Assembly Instructions

English

Grundig SAT Systems

PROFESSIONAL

Terrestrial Digital Terrestrial

PTDT 9200

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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 IEC/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".**

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 PTDT 9200
2 HF 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:
2006/95/EC, 2004/108/EC
The product fulfils the guidelines and standards for CE labelling (page 37).

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

HF input

Channels: ..... C5 ... C12, C21 ... C69
Frequency range: ..... 177.5 ... 226.5, 474 ... 858 MHz
Input level: ..... 60 dBµV ... 80 dBµV
Loop through output gain ..... 0 dB
Symbol rate ..... acc. to EN 300744

COFDM modulator

Signal processing: ..... DIN EN 300744
Transmission modes: 2k, 4k, 8k
Types of modulation: ..... QPSK, 16 QAM, 64 QAM
Code rates: ..... $^1/_2$, $^2/_3$, $^3/_4$, $^5/_6$, $^7/_8$
Guard intervals: ..... $^1/_4$, $^1/_8$, $^1/_{16}$, $^1/_{32}$

HF output

Frequency range: ..... 42.0 MHz ... 860.0 MHz
Channels: ..... C5 ... C12, C21 ... C69
Output level: ..... 96 dBµV
Output impedance: ..... 75 Ω

Connections

HF inputs: ..... 2 IEC sockets
HF loop-through outputs: ..... 2 IEC sockets
HF output: ..... 1 IEC socket
Connection strip (10-pin): ..... for supply voltages and control circuits
RS-232 socket: ..... serial interface for software update

Remote maintenance

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

2.4 Description

The cassette converts two incoming COFDM-modulated signals into two outgoing COFDM-modulated signals with free selectable frequency. Individual stations can be deleted. The cassette has two DVB-T inputs and one HF output.

General

The cassette is equipped with two channel strips ("**A**" and "**B**"). The channel strips consist of the DVB-T tuners, the digital signal preparation units and the output converter. The channel strips are indicated in the head-end station display with "**Bx ...A**" and "**Bx ...B**". The control of the cassette takes place via the control unit of the head-end station.
Two LEDs provide an indication of the 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.
The COFDM modulated HF output signals are sent through the HF 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 43**" 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***".

The cassette is designed for use in head-end stations of the profi line.

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 43**" appears.

2.6 How the TPS module works

After decoding COFDM-modulated signals, the demodulated data streams can be accessed via the integrated TPS module. These data streams, also called transport streams, contain several stations in 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 symbol rate.

Stuffing

The transport stream is padded using what is known as zero data. This ensures a steady and constant 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 the channel strips "A" and "B", one of the both transport streams a new identification must be allocated 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

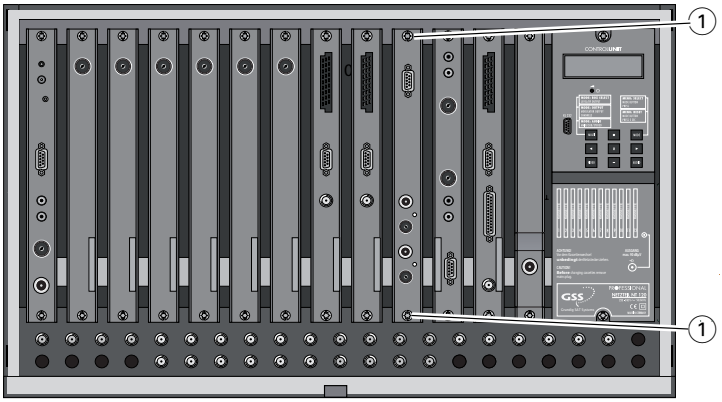
The transport stream contains data in the form of tables which the receivers evaluate and require for convenient use. The TPS module can adjust the "Network Information Table" (NIT) to accommodate the new station data. The "NIT" contains data which is required by the set-top boxes connected to the cable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

3 Assembly

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.

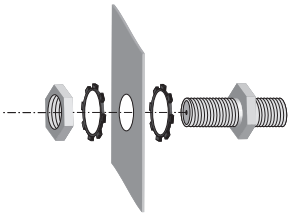
- Remove the fastening screws (1) of an unoccupied slot from the bracket of the head-end station.
- Insert the cassette in this slot and push it into the housing.
- Align the cassette and apply slight pressure to connect it to the connections of the board and the HF bus bar.
- Fasten the cassette with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

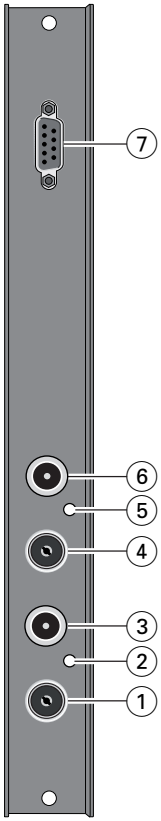
The attenuation of shielding of the connection lines for ASI and antenna must meet the requirements for "Class A".



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

Tighten the nuts of the cable terminals until the teeth on the lock washers put under have penetrated the exterior coating and a good connection is made between the housing / 19" cabinet and cable terminals.

3.3 Cassette overview



① HF input (channel strip "**B**")
② Status LED of the channel strip "**B**"
③ Loop-through output of HF input ①
④ HF input (channel strip "**A**")
⑤ Status LED of the channel strip "**A**"
⑥ Loop-through output of HF input ④
⑦ D-SUB socket "RS 232"

—> 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".

3.4 Connecting the cassette

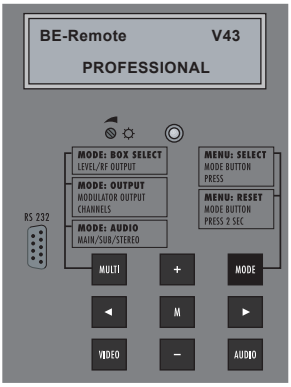
- Connect the HF connections to the inputs "A" (tuner "A") and "B" (tuner "B").
- Connect the head-end station to the mains.

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 main menu items:

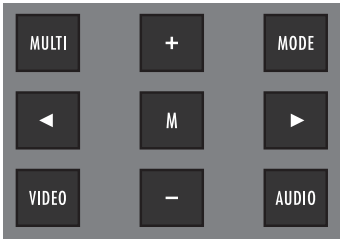
- Channel strip
- Channel / frequency setting
- Output channel / output frequency
- Output level
- Input channel
- Hierarchical modulation
- Station filter
- Output signal
- Transmission parameters
- Station identification
- Stuffing
- Substitute signal
- Transport stream and ORGNET-ID
- Network Information Table (NIT)
- Network/operator identification
- Deleting a PID
- Renaming a PID
- 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

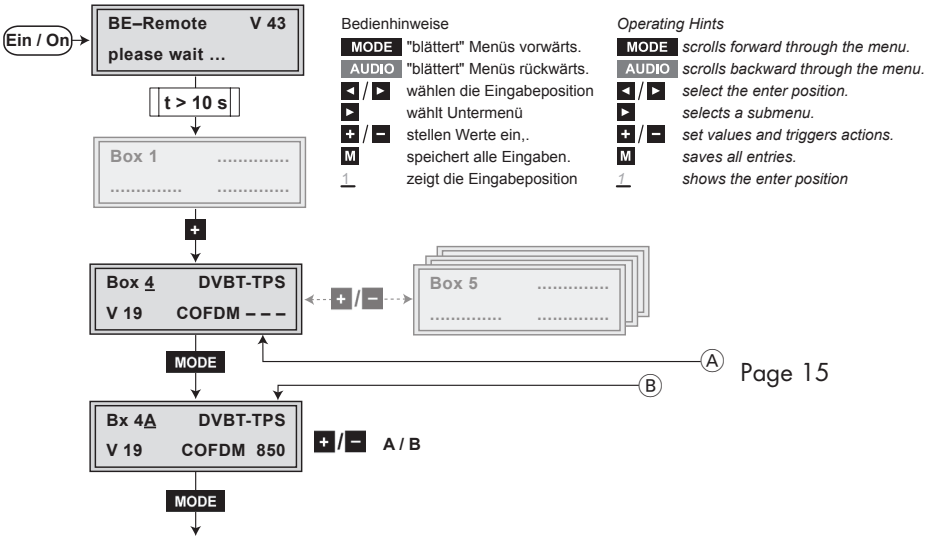
5.1 Preparation

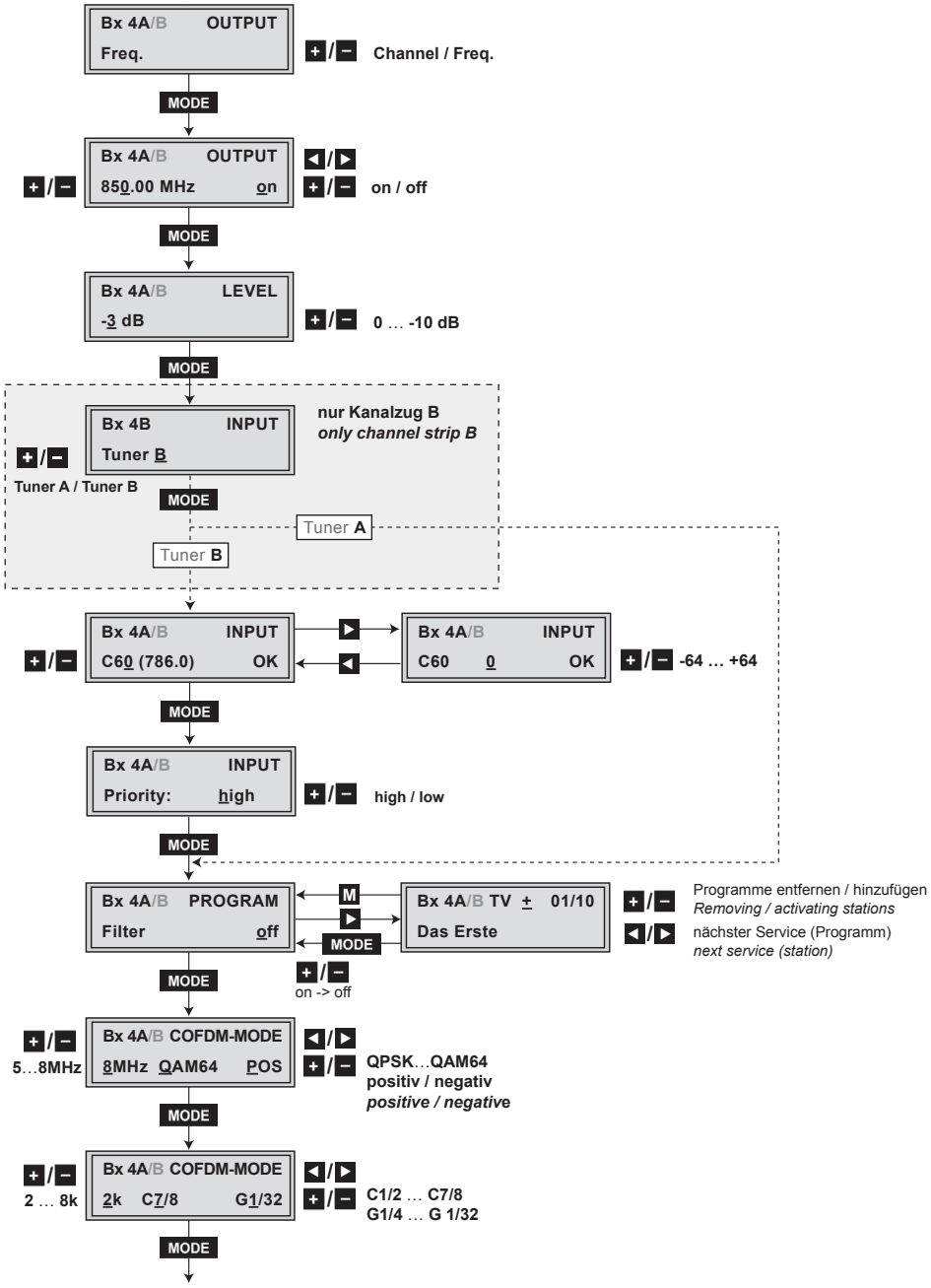
- Test the software versions of the head-end station and the cassette and update them if necessary.
  The current software versions can be found on the website "**www.gss.de**".
- Connect the test receiver to the HF output or the test output of the head-end station.
- Set the output channel / output frequency of the cassette (page 18) and adjust the TV test receiver to this channel / frequency.
- Switch on the channel strip (modulator) if necessary (page 19). For each channel strip, there is a status LED (②/⑤, page 11) which indicates if the channel strip is switched on.
- Balance the output levels of the channel strips "**A**" and "**B**" if the difference in level is ≥ 1 dB (page 19).

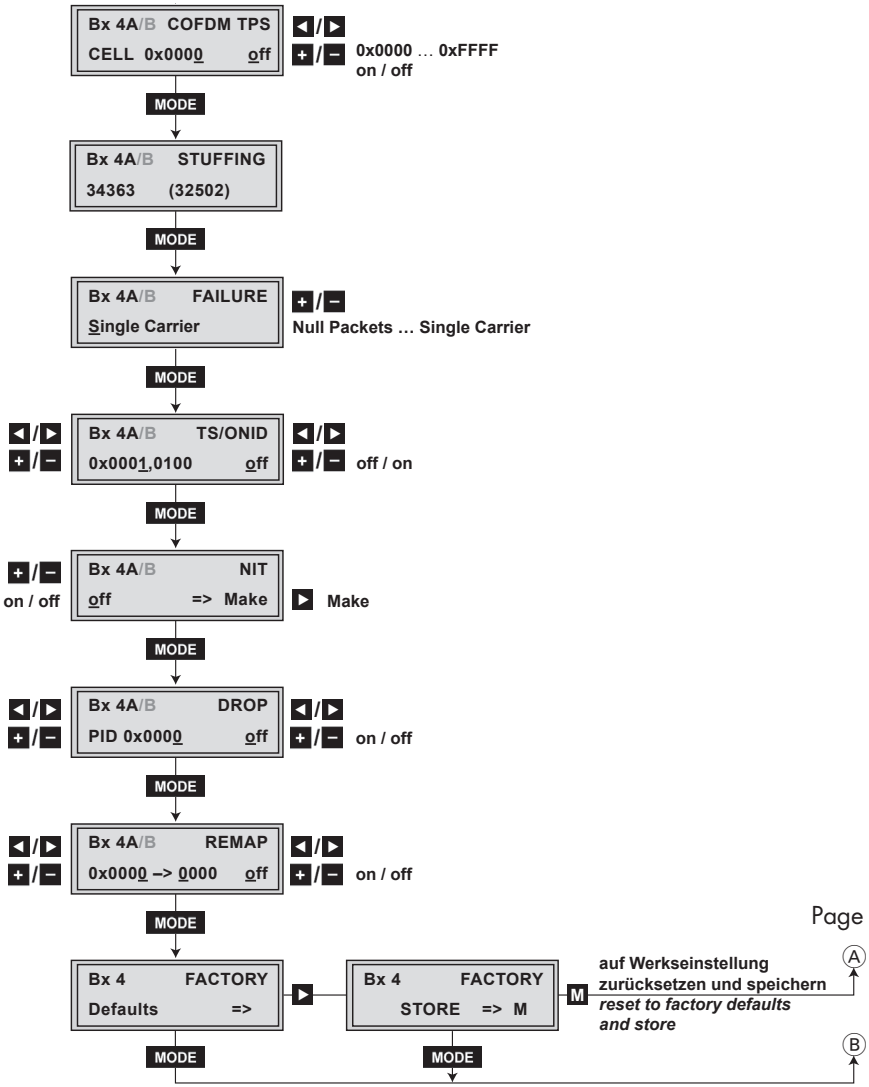
5.2 Notes on level setting

In order to prevent interference within the head-end station and the cable system, the output level of the cassette must be decreased by 8 dB compared to analogue cassettes.

5.3 Programming procedure




Bx 4A/B OUTPUT
Freq.
+/− Channel / Freq.
MODE
Bx 4A/B OUTPUT
850.00 MHz on
◀/▶
+/−
+/− on / off
MODE
Bx 4A/B LEVEL
-3 dB
+/− 0 … -10 dB
MODE
nur Kanalzug B
only channel strip B
Bx 4B INPUT
Tuner B
+/−
Tuner A / Tuner B
MODE
Tuner A
Tuner B
Bx 4A/B INPUT
C60 (786.0) OK
+/−
Bx 4A/B INPUT
C60 0 OK
+/− -64 … +64
MODE
Bx 4A/B INPUT
Priority: high
+/− high / low
MODE
Bx 4A/B PROGRAM
Filter off
M
MODE
Bx 4A/B TV ± 01/10
Das Erste
+/− Programme entfernen / hinzufügen
Removing / activating stations
◀/▶ nächster Service (Programm)
next service (station)
+/−
on -> off
MODE
+/−
5…8MHz
Bx 4A/B COFDM-MODE
8MHz QAM64 POS
◀/▶
+/−
QPSK…QAM64
positiv / negativ
positive / negative
MODE
+/−
2 … 8k
Bx 4A/B COFDM-MODE
2k C7/8 G1/32
◀/▶
+/−
C1/2 … C7/8
G1/4 … G 1/32
MODE

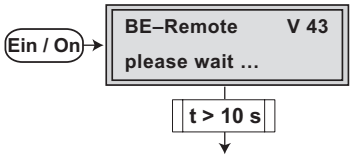

Bx 4A/B COFDM TPS
CELL 0x0000 off
0x0000 … 0xFFFF
on / off
MODE
Bx 4A/B STUFFING
34363 (32502)
MODE
Bx 4A/B FAILURE
Single Carrier
Null Packets … Single Carrier
MODE
Bx 4A/B TS/ONID
0x0001,0100 off
off / on
MODE
Bx 4A/B NIT
off => Make
on / off
Make
MODE
Bx 4A/B DROP
PID 0x0000 off
on / off
MODE
Bx 4A/B REMAP
0x0000 –> 0000 off
on / off
MODE
Bx 4 FACTORY
Defaults =>
Bx 4 FACTORY
STORE => M
M
auf Werkseinstellung
zurücksetzen und speichern
reset to factory defaults
and store
A
B
MODE
MODE

Page 13

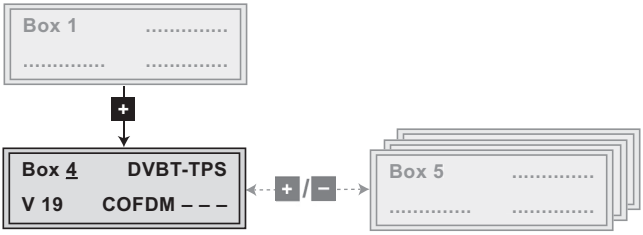
—> Pressing the **MODE** button for longer than 2 seconds cancels the programming procedure. This takes you back to the programme item "Selecting the cassette" from any menu. Any entries that have not been saved are reset to the previous settings.
—> Entries in the menus can be saved by pressing the **M** key. You are taken back to the "Selecting the cassette" menu item.

- Switch on the head-end station

—> The display shows the software version (e.g. V 43)
—> The processor reads the cassettes' data (approx. 10 seconds).



SELECTING THE CASSETTE

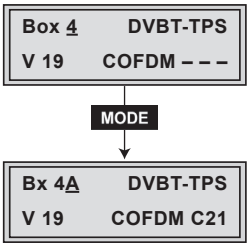


- Select the cassette you want to programme (e.g. **Box 4**) by repeatedly pressing the button **+** if necessary.

—> The display shows e.g. the menu "**Box 4 DVBT-TPS**":
"**Box 4**" stands for slot 4
"**DVBT-TPS**" Type of cassette
"**V 19**" Software version of the cassette

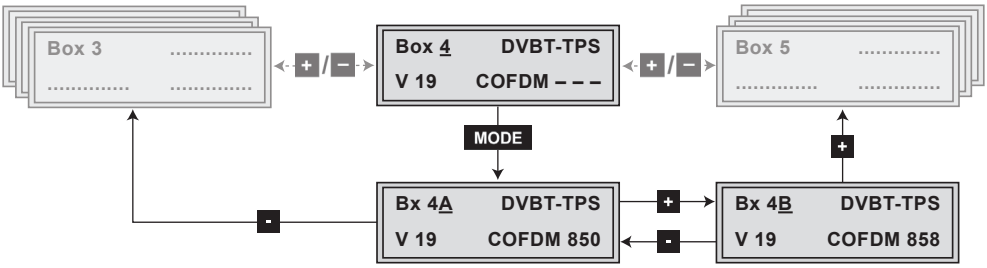
Selecting channel strip "A"

- Press the **MODE** button to select channel strip "**A**".



—> Button **-** selects the previous cassette.

Selecting channel strip "B"



- Press the **+** button to select channel strip "**B**".

—> The display shows e.g. the menu "**Bx 4B DVBT-TPS**":

"**Bx**"	stands for cassette (box),
"**4**"	for slot 4,
"**B**"	for channel strip "**B**"
"**DVBT-TPS**"	Type of cassette
"**858**"	adjusted frequency

—> Button **-** selects channel strip "**A**".
—> Button **+** selects the following cassette.

- Press the **MODE** button.

—> The "Channel / frequency setting" – "**OUTPUT**" menu is activated.

Channel / Frequency setting

In this menu, you can select the channel or frequency setting for the adjustment of the HF output. The channel setting covers the range of channels C5 … C12 and C21 … C69, the frequency setting covers the range from 42.0 MHz to 860.0 MHz.

- Use **+**/**-** to select channel setting "**Channel**" or frequency setting "**Freq.**".
- Press the **MODE** button.

—> The "Output channel" or "Output frequency" – "**OUTPUT**" menu is activated.

Output channel

In this menu you set the output channel of the channel strip (C5 … C12, C21 … C69). Additionally the modulator of the channel strip can be switched off or on (page 19).

- Use the **+**/**-** buttons to set the output channel.

Output frequency

In this menu you set the output frequency of the channel strip (42.0 … 860.0 MHz). Additionally the modulator of the channel strip can be switched off or on (page 19).

- Use the **◄**/**►** buttons to place the cursor under the digit to be set for the frequency display then use **+**/**-** to set the output frequency wished.

SWITCHING THE MODULATOR OFF OR ON

- To switch off the modulator place the cursor under "**on**" using the ▶ button and switch "**off**" the modulator of the channel strip using the **+**/**-** buttons.

—> The status LED is switched off (see also page 11).
—> The switched off modulator is indicated by " **- - -** " in the display instead of the channel or frequency display.

- In the case the modulator is switched "**off**" use the **+**/**-** to switch it "**on**".

- Press the **MODE** button.

—> The "Adjusting the output levels of the channel strips" – "**LEVEL**" menu is activated.

ADJUSTING THE OUTPUT LEVELS OF THE CHANNEL STRIPS

This menu item is used to set the output levels of the modulators of the **channel strips "A" and "B" to the same value**.

- Measure and note down the output level of the channel strip. To adjust the output level to the output levels of the other cassettes please pay attention to chapter 6 "Final procedures".

- By repeatedly pressing the **AUDIO** button scroll back to the "Selecting the channel strip" menu.
  - Select the other channel strip (page 17) and set the following menu items:
  - Select "Channel / frequency setting" (page 18).
  - Set the "Output channel" or "Output frequency" (page 18).
  - Switch on the modulator if necessary (page 19).
  - Measure and note down the output level.
- Activate the "**LEVEL**" menu of the channel strip with the higher output level.
- By pressing **+**/**-** adjust the higher output level of the one channel strip

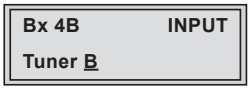
to the lower output level of the other channel strip incrementally ("**0**" … "**–10 dB**").

- Press the **MODE** button.

Channel strip A:
—> The menu "Input channel" – **INPUT**" is activated (page 21).
Channel strip B:
—> The "Selecting the Tuner" – "**INPUT Tuner …**" menu is activated.

Selecting the Tuner (only channel strip B)

In this menu you can select which tuner (input A or B) is to use (only for channel strip B). So the transport streams of the receiving stage "**A**" can be split into two output transport streams.



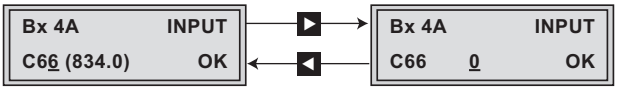
- Press the **+** / **-** buttons to select the tuner wished.

- Press the **MODE** button.

Selection Tuner Line A:
—> The menu "Station filter " – "**PROGRAM**" is activated (page 22).
Selection Tuner Line B:
—> The menu "Input channel" – **INPUT**" is activated.

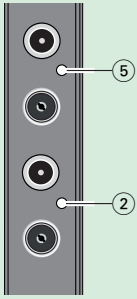
Input channel

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 HF receiver has synchronised to the input signal, "**OK**" is displayed. If "**– –**" appears in the second line of the display, there is no input signal present. Check the configuration of the antenna system and the head-end station as well as the preceding settings of the cassette.



- Use + / - to set the desired input channel.
- If necessary use the ► button to activate the menu "Fine tuning" ("**0**" is displayed additionally).
- Use + / - for fine tuning the input channel.

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



LED indicator	Indication
Green	Signal quality is good
Red	No signal
Off	The channel strip (modulator) is switched off

(5) Status LED Tuner A
(2) Status LED Tuner B

- To return to the main menu press the ◄ button.

- Press the **MODE** button.

—> The menu "Hierarchical modulation" – "**INPUT Priority:**" is activated.

Hierarchical modulation

In order to attain with less field strength a greater range for broadcasters, with DVB-T so-called "hierarchical modulation" can be used. In this process, several data streams are modulated onto a DVB-T data stream using "Quadrature Amplitude Modulation" (QAM). The robust "High Priority" data stream (HP) with a lower data rate is modulated onto the more sensitive "Low Priority" data stream, which possesses a higher data rate. If "hierarchical modulation" is used by the transmission, in good reception conditions, the receivers can receive both data streams; in poorer reception conditions, only the "HP" portion.

Bx 4A	INPUT
Priority:	high

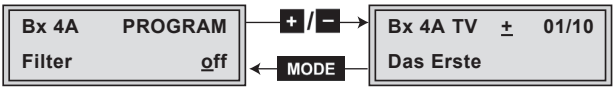
- By pressing **+**/**-** set to "**high**" or "**low**" (not relevant in the case of standard modulation).

- Press the **MODE** button.

—> The menu "Station filter " – "**PROGRAM**" is activated.

Station filter

The default setting for the station filter is "**off**". In this menu you define the stations received to be transmitted. If stations are deactivated the output data rate decreases.
If the station filter is switched off (factory default) all stations of the transport stream passes the station filter. As soon as the station filter is activated all stations are inactive and can be added to the transport stream selectively.



- Press the **+**/**-** button.

—> All stations (services) 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 + 01/10**
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 activated.
"**01/10**"	The 1st of 10 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 deactivated.
" * "	The star means that the TV or radio station selected is scrambled.

—> 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 "**–**"). Factory default: All stations are deactivated.

- To save changes and to activate the station filters press the **MODE** button.

—> The display shows "**PROGRAM Filter on**".

—> If stations are activated the corresponding PIDs (audio, video, text) are inserted into the data stream and the PAT and SDT tables are updated.

Test the status of the individual stations:
If the filter is switched on, press the ▶ button. In this mode you can test the settings of the station filters again or change them if necessary.

—> In the "**PROGRAM Filter on**" menu the station filters switched on can be switched "**off**" using the buttons **+** / **-** if necessary.

- Press the **MODE** button.

—> The "Output signal" – "**COFDM-MODE**" menu 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 "Stuffing" menu (page 30) 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**				**4k**				**8k**			
Symbol duration T_S [µs]	224				448				896			
Carrier space Δ f [kHz]	4.4643				2.232				1.116			
$(n_{carrier})_{theoretical}$	2048				4096				8192			
$(n_{carrier})_{real}$	1705				3410				6817			
Used bandwidth [MHz]	7.61				7.61				7.61			
Total symbol duration T_{GS} [µs]	280	262	238	231	560	504	476	462	1120	1008	952	924
Guard interval T_G [µs]	56	28	14	7	112	56	28	14	224	112	56	28
T_G / T_S	1/4	1/8	1/16	1/32	1/4	1/8	1/16	1/32	1/4	1/8	1/16	1/32

	Transmission parameters for DVB-T at a bandwidth of 7 MHz											
Transmission mode	**2k**				**4k**				**8k**			
Symbol duration T_S [µs]	224				448				896			
Carrier space Δ f [kHz]	4.4643				2.232				1.116			
$(n_{carrier})_{theoretical}$	2048				4096				8192			
$(n_{carrier})_{real}$	1705				3410				6817			
Used bandwidth [MHz]	6.66				6.66				6.66			
Total symbol duration T_{GS} [µs]	320	288	272	264	620	576	544	528	1280	1152	1088	1056
Guard interval T_G [µs]	64	32	16	8	128	64	32	16	256	128	64	32
T_G / T_S	1/4	1/8	1/16	1/32	1/4	1/8	1/16	1/32	1/4	1/8	1/16	1/32

	Transmission parameters for DVB-T at a bandwidth of 6 MHz											
Transmission mode	**2k**				**4k**				**8k**			
Symbol duration T_S [µs]	224				448				896			
Carrier space Δ f [kHz]	4.4643				2.232				1.116			
$(n_{carrier})_{theoretical}$	2048				4096				8192			
$(n_{carrier})_{real}$	1705				3410				6817			
Used bandwidth [MHz]	5.71				5.71				5.71			
Total symbol duration T_{GS} [µs]	373	336	317	308	767	672	634	616	1493	1344	1269	1232
Guard interval T_G [µs]	74.7	37.3	18.7	9.3	149	75	37.4	18.6	298.7	149.3	74.6	37.3
T_G / T_S	1/4	1/8	1/16	1/32	1/4	1/8	1/16	1/32	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. Therefore observe the current output data rate (menu "Stuffing", page 30). If necessary change the COFDM settings or delete services by the station filter (page 22).
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**").

Inverting the user signal

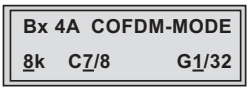
For exceptional cases and "older" digital cable receivers, the spectral position of the user signal can be inverted "**NEG**". The default setting is "**POS**".
- Use **◄**/**►** to place the cursor under "**POS**".
- Use **+**/**-** to set the spectral position to "**NEG**".

- Press the **MODE** button.

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

Transmission parameters

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



Transmission mode

In this menu item you set the quantity of carriers:
2k mode: 1512 carrier for user data (total 1705 carriers)
4k mode: 3024 carrier for user data (total 3410 carriers)
8k mode: 6048 carrier for user data (total 6817 carriers)

—> The standard modes for DVB-T are 2k and 8k.

- Using the **+**/**-** buttons set the transmission mode required ("**2k**" … "**8k**").

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.

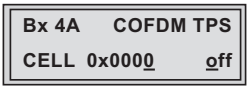
- Use the **◄**/**►** buttons to place the cursor under "**G...**".
- Set the guard interval required using the **+**/**-** buttons ("**G1/4**", "**G1/8**", "**G1/16**", "**G1/32**").

- 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.



- 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.

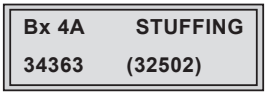
—> By pressing the ◄ button you return to the hexadecimal number setting.

- Press the **MODE** button.

—> The "**STUFFING**" menu is activated.

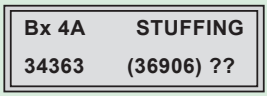
STUFFING

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



34363 (= "Number 1"): Maximum gross output data rate
(**32502**) (= "Number 2"): The current measured gross output data rate.
If the station filter is set correctly, this value is lower than the value of the "Number 1". The value fluctuates, since the data rates of individual stations are dynamically modified by the broadcasters.

—> Is the "Number 2" higher than "Number 1" question marks "**??**" appear in the display. In this case correct the COFDM settings (pages 27 ...) or the settings of the station filter (page 8).

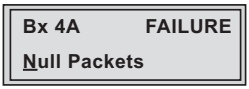


- Press the **MODE** button.

—> The "Substitute signal in the case of an incorrect input signal" – "**FAILURE**" menu 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**", 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.

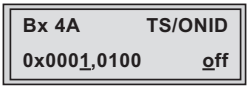


- Use the + / - buttons to set the output signal required.
- Press the MODE button.

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

TRANSPORT STREAM ID AND THE ORGNET-ID

If the stations of a transponder are split into the transport streams of the channel strips "**A**" and "**B**", one of the both transport streams a new identification must be allocated to realise the channel search of the settop boxes connected without mistakes.
If the ORGNET-ID is changed a new NIT must be generated (page 32).



- 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 "Network Information Table" – "**NIT**" menu is activated.

Network Information Table (NIT)

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

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

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

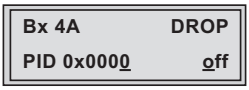
—> The NITs of the other …-COFDM cassettes will stay switched on. When the NIT of the cassette is switched on again ("**on**") by pressing the **-** button, the previously generated NIT is added again. If you have changed parameters in the meantime, you must first select "**Make**" to generate a new,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

- Press the **MODE** button.

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

DELETING A PID

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



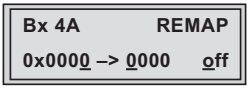
- Use the ◄/► buttons to place the cursor under the respective digit of the hexadecimal number of the PID to be deleted ("**0x0000**") and set the hexadecimal number using +/-.
- Use the ► button to set the cursor under "**off**" and delete the PID using the +/- buttons ("**on**").

- Press the **MODE** button.

—> The "Renaming a PID" – "**REMAP**" menu is activated.

RENAMING A PID

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



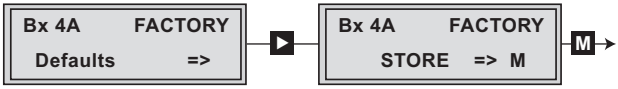
- Use the ◄/► buttons to place the cursor under the respective digit of the hexadecimal number of the PID to be changed ("**0x0000**") and set the hexadecimal number using +/-.
- Use the ◄/► buttons to place the cursor under the respective digit of the hexadecimal number of the new PID ("**–> 0000**").
- 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.

—> 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 "Selecting the channel strip" **without** invoking the factory defaults (page 17).

- Press the **M** button.

—> The factory defaults are saved. The display shows "STORE"
—> Back to "Selecting the cassette" (page 16).
—> By pressing the **MODE** button, you will be returned to the menu item "Selecting the channel strip" **without** saving the factory defaults (page 17).
—> If necessary set channel strip "**B**".

SAVING SETTINGS

- Press the **M** button.

—> Returning to "Selecting the cassette" menu (page 16).
—> 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.

—> By pressing the **MODE** button, you will be returned to the menu item "Selecting the channel strip" **without** saving the programmed data (page 17).
—> If necessary set channel strip "**B**".

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		

Declaration of CE conformity

GSS	Konformitätserklärung Declaration of Conformity / Déclaration de Conformité 005/ 10	CE

Der Hersteller/Importeur
The manufacturer/importer
Le producteur/importateur

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: / déclare, que le produit:

Bezeichnung / Name / Description

SAT- Cassette

Type / Model / Type

GSS PTDT 9200

Bestell-Nr. / Order-No. / Nº de réf.

GAP 3000

folgenden Normen entspricht:
is in accordance with the following specifications: / correspond aux normes suivantes:

EN 50083-2:	***2006***
EN 60065 :	***2002***
EN 60065 + A1 :	***2006***

Das Produkt erfüllt somit die Forderungen folgender EG-Richtlinien:
Therefore the product fulfils the demands of the following EC-Directives:
Le produit satisfait ainsi aux conditions des directives suivantes de la CE:

2006/95/EG	**Richtlinie betreffend elektrische Betriebsmittel zur Verwendung innerhalb bestimmter Spannungsgrenzen** **Directive relating to electrical equipment designed for use within certain voltage limits** **Directive relatives au matériel électrique destiné à être employé dans certaines limites de tension**
2004/108/EG	**Richtlinie über die elektromagnetische Verträglichkeit** **Directive relating to electromagnetic compatibility** **Directive relatives à la compatibilité électromagnétique**

Nürnberg, 16. April 2010

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