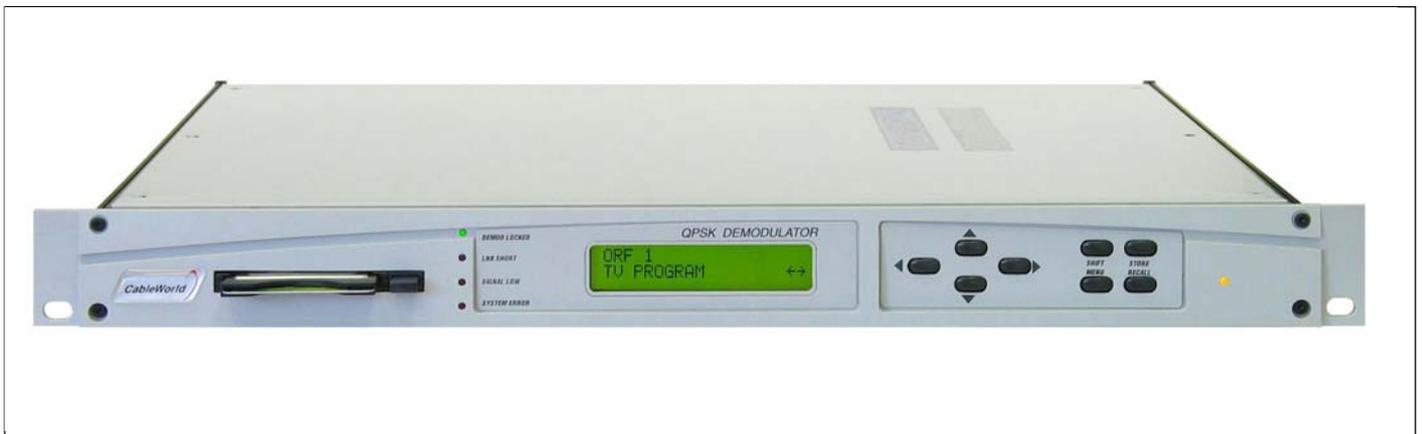


**CW-4142**

# **QPSK DEMODULATOR**

**USER'S MANUAL**



Dear User!

The CW-4142 QPSK DEMODULATOR is a new member of CableWorld's digital satellite receiver family. This instrument provides two more essential features as compared to the earlier ones:

- it can accommodate a Conditional Access Module (CAM), thus provide reception of scrambled programs,
- it is equipped with Asynchron Serial Interface (ASI) which permits the transport stream to be accessed directly.

Prior to take into operation the unit please read through this User's Guide carefully.

## 1. Mechanical construction

The CW-4142 QPSK DEMODULATOR is accommodated in a standard 1 unit high 19" rack frame. The unit is delivered along with the following accessories:

- |               |               |       |
|---------------|---------------|-------|
| 1. Fuse       | T0.4 A (slow) | 1 ea. |
| 2. Power cord |               | 1 ea. |

When mounted in rack cabinet, place the CW-4142 QPSK DEMODULATOR above the relevant TV MODULATOR. These both units together form a channel processing assembly. The channel processing assemblies have to be separated from each other with CW-3004 VENTED COVER PLATES, to provide sufficient ventilation.

## 2. Electrical construction

The CW-4142 QPSK DEMODULATOR equipped with proper CA module and valid SmartCard (subscriber card) demodulates the input QPSK modulated satellite IF signal (920-2150 MHz) and delivers the complete transport stream, which includes those channels having been processed by the Conditional Access Module in descrambled form.

Beyond this, one selected program of the TS (FTA or descrambled) will be MPEG-2 decoded and after digital/analogue conversion is delivered as base band video and sound signal.

The input and output connectors are arranged in the unit's rear panel:

- |                      |   |
|----------------------|---|
| 2 × "F" type sockets | QPSK SAT IF input and loop-through output |
| 1 × BNC socket       | video output                              |
| 1 × BNC socket       | ASI output                                |
| 2 × RCA sockets      | stereo sound channel outputs              |
| 2 × RJ12 sockets     | CW-Bus                                    |

All connections have to be made with high quality, low attenuation cables. Such cables and cable sets are available in CableWorld's product range.

The CW-4142 QPSK DEMODULATOR is composed of following subunits:

- QPSK demodulator and error correction circuitry,
- Common Interface circuitry with standard PCMCIA socket accessible from the front panel,
- MPEG-2 video and audio decoder and
- microprocessor-based control unit.

The instrument incorporates an own switched mode power supply. This power supply is accommodated in the right side of the unit, under a shielding cover and it delivers all necessary supply voltages.

The mains switch and fuse are located on the unit's rear panel. The fuse is accessible after unscrewing the fuse holder.

The switched-on state of the demodulator is indicated by a yellow LED on the front panel.

The required reception parameters can be set with 8 front panel buttons. The operation modes are indicated with LEDs and the actual parameter values in a 2×20 character LCD display, on the front panel. The LCD display is equipped with own back lighting. Without pushing any of the buttons for more than 30 minutes, the back lighting turns down automatically, and turns on again on pushing any of the buttons or inserting or removing the CAM or the SmartCard.

## 3. General information

After switching on the demodulator,

I N I T I A L I Z I N G . . .

appears in the display, followed by

S E L E C T M E N U .

Use the **MENU** button to choose the Normal , or the Extended menu.

As basic setting, the control unit calls the normal menu, which includes only those menu items necessary to set the reception parameters. The extended menu delivers additional information about several internal parameters and permits to set some rarely used functions. The extended menu can be used to locate errors, too.

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## 3.1 Using the push buttons

▲ and ▼

The requested parameter can be selected with the ▲ and ▼ buttons. With these buttons you cycle through the available parameters (menu items).

◀ and ▶, and **SHIFT**

The value of the selected parameter can be increased or decreased with the ◀ and ▶ buttons. If the **SHIFT** button is pressed simultaneously, the rate of the change is higher.

### **MENU**

This button calls the SELECT MENU item, and its second push changes between Extended and Normal menu.

### **STORE**

The changes made to the operating parameters can be stored with pushing this button. On pushing the button, the demodulator writes all parameter values into its non-volatile memory. Therefore the **STORE** button needs to be pushed once only, after having set all parameters. The storing procedure takes approximately 1 second. During this time the display shows SAVI NG. . . .

### **RECALL**

The data stored last can be recalled with the **RECALL** button. On pushing this button, all parameters will be set back to their stored values.

The ← and → characters appearing in the right bottom corner of the display show whether the actual parameter is adjustable and at the same time they also indicate the relevant button for change it. If none of the ← and → characters appears, the value of the selected parameter cannot be changed.

## 3.2 Meaning of the front panel LEDs

### **DEMOD LOCKED**

If this LED lights, the demodulator is receiving the modulated QPSK carrier at proper level and it was able to lock to the carrier. The demodulator can only lock if the receiving frequency and the symbol rate are set to the proper values.

### **LNB SHORT**

This LED flashes if an error occurred in powering the LNB. After the short circuit has been removed, it goes out automatically.

### **SIGNAL LOW**

This LED lights if there is no input signal or the level of the input signal is not sufficient.

### **SYSTEM ERROR**

This LED flashes if an error occurred in the internal microprocessor control of the unit. After termination of the error it goes out automatically.

## 4. Adjustable and query only parameters in the normal menu

### SELECT MENU

Normal usual setting  
Extended the whole set of parameters available

After pushing the **MENU** button, the SELECT MENU item appears. On a further push the Normal menu will be changed to the Extended menu or reversed.

After switching on the demodulator, the log in is the Normal menu. Switching over to the other menu can be made with the ◀ or ▶ button, too.

### LNB LOCAL OSC. FREQ.

Available Lo values:

9.75 GHz  
10.00 GHz  
10.60 GHz

In this menu item the demodulator will be informed about the local oscillator frequency (Lo) of the LNB used with the demodulator. When using universal LNB make sure that the transponder frequency is within the receiving frequency range determined by the setting of the LNB local oscillator frequency. When setting 10.60 GHz, the demodulator automatically outputs a 22 kHz switching signal to switch over the oscillator in universal LNBs.

### RECEIVING FREQUENCY

Receiving frequency ranges:

with Lo set to 9.75 GHz: 10700 ... 11900 MHz  
with Lo set to 10.00 GHz: 10950 ... 12150 MHz  
with Lo set to 10.60 GHz: 11550 ... 12750 MHz

("Lo" is the frequency of the LNB's local oscillator)

To receive a transponder, set the receiving frequency to the transmitting frequency of the transponder. Once the value for Lo has been set in the LNB LOCAL OSC. FREQ. item, it determines the receiving frequency range. (When attempting to set the receiving frequency beyond the upper limit or below the lower limit of the frequency range, the change of the frequency will stop at the limit despite of pushing the frequency increase or frequency decrease button respectively.)

### CARRIER FREQ. DEV.

This parameter gives the difference between the actual and the nominal frequency of the LNB's local oscillator. If the demodulator is locked (the **DEMOD LOCKED** LED is lighting), this frequency difference can be minimized by pushing the ◀ or ▶ button. On this, the (nominal) frequency value set at the RECEIVING FREQUENCY menu item will be corrected for optimal reception.

After each modification of the receiving frequency (e.g. tuning to an other transponder) it is recommended to minimize this frequency difference, which means adjusting the demodulator to the LNB. Later on, it is sufficient to check the frequency difference from time to time and keep it below 1 MHz.

## LNB POWER & POLAR.

Available values:

Off LNB powering switched off  
 Vertical (14 V) vertical polarization  
 Horizontal (18 V) horizontal polarization

The LNB powering is equipped with automatic short circuit protection. In case of short circuit the LNB powering will be switched off for 4.5 seconds then the demodulator attempts to switch on powering for 0.5 seconds. This procedure is followed until the short circuit is removed. The short circuit is signaled by a flashing LED on the front panel.

## SYMBOL RATE

Adjustable range: 2 ... 45 Ms/s

To receive a transponder it is indispensable to set the symbol rate to the right value.

(E.g. the Astra satellites typically use 27.5 Ms/s.)

Display of the program name, e.g.

CNN Int.  
 TV PROGRAM

This menu item shows the name and kind (TV, radio, data) of the program stored last.

In this menu item, the SEARCH FOR CHANNELS menu is entered by pushing the ◀ or ▶ button. The search can be started with the **SHIFT** button. For a search the reception parameters (frequency, polarization and symbol rate) must have already been set. According to the number of programs available, the search procedure can even last 30 sec. During this time SEARCHING FOR CHANNELS. . . is displayed, and the change in the number of dots is indicating the search being in progress.

After an unsuccessful search (e.g. without input signal) the unit returns to the name (and PID values) of the program stored last.

After a successful search the display automatically shows the name and kind of the program found first. The ◀ and ▶ buttons permit to step through the programs found, which unless scrambled and the CA modul in the PCMCIA socket with the SmartCard cannot descramble them, appear on the screen. For radio programs, colour bars can be displayed on the screen, if the menu item COLOUR BAR is switched to On. The data of the selected program can be stored with the **STORE** button. After store, new programs can only be reached through a new search (with pushing ◀ or

▶, then the **SHIFT** button). If the unit cannot interpret the name of the program, UNKNOWN will be displayed along with a serial number, which indicates the program's position in the packet, and only serves the distinction for the case of more than one UNKNOWN program.

Most CA modules can descramble one program only at the same time. In such case, on pushing the **STORE** button, the module goes to the position of descrambling the program selected to the display.

However CA modules of later design are able to descramble more than one program at the same time.

The **CW-4142 QPSK DEMODULATOR** supports this facility. In this case, after the search procedure, the programs to be descrambled simultaneously can be selected with the **SHIFT** button.

Here, the selected program is denoted with a < mark in the second row of the display after the TV PROGRAM or RADIO PROGRAM information.

The selection can be cancelled by pushing the **SHIFT** button once again. For simultaneous descrambling up to 16 elementary streams can be selected, after which on pushing the **SHIFT** button no more selection occurs and the < mark does not appear again.

The 16 elementary streams can cover e.g. 4 services including one video, two audio and one teletext stream each.

**Note:** Since the unit is equipped with one MPEG-2 decoder, it can deliver the analogue base band video and sound of one digital service only. This is always the service selected **last!**

However, in the transport stream at the ASI output all digital programs, among them the descrambled ones are available, and can be lead to remultiplexers and/or further MPEG-2 decoders.

If after having made selection for descrambling, the **STORE** button is pushed with a not selected program in the display, the unit stores the selected programs and goes back the program selected last.

If the module is able to descramble one service only, the **QPSK DEMODULATOR** sends to the module the data of all services selected to descrambling, and always the service selected last will be descrambled. The sequence of the data of services sent to the module is identical with the sequence of selecting the services.

With modules capable of multiprogram descrambling any of the selected services can be appointed to be MPEG2 decoded and displayed on a video monitor.

With modules capable to descramble one service only, take care of the service sent to the MPEG2 decoder, because on receiving a non-descrambled service the MPEG2 decoder outputs neither picture nor sound.

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Therefore with such modules, when pushing **STORE**, one service should be selected only, or the display should read the name of the service, which is descrambled.

## SELECT AUDIO

This menu item permits selecting the desired sound channel when receiving programs with more than one audio channel (e.g. multilingual transmissions). The availability of more than one sound channel is indicated by the ← → mark.

The desired sound channel is then selected with ◀ and ▶, and can be stored with the **STORE** button. After store, the PID of the selected sound channel is displayed and there is no more possibility to select, what is indicated by the disappearance of the ← → mark.

## AUDIO LEVEL

Adjustable range: 0 ... 13

With the **AUDIO LEVEL** parameter the amplitude of the output audio signal (L, R) can be adjusted. The audio amplitude is increasing with the scale numbers. At the value of 0 the audio signal is switched off. Factory setting is 7, which corresponds to a medium volume.

## DECRYPTED PROGRAMS

In this menu item the list of the programs having been selected to descrambling is shown. The ◀ and ▶ buttons permit stepping forward and backward in the list. The ← and → characters in the display show the direction in which further list elements can be found.

## 5. Adjustable and query only parameters in the extended menu

In the extended menu some further menu items appear among the items of the normal menu:

*Factory settings:*

In this menu item, by pushing the **RECALL** button, the factory settings can be retrieved, which are following: ASTRA 19.2°, 11778 MHz, vertical polarization, 27.5 Ms/s, CNN International.

*Satellite parameters:*

SNR: 5 ... 20 dB

(Signal to noise ratio)

VCR: 1/2, 2/3, 3/4, 5/6, 7/8

(Internal error correction code ratio)

CORR. RS. ERR: 0 ... 65535

(Number of the correctable RS errors)

The above parameters provide the user with following information:

- With no input satellite signal the SNR value is less than 5 dB. For a reliable reception approximately 10 dB should be assured. (Use an antenna of adequate size!)

- The VCR parameter shows the value peculiar to the internal (Viterbi) error correction coding of the transport stream. The unit automatically searches this parameter; it cannot be set manually.

- The CORR. RS. ERR parameter shows the total number of the *Reed-Solomon* errors in the packets having occurred since the appearance of the **DEMOD LOCKED** state. The correctable errors do not cause visible deterioration of the picture. This parameter shows the reception quality in an indirect way. In case of reliable reception (with proper input level even at adverse weather conditions) the correctable RS errors are stable at zero.

The displayed value can be reset with pushing the ◀ or ▶ button.

## VIDEO PID NUMBER

This menu item indicates the video packet identifier of the selected program. This PID enables the demodulator to extract the concerning video signal packets from the transport stream.

The Video PID is searched and set automatically and cannot be set manually.

## PCR PID NUMBER

The PCR (Program Clock Reference) PID indicates the clock reference of the received program. These packets serve for the synchronisation of the demodulator's clock generator. The value of the PCR PID often is identical with that of the Video PID.

The PCR PID is searched and set automatically and cannot be set manually.

## TELETEXT PID NUMBER

In this menu item the identifier of the teletext packets belonging to the received program is indicated.

The Teletext PID is searched and set automatically and cannot be set manually.

## AUDIO PID NUMBER

In this menu item the PID of the sound track of the received TV program or of an independent radio program is displayed. This PID enables the demodulator to extract the concerning sound packets.

The Audio PID is searched and set automatically and cannot be set manually.

## AUDIO MODE

This menu item indicates the mode of the received audio channel: mono, stereo, dual etc., and cannot be set.

*Audio parameters:*

AU. SMPL. FR. : 0 ... 48000 Hz  
(Audio sampling frequency)

AU. BIT RATE: 0 ... 448 Kb/s  
(Audio bit rate).

All the above parameters give information about the internal parameters of the demodulator and the received program. These parameters are not adjustable.

## COLOUR BAR

Off

On

With the colour bars switched to On, when receiving radio programs the demodulator delivers standard vertical colour bars with 75 % saturation for measurement purposes.

### Version numbers:

FWS	(Firmware System)
FWA	(Firmware Audio)
DEV	(MPEG Decoder Chip Version)
SW	(Software Version)

The above parameters serve for information purposes only.

### Error codes:

ERROR CODE: 0 ... 255 XXXXXXXX

The error codes indicate the internal error states of the receiver, for use at repair. The error code can be reset with the ◀ or ▶ button. On resetting, the **SYSTEM ERROR** LED ceases flashing. Should the demodulator continue defective operation, restart it with switching off and on. If an error occurs during initialization, the control circuitry inhibits the operation.

## 6. Service menu

The Service menu can be selected in the SELECT MENU item by pushing the ▶ button twice. Here, the bus address of the unit can be set, that is important when establishing remote control from the PC through bus.

Further the type number, serial number and software version of the unit can be checked.

## 7. Important information

The **CW-4142 QPSK DEMODULATOR** continuously monitors in the input stream the Program Map Table (PMT), which describes the program content of the stream. In the case of any change in the stream (e.g. PID change), the unit performs the corresponding modifications in the settings of the CA module and the MPEG-2 decoder.

This permits the demodulator to automatically follow possible changes in the transmitter side (e.g. regional switch-overs etc.)

The operating software of the **CW-4142 QPSK DEMODULATOR** recognizes and supports the CA modules belonging to the most frequently used scrambling systems (CryptoWorks, Viaccess, Irdeto, Nagravision etc.). In case of any problem with recognizing some module type or module

make please contact our customer service. If the SmartCard is removed from the CA module, the module sends a type depending error message,, which overrides the display for 5-6 seconds then the original display returns.

This sequence repeats in about every 5 seconds. After the card is inserted again, the error message leaves off. The error message can also include messages for set top boxes with IR remote control e.g. SMART CARD ERROR, PRESS OK. These messages should be disregarded. If after having set it, the CA module does not descramble for some reason, remove the card from the module and insert it again.

The recommended sequence for setting the **CW-4142 QPSK DEMODULATOR**:

1. Set the reception parameters: LNB Lo frequency, reception frequency, LNB powering and polarization, symbol rate.

If everything was made correctly, the **DEMOD LOCKED** LED lights.

2. Minimize the frequency error in the CARRIER FREQ. ERROR menu item.
3. Go to the program name display menu item and start search as described there. As the unit has found the first program of the packet, insert the concerning CA module with the card in it. In a few seconds the descrambled picture appears on the screen.
4. Now step the programs round, check them on the screen, and select with the **SHIFT** button those you want to have descrambled. Mind the described limit of descrambled streams. When only one program has to be descrambled selecting is not needed. Selecting non-scrambled (FTA) programs is not permitted by the software.

Save the settings with pushing the **STORE** button.

Further, prior to starting a new channel search or prior to changing transponder, always remove the module from the unit first.

*Dear User!*

*Setting the parameters of the CW-4142 QPSK DEMODULATOR needs care and accuracy. In case of incorrect setting the reception of the requested program will fail. Should you face any problem after reading this guide please contact our customer service.*

# CW-4142 QPSK DEMODULATOR

## Technical data

<b>TV System</b>	DVB-S / MPEG2
<b>Input data</b>	
Input signal	950 to 2150 MHz
Input level	-65 to -25 dBm
IF bandwidth	36 MHz
Input impedance	75 Ω
<b>Transmission characteristics</b>	
Modulation type	QPSK SCPC / MCPC
Symbol rate	3 to 30 Msps
FEC	DVB compatible
LNB powering	14 / 18 V (short circuit protected)
LNB oscillator switching	0 / 22 kHz
Video decoding	MPEG2 MP@ML
Video rate	1.5 to 15 Mbps
Aspect ratio	4 : 3 and 16 : 9
Maximum resolution	720 × 576
Audio system	MPEG1 MUSICAM (layer1 / 2)
Sampling frequencies	32, 44.1, 48 kHz
Teletext signals	inserted into the vertical blanking intervals according to standard ITU-R653-1 System B
Common Interface	acc. to EN 502221/1997
<b>Output data</b>	
<i>Video output</i>	
Colour system	PAL / SECAM
Output impedance	75 Ω
Output amplitude	1 Vpp

<i>Sound output</i>	
Nominal output level	approx. 0 dBm scale number ~10, depending on the transmission
Adjustable range	scale number 1 to 13 approx. -24...+10 dBm 0 (Muting)
<i>ASI output</i>	ISO/IEC 13818-1 TM 1449 Rev.1
Output data rate	270 MBaud
Output level	typ. 800 mVpp
<b>General data</b>	
Mass	approx. 3.5 kg
Physical dimensions	19" × 1HU
Width	483.0 mm
Height	43.6 mm
Depth	473.0 mm
Service period	continuous
Power requirement	230 V +10 ... -15 % 50 / 60 Hz
Power consumption	max. 50 VA
Operational temperature range	
- to fulfil the specifications	+10 ... +35°C
- to maintain operation	0 ... +40°C
- relative humidity	80 %
Storage temperature range	- 25 ... +45°C
- relative humidity	95 % non condensing

