INSTRUCTION MANUAL

CompuTime Center CTC

Modular Master Clock

Certification of the Producer

STANDARDS

The Master Time Center MTS was developed and produced in accordance with the EU Guidelines:
2006 / 95 / EC
2004 / 108 / EC
96 / 48 / EC

CE

This product belongs to Class A in accordance with EN 55022.
This equipment can lead to radio interference. In this case, measures must be taken by the user.

References to the Instruction Manual

1. The information in this Instruction Manual can be changed at any time without notice.
   The current version is available for download on www.mobatime.com.
2. This Instruction Manual has been composed with the utmost care, in order to explain all details in respect of the operation of the product. Should you, nevertheless, have questions or discover errors in this Manual, please contact us.
3. We do not answer for direct or indirect damages, which could occur, when using this Manual.
4. Please read the instructions carefully and only start setting-up the product, after you have correctly understood all the information for the installation and operation.
5. The installation must only be carried out by skilled staff.
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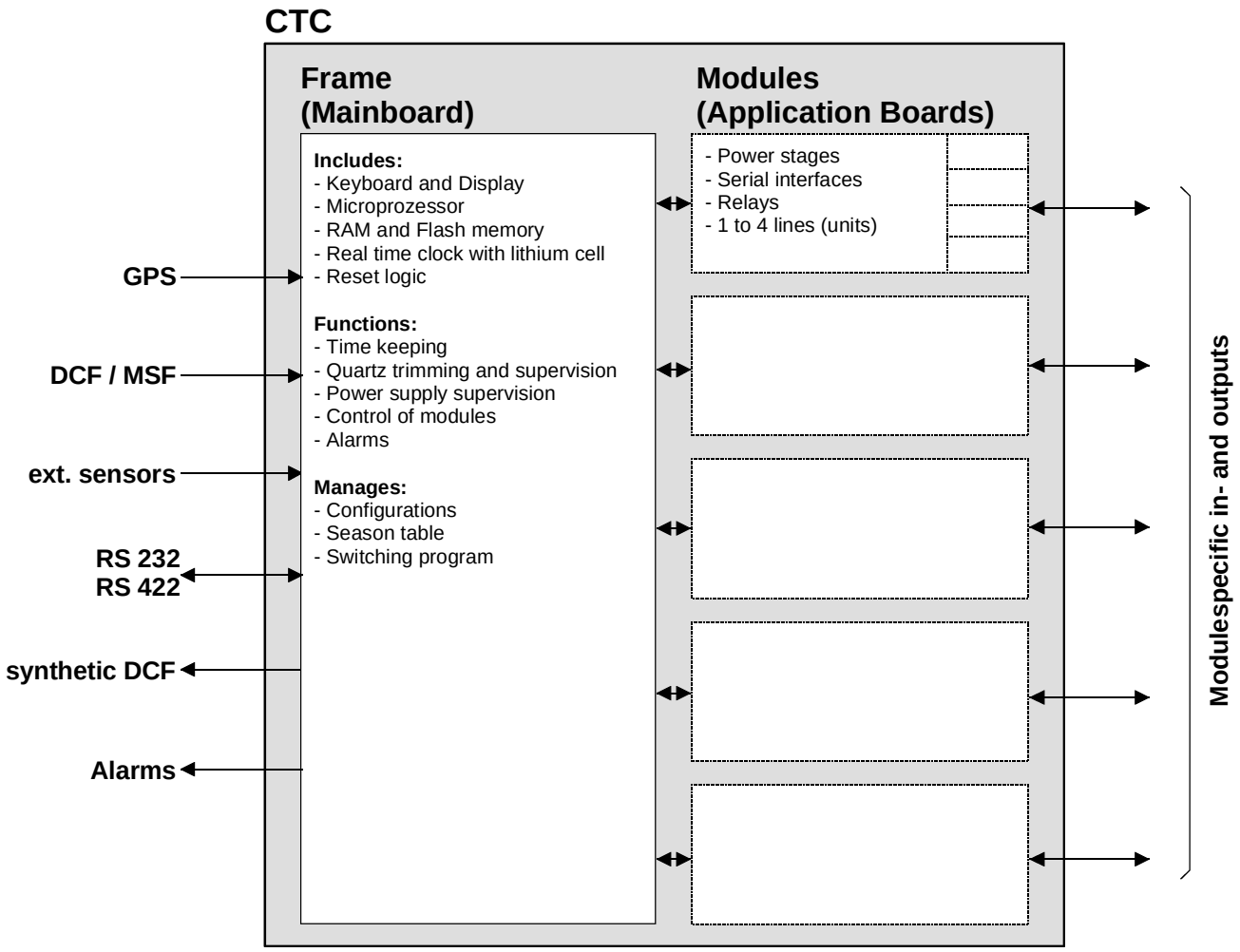
Overview

Table of Content

1. Introduction

The CompuTime Center is a micro-processor master clock, constructed in modular technique. The basic unit (Frame) can be equipped with specific modules (Application Boards), according to the individual application.

The Frame can be equipped with up to 5 application boards, at which some slots are reserved for specific boards. The boards have various interfaces for the emission of the time information at disposal. Each board is then equipped with up to 4 independent lines. The number of lines is dependent on the type of board.



2. Checklist for Start-up

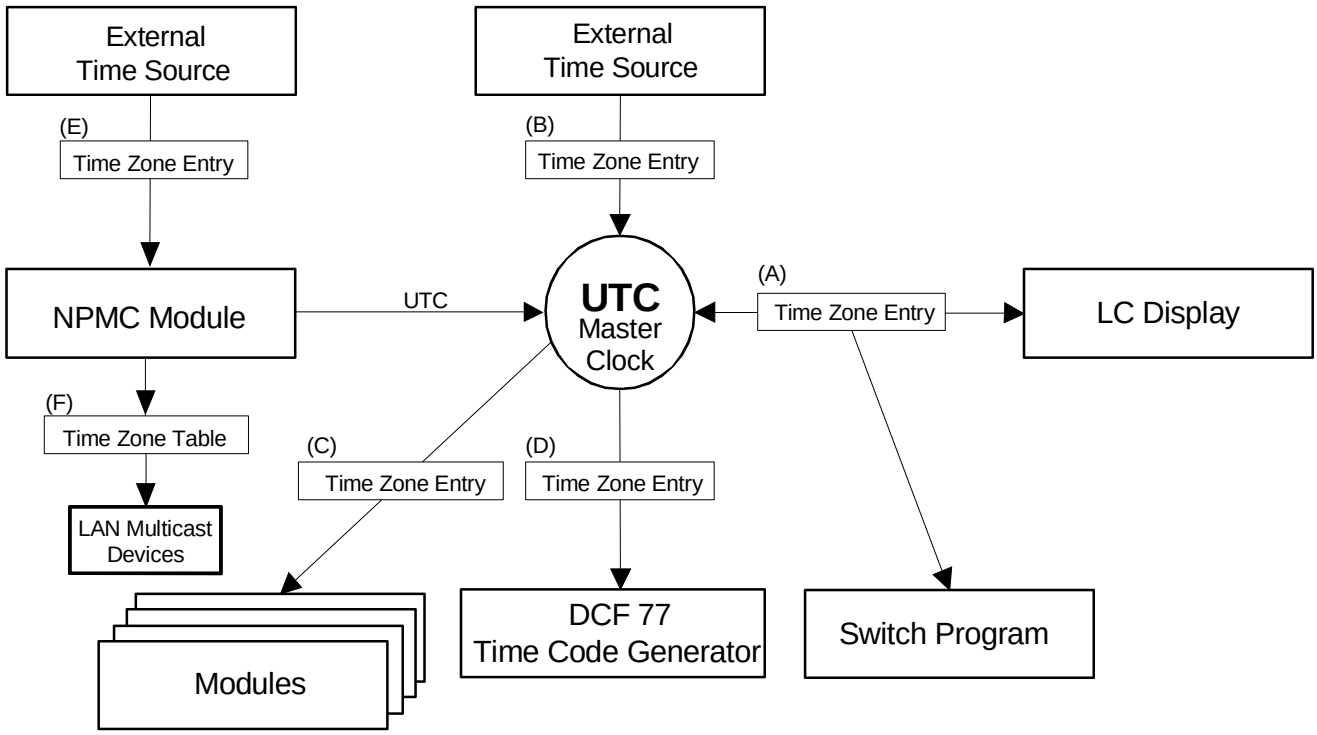
The following list should be of assistance for a safe and fast start-up.

1. Read ‘References to the Instruction Manual’ on page 2
2. Application specific wiring of the inputs and outputs (Annexe A, page 70f)

   Attention: Do not yet connect the CTC to the LAN network!
3. Connect supply (115 / 230 VAC or 24 / 48 / 60 VDC) and switch on (Chapter 5, page 12f)
4. Read notes of operation (Chapter 4, page 9f)
5. Set the required menu language (Chapter 13.1, page 65)
6. Set time zone of the master clock display (Chapter 7.2, page 17)
7. When available, configure external time reference (Chapter 8.1, page 19f) and check the reception quality (Chapter 14.3, page 68)
8. When there is no external time reference, set local time and date manually (Chapter 7.1, page 17)
9. When necessary, load application specific telegram files (Chapter 11.6.3, page 61)
10. Configure modules according to the requirements (Chapters 9, page 22f)
11. Configure DCF output according to the requirements (DCF output Frame chapter 7.5, page 18, DCF output on AB 1.5.0 chapter 9.11.9, page 50 ➔ only possible by using Telnet)
12. Once the configuration of the CTC is completed, save the current settings in the flash memory (Chapter 11.10.1, page 62)

3. Time Administration Concept

The internal master clock as well as the battery assisted real-time clock run with UTC (Universal Time Coordinate). The synchronization inputs and time outputs as well as the time shown on the display are linked via a time zone entry with the master clock time, i.e. all inputs and outputs can be individually allocated to a specific time zone.



Configurable time zones:

(A) Chapter 7.2

(B) Chapter 8.5

(C) Chapter 9.4.6, 9.5.5, 9.6.5, 9.7.5

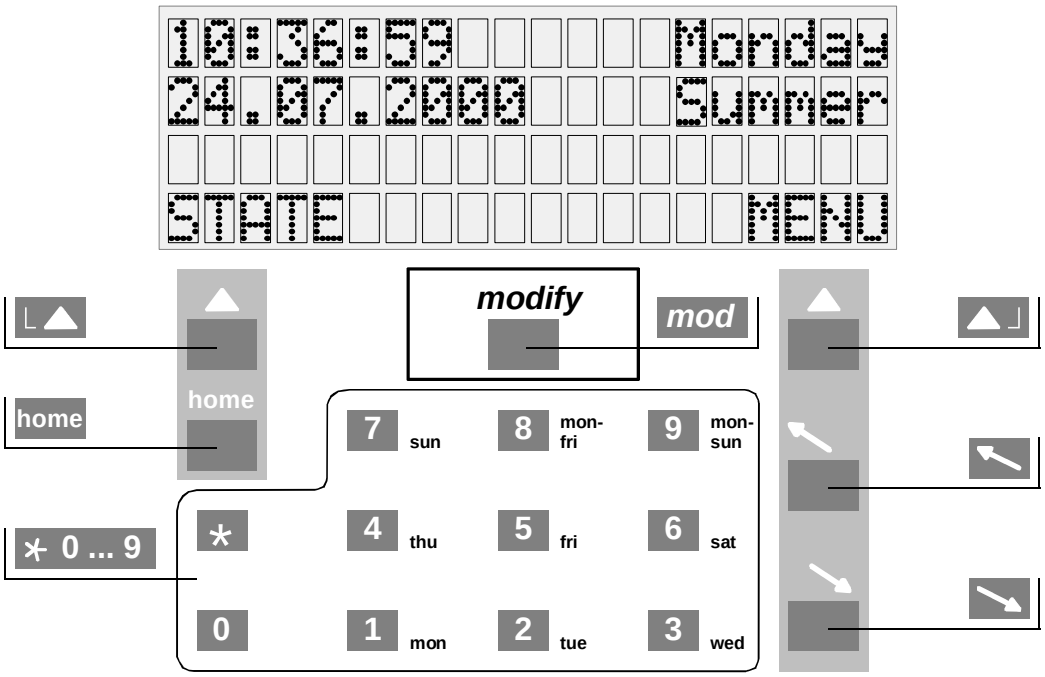
(D) Chapter 7.5

(E) Chapter 8.5

(F) Chapter 9.11.6.6

4. Menu-driven Operation

4.1 Definitions



Navigation keys

└▲	Status menu, back
▲┘	Main menu, alter, select, OK
↖	Cursor up/left
↘	Cursor down/right
home	Return to main view

modify key

mod	Selecting an entry from a list, indicated by an arrow (↓)

Numeric keys

* 0 ... 9

4.2 Keypad Lock

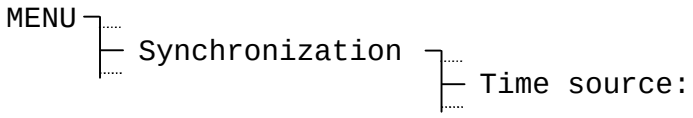
Simultaneous actuation of keys 0 + ↘ in the main view locks the keypad to prevent further inputs. Simultaneous actuation of the keys 1 + ↘ cancels the lock.

The display shows <<< LOCKED >>>.

```
10:36:59        Monday
24.07.2000      Summer

<<<<<< LOCKED >>>>>>
```

4.3 Menu Navigation

This example explains how to navigate through the menu of the CTC and how to change a configuration value. The individual menu items are marked by a schematic diagram of the menu tree.



In the following example, the time source is to be set at DCF.

10:36:59 Monday 24.07.2000 Summer STATE MENU

Press the ↵ key (MENU) to enter the main menu.

Time + Date Synchronization Modules BACK SELECT

The ‘Time + Date’ line then flashes, using the cursor key ↘ move down by one menu item.

Time + Date **Synchronization** Modules BACK SELECT

The ‘Synchronization’ line now flashes, using the navigation key ↵ (SELECT) select this menu item.

Time source: none Time zone: 00 Only synchro.: No BACK EDIT

The ‘Time source” entry now flashes, actuate the navigation key ↵ (CHANGE).

Time source: **none** Time zone: 00 Only synchro.: No CANCEL ↓ OK

Select via the *modify* key mod, indicated by an arrow above the key . Confirm the selection with the navigation key ↵ (OK).

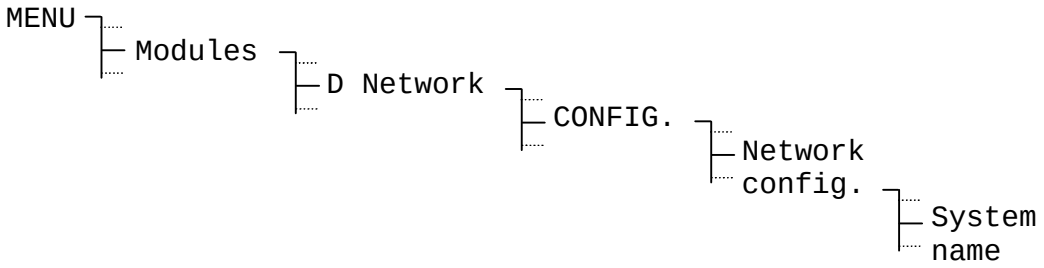
Time source: DCF Time zone: 02 Only synchro.: No BACK EDIT

DCF is now configured as the time source. The associated time zone is automatically set at 02 (CET), see Chapter 8.

Return to the main menu with the home key.

4.4 Edition of Character Sequences

When configuring certain settings of the CTC it is necessary to edit character sequences (text strings). As an example the system name of the network processor module AB 1.3.3 shall be indicated.




```
System name:
CTC

BACK                EDIT
```

Push navigation key ▲┘ (EDIT), in order to enter into the entering mode. Selection of five different entering modes. The first three modes are used for the edition of characters:

<abc>	Small letters, a-z
<ABC>	Capital letters, A-Z
<@0123>	Special characters, figures

The other two modes allow scrolling within the character sequence, erasing or entering of characters:

<SCROLL>
<CLEAR/INSERT>

Switching between the different modes through the *modify* key **mod**. The different actions, i.e. edition of characters, erasing or entering as well as scrolling within the character sequence are executed by means of the cursor keys ↖ ↘.

Depending on the entering mode, the function of the navigation key ▲┘ changes:

NEXT	Take over the item and edit next item
OK	Finish entry and take over the character sequence

Some examples of the different entry modes:

```
System name:
CTC
        <ABC>
BACK      ↓         NEXT
```

Choose capital letters with cursor keys ↖ ↘. Key ▲┘ (NEXT) for next item.

```
E-Mail addressee:
systemadmin@test.ch
       <@0123>
BACK      ↓         NEXT
```

Choose special characters or figures with cursor keys ↖ ↘. Key ▲┘ (NEXT) for next item.

```
E-Mail addressee:
systemadmin@test.ch
       <SCROLL>
CANCEL    ↓           OK
```

Move the cursor with cursor keys ↖ ↘. Key ▲┘ (OK) to confirm the entry.

5. Power Supply

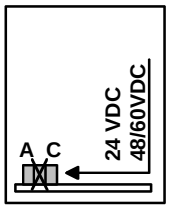
5.1 Connection Mode

The CTC can be fed directly through a direct voltage of 24 V, 48 V or 60 V. No additional mains power supply board is necessary, although certain restrictions have to be considered when running with 48 or 60 V.

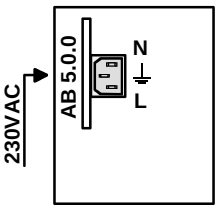
The mains power supply boards AB 5.0.0, AB 5.0.1 and AB 5.0.2 allow a supply from 230 VAC mains voltage. An alternative for 115 VAC is also available.

Connection possibilities :

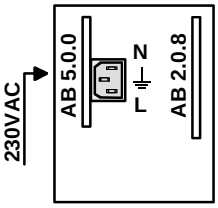
1 **External power supply**
Input voltage : 24, 48 or 60 VDC
Terminal occupation : A(+) C(-)
Configuration of the power supply voltage as per Chap. 13.3
At 48 or 60 VDC following equipment is not possible: *MOBALine* (AB 4.3.0), Time code Generator (AB 4.2.0), GPS 2000 and GPS 4500



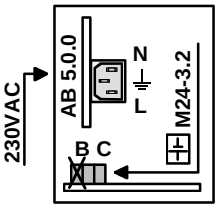
2 **Mains power supply, 230 VAC – 24 VDC**
Input voltage : 230 VAC (–30%+15%, 50/60Hz)
(Alternative : 115 VAC (–30%+15%, 50/60Hz))
Output voltage : 24 VDC
Connection to AB 5.0.0



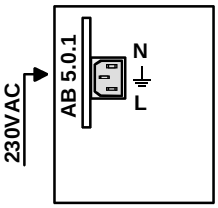
3 **Mains power supply, 230 VAC – 24 VDC, Running reserve**
Input voltage : 230 VAC (–30%+15%, 50/60Hz)
(Alternative : 115 VAC (–30%+15%, 50/60Hz))
Output voltage : 24 VDC
Connection to AB 5.0.0
Internal active running reserve through AB 2.0.8



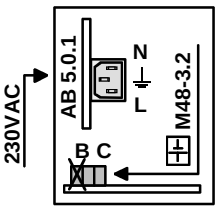
4 **Mains power supply, 230 VAC – 24 VDC, Running reserve**
Input voltage : 230 VAC (–30%+15%, 50/60Hz)
(Alternative : 115 VAC (–30%+15%, 50/60Hz))
Output voltage : 24 VDC
Connection to AB 5.0.0
External active running reserve through M24-3.2
Terminal occupation : B(+) C(-)



5 **Mains power supply, 230 VAC – 48 VDC**
Input voltage : 230 VAC (–30%+15%, 50/60Hz)
(Alternative : 115 VAC (–30%+15%, 50/60Hz))
Output voltage : 48 VDC
Connection to AB 5.0.1
Following equipment is not possible: *MOBALine* (AB 4.3.0), Time code Generator (AB 4.2.0), GPS 2000 and GPS 4500



6 **Mains power supply, 230 VAC – 48 VDC, Running reserve**
Input voltage : 230 VAC (–30%+15%, 50/60Hz)
(Alternative : 115 VAC (–30%+15%, 50/60Hz))
Output voltage : 48 VDC
Connection to AB 5.0.1
External active running reserve through M48-3.2
Terminal occupation : B(+) C(-)
Following equipment is not possible: *MOBALine* (AB 4.3.0), Time code Generator (AB 4.2.0), GPS 2000 and GPS 4500

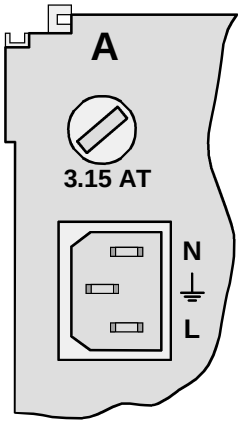


5.2 Connection Terminals

5.2.1 Mains Power Supply 230 VAC (115 VAC)

If a mains power supply board is installed (connection possibilities 2 to 6), this is to be found on slot A.

The board is equipped with a cold device plug, see illustration right. Above the mains plug the primary mains fuse is situated. The connection to a faultless earth protection can improve the quality of the radio reception.



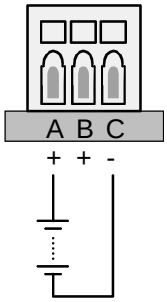
Generally the following colour attribution for the mains voltage 230 VAC will be applied:

Neutral wire (N) :	light blue
Earth protection (⏚) :	yellow-green
Phase (L) :	various

Attention: On some older CTC's the mains connection can be slightly different (i.e. spring terminals). In such a case it is absolutely necessary to follow the printed instructions or the indication on the type plate concerning the sequence of connections for N, L and ⏚ .

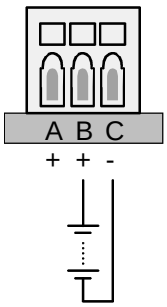
5.2.2 External Power Supply

In case of external power supply from an external direct current source (connection possibility 1) no power supply board is installed. The terminals A (+) und C (-) on the Frame shall be used as voltage input. See also Chapter 13.3.



5.2.3 Running Reserve Battery

Should an external active running reserve of the types M24-3.2 or M48-3.2 be used (connection possibilities 4 und 6), this is to be connected on the terminals B (+) und C (-) of the Frame.



5.3 Running Reserve

All models of the CTC have a passive running reserve. The fitted lithium battery saves all data and operates the internal RTC (Real Time Clock). After a power failure, the master clock time is again at the precise time. The lithium battery is already fitted and connected upon delivery. Where a master clock has not been in use for over 2 years, the lithium battery should be replaced. When the master clock is connected, the lithium battery has a service life of at least 15 years.

The above introduced connection possibilities 1, 4 and 6 (Chapter 5.1) use an active running reserve. These batteries are protected against a total discharge. At approx. 80% of the nominal voltage, the CTC switches off the batteries and changes to passive running reserve.

Attention: A connected battery shall only be connected, once the mains supply has been switched on again. This also applies to charged batteries.

Note: Should a CTC with an internal active running reserve (AB 2.0.8) has to be disconnected during transport, installation, modification, etc. please proceed as per Chapter 9.9.2.

5.3.1 Used batteries/ accumulators disposal

The user is legally obliged **(battery regulation)** to return used batteries and accumulators. **Disposing used batteries in the household waste is prohibited!** Batteries/ accumulators containing hazardous substances are marked with the crossed-out bin. The symbol indicates, that this product is forbidden to be disposed in the household waste. Below the chemical shortcuts for the contained hazardous substances of this product are mentioned:
Ag_2O = Silver oxide, **Cd** = Cadmium, **Hg** = Mercury, **Li** = Lithium**, Li-Ion** = Li-ion, **NiCD** = Nickel-cadmium, **NiMH** = Nickel-metal-hybrid, **Pb** = Lead, **$ZnMnO_2$** = tin-manganese dioxide.
You can return used batteries / accumulators free of charge to any collecting point of your local authority or stores, where batteries / accumulators are sold.
Consequently you comply with your legal obligations and contribute to environmental protection!

6. External Time Sources

6.1 General

It is possible to connect the CTC to several kinds of time sources. This chapter gives a short description of the time sources. The configuration of the corresponding synchronisation mode will be described in Chapter 8.

6.2 DCF – Radio Time Receiver

The connection of a DCF time signal receiver allows the synchronisation from the long wave time signal emitter DCF-77 in Mainflingen (near Frankfurt a.M.), Germany.

The transmission of a time telegram spreads over one minute. After five successive correctly received telegrams the CTC takes over the time information, that means that the synchronisation can last up to 5 minutes at faultless reception.

At good reception the LED in the receiver (DCF / AD 450) and the LED on the print board of the CTC frame (behind terminal 13) must flash in second rhythm. The signal quality (see Chapter 14.3, page 68) will be increased each second of 1 up to the max. value of 100. For each correctly received time, the value of the telegram quality will be increased of 10 up to the max. value of 100.

Available DCF time signal receivers: DCF 4500, DCF 450, AD 450, AD 10

The connection of some time signal receivers is not polarity dependent. For further information please consult the corresponding documentation for the receiver.

6.3 MSF – Radio Time Receiver

The connection of a MSF time signal receiver allows the synchronisation from the long wave time signal emitter MSF-60 in Rugby, England.

Available MSF time signal receiver: MSF 4500

For further information see Chapter 6.2.

6.4 GPS 2000 / GPS 3000

GPS time signal receivers provide a world-wide synchronisation over the satellites of the Global Positioning System (GPS) with the precision of an atomic clock.

The CTC can be synchronised by the receivers of the series GPS 2000 and GPS 3000 with RS 422 interface und TSIP protocol.

The connection diagrams are illustrated in Annexe A.3 and in the documentation of the GPS receivers.

With the setting GPS-NMEA the CTC can also be operated by a GPS receiver with NMEA 0183 protocol. For further information please refer to Annexe F.3.

6.5 GPS 4500

The GPS 4500 time signal receiver is sending a DCF time code with UTC time. To synchronize a CTC with GPS 4500, time source has to be set to DCF and time zone to 00 [UTC] (see Chapter 8.1 and 8.5).

The connection diagrams are illustrated in Annexe A.3 and in the documentation of the GPS receiver.

6.6 MTC (Master Time Center) – CAS

In connection with a MTC Master Time Center the CTC can also function as a sub-master clock. The corresponding protocol allows a supervision and a time synchronisation of the CTC. The transmission follows through the serial interface RS 232, RS 422 or RS 485. Up to 16 CTC's can thus be controlled by a MTC time center module CAS. An additional interface cable (Art. No. 201 041) allows the connection to a modem.

6.7 Minute Impulses

The opto-coupler interface (Art. No. 33231) allows the synchronisation with polarised minute impulses of 24 V or 48 V. The setting of date and time must be made manually. Following that the master clock will be adjusted to the minute impulses. The seasonal time change-over will, with this synchronisation mode as well, be executed automatically.

The opto-coupler interface has to be connected to the terminals DCF in +/-, see also Annexe A.1.

6.8 Serial Time Telegram (RS 232 / RS 422)

The IF 482 telegram is a time telegram, which sends the time and date information as ASCII characters through the serial interface RS 232 or RS 422. The detailed specification can be found in Annexe F.4.

6.9 LAN Network – (S)NTP

The network processor module AB 1.3.3 allows a synchronisation on an (S)NTP server within a LAN network. Further information can be found in Chapter 9.10.

6.10 NPMC – LAN Network (NTP / CAN / GPS-DCF)

The network module NPMC AB 1.5.0 (ersetzt das Modul AB 1.3.3) allows a synchronisation with higher accuracy and lower free running drift.
The module allows synchronization from NTP via LAN network, CAN (synchronization and supervision from the MTC via network) as well as from a highly accurate DCF time source (e.g. GPS 4500 with DCF-UTC).
Further information can be found in Chapter 8.5.

7. Time + Date – Setting and Configuring the Master Clock Time

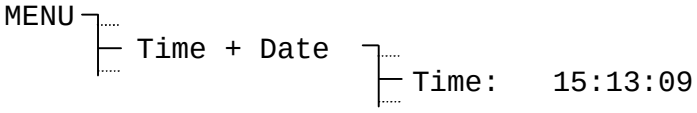
7.1 Manual Setting of Time and Date

Manual setting of the time is required where no external time reference is connected or the clock is set to ‘synchronization only'. Automatically read-in of time information from external time sources overwrites the manual input.

When operating without a time source, set the time zone prior to setting the time, see Chapter 7.2.

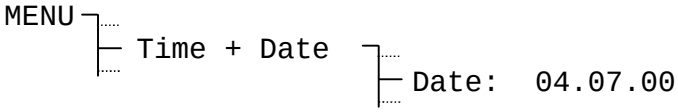
7.1.1 Time

Manual setting of the time for the master clock unit without modification of the date. The shown time corresponds to the selected time zone, see Chapter 7.2.



7.1.2 Date

Manual setting of the date for the master clock unit without modification of the time.



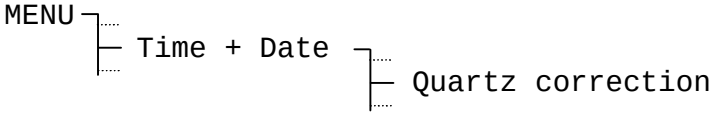
7.2 Time Zone

Choice of time zone for the master clock unit. This entry determines the time for the main display and the treatment of the switch program. See also time zone entry (A) in graphic of Chapter 3.

The cursor keys / are used for selection from the 100 possible entries, or the time zone can be selected by means of a numerical input.

7.3 Quartz Correction

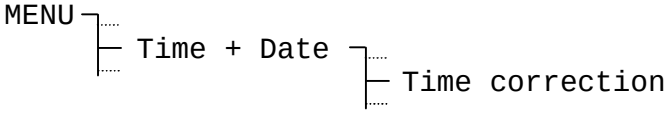
Manual correction of the quartz drift.



The quartz drift is corrected through input of the observed weekly time deviation between -60.0 to +60.0 seconds. This function is not important when operating with an external time reference.

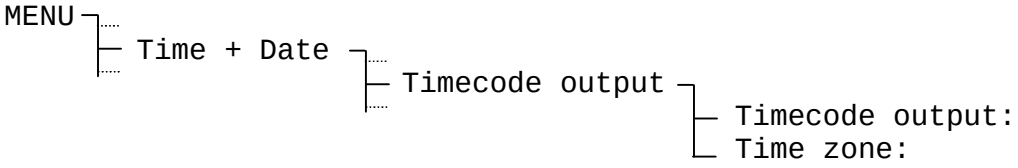
7.4 Time Correction

Small time correction of the master clock time between -60.0 to +60.0 seconds.



7.5 DCF Time Code Output

Configuration of the synthetic DCF time code output



Timecode output:	**DCF, off**
Time zone:	**00 bis 99**, standard is 02 = CET

The DCF time code output is synthetic and thus independent of the selected synchronisation mode and the time signal reception. The signal is DC coded and galvanic separated over a passive current loop. For terminal position see Annexe A.1.

8. Synchronization – Configuration of the External Time Reference

Selection and configuration of the external time reference.

8.1 Time Source

Select the external time source (time reference).

```
MENU
  ├─ Synchronization
  │                    ├─ Time source:
```

Select from: **none, DCF, MSF, GPS-TSIP, GPS-NMEA, IF482, minute impulses (MIN-Imp), CAS, network and NPMC (NTP, CAN, GPS-DCF, DCF)**

The time source must be selected prior to setting the associated time zone (Chapter 8.5).

If **network** is selected, check also the settings under Chapter 9.10.

When CTC is equipped with a NPMC module, choose NPMC as time source. The needed settings are described in chapter 8.5.

For the synchronisation with **minute impulses**, an additional optocoupler interface (art. no. 33231) is necessary, see also Chapter 6.7.

For definitions of the **NMEA** and **IF482** protocols, see Annexe F.3 and F.4.

8.2 Interface (only with GPS-NMEA-, IF482-, CAS synchronization)

Choice of the serial interface for the time sources **GPS-NMEA, IF482** or **CAS.**

```
MENU
  ├─ Synchronization
  │                    ├─ Ser.Interface:
```

Selection from: **RS232, RS422, RS485**[1)]

[1)] RS485 only in case of CAS synchronization

8.3 Baudrate Mode (only with CAS synchronization)

Choice of baudrate determination in case of synchronization through CAS protocol.

```
MENU
  ├─ Synchronization
  │                    ├─ Baudrate Mode:
```

Selection from: **Auto, Hand**

In **Auto** mode the CTC tries to determine the baud rate of the CAS masters automatically and sets the following described baud rate. This process can last for some minutes.

8.4 Baudrate (only with CAS synchronization)

Configuration of the baudrate in case of synchronization through CAS protocol.

```
MENU
  ├─ Synchronization
  │                  ├─ Baudrate:
```

Selection from: **1200, 2400, 4800, 9600, 19200 Bit/s**

8.5 NPMC Time source

```
MENU
  ├─ Synchronization
  │                  ├─ NPMC
  │                  ├─ NPMC-Mode
  │                  ├─ Synch-Source-Module
```

NPMC-Mode: Definition of the NPMC time source **(NTP, CAN, GPS-DCF, DCF)** The time zone is automatically set according the time source.

Synch-Source-Module: **Slot (A-E)** where the NPMC is located

8.6 Time Zone

Specify the time zone of the time source.

```
MENU
  ├─ Synchronization
  │                  ├─ Time zone:
```

A time zone is suggested in line with the selected time source. E.g. when selecting **DCF** as time source the time zone 02 for Central European Time will be suggested.

The cursor keys  /  are used for selection from the 100 possible entries, or the time zone can be selected by means of a numerical input.

8.7 Synchronization Only

When this setting is switched on, the external time source can only set the master clock time where the difference between the time source and master clock is less than +/- 30 seconds. Otherwise synchronization is only made to the second change. This prevents time jumps, which could be caused, e.g. through periodic disturbance of the time signal receiver or unsteady time telegrams from other time sources. Automatic daylight saving time changeovers are not affected by this setting.

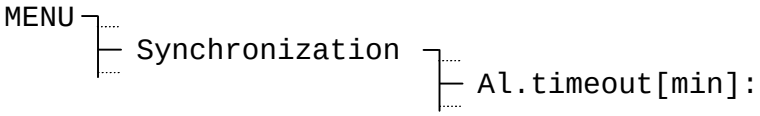
For safety reasons, it is recommend that after setting-up, the clock should be set to “synchronization only”.

```
MENU
  ├─ Synchronization
  │                  ├─ Synchro. only:
```

Selection from: **Yes** or **No**

8.8 Alarm Timeout

Setting the time until an alarm is given, where no valid time can be received from an external time source. For example, with a distorted signal from the time signal receiver.

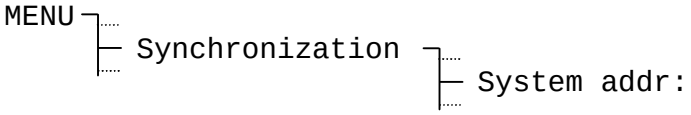


Input range: **0 to 9999 minutes**

8.9 System Address (only with CAS synchronisation)

Setting the system address upon synchronization via CAS protocol.

This consists of a decimal input, that is displayed as hexadecimal figures in brackets.



Input range: **001 to 016**, [01] to [10]

9. Modules

9.1 Module Configuration

The CTC master clock will be delivered in a module configuration as per the User's requirements. The following table shows the available module types with the possible plug-in places.

Module Designation	Type	Slot A	B	C	D	E
Power Supply 24 VDC	AB 5.0.0	✓				
Power Supply 48 VDC	AB 5.0.1	✓				
Power Supply 60 VDC	AB 5.0.2	✓				
4x Impulse Line Driver	AB 4.0.0		✓	✓		
2x Impulse Line Driver	AB 4.0.1		✓	✓		
2x *MOBALine* Driver (1)	AB 4.3.0		✓	✓		
2x Serial Communication	AB 4.1.0		✓	✓	✓	
2x Time code generator	AB 4.2.0		✓	✓	✓	
4x Program Module	AB 9.0.0		✓	✓	✓	
Network Processor Module	AB 1.3.3(2)		✓	✓	✓(2)	
Network Processing Master Clock Module (NPMC)	AB 1.5.0(2)		✓		✓(2)	
Internal Battery Unit (1)	AB 2.0.8					✓

(1) Not to be combined with AB 5.0.1 and AB 5.0.2

(2) Only possible, when no AB 2.0.8 is used.

Which modules are installed in the master clock, can be checked from the main display through the *modify* key **mod**.

```
Modul config.:
CTC
A500B430C---D---E---
BACK
```

Example:

CTC A500B430

Notes: The main display will be reached through the **home** key.

The display will not indicate the battery unit AB 2.0.8 installed in the slot E.

The type plate will also give a detailed information about the module configuration.

9.2 General Operation

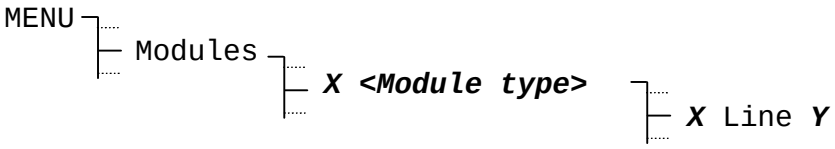
The operation and configuration of individual modules is dependent on each individual construction. In the sub-menu MODULES the possible modules for the slots A to E are indicated. These can be configured on selection. The letter before the board name its slot.

Example:

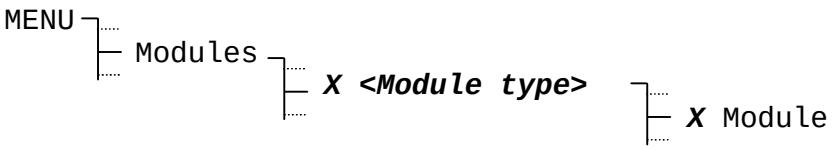
```
A Power supply 24V
B MOBALine driver
C ---
BACK            SELECT
```

Furthermore, the configuration is split up as per lines. For some modules specific settings are situated on the module level, if these settings are the same for all lines of this module.

Configuration of a line:



Configuration on module level:



Concerned are:	***X***	Slot A to E
	<Module type>	Designation of the module (i.e. 4 x impulse lines)
	Y	Line 1 to 4

9.3 Mains Power Supply Module 24V / 48V / 60V(AB 5.0.0 / AB 5.0.1 / AB 5.0.2)

The mains power supply modules AB 5.0.0, AB 5.0.1 and AB 5.0.2 cannot be configured. Only the board type and status will be displayed.

```
MENU
  Modules
    A Power Supply 24V
```

```
Power Supply 24V
State:            run

BACK
```

Note: It is absolutely necessary to pay attention to the nominal mains voltage (115 VAC or 230 VAC) indicated on the type plate.

The different connection possibilities can be found in Chapter 5 and the technical data are specified in Annexe G.

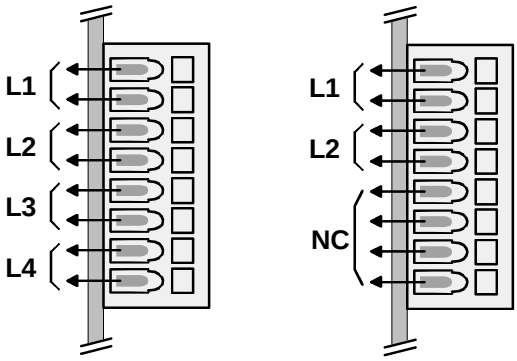
9.4 Impulse Line Driver (AB 4.0.0 / AB 4.0.1)

9.4.1 Module Description

The two module types provide polarised impulses for slave clocks. Both boards have the same number of terminals, only with AB 4.0.1 the four lower terminals are not occupied (NC).

The lines L1 to L4 resp. L1 to L2 are individually configurable. An electronic overload switch protects the output stage in case of a short-circuit on the line.

The output voltage is dependent on the connection mode (see Chapter 5). It can be 24 V, 48 V or 60 V.



AB 4.0.0 **AB 4.0.1**

9.4.2 Change of the Line State

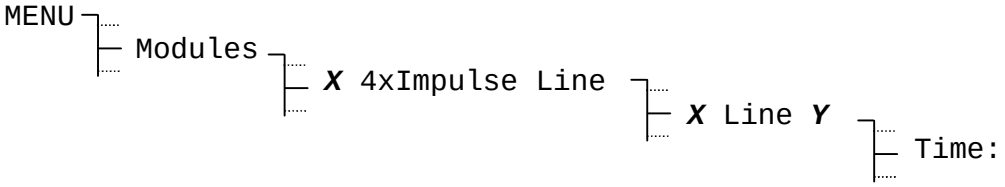
```
MENU
  Modules
    X 4xImpulse Line
      X Line Y
        State:
```

With each pressing of **EDIT** the line state alternates between **stop** and **run**.

An active alarm will be signalised through the line state **alarm**. Before the line can be started again, the alarm cause must be removed.

9.4.3 Line Time

In order to be able to set the slave clocks of an impulse line onto the master clock time, the line must first be stopped, then all the hands of the slave clocks must be set to the same position. The time of the slave clock lines shall then be manually set as follows:

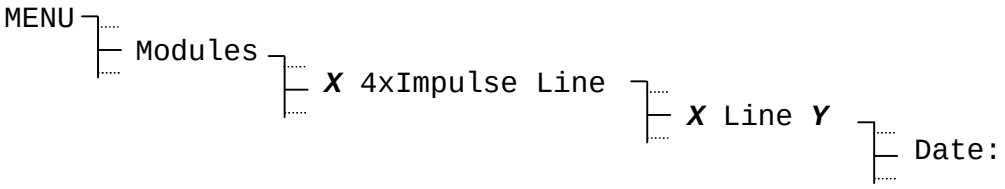


and then the line started anew.

If some slave clocks are running one step slow (1 second, ½-minute, $^1/_5$-minute, $^1/_8$-minute or 1 minute) the polarity of the feeding line to these clocks must be changed. Afterwards the clocks shall be set again as per the above mentioned procedure.

9.4.4 Line Date

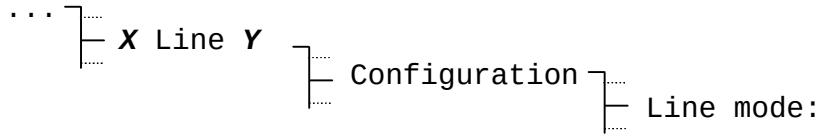
The line date is only important for calendar clocks with a catch-up periodicity of one week (see Chapter 9.4.8).



In case of smaller catch-up periodicities (60s, 12h and 24h) the date will be automatically set to the master clock date and is not of importance.

9.4.5 Line Mode

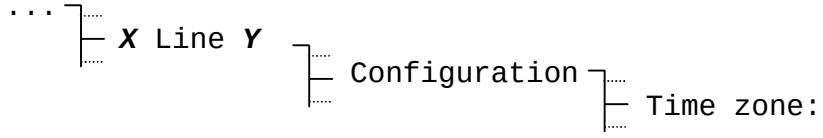
Determines the operation mode of the polarised impulses.



Selection from: **sec, 1/8 min, 1/5 min, 1/2 min, min, DCF**

9.4.6 Time Zone

Setting of the time zone for this output line.



The cursor keys / are used for selection from the 100 possible entries, or the time zone can be selected by means of a numerical input.

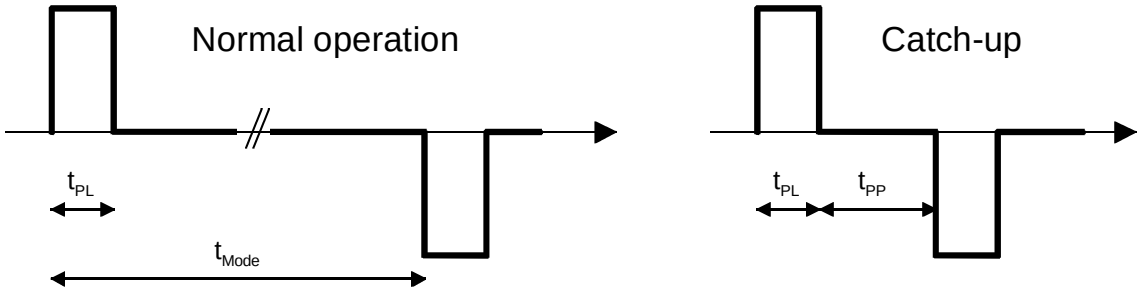
9.4.7 Impulse Length and Impulse Pause

For the impulse length and pause the CTC proposes a standard value according to the selected line mode. These values can, however, be changed.

```
...
   X Line Y
      Configuration
         Pulse length[s]:
         Pulse pause[s]:
```

Input range: **0.1s - 0.7s**, for second lines, (sum however smaller 0.8s)
0.1s - 5.9s, for $^1/_8$- and $^1/_5$-minute lines, (sum however smaller 6.0s)
0.1s - 9.9s, for $^1/_2$-minute and minute lines

The value of the impulse pause is only of importance in catch-up running. The following graph gives an explanation of the relations.



t_{PD}: Impulse length
t_{PP}: Impulse pause
t_{Mode}: Impulse cycle determined by the line mode (e.g. min = 1 minute)

9.4.8 Catch-up Periodicity

Determines the periodicity of the connected impulse slave clocks.

```
...
   X Line Y
      Configuration
         Period:
```

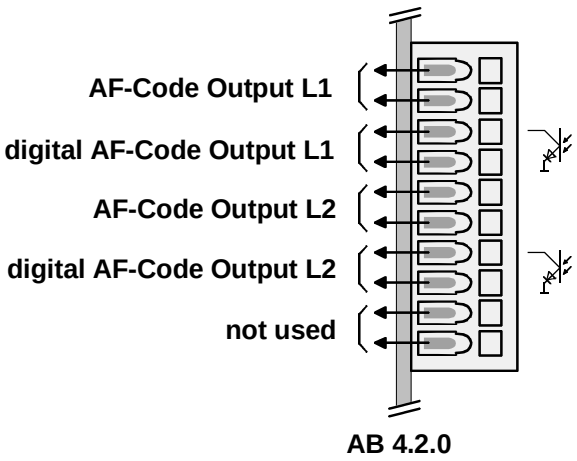
Selection from: **60 sec, 12 h, 24 h, 1 week**

9.5 Audio time code generator AB 4.2.0

9.5.1 Module description

This module provides an audio frequency time code for self-setting slave clocks and interfaces. It is equipped with two independent lines. Each line supplies time information and partly date information, depending on the selected time code.

The max. short-circuit current is 120 mA. If an overload is detected on the line, an alarm will be generated for the corresponding line. For the connection of the external devices, the polarity is irrelevant.



The module AB 4.2.0 supports the following time codes:

IRIG-B standard (B122)
IRIG-B standard 12h (B122)
IRIG-B DIEM (B122)
IRIG-B123 (B123)
AFNOR-A (NFS 87-500 Appendix A)
AFNOR-C (NFS 87-500 Appendix C)
IRIG-E DIEM (E112)
DCF-FSK

9.5.2 Change of the Line State

MENU → Modules → ***X*** Audio time code → ***X*** Line ***Y*** → State:

With each pressing on **EDIT** the line state alternates between **stop** and **run**.

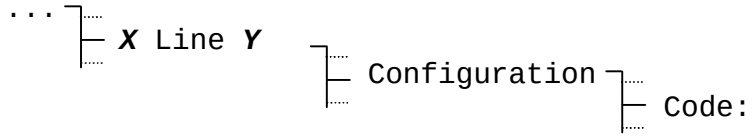
An active alarm will be signalised through the line state **alarm**. Before the line can be started again, the alarm cause must be removed.

9.5.3 Line Time and Date

The displayed time can consequently not be changed but will be based on the selected time zone.

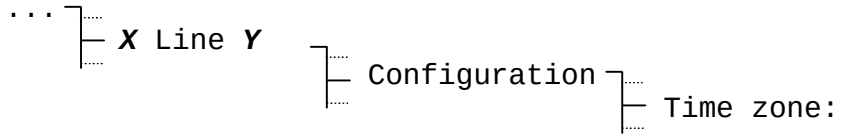
MENU → Modules → ***X*** Audio time code → ***X*** Line ***Y*** → Time: / Date:

9.5.4 Choosing the code type



9.5.5 Time Zone

Setting the time zone for this output line.



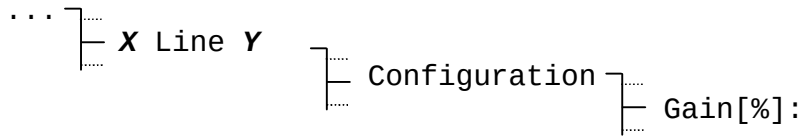
The cursor keys ↖ / ↘ are used for selection from the 100 possible entries, or the time zone can be selected by means of a numerical input.

9.5.6 Defining the output level

Gain: 0%: output level of high amplitude is approximately 0.5 Vpp

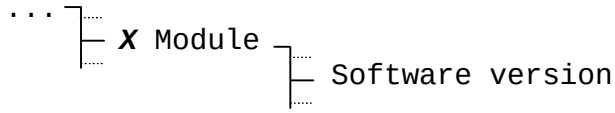
Gain: 99%: output level of high amplitude is approximately 5.6 Vpp

(for IRIG-E, only 30% is supported)



9.5.7 Software Version

The module AB 4.2.0 has its own micro-processor with the corresponding software. The software number and version can be recalled with this menu point. An update is only possible in the factory.



9.5.8 Optocoupler outputs (current loop)

The in the menu selected amplitude or frequency modulated time signal is demodulated available on the optocoupler output (DC current loop passive).

The following standard signals are available on this outputs:

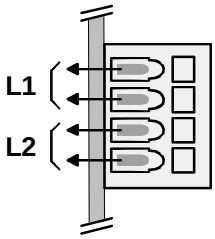
Time code selected in menu:	Output code on optocoupler outputs:
IRIG-B standard (B122)	IRIG-B standard (B002)
IRIG-B standard 12h (B122)	IRIG-B standard 12h demodulated
IRIG-B DIEM (B122)	IRIG-B DIEM demodulated
IRIG-B123 (B123)	IRIG-B123 (B003)
AFNOR A (NFS 87-500)	AFNOR A demodulated
AFNOR C (NFS 87-500)	AFNOR C demodulated
IRIG-E DIEM (E112)	IRIG-E DIEM (E002)
DCF-FSK	DCF-FSK current loop

9.6 MOBALine Driver (AB 4.3.0)

9.6.1 Module Description

This module provides the frequency modulated MOBALine code for self-setting slave clocks, channel relays and interfaces. It is equipped with two independent lines. Each line supplies time information, switching- and signal functions as well as up to 20 different time zones for the realisation of world time clocks.

An electronic overload switch protects the output stages in case of short-circuits on the line. The connection of the terminals is independent of the polarity.



AB 4.3.0

Attention: The board AB 4.3.0 shall only be driven by 24 VDC, see Chapter 5.

9.6.2 Change of the Line State

```
MENU
  Modules
    X MOBAline driver
      X Line Y
        State:
```

With each pressing on **EDIT** the line state alternates between **stop** and **run**. The slave clocks of a stopped line set themselves on 12:00:00.

An active alarm will be signalised through the line state **alarm**. Before the line can be started again, the alarm cause must be removed.

9.6.3 Line Time and Date

Slave clocks with MOBALine code must not be set manually. The displayed time can consequently not be changed but will be based on the selected time zone. A stopped line will always displays 12:00:00.

```
MENU
  Modules
    X MOBAline driver
      X Line Y
        Time:
        Date:
```

Attention: The hands of a MOBALine slave clock must not be touched.

9.6.4 Line Mode

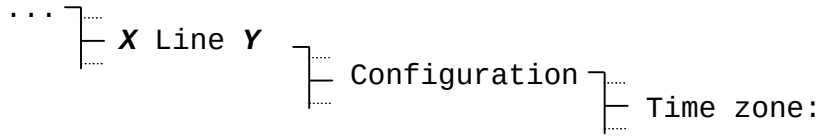
Determines the line mode resp. the running mode of the minute hand of the MOBALine slave clocks.

```
...
  X Line Y
    Configuration
      Line mode:
```

Selection from: **10 sec, 1/2 min, min**

9.6.5 Time Zone

Setting of the time zone for this output line.



The cursor keys / are used for selection from the 100 possible entries, or the time zone can be selected by means of a numerical input.

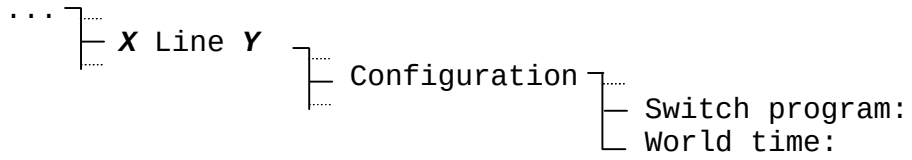
Note: The herein described time zone has no influence on the world time function.

9.6.6 Switch Program and World Time Function dis-/enable

With the factory setting the switch program is activated on all the lines and the world time function is disabled.

Should a world time clock be realised, it is recommended to use a separate line for this application and disable the switch program on this specific line and enable the world time function.

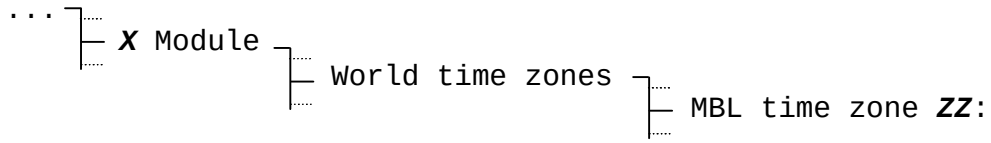
In case of connection of channel relays the switch program needs to be enabled.



Selection from: **ON, OFF**

9.6.7 Definition of the World Time Zones

The world time function allows, besides the local time zone (Chapter 9.6.5), to transmit up to 20 time zones on the MOBALine code. The attribution of these world time zones takes place on the module level, that means that both lines of a module possess the same world time zones.



Example:

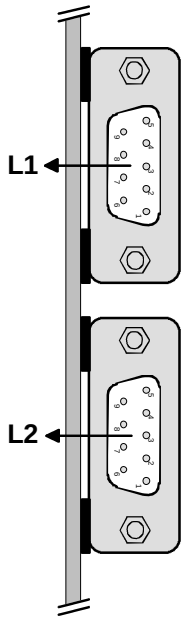
MBL time zone 01: 00	MOBALine world time zone 01 = 00: UTC
MBL time zone 02: 02	MOBALine world time zone 02 = 02: Brussel
MBL time zone 03: 19	MOBALine world time zone 03 = 19: Tokyo
BACK EDIT	

9.7 Serial Communication (AB 4.1.0)

9.7.1 Module Description

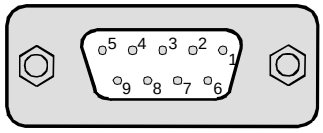
This module provides time and date information through 2 serial interfaces. Each line can be individually configured either for RS 232 or RS 422. The telegram construction can be programmed on choice through telegram files. In addition, a supervision of the external device is possible. More details about the construction of the telegram files can be found in Annexe E.

An opto-coupler output (max. 20 mA / 35 VDC) per line supplies, in addition, a configurable synchronisation impulse. This can also be synchronised directly from GPS, under condition that a GPS receiver is connected, and will thus achieve a better accuracy.



AB 4.1.0

Pin	RS 232	RS 422
1	Synchronisation impulse, opto-coupler, anode +	
2	RXD	RXD +
3	TXD	TXD +
4	NC	
5	GND	
6	NC	
7	NC	TXD -
8	NC	RXD -
9	Synchronisation impulse, opto-coupler, cathode -	



(

(NC: Not connected)

9.7.2 Change of the Line State

```
MENU
 ├ Modules
 │  ├ X Serial Com.
 │  │  ├ X Line Y
 │  │  │  ├ State:
```

With each pressing of **EDIT** the line state alternates between **stop** and **run**.

An active alarm will be signalised through the line state **alarm**. Before the line can be started again, the alarm cause must be removed.

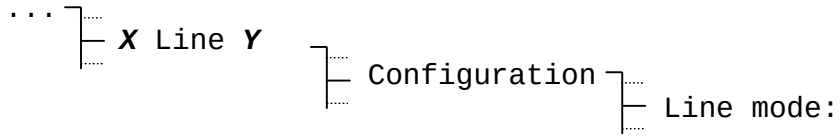
9.7.3 Line Time and Date

The displayed time and date cannot be changed and is based on the selected time zone of this line.

```
MENU
 ├ Modules
 │  ├ X Serial Com.
 │  │  ├ X Line Y
 │  │  │  ├ Time:
 │  │  │  ├ Date:
```

9.7.4 Line Mode

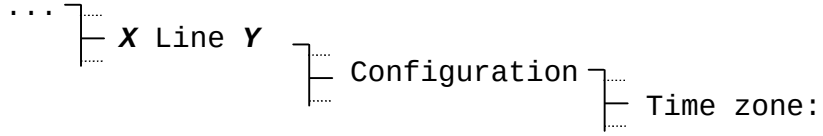
Selection of the interface mode.



Selection from: **RS232, RS422**

9.7.5 Time Zone

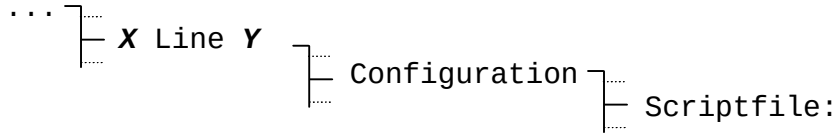
Setting of the time zone for this output line.



The cursor keys / are used for selection from the 100 possible entries, or the time zone can be selected by means of a numerical input.

9.7.6 Telegram File

Selection of the active telegram file.



The selection from 10 possible telegram files follows through the cursor keys / . Empty entries will be marked with --- .

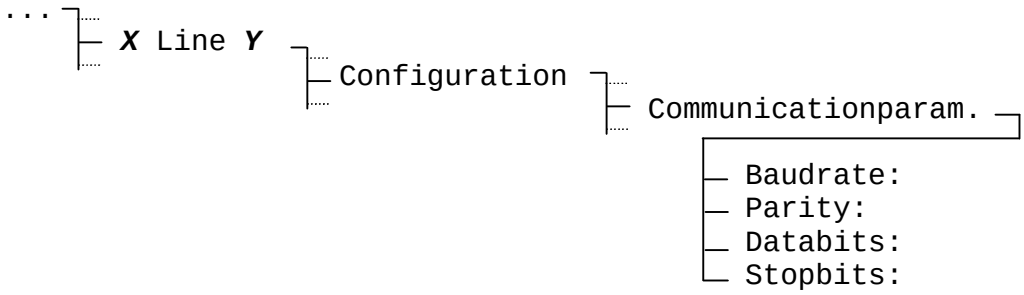
The telegram file determines the contents and form of the serial telegram. Furthermore it contains the starting time of the emission as well as the time between two telegrams. The supervision mode for the connected devices is configured in this file as well. Further details for the construction of the telegram file can be found in Annexe E.

With the optional available CTCW software an example file is enclosed. Chapter 11.6 explains the download of a telegram file on the CTC.

The MB IF482 telegram is firmly programmed on all CTC master clocks. (Definition see Annexe E).

9.7.7 Communication Parameter

Determines the communication parameter for the data transmission.

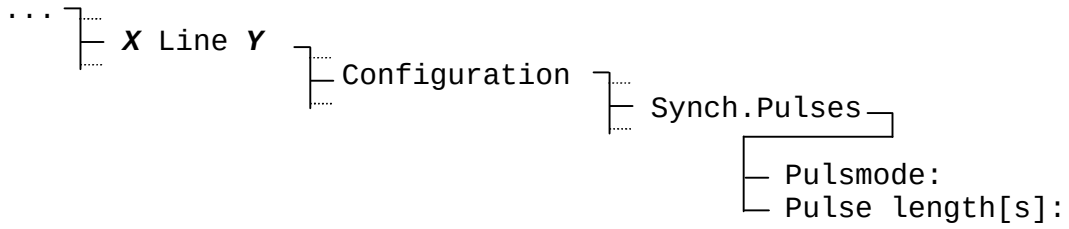


Baudrate: **300, 600, 900, 1200, 2400, 4800, 9600, 19200 Bit/s**
Parity: **even, odd, none**

Data bits:	**7, 8**
Stop bits:	**1, 2**

9.7.8 Impulse Mode and Length

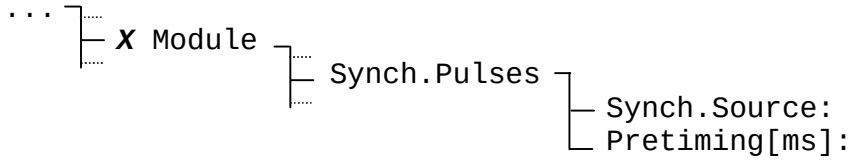
The impulse mode as well as the impulse length can be individually configured for each line.



Impulse mode:	**1/sec, 1/min, 1/hour, 1/day, off**
Impulse length:	**0.1 to 25.0 seconds**, the impulse length must, however, be smaller than the repeating rate, defined with the impulse mode.

9.7.9 Impulse Source and Pretiming

The synchronisation source and the pretiming (in comparison with the second change) of the synchronisation impulse can only be mutually determined for both the lines of a module.



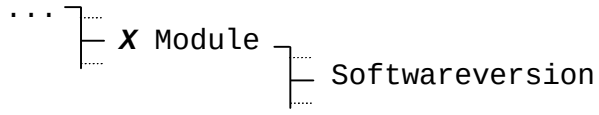
Synchronisation source:	**none, GPS**
Pretiming:	**0 – 800 ms**

In the factory setting the synchronisation impulses will be synthetically generated by the software (**Synch.Source: none**). The accuracy is in this case +/- 10 ms. If connected, the synchronisation impulses can also be synchronised through the GPS receiver (**Synch. Source: GPS**). The accuracy of the impulses is then +/- 100 µsec.

The pretiming is used for the release of the synchronisation impulses before the real second change.

9.7.10 Software Version

The module AB 4.1.0 has its own micro-processor with the corresponding software. The software number and version can be recalled with this menu point. An update is only possible in the factory.

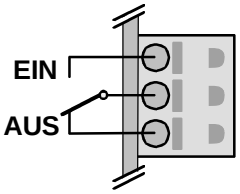


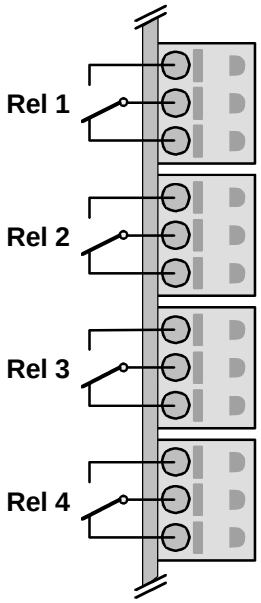
9.8 Program Module (AB 9.0.0)

9.8.1 Module Description

The program module has 4 relays with switching contacts. The relays can each, independent from each other, be attributed to one of the 64 switch program channels. Manual operation of the relays is possible through the channel monitor (Chapter 10.4). Technical data of the contacts can be found in Annexe G.

The illustrated contact position correspond to the idle position (OFF).





AB 9.0.0

9.8.2 Switching States

The states of all 4 relays are assembled on one display.

```
MENU
  ├ Modules
  │   ├ X Program module
```

Rel 1=OFF	Rel 3=OFF
Rel 2=OFF	Rel 4=OFF
08:48:01	05.11.02
BACK	CONFIG.

9.8.3 Channel Assignment

The assignment of the switch program channels to the relays can be defined on choice.

```
... ┐
    └ CONFIG. ┐
             ├ Relay 1 =>Chanal:
             ├ Relay 2 =>Chanal:
             ├ Relay 3 =>Chanal:
             └ Relay 4 =>Chanal:
```

Input range: **01 – 64**, corresponds to the channel number of the switch program
00, relay not assigned (always OFF)

9.9 Internal Battery Unit (AB 2.0.8)

9.9.1 Module Description

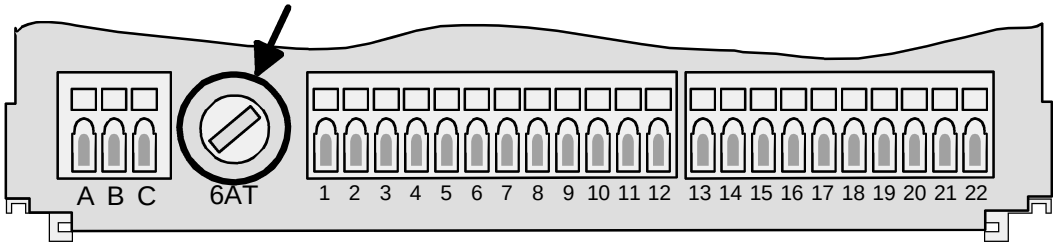
The internal battery unit serves as active running reserve in case of a mains failure. Chapter 5 explains the different connection possibilities and running reserves.

The battery unit is internally wired by the factory and has no further external connections, nor can it be found in the any menu. Only the type plate indicates, if such a unit is installed or not.

9.9.2 Transport / Storage

For the transport or storage of a CTC master clock equipped with an internal battery unit, the instructions of the following list have to be observed:

1) Disconnect the mains supply cable
2) Remove the fuse on the frame (see illustration)
3) Check that the master clock has no power (display blank)

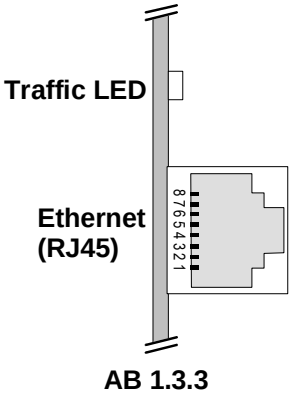


Note: The fuse shall be re-installed only by the setting-up after the transport or storage.

9.10 Network Processor Module (AB 1.3.3)

9.10.1 Module Description

This modules provides different services on a TCP/IP Ethernet LAN network, such as time synchronisation with (S)NTP, alarm reporting with SNMP traps or e-mails and configuration by Telnet (only network related settings). It offers a 10Base-T connection by a RJ45 plug.



This module can act as (S)NTP time server to synchronise other equipment on the LAN or as (S)NTP client and be synchronised by an external (S)NTP server.

The configuration (only network related settings) can be executed once through the menu guidance of the CTC and secondly through a Telnet connection. Simultaneous access through the CTC menu and Telnet connection can lead to wrong configuration parameters and should thus be avoided.

9.10.2 Connection and Synchronization of a Network

The module AB 1.3.3 is conceived for the connection to a 10 Base-T (10Mbit/s) Ethernet LAN. The connection to the next switching HUB is made by means of a commercially available RJ45 patch cable. In order to connect the AB 1.3.3 directly to an individual PC a crossed patch cable is necessary.

For the synchronization of the PCs any SNTP synchronization tool can be used, as for inst. the Shareware-Tool Tardis (http://www.kaska.demon.co.uk). The following adjustments must be done in the synchronization tool:

Server address: corresponds to the IP address of the AB 1.3.3

Protocol: To be accordingly set to the module configuration.

SNTP (more accurate than Broadcast, causes, however, also an accordingly extensive network traffic, when a large number of PCs has to be synchronized).

NTP Broadcast (less accurate than SNTP, is, however, not dependent on the number of PCs to be synchronized and thus minimizing the load on the network (remains always the same).

According to the applied tool, various further parameters can be configured, such as synchronization interval and maximal/minimal correction deviation.

The instructions for the configuration of the CTC network parameter (Chapter 9.10.3.4) can be obtained from the network administrator.

9.10.3 Configuration through the Menu

This chapter explains the configuration of the module through the CTC menu guidance.

```
MENU
  ├ Modules
  │   ├ X Network
```

```
Network:              run
Time:          12:11:15
Date:       24.07.2003
BACK              CONFIG.
```

Display of the current time and date information as well as the operation status (**run** / **alarm**) of the network processor.

The following configuration menu will be obtained by ▲┘ CONFIG.

Attention: Modifications carried out on the configuration will only be activated after leaving the menu.

9.10.3.1. Operation State

The operation status of the network connection only recognizes the two states **run** and **alarm**. It cannot be changed through the menu.

```
CONFIG.
    State:
```

An active alarm is signalised through the operation status **alarm**. In that case, the alarm can be confirmed by deleting the active alarms, see Chapter 14.2.

9.10.3.2. DHCP-Client

If this function is activated, the CTC gets its network configuration (IP address, subnet mask and gateway) automatically from the DHCP server. Previous entered values for IP address, subnet mask and gateway will be overwritten.

```
CONFIG.
    Network config.
        DHCP-Cient
```

9.10.3.3. DHCP name option

With this function activated, the DHCP request will be complemented with the CTC system name. If the DHCP server should assign always the same IP address to a known device, use this option.

```
CONFIG.
    Network config.
        DHCP name option
```

9.10.3.4. IP Settings

Configuration of IP address, subnet mask and gateway.

```
CONFIG.
    Network config.
        IP address
        Subnet mask
        Gateway
```

Example:

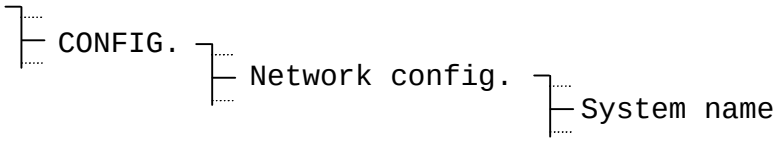
```
IP address:
      165.123.004.023

BACK                EDIT
```

If the function DHCP-Client is activated, these settings will be overwritten by the DHCP server.

Important: The IP address should only be changed in agreement with the network administrator.

9.10.3.5. System Name

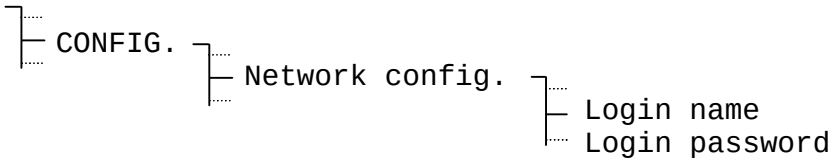
The system name serves for the distinction between several CTC in one network. It can be named on choice and have up to 20 characters. Instructions for the entry of character sequences are found in Chapter 4.4.



The system name appears in the subject of sent e-mails and in the designation field of the SNMP traps.

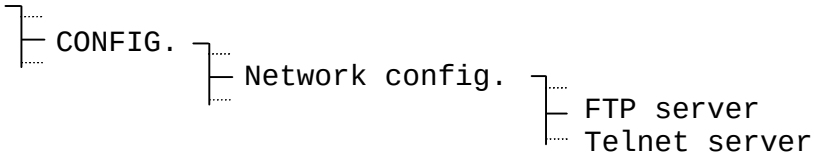
9.10.3.6. Login Name and Login Password

The login name and login password for the Telnet- and FTP-server can be named on choice and have up to 20 characters. Instructions for the entry of character sequences are found in Chapter 4.4.



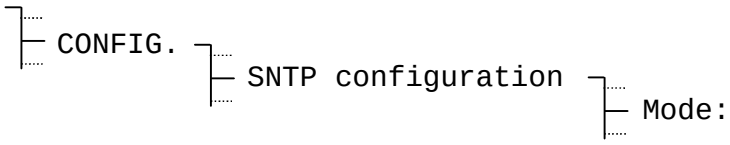
9.10.3.7. FTP Server, Telnet Server

For security reason the FTP and Telnet server function may be disabled with this settings. However, for a configuration over Telnet, the Telnet server needs to be activated. The FTP is only necessary for software updates over the network.



9.10.3.8. SNTP Operation Modes

The operation mode for the time distribution through SNTP is determined with the mode parameter.



Selection from : **OFF**, **Client**, **Server**, **Listen** and **Broadcast**

Client: The CTC runs in SNTP client mode and is synchronized by an (S)NTP server via the network.

Server: The external devices (clients) which are to be synchronized can query the time from the CTC.

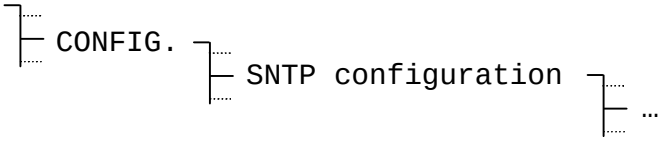
Listen: The CTC "listens" on NTP broadcast packets from a particular IP address and takes over their time.

Broadcast: Time packages will be broadcasted in periodic intervals.

Important: The time source (Chapter 8.1) must also be adjusted to **network** in order to make certain that the time is taken over by the CTC in the client and listen operating modes as well.

9.10.3.9. SNTP Parameters

Further parameters must be edited, depending on the configured mode of operation (Chapter 9.10.3.8).



In the following only those parameters are specified which also have to be configured under normal conditions. The remaining parameters are only to be manipulated for special applications and can be left at the default values for standard applications. A description of the remaining parameters can be found in the Annexe F.1.

Parameters required in client mode:

Source 1:	IP address of the (S)NTP server
Source 2:	IP address of the spare server, if Source 1 fails
Source 3:	IP address of the spare server, if Source 2 fails
Source 4:	IP address of the spare server, if Source 3 fails
Min. stratum:	Stratum level required by the server

Parameters required in server mode:

No required parameters!

Parameters required in list mode:

Source 1:	IP address of the (S)NTP server
Source 2:	IP address of the spare server, if Source 1 fails
Source 3:	IP address of the spare server, if Source 2 fails
Source 4:	IP address of the spare server, if Source 3 fails
Min. stratum:	Stratum level required by the server
Receiving timeout:	Broadcast interval of time server in seconds

Parameters required in broadcast mode:

Broadcast mask:	Subnet for which traps are intended
Interval:	Broadcast interval in seconds

Note: If problems arise when the CTC is synchronized via a network, then the errors can be displayed via Telnet by using the command *state* in the menu SNTP.

9.10.3.10. E-Mail

CTC alarm messages can also be sent through e-mails. At each modification of an alarm status such an e-mail containing time stamp, system name and status of the corresponding alarm (Annexe 0) is sent to the configured e-mail receiver. The required sender e-mail address can be configured through the menu.

Example of an alarm e-mail:

From: ctc@testdomain.ch
To: systemadmin@testdomain.ch
Subject: **CTC** Frame error 'Failure of external time acceptance' has been set

```
CompuTime Center
----------------

Event: Error flag has been set
Error bit: 00 (Failure of external time acceptance)
Device: Frame

Date: 23.10.2003
Time: 18.04.57
```

System name

Alarm bit (0..15)

New status of the alarm bits

Alarm source (Frame or Time Channel 1 / 2)

Time stamp (according configured time zone under chapter 7.2)

9.10.3.11. E-Mail Server IP Address

IP address of the used e-mail server shall be indicated.

```
CONFIG.
    SMTP/SNMP config.
        Email server IP
```

Information: The entry of 000.000.000.000 deactivates the sending of e-mails.

9.10.3.12. E-Mail Sender Address

The e-mail sender address shall be indicated in a character sequence with up to 40 characters. Information for the entry of character sequence can be found in Chapter 4.4.

```
CONFIG.
    SMTP/SNMP config.
        Sender address
```

9.10.3.13. E-Mail Receiver Address

The e-mail receiver address shall be indicated in a character sequence with up to 40 characters. Information for the entry of character sequence can be found in Chapter 4.4.

Two different receivers can be used.

```
CONFIG.
    SMTP/SNMP config.
        Email address 1
        Email address 2
```

9.10.3.14. SNMP Traps

In order to broadcast SNMP traps, the IP address of the network manager system must be known. This can be configured here.

```
CONFIG.
    SMTP/SNMP config.
        Trap IP
```

Information: The entry of 000.000.000.000 deactivates the sending of traps.

9.10.3.15. Software Version

The module AB 1.3.3 has its own micro-processor with the corresponding software, which runs the network related applications. The software number and version can be recalled with this menu point.

```
CONFIG.
    Software version
```

9.10.4 Configuration over Telnet

This chapter explains the configuration of the network settings for the module AB 1.3.3 over a Telnet connection. The pre-setting of the IP address, Subnet mask and Gateway over the CTC menu (Chapter 9.10.3.4) is, however, indispensable, as otherwise no access through the network is possible.

9.10.4.1. Note on Telnet Connections

The Telnet terminal must be configured in such a way that <CR> and <LF> are always sent together for a <Carriage Return>.

9.10.4.2. Login

For the connection with a Telnet terminal the IP address of the CTC must be indicated (command: **open** <IP address>). Afterwards the login with login name (Username) and login password (Password) will follow. Upper and lower case are taken into consideration.

```
CTC Telnet session

Username : ctc
Password : ***
User logged in

CTC>
```

Default settings:

Login name:	`ctc`
Login password:	`ctc`

After the login the entry prompt CTC> shows, that the CTC is waiting for an entry. If no entry is made during 10 minutes, the Telnet connection is interrupted. Only one connection per CTC is possible at the same time.

9.10.4.3. Commands

help shows a summary of the available commands together with a small description:

```
CTC>help
help

 CompuTime Center Help (Main menu)
 ---------------------------------------------------------------------
 COMMAND                        FUNCTION
 0, Main                        change to root level
 1, NetworkConFiGuration        change to network configuration
 2, SNMPconfiguration           change to smtp/snmp coniguration
    SMTPconfiguration
 3, SNTPconfiguration           change to SNTP configuration

 help, ?                        show commands according to the current menu
 show                           show parameters according to the current menu
 undo                           cancel all modification
 version                        version info
 save                           save and activate the new configuration


CTC>
```

The capital letters in commands can be used as abbreviations.

Example: NetworkConFiGuration - > **NCFG** oder **1**

The command names always correspond to the parameter designation.

A corresponding Telnet prompt is displayed depending on the submenu in which one is at the moment:

CTC>	Root-Level
CTC->NCFG>	General network configuration
CTC->SMTP/SNMP>	E-mail and trap configuration
CTC->SNTP>	SNTP configuration

Setting of a parameter:

<Command> <Parameter><CR>

As a confirmation for the entry an echo is broadcasted. An error message appears at a wrong entry format.

Example:

```
CTC->NCFG>ipaddress 192.36.253.43

 IP address = 192.36.253.43

CTC->NCFG>
```

Important: The IP address should only be changed in agreement with the network administrator.

A detailed description of the network parameter is found in Annexe F.1.

After modifying a configuration parameter, this will not be activated immediately. In the overview with **show** a message will inform, that the displayed adjustments not yet have been memorized:

```
CTC->NCFG>show

 CTC  Network ConFiGuration
 ------------------------------
 SYStemName:    CTC

 DHCP:          Off
 DhcpHostname:  Off
 IPAddress:     10.2.0.11
 SubNetMask:    255.0.0.0
 GateWay:       10.0.0.5

 LoginName:     CTC
 LoginPassword: CTC

 telnet:        On
 FTPServer:     On

! current changes haven't been activated yet !

CTC->NCFG>
```

When all the necessary adjustments are made, they can be memorized and activated with **save**. Depending on the made modifications the Telnet connection is interrupted:

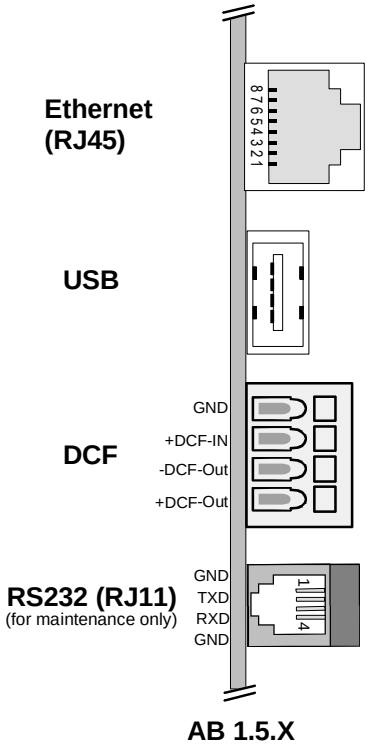
```
CTC>save


 reconfigurate... (it needs up to 10 seconds)

 The telnet session will be disconnected for the reconfiguration

```

The Telnet connection can also be simply terminated by disconnection from the client. Changes which have not been activated with **save** are thus lost.

9.11 Network Processor Master Clock Module (AB 1.5.0)

9.11.1 Module Description

- 100/10Mbit with Auto Negotiation
- NTP 4 (RFC1304), compatible with version 3 and SNTP
- SNMP V1 Alarm-Traps
- Email alarms
- Direct input for a DCF or GPS-DCF signal
- DCF output



This modules provides different services on a TCP/IP Ethernet LAN network, such as time synchronisation with NTP, alarm reporting with SNMP traps or e-mails and configuration of the module by Telnet or SSH. It offers a 10/100Base-T connection by a RJ45 plug.

This module can act as a high precision NTP time server to synchronise other equipment on the LAN. At the same time it can work as NTP client to be synchronised by an external (S)NTP server.

Due to the master clock functions the AB 1.5.0 allows to directly connect a time source (GPS or DCF receiver) and provides a high precision DCF output.

The important network settings can be executed through the menu guidance of the CTC or through a Telnet/SSH connection.

9.11.2 Connection and Synchronization of a Network

The network processing master clock module AB 1.5.0 is conceived for the connection to a Ethernet LAN. In order to connect the CTC directly to a PC a crossed patch cable is necessary.

For the synchronization of the PCs any (S)NTP synchronization tool can be used, as for inst. the Shareware-Tool Tardis (http://www.kaska.demon.co.uk). The following adjustments must be done in the synchronization tool:

Server address: corresponds to the IP address of the AB 1.5.0

Protocol: To be set accordingly to the module configuration.

(S)NTP (more accurate than Broadcast, causes, however, also an accordingly extensive network traffic, when a large number of PCs has to be synchronized).

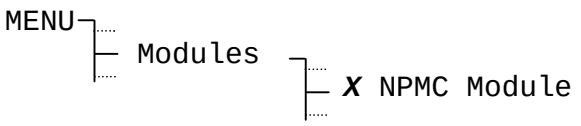
NTP Broadcast / Multicast (less accurate than (S)NTP, is, however, not dependent on the number of client devices to be synchronized and thus minimizing the load on the network (remains always the same).

According to the applied tool, various further parameters can be configured, such as synchronization interval and maximal/minimal correction deviation.

The instructions for the configuration of the CTC network parameter (Chapter 9.11.4.2) can be obtained from the network administrator.

9.11.3 Configuration through the Menu

This chapter explains the configuration of the NPMC module through the CTC menu.




```
Network:              run
Time:            12:11:15
Date:         24.07.2003
BACK               CONFIG.
```

Display of the current time and date information as well as the operation status **run** or **alarm** of the network module.
An active alarm is indicated by the operation status **alarm**.

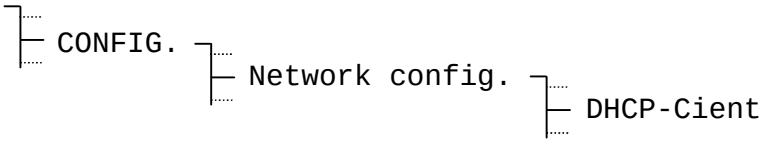
By pressing **CONFIG**. the configuration menu will be obtained, see chapters 9.11.4 to 9.11.7.

Attention: Modifications carried out on the configuration will only be activated after leaving the menu (.e.g. with "home" key).

9.11.4 Network configuration

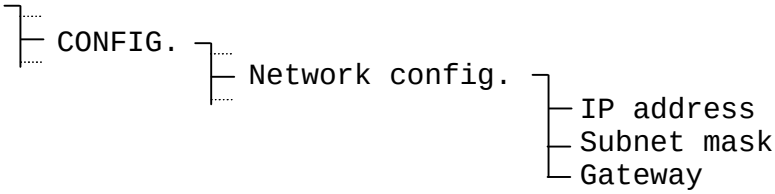
9.11.4.1. DHCP-Client

If this function is activated, the CTC gets its network configuration (IP address, subnet mask and gateway) automatically from the DHCP server. Previous entered values for IP address, subnet mask and gateway will be overwritten.



9.11.4.2. IP Settings

Configuration of IP address, subnet mask and gateway.



Example:

```
IP address:
      165.123.004.023

BACK                EDIT
```

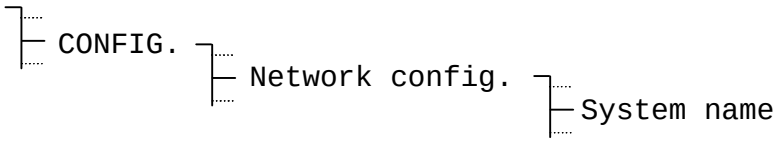
If the function DHCP-Client is activated, these settings will be overwritten by the DHCP server.

Important: The IP address should only be changed in agreement with the network administrator.

Attention: For correct LAN operation **the configuration of a Gateway is mandatory.** This can be done over DHCP or by manual configuration. If no Gateway is available, the own IP address of the NMC can be used.

9.11.4.3. System Name / Hostname

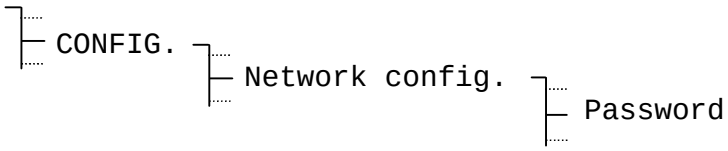
The system name is at the same time the hostname and serves for the distinction between several CTC in one network. **It is absolutely needed** and can be freely choosen (max. 12 characters). Instructions for the entry of character sequences are found in Chapter 4.4, page 11. Default system name: **ctc**



The system name appears in the subject of sent e-mails and in the designation field of the SNMP traps.

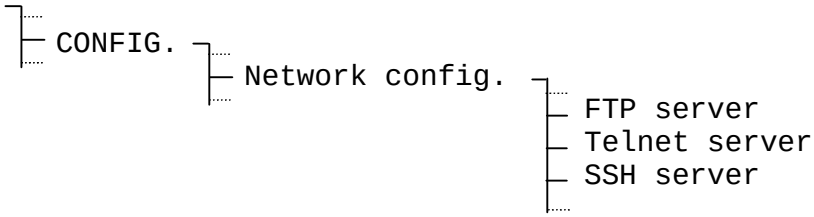
9.11.4.4. Login Password

The login name and login password for the Telnet- and FTP-server can be named on choice and have up to 12 characters. Instructions for the entry of character sequences are found in Chapter 4.4, page 11. Default password: **ctc**



9.11.4.5. FTP Server, Telnet Server, SSH-Server

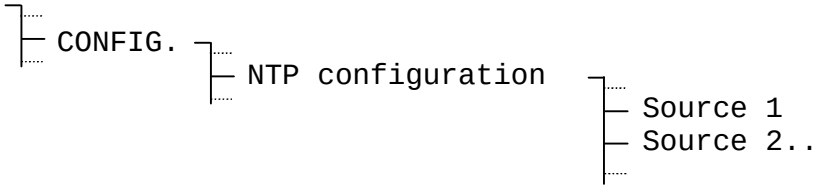
,For security reason the FTP Telnet and SSH server function may be enabled resp. disabled with this settings. However, for a configuration over Telnet, the Telnet server needs to be activated or accordingly SSH. The FTP is only necessary for software updates over the network.



9.11.5 NTP configuration

9.11.5.1. NTP sources

If the CTC is synchronized via NTP, up to 4 timeservers can be configured. With CAN synchronization the NTP sources are automatically set from the corresponding CAM module in MTC and cannot be modified.



9.11.5.2. Broadcast mask

Broadcast address for NTP Broadcast time packets.

```
CONFIG. ─ Network config. ─ Broadcast Mask
```

Note: Address **000.000.000.000** deactivates the Broadcast function.

9.11.5.3. Interval

Defines the interval between the transmission of two NTP Broadcast packets.
Input: 2^**Interval** in seconds (value range: 1 – 16) e.g. value = 2 ➔ Interval 2^2 = 4 sec., value = 5 ➔ Interval: 2^5 = 32 sec.

```
CONFIG. ─ Network config. ─ Interval
```

9.11.5.4. Max. stratumlevel

Defines the maximum stratum level of the NPMC-NTP-server for a DCF (GPS 4500: DCF-UTC) time source and with synchronization from CTC Frame (also with manual time setting)(default value: 0 ➔ no max. value set ➔ stratum is increased up to 16).

```
CONFIG. ─ Network config. ─ Max. stratumlevel
```

When the NPMC module is synchronized from a NTP time source (or from MTC CAN module), the stratum level is automatically set according to the time source (source stratum level + 1). When "Synch-Alarm" is active (time source failed) stratum level is always set to 16 (= invalid time)

9.11.6 Network slave clocks (NTP Multicast)

9.11.6.1. Mode

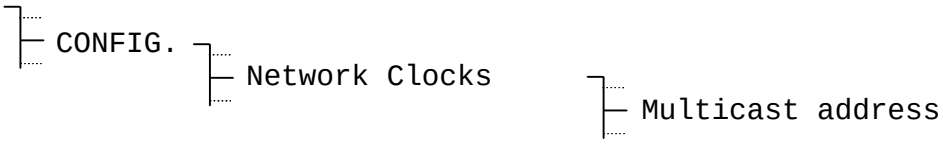
The NPMC module can be used to synchronize slave clocks via LAN. It can be configured to transmit time packets and/or time zone tables. The time zone table is used, when the connected Multicast devices require different times, e.g. UTC and local time, or in world time clocks.

```
CONFIG. ─ Network Clocks ─ Mode
```

OFF:	Multicast function deactivated
NTP:	NTP-Multicast time packets transmitted
NTP + TZ:	Multicast time packets and time zone table transmitted
TZ:	Only packets with time zone table transmitted

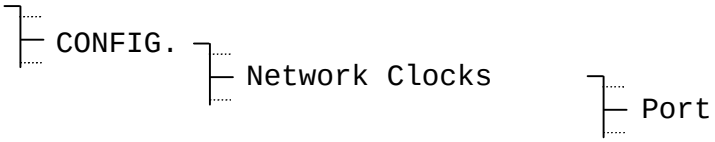
9.11.6.2. Multicast address

Fix Multicast address for NTP and time zone server: **239.192.54.x**
Group address: x = 1..15 for MOBATIME devices, e.g. NCI, SEN 00.



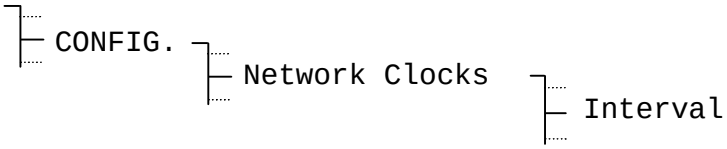
9.11.6.3. Multicast port

Defines the Multicast-Port (1025 – 32535), e. G. 16000.



9.11.6.4. Multicast Interval

Defines the interval between the transmission of two NTP Multicast packets.
Input: 2^**Interval** in seconds (value range: 1 – 16) e.g. value = 2 ➔ Interval 2^2 = 4 sec., value = 5 ➔ Interval: 2^5 = 32 sec.

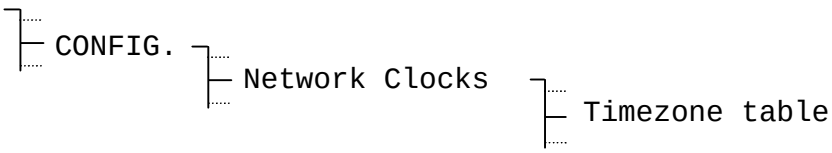


9.11.6.5. Hops

Time to Live (TTL) for NTP- and time zone Multicast packets in hops. (Number of Routers in a network to transfer the packets through; for simple networks without routing, enter value "1"; for one Router enter "2").

9.11.6.6. Timezone table

Configuration of the time zone entries in the table.
The time zone table is sent as Multicast packets.



9.11.7 SMTP / E-mail / SNMP Configuration

9.11.7.1. Alarm E-mail

CTC alarm messages can also be sent through e-mails. At each modification of an alarm status such an e-mail containing time stamp, system name and status of the corresponding alarm (Annexe 0) is sent to the configured e-mail receiver. The required sender e-mail address can be configured through the menu.

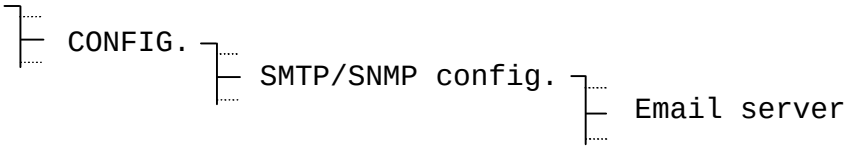
Example of an alarm e-mail:

From: ctc@testdomain.ch
To: systemadmin@testdomain.ch
Subject: **CTC Alarm state has changed**

```
Active CTC Alarms
-----------------
Frame:                              none
AB4.3.0 Mobaline:                   Line output overloaded
AB1.5.0 NPMC:                       none
Time <14:00:48 27.10.08>
Hostname <CTC (10.241.0.83)>
```

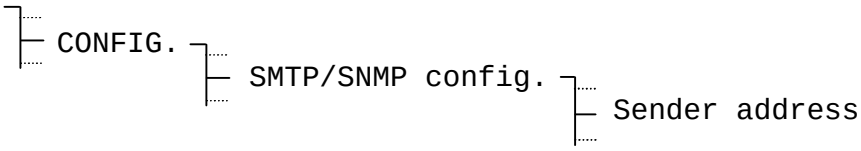
9.11.7.2. E-Mail Server IP Address

IP address of the used e-mail server shall be indicated.



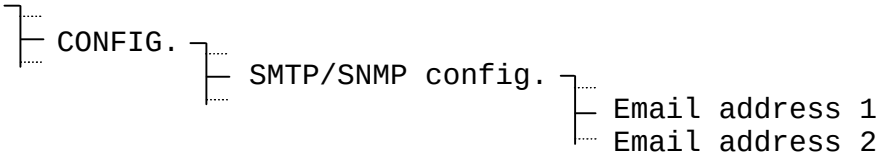
9.11.7.3. E-Mail Sender Address

The e-mail sender address shall be indicated in a character sequence with up to 40 characters. Information for the entry of character sequence can be found in Chapter 4.4 page 11.



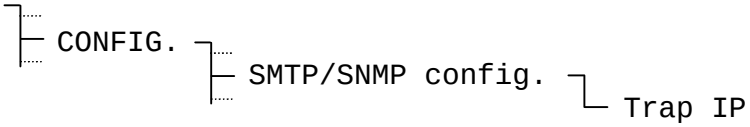
9.11.7.4. E-Mail Receiver Address

The e-mail receiver address shall be indicated in a character sequence with up to 40 characters. Information for the entry of character sequence can be found in Chapter 4.4 page 11. Two different receivers can be used.



9.11.7.5. SNMP Traps

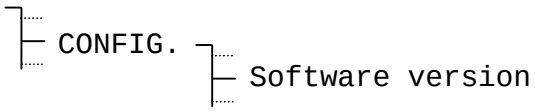
In order to broadcast SNMP traps, the IP address of the network management system must be known. This can be configured here.



Information: The entry of 000.000.000.000 deactivates the sending of traps.

9.11.8 Software Version

The module AB 1.5.0 has its own micro-processor with the corresponding software, which runs the network related applications. The software number and version can be recalled with this menu point.



9.11.9 Configuration over Telnet

This chapter explains the configuration of the network settings for the module AB 1.5.0 over a Telnet connection. The pre-setting of the IP address, Subnet mask and Gateway over the CTC menu (Chapter 9.11.4.2) is indispensable, as otherwise no access through the network is possible.

9.11.9.1. Login

For the connection with a Telnet terminal the IP address of the CTC must be indicated (command: **open** <IP address> or directly "**telnet** <IP address>"). Afterwards the login with login name (Username) and login password (Password) will follow. Upper and lower case are taken into consideration.

Default settings:

Login name:	ctc
Login password:	ctc

After the login the NPMC menu appears. Only one connection per CTC is possible at the same time.

Modifications has to be save while changing resp. leaving the menu with 98 (Return and save)

```
CTC-NPMC                Moser-Baer AG
====================================

MAIN SELECTION
1  Status
     (Actual alarms and history, timesource state, version
2  Configuration
     (Configuration of the lines, timesources, alarms ...)
3  Maintenance
     (Update, backup ...)


99 Exit NPMC menu

Enter desired menu number>
```

Attention: NTP reception (CTC as client and / or CTC as server to foreign clients) can be impaired through network traffic load and network devices (Hub, Switch, Router, Firewall...).
The typical values of accuracy may not be reached, if many client requests are performed at the same time.

10. Switch Program

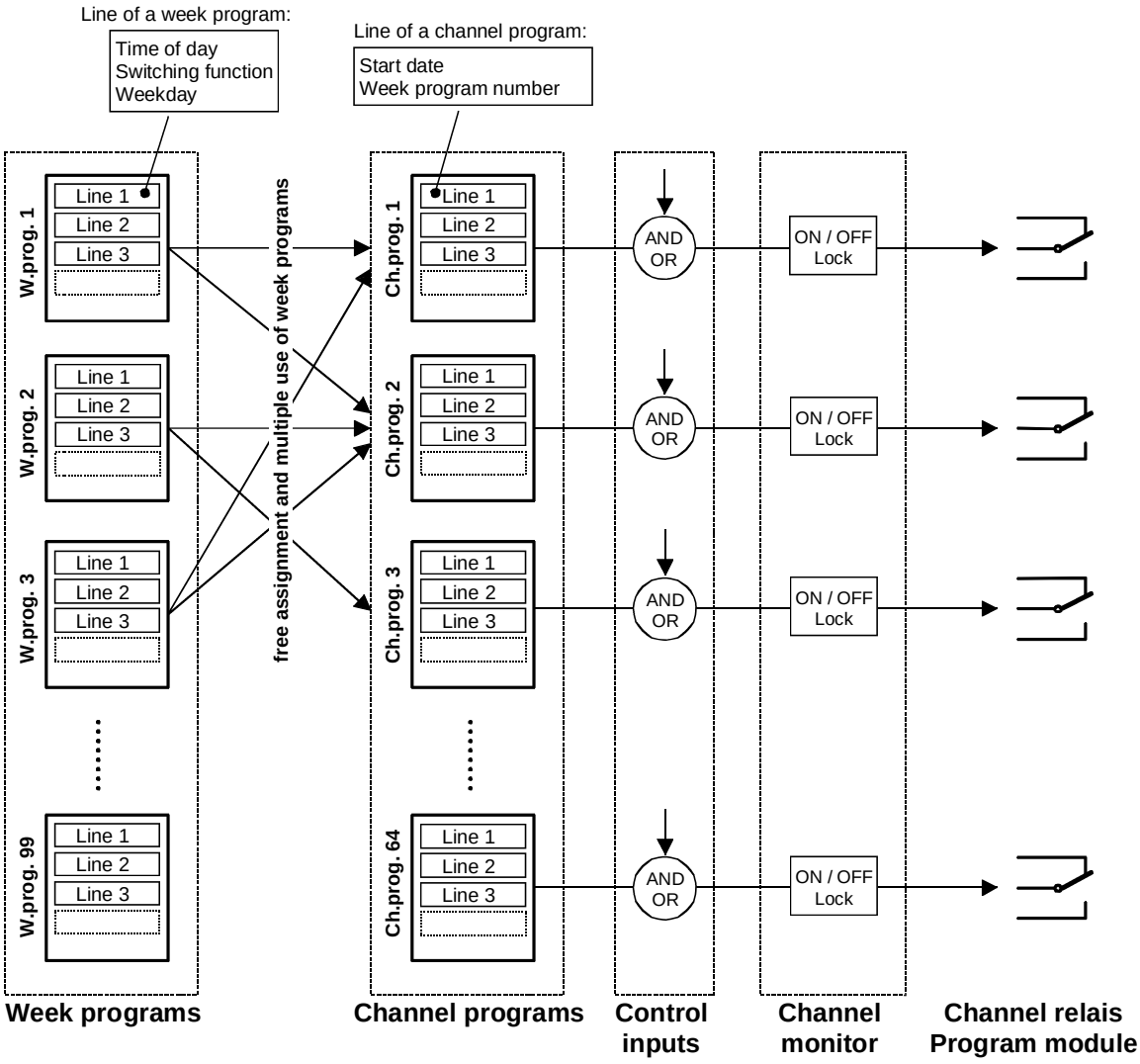
10.1 General Description

The switch program is composed of 99 week programs and 64 channel programs.

The week programs describe the behaviour during one week, independent of date and channel number. Such a week program can contain several lines and each line is composed of time of the day, week days as well as the switching function to be executed at this moment. The 3 possible switching functions are: ON, OFF, Signal 01 – 99 Seconds.

Now the channel programs assign the week programs to the channels, which are dependent on the date. Such a channel program can contain several lines. Each line is composed of the starting date and the number of the week program to be used.

Up to 1000 lines can be programmed in this way. This is the total sum of the lines in the week and channel programs.



Each of the 3 control inputs can be connected with a channel by a AND- or OR combination, i.e. for twilight switch.

The channel monitor offers the possibility to recall the status (ON, OFF) of individual channels, as well as the manual on-off switching of the same. Moreover, a locking allows the freezing of the status of a channel, the status will then not be overwritten by the channel program.

The switch program can be established and edited through the menu guidance. With the PC software 'SwitchEditor' the switch programs can also be worked out on the PC and then be downloaded on the CTC master clock by means of the CTCW software.

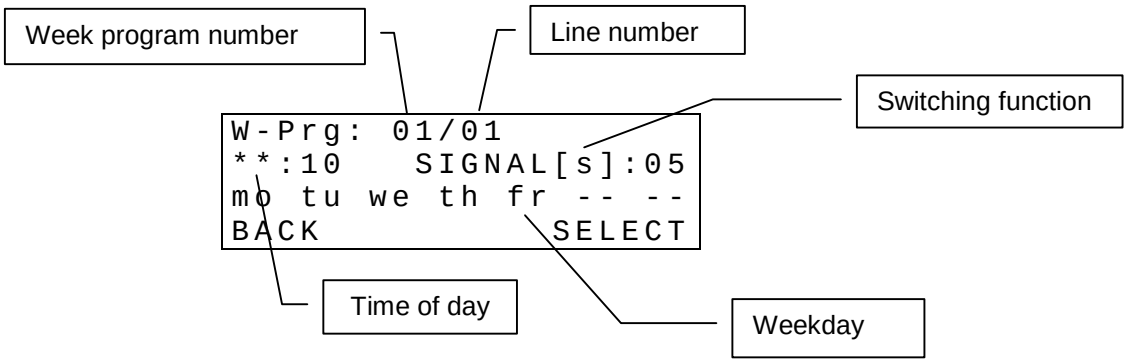
10.2 Week Programs

10.2.1 Description

For most applications a simple week program will be sufficient. The week program editor will be reached over:

```
MENU
  Switch program
    Weekly program
```

The display will only show one line with indication of the number of the week program (01 – 99) and the line number within the week program.



The line entries of a week program are arranged as per the time of the day.

The modification, erasing or addition of a line entry is described in the following chapter. The access will follow as described below (flashing marks in **bold**). :

```
W-Prg: 01/01
**:10   SIGNAL[s]:01
mo tu we th fr -- --
BACK          SELECT
```

Choice of week program (01..99) through cursor keys ↘ / ↘ or numerical entry. Selection through ↵ (SELECT).

```
W-Prg: 01/01
**:10   SIGNAL[s]:01
mo tu we th fr -- --
BACK          SELECT
```

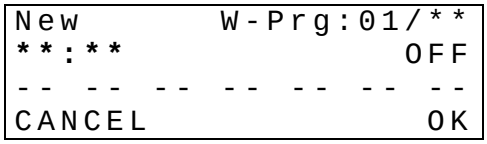
Selection of the line within the week program through cursor keys ↘ / ↘. The current line appears in the display. Elaboration through ↵ (FUNCTION).

```
New entry
Edit entry
Delete entry
BACK          SELECT
```

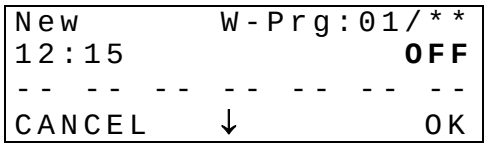
For selection of further procedure, see following chapter.

10.2.2 Insert a New Line Entry

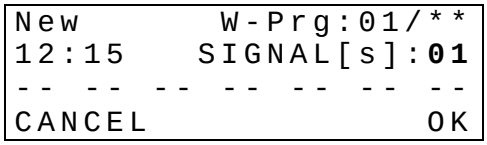
Inserts a new line to the selected week program. The lines will then be arranged as per the time of day.



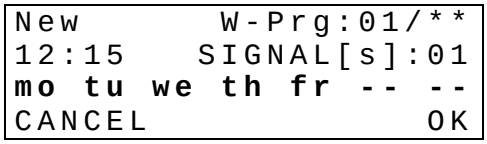
Entry of time of the day through ✳ 0 ... 9, resp. ** as space holder, see example Chapter 10.6. Further with cursor key ↘.



Selection of the switching function (OFF, ON, SIGNAL[s]) through *modify*-key mod. Further with cursor key ↘.



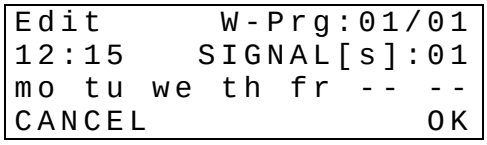
Entry of signal duration (01 – 99 seconds) through ✳ 0 ... 9 (only in case of signal function). Further with cursor key ↘.



Selection of the active week days through direct selection keys ✳ 0 ... 9. Acknowledgement with ▲┘ (OK).

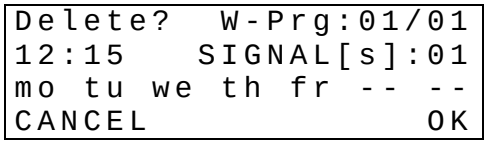
Note: With the cursor keys ↖ / ↘ jumping within the entry mask is possible.

10.2.3 Edit a Line Entry



The selected line appears in the display and can be arranged as described above and stored with ▲┘ (OK). The lines will then be arranged as per the current the time of day.

10.2.4 Delete a Line Entry

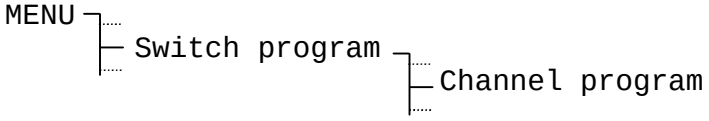


The selected line appears in the display and can be deleted with ▲┘ (OK). Cancel with └▲ (CANCEL).

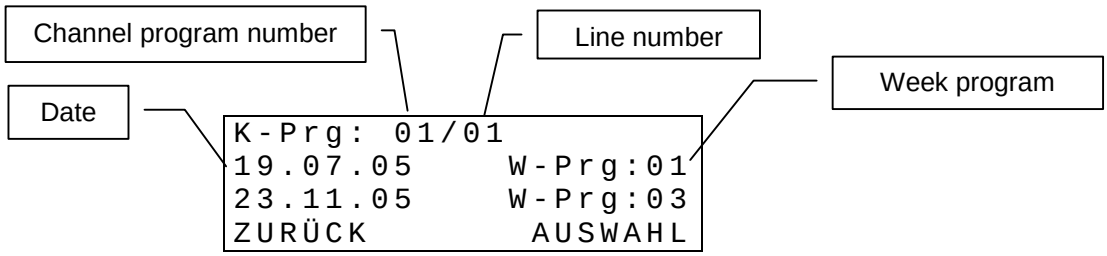
10.3 Channel Programs

10.3.1 Description

In case of complex applications the channel programs combine different week programs according to the date. The channel program editor will be reached through:



Two lines will appear in the display. The indications of the channel program and line numbers refer to the flashing display line.



The line entries of a channel program are arranged as per date.

The changing, deletion or insertion of a line entry is described in the following chapter. The access follows as described below (flashing characters are marked in **bold**):

K-Prg: **01**/01 19.07.05 W-Prg:01 23.11.05 W-Prg:03 BACK SELECT

Choice of a channel program (01..64) through cursor keys / or numerical entry. Selection through (SELECT).

K-Prg: 01/01 **19.07.05 W-Prg:01** 23.11.05 W-Prg:03 BACK FUNCTION

Selection of the line of the channel program through cursor key / . Elaboration through (FUNCTION).

New entry Edit entry Delete entry BACK SELECT

Selection of further procedure, see following chapter.

10.3.2 Insert a New Line Entry

Inserts a new line entry to the selected channel program. The lines will then be arranged according to date again.

New K-Prg:01/** **.**.** W-Prg:01 CANCEL OK

Entry of the date through 0 ... 9, resp. ** as space holder, see example Chapter 10.6. Further with cursor key .

New K-Prg:01/** 19.07.** W-Prg:**01** CANCEL OK

Selection of the week program through 0 ... 9. Acknowledgement (OK).

Note: With cursor keys / jumping within the entry mask is possible.

10.3.3 Edit a Line Entry

Edit K-Prg:01/01 19.07.** W-Prg:01 CANCEL OK

The selected line appears in the display and can be elaborated as described above and stored with (OK). The lines will then be arranged according to the date again.

10.3.4 Delete a Line Entry

```
Delete?   K-Prg:01/01
19.07.**     W-Prg:01

CANCEL              OK
```

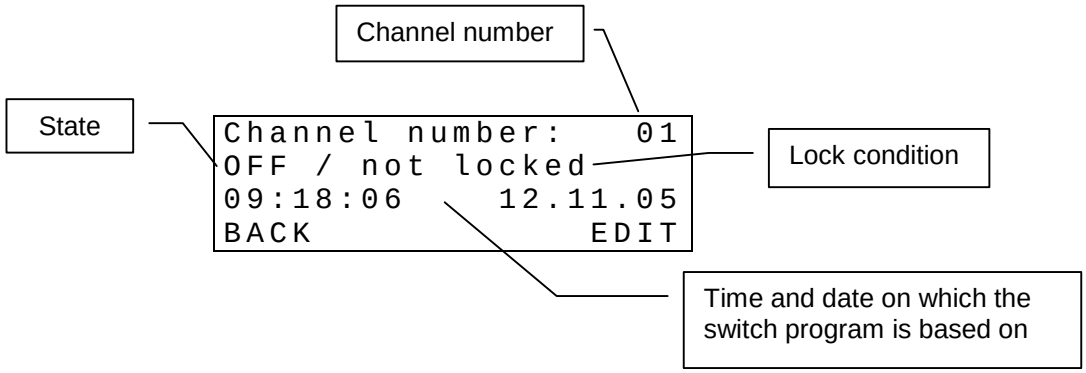
The selected line appears in the display and can be deleted with ▲┘ (OK). Cancel through ┘▲ (CANCEL).

10.4 Channel Monitor

10.4.1 Description

The channel monitor indicates the current switching state of the 64 channels (ON / OFF). The channel state can be manually overwritten and locked if required. A locked channel will no more change its switching state according to the switch program.

MENU ─ Switch program ─ Channel monitor




```
Channel number:   01
OFF / not locked
09:18:06    12.11.05
BACK            EDIT
```

Selection of channel number (01..64) through cursor keys ↖ / ↘ or numerical entry. Change with ▲┘ (EDIT).

```
Channel number:   01
OFF / not locked
09:18:06    12.11.05
BACK      ↓      OK
```

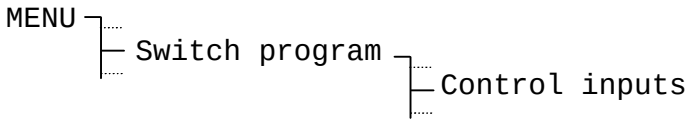
Change of the switching status and locking through the *modify* key mod. Acknowledgement with ▲┘ (OK).

Selection from:
- OFF / not locked
- ON / not locked
- OFF / locked
- ON / locked

Note: Should the locking of a channel be cancelled, in order to be re-introduced to the switch program, one of the alternatives OFF / not locked or ON / not locked shall be selected. The switching state will then be adjusted to the switch program again within 1 – 2 minutes.

10.5 Control Inputs

The 3 control inputs (Annexe A.1) permit the linking of a channel with an external switch (i.e. twilight switch).



Input 1=>Channel: 01
Input 2=>Channel: 02
Input 3=>Channel: 00
BACK EDIT

To each control input a channel can be assigned.

Channel = 00 → Input not occupied

Input 2=>Channel: 02
Input 3=>Channel: 00
Combination: AND
BACK EDIT

Furthermore, the combination mode (AND / OR) can be determined for all 3 control inputs together.

AND combination: The channel only switches ON, when the control input is active (closed) AND the switch program shows an ON-, or Signal command for this time.

OR combination: The channel switches ON, when the control input is active (closed) ODER the switch program shows an ON-, or Signal command for this time.

10.6 Example of a Switch Program

External illumination combined with twilight switch, switched on from 06.00 to 09.00 and from 17.00 to 21.00, Monday to Friday, the whole year.

Week program 1:

W-Prg: 01/01
06:00 ON
mo tu we th fr -- --
BACK SELECT

Line 1: Switching on workdays at 06:00

W-Prg: 01/02
09:00 OFF
mo tu we th fr -- --
BACK SELECT

Line 2: Switching off workdays at 09:00

W-Prg: 01/03
17:00 ON
mo tu we th fr -- --
BACK SELECT

Line 3: Switching on workdays at 17:00

W-Prg: 01/04
21:00 OFF
mo tu we th fr -- --
BACK SELECT

Line 4: Switching off workdays at 21:00

Channel program 1:

```
C-Prg: 01/01
01.01.**     W-Prg:01

BACK             SELECT
```

Line 1: The week program 01 starts every year on 1st January

Linking with twilight switch (control inputs):

```
Input 1=>Channel: 01
Input 2=>Channel: 00
Input 3=>Channel: 00
BACK              EDIT
```

Channel 1 is linked with control input 1 in a AND combination. The illumination will thus only switch on at the programmed times, when the twilight switch announces ‚Dark' .

```
Input 2=>Channel: 00
Input 3=>Channel: 00
Combination:      AND
BACK              EDIT
```

Channel monitor:

```
Channel number:   01
OFF / not locked
09:18:06    12.11.05
BACK              EDIT
```

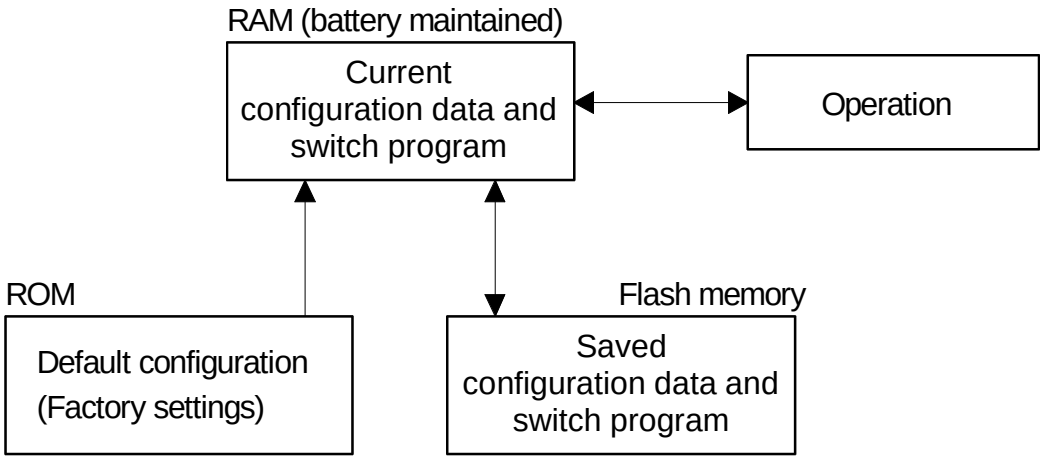
The channel monitor shows the current state of channel 1. The channel shall not be locked.

11. Data Manager – Configurations and Files

This section deals with the administration of configuration data (settings of the CTC) and the switch program as well as the downloading and deletion of files and switch programs on the CTC.

11.1 Administration of the Configuration Data

The current configuration data and the switch program are stored in the battery-maintained RAM and can be saved in the non-volatile flash memory and can also be loaded from this, see diagram. In addition, a function permits the loading of default configuration.



11.2 File Download in General

With the PC software CTCW, the following files can be downloaded to the CTC: System software, season table, telegram files, switch program and menu texts.

This involves use of the RS232 interface, which is available on the terminals of the frame or at the telephone plug in the front panel. Both interfaces fulfil the same function. When occupying the interface in the front panel, the interface RS232 on the terminals of the frame is switched off.

A manual interruption of a download by the CTC is not possible. If the download is not started within one minute of being initialised via the menu, the CTC will revert to normal operation from the download mode.

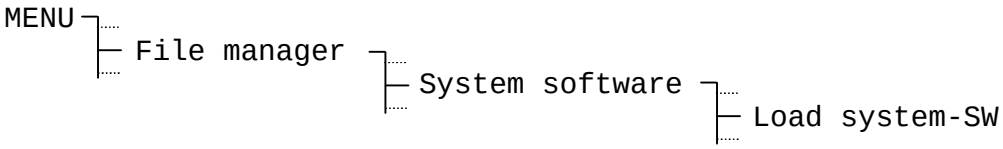
When errors occur during the download of files, these are indicated by means of an error number and text:

```
----- DOWNLOAD -----
Error:              02
Timeout error
       (000000 Bytes)
```

No.	Error message	Troubleshooting
01	Communication error	Check connection
02	Timeout error	Connection interrupted or download not started
03	Checksum error	Transmission error or corrupted file
04	Wrong file	Wrong type of file selected
05	Error writing flash	Major hardware error; can only be repaired in the factory
06	Error erasing flash	
07	Wrong record type	Error in the file: system software, season table, switch program or menu texts
08	Address out of range	
09	Odd address	
10	Request invalid	Error in the CTCW software

11.3 System Software

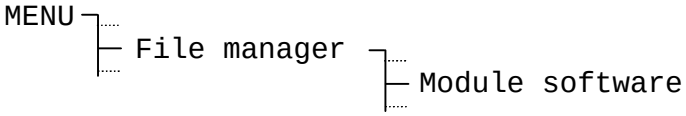
The CTC changes into the Download mode and waits for a new system software through the interface.



Note: Prior the a download the current configuration should be saved in the flash memory (Chapter 11.10). Otherwise it will be overwritten. The restoration of the saved configuration will automatically executed after the download.

11.4 Module Software

The network processor module AB 1.3.3 contains a own microprocessor. The software running on this module may be updated with this menu point.



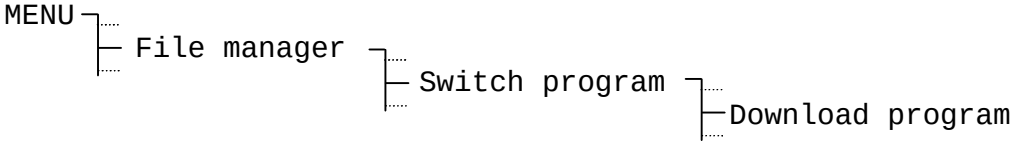
After selecting the corresponding network processor module, the CTC changes into the Download mode and waits for a module software through the interface.

11.5 Switch Program

With the PC software SwitchEditor the switch program can be comfortably established on a PC or notebook and loaded on the CTC through the CTCW software. The switch program memory can also be deleted through this menu point.

11.5.1 Download Switch Program from a PC

After a security inquiry the CTC changes into the download mode and waits for a switch program.



Caution: An existing switch program will be overwritten.

11.5.2 Delete Switch Program

After a security inquiry the present switch program in the RAM of the CTC will be deleted.

```
MENU
  File manager
    Switch program
      Delete program
```

11.6 Telegram File

The CTC provides space for up to 10 telegram files in the flash memory. However, position `01:` is firmly occupied by the IF482 telegram. Construction and further information for the telegram files can be found in Annexe E.

11.6.1 Index

The list of the 10 telegram files will be displayed as per selection of the menu point.

```
MENU
  File manager
    Telegram files
```

Example:

01: IF482.TEL 02: CTC Tele 1 03: --- BACK	- Firmly set through IF482.TEL - Customer specific telegram - Empty space

By means of the cursor keys ↖ / ↘ it is possible to scroll through the list in order to delete telegram files or load new files. Further information in the following chapters.

11.6.2 Delete Telegram File

The access follows through the list of the 10 telegram files.

```
MENU
  File manager
    Telegram files
```

01: IF482.TEL **02: CTC Tele 1** 03: --- BACK SELECT	Mark the telegram files to be deleted with the cursor keys ↖ / ↘ and select it with ▲⌟ (SELECT). After a security inquiry the file with be deleted.

The telegram file `01: IF482.TEL` cannot be deleted.

Caution: Telegram files currently used by serial communication modules should not be deleted.

11.6.3 Download Telegram File from a PC

The access follows through the list of the 10 telegram files.

```
MENU
  File manager
    Telegram files
```

```
01: IF482.TEL
02: CTC Tele 1
03: ---
BACK          SELECT
```

Mark an empty space (`0x: ---`) with the cursor keys ↖ / ↘ and set the CTC in the download mode through the key ↵ (SELECT) and the thereafter following security inquiry.

Caution: Telegram files with the same name will be overwritten, even when trying to store them in a different position.

11.7 Season Table

A new season table (time zone table) can be loaded on the CTC through the interface. For further information concerning the season table, see Chapter 3 and Annexe C.

11.7.1 Download Season Table from a PC

The CTC changes into download mode and waits for a new season table through the interface.

```
MENU
  File manager
    Season table
      Load season table
```

Note: The time zone entries defined by the user are placed within the season table from position 80 on.

11.8 Menu Texts

The CTC provides the opportunity to load menu texts in a customer specific language. Translation of the menu texts and generation of the menu text file is reserved for the manufacturer.

```
MENU
  File manager
    Menu texts
      Load menu texts
```

11.9 Default Configuration

The default configuration (factory settings) can be loaded under this point. The resetting to the default configuration can be executed individually for the master clock part (frame) as well as for each module (board) in the slots A to E. After the selection the execution has to be confirmed.

```
MENU
  File manager
    Default config.
```

Beispiel:

Frame:	Yes	- EDIT (No, Yes)[1]
A Pwr.Supply:	No	- EDIT (No, Yes)
B Imp.Linie:	No	- EDIT (No, Yes)
C MOBALine:	No	- EDIT (No, Yes)
D ---	No	- EDIT (No, Yes)
E ---	No	- EDIT (No, Yes)
Execute		- SELECT
BACK	EDIT	

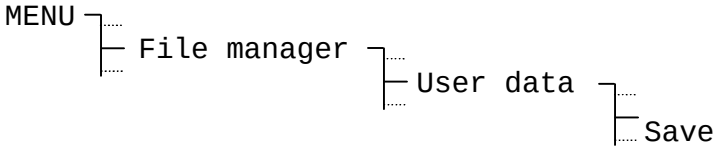
[1] Yes means the default configuration for this part will be loaded.

11.10 User Configuration

The current CTC configuration and the switch program can be saved in the non-volatile flash memory and loaded again from this memory. The settings are thus retained even after a software update.

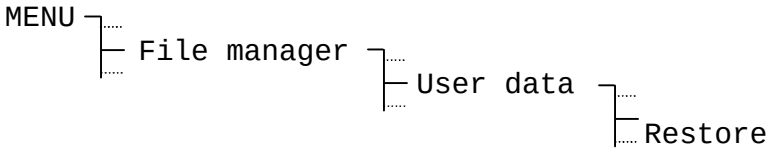
11.10.1 Save

Saves current CTC configuration and the switch program in the flash memory.



11.10.2 Restore

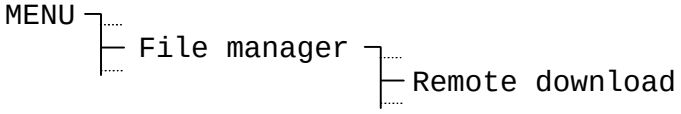
Recalls saved CTC configuration and the switch program from the flash memory into the RAM.



Note: Loading the configuration from the flash memory into the RAM also takes place automatically after an update of the system software.

11.11 Remote Download

Where there is a connection to a PC via the RS232 interface, files (telegram files, season table, etc.) can be downloaded from the PC without manipulation on the CTC. In this case, the RS232 interface is reserved exclusively for file downloads.



Attention: If this function is switched on (YES), the RS232 interface on the frame is not available for further functions (synchronisation through GPS, IF482 telegrams or CAS as well as alarm message through RS232).

12. Alarm Configuration

This chapter treats the configuration of alarm protocols and the masking of individual alarms.

The display of the current and stored alarms is treated in Chapter 14.

12.1 Output of Alarm Protocols

12.1.1 Protocol

The alarm status of the CTC will be issued through the serial interface on the frame. Two different protocols are available for selection.

```
MENU
  Alarm configuration
    Protocol
      Protocol:
```

Selection from: **none, SNMP, Req**

The definition of the alarm protocols **SNMP** and **Req** can be found in Annexe F.5 and F.6. With **none** the issue of alarm protocols is switched off.

Attention: If the output of alarm protocol is switched on (SNMP, Req), the selected interface on the frame is no more available for further functions (synchronisation through GPS, IF482 telegrams or CAS). Excepted is the file download.

12.1.2 Interface

Determines the interface for the alarm protocol output.

```
MENU
  Alarm configuration
    Protocol
      Interface:
```

Selection from: **RS232, RS422, RS485**

12.1.3 Subnet and System Address (only with Req)

The alarm protocol **Req** requires the indication of an address, which distinctly identifies the CTC (see also Annexe F.6). This address is composed of the subnet and system address. The system address is the same as described in Chapter 8.9.

```
MENU
  Alarm configuration
    Protocol
      Subnet addr:
      System addr:
```

Input range: Subnet addr = **001 to 255**, [01] to [FF]
System addr = **001 to 127**, [01] to [7F]

This consists of a decimal input, that is displayed as hexadecimal figures in brackets.

12.2 Alarm Masking

Through this menu point individual alarms can be masked out.

Before an alarm bit in the status menu appears as active alarm (see Chapter 14.1), it will be linked (AND combination) with the corresponding bit in the alarm mask. An 0-bit in the alarm mask causes then the fading out of an alarm bit.

Should for instance a recognised mains failure provoke no alarm on the CTC, this can be faded out through the mask [7FFF] in the mains supply module, see examples.

The setting of an alarm mask will be introduced separately for the frame as well as for all the modules and their lines. Further information for the operation also see Chapter 9.2.

```
MENU
  Alarm configuration
    Alarm mask
      Frame
      A <Module type>
      B <Module type>
      C <Module type>
      D <Module type>
      E <Module type>
```

Reference: ***<Module type>*** Designation of the module (i.e. 4 x Imp.Line) or „---“ if no module is installed.

In the default configuration no alarms are masked out, that means that the values of the alarm mask all are set on **[FFFF]** .

Frame: [FFFF]
CANCEL ↓ OK

Selection of the character to be changed through cursor keys ↖ / ↘. Selection of the characters with *modify* key mod (↓).

Frame: [FFFF]
CANCEL OK

Change of the character through cursor keys ↖ / ↘ or numerical entry ✳ 0 ... 9. Closing of the entry through the key ▲↵ (OK).

Example 1:

Frame: [FFFE]
BACK EDIT

[FFFE] = b’1111 1111 1111 1110

→ Bit 0 cleared

→ Frame alarm bit 0 is masked out (failure of the external time take-over, see also Chap. D.1).

Example 2:

A Power Supply 24V Module: [7FFF]
BACK EDIT

[7FFF] = b’0111 1111 1111 1111

→ Bit 15 cleared

→ Mains power supply module alarm bit 15 is masked out (mains failure, see also Chap. D.2) .

13. Miscellaneous

This chapter treats the adjustments concerning the display presentation, selection of language, DC supply voltage as well as the indications of the software versions.

13.1 Language

The following languages are available: **English, German** and **French**.

```
MENU
  Miscellaneous
    Language
      Language:   English
```

13.2 Display

13.2.1 Contrast

The display contrast can be varied between **0** and **99%**.

```
MENU
  Miscellaneous
    Display
      Contrast[%]:     80
```

13.2.2 Backlight

In the factory setting, the backlighting of the LC Display switches off after 3 minutes (**3 min**). This automatic setting can also be locked **(On)**.

```
MENU
  Miscellaneous
    Display
      Backlight:   3 min
```

Note: A permanently switched on backlight reduces the active reserve power due to the higher current consumption (see Technical Data, Annexe G).

13.3 DC Power Supply Voltage

If the CTC is supplied through an external DC power supply (see connection possibility 1, Chapter 5.1). The nominal DC voltage shall be configured here.

```
MENU
  Miscellaneous
    DC-Supply
      DC-Supply input:
```

Selection from: **24 V, 48 V** or **60 V**

If a mains power supply module AB 5.0.x or a MOBALine driver AB 4.3.0 is installed, the setting of the nominal DC power supply voltage will automatically follow and cannot be changed.

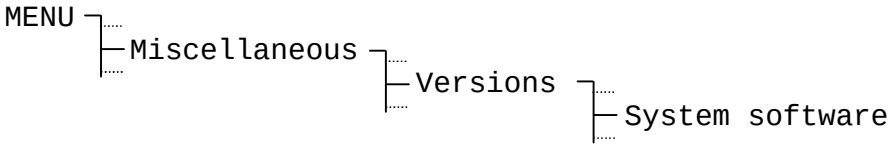
The corresponding lower and upper limit values of the selected voltage can be found in Annexe G.

13.4 Versions

The number and version of the currently installed software and hardware parts can be recalled under this menu item.

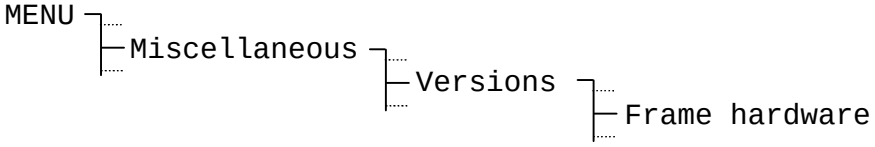
13.4.1 System Software

Information about the currently installed system software on the CTC.



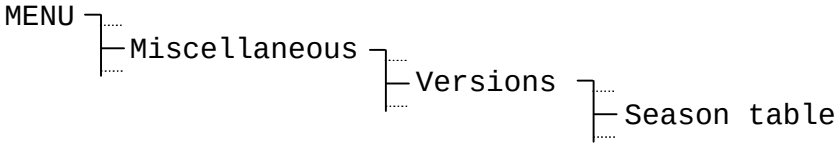
13.4.2 Frame Hardware

Information about the frame hardware.



13.4.3 Season Table

Information about the currently installed season table.



14. State – Alarms and Reception Quality

The state menu provides information about current and past alarms as well as about the reception quality of the external time reference. This menu is reached from the main window via the button L▲ STATE.

14.1 Current Alarms

The current alarms are listed under this item. They are divided according to the master clock unit (frame) and modules with their different lines.

Decoding of the four digit hexadecimal number is given in Annexe 0.

```
STATE ┐
      ├─Current alarms
```

`Frame:  [0000]`	- Alarms of frame
`A <Mod.type>: [0000]`	- Alarms of module in slot A
`B <Mod.type>: [0000]`	- Alarms of module in slot B
`C <Mod.type>: [0000]`	- Alarms of module in slot C
`D <Mod.type>: [0000]`	- Alarms of module in slot D
`E <Mod.type>: [0000]`	- Alarms of module in slot E
`BACK  DETAIL`	

Note: The alarm contact is open as long as at least one active alarm is present. In normal operation without pending alarms it is closed.

Masked out alarms (see Chapter 12.2) are not presented here.

14.2 Stored Alarms

Past alarms are saved here, i.e. a pertinent alarm bit remains set, even when the active alarm has been reset. The structure of the display and its decoding is the same as that for the current alarms.

```
STATE ┐
      ├─ Stored alarms
```

`Frame:  [0000]`	- Alarms of frame
`A <Mod.type>: [0000]`	- Alarms of module in slot A
`B <Mod.type>: [0000]`	- Alarms of module in slot B
`C <Mod.type>: [0000]`	- Alarms of module in slot C
`D <Mod.type>: [0000]`	- Alarms of module in slot D
`E <Mod.type>: [0000]`	- Alarms of module in slot E
`Reset alarms`	- Clears all stored alarm bits
`BACK  DETAIL`	

The stored alarms can be reset with `Reset alarms`.

`Clear stored alarms?`
 	
`(11:15:42/12.04.01)`
`CANCEL  OK`
	The time / date information in brackets corresponds to the time (UTC) of the last erasing.

14.3 Reception Quality

Displays the configured time source and its current quality. The range for the quality details extends from **0** to **100**.

```
STATE ┐
      ├─ Reception quality
      ┘
```

Example:

`Time source: DCF`	- Current time source (display only)
`Quality tele.: 100`	- In the last 10 minutes good reception
`Quality signal: 100`	- Seconds marking okay
`BACK`	

14.3.1 Telegram Quality (Network: Sync. Quality)

The following applies to all time sources **(except network)**: Each read-in and valid time packet increases the value by 10. Accordingly, this value decreases by 10 for each missing or invalid time packet.

The following applies for **network** as time source: Each valid request sequence increases the value by 20. Accordingly, this value decreases by 20 for each invalid request sequence.

Telegram quality (resp. sync. quality) is available for all external time sources.

Note: An ideal figure for telegram quality is 100. All other figures greater than 60 are however adequate for reliable synchronization.

14.3.2 Signal Quality (Network: Valid Packets)

For all time sources **(except network)**: With every read in of the seconds mark, this figure increases by 1. This figure reduces accordingly by 1 for every missing seconds mark.

The following applies for **network** as time source: Number of valid packets of the last request sequence in percent.

Signal quality (resp. valid packets) is available from the following time sources: **DCF, MSF, GPS-TSIP, GPS-NMEA** and **network.**

15. Maintenance

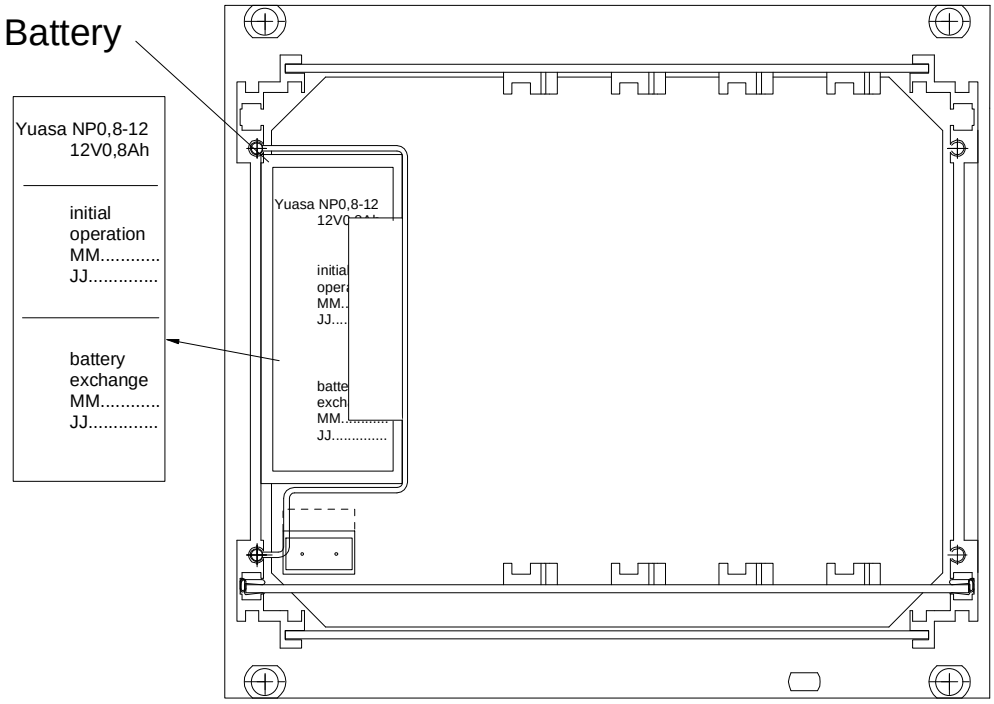
The CompuTime Center is absolutely maintenance-free.

Only the lead-battery has to be changed after a service life of four years.

Please check the battery exchange date written on the tag shown below.

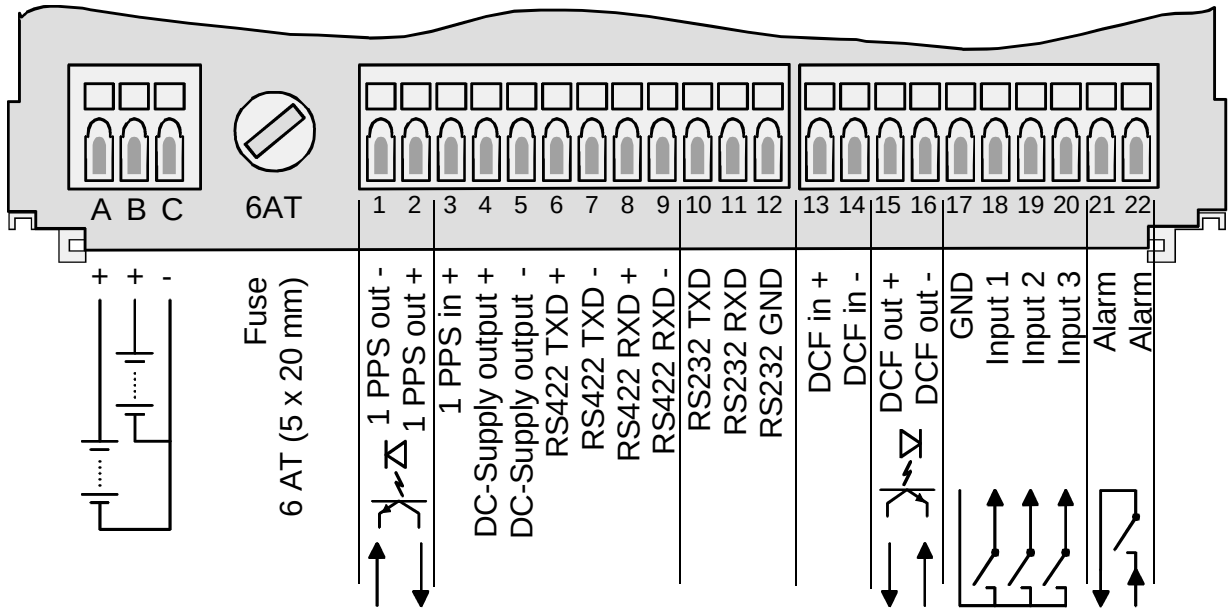
rear view

rear view



A Connection Diagrams

A.1 Frame



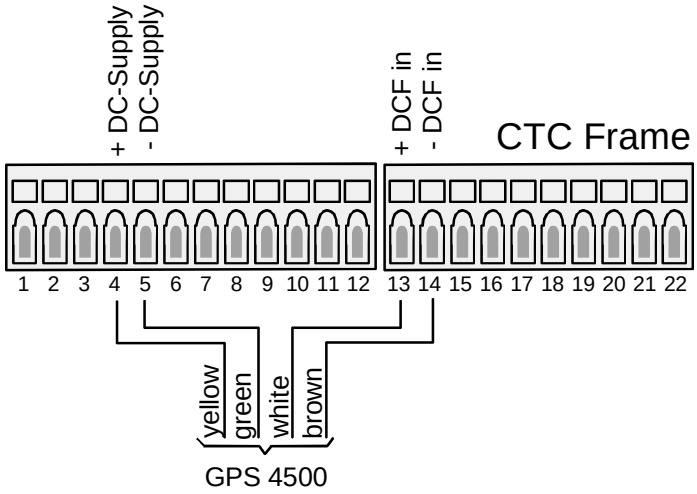
Terminal	Connection	Description
A	External DC power input	Further information in Chapter 5. The inputs are protected through a 6 AT safety-fuse.
B	External battery	
C	GND	
1	1 PPS output -	Looped 1 PPS impulse from GPS receiver, opto coupler, Umax=40V, Imax=20mA, ca. 1.8V @20mA
2	1 PPS output +	
3	1 PPS input	Connection of a GPS receiver together with terminals 6 to 9 (detailed connection diagram see manual for the GPS receiver)
4	DC power supply output +	
5	GND	
6	RS 422 TXD +	Connection of the RS 422 interface of the frame
7	RS 422 TXD -	
8	RS 422 RXD +	
9	RS 422 RXD -	
10	RS 232 TXD	Connection of the RS 232 interface of the frame. Note: The RXD terminal will be de-activated, when the interface of the front plate is used.
11	RS 232 RXD	
12	RS 232 GND	
13	DCF input +	DCF input for the connection of a DCF receiver with current loop output.
14	DCF input -	
15	DCF output +	Synthetic DCF output, opto coupler, Umax=35VDC, I_{on}=10..15mA, I_{off}=2mA @20VDC
16	DCF output -	
17	GND	Control inputs for twilight switch and other devices in connection with the switch program. Active when closed, see also Chap. 10.5
18	Control input 1	
19	Control input 2	
20	Control input 3	
21	Alarm relay	Contact opens at alarm, see Chap. 14.1 Load: 150VDC / 1A / 30W resp. 125VAC / 1A / 60VA
22	Alarm relay	

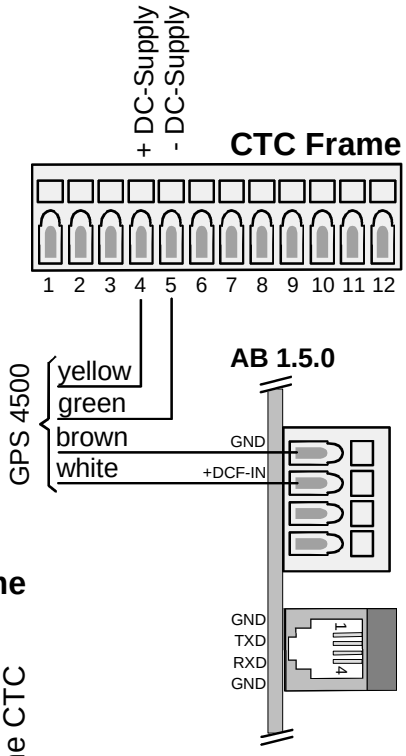
A.2 Modules (Boards)

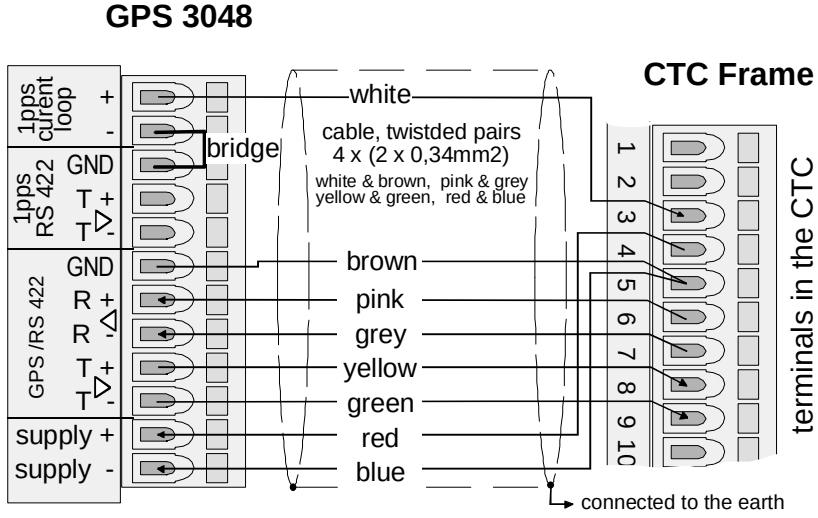
The connection illustrations of the modules can be found in the mentioned chapters:

Module		Chapter	Page
Power Supply 24 V / 48 V	AB 5.0.0 / AB 5.0.1 AB 5.0.2	9.3	24
Impulse Line Driver	AB 4.0.0 / AB 4.0.1	9.4	24
Timecode Generator	AB 4.2.0	9.5	27
MOBALine Driver	AB 4.3.0	9.6	29
Serial Communication	AB 4.1.0	9.7	31
Program Module	AB 9.0.0	9.8	34
Network Processor Module	AB 1.3.3	9.10	36
NPMC Module	AB 1.5.0	9.11	44
Internal Battery Unit	AB 2.0.8	9.9	35

A.3 Connection of GPS 4500 and GPS 3000 Satellite Receiver







B Default Configuration

From the factory, the CTC is supplied in the default configuration. These settings can be reloaded (see Chapter 11.9).

Parameter	Value	Chapter	Page
Time + Date			
Time zone	02	7.2	17
Quartz correction	0.0 s	7.3	17
Timecode output	Off	7.4	17
Synchronisation			
Time source	none	8.1	19
Time zone	00	8.5	20
Interface	RS 232	8.2	19
Baudrate mode	Auto	8.3	19
Baudrate	19200	8.4	20
Synchronization only	No	8.7	20
Alarm timeout	1440 min	8.8	20
Subnet address	01	12.1.3	63
System address	01	8.9 / 12.1.3	21 / 63
Modules			
Impulse Line Driver AB 4.0.x			
Lines 1-4			
State	Stop	9.4.2	24
Line mode	sec	9.4.5	25
Time zone	00	9.4.6	25
Pulse length	0.2	9.4.7	26
Pulse pause	0.3	9.4.7	26
Period	12h	9.4.8	26
Audio Time Code Generator AB 4.2.0			
Lines 1-2			
State	Stop	9.5.2	27
Code	IRIG-B standard (B122)	9.5.4	28
Time zone	00	9.5.5	28
Signal output level (gain) [%]	50	9.5.6	28
MOBALine Driver AB 4.3.0			
Module			
MBL time zones 01 – 20	00 – 19	9.6.7	30
Lines 1-2			
State	Stop	9.6.2	29
Line mode	10 sec	9.6.4	29
Time zone	00	9.6.5	30
Switch program	ON	9.6.6	30
World time	OFF	9.6.6	30

Parameter	Value	Chapter	Page
Serial Communication AB 4.1.0			
Module			
Synch.source	none	9.7.9	33
Pretiming	0	9.7.9	33
Lines 1-2			
State	Stop	9.7.2	31
Line mode	RS232	9.7.4	32
Time zone	00	9.7.5	32
Scriptfile	01 (IF482.TEL)	9.7.6	32
Baudrate	9600	9.7.7	32
Parity	even	9.7.7	32
Databits	7	9.7.7	32
Stopbits	1	9.7.7	32
Pulse mode	OFF	9.7.8	33
Pulse length	0.5 s	9.7.8	33
Program Module AB 9.0.0			
Relais 1 – 4	Channel 1 – 4	9.8.3	34
Network Processor Module AB 1.3.3			
Network config.			
DHCP-Client	OFF	9.10.3.2	37
DHCP name option	OFF	9.10.3.3	37
IP address	000.000.000.000	9.10.3.4	37
Subnet mask	000.000.000.000	9.10.3.4	37
Gateway	000.000.000.000	9.10.3.4	37
System name	CTC	9.10.3.5	38
Login name	CTC	9.10.3.6	38
Login password	CTC	9.10.3.6	38
FTP server	OFF	9.10.3.7	38
Telnet server	ON	9.10.3.7	38
SNTP configuration			
Mode	OFF	9.10.3.8	38
Source 1	0.0.0.0	9.10.3.9	39
Source 2	0.0.0.0	9.10.3.9	39
Source 3	0.0.0.0	9.10.3.9	39
Source 4	0.0.0.0	9.10.3.9	39
Stratum level	1	9.10.3.9	39
Interval	10 (Client),	F.2	87
	32 (Broadcast)	F.2	87
Break	600	F.2	87
Delay	00	F.2	87
Filter size	14	F.2	87
Valid entries	10	F.2	87
Port	123	F.2	87
Sync Lost	120	F.2	87
Rcv timeout	002	F.2	87
Respond time	100	F.2	87
Jitter	15	F.2	87
Asymmetry	50	F.2	87
SMTP/SNMP config.			
Email address 1	-	9.10.3.13	41
Email address 2	-	9.10.3.13	41
Email server IP	0.0.0.0	9.10.3.11	40
Sender address	-	9.10.3.12	40
Trap IP	0.0.0.0	9.10.3.14	41

Parameter	Value	Chapter	Page
Netzwerkprozessor Modul AB 1.5.0			
Network config.			
DHCP-Client	ON	9.11.4.1	45
IP address	0.0.0.0	9.11.4.2	45
Subnet mask	0.0.0.0		
Gateway	0.0.0.0		
System name	CTC	9.11.4.3	46
Login name	ctc (not configurable)		
Login password	ctc	9.11.4.4	46
FTP server	ON	9.11.4.5	46
Telnet server	ON	9.11.4.5	46
SSH server	ON	9.11.4.5	46
NTP Configuration			
Source 1	0.0.0.0	9.11.5	46
Source 2	0.0.0.0	9.11.5	46
Source 3	0.0.0.0	9.11.5	46
Source 4	0.0.0.0	9.11.5	46
Broadcast mask	0.0.0.0	9.11.5.2	47
Broadcast interval	6 (2^x)	9.11.5.3	47
Max. stratum level	0 (not activated)	9.11.5.4	47
Multicast Configuration			
Mode	OFF	9.11.6.1	47
Multicast address	239.192.54.1	9.11.6.2	48
Port	16'000	9.11.6.3	48
Interval	6 (2^x)	9.11.6.4	48
Hops	3	9.11.6.5	48
Time zone entries (1..15)	UTC	9.11.6.6	48
SMTP/SNMP Configuration			
Email server	-	9.11.7.2	49
Sender address.	-	9.11.7.3	49
Email address 1	-	9.11.7.4	49
Email address 2	-	9.11.7.4	49
Trap-IP	0.0.0.0	9.11.7.5	49
Switch Program			
Control inputs 1 – 3	Channel 00	10.5	56
Combination	AND	10.5	56
File Manager			
Remoted download	NO	11.11	62
Alarm configuration			
Protocol			
Protocol	none	12.1.1	63
Interface	RS 232	12.1.2	63
Subnet address	01	12.1.3	63
System address	01	12.1.3	63
Alarm mask			
All masks	FFFF	12.2	64
Miscellaneous			
Language	German	13.1	65
Contrast	40 %	13.2.1	65
Backlight	3 min automatic	13.2.2	65
DC supply input	24 V	13.3	65

C Time Zone Table

Time zone entries in the standard season table (version 9.0).

Time zone	City / State	UTC Offset	DST Change	Standard → DST	DST → Standard
00	UTC (GMT), Monrovia, Casablanca	0	No		
01	London, Dublin, Edinburgh, Lisbon	0	Yes	Last Sun. Mar. (01:00)	Last Sun. Oct. (02:00)
02	Brussels, Amsterdam, Berlin, Bern, Copenhagen, Madrid, Oslo, Paris, Rome, Stockholm, Vienna, Belgrade, Bratislava, Budapest, Liubliana, Prague, Sarajevo, Sofia, Vilnius, Warsaw, Zagreb	+1	Yes	Last Sun. Mar. (02:00)	Last Sun. Oct. (03:00)
03	Athens, Istanbul, Minsk, Helsinki, Riga, Tallinn, Kaliningrad	+2	Yes	Last Sun. Mar. (03:00)	Last Sun. Oct. (04:00)
04	Bucharest, Romania	+2	Yes	Last Sun. Mar. (03:00)	Last Sun. Oct. (04:00)
05	Cairo, Pretoria, Harare	+2	No		
06	Dhaka	+6	Yes	Wed. 31. Mar. (22:59) (2010)	Sun. 31. Oct. (23:59) (2010)
07	Tel Aviv	+2	Yes	Last Fri. Mar. (02:00)	2nd Sun. Oct. (02:00) (2010)
08	Kuwait City	+3	No		
09	Moscow, St. Petersburg, Volgograd	+3	Yes	Last Sun. Mar. (02:00)	Last Sun. Oct. (03:00)
10	Tehran	+3.5	Yes	Sun. 21. Mar. (00:00) (2010)	Tue. 21. Sep. (00:00) (2010)
11	Abu Dhabi, Muscat, Tbilisi	+4	No		
12	Kabul	+4.5	No		
13	Yekaterinburg, Russia	+5	Yes	Last Sun. Mar. (02:00)	Last Sun. Oct. (03:00)
14	Tashkent	+5	No		
15	Mumbai, Calcutta, Madras, New Delhi, Colombo	+5.5	No		
16	Astana, Thimphu	+6	No		
17	Bangkok, Hanoi, Jakarta	+7	No		
18	Beijing, Chongqing, Hong kong, Singapore, Taipei, Urumqi	+8	No		
19	Tokyo, Osaka, Sapporo, Seoul	+9	No		
20	Yakutsk, Russia	+9	Yes	Last Sun. Mar. (02:00)	Last Sun. Oct. (03:00)
21	South Australia: Adelaide	+9.5	Yes	1st Sun. Oct (02:00)	1st Sun. Apr. (03:00)
22	Northern Territory: Darwin	+9.5	No		
23	Queensland: Brisbane, Guam, Port Moresby	+10	No		
24	NSW, Victoria: Sydney, Canberra, Melbourne	+10	Yes	1st Sun. Oct. (02.00)	1st Sun. Apr. (03:00)
25	Tasmania: Hobart	+10	Yes	1st Sun. Oct. (02:00)	1st Sun. Apr. (03:00)
26	Vladivostok	+10	Yes	Last Sun. Mar. (02:00)	Last Sun. Oct. (03:00)
27	Solomon Is. , New Caledonia	+11	No		

28	Auckland, Wellington	+12	Yes	Last Sun. Sep. (02:00)	1st Sun. Apr. (03:00)
29	Marshall Is.	+12	No		
30	Azores	-1	Yes	Last Sun. Mar. (00:00)	Last Sun. Oct. (01:00)
31	Middle Atlantic	-2	No		
32	Brasilia	-3	Yes	3rd Sun. Oct. (00:00)	3rd Sun. Feb. (00:00) (2010)
33	Buenos Aires	-3	No		
34	Newfoundland, Labrador	-3.5	Yes	2nd Sun. Mar. (00:01)	1st Sun. Nov. (00:01)
35	Atlantic Time (Canada)	-4	Yes	2nd Sun. Mar. (02:00)	1st Sun. Nov. (02:00)
36	La Paz	-4	No		
37	Bogota, Lima, Quito	-5	No		
38	New York, Eastern Time (US & Canada)	-5	Yes	2nd Sun. Mar. (02:00)	1st Sun. Nov. (02:00)
39	Chicago, Central Time (US & Canada)	-6	Yes	2nd Sun. Mar. (02:00)	1st Sun. Nov. (02:00)
40	Tegucigalpa, Honduras	-6	No		
41	Phoenix, Arizona	-7	No		
42	Denver, Mountain Time	-7	Yes	2nd Sun. Mar. (02:00)	1st Sun. Nov. (02:00)
43	Los Angeles, Pacific Time	-8	Yes	2nd Sun. Mar. (02:00)	1st Sun. Nov. (02:00)
44	Anchorage, Alaska (US)	-9	Yes	2nd Sun. Mar. (02:00)	1st Sun. Nov. (02:00)
45	Honolulu, Hawaii (US)	-10	No		
46	Midway Islands (US)	-11	No		
47	Mexico City, Mexico	-6	Yes	1st Sun. Apr. (02:00)	Last Sun. Oct. (02:00)
48	Samara, Russia	+4	Yes	Last Sun. Mar. (02:00)	Last Sun. Oct. (03:00)
49	Novosibirsk, Russia	+6	Yes	Last Sun. Mar. (02:00)	Last Sun. Oct. (03:00)
50	Krasnoyarsk, Russia	+7	Yes	Last Sun. Mar. (02:00)	Last Sun. Oct. (03:00)
51	Irkutsk, Russia	+8	Yes	Last Sun. Mar. (02:00)	Last Sun. Oct. (03:00)
52	Magadan, Russia	+11	Yes	Last Sun. Mar. (02:00)	Last Sun. Oct. (03:00)
53	Anadyr, Russia	+12	Yes	Last Sun. Mar. (02:00)	Last Sun. Oct. (03:00)
54	Ittoqqortoormiit, Greenland	-1	Yes	Last Sun. Mar. (00:00)	Last Sun. Oct. (01:00)
55	Nuuk, Greenland	-3	Yes	Last Sat. Mar. (22:00)	Last Sat. Oct. (23:00)
56	Qaanaaq, Greenland	-4	Yes	2nd Sun. Mar. (02:00)	1st Sun. Nov. (02:00)
57	Western Australia: Perth	+8	No		
58	Caracas	-4.5	No		
59	CET standard time	+1	No		
60	Santiago, Chile	-4	Yes	2nd Sun. Oct. (00:00)	2nd Sun. Mar. (00:00)
61	Chile, Easter Island	-6	Yes	2nd Sat. Oct. (22:00)	2nd Sat. Mar. (22:00)
62	Baku	+4	Yes	Last Sun. Mar. (04:00)	Last Sun. Oct. (05:00)
63	Islamabad, Karachi, Pakistan	+5	No	Thu. 15. Apr. (00:00) (2010)	Sun. 31. Oct. (00:00) (2010)
64	Apia, Samoa	-11	Yes	Last Sun. Sep. (00:00)	First Sun. Apr. (00:00) (2011)

Legend:

UTC:	Universal Time Coordinate, equivalent to GMT
DST:	Daylight Saving Time
DST Change:	Daylight Saving Time changeover
Standard → DST:	Time change from Standard time (Winter time) to Summer time
DST → Standard:	Time change from Summer time to Standard time (Winter time)

Example:

2nd last Sun. Mar. (02:00) Switch over on the penultimate Sunday in March at 02.00 hours local time.

Attention: As usual, the time table is adapted each year. You can download the newest time table from our homepage: *www.mobatime.com* ➔ *Downloads* ➔ *Moba-Software* ➔ *Time Zone Table*. If the delivered device contains a newer version as showed in this manual, it's recommended to check the time zone entries.

D Alarm List

For the presentation of the alarms a 16 bit word in the master clock unit (frame) is at disposal. The modules (boards) possess a 16 bit word for the whole module and one word for each line.

Each alarm is attributed to a bit number. This attribution can be found in the following tables. The words will be displayed in a 4-digit hexadecimal number.

The hexadecimal range of numbers is defined from 0 to F, whereby F represents 15. The alarm word appears as the hexadecimal sum of all current alarm bits. The rules for the hexadecimal calculation must be observed.

Decimal	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Hexadecimal	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F

Some examples

0004	0004
0008	0018
000C	001C

Example 1:

```
Frame:          [0011]
A Pwr.Supply:   [8000]
B Ser.Comm.:    [0001]
BACK            DETAIL
```

The view shows the frame alarm word and the module alarm word for slot A and B. Detailed view of the module alarms through ▲ (DETAIL).

```
B Serial Com.
  Module:       [0001]
  Line 1:       [0008]
  Line 2:       [0020]
BACK
```

Frame: [**0011**] = alarm **0001** (failure of time take-over) and alarm **0010** (error in the quartz trimming)

Power Supply: [**8000**] = alarm **8000** (Mains power failure)

Ser. comm.: Module [**0001**] = alarm **0001** (at least 1 alarm on a line)
Line 1 [**0008**] = alarm **0008** (no answer from supervised device)
Line 2 [**0020**] = alarm **0020** (faulty telegram file)

D.1 Frame Alarms

Bit	HEX - Value	Alarm
0	**0001**	Failure of external time acceptance: Within the configured alarm timeout (Chapter 8.8), no valid time package was read in from the external time source.
1	**0002**	Internal hardware error
2	**0004**	Undervoltage of the DC power supply voltage, see table below
3	**0008**	Overvoltage of the DC power supply voltage, see table below
4	**0010**	Error in the automatic quartz trimming: External time source is imprecise or internal quartz is faulty. Fault is automatically reset as soon as the deviation from the external time source to the internal quartz sinks again below 50 ppm.
5	**0020**	Checksum of the saved configuration data is incorrect

Table with the limits for under and over voltage (alarm hysteresis = 2 V):

Nominal DC Power Supply	Undervoltage	Overvoltage
24 V	19 V	32 V
48 V	38 V	60 V
60 V	50 V	72 V

D.2 Alarms Mains Power Supply 24 V / 48 V / 60 V(AB 5.0.0 / AB 5.0.1 / AB 5.0.2)

Module

Bit	HEX - Value	Alarm
15	**8000**	Mains power failure

D.3 Alarms Impulse Line Driver (AB 4.0.0 / AB 4.0.1)

Module

Bit	HEX - Value	Alarm
0	**0001**	Alarm on at least one line, see alarms of the lines.
15	**8000**	Hardware error on module

Line

Bit	HEX - Value	Alarm
0	**0001**	Line output is overloaded, electronic overload fuse has reacted.
15	**8000**	Hardware error on module

D.4 Alarms Audio Time Code Generator (AB 4.2.0)

Module

Bit	HEX - Value	Alarm
0	**0001**	Alarm on at least one line, see alarms of the lines

Line

Bit	HEX - Value	Alarm
0	**0001**	Line output overloaded, electronic overload fuse has reacted.

D.5 Alarms MOBALine Driver (AB 4.3.0)

Module

Bit	HEX - Value	Alarm
0	**0001**	Alarm on at least one line, see alarms of the lines

Line

Bit	HEX - Value	Alarm
0	**0001**	Line output overloaded, electronic overload fuse has reacted.

D.6 Alarms Serial Communication (AB 4.1.0)

Module

Bit	HEX - Value	Alarm
0	**0001**	Alarm on at least one line, vide Alarms of the lines.

Line

Bit	HEX - Value	Alarm
0	**0001**	Internal time error on module
1	**0002**	Faulty time zone configured
2	**0004**	Wrong answer from supervised device (see Annexe E, commands *!SU!test!* and *!AS!*)
3	**0008**	No answer from supervised device (see Annexe E, commands *!SU!any!, !SU!test!, !SU!time!, !AS!* and *!TO!*)
4	**0010**	Communication error (see Chapter 9.7.7: baudrate, number of data bits, parity, number of stop bits)
5	**0020**	Faulty telegram file, syntax and format, see Annexe E
6	**0040**	Faulty configuration data
15	**8000**	Telegram file not found

D.7 Alarms Program Module (AB 9.0.0)

This module has no alarms.

D.8 Alarms Network Processor Module (AB 1.3.3)

Module

Bit	HEX - Value	Error
0	**0001**	No communication with the network processor
1	**0002**	Configured e-mail server not found
2	**0004**	Error at the e-mail transmission
4	**0010**	Incompatible software version on network processor
5	**0020**	Trap send error

D.9 Alarms NPMC Network Processing Master Clock Module (AB 1.5.0)

Module

Bit	HEX - Value	Error
0	**0001**	No communication between NPMC module and CTC frame
1	**0002**	Communication error 1 (at first startup)
2	**0004**	Communication error 2
3	**0008**	External synchronization source failed (GPS, DCF)
4	**0010**	Error in quartz adjustment
5	**0020**	Error with e-mail server
6	**0040**	Internal stratum limit exceeded Check time source settings: ➔ Telnet: 2 Configuration ➔ 2 Time handling ➔1 Time source settings ➔ 4 Stratum limit for synch alarm: 1 – 16.
7	**0080**	NTP lost synchronization source
8	**0100**	NTP malfunction
9	**0200**	Time zone error (faulty time zone table)

E Telegram File Format for Module AB 4.1.0

Printout of the technical description file, which shows the format and all possible commands of a telegram file. The latest telegram definitions can be found on the optional CTCW CD-ROM.

```
!CTC
;-- Start of File (always on the first line) ------------------------

;DEFINITIONS CONFIGURATION FILE FOR SERIAL COMMUNICATION AB 4.1.0
;*************************************************************

;Customer:
;Date:
;Author:
;File:
;Interface:

;-- Output string ---------------------------------------------------
;   the output string has a similar format to the printf command in the
;   programming language "C".
;   !TS! - String with format information
;   !TV! - Variables list in output sequence
;   The formats and variables available can be seen below:

;string with format information
!TS!".......%d....%d..."

;variables list
!TV!var1,var2,..

        ;-- Control and special characters:
        ;   "       ->      String beginning/end
        ;   \"      ->      "
        ;   \xFE    ->      h'FE   (byte binary)
        ;   \\      ->      \
        ;   \n      ->      new line <CR> <LF> (h'0D h'0A)
        ;   %%      ->      %
        ;   %...    ->      Format information (see below)
        ;-- Possible formats:
        ;%dn ascii-dec  where n=1/2/3/4 (number of decimal points)
        ;   i.e.   variable value d'40  => 40  @ n=2
        ;                               => 040 @ n=3

        ;%X  ascii-hex
        ;   e.g.   variable value d'40  => 28

        ;%c  char (binary)
        ;   e.g.   variable value d'40  => h'28

        ;%s  string (always up to ,(comma) see text tables)
        ;    e.g.   string         Jan,  => Jan

        ;%b  hex-output of a asciihex-string (always up to ,(comma) see
        ;    text tables)
        ;    e.g.   string         120A  => h'12 h'0A

        ;-- Possible variables:
        ;
        ;Name:  Description:             Range:    Format:
        ;-------|----------------------|-----------|------
        ;
        ;MSE    (Millisecond)          (0..999)    1W
        ;HSE    (Hundredth of a second)(0..99)     1B
        ;ZSE    (Tenth of a second)    (0..9)      1B
        ;SEK    (Second)               (0..59)     1B
        ;MIN    (Minute)               (0..59)     1B
```

```
        ;STD    (12h or 24h format)    (0..12)
        ;                               or(0..24)  1B
        ;JAR    (Year)                 (0..99)     1W
        ;                               or (1990..2089)
        ;MTG    (Day of month)         (0..31)     1B
        ;JTG    (Day of year)          (1..366)    1W
        ;WTG    (Day of week)          (0..6)      1W text table !WT!
        ;                              (Su..Sa)
        ;KAW    (Calendar week)        (1..53)     1B
        ;MON    (Month)                (1..12)     1W text table !MO!
        ;SAI    (Season)               (0..2)      1W text table !SA!
        ;                              (Win/Sum/UTC)
        ;AKS    (Season change         (0/1)       1W text table !AK!
                 announcement)
        ;AMF    (am/pm-Flag)           (0/1)       1W text table !AM!
        ;SST    (Season state)         (0..3)      1W text table !ST!
        ;       (Bit 0 = Early warning bit)
        ;       (Bit 1 = Summer bit)
        ;CHS    (Checksum)             (0..255)    1B
        ;XCH    (XOR Checksum)         (0..255)    1B
        ;X1C    (XOR Checksum low nibble in ASCII) (0..9, A..F)   1B
        ;X2C    (XOR Checksum high nibble in ASCII)(0..9, A..F)   1B
        ;
        ;Example.  Time telegram with following format
        ;
        ;       "Date: tt:mm:yy Time: hh:mm:ss,mmm<CR><LF>"
        ;
        ;!TS!"Date: %d2:%s:%d2 Time: %d2:%d2:%d2,%d3\n"
        ;!TV!MTG,MON,JAR,STD,MIN,SEK,MSE
;---------------------------------------------------------------------

;-- Hours format -----------------------------------------------------
!PM!
        ;Hours format 12h with am/pm flag
        ;without this entry:   24h format
;---------------------------------------------------------------------

;-- Command string ---------------------------------------------------
!CS!n!ll!"ss..."!
        ;
        ;n  =   Type of command ('3', '4' or 'a')
        ;       n=3 send telegram on request immediately (once)
        ;       n=4 send telegram on request on the next second (once)
        ;       n=a send telegram periodically (see !TI!p! and !SO!)
        ;
        ;ll =   Length of command string in bytes ('01...20')
        ;       ll=00 command string disabled
        ;
        ;ss...  Command string
        ;       (max. 20 characters - has to fit with parameter 'll')
        ;       Use '?' for Wildcards. This character acts as space holder
        ;       for any character.
        ;
        ;Example:
        ;       Definition of a command for an immediate telegram
        ;       output on request (command n=3) :
        ;       'time<CR>' (characters ll=05)
        ;
        ;       !CS!3!05!"time?"!
;---------------------------------------------------------------------

;-- Sendoffset of telegram output ------------------------------------
!SO!hh:mm:ss!
        ;
        ;Sendoffset from 00:00:00 hour for periodical telegram output
        ;(!CS!a!...).
        ;
        ;hh =   hour ('00..23')
        ;mm =   minute ('00..59')
        ;ss =   second ('00..59')
;---------------------------------------------------------------------
```

```
;-- Interval automatic telegram output -----------------------------
!TI!p!hh:mm:ss!
        ;
        ;Interval of periodical time output.
        ;
        ;p  =   constant
        ;hh =   hour ('00..23')
        ;mm =   minute ('00..59')
        ;ss =   second ('00..59')
        ;
        ;Example:
        ;       Time output every 5 seconds, start at 06:00 hour
        ;
        ;       !TI!p!00:00:05!
        ;       !SO!06:00:00!
;---------------------------------------------------------------------

;-- Synchronization mode -------------------------------------------
!SM!m!
        ;Mode of synchronization:
        ;
        ;m = tcorr   The telegram output will be pretimed (-90..995ms).
        ;            Use command !TC!xxx! to set the pretiming value.
        ;
        ;from module SW version 1.00
        ;m = char    The telegram string containing the time information
        ;            'x+1' will be sent on the second 'x'. A synchronization
        ;            character will then be sent on the second 'x+1'.
        ;            Use command !SZ! to define the character.
        ;
        ;from module SW version 1.07
        ;m = char    The telegram string containing the time information
        ;           and a synchronisation character will be sent.
        ;            The telegram string can be pretimed with !TC!xxx (0..995ms).
        ;            The synchronisation character can be pretimed with !PS!xxx!
        ;            (0..800ms).
        ;            If !TC! is set to zero the software acts like the older versions

!SZ!cc!
        ;Synchronization character:
        ;
        ;cc = 00..FF  ASCII-Code of synchronization character in hex-format

!TC!xxx!
        ;Pretiming telegram:
        ;
        ;from module SW version 1.00
        ;xxx = 000..800  Pretiming in Milliseconds, use only 5ms steps
        ;
        ;from module SW version 1.04
        ;xxx = -90..800  Pretiming in Milliseconds, use only 5ms steps
        ;
        ;from module SW version 1.07
        ;xxx = -90..995  Pretiming in Milliseconds, use only 5ms steps

!PS!xxx!
        ;Pretiming synchronization character (from module SW version 1.07):
        ;
        ;xxx = 000..800  Pretiming in Milliseconds, use only 5ms steps

        ;Ex. 1:      The telegram should be sent 20ms earlier than the
        ;            second-change:
        ;
        ;            !SM!tcorr!
        ;            !TC!020!
        ;
        ;Ex. 2:      The synchronization character h'FE should mark the
        ;            validity of the time information. The telegram string
        ;            is 990ms and the synchronisation character 5ms pretimed.
        ;
```

```
        ;            !SM!char!
        ;            !SZ!FE!
        ;            !TC!990!
        ;            !PS!005!
;-----------------------------------------------------------------

;-- Supervision of the external device -----------------------------
!SU!m!
        ;Supervision mode:
        ;
        ;m = none    No supervision.
        ;m = any     Supervision without test, received characters
        ;            (not equal command string) are interpreted as OK.
        ;m = test    Supervision with test, received characters are
        ;            compared with alivestring (!AS!"ss.."!). An error
        ;            is generated after the second receive of a wrong
        ;            string.
        ;m = time    Supervision with time test, the external device
        ;            sends its time information as alivestring. The
        ;            comparison will generate an error if the difference
        ;            of the loop-backed time and the line time is greater
        ;            than the given tolerance.
        ;            Use command !ZT!eee! to set tolerance.
        ;
        ;A timeout will also generate an error, if the AB4.1.0 has not
        ;received a valid alivestring during the configured time. To set
        ;the timeout use !TO!xxxx!.

!TO!xxxx!
        ;Timeout of alive message:
        ;
        ;xxxx = 0000..9999  Timeout in minutes, does the supervised device
        ;                   not send a valid alivestring during the
        ;                   configured timeout time, an error is generated.

!AS!"ss.."!
        ;Alivestring of external device (only !SU!test!):
        ;
        ;ss...  Alivestring
        ;       (max. 20 characters)
        ;       Use '?' for Wildcards. This character acts as space holder
        ;       for any character.

!ZF!f!
        ;Format of time information in alivestring (only !SU!time!):
        ;
        ;f = ascii  Time information is ASCII coded (2 bytes per entry)
        ;f = bin    Time information is binary coded (1 byte per entry)

!LZ!ll!
        ;Length of alivestring containing time information (only !SU!time!):
        ;
        ;ll = 01..64

!ZP!hh,mm,ss!
        ;Position of time information in alivestring (only !SU!time!):
        ;
        ;hh = 01..64   Position of hours
        ;mm = 01..64   Position of minutes
        ;ss = 01..64   Position of seconds

!ZT!eee!
        ;Time tolerance (only !SU!time!):
        ;
        ;eee = 000..255  Acceptable time tolerance in seconds
        ;
        ;Ex. 1:     The external device sends at least all 10 minutes
        ;           a constant string as alive message (string: "OK").
        ;           If the device fails and the AB4.1.0 has not received
        ;           this alive message within the 10 minutes, it will
        ;           generate an error:
```

```
        ;
        ;           !SU!test!
        ;           !AS!"OK"!
        ;           !TO!0010!
        ;
        ;Ex. 2:     The AB4.1.0 should supervise the time of the external
        ;           device in a loop-back manner. A deviation to the
        ;           line time of more than 5 seconds or no message during
        ;           20 minutes should cause an error.
        ;           Format of alivestring: "Time=13:02:58 Date=23.09.00<CR>"
        ;
        ;           !SU!time!
        ;           !ZT!ascii!          ;time in string is ASCII coded
        ;           !LZ!28!             ;length of time string
        ;           !ZP!06,09,12!       ;position of time information
        ;           !ZT!005!            ;time tolerance
        ;           !TO!0020!           ;timeout
;-------------------------------------------------------------------

;-- Area for checksum calculation-----------------------------------
;   from module SW version 1.03
!CK!xx,yy!
        ;xx = position of the first byte (first character = 0)
        ;yy = position of the last byte + 1

;If !CK! is not defined, the checksum calculation starts with the
;first character and ends with the last character before the checksum.
;-------------------------------------------------------------------

;===================================================================
;The following applies generally to the text tables:
;   Name of the table:           !xx!
;   Separating character of the entries:  , (comma)
;   max. 16 chars per entry
;   Warning!:    do not forget "," (comma) after final entry!
;===================================================================

;-- Text table day of week (WTG Su..Sa) 7 entries -------------------
!WT!Sunday,Monday,Tuesday,Wednesday,Thursday,Friday,Saturday,
;-------------------------------------------------------------------

;-- Text table months (Jan..Dec) 12 entries -------------------------
!MO!Jan,Feb,Mar,Apr,May,Jun,Jul,Aug,Sep,Oct,Nov,Dec,
;-------------------------------------------------------------------

;-- Text table season (Win, Sum, UTC) 3 entries---------------------
!SA!Win,Sum,UTC,
;-------------------------------------------------------------------

;-- Text table season change announcement ---------------------------
;   (no announcement, announcement) 2 entries
!AK!0,1,
;-------------------------------------------------------------------

;-- Text table season state -----------------------------------------
;   (0 no announcement, winter)
;   (1 announcement, winter)
;   (2 no announcement, summer)
;   (3 announcement, summer) 4 entries
!ST!A,B,C,D,
;-------------------------------------------------------------------

;-- Text table AM/PM flag 2 entries ---------------------------------
!AM!am,pm,
            ;1st entry  AM/PM flag=0 ie 00:00..11:59
            ;2nd entry  AM/PM flag=1 ie 12:00..23:59
;-------------------------------------------------------------------

;-- File End ---
!EE!
```

```
;-- Name of file (optional, appears in the CTC directory) -----------
@nnn...
            ;nnn...  Filename, max. 12 characters followed by a <CR>.
            ;        This entry is optional, if no name is declared
            ;        'NONAMEx.TEL' will appear in the CTC directory.
            ;
            ;IMPORTANT:
            ;       1) This entry has to be placed AFTER the file end
            ;          command !EE!.
            ;
            ;       2) If a file with the same name as an existing
            ;          file on the CTC is loaded to the CTC, the
            ;          existing file will be OVERWRITTEN.
            ;
            ;
            ;Ex.:     !EE!
            ;         @TELEDEF.TEL
            ;         ;last line
;-----------------------------------------------------------------------

;last line (makes sure that a <CR> follows the filename)
```

F Definitions of Protocols

F.1 SNMP Traps (only in combination with Module AB 1.3.3 or AB 1.5.0)

The distributed SNMP traps have the following fields:

Field	Type	Description	Example
ctcSource	Octet String	System name (max. 20 charact.)	CTC
ctcDate	Octet String	Date	01.12.2001
ctcTime	Octet String	Time	12:30:00
ctcDevice	Integer32	Error source (0=Frame, 1..5=Module 1..5)	0
ctcErrorBit	Integer32	Error bit (0..15)	0
ctcPriority	Octet String	Error priority (W=Warning, A=Alarm)	A
ctcSetClear	Octet String	Error status (C=Cleared, S=Set)	S
ctcDeviceDesc	Octet String	Full text description of field *ctcDevice*	Frame
ctcErrorText	Octet String	Full text description of error	Failure of external time acceptance

The fitting MIB module with the file name CTC.MIB will be supplied together with the CTCW software. It can be found in the sub-directory \DATA.

F.2 SNTP Mode (only in combination with Module AB 1.3.3 or AB 1.5.0)

Asymmetry: Compensation of different transit times for sending and receiving.

Broadcast mask: Subnet in which the broadcast packets are transmitted.

Receiving Timeout [s]: Maximum waiting period for a pending response. The next request is carried out thereafter.

Filter size: Number of time packets which must be present for synchronisation.

Interval [s]: In client mode pause between two requests within a request sequence. An interval of one second is used to begin with after a restart. After each sequence the value is then doubled until the set value is reached.

Pause between two time packets in broadcast and listen mode.

Jitter [ms]:Time packets with a larger deviation in relation to the average value of all packets are rejected.

Max. response time [ms]: Requests which have a longer transit time are rejected.

Min. valid: Number of time packets which must still be valid after filtering in order to effect synchronisation.

Min. stratum: Minimum stratum level required by the (S)NTP server.

Pause [s]: Pause between two request sequences. An interval of one second is used to begin with after a restart. After each sequence the value is then doubled until the set value is reached.

Port: Port used.

Source 1: Main time server.

Source 2: Spare time server if source 1 is not accessible or data are invalid.

Source 3: Spare time server if source 2 is not accessible or data are invalid.

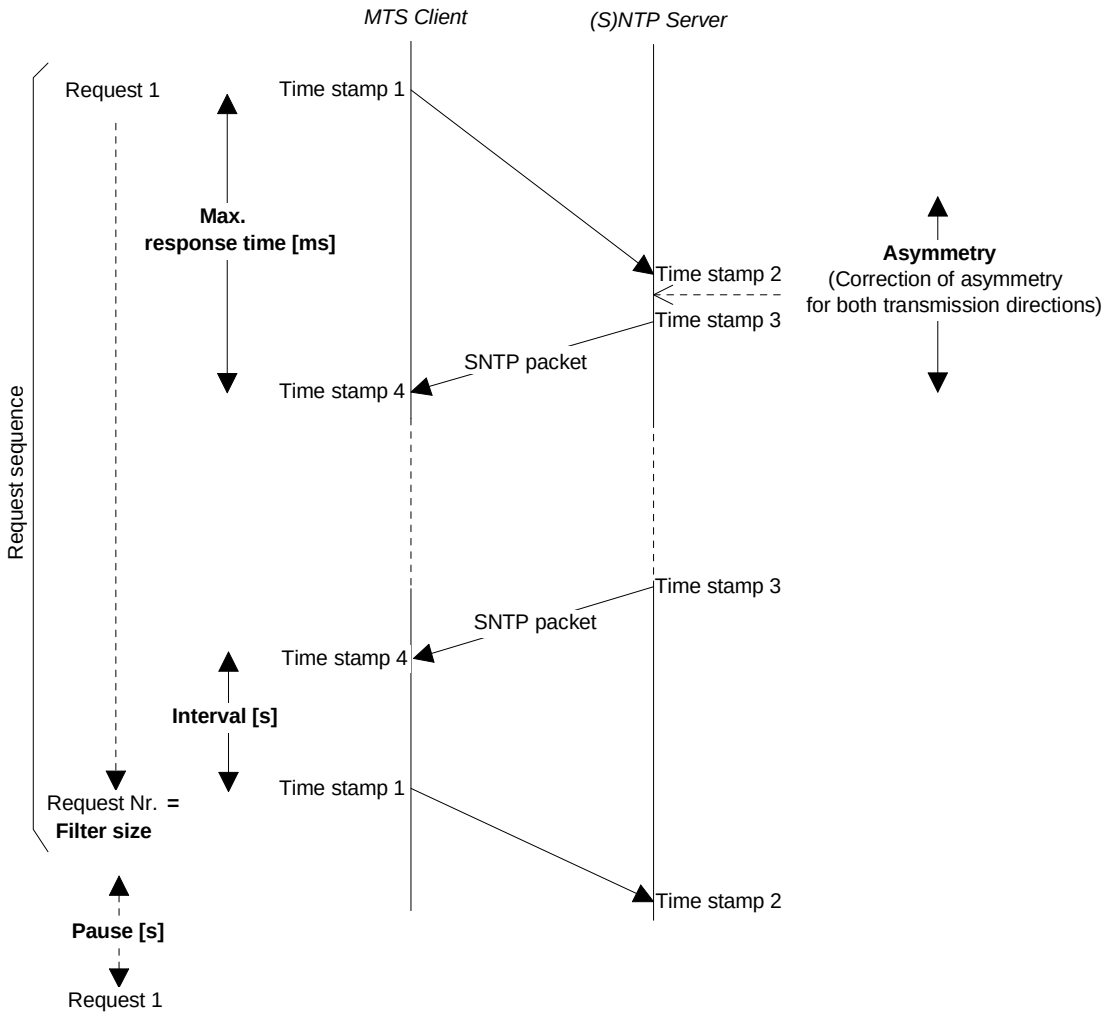
Source 4: Spare time server if source 3 is not accessible or data are invalid.

Stratum level: Stratum level of the CTC in synchronized state. In the case of synchronisation loss (Alarm: Loss of external time transfer) the stratum level drops to 15 and the alarm condition (clock not synchronized) is set in the time packet.

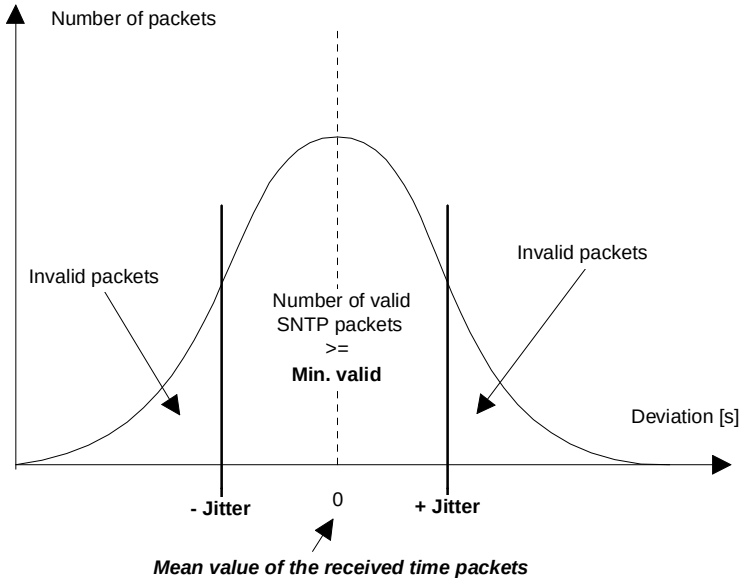
Synch loss [s]: Max period permitted without synchronisation of the (S)NTP server within which time packets are used.

Delay [s]: Delay in a switched line from request to the time that the connection is established.

Various parameters which can be configured in SNTP client mode are shown in the following.



In period from **pause [s]** the CTC starts a request sequence consisting of n requests, where n represents the **filter size**. The individual requests take place in the period from **interval [s].** The maximum permissible **response time [ms]** and any known **asymmetry** can be configured.



All SNTP packets of a request sequence in the range **+ - jitter [ms]** are valid. If this value is greater than the **Min. valid** value and if the conditions transit time below **Max. response time [ms],** period without synchronisation of the server under **Synch Loss [s]** and stratum level of the server are greater than or equal to the **Min. Stratum**, then the entire request sequence is regarded as valid.

F.3 NMEA 0183 – Protocol

The following parameters apply for synchronization from GPS with the NMEA protocol (setting GPS-NMEA, Chapter 8.1):

Protocol:	NMEA 0183 from Version 2.0 or higher
Interface :	RS232 or RS422
Communication parameters:	4800 Baud, 8 data bits, 1 stop bit, no parity
Synchronization:	1 PPS signal (open collector or RS422)
Expected NMEA packets:	GGA (reception quality)
	ZDA (UTC time and date)

Important:

The specified NMEA packets must be:

a) sent automatically by the GPS receiver at periodic intervals (at least every 10 s),

or

b) requested by the CTC by means of a query telegram ($xxGPQ,ZDA*FF and $xxGPQ,GGA*FF).

The used receiver may need to be reconfigured.

F.4 IF482 – Telegram

For synchronization via the serial MB IF482 telegram (setting IF482, Chapter 8.1) the following parameters apply:

Protocol:	MB IF482 telegram; format see below
Interface :	RS232 or RS422
Communication parameters:	9600 Baud, 7 data bits, 1 stop bit, even parity
Synchronization:	Telegram ends at the beginning of the second specified in the telegram
Cycle:	1 second

Format:

Byte No.	Meaning	Character	HEX Code
1	Start character	O	4F
2	Monitoring 1)	A or M	41 or 4D
3	Time-Season (Winter/Summer)	W or S	57 or 53
4	Year tens	0 .. 9	30 .. 39
5	Year units	0 .. 9	30 .. 39
6	Month tens	0 or 1	31 or 31
7	Month units	0 .. 9	30 .. 39
8	Day tens	0 .. 3	30 .. 33
9	Day unit	0 .. 9	30 .. 39
10	Monday .. Sunday	1 .. 7	31 .. 37
11	Hours tens	0 .. 2	30 .. 32
12	Hours units	0 .. 9	30 .. 39
13	Minutes tens	0 .. 5	30 .. 35
14	Minutes units	0 .. 9	30 .. 39
15	Seconds tens	0 .. 5	30 .. 35
16	Seconds units	0 .. 9	30 .. 39
17	Telegram end character	<CR>	0D

1) With a correctly received time in the sender unit, the ASCII character 'A' is issued. If 'M' is issued, this indicates that the sender was unable to receive any time signal for over 12 hours (time is accepted with ‘A’ and ‘M’).

F.5 Alarm Protocol ‚SNMP'

Output of an ASCII string with 65 characters at each status change of an alarm (setting SNMP, Chapter 12.1.1).

Interface:	RS232, RS422 or RS485
Communication parameter:	9600 baud, 7 data bit, 1 stop bit, even parity
Issue cycle:	At each status change of an alarm bit

Form:

Byte Nr.	Signification	Character	HEX Code
1-3	Indicator	CTC	43 54 43
4-20	Reserved for indicator	<SPACE>	20
21	Space sign	<SPACE>	20
22-31	Date Time stamp (UTC)	dd.mm.yyyy	
32	Space sign	<SPACE>	20
33-40	Time Time stamp (UTC)	hh:mm:ss	
41	Space sign	<SPACE>	20
42	Start of address field	A	41
43	Subnet address, hex, high	0 .. F	30 .. 39 / 41 .. 45
44	Subnet address, hex, low	0 .. F	30 .. 39 / 41 .. 45
45	System address, hex, high	0 .. 7	30 .. 37
46	System address, hex, low	0 .. F	30 .. 39 / 41 .. 45
47	Module slot, ten [1)]	0	30
48	Module slot, one [1)]	0 .. 5	30 .. 35
49	Space sign for Unit / Line	U	55
50	Unit resp. Line within module [2)]	0 .. 4	30 .. 34
51	Space sign	<SPACE>	20
52	Start of alarm field	E	44
53-56	Hardware code of module [3)]	xxxx	30 .. 39
57	Space sign	-	2D
58	Bit number of alarm, ten [4)]	0 .. 1	30 .. 31
59	Bit number of alarm, one [4)]	0 .. 9	30 .. 39
60	Space sign	<SPACE>	20
61	Alarm priority	A	41
62	Space sign	<SPACE>	20
63	Alarm status (Set / Clear)	S / C	53 / 43
64	Telegram End sign	<CR>	0D
65	Telegram End sign	<LF>	0A

[1)] Module slot: 00 = Frame, 01 .. 04 = Slots A .. E

[2)] Line: 0 = Frame, 1 .. 4 = Module lines

[3)] Hardware code of the module: 0000 = Frame, 4000 = AB 4.0.0, 4001 = AB 4.0.1, 4030 = AB 4.3.0,...

[4)] Alarm bit number, see Annexe 0

Example:

```
CTC                 27.05.2003 10:55:34 A010102U1 E4010-01 A S<CR><LF>

|        |         |         |         |         |         |  |  |  |
1        10        20        30        40        50        60 63 64 65
```

F.6 Alarm Protocol ‚Req'

Addressed remote request of the alarm status of the CTC. This protocol gives, however, no detailed alarm decoding (setting Req, Chapter 12.1.1).

Interface:	RS232, RS422 or RS485
Communication parameter:	9600 baud, 7 data bit, 1 stop bit, even parity
Issue cycle:	On request of the connected device

Form request string:

Byte Nr.	Signification	Character	HEX Code
1-3	Indicator	CTC	43 54 43
4	Subnet address, hex, high	0 .. F	30 .. 39 / 41 .. 45
5	Subnet address, hex, low	0 .. F	30 .. 39 / 41 .. 45
6	System address, hex, high	0 .. 7	30 .. 37
7	System address, hex, low	0 .. F	30 .. 39 / 41 .. 45

Form answer string:

Byte Nr.	Signification	Character	HEX Code
1-3	Indicator	CTC	43 54 43
4	Subnet address, hex, high	0 .. F	30 .. 39 / 41 .. 45
5	Subnet address, hex, low	0 .. F	30 .. 39 / 41 .. 45
6	System address, hex, high	0 .. 7	30 .. 37
7	System address, hex, low	0 .. F	30 .. 39 / 41 .. 45
8	Space sign	:	3A
9-10	Alarm status	OK / ER	4F 4B / 45 52

Example:

Request: `CTC0101`

Answer: `CTC0101:OK`

G Technical Data

EMC	EN 50081-1 / EN 61000-6-2 / EN 50121-4 / EN 60950
Dimensions	19“ rack, 3HE x 28TE (H x W x D [mm] = 128 x 142 x 265)
Weight	approx. 3kg
Ambient temperature	0 to 50ºC, 10-90% relative humidity, without condensation
Microprocessor	16 Bit, RAM buffered, real-time clock (RTC), flash memory
Lithium battery	Storage shelf life: 2 years Operational service life: 15 years
Display	4 x 20 characters with backlighting
Menu languages	German, English, French and Russian (special Display) selectable
Keypad	Alphanumeric with navigation keys
Accuracy	Time output (synchronized): +/- 10 ms absolute Time mark (AB 4.1.0, GPS synchronized): +/- 0.1 ms absolute Autonomous operation (standard quartz): +/- 0.1 s per day (observed for 24 h), at 20ºC +/- 5ºC. When synchronized via NPMC, see NPMC data.
Switch program	99 week programs, 64 channel programs, total 1000 program lines, 3 control inputs for twilight switch and similar devices
Time zones	Up to 80 predefined, 20 on PC freely programmable entries
Time sources	DCF, MSF, GPS-TSIP, GPS-NMEA (RS232 / RS422 selectable, packets GGA and ZDA min. every 10 s or on request, query), IF482 telegram (RS232 / RS422 selectable), minute pulses, network with SNTP (only with module AB 1.3.3), CAS, NTP and CAN via LAN by means of the module AB 1.5.0 or none (autonomous)
Synchronization inputs on frame	Active current loop input for two wire DCF / MSF time signal receiver, 2 interfaces (RS232 and RS422 (RS485 only for CAS)) for time synchronization from GPS, periodic serial ASCII time telegram (definition MB, IF482) or CAS protocol, input for synchronization pulse 1PPS from GPS (open collector / RS422).
DCF output (Frame)	Synthetic (software generated) DCF time code with selectable time zone on passive current loop. Optocoupler: Umax = 35 VDC, I_{on} = 10..15 mA, I_{off} = 2 mA @ 20 VDC
Alarm contact	Opening relay contact (alarm active ➔ contact open). Switching load: max. 30 W (DC) resp. 60 VA (AC) max. 125 VCD or 1 A / 150 VAC or 1 A
DC power supply	Nominal voltage 24 VDC = 19 – 32 VDC Nominal voltage 48 VDC = 38 – 60 VDC Nominal voltage 60 VDC = 50 – 72 VDC (see also Annexe D.1)
Safety fuse	6 AT / 5 x 20 mm Safety fuse for DC power supply input and battery input is situated on the CTC frame
Power consumption	@ 24 VDC Frame (display backlighting off) = 30 mA Frame (display backlighting on) = 75 mA Impulse Line Driver (AB 4.0.x), without load = 15 mA Time Code Generator (AB 4.2.0), without l. = 30 mA MOBALine Driver (AB 4.3.0), without load = 80 mA

		Serial Communication (AB 4.1.0) =	15 mA
		Program Module (AB 9.0.0) =	5 mA
		Network Processor Module (AB 1.3.3) =	60 mA
		NPMC Module (AB 1.5.0) =	40 mA
	@ 48 VDC	Frame (display backlighting off) =	22 mA
		Frame (display backlighting on) =	55 mA
		Time Code Generator (AB 4.2.0), without l. =	20 mA
		Impulse Line Driver (AB 4.0.x), without load =	15 mA
		Serial Communication (AB 4.1.0) =	15 mA
		Program Module (AB 9.0.0) =	5 mA
		Network Processor Module (AB 1.3.3) =	55 mA
		NPMC Module (AB 1.5.0) =	35 mA
Mains Power Supply	Input:	180 – 264 VAC / 50 – 60 Hz / max. 100 VA	
	Option	80 – 140 VAC/50 – 60 Hz / max. 50 VA	
(AB 5.0.x)	Output:	AB 5.0.0 = 27.8 VDC (nominal 24 VDC, 75 VA, 3A)	
		AB 5.0.1 = 55.6 VDC (nominal 48 VDC, 75 VA, 1.6A)	
		AB 5.0.2 = 69.5 VDC (nominal 60 VDC, 75 VA, 1.25A)	
	Safety fuse:	3.15 AT / 5 x 20 mm	
Impulse Line Driver (AB 4.0.x)	Number of lines:	AB 4.0.0 = 4	
		AB 4.0.1 = 2	
	Line modes:	1 sec., 1/8 min., 1/5 min., ½ min., 1 min., DCF	
	Pulse length:	0.1 – 9.9 Sek. (limits dependent on line mode)	
	Pulse pause:	0.1 – 9.9 Sek. (limits dependent on line mode)	
	Period:	60 sec., 12 hours., 24 hours., 1 week	
	Current:	up to 1 A impulse current each line	
	Voltage:	24 / 48 / 60 VDC (corresponding DC power supply)	
Audio Time Code Generator (AB4.2.0)	Number of lines:	2	
	Line modes:	IRIG-B Std, IRIG-B Std 12h, IRIG-B123, IRIG-B DIEM, AFNOR A, AFNOR C, IRIG-E DIEM, DCF-FSK	
	Output voltage level (no load):	Gain: 0% ➔ Amplitude ≈ 0.5 Vpp	
		Gain: 50% ➔ Amplitude ≈ 1.8 Vpp	
		Gain: 99% ➔ Amplitude ≈ 5.6 Vpp	
		(in IRIG-E-Mode to 30% ➔ Amplitude ≈ 1 Vpp limited)	
	Impedance:	Ri < 50 Ohm	
	Optocoupler outputs:	max. 20 mA / max. 50 VDC	
MOBALine Driver (AB 4.3.0)	Number of lines:	2	
	Line modes:	10 sec.-, ½ min.- or 1 min. steps	
	Current:	up to 700 mA/eff each line	
	Voltage:	20 V	
Serial Communication (AB 4.1.0)	Number of lines:	2	
	Line modes:	RS232 / RS422, selectable	
	Baudrate:	300, 600, 1200, 2400, 4800, 9600, 19200 Baud	
	No. of databits:	7 or 8	
	No. of stopbits:	1 or 2	
	Paritity:	none, even, odd	
	Telegram:	Standard IF482 telegram + free space for 9 telegrams	
	Pulse accuracy:	Synch.source = none (Chapter 9.7.9): +- 10 ms	
		Synch. source = GPS (Chapter 9.7.9): +- 100 µs	
	Pulse output:	Optocoupler, max. 20 mA / 35 VDC	
Program Module (AB 9.0.0)	No. of relays:	4	
	Contacts:	1 change-over contact each relay	
	Switching load:	max. 230 VDC / 5 A / 150 W	
		max. 380 VAC / 5 A / 1250 VA	

Network Processor (AB 1.3.3)	Connection:	10Base-T (10 Mbit/s) Ethernet LAN to RJ45
	Functions:	TCP/IP stack for time synchonization of computers or synchronization of the CTC from an external server over SNTP V3 (RFC 1769), SNMP traps and e-mail for centralized supervision of the device, configuration through menu guidance or Telnet connection
NPMC Network Processor Master Clock (AB 1.5.0)	Connection:	10 / 100Base-T (10 / 100 Mbit/s) Ethernet LAN to RJ45
	Functions:	TCP/IP stack for time synchonization of computers or synchronization of the CTC over NTP V4 (RFC 1305) V3 compatible, SNMP traps and e-Mail for centralized supervision of the CTC, configuration through menu guidance or Telnet connection. Centralized supervision and synchronization from CAN network module in a MTC. Additional DCF input for synchronization of the CTC from GPS (DCF-UTC) for increased accuracy. High precision DCF output when NPMC is synchronized from GPS (DCF-UTC).
Ganggenauigkeit	GPS (DCF input NPMC) to NTP Server:	typical < +/- 100 µs
	GPS (DCF input NPMC) to DCF output NPMC:	typical < +/- 10 µs
Time keeping (internal)	- Synchronized with GPS (DCF input NPMC):	+/-10 µs zu UTC
	- Holdover (Freilauf): Nach mind. 12 Stunden Synchronisation von der Zeitquelle < +/- 0.01 Sek. / Tag (< 0.1ppm) (gemessen während 24 h), bei 20°C +/- 5°C. < +/- 1ms / Tag (< 0.01ppm) (gemessen während 24 h), bei konstanter Temperatur.	
	- Nach Neustart ohne Synchronisation: < +/- 0.25 Sek. / Tag (< 2.5ppm) (gemessen während 24 h), bei 20°C +/- 5°C.	
Zeitserver	NTP V4	(voll V3 kompatible), RFC 1305 (Port 123)
	SNTP	(UDP), RFC 2030 (Port 123)
	TIME	(TCP/UDP), RFC 868 (Port 37)
	DAYTIME	(TCP/UDP), RFC 867 (Port 13)
	Max. Anzahl NTP und SNTP Client Anfragen: > 100 Anfragen / Sek.	
NTP Modus	Server, Peer, Broadcast, Multicast	
NTP-Nebenuhren:	1 Linie mit bis zu 15 verschiedenen Zeitzoneneinträgen. Kommunikation mittels Multicast: -RFC 2236: Internet Group Management Protocol, Version 2 -RFC 1112: Host extensions for IP multicasting -RFC 4601: Protocol Independent Multicast - Sparse Mode (PIM-SM) -RFC 3973: Protocol Independent Multicast - Dense Mode (PIM-DM)	
Internal Battery Unit (AB 2.0.8)	Type:	lead acid battery, gas-proof
	Rating:	24 VDC / 0.8 Ah
	Charging:	Floating charge from AB 5.0.0
	Flat battery monitor circuit on frame switches the battery off at 18 VDC.	
External Battery Unit (M24-3.2)	Type:	lead acid battery, gas-proof
	Rating:	24 VDC / 3.2 Ah
	Charging:	Floating charge from AB 5.0.0
	Dimensions:	19'' rack, 3 HE x 28 TE
	Flat battery monitor circuit on frame switches the battery off at 18 VDC.	

H Index

I Connection Table (to be filled-in)

Slot	Line	Type	Designation

Example:

Slot	Line	Type	Designation
B	1	Impulse	*Slave clock line, main building west, 1st floor*

SALES SWITZERLAND
MOBATIME SWISS AG
Stettbachstrasse 5 • CH-8600 Dübendorf
Tel. +41 44 802 75 75 • Fax +41 44 802 75 65
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