Technical Description

Clock system with different sources of synchronisation

6850

Safety information

The safety regulations and technical data are important for the smooth running of the devices and the protection of people and equipment. Strict compliance with these regulations is required. In case of non-compliance with these regulations the guarantee and warranty claims for the device and possible consequential damage expire.

Safety of the Devices

The production of this device follows the latest technological standards and safety regulations.

The device must not be assembled by anyone but trained personnel. Please make sure that all the connected cables are laid and fixed properly. The device is to be run with the supply voltage stated on the identification plate only.

Only trained personnel or specialists may operate the device.

Repair on opened devices must not be carried out by anyone but specially trained staff or by the ***hopf*** company.

If the maintenance work requires the opening of a device or if a fuse needs changing the device must be separated from all voltage supplies.

If there are reasons to believe that the operational safety can no longer be guaranteed the device must be taken out of service and labelled accordingly. The safety may be impaired when the device does not operate properly or if it is obviously damaged.

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1 Brief Description Model 6850

The circuit board 6850 is a further development of the board 6842. While the board 6842 is synchronised by GPS the board 6850 is synchronised either via the DCF77[1]-pulse or via a serial interface. When built into a system it can execute extended functions i.e. controlling a LAN-connection etc.

The measurements of the circuit boards correspond to the Euro-format 100 mm x 160 mm. The device is configured by means of a key-pad on the front panel of the board by simple menu selection. The voltage supply and the signal transfer occur at a 64-pole VG-strip (DIN 41612 a/c inserted).

The voltage supply +5V DC / 1A is required.

At the exit the following signals are at hand:

- 1 PPS-pulse on TTL level
- 1 kHz square signal on TTL level
- 2 independent serial interfaces with handshake lines in RS232 and RS422 hardware
- 1 optical interface for either plastic or optical fibre
- DCF77-simulation
- variable pulse width for the DCF77-simulation

SYTEM 685011

Stand-alone system built in a ½ 19" module. As a standard it requires 230/120 V AC, further voltage supplies are possible on request.

System 685012

Stand-alone system in a ½ 19" wall housing. A standard 230/120V AC voltage supply is needed, other voltage supplies are possible on request.

System 685013

Stand-alone system built in a ½ 19" table top housing. As a standard it requires 230/120 V AC voltage supply, further voltage supplies are possible on request.

[1] DCF77 = (D) German - (C) long wave signal - (F) Frankfurt - (77) 77,5 kHz

2 Introduction

The circuit board or the system 6850 respectively are mainly used in sub-systems. The time is synchronised via a master system by the DCF77 pulse or a serial standard ***hopf*** DCF-master/slave data string.

Various communication channels like:

- 2 (1)[2] serial RS232 interface
- 2 (1)[2] serial RS422 interface
- 1 kHz frequency output TTL-level
- PPS-pulse TTL-level
- DCF77-simulation of the local or UTC time to control further ***hopf*** radio controlled clocks
- optional fibre optic interface

are available.

[2] in case of on-wires serial synchronisation only one interface is available

3 Set-up

- connect voltage
- switch on voltage supply
- select system mode
- enter local time (required for crystal clocks otherwise recommended)
- enter point of changeover **S ⇨ D** (not always required)
- enter point of changeover **D ⇨ S** (not always required)
- enter difference time not always required)
- release program reset
- view difference time
- view point of changeover **S ⇨ D**
- view point of changeover **D ⇨ S**
- release master reset

3.1 Voltage Supply

The system is available with different voltage supplies. Therefore please take note of the right voltage and polarity when connecting the power supply.

The standard voltages available are:

for stand alone systems

- 230 V AC +10%, -15%
- 120 V AC +10%, -15%

Other voltage supplies are available on request

PLEASE NOTE : SET-UP BY QUALIFIED PERSONNEL ONLY.

3.2 Set-up Base System

After supplying the correct operating voltage the device or the board is switched on and runs independently. The required settings can be entered by means of the key-pad.

3.2.1 Display

In case of the first set-up or after 3 days without voltage supply the following picture is displayed on the 2 x 16 digit LCD display:

LT: [1] **00:00:00** [2] **S - C**
[3] **– –** [4] **– – / – – – / – – – –**

The positions have the following meaning:

[1] **LT:** **00:00:00**
Here the local time is displayed.

[2] status display: If the standard output is the UTC-display, **UT:** appears instead of **LT:,**

position 1 **X--** **"S"** for **s**tandard time
"D" for summer time (**d**aylight time)

position 2 **-X-** **"A"** announcement of changeover to a different time zone. The announcement occurs one hour before the time zone changeover.

position 3 **--X** Display of the internal status of the clock system:
"C" = the clock system runs on crystal operation.
"r" = the clock system is running GPS synchronously but without seconds and crystal adjustment control
"R" = the clock system runs on GPS reception at highest accuracy and output of the PPS-pulse (R = radio).

[3] Display of the days of the week abbreviated:
MO - TU - WE - TH - FR - SA - SU

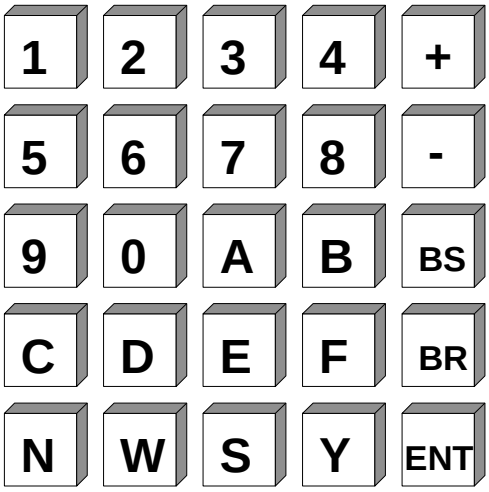
[4] Display of the date:
day / short form of month / year

The lighting of the display is switched on as soon as the voltage supply is connected or a key is pressed. If the key- pad is not used for any entries for 4 minutes the lighting switches itself off again. Thus ensuring a longer life of the display.

3.2.2 Standard Display

After a power cut (< 3 days), the display starts with the internally continued back-up clock information.

4 Key-Pad



4.1 Key Functions

+/- = entry of sign of numbers
BS = BACKSPACE, deletes the last entry
BR = BREAK, stops all key controls
ENT = ENTER, activates the key pad and takes over entered values

4.1.1 Key-Pad Entry / System Control

The main menu is activated by pressing **"ENT"**.

The display changes from showing the time information to displaying the main menu, where at present 4 entry or control modes can be selected. The mode wanted is found by entering the according digit.

Start-picture:

SET = 1 SHOW = 2
S.CLOCK = 3 INI = 4

The modes have the following meaning:

SET: input of set functions like time/date, position, time offset etc.
SHOW: selection of display functions like difference time, point of changeover etc.
S.CLOCK: functions of the control of the synchronous clock like pulse width, stop, start etc.
INI: Initialising functions are required for the basic setting of the system. They are usually set only once.

4.2 SET-Functions

When the number 1 is entered the program returns to the set-functions. The program is structured as user guidance. All the sub-functions are shown on display and selected by

"Y" = yes or turned down by

"N" = no

any key but **"Y"** and **"BR"** is read as no.

When **"N"** is selected the next sub-function is displayed. At present the following set functions can be chosen.

4.2.1 Time/Date Entry

selection picture

SET TIME Y / N _

entry picture

TIME: HH:mm:ss
d.DD/MM/YYYY.Z

This entry function can set the local time. The entry has two lines and must be complete. Leading naughts must also be entered.

The positions have the following meaning:

Input	1. step	**HH**	=	hour	range	from 00 - 23
	2. step	**mm**	=	minute	"	from 00 - 59
	3. step	**ss**	=	seconds	"	from 00 - 59
	4. step	**d**	=	day of the week	"	from 1-7
				1 for Monday...7 for Sunday		
	5. step	**DD**	=	day	range	from 01 - 31
	6. step	**MM**	=	month	"	from 01 - 12
	7. step	**YYYY**	=	year	"	from 1990 – 2089
	8. step	**Z**	=	timezone	input "S" or "D"	

All entries are taken over by pressing the **"ENT"** key.

If the entry is plausible, the time is taken over into the system, otherwise the information **"INPUT-ERROR"** is shown for 3 seconds. The set-function is left at **"INPUT-ERROR"**, the standard picture is displayed again. To continue the entry any key but **"Y"** and **"BR"** may be pressed.

BReak leaves the set program. The standard picture reappears.

PLEASE NOTE : IN COUNTRIES WHICH CHANGE THEIR TIME-ZONE DURING THE COURSE OF THE YEAR THE CHANGEOVER TIMES MUST BE ENTERED (SEE 4.2.2).

4.2.2 Time Zone Changeover

Some countries in the world, depending on the season, have two time zones - a standard time (also called winter time) and a daylight saving time (summer time). The summer time has a time offset of +1 hour compared to the standard time. The exact changeover date for the current year is calculated by means of the entered parameters. The parameters allow a change over to any point of time. The user is informed by the **show**-function where the exact date is stated. If the country has no time zone changeover, naughts are entered in all positions.

selection picture

for daylight saving/standard time changeover

SET CHANGE-OVER
DATE D→ S Y/N

(**D**aylight saving time ⇨ **S**tandard time)

for the standard/daylight saving time changeover

SET CHANGE-OVER
DATE D→ S Y/N

(**S**tandard time ⇨ **D**aylight saving time)

entry picture

D → S hh/d/w/MM
>

S → D hh/d/w/MM
>

The entries have the following meaning

hh = the hour when the changeover is due
00 ... 23 h

d = the day of the week when the changeover is due
1 = Monday ... 7 = Sunday

w = the number of the day of the month when the changeover is due
1 ... 4 day of the week e.g. 1 ... 4 th Sunday in the month
5 last day of the week e.g. last Sunday in the month

MM = the month when the changeover is due

The entry is completed by ENT.

PLEASE NOTE : AFTER CONFIGURING THE **TIME ZONE CHANGEOVER**, THE **DIFFERENCE TIME** AND THE **SYSTEM MODE** IT IS RECOMMENDED TO MAKE A SYSTEM RESET (MASTER RESET) AFTER THE NEXT MINUTE CHANGE.

4.2.3 Selection Picture Parameter of Serial Interface

For each of the two interfaces the parameters like baud rate, parity etc. and the modes can be entered separately. The following selection pictures appear.

SET COM_0 SERIAL PARAMETER Y/N _	**or**	**SET COM_1 SERIAL PARAMETER Y/N _**	**or**	**SET OPTICAL TRNS PARAMETER Y/N _**

see point 5.2 Parameter of the Serial Transmission.

4.2.4 Setting Mode byte 1 Selection

selection picture

SET COM_0 MODE_1 Y/N _	**or**	**SET COM_1 MODE_1 Y/N _**	**or**	**SET OPTICAL TRNS MODE_1 Y/N _**

see point 5.3 Configuration of the Data String (Mode byte).

4.2.5 Setting Mode byte 2 Selection

selection picture

SET COM_0 MODE_2 Y/N _	**or**	**SET COM_1 MODE_2 Y/N _**	**or**	**SET OPTICAL TRNS MODE_2 Y/N _**

see point 5.3 Configuration of the Data String (Mode byte).

4.2.6 LAN-IP-Addresses (Optional)

When the system is extended by one or two LAN-boards the LAN-IP address and another control bit can be entered via the key-pad.

For further information please see description LAN-board 7270.

4.2.7 Key-Word

The entry via key-pad can be protected from unauthorised access by a 4-digit key-word. There is no key-word entered by our company. The customer must set it himself in the **"SET"**-menu.

selection picture

SET KEY-WORD
Y/N

After entering (**Y**)es the display shows the entry picture.

entry picture

KEY-WORD >_

Now a 4-digit number can be entered as key-word except for the sequence

KEY-WORD >0 0 0 0

because this sequence **deletes** the set key-word.

PLEASE NOTE : PLEASE KEEP THE KEY-WORD IN A SAFE BUT KNOWN PLACE.

In case the key-word is lost the circuit board must be returned to our company or the software must be re-programmed at site.

The key-word is active the next time you turn to the menu.

When a menu item is selected you will be asked for the key-word.

KEY-WORD >_

Every entry of a digit is indicated by a * and an arrow completes the entry after the fourth digit.

KEY-WORD >* * * *<

"ENT" confirms the key-word. If the key-word is correct the according menu item is displayed.

In case of a false entry the following is displayed for 5 seconds

WRONG KEY-WORD

After the 2nd false entry the following is displayed for 5 seconds

WRONG KEY-WORD
! LAST CHANCE !

After the 3rd false entry the following is displayed for 5 seconds

WRONG KEY-WORD

and when trying to restart the menu

KEY-PAD
SWITCHED OFF

is displayed.

The entry is blocked for 4 hours. Even rebooting the system does not affect the blocking period.

The system is still fully functional. After 4 minutes the display returns automatically or by pressing the **(BR)** key to the display of the time.

4.2.8 Data Security

All the entry data of points 4.4.2 – 4.2.13 are checked for plausibility and then stored in a voltage fail-safe EEPROM after the next minute change. To check the values a **program reset** or a **master reset** must be executed so that the stored values in the EEPROM are reread into the main memory.

4.3 SHOW Functions

To check the entered values the **SHOW**-function is called up.

After jumping to the display of the main menu by pressing **"ENT"** the number **2** is entered. The first **SHOW** selection picture appears.

The **SHOW**-function can be interrupted by **"BR"** = break at any time.

4.3.1 Difference Time

This function allows to view the actual difference time between the local standard time and UTC time.

selection picture

SHOW DIF.-TIME
Y/N _

After pressing **"Y"** the difference time is displayed e.g. as follows:

DIF.-TIME: +02:00 _

If **"N"** or any other key except **"Y"** and **"BR"** is entered the display jumps to the next selection picture.

4.3.2 Time Zone Changeover S ⇨ D

This function shows the point of changeover from standard time (winter time) to daylight time (summer time).

selection picture

SHOW CHANGE-OVER
S ⇨ D Y/N _

After pressing the **Y**es key the following is displayed.:

TIME: 02.00.00
7.29/03/1998 S>D

The changeover will be (was) on Sunday 29. March 1998 at 02.00 o'clock.

4.3.3 Time Zone Changeover D ⇨ S

This function shows the point of changeover from daylight time (summer time) to standard time (winter time).

selection picture

SHOW CHANGE-OVER
D ⇨ S Y/N _

After pressing the **Y**es key the following is displayed:

TIME: 03.00.00
7.25/10/1998 D>S

The changeover will take place on Sunday 25th October 1998 at 03.00 o'clock.

4.3.4 Further SHOW-Functions

There are further show functions e.g.

SHOW COM_1 SERIAL
PARAMETER Y/N etc.

They do not need further explanations as these functions are self-explanatory

4.4 INI-Functions

These ini-functions can be used to call up different tests during the set-up or to check internal functions. These functions are pre-set by the company.

The following entry sequence puts you into the initialising program. Pressing the key **"ENT"** shows the menu selection picture (see Pt. 4.1.1). Entering the digit **"4"** activates the functions of the initialising programs.

Entering break "**BR**" returns you to the standard display.

Several functions are available for the customer.

4.4.1 System Mode Byte

After entering the INI-menu the 1st request picture is displayed

SET SYSTEM MODE
Y/N

When entering (**Y**)es the following entry picture is shown

OLD M. > xxxxxxxx x = '1' or '0' according to the last entry
NEW M. >_

In the second line only a "0" or a "1" can be set for the individual bits. A "1" means power on function. These bits are used to set the basic functions of the board.

B7	Time in the Display
0	Local Time
1	UTC

B6	Time in the DCF77 Simulation (pulse)
0	Local Time
1	UTC

B5	Adjustment of Daylight Saving Time/Wintertime
0	Only effected by the synchronisation source
1	Additionally effected by the system set points of change-over when synchro-nisation fails during this period.

B4	B3	Not occupied, entry of logical "0" is recommended

Configuration of Synchronisation Mode of System and Synchronisation Source

B2	B1	B0	Description
0	0	0	**Crystal** Mode: - The System runs without external synchronisation source with the entered time (as crystal clock)
0	0	1	Synchronisation by **DCF77 Pulse**[3] (**MEZ**), - Time base of the synchronisation signal: **local time** - The difference time cannot be set and is fixed to CET (+01:00) - The adjustment of daylight saving time/wintertime is based on the synchronisation source
0	1	0	Synchronisation by **DCF77 Pulset**[3] (**worldwide**), - Time base of the synchronisation signal: **local time** - The difference time can be individually set - The adjustment of daylight saving time/wintertime is based on the synchronisation source
0	1	1	Synchronisation by ***hopf*** Master/Slave String via the Serial Interface COM0, - Time base of the synchronisation signal: **local time** - The difference time cannot be set since default by the Master Clock - The adjustment of daylight saving time/wintertime is based on the synchronisation source
1	0	0	Synchronisation by ***hopf*** Master/Slave String via the Serial Interface COM1, - Time base of the synchronisation signal: **local time** - The difference time cannot be set since default by the Master Clock - The adjustment of daylight saving time/wintertime is based on the synchronisation source
1	0	1	***hopf*** internal Assignment
1	1	0	Synchronisation via **IRIG-B** (***hopf*** Master/Slave Slave via the Serial Interface COM1) - Time base of the synchronisation signal: **local time** - The difference time can be set individually [4] - The adjustment of daylight saving time/wintertime is based on the system set points of change-over as far as entered[5]
1	1	1	Synchronisation via **IRIG-B** (***hopf*** Master/Slave Slave via the Serial Interface COM1) - Time base of the synchronisation signal: **UTC** - The difference time can be set individually [4] - The adjustment of daylight saving time/wintertime is based on the system set points of change-over as far as entered [5]

PLEASE NOTE : SYNCHRONISATION BY ***hopf*** MASTER/SLAVE STRING AUTOMATICALLY CAUSES THE ADJUSTMENT OF THE APPROPRIATE SERIAL INTERFACE WITH 9600 BAUD, NO PARITY, 8 DATA BITS AND 1 STOP BIT.

[3] The DCF77 pulse input is located on the internal VG ledge of board 6850. Therefore, the DCF77 pulse input into system 6850 requires additional customized hardware.

[4] The configuration is required for exact evaluation of UTC or rather local time.

[5] The configuration is required for exact evaluation of UTC or rather local time and status of daylight saving time and wintertime.

4.4.2 Time Difference

This function enables the input of difference time between local standard time (wintertime) and coordinated universal time (UTC).

selection picture

SET DIF.-TIME Y/N _

entry picture

DIF-TIME: _

The sign indicates the direction of local time deviating from the coordinated universal time

'+' comply with eastern,

'-' comply with western of the Zero Meridian (Greenwich)

Since most of the countries chose their difference time in hours, the input is also made in intervals of clock hours

e.g. + 05:00 or - 11:00

Several countries also consider smaller intervals, so the input minute by minute is practicable

e.g. + 05:30 or - 08:45

PLEASE NOTE : THE DIFFERENCE TIME ALWAYS REFERS TO THE **LOCAL STANDARD TIME** EVEN THOUGH THE COMMISSIONING OR RATHER THE INPUT OF DIFFERENCE TIME IS MADE AT **DAYLIGHT SAVING TIME**.

PLEASE NOTE : AFTER A CONFIGURATION OF THE SWITCH-OVER OF **TIME ZONE, DIFFERENCE TIME** AND THE **SYSTEM MODE** A SYSTEM RESET (MASTER RESET) AFTER THE NEXT MINUTE CHANGE IS RECOMMENDED.

4.4.3 Delay of the Status Change

The display also shows in the serial data strings whether the system is controlled by the set source of synchronisation or whether it is running on the internal crystal base. In connected devices this information is often used for error messages. To avoid a short interruption of the reception being interpreted as an error, the status change from reception to crystal basis can be delayed. The delay period can be set from 2-255 minutes.

Both viewing and changing the time is carried out in the same display picture by means of the following call-up.

TIME-OUT FOR STA-
TUS-CHANGE Y/N

Entering **"Y"** calls up the display picture:

OLD TIME >xxx>MIN
NEW TIME >_

The xxx are replaced by the presently valid delay period.

When you leave the programme by means of the key **"BR"** the value displayed last is stored in a non-volatile memory.

4.4.4 Repetition Time for sources of synchronisation changeover

This setting is only active with the function ***4.4.7 Status and Pulse Output*** bit 5 (see the according point of description).

4.4.5 Delaying the Time Out of the DCF77-Simulation

Starting the DCF77 antenna signal requires that the system has previously been set by the set source of synchronisation at least once, which guarantees the according accuracy of the signal. After that the DCF77-simulation continues running even after a failure of the external time source.

An error might not be detected by a connected device. Therefore the DCF77-signal is put out disturbed after a source of synchronisation failure. To avoid every short receiving disturbance to cause an immediate DCF77-signal disturbance, it is possible to delay the beginning of the disturbance.

The delay time can be set from 2-254 minutes. In case of 255 minutes a simulation is always carried out. Therefore a DCF77-simulation can be made for any other time entered via the keypad. Usually this setting is used to test time depending functions in the connected devices. Make sure that in this case the source of synchronisation is switched off.

Both viewing and altering the time is carried out in the same display screen by means of the following call-up:

TIME-OUT FOR DCF-
SIMULATION Y/N

Entering **"Y"** calls up the display screen.

OLD TIME >xxx>MIN
NEW TIME >_

Now the new time can be entered is one minute steps.

When you leave the programme by means of the key **"BR"** the last displayed value is stored in a non-volatile memory.

4.4.6 DCF77-Pulse Width

In the DCF77 time data string the time information is transmitted in the BCD format. A logic 1 equals the pulse duration of 200 msec and a logic 0 equals 100 msec. Some manufacturers do not comply to this rule and give out shorter pulses e.g. 160 msec. for logic 1 and 70 msec. for logic 0. The pulse width can be altered so that these devices can be synchronised.

The display picture, used both for viewing as well as altering, is called up by the following command:

SET DCF HIGH/
LOW-PULS Y/N

Entering **"Y"** shows the following picture:

P H/L>200/100<
NEW P.>_

The two pulse widths can now be entered.

The high-pulse may vary between 150-240 msec and the low-pulse between 70-140 msec .

If the key **"BR"** is used to leave the program the value displayed last is stored in a non-volatile memory.

4.4.7 Status and Pulse Output

A programmable output on TTL level (Pin 8c) and a potential-free optical coupler contact (Pin 8a collector; Pin 14a emitter) are available at the connector strip. Both outputs are controlled in parallel. Various status messages or pulses can be putout.

It is programmed by entering a byte. The programming is requested by the following picture:

SET STATUS- OR
PULS-OUTPUT Y/N

When (**Y**)es is entered the following entry picture is shown

OLD M. > xxxxxxxx
NEW M. >_

In the second line only a "0" or a "1" may be set for the individual bits. A "1" is to be regarded as switch-on function. As only one output is available only one "1" may be set in the byte. Several "1"-conditions cause an error message.

The bits have the following meaning for the outputs.

Pin 8 according to GND, optical coupler switched active (low active)

Bit 7	free	
Bit 6	free	
Bit 5	source of synchronisation changeover	
Bit 4	day pulse (24 h clock)	on-period 1 s
Bit 3	hour pulse	on-period 1 s
Bit 2	minute pulse	on-period 1 s
Bit 1	second marker	on-period 250 msec
Bit 0	status radio operation	

Bit 5

When bit 5 is enabled an external relay, which switches the source of synchronisation over to another in case of a failure, can be controlled by the output information at pin 8 or via the optical coupler.

Normally the source of synchronisation 1 is switched on. If it fails for more than 10 minutes the external relay is turned to the second source.

After a repetition period of 10 minutes the system returns to source one. If a synchronisation has taken place in the meantime the standard status is regained. If not source 2 is used again.

The repetition period can be changed by the INI-Function ***4.4 INI-Functions***.

REP-TIME FOR SYN
SOURCE 1 Y/N

When **"Y"** is entered the following picture is shown

OLD TIME >xxx>MIN
NEW TIME >_

In the 2nd line the repetition period can be set between 10 - 255 minutes.

4.4.8 Special Byte

This byte is implemented for special applications and not allocated yet.

4.4.9 Crystal Control

While operation the system in crystal mode, the frequency of the time base of the crystal can be adjusted by means of this menu item. The accuracy of the system will be increased by that. In this menu the display shows:

SET CRYSTAL-
CONTROL Y/N

When entering **"Y"** the following is shown on display:

C.-VALUE > XXX< XXX = aktueller Wert
NEW VALUE >_

In the second line a new crystal control value between 000-999 can be entered.

A change of the actual value in +/-20 steps correspond with a change of the crystal frequency of +/- 1 ppm.

PLEASE NOTE : IN CASE THE SYSTEM IS CONTROLLED BY A SYNCHRONISATION SOURCE THIS POINT SHOULD NOT BEEN APPLIED OWING TO THE FACT THAT THE CRYSTAL FREQUENCY IS AUTOMATICALLY AND CONTINOUSLY ADJUSTED.

4.4.10 Program-Reset

With this function the program counter will be set back to the beginning. After jumping into the menu-picture by pressing **"ENT"** the Ini-range of functions is activated by digit 4. The first picture for the Ini-functions appears. After pressing any key except **"Y"** or **"BR"** several times the following option frame appears.

PROGRAMM RESET
Y/N _

After pressing **"Y"** the program-reset will be executed. The program jumps back to the beginning of the program. Other functions are not carried out.

4.4.11 Master Reset

The selection is done through the following picture:

MASTER RESET
Y/N _

After pressing **"Y"** the master-reset will be executed. The reset-connection of the board will be set to zero for a short time. Thereby all other modules in the system are set to zero and the program jumps back to the beginning of the program.

4.5 Summary Key Pad

- the menu is activated by pressing the **ENT** key.
- selection of functions by **1** to **4**
- switch to standard picture by **BR**eak
- end of entries by **ENT**er
- selection of individual functions by **Y**es
- pass function by No or any other key except **BR**eak and **Y**es.
- plausibility errors are indicated by **INPUT-ERROR**, new selection and entry is required.

4.5.1 Set Functions

valence

C	thousand	**T**	tens
D	hundred	**S**	unit
N	post decimal digit		

- local time

HOUR	T	H	0 - 2
HOUR	S	H	0 - 9
.			
MINUTE	T	m	0 - 5
MINUTE	S	m	0 - 9
.			
SECOND	T	s	0 - 5
SECOND	S	s	0 - 9
.			
.			
day of the week		d	1 - 7
.			
DAY	T	D	0 - 3
DAY	S	D	0 - 9
.			
MONTH	T	M	0 - 1
MONTH	S	M	0 - 9
.			
.			
YEAR	C	Y	1 - 2
YEAR	D	Y	0 - 9
YEAR	T	Y	0 - 9
YEAR	S	Y	0 - 9
.			

- TIME-OFFSET

sign ±	+ or -
tens digit hour	0 - 1
unit digit hour	0 - 9
.	
tens digit minute	0-5
unit digit minute	0-9

  point of time zone changeover
  data string as local time

4.6 Display Functions

- time-offset
- standard / daylight change-over
- daylight / standard change-over
- interface parameter
- interface mode byte
- LAN-IP address and control byte
- control of display
- pulse and status output
- system byte

4.7 Control of Synchronous Clocks

If the circuit board 6850 is used in a sub-system with synchronous clock lines, these lines are controlled via menu pt. 3.

Up to 4 lines can be managed by the board (see description board 7406).

After menu pt.3 is called up, the selection picture for the number of the synchronous clock appears.

SLAVE CLOCK NO.
1 - 4 >

Entering number 1-4 selects the according synchronous clock line. This number is kept in all subsequent pictures.

To control the synchronous clock line the following points are available.

4.7.1 Viewing Synchronous Clock

This command shows all information about the synchronous clock.

selection picture

SLAVE CLOCK NO: x
SHOW Y/N

x = number of synchronous clock line

When **"Y"** is entered the status picture of the synchronous clocks is shown.

e.g.
SC.x R: 15.43.17
3,0 s 19/01/98
or
SC.x S: 15.45.18
3,0 s 19/01/98

x	=		stands for the selected synchronous clock line
R	=	**R**un	the synchronous clock is running
S	=	**S**top	the synchronous clock has stopped
			15.43.17 and 15.45.18 is the time of the synchronous clock
			15.43.18 19/01/98 date of the synchronous clock day/month/year

The display will be actualised every 5 seconds.

When pressing "**BR**" the display will be stopped and pressing "**ENT**" allows the change into the next menu.

4.7.2 Setting the Synchronous Clock

After commissioning or after repair works to the synchronous clock line the clocks must be updated to the current time.

selection picture

SLAVE CLOCK NO.x
SET Y/N

The entry picture appears once **"Y"** is entered.

SC.-NO. x SET TIME
>

The time shown by the **synchronous clocks** is now entered in **HR : MI : SE**, ended by **ENT.** The date is added automatically. The complete data string is now transmitted to the according synchronous clock. If this clock was stopped before this entry automatically starts the clock again. A master reset of the system also releases an automatic start of the clocks.

Please note the following: If synchronous clocks with 12 or 24 hour clocks are used together the time of the 24 hour clock must be entered.

4.7.3 Start/Stop Synchronous Clock

In case of commissioning or repairing the synchronous clock we advise stopping the clock line first.

All the clocks must be set mechanically to the same time in case of commissioning. Then following pt.5.2 puts the clock into operation.

The repair of a synchronous clock e.g. exchange of a clock, requires the mechanical setting of the exchanged clock to the time of the other clocks to put the line back into operation.

selection picture

SLAVE CLOCK NO.x
RUN /STOP Y/N

Entering **"Y"** shows the selection picture

SLAVE CLOCK NO.x
RUN = + STOP = --

+ = Starting the line
– = stopping the line

Completing the entry by ENT not necessary

4.7.4 Synchronous Lines Pulse Time

The analogue synchronous clocks need a pole-alternating setting pulse varying in length depending on the size. This pulse can be set individually for every line between 0.1 s and 3.2 s. The pulse break corresponds with the pulse duration so that a pulse cycle is twice as long as the adjusted pulse duration.

Selection picture

SLAVE CLOCK NO.x
SET PULS Y/N

The following entry picture appears once **"Y"** is entered

S.CLOCK x PULS
IN=+/- > 3,0 < sec

At present the valid pulse is up to 3.2 seconds long. It can be increased by + or diminished by - in steps of 0.1 sec.

The pulses are stored in a fail-safe memory. Completing the entry by **ENT** is not required.

When pressing "**BR**" the display will be stopped and pressing "**ENT**" allows the change into the next menu.

5 Configuration

5.1 Configuration of the Serial Interfaces

The clock is equipped with two serial interfaces with handshake lines, which can be set independently. Data can be exchanged via the RS232c (V.24) and RS422 (V.11) signal level. These interfaces can be used for the transmission of time data strings to other computers.

There is also an optical serial interface without handshake with plastic or optical fibre lines available for transmission.

Various data strings are available. Customised data strings are available on request. The following settings can be done individually for every serial interface.

5.2 Parameter of the Serial Transmission

The interface is parametered by means of the key pad. The setting for baud rate, data bit, stop bit and parity is reached by pressing the **[ENT]** key and selecting the **"SET"** function. In the selection dialogue the entry for **COM0**, **COM1** or **optical interface** must be chosen. Only the interface **0** is described below. The same settings apply to the interface **1** and for the optical interface.

- **[ENT]** - key
- **"1"** for "SET - functions"
- select "SET COM0 SERIAL PARAMETER Y/N"
- **"Y"**

The interface - parameter - dialogue appears on LCD-display showing:

B:_

Here the baud rate must be entered as a five digit numeric value. The following entries are possible:

- 19200 for 19.200 baud
- 09600 for 9.600 baud
- 04800 for 4.800 baud
- 02400 for 2.400 baud
- 01200 for 1.200 baud
- 00600 for 600 baud
- 00300 for 300 baud
- 00150 for 150 baud

After the entry of the last digit the following message is displayed:

W:_

Here the number of data bit for the transmission must be entered. Possible entries are:

- 8 for 8 data bit
- 7 for 7 data bit

After the entry of the digit for the number of data bits the following message is displayed:

P:_

Here the type of parity bit for the transmission must be entered. Possible entries are:

- N for no parity
- E for parity even
- 0 for parity odd

The following message is displayed:

S:_

Here the number of stop bits for the transmission must be chosen:

- 1 for 1 stop bit
- 2 for 2 stop bit

Finally the release for the handshake lines RTS and CTS appears:

HS:_

The following can be entered here

- N data transmission **without** handshake
- Y data transmission **with** handshake

After the entry of the number of stop bits the key **[ENT]** must be pressed, which causes a plausibility check of all entries. If all the entries are plausible the settings are taken over.

PLEASE NOTE : IN CASE OF A FAULTY ENTRY YOU CAN USE THE KEY **[BS]** (BACKSPACE) TO RETURN TO THE PREVIOUS EDITING FIELD AND REWRITE IT.

5.3 Configuration of the Data String (Mode byte)

The received time information can be put out via the interface in a data string stating the internal clock status. This enables the user to synchronise connected computers with the atom accurate time. The read out point of time, the string structure and the used control characters can be chosen by entering the according **mode byte 1 and 2**.

You reach the set function for the **mode byte** via the following keys:

- **[ENT]** key
- **"1"** for "SET functions"
- selection of "SET COM0
  MODE 1 / 2 Y/N"
- **"Y"**

The input mask for the **mode byte** appears:

BIT 7654 3210

The LCD cursor is now under the bit position 7. Every bit is like a switch by means of which the mode of the serial interface can be set. Depending on the required mode of the serial interface either

0 = switch off
or 1 = switch on

must be entered under every bit position. The meaning of every bit position (switch) is explained in the chapters below.

5.3.1 Local Time or UTC in the Serial Output with Mode byte 1

bit position 7	time zone
on	local time
off	UTC (Universal Time Co-ordinated)

5.3.2 Second Advance of Serial Output with Mode byte 1

bit position 6	second advance
off	with second advance
on	without second advance

5.3.3 Bit 5 – not used at present

bit position 5	
off	free
on	free

5.3.4 Last Control Character as On-Time-Marker with Mode byte 1

In this setting the last control characters (see string structure) can be transmitted on the marker of the next second change.

bit position 4	control character on the second change
off	with control character on second change
on	without control character on second change

5.3.5 Control Character CR and LF with Mode byte 1

This switch is used to exchange the characters CR and LF.

bit position 3	control characters CR and LF
off	LF / CR
on	CR / LF

5.3.6 Delayed Transmission

In the setting "control characters on the second change" the last character of the data string is transmitted on the second change and straight afterwards the string which is valid for the new second change. This may cause error messages in computers under heavy load. Bit position 2 can be used to delay the transmission of the data string depending on the baudrate.

Example:

Baud rate 9600 baud

Milliseconds	delayed	not delayed
000	final character (ETX)	final character (ETX)
002	–	new data string
025	–	end of new data string
930	new data string	-
955	end of new data string	–
000	final character (ETX)	final character (ETX)

Baud rate 2400 baud

Milliseconds	delayed	not delayed
000	final character (ETX)	final character (ETX)
002	–	new data string
105	–	end of new data string
810	new data string	-
913	end of new data string	–
000	final character (ETX)	final character (ETX)

bit position 2	delayed transmission
off	with delay
on	without delay

5.3.7 Synchronisation Point with Mode byte 1

Bit 1	Bit 0	point of transmission
off	off	transmission every second
off	on	transmission on the minute change
on	off	transmission on the hour change
on	on	transmission on request only

5.3.8 Selection of Data String with Mode byte 2

This mode byte serves to set the putout data string. At present only bit position 0-3 are in function, the other bits are reserved for later extensions.

Bit position				structure of data string
3	2	1	0	
off	off	off	off	Standard ***hopf*** data string
off	off	off	on	Standard ***hopf*** with year in 4 digits
off	off	on	off	DCF-Master/Slave data string
off	off	on	on	Siemens SINEC H1
off	on	off	off	T-String
off	on	off	on	IBM Sysplex-Timer 1 + 2

5.4 Data Format of the Serial Transmission

The data are transmitted as BCD values in ASCII and can be displayed by every terminal programme (e.g. TERMINAL.EXE under Windows). The following control characters from the ASCII set of characters are used in the data string if necessary.

- $20 = space
- $0D = CR (carriage return)
- $0A = LF (line feed)
- $02 = STX (start of text)
- $03 = ETX (end of text)

PLEASE NOTE : THE STATUS VALUES MUST BE DECODED SEPARATELY (SEE DATA STRING STRUCTURE).

5.5 Serial Request

The requests of data strings which are not listed in this chapter are described with the data strings.

5.5.1 Serial Requests with ASCII Characters (Standard and Standard 2000)

The user can start a data string output using a control character. These control characters are:

- ASCII **"D"** -- for time/date (local time)
- ASCII **"G"** -- for UTC time/date

The system answers within 1 msec. with the according data string.

This is often too fast for the requesting computer. It is therefore possible to delay the answer in 10 msec. steps by software in case of request. To delay the transmission of the data string the small letters "d,g" are transmitted to the clock by the requesting computer with a two digit multiplication factor.

The multiplication factor is interpreted by the clock as hexadecimal values.

Example:

The computer sends **ASCII gFF** (Hex 67, 46, 46)
The clock sends the data string UTC time/date after approx. 2550 milliseconds.

6 Data Strings

6.1 General Information about the Serial Data Output of the Board 6850

In case of the setting ETX on the second change there may be a gap in the transmission of up to 970 msec. depending on the baud rate. Please take this fact into consideration when programming a time-out on the reception side.

In all the data strings it is possible to exchange the control characters CR and LF by means of **mode byte 1**.

The transmitted data strings are compatible with the data strings of the following ***hopf*** radio controlled clocks.

- board 6020/6021 standard with control characters
- board 7200/7201 standard with control characters
- board 7220/7221 standard with control characters
- board 7240/7245 standard with control characters
- board 6840/6841 standard with control characters
- board 6842 standard with control characters
- system 4465/4475 standard with control characters
- system 6870/6875 standard with control characters

6.2 Structure of the hopf Standard Data String

character no.	meaning	
1	STX (start of text)	
2	status (internal clock status)	; see 6.2.1
3	day of the week (1=Monday...7=Sunday)	; see 6.2.1
	for UTC time bit 3 is set to 1 in the day of the week	
4	hour tens digit	
5	hour unit digit	
6	minute tens digit	
7	minute unit digit	
8	second tens digit	
9	second unit digit	
10	day tens digit	
11	day unit digit	
12	month tens digit	
13	month unit digit	
14	year tens digit	
15	year unit digit	
16	LF (line feed)	; see 6.1
17	CR (carriage return)	; see 6.1
18	ETX (end of text)	

6.2.1 Status and Day of the Week Nibble in the hopf Standard Data String

The second and the third ASCII-characters contain the status and the day of the week. The status is decoded binaurally. The structure of these characters:

	b3	b2	b1	b0	meaning
status nibble:	x	x	x	0	no announcement hour
	x	x	x	1	announcement hour (ST-WT-ST)
	x	x	0	x	winter time (WT)
	x	x	1	x	daylight saving time (ST)
	0	0	x	x	time/date invalid
	0	1	x	x	crystal operation
	1	0	x	x	radio operation (basic operation)
	1	1	x	x	radio operation (high accuracy)
day of the week nibble:	0	x	x	x	CEST/CET
	1	x	x	x	UTC - time
	x	0	0	1	Monday
	x	0	1	0	Tuesday
	x	0	1	1	Wednesday
	x	1	0	0	Thursday
	x	1	0	1	Friday
	x	1	1	0	Saturday
	x	1	1	1	Sunday

6.2.2 Example of a Transmitted hopf Standard Data String

(STX)E3123456170496 (LF)(CR)(ETX)

radio operation (high accuracy)
daylight saving time
no announcement
it is Wednesday 17.04.96 - 12:34:56h
( ) - ASCII control characters e.g. (STX)

6.3 Data String SINEC H1

The control characters STX and ETX are transmitted only if the output is set "with control characters". Otherwise there are no control characters. In case of the setting "ETX delayed" the last character (ETX) is transmitted exactly on the next second change.

The data string can be requested by **"?"** and **"T"**.

character no.	meaning	value (value range)	
1	STX (start of text)	$02	
2	"D" ASCII D	$44	
3	":" colon	$3A	
4	tens day	$30-33	
5	unit day	$30-39	
6	"." point	$2E	
7	tens month	$30-31	
8	unit month	$30-39	
9	"." point	$2E	
10	tens year	$30-39	
11	unit year	$30-39	
12	";" semi colon	$3B	
13	"T" ASCII T	$54	
14	":" colon	$3A	
15	day of the week	$31-37	
16	";" semi colon	$3B	
17	"U" ASCII U	$55	
18	":" colon	$3A	
19	tens hours	$30-32	
20	unit hours	$30-39	
21	"." point	$2E	
22	tens minute	$30-35	
23	unit minute	$30-39	
24	"." point	$2E	
25	tens seconds	$30-36	
26	unit seconds	$30-39	
27	";" semicolon	$3B	
28	"#" or space	$23 / $20	; see 6.3.1
29	"*" or space	$2A / $20	; see 6.3.1
30	"S" or space	$53 / $20	; see 6.3.1
31	"!" or space	$21 / $20	; see 6.3.1
32	ETX (end of text)	$03	

6.3.1 Status in the Data String SINEC- H1

The characters 28-31 in the data string SINEC H1 give information about the synchronisation status of the clock.

meaning of the following:

character no.:28 =	"#"	no radio synchronisation after reset, time invalid
	space	radio synchronisation after reset, clock at least in crystal operation
character no.: 29 =	"*"	time from the internal crystal
	space	time from radio reception
character no.: 30 =	"S"	daylight saving time
	space	standard time
character no.: 31 =	"!"	announcement of a S/D or D/S changeover
	space	no announcement

6.3.2 Example of a Transmitted Data String SINEC H1

(STX)D:03.01.96;T:1;U:12.34.56; _ _ _ _ (ETX) (_) = space

radio operation, no announcement, standard time
It is Wednesday 03.01.96 - 12:34:56 h

6.4 hopf Standard Data String String 2000

The structure of the data string is the same as the standard string and differs only in as much as the year is transmitted with 4 digits.

character no.	meaning	
1	STX (start of text)	
2	status (internal status of the clock)	; see 6.4.1
3	day of the week (1=Monday ... 7=Sunday)	; see 6.4.1
	In case of UTC time bit 3 is set to 1 in the day of the week	
4	tens hour	
5	unit hour	
6	tens minutes	
7	unit minutes	
8	tens seconds	
9	unit seconds	
10	tens day	
11	unit day	
12	tens month	
13	unit month	
14	tens century	
15	unit century	
16	tens year	
17	unit year	
18	LF (line feed)	; see 6.1
19	CR (carriage return)	; see 6.1
20	ETX (end of text)	

6.4.1 Data String 2000 Status- and Day of the Week Nibble

The second and third ASCII-characters contain the status and the day of the week. The status is decoded binaurally. Structure of these characters:

	b3	b2	b1	b0	meaning
status nibble:	x	x	x	0	no announcement hour
	x	x	x	1	announcement (ST-WT-ST)
	x	x	0	x	standard time (WT)
	x	x	1	x	daylight saving time (ST)
	0	0	x	x	time/date invalid
	0	1	x	x	crystal operation
	1	0	x	x	radio operation
	1	1	x	x	radio operation (high accuracy)
day of the week nibble:	0	x	x	x	CEST/CET
	1	x	x	x	UTC - time
	x	0	0	1	Monday
	x	0	1	0	Tuesday
	x	0	1	1	Wednesday
	x	1	0	0	Thursday
	x	1	0	1	Friday
	x	1	1	0	Saturday
	x	1	1	1	Sunday

6.4.2 Example of a Transmitted Data String 2000

(STX)E312345603011996(LF)(CR)(ETX)

radio controlled operation (high accuracy)
daylight saving time
no announcement
It is Wednesday 03.01.1996 - 12:34:56 h.
( ) - ASCII-control characters e.g. (STX)

6.5 Data String T-String

The T-string can be transmitted in all modes (e.g. with **advance** or **last control characters on the second change**).

The data string can be requested by "**T**".

character no.	meaning	value (value range)
1	"T" ASCII T	$54
2	":" colon	$3A
3	tens year	$30-39
4	unit year	$30-39
5	":" colon	$3A
6	tens month	$30-31
7	unit month	$30-39
8	":" colon	$3A
9	tens day	$30-33
10	unit day	$30-39
11	":" colon	$3A
12	tens day of the week	$30
13	unit day of the week	$31-37
14	":" colon	$3A
15	tens hour	$30-32
16	unit hour	$30-39
17	":" colon	$3A
18	tens minute	$30-35
19	unit minute	$30-39
20	":" colon	$3A
21	tens seconds	$30-36
22	unit seconds	$30-39
23	CR (carriage return)	$0D
24	LF (line feed)	$0A

6.5.1 Example of a Transmitted Data String T-String

T:96:01:03:03:12:34:56(CR)(LF)

It is Wednesday 03.01.96 - 12:34:56h

6.6 Master/Slave-String

This master /slave string can be used to synchronise slave systems with the time data of the master system up to an accuracy of ± 0.5 msec. The difference time is included in the data string.

The difference time is transmitted in hours and minutes following the year. The transmission is done in BCD. The difference time may be up to ± 11.59 h.

The sign is shown as the highest bit in the hours.

logic "1" = local time before UTC
logic "0" = local time after UTC

Example :

90.00	difference time	+ 10.00 h.
01.30	difference time	– 01.30 h.
81.30	difference time	+ 01.30 h

The whole data string shows the following structure:

character no.	meaning	value (value range)	
1	STX (start of text)	$02	
2	status	$30-$39,$41-$46	; see 6.6.1
3	day of the week	$31-$37	; see 6.6.1
4	tens hour	$30-32	
5	unit hour	$30-39	
6	tens minute	$30-$35	
7	unit minute	$30-$39	
8	tens second	$30-36	
9	unit second	$30-39	
10	tens day	$30-33	
11	unit day	$30-39	
12	tens month	$30-31	
13	unit month	$30-39	
14	tens year	$30-39	
15	unit year	$30-39	
16	tens diff.time + sign hour	$30$31,$38,$39	
17	unit diff.time + hour	$30-39	
18	tens diff. time minutes	$30-35	
19	unit diff. time minutes	$30-39	
20	LF (line feed)	$0A	; see 6.1
21	CR (carriage Return)	$0D	; see 6.1
22	ETX (end of text)	$03	

6.6.1 Status in the Data String Master-Slave

	b3	b2	b1	b0	meaning
status nibble:	x	x	x	0	no announcement hour
	x	x	x	1	announcement (ST-WT-ST)
	x	x	0	x	standard time (WT)
	x	x	1	x	daylight saving time(ST)
	x	0	x	x	no announcement leap second
	x	1	x	x	announcement leap second
	0	x	x	x	radio operation
	1	x	x	x	radio operation (high accuracy)
day of the week nibble	0	0	0	1	Monday
	0	0	1	0	Tuesday
	0	0	1	1	Wednesday
	0	1	0	0	Thursday
	0	1	0	1	Friday
	0	1	1	0	Saturday
	0	1	1	1	Sunday

6.6.2 Example of a Transmitted Data String Master-Slave

(STX)831234560301968230(LF)(CR)(ETX)

Radio operation, no announcement, standard time
It is Wednesday 03.01.96 - 12:34:56 h
The difference to UTC is +2.30 hours

6.6.3 Settings

The following setting is required for the synchronisation of the ***hopf*** slave-systems:

- output every minute
- output second advance
- ETX on the second change
- 9600 baud, 8 bit, 1 stop bit, no parity

According setting for mode byte 1: **1000 0101**

Under this setting the time base is controlled perfectly in the slave systems.

PLEASE NOTE : FOR SPECIAL APPLICATIONS THE OUTPUT OF THE UTC TIME CAN BE ACTIVATED IN MODE BYTE 1.

6.7 Data String IBM 9037 Sysplex Timer

This data string is used to synchronise the IBM 9037 Sysplex Timer. The 9037expects the time at its output every second. The following settings are required:

9600 baud, 8 data bit, parity odd, 1 stop bit, transmission on request without second advance and control characters.

When the Sysplex Timer is switched on it transmits the ASCII character "C" to the connected radio controlled clock, so that the protocol in the table below is put out automatically every second.

The setting UTC or local time are optional.

character no.:	meaning	value (value range)	
1	SOH (start of header)	$02	
2	hundred- current day of year	$30-33	
3	tens -current day of year	$30-39	
4	unit -current day of year	$30-39	
5	":" colon	$3A	
6	tens hour	$30-32	
7	unit hour	$30-39	
8	" : " colon	$3A	
9	tens minute	$30-35	
10	unit minute	$30-39	
11	" : " colon	$3A	
12	tens second	$30-35	
13	unit second	$30-39	
14	quality identifier	$20,41,42,43,58	
15	CR (carriage return)	$0D	; see 6.1
16	LF (line feed)	$ 0A	; see 6.1

6.7.1 Status in the Data String Sysplex Timer

Character number 14 informs about the synchronisation status of the clock. Possible values and their meaning are listed below.

"?"	=	question mark	=	no time at hand
" "	=	space	=	radio controlled time at hand
"A"	=	Hex 41	=	crystal operation for more than 20 minutes
"B"	=	Hex 42	=	crystal operation for more than 41 minutes
"C"	=	Hex 43	=	crystal operation for more than 416 minutes
"X"	=	Hex 58	=	crystal operation for more than 4160 minutes

6.7.2 Example of a Transmitted Data String Sysplex Timer

(SOH)050:12:34:56 _ (CR) (LF) (_) = Space

radio controlled operation , 12:34:56 h, 50th day of the year

7 Pin Allocation of Serial Interfaces

7.1 Pin Allocation of the 25 pole SUB-D female Connector COM 0

25-pole SUB-D female connector - pin no.	allocation			64-pole VG-strip pin no.
1		free		free
2	TxD	(transmit data)	RS232c	2a
3	RxD	(receive data)	RS232c	3a
4	RTS	(ready to send)	RS232c	4a
5	CTS	(clear to send)	RS232c	5a
6		free		free
7	0V	GND		7a
8		free		free
9		free		free
10		free		free
11	TxD	(transmit data)	RS422	10a
12	/TxD	(transmit data)	RS422	11a
13		free		free
14		free		free
15		free		free
16		free		free
17		free		free
18		free		free
19		free		free
20		free		free
21		free		free
22	RxD	(receive data)	RS422	12a
23	/RxD	(receive data)	RS422	13a
24		free		free
25		free		free

7.2 Pin Allocation of the 9 pole SUB-D female Connector COM 1

9-pole SUB-D female connector - pin no.	allocation			64-pole VG-strip pin no.
1	GND			7c
2	TxD	(transmit data)	RS232c	2c
3	RxD	(receive data)	RS232c	3c
4	/RxD	(receive data)	RS422	13c
5	RxD	(receive data)	RS422	12c
6	RTS	(ready to send)	RS232c	4c
7	CTS	(clear to send)	RS232c	5c
8	TxD	(transmit data)	RS422	10c
9	/TxD	(transmit data)	RS422	11c

8 Technical Data Basic System

operating voltage:	standard:	230 V AC +10% -15%
	option:	120 V AC +10% -15%
		110 V DC (60V - 120V)
		60 V DC (38 V - 75V)
		24 V DC (18 V - 36V)
power consumption device fully equipped:		50 VA
display:		LCD-display 2x16 digits
type of display:		alphanumeric
height of digits:		5 mm
key-pad:		25 keys

special requirements: hard- and software alterations according to customer specifications are possible

PLEASE NOTE : THE ***hopf*** COMPANY WITHHOLDS THE RIGHT TO ANY ALTERATIONS IN HARD- AND SOFTWARE. THE NAMES IBM, SIEMENS, WINDOWS ETC. USED IN THIS DOCUMENT ARE REGISTERED TRADE NAMES OF THE ACCORDING COMPANIES.

8.1 Technical Data Board 6850

In general:

board dimension:	euro format 160 x 100 mm (6.3" x 3.94"); front panel 20 TE (20 HP)
weight:	0.120 kg (0.2645547 lb)
voltage supply:	+5 V DC ± 5%
power consumption:	0.6 A
MTBF value (only control board):	> 350,000 h
standards:	EN95650; CE
maintenance interval:	maintenance free

Temperature range:

in operation:	0..50°C for specified data's
storage:	-30 to +80°C (-22 to +176°F)
humidity of the air:	100% not condensed

Quartz clock accuracy:

non-regulated:	± 10 ppm
regulated	± 1 ppm

Back-up clock:

buffering:	3 days
accuracy:	± 25 ppm from +10 to +50°C (+50 to +122°F)

Inputs:

DCF77-Takt:	TTL level

Outputs:

pulse output:	TTL level
pulse output:	optical coupler: 60 V DC / 20 mA

Interfaces:

2 serial independent	interfaces with RS232 / RS422 hardware with handshake lines RTS / CTS
DCF77 antenna simulation	77,5 kHz; level = 3 mVss at 50 Ohm
1 PPS pulse	TTL level
1 kHz pulse	TTL level
LWL:	ST connector - mail
- wave-length:	820 nm
- optical cable:	62.5 / 125 µm
- transmission circuit:	up to 1000 m

Interface parameters:	RS232 / RS422 / LWL
baud rate:	150 – 19200 Baud
stop bit:	1 Bit / 2 Bit
word length:	7 Bit / 8 Bit
parity:	no, even or odd
handshake:	RTS /CTS