

# **Technical Description**

Large Scale Display  
4980



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## 1 Specifications

- fully automatic setting of the clock by reception of the time signal transmitter DCF77
- elimination of reception interferences by micro-processor controlled checking of the received time data string
- transmission failure bridging by integrated crystal clock which runs the time and date in case of failures
- in case of power failures internally running back-up clock, due to modern components buffered completely maintenance free
- built-in watchdog circuit (automatic restart in case of programme execution error)
- time/ date output via serial interface
- display of different time information selectable via DIP-Switch
- change to different display outputs like frequency, megawatt etc. by DIP-Switch

## 2 Functions

### 2.1 General

The basic version of the large display 4980 consists of a LED matrix of 16x64 LEDs. It is possible to display 2 lines of eight 42mm or 1 line of six 84mm alphanumeric characters on this matrix.

The display can be used for the display of time/date but also as a general large display for other values, like time synchronized by power line, difference time and mains frequency, which can be transferred from the **hopf** system 7001.

Various display and decoding programmes, selectable by DIP-Switch, are integrated in the large display 4980.

### 2.2 Set-up

The large display 4980 is delivered ready for operation in its casing. Only some connections necessary for running must be made.

To install the display the right side of the housing has to be taken off and the red filter screen must be removed. Now the display can be connected to the voltage, antenna or data cable depending on the requirements. The cables must be fed through a hole in the back of the housing and connected to the according terminals. You will find the connection diagram at the end of the description.

There are holes in the back of the housing to fix the display to a wall by means of screws.



**Please note :** The installation is to be carried out by qualified personnel only. Please make sure that the cable is dead when connecting the voltage supply.

When the voltage supply is switched on the programme position and the date are displayed for 5 seconds.

e.g.        **RevNr 03.00**  
              **vom 14.03.97**

### **3 Large Display as Radio Controlled Clock**

The DIP-Switch 8 in switch block SW2 is used to select the display as either radio controlled clock or as general large display.

<b>S8</b>	<b>SW2</b>
on	display as radio clock
off	general large display

The control board for the large display contains a DCF77-receiver, which can serve to decode and display the time/date information. The DCF77-signal can be supplied either by an active **hopf** antenna, by a DCF77-simulation or by the DCF77-pulse.

A **hopf** antenna or the DCF77-simulation electrically behave the same. The DCF77-decoder programme in the display is activated by DIP-Switch 8 in switch block SW1 for this supply.

<b>S8</b>	<b>SW1</b>
on	decoding DCF77-antenna or DCF77-simulation
off	decoding of the DCF77-pulse input

#### **3.1 Antenna Installation**

Connect the **hopf** antenna included in the delivery or a DCF77-antenna signal to the BNC-female connector on the control board by means of a coax cable RG 59.

When using **hopf** antennas and DCF77-simulation the cable must not be longer than 500m.

##### **Please note the following points when installing the antenna**

- to achieve a high short term accuracy of  $\pm 1$  msec of the decoded DCF77-signal the antenna is of broad band design. Therefore do not place the antenna close (<5m) to electric and magnetic currents like monitors, engines or heavy current cases etc.
- In case of indoor antennas please consider also the shielding by buildings. Reinforced concrete and corrugated sheet metal walls are widely HF-proof. Install the **hopf** antenna at or near a window if possible.

##### **3.1.1 Alignment of the Antenna**

All the **hopf** antennas except the all-round antenna 4437 have a directional pattern. The antennas must therefore be directed to the DCF77-transmitter. The transmitter is situated in Mainflingen near Frankfurt on the Main. The indoor antenna must be installed at a right angle to the transmission direction of the transmitter, in case of outdoor antennas the black directional bar underneath the antenna housing must be directed to Frankfurt.



**Please note :** If the colon on the display between hours and minutes flashes, the clock isn't radio controlled anymore.

### **3.1.2 Antenna Alignment Programme**

It is possible to check the setting to make sure that the antenna is aligned correctly. The push button next to the switch block SW3 starts the antenna alignment programme, if it is pressed for about 1 to 2 seconds. More than three seconds causes a programme reset.

#### **Push button pressed**

1-2 seconds	starts antenna alignment programme
more than 3 sec.	programme reset

When the push button is pressed the display counts the seconds from 0 up to 9 seconds.

The antenna alignment programme deletes the display matrix and sets the amplification for the DCF77-signal back. In the display a light bar is shown in the bottom LED line. The DCF77-decoder programme starts to set the amplification for the antenna position again.

As the amplification change progresses the light bar moves from the bottom line to the top display line. At the same time a dip to the bottom line every second must be recognizable. This indicates the amplitude dip of the DCF77-signal.

The informational content of the DCF77-signal lies within the carrier signal dipping every second to 25% of the amplitude. The time of the dipping for 100 or 200 msec corresponds with a logical 'naught' or 'one'.

The dip of the light bar to the bottom line is shorter or longer accordingly. Depending on the signal field strength the amplification is set in 20-25 seconds and is kept on this level different to normal operation. If the antenna is now turned from the set position the light bar must move back to the bottom line because the antenna receives a weaker field strength.

When the antenna is turned by exactly 90° from it's best position the signal field strength is 0. Here the light bar is in the bottom matrix line. From this minimum position the antenna is turned back by 90°. The antenna is thus aligned exactly to Frankfurt (Mainflingen).

The antenna alignment programme can be left prematurely by a reset. The programme is left automatically after 4 minutes. This programme is only an aid to align the antenna. It is not necessary to call up this programme after the installation.

### **3.1.3 Indirect Lightning Protection**

To eliminate the chance of lightning striking the large display via the antenna, the antenna can be secured by an indirect lightning protection. In case of an operation with an outdoor antenna we recommend using a lightning protection.

### **3.1.4 DCF77-Pulse-Synchronization**

All **hopf** clocks emit a decoded DCF77-pulse. This pulse can also be used for synchronization. To supply it the DCF77-pulse programme on the control board is activated by means of a DIP-Switch in the switch block 1.

<b><u>S8</u></b>	<b><u>SW1</u></b>
on	decoding DCF77-antenna or DCF77-simulation
off	decoding of the DCF77-pulse input

The DCF77-pulse signal is connected to the "DCF-T in" terminals. For connection use for the different levels like TTL-compatible, RS422 or optical coupler control see appendix.

### **3.2 Time/Date Display**

The following displays for time and date can be set by dip switch SW1 in the matrix display at present.

<b><u>S7</u></b>	<b><u>SW1</u></b>
on	2 line display 42mm height of characters
off	1 line display 84 mm height of characters

<b><u>S7</u></b>	<b><u>S6</u></b>	<b><u>S5</u></b>	<b><u>SW1</u></b>
on	on	on	display time and date 42 mm height of digits
off	on	off	display date only 84 mm height of digits
off	on	on	display time only 84 mm height of digits
off	off	on	display time only 84 mm, seconds 42 mm height of digits

further switch combinations are not implemented yet.

<b><u>S4</u></b>	<b><u>S3</u></b>	<b><u>SW1</u></b>
on	on	European date layout
on	off	American date layout
off	on	not used
off	off	not used

<b><u>S2</u></b>	<b><u>S1</u></b>	<b><u>SW1</u></b>
on	on	German abbreviations for the day of the week and month
on	off	English abbreviations for the day of the week and month
off	on	French abbreviations for the day of the week and month
off	off	Spanish abbreviations for the day of the week and month



## **4 Serial Interface**

Depending on the mode of the board 4980 the serial interface can be used either for the time data output or the input of display data for the matrix. The function is selected by means of the DIP-Switch SW2 push button 8.

<b><u>S8</u></b>	<b><u>SW2</u></b>
on	operation as (radio controlled) clock
off	operation as matrix display

Depending on the mode the DIP-Switch SW3 has a different meaning.

### **4.1 Choice of Hardware**

The display 4980 is equipped with a serial interface in the

RS232 (V.24)  
RS422 (V.11)

format. Physically only one interface can be used as an input. For the operation of the RS232 interface no handshake lines have been provided (3 wire operation).

### **4.2 Choice of Transmission Parameter**

On the board 4980 the parameter baud rate, stopbits and parity bits can be configured by means of the DIP-Switch SW2. The settings are identical for both operating modes (clock/display).

After every alteration of the setting a RESET must be caused.

#### **4.2.1 Word Length**

Switch position at DIP-Switch SW2, push button 7 (see diagram in the appendix)

<b><u>S7</u></b>	<b><u>SW2</u></b>
on	8 Bit
off	7 Bit

#### **4.2.2 Parity-Bit**

Switch position at DIP-Switch SW2, push button 5 and 6 (see diagram in the appendix)

<b><u>S6</u></b>	<b><u>S5</u></b>	<b><u>SW2</u></b>
on	on	no parity
on	off	no parity
off	on	parity bit even
off	off	parity bit odd

#### **4.2.3 Stop-Bit**

Switch-position at DIP-Switch SW2, push button 4 (see diagram in the appendix)

<b><u>S4</u></b>	<b><u>SW2</u></b>
on	1 stop-bit
off	2 stop-bits

#### **4.2.4 Baud Rate Settings**

Switch position at DIP-Switch SW2, push button 1-3 (see diagram in the appendix)

<b><u>S3</u></b>	<b><u>S2</u></b>	<b><u>S1</u></b>	<b><u>SW2</u></b>
on	on	on	150 Bd
on	on	off	300 Bd
on	off	on	600 Bd
on	off	off	1200 Bd
off	on	on	2400 Bd
off	on	off	4800 Bd
off	off	on	9600 Bd
off	off	off	19200 Bd

### **4.3 Operation as Radio Controlled Clock**

#### **4.3.1 Time Base (UTC /Local)**

The time base of the serial interface can be set by means of DIP-Switch SW3 push button 8

<b><u>S8</u></b>	<b><u>SW3</u></b>
on	UTC
off	Local Time

#### **4.3.2 Moment of Output**

The moment of the output of the serial data string is set at the DIP-Switch SW3. The push-button S3 to S6 are not used at present. They can be programmed according to customer specifications and described here.

<b><u>S2</u></b>	<b><u>S1</u></b>	<b><u>SW3</u></b>
on	on	every second
on	off	every minute
off	on	every hour
off	off	on request

#### **4.3.3 Output on Request**

In the setting output on request ASCII characters must be transmitted to the board

For the output of the complete data string	ASCII " <b>D</b> "	(44 HEX).
For the output time only	ASCII " <b>U</b> "	(55 HEX).

But it is also possible to initiate the data string output in the following settings:

output every second  
output every minute  
output every hour

#### **4.3.4 The Put Out Time Data String**

The received time can be put out in different data strings, selected by means of the switches S3 and S4 in the DIP-switch bank SW3.

At present the following data strings are at hand:

<b>S4</b>	<b>S3</b>	<b>SW3</b>
on	on	<b>hopf</b> standard data string
on	off	string 2000
off	on	free, for the time being <b>hopf</b> standard data string
off	off	free, for the time being <b>hopf</b> standard data string

#### **4.3.5 hopf Standard Data String**

All **hopf** radio controlled clocks with serial interface (DCF77 or GPS) have the **hopf** standard data string.

It is the same as the "standard data string 6021".

##### **4.3.5.1 Data String hopf Standard Time/Date**

<b>character. no.:</b>	<b>meaning</b>	
1	STX (start of text)	
2	Status H-Nibble	; see 4.3.5.3
3	Status L-Nibble	; see 4.3.5.3
4	hours tens	
5	hours unit	
6	minutes tens	
7	minutes unit	
8	seconds tens	
9	seconds unit	
10	day tens	
11	day unit	
12	month tens	
13	month unit	
14	year tens	
15	year unit	
16	LF (line feed)	; see 4.3.5.5
17	CR (Carriage Return)	; see 4.3.5.5
18	ETX (end of text)	

**4.3.5.2 Data String hopf Standard Time only**

The data string can be requested by ASCII "U" CET/CEST.

<b>character no.:</b>	<b>meaning</b>	
1	STX (start of text)	
2	hours tens	
3	hours unit	
4	minutes tens	
5	minutes unit	
6	seconds tens	
7	seconds unit	
8	LF (line feed)	; see 4.3.5.5
9	CR (carriage return)	; see 4.3.5.5
10	ETX (end of text)	

**4.3.5.3 Status- and Day of the Week Nibble in the Data String hopf Standard**

The second and the third ASCII characters contain the status and the day of the week.

Structure of these characters.

<b>B7</b>	<b>B6</b>	<b>B5</b>	<b>B4</b>	<b>B3</b>	<b>B2</b>	<b>B1</b>	<b>B0</b>	<b>meaning</b>
x	x	x	x	0/1	0	0	1	Monday
x	x	x	x	0/1	0	1	0	Tuesday
x	x	x	x	0/1	0	1	1	Wednesday
x	x	x	x	0/1	1	0	0	Thursday
x	x	x	x	0/1	1	0	1	Friday
x	x	x	x	0/1	1	1	0	Saturday
x	x	x	x	0/1	1	1	1	Sunday
x	x	x	0	x	x	x	x	no announcement
x	x	x	1	x	x	x	x	announcement
x	x	0	x	x	x	x	x	standard time
x	x	1	x	x	x	x	x	daylight saving time
0	0	x	x	x	x	x	x	time invalid
0	1	x	x	x	x	x	x	crystal operation
1	0	x	x	x	x	x	x	radio operation
1	1	x	x	x	x	x	x	radio operation adjusted

Bit3 determines the time zone:

**Bit3 time zone**

- 0 output local time CET or CEST
- 1 output UTC

**4.3.5.4 Example of a Transmitted Data String hopf Standard****(STX)E2132958270499(LF)(CR)(ETX)**

ASCII-characters: 02,45,32,31,33,32,39,35,38,32,37,30,34,39,39,0A,0D,03

radio operation (high accuracy)

daylight saving time

no announcement

It is Tuesday 27.04.99 - 13:29:58 h

( ) - ASCII control characters e.g. (STX)

**or****(STX)EA112958270499(LF)(CR)(ETX)**

ASCII-characters: 02,45,41,31,31,32,39,35,38,32,37,30,34,39,39,0A,0D,03

radio operation (high accuracy)

UTC

no announcement

It is Tuesday 27.04.99 - 11:29:58 h

**4.3.5.5 Output Order of the Control Characters "CR" and "LF"**

The output order of the control characters "CR" and "LF" can be exchanged by means of switch 5 in Dip-Switch SW3:

<b>S5</b>	<b>SW3</b>
on	order "LF" - "CR"
off	order "CR" - "LF"

**4.3.6 hopf Standard Data String 2000**

This data string is like the **hopf** standard data string except that the year is transmitted in 4 digits. As DCF77 transmits the year in two digits the century is calculated.

The output of data is correct between 1<sup>st</sup> Jan. 1970 and 31<sup>st</sup> Dec. 2069.

**4.3.6.1 Data String 2000 Time / Date**

<b><u>character no.:</u></b>	<b><u>meaning</u></b>	
1	STX (start of text)	
2	Status H-Nibble	; see 4.3.5.3
3	Status L-Nibble	; see 4.3.5.3
4	hours tens	
5	hours unit	
6	minutes tens	
7	minutes unit	
8	seconds tens	
9	seconds unit	
10	day tens	
11	day unit	
12	month tens	
13	month unit	
14	year 1000s	
15	year 100s	
16	year tens	
17	year unit	
18	LF (line feed)	; see 4.3.5.5
19	CR (Carriage Return)	; see 4.3.5.5
20	ETX (end of text)	

**4.3.6.2 Data String 2000Time only**

Like the time data string under 4.3.5.2

**4.3.6.3 Structure of the Status Byte in the Data String 2000**

Like status under 4.3.5.3

**4.3.6.4 example of a transmitted data string 2000**

**(STX)E213295827041999(LF)(CR)(ETX)**

ASCII-characters: 02,45,32,31,33,32,39,35,38,32,37,30,34,31,39,39,39,0A,0D,03

radio operation (high accuracy)

daylight saving time

no announcement

It is Tuesday 27.04.1999 - 13:29:58 h

( ) - ASCII control characters e.g. (STX)

#### **4.4 Operation as Matrix Display**

When connected to the system 7001 the large display is connected to the board 7515 in party-line operation via the RS422 (V.11) (see drawing in the appendix). Depending on the DIP-Switch SW3 the display can filter the following data strings from the serial interface boards 7515/7245 or 7201/7221 and display them. The data of the serial interface are checked for the transmitted identification (F0-F8) and when a valid data string for this display arrives the data are shown in the display. Dip switch SW3, push button 1-5 can be used to select the string to be shown in the matrix display.

<b>S5</b>	<b>S4</b>	<b>S3</b>	<b>S2</b>	<b>S1</b>	<b>ident.</b>	<b>Display</b>
off	on	on	on	on	F0	system time
off	on	on	on	off	F1	power line time
off	on	on	off	on	F2	difference time
off	on	on	off	off	F3	frequency and difference frequency
off	on	off	on	on	F4	temperature and humidity
off	on	off	on	off	F5	power 1
off	on	off	off	on	F6	power 2
off	on	off	off	off	F7	synchronisation by string
off	off	on	on	on	F8	user specified string

##### **4.4.1 Height of Digits during Matrix Operation**

The display can be set by means of the DIP-Switch 3 push button 8 to either 42 or 84 mm height of digits.

<b><u>S8</u></b>	<b><u>SW3</u></b>
on	42 mm
off	84 mm

Depending on the set identification the data are written into the display.

#### **4.4.2 F0 = System Time**

In case of the setting system time the board 4980 filters the following string from the serial input.

##### **String structure**

<b>character no.:</b>	<b>meaning</b>	<b>value range in Hex</b>
1	STX (Start of Text)	02
2	"F"	46
3	"0"	30
4	"S"	53
5	"y"	79
6	space	20
7	tens digit hour	30-32
8	unit digit hour	30-39
9	colon	3A
10	tens digit minute	30-35
11	unit digit minute	30-39
12	colon	3A
13	tens digit seconds	30-36
14	unit digit seconds	30-39
15	ETB (End of Block)	17
16	ETX (End of Text)	03

When the above data string is received hours, minutes and seconds are displayed as follows.

**12:34:56**

If the DIP-Switch SW3 push button 8 is set to **ON** (42mm height of digits) a second string (power line time) is filtered from the serial input and displayed in the bottom line of the display, as follows:

**Sy 12:34:56**

**N1 12:34:57**



#### **4.4.3 F1 = Time Synchronized by Power Line**

If set to time synchronized by power line the board 4980 filters the following string from the serial input.

##### **String structure:**

<b>character no.:</b>	<b>meaning</b>	<b>value range in Hex</b>
1	STX (Start of Text)	02
2	"F"	46
3	"1"	31
4	"N"	4E
5	"1"	31
6	space	20
7	tens digit hour	30-32
8	unit digit hour	30-39
9	colon	3A
10	tens digit minute	30-35
11	unit digit minute	30-39
12	colon	3A
13	tens digit second	30-36
14	unit digit second	30-39
15	ETB (End of Block)	17
16	ETX (End of Text)	03

When the above described data string is received hours, minutes and seconds are displayed as follows:

**12:34:56**

If the DIP-Switch SW3 push button 8 is set to **ON** (height of digits 42mm) a second string (system time) is filtered from the serial input and displayed in the bottom line, as follows :

**N1 12:34:56**

**Sy 12:34:57**

**4.4.4 F2 = Difference Time**

When set to difference time the board 4980 filters the following string from the serial input.

**String structure**

<b>character no.:</b>	<b>meaning</b>	<b>value range in Hex</b>
1	STX (Start of Text)	02
2	"F"	46
3	"2"	30
4	"t"	53
5	column	7F
6	column	7F
7	sign (+/-)	2B-2D
8	row	7F
9	row	7F
10	tens digit hour	30-32
11	unit digit hour	30-39
12	colon	3A
13	tens digit minute	30-35
14	unit digit minute	30-39
15	colon	3A
16	tens digit second	30-36
17	unit digit second	30-39
18-22	5 * Space	20
23	CR (Carriage Return)	0D
24	hundredth millisecond	30-39
25	tens digit millisecond	30-39
26	unit digit millisecond	30-39
27	ETB (End of Block)	17
28	ETX (End of Text)	03

When the above described data string is received seconds and milliseconds are displayed as follows

**+ 06,447**

if the DIP-Switch SW3 push-button 8 is set to **ON** (42mm height of digits) the difference time is displayed as follows:

**t + 00:00:06**

**447**

#### **4.4.5 F3 = Mains Frequency and Difference Frequency**

When set to mains frequency the board 4980 filters the following string from the serial input.

##### **String structure:**

<b>character no.:</b>	<b>meaning</b>	<b>value range in Hex</b>
1	STX (Start of Text)	02
2	"F"	46
3	"3"	33
4	"f"	66
5	"1"	30
6	space	20
7	tens digit frequency	30-39
8	unit digit frequency	30-39
9	comma	2C
10	frequency 1/10	30-39
11	frequency 1/100	30-39
12	frequency 1/1000	30-39
13	Space	20
14	"H"	48
15	"z"	7A
16	CR (Carriage Return)	0D
15	column	7F
16-19	4 * Space	20
20-31	like no. 4-15	
32	ETB (End of Block)	17
33	ETX (End of Text)	03

This string generates the following displays

<b><u>S6</u></b>	<b><u>SW3</u></b>
on	display mains frequency f1
off	display difference frequency

In setting "difference frequency" the basic frequency of the net must be set correctly by push button 7 in DIP-Switch SW3.

<b><u>S7</u></b>	<b><u>SW3</u></b>
on	50 Hz basic frequency
off	60 Hz basic frequency

The height of the digit is dependent of DIP-Switch SW3 push button 8.

<b><u>S8</u></b>	<b><u>SW3</u></b>
on	42 mm digit
off	84 mm digit

The mains frequency display e.g. shows at follow:

**49,998**

84 mm digit

f1 49,998 Hz

42 mm digit

The difference frequency display e.g. shows at follow:

**+00,002**

84 mm digit

df +00,002 Hz

42 mm digit

#### **4.4.6 F4 = Temperature and Humidity**

When setting temperature and humidity the board 4980 filters the following string out of the serial input

##### **String structure**

<b><u>character no.:</u></b>	<b><u>meaning</u></b>	<b><u>value range in Hex</u></b>
1	STX (Start of Text)	02
2	"F"	46
3	"4"	31
6	tens digit temperature	30-39
7	unit digit temperature	30-39
8	"°"	30-39
9	"C"	30-39
10	tens digit humidity	30-39
11	unit digit humidity	30-39
12	"%"	30-39
13	"H"	30-36
14	ETB (End of Block)	17
15	ETX (End of Text)	03

Once the above described data string is received temperature and humidity are displayed as follows:

**32° C 56%H**

This data string is displayed in 84mm height only .

#### **4.4.7 F5 / F6 = Power 1 and 2**

In case of the setting power the board 4980 filters the following strings from the serial input.

##### **String structure**

<b><u>character no.:</u></b>	<b><u>meaning</u></b>	<b><u>value range in Hex</u></b>
1	STX (Start of Text)	02
2	"F"	46
3	"5"/"6"	35/36
6	thousand digit power	30-39
7	hundred digit power	30-39
8	tens digit power	30-39
9	unit digit power	30-39
10	ETB (End of Block)	17
11	ETX (End of Text)	03

Once the above described data string is received either power 1 or 2 is displayed as follows. .

**1235 MW**

This data string is displayed in 84mm height only.

#### **4.4.8 F7 = Master/Slave data string**

This data string serves to supply the large display with the time information via the board 7515. The data string includes the difference time of the base system so that UTC can be displayed with the correct difference. The string is transmitted in the 59<sup>th</sup> second with the data of the next full minute. The character ETX (end of text) is transmitted on the second change and switches the data on the large display valid.

The status is structured as follows:

	<b>b3</b>	<b>b2</b>	<b>b1</b>	<b>b0</b>	<b>meaning</b>
<b>status nibble:</b>	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	crystal operation
	1	x	x	x	radio operation
<b>day of the week nibble:</b>	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

The difference time is transmitted in hours and minutes. The transmission is done in BCD. The difference time may be up to.  $\pm 11.59$  h.

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

logical "1" = local time before UTC

logical "0" = local time after UTC

#### **example :**

90.00      difference time + 10.00 h.

01.30      difference time - 01.30 h.

**string structure:**

<b>character no:</b>	<b>meaning</b>	<b>value range in Hex</b>
1	STX (Start of Text)	02
2	"F"	46
3	"7"	37
4	status high-nibble	30-39,41-46
5	status low-nibble	30-39,41-46
6	tens hour	30-32
7	unit hour	30-39
8	tens minute	30-35
9	unit minute	30-39
10	tens second	30
11	unit second	30
12	tens day	30-33
13	unit day	30-39
14	tens month	30-31
15	unit month	30-39
17	tens year	30-39
18	unit year	30-39
19	tens difference-hours	30,38,39
20	unit difference-hours	30-39
21	tens difference-minutes	30-35
22	unit difference-minutes	30-39
23	CR	0D
24	LF	0A
25	ETX	03



#### **4.4.9 F8 = special strings**

This setting can be used to show some data on the large display. The display looks as follows:

##### **1 line**

height of digit : 84 mm  
max. number of digits : 16<sup>1</sup>  
ASCII-characters : HEX 20 - HEX 5A  
special characters, digits and capital letters

##### **2 lines**

height of digit : 84 mm  
max. number of digits : 10 digits/line  
ASCII-characters : HEX 20 - HEX 7A  
special characters, digits, small and capital letters

Control characters are:

STX	= Start of Text	HEX02	
ETX	= End of Text	HEX03	
LF	= Line feed	HEX0A	to change line
DEL	= Delete	HEX7F	to insert a free line

It is possible to use less than the maximum number of digits. LF or ETX are the outer borders.

---

<sup>1</sup> For the clearance of the display there are 16 characters available. There fit 6 big characters in there full sizes on the display.

The strings must have the following structure:

**1<sup>st</sup> line:**

<b>character no.:</b>	<b>meaning</b>	<b>value range in Hex</b>
1	STX (start of text)	02
2	"F"	46
3	"8"	37
4	"1" for 1 line	31
5	1 <sup>st</sup> character	
:		
:		
20	last character	
21	ETX	03

**2<sup>nd</sup> line:**

<b>character no.:</b>	<b>meaning</b>	<b>value range in Hex</b>
1	STX (start of text)	02
2	"F"	46
3	"8"	37
4	"2" for 2 lines	32
5	1 <sup>st</sup> character - 1 <sup>st</sup> line	
:		
:		
14	last character - 1 <sup>st</sup> line	
15	LF line feed	0A
16	1 <sup>st</sup> character - 2 <sup>nd</sup> line	
:		
:		
25	last character - 2 <sup>nd</sup> line	
26	ETX	03

## **5 Technical Data Radio Controlled Clock Large Display 4980**

voltage supply	220V AC / 50-60 Hz
operating voltage 4980:	+ 5V DC $\pm$ 5%
display:	+ 5V DC $\pm$ 5%
power consumption:	without display about 590 mA with display about 2,5 A
crystal clock deviation:	$\pm$ 2 ppm at 25°C after control by the DCF77-Signal
back-up clock deviation	$\pm$ 25 ppm at 25°C
buffering time (back-up clock):	3 days (maintenance free)
antenna:	active ferrite antenna (max. cable length 500 m without antenna amplifier) weather proof outdoor antennas available
lightning protection	an indirect lightning protection for the antenna is available
serial interface :	RS232 and RS422 without handshake
DCF77-pulse input:	RS422 hardware
DCF77-pulse output:	RS422 hardware
temperature range :	0-70° C
special orders	hard and software designs according to customer needs and specifications are possible



**Please note :** The **hopf** company withhold the right to technical alterations in hard and software at any time.

### DIP-Switch SW1

**S1 S2** german day of the week and month initials  
 on on english day of the week and month initials  
 on off french day of the week and month initials  
 on off spanish day of the week and month initials

**S3 S4** european date format  
 on on american date format  
 on off free  
 on off free

**S5 S6 S7** on on output time and date 42mm digits  
 on off output date only 84mm digits  
 on on output time only 84mm digits  
 on off output time only 84mm and seconds 42mm digits

**S8** on synchronize by antenne  
 on off synchronize by pulse input

### DIP-Switch SW2

**S1 S2 S3** on on 150 bd  
 on on 300 bd  
 on on 600 bd  
 on off on 1200 bd  
 on on 2400 bd  
 on off 4800 bd  
 on off 9600 bd  
 on off 19200 bd

**S4** 1 stop bit  
 on 2 stop bits

**S5 S6** on no parity  
 on on no parity  
 on off parity even  
 on off parity odd

**S7** on 8 bit word length  
 on off 7 bit word length

**S8** on radio clock  
 on off matrix display

### DIP-Switch SW3

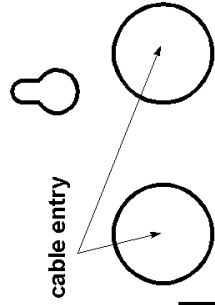
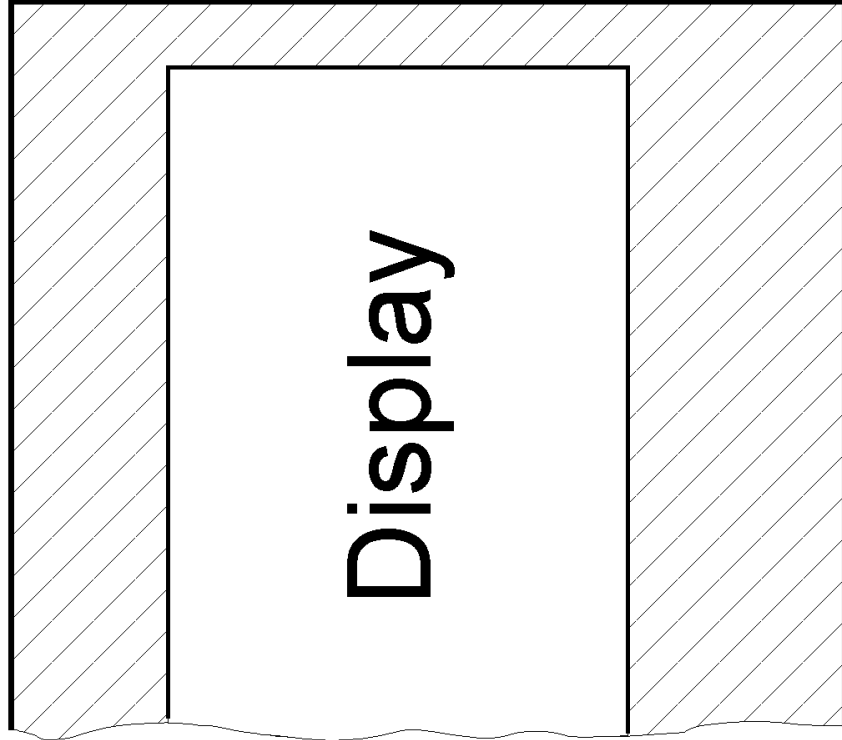
**mode: matrix display**

S1	S2	S3	S4	S5	label
on	on	on	on	off	F0 system time
on	on	on	on	off	F1 net time
on	off	on	on	off	F2 difference time
on	off	on	off	off	F3 frequency
on	off	on	off	off	F4 temperature a humidity
on	off	on	off	off	F5 Power 2
on	off	off	on	off	F6 Master/Slave (GPS)
on	on	on	off	off	F7 Special String
on	on	on	off	off	F8

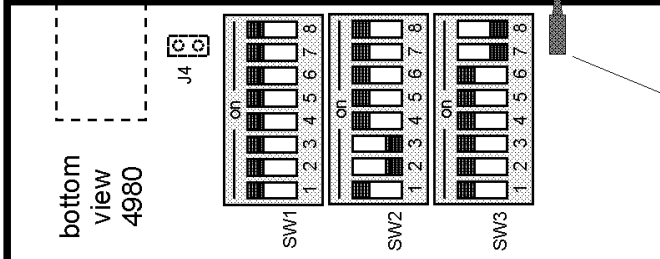
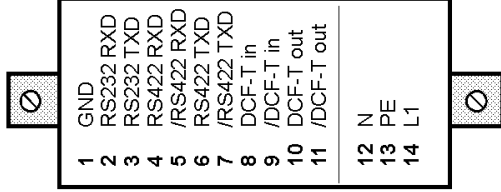
**S6** on frequency display  
 on off difference frequency

**S7** on 50 Hz basic  
 on off 60 Hz basic

**S8** on 42 mm digit  
 on off 84 mm digit



### terminal block

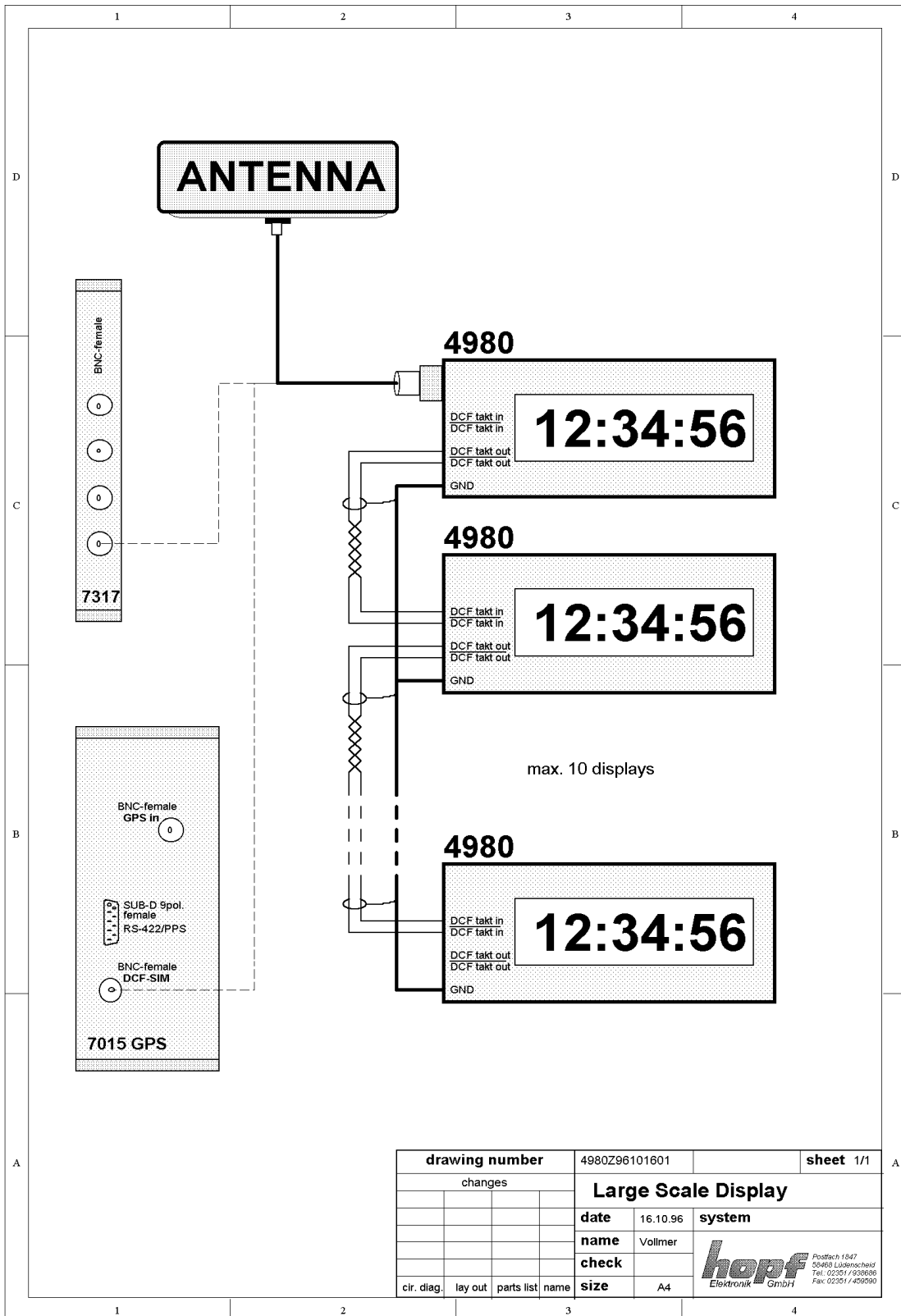


push button  
 < 3 sec. - antenna alignment  
 ≥ 3 sec. - RESET

Changes		Drawing number	ZC97112803	page 1/1
18.05	SW3 S3/4	Vo	<b>Board 4980</b>	system
17.11	J4	Vo		
21.10	F7 / F8	Vo		
16.07	terminal	Vo		
18.06	spanish	Vo		
25.05	terminal	Vo	date	28.11.97
	changes	name	check	Vollmer
	size	name	size	A4

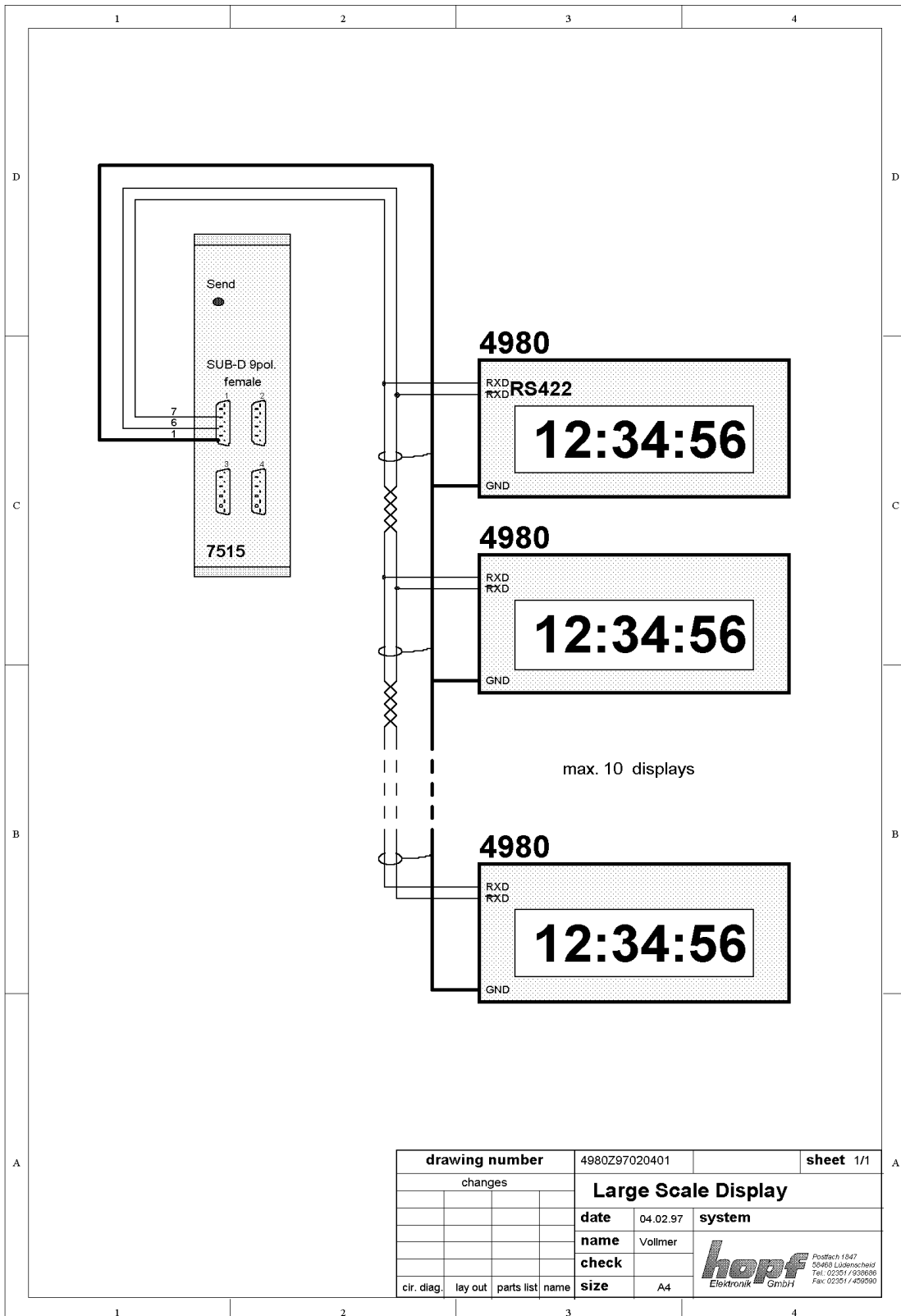



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<b>drawing number</b>	4980Z96101601	<b>sheet</b> 1/1
<b>changes</b>	<b>Large Scale Display</b>	
<b>date</b>	16.10.96	<b>system</b>
<b>name</b>	Vollmer	
<b>check</b>		
<b>size</b>	A4	
<b>cir. diag.</b>	<b>lay out</b>	<b>parts list name</b>

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 Elektronik GmbH



<b>drawing number</b>		4980Z97020401		<b>sheet</b> 1/1	
changes		<b>Large Scale Display</b> <b>date</b> 04.02.97 <b>system</b> <b>name</b> Vollmer <b>check</b>  <small>Postfach 1847 50460 Lüdenscheid Tel: 02351 / 95368-0 Fax: 02351 / 499090</small>			
cir. diag.					
lay out					
parts list					
name					
<b>size</b>		A4			