Assembly Instructions

PR●FESSIONAL

Terrestrial Digital
Terrestrial

PTDT 1000

English

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.
- Earth the SAT receiver in accordance with DIN EN 50083-1 / 60728-11 and VDE 0855 (earthed, equipotential bonding rail).
- **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 1000   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.

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
Types of modulation: .... QPSK, 16 QAM, 64 QAM
Output level: .... 96 dBµV

Output impedance: .... 75 Ω

ASI interfaces
Standard: ....DIN EN 50083-9
Format:..MPEG ISO IEC 13818-1
User data rate: .... 2 … 90 Mbit/s
Level (input / output): ....800 mV$_{PP}$ ± 10%
Return loss (input):... > 17 dB (5 … 270 MHz)

Connections
DVB-T inputs:...2 IEC sockets
HF loop-through outputs: ....2 IEC sockets
HF output: .... 1 IEC socket
ASI input: .... 1 BNC socket, 75 Ω
ASI output:.. 1 BNC socket, 75 Ω
LAN:.. 1 RJ-45 socket
Connection strip (10-pin):....................for supply voltages and control circuits
RS-232 socket: ....serial interface for software update
Common Interface: ....several channels can be descrambled.

2.4 Description

The cassette converts two incoming COFDM modulated signals into two outgoing COFDM modulated signals with free selectable frequency. The cassette has two DVB-T inputs and one ASI input (ASI – Asynchronous Serial Interface acc. DIN EN 50083-9).
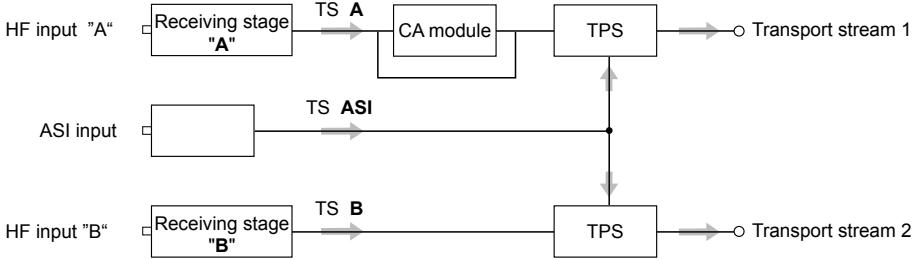
The transport streams decoded from the receiving stages and the transport stream fed in via the ASI input can be multiplexed into two transport streams by the TPS module. The signal path is set in the menu items input signal path "**INROUTE**" and output signal path "**OUTROUTE**".

The output transport streams can be outputted at the ASI output and/or via two modulators at the HF output.
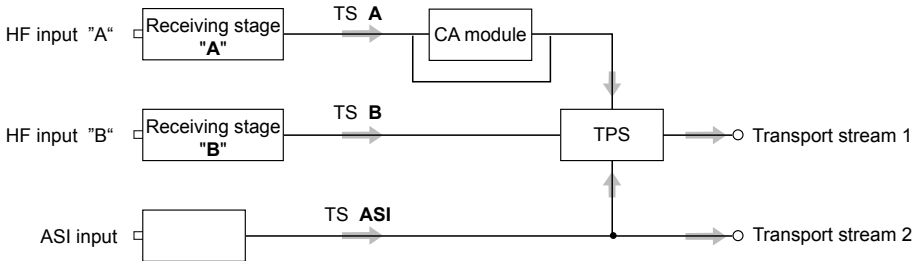
2.4.1 Input signal path "INROUTE"

Menu setting "A+ASI = 1   B+ASI = 2"

The transport streams of the receiving stage "TS **A**" and of the ASI input "TS **ASI**" generate the transport stream 1. The transport streams of the receiving stage "TS **B**" and of the ASI input "TS **ASI**" generate the transport stream 2.

HF input "A" → Receiving stage **"A"** — TS **A** → CA module — TPS → Transport stream 1

ASI input — TS **ASI** →

HF input "B" → Receiving stage **"B"** — TS **B** → TPS → Transport stream 2

Menu setting "A+B+ASI = 1   ASI = 2"

The transport streams of the receiving stages "TS **A**" and "TS **B**" and of the ASI input "TS **ASI**" generate the transport stream 1. The "TS **ASI**" transport stream fed via the ASI input generates the transport stream 2.

HF input "A" → Receiving stage **"A"** — TS **A** → CA module

HF input "B" → Receiving stage **"B"** — TS **B** → TPS → Transport stream 1

ASI input — TS **ASI** → Transport stream 2

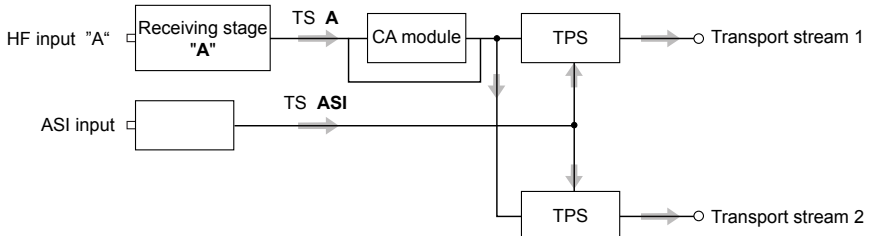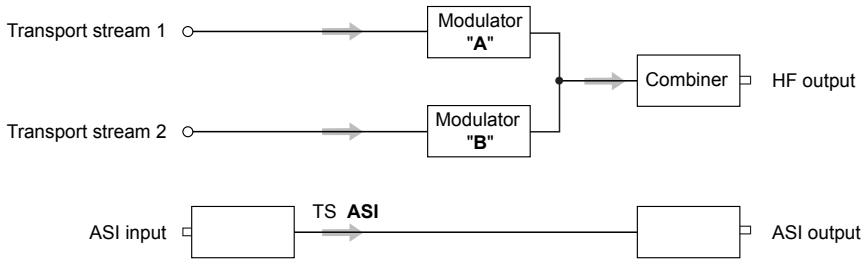#### Menu setting "A+ASI = 1   A+ASI = 2"

The transport streams of the receiving stage "**A**" "TS **A**" and of the ASI input "TS **ASI**" are split into transport stream 1 and 2. Receiving stage "**B**" is not used.

HF input "A" → Receiving stage **"A"** — TS **A** → CA module — TPS → Transport stream 1

ASI input — TS **ASI** →

TPS → Transport stream 2

2.4.2 Output signal path "OUTROUTE"

Menu setting "ASI => ASI"

Transport stream 1 is made available via modulator "**A**", transport stream 2 via modulator "**B**" and the transport stream from the ASI input "TS **ASI**" via the ASI output.

Transport stream 1 ○───	→	Modulator "**A**"	
			Combiner ─ HF output
Transport stream 2 ○───	→	Modulator "**B**"	

ASI input ─ [ ] ── TS **ASI** → ──── [ ] ─ ASI output

Menu setting "1 => ASI   ASI => MA"

Transport stream 1 is made available via the ASI output, transport stream 2 via modulator "**B**" and the transport stream from the ASI input "TS **ASI**" via modulator "**A**" (MA).

Transport stream 1 ○──────── → ──────── [ ] ─ ASI output

ASI input ─ [ ] ── TS **ASI** → Modulator "**A**"
Combiner ─ HF output
Transport stream 2 ○─── → Modulator "**B**"

Menu setting "2 => ASI   ASI => MB"
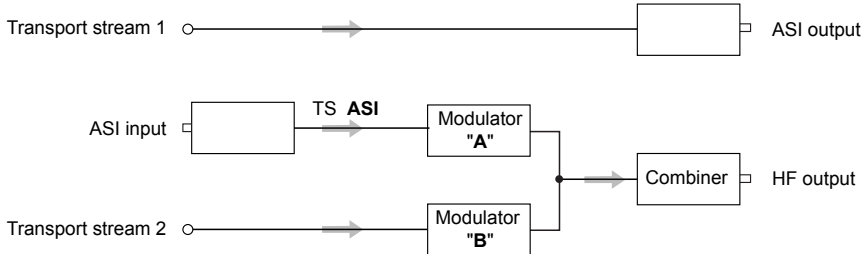
Transport stream 1 is made available via modulator "**A**", transport stream 2 via the ASI output and the transport stream from the ASI input "TS **ASI**" via modulator "**B**" (MB).

Transport stream 1 ○─── → Modulator "**A**"
Combiner ─ HF output
ASI input ─ [ ] ── TS **ASI** → Modulator "**B**"

Transport stream 2 ○──────── → ──────── [ ] ─ ASI output
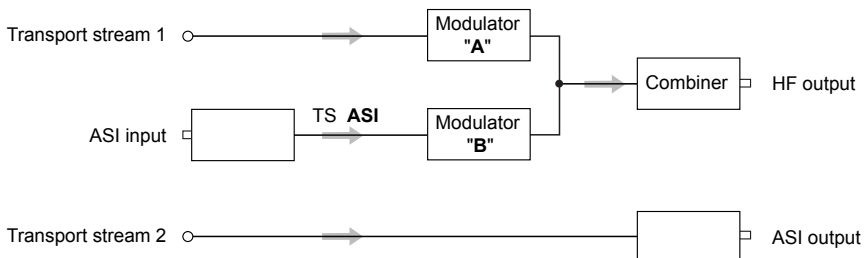
2.4.3 General

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**". Using an adequate CA module scrambled stations can be descrambled via channel strip "**A**".

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. Additionally the quality of the transport stream received is displayed ("**CN…**"). 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. Additionally a transport stream is made available via the ASI output dependent on the signal path set.

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 42**" 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 the following head-end stations:
PSU 12, PSU 8-16 and PST 19-1.

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 42**" appears.

2.6 How the TPS module works

After decoding COFDM-modulated signals, the demodulated data streams and the data stream fed via the ASI socket 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. Additionally stations of the different transport streams can be assembled to a new transport stream.

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.

Changing the operator ID (CAT)

Some network operators transmit an operator ID in the data stream (e.g. visAvision). By changing the CAT the operator ID can be adjusted to the current demands.

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.
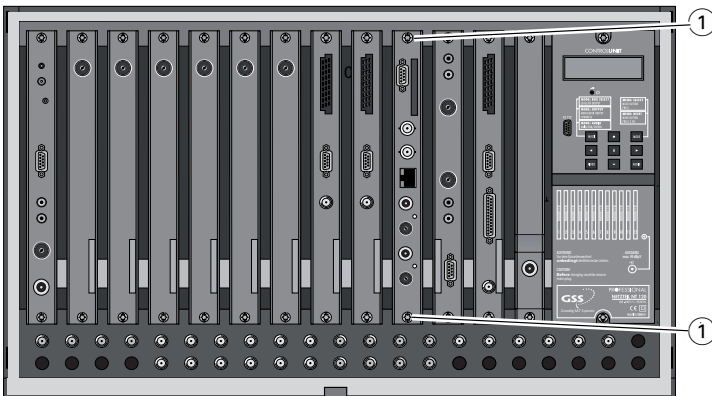
3.2 EMC regulations

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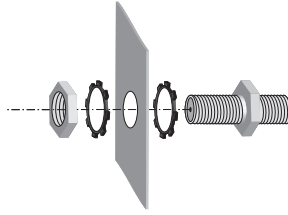
- Insert the required number of cable terminals in the openings provided in the head-end station or in the 19" cabinet.

> —> Cable terminals are not included in the scope of delivery.

⚠ 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   Overview of the cassette
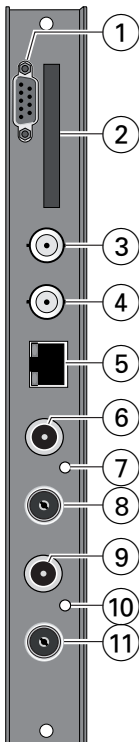
① D-SUB socket "RS 232"

② Slot for CA module

③ ASI output

④ ASI input

⑤ without function

⑥ Loop-through output of HF input "**A**"

⑦ Status LED of HF input "**A**"

⑧ HF input "**A**" (channel strip "**A**")

⑨ Loop-through output of HF input "**B**"

⑩ Status LED of HF input "**B**"

⑪ HF input "**B**" (channel strip "**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***".

3.4 Connecting the cassette

- Connect the HF connections to the inputs ⑧ (channel strip "**A**") and ⑪ (channel strip "**B**") .
- Connect the ASI input ④ and the ASI output ③ to the peripheral ASI devices.

3.5 Retrofitting a CA module

The cassette is equipped with a common interface. It allows you to connect a CA module for various scrambling systems and service providers. Scrambled stations 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 module to be used to ensure that it is 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 module, please read the corresponding operating manual from the respective provider.

- Insert the smart card into the CA module so that the chip ③ on the smart card ① faces the thicker side (top) of the CA module ②.
- Insert the CA module into the slot ④ (see chap. 3.3) with the top side of the CA module facing the top side of the cassette.
- Push the CA module without canting into the guide rails of the CA slot ④ and contact it to the common interface.

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:

– Input signal path
– Output signal path
– Channel strip
– Channel / frequency setting
– Output channel / output frequency
– Output level
– Input channel
– Hierarchical modulation
– Station filter
– CA module (if available)
– Output signal
– Transmission parameters
– Station identification
– Output data rate
– 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 up-date 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 24) and adjust the TV test receiver to this channel / frequency.
- Switch on the channel strip (modulator) if necessary (page 24). For each channel strip, there is a status LED which indicates if the channel strip is switched on.

Status-LED   Status-LED
Kanalzug "B"   Kanalzug "A"
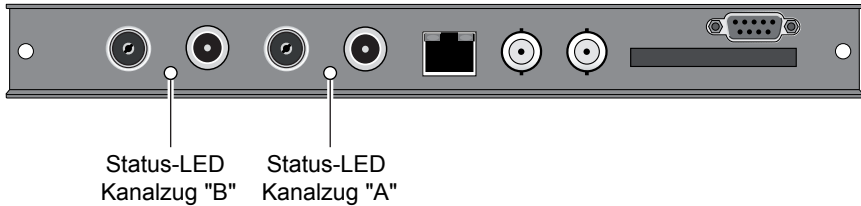
- Balance the output levels of the channel strips "**A**" and "**B**" if the difference in level is ≥ 1 dB (page 25).

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

Channel strips "A" (without CA module) and "B"

| Ein / On → | BE–Remote   V 42 |
| | please wait … |

t > 10 s

Box 1 ....
....

+

| Box 4   DVBT-TPM | **+** / **−** | Box 5 .... |
| V 14   COFDM – – – | | .... |

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MODE

Bx 4 INROUTE	**+** / **−**
A+B+ASI=1 ASI=2	A+ASI=1 B+ASI=2
	A+B+ASI=1 ASI=2
	A+ASI=1 A+ASI=2

M

M ← **MODE** **AUDIO**

| Bx 4   OUTROUTE | **MULTI** | Bx 4   ASI RATE | **◀** / **▶** |
| 1=>ASI   ASI=>MA | **AUDIO** | 108000 KBits | **+** / **−** |

M

+ / **−**

1=>ASI   ASI=>MA
2=>ASI   ASI=>MB
ASI=>ASI

MODE

Bx 4 ASI OPTION	**◀** / **▶**	188 / 204
188 pos. cont.	**+** / **−**	positiv / negativ, *positive / negative*
		kontinuierlich / burst,
		continuous / burst

MODE **AUDIO**

M **MODE**

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| Bx 4   LINE | **◀** / **▶** |
| Line A <=   => Line B | Line A / Line B |

M **◀** **AUDIO**

| Bx 4A   OUTPUT | **+** / **−**   Channel / Freq. |
| Channel |

M **MODE** **AUDIO**

| Bx 4A   OUTPUT | **◀** / **▶** |
| 850.00MHz   on | **+** / **−**   on / off |

+ / **−**

M **MODE** **AUDIO**

```
┌─────────────────────┐
│ Bx 4A      LEVEL    │
│ -3 dB               │    [+]/[-]   0 … -10 dB
└─────────────────────┘
    [M]  [MODE] [AUDIO]

┌─ ─ ─ ─ ─ ─ ─ ─ ─ ┐
│ INROUTE:          │
│ A+ASI=1  A+ASI=2  │
│ LINE: B           │
└─ ─ ─ ─ ─ ─ ─ ─ ─ ┘

┌─────────────────────┐      ┌─────────────────────┐
│ Bx 4A      INPUT    │ [▶]  │ Bx 4A      INPUT    │
[+]/[-] │ C66 (834.0)    OK  │ [◀]  │ C66    0       OK  │ [+]/[-] -64 … +64
└─────────────────────┘      └─────────────────────┘
    [M]  [MODE] [AUDIO]

┌─────────────────────┐
│ Bx 4A      INPUT    │
│ Priority:     high  │    [+]/[-]   high / low
└─────────────────────┘
    [M]  [MODE] [AUDIO]
```

```
┌─────────────────────┐  [M]   ┌─────────────────────┐
│ Bx 4A    PROGRAM    │ [▶]    │ Bx 4A TV   ±  01/10 │   [+]/[-]  Programme entfernen / hinzufügen
│ Filter         off  │       │ Das Erste           │            Removing / activating stations
└─────────────────────┘        └─────────────────────┘   [◀]/[▶]  nächster Service (Programm)
    [M]  [MODE]      [+]/[-]                                       next service (station)
                     on -> off
                   [AUDIO]  [MODE]
                                ┌─────────────────────┐
                          [M]   │ Bx 4B TV   ±  02/19 │   [+]/[-]  Programme entfernen / hinzufügen
                                │ SWF3                │            Removing / activating stations
                                └─────────────────────┘   [◀]/[▶]  nächster Service (Programm)
                                                                   next service (station)
                                [AUDIO]  [MODE]
                                ┌─────────────────────┐
                          [M]   │ ASI    TV   ±  01/10│   [+]/[-]  Programme entfernen / hinzufügen
                                │ . . . . .           │            Removing / activating stations
                                └─────────────────────┘   [◀]/[▶]  nächster Service (Programm)
                                                                   next service (station)
                                        [MODE]
```

Kanalzug "A" ohne
CA-Modul,
Kanalzug "B" /
*Channel strip "A"
without CA module,
Channel strip "B"*

Kanalzug "A" mit CA-Modul
Channel strip "A" with CA module

(C)

(D)

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```
               [AUDIO]
┌─────────────────────┐
[+]/[-] │ Bx 4A  COFDM-MODE  │ [◀]/[▶]
5…8MHz │ 8MHz  QAM64   POS  │ [+]/[-]  QPSK…QAM64
└─────────────────────┘           positiv / negativ
    [M]  [MODE] [AUDIO]            *positive / negative*

┌─────────────────────┐
[+]/[-] │ Bx 4A  COFDM-MODE  │ [◀]/[▶]
2 … 8k │ 8k   C7/8     G1/32 │ [+]/[-]  C1/2 … C7/8
└─────────────────────┘           G1/4 … G 1/32
    [M]  [MODE] [AUDIO]
```

```
┌─────────────────────────┐
│ Bx 4A      COFDM TPS     │  ◀/▶    0x0000 … 0xFFFF
│ CELL  0x0000        off  │  +/−    on / off
└─────────────────────────┘
   M   MODE   AUDIO

┌─────────────────────────┐
│ Bx 4A      STUFFING      │
│ 34363     (32502)        │
└─────────────────────────┘
   M   MODE   AUDIO

┌─────────────────────────┐
│ Bx 4A      FAILURE       │  +/−
│ Null Packets             │  Null Packets … Single Carrier
└─────────────────────────┘
   M   MODE   AUDIO

◀/▶   ┌─────────────────────────┐  ◀/▶
+/−   │ Bx 4A      TS/ONID       │  +/−   off / on
      │ 0x0001,0100        off   │
      └─────────────────────────┘
         M   MODE   AUDIO

+/−   ┌─────────────────────────┐
on/off│ Bx 4A            NIT     │  ▶   Make
      │ off        => Make       │
      └─────────────────────────┘
         M   MODE   AUDIO

◀/▶   ┌─────────────────────────┐  ◀/▶
+/−   │ Bx 4A            CAT-ID  │  +/−   on / off
      │ 0xDE00             off   │
      └─────────────────────────┘
         M   MODE   AUDIO

◀/▶   ┌─────────────────────────┐  ◀/▶
+/−   │ Bx 4A            DROP    │  +/−   on / off
      │ PID 0x0000         off   │
      └─────────────────────────┘
         M   MODE   AUDIO

◀/▶   ┌─────────────────────────┐  ◀/▶
+/−   │ Bx 4A            REMAP   │  +/−   on / off
      │ 0x0000 –> 0000     off   │
      └─────────────────────────┘
         M   MODE   AUDIO
```

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```
┌─────────────────────────┐       ┌─────────────────────────┐
│ Bx 4A      FACTORY       │   ▶   │ Bx 4A      FACTORY       │  M
│ Defaults         =>      │       │      STORE   => M        │
└─────────────────────────┘       └─────────────────────────┘
   M   MODE                              MODE
```

Ⓐ auf Werkseinstellung
zurücksetzen und speichern
*reset to factory defaults
and store*

Ⓑ

Channel strip "A" with CA module

Ⓒ

Bx 4A	CA
PID Check	**on**

+ / **−** on / off

MODE

Bx 4A	CA
Menu <=	=> Edit

M **MODE**

◄   ►

MODE

Bx 4A 0**1**/03 MENU
Information *)

+ / **−**

*) Die angezeigte Information ist
abhängig vom verwendeten
CA-Modul.
*The information displayed is
dependent on the CA module
used.*

Bx 4A   TV   **X** 04/09
. . . .

+ / **−** X / 0

X – entschlüsseln
descrambling
0 – nicht entschlüsseln
no descrambling

◄ / ►
nächster Service
next service

Ⓓ

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.
> —> Pressing the **AUDIO** button returns to the previous menu.

• Switch on the head-end station

> —> The display shows the software version (e.g. V 42)
> —> The processor reads the cassettes' data (approx. 10 seconds).


```
           ┌──────────────────────┐
(Ein / On)→│ BE–Remote      V 42  │
           │ please wait …        │
           └──────────────────────┘
                     │
                  ┌───────┐
                  │ t > 10 s │
                  └───────┘
                     ↓
```

Selecting the cassette


```
┌──────────────────────┐
│ Box 1        ……………    │
│ ……………        ……………    │
└──────────────────────┘
        │
       [+]
        ↓
┌──────────────────────┐        ┌──────────────────────┐
│ Box 4     DVBT-TPM   │        │ Box 5        ……………    │
│ V 14      COFDM – – –│ ←[+]/[–]→│ ……………        ……………    │
└──────────────────────┘        └──────────────────────┘
```
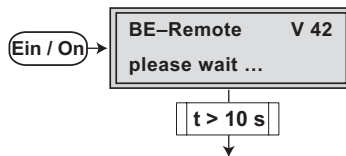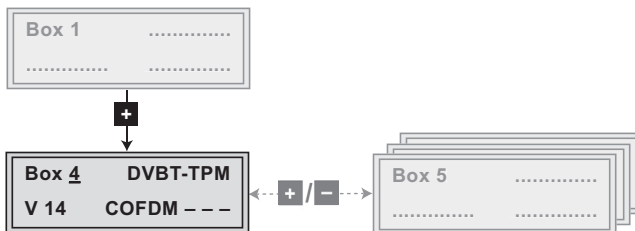
• Select the cassette you want to programme (e.g. **Box 4**) by repeatedly pressing the button **+** if necessary.

> —> The display shows e.g. the menu "**Box 4   DVBS2-TPM**":
> "**Box 4**"   stands for slot 4
> "**DVBS2-TPM**"   Type of cassette
> "**V 14**"   Software version of the cassette

• Press the **MODE** button.

Input signal path

In this menu you define the signal path of the input transport streams.
Menu setting "**A+ASI = 1   B+ASI = 2**" (page 7).
Menu setting "**A+B+ASI = 1   ASI = 2**" (page 7).
Menu setting "**A+ASI = 1   A+ASI = 2**" (page 7).

```
Bx 4          INROUTE
A+B+ASI=1       ASI=2
```

• Use the **+**/**-** buttons to select the signal path wished.

• Press the **MODE** button.

Output signal path

In this menu you define the signal path of the output transport streams.
Menu setting "**ASI => ASI**" (page 8).
Menu setting "**1 => ASI   ASI => MA**" (page 8).
Menu setting "**2 => ASI   ASI => MB**" (page 8).

```
Bx 4          OUTROUTE
1=>ASI         ASI=>MA
```

• Use the **+**/**-** buttons to select the signal path wished.

• If you do not want to do ASI settings, press the **MODE** button.

• To set the ASI parameters press the **MULTI** button.

ASI transfer rate

In this menu you set the output transfer rate for the ASI component connected. For this setting please take the required information from the documentation (technical data) of the ASI component to be connected.

```
Bx 4          ASI RATE
108000 KBits
```

- Use the ◄/► buttons to place the cursor under the digits to be set for the transfer rate then use the +/- buttons to set the transfer rate wished.

- Press the **MODE** button.

—> The "ASI options" – "**ASI OPTION**" menu is activated.

ASI options

In this menu you define the size of the data packets, their polarity and the type of transmission.
For this setting please take the required information from the documentation (technical data) of the ASI component to be connected.

```
Bx 4       ASI OPTION
188   pos.   cont.
```

- Press the +/- buttons to set the size of the data packets ("**188**" or "**204**" bits).

- If the polarity of the data to be transmitted has to be changed, press the ◄/► buttons to place the cursor under "**pos.**" (positive – standard) and using the +/- buttons set to "**neg.**" (negative).

- To change the type of transmission press the ◄/► buttons to position the cursor under "**cont.**" (continuous – standard) and using the +/- set to "**burst**".

—> Setting "**cont.**"
The data packets of the user data are collected to a great data packet in the transport stream.

—> Seting "**burst**"
The data packets of the user data are spaced out evenly in the trans-
port stream.

• Press the **MODE** button.

—> The "Channel strip" – "**LINE**" menu is activated.

Channel strip

```
Bx 4              LINE
Line A <=   => Line B
```
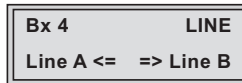
• By pressing ◄ select channel strip "**A**" ("**Line A**") or select channel strip "**B**"
("**Line B**") by pressing the ► button.

—> 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.

⚠ 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 chan-
nel 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 (chan-
nels 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 47).
Please note thereby that many receivers cannot receive the channel ranges
S21 … S41 (306 … 466 MHz).

```
Bx 4A          OUTPUT
Channel
```
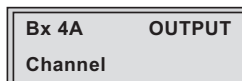
- Use ➕/➖ to select channel setting "**Channel**" or frequency setting "**Freq.**".

- Press the **MODE** button.

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

Output channel

Output frequency

Modulator

Setting the 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.

```
Bx 4A          OUTPUT
C21                  on
```
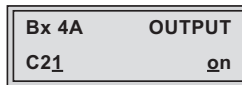
- Use the ➕/➖ buttons to set the output channel.

Setting the 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.

```
Bx 4A          OUTPUT
850.00MHz            on
```
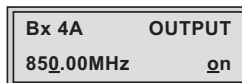
- Use the ◀/▶ buttons to place the cursor under the digit to be set for the frequency display then use ➕/➖ to set the output frequency wished.

Switching the modulator off or on

```
Bx 4A          OUTPUT
C21                  on
```
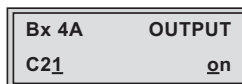
- To switch off the modulator place the cursor under "**on**" using the ▶ button and switch "**off**" the modulator of the channel strip using the ➕/➖ buttons.

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

- Press the **MODE** button.

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**.

```
Bx 4A          LEVEL
  -3 dB
```

- 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 23) and set the following menu items:
  - "Channel / frequency setting" (page 23).
  - "Setting the output channel" or "Output frequency" (page 24).
  - Switch on the modulator if necessary (page 24).
  - 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**").

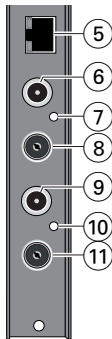- Press the **MODE** button.

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.

| Bx 4A   INPUT | | | | Bx 4A   INPUT |
| C6<u>6</u> (834.0)   OK | ▶ | | | C66   <u>0</u>   OK |
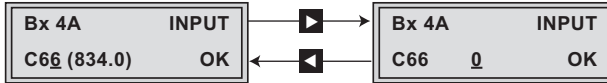
- Use ➕/➖ to set the desired input channel.
- If necessary use the ▶ button to activate the menu "Fine tuning" ("**0**" is displayed additionally).
- Use ➕/➖ for fine tuning the input channel.

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

⑦ Status LED of the channel strip "**A**"
⑩ Status LED of the channel strip "**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 activated the output data rate increases.
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.
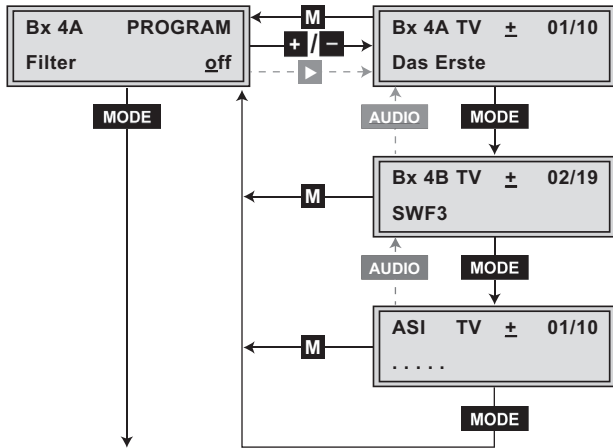
The figure of the menu below is dependent on the setting of the "Selecting the input signal path" menu (page 21).
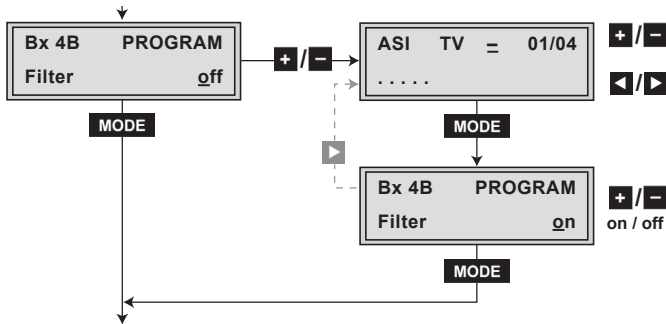The menu shows the setting "**A+B+ASI = 1   ASI = 2**".
With this setting the transport stream of channel strip "**B**" is routed to the transport stream of channel strip "**A**" and therefore cannot be set in channel strip "**B**". Programming channel strip "**B**" the transport stream coming from the ASI input can be processed only.

Menu setting "**A+B+ASI = 1   ASI = 2**".
Channel strip "**A**"

```
┌─────────────────────┐    ┌M┐    ┌─────────────────────┐
│ Bx 4A     PROGRAM   │◄──┤ ├───►│ Bx 4A TV  ±   01/10 │
│ Filter         off  │   ┌+ / −┐ │ Das Erste           │
└─────────────────────┘   └─ ▶ ─┘ └─────────────────────┘
         │                              │
       ┌MODE┐                ┌AUDIO┐ ┌MODE┐
         │                              ▼
         │                   ┌─────────────────────┐
         │            ◄──┤M├─│ Bx 4B TV  ±   02/19 │
         │                   │ SWF3                │
         │                   └─────────────────────┘
         │                              │
         │                    ┌AUDIO┐ ┌MODE┐
         │                              ▼
         │                   ┌─────────────────────┐
         │            ◄──┤M├─│ ASI   TV  ±   01/10 │
         │                   │ . . . . .           │
         │                   └─────────────────────┘
         │                              │
         │                           ┌MODE┐
         ▼                              │
```

—> The following figure shows the "Station filter" menu of channel strip "**B**".

```
         │
         ▼
┌─────────────────────┐   ┌+ / −┐  ┌─────────────────────┐   ┌+ / −┐
│ Bx 4B     PROGRAM   │──┤     ├─►│ ASI   TV  =   01/04 │   ┌◄ / ►┐
│ Filter         off  │  └─────┘  │ . . . . .           │
└─────────────────────┘           └─────────────────────┘
       ┌MODE┐                            ┌MODE┐
         │                  ┌▶┐             ▼
         │                          ┌─────────────────────┐   ┌+ / −┐
         │                          │ Bx 4B     PROGRAM   │   on / off
         │                          │ Filter          on  │
         │                          └─────────────────────┘
         │                                ┌MODE┐
         ▼                                  │
```

• Press the ⊞ / ⊟ button.

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

—> If no station is found, the following error 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 and the components connected to the ASI input.

—> 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 stationselected is encoded. To enable the stations, 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 " **–** ").
Factory default: All stations are deactivated.

- Press the **MODE** button.
- Set the station filters of channel strip "**B**" and "**ASI**" in the same way as channel strip "**A**".

• To save changes and to activate the station filters press the **MODE** button.
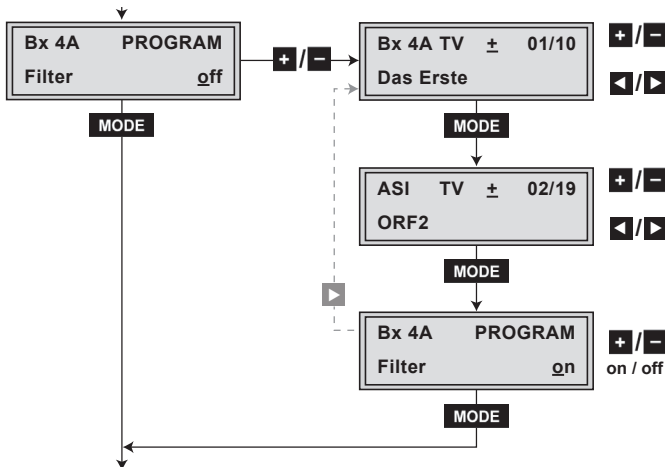
Test the status of the individual stations:

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.

Menu setting   "**A+ASI = 1   B+ASI = 2**"
                   "**A+ASI = 1   A+ASI = 2**".

Channel strip "**A**"

Bx 4A PROGRAM		**+** / **−**
Filter off		**◀** / **▶**

+ / **−**

Bx 4A TV ± 01/10	**+** / **−**
Das Erste	**◀** / **▶**

MODE   **MODE**

ASI TV ± 02/19	**+** / **−**
ORF2	**◀** / **▶**

MODE

▶

Bx 4A PROGRAM	**+** / **−**
Filter on	on / off

MODE

• Set the channel strip "**A**" or "**B**".

- Press the **MODE** button.

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 is made according to the following formula:

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

Modulation	Code rate	Net data rate [kbit/s] at a bandwidth of 8 MHz			
		Guard interval			
		$1/4$	$1/8$	$1/16$	$1/32$
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 Δf [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 Δf [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 Δf [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	$^1/_4$	$^1/_8$	$^1/_{16}$	$^1/_{32}$	$^1/_4$	$^1/_8$	$^1/_{16}$	$^1/_{32}$	$^1/_4$	$^1/_8$	$^1/_{16}$	$^1/_{32}$

Setting the output signal

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

```
Bx 4A  COFDM-MODE
8MHz  QAM64     POS
```

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.

```
Bx 4A  COFDM-MODE
8MHz  QAM64     POS
```

• 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.

```
┌─────────────────────┐
│ Bx 4A  COFDM-MODE   │
│ 8k   C7/8      G1/32 │
└─────────────────────┘
```

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.

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.

```
Bx 4A     COFDM TPS
CELL  0x0000      off
```

• 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.

• Press the **MODE** button.

Output data rate

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

```
┌─────────────────────────┐
│ Bx 4A        STUFFING   │
│ 34363       (32502)     │
└─────────────────────────┘
    Number 1    Number 2
```

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.

—> "Number 2" is not displayed in the channel strips "**A**" or "**B**" at the settings "**OUTROUTE 1=>ASI ASI=>MA**" or "**2=>ASI ASI=>MB**", for the data rate of the ASI input signal cannot be measured. The ASI input signal therefore must be built in such a way so that the output data rate ("Number 1") is not exceeded.
The data rates of the transport streams built by the cassette can be measured at the setting "**OUTROUTE ASI=>ASI**" and be displayed in the respective channel strip.

—> Is the "Number 2" higher than "Number 1" question marks "**??**" appear in the display. In this case correct the COFDM settings (pages 31 …) or the settings of the station filter (page 27).

```
┌─────────────────────────┐
│ Bx 4A        STUFFING   │
│ 34363       (36906) ??  │
└─────────────────────────┘
```

• 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.

```
Bx 4A          FAILURE
Null Packets
```
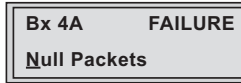
• Use the **+**/**-** buttons to set the output signal required.

• 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 39).
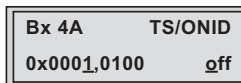
```
Bx 4A          TS/ONID
0x0001,0100        off
```

• 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.

Network Information Table (NIT)

```
Bx 4A              NIT
off        =>  Make
```

- 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.

Network/operator identification

In this menu, you can change the network/operator identification (CAT-ID – **C**onditional **A**ccess **T**able - **Id**entification), for example of the visAvision transponder (Eutelsat 8° West).

```
Bx 4A          CAT-ID
0xDE00            off
```

CAT is not to be changed:
• Press the **MODE** button.

> —> The "Deleting a PID" – "**DROP**" menu is activated (page 41).

Changing the CAT:
The network operator e.g. requires that you set the operator ID of the visAvision transponder to "2".

• Use the **◄**/**►** buttons to position the cursor under the digit to be set.
• Use **+**/**-** to change the operator ID from "**0xDE00**" to "**0xDE02**".
• Use the **►** button to position the cursor under "**off**," then use **+**/**-** to activate the new CAT ("**on**").

> —> The menu display switches to "**modified**".
> —> If you try to change the network/operator identification (operator ID) of a transponder which cannot be modified, "**not modified**" appears in the display.

• Press the **MODE** button.

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

Deleting a PID

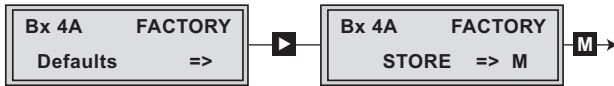In this menu a PID of the transport stream can be deleted.

```
Bx 4A              DROP
PID 0x0000          off
```

- 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.

```
Bx 4A            REMAP
0x0000 –> 0000    off
```

- 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.

```
┌─────────────────────┐       ┌─────────────────────┐
│ Bx 4A     FACTORY   │       │ Bx 4A      FACTORY  │
│ Defaults      =>    │  ▶    │      STORE  =>  M   │  M ▸
└─────────────────────┘       └─────────────────────┘
```

• 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 23).

• Press the **M** button.

> —> The factory defaults are saved. The display shows "STORE"
> —> Back to "Selecting the cassette" (page 20).
> —> By pressing the **MODE** button, you will be returned to the menu item "Selecting the channel strip" **without** saving the factory defaults (page 23).
> —> If necessary set channel strip "**B**".

Saving settings

• Press the **M** button.

> —> Returning to "Selecting the cassette" menu (page 20).
> —> 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.
>   "**C**" – Network/operator identification CAT 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 23).
> —> If necessary set channel strip "**B**".

5.4.1 Operation with a CA module

In order for this function of the CA module to be possible, stations capable of being descrambled by the CA module you are using and your smart card must be selected in the "Station filter" – "**PROGRAM**" menu (page 27).
Short-term picture loss may occur when switching between scrambled and unscrambled broadcasts within one service (e.g. scrambled stations and unscrambled regional broadcasters).

Setting the PID monitoring

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

```
Bx 4A              CA
PID Check          on
```

- Use the **+** / **-** buttons to switch "**off**" or "**on**" the PID monitoring.

- Press the **MODE** button.

—> The "Configuring the CA module" – "**CA**" menu is activated.

Configuring the CA module

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.
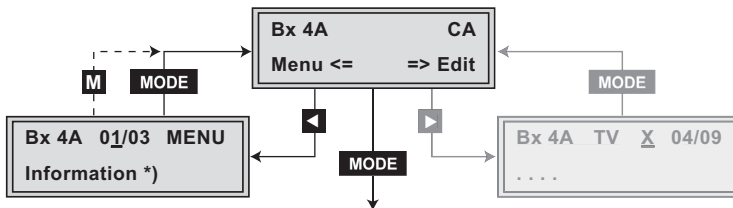
—> By pressing the **MODE** button you can skip the "Configuring the CA module" – "**CA**" menu and activate the "Output signal" – "**COFDM-MODE**" menu (page 34).

- Press the ◄ button to activate the menu of the CA module.

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

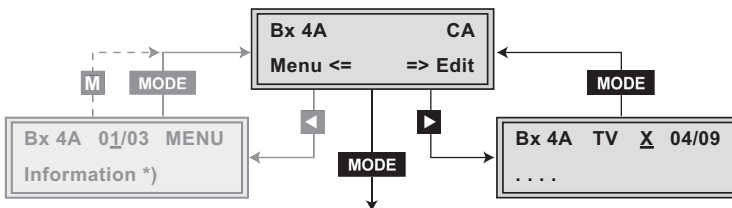—> You will be returned to the "CA module" – "**CA**" menu item.
—> By pressing the **MODE** button you can cancel the settings in the menu of the CA module and are returned to the "CA module" – "**CA**" menu.

- Press the ► button.

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

Station filter

In this menu you select the stations wished from the encoded data stream, which are to be descrambled.

Meaning of the indicators in the example:

"**Bx 4A**"	Slot 4, channel strip "**A**"
"**TV**"	TV channel type
"**X**"	The currently selected station is to descramble.
"**04/09**"	The 4th of 9 stations read is being displayed.
"**. . . .**"	Station name

Further possible terms displayed:

"**RA**"	Radio channel type
"**0**"	The currently selected station remain unchanged.

• Use the ◄ / ► buttons to call up the stations in sequential order which are to be descrambled, then use + / - to descramble ("**X**") or not to descramble them ("**0**").

Save changes and activate the station filter:
• Press the **MODE** button.

> —> The filter is activated. The display shows the "CA module" – "**CA**" menu.

```
Bx 4A           CA

Menu <=     => Edit
```

• Press the **MODE** button.

> —> The "Output signal" – "**COFDM-MODE**" menu is activated (page 34).

6   Final procedures

⚠ **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).

7 Channel and frequency tables

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		

Service:

Phone: +49 (0) 911 / 703 2221
Fax: +49 (0) 911 / 703 2326
Email: service@gss.de