IRD 8500/..
Operating manual
Integrated Receiver Decoder
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Introduction

General notes

NOTE: Keep this manual handy at all times.

Technical modifications

Changes of information contained in this manual reserved.

Copyright

This manual contains information protected by copyright. All rights reserved. No part of this manual may be photocopied, otherwise reproduced or translated into another language without the prior written consent of Hirschmann.

Explanation of warning and note symbols

WARNING: Indicates that ignorance or negligence of the recommended cautionary measures may lead to personal injuries or device damage.

ATTENTION: Indicates that ignorance or negligence of the recommended cautionary measures may lead to device damage.

NOTE: Useful tips and information on practical application.
Safety notes

WARNING: Improper use of electrical devices may result in electrical shocks!

ATTENTION: The IRD 8500/.. must be connected only to grounded mains!

ATTENTION: The mains cable must not be exposed to mechanical stress!

ATTENTION: The mains cable must be disconnected from the IRD 8500/.., if:
- the cable or the plug was damaged.
- a liquid was spilled onto the device
- the cabinet was damaged
Explaination to digital TV broadcasting technique

General

Objective
With the help of data reduction by means of minimizing redundant moving picture information as well as flexible organisation of the signal quality, transmission capacity shall be increased.

Realization
First picture and sound data are reduced. Out of the compressed data streams a multiplex data stream is composed together with additional information (e.g. teletext). The necessary methods for that are defined in the MPEG-2. For the additional information only the syntactic frame is defined here. Which kind of data and in which way data are to be integrated into the multiplex data stream is laid down by the European DVP-project. For decoding a high transmission quality and an approximative zero bit error rate must be guaranteed. For digital modulation methods QPSK and QAM channel coding is used. Through these methods a certain amount of bit errors can be corrected on the receiver side. The procedures for coding and transmission are defined by the European DVP-project.

MPEG-2
The MPEG-2 standard (ISO/IEC 13818) set up by the MPEG standardization committee regulates the coding of moving pictures and the accompanying sound.

DVB
In addition to the transmission procedures defined by the MPEG-2 standard, the European DVB-project (Digital Video Broadcasting) has laid down a number of definitions which were forwarded to the organisations ETSI / CENELEC for standardization.

MPEG-decoding
For decoding the MPEG data stream several steps are necessary. For that different elements out of the data stream are used. (see picture 1)

- Transportstream Synchronisation
- Sync Byte 0x47
- Reading out the Transportstream
- Program Specific Information (PSI)
- Selecting a program
- Packet Identification (PID)
- Decoding
- Conditional Access Table (CAT)
- Synchronisation Program (VIDEO / AUDIO)
- Programme Clock Reference (PCR) Time stamps (PTS + DTS)
- Decoding additional data
- Service Information (SI)
Transport stream synchronization

The transport stream packet consists of different substream data packets. The data packets are transmitted with a length of 188 bytes. At the beginning of each packet is the sync-byte (0x47). Because this value is not exclusively reserved for the sync-byte, the repetetive occurrence of the sync-byte every 188 bytes has to be checked too to ensure stable synchronization.

Packet identifying

To identify the individual packets there is a Packet Identity (PID) contained at the beginning of each packet (after the sync-byte). Each substream (e.g. video, audio) gets its own PID. Some PIDs are assigned automatically and cannot be changed. (e.g.: PAT, CAT, .. siehe table 1)

Structure of the transport stream

Normally a transport stream contains several programs. Each of this program contains again a number of different substreams (elementary streams).

Program access

With the help of the information about the structure of a transport stream the required program can be selected for decoding. If a program contains different equivalent elementary streams (e.g. different languages), the respective selection has to be made, too. The selected elementary stream packets, which were detected by PID, are passed on from the demultiplexer to the decoder.

Decoding

The encoding of the received data can take place on various levels. The entire transport stream or elementary streams (Packetized Elementary Streams PES) can be encoded. The header information of the transport stream always stays uncoded, the header information of the PES is also encoded when the entire transport stream is encoded.

The data necessary for decoding are transmitted in the Entitlement Control Messages (ECM) and in the Entitlement Management Messages (EMM).

The ECMs also contain the necessary keycodes and the EMMs also contain the access codes for the receiver.

Program synchronization

A program consists of several elementary streams. To synchronize the decoding of the individual elementary streams a common reference is necessary. For that a Program Clock Reference (PCR) is included in each elementary stream. This information is contained in the Adaption Field, which is also transmitted in a cycle of max. 100ms. The Adaption Field always stays uncoded.

The information derived from the PCR-data is used to control the 27 MHz system clock of the receiver. In this way the synchronization of multiplexer and demultiplexer is ensured.

For synchronizing the elementary streams additional time reference values, Decoding Time Stamps (DTS) and Presentation Time Stamps (PTS) are contained in the elementary streams.
Data tables

On the one hand, the tables are defined in the MPEG-2 standard and on the other hand, they are specified from the DVB-project.

MPEG Program Specific Information (PSI):

PAT Program Association Table, contains information about the programs in the transport stream.
PMT Program Map Table, contains information about the elementary streams belonging to the program.

DVB Service Information (SI):

CAT Conditional Access Table, contains the necessary information for the CA-module for decoding coded programs.
NIT Network Information Table, contains information about the included programmes (e.g. frequency, modulation type, ...) of the distribution network and the name of the distribution network.
SDT Service Description Table, describes the available programmes and services of the distribution network.
EIT Event Information Table, an electronic TV-guide with identification of programme start and age classification.
RST Running Status Table, contains status information about the individual programmes.
TDT Time and Date Table, contains information about the current date and time (UTC).
TOT Time Offset Table, contains information about the local date- and time-shift.
ST Stuffing Table, without content, is created when overwriting invalid tables.
BAT Bouquet Association Table, informs about the different programs of the provider independent from the broadcasting area.

The PIDs of the tables are pre-assigned. the only exeption are the PMTs, whose PIDs are defined in the PAT. To transmit different tables with one PID, each table contains a Table_ID at the beginning.

<table>
<thead>
<tr>
<th>Table</th>
<th>PID</th>
<th>Table_ID</th>
</tr>
</thead>
<tbody>
<tr>
<td>PAT</td>
<td>0x0000</td>
<td>0x00</td>
</tr>
<tr>
<td>PMT</td>
<td>0x0020...0x1FFE</td>
<td>0x02</td>
</tr>
<tr>
<td>CAT</td>
<td>0x0001</td>
<td>0x01</td>
</tr>
<tr>
<td>NIT</td>
<td>0x0010</td>
<td>0x40...0x41</td>
</tr>
<tr>
<td>BAT</td>
<td>0x0011</td>
<td>0x4A</td>
</tr>
<tr>
<td>SDT</td>
<td>0x0011</td>
<td>0x42, 0x46</td>
</tr>
<tr>
<td>EIT</td>
<td>0x0012</td>
<td>0x4E...0x6F</td>
</tr>
<tr>
<td>RST</td>
<td>0x0013</td>
<td>0x71</td>
</tr>
<tr>
<td>TDT</td>
<td>0x0014</td>
<td>0x70</td>
</tr>
<tr>
<td>TOT</td>
<td>0x0014</td>
<td>0x73</td>
</tr>
<tr>
<td>ST</td>
<td>0x0010...0x0014</td>
<td>0x72</td>
</tr>
</tbody>
</table>
Definitions

MPEG **Moving Pictures Experts Group**: A standardization committee, whose task is the encoding of moving pictures and sound information. Developed the basic standards for data reduction. (MPEG-1...MPEG-4)

DVB **Digital Video Broadcast**: For digital broadcasting of TV-signals additional standards for transmitting of MPEG-signals were defined.

Symbol rate Data rate of the applied digital signal on the input. For correct decoding the data rate is to be set on the receiver.

Code rate According to the selected transmission path encoding is applied to ensure correct transmission of the data signal. The code rate corresponds to the ratio between useful data and total amount of data. The more additional data is transmitted, the better the original useful signal can be restored in case of a transmission failure.

BER **Bit Error Rate**: The BER is measured by means of the Viterbi decoder. The BER shows the ratio between the correctly received bits and the incorrect bits. For correct processing of moving pictures the BER should not exceed a value of 1x10^-5.

Multiplex Several **Packetized Elementary Streams** (PES) are multiplexed into a transportstream (acc. to time-multiplex for MPEG2/Packetgeneration). A single PES contains the video, audio and data information of a single programme. The length of the transmitted packets are 188 or 204 bytes. In order to be able to re-assign the individual packets on the receiver side, the packets are provided with a programme identification.

C/N **Carrier to Noise**: Carrier to noise ratio of the input signal. For digital signals this value includes the thermic noise and other distortions of the signal. (e.g. intermodulation, phase-jitter, ...). It is very difficult to measure this value, it is calculated back from the necessary correction expense. In order to enable correct processing of moving pictures the C/N-ratio in connection with the code rate of the input signal should achieve a BER smaller than 1x10^-5.

TS identifier **Transport Stream identification**: Each MPEG-transport stream has a unique descriptor. This descriptor identifies a transport stream independently of transmission path and frequency.

Demux state Demultiplexer status. The demultiplexer must adapt its signal processing clock to the clock rate of the input signal. The necessary information for this is derived from the MPEG-input signal. After successful synchronization the message “sync ok” occurs.
### Introduction

| **VPS** | Video Programming System. The VPS data is used for synchronization of recordings. This data is integrated into line 16 of the baseband video signal. |
| **Closed caption** | Using the TV-standard NTSC additional coded data can also be transmitted. For complying with standards the function “Closed caption” must be used for signal integration. |
| **Wide screen signalling** | If a PAL plus-signal is transmitted, the information about the currently sent picture size (4:3, 16:9) is provided in line 23. |
| **Common interface** | Defines a 64-pole interface for connection of a Conditional Access Module. The CA-module is used for decoding encoded programmes. |
| **CA** | Conditional Access: Several providers send their programmes encoded. In order to decode this programmes on the receiver side, a Conditional Access Card (hardware) of the provider is needed. Together with the identification of the data in the MPEG-signal, if the receiver supports this function, the signal can be decoded. |
| **Smart-Card** | The smart card is supplied to the program receiver after obtaining the licence (Pay-TV) or another valid authorization. On the smart card customer-specific data is stored. The CA-module includes a smart-card reader. The releasing of decoding of programs happens via the digital data stream. |
Description

General

The Integrated Receiver Decoder IRD 8500/QP serves for converting a QPSK SAT-signal with MPEG-2 standard into a video-baseband-signal with the standard PAL, NTSC or SECAM according to ITU-R BT624 (PAL-B/G). The audio signal is also converted into the baseband. The IRD 8500/QP also supports the decoding of encoded data (software option). All CA-modules which use the Common Interface are supported. With its optional MPEG-interface an MPEG-input and an MPEG-output are also available. With option LNB supply the supply voltage 13/18V and the control signal 22kHz are available.

Design

View

Integrated Receiver Decoder IRD 8500/QP

The IRD 8500/QP is built as a 19" slide-in module with 1HU height. The front-panel contains:
- the display
- the LED’s
- the operating elements
- the video monitoring output
- the audio monitoring output
- opening to slide-in the Conditional Access Module

The rear-panel contains:
- the mains connection
- 1.SAT-IF input
- video-signal outputs
- RS232 interface
- 10 Mbit Ethernet-interface
- remote monitoring interface "ALARMS"

Cooling

The IRD 8500/QP is cooled by convection.
Power supply

Depending on the model the IRD 8500/.. can be operated with the following mains voltages:
- 115 VAC
- 230 VAC

**ATTENTION:** Before operation make sure that the mains voltage matches the supply voltage indicated on the device.

The mains fuse is located beside the mains socket. The IRD 8500/.. does not have a mains switch. To disconnect the IRD 8500/.. from the mains, the mains plug must be pulled out of the device.

Control

General

For controlling there are the following possibilities:
- Keypad and display on the IRD 8500/.. (see chapter "Menu operation")
- 10Mbit Ethernet-interface (software option “Network Access Control”)
- RS 232 Interface for stand-alone devices (software option “Network Access Control”)

Remote control in a network (software option)

The IRD 8500/.. can be remote controlled via the Ethernet- or RS232-interface. A standard WWW-browser with TCP/IP protocol (e.g. Internet Explorer) is to be used. The remote control can be disabled on the IRD 8500/.. .

Monitoring

General

For monitoring there are the following possibilities:
- keypad and display
- LED's “f” and “OUT” (see interfaces and operating elements)
- Monitoring output "VIDEO ☀", monitoring output "AUDIO ☀
- 10 Mbit Ethernet-interface (software option “Network Access Control”)
- RS 232 Interface for stand-alone devices (software option “Network Access Control”)
- Remote monitoring interface "ALARMS"
- History / operation log (see menu operation)
- Status display (see menu operation)

Remote monitoring interface "ALARMS"

On the remote monitoring interface “ALARMS” the status messages "ALARM" and "WARNING" are signalled via two floating double-throw contacts.

To the floating double-throw contacts external error indicators (e.g. siren, lamp) can be connected. The pin-assignment is shown in chapter "Interfaces and operating elements".
SAT-receiver/demodulator

Input frequency menu
"Input frequency"
"Input level"
"Frequency offset"
"Tuner status"
The input frequency can be adjusted in a range from 920 ... 2150 MHz in steps of 0,1 MHz. The current signal strength as well as the frequency offset of the input signal can be queried. The displayed frequency offset is defined as follows: offset = received frequency - set frequency. The software is tracking the frequency, until the tuner is locked. The current status (locked/unlocked) can be queried. For monitoring a warning- and an alarm threshold can be defined for each parameter.

Symbol rate Menu "Input symbol rate"
The symbol rate of the input signal is to be adjusted according to the input signal. It can be set in a range from 4 ... 45 MSymb/s in steps of 0,1 kSymb/s.

Transport stream Menu "TS identifier"
When entering a SAT-input frequency a search starts in a range of ±8MHz of the set mid-frequency to find present transport streams. The transport stream identifier (ID) and the input frequency of the transport streams are displayed.
Unique identification of a transport stream is only possible with the TS ID.
The displayed input frequency of a transport stream can vary about the frequency deviation of the LNC-oscillator.
The desired transport stream is to be selected from the available transport streams.

Bit Error Rate Menu "Input BER after V.”
The BER of the MPEG-signal can be queried after the Viterbi-decoding. A warning- or an alarm threshold can be defined.

Code rate input signal Menu "Input code rate"
The code rate of the input signal can be queried. The code rate can be monitored by defining a warning- or an alarm message.

Carrier to noise Menu "Input C/N"
The C/N-ratio of the input signal is measured and can be queried. A warning- or an alarm threshold can be defined.

LNB remote supply Menu “LNB supply”
With the option “LNB supply” this menu is displayed. The LNB remote supply is used for the direction of the polarity and is available with 13V (vertical) or 18V (horizontal).

LNB control Menu “LNB 22kHz”
With the option “LNB supply” this menu is displayed. The 22kHz control signal is used for the selection of the receiving frequency band.
### MPEG processing

**MPEG-input Menu "MPEG input"**

According to the desired source of the MPEG-signal, the MPEG input has to be pre-selected. There are following possibilities available:

- SAT
- SPI
- TSI (only with the option "MPEG interface" available)

### Program selection

**Menu "Select service"**

The programmes present in the transport stream are displayed. The desired programme must be selected. In order to read the entire displayed text for long programme descriptions, the text can be scrolled (see menu operation).

In the beginning of each programme description a symbol is positioned which shows the current status of decoding.

The following indications are possible:

- "#" encoded programme
- "?" programme is not decoded correctly
- "+" programme is decoded correctly

When changing a programme, a programme interruption occurs for approx. 2sec. during re-initialization.

### Demultiplexer and decoder status

**Menu "Demux status" "Decoder status"**

If the demultiplexer is synchronized with the MPEG-input data stream, "sync ok" is displayed. If the decoder can decode the signal correctly, "play" is displayed, otherwise "idle" is displayed. Monitoring of the corresponding states can be done by setting warning- or alarm messages.

### Test lines

**Menu "Test lines"**

The test lines pre-assigned for the respective standard (see Appendix / Technical data) can be switched off.

### VPS data, sound status

**Menu "VPS"**

The VPS-data as well as the sound status (mono/stereo/2-tone) present in the MPEG-input signal are inserted into the data line 16. The VPS-data can be switched off.

### Teletext

**Menu "Teletext"**

Teletext data present in the MPEG-input signal can be inserted into the video signal.

### Closed captioning

**Menu "Closed caption"**

For NTSC, data of the MPEG-signal coded in the picture can be transmitted. This function can be switched off.

### Wide screen

**Menu "Wide screen sign."**

For PAL-plus the information "wide screen signalling" is inserted into line 23, if a corresponding picture format is present at the input. This function can be switched off.
## Conditional Access (Option)

**Selection CA-applications**  
Applications available on the CA-card can be queried. The application for the desired programme is to be selected.

**CA-card menu**  
Menus available on the card can be selected here. The description of the menu items can be found in the documentation of the CA-card.

## Video processing

**Image format**  
The format of the output image of the IRD 8500/.. is set with 4:3. If a 16:9 input format is present, adaptation to the output format can be set in 3 different ways:

- **pass-through**  
  (not defined output image)
- **letter box**  
  (vertical filter, black bar on the upper and lower image margin)
- **pan & scan**  
  (expanding to the total image height, trimming the left and right margin)

**Test signal**  
The IRD 8500/.. provides a EBU color bar testsignal 100%.

**Output switch-off**  
The video baseband output can be switched off. Switch-off of the output signal is recommended when settings are changed on the IRD 8500/.. .

**TV Standard**  
For the baseband video signal the following TV-standards are available:

- **PAL**
- **NTSC**
- **SECAM**

If the TV-standard is changed, a warm reset is performed on the IRD 8500/.. .
Audio processing

Language selection of the sound
Menu "Select language"

The language of the sound can be selected in the menu. When changing the language, the programme is interrupted for approx. 2 seconds.

Selection of the mode of the sound
Menu "Audio Mode"

The audio baseband output can be selected from the following possibilities:

- Mono
- Stereo
- 2-Tone R
- 2-Tone L

The selection of the audio baseband signal does not influence the sound coding (mono, stereo, 2tone) carried out by the MPEG input signal.

Mute switching of the audio signal
Menu "MUTE"

The audio base band signal can be switched off.

Audio output level
Menu "Audio level"

The output level can be adjusted in a range from -3 ... 12 dBm (600 ohm) in steps of minimum 0,1 dB.
Putting into operation

Block diagram

Block diagram Integrated Receiver Decoder with option MPEG-interface
Interfaces and operating elements

Front-panel

View

Integrated Receiver Decoder IRD 8500/..

[1] Display (two lines with 20 characters each)
[2] Cursor keys
[3] ESC-key
[4] ENTER-key
[5] LED "OUT" lights up green, if input signal is correctly processed and an output signal is present.
[6] LED "" lights up red in case of an alarm or hardware error. In addition the display shows which error occurred (e.g. "ERROR: sync nok").
[8] AUDIO-monitoring output "AUDIO m" (6.3mm jack socket; 600 ohm)
[9] VIDEO-monitoring output "VIDEO m" (BNC-socket 75 ohm)
Putting into operation

Rear-panel

View

[Integrated Receiver Decoder IRD 8500/..]

[1] 1. SAT-IF input "SAT IF e" (F-socket)
[2] VIDEO output "VIDEO a" (BNC-socket; 75 ohm)
[3] VIDEO output "VIDEO a" (BNC-socket; 75 ohm)
[4] left audio baseband output "AUDIO L a" (XLR-socket, 3-poles)
[5] right audio baseband output "AUDIO R a" (XLR-socket, 3-poles)
[6] Serial output “ASI a” (BNC-socket, 75 ohm)
[7] Parallel output “SPI a” (25-pole sub-D-socket)
[8] Parallel input “SPI e” (25-pole sub-D-socket)
[9] remote monitoring interface "ALARMS" (9-pole sub-D-socket)
[10] "RS 232" interface (9 pole sub-D-socket)
[12] LED "LINK" (lights up when Ethernet connection is electrically correct)
[13] mains connection "MAINS"
[14] mains fuse
Pin-assignment RS232-interface (socket)

<table>
<thead>
<tr>
<th>Pin</th>
<th>Remark</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>not used</td>
</tr>
<tr>
<td>2</td>
<td>RXD (Receiving Data)</td>
</tr>
<tr>
<td>3</td>
<td>TXD (Transmitting Data)</td>
</tr>
<tr>
<td>4</td>
<td>not used</td>
</tr>
<tr>
<td>5</td>
<td>ground</td>
</tr>
<tr>
<td>6 ... 9</td>
<td>not used</td>
</tr>
</tbody>
</table>

Pin-assignment interface "ALARMS"

The double throw contacts are dimensioned for the following values:

- Maximal switchable voltage: 30 VDC or 42 VAC *(SELV acc. to EN60950)*
- Maximal switchable current: 0.5 A
  *SELV...low voltage circuit (safety extra-low voltage)*

<table>
<thead>
<tr>
<th>Pin</th>
<th>Remark</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>break contact (alarm)</td>
</tr>
<tr>
<td>2</td>
<td>base contact (alarm or warning)</td>
</tr>
<tr>
<td>3</td>
<td>make contact (warning)</td>
</tr>
<tr>
<td>4</td>
<td>REMOTE_2 (programmable input)</td>
</tr>
<tr>
<td>5</td>
<td>ground</td>
</tr>
<tr>
<td>6</td>
<td>break contact (alarm)</td>
</tr>
<tr>
<td>7</td>
<td>make contact (warning)</td>
</tr>
<tr>
<td>8</td>
<td>REMOTE_1 (programmable input)</td>
</tr>
<tr>
<td>9</td>
<td>+12 V / Ri = 560 Ohm</td>
</tr>
</tbody>
</table>

wiring of the alarms
The Ethernet interface is using a RJ-45 Stuart connector.

<table>
<thead>
<tr>
<th>Pin</th>
<th>Remark</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>RD+ Receive data (positive)</td>
</tr>
<tr>
<td>2</td>
<td>RD- Receive data (negative)</td>
</tr>
<tr>
<td>3</td>
<td>TD+ Transmit data (positive)</td>
</tr>
<tr>
<td>6</td>
<td>TD- Transmit data (negative)</td>
</tr>
<tr>
<td>4/5/7/8</td>
<td>not used</td>
</tr>
</tbody>
</table>
Start-up

**ATTENTION:** Operating work must be carried out by personnel with RF-knowledge.

**ATTENTION:** If the device is steamed up after unpacking, it must be acclimated at least one hour before starting operation.

**ATTENTION:** During operation the vents must not be covered. When mounting the device in a rack, take care that there is a gap of at least 1 HU between the devices.

**NOTE:** When building in the device in a rack use rails or any other suitable mount.

**NOTE:** Before operation read the chapter "Menu operation".

### Procedure

1. Check if the supply voltage shown beside the mains socket matches the mains voltage.

**ATTENTION:** A wrong mains voltage will cause a defect in the IRD 8500/.. Therefore check the mains voltage before connecting the module to the mains.

2. Slide in the IRD 8500/.. into the intended place in the 19" rack.

3. Fix the module with the 4 screws on the front-panel.

4. Connect the signal cabling.

5. Connect the IRD 8500/.. to the mains (boot procedure starts)

6. Check the LC-display.

7. Adjust the contrast of the LC-display (see menu operation "display / contrast")
8. For the first start-up use the help of the "setup assistant". This menu is entered by calling up the sub-menu "factory setting" under "setup". After the IRD 8500/.. was reset to the factory settings you are queried whether you want to use the help of the setup assistant or not. If your answer is "Yes", the following parameters must be entered:
   - MPEG input (SAT, SPI, TSI)
   - Sat input frequency (1st SAT-IF level)
   - Input symbol rate (4 ... 45 MSymb/s)
   - TS identifier (selection of the transport stream)
   - Select service (selection of the program)
   - Select language (selection of sound2)
With "finished" you return to the main menu. The IRD 8500/.. is now ready for operation.

9. Check the LED`s on the front-panel.
   - LED "f" does not light up
   - LED "OUT" lights up

10. Check the operating parameters of the IRD 8500/.. in the menus "Sat receiver", "MPEG processing", "Conditional access", "Video processing" and "Audio processing".

11. For optimizing the IRD 8500/.. adjust the settings of all other parameters (e.g. "Audio level") in the menus.

12. Set the desired warning- and alarm thresholds for the displayed values.
The menu tree of the IRD 8500/.. shows the following main menus:

- **Sat receiver** setting the SAT-parameters
- **MPEG processing** setting of specific programme parameters, test lines, VPS, Teletext, etc.
- **Conditional Access** setting of CA-parameters (software option)
- **Video Processing** setting of video parameters
- **Audio Processing** setting of audio parameters
- **History/Status** query of status, history and operation log
- **Setup** setting the device configuration
- **Network** setting and query of the network parameters
- **Miscellaneous** query of device configuration, entry of PIN-codes

---

**Menu tree**

**General**

- Sat receiver setting the SAT-parameters
- MPEG processing setting of specific programme parameters, test lines, VPS, Teletext, etc.
- Conditional Access setting of CA-parameters (software option)
- Video Processing setting of video parameters
- Audio Processing setting of audio parameters
- History/Status query of status, history and operation log
- Setup setting the device configuration
- Network setting and query of the network parameters
- Miscellaneous query of device configuration, entry of PIN-codes

---

**Diagram**

[Diagram of the menu tree with options such as Sat receiver, MPEG processing, Conditional Access, Video processing, and Audio processing, each with sub-options like input frequency, tuner status, etc.]
Menu tree

1) Function if the software option Conditional Access Control (CAC 8000) is installed.

2) Function only with the option “LNB supply” available
Menu operation

Operation

Cursor keys
The IRD 8500/.. is operated via the key pad on the front-panel. With the cursor keys “↑” and “↓” you can select the desired menu item. With the cursor key “→” you enter the desired menu. With the cursor keys “↑” and “↓” you can select the desired function in the sub-menu.

ESC-key
With the ESC-key you can move one level up in the menu tree.

ENTER-key
With the ENTER-key you select a setting or a measured value, and confirm an entry.

Change settings
Select the value to be changed by pressing the ENTER-key.

- Position the cursor with the keys “←” and “→” and set the desired value with the keys “↑” and “↓”.

You can exit a configuration menu in the following way:
- to confirm the entry press the ENTER-key
- to cancel the entry press the ESC-key
- to exit the menu press the ESC-key or the key “←”

If a value is changed, a range-window shows up on the display. The vertical line represents the value currently set.

When changing the value, the line is moving along in the range-window. If the possible adjustment range is left, it is indicated by an arrow. Input values outside the valid range are not accepted.
An error message “value out of range !” is displayed.

On the right margin of the display an information bar is located. The following displays are present:

Arrow to the top or to the bottom : further menus can be selected by using the cursor keys.

Arrow to the right: by using the “-→”-key a submenu can be selected.
Display of an “E” : the currently selected setting can be edited/changed.

Display of an “L” : for the currently selected status resp. value a warning- or alarm-message can be defined.

Alarm and warning messages

By pressing the ENTER-key an alarm- and warning threshold value for a status message or displayed value can be defined.

With the cursor keys “←” and “→” the text can be scrolled through.

With the keys “↑” and “↓” the following settings can be changed:

- selection between alarm and warning message
- selection of the message state: “EN” enables the message, “dis” disables the message.
- selection of condition for status indication (e.g. “if sync ok” or “if sync not ok”)
- the thresholds for display values (upper limit, lower limit) can be selected and changed. (see change settings)

Confirmation of the entries with the ENTER-key.

Password protection

Menu “Change password” You can provide the IRD 8500/.. with a password protection. At delivery the password is “0000”. Password query is suppressed with this password. To protect the IRD 8500/.. from unauthorized use you have to change the password. However, query of the parameters and settings is possible at all times.

After entering the password (query) all settings can be changed without restrictions. If no key is pressed during a period of 30 minutes, the device changes back into the protected mode.

Repeated entry of the current password in the menu or the entry of a new password causes the device to change immediately to protected mode.

NOTE: Write down the changed password. In case of loosing your password contact the next service center.
## Configuration / Identification

### Device identification

For device identification in a network additional information of the device can be stored. The following sub-settings are possible:

- **ID: long name** [30 characters] ***Hirschmann***
- **ID: short name** IRD 8500 (pre-assigned)
- **ID: rack** [2 characters] A1
- **ID: mainframe** [2 characters] 10
- **ID: location** [20 characters] Rankweil 3
- **ID: network** [30 characters] Rheinmetall
- **ID: channel** [30 characters] evaluation 8500

### Device identification

The information about the current device configuration can be queried. For each mounted assy the following information is available:

- **SW-Vers** Current software-version
- **GUI-V.** Version for the graphical user interface
- **Ord.Nr.** Hirschmann ordering number
- **Ser.Nr.:** Serial number of the assy
- **G-Nr.** Hardware version of the assy
- **SG-Nr.** Software-version of the assy
- **Prod.** Date of production
- **Rep.** Date of last repair
- **Build:** Number of compiling

If information is not available (e.g. the assy has no software) the message “—” is displayed.

## Status display / history / operation log

### Status messages

If status messages are present, the message with the highest priority is scrolled across the upper line of the display in the main menu.

**NOTE:** The submenus do not contain a status line.

After booting the device the upper line of the display shows “IRD 8500 all ok” as well as the name stored under “Setup\Device ID: menu\Device ID:long name”

Further messages about current errors, alarms and warnings can be queried.

The message text can be seen by selecting the next submenu. By using the cursor keys, the individual message texts can be read as a whole.

(Exit with ESC-key)

If an error or warning message appears on the LC-display, it is likely that you will find some additional information in the history.
History / operation log

Menu
“History show”
“History delete”

All errors, alarms and warnings that occurred as well as changes in the device settings are stored in an operation log. The records are displayed with current time and date and a consecutive number. The entries (max.250) can be queried. The most recent events are stored with the lowest number.

If a threshold value is exceeded, a [+] in front of the message indicates that the valid range was left. If the value returns into the valid range, a repeated entry with a [-] in front of the message is shown.

The message text can be seen by selecting the next submenu. By using the cursor keys, the individual message texts can be read as a whole.

(exit with ESC-key)

The information stored in the history can only be deleted as a whole.

Menu
“Extended messages”

Is not used in the IRD 8500/.. for the time being.

Preset / Reset

Preset
Menu “Factory settings”

If the complete IRD 8500/.. shall be reset to the factory settings, a preset has to be performed, which sets back all parameters and all alarm and warning thresholds to the factory settings.

After the preset is executed, a “set up assistant” is available for easy putting into operation (see chapter “putting into operation”)

Reset
Menu “Reset Alarms/Warn.”

The alarm and warning thresholds can be de-activated individually for each measuring parameter or all alarm and warning thresholds can be de-activated at once.

Network

Network access
Menu
“Network access”

Network access can be disabled (e.g. in order not to cause remote error messages when doing maintenance work or setting changes).

For the network access the following possibilities are available:

- **FREE** full access, all read/write possibilities are available (option Network Access Control)
- **Update only** only an update of the flash-software can be performed (if no software option was ordered)

Menu “Remote control”

If “Remote control” is set to “OFF”, the remote control is disabled, which means that that remote control center is still able to receive messages from the equipment (e.g. configuration changes made by a local operator), but cannot change the configuration any more.

Menu “Online users”

Indication of the present number of guest / operators / ftp connections
**Network status**

**Menu “Ethernet status”**

If the IRD 8500 is used in a network with automatic DHCP-address assignment, the address assigned by the server is displayed.

Interruption of an existing network connection causes the error message “Ethernet offline”.

**Network configuration**

**Menu “Ethernet configuration”**

Ethernet configuration is carried out via a desktop PC. Necessary additional information about the submenus listed below can be found in the online help.

---

**NOTE:** Before you connect the IRD 8500 to the network, contact your network provider

---

For the network configuration the following menu items are available:

- Network mode (setting of the DHCP address auto/man; when changing the setting, the CPU on the board “Controller Assy” performs a reset)
- Network IP (is assigned when DHCP is auto, to be set in manual mode)
- Network IP mask (is assigned when DHCP is auto, to be set in manual mode)
- Network gateway IP (is assigned when DHCP is auto, to be set in manual mode)
- Network DNS IP (is assigned when DHCP is auto, to be set in manual mode)
- Network MAC chip address of the Ethernet-controllers

**Menu “PPP status”**

Indication of the availability of the PPP connection (remote control RS 232).

**Menu “PPP configuration”**

For the PPP connection (for stand-alone devices) the following menu items are available:

- PPP baudrate: Input of the baudrate for the RS 232 connection
- PPP IP: Input of the IP address of the BS8000 devices
- PPP remote IP: Input of the IP address of the PC
- PPP login name: Input of the user ID
- PPP login password: Input of the password

**Mail**

**Menu “Mail settings”**

In network operation, configuration of the mail parameters is to be carried out via the submenus of this menu.

- Netmail sending: Select the type(s) of messages you want to send (e.g. Errors and warnings). If you, for example, select +INFO errors, warnings and info will be sent. Errors will reduce the messages to error only.
- Netmail server IP: Input of the mailserver IP
- Netmail account: Input of the mail account
- Netmail dest.: Input of the email address
- Netmail delay: Input of the delay for sending mail
- Netmail send testmail: This menu item permits to sends a test mail
Display

Illumination The display illumination is automatically switched off, if no key is pressed on the IRD 8500/.. for 15 minutes. When pressing any key the illumination switches on again.

Display contrast The contrast of the display can be adapted to the light conditions in the room.

Menu “Contrast”

Date / Time / Temperature

Date / Time The time settings stored in history are derived from this clock.
Menu “Date & Time” Format: [ YYYY:MM.DD HH.MM.SS ]

Temperature The temperature in the housing is measured. The current value can be queried.
Menu “Temp.”

PIN-Code

Release of options If the input of a PIN-code is necessary for the release of an option, it has to be entered in this menu. If the code is correct the message “Code accepted” is shown. If the code is incorrect, the message says “Code not accepted”.
Menu “Device PIN code”
Important notes

ATTENTION: Maintenance work must be carried out by trained staff with RF-knowledge.

ATTENTION: In case of a technical problem send your IRD 8500/.. to your next service center for repair.

NOTE: Please go to our service homepage http://service.hirschmann.at to find other helpful information.
Functional check

Procedure

For a functional check it is sufficient to check the nominal states of the LED’s on the front panel and the operating parameters on the display.

Nominal operation state

- LED "1" does not light up
- LED "OUT" lights up

Menu "MPEG processing"
- DMX state sync ok
- Decoder state play

Menu "Video processing"
- Output signal On

Menu "Audio processing"
- Audio mute Off

All other operating parameters are programme- or system-dependent.
## Help with problems

### LED indications

<table>
<thead>
<tr>
<th>Failure</th>
<th>Repair</th>
</tr>
</thead>
</table>
| LC-display display remains dark | - Press any key.  
  - Check the power supply.  
  - Check the mains fuse.  
  - Change the IRD 8500/.. |
| red LED "\(^{1}\)" lights up | - An alarm was triggered. Check which alarm is active in the history. Solve the problem or change the alarm threshold.  
  - An existing Ethernet connection was interrupted.  
  - Change the IRD 8500/..  
  - Check the following settings:  
    - Input frequency  
    - Input level  
    - Symbol rate  
    - LNB supply (option LNB supply)  
    - LNB 22kHz (option LNB supply)  
    - Tuner state  
    - Restore the factory settings with PRESET and re-configure the device. |
| LED "OUT" does not light up  
DMX state: “sync. not ok”  
Decoder state: “idle” | - Check the following settings:  
  - Video output  
  - Restore the factory settings with PRESET and re-configure the device. |
| LED "OUT" does not light up  
DMX state: sync ok  
Decoder state: play | - Check the following settings:  
  - Video output  
  - Restore the factory settings with PRESET and re-configure the device. |
| LED "OUT" lights up no sound or sound very soft | - Check the following settings:  
  - Audio mute  
  - Audio gain  
  - Check if the audio operating outputs are connected to the “IRD assy”  
  - Restore the factory settings with PRESET and re-configure the device. |

---

**NOTE:** Error messages, which are inserted on the LC-display, are listed in the appendix.
Change

Changing the mains fuse

**ATTENTION:** Danger of electric shocks! Disconnect the IRD 8500/.. from the mains before changing the fuse!

**Procedure**

1. Disconnect the IRD 8500/.. from the mains.

2. The fuseholder is located beside the mains socket. Open the bayonet lock of the fuse holder with a screwdriver.

3. Replace the defective fuse (5x20 mm). The fuses have, depending on the mains voltage, the following values:
   - 230 V mains connection: 0.315 AT
   - 115 V mains connection: 0.63 AT

Changing the battery

**ATTENTION:** Danger of electric shocks! Disconnect the IRD 8500/.. from the mains before changing the battery!

**WARNING:** Improper change of the battery may cause an explosion. Replacement only by the same or an equivalent type recommended by the manufacturer!

**ATTENTION:** Lithium batteries must not be disposed of as domestic waste! Send the used batteries back to the manufacturer or supplier. Address of the manufacturer of the battery:

Firma RENATA AG
Kreuzenstr. 30
CH-4452 Itingen

**NOTE:** The data in the ERROR history and the note entries (when using in the network) get lost when the battery is changed.
1. Disconnect the IRD 8500/.. from the mains.

2. Loose the screws on the cover and remove it.

3. Replace the empty lithium battery by a new one (lithium battery CR 2477N 3V/1000mAh; Manufacturer: RENATA)

4. Watch out for the correct polarity of the battery!

5. Close the cover.

6. Reconnect the device to the mains.

7. Carry out a functional check (see chapter).

Top view of Integrated Receiver Decoder with open cover (only CPU board)
Fitting of options

General

The option MPEG-interface can also be fitted after the installation.

- First disconnect the IRD 8500/.. from the mains.
- Open the cover.
- Install the option MPEG-interface or “LNB supply” according to the installation instruction enclosed.
- Close the cover.
- Reconnect the IRD 8500/.. to the mains.
- The option is automatically detected by the software. Perform the necessary settings in the menus. (e.g. change MPEG-input to TSI).

Top view of Integrated Receiver Decoder with open cover
Software update

A software update can be carried out via the Ethernet interface (for headends with several BS8000 devices) as well as via the RS232 interface and a PPP connection (for stand-alone BS8000 devices). If a software update is necessary, all the information about the update will be enclosed in the upgrade package.

---

**NOTE:** You can download the software update with the update information from the software update section on our service homepage http://service.hirschmann.at. Look for the ordering number given below. The update section is protected by password. To obtain the present password please contact service@rw.hirschmann.at. The password is changed monthly.

---

Ordering description: Software SW CPU-IRD 8500
Ordering number 879 310-814
Ordering description: Software SW IRD 8500
Ordering number 879 310-808

Handling

Storage

We recommend to store the IRD 8500/.. in the original packaging.

Pay attention to the following parameters:

- Temperature -20 ... +70°C
- Relative humidity 20 ... 80 %

Transport

We recommend to transport the IRD 8500/.. in the original packaging. Watch out that there is no mechanical stress on the connectors and operating elements.

Disposal

The device must be recycled / disposed of after duly operation according to the national disposal regulations.

We recommend in case to contact the local authorities.
Ordering information

Ordering information Integrated Receiver Decoder for 230 V mains connection

<table>
<thead>
<tr>
<th>Model</th>
<th>Type</th>
<th>Part number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Input SAT-QPSK-signal</td>
<td>IRD 8500/QP</td>
<td>977 160-001</td>
</tr>
<tr>
<td>Input QAM-signal</td>
<td>IRD 8500/QA</td>
<td>977 160-002</td>
</tr>
<tr>
<td>Input OFDM-signal</td>
<td>IRD 8500/OF</td>
<td>977 160-003</td>
</tr>
<tr>
<td>Input MPEG-signal</td>
<td>IRD 8500/MP</td>
<td>977 160-004</td>
</tr>
</tbody>
</table>

Ordering information Integrated Receiver Decoder for 115 V mains connection

<table>
<thead>
<tr>
<th>Model</th>
<th>Type</th>
<th>Part number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Input SAT-QPSK-signal</td>
<td>IRD 8500/QP</td>
<td>977 160-101</td>
</tr>
<tr>
<td>Input QAM-signal</td>
<td>IRD 8500/QA</td>
<td>977 160-102</td>
</tr>
<tr>
<td>Input OFDM-signal</td>
<td>IRD 8500/OF</td>
<td>977 160-103</td>
</tr>
<tr>
<td>Input MPEG-signal</td>
<td>IRD 8500/MP</td>
<td>977 160-104</td>
</tr>
</tbody>
</table>

Ordering information for options

<table>
<thead>
<tr>
<th>Hardware</th>
<th>Description</th>
<th>Type</th>
<th>Order number</th>
</tr>
</thead>
<tbody>
<tr>
<td>MPEG interface</td>
<td>AS-MPI 8505</td>
<td>888 224-001</td>
<td></td>
</tr>
<tr>
<td>LNB supply</td>
<td>AS-LNB 8500/75</td>
<td>888 076-001</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Software</th>
<th>Description</th>
<th>Type</th>
<th>Order number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Conditional Access Control</td>
<td>CAC 8000</td>
<td>879 310-809</td>
<td></td>
</tr>
<tr>
<td>Network Access Control</td>
<td>NAC 8000</td>
<td>879 310-810</td>
<td></td>
</tr>
</tbody>
</table>

NOTE: When ordering the Network Access Control Software, both the serial number of the IRD 8500/.. (see “Miscellaneous\Module info”) and the MAC number of the Ethernet controller have to be stated in addition to the part number. The MAC number can be queried on the device. (see menu “Network\Ethernet configuration\network MAC”)

NOTE: When ordering the Conditional Access Control Software, also the serial number of the IRD 8500/.. (see “Miscellaneous\Module info) has to be stated in addition to the part number.

The software options are released with a PIN-code.
## Services

<table>
<thead>
<tr>
<th>Country</th>
<th>Address</th>
<th>Phone</th>
<th>Fax</th>
<th>Email</th>
</tr>
</thead>
<tbody>
<tr>
<td>Austria</td>
<td>Hirschmann Austria GmbH, Oberer Paspelsweg 6-8, A-6830 RANKWEIL-BREDERIS</td>
<td>+43-(0)5522/307 0</td>
<td>+43-(0)5522/307 555</td>
<td><a href="mailto:info@rw.hirschmann.at">info@rw.hirschmann.at</a></td>
</tr>
<tr>
<td>Germany</td>
<td>Hirschmann Electronics GmbH &amp; Co. KG, Stuttgart Str. 45 - 51, D-72654 NECKARTENZLINGEN</td>
<td>+49-(0)7127/14 0</td>
<td>+49-(0)7127/14 1214</td>
<td><a href="mailto:info@nt.hirschmann.de">info@nt.hirschmann.de</a></td>
</tr>
<tr>
<td>Benelux</td>
<td>Richard Hirschmann, Electronique Nederland B.V., Postbus 92, NL-1380 AB WEESP</td>
<td>+31-(0)2944 62 555</td>
<td>+31-(0)2944 80 639</td>
<td><a href="mailto:ibn@hirschmann.nl">ibn@hirschmann.nl</a></td>
</tr>
<tr>
<td>France</td>
<td>Richard Hirschmann, Electronique S.A., 24, rue du Fer à Cheval, Z.I. F-95200 SARCELLES</td>
<td>+33-(0)1/3933 02 80</td>
<td>+33-(0)1/3990 59 68</td>
<td><a href="mailto:erempfer@hirschmann.fr">erempfer@hirschmann.fr</a></td>
</tr>
<tr>
<td>Great Britain</td>
<td>Richard Hirschmann, Electronics UK Ltd., St. Martins Way, St. Martins Business Centre, GB-BEDFORD MK42 OLF</td>
<td>+44-(0)1234/34 5999</td>
<td>+44-(0)1234/35 2222</td>
<td><a href="mailto:richardhirschmann@compuserve.com">richardhirschmann@compuserve.com</a></td>
</tr>
<tr>
<td>Singapur</td>
<td>Hirschmann Electronics Pte Ltd, 3, Howard Road, Tat Hong Industrial Building #04-00, SGP-Singapore 369 578</td>
<td>+65 / 382 2055</td>
<td>+65 / 382 2755</td>
<td><a href="mailto:hirschmann.ap@pacific.net.sg">hirschmann.ap@pacific.net.sg</a></td>
</tr>
<tr>
<td>Spain</td>
<td>Hirschmann Espania S.A., c/Trespaderne, 29, (Barrio del Aeropuerto), Edifica Barayas 1, 2a Planta, E-28042 MADRID</td>
<td>+34-(0)91/746 1730</td>
<td>+34-(0)91/746 1735</td>
<td><a href="mailto:hes@hirschmann.es">hes@hirschmann.es</a></td>
</tr>
<tr>
<td>Ungarn</td>
<td>Hirschmann Hungaria Kft., Rokolya u. 1-13, H-1131 BUDAPEST</td>
<td>+36-(0)13/49 41 99</td>
<td>+36-(0)13/29 84 53</td>
<td><a href="mailto:hirschmann.budapest@mail.matar.hu">hirschmann.budapest@mail.matar.hu</a></td>
</tr>
<tr>
<td>USA/Canada</td>
<td>Hirschmann Electronics, Inc., 30 Hook Mountain Road - Unit 201, PINE BROOK, N.J. 07058, USA</td>
<td>+1-973/830 2000</td>
<td>+1-973/830 1470</td>
<td><a href="mailto:ischnaitmann@hirschmann-usa.com">ischnaitmann@hirschmann-usa.com</a></td>
</tr>
<tr>
<td>Internet</td>
<td><a href="http://www.hirschmann.de">http://www.hirschmann.de</a>, <a href="http://service.hirschmann.at">http://service.hirschmann.at</a> (e.g. Software update)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
General data

Nominal temperature range : +5 ... +40 °C
Operation temperature range : 0 ... +45 °C
Storage temperature range : -20 ... +70 °C

Cooling : Convection

Dimensions (W x D x H) : 483 x 490 x 44 mm
(19" cabinet mit 1 HU)
Mounting depth without cabling : 450 mm
Weight : max. 6.0 kg

Connections

Mains : Compact mains plug
1. SAT IF-input F-socket
VIDEO-output : 3 x BNC-socket
AUDIO-output : Audio-socket, type XLR 3-poles
AUDIO-monitoring output : 6,3 mm jack socket

Technical data

Power supply

Mains voltage:
115 V version : 97 ... 132 VAC
230 V version : 195 ... 264 VAC

Mains frequency : 48 ... 62 Hz

Mains fuses:
for 230 V : 0.315 A slow
for 115 V : 0.63 A slow

Power consumption at nominal load : max. 24 W (without options)

EMV : EN 50083-2/A1 edition 9/95 +
A1 edition 3/97
Safety standard : EN 60065 (edition April 94)
Input

1. SAT-IF input “SAT IF -Ω”:
   - Impedance: 75 ohm
   - Frequency range: 950 ... 2150 MHz
   - Level: -65 ... -25 dBm
   - Tuning increment: 0.1 MHz
   - AFC capture range: ± 8 MHz
   - Return loss: ≥ 8 dB (typ.: ≥ 12 dB)
   - Oscillator interference level: ≤ -63 dBm
   - Frequency 2.SAT-IF: 479.5 MHz
   - IF-bandwidth: 55 MHz
   - Demodulation: I/Q or I/-Q
   - Direction of rotation: automatically detected
   - Spectral sharpening: cos roll off 35%
   - Output-symbol rate: 4 ... 45 MSymb/s
   - Smallest adjustment step: 0.1 kSymb/s
   - Decoding: acc. to DVB standard ETS 300421
   - Remote supply LNB:
     - vertical: 12,5 ... 14,0 V / max. 310 mA
     - horizontal: 17,2 ... 18,8 V / max. 310 mA
   - 22 kHz control signal:
     - f = 20 ... 24 kHz; Zi = 15 Ohm;
     - Upp = 500 ... 800 mV

Synchronous Parallel Interface input “SPI -Ω” (Low Voltage Differential Signal)
   - Datarate: 2 ... 64 Mbit/s
   - Clock frequency: 250 kHz ... 8 MHz
   - Frame length: 188 or 204 Bytes
   - Level: 100 mVpp ... 2.0 Vpp
   - Impedance: 90 ... 132 Ohm
   - Clock phase: rising edge in the center of the data bit

Outputs

Video output 2 x “VIDEO Ω”:
   - TV standard: PAL, NTSC, SECAM corr. ITU-R BT624
   - Output signal: CVBS
   - Output level: 1 Vss ± 5 mV
   - Impedance: 75 ohm
   - Return loss: ≥ 34 dB (0 - 5 MHz)
   - Video bandwidth: DC ... 5 MHz
   - Video amplitude response: ≤ ± 0.5 dB
   - Clamping: 0 V ± 30 mV
   - Differential phase: < 1.5°
   - Differential amplitude: < 1.5%
   - S/N (rated, slope): ≥ 56 dB
   - Y - C delay: ≤ 25 ns
   - Hum suppression (reference 1Vpp): ≥ 60 dB
   - Base line distortion (20T-Impulse): < 2%
Appendix

Audio output “AUDIO a”:
- Frequency range: 20 Hz ... 15 kHz
- Output level: + 9 dBm / 600 ohm
  + 0.5 ... + 15 dBm adj. by steps of 0.5 dB
- Frequency range: ≤ ± 0.5 dB
- Impedance: < 30 ohm symmetrical
- S/N: ≥ 85 dB
- Channel cross talk: ≥ 70 dB

Synchronous Parallel Interface output “SPI a” (Low Voltage Differential Signal)
- Datarate: 2 ... 64 Mbit/s
- Clock frequency: 250kHz ... 8 MHz
- Impedance: ≤ 100 Ohm
- Level: 247 ... 454 mVpp
- Clock phase: rising edge in the center of the data bit

Asyncronous Serial Interface output “ASI a”
- Frame length: 188 Bytes or 204 Bytes
- Data rate: 270 Mbit/s
- Impedance: 75 Ohm
- Return loss: ≥ 17 dB (5 .. 270 MHz)
- Level: 720 ... 880 mV

Monitoring outputs

Video-monitoring output front-panel “VIDEO m”
equivalent to “VIDEO e” on the rear-panel

Audio-monitoring output front-panel “AUDIO m”
equivalent to “AUDIO a” on the rear-panel, but
- Impedance: 600 ohm unsymmetrical

Teletext
- Receiving system: acc. to ETS 300-472 (DVB)
- Transmitting system: acc. to CCIR Rec. 653 system B

VITS
- EBU color bar signal 100% standard B/G

Test lines
- PAL: CCIR line 17 / 18 / 300 / 331
- NTSC: CCIR line 17 / field 1 and 2
Interfaces

RS232:
Pin-assignment : (see “Putting into operation \ Interfaces”)

NOTE: In order to meet the EMV-requirements a shielded cable must be used with the RS 232 interface.

Ethernet:
10 Mbit interface “10 BASE-T”
Pin-assignment : (see “Putting into operation \ Interfaces”)

MPEG interface (option):
Data are delivered with the option.

Remote monitoring interface “ALARMS”:
Max. switched voltage : 30 VDC oder 42 VAC *(SELV nach EN60950)
Max. switched current : 0,5 A
Pin-assignment : (see “Putting into operation \ Interfaces”)

*SELV....low voltage circuit (safety extra-low voltage)
Appendix

Error messages

The list below covers hardware errors and network errors. We have excluded all network errors from the list, for which local repair does not seem to be feasible.

Most network errors will cause the device to perform a reset. If the network error, however, persists, contact one of our service centers.
<table>
<thead>
<tr>
<th>Message</th>
<th>Cause</th>
<th>Solution</th>
</tr>
</thead>
<tbody>
<tr>
<td>27 MHz failure.</td>
<td>Unknown.</td>
<td>Change the device and contact one of our service centers.</td>
</tr>
<tr>
<td>Amplifier A current overload.</td>
<td>The hybrid is defect.</td>
<td>Change the device and contact one of our service centers.</td>
</tr>
<tr>
<td>Amplifier B current overload.</td>
<td>The hybrid is defect.</td>
<td>Change the device and contact one of our service centers.</td>
</tr>
<tr>
<td>Battery empty - Data lost.</td>
<td>The lifetime of the battery has expired.</td>
<td>Replace the battery.</td>
</tr>
<tr>
<td>Battery has low voltage, replace.</td>
<td>The lifetime of the battery has expired.</td>
<td>Replace the battery.</td>
</tr>
<tr>
<td>Communication problem.</td>
<td>Unknown.</td>
<td>Interrupt the power supply for a few seconds. OR Restore the factory settings in the SETUP menu and reconfigure the device.</td>
</tr>
<tr>
<td>Current overload module x.</td>
<td>Unknown.</td>
<td>Change the device and contact one of our service centers.</td>
</tr>
<tr>
<td>DHCP failed _ Network disabled.</td>
<td>DHCP access failure.</td>
<td>Check the DHCP server in the network. If the DHCP server is out of order, you can try entering a valid IP address manually. If the problem cannot be solved this way, contact one of our service centers.</td>
</tr>
<tr>
<td>DHCP failure (no valid server found).</td>
<td>DHCP access failure.</td>
<td>Check the DHCP server in the network. If the DHCP server is out of order, you can try entering a valid IP address manually. If the problem cannot be solved this way, contact one of our service centers.</td>
</tr>
<tr>
<td>Message:</td>
<td>DHCP failure, extend lease time failed.</td>
<td></td>
</tr>
<tr>
<td>---------</td>
<td>----------------------------------------</td>
<td></td>
</tr>
<tr>
<td>Cause:</td>
<td>DHCP access failure.</td>
<td></td>
</tr>
<tr>
<td>Solution:</td>
<td>Check the DHCP server in the network. If the DHCP server is out of order you can try entering a valid IP address manually. If the problem cannot be solved this way, contact one of our service centers.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Message:</th>
<th>DPPL failure.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cause:</td>
<td>The assy &quot;DDS&quot; has no clock or is defect.</td>
</tr>
<tr>
<td>Solution:</td>
<td>Change the device and contact one of our service centers.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Message:</th>
<th>DSP failure.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cause:</td>
<td>Unknown.</td>
</tr>
<tr>
<td>Solution:</td>
<td>Change the device and contact one of our service centers.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Message:</th>
<th>EEPROM failure.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cause:</td>
<td>Unknown.</td>
</tr>
<tr>
<td>Solution:</td>
<td>Change the device and contact one of our service centers.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Message:</th>
<th>Factory adjustment incomplete.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cause:</td>
<td>The factory settings could not be restored.</td>
</tr>
<tr>
<td>Solution:</td>
<td>Change the device and contact one of our service centers.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Cause:</td>
<td>Something is wrong with the ftp-client.</td>
</tr>
<tr>
<td>Solution:</td>
<td>Change the device and contact one of our service centers.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Message:</th>
<th>Flash data failure.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cause:</td>
<td>The flash is defect.</td>
</tr>
<tr>
<td>Solution:</td>
<td>Change the device and contact one of our service centers.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Message:</th>
<th>Flash: Failed erasing.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cause:</td>
<td>The flash is defect.</td>
</tr>
<tr>
<td>Solution:</td>
<td>Change the device and contact one of our service centers.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Message:</th>
<th>Flash: Failed writing.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cause:</td>
<td>The flash is defect.</td>
</tr>
<tr>
<td>Solution:</td>
<td>Change the device and contact one of our service centers.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Message:</th>
<th>FPGA failure.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cause:</td>
<td>Unknown.</td>
</tr>
<tr>
<td>Solution:</td>
<td>Change the device and contact one of our service centers.</td>
</tr>
</tbody>
</table>

Appendix

Cause: Something is wrong with the ftp-client.
Solution: Change the device and contact one of our service centers.

Message: General fault module x.
Cause: Unknown.
Solution: Change the device and contact one of our service centers.

Message: General hardware failure.
Cause: Maybe the device fails to access the EEPROM
OR The EEPROM checksum is not correct
OR The EEPROM data have changed.
OR The module has a wrong identification number (that means that the
hardware configuration is incorrect)
OR the adjustment bytes are incorrect.
Solution: Change the device and contact one of our service centers.

Message: I2C-bus blocked.
Cause: Communication problem.
Solution: Switch off the installation and interrupt the power supply for a few
seconds.
OR Restore the factory settings (SETUP menu) and reconfigure the
device.

Message: Incorrect mail settings.
Cause: Unknown.
Solution: Check the mail settings.

Message: Invalid module settings.
Cause: Invalid settings.
Solution: Check the module settings.

Message: Modulator failure.
Cause: Connection problem.
Solution: Check if the specified connections are provided on the slide-in places
for the options (e.g. after removal of an option)
OR Change the device.

Message: No battery found.
Cause: Connection problem.
Solution: Replace the battery.

Message: No submodule found.
Cause: Connection problem.
Solution: Check the connection to the submodule.
Message: Option IF in/out failure.
Cause: Unknown.
Solution: Change the device and contact one of our service centers.

Message: Option ref. freq. failure.
Cause: Unknown.
Solution: Change the device and contact one of our service centers.

Message: Option RF amplifier failure.
Cause: Unknown.
Solution: Change the device and contact one of our service centers.

Message: Option stereo failure.
Cause: Unknown.
Solution: Change the device.

Message: Option video in/out failure.
Cause: Unknown.
Solution: Change the device and contact one of our service centers.

Message: Power supply failure.
Cause: Unknown.
Solution: Change the device and contact one of our service centers.

Message: QAM failure.
Cause: The problem may result from the fact that the device fails to generate the QAM symbol clock
OR the QAM chip is defect
OR the register of the QAM chip is faulty.
Solution: Change the device and contact one of our service centers.

Message: QRF failure.
Cause: The phase-locked loop on the QRF assy or the QRF chip is defect.
Solution: Change the device and contact one of our service centers.

Message: RF-converter failure.
Cause: Unknown.
Solution: Change the device and contact one of our service centers.

Message: SAT receiver failure.
Cause: Unknown.
Solution: Change the device and contact one of our service centers.
<table>
<thead>
<tr>
<th>Message</th>
<th>Cause</th>
<th>Solution</th>
</tr>
</thead>
<tbody>
<tr>
<td>SMPT: Fatal: Couldn_t spawn mailclient</td>
<td>Something is wrong with the mail client</td>
<td>Change the device and contact one of our service centers.</td>
</tr>
<tr>
<td>Supply voltage failure.</td>
<td>Unknown.</td>
<td>Change the device and contact one of our service centers.</td>
</tr>
<tr>
<td>Temperature too high.</td>
<td>The housing temperature is above 70 degrees Celsius.</td>
<td>Verify that the vents are not blocked.</td>
</tr>
<tr>
<td>Temperature too low.</td>
<td>The temperature is below 0 degrees Celsius or hardware failure.</td>
<td>Verify that the ambient temperature of the equipment is in the operation range of 0 ... 45 degrees Celsius OR Change the device.</td>
</tr>
<tr>
<td>Too many guests online, disconnect.</td>
<td>More than 5 guests have tried to log in.</td>
<td>Reduce the number of guests.</td>
</tr>
<tr>
<td>Twisted pair disconnected / Incorrect mail settings</td>
<td>Broken connection OR invalid settings.</td>
<td>Verify that the network connection and the mail configuration (IP number, mail address, host, account) are correct.</td>
</tr>
<tr>
<td>xx V power supply failure.</td>
<td>Unknown.</td>
<td>Change the device and contact one of our service centers.</td>
</tr>
</tbody>
</table>

**NOTE:** Under normal conditions most network errors will cause the BS8000 to make a reset and fix the problem automatically.