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Overview

The installation industry-PC C2011 is designed for use in machines and Installations. A complete IBM compatible PC is built in a 19 inch installation shell with a highly integrated mainboard, harddisk, diskette drive , machine suitable keyboard and a 10 inch LC display. The integrated II/O Lightbus Interface enables fast connections of up to 255 decentrally installed input/output modules secured from interferences. The industry PC C2011, together with the II/O Lightbus achieves a universal machine control.

CPU:	486 SX 33 MHz, 486 DX 33 MHz or 486 DX2 66 MHz
Chipset:	VLSI 82C480
Work Space:	up to 32 MB
Video Controller:	Western Digital WD90C24
Video RAM:	512 kB oder 1 MB
Disk Drive:	3½ Zoll 1,44 MB
Mass Memory:	66 MB AT-Bus hard disk or
Memory Devices:	1,5 MB ROM-Disk with 640kB (max. 2,5 MB) CMOS-RAM
Ports:	II/O-Lightbus Interface
	2 serial RS232 ports
	1 parallel Centronics port
	connection for external standard keyboard
Display:	dual scan BW, dual scan colour or TFT display
	background light switchable by software
Keyboard:	parallel data entry over front panel and external keyboard
UPS (optional):	uninterruptible power source through 18 V / 0,65 Ah NiCad-accumulator if the external supply voltage drops, with intelligent charging system for the accumulator.

Usage

All keys, except the special keys above the LC display and the brightness keys, can also be found on a standard keyboard.

The Shift key, the Ctrl key and the Alt key change the meaning of the function key which is pressed at the same time. Example F1, Shift-F1, Ctrl-F1 and Alt-F1 - they all have a different meaning, that is defined by the software.

The Escape key is used to close dialogue windows.

esc   ctrl   alt   help

The Help key opens a help window for the current program On a standard keyboard the F12 key is assigned the same meaning.

Cursor Keys

The Home key moves the cursor to the beginning of the row.

The Cursor-up key moves the cursor one place up.

The Page-up key leafs one page back.

The Tabulator key moves the cursor to the next input field or to the previous field, if Shift and Tabulator are pressed.

home   pg up

The Cursor-left key moves the cursor one position to the left.

The Cursor-right key moves the cursor one position to the right.

end   pg dn

The End key moves the cursor to the end of the line.

The Cursor-down key moves the cursor one position down.

The Page-down key leafs one page forward.

The cursor is the flashing Element , which indicates the place at which the next given Element is to be entered and displayed. It can be considered an insertion indicator.

Number Pad

After pressing insert all characters on the right side of the cursor will be overwritten.

The Backspace key deletes the character on the left side of the cursor.

delete   insert   ←   -

Delete erases the Character on the right side of the cursor.
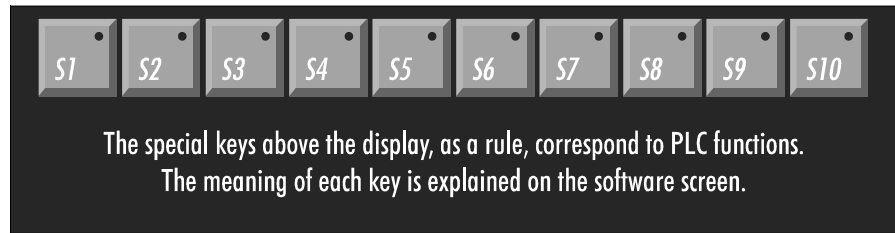
7   8   9   +

4   5   6   y

y/n for answering yes/no questions.

Shift changes the funktion of the Tabulator or Function key, if it is pressed together with one of these keys.

1   2   3   n

shift   0   .   ↵

Confirm what was entered with the Enter key.

Special Keys

| S1 | S2 | S3 | S4 | S5 | S6 | S7 | S8 | S9 | S10 |

The special keys above the display, as a rule, correspond to PLC functions.
The meaning of each key is explained on the software screen.

Function Keys

IIO-Puffer:—D0000000   IIO-Adresse:—D0000000

| F1 BOX EINFÜG | F2 BOX LÖSCH | F3 ZEILE EINFÜG | F4 KOMM EINFÜG | F5 INTENS TEST | F6 RING TEST | F7 RESET I/O | F8 CDL DATEN | F9 SPEI TAB | F10 VORH MENÜ |

The meaning of the function keys is defined by the software
and displayed at the bottom of the display.

| F1 | F2 | F3 | F4 | F5 | F6 | F7 | F8 | F9 | F10 |

Display Brightness

The brightnes of the display can be adjusted
with the two lower left keys on the front panel.

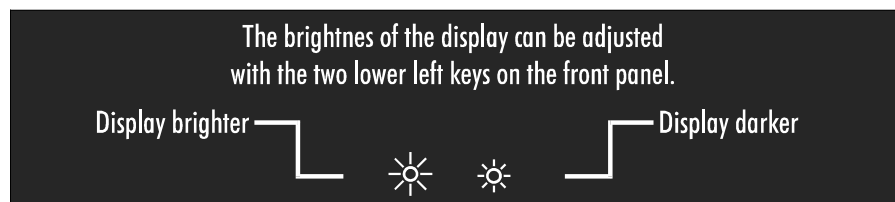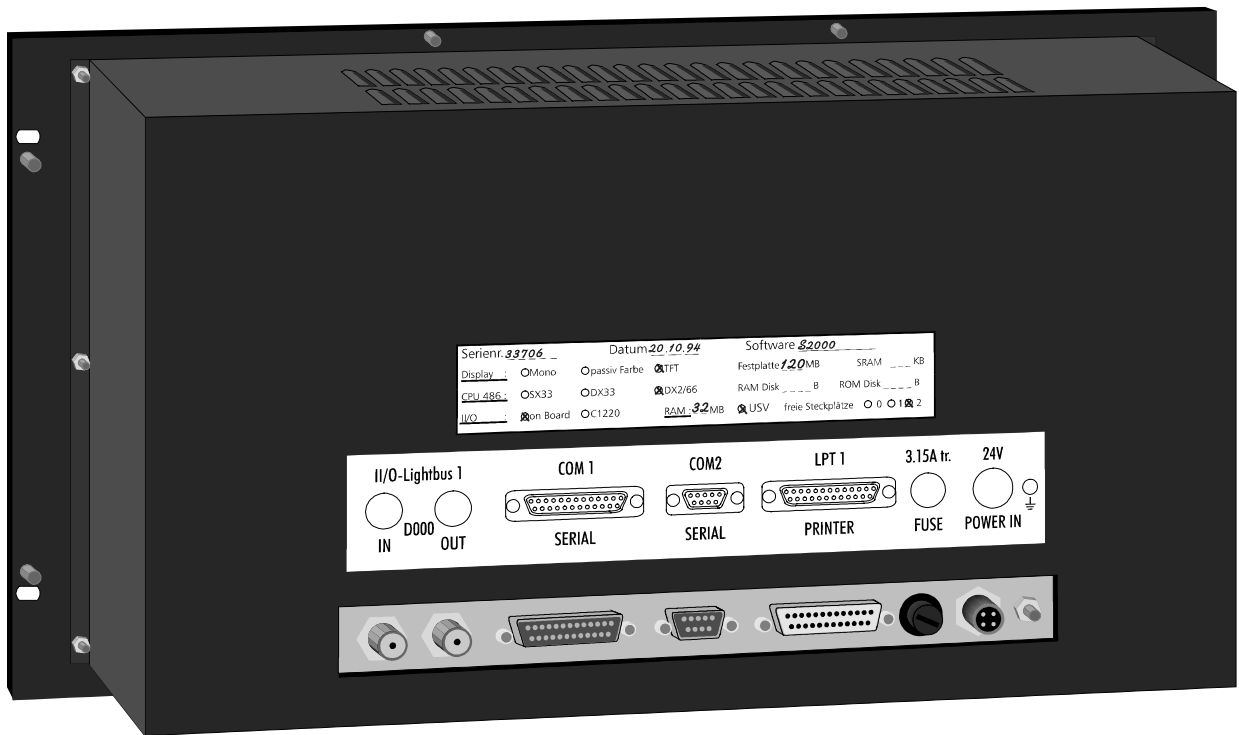Display brighter   Display darker

The keys which adjust the brightness of the display have no function, if a TFT
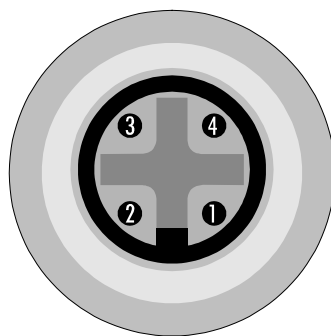display is used.

Connections

Power supply

24 V=

In case the industry PC is supplied with a uninterruptible power source, the 24 V supply and the NiCad Accumulator are connected through the four pole BINDER-plug. The picture displays the BINDER-plug needed (type 99 0430 30 04).

Pin Number	Function
1	Power Supply +24 V
2	Accu +
3	Power Supply Ground
4	Accu -

Parallel port

PRINTER
LPT1

The parallel port corresponds to the Centronics standard and is addressed by the software as LPT1. The picture displays the front of the required plug with a 25 pole SUB-D pin terminal.
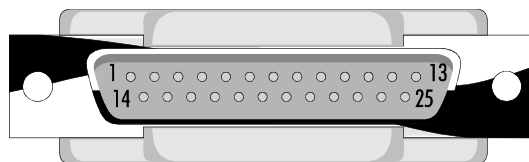
Pin Number	Function
1	Strobe
2	Data 0
3	Data 1
4	Data 2
5	Data 3
6	Data 4
7	Data 5
8	Data 6
9	Data 7

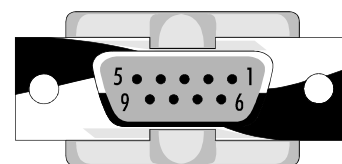| Pin Number	Function
10	Ack
11	BUSY
12	PE
13	SLCT
14	AUTO FEED XT
15	ERROR
16	INIT
17	SLCT IN
18-25	Ground

Serial ports

RS 232 / 20 mA
COM1
COM2

The computer has two serial ports which correspond to the RS 232 standard, where COM1 is a 25 pole SUB-D pin terminal and COM2 a 9 pole SUB-D pin terminal. The picture displays the required 25 or 9 pole plug.
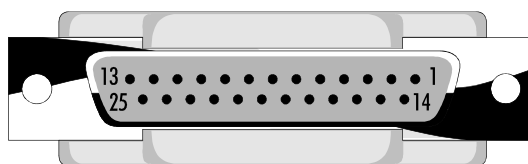
COM1

COM2

Pin No. COM 1	Function RS232C	Pin No. COM 1	Function 20 mA
2	TXT	9	CC1
3	RXD	10	- 12 V
4	RTS	12	EI +
5	CTS	13	SI -
6	DSR	14	CC2
7	Gnd	24	EI -
8	DCD	25	SI +
20	DTR		
22	RI		

Pin No. COM 2	Function RS232C
1	CD
2	RXD
3	TXD
4	DTR
5	Gnd
6	DSR
7	RTS
8	CTS
9	RI

II/O-Lightbus port

The Beckhoff Industrial Input/Output System, short II/O System, consists of a PC that is connected to a maximum of 254 peripheral modules which are also called boxes. The connection is achieved by a fibre optic field bus - the II/O-Lightbus. Among the modules there are standard 24 V inputs/outputs, analogue input/output channels, modules to measure distances like rotary encoder and power amplifiers for driving units.

II/O-Lightbus IN/OUT
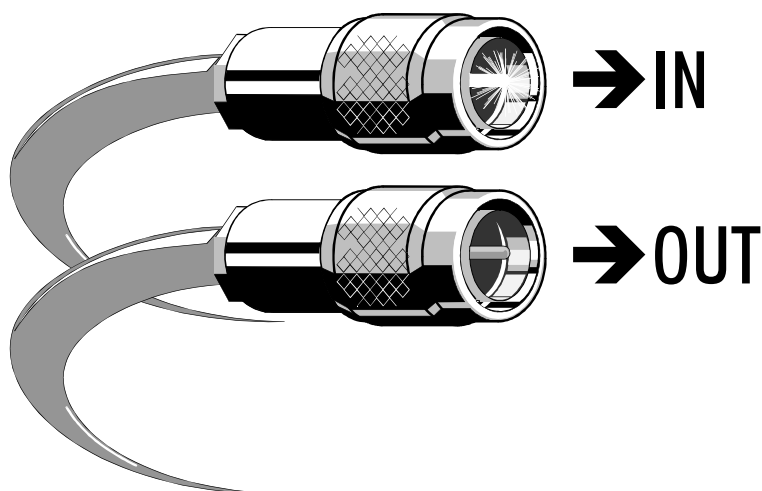
The II/O-Lightbus consists of a fibre optic ring, that is connected to the PC with its beginning and its end. The plug which is emitting red light when the II/O-Lightbus is active has to be connected to the socket „IN". Plugs of the HARTING company, type F-TNC, code 2010 001 6211, are required.
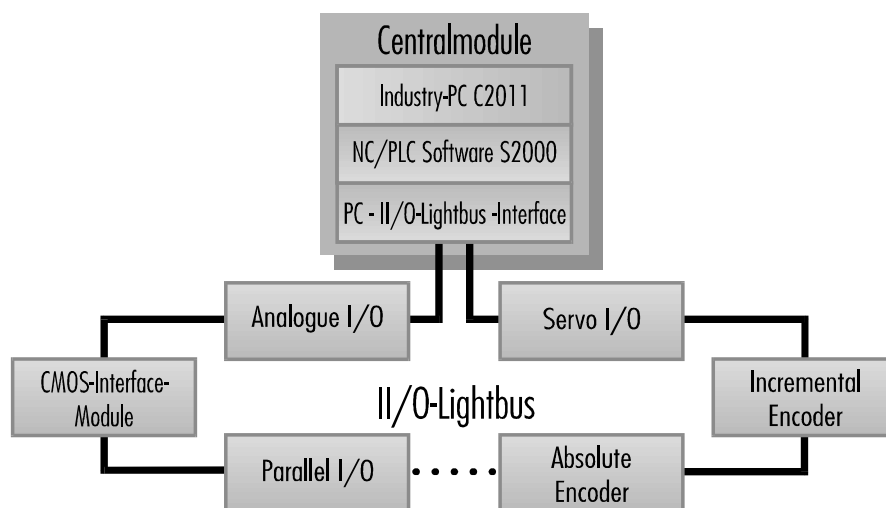
Connection of an external keyboard
There is a shutter in the front tableau, behind which the 3½ inch disk drive and the connection for an external keyboard can be found. Any AT keyboard can be connected.

Connection for an External keyboard
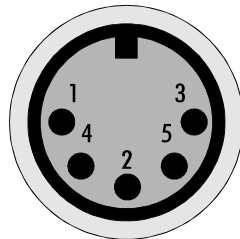
Pin Number	Function
1	Keyboard Clock
2	Keyboard Data
3	Free
4	Ground
5	+5 V

Grounding screw, fuse

FUSE

In addition there is a grounding screw and a fuse on the rear panel. Use delay action 3,15 A heat coil fuse only.

Setup

Usage and basic adjustments

The BIOS of the industry PC C2001 includes an integrated setup program which enables the user to change the system configuration. For example, the type of drive, or the screen mode or shadow ram areas. The BIOS uses this data while booting to configure the computer.

The configuration data adjusted in the setup program is permanently stored in the battery buffered CMOS RAM.

After switching the computer on, a self test is executed. During this test the keys CTRL, ALT and ESC have to be pressed together, in order to start the setup program.

*The Status Page appears after calling the setup program.*

```
 Date: 07 Sep 1994              80486DX2 ISA BIOS (214FL002)
 Time: 15:38:14                     Award Software, Inc.

 Drive A:        1.44M, 3½ in.
 Drive B:        None              Base Memory:        640K
                                   Extended Memory:   3072K
 Video:          EGA/VGA           Expanded Memory:      0K
                                   Other Memory:       384K

                                   Total Memory:      4096K
 Halt On:        All Errors
 POST Messages:  Maximize
 Memory Test:    Minimize
 Boot Sequence:  C,A
 Security:       Disabled
 Virus Warning:  Enabled           Default Speed:     High

                         CYLS. HEADS SECTORS PRECOMP LANDZONE
 Disk 0:    49  ( 120Mb)   812    8     38     None      811
 Disk 1:  None  (****Mb)     0    0      0        0        0

 Alt-F1 for Menu Help                           F10 exits
 Page 01: Status Page        PgDn = Options Page F2 change colors
```

Use the lower left keys on the front panel in order to adjust the brightness of the screen. Moreover pressing F2 changes the colours of the program.
The setup program contains 2 screen pages. Pressing the page up or page down keys enables to switch between the pages.
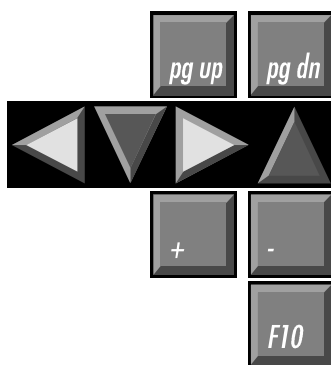
Move through the menu items with the cursor keys. The items can be changed with plus or minus keys. Inside a digit field the number keys can be used as well.
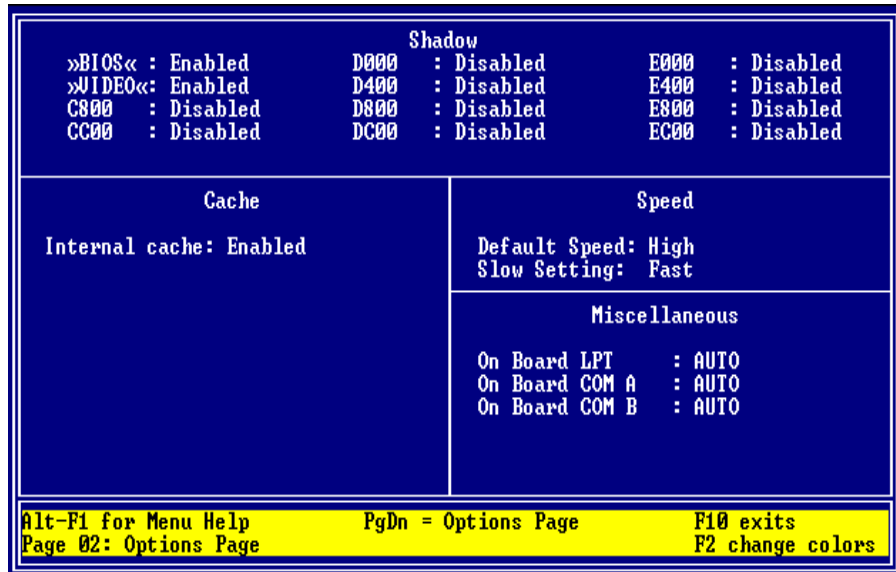
F10 exits the setup program, and will request whether the adjustments made are to be stored.
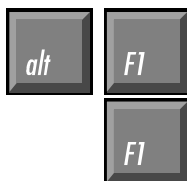
The pictures display the basic adjustments made by the company.
A list of all keys needed to use the setup is displayed by pressing ALT and F1 together.

F1 alone causes a help text to be tuned in to the current menu item. The text contains a list of all possible adjustments for this item.

*The Page Down key switches
to the option page.*

```
                              Shadow
   »BIOS« : Enabled      D000  : Disabled    E000   : Disabled
   »VIDEO«: Enabled      D400  : Disabled    E400   : Disabled
   C800   : Disabled     D800  : Disabled    E800   : Disabled
   CC00   : Disabled     DC00  : Disabled    EC00   : Disabled

          Cache                            Speed

   Internal cache: Enabled        Default Speed: High
                                  Slow Setting:  Fast

                                        Miscellaneous

                                  On  Board LPT    : AUTO
                                  On  Board COM A  : AUTO
                                  On  Board COM B  : AUTO




   Alt-F1 for Menu Help       PgDn = Options Page      F10 exits
   Page 02: Options Page                               F2 change colors
```

Disk drive and ROM disk

Each Industry PC C2001 has a 1,44 MB, 3½ inch disk drive, which is assigned
to drive A:

Drive A: If the PC is equipped with a ROM disk, this drive must be assign to A and the
Drive B: disk drive to drive B, (computer always boots from ROM disk). It is not possible
to boot from drive C. There is no entry for ROM disk available in the setup,
therefore set drive A to 'None' and the ROM disk will be recognised as drive A:

Without ROM-Disk: With ROM-Disk:
DRIVE A: 1.44M, 3½ in.   DRIVE A: None
DRIVE B: None   DRIVE B: 1.44M, 3½ in.

The harddisk

The setup program is able to recognise the hard disk installed and insert the
data in the corresponding fields.

Disk 0:   49   To do so activate line "Disk 0:" and enter "49". This is possible by using the
plus or minus keys or by entering the value directly.
In the status line at the bottom of the screen this message will appear:

<Enter> for C: IDE Detection now.

Press Enter and wait until the values of the hard disk are inserted.

Boot sequence

"Boot Sequence" stands for the order in which the drive and C are examined
for boot sectors.
It is either possible to enter "C,A" or "A,C".
"Boot Sequence: C,A" means that booting from hard disk is attempted first.
Only if there is no hard disk installed, not properly inserted in the setup or if
the hard disk is not formatted as a system drive, drive A is examined for a boot
disk.

If there is no boot disk inserted in drive A, an error message is displayed.
In case booting from disk is enabled as well or if, instead of a hard disk, a
ROM disk is installed "Boot Sequence: A,C" has to be adjusted. Then the
computer examines drive A for a boot disk or for the ROM disk. If both fail the
operating system is loaded from the hard disk.

Without ROM-Disk: With ROM-Disk:
Boot Sequence: C,A   *Boot Sequence: A,C*

Other adjustments

The data and the time can be adjusted in the setup. Though DOS also provides
the commands DATE and TIME.
All other adjustments should be done according to the pictures on the previ-
ous pages.

Interior structure

The industry PC C2011 is designed such that most of the repairs and changes of equipment can be done with the descriptions given in this chapter.

Opening the casing

Only staff which has sufficient experience with PC hardware should open the PC. Inappropriate handling can cause severe damage.
On the sides of the casing there are 6 nuts which fasten the rear plate.
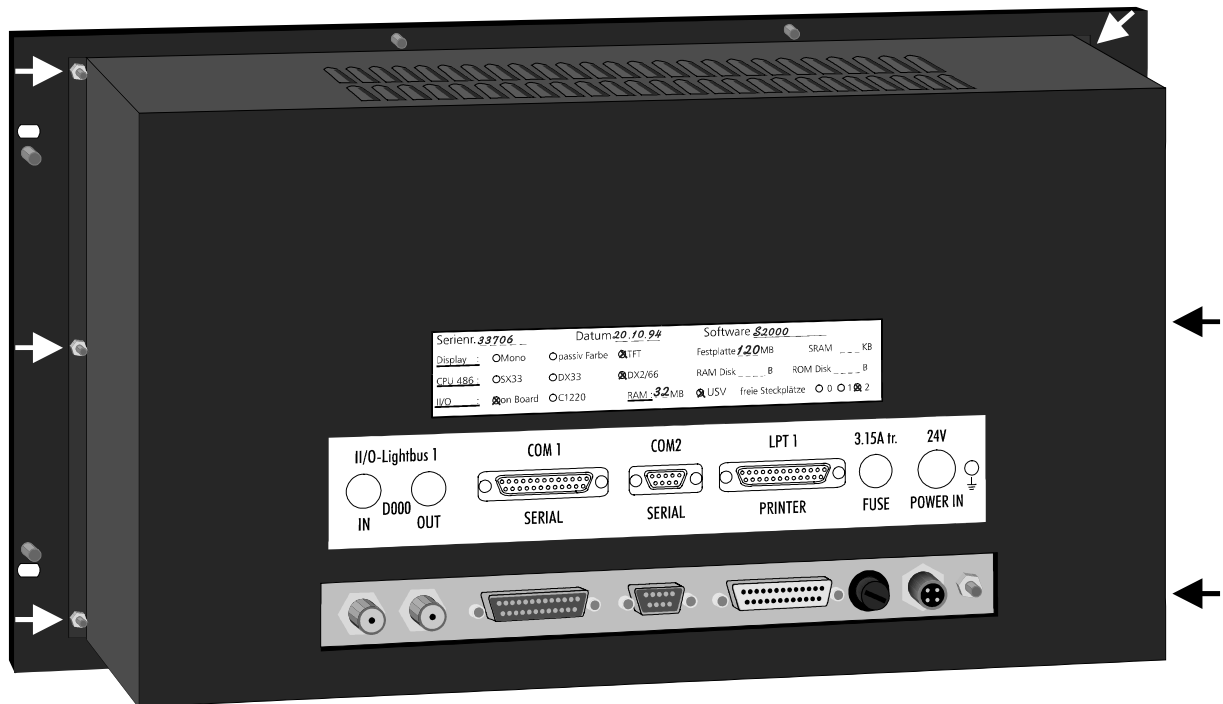
Rear panel board

The rear panel board is behind the rear plate of the chassis, which can be removed after screwing out the seven screws. Among other things, it contains the lithium battery, which supplies the BIOS with power, while the computer is switched off.

Assure yourself of the correct installation of the lithium battery poles.
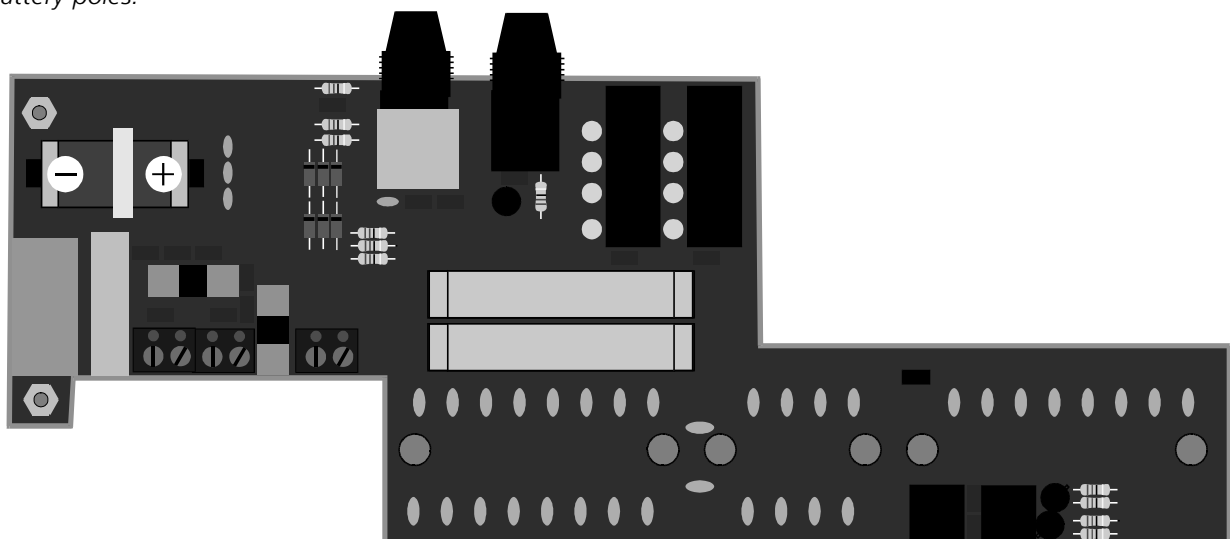
If BIOS data is lost, check the battery.

Should there be a loss of the data inserted in the BIOS, check the Lithium battery. In case the voltage drops below 2,6 V, replace battery.
A soldering iron is required to change the lithium battery. Consider that the poles of the battery are installed correctly as it is shown in the picture.
The type name of the battery is:
Maxell ER3S lithium battery 3,6 V RM25.4 ½AA

Type of lithium battery

The mainboard

On the chassis attached to the front plate there is the power adapter and the mainboard. The mainboard is a 486 ISA bus board with a number of integrated components:
- II/O-Lightbus interface
- Floppy and harddisk controller.
- Serial and parallel ports
- Video controller including 512 kB or 1 MB video RAM
- LCD interface
- Keyboard selector
- Interface for special keys on the front plate
- 3 parallel input/output devices
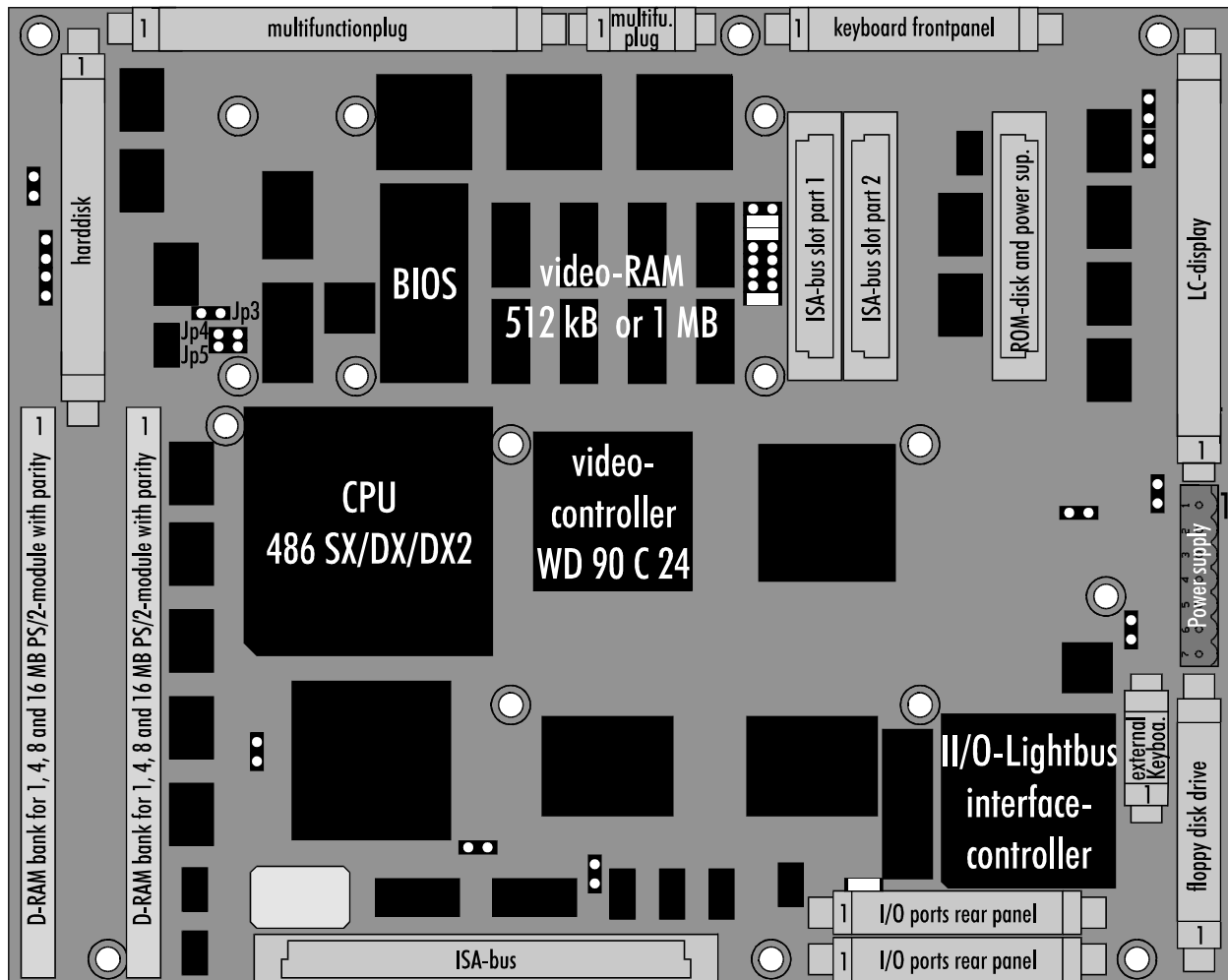
The mainboard of the industry PC C2011 works with 2 busses. The processor bus connects the 486 CPU with the main memory and the ROM which contains the system- and the video BIOS in one device. Through the VLSI chips communication between the processor bus, the ISA bus and all components connected to it is achieved:

- The II/O-Lightbus interface with the XILINX processor XC3030
- A combo controller device VLSI 37C651 „COMBO" with floppy and harddisk controller, a parallel and two serial ports and the keyboard selection between front panel and external keyboard
- Video controller including 512 kB video-RAM for TFT-Displays or 1 MB for dual scan displays
- a parallel input/output device for the special keys on the front panel
- a parallel input/output device for the multifunction board C2000BAT
- a parallel input/output device for monitoring functions

The block diagram of the C2011 mainboard
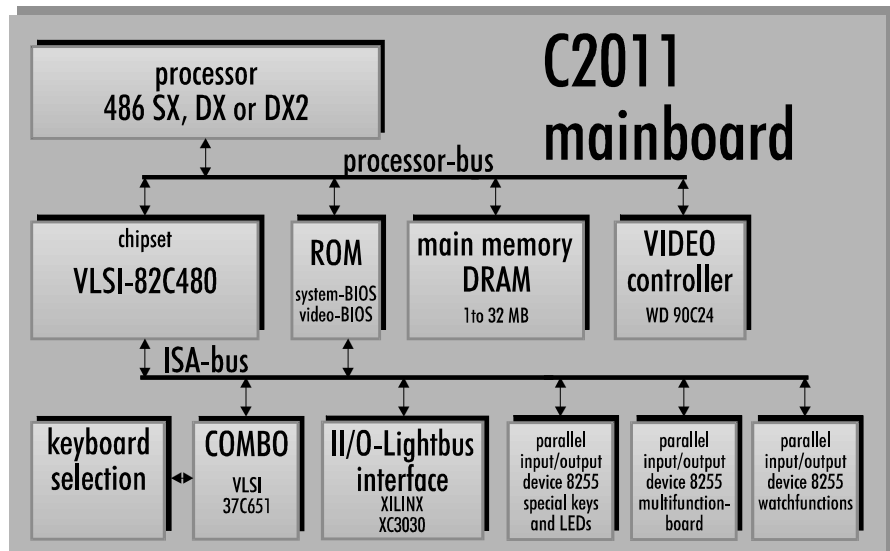
Adding up the memory

*PS2-Modules
1, 4, 8 or 16 MB
with parity bit,
arbitrary sequence,
any combination is possible,
max. height of modules : 30 mm*

There are 2 slots for PS2-SIMM modules on the mainboard. The slots are suitable for 1, 4, 8 or 16 MB modules, which must have parity bits, that are 9 bits for a byte. Any combination of these modules and any sequence is possible when inserting them in the slots. Due to space limitations the height of the modules is limited to 30 mm.

To remove a present SIMM module push the flaps right and left to the outside and pull the module to the front until it is released by the hooks in the drill holes.

Removing a SIMM Module
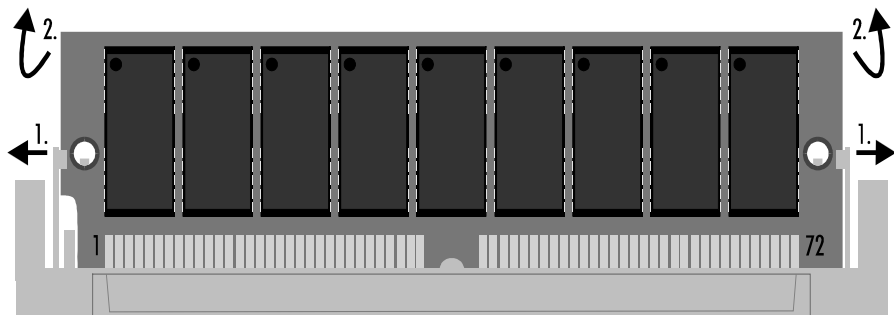
There is only one way to insert PS2-SIMM modules in a slot. Put the module with the contact surfaces vertically down in the slot. Tilt it to the back until the flaps are fastened. The proper hold of the modules can be checked by the hook which grips in to the drill hole from behind. The system will automatically recognise the size of the memory.

Inserting a SIMM-Module
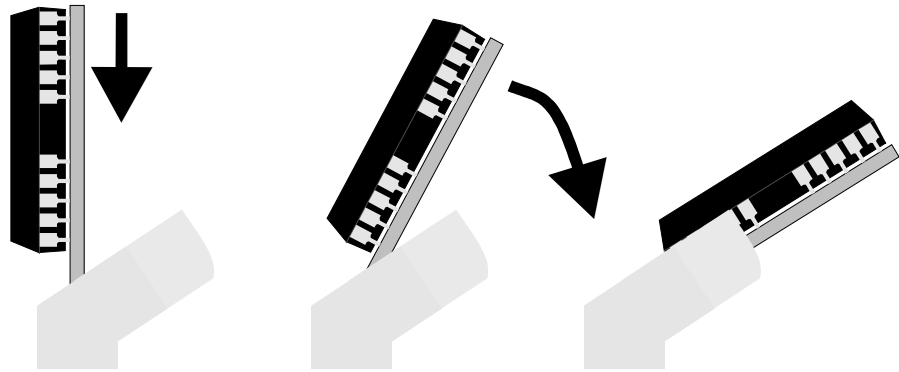
Changing the processor
Three different processors can be mounted on the board:

486 SX 33 MHz
486 DX 33 MHz
486 DX2 66 MHz

Remove the CPU cooler
Remove processor
place the frame under the
new processor
Marked corners have to
match

Heat conducting paste

To change the processor remove the chassis plate. Then remove the fan and the CPU cooler below from the holding frame of the processor. Pull out the processor without slanting it.
Place the frame, that holds the cooler, under the new processor.
The pin 1 corner of the processor is marked. There is also a marked corner on the inner side of the socket. Put the processor in the socket such that the marked corners match. Heed that the processor is centred on the socket. Put heat conducting paste on the cooler and the processor. Then put the fan and the cooler back into the holding frame.

*Jumper*

Now the computer has to be instructed which processor it is equipped with. The corresponding jumpers are 4, 5, 6. They have to be set according to the description in the picture. The jumpers are situated under the hard disk or flash ROM board.
The next section describes how to remove it. Do not change any other jumper on the board.

Jumper configuration for 486 SX and 486 DX / DX2 CPU
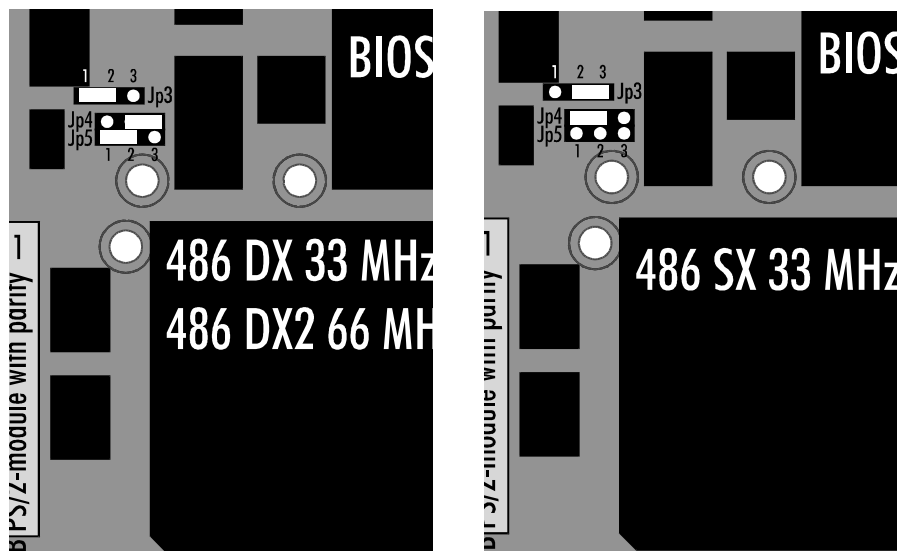
Harddisk and ROM disk

The industry PC C2011 is equipped with a 2½ inch harddisk or a ROM disk These are situated on the board which is plugged in the mainboard as displayed in the following pictures. In order to remove this board, which is necessary when the jumper configuration for the processor has to be changed, push back the white plastic hooks and pull the board up out of the plug connections. If the harddisk board is to be removed, the 40 pole plug has to be unlocked.
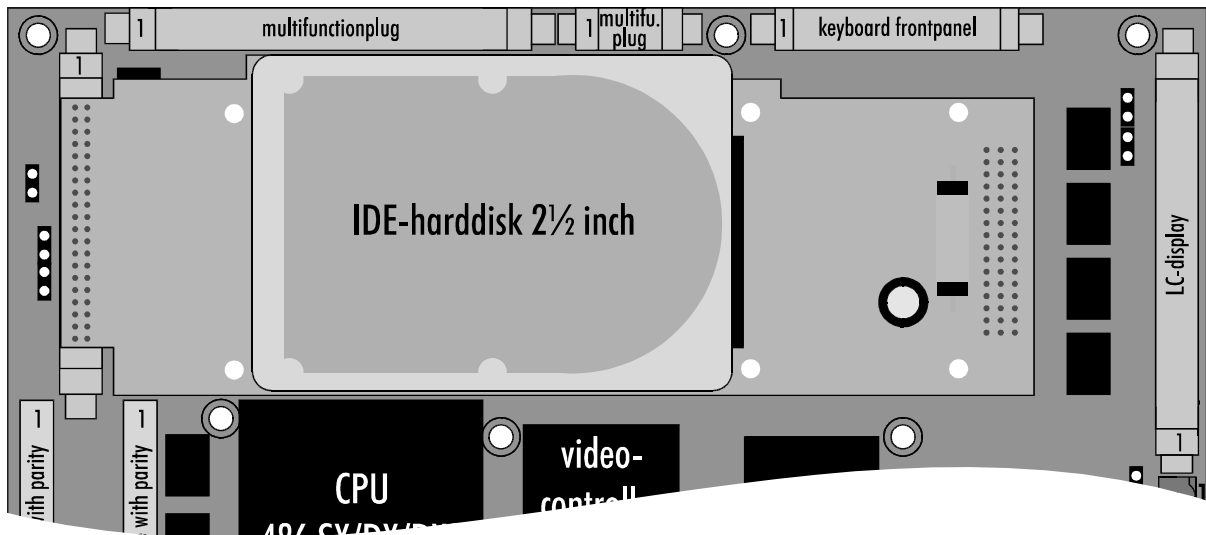
Remove the four screws from the bottom side of the board. Then the harddisk can be removed from the pin terminal by pulling it to the side.
Pay attention to the resistance to shock and elevated temperatures required for Industry PCs.
After changing a harddisk it has to be entered in the setup as described in chapter 4.
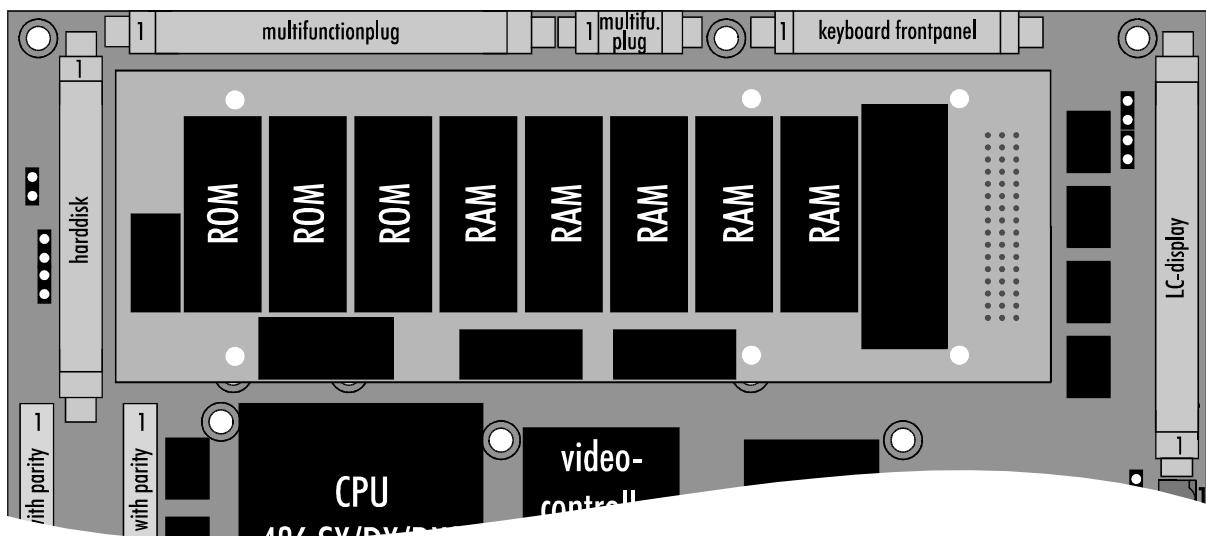
The ROM disk contains 1.5 MB ROM and ranging from 640 kB to 2.5 MB CMOS-RAM, of which the contents are retained even if the computer is switched off. This is because a lithium battery on the ROM disk board supplies the RAM with the required power.

If, at a later time, the harddisk is to be replaced by a ROM disk, the data connection of the disk drive should be exchanged so that it becomes drive A. This is because it is not possible to boot from diskette.

Change the data in the setup too. Set "Drive A" to "1.44M, 3½ in.", "Drive B" to „None" and enter the harddisk to be "Disk 0", as described in chapter setup.

Installing ISA slots

In case other plug-in cards are to be installed, the rear plate of the PC has to be opened as described at the beginning of this chapter. The computer has two ISA slots which are mounted on a card plugged onto the mainboard. The card is displayed in the following picture. Screw the cover plate of the card to the chassis after plugging it in.
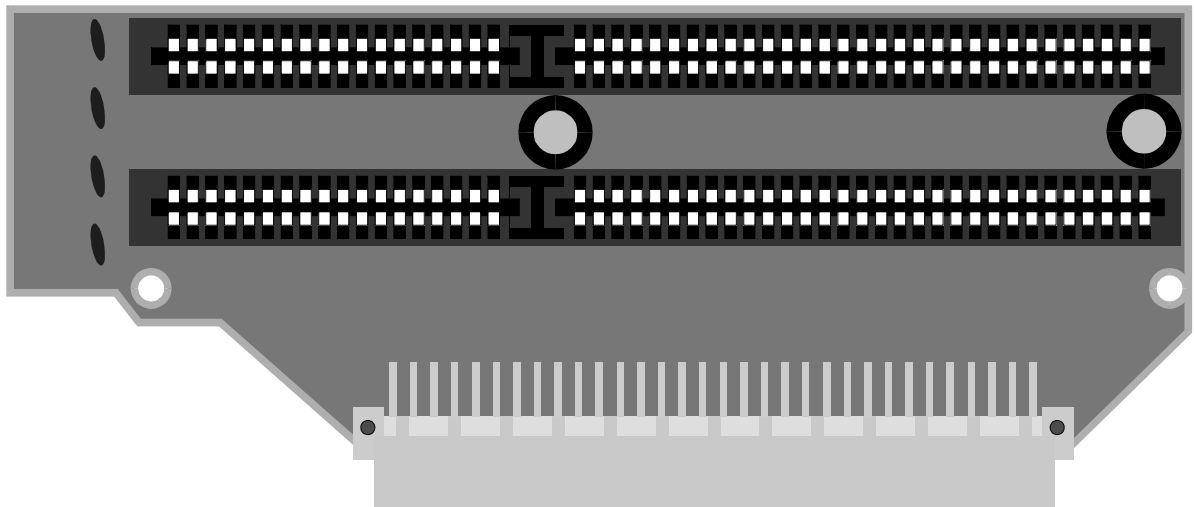
Changing the tubes of the LCD background light
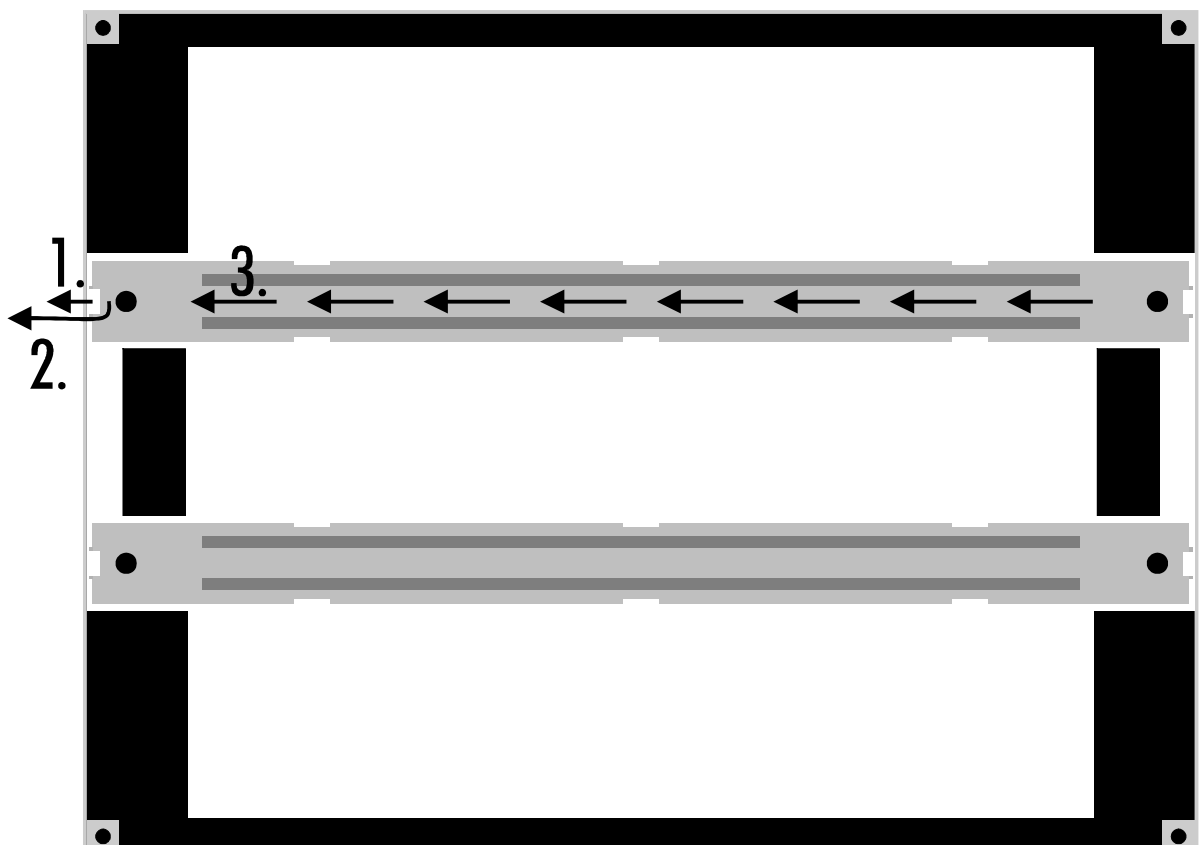
TFT-displays only   Changing the fluorescent tubes is only possible for TFT colour displays.

- Open the casing as described above and remove the four nuts through which the chassis is attached to the front panel. After removing the chassis the LC display can be reached. Put the front panel on a soft ground.
- There are two metal plates on the white plastic cover. Under each of them is a fluorescent tube. Bend the white tab slightly to the outside as it is displayed on the previous page under 1. Lift the plate over it and then pull it to the side out of the guide way.
- Remove the upper part of the rubber holdings at the end of the fluorescent tube and change the tube with all the connections and cables.

Changing the LC-display

In case the LC-display is defect , it can be changed for a new one of the same type. Changing from monochrome to colour display or from dual scan to TFT is not possible for the user - please send the computer in.

- Open the casing as described above and remove the four nuts through which the chassis is attached to the front panel. After removing the chassis the LC display can be reached.
- put the front panel on a soft ground.
- The LC display is attached to the front panel by four screws . Unscrew the nuts and replace the display. Do not touch the display surface or the inner side of the front sheet.
- Remove the plugs and keep the poles in mind.

Do not leave fingerprints
- The LC-display is attached to the front plate by four screws. Remove the nuts and change the display. Do not touch the display surface or the inside of the front sheet.

The multifunction board

If desired, the industry PC C2011 can be equipped with an uninterruptibel power source. which after the supply voltage failed keeps the computer working for about 15 minutes by means of an external NiCad accumulator. The multifunction Board C2000BAT controls it. For later installations the computer has to be sent in.

Uninterruptibel power source

The multifunction board is mounted above the power adapter.
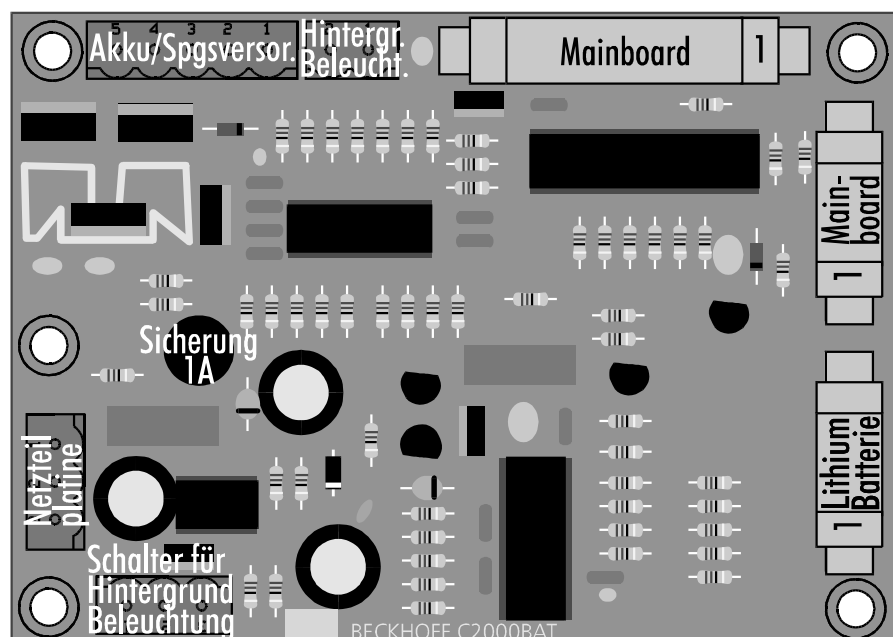
Accumulator pole protection   The multifunction board has a simple pole protection. If the wrong poles are connected to the accumulator, the higher flow of current melts a fuse (1A) on the C2000BAT board. To replace the fuse, the casing of the computer has to be opened. The arrangement of the fuses on the board can be taken from the picture.

The power supply

Next to the mainboard there is the power adapter, which smoothes the input voltage and transforms it into the different voltages required by the devices.
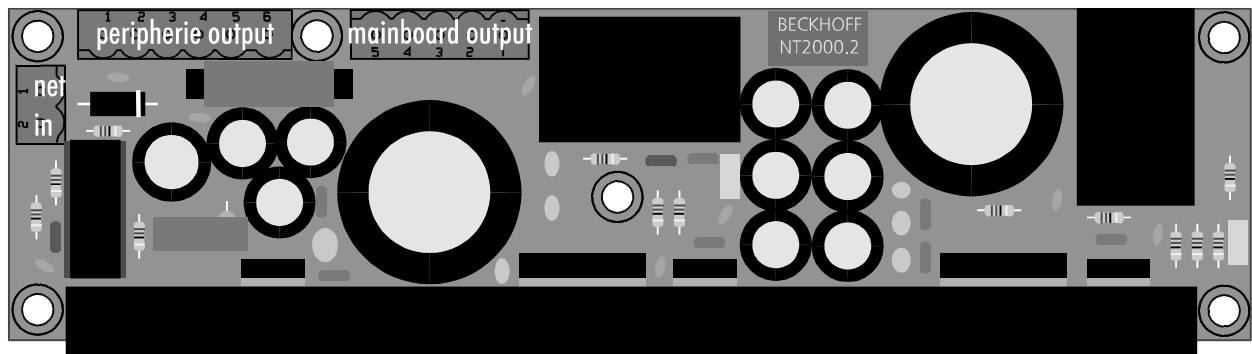
Periphery Output	Function
1	+5 V
2	Ground (0 V)
3	+12 V
4	+5 V
5	Ground (0 V)
6	+12 V

Mainboard Output	Function
1	+12 V
2	+5 V
3	Ground(0 V)
4	-5 V
5	-12 V

Net In	Function
1	+24 V
2	0 V

Programming

The parallel input/output devices 8255

There are three parallel input/output devices, short name PIO, type 8255 on the mainboard.

One device controls the special keys and the LED's on the front panel. The other one controls the multifunction board and the third watches the temperature inside the PC and the voltage of the lithium battery.

Each 8255 device disposes of three 8 bit ports. They can be configured for input or output by the configuration control register. The control register and the three data registers are assigned to addresses in the PC memory.

The addresses of the three PIO devices of the industry PC

Special keys LED's	Address	Multifunction-board	Address	Watch functions	Address
Port A	220H	Port A	230H	Port A	240H
Port B	221H	Port B	231H	Port B	241H
Port C	222H	Port C	232H	Port C	242H
Control register	223H	Control register	233H	Control register	243H

In the control register of a PIO device you can determine, which port should work as input or output port.

Configuration:
after booting the PC write
91H in Address 223H,
93H in Address 233H and
82H in Address 243H

After a reset or after switching the computer on all ports are programmed to be inputs. To configure a PIO device according to their tasks in the industry PC C2011, write the value 91H in the control register in address 223H, 93H in address 233H and 82H in address 243H. The configuration remains as long as receive, until you overwrite the addresses or restart the computer.

The special keys

The industry PC C2001 has a keyboard with a row of function keys below the LC display, a cursor block, the numerical key pad and row of ten special keys above the LC display.

In addition, there are two keys to adjust the brightness of the display. They have no function, if a TFT display is used,

Keys to adjust the brightness of the display
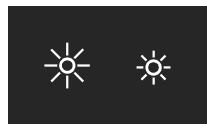
Each of the 10 special keys contains a red LED

LED 1 •	LED 2 •	LED 3 •	LED 4 •	LED 5 •	LED 6 •	LED 7 •	LED 8 •	LED 9 •	LED 10•
S1	S2	S3	S4	S5	S6	S7	S8	S9	S10
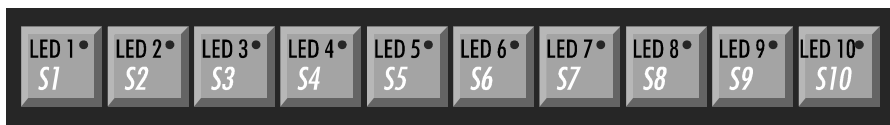
The keyboard of the front panel can be used together with an external AT keyboard at the same time.
The special keys on the front panel are not connected to the keyboard device but are monitored by Port A and the lower part of port C, both belonging to the parallel input/output device, which has an address range from 220H to 223H.

Special Keys	S10	S9	S8	S7	S6	S5	S4	S3	S2	S1
Port	Port C		Port A							
Address	222H		220H							
Bit	1	0	7	6	5	4	3	2	1	0
Pressed =	0	0	0	0	0	0	0	0	0	0
Erased =	1	1	1	1	1	1	1	1	1	1

It is unnecessary to program the port for a read operation on the keys, since after switching the computer on or after a reset the ports are already programmed to be inputs.

Example:
- Press Keys S5 and S9 and meanwhile read the addresses 220H and 222H.
- 11101111B will be obtained from address 220H and XXXXXX10B from 222H. X denotes an arbitrary value.

The LED's

Each of the 10 special keys has a red LED which can be programmed through port B and the upper half of port C of the same input/output device used for the special keys and so has an address range from 220H to 223H.

Inverted values for LED setting.

Notice that an inverted value has to be used for the LED's, that means, if the bit is set the LED is off.

Since, after a reset, all Ports are inputs, the value 10010001B = 91H has to be written into the control register at the address 223H before performing a operation on the LED's. Thus Port B and the upper half of Port C are used as an output. This configuration lasts until it is overwritten.

For switching LED's 91H must be written into the control register of the PIO device.

Example:
- Write 10010001B = 91H into address 223H
- To switch on LED 6 and switch off all of the others: write DFH into address 221H and set Bit 4 and 5 of address 222H, by writing a suitable value into them, for example 30H or FFH.

LED's	10	9	8	7	6	5	4	3	2	1
Port	Port C		Port B							
Address	222H		221H							
Bit	5	4	7	6	5	4	3	2	1	0
LED on =	0	0	0	0	0	0	0	0	0	0
LED off =	1	1	1	1	1	1	1	1	1	1

The multifunction board

Uninterruptible power source

The industry PC C2001 can be equipped with an uninterruptible power source, which keeps the computer working for 15 minutes by an external NiCad accumulator, if desired. The controlling is done by the multifunction board C2000BAT, which is addressed by the parallel input/output device with the address range from 230H to 233H.

configure PIO device

To configure the PIO device you have to write the value 93H into the control register in address 233H.

Register	Address	Function
Port A	230H	not used
Port B	231H	reading the charging status
Port C Lower Half	232H Bit 0-3	several inputs
Port C Upper Half	232H Bit 4-7	several outputs
Control Register	233H	for this configuration: 10010011B = 93H

Port C							
Address 232H							
Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Output				Input			
UPS active/ passive	not used	not used	LC Display light	external suppl. Vltge.	accumulator voltage	not used	request LCD switch
0 = passive 1 = active			0=off 1=on	0= failure 1= OK	0=U<16 V 1=U>16 V		0=on 1=off

Controlling the LCD background light

switch for LCD background light

The background light of the LC display is controlled through port C, bit 4. The light is switched on by setting the bit. A C2011 with uninterruptible power source has got a switch on back which controls the background light of the LC display. If the software cleared bit 4, and so the background light has been switched off, you can switch in on again by using this switch. You can request the position of this switch over bit 0 from port C of the PIO device which is controlling the multifunction board at address 232H.

Uninterruptible power source

Monitoring the external supply voltage of 24 V can be activated by setting bit 7 of port C at address 232H.

If the external supply voltage falls below a value of 16 volts, the multifunction board switches to accumulator power and signalises it to the software by erasing bit 3 of port C at address 232H.

The NiCad accumulator (18 V/0,65 Ah) supplies the computer, depending on the charging for about 15 minutes with power. During this period the software has the time to save the data. After that, the software can switch off the computer by clearing bit 7 of port C at address 232H.

If the accumulator voltage falls below 16 V while running with additional power supply, it is signalised to the software by erasing bit 2 of port C at address 232H.

The charging system

An integrated charging system always keeps the accumulator fully charged.. The charging current is about 1/3 of the capacity. This makes it 230 mA. So the charging procedure takes, depending on the charge of the accumulator, up to 3 hours. The use of an integrated charge control avoids an overcharging of the accumulator.

Port B of the PIO device leads a signal, which gives information over the charging mode.

The signal of the charging regulator indicates the charging mode.

Port B							
Address 231H							
Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Input							
charging regulator	not used	not used	not used	not used	not used	not used	not used

The accumulator charging system of the multifunction board can run in the following modes:
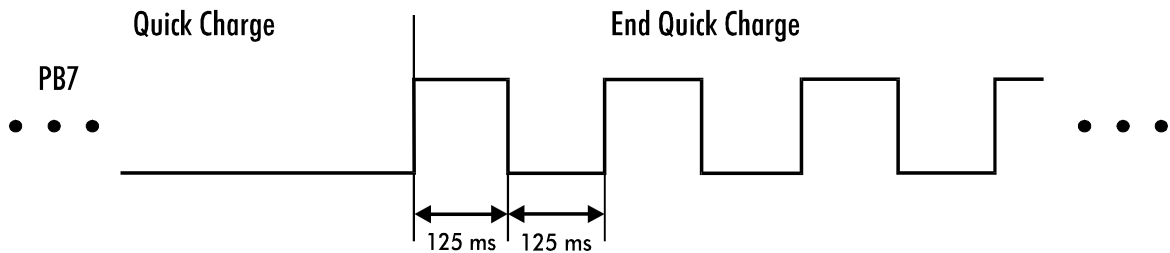
Quick Charge

After switching on, when the accumulator is connected, the charging regulator will be in mode Quick Charge. The accumulator is loaded with a constant current of 230 mA . Line 7 of port B is low.

Accumulator Disconnected

The charge control recognises if the accumulator is connected or not. If the accumulator is missing, line 7 of port b is on high level.
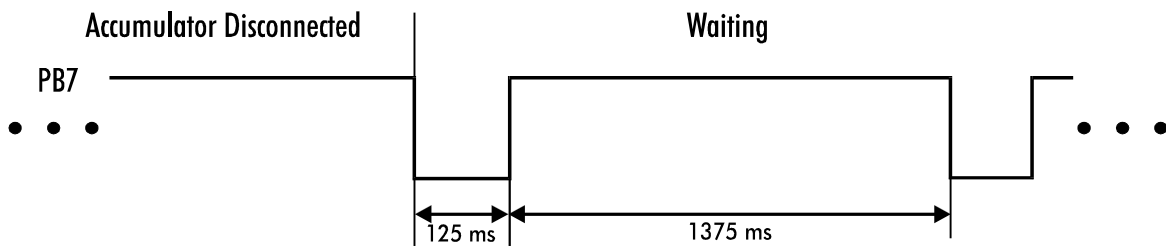
End Quick Charge

If charging was stopped by the charge control, line 7 of Port B has changing low and high levels and a high level with a cycle length of 250 ns.

Waiting

In this mode the charge control waits until a valid accumulator voltage is recognised. Then quick charge is continued. Bit 7 of port b is changing from low to high level with a cycle length of 1.5 sec.

The watch functions

The third input/output device measures the temperature in the casing of the industry PC and signalises if the battery on the rear plate board has to be changed.

The addresses 240H to 243H are assigned to the device. Only port B is used in this case. It has to be programmed to be input, before data can be read from address 241H. Write the value 10000010B = 82H into the control register with the address 243H. Bit 5 is deleted as soon the voltage of the lithium battery falls below 2.6 V.

Bit 3 is set, if the temperature inside the industry PCs exceeds 40°C. In case of further heating up, by steps of 10°C, the bits 2, 1, 0 will be set.

Port B							
Address 241H							
Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Input							
not used	not used	Battery-condition	not used	Temperat. of-casing	Temperat. of-casing	Temperat. of-casing	Temperat. of-casing
		$0 = U < 2{,}6V$ $1 = U > 2.6V$		$0: \vartheta < 40°C$ $1: \vartheta > 40°C$	$0: \vartheta < 50°C$ $1: \vartheta > 50°C$	$0: \vartheta < 60°C$ $1: \vartheta > 60°C$	$0: \vartheta < 70°C$ $1: \vartheta > 70°C$

The ROM disk

If your computer is equipped with a ROM disk it is assigned to drive A and the disk drive is assigned drive B. To program the three EPROM units 27020 or 27040 a customary programming appliance and converting software, which creates the binary files needed for the EPROM programming appliance from the desired files is acquired. The converting software is delivered with the ROM disk.

- Create a directory ROMDATA on the hard disk of the computer for development.
- Format a bootable system disk, by using the MS DOS command FORMAT A: /S. This is necessary to make the ROM disk bootable.
- Copy all data and directories for the ROM disk to this diskette.
- Compress the disk. The PCTOOLS program OPTIMZR can be used, which is, for earlier releases of PCTOOLS called COMPRESS.
- Use the following command to start the conversion software: PK A: C:\ROMDATA\PKDISK /D:A /N:3 /t:27040 /b:6 /f:720 /v- Then the contents of the diskette will be in the binary files PKDISK.PK1, PKDISK.PK2 and PKDISK.PK3 in the directory ROMDATA on the hard disk.
- Program the EPROM units with these file and insert the EPROM's in the sockets on the ROM Disk.

Graphic driver

Windows driver

For the optimal function of Windows it is necessary, to install the graphic driver. The enclosed diskette contains the driver. The application of the Windows own VGA driver brakes the graphic output considerably and can advertise errors in individual cases. To install the driver you have to start the file SETUP in the directory WINDOWS on the diskette.

An installation over the Windows own SETUP program is not possible, because thereby Windows will not copy all necessary files onto the hard disk.

The directories on the driver diskette

Start A:\WINDOWS\SETUP by using the file manager or by opening the menu file in the program manager and selecting the order „execute".

*File manager
file - execute*
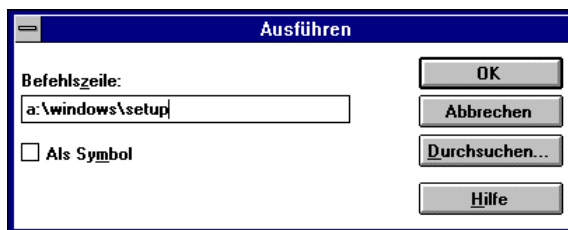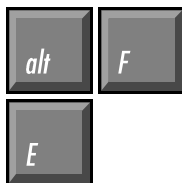
Then the SETUP program will initialise itself and open ultimately following window:

Continue

Select all resolutions
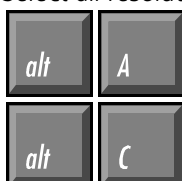
Thereupon a selection appears of possible graphic resolutions. Select all, by a mouse click onto the button "All", or by pressing the keys Alt and A. Then all drivers will be marked blue. With Alt and C or by a mouse click onto the "Continue" button you can start the installation.

Continue

Also at a LC-Display with a maximum of 640x480 points you can use a higher resolution as virtual screen.

User: 79% GDI: 59%   Western Digital Video Changer Setup   Disk C: 113.2 Mb

Western Digital Video Changer Setup

Install Drivers

Select the drivers you want to install on your system:
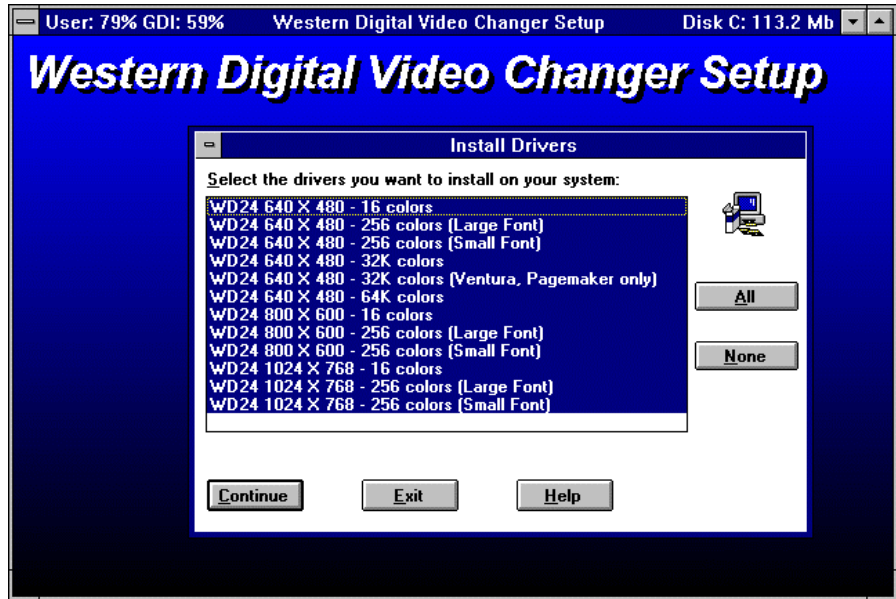
WD24 640 X 480 - 16 colors
WD24 640 X 480 - 256 colors (Large Font)
WD24 640 X 480 - 256 colors (Small Font)
WD24 640 X 480 - 32K colors
WD24 640 X 480 - 32K colors (Ventura, Pagemaker only)
WD24 640 X 480 - 64K colors
WD24 800 X 600 - 16 colors
WD24 800 X 600 - 256 colors (Large Font)
WD24 800 X 600 - 256 colors (Small Font)
WD24 1024 X 768 - 16 colors
WD24 1024 X 768 - 256 colors (Large Font)
WD24 1024 X 768 - 256 colors (Small Font)
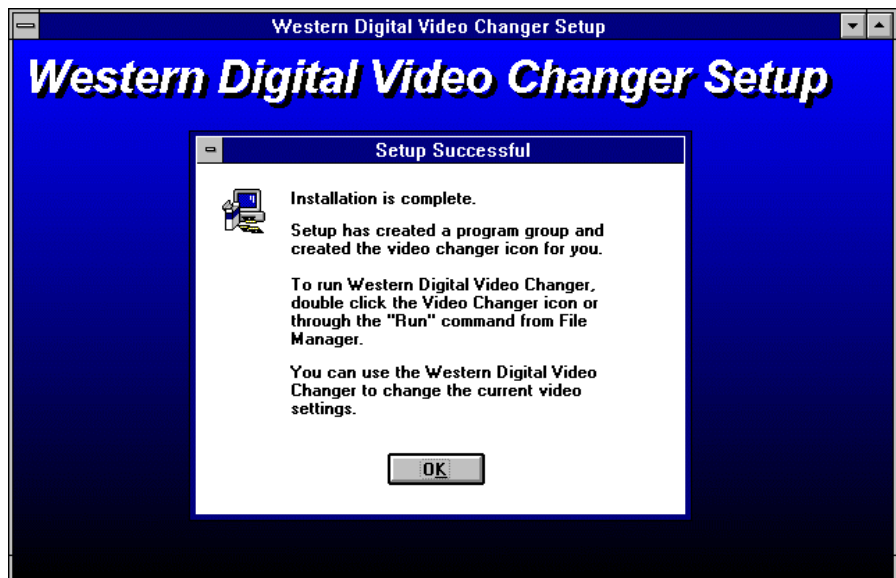
All

None

Continue   Exit   Help

It takes a few minutes to copy all necessary files from the diskette into the Windows directory of your hard disk. The program makes no additional directory.

The beam shows the progress of the copy process.

Western Digital Video Changer Setup

Western Digital Video Changer Setup

Western Digital Video Changer Setup

Source File:
A:\SYMBOLE.FON
Destination File:
C:\WINDOWS\SYSTEM\SYMBOLE.FON

83%

Cancel

The installation is complete.

Western Digital Video Changer Setup

Western Digital Video Changer Setup

Setup Successful

Installation is complete.

Setup has created a program group and created the video changer icon for you.

To run Western Digital Video Changer, double click the Video Changer icon or through the "Run" command from File Manager.

You can use the Western Digital Video Changer to change the current video settings.

OK

Enter

Enter
starts the Video Changer

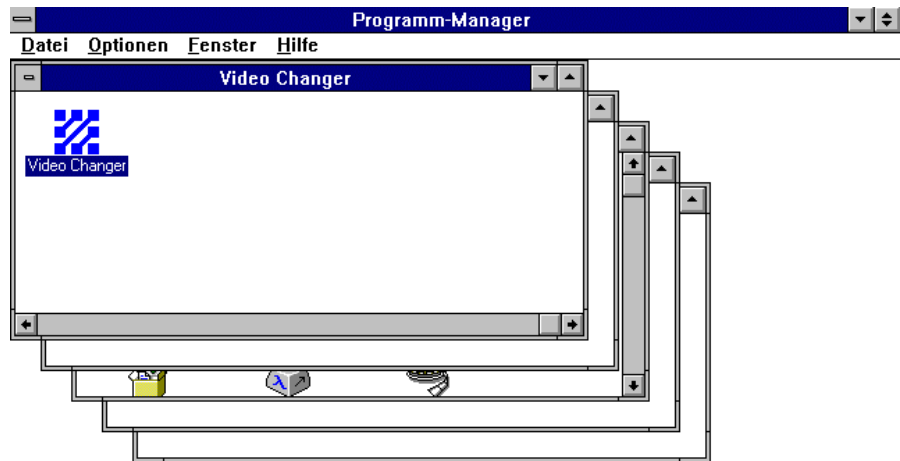*With the mouse you can put the icon of the Video Changer into an other window and delete the empty window with the Del key.*

After successful completion of the copy process you have to press Enter or click onto the OK button to end the SETUP program.

The SETUP program builds a new group in the program manager, which contains the program Video Changer. To start this program you have to click onto the icon doubly. In so far as the program name of the Video Changer is blue, as you can see in the picture, you can press also Enter, to start that program.

The program Video Changer offers the possibility to switch into different graphic resolutions. You can also choose between two different font sizes, you can accelerate the graphic construction by Font Caching, the mouse cursor can be shown black or white and the depth of the colours is adjustable as well as the picture frequency.

You can get detailed help for the Video Changer with

alt   *H*

In some resolutions not all options are accessible. You will become detailed information through a click onto the Help button or by pressing Alt and H. After a change of the options you must restart Windows. The Video Changer points you to this in a window. Then you can trigger the restart with a click onto the corresponding button.

The window of the Video Changer
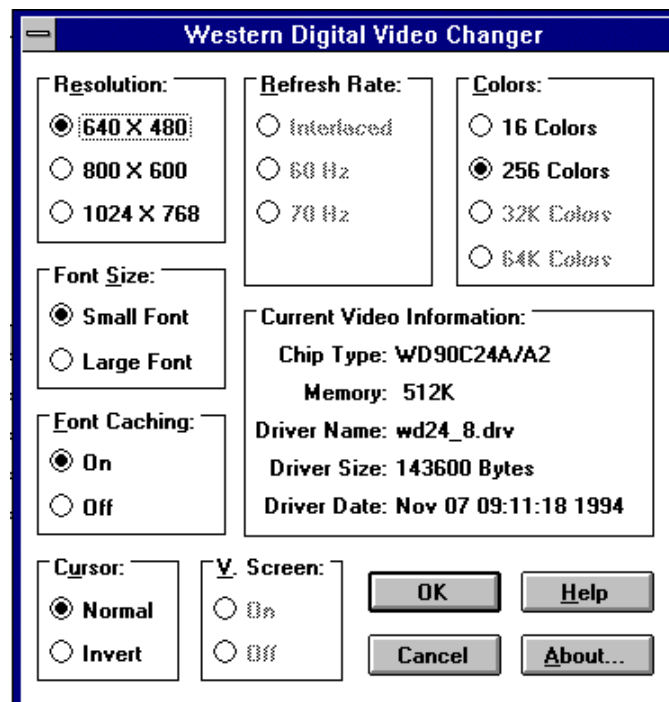
The picture of a LC display is always flicker free.

The LC-display integrated in the industry PC presents a picture in the maximum resolution of 640 x 480 points with 256 colours. Thereby the picture is always flicker free. The adjustable refresh rate refers only to a monitor, which you can connect to the back of the PC. The instruction belonging to your monitor can tell you, with which screens refresh frequency your monitor can work at the desired resolution. The expression "Interlaced" is standing for a frequency of 43,5 Hz.

External monitor

Virtual screen

You can use also higher resolutions as your monitor or LC-Display indicates. To do so you have to set the switch "V. Screen" for virtual screen to the position "On". A virtual screen always shows only a section of the hole screen. If the mouse cursor touches the edge of the screen, the section will shift in the corresponding direction.

The virtual screen function of the driver works on computers with a BIOS from version 10. On older industry PC you have to exchange the BIOS before you can use the virtual screen function. Along with a passive colour LC display, the virtual screen works only in the 16 colours' mode.

If you choose a resolution, your Display can not perform, and thereby you have switched off the function of the virtual screen, you will receive the following error message at the next start of Windows:

Error message at Windows start

This display driver does not support your display configuration.
Use Windows SETUP to select a different display type.

CD\WINDOWS
SETUP

To remove the error, you have to change into the Windows directory under DOS and call up SETUP.

```
Windows für Workgroups 3.11-Setup

    System-Informationen

        Computer:        MS-DOS-System
        Anzeige:         VGA
        Maus:            Microsoft oder IBM PS/2
        Tastatur:        Erweiterte 101-/102-Tasten-US oder andere
        Tastaturlayout:  Deutsch
        Sprache:         Deutsch
        Codeseite:       Mehrsprachig (850)

                         Um dies zu akzeptieren, drücken Sie EINGABE.

    Falls ein oder mehrere Einträge nicht richtig sind:

        • Drücken Sie die NACH-OBEN/UNTEN-TASTE, um den Eintrag
          zu markieren.
          Um weitere Auswahlmöglichkeiten zu sehen, drücken Sie
          die EINGABETASTE.

 EINGABE=Weiter  F1=Hilfe  F3=Beenden
```

*Screen: WD24*
640x480x256 (Small Font)

Move the cursor to the field "screen" with the up key. Then press Enter and choose the entry "WD24 640x480x256 (Small Font)". Press Enter again, to accept the selection. After this move the grey beam with the cursor down key on the line „to accept this, press Enter" and press Enter. The program asks you then, whether you want to install the necessary drivers newly or use the al-

keep available drivers

ready installed one. Press Enter here, to keep the available drivers. It lasts at least some seconds until you are back to the DOS prompt. After that you can

WIN

start Windows with "WIN". Then you can start the Video Changer to choose the right resolution.

Monitor/LC-display switch

The driver diskette contains three programs in the directory UTILITY for the switch between a monitor connected at the back of the Industry PC and the LC display or for the simultaneous use of both.

CRT.EXE   switches the picture exclusively to the external monitor.
LCD.EXE   activates the LC display and deletes the picture of the external monitor.
SIMUL.EXE   shows a picture on both screens.

Sizes
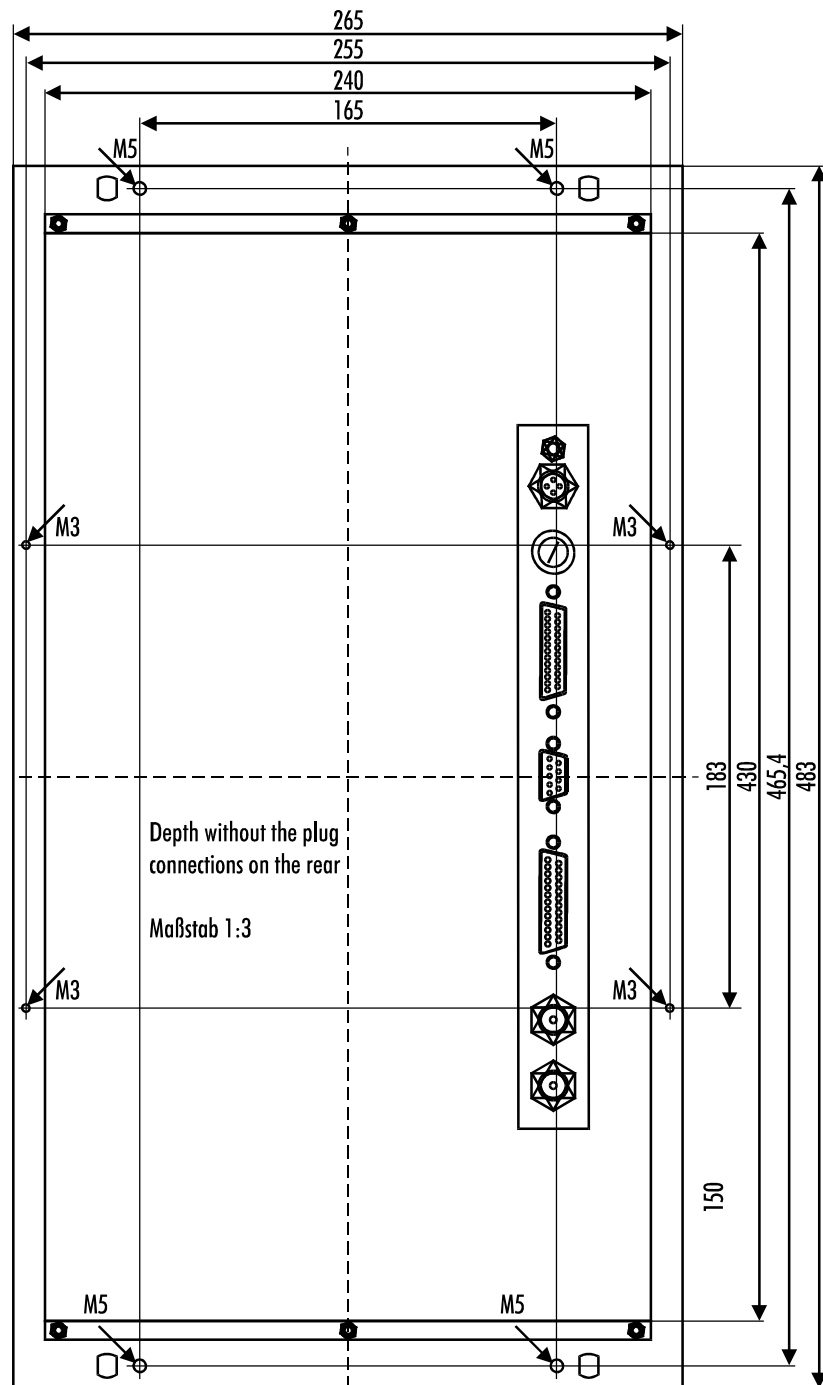
The drawing shows the rear of the installation industry PC C2011 in a scale of 1:3. The flap of the front panel stands out to a maximum of 194 mm.
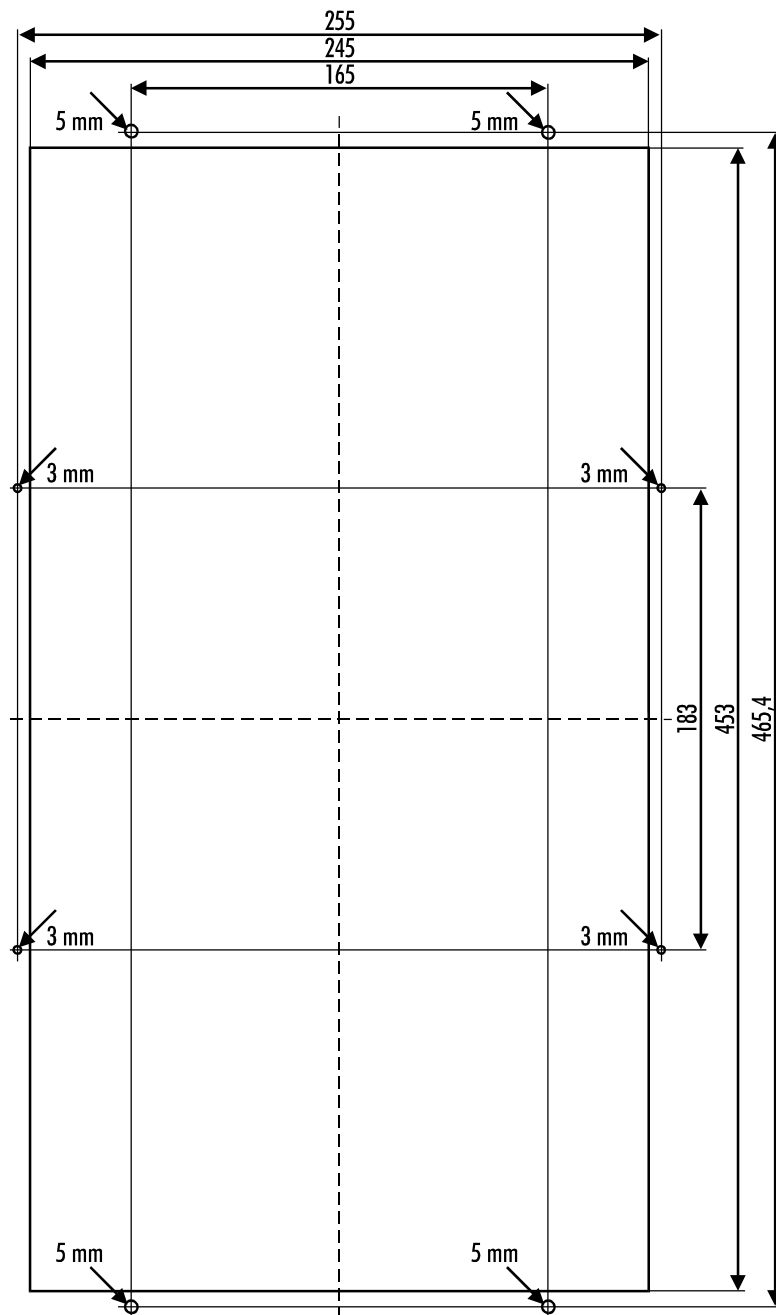
The picture displays the part of the switchboard, which is required to install the industry PC C2011.

Operating Conditions

Temperature of the environment:	5 to 45 °C, due to limitations of resistance to heat of the LC display.
Humidity:	Max. 95% no condensation
Resistance to vibrations:	
Casing & chassis:	Vibrations 5G at 10..55Hz Shock resistance 30G
Floppydisk drive:	Vibrations 0,5G at 5..500Hz Shock resistance 5G
Harddisk:	Vibrations 0,5G at 17..500Hz Shock resistance 10G
TFT- Colour Display	Vibrations 1G at 58..500Hz Shock resistance 50G
Protection:	Front panel: IP65 Rear panel: IP30
Supply voltage:	15 to 36 V DC (no smoothing)
Input current:	Dual scan monochrome-display: 1.3 A Dual scan colour display: 1.6 A TFT colour display: 2.5 A