

Instruction Manual

A thick black L-shaped line starts from the bottom of the 'Instruction Manual' title, extends vertically down, then horizontally to the right, and then vertically down again, ending near the 'Models' section.

W&T COM-Server

Rel. 3.0, 12 / 96

Models

#58001 / #58004	Display
#58201	Compact
#58301 / #58304	19"
#58401 / #58404	OEM



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Subject to error and alteration

Since it is possible that we make mistakes, you mustn't use any of our statements without verification. Please, inform us of any error or misunderstanding you come about, so we can identify and eliminate it as soon as possible.

Carry out work on or with W&T products only to the extent that they are described here and after you have completely read and understood the manual and guide. We are not reliable for unauthorized repairs or tampering. When in doubt, check first with us or with your dealer

Introduction and overview

The variety and complexity of ways in which the W&T COM-Server can be used requires comprehensive documentation of the device. It is not necessary to read the entire manual, however, in order to be able to use its very special applications.

The manual is divided into six main chapters, each of which covers a specific topic.

- **Part 1: Connections and configurations**

This chapter describes the options for connecting the device. Here you will find everything about the *hardware*, such as the location and specification of the connections, arrangement of jumpers, views of circuit cards, including schematic depictions of the different configurations of the W&T COM-Server.

- **Part 2: Displays and settings**

This chapter describes the organizational principle of the menu for software configuration of the device, as well as all of the operating and error messages and the display outputs of the W&T COM-Server. Concrete descriptions are provided of all configurations which are independent of the type of network in use, such as configuration of the serial ports and software updating of the device.

- **Part 3: The TCP/IP protocol**

This chapter contains all of the configurations and modes for use when you are working with the TCP/IP network protocol and connection is to be established with another network station (not a W&T COM-Server) .

- **Part 4: The IPX protocol**

We have kept this chapter very short, since it is only relevant for those who have implemented their application with the Netware Development Kit (item no. #58113). You will find comprehensive instructions in the documentation for that package.

- **Part 5: Box to box TCP / IPX**

This chapter describes the possibilities for linking W&T COM-Servers together for the two network protocols (TCP/IP and IPX). If you have decided on the TCP/IP protocol, start by reading Chapter 3.1 *Quick installation*, and then read this part of the instructions.

- **Part 6: Expanded TCP/IP socket functions**

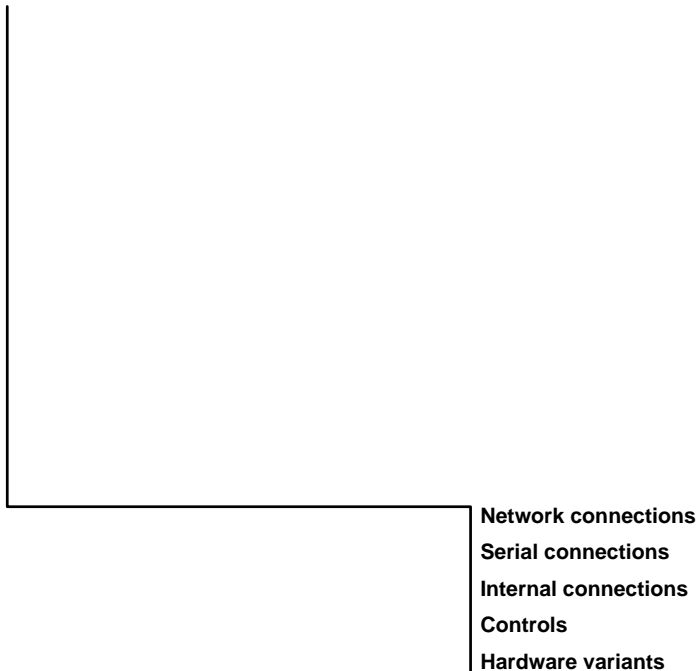
This chapter is very specialized, and of interest only to those who will use the W&T COM-Server in the TCP/IP socket server or client mode (see Chapter 3.6). It contains documentation of all of the additional socket functions of the W&T COM-Server and instructions for socket programming in general.

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Part 1

Connections and hardware variants

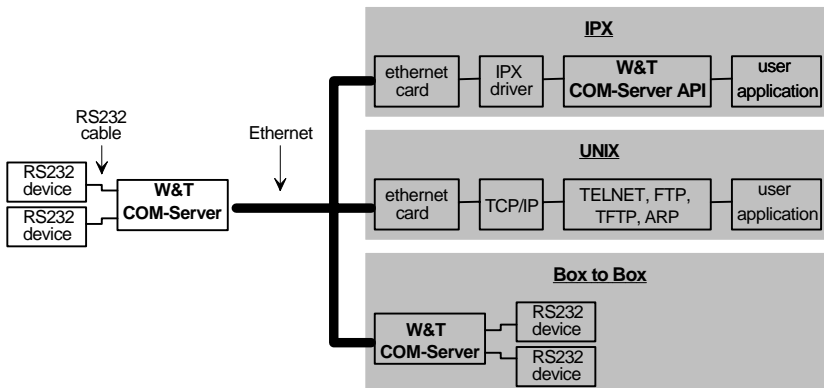


1.1 Tasks of the W&T COM-Server

The W&T COM-Server permits direct communication with serial devices over an Ethernet network from a great variety of computer architectures.

Measuring instruments, control devices and peripheral equipment of all types which are equipped with a serial port can be addressed over an Ethernet LAN without any problem. The connections can use the same cable as an existing network without impairing the operation of the latter; existing repeaters, bridges or routers can be used without any problem.

Application diagram "RS232 device <-> COM-Server <-> User application"



Every COM-Server provides up to four independent serial ports, which can have different parameter settings for each channel.

Data transmission takes place in full duplex mode at a maximum rate of 153.6 k Baud (4-port version) or 57,600 Baud (single-port version). The Display version, with its integrated LCD combined with the built-in keypad, permits user-friendly, menu-guided local configuration of the COM-Server.

1.2 External connections of the W&T COM-Server

The W&T COM-Server should be placed in a location where the maximum permitted cable run of 15 m to the serial devices and 185 m or 100 m on the network side are not exceeded. If this is not possible in individual cases, line drivers can be used for the serial port; depending upon the model, these permit transmission distances of up to 1000 m (W&T #80001). The use of Ethernet repeaters and hubs makes it possible to expand the length of the network to as much as 2.5 km (W&T #55615).

Please note that none of the plug-in connectors may be inserted unless the terminal devices are turned off. The locations of the individual connections can be found in the illustrations in Section 1.4 (Hardware variants of the W&T COM-Server).

The self-adhesive hook-and-loop tape which is included with some versions makes it possible to mount the COM-Server directly on a flat surface, such as the vertical side of a printer.

1.2.1 Ethernet connections

Both an IEEE 802.3 compatible 10Base2 port (BNC) and a 10BaseT port (RJ45) are available for network connection, as well as an optional AUI port.

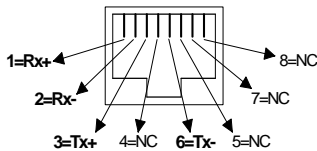
Switching over...

among the three possible network connections takes place automatically. Please note that the cable type can only be recognized if a cable is actually connected when the COM-Server is switched on. If you wish to change cable types, exchange the cables and then press the RESET switch on the back of the unit. The type of cable currently in use is displayed on the screen in RUN mode.

10BaseT for twisted pair cable

The W&T COM-Server can be connected to a 10BaseT hub (W&T #55603) through the shielded RJ45 connector on the rear of the case. The pin assignments conform to a standard MDI port (AT&T258), so a 1:1 cable can be used.

The current link status can be seen on the display screen in RUN mode. If the system has successfully established a connection with the hub, the display "Cable: TP" appears at this point; if not, "Cable: Link fail" is reported. The display is updated automatically every 60 seconds. However, a manual update can also be forced at any time by pressing the OK key.



RJ45 connector (pinout according to AT&T256)

10Base2 for coaxial cable

The BNC connector can be used to link the W&T COM-Server into a 10Base2 network segment.

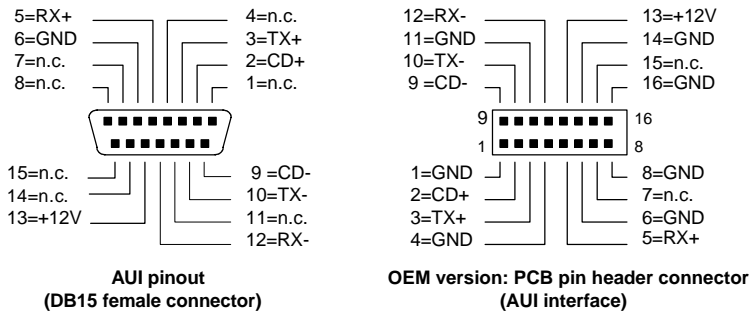
When using conventional technology with BNC T-connectors, please be aware that it may be necessary to disconnect the cable and that this can cause difficulties for other users. Before connecting the COM-Server please consult with the responsible network administrator.

Important!

When the COM-Server is placed at the end of the segment, it is essential to terminate the cable with a 50Ω terminator.

Network connector: AUI (optional)

The AUI connector permits the W&T COM-Server to be connected to a MAU and thereby be linked into a network segment. The COM-Server OEM short/long models have a double-row pin contact strip (see Section 1.4.4) which supplies all of the signals for the AUI port.



1.2.2 Serial connectors

W&T COM-Servers are equipped with RS232 as part of the standard configuration. If you use other modules in your unit (for example, RS422/485, LWL, 20mA, ...), please read the supplemental module instructions.

The pin assignments of the RS232 ports on the W&T COM-Server are identical to those on a PC, which permits the use of standard cables. Be sure that all of the ports are configured for identical transmission parameters and handshake protocols (see Section 2.2.2.3).

Since interface ports on peripheral devices are often highly manufacturer-specific in design, it may not be possible to use standard cables in some configurations. In such cases the documentation for the devices in question should be referred to.

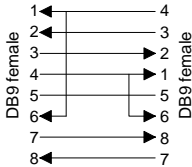
The details of pin assignment and the W&T cables for the most important applications are shown in the following section.

Pin	Direction	Signal	Description	Default function ⁽¹⁾
1	IN	DCD	Data Carrier Detect	Ignored
2	IN	RxD	Receive Data	Data input
3	OUT	TxD	Transmit Data	Data output
4	OUT	DTR	Data Terminal Ready	+12V with active connection to PC (LOCK/UNLOCK)
5	--	GND	Signal Ground	--
6	IN	DSR	Data Set Ready	Data transmission only at +3...12V
7	OUT	RTS	Ready To Send	Handshake output +12V = Ready to receive data -12V = Not ready to receive data
8	IN	CTS	Clear To Send	Data transmission only at +3...12V
9	IN	RI	Ring Indicator	Ignored

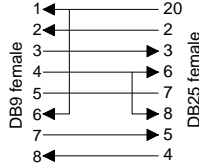
⁽¹⁾ can be modified temporarily by the specific software

Pin assignments and functions, RS232 / DB9 connector

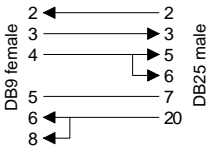
COM-Server <> 9 pin PC
#1199x



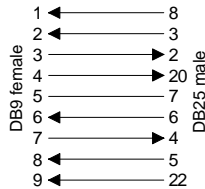
COM-Server <> 25 pin PC
#1179x



COM-Server -> Printer
#1189x



COM-Server <> Modem
#1198x



1.2.3 Power supply

The power supply depends upon the model of W&T COM-Server.

- W&T COM-Servers with Display (#58001, #58004)

The W&T COM-Servers have a built-in power adapter. Power is drawn through the supplied power cord and matching connector on the back of the case.

Because this power adapter is designed for an input voltage range of 110V~ to 230V~, the W&T COM-Server can also be used equally well in countries with other line voltages.

- W&T COM-Server Compact (#58201)

The W&T COM-Server Compact includes a special plug adapter (see Technical data in the Appendix), which connects to the matching input (DC power jack) on the back of the case. This adapter has a fixed input voltage of 230V.

- W&T COM-Server 19" OEM (#58301, #58304)

These COM-Servers are able to get their power through the VG strip. Jumpers on the board allow it to be set up for the most common bus standards (see Section 1.4.5).

- W&T COM-Server OEM short / long (#5840x)

These versions allow various power supply options. Power can be supplied through one of the two power adapters or through a proprietary design. The connections can be taken from the illustration in Section 1.4.4.

1.3 Control elements of the W&T COM-Server

W&T COM-Servers are supplied in a variety of different models. The control elements are not identical, nor are they positioned uniformly on the various models. The following pages show sketches of the front and rear plates (if present) for all of the models.

1.3.1 Reset button

This button resets the internal microprocessor, thereby restarting the W&T COM-Servers. Since all of the data stored in the COM-Server are lost when this happens, caution should be used when pressing this button.

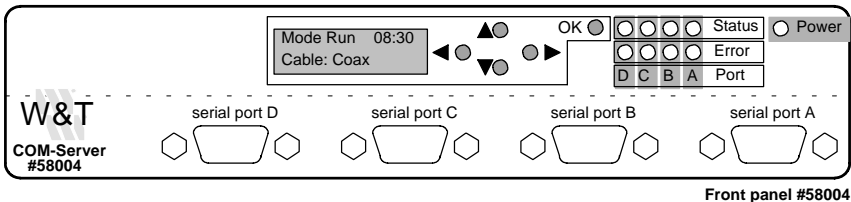
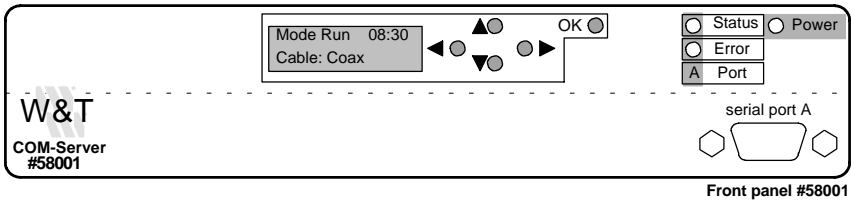
To reduce the risk of inappropriate operation and the resultant loss of data, the Reset button is recessed into the back of the case.

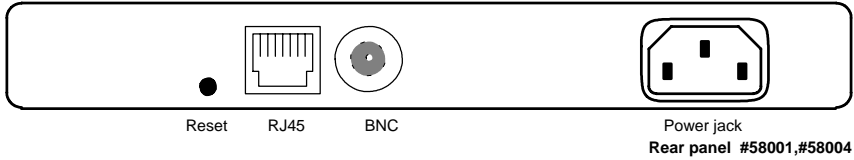
1.3.2 Front control panel (models #58001, #58004)

The operating parameters for the W&T COM-Server can be set through the keypad which is integrated into the faceplate. Using the directional keys (↓↑→←), the user can move around in the menu structure described in the following chapters. Any changes or selections which are made must be confirmed with the OK key in order to take effect.

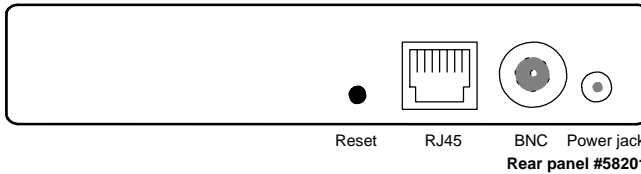
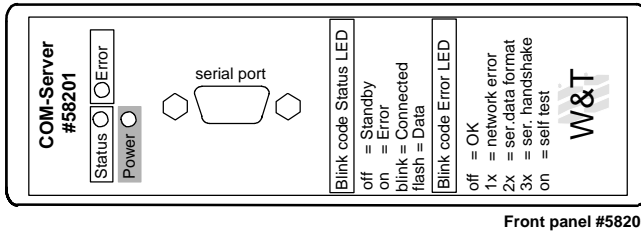
1.4 Hardware variants of the W&T COM-Server

1.4.1 W&T COM-Server with Display #58001, #58004

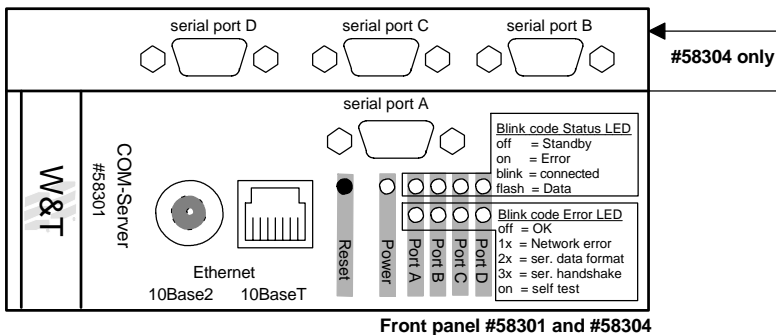




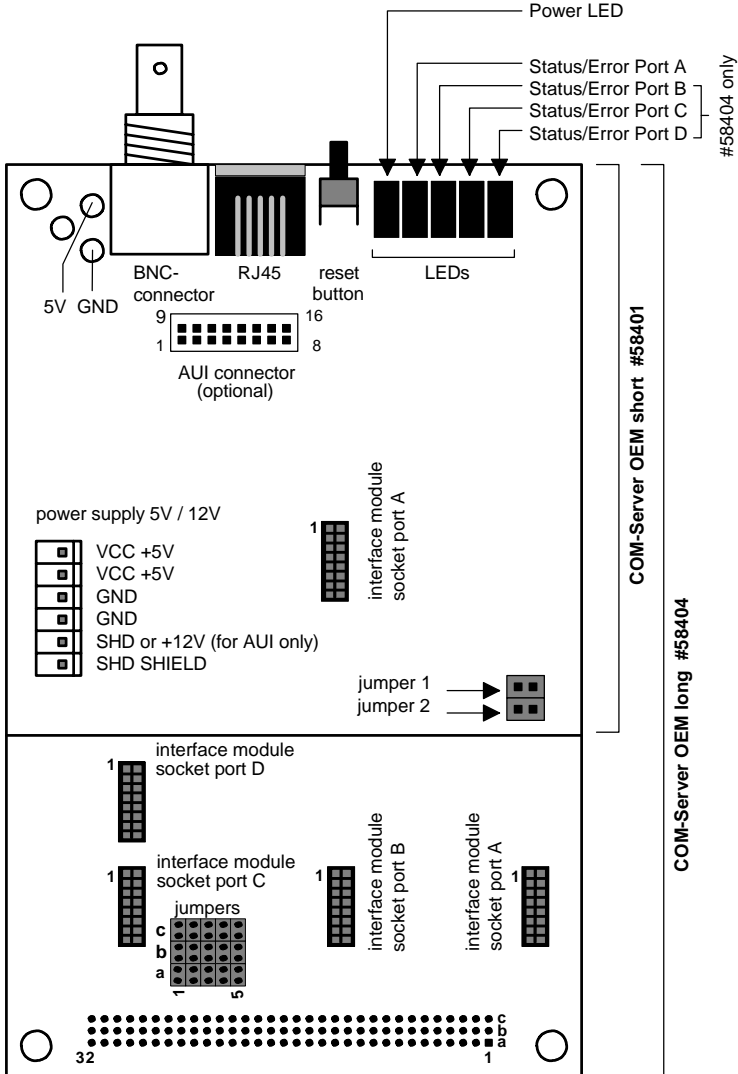
1.4.2 W&T COM-Server Compact #58201



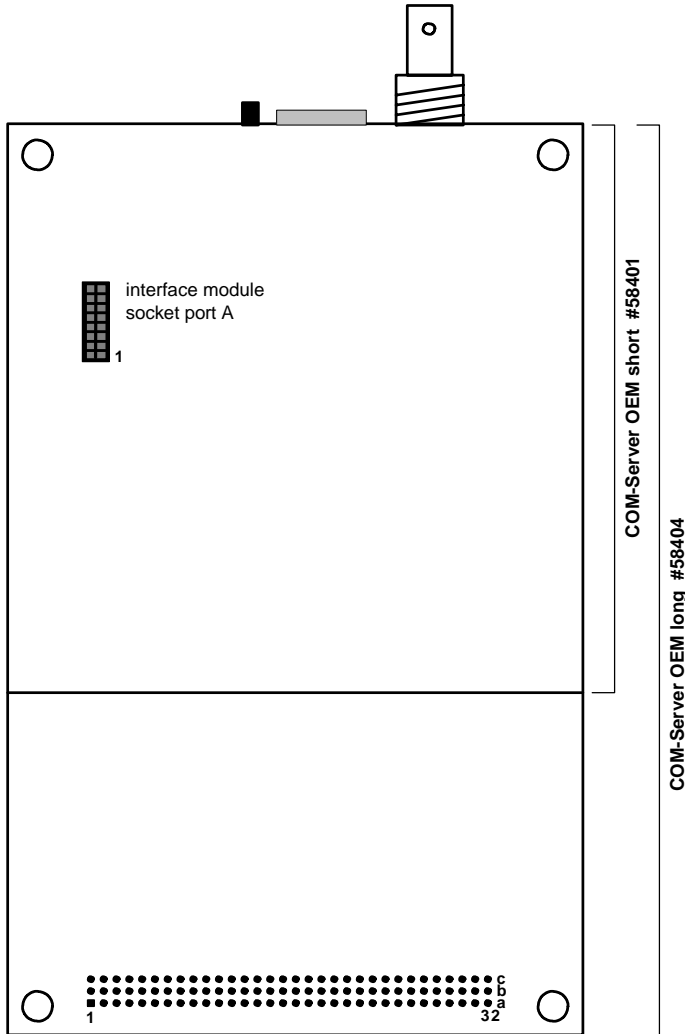
1.4.3 W&T COM-Server 19" OEM #58301, #58304



1.4.4 W&T COM-Server OEM short #58401 / long #58404



Component side of board




Solder side of board

1.4.5 Internal connections of the W&T COM-Server

Now let us describe the connectors which are located directly on the board. It is only necessary to know the details of these connections if you are working with the OEM version of the COM-Server. The locations of the connectors on the board can be seen from the illustrations on the preceding pages.

Contact assignments of the module sockets

1	16		Pin	Direction	Signal	Description	Default function ⁽¹⁾
2	15		1	OUT	5V	Power supply 5V	--
3	14		2	IN	RI	Ring Indicator	Ignored
4	13		3	IN	RxD	Receive Data	Data input
5	12		4	OUT	TxD	Transmit Data	Data output
6	11		5	--	n.c.	not connected	--
7	10		6	IN	CTS	Clear to Send	Handshake input Low: data transfer, High: stop
8	9		7	OUT	DTR	Data Terminal Ready	Low with active connection to PC
9			8	IN	DSR	Data Set Ready	Handshake input Low: data transfer, High: stop
			9	OUT	RTS	Ready to Send	Handshake output Low: ready to receive data High: not ready to receive data
			10	IN	DCD	Data Carrier Detect	Ignored
			11	OUT	12V	+12V	--
		12	OUT	GND	Signal Ground	--	

⁽¹⁾ can be temporary modified by software

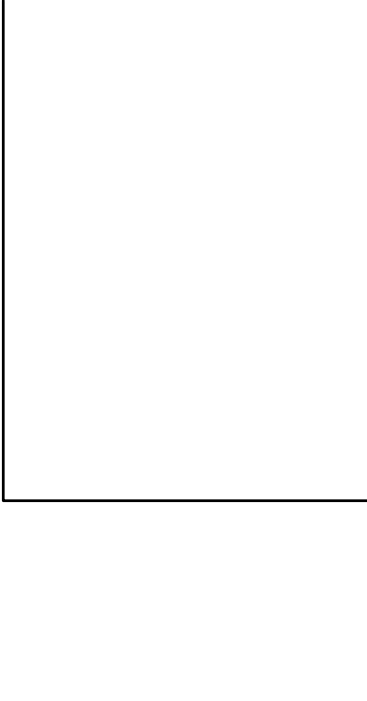
Contact assignments of the VG strip

The 19" OEM COM-Servers (#58301, #58304) get their power through the VG strip. Depending upon the bus system which you are using, jumpers a-c in the appropriate row of the jumper strip must be set on the board in order to provide power for the COM-Server.

Jumper	Connector pin VG strip			Input COM-Server			Default (all three jumpers of a row closed)
	A	B	C	A	B	C	
Jumper Row 1	9c	32c	31c	GND	+5V	+12V	VME bus J1
Jumper Row 2	2b	1b	n.c.	GND	+5V	+12V	VME bus J2
Jumper Row 3	32c	31c	3c	GND	+5V	+12V	Multibus II
Jumper Row 4	32c	1c	13a	GND	+5V	+12V	ECB bus
Jumper Row 5	32c	29a	9a	GND	+5V	+12V	BUS7ISA

Part 2

Displays and settings



- Displays
- Error messages
- Overview of menu tree
- Configurable serial ports
- Special key functions
- Software updating

2.1 Displays

The W&T COM-Servers have a power LED, and for each serial port a status LED and an error LED.

In addition, the Display versions (#5800x) have a 2x16 character LCD screen for displaying error and status messages.

2.1.1 LED displays

- **Power LED**

Indicates connection to the power supply. If the LED fails to light up, please check to make sure that the plug-in adapter is properly connected, or that the line cord is properly connected and in good condition (with built-in adapter).

In the case of 19" OEM COM-Servers (#5830x) please be sure to check the proper setting of your bus system in the jumper strip on the board (see Section 1.4.5).

- **Status LEDs**

Flash whenever there is network activity (sending and receiving) at the corresponding W&T COM-Server port. In the case of reception, the functioning of the LED pertains exclusively to data and control packets which are addressed directly to the COM-Server.

Periodic blinking indicates that the corresponding serial port has a valid connection with another network participant. When useful data are passing over the connection the LED flashes briefly.

On Display versions only (item no. 5800x):

- **Error LEDs**

Indicate present errors or errors in memory. In this case an error text, the time of the error, and the number of the responsible RS232 port (if any) can be obtained from the LCD screen.

All other versions:

- **Error LEDs**

By means of different blink codes, the error LEDs indicate the following error conditions at the corresponding port:

1 blink of all error LEDs = Check network

If the 10BaseT port is being used, the COM-Server is unable to receive a link pulse from a hub. Check the cable or the hub port. If you are using the BNC connector, the coax cable should be checked for correct termination or a possible break or short circuit in the cable. When using an AUI connector please check its connection to a MAU.

2 blinks = check serial data format

At least one character was received at the corresponding port with a parity or framing error, or the data register of the serial receiving module was written to, even though the prior character had not been read out. Check the correctness of the serial parameter settings, the handshaking procedure or the connecting cable.

3 blinks = check serial handshake

The serial device connected to the particular port is not reacting to the handshake stop signal set by the COM-Server and is continuing to send data. This can result in overwriting of the serial ring buffer and consequently in the loss of data. Check to see that the handshake configuration of the devices is correct and that the connecting cable is properly wired.

all error LEDs on = self-test error

The self-test which is performed after every Start or Reset of the COM-Servers did not finish normally.

This error can occur if you interrupted a software update early and it was not possible to transfer the complete operating software. The COM-Server is no longer operable in this state. Repeat the software update over the network with TFTP (see Section 2.4.1).

If the only way you can perform the update is through the serial port, Jumper 1 on the board (see illustration in Section 1.4.4) must be closed. Afterward press the Reset button (see Section 2.4.2).

If the error cannot be corrected, or if it occurs independently without being preceded by a software update, please send the unit to us.

2.1.2 Display error messages

The following section shows the error messages which can appear in the display, and possible causes:

1.) "Link fail" (with twisted pair cable only)**Display:**

Mode: RUN	13:00
Cable: Link fail	

The network cable definition is set for the 10BaseT port, but no link pulse is being received. The cause may lie in a defective 10BaseT cable or hub port. Another possible reason is an incorrectly wired cable.

The display is either updated automatically every 60 seconds, or optionally whenever the OK key is pressed.

2.) "Cable open" (for coax or AUI cable only)

Display:

Mode: RUN	14:00
Cable open	

The network segment is not correctly terminated (coax), or there is a discontinuity in the connecting cable. With the help of a LAN Scanner (W&T #55506) the error can quickly be found and corrected.

3.) Checksum error during self-test

Display:

ROM Test Error NET FLASH-UPDATE

This error can occur if you interrupted a software update early and it was not possible to transfer the complete operating software. The COM-Server is no longer operable in this state. Repeat the software update over the network with TFTP (see Section 2.4.1).

If the only way you can perform the update is through the serial port, Jumper 1 on the board (see illustration in Section 1.4.4) must be closed. Press the Reset button. The following message will appear on the display screen:

ROM Test Error SERAIL FLASH-UPD

Repeat the software update via COM port A (see section 2.4.2). If the error cannot be corrected, or if it occurs independent of any preceding software update, please send the unit to us.

4.) CTS/DSR/RLSD Time Out (only in connection with a Netware application IPX)

Display:

Port x	15:00
CTS/DSR/RLSD Time Out	

The IPX-API function call SET_COM_STATE can be used to specify a timer value for the W&T COM-Server for each of the three listed serial input signals. The timer begins to run when the corresponding input goes LOW (-12V), and is reset as soon as a HIGH (+12V) occurs. If that does not occur during the time period defined in the configuration, this error message is issued. Possible causes can be

a serial hardware device which is not connected, or which is unselected, defective or incorrectly configured.

As delivered from the factory, the timers for all of the inputs are switched off.

5.) No halt on XOFF/DTR/RTS

Display:

Port x	16:00
No Halt on XOFF/RTS/DTR	

The serial hardware device connected to the particular port is not reacting to the stop signal set by the COM-Server and is continuing to send data. This can result in overwriting of the serial ring buffer and consequently in the loss of data.

Check to see that the handshake configurations of the devices match and that the connecting cables are wired correctly.

6.) Overrun Error

Display:

Port x	17:00
Overrun Error	

The data register of the serial receiving module was written to, even though the prior character had not been read out.

Since this is a purely internal process within the device, when this error message occurs it is highly probable that there is a hardware error in the COM-Server.

7.) Parity Error

Display:

Port x	18:00
Parity Error	

A character received at the corresponding serial port has the wrong parity bit or none at all.

Please check to see that the transmission parameter configurations of the COM-Server and the corresponding serial device match. Parity errors can also be caused by the use of excessively long connecting cables.

8.) Framing Error

Display:

Port x	19:00
Framing Error	

A character received at the corresponding serial port does not fit into the time frame which results from the transmission parameter settings (baud rate, start bit, data bits, parity bit, stop bits).

In this case again please check to see that the configuration of the COM-Server and the serial device match.

9.) PC disconnect (only in connection with a Netware application IPX)

Display:

Port x	20:00
PC disconnect	

If there is an active IPX connection to a control PC, the latter automatically asks for the status of the W&T COM-Server every two minutes when there is no data traffic. If this query is not made for more than 4 minutes, the W&T COM-Server automatically breaks off the existing connection to the PC, in order to be available for other participants who may be present. Any data present in the internal buffers at this time are completely lost.

2.1.3 The error memory of the W&T COM-Server

The W&T COM-Server stores the last 10 errors which occurred, together with the time of their occurrence and the port number, in a ring buffer. The most recent message at any time is always the one currently displayed on the screen. The ↓ key can be used to call up the earlier messages in order and read them on the screen.

Stored error messages are erased by pressing the OK key when they are displayed on the screen. This causes the next earlier message to scroll automatically into the display. Consequently if all of the memory locations of the W&T COM-Servers are occupied, then the OK key needs to be pressed 10 times to delete all of the messages.

2.2 Configuring the W&T COM-Server

Configuration of the W&T COM-Servers can be performed directly on the unit on the models with integrated LCD display (#5800x). For all other models of the COM-Server the procedures for configuring the device are dependent upon the type of network protocol being used. Depending upon the protocol, it is possible to perform the configuration over the network (with the help of TELNET or the IPX-API).

These options are described in the corresponding chapters of the manual (TCPIP protocol, IPX protocol).

2.2.1 Nonvolatile memory

The W&T COM-Server stores all locally set configuration data in a special non-volatile memory region. Once the data have been saved, they are activated again each time the unit is turned on.

The transfer to non-volatile memory occurs when you have left that branch of the menu by pressing the "OK" key (possibly more than once) and the message "Saving..." has appeared on the display screen.

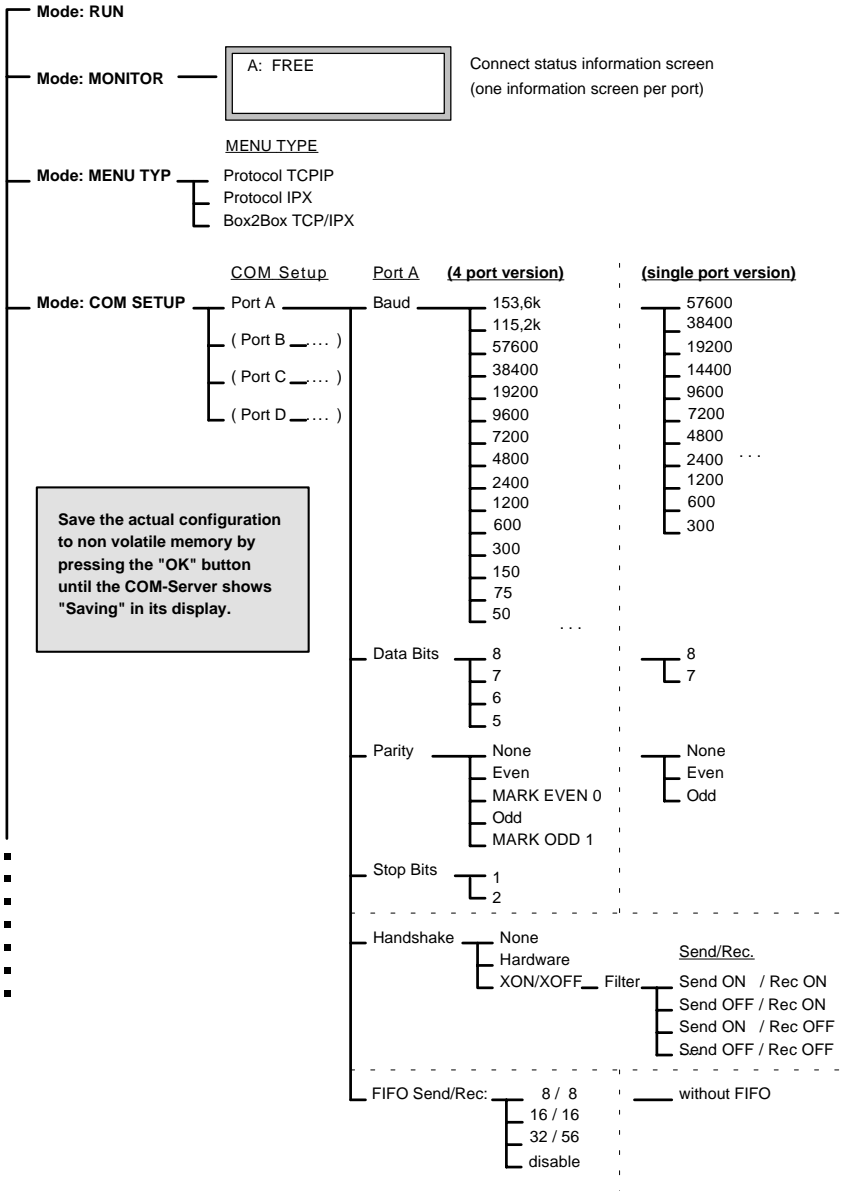
Following the illustration of the menu structure you will find a detailed example of modifying the parameters.

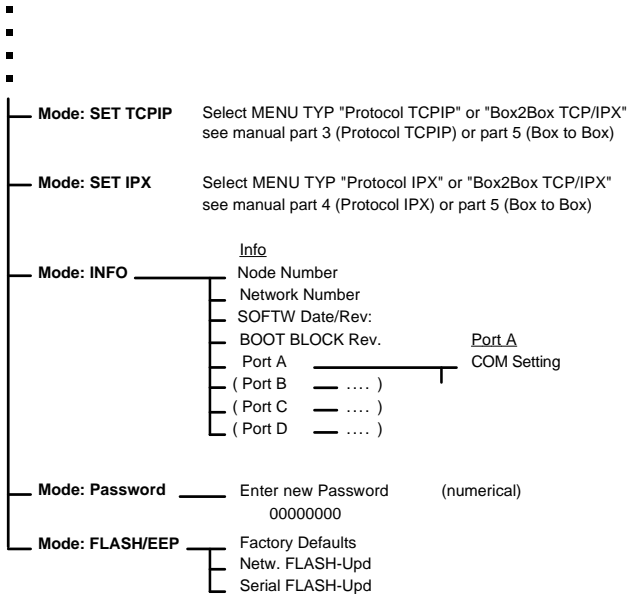
2.2.2 Overview of the display menus

This overview may be somewhat confusing at first. Play around a little bit at first with the display by using the four arrow keys. As long as you press only these keys you can move all around the menu without anything really being changed.

While the following section contains a thorough explanation of the individual menu items, with a little skill you can also play at trying out how to use the menu. You would be best advised to read the information about the filter in software handshaking, however.

Now that you know your way around, use the OK key now instead of the left arrow key in order to really perform the settings. In order to prevent accidental operation, the OK key is located on the front, clear to the right.





Example:

Starting from the RUN mode the modification of the baud rate for Port B from 9600 to 19200 baud can be made through the following keyboard entries:

Key Display

		Mode: RUN [time] Cable: Coax
1.00	↓	Mode: MONITOR
2.00	↓	Mode: MENU TYPE
3.00	↓	Mode: COM SETUP
4.00	→	Mode: COM SETUP Port A
5.00	↓	Mode: COM SETUP Port B
6.00	→	PortB Baud
7.00	→	Baud 9600

Key Display

8.00	↑	Baud: 19200
9.00	OK	Port B Baud
10.0 0	OK	Mode: COM SETUP Port B
11.0 0	OK	Mode: COM SETUP
12.0 0	↑	Mode: MENU TYPE
13.0 0	↑	Mode: MONITOR
14.0 0	↑	Mode: RUN

2.2.2.1 Mode: RUN

The W&T COM-Server is ready to establish a connection between the network and a serial device in accordance with its configuration. The type of cable currently in use is shown in the second line of the display.

2.2.2.2 Mode: MENU TYPE

To make the use of the menu as clear as possible, different branches of the menu are blanked out depending upon the network protocol you are using.

In this menu you can set the protocol for which you wish to configure the COM-Server. Naturally you can still configure the menu for both protocols by switching the MENU TYPE.

- **The TCP/IP protocol**
Confirm the selection with "OK." The menu "Mode: SET TCP/IP" appears with all of the client/server applications. The menu "Mode: SET IPX" is not visible.
- **The IPX protocol**
Confirm the selection with "OK." The menu "Mode: SET IPX" appears. The menu "Mode: SET TCP/IP" is no longer visible.
- **Box to box TCP/IPX**
Confirm the selection with "OK." Both menus appear, "Mode: SET IPX" and "Mode: SET TCP/IP," but in each case with only the settings which are relevant for the box to box mode.

2.2.2.3 Mode: COM SETUP

The W&T COM-Server, like every serial device, has to be set to the communication parameters of its partner. In this mode all of the RS232 parameters which are relevant for operation can be configured separately for each port. Besides the usual settings for baud rate, data bits, parity and stop bits, at this point the handshaking method and, for multiple-port versions, the size of the FIFO buffer in the UART can be specified.

All changes take place immediately after you leave the respective menu level by pressing the OK key.

Please note that storing the parameters deletes all data which is currently in the temporary buffers of the W&T COM-Server.

- **Hardware handshaking**
When hardware handshaking is used, the individual RS232 signals perform the functions described in Section 1.2.2 according to the factory settings. Please note that depending upon the version the meanings of the individual signals can be changed by the particular application software at any time.

- **Software handshaking**

Software handshaking is carried out through the two ASCII characters (h11) = XON and (h13) = XOFF. In this case the RTS output is permanently set at the factory for +12V, and the CTS, DSR, DCD and RI are ignored.

A special feature are the four options under the menu item "Filters." These options define whether the handshake bytes XON (h11) and XOFF (h13) are filtered out or are communicated transparently.

Send filter = OFF

(XON/XOFF filter for data direction network → RS232)

All useful data, including the signals XON and XOFF, are output to the RS232 port without filtering. It only makes sense to use this operating mode when the attached device is a graphics printer, in whose data stream the handshake symbol must also be expected to occur.

Send filter = ON

If the characters XON or XOFF should occur within the useful data, they are filtered out by the W&T COM-Server and are not forwarded to the terminal device. This operating mode is always the one to choose for bidirectional RS232 connections, since otherwise problem-free data communication is not possible.

Receive filter = OFF

(XON/XOFF filter for data direction RS232 → network)

The XON and XOFF characters sent by the serial device are transferred to the network along with the actual useful data. This operating mode requires that the particular recipient on the network have a special means for separating useful and control data.

Receive filter = ON

XON and XOFF characters sent by the serial device are treated as control bytes by the W&T COM-Server and are not inserted into the network data stream. This ensures that the network recipient receives only pure useful data.

2.2.2.4 Mode: MONITOR / SET IPX / SET TCPIP

In these menus all of the network-relevant parameters are set or displayed. The configurations and operating modes which are to be set here differ considerably, according to which protocol you are using. For this reason the descriptions will be found in the chapters for the specific protocols: "The TCPIP protocol," "The IPX protocol," and "Box to box TCP/IPX."

2.2.2.5 Mode: INFO

This item allows you to call up the device-specific parameters and the port parameter settings for all of the serial ports.

- **Node Number**

Displays the Ethernet address of the W&T COM-Server. This number is factory-set and registered and cannot be changed.

- **Network Number (IPX protocol)**

Displays the network address of the Netware network to which the COM-Server is connected. If there is no Netware server in the network, then the display is blank.

- **Software Date/Rev.**
Displays the creation date and version number of the operating software stored in FLASH memory.
- **BOOT BLOCK Rev.**
Displays the creation date and version number of the boot block software.
- **COM Setting**
This item shows the current serial configuration of the selected port in the following format:

[baud rate], [parity], [data bits], [stop bits], [handshake].

The handshake variable can take these values:

		Send filter	Receive filter
[N]	No handshaking	----	----
[H]	Hardware handshaking	----	----
[X]	Software handshaking XON/XOFF	OFF	OFF
[S]	Software handshaking XON/XOFF	ON	OFF
[R]	Software handshaking XON/XOFF	OFF	ON
[SR]	Software-Handshake XON/XOFF	ON	ON

All of the other items of information listed in the INFO mode are network parameters, and are described in detail in the instructions for the individual versions.

2.2.2.6 Mode: PASSWORD

Here you can specify an 8-character hexadecimal password, which protects the menu items Mode: COM SETUP, Mode: SET IPX, Mode: SET TCPIP and Mode: FLASH/EEP from unauthorized access. The factory setting is 00000000, which permits unrestricted access to all of the configuration options of the COM-Server.

The numerical value is input with the cursor keys. The ←/→ keys determine the position of the cursor within the number, which can then be incremented or decremented by means of the ↑/↓ keys.

Important!

In order to reset or modify any of the parameters, including the password itself, you have to know the old password. For this reason a written record of the password should always be kept in a secure place.

2.2.2.7 Mode: FLASH / EEP

In this mode you can start the software update or completely reset the nonvolatile memory (EEPROM).

- **Factory Defaults**

When you confirm this with "OK," all of the settings which you have stored are reset to the defaults. The configuration then corresponds to the factory setting.

Important!

Resetting the nonvolatile memory leads to the loss of **all** settings which have been made, including the IP address or IPX port numbers which have been assigned.

- **Net FLASH-Update**

Before you activate this mode, terminate all currently active network connections. Then confirm with "OK." The unit goes into the mode for update over the network. The caption "NET UPDATE" appears on the display, and all of the green LEDs light up.

Important!

This mode blocks all other operating modes of the COM-Server, as well as the keypad. The only way to exit from the update mode is to perform the update or press the Reset button. All currently active connections, including any data, are lost.

- **Serial FLASH-Update**

Before you activate this mode, terminate all currently active network connections. Then confirm with "OK." The unit goes into the mode for update through serial port A. The caption "SERIAL UPDATE" appears on the display, and all of the green LEDs light up.

Important!

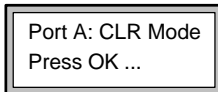
This mode blocks all other operating modes of the COM-Server, as well as the keypad. The only way to exit from the update mode is to perform the update or press the Reset button. All currently active connections, including any data, are lost.

2.3 Special key functions

For those W&T COM-Servers which have the display screen and keypad there are various key combinations which enable you to deactivate operating mode settings separately for each port, quickly and easily. Pressing the indicated keys returns the W&T COM-Server to its basic state so that it can be reconfigured.

- **Clear Mode Port A:**

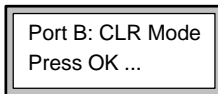
Simultaneously press the "OK" and "←" keys and hold them down until the following message appears:



Port A: CLR Mode
Press OK ...

- **Clear Mode Port B:**

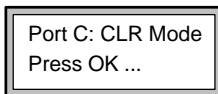
Simultaneously press the "OK" and "↑" keys and hold them down until the following message appears:



Port B: CLR Mode
Press OK ...

- **Clear Mode Port C:**

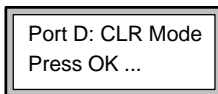
Simultaneously press the "OK" and "→" keys and hold them down until the following message appears:



Port C: CLR Mode
Press OK ...

- **Clear Mode Port D:**

Simultaneously press the "OK" and "↓" keys and hold them down until the following message appears:

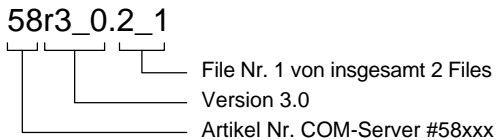


Port D: CLR Mode
Press OK ...

2.4 Updating the W&T COM-Server software

Since the operating software of the W&T COM-Server is constantly undergoing further development, the device also has a provision for performing a software update. When you wish to add additional functions, you receive up to four files from us; these contain the new firmware.

These files are named according to the following system:



There are two options for performing the update itself. If you have access to a UNIX computer or a PC with a TCPIP kernel, you can carry out the software update with TFTP. This goes much more quickly than updating through the serial port, and can be carried out from practically any computer on which a TCPIP stack is activated.

The second option is to update through the serial port.

IMPORTANT:

- Never force an interruption of the update process by pulling the line plug or pressing the Reset button. The COM-Server is inoperable following an incomplete update.
- Never mix files with differing versions in their filenames. This will prevent the device from working.
- Transfer all of the files in sequence. The COM-Server automatically recognizes when all of the files have been transferred and the new operating software is complete. It then performs a reset by itself.
- The software update has no effect on the configuration of the W&T COM-Server.

2.4.1 Network update of the W&T COM-Server software

This procedure requires a UNIX computer or a PC with a TCPIP stack, which supplies the functions of the TFTP protocol.

The individual steps of the update process are described below. Please follow the directions closely. An incomplete update will render the device inoperable!

Software update with TFTP

1. Select "Mode: FLASH/EEP - Netw. FLASH-UPD" in the menu and confirm with "OK."
The screen displays the message "NET FLASH-UPDATE" and all of the green status LEDs are on. Now the COM-Server can only be addressed with TFTP. The menu is no longer operable.
2. Now transfer the first file to the COM-Server with the command TFTP. **Be sure to use binary mode!** While the data are being transferred over the network, the status LED for Port A flashes. Afterward the COM-Server shifts into the programming mode and all of the error LEDs light up. This process can take a few seconds. Wait until the error LEDs go out and the status LEDs light up again.

Repeat this process for all of the files.

3. The COM-Server recognizes when all of the files have been transferred and **automatically** performs a restart. If all of the green status LEDs are lit again after all of the files have been transferred, repeat step 2 in its entirety. You may have omitted a file. Duplicating transmission of a given file does not cause an error in the update itself. The COM-Server waits until it has all of the needed files.

Example 1: SCO UNIX

You have received the following two files from us: 58r3_1.2_1 and 58r3_1.2_2. The new operating software is version 3.1.

Enter the following commands at the prompts:

```
# tftp
tftp> connect [ip_number | host_name]
tftp> binary
tftp> put 58r3_1.2_1 [remote filename]
(remote filename = any letter)
```

Now wait until the green status LEDs light up again, and then transfer the second file.

```
tftp> put 58r3_1.2_2 [remote filename]
tftp> quit
#
```

Example 2: Windows LAN Work Place

You have received the following two files from us: 58r3_4.2_1 and 58r3_4.2_2. The new operating software is version 3.4.

Enter the following orders at the prompts:
(*remote filename* = any letter)

```
C:\ ftp -B 58r3_4.2_1 [ip_number | host_name] = [remote filename]
```

Now wait until the green status LEDs light up again, and then transfer the second file.

```
C:\ ftp -B 58r3_4.2_2 [ip_number | host_name] = [remote filename]
```

2.4.1 Serial update of the W&T COM-Server software

This procedure requires a PC with a configurable serial port.

The individual steps of the update process are described below. Please follow the directions closely. An incomplete update will render the device inoperable!

Software-Update via COM-Server Port A

1. Connect Port A of the COM-Server with the serial port of the PC from which you wish to perform the update.
2. Configure the serial port of the PC to the following parameters:
9600 baud, no parity, 8 bits, 1 stop bit
3. Select "Mode: FLASH/EEP - Serial FLASH-UPD" in the COM-Server menu and confirm with "OK." The screen displays the message "Serial FLASH-UPDATE" and all of the green status LEDs are on. Now the COM-Server can no longer be addressed over the network, and the menu is no longer operable.
4. Now transfer the first file to the COM-Server with the COPY command. While the data are being transferred via the serial port, the status LEDs blink rhythmically. This step can last up to three minutes. Afterward the COM-Server shifts into the programming mode and all of the error LEDs light up. This process can take a few seconds. Wait until the error LEDs go out and the status LEDs again light steadily. Repeat this process for all of the files.
5. The COM-Server recognizes when all of the files have been transferred and **automatically** performs a restart. If all of the green status LEDs are lit again after all of the files have been transferred, repeat step 2 in its entirety. You may have omitted a file. Duplicating transfer of a given file does not cause an error in the update itself. The COM-Server waits until it has all of the needed files.

Example:

You have received the following two files from us: 58r3_1.2_1 and 58r3_1.2_2. The new operating software is version 3.1. The COM-Server is connected to the COM2 port of your PC. Enter the following commands at the prompts:

```
C:\ mode COM2: 96,N,8,1
```

```
C:\ copy 58r3_1.2_1 com2 /B
```

Now wait until the green status LEDs light up again, and then transfer the second file.

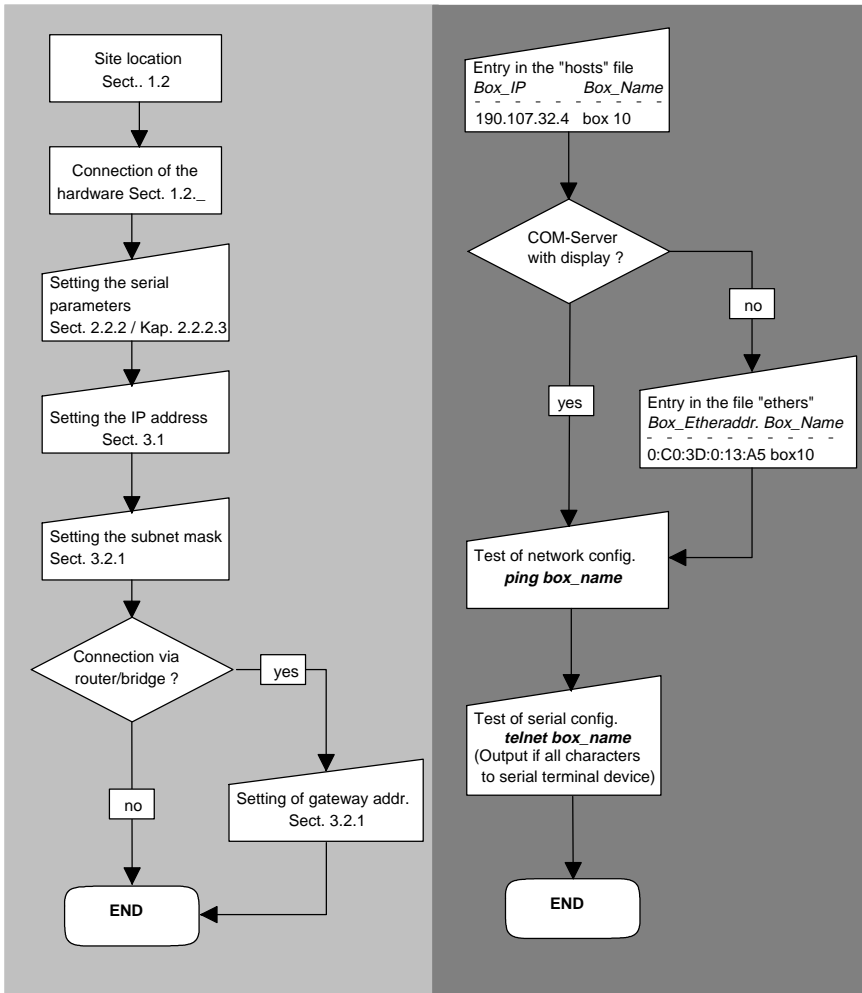
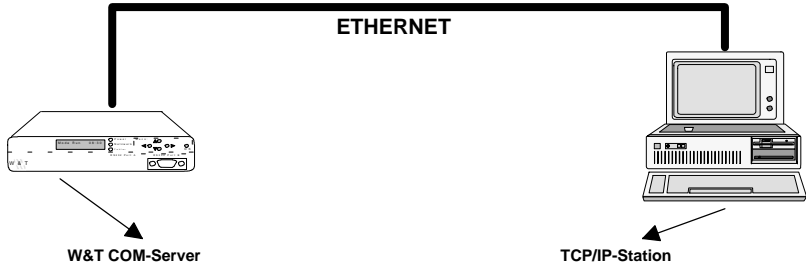
```
C:\ copy 58r3_1.2_2 com2 /B
```


Part 3

The TCP/IP protocol



- SET TCPIP menu
- ARP/RARP
- PING
- FTP client/server
- TELNET client/server
- SOCKET Client/server
- SLIP router



3.1 Assigning the IP address

You have a number of options available for assigning the IP address for the COM-Server.

- **On the COM- Server's display** (display versions only)
In the "SET TCPIP - Box IP Number" enter the appropriate IP address.
- **By means of the RARP server**
Activate the RARP server; enter the Ethernet address for the box in the `/etc/ethers` file and the IP address for the box in the `/etc/hosts` file. Connect the COM-Server to the network **in the same segment** of the RARP server.

Example:

The Ethernet number for your COM-Server is: 00:C0:3D:00:12:FF.

It is to be given the IP number 190.107.231.11 and the alias WT_1.

Entry in the file `/etc/hosts`: 190.107.231.11 WT_1

Entry in the file `/etc/ethers`: 00:C0:3D:00:12:FF WT_1

If no RARP daemon is activated yet, do this now. Under SCO UNIX, for example, the command is: `rarpd -a`

- **By means of the "arp" command**
This method can only be carried out if the COM-Server does not yet have an IP address, so that the entry is 0.0.0.0 (set at the factory). To change an IP address use a different method, or remote configuration with TELNET.

Assign the COM-Server an IP address in the `/etc/hosts` file, and then use the "arp" command to make an entry in the address table:

Under SCO UNIX, for example:

```
arp -s WT_1 00:C0:3D:00:12:FF
```

Establish a network connection to the COM-Server (e.g. Ping, Telnet ... WT_1).

- **Input at the serial interface when starting the COM- Server**
(versions without display only)
Connect a terminal to Port A and configure the serial port of the terminal with 9600 baud, no parity, 8 data bits, 1 stop bit, no handshake.

Activate the reset button on the COM-Server. After every hardware test all of the green data LEDs light up for about two seconds.

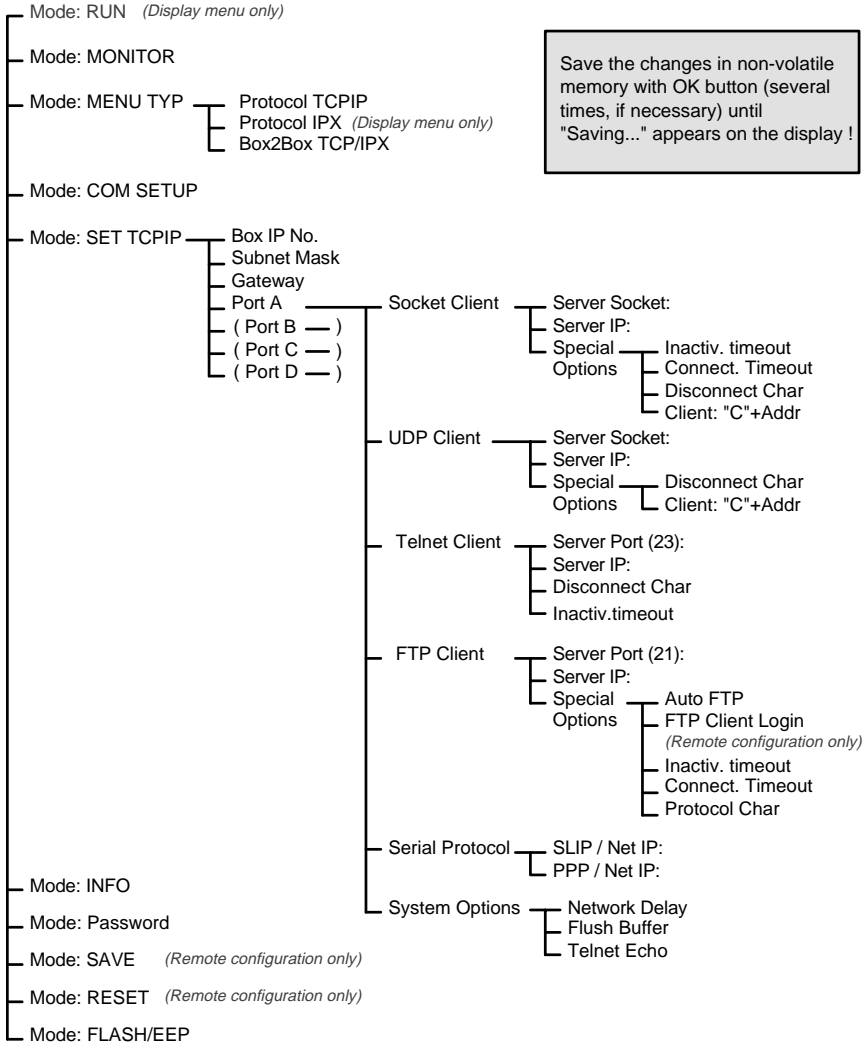
During this time, key in the letter "x" at least 3 times. If the COM-Server recognizes the input, the prompt "IPno.+<Enter>" appears on your terminal.

Enter the IP address in the usual format (xxx.xxx.xxx.xxx) and end the input with <Enter>. If the input is correct, the assigned IP address is shown as acknowledgment; otherwise the message "Failed" is displayed.

The procedure can be repeated any number of times.

3.2 Menu tree for the TCP/IP protocol

The methods for controlling the system and adjusting the serial parameters were already described in Parts 1 and 2. This part contains explanations of all of the configurations which are needed in order to implement the client/server applications which are based on TCP/IP.



Whenever you leave this menu branch by pressing the OK key, the system stores the parameters which have been set and attempts to work with them. You can return at any time without saving by pressing the ← key.

When the message "Saving..." appears on the display, the new configuration has been stored in non-volatile memory.

Remote configuration with Telnet

In addition, the COM-Server can be configured very conveniently via the network with the help of TELNET. This can be done from any host which is connected to the network and has the TELNET command available.

Simply enter the command

```
telnet [IP number or host] 1111
```

Please see your user manual for the precise syntax of the commands for your UNIX system or your TCP/IP kernel. "1111" stands for the port number.

On the screen you will have almost exactly the same configuration menu as in the local display. By entering the appropriate number you can select the sub-menus.

3.2.1 Mode: SET TCPIP

- **Box IP number**

Enter the IP number here under which the box is to be addressed. Please note that this number is not freely selectable, but must be defined dependent upon the network address of the TCP/IP network. The form of input conforms to the usual syntax (e.g. 192.107.232.009). The cursor keys are used to input the numerical value. The ←/→ keys govern the position of the cursor within the number; the ↑/↓ keys can then be used to count up or down by steps.

- **Sub-net mask**

Specify the sub-net mask for the sub-network in which your COM-Server is located (e.g. 255.255.255.0). Erroneous entries are corrected automatically when they are saved.

- **Gateway**

If appropriate, enter the IP number of the gateway, if routing to other sub-networks is necessary.

3.2.1.1 Socket client

In this mode the COM-Server is activated as a TCP socket client (TCP streams). In the "Server Socket" sub-menu enter the port number and in the "Server IP" sub-menu enter the IP number of your socket server to which the COM-Server is to make a connection.

Special options

- **Inactivity timeout** (default: 30 seconds):
Here you can enter a timeout for the connection. The value is specified in seconds in a decimal number. If no data are transferred for the specified length of time, then the COM-Server breaks off the connection to the socket server. The value zero deactivates this mode.
- **Connection timeout** (default: 300 seconds):
This value is also a connection timeout (decimal and in seconds). This timeout only becomes active if there are no activities taking place on the network side between the server and the client. This state indicates that the connection is hanging. The timeout value should be chosen accordingly. The value zero deactivates this mode.
- **Disconnect char** (default: 3):
Here you can enter a decimal character which will end the current connection. If this character is received at the serial port, the COM-Server interrupts the connection to the socket server. The character is not included in the transmission. The default value is 3, which corresponds to the key code "Ctrl C." The value zero deactivates this mode.
- **Client: "C" + addr** (default: inactive):
This function makes it possible to establish connections to different server addresses without the need of adjusting settings on the Box (see Section 3.6.1.2).

3.2.1.2 UDP mode

In this mode the COM-Server is activated for the UDP mode; that is, data are transmitted by means of UDP datagrams. Enter the port number in the "Server Socket" sub-menu, and in the "Server IP" sub-menu enter the IP number of your UDP server with which the COM-Server is to exchange data.

Special options

- **Disconnect char** (default: 3):
The Disconnect char is only in effect when the option "Client: C+Addr" is active. If this character is received at the serial port, the current destination address to the UDP server is deleted. Data cannot be transmitted again until a new destination address is sent. The character is not included in the transmission. The default value is 0.
- **Client: "C" + addr** (default: inactive):
This function makes it possible to transfer data with various UDP servers, without the need of adjusting settings on the Box (see Section 3.6.2).

3.2.1.3 Telnet client

In this menu the COM-Server is configured as a Telnet client. Enter the port number in the "Server Port" sub-menu, and in the "Server IP" sub-menu enter the IP number of your Telnet server to which the COM-Server is to establish the connection. The port number for the standard Telnet server is 23.

- **Disconnect char** (default: 3):
Here you can enter a decimal character which will end the Telnet connection. The character is not included in the transmission. The default value is 3, which corresponds to the key code "Ctrl C." The value zero deactivates this mode.
- **Inactivity timeout** (default: 30 seconds): Enter a connection timeout here in seconds in a decimal number. If no data are transferred for the specified length of time, then the COM-Server breaks off the connection to the Telnet server. The value zero deactivates this mode.

3.2.1.4 FTP client

In this menu the COM-Server is configured as an FTP client. Enter the port number in the "Server Port" sub-menu, and in the "Server IP" sub-menu enter the IP number of your FTP server to which the COM-Server is to establish the connection. The port number for the standard FTP server is 21.

Special options:

- **Auto FTP** (default: inactive):
This switch toggles between serial protocol (inactive) and automatic operation (active). See Section 3.4.2.1.
- **FTP client login (with Auto FTP = active)**
(for remote configuration with TELNET only)
One after another enter the login parameters with which the COM-Server can lock into your FTP server. The parameters needed are a username and password, the transmission mode, and the name of the file which is to be read or written.
- **Inactivity timeout** (default: 30 seconds):
Here you can enter a timeout for the connection. The value is specified in seconds in a decimal number. If no data are transferred for the specified length of time, then the COM-Server breaks off the connection to the socket server. The value zero deactivates this mode.
- **Connection timeout** (default: 300 seconds):
This value is also a connection timeout (decimal and in seconds). This timeout only becomes active if there are no activities taking place on the network side between the server and the client or if a continuous handshake stop is preventing the flow of data. This state indicates that the connection is hanging. The timeout value should be chosen accordingly. The value zero deactivates this mode.
- **Protocol char** (default: 3):
If the FTP client is used with serial protocol, a decimal character must be entered here which the protocol is to use as the separator character. This character must not occur in the data stream, since this can lead to malfunctions or premature break-off of transmission.
In the "Automatic FTP client" mode this character is evaluated as a condition for ending the FTP connection, if it has a value other than zero.

3.2.1.5 Serial protocol

If the COM-Server port is to be locked as a SLIP or PPP router, enter the network address of the sub-network here to which the SLIP or PPP packets are to be routed. Also see Section 3.7.

3.2.1.6 System options

In this menu branch you can set certain specific values which are normally not meaningful.

- **Network Delay** (default: active):
This switch changes the frequency with which serial data are packaged into network packets. When the switch is "active": packaging starting from a number of characters which depends upon the baud rate or after about 20 ms (lighter load on the network!); with the switch "inactive": immediate packaging starting from the first character (for applications whose timeouts do not allow this slight delay).
 - **Telnet Echo** (default: active):
If the COM-Server is operated as a TELNET server, the echo mode can generally be set at the local terminal. If Remote Echo Mode is selected, the COM-Server gives an echo for each character. If you have a serial terminal device which also sends an echo, each character appears twice on the screen. For this purpose you can deactivate the echo in the COM-Server.
 - **Flush Buffer** (default: active):
If this switch is "active," each time a new connection is established the serial buffer is cleared, along with any residual data which were not able to be transmitted (Handshake Stop). But if you connect a terminal device to the COM-Server, for which the program for example requires a longer Handshake Stop, you can prevent clearing of the buffer by deactivating this switch. This makes it possible to establish a number of connections in a row on the network, and the data are collected in the buffer until they are transmitted.
-

3.2.2 Mode: RESET

(Only with remote configuration via TELNET)

Select this menu item to execute a software reset on the COM-Server. First your Telnet session will be closed normally.

3.2.3 Mode: SAVE

(Only with remote configuration via TELNET)

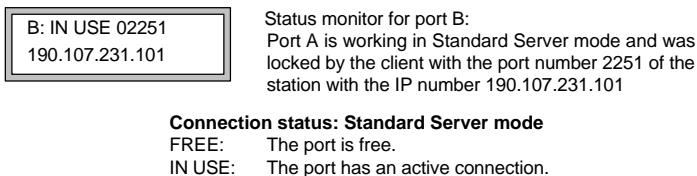
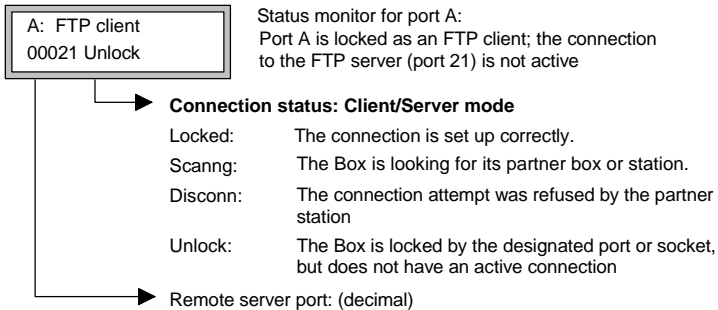
Here you can make all of the changes which you have made in the Box take effect. If a password has been activated, then it is demanded here. If the input is correct, the message "Saving...." appears on the screen.

If the input is incorrect, you are returned to the main menu without saving the values and the message "Failed" appears on the screen..

3.2.4 Mode: MONITOR

This mode permits constant monitoring of the connection status of all COM-Server ports. By scrolling the screen of the display upward or downward you can read the status of each channel, one at a time.

In TELNET remote configuration mode you select the port by entering the corresponding number. This gives you the current status of the connection. The output is updated when you leave the sub-menu and then return to it again.



3.3 Protocols for the TCP/IP suite

The following protocols and applications are implemented in the COM-Server:

ARP, RARP, ICMP (PING functions),
 FTP (client and server), TELNET (client and server),
 TCP and UDP sockets (for client/server applications),
 SLIP,
 RIP (active in configured SLIP mode)

3.4 Data transfer via FTP

Data exchange by means of FTP protocol is file oriented, that is, it is possible to output file contents to the serial port of the COM-Server, or to read characters into files from the serial port. The COM-Server includes both an FTP server and an FTP client.

3.4.1 Mode: FTP server

This mode should be used when the data to be transferred are present in file form and the action is always to be started from your PC or UNIX host.

No preliminary settings are needed on the COM-Server for this mode. You can address the device by name or IP address, like any other station on the network.

Selecting the serial port:

The serial port is selected by designating a port number when calling FTP. If no port is designated, port A is addressed by default.

Calling FTP:

ftp IP number or host	- addresses port A
ftp IP number or host 7000	- addresses port A
ftp IP number or host 7100	- addresses port B
ftp IP number or host 7200	- addresses port C
ftp IP number or host 7300	- addresses port D

After inputting the command "ftp" you can acknowledge the request for the login name with "ENTER".

The following commands are available:

put [local file remote file]	- send the file "local file" to the RS232
get [remote file local file]	- read in characters from the RS232 into the local file
ascii	- transfer ASCII files
image	- transfer binary files
quit	- ends the FTP session

Comments on [remote file]:

put	- enter any letter, since no remote file exists
get	- 1. likewise enter any name or letter or - 2. code a time criterion for halting the transfer of data For this purpose enter a number of no more than 3 digits (one tick corresponds to one second). If [remote file] has no value in this range, the connection is broken off 30 seconds after the last character is read in.

For the exact designations of your function calls please consult the user manual for your FTP software.

Important:

In the menu "Mode: MONITOR" the entry "FREE" must be visible on the corresponding screen before a connection can be opened.

3.4.2 Mode: FTP client

This mode makes it possible to access files on any PC or UNIX host which has an FTP server active. The action must always be initiated from the serial terminal device.

The COM-Server port is configured for this mode in the "SET TCPIP - Port ... - FTP Client" menu.

Settings:

- Menu: SET TCPIP - Port ... - FTP Client - Server Port(21): 21 for the standard FTP Server or a different port number for a special FTP server.
- Menu: SET TCPIP - Port ... - FTP Client - Server IP:" IP number of the station on which the FTP server is to be called.

After all of the values have been fed into the COM-Server and confirmed repeatedly with OK until the message "Saving" appears on the display, the client mode is activated. "FTP Client" appears in the first line of the status monitor.

FTP client functions:

TYPE A Activation of the ASCII transmission type
TYPE I Activation of the IMAGE (binary) transmission type
STOR *remote file*: Stores all of the data received at the serial port in *remote file*
RETR *remote file*: Outputs "remote file" to the serial port
APPE *remote file*: Appends all data received at the serial port to the end of *remote file*
LIST *remote dir*: Outputs *remote dir*

Please pay attention to the CAPITALIZATION of the commands!

For transmission of the necessary parameters (login, password, FTP client functions) there are two options, as described in the following section.

3.4.2.1 Automatic FTP client

This mode is appropriate whenever the same command is to be executed repeatedly, dependent upon the presence of data at the serial port.

Activation:

Set the switch "SET TCPIP - Port ... - FTP Client - Special Options - Automatic FTP" on the COM-Server to "active." Call the remote configuration from a TCP/IP station (telnet *IP no. 1111*) and choose

"SET TCPIP - Port ... - FTP Client - Special Options - FTP Client Login".

Enter, one after the other, the login name, the password and the FTP client functions.

Important!

You have a maximum of 80 characters available for all specifications!

Establishing a connection:

The FTP client functions LIST and RETR are invoked by the presence of any character at the serial port. This character is not transmitted.

The FTP client functions STOR and APPE are executed as soon as the first character to be transmitted is present at the serial port.

As the end conditions for the FTP client functions STOR and APPE, please enter at least one of the following values on the COM-Server or by means of remote configuration:

"SET TCPIP - Port ... - FTP Client - Special Options - Inactive Timeout" (in seconds)

For example:

Inactive Timeout = 00030 -> If 30 seconds pass without it being possible to read a character from the RS232 port, the connection is broken off ("0" corresponds to no time limit, but most servers do not allow a connection longer than 5 minutes).

"SET TCPIP - Port... - FTP Client - Special Options - Protocol Char"

If this character is received the connection is closed immediately. The character is not transmitted! If the value of the character is zero, this end condition is disabled.

The first 16 characters of any error codes from the FTP server are output to the display.

3.4.2.2 FTP client with serial protocol

This mode is appropriate when you want to execute constantly changing commands with different files and have access to a means of terminal input or of programming on the serial side.

Activation:

Set the switch "SET TCPIP - Port ... - FTP Client - Special Options - Automatic FTP" on the COM-Server to "Inactive".

Select a character which does not occur in your stream of useful data and enter it under "SET TCPIP - Port ... - FTP Client - Special Options - Protocol Char" (for example, "003" corresponds to the keycode "Ctrl C").

Serial protocol:

The format of the login string (entered via the serial port) is:

```
login_name< lf >password< lf >(TYPE I | TYPE A)< lf >(STOR | RETR | APPE | LIST)
remote file/dir < lf >disconnect char
```

The individual commands are separated with "0A hex" (corresponding to "line feed," keyboard input "CTRL J").

Important!

For the complete login string you have 128 characters available!

Establishing a connection:

Send the login string to the appropriate port of the COM-Server. If the string is received completely, the COM-Server begins to set up the connection and process the commands.

If the functions are successfully executed in sequence, you receive the code "OK+ *disconnect char*".

Afterward the useful data are transmitted, from the serial port to the network or vice versa, depending on the command. The stream of useful data must also be concluded with *disconnect char*.

If an error occurs, the error code of the FTP server + *disconnect char* is reported.

In both cases the connection is closed automatically and you receive the ending code of the FTP server + *disconnect char*.

Omitting the "TYPE" command:

It is possible to omit parameter 3 (the TYPE command) and enter only the separator character "Ctrl J". In that case the string would look like this:

```
login_name<lf>password<lf><lf>(STOR|RETR|APPE|LIST) remote file/dir<lf>disconnect char
```

Examples:

1.) User "elton" with the password "happy" would like to obtain the file "/etc/hosts" in ASCII format. The value "003" (Ctrl C) is entered as the protocol character. The protocol would look like this:

```
Serial device:      elton<lf>happy<lf>TYPE A<lf>RETR /etc/hosts<lf><Ctrl C>
COM-Server:        OK<Ctrl C>
                   [content of the file /etc/hosts]<Ctrl C>
                   221 Goodbye<Ctrl C>
```

2.) User "elton" with the password "happy" would like to append binary data to the end of the file "/usr/elton/config". The value "003" (Ctrl C) is entered as the protocol character. The protocol would look like this:

```
Serial device:      elton<lf>happy<lf>TYPE I<lf>APPE /usr/elton/config<lf><Ctrl C>
COM-Server:        OK<Ctrl C>
Serial device:      [binary data]<Ctrl C>
COM-Server:        221 Goodbye<Ctrl C>
```

3.) User "elton" with the password "happy" would like to look at the file "/usr/private" and transfer the data in ASCII mode, but the file is not present. The protocol would look like this:

```
Serial device:      elton<lf>happy<lf>TYPE A<lf>RETR /usr/private<lf><Ctrl C>
COM-Server:        550 /usr/private: No such file or directory<Ctrl C>
                   221 Goodbye<Ctrl C>
```

Connection monitor:

In the corresponding status "MONITOR" you can read out the current status of the connection (see Section 2.3).

3.4.2.3 Deactivating the "FTP client mode":

Set the value in the menu "SET TCP/IP - Port... - FTP Client - Server Port" to zero. The COM-Server deactivates the connection and deletes the FTP client mode.

3.5 Data transfer via TELNET

Telnet is a protocol for terminal emulation, with character-oriented data transfer. Telnet makes active, bidirectional character exchange possible between the UNIX station or the PC and the serial terminal device connected to the COM-Server.

3.5.1 Mode: TELNET server

No default settings are required on the COM-Server. You can address the device like any other station on the network, by name or IP address.

Selecting the serial ports:

The serial ports are selected by designating a port number when calling FTP. If no port number is designated, port A is addressed by default.

Calling Telnet:

telnet	IP number or Host		- addresses port A
telnet	IP number or Host	6000	- addresses port A
telnet	IP number or Host	6100	- addresses port B
telnet	IP number or Host	6200	- addresses port C
telnet	IP number or Host	6300	- addresses port D

If the connection is successful, a message from the TELNET server appears on the screen. From this point on data can be read in or output in character form via the keyboard.

All data which are present at the serial port are output to the screen (and, if so specified, to a file). All keyboard entries are sent as data in character form to the serial port.

From the moment the connection is established, the host works in "local echo mode," though it is also possible to switch over to "remote echo mode."

Important:

The entry "FREE" must be visible on the status monitor for the port before a connection can be made.

3.5.2 Mode: TELNET client

This mode makes it very simple to implement a terminal emulation on a serial device and use it to establish direct communication with the TCP/IP station on which the Telnet server is active.

The COM-Server port is configured for this mode in the "SET TCPIP - Port ... - Telnet Client" menu.

Settings:

- Menu: SET TCPIP - Port ... - Telnet Client - Server Port (23): 23 for the standard Telnet server or a different port number for a special Telnet server
- Menu: SET TCPIP - Port ... - Telnet Client - Server IP: IP number of the host on which the Telnet server is to be called.

After you have entered and stored all of the values, the Telnet client mode is activated. The message "Telnet client" appears in the status monitor for the port.

Opening and closing the connection to the Telnet server:

The connection is opened when the first character is read in from the serial port. You can close the connection with a special character, which can be input in the "SET TCPIP - Port ... - Telnet Client - Disconnect Char: " menu. It is important that this value must not be used within a Telnet session, since this would lead to premature termination. The default value is "003," which corresponds to the keyboard code "Ctrl C".

In the "MONITOR" you can read the status of the connection; the message "Locked" or "Unlock" appears there, depending upon whether the connection is active or not (also see Section 2.3).

Deactivating the "Telnet client mode":

Set the value to zero in the "SET TCPIP - Port ... - Telnet Client - Server Port:" menu. The COM-Server breaks off the connection and deactivates the Telnet client mode.

3.6 Data transfer by TCP/IP sockets

With the socket API (such as "WINDOWS socket API," "UNIX socket interface," ...) it is possible to implement a great variety of application cases in the form of "client" or "server" processes on TCP/IP stations. The API offers the entire set of functions for transporting the data over the network. You can construct your own application, that is, the further processing and evaluation of the data, in accordance with the requirements (for the extended functions of the COM-Server also read Part 6, "Expanded TCP/IP socket functions" and Section 6.6 "Instructions for socket programming").

The COM-Server offers two options at this level: client/server processes with TCP sockets (streams) and with UDP sockets (datagrams).

The TCP protocol is connection oriented; that is, during the transfer of data there is a fixed connection between client and server. TCP has all of the mechanisms for opening and closing a connection and ensuring error-free data transfer over the network.

In contrast to this, UDP has no mechanisms for repeating data packets or checking their completeness. Data transfer with UDP is recommended, when a higher-level protocol between the serial terminal device on the COM-Server and the application on the TCP/IP station already ensures error-free transfer of data.

3.6.1 Applications with TCP sockets

The server and client processes in the COM-Server have the following TCP sockets:

"8000" - port A
 "8100" - port B
 "8200" - port C
 "8300" - port D

Do not use these four socket numbers for your own processes!

3.6.1.1 COM-Server mode: socket server

In this mode no settings are needed on the COM-Server.

Important:

The entry "FREE" must be visible in the status MONITOR for the corresponding port!

The connection is controlled by your client process; that is, you open and close the connection. Once a connection has been established, bidirectional data traffic is possible between the two processes. The COM-Server delivers all of the data from the LAN to the serial port, and conversely reads in all data from the serial port, in order to convey it to your client process.

3.6.1.2 COM-Server mode: socket client

In this mode the COM-Server itself, as a client, is able to open and close a connection, depending upon whether data are to be transferred or not. If there is no connection to the server active at the moment, it can also itself be the server and accept connections.

The mode is configured in the "SET TCPIP - Port ... - Socket Client" menu for always connecting to the main server, or in the "SET TCPIP - Port... - Socket Client - Special Options - Client: "C"+Addr."" menu for connections with various servers.

Settings:

- Menu "SET TCPIP - Port ... - Socket Client - Server Socket:"
The socket on which the server program is working on the host.
- Menu "SET TCPIP - Port ... - Socket Client - Server IP:"
The IP number of the host on which the server program is active.
- Menu "SET TCPIP - Port ... - Socket Client - Special Options - Inactivity Timeout:"
Here is the place to configure the timer whose count-down causes the Box to close the connection. The timer is reset when data are exchanged.
 - tick = 1 second
 - "00001" is the minimum value (1 second).
 - "00000" deactivates the function.
- Menu "SET TCPIP - Port... - Socket Client - Special Options - Client: "C"+Addr.":
Activating this switch makes the socket client mode active. The format for the address input is: "C-key+address+CR/LF".

Examples:

C190.107.231.101,4800<CR>

(if there is no entry for a server socket under "...- Socket Client-")

C101<CR>

(if there is an entry for a server socket under "...-Socket Client-," for example 190.107.231. and the port no. 4800 are then the defaults).

After all of the values have been saved on the COM-Server and all of the queries have been acknowledged with "OK" until the message "Saving" appears on the screen, the client mode is activated. The entry "Client: Socket" appears on the status monitor of the corresponding port. The current status of the connection can always be read here.

Important:

Please note the explanations for the "Socket Client" menu in Section 3.2.1.1. There are a number of options for opening and closing the connection, depending upon various events ("Special Options" sub-menu).

Deactivating the "socket client mode":

Set the value to zero in the "SET TCPIP - Port ... - Socket Client - Server Socket:" menu, or deactivate the "Client: "C"+Addr." switch in the "SET TCPIP - Port... - Socket Client - Special Options" menu. The COM-Server breaks off the connection and deactivates the socket client mode.

3.6.1.3 Client/server mode between COM-Servers

There are various options for connecting two or more COM-Servers with each other by means of this mode. Use the server socket addresses 8000 (port A), 8100 (port B), 8200 (port C) or 8300 (port D). The COM-Servers can then establish mutual connections when data are present at the serial port, and can close the connections again.

"C key addressing" makes varying connections between COM-Servers possible.

Important:

In contrast to the Box-to-Box mode these are non-durable connections and are not limited to two COM-Server ports at a time.

- **Application:** A control program polls a measuring device; the measuring device is passive.

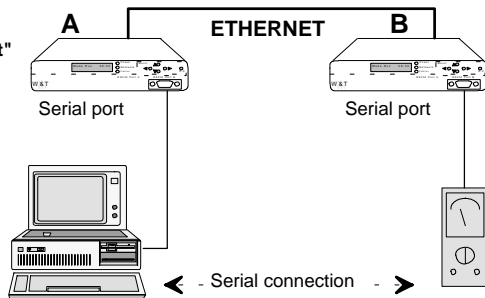
Configuration menu "SET TCP/IP - Port ... - Socket Client"

COM-Server A

Server Socket: 8000
Server IP: IP-Addr. COM-Server B
Client "C+Addr": inactive

COM-Server B

Server Socket: 0000
Server IP: IP-Addr. 0.0.0.0
Client "C+Addr": deaktiv



- **Application:** A control program polls a measuring device; the measuring device can convey data actively to the control program.

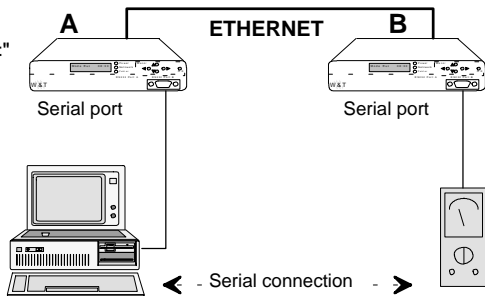
Configuration menu "SET TCP/IP - Port ... - Socket Client"

COM-Server A

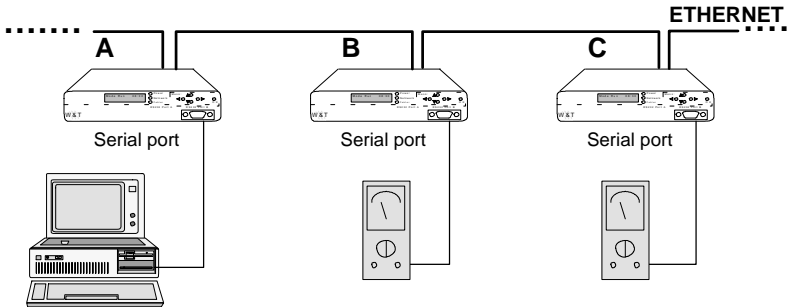
Server Socket: 8000
Server IP: IP-Addr. COM-Server B
Client "C+Addr": inactive

COM-Server B

Server Socket: 8000
Server IP: IP-Addr. COM-Server A
Client "C+Addr": inactive



- **Application:** A control program polls a number of measuring devices; the measuring devices can send data to the control program independently (in case of an error, for example).



Configuration menu "SET TCPIP - Port .. - Socket Client"

COM-Server A

Server Socket: 0000
 Server IP: IP-Addr. 0.0.0.0
 Client "C+Addr": inactive

COM-Server B, C, ...

Server Socket: 8000
 Server IP: IP-Addr. COM-Server A
 Client "C+Addr": inactive

The control program addresses the measuring devices via the serial port in the following format: *C ip_addr, port_number*

Example:

C190.107.231.8,8000<CR> Establishes a connection with COM-Server port A, using the IP address 190.107.231.8

3.6.2 Applications with UDP sockets (Revision 3.7 and later)

The server and client processes in the COM-Server have the following UDP sockets:

```
"8500" - port A
"8600" - port B
"8700" - port C
"8800" - port D
```

3.6.2.1 COM-Server mode: UDP mode

In each case (client or server) the respective port on the COM-Server must be configured for transport with UDP sockets, in order to guarantee clear assignment of the incoming serial data. In principle, all UDP datagrams which are addressed to the respective port are accepted. Incoming serial data are sent to the configured application (server IP, server socket).

The mode is configured in the "SET TCPIP - Port ... - UDP Mode" menu for always connecting to the same TCP/IP station (and it makes no difference which is the client and which the server, since there is no setting up and breaking off of a connection) or else in the "SET TCPIP - Port... - UDP Mode - Special Options - Client: "C"+Addr."" menu for connections with changing servers.

Settings:

- Menu "SET TCPIP - Port ... - UDP Mode - Server Socket:"
Socket at which the server or client program is working on the host
- Menu "SET TCPIP - Port ... - UDP Mode - Server IP:"
IP number of the host on which the server or client program is activated
- Menu "SET TCPIP - Port... - UDP Mode - Special Options - Client: "C"+Addr."
Activation of the switch activates a "UDP client" mode. The server is addressed in serial order, i.e. the useful data must be preceded by the destination address. This address is not included in the transmission. It remains in effect until the "disconnect char" (configurable under Special Setup) is received.
Format of the address input: "C *address* CR/LF".

Examples:

address = IP address,socket (if there is no server socket entered under "... - UDP Mode - ")
C190.107.231.101,4800<CR>

address = 4th byte of the IP address (if entered under "... - UDP Mode - Remote Server IP " and " - Remote Server Socket" , e.g. 190.107.231.___ and port no. 4800 are then the defaults)
C101<CR>

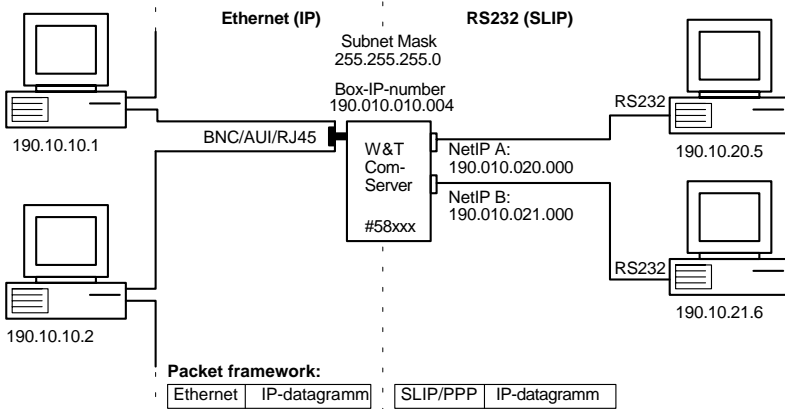
After all of the values have been saved on the COM-Server and all of the queries have been acknowledged with "OK" until the message "Saving" appears on the screen, the client mode is activated. The entry "UDP mode" appears on the status monitor of the corresponding port. The current status of the connection can always be read here.

Deactivating the "UDP mode":

Set the value to zero in the "SET TCPIP - Port ... - UDP Mode - Server Socket:" menu, or deactivate the "Client: "C"+Addr." switch in the "SET TCPIP - Port... - UDP Mode - Special Options" menu.

3.7 SLIP mode

The W&T COM-Server can also be used as a simple router. The IP datagrams are transported via the serial medium using the SLIP or PPP protocol.



Konfiguration eines COM-Servers im SLIP/PPP-Modus

SLIP settings:

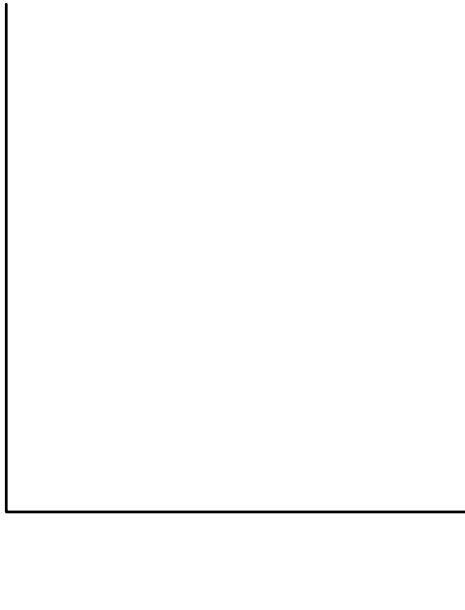
In the menu "SET TCPIP - Port ... - Serial Protocol - SLIP / NetIP:" enter the network IP number of the sub-network to and from which the data is to be routed, and confirm with the OK button. The COM-Server forwards all of the packets with the same network address via the serial port and reads in all of the packets from the RS232 port in order to distribute them on the LAN.





Part 4

The IPX protocol

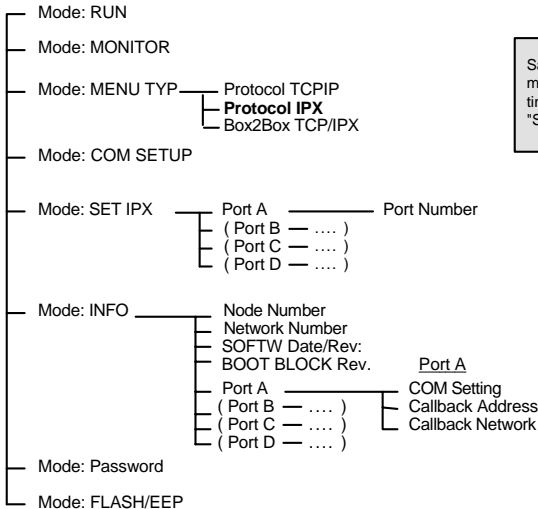


Mode: SET IPX
Mode: INFO
Mode: MONITOR

4.1 Menu tree for the IPX protocol

This chapter is only relevant for those who have obtained the Netware Development Kit (Product no. #58113) for the COM-Server. To operate the COM-Server in the IPX Box to Box mode, please read Part 5 (Box to Box TCP/IPX).

Operation and setting the serial parameters were described in Parts 1 and 2; this part explains very briefly how to configure the COM-Server so that you can address it from your PC using your own application software.



Save the changes in non-volatile memory with OK button (several times, if necessary) until "Saving..." appears on the display !

Important!

Whenever you leave the menu branches by way of the OK button, this always leads to a save of the changes that have been made and the attempt to work with them. The ← button can be used to return without saving.

The COM-Server can also be configured via the network with the help of the supplied driver. If you have more than one COM-Server connected to your network, configuration via the network is preferable, since the driver lists all of the devices in one file and configures them automatically. Please read the applicable instructions.

4.1.1 Mode: SET IPX

Configuration of the COM-Server for the network is accomplished with a single entry for each port present.

- **Port number**

Assign a port number in decimal format to each port. This port number is used for unambiguous identification of the particular serial terminal device being addressed. At the factory the value 65535 is entered for all ports. This value stands for the initial entry, and must be changed. A change can be made by overwriting the former values, followed by confirmation with the OK button.

Important!

Please be sure to note that a port number can only occur once on a network. The values 0 and 65535 are not allowed.

The numerical value is input with the cursor keys. The ←/→ keys govern the cursor position within the number, which can then be counted up or down in steps by means of the ↑/↓ keys.

4.1.2 Mode: INFO

- **Network number**

Returns the number of the network to which the COM-Server is connected. If there is no Netware server on the network, the entry remains empty.

- **Callback ethernet adr.**

Designates the ethernet address of a controller PC or the port number of a COM-Server, with which a connection is made automatically as soon as serial data are received (if no other connection exists).

More detailed explanations of this may be found in the chapter on installation of the rerouter via Interrupt 14 (Instructions for "Netware Development Kit").

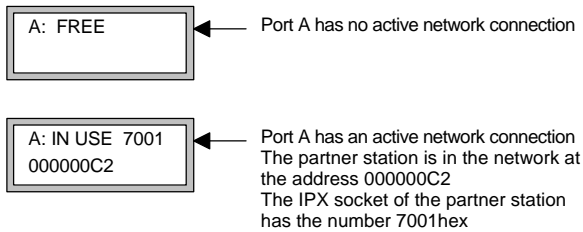
- **Callback network no.**

Designates the address of the network where there is a controller PC or a COM-Server with which a connection can be made automatically as soon as serial data are received (if there is no other connection).

More detailed explanations of this may be found in the chapter on installation of the rerouter via Interrupt 14 (Instructions for "Netware Development Kit").

4.1.3 Mode: MONITOR

This mode permits constant monitoring of the connection status of all COM-Server ports. The data in the display are updated immediately whenever there is a change.



Part 5

Box to box TCP / IPX



Menu tree for box to box TCP / IPX

Box to box operation

Box to box IPX

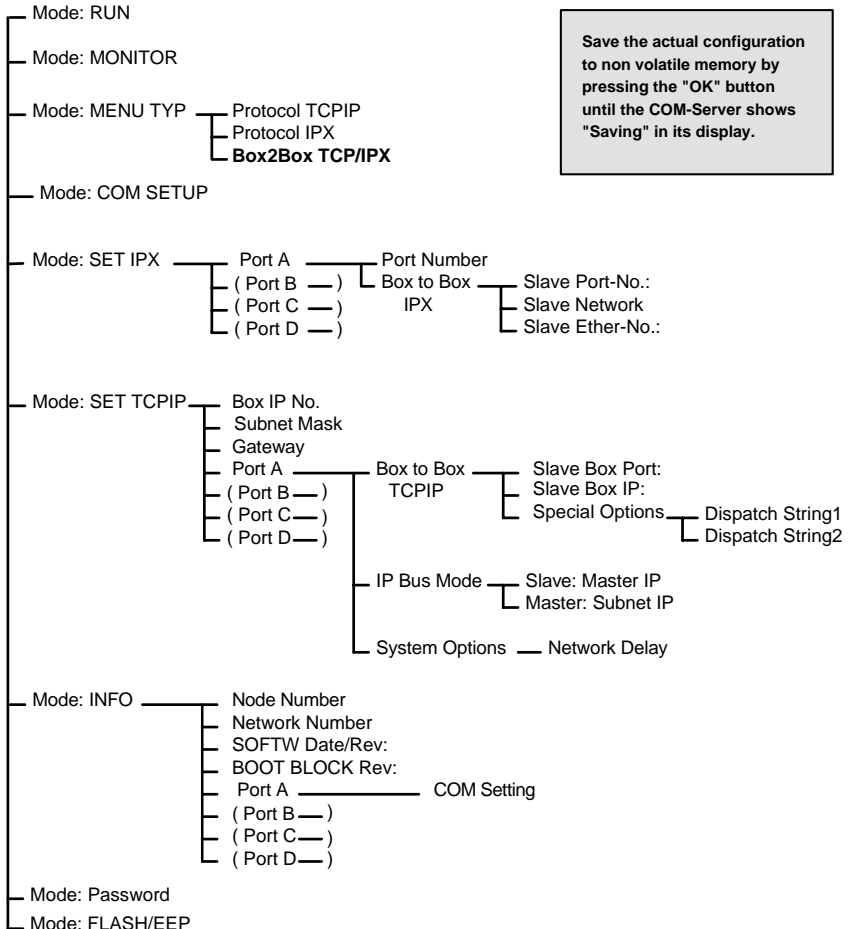
Box to box TCP

Bus master/slave operation

5.1 Menu tree for box to box TCP/IPX

This menu tree can be used to make all of the settings which are needed in order to "connect" multiple COM-Servers with each other. As always, you still have the usual serial connections available, but data transfer is now handled via the network.

Display menu:



Leaving the menu branch by pressing the OK key always causes the system to save the parameter settings and to attempt to work with them. It is always possible to return without saving by pressing the ← key.

If the message "Saving..." appears on the display screen, the new configuration has been received into nonvolatile memory.

Remote configuration with Telnet

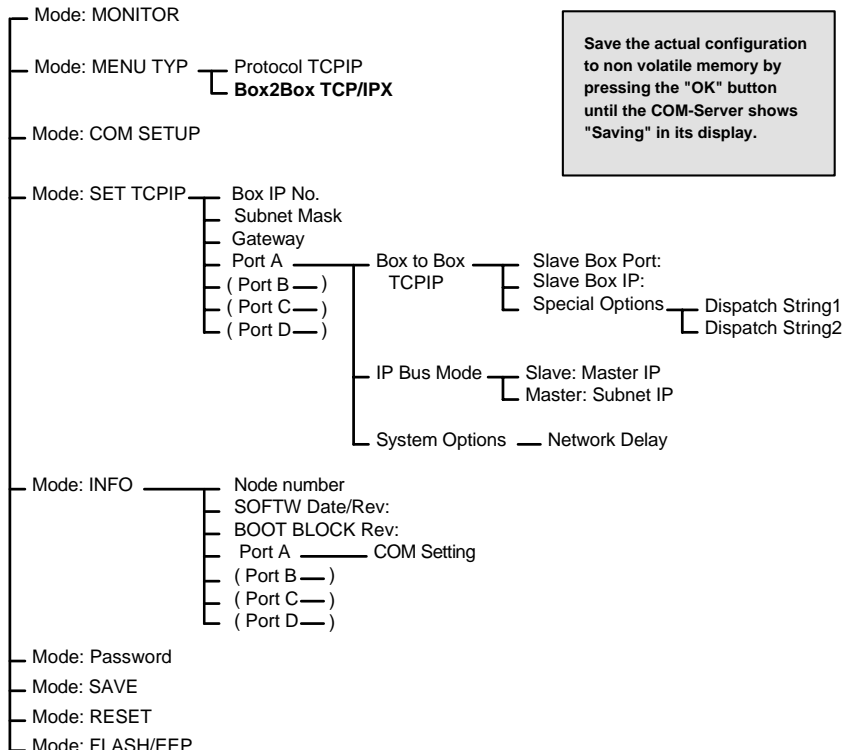
If you wish to connect the COM-Server with the network protocol TCP/IP (box to box TCPIIP) or IP (IP bus mode), you can also perform the configuration of the devices very easily over the network, using TELNET. This can be sent from any host which is connected to the network and has the TELNET command.

Simply enter the command

```
telnet [IP number or host] 1111
```

Please look up the exact syntax of the commands for your UNIX system or your TCPIIP kernel in your user's manual. "1111" is used for the port number.

The following configuration menu appears on the screen. You can select the submenus by entering the corresponding number.



5.1.1 SET IPX mode

- **Port number**

Assign a port number in decimal format to each port. This port number is used for positive identification of the serial device which is being addressed. The factory default setting for both ports is 65535. This value stands for the initial entry, and must be changed. Changes can be made by overwriting the former values and confirming with the OK key.

Important!

Be sure to remember that a particular port number can only be assigned once in each network. The values 0 and 65535 are not allowed.

- **Box to box (IPX)**

This submenu is used to configure the master box for the box to box mode. Enter the decimal port number of the desired port of the slave box under the item "Slave Port No.:". After you leave the menu by pressing the OK key, and after each restart, the COM-Server automatically searches the network for the specified port and blocks it from access by other users. In the event of power loss, network interruption etc., after the problem has been corrected the system automatically attempts to re-establish the connection.

The entry "Slave Port No." = 0 terminates the connection, freeing the port for a new connection.

If the other station is on a different network, under "Slave network" enter the network address of the slave box. The value 0 causes the COM-Server to search for the designated partner station only on the local network.

If it is necessary to prevent broadcasts at the lowest level when routing into other networks (when routing over an ISDN line, for example), enter the last two digits of the six-digit Ethernet address for the slave box under "Slave Ether No." (for example: 12 A7).

Important!

The box to box mode is set exclusively on a COM-Server; that is, for this mode of operation the slave port may only be set on a COM-Server. No changes or entries are needed at the partner station (see also Section 5.2, "Box to box operation").

5.1.2 SET TCPIP mode

The basic configuration of the COM-Server for working with the TCPIP protocol was already explained in detail in sections 3.1 and 3.2. If you have not yet configured the COM-Server for your network (IP number, subnet mask, gateway), please read the indicated sections first.

- **Box to box TCPIP**

Configure the master box for the box to box mode here. In the submenu "Box to box TCPIP" enter the desired port (Port A-D) under the item "Slave Box Port" and the IP number of the slave box under the item "Slave Box IP." If you select the entry "-" under "Slave Box Port," the port is free.

Important!

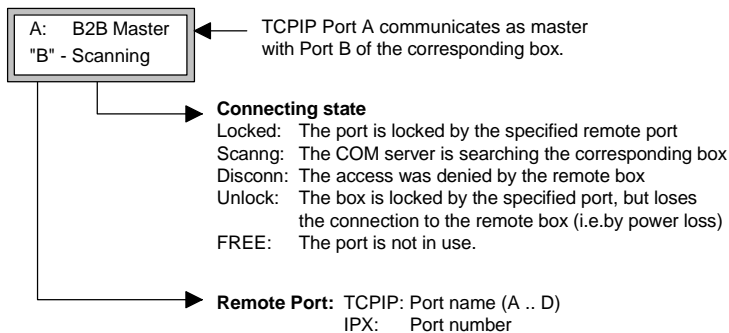
The box to box mode is set exclusively on **one** COM-Server; that is, for this operating mode the "slave box port" may be set only on the master box. No changes or entries are needed on the slave box itself (see also Section 5.2, "Box to box operation").

- **Bus master/slave mode**

If you have connected several COM-Servers in a network with the intention that they constitute a bus, then configure each port here individually (see Section 5.5).

5.1.3 MONITOR mode

This mode permits constant monitoring of the connection states of all COM-Server ports. The information on the display screen is updated immediately whenever there is a change. In the status query during remote configuration with TELNET (TCPIP protocol only), updating is accomplished by leaving and again calling the monitor for the port in question.

**5.1.4 RESET mode**

(For remote configuration with TELNET only)

Select this menu item to perform a software reset on the COM-Server. First your Telnet session will be closed normally.

5.1.5 SAVE mode

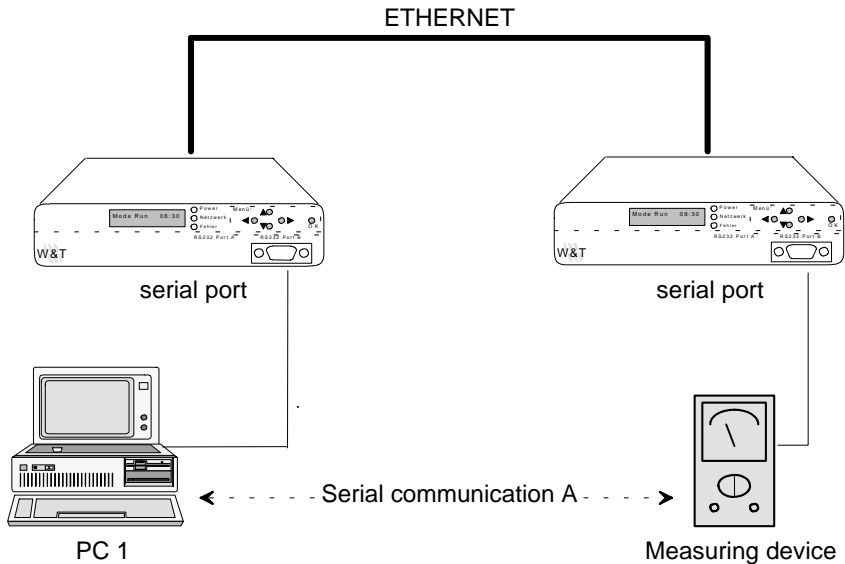
(For remote configuration with TELNET only)

You can use this to make all of the changes which you have made in the box take effect. If a password has been activated, then it is asked for here. If the input is correct, then the message "Saving..." appears on the screen.

If the input is incorrect the values are not saved and you are returned to the main menu; the message "Failed" appears on the screen.

5.2 Box to box operation

The box to box mode allows a firm logical connection of any two COM-Server ports over the network, without an additional controlling computer. In this mode the two connected serial devices are in constant online contact with each other. Any additional data traffic or other network protocols have no effect on the connection.



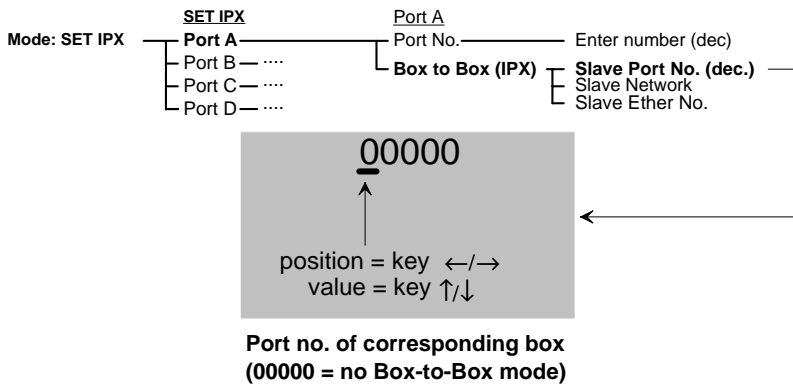
Typical applications

- Replaces costly serial star cabling layouts, for example in medium-size computing systems.
- Serial connections over greater distances. A pair of COM-Servers replaces two line drivers, and in addition offers error correction through the Ethernet transmission procedure.
- Long-distance serial connection using already existing Ethernet internetwork connections (routers, bridges etc.).
- Implementation of serial connections at frequently changing locations without the expense of additional cabling. Simply connect to the Ethernet cable.

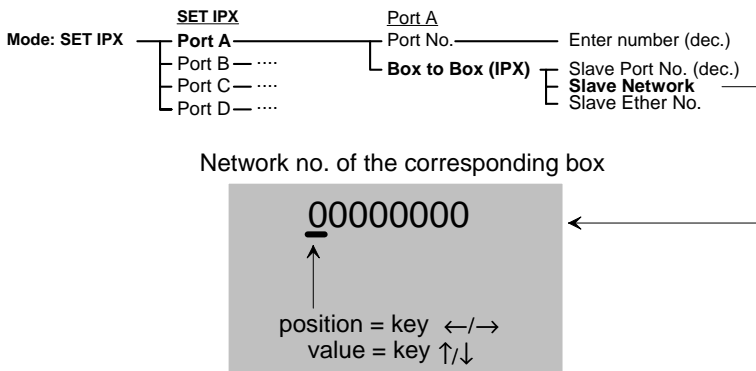
5.3 Setting the box to box mode (IPX)

All of the settings are made locally on one W&T COM-Server. The port at which the box to box mode is initialized functions as the master port. After every reset it will automatically try to find the defined partner station on the network, and when successful will block it from access by other users. This port then functions as the slave port

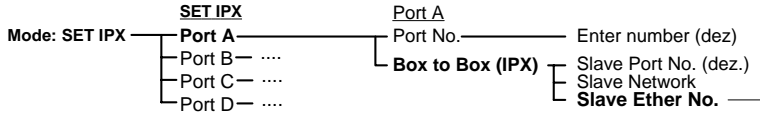
In the COM-Server menu SET IPX, set the desired port of the other station under the *Box to box (IPX) / Slave Port No.* for the appropriate port. If you wish to communicate with a measuring device which is connected to COM-Server port no. 11, for example, enter the value "11" under *Slave Port No.*



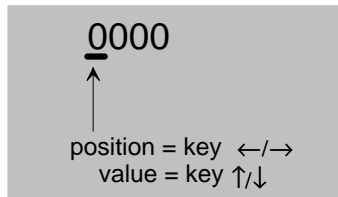
If the other station is not located on the same network, but can only be reached via a router, etc., the COM-Server must in addition be informed of the corresponding network number under *Box to Box / Slave Network*.



If the connection is routed over an ISDN or modem line, it is necessary in many cases to filter out broadcasts at the lowest level. In order to make this possible, enter the last two digits of the six-place Ethernet address for the slave box under *Box to Box / Slave Ether No.*



Two least significant bytes of the slave box ethernet number



When you leave the menu by pressing the OK key, the COM-Server saves the changes in its non-volatile memory and attempts to find the specified partner station on the network. There must be no settings made at that other station, since the connection is both established and managed by the master box.

Important!

The box to box mode is set exclusively on the master port; this means that for this operating mode the slave port may be set on only one of the two COM-Servers. No changes or entries are needed on the slave port. So for an online connection between port number 5 and port number 7, for example, the value 7 needs to be set in the menu item *Slave Port No.* on port number 5 only.

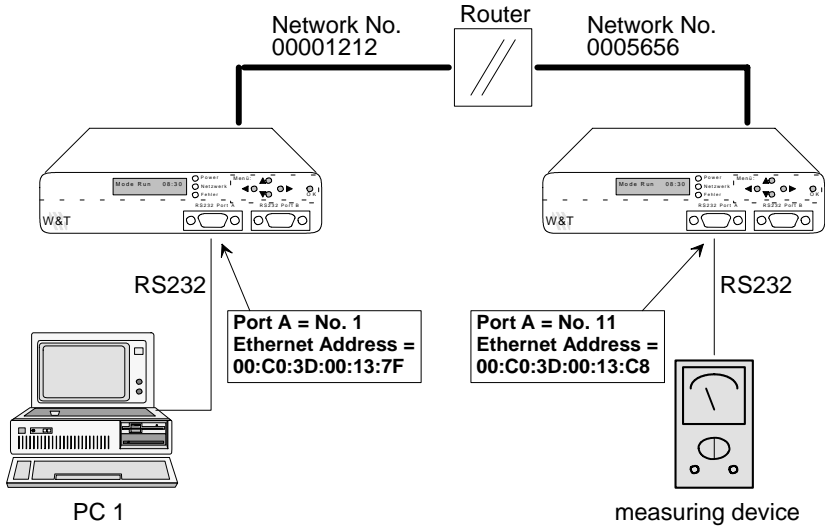
If the connection between the two ports is set up correctly, then the slave port is also firmly locked, even if the connection should ever be interrupted (by a power failure, for example).

Ending a box to box connection

Once a connection exists it can only be deleted by entering the value "00000" in the submenu *Box to Box (IPX) - Slave Port No.* on the master box. The master port also releases the slave port again. For this to work, it is imperative that the slave box be connected to the network!

If the release of a port should fail to function for any reason, you can delete all of the values which pertain to the box to box mode by means of the appropriate key combinations. For further information see Section 2.3 "Special key functions."

Sample configuration (IPX)



Port A

← Port Number — Enter number (dez)

← Box-to-Box — Slave Port No. (dez.)

00011

 Slave Network

00005656

 Slave Ether No.

13C8

Port A

← Port Number — Enter number (dez)

← Box-to-Box — Slave Port No. (dez.)

00000

 Slave Network

00000000

 Slave Ether No.

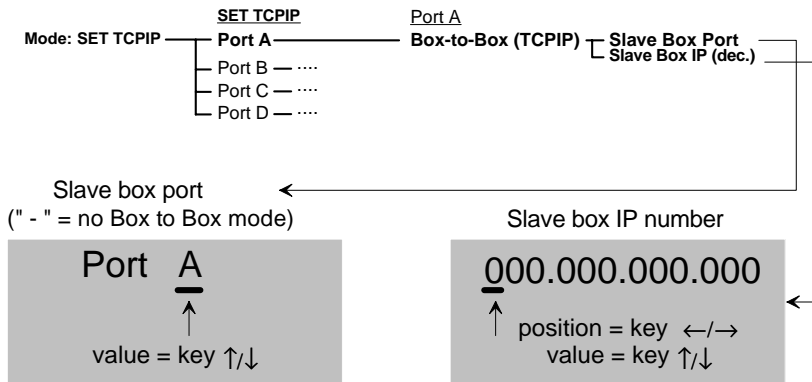
0000

5.4 Setting the box to box mode (TCP/IP)

All settings with the exception of the serial parameters are made locally on **one** W&T COM-Server. The port at which the box to box mode is initialized functions as the "master port." The port of the partner station functions as the so-called "slave port." After every reset the master port will automatically try to locate its defined slave port on the network, and when successful will block it from access by other users.

For box to box applications with temporary connections (via ISDN, for example) or among multiple W&T COM-Servers, please also see Section 3.6.3.

In the COM-Server menu SET TCP/IP, set the desired port of the slave box (A to D) under the *Box to box (TCPIP) / Slave Box Port* for the appropriate port. Under the item *Slave Box IP* enter the IP number for the slave box.



Important!

The subnet mask for the network in which the COM-Servers are located must **always** be specified (*Mode SET TCP/IP - Subnet Mask*).

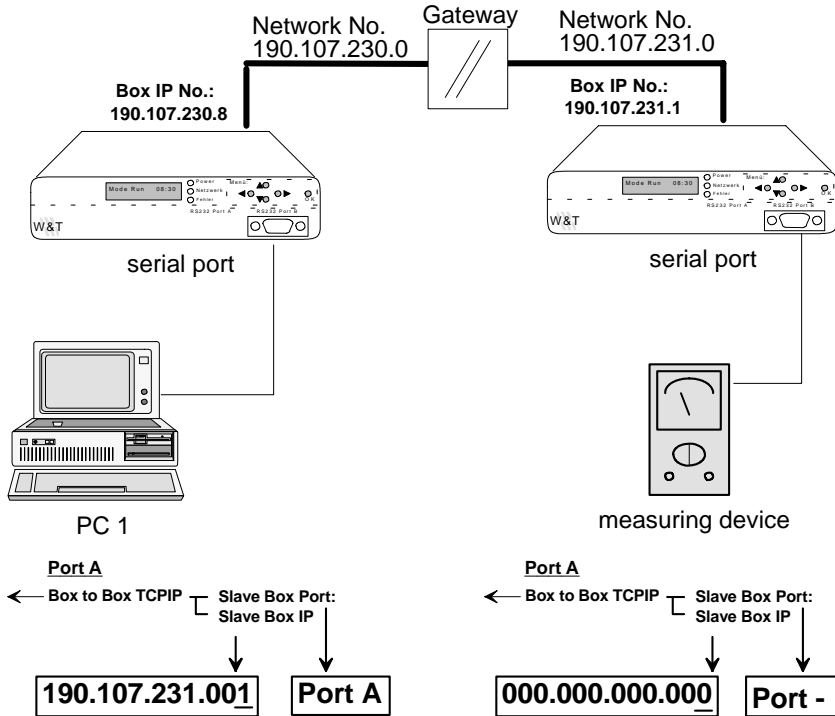
If the master box and the slave box are not on the same network, the appropriate IP number for the gateway must be entered in the menu *SET TCP/IP Gateway* on both COM-Servers.

Deactivating "box to box mode"

A connection can only be activated if the box to box mode is deleted on the master box. Select the entry " - " in the menu *"SET TCP/IP PORT... Slave Box Port: "* on the master box. The master box terminates the connection immediately, and also releases the slave box for new connections.

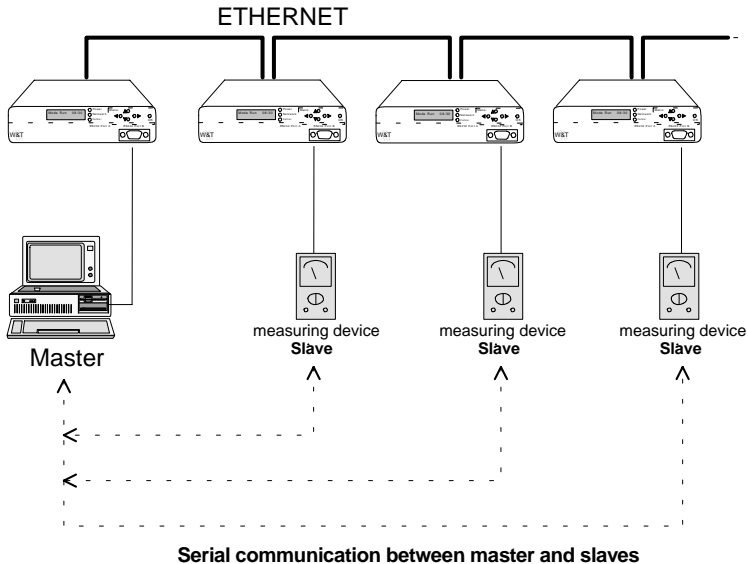
If the release of a port should fail to function for any reason, you can delete all of the values which pertain to the box to box mode by means of the appropriate key combinations. For further information see Section 2.3 "Special key functions."

Sample configuration (TCP/IP)



5.5 IP bus master/slave operation

The "IP bus master/slave" mode allows a firm logical connection of any multiple COM-Server ports which you want joined over the network in the form of a bus. In this mode the connected serial devices are in constant online contact with each other. Any additional data traffic or other network protocols have no effect on the connection.



Please note:

- The serial devices must transmit their data with their own security protocol, since the COM-Servers use "IP" as their network transmission protocol, which means that they provide no assurance of data safety.
- Master and slave devices which are to form a bus must belong to a single subnet. In other words, all of the COM-Servers must have the same subnet mask and network address.

Setting the IP bus master/slave mode

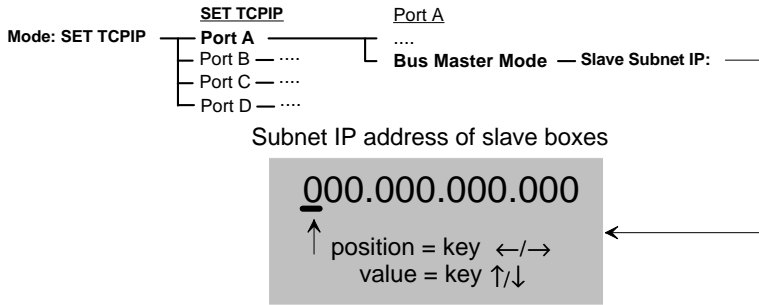
This mode is activated on every COM-Server port by entering a value other than zero for the corresponding IP address.

Activating the master:

On the COM-Server port to which the master is connected, set the subnet IP address in the menu *SET TCPIP* under *IP Bus Mode - Master: Subnet IP:*. The subnet IP address is that part of the IP address which all of the slaves and the master share in common. It is sufficient to enter a value other than zero and confirm with *OK*. The COM-Server determines the subnet IP address itself from its own IP number and the subnet mask and enters it. This activates the master.

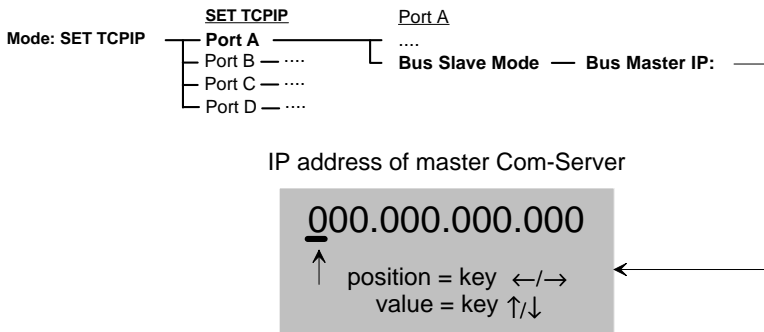
IMPORTANT!

Only **one** port of the COM-Server can be activated as IP bus master. It is not possible to connect a slave to another port of the device at the same time.



Activating the slaves:

On all of the COM-Servers, on all ports to which slaves are connected, set the complete IP address of the COM-Server to which the master is connected in the menu *SET TCPIP* under *Bus Slave Mode - Bus Master IP:*. This activates the slave.



Part 6

Expanded TCP/IP socket functions



Port control Sockets
Reset Com port status
Reset Com-Server
EEPROM upload /download
Socket programming

6.1 The COM-Server's control and service ports

The earlier chapters explained all of the standard applications which have been implemented in the COM-Server. These applications cover a large proportion of the application options for the COM-Server. Realizing complex problems, however, often requires customized adaptation of the software.

For users who make use of the possibilities of socket programming, the COM-Server offers additional functions which can be activated simultaneous with data transfer in the form of server processes.

6.2 Port control socket

It is well known that the sockets for transfer of data (8000, 8100, 8200, 8300) to the serial ports of the COM-Server do not influence the serial port itself. However, some applications make it necessary for the status and configuration of the port to be known at all times.

Parallel to the "data" connection, a control connection can also be opened at an additional socket. Through this connection the current status of the port (handshake lines and error conditions) can be read out and commands made. Only the "useful data" are transported via the data connection.

The following socket numbers have been reserved for these control connections:

- Port control socket, port A: 9094
- Port control socket, port B: 9194
- Port control socket, port C: 9294
- Port control socket, port D: 9394

The control connection can be opened when the respective port is addressed as a server on the sockets 8000, 8100, 8200 or 8300, or has been configured as a socket client.

The data and control sockets are independent of each other. They can be opened and closed individually as often as necessary.

6.2.1 The port control structure

For the exchange of information and commands, a defined structure is transmitted on this socket.

To request an informational structure, it is sufficient to send any character to the control port. If a command is to be given, the complete structure (30 bytes) is expected in a packet. If unaddressable data (e.g. only half of a structure) are received at the control port, an informational structure is also sent in response.

The structure has a fixed length of 30 bytes, and is made up of the following individual structures.

```
#pragma pack(1)
typedef struct _rem_box_cntrl
{
    char    zero_1;
    COM_ERROR    _ce;
    COM_STAT    _cs;
    BOX_CNTRL    _bc;
    char    zero_2;
} REM_BOX_CNTRL;
#pragma pack()
```

zero_1 / zero_2:

The two characters *zero_1* and *zero_2* are the starting and ending characters of the structure, and must always be zero.

The structure COM_ERROR:

The structure *COM_ERROR* has the length of an integer and contains all of the error states of the port.

```
typedef struct _com_error
{
    union
    {
        int error_flags;
        struct _err_flags
        {
            int f_data      : 1;    //Set when data available
            int f_net       : 2;    // 1 when Netware error occurs
                                     // 2 unresolved command
                                     // 3 reset Box after overrun or timeout
            int f_com       : 1;    //Set when COM port error detected
            int f_break     : 1;    //Reflect the break flag
            int f_cts_time  : 1;    //Time out while waiting for CTS
            int f_dsr_time  : 1;    //Time out while waiting for DSR
            int f_rlsd_time : 1;    //Time out while waiting for RLSD (CD)
            int f_overrun   : 1;    //Overrun error
            int f_parity    : 1;    //Parity error
            int f_frame     : 1;    //Framing error
            int f_status    : 1;    //Port LOCK info available (IPX-API only)
            int no_use_1    : 1;    //not used
            int no_use_2    : 1;    //not used
            int f_rx_over   : 1;    //Ring buffer overrun after handshake
            int no_use_3    : 1;    //not used
        };
    };
} COM_ERROR;
```

The structure `COM_STAT`:

The structure `COM_STAT` has a length of 3 integers and contains the status of the handshake lines and the content of the send and receive buffer for the serial port. In addition, it offers the possibility of influencing the handshake lines and buffers directly.

```

typedef struct _com_stat          //States of com port for read/write
{
    union
    {
        {
            int com_flags;
            struct _com_flags
            {
                int dsr_hold      : 1; //DSR line                - low byte
                int cts_hold      : 1; //CTS line                |
                int ri_hold       : 1; //RI line                 | is set with every
                int rlsd_hold     : 1; //RLSD line              | received packet
                int dtr_hold      : 1; //DTR line                |
                int rts_hold      : 1; //RTS line                |
                int x_receive     : 1; //XOFF received          |
                int x_send       : 1; //XOFF was sent          |
                int dummy        : 2; //space not used         - high byte
                int send_xoff    : 1; //Send XOFF asynchron   |
                int flush_rd     : 1; //Flush serial input buffer
                int flush_wr     : 1; //Flush serial output buffer
                int set_rts_dtr  : 1; //Set RTS to rts_hold and
                                //DTR to dtr_hold
                int set_break    : 1; //Independent setting break mode
                int clear_break  : 1; //Independent clearing break mode -
            };
        };
        int cbInQueue;           //Receive byte count of COM ring buffer
        int cbOutQueue;         //Transmit byte count of COM ring buffer
    } COM_STAT;
    
```

- **Deleting buffers and influencing the handshake:**

- 1) Copy the complete structure of a received information packet from the COM-Server and fill out the high byte of the `COM_STAT` structure.
- 2) All commands whose flags have the value 1 are executed. When setting the flag `wr_rts_dtr`, be sure that you also properly set the flags `rts_hold` and `dtr_hold` in the low byte.

The structure BOX_CNTRL:

The structure *BOX_CNTRL* (20 bytes) stores the configuration of the port (baud rate, data bits, parity, stop bits, handshake behavior, timing values...). Here you can influence the parameters and how they are stored.

You can see the baud table that is used in the remote configuration or in the display (menu "COM SETUP - Port... - Baud"). COM-Servers with multiple serial ports always use Table 2.

```

typedef struct _box_cntrl
{
    struct _baud_fifo
    {
        char baud : 5; // Baud rate for channel
                        // Com-Servers (max. 1 port)   Com-Servers with 1-4 ports
                        // Table 1                       Table 2
                        // 0 = 57600   6 = 2400         11 = 230,4k   5 = 4800
                        // 1 = 38400   7 = 1200         14 = 153,6k   6 = 2400
                        // 2 = 19200   8 = 600          15 = 115,2k   7 = 1200
                        // 20 = 14400  9 = 300          0 = 57600     8 = 600
                        // 3 = 9600    1 = 38400        1 = 38400     9 = 300
                        // 5 = 4800    2 = 19200       2 = 19200    10 = 150
                        //                                     3 = 9600     12 = 75
                        //                                     4 = 7200     13 = 50
                        // (only COM-Server with Baud Table 2)
        char fifo_aktiv : 1; // FIFO enable
                            // 0 = FIFO disabled
                            // 1 = FIFO enabled
        char fifo : 2; // Send / receive FIFO trigger:
                    // 0 = 8 / 8
                    // 1 = 16 / 16
                    // 2 = 32 / 56
                    // 3 = disable
    };
    char bits; // 00xx.xxxx data bits, stop bits, parity
              // 00 = 5 data bits
              // 01 = 6 data bits
              // 10 = 7 data bits
              // 11 = 8 data bits
              // 0 = 1
              // 1 = 1½, 2 stop bits
              // 1 = parity enable
              // 0 = odd, 1 = even parity
              // 1 = stick parity
    int RLS_time_out; // Timer before f_rlsd_time will be set
    int CTS_time_out; // Timer before f_cts_time will be set
    int DSR_time_out; // Timer before f_dsr_time will be set
    char XONChar; // Char excepted as XON
    char XOFFChar; // Char excepted as XOFF
    int XONLim; // Limit in ring buffer before clearing handshake stop
    int XOFFLim; // Limit in ring buffer before setting handshake stop
    char PEChar; // Replace this char if parity error
}
    
```

```

struct _commands
{
    unsigned char save_command : 4;           //Save COM configuration
                                              //0 = no save
                                              //1 = save without EEPROM update
                                              //2 = save with EEPROM update
    unsigned char clear_error   : 1;         //1 = clear error in display / lamps
    unsigned char free_cmd      : 3;         //not used
};
int UserTime;           //AUTO_LOCK_OUT time defined by user (IPX-API only)

union
{
    int f_flags;
    struct f_flags
    {
        int f_rts_disable : 1;           //RTS will not change at LOCK/UNLOCK
        int f_dtr_disable : 1;           //DTR will not change at LOCK/UNLOCK
        int f_outx         : 1;           //Enable software handshake while sending
        int f_inx          : 1;           //Enable software handshake while receiving
        int f_outx_cts     : 1;           //Enable hardware handshake on CTS
        int f_outx_dsr     : 1;           //Enable hardware handshake on DSR
        int f_inx_dtr      : 1;           //Enable hardware handshake on DTR
        int f_inx_rts      : 1;           //Enable hardware handshake on RTS
        int f_parity        : 1;           //Enable parity check & error report
        int f_pechar        : 1;           //Enable replacement of received char
        int f_inxfilter     : 1;           //Enable XON/XOFF filter while receiving
        int f_outxfilter    : 1;           //Enable XON/XOFF filter while sending
        int f_rts_default  : 1;           //1 = While RTS is not used, RTS is active
        int f_dtr_default  : 1;           //1 = While DTR is not used, DTR is active
        int f_user_time    : 1;           //Enable user defined time out
        int no_use_4       : 1;           //not used
    };
};
} BOX_CNTRL;

```

- **Configuring the serial port:**

1) Copy the complete structure of a received information packet from the COM-Server and fill out the structure *BOX_CNTRL*. In this way you only need to change the values which you want to change.

2) To be able to work with the configuration, you have to set the *save_command* value in the structure. The value 2 causes the COM-Server to save the current configuration in non-volatile memory and to use it again even after a restart. A 1 does not overwrite the non-volatile memory; that is, after a restart the system again uses the old configuration.

6.3 Reset COM port status via socket

For special applications this socket offers the possibility of performing a "forced" reset of the COM ports; that is, the parameters of the current connection are erased. The current connection partner (host) is informed of this by a "TCP/IP RST".

The socket numbers for the individual COM-Server ports are:

9084 for port A
9184 for port B
9284 for port C
9384 for port D

Example:

The host with the IP number 190.107.231.100 has a connection with the COM-Server with the IP number 190.107.231.8 on the data socket 8000 (port A). The host fails or is cut off by a cabling failure. The COM-Server port A remains blocked as long as the host is not responding.

In order to reset this port for a new connection, an OPEN must be performed on the socket 9084 (port A) of the COM-Server. The COM-Server will respond to the OPEN and immediately initiate a CLOSE. At the same time it sends a RESET signal to the host 190.107.231.100 and clears its parameters.

The next OPEN on the socket 8000 is now returned by the COM-Server.

IMPORTANT:

Following this FLUSH parts of the content of the buffer can be lost. This socket can be opened by any station, and should therefore only be used as a last resort! No data are to be transported over this connection! The socket is opened by a host and is closed again immediately by the COM-Server.

6.4 Software reset of the COM-Server via socket

The **Socket 8888** was set up for the eventuality that the COM-Server should ever need to be completely reset. If a connection is ever opened on this socket, the COM-Server closes it again immediately and then performs a software reset.

IMPORTANT:

After this reset all buffer contents and any active connections are deleted - the COM-Server is in its basic state! This reset can be initiated from any station and should therefore only be used as a last resort!

6.5 EEPROM upload/download via socket

This function offers the possibility of saving the contents of the COM-Server EEPROM to your computer in file form, and also of copying this file back to the EEPROM.

The COM-Server automatically opens an FTP connection to your computer and creates a file consisting of the content of its EEPROM. In order to be able to do this it needs login parameters for an FTP connection.

You convey the login string via the **socket 8001**. Open the socket, transmit the login string, and close the socket again. The COM-Server then performs the file transfer automatically.

6.5.1 Format of the login string:

- **Reading the EEPROM**

```
user \n password \n TYPE I \n STOR /path/filename000 \n      or
user \n password \n TYPE I \n STOR /path/filename??? \n
```

- **Writing to the EEPROM**

```
user \n password \n TYPE I \n RETR /path/filename000 \n or
user \n password \n TYPE I \n RETR /path/filename??? \n
```

Parameters:

user, password:

user login and password

TYPE I:

must be specified for binary file format

/path/filename000:

The COM-Server overwrites the three zeros at the end of the filename with the fourth byte of its IP address, so that each device accesses its own file and yet you can send the same string to all of the boxes.

/path/filename???:

If the last three characters do not produce the value zero, the COM-Server reads or writes this special file, so that you can configure all devices with the same file.

\n

Separator character: linefeed (0x0a)

6.5.2 Usage

If you want to configure a number of COM-Servers in the network, all of which are to work with the same settings, you assign an IP address to each device. Then you configure one device completely, read out the EEPROM, and load this file into all of the other devices. This spares you the tedious work of configuring each device separately.

Example:

Login string to be read out: "wt \n eeprom \n TYPE I \n STOR /usr/wt/wt999 \n

Login string to be read out: "wt \n eeprom \n TYPE I \n RETR /usr/wt/wt999 \n

IMPORTANT:

When the EEPROM has been rewritten, the COM-Server performs a reset to make the changes take effect. With the exception of the IP address, all of the values in the EEPROM are overwritten. After this reset the contents of all buffers and any active connections are deleted - the COM-Server is in its basic state!

APPENDIX

Overview of TCP port numbers
Technical data

APPENDIX A

Overview of the port and socket numbers used in the COM-Server

Port number/ socket number	Usage
6000,6100, 6200, 6300	TELNET server, port A - D
7000, 7100, 7200, 7300	FTP server, port A - D
8000, 8100, 8200, 8300	Data sockets (client and server), port A - D
1111	Remote configuration with TELNET
9094, 9194, 9294, 9394	Port control sockets, port A - D
9084, 9184, 9284, 9384	Reset port status via socket, port A - D
8888	Reset COM-Server
8001	EEPROM upload and download via socket

APPENDIX B

Technical data

Power supply:	Internal adapter:	110V - 230V, 47 Hz - 63 Hz power cord
	Plug-in adapter:	230V, 60 mA Connection for COM-Server: DC power jack inside \varnothing 2.0 mm outside \varnothing 6.3 mm Plug-in adapter connection: DC power plug inside \varnothing 2.1 mm outside \varnothing 5.5 mm inside: GND, outside: +5V
Power consumption:		approx. 15 VA
Current draw of COM-Server:		max. 600 mA
Permissible ambient temperature:		0° - 40° Celsius
Permissible relative humidity (non-condensing):		0% - 95%
Dimensions, mm (W x D x H):	COM-Server with display:	213 x 168 x 40 115 x 110 x 34
	COM-Server Compact:	130 x 40 x 170
	COM-Server 19" OEM:	100 x 100 x 25 (equipped height)
	COM-Server OEM short:	160 x 100 x 25 (equipped height)
	COM-Server OEM long:	
Weight:	COM-Server with display:	approx. 1000 g approx. 250 g
	COM-Server Compact:	approx. 200 g
	COM-Server 19" OEM:	approx. 130 g
	COM-Server OEM short:	approx. 150 g
	COM-Server OEM long:	
Electrical isolation:		Ethernet: 500 Vrms
Ports	RS232 (other modules optional):	1-4 x DB9
	Ethernet:	BNC 10BaseT, RJ45, male 10Base2 (optional)
Display:		LCD, 2x16 characters

Subject to corrections and modifications

W&T 12/96

