Wentworth Laboratories

PEGASUS

Models S200, S200D, S200-PR, S200LSC, 300S, 360S

WAFER PROBING EQUIPMENT

OPERATING AND SERVICE MANUAL

Issue 6.2, July 2011
Software version 6.1 onwards
Part Number 2091-001

The Leader in ProbeAbility ™

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SAFETY NOTICES

- **NOTE** A **NOTE** in this manual refers to special information for the user's attention. It provides additional and operational information that the user should be aware of.

CAUTION A **CAUTION** in this manual denotes a hazard condition, either immediately or the potential for one. It calls attention to a procedure that, if not performed correctly or adhered to, could result in damage to or destruction of the equipment. Do not proceed beyond a **CAUTION** sign until the indicated conditions are fully understood and met.

WARNING A **WARNING** in this manual denotes a hazard condition, either immediately or the potential for one. It calls attention to a procedure that, if not performed correctly or adhered to, could result in injury or loss of life. Do not proceed beyond a **WARNING** sign until the indicated conditions are fully understood and met.

- After instructions that will produce automatic movements, a note in this format identifies what movements are to be expected. These movements are not normally hazardous, but you must take care to avoid contact with any moving parts.

This product and related documentation must be reviewed before use. Familiarisation of the procedures within this manual must be achieved before attempting operation, adjustments and/or repairs. This instrument has been designed and tested in accordance to the requirement for CE marking and has been supplied in a safe and working condition.

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IN THIS MANUAL

This is the Operating and Service Manual for the ***Pegasus*** series of wafer probers from Wentworth Laboratories Limited.

The manual consists of five major sections:

INTRODUCTION

Chapters 1–3 introduce you to the major features of the ***Pegasus S200*** series of wafer probers:

SPECIFICATIONS ..... Chapter 1

Fuse rating 6.3A T (time delay). For continued protection always replace with the same type

WARNING The controller is double pole fused, and hence if the fuse in the neutral line blows there will be mains voltage with respect to earth present inside the controller. Therefore always remove the mains plug before doing any work in the controller.

This equipment is designed to operate indoors, within the temperature range 18°C to 22°C at a maximum humidity 70%. Pollution degree 1

CONTROLS AND INDICATORS ..... Chapter 0

OPERATOR INTERFACES ..... Chapter 3

1 SPECIFICATIONS

1.1 Installation instruction

WARNING When moving the stage observe standard lifting procedures for heavy objects. The S200 weighs approximately 45kg and the 300S weighs approximately 100kg.

Place the stage on a bench that will take the weight of the stage

Ensure that the bench and stage give a comfortable working height

WARNING When positioning the Controller ensure that the socket-outlet that powers the Controller is easily accessible at all times. (This is the disconnect device of the system if anything should go wrong).

Ensure that the ventilation holes in the bottom of the controller and the fan inlet at the rear are not obscured.

1.2 Technical Specifications, *Pegasus* S200 Series

XY Stage		
Type	High precision recirculating ball lead screws	
	S200 6-inch	**S200 8-inch**
Stage Travel	160mm x 160mm (6.3" x 6.3")	210mm x 210mm (8.3" x 8.3")
Resolution	1.25µm	1.25µm
Probing Speed	95mm/sec max (3.75"/sec max)	95mm/sec max (3.75"/sec max)
Indexable Range	10µm to 160mm (0.001" to 6.0")	10µm to 210mm (0.001" to 8.0")
Absolute Incremental Accuracy	Better than ±7µm over 160mm	Better than ±7µm over 200mm
Repeatability	±4µm	±4µm
Chuck Stage		
Type	Stepper motor drive – linear bearings	
Total Travel	10mm (0.44") max	
Fine Lift	User programmable within total travel	
Overtravel	User programmable within total travel	
Overtravel Indexable	User programmable within total travel	

Range	
Search Window	User programmable within total travel
Resolution	1µm (0.00004")
Chuck Speed	See **Cycle Times** table (next page)

Physical Specifications (without microscope)	**S200 Prober**	**Controller Unit**
Width	572mm (22.5")	450mm (17.7")
Depth (includes connectors)	633mm (24.0")	480mm (19.0")
Height (excludes optics)	300mm (12.0")	190mm (7.0")
Weight	45kg (99lb)	17kg (37.5lb)
Platform Height Adjustment	Fine: 25mm micrometer control	Gross: 50mm (2in) variable setting
Vacuum requirement	0.5 cfm at 20" Hg (min) from external pump	
Power	220-240VAC 50Hz and 100-115V 60Hz, auto select, 1000VA	

Fuse rating 6.3A T (time delay). For continued protection always replace with the same type

WARNING The controller is double pole fused, and hence if the fuse in the neutral line blows there will be mains voltage with respect to earth present inside the controller. Therefore always remove the mains plug before doing any work in the controller.

This equipment is designed to operate indoors, within the temperature range 18°C to 22°C at a maximum humidity 70%. Pollution degree 1

Technical Specifications, *Pegasus* 300S Series

XY Stage	
Type	High precision recirculating ball lead screws
Stage Travel	305mm x 305mm (12" x 12")
Resolution	0.3µm
Indexable Range	10µm to 300mm (0.001" to 12")
Absolute Incremental Accuracy	Better than ±8µm over 300mm
Repeatability	±4µm
Chuck Stage	
Type	Stepper motor drive – linear bearings
Total Travel	10mm (0.44") max
Fine Lift	User programmable within total travel
Overtravel	User programmable within total travel
Overtravel Indexable Range	User programmable within total travel
Search Window	User programmable within total travel
Resolution	1µm (0.00004")

Physical Specifications (without microscope)	**300S Prober**	**Controller Unit**
Width	828mm (32.6")	450mm (17.7")
Depth (includes connectors)	810mm (31.8")	480mm (19.0")
Height (excludes optics)	366mm (14.4")	190mm (7.0")
Weight	100kg (220lb) approx	17kg (37.5lb)
Platform Height Adjustment	58mm (2.3”) variable setting	
Vacuum requirement	0.5 cfm at 20” Hg (min) from external pump	
Power	220-240VAC 50Hz and 100-115V 60Hz, auto select, 1000VA	

Fuse rating 6.3A T (time delay). For continued protection always replace with the same type

WARNING The controller is double pole fused, and hence if the fuse in the neutral line blows there will be mains voltage with respect to earth present inside the controller. Therefore always remove the mains plug before doing any work in the controller.

This equipment is designed to operate indoors, within the temperature range 18°C to 22°C at a maximum humidity 70%. Pollution degree 1

2 CONTROLS AND INDICATORS

2.1 Units

The ***Pegasus*** consists of three main units:

- **Prober** unit – the travelling wafer chuck and its base unit.
- **Keypad** unit – the manual control interface, which usually located at the side of the Prober.

Fig 2.1:S200 Prober and Keypad units, with optional optics

- **Controller** unit – usually located under the bench. See Fig 2.2 on next page.

The three units are interconnected by cables during installation. This chapter will explain the various functions and interconnections.

2.2 Mains Power Control

Mains power input is to the rear of the Controller unit.

Mains power is controlled by the green button on the Controller unit.

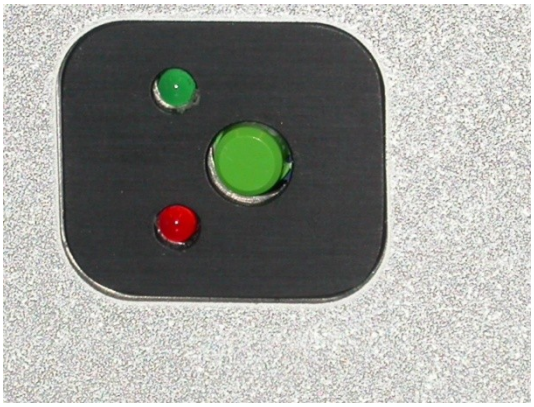


Fig 2.2: Controller unit – note the green power button.

LED Indication	Status
• Green LED off • Red LED off	Mains not connected
• Green LED flashing • Red LED off	**Standby** mode: mains connected, but ***Pegasus*** not turned on
• Green LED on • Red LED off	**Operation** mode
• Green LED flashing • Red LED flashing	**Emergency Stop**
• Green LED on • Red LED on	Power supply fault.

2.2.1 Power-On

When mains is connected, the ***Pegasus*** changes to **Standby** mode, so the green LED gives short flashes with long gaps.

When you press the green button on the Controller, the ***Pegasus*** changes from **Standby** mode to **Operation** mode, and the green LED turns permanently on.

2.2.2 Manual Shutdown

Under normal conditions, the Pegasus should be switched off by pressing the **Shutdown** function key.

However, it is possible to shut the machine down by pressing the green button, which will switch to **Standby** mode, with the green LED giving short flashes and long gaps.

CAUTION In normal operation, do not turn the power off manually while the ***Pegasus*** is probing or the chuck is moving. If you do this, there is a risk of equipment damage. In an emergency, use the **Emergency Stop** button.

2.3 Emergency Stop

In an emergency, **quickly** press the red button at the front left of the Prober unit.

The ***Pegasus*** will shut down safely into **Emergency Stop** mode and all powered motion will cease.

Fig 2.3: Emergency Stop button

- **NOTE** For a non-emergency pause, giving the opportunity to resume the current operation, press the **Pause** function key on the keypad.

2.3.1 Re-starting after an Emergency Stop

WARNING Do not re-start the ***Pegasus*** until you have:

- Read and understood all the following instructions;
- Rectified the cause of the emergency;
- Verified that it is safe to re-start; and
- Obtained authorisation to re-start after an emergency stop, if that is required by your company's operating instructions.

When you press the red button, it stays locked in, and the red and green LED indicators on the Controller flash (short flashes, short gaps).

To re-start the ***Pegasus***, you must release the red button, by twisting it clockwise until it springs out. Now you can press the green button on the Controller to power the ***Pegasus*** on again.

CAUTION Since the ***Pegasus*** was shut down in an abnormal condition, it will automatically take the following actions on re-start:

- The chuck will not move from the position where it was stopped
- The chuck and pins vacuum will be on
- The LCD will display the **Power-up** screen (Section 4.1)
- There will be no stored 'memory' of operations before the emergency stop.

Be aware that these automatic actions will take place.

You will then need to set up the operating conditions again. Follow the instructions in Chapter 4 onwards, taking care to safeguard the wafer, probe card and other delicate items against possible damage.

2.4 Power Supply Fault

If the red LED indictor on the Controller button is permanently on, the ***Pegasus*** has detected a fault in its power supplies.

You cannot switch the ***Pegasus*** into this state using any manual controls, and you cannot make any repairs.

Contact your local Wentworth representative, or one of the Wentworth offices – see inside front cover.

3 OPERATOR INTERFACES

The ***Pegasus*** wafer prober is controlled by a keypad and joystick.

An LCD screen displays the status of the machine and its operations, and reminds you when actions are necessary.

Fig 3.1: Screen, keypad and joystick

3.1 Screen and Function Keys

This is a typical LCD display:

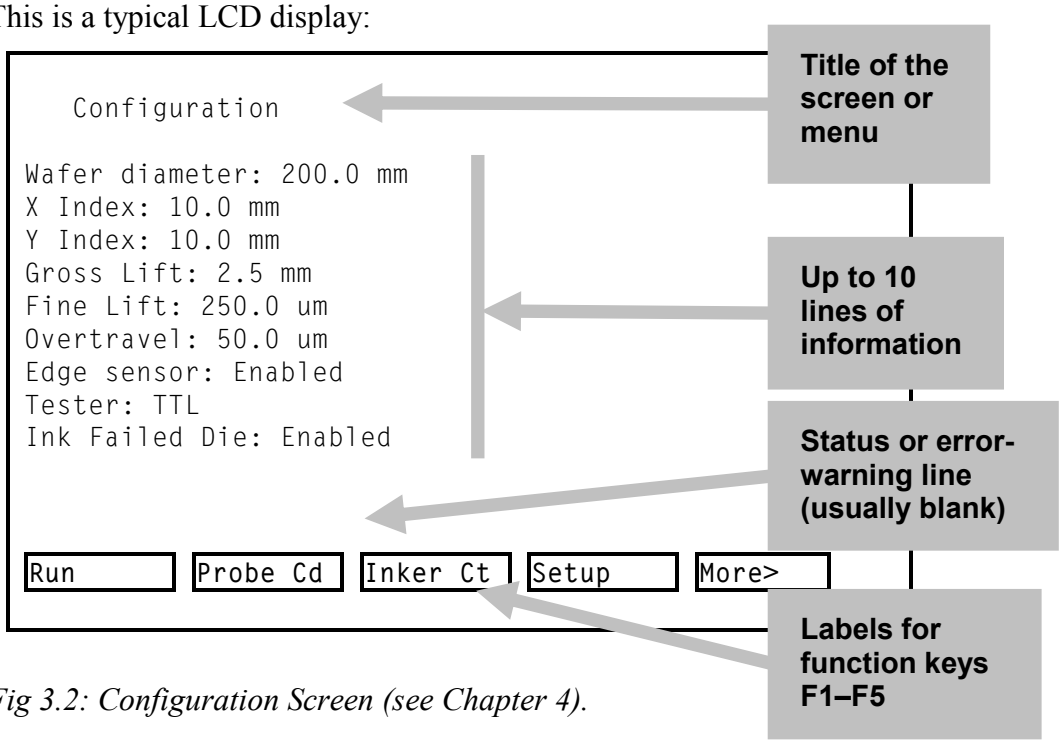


Fig 3.2: Configuration Screen (see Chapter 4).

The five highlighted blocks along the bottom of the LCD display are labels for the five function keys **F1**–**F5** immediately below the screen. The labels change to show the current function of each key, which will vary according to context.

In this manual, an instruction such as "Press **F1** = **Run**" is shorthand for "Press the **F1** key, whose label is currently **Run**".

The backlight for the LCD can be programmed to switch off after a period of non-use (Section 6.4.9). The backlight is automatically switched on again when any key is pressed or when the joystick is moved.

CAUTION Any keypress will be processed as a command, which will be executed as well as turning on the backlight.

If you only want to turn on the backlight, press the [.] (decimal point) key on the numeric keypad.

3.2 Keypad

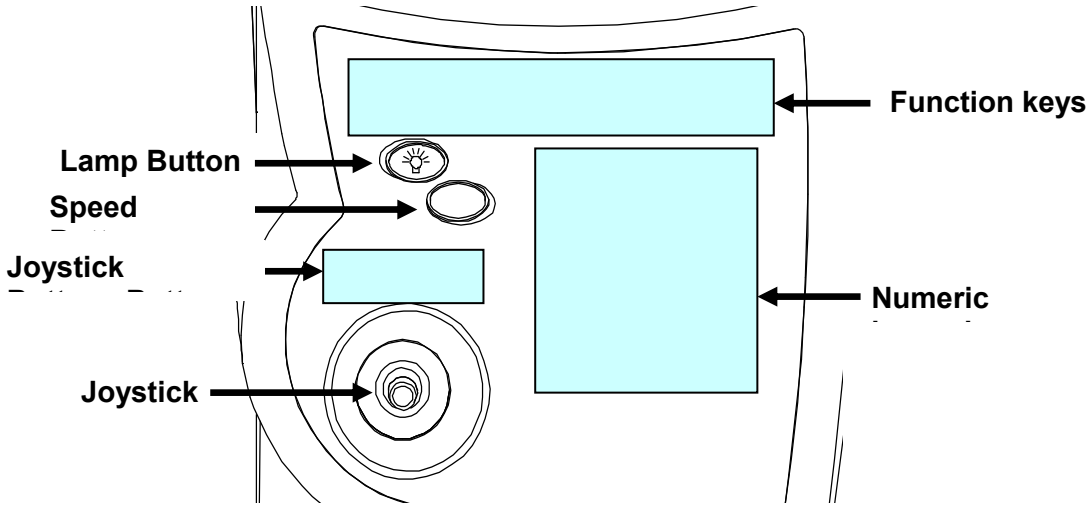


Fig 3.3: Keypad layout

The keypad contains the following features:

- **Function keys** – see above
- **Lamp button** – turns the lamp on and off, independently of any software control. Press once to change lamp status.
- **Joystick speed button** – When the joystick is being used, this button changes the speed of the motion that the joystick is controlling – see below for details.

- **Numeric keypad** – for entering numbers:
  - **Number keys** – numbers 0–9 and decimal point
  - **ESCape key** [ESC] – generally has the same function as **F5** = **Cancel**
  - **Backspace key** [←] – deletes the last keypad entry
  - **Enter key** [↵] – enters whatever has been typed using the keypad. Generally has the same function as **F4** = **Accept**.
- **Joystick left and right buttons** (green) – see below.

3.3 Joystick

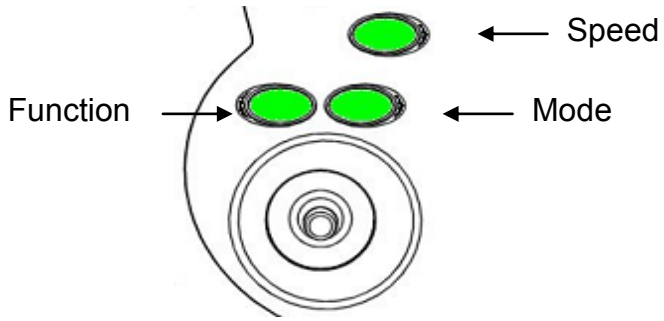


Fig 3.4: Joystick, with the Function, Mode, and Speed buttons

The joystick offers control of chuck movement when appropriate. Chuck movement follows your left-right and front-back movements of the joystick. Depending on the current mode:

- The left-right movement of the joystick may control either the left-right movement or the anti-clockwise/clockwise rotation of the chuck.
- The front-back movement of the joystick may control either front-back movement of the chuck, the up-down movement of the chuck, or the up-down movement of the platform (if fitted).

3.3.1 Joystick Speed Button

When the joystick is being used to control chuck motion, the **Speed** button changes the speed of the motion that the joystick is controlling.

To change the axis speed, press the **Speed** button. Repeated presses will toggle the speed of motion through two steps. While this function is active, the current speed is indicated on the display status line (2 = fast speed ... 1 = slow speed).

3.3.2 Joystick Mode Button

When the joystick can be used in two or more control modes (for example, some screens use the joystick to control both XY and Z motion, or when the optional motorised PMM is fitted), the **Mode** button toggles between the available modes. In the screens where there is only a single control mode is available, this button is unused.

3.3.3 Joystick Function Button

The **Function** button implements screen dependent functionality, which is detailed in relevant sections of this manual. The most common use of this button is to function the same of the F1 key (to allow the operator to access the F1 soft-key while looking down a microscope).

3.4 Prober Status Indicator

When the status indicator accessory is fitted, it gives visual (and optionally audio) indication of the state of the machine. The status indicator consists of three lights (red, amber, and green) and optionally a buzzer.

The lights are used to indicate the state of the machine as follows:

Red	Amber	Green	State
On	Off	Off	Machine is idle
Off	Off	On	Machine is probing
Off	On	On	Machine requires attention but is still probing
On	On	Off	Machine requires attention and has stopped probing
Off	Off	Off	Machine powered down or in remote mode

The buzzer can be set to automatically sound when any combination of the red and amber lights are on.

OPERATING INSTRUCTIONS

Chapters 4–16 describe all the screens and functions that are accessible from the keypad-LCD interface:

4 POWER-UP AND CONFIGURATION SCREENS

4.1 Power-up Screen

The opening screen immediately after power-up displays the following information, as shown in Fig 4.1 below:

- ***Pegasus*** model number
- ***Pegasus*** software version number
- ***Pegasus*** serial number
- Whether the *Pegasus* is calibrated.

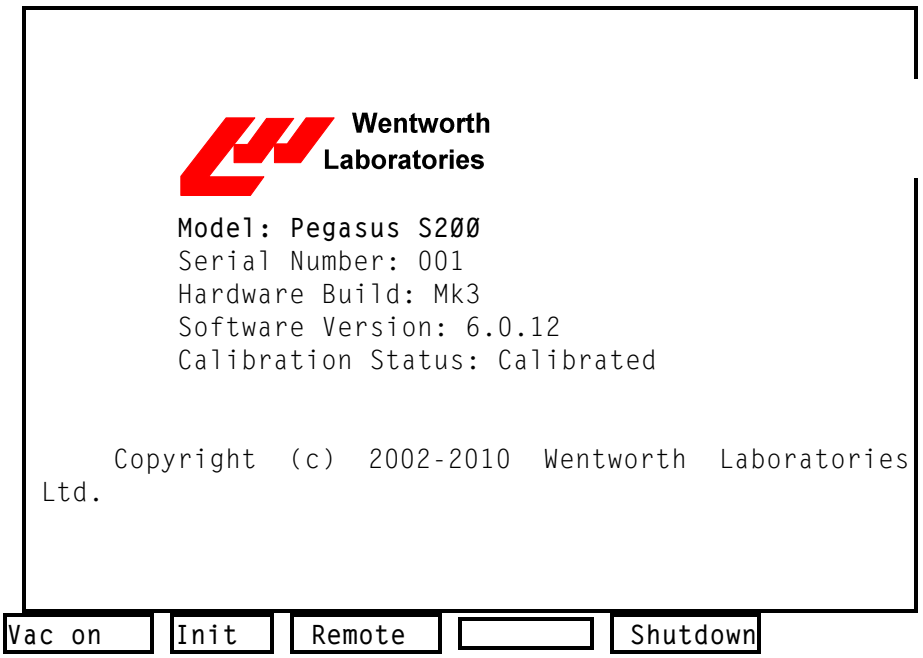


Fig 4.1: ***Power-up*** *screen (example only; details will vary)*

Only three functions are available:

- **F1** = **Vac on** – releases the chuck vacuum (and if appropriate the secondary chuck or pins vacuum), which was automatically established at power-on (if the vacuum supply was available). Press this key only if you need to move or replace a wafer that was already on the ***Pegasus*** when it was powered-up. In all other menus, vacuum control is automatic. Note that the status of the key reflects the current state of the vacuum, thus if the key states **Vac on** then the vacuum has been applied and vice versa.
- **F2** = **Init** – press this key to reference the stepper motors (see Chapter 14).

  After a delay of up to 20 seconds, the ***Pegasus*** then displays the **Configuration** screen (next section).

Should the Pegasus fail to reference, the **Reference Failure** screen will be displayed (see Chapter 14).

- **F3 = Remote – enters remote mode, as described in Chapter 13**
- **F5 = Shutdown – starts a controlled shutdown, as described in Chapter 17.**

4.2 Configuration Screen

This is the main working screen for the ***Pegasus***. It is accessed by pressing **F2** = **Init** from the **Power-up** screen (above).

All other menus and functions eventually lead back to this **Configuration** screen.

Fig 3.2 shows a typical **Configuration** screen (this is the same screen as Fig 3.2 on page 13 where the main features are identified).

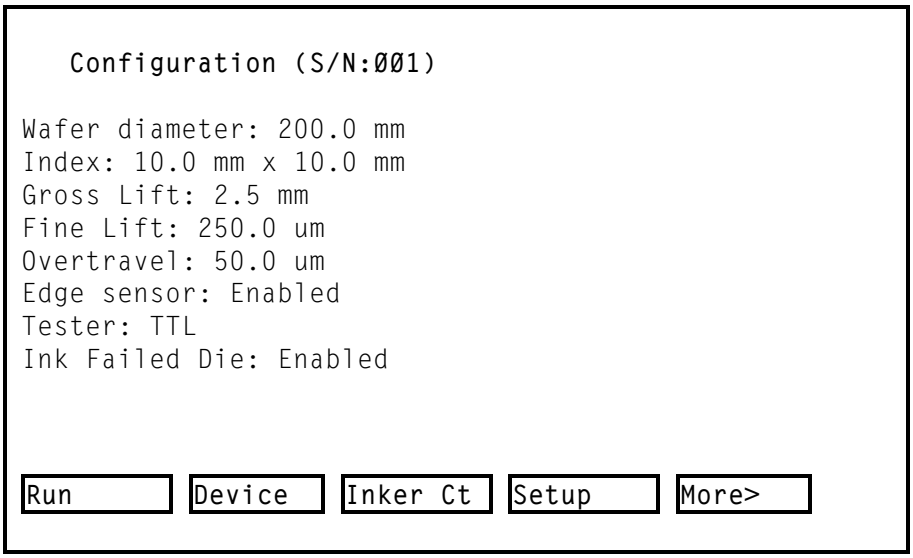


*Fig 4.2: **Configuration** screen (example; details will vary)*

The **Configuration** screen has several options, selected by the function keys. The first four options (**F1**–**F4**) are displayed first. To cycle through the rest of the options, press **F5** = **More** repeatedly until you eventually return to the first four, as shown in Fig 3.2 below.

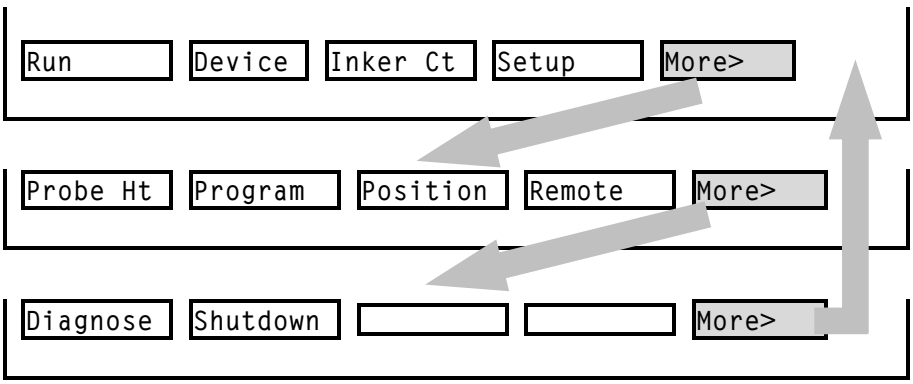


Fig 3.2: The **F5** = **More** *button cycles through additional options.*

Table 4.1 presents a map of the functions, and the key-presses required to reach each function on first entering the **Configuration** screen.

Table 4.1: Map of ***Configuration*** *screen functions*

Option	Function Key Label	Chapter	Keypresses (from entering **Configuration** screen)
Run Batch Screen	Run	**5**	**F1**
Setup Menu	Setup	**6**	**F4**
Change Probe Card	Probe Cd	**7**	**F2**
Device*	Device	**8**	**F2**
Change Inker Cartridge	Inker Ct	**9**	**F3**
Probe Height Setup	Probe Ht	**10**	**F5**, **F1**
Program Mode*	Program	**11**	**F5**, **F2**
Position Calibration	Position	**12**	**F5**, **F3**
Remote Control Functions	Remote	**13**	**F5**, **F4**
Engineering Diagnostics	Diagnose	**15**	**F5**, **F5**, **F1**
Shutdown	Shutdown	**17**	**F5**, **F5**, **F2**

* **Note:** This facility is only available as a software option, and is not available on a standard prober. To upgrade your prober to include this facility, please contact Customer Services.

5 RUN BATCH SCREEN

CAUTION When using an S200D it is important that the **wafer size** has been set correctly (Section 6.1). **Failure to do so could result in severe damage of the needles, callipers and wafer carrier.**

The **Run** menu is accessed by pressing **F1** = **Run** from the **Configuration** screen (if you cannot see this option in the **Configuration** screen, press **F5** = **More** until it appears).

This chapter leads you through a series of procedures to:

1. Load a wafer on the chuck (Section 5.1)
2. Accurately align the wafer (Section 5.2)
3. Position the first die under the prober needles (Section5.6)
4. Start the probing run (Sections 5.8 and 5.10).

Steps in the procedures are numbered 1 - 2 - 3 within each section. Automatic actions by the ***Pegasus*** are indicated by • bullet points.

- **NOTE** If Chip Probing is enabled, Prober operation will differ that described here, (see chapter 16).

5.1 Load Wafer and Choose Alignment Method

1. When you press **F1** = **Run** from the **Configuration** screen, the following actions take place automatically:
   - The chuck moves to the preset manual load position (see Section 12.3).
   - If the ***Pegasus*** includes the load pins option, the chuck also drops, leaving the load pins standing above the chuck level.
2. Place the wafer on the chuck (or load pins if fitted), as centrally as possible. If the chuck face has vacuum rings, you can use them as an aid in centring. For an S200D the clamp ring needs to be removed to place the wafer in the carrier.

   Rotate the wafer so that its two alignment fiducials are oriented as accurately as possible in either the X direction or the Y direction, with the centre of the wafer within ± 5mm of the probing centre. The chuck has a rotation range of ±8 degrees, so the wafer must be placed within ±8 degrees of its correct orientation.

   If required, the Enter key can be used to toggle the chuck vacuum on/off.
3. You now have four choices of alignment method:
   1. If you wish to carry out a two-point alignment procedure in the X direction (left and right), press **F1** = **Align X** and continue to Section 5.2.1.
   2. If you wish to carry out a two-point alignment procedure in the Y direction (front and back), press **F2** = **Align Y** and continue to Section 5.2.2.

3. If you wish to carry out the alignment by using the joystick while the ***Pegasus*** scans automatically in the X direction (left–right), press **F3 = Scan X** and continue to Section 5.2.3.
4. If you wish to carry out the alignment by using the joystick while the ***Pegasus*** scans automatically in the Y direction (front–back), press **F4 = Scan Y** and continue to Section 5.2.4.

The alignment process can be run remotely using the **LDALN** command.

5.2 Alignment Procedures

- If **Keep Last Theta Alignment** is enabled, (see section 6.4.11), the Prober will bypass the Alignment Procedure, in which case continue to Section 5.6 – **Position First Die**.

Carry out the alignment procedures described in only **one** of these sections. When you have completed alignment by your chosen method, continue to Section 5.6 – **Position First Die**.

Note that during the alignment procedure, the Chuck will at times move more slowly in X or Y, (dependent on the selected procedure); this is done to aid visual alignment of the wafer.

5.2.1 Align X Procedure

1. When you press **F1 = Align X**, the following actions take place automatically:
   - If the ***Pegasus*** includes the load pins option, the pins vacuum is applied and the chuck is raised.
   - The chuck vacuum is applied and any pins vacuum is released.
   - The chuck rises to its **Gross Lift** height (see Section 6.6)
   - The chuck moves to the outside right-hand side of the wafer, as set by the wafer diameter (see Section 0) or wafer width (see Section 6.5.5).

   If required, the probing height can be adjusted by pressing **F3 = Probe Ht**. The change probing height routine is detailed in section 10.
2. Locate the first fiducial through the microscope, and then use the joystick to accurately position the fiducial under the probe needles or the cross-hairs of the microscope.

Joystick

When using the joystick, remember that pressing the **Speed** button will slow the movement down in a series of steps, giving extremely fine movement control.

During this function, the right-hand green button by the joystick copies the **F1** = **Continue** function key, so that you can control the ***Pegasus*** without taking your eyes from the microscope.

See Section 3.3 for more details of joystick control.

3. When you have done this, press **F1** = **Continue** (or the right-hand green button by the joystick).
   - The chuck moves to approximately where the second fiducial is expected to be.
4. Locate the second fiducial through the microscope, and then use the joystick to accurately position the fiducial under the probe needles or the cross-hairs of the microscope.

During this function, the left-hand green button by the joystick copies the **F1** = **Repeat** function key.

5. If you wish to check the alignment, or to return to the first fiducial, press **F1** = **Repeat** (or the left-hand green button by the joystick).
   - Based on the information you have provided, the chuck rotates so that the fiducials are exactly aligned in the X direction.
   - The chuck now moves back in the X direction to place the first fiducial under the probe needles or the cross-hairs.

   A useful check of alignment is to watch the 'streets' between the devices as they travel through your view. If alignment is incorrect, the streets will drift up or down as you watch; if alignment is correct, there will be no drift.
6. Check the alignment of the first fiducial once again. If alignment is not correct, go back to step 2 (first alignment point) and repeat steps 2 through 5.
7. When you are finally satisfied that the wafer alignment is correct, press **F2** = **Continue**.
8. Continue to Section 5.35.6 – **Position First Die**.

5.2.2 Align Y Procedure

1. When you press **F2** = **Align Y**, the following actions take place automatically:

- If the ***Pegasus*** includes the load pins option, the pins vacuum is applied and the chuck is raised.
- The chuck vacuum is applied and any pins vacuum is released.
- The chuck rises to its **Gross Lift** height (see Section 6.6)
- The chuck moves to approximately where the first fiducial is expected to be.

If required, the probing height can be adjusted by pressing **F3 = Probe Ht**. The change probing height routine is detailed in section 10.

2. Locate the first fiducial through the microscope, and then use the joystick to accurately position the fiducial under the probe needles or the cross-hairs of the microscope.

Joystick

When using the joystick, remember that pressing the **Speed** button will slow the movement down in a series of steps, giving extremely fine movement control.

During this function, the right-hand green button by the joystick copies the **F1 = Continue** function key, so that you can control the ***Pegasus*** without taking your eyes from the microscope.

See Section 3.3 for more details of joystick control.

3. When you have done this, press **F1 = Continue** (or the right-hand green button by the joystick).
   - The chuck moves to approximately where the second fiducial is expected to be.
4. Locate the second fiducial through the microscope, and then use the joystick to accurately position the fiducial under the probe needles or the cross-hairs of the microscope.

During this function, the left-hand green button by the joystick copies the **F1 = Repeat** function key.

5. If you wish to check the alignment, or to return to the first fiducial, press **F1 = Repeat** (or the left-hand green button by the joystick).
   - Based on the information you have provided, the chuck rotates so that the fiducials are exactly aligned in the Y direction.

- The chuck now moves back in the Y direction to place the first fiducial under the probe needles or the cross-hairs.

A useful check of alignment is to watch the 'streets' between the devices as they travel through your view. If alignment is incorrect, the streets will drift left or right as you watch; if alignment is correct, there will be no drift.

6. If alignment is not correct, go back to step 2 (first alignment point, which will have moved because of the chuck rotation) and repeat steps 2 through 5.
7. When you are finally satisfied that the wafer alignment is correct, press **F2** = **Continue**.
8. Continue to Section 5.6 – **Position First Die**.

5.2.3 Scan X Alignment

Scan X alignment allows you to align the wafer fully by Theta motion (rotation) only.

1. When you press **F3** = **Scan X**, the following actions take place automatically:
   - If the ***Pegasus*** includes the load pins option, the pins vacuum is applied and the chuck is raised.
   - The chuck vacuum is applied and any pins vacuum is released.
   - The chuck rises to its **Gross Lift** height (see Section 6.6)
   - The chuck starts scanning repeatedly along the X axis, from left to right and back again.
2. Scanning does not start automatically, but must be started by pressing **F1** = **Start**. Before scanning is started, the probing height can be adjusted by pressing **F2** = **Probe Ht** if required.
3. Looking through the microscope, note how the 'streets' between the devices are drifting as they travel through your view. Initially the Theta alignment will be incorrect, so the streets will drift up or down as you watch.

   If you cannot see a street, press **F2** = **Pause**, press the left-hand green joystick button to change to X/Y mode, and use the joystick to move the wafer in the Y direction until the edge of a 'street' is centred in the microscope. Then press the left-hand green joystick button again to change back to Theta mode, and press **F2** = **Resume**.

Joystick

When using the joystick, remember that pressing the **Speed** button will slow the movement down in a series of steps, giving extremely fine movement control.

.

The right-hand green joystick button change between Theta mode (front/back joystick motion rotates the chuck) and normal X/Y mode. The left-hand green joystick button copies **F1** = **Continue**.

See Section 3.3 for more details of joystick control.

4. Adjust the chuck angle using the joystick in Theta mode (front/back motion rotates the chuck) until the Theta alignment is accurate and there is no perceptible up–down drift of the 'streets' while scanning.
5. When you are finally satisfied that the wafer alignment is correct, press **F1** = **Continue** (or the right-hand green joystick button).

6. Continue to Section5.6– **Position First Die**.

5.2.4 Scan Y Alignment

Scan Y alignment allows you to align the wafer fully by Theta motion (rotation) only.

1. When you press **F4** = **Scan Y**, the following actions take place automatically:
   - If the ***Pegasus*** includes the load pins option, the pins vacuum is applied and the chuck is raised.
   - The chuck vacuum is applied and any pins vacuum is released.
   - The chuck rises to its **Gross Lift** height (see Section 6.6)
   - The chuck starts scanning repeatedly along the Y axis, from left to right and back again.
2. Scanning does not start automatically, but must be started by pressing **F1** = **Start**. Before scanning is started, the probing height can be adjusted by pressing **F2** = **Probe Ht** if required.
3. Looking through the microscope, note how the 'streets' between the devices are drifting as they travel through your view. Initially the Theta alignment will be incorrect, so the streets will drift left or right as you watch.

   If you cannot see a street, press **F2** = **Pause**, press the left-hand green joystick button to change to X/Y mode, and use the joystick to move the wafer in the X direction until the edge of a 'street' is centred in the microscope. Then press the left-hand green joystick button again to change back to Theta mode, and press **F2** = **Resume**.

Joystick

When using the joystick, remember that pressing the **Speed** button will slow the movement down in a series of steps, giving extremely fine movement control.

The left-hand green joystick button change between Theta mode (front/back joystick motion rotates the chuck) and normal X/Y mode. The right-hand green joystick button copies **F1** = **Continue**.

See Section 3.3 for more details of joystick control.

4. Adjust the chuck angle using the joystick in Theta mode (front/back motion rotates the chuck) until the Theta alignment is accurate and there is no perceptible left–right drift of the 'streets' while scanning.
5. When you are finally satisfied that the wafer alignment is correct, press **F1** = **Continue** (or the right-hand green joystick button).

6. Continue to Section 5.6 – **Position First Die**.

5.3 Wafer Centre Wizard

If Wafer Centre is enabled (see 0), the wafer centre wizard will be presented after wafer alignment.

When prompted, use the joystick to move the wafer under a probe so that the probe is positioned at any extreme circumference point on the upper left quarter of the probable area (note: if the wafer edge is used, die will be tested right up to the wafer edge).

Press continue and the chuck shall move the wafer in X close to the wafer edge on the upper right of the wafer. When prompted, use the joystick to align the same probe above the extreme circumference point on the upper right quarter of the probable area. Note: Only X movement is possible at point in the wizard.

Press continue and the chuck shall move the wafer in Y close to the wafer edge on the lower right of the wafer. When prompted, use the joystick to align the same probe above the extreme circumference point on the lower right quarter of the probable area. Note: Only Y movement is possible at point in the wizard.

When all three points have been aligned, press continue to confirm the Pegasus can now determine the exact wafer centre and probable area.

At any stage, the process can be restarted by pressing Repeat or aborted by pressing Abort.

5.4 Position Reference Die

If Local Reference Die is enabled in the Tester Set-up menu, you will be asked to set a die position which will be identified to the tester as index (0, 0).

Simply use the joystick to move the reference die under the probe needles, and then press **F1=Continue**.

This is independent to the First Die position, enabling testing to start at a positive or negative offset from the (0, 0) index. Note: if the reference die and first die can be set to the same position, in which case there will be no index offset.

5.5 Position Central Die

The TTL & 8255 BCD tester needs to know the approximate position of the central die on the wafer. If the TTL & 8255 BCD tester is selected, this screen is displayed before the First Die screen to let you set the position of the central die.

Simply use the joystick to move the central die under the probe needles, and then press **F1=Continue**.

5.6 Position First Die

When you press **F2** = **Continue** after alignment in either X or Y (or if the Central Die screen is displayed, **F1** = **Continue**):

- If Save First Die Position is disabled, the Prober will estimate and move to the expected first die position. If Save First Die Position is enabled, the Prober will move to the first probed die position of the previous wafer.

1. Use the microscope and joystick to position the needles as closely as possible over the front left die.

> **Joystick**
>
> When using the joystick, remember that pressing the **Speed** button will slow the movement down in a series of steps, giving extremely fine movement control.
>
> During this function, left-hand green button by the joystick will alternately raise and lower the chuck, so that you can control the ***Pegasus*** without taking your eyes from the microscope.
>
> See Section 3.3 for more details of joystick control.

2. Press the left-hand green button by the joystick to fine-lift the chuck to bring the needles into contact. (Joystick X-Y control is automatically disabled while the chuck is raised.)

   F3 = **O/T On** or **O/T Off** specifies whether or not Overtravel will be applied when you perform a chuck lift, to bring the pins into firm contact with the die.

3. If the needles do not make contact in exactly the correct place, press the left-hand green button again to lower the chuck and re-enable X-Y movement. Use the joystick to make further fine adjustments. Press the left-hand green button to re-check the needle positions.

   When the needle positions are correct, the ***Pegasus*** has all the information it needs for automatic wafer probing.

4. Pressing the **F4** = **Manual** function key will enter the Manual Wafer testing screen; see section 5.7 for more details, allowing indexing and testing to be tried on some of the die, before starting the automatic wafer probing sequence.

5. Pressing the **F5=More, F2=Browse** function keys will enter the Browse Wafer screen which allows the wafer to be manually scanned and measured. See section 5.8 for more details.

6. Press **F1** = **Continue**

   F1 = **Continue** will not be displayed if the **First Die Position** in the **X-Y Index** menu (Section 0) has been set to either **Top Prompt** or **Bottom Prompt**. Instead

you will have the choice of **F1** = **Left** or **F2** = **Right**. Press either key to start probing at the specified corner die.

- If the Auto Ink facility has been enabled, the number of die specified by the Auto Ink Die Count is inked, and the user is prompted to continue.
- The automatic wafer probing sequence begins, starting from the specified die.

5.7 Manual Wafer Testing Screen

This screen allows the operator manually check die indexing and testing on any part of the wafer; it has three modes, **Drive**, **Index (no lift)**, and **Index (with Lift)** which are selected by pressing the **F1** function key.

In **Drive** mode, with the Chuck at gross-lift, the Joystick can be used to move the Chuck freely around the Stage.

In **Index (no lift)** mode, with the Chuck at gross-lift, the Joystick can be used to step the chuck freely around the Stage.

In **Index (with lift)** mode, the Joystick is used to move and test one die at a time. For example, moving the Joystick up will initiate the following sequence:

1. The Chuck moves to gross-lift.
2. The Chuck moves up one Y Index.
3. The Chuck moves to Fine-lift
4. If enabled, the Prober initiates the Test and automatic Ink sequence.

Holding the Joystick in the up, down, left, or right position for longer than a second while in **Index** mode will initiate move and test auto-repeat. Move and test auto-repeat will continue until the Joystick is returned to the centre position. When the joystick is returned to the centre position, the current move and test cycle will always be completed.

The Chuck can be toggled between fine-lift and gross-lift with the left Joystick key. Pressing the right Joystick will test the die currently under the needle(s).

- Press **F2** to switch between **Test is On** and **Test is Off**; when **Test is On** is displayed, the Prober will test the Die after an Index; when **Test is Off** is displayed, and the Prober will not test the Die after an Index.
- Press **F3** to switch between **Ink is On** and **Ink is Off**; when **Ink is On** is displayed, the Prober will automatically Ink failed Die after an Index; when **Ink is Off** is displayed, the Prober will not automatically Ink failed Die after an Index.

  Inking is only available if all Inkers are set to zero offset and Inking has been enabled, otherwise, **F3** will display **Ink N/A**, (Ink Not Available).
- Press **F5 = More>** followed by **F1 = Setup** to display the **Setup Menu**.
- Press **F5 = More>** followed by **F2 = Manual Ink** to enable/disable manually inking using the numeric keypad (i.e., when manual inking is enabled, the 1 key fires inker number 1, the 2 key fires inker number 2, etc).

- Press **F5 = More>** followed by **F3 = Alignment** to re-align the wafer, see section 5.2.

- **Note:** The Probe Clean facility is only available as a software option, and is not available on a standard prober. To upgrade your prober to include this facility, please contact Customer Services.

  - Press **F5 = More>** followed by **F4 = Clean** to clean the probes.

To exit the screen, press the function key labelled **Done**.

If an error occurs during Manual Wafer Testing, then the **Probing Error Pause** screen may be displayed, (see section 5.11).

5.8 Browse Wafer Screen

This screen is entered from the First Die Screen. It allows the operator to manually browse die on the wafer and provides user definable coordinates for measurement purposes.

On entering the chuck will be positioned at the approximate first die position with the chuck height at gross-lift. The screen will display two sets of coordinates labelled **Physical** and **User X, Y**. These will display the current chuck position and both sets of coordinates will display identical values. The Joystick may be used to move the chuck position in X and Y only. As the chuck is moved, the coordinates will be updated in real-time to reflect its current position.

At any point, when the chuck has been moved to a position of interest, the **F1= Clear User** function key may be pressed and the User X, Y coordinates will be set to 0. As the chuck is moved, the user coordinates will reflect the relative distance from this origin position.

Additionally at any point the **F2 = Set Index** may be pressed and the current values of the User X and Y coordinates will be loaded into the X and Y index values (see sections 6.2 and 6.3).

After browsing the wafer is complete, press the **F5 = Exit** function key which will move the chuck back to its previous first die position and return to the First Die Screen.

5.9 During Probing

If you wish to pause the probing sequence before it completes automatically, press the **Pause** function key. To resume, press the function key labelled **Paused**.

When paused:

The Chuck can be toggled between fine-lift and gross-lift with the left Joystick key; when at gross-lift, the Chuck can be moved with the Joystick.

- Press **F1 = Resume** to restart probing.
- Press **F2 = Man/Clean** (systems not equipped with the Probe Clean Facility software option) to move the chuck to the manual clean position, leaving the probes accessible for manual cleaning, see section 12.7.

- Press **F3 = Stop Ink** to abort failed die inking for the current wafer. Note: Inking cannot be re-enabled until testing is complete. When the current wafer is replaced or retested, inking is automatically re-enabled.
- Press **F5 = More** followed by **F1 = Manual** to enter the **Manual Wafer Testing** screen, see section 5.7.
- Press **F5 = More** followed by **F2 = Setup** to display the **Setup Menu**.
- Press **F5 = More** followed by **F3 = Probe Cd** to display the **Change Probe Card Screen**.
- Press **F5 = More** followed by **F4 = Probe Ht** to display the **Change Probe Height Screen**.

If **Paused** is selected, '**Update Probing Position?**' will be displayed with two options, **F1 = Yes** or **F2 = No**. Press **F1 = Yes** to update the probing position and continue probing from the current chuck position. Press **F2 = No** to abandon any joystick movements and return to probing from the last test position.

If you wish to stop and abandon the probing sequence before it completes automatically, press **F4 = Abort** – see Section 5.10.2 below.

If a recoverable error occurs during probing, then the **Probing Error Pause** screen, (see section 5.11), will be displayed.

- **NOTE** Some **Setup Menu** options cannot be changed whilst probing and will be greyed out.

5.10 After Probing

5.10.1 Successful Sequence

If the **Pause at End of Wafer** option has been set to **Yes**, then the system will first enter the **Pause on Error** screen, see section 5.11.

After a successful probing sequence:

- The chuck moves to the preset loading/unloading position.
- A message asks if you wish to re-test the same wafer.

You now have up to three options:

1. **To re-test the wafer**, press **F1 = Retest** and the probing sequence will repeat.
2. **Press F2 = Full Test if sampled testing has been performed (See Sample Step Size in X/Y Index Menu)** and you now want to test the whole wafer
3. **To unload the wafer and stop**, press **F5 = Done**.

If you pressed **F5 = Done**, then:

- The chuck rotates to the Theta = zero angle.
- If the ***Pegasus*** includes the load pins option, the pins vacuum is applied and the chuck vacuum is released. The chuck then drops, leaving the wafer standing on the pins.

- If the ***Pegasus*** does not include the load pins option, the chuck vacuum is released, leaving the wafer on the chuck.
- You will then be returned to the **Configuration** screen (Chapter 4). Unload the wafer that has just been tested.

5.10.2 Aborted Sequence

If the probing sequence has been stopped by pressing **F5**:

- The chuck rotates to the Theta = zero angle.
- The chuck moves to the preset loading/unloading position
- If the ***Pegasus*** includes the load pins option, the pins vacuum is applied and the chuck vacuum is released. The chuck then drops, leaving the wafer standing on the pins.
- If the ***Pegasus*** does not include the load pins option, the chuck vacuum is released, leaving the wafer on the chuck.
- A message asks you to unload the wafer.

When you have unloaded the wafer, press **F1** = **Done.**

You are returned to the **Configuration** screen (Chapter 4).

5.11 Probing Error Pause Screen

Prior to entering the Probing Error Pause screen from the **Wafer Testing** screen, the system will display the relevant error message in the status line, the user must then press **F1** = **continue**.

The system may also enter the Probing Error Pause screen, directly from the **Manual Wafer Testing** screen; although this is not recursive, (that is, if the system has entered Probing Error Pause screen, and the user then chooses to run the **Manual Wafer Testing** screen, a further error will not automatically run the Probing Error Pause screen again).

This screen is intended to allow the operator to correct errors and review wafer testing prior to resuming wafer testing or abandoning the probing sequence. To resume probing, press the function key labelled **Paused**.

When paused on an error:

The Chuck can be toggled between fine-lift and gross-lift with the left Joystick key; when at gross-lift, the Chuck can be moved with the Joystick.

- Press **F1** = **Ignore** to restart probing.
- Press **F5** = **More** followed by **F1** = **Manual** to enter the **Manual Wafer Testing** screen, see section 5.7.
- Press **F5** = **More** followed by **F2** = **Setup** to display the **Setup Menu**.
- Press **F5** = **More** followed by **F3** = **Probe Cd** to display the **Change Probe Card Screen**.

- Press **F5 = More** followed by **F4 = Probe Ht** to display the **Change Probe Height Screen**.

If **Ignore** is selected, '**Update Probing Position?**' will be displayed with two options, **F1 = Yes** or **F2 = No**. Press **F1 = Yes** to update the probing position and continue probing from the current chuck position. Press **F2 = No** to abandon any joystick movements and return to probing from the last test position.

If you wish to stop, abandon the probing sequence and return the Chuck to the unloading position, press **F4** = **Finish** – see Section 5.10.2 above.

6 SETUP MENU

The **Setup** menu is accessed by pressing **F4** = **Setup** from the **Configuration** screen (if you cannot see this option in the **Configuration** screen, press **F5** = **More** until it appears).

If the **Setup** menu has been protected by a Setup passcode (see Section 6.10.2), you must enter the passcode before you can use this menu. Key-in the passcode and press **F4** = **Accept**. (An incorrect entry will be refused, and you will be able to try again. Alternatively, press **F5** = **Cancel** (or the **ESC** key).

The **Setup** menu contains ten options as described below. To select an option, press the numbered key on the keypad (press **0** for option **10**). Alternatively you can move the selection highlight by pressing either **F1** = **Up** or **F2** = **Down**, and then choose it by pressing **F3** = **Select** or the **Enter** ↵ key.

Whenever you need to exit from this menu and return to the **Configuration** screen, press **F5** = **Exit** or the **ESC** key. If you have changed any setting, you will be prompted if you want to save your changes. If you do want to save your changes press **F1** = **Yes**, however, if you don't press **F2** = **No**.

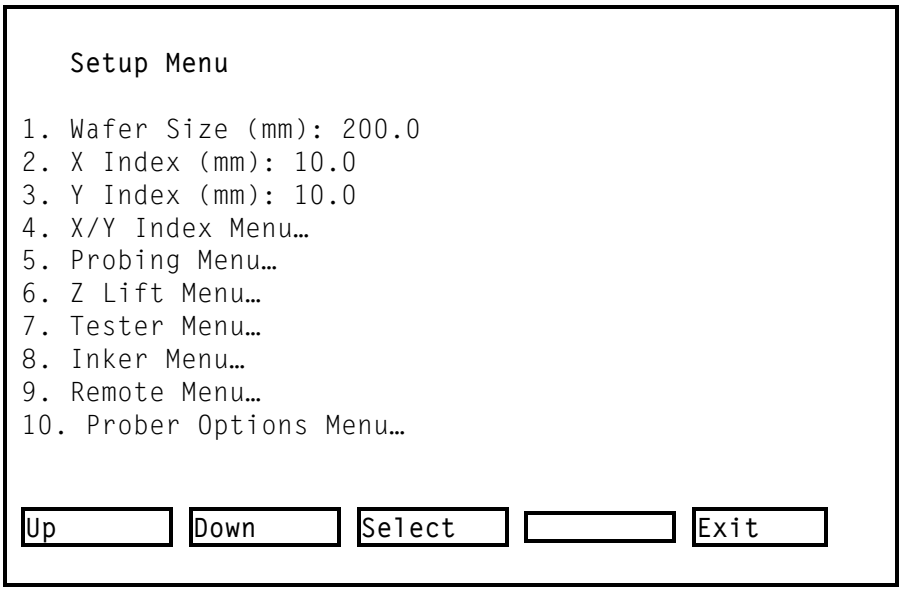


Fig 6.1: Setup Menu

Entering Values

Whenever you choose an option that requires a value to be entered, a help line appears, reminding you of the acceptable range for this entry and the available resolution.

The initial value is in millimetres (mm) – but see **More About Units** below. You can change any display between mm and micrometers (µm) by pressing **F3** = **Units**. Changing units will re-display the value you have already entered, but in the new units.

To make a large change from the displayed value, key in new numbers from the keypad. To make a small change, it may be more convenient to press either **F1** = [+] (increase in small steps equal to the **Resolution** value) or **F2** = [–] (decrease in small steps equal to the **Resolution** value).

When the displayed value is correct, press **F4** = **Accept** or the **Enter** [↵] key. This will save the new value and return you to the **Setup** menu.

If ever you wish to revert to the last saved value and discard changes you have just keyed in, press **F5** = **Cancel** or the [ESC] key. Note that **Cancel** or [ESC] will not retrieve a previous value if you have already overwritten it by pressing **F4** = **Accept**.

More about Units

The normal units for wafer probing are millimetres (**mm**) and micrometers (**µm**, or **um** on the screen display). All menu functions are described in these units.

To change to inch-based units from metric:

1. Start from the **Setup** menu.
2. Choose option **10** (**Prober Options** menu, press **0**).
3. On entering the **Prober Options** menu, the highlight is already on **Metric Units**. By default, this option will say **Yes**.
4. To change to inch-based units, access this option by pressing **F3** = **Select**.
5. Press **F1** = **Toggle**, and the setting will change to **No**. Press **F4** = **Accept**.
6. Press **F5** = **Back** to return to the **Setup** menu.
7. All linear units will now be either inches or mils (thousandths of an inch). The **Units** functions will change between these two inch-based units.

To change back from inch-based units to metric:

Repeat all the above instructions. This time, **F1 = Toggle** will change back.

6.1 Wafer Size

This option sets the wafer size. Note the help line that appears, reminding you of the acceptable range for this entry (1 µm to the maximum wafer size) and the available resolution (1 µm).

200 mm is a standard '8-inch' wafer. If required, set a new value using the instructions given in **Entering Values** above.

The wafer size parameter can be accessed remotely using the **RDI** and **WDI** commands.

6.2 X Index

The chuck is driven in the X and Y directions in a series of small steps. Index counts are what the screen display uses to indicate the current X and Y positions.

X Index is the step size for chuck travel in the X (left-right) direction. Note the help line that appears, reminding you of the acceptable range for this entry (1 µm to half the maximum wafer size) and the available resolution (100 nm).

The X Index parameter can be accessed remotely using the **RXI, RXJ, RXM, WXI, WXJ** and **WXM** commands.

6.3 Y Index

The chuck is driven in the X and Y directions in a series of small steps. Index counts are what the screen display uses to indicate the current X and Y positions.

Y Index is the step size for chuck travel in the Y (front-back) direction. Note the help line that appears, reminding you of the acceptable range for this entry (1 µm to half the maximum wafer size) and the available resolution (100 nm).

6.4 The Y Index parameter can be accessed remotely using the RYI, RYJ, RYM, WYI, WYJ and WYM commands.X/Y Index Menu

This sub-menu contains various parameters related to X-Y movement.

6.4.1 X Index

This repeats the **X Index** function in the parent **Setup** menu, for convenience. See Section 6.2 above.

6.4.2 Y Index

This repeats the **Y Index** function in the parent **Setup** menu, for convenience. See Section 6.3 above.

6.4.3 Sample Step Size

Sample step size is only configurable if the Wafer Centre wizard is enabled (See 0). A sample step size > 1 enables sampled testing on an unmapped wafer. Given a step size of n, after each test the chuck shall be moved to position the probe(s) under the next nth die position. The next nth die position is calculated according the chuck movement orientation as dictated by the value of First Die Position in

the X/Y Index Menu, and any associated wafer turnaround that would occur if the test were single stepping. Note: If the Wafer Centre wizard is disabled, testing assumes single die stepping irrespective of the value of Sample Step Size.

6.4.4 Maximum Missing Die

Detection of a missing die is normally used to indicate the end of a row, and to initiate automatic turn-around to the next row. The default value is 0, so any missing die will cause turn-round to the next row. If you know that there are missing dies *within* the array on the wafer (as distinct from the edges of the array) then increase this parameter to prevent premature movement to the next row.

This parameter can be accessed remotely using the **PIMD** command.

6.4.5 Off-site Steps

The end of a row is detected by the wafer edge sensor failing to open when the chuck is lifted for probing – see also **Exclusion**, Section 6.5.2; and **Edge Sensor Enabled**, Section 0.

To turn around and start probing the next row in the opposite X direction, the ***Pegasus*** does the following:

- Takes ***n*** 'off-site steps' each of one die, further outwards in the X direction.
- Steps up one row (Y direction).
- Searches for the next die, by taking up to ***m*** 'on-site steps' each of one die, back in the opposite X direction. Stops searching if the edge sensor operates before ***m*** steps have been reached.
- Re-starts probing.

Off-site Steps sets the value of ***n*** – see above – in units of a whole die. The default value is 2.

This parameter can be accessed remotely using the **RDW** and **WDW** commands.

6.4.6 On-site Search Steps

On-site Search Steps sets the value of ***m*** – see above – in units of a whole die. The default value is 8.

This parameter can be accessed remotely using the **REW** and **WEW** commands.

6.4.7 First Die Position

This setting controls which die on the wafer will be the first to be probed. **F1** = **Next** and **F2** = **Prev**ious will cycle through the options:

- **Top-Prompt** – just before each scan begins, you will be given the choice of starting at the right or left die on the top row (see end of Section 5.6)
- **Top-Right**
- **Top-Left**

- **Bottom-Prompt** – just before each scan begins, you will be given the choice of starting at the right or left die on the bottom row (see end of Section 5.6)
- **Bottom-Right**
- **Bottom-Left**

This parameter can be accessed remotely using the **RAD** and **WAD** commands.

6.4.8 Save First Die Position

If **Save First Die Position** is enabled, the Prober will remember the position of the first die probed on each wafer. The Prober will then move to this position after alignment of the next wafer; instead estimating a first die position from the wafer size and the **First Die Position** setting, (see Section5.6).

Press **F1=Toggle** to change between enabled and disabled.

Note: When first enabled or if the previously saved position is invalid due to a change in Exclusion Zone. The Prober will estimate the first die position.

6.4.9 Lamp Switching Mode

This setting determines what happens to the lamp power during wafer setup and during wafer testing. Use **F1** = **Next** or **F2** = **Prev**ious to cycle through the available options:

- **None** = no change from previous state
- **Off-only** = lamp power switched off before testing begins
- **On-only** = lamp power switched on when testing ends
- **On/off** = lamp power switched on for wafer setup and off during testing (default).

This parameter can be accessed remotely using the **RLA** and **WLA** commands.

6.4.10 Pause at End of Wafer

If this option is off (the default setting, option 1 = **Disabled**) then when wafer testing has completed, the Chuck will return to the unloading position.

If **Pause at End of Wafer** is on (option 1 – **Enabled**) then when testing has completed, the Chuck will remain at the last off site search position, and the **Probing Error Pause** screen will be displayed (see Section 5.11).

6.4.11 Keep Last Theta Alignment

If **Keep Last Theta Alignment** is enabled, the Prober will use the last Theta alignment position for the following wafers. When a wafer is loaded on the Chuck, the operator will be asked to press **F1=Continue**, instead of selecting an **Alignment Procedure**. The Prober will then move directly to the **First Die Position**.

Press **F1=Toggle** to change between enabled and disabled.

Note: The stored Alignment is volatile and lost if the power is cycled. Thus when first enabled, after switching the machine on, the Prober will run through an **Alignment Procedure** for the next wafer, to create the correct alignment position. In addition, if **Keep Last Theta Alignment** is enabled and the power is cycled, the Prober will run through an **Alignment Procedure** for the first wafer.

6.4.12 Zero Theta before Unload

If **Zero Theta before Unload** is enabled, the Prober will rotate the chuck back to the zero position when the chuck is moved to the load position.

Press **F1=Toggle** to change between enabled and disabled.

6.4.13 Edge Sensor Auto Recovery

If the edge sensor opens before the lower search window limit is reached, the Z axis becomes de-referenced. This option enables a number of auto re-referencing retries before displaying an error message.

6.4.14 Vacuum Hold Delay

Vacuum Hold Delay is required to allow the chuck vacuum to reach optimum grip before moving the chuck. This delay can take a value between 1/10 second and 10 seconds and is set in units of 1/10 second. The default value is 2/10 second.

6.4.15 Search Delay

When performing offsite step/onsite search or missing die detection no die testing is performed and without a delay chuck X/Y movement speeds up significantly, potentially shaking the edge sensors and leading to inaccurate edge detection. A Search Delay is required between individual X/Y steps performed during offsite/onsite search and missing die detection (see 6.4.4). This can take a value between 50ms and 200ms. The default value is 100ms

6.4.16 First Die Index

Specifies the x and y coordinates of the first die to index (defaults to 0, 0). This enables the index coordinates to be offset by an arbitrary position on the die.

6.4.17 Pause on First Die

When enabled it causes the prober to enter the pause screen after moving to the first die position and wait for user input before resuming probing (defaults to disabled).

6.4.18 Move XY Index on Z Clear

When enabled it starts the index move in X and Y when the chuck Z motor has moved to a clear position. This is when it has moved down to below its overtravel and search window position, but before it stops. This has the potential to speed up test time (defaults to disabled).

6.5 Probing Menu

This sub-menu controls the way in which the prober limits the probing area.

6.5.1 Chuck

On Dual-chuck probers, this setting switches the prober between the two chuck plates.

To change the **Chuck** setting, press **F3** = **Select**, **F1** = **Toggle** to make the change, and then **F4** = **Accept** (or for no change press **F5** = **Cancel**).

6.5.2 Exclusion

If **Exclusion** is Enabled (the default setting, option 1 = **Enabled**) then this menu defines the physical size of the wafer.

If **Exclusion** is off (option 1 = **Disabled**) then the edge of the wafer is being located by an edge sensor, or by probing blind until dies are found and prober results appear.

To change the **Exclusion** setting, press **F3** = **Select**, **F1** = **Toggle** to make the change, and then **F4** = **Accept** (or for no change press **F5** = **Cancel**).

Note: This parameter is permanently enabled on the Pegasus S200D, and cannot be disabled.

This parameter can be accessed remotely using the **PEXXY** command.

6.5.3 Substrate Shape (Circular / Rectangular)

If **Circular**, you can then change option **4** (**Diameter**).

If **Rectangular**, you can then change options **5** and **6** (**Width** and **Height**).

To change this setting, press **F3** = **Select**, **F1** = **Toggle** to make the change, and then **F4** = **Accept** (or for no change press **F5** = **Cancel**).

This parameter can be accessed remotely using the **PEXXY** command.

6.5.4 Diameter

Only available for change if **Substrate Shape** is set to **Circular** (see above).

This is the same setting as **Wafer Size** (Section 6.1). Note the help line that appears, reminding you of the acceptable range for this entry (1 µm to the maximum wafer size) and the available resolution (1 µm).

The ***Pegasus*** S200 8-inch model will accept any wafer diameter up to 200 mm (a standard '8-inch' wafer). The ***Pegasus*** S200 6-inch model will accept any wafer diameter up to 150 mm (a standard '6-inch' wafer).

If required, set a new value using the instructions given in **Entering Values** on page 36.

This parameter can be accessed remotely using the **PEXXY** command.

6.5.5 Width

Width (X direction) of rectangular substrate, only available for change if **Substrate Shape** is set to **Rectangular**.

The ***Pegasus*** S200 8-inch model will accept any wafer width up to 200 mm. The ***Pegasus*** S200 6-inch model will accept any wafer width up to 150 mm.

If required, set a new value using the instructions given in **Entering Values** on page 36.

This parameter can be accessed remotely using the **PEXXY** command.

6.5.6 Height

Height (Y direction) of rectangular substrate, only available for change if **Substrate Shape** is set to **Rectangular**.

The ***Pegasus*** S200 8-inch model will accept any wafer height up to 200 mm. The ***Pegasus*** S200 6-inch model will accept any wafer height up to 150 mm.

If required, set a new value using the instructions given in **Entering Values** on page 36.

This parameter can be accessed remotely using the **PEXXY** command.

6.5.7 Wafer Centre

This option enables or disables the Wafer Centre Wizard (see 5.3). The wafer centre wizard allows the user to define the exact wafer centre and probable area of the currently mounted wafer. Wafer Centre Wizard must be enabled if sampled die testing is required on unmapped wafers.

6.5.8 Exceptions Menu

1. Buzzer

There are five buzzer options (which are only applicable when a status indictor accessory with the optional buzzer is fitted):

- **Off** = the buzzer is not used (default)
- **Red only** = the buzzer automatically sounds when the red light is on. It is turned off when the red light is turned off.
- **Amber only** = the buzzer automatically sounds when the amber light is on. It is turned off when the amber light is turned off.
- **Red and Amber** = the buzzer automatically sounds when both the red and the amber lights are on. It is turned off when either the red or the amber light is turned off.
- **Red or Amber** = the buzzer automatically sounds when either the red or the amber light is on. It is turned off when both the red and the amber lights are turned off.

2. Consecutive Fail Limit

This sets the maximum number of allowed successive test failures. When this limit is exceeded, the **Consecutive Fail Action** is triggered (see below). To disable this feature, set this value to zero.

3. Consecutive Fail Action

This sets what action the ***Pegasus*** takes when the **Consecutive Fail Limit** is exceeded (see above):

- **Warn** = continues testing, but turns the amber light on and displays a warning message on the status line of the LCD.
- **Stop** = stops testing, turns the amber and red lights on, and displays error menu.

- **Note:** The Probe Clean facility is only available as a software option, and is not available on a standard prober. To upgrade your prober to include this facility, please contact Customer Services.

  - **Clean / Warn** = Cleans the probes and then retests the last die. If the die still fails, functions like the **Warn** action above.
  - **Clean / Stop** = Cleans the probes and then retests the last die. If the die still fails, functions like the **Stop** action above.

4. Ink Cartridge Life

This sets the ink cartridge empty level. When the inker has fired this number of ink dots, testing stops (the amber and red lights are turned on and the error menu is displayed). To disable this feature, set this value to zero.

5. Ink Cartridge Warning

This sets the ink cartridge low level. When the inker has fired this number of ink dots, testing continues (but the amber and red lights are turned on and a warning message is displayed on the status line of the LCD). To disable this feature, set this value to zero.

6. Ink Cartridge Ignore

When the ink cartridge reaches the low or empty levels (see above), the error can be temporarily disabled by pressing the ignore function key. This sets the number of ink dots are ignored before the error is re-enabled.

6.5.9 Probe Cleaner Menu

- **Note:** The Probe Clean facility is only available as a software option, and is not available on a standard prober. To upgrade your prober to include this facility, please contact Customer Services.

1. Material Type

There are currently three supported types of cleaning material:

- **Polymer Pad** = one or more polymer pads attached to the chuck plate. To clean the needles, they are inserted in the polymer one or more times.

When all locations on the polymer have been used, the pad must be replaced.

- **Ceramic Plate** = a ceramic plate attached to the chuck plate. To clean the needles, they are brought into contact with the plate one or more times. When all locations on the plate have been used, cleaning restarts at the first location.
- **Dual Ceramic/Polymer** = combination of the above**.**

2. Auto Clean Count

This value holds the number of tests between automatic probes cleaning. Setting this value to zero will disable automatic probe cleaning.

Note: This value will depend on the manufacturer and the type of cleaning material used. Please consult the cleaning material's documentation for more information.

3 Ceramic Plate Menu/ 4 Polymer Pad Menu

These sub-menus, select parameters used in the probe cleaning operations.

1. Gross Lift

Sets the **Gross Lift** value used when cleaning the probes – see Table 6.1 (page 45) for the Z lift definitions. This setting is automatically set by the Probe Cleaner Wizard, and so should not be normally set using this menu.

2. Fine Lift

Sets the **Fine Lift** value used when cleaning the probes – see Table 6.1 (page 45) for the Z lift definitions.

3. Search Window

Sets the **Search Window** value used when cleaning the probes – see Table 6.1 (page 45) for the Z lift definitions. This setting is disabled when the edge sensor is disabled.

4. Insertion/Overtravel

Sets the **Overtravel** value used when cleaning the probes – see Table 6.1 (page 45) for the Z lift definitions. For the Polymer Pad, this contains the insertion distance into the polymer.

Note: This value will depend on the manufacturer and the type of cleaning material used. Please consult the cleaning material's documentation for more information.

5. Cycles to Clean Probe

This value holds the total number of touchdowns or insertions required to clean the probes. The number of touchdowns/insertions at each site on the material is set by the Cycles per Location value (below). When the number of touchdowns/insertions at a site is reached, the prober moves to the next site on the material using the Location X Step and Location Y Step values (below).

Note: This value will depend on the manufacturer and the type of cleaning material used. Please consult the cleaning material's documentation for more information.

6. Cycles per Location

This value holds the total number of touchdowns or insertions allowed at each cleaning site.

Note: This value will depend on the manufacturer and the type of cleaning material used. Please consult the cleaning material's documentation for more information.

7. Location X Step

This setting holds the horizontal distance between cleaning sites.

Note: This value will depend on the manufacturer and the type of cleaning material used, but it's recommended that it should be at least twice the diameter of a probe needle. Please consult the cleaning material's documentation for more information.

8. Location Y Step

This setting holds the vertical distance between cleaning sites.

Note: This value will depend on the manufacturer and the type of cleaning material used, but it's recommended that it should be at least twice the diameter of a probe needle. Please consult the cleaning material's documentation for more information.

Probe cleaning may be invoked remotely using the **CPIM** command.

6.5.10 Select Wafer Map

This option displays a list of wafer map files which are currently stored on the prober. By scrolling down the list a new wafer map file may be selected.

6.6 Z Lift Menu

Table 6.1: Z Lift Definitions

- **Z movement** refers to the chuck **travel** in the up/down direction.
- **Gross Lift** is the height at which it is safe to move the chuck in the X-Y directions without causing damage (referenced to the normal 'zero' chuck height).
- **Fine Lift** is the extra Z travel, beyond **Gross Lift** height, to bring the probes into contact with the wafer.
- **Probing Height** is the sum of **Gross Lift** + **Fine Lift** (but not including **Overtravel**).

- **Search Window** is the further height range within which the prober will look for the wafer surface, if an edge sensor is being used and has not located the wafer surface within the programmed **Fine Lift** height. This **Search Window** value is additional to the Fine Lift height.
- **Overtravel** (or overdrive) is the extra Z travel, beyond the **Fine Lift** height, to bring needles into firm electrical contact for reliable probing.
- **Camera Height** on the ***Pegasus*** S200-PR model is the chuck lift required to bring the wafer into camera focus; this must be less than or equal to the **Gross Lift** height.
- **Z Range** is the maximum total value that the **Gross Lift**, **Fine Lift**, **Search Window**, and **Overtravel** can lift the chuck above the normal 'zero' chuck height. The **Z Range** is 11.5 mm.
- **Pins Drop** applies only to models with chuck pins installed. The chuck pins are fixed, and **Pins Drop** is the distance *below* the normal 'zero' chuck height that the chuck will sink when required, leaving the wafer supported on the protruding pins.

6.6.1 Gross Lift

Sets the **Gross Lift** value – see Table 6.1 above.

The default units are millimetres, but note that the subsequent (and finer) Z movements default to more convenient units of µm. (Individual units settings can be changed if desired, using the **F3** = **Units** option as described on page 36).

This parameter can be accessed remotely using the **RKG, RKGM, WKG** and **WKGM** commands.

6.6.2 Fine Lift

Sets the **Fine Lift** value – see Table 6.1 above.

Default units are µm.

This parameter can be accessed remotely using the **RKF, RKFM, WKF** and **WKFM** commands.

6.6.3 Search Window

Sets the **Search Window** value – see Table 6.1 above.

Default units are µm.

This parameter can be accessed remotely using the **RSW, RSWM, WSW** and **WSWM** commands.

6.6.4 Overtravel

Sets the **Overtravel** value – see Table 6.1 above.

Default units are µm.

This parameter can be accessed remotely using the **RZI, RZIM, WZI** and **WZIM** commands.

6.6.5 Camera Lift

This option is only available on the ***Pegasus with PR*** (Automatic Pattern Recognition).

With PR, **Camera Lift** is the Z movement of the chuck that is required to bring the wafer into focus for the camera. **Camera Lift** is referenced from the same zero Z as **Gross Lift**, and must be less than the **Gross Lift** value.

Default units are µm.

This parameter can be accessed remotely using the **PZCL** command.

6.6.6 Pins Drop

This option is only available if the Pegasus has been factory-fitted with load pins.

If **Pins Drop** is enabled, then when the chuck has travelled to its loading position it will drop below its normal Z reference height, which leaves the pins standing above the chuck.

This parameter can be accessed remotely using the **PZDP** command.

6.6.7 Chuck Lift

The default setting is **Enabled**. Change to **Disabled** only when you need to disable all Z movement for testing.

This parameter can be accessed remotely using the **CO0, CO1** and **STP** commands.

6.6.8 Edge Sensor

An edge sensor is a switch that opens when it makes mechanical contact with the surface of the wafer. The default setting is **Enabled** to enable edge sensors. Change to **Disabled** if an edge sensor is not in use.

This parameter can be accessed remotely using the **ES0, ES1, ESO** and **STP** commands.

6.6.9 Contact Enhancement

This menu item can be used to enhance probe marks by controlling the effect of probe contact on the device. The value can be trimmed from '1', which will provide optimum probe marks, to 250, which will provide optimum step speeds.

This parameter can be accessed remotely using the **PCE** command.

6.6.10 Damping Enhancement

This menu item can be used to enhance probe marks by controlling the effect of probe vibration. The value can be trimmed from '1', which will provide optimum probe marks, to 250, which will provide optimum step speeds.

This parameter can be accessed remotely using the **PDE** command.

6.6.11 Delay Before Fine Up

If there are vibrations during X-Y movement, this facility can insert a delay of a few milliseconds to allow the chuck and/or probe needles to settle before performing a **Fine Lift** (default: zero for no delay).

This parameter can be accessed remotely using the **PZCD, RCD and WCD** commands.

6.6.12 Delay After Fine Up

If there are vibrations during fine lift, this facility can insert a delay of a few milliseconds before allowing the Controller to send the 'ready' signal to the tester (default: zero for no delay).

This parameter can be accessed remotely using the **PZCD, RCAD and WCAD** commands.

6.6.13 Lift Upper Limit

This menu item sets the upper limit of Z movement. This is used to limit Z movement so that the prober cannot damage probes on systems fitted with a fixed chuck (where edge sensors are not being used). *Note that attempting to set this value to less than the current probing or probe cleaning height will result in a valid out of range error.*

6.6.14 Z2 and Z3 Lift Menus

These menus allow the operator to set various Z movement parameters for the Flying Arms (if fitted). Z2 refers to the front Flying Arms and Z3 to the side flying arm.

The menus available are:

1. Gross Lift

Sets the **Gross Lift** value – see Table 6.1 above.

The default units are millimetres, but note that the subsequent (and finer) Z movements default to more convenient units of µm. (Individual units settings can be changed if desired, using the **F3** = **Units** option as described on page 36).

This parameter can be accessed remotely using the **RKGM Zn,** and **WKGM Zn** commands where n should be 2 for the front arm and 3 for the side arm.

2. Fine Lift

Sets the **Fine Lift** value – see Table 6.1 above.

Default units are µm.

This parameter can be accessed remotely using the **RKFM Zn** and **WKFM Zn** commands where n should be 2 for the front arm and 3 for the side arm.

3. Search Window

Sets the **Search Window** value – see Table 6.1 above.

Default units are µm.

This parameter can be accessed remotely using the **RSWM Zn** and **WSWM Zn** commands where n should be 2 for the front arm and 3 for the side arm.

4. Overtravel

Sets the **Overtravel** value – see Table 6.1 above.

Default units are µm.

This parameter can be accessed remotely using the **RZIM Zn** and **WZIM Zn** commands where n should be 2 for the front arm and 3 for the side arm.

5. Edge Sensor

An edge sensor is a switch that opens when it makes mechanical contact with the surface of the wafer. The default setting is **Enabled** to enable edge sensors. Change to **Disabled** if an edge sensor is not in use.

This parameter can be accessed remotely using the **ES0, ES1, ESO** and **STP** commands.

6.7 Tester Menu

6.7.1 Tester

This enables or disables any connected testers, for diagnostic purposes.

This parameter can be accessed remotely using the **TO0, TO1** and **STP** commands.

6.7.2 Tester Interface

There are a number of Tester Interface options, (see Chapter 20):

- **TTL –** Generic TTL interface.
- **Dual TTL** – Dual generic TTL interface, (available on Mk3 Controllers); enables two TTL Testers to be connected to the ***Pegasus,*** for dual die testing.

- **TTL & RS232 –** Generic TTL interface, but the X, Y stage position (in microns) is sent out the Serial 2 RS232 port before the signal is sent to the tester to start testing.
- **TTL Indexed RS232 –** Generic TTL interface, but the X, Y die index position is sent out the Serial 2 RS232 port before the signal is sent to the tester to start testing.
- **AWP-TTL –** AWP Compatible TTL Interface.
- **AWP-TTL & RS232** AWP Compatible TTL Interface, but with the X, Y stage position (in microns) is sent out the Serial 2 RS232 port before the signal is sent to the tester to start testing.
- There are also options for different proprietary Testers.

Once an interface has been selected, press **F1** = **Yes** to load that Testers default TTL settings, or **F2** = **No** to keep the current settings.

This parameter can be accessed remotely using the **PTST** command.

6.7.3 Tester Timeout

This sets how long the ***Pegasus*** will wait for a response from the tester before declaring a timeout error and stopping the probing sequence. The waiting time is counted from the end of any **Delay After Fine Up** (Section 6.6.12).

This parameter can be accessed remotely using the **PTTO** command.

6.7.4 Test Array

Determines the test pattern for a Wei Min multi die tester.

This parameter can be accessed remotely using the **PTST** command.

6.7.5 Local Reference Die

This enables the use of a reference die to identify the (0, 0) die position in a test run independent to the First Die position. The reference die position is set between wafer alignment and setting of the First Die.

6.7.6 Tester I/O Menu

This menu sets various options for a tester that has a TTL connection to the Pegasus (see Chapter 20).

1. Pass Active

These are the signals from the tester to indicate whether devices have passed the test – or conversely to indicate failed devices that the prober will need to ink. If the tester returns an active high-signal to indicate 'pass', leave this option at its default setting of **High**. To reverse this setting, press **F3** = **Select**, then **F1** = **Toggle** so that the setting reads **Low**, and finally press **F4** = **Accept**.

This parameter can be accessed remotely using the **PTTL** command.

2. Finish Test Active

'Finish test' is the signal from the tester to indicate that the test has finished. If the tester returns an active-high signal to indicate this, leave this option at its default setting of **High**. To reverse this setting, press **F3** = **Select**, then **F1** = **Toggle** so that the setting reads **Low**, and finally press **F4** = **Accept**.

This parameter can be accessed remotely using the **PTTL** command.

3. Start Test Active

'Start test' is the signal that the Prober sends to the tester, to indicate the device is ready for testing. If the tester requires an active-high signal, leave this option at its default setting of **High**. To reverse this setting, press **F3** = **Select**, then **F1** = **Toggle** so that the setting reads **Low**, and finally press **F4** = **Accept**.

This parameter can be accessed remotely using the **PTTL** command.

4. End of Wafer Active

This is the signal that the Prober sends to the tester, to indicate that all devices on this wafer have been tested. If the tester requires an active-high signal, leave this option at its default setting of **High**. To reverse this setting, press **F3** = **Select**, then **F1** = **Toggle** so that the setting reads **Low**, and finally press **F4** = **Accept**.

This parameter can be accessed remotely using the **PTTL** command.

5. Test Bin Lines

This option only affects operation of the Standard TTL interface. It sets the number of input lines to be read to determine the bin number of the tested die.

This parameter can be accessed remotely using the **PTST** command.

6. Second Inker Active

The 'second inker' line is only available to AWP-TTL interfaces. It provides additional bin information; for example, to fire the Second Inker. If the tester returns an active-high signal on this line, leave this option at its default setting of **High**. To reverse this setting, press **F3** = **Select**, then **F1** = **Toggle** so that the setting reads **Low**, and finally press **F4** = **Accept**.

7. Further options

Further I/O configuration can be made to control the operation of proprietary tester interfaces.

6.7.7 Tester RS232 Menu

This menu sets various options for a tester that has a RS232 connection to the Pegasus (see Chapter 21)

1. End of line

This parameter sets the end of line character or character(s).

6.7.8 GPIB Menu

This menu sets various options for a tester that has a GPIB (IEEE 488.2) connection to the Pegasus (see Chapter 21).

1. Device

This parameter sets the GPIB device number.

2. End of line

This parameter sets the end of line character or character(s).

3. Start of wafer delay

This parameter sets delay between the start of wafer and test first die events. This parameter is only required by some testers, and should normally be left at the default value of zero.

6.8 Inking Menu

6.8.1 Inker Type

There are currently four supported types of inker:

- **Standard** = this is a static inker
- **Sledge Lowered** = this inker sits in a raised position and is lowered pneumatically to ink a die.
- **Solenoid Lowered** = this inker sits in a raised position and is lowered electrically to ink a die.
- **Solenoid Raised** = this inker sits in a lowered position and is raised electrically when the chuck is moved.

This parameter can be accessed remotely using the **PINK** command.

6.8.2 Ink Failed Die

This enables or disables using the inker to ink failed die. The following options control the mechanism that die can be inked:

- **During Testing (No Offset)** = The die being tested is inked
- **During Testing (X Offset)** = The inker is physically offset from the probes, by a whole number of die so that the testing of one die coincides with the inking of a previous die. The offset parameters are controlled by the Probes to Inker Offset X Menu described below.
- **During Testing (Y Offset)** = The inker is physically offset from the probes, by a whole number of die so that the testing of one die coincides with the inking of a previous die. The offset parameters are controlled by the Probes to Inker Offset Y Menu described below.
- **After Testing** = A second pass of the die is made following testing to ink failed die.

6.8.3 Auto Ink Die Count

This parameter sets the number of die to be automatically inked without testing at the start of the wafer. If this parameter is set to zero (the default value), automatic inking is disabled.

- **NOTE** This parameter should only be used to force inking of the first few die on a wafer in preparation for alignment by further processes. Unless your processes require this, this parameter must be set to zero.

6.8.4 Inker Pulse Width

This sets the length of the electrical pulse applied to eject the ink. The default value of 15 ms is correct for the inkers supplied as standard with the ***Pegasus*** prober.

This parameter can be accessed remotely using the **RIP** and **WIP** commands.

6.8.5 Probes to Inker Offset X Menu

This menu sets the offset for each pair of inkers available on the prober.

Sometimes an inker is physically offset from the probes by a whole number of dies, so that the prober must 'remember' the results for a faulty die until it moves below the associated inker and can then be marked.

If offset inking is not selected, (i.e. whenever **all** of the offsets are set to zero), one inker is required for each set of test probes.

In this case, Inker 1 is associated with Pass/Fail input 1, Inker 2 with Pass/Fail input 2, Inker 3 with Pass/Fail input 3, and so on.

When offset inking is selected, (i.e. whenever **any** of the offsets are set to a non-zero value), two inkers are required, rather than one, for each set of test probes.

In this case, the inkers are paired for each TTL Pass/Fail input line. Inkers 1 and 2 are associated with Pass/Fail input 1, Inkers 3 and 4 with Pass/Fail input 2, Inkers 5 and 6 with Pass/Fail input 3, and so on.

- This parameter can be accessed remotely using the **RID** and **WID** commands.**NOTE** With offset inking, (as defined above), two inkers are used for every set of test probes, even if one or more of the offsets is set to zero.

6.8.6 Probes to Inker Offset Y Menu

Corresponding offsets to the above menu for Y offset inkers.

6.8.7 Inker Count Menu

This menu shows the ink fired count for each inker available on the prober.

6.8.8 Exceptions Menu

This repeats the **Exceptions** menu in the **Probing** menu, for convenience. See section 6.5.8 above.

6.9 Remote Menu

If one or more remote interfaces have been purchased, the following options will appear.

6.9.1 Remote Interface

This option selects which remote interface is available, if more than one remote interface has been purchased. Press **F3** = **Select**, followed by either **F1** = **Next** or **F2** = **Prev** to cycle through the options: **RS232** and **GPIB**. Press **F4** = **Accept** to confirm your choice.

6.9.2 INF 050/051 Messages

This option determines whether the ***Pegasus*** will use the positioning information from edge sensors to send INF 050/051 codes to the host (Section 0).

To change the INF 050/051 Messages setting, press **F3** = **Select**, **F1** = **Toggle** to make the change, and then **F4** = **Accept** (or for no change press **F5** = **Cancel**).

6.9.3 RS232 Menu

This sub-menu will only be available if the **Remote Interfac**e selection (option **1** above) is **RS232**. See Chapter 23 for further details.

- **NOTE** If the prober is be controlled by LabMaster (UK), all these menu items must be set to their default values.

1. Parameters

This function selects one of four predefined groups of RS232 parameters. The options available are:

Parameter group	9600,8,N	38400,7,E (default)	115200,7,E	19200,7,E
Baud Rate	9600	38400	115200	19200
Character bits	8 bits	7 bits	7 bits	7 bits
Start bits	1 bit	1 bit	1 bit	1 bit
Stop bits	2 bits	2 bits	2 bits	2 bits
Parity	None	Even	Even	Even

2. INF Mode

INF mode is the normal setting. It is strongly recommend that this setting is used unless backwards compatibility with older systems is required. **SRQ** mode is the alternative for backward compatibility (refer to older AWP prober manuals).

3. EOT Character

This is the text terminating character, normally ASCII 10 = LF. It is strongly recommended that this setting is used, unless backwards compatibility with older systems is specifically required. You can if necessary enter any ASCII character code from 1 to 255 (decimal format).

6.9.4 GPIB Menu

This sub-menu will only be available if the **Remote Interface** selection (option **1** above) is **GPIB**. See Chapter 24 for further details.

- **NOTE** If the prober is be controlled by LabMaster (UK), all these menu items must be set to their default values.

1. Device

This is the GPIB device number of the ***Pegasus*** prober, which can range from 1 (DEV1) to 32 (DEV32).

2. INF Mode

INF mode is the normal setting. It is strongly recommend that this setting is used unless backwards compatibility with older systems is required. **SRQ** mode is the alternative for backward compatibility (refer to older AWP prober manuals).

3. EOT Character

This is the text terminating character, normally ASCII 10 = LF. It is strongly recommend that this setting be used unless backwards compatibility with older systems is required. You can if necessary enter any ASCII character code from 1 to 255 (decimal format).

4. Bus Clear Check

Prior to writing any reply from a remote GPIB command, if this is enabled, the software waits for any prior SRQs that have been sent to be cleared, and for any prior data that has been written, to be read.

6.10 Prober Options Menu

For access to this sub-menu, press **0** from the main **Setup** menu.

6.10.1 Units

The default units for the ***Pegasus*** prober are millimetres and micrometres (**µm**, or **um** on-screen). To change the default units to inches and mils (thousandths of an inch), press **1** in the **Prober Options** menu, press **F3** = **Select**, and then press **F1** = **Toggle**. The setting changes from **Metric** to **Imperial**; press **F4** = **Accept**.

See **More About Units** on page 36 for further details.

All dimensions are calculated internally in much smaller units (nanometres) so there are no significant errors in changing repeatedly between the two systems of units. However, the 1.250µm physical resolution limit still applies, even when operating in inches and mils.

6.10.2 Setup Password

Access to the **Setup** menu can be protected by a Setup password. When a Setup password has been set, using this menu option, it will be required in future for access to any part of the **Setup** menu (see start of Chapter 5.11), and to certain device file and program mode features.

To set up a password, press **2** in the **Prober Options** menu. Then key-in a code of up to 10 characters using the keypad (the decimal point . character is also acceptable, and can be used more than once).

If you wish to stop using a Setup password, press the Backspace ← key until the password has been cleared, and then press **F4** = **Accept**.

CAUTION If you are using password protection and then you lose or forget the Setup password, you will not be able to change the ***Pegasus*** set-up. Please contact the Service Department of Wentworth Laboratories or their agent.

6.10.3 Display Menu

This sub-menu controls features of the LCD display. To select this sub-menu, press **3** in the **Prober Options** menu.

1. Backlight Time

The backlighting for the LCD can be programmed to switch off after a period of non-use. To change this time from its default of 60 minutes, first press **F3** = **Select**. You may now enter a new time from the keypad (**0** = never switch off) or by using **F1** = + (more) or **F2** = – (less), followed by **F4** = **Accept**.

2. Contrast

To change the contrast of the LCD display, first press **F3** = **Select**. You may now change the contrast using **F1** = **Up** or **F2** = **Down**, and the screen will change as you press these keys. When the contrast is correct, press **F4** = **Accept**.

6.10.4 Joystick Menu

This sub-menu controls features of the joystick. To select this sub-menu, press **4** in the **Prober Options** menu.

1. Index Initial Delay

This parameter sets the delay in milliseconds between the first and second indexes when the joystick is in **XY Index** mode.

2. Index Repeat Delay

This parameter sets the delay in milliseconds between the second and subsequent indexes when the joystick is in **XY Index** mode.

3. Default Z Speed

This parameter sets the default Z speed to be either Medium or Slow in the screens where the joystick is used to control Z motion.

4. Hysteresis

This parameter sets the percentage of physical movement that must be made on the joystick, before this is registered as a potential speed change of the controlled axis.

5. Joystick mode

This selects between either 3 speed or percentage joystick mode.

6.10.5 Peripherals Menu

This sub-menu controls features of the LCD display. To select this sub-menu, press **5** in the **Prober Options** menu.

Custom peripherals have their own controls accessible from this menu. The following items describe the common peripherals found in ***Pegasus*** systems.

1. Microscope Lamp

This parameter tells the prober what type of Microscope Lamp is installed. It must be set to **Fluorescent** if a fluorescent or mains powered illuminator is fitted and to **LED** if a stage powered LED illuminator is fitted. To change this parameter, first press **F3** = **Select**, then press **F1** = **Toggle**, followed by **F4** = **Accept**.

2. Edge Sensor Debounce Time

This parameter sets the maximum time, the Prober will allow, for the Edge Sensor to settle or "debounce" after a fine down movement, before generating an error.

The value can be set between 10ms and 10,000ms (10 seconds); in increments of 10ms.

3. DSP Clamp/Wafer Overlap (APS80DSP only)

This parameter sets the distance past the reference position that the lower clamp should travel to provide adequate clamping of the wafer.

Note. This will be set during build and commissioning of the prober and should not be adjusted without consultation with Wentworth Laboratories as the chuck can be damaged if the incorrect value of parameter is entered.

4. Reader Menu

This menu allows the prober to be configured to communicate with a data reader (BCR,OCR for example).

1. **Parameters**

   This function selects one of four predefined groups of RS232 parameters. The options available are:

Parameter group	9600,8,N	38400,7,E (default)	115200,7,E	19200,7,E
Baud Rate	9600	38400	115200	19200
Character bits	8 bits	7 bits	7 bits	7 bits
Start bits	1 bit	1 bit	1 bit	1 bit
Stop bits	2 bits	2 bits	2 bits	2 bits
Parity	None	Even	Even	Even

2. **End of Line**

   This is the text terminating character. This should be set to the value recommended in the manual of the device that is being connected

3. **Command**

   If the reader requires a specific command to instruct it to read it should be entered here. This should normally be left blank

4. **Timeout (seconds)**

   This parameter should be set to avalue greater than it would normally take the reader to respond to a read command.

5. **Prefix**

   Enter any characters that may prefix the bardcode. These characters will be stripped from the barcode.

6. **Postfix**

   Enter any characters that may suffix the bardcode. These characters will be stripped from the barcode.

5. Front Arm Menu and Right Arm Menu

1. Gross Lift

Sets the **Gross Lift** value – see Table 6.1 above.

The default units are millimetres, but note that the subsequent (and finer) Z movements default to more convenient units of µm. (Individual units settings can be changed if desired, using the **F3** = **Units** option as described on page 36).

This parameter can be accessed remotely using the **RKGM Zn,** and **WKGM Zn** commands where n should be 2 for the front arm and 3 for the side arm.

2. Fine Lift

Sets the **Fine Lift** value – see Table 6.1 above.

Default units are µm.

This parameter can be accessed remotely using the **RKFM Zn** and **WKFM Zn** commands where n should be 2 for the front arm and 3 for the side arm.

3. Edge Sensor

An edge sensor is a switch that opens when it makes mechanical contact with the surface of the wafer. The default setting is **Enabled** to enable edge sensors. Change to **Disabled** if an edge sensor is not in use.

This parameter can be accessed remotely using the **ES0, ES1, ESO** and **STP** commands.

4. Overlap

This is the distance that will form an exclusion zone between the front and right arms in order to prevent collision

6.10.6 Network Menu

The Network Menu is only available on Mk3 or later hardware variants, which were originally supplied with version 3.5 or later software.

Note: Simply upgrading a previous, Mk3 to the latest version of software, will **not** enable the **Network Menu** options.

This sub-menu is used to set the Prober network settings to match your network requirements. To select this sub-menu, press **6** in the **Prober Options** menu.

When network parameters have been altered and the **Network Menu** exited; the Prober will re-configure the Network set-up and **Building network database and files, please wait…** will be displayed.

Once the Network is re-configured, the system will need to reboot for the changes to take effect; the prober will display: **System must reboot, for settings to take effect. Reboot Now?**; press **F1 = Yes** to reboot immediately or **F2 = No** to continue working, (the changes will then take effect next time the prober is turned on).

CAUTION Incorrect network settings can affect other devices on the network. Seek advice from your Network Administrator before connecting the Pegasus to your Network.

1. Host Name

This parameter sets the Prober network host name. Use **F1**, **F2** and **F3** to change this parameter, followed by **F4** = **Accept**.

2. Domain

Use this parameter to enter your network domain name. Use **F1**, **F2** and **F3** to change this parameter, followed by **F4** = **Accept**.

3. DHCP Client

Where available, the DHCP Client can be enabled to automatically obtain network settings from a DHCP Server. To change this parameter, first press **F3** = **Select**, then press **F1** = **Toggle**, followed by **F4** = **Accept**.

4. Internet Protocol Menu

This sub-menu allows the Prober Internet Protocol, (IP), settings to be viewed and altered.

To change any of the IP Menu settings, move to the entry, press **F3** = **Select**, key in the new IP entry, followed by **F4** = **Accept**.

If the Prober is being used in a point-to-point configuration without DNS; use the Backspace ← key to delete both the Primary and Secondary DNS settings, (once accepted, both will then display 0.0.0.0), and disable DNS resolution.

Note: If the DHCP Client is enabled, then all the IP sub-menu items will be greyed out.

6.10.7 Remote Chip Prober Menu

This option is only available on Mk3 or later hardware variants, where the **Remote Chip Probing** option has been purchased.

This sub-menu is used to set-up Remote Chip Probing on the Prober. To select this sub-menu, press **7** in the **Prober Options** menu.

1. Remote Chip Probing

Enables or disables Remote Chip Probing. When Enabled, pressing the **F1** = **Run** function key, will enable the user to transfer and probe the Frame / Wafers map file from the Scanning system, (see chapter 16).

- **NOTE** If Remote Chip Probing is enabled on a Scanning system, it will automatically disable during the Scanning process.

2. Scanner Hostname

Use this parameter to enter the Scanner's hostname or IP. Use the numeric keypad, **F1**, **F2** and **F3** to change this parameter, followed by **F4** = **Accept**.

Note: The Scanner PC hostname, **not** the IP address, must be used on networks with DHCP; otherwise, the Pegasus to Scanner connection will be lost when the Scanner's DHCP lease expires.

3. Port Number

Use this parameter to enter the IP Port number used by the PegNet Server on the Scanner PC.

By default the PegNet protocol uses IP port number 5555, on networks where another TCP/IP Listening Server uses this port number, the Port number will need to be changed, both on the Scanner PC and on all the attached probers.

Use the numeric keypad to enter the new port number, followed by **F4** = **Accept**.

7 CHANGE PROBE CARD SCREEN

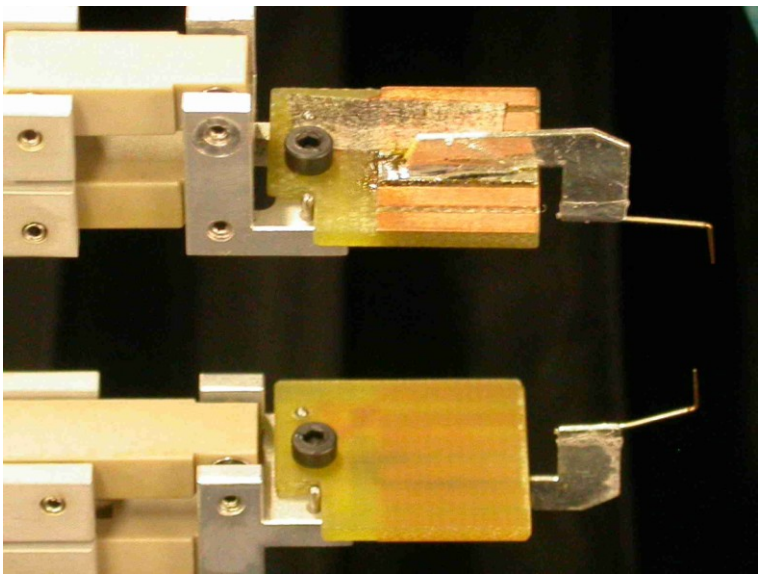
This screen allows you to change and align the probe card.

First you change the probe card. Next you load a test wafer and align it as if you were going to start probing, exactly as described in Chapter 5. Then you can align the probe card so that the needles are over the lands on the die nearest the centre of the wafer. Finally you set the probe height for this new probe card, and optionally begin probing.

7.1 Starting

1. Starting in the **Configuration** screen (Chapter 4), press **F2** = **Device** followed by **F4=Probe Cd** (if you cannot see this option in the **Configuration** screen, press **F5** = **More** until it appears).
   - The chuck moves to the safe position for changing the probe card (back right) and pauses in the **Change Probe Card** menu.
2. Change the probe card: loosen the four locking screws, remove the old probe card, insert the new probe card and re-tighten the locking screws.

   For an S200D remove the screw holding the top or bottom probe card to the calliper. When replace the probe card ensure that the location dowel is in the probe card hole and the datum edge is located against the alignment dowel.



3. If at this point you wish to divert into the **Setup** menu, press **F2** = **Set-up** and see Chapter 5.11 for further details.

CAUTION Check that there is sufficient clearance for the Chuck to pass under the probe card before proceeding.

4. To continue setting up the probe card, press **F1** = **Continue**, the Chuck will now move to the Load position.

5. Select the required Alignment process as described in Chapter 5, the Chuck will move to the probing centre and you will be asked to move the Chuck up to the focus height using the joystick. Having both the wafer and needles in focus will assist wafer alignment.

CAUTION Check that there is sufficient clearance for the Chuck to move around under the needles without damage, before proceeding.

6. Once adjusted, press **F1 = Accept** or the right-hand green joystick button, to set the focus height and continue. For safety, the focus height must be at least 1mm up from the Chucks start position; otherwise the Prober will display an error and the user will need to readjust the Chuck and Platform positions.
7. Wafer alignment now proceeds as described in Chapter 5. Please follow those instructions.

7.2 Setting the Calliper Position – S200D

Before setting the probe height on an S200D it is important that the callipers are positioned central to the wafer. In the first instance this is done visually.

Load a half wafer into the wafer carrier and move to the probing position. (This can be achieved through the Diagnose screen (Section 15).

Move X and Y such that the needles are not directly above or below the wafer. Set the axis to be moved by the joystick to Z, then close the callipers together until the needles cross over. Slowly move X and Y until the half wafer is close to the needles and visually check where the wafer is relative to the cross over point of the needles. Adjust the height of the platform using the micrometer screw at the rear of the platform.

Final adjustment can be done by observing the size of the upper and lower probe marks, then adjusting the platform height accordingly.

7.3 Set Probing Height

The final step is to adjust the **Probing Height** for this new probe card – see Section 6.6 for a definition. This is done by driving the chuck up to the current **Probing Height** and then adjusting the **Gross Lift** component using the joystick; the **Fine Lift** value already set will remain the same.

- Initially the chuck lifts only as far as the previous **Gross Lift** height, so that the needles are safely clear of the dies.

Joystick

When using the joystick, pressing the **Speed** button will slow the movement down in a series of steps, from **3** (fastest) down to **1**. This gives you very fine movement control.

During this function, right-hand green button by the joystick will interchange between Y movement and Z movement when the joystick is moved forward or back.

The left-hand green joystick button copies **F1** = **Accept** to move on to the next step.

See Section 3.3 for more details of joystick control.

1. Initially the joystick mode is Z movement, and the speed is minimum (**2**). Push the joystick away from you (raise chuck) until you see the probe pins contact the wafer.

- **NOTE** If the probe card uses edge sensors, the screen shows their status (up to 4) so that you can use the edge sensors to set the **Probing Height**.

2. If you need to re-adjust the X position, first press the right-hand green joystick button to switch the joystick into Z control mode, and lower the chuck to a safe height. Then press the right-hand green joystick button to regain X-Y control.

   When you have finished with this X-Y adjustment, press the right-hand joystick button again to switch back to Z control mode.

CAUTION Do not use the joystick in X-Y control mode without manually lowering the chuck. (While the joystick is in Z control mode, X movement is automatically disabled.)

CAUTION Remember that the aim is to set the height where *first* contact is made by the needles. When probing, the ***Pegasus*** will automatically add the programmed amount of **Overtravel** (see Section 0) to achieve reliable contact.

3. When you have accurately set the **Probing Height**, press **F1** = **Accept** or the right-hand green joystick button. Now you can either:
   - Press **F1** = **Unload** to unload this wafer and return to the **Configuration** screen (Chapter 4); or
   - Press **F2** = **Run** to prepare to probe the present wafer. See Section 5.6 onwards for further instructions.

7.4 Platform Control Screen

This screen allows you to move the motorised platform.

WARNING The movement of the platform can trap fingers and cause injury.

CAUTION The upward movement of the platform can cause the platform (or accessories on the platform) to collide with and damage the microscope. You must set the platform upper limit to ensure that such a collision cannot happen.

CAUTION The downward movement of the platform can cause the platform (or accessories on the platform) to collide with and damage the chuck. You must set the platform lower limit to ensure that such a collision cannot happen.

The following options are available:

1. If the platform has not been referenced since the machine has been powered on, it must be referenced before it can be moved. If the platform has not been referenced, only the **F1 = Init** softkey will be displayed. Pressing **F1 = Init** will reference the platform.
2. To move the platform to its upper limit, press **F1** = **Go Upper**.
3. To move the platform to its lower limit, press **F2** = **Go Lower**.
4. To move the platform to any position, move the joystick up to raise the platform or down to lower the platform. The platform will automatically stop moving when it reaches either its upper or the lower limit. If a limit has been disabled, the platform will automatically stop moving when it reaches the physical end of movement.
5. The platform's upper and lower limits can be modified by using the following options:
   - To move the platform to any position, use the joystick as above.
   - To allow movement above the upper limit, press **F3** = **Upper Off** to disable the upper limit. The upper limit can be re-enabled by pressing **F3 = Upper On**. Note: If the platform is physically above the upper limit when it is re-enabled, the platform is automatically moved back down to the limit.
   - To allow movement below the lower limit, press **F4** = **Lower Off** to disable the lower limit. The lower limit can be re-enabled by pressing **F4 = Lower On**. Note: If the platform is physically below the lower limit when it is re-enabled, the platform is automatically moved back up to the limit.
   - To set the upper limit to the current platform position, press **F5, F1** = **Set Upper**. Note: If the upper limit is disabled when the limit set, it is automatically re-enabled.
   - To set the lower limit to the current platform position, press **F5, F2** = **Set Lower**. Note: If the lower limit is disabled when the limit set, it is automatically re-enabled.
   - When you have finished modifying the limits, press **F5 = Back**.
6. When you have finished with Platform Control Screen, press **F3 = Done**.

8 DEVICE OPTIONS SCREEN

- **Note:** This facility is only available as a software option, and is not available on a standard prober. To upgrade your prober to include this facility, please contact Customer Services.

8.1 Using Device Files

Device files allow the wafer set-up to be saved to a file and reloaded when required. This facility is intended to be used when multiple wafer types are tested on the same prober.

Device files are stored in flash memory on the prober. The number of these files is only limited by the available flash memory.

The Device Options Screen is displayed by pressing the **F2 = Device** key from the Configuration Screen (see section □ for details).

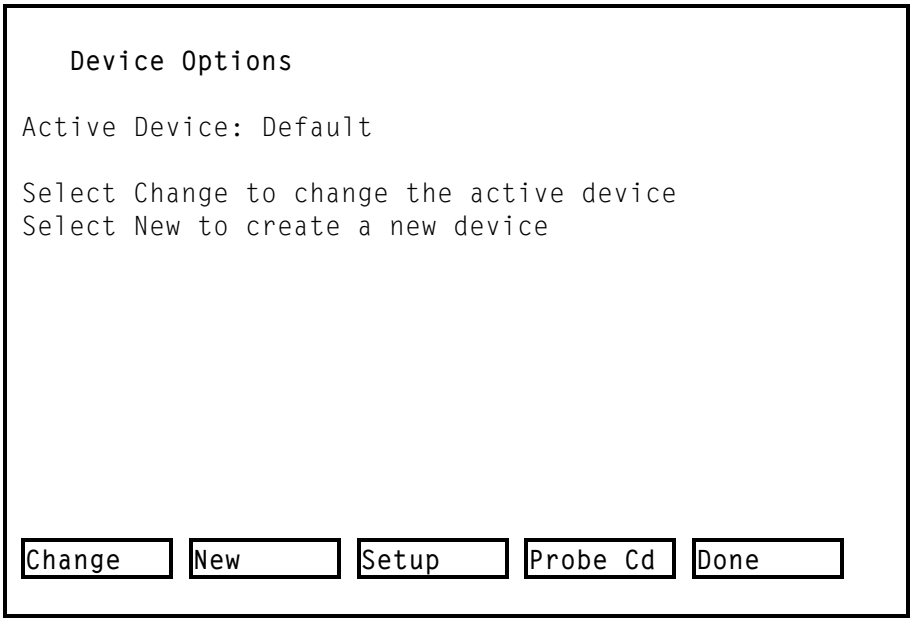


Fig 8.1: ***Device Options*** *screen (example; details will vary)*

8.2 Changing the Active Device

To change the currently active device, press the **F1 = Change** key.

A list of all the devices will be displayed, with the cursor on the currently active device. Use the **F1 = Up** and **F2 = Down** keys to move the cursor to the device you wish to make the active device, and then press the **F4 = Select** key to make this the active device. *Note: If there are more devices in flash memory than can fit on a single screen, the list will scroll when you try to move up from the first device or move down from the last device on the screen.*

The parameters in the active device file can be edited using the **Setup** key in this screen or any other screen with a **Setup** key. When a parameter is changed, it is automatically saved to the file.

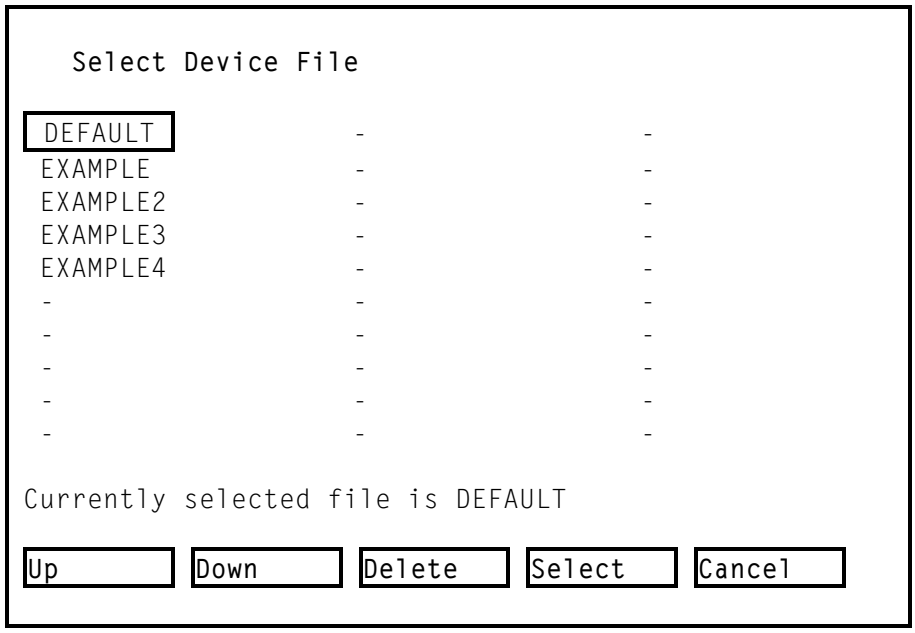


Fig 8.2 ***Select Device File*** *screen (example; details will vary)*

8.3 Creating a New Device File

To start creating a new device, press the **F2 = New** key. If the Set-up password has been set, you will be prompted for it before you can continue.

1. First, you will be asked for the name of the new device. If a device with this name already exists, you will be asked if you want to overwrite this device. If you say **No**, you will be prompted for the name of the device again.
2. Next, you will be asked if you want to copy the wafer set-up parameters from the currently active device. If you say **Yes**, the new device will have all the parameters set to the same values as the active device. If you say **No**, the new device will have all the parameters set the prober's default values.
3. Finally, you will be asked if you want to make this device the active device.

The device file parameters can only be edited if the device is the active device. The parameters in the active device file can be edited using the **Setup** key in this screen or any other screen with a **Setup** key. When a parameter is changed, it is automatically saved to the file.

8.4 Other Options

The Setup Menu is displayed by pressing the **F3 = Setup** key (see section 6 for details).

The Change Probe Card Screen is displayed by pressing the **F4 = Probe Cd** key (see section 7 for details).

9 CHANGE INKER CARTRIDGE SCREEN

This screen starts a procedure to change an inker cartridge, and optionally to test it using a scrap wafer.

1. Starting in the **Configuration** screen (Chapter 4), press **F3** = **Inker Ct**.
2. The **Inker Cartridges to Change** screen now asks you to select all the inkers that are to be changed. Press **1** to select / deselect inker 1, **2** to select / deselect inker 2 and so on, until the status line shows all the inkers that are to be changed. If the Prober has 10 inkers, use **0** to select inker 10.
   - The Prober pauses in the **Change Inker Cartridge** menu.
3. At this time, change the inker cartridge.
4. If you wish to test the new inker cartridge, press **F1** = **Continue**.

   If you do not wish to test the cartridge after changing it, press **F2** = **Done**. You are returned to the **Configuration** screen (Chapter 4).
5. If at any time in the subsequent steps you wish to stop the procedure, press **F5** = **Cancel**. You are returned to the **Configuration** screen (Chapter 4).

   The rest of this procedure only applies when you have pressed **F1** = **Continue**.
   - If the chuck is not already at the load position, it will move there.
6. Then the **Loading Wafer** menu asks you to load a test wafer onto the chuck (first removing any other wafer). When you have done this, press **F1** = **Continue**.
   - If the ***Pegasus*** includes the load pins option, the pins vacuum is applied and the chuck is raised.
   - The chuck vacuum is applied and any pins vacuum is released.
   - Wafer alignment now proceeds as described in Chapter 5. Please follow those instructions.
7. Now you can test each inker on the machine in turn by pressing **1** to fire inker 1, **2** to fire inker 2 and so on. If the Prober has 10 inkers, use **0** to fire inker 10.

   To make realistic tests and then see the results, optionally you can alternately raise and lower the chuck using the left-hand green button by the joystick. While the chuck is lowered, you can move it in the X and Y direction using the joystick. While the chuck is raised, the joystick is disabled to protect the wafer and probe card.

Joystick

When using the joystick, remember that pressing the **Speed** button will slow the movement down in a series of steps, giving extremely fine movement control.

See Section 3.3 for more details of joystick control.

8. When you have finished the inker tests, press **F1** = **Continue**.
   - The chuck moves back to the load position.
   - The **Unloading Wafer** menu asks you to remove the test wafer and optionally replace it with a wafer to be probed.
9. When you have completed all these operations, press **F1** = **Done**.

   You are returned to the **Configuration** screen (Chapter 4).

10 CHANGE PROBE HEIGHT SCREEN

- **NOTE** When using an S200D the following procedure assume that the callipers have been centralised as described in Section 7.2

This screen starts a procedure allowing you to change the probing height. The probing height is changed by adjusting the **Gross Lift** height (see **Z Lift Definitions** in section 6.6) at the centre of the wafer. The **Fine Lift** height, which is relative to the **Gross Lift**, will not be changed by this procedure.

1. Starting in the **Configuration** screen (Chapter 4), press **F1** = **Probe Ht**. (If you cannot see this option, press **F5** = **More** until it appears.)
   - The chuck moves to the preset loading/unloading position and the procedure pauses in the **Loading Wafer** menu.

   If you wish to abandon the probe height setup procedure, either now or at any later time, then press **F5** = **Abort**. You are returned to the **Configuration** screen (Chapter 4).
2. Load and align the wafer as described in section 5.2, and then press **F1** = **Continue**.
   - If the ***Pegasus*** includes the load pins option, the pins vacuum is applied and the chuck is raised.
   - The chuck vacuum is applied and any pins vacuum is released.
   - The chuck rises to its **Gross Lift** height (see Section 6.6)
   - The chuck moves from the load position to the default probing centre.
3. You can now use the joystick to raise or lower the chuck until you reach the correct probing height.

   The height you are aiming to adjust is the **Gross Lift** height (see **Z Lift Definitions** in section 6.6) that with the **Fine Lift** will bring the probes into contact with the wafer.

Joystick

For this **Probe Height Setup** application, the joystick controls the height of the chuck relative to the fixed probes. Away from you = up, and towards you = down (Sideways movement of the joystick has no effect).

When using the joystick, pressing the **Speed** button will slow the movement down in a series of steps, giving extremely fine movement control.

See Section 3.3 for more details of joystick control.

4. When you have correctly adjusted the **Gross Lift** height, press **F1** = **Accept**.
   - The chuck will automatically move back to the load position.
5. Unload the wafer, and then press **F1** = **Done**.

   You are returned to the **Configuration** screen (Chapter 4).

The change probe height operation can be invoked remotely using the **LDPH** remote command.

11 PROGRAM MODE SCREEN

- **Note:** This facility is only available as a software option, and is not available on a standard prober. To upgrade your prober to include this facility, please contact Customer Services.

11.1 Using Program Mode

Program Mode allows a series of pre-programmed sites to be probed in the order they were trained, and is intended to be used to partially test a wafer.

Trained programs are stored as files in flash memory on the prober. The number and size of these program files is only limited by the available flash memory.

The Program Mode screen is displayed by pressing the **F2 = Program** key from the Configuration screen (see section 4.2 for details).

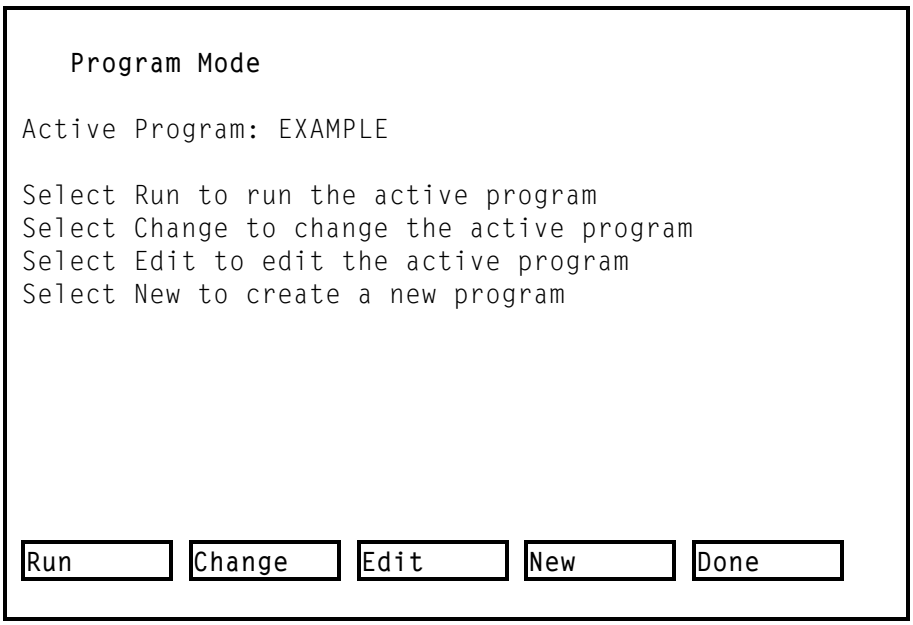


*Fig 10.1: **Program Mode** screen (example; details will vary)*

11.2 Running the Active Program

To run the currently active program, press the **F1 = Run** key. *Note: If there is no active program, this option will be disabled. In this case, this option can be enabled either by selecting an existing program (see section 11.3 below for details) or by training a new program (see section 11.5 below for details).*

This option functions identically to pressing the **F1 = Run** key from the Configuration screen (see section 5 for details), except that the program sites are tested rather than the whole wafer.

11.3 Changing the Active Program

To change the currently active program, press the **F2 = Change** key.

A list of all the programs will be displayed, with the cursor on the currently active program. Use the **F1 = Up** and **F2 = Down** keys to move the cursor to the program you wish to make the active program, and then press the **F4 = Select** key to make this the active program. *Note: If there are more programs in flash memory than can fit on a single screen, the list will scroll when you try to move up from the first program or move down from the last program on the screen.*

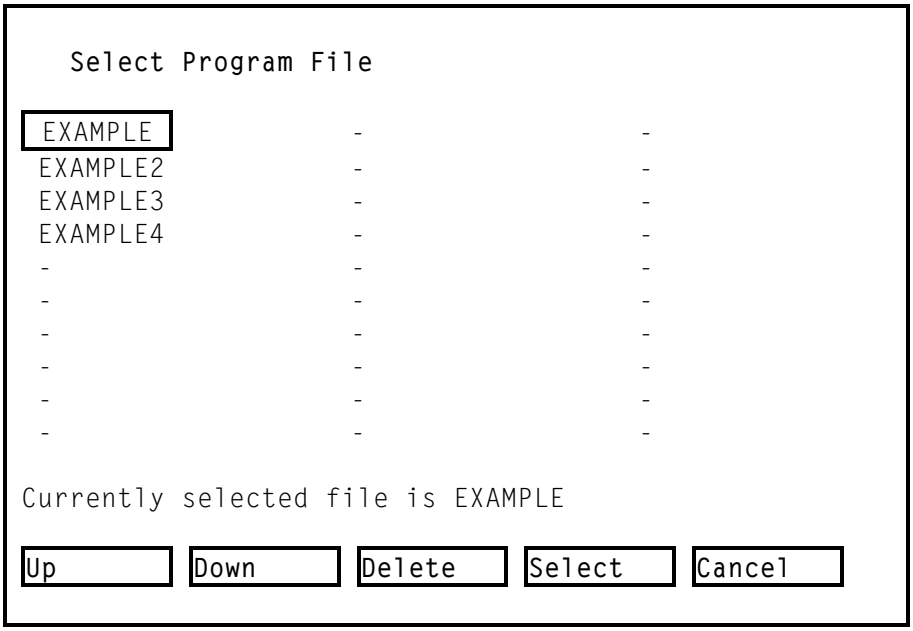


Fig 10.2 ***Select Program File*** *screen (example; details will vary)*

11.4 Editing the Active Program File

To start editing the currently active program, press the **F3 = Edit** key. If the Set-up password has been set, you will be prompted for it before you can continue. *Note: If there is no active program, this option will be disabled. In this case, this option can be enabled either by selecting an existing program (see section 11.3 above for details) or by training a new program (see section 11.5 below for details).*

1. First, you will be prompted to load and align a wafer.
2. After you have aligned the wafer on the first die, you will be able to edit the program:
    - The joystick can be used to move between sites. Pressing the right-hand joystick button will toggle the between index and continual joystick movement.
    - The **F1 = Add Pt** key will add the current wafer position as a site after the current site.
    - The **F2 = Update Pt** key will change the current site to the current wafer position.

- The **F3 = Delete Pt** key will delete the current site.
- The **F4 = Prev Pt** key will move the chuck to the previously added point
- The **F5, F1=Next Pt** keys will move the chuck to the next point in the list of previously added points.
- The **F5, F2=Goto Pt…** keys will enable the chuck to be moved to any previously added point, addressed by the index number that it was added.
- The **F5, F3=Done** keys will end editing, saving the changes in the current program.
- The **F5, F4=Cancel** keys will abort the edit and discard any changes made to the program.

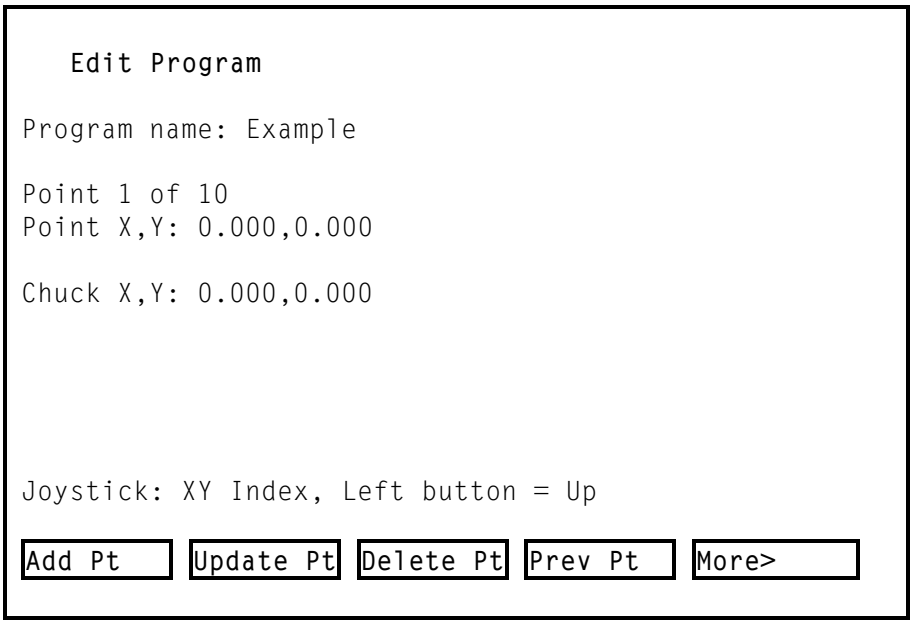


Fig 10.3 ***Edit Program*** *screen (example; details will vary)*

3. When you have finished training the program, you will be prompted to unload the wafer.

11.5 Training a New Program File

To start training a new program, press the **F4 = New** key. If the Set-up password has been set, you will be prompted for it before you can continue.

1. First, you will be prompted for the name of the new program. If a program with this name already exists, you will be asked if you want to overwrite the program. If you say No, you will be prompted for the name of the program again.
2. Next, you will be prompted to load and align a wafer.
3. After you have aligned the wafer on the first die, you will be able to train the program. This identical to editing a program (see section 11.2 above for details).

4. When you have finished training the program, you will be prompted to unload the wafer.
5. Finally, you will be asked if you want to make this program the active program.

12 POSITION CALIBRATION MENU

This menu allows you to calibrate and adjust the preset positions to which the chuck will move, for various purposes:

- Probing centre (or centres in the case of a dual chuck ***Pegasus***) (Section 12.1)
- Camera centre (Section 12.2)
- Loading/unloading of wafer (Section 12.3)
- Robot (for future expansion; not currently available on ***Pegasus*** models).
- Changing the probe card (Section 12.4)
- Setting the probe cleaner positions (Section 0)

12.1 Probing Centre Position(s)

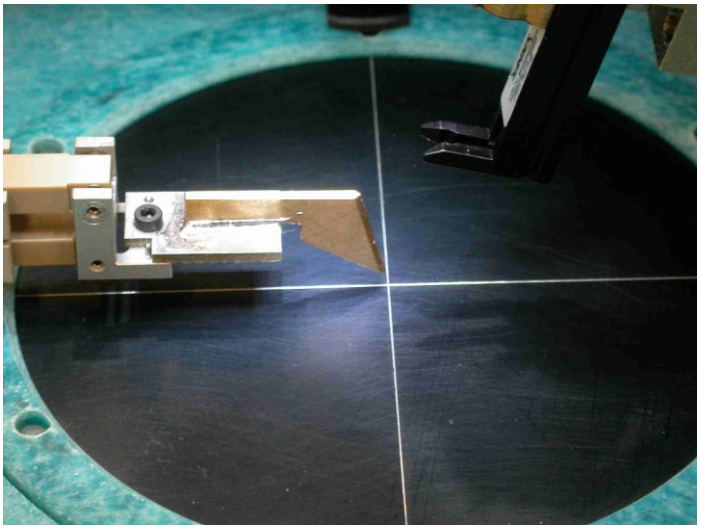
The default probing centre is the centre of the chuck and this is where the chuck normally moves to. If the required probing centre is not at the centre of the chuck, choose **1 = Primary Probing Area Centre Position** or **2 = Secondary Probing Area Centre Position** from the **Position Calibration** menu, and use the joystick to locate the correct position.

Joystick

When using the joystick, pressing the **Speed** button will slow the movement down in a series of steps, giving extremely fine movement control.

See Section 3.3 for more details of joystick control.

When using an S200D the probing centre position can be obtained by loading the alignment disc in to the wafer carrier and replacing the upper needle set with the alignment tool.



By Looking down through the microscope, use the joystick to align the cross with the point of the alignment tool.

(*Note: If the calliper set has been replaced or the XY adjustment allowed is insufficient, it may be necessary to loosen the platform holding screws and physically move the platform)*

When the probing centre is correct, press **F1** = **Accept**.

To abandon the process and reset the probing position to its default value, press **F2** = **Default**. To abandon the process and leave the probing centre as it was before you entered this menu option, press **F5** = **Cancel**.

Alternatively the probing centre can be set using the centre of rotation. This is performed by pressing **F3=COR Calc**. This uses rotates a die of a standard wafer to calculate the probing centre. Follow the on-screen instructions to use this method.

The primary and secondary probing positions can be trained remotely using the **UITP** command.

12.2 Camera Centre Position

This function is only available on ***Pegasus*** models with PR (Pattern Recognition). In these models, the Probing centre (see Sections 12.1 and 5.1) is offset towards the rear of the stage, creating a separate PR section at the front.

If the correct camera position is not at the default position, choose **3** = **Camera Area Centre Position** from the **Position Calibration** menu, and use the joystick to locate the correct position.

Joystick

When using the joystick, pressing the **Speed** button will slow the movement down in a series of steps, giving extremely fine movement control.

See Section 3.3 for more details of joystick control.

When the camera position is correct, press **F1** = **Accept**.

To abandon the process and reset the camera position to its default value, press **F2** = **Default**.

To set the camera centre using a standard device and using the centre-of-rotation method, press **F3=COR Calc**.

To abandon the process and leave the camera position as it was before you entered this menu option, press **F5** = **Cancel**.

The camera centre position can be trained remotely using the **UITP** command.

12.3 Loading/unloading Position

When you choose **4 = Manual Load Position** from the **Position Calibration** menu, the chuck automatically moves to its present position for loading/unloading of wafers. The default position is to the front and left but you can change the default X position by pressing either **F3** = **Centre** or **F4** = **Right** (**F2** = **Left** restores the default position).

Starting from any of these three preset positions, you can use the joystick for further adjustments.

Joystick

When using the joystick, remember that pressing the **Speed** button will slow the movement down in a series of steps, giving extremely fine movement control.

See Section 3.3 for more details of joystick control.

When adjustment of the load/unload position is complete, press **F1** = **Accept**. To abandon the adjustment process, press **F5, F2** = **Cancel**.

The load positions can be trained remotely using the **UITP** command.

12.4 Change Probe Card Position

When you choose **6 = Probe Card Change Position** from the **Position Calibration** menu, the chuck automatically moves to its present position for changing of probe card

or probe needles. The default position is to the back and right, and the joystick is used locate the required position.

Joystick

When using the joystick, remember that pressing the **Speed** button will slow the movement down in a series of steps, giving extremely fine movement control.

See Section 3.3 for more details of joystick control.

When adjustment of the change probe card position is complete, press **F1** = **Accept**. To abandon the adjustment process, press **F5** = **Cancel**.

The probe change position can be trained remotely using the **UITP** command.

12.5 Prober Cleaner Wizard

- **Note:** The Probe Clean facility is only available as a software option, and is not available on a standard prober. To upgrade your prober to include this facility, please contact Customer Services.

When you choose **7** = **Probe Cleaner Areas** from the **Position Calibration** menu, you are taken through the following steps:

1. Firstly, you are asked if you are changing the probe cleaner material. If you answer yes, you are taken to step two, otherwise you are taken to step three.
2. The **Change Material** screen is displayed, which allows you to change the Probe Cleaning material. The chuck is initially moved to the centre of the stage, and can then be moved using the joystick to a position where the material can be changed.
3. The **Set Number of Areas** screen is displayed, which allows you to set the number of Probe Cleaning areas on the chuck.
4. The **Train Area 1** screen is displayed, which allows you to set the bottom left and top right corners of the first Probe Cleaning area. When these have been set, you are taken through setting the Gross Lift value.
5. If more than one area has been set, the **Train Area 2**, **Train Area 3**, and **Train Area 4** screens are displayed as appropriate. These are identical to the **Train Area 1** screen (above), except that the Gross Lift value is not set.

The remote command **CPTA** can be used to train this position.

12.6 Process Validation Position

- **Note:** This function is currently only available on Pegasus 200GS models with a reference LED

To move the chuck to the process validation position, choose **9** = **Process Validation Position** from the **Position Calibration** menu. If the process validation position is not correct, use the joystick to locate the correct position.

Joystick

When using the joystick, pressing the **Speed** button will slow the movement down in a series of steps, giving extremely fine movement control.

See Section 3.3 for more details of joystick control.

When the process validation position is correct, press **F1** = **Accept**.

To abandon the process and reset the process validation position to its default value, press **F2** = **Default**.

To abandon the process and leave the process validation position as it was before you entered this menu option, press **F5** = **Cancel**.

12.7 Manual Clean Position

- **Note:** This function is currently only available on systems not supplied with the Probe Clean Facility software option (see 0) and allows users to set a chuck position which will allow access to the probes for manual cleaning.

To set the manual clean position, choose **10**= **Manual Clean Position** from the **Position Calibration** menu. If the process validation position is not correct, use the joystick to locate the correct position.

Joystick

When using the joystick, pressing the **Speed** button will slow the movement down in a series of steps, giving extremely fine movement control.

See Section 3.3 for more details of joystick control.

When the manual clean position is correct, press **F1** = **Accept**.

To abandon the process and reset the manual clean position to its default value, press **F2** = **Default**.

To abandon the process and leave the manual clean position as it was before you entered this menu option, press **F5** = **Cancel**.

13 REMOTE CONTROL FUNCTIONS

13.1 Operation in Remote Mode

When you press **F4** = **Remote** in the **Configuration** screen (Chapter 4; if you cannot see this menu option, press **F5** = **More** repeatedly until it appears), the ***Pegasus*** is put directly into **Remote mode**, under the control of a remote system.

While the ***Pegasus*** is under Remote control, the **Remote mode** display shows its status.

For full details of Remote control functions and programming, see Chapters 22–25.

Depending on the programming of the remote system, it may be possible to regain manual control by pressing **F1** = **Local**. However, the remote system usually disables all manual control of the ***Pegasus*** – including **F1** – until the remote system's own program has completed.

When the remote system program has completed, the ***Pegasus*** is returned to normal keypad control (**Local mode**) at the **Remote mode** screen. The status line says **In Local mode...** and the following function keys are restored.

13.2 Further Remote Menu Options

If **F1** = **Local** has not been disabled and you press this key, you are returned to the **Remote Mode** display. A message reminds you that the ***Pegasus*** is now in **Local mode**.

You now have five menu options.

F1 = **Remote** returns you to Remote mode (see above).

F2 = **Load** – if there is a wafer on the chuck, you are prompted to unload it before loading the next one. See Section 5.1 onwards for instructions on loading a wafer.

F3 = **Unload** is active if the Remote procedure has left a wafer on the chuck. See Section 5.10.1 for instructions for unloading a wafer.

F4 = Menu displays the **Remote Menu** (see section 6.9)

F5 = More> displays the following menu options:

F1 = Manual displays the **Manual Wafer Testing Screen** (Section 5.7).

F2 = Cleaner displays the The probe change **position can** be trained remotely using the **UITP** command.

Prober Cleaner Wizard (Section 0).

F3 = Probe Ht sets the Probe Height (Chapter 10)

F4 = **Done** exits from the **Remote mode** screen, and returns to the **Configuration** screen (Chapter 4).

14 RE-INITIALISATION

14.1 Z-Axis

To reset the ***Pegasus*** chuck's Z-axis to its initial referenced condition, press **F1** = **Re-init** in the **Chuck Control** menu of the **Diagnose** screen (Chapter 15), followed by **F1** = **Z-Axis**.)

- The chuck moves in the Z direction (normally downward) until its reference switch operates. This definitively positions the chuck in the Z axis.

Depending on the current position of the chuck, this can take up to 5 seconds.

After re-initialisation, you are returned to the **Chuck Control** screen.

14.2 Stage

To reset the ***Pegasus*** chuck to its initial referenced condition, press **F1** = **Re-init** in the **Chuck Control** menu of the **Diagnose** screen (Chapter 15), followed by **F2** = **Stage**.

- The chuck moves in the Z direction (normally downward) until its reference switch operates. This definitively positions the chuck in the Z axis.
- The chuck rotates to reference itself on the Theta axis.
- The chuck moves in the X direction to reference itself on the X axis.
- The chuck moves in the Y direction to reference itself on the Y axis.

Depending on the current position of the chuck, this can take up to 20 seconds.

After re-initialisation, you are returned to the **Chuck Control** screen.

14.3 Platform

This function is only available on ***Pegasus*** models fitted with a motorised platform. On all other models, this function is greyed out.

To reset the ***Pegasus*** platform to its initial referenced condition, press **F1** = **Re-init** in the **Chuck Control** menu of the **Diagnose** screen (Chapter 1), followed by **F3** = **Platform**.

- The platform moves in the Z direction (normally upward) until its reference switch operates.
- The platform moves to the upper limit.

Depending on the current position of the platform, this can take up to 5 seconds.

After re-initialisation, you are returned to the **Chuck Control** screen.

14.4 PMM

This function is only available on ***Pegasus*** models fitted with a PMM. On all other models, this function is greyed out.

To reset the PMM to its initial referenced condition, press **F1** = **Re-init** in the **Chuck Control** menu of the **Diagnose** screen (Chapter 1), followed by **F4 = PMM**.

Depending on the current position of the PMM, this can take up to 60 seconds.

After re-initialisation, you are returned to the **Chuck Control** screen.

14.5 Arms

This function is only available on ***Pegasus*** models fitted with flying arms. On all other models, this function is greyed out.

To reset the flying arms to there initial referenced condition, press **F1** = **Re-init** in the **Chuck Control** menu of the **Diagnose** screen (Chapter 1), followed by **F5 = Arms**.

- The platform moves in the Z direction (normally upward) until its reference switch operates.
- The platform moves to the upper limit.

Depending on the current position of the flying arms, this can take up to 60 seconds per arm.

After re-initialisation, you are returned to the **Chuck Control** screen.

14.6 Reference Failure Screen

This screen is displayed when the ***Pegasus*** has failed to reference one or more of the Stepper motors.

- **Note:** because the unit is in a fault condition, the ***Pegasus*** may appear sluggish in its response to key presses and the joystick.

CAUTION **Before continuing check the following:**

1. **That the probe card and needles, etc. are clear of the chuck. And that any edge sensors fitted are closed.**
2. **That all connectors and cables are properly connected to both the Pegasus stage and controller.**
3. **Check that the green power indicator, on the front of the Controller, is illuminated continuously and not flashing.**

If any of the above conditions are not met, press **F2 = No** to shutdown the controller and rectify the fault, be for resuming operation.

If the power indicator is flashing, please contact your local service representative for assistance.

If all the above appear correct, press **F1 = Yes** to continue; the ***Pegasus*** will now try to reference each motor and report the results. **Note:** that for safety reasons, if the Z axis fails to reference, no other axis will be referenced.

Once this process has completed you have the option to **Re-Initialise**, run the **Diagnostic** screen, (see Chapter 15), or **Shutdown** the ***Pegasus***.

Press **F1** = **Re-init** to try to reference the motors again, once you have cleared any fault.

Press **F2** = **Diagnose** to enter the **Diagnostics** screen, which allows joystick control of referenced motors and displays the current Edge Sensor input states.

Press **F3** = **Shutdown** to power down the ***Pegasus***.

15 DIAGNOSE

The **Diagnostics** screen is for the use of service engineers only. It shows the status of the chuck and of various interconnections described in Chapter 19 and also provides certain alignment functions described in Chapter 26.

The Diagnostics Tools menu contains several sub-menus described in the following sections:

15.1 Chuck Control

Fig 14.1 shows a typical display of the Chuck Control screen. It lists four groups of parameters:

1. Chuck position – X, Y, Z and Theta co-ordinates. If the optional motorised platform is fitted, the W axis will be displayed. If the optional motorised PMM is fitted, the R, S, and T axes will be displayed.
2. Edge sensor –the status of up to 10 individual edge sensor lines
3. Vacuum lines and outputs to 'traffic light' indicators
4. Joystick status – which movement the joystick will currently control, and the function of the left-hand green joystick button (the right-hand button always signals **Accept** or **Continue**).

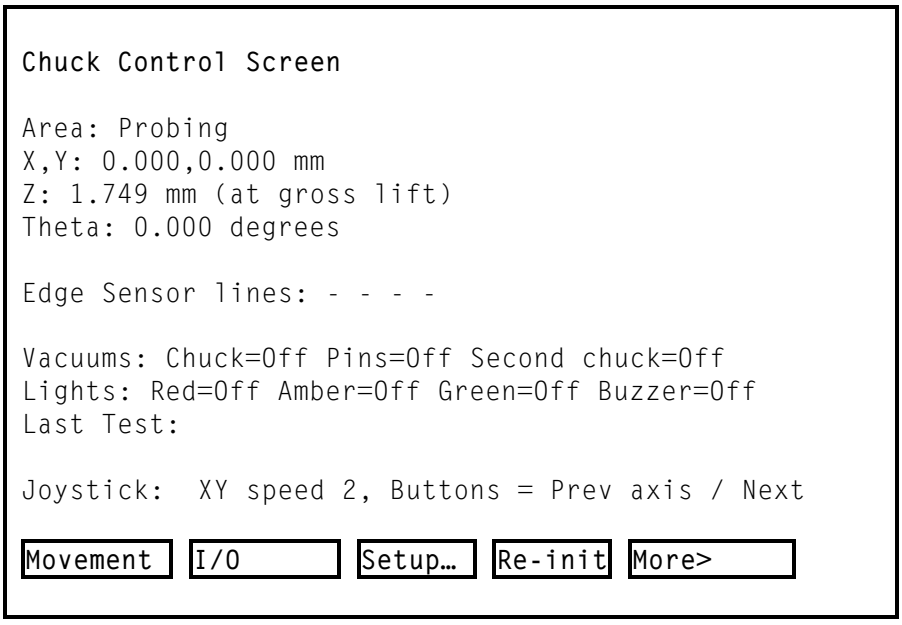


*Fig 14.1: Typical **Diagnostics** screen – additional functions are available by pressing* Movement *or* I/O.

15.1.1 Movement Functions

F1 = **Movement** displays additional functions than allows the chuck to be controlled:

1. Pressing **F1** = **Gross** controls Gross Lift movement (see Section 6.6 for definitions). If the chuck is at zero height, displayed on-screen as **Z = 0.000 mm**, pressing **F1** = **Gross** will raise the chuck. The numerical **Z** display will change accordingly and will also indicate **(at gross lift)**. If the chuck is already raised to its Gross Lift height, pressing **F1** = **Gross** will lower it to zero height. This action also cancels any additional Fine Lift (see next section). If flying arms are fitted and a flying arm is being controlled by the joystick, then this softkey will act on the flying arm's z-axis rather than the chuck's z-axis.
2. Pressing **F2** = **Fine** controls Fine Lift movement (see Section 6.6 for definitions). This function is only enabled when the chuck has already been raised to its Gross Lift height (see above). When the chuck is at its Gross Lift height, pressing **F2** = **Fine** will raise the chuck, and the **Z** display will now indicate **(at fine lift)**. If the chuck is already raised to its Fine Lift height, pressing **F2** = **Fine** will lower it to back to the Gross Lift height. If flying arms are fitted and a flying arm is being controlled by the joystick, then this softkey will act on the flying arm's z-axis rather than the chuck's z-axis.
3. Pressing **F3** = **Loader** will operate a loader where one is fitted. For instance where for S200D systems which have an automatic clamp ring, this will open and close the clamp. Note that the loader must be returned to its closed position before any chuck movement may be made.
4. Pressing **F4** = **Move Area** provides the ability to move to the various areas that have been set up, such as the manual load and probing areas (see Chapter 12).
4. Pressing **F5** = **More** followed by **F1=Theta** provides the ability to rotate the chuck in theta by 90 degree amounts clockwise and counter clockwise where the chuck has this ability.

15.1.2 I/O Functions

F2 = **I/O** displays additional functions than allows the chuck to be controlled:

1. Pressing **F1 = Vacuums** and then **F1** = **Chuck** will turn the chuck vacuum on and off. The status is indicated on the **Vacuums:** line on the screen display, and each key-press reverses the previous status.
2. Pressing **F1 = Vacuums** and then **F2** = **S.Chuck** will turn the secondary chuck vacuum on and off (if a secondary chuck is fitted). The status is indicated on the **Vacuums:** line on the screen display, and each key-press reverses the previous status.
3. Pressing **F1 = Vacuums** and then **F3** = **Pins** will turn the pins vacuum on and off (if pins are fitted). The status is indicated on the **Vacuums:** line on the screen display, and each key-press reverses the previous status.
4. Pressing **F2= Lights** and then **F1** = **Red** will turn the red light on the external light pole on and off (if an external light pole is fitted). The status is indicated on

the **Lights:** line on the screen display, and each key-press reverses the previous status.

5. Pressing **F2 = Lights** and then **F2 = Amber** will turn the amber light on the external light pole on and off (if an external light pole is fitted). The status is indicated on the **Lights:** line on the screen display, and each key-press reverses the previous status.
6. Pressing **F2 = Lights** and then **F3 = Green** will turn the green light on the external light pole on and off (if an external light pole is fitted). The status is indicated on the **Lights:** line on the screen display, and each key-press reverses the previous status.
7. Pressing **F2 = Lights** and then **F4 = Buzzer** will turn the buzzer on the external light pole on and off (if an external light pole is fitted and if it has a buzzer). The status is indicated on the **Lights:** line on the screen display, and each key-press reverses the previous status.
8. Pressing **F3 = Inkers** allows up to 4 inkers to be fired from the keypad.
9. Pressing **F4 = Do Test** initiates a test sequence and displays the result in the Last Test field of the display

15.1.3 .Setup

Pressing **F3 = Setup** will take you to the **Setup** screen (Chapter 6).

15.1.4 Re-init

Pressing **F4 = Re-init** will take you to the Re-initialisation screen (Chapter 14).

15.1.5 Motor Off

Pressing **F5, F1 = Motor off** will remove the power from the stepper motors. This will allow those parts moved by the motors, such as the chuck and platform to be moved by hand. Following this the only action possible is to Re-Init which re-references the motors.

15.2 Platform Control

On systems which support a motorised platform this menu may be used to test the motor movement (see section 7.4)

15.3 PMM/CAP Control

On systems which support a motorised PMM and probes this menu may be used to test their motor movement.

15.4 Robot Control

On systems which support a robot loader, this menu may be used to test the motor movement.

15.5 System Options

This sub-menu may be used to display a variety of system information:

1. **System Information** = Displays detailed information concerning the type of the ***Pegasus*** prober, its serial number, software version number, and peripheral version numbers.
2. **View Log =** Displays the debug.log file on the display. Note that the log file must be formatted to the screen size and this can take several seconds to respond if the file is very large.
3. **Log Menu** = Enables the control of the level of information logged to the debug.log file, and the size of the log file.

15.6 Factory Options

1. **Input Line Monitor** = .Displays the status of 8 inputs connected to the Stage board. These include sensors for doors etc.
2. **Chuck Planearisation** = Starts the chuck planarisation wizard (see Chapter 26)

16 REMOTE CHIP PROBING

- **Note:** This facility is only available as a software option, on Mk3 or later hardware variants, and is not available on a standard prober. To upgrade your Mk3 or later Prober to include this facility, please contact Customer Services.

Remote Chip Probing is enabled from the Remote Chip Prober menu, (see section 6.10.7) and the Network menu, (see section 6.10.6).

The **Run** menu is accessed by pressing **F1** = **Run** from the **Configuration** screen (if you cannot see this option in the **Configuration** screen, press **F5** = **More** until it appears).

This Chapter should be read in conjunction with Chapter 5.

This chapter leads you through a series of procedures to:

1. Select and Load a Chip Probing Map from the Scanner PC (Section 16.1)
2. Load a frame / wafer on the chuck (Section 16.2)
3. Accurately align the frame / wafer (Section 16.3)
4. Position the reference die and start probing (Section 16.4)
5. Probing the frame / wafer (Section 5.8)
6. After probing (Section 16.5).

16.1 Select and Load Chip Probing Map

When you press **F1** = **Run** from the **Configuration** screen, the Prober will contact the PegNet Server software on the Scanner PC, and obtain a list of Probing Maps.

A list of all the available Probing Maps will be displayed. Use the **F1** = **Up** and **F2** = **Down** keys to move the cursor to the Probing Map that matches the frame / wafer to be probed, and then press the **F4** = **Select** key to make this the active program. The user needs to select the Map that matches the frame / wafer to be probed.

Note: If there are Maps than can fit on a single screen, the list will scroll when you try to move up from the first Map or move down from the last Map on the screen.

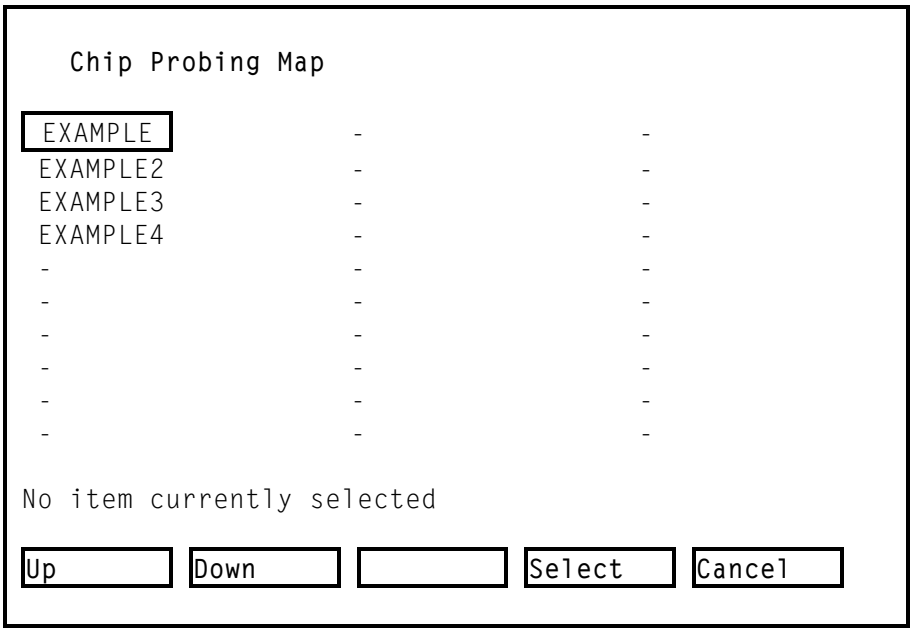


Fig 16.1 ***Select Chip Probing Map*** *screen (example; details will vary)*

16.2 Load Frame / Wafer

When you press **F1** = **Run** from the **Configuration** screen, the following action take place automatically:

- The Probing Map is downloaded from the PegNet Server.
- The Wafer Diameter is updated with information from the Probing Map.
- The chuck moves to the preset manual load position (see Section 12.3).

Place the frame / wafer on the chuck, with the devices positioned as centrally as possible. You can use the vacuum holes as an aid in centring.

Rotate the wafer so that it is oriented as accurately as possible in either the X direction or the Y direction. The chuck has a rotation range of ±8 degrees, so the wafer must be placed within ±8 degrees of its correct orientation.

If required, the Enter key can be used to toggle the chuck vacuum on/off.

16.3 Alignment Procedure

The frame / wafer needs to be aligned to match alignment used, when the devices were originally scanned.

1. When you press **F1** = **Continue**, the following actions take place automatically:

- The chuck vacuum is applied.
- The Chuck moves to the Probing centre position.

- The chuck rises to its **Gross Lift** height (see Section 6.6)
- The chuck moves to the outside left-hand side of the frame / wafer, as set by the Wafer Diameter.

  If required, the probing height can be adjusted by pressing **F2 = Probe Ht**. The change probing height routine is detailed in section10.

2. During Scanning, the Scanner system probes two devices, which are now used to align the frame / wafer on the chuck.

   Locate the left hand probed device through the microscope; then use the joystick to move the chuck and the left hand green joystick button to toggle between gross and fine lift; so that the device pads are accurately positioned under the probe needles when the chuck is raised to the fine lift position.

Joystick

When using the joystick, remember that pressing the **Speed** button will toggle between fast variable and slow variable speeds, to give extremely fine movement control at low speed.

During this function, the left-hand green button by the joystick will toggle between the fine up and gross lift positions; and the right-hand green button by the joystick copies the **F1 = Continue** function key, so that you can control the ***Pegasus*** without taking your eyes from the microscope.

See Section 3.3 for more details of joystick control.

3. When you have done this, press **F1 = Continue** (or the right-hand green button by the joystick).
- The chuck moves to approximately where the second device is expected to be.
4. Locate the second probed device through the microscope, then use the joystick move the chuck, so that the device pads are accurately positioned under the probe needles when the chuck is raised to the fine lift position.
5. If you wish to check the position, or to return to the first probed device, press **F1 = Repeat**.
- The chuck now moves back to place the first probed device under the probe needles.
6. Check the position of the first probed device once again. If the position is not correct, go back to step 2 (first alignment point) and repeat steps 2 through 5.
7. When you are satisfied that the probed devices have been accurately positioned, press **F2 = Continue**.
- Based on the information you have provided, the chuck rotates so that the frame / wafer is at exactly the same angle as when originally scanned.

8. Continue to Section 16.4 – **Position Reference Die**.

16.4 Position Reference Die

During Scanning, the operator is asked to move the required Reference Die under the needles on the Scanning System. The Reference Die performs two functions:

a. It sets the first position in the RS232 indexed output to the Tester.

b. It is used to accurately position the Scanned frame / wafer relative to the needles on the Remote Chip Prober.

- The chuck now moves to place the Reference Die under the probe needles.

If this is the first frame / wafer to be probed from a remote Probing Map, the chuck will move to the centre of the frame / wafer, otherwise the chuck will move to the last Reference Die position.

1. Locate the Reference Die through the microscope; then use the joystick to move the chuck and the left hand green joystick button to toggle between gross and fine lift; so that the device pads are accurately positioned under the probe needles when the chuck is raised to the fine lift position.

   You can use the **F3** button to toggle between applying and not-applying the overtravel during fine lift.

2. When you are satisfied with the needle positions, press **F1** = **Continue** the system will now probe the wafer, (see section 5.8 - **During Probing**).

- **NOTE** If the Prober is paused during probing, the **Update Probing position** option will not be available, when returning to the **Testing Wafer** screen.

16.5 After Probing

Operation after probing is the same as for a solid wafer, (see section 5.10 – **After Probing**), except where Sample Probing has been turned on for the frame / wafer on the Scanning system.

In this case the **Unloading Wafer** screen includes the **F2 = Full Test** option; selecting the **Full Test** option will cause the Prober to go back and test every device on the entire frame / wafer.

17 SHUTDOWN

To power-down the ***Pegasus*** in a controlled manner, press **F2** = **Shutdown** in the **Configuration** screen (Chapter 4).

(If you cannot see this option, press **F5** = **More** repeatedly until it appears.)

- You will be prompted to either select **F1 = Powerdown** or **F2=Reboot**.
- On a power-down, the ***Pegasus*** switches itself into **Standby** mode – see Section 2.2.

WARNING In **Standby** mode, mains power is still connected to the ***Pegasus*** Controller unit.

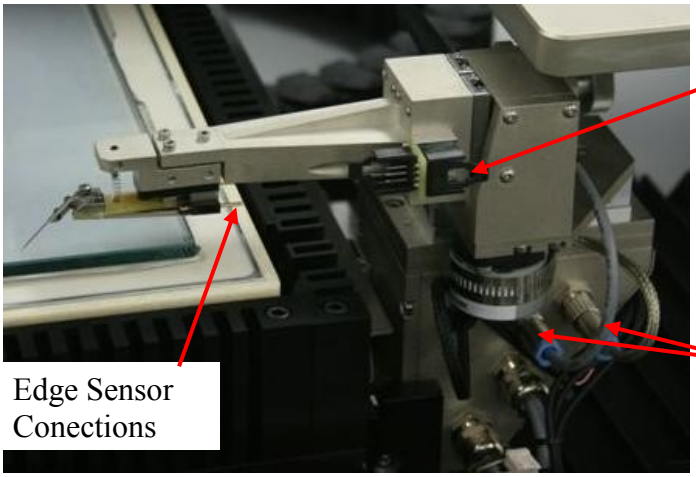
To power the ***Pegasus*** on again, see Section 2.2.1.

18 FLYING ARM REMOVAL AND REPLACEMENT

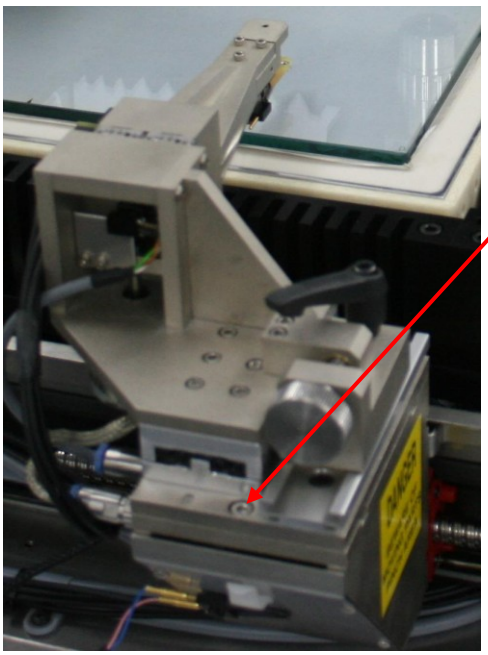
The Flying Arms have been designed to be removeable (and interchangeable on model 360S) whilst still enabling the equipment to function as a conventional prober

18.1 Flying Arm Removal

CAUTION Before disconnecting any cables make sure the controller has been switched off



Disconnect the motor, reference switch, edge sensor and tester cables. The tester cable and the edge sensor cables can be parked in the plastic spring clip on the front of the Flying Arm.



Remove the front and rear loacting screws and then gently lift the Flying Arm assembly away from it's stage.

Front Locating Screw (Rear Screw not shown)

18.2 Flying Arm Replacement

CAUTION Before connecting any cables make sure the controller has been switched off

Replacement of the Flying Arms is the reverse of the removal procedure described in the previous section.

Make sure that all cables have been connected, including the edge sensor cables.

18.3 Manual Adjustment of the Flying Arms

Each Flying Arm can be manually moved in a direction perpendicular to it's driven axis. There is coarse and fine adjustment available.

To make a coarse adjustment to the position of the Flying Arm undo the locking handle and manually slide the Arm in the direction required.

To make a fine adjustment to the Arm's position ensure that the locking handle is locked then turn the thumbwheel to move the Arm in the direction required

INTERCONNECTIONS AND INTERFACES

Chapters 19 and 20 describe the interconnections between the units of the ***Pegasus***, and the interface options for an external wafer tester.

19 INTERCONNECTIONS

This chapter describes the interconnections between the three units of the ***Pegasus*** – the Prober, the Keypad and the Controller.

19.1 Prober Rear Panel

All connections to the Prober are on the rear panel. Fig 17.1 (MK3) and Fig17.2 (MK2) show the connectors, and details are listed below.

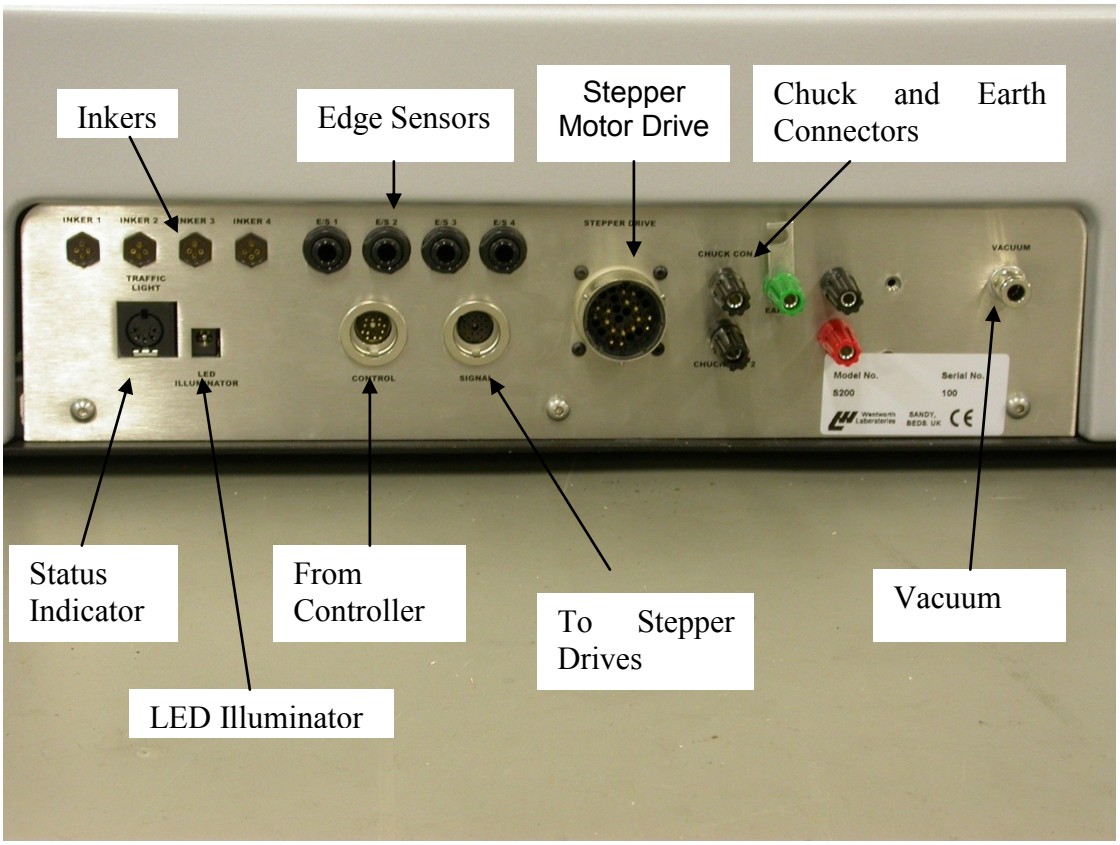


Fig 17.1: Prober rear panel connections MK3

1. **INKERS** (1–4) – connection points for up to four Xandex inkers which are mounted on the machine platform.
2. **CONTROL** – communications between Controller and Prober.
3. **SIGNAL** – fast control signals to the stepper driver.
4. **TRAFFIC LIGHTS** – outputs to external 'traffic light' status indicator.
5. **LED ILLUMINATOR** – power supply to microscope illuminator (MK3 only)
6. **CAMERA ILLUMINATION** – this output can drive two independent LED arrays.(MK2 only)

7. **EDGE SENSORS** (3.5 mm mono jacks) – activated via an electrically isolated supply (500V DC isolation).
8. **STEPPER DRIVE** – power from the Controller to the X, Y, Z and Theta stepper motors.
9. **CHUCK CON 1 & 2** – two 4 mm insulated banana jack terminals providing electrical connection(s) to the chuck (500V DC isolation).
10. **EARTH** – green 4 mm insulated banana jack. This is connected to the frame of the stage and via the cabling to mains Earth (ground). This is the Earth point for the entire Prober assembly. The Prober is connected to the mains Earth on the Controller via the **STEPPER DRIVE** cable; this cable must be correctly connected to both the Controller and the Prober, at all times when the machine is connected to a mains supply.

WARNING To avoid risk of electrical shock or equipment damage, do not operate the ***Pegasus*** without a proper Earth (ground) connection as detailed above.

11. **VACUUM** – connector for tubing (6 mm OD, 4 mm ID) from an external vacuum source. This point is internally linked to the chuck via an air filter and a solenoid valve. The valve is normally controlled automatically, but may also be controlled manually from the **Power-up** screen by **F1** = **Vac on** (Section 4.1) or from the **Diagnostics** screen (Section 15).

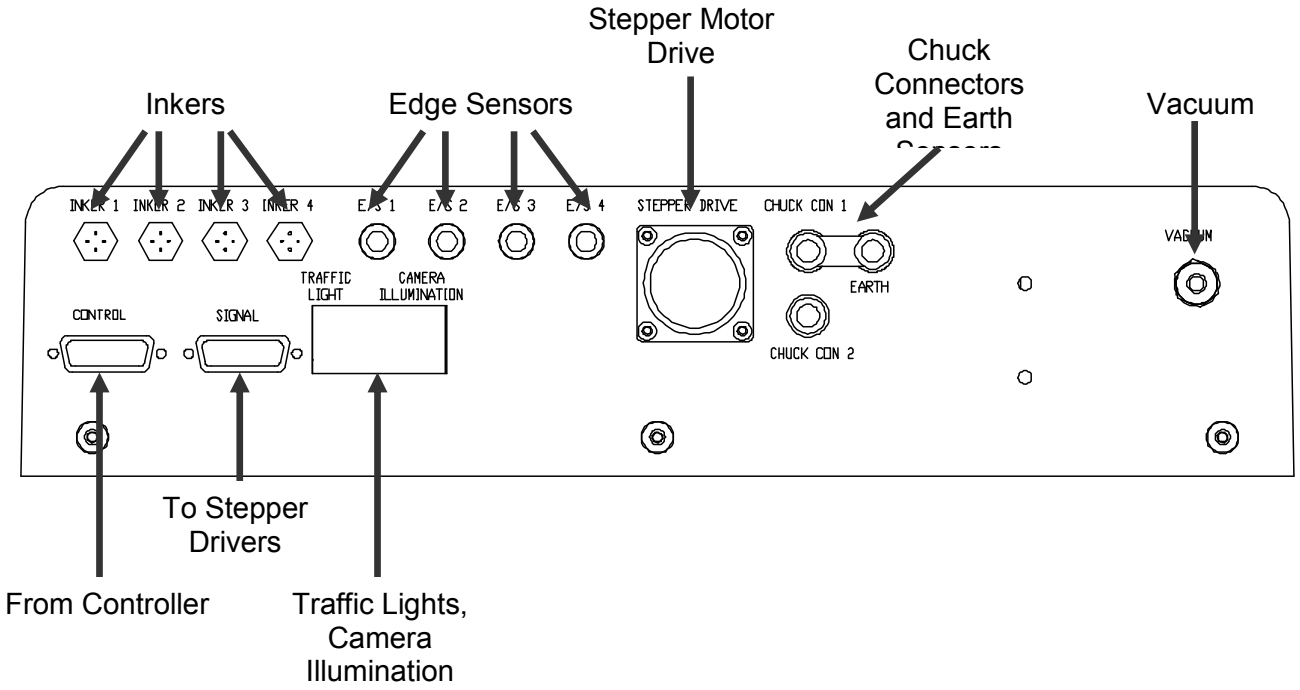


Fig 17.2: Prober rear panel connections MK2

19.2 Controller Rear Panel

All connections to the Controller are on the rear panel. Fig 17.3 (below) shows the connectors, and details are listed below.

1. **ETHERNET** – 10Base-T connector used for external networking.
2. **MMI** – to Keypad and Screen.
3. **TTL** – these two 15-way 'D' plugs each provide four TTL signal outputs, seven TTL signal inputs, a +5V DC power output. See Chapter 20 for details of use.
4. **GPIB** –standard IEEE 488 interface connection points (24-way sockets). With the appropriate board installed in the Controller (Chapter 24), most ***Pegasus*** functions may be controlled from an external PC or an external Automatic Test Equipment (ATE) system.
5. **PROBER** – communication and power to the Prober.
6. **SIGNAL** – fast control signals from the Prober to the stepper driver.
7. **SERIAL** – two 9-way 'D' plugs for RS232 control. With the appropriate board fitted in the controller (Chapter 23), most ***Pegasus*** functions may be controlled from an external PC or an external Automatic Test Equipment (ATE) system.
8. **STEPPER DRIVE** – X, Y, Z and Theta stepper motor power to the Prober.
9. **FAN** – the Controller cooling fan, with air filter. For instructions on cleaning or changing the filter, see Section 26.3.

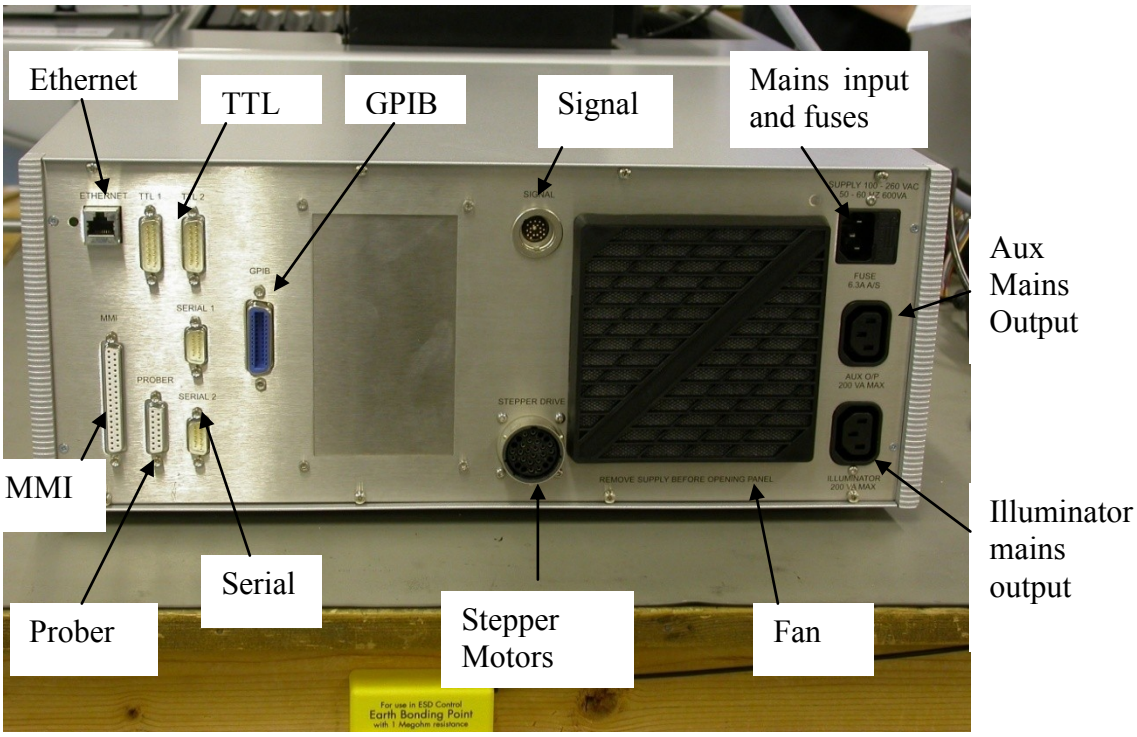


Fig 17.3: Controller rear panel connections

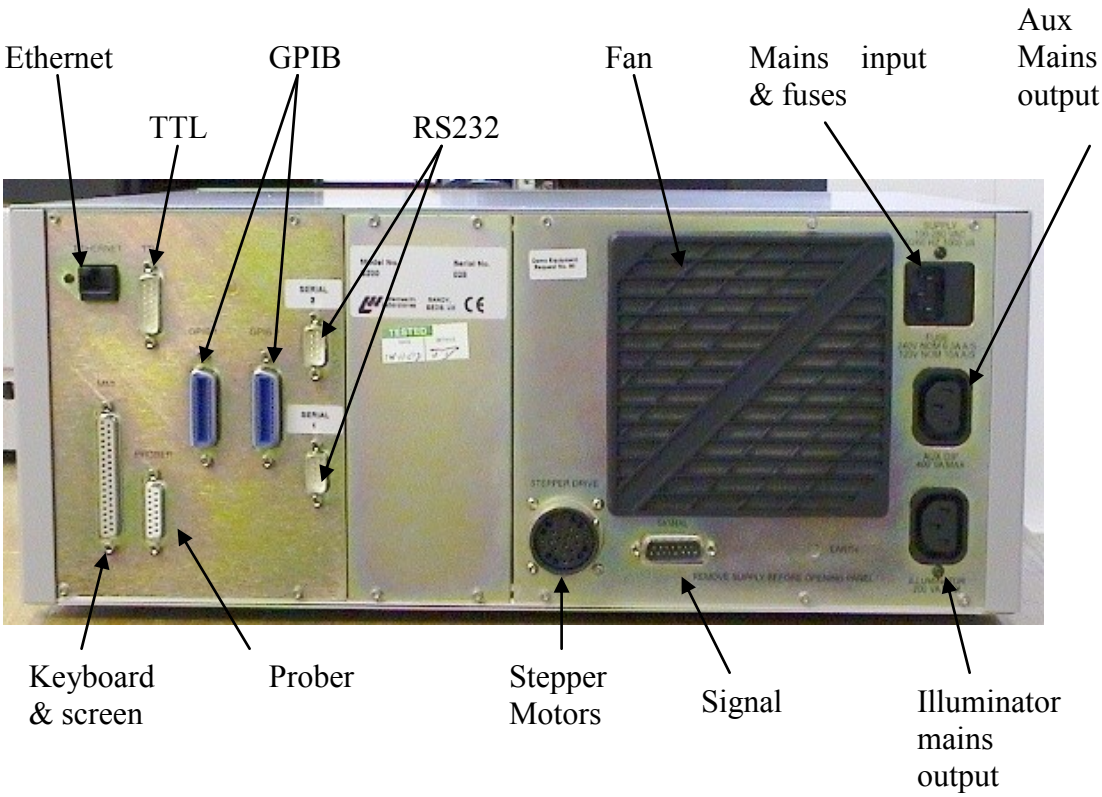


Fig 17.4: MK2 Controller rear panel connections

10. **MAINS SUPPLY** – this IEC (CEE-22) connector is for incoming 100-240V AC supply. The mains input is protected by two 6.3A anti-surge fuses.

WARNING Use of incorrect fuses can cause equipment damage and danger to life. Operate the ***Pegasus*** equipment using only the correct fuses as specified above.

WARNING If one of the two mains fuses blows, hazardous mains voltage may still be present inside the Controller.

11. **AUX O/P** – not used.

12. **ILLUMINATOR O/P** – this IEC (CEE-22) power socket may be used to provide mains power for a microscope lamp power supply (200VA max. at the mains supply voltage, not isolated). This output is controlled via the **Lamp** button on the keypad (Section 3.2).

20 TTL TESTER INTERFACE

This chapter describes various interface options between the ***Pegasus*** and the associated wafer tester(s) using the TTL interface.

The Mk3 Pegasus has two TTL Tester Interface connectors, allowing the connection of two testers for dual-die testing, (use the **Dual TTL** tester interface option).

20.1 Inputs and Output

20.1.1 Standard Inputs and Outputs

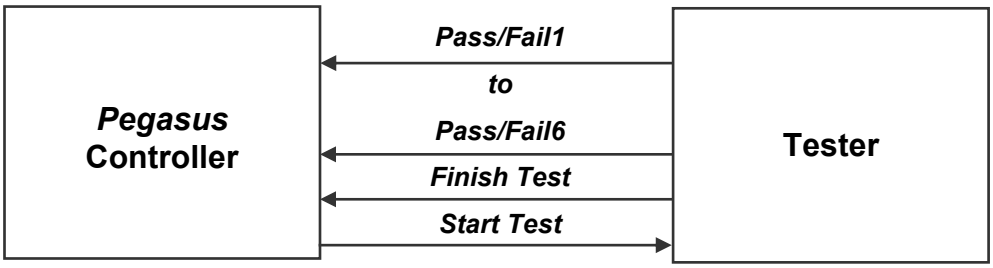


Fig 18.1: Prober Standard TTL Tester signal flow

20.1.2 AWP Compatible Inputs and Outputs

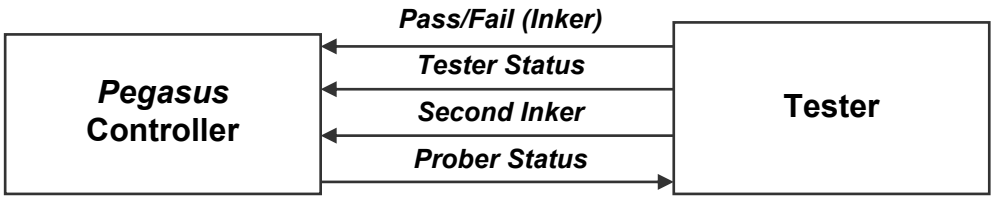


Fig 18.2: Prober–AWP Tester signal flow

The AWP Compatible Inputs and Outputs require an adaptor, to emulate the AWP connections.

20.1.3 Input and Output Circuits

All TTL Tester inputs, outputs and power supply lines have galvanic isolation from the internal Controller circuitry and are designed to work as part of a 5Volt system.

The 5Volt DC supply has internal fuse protection and can source up to 350mA.

Inputs are to the cathode of an Optocoupler diode and the driving circuitry must be capable of sinking 20mA.

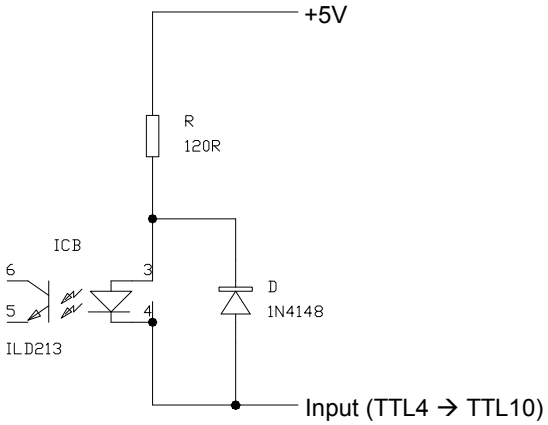


Fig 18.3: Tester Input Circuit

Outputs are open collector and capable of sinking 20mA @ $0.4V_{CE.}$

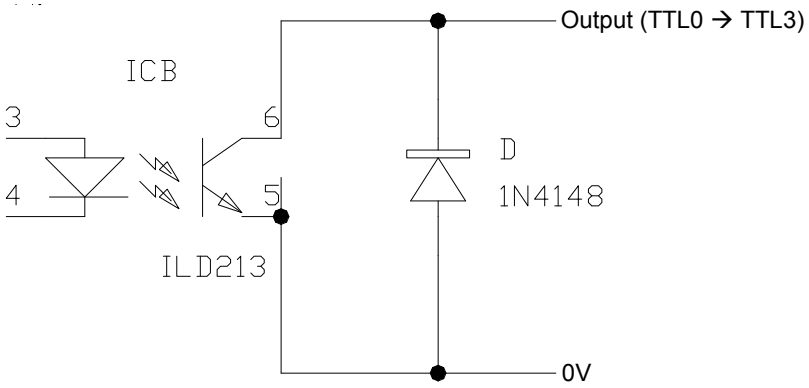


Fig 18.4: Tester Output Circuit

20.1.4 Connections

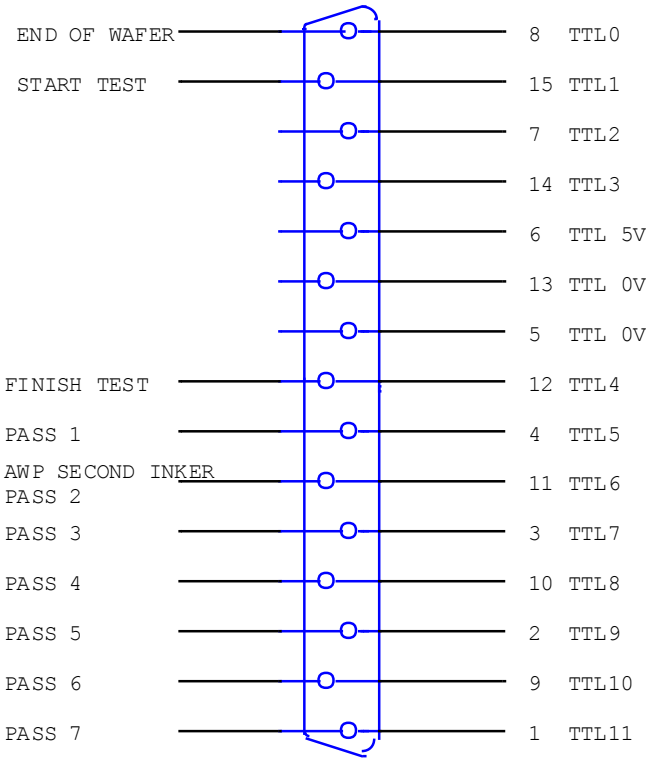


Fig 18.5: TTL1 Tester Connector

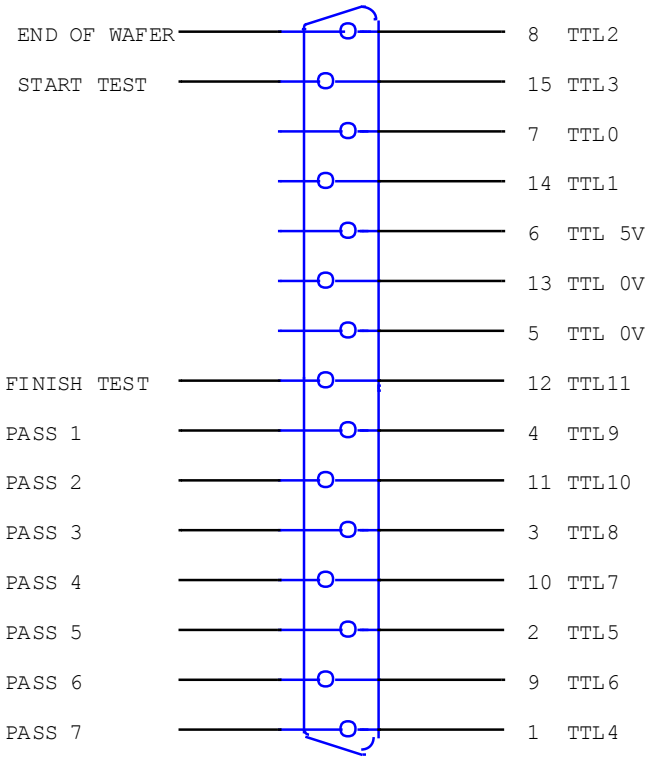


Fig 18.6: Mk3 TTL2 Tester Connector

20.1.5 Start Test Output (Prober Status Output – AWP Compatible)

This output indicates when the Prober is READY, i.e. after the chuck has lifted and applied overtravel to the probe needles.

The active level, (high or low when READY), is configurable in the Tester Set-up Menu.

20.1.6 Finish Test Input (Tester Status Input – AWP Compatible)

The Finish test Input is used to indicate when the Tester is READY, i.e. after testing has finished.

The active level, (high or low when READY), is configurable in the Tester Set-up Menu. However; an active low is recommended, to obtain maximum performance from the Pegasus's interrupt system.

20.1.7 Pass/Fail Inputs 1 to 6 (Pass/Fail Input – AWP Compatible)

The Pass/Fail Inputs indicate the test results of individual devices, to cause inking to take place of failed devices. Use Pass1 in AWP compatible mode.

The active level, (high or low for a pass), is configurable in the Tester Set-up Menu.

20.1.8 Second Inker Input (AWP Compatible Only)

The Second Inker Input is similar to the Tester Status Input, and should be used in conjunction with the Pass/Fail Input. The input should be switched to choose Inker 3 instead of Inker 1, or if using the offset inking facility (see Section 6.8), to choose Inker 4 instead of Inker 2.

The active level, (high or low to select the Second Inker), is configurable in the Tester Set-up Menu.

20.2 Tester Interface Timings

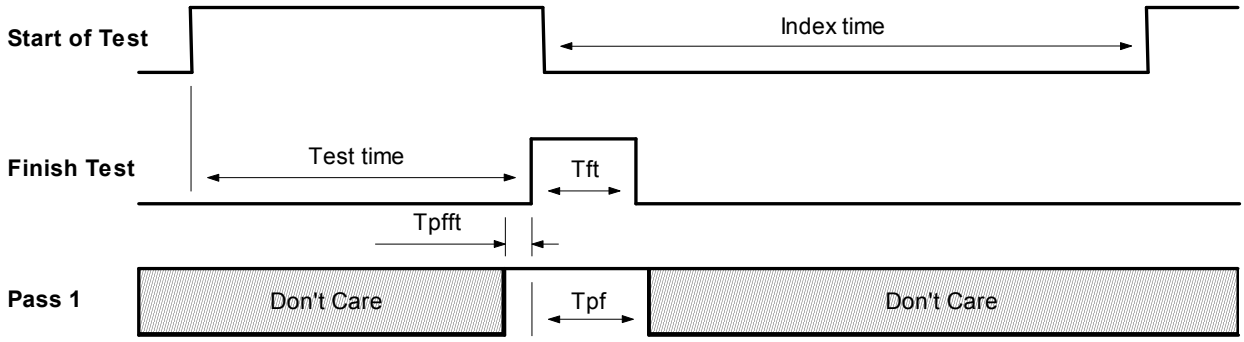


Fig 18.7: TTL Timing Diagram

Test Time – the time taken by the Tester, to tests the device.

Index Time – the time taken by the Prober, to move to the next device.

Tft – Finish Test signal time; this must be held for greater than 10milliseconds and should be less than the Index Time to prevent loss of system performance.

Tpfft – Time Pass/Fail to Finish Test; the Pass/Fail result must be valid at least 3 microseconds before the Finish Test signal.

Tpf – Pass/Fail Signal time; this must be held for greater than 10milliseconds after the Finish test signal has gone active.

21 SIMPLE RS232 / GPIB TESTER INTERFACE

This chapter describes the interface between the ***Pegasus*** prober and a wafer tester using either the RS232 or GPIB (IEEE 488.2).

Each event line consists of a two-character long event name, followed by any parameters to the event, followed by the end of line character(s). The events are listed in logical order, rather than alphabetical order. The following syntax is used:

- <eol> denotes the end of line character(s).
- Angle brackets <> denote a parameter field.
- Square brackets [] surround optional parameters.
- Three dots … denote repeated parameters.

All commands are case-sensitive (unless stated otherwise). For clarity in this manual, an underline character _ denotes a space. Wherever an underline character appears here, a space must be used in the actual event line.

When using RS232, the Serial 2 connector on the back of the controller is used. The RS232 parameters are set to baud rate of 9600, 8 data bits, and no parity. The end of line character(s) can be set in the tester menu.

When using GPIB, the GPIB connector on the back of the controller is used. The device number and end of line character(s) can be set in the tester menu. When the Pegasus sends an event, it also raises the service request (SRQ) line on the GPIB bus to notify the tester and sets the serial poll response byte to 40 hexadecimal (otherwise the response byte is set to zero).

NOTE: the GPIB and Serial 2 interfaces share hardware resources, which means it is not possible to use both simultaneously. Thus it is not possible, for instance, to use the RS232 Serial 2 interface for the tester and the GPIB interface for remote control of the prober. Pegasus Generated Event Lines

21.1 Prober Generated Events

21.1.1 Start of Wafer (WB) Event

The Pegasus sends this event when it starts probing a wafer. For systems with a barcode or OCR reader, the wafer id is put in the <id> field. The tester should not respond to this event.

Syntax: `WB [ I <id> ] <eol>`

21.1.2 Test First Die (TF) Event

The ***Pegasus*** sends this event when the system is ready to test the first die on the wafer. The <column> field contains the column number of the die to be tested; the <row> field contains the row number of the die to be tested. For systems using a multi-die test array, the <mask > field contains an 8-bit die present mask. For multi-die test arrays of

9-16 die, a second <mask> field will be present. The tester should respond with either a Test Complete event when the die has been tested or an Abort testing event if the wafer is to be aborted.

Syntax: `TF X <column> Y <row> , <mask> [ , <mask> ] <eol>`

21.1.3 Test Subsequent Die (TS) Event

The Pegasus sends this event when the system is ready to test each subsequent die on the wafer. Apart from the name, it identical to the Test First Die event (above).

Syntax: `TS X <column> Y <row> , <mask> [ , <mask> ] <eol>`

21.1.4 Pause (PA) Event

If the operator presses the pause softkey to temporally pause testing, the Pegasus sends this event to inform the tester that this has happened. The tester should not directly respond to this event, but ought update its display and pause its timeout count (if appropriate).

Syntax: `PA <eol>`

21.1.5 Resume After Pause (CO) Event

When the operator presses the continue softkey to resume testing, the Pegasus sends this event to inform the tester that this has happened. The tester should not directly respond to this event, but ought update its display and reset its timeout count (if appropriate).

Syntax: `CO <eol>`

21.1.6 Wafer Complete (PC) Event

The Pegasus sends this event when probing of a wafer is complete. The tester should not respond to this event. *Note: This event is not sent if the operator aborted probing on the Pegasus, or if the Pegasus received an AP response to either the TF or TS events.*

Syntax: `PC <eol>`

21.1.7 Wafer Name (_WN) Event

The prober sends this event when it receives a _WN command from the tester. The <name> field contains the **Wafer Name** string from the active wafer map. If a wafer map isn't being used or if the **Wafer Name** is empty, then this field will be empty.

Syntax: `_WN <name> <eol>`

21.1.8 Die Comment (_DC) Event

The prober sends this event when it receives a _DC command from the tester. The <comment> field contains the current die's **Comment** string from the active wafer map. If a wafer map isn't being used or if the **Comment** is empty, then this field will be empty.

Syntax: `_DC <comment> <eol>`

21.2 Tester Generated Commands

21.2.1 Test Complete (ET) Command

This command is sent in response to a test die event from the prober. The tester sends this command when it has completed testing the die. The <bin> field contains the bin number for the die. When using a multi-die test array, there is comma-separated list of bin numbers for each die in the array (whether the die is present or not). If a die is missing from the array, then a bin number of zero should be returned for that die.

Syntax: `ET <bin> [ , <bin> … ] <eol>`

21.2.2 Abort Testing (AP) Command

This command can be sent in response to a test die event from the prober. The tester sends this command if it wants to abort testing of the wafer.

Syntax: `AP <eol>`

21.2.3 Request Wafer Name (_WN) Command

This command can be sent in response to a test die event from the prober. The tester sends this command to request the **Wafer Name** string from the active wafer map. See the Wafer Name Event (above) for the prober's response.

Syntax: `_WN <eol>`

21.2.4 Request Die Comment (_DC) Command

This command can be sent in response to a test die event from the prober. The tester sends this command to request the current die's **Comment** string from the active wafer map. See the Die Comment Event (above) for the prober's response.

Syntax: `_DC <eol>`

21.3 Example Test Sequence

The minimal wafer test sequence consists of the following prober events and tester commands:

- The prober generating a WB event at the start of the wafer, which the tester doesn't respond to.
- The prober generating a TF event on contact with the first die, which the tester responds to with an ET command when the test is complete.
- The prober generating a TS event on contact with each subsequent die, which the tester responds to with ET commands when each test is complete.
- The prober generating a PC event at the end of the wafer, which the tester doesn't respond to.

Note: For simplicity this sequence ignores all optional communication (for example, if the operator presses the pause softkey on the prober).

21.3.1 REMOTE CONTROL

Chapters 22–25 describe the remote control methods that can be used with the ***Pegasus***, and the remote control command set:

22 REMOTE CONTROL USING A PC

22.1 Overview

The ***Pegasus*** prober can be controlled from a remote PC using either an RS232 link or a GPIB (IEEE 488.2) link.

When the ***Pegasus*** prober has an RS232 or GPIB interface, the PC can carry out most of the control functions available from the ***Pegasus*** keypad, plus a number of extra functions, allowing probing to be undertaken by remote control.

22.2 INF/SRQ Mode

Under RS232 or GPIB control, the ***Pegasus*** prober can respond using one of two modes, either **INF** mode or **SRQ** mode. The mode is set using the **Remote** menu (Section 6.9).

22.2.1 INF Mode

When a command is received, the ***Pegasus*** prober responds with the status byte and with either a reply (if the command has one) or with an **INF** code (see Section 25.4).

22.2.2 SRQ Mode

When a command is received, the ***Pegasus*** prober responds with the status byte and a reply if the command has one.

22.3 Text Terminator Character

Under RS232 or GPIB control, all commands and replies are ended with the text terminator character (generically labeled as <tt> in this manual)

23 REMOTE CONTROL BY RS232

To use the ***Pegasus*** under RS232 control, the optional factory-fitted RS232 Communications Facility (part number 2086-00109) must have been purchased.

For remote communications, the ***Pegasus*** uses the RS232 connector labeled **Serial 1** on the rear panel of the Controller unit (Section 19.2). The pin connections of the 9-pin 'D' connector are as follows:

Pin	Name	Function
2	RX	Data to prober
3	TX	Data from prober
4	DSR	Unused handshake line
5	GND	Signal ground
6	DTR	Unused handshake line
7	CTS	Unused handshake line
8	RTS	Unused handshake line

The ***Pegasus*** prober may be set to one of three preset RS232 parameter groups by using the **Parameters** item of the RS232 menu (Section 6.9.3). The parameter groups are as follows:

Parameter group	**115200,7,E**	**38400,7,E** (default)	**19200,7,E**	**9600,8,N**
Baud Rate	115200	38400	19200	9600
Character bits	7 bits	7 bits	7 bits	8 bits
Start bits	1 bit	1 bit	1 bit	1 bit
Stop bits	2 bits	2 bits	2 bits	2 bits
Parity	Even	Even	Even	None

When using the **9600,8,N** parameter group, the status byte is not automatically returned. If this is required, the STA command must be used to request it. For example (in **INF** mode):

PC: `LDI<tt>` where<tt> is the text terminator character

Pegasus: `INF_000<tt>`

PC: `STA<tt>`

Pegasus: `00001000<tt>`

For the other two RS232 parameter groups, the status byte is returned in two characters before the command reply. The status byte is two hexadecimal digits (the first and second characters). For example (in **INF** mode):

PC: `LDI<tt>`

Pegasus: `08 INF_000<tt>`

It is recommended that the ***Pegasus*** prober is set up and used in **INF** mode, with a text terminator character of decimal 10 (ASCII LF).

23.1 Connection to PC Serial Communications Port

A 9 way female 'D' to 9 way female 'D', NULL Modem cable, as described in the table bellow, is required to connect to the Serial Communications Port of a Personal Computer.

RS232 Signal	Pin	Pin	RS232 Signal
Screen	Case	Case	Screen
Rx	2	3	Tx
Tx	3	2	Rx
DTR	4	6 & 1	DSR & CD
GND	5	5	GND
DSR & CD	6 & 1	4	DTR
TRS	7	8	CTS
CTS	8	7	TRS

24 REMOTE CONTROL BY GPIB (IEEE 488.2)

To use the ***Pegasus*** under GPIB control, the optional factory-fitted GPIB Communications Facility (part number 2086-00109) must have been purchased.

For remote communications, the ***Pegasus*** uses the GPIB connector labeled **GPIB 1** on the rear panel of the Controller unit (Chapter 19).

Wiring of the GPIB connector and leads is to the GPIB standard.

The ***Pegasus*** prober address may be set to any GPIB device from 1 to 31 by using the **Device** item of the **GPIB** menu (Section 6.9.4).

It is recommended that ***Pegasus*** set-up in **INF** mode, with a text terminator character of decimal 10 (ASCII LF).

NOTE: the GPIB and Serial 2 interfaces share hardware resources, which means it is not possible to use both simultaneously. Thus it is not possible, for instance, to use the RS232 Serial 2 interface for the tester and the GPIB interface for remote control of the prober.

25 REMOTE COMMAND STRUCTURE

This chapter lists the complete command set for remote control of the ***Pegasus*** probers. Section 25.1 lists the 'native ***Pegasus'*** command set that is recommended for future development.

Many of the 'current' commands are compatible with the earlier AWP command set, and AWP compatibility is indicated for each command in Section 25.1.

Section 25.2 lists further obsolete 'AWP compatible' commands that are supported by the ***Pegasus*** for applications where reverse compatibility is essential; but more effective functions exist in the 'native ***Pegasus'*** command set.

Syntax

The following syntax is used:

- Note that all commands are case-sensitive; for example, the **`GTXY`** command is not the same as **`GTxy`**
- Square brackets [ ] surround optional parameters
- <tt> denotes the text terminator character (Section 22.3)
- For clarity in this manual, an underline character _ denotes a space. Wherever an underline character appears here, a space must be used in the actual command
- The **INF** codes quoted in the reply syntax below are the ones returned by the ***Pegasus*** after correct execution of the command. For further details of **INF** codes, including error codes, see Section 25.4.

25.1 Pegasus Commands

`CAPCOMMIT` – Align CAP

Description: Uses the previously saved 3 alignment positions for the CAP or PMM specified by the string 'name' to set the alignment axes for the device. Valid 'name' strings are PMM, CAP1, and CAP2...CAP6 depending on the number of CAPs that have been installed in the system.

Command syntax: `CAPCOMMIT_name<tt>`

Reply syntax: `INF_000<tt>`

Availability: Systems fitted with either a PMM and/or one or more CAPs.

AWP compatible: No

`CAPGO` – Go to CAP saved position

Description: Moves the CAP or PMM specified by the string 'name' to the previously stored position specified by 'position'. Valid 'name' strings are PMM, CAP1, and CAP2...CAP6 depending on the number of CAPs that have been installed in the system. Valid 'position' strings are CR for Cruise height, PT for

pretouch height, CO for contact height, P0, P1 and P2 for alignment positions.

Command syntax: `CAPGO_name_pos<tt>`

Reply syntax: `INF_000<tt>`

Availability: Systems fitted with either a PMM and/or one or more CAPs.

AWP compatible: No

`CAPSET` – Set CAP saved position

Description: Stores the current position of the CAP or PMM specified by the string 'name' for the specified 'pos'. Valid 'name' strings are PMM, CAP1, and CAP2...CAP6 depending on the number of CAPs that have been installed in the system. Valid 'pos' strings are CR for Cruise height, PT for pretouch height, CO for contact height, P0, P1 and P2 for alignment positions.

Command syntax: `CAPSET_name_pos<tt>`

Reply syntax: `INF_000<tt>`

Availability: Systems fitted with either a PMM and/or one or more CAPs.

AWP compatible: No

`CAPUNALIGN` – Unalign CAP

Description: Sets the CAP or PMM specified by the string 'name' to be unaligned. Any previously set alignment points are forgotten. Valid 'name' strings are PMM, CAP1, and CAP2...CAP6 depending on the number of CAPs that have been installed in the system.

Command syntax: `CAPUNALIGN_name<tt>`

Reply syntax: `INF_000<tt>`

Availability: Systems fitted with either a PMM and/or one or more CAPs.

AWP compatible: No

`CDR/CUR` – Chuck Down/Up Relative

Description: Moves the chuck down (`CDR`) or up (`CUR`) by the number of steps in the 's' parameter, relative to its present position

Command syntax: `CDR_s<tt>` or `CUR_s<tt>`

Reply syntax: `INF_000<tt>`

Availability: All models

AWP compatible: Yes

CDW/CUP – Chuck Fine Down/Up

Description: Moves the chuck to the fine down (CDW) or fine up (CUP) position. The optional parameter (a) specifies the axis to move, no parameter or Z1 moves the main chuck, Z2 moves the front flying arm (if fitted) and Z3 the right flying arm (if fitted).

If the second optional parameter p is specified as a 1, the command returns the Z coordinate following the move in the format similar to the PSS command. Command syntax: CDW [_a[,_p]]<tt> or CUP [_a[,_p]]<tt>

Reply syntax: INF_000<tt>

Availability: All models

AWP compatible: Yes

Comments: The GDW/GUP command is used to move the chuck to the Gross Up or Gross Down positions.

CMOV – Start/Stop Continuous Movement

Description: This command starts or stops continuous movement of an axis. The axis to be started or stopped is specified by the 'a' parameter, the speed & direction of movement is specified by the 'v' parameter, and where available, Slow Mode, (very slow continuous movement), is enabled or disabled by the optional 's' parameter.

The axis parameter can be: X for the X-axis, Y for the Y-axis, Z for the Z-axis, C for the Theta axis, W for the platform axis, R for the PMM's X-axis, S for the PMM's Y-axis, or T for the PMM's Z-axis (if flying arms are fitted this parameter can also be X2 for the front arm X axis, Z2 for the front arm Z axis, Y3 for the right arm Y axis or Z3 for the right arm Z axis).

The speed parameter is a percentage of the dropout speed, with 0 used to stop movement. Positive speed values move the axis forward and a negative speed values move the axis backward. Specified speeds greater than the fastest available speed will be rounded down to the fastest speed.

The 's' parameter can be 0 to disable or 1 to enable Slow Mode; the parameter is optional and defaults to disable.

Command syntax: CMOV_a,v,[s]<tt>

Reply syntax: INF_000<tt>

Availability: All models. Slow Mode is only available on Motor Types 1,2,3 and 4 at version 3.10 or later.

AWP compatible: No

Comments: To get the Motor Type and version, use the GMTR command.

CPIM – Clean Probes Immediately

Description: This command cleans the probe needles (see section 6.5.9). If the probe cleaner material needs changing, this command returns INF 700.

Command syntax: CPIM<tt>

Reply syntax: INF_000<tt>

Availability: Only models fitted with a probe cleaner

AWP compatible: No

CPTA – Train the Probe Clean Position (using the Local User Interface)

Description: Uses the system's keypad and display unit to train the system position for the probe clean position (see section 0).

Command syntax: CPTA <tt>

Reply syntax: INF_000<tt>

Availability: Only models fitted with a probe cleaner

AWP compatible: No

CO0/CO1 – Chuck Override Disable/Enable

Description: Disables (CO0) or enables (CO1) chuck override (see section 6.6.7).

Command syntax: CO0<tt> or CO1<tt>

Reply syntax: INF_000<tt>

Availability: All models

AWP compatible: Yes

DCL/LLO – Lock/Unlock Remote Mode

Description: Locks (LLO) or unlocks (DCL) remote mode on the ***Pegasus*** unit. When remote mode is unlocked, the user can exit remote mode locally using the keypad. When remote mode is locked, the user cannot exit remote mode.

Command syntax: DCL<tt> or LLO<tt>

Reply syntax: INF_000<tt>

Availability: Only on models fitted with a keypad and display unit.

AWP compatible: Yes

ER0/ER1 – Edge Sensor Signal Enable/Disable

Description: Disable (ER0) or enable (ER1) the edge sensor signal. When enabled, the ***Pegasus*** unit sends a message to the Controller if the edge sensor stage changes while the ***Pegasus*** unit is waiting to receive a command. The edge

sensor signal is used to send back state changes due to, for example, the effects of manual chuck movement.

Command syntax: ER0<tt> or ER1<tt>

Reply syntax: INF_000<tt>

Availability: All models

AWP compatible: Yes

ES0/ES1 – Edge Sensor Disable/Enable

Description: Disables (ES0) or enables (ES1) the edge sensors (see section 6.6.8).

Command syntax: ES0<tt> or ES1<tt>

Reply syntax: INF_000<tt>

Availability: All models

AWP compatible: Yes

ESC – Exit Remote Mode

Description: Exits remote mode. This command does not send a reply. However, when remote mode is re-entered, the ***Pegasus*** unit sends an INF_000 message

Command syntax: ESC<tt>

Reply syntax: No reply.

Availability: All models

AWP compatible: Yes

ESO – Edge Sensor Enable/disable

Description: Enables/disables edge sensors or reads edge sensor status (see section 6.6.8). Parameter s specifies the Z axis, Z (main chuck), Z1 (main chuck, the same a Z), Z2 (front flying arm), Z3 (right flying arm) second parameter e (optional) 0 disables, 1 enables.

Command syntax: ESO_s,e<tt>

Reply syntax: INF_000<tt> if setting flag (two parameters), or ESO_s,e if reading status of edge sensor enable flags.

Availability: All models

AWP compatible: No

GCAP – Return CAP information

Description: Returns the number of CAP and PMM devices and their serial numbers and position. The returned ‘n’ value is the number of PMM and CAP devices present. Then for each device a serial number string ‘s’ is returned following

by a single character position 'p'. Possible values for 'p' are 'L' for Left, 'R' for Right, 'F' for Front, 'B' for Back or – for Unknown.

Command syntax: `GCAP<tt>`

Reply syntax: `n[,s1p1[..,snpn]]<tt>`

Availability: Systems fitted with either a PMM and/or one or more CAPs.

AWP compatible: No

`GDW/GUP` – Chuck Gross Down/Up

Description: Moves the chuck to the Gross Down (`GDW`) or Gross Up (`GUP`) position. The optional parameter (a) specifies the axis to move, no parameter or Z1 moves the main chuck, Z2 moves the front flying arm (if fitted) and Z3 the right flying arm (if fitted).

If the second optional parameter p is specified as a 1, the command returns the Z coordinate following the move in the format similar to the PSS command.

Command syntax: `GDW [_a[,_p]]<tt>` or `GUP [_a[,_p]]<tt>`

Reply syntax: `INF_000<tt>`

Availability: All models

AWP compatible: Yes

Comments: The CDW/CUP command is used to move the chuck to the Fine Down or Fine Up positions. The GUP command may be used to move the chuck to a safe gross lift height ready for probing the first die. Subsequent Z movements to move the probes onto and off of the die under test should use the CUP and CDW command. If edge sensors are being used this will dynamically adjust the gross lift value to track the wafer surface. Therefore it is advisable not to use the GUP command during the probing process until the start of the next wafer. Doing so may cause unexpected results.

`GID` – Get Model ID

Description: Returns model information about the ***Pegasus*** unit in the 's' parameter. The 's' parameter consists of the ***Pegasus*** model name, followed by a semi-colon, followed by a list of options separated by commas. Options can include:

- LM – Compatible with LabMaster.
- Pins – Optional chuck load pins fitted.
- Platform – Optional motorised platform fitted.
- PR – Optional PR camera fitted.
- PMM – Optional motorised PMM fitted.

- CAP – Optional motorised CAPs fitted
- Z2 – Front flying arm
- Z3 – Right flying arm
- Reader – Optional OCR
- Robot – Robot loader
- Cleaner – Prober cleaner support

Command syntax: `GID<tt>`

Reply syntax: `s<tt>`

Availability: All models

AWP compatible: Yes

Comment: Also see the `GSN` and `VSN` commands.

`GHB` – Get Hardware Build

Description: Return the hardware build of the ***Pegasus*** unit in the 'n' parameter

Command syntax: `GHB<tt>`

Reply syntax: `n<tt>`

Availability: All models

AWP compatible: No

Comment: Also see the `GID` and `VSN` commands.

`GIL` – Get Input Line

Description: Reads the input line specified in the 'n' parameter and returns the value of the line in the 'f' parameter (either `0` for clear or `1` for set)

Command syntax: `GIL_n<tt>`

Reply syntax: `GIL_n,f<tt>`

Availability: All models

AWP compatible: No

`GMTR` – Get Motor Information

Description: Returns information about the Motor Card, for the specified axis. The 'a' parameter may be X (for the chuck X axis), Y (for the chuck Y axis), Z (for the chuck Z axis), C (for the chuck theta axis), W (for the platform), R (for the PMM X axis), S (for the PMM Y axis) or T (for the PMM Z axis). The information returned varies depending on the optional 'i' parameter. If the parameter is omitted, the Card Type number is returned in the 'i1' parameter and the Card Version number in the 'i2' parameter. If 'i' is specified as L, the motor limits are returned. In this case 'i1' returns the lower limit and 'i2' the

upper limit. For the linear motors these limits are returned in microns. For the C axis, the units are in milli-degrees.

Command syntax: GMTR_a[,i]<tt>

Reply syntax: GMTR_i1,i2<tt>

Availability: All models

AWP compatible: No

Comment: Current Motor Types are: 0 - Pre-Mk3 Stepper; 1 - Single Axis Mk3 Stepper; 2 - First axis of Three-Axis Mk Stepper; 3 - Second axis of Three-Axis Mk3 Stepper; 4 - Third axis of Three-Axis Mk3 Stepper.

GPMM – Get PMM Information

Description: Returns information about the PMM (if fitted). Currently only the number of axes is returned in the 'n' parameter, *although additional parameters may be added in future software versions*.

Command syntax: GPMM<tt>

Reply syntax: n<tt>

Availability: Only models fitted with a motorised PMM

AWP compatible: No

GROUP – Group a number of CAP devices

Description: Includes the specified CAP or PMM devices in a group. Then as one of the CAP devices are subsequently moved, all the other CAP devices are moved in comparable alignment movement such that the relative position of the devices remains the same. Valid 'name' strings are PMM, CAP1, and CAP2...CAP6 depending on the number of CAPs that have been installed in the system.

Command syntax: GROUP_name1[,name2[…,namen]]<tt>

Reply syntax: INF_000<tt>

Availability: Systems fitted with either a PMM and/or one or more CAPs.

AWP compatible: No

GSN – Get Serial Number

Description: Return the serial number of the ***Pegasus*** unit in the 's' parameter

Command syntax: GSN<tt>

Reply syntax: s<tt>

Availability: All models

AWP compatible: No

Comment: Also see the GID and VSN commands.

GTS – Go To Position

Description: This command moves the axis specified by the 'a' parameter to the position specified by the 'p' parameter.

The axis parameter can be: X for the X-axis, Y for the Y-axis, Z for the Z-axis, C for the Theta axis, W for the platform axis, R for the PMM's X-axis, S for the PMM's Y-axis, T for the PMM's Z-axis, X2 for the front flying arm X axis, Z2 for the front flying arm Z axis, Y3 for the right flying arm Y axis or Z3 for the right flying arm Z axis. The position is in units of millidegrees for Theta axis, and in units of microns for all other axes.

In addition, if the axis parameter is XY the positions of both the X and Y axes can be specified (separated by a comma), and if the axis parameter is RS the positions of both the PMM's X and Y axes can be specified (separated by a comma).

Command syntax: `GTS_a,p<tt>`

Reply syntax: `INF_000<tt>`

Availability: All models

AWP compatible: No

GTTH – Go To Theta Position

Description: Rotates the chuck to the Theta-axis position in millidegrees specified in the 't' parameter

Command syntax: `GTTH_t<tt>`

Reply syntax: `INF_000<tt>`

Availability: All models

AWP compatible: No

GTXY – Go To X,Y Position

Description: Moves the chuck to the X-axis and Y-axis position in microns specified in the 'x' and 'y' parameters

Command syntax: `GTXY_x,y<tt>`

Reply syntax: `INF_000<tt>`

Availability: All models

AWP compatible: No

GTxy – Go To Uncalibrated X,Y Position

Description: Moves the chuck to the uncalibrated X-axis and Y-axis position in microns specified in the 'x' and 'y' parameters

Command syntax: `GTxy_x,y<tt>`

Reply syntax: INF_000<tt>

Availability: All models

AWP compatible: No

IDW/IUP – Inker Down/Up

Description: Lowers (IDN) or raises (IUP) the inkers on DSP models to allow the chuck to be moved in and out of the probing area.

Command syntax: IDW<tt> or IDN<tt>

Reply syntax: INF_000<tt>

Availability: DSP models only

AWP compatible: Yes

INK – Fire Inker

Description: Fires the inker number specified in the optional 'n' parameter. If this parameter is omitted, inker 1 will be fired.

Command syntax: INK[_n]<tt>

Reply syntax: INF_000<tt>

Availability: All models

AWP compatible: Backward compatible only

Comments: The inker number parameter was not supported by the AWP

LDA – Move to Alignment Zone Centre

Description: Moves to the centre of the camera alignment zone and moves the chuck to the camera lift height

Command syntax: LDA<tt>

Reply syntax: INF_000<tt>

Availability: All models

AWP compatible: Yes

LDALN – Run Wafer Alignment Screen

Description: If the parameter is '1' then the system will drops into local mode and run the Focus Height Screen, before running the Alignment Screen, to enable the user to align the wafer on the chuck (see section 5.1)

If the parameter is omitted or '0', the system drops straight into the Alignment Screen. Returns to Remote mode on exit.

Command syntax: LDALN[_n]<tt>

Reply syntax: INF_000<tt>

Availability: Models with a Keypad fitted.

AWP compatible: No

LDB – Move to Load Position

Description: Moves the manual load position following a LDS command

Command syntax: LDB<tt>

Reply syntax: INF_000<tt>

Availability: All models

AWP compatible: Yes

LDC – Move to Probing Zone Centre

Description: Moves to the centre of the probing zone and moves the chuck to the gross lift height unless the optional parameter 'n' is set to 0.

Command syntax: LDC[_n]<tt>

Reply syntax: INF_000<tt>

Availability: All models

AWP compatible: Yes

LDI – Initial Load

Description: This command references the axis specified in the 'a' parameter, or all the chuck axes (X, Y, Z, and Theta) if no axis is specified.

The axis parameter can be: Z for the Z-axis, C for the Theta axis, W for the platform axis, LD for the loader device, PMM for all the PMM's axes, Z2 for a front flying arm or Z3 for a right flying arm

Command syntax: LDI[_a]<tt>

Reply syntax: INF_000<tt>

Availability: All models

AWP compatible: Yes

LDM / LDL – Move to Manual Load Position

Description: Moves to the manual load position and moves the chuck to the Z reference height

Command syntax: LDM<tt>

Reply syntax: INF_000<tt>

Availability: All models

AWP compatible: Yes (LDL only)

LDPH – Run Probe Height Screen

Description: Drops into local mode and runs the Probe Height screen, to enable users to set the Probe Height of a wafer on the Chuck (see Chapter 10). Following the probe height screen, if the optional 'n' parameter is non-zero, the chuck is moved to the probing centre. Returns to Remote mode on exit.

Command syntax: `LDPH[_n]<tt>`

Reply syntax: `INF_000<tt>`

Availability: Models with a Keypad fitted.

AWP compatible: No

LDR - Move to Robot Load Position

Description: Moves to the robot load position and moves the chuck to the gross lift height. If the optional 'n' parameter is non-zero the robot is moved to its load state.

Command syntax: `LDR[_n]<tt>`

Reply syntax: `INF_000<tt>`

Availability: Only models fitted with a robot

AWP compatible: Yes

LDS – Move to Change Probe Card Position

Description: Move to the position for changing the Probe Card

Command syntax: `LDS<tt>`

Reply syntax: `INF_000<tt>`

Availability: All models

AWP compatible: Yes

LI0/LI1 – Lamp Off/On

Description: Turns the microscope lamp off (`LI0`) or on (`LI1`)

Command syntax: `LI0<tt>` or `LI1<tt>`

Reply syntax: `INF_000<tt>`

Availability: All models

AWP compatible: Yes

LMC – Start Program Download

Description: Begins download of program points to the program name specified in the optional 's' parameter. If this parameter is omitted, the program name will be 'Noname'. Note: This command clears the program currently in program memory

Command syntax: LMC[_s]<tt>

Reply syntax: INF_000<tt>

Availability: Only models fitted with the program download software option.

AWP compatible: Backwards compatible only

Comments: The program name parameter was not supported by the AWP

LME – End Program Download

Description: Ends download of a program points

Command syntax: LME<tt>

Reply syntax: INF_000<tt>

Availability: Only models fitted with the program download software option

AWP compatible: Yes

LMP – Download Program Point

Description: Downloads a program point.

Command syntax: LMP_x_y<tt>

Reply syntax: INF_000<tt>

Availability: Only models fitted with the program download software option

AWP compatible: Yes

MSHTDWN – Motor Shut Down

Description: Powers down the motors, in the Stage area specified by the optional ‘a’. Valid areas are:

CHUCK (powers down X, Y, Z and C), PLATFORM and PMM (R, S and T). If no ‘a’ parameter is supplied, all areas will power down.

Command syntax: MSHTDWN_[a]<tt>

Reply syntax: INF_000<tt>

Availability: Models with Motor Types 5 or greater or Motor Types 1,2,3 and 4 at version 3.10 or later.

AWP compatible: No

Comments: This command improves low current and noise measurements, on Failure Analysis type equipment, by turning off the electronic switching circuits associated with stepper motor drives.

Use of the command, on axis without feedback may cause loss of position.

To get the Motor Type and version, use the GMTR command.

NXD – Next Die Down

Description: Moves to the die below the current die

Command syntax: NXD<tt>

Reply syntax: INF_000<tt>

Availability: All models

AWP compatible: Yes

NXF – Finish Indexing Mode

Description: Exits indexing mode

Command syntax: NXF<tt>

Reply syntax: INF_000<tt>

Availability: All models

AWP compatible: Yes

NXL – Next Die Left

Description: Moves to the die to the left of the current die

Command syntax: NXL<tt>

Reply syntax: INF_000<tt>

Availability: All models

AWP compatible: Yes

NXR – Next Die Right

Description: Moves to the die to the right of the current die

Command syntax: NXR<tt>

Reply syntax: INF_000<tt>

Availability: All models

AWP compatible: Yes

NXT - Next Die

Description: Enters indexing mode and moves to the first die to be probed, or moves to the next die to be probed if already in indexing mode. Indexing mode is exiting using the NXF command (above).

Command syntax: NXT<tt>

Reply syntax: INF_000<tt>

Availability: All models

AWP compatible: Yes

NXU - Next Die Up

Description: Moves to the die above the current die

Command syntax: NXU<tt>

Reply syntax: INF_000<tt>

Availability: All models

AWP compatible: Yes

PAOD – Get/Set Flying Arm Overlap Distance

Description: This command gets or sets the overlap distance for the flying arm specified in the 'a' argument. The 'a' argument is Z2 for the front arm or Z3 for the right arm. The overlap distance is set if the optional 'd' argument is specified. The 'd' argument is the overlap distance in mm for that arm, and must be in the range 0 to 80 (an overlap distance of 0 disables overlap *for that arm*). The current value is returned as a reply. Thus if no 'd' parameter is specified, this command can be used to return the value without changing the current value.

Command syntax: PAOD_a[,d]<tt>

Reply syntax: PAOD_a,d<tt>

Availability: Only on models fitted with flying arms

AWP compatible: No

Comments: This command should normally be used twice, once for each flying arm.

PCE – Get/Set Contact Enhancement

Description: This command sets the contact enhancement if the optional argument 'v' is specified (see section 6.6.9). This must be a decimal integer in the range 1 to 250. The current value of the contact enhancement is returned as a reply. Thus if no 'v' parameter is specified, this command can be used to return the value without changing the current value.

Command syntax: PCE[_v]<tt>

Reply syntax: PCE_v<tt>

Availability: All models.

AWP compatible: No

Comments: To get/set the damper enhancement, use the PDE command.

PCL – Set/ Clear limits to the probing area

Description: This command restricts the probing area from the entire probing region to a sub-area (normally a single die) when the four parameters x1,y1,x2,y2 are specified. These represent the bottom-left and top-right corners of the bounding box for the limits. They are floating point numbers specifying

values in mm. If no parameters are specified then this restricted region is cleared, and the normal probing area is available.

Command syntax: `PCL[_x1,y1,x2,y2]<tt>`

Reply syntax: `PCL[_x1,y1,x2,y2]<tt>`

Availability: All models.

AWP compatible: No

`PCPA` – Alignment Zone Centre Position Parameter

Description: Returns (and optionally sets) the centre position of the camera alignment zone in units of microns in the 'x' and 'y' parameters

Command syntax: `PCPA[_x,y]<tt>`

Reply syntax: `PCPA_x,y<tt>`

Availability: All models

AWP compatible: No

`PCPP` – Primary Probing Zone Centre Position Parameter

Description: Returns (and optionally sets) the centre position of the primary probing zone in units of microns in the 'x' and 'y' parameters

Command syntax: `PCPP[_x,y]<tt>`

Reply syntax: `PCPP_x,y<tt>`

Availability: All models

AWP compatible: No

`PCPS` – Secondary Probing Zone Centre Position Parameter

Description: Returns (and optionally sets) the centre position of the secondary probing zone in units of microns in the 'x' and 'y' parameters

Command syntax: `PCPS[_x,y]<tt>`

Reply syntax: `PCPS_x,y<tt>`

Availability: Only on models fitted with a dual chuck

AWP compatible: No

`PDE` – Get/Set Damper Enhancement

Description: This command sets the damper enhancement if the optional argument 'v' is specified (see section 6.6.10). This must be a decimal integer in the range 1 to 250. The current value of the damper enhancement is returned as a reply. Thus if no 'v' parameter is specified, this command can be used to return the value without changing the current value.

Command syntax: `PDE[_v]<tt>`

Reply syntax: PDE_v<tt>

Availability: All models.

AWP compatible: No

Comments: To get/set the contact enhancement, use the PCE command.

PDW/PUP – Pins Down/Up

Description: Lowers (PDW) or raises (PUP) the load pins

Command syntax: PDW<tt> or PUP<tt>

Reply syntax: INF_000<tt>

Availability: Only models fitted with load pins

AWP compatible: Yes

PIMD – Missing Die During Indexing

Description: Returns (and optionally sets) the maximum number of missing die during indexing in the 'n' parameter (see section 6.4.4).

Command syntax: PIMD[_n]<tt>

Reply syntax: PIMD_n<tt>

Availability: All models

AWP compatible: No

PEXXY – Read / set exclusion zone

Description: Returns and optionally sets the exclusion zone. If the 'e' parameter is specified as 0 the exclusion zone is disabled, if non-zero it is enabled. If the 's' shape parameter is 0 the exclusion zone is circular, otherwise it is rectangular. If the shape is circular then the third parameter is taken as the wafer diameter. If the shape is rectangular, then the third and fourth parameters are taken as the wafer width and height.

Command syntax: PEXXY_[e,0,d]<tt> or PEXXY_[e,1,w,h]<tt>

Reply syntax: PEXXY_e,0,d<tt> or PEXXY_e,1,w,h<tt>

Availability: All models

AWP compatible: No

PINK – Inker Type Parameter

Description: Returns (and optionally sets) the Pegasus Inker type in the 'n' parameter (see section 6.8.1). Contact Wentworth Laboratories for a current list of Inker types.

Command syntax: PINK[_n]<tt>

Reply syntax: PINK_n<tt>

Availability: All models

AWP compatible: No

PISDT – Inker Sledge Down Time

Description: Returns (and optionally sets) the Inker Sledge Down Time, in units of 1/10 Seconds, in the 'n' parameter

Command syntax: PISDT[_n]<tt>

Reply syntax: PISDT_n<tt>

Availability: Systems with an Inker Sledge fitted

AWP compatible: No

PLPC – Probe Change Position Parameter

Description: Returns (and optionally sets) the probe change position in units of microns in the 'x' and 'y' parameters

Command syntax: PLPC[_x,y]<tt>

Reply syntax: PLPC_x,y<tt>

Availability: All models

AWP compatible: No

PLPM – Manual Load Position Parameter

Description: Returns (and optionally sets) the manual load position in units of microns in the 'x' and 'y' parameters

Command syntax: PLPM[_x,y]<tt>

Reply syntax: PLPM_x,y<tt>

Availability: All models

AWP compatible: No

PLPR – Robot Load Position Parameter

Description: Returns (and optionally sets) the robot load position in units of microns in the 'x' and 'y' parameters

Command syntax: PLPR[_x,y]<tt>

Reply syntax: PLPR_x,y<tt>

Availability: Only models fitted with a robot

AWP compatible: No

PPRO – Read / set active program

Description: Returns and optionally sets the active program in program mode. If the 'p' parameter is specified validates that this is a valid program name and if so sets it to be the currently active program.

Command syntax: PPRO_[p]<tt>

Reply syntax: PPRO_p<tt>

Availability: Models supplied with program mode

AWP compatible: No

PSGM – Get Z Position

Description: Returns the current z-axis position in microns in the 'z' parameter

Command syntax: PSGM<tt>

Reply syntax: PSGM_z<tt>

Availability: All models

AWP compatible: No

PSLL – Stepper Lower Limit Parameter

Description: Returns (and optionally sets) the lower limit of the axis specified by the 'a' parameter. The limit is specified in the 'l' parameter.

The axis parameter can be: W for the platform axis. The position is in units of microns.

Command syntax: PSLL_a[,l]<tt>

Reply syntax: PSLL_a,l<tt>

Availability: All models.

AWP compatible: No

PSLU – Stepper Upper Limit Parameter

Description: Returns (and optionally sets) the upper limit of the axis specified by the 'a' parameter. The limit is specified in the 'l' parameter.

The axis parameter can be: W for the platform axis. The position is in units of microns.

Command syntax: PSLU_a[,l]<tt>

Reply syntax: `PSLU_a,l<tt>`

Availability: All models.

AWP compatible: No

`PSP` – Get Pins Position

Description: Returns the current pins position in the 'f' parameter (either `0` for lowered or `1` for raised)

Command syntax: `PSP<tt>`

Reply syntax: `PSP_f<tt>`

Availability: All models

AWP compatible: Yes

`PSS` – Get Position

Description: Returns the current position of the axis is specified by the 'a' parameter in the 'p' parameter.

The axis parameter can be: X for the X-axis, Y for the Y-axis, Z for the Z-axis, C for the Theta axis, W for the platform axis, R for the PMM's X-axis, S for the PMM's Y-axis, T for the PMM's Z-axis, X2 for the front flying arm X axis, Z2 for the front flying arm Z axis, Y3 for the right flying arm Y axis or Z3 for the right flying arm Z axis. The position is in units of millidegrees for Theta axis, and in units of microns for all other axes.

In addition, if the axis parameter is XY the positions of both the X and Y axes are returned (separated by a comma), and if the axis parameter is RS the positions of both the PMM's X and Y axes are returned (separated by a comma).

Command syntax: `PSS_a<tt>`

Reply syntax: `PSS_a,p<tt>`

Availability: All models

AWP compatible: No

PSTH – Get Theta Position

Description: Returns the current Theta-axis position in millidegrees in the 't' parameter

Command syntax: PSTH<tt>

Reply syntax: PSTH_t<tt>

Availability: All models

AWP compatible: No

PSXY - Get X,Y Position

Description: Returns the current X-axis and Y-axis positions in microns in the 'x' and 'y' parameters

Command syntax: PSS_a<tt>

Reply syntax: PSS_a,p<tt>

Availability: All models

AWP compatible: No

PSxy - Get Uncalibrated X,Y Position

Description: Returns the current uncalibrated X-axis and Y-axis positions in microns in the 'x' and 'y' parameters

Command syntax: PSxy<tt>

Reply syntax: PSxy_x,y<tt>

Availability: All models

AWP compatible: No

PSZM – Get Z Fine Lifted Position

Description: Returns the current Fine Lifted position (current distance above the gross lift height) in units of microns in the 'z' parameter

Command syntax: PSZM<tt>

Reply syntax: PSZM_z<tt>

Availability: All models

AWP compatible: No

Comments: The PSG command is used to return the current Z-axis position

PTST – Tester Parameters

Description: Returns (and optionally sets) the Tester type in the 't', Test Array in the 'a' and Test Bins in the 'b' parameter. Parameters 'a' and 'b' are optional (see section 6.7.2, 6.7.4 and 6.7.6).

If two parameters are passed, then 't' sets the tester type; and 'a' sets the Test Array for Multi-Die Testers or the Test Bins for non-Multi-Die Testers.

Contact Wentworth Laboratories for details of Tester types and Test Arrays.

Command syntax: `PTST_[t[,a[,b]]]<tt>`

Reply syntax: `PTST_t_a_b<tt>`

Availability: All models

AWP compatible: No

`PTTL` – Read / set TTL tester outputs

Description: Returns and optionally sets the TTL tester outputs. Each bit should be either a 1 or a 0. 's' specifies start-of-test, 'e' end-of-test, 'p' pass, 'w' end-of-wafer (see section 6.7.6).

Command syntax: `PTTL_[s,e,p,w]<tt>`

Reply syntax: `PTTL_s,e,p,w<tt>`

Availability: All models

AWP compatible: No

`PTTO` – Tester Timeout Parameter

Description: Returns (and optionally sets) the tester timeout in units of seconds in the 't' parameter (see section 6.7.3).

Command syntax: `PTTO[_t]<tt>`

Reply syntax: `PTTO_t<tt>`

Availability: All models

AWP compatible: No

`PZCD` – Z Chuck Delay Parameter

Description: Returns (and optionally sets) the Fine Lift delay in units of milliseconds in the 't' parameter (see sections 6.6.11 and 6.6.12). The before Fine Lift delay is specified by setting the 'c' parameter to `B` and the after Fine Lift delay is specified by setting the 'c' parameter to `A`

Command syntax: `PZCD_c[,t]<tt>`

Reply syntax: `PZCD_c,t<tt>`

Availability: All models

AWP compatible: No

`PZCL` – Alignment Lift Parameter

Description: Returns (and optionally sets) the camera alignment lift height in units of microns in the 'z' parameter (see section 6.6.5).

Command syntax: PZCL[_z]<tt>

Reply syntax: PZCL_z<tt>

Availability: All models

AWP compatible: No

PZPD – Pins Drop Parameter

Description: Returns (and optionally sets) the load pins drop height in units of microns in the 'z' parameter (see section 6.6.6).

Command syntax: PZPD[_z]<tt>

Reply syntax: PZPD_z<tt>

Availability: Only models fitted with load pins

AWP compatible: No

RAD – Read Initial Index Direction

Description: Returns the initial index direction in the 'c' parameter, where L is left movement and R is right movement (see section 6.4.7)

Command syntax: RAD<tt>

Reply syntax: RAD_c<tt>

Availability: All models

AWP compatible: Yes

RBO – Read Back-off Distance

Description: Returns the jaw back-off distance in units of hundredth of an inch in the 'z' parameter

Command syntax: RBO<tt>

Reply syntax: RBO_z<tt>

Availability: Only DSP models

AWP compatible: Yes

RDI – Read Probing Zone Diameter

Description: Returns the probing zone's diameter in units of 10 microns in the 'n' parameter (see section 6.1). A value of zero means that the probing zone is disabled. This setting is only used when the probing zone's shape is circular

Command syntax: RDI_n<tt>

Reply syntax: INF_000<tt>

Availability: All models

AWP compatible: Yes

RDW – Read Off-Site Steps

Description: Returns the number of off-site steps in the 'n' parameter (see section 6.4.5).

Command syntax: RDW<tt>

Reply syntax: RDW_n<tt>

Availability: All models

AWP compatible: Yes

RD:RID – Return reader ID

Description: Returns the identifier string for the attached reader.

Command syntax: RD:RID<tt>

Reply syntax: idstring<tt>

Availability: Models with an OCR

AWP compatible: No

RD:TRP – Train the Reader Position (using the Local User Interface)

Description: Uses the system's keypad and display unit to train the system position for the attached OCR.

Command syntax: RD:TRP <tt>

Reply syntax: INF_000<tt>

Availability: Models with an OCR

AWP compatible: No

REW – Read On-Site Search Steps

Description: Returns the maximum number of on-site steps in the 'n' parameter (see section 6.4.6).

Command syntax: REW<tt>

Reply syntax: REW_n<tt>

Availability: All models

AWP compatible: Yes

RID – Read Inker Offset

Description: Returns the inker offset in the 'o' parameter for 'n'th inker. If 'n' is omitted it defaults to the first inker (see section 6.8.5).

Command syntax: RID[_n]<tt>

Reply syntax: RID_o<tt>

Availability: All models

AWP compatible: Yes

`RIP` – Read Inker Pulse Width

Description: Returns the inker pulse width in units of 5 milliseconds in the 't' parameter (see section 6.8.4).

Command syntax: `RIP<tt>`

Reply syntax: `RIP_t<tt>`

Availability: All models

AWP compatible: Yes

`RKFM` – Read Z Fine Lift

Description: Returns the Z Fine Lift in units microns in the 'z' parameter, the optional parameter 'a' specifies the Z axis, no value of Z1 is the main chuck Z axis, Z2 if the front flying arm Z axis and Z3 is the right flying arm Z axis (see section 6.6.2).

Command syntax: `RKFM [_a]<tt>`

Reply syntax: `RKFM_z<tt>`

Availability: All models

AWP compatible: No

`RKGM` – Read Z Gross Lift

Description: Returns the Z Gross Lift in units of microns to the value in the 'z' parameter, the optional parameter 'a' specifies the Z axis, no value of Z1 is the main chuck Z axis, Z2 if the front flying arm Z axis and Z3 is the right flying arm Z axis (see section 6.6.1).

Command syntax: `RKGM [_a]<tt>`

Reply syntax: `RKGM_z<tt>`

Availability: All models

AWP compatible: No

`RL` – Read Manual Load Position

Description: Returns the manual load position to the value in the 'n' parameter, where `1` is the front left side of the stage, `2` is the front right side of the stage, and `3` is the front centre of the stage

Command syntax: `RL<tt>`

Reply syntax: `INF_000<tt>`

Availability: All models

AWP compatible: Yes

Comment: This command is only provided for backwards compatibility with the AWP series. If backward compatibility is not required, this command should not be used and the `PLPM` command should be used instead

`RLA` – Read Microscope Lamp Switching Mode

Description: Returns the Microscope Lamp's switching mode in the 'n' parameter, where:

`0` = No automatic switching

`1` = Lamp switched off at start of run

`2` = Lamp switched on at end of run

`3` = Combination of 1 and 2

(see section 6.4.9).

Command syntax: `RLA<tt>`

Reply syntax: `RLA_n<tt>`

Availability: All models

AWP compatible: Yes

`ROT` – Rotate in Theta

Description: Rotates the chuck specified amount in milli-degrees. However the theta position that the remote interface maintains is unchanged. Thus subsequent PSS C or GTS C commands will act as if no rotation had occurred. This is useful for chucks that can rotate by 180 degrees whilst the controlling software can assume that no rotation has occurred. Calling this command with a theta angle of 0, clears any previously set rotation amount and restores the chuck to its original orientation.

The command returns the current rotation amount or 0 if none has been set.

Command syntax: `ROT [_p]<tt>`

Reply syntax: `ROT_p<tt>`

Availability: All models

AWP compatible: No

`RRX` – Read Probing Zone Width

Description: Returns the probing zone's width in units of 10 microns in the 'x' parameter. This setting is only used when the probing zone's shape is rectangular

Command syntax: `RRX<tt>`

Reply syntax: `RRX_x<tt>`

Availability: All models

AWP compatible: Yes

RRY – Read Probing Zone Height

Description: Returns the probing zone's height in units of 10 microns in the 'y' parameter. This setting is only used when the probing zone's shape is rectangular

Command syntax: RRY<tt>

Reply syntax: RRY_y<tt>

Availability: All models

AWP compatible: Yes

RRZ – Read Probing Zone Shape

Description: Returns the probing zone's shape in the 'n' parameter, where 0 is circular and 1 is rectangular

Command syntax: RRZ<tt>

Reply syntax: RRZ_n<tt>

Availability: All models

AWP compatible: Yes

RSWM – Read Z Search Window

Description: Returns the Z-axis search window in units of microns in the 'z' parameter, the optional parameter 'a' specifies the Z axis, no value of Z1 is the main chuck Z axis, Z2 if the front flying arm Z axis and Z3 is the right flying arm Z axis (see section 6.6.3).

Command syntax: RSWM [_a]<tt>

Reply syntax: RSWM_z<tt>

Availability: All models

AWP compatible: No

RXM – Read X Index

Description: Returns the X index in units of 10 microns in the 'x' parameter (see section 6.2).

Command syntax: RXM<tt>

Reply syntax: RXM_x<tt>

Availability: All models

AWP compatible: Yes

RYM – Read Y Index

Description: Returns the Y index in units of 10 microns in the 'y' parameter (see section 6.3).

Command syntax: RYM<tt>

Reply syntax: RYM_y<tt>

Availability: All models

AWP compatible: Yes

RZIM – Read Z Overtravel

Description: Returns the Z-axis overtravel in units of microns in the 'z' parameter, the optional parameter 'a' specifies the Z axis, no value of Z1 is the main chuck Z axis, Z2 if the front flying arm Z axis and Z3 is the right flying arm Z axis (see section 6.6.4).

Command syntax: RZIM [_a]<tt>

Reply syntax: RZIM_z<tt>

Availability: All models

AWP compatible: No

SOL – Set Output Line

Description: Sets the output line specified in the 'n' parameter and to the value in the 'f' parameter (either 0 for clear or 1 for set).

This command requires in-depth knowledge of the Pegasus Input and output, (I/O), hardware. If you require direct access to I/O, contact Wentworth Laboratories Ltd, for further advice.

Command syntax: SOL_n,f<tt>

Reply syntax: INF_000<tt>

Availability: All models

AWP compatible: No

SQAC – Save the state of the CAP positions in flash

Description: The current state of the PMM and CAPS are saved into flash.

Command syntax: SQAC<tt>

Reply syntax: INF_000<tt>

Availability: Systems fitted with either a PMM and/or one or more CAPs.

AWP compatible: No

`STA` – Status

Description: Returns the status word

Command syntax: `STA`<tt>

Reply syntax: `xxxxxxxx`<tt>

Availability: All models

AWP compatible: Yes

`STP` – Extended Status

Description: Returns the extended status information

Command syntax: `STP`<tt>

Reply syntax: `gpeeooouiwwlcvvtt`<tt>

Availability: All models

AWP compatible: Yes

`TO0/TO1` – Tester Disable/Enable

Description: Disables (`TO0`) or enables (`TO1`) the local tester interface (see section 6.7.1).

Command syntax: `TO0`<tt> or `TO1`<tt>

Reply syntax: `INF_000`

Availability: All models

AWP compatible: Yes

`TST` – Test

Description: Test die(s) using the currently selected Pegasus Tester type. The reply is Tester Type, and Test Array or Test Bin specific.

AWP Compatible Tester selected

The pass/fail result is returned in the 'p' parameter (either P for pass or F for fail); and the inker line number, either 1 or 3, is returned in the 'b' parameter.

Non-Multi-Die Tester selected

The Bin number is returned in the 'b' parameter; this is read from the Pass lines in use, as a binary number, in the range $0 \rightarrow \left(2^{TestBins}\right) - 1$; where Pass1 = 1, Pass2 = 2, Pass = 4, Pass5 = 8, Pass6 = 16 and Pass7 = 32.

E.g. if the Pass level is high, with four Test Bins; and Pass1 = 1, Pass2 = 1, Pass3 = 1 & Pass4 = 0, the Bin result will be 1 + 2 + 4 = 7. Unused Pass lines are ignored.

Multi-Die Tester selected

A pass/fail result is returned in the 'p' parameters (either P for pass or F for fail), for each die in the Test Array.

Command syntax: `TST<tt>`

Reply syntax: AWP Tester `pb<tt>`

non-Multi-Die Testers `b<tt>`

Multi-Die Testers p[,p…..]<tt>

Availability: All models

AWP compatible: Backward compatible only

`TSTLR` – Return delayed test results

Description: This command is used to retrieve the test results for testers that generate delayed test results.

Non-Multi-Die Tester selected

The Bin number is returned in the 'b' parameter; this is read from the Pass lines in use, as a binary number, in the range $0 \rightarrow \left(2^{TestBins}\right)-1$; where Pass1 = 1, Pass2 = 2, Pass = 4, Pass5 = 8, Pass6 = 16 and Pass7 = 32.

E.g. if the Pass level is high, with four Test Bins; and Pass1 = 1, Pass2 = 1, Pass3 = 1 & Pass4 = 0, the Bin result will be 1 + 2 + 4 = 7. Unused Pass lines are ignored.

Multi-Die Tester selected

A pass/fail result is returned in the 'p' parameters (either P for pass or F for fail), for each die in the Test Array.

Command syntax: `TSTLR<tt>`

Reply syntax: non-Multi-Die Testers `b<tt>`

Multi-Die Testers p[,p…..]<tt>

Availability: Models connected to testers that provide delayed test results

AWP compatible: No

`UITP` – Train a System Position (using the Local User Interface)

Description: Uses the system's keypad and display unit to train the system position specified by the 'name' parameter. The 'name' parameter can be one of the following: PPP for the primary probing position, SPP for the secondary probing position, CCP for the camera centre position, MLP for the manual load position, RLP for the robot load position, or PCP for the probe change position.

Command syntax: `UITP_<name><tt>`

Reply syntax: `INF_000<tt>`

Availability: All models

AWP compatible: No

VAC – Vacuum Control

Description: Returns (and optionally turns on/off) the vacuum line specified by the 'n' parameter. The 'n' parameter can be one of the following: CV for the chuck vacuum, SCV for the secondary chuck vacuum (if a second chuck is fitted), PV for the pins vacuum (if load pins are fitted), or a number specifying the vacuum line number.

Command syntax: `VAC_n[,f]<tt>`

Reply syntax: `VAC n,f<tt>`

Availability: All models

AWP compatible: No

VACE – Vacuum Enable

Description: Returns (and optionally changes) the enabled/disabled state ('f' is either `0` for disabled or `1` for enabled) of the vacuum line specified by the 'n' parameter. The 'n' parameter can be one of the following: CV for the chuck vacuum, SCV for the secondary chuck vacuum (if a second chuck is fitted), PV for the pins vacuum (if load pins are fitted), or a number specifying the vacuum line number.

Command syntax: `VACE_n[,f]<tt>`

Reply syntax: `VACE_n,f<tt>`

Availability: All models

AWP compatible: No

VSN – Get Software Version Number

Description: Return the software version number of the ***Pegasus*** unit in the 's' parameter

Command syntax: `VSN<tt>`

Reply syntax: `s<tt>`

Availability: All models

AWP compatible: Yes

Comment: Also see the `GID` and `GSN` commands.

WAD – Write Initial Index Direction

Description: Sets the initial index direction to the value in the 'c' parameter, where L is left movement and R is right movement (see section 6.4.7).

Command syntax: WAD_c<tt>

Reply syntax: INF_000<tt>

Availability: All models

AWP compatible: Yes

WBO – Write Back-off Distance

Description: Set the jaw back-off distance in units of hundredth of an inch to the value in the 'z' parameter

Command syntax: WBO_z<tt>

Reply syntax: INF_000<tt>

Availability: Only DSP models

AWP compatible: Yes

WDI – Write Probing Zone Diameter

Description: Sets the probing zone's diameter in units of 10 microns to the value in the 'n' parameter (see section 6.1). A value of zero will disable the probing zone. This setting is only used when the probing zone's shape is circular

Command syntax: WDI_n<tt>

Reply syntax: INF_000<tt>

Availability: All models

AWP compatible: Yes

WDW – Write Off-Site Steps

Description: Sets the number of off-site steps to the value in the 'n' parameter (see section 6.4.5).

Command syntax: WDW_n<tt>

Reply syntax: INF_000<tt>

Availability: All models

AWP compatible: Yes

WEW – Write On-Site Search Steps

Description: Sets the maximum number of on-site steps to the value in the 'n' parameter (see section 6.4.6).

Command syntax: WEW_n<tt>

Reply syntax: INF_000<tt>

Availability: All models

AWP compatible: Yes

WID – Write Inker Offset

Description: Sets the inker offset to the value in the 'o' parameter (see section 6.8.5). If the optional inker index is not specified it defaults to the first inker, otherwise it specifies the inker number.

Command syntax: `WID[_n,],o<tt>`

Reply syntax: `INF_000<tt>`

Availability: All models

AWP compatible: Yes

WIP – Write Inker Pulse Width

Description: Sets the inker pulse width in units of 5 milliseconds to the value in the 't' parameter (see section 6.8.4).

Command syntax: `WIP_t<tt>`

Reply syntax: `INF_000<tt>`

Availability: All models

AWP compatible: Yes

WKFM – Write Z Fine Lift

Description: Sets the Z fine lift in units of microns to the value in the 'z' parameter, the optional parameter 'a' specifies the Z axis, no value of Z1 is the main chuck Z axis, Z2 if the front flying arm Z axis and Z3 is the right flying arm Z axis (see section 6.6.2).

Command syntax: `WKFM_[a,]z<tt>`

Reply syntax: `INF_000<tt>`

Availability: All models

AWP compatible: No

WKGM – Write Z Gross Lift

Description: Sets the Z Gross Lift in units of microns to the value in the 'z' parameter, the optional parameter 'a' specifies the Z axis, no value of Z1 is the main chuck Z axis, Z2 if the front flying arm Z axis and Z3 is the right flying arm Z axis (see section 6.6.1).Command syntax: `WKGM_[a,]z<tt>`

Reply syntax: `INF_000<tt>`

Availability: All models

AWP compatible: No

WL – Write Manual Load Position

Description: Sets the manual load position to the value in the 'n' parameter, where 1 is the front left side of the stage, 2 is the front right side of the stage, and 3 is the front centre of the stage

Command syntax: WL_n<tt>

Reply syntax: INF_000<tt>

Availability: All models

AWP compatible: Yes

Comment: This command is only provided for backwards compatibility with the AWP series. If backward compatibility is not required, this command should not be used and the PLPM command should be used instead

WLA – Write Microscope Lamp Switching

Description: Sets the Microscope Lamp's switching mode in the 'n' parameter, where:

0 = No automatic switching

1 = Lamp switched off at start of run

2 = Lamp switched on at end of run

3 = Combination of 1 and 2

(see section 6.4.9).

Command syntax: WLA_n<tt>

Reply syntax: INF_000<tt>

Availability: All models

AWP compatible: Yes

WRX – Write Probing Zone Width

Description: Sets the probing zone's width in units of 10 micron to the value in the 'x' parameter. This setting is only used when the probing zone's shape is rectangular

Command syntax: WRX_x<tt>

Reply syntax: INF_000<tt>

Availability: All models

AWP compatible: Yes

WRY – Write Probing Zone Height

Description: Sets the probing zone's height in units of 10 micron to the value in the 'y' parameter. This setting is only used when the probing zone's shape is rectangular

Command syntax: `WRX_y<tt>`

Reply syntax: `INF_000<tt>`

Availability: All models

AWP compatible: Yes

`WRZ` – Write Probing Zone Shape

Description: Sets the probing zone's shape to the value in the 'n' parameter, where `0` is circular and `1` is rectangular

Command syntax: `WRZ_n<tt>`

Reply syntax: `INF_000<tt>`

Availability: All models

AWP compatible: Yes

`WSWM` – Write Z Search Window

Description: Sets the Z-axis search window in units of microns to the value in the 'z' parameter, the optional parameter 'a' specifies the Z axis, no value of Z1 is the main chuck Z axis, Z2 if the front flying arm Z axis and Z3 is the right flying arm Z axis (see section 6.6.3).

Command syntax: `WSWM_[a,]z<tt>`

Reply syntax: `INF_000<tt>`

Availability: All models

AWP compatible: No

`WXM` – Write X Index

Description: Sets the X index in units of 10 microns to the value in the 'x' parameter (see section 6.2).

Command syntax: `WXM_x<tt>`

Reply syntax: `INF_000<tt>`

Availability: All models

AWP compatible: Yes

`WYM` – Write Y Index

Description: Set the Y index in units of 10 microns to the value in the 'y' parameter (see section 6.3).

Command syntax: `WYM_y<tt>`

Reply syntax: `INF_000<tt>`

Availability: All models

AWP compatible: Yes

WZIM – Write Z Overtravel

Description: Sets the Z-axis overtravel in units of microns to the value in the 'z' parameter, the optional parameter 'a' specifies the Z axis, no value of Z1 is the main chuck Z axis, Z2 if the front flying arm Z axis and Z3 is the right flying arm Z axis (see section 6.6.4).

Command syntax: `WZIM_[a,]z<tt>`

Reply syntax: `INF_000<tt>`

Availability: All models

AWP compatible: No

XOFF – System Power Down

Description: Waits for the Power Down Wait Time, and then powers down the system; the Wait Time is internally set on the ***Pegasus***, but has a default of 1 minute.

Command syntax: `XOFF_z<tt>`

Reply syntax: No reply

Availability: All models

AWP compatible: No

25.2 Obsolete AWP Commands

- **NOTE** The ***Pegasus*** remote commands set and probing capabilities, provide significant improvements over the older AWP system. As a result, use of some superseded commands can significantly impair system performance; where this is the case, commands are commented as **"Not recommended for future applications"** and system integrators are strongly recommended to use the new commands.

GTX – Go To X Position

Description: Moves the chuck to the X-axis position in microns specified in the 'x' parameter

Command syntax: `GTX_x<tt>`

Reply syntax: `INF_000<tt>`

Availability: All models

Comments: If AWP compatibility is not required, the ***Pegasus*** `GTXY` command should be used instead

GTY - Go To Y Position

Description: Moves the chuck to the Y-axis position in microns specified in the 'y' parameter

Command syntax: GTY_y<tt>

Reply syntax: INF_000<tt>

Availability: All models

Comments: If AWP compatibility is not required, the ***Pegasus*** GTXY command should be used instead

THR – Reference Theta

Description: References (initialises) the Theta axis

Command syntax: THR<tt>

Reply syntax: INF_000<tt>

Availability: All models

Comments: If AWP compatibility is not required, the ***Pegasus*** LDI command should be used instead

HDW/HUP – Clamp Ring Open/Close

Description: Opens (HUP) or closes (HDW) the DSP's automatic clamp ring

Command syntax: HDW<tt> or HUP<tt>

Reply syntax: INF_000<tt>

Availability: Only DSP models

Comments: If AWP compatibility is not required, the ***Pegasus*** PDW/PUP command should be used instead

I2K – Fire Inker Two

Description: Fires inker number 2

Command syntax: I2K<tt>

Reply syntax: INF_000<tt>

Availability: All models

Comments: If AWP compatibility is not required, the ***Pegasus*** INK command should be used instead

I3K – Fire Inker Three

Description: Fires inker number 3

Command syntax: I3K<tt>

Reply syntax: `INF_000<tt>`

Availability: All models

Comments: If AWP compatibility is not required, the ***Pegasus*** `INK` command should be used instead

`I4K` – Fire Inker Four

Description: Fires inker number 4

Command syntax: `I4K<tt>`

Reply syntax: `INF_000<tt>`

Availability: All models

Comments: If AWP compatibility is not required, the ***Pegasus*** `INK` command should be used instead

`IL1` – Get Input Line One

Description: Reads the ***Pegasus*** equivalent of AWP input line 1 and returns the value (either `0` for clear or `1` for set) in the 'f' parameter. Note: On the AWP, output line 1 was normally connected to the TTL 'test finished' line.

Command syntax: `IL1<tt>`

Reply syntax: `IL1_f<tt>`

Availability: All models

Comments: If AWP compatibility is not required, the ***Pegasus*** `GIL` command should be used instead

`IL2` - Get Input Line Two

Description: Reads the ***Pegasus*** equivalent of AWP input line 2 and returns the value (either `0` for clear or `1` for set) in the 'f' parameter. Note: On the AWP, output line 2 was normally connected to the TTL 'pass/fail' line

Command syntax: `IL2<tt>`

Reply syntax: `IL2_f<tt>`

Availability: All models

Comments: If AWP compatibility is not required, the ***Pegasus*** `GIL` command should be used instead

`IL3` - Get Input Line Three

Description: Reads the ***Pegasus*** equivalent of AWP input line 3 and returns the value (either `0` for clear or `1` for set) in the 'f' parameter. Note: On the AWP, output line 3 was normally connected to the TTL 'bin number' line.

Command syntax: `IL3<tt>`

Reply syntax: `IL3_f<tt>`

Availability: All models

AWP compatible: Yes

Comments: If AWP compatibility is not required, the ***Pegasus*** `GIL` command should be used instead

`IL4` - Get Input Line Four

Description: Reads the ***Pegasus*** equivalent of AWP input line 4 and returns the value (either `0` for clear or `1` for set) in the 'f' parameter. Note: On the AWP, output line 4 was normally unused

Command syntax: `IL4<tt>`

Reply syntax: `IL4_f<tt>`

Availability: All models

AWP compatible: Yes

Comments: If AWP compatibility is not required, the ***Pegasus*** `GIL` command should be used instead

`IL5` - Get Input Line Five

Description: Reads the ***Pegasus*** equivalent of AWP input line 5 and returns the value (either `0` for clear or `1` for set) in the 'f' parameter. Note: On the AWP, output line 5 was normally unused

Command syntax: `IL5<tt>`

Reply syntax: `IL5_f<tt>`

Availability: All models

Comments: If AWP compatibility is not required, the ***Pegasus*** `GIL` command should be used instead

`IL6` - Get Input Line Six

Description: Reads the ***Pegasus*** equivalent of AWP input line 6 and returns the value (either `0` for clear or `1` for set) in the 'f' parameter. Note: On the AWP, output line 6 was normally unused

Command syntax: `IL6<tt>`

Reply syntax: `IL6_f<tt>`

Availability: All models

Comments: If AWP compatibility is not required, the ***Pegasus*** `GIL` command should be used instead

IL7 - Get Input Line Seven

Description: Reads the ***Pegasus*** equivalent of AWP input line 7 and returns the value (either `0` for clear or `1` for set) in the 'f' parameter. Note: On the AWP, output line 7 was normally connected to the first edge sensor

Command syntax: `IL7<tt>`

Reply syntax: `IL7_f<tt>`

Availability: All models

Comments: If AWP compatibility is not required, the ***Pegasus*** `GIL` command should be used instead

IL8 - Get Input Line Eight

Description: Reads the ***Pegasus*** equivalent of AWP input line 8 and returns the value (either `0` for clear or `1` for set) in the 'f' parameter. Note: On the AWP, output line 8 was normally connected to the second edge sensor

Command syntax: `IL8<tt>`

Reply syntax: `IL8_f<tt>`

Availability: All models

Comments: If AWP compatibility is not required, the ***Pegasus*** `GIL` command should be used instead

NAA/NAC – Rotate Chuck Clockwise/Anti-clockwise

Description: Rotate the chuck clockwise (`NAC`) or anti-clockwise (`NAA`) by the number of AWP Theta steps specified in the 's' parameter. There are 800,000 AWP Theta steps per rotation

Command syntax: `NAA_s<tt>` or `NAC_s<tt>`

Reply syntax: `INF_000<tt>`

Availability: All models

Comments: If AWP compatibility is not required, the ***Pegasus*** `GTTH` command should be used instead

O1C/O1S – Sets/Clear Output Line One

Description: Sets (`O1S`) or clears (`O1C`) the ***Pegasus*** equivalent of AWP output line 1. Note: On the AWP, output line 1 was normally connected to the red traffic light line

Command syntax: `O1C<tt>` or `O1S<tt>`

Reply syntax: `INF_000<tt>`

Availability: All models

Comments: If AWP compatibility is not required, the ***Pegasus*** `SOL` command should be used instead

`O2C/O2S` – Sets/Clear Output Line Two

Description: Sets (`O2S`) or clears (`O2C`) the ***Pegasus*** equivalent of AWP output line 2. Note: On the AWP, output line 2 was normally connected to the amber traffic light line

Command syntax: `O2C<tt>` or `O2S<tt>`

Reply syntax: `INF_000<tt>`

Availability: All models

Comments: If AWP compatibility is not required, the ***Pegasus*** `SOL` command should be used instead.

`O4C/O4S` – Sets/Clear Output Line Four

Description: Sets (`O4S`) or clears (`O4C`) the ***Pegasus*** equivalent of AWP output line 4. Note: On the AWP, output line 4 was normally connected to the 'end of wafer' TTL line

Command syntax: `O4C<tt>` or `O4S<tt>`

Reply syntax: `INF_000<tt>`

Availability: All models

Comments: If AWP compatibility is not required, the ***Pegasus*** `SOL` command should be used instead

`O5C/O5S` – Sets/Clear Output Line Five

Description: Sets (`O5S`) or clears (`O5C`) the ***Pegasus*** equivalent of AWP output line 5. Note: On the AWP, output line 5 was normally connected to the 'start test' TTL line.

Command syntax: `O5C<tt>` or `O5S<tt>`

Reply syntax: `INF_000<tt>`

Availability: All models

Comments: If AWP compatibility is not required, the ***Pegasus*** `SOL` command should be used instead

`O8C/O8S` – Sets/Clear Output Line Eight

Description: Sets (`O8S`) or clears (`O8C`) the ***Pegasus*** equivalent of AWP output line 8. Note: On the AWP, output line 8 was normally connected to the 'start test' TTL line.

Command syntax: `O8C<tt>` or `O8S<tt>`

Reply syntax: `INF_000<tt>`

Availability:	All models
Comments:	If AWP compatibility is not required, the ***Pegasus*** SOL command should be used instead

`PSA` – Get Theta Position

Description:	Returns the current position in steps of the Theta-axis in the 's' parameter. Note: There are 800,000 AWP Theta steps per rotation
Command syntax:	`PSA<tt>`
Reply syntax:	`PSA_s<tt>`
Availability:	All models
Comments:	If AWP compatibility is not required, the ***Pegasus*** `PSTH` command should be used instead

`PSG` – Get Z Position

Description:	Returns the current z-axis position in AWP steps, (1/5 thousandths of an inch), in the 'z' parameter
Command syntax:	`PSG<tt>`
Reply syntax:	`PSG_z<tt>`
Availability:	All models
AWP compatible:	Yes
Comment:	Not recommended for new applications, use PSGM.

`PSQ` – Get Clamp Ring Position

Description:	Returns the current position in steps of the DSP's automatic clamp ring in the 's' parameter
Command syntax:	`PSQ<tt>`
Reply syntax:	`PSQ_s<tt>`
Availability:	Only DSP models
Comments:	If AWP compatibility is not required, the ***Pegasus*** `PSP` command should be used instead

`PSX` – Get X Position

Description:	Returns the current X-axis position in microns in the 'x' parameter
Command syntax:	`PSX<tt>`
Reply syntax:	`PSX_x<tt>`
Availability:	All models

Comments: If AWP compatibility is not required, the ***Pegasus*** `PSXY` command should be used instead

`PSY` – Get Y Position

Description: Returns the current Y-axis position in microns in the 'y' parameter

Command syntax: `PSY<tt>`

Reply syntax: `PSY_y<tt>`

Availability: All models

Comments: If AWP compatibility is not required, the ***Pegasus*** `PSXY` command should be used instead

`PSZ` – Get Z Fine Lifted Position

Description: Returns the current Fine Lifted position (current distance above the gross lift height) in AWP steps, (1/5 thousandths of an inch), in the 'z' parameter

Command syntax: `PSZ<tt>`

Reply syntax: `PSZ_z<tt>`

Availability: All models

AWP compatible: Yes

Comments: Not recommended for new applications, use PSZM. The `PSG` command is used to return the current Z-axis position

`RCAD` – Read Delay After Fine Lift

Description: Returns the delay after Fine Lift in the 'n' parameter, where:

`0` = no delay

`1` = 100ms delay

`2` = 200ms delay

`3` = 500ms delay

`4` = 1s delay

`5` = 2s delay

`6` = 5s delay

(see section 6.6.12).

Command syntax: `RCAD<tt>`

Reply syntax: `RCAD_n<tt>`

Availability: All models

Comments: If AWP compatibility is not required, the ***Pegasus*** `PZCD` command should be used instead

RCAX – Read Alignment Zone X Centre

Description: Returns the X-axis centre position of the camera alignment zone in the 'x' parameter

Command syntax: RCAX<tt>

Reply syntax: RCAX_x<tt>

Availability: All models

Comments: If AWP compatibility is not required, the ***Pegasus*** PCPA command should be used instead

RCAY – Read Alignment Zone Y Centre

Description: Returns the Y-axis centre position of the camera alignment zone in the 'y' parameter

Command syntax: RCAY<tt>

Reply syntax: RCAY_y<tt>

Availability: All models

Comments: If AWP compatibility is not required, the ***Pegasus*** PCPA command should be used instead

RCCX - Read Probing Zone X Centre

Description: Returns the X-axis centre position of the probing zone in the 'x' parameter

Command syntax: RCCX<tt>

Reply syntax: RCCX_x<tt>

Availability: All models

Comments: If AWP compatibility is not required, the ***Pegasus*** PCPP command should be used instead

RCCY – Read Probing Zone Y Centre

Description: Returns the Y-axis centre position of the probing zone in the 'y' parameter

Command syntax: RCCY<tt>

Reply syntax: RCCY_y<tt>

Availability: All models

Comments: If AWP compatibility is not required, the ***Pegasus*** PCPP command should be used instead

RCD – Read Delay Before Fine Lift

Description: Returns the delay before Fine Lift in the 'n' parameter, where:

0 = no delay

1 = 100ms delay

2 = 200ms delay

3 = 500ms delay

4 = 1s delay

5 = 2s delay

6 = 5s delay

(see section 6.6.11).

Command syntax: RCD<tt>

Reply syntax: RCD_n<tt>

Availability: All models

Comments: If AWP compatibility is not required, the ***Pegasus*** PZCD command should be used instead

RCS – Read Z Speed

Description: Returned the Z speed in the 'n' parameter, where 1 is the fastest speed and 6 is the slowest speed on AWP machines.

Command syntax: RCS<tt>

Reply syntax: RCS_0<tt>

Availability: All models

AWP compatible: Yes

Comments: Z speed is internally controlled on the ***Pegasus***. RCS is provided as a dummy command, purely for backwards compatibility; it has no effect on system operation and always returns 0.

RKF – Read Z Fine Lift

Description: Returns the Z Fine Lift in units of thousandths of an inch in the 'z' parameter (see section 6.6.2).

Command syntax: RKF<tt>

Reply syntax: RKF_z<tt>

Availability: All models

AWP compatible: Yes

Comments: Not recommended for new applications, use RKFM

RKG – Read Z Gross Lift

Description: Returns the Z Gross Lift in units of thousandths of an inch to the value in the 'z' parameter (see section 6.6.1).

Command syntax: RKG<tt>

Reply syntax: RKG_z<tt>

Availability: All models

AWP compatible: Yes

Comments: Not recommended for new applications, use RKGM

RSW – Read Z Search Window

Description: Returns the Z-axis search window in units of 1/10 thousandths of an inch in the 'z' parameter (see section 6.6.3).

Command syntax: RSW<tt>

Reply syntax: RSW_z<tt>

Availability: All models

AWP compatible: Yes

Comments: Not recommended for new applications, use RSWM

RXI/RXJ – Read X Index (Imperial)

Description: Returns the X index in units of hundredths (RXI) or thousandths (RXJ) of an inch in the 'x' parameter (see section 6.2).

Command syntax: RXI<tt> or RXJ<tt>

Reply syntax: RXI_x<tt> or RXJ_x<tt>

Availability: All models

Comments: If AWP compatibility is not required, the ***Pegasus*** RXM command should be used instead

RYI/RYJ – Read Y Index (Imperial)

Description: Returns the Y index in units of hundredths (RYI) or thousandths (RYJ) of an inch in the 'y' parameter (see section 6.3).

Command syntax: RYI<tt> or RYJ<tt>

Reply syntax: RYI_y<tt> or RYJ_y<tt>

Availability: All models

Comments: If AWP compatibility is not required, the ***Pegasus*** RYM command should be used instead

RZI – Read Chuck Overtravel

Description: Returns the chuck overtravel in units of thousandths of an inch in the 'z' parameter (see section 6.6.4).

Command syntax: RZI<tt>

Reply syntax: `RZI_z<tt>`

Availability: All models

AWP compatible: Yes

Comments: Not recommended for new applications, use RZIM

`VC0/VC1` – Chuck Vacuum On/Off

Description: Turns the chuck's vacuum supply on (`VC1`) or off (`VC0`)

Command syntax: `VC0<tt>` or `VC1<tt>`

Reply syntax: `INF_000<tt>`

Availability: All models

Comments: If AWP compatibility is not required, the ***Pegasus*** `VAC` command should be used instead

`VP0/VP1` – Pins Vacuum On/Off

Description: Turns the load pin's vacuum supply on (`VP1`) or off (`VP0`)

Command syntax: `VP0<tt>` or `VP1<tt>`

Reply syntax: `INF_000<tt>`

Availability: Only models fitted with load pins

Comments: If AWP compatibility is not required, the ***Pegasus*** `VAC` command should be used instead

`WCAD` – Write Delay After Fine Lift

Description: Sets the delay after Fine Lift to the value in the 'n' parameter, where:

`0` = no delay

`1` = 100ms delay

`2` = 200ms delay

`3` = 500ms delay

`4` = 1s delay

`5` = 2s delay

`6` = 5s delay

(see section 6.6.12).

Command syntax: `WCAD_n<tt>`

Reply syntax: `INF_000<tt>`

Availability: All models

Comments: If AWP compatibility is not required, the ***Pegasus*** `PZCD` command should be used instead

`WCAX` – Write Alignment Zone X Centre

Description: Sets the X-axis centre position of the camera alignment zone to the value in the 'x' parameter

Command syntax: `WCAX_x<tt>`

Reply syntax: `INF_000<tt>`

Availability: All models

Comments: If AWP compatibility is not required, the ***Pegasus*** `PCPA` command should be used instead

`WCAY` - Write Alignment Zone Y Centre

Description: Sets the Y-axis centre position of the camera alignment zone to the value in the 'y' parameter

Command syntax: `WCAY_y<tt>`

Reply syntax: `INF_000<tt>`

Availability: All models

Comments: If AWP compatibility is not required, the ***Pegasus*** `PCPA` command should be used instead

`WCCX` - Write Probing Zone X Centre

Description: Sets the X-axis centre position of the probing zone to the value in the 'x' parameter

Command syntax: `WCCX_x<tt>`

Reply syntax: `INF_000<tt>`

Availability: All models

Comments: If AWP compatibility is not required, the ***Pegasus*** `PCPP` command should be used instead

`WCCY` - Write Probing Zone Y Centre

Description: Sets the Y-axis centre position of the probing zone to the value in the 'y' parameter

Command syntax: `WCCY_y<tt>`

Reply syntax: `INF_000<tt>`

Availability: All models

Comments: If AWP compatibility is not required, the ***Pegasus*** `PCPP` command should be used instead

WCD – Write Delay Before Fine Lift

Description: Sets the delay before Fine Lift to the value in the 'n' parameter, where:

0 = no delay

1 = 100ms delay

2 = 200ms delay

3 = 500ms delay

4 = 1s delay

5 = 2s delay

6 = 5s delay

(see section 6.6.11).

Command syntax: WCD_n<tt>

Reply syntax: INF_000<tt>

Availability: All models

Comments: If AWP compatibility is not required, the ***Pegasus*** PZCD command should be used instead

WCS – Write Z Speed

Description: Set the Z speed to the value in the 'n' parameter, where 1 is the fastest speed and 6 is the slowest speed on AWP machines.

Command syntax: WCS_n<tt>

Reply syntax: INF_000<tt>

Availability: All models

AWP compatible: Yes

Comments: Z speed is internally controlled on the ***Pegasus***. WCS is provided as a dummy command, purely for backwards compatibility and has no effect on system operation.

WKF – Write Z Fine Lift

Description: Sets the Z fine lift in units of thousandths of an inch to the value in the 'z' parameter (see section 6.6.2).

Command syntax: WKF_z<tt>

Reply syntax: INF_000<tt>

Availability: All models

AWP compatible: Yes

Comments: Not recommended for new applications, use WKFM

WKG – Write Z Gross Lift

Description: Sets the Z Gross Lift in units of thousandths of an inch to the value in the 'z' parameter (see section 6.6.1).

Command syntax: WKG_z<tt>

Reply syntax: INF_000<tt>

Availability: All models

AWP compatible: Yes

Comments: Not recommended for new applications, use WKGM

WSW – Write Z Search Window

Description: Sets the Z-axis search window in units of 1/10 thousandths of an inch to the value in the 'z' parameter (see section 6.6.3).

Command syntax: WSW_z<tt>

Reply syntax: INF_000<tt>

Availability: All models

AWP compatible: Yes

Comments: Not recommended for new applications, use WSWM

WXI/WXJ - Write X Index (Imperial)

Description: Sets the X index in units of hundredths (WXI) or thousandths (WXJ) of an inch to the value in the 'x' parameter (see section 6.2).

Command syntax: WXI_x<tt> or WXJ_x<tt>

Reply syntax: INF_000<tt>

Availability: All models

Comments: If AWP compatibility is not required, the ***Pegasus*** WXM command should be used instead

WYI/WYJ - Write Y Index (Imperial)

Description: Set the Y index in units of hundredths (WYI) or thousandths (WYJ) of an inch to the value in the 'y' parameter (see section 6.3).

Command syntax: WYI_y<tt> or WYJ_y<tt>

Reply syntax: INF_000<tt>

Availability: All models

Comments: If AWP compatibility is not required, the ***Pegasus*** WYM command should be used instead

WZI – Write Z Overtravel

Description: Sets the Z-axis overtravel in units of thousandths of an inch to the value in the 'z' parameter (see section 6.6.4).

Command syntax: `WZI_z<tt>`

Reply syntax: `INF_000<tt>`

Availability: All models

AWP compatible: Yes

Comments: Not recommended for new applications, use WZIM

25.3 Prober Status Byte

The Prober Status Byte returns status information about the Prober, followed by the Reply as listed above (text or **INF** code). The bits in the Prober Status Byte are as follows:

Bit No	Significance
0	Fault bit : see below
1	Fault bit : see below
2	Logic 1 = chuck is lifted by gross setting
3	Logic 0 = chuck stopped[1] Logic 1 = chuck moving
4	Logic 1 = chuck is in UP position (Fine Lift)
5	Logic 1 = edge sensor open
6	RSV = prober has SRQ'd
7	Logic 1 = fault condition exists

If bit 7 is at logic `0`, the state of the second edge sensor is shown. If bit 7 is at logic `1`, a fault condition exists, examples of which are shown below.

[1] This is only available in software version 3.6.3 and above. This bit was always set to logic 1 in all earlier versions of the software.

Bit 7	Bit 1	Bit 0	Meaning
0	0	0	Edge sensor 2 closed
0	0	1	Edge sensor 2 open
0	1	0	Not used
0	1	1	Not used
1	0	0	Exceeding -ve X travel (right) or some other fault condition
1	1	0	Exceeding +ve X travel (left) or some other fault condition
1	0	1	Exceeding +ve Y travel (up) or some other fault condition
1	1	1	Exceeding -ve Y travel (down) or some other fault condition

To avoid the possible ambiguities in fault conditions reported using in the Prober Status Byte, as shown above, the recommended method of Remote communication is using **INF** mode, as errors are indicated explicitly in the **INF** message. Error handling in **INF** mode should therefore be by examination of the **INF** reply rather than the Prober Status Byte.

The Prober Status Byte may be examined at any time by sending the `STA` command (page 143).

25.4 INF Codes

The **INF** code returned following successful command execution will normally be `000`. However, commands that are requests for information will return other **INF** codes containing variable parameters, as detailed in Sections 25.1 and 25.2.

The general format of the **INF** code is `INF nnn`, where `nnn` is the three-digit error code. Certain codes contain additional information about the error in an item number. The format for these INF codes is `INF nnn:i`, where `nnn` is the three digit error code and `i` is the item number.

The following tables show the **INF** codes for fault conditions, and are divided into the following groups.

25.4.1 General

Code	Meaning
000	Command executed
003	Attempt to move in X or Y outside the current area
008	Unrecognised prober command
009	X increment or Y increment is zero (therefore NXT mode cannot be used)

25.4.2 Sequence Faults

Code	Meaning
010	Attempt to move X, Y or Theta with the Chuck raised
011	System or Axis is unreferenced
012	Under- or over-range prober variable
013	Prober variable is too small[2]
014	Prober variable is too large
015	Prober variable is an invalid multiple[2]
016	Probing height is above Z limit[2]

25.4.3 Edge Sensor Faults

Code	Meaning
030	Edge sensor open when at gross down position, GUP function
031	Edge sensor open after moving to fine down position, CDW function
032	Edge sensor open when at fine down position, CUP and NXT functions
033	Edge sensor not opening within search window, CUP function
039	Edge sensor open during as the chuck is being lifted, GUP function.

25.4.4 Hardware Faults

Code	Meaning
020	Edge sensor open when chuck at fine down position
021	Motor failed to reference[2]
022	Chuck not Gross lifted when NXT command sent (e.g. collapsed chuck, self-reset to GROSS DOWN)
024	Tester has timed out during TTL test, using the TST function
028	Where fitted, a sensor indicates that the clamp holding the wafer failed to open to load/unload a wafer.
029	Where fitted, a sensor indicates that the clamp holding the wafer failed to close prior to moving the chuck. This error will prevent movement of other chuck axes.

25.4.5 Learn Mode Program Download Faults

Code	Meaning
070	LMP command used before an LMC command, or after an

[2] This reuses an error number that was used for a different failure on earlier AWP systems, breaking the backwards compatibility with the errors between those systems and Pegasus Controllers.

	LME command
071	Learn Mode program ,memory is full

25.4.6 Information Codes

Code	Meaning
050	Edge sensor state changed to open
051	Edge sensor state changed to closed

25.4.7 System Codes

Code	Meaning
300	Internal System fault, please contact your Wentworth Service Agent
301	Command has attempted to access un-initialised hardware
302	Error in interface protocol with Stepper Motor Control Firmware
303	System hardware does not support the requested function
304	Incorrect peripheral for the requested command function
305	Error accessing controller file system
306	User has aborted the command function

25.4.8 Probing Exception Codes

Code	Meaning
400	During testing the failure count has exceeded the *Fail Limit* device parameter.
401	Warning to indicate that the number of inkings of a particular cartridge may mean that the cartridge is getting low and should be changed.
402	The number of inkings of a particular cartridge means that the cartridge is empty and must be changed for correct operation.
403	During testing, when attempting to start the test of a new device, the *Finish Test* signal has not asserted to indicate that the previous device has completed testing within the expected time.
404	During testing, the *Finish Test* signal has not been asserted that the current device has completed testing within the expected time.
405	During testing, the custom *Testing* input has not asserted to indicate that the current device has completed testing within the expected time.
406	During testing, the custom *Testing* input has not asserted to indicate that the current device has started testing within the expected time.
407	The tester command is invalid, TSTLR command

410	No command received from the tester within the expected time.
411	Invalid command received from the tester.
412	Abort probing command received from the tester.

25.4.9 Stepper Motor Error Codes

Code	Meaning
500	The stepper motor has not been correctly initialised
501	The stepper motor failed to reference correctly
502	The stepper motor detected an unexpected fault.
503	No acknowledgement received back from a stepper command.
504	Attempt to update the stepper motor while it is still moving.
505	The stepper motor detected that the edge sensor opened unexpectedly during movement.
506	No acknowledgement was received back from a stepper command within the expected time.
507	The stepper command received was not recognised.
508	The stepper command received contained invalid data.

25.4.10 Safety and limit codes

Code	Meaning
600	An attempt to move the motor at a speed greater than its velocity limit.
601	An attempt to move a component when a door or contact has been opened. No movement will be made as this could compromise the safety of the operator. Close the door to resume normal operation.
602	A door or contact has been opened while a component is moving. The component will be stopped as soon as the door open condition has been detected as this could compromise the safety of the operator. Close the door to resume normal operation.
603	If fitted a vacuum sensor has detected that the vacuum failed to turn on. Check that the vacuum supply is functioning correctly.
604	If fitted a vacuum sensor has detected that the vacuum failed to turn off.

25.4.11 Stage I/O Interface Codes

Code	Meaning
630	No communication between the controller and the Stage I/O interface.

631	No acknowledgement received from the Stage I/O interface within the expected time.
632	Multiple errored packets received from the Stage I/O interface.

25.4.12 Network (Internet Protocol) Error Codes

Code	Meaning
650	Unexpected IP communication error.
651	No communication received over IP within the expected time.
652	Connection error to remote system over IP
653	IP socket error
654	Unable to resolve host name as IP address.
655	Domain name not supplied as required by DNS.

25.4.13 Peripheral Codes

Code	Meaning
700	Probe cleaner material needs changing
701	Probe cleaning paused by user.
702	Probe cleaning aborted by user.
703	Attempt to set probe cleaning height above Z limit.
710	Attempt to set camera height above gross height.
720	Unable to access OCR reader.
721	No character read from the OCR reader within the expected time.
722	Attempt to read the ID of the OCR reader failed.
724	Prefix characters are missing from the ID read from the OCR reader.
725	Postfix characters are missing from the ID read from the OCR reader.
730	Failed to load from the manual load area

25.4.14 Failure Analysis and PMM Codes

Code	Meaning
800	Probe below pretouch height.
801	Device is not aligned.
804	Incorrect argument count
805	Angle not suitable for alignment.
806	Unexpected error detected.

807	Incorrect device alignment.
808	Invalid height (e.g. cruise above contact height)

25.4.15 Customisation Error Codes

Code	Meaning
900	Inker lift error
901	During testing, when attempting to start the test of a new device, the *Finish Test* signal has not asserted to indicate that the previous device has completed testing within the expected time.
902	During testing, the *Finish Test* signal has not been asserted that the current device has completed testing within the expected time.

SERVICING INSTRUCTIONS

The ***Pegasus*** requires little user servicing.

Chapter 26 describes the user servicing that is necessary from time to time.

26 SERVICING

With the exception of the chuck leadscrews, the ***Pegasus*** prober requires no regular servicing. Over a long period of time, however, mechanical wear will inevitably occur in the moving parts of the machine and minor adjustments may be necessary.

The information given in this chapter provides sufficient information regarding all user repairs and adjustments. Any task not detailed here is considered outside the scope of user repair, please contact the Service Department of Wentworth Laboratories or their agent.

A suggested maintenance schedule is as follows:

Task	Interval period	Level of difficulty
Cleaning	Monthly or as required	Low
Motor drive coupling adjustment (MK2 only)	As required	Medium
Cleaning the controller air filter	Yearly or as required	Low
X and Y ballscrew lubrication	Yearly	Medium
Chuck ballscrew lubrication	Yearly	Medium
Planarisation of the chuck	Yearly or as required	Medium
S200D Wafer carrier Planarising	Yearly or as required	Medium

- Good housekeeping standards are to be observed.
- Wipe over the inker and keep clean.
- Remove any spilt ink with a recommended solvent.
- The interior should also be kept free of dust and debris.

26.1 Before You Begin

WARNING Ensure that all electrical supplies to the Prober and Controller are isolated before performing any of the following procedures:

- Maintenance of Prober or Controller
- Servicing of Prober or Controller
- Removing or inserting interconnecting cables
- Removing any of the Controller or Prober covers

Refer to your test equipment manual and ensure that electrical isolation is achieved before performing the following:

- Removing or replacing needles or probe card.

WARNING Take the following precautions against physical hazards:

- Do not put hands onto the stage while it is in motion
- Sudden movement of the chuck or platform can trap fingers and cause injury if electrical supplies are on
- Removal of the bellows will expose mechanical moving parts and trap points
- Do not touch the point of the probe, as this can cause a minor wound
- Inker coils may become very hot, depending on duty cycle.

CAUTION Take the following precautions against equipment damage:

- Make sure that the probe card and wafer are removed from the Prober before performing maintenance or service procedures
- Ensure that the consequences of using electronic inputs or outputs are fully understood before use
- Ensure adequate platform clearance when changing or aligning probe cards.

26.2 Motor Drive Coupling Adjustment (MK2 only)

Occasionally the motor coupling between the lead screw and the motor may become loose, resulting in loss of X or Y drive. The following procedure details how to access and tighten the coupling.

1. Remove the securing screws for the bellows protecting the appropriate leadscrew drive. If the X drive is to be adjusted, take off the right-hand bellows; if the Y drive is to be adjusted, take off the rear bellows.
2. Refer to Fig 23.1 and identify the two socket-head screws securing the shaft coupling to the stepper motor shaft (one screw is visible in Fig 23.1, marked by the arrow).
3. Using a suitable hexagon wrench, tighten these securing screws. Turn the leadscrew or motor shaft by hand as necessary to gain access to these screws.
4. Re-assemble and secure the bellows.

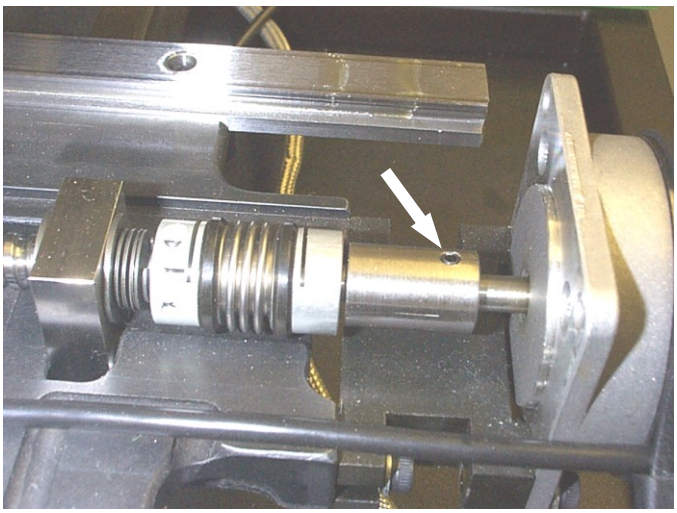


Fig 23.1: Lead screw assembly, showing one of the two securing screws in the shaft coupling (the second is behind).

26.3 Cleaning the Controller Air Filter

To ensure that the Controller continues to operate at maximum efficiency, the air filter must be cleaned at regular intervals, as follows:

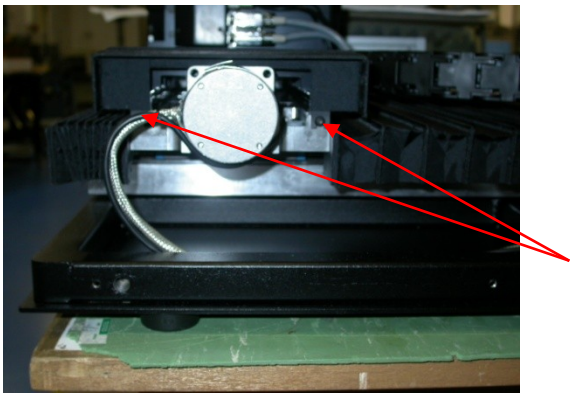
1. Referring to the Controller rear panel diagram on page 101, pull off the cover to release the filter housing from the rear panel.
2. Remove and clean the filter pad: if it cannot be cleaned, obtain a replacement (Replacement Controller Filter, Part Number 2375-07509).
3. Replace the filter pad and re-install the filter housing on the rear panel.

26.4 X and Y Ballscrew Lubrication

Note. It is important that the grease used is – Kluber NBU15. Using any other grease will reduce the life of the leadscrew.

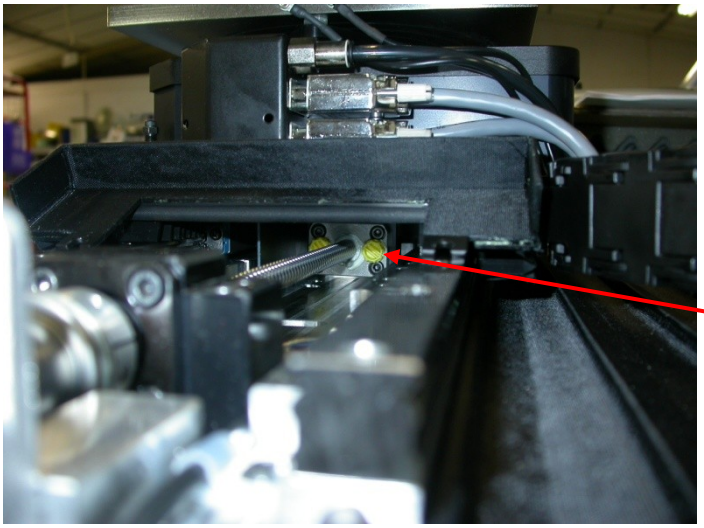
Drive the chuck to the front left hand corner position then power down the prober.

Remove the grey outer covers and then undo the 2 screws holding the right hand X bellows



.

Lift the covers to reveal the ballscrew then using a long flat blade screwdriver remove the right hand yellow cap on the ballscrew nut.



Using a syringe loaded with 0.45ml of Kluber NBU15 grease, inject the grease into the ballscrew nut. Replace the yellow cap. **Note.** Replacing the yellow cap forces the grease into the ballscrew nut.

To lubricate the Y axis ballscrew remove the 2 screws holding the rear Y bellows then lift the bellows to reveal the ballscrew. Lubricate the nut using the same procedure as for the X axis.

Replace all covers and switch on the prober. Drive X and Y axes over their full travel length in order to disperse an even layer of grease over the ballscrew.

26.5 Chuck Leadscrew Lubrication

Note. It is important that the grease used is – Kluber NBU15. Using any other grease will reduce the life of the leadscrew.

The leadscrews within the chuck assembly require re-lubricating once a year. To achieve this, drive the chuck to a position on the prober where the 3 mounting screws can be accessed (2 of these mounting screws are the 2 front screws used for planarisation of the chuck – see next section).

Remove power from the prober, and disconnect the 2 cables and the vacuum pipe on the side of the chuck. Remove the 3 chuck mounting screws. The chuck can now be removed from the prober.

Remove the chuck plate, and then, keeping the chuck upright, remove the 3 screws holding the top plate to the leadscrew nuts. Remove the top plate taking care not to lose the spherical washer located between the top plate and the leadscrew nut.

Using the belt on the underside of the chuck, drive the leadscrews until the nuts are almost at full stroke. Remove any excess of old grease, and then smear the leadscrew with fresh grease. Again using the belt, run the nuts up and down the leadscrew to spread the grease over the length of the thread.

Replace the spherical washers, top plate and chuck plate. Replace the chuck on the prober and re-connect the cables and vacuum tube.

Ensure the chuck is planar by performing the procedure in the next section.

26.6 Planarisation of Chuck

CAUTION It is essential for the correct operation that the chuck is parallel to the X and Y rails, otherwise damage can occur to the probes or to the wafers under test while the chuck is moving. If the chuck is not parallel to the rails, this can also lead to inconsistent electrical connections across the width or length of the wafer.

If it is suspected that the chuck is not parallel, first make an accurate test as follows.

1. Starting from the **Configuration** screen (Chapter 4), go to the **Diagnose** screen by pressing **F1** = **Diagnose** (If you cannot see this option, press **F5** = **More** until it appears) and then **F1** = **Diagnose**. Then press **6** = **Factory Options** and **2** to select the **Chuck Planearisation** screen.

   - The chuck moves to the centre of its probing area.

The chuck rises to its programmed **Probing Height** (= **Gross Lift** + **Fine Lift**; see Section 6.6).**Joystick**

During this function, the right-hand green button by the joystick moves the chuck up and down by its **Fine Lift** height.

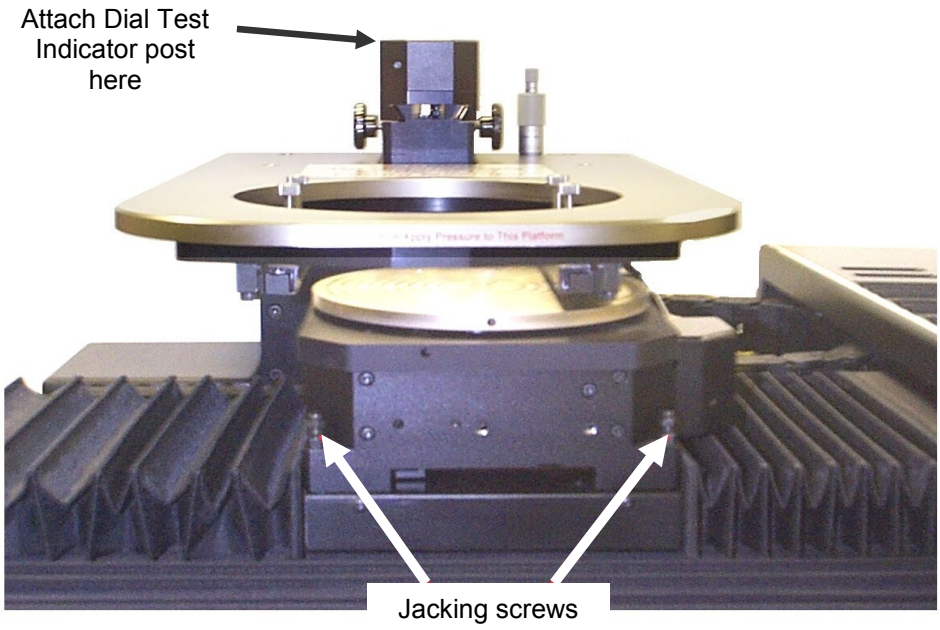


Fig 23.2: Jacking screws and Dial Test Indicator attachment

2. Mount a Dial Test Indicator (DTI) so that the DTI finger is touching within the vacuum ring on the chuck plate, as shown in Fig 23.3.

CAUTION The DTI must be mounted at a height so that when the chuck is lowered, the DTI finger does not contact the chuck plate. If the DTI is touching the chuck

plate while the chuck is moving, it will cause damage to the chuck surface and probably the DTI.

Fig 23.3: Dial Test Indicator

3. Press **F1** = **Pos 1**.
    - The chuck performs a **Fine Down** Z movement, moves to the front of its probing area and then performs a **Fine Up**.
4. If the DTI finger rests off the chuck plate or sits in a groove, lower the chuck by pressing the left-hand green joystick button. Then use the joystick in X-Y mode to move to a better position.

Joystick

When using the joystick, pressing the **Speed** button will slow the movement down in a series of steps, from **5** (fastest) down to 1. This gives you very fine movement control.

See Section 3.3 for more details of joystick control.

Press the **F1** = **Pos 1** key again to save this as the new position. This area of the chuck is a fixed height and cannot be mechanically adjusted.

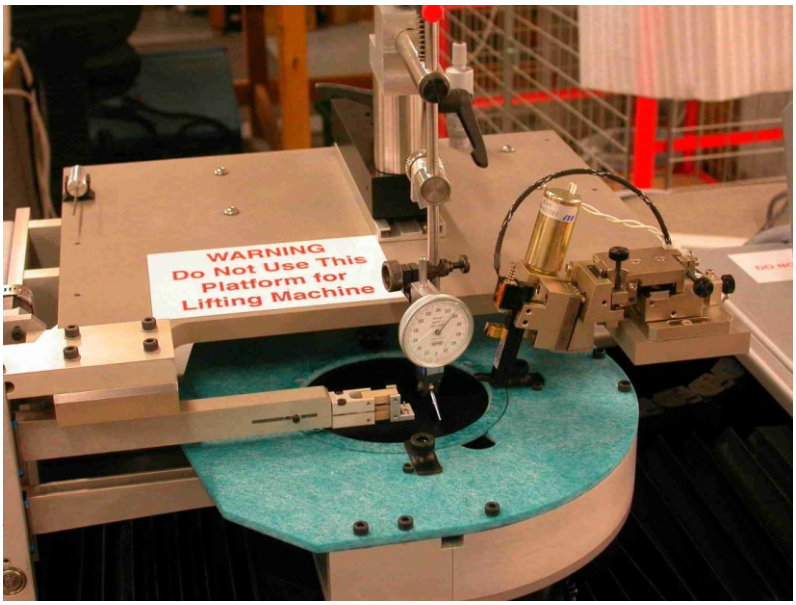
5. Rotate the DTI outer ring until the needle is on zero.
6. Press **F2** =**Pos 2**.
    - The chuck performs a Fine Down Z movement, moves so the DTI rests on the front right side of the chuck and then performs a Fine Up.
7. If the DTI finger rests off the chuck plate or sits in a groove, lower the chuck by pressing the left-hand green joystick button. Then use the joystick in X-Y mode to

move to a better position. Press the **F2** = **Pos 2** key again to save this as the new position.

8. Adjust the right jacking screw (Fig 23.2 on page 180) either up or down as required to make the DTI read zero again. Firstly loosen the lower locking nut, then the cap-head hex screw, and then adjust the jacking screw to raise or lower this side of the chuck.
9. Press **F3 =Pos 3**.
    - The chuck performs a **Fine Down** Z movement, moves so that the DTI rests on the front left side of the chuck and then performs a **Fine Up** Z movement.
10. If the DTI finger rests off the chuck plate or sits in a groove, lower the chuck by pressing the left-hand green joystick button. Then use the joystick in X-Y mode to move to a better position. Press the **F2** = **Pos 3** key again to save this as the new position.
11. Again adjust the right jacking screw up or down as required to make the DTI read zero. Firstly loosen the lower locking nut, then the cap-head hex screw, and then adjust the jacking screw to raise or lower this side of the chuck.
12. Repeat steps 3 through 11 until all three readings are within 12 microns of each other.

26.6.1 S200D Wafer Carrier Planarising

To planarise the wafer carrier on a S200D place the centre disc upside down in the carrier. Set the Dial Test Indicator so that it contacts the disc. **Ensure that the exclusion zone is set to the correct size.** Proceed as describe in Section 26.6 until a planarity of 50 microns is achieved.



26.7 Lead Screws

The lead screws used on the ***Pegasus*** prober require no lubrication – they are a self-lubricating, recirculating ball design.

CAUTION Attempting to lubricate the lead screws could damage them. Using any lubricant other than that specified by the manufacturer will cause damage to the lead screws.

26.8 Electrical Schematics

Schematics for the Pegasus series of probers can be found in the Drawings folder on the Pegasus Manuals CD.

List of available drawings:

Drawing No.	Description	Prober Serial No.
2375-823-1_1C	Schematic Interface Connections	20 - 99
2375-823-2_1C	Interface PCB Layout	20 – 99
2375-823-3_1C	Controller Board Positions	39 – 99
2375-823-4_1C	Controller Board Positions	20 – 38
2375-823-5_1C	Interface PCB Layout	100 -
2375-823-6_1C	Controller Board Position	100 – 123
2375-823-7_1C	Schematic Interface Connections	100 -
2375-823-8_1C	Controller Board Layout	124 -