IMPORTANT:

- Please note that we have revised this version of the Service Manual.
  It is therefore necessary that you no longer use the first edition.
- In case of faults which you are unable to eliminate with the help of this manual, please contact our Customer Service.
- It is essential that you take this Service Manual with you for every visit to a customer.

Furthermore, you must always have the spare parts list and the wiring diagrams with you as well.

You can order additional copies of this Service Manual under the

- order number **58 35 694** from our department **GZP** in Bensheim.

See reverse side of manual for address.

**Version 2.1**
D 3344.076.01.04.02  03.2002
CEREC 3

Service Manual
Additional requirements:

- **Spare parts list**
  Order No. 58 62 581

- **Circuit diagrams** CEREC 3 / CEREC Scan
  Acquisition unit:  Order No. 58 35 710
  Milling unit:  Order No. 58 35 728

- **Tools**
  - Hexagonal screwdriver (90° offset): Sizes 1.5; 2; 2.5; 4; 6
  - Fork wrench, sizes 5.5; 8; 10; 14
  - Torque screw driver, sizes 5, 6, 20, 25, 40
  - Philips-head screw driver Size 1
  - Slot screw driver, insulated, Size 2, 3
  - Socket wrench 8mm
  - Cutting pliers
  - Special tool for monitor nut
  - Special tool for locking button: Order No.: 59 08 947

- **Accessories**
  - Digital multimeter, accuracy class: 1
  - Soldering tool for repairing cables
  - Side cutting pliers
  - Cable ties
  - Teflon tape
  - PS2 mouse (recommended)
  - PS2 keyboard (recommended)
  - 3.5" disk
  - Calibration piece and pins (recommended)
  - Fuses (recommended):
    - F1/F2 (2 pcs.)  5AT,  Order No.: 20 33 111
    - F1/F2 (2 pcs) for acquisition unit starting with Ser. No.: 3300
      - 6,3 AT,  Order No.: 10 77 452
    - F3  1.25AL  Order No.: 59 15 181
    - F4  2AT  Order No.: 10 80 522
  - F1/F2 (2 pcs) for acquisition unit starting with Ser. No.: 3300
List of Contents

1 General ........................................................................................................................................ 1-1
  1.1 General Notes ....................................................................................................................... 1-3

2 Service Software ..................................................................................................................... 2-1
  2.1 General Notes ....................................................................................................................... 2-3
  2.2 Basic Structure of Test Dialogs .......................................................................................... 2-5
  2.3 Individual Test Points ........................................................................................................... 2-10

3 Trouble Shooting: Milling Unit ............................................................................................... 3-1
  3.1 Device cannot be switched ON. Green LED (Ready for operation) not illuminated ... 3-5
  3.2 No connection to PC / acquisition unit. Software cannot be installed ...................... 3-7
  3.3 No air pressure .................................................................................................................... 3-9
  3.4 Fan not running. Unit shuts down completely after a short time ................................ 3-11
  3.5 Water pump: Pressure too low ........................................................................................... 3-13
  3.6 Defective light barrier ........................................................................................................ 3-15
  3.7 Door switch. Please close milling chamber door ............................................................ 3-17
  3.8 Motor locking positions: Problems changing grinders ................................................... 3-19
  3.9 Stepping motors (milling unit). Loss of steps ................................................................. 3-21
  3.10 Touch errors ..................................................................................................................... 3-23
  3.11 Trouble shooting. Defective CCP board ....................................................................... 3-25

4 Trouble shooting: Acquisition Unit .......................................................................................... 4-1
  4.1 System cannot be switched ON ....................................................................................... 4-7
  4.2 PC not booting properly I ................................................................................................. 4-9
  4.3 PC not booting properly II ............................................................................................... 4-11
  4.4 PC does not respond during switch-on, PC power supply does not start .................. 4-12
  4.5 Further PC faults .............................................................................................................. 4-14
  4.6 Monitor image flickering .................................................................................................... 4-15
  4.7 No monitor display .............................................................................................................. 4-17
  4.8 Incorrect monitor display format size .............................................................................. 4-19
  4.9 Monitor: Color shade/gray scale is too weak ................................................................. 4-21
  4.10 Trackball not functioning ............................................................................................... 4-23
  4.11 Trackball buttons not functioning .................................................................................. 4-25
  4.12 Pedal not functioning ..................................................................................................... 4-27
  4.13 Keyboard not functioning /defective ........................................................................... 4-29
  4.14 No camera image ............................................................................................................ 4-31
  4.15 Incorrect measuring sensor setting ............................................................................... 4-33
  4.16 Camera calibration: messages ...................................................................................... 4-35
  4.17 Interference at radio interface ....................................................................................... 4-37
  4.18 No sound or sound level too low .................................................................................... 4-41
  4.19 No Sirocam camera image ........................................................................................... 4-43
  4.20 Sirocam camera image interference ........................................................................... 4-45
List of Contents

4.21 SIROCAM camera: Incorrect image settings .............................................................. 4-47
4.22 Digital X-ray problems ................................................................................................. 4-49

5 Settings............................................................................................................................. 5-1
  5.1 Monitor Settings ........................................................................................................ 5-3
  5.2 Calibrating the 3D camera ......................................................................................... 5-4
  5.3 Pairing the DECT-radio interface (EU) .................................................................... 5-5
  5.4 Replacing a module of the DECT radio interface (EU) .......................................... 5-8
  5.5 Pairing the Futaba radio interface (USA/Japan) ..................................................... 5-9

6 Acquisition Unit: Repairs ............................................................................................... 6-1
  6.1 Electrical and Electromechanical Components ..................................................... 6-4
  6.2 Mechanical components ......................................................................................... 6-30

7 Milling Unit: Repairs ...................................................................................................... 7-1
  7.1 Milling Unit: General Activities ............................................................................ 7-3
  7.2 Replacing the Scanner ......................................................................................... 7-5
  7.3 Replacing the Drive and/or Motor ......................................................................... 7-11
  7.4 Checking / Adjusting Stop positions .................................................................... 7-13
  7.5 Stepping Motors: Replacing / Adjustment ............................................................ 7-15

8 Installing Software ......................................................................................................... 8-1
  8.1 Acquisition Unit: Network Installation ................................................................ .. 8-3
  8.2 How to install an MO drive ................................................................................... 8-25
1 General
List of Contents

1.1 General Notes ............................................................................................................... 1-3
1.1 General Notes

Nominal line voltage ranges

The CEREC® 3 acquisition unit can be used in the following nominal line voltage ranges:

- Europe 230VAC / 50Hz
- USA 115VAC / 60Hz
- Japan 100VAC / 50Hz and 60Hz

The CEREC 3 / CEREC Scan milling unit can be used in the following nominal line voltage ranges:

- 100V – 230VAC; 50/60Hz

Faults in electronic medical equipment caused by mobile phones

In order to ensure safe operation of electronic medical equipment, the use of mobile phones in practices and hospital areas is strictly prohibited.

Opening the device

When opening the device:

- Please observe the necessary precautions when handling printed circuit boards (ESD).
- Touch a ground point to discharge static electricity before handling any components.

Measurements

Always switch OFF the device before connecting the measuring instrument.

Select the correct current/voltage type and adjust the measuring range to match the expected readings.

Perform continuity tests only on devices which are switched off.

When replacing parts

Switch OFF the device before replacing any parts.

For safety reasons the device should be disconnected from the power supply when replacing parts around the line transformer.

The item numbers for ordering spare parts can be found in the spare parts list, Order No. 58 62 581.

The diagrams contained in the spare parts list provide a useful guide when replacing parts.

Repairing and/or upgrading the PC drawer

Replace the broken warranty seal on the bottom side of the PC drawer with the supplied seal of conformity.

Disposal

Please observe the instructions found in the relevant user guide.
2 Service Software

CEREC 3
List of Contents

Service Software

List of Contents

2.1 General Notes ................................................................................................. 2-3
2.2 Basic Structure of Test Dialogs ......................................................................... 2-5
2.3 Individual Test Points ....................................................................................... 2-10
2.1 General Notes

Test requirements

Requirement for all tests:

- PC / acquisition unit are switched on and ready for operation.
- PC / acquisition unit and milling unit are interconnected (per interface cable or radio link)
- The software has been loaded for the milling unit (see Operating Instructions for Milling Unit/Milling Unit Scan, Switching the units on, Initial start-up).
- The door of the milling chamber must remain closed as long as any motors or the water pump are running. If the door of the milling chamber is opened during the test, all motors and the water pump will switch off immediately (same function as pressing the Stop button).
- The tools (burs) must be installed already during operation of the water pump.
- During operation of the water pump, the air pump must always be running to protect the gearing against water damage, i.e. the air pump is started first. If the air pressure switch detects no air pressure, an error message will appear and the test can not be performed.

Service Software Log File

The service software is a component of the product software. This software generates a log file for all tests performed. This log file is located on delivery in the directory

c:\programme\Cerec\System\Service\Protocols

and is named

Test file_XXXXXXXXXXXX.TXT

The Xs here denote the serial no. of the controller board.

Each time the service software is started, a confirmation query appears asking whether this file (if it already exists) should be deleted. If NO (do not delete) is selected, the tests subsequently performed will be appended to the ones previously saved. Each test is labeled with a starting and ending date. The test file can be viewed with the editor at any time. If the user exits from a test without saving it, he will be asked if he really wants to quit without saving. If Yes (Quit without saving) is then selected, the data just measured will be lost.

After completing a test section, the log file must be saved under a new name to a diskette belonging to the corresponding unit.

Assessment scores

There are three different scores which can be assigned to test results:

- Passed fully (green label)
- Passed (yellow label)
- Not passed (red label)

NOTE

These assessment categories apply starting with software version V1.1 R600

The score Passed (yellow label) may be irrelevant for a specific test. In this case n.a. (not applicable) will be written to the log file for this score.
2.1 General Notes

**CAUTION**

To ensure trouble-free operation of the system, all test results should be labeled “Passed fully”. If the test results are marked “Passed”, uncritical changes have occurred at this point of time. If the test results are labeled “Not passed”, you must find and correct the fault(s).

Example of test protocol:

Path: `c:\programme\Cerec\System\Service\Protocols`

**NOTE**

If the milling unit housing is left open, the temperature switch on the CC PC board may cut out after a short time (T>90°C). The cooling fan can work properly only with the cover closed.

Overview of gearing unit:

![Overview of Gearing Unit](image)
2.2 Basic Structure of Test Dialogs

NOTE
For a functional description of the menu items, see the user’s manual.

Via the Service menu you can ...
- select a wide range of Service functions with Settings/Service...

CAUTION
The Service functions may be used only by authorized service technicians who have been trained by Sirona.

Password protection

The service software test dialogs are protected by a password to prevent manipulations by unauthorized users.

The password has four digits. It changes daily and is generated from the system date of the computer according to the following scheme:

<table>
<thead>
<tr>
<th>Password number</th>
<th>Generated from</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2. number of the current month</td>
</tr>
<tr>
<td>2</td>
<td>1. number of the current month</td>
</tr>
<tr>
<td>3</td>
<td>2. number of the current day</td>
</tr>
<tr>
<td>4</td>
<td>1. number of the current day</td>
</tr>
</tbody>
</table>

Example: 24.05.2001 becomes 5042

NOTE
Since the password is thus valid for only one day, it may be passed on to the user in exceptional cases, e.g. when providing him with emergency help over the phone.

CAUTION
The password should always be treated confidentially. Before entering the password, always determine the date as inconspicuously as possible.

NOTE
If you enter the correct password, and the commands are nevertheless not enabled, first check the system date of the computer.

The dialog for setting the system time can be called up in all Windows operating systems by double-clicking the time displayed in the status line.
2.2 Basic Structure of Test Dialogs

Now enter the password.

If you confirm this Service dialog with Yes, the Test selection dialog box will open.

Log file

**NOTE**

If a log file named after the milling unit already exists at the time of the program start, a confirmation query will appear asking if the data from the new test run should be appended to the existing file or it should be deleted first.

**NOTE**

If the display "...0000.txt" appears, this means that there is no connection to the milling unit.

Possible causes:

- The CEREC 3 program has been started more than once
- There is no (cable or radio-link) connection between the milling unit and the acquisition unit/PC
- The software download to the milling unit has not been completed.
2.2 Basic Structure of Test Dialogs

Test selection dialog

In the Test selection dialog you can select …

- a Total test (default selection on delivery) or
- an individual test.

The selected test dialog is then opened by clicking on OK.
2.2 Basic Structure of Test Dialogs

Example: Total test

1. Number of test runs completed since the last time the Start button was actuated.
2. Status bar for current state of test run.
3. Check boxes for selecting (activating/deactivating) the tests available in this test dialog.
4. Check box for selecting the options possible in this test dialog.
5. Number of test results since the last Start:
   - Passed fully
   - Passed
   - Not passed
6. Pressing Start initiates the test run with the selecting settings. The test run will be repeated until it is interrupted with the Stop button. The test run counter is then reset to 0. Once started, the test run can be halted only with Stop. No other inputs are possible during the test run.
7. The test is canceled as soon as possible with Stop. The test in progress at the time of cancellation is not counted. All inputs are now possible again.
8. Save stores all existing data to the log file. The data are appended to the previously existing log file (if the current test run has not yet been saved). If no data exist, a message to that effect will appear (confirm with OK). Once a test run has been saved to the log file, a new test run must be started before selecting the save function again.
9. Press **Back** to quit the test dialog and return to the service dialog. If any data exist and have not yet been saved, you will be queried whether or not the test data should be saved.

![Save test data dialog](image)

**Save test data?**

You are about to leave the test without backing up the determined test data in the log file! Do you want to save the determined data?

- **Yes**
- **No**

10. **Result:**

- **No color** => No measurement available yet
- **Green** => Measurement shows that test was **Passed fully**
- **Yellow** => Measurement shows that test was **Passed**
- **Red** => Measurement shows that test was **Not passed**
2.3 Individual Test Points

2.3.1 Serial Communication

The test is primarily used to measure the speed and quality of data transmission. This is especially important if the system is not operated through the standard line (RS-232 max. 10 m), but via other types of connections instead e.g. an infrared link, a DECT coupling or over longer distances via interface converters e.g. RS-422.

The transmission time between the beginning of transmission and the end of reception is calculated for a specific data record on the PC. A test run comprises one complete transmission in both directions.

The values thus measured are then saved to the log file.

Typical values:

<table>
<thead>
<tr>
<th></th>
<th>COM1 Baud rate: 115200</th>
<th>COM1 Baud rate: 19200</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cable</td>
<td>400-500ms</td>
<td>–</td>
</tr>
<tr>
<td>Radio</td>
<td>Europe: 600-750ms</td>
<td>–</td>
</tr>
<tr>
<td></td>
<td>USA/Japan: –</td>
<td>2-3 s</td>
</tr>
</tbody>
</table>

**NOTE**

The limiting values and color coding refer to a baud rate of 115200.

2.3.2 Media supply

**Purpose of Test:**

To check the media supply (air, water, fan) for proper functioning and test the pressure switches and the run-up time of the pump.
2.3 Individual Test Points

Procedure

The pumps and the fan are switched on by nominal select control depending on selection. The motor currents and the condition of the pressure switches are registered. The points of time when the pressure detectors respond are measured. After approx. 5 seconds the pumps are switched off and the time required until the pressure switch responds is measured and evaluated.

Save

Save stores the measured values to the log file under the heading of Media supply.

<table>
<thead>
<tr>
<th>Media supply</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Test course</td>
<td>1</td>
</tr>
<tr>
<td>No. of test runs</td>
<td></td>
</tr>
<tr>
<td>Current date of the test run</td>
<td></td>
</tr>
</tbody>
</table>

MaXumum Limits

<table>
<thead>
<tr>
<th>Act</th>
<th>Max</th>
<th>Min</th>
<th>Max</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.16</td>
<td>0.16</td>
<td>0.20</td>
<td>0.70</td>
</tr>
</tbody>
</table>

NOTE

The limiting values apply to a completely filled water circuit.

Deviations of measurements

Deviations may occur:

- During the first test run (if any air is still in the water circuit)
- If the amount of water in the water tank is insufficient
- After filling the water tank.
2.3 Individual Test Points

2.3.3 Light Barriers, Door Switch, Temperature Sensor and Motor Stop Positions

Purpose of Test:
This test serves to evaluate the safe functioning of the light barriers and check the door switch, the temperature sensor and the motor stop positions.

Light Barriers
When the end position is located, the slot of the gear is measured via the width and height at which the stepping motor positions are registered with the flanks.

The light barriers to be tested can be selected in all variations. If no light barrier is selected, the Start button is not active.
Default setting: All light barriers selected.

Door Switch/Control Keys
The current state of the door switch and control keys can be checked via a status bar display.
2.3 Individual Test Points

Temperature

A temperature display has been realized to check the temperature of the milling machine.

Motor Stop Positions

In the **Test selection** dialog, **Motor stop positions** is defined as the default setting.

The motors are moved to these positions to test the motor stop positions. Depending on which button is selected, the motors move to the corresponding position and stop there. The motors can be reset to their home positions by pressing the **Home** button.

If the home position can not be reached or lost steps occur during motor movement, this will be reported.
2.3 Individual Test Points

2.3.4 Stepping Motor Test

**CAUTION**

Observe the warnings in the Testpiece dialog.

**Purpose of Test:**

This test serves to evaluate the functioning of the stepping motors. The stepping motors are tested and evaluated for this purpose. The evaluation is made based on a factor for the reserve capacity of each stepping motor. In addition, this test can also be used for installation and adjustment purposes as well as to break in the milling machine.

**Procedure**

It is possible to individually trigger and test the stepping motors in various combinations.

The stepping motors are run at various speed settings via an acceleration table and the resulting step losses are measured. The number of step loss events is then registered and evaluated. Finally, a reserve capacity is assigned to each motor based on this data.

**Display of Test Results**

In order to satisfy different requirements for adjustment and testing purposes, this test also offers the option of choosing between data summation and display of the results for individual test runs.
2.3 Individual Test Points

2.3.5 Stepping Motors - Single Step

![CAUTION]

Observe the warnings in the opened dialog.

Purpose of Test:
The test is used to control the motors individually in case of malfunction.

Procedure:
Using the Move buttons, you can move the individual motors in the longitudinal and rotation directions.

<table>
<thead>
<tr>
<th>Actual position</th>
<th>1</th>
<th>1</th>
<th>1</th>
<th>0</th>
<th>0</th>
<th>1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Steps</td>
<td>5</td>
<td>5</td>
<td>5</td>
<td>5</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>Light balance</td>
<td>[undefined]</td>
<td>[undefined]</td>
<td>[undefined]</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Technique</td>
<td>Grind</td>
<td>Block</td>
<td>Mill</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Speed factor</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Motor position</td>
<td>Home</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Specification</th>
<th>Grind</th>
<th>Block</th>
<th>Mill</th>
</tr>
</thead>
<tbody>
<tr>
<td>One longitudinal step (L) equals</td>
<td>12.5µm</td>
<td>12.5µm</td>
<td>12.5µm</td>
</tr>
<tr>
<td>One rotational step (R) equals</td>
<td>approx. 0.04° (2.5')</td>
<td>approx. 0.13° (7.7')</td>
<td>approx. 0.04° (2.5')</td>
</tr>
</tbody>
</table>
2.3 Individual Test Points

2.3.6 DC Motors "Inlet/Load"

**Purpose of Test:**
This test serves to run in the DC motors and check them for proper functioning under continuous load.

**Procedure**
The DC motors are tested through operation at a constant current. The resulting speed provides an indication of the running resistance of the gearing units.

![DC motors "Inlet/Load" test interface](image)

The two motors (Motor 1 and Motor 3) can be selected together or separately. If no motor is selected, the Start button is not active. Default: Both motors selected.

**Test Run:** The test runs in an endless loop until the Stop button is actuated. The current measured values are displayed. A test run consists of one part run time and one part pause for each motor.

2.3.7 DC motors "Touch"

**Purpose of Test:**
This test is used to check the two DC motors for proper functioning in the Low-speed mode.
2.3 Individual Test Points

Procedure

The DC motors are tested by adjusting them to the touch speed (in the relevant directions of rotation). Then the relevant data are determined.

The possible gearing units (1,3) can be selected either together or separately. The **Start** button remains inactive as long as no gearing has been selected. Default: Both motors selected.
2.3 Individual Test Points

2.3.8 DC motors "Speed"

Purpose of Test:

This test is used to check the two DC motors and their gearings for flawless functioning in the High-speed mode.

Procedure

The DC motors are tested by accelerating them from a standing start to working speed and then measuring the relevant data.

NOTE

The current is monitored during all measurements. The maximum current must not stop for longer than 2 seconds; otherwise the test will immediately be interrupted by an error message.
2.3 Individual Test Points

2.3.9 Scanner test (Scan)

Purpose of Test:

This test serves to evaluate the functioning and accuracy of the scanner.

![Diagram of Scanner Test Setup]

Procedure

The various required measurements are performed with the help of the calibration phantom.

The functions to be tested can be selected in different variations. If no function is selected, the Start button remains inactive. Default setting: Test all functions.

2.3.10 Continuous load

Purpose of Test:

This test serves to simulate a maximum load for the power supply and intentionally heat up the entire system.

All loads can be operated simultaneously. The temperature rise of the system is then measured.

![Diagram of Continuous Load Test Setup]
2.3 Individual Test Points

2.3.11 Camera quick test

The camera quick test consists of a series of individual test steps, which can be carried out both in the specified order and individually.

Some test steps are made up of several partial steps, some of which can be activated individually. These functions should only be used by trained technicians.

**NOTE**

In many cases "Next" is the same as pressing RETURN.

To select individual test steps, either mark the test step (by clicking it with the left trackball button, to highlight it in blue) and then select Jump or double click on the test step.

Test steps can also be selected by choosing Next, previous or repeat. Select Stop to stop the process. After clicking Stop, the button remains highlighted until the sequence has actually stopped. Stop then returns to its normal shading and the sequence can be continued by selecting the corresponding buttons.
2.3 Individual Test Points

Select **Exit** to exit the test run.

⚠ **CAUTION**

If you exit the test run without selecting the test step
- "Close Frame Grabber" or
- "Service/Protocol/Save",
no protocol (log file) is saved.

If a blue dialog box appears, you must select **Next** to continue the sequence after following the instructions contained in the box.

**Calibration Set A**

If Box **A** appears, please set Calibration Set **A** to the 3D camera.

**Checking the RGB adjustment**

![A]

Side **A**  
Flat surface

**Calibration Set B**

If Box **B** appears, please set Calibration Set **B** to the 3D camera.

**Camera - calibration**

![B]

Side **B**  
Surface with cross
2.3 Individual Test Points

If a yellow results box appears, select *Next* to continue the sequence.

The results of the completed test steps are shown in the LOG box during the sequence.
The entire LOG box can be viewed by scrolling up/down.

Errors can occur while you are carrying out the test steps. Here, it is important to follow the instructions.

The camera quick test also includes several *Service functions*, which can be selected in the *Service* menu and in the pull-down menus.

**NOTE**

*Service functions can only be selected when the test run is stopped.*

To end a service function, select a button to continue the test run (e.g. *Next*).

Service functions consist of:
- Protocol
- Live image
2.3 Individual Test Points

- Lifting magnet
- LED
- Slide alignment

Protocol

<table>
<thead>
<tr>
<th>Test sequence: Diagnose - Hille für Service</th>
</tr>
</thead>
<tbody>
<tr>
<td>Service</td>
</tr>
<tr>
<td>---------</td>
</tr>
<tr>
<td>Protocol</td>
</tr>
<tr>
<td>Live image</td>
</tr>
<tr>
<td>Lifting magnet</td>
</tr>
<tr>
<td>LED</td>
</tr>
<tr>
<td>Slide alignment</td>
</tr>
</tbody>
</table>

- Relative intensity of covered to open aperture
- Checking the quality of the search image
- Height time noise (with filtering 1 x, 2 x, 4 x grid frequency)

Select Service/Protocol/Save to create a protocol (log file) during the test run.

To view the protocol, select Service/Protocol/Display.

Select RETURN to close the protocol (log file) display.

Live image

<table>
<thead>
<tr>
<th>Test sequence: Diagnose - Hille für Service</th>
</tr>
</thead>
<tbody>
<tr>
<td>Service</td>
</tr>
<tr>
<td>---------</td>
</tr>
<tr>
<td>Protocol</td>
</tr>
<tr>
<td>Live image</td>
</tr>
<tr>
<td>Lifting magnet</td>
</tr>
<tr>
<td>LED</td>
</tr>
<tr>
<td>Slide alignment</td>
</tr>
</tbody>
</table>

- Relative intensity of covered to open aperture
- Checking the quality of the search image
- Height time noise (with filtering 1 x, 2 x, 4 x grid frequency)

Moving grid = Search image

Int. LED on (standing grid) = Search image with standing grid - visible grid stripes

Int. LED off (standing grid) = Search image with internal LED deactivated, so that objects can only be seen when they are illuminated externally.

Lifting magnet

The lifting magnet is attracted approximately every 3 sec. for a period of approx. 1 sec. A clicking sound can be heard.

LED and Slide alignment are not required in the camera quick test.
2.3 Individual Test Points

The camera quick test **Sequence** comprises the test steps (functions) listed below.

**Associated test functions:**

- Initialization of the frame grabber
- Checking the RGB adjustment
- Camera calibration
- Telescoping with covered aperture
- Relative parallax angle
- Relative intensity of covered to open aperture
- Checking the quality of the search image
- Height time noise (with filtering 1 x, 2 x, 4 x grid frequency)
- Temporal noise in the search image
- Entry of the header data
- Closing the frame grabber

Camera calibration data obtained from successfully completed tests are saved and used in the following camera quick test. These data are not used for camera operation outside the service program, so that the recording process is not affected by the program.

This also means that the camera must be calibrated before it is used in the camera quick test. This enables the test steps to produce correct results. **Checking the RGB adjustment** is the only test step which can produce correct results without the calibration process being completed.

The test results are indicated in three colors: Green = fully passed, Yellow = passed, Red = not passed.

---

**CAUTION**

Failed tests may be due to a badly prepared calibration set. The uniformity of the powder coating should then be checked. It should also be noted that test failures may be the result of a faulty camera cable or PC drawer (Refer to Chapter 4.14 - 4.16).

---

In the test step labelled **Entry of the header data**, a 4-6 figure number must be entered for the serial number (card).

Carrying out the **Closing the frame grabber** test step involves generating a protocol of the completed tests to be stored as a file in the \CEREC\SYSTEM\SERVICE\PROTOCOLS folder. The file name includes the date and time of the test as well as the camera serial number, if this was entered in the **Entry of the header data** test step. If a test step has been carried out several times, the latest result is entered in the protocol.
2.3 Individual Test Points

2.3.12 Info milling unit

This dialog box contains information on the connected milling unit and the milling times of the burs.

<table>
<thead>
<tr>
<th>Name</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Serial number</td>
<td>204</td>
</tr>
<tr>
<td>Milling unit ID</td>
<td>0</td>
</tr>
<tr>
<td>Parallel sided burr (min.)</td>
<td>277</td>
</tr>
<tr>
<td>Cone shaped burr (min.)</td>
<td>150</td>
</tr>
<tr>
<td>Total milling time (min.)</td>
<td>5902</td>
</tr>
<tr>
<td>Total scan time (min.)</td>
<td>3989</td>
</tr>
</tbody>
</table>

- **Serial number** – Serial no. of CC PC board
- **Milling unit ID**:
  - **Identifier 0** = CEREC 3 milling unit / scanner (serial number <5000)
  - **Identifier 1** = CEREC inLab milling unit (serial number ≥5000)
  - **Identifier 2** = CEREC 3 milling unit / scanner (serial number ≥5000)
  - **Identifier ??** = no milling machine connected

- **Parallel sided burr (min.)** – elapsed milling time of parallel-sided bur
- **Cone Shaped (Tapered) burr (min.)** – elapsed milling time of tapered bur
- **Total milling time (min.)** – elapsed milling time of milling unit
- **Total scan time (min.)** – elapsed scanning time of milling unit
3 Trouble Shooting: Milling Unit

CEREC 3
Trouble Shooting: Milling Unit

List of Contents

3.1 Device cannot be switched ON. Green LED (Ready for operation) not illuminated ........ 3-5
3.2 No connection to PC / acquisition unit. Software cannot be installed............................ 3-7
3.3 No air pressure ............................................................................................................. 3-9
3.4 Fan not running. Unit shuts down completely after a short time ..................................... 3-11
3.5 Water pump: Pressure too low ..................................................................................... 3-13
3.6 Defective light barrier .................................................................................................. 3-15
3.7 Door switch. Please close milling chamber door .............................................................. 3-17
3.8 Motor locking positions: Problems changing grinders .................................................. 3-19
3.9 Stepping motors (milling unit). Loss of steps ................................................................. 3-21
3.10 Touch errors ................................................................................................................ 3-23
3.11 Trouble shooting. Defective CCP board .................................................................. 3-25
**3.1 Device cannot be switched ON. Green LED (Ready for operation) not illuminated**

- Line power supply connected to electric outlet?
- Line voltage fuses OK? If not: Always replace both fuses.
- Check line voltage on power supply unit terminal: 100-240V

---

**CAUTION: Switch OFF the unit before connecting a measuring instrument or replacing parts!**

- Green LED on power supply unit illuminated?
  - **No** → Replace power
  - **Yes**
    - CC Turn ON main switch Pos. **IV204 (42V)** illuminated?
      - **No** → Replace board
      - **Yes**
        - CC Lamps **V200 (5V)** and **V205 (24V)** and **V206 (12V)**?
          - **No** → Replace board
          - **Yes**
            - Board battery defective/run down
              - Replace battery
CAUTION: Switch OFF the unit before connecting a measuring instrument or replacing parts!

- CAUTION: Fault may also be on PC/acquisition unit.
- Check configuration in the Communication menu.

1. **Cable version**
   - Check:
     - Serial connecting cable
     - Interface settings on PC / acquisition Unit
   - Connection OK
     - Yes → Unit OK
     - No → Replace board
   - Replace board
     - Connection OK?
       - Yes → Unit OK
       - No → Replace cable harness

2. **Radio controlled version**
   - NOTE: When updating software, it may be necessary to make several (2-3) attempts at starting.
   - Check:
     - Interface settings on PC / acquisition unit
   - Connect up using the cable:
     - Connection OK?
       - Yes → Unit OK
       - No → Replace cable harness
     - Replace board
       - Connection OK?
         - Yes → Unit OK
         - No → Replace board
   - Connect radio module
     - V 292 (10V) illuminated?
       - Yes → Replace radio module
       - No → Replace board

**3.2 No connection to PC / acquisition unit. Software cannot be installed**
3.3 No air pressure

Select Settings/Service/Test selection/Media supply/Air pump (see page 2 - 10) Carry out test

- Run-up time too short (0.00) and Run-on time too long (0.49)
  - Check plug connections on air pressure switch.
  - Connect plugs. Test passed?
    - No Replace air pressure switch
    - Yes Device OK

- Run-up time too long (4.50) and Run-on time too short (0.00)
  - Replace air pressure switch
  - Device OK

- Run-on time too long
  - Check air hoses
  - Eliminate fault

- Current draw too low (0.00)
  - Check plug connections on air pump
  - Connect plugs. Test passed?
    - No Replace air pump
    - Yes Device OK

- Current draw too high (>0.60)
  - Replace air pump
    - Test passed?
      - No Replace board
        - Test passed?
          - No Replace cable harness
          - Yes Device OK
        - Yes Device OK
      - Yes Device OK
    - Yes Device OK
Fan unit
3.4 Fan not running. Unit shuts down completely after a short time

- Select Settings/Service/Test selection/Media supply/\textit{Fan unit} (see page 2-10) Carry out test

Normal current input level, Fan unit not running → Fan unit Mechanical → Remove mechanical obstruction

Current input too low → Check plug connections on fan unit. Plug connections OK?

Yes → Are the following LEDs on? \textit{V320 (L\_FAN)} and \textit{L042VDC} applied at \textit{X8.1} and \textit{X8.2}?

Yes → Replace fan unit

No → Replace CC board

No → Check line L8. Line OK?

Yes → Repair line or replace cable harness

No → Replace CC board

Current draw too high → Disconnect \textit{X8}. Current draw still too high?

Yes → Check \textit{X8.1} & \textit{X8.2} for short circuits. Short circuit?

Yes → Replace cable harness

No → Replace board

No → Replace fan unit
CAUTION: Switch OFF the unit before connecting a measuring instrument or replacing parts!

- Preliminary test: Water tank full. Tank connection button locked in place
- Select Settings/Service/Test selection/Media supply/\textit{Water pump} (\textit{\textsuperscript{\textdagger}} see page 2 - 10) Carry out test

If the test is not passed, a "damping box upgrade kit" must be ordered. Order No.: 58 85 673
CAUTION: Switch OFF the unit before connecting a measuring instrument or replacing parts!

- Select Settings/Service/Test selection/Light barriers, …/Light barriers (see page 2 - 12) Carry out test.

3.6 Defective light barrier

CAUTION: May be due to stepping motors Total failure!

Unit OK

Replace the corresponding light barrier in G / B / M axis.

Test passed?

No

Replace board

Test passed?

Yes

Yes

Replace the cable harness

No

Replace the board

Test passed?

Yes

Yes

Replace the cable harness

No

Replace the board

Test passed?

Yes

Yes

Replace the cable harness

No

Replace the board

Test passed?

Yes

Yes

Replace the cable harness

No

Replace the board

Test passed?

Yes

Yes

Replace the cable harness

No

Replace the board

Test passed?

Yes

Yes

Replace the cable harness

No

Replace the board

Test passed?

Yes

Yes

Replace the cable harness

No

Replace the board

Test passed?

Yes

Yes

Replace the cable harness

No

Replace the board

Test passed?

Yes

Yes

Replace the cable harness

No

Replace the board

Test passed?

Yes

Yes

Replace the cable harness

No

Replace the board

Test passed?

Yes

Yes

Replace the cable harness

No

Replace the board

Test passed?

Yes

Yes

Replace the cable harness

No

Replace the board

Test passed?

Yes

Yes

Replace the cable harness

No

Replace the board

Test passed?

Yes

Yes

Replace the cable harness

No

Replace the board

Test passed?

Yes

Yes

Replace the cable harness

No

Replace the board

Test passed?

Yes

Yes

Replace the cable harness

No

Replace the board

Test passed?

Yes

Yes

Replace the cable harness

No

Replace the board

Test passed?

Yes

Yes

Replace the cable harness

No

Replace the board

Test passed?

Yes

Yes

Replace the cable harness

No

Replace the board

Test passed?

Yes

Yes

Replace the cable harness

No

Replace the board

Test passed?

Yes

Yes

Replace the cable harness

No

Replace the board

Test passed?

Yes

Yes

Replace the cable harness

No

Replace the board

Test passed?

Yes

Yes

Replace the cable harness

No

Replace the board

Test passed?

Yes

Yes

Replace the cable harness

No

Replace the board

Test passed?

Yes

Yes

Replace the cable harness

No

Replace the board

Test passed?

Yes

Yes

Replace the cable harness

No

Replace the board

Test passed?

Yes

Yes

Replace the cable harness

No

Replace the board

Test passed?

Yes

Yes

Replace the cable harness

No

Replace the board

Test passed?

Yes

Yes

Replace the cable harness

No

Replace the board

Test passed?

Yes

Yes

Replace the cable harness

No

Replace the board

Test passed?

Yes

Yes

Replace the cable harness

No

Replace the board

Test passed?

Yes

Yes

Replace the cable harness

No

Replace the board

Test passed?

Yes

Yes

Replace the cable harness

No

Replace the board

Test passed?

Yes

Yes

Replace the cable harness

No

Replace the board

Test passed?

Yes

Yes

Replace the cable harness

No

Replace the board

Test passed?

Yes

Yes

Replace the cable harness

No

Replace the board

Test passed?

Yes

Yes

Replace the cable harness

No

Replace the board

Test passed?

Yes

Yes

Replace the cable harness

No

Replace the board

Test passed?

Yes

Yes

Replace the cable harness

No

Replace the board

Test passed?

Yes

Yes

Replace the cable harness

No

Replace the board

Test passed?

Yes

Yes

Replace the cable harness

No

Replace the board

Test passed?

Yes

Yes

Replace the cable harness

No

Replace the board

Test passed?

Yes

Yes

Replace the cable harness

No

Replace the board

Test passed?

Yes

Yes

Replace the cable harness

No

Replace the board

Test passed?

Yes

Yes

Replace the cable harness

No

Replace the board

Test passed?

Yes

Yes

Replace the cable harness

No

Replace the board

Test passed?

Yes

Yes

Replace the cable harness

No

Replace the board

Test passed?
Slide door switch to upper stop

Door switch
3.7 Door switch. Please close milling chamber door

CAUTION: Switch OFF the unit before connecting a measuring instrument or replacing parts!

- Select Settings/Service/Test selection/Light barriers, …/Door switch/Operating keys (see page 2 - 12) Carry out test
- Test the door switch function:
  - When the milling chamber door is opened at both contacts, "Open" must appear in the display before the door has moved a distance of 5 mm.
  - When the milling chamber door is closed at both contacts, "Closed" must appear in the display before the door is locked in place.

---

Check position of door switch.
Door switch positioned at upper stop?

No → Slide the door switch to the stop.
Door switch functioning?

No → Check plug connections on door switch.
Connect plugs. Test passed?

No → Test door switch using another magnet
Test passed?

No → Replace door switch

Yes → Unit OK

---

Check the position of the door switch.

No → Slide the door switch to the stop.
Door switch functioning?

Yes → Check plug connections on door switch.
Connect plugs. Test passed?

Yes → Test door switch using another magnet
Replace magnet. Replace door. Test passed?

Yes → Unit OK

Yes → Unit OK

---

CAUTION: Switch OFF the unit before connecting a measuring instrument or replacing parts!
Locking pins
3.8 Motor locking positions: Problems changing grinders

CAUTION: Switch OFF the unit before connecting a measuring instrument or replacing parts!

- Select Settings/Service/Test selection/Light barriers, …/Motor stop positions (see page 2 - 13) Carry out a test.
- Move grinder to stop position. Replace grinder

Grinder not locked in position (drive rotates with grinder when attempting to release the grinder from the drive).
Move grinder to home position. Locking pins loosened?

No

Check drive. Can the pressure spring be pressed in?

No

Replace gearing

see “Replacing the Drive and/or Motor” on page 1 - 11

Yes

Replace locking pins (Checking and adjustment of locking pins)

No

(G2A see “Checking / Adjusting Stop positions” on page 1 - 13)

Yes

Reposition and seal locking pins (G2A see “Checking / Adjusting Stop positions” on page 1 - 13)
3.9 Stepping motors (milling unit). Loss of steps

CAUTION: Switch OFF the unit before connecting a measuring instrument or replacing parts!

- Select Settings/Service/Test selection/Stepping motors (see page 2 - 14) Carry out test

If step losses occur in stages 1 to 3

Replace the corresponding stepping motor
Step losses still indicated?

Yes

Replace board
Test passed?

Yes

Unit OK

No

Replace cable harness

Yes

Unit OK

No

Replace milling machine

No

Unit OK
Select Settings/Service/Test selection/DC Motors “Touch” *(see page 2 - 16) Carry out test

RMS speed too high, severe speed fluctuations, low current (< 0.20)

- Replace gearing

Current too high (> 0.10) and motor not turning.

- Check locking position. Movement?
  - No → Replace gearing
  - Yes → Replace DC motor

Current too low (0.00)

- Check plug connections on DC motor

- Connect plugs. Test passed?
  - No → Replace DC motor
  - Yes → Unit OK

CAUTION: Switch OFF the unit before connecting a measuring instrument or replacing parts!
NOTE: If a CCP board is defective, it must be assumed that this is due to a defective motor rather than a fault on the CCP board.

The motors must therefore be checked first of all.

Do the following:

1. Remove the milling machine PE conductor connector from the bus point.
2. Connect the measuring device between the milling machine PE conductor connector and the PE conductor bus point (DC voltage > 50 V).

NOTE: In all the following tests:
   - No fault: \( U < 3 \text{ V} \)
   - Fault: \( U > 3 \text{ V} \)

3. Install a new CCP board.
4. Switch on the unit.

**Carry out a stepping motor test**

5. Defective motor test (interwinding fault to ground). Adjust voltage to approx. 39V.

**DC motor test (run-in / load)**

6. If the defective motor (interwinding fault to ground) is tested, a voltage of approx. 22V results.

**Other causes**

7. If approx. 5V is registered, this indicates a defective light barrier, milling chamber lighting or Hall sensor on one of the DC motors.
8. Locate the cause by disconnecting the individual leads.
9. Switch off the unit. Disconnect from the line power supply.
10. Replace the corresponding part and repeat the test.
11. CAUTION: After repairing the PE conductor - milling machine connection to PE conductor - reconnect the bus point.
4 Trouble shooting: Acquisition Unit
Trouble shooting: Acquisition Unit

List of Contents

4.1 System cannot be switched ON ................................................................. 4-7
4.2 PC not booting properly I................................................................. 4-9
4.3 PC not booting properly II................................................................. 4-11
4.4 PC does not respond during switch-on, PC power supply does not start............................... 4-12
4.5 Further PC faults .............................................................................. 4-14
4.6 Monitor image flickering................................................................. 4-15
4.7 No monitor display............................................................................. 4-17
4.8 Incorrect monitor display format size................................................... 4-19
4.9 Monitor: Color shade/gray scale is too weak........................................ 4-21
4.10 Trackball not functioning............................................................... 4-23
4.11 Trackball buttons not functioning...................................................... 4-25
4.12 Pedal not functioning....................................................................... 4-27
4.13 Keyboard not functioning /defective .................................................. 4-29
4.14 No camera image.............................................................................. 4-31
4.15 Incorrect measuring sensor setting .................................................... 4-33
4.16 Camera calibration: messages.......................................................... 4-35
4.17 Interference at radio interface ............................................................................................ 4-37
4.18 No sound or sound level too low ....................................................................................... 4-41
4.19 No Sirocam camera image ............................................................................................... 4-43
4.20 Sirocam camera image interference ............................................................................... 4-45
4.21 SIROCAM camera: Incorrect image settings ................................................................. 4-47
4.22 Digital X-ray problems .................................................................................................... 4-49
Main switch on rear of device
Supply line
Keyboard board
L3
DV
DECT supply board
X4
F1/F2
F3
4.1 System cannot be switched ON

CAUTION: Switch OFF the unit before connecting a measuring instrument or replacing parts!

- Line power supply connected to socket?
- Power plug connected?
- Power switch on rear of unit switched ON?
- Power cable attached to PC drawer?
- Keyboard board cable plug X4 connected to DECT power supply board (DV)?

LED above ON pushbutton is yellow?

Yes → Device OK

No → Is the LED green when the ON button is pressed?

Yes → Replace keyboard board TT

No → Replace keyboard board TT

Check F1, F2 and F3 fuses. Replace if necessary. Is the LED green when the ON button?

Yes → Device OK

No → Disconnect the plug on the keyboard board lead and check for 5V on socket X4 (between pins 1 & 6). 5V present?

Yes → Replace keyboard board TT

No → Check fuse F4 (on DV). OK?

Yes → Replace DECT power supply board DV

No → Replace fuse F4

CAUTION: Switch OFF the unit before connecting a measuring instrument or replacing parts!
CAUTION: Switch OFF the unit before connecting a measuring instrument or replacing parts!

- Are the keyboard, trackball and VGA cable connected to the monitor on the PC drawer?
- Is there a disk in the disk drive? If there is, remove it.
- Is the LED above the ON button yellow or green? (see page 4 - 7)

Is the boot-up process interrupted when you try to access the hard disk during the BIOS startup or does a "blue screen" error message appear when Windows is started?

Yes → No → Unit OK

Boot with restore disk (from PC hardware version BA) or with bootable image CD-ROM.

(CAUTION, loss of data).

PC booting correctly?

Yes → No → Replace PC drawer

Replace PC drawer
### Table 1: List of beep-tone error codes

<table>
<thead>
<tr>
<th>Beep tone sequence</th>
<th>Cause of error</th>
</tr>
</thead>
</table>
| 1x short           | OK beep following graphics card test.  
If no image is visible yet, check the following points:  
Is the monitor switched on and the control LED illuminated?  
If not:  
Check the monitor voltage supply.  
If the red control LED is illuminated, check the VGA cable connecting the graphics card to the monitor.  
If the green control LED is illuminated (monitor detects an input signal), check the brightness and contrast settings of the monitor. |
| 1x long and 3x short | The graphics card is defective or not correctly plugged in to the motherboard. |
| Repeatedly long    | The memory module on the motherboard is defective or not correctly plugged in. |

### Table 2: Error messages during boot-up and possible causes of errors:

<table>
<thead>
<tr>
<th>Error message</th>
<th>Cause of error</th>
</tr>
</thead>
<tbody>
<tr>
<td>Floppy disk(s) fail (40):</td>
<td>Voltage supply or data cable to floppy not correctly plugged in or defective. If the cable is OK, the floppy disk drive may be defective.</td>
</tr>
<tr>
<td>Disk Boot Failure, insert System Disk and press Enter:</td>
<td>If the primary master disk was not found: Check the data cable and voltage supply of the hard disk and the CD/DVD drive.</td>
</tr>
<tr>
<td>Press a key to reboot:</td>
<td>Boot sector of hard disk can not be found. Boot with restore disk (from PC HW version BA) or with bootable image CD-ROM. If this fails, replace the PC.</td>
</tr>
</tbody>
</table>
PC power supply starts. PC begins boot-up procedure. Boot-up procedure not correctly completed.

Does the system detect the graphic card and display it on the monitor?
Yes
No

Is a short beep emitted?
Yes
No

Are the beep tones audible?
Yes
No

Eliminate errors as outlined in Table 1, "List of beep-tone error codes".

No

Does the memory test run without errors?
Yes
No

Remove memory module, clean contact strip (e.g. rubber eraser). Plug memory module in again.

Is the PC now functioning perfectly?
Yes
No

Correct error as specified in Table 2, "Error messages during boot-up".

Copying a new image (CAUTION, loss of data!).

Is the PC now functioning perfectly again?
Yes
No

Replace PC

Unit OK.

Next, see page 4 - 13 -->

CAUTION: Switch OFF the unit before connecting a measuring instrument or replacing parts!
4.4 PC does not respond during switch-on, PC power supply does not start

---

PC does not respond during switch-on, PC power supply does not start.

Is the yellow Standby LED at the top right of the keyboard illuminated?

- Yes
  - Is a voltage of 230VAC present at the power input of the PC?
    - Yes
      - Check the fuses, connectors and main switch.
    - No
      - Test: Briefly connect pin5 and pin9 to X4 on the DECT power supply board.
        - Does the PC boot now?
          - Yes
            - Removed and open the PC drawer. Check the plug connections of the boards, the memory banks and the CPU.
              - ATTENTION! Do not press against the CPU fan. Temporarily connect the PC power supply and leads L1, L2 and L3.
              - Is the blue cable between the motherboard and the DECT power supply board plugged in at both ends?
                - Yes
                  - Connect the cable. Can the PC be booted now?
                    - Yes
                      - Device OK.
                      - Reassemble the PC, slide it into the acquisition unit and connect the cables.
                    - No
                      - Reassemble the PC, slide it into the acquisition unit and connect the cables.
                - No
                  - Keyboard, lead L3 or lead L4 defective.
                    - Replacement of the defective component.
        - No
          - Is the PC now be booted by pressing the ON key on the keyboard?
            - Yes
              - Unit OK
              - Reassemble the PC, slide it into the acquisition unit and connect the cables.
            - No
              - Continued on next page

---

CAUTION: Switch OFF the unit before connecting a measuring instrument or replacing parts!
4.4 PC does not respond when switched on, PC power supply does not start

Disconnect power cord from PC.
Unplug power supply from drives and from auxiliary fan.
Disconnect ribbon cable for drives from motherboard
Plug power cord back in.
Does the PC power supply start running?
Yes
Reconnect drives and fans in succession.
Replace defective component
No
Audit power cable from PC.
Remove all boards except for the graphic card and the DECT power supply board.
Plug the power cable back in to the PC.
Does the PC power supply start running this time?
Yes
Reinstall boards in succession.
Replace defective board.
Reconnect PC.
No
Connect a replacement power supply to the motherboard and plug in the power cord.
Does the PC power supply start running this time?
Yes
Reassemble PC with replacement power supply.
Install PC in acquisition unit.
No
Replace complete PC.

CAUTION: Switch OFF the unit before connecting a measuring instrument or replacing parts!
## 4.5 Further PC faults

<table>
<thead>
<tr>
<th>Case of defect/fault</th>
<th>How to detect / measure to take</th>
</tr>
</thead>
<tbody>
<tr>
<td>COM port not functioning</td>
<td>Try replacing the radio interface with a cable connection. If this fails, check whether the COM port is enabled in the BIOS. If it is, replace the PC.</td>
</tr>
<tr>
<td>No mouse pointer displayed on screen</td>
<td>Trackball defective or not connected.</td>
</tr>
<tr>
<td>No keyboard input possible</td>
<td>Keyboard (keyboard controller) defective or improperly connected. Check to make sure this fault is not due to bent plug contacts.</td>
</tr>
</tbody>
</table>
| Network can not be accessed             | LED "10" or LED "100" on the slot plate of the network card must always be illuminated green. If not:  
  - The network cable between the network card and the hub / switch is defective.  
  - Hub / switch defective (check whether other PCs connected to hub / switch can access the network).  
  - Network card defective  
  The "TX Data Act" LED flashes during data communication via the network.                                                                 |
| CD-ROM / DVD-ROM missing in list of system drives (Explorer) | Data cable and/or voltage supply disconnected and/or defective. If this is not the case, the drive is defective. Test via BIOS: It must be possible to select the drive. |
| No audio playback                       | Only a musical CD or only a wave file can not be played back:  
  - Check the software settings.  
  - Wrong sound card driver installed.  
  - Cable between CD-ROM / DVD-ROM drive and sound card loose or defective.  
  - Sound card defective.  
  - CD-ROM / DVD-ROM drive defective.                                                                                                                                 |
| No audio playback at all:               | Test: Connect loudspeaker directly to sound card without the amplifiers on the DECT power supply board. If an audio playback occurs then, check the cables to and from the DECT power supply board. Then replace these cables or the DECT power supply board if necessary. If the sound playback functions without the DECT power supply board: Then the loudspeakers (including the lead) or the sound card are/is defective, or there is an error in the software setting, or the wrong driver was installed for the sound card. |
| Warning on monitor indicating that fan RPM is too low | Check whether the fan brushes against an obstruction. If not, replace the fan. If replacement of the fan does not eliminate fault, replace the PC. In this case, there is probably a defect on the motherboard. |
If the image on the monitor flickers, a distinction must be made between two causes:

a) Flickering of the image brightness and
b) Flickering of the image due to incorrectly set monitor parameters

Adjustment of monitor parameters (all types except PV751)

- Select the mode Start Exit in Windows.
- Press the SELECT/AUTO monitor button twice in succession while in this mode. The monitor then automatically sets the adjustment parameters.
- Then exit the "Quit Windows" window with "Cancel". The monitor is now correctly adjusted.

For type PV751 monitors only (see name plate on rear side of monitor):

- Set image brightness to **maximum value of 130**
- Set contrast to **maximum value of 140**

If the monitor still flickers following both of these checks, you must then replace

- the monitor (if monitor type PV751 is not involved) and/or
- the assembly "power supply, complete" REF 58 09 889, Rep 58 65 550 (see Chapter ‘6.1.5 Complete power supply unit’).
4.7 No monitor display

- Are the power supply and the VGA cable connected to the monitor?
- Is the monitor switched on (LED to the right of the ON switch is red or green)?
- Is the PC switched on (LED above the ON button is green)?
- Switch off the monitor and switch it on again after a few moments.

CAUTION: Switch OFF the unit before connecting a measuring instrument or replacing parts!

Monitor dark?

No → Replace monitor

Yes

Is the LED on the monitor green or red?

No → Is the monitor switched ON?

Yes → Device OK. Reconnect VGA cable

No → Switch monitor on. Unit OK.

from HW Version AC to Hardware Version

Is the LED on the monitor green?

Yes → Replace monitor

No → Replace monitor

Is the LED on the monitor red?

Yes → Disconnect the power supply cable and check for 12V. 12V present?

Yes → Replace monitor

No → Replace monitor

No

Check VGA cable. OK?

Yes → Replace PC drawer

No → Replace VGA cable.

Yes → Unit OK

No → Replace DECT DP power supply board. Monitor screen ON?

Yes → Unit OK

No → Replace PC power supply

Press the "Y" and "S" keys to switch on the monitor. Does monitor carry out a self-test?

Yes → Replace monitor

No

Is the LED on the monitor green or red?

Yes

No

Disconnect the power supply cable and check for 12V. 12V present?
4.8 Incorrect monitor display format size

In Windows, select START -> SETTINGS-> CONTROL PANEL> DISPLAY-> SETTINGS to check that the resolution is not set to above 1024X768 (VESA XGA) and that the refresh rate is set to between 56Hz and 75Hz.

When the resolution is set to exactly 1024x768 (VESA XGA), press the SELECT/AUTO button twice to automatically adjust the monitor to the correct setting. If this does not happen, replace the monitor.

When using screen resolutions lower than 1024x768 (VESA XGA): Press the MENU button. Then press the SELECT/AUTO key once. Select for Full screen mode. If this is not possible, replace the monitor.

CAUTION: Switch OFF the unit before connecting a measuring instrument or replacing parts!
Display Properties

Brightness

Contrast
Monitor: Color shade/gray scale is too weak

- Check Windows color pallet setting in the **Start -> Settings -> Control -> Display -> settings**.
  In the color pallet, a setting between 16Bit (High Color = 65536 colors) and 24Bit (True Color = 16777216 colors) must be selected (only applies to 3dfx Voodoo3 graphics card). If other graphics cards are used, the color pallet setting must be > 16Bit.

- Adjust the monitor brightness to 140 and the contrast to 130.

```
Poor color shading/
gray scale?

Yes

Replace VGA cable.
Poor color shading/
gray scale?

No  →  Unit OK

Yes

Replace monitor.
Poor color shading/
gray scale?

No  →  Unit OK

Yes

Replace PC drawer.
```

4.9  CAUTION: Switch OFF the unit before connecting a measuring instrument or replacing parts!
4.10 Trackball not functioning

CAUTION: Switch OFF the unit before connecting a measuring instrument or replacing parts!

Switch device OFF and ON again.

Is the trackball

- Yes
  - Unit OK

- No
  - Keyboard functioning?
    - Yes
      - Unit OK
    - No
      - Have the PS/2 plugs for the keyboard and the trackball been switched?
        - Yes
          - Connect trackball PS/2 plug correctly. Trackball functioning?
            - Yes
              - Unit OK
            - No
              - Replace trackball
        - No
          - Swap PS/2 plugs. Device OK.

Is the PS/2 plug for the trackball properly connected?

- Yes
  - Unit OK

- No
  - Attach replacement trackball or mouse to the PC drawer with a PS/2 plug and test. Trackball/Mouse functioning?
    - Yes
      - Unit OK
    - No
      - Replace PC drawer
4.11 Trackball buttons not functioning

- Check whether trackball is functioning
- Disconnect the pedal and reboot the PC.
- Check continuity of keyboard board lead L3 (between DECT supply board DP and keyboard board TT).
- Check trackball power supply.

```
Check for short circuits of the two pedal sockets and the pedal
Short circuit occurred?

Yes

Replace pedal or lead L3 between DECT supply board DP and keyboard board TT.
Trackball buttons functioning?

No

Check continuity on L7 keyboard cable between trackball and keyboard board.
OK?

Yes

Replace keyboard board TT

No

Repair lead L7 or Replace trackball

No

Replace keyboard board TT
```

CAUTION: Switch OFF the unit before connecting a measuring instrument or replacing parts!
Pedal lead L8

Right-handed

Left-handed
CAUTION: Switch OFF the unit before connecting a measuring instrument or replacing parts!

- Refer to "Changing from Right-Handed to Left-Handed Operation" in the Operating Instructions for the Acquisition Unit. Software changeover via Start -> Settings -> Control -> Mouse.
- Is the plug of pedal lead L8 connected properly?
- Is the pedal not mechanically obstructed?

Both trackball buttons functioning?  No  Pull off the plug L8.
Yes

Both trackball buttons functioning?  No  Repair/replace pedal lead (Microswitch, compl.)
Yes  Repair/replace pedal lead (Microswitch, compl.)

Replace keyboard board (TT)

4.12 Pedal not functioning
Keyboard not functioning /defective

- Check whether the trackball and keyboard PS/2 plugs are properly connected to the PC drawer and not in the wrong sockets (switched).
- Check continuity on L3 cable to the keyboard board.

CAUTION: Switch OFF the unit before connecting a measuring instrument or replacing parts!

LED above ON button **green**?
- Yes: Replace keyboard
- No: Check the supply voltages at the output socket of the DECT power supply board (X4.1: +5V and X4.2: +12V).
  - Supply voltage OK?
    - Yes: Replace DECT power supply board
      - Keyboard functioning?
        - Yes: Device OK
        - No: Replace keyboard
    - No: Replace keyboard

Check the supply voltages at the PS/2 output socket (PIN 4: +5V and PIN 3: GND) on the PC drawer.
- Supply voltage OK?
  - Yes: Replace keyboard
  - No: Replace PC drawer.
    - Keyboard functioning?
      - Yes: Unit OK
      - No: Replace keyboard
1. Is the camera cable properly connected to the camera and the image acquisition (Frame Grabber) card in the PC drawer?

2. **For versions up to IDS 2001 only:**
   - Recorded image displayed without camera live image?
     - If YES, check Windows color pallet setting via `Start -> Settings -> Control -> Display -> Settings`. In the color pallet, a setting between 16Bit (High Color = 65536 colors) and 24Bit (True Color = 16777216 colors) must be selected. Change the setting if necessary. It is permissible to select 32Bit on Pentium® III systems.

3. **Only for versions up to IDS 2001:**
   - If there is still no live image, check whether the screensaver was activated.
   - If the answer is YES, select `Settings -> Control -> Display -> Screensaver (None)`. Then accept this setting and reboot the PC if necessary.

4. Carry out camera quick test (`/G2A` see page 2 - 20).

5. Connect replacement camera cable.
   - If this fails, connect a replacement camera.
   - If this also fails, install new software.
   - If there is still no camera image, the image acquisition (Frame Grabber) card in the PC drawer is probably defective. Replace the Frame Grabber card.

6. CEREC fault message appears when the camera should be activated? YES: install new software.
   - If no camera image appears, replace the Frame Grabber card.
Check whether the lifting magnet in the 3D camera is briefly activated during the measuring phase. A clicking sound should be heard.

Badly adjusted optical impressions may be due to shaking of the camera. The stored optical impression may, however, be OK despite shaking of the camera.

**Incorrect measuring sensor setting**

- **Lifting magnet activated?**
  - Yes: Recalibrate 3D camera (Refer to the acquisition unit operating instructions)
  - No: Connect replacement camera cable. Lifting magnet activated?
    - Yes: Replace camera cable and recalibrate 3D camera
    - No: Connect the replacement camera to test it. Lifting magnet activated?
      - Yes: Replace and recalibrate 3D camera
      - No: Replace Grabcer* image acqn. card

*Frame Grabber card

**CAUTION:** Switch OFF the unit before connecting a measuring instrument or replacing parts!
There are two types of error messages which can occur during camera calibration:

- Type 1 are warnings which should be treated seriously. It is possible to temporarily accept these errors by selecting OK and then continue with the calibration process.
- Type 2 are errors which force the calibration process to stop without the calibration data being saved.

The texts of the error messages give instructions on what to do. Observe the following:

- Prepare the calibration set properly.
- Slide the calibration set up to the stop.
- Ensure that the camera is kept clean (see acquisition unit operating instructions and 3D camera calibration instructions).

If "Image too small.." is displayed, try to reposition the prism tube in relation to the camera in order to avoid any possible image loss.

If it is not possible to prevent errors from occurring by carrying out the suggested measures, the 3D camera, camera cable or PC drawer may be defective.

First, test the replacement 3D camera. If this does not help, test a replacement camera cable. If this still does not help, test a replacement PC drawer.

The Service program can also be used for diagnosis and documentation purposes.

Select **Settings / Service / Camera quick test** to test the camera and to record the results in a protocol (see page 2 - 20 and ff.).
Milling Unit Radio module
First check the power supplies and cable connections.
If no LEDs are illuminated, this indicates that there is a problem with the power supply.
Replace the connection cable to determine whether this is the cause of the problem.
The serial cable connection on the DECT radio interface basically consists of two null modem cables (There is a 1:1 connection between the pins at either end. Check continuity).
The serial cable connection on the Futaba radio interface comprises:
  – A null modem cable with two sockets linking the PC to the radio interface.
  – A serial terminal cable linking the radio interface and milling unit (pins 2 & 3, 4 & 6, 7 & 8 at one end are each reverse-linked to the pins at the other end. Check continuity).

It is important to observe the following in serial links:
- The baud rate setting in the Cerec program must always be matched to the transmission channel connected. Always select 19200 baud for the Futaba radio interface. For the DECT radio interface, the configured value (usually 115200 baud) must be selected. Baud rates between 19200 and 115200 can be used for the cable connection between the PC and the milling unit. 115200 baud is normally used. For longer cables (>10m) or when using additional plug connections along the cable route, it may be necessary to reduce the baud rate.
- The milling unit checks the baud rate at which the software was installed. Should the baud rate be changed, the milling unit must be reinstalled.
- When the Cerec program is started, it only checks whether a suitable milling unit has been connected to the selected PC serial socket. If a downloaded milling unit is detected, it is then transferred. If this serial socket is being used by a different application (e.g. Sidexis/Videxis or a program which has already started and is running with the milling unit), the milling unit is of course not available.
- If the milling unit is accessed manually from the Cerec program (e.g. when calibrating the scanner, scanning, calibrating the milling unit, milling, changing instruments, carrying out maintenance or servicing) the milling unit software version is checked automatically. If this serial socket is being used by a different application (e.g. Sidexis/Videxis or a program which has already started and is running with the milling unit), the milling unit is of course not available.
- The milling unit status display is only checked at the start of the program and when accessing the milling unit manually. If the milling unit is released by another application (e.g. after completion of milling), the milling unit can be accessed manually again and the status display is updated in the current program. Only individual status displays are changed. Status displays in other applications in current use are not changed!

CAUTION: Switch OFF the unit before connecting a measuring instrument or replacing parts!
Left LED

LED
CO/SD/RD
4.17 Interference at radio interface

4.17.1 DECT radio interface (EU)

The following problems can occur:

- Radio interfaces are not properly paired or configured. If they are incorrectly paired, the radio interfaces cannot be linked (Left LED flashes and fails to remain illuminated).
- If several radio interfaces are in use, this increases the load on the DECT frequency band. Due to the component tolerances, the available DECT band frequency range can only accommodate approx. 8 CEREC3 devices. This can be seen when it takes longer (up to 2 minutes) for the pairs of DECT radio signals to link up. It is not possible to connect the PC to the milling unit until the DECT pairs are linked (left LED remains illuminated).
- When using several pairs of radio interfaces, do not position them close together. Place them 1m apart where possible. Interference occurs if the radio modules are too close.
- If the original Siemens program is used to check the GIGASET M101 data setting, the radio interfaces may block the PC/Milling unit link after exiting the program. This is a common fault in Siemens software used in radio interfaces. To remedy this problem, interrupt the power supply to both radio modules for few seconds. Then switch on the power again and wait until the DECT radio pairs link up.
- Should communication errors occur (Error messages: "Communication interference" or "Milling unit not ready"), this problem can also be remedied by interrupting the power supply to both radio modules for few seconds. Then switch on the power again and wait until the DECT radio pairs link up.

4.17.2 Futaba radio interface (USA/Japan)

The following problems can occur:

- Radio interfaces are not correctly adjusted or are defective. Here, no link is made between the two radio interfaces and the LED CO (left) fails to change from red to green.
- Cable is not properly connected. Here, the CEREC program cannot link up and the data remain in the radio interface buffer for approx. 1 minute. Following an attempted link-up at one of the radio interfaces, this is indicated when the SD or RD LED is illuminated for approx. 1 minute and does not extinguish immediately afterwards.

CAUTION: Switch OFF the unit before connecting a measuring instrument or replacing parts!
CAUTION: Switch OFF the unit before connecting a measuring instrument or replacing parts!

- Check whether the jack connector on the loudspeaker lead is connected to the green socket for the sound card on the PC drawer.
- Check the volume level in Windows.
- Check the L3 lead to the keyboard board.
- Check the L5 lead connecting the keyboard board to the loudspeakers.
- Check whether the loudspeakers are installed in the specified positions.
- Replace the loudspeakers if necessary.

4.18 No sound or sound level too low
Is the fan inside the Sirocam drawer unit running? If not, check the F4 fuse (T2AH) in the base of the device. Check the Sirocam connection lead. Check the F1 (5AT) and F2 (1AT) fuses on the Sirocam power supply unit plug-in board (Part No. 5854992) in the Sirocam drawer.

Open the SIDEXIS/VIDEXIS application.

Does an error message appear when trying to open the image acquisition window for the live image display as described in the user manual (SIDEXIS/VIDEXIS)? If this happens, check whether there is another PC application running which operates using the Sirocam or CEREC 3D camera. Close this application and retest the Sirocam camera. If another error message appears when trying to open the acquisition window for the live image display, then the Frame Grabber card must be replaced.

Check whether the Sirocam camera is properly connected to the Sirocam drawer.

Does the halogen lamp light up when the Sirocam camera is removed from its bracket? If not, replace the halogen lamp (refer to the operating instructions for the acquisition unit).

If the acquisition window for the live image display in the Videxis/Sidexis application is open when the Sirocam camera is removed from its position and the halogen lamp is illuminated, and there is still no image is displayed, then you must check the lead from the Sirocam module to the PC image acquisition card together with the lead to the camera socket throughout the Sirocam module. If these cable connections are in fault-free condition, then one of the two plug-in printed circuit boards on the Sirocam module (camera board or SIROCAM power supply unit board) is defective. First replace the camera board. If the error persists, replace the SIROCAM power supply unit board.

**CAUTION: Switch OFF the unit before connecting a measuring instrument or replacing parts!**
If interference occurs during live image displays when using the Sirocam camera, the following steps should be taken in the suggested order:

1. The Sirocam module could be incorrectly connected. Remove the Sirocam module once and then reconnect it. Recheck the camera image.

2. Does the screen interference increase/decrease by shaking the camera cable (at camera end or plug end)? If so, replace the Sirocam camera together with the camera socket lead (Part No. 5811232).

3. Check the continuity in the lead connecting the Sirocam module to the image acquisition (Frame Grabber) card in the PC (compare with circuit diagram specifications). If the interference increases/decreases by shaking the cable, replace the Sirocam lead (Part No. 5832865).

4. If the screen interference forms horizontal lines, this is probably due to a fault on the image acquisition card in the PC drawer. Replace the image acquisition (Frame Grabber) card.

5. Diagonal lines running across the screen, as opposed to localized interference, are probably due to a fault in the camera electronics on the camera board (Part No. 5864629) or in the camera socket* leads (Part No. 5811232) and the Sirocam lead (Part No. 5832865). These components must be replaced one after another until the fault has been remedied.

* Check whether the ferrite core is fitted.
**CAUTION: Switch OFF the unit before connecting a measuring instrument or replacing parts!**

- If only a black/white image appears, it is necessary to check the color intensity and tone settings in SIDEXIS/VIDEXIS. The tone should be set to 0 and the color intensity to approx. 80. If these settings are correct, the fault is probably caused by a defective Sirocam lead (Part No. 5832865). If a replacement lead fails to remedy the fault, the Frame Grabber card must be replaced.

- If the image is too weak, too dark or the colors are too faint, it is necessary to check and possibly change the brightness, contrast, intensity and tone settings in SIDEXIS/VIDEXIS. If changes are made, make sure you exit the Settings window by selecting OK so that the new values are permanently saved. The recommended default control settings are: BRIGHTNESS=110, CONTRAST=70, TONE=0, COLOR INTENSITY=80.

- If the image is still poor, the SIROCAM camera and/or camera board must be replaced.

---

**4.21 SIROCAM camera: Incorrect image settings**
Should you encounter problems with the digital X-ray box in the acquisition unit, the following procedure is recommended:

1. Is the PC switched on and can an image be seen on the monitor?

2. Check the supply voltage to the X-ray box. Is the X-Ray lead (Part No. 5832832) properly attached? Can approx 5.2 V be measured at the 9-pin D-SUB plug between Pins 7 (+5.2V) and 8 (GND)?

3. Is the X-ray box connected to the practice network and directly linked to the PC ethernet card in the acquisition unit?

If points 1-3 can be confirmed, the faults must be localized with the aid of the SIDEXIS Intraoral service handbook.

CAUTION: Switch OFF the unit before connecting a measuring instrument or replacing parts!
Settings
## List of Contents

5.1 Monitor Settings ........................................................................................................ 5-3
5.2 Calibrating the 3D camera ......................................................................................... 5-4
5.3 Pairing the DECT-radio interface (EU) ..................................................................... 5-5
5.4 Replacing a module of the DECT radio interface (EU) ............................................. 5-8
5.5 Pairing the Futaba radio interface (USA/Japan) ....................................................... 5-9

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## Settings

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<table>
<thead>
<tr>
<th>Section</th>
<th>Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>5.1</td>
<td>Monitor Settings</td>
<td>5-3</td>
</tr>
<tr>
<td>5.2</td>
<td>Calibrating the 3D camera</td>
<td>5-4</td>
</tr>
<tr>
<td>5.3</td>
<td>Pairing the DECT-radio interface (EU)</td>
<td>5-5</td>
</tr>
<tr>
<td>5.4</td>
<td>Replacing a module of the DECT radio interface (EU)</td>
<td>5-8</td>
</tr>
<tr>
<td>5.5</td>
<td>Pairing the Futaba radio interface (USA/Japan)</td>
<td>5-9</td>
</tr>
</tbody>
</table>
5.1 Monitor Settings

Factory Settings

The monitor is supplied with the following factory settings:

- Brightness: 140
- Contrast: 130
- Press SELECT/AUTO twice to adjust the image position.

Setting the brightness and contrast

The brightness and contrast can be set to match individual working environments. The brightness can be adjusted without pressing the MENU button by using the ◀ and ▶ buttons. To adjust the contrast, first press the MENU button. Provided that the on-screen display can be seen, it is possible to press the ◀ and ▶ buttons to adjust the contrast. When the on-screen display disappears, the setting entered last is stored automatically.

Setting the image and phase position

It may occasionally be necessary to readjust the image position and the phase position of the pixels on the monitor. In this case, proceed as follows:

1. First, boot your PC. Next, press the SELECT/AUTO monitor button twice to allow the monitor to self adjust.
   
   If you are not satisfied with the monitor settings, more precise adjustments can be made by carrying out the instructions below.

2. Start the NTEST.EXE program (C:\Programs\NTEST\NTEST.EXE).

3. Position the mouse pointer on the RESOLUTION icon.
   
   Press the left trackball button once and press the right trackball button once.
   
   Fine black vertical lines over a white background appear on the screen.

4. Press the Menu button on the monitor twice (main menu, page 2) and then press SELECT/AUTO twice ("FREQUENCY").
   
   Use the ◀ and ▶ buttons to adjust the monitor until there is no vertical interference visible in the display.
   
   There is still fine horizontal interference running across the display. To minimize this interference, press the SELECT/AUTO button again and select "TRACKING". Use the ◀ and ▶ buttons to optimize the horizontal settings on the monitor.

5. Press the right trackball button to return to the NTEST main screen.
   
   Press the Menu button on the monitor several times until "Main Menu Page 2" is displayed.
   
   Press SELECT/AUTO, select "HORIZONTAL POSITION" and "VERTICAL POSITION" and adjust the position of the display using the ◀ and ▶ buttons. It is important that each of the outer edges can be seen. The monitor settings are automatically saved when the on-screen display disappears.
5.2 Calibrating the 3D camera

Refer to the Section with the same title in the acquisition unit instructions.
5.3 Pairing the DECT-radio interface (EU)

The DECT radio interface is paired using the original Siemens program on the CD supplied with every DECT pair. A standard handbook containing clearly presented explanations of all the procedures is also supplied with every DECT pair.

**Quick reference guide:**

1. Install the original Siemens program from the original CD or from the directory `C:sironagigaset`.

   However, make sure that you select the latest program version displayed in the "Gigaset M100 Data SETUP" window following each system start.
5.3 Pairing the DECT-radio interface (EU)

The old program which appears in the "Gigaset M101 Data SETUP" window should no longer be used, since it fails to recognize modules equipped with new firmware.

2. If you are not sure whether both DECT radio interfaces are adjusted to the default settings, reset to the default settings.

   For this, take each of the radio interfaces, hold down the black button A and plug the power supply unit into the electric outlet. Hold the button down for 30 seconds! No LEDs should be illuminated during the first 10 seconds. The right LED should then come on.

   The radio interface is set to the default settings after the right LED has extinguished.

3. Disconnect both radio interfaces from the power supply for a few seconds.

   Reconnect the two radio interfaces to the power supply.

4. Now attach one radio interface to the COM1 socket on the PC. Place the other radio interface beside it, without connecting it in series.

   **CAUTION**
   
   The radio interface connected to the PC will be used as the MOBILE UNIT and integrated in the PC later on.
   
   The other radio interface will be used as the BASE. It will be attached to the milling unit later on.

5. Start the Siemens program

6. Click on **Install** and then **Local Station**.

7. Hold down the black A button on the BASE for more than 10s.

   The flashing LED on the left should flash for 10 seconds, and then both LEDs should begin to flash alternately.
8. Click **Register**.

Confirm the following window with **OK**.

9. After a few seconds, the MOBILE UNIT detects the BASE and this is indicated in the program. Click **Remote adapter** to view the BASE which has been logged on.

10. Click **Operating mode**

11. Select the following settings:
   - Operating mode: "Direct connection",
   - Bits per second: "115200",
   - Data bits: "8",
   - Parity: "None (N)",
   - Stop bits: "1" and
   - Data flow control: "Hardware (RTS/CTS)".

12. Click **Apply**.

The two radio interfaces are now configured using the specified baud rate and flow control.

13. Click **OK** to exit the program.

14. Disconnect both radio interfaces from the power supply for a few seconds.

Restart. The radio interfaces are now ready for operation.
5.4 Replacing a module of the DECT radio interface (EU)

If one of the two radio interfaces must be replaced by a new module, first make sure that both modules have been programmed with the same firmware.

To do this, proceed as follows for both modules one after the other:

1. Connect module to COM1 port of PC.

2. Insert the CD-ROM supplied with the spare part in the CD-ROM drive.

   After starting the Siemens program, press the "Firmware Update" button.

3. Confirm the Identification window with Next.

   The current version of the firmware in the module is then displayed.

4. If the current version and the latest version on the CD-ROM are identical, you can terminate the program.

5. If the current version and the latest version on the CD-ROM are not identical, press the Next button.

   The module will then be programmed with the latest firmware (this takes about 5 minutes).
5.5 Pairing the Futaba radio interface (USA/Japan)

CAUTION
Do not use the Futaba radio interface without the aerial! It must always be connected to aerial connection A.

In order to provide a communication link between the two radio interfaces, it is necessary to check/adjust the following:

1. Loosen cover C using a small screwdriver and slide it open.
2. On the DIL switch panel, switches 1, 2 and 6 must be pointing upwards (ON) and the others must be pointing downwards (OFF).

All radio interfaces are supplied with the same transmission frequency setting. If several radio interfaces are used in overlapping ranges, they must be adjusted to different transmission frequencies.

3. On each of the two pairs of linked radio interfaces, the rotary coding switch D must be set to between 0 and 7.

CAUTION
Switch positions 8 to 15 (F) must not be used.
5.5 Pairing the Futaba radio interface (USA/Japan)

Different switch settings must be used on all pairs of radio interfaces in operation in the same area. This limits the number of radio links which can be used in one area to a maximum of 8 pairs.

If the settings are changed, interrupt the power supply for a few seconds to make sure that the new switch positions are registered in the internal logic elements.

The Futaba radio interface is now automatically set to a baud rate of 19200 and the hardware flow control is configured.
6 Acquisition Unit: Repairs
List of Contents

Acquisition Unit: Repairs

List of Contents

6.1 Electrical and Electromechanical Components ................................................................. 6-4
6.2 Mechanical components ........................................................................................................ 6-30
6.1 Electrical and Electromechanical Components

NOTE
When replacing electrical and electromechanical components, please refer to the wiring diagrams of the exposure unit to determine the correct designations for fuses, leads and PC boards.

6.1.1 Fuses
Fuses generally may be replaced only with fuses of the same type and size. The following fuses can be replaced by a service engineer on site:

**Line power supply input filter fuses F1 and F2**
Replacement of the F1 (T5AH/from Series No. 3300: T6.3AH) and F2 (T5AH/from Series No. 3300: T6.3AH) fuses in the line power supply input filter is explained in the Section "Main fuses" in the acquisition unit instructions.

**Secondary circuit fuse, isolating transformer F3**
In order to change fuse F3 (T1.25AL), you must first place the acquisition unit on its side. The fuse holder for F3 is mounted on the bottom side of the unit base.

**Sirocam heater fuse F4**
In order to change fuse F4 (T2AH), you must first place the acquisition unit on its side. The fuse holder for F4 is mounted on the bottom side of the base plate.
Fuses on the video power supply unit board

The Sirocam module must be pulled out of the acquisition unit in order to change the fuse on the power supply unit PC board. Proceed as follows:

1. Disconnect connectors XS1 and XS3 from the camera board.
2. Remove the four screws A from the shield plate.
3. Fold out the shield plate from the side. The power supply board can now be seen.
4. Now replace fuses F1 (T5AH) and F2 (T1AL) on the video power supply unit board.
5. Reinstall and screw on the shield using the 4 screws (A).
6. Plug connectors XS1 and XS3 back in.

CAUTION

Make absolutely sure that two-pin connector XS3 is plugged in to the left edge of the video board as shown.

7. Slide the Sirocam module into the acquisition unit and connect the Sirocam camera.
To replace the PC drawer, proceed as follows:

1. Switch off the acquisition unit and disconnect the power plug.
2. Remove the rear section.
3. Unscrew and remove all cables from the back of the PC.
4. Unscrew bracket B located above the power plug on the PC power supply and disconnect the power plug.
5. Open the front door, pull apart the Velcro fastening and open the door fully, allowing the pedal to drop down.
6. Remove only the two bottom screws in the side sections on each side.
7. The PC drawer can now be pulled forwards and out of the acquisition unit.
8. To fit the PC drawer, carry out the same steps but in reverse order.

**CAUTION**

Make absolutely sure that bracket B is screwed on correctly above the power plug on the PC power supply. It forms a grounding point between the PC housing and the device chassis.

9. Move the pedal up and secure. If necessary, press the retaining spring back slightly to make it easier to insert the pedal.
6.1 Electrical and Electromechanical Components

6.1.3 DECT Power Supply Board

Part No.: 58 73 083
Rep. Part No.: 58 65 584

1. Perform points 1 to 7 in the instructions for replacing the PC Acquisition Unit.
2. Undo the strap on the bottom of the PC.
3. Unlock housing catch A und pull front section with drive forward (CAUTION: leads).
   Lift off foam plastic shell and lay it aside.
4. Unscrew and remove the screw.
5. Disconnect plugs X1 and X2.
6. Remove the DECT power supply board.
7. Plug connectors X1 and X2 into the DECT power supply board supplied
   Insert the board and screw it on firmly.
8. Position foam plastic shell, making sure that the drives are correctly positioned.
9. Slide on the front part until it locks into place.
10. Attach the strap and tighten.
6.1.4 **Frame Grabber card**

Part No.: 58 73 091  
Rep. Part No.: 58 65 592

1. Perform points 1 to 4 of the instructions for replacing the DECT Power Supply Board.  
2. Remove the frame grabber card, insert a new card and screw on firmly.  
3. Perform points 8 to 10 of the instructions for replacing the DECT Power Supply Board.

6.1.5 **Complete power supply unit**

Part No.: 58 09 889  
Rep. Part No.: 58 65 550

To replace the power supply unit, proceed as follows:

1. Switch off the acquisition unit and disconnect its power plug.  
2. Remove the rear section, unscrew and remove the three screws on the cover plate and remove the plate.  
3. Unscrew the bracket located above the power plug on the PC power supply unit and disconnect the power plug.  
4. If necessary, disconnect the plug connection of the monitor power supply (if a power supply unit with a separate monitor power supply is installed).  
5. Place the acquisition unit on its side.  
6. Remove all holding screws attached to the base plate.  
7. Take out the base plate and place it to one side.  
8. Disconnect the power cable to the PC power supply unit and the grounding cable on the cover plate.  
9. If the acquisition unit is equipped with the SIROCAM option, disconnect lead L12 (SIROCAM lead) at the isolating point to the Sirocam transformer.
6.1 Electrical and Electromechanical Components

**CAUTION**

The SIROCAM transformer, the fuse holder and the 56W series resistor for the SIROCAM heater as well as the corresponding leads all must be removed and reinstalled in the replacement power supply unit.

10. Insert the power cable to the PC power supply unit and the grounding cable for the cover plate through the rear side of the unit and reconnect lead L12 (SIROCAM lead) if necessary.

11. Insert replacement power supply unit into the base and screw down firmly.

**CAUTION**

It is important to make sure that the leads are not crushed and that they do not come into contact with the 56W series resistor for the Sirocam heater.

12. Place the acquisition unit in an upright position.

13. Connect power plug to the PC power supply and screw down the bracket firmly.

14. Connect plugs of monitor power supply.

**NOTE**

If the LCD monitor was powered by the DECT power supply board of the PC drawer before the complete power supply unit was replaced, this will be changed. In the future the monitor will be powered by the separate monitor power supply unit of the "complete power supply unit" module. To perform this conversion, the monitor lead previously used must be replaced with the new one supplied. The procedure for dismantling the front and rear housing covers required to replace the monitor lead is described in the chapters '6.2.10 Monitor adapter' and '6.2.11 Monitor support, complete'.

15. Screw on cover plate tight with three screws. Also screw grounding cable on to cover plate. Make sure to use the special washer.

16. Attach the rear section and plug in the power cord.

17. If necessary, attach a label specifying the new fuse ratings to the rear side of the unit base. Affix the new label over the old one.
To replace the control unit, proceed as follows:

1. Switch off the acquisition unit and disconnect its power plug.
2. Remove the rear section, detach the VGA lead on the graphics card and the power supply lead to the monitor at the DECT supply point. Remove the star knob screws of the monitor mounting and lift the monitor off of the acquisition unit.
3. Disconnect the cameras from the acquisition unit and keep in a safe place.
4. Unscrew the control unit at the rear end of the handle and at the monitor support. Unscrew and remove C.
5. Disconnect the keyboard and trackball leads from the PS/2 sockets on the PC.
6. Unscrew and remove the grounding band from the rear side of the unit.
7. Lift the control unit off the acquisition unit and open the cable fasteners.
8. Disconnect leads L3, L10/L20, L13 and HP1 from the keyboard board.
9. Remove the control unit.
10. To install the new control unit, carry out Steps 1-8 in reverse order.
6.1 Electrical and Electromechanical Components

6.1.7 Keyboard board

Part No.: 58 09 954

To replace the keyboard board, follow the procedure below:
1. Carry out Steps 1 to 9 in the instructions for replacing the Control unit.
2. Disconnect leads L4, L5 and L7 from the keyboard board.
3. Unscrew and remove the keyboard board.
4. Position the new keyboard board, align (ensuring there is an even gap around the side edges) and screw down firmly.
5. Reconnect leads L4, L5 and L7.
6. Install the control unit in accordance with the instructions for replacing the Control unit.

6.1.8 Keyboard board (L3) lead (L3)

Part No.: 58 10 044

To replace lead L3 on the keyboard board, follow the instructions below:
1. Carry out Steps 1 to 9 in the instructions for replacing the Control unit.
2. “Remove the plug panel on the rear of the device and unscrew the two jack sockets in the panel used for connecting the pedal cable.”
6.1 Electrical and Electromechanical Components

3. Screw in the two jack sockets for the replacement cable.

⚠️ **CAUTION**
*It is important to make sure that the two sockets are attached in the correct positions!*

4. Screw the plug panel back on to the rear of the unit.

5. Complete the installation of the control unit by following the instructions for replacing the control unit.

6.1.9 **Complete keyboard**

Part No.: 58 10 796

To replace the keyboard board, follow the procedure below:

1. Loosen the four nuts used to attach the keyboard to the control unit.

⚠️ **NOTE**
*If a Sirocam camera is present, a special screw must be loosened instead of a nut.*

2. Unscrew and remove the grounding band on the rear of the unit.

3. Take out the keyboard and disconnect lead L4 on the keyboard controller.

4. Install the new keyboard.

⚠️ **CAUTION**
*It is important to make sure that the flexible track conductors are properly connected to the keyboard controller board and that no damage is caused to the flexible track conductors.*

5. Screw down the new keyboard and align to ensure that there is an even gap around the side edges.

6. Screw the grounding band on to the rear side of the device.
6.1.10 Trackball

Part No.: 58 33 053

To replace the trackball, follow the procedure below:

1. Unscrew and remove the ring around the ball.
2. Carry out Steps 1 to 9 in the instructions for replacing the Control unit.
3. Disconnect lead L7 from connector X4 of the keyboard board.
4. Undo the screw connection between the trackball and the control unit and remove the trackball from the upper side of the control unit.
5. Position the new trackball on the underside of the control unit and screw in place from the upper side.
6. Reconnect lead L7. Route the lead from the trackball to plug PS/2 on the PC at the rear of the device.
7. To install the control unit, follow the instructions for replacing the control unit.
8. Insert the trackball and screw on the outer ring again.

The ease of action of the trackball can be set by selecting the stop position of the ring.
6.1 Electrical and Electromechanical Components

6.1.11 Loudspeaker unit

Part No.: 58 32 808

To replace the entire loudspeaker, follow the procedure below:

1. Carry out Steps 1 to 7 in the instructions for replacing the Control unit.
2. Disconnect lead L5 from the keyboard board.
3. Release the two loudspeakers from the spring locks (e.g. with the aid of two small screwdrivers).
4. Connect lead L5 on the new pair of loudspeakers to the keyboard board.
5. Insert each loudspeaker into the side hole indicated by its cable.
6. Install the control unit in accordance with the instructions for replacing the control unit.
6.1 Electrical and Electromechanical Components

6.1.12 Microswitch unit

Part No.: 58 10 739

To replace the microswitch, follow the procedure below:

1. Place the unit on its side and fold away the pedal.
2. Use a torque screwdriver to remove the entire microswitch from the unit base.
3. Before fitting the new switch, loosen the screws on the microswitch mounting and then push the switch together inside the elongated slots in order to avoid any damage beforehand.
4. Screw the new microswitch into the unit base and ensure that it is positioned at right angles to the pedal.
5. Move the pedal to its release position at the stop using adhesive tape or by hand.
6. It is important to push the microswitch up as far as possible to allow the microswitch plunger to be held back by the spring clip, without completely bending (or over-bending - see 3.).
7. After the pedal is activated or released, the switch must open from its resting position so that it can be triggered from all sides when the door is closed.
6.1 Electrical and Electromechanical Components

6.1.13 LCD monitor unit

Part No.: 58 10 143
Rep. Part No.: 58 65 535

To replace the LCD monitor unit, follow the procedure below:

1. Switch off and unplug the acquisition unit.
2. Take off the back section and disconnect the VGA lead (L1) on the graphics card and the power supply lead to the monitor (L2) at the DECT supply point. Remove the three star grip screws D on the monitor mounting and lift the monitor off the acquisition unit.
3. Install the new monitor from above. Here you must feed the VGA lead and the power supply cable for the monitor (L2) through the opening on the monitor support and through to the rear of the unit.
4. Attach the monitor firmly using the 3 star grip screws D, starting with one screw at the rear. Screw the VGA lead on to the graphics card and connect the power supply lead for the monitor to the DECT supply.

6.1.14 VGA lead

1. For instructions on how to remove the front and rear monitor panels, see ‘6.2.10 Monitor adapter” and “6.2.11 Monitor support, complete”.
2. Replace the VGA lead and reinstall the monitor panels.
6.1 Electrical and Electromechanical Components

6.1.15 3D camera

Part No.: 58 09 863  
Rep. Part No.: 58 65 543

To replace the 3D camera, follow the procedure below:

1. Disconnect the old 3D camera from the camera cable and attach the new 3D camera.
2. Calibrate the 3D camera with the aid of the CEREC application (see 3D Camera calibration in the acquisition unit operating instructions).

6.1.16 Cerec camera lead

Part No.: 5832873

To replace the Cerec camera lead, follow the procedure below:

1. Carry out Steps 1 to 9 in the instructions for replacing the Control unit.
2. Disconnect the Cerec camera lead from the image processing board in the PC drawer.
3. Remove the right-hand side section. Here you must remove the three side screws and the rear connecting screw between the side section and the control unit.
4. Remove the old camera lead and install a new one.

⚠️ CAUTION  
It is important to ensure that the exposed cable between the reinforcing sleeve affixed to the side and the camera plug is exactly the same length as the previous camera cable. It may be necessary to reposition the sleeve on the cable.

5. Connect a new camera lead to the image acquisition card in the PC drawer and screw in place.
6. Install the control unit in accordance with the instructions for replacing the control unit.
7. Insert the side section from the rear of the unit and attach it to the control unit using the three side screws and the connecting screw.

⚠️ CAUTION  
It is important to make sure that the side section fits snugly into the rear guideways!
6.1 Electrical and Electromechanical Components

6.1.17 Cerec heater

Part No.: 58 11 190

To replace the Cerec heater, follow the procedure below:

1. Carry out Steps 1 to 9 in the instructions for replacing the Control unit.
2. Unscrew the heater from the control unit. Disconnect the cable from the keyboard board and pull it out through the ventilation slot.
3. Feed the connecting cable for the new heater through the ventilation slot and connect the cable to the keyboard board.
4. Screw the heater on to the control unit firmly.

⚠️ CAUTION

*It is important to make sure that the heater is positioned at right angles to the control unit. If necessary, readjust the heater after installing the control unit.*

5. Install the control unit in accordance with the instructions for replacing the control unit.
To replace the Cerec camera board, follow the procedure below:

1. Switch off and unplug the acquisition unit.
2. Open the front door, pull apart the Velcro fastening and take off the door carefully.
3. Remove the cover plate.
4. Disconnect the Sirocam plug and place it to one side.
5. Pull out the lock and turn it 90° to the left (CCW).
6. Pull out the Sirocam module completely.
7. Disconnect the two plugs on the lead of the complete camera socket (XS1, XS3) from the Cerec camera board.
8. Unscrew the camera board and pull off the Sirocam power supply cable.
9. Connect the new camera board to the Sirocam power supply cable, position and screw together firmly.
10. Connect the two plugs on the complete camera socket lead (XS1, XS3) to the Cerec camera board.
11. Slide the Sirocam module into the acquisition unit.

⚠️ CAUTION

Make sure that the plug at the end of the rear module is properly inserted into the socket on the matching component!

12. Turn the lock 90° to the right (CW) and then position the locking bar.
13. Plug in the Sirocam and put on the cover plate.
14. Raise the front door, press the Velcro fastening together and close the door.
To replace the board on the Sirocam power supply unit, follow the procedure below:

1. Switch off the acquisition unit and disconnect its power plug.
2. Open the front door, pull apart the Velcro fastening and take off the door carefully.
3. Remove the cover plate.
4. Disconnect the Sirocam plug and place it to one side.
5. Pull out the lock and turn it 90° to the left (CCW).
6. Pull out the Sirocam module completely.
7. Remove the four screws on the shield plate for the two boards belonging to the Sirocam drawer.
8. Pull the shield plate out of the Sirocam drawer in the direction of the lamp module.
9. Disconnect the cable to the camera board and also the leads to the halogen lamp, thermostat and fan.
10. Remove the holding screws on the Sirocam power supply unit board.
11. Position the new Sirocam power supply unit board and screw it down firmly.

**CAUTION**

Attach the screws on the 25-pin plug connector first!
12. Connect the leads to the halogen lamp, thermostat, fan and camera board.

13. Position the shield plate with the attached boards and screw it down firmly.

14. Slide the Sirocam module into the acquisition unit.

**CAUTION**

*Make sure that the plug at the end of the rear module is properly inserted into the socket on the matching component! It may be necessary to unscrew the matching component from the Sirocam lead and to reconnect it after sliding in the Sirocam module.*

15. Turn the lock 90° to the right (CW) and then position the locking bar.

16. Connect the Sirocam plug and put on the cover plate.

17. Raise the front door, press the Velcro fastening together and close the door.
To replace the SIROCAM lead, follow the procedure below:

1. Switch off the acquisition unit and disconnect its power plug.
2. Remove the rear section.
3. Release and remove the Sirocam lead plug on the image acquisition card of the PC drawer and on the Sirocam drawer.
4. Undo the three screws on the cover plate and remove the plate.
5. Place the acquisition unit on its side.
6. Remove all the base plate holding screws.
7. Take out the base plate and place it to one side.
8. Disconnect the Sirocam lead at the Sirocam transformer isolating point and pull out the lead from the rear of the device.
9. Feed in the new lead from the rear and connect it to the transformer lead.
10. Position the base plate and screw down firmly.
11. Place the acquisition unit in an upright position.
12. Replace and screw down the cover plate. Then screw the grounding cable onto the cover plate. Make sure to use the special washer.
13. Connect the Sirocam lead to the image acquisition card in the PC drawer and screw it down.
14. Connect the Sirocam lead to the rear of the Sirocam module and screw it down firmly.
6.1 Electrical and Electromechanical Components

6.1.21 Complete light module unit

Part No.: 58 55 114

To replace the entire light module unit, follow the procedure below:

1. Switch off the acquisition unit and disconnect its power plug.
2. Open the front door, pull apart the Velcro fastening and take off the door carefully.
3. Remove the cover plate.
4. Disconnect the Sirocam plug and place it to one side.
5. Pull out the lock and turn it 90° to the left (CCW).
6. Pull out the Sirocam module completely.
7. Remove the four fixing screws A on the light module.
8. Disconnect the thermostat, fan and halogen lamp leads from the Sirocam (NSB) power supply board.
9. Gently withdraw the light module from the camera socket and remove it.
10. Position the new light module and screw it in place.

⚠️ CAUTION

It is important to make sure that the fiber-optic rod inside the camera socket is not damaged!
6.1 Electrical and Electromechanical Components

11. Connect the thermostat, fan and halogen lamp leads to the Sirocam (NSB) power supply board.

12. Slide the Sirocam module into the acquisition unit.

⚠️ **CAUTION**

*Make sure that the plug at the rear end of the module is properly inserted into the socket on the matching component!*

13. Turn the lock 90° to the right (CW) and then position the locking bar.

14. Connect the Sirocam plug and put on the cover plate.

15. Raise the front door, press the Velcro fastening together and close the door.

6.1.22 Complete camera socket

Part No.: 58 11 232
6.1 Electrical and Electromechanical Components

To replace the camera socket, follow the procedure below:

1. Switch off the acquisition unit and disconnect its power plug.
2. Open the front door, pull apart the Velcro fastening and take off the door carefully.
3. Remove the cover plate.
4. Disconnect the Sirocam plug and place it to one side.
5. Pull out the lock and turn it 90° to the left (CCW).
6. Pull out the Sirocam module completely.
7. Remove the four holding screws from the light module.
8. Disconnect the thermostat, fan and halogen lamp leads from the Sirocam power supply board.
9. Gently withdraw the light module from the camera socket and remove it.
10. Remove the camera socket fastening screws.
11. Completely disconnect the two plugs on the camera socket lead from the Cerec camera board.
12. Press the lead grommet out of the partition plate and take it off the lead.
13. Release the ferrite piece from the drawer plate and remove the entire camera socket lead.
14. Screw in the camera socket attached to the new lead.
15. Position and attach the ferrite piece belonging to the new lead.
16. Place the grommet on the lead and press it into the partition plate.
17. Connect the two plugs on the camera socket lead to the Cerec camera board.
18. Position the light module and screw it in place.

⚠️ **CAUTION**  
It is important to make sure that the fiber-optic rod inside the camera socket is not damaged!

19. Connect the thermostat, fan and halogen lamp leads to the Sirocam power supply board.
20. Slide the Sirocam module into the acquisition unit.

⚠️ **CAUTION**  
Make sure that the plug at the rear end of the module is properly inserted into the socket on the matching component!

21. Turn the lock 90° to the right (CW) and then position the locking bar.
22. Connect the Sirocam plug and put on the cover plate.
23. Raise the front door, press the Velcro fastening together and close the door.
6.1 Electrical and Electromechanical Components

6.1.23 Sirocam heater

Part No.: 58 32 907

To replace the Sirocam heater, follow the procedure below:

1. Carry out Steps 1 to 9 in the instructions for replacing the Control unit.
2. Unscrew the heater from the control unit. Disconnect the cable from the floating isolating point and pull it out through the ventilation slot.
3. Feed the connecting cable for the new heater through the ventilation slot and connect the cable to the floating cable connector.
4. Screw the heater onto the control unit firmly.

CAUTION
It is important to make sure that the heater is positioned at right angles to the control unit. If necessary, readjust the heater after installing the control unit.

5. Install the control unit in accordance with the instructions for replacing the control unit.

6.1.24 EU radio interface

Part No.: 58 32 998
or DECT module, 1-piece. Rep. Part No.: 58 65 600

When replacing one or both of the DECT radio interfaces, make sure that linked radio interfaces are paired as specified in ‘5.3 Pairing the DECT-radio interface (EU)’. 
6.1 Electrical and Electromechanical Components

6.1.25 Radio interface USA/Japan

Futaba radio interface

When replacing one or both of the Futaba radio interfaces, make sure that the settings are as specified in ‘5.5 Pairing the Futaba radio interface (USA/Japan)’.

Höft & Wessel radio interface

⚠️ CAUTION
When replacing a Höft & Wessel radio interface module, always replace both modules at the same time. These modules can be mated only at the manufacturer’s plant.

1. Insert the module labeled Acquisition Unit „FT“ in the acquisition unit.
2. Connect the module labeled Milling Unit „PT“ to the milling unit.

6.1.26 DECT data transfer cable (L11/L21)

Part No.: 58 57 367

To replace the DECT data transfer cable, follow the procedure below:
1. Carry out Steps 1 to 9 in the instructions for replacing the Control unit.
2. Unscrew the radio module bracket.
3. Unscrew, disconnect and remove data transfer cable L11/L21.
4. Route, connect and screw on new L11/L21 data transfer cable as shown in the drawing.
5. Screw the radio module bracket back on.
6. Install the control unit by following the instructions for replacing the control unit.
6.1.27 XAB IO

Spare Part No.: 51 68 427
Rep. Part No.: 51 68 435

To replace the XAB IO, follow the procedure below:

1. Carry out Steps 1 to 9 in the instructions for replacing the Control unit.
2. Disconnect plug of network lead L14. Unscrew and remove plug B.
3. Unscrew the radio module bracket.
4. Remove screw C and take out the X-ray module.
5. Unscrew the 2 screws on the X-ray module and take off the cover panels.
6. Disconnect all plugs from the XAB IO PC board and unscrew the board.
7. Screw on the new XAB IO PC board and reconnect the plugs previously disconnected.
8. Screw the cover panels back on.
9. Insert the X-ray module and attach with screw C and the radio module bracket.

6.1.28 XAB D

Spare Part No.: 51 68 443
Rep. Part No.: 51 68 450

To replace the XAB D:

1. Carry out Steps 1 to 5 in the instructions for replacing the XAB IO.
2. Disconnect all plugs from the XAB D board and unscrew the board.
3. Screw on the new XAB D board and reconnect the plugs previously disconnected.
4. Carry out Steps 8 to 10 in the instructions for replacing the XAB IO.
6.1.29 Internal X-ray data transfer cable (L13)

Part No.: 58 32 840

To replace the X-ray data transfer cable, follow the procedure below:

1. Carry out Steps 1 to 5 in the instructions for replacing the XAB IO.
2. Disconnect all plugs from the XAB IO board and take out data transfer cable L13.
3. Insert the new data transfer cable L13 and reconnect the plugs previously disconnected.
4. Carry out Steps 8 to 10 in the instructions for replacing the XAB IO.

6.1.30 External interface

Part No.: 58 57 375

To replace the external interface, follow the procedure below:

1. Switch off the acquisition unit and disconnect its power plug.
2. Remove the rear section.
3. Unscrew and remove all the plugs on the external interface.
4. Unscrew the external interface (3 screws) and screw on the new external interface.
5. Reconnect the plugs previously disconnected and screw them on firmly.
6. Install the rear section.
6.2 Mechanical components

CAUTION
Disconnect the line power supply BEFORE replacing any parts.

6.2.1 Front flap

Complete front flap, Part No.: 58 10 762
Front flap, Part No.: 58 10 838

1. Swing the pedal down.
2. Loosen the L/R screws on the door support (screws need not be unscrewed completely).
3. Turn the front flap together with the door support and remove both.
4. To install, carry out the same steps in reverse order.
5. Door adjustment:
   Adjust the gap between the control unit and the door to approx. 1.5 - 2 mm. Tighten the L/R screws firmly.
6. It must be possible to close the door without scraping on the left or right. Any scraping can be corrected by loosening one of the fastening screws.
6.2 Mechanical components

6.2.2 Side section

Side section - right, Part No.: 58 10 812
Side section - left, Part No.: 58 10 804

1. Take off the rear section.
2. Remove the top rear screw on the control unit.
3. Remove the 3 screws on the front.
4. Slide the side section out towards the rear.
### 6.2.3 Attaching the rear section

Part no.: 58 55 049

1. Remove the leads from the external interface.
2. To remove the rear section, place a finger or thumb in the top cut-away, press downwards and pull back.
3. Place your thumb in the top cut-away. Using your hand, guide the lower section of the back into the side sections and push down, turning the rear section towards the control unit.
4. Push the lower bolts down and attach the rear section to the control unit.
6.2.4 Unit base

Part No.: 58 10 952

1. Remove the Sirocam camera and unscrew the CEREC.
2. Take off the rear section, side sections and front flap.
3. Unscrew the cable grip at the rear of the base. Then loosen and disconnect all the leads coming from below.
4. Position the unit on its side. Place a support underneath the unit so that the base is not in contact with the floor.
5. Remove the 6 screws on the bottom and take off the base.
6. Install the rollers, power supply plate, microswitch, filter, filter cover etc. on the new base.
7. Install the base and make sure that there is an even gap between all sides of the base and the drawer plate.

6.2.5 Castors

Roller, Part No.: 41 82 395
Castor with parking brake, Part No.: 41 82 403

1. Place the unit on its side.
2. Replace defective castor with a replacement castor.

6.2.6 Filter mat

Part No.: 58 33 046

1. To remove the filter cover on the bottom side, place your hand under the right-hand side and press the locking hook.
2. Replace the old filter mats with new ones and insert them in the filter cover.
3. Attach the filter mats and the filter cover to the base and push up to lock in place.
6.2 Mechanical components

6.2.7 Pedal (foot switch)

Part No.: 58 10 877

1. Swing the pedal down past the stop spring.
2. Bend the pedal to one side and then slide it out in the opposite direction.
3. Attach one side of the new pedal and attach the other side by bending its arm section.

6.2.8 CEREC bracket

Part No.: 58 10 069

1. Remove the 3 bottom screws, take off the Cerec bracket and replace it with a new one.
2. Install the CEREC bracket using the 2 rear screws. Do not fully tighten the screws, since the bracket must still be moveable.
3. Press the bracket as firmly as possible against the control unit and tighten the two rear screws firmly.
4. Then insert the third screw and tighten so as to gently pretension the bracket against the control unit.
6.2.9 Sirocam bracket

Part No.: 58 11 216

1. First, remove the 3 bottom screws together with the special screw. Then take off and replace the Sirocam bracket with a new one.

2. Install the Sirocam bracket using the 2 rear screws. Do not fully tighten the screws, since the bracket must still be moveable.

3. Press the bracket as firmly as possible against the control unit and tighten the two rear screws.

4. Then insert the third screw and tighten. The bracket is now held with light tension to the control unit.

5. Finally, insert the special screw until it grips. The screw must not be fully tightened (do not use a nut to attach the keyboard at this point).
6.2 Mechanical components

6.2.10 Monitor adapter

Part No.: 58 10 242

1. Remove the monitor as explained ("6.1.13 LCD monitor unit").

2. Undo screw A for the rear enclosure of the monitor stand by inserting a tool in the slot on the monitor front panel.

3. At a height of approx. 5cm, press the rear enclosure of the monitor stand together with one hand and remove it from the rear (if necessary, this can be made easier by inserting a screwdriver into the slot and pressing against the top of the screw hole).

4. A special tool is now used to remove the monitor nut and replace the monitor adapter.

5. Install the new monitor adapter. Do not fully tighten the monitor nut. The adapter must still be able to rotate without any play.

6. Clip the monitor enclosure into place and attach the screws.

7. Install the monitor as explained in ("6.1.13 LCD monitor unit").
6.2 Mechanical components

6.2.11 Monitor support, complete

Part No.: 58 33 079

1. Remove the monitor rear panel as explained in ‘6.2.10 Monitor adapter”.

2. Remove the 4 screws holding the monitor front panel as well as the 4 screws holding the LCD monitor.

3. A special tool is now used to remove the monitor nut and replace the monitor support.

4. Install in accordance with the above instructions.

6.2.12 Monitor nut

Part No.: 58 32 931

Refer to ‘6.2.10 Monitor adapter”.

6.2.13 Monitor panels

Monitor panel - front, Part No.: 5811265
Monitor panel - rear, Part No.: 5811273

Refer to ‘6.2.10 Monitor adapter” and ‘6.2.11 Monitor support, complete”.

6.2.14 DECT holder

Part No.: 58 10 309

1. Remove the left and right side sections and the rear section.

2. Remove control unit. Undo the two DECT holder screws

3. To replace and install the radio interface, repeat these steps in reverse order.
6.2 Mechanical components

6.2.15 Plug-in board

Part No.: 58 06 885

1. Remove the back section and the left side section (front view).

2. The two stamped indents on the side section can be punched out using a screwdriver. The existing holes can be used for installing replacement parts.
7 Milling Unit: Repairs

CEREC 3
Milling Unit: Repairs

List of Contents

7.1 Milling Unit: General Activities ................................................................. 7-3
7.2 Replacing the Scanner .................................................................................. 7-5
7.3 Replacing the Drive and/or Motor ............................................................... 7-11
7.4 Checking / Adjusting Stop positions ........................................................... 7-13
7.5 Stepping Motors: Replacing / Adjustment .................................................... 7-15
7.1 Milling Unit: General Activities

7.1.1 Removing the front panel

1. Pull out the tank.
2. Loosen the two side screws.
3. Open the milling chamber door slightly (catch must be open).
4. Pull out the front panel approx. 10 cm.
5. Disconnect the cables (door lock, sealed keypad).
6. Remove the front panel completely, pressing the tank connector upwards.

7.1.2 Installing the front panel

1. Close the milling chamber door.
2. Slide in the front panel slightly while raising the tank connector.
3. Connect the cables (door lock, sealed keypad).
4. Slide in the front panel completely, opening the milling chamber door slightly.

CAUTION
Do not insert the front panel into the seal.

5. Lift the front panel over the seal and screw it on at the side again.
6. Insert the tank.
7.1 Milling Unit: General Activities
7.2 Replacing the Scanner

7.2.1 Safety

Scanning Milling Unit

The unit corresponds to a CLASS 1 LASER PRODUCT.

The scanner contains a CLASS 2 laser source.

---

CAUTION

- Laser radiation
- Do not stare into the beam
- Class 2 Laser Product

---

CAUTION

- The laser beam emerges at right angles to the window of the scanner!
- Power: < 1 mW
- Wave length: 670 nm
- Aperture angle: > 10 mrad

---

CAUTION

Check the scanner for visible damage before every scanning operation!

---

CAUTION

The scanner may be installed and removed only by service engineers.

---

CAUTION

Before opening the milling unit, switch the unit OFF and disconnect it from the power supply.

---

CAUTION

UNDER NO CIRCUMSTANCES may the plugs of the scanner be plugged in before the scanner is installed.
7.2 Replacing the Scanner

7.2.2 Preparations

1. In the Settings menu item call up the Service menu item.
2. Click on the Yes button in the two following windows.
   See “Password protection” on page 2 - 5.
3. In the Test selection window select the Light barriers, ... subitem and confirm with OK.
4. In the Switch window select the Motor stop positions subitem and click on Home.
   The unit moves into the starting position.

CAUTION
Switch the unit OFF and disconnect it from the power supply.

NOTE
Remove the milling burrs and ceramic block (if present).
7.2 Replacing the Scanner

7.2.3 Removing the Scanner

1. Unscrew 5 screws A from the cover and remove the cover to the rear.

2. Pull off plug X5.
   Cut through the two cable ties on the scanner cable.

3. Turn the left drive by hand, unscrew the 2 screws and detach the scanner from the carrier.

4. Pry out the sealing collar with the block changing tool.
   Pull the two plugs through the hole one after the other and remove the scanner with cable.
7.2 Replacing the Scanner

7.2.4 Installing a New Scanner

1. Push both plugs of the scanner one after the other through the hole and pull out cable in the cast part.

2. First insert the sealing collar below and then press with the block changing tool until the collar is fully flush with the milling chamber wall.

![Image of scanner installation](image1.jpg)

---

- **CAUTION**

The surface B must be free of impurities.

3. Insert scanner locating pin C and loosely fasten the scanner with 2 screws.

4. Align the scanner parallel to the carrier and tighten both screws.

![Image of scanner alignment](image2.jpg)
7.2 Replacing the Scanner

5. Turn the drive by hand up to the stops and make sure it moves freely.

⚠️ **CAUTION**

*The block axle must not come into contact with the scanner cable.*

*The scanner cable must lie above the water hose.*

6. Fasten the scanner cable with the cable tie on the adhesive base so that the cable curves away from the sealing collar and does not lie in the region of the gearwheels.

Cut off excess length of the cable tie.

7. Run scanner cable as shown and plug both plugs onto X5 (pay attention to coding).

8. Slightly raise the cover at the back, mount it and fasten with 5 screws.
7.2 Replacing the Scanner

7.2.5 Functional Test

1. In the *Settings* menu call up the *Service* menu item.
2. Click on the *Yes* button in the two following windows. See “Password protection” on page 2 - 5.
3. Connect the unit to the power line and switch it ON.
4. Perform calibration. See Operating Instructions for the Milling Unit, Calibrating the Scanner.
5. In the *Test selection* window select the *Sensor test (Scanner test)* subitem and confirm with *OK*.
6. In the *Sensor test (Scanner test)* window click on the *Start* button.
   When approximately 10 test runs have been made, click on the *Stop* button.
   All fields must have a green background.
7.3 Replacing the Drive and/or Motor

1. Change the drive/motor as shown in the diagram.

**CAUTION**

Pay attention to the enclosed data sheet.

2. Check stop positions. Adjust if necessary. Refer to (see page 7 - 13).

**Running up the motor / drive**

3. Select /Service/Test selection/DC - motors "Inlet/Load" (see page 2 - 16).

**NOTE**

Motor ½ = DC milling motor;
Motor 3 = DC sensor motor.

4. Allow the motor to run until the speed indicator has reached at least the yellow level (the indicator is usually red at the start of the run-up time).

**Calibrating the milling unit**

5. Refer to the instructions for using the milling unit.

**Milling test pieces**

7. Mill test pieces.
7.3 Replacing the Drive and/or Motor

Motor / drive testing


If not all the displays have a green background, mill another test piece and repeat the test.
7.4 Checking / Adjusting Stop positions

When carrying out some servicing tasks, it may be necessary to adjust the stop positions on milling units, especially when replacing:

- Drive units
- DC motors
- Light barriers

7.4.1 Checking the stop position

1. Select Settings/Service/Test selection/Light barriers, Motor stop positions (see page 2 - 13).
2. Call up Stop position 1 or 3 of the corresponding motor.
3. Check whether the installed grinder can be removed and screwed back into place with the grinder changer (see operating instructions for the milling unit and changing grinders).

If this is not the case, the stop position must be adjusted.

7.4.2 Adjusting the stop position

1. Switch off the device.
2. Remove the hood.
3. Take off the front panel (see page 7 - 3).
4. Switch on the device.
5. Start the CEREC 3 program.
7. Call up stop position adjustment by selecting: Settings/Service/Test selection/Light barriers, Motor stop positions (see page 2 - 13).
8. Call up Stop position 1 or 3 of the corresponding motor.
7.4 Checking / Adjusting Stop positions

   (latching button on gear box flush with gear box cover).

10. Call the test "Stepping Motors - Single Step" (see page 2 - 15):
    Settings/Service/Test selection.
    Set the Speed factor to "10".

11. Check to make sure that the locking button moves past the latching button
    without contacting it when the motors run (Grind for stop position 3, Mill for
    stop position 1).

   CAUTION
   Do not reach into the milling machine or leave any tools inside.

After carrying out the adjustments, recheck the stop position
(see page 7 - 13).

12. Switch off the unit. Disconnect from the line power supply!

13. Remove the shorting plug from the door lock.

14. Install the front panel (see page 7 - 3).

15. Attach the hood.
7.5 Stepping Motors: Replacing / Adjustment

1. Switch off the unit. Disconnect from the line power supply!
2. Remove the hood.
3. Take off the front panel (see page 7 - 3).

When working on the block axis
4. Unscrew and remove the 4 screws on the milling machine mounting.
5. If necessary remove the cable ties and hoses to enable the milling machine to be turned in order to provide access to the motor screws on the block axle.

On all motors
6. Disconnect the cable for the corresponding motor.
7. Remove the screws from the corresponding motor.

On longitudinally mounted motors
8. Remove the motor with the spindle.
9. Release the clamping flange.

On torque motors
10. Pull out the motor with the shaft.
11. Release the clamping flange.

To replace a motor
12. Remove the motor and install a new one.

Clamping flange / Spindle adjustment
13. Adjust the spindle / shaft so that it is kept at a distance of max. 0.5 mm from the motor housing.

CAUTION
The spindle must not touch the motor housing.

14. Adjust the clamping flange so that it is kept at a distance of max. 0.5 mm from the motor housing.

CAUTION
The spindle must not touch the motor housing.

On longitudinally mounted motors
15. Push the motor into position with the spindle.

On torque motors
16. Tension the cogwheels according to the markings (3 teeth on the block axle, 4 teeth on other axles) and fit the motor and shaft.

On all motors
17. Screw on the motor (must still be moveable).
18. Connect the cable for the corresponding motor.

CAUTION
Make sure that the plugs are correctly positioned.

7.5 Stepping Motors: Replacing / Adjustment

CAUTION
The connector is still energized.

20. Switch on the device.
21. Start the CEREC 3 program.
22. Select Settings/Service/Test selection/Stepping motors (see page 2 - 13).
23. Select the corresponding motor and Stage 3.

CAUTION
Do not reach into the milling machine or leave any tools inside.

24. Gently tighten the screws while the motor is running.
25. If the corresponding display is green after another test run, finish tightening the screws.
26. Test the other motor on the same axle (Stage 3).
27. Readjust if necessary.

CAUTION
Switch off the unit! Disconnect from the line power supply!

28. Remove the shorting plug from the door lock.

When working on the block axle

29. Screw down the milling machine firmly (attach protective ground conductor!).
30. Replace cable ties and connect hoses if necessary.
31. Mount the front panel (see page 7 - 3).
32. Attach the hood.
8 Installing Software
Installing Software

List of Contents

8.1 Acquisition Unit: Network Installation ................................................................. 8-3
8.2 How to install an MO drive..................................................................................... 8-25
8.1 Acquisition Unit: Network Installation

The network installation is described using a direct network link via a Network Interface Card (NIC) as an example. The installation procedure for TCP/IP and NetBEUI protocols is described.

NOTE

All the settings shown here are only intended as examples!

Different settings must be used in other network environments!
Contact your network administrator for further information.

To carry out a network installation, select the network environment icon on your desktop and click the right mouse button.

In the dialog box displayed (Fig. 8-1), select "Properties".

Confirm the "Network Configuration" dialog box (Fig. 8-2) by clicking "Yes".
The "Network Setup Wizard" is activated.

- Select "Wired to the network" for a direct connection to the network (Fig. 8-3).

Confirm your selection with "Next".

The next dialog box is used to search for the network adapter (Fig. 8-4).

- The NIC drivers are stored on the hard disk drive in the acquisition unit. Here you must therefore choose "Select from list...".
In the "Select Network Adapter" dialog box (Fig. 8-5), select "Have Disk" to install the drivers from your hard disk drive.

![Select Network Adapter](image1)

A dialog box appears for entering the path of your NIC drivers (Fig. 8-6).

▶ Enter the path for the driver data:
"C:\SIRONA\3COM\3C905CTX\DISK1".

![Enter path](image2)

▶ Select "OK" to confirm.
8.1 Acquisition Unit: Network Installation

- In the "Select OEM Option" dialog box, select "3Com EtherLink PCI NIC" and confirm with "OK" (Fig. 8-7).

Fig. 8-7 Select OEM option

- In the "Network Setup wizard" dialog box, select the "3Com EtherLink PCI NIC" network adapter and confirm with "Next" (Fig. 8-8).

Fig. 8-8 Select network adapter

In the "Network Setup Wizard" dialog box (Fig. 8-9), you must now select the protocol to be installed.

- To install a network with a "NetBEUI" protocol, refer to point "Network Setup with NetBEUI Protocol" on page 8 - 15.
For "TCP/IP" networking, select the protocol and confirm with "Next" (Fig. 8-9).

Fig. 8-9 Select protocol
8.1 Acquisition Unit: Network Installation

8.1.1 Network installation with TCP/IP protocol

**NOTE**
All the settings shown here are only intended as examples!
Request the corresponding settings for your network environment from your network administrator.

![Network Setup Wizard](image)

Fig. 8-10 Select Network Services

- Accept the selected Network Services and confirm with "Next" (Fig. 8-10).
- Confirm the following dialog box with "Next" (Fig. 8-11).

![Network Setup Wizard](image)

Fig. 8-11 Install components
8.1 Acquisition Unit: Network Installation

- If you are prompted to enter path in the "Windows NT Setup" dialog box, enter the path for the "i386" directory in the Windows NT 4.0 workstation CD (Fig. 8-12).

![Fig. 8-12 Copy files]

The files contained in the "i386" directory are copied onto your hard disk drive. In the "TCP/IP-Setup" dialog box you are queried if you want to use the "DHCP Server".

**NOTE**

Contact your network administrator if you require further details on the DHCP Server.

- If your administrator has assigned you a specific TCP/IP address, select "No" in the dialog box (Fig. 8-13). The installation shown here uses a specified TCP/IP address.

![Fig. 8-13 TCP/IP setup]

The network will now be installed.
Various settings must now be selected in the "Microsoft TCP/IP Properties" dialog box.

First, enter the IP and default gateway addresses and specify the Subnet Mask setting (Fig. 8-14).

**NOTE**
These address settings and the mask only apply to this example. Request the corresponding settings for your network environment from your network administrator!

![Microsoft TCP/IP Properties dialog box](image)

**Fig. 8-14 IP address**

Device type: TCP

Workstations: 192.168.15.10 to 192.168.15.99 (max. 89 PCs)
TCP/IP address allocation guidelines

Enter the following DNS data (Fig. 8-15):

**NOTE**
These settings only apply to this example. Request the corresponding settings for your network environment from your network administrator!

![Microsoft TCP/IP Properties dialog box](image)

Fig. 8-15 DNS service

**NOTE**
In this example, no entries are made in the WINS address or routing! Contact your network administrator if you require further details!

- In the dialog box referring to the missing WINS address, select "Yes" to confirm.
- No changes are made in the Network Linkings dialog box (Fig. 8-16). Select "Next" to confirm.
8.1 Acquisition Unit: Network Installation

**NOTE**

Contact your network administrator if you require further details!

![Network Setup Wizard](image)

*Fig. 8-16*

- Select "Next" in the dialog box. Windows then starts the network *(Fig. 8-17).*

![Network Setup Wizard](image)

*Fig. 8-17*

- You must now specify whether your computer will be part of a workgroup or a domain.
  
  In this example, the computer will be a member of the group "MY_PRACTICE" *(Fig. 8-18).*
8.1 Acquisition Unit: Network Installation

**NOTE**

*Contact your network administrator if you require further details!*

---

**Fig. 8-18**

![Network Setup Wizard](image)

Select whether your computer will be participating in a workgroup or a domain and enter the name of the workgroup or domain. If you are not sure which one to select or what name to enter, contact your Network Administrator.
8.1 Acquisition Unit: Network Installation

The network is now installed.

- In the next dialog box (Fig. 8-19), select "Finish" to confirm.

![Network Setup Wizard](image1)

Fig. 8-19

- You are then prompted to restart your computer (Fig. 8-20).

![Network Settings Change](image2)

Fig. 8-20

After restarting your computer, an error message is displayed. To remedy this error you must reinstall ServicePack 5 for NT.

- To do this, select "C:\SIRONA\NT4Sp5\SP5I386.EXE".
- Follow the setup instructions for the Service Pack

This error message should not be displayed after restarting.
8.1.2 Network Setup with NetBEUI Protocol

- In the "Network Setup Wizard" dialog box, select the "NetBEUI Protocol" and confirm with "Next" (Fig. 8-21).

Fig. 8-21

- Accept the selected Network Services and confirm with "Next" (Fig. 8-22).

Fig. 8-22
8.1 Acquisition Unit: Network Installation

- Confirm the following dialog box with "Next" (Fig. 8-23).

![Network Setup Wizard](image1)

**Fig. 8-23**

- If you are prompted to enter the path in the "Windows NT Setup" dialog box, enter the path for the "i386" directory in the Windows NT 4.0 workstation CD (Fig. 8-24).

![Windows NT Setup](image2)

**Fig. 8-24**

- No changes are made in the Network Linkings dialog box (Fig. 8-25). Select "Next" to confirm.
8.1 Acquisition Unit: Network Installation

NOTE
Contact your network administrator if you require further details!

Fig. 8-25

- Select "Next" in the dialog box. Windows then attempts to start the network (Fig. 8-26).

Fig. 8-26
8.1 Acquisition Unit: Network Installation

You must now specify whether your computer will be part of a workgroup or a domain.

In this example, the computer will be a member of the group "MY_PRACTICE" (Fig. 8-27).

NOTE
Contact your network administrator if you require further details!

![Network Setup Wizard](image)

Fig. 8-27
8.1 Acquisition Unit: Network Installation

The network is now installed.

- In the next dialog box (Fig. 8-28), select "Finish" to confirm.

![Network Setup Wizard](image)

**Fig. 8-28**

- You are then prompted to restart your computer (Fig. 8-29).

![Network Settings Change](image)

**Fig. 8-29**

After restarting your computer, an error message is displayed. To remedy this error you must reinstall ServicePack 5 for NT.

- To do this, select "C:\SIRONA\NT4Sp5\SP5i386.EXE".

- Follow the setup instructions for the Service Pack.

This error message should not be displayed after restarting.
8.1 Acquisition Unit: Network Installation

8.1.3 Change computer name

If you wish to integrate the acquisition unit into an existing network, it may be necessary to make changes to the computer name and workgroup / domain.

NOTE
Contact your network administrator if you require further details!

- To change the computer name or workgroup / domain, click the network environment icon on your desktop with the right mouse button.
- In the dialog box displayed (Fig. 8-30), select "Properties".

![Fig. 8-30](image-url)
8.1 Acquisition Unit: Network Installation

- In the "Network" dialog box, click the "Identification" tab (Fig. 8-31).

- Select "Change" and make any necessary changes in the "Identification Changes" dialog box (Fig. 8-32).
8.1 Acquisition Unit: Network Installation

**NOTE**

Contact your network administrator if you require further details!

- In the "Network" dialog box, click the "Protocols" tab. Select TCP/IP Protocol and click "Properties" (Fig. 8-33).

![Network Protocols](image)  
*Fig. 8-33*
8.1 Acquisition Unit: Network Installation

The "Microsoft TCP/IP Properties" box (Fig. 8-34) is used to enter the host name and domain.

NOTE
These settings only apply to this example. Request the corresponding settings for your network environment from your network administrator!

![Microsoft TCP/IP Properties](image-url)
8.1.4 User settings

The default user setting and password, "Cerec" (use correct upper/lower case), are automatically logged in when the acquisition unit is started.

This user belongs to the administrator group.

Autologin can be used by entering the necessary data in the registration database.

NOTE

Contact your network administrator for advice on changing the user settings.
8.2 How to install an MO drive

Sample installation of a magneto-optical (MO) drive on the parallel port of a CEREC 3 acquisition unit.

A Fujitsu DynaMO 640 drive with a parallel/SCSI converter is used as an example for the installation procedure.

You can order this MO drive from Sirona under Order No.: 41 82 981.

NOTE
The proper procedures for data relocation and running data backups are described in the SIDEXIS Operator’s Manual.
The path for the external data storage medium can be set by the service engineer in the Sidexis menu Utilities/System Setup/Service/Relocate.

NOTE
The procedures and settings used in this installation guide are only intended as an example!
For other drives / converters, please observe the instructions provided by the respective manufacturer!

Connecting MO-drive

ATTENTION
Switch off the acquisition unit.

- Plug the smaller connector of the parallel/SCSI cable included in the scope of delivery into the upper socket A of the MO drive and screw down the connector.

- Plug the other end of the cable into the parallel port of the acquisition unit or the external interface and screw down the connector.
8.2 How to install an MO drive

- Connect the power supply of the MO drive.
- Switch on the MO drive first and then the acquisition unit.

8.2.1 Installing the driver software under Windows 2000

- Connect the MO drive to the USB port of the acquisition unit or the external interface.

The MO drive logs on by itself.

The drive then appears as "Removable Disk (F:)" in the Windows Explorer.

8.2.2 Installing the driver software under Windows NT

- To install the driver software, insert the first floppy disk into the floppy disk drive of the acquisition unit.
- Run the setup program ("A:\Setup.exe").
8.2 How to install an MO drive

- Select the language you wish to use for the installation procedure and confirm with **Next**.

- Insert the second floppy disk and confirm the dialog box with **OK**.

- Confirm the **Welcome** dialog box by selecting **Next**.

In order to be able to install the driver software, you must agree to the **“Software License Agreement”**.

- Select **Yes** to confirm.

- Confirm the **“Choose Destination Location”** dialog box by selecting **Next**.
8.2 How to install an MO drive

- Confirm the “Select Program Folder” dialog box by selecting Next.

The “Start Copying Files” dialog box shows you the current settings again.
- Select Next to confirm.

The files will be copied.

- In the “Select Device” dialog box, select “Parallel SCSI Adapter - EPST” and confirm with OK.
- If you do not wish to view the “README” file, deactivate the check box in the “Setup Complete” dialog box and confirm with Finish.

In order to load the driver software, the acquisition unit must be rebooted.
- Select Finish to confirm the “Setup Complete” dialog box.

After the restart, the drive appears as “Removable Disk (F:)” in the Windows Explorer.
We reserve the right to make any alterations which may be due to technical improvements.