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SIEMENS

SIMATIC HMI

Operator Panel OP47-12

Equipment Manual

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Safety Guidelines

This manual contains notices which you should observe to ensure your own personal safety, as well as to protect the product and connected equipment. These notices are highlighted in the manual by a warning triangle and are marked as follows according to the level of danger:



Warning

indicates that death, severe personal injury or substantial property damage **can** result if proper precautions are not taken.



Caution

indicates that minor personal injury or property damage can result if proper precautions are not taken.

Note

draws your attention to particularly important information on the product, handling the product, or to a particular part of the documentation.

Qualified Personnel

Equipment may be commissioned and operated only by **qualified personnel**. Qualified personnel within the meaning of the safety notices in this manual are persons who are authorized to commission, ground and identify equipment, systems and circuits in accordance with safety engineering standards.

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Note the following:



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We have checked the contents of this manual for agreement with the hardware and software described. Since deviations cannot be precluded entirely, we cannot guarantee full agreement. However, the data in this manual are reviewed regularly and any necessary corrections included in subsequent editions. Suggestions for improvement are welcomed.

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Preface

Purpose

This equipment manual contains precise details of the technical structure of the OP47-12 operator panel.

Where to find what

The *OP47-12 Equipment Manual* is subdivided into the following chapters:

Chapters 1-3 contain information about the individual components of the operator panel and describe its physical and electrical installation.

Chapters 4-5 describe the user-definable settings in the Setup program.

Chapter 6 provides information about servicing the operator panel.

The Appendix contains the technical data and the ESD guidelines.

Abbreviations

The abbreviations used in the *OP47-12 Equipment Manual* are explained below.

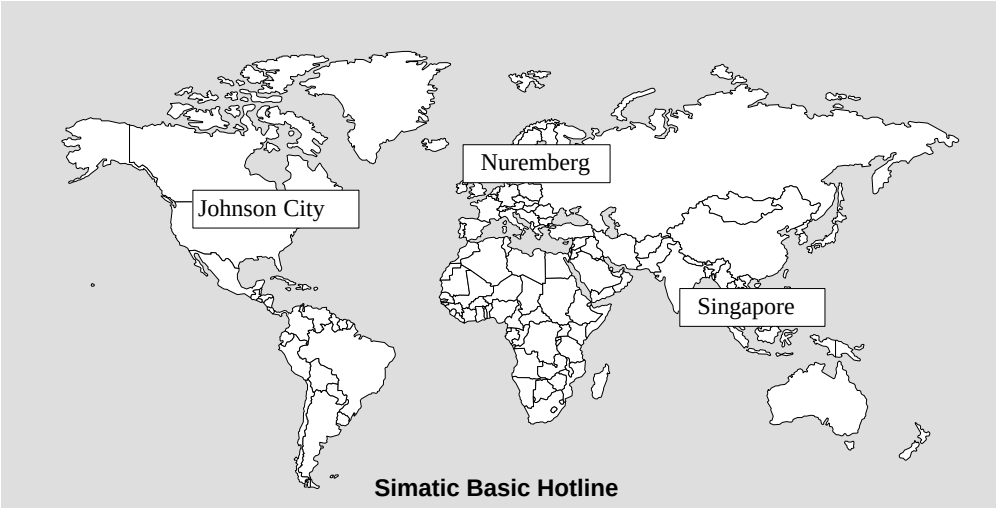
DOS	Disk Operating System
ESD	Electrostatically sensitive devices
EM	Equipment manual
LCD	Liquid crystal display
LED	Light-emitting diode
MPI	Multipoint interface (SIMATIC S7)
OP	Operator panel
PC	Personal computer
PCMCIA	Personal Computer Memory Card International Association
PU	Programming unit
RAM	Random-access memory
TFT	Thin-film transistor

Other Sources of Assistance

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  - from the **Bulletin Board System** (BBS) in Nuremberg (*SIMATIC Customer Support Mailbox)* on +49 (911) 895-7100.

    For calling up the mailbox, you should use a modem with up to V.34 (28.8 kBaud) capability and set the parameters as follows: 8, N, 1, ANSI, or connect via ISDN (x.75, 64 kBit).

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Glossary

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Product Description

1

Overview

This introductory chapter provides a brief overview of the OP47-12 and its

- performance characteristics and
- controls, display and indicators.

1.1 Performance Characteristics of OP47-12

Area of application of operator panel

The OP47-12 operator panel is suitable for demanding tasks in the field of ”operation and monitoring of electronically controlled machines”. It is designed as a fitted unit for use directly on the machine.
The high enclosure rating (IP65 for front panel) also makes the unit suitable for use in tough industrial environments. The OP can be fitted in the following locations:

- control cabinets/desks
- 19” cabinets/racks.

Specifications

The table below provides an initial summary of the specifications of the OP47-12. More precise information about the individual components is provided in the subsequent, more detailed chapters.

Summary of OP47-12 Specifications		
Processor	Pentium	200 MHz
Memory and disk storage	Second-level cache (pipeline burst)	512 Kbytes
	Hard disk	$\geq$ 1.6 GByte
	System memory	64 Mbytes
	Floppy disk drive	3½” drive (1.44 Mbytes)
Software	Operating system	Windows NT
	System software	SIMATIC WIN CC
Ports	PLC, PC/PU	Serial (see Chapter 3.1)
	Printer	serial/parallel (see Chapter 3.1)
Display	LCD color display	12.1“; TFT (active control) with backlighting
	Resolution (pixels)	800 × 600
	Number of colors	256
Sealed Keyboard	System keys with fixed functions	32 (4 with LED)
	Function keys with programmable functions	36 (28 with LED)
	Labelling of function keys	System-specific using labelling strips
Facility for fitting AT cards	in AT expansion box:	Yes
	– Expansion slots – Plug-in AT cards	2 standard ISA slots 2/3-length16-bit cards (ISA)
Direct key module (optional)	Digital outputs, controlled by keys	16

Summary of OP47-12 Specifications		
Special features:	Hardware clock (with buffer backup)	Yes
	Operation of external PS/2 or MF2 keyboard	MF2 keyboard: connected to front panel PS/2 keyboard: connected to rear panel
	Operation with integral IP65 mouse or external PS/2 mouse	Yes
	Module slot for PCMCIA cards	Slot A for type I, II; III Slot B for type I, II User software must also be installed.
	Processor cooling	Heatpipe: pipe that leads directly from the heat sink on the processor to the inner heat sink on the outer panel of the OP and dissipates the heat via the unit's outer case. Fully industry-compatible in contrast with fan cooling.

1.2 Controls, Display and Indicators

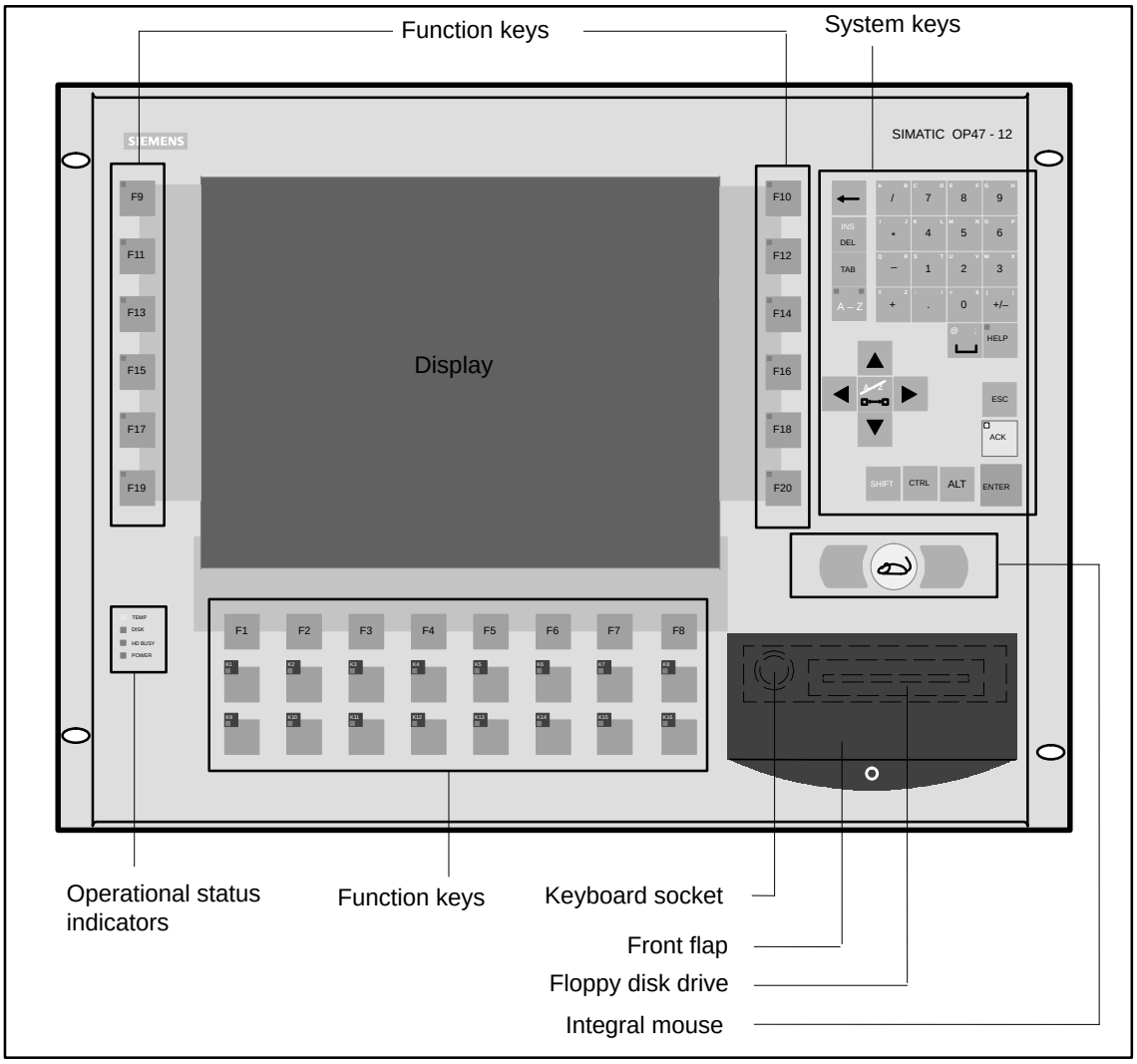


Figure 1-1 Arrangement of controls, display and indicators

Physical Installation

2

Overview

This chapter provides information about the OP47-12 in the following subject areas:

- Installing the operator panel
- Unit dimensions
- Function key labelling

2.1 Installing the Operator Panel

Installation site and conditions

The OP47-12 is suitable for installation in

- 19” (48,26 cm) cabinets/racks,
- front panels of control cabinets and desks.



Caution

- In order to prevent the operator panel overheating,
  - the unit must not be exposed to direct sunlight (this also prevents the keyboard sealing film fading)
  - the vent slots on the unit casing must not be covered over when the unit is in its installed position.
- The following points should be observed when installing the OP47-12:
  - The temperature inside the unit is higher when not installed vertically. If not installing the unit vertically, reduce the maximum ambient temperature, e.g. by means of additional heat removal facilities (fan).
  - The operator panel must not be installed in an horizontal position since the heatpipe cooling system will not operate at maximum efficiency.

Note

The IP65 enclosure rating of the front panel is only guaranteed if

- the seal on the front panel of the OP is properly seated
- the OP is correctly installed using the screw clamps supplied.

Before installation

If you wish to alter the labelling of the function keys, before installing your OP47-12 carry out the instructions given in section 2.3.

Allow sufficient space for the OP47-12 to be opened when it is in situ. For example, replacing the backlighting requires the unit to be opened up and then a plate rotated through 90° (see Fig. 6-4).

The depth of the OP47-12 measured from the front panel with the PC box opened out is approx. 330 mm.

Also take account of the other unit dimensions when installing (see Chapter 2.2).

Installing in 19”cabinets/racks

When installing the OP, use the frame sections supplied by the cabinet/rack manufacturer.
Fitting dimensions of OP47-12 for a standard 19” cabinet:

Front panel width: 19” (= 48.26 cm) Height: 8 height units (= 35.48 cm)

The OP/OP front panel is fixed to the frame sections by means of four screws.

Installing in control cabinets/desks

To install the unit, proceed as follows:

1. The front panel of the cabinet/desk must have a cutout measuring 433×335 (width $\times$ height in mm); also allow for the unit depth requirement of 146 mm.
   The front panel must not be thicker than 16 mm.

2. Insert the operator panel in the prepared cutout from the front.
   Take suitable measures to prevent the OP falling out of the front panel while it has not been finally fixed in position.

3. Securely attach the OP to the front panel using the six screw clamps (1) supplied. Figure 2-1 shows the positions for the screw clamps.

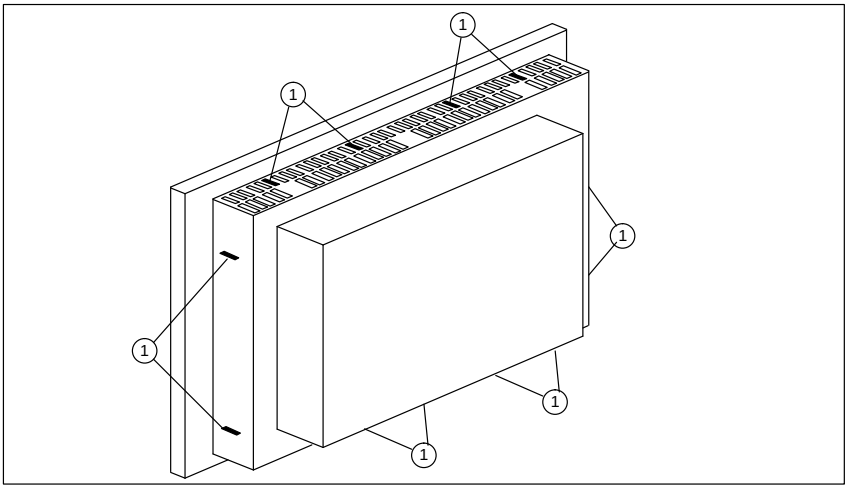


Figure 2-1 Positions for the screw clamps

The screw clamps should be hooked into the OP casing and then the stud screws tightened against the front panel from the back (see Figure 2-2).

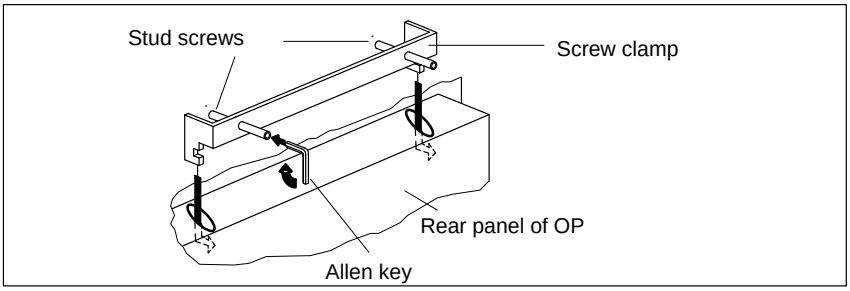


Figure 2-2 Locating and tightening the screw clamps

2.2 Unit Dimensions

When installing the OP47-12 allow for the unit dimensions as shown in the diagrams below.

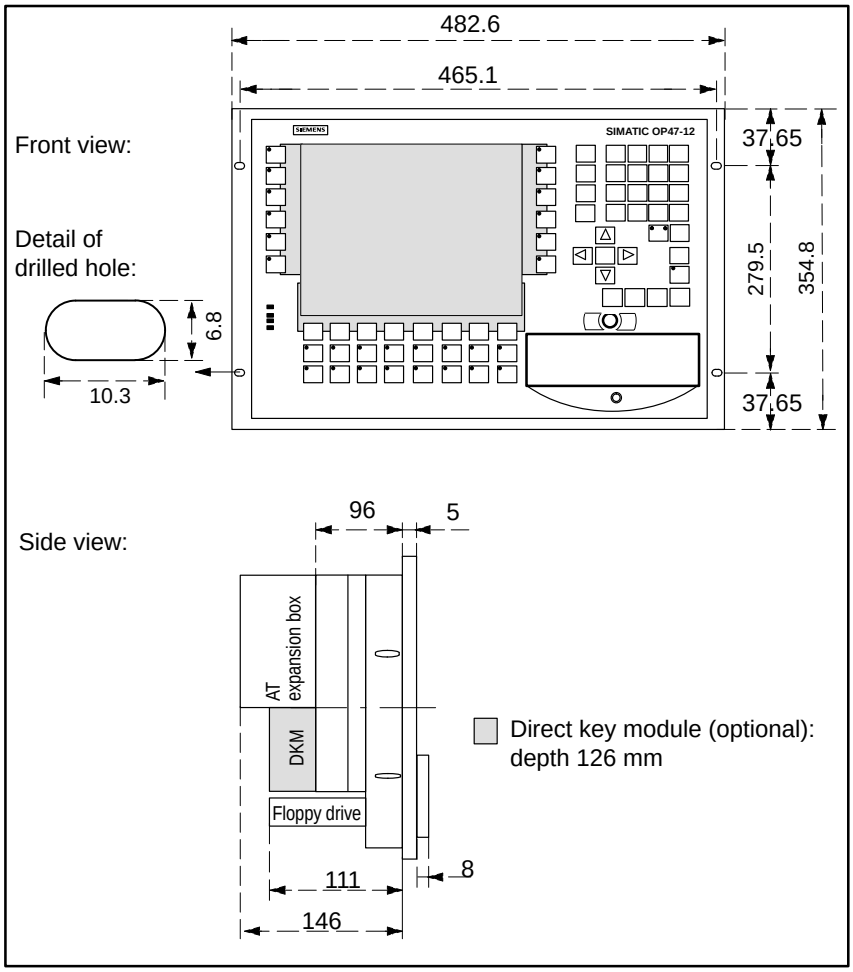


Figure 2-3 OP47-12 unit dimensions (in mm)

2.3 Labelling Function Keys

Labelling when supplied

When the unit is supplied, the operator panel function keys are labelled as follows:

- F1 to F20 and
- K1 to K16.

Changing labelling strips

A set of blank labelling strips is supplied with the OP. These can be used to make system-specific key labels for the OP.

Note

The lettering on the labelling strips must be completely smudge-proof before they are inserted. If the keyboard sealing film is soiled on the inside it can not be cleaned and can only be replaced at the factory.

To replace the labelling strips proceed as follows:



Caution

1. Make sure the OP is disconnected from the power supply.

---

2. Place the unit face down.
3. The labelling strips for the outer odd-numbered function keys F9 to F19 can be replaced through the side slit without further dismantling the unit, as illustrated in Figure 2-4.

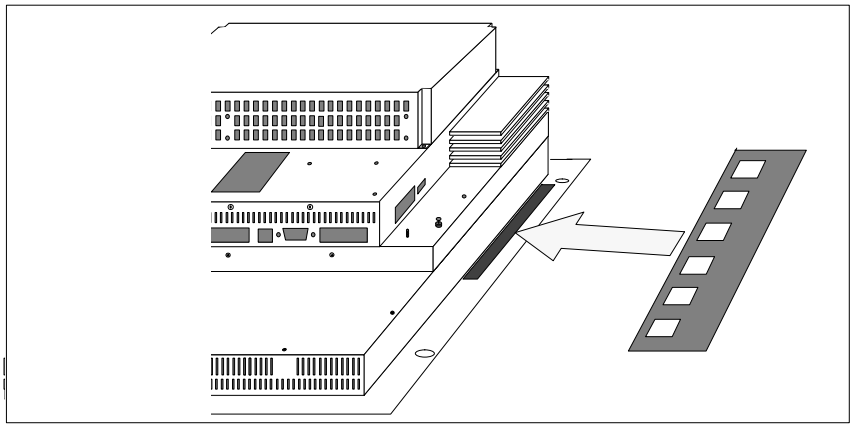


Figure 2-4 Inserting labelling strips for outer row of function keys

4. To replace the remaining labelling strips, proceed as follows:
   release the nine screws (Figure 2-5, ① from the L-shaped plate on the back of the unit; two of them are on the cover plate next to the PCMCIA slot.

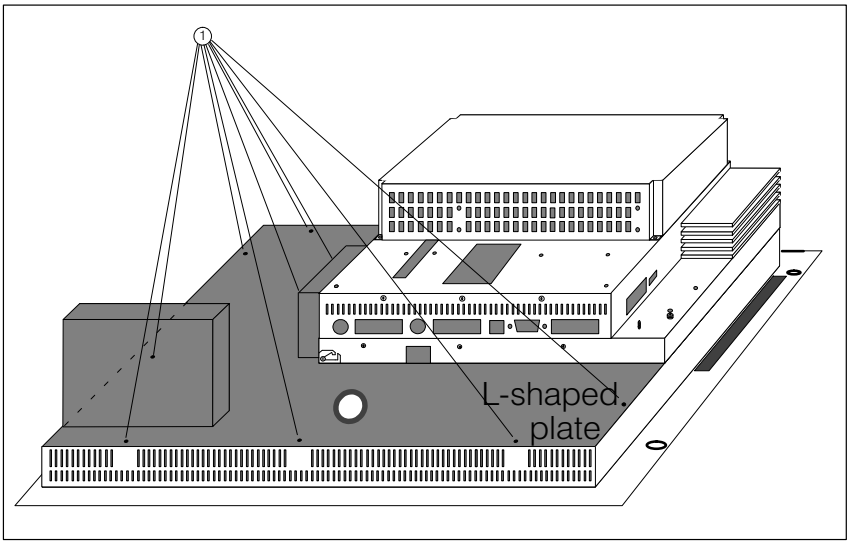


Figure 2-5 Removing the L-shaped plate

5. Remove the L-shaped plate shaded grey in Figure 2-5.
6. Insert the labelling strips through the slots provided (see Figure 2-6).

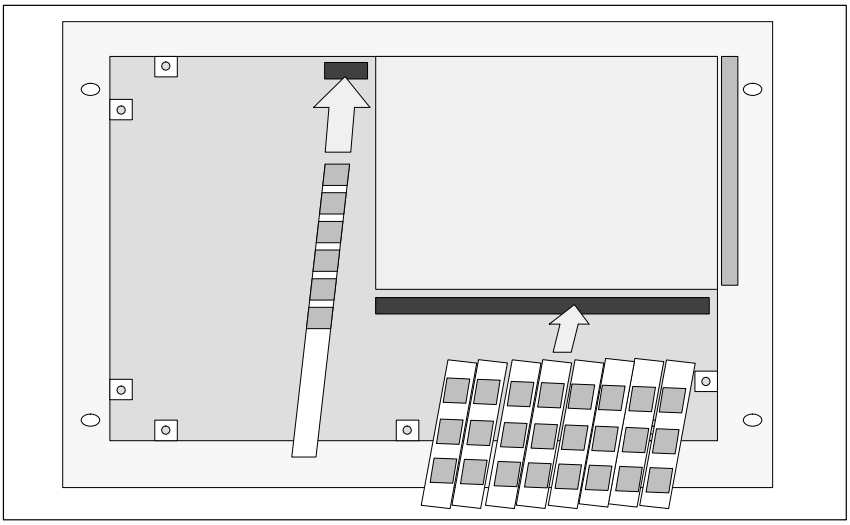


Figure 2-6 Inserting the labelling strips

7. Screw the L-shaped plate back in place after inserting the labelling strips.

Electrical Installation

3

General notes on installation

The fundamental basis for trouble-free operation is EMC-based layout of the PLC and the use of interference-proof wiring.

The guidelines for interference-proof layout of your PLC apply equally to the electrical installation of the operator panel.



Caution

- All signal links must use shielded wiring only.
- All connectors must be secured by screws or catches.
- Signal lines must not share a common cable duct with high-power cables.

Configuration options

Figure 3-1 shows some of the configuration options for OP, PLC and peripherals.

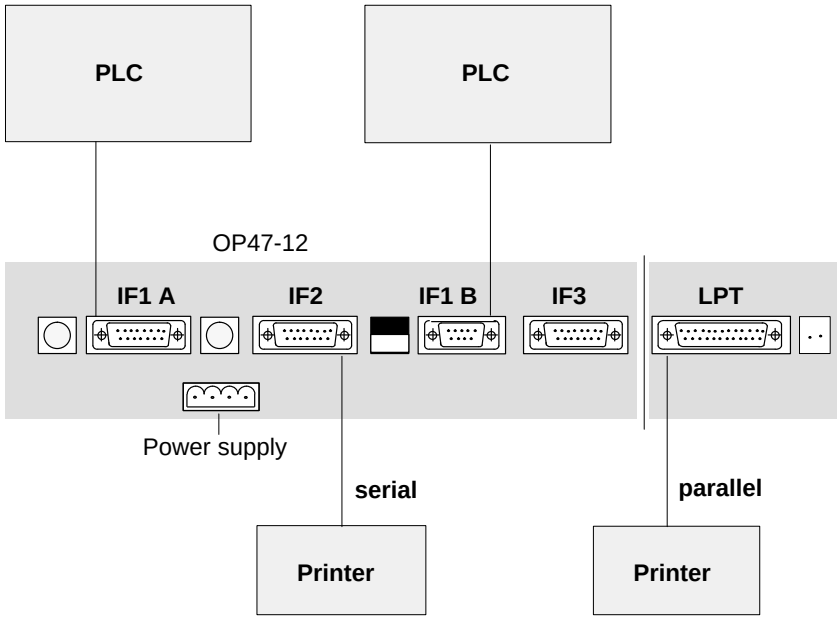
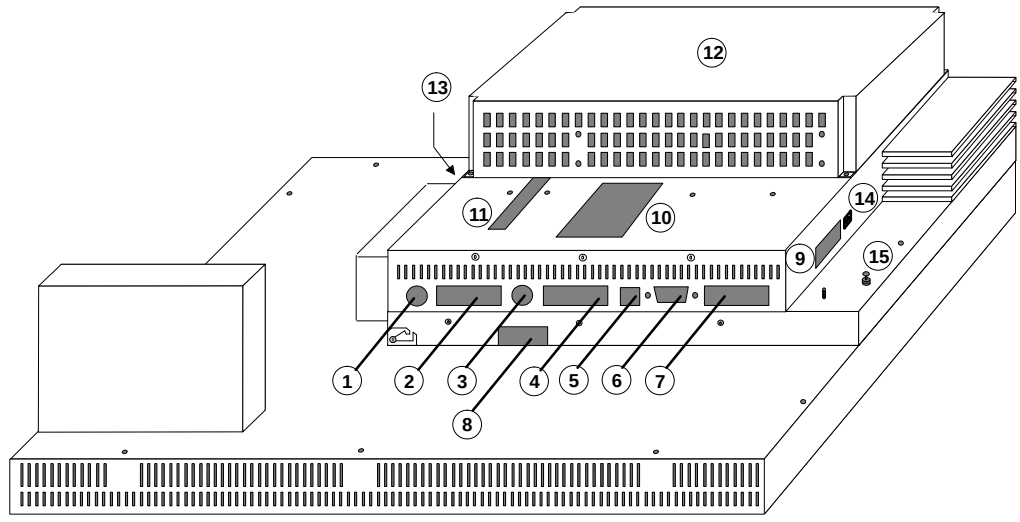


Figure 3-1 Configuration options

Detailed information on electrical connections is given in the later chapters.

3.1 Connections/Interfaces



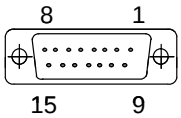
1 = Interface for PS2 keyboard
2 = Serial interface IF1 A
3 = Interface for PS2 mouse
4 = Serial interface IF2
5 = DIL switches
6 = Serial interface IF1 B
7 = Serial interface IF3
8 = Connection for 24 V DC power supply, Relay output (not usable)
9 = Parallel interface LPT1
10 = Battery compartment
11 = Interface for direct key module
12 = AT expansion box
13 = PCMCIA slot A and slot B (not visible in illustration)
14 = Relay output for temperature monitoring
15 = Earth connection (earth screw)

Figure 3-2 Connections and interfaces

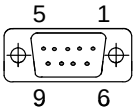
Name		Description	
Serial interfaces		Level	Usage
	IF1 A	V.24/TTY (active/passive)	PLC
	IF2	V.24/TTY (active/passive)	PC, PU, printer
	IF1 B	RS422/RS485 (electrically isolated)	PLC
	IF3	TTY (passive) /RS422/RS485	Free choice
DIL switches		For setting the serial interface IF1 B (see Chapter 3.1.2). DIL switches have to be set for RS422 mode. For RS485 the DIL switches can be used to apply accompanying signals to the bus.	
Parallel interface	LPT1	for parallel printer connection	
Interface for PS/2 keyboard		On rear panel	
Interface for PS/2 mouse		On rear panel	
Interface for MF2 keyboard		On front panel	
AT expansion box		For fitting two $^{2}/_{3}$-length ISA-AT cards	
PCMCIA slot A and slot B		For PCMCIA cards	
Interface for direct key module (optional)		For connecting a direct key module with 16 digital outputs.	

3.1.1 Connector Pin Assignment

IF1 A, IF2

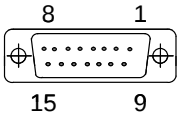
Sub-D socket	Pin No.	General	V.24	TTY
	1	Casing		
	2			RxD–
	3		RxD	
	4		TxD	
	5		CTS	
	6			TxD+
	7			TxD–
	8	Casing		
	9			RxD+
	10		RTS	
	11			+20 mA
	12	GND		
	13			+20 mA
	14	+ 5 V		
	15	GND		

IF1 B

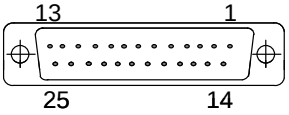
Sub-D socket	Pin No.	General	RS422	RS485
	1			
	2			
	3		TxD (B)	Data B
	4		RxD (B)	RTS[1]
	5	GND (elec. isol.)		
	6	+5 V (elec. isol.)		
	7			
	8		TxD (A)	Data A
	9		RxD (A)	RTS[1]

1) Can be set by means of DIL switches

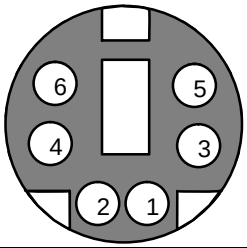
IF3

Sub-D socket	Pin No.	General	TTY	RS422	RS485
	1	Casing			
	2		RxD–		
	3			RxD(B)	Data B
	4			TxD(B)	
	5			RxD(A)	
	6		TxD+		
	7		TxD–		
	8	Casing			
	9		RxD+		
	10			TxD(A)	Data A
	11	+24 V			
	12	GND (5 V)			
	13	–			
	14	+ 5 V			
	15	GND (24 V)			

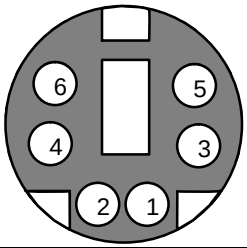
LPT

Socket	Pin No.	Signal Description	Input/Output
	1	– Strobe	Output (open collector)
	2	+ Data Bit 0	Output (TTL level)
	3	+ Data Bit 1	Output (TTL level)
	4	+ Data Bit 2	Output (TTL level)
	5	+ Data Bit 3	Output (TTL level)
	6	+ Data Bit 4	Output (TTL level)
	7	+ Data Bit 5	Output (TTL level)
	8	+ Data Bit 6	Output (TTL level)
	9	+ Data Bit 7	Output (TTL level)
	10	– Acknowledge	Input (4.7 kΩ pull up)
	11	+ Busy	Input (4.7 kΩ pull up)
	12	+ Paper End	Input (4.7 kΩ pull up)
	13	+ Select	Input (4.7 kΩ pull up)
	14	– Auto Feed	Output (open collector)
	15	– Error	Input (4.7 kΩ pull up)
	16	– Init. Printer	Output (open collector)
	17	– Select Input	Output (open collector)
	18...25	Ground	Ground

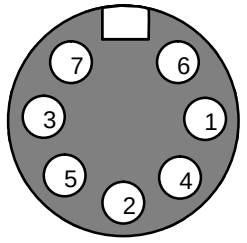
PS/2 Mouse

Socket	Pin	Designation	Input/Output
	1	Data	Input/Output
	2	Not used	–
	3	0 V	–
	4	5 V power supply	Output
	5	Clock	Input/Output
	6	Not used	–

PS/2 Keyboard

Socket	Pin	Designation	Input/Output
	1	Keyboard data	Input/Output
	2	Mouse data	Input/Output
	3	0 V	–
	4	5 V power supply	Output
	5	Keyboard clock	Input/Output
	6	Mouse clock	Input/Output

MF2 Keyboard

Socket	Pin	Designation	Direction
	1	Clock	Keyboard
	2	Data	Keyboard
	3	–	–
	4	0 V	–
	5	+ 5 V	–
	6	–	–
	7	–	–

3.1.2 Setting Serial Interface IF1B

DIL switches for IF1B

When the unit is supplied, the serial interface IF1B is set to RS485 with RTS on Pin 4. Using the DIL switches next to the socket, the interface can be set to other RS485 modes or to RS422 mode. Only the switch settings shown in Figure 3-3 are permissible.

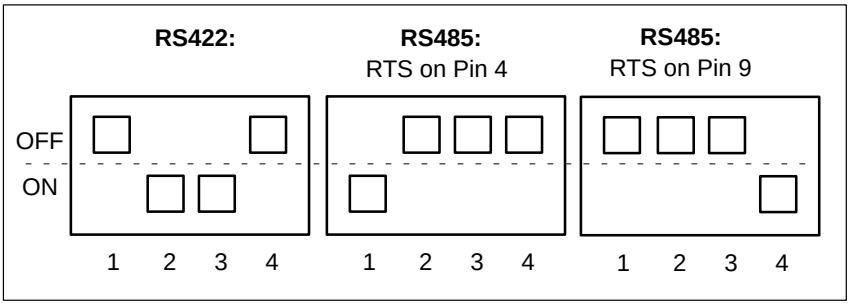


Figure 3-3 Permissible DIL switch settings

3.2 Connecting the Power Supply

Power supply requirements

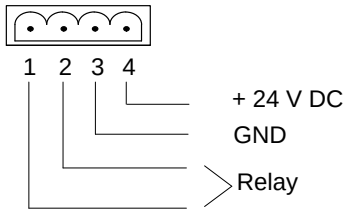
Power supply	24 V DC
Voltage range	18 V to 30 V

Caution

- With 24-V power supply units, care must be taken to ensure **safe electrical isolation** of the low voltage circuit. Use only power supply units to IEC 364-4-41 or HD 384.04.41 (VDE 0100, Part 410) standard!
- The supply voltage must be within the voltage range specified above. If it is not, the possibility of functional failure on the part of the unit can not be excluded.

Power supply socket pin assignment

The four-pin socket for the power supply has the following pin assignment:



Terminal block

The power supply is connected via the four-pole terminal block supplied as follows:

- Secure wires in terminal block (wire cross-sectional area: 0.5...2.5 mm^2)
- Plug terminal block into lower connector on OP

Earth connection (earth screw)

The earth screw on the rear panel of the unit (see Figure 3-2) must be connected to the cabinet earth.

User-Specific Settings

4

Overview

This chapter explains how to alter the settings in the Setup program.

4.1 The Setup Program

The Setup program is in the ROM BIOS. The system configuration settings are stored in the operator panel's battery-protected memory.

You can use Setup to define the system configuration (e.g. hard disk type) and system properties. Setup is also used to set the system date and time on the clock module. For alter the settings an external keyboard must be connected.



Caution

The OP47-12 device configuration is preset for operation with the software supplied. You should only alter the existing settings if you have made technical modifications to the unit.

Starting Setup

After completing the startup test, the BIOS offers you the option of starting Setup in order to change specific system settings.

To start Setup, press DEL as soon as the appropriate prompt appears on the screen after booting the system.

Setup main menu

When Setup starts, you are first presented with the Setup Main Menu from where you can switch to the individual Setup screens.

```
              ROM PCI/ISA BIOS (2A59F000)
                  CMOS SETUP UTILITY
                AWARD SOFTWARE, INC.

STANDARD CMOS SETUP             INTEGRATED PERIPHERALS
BOIS FEATURES SETUP             PASSWORD SETTING
CHIPSET FEATURES SETUP          IDE HDD AUTO DETECTION
PNP/PCI CONFIGURATION           SAVE & EXIT SETUP
LOAD BIOS DEFAULTS              EXIT WITHOUT SAVING
LOAD SETUP DEFAULTS

Esc : Quit                      ↑↓→←   : Select Item
F10 : Save & Exit Setup         (Shift)F2 : Change Color

             Time, Date, Hard Disk Type ...
```

Figure 4-1 Setup Main Menu

Switching to Setup screens

From the Main Menu, you can switch to the required Setup screens as follows:

Step	Action	Result
1	Select the required Setup screen by means of the arrow keys ↓ and ↑.	The selected screen is highlighted in inverse type.
2	Press RETURN.	The required Setup screen is displayed.
3	After returning to the Main Menu from a Setup screen: – Press ESC – Press F10	 To quit Setup without saving the changes made To quit Setup and save the changes made
4	Press Y (on German keyboard: Z) or Press N	To confirm that you wish the changes to be saved or To discard the changes

Program controls on the Setup screens

The Setup screens offer the following program control options:

Key	Function
Arrow keys ↓ and ↑	Activate option boxes and enable scrolling within an input box
ESC	Returns you to the Setup Main Menu, any changes are retained but at that point not saved
Page Up/Page Dn/+/–	Scroll the list of possible options for the box concerned
F1	Activates Online Help
F5	Restores the previous contents of the active box
F6	(=Load BIOS Defaults) Loads the BIOS manufacturer's default settings for the active Setup screen. These create a stable overall system condition.
F7	(=Load Setup Defaults) Loads the Setup default settings for optimum OP configuration with regard to the active Setup screen. These ensure optimum system capacity utilization and best possible OP system performance.

The settings required for SIMATIC WIN CC are described in the commissioning instructions.

Standard CMOS Setup

The screen “Standard CMOS Setup” provides the facility for setting various system components as follows:

- Date and time
- Hard disk parameters as follows:
  The default setting is **Primary Master: Auto**, i.e. the hard disk used on the OP is automatically detected when the unit is started up. The hard disk settings should not be altered.
- FDD information as follows:
  Assignment of the drive letter and the disk capacity for the floppy drive on the OP.
- Display parameters
- Memory details

```
                        ROM PCI/ISA BIOS (2A59F000)
                            CMOS SETUP UTILITY
                          AWARD SOFTWARE, INC.

   Date (mm:dd:yy) : Sat, Feb 07 1998
   Time (hh:mm:ss) : 15 : 26 : 28
   HARD DISKS         TYPE    SIZE    CYLS  HEAD PRECOMP LANDZ SECTOR  MODE
   ------------------------------------------------------------------------

   Primary Master   : Auto       0       0     0       0     0      0  AUTO
   Primary Slave    : Auto       0       0     0       0     0      0  AUTO
   Secondary Master : Auto       0       0     0       0     0      0  AUTO
   Secondary Slave  : Auto       0       0     0       0     0      0  AUTO

                                          Base Memory:   640K
                                      Extended Memory: 15360K
                                         Other Memory:   384K
                                      ------------------------
                                         Total Memory: 16384K

   ESC: Quit                  ↑↓→←:Select Item          PU/PD(+/- : Modify
   F1 : Help                  (Shift)F2 : Change Color
```

Figure 4-2 “Standard CMOS Setup” screen

BIOS Features Setup

This screen specifies the default settings for the components used in the system, e.g. the boot disk drive sequence (default setting: A, C, SCSI).

The **Security Option** setting allows you to specify for which part of the system password protection is to be activated (default setting: Setup).

The password itself can be defined on the “Password Setting” screen (see Figure 4-7).

Apart from the setting for **Security Option** we strongly recommend that you do not alter the default settings on this screen!

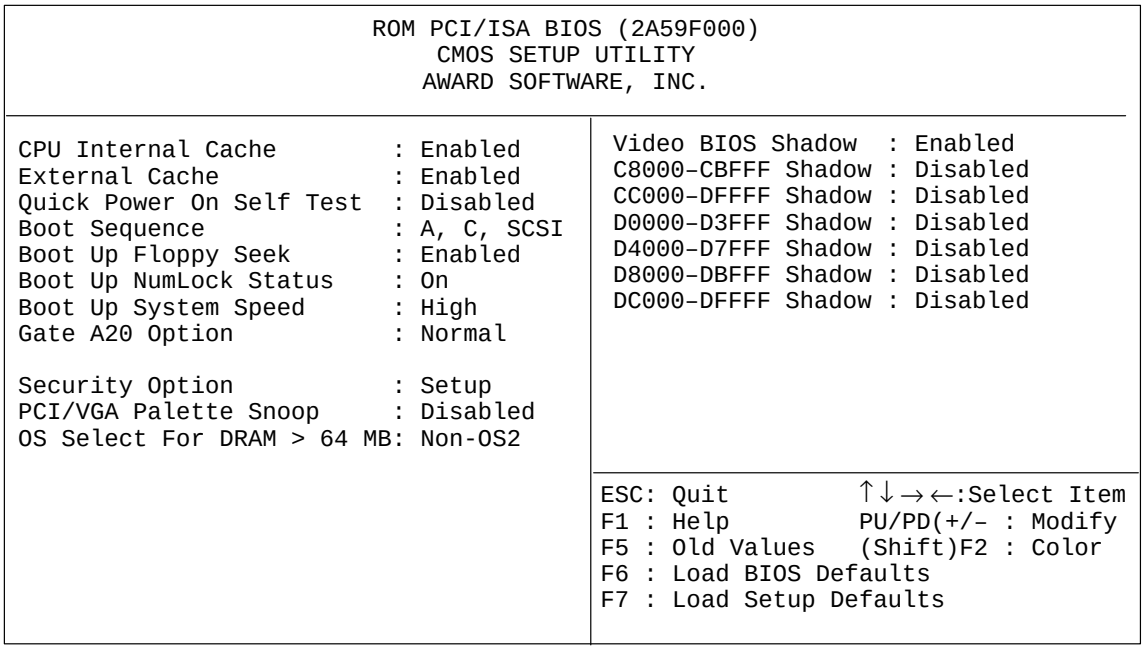


Figure 4-3 “BIOS Features Setup” screen

Chipset Features Setup

This screen contains the defaults for chipset-specific settings and settings for system components (memory etc.). The settings have been selected for optimum system performance and should therefore not be altered.

```
                    ROM PCI/ISA BIOS (2A59F000)
                      CMOS SETUP UTILITY
                    AWARD SOFTWARE, INC.
Auto Configuration          : Enabled   | Memory Parity/ECC Check : Auto
DRAM Timing                 : 60ns      | Single Bit Error Report : Enabled
DRAM RAS# Precharge Time    : 3         | L2 Cache Cacheable Size : 64MB
DRAM R/W Leadoff Timing     : 6/5       | Chipset NA# Asserted    : Enabled
Fast RAS# To CAS# Delay     : 3         | Pipeline Cache Timing   : Faster
DRAM Read Burst (EDO/FPM)   : x222/x333 | Passive Release         : Enabled
DRAM Write Burst Timing     : x222      | Delayed Transaction     : Disabled
Turbo Read Leadoff          : Disabled
DRAM Speculative Leadoff    : Enabled
Turn-Around Insertion       : Disabled
ISA-Clock                   : PCICLK/4

System BIOS Cacheable       : Enabled
Video  BIOS Cacheable       : Enabled
8 Bit I/O Recovery Time     : 3         ------------------------------------
16 Bit I/O Recovery Time    : 2         ESC: Quit         ↑↓→←:Select Item
Memory Hole At 15M-16M      : Disabled  F1 : Help         PU/PD(+/- : Modify
Peer Concurrency            : Enabled   F5 : Old Values   (Shift)F2 : Color
Chipset Special Features    : Disabled  F6 : Load BIOS Defaults
DRAM ECC/PARITY Select      : ECC       F7 : Load Setup Defaults
```

Figure 4-4 “Chipset Features Setup” screen

PNP/PCI Configuration

This screen contains the settings for the system's "Plug-and-Play" functions. The settings have been selected for optimum system performance and should therefore not be altered.

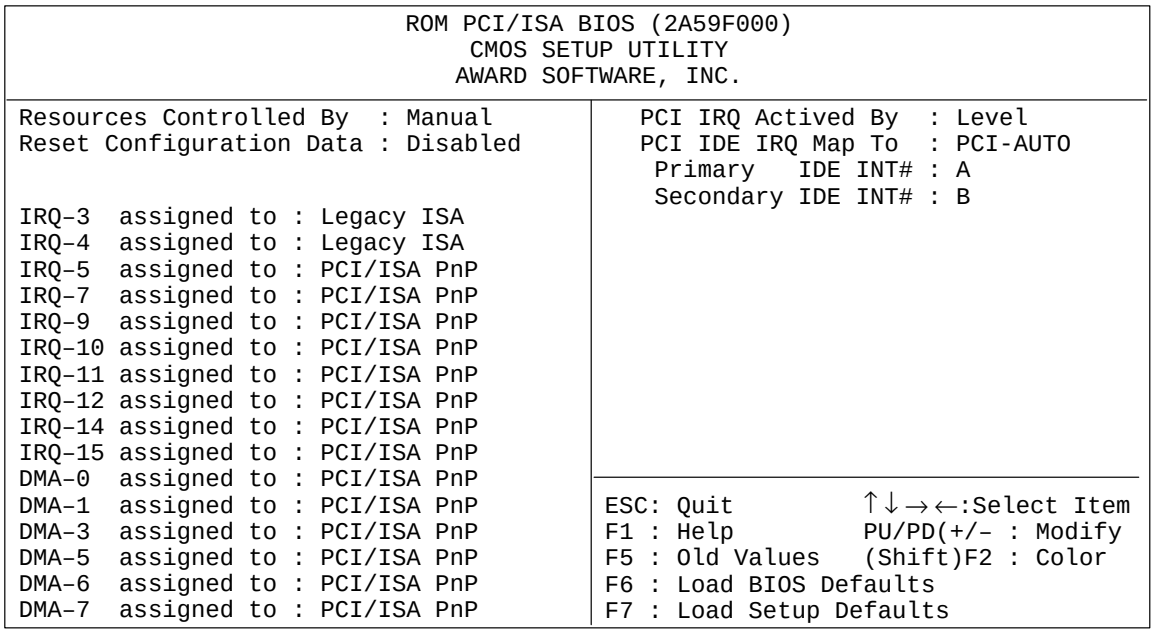


Figure 4-5 "PNP/PCI Configuration" screen

Integrated Peripherals

This screen allows you to specify the interface parameters for connecting peripheral devices.

```
                        ROM PCI/ISA BIOS (2A59F000)
                            CMOS SETUP UTILITY
                          AWARD SOFTWARE, INC.

IDE HDD Block Mode          : Disabled

On-Chip Primary    PCI IDE: Enabled
On-Chip Secondary  PCI IDE: Disabled
IDE Primary Master PIO    : Auto
IDE Primary Slave  PIO    : Auto


FDC Controller              : Enabled
PCMCIA ATA HDD              : Disabled

Parallel Port               : LPT1/IRQ7


ASPC2                       : Disabled
Matrix Keyboard             : Disabled


PS/2 mouse                  : IRQ12

Serial 1 Address   : COM1
         Interrupt : IRQ4
         Physical  :  TTY/V24 (IF1 A)
Serial 2 Address   : Disabled
         Interrupt : Disabled
         Physical  : TTY/V24 (IF2)
Serial 3 Address   : Disabled
         Interrupt : Disabled
         Physical  : TTY/V24 (IF3)
Serial 4 Address   : COM2
         Interrupt : IRQ3
         Physical  : RS232 (IF4)

ESC: Quit          ↑↓→←:Select Item
F1 : Help          PU/PD(+/– : Modify
F5 : Old Values    (Shift)F2 : Color
F6 : Load BIOS Defaults
F7 : Load Setup Defaults
```

Figure 4-6 “PNP/PCI Configuration” screen

- PCMCIA ATA HDD:
  Must be set to ”Enabled” if the OP is to be booted from a PCMCIA hard disk.
- Parallel Port:
  Default setting is “LPT1/IRQ7” for connecting a printer to the parallel interface. You can alter the setting for connecting various other devices (e.g. a CD-ROM drive).
  Possible parameters: Disabled, LPT1, EPP, ECP.
- ASPC2:
  If the integrated ASPC2 is to be used for MPI/DP communication, an unassigned interrupt must be specified here. The driver must then be installed in Windows.
- Serial 1 to Serial 4:
  These options are for entering the settings for external ports on the rear panel of the OP. The default settings correspond to the assignment of the SIMATIC HMI OP family as supplied.

  Interface IF4 is used internally.

Password Settings

On this screen you can specify, alter or disable the password required for starting Setup.

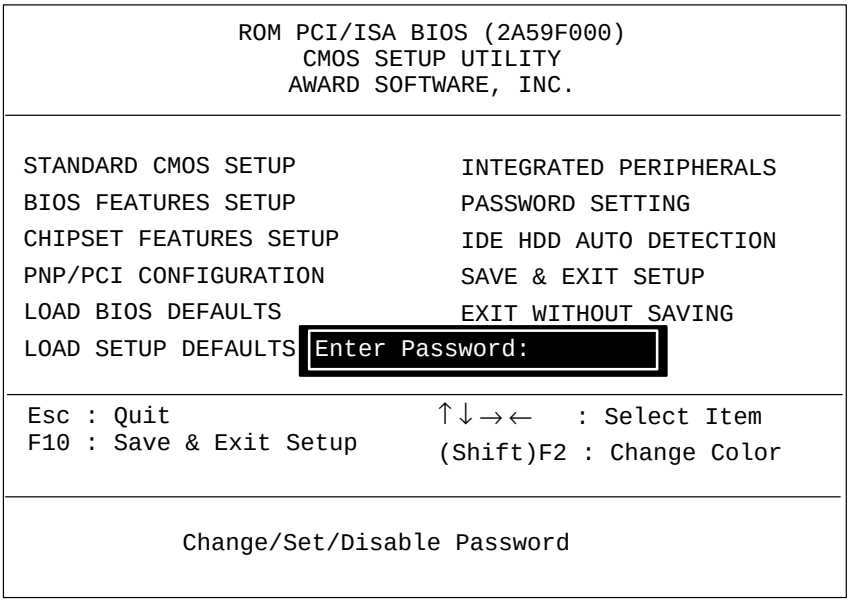


Figure 4-7 Password setup

IDE HDD Auto Detection

The screen “IDE HDD Auto Detection” shows the hard disk parameters identified by the “Autodetect” function.

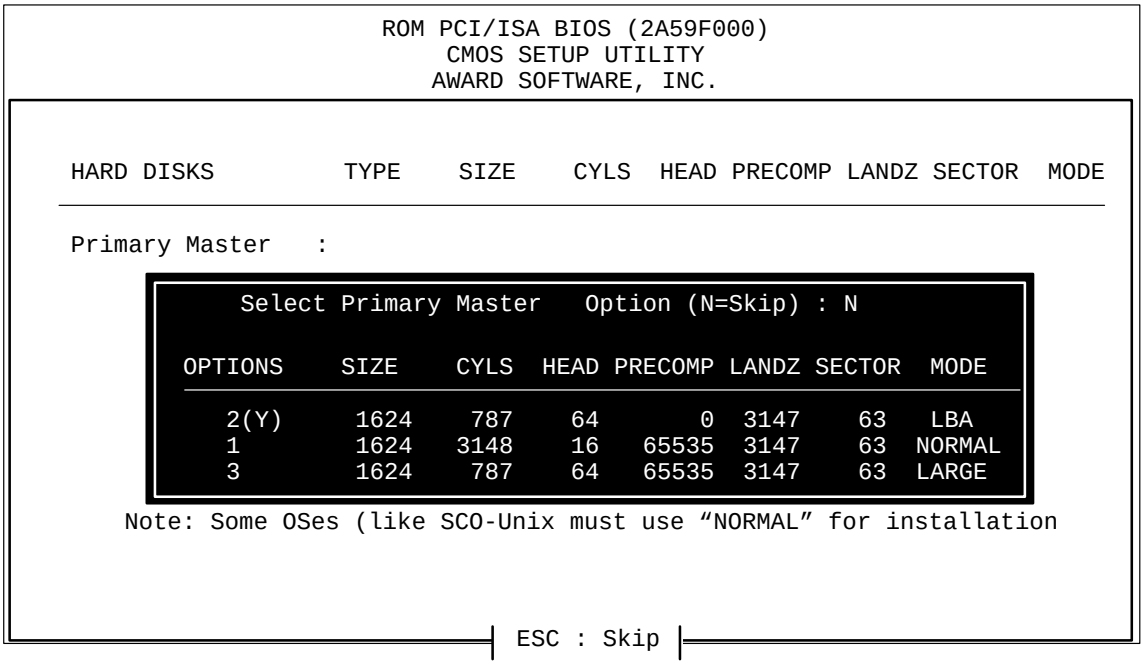


Figure 4-8 “IDE HDD Auto Detection” screen

Installing Expansion Modules and Optional Equipment

5

This chapter contains instructions for

- installing AT cards in the AT expansion box
- installing a direct key module
- connecting an external mouse
- as well as a table of interrupt assignments.

5.1 AT Cards

The OP47-12 has an AT expansion box with two expansion slots for 2/3-length 16-bit AT cards (ISA).

Cards installable in AT slots

The cards that can be fitted in the AT slots are communication cards, for example.

Fitting AT cards

To install an AT card, proceed as follows:



Warning

Make sure the OP is disconnected from the power supply. Before carrying out any work on the opened unit make sure you have observed the ESD guidelines in the Appendix.

1. Place OP47-12 with the front panel face down.
2. Release the five screws shown in Figure 5-1 with the number ①.

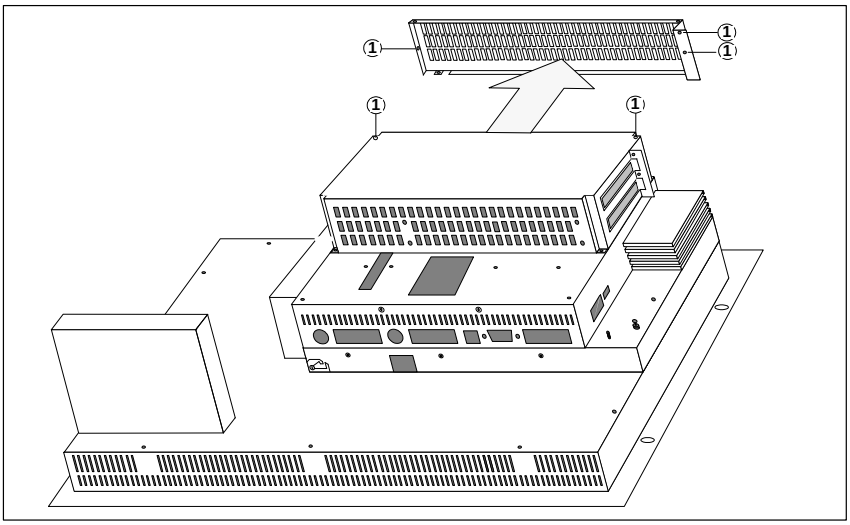


Figure 5-1 Removing the side panel

3. Remove the side panel.
4. Carefully insert AT cards in slot so that interface sockets locate in the cut-outs provided in the AT expansion box. The angled fixing bracket of the AT card should locate against the front fixing bracket of the side panel.

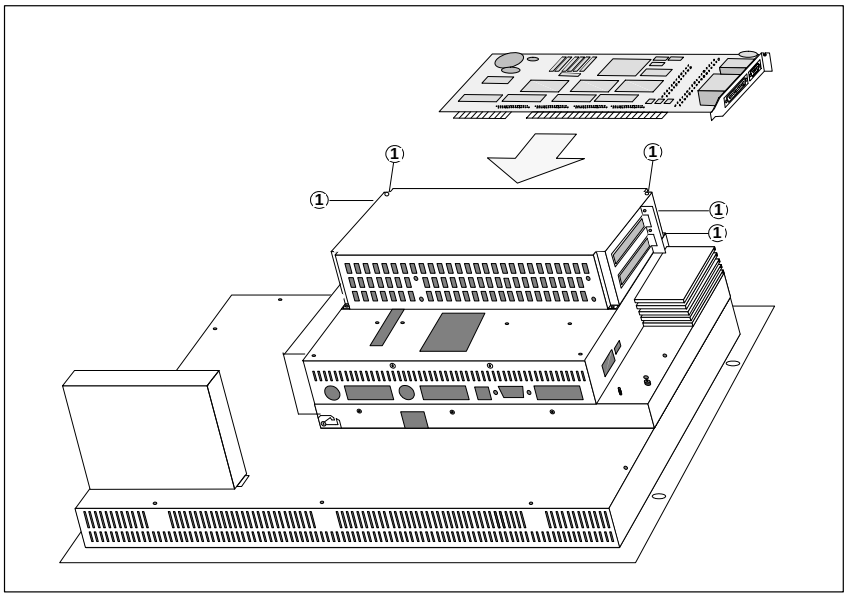


Figure 5-2 Inserting an AT card

5. Adjust side panel and fix with five screws ①.
6. Connect peripheral devices to AT cards.

5.2 Direct Key Module

You can order a direct key module for the OP47-12 as an optional extra. It consists of two module boards and an outer casing that is screwed to the back of the OP47-12. It can be fitted as an upgrade at any time.

Function of the direct key module

The direct key module is used in situations where direct operation of the keys without communication-related delays is required. Example: direct keys for inching mode.

The direct key module (DKM) provides two sets of eight digital outputs. Those outputs are set by pressing the relevant function keys.

This function can be set by means of the DIL switches on the direct key module.

External power supply

The digital outputs are electrically isolated from the operator panel by optocouplers. The module boards therefore require their own separate power supply.

5.2.1 Fitting the Direct Key Module

In order to fit a direct key module to the OP47-12, proceed as follows:

1. Place OP47-12 with the front panel face down.



Caution

- Make sure the OP is disconnected from the power supply.
- Before carrying out any work on the opened unit make sure you have observed the ESD guidelines in the Appendix.

2. Release the two rivets ① and remove the cover plate shown in Figure 5-3 with the number ② from the back of the OP.

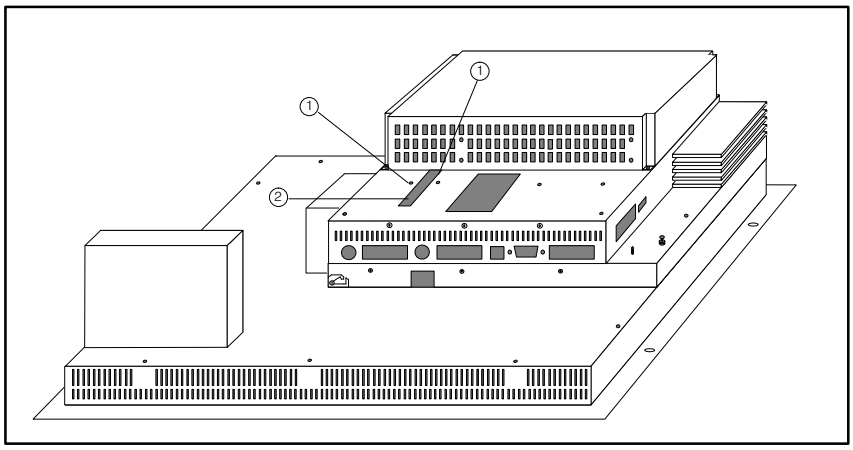


Figure 5-3 Removing the cover plate

3. Plug direct key module connector into socket located under the cover plate ② (see Figure 5-3).
4. Fix direct key module to the OP using the four screws ③ supplied (see Figure 5-4).

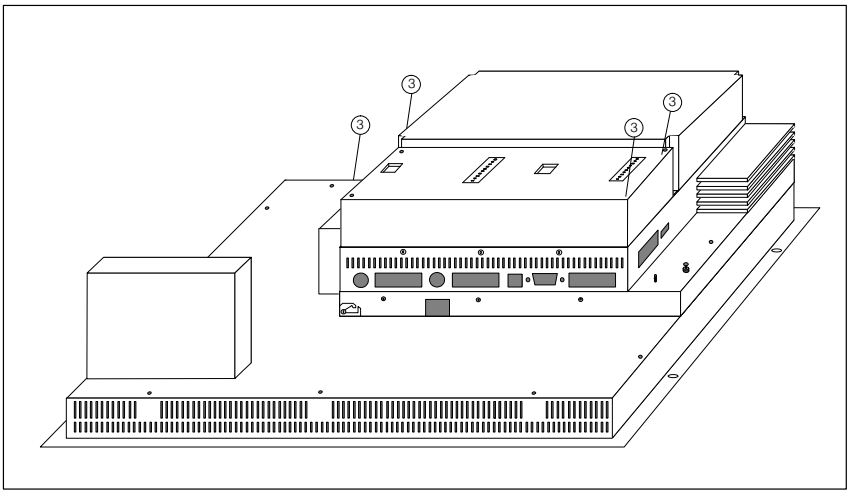


Figure 5-4 Fixing direct key module to OP

5.2.2 Connections and Adjusters

Each of the two module boards of the direct key module has

- a 10-pin connector strip
  for connecting the outputs of the external power supply unit
- a row of DIL switches
  for setting whether the outputs are set by keyboard input or the software.

When the module is fitted, the connector strip and the DIL switches are on the rear panel of the OP.

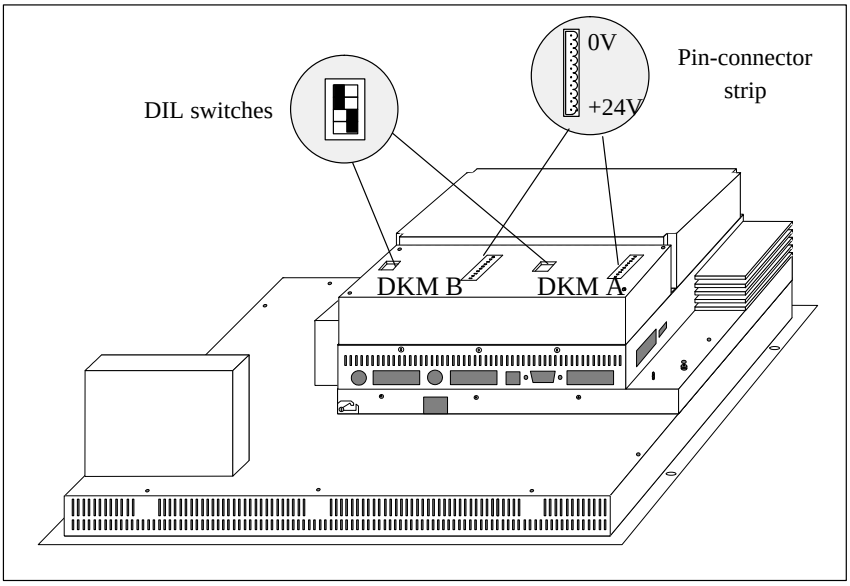
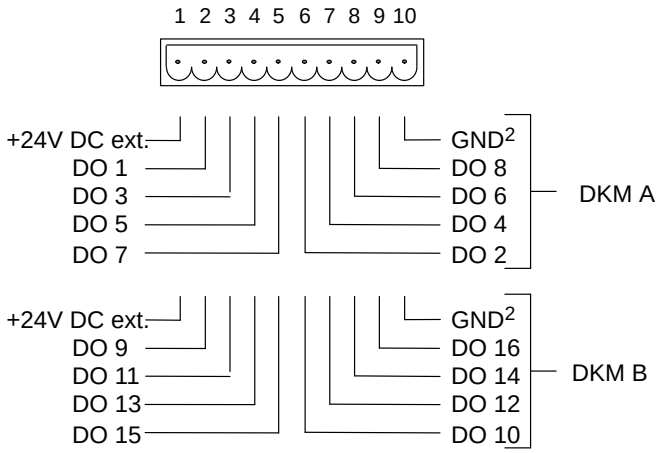


Figure 5-5 Position of connections and adjusters

Pin-connector strips

The pin assignment of the connector strips on module boards DKM A and DKM B is as follows:



2) Electrically isolated

The components to be controlled, (e.g. relays, indicator lamps, etc.) are connected as follows using the five-pin terminal strips supplied:

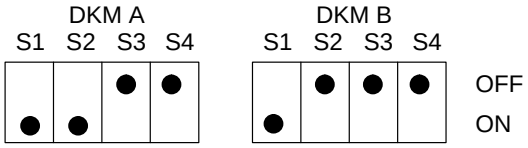
- Secure wires in terminal blocks
  (wire cross-sectional area: 0.5...2.5 mm^2)
- Plug terminal blocks into connector on direct key module

DIL switches

The setting of the DIL switches determines how the digital outputs of the direct key module are controlled.

- When the switches are set to OFF the outputs are controlled by means of function keys.
- Setting the switches to ON has no function.

DIL switch settings:



S1 is always ON; S2 selects the module board.

S3 and S4 each control one group of outputs as shown below:

		OFF	ON
DKM A	S3	F9/F11/F13/F15 function as direct keys	–
	S4	F10/F12/F14/F16 function as direct keys	–
DKM B	S3	F17/F19 function as direct keys	–
	S4	F18/F20 function as direct keys	–
The assignment of the function keys in this table relates to the standard key assignment without plug-in module.			

When switch S3 or S4 is set to the OFF position, the digital outputs are permanently assigned to the keys F9 ... F20 as follows:

Key F9 sets output DO 1

Key F10 sets output DO 2

-
-
-

Key F20 sets output DO 12.

5.3 External Mouse

There is a permanently fitted internal mouse on the front panel for operating the OP47-12. If you wish, however, you can install a standard PS/2 mouse. To do so, remove the connector for the internal mouse on the rear panel of the OP (see Figure 3-2) and plug in the connector for the external mouse.

5.4 Interrupt Assignment

Table 5-1 below details the interrupt assignment. This information is required primarily in order to prevent conflicts between modules (e.g. caused by using the same hardware interrupt) when using additional modules.

The 16 hardware interrupts (IRQ 0 to IRQ 15) are controlled on the OP47-12 by two integral type-82C59 interrupt controllers. The INT output of the slave controller is connected to the IRQ 2 input of the master controller.

Table 5-1 I/O addresses of interrupt controllers

List of Hardware Interrupts		Programmable Interrupt Vector, Memory Address
NMI	RAM parity; I/O channel parity	INT 2_H
IRQ 0	Timer output 0, internal peripheral-device controller (ISP)	INT 8_H
IRQ1	Keyboard (output buffer full)	INT 9_H
IRQ 2	Interrupt of slave interrupt controller	INT A_H
IRQ 3*)	Serial interface (COM 2)	INT B_H
IRQ 4*)	V.24/V.28 interface, serial interface (COM 1)	INT C_H
IRQ 5*)	User-assignable	INT D_H
IRQ 6*)	Floppy controller	INT E_H
IRQ 7*)	Parallel printer interface 1 (LPT)	INT F_H
IRQ 8*)	Real-time clock (RTC) low active	INT 70_H
IRQ 9*)	User-assignable	INT 71_H
IRQ 10*)	User-assignable	INT 72_H
IRQ 11*)	User-assignable	INT 73_H
IRQ 12*)	PS2 mouse	INT 74_H
IRQ 13	Maths processor	INT 75_H
IRQ 14*)	Hard disk controller; IDE interface	INT 76_H
IRQ 15*)	User-assignable	INT 77_H

* These signals are applied to the peripheral-device ports and can also be used by the PCMCIA interface.

Servicing/Maintenance

6

Overview

The operator panel is designed for low maintenance.

The tasks involved in maintaining the OP are the following:

- Regular cleaning of the Cleaning keyboard sealing film and the display using a damp cloth (use water only),
- Replacing the backup battery and
- Replacing the display backlighting.

You can install or replace the following components on the OP47-12 yourself:

- AT expansion box and AT cards,
- Direct key module,
- Hard disk and
- Floppy disk drive.

Instructions on how to fit AT cards and a direct key module are given in Chapter 5.

6.1 Casing Components

Overview

Almost all maintenance and servicing operations necessitate opening the OP. The only exceptions are

- replacing the battery and
- replacing AT cards

Housing components

The casing of the OP47-12 is made up of the following components:

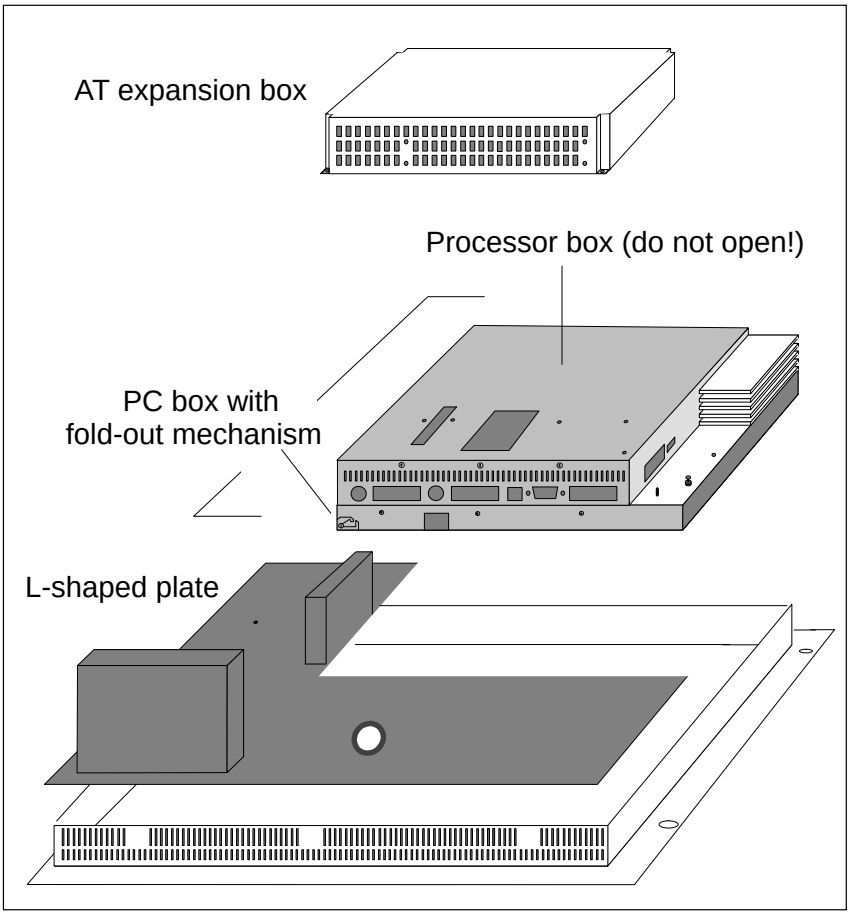


Figure 6-1 Casing components of OP47-12

Caution

If you remove the unit immediately after switching it off, the outer case will still be hot due to heat dissipation from the heatpipe.



Caution

When you open the OP, you must not open the processor box attached to the PC box. The screws are sealed. If those seals are broken, the manufacturer's guarantee on your OP will be void. Assuming the manufacturer's guarantee for your unit has not expired, you should have any work on components inside the processor box carried out by your local Siemens agents.

Safety precautions

Observe the following precautions before opening the unit:



Warning

- Repairs to the unit may only be carried out by suitably qualified and authorized technical staff!
- Opening of the unit by unauthorized persons and failure to follow the correct repair procedures can can be highly dangerous.



Caution

- The backlighting uses voltages > 1000 V. Make sure that the OP is disconnected from the power supply.
- Before carrying out any work on the opened unit make sure you have observed the ESD guidelines in the Appendix.

6.2 AT Expansion Box

The AT expansion box is screwed onto the rear of the OP47-12. To replace the AT expansion box, proceed as follows:

Caution

- Make sure the OP is disconnected from the power supply.
- Before carrying out any work on the opened unit make sure you have observed the ESD guidelines in the Appendix.

1. Place OP47-12 with the front panel face down.
2. Release the four screws ① and withdraw AT expansion box vertically so that the connection with the casing comes apart.

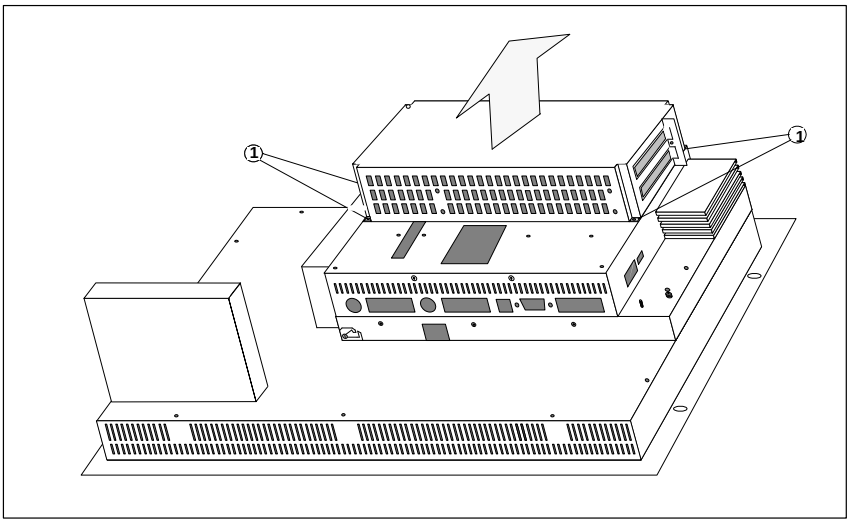


Figure 6-2 Replacing the AT expansion box

3. Fit new AT expansion box by following the reverse procedure.
4. Remove AT cards from replaced AT expansion box and fit in new AT expansion box (see Chapter 5.1).

6.3 Replacing Backlighting

To replace the backlighting tubes, proceed as follows:

1. Remove the L-shaped plate.
2. Fold out the PC box.
3. Replace the tubes.
4. Reassemble the unit.



Warning

Liquid crystal can leak out of a damaged display.

It is absolutely essential to avoid skin contact with the fluid and inhaling the vapor. If you should inadvertently come into contact with the liquid crystal, clean the skin immediately with alcohol.

Consult a doctor immediately!

The difference in brightness between a new and an old CCFL backlighting tube is clearly noticeable on the display. For that reason, if one tube has failed you should replace the other one at the same time. This will also save you the trouble of opening up the unit again within a short time when the second tube fails.

To replace the backlighting tubes, proceed as follows:

Removing the L-shaped plate

First remove the L-shaped plate. To do so proceed as follows:

1. Place OP47-12 with the front panel face down.
2. Release the nine screws marked in Figure 6-3 with the number ① from the L-shaped plate; two of them are on the cover plate next to the PCMCIA slot.
3. Remove the L-shaped plate shaded grey in Figure 6-3.

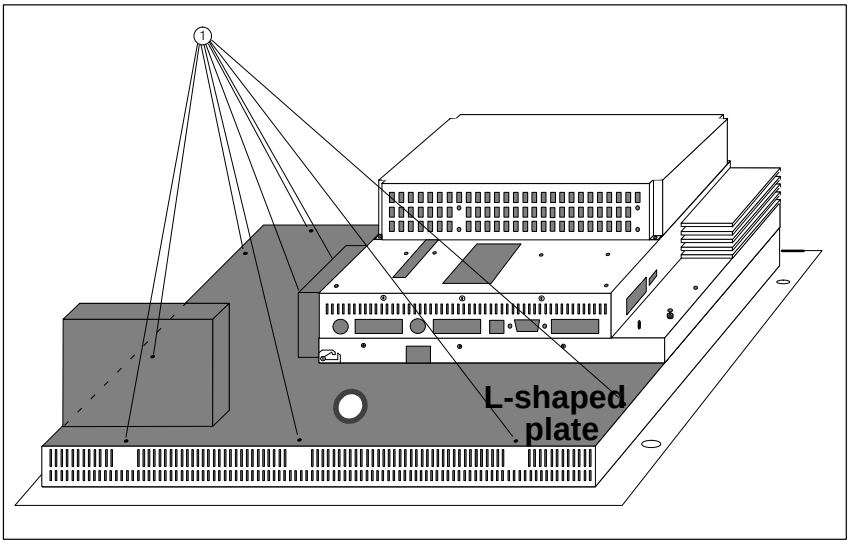


Figure 6-3 Removing the L-shaped plate.

Folding out PC box

To replace the backlighting, the PC box must be folded out after the L-shaped plate has been removed (see Figure 6-3).

To do so, proceed as follows:

1. Unscrew the two screws marked in Figure 6-4 with the number ①.
2. Carefully fold out the PC box.
3. Release rubber arrester and display connector on the inside.
4. Fold out the PC box to its full extent (90°).

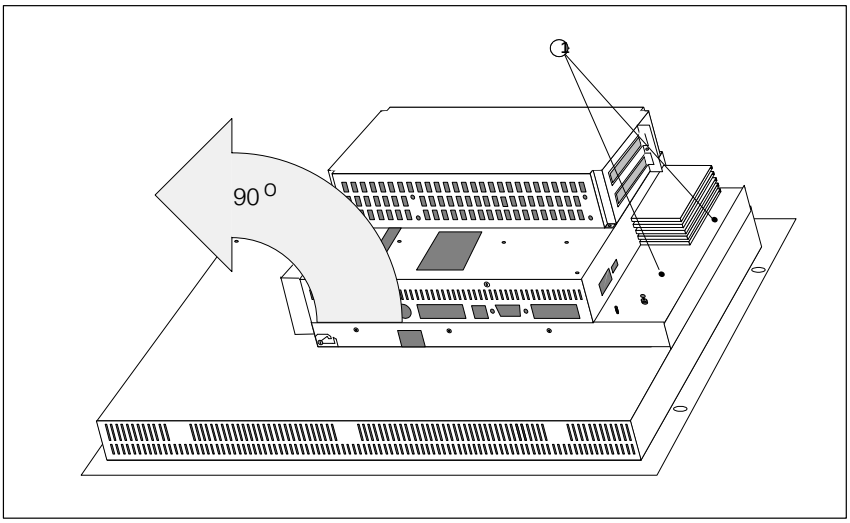


Figure 6-4 Releasing and folding out the PC box

Replacing the tubes

To replace the tubes, proceed as follows after folding out the PC box:

1. Disconnect the connectors for the pink and white power supply cable (Figure 6-5, ③) to the display inverter.
2. Release the screws marked in Figure 6-5 with the number ① from the tube covers (for detail see Figure 6-6). To do so, use a size 0 watchmaker's screwdriver for cross-headed screws.
3. Remove the fixing clamps and their surrounds from underneath the tube covers (for detail see Figure 6-6).
4. Remove covers ②.
5. Replace the tubes.
6. Reassemble unit by following the reverse procedure.

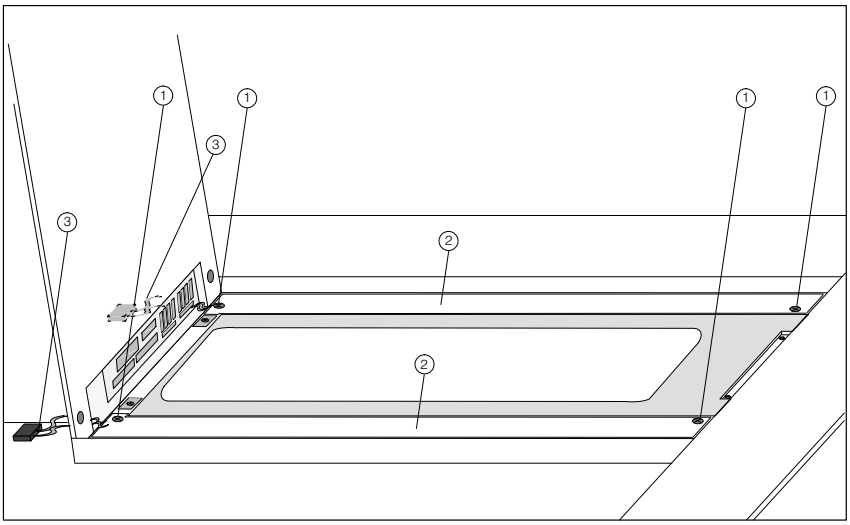


Figure 6-5 Releasing the tube cover screws on the display (general view)

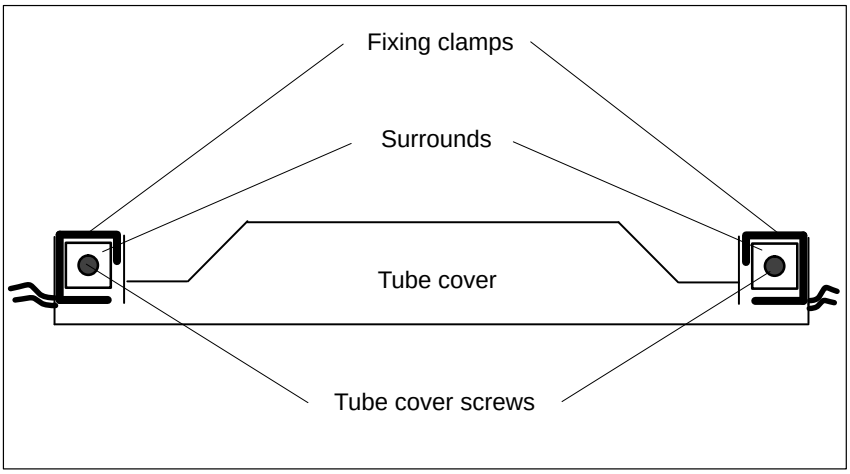


Figure 6-6 Releasing the tube cover screws on the display (detail)

6.4 Replacing the Hard Disk

To replace the hard disk, proceed as follows:

1. Remove the L-shaped plate.
2. Fold out the PC box.
3. Replace the hard disk.
4. Reassemble the unit.

Removing the L-shaped plate

First remove the L-shaped plate. To do so proceed as follows:

1. Place OP47-12 with the front panel face down.
2. Release the nine screws marked in Figure 6-7 with the number ① from the L-shaped plate; two of them are on the cover plate next to the PCMCIA slot.
3. Remove the L-shaped plate shaded grey in Figure 6-7.

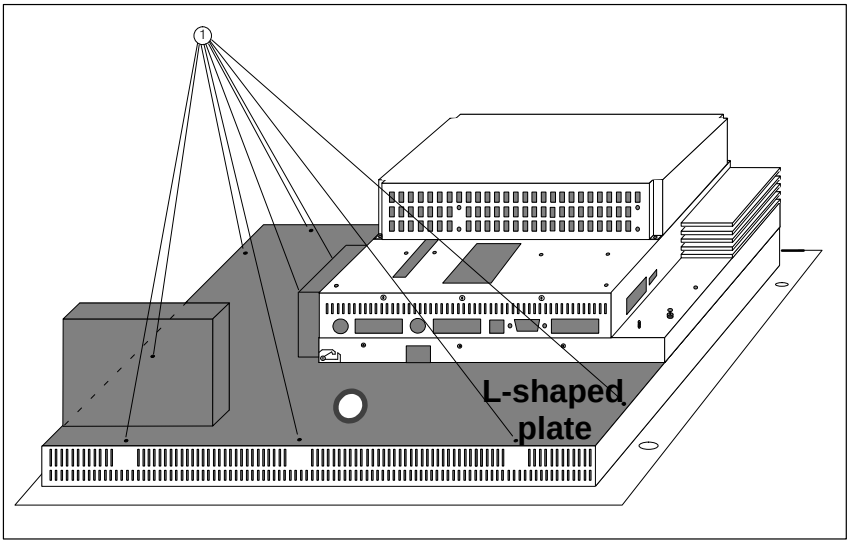


Figure 6-7 Removing the L-shaped plate.

Folding out PC box

To replace the hard disk, the PC box must be folded out after the L-shaped plate has been removed (see Figure 6-7).

To do so proceed as follows:

1. Unscrew the two screws marked in Figure 6-8 with the number ①.
2. Carefully fold out the PC box.
3. Release rubber arrester band and display connector on the inside.
4. Fold out the PC box to its full extent (90°).

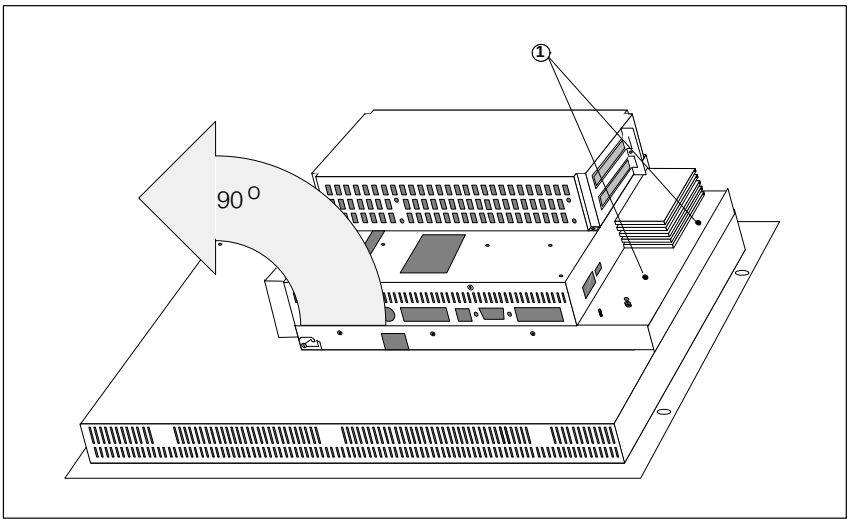


Figure 6-8 Releasing and folding out the PC box

Replacing the hard disk

To replace the hard disk, proceed as follows after folding out the PC box:

1. Disconnect the hard disk power supply connector ①
2. Disconnect the hard disk ribbon cable ②.
3. Remove four screws ③ and lift off hard disk together with insulating frame.
4. Remove hard disk from insulating frame.
5. Insert new hard disk in insulating frame.
6. Refit hard disk and insulating frame using four screws ③.
7. Reconnect hard disk ribbon cable ② and hard disk power supply cable ①.
8. Reassemble unit.

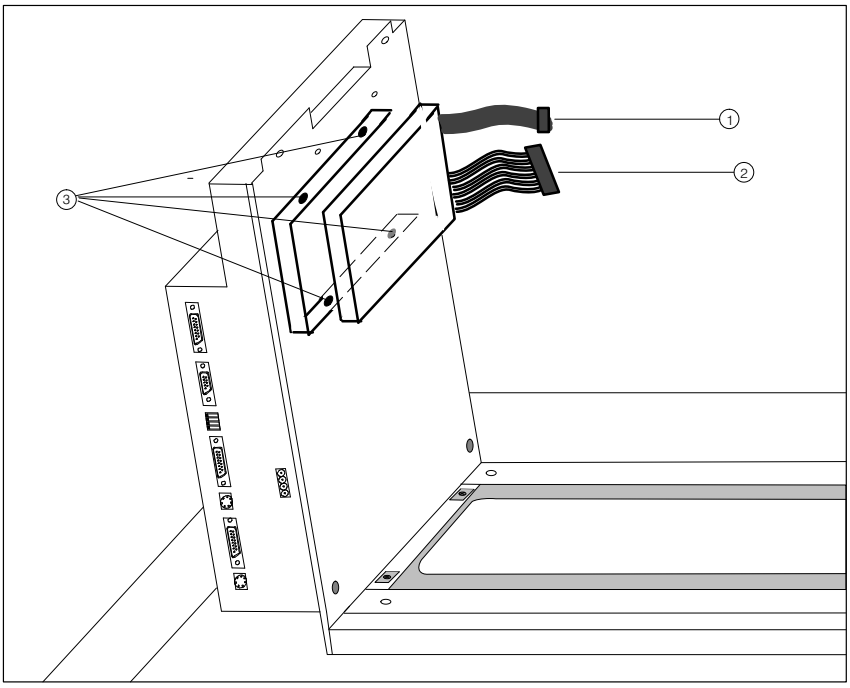


Figure 6-9 Removing hard disk screws

6.5 Replacing the Floppy Disk Drive

To replace the floppy disk drive, proceed as follows:

1. Remove the L-shaped plate.
2. Replace the floppy disk drive.
3. Screw the L-shaped plate back in place.

Removing the L-shaped plate

First remove the L-shaped plate. To do so proceed as follows:

1. Place OP47-12 with the front panel face down.
2. Release the nine screws marked in Figure 6-10 with the number ① from the L-shaped plate; two of them are on the cover plate next to the PCMCIA slot.
3. Remove the L-shaped plate shaded grey in Figure 6-10.

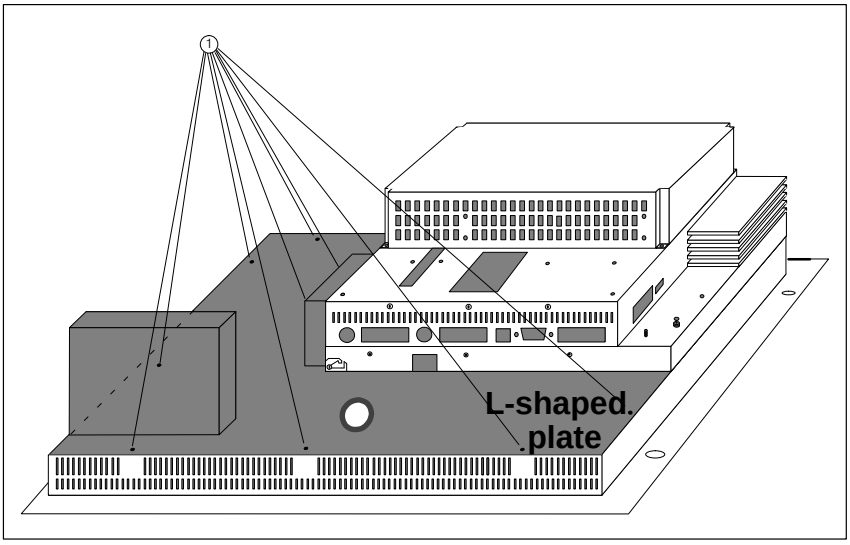


Figure 6-10 Removing the L-shaped plate.

Replacing the floppy disk drive

To replace the floppy disk drive, proceed as follows after removing the L-shaped plate:

1. Slide the connector cover ① in the direction of the arrow as shown in Figure 6-11. Disconnect ribbon cable ②. When connecting the cable to the terminal on the new floppy disk drive, make sure that the side of the cable with the end colored blue is facing upwards and the cable contacts are facing downwards.

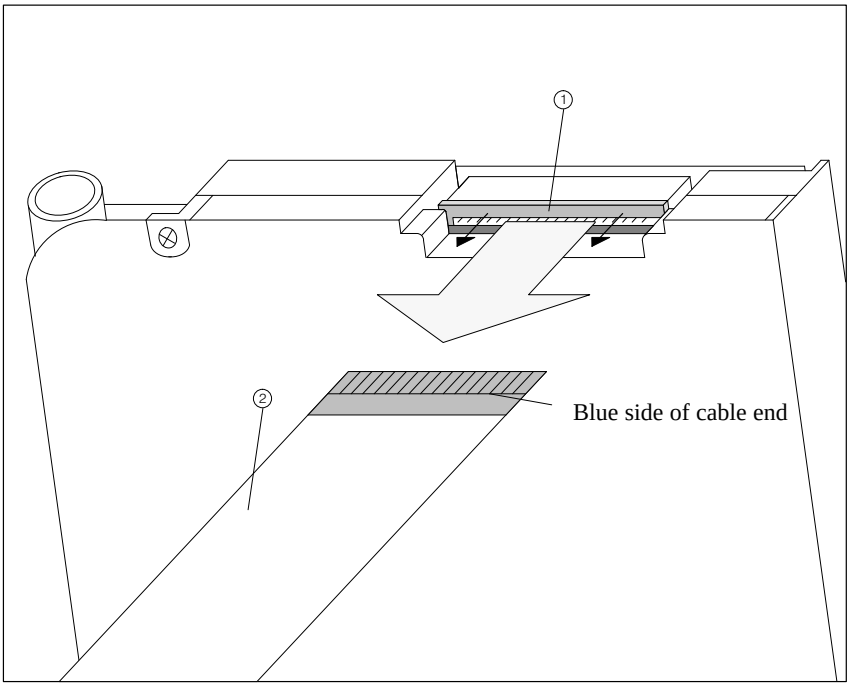


Figure 6-11 Releasing the connector cover and disconnecting the cable

2. On the rear of the floppy disk drive base plate, release three screws ③ (see Figure 6-12).
3. Remove floppy disk drive.

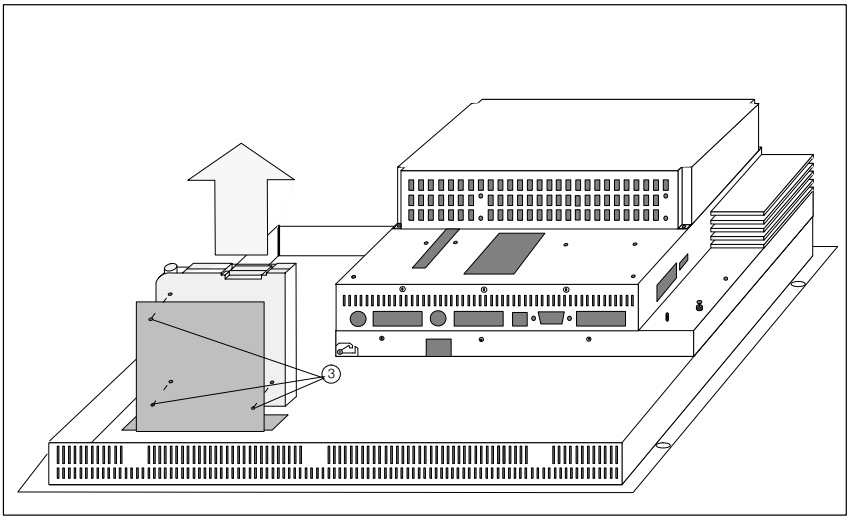


Figure 6-12 Removing the screws on the floppy disk drive mounting bracket and removing the floppy disk drive from the base plate

4. Fit new floppy disk drive by following the reverse procedure.
5. Screw the L-shaped plate back in place.

6.6 Backup Battery

Function

The backup battery makes sure that when the power supply is turned off,

- the operating data in the SRAM of the OP is not lost, and
- that the hardware clock keeps running.

Battery life

The OP uses a lithium battery. It is fitted when the unit is supplied and under normal operating conditions has a typical service life of about 5 years.

Battery condition

A discharged battery is indicated by a system message when the OP is in use. The backup battery should be replaced as soon as possible after the message has been displayed.

Battery suppliers

New batteries should be obtained from the Siemens spare parts service. They are supplied ready to fit (with cable and connector).

Safety precautions

When handling lithium batteries you should observe the following precautions:



Warning

- If not handled properly, lithium batteries can explode.
- Batteries should never
  - be charged
  - be opened
  - be short circuited
  - have their poles reversed
  - be heated to over 100 °C
  - be exposed to direct sunlight for long periods.
- You should not allow condensation to form on batteries.
- If you have to transport the batteries, the hazardous good transport regulations for the relevant mode of transport must be observed (goods subject to identification).

Battery cover

The illustration below shows the position of the battery cover.

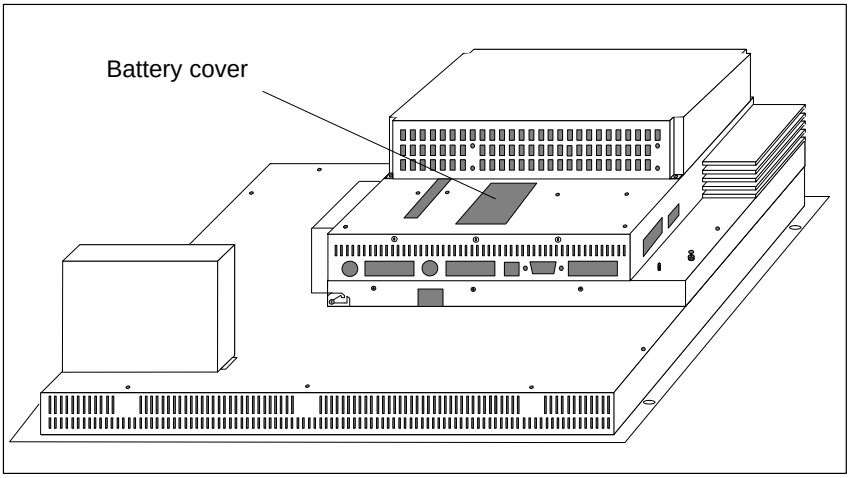


Figure 6-13 Position of battery cover

Before replacing

Before replacing the battery, observe the following precautions:

Caution

- The battery may only be replaced by suitable qualified personnel.
- Before replacing the battery make sure you have observed the ESD guidelines in the Appendix to this manual.

Caution

Always replace the battery with the power supply switched on so as to prevent loss of data (e.g. passwords).

Replacing the battery

To replace the battery, proceed as follows:

1. If you have fitted a direct key module, you must unscrew it (Chapter 5.2.1) in order to gain access to the battery cover (see Figure 6-13).



Caution

Before removing the direct key module you must switch off the OP! You must then switch the power supply on again to prevent loss of data when replacing the battery.

2. Fold out battery cover and discharged battery to rear and disconnect battery connector. Remove battery from cover.
3. Fit new battery by following the reverse procedure.



Caution

Used lithium batteries are classed as special-category waste and must be disposed of accordingly. They should be placed individually in plastic bags and sealed.

Technical Data

A

Overview

This chapter details the technical data for the OP47-12 for the following:

- Casing
- Processor
- Memory
- Software
- Display
- Keyboard
- Power supply
- Backup battery
- Relay contacts
- Direct key module
- AT expansion box
- Ambient conditions
- Interference immunity
- Interference emission

Casing	
External dimensions (WxH) in mm	482.6 × 354.8
Fitting cutout (WxH) in mm	433 × 335
Fitting depth in mm	144
Enclosure rating Front Rear	 IP65 IP20
Weight	Approx. 11 kg

Processor	
Type	Pentium
Clock frequency	200 MHz

Memory	
DRAM upgradable to	64 MB
Second-level cache	512 Kbytes
Floppy disk drive	1.44 MB
Hard disk	≥ 1.6 GB
PCMCIA/Jaida • Slot A • Slot B	 For type I, II, III For type I, II

Software	
Operating system environment	Windows NT
System software	SIMATIC WinCC

Display	
Type	TFT (active control), LCD
Resolution (hor. x vert.)	800 x 600
Display	256 colors
Effective screen area	246 x 184.5 mm
Backlighting	CCFL tubes
Service life[1]	Approx. 25,000 h

1) The backlighting tubes for the display are parts subject to wear and are therefore not covered by the terms of the guarantee. Depending on the operating temperature, they have a service life of around 25,000 hours. In unfavorable operating conditions we recommend that the tubes are replaced after that period. The tubes are available as spare parts. If one tube fails it is advisable to replace both at the same time in order to ensure even illumination.

Keyboard	
Type	Sealed keyboard
System keys	32 (4 with LED)
Soft keys (F)	20 (12 with LED)
Function keys (K)	16 (all with LED)

Power supply	
Power supply	24 V DC
Permissible range	18 V to 30 V
Max. permissible transients	35 V (500 ms)
Time between transients	50 s min.
Power consumption (without AT cards) Typically Maximum continuous current	 Approx. 2.2 A Approx. 2.5 A
Circuit breaker	Internal electronic

Backup battery for SRAM	
Type	3.6 V;
Voltage; capacity[2]	Lithium battery approx. 1.5 Ah

2) Technical data subject to alteration.

Relay contacts when power supply connected	
Switching capacity	24 V DC, 0.4 A (no inductive load)

Direct key module (optional)	
Number of outputs[3]	2 x 8
Max. output current	300 mA per output
Min. output voltage (high)	15 V per output
Max. output voltage (low)	10 V per output
Ext. power supply	24 V DC
Permissible range	18 V to 30 V

3) Only 12 outputs can be controlled by function keys.

AT expansion box	
Slots	2 standard ISA slots
Plug-in AT cards	2/3-length 16-bit cards
Maximum available power for consumption[4] by AT cards at	
• +5 V	2 A
• +12 V	1 A
• –5 V	100 mA
• –12 V	100 mA

4) The figures quoted apply to both cards together and must not be exceeded. If only one AT card is fitted, the maximum levels can be used by that card alone.

Ambient conditions	
Ambient temperature during operation	+5...+40° C (installed vertically)
(Vertical installation! Horizontal installation is **not permissible)**	4...35° C (inclined installation with max. inclination of 25°)
Transport, storage	–20...60° C
Installation position with FDD	Max. 25° inclination to front or rear
Relative air humidity	
During operation	Max. 80%, no condensation
Transport, storage	10%...90%, no condensation
Exposure to shock	
During operation	5 g / 30 ms during FD/HD accessing operations
	15 g / 11 ms at other times
Transport, storage	50 g
Vibration	
During operation	0.035 mm (10 – 58 Hz)
	1 g (58 – 500 Hz)
Transport, storage	3.5 mm (5 – 8.5 Hz)
	1 g (8.5 – 500 Hz)

Max. pressure difference (front/rear panel)	
Air pressure	
During operation	706...1030 hPa
Transport, storage	581...1030 hPa

Conformity of the product described with the requirements of Directive 89/336 EEC is certified by compliance with the following standards:

Interference immunity	
Static discharge	EN 64000-4-2 6 kV contact discharge 8 kV air discharge
HF radiation	ENV 50140 10 V/m, 80% AM, 1 kHz
Pulse modulation	ENV 50204 900 MHz ± 5 MHz duty cycle 10 $V/m_{eff.}$, 50% ED, 200 Hz
HF current	ENV 50141 150 kHz – 80 MHz 10 V, 80% AM, 1 kHz
Burst interference	EN 61000-44
Mains supply lines	
Supply lines	2 kV
Process data lines	2 kV
Signal lines	1 kV

Interference emission	
	EN 55011 Class A

ESD Guidelines

B

What does ESD mean?

Virtually all modern circuit boards are fitted with highly integrated modules or components using MOS technology. Due to the technology involved, such electronic components are very sensitive to excess voltages and therefore to electrostatic discharge.

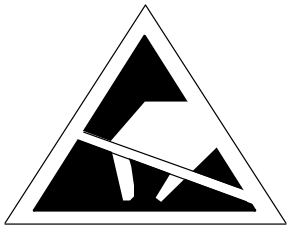
The common international term for such equipment is

Electrostatically Sensitive Devices

usually abbreviated to

ESD.

The symbol illustrated below appears on cabinets, module racks and packaging to indicate that they contain electrostatically sensitive devices and that therefore the appropriate precautions regarding touching those items should be observed.



ESDs can be damaged by voltages and energy levels far below those that we as humans are capable of perceiving. Such voltages can occur simply by a component or module being touched by a person whose electrostatic potential has not been discharged. Components subjected to such excess voltages do not normally immediately show obvious signs of damage as malfunction may not occur until the item concerned has been in operation for a long period.

Important safety precautions for preventing static charge

Most plastics very easily become statically charged and should therefore be kept well away from sensitive components!

When handling electrostatically sensitive devices, care should be taken to ensure that people, working surfaces and packaging are properly earthed!

Handling ESDs

The guiding principle is that electronic modules should only be touched if it is absolutely unavoidable in order to carry out work on them. When taking hold of electronic circuit boards, never touch terminal pins or printed conductors.

Components may only be touched provided

- you are permanently earthed by means of a wrist strap connected to earth or
- you are wearing special earthing shoes or earthing strips on your shoes in combination with an earthing floor.

Before you touch an electronic module, you must earth your own body. The easiest way to do this is to touch an electrically conductive object which is connected to earth (e.g. bare metal components of a control cabinet, water pipe, etc.) immediately beforehand.

Modules must not be brought into contact with statically chargeable and non-conducting materials such as plastic film, nonconductive table tops or articles of clothing made of artificial fibers.

Modules may only be placed on electrically conductive surfaces (table with earthing cover, conductive earthing foam, ESD packaging bags, ESD transport containers).

Do not place modules in the vicinity of data display units, televisions or monitors (minimum distance from screen > 10 cm).

Taking measurements on/modifying ESDs

Measurements may only be taken on modules provided

- the measuring instrument is earthed (e.g. via protective earth) or
- before measuring with an electrically isolated instrument, the measuring head is briefly earthed (e.g. by touching against bare metal PLC casing).

Soldering may only be carried out with an earthed soldering iron.

Shipping ESDs

Modules and components must always be shipped or stored in electrically conductive packaging (e.g. metalized plastic boxes, metal tins).

If the packaging is not conductive, modules must be wrapped in conductive material before packing. This can be done using conductive rubber foam, ESD bags, household baking foil or paper (never use plastic bags or plastic film).

In the case of modules with built-in batteries, care should be taken to ensure that the conductive packaging does not touch or short-circuit the battery terminals; if necessary, the terminals should be covered over with insulating tape or insulating material.

Siemens Worldwide

C

In this Appendix

In this appendix you will find a list of:

- All cities in the Federal Republic of Germany with Siemens Sales Offices and
- All European and non-European Siemens Companies and Representatives of Siemens AG.

Algeria
Siemens Bureau d'Alger
• Alger
Angola
TECNIDATA
• Luanda
Argentina
Siemens S.A.
• Bahía Blanca
• Buenos Aires
• Còrdoba
• Mendoza
• Rosario
Australia
Siemens Ltd.
• Adelaide
• Brisbane
• Melbourne
• Perth
• Sydney

Austria
Siemens AG Österreich
• Bregenz
• Graz
• Innsbruck
• Linz
• Salzburg
• Vienna
Bahrain
Transitec Gulf
• Manama
Bangladesh
Siemens Bangladesh Ltd.
• Dhaka

Belgium

Siemens S.A.
- Brussels
- Liège

Siemens N. V.
- Antwerp

Bolivia

Sociedad Comercial é Industrial Hansa Ltda.
- La Paz

Bosnia-Herzegovina

Generalexport Predstavnistvo Sarajevo
- Sarajevo

Bophuthatswana

Siemens Ltd.
- Mafekeng

Brazil

Siemens S.A.
- Belém
- Belo Horizonte
- Brasilia
- Campinas
- Curitiba
- Fortaleza
- Pôrto Alegre
- Recife
- Rio de Janeiro
- Salvador de Bahia
- São Paulo
- Vitória

Brunei

- Brunei Darussalam

Bulgaria

Siemens AG, Bulgaria Representative
- Sofia

Chile

INGELSAC
- Santiago de Chile

Colombia

Siemens S.A.
- Barranquilla
- Bogotá
- Cali
- Medellín

Costa Rica

Siemens S.A.
- Panama
- San José

Croatia

Siemens d. o. o.
- Zagreb

Cuba

Respresentación
Consult iva EUMEDA
- La Habana

Cyprus

GEVO Ltd.
or
Jolali Ltd.
- Nicosia

Czech Republic

Siemens AG
- Brno
- Mladá Boleslav
- Prague

Denmark

Siemens A/S
- Copenhagen, Ballerup

Egypt

Siemens Technical Office
- Cairo-Mohandessin

Siemens Technical Office
- Alexandria

EGEMAC S.A.E.
- Cairo-Mattaria

Ecuador

Siemens S.A.
- Quito

El Salvador

Siemens S.A.
- San Salvador

Ethiopia

Addis Electrical Engineering Ltd.
- Addis Abeba

Federal Republic of Germany

Aachen
Augsburg
Bayreuth
Berlin
Bielefeld
Bonn
Bremen
Brunswick
Chemnitz
Coblenz
Cologne
Constance
Darmstadt
Dortmund
Dresden
Duisburg
Düsseldorf
Erfurt
Essen
Frankfurt am Main
Freiburg
Hamburg
Heilbronn
Karlsruhe
Kassel
Kempten/Allg.
Kiel
Laatzen
Leipzig
Lingen
Magdeburg
Mainz
Mannheim
Munich
Münster/Westf.
Nuremberg
Osnabrück
Regensburg
Rostock
Saarbrücken
Siegen
Stuttgart
Ulm
Wetzlar
Wilhelmshaven
Wuppertal
Würzburg

Finland

Siemens Oy
- Espoo, Helsinki

France

Siemens S.A.
- Haguenau
- Lille, Seclin
- Lyon, Caluire-et-Cuire
- Marseille
- Metz
- Paris, Saint-Denis
- Strasbourg
- Toulouse

Great Britain

Siemens plc
- Birmingham, Walsall
- Bristol, Clevedon
- Congleton
- Edinburgh
- Glasgow
- Leeds
- Liverpool
- London, Sunbury-on-Thames
- Manchester
- Newcastle

Greece

Siemens A.E.
- Athens, Amaroussio
- Thessaloniki

Guatemala

Siemens S.A.
- Ciudad de Guatemala

Honduras

Representaciones Electroindustriales S de R.L. - Relectro
- Tegucigalpa

Hong Kong

Siemens Ltd.
- Hong Kong

Hungaria

Siemens Kft
- Budapest

Iceland

Smith & Norland H/F
- Reykjavik

Indonesia

P.T. Siemens Indonesia, P.T. Siemens Dian-Grana Elektrika, Representative Siemens AG
- Jakarta

Iraq

Samhiry Bros. Co. Limited

or

Siemens AG (Iraq Branch)
- Baghdad

Iran

Siemens S.S.K.
- Teheran

Ireland

Siemens Ltd.
- Dublin

Italy

Siemens S.p.A.
- Bari
- Bologna
- Brescia
- Casoria
- Florence
- Genoa
- Milan
- Padua
- Rome
- Turin

Ivory Coast

Siemens AG
- Abidjan

Japan

Siemens K.K.
- Tokyo

Korea

Siemens Ltd.
- Changwon
- Seoul
- Ulsan

Kuwait

National & German Electrical and Electronic Services Co. (NGEECO)
- Kuwait, Arabia

Lebanon

Ets. F.A. Kettaneh S.A.
- Beirut

Libya

Siemens AG, Branch Libya
- Tripoli

Luxemburg

Siemens S.A.
- Luxemburg

Malaysia

Siemens Electrical Engineering Sdn. Bhd.
- Kuala Lumpur

Malta

J. R. Darmanin & Co. Ltd.
- Valletta

Mexico

Siemens S.A. de CV
- Culiacán
- Gómez Palacio
- Guadalajara
- León
- México, D.F.
- Monterrey
- Puebla

Morocco

SETEL

Société Electrotechnique et de Télécommunications S.A.
- Casablanca

Mozambique

Siemens Liaison Office
- Maputo

Namibia

Siemens (Pty.) Ltd.
- Windhoek

Nepal

Amatya Enterprises (Pvt.) Ltd.
- Kathmandu

Netherlands

Siemens Nederland N.V.
- The Hague
- Rijswijk

New Zealand

Siemens Ltd.
- Auckland
- Wellington

Nicaragua

Siemens S.A.
- Managua

Nigeria

Electro Technologies Nigeria Ltd. (ELTEC)
- Lagos

Norway

Siemens A/S
- Bergen
- Oslo
- Stavanger
- Trondheim

Oman

Waleed Associates
- Muscat

Pakistan

Siemens Pakistan Engineering Co., Ltd.
- Islamabad
- Karachi
- Lahore
- Peshawar
- Quetta

Paraguay

Rieder & Cia. S.A.C.I.
- Asunción

People's Republic of China

Siemens AG Representation
- Beijing
- Guangzhou
- Shanghai

Peru

Siemsa
- Lima

Philippine Islands

Maschinen & Technik Inc. (MATEC)
- Manila

Poland

Siemens GmbH
- Gdansk-Letnica
- Katowice
- Warsaw

Portugal

Siemens S.A.
- Albufeira
- Coímbra
- Lisbon, Amadora
- Matosinhos
- Porto

Qatar

Trags Electrical Engineering and Air Conditioning Co.
- Doha

Romania

Siemens birou de consultatii tehnice
- Bukarest

Russia

Siemens AG

or

Mosmatic
- Moscow

Siemens AG
- Ekaterinburg

Rwanda

Etablissement Rwandais
- Kigali

Sambia

Electrical Maintenance Lusaka Ltd.
- Lusaka

Saudi Arabia

Arabia Electric Ltd. (Equipment)
- Al-Khobar
- Jeddah
- Riyadh

Singapore

Siemens (Pte.) Ltd.
- Singapore

Slovak Republic

Siemens AG
- Bratislava

Slovenia

Siemens d. o. o.
- Ljubljana

South Africa

Siemens Ltd.
- Cape Town
- Durban
- Johannesburg
- Middelburg
- Newcastle
- Port Elizabeth
- Pretoria

Spain

Siemens S.A.
- Barcelona
- Bilbao
- Gijón
- Granada
- La Coruña
- Las Palmas de Gran Canaria
- León
- Madrid
- Málaga
- Murcia
- Palma de Mallorca
- Pamplona
- Sevilla
- Valencia
- Valladolid
- Vigo
- Zaragoza

Sri Lanka

Dimo Limited
- Colombo

Sudan

National Electrical & Commercial Company (NECC)
- Khartoum

Swaziland

Siemens (Pty.) Ltd.
- Mbabane

Sweden

Siemens AB
- Göteborg
- Jönköping
- Malmö
- Sundsvall
- Upplands Väsby, Stockholm

Switzerland

Siemens-Albis AG
- Basel
- Bern
- Zürich

Siemens-Albis S.A.
- Renens, Lausanne

Syria

Siemens AG, Branch (A.S.T.E.)
- Damascus

Tanzania

Tanzania Electrical Services Ltd.
- Dar-es-Salaam

Taiwan

Siemens Ltd., TELEUNION Engineering Ltd.

or

TAI Engineering Co., Ltd.
- Taichung
- Taipei

Thailand

Berti Jucker Co. Ltd.
- Bangkok

Tunesia

Sitelec S.A.
- Tunis

Turkey

SIMKO
- Adana
- Ankara
- Bursa
- Istanbul
- Izmir
- Samsun

Ukraine

Siemens AG
- Kiev

United Arab Emirates

Electro Mechanical Co.

or

Siemens Resident Engineers
- Abu Dhabi

Scientechnic

or

Siemens Resident Engineers
- Dubai

United States of America

Siemens Industrial Automation Inc.

Automation Division
- Alpharetta, GA

Numeric Motion Control
- Elk Grove Village, Illinois

Uruguay

Conatel S.A.
- Montevideo

Venezuela

Siemens S.A.
- Caracas
- Valencia

Vietnam

OAV Representative Office
- Hanoi

Yemen (Arab. Republic)
Tihama Tractors & Engineering Co., Ltd. or Siemens Resident Engineers • Sanaa

Zaire
SOFAMATEL S.P.R.L. • Kinshasa

Glossary

Definition of Terms

AT expansion box Box for housing two 2/3-length 16-bit AT cards.

Automation systems SIMATIC S7-series **PLCs** (e.g. SIMATIC S7-200/300)

BIOS Setup Provides the facility for altering basic settings for the OP47 in DOS mode.

Booting Startup procedure that loads the operating system into the system memory of the OP.

Direct key module Optional unit for the OP47-12 providing two sets of 8 digital outputs for direct operation of keys without communication-related delays.

PCMCIA **P**ersonal **C**omputer **M**emory **C**ard **I**nternational **A**ssociation

Association of computer manufacturers formed with the aim of defining an international standard for memory modules and PC expansion cards. Cooperates with **JEIDA**.

PLC Generic term for devices/systems with which the OP communicates (e.g. SIMATIC programmable controllers or PCs).

Programmable controllers SIMATIC S5-series **PLCs** (e.g. S5-115U/135U)

Soft keys Function keys can function as soft keys, i.e. be assigned a different function from one screen to another.

Index

A

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