1,00E-8	<1,00E-8		
4	3	11541,0	P1 V/Lo	DVB-S		22000	70,0	12,6	1,26E-5	<1,00E-8		
5	4	12693,0	P1 H/Hi	DVB-S		22000	68,5	14,7	2,13E-8	<1,00E-8		
6	5	12398,0	P2 H/Hi	DVB-S		27500	69,5					
7	6	11047,0	P2 V/Lo	DVB-S		2400	61,0					
8	7	11837,0	P1 H/Hi	DVB-S		27500	73,5	12,2	4,32E-7	<1,00E-8		
9	8	12545,0	P1 H/Hi	DVB-S		22000	70,5	12,1	7,89E-7	<1,00E-8		
10	9	11954,0	P1 H/Hi	DVB-S		27500	72,5	15,0	1,25E-8	<1,00E-8		
11	10	12188,0	P1 H/Hi	DVB-S		27500	73,0	14,9	<1,00E-8	<1,00E-8		
12	11	11364,0	P1 H/Lo	DVB-S2	8PSK	22000	68,0	15,1	2,50E-3		<1,00E-8	
13	12	11915,0	P1 H/Hi	DVB-S2	QPSK	27500	73,0	11,8	6,26E-7		<1,00E-8	
14	13	11305,0	P1 H/Lo	DVB-S2	8PSK	22000	68,0	12,6	7,54E-3		<1,00E-8	
15	14	10732,0	P1 V/Lo	DVB-S2	8PSK	22000	71,0	17,3	6,77E-4		2,98E-8	
16												
17												
18												
19												

The results of the Data Logger are saved on the USB stick in XML. This file can be opened in Microsoft Excel or OpenOffice Calc. This makes it easy for any installer to adjust the data in a personalized form and according to their own company rules.

have liked to see and which the meter did not provide. Quite the opposite was true and once we had completed our test the KWS VAROS 109 was designated our new reference meter for satellite signals.

Need we say more? Obviously, we did not just accept the measurement results given out by this handheld meter as matters of fact. Far from it – we checked all values against those indicated by other reference meters in our test center. Among those was a tried-and-tested KWS AMA 210S as well as a KWS AMA 218S, both of which provide excellent measurements even after almost 20 years of service. Using the same meters over such a long timespan is only possible thanks to KWS designing all its products with a long service life in mind. Thanks to DVB and MPEG upgrades our 'old' KWS meters are still popular and have lost nothing of their initial appeal. The KWS VAROS 109 allows firmware upgrades via the supplied USB memory stick, with new software being released on the KWS website. We were even able to try that out ourselves since a new firmware release was published during our test. Not surprisingly, the software update was accomplished completely hassle-free.

The KWS VAROS 109 passed the comparison test with flying colours. We actually believe that in everyday

use the measuring precision is even better than specified by the manufacturer. This might be intended by KWS in order to differentiate this VAROS meter from its own top-notch AMA series – at least as far as the written specifications are concerned. (Table)

In general, an accurate BER measurement will suffice for precise antenna alignment. This parameter indicates the bit error rate, which means it tells you how frequently a bit error occurs in the data stream. If the BER value is low, this means the VITERBI error correction routine will be able to automatically correct the signal. The MER, on the other hand, shows the modulation/error ratio. Here, the higher the value, the more exactly all symbols fall into the corresponding squares.

For maintenance and error diagnosis it is particularly important to measure BER and MER simultaneously. This is because there may be a high MER value (which is a good thing) and still an increased bit error rate (not a good thing). Oxidised cables or a faulty F plug may be to blame for such a situation. The KWS VAROS 109 is able to indicate the BER as CBER and VBER. CBER is short for channel bit error rate and shows the bit error rate before VITERBI error correction. Values ranging from 1e-5 to 1e-6 are good, but with a value of 1e-4 and above you should expect reception problems.

VBER, on the other hand, indicates the bit error rate after VITERBI error correction and here you should always get a value of 1e-8 or below, which means one bit error per 108 bits. This target value makes sure you have some leeway for reliable reception in bad weather. In addition to that, the KWS VAROS 109 can also measure the power intake at the HF input, which is important for making sure the tuner of a satellite receiver is not put under more strain than it can safely handle. You should definitely keep an eye on power intake whenver you do not only use an LNB but also multi-switches or even one or several DiSEqC motors.

It goes without saying that we always put our meters to a thorough test, sparing neither effort nor expense. This time, the KWS VAROS 109 had to prove its worth with the following tasks:

1) Re-alignment of our antenna array.

Some time ago we installed a small antenna array made up of four flat antennas which we use for many of our product tests as it allows us to work with four different satellite positions. All four flat antennas are mounted on a single pole using vertical pipes, and the whole set-up can easily be transported

Meter	Signal level dBµV)	VBER
KWS VAROS 109	82.0dB	<1.00e-8
KWS AMA 210S	81.5dB	<1.00e-8
KWS AMA 218S	81 dB	<1.00e-8

Table – Comparison measurement: Astra 19.2E - 11.066 MHz, vertical, 22000, 5/6

and put on any hard surface without additional mounting requirements. For us, this is an extremely convenient solution in our daily routine, as we can move or store the entire array without changing the position of the individual antennas whatsoever.

It allows us to test and evaluate different receivers and satellite-related products without occupying a lot of floor surface – something that is in scare supply anyway in most test centers. What's more, we don't have to install and dismount the antennas for each test. We noticed, however, that even with the best of intentions the antennas had become slightly misaligned after several months. What better way to re-adjust them than with the KWS VAROS 109 handheld meter?

To that end, we first connected the meter to the 4/1 DiSEqC multi-switch of the antenna array using the supplied blue measuring cable. Aligning all four antennas with the help of the KWS VAROS 109 turned out to be fun. All we did was select DiSEqC 1.0 in the LNB menu and the meter then allowed us right away to directly address each of the four signal inputs. Using the spectrum analyser function one antenna after the other could be fine-tuned.

Since we were dealing with 60 cm flat antennas, however, we tried to really max out on their reception capabilities so that it would also become possible to receive the UK beam of ASTRA 1N 28.2E at our location. In northern Portugal we would normally require at least a 100 cm antenna (with 120 cm being recommended) to even think about reception, according to the operator's footprint map. With our newly aligned antenna a mere 60 cm is seemingly enough, provided the weather is kind to us. Signals from that beam are of particular importance to us since we are always for the lookout for borderline signals that we use to put new receivers to the acid test, so to speak.

It took us less than 15 minutes to align all four antennas for optimum reception (28.2E, 19.2E, 13.0E and 30.0W). During the process, we were thoroughly impressed by how easy and convenient an aid the KWS VAROS 109 turned out to be. Thanks to the measurement

SCR and JESS with the KWS VAROS 109

1. In DiSEqC settings the SCR (Unicable) and JESS options are available as well.

2. In a unicable set-up the frequencies of all user bands can be individually determined, and the KWS VAROS 109 is capable of storing various memory banks. This way user bands need not be set up from scratch for every new measurement.

3. With SCR up to eight outlets can be provided with signals from up to two satellite positions. The centre frequency of each user band can be set individually to avoid interference.

4. Using the numeric key pad you can enter the centre frequency easily and conveniently while in the background the spectrum of the corresponding user band is presented in real-time.

5. The KWS VAROS 109 even supports the extended SCR standard by the name of JESS (Jultec Enhanced Stacking System), which can distribute up to four satellite positions to up to 16 users along a single cable.

6. Setting up a JESS installation is similar to SCR, with the exception that up to 16 user bands can be created, instead of eight for SCR.

7. Here, too, it is of course possible to individually adjust the centre frequency of each user band.

8. As an alternative, the KWS VAROS 109 is able to determine all user bands automatically with a frequency scan. This is extremely helpful when re-aligning an antenna, since this way the centre frequencies of the individual user bands are pre-defined automatically.

9. No JESS converter box was installed in this set-up, which prompted the meter to give out an alert.

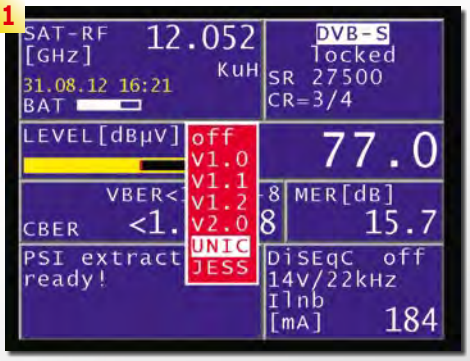
10. Due to the missing JESS converter the meter could not detect any user bands either. While this is an obvious flaw in this specific installation, the same error could also occur due to interference caused by the cable.

11. JESS can receive and distribute signals from up to four satellites, and if you're serious about your business you should make a point of checking each position. With the KWS VAROS 109 this does not turn into a waste of time, as there is a dedicated menu for switching between those positions quickly and easily.

12. An additional bonus is hidden behind the Prog.Tool menu item: The KWS VAROS 109 is capable of programming SCR and JESS antenna outlets. With single-cable set-ups this is particularly important for making sure users cannot mess up the entire system when they change the LNB settings of their receiver.

13. Thanks to a clearly laid-out table it is possible to individually program each antenna outlet. The configuration parameters can even be read out and written back so that you can easily gain an overview of the complete set-up and make sure users do not interfere with each other.

1



screen showing all parameters simultaneously you only need to press a few buttons to switch between analyser, measurement and MPEG display and to enter all required data.

What's more, all commands are executed in a breeze and we never noticed any lag or waiting periods. Thanks to the swift reaction to all user inputs a job can be completed efficiently and without wasting time. The KWS VAROS 109 accomplished mission one to our utmost satisfaction.

2) Correct alignment of a motor-controlled antenna.

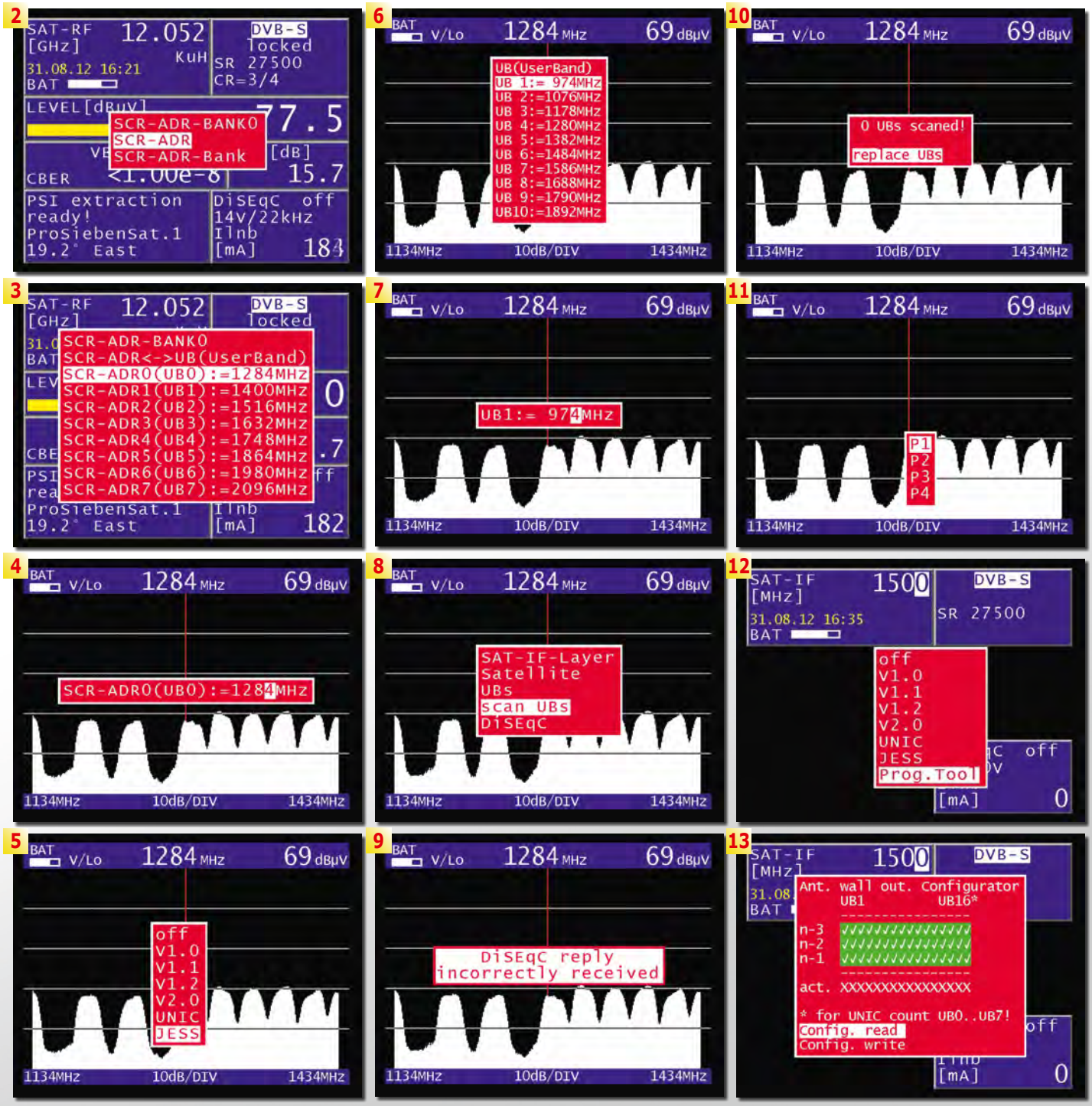
We wanted to find out how quickly an antenna with DiSEqC 1.2 motor could be aligned. While many meters boast DiSEqC 1.2 support, this feature is all too often implemented in a less than perfect way, to put it mildly. After all, what use is DiSEqC 1.2 if you cannot monitor the spectrum display in real-time while moving the antenna manually using DiSEqC 1.2 positioning?

Once again the KWS VAROS 109 did not fail to impress us, and it behaves just like you'd expect from a top-notch meter. Go to the LNB menu, set DiSEqC 1.2 and use the POSITIONER option which gives you the following commands:

- Drive
- Limit east
- Limit west
- Limits off
- Save
- Go to

When in Drive mode you can tap on the Left or Right button to initiate a short antenna movement to the East or West. If you keep the button pressed the antenna will move continuously.

The spectrum is available in real-time throughout the process, something that is extremely helpful. It allows you to conveniently move to various satellite positions and to save them in the DiSEqC motor. You may also want to remember the following hint: If the intention is to perfectly align a motor-controlled antenna we save a satellite position in the easternmost limit, the westernmost limit as well right in the middle of the arc. This way we can easily move



to each of those positions using the 'Go to' functions if we need to check and evaluate the antenna alignment.

Once those satellite positions are precisely aligned we manually visit each orbital position from East to West and save them in the DiSEqC motor. To that end we draw up a list with the satellites that correspond to each of the saved positions. The NIT function of the KWS VAROS 109 offers excellent assistance for that task, as we don't always know right away which satellite we are currently receiving, especially if we're targeting more exotic birds.

We also appreciated the straightforward implementation of the Limit function. All you need to do is go to the limit positions and use the 'Limit East' or 'Limit West' function – that's it. Thanks to the smart implementation of all required DiSEqC 1.2 functions in the KWS VAROS 109 the alignment of motor-controlled antennas has finally lost its sting.

Our only suggestion for improvement concerns the DiSEqC 1.2 memory positions, which are numbered from 0 to 99. With the currently available firmware these memory positions can only be accessed using the Up/Down buttons. Wouldn't it be nice to simply enter a number for calling up the corresponding position? But then again, we cannot be full of praise only and have to find something to criticise after all. And if truth be told, there are very few occasions that you have to deal with more than 30 satellite positions, and anything below that can easily be found by scrolling up and down the list. So if you think of getting this KWS meter, don't let us spoil that idea…

3) Alignment of a 2.4m C band mesh antenna.

For this test we wanted to re-align our C band antenna to a new satellite position. Currently it points to 37.5W and its new target position should be NSS-806 at 40.5W. While this satellite predominantly serves South America its East-Hemi C-Band Beam can also be received in Europe with the right equipment and antenna size.

If you have ever tried to set up and correctly align a C band antenna you will know that it requires better skills and equipment than Ku band antennas. There is an obvious reason for that: C band antennas focus any radiation more precisely which means that even small imperfections will impair reliable reception. In addition, there's the LNB which also has to be mounted with increased precision for C band reception. And we're not only talking about skew here. We've even had cases when the material of the dielectric was the deciding factor whether or not a usable signal came in.

But let's take one step at a time. Before we can even contemplate the dielectric we first have to modify the antenna pole so that we can point the antenna further to the west.

So off comes the antenna, which of course means that its initial alignment towards 37.5W becomes history in a matter of seconds. And this

in turn implies that we'll have to re-align the antenna again after re-mounting it on the pole. We honestly could not have asked for better conditions for determining the KWS VAROS 109's worth in the C band.

As always, the accuracy and response of the spectrum display make or break such a mission, and thanks to the fast KWS VAROS 109 the C band all of a sudden does not feel like uncharted territory any longer. Incidentally, we did not even have to consult the manual or look up the transponders of NSS-806 on the Internet: The handheld KWS meter comes with a list of virtually all transponders of virtually all satellites worldwide and so all we had to do was find NSS-806 on the list and then select a transponder with a high symbol rate.

Obviously the meter put out an alert saying that no signal is locked, but once we changed back to spectrum mode the marker was spot on the appropriate frequency. We could then easily identify the satellite by a signal level building up right around the marker position. The final step is to maximise the signal level, which can be accomplished by slowly moving the antenna until the level right at the marker position does not increase any more.

The moment of truth arrives when the signal scan is launched, and with the KWS VAROS 109 that moment of truth is almost bound to be a moment of success as well!

The LNB we used for our test did not come with a dielectric, so we tried out a few materials to improve reception. The underlying reason is that the NSS-806 transmits its signals with circular polarisation.

Regular readers know that we never run away from experiments and with the fast reaction times of the KWS VAROS 109 we almost wished those experiments would go on forever. The meter could not care less when a signal was temporarily interrupted because we put our hand between LNB and antenna, or when we tried a useless dielectric – as soon as an active signal arrived at the meter's input socket again that signal was locked right away for analysis.

The built-in tuner has excellent reception qualities and was able to also lock very weak signals. We found that the threshold of the KWS VAROS 109 is definitely lower than that of other meters we use, and installers working with tricky signals will attach particular value to that benefit.

Time and again we even went so far as to unplug a cable without turning off the meter, and to plug it in again – regardless of the consequences and causing a number of short circuits along the way. Once again, the KWS VAROS 109 did not take offence and even refrained from giving out warning messages. It just continued its job as soon as a valid signal was available again. One thing is for sure: DXers will definitely appreciate the excellent assistance the KWS VAROS 109 can provide with the correct alignment of large antennas.

And if all of the above still does not leave you yearning for the new KWS handheld meter, there is one more feature that should finally tip the scales: These days an increasing number of cable subscribers want to switch to satellite TV, since in markets like Germany satellite television offers much better free-to-air variety and in general also better video quality. Another aspect that makes the switch worthwhile is that you don't need a subscription and you can reduce your monthly bills – as opposed to cable TV. Yet, all that glitters is not gold and in many buildings it is either not possible or not allowed to replace old cabling and add new cables.

Incidentally, the distribution infrastructure for cable TV follows different rules than for satellite reception, which places much higher demands. It is only since very recently that single-cable solutions for satellite TV have hit the market and gained some prominence. Systems such as SCR and JESS can make use of an existing internal cable

TV distribution system for satellite TV, and more and more owners of detached houses will also realise the advantages of single-cable systems in the long term. In theory it is possible to provide satellite TV to every single room of a home, since with SCR and JESS signals can be carried over a single cable distribution system. SCR allows distribution of signals from two different satellite positions to a total of eight independent outlets, and JESS even has capacity for up to four satellite positions and up to 16 independent outlets. Each outlet (user) is assigned a dedicated frequency which carries the transponder that is required for the selected channels. Special DiSEqC commands are used by the single-cable converter to select the appropriate transponder and send it to the correct outlet using the pre-assigned frequency for that particular outlet. While the whole set-up is not as complicated as it appears at first sight, there still is some installation and programming work to be done for a reliable single-cable solution. A powerful meter is an absolute 'must have' for such jobs, and the price you pay for professional equipment will soon turn out to be money well spent.

The KWS VAROS 109 is one such professional meter, designed for professional installers, and as such it is compatible with SCR and JESS installations. And when we say it is compatible this is only half the truth.

While most professional meters are capable of evaluating an SCR distribution system by presenting the frequency ranges of each user (also called user bands) in the spectrum display, the KWS VAROS 109 goes the extra mile: It can be individually configured for each SCR solution, that is to say the centre frequency to be used for each outlet can be specified and it is even possible to save a number of different SCR/JESS configurations right in the meter. Installers looking after several different systems will save valuable time by not having to enter the same parameters again and again. What's more, the KWS VAROS 109 is able to identify the user bands all by itself by carrying out a short-time scan and determining the centre frequencies created by the converter for each user band.

With JESS distributing up to four satellite positions via up to 16 user bands the converter has to change the required transponder frequency to the centre frequency of each corresponding user band. This in turn means that receivers must send a JESS command to the converter with information about the required transponder frequency and then negotiate the corresponding centre frequency of the user band.

Each new channel selection triggers the entire chain of JESS commands and negotiations, and with up to 16 receivers on a single line data traffic may become so dense that accidents can occur. It is therefore paramount for an SCR or JESS installation to be correctly set up and thoroughly evaluated.

Special antenna sockets are used for SCR and JESS signal distributions that make sure users cannot unwittingly change any settings and interfere with other users. Each of those sockets is programmed by the installer with the centre frequency corresponding to the user in question so that they cannot mess up the SCR or JESS system when they make changes in their receiver's installation menu (LNB settings, etc.).

The KWS VAROS 109 can be used to program the SSD6 series of antenna sockets by Axing, or Jultec's JAP series, which is a unique sell-

ing proposition in the meter market. We don't know of any other meter that can be used for evaluating, programming and documenting SCR and JESS systems the way the KWS VAROS 109 does. KWS has truly gone out of its way to whizz up a meter that meets all requirements, and then some…

And the list goes on: A logging function is extremely important with professional meters. After all, many customers want to see in writing what state their reception system is in and demand a printed log report.

As it is frequently necessary to measure the signal parameters of the same transponder at various antenna outlets throughout a building, a top-notch meter must be able to do such repetitive jobs automatically. How does the KWS VAROS 109 fare in that regard? Well, installers can easily add any transponder to the internal memory of the KWS VAROS 109. The memory can store a total of 99 transponders and the list can be sorted according to frequency, range or satellite if required. In addition, each memory position can be locked so that it cannot be deleted accidentally.

Whenever a series of measurements is to be performed on a reception system the installer only has to call up the data logger, enter the start and end positions in the tuning memory and the KWS VAROS 109 will automatically measure the selected transponder. An XML file is created for each measurement series. The files can then be opened and worked with on any PC using Microsoft Excel or OpenOffice Calc. We believe it's a smart move by KWS to use an open file format for log files as this allows for much more versatile data processing.

Installers dealing mainly with satellite reception now don't have an excuse any longer for not using a professional meter by KWS. The VAROS 109 is a fully-fledged meter, but with a price tag that is as small as its size. If you're an experienced DXer or even a hobby installer without your own business you should also give this new offering by KWS some serious consideration.

Many companies already use KWS meters of the AMA or VAROS ranges, and even they have good reason to equip their installers with the new KWS VAROS 109 handheld meter for their daily routines. Its small dimensions coupled with low weight and long battery life make it an ideal companion for installation jobs.

The meter offers all features and functions required for installation, maintenance and fault clearance and once you start using it you'll never want to give it away again. Not only does it provide measurements with utmost precision, it is also extremely easy and convenient to use.

So can it be true that for once we have nothing to criticise? If you press us really hard, there is actually one issue that we have: The nylon bag and – even more importantly – the hard case don't show a huge KWS logo. This is a shame, since customers won't know right away that their installation job will be performed by a professional with the best equipment available.

Expert Opinion

Vitor Martins Augusto
TELE-audiovision
Test Center
Portugal

\+
- Easy and quick operation
- Light weight
- Great screen, readable even under direct sun light
- Very accurate
- Very responsive
- Pre-programmed transponder list for all relevant satellites

–
- None

TECHNICAL DATA

Manufacturer	KWS-Electronic GmbH, Tattenhausen Sportplatzstrasse 1 83109 Großkarolinenfeld, Germany
Website	www.kws-electronic.de
Email	info@kws-electronic.de
Tel	+49-8067-9037-0
Model	KWS VAROS 109
Function	Handheld Signal Analyzer with Spectrum
Frequency range	910 – 2150 MHz
Modes	DVB-S, DVB-S2
Input	via keyboard
Monitor	5,7" Color-TFT, VGA Resolution
Menue Languages	English, French, German, Italian
HF Input	F-Plug / 75 Ohm (IEC 60169-24)
Input Attenuator	0 – 30 dB in 4 dB increments
Level Measurement	30 – 100 dBµV
Measuring accuracy	±2,0 dB at 20° C ±2,5 dB at 0° C – 40° C
Acoustic level indicator	yes
DVB-S	QPSK-Demodulator (according ETS 300421)
Symbolrates	2 – 45 Msym/s
Measuring parameters	(according ETR 290)
VBER	10-2 bis 10-8 (after Viterbi)
CBER	10-2 bis 10-8 (before Viterbi)
MER	2 – 20 dB resolution 0.1 dB
DVB-S2	QPSK/8PSK-Demodulator (according ETS 302307)
Symbolrates	2 – 45 Msym/s
Measuring parameters	(according ETR 290)
VBER	10-1 bis 10-8 (after LDPC)
CBER	10-2 bis 10-8 (before LDPC)
MER	1 – 20 dB resolution 0.1 dB
Video	MPEG-2 (ISO/IEC 13818-2)
Audio	MPEG-2 (ISO/IEC 13818-3)
Stereo	Dolby Digital AC-3, Dolby Digital Plus,
AAC	MPEG-2 AAC (ISO/IEC 13818-7),
AAC	MPEG-4 AAC (ISO/IEC 14496-3)
CI (Common Interface)	yes
DataLogger	XML on USB stick
Interfaces	DVI, USB-A
Memory	99
Power to LNB	14 V/18 V, < 500 mA (short circuit-proof)
Power Meter	0 – 500 mA at 1 mA
External Power	11 – 15 V DC max. 2,5 A
Battery	Li-Ion-Battery Pack 7,2V / 6,6Ah
Operating Time	approx 3.5 hours, automatic shutdown
EMV	according to EN 61000-6-2 and EN 61000-6-3
Dimensions	W 164 mm, H 266 mm, D 70 mm
Weight	approx 1.3 kg including battery