PHILIPS

LOGIC ANALYZERS PM 3580/PM 3585

Service manual

FLUKE AND PHILIPS - THE GLOBAL ALLIANCE IN TEST & MEASUREMENT

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LOGIC ANALYZERS
PM 3580 / PM 3585
Service manual

PHILIPS
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Dual logic analysis

PF8690/00 System Software
Software Version 1.0, English
I&E, Test & Measurement

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Purpose of this Manual

This manual contains all the information required for completing installation, maintenance and servicing procedures on the PM 3580/PM 3585 series of Logic Analyzers and their associated options.

Great care has been taken to ensure that all the information contained within this manual is complete and accurate. If, however, you find any omissions, or have any suggestions, please send your comments to the address below.

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Chapter 1
Safety and Installation

Operator Safety

The following subsections contain information, warnings and cautions which must be followed to ensure safe operation and to retain the instrument in a safe condition. Read these carefully before installation and use of the instrument.

Adjustment, maintenance and repair of the instrument shall only be carried out by qualified personnel.

Safety Precautions

For the correct and safe use of this instrument it is essential that both operating and service personnel follow generally accepted safety procedures in addition to the safety precautions specified in this manual.

Specific warning and caution statements, where they apply, will be found throughout the manuals.

Where necessary, the warning and caution statements and/or symbols are marked on the apparatus.

Caution and Warning Statements

WARNING

Calls attention to a potential danger that requires correct procedures or practices in order to prevent personal injury.

CAUTION

Is used to indicate the correct operating and maintenance procedures in order to prevent damage to, or destruction of, the equipment or other property.

Symbols

High Voltage (red) ≥ 1000 Volts

Live Part (black/yellow)

Read the operating instructions.

Protective earth (grounding) terminal.

Impaired Safety Protection

Whenever it is likely that safety-protection has been impaired, the instrument must be made inoperative and be secured against unintentional operation. The matter should then be referred to qualified technicians.

Safety protection is likely to be impaired if, for example, the instrument fails to perform the intended measurements or shows visible damage.

Safety Notice

WARNING

The opening of covers or the removal of parts, except those to which access can be gained by hand, is likely to expose live parts and accessible terminals which can be dangerous to life.

- The instrument **must** be disconnected from all voltage sources before it is opened for any adjustments, replacement, maintenance or repair.
- The Cathode Ray Tube (CRT) and the Extreme High Tension (EHT) cable **must** be electrically discharged before commencing work on the Visual Display Unit (VDU).
- Note that the capacitors inside the instrument can hold their charge even if the instrument has been disconnected from all voltage sources.
- Components that are important for the safety of the instrument may only be renewed by components obtained through your local Philips organization.
- After repair and maintenance in the primary circuit safety inspection and tests, as mentioned chapter 6, **must** be performed.
- All of the screws that secure the System board to the frame of the Logic Analyzer must be in place as they have an effect on the operation of the instrument.
- Before any connection to the input connectors is made, the instrument must be connected to a protective earth conductor via the three-core mains cable; the mains plug must only be connected to a socket outlet provided with a protective earth contact. The protective action must not be negated by the use of an extension cord without protective conductor.

Installation

Before attempting to use the logic analyzer read this section carefully and complete the necessary procedures.

Working Position

Horizontal on bottom feet, vertical on rear feet and any intermediate angle. Check that the fan is running after power-up, and that the cooling air flow is unobstructed.

Earthing

Before any connection to the input connectors is made, the instrument must be connected to a protective earth conductor via the three-core mains cable; the mains plug must only be connected to a socket outlet provided with a protective earth contact. The protective action must not be negated by the use of an extension cord without protective conductor.

WARNING

Any interruption of the protection earth connector inside or outside the instrument or the disconnection of the protection earth terminal is likely to make the instrument dangerous. Intentional interruption is prohibited.

Before connecting the equipment to the mains of the building installation, the proper functioning of the protective earth lead of the building installation needs to be verified.

Setting the Line Voltage

Before plugging in the instrument make certain that it has been set to the local voltage.

Note: If the power plug has to be adapted to the local situation, such adaptation should only be done by a qualified technician.

WARNING

The instrument shall be disconnected from all voltage sources when a fuse is to be renewed, or when the instrument is to be adapted to a different line voltage.

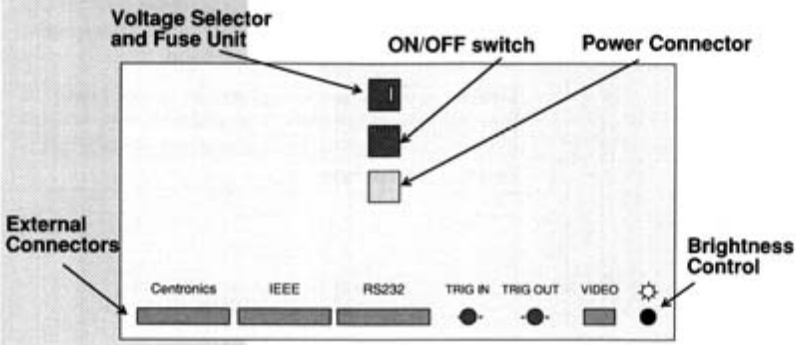
The two possible settings are 110 V (90 V - 135 V supplies) and 220 V (180 V - 264 V supplies).

Note

The correct fuse should be used for each of the voltage settings:

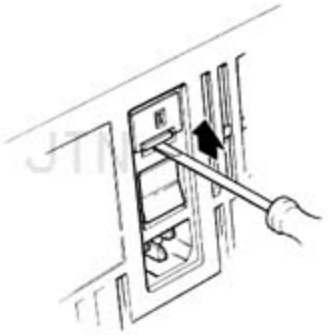
- 220 V: 2 A/250 V slow.
- 110 V: 4 A/250 V slow.

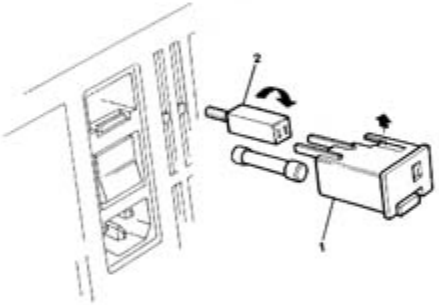
This setting is determined by the voltage selector unit located at the rear of the instrument: see the figure below.



To change the setting, proceed as follows, with reference to the figures below:

- Disconnect the power supply from the instrument.
- Prize the voltage selector unit (1) from the rear of the instrument.
- Lift the retaining lug that holds the voltage selector (2) into the unit and then remove the selector.
- Rotate the voltage selector so that the required figure will be displayed in the window of the unit.
- Insert the fuse with the required rated current and of the specified type.
- Replace the complete unit in the reverse order of that of the removal procedure.





Switching on the Logic Analyzer

Ensure that the instrument has been set to the local line voltage.

- Ensure that the power cable is not connected to the power supply and that the power switch on the instrument is OFF.
- Plug the female end of the power cable into the instrument.
- Plug the power cable into an appropriate **earthed** power source.
- Remove the transport protector (if any) from the floppy disk drive by pushing the eject button.
- Switch on the instrument. This will cause the light on the floppy drive to illuminate and a start-up message to appear on the screen.
- Push the System disk (PF 8690) into the drive until it locks.

Adjust the brightness of the screen, using the control located at the rear of the instrument (see the figure on page 6), to suit your requirements.

Note: If you press any key during the power on sequence of the analyzer, it will perform a (15 minute) self-test and display the results of the test on the screen. After the self-test has been completed and is satisfactory, you can proceed to use the instrument.

Setting the Date and Time

A facility is available on the Utility disk to enable you to set the date and time, and the format of presentation, on the instrument.

After the procedure has been verified the date and time are stored in the RAM of the instrument and protected by the battery backup, therefore this procedure is not required every time the instrument is powered on.

The date and time can be set using the following procedure:

- Select the "Set date and time" utility from the utilities menu. The "Set date and time" popup menu appears.
- Move to the check field defining the time format required and press the *SELECT* key.
- Move to either the *Date* or *Time* field. These are normal editable fields. Each part of the date and time (day, month, year, hour and minutes) must consist of two digits, so include leading zeros. The parts are separated by dots. The hours should always be entered in 24-hour format.

  You will not be able to leave a field if the entries you make in it are not valid.
- Exit this popup menu by selecting either the *return* ("✔" at the top left) or *cancel* (the "X" at the top right) field. If the *return* field is selected, the instrument will use the new date and time.

Chapter 2

General Information

The PM 3580/PM 3585 logic analyzers and their associated options are intended for use within Research & Development, Manufacturing, Service and Education environments. Typical applications include:

- Hardware testing and de-bugging.
- Hardware & Software integration.
- Software de-bugging.
- Software optimisation.
- System diagnostics.

The PM 3580 and the PM 3585 come in the following basic models.

PM 3580/30: 32 dual-analysis channels with 100 Mhz Timing, 50 Mhz state, and 1K deep acquisition memory.

PM 3580/60: 64 dual-analysis channels with 100 Mhz Timing, 50 Mhz state, and 1K deep acquisition memory.

PM 3585/60: 64 dual-analysis channels with 200 Mhz Timing, 50 Mhz state, and 2K deep acquisition memory.

PM 3585/90: 96 dual-analysis channels with 200 Mhz Timing, 50 Mhz state, and 2K deep acquisition memory.

Upgrade kits are available for the PM 3580/30 and the PM 3585/60 (only installable via the Fluke/Philips Service Centers).

Characteristics

Performance Characteristics

The PM 3580 series analyzers have a single analyzer architecture whereas the PM 3585 series analyzers can be split into 2 logically separate analyzers. Each analyzer can be assigned any or all of the available 16 channel pods and can acquire state and timing data on all channels in parallel.

Safety Characteristics

This apparatus has been designed and tested in accordance with IEC publication 348, Safety Requirements for Electrical Measuring Apparatus, it has been supplied in a safe condition. This manual contains information and warnings that have to be followed by the user to ensure safe operation and to retain the instrument in a safe condition. The apparatus has been designed for normal indoor use and should only be subjected to the temperature ranges stated in the specifications.

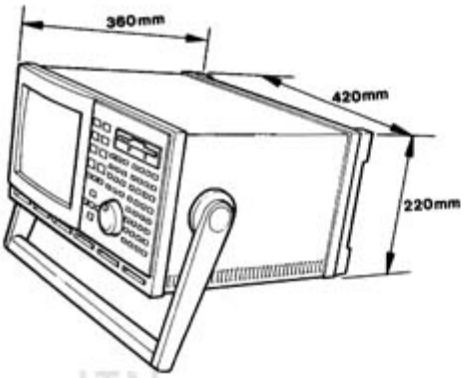
Initial Characteristics

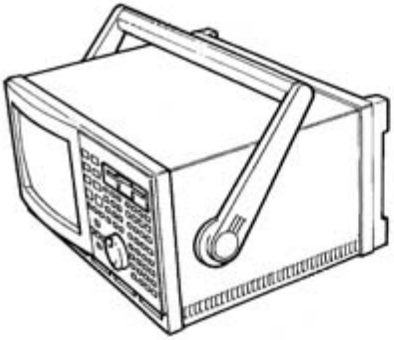
Overall Dimensions

- Height 222 mm
- Width 420 mm
- Depth 360 mm
- Weight 13 kg (28.7 lbs)

Operational position

- Horizontal on bottom feet, vertical on rear feet and any intermediate angle.


360mm
420mm
220mm



Environmental Characteristics

The environmental data stated in this manual are based on the results of the manufacturer's checking procedures.

Details of these procedures and the failure criteria are supplied on request by the Fluke/Philips organization in your country, or by Philips, Industrial and Electroacoustic Systems Division, BU - T&M, 5600MD Eindhoven, the Netherlands.

Specification

Environmental Data

Standards	MIL-T-28800D, Type III, Class 5, Style E.
Temperature	
Rated Range of use	5°C to 40°C (41°F to 104°F)
Limited Range of operation	0°C to 55°C (32°F to 131°F)
Range for storage and transport	-40°C to 70°C (-40°F to158°F)
Relative Humidity	
Operating	15% to 90% non-condensing
Storage and transport	5% to 95% non-condensing
Altitude	
Operating	4500 m (15000 ft)
Storage and transport	12000 m (40000 ft)
Vibration	Swept sine resonance search 5 - 55 Hz, 2 g(rms), 15 minutes per axis, 10 minutes resonance dwell.
EMI	VDE 0871 Class B, FCCA
Safety	IEC 348 Class 1, VDE 0411, CSA 556B.
Display	9" monochrome screen with 4 level greyscale.

Power	140 VA
Inputs	
Probe impedance	200 kΩ / 7 pF
Thresholds per 8 channels	TTL, ECL or variable (-3 V to +12 V, in steps of 100mV)
Threshold accuracy	± 2.5% of V^*_{th} ± 150 mV
Threshold overdrive	150 mV
Minimum swing peak to peak	2x (300 mV + 2.5% of V^*_{th}) centered on V^*_{th} ($^*V_{th}$ = selected threshold voltage)
Maximum input voltage	± 50 V peak
Channel to channel skew	< 4 ns
Max time-stamp error	5 ns
Data setting/storage	DOS format 2.0 MByte (1.44 MByte formatted) 3.5" floppy disk. Will also accept formatted 720 kByte disks.
Hardcopy output	Epson or Epson compatible printers via a centronics parallel printer output.
External video output	MVGA compatible.
External BNC Trigger	
Active trigger level	High
Input resistance	100 kΩ
Minimum pulse width	25 ns (typical)
External BNC Trigger Out	
Active trigger level	High
Output impedance	50 Ω
Pulse width	20 ns (typical)
Delay between trigger condition true (at probetip) to trigger out true	Approx. 430 ns

Configuration

Timing analyzer

Sample period	5 ns (10 ns for PM 3580)
Sample period accuracy	0.005%
Time interval accuracy	± (Sample period + skew + 0.005% of time interval reading)
Min. detectable pulse	6 ns typical for PM 3585 11 ns typical for PM 3580 7 ns guaranteed for PM 3585 12 ns guaranteed for PM 3580
Storage method	Transitional

Glitch analyzer

Min. detectable glitch	3 ns (typical) 4 ns (guaranteed)

State analyzer

No. of external clocks	4, selectable from any channel, qualifiable by 1-4 ORed expressions of any/all ANDed input channel(s).
Clock edges	Rising, falling or any
Minimum clock width	7 ns
Clock repetition rate	50 MHz maximum
Set up, hold time	Data and clock qualifiers must be present ≥ 10 ns before and remain present ≥ 0 ns after, the external clock.
Max. time-stamp error	± (5 ns + 0.005% of time interval reading).

Chapter 3

Performance Verification Procedures

The condition of the analyzer can be checked periodically or after repair of the input circuitry by completing the performance analyses detailed in this chapter.

The analyzer can also complete a comprehensive performance and diagnostic test during power-on of the instrument, this procedure is described on page 34.

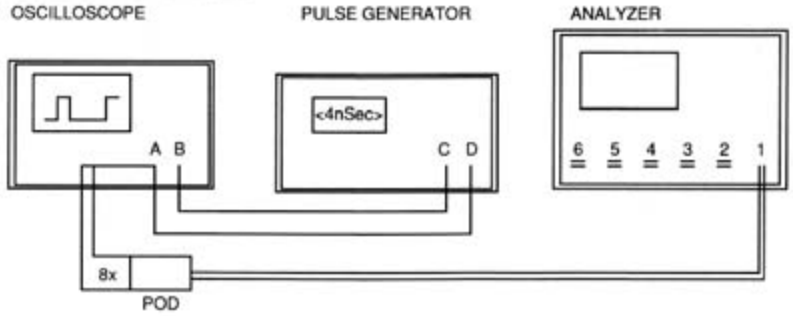
For accurate results allow the instrument to warm up for 15 minutes before commencing the test.

The recommended test equipment is:

1. Oscilloscope (350 MHz) - Philips PM 3295A or equivalent.
2. Programmable Pulse Generator - Philips PM 5781 (125 MHz, transition times 2 nSec - 100 mSec).
3. An Analyzer pod PF 8600/2x.
4. A specially prepared BNC probe (scope channel A). See page 21
5. A specially prepared BNC probe (scope channel B). See page 21
6. A digital multimeter - Philips PM 2718 or equivalent.
7. 2 BNC T-piece plugs.
8. 1 PM 9053 BNC - 19 mm adapter plug.

Interconnections of instruments

The figure below shows the interconnections between the instruments to execute the Performance Verification Procedures.



Standard Generator settings

The generator should be set up as follows:

1. Rising and falling edge 2.0 nSec.
2. Pulse period 100 nSec.
3. Trigger mode - internal trig.
4. Output level ECL.
5. Pulse mode single.
6. Clock out and output A enabled.
7. Output B disabled.
8. High level -0.80 Volts, low level -1.80 Volts.

Standard Oscilloscope settings

The oscilloscope should be set up as follows:

1. Input impedance 50 Ω on both channels.
2. Alternating beams channel A and B display.
3. Magnified X-timebase 1 nSec/div.
4. Input voltage selector both channels AC.
5. ECL level -1.30 Volts centred for both channels on the oscilloscopes screen horizontal centre line.

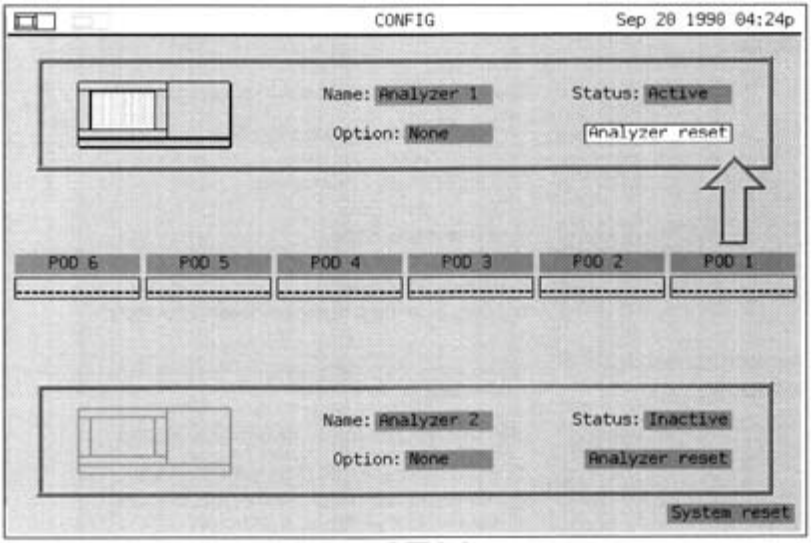
The BNC connections

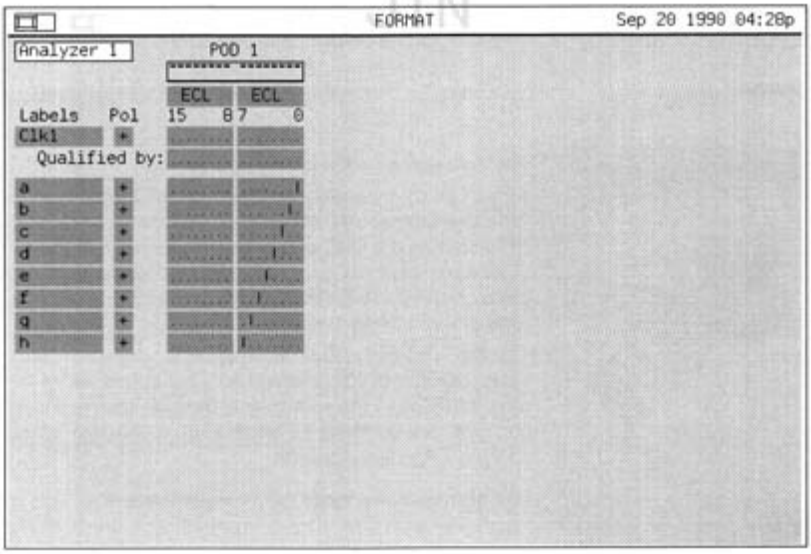
The analyzer is tested per Pod entry.

A Pod has 16 channels available of which 8 channels are tested simultaneously. These channels are connected via the probes to the BNC connector on channel A of the oscilloscope, which in turn receives the pulses from the generator. Refer to the illustration on page 20 Interconnections of instruments.

The BNC connector, illustrated opposite, extends the generator signal to a pin soldered onto the centre pin of the plug. Attached to the earth-ring of the plug some connection pins are soldered for earth lead connection of the analyzers Pod ground leads.

Use short ground leads for all measurements.


CONFIG
Sep 20 1990 04:24p
Name: Analyzer 1
Status: Active
Option: None
Analyzer reset
POD 6
POD 5
POD 4
POD 3
POD 2
POD 1
Name: Analyzer 2
Status: Inactive
Option: None
Analyzer reset
System reset


FORMAT
Sep 20 1990 04:28p
Analyzer 1
POD 1
ECL
ECL
Labels
Pol
15
8
7
0
Clk1
Qualified by:
a
b
c
d
e
f
g
h

Minimum Detectable Glitch

Theory

If the pulse width is less than the minimum sample period of the analyzer the pulse is said to be a glitch. The minimum detectable glitch is the minimum pulse width that can be detected.

Measurement Set-up

Interconnections

Insert the Pod cable into Pod1 of the analyzer.

Connect all channels 0-7 to the data pulse on the BNC plug of channel A of the oscilloscope.

Analyzer settings

CONFIG: Refer to illustration opposite.
FORMAT: Refer to illustration opposite.
TRACE: Refer to illustration on page 24.

Generator settings

PULSE DURATION: 6.00 nSec
DELAY: not applicable

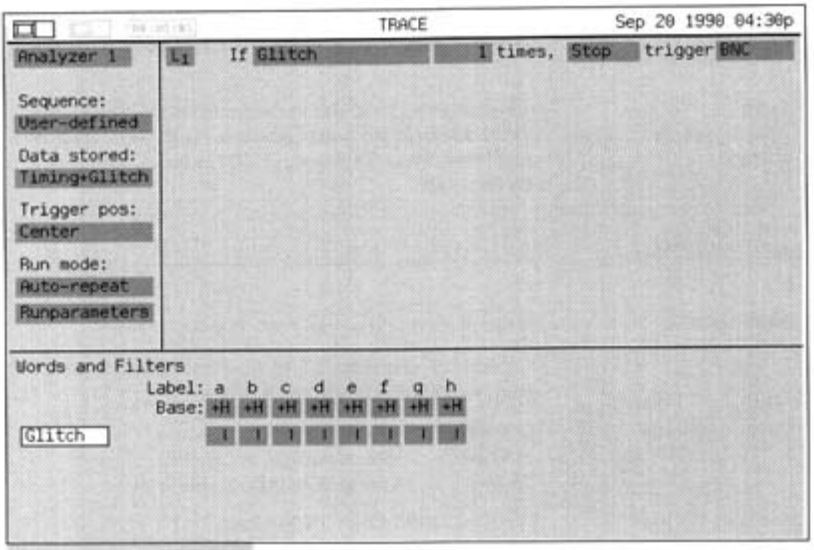
Measurement

Start acquisition now.

The analyzer will not trigger if no glitches have been found. Gradually decrease the PULSE DURATION on the generator until the analyzer triggers.

These pulse widths are classified as glitches.

To find the minimum detectable glitch an accurate decrease of the pulse width must be done until one of the timing lines on the analyzer shows a missing glitch. Gradually increase the pulse width until again all 8 timing lines are constantly filled with glitches. The PULSE DURATION found is defined as the minimum detectable glitch. This should be better than, or equal to the specifications.


TRACE
Sep 20 1990 04:30p
Analyzer 1
L1 If Glitch 1 times, Stop trigger BNC
Sequence:
User-defined
Data stored:
Timing+Glitch
Trigger pos:
Center
Run mode:
Auto-repeat
Runparameters
Words and Filters
Label: a b c d e f g h
Base: +H +H +H +H +H +H +H +H
Glitch
1 1 1 1 1 1 1 1

Minimum Detectable Pulse

Theory

The minimum detectable pulse is a pulse which is guaranteed to be sampled by the analyzer. This is a pulse having a width slightly larger than the sample period of the analyzer, (PM 3580: 10 nSec; PM3585: 5 nSec).

Measurement Set-up

Interconnections

Insert the Pod cable into Pod1 of the analyzer.

Connect the analyzer Pod channel 7 and its adjacent short ground leads to the clock BNC plug on channel B of the oscilloscope.

Analyzer settings

CONFIG: Refer to illustration on page 22.
FORMAT: Refer to illustration on page 26.
TRACE: Refer to illustration on page 26.

Generator settings

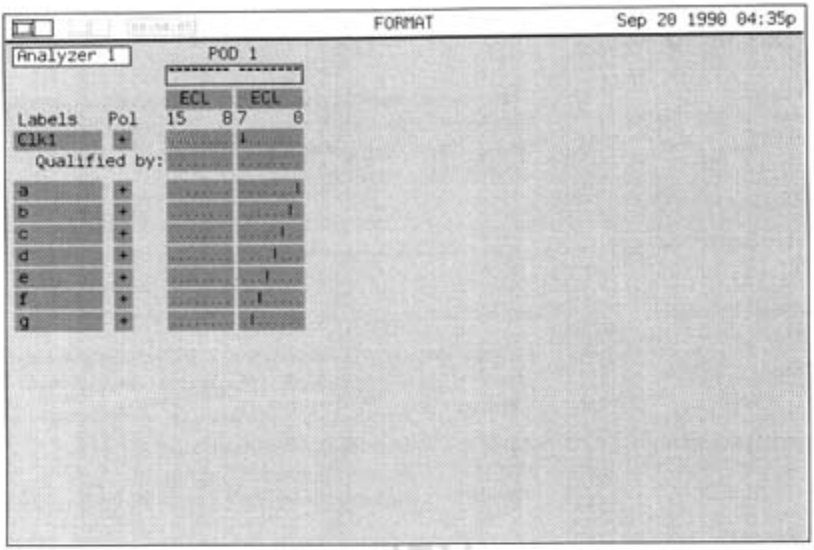
see glitch detection.
PULSE DURATION 15 nSec

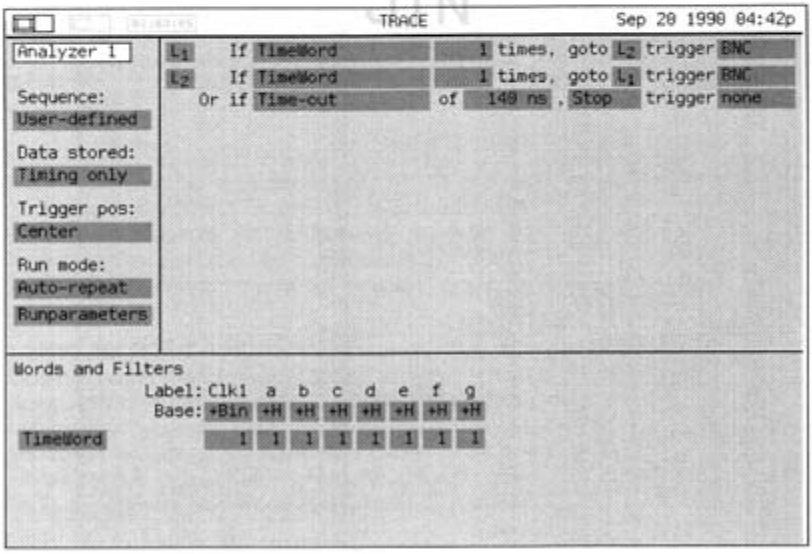
Measurement

Start acquisition now.

As long as the pulse duration is greater than 7 nSec (PM3585) 12 nSec (PM3580) a TIMEWORD will be detected, however as long as all channels contain the TIMEWORD pulse within the timeout limit the analyzer will not trigger, because the trigger condition has not been met.

Now gradually decrease the PULSE DURATION until the analyzer triggers. On the trigger moment the analyzer did not find a TIMEWORD 7F (all ones) but one or more missing TIMEWORD pulse(s). Now gradually increase the PULSE DURATION until the analyzer does not trigger any more. The PULSE DURATION found is defined as the minimum detectable pulse and should meet the specifications.

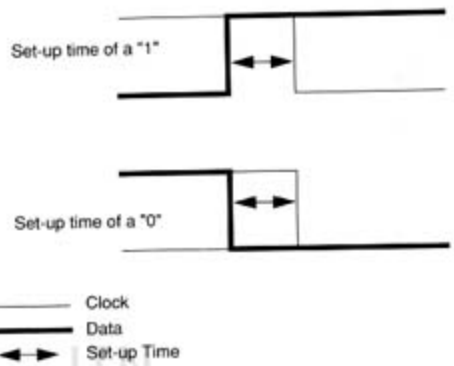

FORMAT
Sep 20 1990 04:35p
Analyzer 1
POD 1
ECL
ECL
Labels
Pol
15 8 7 0
Clk1
Qualified by:
a
b
c
d
e
f
g


TRACE
Sep 20 1990 04:42p
Analyzer 1
L1 If TimeWord 1 times, goto L2 trigger BNC
L2 If TimeWord 1 times, goto L1 trigger BNC
Or if Time-out of 140 ns, Stop trigger none
Sequence:
User-defined
Data stored:
Timing only
Trigger pos:
Center
Run mode:
Auto-repeat
Runparameters
Words and Filters
Label: Clk1 a b c d e f g
Base: +Bin +H +H +H +H +H +H +H
TimeWord 1 1 1 1 1 1 1 1

Set-Up Time

Theory

The set-up time is the interval immediately preceding the active transition of the clock pulse during which, in order to be recognized, the data must be maintained at the input.



A negative set-up time indicates that the correct logic level may be initiated sometime after the active transition of the timing pulse and still be recognized.

The set-up time can be measured for a logic "1" as well as for a logic "0".

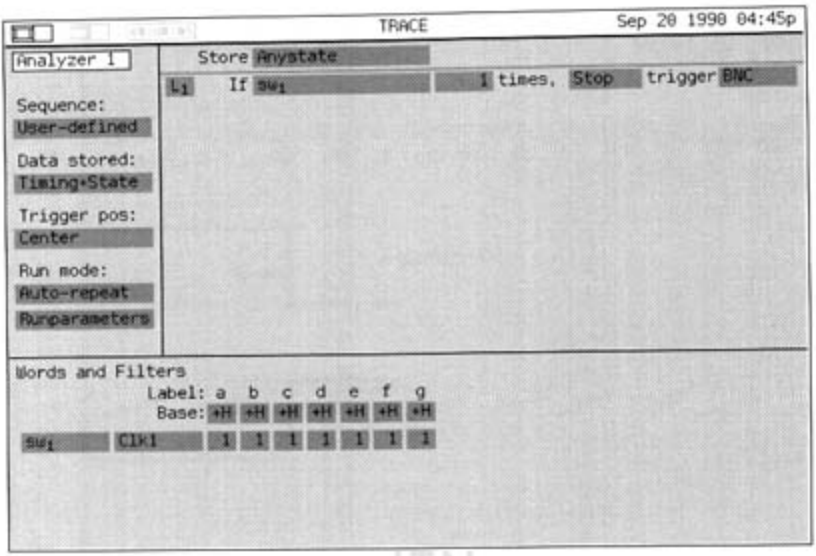
Set-up time of a logic "1"

Generator settings

DELAY: 40 nSec
DURATION: 20 nSec

Analyzer settings

FORMAT: Refer to illustration opposite (top).
TRACE: Refer to illustration on page 28.



Measurement

Start acquisition now.

The analyzer will not trigger because the data will be 00, the data transition to a logic "1" being later than the negative going edge. Gradually shift the data transition (positive going edge) to the left on the scope by decreasing the PULSE DELAY on the generator. The data transition will now approach and pass the negative clock before the analyzer triggers.

This means that the hex word 7F is found.

All channels captured a logic "1".

Now change the trigger word in the TRACE menu to: L1 If sw1, 1 time, Stop, trigger BNC.

To ensure that the word 7F is always captured, decrease the PULSE DELAY until the analyzer no longer triggers.

The delay can now be measured on the oscilloscope. The value found is called the set-up time for a "1" and should fulfil the specifications.

Set-up time of a logic "0"

The principle is the same as that for the measurement of the set-up time for a logic "1".

The generator, however, must issue a complementary data pulse and the trigger word sw1 in the trace menu of the analyzer must be set to hex 00.

Starting with the negative going data pulse on the right, due to the DELAY of the generator, the pulse is shifted to the left until hex 00 is captured.

When the word sw1 is complemented in the TRACE menu a repetitive acquisition is started, at the same time decreasing the DELAY on the generator.

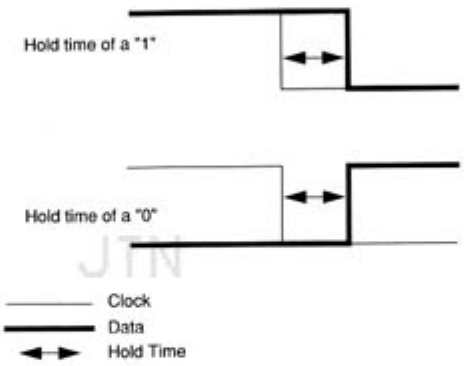
When the analyzer no longer triggers, the set-up time of a "0" can be measured on the oscilloscope.

This value must be according to the specification.

Hold Time

Theory

The interval immediatly following the active transition of the clock pulse, during which interval the data to be recognized, must be maintained at the input to ensure their continued recognition. A negative hold time indicates the correct level may be released prior to the clock pulse and still be recognized.



Hold time of a logic "1"

Generator settings

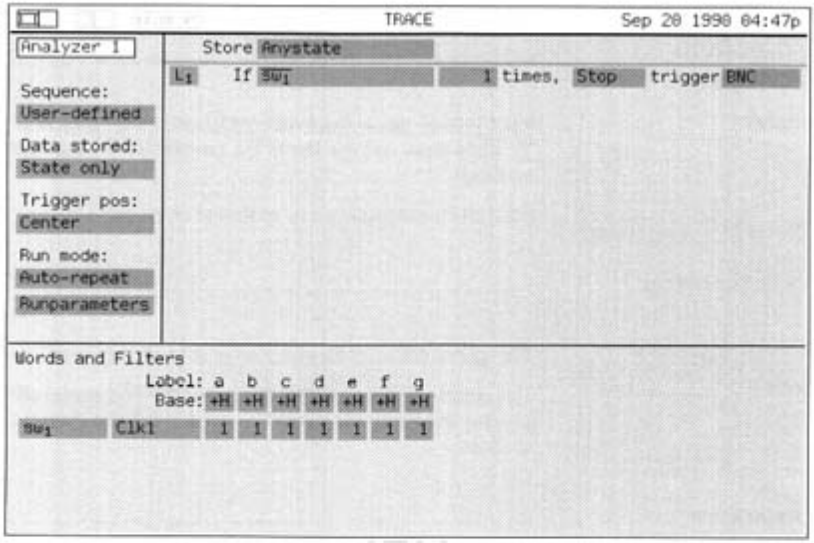
DELAY: 44 nSec

DURATION: 40 nSec

Analyzer settings

FORMAT: Refer to illustration 26 (top)

TRACE: Refer to illustration opposite.



Measurement

Start acquisition.

The analyzer will not trigger now since 7F is captured all the time. By decreasing the DELAY on the generator the data pulse is shifted left (the hold time decreases). If the analyzer still does not trigger when the data pulse is shifted into the negative clock edge, then the hold-time is less than 0 nSec.

Hold-time of a logic "0"

The procedure equals that of the hold-time of a "1".

sw1 must be changed to 00.

This measurement will deliver a hold-time less than 0 nSec.

Threshold Voltage

Theory

Input voltage below the threshold is recognized as a logic "0" while input voltage above the threshold is recognized as a logic "1".

For threshold accuracy see specification on page 16.

Generator settings

The generator must be switched to external triggering.

This mode will never trigger the generator and hence adjustable DC levels are available to check thresholds of the analyzer.

Measurement

For this measurement a BNC to 19 mm adaptor (PM 9053) must be used for the digital multimeter. **Do not** use the normal single measurement leads because of noise and hum influences on the measurements.

Remove the channel A special BNC plug from the oscilloscope and connect the plug onto the digital multimeter special probe.

Acquisition on all available thresholds can be checked now, by varying the DC-voltage of the Pulse Generator within the tolerance limits of the threshold level selected in the FORMAT menu.

The hysteresis around a threshold should be according the specification on page 16. Only the positive range needs to be checked. Internally the threshold is accomplished by a Digital to Analog Converter with an adjustable gain and a polarity output voltage setting. The negative output voltage being as linear as the positive output voltage.

For TTL logic the threshold is set to 1,4 Volts while ECL has a threshold of -1,3 Volts.

All threshold tolerance ranges must be according to the specifications.

NOTE:

Performance verification can be continued on the above topics by checking every channel in relation to any other channel being the clock input, as well as using positive and negative edged transitions.

Power On Self Test

The Logic Analyzer can perform a comprehensive performance and diagnostic test on power-on. This self test procedure is performed for the CPU part of the system board if one of the keys on the keyboard is pressed when the instrument is switched on. The procedure tests the operation of the RAM, calculates the Checksum of the PROM, the status of the disk controller and the interrupt of the MFP. If an error is detected the procedure will be terminated and the failure report displayed on the screen.

PROM Release and Version

After invoking the Power On Self Test the prom Release and Version of the mainboard and keyboard are displayed on the screen.

RAM test

This tests for the correct operation of the RAM. Information containing the current address being tested will be displayed. If an error is found during the test procedure an error message will be displayed.

Checksum

This test calculates the Checksum of the PROM. Information will only be displayed in the case of an error and will include the Checksum calculated and the Checksum that has been read from PROM.

Floppy Controller test

This test checks the disk controller chip and the ready status of the drive and if an error is found an error message will be displayed.

MFP (Multi-Function Peripheral)

This test starts the counter of the MFP and awaits an interrupt from the counter. If an interrupt is not received then an error message is displayed stating that the MFP is inoperable.

Chapter 4

Dismantling the Equipment

This section provides the dismantling procedures that may be required whilst performing repairs to the Logic Analyzer.

All items removed from the instrument must be adequately protected against damage, and all normal precautions regarding the use of tools must be observed.

During dismantling a careful note must be made of the positions of all the leads that are to be disconnected to ensure that they are reconnected to their correct terminals during re-assembly.

CAUTION

Damage may result if:

- The instrument is switched on when a unit has been removed or disconnected.
- A unit is removed within one minute of the instrument being switched off.

Required tools and materials

For the complete disassembly and reassembly of the instrument the following tools are required:

- Torx screwdrivers	T8 -	4822 395 50263
	T10 -	5322 395 50381
	T20 -	
- Flat blade screwdriver (small)		
- Nylon tie wraps		5322 401 14154

Removing the Covers

WARNING

The removal of the cover or the removal of parts, except those to which access can be gained by hand, is likely to expose live parts, and also accessible terminals may be live.

The instrument must be disconnected from all voltage sources and the crt discharged before any adjustment, replacement or maintenance during which the instrument will be opened.

When any adjustment, maintenance or repair of the opened instrument while it is under voltage is necessary, it shall be carried out only by a qualified person who is aware of the hazard involved.

Note that capacitors inside the instrument may still be charged even if the instrument has been removed from all voltage sources.

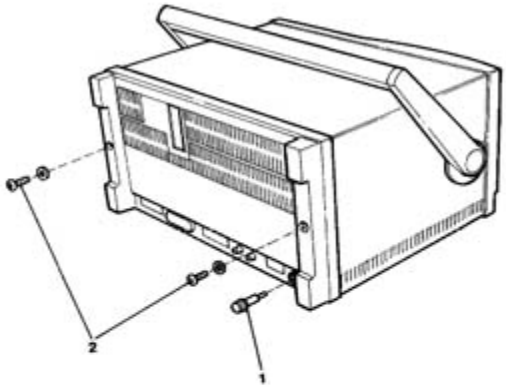
Access To Parts

NOTE: For installation reverse the removal sequence.

Before commencing the removal of any cover or module of this instrument ensure that it has been disconnected from the main voltage supply. Remove any other external connections to the instrument.

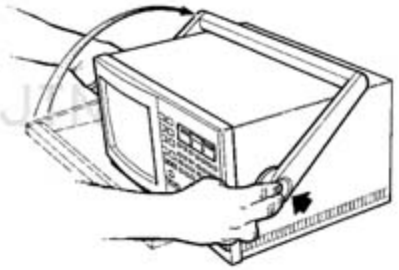
Rear access plate

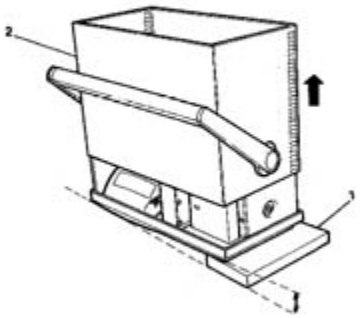
- Ensure that all external connections to the instrument have been removed.
- Remove the brightness control knob (1) located in the bottom right corner of the rear plate by pulling it away from the spindle.
- Locate and loosen the two Torx screws (2) and washers on the rear cover, they are located on both edges approximately half way up.
- Remove the rear plate from the unit and put it in a safe place.



Instrument sleeve

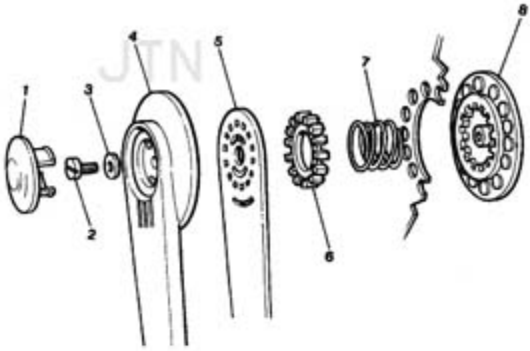
- Complete procedure : **Rear access plate**.
- Adjust the position of the carrying handle so that it is not obscuring the front of the instrument.
- (The position of the handle is altered by applying pressure to the centre of handle pivots and then moving the handle.)
- Position the instrument face down on the work surface using a piece of foam rubber (1), or similar material, to
- Slide the sleeve (2) of the instrument away from the chassis.





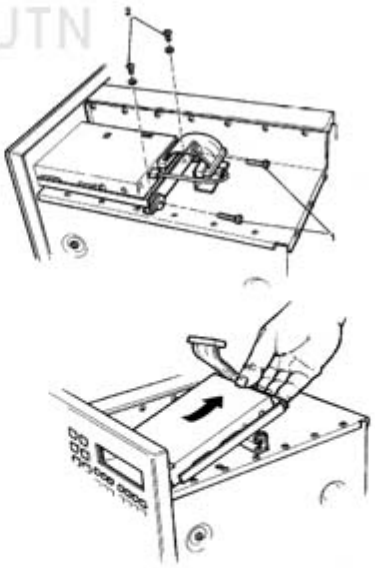
Handle

- Complete procedure: **Instrument sleeve**.
- Insert a small screwdriver blade into the slot next to the handle pivot and prise off the central cover (1), this will reveal a slotted screw (2). Repeat this procedure for the other side of the handle.
- Remove the slotted screw and washer (3) on either side of the handle that fix it to the instrument sleeve.
- Remove the handle assembly (4-8). It is suggested that you reassemble all the component parts of the handle pivot assembly to avoid misplacing them.



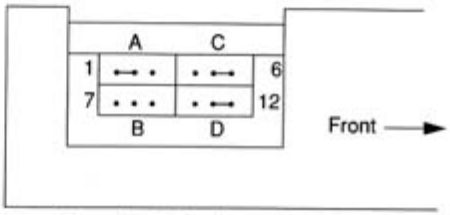
Disk Drive Removal

- Complete procedure: Instrument sleeve.
- Disconnect the power and ribbon cable attached to the rear of the disk drive.
- Remove the two screws (1) that fasten the disk drive, via grommets, to the bracket which, in turn, is fastened to the cover of the power supply unit.
- If the bracket has also to be removed remove the two screws (2).
- Lift the disk drive out of the unit. This is carried out by carefully lifting the rear of the drive and then gently pulling the drive out of the instrument.
- Remove the disk drive from the mounting bracket by removing the four screws on the underside of the assembly.



Disk Drive Jumper Settings

Before installing the drive as a replacement unit it is suggested that you confirm that the jumper settings are correct.

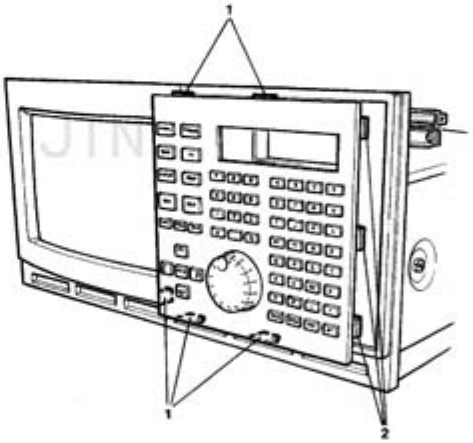


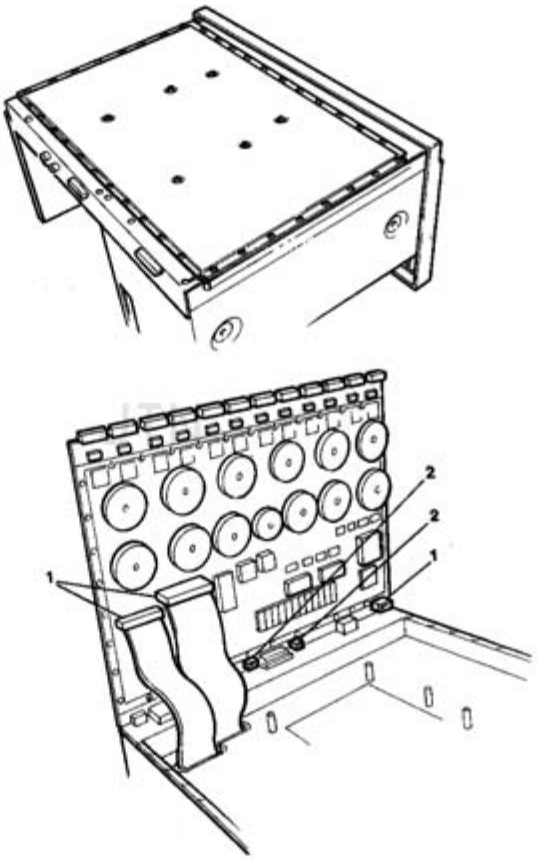
Location of the Jumper Block

Connection		*Comment*
A	1 - 2	Drive select 0
B	-	No connections
C	5 - 6	Mode change caused by internal sensors
D	11 - 12	Shifts to 2M mode with the HDI input HIGH

Keyboard

- Complete procedure : **Instrument sleeve**.
- Gently press the fixing lugs (1) that attach the keyboard to the main fascia of the instrument so as to enable it to move. The location of these are shown in the illustration opposite.
- Pull the left hand edge of the keyboard toward you and withdraw the pad in the direction of the VDU screen so as to free the three locating lugs (2).
- Disconnect the four wired plug that is attached to the keyboard.




1
2
2
1

Printed Circuit Board

- Complete procedure : **Instrument sleeve**.
- Position the instrument so that it is upside down with the rear towards you.
- Remove all the Torx screws that fasten the metal base plate to the printed circuit board. This will reveal the underside of the printed circuit board.

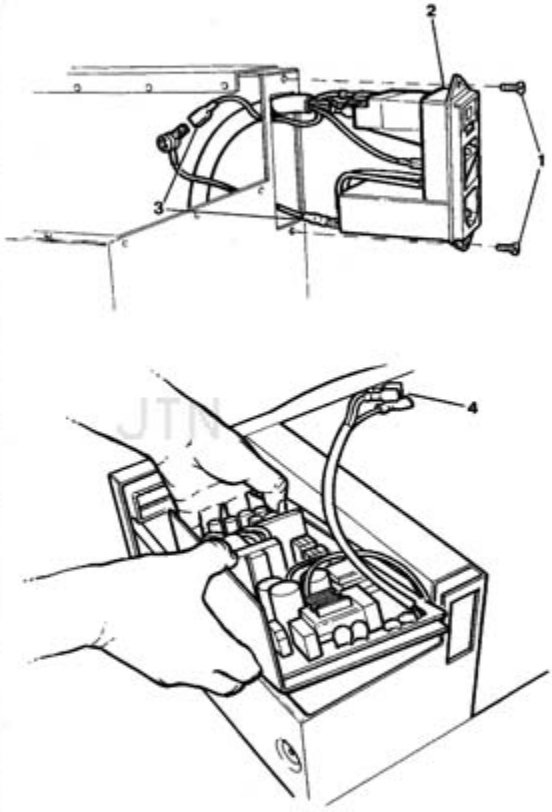
CAUTION

When re-assembling the instrument all of the screws that have just been removed must be replaced. Failure to do so will severely affect the operation of the instrument.

- Remove the Torx screws that fasten the rear metal bracket to the main chassis of the instrument.
- Lift the board towards you and gently pull it away from the chassis. When it is possible to gain access to the three ribbon (1) and two power supply connectors (2) disconnect these from the board and then continue withdrawing the board.

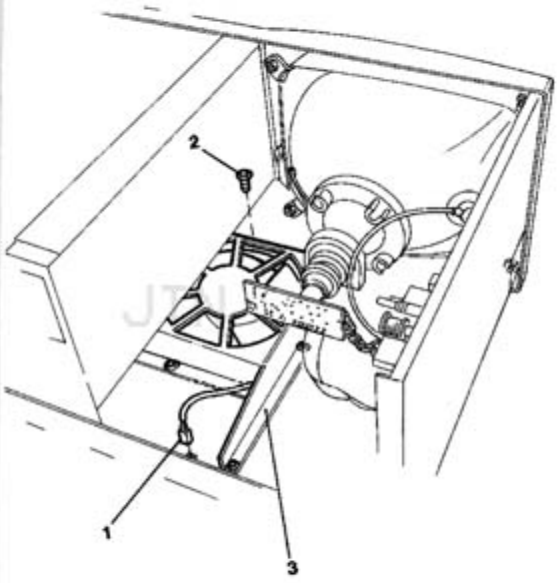
Note that there are ICs located at the front of this board and care must be taken to avoid them being damaged during the removal of the board.

- Place the board in a safe place.


2
1
3
4

Power Supply Unit

- Complete procedure : **Disk Drive removal**.
- Remove all the Torx screws that fasten the PSU cover to the main chassis of the equipment.
- Disconnect the ribbon cable from the PSU cover.
- Remove the two screws (1) that fasten the mains input socket (2) to the chassis.
- Disconnect the two grounding wires (3) from their respective connectors on the mains input socket and the chassis.
- Disconnect the four wires (4) to the mains input socket, noting their positions to enable the correct reconnection.
- Lift the rear of the PSU circuit board up slightly and then remove the board from the chassis.
- Disconnect the ribbon cable from the front of the PSU.

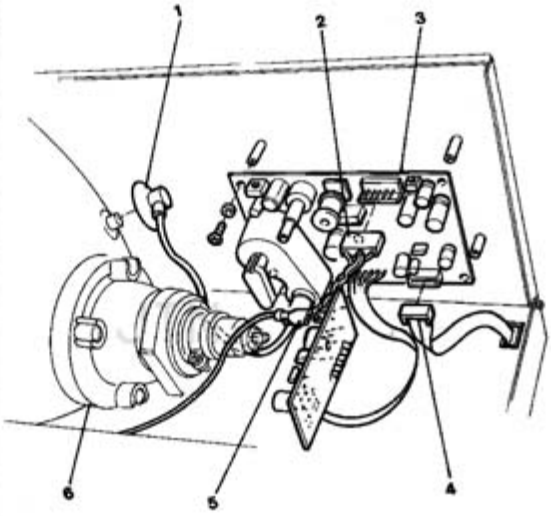

2
1
3

Fan Unit

- Complete pocedure : **Instrumental sleeve**.
- Disconnect the fan unit power supply cable (1) from the socket on the chassis.
- Remove the Torx screws (2) that fasten the fan unit (3) to the instrument chassis.
- Lift the Fan Unit clear of the instrument chassis and put it in a safe place.

WARNING

Take care not to damage the rear of the CRT during this procedure in order to avoid any risk of implosion.


1
2
3
6
5
4

Visual Display Unit

WARNING

Before commencing any task on the VDU ensure that the CRT and the eht cable have been discharged. see safety instructions clauses. Pages 3 and 4.

Removal of PCBs

- Disconnect the two small ribbon cables from the PCB (2&4) and the EHT lead from the CRT (1).
- Remove the grounding wire from the CRT PCB (5) and then pull this PCB away from the tube.
- Remove the screws that fasten the PCB (3) to the chassis.

Removal of CRT

- Complete procedure: **Removal of PCBs,** described above.
- Undo the four locknuts that fix the CRT mounting bracket to the chassis of the instrument, being sure to support the CRT at all times. Note that one of the screws is slightly obscured by the fan unit, you may find it easier to remove the Fan unit before removing the CRT.
- Place the CRT on a scratch free surface.

Chapter 5

Safety Inspection After Maintenance

General Inspection

- Take care that the clearance distances have not been reduced.
- Before soldering, the wires should be bent through the holes of the solder tags, or wrapped around the tag in a U shaped manner. The rigidity of the wiring can be maintained by means of cable clamps or lacing.
- Replace all insulating guards or plates.

Checking The Protective Earth Connection

The correct connection and condition can be checked visually and then by measuring the resistance between the protective lead connection and the plug and chassis. The resistance should not be greater than 0,1 Ω. During the measurement the mains cable should be removed. Any resistance variation indicates a defect.

Checking The Insulation Resistance

Measure the insulation resistance at U = 500 Volts DC between the mains connections and the protective lead connections. For this purpose set the mains switch to ON. The insulation resistance should be greater than 2 MΩ.

NOTE: 2 MΩ is a minimum requirement at 40°C and 95% relative humidity. Under normal conditions the insulation should be in the region of 10-20 MΩ.

Checking The Leakage Current

The leakage current should be measured between each pole of the mains supply in turn with all the accessible conductive parts connected together, including the measuring earth terminal.

The leakage current, if measured from the mentioned components should be less than 0,5 mA rms.

Voltage Test

The instrument must be capable of withstanding, without electrical breakdown, the application of a test voltage between the supply circuit and the accessible conductive parts that are liable to become energised.

The test potential should be 1500 V rms at the supply circuit frequency, and applied for one second. The test should be conducted when the instrument is fully assembled and with the primary switch in the ON position. During the test both sides of the primary circuit of the test equipment must be connected together and then to one terminal of the Voltage test equipment. The other Voltage test equipment terminal is to be connected to the accessible conductive parts.

Chapter 6

Spare Parts

DESCRIPTION	PART NUMBER	REFER
System Main Board		page: 46
200 Mhz 96 Channels	5322 214 90493	
200 Mhz 64 Channels	5322 214 90531	
100 Mhz 64 Channels	5322 214 90529	
100 Mhz 32 Channels	5322 214 90528	
Power Supply Unit	5322 218 51039	page: 48
Keyboard Assembly	5322 693 91467	page: 45
9" Monitor + Controller	5322 218 61426	page: 52
Floppy Disk Drive	5322 693 22588	page: 43
Fan + cable	5322 361 10576	page: 50
Mains Entry Unit	5322 277 11235	page: 48
Rotary Dial Knob	5322 414 30178	page: 45
Front Panel	5322 447 91781	page: 41
Instrument Sleeve	5322 447 91785	page: 41
Rear Panel	5322 447 91782	page: 41
Cabinet Foot	5322 462 41673	-----
Handle Assembly	5322 498 50313	page: 42
Fuse (2 Amps Slow)	5322 253 30025	page: 6
Fuse (4 Amps Slow)	5322 253 30028	page: 6