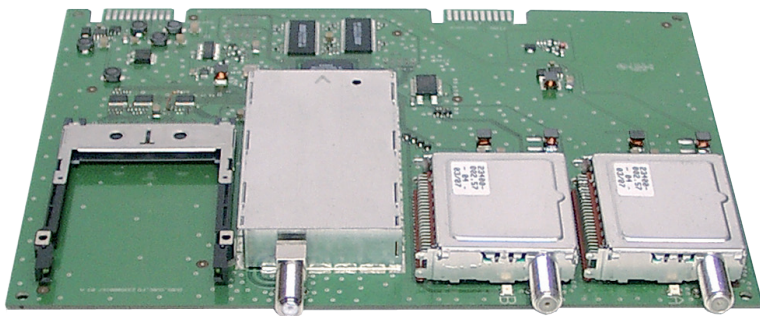# Assembly Instructions

**English**

# Head-End Station STC 160
# Head-End Digital Modulator QAM

## HDMH 660 CI TPS



**Notes on the Assembly Instructions.**
As well as this supplementary Assembly Instructions, the Assembly Instructions for the STC 160 apply.

CE

# CONTENTS

# 1  SAFETY REGULATIONS

⚠ • The standards EN/DIN EN 50083 resp. IEC/EN/DIN EN 60728 must be observed.
  • Do not perform installation and service work during thunderstorms.
  • 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.
  • Avoid short circuits!
  • Observe the relevant country-specific standards, regulations and guidelines on the installation and operation of antenna systems.
  • To ensure electromagnetic compatibility, make sure all connections are tight and the covers are screwed on securely.
  • No liability is accepted for damage caused by faulty connections or inappropriate handling of the device.

⚠ Check the head-end station STC 160 according to the safety instructions listed in their assembly instruction.

Take precautions 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  SCOPE OF DELIVERY

1 Head-end Digital Modulator QAM "HDMH 660 CI TPS"
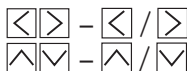1 HF connection cable
1 Brief Assembly Instructions

## 2.2 MEANING OF THE SYMBOLS USED

⚠️          Important note

—>         General note

◁▷ – ◁ / ▷
△▽ – △ / ▽      Optional use of the buttons

•          Performing works

## 2.3 TECHNICAL DATA

The requirements of the following EU directives are met:
2006/95/EC, 2004/108/EC
The product fulfils the guidelines and standards for CE labelling (page 41).

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

**HF input**

Frequency range: ...................................................... 925 … 2150 MHz
Level range: .......................................................... 60 dBμV … 80 dBμV
Input impedance: ................................................................... 75 Ω
Return loss: ........................................................................... 8 dB
DVB-S modes: ...........................................DVB-S $^1/_2$ , $^2/_3$ , $^3/_4$ , $^5/_6$ , $^7/_8$
DVB-S2 modes: ...................QPSK $^1/_2$ , $^3/_5$ , $^2/_3$ , $^3/_4$ , $^4/_5$ , $^5/_6$ , $^8/_9$ , $^9/_{10}$
                     8PSK $^3/_5$ , $^2/_3$ , $^3/_4$ , $^5/_6$ , $^8/_9$ , $^9/_{10}$
Symbol rate DVB-S: .......................................... QPSK:   2 … 45 MSymb/s
Symbol rate DVB-S2: ....................................... QPSK: 10 … 30 MSymb/s
                     8PSK: 10 … 31 MSymb/s
LNB operating voltage: ......................................... +12 V / 2 x ≤300 mA

**HF output**

Channels: ...................................................................... S21 … C69
Frequency range: .............................................. 42.0 MHz … 860.0 MHz
Types of modulation: ...................................QAM 4, 16, 32, 64, 128, 256
Output level: ...................................................................... 83 dBμV
Output impedance: ................................................................. 75 Ω

**Connections**

SAT inputs:..........................................................................2 F sockets
HF output:........................................................................... 1 F socket
Connection strip (20-pin): ..................for supply voltages and control circuits
Conditional access:...........................several channels can be descrambled

---

| 2.4 | DESCRIPTION |
|---|---|

The Head-End Digital Modulator HDTV "HDMH 660 CI TPS", in the following called DVB-S2-QAM module converts two DVB-S-/DVB-S2-modulated data streams into two QAM-modulated data streams. The DVB-S2-QAM module has two SAT-IF inputs and one HF output. Components (e.g. LNB) which are connected upstream can be powered through the SAT-IF inputs.

The DVB-S2-QAM module is equipped with two channel strips ("**A**" and "**B**"). The channel strips consist of the digital SAT tuners, the digital signal processing levels and an output converter. The channel strips for the DVB-S2-QAM module are indicated in the head-end station display with "**Bx …A**" and "**Bx …B**".

Using an adequate CA module scrambled channels can be descrambled via channel strip "**A**". The control of the module takes place via the control unit of the head-end station.

Two LEDs indicate if the respective channel strip is switched on (LED illuminates) or off, and also provide an indication of the signal quality based on their colour. Additionally the quality of the data stream received is displayed ("**CN…**").

The integrated TP module (Transport Stream Processing) processes the data from the demodulated transport streams. This enables service information (NIT – Network Information Table) to be changed, data rates to be increased (stuffing) and for individual stations to be deleted from the transport stream (thus optimising bandwidth for the other stations being transmitted). In addition, the operator ID (required for e.g. visAvision) can be set.

The HF output signals are sent through the HF output of the DVB-S2-QAM module to the output collector.

When the head-end station is switched on, the two-line LC display shows the "**SETUP**" menu and the software version of the control unit. The head-end station output level can be adjusted in this menu.

The DVB-S2-QAM module operating software can be updated using a PC or notebook and the software "**BE-Flash**" via the 9-pin SUB-D socket on the head-end station. You can find the current operating software for the DVB-S2-QAM module, the software "**BE-Flash**" and the current assembly instructions on the website "***www.gss.de***".

The DVB-S2-QAM module is designed exclusively for use in the STC 160 head-end station.

After decoding QPSK- or 8PSK-modulated signals, the demodulated data stream can be accessed via the integrated TPS module. This data stream, also called transport stream, contains 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 required.

### Stuffing
The transport stream is padded using what is known as zero data. This ensures a steady and constant output symbol rate.

### 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 box 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.

Modulation schemes such as QPSK and QAM transmit multiple bits simultaneously. These are referred to as symbols. In addition to the user data flow which transmits video and audio information, error correction bits are transferred. The FEC number states the ratio of user bits to the complete transmitted bits. The output symbol rate is calculated as follows:

256-QAM: **SR (A)** = FEC x $^1/_4$ x SR (E)
128-QAM: **SR (A)** = FEC x $^2/_7$ x SR (E)
 64-QAM: **SR (A)** = FEC x $^1/_3$ x SR (E)
 32-QAM: **SR (A)** = FEC x $^2/_5$ x SR (E)
 16-QAM: **SR (A)** = FEC x $^1/_2$ x SR (E)
  4-QAM: **SR (A)** = FEC x $^1/_1$ x SR (E)

**Example:**
Output symbol rate 64-QAM, FEC= $^3/_4$,
Input symbol rate SR (E) = 27,500 kSymb/s

**SR (A)** = $^3/_4$ x $^1/_3$ x 27,500 kSymb/s
**SR (A)** = **6,875 kSymb/s**

—> If no "FEC" is stated in the station lists, it can be assumed to be "FEC = $^3/_4$".

**Reception from a transponder with a very low symbol rate (SCPC station)**
The extremely low data rate means that the output symbol rate is very low. If there are reception problems with different digital receivers, set output symbol rate to a higher value.

**Defined symbol rates**
Some cable operators specify a fixed symbol rate (e.g. 6,900 kSymb/s).

## (**SelecPlex®**)

Channels with low bandwidths are the result of filtering out stations which are not required. These "narrow" channels can then be arranged in one channel to save space. To do this, activate the "Setting the output frequency" menu (assignment outside the official channel grid).

—> The required bandwidth (in kHz) is roughly equal to the symbol rate (kSymb/s) plus 20%.
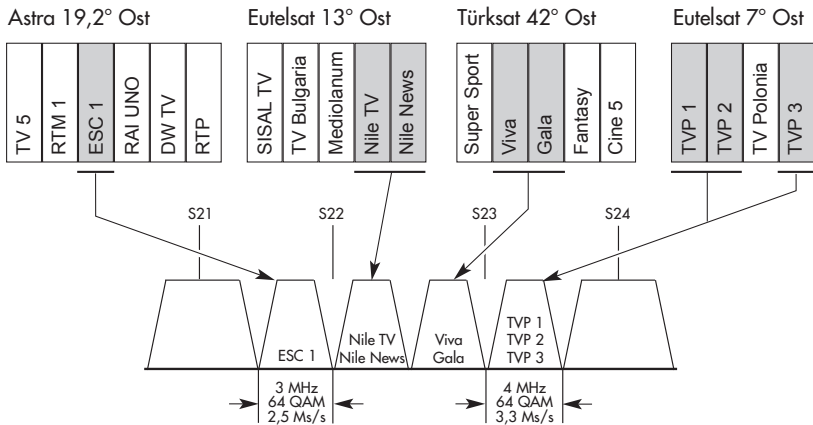


## Caution:

The modulator in this module employs automatic neighbouring-channel assignment. This means that when the output channel or the output frequency for channel strip "**A**" is set, channel strip "**B**" will always be 8 MHz above channel strip "**A**".

If SelecPlex® will be used, the normal channel separation of 8 MHz can be reduced to 2 MHz via the frequency setting for channel strip "**B**".

# 3    INSTALLATION

⚠ – 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 module, switch off the head-end station or
unplug the power cable from the mains power socket.

Take measures to protect against ESD!

• Open the housing of the head-end station in accordance with the assembly
instructions for the STC 160.

## 3.1    RETROFITTING A CA MODULE

The DVB-S2-QAM module is equipped with a common interface. It allows you
to connect a CA module for various scrambling systems and service provid-
ers. Scrambled channels can only be descrambled with a CA module suitable
for the scrambling system and the corresponding smart card. The smart card
contains all the information for authorisation, descrambling and subscription.

⚠ – Check with the distributor or manufacturer of the CA module to be used to
ensure that it is suitable for the reception of several channels.
– **The hardware and software of the DVB-S2-QAM module have been thor-
oughly prepared and tested.**
– **Any changes made by program providers to the structures in the program
data might impair or even prevent this function.**
– When working with the CA module, please read the corresponding operat-
ing manual from the respective provider.

• Insert the smart card ① into the CA module ② so that the chip ③ on the
smart card faces the thicker side (top) of the CA module (fig. 1).
• Push the CA module ② without canting into the guide rails ④ of the com-
mon interface ⑤ according to the following picture and contact it to the
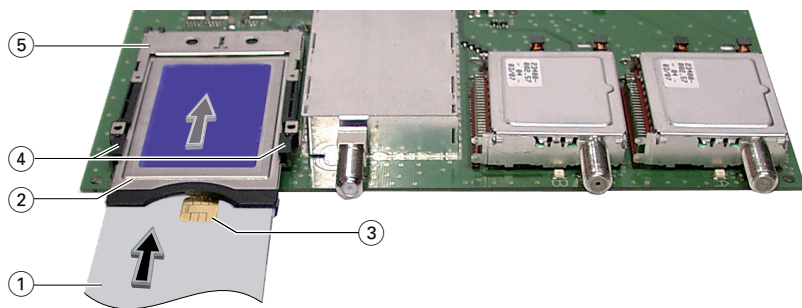common interface.

*Fig. 1*

## 3.2 INSTALLING THE DVB-S2-QAM MODULE

⚠ – Check that the plug contacts of the CA module are tightly seated in the terminal strips on the common interface of the DVB-S2-QAM module and make sure there is reliable contact.
– When installing a module, make sure that it is inserted in one of the long, numbered grooves in front of the contact strip on the board at the rear wall of the housing.
– The shorter, non-numbered grooves without a contact strip on the board at the rear wall of the housing are for add-on modules only.

• Open the housing of the head-end station in accordance with the assembly instructions for the STC 160.
• Open the locking device ① in the direction of the arrow (fig. 2).
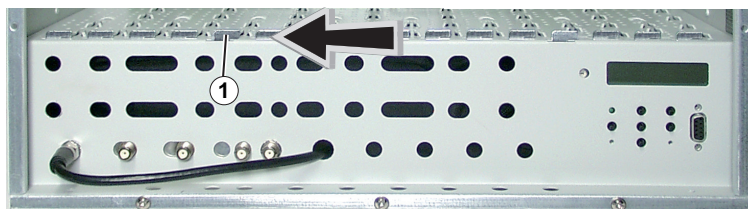


*Fig. 2*

• Insert the DVB-S2-QAM module in grooves Ⓐ and Ⓑ of an open slot (with contact strip on the board at the rear wall of the housing) and gently slide it into the head-end station until it makes contact with the board on the rear wall (fig. 3).
• After installing the DVB-S2-QAM module close the locking device ① in the direction of the arrow (fig. 3).
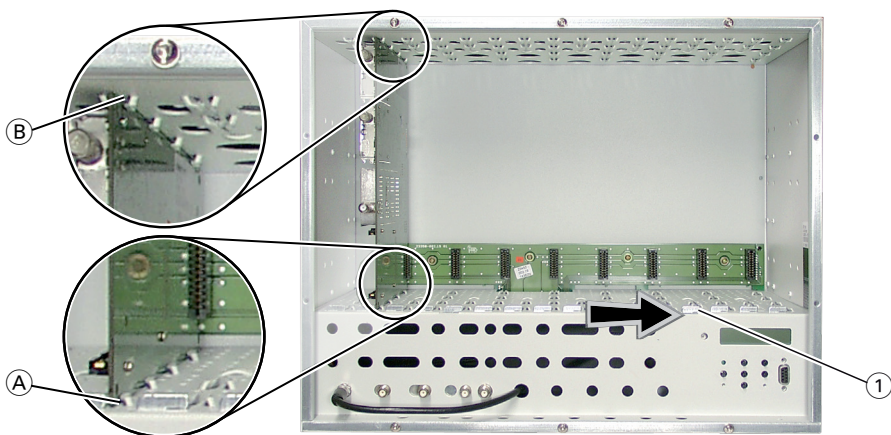
*Fig. 3*

## 3.3 Connecting the DVB-S2-QAM module



*Fig. 4*

- Connect SAT-IF inputs Ⓒ on the DVB-S2-QAM module (fig. 4) to the prein-stalled F terminals in the rear wall of the head-end station via the cable inlets Ⓕ using HF cables made on-site (length approx. 80 cm) or if applicable connect each to one of the outputs of a retrofitted SAT-IF input distributor.
- After programming, connect the modulator output Ⓓ to one of the input sockets Ⓖ of the output collector.

# 4   THE CONTROL PANEL AT A GLANCE

## 4.1   MENU ITEMS

Program the DVB-S2-QAM module using the buttons on the head-end station control panel. The menus appear on the two-line display of the control panel. The parameters and functions to be set are underlined.

With the ⌃ button select the channel strip / other modules.

You can use the M button to select the following menu items:

– Activating the module and channel strip
– Channel setting / frequency setting
– Output channel / output frequency
– Output level
– LNB oscillator frequency
– Input symbol rate
– Input frequency
– Station filter
– CA module  (if available, only channel strip A)
  PID Check
  Menu/Edit
– QAM modulation
– Stuffing
– Substitute signal
– Network Information Table (NIT)
– **C**onditional **A**ccess **T**able (CAT)
– Deleting/Renaming a PID
– Factory reset
– Save data
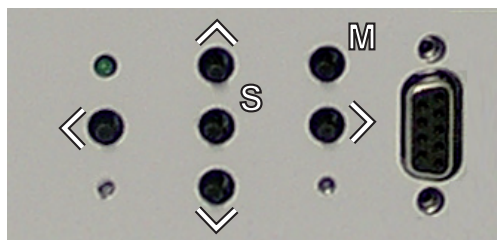
| ⟨ ⟩ | To move the cursor, call up functions |
| ∧ ∨ | To adjust values and functions |
| S | To save the programmed data |
| M | To switch to the next menu |

## 5 PROGRAMMING

### 5.1 PREPARATION

- Test the software versions of the head-end station and the DVB-S2-QAM module and update them if necessary. The current software versions can be found on the website "**www.gss.de**".
- Connect the test receiver to the modulator output on the DVB-S2-QAM module (D) or to the HF output on the output collector if it is already connected (page 12).
- Adjust the test receiver to the output channel / output frequency of the channel strip to be set.
- Switch on the channel strip (modulator) if necessary (page 22). For each channel strip, there is an status LED which indicates if the channel strip is switched on.



Status LED –
Kanalzug "A"

Status LED –
Kanalzug "B"
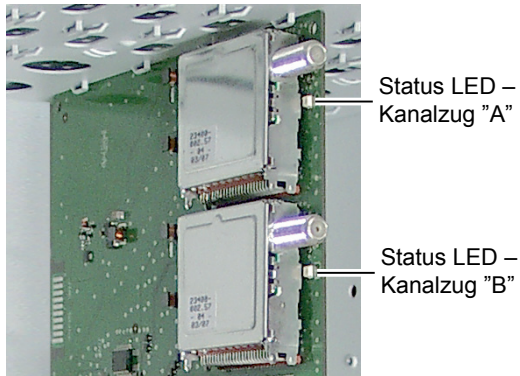
### 5.2 NOTES ON LEVEL SETTING

In order to prevent interference within the head-end station and the cable system, the output level of the DVB-S2-QAM module must be lowered by 10 dB compared to analogue cassettes at 64 QAM, and by 4 dB compared to analogue cassettes at 256 QAM.
Check the output level of the output collector according to the assembly instructions of the head-end station STC 160 and if necessary set it to the demand of the cable system.

## 5.3 PROGRAMMING PROCEDURE

Ein/On

| SETUP | BE160 |
| | V 10 |

△

| Bx 1A | TPS |
| 850.0 MHz | B V 15 |

△ →

| Bx 1B | TPS |
| 858,0 MHz | B V 15 |

M

| Bx 1A/B | OUTPUT |
| Freq. | |

△/▽

**Channel / Freq.**

M

△/▽ ◁/▷

| Bx 1A/B | OUTPUT |
| 850.0/858.0 | on |

△/▽ ◁/▷

**on / off**

M

| Bx 1A/B | LEVEL |
| 0 dB | |

△/▽

**0 … -25 dB**

M

△/▽

| Bx 1A/B | LNB |
| 10600 MHz | |

◁/▷

M

△/▽ ◁/▷

| Bx 1A/B | SYMBOL |
| 27500 | DVB-S |

△/▽ ◁/▷

**DVB-S / DVB-S 2**

M

△/▽ ◁/▷

| Bx 1A/B | FREQ |
| 11835 -1.1 | CN 13 |

M

| Bx 1A/B | PROGRAM |
| Filter | off |

S
▷
M

| Bx 1A/B TV ± | 01/09 |
| Das Erste | |

△/▽ Programme entfernen / hinzufügen
*Removing / activating stations*

◁/▷ nächster Service (Programm)
*next service (station)*

M

△/▽

**on / off**

```
Bx 1A          CA
PID Check      on        [∧]/[∨]
```

[M]

```
Bx 1A          CA
Menu <=    => Edit       [<]     [>]
```

[M]

```
Bx 1A   TV  X  04/09     [∧]/[∨]  X / 0
. . . .
```

X – entschlüsseln
     *descrambling*
0 – nicht entschlüsseln
     *no descrambling*

[<]/[>]
nächster Service
*next service*

```
Bx 1A  01/03  MENU       - S - - - - - - - ->
Information *)
```
[M]

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

---

[∧]/[∨]
[<]/[>]
```
Bx 1A/B        QAM
256         normal
```
[∧]/[∨]
[<]/[>]  normal / inverse

4 … 256

[M]

[∧]/[∨]
[<]/[>]
```
Bx 1A/B    STUFFING
SR=6900  (6531)
```

[M]

```
Bx 1A/B     FAILURE
Single Carrier
```
[∧]/[∨]

Null Packets /
Single Carrier

[M]

```
Bx 1A/B          NIT
off        => Make
```
[∧]/[∨]          [>]  neue NIT erstellen
                      *make new NIT*
on / off

[M]

[<]/[>]
[∧]/[∨]
```
Bx 1A/B       CAT-ID
0xDE00         off
```
[<]/[>]
[∧]/[∨]  on / off

[M]

```
┌─────────────────────┐
│ Bx 1A/B        PID  │    ☐/☐
│ 0 1   – – – –       │    ☐/☐
└─────────────────────┘
         │
        [M]
         │
┌─────────────────────┐   Werkeinstellung      ┌─────────────────────┐
│ Bx 4      FACTORY   │   aufrufen        [ > ] │ Bx 4      FACTORY   │  [S]→ Ⓐ Page 16
│ Defaults       =>   │   invoke factory defaults│     STORE  =>  M    │
└─────────────────────┘                          └─────────────────────┘
         │                                                  │
        [M]                                                [M]
         │◄─────────────────────────────────────────────────┘
         │
┌─────────────────────┐   Einstellung speichern  ┌─────────────────────┐
│ Bx 4      MEMORY    │ [S] store factory defaults │       STORE         │  → Ⓐ Page 16
│   S => STORE        │                            └─────────────────────┘
└─────────────────────┘
         │
        [M]
         │
┌─────────────────────┐
│                     │
│       CANCEL        │
└─────────────────────┘
         │
         └──────────────────────────────────► Ⓐ   Page 16
```
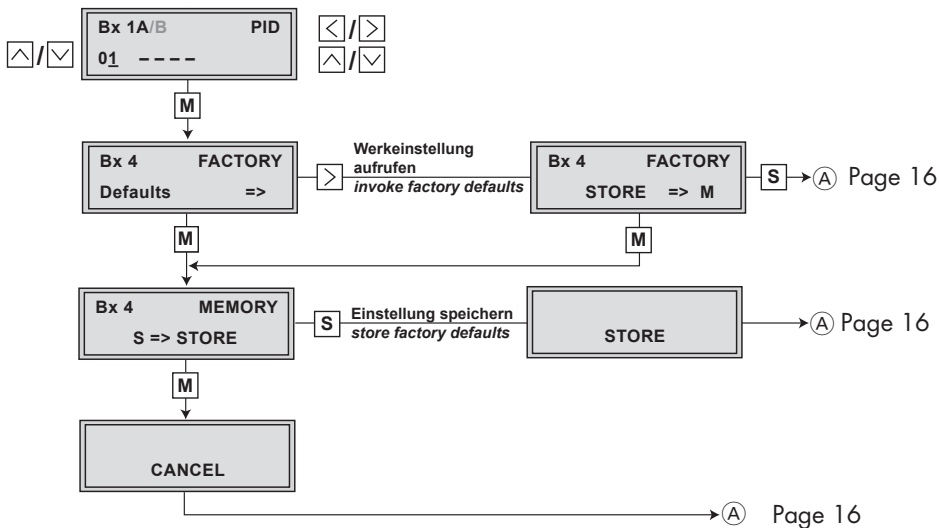
—> Pressing the M button for longer than 2 seconds cancels the programming procedure. This takes you back to the program item "**Selecting the module/channel strip**" from any menu. Any entries that have not been saved are reset to the previous settings.

—> Entries in the menus can be saved by pressing the S key. You are taken back to the "**Selecting the module/channel strip**" menu item.

- Switch on the head-end station.

—> The display shows "**SETUP   BE160**" and the software version of the head-end station (e.g. V 10).

—> In the "**SETUP**" menu, the output level of the output collector can be adjusted (see STC 160 assembly instructions).

```
(Ein/On)
    ↓
SETUP      BE160
            V 10
```
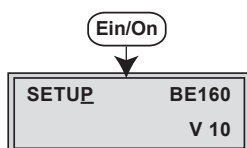
### Selecting the module / channel strip

- If necessary, press △▽ repeatedly to select the particular module (**Bx** …) or channel strip "**A**" or "**B**" to be programmed.
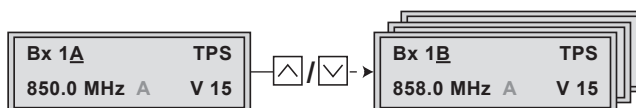
```
Bx 1A        TPS      △/▽      Bx 1B        TPS
850.0 MHz A  V 15              858.0 MHz A  V 15
```

• Press the ⏹M button.

### CHANNEL / FREQUENCY SETTING

In this menu, you can choose whether you require the channel or frequency setting for the adjustment of the HF output. The channel setting covers the range of channels S21 … S41 and C21 … C69, the frequency setting covers the range from 42.0 MHz to 860.0 MHz.

| Bx 1A/B | OUTPUT |
|---|---|
| Freq. | |

| Bx 1A/B | OUTPUT |
|---|---|
| Channel | |

⚠ The QAM signal is normally transmitted with a bandwidth of 8 MHz. This means that you can only use the channel centre frequency of the existing channel grid in the range of channels S21 … C69 (frequency grid 8 MHz). The CCIR channel grid is 7 MHz in the range of the lower frequency bands (channels C2 … S20). Therefore the frequency setting is used here. If one uses the existing channel grid of 7 MHz in these channel ranges, this will result in interference (overlapping) with the 8 MHz QAM signal packages, thus causing transmission problems.

For programming in these channel ranges and in the frequency ranges below them, we recommend starting with channel S21 / 306 MHz going back in steps of 8 MHz, or reducing the bandwidth of the QAM output signal by removing stations.

⚠ The modulator in this module employs automatic neighbouring-channel assignment. This means that when the output channel or the output frequency for channel strip "**A**" is set, channel strip "**B**" will always be 8 MHz above channel strip "**A**".
If SelecPlex® will be used, the normal channel separation of 8 MHz can be reduced to 2 MHz via the frequency setting for channel strip "**B**".

⚠ Using "SelecPlex®" only the frequency setting can be used.

- Use ⌃⌄ to select channel setting "**Channel**" or frequency setting "**Freq.**".

- Press the M button.

> —> The "Output channel" or "Output frequency" – "**OUTPUT**" menu is activated.
> —> If channel setting is selected continue with "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 22). The automatically assigned neighbouring frequency in channel strip "B" will be shown in the display next to the frequency to be set in channel strip "A". If the output frequency of channel strip "A" is changed, the output frequency of channel strip "B" will follow with a frequency separation of 8 MHz (automatic neighbouring-channel assignment).

```
Bx 1A/B      OUTPUT
850.0/858.0        on
```

- Use the ⌂⌂ buttons to position the cursor under the digit to be set for the frequency display then use ⌃⌄ to set the output frequency wished.

> —> Channel strip "B":
>     If SelecPlex® will be used, the normal channel separation of 8 MHz can be reduced to 2 MHz.

## Output channel

In this menu you set the output channel of the channel strip (S21 … S41, C21 … C69). Additionally the modulator of the channel strip can be switched off or on.

The modulator in this module employs automatic neighbouring-channel assignment. This means that when the output channel for channel strip "A" is set, the output channel of channel strip "B" will always be one channel above channel strip "A". The automatically assigned neighbouring channel in channel strip "B" will be shown in the display next to the channel to be set in channel strip "A". If the output channel of channel strip "A" is changed, the output channel of channel strip "B" will follow with a channel separation of 8 MHz.

```
Bx 1A/B      OUTPUT
C67/C68          on
```

• Use the △▽ buttons to set the output channel.

### Switching the modulator of the channel strip off or on

```
Bx 1A/B      OUTPUT
C67/C68          on
```

• Using the ▷ button, move the cursor under "**on**" or "**off**" and then use the △▽ buttons to switch off "**off**" the channel strip (modulator) or to switch it on "**on**" if necessary.

—> When it is switched off, the status LED for the channel strip goes out (see page 24).

—> The switched off channel strip is indicated in the display with "– – –" instead of the channel or frequency display.

```
Bx 1A        OUTPUT
- - - / C68        off
```

• Press the M button.

—> The "Output levels" – "**LEVEL**" menu is activated.

## OUTPUT LEVELS

This menu item is used to set the output levels of the modulators of the module´s channel strips to the same value and to level them to the output levels of the modulators of other modules used.

⚠ In order to prevent interference within the head-end station and the cable system, the output level of the DVB-S2-QAM module must be lowered by 10 dB compared to the system level at 64 QAM, and by 4 dB compared to the system level at 256 QAM.

```
Bx 1A          LEVEL
0 dB
```

- Use the test receiver to measure the output level of the channel strip and make note of the value.
- When adjusting the second channel strip, compare its value with the value noted for the first channel strip.
- Measure the output levels of the modulators of other modules used and make notes of their values.
- Use the △▽ buttons to balance the higher output level of the one channel strip to the lower output level of the other channel strip and the output levels of the modulators of other modules used ("**0 dB**" … "**–25 dB**").

- Press the M button.

—> The "LNB oscillator frequency" – "**LNB**" menu is activated.

## LNB OSCILLATOR FREQUENCY

Set the oscillator frequency of the LNB used in this menu.

```
Bx 1A/B          LNB
10600 MHz
```

- Use the ◁▷ buttons to position the cursor under the digit of the frequency displayed.
- Press △▽ to enter the respective digit of the oscillator frequency of the LNB used.
- Repeat the procedure by the quantity of the digits to be set.

- Press the $\boxed{\text{M}}$ button.

## INPUT SYMBOL RATE / DVB MODE

The symbol rates of the satellite transponders can be found in the current channel table of the satellite operator, in various satellite magazines and in the Internet.
The cassette recognizes the transmitted DVB mode and switches over between the normal QPSK mode (DVB-S) and the DVB-S2 mode. Receiving stations with DVB-S2 mode, we suggest to preset the DVB mode to shorten the time for searching stations.

```
Bx 1A/B      SYMBOL
27500        DVB-S
```

## SETTING THE INPUT SYMBOL RATE

- Use the $\boxed{<}\boxed{>}$ buttons to position the cursor under the digit of the symbol rate displayed to be set.
- Press $\boxed{\wedge}\boxed{\vee}$ to enter the respective digit of the desired symbol rate.
- Repeat the procedure by the quantity of the digits to be set.

## SETTING THE DVB MODE

- Use the $\boxed{>}$ button to place the cursor under "**DVB-S**" and set the required DVB-S2-mode with the buttons $\boxed{\wedge}\boxed{\vee}$ .

- Press the $\boxed{\text{M}}$ button.

## INPUT FREQUENCY

Once the HF receiver has synchronised to the input signal, any offset to the target frequency is displayed in MHz, e.g. "**-1.8**".
The "**CN…**" indicator in this menu provides an indication of the signal-to-noise ratio of the received carrier. If the value is below "**CN 5**," this may result in loss of video.

If a question mark "**(?)**" appears in the second line of the display, there is no input signal present. Check the configuration of the antenna system and head-end station, as well as the previously adjusted module settings.

```
Bx 1A/B        FREQ
11835   -1.8  CN 12
```

- Use the ◁ ▷ buttons to position the cursor under the digit of the frequency displayed to be set.
- Press △ ▽ to set the respective digit of the input frequency needed.
- Repeat the procedure by the quantity of the digits to be set.
- Set the frequency offset shown in the display (e.g. "**– 1.8**") to less than 1 MHz by varying the input frequency using the △ ▽ buttons.

—> In addition to the indicator in the display, the quality of the transport stream received is indicated by a status LED:



Status LED –
Kanalzug "A"

Status LED –
Kanalzug "B"
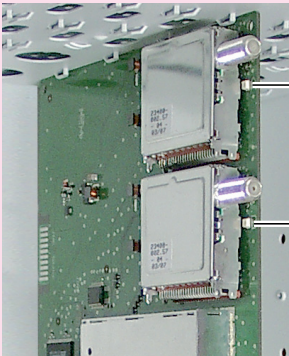
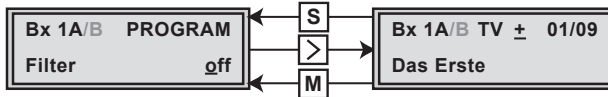| LED indicator | Indication |
|---|---|
| Green | Signal quality is good |
| Yellow | Signal quality is poor |
| Red | No signal |
| Off | The channel strip (modulator) is switched off |

- Press the **M** button.

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

The default setting for the station filter is "**off**". In this menu you define the stations received to be transmitted.

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. If stations are activated the output data rate increases.

| Bx 1A/B   PROGRAM | | S | | Bx 1A/B TV +   01/09 |
|---|---|---|---|---|
| Filter            o**ff** | | > | | Das Erste |
| | | M | | |

- 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 message will appear in the display "**FILTER   no Service**".
In this case, check the previously adjusted settings for the module as well as the components connected at the SAT input.

—> The display shows e.g.:**Bx 1A   TV   +   01/09**
                                **Das Erste**

**Meaning of the indicators in the example:**

| "**Bx 1A**" | Slot 1, channel strip "**A**" |
|---|---|
| "**TV**" | TV channel type |
| " **+** " | The currently selected station is activated. |
| "**01/09**" | The 1st of 9 stations is being displayed. |
| "**Das Erste**" | Station name |

**Further possible terms displayed:**

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

• Use the $\boxed{<}\boxed{>}$ buttons to call up the stations in sequential order, then use $\boxed{\wedge}\boxed{\vee}$ to activate (indicated by " **+** ") or to deactivate them (" **–** ").

• To save changes and to activate the station filter press the $\boxed{M}$ button.

**Test the status of the individual stations:**
If the station filter is switched on, press the $\boxed{>}$ button.
In this mode you can use the $\boxed{<}\boxed{>}$ buttons to scroll through the station list, and $\boxed{\wedge}\boxed{\vee}$ to deactivate activated stations or activate further stations.

• In the "**PROGRAM   Filter   on**" menu the station filter can be switched "**off**" using the buttons $\boxed{\wedge}\boxed{\vee}$ .

• Press the $\boxed{M}$ button.

## QAM modulation / User signal

In this menu, you can set the QAM modulation and invert the user signal.

```
Bx 1A/B          QAM
256             normal
```

### Setting the QAM modulation

• Use △▽ to set the QAM modulation ("**4**" … "**256**").

—> For higher QAM modulation, the output symbol rate is lowered.
An output QAM modulation of > 64 QAM places a large burden
on the cable network. Due to noise, delay and frequency response
problems, reception of the converted output signal can be impeded.

### Inverting the user signal

For exceptional cases and "older" digital cable receivers, the spectral position
of the user signal can be inverted.

• Use ◁▷ to place the cursor under "**normal**".
• Use △▽ to set the spectral position to "**inverse**".

• Press the **M** button.

—> The "Data rate" – "**STUFFING**" menu is activated.

```
Bx 1A/B    STUFFING
SR=6900  (6531)
```
Number 1    Number 2

**SR=6900** (= "Number 1"): Active output symbol rate
(**6531**) (= "Number 2"): The current measured output symbol rate.

> —> If the station filter is activated, this value is lower than the value of
> the "Number 1". The value fluctuates, since the data rates of indi-
> vidual stations are dynamically modified by the broadcasters.

• Use the $\boxed{<}\boxed{>}$ buttons to place the cursor under the number to be changed
("Number 1") and set the symbol rate with the buttons $\boxed{\wedge}\boxed{\vee}$ .
The value set corresponds to the new output symbol rate.

> —> The "Number 1" can be increased to any value up to 7500.
> **Caution:**
> Symbol rates > 7000 kilosymbols/s increase the bandwidth of the
> output signal. Thus the output channels will overlap. In this case the
> bandwidth of the neighbouring-channels has to be decreased (see
> "SelecPlex®", page 9).
> Approximately calculation of the output bandwidth:
> Symbol rate [MSymb/s] x 1.15 = Bandwidth [MHz]
>      7.2 [MSymb/s] x 1.15 = 8.28 [MHz]
>      6.9 [MSymb/s] x 1.15 = 7.935 [MHz]
>
> —> With the station filter switched "**on**", the "Number 1" can be de-
> creased. To do this, observe the "Number 2" for approx. 30 seconds
> and note the highest value. Add roughly 10 % to this value. Do not
> decrease the "Number 1" lower than the value of "Number 2".
> Is the "Number 1" lower than "Number 2" question marks "**??**" ap-
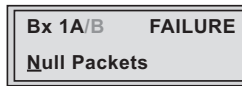> pear in the display.

```
Bx 1A/B    STUFFING
SR=6200    (6531) ??
```

• Press the $\boxed{M}$ button.

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

You use this menu to set whether a QAM signal filled with "**Null Packets**" or a "**Single Carrier**" signal should be provided as an output signal whenever an incorrect input signal occurs.

```
Bx 1A/B        FAILURE
Null Packets
```

- Use the ⏶⏷ buttons to set the output signal required.

- Press the M button.

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

## NETWORK INFORMATION TABLE (NIT)

```
Bx 1A/B            NIT
off          => Make
```
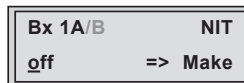
- To switch the NIT on or off ("**on**"/"**off**") press the ⏶⏷ buttons.

- Press the ⏵ button to activate the NIT ("**Make**").

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

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

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

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

—> **Using the PSW 160 remote control software a NIT for several stations can be created.**

• Press the M button.

—> The "Network/operator identification" – "**CAT-ID**" menu is activated.

## 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 1A/B       CAT-ID
0xDE00           off
```

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

—> The "Deleting/Renaming a PID" – "**PID**" menu is activated (page 32).

CAT is to be changed:
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 of the operator ID 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 $\boxed{M}$ button.

## DELETING (DATA CONTENT) A PID / RENAMING A PID

In this menu you can delete or rename up to 9 PIDs of the transport stream. The changes are stored at 9 memory locations.

```
Bx 1A/B          PID
01   – – – –
```

—> First, memory location 01 is shown.

```
Bx 1A/B          PID
01   – – – –
```

## DELETING A PID (DATA CONTENT)

In this menu the data content of a PID of the transport stream can be deleted (tables will not be changed).
- First, select the desired memory location using buttons $\boxed{\wedge}\boxed{\vee}$.
- Use button $\boxed{>}$ to place the cursor under the right digit of the PID input field ("– – – –") and set the hexadecimal number of the PID to be deleted (e.g. 1FFE) using buttons $\boxed{\wedge}\boxed{\vee}$ $\boxed{<}\boxed{>}$.

```
Bx 1A/B          PID
01   x1 FFE      drop
```

—> "drop" is displayed at the right side.

- Repeat this process in order to delete more PIDs (max. 9).

—> In order to undo any changes, select the corresponding memory location(s) and set the hexadecimal number of the PID, which was dropped, to "1FFF"
—> "– – – –" is displayed.

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

- First, select the desired memory location using buttons $\boxed{\wedge}\boxed{\vee}$.
- Use button $\boxed{>}$ to place the cursor under the right digit of the PID input field ("– – – –") and set the hexadecimal number of the PID to be changed (e.g. 1FFE) using buttons $\boxed{\wedge}\boxed{\vee}$ $\boxed{<}\boxed{>}$.

```
Bx 1A/B          PID
01   x1 FFE      drop
```

- Place the Cursor below the "drop" indicator using button $\boxed{>}$.
- Enter the new PID (e.g. 1FFD) using buttons $\boxed{\wedge}\boxed{\vee}$ $\boxed{<}\boxed{>}$.

```
Bx 1A/B          PID
01  x1FFE   –>x1FFD
```

- Repeat this process in order to rename more PIDs (max. 9).

> —> In order to undo any changes, select the corresponding memory location(s) and set the hexadecimal number of the PID, which was renamed, to "1FFF"
> —> "– – – –" is displayed.

- Press the $\boxed{M}$ button.

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

In this menu you can reset all settings (together for both lines) to the factory defaults.
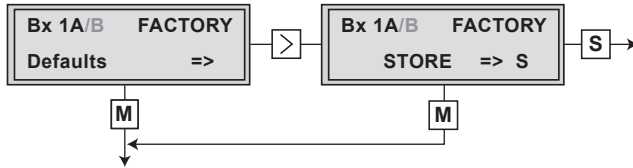


• If you don´t like to invoke the factory defaults press button M.

—> The "Saving data" – "**MEMORY**" menu is activated (Page 35).

• Press the ▷ button.
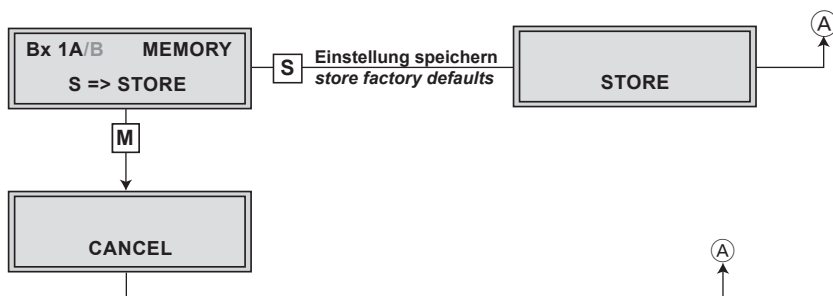
—> The factory defaults are invoked (**"FACTORY STORE"**).

• Press the S button.

—> The factory defaults are saved.
The display shows "STORE"
—> Return to "Selecting the module" (page 19).
—> By pressing the M button the "Saving data" – "**MEMORY**" menu is activated.

```
┌─────────────────────┐        ┌──────────────────────────┐                    Ⓐ
│ Bx 1A/B    MEMORY   │   ┌─┐  │ Einstellung speichern    │   ┌──────────────┐  │
│                     │   │S│  │ store factory defaults   │   │    STORE     │──┘
│   S => STORE        │   └─┘  └──────────────────────────┘   └──────────────┘
└─────────────────────┘
          ┌─┐
          │M│
          └─┘
           │
           ▼
┌─────────────────────┐
│                     │                                              Ⓐ
│      CANCEL         │                                               │
│                     │                                               │
└─────────────────────┘──────────────────────────────────────────────┘
```

- All programmed data is saved by pressing the $\boxed{S}$ button. You will be re-
  turned to the menu item "**Selecting the module / channel strip**" (page 19).

> —> By pressing the $\boxed{M}$ button, you will be returned to the menu item
> "**Module / channel strip**" **without** saving the programmed data.

## CA MODULE

In order to enable the function of the CA module, stations capable of being descrambled by the CA module you are using and your smart card must be selected in the "Setting the station filter" – "**PROGRAM**" menu (page 26).

—> Where both scrambled stations and unscrambled regional broadcasters are transmitted via a single channel, short-term picture loss may occur when switching between scrambled and unscrambled broadcasts.

## PID MONITORING

In this menu the PID monitoring can be switched off.

| Bx 1A | CA |
|-------|-----|
| PID Check | on |

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

• Use the ⋀⋁ buttons to switch "**off**" or "**on**" the PID monitoring.

• Press the M button.

—> The "Configuring the CA module" – "**CA**" submenu 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 head-end station. This may appear as a fixed display or as scrolling text according to display capabilities.
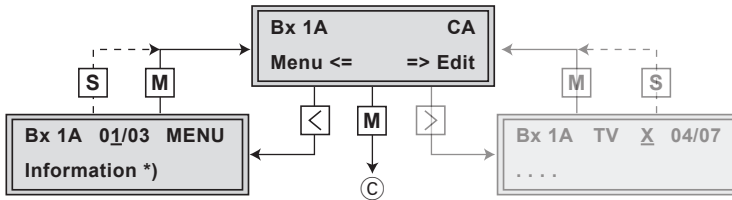
> —> By pressing the M button you can skip the "Configuring the CA module" – "**CA**" menu and activate the "QAM modulation" – "**QAM**" menu (page 28).

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

> —> The display shows e.g.:  **Bx 1A   01/03   MENU**
>                                              **Information**
> **Meaning of the indicators:**
> "**Bx 1A**"          Slot 1, channel strip "**A**"
> "**01/03**"          The first of three menu items is activated.
> "**MENU**"          The menu of the CA module is activated.

For the explanation of further details please use the operating instructions of the CA module used.
- Use the △▽ buttons to activate the menu desired.
- Press the ⟩ button to activate the menu.
- Use the △▽ buttons to select the function desired.
- To set the CA module use the ⟨⟩ and △▽ buttons.
- All settings are saved by pressing the S button.

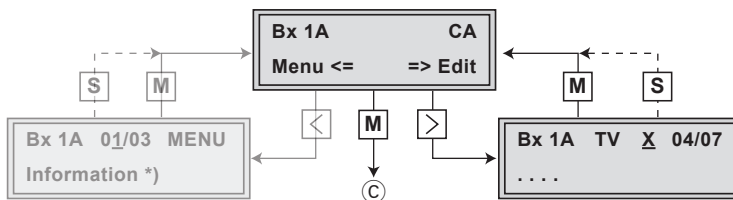> —> You will be returned to the "Configuring the CA module" – "**CA**" menu item.
> —> By pressing the M button you can cancel the settings in the menu of the CA module and are returned to the "Configuring the CA module" – "**CA**" menu.

• Press the $\boxed{>}$ button.

## SELECTING STATIONS

In this menu you select the stations wished to be descrambled.



—> The display shows e.g.: **Bx 1A TV X 04/07**

           **. . . .**

**Meaning of the indicators in the example:**

| | |
|---|---|
| "**Bx 1A**" | Slot 1, channel strip "**A**" |
| "**TV**" | TV channel type |
| "**X**" | The currently selected station will be descrambled. |
| "**04/07**" | The 4th of 7 stations read is being displayed. |
| "**. . . .**" | Station name |

**Further possible terms displayed:**

| | |
|---|---|
| "**RA**" | Radio channel type |
| "**0**" | The currently selected station remains unchanged. |

• Use the $\boxed{<}\boxed{>}$ buttons to call up the stations in sequential order which are to be descrambled, then use $\boxed{\wedge}\boxed{\vee}$ to descramble (" **X** ") or not to descramble them (" **0** ").

• Save changes and activate the station filter:
  Press the $\boxed{M}$ button.

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

```
Bx 1A            CA
Menu <=     => Edit
```

• Press the $\boxed{\text{M}}$ button.

—> The "QAM modulation" – "**QAM**" menu is activated (page 28).


## 6    FINAL PROCEDURES

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

• Securely tighten the cable connections using an appropriate open-ended spanner.
• After programming, connect the modulator output ⒟ to one of the input sockets ⒢ of the output collector (page 12, fig. 4).
• Test the output level of the output collector according to the STC 160 assembly instructions and set the output level required for the cable system.
• Mount the base plate and the front cover (see STC 160 assembly instructions).

## 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 |

## 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)

| Channel | [MHz] | Channel | [MHz] | Channel | [MHz] | Channel | [MHz] | Channel | [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 | | |

# CE - Declaration of Conformity

<table>
<tr><td><strong>GSS</strong></td><td><strong>Konformitätserklärung</strong><br><strong>Declaration of Conformity / Déclaration de Conformité</strong><br><strong>021/ 08</strong></td><td>CE</td></tr>
</table>

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

**Modulator - Modul**

Type / Model / Type

**GSS  HDMH 660 CI TPS**

Bestell-Nr. / Order-No. / Nº de réf.

**GAK 7500**

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

| | |
|---|---|
| *EN 50083-2:* | *2006* |
| *EN 60950-1 :* | *2001* |

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, 9. Oktober 2008**

Michael Bierschneider
*Leiter Entwicklung*
*Manager Development / Directeur Dèveloppement*