

Industriefunkuhren



Technical Manual

LAN Board

Model 7270

ENGLISH

Version: 07.00 – 08.03.2007

Valid for Devices 7270 with FIRMWARE Version: **07.xx**

Version number (Firmware / Description)

THE FIRST TWO DIGITS OF THE VERSION NUMBER OF THE TECHNICAL DESCRIPTION AND THE FIRST TWO DIGITS OF THE FIRMWARE VERSION MUST **COMPLY WITH EACH OTHER.**

THE DIGITS AFTER THE POINT IN THE VERSION NUMBER INDICATE CORRECTIONS IN THE FIRMWARE / DESCRIPTION THAT ARE OF NO SIGNIFICANCE FOR THE FUNCTION.

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Homepage: <http://www.hopf.com>

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Symbols and Characters



Operational Reliability

Disregard may cause damages to persons or material.



Functionality

Disregard may impact function of system/device.



Information

Notes and Information.



Safety regulations

The safety regulations and observance of the technical data serve to ensure trouble-free operation of the device and protection of persons and material. It is therefore of utmost importance to observe and compliance with these regulations.

If these are not complied with, then no claims may be made under the terms of the warranty. No liability will be assumed for any ensuing damage.



Safety of the device

This device has been manufactured in accordance with the latest technological standards and approved safety regulations

The device should only be put into operation by trained and qualified staff. Care must be taken that all cable connections are laid and fixed in position correctly. The device should only be operated with the voltage supply indicated on the identification label.

The device should only be operated by qualified staff or employees who have received specific instruction.

If a device must be opened for repair, this should only be carried out by employees with appropriate qualifications or by **hopf** Elektronik GmbH.

Before a device is opened or a fuse is changed all power supplies must be disconnected.

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.

CE-Conformity



This device fulfils the requirements of the EU directive 89/336/EWG "Electromagnetic compatibility" and 73/23/EWG "Low voltage equipment".

Therefore the device bears the CE identification marking (CE=Communauté Européenne)

CE = Communautés Européennes = European communities

The CE indicates to the controlling bodies that the product complies with the requirements of the EU directive - especially with regard to protection of health and safety for the operator and the user - and may be released for sale within the common markets.

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1 General information

LAN Board 7270 is a **Network Time Server** (NTS) for **hopf** GPS and DCF77 System 7001 and Base System 68xx (6842, 6850 and 6855) for 19“ or ½ 19“ (3U) racks).

It can be used for synchronizing PC or SPS networks with the accurate time and can be installed at any point in the network.

The board supports the world wide used time protocol **NTP** (**Network Time Protocol**) **version 1, 2 and 3** (RFC 1305) und **SNTP** (Simple NTP, RFC 2030) as well as the special industrial Ethernet protocol '**SINEC H1 time datagram**'.

The LAN Board 7270 is available with network interface 10 Base-T or 10/100 Base-T.

Extensive parameters are provided to suit the conditions of individual applications by means of a variety of access / configuration channels.

The configuration of the LAN Board 7270 is via the keypad of the **hopf** System 7001 or 68xx.

Ethernet Remote control of the board 7270 using a text based menu via Telnet is possible. Furthermore the LAN board 7270 supports a basic SNMP functionality.

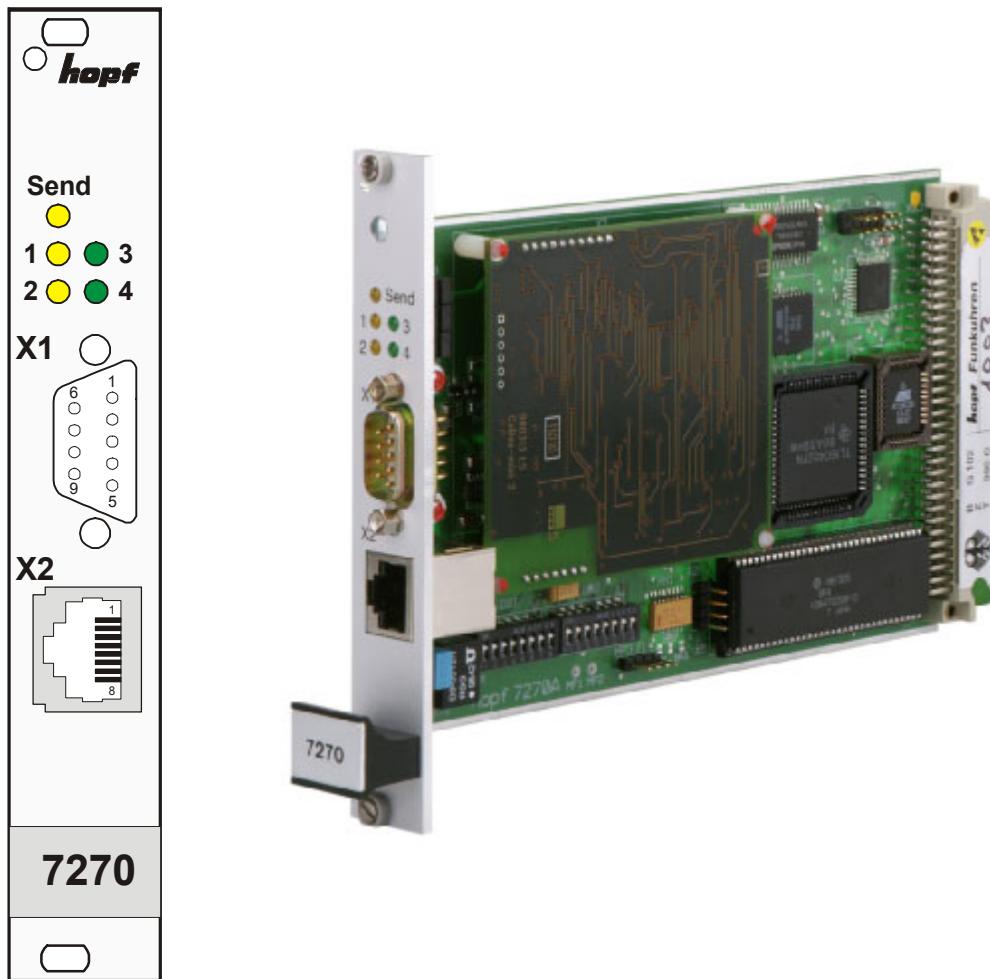
A variety of management and monitoring functions are available (e.g. SNMP traps, Syslog messages).

2 LAN Board 7270 Construction

This chapter describes the hardware components of the LAN Board 7270

2.1 LAN Board 7270 Front Panel

The LAN Board 7270 has a 3U/4HP front panel for 19" systems. It is equipped with the following components:



2.1.1 LED Status and Error Codes

There are 5 LEDs for status or error messages on the front panel.

2.1.1.1 Send LED

SEND LED	Description
Flashing	Normal case. Access to the internal bus is displayed. The LAN Board 7270 is correctly connected to the system 7001.
Permanently off	Error on another board. No further bus access is possible.
Permanently lit	Error on the LAN Board 7270

2.1.1.2 Network Status LEDs 1-4

LED 1	LED 2	LED 3	Function
Lit	Off	Off	Synchronization of LAN possible with LAN Board 7270.
Off	Flashing	Off	No synchronization of LAN possible with LAN Board 7270 e.g.: <ul style="list-style-type: none">• system 7001 not synchronised,• or LAN Board 7270 is not implemented, it becomes no time information from system 7001.

LED 4	Function
Lit	Network connection is correctly via RJ45
Off	Network connection is incorrect via RJ45

LED 1-4	Function
al off \Rightarrow al lit \Rightarrow initial flashing	RESET -behaviour of LAN Board 7270 with on it following initialising. (duration about 5 second)
different flashing of al LEDs	Error behaviour (continuous)

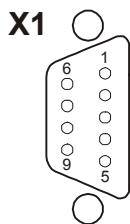


Telnet-configurations-mode:

LED 3 of LAN board 7270 is flashing into configuration mode.
e.g. with **Telnet** or through **system 7001**.

2.1.2 SUB-D, connector X1

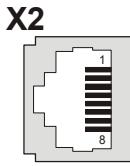
X1 (9-pole SUB-D connector)



Pin no.	Allocation
1	Minute pulse of defined length (isolated to GND1)
2	Receiving cable RxD1 (RS232)
3	Transmission cable TxD1 (RS232)
4	free
5	GND
6	+12 V DC, max. 50mA (isolated to GND1)
7	reserved
8	reserved
9	GND1 (isolated) for minute pulse

2.1.3 RJ-45 Socket X2

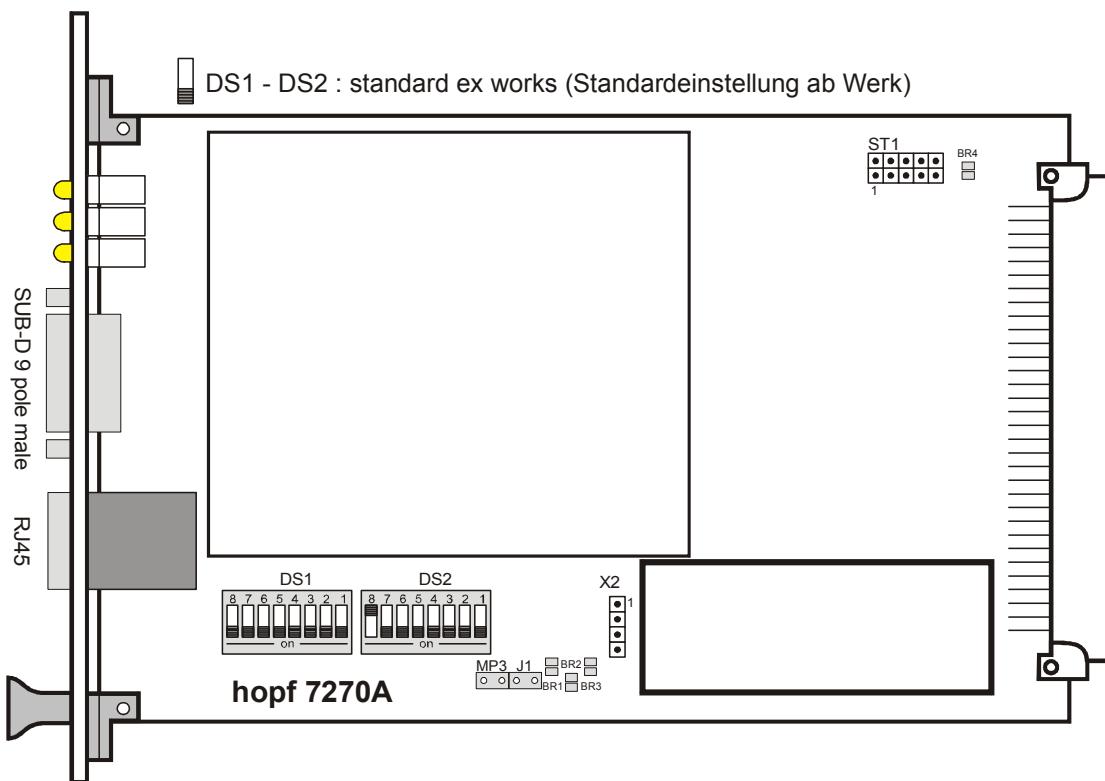
X2 (RJ-45 bush, with shield, 10/100 Base-T connector)



Pin no.	Allocation	
1	positive transmission line	Tx+
2	negative transmission line	Tx-
3	positive receiving line	Rx+
4	unassigned	-
5		
6	negative receiving line	Rx-
7	unassigned	-
8		

2.2 Overview of LAN Board 7270 (3U/4HP) Assembly

Position drawing of LAN Board 7270



2.2.1 Additional connectors, jumpers and measuring points

	Function
ST1	hopf Elektronik GmbH service connector
X2	hopf Elektronik GmbH diagnosis connector
J1	hopf Elektronik GmbH service jumper
MP3	Operating voltage measuring points (5V DC)

2.2.2 DIP switch block 1 (DS1)

No.:	Function
8	LAN configuration via system keyboard allow / not allow (see chapter 5 Configuration of the LAN Board 7270)
7	for 7001 / 68xx system bus specification (see chapter 3.2 Selection of hopf Base System 68xx or 7001)
6, 5	configuration of the length of the minute pulse (in msec) (see chapter 9 Configuration of the Minute pulse)
4-1	board identification in System 7001 / 68xx (see chapter 3.3 Setting the System Board Number)

2.2.3 DIP switch block 2 (DS2)

No.:	Function
8	reserved for hopf Elektronik GmbH, the setting must not be changed! (ought to set off)
7-3	unassigned (ought to set on)
2	SINEC H1 time datagram transmission point at the same second (default) / 1 second subsequent (see chapter 8 Transmission Point of the SINEC H1 time Datagram)
1	Configuration of the transmitted time telegram depending on the Base System Status (see chapter 7 Status of time datagram dependent on System Status)

3 Implementing LAN Board 7270 in a **hopf** Base System

All Function Boards are parameterised individually from within the Base System.



Each LAN Board 7270 is uniquely identified in a **hopf** Base System via an assigned Board number

The following steps are required for the purpose of implementation:

- Free slot available in the Base System (bus bridge)
- Not more than 1 LAN Board (System 68xx) or 7 LAN Boards (System 7001) already implemented
- Set the Base System in which the Board is to be implemented via the DIP switch on Board 7270
- Set a Board number that is not yet assigned in the Base System via the DIP switch on LAN Board 7270
- Switch the Base System off
- Remove the Bus Bridge Board from the Base System
- Insert the LAN Board 7270
- Switch the System on
- Select the LAN Board 7270 setting menu in the Base System (LAN x / x = set Board number)
- Set the desired LAN parameters (IP, network mask and gateway) via the menu

3.1 LAN Board 7270 Base Parameters (factory setting)

The LAN Board 7270 is supplied in the following configuration:

Base Parameters	
IP Address:	192.168.017.XXX (XXX= Board number)
Gateway:	000.000.000.000 - no gateway set
Network Mask:	8 (255.255.255.000)
Control byte	0000 0010
Password:	No password activated for Telnet access

NTS Parameters	
Antenna Type:	hopf 6021 (must not be changed)
SNMP Manager IP Address:	000.000.000.000 - not set
Syslog IP Address:	000.000.000.000 - not set
Encryption:	not activated
SINEC H1 time datagram:	not activated
SNTP Ref. Identifier:	" hopf "
UDP Port:	not activated

3.2 Selection of **hopf** Base System 68xx or 7001

Selection can be made to operate the LAN Board 7270 in Base System 7001 or Base Systems 6842, 6850 or 6855 by means of switch SW7 on dip switch bank **DS1**.

	LAN Board 7270 will only operate properly if this setting is correct.
---	---

DS1 / SW7	hopf Base System Selection
on	Base System 7001
off	Base System 68xx

3.3 Setting the System Board Number

The boards must be coded to a System Board number in order to enable the various LAN Boards to be administered and configured in the Base System.

	Under no circumstances may two LAN Board 7270 with the same Board number be integrated into one Base System. This leads to unspecified faults on these two Boards!
---	---

The coding of the Board number takes place on LAN Board 7270 via DIP switch bank (**DS1**).

3.3.1 Setting the Board Number for Base System 7001

A maximum of 8 LAN Boards of different types (e.g. Board 7270 and Board 7271) can be configured in System 7001. The Board number is set via the DIP switch bank (**DS1 / SW1-4**) for unique identification in the Base System.

The LAN Boards can be parameterised in the Base System menu from LAN 1 (Board number 1) to LAN 8 (Board number 8).

DS1				Board No.:
DIP 4	DIP 3	DIP 2	DIP 1	
on	on	on	on	Board No. 1
on	on	on	off	Board No. 2
on	on	off	on	Board No. 3
on	on	off	off	Board No. 4
on	off	on	on	Board No. 5
on	off	on	off	Board No. 6
on	off	off	on	Board No. 7
on	off	off	off	Board No. 8

	Only these Board numbers set with the DIP switch are allowable in System 7001. System 7001 is unable to configure Board numbers which are set outside the range of the system (1-8).
---	--

3.3.2 Setting the Board Number for Base System 68xx

A maximum of 2 LAN Boards of different types (e.g. Board 7270 and Board 7271) can be configured in the System 68xx. The Board number is set via the DIP switch bank (**DS1 / SW1-4**) for unique identification in the Base System.

The LAN Boards can be parameterised in the Base System menu with LAN 1 (Board number 1) and LAN 2 (Board number 2).

DS1				Board No.:
DIP 4	DIP 3	DIP 2	DIP 1	
on	on	on	on	Board No. 1
on	on	on	off	Board No. 2



Only those Board numbers set with the DIP switch are allowable in System 68xx.

System 68xx is unable to configure Board numbers which are set outside the range of the system (1-2).

3.4 Creating the Network Connection



Ensure that the network parameters of the LAN Board are configured in accordance with the local network before connecting the LAN Board to the network (see **Chapter 4 LAN Board 7270 Network Configuration via the Base System**).



Connecting a network to an incorrectly configured LAN Board (e.g. duplicated IP address) may cause interference in the network.



Request the required network parameters from your network administrator if you do not know them.

The network connection is made via a LAN cable with RJ45 plug (recommended cable type: CAT5 or better).

4 LAN Board 7270 Network Configuration via the Base System

LAN Board 7270 is configured via the keyboard of the respective Base System. The necessary network parameters are configured such as IP address, gateway address, network mask and a general control byte.

The Technical Description of the respective Base System is the basis for configuration. The following covers only the Board-specific menus of the respective Base System.



After they have been entered fully, the LAN parameters configured through the system menu are transferred to the control board by pressing the **ENT** key. In order for the LAN parameters to be transferred from the control board to the LAN Board and to be stored there it is necessary to exit the menu by pressing the **BR** key.



The Base System does not accept LAN parameters which are subsequently changed via the Ethernet and thus they are no longer displayed correctly. For this reason the assignment of LAN parameters via the Base System is recommended.

4.1 IP Address (IPv4)

An IP address is a 32 bit value divided into four 8 bit numbers. The standard presentation is 4 decimal numbers (in the range 0...255) separated from each other by dots (dotted quad notation).

Example: 192.002.001.123

The IP address consists of a leading network ID followed by the host ID. Four common network classes were defined in order to cover different requirements. Depending on the network class, the last one, two or three bytes define the host while the rest define the network (network ID) in each case.

In the following text the "x" stands for the host part of the IP address.

Class A Networks

IP addresses 001.xxx.xxx.xxx to 127.xxx.xxx.xxx

There is a maximum of 127 different networks in this class. This allows the possibility to connect a very high number of devices (max. 16.777.216)

Example: 100.000.000.001, (Network 100, Host 000.000.001)

Class B Networks

IP addresses 128.000.xxx.xxx to 191.255.xxx.xxx

Each of these networks can consist of up to 65534 devices.

Example: 172.001.003.002 (Network 172.001, Host 003.002)

Class C Networks

IP addresses 192.000.000.xx to 223.255.255.xxx

These network addresses are the most commonly used. Up to 254 devices can be connected.

Class D Networks

The addresses from 224.xxx.xxx.xxx - 239.xxx.xxx.xxx are used as multicast addresses.

Class E Networks

The addresses from 240.xxx.xxx.xxx - 254.xxx.xxx.xxx are designated as "Class E" and are reserved.

4.2 Gateway Address

The gateway or router address is required in order to be able to communicate with other network segments. The standard gateway must be set to the router address which connects these segments. This address must be within the local network.

4.3 Network Mask

The network mask is used to partition IP addresses outside of network classes A, B and C. When entering the network mask it is possible to designate the number of bits of the IP address to be used as the network part and the number to be used as the host part, e.g.:

Network Class	Network Part	Host Part	Network Mask Binary	Network Mask Decimal
A	8 Bit	24 Bit	11111111.00000000.00000000.00000000	255.0.0.0
B	16 Bit	16 Bit	11111111.11111111.00000000.00000000	255.255.0.0
C	24 Bit	8 Bit	11111111.11111111.11111111.00000000	255.255.255.0

The number of bits for the host part is entered in order to calculate the network mask:

Network Mask	Host Bits
255.255.255.252	2
255.255.255.248	3
255.255.255.240	4
255.255.255.224	5
255.255.255.192	6
255.255.255.128	7
255.255.255.000	8
255.255.254.000	9
255.255.252.000	10
255.255.248.000	11
.	.
.	.
255.128.000.000	23
255.000.000.000	24

Example:

Desired network mask:

255.255.255.128

Value to be entered:

7

4.4 Input Functions of Base Systems 6842, 6850 and 6855



After they have been entered fully, the LAN parameters configured through the system menu are transferred to the control board by pressing the **ENT** key. In order for the LAN parameters to be transferred from the control board to LAN Board 7270 it is necessary to exit the respective menu by pressing the **BR** key.

4.4.1 Inputting the Static IPv4 Address

The IP address mode are entered via the following selection frames:

SET LAN 1
ADR. Y/N

or

SET LAN 2
ADR. Y/N

After entering **y** the display changes to the input frame (LAN 1 in this case):

L A N 1 >

Static IPv4 Address

The IPv4 address is entered in 4 groups of digits configurable from 000 to 255. They are separated by a dot (.). Input must be in the form of 3 digits (e.g.: 2 ⇒ 002).

An example of a complete entry would be as follows:

LAN 1 >192.168.
017.001<

This example shows the supplied factory setting of IP address 192.168.017.001 (see [chapter 4.1 IP Address \(IPv4\)](#)).

In the case of an implausible entry (such as 265), an INPUT ERROR is sent and the complete entry is rejected.

4.4.2 Inputting the Gateway Address

The gateway address is entered via the following selection frames:

SET LAN 1
GATEWAY ADR. Y/N

or

SET LAN 2
GATEWAY ADR. Y/N

After entering **y** the display changes to the input frame:

G . W 1 >

The gateway address can now be entered in the same way as the IP address (see [Chapter 4.4.1 Inputting the Static IPv4 Address](#)).

A demarcation arrow follows the last group of figures "<" (see ***Chapter 4.2 Gateway Address***).

4.4.3 Inputting the Network Mask

The network mask is entered via the following selection frames:

SET LAN 1
NET-MASK. Y/N

or

SET LAN 2
NET-MASK. Y/N

After entering **y** the display changes to the input frame:

NET-MASK	LAN 1
>	-

The network mask can now be entered in the range from 0-31. A demarcation arrow follows the last group of figures (see ***Chapter 4.3 Network Mask***).

4.4.4 Inputting the Control Byte

Various settings can be made with the control byte.

The control byte is entered via the following selection frames:

	SET LAN 1
C N T R L . - B Y T E	Y / N

or

	SET LAN 2
C N T R L . - B Y T E	Y / N

After entering **Y** the display changes to the input frame.

For editing purposes, the individual bits of the new byte are entered on the second line with "0" and "1".

The bits of the parameter byte are numbered consecutively in descending order:

e.g.:

BIT	7	6	5	4	3	2	1	0
	0	0	0	0	0	0	1	0

(standard setting for NTP)

The entry must be concluded by pressing the **ENT** key.

The function of the control byte see in **chapter 4.6 Control byte**.

4.5 Base System 7001 Input Functions

The input and display functions are called up by means of the menu header **BOARDS:3** under **BOARD 7270 / 7271 / 7272**.

The following LAN Board menu appears:

No : 1	CB : 0 0 0 0 0 0 0 0	IP : 0 0 0 . 0 0 0 . 0 0 0 . 0 0 0
N E W	> _	> . . . <

The first input expected under **No:** is the System Board Number (**1-8**) of the LAN Board to be configured (in this case Board number 1) and this is confirmed with the **ENT** key.

After the Board number has been entered, the current configuration of the selected LAN Board is displayed on the first menu line.

The new parameters can be entered on the second line. It is possible to change to the next menu header without making a new entry by pressing the **ENT** key.



After they have been entered fully, the LAN parameters configured through the system menu are transferred to the control board by pressing the **ENT** key. In order for the LAN parameters to be transferred from the control board to LAN Board 7270 and to be stored there it is necessary to exit the respective menu by pressing the **BR** key.

4.5.1 Inputting the Control Byte

Various settings can be made with the control byte (CB:).

No : 1	CB : 0 0 0 0 0 0 0 0	IP : 1 9 2 . 1 6 8 . 0 1 7 . 0 0 1
N E W	> _	> . . . <
7 6 5 4 3 2 1 0		

The individual bits of the control byte are configured by entering **0** and **1**.

The complete entry is completed by pressing the **ENT** key. The new control byte appears on the top line.

The function of the control byte see in **chapter 4.6 Control byte**.

4.5.2 Inputting the Static IPv4 Address

The currently valid IP address appears on the top line.

No : 1	CB : 0 0 0 0 0 0 0 0	IP : 1 9 2 . 1 6 8 . 0 1 7 . 0 0 1
N E W	> 0 0 0 0 0 0 0 0	> . . . <

The IPv4 address is entered in 4 groups of digits each separated by a dot (.). The entry must take place in 3 digits in the value range from 000 - 255.

The entry is completed by pressing the **ENT** key. The new address appears on the top line. In the case of an incorrect entry this menu header is exited and an error message is sent.

This example shows the supplied factory setting of IP address 192.168.017.001 (see **chapter 4.1 IP Address (IPv4)**)

4.5.3 Inputting the Network Mask

The currently valid network mask appears on the top line.

No : 1	NM : 00				GW : 192.168.017.152				
NEW	>	_			>	.	.	.	<

The input range for the network mask lies between **0-31**.

The entry is completed by pressing the **ENT** key. The new network mask appears on the top line. In the case of an incorrect entry this menu header is exited and an error message will be displayed (see *Chapter 4.3 Network Mask*).

4.5.4 Inputting the Gateway Address

The next menu header to appear concerns the editing of the gateway or router address.

No : 1	NM : 16				GW : 192.168.017.152				
NEW	> 16				> _	.	.	.	<

The gateway address can now be entered in the same way as the IP address (see *Chapter 4.4.1 Inputting the Static IPv4 Address*).

See also *Chapter 4.2 Gateway Address*.

4.6 Control byte

Various functions can be configured via the control byte.

4.6.1 Bit 7, reserved for **hopf** Elektronik GmbH

Bit 7	Standard setting (reserve for hopf Elektronik GmbH)
0	Must not be changed

4.6.2 Bit 6, Output of NTP Protocol or SINEC H1 time datagram

Bit 6	Output time protocol
0	NTP protocol
1	SINEC H1 time datagram

4.6.3 Bit 5/4, MAC- Broadcast-Adresse für SINEC H1 time datagram

Configuration of the required SINEC H1 time datagram MAC address or Broadcast address.

Bit 5	Bit 4		
0	0	MAC- address 1	09 00 06 03 FF EF
0	1	MAC- address 2	09 00 06 01 FF EF
1	0	Broadcast- address.	FF FF FF FF FF FF
1	1	Broadcast- address.	FF FF FF FF FF FF



When **NTP** protocol is set these bits are irrelevant.

4.6.4 Bit 3/2, Transmission intervals for SINEC H1 time datagram

Configuration of the required transmission intervals for SINEC H1 time datagram.

Bit 3	Bit 2	Transmission intervals
0	0	1 sec.
0	1	10 sec.
1	0	60 sec.
1	1	60 sec.



When **NTP Protocol** is set the bits are irrelevant.

4.6.5 Bit 1/0, Time basis for NTP and SINEC H1 time datagram

Configuration of the time basis for NTP and SINEC H1 time datagram.

Bit1	Bit0	Time basis for NTP and SINEC H1 time datagram
0	0	Local time
0	1	Local standard time (CET)
1	0	UTC
1	1	Local standard time (CET) with details of summer and winter time in the time status

5 Configuration of the LAN Board 7270

There are a limited configuration with Ethernet via Telnet possible.

To use the configuration via Telnet the configuration via the system keypad of the radio-controlled clock should not be used. This is activated with **switch no.: 8** DIP switch block 2 (**DS2**).

DS1 / SW8	Configuration of LAN board 7270 via the system keypad
on	allow (Default).
off	not allow.



In the Base System 7001 / 68xx, the changed LAN configuration is only stored in the Board's flash memory and is ALWAYS overwritten when a new value is entered.

Data changed via the LAN is not updated in the Base System and thus is no longer displayed correctly after the change. For this reason it is recommended to configure the network mask via the Base System.

The connection is built via Telnet by entering the IP address of LAN-Board 7270; access is via port 9999.



Figure 1: Telnet

Confirm the entry (Figure 1) with the **ENTER** key.

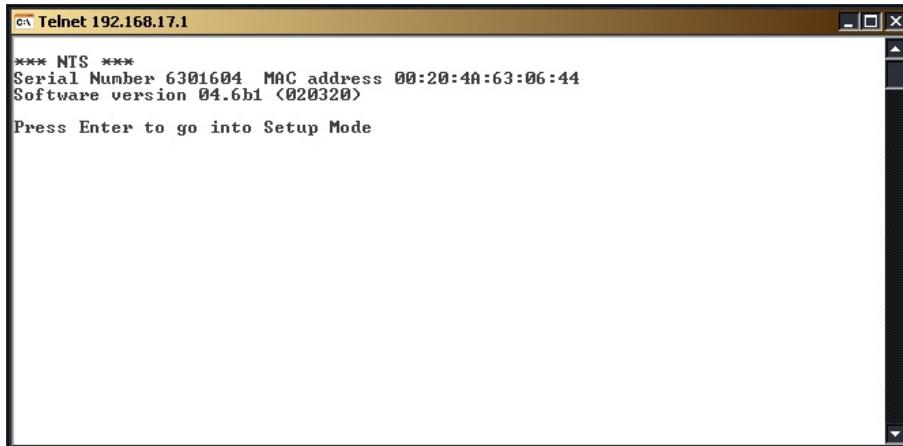


Figure 2: Select the NTP LAN Board 7270

The dialogue is aborted after 5 seconds if the **ENTER** key is not pressed.

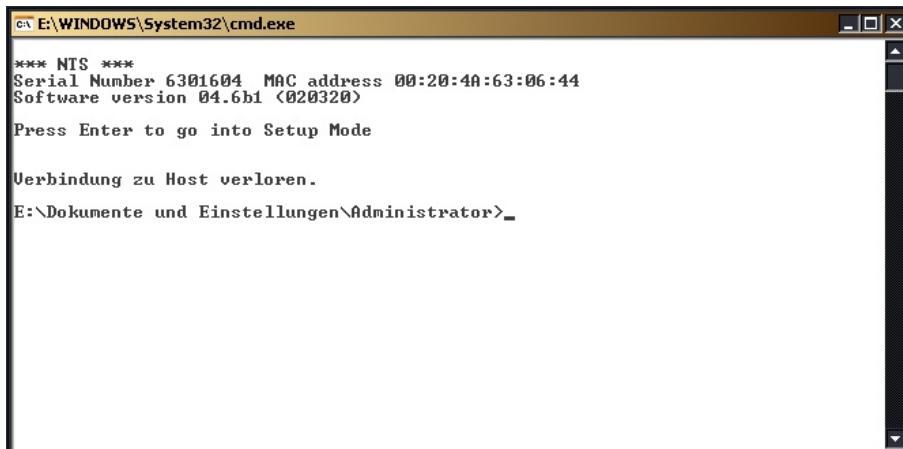


Figure 3: Telnet interruption

After pressing the **ENTER** key in time a selection menu appears.



Figure 4: Selection menu

5.1 Menu (0) - Basic Configuration / Telnet password

Select the "Basic configuration" menu by entering **0** followed by **ENTER**.

```

C:\ Telnet 192.168.17.1
*** NTS ***
Serial Number 6301604 MAC address 00:20:4A:63:06:44
Software version 04.6b1 (020320)

Press Enter to go into Setup Mode

*** basic parameters
Hardware: Ethernet Autodetect
IP addr 192.168.17.1, no gateway set, netmask 255.255.000.000
*** NTS parameters
Antenna type: Hopf 6021
SNTP Ref.Identifier: "hopf"
Encryption is disabled
UDP datagram disabled
SINEC H1 Datagram disabled

Change Setup :
0 Basic configuration
1 NTS configuration
2 Factory defaults
8 Exit without save
9 Save and exit
Your choice ? 0
IP Address : <192> .<168> .<017> .<001> ←
Set Gateway IP Address <N> N
Netmask: Number of Bits for Host Part <0=default> <16>
Change telnet config password <N> N

*** basic parameters
Hardware: Ethernet Autodetect
IP addr 192.168.17.1, no gateway set, netmask 255.255.000.000
*** NTS parameters
Antenna type: Hopf 6021
SNTP Ref.Identifier: "hopf"
Encryption is disabled
UDP datagram disabled
SINEC H1 Datagram disabled

Change Setup :
0 Basic configuration
1 NTS configuration
2 Factory defaults
8 Exit without save
9 Save and exit
Your choice ? -

```

Figure 5: "Basic configuration" menu

A password can be set for the Telnet connection to prevent unauthorized access to the configuration menu via the LAN interface.

```

C:\ Telnet 192.168.17.1
*** basic parameters
Hardware: Ethernet Autodetect
IP addr 192.168.17.1, no gateway set, netmask 255.255.000.000
*** NTS parameters
Antenna type: Hopf 6021
SNTP Ref.Identifier: "hopf"
Encryption is disabled
UDP datagram disabled
SINEC H1 Datagram disabled

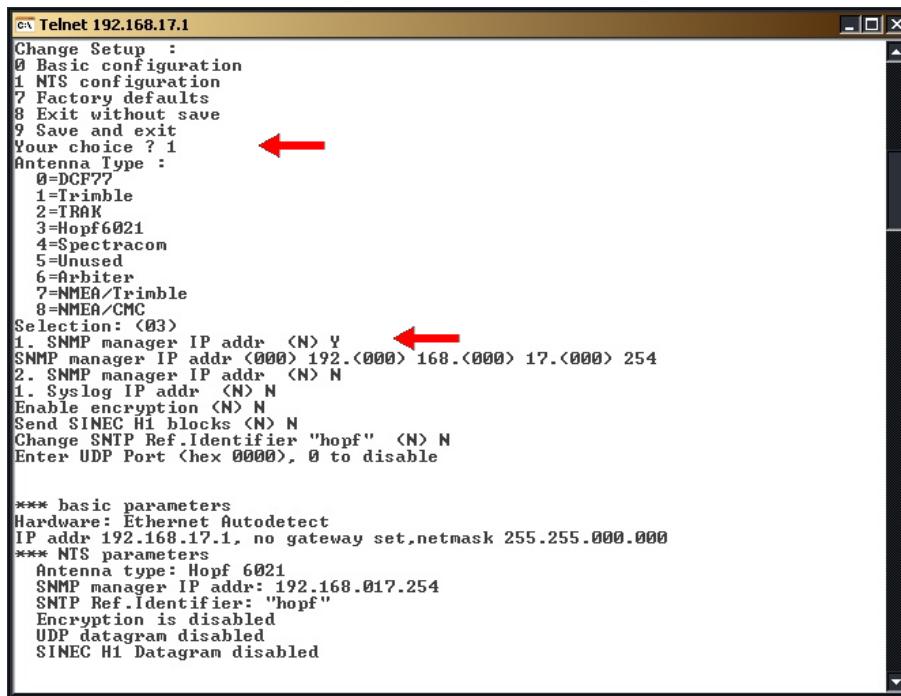
Change Setup :
0 Basic configuration
1 NTS configuration
2 Factory defaults
8 Exit without save
9 Save and exit
Your choice ? 0
IP Address : <192> .<168> .<017> .<001> ←
Set Gateway IP Address <N> N
Netmask: Number of Bits for Host Part <0=default> <16>
Change telnet config password <N> Y ←
Enter new Password: 1234

```

Figure 6: Telnet Password

5.2 Menu (1) - NTS Configuration

Select the "NTS configuration" menu by entering **[1]** followed by **[ENTER]**.



```

c:\ Telnet 192.168.17.1
Change Setup :
0 Basic configuration
1 NTS configuration
2 Factory defaults
3 Exit without save
4 Save and exit
Your choice ? 1 ←
Antenna Type :
0=DCF77
1=Trimble
2=TRAK
3=Hopf6021 ←
4=Spectracom
5=Unused
6=Arbiter
7=NMEA/Trimble
8=NMEA/CMC
Selection: <03>
1. SNMP manager IP addr <N> Y ←
SNMP manager IP addr <000> 192.<000> 168.<000> 17.<000> 254
2. Syslog IP addr <N> N
1. Syslog IP addr <N> N
Enable encryption <N> N
Send SINEC H1 blocks <N> N
Change SNTP Ref.Identifier "hopf" <N> N
Enter UDP Port <hex 0000>, 0 to disable

*** basic parameters
Hardware: Ethernet Autodetect
IP addr 192.168.17.1, no gateway set, netmask 255.255.0.000.000
*** NTS parameters
Antenna type: Hopf 6021
SNMP manager IP addr: 192.168.017.254
SNTP Ref.Identifier: "hopf"
Encryption is disabled
UDP datagram disabled
SINEC H1 Datagram disabled

```

Figure 7: "NTS configuration" menu

5.2.1 Antenna Type Setting

The time source for LAN Board 7270 is selected in this menu. The standard setting is **hopf 6021**.



LAN Board 7270 can only achieve Stratum 1 output accuracy with the **hopf 6021** setting. LAN Board 7270 is unable to evaluate time information supplied on any other setting.

5.2.2 SNMP Setting

Up to two IP addresses can be set per SNMP manager. These serve as target addresses for both SNMP enquiries and SNMP traps.

After setting the IP address for the first SNMP manager, a second IP address can also be set for a second SNMP manager (Figure 7).

5.2.3 Syslog Setting

Up to two Syslog IP addresses can be set. "Local0" to "Local7" can be selected for the output.

```

c:\ Telnet 192.168.17.1
Change Setup :
0 Basic configuration
1 MTS configuration
? Factory defaults
8 Exit without save
9 Save and exit
Your choice ? 1
Antenna Type :
0=DCP77
1=Trimble
2=TRAK
3=Hopf6021
4=Spectracom
5=Unused
6=Arbiter
7=NMEA/Trimble
8=NMEA/CMC
Selection: <03>
1. SNMP manager IP addr <N> N
1. Syslog IP addr <N> y
Syslog IP addr <000> 192.<000> 168.<000> 17.<000> 253
2. Syslog IP addr <N> N
Syslog file LOCAL0 [0..7] 0
Enable encryption <N> N
Send SINEC H1 blocks <N> N
Change SNTP Ref.Identifier "hopf" <N> N
Enter UDP Port <Hex 0000>, 0 to disable

*** basic parameters
Hardware: Ethernet Autodetect
IP addr 192.168.17.1, no gateway set, netmask 255.255.000.000
*** MTS parameters
Antenna type: Hopf 6021
Syslog IP addr : 192.168.017.253
Syslog file LOCAL0
SNTP Ref.Identifier: "hopf"
Encryption is disabled
UDP datagram disabled
SINEC H1 Datagram disabled

```

Figure 8: Syslog

5.2.4 Encryption Setting

For NTP, authentication can be activated optionally via DES and MD5. In this case it should be noted that a telegram requires 40 msec. for authentication. Various keys can be set with up to eight characters. The characters are entered in hexadecimal notation.

```

c:\ Telnet 192.168.17.1
Change Setup :
0 Basic configuration
1 MTS configuration
? Factory defaults
8 Exit without save
9 Save and exit
Your choice ? 1
Antenna Type :
0=DCP77
1=Trimble
2=TRAK
3=Hopf6021
4=Spectracom
5=Unused
6=Arbiter
7=NMEA/Trimble
8=NMEA/CMC
Selection: <03>
1. SNMP manager IP addr <N> N
1. Syslog IP addr <N> N
Enable encryption <N> y
Send SINEC H1 blocks <N> N
Change SNTP Ref.Identifier "hopf" <N> N
Enter UDP Port <Hex 0000>, 0 to disable
Enter MAC Key #1 <00>4C <00>02 <00>12 <00>27 <00> <00> <00>
Enter MAC Key #2 <00>
Enter MAC Key #3 <00>
Enter MAC Key #4 <00>
Enter MAC Key #5 <00>
Enter MAC Key #6 <00>

*** basic parameters
Hardware: Ethernet Autodetect
IP addr 192.168.17.1, no gateway set, netmask 255.255.000.000
*** MTS parameters
Antenna type: Hopf 6021
SNTP Ref.Identifier: "hopf"
Encryption is enabled
UDP datagram disabled
MAC Key H1: 4C 02 00 12 27 00 00 00
SINEC H1 Datagram disabled

```

Figure 9: Encryption

5.2.5 SINEC H1 time datagram setting

LAN Board 7270 can be configured to operate as a time transmitter in a SINEC H1 time datagram LAN. For this purpose the LAN Board 7270 can be set to two different MAC addresses or it can distribute the time information in broadcast mode.

- MAC address 1 09 00 06 03 FF EF
- MAC address 2 09 00 06 01 FF EF
- Broadcast

The transmission interval for the SINEC H1 time datagram protocol can then be set for the broadcast mode:

- 01 second
- 10 seconds
- 60 seconds

```

Telnet 192.168.17.1
Change Setup :
0 Basic configuration
1 MTS configuration
2 Factory defaults
8 Exit without save
9 Save and exit
Your choice ? i
Antenna Type :
0=DCF??
1=Trimble
2=TRAK
3=Hopf6021
4=Spectracom
5=Unused
6=Arbiter
7=NMEA/Trimble
8=NMEA/CMC
Selection: <03>
1. SNMP manager IP addr <N> N
1. Syslog IP addr <N> N
Enable encryption <N> N
Send SINEC H1 blocks <N> Y
Select MAC address:
0: 09 00 06 03 FF EF 1: 09 00 06 01 FF EF 2: Broadcast
Enter number <0>
Select H1 interval: 0=1sec./1=10sec./2=60sec. <0>
Change SNTP Ref.Identifier "hopf" <N> N
Enter UDP Port <hex 0000>, 0 to disable

*** basic parameters
Hardware: Ethernet Autodetect
IP addr 192.168.17.1, no gateway set, netmask 255.255.0.000.000
*** MTS parameters
Antenna type: Hopf 6021
SNTP Ref.Identifier: "hopf"
Encryption is disabled
UDP datagram disabled
Send SINEC H1 block to MAC: 09 00 06 03 FF EF
H1 Time interval: 01 sec.

```

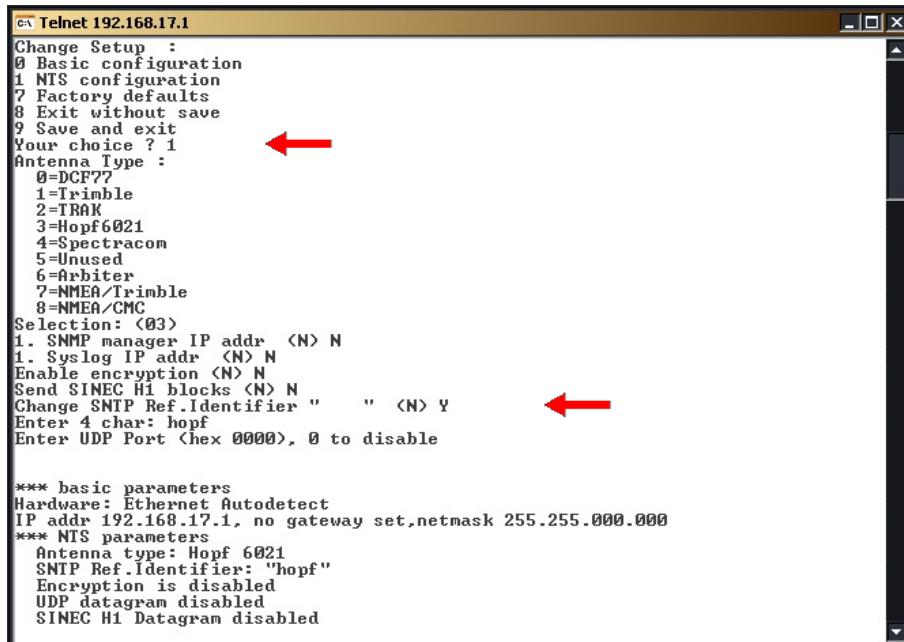
Figure 10: SINEC H1 time datagram



For configuration of SINEC H1 time datagram via Telnet the function "transmission point of the SINEC H1 datagram" must always be configured specially via the System.
See **chapter 8 Transmission Point of the SINEC H1 time Datagram**.

5.2.6 SNTP Ref. Identifier

Under this menu heading, any desired sequence of up to four characters can be set as the SNTP Ref. Identifier.



```

Telnet 192.168.17.1
Change Setup :
 0 Basic configuration
 1 MTS configuration
 7 Factory defaults
 8 Exit without save
 9 Save and exit
Your choice ? 1
Antenna Type :
 0=DCF??
 1=Trimble
 2=TRAK
 3=Hopf6021
 4=Spectracom
 5=Unused
 6=Arbitrator
 7=NMEA/Trimble
 8=NMEA/CMC
Selection: <03>
 1. SNMP manager IP addr <N> N
 1. Syslog IP addr <N> N
Enable encryption <N> N
Send SINEC H1 blocks <N> N
Change SNTP Ref.Identifier "      " <N> Y
Enter 4 char: hopf
Enter UDP Port <hex 0000>, 0 to disable

*** basic parameters
Hardware: Ethernet Autodetect
IP addr 192.168.17.1, no gateway set, netmask 255.255.0.000.000
*** MTS parameters
  Antenna type: Hopf 6021
  SNTP Ref.Identifier: "hopf"
  Encryption is disabled
  UDP datagram disabled
  SINEC H1 Datagram disabled

```

Figure 11: SNTP Ref. Identifier

5.2.7 UDP Setting

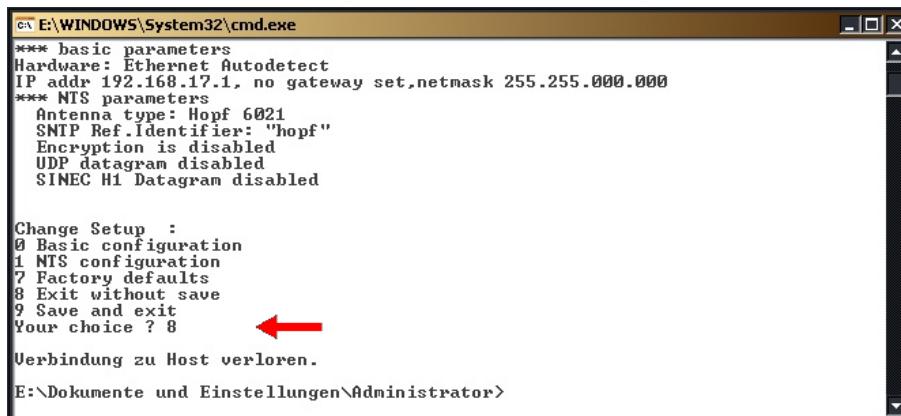
This setting is not used for NTP and SINEC H1 time datagram and is disabled as standard.

5.3 Menu (7) - Factory Defaults

In this equipment version, this menu leads to an incorrect base configuration. Therefore, it must not be used. If, in spite of this, this menu has been activated, the original supply condition is to be reproduced as described in ***Chapter 3.1 LAN Board 7270 Base Parameters (factory setting)***, in order to ensure the correct operation of this equipment.

5.4 Menu (8) - Exit without save

Discard all changes made in this session by entering **[8]** followed by **ENTER**.



```

C:\> E:\WINDOWS\System32\cmd.exe
*** basic parameters
Hardware: Ethernet Autodetect
IP addr 192.168.17.1, no gateway set, netmask 255.255.000.000
*** NTS parameters
Antenna type: Hopf 6021
SNTP Ref.Identifier: "hopf"
Encryption is disabled
UDP datagram disabled
SINEC H1 Datagram disabled

Change Setup :
0 Basic configuration
1 NTS configuration
2 Factory defaults
8 Exit without save
9 Save and exit
Your choice ? 8 ←

Verbindung zu Host verloren.

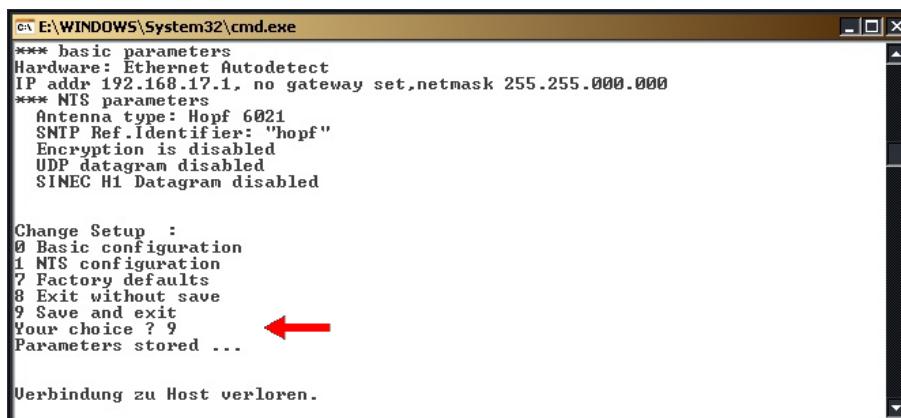
E:\Dokumente und Einstellungen\Administrator>

```

Figure 12: Discard settings

5.5 Menu (9) - Save and Exit

Save the settings by entering **[9]** followed by **ENTER**.



```

C:\> E:\WINDOWS\System32\cmd.exe
*** basic parameters
Hardware: Ethernet Autodetect
IP addr 192.168.17.1, no gateway set, netmask 255.255.000.000
*** NTS parameters
Antenna type: Hopf 6021
SNTP Ref.Identifier: "hopf"
Encryption is disabled
UDP datagram disabled
SINEC H1 Datagram disabled

Change Setup :
0 Basic configuration
1 NTS configuration
2 Factory defaults
8 Exit without save
9 Save and exit
Your choice ? 9 ←
Parameters stored ...

Verbindung zu Host verloren.

E:\Dokumente und Einstellungen\Administrator>

```

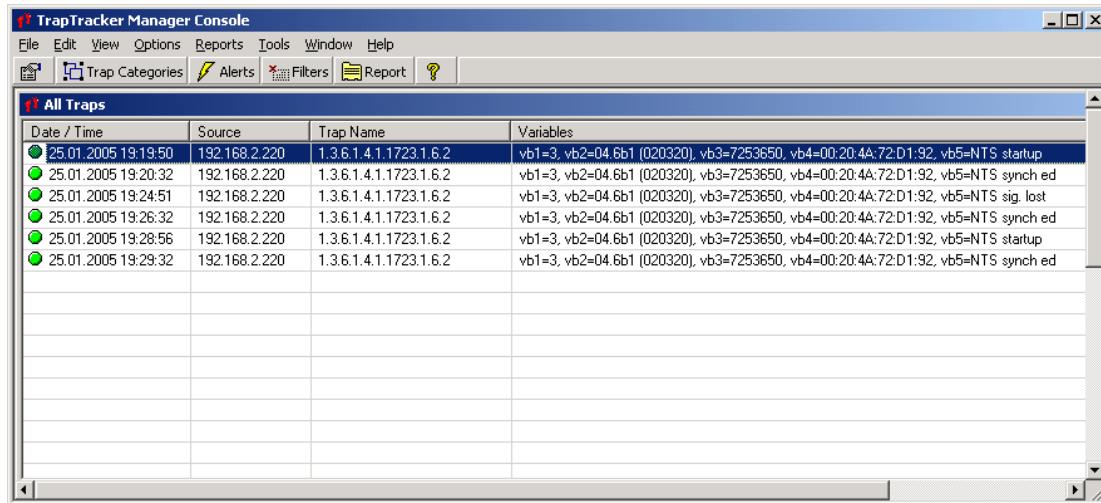
Figure 13: Saving the settings

6 Remote monitoring via SNMP (read only)

For further information regarding the set-up of applications with remote monitoring via SNMP please contact **hopf** Elektronik GmbH.

6.1 SNMP Traps of LAN Board 7270

(There is a software for the reception and evaluation of the SNMP Traps required which is **not** included in the delivery volume of LAN Board 7270).



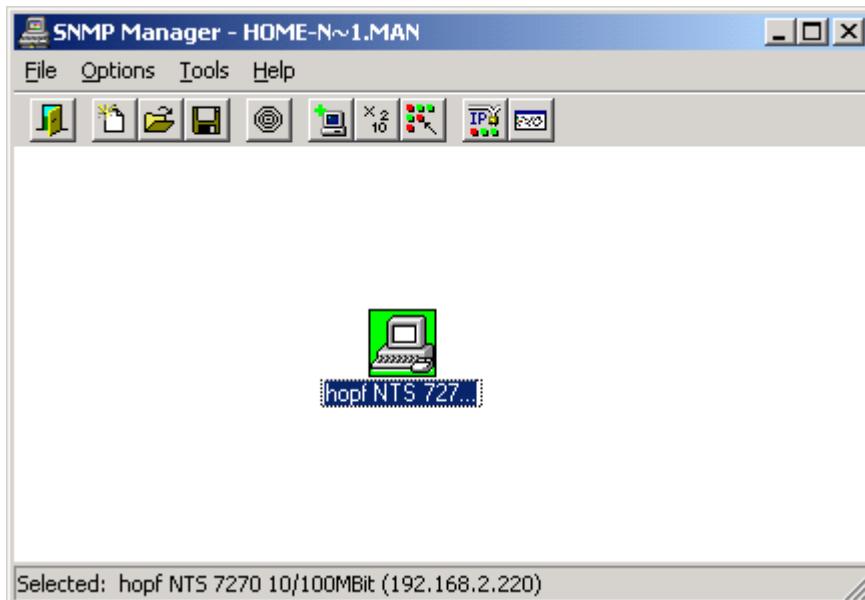
Picture 8: Overview of SNMP Traps

SNMP Traps after switch-on of the clock system, after synchronisation and loss of the synchronisation signal (Picture 8)

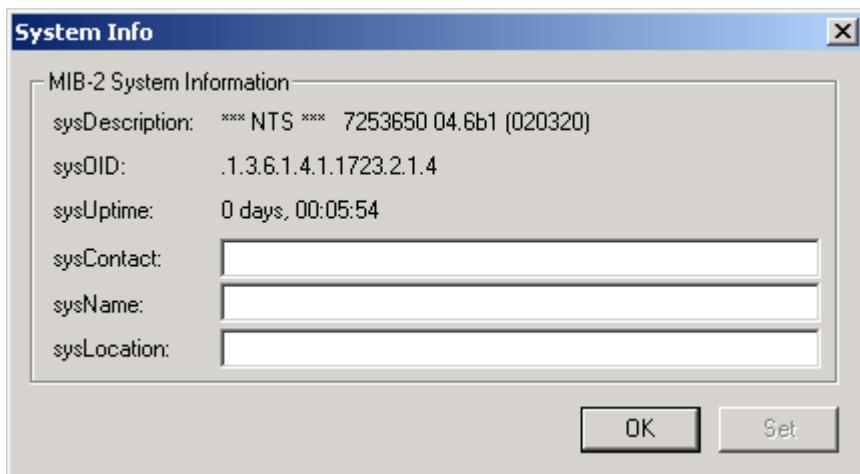
- Line 1: SNMP Trap after switch-on of the clock system
- Line 2: SNMP Trap after successful synchronisation of the clock system (system status = R (radio))
- Line 3: SNMP Trap after loss of synchronisation (system status = C (crystal))
- Line 4: SNMP Trap after resynchronisation of the clock system (system status = R (radio))
- Line 5: SNMP Trap after a RESET of the clock system
- Line 6: SNMP Trap after successful synchronisation of the clock system (system status = R (radio))

6.2 Possible Query of SNMP Information of LAN Board 7270

(There is a software for query of SNMP Information required which is **not** included in the delivery volume of LAN Board 7270).



Picture 9: Example for Monitoring LAN Board 7270



Picture 10: Example for Readout of SNMP Information

Possible query of data (Picture 10):

- sysDescription
- sysOID
- sysUptime

6.3 SNMP MIB in ASN.1 Format for LAN Board 7270

```
LTX-NTS-MIB DEFINITIONS ::= BEGIN

IMPORTS
    enterprises, IpAddress, Counter, TimeTicks
        FROM RFC1155-SMI
    OBJECT-TYPE
        FROM RFC-1212
    DisplayString
        FROM RFC-1213;

pronet          OBJECT IDENTIFIER ::= { enterprises 1723 }
software        OBJECT IDENTIFIER ::= { pronet 1 }
ntp              OBJECT IDENTIFIER ::= { software 6 }

-- NTP SERVER MIB
-- Parameters (Prefix Par)

ntpAntennaType OBJECT-TYPE
    SYNTAX      INTEGER (0)
    ACCESS     read-only
    STATUS     mandatory
    DESCRIPTION
        "a value which indicates the antenna type of the
         NTP-Server:

        0 - DCF77 antenna           (used in Germany)
        1 - Trimble GPS antenna     (worldwide)
        2 - Trak GPS antenna        (worldwide)
        3 - Hopf6021 GPS antenna   (worldwide)
        4 - Spectracom GPS antenna (worldwide)
        5 - not in use yet
        6 - Arbitrator antenna      (used in USA)
        7 - NMEA/Trimble
        8 - NMEA/CMC               "
::= { ntp 1 }

ntpVersionNumber OBJECT-TYPE
    SYNTAX      DisplayString (SIZE (0..40))
    ACCESS     read-only
    STATUS     mandatory
    DESCRIPTION
        "The version number of the currently running
         firmware."
::= { ntp 2 }
```

```
ntpSerialNumber OBJECT-TYPE
    SYNTAX      DisplayString (SIZE (0..40))
    ACCESS     read-only
    STATUS      mandatory
    DESCRIPTION
        "The serial number of the NTP server."
    ::= { ntp 3 }

ntpMAC OBJECT-TYPE
    SYNTAX      DisplayString (SIZE (0..40))
    ACCESS     read-only
    STATUS      mandatory
    DESCRIPTION
        "The hardware address or MAC which is unique
         for every network device."
    ::= { ntp 4 }

ntpMessageString OBJECT-TYPE
    SYNTAX      DisplayString (SIZE (0..40))
    ACCESS     read-only
    STATUS      mandatory
    DESCRIPTION
        "The state of the NTP server which could be:
         - NTS startup      Startup message after reset
                           or powerup.
         - NTS synch'ed     Network time is synchronized.
         - NTS unsynch'ed   Network time not synchronized.
         - NTS sig. lost    Time source is lost no data."
    ::= { ntp 5 }

END
```

6.4 Summary from the complete MIB-2 of LAN Board 7270

Not all parameters are supported. Non-set parameters are set to "0".

```
sysDescr.0 *** NTS *** 7252484 04.6b1 (020320)
sysObjectID.0 .1.3.6.1.4.1.1723.2.1.4
sysUpTime.0 273117
sysContact.0
sysName.0
sysLocation.0
sysServices.0 12
ifNumber.0 1
ifIndex.1 1
ifDescr.1 Network
ifType.1 6
ifMtu.1 1500
ifSpeed.1 10000000
ifPhysAddress.1 0x00 0x20 0x4A 0x72 0xCD 0x04
ifAdminStatus.1 up
ifOperStatus.1 up
ifLastChange.1 0
ifInOctets.1 241012
ifInUcastPkts.1 619
ifInNUcastPkts.1 1445
ifInDiscards.1 0
ifInErrors.1 0
ifInUnknownProtos.1 0
ifOutOctets.1 866175
ifOutUcastPkts.1 640
ifOutNUcastPkts.1 3
ifOutDiscards.1 0
ifOutErrors.1 0
ifOutQLen.1 2
ipForwarding.0 not-forwarding
ipDefaultTTL.0 31
ipInReceives.0 1277
ipInHdrErrors.0 0
ipInAddrErrors.0 0
ipForwDatagrams.0 0
ipInUnknownProtos.0 0
ipInDiscards.0 0
ipInDelivers.0 1283
ipOutRequests.0 0
ipOutDiscards.0 0
ipOutNoRoutes.0 0
ipReasmTimeout.0 0
ipReasmReqds.0 0
ipReasmOKs.0 0
ipReasmFails.0 0
ipFragOKs.0 0
ipFragFails.0 0
ipFragCreates.0 0
ipAdEntAddr.100.10.40.84 100.10.40.84
ipAdEntIfIndex.100.10.40.84 1
ipAdEntNetMask.100.10.40.84 255.255.0.0
ipAdEntBcastAddr.100.10.40.84 1
ipAdEntReasmMaxSize.100.10.40.84 0
icmpInMsgs.0 10
```

```
icmpInErrors.0      0
icmpInDestUnreachs.0      0
icmpInTimeExcds.0      0
icmpInParmProbs.0      0
icmpInSrcQuenches.0      0
icmpInRedirects.0      0
icmpInEchos.0      4
icmpInEchoReps.0      0
icmpInTimestamps.0      0
icmpInTimestampReps.0      0
icmpInAddrMasks.0      0
icmpInAddrMaskReps.0      0
icmpOutMsgs.0      4
icmpOutErrors.0      0
icmpOutDestUnreachs.0      5
icmpOutTimeExcds.0      0
icmpOutParmProbs.0      0
icmpOutSrcQuenches.0      0
icmpOutRedirects.0      0
icmpOutEchos.0      0
icmpOutEchoReps.0      4
icmpOutTimestamps.0      0
icmpOutTimestampReps.0      0
icmpOutAddrMasks.0      0
icmpOutAddrMaskReps.0      0
udpInDatagrams.0      670
udpNoPorts.0      520
udpInErrors.0      5000
udpOutDatagrams.0      673
.1.3.6.1.4.1.1723.1.6.1.0      0
.1.3.6.1.4.1.1723.1.6.2.0
.1.3.6.1.4.1.1723.1.6.3.0
.1.3.6.1.4.1.1723.1.6.4.0
.1.3.6.1.4.1.1723.1.6.5.0
```

7 Status of time datagram dependent on System Status

The LAN board 7270 can be differently configured for the transmission of the time telegrams in dependence of the Base System Status.

7.1 Output of NTP Stratum dependent on System Status

By setting **DS2 Switch 1 = ON**:

- Output of NTP protocol with actual time and NTP status **Stratum 1** only when system status is radio ("r", "R").
- Timestamps in the NTP protocol are analysed as 0 and the NTP status **Stratum 0** (invalid / not defined) when the system status is crystal ("C"). Thus a synchronisation of other devices / systems is not possible by this LAN Board 7270 (NTP-server).

By setting **DS2 Switch 1 = OFF**:

- Output of the NTP protocol with actual time and **Stratum 1** takes place independent of the system status radio ("r", "R") or crystal ("C"). The basis system only needs to have a valid time, e.g. by manual time input.

DS2 DIP1	NTP synchronization under system status	System Status	Output LAN Board 7270 NTP	NTP Reception Status
on	Radio-controlled operation "R" (default setting)	Not valid "-"	No time / Stratum 0	Stratum 16
		Crystal operation "C"	No time / Stratum 0	Stratum 16
		Radio reception "r, R"	System time / Stratum 1	Stratum 1
off	Radio-controlled operation "R" Quartz operation "C" (The radio status for NTP is simulated)	Not valid "-"	No time/ Stratum 0	Stratum 16
		Crystal operation "C"	System time / Stratum 1	Stratum 1
		Radio reception "r, R"	System time / Stratum 1	Stratum 1



NTP clients/servers that are synchronized with the LAN Board 7270 are not able to identify whether the simulation status is active.
Time deviations arising in this mode, due to drift in the quartz operation (independent clock) or manual setting of the time/date in this way can be accepted by the NTP client/server and can occur to a **time leap**.

7.2 Output SINEC H1 time Datagram Output dependent on System Status

DS2 SW1	System status	Output of SINEC H1 time datagram with actual time
on	radio synchronous ("r", "R")	and the time status " Synchronous. "
	crystal ("C")	but with time status " Synchronisation failed "
off	radio ("r", "R") or crystal ("C"). (The status synchronous is simulated)	and time status " Synchronous " The output is independent from system status radio. The basis system only needs to have a valid time, e.g. by manual time input.



NTP clients/servers that are synchronized with the LAN Board 7270 are not able to identify whether the simulation status is active.
 Time deviations arising in this mode, due to drift in the quartz operation (independent clock) or manual setting of the time/date in this way can be accepted by the NTP client/server and can occur to a **time leap**.

8 Transmission Point of the SINEC H1 time Datagram

DS2 SW2	The transmission of the SINEC H1 time datagram takes place at the broadcasted transmission point of the datagram...		
on	based on the time information of its transmission point. (Default) e.g.: transmission point (UTC, absolute): 12:33: 00 ,001	with time information: 12:33: 00 ,000	
off	one second delayed. e.g.: transmission point (UTC, absolute): 12:33: 01 ,002	with time information: 12:33: 00 ,000	



Activation of this function only if SINEC H1 time datagram output (see **chapter 4.6 Control byte**) is configured via system keypad!

9 Configuration of the Minute pulse

A potential free minute pulse of 12V DC is distributed on the 9-pole SUB-D male connector. The length of the pulse can be adjusted in 4 steps. The pulse lengths are set via the DIP switch block (**DS1**) as follows:

DS1 / SW6	DS1 / SW5	Pulse length
on	on	10 msec
on	off	100 msec
off	on	500 msec
off	off	1000 msec

The output is an "open emitter" with a current limiter. The external pull down load must be in a range of 120 to 600 Ohm.



The output must have a load of 20mA ($RL < 600 \Omega$). Otherwise the slew rate will be too low.

10 Technical data

General	Euro board 160 x 100 mm (4HP) for 19" or ½ 19" (3U) racks Function board for System 7001/68xx
Voltage supply Internal system voltage	5V DC ± 5%
Current with 10 Base-T Interface with 10/100 Base-T interface	typisch 200mA 450mA
Temperature range	0 bis 50° C 0 to 50° C
MTBF	> 285.000 Std.

Network interface	10 Base-T oder 10/100 Base-T
Network Connections	The network connection is made via a LAN cable and RJ45 plug (recommended cable type: CAT5 or better).
Request per second	max. 400 Requests
Number of connectable clients	Theoretically unlimited
Ethernet compatibility	Version 2.0 / IEEE 802.3
Network Protocols	IPv4, UDP, TCP, SNMP (limited), ICMP, Telnet, FTP
Time Protocols	NTP versions 1, 2 and 3 (RFC 1305) SNTP (Simple NTP, RFC 2030) or SINEC H1 time datagram

Minute pulse	potential isolated, as current generator 12V DC / min. 20mA, max. 100 mA
ext. 12V DC voltage	12V DC, max. 100mA, potential isolated
isolation	min. 1000V DC

CE compliant to EMC Directive 89/336/EC and Low Voltage Directive 73/23/EC	
Safety / Low Voltage Directive	DIN EN 60950-1:2001 + A11 + Corrigendum
EN 61000-6-4	
EMC (Electromagnetic Compatibility) / Interference Immunity	EN 61000-4-2 /-3/-4/-5/-6/-11
EN 61000-6-2	EN 61000-3-2 /-3
Radio Interference Voltage	EN 55022
Radio Interference Emission	EN 55022 Class B

11 Glossary

Broadcast address

The IP address is used for addressing all hosts in a network. As a rule this address corresponds to the network ID and the value 255 for each part of the host part of the IP address (e.g. 149.202.255.255 stands for all hosts in class B networks 149.202.0.0).

MAC address

Media Access Control address is a non-changeable 8 Byte hardware address of a network board.

SINEC H1 time datagram

Special Ethernet time protocol for industrial applications

NTP

Network Time Protocol, a network time protocol for synchronizing networks.

SNTP

Simple Network Time Protocol

SNMP

Simple Network Management Protocol

NTS

Network Time Server

MIB

Management Information Base

ASN.1

Abstract Syntax Notation One