

# A20 / A20T

## FM Monitoring Decoder

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## Instruction Manual

October 2006

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# 1. Introduction

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The A20 series decoders are designed for measuring and monitoring RDS signals. All analog signals are processed by using state-of-the art Digital Signal Processing (DSP). The instruments are provided in 19", 1 rack unit housings.

Available versions are the A20 (with LCD / Jogwheel) and the A20T (without LCD / Jogwheel). This manual covers both versions under the term "A20". As A20T provides no LCD / Jogwheel, all related descriptions are not applicable.

The A20 / A20T are available as different types with different functionality:

Three different A20 types and an MP3 option are available.

A20-RDS	<ul style="list-style-type: none"><li>• Analog measurement and monitoring of RF-level, RDS-level, and RDS-phase</li><li>• RDS measurement and monitoring functions for PI, PS, TA, /TA, TP, all groups incl. their contents, ODA, TMC, RDS-synchronization and block error rate.</li><li>• Alarm reporting via: E-Mail, serial output (RS-232C), activation of floating relay contacts, SNMP</li><li>• Local operation using Jogwheel in combination with a 2x40 character LCD</li><li>• Remote operation by using supplied A20 Config software.</li><li>• Floating opto-isolated inputs</li></ul>
A20-FM	All features of A20-RDS with additional audio measurement functions: <ul style="list-style-type: none"><li>• Measurement of the audio deviation, for the left and the right channel individually</li><li>• Measurement of the pilot signal level</li><li>• Monitoring function for audio deviation target interval with time delay</li></ul>
A20-MPX+Peak	<ul style="list-style-type: none"><li>• All features of A20-FM with additional MPX-deviation and -power measurements.</li><li>• Expanded PC software enables long-term measurements of the MPX peak deviation and the MPX modulation power (monitoring, log file).</li></ul>
MP3 Option	<ul style="list-style-type: none"><li>• MP3 server module is optional for any of the above. This makes it possible to monitor the off-air audio remotely on a PC by receiving an MP3 stream via TCP/IP.</li></ul>

## Important

Read this instruction manual carefully before attempting to operate the instrument. Save this instruction manual for future reference – it contains important safety and operating instructions for the instrument.

## Safety definitions

Warning	Describes precautions necessary to prevent injury, loss of life, fire or an electrical shock
Caution	Describes precautions necessary to protect the equipment

## Further notices

The model as shown on the cover may differ from the supplied model.

Configurations, functions and specifications are subject to change without notice.

## 2. Precautions

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- Do not remove protective covers on the unit – hazardous voltages are present inside.
- To avoid the risk of electrical shock hazards: Check the front panel / housing for damage and the supply cord for abrasion / damage.
- Use a grounded three-wire power supply cord and -plug only, which complies with the national regulations. If necessary, another than the supplied supply cord has to be used, which complies with the regulations of the country where the unit is operated.
- The unit must be plugged into a grounded power socket only - Shock hazards may exist if the unit is not properly grounded.
- The grounding wire/contact must not be removed.
- Make sure that the power socket is next to the unit and readily accessible to the user.
- Do not operate the unit in a dusty environment or in direct sunlight exposure.
- Ensure sufficient heat dissipation during operation
- The surface of the unit can heat up during operation – do not touch.
- Devices which are connected to the unit could be damaged by the unit or damage the unit itself, if the output levels exceed the limits.
- Never expose the unit to rain, snow, or liquids. Do not touch the unit with wet hands.
- Do not use corrosive detergents on the unit.
- Do not operate the unit in the presence of flammable gases. Explosion can result.

### 3. Supplied Parts

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- A20 FM Monitoring Decoder or A20T FM Monitor Decoder
- Instruction manual
- Power supply cord
- Null modem cable (2x 9 pin Sub-D female connector)
- RJ45-patchcable
- BNC connection cable
- CD with Software A20Config for Windows 95/98/98SE/2000/NT/XP for remote operation

### 4. Manufacturer

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### 5. Installation

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This section describes how to install and connect the instrument correctly.

#### Best setup location

The A20 should be installed in a 19" rack. Avoid direct sunlight, proximity to radiators and air conditioning, dust, water, and chemicals. Choose a rack location that permits a clear view of the digital display on the instrument.

#### Mains supply connection

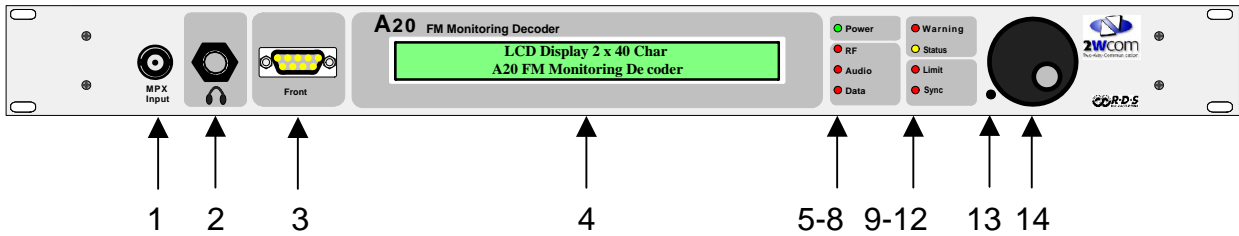
This instrument is designed for operation with 230V AC / 50Hz or 115V AC / 60Hz (depending on version). No power switch is available; unplug unit to remove power. Keep the supply plug readily accessible to the user.

#### **Warning:**

Disconnect power plug prior to opening the housing. Repair of the equipment must only be carried out by authorized and qualified personnel.

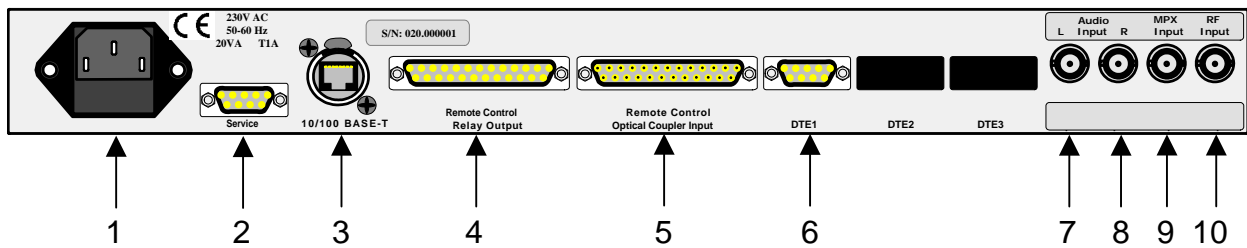
## 6. Control elements and connectors

### Front panel



1	[MPX Input]	BNC connector; Input for an external MPX signal (Front MPX input).
2	Headphone connector [Headphones]	6.3mm connector (1/4"); Output of a selectable audio signal for testing purposes.
3	[Front]	9 pole SUB-D connector; Serial RS-232C communication with the PC software for remote control operation.
4	Digital display	Illuminated digital display (LCD) with 2 x 40 characters A20T: No LCD available
5	[Power]	LED indicator (green); Lit when external supply is ok
6	[RF]	LED indicator (red); Lit when measured antenna signal level, minus the selected attenuation is below 20 dB $\mu$ V or above 60 dB $\mu$ V. Not active if unit is in MPX-mode.
7	[Audio]	LED indicator (red); Lit when the measured internal audio signal deviation during tuner operation is below the configured monitoring limit.
8	[Data]	No function
9	[Warning]	LED indicator (red); Flashes during start-up of the TCP/IP module. Continuously lit when device errors arise.
10	[Status]	LED indicator (yellow); Lit when scan mode is activated.
11	[Limit]	No function
12	[Sync]	LED indicator; Lit when RDS synchronization is lost.
13	Reset switch (pin hole)	Switch to initiate a warm start (use paperclip or similar)
14	[Jogwheel]-Knob	Navigate in (rotate) and activate (push in) displayed menu structure A20T: No jogwheel available

## Rear side



- |    |                        |  |
|----|------------------------|--|
| 1  | Power supply connector | Standardized supply connector with integrated fuse holder (1A T 5x20mm, slow blow type)  |
| 2  | [Service]              | Servicing connector. Not usable for setup or data communication to the A20.  |
| 3  | [10/100 Base T]        | RJ-45 connector for TCP/IP connections   |
| 4  | [Relay Output]         | 25-pole Sub-D male connector is used to gain access to the floating relay contacts. It is possible to assign functions via A20Config software.   |
| 5  | [Opto-isolated Inputs] | 25-pole Sub-D female connector is used to gain access to the floating opto-isolated inputs. It is possible to assign functions via A20Config software. These functions are executed if the corresponding input is activated. Their states can be viewed via a status menu. |
| 6  | [DTE1]                 | 9 pole SUB-D connector; Serial RS-232C communication with the PC software for remote control operation or output of serial alarm messages (DTE) of the monitoring function.  |
| 7  | [Audio Input L]        | BNC connector, Input for left audio channel of an external receiver. It is possible to measure the level of the signal and to forward the signal as MP3 stream via TCP/IP (MP3-option required).   |
| 8  | [Audio Input R]        | BNC connector, Input for right audio channel of an external receiver. It is possible to measure the level of the signal and to forward the signal as MP3 stream via TCP/IP (MP3-option required).  |
| 9  | [MPX Input]            | BNC connector, Input for external MPX sources.   |
| 10 | [RF Input]             | BNC connector, Input for from the antenna or RF sample port.   |



## 7. Operation

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### A20T - Operation differences to A20

A20T: LCD and jogwheel descriptions are not applicable. Use remote operation with A20Config PC-software.

### Configurable measurement units

The measurement values RDS-Level, MPX-Deviation, Audio Level, External Audio Level, and Pilot Level can be displayed in different units:

mVpp	Unit for signal voltages in mV as peak-peak value.
%	Unit for percentage proportional to 75 kHz transmitter frequency deviation.
kHz	Unit for assumed transmitter frequency deviation. For a correct display it is possible to set the practical transmitter frequency deviation that is caused by a modulation level of 6 dBu.
dBu	Unit for a logarithmic signal voltage ratio in reference to 0.775 V.
dB $\mu$ V	Unit for a logarithmic signal voltage ratio in reference to 1 $\mu$ V.

The setup of the different units can be done with the A20Config software.

### Power on

The instrument is ready for operation shortly after it has been connected to external power. The display first shows a bootloader message ("A20-Bootloader Vx.xx") and then the A20 shows a version message.



### Start message with version display



A20 Vers. X.XX FM Monitoring Decoder
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The version number X.XX shows the firmware version of the instrument. The display remains for approx. 3 sec. and then changes to the status screen. A push on the jogwheel skips the delay time.

## Menu operation - Description of the menu navigation

For menu navigation, a jogwheel is used. The jogwheel has the following functions: Step left or right by rotating the wheel left or right, select/enter by pushing the wheel in.

The cursor on the screen is represented by the symbol . Rotate the jogwheel to highlight the next menu button with the cursor. Push the jogwheel to navigate into the submenu, which is represented by the highlighted menu button. To return to the previous menu, highlight and select the  symbol (usually shown at the right part of the display).

If a configurable menu button has been selected, the configurable value is shown in bracket symbols  and . The value can be changed by rotating the jogwheel. A push on the jogwheel confirms the selection and leaves the configuration of the menu button.

Some submenus just show data and offer no configuration options. In this case no cursor is shown and a push on the jogwheel brings back the previous menu.

## Status screen - Warmstart/Coldstart selection and battery display

```
A20 Vers. X.XX
Warmstart      Battery OK
```

The status screen offers two menu buttons. The cursor highlights the [Warmstart] button by default. After 5 sec. of no activity, the main menu is shown.

### Warm/Coldstart selection

```
A20 Vers. X.XX
>Warmstart<    Battery OK
```

The user can choose between a warmstart (started by default) and a coldstart of the instrument. To coldstart, select warmstart, turn the jogwheel to change to coldstart and press jogwheel to execute. This must be done within the first 5 seconds before the default warmstart happens.

If coldstart is executed, the buffer memory with all alarm messages will be erased. A warmstart does not change any RAM data.

### Battery OK

```
A20 Vers. X.XX
Warmstart      >Battery OK
```

[Battery OK] indicates that the battery voltage is sufficient to maintain the RAM data after power loss. If the voltage drops below 2.5 V, the display shows [Battery low]. If this state arises, the battery has to be replaced. Battery replacement can only be performed by trained service personnel.

If the menu button [Battery ok / low] is highlighted and selected, the battery voltage is shown in mV.

```
A20 Vers. X.XX
Warmstart      >3656mV
```

A push on the jogwheel exits the battery voltage indication.

The functions of the A20 are accessible via the menu structure using the jogwheel and the digital display. The menus are explained below. For clarity, the full menu path is stated for each function.

## Main menu screen

The main menu structure is subdivided into two screens. Screen one is shown below.

>RDS-INF	Values	Alarm	Scan
Control	CTRL GR	Interface	Memory

After the last menu button of the first main menu page has been highlighted by rotating the jogwheel right, the second screen is shown.


>Settings
-----------

By turning the jogwheel left, the first screen of the main menu is shown again.

## Menu [RDS-INF] - Selection for RDS data indication

### Main menu>[RDS-INF]


The RDS-INF menu contains a submenu. This submenu is for the selection of the RF frequency/source and for displaying general RDS information like the PI, PS, group data etc.

PI, PS, ...	CT	GRP	AF	
RT	GR	EON		

## Submenu [PI,PS,..] - RDS program data / Selection of the RF/MPX source

### Main menu>[RDS-INF]>[PI,PS,..]

This menu shows the PI, PS, TP, TA, MS, PTY, and the MPX source.

PI	PS	TP	TA	MS	PTY	MPX	
xxxx	12345678	1	1	MS	031	FRONT	

## **MPX-source and tuner frequency configuration**

### **Main menu>[RDS-INF]>[PI,PS,...]**

To select between an external MPX signal as source and the internal tuner as source, the menu button [MPX] (external MPX) or [FREQ] (internal tuner) has to be highlighted and configured. The tuner will be muted if an external MPX source is selected.

To select between the front and the rear MPX input if [MPX] has been selected as source, the menu button [FRONT] or [REAR] has to be highlighted and selected.

To adjust the tuner frequency if [FREQ] has been selected as source, the menu button [XX.X] has to be highlighted and selected. The frequency can be changed in steps of 100 kHz. The receiving frequency changes while rotating the jogwheel. If no RDS signal can be decoded, the [PI] shows "\*\*\*\*\*".

The received audio signal can be monitored at the headphone connector. The type of signal at the headphone connector can be configured via the PC software A20Config.

#### **Notes:**

Choose a proper measurement range for the correct measurement of RF-Signals. See also 'RF measurement ranges' on page 27.

The MPX source or tuning frequency cannot be changed during active scan mode. For indication, the "Status"-LED is lit when scan mode is activated.

### Submenu [CT] - RDS clock and internal real-time clock

#### Main menu>[RDS-INF]>[CT]

This menu shows the current CT as decoded from the 4A group and the internal real-time clock (RTC). Additionally the RDS time offset is shown in 30-minute steps. The offset has to be considered when reading the clock (e.g. "+04" means +2 hours). The time format is as shown below.

Indication of the RDS time offset in x steps of 30 minutes

```
RDS (Offset=+04)   SET INTERN
dd.mm.yy-hh:mm:ss ON dd.mm.yy-hh:mm:ss
```

RDS-CT from 4A group  
(Offset included)

Present time of the RTC

### [SET]

#### Main menu>[RDS-INF]>[CT]>[SET]

```
RDS (Offset=+02)  >SET INTERN
dd.mm.yy-hh:mm:ss CT dd.mm.yy-hh:mm:ss
```

The menu button [SET] can be switched between [CT], [SNTP], and [OFF]:

CT: The internal RTC is set by every received CT (4A group).

SNTP: The internal RTC is set by an NTP-Server via TCP/IP (every 60 minutes or after a restart). The NTP-Server address is defined in the TCP/IP interface settings.

OFF: The internal RTC runs independently from RDS CT and SNTP.

"RDS" shows the received RDS date and time.

"INTERN" shows the date and time of the internal realtime clock.

### Submenu [GRP] - Current group sequence

#### Main menu>[RDS-INF]>[GRP]

This menu shows the current group sequence, live as received. The groups 10 to 15 are displayed as hexadecimal numbers A to F. The second row shows the corresponding group type A or B for every group number (typically mainly type A groups are used). The scrolling display can be stopped by rotating the jogwheel right. A stopped display is indicated by an [S] in the right part of the display. The display scrolls again after rotating the jogwheel left. A restart will display current data and will not 'catch-up' prior data.

```
0260E60550260BB
AAAAAAAAAAAAAAAAA S
```

[S] indicates a stopped display

## Submenu [AF] - Alternative frequencies

### Main menu>[RDS-INF]>[AF]

The AF menu shows the received AF lists. A maximum of five received frequencies can be shown per row. If the number of frequencies (shown in the left part of the display) exceeds 10, the jogwheel can be used to scroll the list.

If the coding method B is used, the shown frequencies correspond to the head frequency and can be highlighted and selected to show the corresponding alternative frequencies in a list. If the head frequency is highlighted, the number of contained frequencies is shown at the left part of the display (next to the number of total frequencies).

Adjusted tuner frequency or MPX

Method (A or B)

93.2 B	93.6	93.7	99.8	99.1	93.5
29 02	99.4	88.3	102.3	89.3	93.8

Number of alternative frequencies corresponding to the selected head frequency (Method B).

Total number of received AF lists

Exit button on the left side

The alternative frequencies of a head frequency are shown as a list, after selection with the jogwheel:

01.	87.6 MHz
02.	98.5 MHz

Alternative frequency in MHz

Numbering of the frequencies

If the list contains more than two frequencies, the jogwheel can be used to scroll the list.

**Submenu [RT] - Radio text**  
**Main menu>[RDS-INF]>[RT]**

The RDS radio text is displayed in two rows with a word-wrap at the end of the first row, to display all possible 64 characters. "AB=0" and "AB=1" indicate the state of the RT-flag. If the flag changes its state, the display is cleared. If the RDS reception is weak, the display may show no or incorrect text.

```
RT: Radiotext Radiotext Radiotext Radio  
AB=n text Radiotext Radiotext
```

**Submenu [GR] - Group data**  
**Main menu>[RDS-INF]>[GR]**

```
6A: 1F FFFF FFFF 11 1111 1111  
6A:-12 2222 2222 13 3333 3333
```

All group types can be chosen by rotating the jogwheel. The example above shows the group 6A. The 37 free bits of a group are displayed, 5 bits block 2, 16 bits block 3 and 16 bits block 4 (see RDS standard CENELEC/IEC). Here the data 1F..., 11..., 12..., 13... have been received. The display is continuously updated.

**Submenu [EON] - EON data**  
**Main menu>[RDS-INF]>[EON]**

This menu shows the PI of the other network as EON information.

```
NETWORK: 1111 2222 3333 4444 5555 6666  
7777 8888
```

**Menu [Values] - Measurement selection**  
**Main menu>[Values]**

Menu [Values] is for the selection of several measurements and shows:  
[Audio], [RDS], [MPX], [RF], [Pilot]

```
RDS Audio MPX RF Pilot
```



## Submenu [RDS] - RDS level, phase and block errors

### Main menu>[Values]>[RDS]

This menu shows the RDS measurements. The RDS modulation level in the selected unit, the phase of the RDS signal in reference to the pilot tone in degrees, and the RDS block error in percent are measured. If the signal source has been changed, all values are refreshed.

Source ([MPX]=external input, [FREQ]=internal tuner)

RDS-Level	Phase	Bl-Err	MPX	
[unit]	[°]	100%	FRONT	

[FRONT]=Signal comes from front MPX input

[REAR] = Signal comes from rear MPX input

If [FREQ] has been chosen, the frequency is displayed in MHz

For details of the selection between external MPX and internal tuner see page 13.

### [RDS-Level]

#### Main menu>[Values]>[RDS]>[RDS-Level]

If the RDS decoder is synchronized, the measured value of the RDS modulation level is shown in the selected unit. The signal source can be external MPX or the internal FM tuner. The value will be cleared if the RDS decoder is not synchronized.

### RDS-[Phase]

#### Main menu>[Values]>[RDS]

The RDS phase shows the phase difference between the pilot signal and the RDS signal. The possible range is 0° to 180°. Typically the desired value is 90°.

Note: The RDS modulation level and the phase measurement require that no ARI signal and no test patterns (e.g. continuous sequence of 0 or 1) are present.

### [Bl-Err]

#### Main menu>[Values]>[RDS]

Shows the current RDS block error rate in %. The instrument executes a 2-bit error correction. Every block error is counted, including the recoverable errors. If the tuner frequency or signal source is changed (scan mode) the value starts at 100%.

### Submenu [Audio] - Audio level

#### Main menu>[Values]>[Audio]

The audio measurements\* are only present in the A20-FM. The measured audio level is shown in the selected unit. Signals from the internal tuner or the external MPX inputs can be measured. If the active dataset is configured for monitoring the audio signal deviation during tuner operation, the LED "Audio" is lit if the signal is below the configured limit. The signals from the external audio inputs [Audio Input L] and [Audio Input R] can be measured simultaneously. These are shown at the right half of the display.

Left	Right	Ext-Left	Ext-Right	!
[unit]	[unit]	[unit]	[unit]	

### Submenu [MPX] - Indication of MPX deviation and MPX power

#### Main menu>[Values]>[MPX]

The MPX measurement\* is part of the A20-MPX+Peak. The measured MPX deviation is shown in the selected unit and the MPX power is shown in dBr.\*

MPX-Deviation	MPX-Power	!
[unit]	[dBr]	

\* The menu shows no values if the instrument function is not included.

### Submenu [RF] - Indication of the RF level / Attenuator selection

#### Main menu>[Values]>[RF]

Measurement of the RF level. The measurement range is 20...60 dB $\mu$ V.

The A20 is equipped with internal RF attenuators to increase the measurement range. These can be selected automatically or manually. Manual selection can be done by using the menu entry [Attenuate]. The following attenuators can be selected: [0dB], [20dB], [40dB], and [60 dB]. Therefore levels up to 120 dB $\mu$ V can be measured.


“RF-Level” shows the measured level in dB $\mu$ V.

The menu button [Attenuate] enables the selection of the different attenuators.

The [Auto-Mode] entry is for activating the automatic RF attenuation (not available if the scan mode is activated). The automatic activates the required RF attenuation depending on the RF input level.

The displayed RF level is corrected to compensate the selected attenuation.


See also page 27 for details regarding the correct measurement ranges depending on the level to be measured.

RF-Level	Attenuate	Auto-Mode	
[dB $\mu$ V]	[dB]	[ON/OFF]	

### Submenu [Pilot] - Pilot signal modulation level

#### Main menu>[Values]>[Pilot]

Measurement of the pilot modulation level. The level is shown in the selected unit.

Pilot-Level	
[unit]	

## Menu [Alarm] - Alarm messages

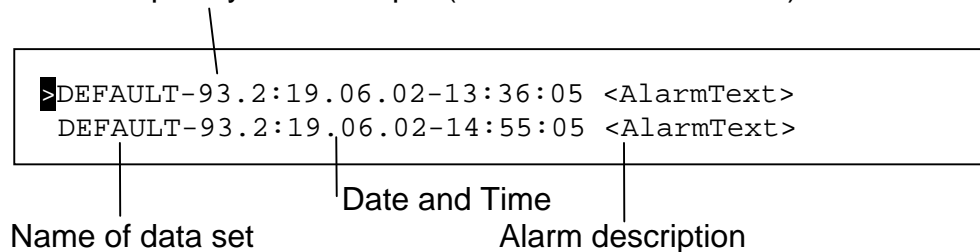
### Main menu>[Alarm]

This menu shows max. 50 of the latest alarm messages as a scrollable list. Each message may be up to 80 characters long. The message is shown in two parts of 40 characters, which flip every 3 seconds between the parts after approximately 7 seconds of user inactivity.

All messages have a consecutive numbering. Each message begins with an identifier (Default, DS01 etc.) to indicate the corresponding data set. This is followed by the tuned frequency of the dataset or the source of the MPX signal (only for default data set), followed by the date and time as taken from the real-time clock (the RTC can be synchronized to the CT of an RDS signal - see menu CT on page 14).

The alarm text itself describes the alarm event. This menu is for indication only; changes of the alarm configurations can be done with the A20Config software.

Tuner frequency or MPX input (MPX-Front / MPX-Rear)



Definable alarm actions are:

- Send email via the network
- Activate one of 8 separate relay contacts
- Generate serial alarm message on port [DTE1]
- Send SNMP trap via the TCP/IP network

An alarm stops only if the rescinding condition has ended the alarm.

Example:

It has been defined, that the TA bit must not be active for a duration > 100 sec. If the time interval of 100 sec. is exceeded e.g. the following email or DTE alarm message is generated:

```
DEFAULT-93.2:08.06.06-07:00:12 TA longer than 100s active
```

If the TA bit is inactive again, the alarm will be ended by sending a corresponding message (email or DTE):

```
DEFAULT-93.2: 08.06.06-07:08:20 TA END
```

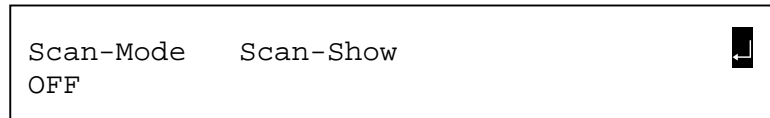
Note:

An alarm may not end immediately if the A20 is in scan mode operation. This happens if the A20 switches to the next dataset, before the alarm condition ends. In such a case, the alarm will not clear until its dataset is selected again after the alarm condition has ended. If a new alarm configuration is sent with A20Config, the alarms are reset instantly.

## Menu [Scan] - Activation / Display of scan mode configuration

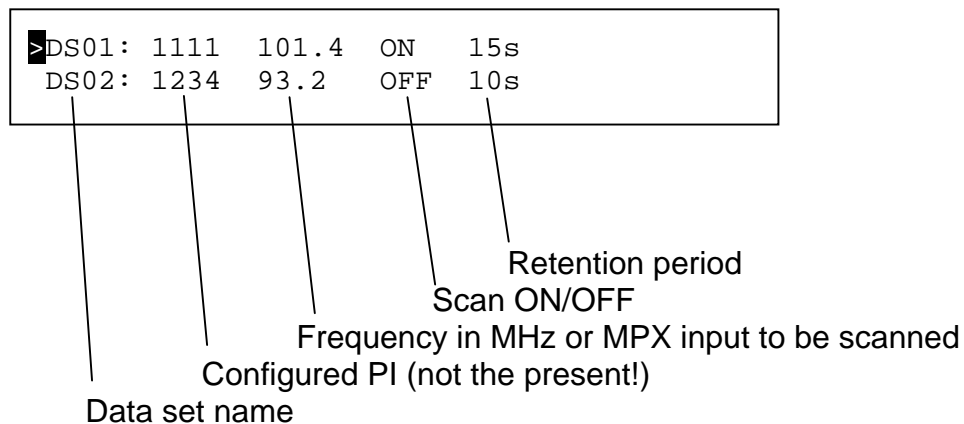
### Main menu>[Scan]

The scan mode of the A20 enables the user to monitor up to 8 different datasets (frequencies and/or MPX inputs) in rotation with an individual time interval.



The menu entry [Scan-Mode] is for turning the function [ON] and [OFF].

The menu entry [Scan-Show] shows the fundamental scan parameters as a list. The list can be scrolled by turning the jogwheel. The scan- and monitoring configuration can be setup with the PC software A20config only.



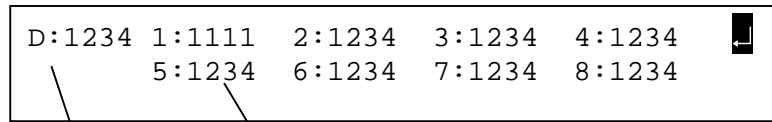
The menu shows the fundamental scan parameters: Each dataset with its individual number (Def for the default data set, DS1 for data set 1, DS2 for data set 2 etc.), the configured PI, the corresponding frequency or MPX input, the indication if the data set will be scanned (ON) or not (OFF), and the listen time before switching to the next data set.

Notes: The tuner frequency and the MPX source cannot be changed and the automatic attenuation cannot be activated if the scan mode is active (selection of attenuation for the individual monitoring datasets via A20Config). For indication, the "Status"-LED is lit during activated scan mode.

## Menu [Control] - Monitoring data sets

### Main menu>[Control]

The menu contains the monitoring parameters of each individual scan data set. At first a selection menu with all 8+1 data sets is shown.



Configured PI  
Data set number (D=DEFAULT or DS01-DS08)

Each data set can be highlighted and selected. The details of a data set are shown after selection of the data set. The details are displayed as a scrollable list.

```
* DS01      (PIhex) *
RDS-Level   600 mVpp 10      (10 means a tolerance of +/- 10mVpp)
RF-Level    60 dBuV 10
PI          xxxx
PS          12345678
TP          0/1
TA          xxx s
No TA       xxxx s
Block Err   > xx% xx s
CTRL GR
TMC         xxxx s
ODA         xxxx s
No SYNC     xxxx s
Audio L/R   xxx kHz xx s
```

An alarm action can be assigned to each parameter. This action is executed if an alarm occurs. Selectable alarm actions are:

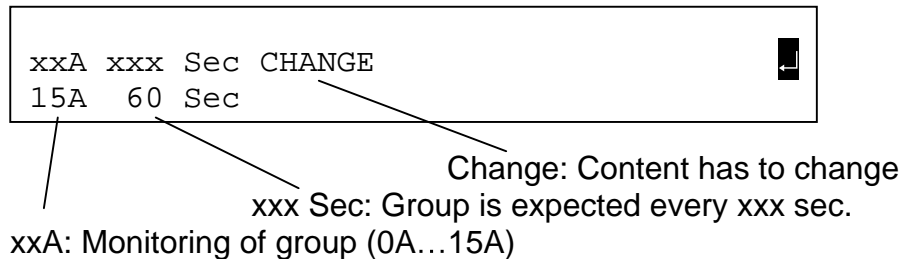
- Email: Sending email to predefined address
- DTE: Serial RS-232C text output on port [DTE1]
- SNMP: Sending message (trap) to predefined SNMP host
- Relay: Activating a relay
- Combinations:  
Email+DTE; Email+Relay; DTE+Relay; SNMP+DTE, SNMP+Email; SNMP+Relay.

Configuration of the monitoring / alarms and the email address can be done via A20Config software.

## Menu [CTRL GR] - Display of group monitoring

### Main menu>[CTRL GR]

The menu shows the group monitoring parameters of each individual scan data set. At first a selection menu with all 8+1 data sets is shown. Each data set can be highlighted and selected. The details of a data set are shown after the selection of the data set. The details are displayed as a scrollable list.



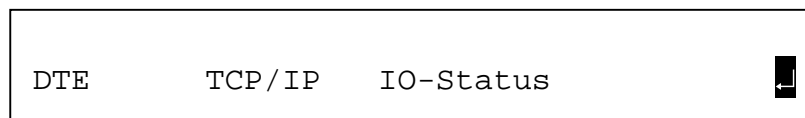
This scrollable menu is for indication only. Individual parameters can be configured via the A20Config software.

Eight different groups per data set can be monitored. A time delay interval can be defined for each group. This time delay determines the delay before generating an alarm if the specified group is missing. The selectable alarm type is valid for all 8 groups.

## Menu [Interface] - TCP/IP and RS-232C interface configuration

### Main menu>[Interface]

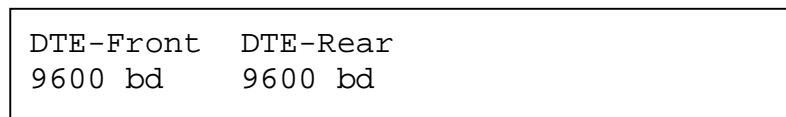
This menu shows a selection for the serial ports [DTE], the [TCP/IP] ports and the relay outputs / opto-isolated inputs [IO-Status].



### Menu [DTE]

#### Main menu>[Interface]>[DTE]

This menu shows the configuration of the serial RS-232C ports. The configuration is 9600 baud, 8 data bits, 1 stop bit and no parity (9600/8/N/1), and cannot be changed.



## Menu [TCP/IP]

### Main menu>[Interface]>[TCP/IP]



This menu shows the configuration of the TCP/IP interface. The following data can be displayed / configured.

The following parameters are displayed or can be configured:

[IP-Address]	Individual address that is necessary to identify a hardware in an IP network like the internet or intranet.	
[Hostname]	Instrument name. This name is used as a part of the originators email-address in emails sent by the A20 monitoring function.	Configurable via A20Config.
[Email]	Destination address of the emails, generated by the A20 monitoring function.	
[Mailserver IP]	Address of the email server that is used for sending emails.	
[Gateway]	Address of the local system that is used for the internet access.	
[Subnet Mask]	Bit mask, which separates an IP address into a network part and a host part.	
[SNMP-Server IP 1]	Address of the system that should receive the SNMP traps of the instrument.	
[SNMP-Server IP 2]	Address of an additional system that should receive the SNMP traps of the instrument. Can be deactivated by setting the address to 0.0.0.0	
[SNTP-Server IP]	Address of an NTP-Timeserver for synchronizing the internal realtime-clock.	
[A20Config Port]	Address of the port that is used for the A20Config software.	
[MP3 Port]	Address of the port that is used for MP3 streaming.	
[Decoder Port]	Address of the port that is used for the RDS Softdecoder.	

The necessary address settings above do depend on the individual network and should be assigned by a responsible network administrator.

The settings of this menu can be configured as follows:

Use the [jogwheel] to highlight an address type. To do this rotate the [jogwheel] left and push it one time for editing. The address part to be edited is then marked by the symbols  and . Rotate the [jogwheel] to edit the first part of the address. Push the [jogwheel] one time and edit the second part of the address as described before. Continue until the last of the four parts of the address is edited. After the last edited part has been confirmed by a single push on the [jogwheel] it is possible to navigate in the TCP/IP menu again.



### Menu [IO-Status] - Display of relay and opto isolated input state

#### Main menu>[Interface]>[IO-Status]

This menu shows the present status of the relay and the opto-isolated inputs. A “1” indicates an active relay or opto-isolated input, a “0” indicates the inactive state. It is possible to assign functions to the relay and the opto-isolated input by using the PC software A20Config. Please see page 30 in the section “interfaces” and the A20Config manual.

Relay	1:0	2:0	3:0	4:0	5:0	6:0	7:0	8:0
Opto	1:0	2:0	3:0	4:0	5:0	6:0	7:0	8:0

State of the relay or opto-isolated input  
Number of the relay contact or opto-isolated input contact

### Menu [Memory] - Display of PI, PS, Frequency / MPX input of the data sets

#### Main menu>[Memory]

This menu shows the latest received PI, PS and the corresponding frequency or MPX input for the default dataset and the other 8 data sets. The data remains even after loss of signal.

>	Def	: PI=D382	PS= NDR	2	93.2
	DS01	: PI=D3E8	PS= RSH		101.4


Name of scan data set  
Latest received PI  
Latest received PS  
Tuning-Frequency in MHz or MPX input

### Menu [Settings] - Frequency Deviation Reference Level / Volume / Versions

#### Main menu>[Settings]

This menu shows a selection: [Volume] for the dynamic range of the MP3 signal / headphone volume and [Info] for the display of the hardware / firmware versions.

Additionally the menu enables to adjust the practical transmitter frequency deviation, that corresponds to a modulation signal level of 6 dBu. This is for the correct display of the estimated transmitter frequency deviation.

Reference level	Volume	Info	
40 kHz = 6.0 dBu			

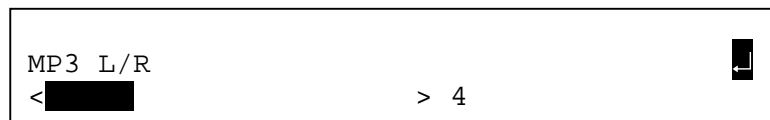
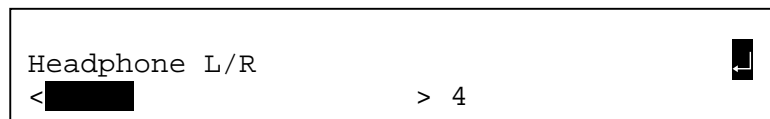
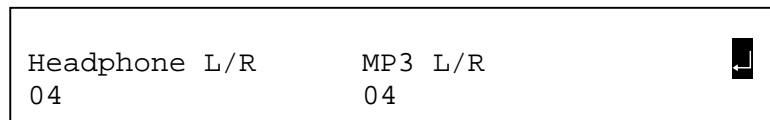
## Menu [Volume] - MP3 dynamic range / Headphone volume

### Main menu>[Settings]>[Volume]

[Headphone L/R] is for adjusting the volume of the headphone signal. [MP3 L/R] is for adjusting the dynamic range of the MP3 signal. This means to adjust the maximum volume, available at the MP3-player.

The adjustments should be done carefully to avoid signal clipping!

Adjustments can be done by rotating the jogwheel. During adjustment the setting is indicated by the numerical value and a bar, whose length corresponds to the adjustment level. In the overview both adjustments are shown as numerical value as they are stored in the EEPROM (non-volatile).



## Menu [Info] - Version display

### Main menu>[Settings]>[Info]



Several different Versions are shown:

- A20 FW: Instrument firmware version
- NetPC FW: TCP/IP module firmware version
- DSP FW: DSP firmware version
- DSP HW: DSP hardware version

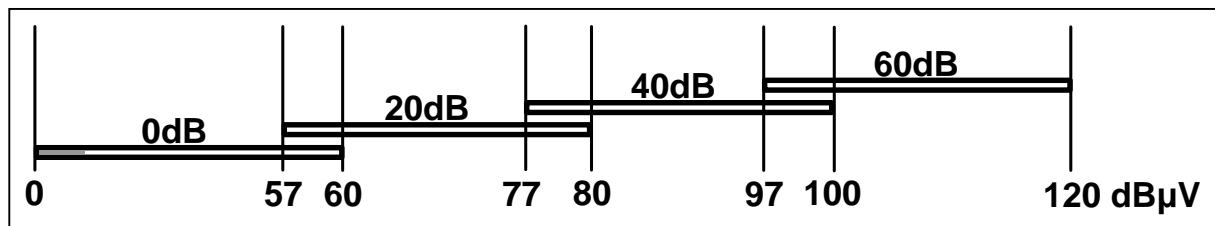
## 8. RF measurement ranges

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### Automatic / Manual RF attenuator selection

The maximum signal level at the RF input without attenuation is 120 dB $\mu$ V. A precise measurement can be done on a level up to 60 dB $\mu$ V. The A20 provides internal attenuators for measurements up to 120 dB $\mu$ V. The displayed RF level is corrected to compensate the selected attenuation.

The attenuators can be selected automatically or manually. The automatic attenuation activates the required attenuator depending on the RF input level. For the scan mode it is possible to select an individual attenuation for each monitoring dataset - the automatic attenuation cannot be activated if the scan mode is activated.



The diagram above shows how the automatic activates the RF attenuators depending on the RF input level. Manual attenuation selection should be done in a similar way, to keep the RF level in the upper part of a sub-range.

With the attenuators, the total measurement range is 20...120 dB $\mu$ V.

Automatic attenuation selection:

In tuner mode, the "RF"-LED is activated if the level at the RF input is outside the range of 20...120 dB $\mu$ V.

Manual attenuation selection:

In tuner mode, the "RF"-LED is activated if the level at the RF input minus the selected attenuation value is outside the range of 20...60 dB $\mu$ V.

## 9. Interfaces

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The A20 has several interfaces for communication and the input and output of signals.

### RS-232C serial interfaces

Note: A null modem cable is necessary to connect the A20 to a computer via RS-232C.

#### Front interface [RS-232]

9 pole SUB-D connector for RS-232C communication. Used to connect to a PC which has the supplied A20Config software installed. The protocol is UECP (EBU-SPB 490, UECP version 5.1). The interface parameters are fixed on 9600 baud, 8 data bits, 1 stop bit and no parity (9600/8/N/1).

#### Rear interface [DTE1]

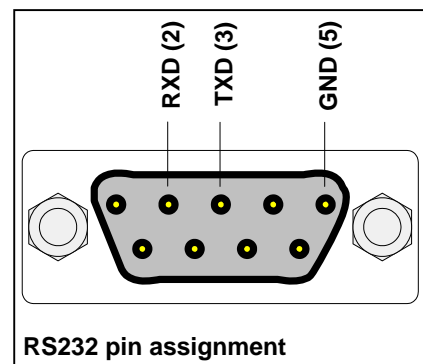
9 pole SUB-D connector for RS-232C communication or the output of serial alarm messages of the monitoring function. Same parameters as the front interface.

#### [Service]

9 pole SUB-D connector for servicing purposes only. No communication to the A20 or configuration possible.

#### Pin assignment

The pin assignments of the serial RS-232C ports are shown at the right side. No hardware handshake available on all serial ports.



### TCP/IP network interface

The A20 has a 10 / 100 MBit TCP/IP interface [10/100-Base-T]. A proper RJ-45 patch cable can be used to connect the instrument to your network.

## MP3 - Audio transmission as MP3 data stream

The same audio signals which are available at the headphone connector can be sent as an MP3 stream over the TCP/IP network.\* So it is possible to receive the received audio signal for one station or the scanned list at another site over your local network or the Internet. The stream can be received with typical MP3 player software such as Winamp or iTunes.

The MP3 streaming function can be started and configured via the A20Config software. There it is possible to scale the data rate and the audio quality according to the available network bandwidth.

Note: The generated MP3 data stream format (ICY) is not supported by the Windows Media Player (tested with V10.00.00.3802). Please use software like e.g. Winamp or iTunes, which support the format.

\* Function is only available on instruments with integrated MP3 option.

## BNC Connectors

The instrument has one BNC connector on the front side and four BNC connectors on the rear side.

Note: Only one of the RF/MPX inputs can be active at a time.

### Front side

[MPX Input]

For external MPX/baseband signal.

### Rear side

[MPX Input]

For external MPX/baseband signal.

[RF Input]

RF antenna signal for the internal tuner.

Caution: The maximum allowable level at this input is 120 dB $\mu$ V. Measurements are possible with levels up to 120 dB $\mu$ V (with activated 60 dB attenuator) or up to 60 dB $\mu$ V (without attenuation).

[Audio Input L] and [Audio Input R]

These connectors can be used to input an external audio signal (left and right channel). The signal level can be measured and the signal can be switched to the headphone connector. If the option MP3 is installed, the signal can also be used to generate an MP3 stream via TCP/IP (configurable via A20Config).

## Opto-isolated inputs / Relay connectors

[Optical Coupler Input]

Caution: Never apply a voltage that is negative or exceeds +24V!

The instrument has 8 floating opto-isolated inputs. It is possible to assign specific functions to the individual opto-isolated inputs by using the PC software A20Config. Possible functions are:

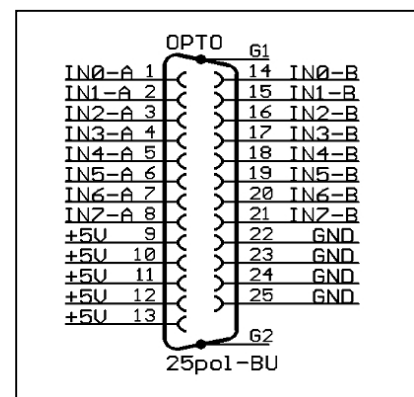
- Email: Sends a message to predefined email address
- DTE: Outputs a serial RS-232C text message on port [DTE1]
- Relay x: Activates an integrated relay
- SNMP: Sends a trap message to predefined SNMP host
- DSx: Activates a monitoring dataset
- Combinations:
  - Email+DTE; Email+Relay x; DTE+Relay x; SNMP+DTE; SNMP+Email; SNMP+Relay x
- None No function assigned

Example: This makes it possible to switch to monitoring dataset 1 by activating opto-isolated input 1 and to switch to monitoring dataset 2 by activating opto-isolated input 2.

Notes: No opto-isolated input functions are executed if the scan mode is activated. The activation of an opto-isolated input resets the functions that are activated by other active opto-isolated input. Active messages are not ended by switching to another dataset.

The present state of these inputs can be displayed via the LCD or the PC software A20Config. A voltage of at least +5V DC is necessary to drive the inputs. The connector provides a supply of +5V DC, so switch to ground or floating drive configurations are possible.

The following table shows the individual opto-isolated input with their pin numbers.



	Opto 0	Opto 1	Opto 2	Opto 3	Opto 4	Opto 5	Opto 6	Opto 7
Pin A	1	2	3	4	5	6	7	8
Pin B	14	15	16	17	18	19	20	21

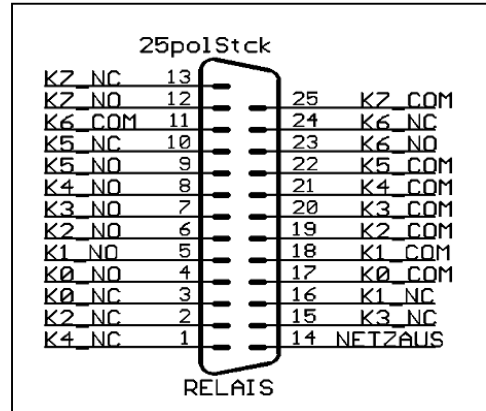
[Relay Output]

Caution: The relay contacts have a maximum rating of 0.5A at 125V AC / 60V DC. The maximum peak current is 1A!

25 pole Sub-D male connector on the rear side of the instrument. All contacts of the 8 floating SPDT are accessible. Several functions can be assigned to the relay via the A20Config software.

Pin 14 provides +5V DC (fused, 100 mA) which can be used for an operation indicator etc.

The following table shows the individual relay designator with the corresponding pin numbers.



	K0	K1	K2	K3	K4	K5	K6	K7
NC	3	16	2	15	1	10	24	13
NO	4	5	6	7	8	9	23	12
COM	17	18	19	20	21	22	11	25

**Headphone connector**

The instrument has a 6.3 mm (1/4") stereo female connector for the output of audio signals. The type of signal (raw MPX, decoded MPX, and external MPX) can be selected via the A20Config software. The signal level can be adjusted at the instrument (via menu) or via the A20Config software.

## **10.Maintenance & Servicing**

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### **Maintenance**

No special maintenance is necessary on the instrument. Dust can be removed by a dry duster. For cleaning use only neutral, non-corrosive detergents applied to a cloth - not the instrument.

### **Servicing**

The modules of the instrument are complex, and should be serviced only by authorized personnel.

The 2wcom GmbH is equipped with special measurement and repair kits. Therefore a repair by the user is not intended.

### **Calibration**

Due to the design and construction of the instrument, no calibration is necessary.



## 11. Troubleshooting

The following chart is designed to help you to correct minor problems with the use of the instrument prior to contact our service department (report failures by email or fax). Also be sure to read the entire manual carefully, as this often helps in understanding and fixing problems.

<b>Problem</b>	<b>Possible Cause</b>	<b>Solution</b>	<b>Ref.</b>
Power does not come on	<ul style="list-style-type: none"> <li>• Power cable is improperly connected</li> <li>• Mains supply failure</li> <li>• Blown fuse</li> </ul>	<ul style="list-style-type: none"> <li>• Check supply cord</li> <li>• Check mains supply</li> <li>• Replace fuse by same type</li> </ul>	
Instrument does not work	<ul style="list-style-type: none"> <li>• System halted</li> </ul>	<ul style="list-style-type: none"> <li>• Disconnect and reconnect the instrument from/to mains supply</li> </ul>	
Instrument shows false measurement results	<ul style="list-style-type: none"> <li>• Wrong signal source selected</li> <li>• Wrong tuner frequency</li> <li>• RF signal level outside the measurement range</li> </ul>	<ul style="list-style-type: none"> <li>• Select correct input</li> <li>• Tune to correct tuner frequency</li> <li>• Activate / Deactivate internal attenuators or adjust level</li> </ul>	Page 13 Page 13 Page 19, 27
Signal source cannot be changed or switches back automatically.	<ul style="list-style-type: none"> <li>• Scan mode activated</li> </ul>	<ul style="list-style-type: none"> <li>• Deactivate scan mode if a single frequency or MPX signal should be monitored.</li> </ul>	Page 21
Instrument does not communicate via RS232C to connected units	<ul style="list-style-type: none"> <li>• Data cable not properly connected</li> <li>• Wrong cable type</li> <li>• Wrong COM port of the PC selected</li> </ul>	<ul style="list-style-type: none"> <li>• Check connections</li> <li>• Use correct cable type (null modem cable)</li> <li>• Select the correct COM port in A20Config software</li> </ul>	
TCP/IP communication does not work	<ul style="list-style-type: none"> <li>• TCP/IP settings (IP-address, Netmask, Gateway) wrong</li> <li>• Network does not work at all.</li> <li>• Computer Network settings not correct</li> <li>• Firewall blocks used A20 ports</li> </ul>	<ul style="list-style-type: none"> <li>• Check TCP/IP settings</li> <li>• Check network</li> <li>• Check settings</li> <li>• Check firewall configuration</li> </ul>	Page 24
Relay output is not actuated as desired	<ul style="list-style-type: none"> <li>• Programming of the relay function is not correct</li> </ul>	<ul style="list-style-type: none"> <li>• Check programming of the relay function, configure via A20Config software if necessary</li> </ul>	
Opto-isolated input activation does not activate the desired function	<ul style="list-style-type: none"> <li>• Incorrect opto-isolated input function assignment</li> </ul>	<ul style="list-style-type: none"> <li>• Check the assigned opto-isolated functions and modify by using A20Config software if necessary.</li> </ul>	
Instrument does not activate configured monitoring action.	<ul style="list-style-type: none"> <li>• An alarm has been triggered and is still active.</li> </ul>	<ul style="list-style-type: none"> <li>• An alarm has to be ended by returning to in limit condition.</li> </ul>	

## 12. Specifications

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### Measurement ranges:

Pilot tone	100 mVpp ... 1500 mVpp
RDS level	25 mVpp ... 2500 mVpp
RDS phase	0° ... 180°
HF level	20 dB $\mu$ V ... 120 dB $\mu$ V (levels >60 dB $\mu$ V with activated 20, 40 or 60 dB attenuator)

additionally for A20-FM:

Audio deviation 0.2 kHz ... 100 kHz

additionally to all functions above for  
A20-MPX+Peak:

MPX deviation 0.2 kHz ... 100 kHz

MPX power -40dBr ... +12 dBr

### Inputs:

MPX (front and rear) input impedance > 10 k $\Omega$   
BNC connector  
max. MPX level: 15 dBu ( $\triangleq$  approx. 112 kHz dev.)

Audio L / R input impedance > 10 k $\Omega$   
BNC connector  
max. Audio level: 15 dBu ( $\triangleq$  approx. 112 kHz dev.)

RF Input Impedance 50  $\Omega$   
BNC connector  
max. RF level: 120 dB $\mu$ V

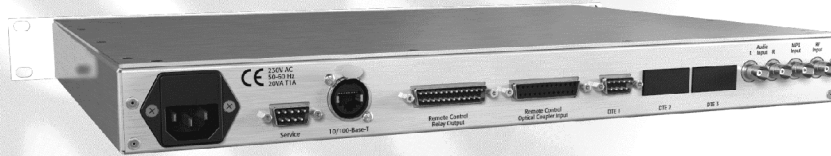
### Outputs:

Headphone Output impedance < 10  $\Omega$   
6,3 mm connector  
max. audio- or MPX level 15 dBu ( $\triangleq$  approx. 112 kHz dev.)

MP3-Interface (only with MP3 option)

MP3-Stream  
RJ45 Network link  
MPEG 2 Layer 3

MPEG 2: 24 / 22,05 / 16 kHz  
MPEG coding quality adjustable in three steps  
Variable bit rate coding with up to 192 kBit/s



## A20 FM Monitoring Decoder - Technical Details

<b>MPX Signal input</b>	Selection from RF (internal FM tuner) input or external signal	<b>Alarm functions</b>	Controlling the data	RDS level, RF level, PI, PS, TP change, TA length, TA toggle control, block error level
Connector	BNC unbalanced, 1 x rear, 1 x front		Controls the content of a certain group	A certain group type has to be received within x sec. and the content has to change
Impedance	> 10 kΩ		Alarm types	serial interface, potential free relay contact, E-mail, SNMP
<b>RF Input / FM tuner</b>			Alarm report	can be read out via serial port or TCP/IP
Tuner	PLL synchronised, 50 Ω	<b>Scan mode</b>	Frequencies	8
Input range	20...120 dBμV (>60 dBμV with switchable attenuators)		Switch over time	The switch over time can be defined individually for each frequency
Switchable attenuators	20 dB, 40 dB and 60 dB		Control functions	Each frequency can be controlled according to all above mentioned functions
Connector	BNC, 1 x rear	<b>General Data</b>	Power consumption	20 VA
<b>Front panel</b>			Case dimensions	19", 1 HU, depth: 310 mm width: 424 mm front panel: 484 mm
LCDisplay	2 x 40 characters		Weight	2 kg
Jog wheel	impulse, ENTER button		Housing	aluminium chromated
8 LED's	Power, RF, Audio, Data, Warning, Status, Limit, Sync		Rated temperature range	+ 5°C...+ 45°C
<b>Headphone</b>			Operating temperature range	0°C...+ 50°C
Connector	6.3 mm		Storage temperature range	- 40°C...70°C
Impedance	< 10 Ω		Power supply	internal 230 V (± 10%), 50 Hz or 115 V (± 10%), 60 Hz
<b>Interfaces</b>		<b>Optional features:</b>	<b>MP3-Encoder -</b>	MPEG 1/2 Layer 3 encoder
<b>Remote control input</b>	8 opto isolated inputs		<b>Transmission of encoded</b>	Adjustable MPEG Encoder quality in 7 steps
Connector	25 pole sub-D female		<b>MP3 data by TCP/IP</b>	Adjustable sample rates for latest Live-Stream-Technology
<b>Remote control output (messages)</b>	8 relay contacts potential free (for DC: max. 60V, 0.5A)			Reception of Audio-Live-Stream by Windows Media Players like WinAmp or iTunes.
Connector	25 pole sub-D male			from tuner
<b>Data interfaces</b>	For input and output of setup parameters and RDS data type			2 additional BNC connectors (left, right) and 1 additional BNC connector (MPX input)
Connector	2 x RS-232C, 9 pole sub-D male			Version: 16.08.2006
Location	1 x front, 1 x rear			These data are subject to modifications and amendments.
Transmission rate	9600 baud, asynchronous			Errors excepted
Data format	UECP (Universal Encoder Communication Protocol)			
<b>TCP/IP data interfaces</b>	For RDS data, measurement values, logs and setup functions (rear)			
Type	full duplex 10 / 100 BASE -T			
Connector	Neutrik Ethercon / RJ 45			
<b>RDS Measurement</b>				
RDS level	Measurement of RDS-Level (error < 3 %)			
RDS level	25...2500 mVpp			
RDS phase	measurement resolution ± 2 degrees			
RDS decoder	PI, PS, TA, TP, PTY, MS, CT, RT, Group sequence, Content of all group types			
RF level	20...120 dBμV (> 60 dBμV with switchable attenuators)			
<b>FM Measurement (only with option FM)</b>				
Audio	Separate measuring of Audio-Deviation (L+R) error < 3 % Peak level measurement Failure monitoring (L, R, RF, Pilot) Additional L, R connector at the rear side for external audio signal			
MPX (only with option MPX)	MPX deviation and power measurement, BS.412-9 compliant			

Sales Representative