Assembly Instructions

English

Grundig SAT Systems

PROFESSIONAL

4 x HDTV Digital COFDM

PADT 6400

KLASSE A CLASS

CE

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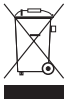
Contents

1 Safety regulations and notes

- Assembly, installation and servicing should be carried out by authorised electricians.
- Switch off the operating voltage of the system before beginning with assembly or service work or pull out the mains plug.
- Do not perform installation and service work during thunderstorms.
- Install the system so it will not be able to vibrate…
  - in a dust-free, dry environment
  - in such a manner that it is protected from moisture, fumes, splashing water and dampness
  - somewhere protected from direct sunlight
  - not within the immediate vicinity of heat sources
  - in an ambient temperature of 0 °C to +50 °C. In case of the formation of condensation wait until the system is completely dried.
- Ensure that the head-end station is adequately ventilated. Do not cover the ventilation slots.
- Beware of short circuits
- No liability is accepted for any damage caused by faulty connections or inappropriate handling.
- Observe the relevant standards, regulations and guidelines on the installation and operation of antenna systems.
- The standards EN/DIN EN 50083 resp. IEC/EN/DIN EN 60728 must be observed.
- **For further information please read the assembly instructions for the head-end station used.**
- **Test the software versions of the head-end station and the cassette and update them if necessary. The current software versions can be found at "www.gss.de/en".**

Take action to prevent static discharge when working on the device!



Electronic devices should never be disposed of in the household rubbish. In accordance with directive 2002/96/EC of the European Parliament and the European Council from January 27, 2003 which addresses old electronic and electrical devices, such devices must be disposed of at a designated collection facility. At the end of its service life, please take your device to one of these public collection facilities for proper disposal.

2 General information

2.1 Packing contents

1 Cassette PADT 6400
2 RF cables
1 Brief assembly instructions
1 Measuring log

2.2 Meaning of the symbols used

Important note

—> General note

• Performing works

2.3 Technical data

The devices meet the following EU directives:
2011/65/EU, 2006/95/EC, 2004/108/EC
The product fulfils the guidelines and standards for CE labelling (page 45).

Unless otherwise noted all values are specified as "typical".

RF input

Frequency range: ..... 910 ... 2150 MHz
Level range: ..... 60 dBµV ... 80 dBµV
DVB-S modes: ..... QPSK $^{1}/_{2}$, $^{2}/_{3}$, $^{3}/_{4}$, $^{5}/_{6}$, $^{7}/_{8}$
DVB-S2 modes: .....QPSK $^{1}/_{2}$, $^{3}/_{5}$, $^{2}/_{3}$, $^{3}/_{4}$, $^{4}/_{5}$, $^{5}/_{6}$, $^{8}/_{9}$, $^{9}/_{10}$
8PSK $^{3}/_{5}$, $^{2}/_{3}$, $^{3}/_{4}$, $^{5}/_{6}$, $^{8}/_{9}$, $^{9}/_{10}$
16APSK $^{2}/_{3}$, $^{3}/_{4}$, $^{4}/_{5}$, $^{5}/_{6}$, $^{8}/_{9}$, $^{9}/_{10}$
32APSK $^{3}/_{4}$, $^{4}/_{5}$, $^{5}/_{6}$, $^{8}/_{9}$, $^{9}/_{10}$
Symbol rate DVB-S:..... QPSK: 1 ... 45 MSymb/s
Symbol rate DVB-S2:..... QPSK: 4.5 ... 45 MSymb/s
8PSK: 4.5 ... 45 MSymb/s
16APSK: 4,5 ... 39 MSymb/s
32APSK: 4,5 ... 32 MSymb/s

ASI input

Standard: .....DIN EN 50083-9
Format: .....MPEG ISO IEC 13818-1

Maximum data rate: ..... 108 Mbit/s
Level (input / output): ..... 800 mVPP ± 10%
Return loss (input):.....> 17 dB (5 ... 270 MHz)

COFDM modulator

Signal processing: ..... DIN EN 300744
Transmission modes: 2k
Types of modulation: ..... QPSK, 16 QAM, 64 QAM
Code rates:..... $^{1}/_{2}$, $^{2}/_{3}$, $^{3}/_{4}$, $^{5}/_{6}$, $^{7}/_{8}$
Guard intervals: ..... $^{1}/_{4}$, $^{1}/_{8}$, $^{1}/_{16}$, $^{1}/_{32}$

RF output

Frequency range: ..... 42.0 MHz ... 860.0 MHz
Channels: .....C5 ... C12, C21 ... C69
Output level: ..... 83 dBµV
Output impedance: .....75 Ω

Connections

SAT inputs:.....2 F sockets
ASI input: .....1 BNC socket
RF output: .....1 IEC socket
Connection strip (10-pin): .....for supply voltages and control circuits
RS-232 socket: ..... serial interface for software update
Common Interface: .....2 (several channels can be descrambled).

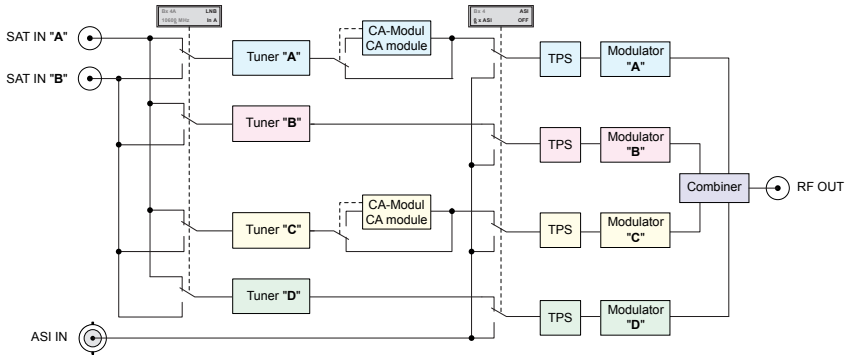
Remote maintenance

Remotely controllable (via PSW 1000*): .....yes
Remote update (via BEflash*): .....yes
(* and a corresponding management unit)

2.4 Description

The quad transmodulator cassette converts all stations modulated according to DVB-S / DVB-S2 standard (also 16/2 APSK) into four COFDM modulated signals according to DIN EN 300744 for feeding into a cable network. The cassette has two digital SAT IF inputs and one RF output.

Block diagram



General

The cassette is equipped with four channel strips ("**A**" ... "**D**"). The channel strips consist of the digital tuners, the digital signal preparation units and the output converter. The channel strips are indicated in the head-end station display with "**Bx ...A**" ... "**Bx ...D**". Using adequate CA modules scrambled channels can be descrambled via tuner "**A**" and "**C**".
As signal source of the channel strips, tuners or the ASI input can be selected according to the table below:

		Line A	Line B	Line C	Line D	CA
0xASI	**OFF**	Tuner A	Tuner B	Tuner C	Tuner D	2
1xASI	**D**	Tuner A	Tuner B	Tuner C	ASI	2
2xASI	**B/D**	Tuner A	ASI	Tuner C	ASI	2
2xASI	**C/D**	Tuner A	Tuner B	ASI	ASI	1
3xASI	**B/C/D**	Tuner A	ASI	ASI	ASI	1
4xASI	**A/B/C/D**	ASI	ASI	ASI	ASI	0

The control of the cassette takes place via the control unit of the head-end station. Four LEDs provide an indication of the SAT IF input signal quality based on their colour and indicate if the respective channel strip is switched on (LED illuminates) or off.
The integrated TPS module (Transport Stream Processing) processes the data of the transport streams.
Channel as well as frequency setting is possible for modulators "**A**" and "**C**". The modulators "**B**" and "**D**" work at the adjacent channels of modulators"**A**" and "**C**". Herein only frequency setting (frequency spacing of channel strips "A <–> B" and "C <–> D") is possible to reduce the bandwidth at signals of low data rates.

The COFDM modulated RF output signals are sent through the RF output of the cassette to the output collector. The common output level of the channel strips can be set at the output collector.
When the head-end station is switched on, the two-line LC display shows the software version of the control unit. To operate this cassette the software version of the control unit must be "**V 45**" or higher. You can find the current operating software for the control unit and the cassette, the software "**BE-Flash**" and the current assembly instructions on the website "***www.gss.de/en***".

The cassette is intended for use in the PROFI-LINE head-end stations.

⚠ **In stations with more than eight slots, a maximum of 10 cassettes may be operated, to prevent overloading the power supply and overheating the head-end station.**
All other slots must remain free!

2.5 Software query

Control unit
If necessary, you can activate the indication of the software version of the control unit manually:

- Press any two keys on the control unit of the head-end station simultaneously until the display goes dark and the software version, e.g. "**V 45**" appears.

Cassette
The software version of the cassette is shown in the display after activating the cassette (see page 19).

2.6 How the TPS module works

After decoding the input signals, the demodulated data streams can be accessed via the integrated TPS module. These data streams, also called transport streams, contain several stations with all their components (video, audio, data and service information), which can be changed using the TPS module.

Station filter

Individual stations can be deleted. This reduces the data rate and, consequently, the output data rate.

Changing the Transport stream and ORGNET-ID

The transport stream ID can be changed. If the stations of a transponder are split into the transport streams of different channel strips, a new identification must be allocated to the "new" transport streams to realise the channel search of the settop boxes connected without mistakes.
If the ORGNET-ID is changed a new NIT must be generated.

Changing the NIT

The transport stream contains data in the form of tables which the receivers evaluate and require for convenient use. The TPS module can adjust the "Network Information Table" (NIT) to accommodate the new station data. The "NIT" contains data which is required by the set-top boxes connected to the cable network for the automatic search feature.

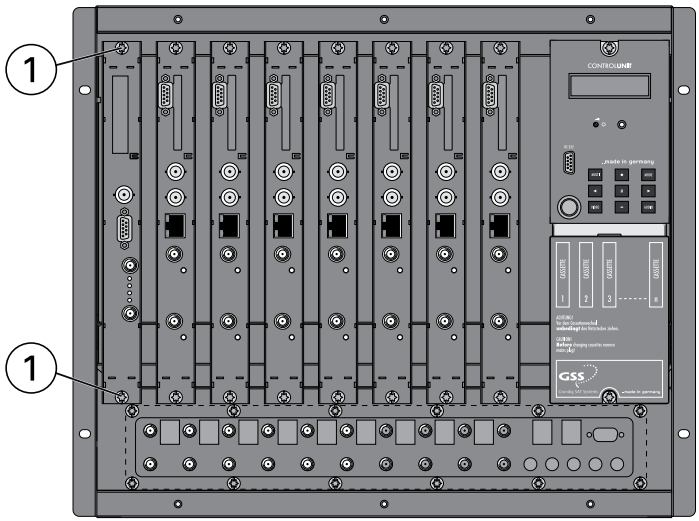
3 Assembly

In stations with more than eight slots, a maximum of 10 cassettes may be operated, to prevent overloading the power supply and overheating the head-end station.
All other slots must remain free!

3.1 Installing the cassette

– Ensure the head-end station is mounted so it will not be able to vibrate. Avoid, for example, mounting the head-end station onto a lift shaft or any other wall or floor construction that vibrates in a similar way.
– Before installing or changing a cassette unplug the power cable from the mains power socket.

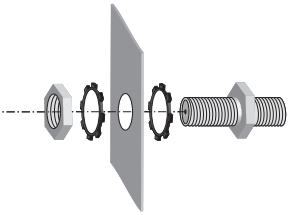
- Remove the fastening screws (1) of an unoccupied slot from the bracket of the head-end station.
- Insert the cassette in this slot and push it into the housing.
- Align the cassette and apply slight pressure to connect it to the connections of the board and the RF bus bar.
- Fasten the cassette with the screws (1).



3.2 EMC REGULATIONS

To comply with the current EMC regulations, it is necessary to connect the lines leading in and out of the head-end station using cable terminals.
When mounting the cassette in a head-end station which is installed in a 19" cabinet, make sure the connections leading in and out for the 19" cabinet are made using cable terminals.

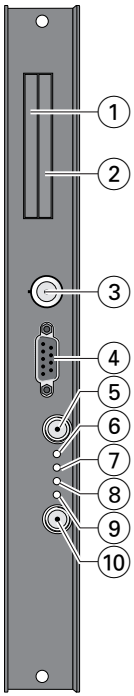
The attenuation of shielding of the connection lines for ASI and antenna must meet the requirements for "Class A".



- Insert the required number of cable terminals in the openings provided in the head-end station or in the 19" cabinet.

Tighten the nuts on the cable terminals until the teeth on the lock washer have penetrated the exterior coating and a good connection is made between the housing and cable terminals.

3.3 Cassette overview



① Slot for CA module of "tuner A"
② Slot for CA module of "tuner C"
③ ASI input
④ D-SUB socket "RS 232"
⑤ SAT input "A"
⑥ Status LED of channel strip "A"
⑦ Status LED of channel strip "B"
⑧ Status LED of channel strip "C"
⑨ Status LED of channel strip "D"
⑩ SAT input "B"

The operating software of the cassette can be updated via the 9-pin D-SUB socket "RS 232" using a PC or notebook and the software "BE-Flash". You can find the current operating software on the website "www.gss.de/en".

3.4 Connecting the cassette

- Connect "SAT input A" ⑤ and "SAT input B" ⑩ to the respective outputs of the SAT IF input distributors.

—> Avoid wide differences in level at the inputs!

- If required connect the ASI input ③ to the ASI output of a corresponding signal source.
- Connect the head-end station to the mains power supply.

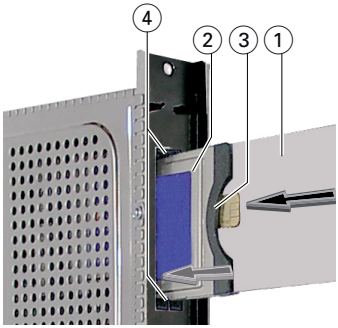
3.5 Retrofitting a CA module

The cassette is equipped with two common interfaces. This allows you to connect two CA modules for various scrambling systems and service providers. Scrambled channels can only be descrambled with a CA module suitable for the scrambling system and the corresponding smart card. The smart card contains all the information for authorisation, descrambling and subscription.

Caution

– Check with the distributor or manufacturer of the CA modules to be used to ensure that they are suitable for descrambling several channels.
– The hardware and software of this cassette have been thoroughly prepared and tested.
– Any changes made by programme provider to the structures in the programme data might impair or even prevent this function.
– When working with the CA modules, please read the corresponding operating manuals from the respective providers.

- Insert the smart cards into the CA modules so that the chip (3) on the smart card (1) faces the thicker side (top) of the CA module (2).
- Insert the CA modules into the slots (4) with the top sides of the CA modules in left direction.
- Push the CA modules without canting into the guide rails of the CA slots (4) and contact them to the common interfaces.



—> If the module is inserted in the head-end station, the left common interface is assigned to tuner A, the right one to tuner C.

4 The control panel at a glance

4.1 Menu items

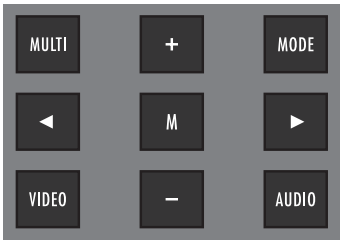
Programme the cassette using the buttons on the control unit of the head-end station. The two-line display of the control unit then shows the menus.
The parameters and functions to be set are underlined.
Use the **MODE** key to select the following menu items:

- Output signal settings:
  Modulator on/off, level
  Output channel (modulators A and C)
  Output frequency (modulators A…D)
  Transmission parameters
  Substitute signal
- ASI input
- Input signal settings:
  LNB oscillator frequency
  Input symbol rate
  Input frequency
  Station filter
  CA module
  Economize descrambling capacity
- Options:
  Transport stream and ORGNET-ID
  BAT, STD-other
  Deleting a PID
  Renaming a PID
- Data rate
- Network Information Table (NIT)
- Factory reset

4.2 Control panel

The key pad on the head-end station is used to scroll through the menus step-by-step:

MODE scrolls forward through the menus.
◄/► select parameters in the menus.
+/- set values, initiate actions.
MULTI selects sub-menus.
AUDIO scrolls backward through the menus.
M saves all entries.



5 Programming

5.1 Preparation

- Test the software versions of the head-end station and the cassette and update them if necessary.
  The current software versions can be found on the website "**www.gss.de/en**".

5.2 Notes on Programming

Level setting

In order to prevent interference within the head-end station and the cable system, the output level of the cassette must be decreased by 4 dB compared to an analogous level.

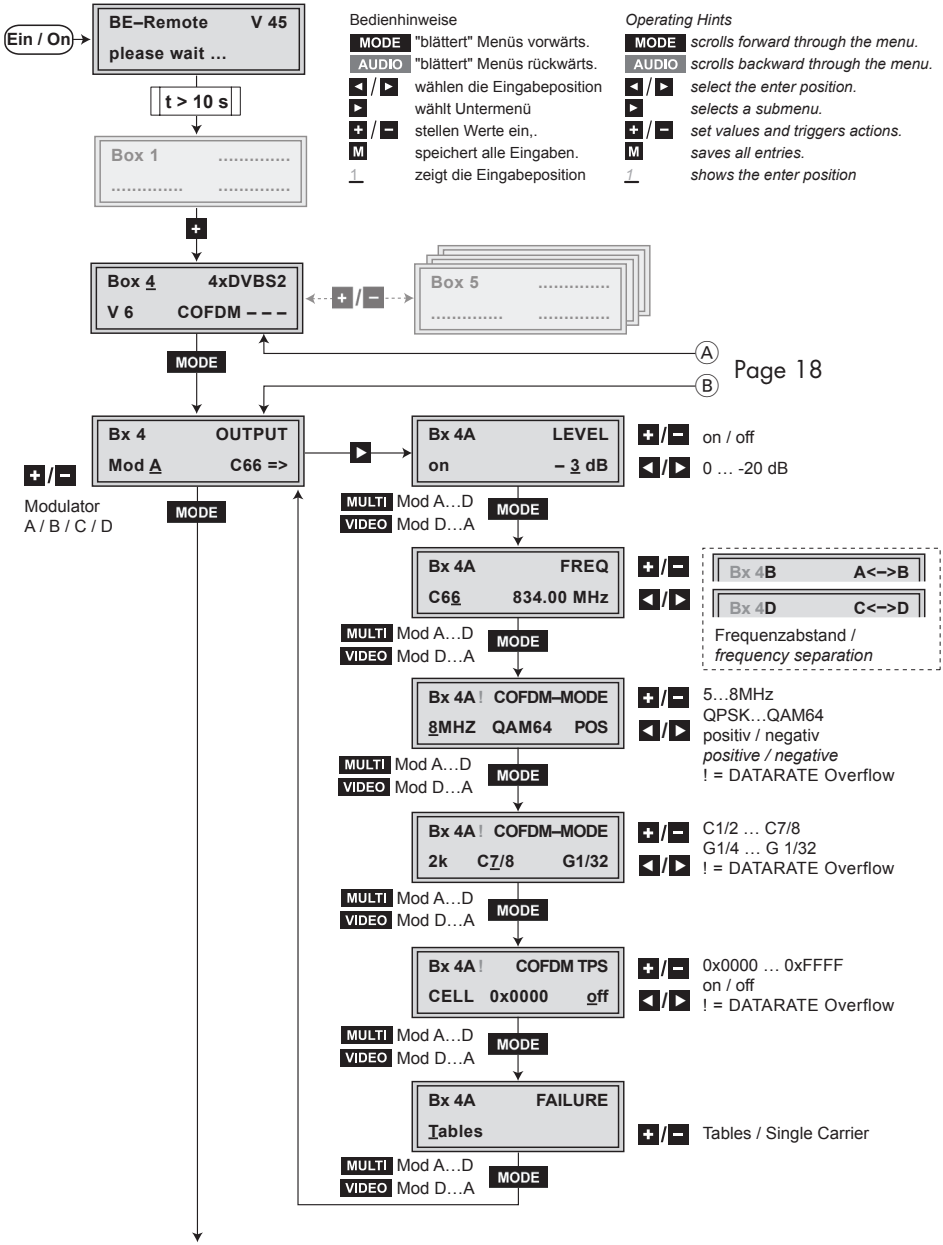
- Connect the test receiver to the RF output or the test output of the head-end station.
- Set the output channel / output frequency of the cassette (page 20) and adjust the TV test receiver to this channel / frequency.
- Switch on the channel strip (modulator) if necessary (page 20). For each channel strip, there is a status LED which indicates if the channel strip is switched on (⑥…⑨ page 12).
- Balance the output levels of the channel strips if the difference in level is ≥ 1 dB (page 20).
- Measure the output levels of the other cassettes and tune them to a uniform output level using the appropriate level controls or software dependent on the head-end station used. Please regard the assembly instructions of the respective head-end station.

—> Avoid wide differences in level at the inputs!

Generating the NIT via the control unit

If you generate a new NIT via the control unit at mixed equipping with double and quad cassettes, the NIT must be mandatory generated via the menu of a quad cassette, in order to capture all transponders!

—> You have nothing to consider if you create the NIT via the PSW 1000.

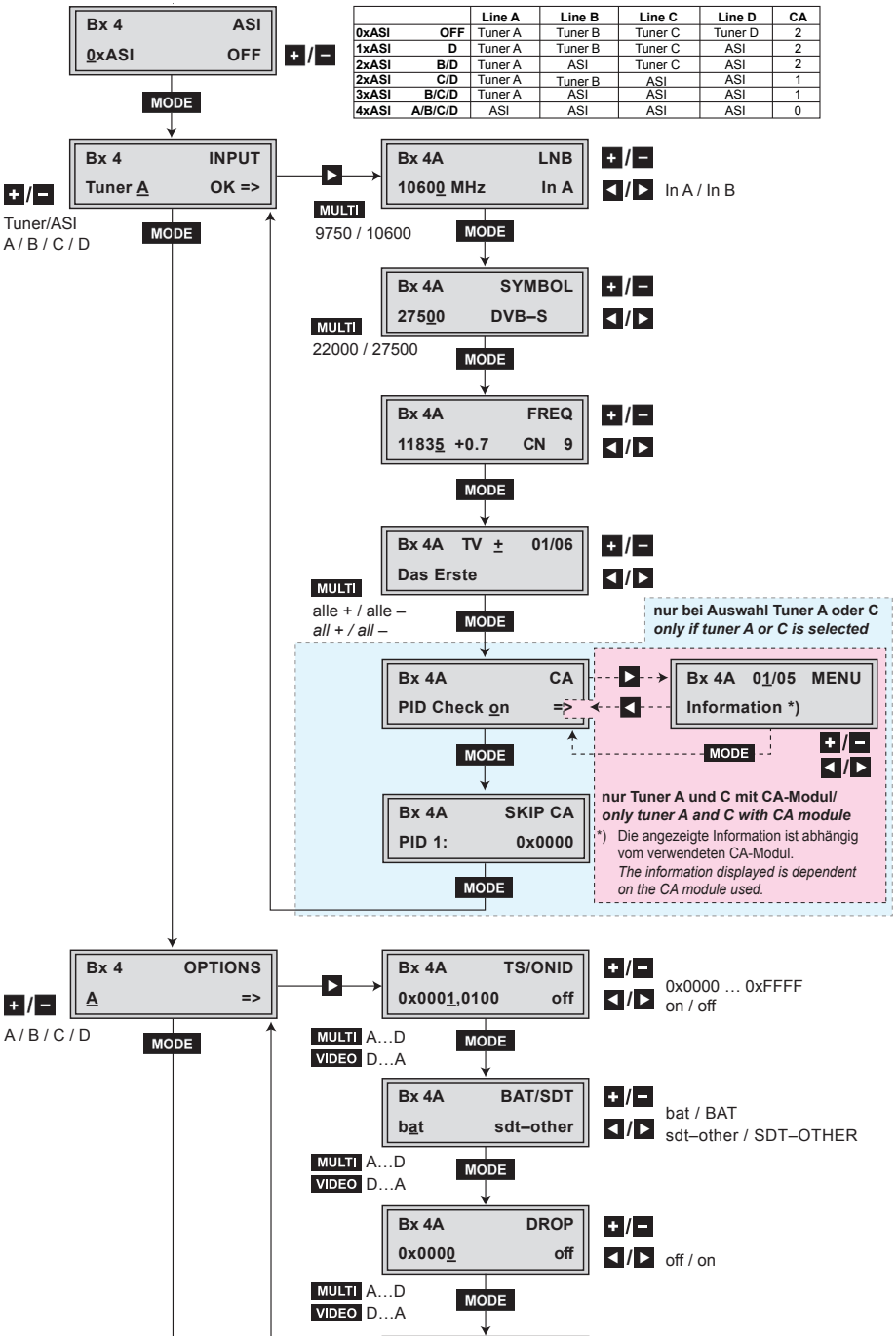


Bedienhinweise

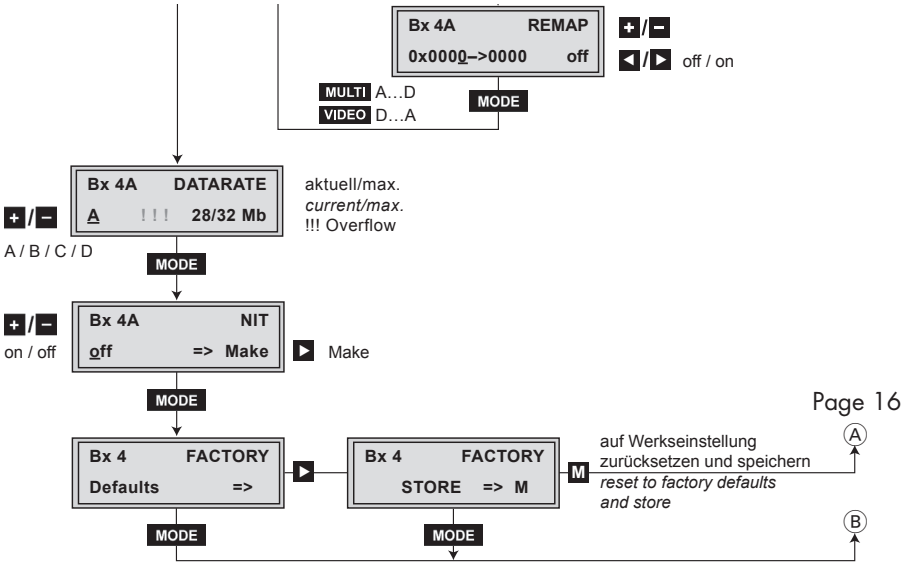
MODE	"blättert" Menüs vorwärts.
AUDIO	"blättert" Menüs rückwärts.
◀ / ▶	wählen die Eingabeposition
▶	wählt Untermenü
+ / –	stellen Werte ein,.
M	speichert alle Eingaben.
1	zeigt die Eingabeposition

Operating Hints

MODE	*scrolls forward through the menu.*
AUDIO	*scrolls backward through the menu.*
◀ / ▶	*select the enter position.*
▶	*selects a submenu.*
+ / –	*set values and triggers actions.*
M	*saves all entries.*
1	*shows the enter position*



		Line A	Line B	Line C	Line D	CA
0xASI	OFF	Tuner A	Tuner B	Tuner C	Tuner D	2
1xASI	D	Tuner A	Tuner B	Tuner C	ASI	2
2xASI	B/D	Tuner A	ASI	Tuner C	ASI	2
2xASI	C/D	Tuner A	Tuner B	ASI	ASI	1
3xASI	B/C/D	Tuner A	ASI	ASI	ASI	1
4xASI	A/B/C/D	ASI	ASI	ASI	ASI	0



5.4 Programming the cassette

—> Pressing the **MODE** button for longer than 2 seconds cancels the programming procedure. This takes you back to the programme item "Selecting the cassette" from any menu. Any entries that have not been saved are reset to the previous settings.

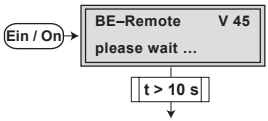
—> Entries in the menus can be saved by pressing the **M** key. You are taken back to the "Selecting the cassette" menu item.

—> The cursor position for settings is shown by "_".

- Switch on the head-end station

—> The display shows the software version (e.g. V45) of the control unit.

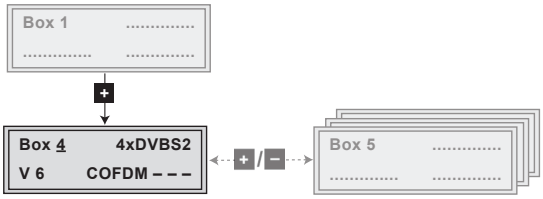
—> The processor reads the cassettes' data (approximately 10 seconds).



- Press the **MODE** button.

—> The "Selecting the cassette" – "**Box x …**" menu is activated.

SELECTING THE CASSETTE



- Select the cassette you want to programme (e.g. **Box 4**) by repeatedly pressing the button **+** if necessary.

—> The display shows e.g. the menu : **Box 4** **4xDVBS2**
V 6 **COFDM**

"**Box 4**"	stands for slot 4
"**4xDVBS2 COFDM**"	Type of cassette
"**V 6**"	Software version of the cassette

- Press the **MODE** button.

—> The "Output settings" – "**OUTPUT**" main menu is activated.

OUTPUT SETTINGS

In this menu you select the modulator for which you would like to do the output settings in the related submenus.

—> In order to skip the "Output settings", press button **MODE**.
—> For example an indicated "C66" shows the current channel set. If "C – –" is displayed a frequency which does not correspond to the channel-/frequency grid was set.
—> It is possible to rotate through the submenus of all modulators using the buttons **MULTI** (ascending) and **VIDEO** (descending).

- Using buttons **+**/**-** select the desired modulator.
- Press the **►** button.

—> The "Modulator on/off, Level" – "**LEVEL**" submenu is activated.

Modulator on/off, Level

This menu item is used to set the output levels of the four modulators to the same value and to switch the modulators on or off.

- Measure and note down the output level of each modulator.

—> In order to adjust the output levels to the output levels of the other cassettes please pay attention to chapter "Final procedures" (page 43).

- Using the buttons **MULTI** (ascending) or **VIDEO** (descending) activate the "**LEVEL**" menus of all the modulators with higher output levels.
- By pressing **+**/**-** adjust the higher output levels to the output level of the modulator with the lowest output level incrementally.
- Use the **◄** button to place the cursor under "on" resp. "off".
- Use the **+**/**-** buttons to switch each modulator on or off.
- Press the **MODE** button.

—> The "Channel / Frequency" – "**FREQ**" submenu is activated.

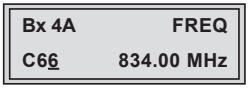
Channel / Frequency

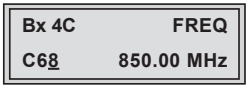
In this menu you can adjust the output channel (only at modulator A and C) or the output frequency of the respective modulator.

—> The COFDM signal is normally transmitted with a bandwidth of 8 MHz. This means that you can only use the channel centre frequency of the existing channel grid in the range of channels C21…C69 (frequency grid 8 MHz). The CCIR channel grid is 7 MHz in the range of the lower frequency bands (channels C5 … C12). If 8 MHz COFDM signal packages are transmitted in these channel ranges, this will result in interference (overlapping) and transmission problems.

For programming in these channel ranges and in the frequency ranges below them, we recommend starting with frequency 306 MHz going back in steps of 8 MHz (see frequency table on page 44). Please note thereby that many receivers cannot receive the channel ranges S21 ... S41 (306 ... 466 MHz).

Channel setting (only modulators "A" and "C"):



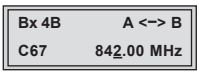


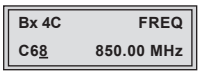
—> **The channel setting is only possible at modulators "A" and "C".**

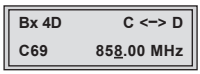
- Use buttons ◄/► to select the cursor position for channel setting.
- Use buttons +/- to adjust the desired channel.

—> The modulators "B" and "D" by default are fixed to a spacing of + 8 MHz to the modulators "A" and "C". Only this spacing to the modulators "A" and "C" can be set via the frequency setting.

Frequency setting (modulators "A" ... "D"):







—> For modulators "A" and "C" any frequency (42,0 MHz ... 860,0 MHz) can be set via the frequency setting.
For modulators "B" and "D" only this spacing to the the modulators "A" and "C" can be set via the frequency setting.

- Use buttons ◄/► to select the cursor position for frequency setting.
- Use buttons +/- to adjust the desired frequency.

- Press the **MODE** button.

—> The "Output signal" – "**COFDM-MODE**" submenu is activated. Please take note of the tables below before setting the COFDM parameters.

COFDM PARAMETERS

The tables below show the dependence of the transmittable net data rate on the settings of the COFDM parameters.
The conversion of the net data rate into the gross data rate displayed in the "Output data rate" menu (page 40) is made according to the following formula:

$$\text{Gross data rate} = \frac{204 \times \text{net data rate}}{188}$$

		Net data rate [kbit/s] at a bandwidth of 8 MHz			
		Guard interval			
Modulation	**Code rate**	1/4	1/8	1/16	1/32
QPSK	1/2	4976	5529	5855	6032
	2/3	6635	7373	7806	8043
	3/4	7465	8294	8782	9048
	5/6	8294	9216	9758	10053
	7/8	8709	9676	10246	10556
16 QAM	1/2	9953	11059	11709	12064
	2/3	13271	14745	15612	16086
	3/4	14929	16588	17564	18096
	5/6	16588	18431	19516	20107
	7/8	17418	19353	20491	21112
64 QAM	1/2	14929	16588	17564	18096
	2/3	19906	22118	23419	24128
	3/4	22394	24882	26346	27144
	5/6	24882	27647	29273	30160
	7/8	26126	29029	30737	31668

If the bandwidth is decreased by 1 MHz the transmittable data rate is decreased by approx. 1/8.

Modulation	Code rate	Net data rate [kbit/s] at a bandwidth of 7 MHz			
		Guard interval			
		1/4	1/8	1/16	1/32
QPSK	1/2	4354	4838	5123	5278
	2/3	5806	6451	6830	7037
	3/4	6532	7257	7684	7917
	5/6	7257	8064	8538	8797
	7/8	7620	8467	8965	9237
16 QAM	1/2	8709	9676	10246	10556
	2/3	11612	12902	13661	14075
	3/4	13063	14515	15369	15834
	5/6	14515	16127	17076	17594
	7/8	15240	16934	17930	18473
64 QAM	1/2	13063	14515	15369	15834
	2/3	17418	19353	20491	21112
	3/4	19595	21772	23053	23751
	5/6	21772	24191	25614	26390
	7/8	22861	25401	26895	27710

Modulation	Code rate	Net data rate [kbit/s] at a bandwidth of 6 MHz			
		Guard interval			
		1/4	1/8	1/16	1/32
QPSK	1/2	3732	4147	4391	4524
	2/3	4976	5529	5855	6032
	3/4	5599	6221	6587	6786
	5/6	6221	6912	7318	7540
	7/8	6532	7257	7684	7917
16 QAM	1/2	7465	8294	8782	9048
	2/3	9953	11059	11709	12064
	3/4	11197	12441	13173	13572
	5/6	12441	13824	14637	15080
	7/8	13063	14515	15369	15834
64 QAM	1/2	11197	12441	13173	13572
	2/3	14929	16588	17564	18096
	3/4	16796	18662	19760	20358
	5/6	18662	20735	21995	22620
	7/8	19595	21772	23053	23751

	Transmission parameters for DVB-T at a bandwidth of 8 MHz			
Transmission mode	**2k**			
Symbol duration T_S [µs]	224			
Carrier space Δ f [kHz]	4.4643			
$(n_{carrier})_{theoretical}$	2048			
$(n_{carrier})_{real}$	1705			
Used bandwidth [MHz]	7.61			
Total symbol duration T_{GS} [µs]	280	262	238	231
Guard interval T_G [µs]	56	28	14	7
T_G / T_S	$^1/_4$	$^1/_8$	$^1/_{16}$	$^1/_{32}$

	Transmission parameters for DVB-T at a bandwidth of 7 MHz			
Transmission mode	**2k**			
Symbol duration T_S [µs]	224			
Carrier space Δ f [kHz]	4.4643			
$(n_{carrier})_{theoretical}$	2048			
$(n_{carrier})_{real}$	1705			
Used bandwidth [MHz]	6.66			
Total symbol duration T_{GS} [µs]	320	288	272	264
Guard interval T_G [µs]	64	32	16	8
T_G / T_S	$^1/_4$	$^1/_8$	$^1/_{16}$	$^1/_{32}$

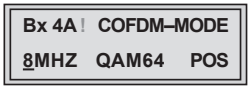
	Transmission parameters for DVB-T at a bandwidth of 6 MHz			
Transmission mode	**2k**			
Symbol duration T_S [µs]	224			
Carrier space Δ f [kHz]	4.4643			
$(n_{carrier})_{theoretical}$	2048			
$(n_{carrier})_{real}$	1705			
Used bandwidth [MHz]	5.71			
Total symbol duration T_{GS} [µs]	373	336	317	308
Guard interval T_G [µs]	74.7	37.3	18.7	9.3
T_G / T_S	$^1/_4$	$^1/_8$	$^1/_{16}$	$^1/_{32}$

OUTPUT SIGNAL

In this menu, you can set the bandwidth, the carrier modulation and the spectral position of the output signal.

Bandwidth of the output signal

To transmit the output signal in the channel range of C21 to C69 a bandwidth of 8 MHz can be used.
In the channel range of C5 to C12 a bandwidth of ≤ 7 MHz must be set.
If frequency setting is selected you can set the bandwidth dependent on the frequency of the adjacent channel.



- Use **+**/**-** to set the bandwidth of the output signal ("**5 MHz**" … "**8 MHz**").

Carrier modulation

In this menu item the carrier modulation is set. At this the setting "**QPSK**" corresponds to the lowest and the setting "**QAM64**" to the highest output data rate.

- Use the **◄**/**►** buttons to place the cursor under "**QPSK / QAM...**".
- Set the carrier modulation of the output signal using the **+**/**-** buttons ("**QPSK**", "**QAM16**", "**QAM64**").

—> A displayed "!" indicates an output data rate overflow (page 40).

Spectral position – inverting the user signal

For exceptional cases and "older" digital cable receivers, the spectral position of the user signal can be inverted "**NEG**". The default setting is "**POS**".

- Use **◄**/**►** to place the cursor under "**POS**".
- Use **+**/**-** to set the spectral position to "**NEG**".

- Press the **MODE** button.

—> The "Transmission parameters" – "**COFDM-MODE**" submenu is activated.

TRANSMISSION PARAMETERS

In this menu you can set the code rate and the guard interval.

—> The 2k transmission mode is fixed.
2k mode: 1512 carrier for user data (total 1705 carriers)
—> A displayed "!" indicates an output data rate overflow (page 40).

Code rate

During a transmission, data can be lost or changed. To recover this data, redundancy is added to the signal to be transmitted (forward error correction). The factor of the quantity of redundancy contained in the bits transmitted is called code rate.
Using the setting "**C7/8**" you can get the highest output data rate at lowest redundancy.

- Use the ◄/► buttons to place the cursor under "**C...**".
- Set the code rate required using the + / - buttons ("**C1/2**", "**C2/3**", "**C3/4**", "**C5/6**", "**C7/8**").

Guard interval

In this menu item you set the relation of the duration of the user symbols to the duration of the guard intervals to be transmitted. A high guard interval, e.g. "**G1/4**" causes a low output data rate. For cable networks the setting "**G1/32**" is adequate.

- Use the ◄/► buttons to place the cursor under "**G...**".
- Set the guard interval required using the + / - buttons ("**G1/4**", "**G1/8**", "**G1/16**", "**G1/32**").

- Press the MODE button.

—> The "Transmitter identification" – "**COFDM TPS**" menu is activated.

TRANSMITTER IDENTIFICATION

At terrestrial transmission an identification is referred to each COFDM modulated transmitter. When COFDM modulated signals are fed into cable networks this identification is not necessary usually. If receiving problems should occur you must refer a transmitter identification (CELL ID) to each output channel and switch "**on**" the transmitter identification.

—> A displayed "!" indicates an output data rate overflow (page 40).

- Use the ◄/► buttons to position the cursor under the digit of the hexadecimal number to be set.
- Press +/- to set the respective digit of the hexadecimal number.
- Repeat the procedure by the quantity of the digits to be set.
- Using the ► button place the cursor under "**off**" and switch "**on**" the transmitter identification using the +/- buttons.

—> By pressing the ◄ button you return to the hexadecimal number setting.

- Press the MODE button.

—> The "Substitute signal in the case of an incorrect input signal" – "**FAILURE**" submenu is activated.

SUBSTITUTE SIGNAL IN THE CASE OF AN INCORRECT INPUT SIGNAL

You use this menu to set whether a COFDM signal filled with null packets and self-made tables "**Tables**" or a "**Single Carrier**" signal should be provided as an output signal whenever an incorrect input signal occurs. Self-made tables are transmitted furthermore.

- Use the **+** / **-** buttons to set the required output signal.
- Press the **MODE** button.

—> Returning to "Output settings" main menu (page 19).
—> If necessary set further modulators.

- Press the **MODE** button.

—> The "ASI input" – "**ASI**" main menu is activated.

ASI INPUT

In this menu you select the signal sources (corresponding tuner or ASI) for the channel strips A…D.

The following settings are available:

		Line A	Line B	Line C	Line D	CA
0xASI	**OFF**	Tuner A	Tuner B	Tuner C	Tuner D	2
1xASI	**D**	Tuner A	Tuner B	Tuner C	ASI	2
2xASI	**B/D**	Tuner A	ASI	Tuner C	ASI	2
2xASI	**C/D**	Tuner A	Tuner B	ASI	ASI	1
3xASI	**B/C/D**	Tuner A	ASI	ASI	ASI	1
4xASI	**A/B/C/D**	ASI	ASI	ASI	ASI	0

- Use the **+**/**-** buttons to set the required numbers of lines using the ASI input signal.

—> On the left side you select the number of "ASI lines", on the right side you see, which lines are used.

- Press the **MODE** button.

—> The "Input settings" – "**INPUT**" main menu is activated.

INPUT SETTINGS

In this menu you select the tuner for which you would like to do the input settings in the related submenus.

—> In order to skip the "Input settings", press button **MODE**.
—> "OK" indicates a present input signal.

- Using the buttons **+**/**-** select the desired channel strip ("A"...."D").

—> Dependent on the "ASI input selection" (page 28) you will get "Tuner" or "ASI" for selection. If "line" is displayed you will only get access to the station filter settings. IF "tuner" is displayed, in addition you get access to the tuner settings and if a CA module is retrofitted the corresponding CA menu is available.

- Press button **▶**.

Input signal source ASI:
—> The "Station filter" – "e.g. **01/06**" submenu is activated (page 32).

Input signal source Tuner:
—> The "LNB oscillator frequency, Input" – "**LNB**" menu is activated.

LNB oscillator frequency, Input

—> This menu is only displayed if "Tuner" is selected as input signal source (page 28).

In this menu select the SAT input and set the oscillator frequency of the LNB used.

- Use buttons ◄/► to place the cursor under the digit to be set for the oscillator frequency displayed.
- Press buttons +/- to enter the respective digit of the oscillator frequency of the LNB used.
- Repeat the procedure by the quantity of the digits to be set.
- Use button ► to place the cursor under "In A" resp. "In B".
- Press buttons +/- to select the respective SAT input ("A" or "B").
- Press the **MODE** button.

—> The "Input symbol rate, DVB mode" – "**SYMBOL**" submenu is activated.

Input symbol rate, DVB mode

—> This menu is only displayed if "Tuner" is selected as input signal source (page 28).

In this menu set the symbol rate of the desired transponder. The DVB mode is indicated.

Symbol rate:
The symbol rates of the satellite transponders can be found in the current channel table of the satellite operator, in various satellite magazines and in the Internet.

- Use ◄/► to position the cursor under the digit to be set for the symbol rate displayed.
- Press + / - to enter the respective digit of the symbol rate needed.
- Repeat the procedure by the quantity of the digits to be set.

DVB mode:
The cassette recognizes the transmitted DVB mode and switches over between the normal QPSK mode (DVB-S) and the DVB-S2 mode.

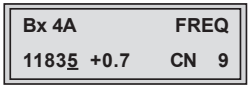
- Press the **MODE** button.

—> The "Input frequency" – "**FREQ**" submenu is activated.

Input frequency

—> This menu is only displayed if "Tuner" is selected as input signal source (page 28).

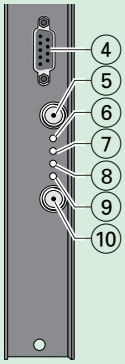
If three dots " **...** " appear in the second line of the display, the cassette is in the "**station search**" mode. Please wait until the process has finished.
Once the RF receiver has synchronised to the input signal, any offset to the target frequency is displayed in MHz, e.g. "**– 1.8**".
If a question mark "**?**" appears in the second line of the display, there is no input signal present. In this case check the configuration of the antenna system and head-end station as well as the preceding settings of the cassette.



- Use ◄/► to position the cursor under the digit of the frequency displayed to be set.
- Press + / - to set the respective digit of the input frequency needed.
- Repeat the procedure by the quantity of the digits to be set.
- Set the frequency offset shown in the display (e.g. "**– 1.8**") to less than 1 MHz ("**± 0.x**") by varying the input frequency using the + / - buttons.

Signal to noise ratio:
"CN ..." indicates the current signal to noise ratio, in order to estimate the quality of the input signal.

—> In addition to the indicator in the display, there is also a status LED which indicates the quality of the received transport stream:



⑥ Status LED channel strip A
⑦ Status LED channel strip B
⑧ Status LED channel strip C
⑨ Status LED channel strip D

LED indicator	Indication
Green	Signal quality is good
Orange	Signal quality is poor
Red	No signal
Red<–>Green	Data rate overflow (output)
Off	Channel strip (modulator) off

- Press the **MODE** button.

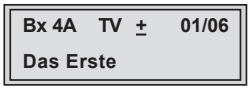
—> The "Station filter" – e.g. "**01/06**" submenu is activated.

Operation with a CA module

In order to descramble scrambled channels a corresponding smart card is needed.
The channels to be descrambled are set in submenu "station filter".

Station filter

In this menu stations (services) of a transponder can be switched off.
Herein you select which scrambled station should be descrambled using an adequate CA module (only via tuner "A" and "C").



—> All stations from the channel strip will be read, and then displayed with name and station type.

—> If no station is found, the following message will appear in the display: "**FILTER no Service**".
In this case, check the configuration of the antenna system and head-end station, as well as the previously adjusted settings for the cassette.

—> The display shows e.g.: **Bx 4A TV + 01/06**
Das Erste

Meaning of the indicators in the example:

"**Bx 4A**"	Slot 4, channel strip "**A**"
"**TV**"	TV channel type
" **+** "	The currently selected station is switched on.
"**01/06**"	The 1st of 6 stations is being displayed.
"**Das Erste**"	Station name

Further possible terms displayed:

"**RA**"	Radio channel type For radio stations, the background of the screen of the connected TV or test receiver is darkened.
" **–** "	The currently selected station is switched off.
" * "	The star means that the TV or radio station selected is scrambled. To enable the station, the CA module and the appropriate smart card of the station provider are required.

—> If a service number (e.g. "**131**") appears instead of "**TV**" or "**RA**", this indicates that an unnamed station or an undefined data stream is being received.

- Use the ◄/► buttons to call up the stations in sequential order, then use **+**/**-** to activate (indicated by " **+** ") or to deactivate them (indicated by " **–** ").

—> Using button **MULTI** all station can be activated/deactivated.

—> If a station is scrambled (indication "*"), in this menu you select whether it should be descrambled using an adequate CA module (only possible via tuner "A" and "C").

- Press button **+** twice to descramble a station (indication "X").

- Press the **MODE** button.

Input signal source ASI:
—> Returning to "Input settings" - "**INPUT**" main menu (page 29). If necessary set further channel strips.

Input signal source Tuner:
—> The "PID monitoring" – "**CA**" submenu is activated.

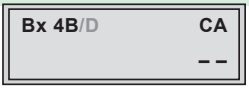
PID MONITORING

—> This menu is only displayed if "Tuner" is selected as input signal source (page 28).

In this menu you can switch off the PID monitoring and call up a menu for the settings of the CA module (dependent on the CA module).

—> If tuner B or D is selected, this menu is out of order.

Indication:



PID monitoring:

—> The factory default of the PID monitoring is switched on.
If particular PIDs are not descrambled the CA module is reset. Additionally dropouts may occur if several stations are descrambled. To prevent this the PID monitoring can be switched off.

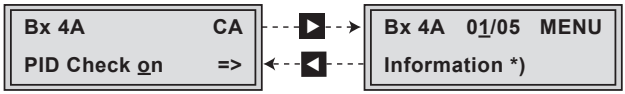
- Use the **+**/**-** buttons to switch "**off**" or "**on**" the PID monitoring.
- Use the **►** button to activate the menu of the CA module (only if Tuner "A" or "B" is selected).

—> Access to this menu is only possible with installed **CA module** and inserted smart card.

CA MODULE

—> This menu is only displayed if "Tuner A/C" is selected as input signal source (page 28) and a CA module is installed.

The menu varies according to which CA module you are using. For this reason, please refer to the operating manual of your particular CA module. The relevant information is shown in the display of the head-end station. This may appear as a fixed display or as scrolling text according to display capabilities.



—> The display shows e.g.: **Bx 4A 01/05 MENU**

Meaning of the indicators:

"**Bx 4A**"	Slot 4, channel strip "**A**"
"**01/05**"	The first of five menu items is activated.
"**MENU**"	The menu of the CA module is activated.

*) For the explanation of further details please use the operating instructions of the CA module used.

- Use the **+**/**-** buttons to activate the menu desired.
- Press the **►** button to activate the menu.
- Use the **+**/**-** buttons to select the function desired.
- To set the CA module use the **◄**/**►** and **+**/**-** buttons.

—> By pressing the **MODE** button you can cancel the settings in the menu of the CA module and are returned to the "PID monitoring" – "**CA**" menu.

- All settings are saved by pressing the **M** button.

—> You will be returned to the "PID monitoring" – "**CA**" menu.

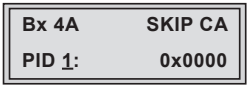
- Press the **MODE** button.

—> The "Economize descrambling capacity" – "**SKIP CA**" is activated.

ECONOMIZE DESCRAMBLING CAPACITY

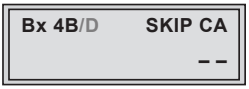
—> This menu is only displayed if "Tuner" is selected as input signal source (page 28).

In this menu up to 9 not needed PIDs (e.g. audio PIDs of foreign language versions) can be excluded from the descrambling in order to economize descrambling capacity.



—> If tuner B or D is selected, this menu is out of order.

Indication:



- Using buttons **+**/**-** select the desired memory location (PID 1…9) .
- Use **◄**/**►** to position the cursor under the digit of PID to be set.
- Press **+**/**-** to set the respective digit of the PID needed.
- Repeat the procedure by the quantity of the digits to be set.

—> If required select another memory location and enter the next PID which shall not descrambled.
—> To delete a stored PID, overwrite it by "0000".

- Press the **MODE** button.

—> Returning to "Input settings" - "**INPUT**" main menu (page 29).
—> If required set further channel strips.

- Press the **MODE** button.

The "Option settings" – "**OPTIONS**" main menu is activated.

Option settings

In this menu you select the channel strip for which you would like to do the option settings in the related submenus.

—> In order to skip the "Option settings", press button **MODE**.

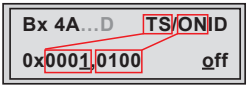
- Using the buttons **+**/**-** select the desired channel strip ("A"…"D").
- Press button **►**.

—> The "Transport stream ID and ORGNET-ID" – "**TS/ONID**" menu is activated.

Transport stream ID and ORGNET-ID

If the stations of a transponder are split into the transport streams of several channel strips, a new identification must be allocated to the further transport streams to realise the channel search of the settop boxes connected without mistakes.

—> If the ORGNET-ID is changed also a new NIT must be generated (page 40).



- Use the **◄**/**►** buttons to position the cursor under the digit of the hexadecimal number to be set.
- Press **+**/**-** to set the respective digit of the hexadecimal number.
- Repeat the procedure by the quantity of the digits to be set.
- Using the **►** button place the cursor under "**off**" and switch "**on**" the transmitter identification using the **+**/**-** buttons.

—> By pressing the **◄** button you return to the hexadecimal number setting.

- Press the **MODE** button.

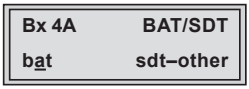
—> The "BAT/SDT-OTHER tables" – "**BAT/SDT**" submenu is activated.

BAT/SDT-OTHER TABLES

In this menu you can switch on resp. off the BAT- and SDT-OTHER tables.

—> **BAT** = **B**ouquet **A**ssociation **T**able:
Information in the data stream about the affiliation of station packets to a specific bouquet.

—> **SDT-OTHER** = **S**ervice **D**escription **T**able – **OTHER** data streams:
Information in the data stream about service parameter of other data streams.



- Using the ◄ button place the cursor under "**bat**" and switch "on" ("**BAT**") or "off" ("**bat**") the bouquet association table using the + / - buttons.
- Using the ► button place the cursor under "**sdt-other**" and switch "on" ("**SDT-OTHER**") or "off" ("**sdt-other**") the service description table using the + / - buttons.

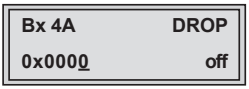
—> Capital letters: Function activated
Lower case letters: Function deactivated (factory default)

- Press the MODE button.

—> The "Deleting a PID" – "**DROP**" submenu is activated.

DELETING A PID

In this menu a PID of the transport stream can be deleted.



- Use the ◄ / ► buttons to place the cursor under the respective digit of the hexadecimal number of the PID to be deleted ("**0x0000**") and set the hexadecimal number using + / - .

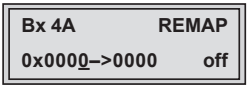
- Use the ▶ button to set the cursor under "**off**" and delete the PID using the **+**/**-** buttons ("**on**").

- Press the **MODE** button.

—> The "Renaming a PID" – "**REMAP**" submenu is activated (page 39).

RENAMING A PID

In this menu you can allocate a new address to a PID retaining the complete data content.



- Use the ◀/▶ buttons to place the cursor under the respective digit of the hexadecimal number of the PID to be changed ("**0x0000**") and set the hexadecimal number using **+**/**-**.
- Use the ◀/▶ buttons to place the cursor under the respective digit of the hexadecimal number of the new PID ("**–> 0000**").
- Set the hexadecimal number using **+**/**-**.
- Use the ▶ button to set the cursor to "**off**" and rename the PID using the **+**/**-** buttons ("**on**").

- Press the **MODE** button.

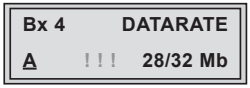
—> Returning to "Option settings" main menu (page 37).
—> If required set further channel strips.

- Press the **MODE** button.

The "Output data rate" – "**DATARATE**" main menu is activated.

Output data rate

This menu shows the output data rate defined using the COFDM settings and the current output data rate.



28: The current measured gross output data rate.
32: Maximum gross output data rate.
If the station filter is set correctly, current data rate is lower than the maximum data rate. The value fluctuates, since the data rates of individual stations are dynamically modified by the broadcasters.

—> Is the current data rate higher than the maximum data rate exclamation marks "**!!!**" appear in the display. In this case correct the COFDM settings (pages 25 ...) or the settings of the station filter (page 32).

- Press the **MODE** button.

—> The "Network Information Table" – "**NIT**" main menu is activated.

Network Information Table (NIT)

- To switch NIT "**on**" resp. "**off**" press the **+**/**-** buttons.
- Press the **►** button to activate NIT ("**Make**").

All active cassettes which are able to output a NIT ("NIT cassettes") must be set and ready for reception.

—> The NIT of all "NIT cassettes" are switched on.

—> The cassette fetches all the information (output frequencies, output data rates, etc.) it needs from all the "NIT cassettes" in order to generate the NIT. This process may take a few seconds.
Then the NIT is generated, added and sent to all "NIT cassettes". The other "NIT cassettes" also add this new NIT. The status of all "NIT cassettes" in the NIT menu changes to "**on**".
The display shows: "**read ... / copy ...**".

- To switch off the new NIT ("**off**") press the **-** button.

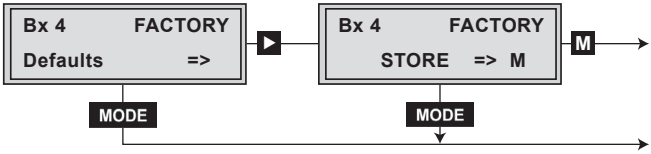
—> ⚠ The NITs of the other "NIT cassettes" will stay switched on. When the NIT of the cassette is switched on again ("**on**") by pressing the **-** button, the previously generated NIT is added again. If you have changed parameters in the meantime, you must first select "**Make**" to generate a new, up-to-date NIT.

- Press the **MODE** button.

—> The "Factory reset" – "**FACTORY Defaults**" menu is activated.

Factory reset

In this menu you can reset all settings to the factory defaults.



- Press the ▶ button.

—> The factory defaults are invoked (**"FACTORY STORE"**).
—> By pressing the **MODE** button, you will be returned to the menu item "Output settings" **without** invoking the factory defaults (page 19).

- Press the **M** button.

—> The factory defaults are saved.
The display shows "STORE"
—> Back to "Selecting the cassette" (page 19).
—> By pressing the **MODE** button, you will be returned to the menu item "Output settings" **without** saving the factory defaults (page 19).
—> If required set further channel strips.

Saving settings

- Press the **M** button.

—> Returning to "Selecting the cassette" menu (page 19).
—> The settings are saved.
—> If functions of the TPS module are activated, their status is shown in the second line of the menu:
"**M**"– Station filter is switched on.
"**N**" – NIT is activated.
—> If required set further channel strips.

After installing the head-end station, upgrading accessories or installing cassettes it is necessary to tighten all cable connections, cable terminals and cover screws in order to maintain compliance with current EMC regulations securely.

- Securely tighten the cable connections using an appropriate open-ended spanner.
- Measure the output levels of the other cassettes and tune them to a uniform output level using the appropriate level controls or software dependent on the head-end station used. Please regard the assembly instructions of the respective head-end station.
- Mount the front cover (see assembly instructions of the head-end station).

Advice for a frequency grid (8 MHz) in the band I/III

Frequenz Frequency [MHz]	Frequenz Frequency [MHz]	Frequenz Frequency [MHz]	Frequenz Frequency [MHz]	Frequenz Frequency [MHz]	Frequenz Frequency [MHz]
42.00	82.00	146.00	186.00	226.00	266.00
50.00	114.00	154.00	194.00	234.00	274.00
58.00	122.00	162.00	202.00	242.00	282.00
66.00	130.00	170.00	210.00	250.00	290.00
74.00	138.00	178.00	218.00	258.00	298.00

Channel-/frequency grid for DVB-T (band III, bandwidth 7 MHz)

Kanal Channel	Frequenz Frequency [MHz]	Kanal Channel	Frequenz Frequency [MHz]	Kanal Channel	Frequenz Frequency [MHz]
C 5	177.5	C 8	198.5	C 11	219.5
C 6	184.5	C 9	205.5	C 12	226.5
C 7	191.5	C 10	212.5		

CCIR – Hyperband (frequency grid 8 MHz)

Kanal Channel	Kanalmittenfrequenz Channel centre frequency [MHz]	Kanal Channel	Kanalmittenfrequenz Channel centre frequency [MHz]	Kanal Channel	Kanalmittenfrequenz Channel centre frequency [MHz]	Kanal Channel	Kanalmittenfrequenz Channel centre frequency [MHz]	Kanal Channel	Kanalmittenfrequenz Channel centre frequency [MHz]
S 21	306.00	S 26	346.00	S 30	378.00	S 34	410.00	S 38	442.00
S 22	314.00	S 27	354.00	S 31	386.00	S 35	418.00	S 39	450.00
S 23	322.00	S 28	362.00	S 32	394.00	S 36	426.00	S 40	458.00
S 24	330.00	S 29	370.00	S 33	402.00	S 37	434.00	S 41	466.00
S 25	338.00								

CCIR – Band IV/V (frequency grid 8 MHz)

C 21	474.00	C 31	554.00	C 41	634.00	C 51	714.00	C 61	794.00
C 22	482.00	C 32	562.00	C 42	642.00	C 52	722.00	C 62	802.00
C 23	490.00	C 33	570.00	C 43	650.00	C 53	730.00	C 63	810.00
C 24	498.00	C 34	578.00	C 44	658.00	C 54	738.00	C 64	818.00
C 25	506.00	C 35	586.00	C 45	666.00	C 55	746.00	C 65	826.00
C 26	514.00	C 36	594.00	C 46	674.00	C 56	754.00	C 66	834.00
C 27	522.00	C 37	602.00	C 47	682.00	C 57	762.00	C 67	842.00
C 28	530.00	C 38	610.00	C 48	690.00	C 58	770.00	C 68	850.00
C 29	538.00	C 39	618.00	C 49	698.00	C 59	778.00	C 69	858.00
C 30	546.00	C 40	626.00	C 50	706.00	C 60	786.00		

GSS	**Konformitätserklärung** **Declaration of Conformity** **007/ 14**	CE

Der Hersteller/Importeur
The manufacturer/importer **GSS Grundig SAT Systems GmbH**

Anschrift / Address / Adresse **Beuthener Straße 43, D-90471 Nürnberg, Germany**

erklärt hiermit eigenverantwortlich, daß das Produkt:
declare under their sole responsibility that the product:

Bezeichnung / Name / Description **Head-End Digital Modulator 4x HDTV Digital COFDM**

Type / Model / Type **GSS PADT 6400**

Bestell-Nr. / Order-No. **GAP 4400**

folgenden Normen entspricht:
is in accordance with the following specifications:

EN 50083-2:	***2012***	***EN 60065:***	***2002***
EN 50581:	***2012***	***EN 60065 + A1:***	***2006***
		EN 60065 + A11:	***2008***
		EN 60065 + A2:	***2010***
		EN 60065+ A12:	***2011***

Das Produkt erfüllt somit die Forderungen folgender EG-Richtlinien:
Therefore the product fulfils the demands of the following EC-Directives:

2006/95/EG	**Richtlinie betreffend elektrische Betriebsmittel zur Verwendung innerhalb bestimmter Spannungsgrenzen** **Directive relating to electrical equipment designed for use within certain voltage limits**
2004/108/EG	**Richtlinie über die elektromagnetische Verträglichkeit** **Directive relating to electromagnetic compatibility**
2011/65/EG	**Richtlinie zur Beschränkung der Verwendung bestimmter gefährlicher Stoffe in Elektro- und Elektronik Altgeräten** **Directive on the restriction of the use of certain hazardous substances in electrical and electronic equipment**

Nürnberg, 14. April 2014

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