2Wcom
Wireless-World-Communication

A20 / A20T

FM Monitoring Decoder

User Manual

November 2017

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1. Symbols in this manual

1.1. References and Hyperlinks in this PDF File

The original text document of this manual uses bookmarks for reference purposes. If you read this manual as a non-print version, please note that this PDF file also contains all bookmarks! So you can navigate through the document via the content overview in your PDF viewing software if you activate "bookmarks view".

All references to pages, sections, figures and tables as well as hyperlinks in the text identify a location within this PDF file. Just click the reference to find the referred passage in the text!

1.2. Warning signs and their meaning

The following warning signals are used in this user manual:

	Warning of general danger location
	Warning of electric shock
	Warning of hot surface
	Warning of fire hazard

1.3. Tags and their meaning

The following signal words are used in the product documentation in order to warn the reader about risks and dangers. The tags described here are always used only in connection with the related product documentation and the related product.

⚠ DANGER	Indicates a hazardous situation which, if not avoided, will result in death or serious injury.
⚠ WARNING	Indicates a hazardous situation which, if not avoided, could result in death or serious injury.
NOTICE	Describes precautions necessary to protect the equipment.
	**NOTE:** Useful information for the user.

2. Introduction

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 / Scan Function). This manual covers both versions under the term “A20”. As A20T provides no LCD / Jogwheel / Scan Function, all related descriptions are not applicable.

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

Three different A20 types and also options are available.

A20-RDS	• Analog measurement and monitoring of RF-level, RDS-level, and RDS-phase • RDS measurement and monitoring functions for PI, PS, TA, /TA, TP, all groups incl. their contents, ODA, TMC, RDS-synchronization and block error rate • Alarm reporting via: SNMP, E-Mail, serial ASCII text output (RS-232), activation of floating relay contacts • Local operation using Jogwheel in combination with a 2x40 character LCD • Remote operation by using the supplied remote control software for PC. • Floating opto-isolated inputs
A20-FM	All features of A20-RDS with additional audio measurement functions: • Measurement of the audio deviation, for the left and the right channel individually • Measurement of the pilot signal level • Monitoring function for audio deviation target interval with time delay
A20-MPX+Peak	• All features of A20-FM with additional MPX-deviation and -power measurements • Expanded remote control software enables long-term measurements of the MPX peak deviation and the MPX modulation power (monitoring, log file)

MP3 Option	• 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 internet
SPS Option	• Monitoring the PS to change periodically if SPS (Scrolling PS) is used. This function can be configured with the remote control software

NOTE: Read this user manual carefully before attempting to operate the unit.
Save this user manual for future reference – it contains important safety and operating instructions for the device.

NOTE: The model as shown on the cover may differ from the supplied model.
Configurations, functions and specifications are subject to change without notice.

3. Safety Instructions

For a secure operation of the device the user should read and hold on all safety instructions mentioned in this manual before the first operation.

⚠ WARNING	Non-compliance with the safety instructions can lead to serious injury.

Any changes on the device or operation of the parts not having been proved and released by the manufacturer can lead to unforeseen damage.

Every improper use of the device and all actions on the device not mentioned in this user manual are regarded as a not allowed misuse outside the statutory limits for liability of the manufacturer.

If you sell the device or give it to another person, attach this user manual to the device.

Never operate the device, if it does not function properly. If the device or its part is out of order, put it out of operation. Never repair the device by yourself. If there are any damages in the device, send it immediately to 2wcom Systems for maintenance or dispose it professionally according to the regional disposal regulations.

Keep the device away from unauthorized persons.

⚠ DANGER	
	**DANGER of electric shock** Plug the device into a grounded power socket only. Never remove the grounding wire/contact. Never open the housing of the device by yourself. Never touch open electrical parts. Dangerously high voltages are present inside the housing. Even after disconnecting the mains supply, dangerously high voltage levels may be present for a certain time. Do not touch the device with wet hands. Never expose the device to liquids. If any liquid comes inside the housing, immediately disconnect the device completely from the power supply. Do not continue operating the device.
	**FIRE HAZARD of overheating or electric shock**

	Ensure sufficient heat dissipation during operation. Avoid following when installing the device: – non-ventilated environment, for example a narrow shelve or built-in rack; – extremely warm or cold place; – direct sunlight exposure; – too high or too low temperature; – extremely wet or dusty environment. Do not operate the device in the presence of flammable gases. Do not cover the ventilation openings of the device to avoid heat accumulation. Do not put objects with open flames such as burning candles on the device. Do not put heavy objects on the supply cord. A damaged cord can lead to fire or electric shock hazards. To disconnect the supply cord, drag always the plug and never the cable to avoid the cord damage.

⚠ WARNING	
	**WARNING of explosive atmosphere** Risk of the explosion hazard. Do **not** use the device in an explosive environment.
	**WARNING of hot surface** The surface of the device can heat up during operation. The device is equipped with a passive cooling system. Do not touch the surface of the device during operation.

NOTICE	
	CAUTION: Risk of equipment damage *Before the first operation:*

	Check the housing, the front panel, the supply cord and the plug for visible damage (e.g. scratches, cracks, damaged isolation and abrasion) In case of damage, unplug immediately the supply cord. Never operate device with a damaged supply cord. All damaged components must be replaced immediately. *Installation:* Use only a grounded three-wire power supply cord and -plug that complies with the national regulations. If necessary, another than the supplied supply cord has to be used, in compliance with the regulations of the country where the device is operated. Make sure that the AC power outlet is next to the device and readily accessible to the user. *Installation of other devices:* External devices which are connected to the device could be damaged by the device or damage the device itself if the output levels exceed the specified limits. *Cleaning:* Do not use corrosive detergents on the device such as benzine, thinner, alcohol or acetone. Clean the surface of the device only with a soft dry cloth.

4. Supplied Parts

- A20 FM Monitoring Decoder or A20T FM Monitor Decoder
- Power supply cord*
- RS-232 null modem cable (2x 9 pin D-SUB female connector)
- RJ45-patchcable (optional)
- BNC connection cable
- PC Software to download (RDS Lab optional)
- User manual in PDF format to download; on request by paper

*available for different countries

NOTE: The scope of delivery may deviate in special cases.

5. Manufacturer

2wcom Systems GmbH • Am Sophienhof 8 • 24941 Flensburg • Germany

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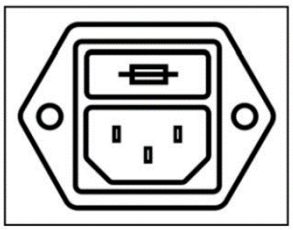
6. Installation

Best setup location

The device 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 indicators on the device and ensure a sufficient heat dissipation of the device.

Mains supply connection



The device is designed for operation with 100 to 240 V AC, 50 to 60 Hz. Check the corresponding device labeling for compatibility to the domestic line voltage and frequency before connecting the IEC power connector to the mains supply!

No power switch is available; unplug mains supply connector to remove power. Keep the mains supply plug readily accessible to the user.

⚠ WARNING

WARNING

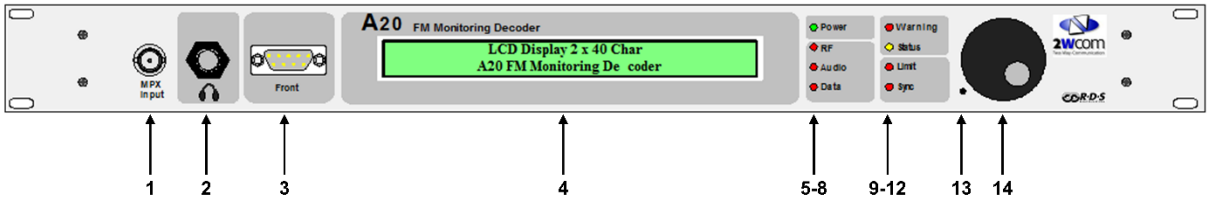
Disconnect mains power plug before you open the housing.

Repair of the equipment must only be carried out by authorized and qualified personnel.

Read also Section „Safety Instructions”.

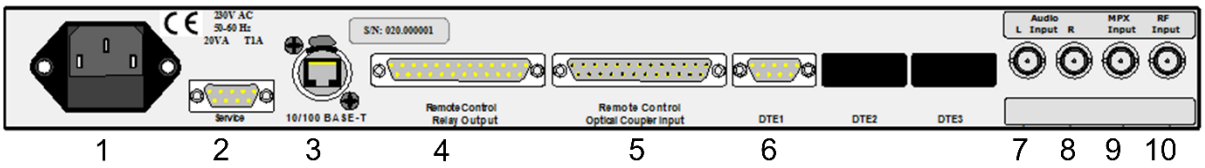
7.Control elements and connectors

7.1. Front Panel



1	[MPX Input]	BNC connector; Input for an external MPX signal (Front MPX input).
2	Headphone connector [Headphones]	6.3 mm connector (1/4”); Output of a selectable audio signal for testing purposes.
3	[Front]	9 pole D-SUB male connector; Serial RS-232 communication with the remote control software.
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 dBµV or above 60 dBµV. 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]	LED indicator (red); Flashes during a firmware update of the integrated TCP/IP module.
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

7.2. Rear side



1	Power supply connector	Standardized supply connector with integrated fuse holder (1A T 250V, 5x20 mm, 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 D-SUB male connector is used to gain access to the floating relay contacts. It is possible to assign functions via the remote control software.
5	[Opto-isolated Inputs]	25-pole D-SUB female connector is used to gain access to the floating opto-isolated inputs. It is possible to assign functions via the remote control software. These functions are executed if the corresponding input is activated. Their states can be viewed via a status menu.
6	[DTE1]	9 pole D-SUB male connector; Serial RS-232 communication with the remote control software or the output of ASCII 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.

8.Operation

8.1. A20T - Operation differences to A20

LCD, jogwheel, and scan-function descriptions are not applicable for A20T. For operation please use the remote control software.

8.2. 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 FM frequency deviation.
kHz	Unit for assumed transmitter FM frequency deviation.
dBu	Unit for a logarithmic signal voltage ratio in reference to 0.775 V.
dBµV	Unit for a logarithmic signal voltage ratio in reference to 1 µV.

For a correct display of the signal levels, it is possible to set the practical FM transmitter frequency deviation that is caused by a modulation level of 6 dBu (see page 30) .

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

8.3. Power on

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

8.4. Start message with version display

```
      A20 Vers. X.XX

    FM Monitoring Decoder
```

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.

8.5. 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.

8.6. 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

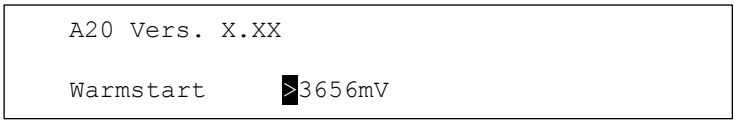
```
A20 Vers. X.XX

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.

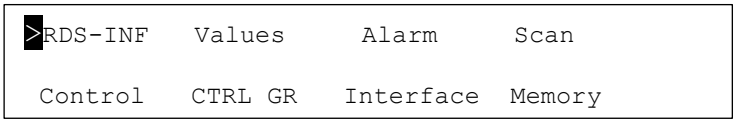


A push on the jogwheel exits the battery voltage indication.

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.

8.7. Main menu screen

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



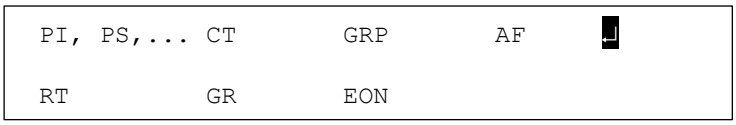
After the last menu button of the first main menu page has been highlighted by rotating the jogwheel right, the second screen is shown.

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

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

8.8. 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.



8.8.1. 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] is selected as source, the menu button [FRONT] or [REAR] needs to be highlighted and selected.

To adjust the tuner frequency if [FREQ] is selected as source, the menu button [XX.X] needs to be highlighted and selected. The frequency can be changed in steps of 50 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 remote control software.

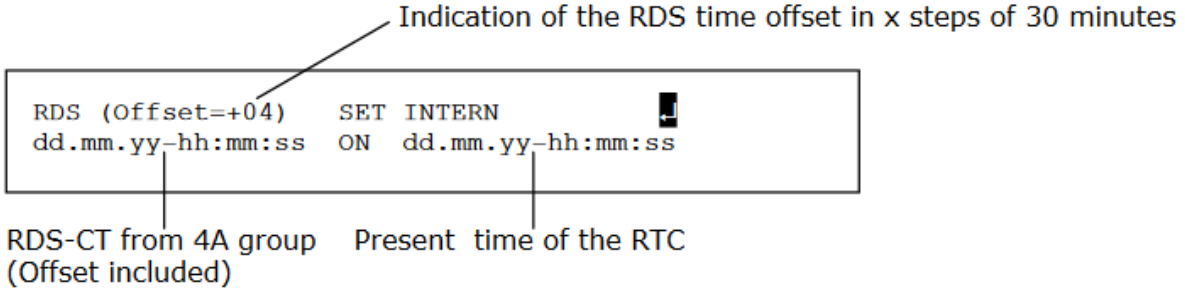
NOTE: Choose a proper measurement range for the correct measurement of RF-Signals. See also 'RF measurement ranges' on page 27.

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..

8.8.2. Submenu [CT] - RDS clock and internal real-time clock

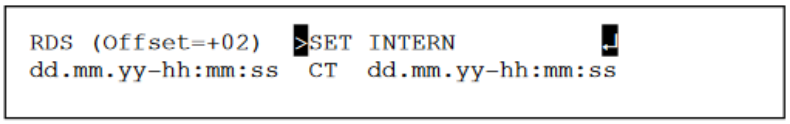
Main menu>[RDS-INF]>[CT]

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.



8.8.2.1. [SET]

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



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.

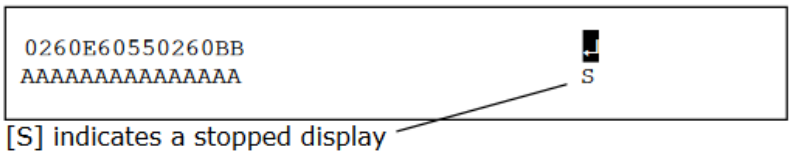
"RDS" shows the received RDS date and time.

"INTERN" shows the date and time of the internal real-time clock.

8.8.3. 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.

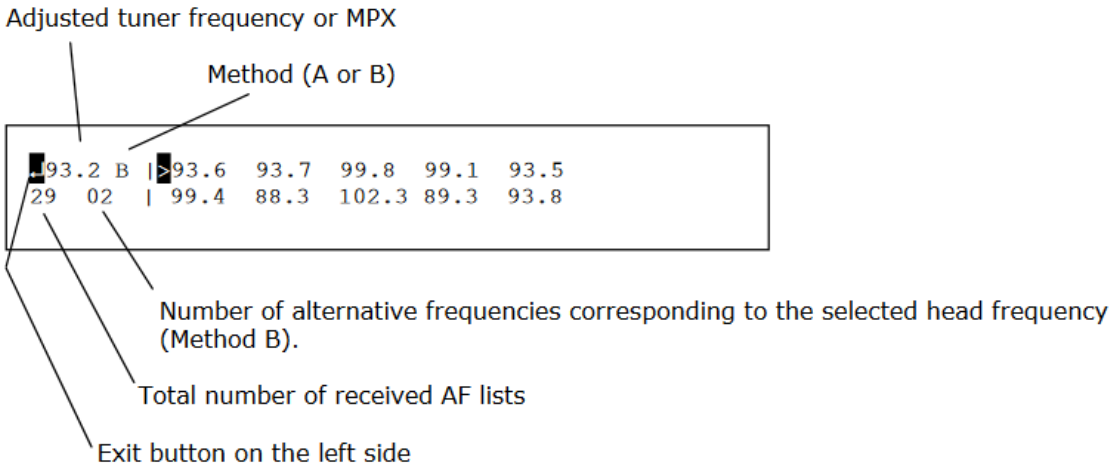


8.8.4. Submenu [AF] - Alternative frequencies

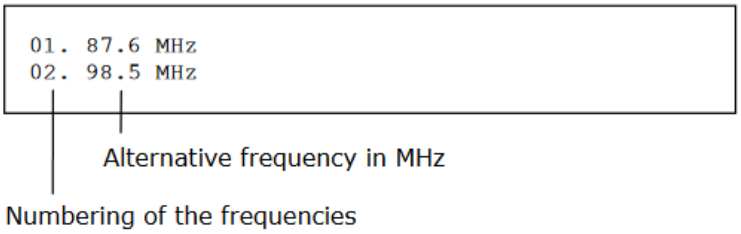
Main menu>[RDS-INF]>[AF]

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 entries, 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).



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



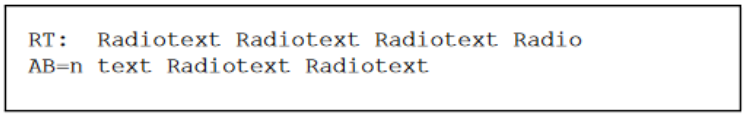
If the list contains more than two frequencies, the jogwheel can be used to scroll the list.

8.8.5. Submenu [RT] - Radio text

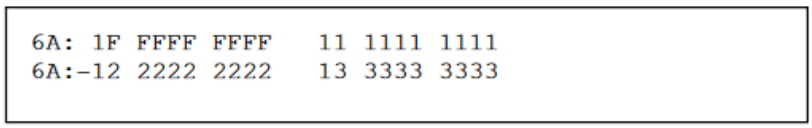
Main menu>[RDS-INF]>[RT]

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.



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

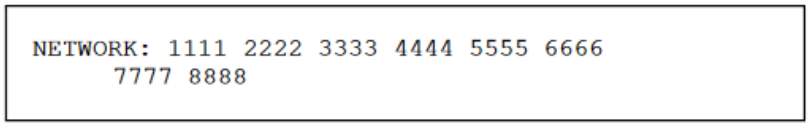


All group types can be chosen by rotating the jogwheel. The example above shows the group 6A. The 37 free bits of a group are displayed, 5 bits block 2, 16 bits block 3 and 16 bits block 4 (see RDS standard CENELEC/IEC). Here the data 1F.., 11..., 12..., 13... have been received. The display is continuously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

8.8.7. Submenu [EON] - EON data

Main menu>[RDS-INF]>[EON]

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

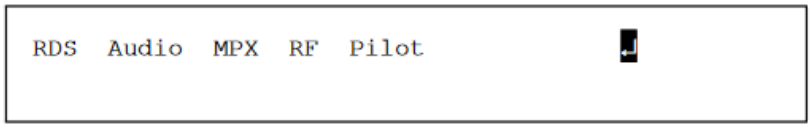


8.9. Menu [Values] - Measurement selection

Main menu>[Values]

Menu [Values] is for the selection of several measurements and shows:

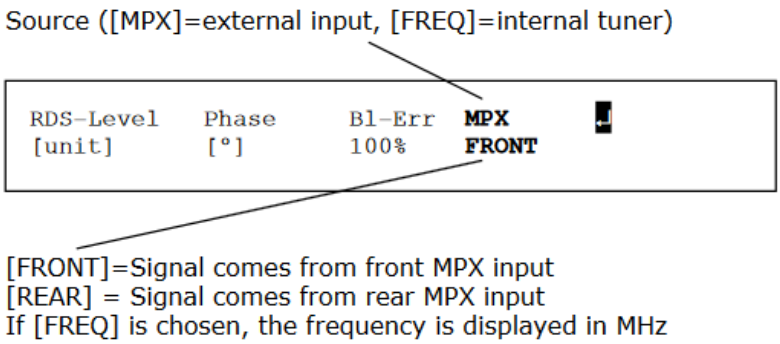
[Audio], [RDS], [MPX], [RF], [Pilot]



8.9.1. 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.



For details of the selection between external MPX and internal tuner see page 18.

8.9.2. [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.

8.9.3. 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.

8.9.4. [Bl-Err]

Main menu>[Values]>[RDS]

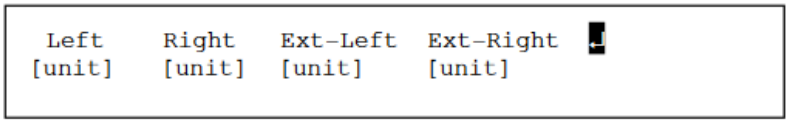
Shows the current RDS block error rate in %. The instrument executes a 2-bit error correction. Every block error is counted, including the recoverable errors. If the tuner frequency or signal source is changed (scan mode) the value starts at 100%.

8.9.5. 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

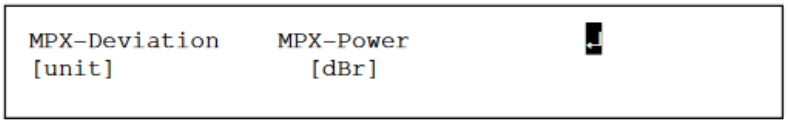
can be measured. If the active dataset is configured for monitoring the audio signal deviation during tuner operation, the LED "Audio" is lit if the signal is below the configured limit. The signals from the external audio inputs [Audio Input L] and [Audio Input R] can be measured simultaneously. These are shown at the right half of the display.



8.9.6. 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.*



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

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

Main menu>[Values]>[RF]

Measurement of the RF level. The measurement range is 20…60 dBµV.

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 [60dB]. Therefore levels up to 120 dBµV can be measured.

"RF-Level" shows the measured level in dBµV.

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 32 for details regarding the correct measurement ranges depending on the level to be measured.

8.9.8. Submenu [Pilot] - Pilot signal modulation level

Main menu>[Values]>[Pilot]

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

8.10. Menu [Alarm] - Alarm messages

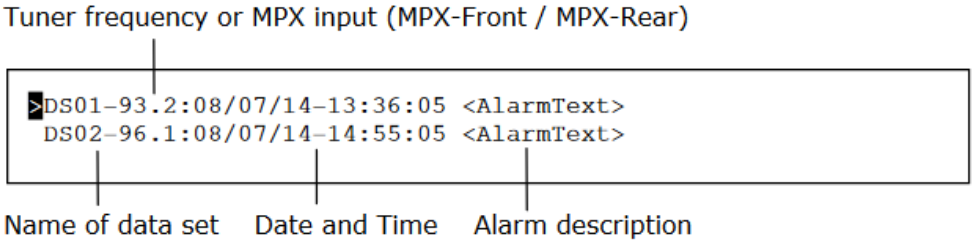
Main menu>[Alarm]

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 18).

The alarm text itself describes the alarm event. This menu is for indication only; changes of the alarm configurations can be done with the remote control 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 ASCII alarm message on RS-232 port [DTE1]

• Send SNMP trap / event via the IP network

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

Example: It was 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:

DS01-93.2:08/07/14-07:00:12 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):

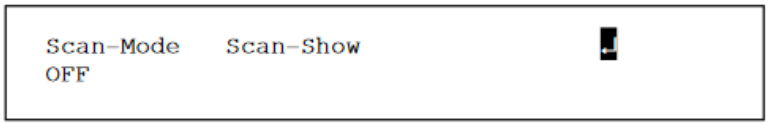
DS01-93.2:08/07/14-07:08:20 TA END

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 the remote control software, the alarms are reset instantly.

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

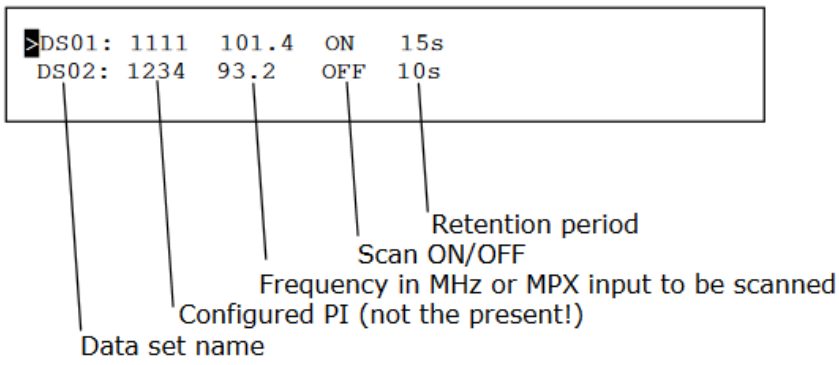
Main menu>[Scan]

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 only be setup with the remote control software.



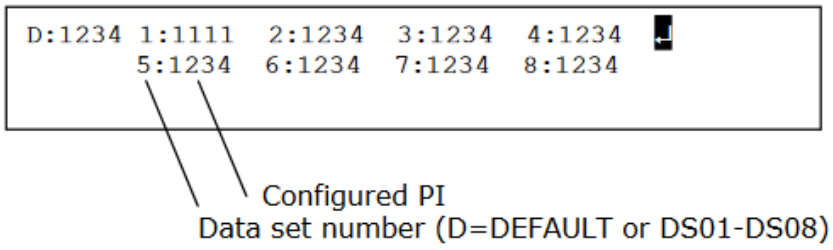
The menu shows the fundamental scan parameters: Each dataset with its individual number (Def for the default data set, DS1 for data set 1, DS2 for data set 2 etc.), the configured PI, the corresponding frequency or MPX input, the indication if the data set will be scanned (ON) or not (OFF), and the listen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

NOTE: 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 the remote control software). For indication, the "Status"-LED is lit during activated scan mode.

8.12. 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.



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:

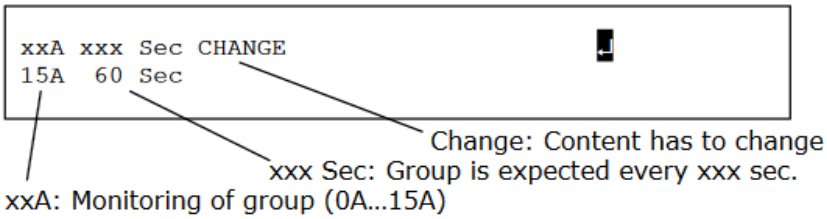
- Email: Sending an email to predefined address
- DTE: ASCII text output on RS-232 port [DTE1]
- SNMP: Sending SNMP trap / event to predefined SNMP host
- Relay: Activating a relay
- Combinations:
  Email+DTE; Email+Relay; DTE+Relay; SNMP+DTE, SNMP+Email; SNMP+Relay.

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

8.13. 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.



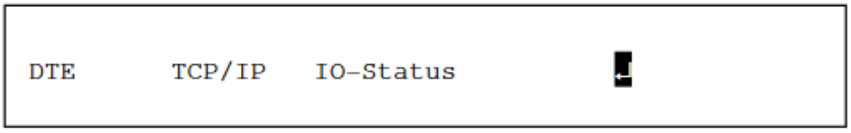
This scrollable menu is for indication only. Individual parameters can be configured via the remote control software.

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.

8.14. Menu [Interface] - TCP/IP and RS-232 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].



8.14.1. Menu [DTE]

Main menu>[Interface]>[DTE]

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

8.14.2. 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 sender email-address in emails sent by the A20 monitoring function.	Configurable via remote control software.
[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 / events of the instrument.
[SNMP-Server IP 2]	Address of an additional system that should receive the SNMP traps / events 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 real-time-clock.
[A20Config Port]	Address of the port that is used for the remote control software.
[MP3 Port]	Address of the port that is used for MP3 streaming.
[Decoder Port]	Address of the port that is used for the 2wcom software RDS Lab and RDS Softdecoder.

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

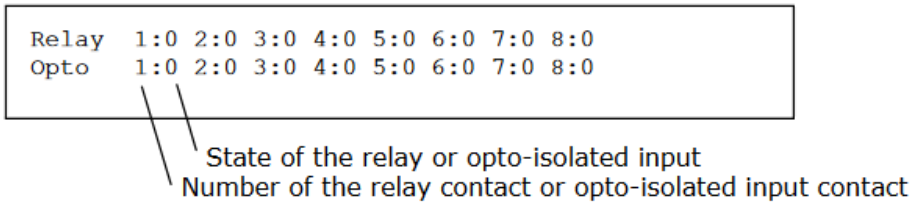
The settings of this menu can be configured as follows:

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.

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

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

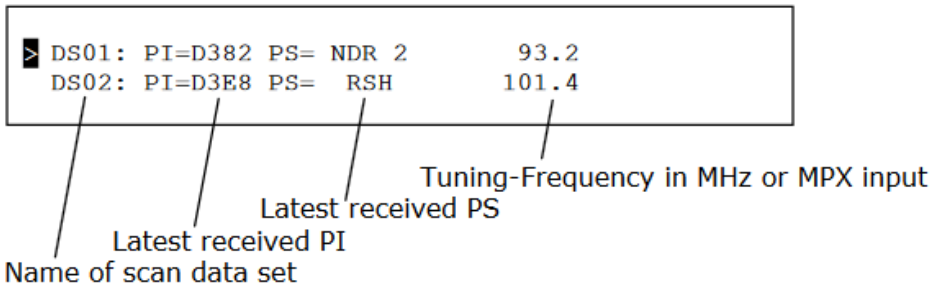
This menu shows the present status of the relay and the opto-isolated inputs. A "1" indicates an active relay or opto-isolated input, a "0" indicates the inactive state. It is possible to assign functions to the relay and the opto-isolated inputs by using the remote control software. Please see page 35 in the section "interfaces" and the manual of the remote control software.



8.15. 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 a loss of the signal.



8.16. 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 modulation signal levels.

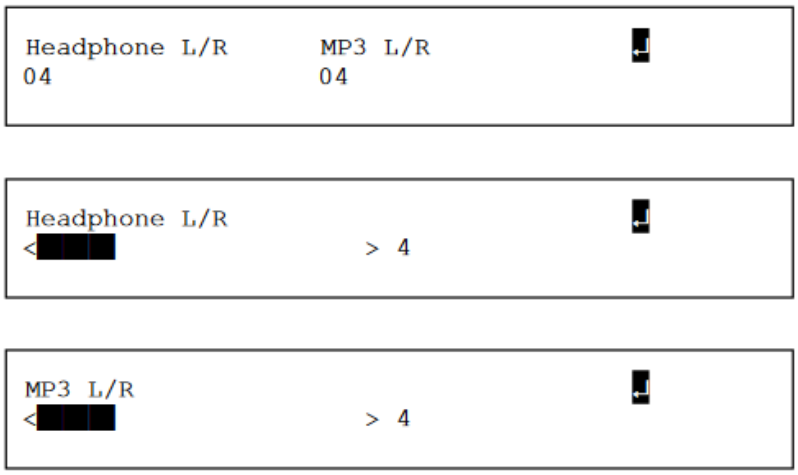
8.16.1. Menu [Volume] - MP3 dynamic range / Headphone volume

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.

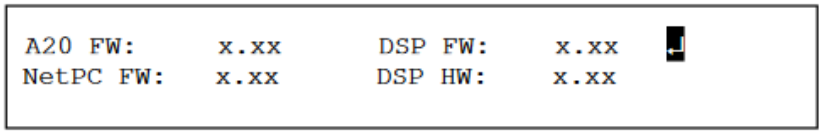
The adjustments should be done carefully to avoid signal clipping!

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).



8.16.2. 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

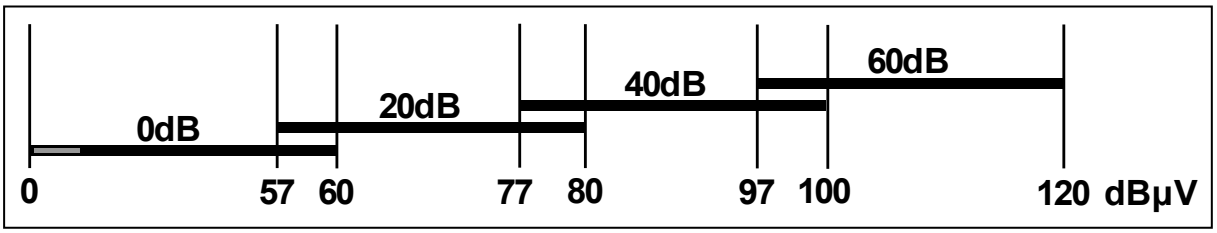
DSP HW: DSP hardware version

9. RF measurement ranges

9.1. Automatical / Manual RF attenuator selection

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

The attenuators can be selected automatically or manually. The automatical 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 automatical attenuation cannot be activated if the scan mode is activated.



The diagram above shows how the automatical attentuation 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 dBµV. If the signal level is below 20 dBµV, the monitoring is not operating during RF operation.

9.2. Automatical attenuation selection:

In tuner mode, the "RF"-LED is activated if the level at the RF input is outside the range of 20…120 dBµV.

9.3. 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 dBµV.

10. Interfaces

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

10.1. RS-232 serial interfaces

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

Front interface [Front]

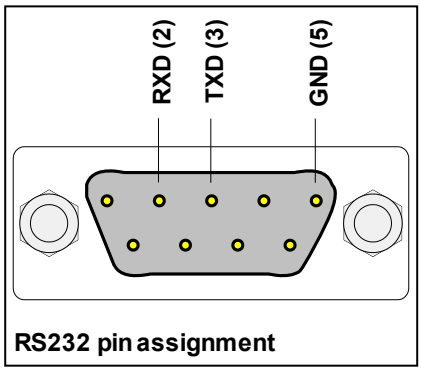
9 pole D-SUB connector for RS-232 communication. Used to connect to a PC with installed remote control software. The protocol is UECP (EBU-SPB 490, UECP version 5.1). The interface parameters are fixed on 9600 baud, 8 data bits, 1 stop bit and no parity (9600/8/N/1).

Rear interface [DTE1]

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

[Service]

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



RS232 pin assignment

Pin assignment

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

10.2. 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.

10.3. MP3 - Audio transmission as MP3 data stream

The same audio signals as available at the headphone connector can be sent as an MP3 stream* over the IP network. So it is possible to receive the remotely received audio signal for one station or the scanned list 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 remote control 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 V11.0.6000.6324). Please use software like e.g. Winamp or iTunes, which support the format.

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

10.4. 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/base band signal.

Rear side

[MPX Input]

For external MPX/base band signal.

[RF Input]

RF antenna signal for the internal tuner.

NOTICE	
	CAUTION: Risk of equipment damage The maximum allowable level at this input is 120 dBµV. Measurements are possible with levels up to 120 dBµV (with activated 60 dB attenuator) or up to 60 dBµV (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 remote control software).

10.5. Opto-isolated inputs / Relay connectors

[Optical Coupler Input]

NOTICE	
	CAUTION: Risk of equipment damage Never apply a voltage that is negative or exceeds +24 V !

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

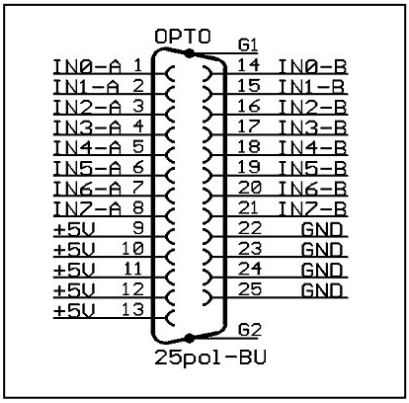
- Email: Sends a message to predefined email address
- DTE: Outputs an ASCII text message on RS-232 port [DTE1]
- Relay x: Activates an integrated relay
- SNMP: Sends an SNMP trap /event message to predefined SNMP host
- DSx: Activates a monitoring dataset
- Combinations:

  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.

Note: 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 remote control software. A voltage of at least +5 V DC is necessary to drive the inputs. The connector provides a supply of +5 V 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]

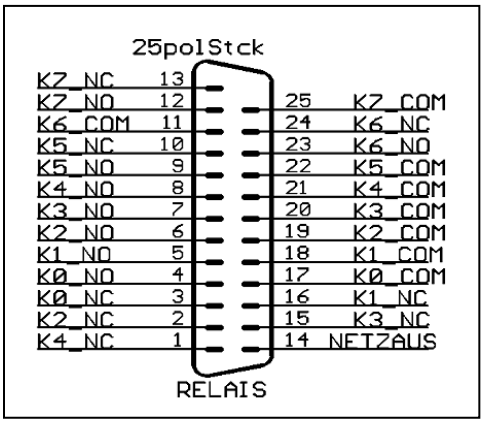
NOTICE

CAUTION: Risk of equipment damage

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

25 pole D-SUB 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 remote control software.

Pin 14 provides +5 V 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

10.6. 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 remote control software. The signal level can be adjusted at the instrument (via menu) or via the remote control software.

11. Maintenance & Servicing

Maintenance

No special maintenance is necessary on the instrument. Dust can be removed by a dry cloth / 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.

12. 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.

Problem	Possible Cause	Solution	Ref.
Power does not come on	• Power cable is improperly connected • Mains supply failure • Blown fuse	• Check supply cord • Check mains supply • Replace fuse by same type	
Instrument does not work	• System malfunction	• Disconnect and reconnect the instrument from/to mains supply	
Instrument shows false measurement results	• Wrong signal source selected • Wrong tuner frequency • RF signal level outside the measurement range	• Select correct input • Tune to correct tuner frequency • Activate / Deactivate internal attenuators or adjust level	Page 18 Page 18 Page 23, 32
Signal source cannot be changed or switches back automatically.	• Scan mode activated	• Deactivate scan mode if a single frequency or MPX signal should be monitored.	Page 25
Instrument does not communicate via RS-232 to connected units	• Data cable not properly connected • Wrong cable type • Wrong COM port of the PC selected	• Check connections • Use correct cable type (null modem cable) • Select the correct COM port in remote control software	
TCP/IP communication does not work	• TCP/IP settings (IP-address, Port, Netmask, Gateway) wrong • Network does not work at all. • Computer Network settings not correct • Firewall blocks used A20 ports	• Check TCP/IP settings • Check network • Check settings • Check firewall configuration	Page 28
Relay output is not actuated as desired	• Programming of the relay function is not correct	• Check programming of the relay function, configure via remote control software if necessary	
Opto-isolated input activation does not activate the desired function	• Incorrect opto-isolated input function assignment	• Check the assigned opto-isolated functions and modify by using the remote control software if necessary.	
Instrument does not activate configured monitoring action.	• An alarm has been triggered and is still active.	• An alarm has to be ended by returning to an in limit condition.	

13. Specifications

Measurement ranges:

Pilot tone	100 mVpp ... 1500 mVpp
RDS level	25 mVpp ... 2500 mVpp
RDS phase	0° ... 180°
HF level	20 dBµV ... 120 dBµV
	(levels >60 dBµV 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	-40 dBr ... +12 dBr

Inputs:

MPX (front and rear)	input impedance > 10 kΩ
	BNC connector
	max. MPX level: 15 dBu (≙ approx. 112 kHz dev.)
Audio L / R	input impedance > 10 kΩ
	BNC connector
	max. audio level: 15 dBu (≙approx. 112 kHz dev.)
RF Input	Impedance 50 Ω
	BNC connector
	max. RF level: 120 dBµV

Outputs:

Headphone	Output impedance < 10 Ω
	6.3 mm (1/4”) connector

	max. audio- or MPX level 15 dBu (≙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/A20T FM Monitoring Decoder – Technical Details

MPX Signal input	Selection from RF (internal FM tuner) input or external signal
Connector	BNC unbalanced, 1 x rear, 1 x front
Impedance	> 10 kΩ
RF input / FM tuner	
Tuner	PLL synchronised, 50 Ω
Input range	20...120 dBµV (>60 dBµV with switchable attenuators)
Switchable attenuators	20 dB, 40 dB and 60 dB
Connector	BNC, 1 x rear
Front panel	
LCDisplay (not available for A20T)	2 x 40 characters
Jog wheel (not available for A20T)	impulse, ENTER button
8 LED's	Power, RF, Audio, Data, Warning, Status, Limit, Sync
Headphone	
Connector	6.3 mm
Impedance	< 10 Ω
Interfaces	
Remote control input	8 opto isolated inputs
Connector	25 pole sub-D female
Remote control output (messages)	8 relay contacts potential free (for DC: max. 60V, 0.5A)
Connector	25 pole sub-D male
Data interfaces	For input and output of setup parameters and RDS data type
Connector	2 x RS-232C, 9 pole sub-D male
Location	1 x front, 1 x rear
Transmission rate	9600 baud, asynchronous
Data format	UECP (Universal Encoder Communication Protocol)
TCP/IP data interfaces	For monitoring and measurement values, logs and control functions (rear)
Type	full duplex 10 / 100 BASE -T
Connector	Neutrik Ethercon / RJ 45
Measurement Options RDS:	
RDS level	Measurement of RDS-Level (error < 3 %), 25...2500 mVpp
RDS phase	measurement resolution ± 2 degrees 0°...180°
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)
FM (additional available as option FM)	
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 (additional available as option MPX)	
MPX	MPX deviation and power measurement, BS.412-9 compliant
Alarm functions	
Controlling the measurement values	RDS level, RF level, audio and MPX
Controlling data	PI, PS, TP change, TA length, TA toggle control, block error level
Controls the content of a certain group	A certain group type has to be received within x sec. and the content has to change
Alarm types	serial interface, potential free relay
Alarm report	contact, E-mail, SNMP can be read out via serial port or TCP/IP

Scan mode	
Frequencies	8 (A20T: only 1 frequency)
Switch over time	The switch over time can be defined individually for each frequency.
Control functions	Each frequency can be controlled according to all above mentioned functions.
General Data	
Power consumption	20 VA
Case dimensions	19", 1 HU, depth: 310 mm width: 424 mm front panel: 484 mm
Weight	3,5 kg
Housing	aluminium chromated
Rated temperature range	+ 5°C...+ 45°C
Operating temperature range	0°C...+ 50°C
Storage temperature range	- 40°C...70°C
Power supply	internal 100 V - 230 V (± 10%), 50 Hz - 60 Hz
Optional hardware features:	
MP3-Encoder - Transmission of encoded MP3 data via TCP/IP	MPEG 1/2 Layer 3 encoder - Adjustable MPEG Encoder quality in 7 steps - Adjustable sample rates for latest Live-Stream-Technology - Reception of Audio-Live-Stream by A20 Lab or Windows Media Players like WinAmp or iTunes.
from tuner or external audio source	2 additional BNC connectors (left, right) and 1 additional BNC connector (MPX input)
Optional RDS softdecoder features:	
TMC and RT+ monitoring	TMC: - decoded TMC messages as plain text*, - basic TMC details like SPN, LTN, SID, MGS and encryption parameters * provided that the national location database is available RT+: 3A group info, RT+ tags (type and content) taken from current Radio Text, summed up in a list for each new RT+ content
EWS	Decoding of EWS data: (for more details refer to our product leaflet of the 2wcom Early Warning System)
RDS Logger	single license for each device
SPS Monitoring	displayed as plain text
Version: 08.08.2008	
These data are subject to modifications and amendments. Errors excepted	