

## 4 Maintenance and Troubleshooting

### 4.1 Maintenance

#### 4.1.1 Mechanical Maintenance

- Clean the front panel and keys using a soft, damp cloth soaked with a liquid detergent, if required.
- Cleaning the LC display: do not use any acid solutions or abrasive cleaners (otherwise the anti-reflecting coat is damaged)! We recommend that standard cleaners as are used for optical devices such as glasses, objectives and the like or water mixed with some rinsing liquid be used for cleaning.

#### 4.1.2 Electrical Maintenance

The UPD requires no electrical maintenance.

## 4.2 Function Test

Upon switch-on of the UPD the following self-tests are performed:

- Self-test on the computer. On the detection of any error the AT warning tone codes (see Table 4-1) will be audible. The system start is aborted, the UPD cannot be operated. With an external keyboard connected, the subsequent memory test can be aborted by pressing the "ESC" key.

Table 4-1 AT warning tone codes

AT-warning tone	Meaning
1	DRAM refresh failure
2	Parity Circuit failure
3	Base 64kB RAM failure
4	System Timer failure
5	Processor Failure
6	Keyboard Controller-Gate A20 error
7	Virtual Mode Exception Error
8	Display Memory R/W Test Failure *)
9	ROM-BIOS CheckSum Failure

\*) non-fatal error

- Self-test on all boards of the measurement hardware including all options installed (recognized by the UPD itself). The self-test is carried out while the switch-on picture is being displayed on the screen and also during normal measurement procedures - however to a limited extent. On the detection of an error a message is displayed, which specifies the type of error, the name of the defective board and, if possible, a hint for the user how to eliminate the defect.

## 4.3 Troubleshooting

Error messages displayed after the self-tests or during a measurement usually contain a hint as to the cause of trouble and its elimination (see Section 2.3.6, Error Messages). If the cause is a defective board, it should be replaced (see 4.4, Boards Replacement). For more details on the theory of operation of the measurement hardware boards and instructions on further fault locating, please refer to the Service Manual (order designation 1030.7551.24).

### 4.3.1 Replacing the SETUP Battery

#### Fault symptoms:

- The real-time clock or the data are incorrect upon switch-on of the UPD.
- The UPD does not run up.

#### Cause:

Lost setup, PC lithium battery discharged

The UPD contains a lithium battery for backing up the CMOS memory containing the computer setups when the UPD is switched off. The setups include operating parameters such as disk drives, memory organization etc. which the computer requires during system start. The instrument may fail completely when this setup or parts thereof are missing. Battery life is about 6 years.

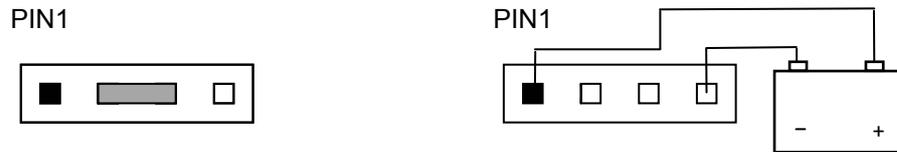
#### Error recovery:

Replace the battery and reset the setup

**Note:** *An order no. for a spare battery is not given at this place since the current types will assumably no longer be available until failure of this battery. However, do not mind using regular batteries.*

Replacing the battery

UPD 05 incl. 80486 DX4/75 Board	Remove battery (contained in the black battery holder which is fixed to the board by means of a cable tie Insert new appropriate 3.4 V to 3.6 V lithium battery. Make sure that polarity is correct.
UPD 02 incl. 80386 DX40 Board	<ul style="list-style-type: none"> <li>- Remove PCB (the large board in the upper chamber, installed upside down)</li> <li>- Either:               <ul style="list-style-type: none"> <li>Unsolder battery (= accu) (located next to the keyboard) and replace by a new MH or Ni-Cd accu (3.6 V)</li> </ul> </li> <li>- or:               <ul style="list-style-type: none"> <li>use an ext. 3.4 to 3.6 V lithium battery (e.g., TADIRAN TL-5151). Remove jumper between pins 2 and 3 of pin connector J6 and connect cable of the lithium battery (4-pole, pin1= plus) (cf. Fig. ). Fix battery using cable tie.</li> </ul> </li> <li>- Refit PCB.</li> </ul>



- Reinstall PCB.
- Reset SETUP (see next section)

### 4.3.2 BIOS-SETUP

It depends on the UPD model and the time of delivery, which controller boards and hard disk drives are supplied with the instrument. Thus, the operating menu for setting the SETUP parameters and the parameters, too, differ accordingly.

Operation of the setup menu is not explained since it may be obtained from the operator guidance lines.

#### Calling the SETUP menu

- Switch off the instrument, connect external keyboard.
- Switch on, press "DEL" key (or ENTF key with German keypad) and hold until the SETUP menu is displayed.
- Select menu item for setting the setup (e.g., "RUN CMOS SETUP", "STANDARD-SETUP", ...)
- Set according to the board and hard disk installed. The parameters to be entered are listed in the paragraphs below.

**Note:** *The setup menus assume an English keypad to be connected. With a German keypad, Y and Z have been exchanged compared to the English one (notice with acknowledging requests).*

**Caution:** *If the SETUP is not set correctly, this may lead to malfunction of the instrument! In this case, switch off the instrument, press "INS" key (or "Einfg" key with German keypad) and hold, switch on the instrument and release key with start of the memory test. The SETUP is thus reset to default values.*

#### SETUP for UPD 05 with 80486 DX4/75 Board

Table 4-2 Standard Setup (UPD05)

Date/Time	Current date /time
Floppy A	1,44 MB
Floppy B, Slave Disk	not installed
Hard Disk	use DETECT MASTER (s. u.)

The parameters for the hard disk need not be entered. The setup program determines the parameters when calling the "DETECT MASTER" function in the UTILITY menu.

Table 4-3 Advanced Setup (UPD 05)

Typematic Rate	30
System Keyboard	Absent
Primary Display	VGA/EGA
Above 1MB Memory Test	Enabled
Memory Test Tick Sound	Enabled
Hit "DEL" Message Display	Enabled
Extended BIOS RAM Area	0:300
Halt for "F1" if any Error	Disabled
System Boot Up Num Lock	On
Numeric Processor Test	Enabled
Floppy Drive Seek At Boot	Disabled
System Boot Up Sequence	C:, A:
Password Checking	Setup
Video Shadow C000, 32K	Enabled
Shadow C800, 32K	Enabled
Shadow D000, 32K	Disabled
Shadow D800, 32K	Disabled
Shadow E000, 32K	Disabled
Shadow E800, 32K	Disabled
Internal Cache	Enabled
Internal Cache Write Mode	Wrt-Thru
External Cache	Enabled
Video ROM Cache C000, 32k	Enabled
System ROM Cache F000, 64k	Enabled
Non Cachable Area #1 Size	Disabled
Non Cachable Area #1 Base	Disabled
Non Cachable Area #1 Type	DRAM
Non Cachable Area #2 Size	Disabled
Non Cachable Area #2 Size	Disabled
Non Cachable Area #2 Type	DRAM
IDE Block Mode	Disabled
Primary Master IDE LBA Mode	Disabled
Primary Slave IDE LBA Mode	Disabled
Secondary IDE Drives Preset	None
Secondary Master IDE LBA Mode	Disabled
Secondary Slave IDE LBA Mode	Disabled

**Troubleshooting****UPD**

Table 4-4 Chipset Setup (UPD 05)

System Auto Configuration	Enabled
Bus Frequency	7.159 MHz
System DRAM Speed	Fastest
DRAM Write Cycle Pulse Time	1T
DRAM Write Cycle Wait State	1 ws
Cache Burst Read Cycle Time	1T
Cache Write Cycle Time	2T
16 Bit 0 Wait State Override	Disabled
16 Bit I/O Read Cmd Delay	Disabled
16 Bit Read Cyc Reduction	Disabled
DRAM Burst Write Mode	Disabled
Slow Refresh	Disabled
Hidden Refresh	Enabled
Local Bus Latch Timing	T3
Local Bus Ready (LRDY *)	Sync.
16 Bit I/O Recovery Time	5 Clks
16 Bit Memory, I/O Wait State	1 ws
8 Bit I/O Recovery Time	16 Clks
8 Bit Memory, I/O Wait State	4 ws

**Note on memory expansion, if fitted:**

The SIMM modules used have 72 contacts (PS2-SIMMs). 1Mx36 or 4Mx36 modules with an access time of 70 ns may be used.

SETUP for UPD 02 with 80386/40-Board

Table 4-5 Standard Setup (UPD 02)

Floppy Drive A	1.44 MB
System Keyboard	Not Installed
Harddisk C	use AUTODETECT HARDDISK (s.u.)
Harddisk D	Not installed
Primary Display	VGA/EGA

The parameters for the hard disk need not be entered. The setup program determines the parameters when calling the AUTO DETECT HARDDISK function.

Table 4-6 Advanced Setup (UPD 02)

Above 1MB Memory Test	Enabled
Memory Test Tick Sound	Disabled
Hard Disk Type 47 Area	0:300
System Boot Up Num Lock	Off
Floppy Drive Seek At Boot	Disabled
System Boot Up Sequence	C:, A:
External Cache	Enabled
Internal Cache	Disabled
Password Checking	Setup
IDE Block Mode	Disabled
IDE Standby Mode	Disabled
Chip Away Virus	Disabled

Table 4-7 Chipset Setup (UPD 02)

Cache Read Option	3--1--1--1
Cache Write Option	1 WS
DRAM Waitstates	1 WS
Keyboard Clock Select	9.5 MHz
AT Clock	CPUCLK/5
16 Bit I/O Recovery Time	5/3 BCLK
CoProcessor Ready	No Delay
Non Cachable Area \#1 Size	Disabled
Non Cachable Area \#1 Base	Disabled
Non Cachable Area \#1 Type	DRAM
Non Cachable Area \#2 Size	Disabled
Non Cachable Area \#2 Size	Disabled
Non Cachable Area \#2 Type	DRAM
Memory Remapping	Enabled
Alle Shadow Optionen	Enabled

- Store setup

**Note on memory expansion, if fitted :**

The SIMM modules used have 72 contacts (PS2-SIMMs). 1Mx36 or 4Mx36 modules with an access time of 70 ns may be used..

Fig. 4-1

Fig. 4-2

Fig. 4-3

Table 4-8

Driveparameter (im BIOS einzutragen)						
Drive	Cyln	Head	WPcom	LZone	Sect	Size
CP 3044	980	5	65535	982	17	41 MB
CP 30104	762	8	0	0	39	116 MB
CP 30254	895	10	0	0	55	240 MB

Fig. 4-4

Fig. 4-5

Fig. 4-6

Fig. 4-7



Fig. 4-8

### 4.3.3 Others

**Fault symptom:**

- After switch-on, the UPD is not in the same state as it was before switch-off. The last entries have been omitted.
- The following error message is displayed:  
"CMOS CHECKSUM ERROR. "

**Cause:**

Battery of test hardware discharged, since the instrument has long since been switched on.

The UPD contains a CMOS memory which stores all settings of all active panels and the data of the recorded traces. The settings of the other panels and the previous states of the active panels is saved on the hard disk, in addition. These data are still available after a failure of the battery. A capacitor bank is used as backup for the CMOS RAM when the instrument is switched off.

**Error recovery:**

Have the instrument switched on for at least four hours. The battery is then recharged and the settings are retained after switch-off.

**Fault symptom:**

The UPD does not respond in a sensible way or not at all on key depressions or IEC bus commands.

**Cause:**

The combination of previous settings resulted in an inadvertent program run causing the software to "crash".

**Error recovery:**

Restart the UPD!

Depending on the desired instrument setup take the following steps:

Restart the UPD with the instrument setup most recently stored in the CMOS-RAM.

This setup may be correct despite the faulty response of the UPD. To avoid having to enter again the settings most recently made, have a try at starting the UPD with this setup.

- Turn power switch off and on. (No further action possible).

In case the procedure stated above fails, restart the UPD with its default setup.

- Connect external keyboard (see 1.1.6, Connecting an External Keyboard).
- Turn power switch off and on.
- When the UPD switch-on logo is displayed, abort the UPD program by pressing ESC and enter the DOS operating system level, where you can restart the UPD with its default setting by entering the command

UPD -d eingegeben und mit ENTER quittiert wird.

The setup "DEFAULT.SET" in the "c:\upd\setup" directory supplied together with the UPD is loaded.

LOAD INSTRUMENT STATE in the FILE panel allows the loading of a setup which was stored by the user (see 2.9.1.1).

Further notes on software faults can be looked up in Section 2.3.6, Error Messages.

Fig. 4-9

**Fault symptom:**

- After switch-on, the UPD is not in the same state as it was before switch-off. The last entries have been omitted.
- The following error message is displayed: "CMOS CHECKSUM ERROR. CHECK BATTERY"

**Cause:**

Flat lithium battery of measurement hardware

The UPD contains a CMOS memory where all settings of all active panels and the data of the measurement traces are stored. The settings of the other panels and the previous states of the active panels are additionally stored to the hard disk, ensuring that these data will be available when the battery fails. A lithium battery is used for backing up the CMOS memory when the instrument is switched off. Battery life is approximately 10 years.

**Error recovery:**

- Withdraw the Digital Generator board (designation A12, see identification on rear panel), see Section 4.4, Replacing the Boards).
- Solder out the flat battery.

The following battery types can be fitted instead:

- \* Saft LS3 CNA, lithium 3.4 V, 1 AH (R&S order no. 0565.1687.00)
  - \* Electroche QFC85 1/2 AM 3B960-AX
- Fit the new battery by way of soldering, check for correct polarity (see battery labellings), fix the battery using a cable tie.
  - Refit the board, close the instrument.
  - Turn the UPD on. It automatically loads the complete setup most recently stored to the hard disk (see above).

#### 4.3.4

**Fault symptom:**

- The UPD does not respond in a sensible way or not at all on key depressions or IEC bus commands.

**Cause:**

The combination of previous settings resulted in an inadvertent program run causing the software to "crash".

**Error recovery:**

Restart the UPD!

Depending on the desired instrument setup take the following steps:

Restart the UPD with the instrument setup most recently stored in the CMOS-RAM.

This setup may be correct despite the faulty response of the UPD. To avoid having to enter again the settings most recently made, have a try at starting the UPD with this setup.

- Turn power switch off and on. (No further action possible).

In case the procedure stated above fails, restart the UPD with its default setup.

- Connect external keyboard (see 2.16 Connecting External Devices).
- Turn power switch off and on.
- When the UPD switch-on logo is displayed, abort the UPD program by pressing ESC and enter the DOS operating system level, where you can restart the UPD with its default setting by entering the command  
<ERROR: Graphics Frame Lost>

-d: The setup "DEFAULT.SET" in the "c:\upd\setup" directory supplied together with the UPD is loaded.

LOAD INSTRUMENT STATE in the FILE panel allows the loading of a setup which was stored by the user (see 2.9.1.1).

## 4.4 Replacing the Boards

### **Important!**

**All boards are sensitive to electrostatic charge. Handle them in line with the ESD-regulations!**

The following applies to the replacement of all boards:

- Disconnect the power connector the from UPD.
- Unscrew the feet from instrument rear (four Phillipps screws).
- Slide the upper panelling slightly to the rear and withdraw.
- After having fitted the new board remount all covers, brackets and clamps in reverse order to that of removal. Fit the panelling and the instrument feet.
- Turn the UPD on.

### 4.4.1 Plug-in Cards of AT Computer Board

Applies to the following boards:

Digital Generator		1030.8706.02
Digital Analyzer		1030.8506.02
AES/EBU-S/P DIF Option	(UPD-B2)	1030.2001.02
Highspeed Option	(UPD-B3)	1030.2301.02
IEC 625/IEEE 488 Option	(UPD-B4)	1030.2901.02

- Remove the clamp from the board to be replaced.
- Remove the appertaining bracket (2 screws on instrument rear) and withdraw the rear-panel section.
- Disconnect all cables of this board or led via this board.
- Withdraw the old board, fit the new board at the same position.
- Reconnect all cables which have been removed.

A label with the designations of the board (eg A12) and of the connector is adhered to each cable connector. The board designation is on the instrument frame, the connector designation on the board.

To provide for proper laying of the cables insert the cables in the following order (slots are counted from left to right, when seen from the front):

Cable	Plug-in card	Connector
W35	A15 (into slot no. 8)	X30 (first from rear)
W31	A11 (into slot no. 7)	X30 (second from rear)
W32	A12 (into slot no. 6)	X30 (second from rear)
W93	A12 (into slot no. 6)	X90 (first from rear)
Jumper W71	A11 (into slot no. 7)	X71 (second from rear)
Jumper W71	A15 (into slot no. 8)	X71 (second from rear)

#### 4.4.2 Analog Generator

The analog generator consists of the following boards:

DAC BOARD	1030.9460.02
OUTPUT CIRCUIT	1030.9290.02
LOW DIST GEN (UPD-B1 option)	1031.2601.02

These boards are located behind the output connectors in the analog unit of the UPD and are inserted into the analog motherboard.

- Remove the cover plate from the analog unit (to the right, when seen from the front).

**Caution:**

**None of the three boards of the analog generator can be replaced independently of the other boards without any adjustment or calibration required. Frequency response and DC offset is to be adjusted, level accuracy and DC offset to be calibrated.**

For adjustment and calibration of the analog generator, refer to the Service Manual (R&S order no. 1030.7551.24).

##### 4.4.2.1 Replacing the DAC BOARD

- Remove the cover plate from the analog unit (to the right, when seen from the front).
- Unscrew the board holding device from the center panel.
- Tilt the lever to the top and withdraw the board.
- Insert the new board.
- Turn the UPD on.

**Adjustment and calibration:**

Generators ANLG 25kHz and ANLG 110kHz:

Adjust frequency response and DC offset. Calibrate level accuracy and DC offset. For adjustment and calibration of the DAC board refer to the Service Manual (R&S order no. 1030.7551.24).

##### 4.4.2.2 Replacing the LOW DISTORTION GENERATOR (UPD-B1 Option)

- Remove the cover plate from the analog unit (to the right when seen from the front).
- Unscrew the board holding device from the center panel.
- Tilt the lever to the top and withdraw the board.
- Insert the new board.
- Turn the UPD on.

**Adjustment and calibration:**

See Section 1.2.1 Fitting the LOW-DISTORTION GENERATOR Option (UPD-B1)

No external measuring equipment is required for this purpose. However, be sure the other two boards of the analog generator and of the analog analyzer have been adjusted and calibrated, too.

**4.4.2.3 Replacing the OUTPUT CIRCUIT**

- Remove the cover plate from the analog unit (to the right when seen from the front)
- Tilt both levers to the top and withdraw the board.
- Insert the new board.

**Adjustment and calibration:**

The OUTPUT CIRCUIT board influences the signals of the other two boards. Therefore, after replacement

- first adjust and calibrate the DAC BOARD and
- then adjust and calibrate the LOW DISTORTION GENERATOR.

***Stick to the above order!***

**4.4.3 Analog Analyzer**

The analog analyzer consists of the following boards:

Channel 1		
ANALOG ANALYZER	1030.9102.02	
ADC BOARD	1030.9260.02	
Channel 2		
ANALOG ANALYZER	1030.9102.02	
ADC-BOARD	1030.9260.02	(Part of UPD-B3 option)

The boards of the analog analyzer are located behind the input female connectors in the analog unit of the UPD and inserted in the analog motherboard.

With the UPD-B3 option fitted, the ADC BOARD is included in each of the ANALOG ANALYZERs.

**4.4.3.1 Replacing the ANALOG ANALYZER CH1 or CH2**

- Remove the upper panelling and shielding cover (to the right when seen from the front).
- Withdraw the Analog Analyzer CH1 or CH2 board using the levers and remove the coaxial connectors from the bottom.
- Complete the new analog analyzer with the ADC BOARD, if required (see 4.4.3.2) and fit into the instrument.
- Start up the UPD.

**Adjustment and calibration:**

**Proceed in line with Service Manual, R&S order no. 1030.7551.24**

**4.4.3.2 Replacing the ADC BOARD**

- Remove the ANALOG ANALYZER.
- Withdraw the smaller one of the two shielding covers on component side.
- Unscrew the two screws on rear side.
- Withdraw the ADC board to the top holding it as straight as possible in order to avoid bending the connector pins.
- Insert the new board.

**Adjustment and calibration:**

Proceed in line with Service Manual, R&S order no. 1030.7551.24.

When retrofitting the ADC BOARD into the ANALOG ANALYZER CH2 to complete the UPD-B3 option, calibration and adjustment can be performed in line with Section 1.2.1, Fitting the Options without any further measuring equipment being required. Be sure the other boards of the analog analyzer have already been adjusted and calibrated.

## 4.5 Boards Replacement

### 4.5.1 Opening the instrument

#### Replacing the Boards

- Disconnect the power connector the from UPD.
- Unscrew the feet from instrument rear (four Phillipps screws).
- Slide the upper panelling slightly to the rear and withdraw.

***Important!***

***All boards are sensitive to electrostatic charge. Handle them in line with the ESD-regulations!***

### 4.5.2 Boards Replacement

Any boards may be replaced without returning the instrument to the factory for recalibration.

The Service Manual (Order No. in the Data Sheet) supplies information on the replacement and what is to be noticed.

However, it is advisable to have the nearest R&S service center perform the replacement. Their staff is skilled for servicing this instrument and always informed on modifications and updates.