MAGIC

DAB ETI Audio Decoder

Hardware/Software Description

AVT Audio Video Technologies

MAGIC

ETI Audio Decoder

Hardware/Software Description

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Content

1   SAFETY

1.1   Introduction

This system has been developed in line with the present state-of-the-art and fulfils the current national and international safety requirements. It is provided with a high degree of operational safety resulting from many years of development experience and continuous stringent quality checks in our company.

In normal operation, this system is safe.

There are, however, some potential sources of danger that cannot be completely eliminated.

This Hardware Description therefore contains basic safety instructions that must be observed during system configuration and operation. This Hardware Description must be read before the system is used and the current version of the document must always be kept close to the equipment.

All safety instructions have a uniform appearance. This appearance is described in detail in CHAPTER 1.3.

1.2   General safety requirements

In order to keep the technically unavoidable residual risk to a minimum, it is imperative to observe the following rules:

– *Transport, storage and operation of the unit/system must be under the permissible conditions only*.

– *Installation, configuration and disassembly must be carried out only by expert personnel and with reference to the respective documentation.*

– *The system must be operated by expert and authorised users only.*

– *The system must not be operated unless it is in perfect working order.*

– *Any conversions or changes to the system or parts of the system (including the software) must be carried out by qualified personnel from our company or by expert personnel authorised by our company.*
All changes carried out by other persons lead to a complete exemption from liability.

– *The removal or disabling of safety facilities, the clearing of faults and errors, and the maintenance of the equipment must be carried out by specially qualified personnel only.*

– *Non-system software is used at one's own risk. The use/installation of non-system software can adversely affect the normal functioning of the system software.*

– Only use tested and virus-free data carriers!

| 1.3 | **Appearance of the safety instructions** |

All safety instructions include a *signal word* that classifies the danger and a *text block* that contains descriptions of the type and cause of the danger, the consequences of ignoring the safety instruction and the measures that can be taken to minimise the danger. In some safety instructions, a *warning symbol* is placed underneath the signal word (see also CHAPTER 1.3.2):

Signal Word   *Type and cause of danger*

Possible consequences of ignoring the safety instruction

Measures to minimise the danger

1.3.1   Classification of safety instructions

There are five classes of safety instructions: "Danger", "Warning", "Caution", "Notice" and "Important". The classification is shown in the following table.

TAB. 1   SIGNAL WORDS AND THE RESULTS OF IGNORING THE SAFETY INSTRUCTIONS

Result / Signal word	Death			Serious injury			Minor injury			Material damage[a]			Fault[b]		
	definite	likely	possible	definite	likely	possible	definite	likely	possible	definite	likely	possible	definite	likely	possible
DANGER[c]	■	■		■	■										
WARNING			■			■									
CAUTION							■	■	■						
NOTICE											■	■			
IMPORTANT													■	■	■

a   Damage to product or product environment
b   Considerable impairment to operation
c   This danger class is not required for this system

The signal word "Note" is also used in this Hardware Description. Text passages marked in this way do not describe a danger, but rather contain reminders, tips and general information to ensure optimum operation of the system.

1.3.2   Symbols

The following warning symbols are used:

TAB. 2   WARNING SYMBOLS

Symbol	Meaning
⚠	General warning about a danger
⚡	Warning about a dangerous electrical voltage
ⓘ	Remark, Tip

The safety instructions classified "Danger", "Warning" and "Caution" always include a warning symbol, "Notice" and "Important" safety instructions sometimes include a warning symbol.

2   INTRODUCTION

The MAGIC ETI Audio Decoder allows the monitoring of DAB signals with ETI (NA,G.704) and ETI (NI,G.703) format. The system monitors all audio and data channels in the ETI data stream and can decode one audio channel.

The system can be configured using a simple Windows application software which also allows detailed evaluation of the ETI data stream and a detailed fault analysis.

3   M E C H A N I C A L   D E S I G N

The functions of the MAGIC ETI Decoder are integrated on a single PCB. The system is accommodated in a 19" housing (1 U). It can also be mounted in an ETSI rack.

FIG. 1   **FRONT VIEW: MAGIC ETI DECODER**

Control LEDs   Operating Keys
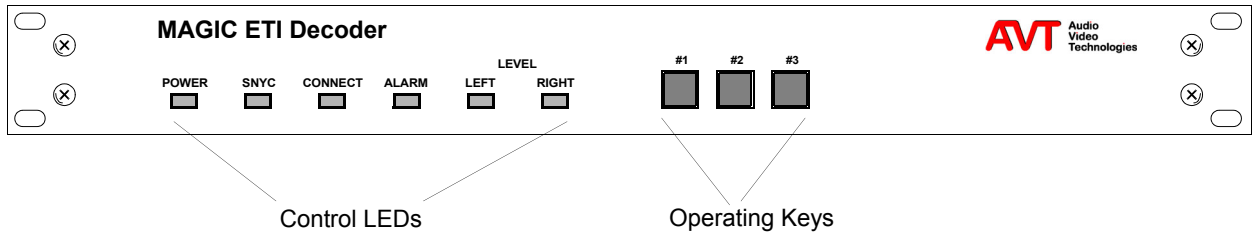
4   SYSTEM DESCRIPTION

The functional elements of the systems are shown in FIG. 2.

FIG. 2   **BLOCK DIAGRAM OF THE MAGIC ETI DECODER**
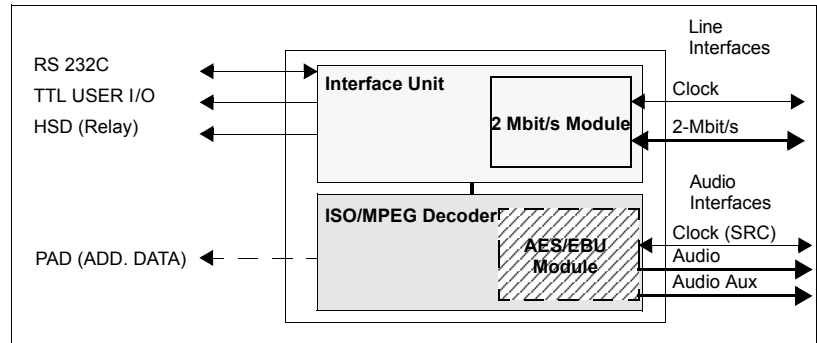
The signal to be monitored is connected to the 2-Mbit/s interface of the ETI Audio Decoder system. The incoming signal will automatically and regenerated be connected without any modification to the 2-Mbit/s output interface.

One of the ETI audio streams can be decoded using the ISO/MPEG Layer II decoder and is available as an analogue audio signal.

The audio signal can also be in the digital format AES/EBU if the system is equipped with the optional AES/EBU module. The intgrated Sample Rate Converter (SRC) synchronises the audio signal to a connected external clock. Alternatively, the clock can also be supplied by the system (internal clock).

The Windows PC software allows the configuration and control of the system over an RS232 interface. The User I/O interface and the HSD Relay interface can be used for external alarm signalling.

Remark   ***Functional Restrictions***

Presently the decoding of audio signals with 24-kHz sampling frequency is not supported.

PAD (Program Associated Data) is not available at the ADD. DATA interface.

4.1   **The circuit „Interface Unit"**

The Interface Unit provides the data multiplexing, the generation and the processing of the ETI protocol, as well as the monitoring of the ISO/MPEG coded audio signals and the control of the network interface.

A multiplexing frame in the E1/2-Mbit signal consists of 32 time slots, each with 8 bits. The frame length is 125µs (the frame frequency is 8-kHz). The frame structure is displayed in the following diagram:

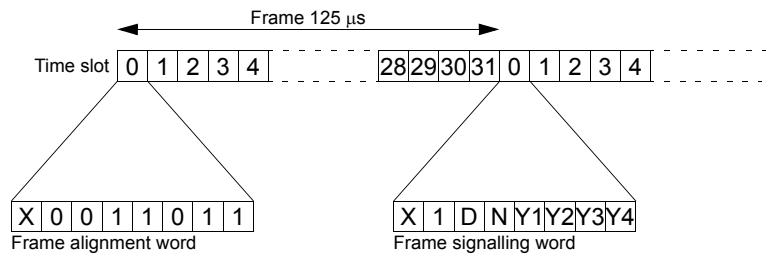**FIG. 3**   **MULTIPLEX FRAME OF THE 2-MBIT/S SIGNAL (E1)**

D-Bit:	Urgent alarm on the Remote Site
N-Bit:	Non urgent alarm on the Remote Site
Y1…Y4:	National User Bits
X:	International User Bits

Time slot contains alternately the frame alignment signal and the service digits. The frame alignment signal is for synchronisation, whereas the service digits transmit alarms to the remote end. Time slot 16 is for the transmission of dialling information and cannot be used for the transport of data.

Two different frame formats have been defined for 2-Mbit/s data stream:

– the Double-Frame format

– the CRC4-Multi-Frame format

The Double-Frame format corresponds exactly with FIG. 3. In the CRC4-Multi-Frame format, a so called check bit is transmitted as the first bit of the frame alignment word.

The ETI(NA,G.704) signal is transmitted in time slots 1...15 and 17...31.

The ETI(NI, G.703) signal is tranmitted in time slots 0...31.

The electrical characteristic of the E1 signal is according ITU G.703.

FIG. 4 shows the block diagram if the Interface Unit. central elements are the ETI processing component and the Demux DSP.

The ETI DSP is responsible for the control of the complete signal and for the evaluation of the ETI signal.

The Demux DSP is responsible for the complete data multiplexing. The use of programmable logic devices permits the realisation of flexible implementations.

The PLL circuit supports all necessary clock signals such as the 48-kHz sampling clock for the Audio Decoder.

The Digital IO circuit generates the control signals for the operator circuit. Also the interface adaption is implemented in this circuit, as is also the case in Line, Data and Extension Bus circuits. The user data will be transmitted via programmable logic to the data processing DSPs.

FIG. 4 **BLOCK DIAGRAM OF THE INTERFACE UNIT (MULTIPLEXER)**
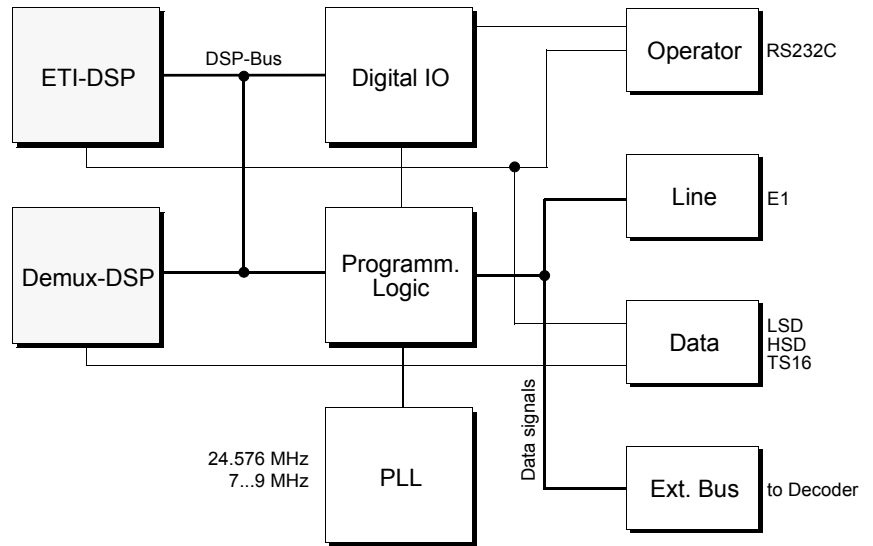
4.2   The ISO/MPEG Decoder

The Audio Decoder can decode all ISO/MPEG Layer II and ISO/MPEG Layer III coded data streams, which comply with the ISO/IEC 11172-3 standard. The following modes are possible

– STEREO

– JOINT STEREO

– DUAL CHANNEL

– MONO

Sampling frequencies of 32-kHz, 44.1-kHz and 48-kHz are supported. If pre-emphasis signals (J.17, 50/15 µs) are detected in the coded audio data signals, de-emphasis filters are automatically used in the decoder.

The audio output is realised electronic balanced.

The decoder circuit consists of a DSP and a micro controller. The software for both can be loaded into a Flash Eprom.

Attention

The MAGIC Encoding Systems support seamless switching of audio modes and audio data rates. However, the switching of half-sampling frequencies (24-kHz in DAB) by the encoder can only be realised with disturbances. The Decoder can also process these types of re-configurations without disturbances. However, switching from Mono to Stereo (Stereo, Dual Channel, Joint Stereo) and vice versa will have short breaks.

Presently, half-sampling frequencies cannot be decoded by the Audio Decoder.

FIG. 5   BLOCK DIAGRAM OF THE AUDIO DECODER
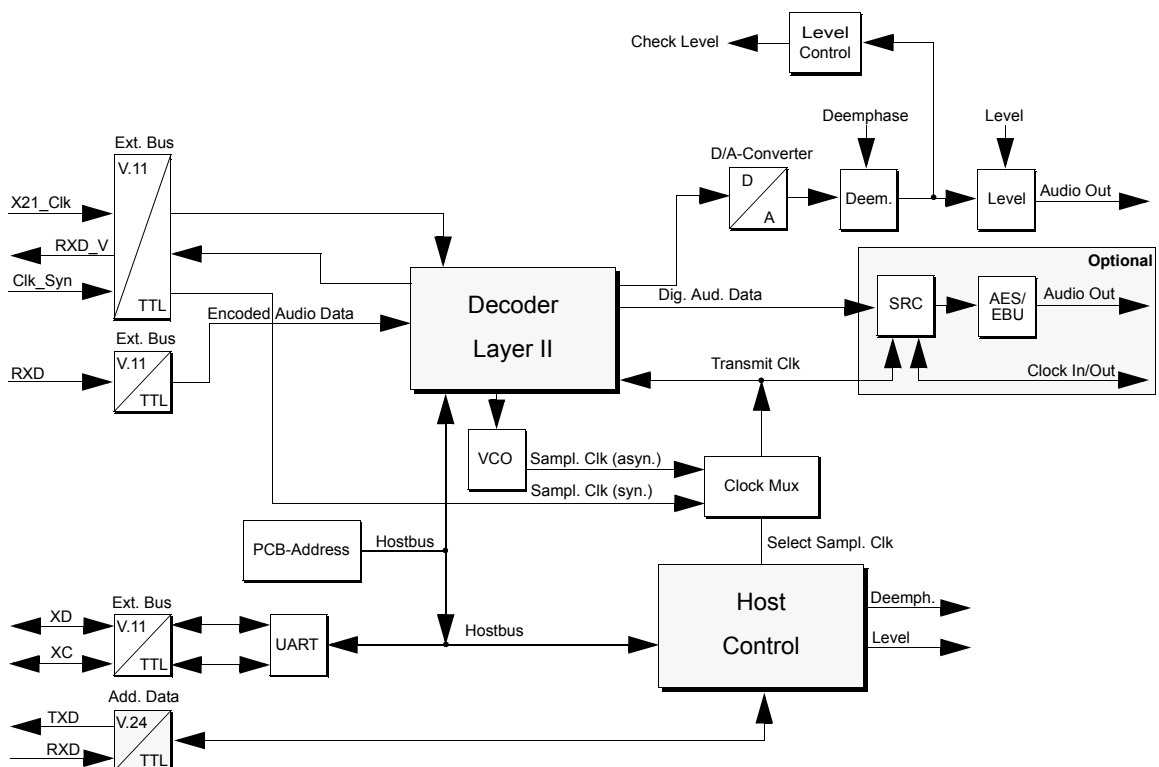
5.1   Configuration of the 2 Mbit/s (E1) Interface

Nearly all parameters of the MAGIC ETI Decoder system can be configured by the Windows PC software.

Only the 2-Mbit interface must be configured for balanced or unbalanced operation. The systems will be delivered in the operation mode which is ordered.

FIG. 8 shows a picture of the 2-Mbit/s module. Unless used as a converter (see below), it should be ensured that all jumpers are inserted in the same row. In addition it is possible to configure the system for T1 (USA and Asia) networks. All settings are for the 2-Mbit input, 2-Mbit output, clock input and clock output.

To open the system please remove the four front screws and the screw on the left side. Then you can remove the front. Press with both hands on the cover and drag the cover in your direction.

Remark

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The system can be also used as a converter from balanced to unbalanced signal lines. For this purpose the jumpers can be set in different rows.

Warning

Dangerous voltages are present, when unit is opened !
If the jumper positions must be changed, please remove the power cable.

In doubt please leave the configuration to service personnel.

FIG. 6   **POSITION OF THE JUMPERS TO CONFIGURE THE E1/T1 LINE INTER-FACE**
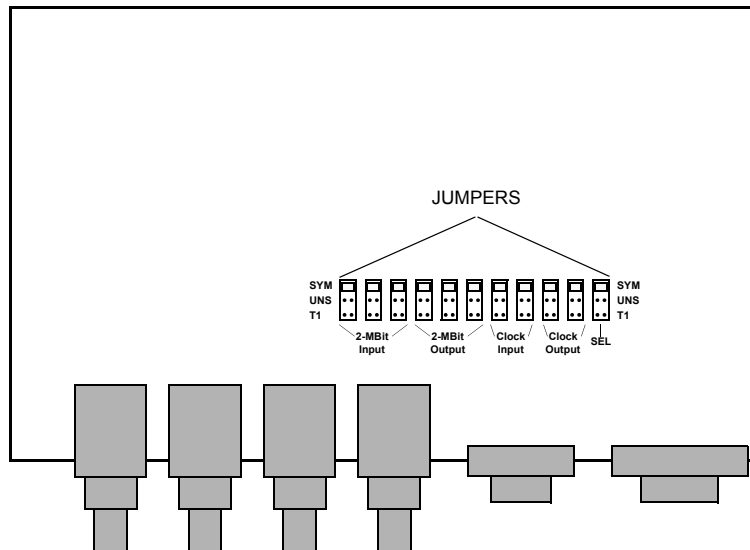
5.2 **Configuration of the headroom of the analogue output**

The jumpers for the configuration of the headroom are located as shown in FIG. 7. Before changing the settings please make sure, that the power supply cable is disconnected. The figure below shows the setting of the jumpers. The following settings can be selected:

– 6 dB Headroom and

– 10 dB Headroom.

Important The jumpers for the left and right channels must be configured in the same way.

The factory setting is 6 dB headroom since the MAGIC Encoder systems are also configured with 6 dB headroom.

FIG. 7   CONFIGURATION OF THE HEADROOM OF THE ANALOGUE OUTPUT

5.3   **Configuration of the AES/EBU Module**
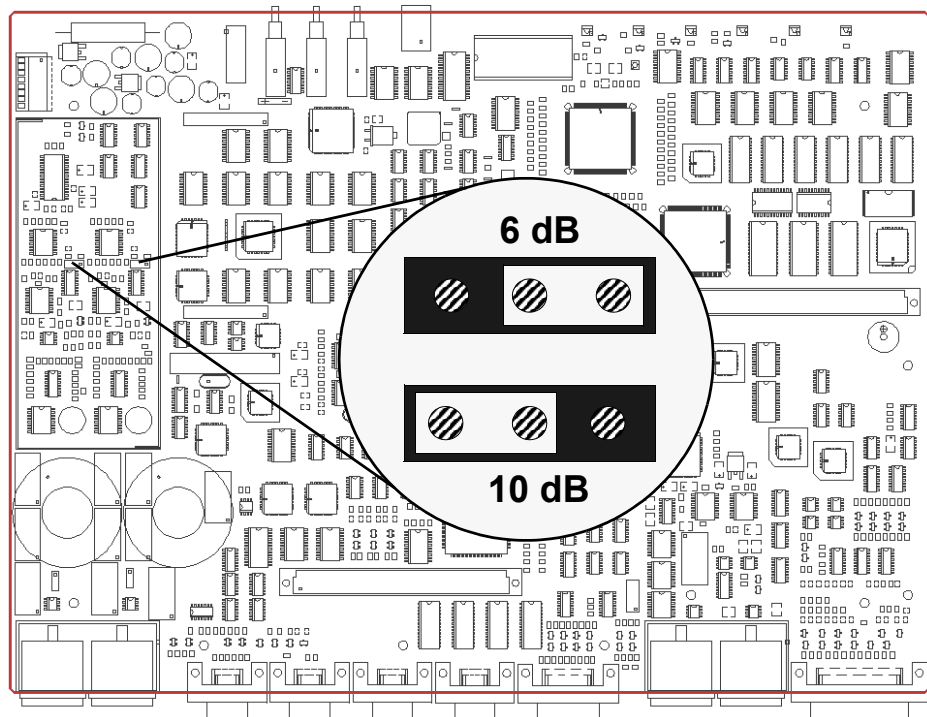
If an AES/EBU module is fitted, the digital output of the ISO/MPEG Decoder can be used. There is no need of a hardware setting. The interface can be configured by PC software.

It is possible to equip the AES/EBU module byself later.

FIG. 8   **POSITION OF THE AES/EBU MODULE**
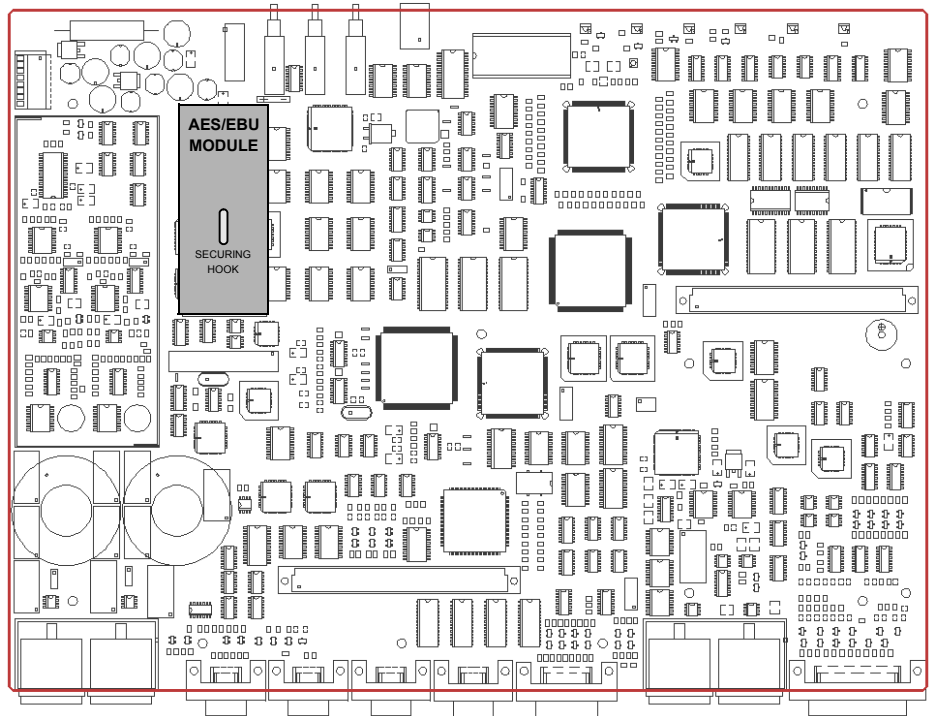
6 PUTTING THE MAGIC ETI DECODER INTO OPERATION

6.1 Mounting

With dimensions (W × H × D) of 439 mm × 44.5 mm (1 U) × 395 mm, the MAGIC ETI Decoder can be used as a table-top unit or, equipped with mounting brackets, can be installed in ETSI or 19-inch racks.

The dimensions given above are valid for the table-top version with neither mounting brackets nor feet. If the MAGIC system is to be inserted into a rack, it should be remembered that the bending radius of the cables should always be greater than the minimum allowed value.

If the MAGIC system is installed in a rack, it should also be ensured that sufficient ventilation is provided. It is recommended that at least 3 cm space is left. As a rule, the ambient temperature should not lie outside the range +5°C to +40°C. These limits are of particular importance if the MAGIC system is inserted in a rack.

During operation, the humidity must lie between 5% and 85%.

Notice **Incorrect ambient temperature and humidity can lead to equipment failure**

Operation of the unit outside the above limits invalidates the warranty.
The MAGIC system must therefore be operated within the specified limits.

6.2 Connection to the mains voltage

The MAGIC system can be operated with a voltage (mains) between 90 and 253 V without the need for switching. The mains frequency can vary between 45 Hz and 65 Hz. The power consumption is a maximum of approx. 35 W. The housing must be earthed (grounded) in accordance with local regulations. This earthing is usually realised via the protective conductor of the mains cable. If the mains cable does not have a protective conductor, however, the device must be earthed via the earthing bolt at the rear of the unit.

Warning **Dangerous voltages in the event of improper earthing!**

If there is improper earthing, dangerously high voltages can be present on the unit housing in the event of a fault.
Do not use extension cables without protective earth contacts!
In case of doubt, use additional earthing!

After the unit is switched on, the green "POWER" LED should light up. An internal reset is then triggered. This is indicated by a blinking "ALARM" LED. After approximately twenty seconds, the unit is operational.

6.3	**Signalling LEDs**

There are six LEDs for signalling on the MAGIC ETI Decoder system.

(1) **POWER**   green
Lights up when the operating voltage (+5V only) is present.

(2) **SYNC**   green
Lights up when ISO/MPEG Decoder is synchronised.

(3) **CONNECT**   green
Lights up when the ETI frame has been synchronised with.

(4) **ALARM**   red
This LED lights up if a fault has occurred in the unit.

(5) **LEVEL**   yellow
Level indication for the left and right audio channel. These LEDs lights up when the signal level is greater than -24 dBr below the configured nominal output level of the decoder.

6.4	**Operating Keys on the front panel**

The three keys on the front panel allows one to select the audio program which is to be decoded

– **#1**: Select previous Audio program in the ETI data stream

– **#2**: Select first Audio program in the ETI data stream

– **#3**: Select next Audio program in the ETI data stream

Please note, that there is no rotating functionality on these keys.

6.5	**Replacing the fuse**

The mains side is protected by a fuse that is soldered into the power supply unit. This fuse **must only be replaced by service personnel only**.

Warning   **Dangerous voltages!**

Do not open the system. Please ask service personnel for help.

| 6.6 | **Connection of the ETI Decoder in the DAB network** |

Before the system is put into operation please define its location. The Ensemble Multiplexer DM-001 from Rohde&Schwarz provides two ETI outputs (see FIG. 9). One can be used for the transmission of the ETI signal to DAB transmitters, the other one for the connection of the ETI Audio Decoder. If the system is to be used at the transmitter location the ETI Audio Decoder has to be connected into the ETI signal transmission path. The system loops the incoming and regenerated 2-Mbit signal to the 2-Mbit output (see FIG. 10).

Remark

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If you use the looped 2-Mbit output a break in the ETI Audio Decoder will result in an interruption in the ETI transmission path.

The loop in the ETI Audio Decoder will be implemented in the last component of the 2-Mbit interface. Only a defect of this component and a defect of the power supply will cause an interruption in the ETI signal path.

In the following application the ETI Audio Decoder is connected to the Ensemble Multiplexer DM-001 from Rohde&Schwarz.

FIG. 9   APPLICATION WITH THE ETI AUDIO DECODER
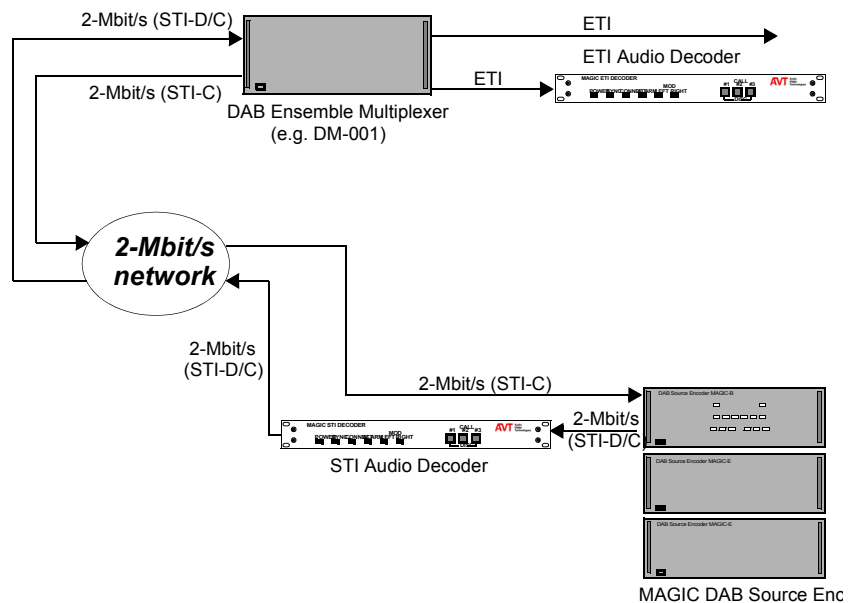
Possible Channel Configuration:

TS 0	TS 1	TS 2	TS 3	....	TS16	.....	TS 30	TS 31
G.704	ETI-Frame with Audio and Data streams					ETI-Frame with Audio and Data streams		

6.7   **Connection of the Systems**

The following figure shows how the system should be connected. If possible, the balanced interface should be used, bcause longer distances with less disturbances can be achieved (see CHAPTER 5.1, Configuration of the 2 Mbit/s (E1) Interface).

FIG. 10   **CONNECTION DIAGRAM (UNBALANCED, BALANCED)**
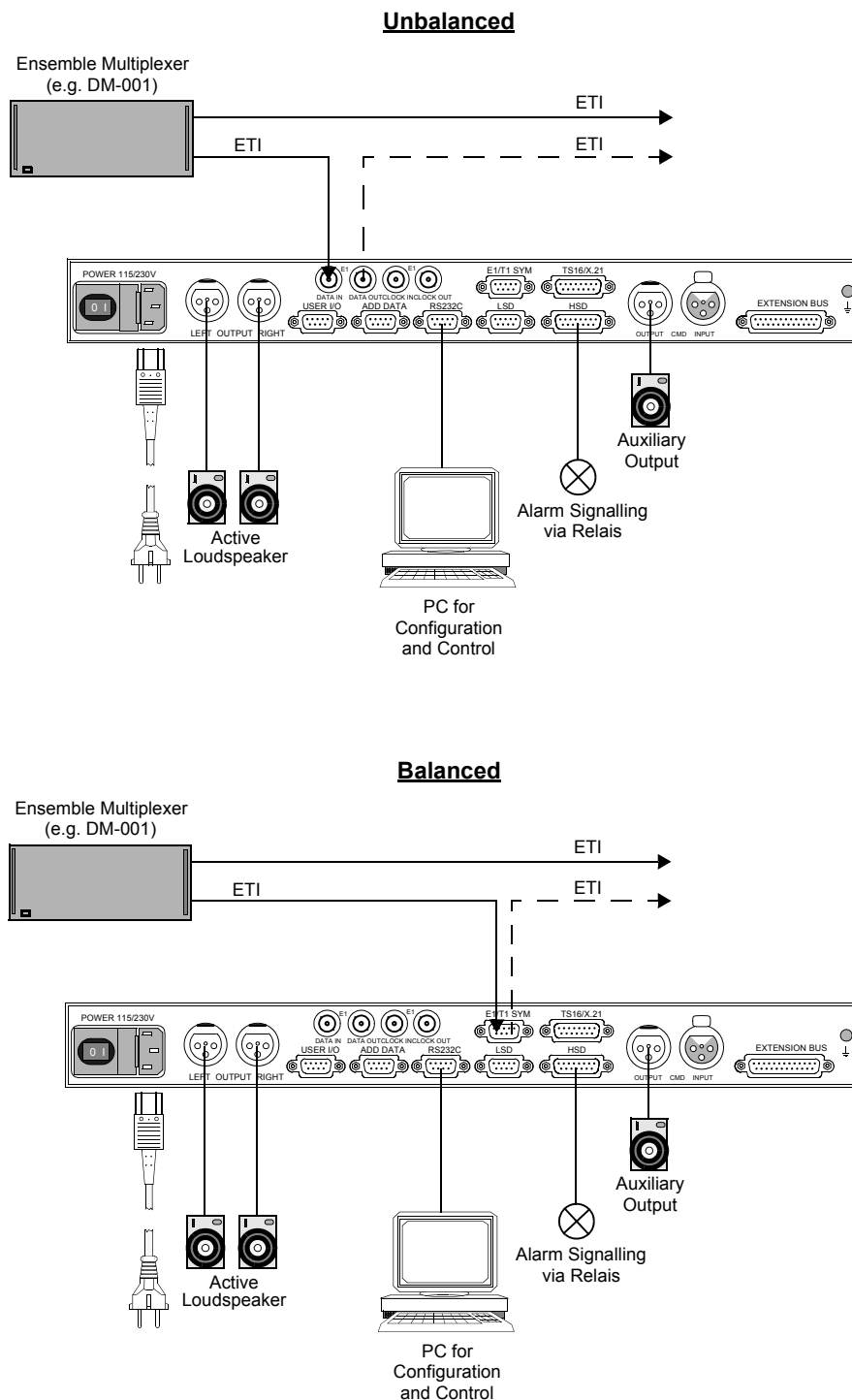
7   W I N D O W S   P C   S O F T W A R E   E T I   D E C O D E R

The configuration of the system is possible with the delivered Windows PC Software.

7.1   Hardware requirements

The following minimum requirements are necessary for the PC:

– IBM PC AT, IBM PS/2 or 100% compatible

– Pentium Processor (> 133 MHz) recommended

– Windows 95/98/ME/NT 4.0 (SP4.0)/ME

– 5 MB free disk space

– IBM SVGA graphic adapter with 800 x 600 pixel

– at least one free serial interface RS-232

– Microsoft, IBM PS/2 or 100% software compatible mouse

7.2   Installation of the Windows PC Software

Insert the CD included in delivery in your disk drive. After a short time, the installation interface is displayed in your browser. If it is not opened automatically, you can start the interface also manually. Select your disk drive in the Explorer and double click on the file **Start.bat**.

Please press the **MAGIC ETI Audio Decoder** button to install the MAGIC ETI Decoder Software.

By the way, warnings because of ActiveX Scripts can be ignored.

FIG. 11   **INSTALLTION OF THE SOFTWARE VIA INTERNET BROWSER**
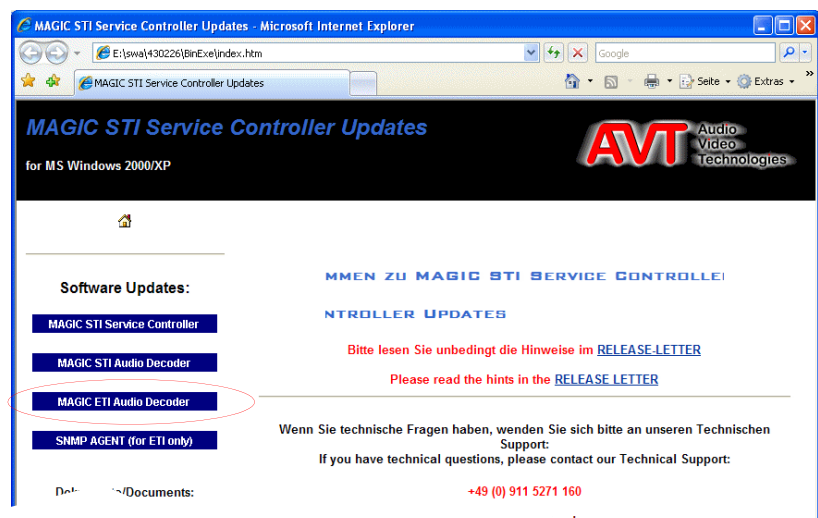
Please follow the the instructions of the installation software.

After installation you will find the *ETI Decoder* Icon to start the software.

Connect your PC (RS232) via a Nullmodem cable (Pin 2 and Pin 3 is crossed, not delivered with the system) with the ETI Audio Decoder system.
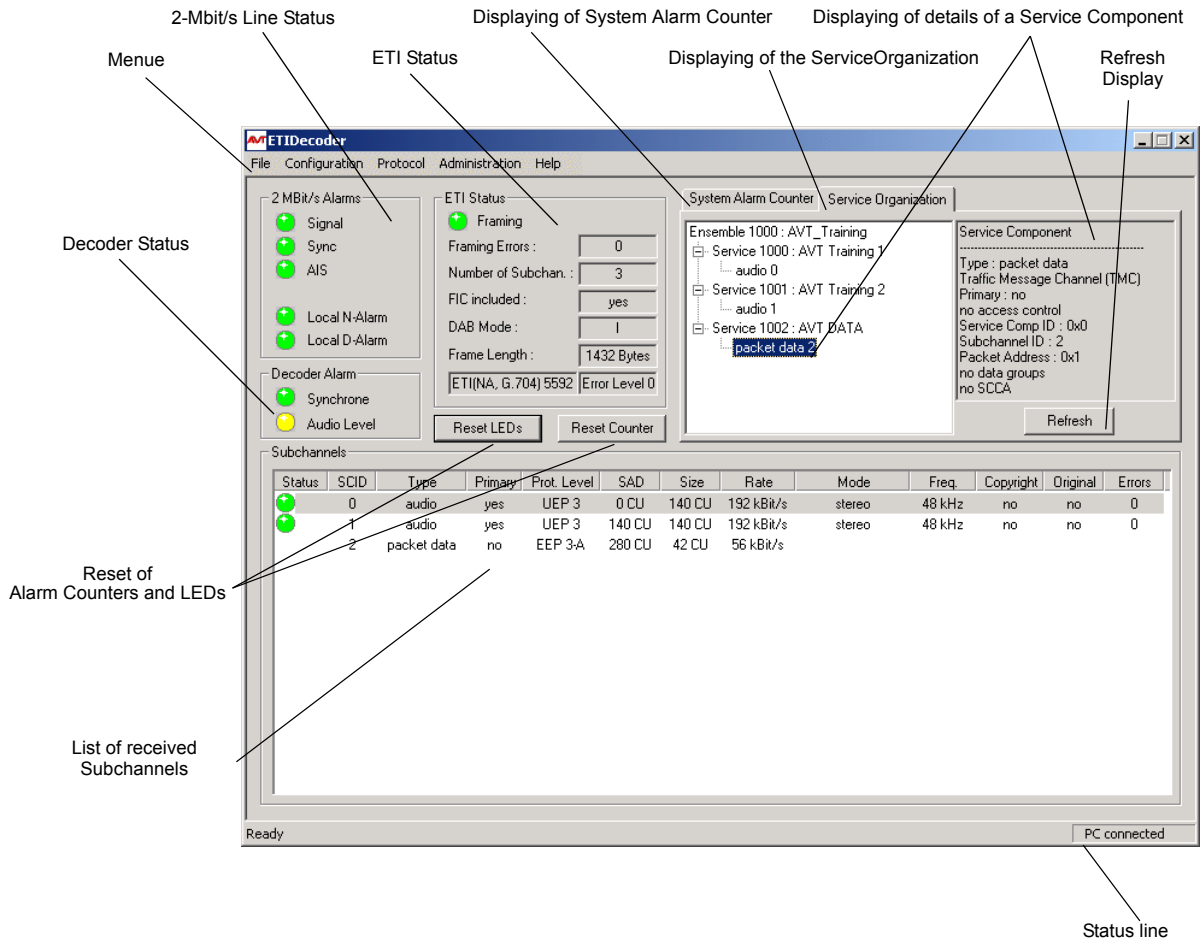
Switch on the system.

7.3 Elements of the graphical user interface

In the following figure all elements of the graphical user interface are described.

All functionalities will be described in detail in the following chapters.

FIG. 12   ELEMENTS OF THE WINDOWS SOFTWARE ETI DECODER

7.4 Menu File

7.4.1 Submenu Exit

Via the submenu *File* -> *Exit* the program will be closed.

7.5 Menu Configuration - Basic configuration of the system

After booting the system and connection with a PC you will see in the status line the message *PC connected*.

7.5.1 Submenu Com Port

If the message **PC not connected**[1] appears, please check the selected COM port under the submenu **Configuration** -> **COM Port** and change the settings. Factory settings are: **19200 Baud** and Parity **None**.
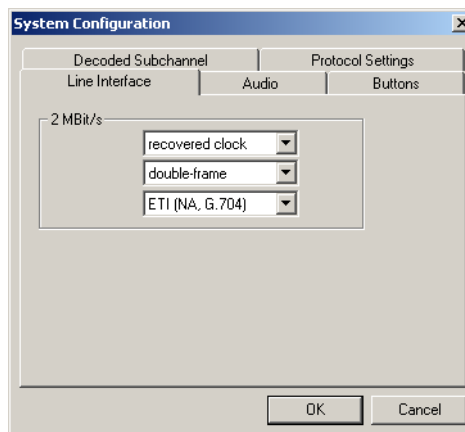
FIG. 13   COM PORT KONFIGURATION
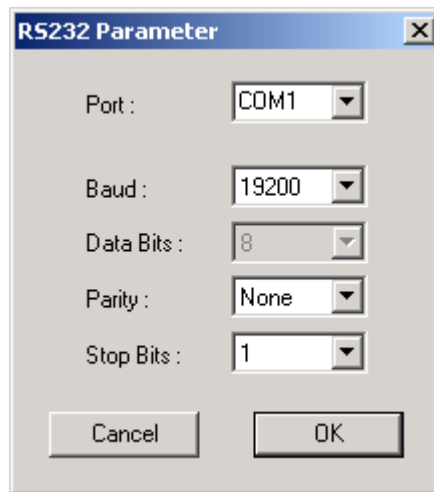
7.5.2 Submenu System Configuration

7.5.2.1 Configuration of the Line interface

FIG. 14   CONFIGURATION OF THE LINE INTERFACE

The page **Line Interface** allows the configuration of the **2-Mbit/s** interface.

As reference clock you should normally select **Recovered Clock**. This setting generates the clock from the incoming 2-Mbit signal.
Alternatively you can use the setting **External Clock**, if you have connected an external clock to the clock input. The setting **Internal Clock** is only for test purposes. In this case the clock is generated by the system.

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1 If the connection is faulty try 9600 Baud and Parity Odd.

The both 2-Mbit formats **Double-Frame** and **CRC4-Multi-Frame** depends from your 2-Mbit/s network.

| *Remark* | Please ask for details your network provider. |

If you have connected the MAGIC System to the Rohde & Schwarz Ensemble Multiplexer DM001 please select the Double-Frame format, because the DM001 supports only this format.

Depending on your ETI signal you must select **ETI (NA, G.704)** or **ETI (NI,G.703)**.

7.5.2.2   Configuration of the Audio Interface

FIG. 15   CONFIGURATION OF THE AUDIO INTERFACE
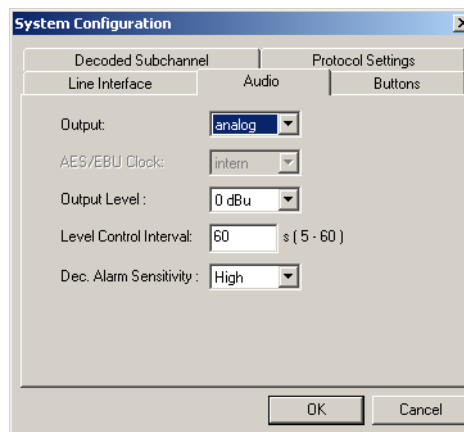
The page **Audio** allows the configuration of the audio interface.

As **Output** interface you can select **analog** or **digital**, if you have equipped an optional AES/EBU module.

The selection **AES/EBU clock** allows to synchronize the digital output signal to a connected **External** clock (via Sampling Rate Converter). If you select **Internal** clock the output of the digital audio signal will be synchronised to the internal clock.

Using the analog output interface you can adapt the **Output Level** from -20 dBu to +12 dBu (seven different levels are available).

The **Level Control Interval** of the level control circuit can be set from 5 to 60 seconds. If the level is lower than 24 dBr as the nominal level in between the selected interval you will get a warning.

The **Decoder Alarm Sensitivity Low** avoids error signalling which can appears during a reconfiguration or other changes in the signal. If the sensitivity is **High** each error in the signal will be shown as an alarm.

7.5.2.3 Configuration of the front buttons

FIG. 16   CONFIGURATION OF THE FRONT BUTTONS
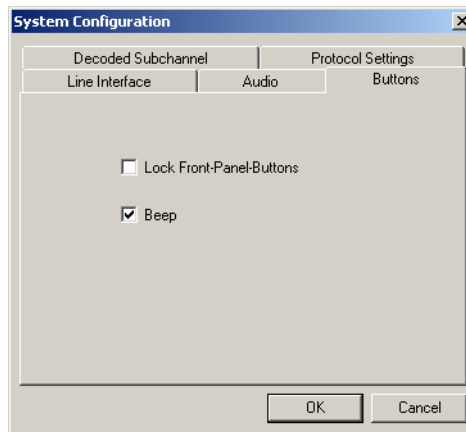
Via the page **Buttons** you can **lock** the **Front-Panel-Buttons**. In this case you can't change the decoded program using the front buttons.

Activating the **Beep** you will hear on each pressing of a button a short beep.

7.5.2.4 Configuration of the default decoded Audio Subchannel

FIG. 17   CONFIGURATION OF THE DEFAULT DECODED AUDIO SUBCHANNEL
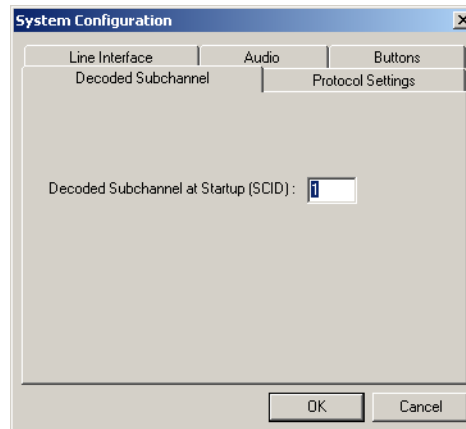
If you wish that the decoder should decode a fixed program after power on, you must type in the field **Decoded Subchannel at Startup** the corresponding Subchannel ID.

7.5.2.5   **Configuration of the Protocol Settings**

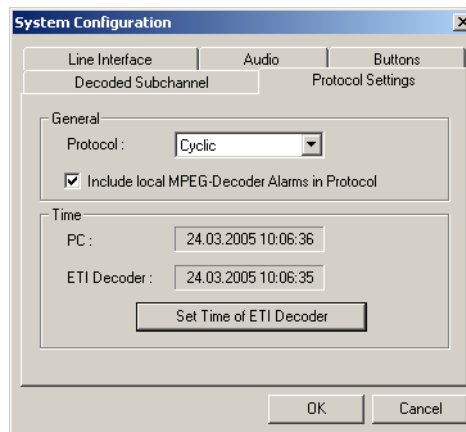FIG. 18   CONFIGURATION OF THE PROTOCOL SETTINGS

The ETI Decoder allows internal storage of up to 7000 alarms. The following settings are available:

– *Off* switches the protocol function off

– *Cyclic* stores all messages in a ring buffer

– *Standard* stores all messages without a ring buffer and stops if buffer is full

The check box *Include local MPEG-Decoder Alarms in Protocol* enables storage of local Decoder alarms in the protocol list.

With *Set Time of ETI Decoder* you can set the Decoder time to the PC time. If the time is available in the ETI stream the sytem will decode the time information automatically.

7.5.2.6   **SNMP**

The *SNMP* settings are only displayed, if the *SNMP Agent* option is available (see CHAPTER 8).

7.5.3   **Submenu Administration Password**

To protect the system configuration from unauthorised acccess, you can assign a password via *Administration Password*. The password is stored on the PC.

Please enter the password under *Enter new Password*. Confirm your entry in the *Confirm Password* line.

Now, the configuration can only be changed after the password has been entered.

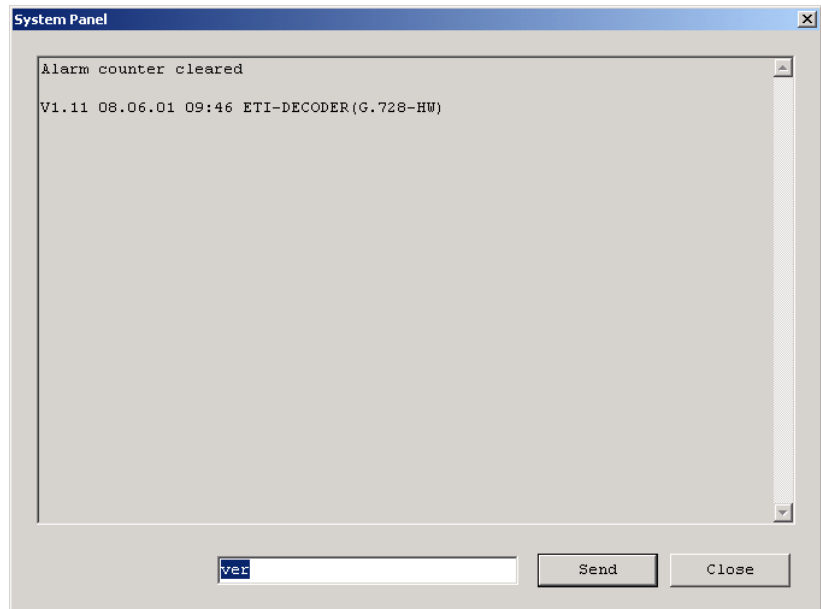FIG. 19   ENTRY OF THE ADMINISTRATOR PASSWORD
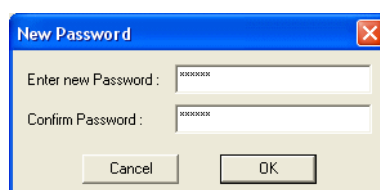
7.6   **Menu Administration**

7.6.1   **Submenu System Panel**

The submenu *System Panel* is only for Service purposes. Please use this panel only, if a service technician of AVT requested from you.

FIG. 20   **SYSTEM PANEL**

7.6.2   **Submenu Software Download**

Via the menu *Administration* -> *Software Download* it is possible to download new firmware to the system.

The actual software you will find in the internet:

     http://www.avt-nbg.de

If you have download a new software from the internet, you must first install the new software on your PC. After installation change to *Administration -> Software Download*, select the file *i2_eti*. Start the Update with the *Start* button. The bars *Program*, *Data*, *Eprom* shows the progress of the download. Download errors will be counted in the field *CRC Errors*.

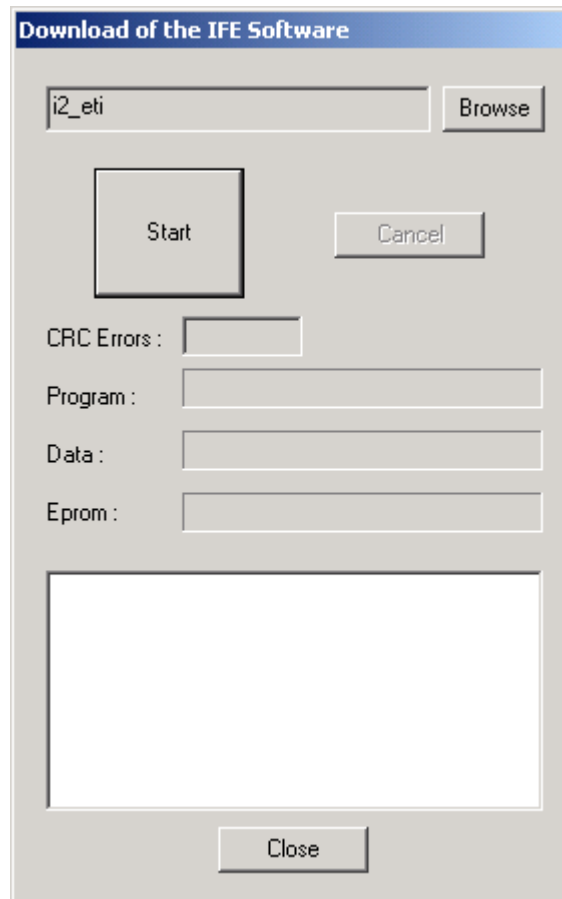*Remark*   *The download can be successful, although errors are occured.*

After the download please switch off and on the system.

FIG. 21   **SOFTWARE DOWNLOAD**

7.7 **Menu Help**

7.7.1 **About ETI Decoder**

The menu *Help* -> *About ETI Decoder* shows the information window of the software.

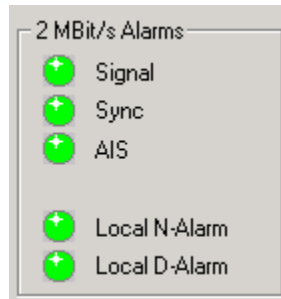Here you can check the actual software versions of the different modules.

FIG. 22 **ABOUT ETI DECODER**

| 7.8 | **Displaying of the 2-Mbit/s Status** |

If the system is configured in the right way and the 2-Mbit is connected all LEDs of the 2-Mbit/s status lights green. The LED local N-Alarm must be lights green at latest after 4 minutes.

| **FIG. 23** | **2-MBIT STATUS** |

All LEDs can be lights in three different colors:

green   no error

red   error

blue   error was occured

The LEDs have the following meaning:

SIGNAL

This LED signals an error, if there is no HDB3 coded signal on the 2-Mbit line.

SYNC*hronisation*

This LED signals an error, if there is no framing (G.704) on the 2-Mbit signal.

***A*larm *I*ndication *S*ignal**

This LED signals an error, if there were 2 or less '0' in the last two frames of the 2-Mbit/s signal.

LOCAL N*ondeferred*-ALARM

This LED signals an error, if the *local* bit error rate is higher than 10e-06. This means there was one bit error in 4 minutes. After power on this alarm occurs normally for 4 minutes.

LOCAL D*eferred*-ALARM

This LED signals an error, if the *local* bit error rate is higher than 10e-03. A decoding of the signal is in this case not possible.

CLOCK

This LED signals an error, if there is no clock signal available on the clock input of the system. This alarm can only occured, if you have configured the clock source to *External Clock* (see CHAPTER 7.5.2.1).

7.9 Displaying of the ETI Status

Is the system synchronised to the ETI frame you can analyse the content of the *ETI Status*.

The LED *Framing* lights green, if the frame can be found.

The number of Audio and Data subchannels will be shown under *Number of Subchannels*.

If the Fast Information Channel is included into the ETI Data stream, you will get a message under *FIC included* .

The next text fields informs you about the *DAB Mode*, the *Frame Length*, the *ETI Mode* and the actual *Error Level*.

FIG. 24   ETI STATUS
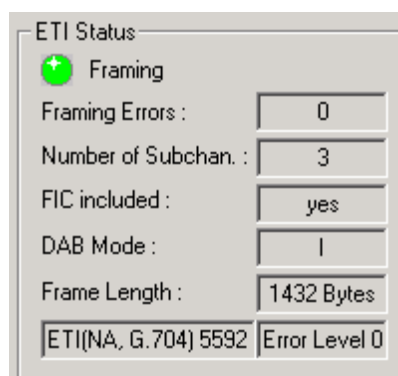
To reset all blue LEDs press the [Reset LEDs] button.

The button [Reset Counter] resets all error counters.

Remark   *The storage of all error counters will be done in the system. If you switch off the system all counters will be lost.*

Closing or starting the software has no effect for the counters, only the LEDs will be resetted.

7.10   **Display of the System Alarm Counter**

Using the page *System Alarm Counter* all alarms of the interface unit (IFE) will be shown. These alarm counters are corresponding to the 2-Mbit Status LEDs (see CHAPTER 7.8).

In addition all synchronisation errors of the ISO/MPEG Audio Decoder will be counted (ISO/MPEG Decoder not synced).

Remark

i

Note, that this error counter has no relation to the error counter of the Audio subchannels (see CHAPTER 7.12).

The communication between the Interface unit and the ISO/MPEG Decoder is realized via the proprietary Extension Bus of the system. If there are errors in the communication between the units the error counter *No communication with Audio Decoder* will be increased.

FIG. 25   **DISPLAYING OF THE SYSTEM ALARM COUNTER**

```
┌─────────────────────────────────────────────────────────────┐
│ System Alarm Counter │ Service Organization │                │
│ ┌──────────────────────────────────────────────────────────┐ │
│ │                                                            │ │
│ │      No communication with Audio Decoder      0            │ │
│ │      G703: No signal                          0            │ │
│ │      G704: AIS error                          0            │ │
│ │      G704: Loss of sync.                      0            │ │
│ │      G704: Local N-Alarm                      0            │ │
│ │      G704: Local D-Alarm                      0            │ │
│ │      ISO/MPEG-Decoder not synced              0            │ │
│ │                                                            │ │
│ └──────────────────────────────────────────────────────────┘ │
└─────────────────────────────────────────────────────────────┘
```

The button [Reset Counter] resets all error counters.

Remark

i

The storage of all error counters will be done in the system. If you switch off the system all counters will be lost.
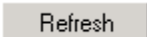
Closing or starting the software has no effect for the counters, only the LEDs will be resetted.

7.11 Displaying of the Service Organization

The page *Service Organization* gives information about the structure of each service in the ETI data stream. Is a component selected, the detailed information of the *Service Component* will be shown in the right window. A double-click to an audio component allows the listening of the corresponding audio program.

FIG. 26   DISPLAYING OF THE SERVICE ORGANIZATION
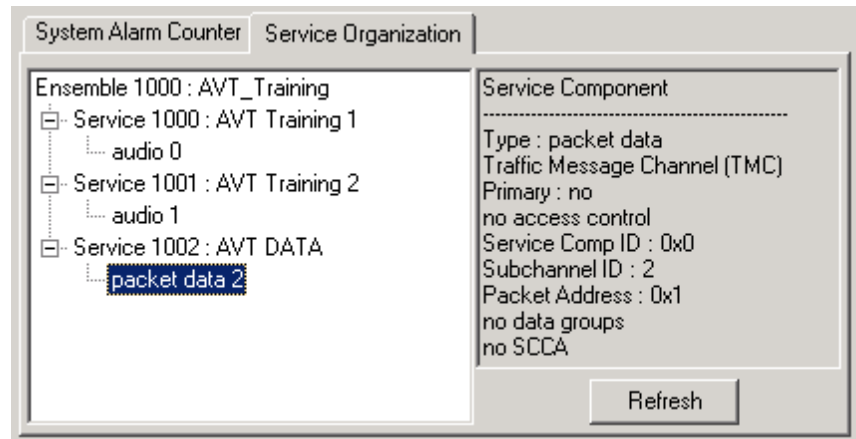
Te button [Refresh] refreshs the displaying of the Service Organization.

Remark   *Note, that changes in the Service Organization will not be shown automatically.*

7.12   **Status of the Subchannels**

The list *Subchannels* shows all subchannels in the ETI data stream.

FIG. 27   **SUBCHANNEL STATUS**

Status	SCID	Type	Primary	Prot. Level	SAD	Size	Rate	Mode	Freq.	Copyright	Original	Errors
●	0	audio	yes	UEP 3	0 CU	140 CU	192 kBit/s	stereo	48 kHz	no	no	0
●	1	audio	yes	UEP 3	140 CU	140 CU	192 kBit/s	stereo	48 kHz	no	no	0
	2	packet data	no	EEP 3-A	280 CU	42 CU	56 kBit/s					

The LED *Status* is green, if the ISO/MPEG frame of the audio program is synchronised.

SCID is the subchannel identifier of the subchannel.

Type marks the subchannel as audio or data.

The column *Primary* informs you, if a subchannel is primary or secondary.

The next column shows the *Protection Level* of each subchannel, follows by the *SAD* (Start Address) and *Size* of the subchannel in Capacity Units (*CU*)

The last columns informs you about the data rate *Rate*, the coding mode *Mode*, the sampling frequency *Freq.*, the status of the *Copyright* and *Original* Bits, which are part of the ISO/MPEG header.

The column *Errors* displays the number of errors in the ISO/MPEG header of the audio program. The marked audio subchannel will be decoded and can be heared.

Remark

*In case of a sampling frequency of **24-kHz**, it is at the moment not possible to listen this audio subchannel.*

To reset all blue LEDs press the [Reset LEDs] button.

The button [Reset Counter] resets all error counters.

Remark

The storage of all error counters will be done in the system. If you switch off the system all counters will be lost.
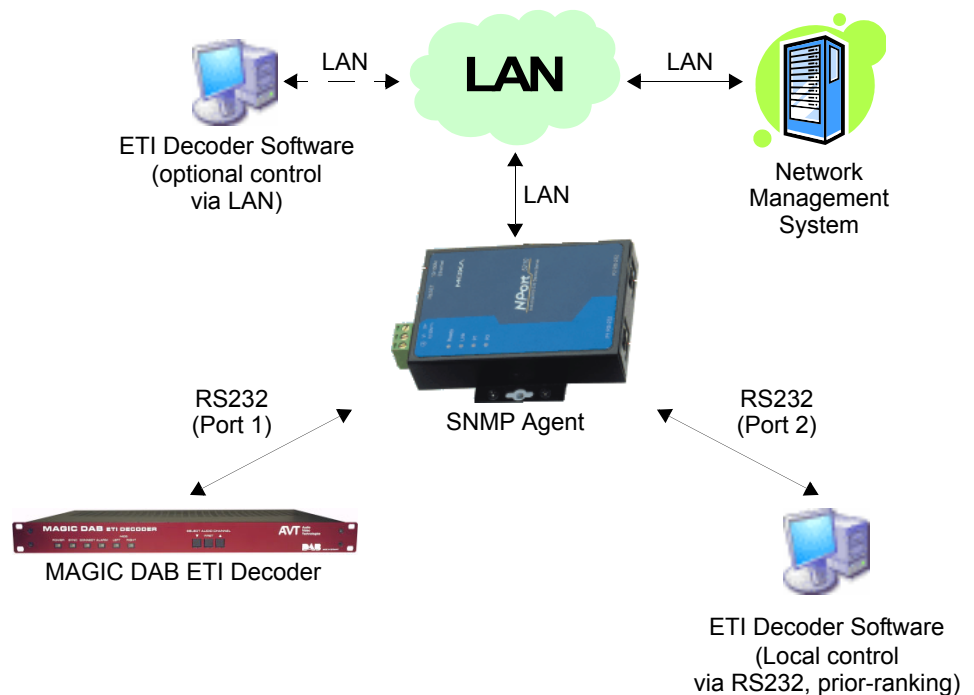
Closing or starting the software has no effect for the counters, only the LEDs will be resetted.

8   OPTION: SNMP AGENT

The **SNMP Agent** option (oder no. 800700) allows the **MAGIC DAB ETI Decoder** to be connected to a Network Management System.

The following block diagram shows the basic functionality of the option:

FIG. 28   BLOCK DIAGRAM OF THE SNMP OPTION

The **MAGIC DAB ETI Decoder** is connected via its RS232 interface to the RS232 interface (Port 1) of the SNMP Agent (RS232/LAN converter which is included in the delivery).

For local system control and monitoring, a PC with **ETI Decoder** Software can be connected to the second RS232 interface (Port 2) of the SNMP Agent.

Remark

The local control via Port 2 is always given priority over the control via LAN.

The LAN interface of the SNMP Agent is connected with the network. In this way, the system can be controlled, configured and monitored remotely via the **ETI Decoder** Software, or it can be integrated in a Network Management System via SNMP.
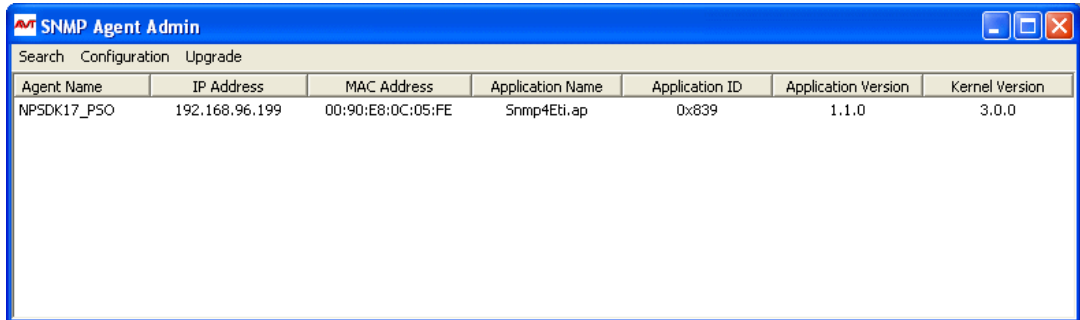
8.1   Putting the SNMP Agent into operation

Please cable all components as shown in FIG. 28. In addition to the *ETI Decoder* Software you need to install the *SNMP AGENT* Software from your installation CD.

Then, please start the *SNMP AGENT Admin* Software. FIG. 29 shows the main window of the administration software of the SNMP Agent.

Select *Search → Broadcast Search*[1] in the menu to search for all SNMP Agents in the network.
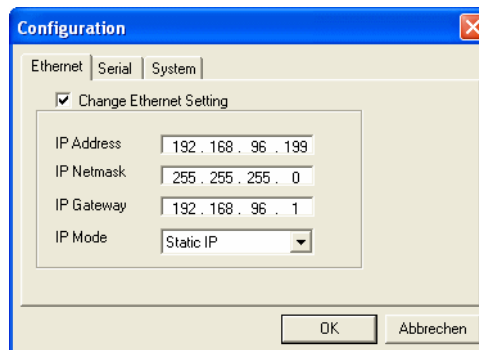
FIG. 29   **SNMP AGENT ADMIN MAIN WINDOW**

Please select the desired SNMP Agent and then, click on the *Configuration* menu. In the configuration dialog you can adjust the following settings[2]:

– *Ethernet*: all relevant network settings

– *Serial*: the parameters of the serial interface

– *System*: name and password

For the start-up, only the Ethernet settings are relevant at first. Please enter the desired IP address, the net mask and the gateway. You will get this information from your administrator. Under *IP Mode* please select *Static IP* and press the *OK* button afterwards.

FIG. 30   **ETHERNET CONFIGURATION**

---

1   If you already know the IP address of the SNMP Agent, you can also search via the menu item *Search by IP*.

2   To change settings, you need to enable the *Change ...* check box.

The data is stored on the SNMP Agent. It can now be reached under the entered IP address in the network. All further settings are configured in the *ETI Decoder* Software.

Remark i	*With the* **SNMP AGENT Admin** *Software, a firmware update of the RS232/LAN converter is also possible: Via the menu* **Upgrade** → **Application** *you can load an application firmware (file name:* `Snmp4Eti.ap` *in the directory* `<installation path>\AVT SNMP Agent`*). The menu* **Upgrade** → **Kernel** *allows an update of the system software.*

To protect your system from unauthorised access, it is necessary to configure a password after the start-up under **Configuration** → **System** *or in the* **ETI Decoder** *Software.*

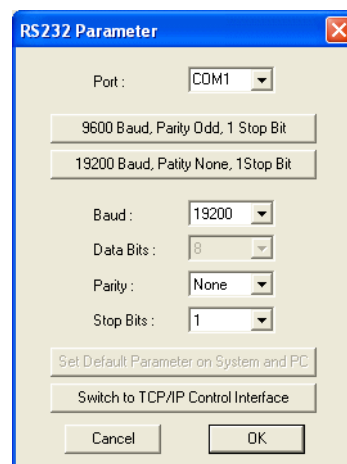*ATTENTION: If you forget your password, the SNMP Agent needs to be sent in to unlock it.*

8.2 **Configuration of the SNMP Agent**

Please start now the *ETI Decoder* Software.

The default setting is a connection via a COM Port of the PC. With *Configuration* → *Com Port* the configuration dialog for the COM Port is displayed.

FIG. 31   COM PORT CONFIGURATION FOR TCP/IP ACCESS

Please select the COM Port of your PC to which the SNMP Agent Port 2 is connected and also the desired baud rate (default setting: 19200 Baud).

In the status line of the *ETI Decoder* Software the message *PC Connected* is displayed.

The SNMP settings can now be configured under *Configuration* → *System* → *SNMP*.

FIG. 32   CONFIGURATION OF THE SNMP AGENT

General

Enter a system name of your choice under *System name*. This name is also displayed in the *SNMP AGENT Admin* Software.

RS232 Interface Parameter

Please select under *Port 1 and Port 2* the baud rate with which you operate the *MAGIC DAB ETI Decoder*. By default, 19200 Baud is selected.

IP Parameter

Under *IP Parameter* you can set the *IP Address*, the *Netmask*, the IP address of the *Gateway* and the *Remote Ctrl. Port*. Except for the port, these settings are identical with the settings in the *SNMP AGENT Admin* Software (see FIG. 32). Please ask your network administrator for the correct settings.

Remark

If you enter "0" for Remote Ctrl. Port, the remote control functionality via TCP/IP is locked (see CHAPTER 8.4).

SNMP Parameter

The SNMP settings for the communication with your Network Management System can be configured under *SNMP Parameter*. Please ask your network administrator for the correct settings.

– The SNMP Agent allows the addressing of two different Network Management Systems. Please enter the corresponding IP Addresses under **NMS IP Address 1** and **NMS IP Address 2**.

– Under **SNMP Port** please enter the port of the Agent, at which it receives messages. As default setting you should enter **Port 161**.

– The sender port for traps can be configured under **Trap Port**. The default setting is usually **Port 162**.

– The **Public Community Name** is an identifier **to read** data. The name has to be identical with the name in your Management System. By default, the name **public** is used.

– The **Private Community Name** is an identifier **to read and write** data. The name has to be identical with the name in your Management System. By default, the name **private** is used.

– Under **Trap Community Name** you define the name for the trap datagrams. The name has to be identical with the name in your Management System. By default, the name **trap** is used.

– If a trap is to be generated when wrong community names are used, please enable the option **Generate Authentication Failure Traps**.

Change Password

Remark

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*Please note that, at this point, you define the password for the SNMP Agent. The password for the **ETI Decoder** Software is configured under **Configuration → Administration Password** .*

By pressing the **Change Password** button, the window for entering the password for the SNMP Agent is displayed. Please enter the password under **Enter new Password**. Confirm your entry in the **Confirm Password** line.

FIG. 33   PASSWORD ENTRY OF THE SNMP AGENT

If the password is selected, only people who know the password can change the parameters of the SNMP Agent or execute a firmware upgrade of the SNMP Agent via the network by using the **SNMP AGENT Admin** Tool.
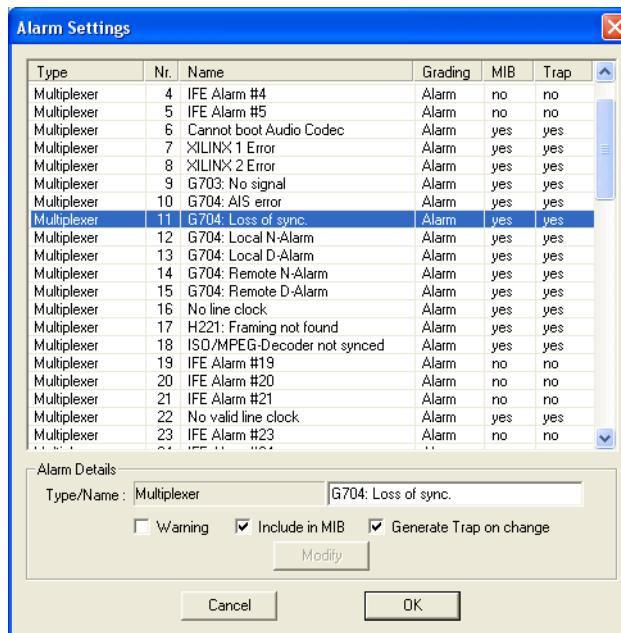
Attention

!

If you forget the password, the SNMP Agent needs to be sent in to unlock it.

Alarm Settings

By clicking on the **Alarm Settings** button, the dialog for the configuration of all possible alarms is displayed.

FIG. 34 **ALARM SETTINGS**

Every alarm[1] which can be monitored in a Network Management System is displayed in the list:

– The *Type* column shows the alarm type:

  – *Multiplexer*: the alarm refers to the hardware multiplexer of the system.

  – *MPEG Decoder*: the alarm signals an error in the MPEG Decoder of the system.

  – Additionally, three further types are available, which can be considered as global alarm:

    – *Sync. Status*: this alarm is set, if the ETI frame signal is faulty

    – *Audio Stream*: this alarm is set, if an Audio stream is faulty

    – *SNMP Agent*: this alarm is set, if the communication between the system and the SNMP Agent is faulty (e.g. power supply error in the system).

– Under *No.* the index of the alarm is displayed for each type.

– In the *Name* column you will find a more detailed description of the alarm. If you click on an alarm, you can also assign your own alarm name under *Alarm Details*.

– Via the *Grading* entry you can define the importance of an alarm (alarm or warning). Less important alarms (e.g. level alarms) can be marked by activating the *Warning* option in the *Alarm Details*.

– If an alarm is to be written in the *MIB File*, please activate the *MIB* (Management Information Base) option.

---

1 Certain alarms are only listed for the reason of compatibility with other products, however, they are not important for the *MAGIC DAB ETI Decoder*. These alarms are marked with „#<nr>“.

– If additionally a *Trap* is to be generated when the alarm status chan-
ges, please enable the option *Generate Trap on change*.

After certain changes in the SNMP Agent, it needs to be restarted. In this way,
all connections are disconnected. Please establish the connection again by
remote control via TCP/IP by pressing the **Connect** button.

FIG. 35   **DIALOG IF NO TCP/IP CONNECTION EXISTS**
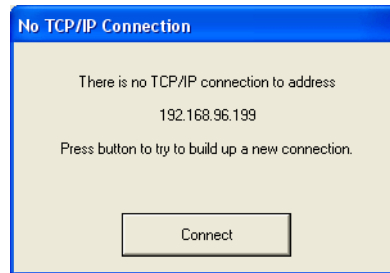
Therewith the configuration of the SNMP Agent is finished.

8.3   **Integration into the Network Management System**

To integrate the *MAGIC DAB ETI Decoder* into your Network Management System you need to import the MIB file `AVT-ETI-DECODER.mib`, which can be found in the installation directory of the SNMP Agent `(<installation directory>\AVT SNMP Agent)`, into your Mangement System.

FIG. 36   **MIB FILE (ABSTRACT)**

The *MIB Enterprise ID* for AVT Audio Video Technologies GmbH is:

26196

The alarm status for all listed alarms is defined in the following way:

–   ok = 1

–   error = 2

–   warning = 3

8.4	Remote Control via LAN

With the **SNMP Agent** option you also have the possibility to control and monitor the system via the network by using the **ETI Decoder** Software.
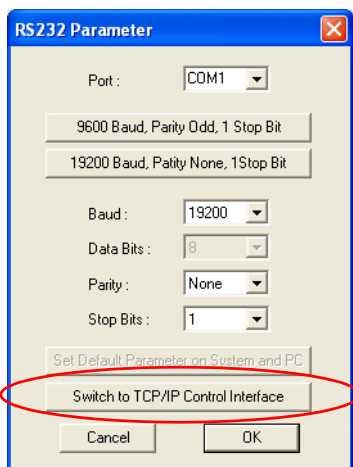
Remark

i

*Please note that local control is always given priority over control via network. As soon as the **ETI Decoder** Software is started locally at Port 2 of the SNMP Agent, remote control via TCP/IP is automatically interrupted.*

To activate the TCP/IP interface please open the dialog for the administration of the control interfaces via the menu **Configuration → COM Port**.

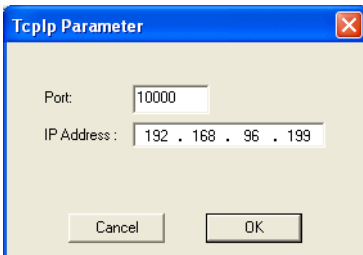Please press the **Switch to TCP/IP Control Interface** button to activate the control interface via TCP/IP.

FIG. 37	COM PORT CONFIGURATION FOR TCP/IP ACCESS

In the following dialog, you enter the **Port** (Default stetting: 10000) and the **IP Address** (see FIG. 30), under which the SNMP Agent is accessible.

FIG. 38	TCP/IP PARAMETER

After pressing the **OK** button, the connection is being established.

| *Remark* | *If you cannot establish a connection via the network, maybe the port in the SNMP Agent needs to be configured via local control. Please press under* **Configuration → Com Port** *the* **Switch to RS232 Control Interface** *button. Select the COM Port of the PC to which the SNMP Agent is connected. Under* **Configuration → System → SNMP → IP Parameter → Remote Ctrl. Port** *please enter the desired port (see also FIG. 32).* |

A 1   I N T E R F A C E S

The following figure shows the rear view of the MAGIC ETI Decoder.

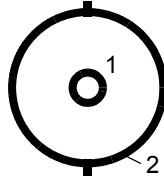**FIG. 39**   **REAR VIEW OF THE SYSTEM**
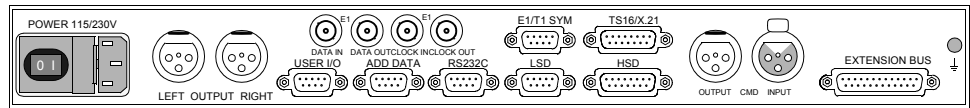
All interfaces are described in detail in the following.

A1.1 E1(2-Mbit/s) Interface

This interface supports up to 32 64-kbit/s channels using ITU recommendation G.703/G.704.
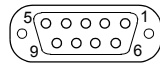
A1.1.1 Unbalanced E1 Interface

TAB. 3 PIN ASSIGNMENT: UNBALANCED E1 INTERFACE

Socket: Data in / Data out (BNC)		
Pin	**Signal**	**Electrical characteristics**
1	Data - F1 in / F1 out	Amplitude: 3 V_{pp}
2	Ground	Impedance: 75 Ω unbalanced
		Range: 100 m

TAB. 4 PIN ASSIGNMENT: UNBALANCED CLOCK INTERFACE

Socket: Clock in / Clock out (BNC)		
Pin	**Signal**	**Electrical characteristics**
1	Data - T3 in / T3 out	Amplitude: 0.5 ... 1.9 V_{0p} (Input)
2	Ground	1.5 V_{0p} (Output)
		Impedance: 75 Ω unbalanced
		Range: 100 m

A1.1.2 Balanced E1 Interface

TAB. 5 PIN ASSIGNMENT: BALANCED E1/T1 INTERFACE

Socket: E1/T1 balanced (SUB-D, 9-pole)			
Pin	**Signal**		**Electrical characteristics**
1	Shield		Amplitude: 3 V_{pp} acc. G.703
2	RXD a	Data in a	Impedance: 120 Ω bal.
3	TXD a	Data out a	Range: 100 m
4	RXCLK a	Clock in a	
5	TXCLK a	Clock out a	Clock:
6	RXD b	Data in b	Amplitude: 0.5 bis 1.9 V_{0p} (Input)
7	TXD b	Data out b	1.5 V_{0p} (Output)
8	RXCLK b	Clock in b	
9	TXCLK b	Clock out b	

A1.2   **TS16/X.21 Interface (Option)**

This interface can't be used in the ETI variant.
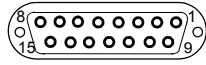
TAB. 6   PIN ASSIGNMENT: TS16 INTERFACE

Socket: TS16 (SUB-D, 15-pole)			
Pin	**Signal**		**Electrical characteristics**
1	SHIELD		Level: V.11
2	TXa	Transmit a (to network)	Range: max. 100 m
3	Ca	Control a (to network)	
4	RXa	Receive a (from network)	
5	Ia	Indication (from network)	
6	CLKa	Clock (from network)	
7	B_CLKa	Byte clock (from network)	
8	GND	Ground	
9	TXb	Transmit Data (to network)	
10	Cb	Control (to network)	
11	RXb	Receive b (from network)	
12	Ib	Indication (from network)	
13	CLKb	Clock (from network)	
14	B_CLKb	Byte clock (from network)	
15		not connected	

A1.3 **RS232C Interface**

The RS232C interface is for the configuration and monitoring of the MAGIC ETI Decoder system from a PC.
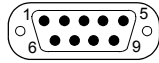
TAB. 7 **PIN ASSIGNMENT: RS232 INTERFACE**

Connector: RS232C (SUB-D, 9-pole)			
Pin	**Signal**		**Electrical characteristics**
1		not used	Type: DTE
2	RXD	Receive Data	Level: V.24
3	TXD	Transmit Data	Data rate: 300 to
4	DTR	Data terminal ready	38400 Baud
5	GND	Ground	Range: max. 15 m
6	DSR	Data set ready	Protocol: 1 start bit
7	RTS	Request to send	7 or 8 data bits[a]
8	CTS	Clear to send	1 parity bit[b]
9		not used	1 stop bit

a Pre-setting: 8 Bits

b The following parities can be set: none, even, odd. Pre-setting: none

A1.4 **TTL-USER-I/O Interface**

This interface is used to transmit control signals to external units. Three of these signals are used for the control of the three relays. The other five signals are not in use.
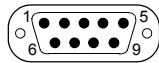
**TAB. 8** **PIN ASSIGNMENT: TTL-USER-I/O INTERFACE**

Connector: TTL USER-I/O (SUB-D, 9-pole)		
Pin	**Signal**	**Electrical characteristics**
1	TTL_1_IN/OUT	Level: TTL/CMOS
2	used for Relay 1	Max. Load: 20 mA
3	TTL_3_IN/OUT	
4	used for Relay 2	
5	GND	
6	TTL_5_IN/OUT	
7	used for Relay 3	
8	TTL_7_IN/OUT	
9	TTL_8_IN/OUT	

A1.5   **LSD Interface**

The LSD interface is for the transmission of low speed data.

This interface in this variant is not in use.
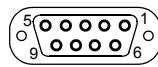
TAB. 9   PIN ASSIGNMENT: LSD INTERFACE

Socket: LSD (SUB-D, 9-pole)				
Pin	**Signal**		**Electrical characteristics**	
1	CD	Carrier Detect	Type:	DEE
2	RxD	Receive Data	Data rate:	300 to 38400 Baud
3	TxD	Transmit Data	Level:	V.24
4	DTR	Data Terminal Ready		
5	GND	Ground	Range:	max. 15 m
6	DSR	Data Set Ready		
7	RTS	Request To Send		
8	CTS	Clear to Send		
9	RI	Ring Indication		

A1.6   **HSD Interface**

This interface can be used as transparent data interface (High Speed Data).

This interface in this variant is not in use.

In addition on this socket the outputs of the three signalling relays are available.
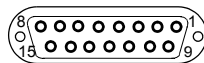
TAB. 10   PIN ASSIGNMENT: HSD INTERFACE

Socket: HSD (SUB-D 15-pole)				
Pin	**Signal**		**Electrical characteristics**	
1	Shield		Type:	DCE
2	T a	Transmit a	Level:	V.11, symm.
3	Relay 1a	Power Fail 115/230VAC	Data Rate:	max. 128 kbit/s
4	R a	Receive a	Range:	100 m
5	Relay 2a	2-Mbit Alarm		
6	S a	Signal Element Timing a	Relay:	
7	Relay 3a	ISO/MPEG Alarm[a]	Voltage:	max. 24V=
8	GND	Ground	Current:	max: 0,5A
9	T b	Transmit b		
10	Relay 1b	Power Fail 115/230VAC		
11	R b	Receive b		
12	Relay 2b	2-Mbit Alarm		
13	S b	Signal Element Timing b		
14	Relay 3b	ISO/MPEG Alarm		
15		not used		

a   Disturbance of a t least one ISO/MPEG header in the received ETI stream
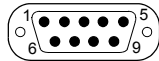
A1.7   **Additional Data Interface**

The Additional Data interface allows the output of the PAD (Program Associated Data).

Remark   *Functional Restriction*

Presently an output of PAD (Program Associated Data) is not implemented.

TAB. 11   **PIN ASSIGNMENT: ADDITIONAL DATA INTERFACE**

Connector: Additional Data (SUB-D, 9-pole)			
Pin	**Signal**		**Electrical characteristics**
1			Type: DTE
2	RXD	Receive Data	Level: V.24
3	TXD	Transmit Data	Data Rate: 300 to 38400 Baud
4			Range: max. 15 m
5	GND	Ground	
6			
7			
8			
9			

A1.8	**AES/EBU Interface**

The AES/EBU interface allows the transmission of digital audio data.
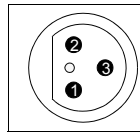
TAB. 12   **PIN ASSIGNMENT: AES/EBU INTERFACE**

Connector: AES/EBU (XLR)				
Pin	**Signal**		**Electrical characteristics**	
1	Shield		Level:	V.11, balanced, earth free
2	TXD a	Transmit Data a		
3	TXD b	Transmit Data b	Range:	max. 100 m

If the AES/EBU module is equipped the digital audio data stream is available on the OUTPUT LEFT connector. Via the PC the connector OUTPUT RIGHT can be configured as clock input or output. The integrated Sampling Rate Converter adapts the connected clock to the network clock. (Frequency range: 24...64 kHz).

TAB. 13   **PIN ASSIGNMENT: SAMPLING CLOCK INTERFACE**

Connector: Sampling Clock (XLR)				
Pin	**Signal**		**Electrical characteristics**	
Input or Output (selectable)			Level:	V.11, balanced
1	Shield		Range:	max. 30 m
2	CLK a	Clock a		
3	CLK b	Clock b		

A1.9	**Analogue Audio Interface**

The analogue audio interface allows the transmission of analogue audio signals and is realized as electronically, balanced interface.
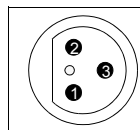
TAB. 14   **PIN ASSIGNMENT: ANALOGUE AUDIO INTERFACE**

Connector: Analogue Audio interface (XLR)			
Pin	**Signal**	**Electrical characteristics**	
1	Shield	Level:	−20 dBu to +12 dBu
2	Audio a Out	Impedance:	600 Ω elektr. bal.
3	Audio b Out		

A1.10	**Monitor Output (CMD Output)**

In parallel to the analogue Stereo output a Mono signal is also available on the monitor output **CMD Output**. The socket **CMD Input** has no function.
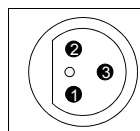
**TAB. 15**   **PIN ASSIGNMENT: MONITOR OUTPUT**

Connector: Monitor Output (XLR)		
Pin	**Signal**	**Electrical characteristics**
1	Shield	Level depends from the setting of the Stereo analogue output
2	Audio a Out	
3	Audio b Out	Impedance: 600 Ω elektr. bal.

A1.11	**Extension Bus Interface**

The Extension Bus allows a cascading of two or more MAGIC systems.

This function is in this variant not available.
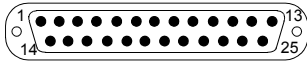
TAB. 16   PIN ASSIGNMENT: EXTENSION BUS INTERFACE

Connector: Extension Bus (SUB-D, 25-pole)			
Pin	**Signal**		**Electrical characteristics**
1	Shield		Data Rate:
2	TXa	Transmit Data a	64-kbit/s to 2,048-Mbit/s
3	Ca	Control a	Level: V.11, balanced
4	RXa	Receive Data a	Protocol for RS-485:
5	CLK48a	Clock 256x48 kHz a	1 Startbit
6	CLKa	Clock Receive a	8 Data bits
7			1 Parity bit
8	GND	Ground	1 Stop bit
9	TXb	Transmit Data b	Data Rate: 19200 Bd
10	Cb	Control b	
11	RXb	Receive Data b	
12	CLK48b	Clock 256x48 kHz b	
13	CLKb	Clock Receive b	
14	CTa	Control RS485-Bus	
15	CTb	Control RS485-Bus	
16	C_DATAa	RS485-Bus	
17	C_DATAb	RS485-Bus	
18	RXD_Va	Receive_D_Valid a	
19	RXD_Vb	Receive_D_Valid b	
20	TXD_Va	Transmit_D_Valid a	
21	TXD_Vb	Transmit_D_Valid b	
22	FSa	Frame_Sync a	
23	FSb	Frame_Sync b	
24	reserved		
25	reserved		

A 2   TECHNICAL DATA

A2.1   Decoder

Coding standard	ISO/MPEG Layer II DAB EN 300401
Number of channels	2 × mono or 1 × stereo
Sampling Frequency	48-kHz
Modes	Mono Channel, Dual Channel, Stereo, Joint-Stereo
Audio Interface	Digital Output acc. AES/EBU Professional with Sample Rate Converter (*optional*)
Data Interface	RS232 for PAD[1]
Error recognition	CRC16 in ISO/MPEG data stream

Analogue Outputs

Electronically, balanced Audio Interface (XLR)

Impedance	600 Ω
Level selectable	−20 to +12 dBu
Headroom	6 dB/10 dB (via jumper selectable)
Frequency range	20...20000 Hz
Equalization	Deemphasis acc. ITU-T J.17 or 50/15 μs
THD	K2 + K3 $\leq$ 0.025% (f = 1 kHz)
S/N	approx. 90 dB unweighted
Crosstalk	(L$\leftrightarrow$R) > 80 dB (f = 10 kHz)
Level deviation	$\pm$ 0,2 dB with f=1 kHz

Level Control (left and right channel)

Threshold value	−24 dB below the selected nominal level

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1   Function not implemented

A2.2   **Interface unit with multiplexer**

Signalling/Synchronization

ETI EN 300799, Ensemble Transport Interface
- ETI (NA, G.704)$_{5592}$
- ETI (NA, G.704)$_{5376}$
- ETI (NI, G.703)
DAB modes: I, II, III, IV

Line interfaces

E1   2.048-Mbit/s
                                  G.703/G.704

Additional Data interfaces

LSD[1]   max.38400 Baud, V.24, asynchronous

HSD[1]   64/128-kbit/s, V.11 level, balanced

User interfaces

PC control   max. 38400 Baud, V.24, asynchronous

TTL signalling   5 In-/outputs TTL level, programmable

Alarm interface   3 potential free relays

A2.3   **Power Supply**

Voltage   90 to 253 V (50/60 Hz)

Power consumption   max. 35 W

A2.4   **Dimensions**

H × B × T   44 × 449 × 450 (mm)

Weight   ca. 6 kg

A2.5   **Additional Information**

EMC   VDE 0878, Limit B

Electrical Safety   EN 60950

Temperature   +5 °C to 40 °C

Relative Humidity   5% ... 85%

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1 Function is not implemented

A 3   G E N E R A L

A3.1   Order Numbers

MAGIC ETI Audio Decoder   800090

Accessoires

AES/EBU Module   500007

PC cable   490003

A3.2   Delivery Range

– MAGIC ETI Audio Decoder

– Windows PC Software

– Power cable

– Adhesive feets

– ETSI mounting brackets

– Documentation