Agilent Technologies E5010B Spinstand

Disk Clamp Replacement Guide

Third Edition

FIRMWARE REVISIONS/SERIAL NUMBERS
This manual applies directly to instruments which installed
the system software revision A.03.30 or later.

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Notices

The information contained in this document is subject to change without notice.

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Manual Printing History

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July 2001 Third Edition

Safety Summary

The following general safety precautions must be observed during all phases of operation, service, and repair of this instrument. Failure to comply with these precautions or with specific WARNINGS elsewhere in this manual may impair the protection provided by the equipment. In addition it violates safety standards of design, manufacture, and intended use of the instrument.

The Agilent Technologies assumes no liability for the customer's failure to comply with these requirements.

- Ground The Instrument

  To avoid electric shock hazard, the instrument chassis and cabinet must be connected to a safety earth ground by the supplied power cable with earth blade.

- DO NOT Operate In An Explosive Atmosphere

  Do not operate the instrument in the presence of flammable gasses or fumes. Operation of any electrical instrument in such an environment constitutes a definite safety hazard.

- Keep Away From Live Circuits

  Operating personnel must not remove instrument covers. Component replacement and internal adjustments must be made by qualified maintenance personnel. Do not replace components with the power cable connected. Under certain conditions, dangerous voltages may exist even with the power cable removed. To avoid injuries, always disconnect power and discharge circuits before touching them.

- DO NOT Service Or Adjust Alone

  Do not attempt internal service or adjustment unless another person, capable of rendering first aid and resuscitation, is present.

- DO NOT Substitute Parts Or Modify Instrument

  Because of the danger of introducing additional hazards, do not install substitute parts or perform unauthorized modifications to the instrument. Return the instrument to a Agilent Technologies Sales and Service Office for service and repair to ensure that safety features are maintained.

- Dangerous Procedure Warnings

  Warnings, such as the example below, precede potentially dangerous procedures throughout this manual. Instructions contained in the warnings must be followed.

WARNING **Dangerous voltages, capable of causing death, are presenting this instrument. Use extreme caution when handling, testing, and adjusting this instrument.**

Safety Symbol

General definitions of safety symbols used on the instrument or in manuals are listed below.


Instruction Manual symbol: the product is marked with this symbol when it is necessary for the user to refer to the instrument manual.

Alternating current.

Direct current.

On (Supply).

Off (Supply).


In position of push-button switch.


Out position of push-button switch.


Frame (or chassis) terminal. A connection to the frame (chassis) of the equipment which normally include all exposed metal structure.

WARNING **This warning sign denotes a hazard. It calls attention to a procedure, practice, condition or the like, which, if not correctly performed or adhered to, could result in injury or death to personnel.**

CAUTION This Caution sign denotes a hazard. It calls attention to a procedure, practice, condition or the like, which, if not correctly performed or adhered to, could result in damage to or destruction of part or all of the product.

NOTE Note denotes important information. It calls attention to a procedure, practice, condition or the like, which is essential to highlight.

Certification

Agilent Technologies certifies that this product met its published specifications at the time of shipment from the factory. Agilent Technologies further certifies that its calibration measurements are traceable to the United States National Institute of Standards and Technology, to the extent allowed by the Institution's calibration facility, or to the calibration facilities of other International Standards Organization members.

Warranty

This Agilent Technologies instrument product is warranted against defects in material and workmanship for a period corresponding to the individual warranty periods of its component products. Instruments are warranted for a period of one year. Fixtures and adapters are warranted for a period of 90 days. During the warranty period, Agilent Technologies will, at its option, either repair or replace products that prove to be defective.

For warranty service or repair, this product must be returned to a service facility designated by Agilent Technologies. Buyer shall prepay shipping charges to Agilent Technologies and Agilent Technologies shall pay shipping charges to return the product to Buyer. However, Buyer shall pay all shipping charges, duties, and taxes for products returned to Agilent Technologies from another country.

Agilent Technologies warrants that its software and firmware designated by Agilent Technologies for use with an instrument will execute its programming instruction when property installed on that instrument. Agilent Technologies does not warrant that the operation of the instrument, or software, or firmware will be uninterrupted or error free.

Limitation of Warranty

The foregoing warranty shall not apply to defects resulting from improper or inadequate maintenance by Buyer, Buyer-supplied software or interfacing, unauthorized modification or misuse, operation outside the environmental specifications for the product, or improper site preparation or maintenance.

IMPORTANT No other warranty is expressed or implied. Agilent Technologies specifically disclaims the implied warranties of merchantability and fitness for a particular purpose.

Exclusive Remedies

The remedies provided herein are buyer's sole and exclusive remedies. Agilent Technologies shall not be liable for any direct, indirect, special, incidental, or consequential damages, whether based on contract, tort, or any other legal theory.

Assistance

Product maintenance agreements and other customer assistance agreements are available for Agilent Technologies products.

For any assistance, contact your nearest Agilent Technologies Sales and Service Office. Addresses are provided at the back of this manual.

Typeface Conventions

Bold	Boldface type is used when a term is defined. For example: **icons** are symbols.
Italic	Italic type is used for emphasis and for titles of manuals and other publications.
[Hardkey]	Indicates a hardkey labeled "Hardkey."
Softkey	Indicates a softkey labeled "Softkey."
[Hardkey] - Softkey1 - Softkey2	Indicates keystrokes **[Hardkey] - Softkey1 - Softkey2**.

Contents

Contents

1 Overview

Manual Overview

This guide describes information to replace the disk clamp of the Agilent Technologies E5010B spinstand. The information contained in each chapter is as follows.

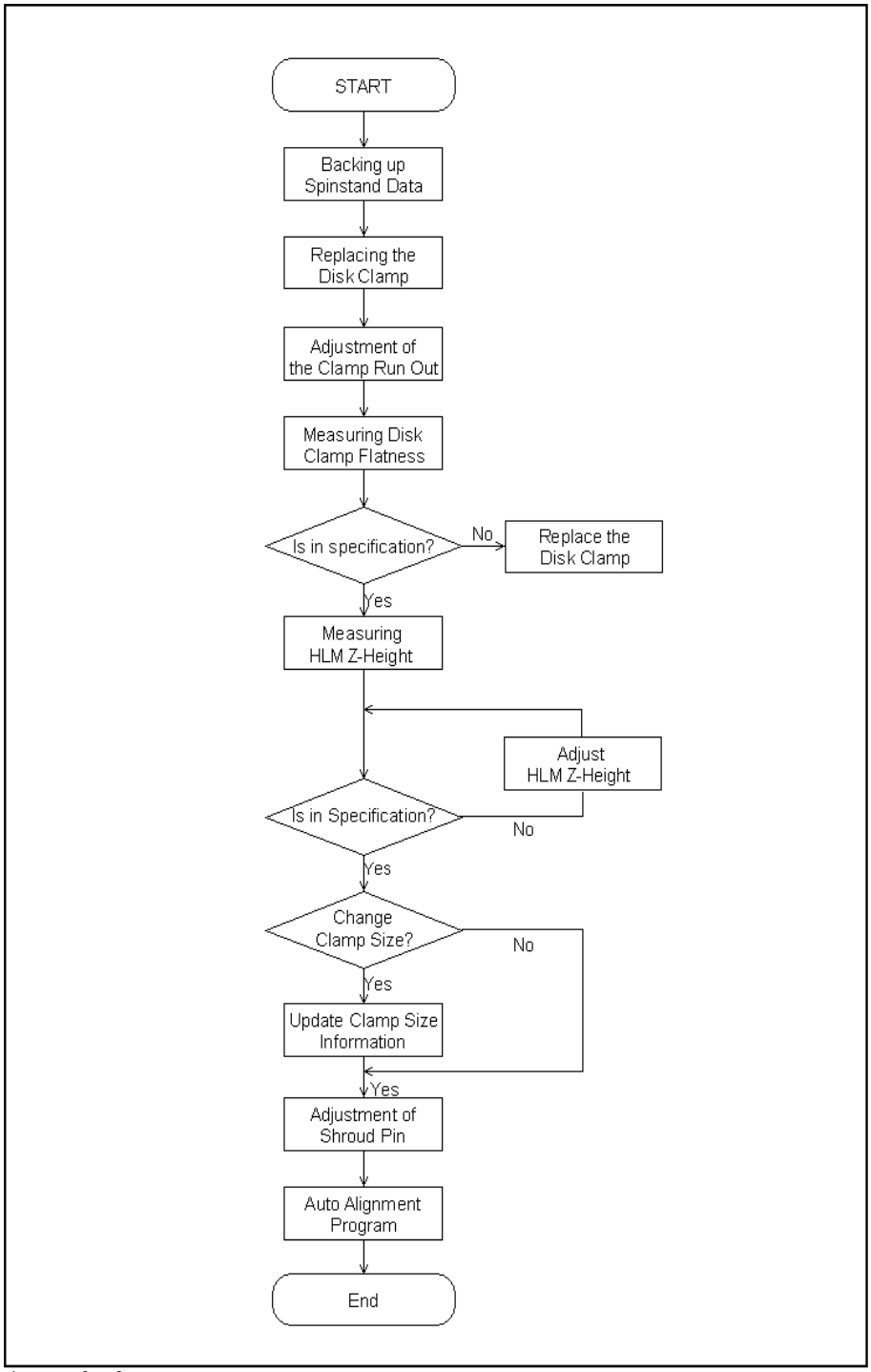
Chapter 1	This chapter describes the organization of this guide and preparation for disk clamp replacement. Before replacement, you need to understand this chapter and prepare required tools and procedures.
Chapter 2	This chapter describes how to replace the disk clamp. Procedure required after replacement are also described.

CAUTION Disk clamp replacement for the E5010B spinstand is permitted for only trained personnel such as an Agilent Customer Engineer.

Disk Clamp Replacement Flow

Figure 1-1 shows overall disk clamp replacement flow.

Figure 1-1



clamp_rep_flow_2

Tool Requirements

The following tools are required to replace the disk clamp.

Table 1-1 Tool Requirements

Tool	Specification		Purpose
Hex Key	Hex Size	1/8”	Disk Clamp Replacement
		3mm	Z-Height Adjustment (HLM Baseplate)
		4mm	Z-Height Adjustment (HLM Upper Part)
		0.028” (0.7mm)	Shroud Pin Adjustment
Open End Wrench *1	Size	6mm	Removing Cables on Head Amplifier
Long Shaft Hex Key	Hex Size	5/32”	Removing Shroud
Torque Limiting Driver	Hex Size	1/8” (3.5Nm)	Disk Clamp Replacement (3.5”, 2.5”)
		1/8” (3.5Nm)*2	Disk Clamp Replacement (1.8”)
		3mm (3.0Nm)	Z-Height Adjustment (HLM Baseplate)
TORX Driver		T10	Removing HLM Cover/Head Amplifier
Connector Plier			Disk Clamp Replacement
Soft Plastic Hammer			Disk Clamp Replacement
Z-Height Jig *3			Z-Height Adjustment
Shim Stocks	Various Thickness *4		Z-Height Adjustment
Static Control Wrist Strap			ESD Protection
Electric Micrometer Set (Lever Head Type) with Stand	0.1µm Resolution		Disk Clamp Replacement Z-Height Adjustment
Loctite 241			Fixing Shroud Pin
Spinstand Tool Software*5			Disk Clamp Replacement Z-Height Adjustment

*1. Torque Limiting Wrench (6mm Opening 3.5kgfcm Limit) is recommended
*2. Slim type hex bit is required. One slim type hex bit is accompanied by the E5010U Option 724.
*3. Various types of jigs are available. E5010U Option 720 (Agilent P/N E5010-65720) is for 3.5”, E5010U Option 721 (Agilent P/N E5010-65721) is for 2.5”, and E5010 Option 724 (Agilent P/N E5010-65724) is for 1.8” disk clamp
*4. Agilent P/N E5010-65022 is available. E5010-65022 includes two square shims for 10 and 20µm thickness.
*5. Spinstand Tool Software is a software to control the E5010B spinstand. This software is included in the E5022A/B System Software rev. 3.30 or later. In the case of installing the 1.8” disk clamp, System Software rev.A.04.02.03 or later is required, since 1.8’ disk clamp is supported from rev. A.04.02.03.

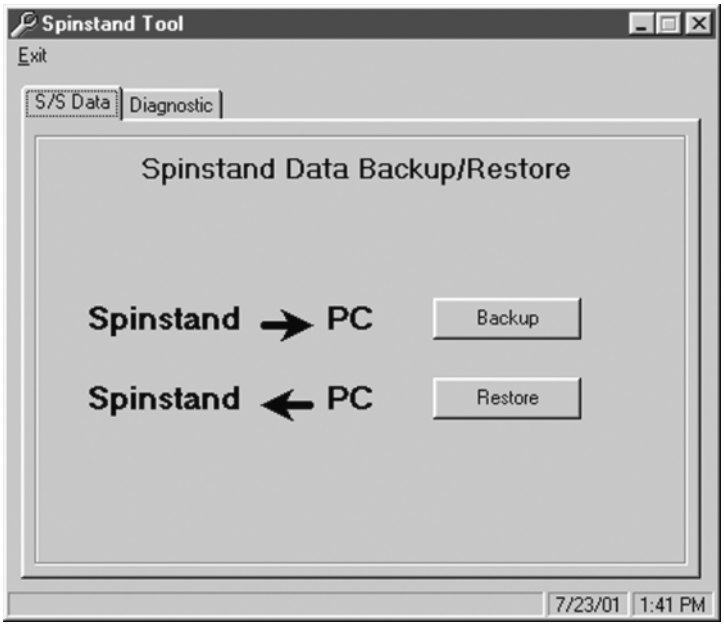
Data Backup

There is data stored in the spinstand controller. There are information on alignment of stages, disk clamp size and other information. It is recommended to take a backup before disk clamp replacement. The method of backing up and restoring spinstand's data is described below.

NOTE It is strongly recommended to reboot the PC before launching Spinstand Tool Software to free serial port from other applications. Also, shutdown any application that use serial port. Such application may lock serial port and cause conflict with Spinstand Tool Software.

Backing Up Spinstand Data

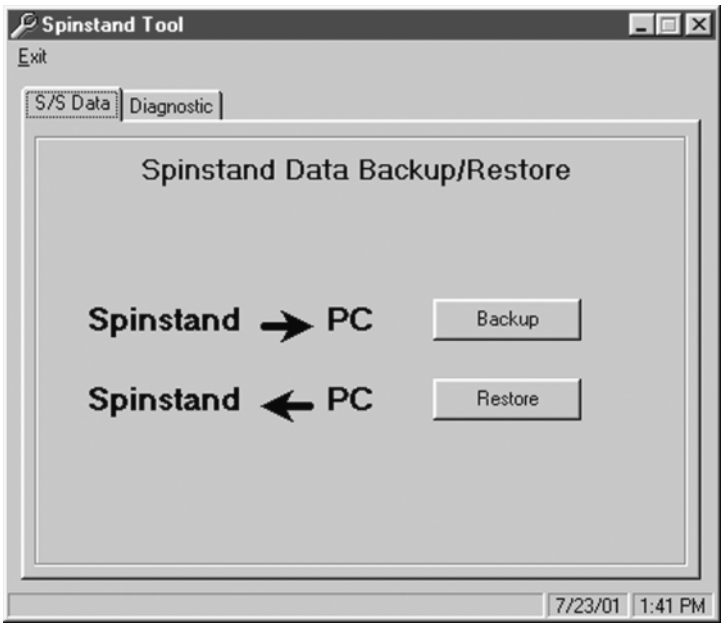
1. Power on the spinstand and the PC.
2. Launch Spinstand Tool Software (**[Start] -[Programs]- [Agilent Hard Disk ReadWrite Test System] - [Spinstand Tool]**) from the **[Start]** menu of the Windows95/2000.



3. Click on **[Backup]** button then select the destination and save the data. It takes about one minute to complete backup.

Restoring Spinstand Data

1. Power on the spinstand and the PC.
2. Launch Spinstand Tool Software (**[Start] -[Programs]- [Agilent Hard Disk ReadWrite Test System] - [Spinstand Tool]**) from the **[Start]** menu of the Windows95/2000.



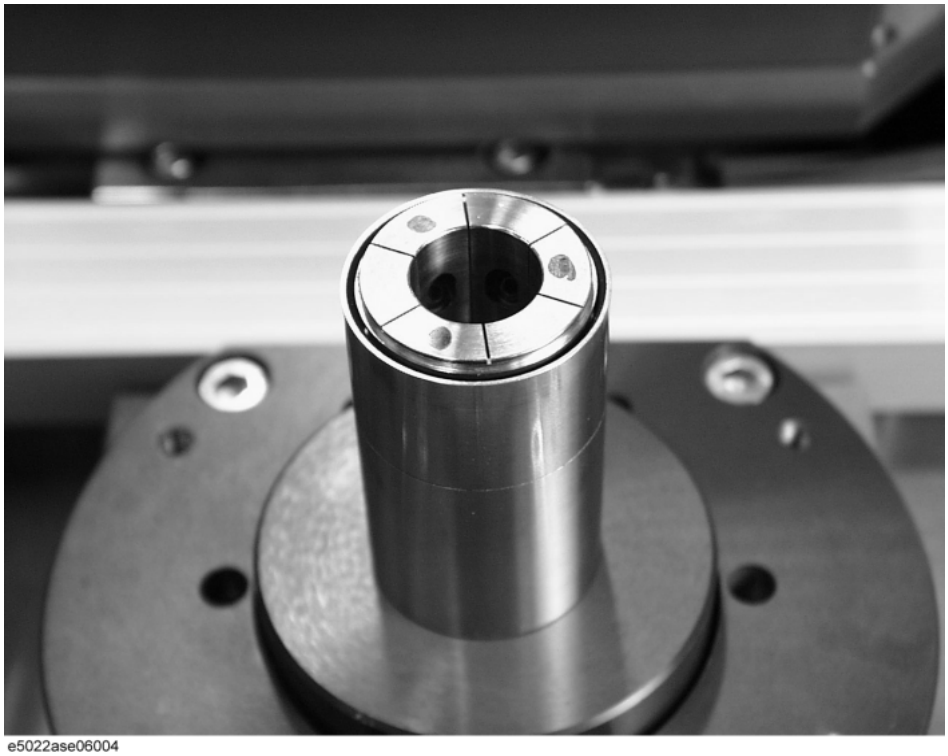
3. Click on **[Restore]** button then select the file name you want to restore. It takes about one minute to restore the data.

2 Replacement of Disk Clamp

Replacement of Disk Clamp

In the Agilent E5010B Spinstand, vacuum is used to clamp the media. The part which holds the media is the disk clamp. The disk clamp has a precise surface that makes perfect contact to the media. The vacuum force pulls the media to the disk clamp and prevents media from falling off in low rpm. In higher rpm, centrifugal force moves media holder against the spring force to hold the media. Since the spindle rotates at very high speed, the disk clamp must be centered very precisely to the spindle center. The technique to replace and adjust center of the clamp is described in this section.

Figure 2-1 **Disk Clamp**



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Removing Disk Clamp

CAUTION Always make sure air is provided and servo loop turned off. Turning the spindle with servo loop on may cause fatal damage to the servo amplifier. Turning the spindle without air supply may cause fatal damage to the air bearing of the spindle.

Table 2-1 Pressure Range of Air Supply (All Units are in kPa)

	Main Air	Main Vacuum
Minimum	670	
Maximum	730	-70

Step 1. Removing the head amplifier with a T10 TORX driver.

Step 2. Removing the shroud switch with a T10 TORX driver.

Step 3. Removing the shroud with a long shaft 5/32” hex key.

Step 4. Loose the screw in center of the disk clamp using a 1/8” hex key.

Step 5. When the screw is completely loosen, remove the clamp from the spindle.

NOTE Do not hit the surface with the shroud or the tool, which contacts with a media. This surface is extremely precise and damaging this surface will result in disk slip and disk scratch.

Attaching Disk Clamp

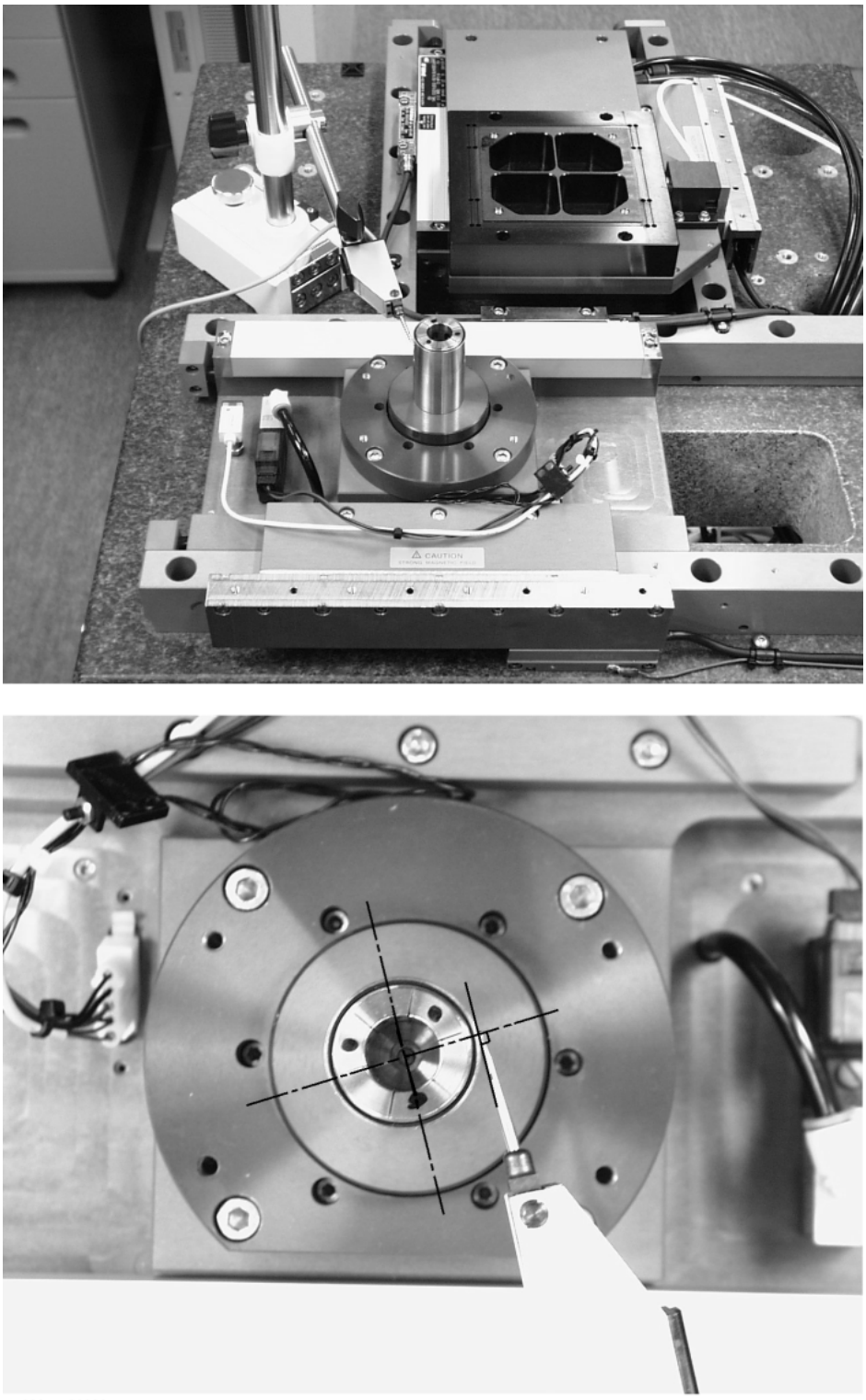
Step 1. Wipe contact surface of both spindle and new disk clamp with alcohol.

Step 2. Place the disk clamp on the spindle in the direction that both vacuum hole and positioning pin matches in its place.

Step 3. Tighten the screw in the center of the disk clamp to approximately 0.3Nm.

Step 4. Measure the run out of the disk clamp as shown in figure Figure 2-2.

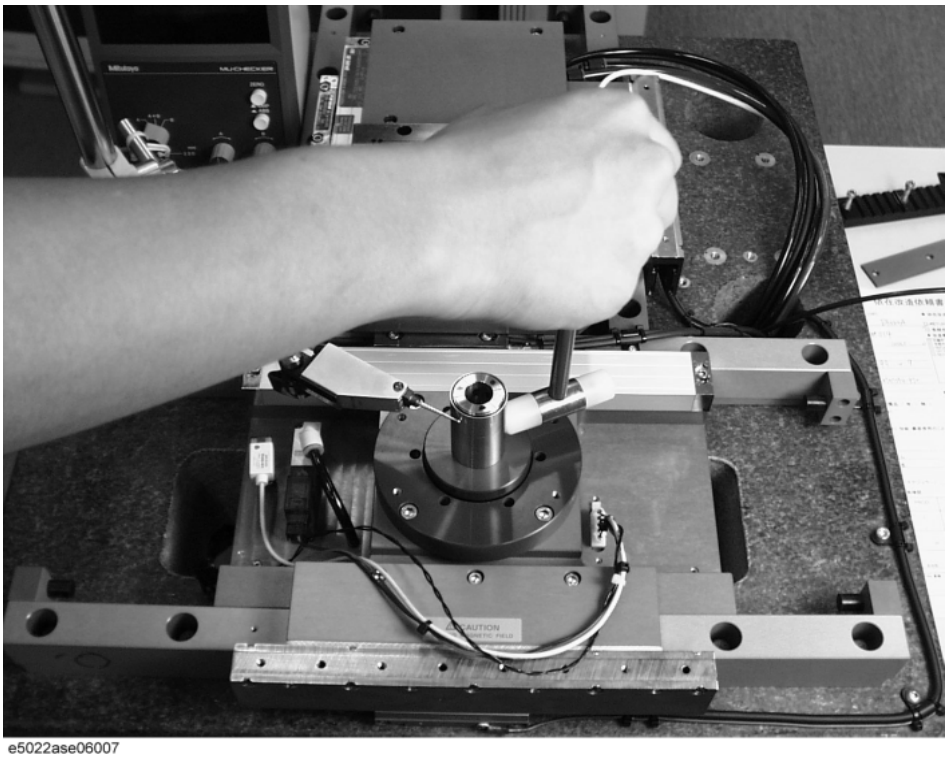
Figure 2-2 **Measurement of Run Out**



Step 5. Mark the minimum and the maximum value (e_m and e_M) and its locations.

Step 6. Measuring minimum point, hit opposite side with plastic hammer very gently until the value becomes $(e_m+e_M)/2$.

Figure 2-3 **Adjustment of Clamp Run out**



Step 7. Repeat steps 5 and 6 until run out gets within 1.2µm.

Step 8. Carefully tighten the screw at the center of the clamp to 3.5Nm.

Step 9. Measure the run out. If the value is larger than 3.0µm, loosen the screw and go back to step 3.

Checking Disk Clamp Flatness

Check the disk clamp flatness by following below steps.

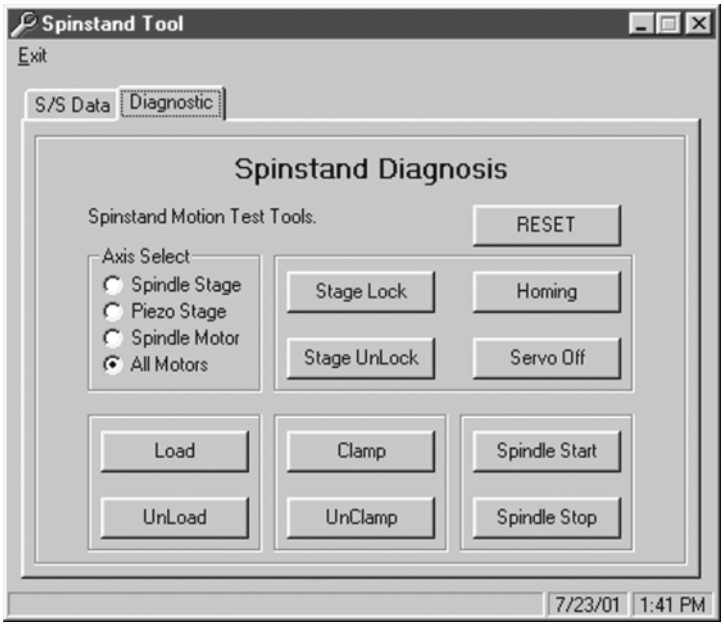
CAUTION Always make sure air is provided and servo loop turned off. Turning the spindle with servo loop on may cause fatal damage to the servo amplifier. Turning the spindle without air supply may cause fatal damage to the air bearing of the spindle.

Step 1. Launch Spinstand Tool (**[Start] - [Programs] - [Agilent Hard Disk ReadWrite Test System] - [Spinstand Tool]**) from the **[Start]** menu of the Windows95/2000.

Figure 2-4 Opening Window of Spinstand Tool

Step 2. Click on the **[Diagnostic]** tab.

Figure 2-5 Spinstand Tool - Diagnostic Menu

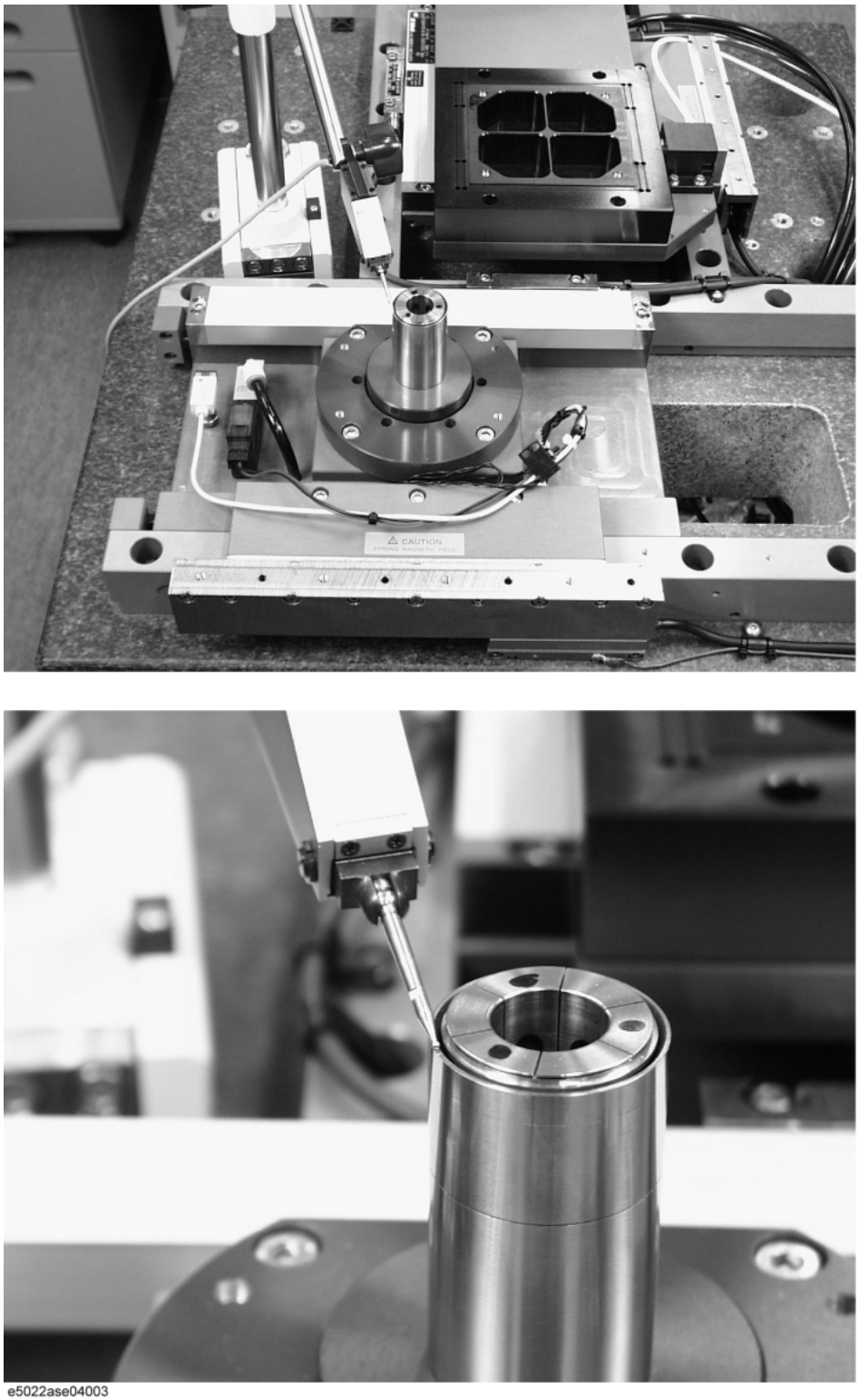


Step 3. Select **[Spindle Motor]** in the **[Axis Select]** menu.

Step 4. Press **[Servo Off]** button to turn off the servo loop.

Step 5. Place micrometer on the rim of the disk clamp as shown in Figure 2-6.

Figure 2-6 **Micrometer Placement for Measurement of Disk Clamp Flatness**



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Step 6. Slowly rotate the spindle with hand and check the micrometer value. Rotate the spindle only in the direction of the micrometer probe. In the picture, counter clockwise.

Step 7. Mark the maximum and the minimum value and subtract them to obtain flatness.

Step 8. If the value in Step.7 is out of the specification, it means the disk clamp is damaged. Then, you should replace the disk clamp with new one.

Table 2-2 Specification of Disk Clamp Flatness

	Maximum (μm)
Disk Clamp Flatness	3

Measuring HLM Z-Height

Measure the HLM Z-height by following below steps.

Step 1. Remove the head amplifier from HLM.

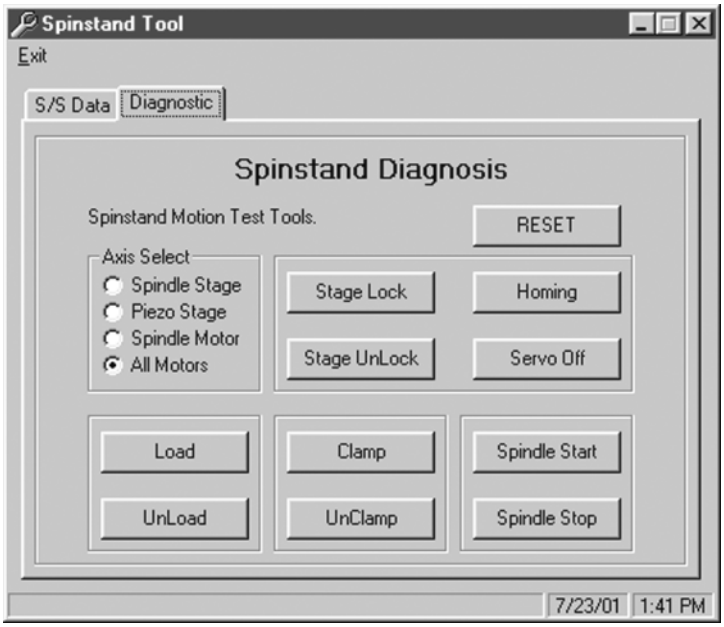
NOTE It is easier to perform HLM Z-height measurement with HLM covers off. To remove the HLM covers, use a TORX T10 driver.

Step 2. Launch Spinstand Tool (**[Start] - [Programs] - [Agilent Hard Disk ReadWrite Test System] - [Spinstand Tool]**) from the **[Start]** menu of the Windows95/2000.

Figure 2-7 Opening Window of Spinstand Tool

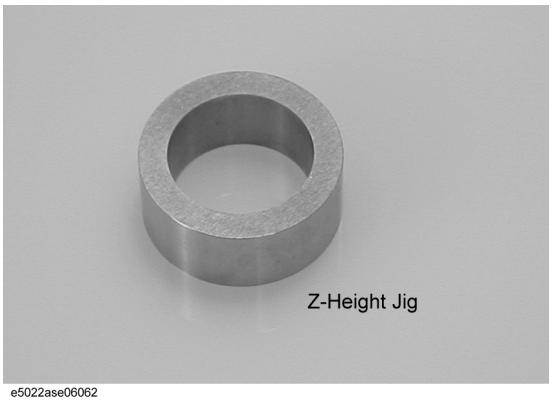
Step 3. Click on the **[Diagnostic]** tab.

Figure 2-8 Spinstand Tool - Diagnostic Menu



Step 4. Place a Z-height jig onto the spindle, then vacuum clamp the jig by pressing **[Clamp]** button.

Figure 2-9 **Z-Height Jig**

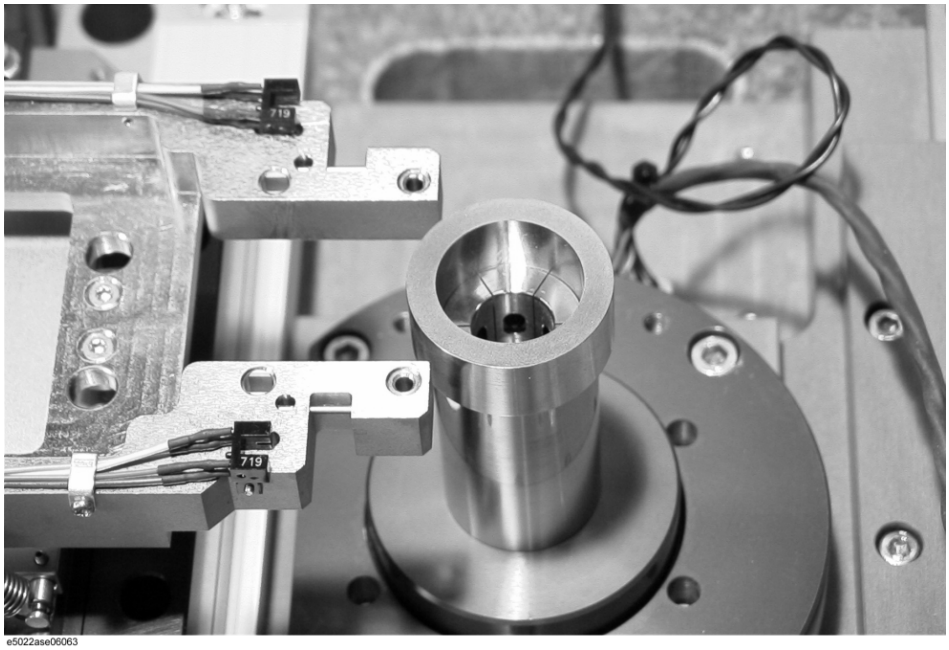


CAUTION Do not hit the rim of the disk clamp with the Z-height jig. Damaging the surface of the disk clamp will result in disk slip and undesired measurement result.

Step 5. Select **[Spindle Stage]** in the "Axis Select" menu, then press **[Servo Off]** button and **[Stage Unlock]** button to free float the spindle stage.

Step 6. Move the spindle stage manually to the location shown in Figure 2-10.

Figure 2-10 **Stage Location for Z-Height Adjustment**



Step 7. Lock down spindle stage by pressing **[Stage Lock]** button.

Step 8. Select **[HLM Stage]** in the "Axis Select" menu, then press **[Servo Off]** button and **[Stage Unlock]** button to free float the HLM stage.

Step 9. Move the HLM stage manually to the location shown in Figure 2-10.

Step 10. Lock down HLM stage by pressing **[Stage Lock]** button.

Step 11. Press **[Load]** button to load the HLM.

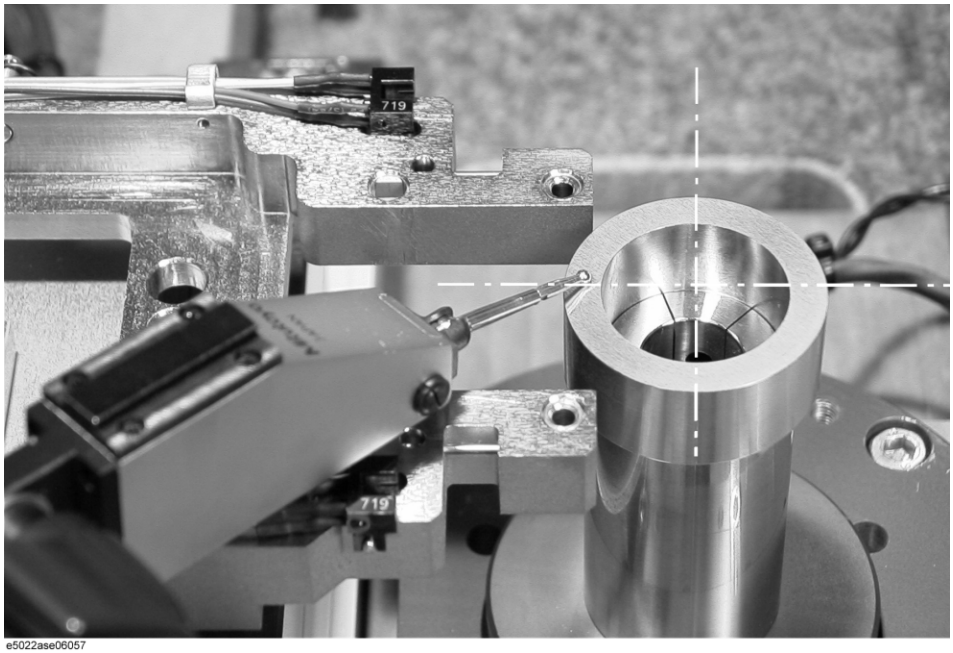
Step 12. Now, status of the spinstand is following. Confirm the status and go to the next step.

Table 2-3 Status of Spinstand

	Status
Spindle Stage	Lockdown
Piezo Stage	Lockdown
HLM Status	Load
Clamp Status	Clamp

Step 13. Place the micrometer probe on the Z-height jig as in Figure 2-11.

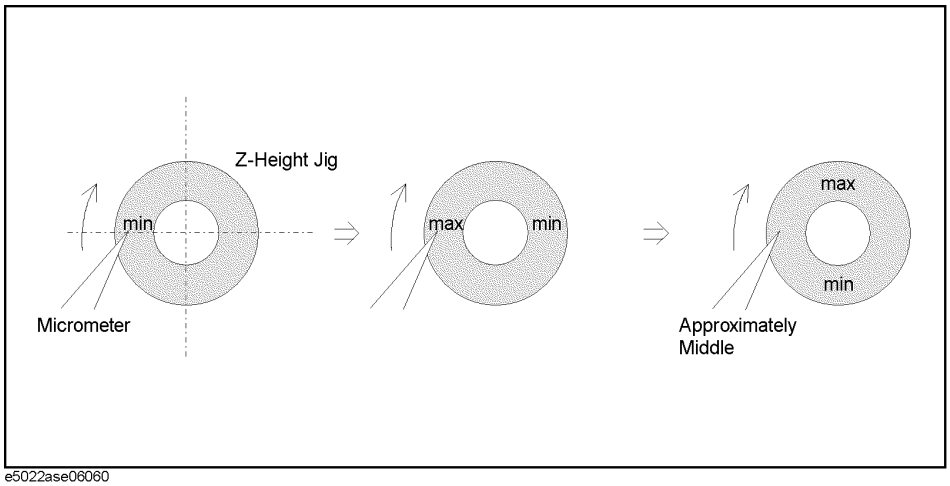
Figure 2-11 Placing Micrometer on Z-Height Jig



Step 14. Rotate the spindle with your hand and measure maximum and minimum height of the jig.

Step 15. Mark the highest and lowest point. Then turn the spindle as shown in Figure 2-12. Bring the middle point to the location of the micrometer probe.

Figure 2-12 **Bringing Middle Point to Center**



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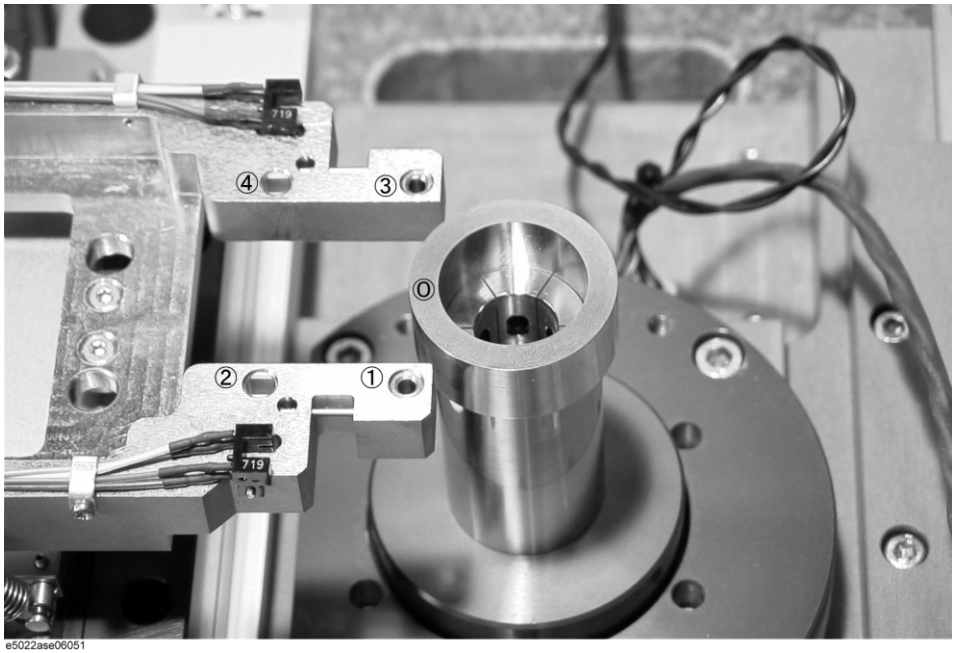
Step 16. Reset the reading of the micrometer to zero.

Step 17. Move the micrometer probe to the point "1" in Figure 2-13 by sliding the micrometer probe stand.

Figure 2-13 **Points to Measure HLM Z-Height**



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NOTE Do not change the direction of the probe stand when sliding the stand. Rotating the stand will result in incorrect measurement value.

Step 18. Measure the difference in height between the jig and the arm of the HLM at three other points shown in Figure 2-13. The specification of the Z-height is as follows. If the value is out of the specification, you should adjust Z-height. Refer to "Adjustment of HLM

Z-Height" section to adjust Z-height.

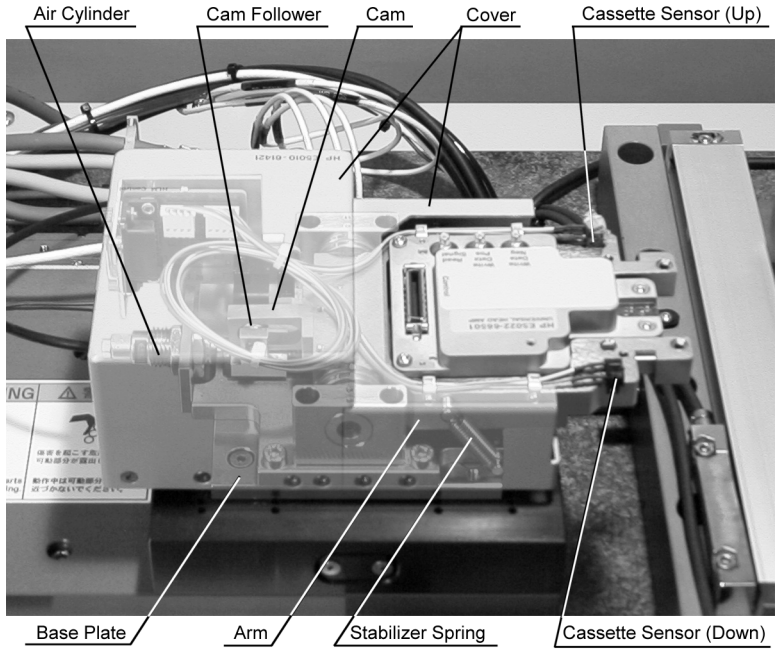
Table 2-4 Specification of HLM Z-Height

	Min	**Max**
Z-Height Difference from Z-Height Jig to HLM	-5μm	+10μm
Difference Among Four Points on HLM	n/a	10μm

Adjustment of HLM Z-Height

The relative height between the clamp (media) and the HLM is called Z-height. The precision of the Z-height of the HLM is micron order to achieve repeatable measurement result. Taking tolerances of parts that consist HLM and spindle in to account, measurement and in some cases adjustment is needed when any of above parts is replaced. This section provides information on adjusting Z-height of the HLM with a Z-height jig and electric micrometer. Figure 2-14 shows name of each part that is used in this section.

Figure 2-14 Name of Each Part in HLM

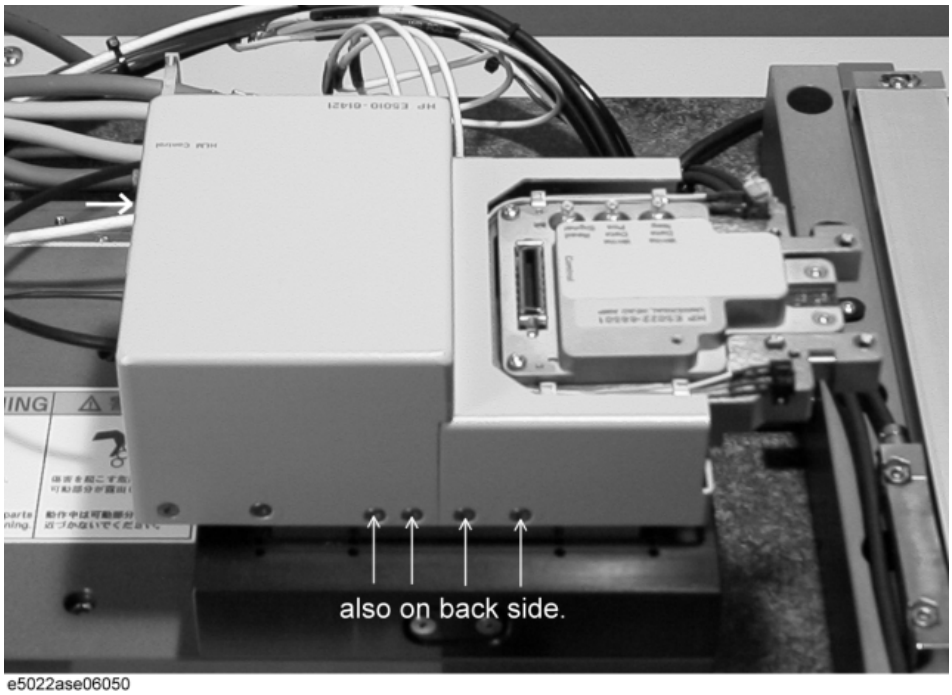


Adjusting HLM Z-Height

Step 1. Measure the Z-height of the HLM by following “Measuring HLM Z-Height” on page 23. If the result is out of the specification, adjustment is necessary.

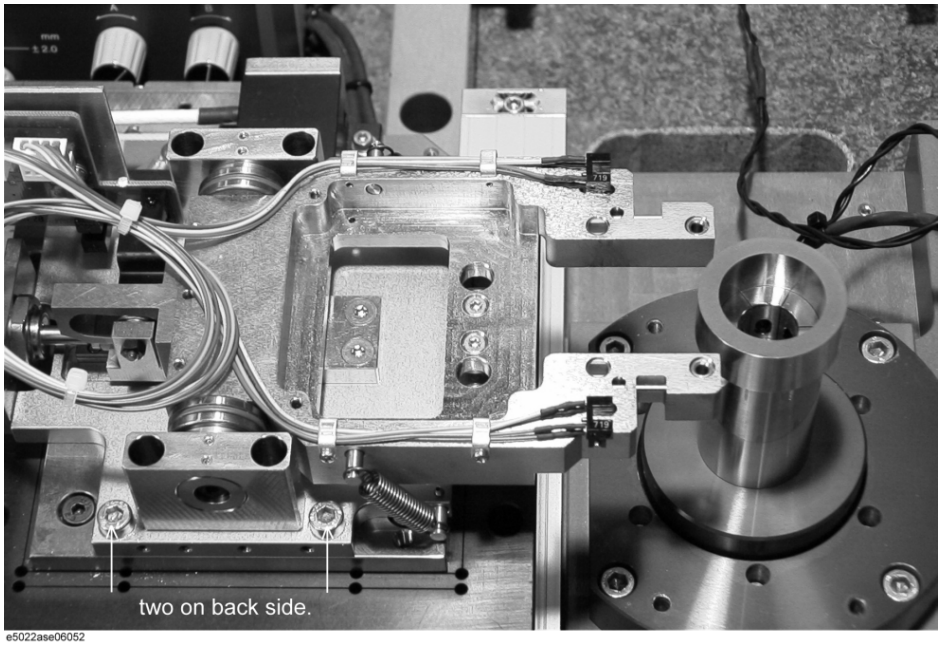
Step 2. Remove front and rear covers of the HLM by removing nine screws with a T10 TORX driver as in Figure 2-15.

Figure 2-15 **Removing HLM Cover**



Step 3. Remove upper part of the HLM by removing four hex socket head cap screws with a 4mm hex key.

Figure 2-16 **Removing Upper Part of HLM**

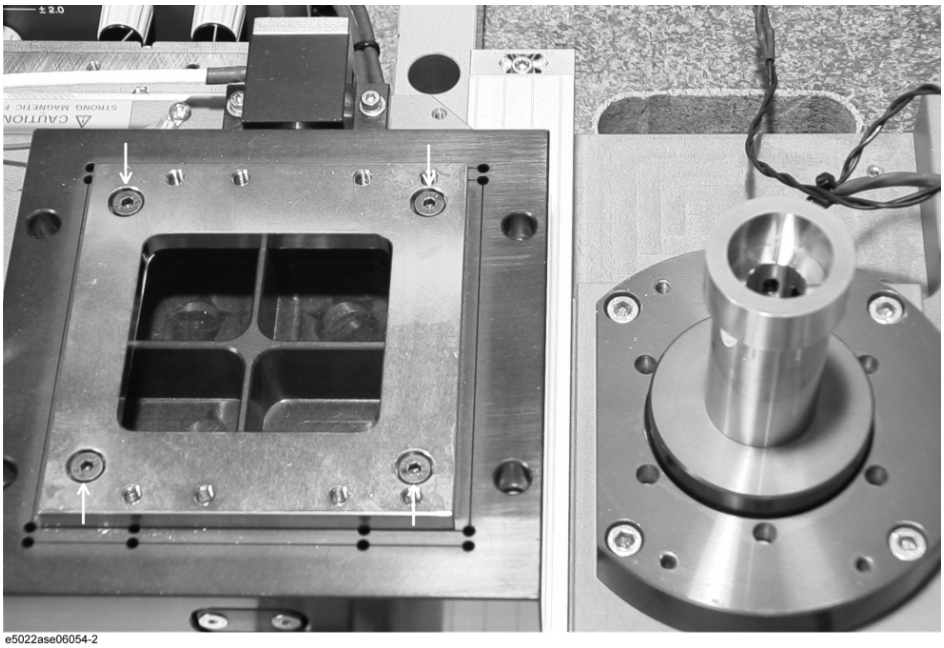


NOTE Your HLM may not be identical to the one shown in Figure 2-16. There may be minor

design change.

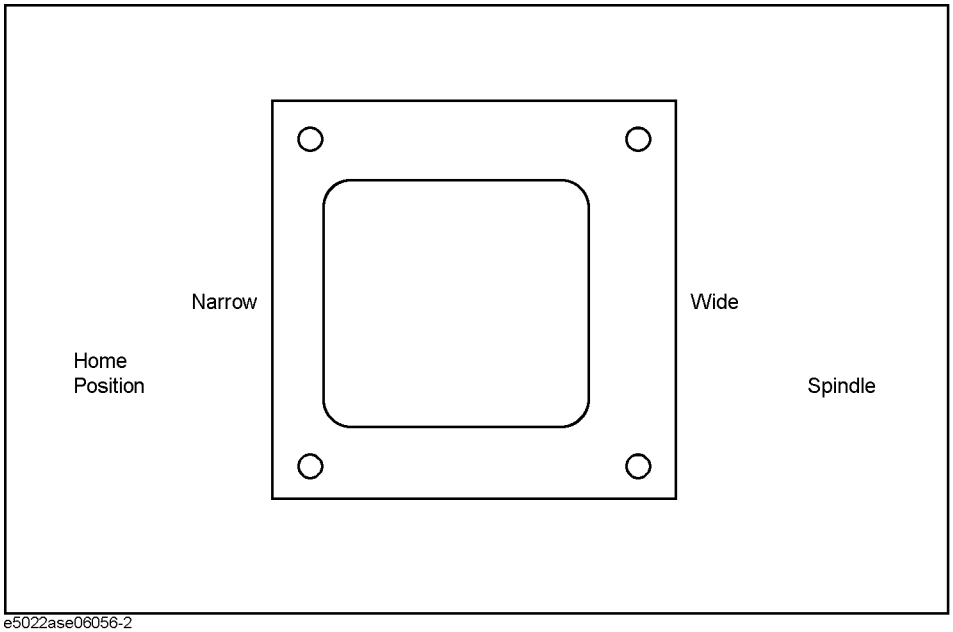
Step 4. Remove the base plate by removing the screws shown in Figure 2-17 with 3mm hex key.

Figure 2-17 Removing Base plate



Step 5. Insert or remove shim stocks to adjust Z-height. If you want to change the posture of the HLM, then cut a sheet of shim stock to obtain desired shape.

Figure 2-18 Shim Stock Used for Adjusting Z-Height



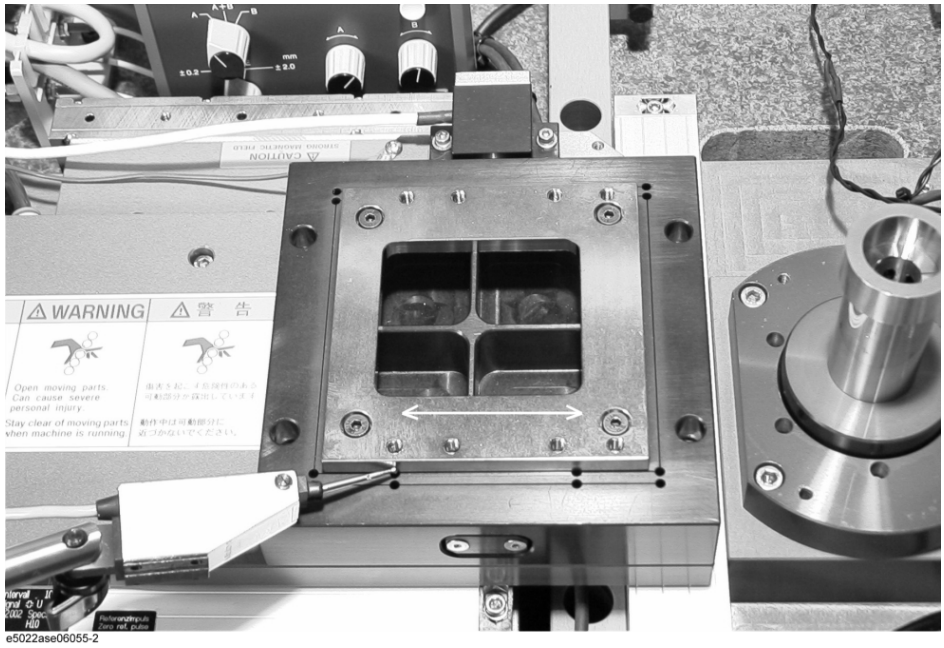
Step 6. Adjust the orientation of the base plate roughly, and tighten four screws loosely with a 3mm hex key.

NOTE Usage of a torque wrench is recommended for improving repeatability of adjustment using shim stocks. Tightening screws of the base plate, with shims underneath, at different torque will result in different height of the HLM.

Step 7. Select **[HLM Stage]** in the "Axis Select" menu, then press **[Servo Off]** button and **[Stage Unlock]** button. The HLM stage will free float.

Step 8. Make a fine adjustment of the orientation of the base plate with the micrometer as shown in Figure 2-19. The difference in the micrometer reading should be within 15μm at both ends.

Figure 2-19 Adjusting Orientation of Base plate



Step 9. Press **[Stage Lock]** and lockdown the HLM stage.

Step 10. Tighten four screws of the base plate evenly up to 3.0Nm with the torque wrench with 3mm hex bit.

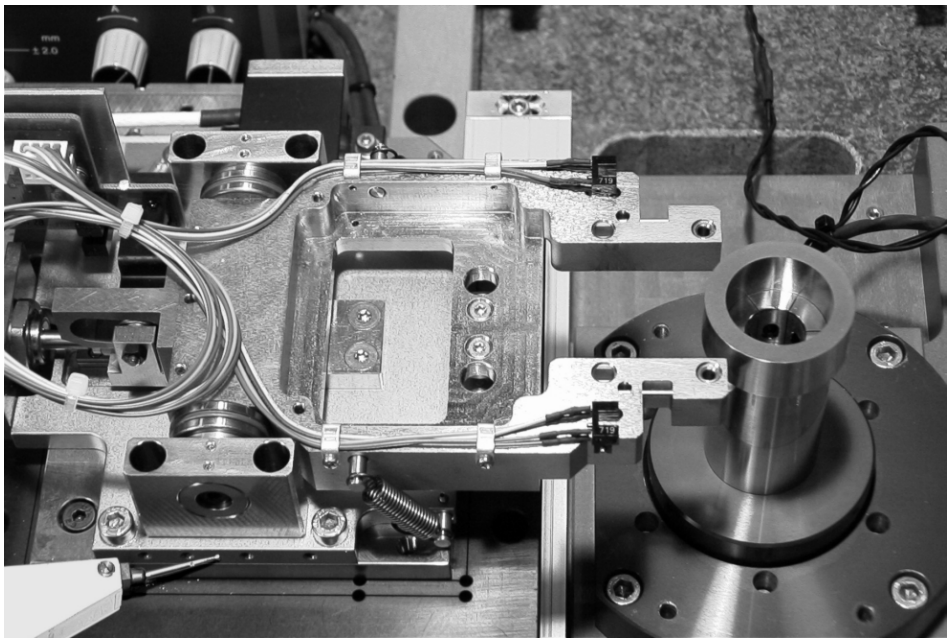
Step 11. Attach the upper part of HLM with four screws. Tighten them evenly.

Step 12. Measure the Z-height of the HLM. If the Z-height is out of the range, repeat steps from 3 to 11.

Step 13. Select **[HLM Stage]** in the "Axis Select" menu, then press **[Servo Off]** button and **[Stage Unlock]** button. The HLM stage will free float.

Step 14. Loosen four screws fixing upper part of the HLM and adjust orientation of the HLM with the micrometer as shown in Figure 2-20. The difference in the micrometer reading should be within 30μm.

Figure 2-20 **Adjusting Upper Part's Orientation**



Step 15. Re-check the Z-height. If the Z-height is out of the specification, then re-adjust Z-height.

Updating Clamp Size Information

Disk clamp size information is stored in the spinstand controller as one of spinstand unique data. When you change the disk clamp size, you need to update this information using Spinstand Tool Software. If you don't change the clamp size, you don't need to care about this.

CAUTION Changing the disk clamp size without updating clamp size information may cause fatal damage to the spinstand. Never forget to update clamp size information when you change the disk clamp size.

Step 1. Launch Spinstand Tool (**[Start] - [Programs] - [Agilent E5022A] - [Spinstand Tool]**) from the **[Start]** menu of the Windows95/2000.

Figure 2-21 Opening Window of Spinstand Tool

Step 2. Expand the Spinstand Tool Menu and select the **[Clamp Size]** tab. To expand the menu, click the point shown in Figure 2-22 while pressing [Shift] and [Ctrl] keys simultaneously.

Figure 2-22 **Expand Spinstand Menu**

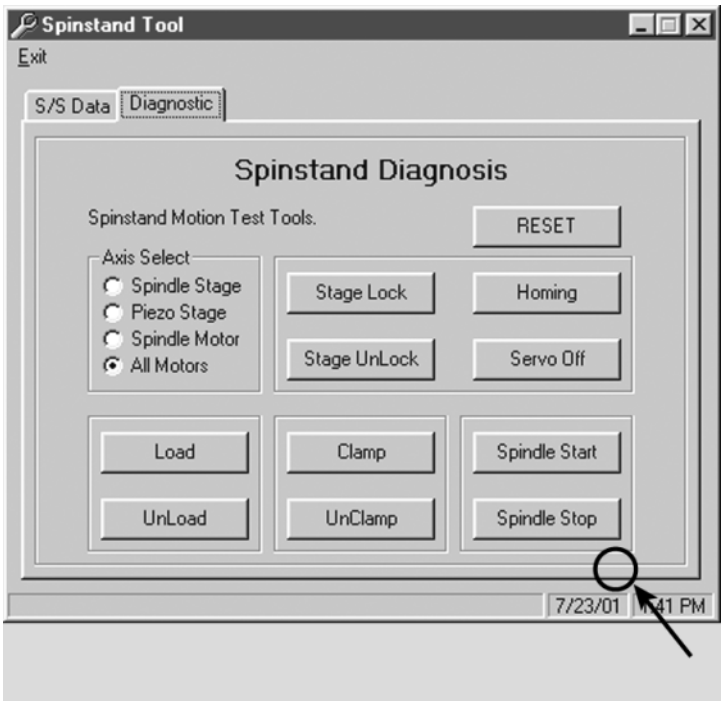
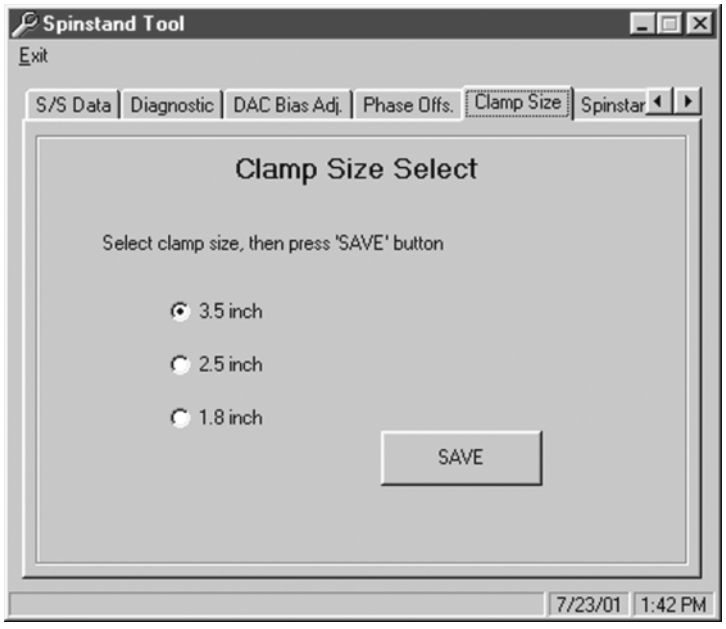


Figure 2-23 **Spinstand Tool - Clamp Size Menu**



CAUTION Never press **[All Reset]** button unless needed. This command will erase data stored in the spinstand.

NOTE In normal state, the Spinstand Tool has only two menus. For trained personnel such as an Agilent Customer Engineer, additional menus are available.

Step 3. Select the clamp size and press **[SAVE]** button.

CAUTION Never forget to press **[SAVE]** button. If you quit the Spinstand Tool without pressing the **[SAVE]** button, new clamp size information is not saved and it may cause fatal damage.

Step 4. Quit the Spinstand Tool and reboot the spinstand and the PC.

Adjustment of Shroud Pin Length

The shroud pin on the lid of the shroud prevents the media to fall off the disk clamp in unexpected obstacles. Since proper extension length of this pin depends on the disk clamp size, you need to adjust it when you change the disk clamp size.

CAUTION The original shroud does NOT provide protection from glass media shards which can cause death or serious injury (blindness, etc.). Do NOT use with glass media except with an appropriate cover.

Adjustment of Extension Length (From 3.5”/2.5” to 1.8”)

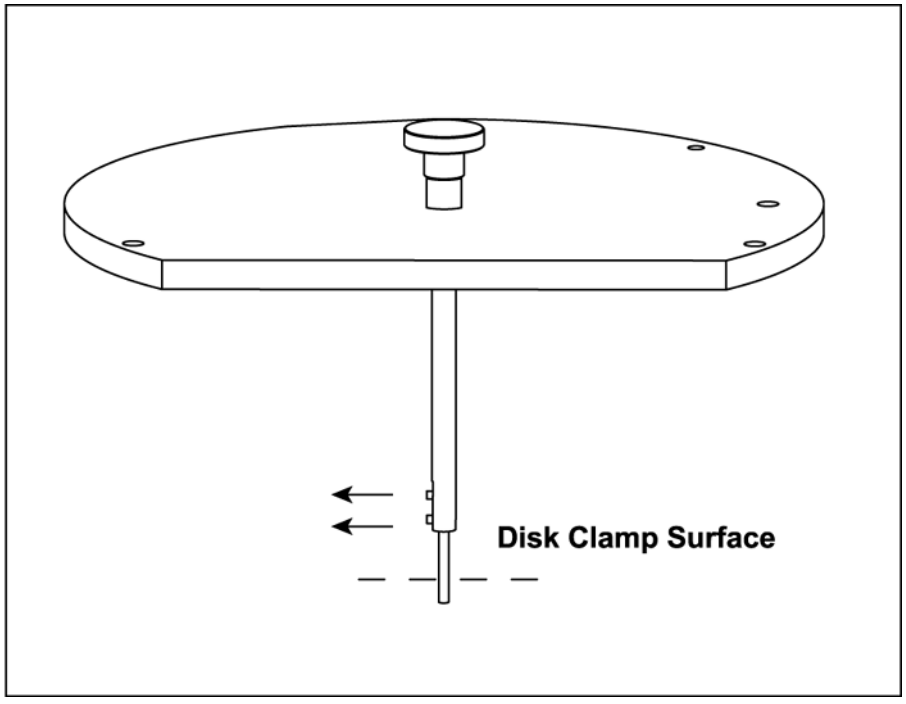
When you replace the 3.5” or the 2.5” disk clamp with the 1.8” one, adjust extension length of the shroud pin by following below steps.

Step 1. Attach the shroud with a long shaft 5/32” hex key.

NOTE Do not hit the surface with the shroud or the tool, which contacts with a media. This surface is extremely precise and damaging this surface will result in disk slip and disk scratch.

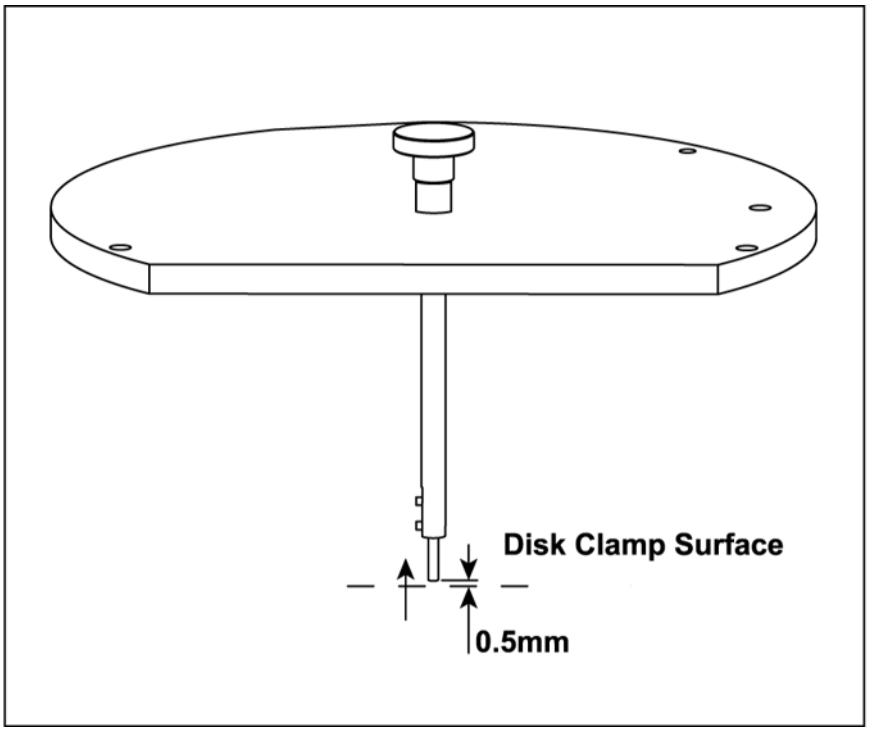
Step 2. loosen two set screws on the shroud pin with a 0.028” (0.7mm) hex key.

Figure 2-24 Loosening Set Screws



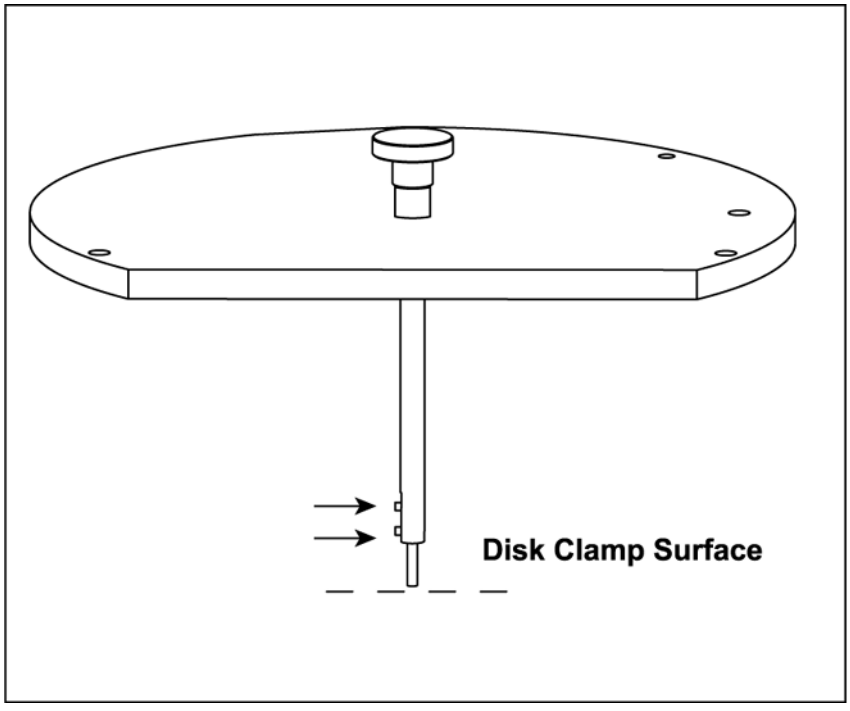
Step 3. Put the pin tip into the shroud pin as shown in the Figure 2-25.

Figure 2-25 **Putting Pin Tip into Shroud Pin**



Step 4. Fix two set screws and apply small amount of loctite to the screws. Allow 2 to 3 minutes for loctite to harden.

Figure 2-26 **Fixing Set Screws**



Adjustment of Extension Length (From 1.8” to 3.5”/2.5”)

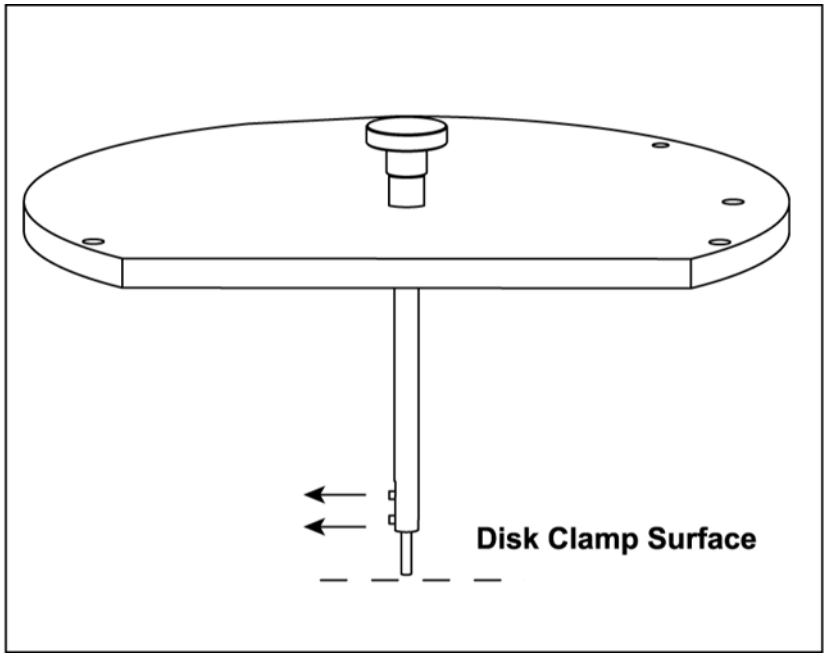
When you replace the 1.8” disk clamp with the 3.5” or the 2.5” one, adjust extension length of the shroud pin by following below steps.

Step 1. Attach the shroud with a long shaft 5/32” hex key.

NOTE Do not hit the surface with the shroud or the tool, which contacts with a media. This surface is extremely precise and damaging this surface will result in disk slip and disk scratch.

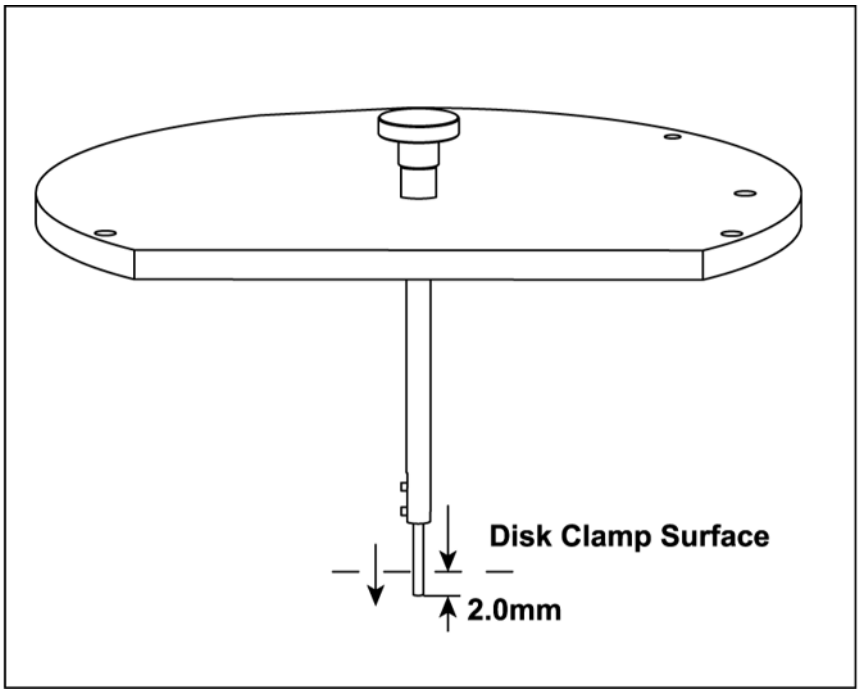
Step 2. loosen two set screws on the shroud pin with a 0.028” (0.7mm) hex key.

Figure 2-27 Loosening Set Screws



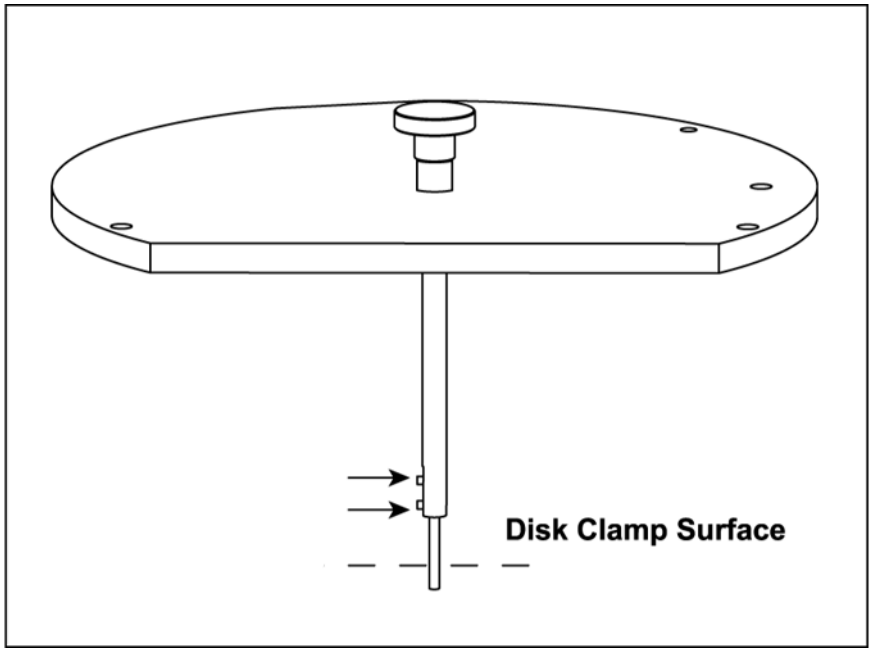
Step 3. Extract the pin tip from the shroud pin as shown in the Figure 2-28.

Figure 2-28 **Extracting Pin Tip from Shroud Pin**



Step 4. Fix two set screws and apply small amount of loctite to the screws. Allow 2 to 3 minutes for loctite to harden.

Figure 2-29 **Fixing Set Screws**



Auto Alignment

After the disk clamp replacement, you must run Auto Alignment program (**[Start]-[Programs]-[Agilent HardDisk ReadWrite Test System]-[Spinstand Alignment]**).

The Auto Alignment is a tool used in determining the center of the spindle. The Auto Alignment sets the system to record the center of the spindle. Once the Auto Alignment is completed, the alignment data will be saved in the non volatile memory of the spinstand. This data contains each individual data of the Up Face and Down Face cassettes.

In general, Auto Alignment is performed at the factory with the head at customer's request.

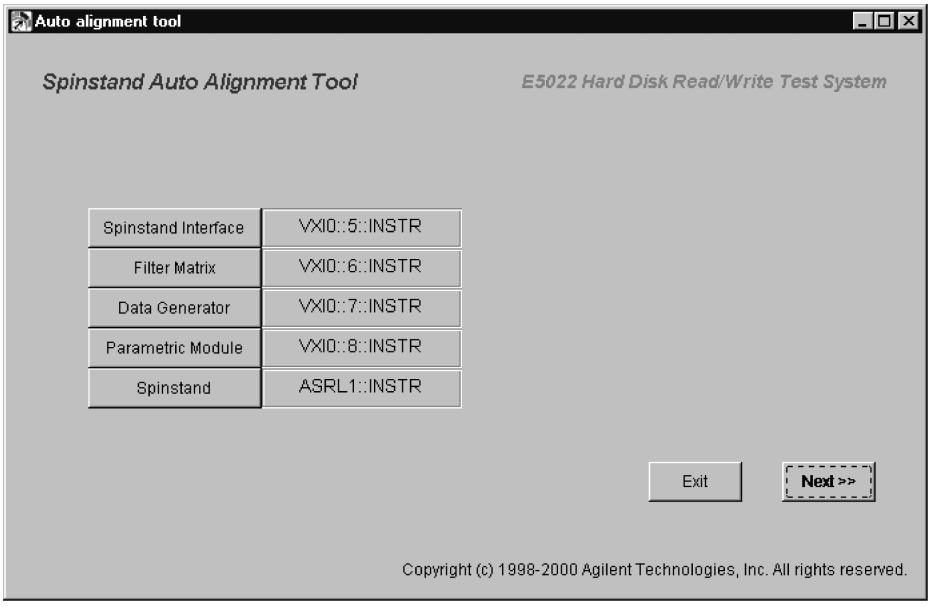
Procedure of Auto Alignment

The procedure for Auto Alignment program is as follows.

Step 1. Set the HGA cassette on the spinstand.

Step 2. Click **[Program] -[Agilent HardDisk Read/Write Test System]-[Spinstand Alignment]** from the Windows starting menu.

Figure 2-30 **Main Menu**

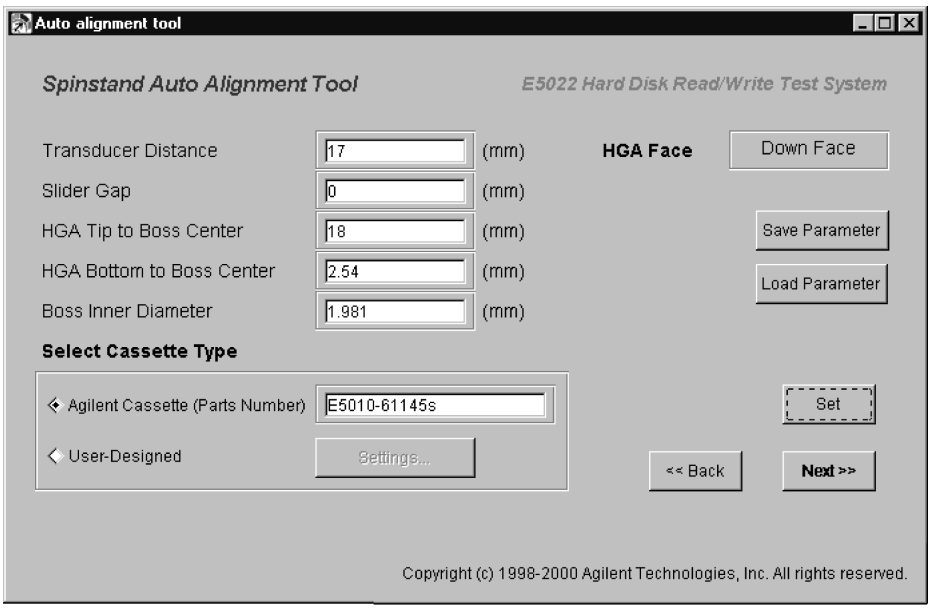


Step 3. Check the module address of each instrument displayed in the main menu. Normally, there is no need to change the setting of this address.

NOTE Refer to hpe5022_init function of the programming manual to check the module address of each instrument.

Step 4. Click **[Next]** to initialize the system. When initialization is successful the HGA's size input window will be displayed.

Figure 2-31 **HGA Size Input**



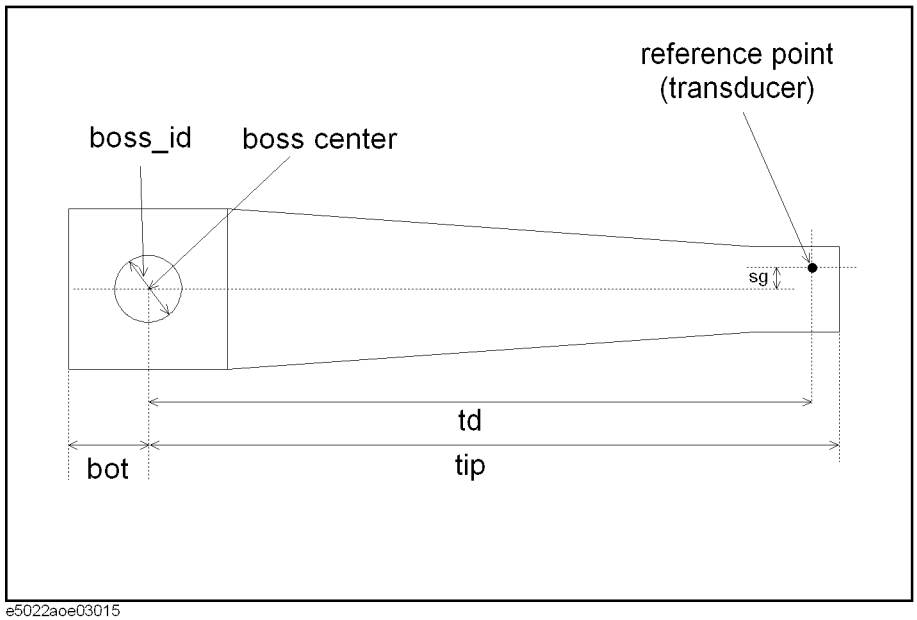
Step 5. Setting the dimensions of each part of the HGA.

- Transducer Distance, specify the perpendicular distance between the boss center and the reference point as shown in (Figure 2-32 td).
- Slider Gap, specify the perpendicular distance between the reference point and the boss center as shown in (Figure 2-32 sg).
- HGA tip to Boss Center, specify the distance from the boss center to the tip of the HGA as shown in (Figure 2-32 tip).
- HGA bottom to Boss Center, specify the distance from the boss center to the base of the HGA as shown in (Figure 2-32 bot).
- Boss Inner Diameter, specify the inner diameter of the boss as shown in (Figure 2-32 boss_id).
- Select Cassette Type

  When using Agilent designed cassette, check on "Agilent Cassette (Parts Number)" and enter the Agilent parts number of the HGA cassette. The parts number is printed on top of the cassette. A string example is "E5022-61141s". If the cassette parameters are stored in a text file (e.g., Cassette.txt), you can load the cassette parameters automatically using the **[Load Parameter]** button.

  When using a customer -designed cassette, check on "User-Designed" check box. A popup menu will appear when you click on **[Settings]** button.

Figure 2-32 **HGA Parameter**



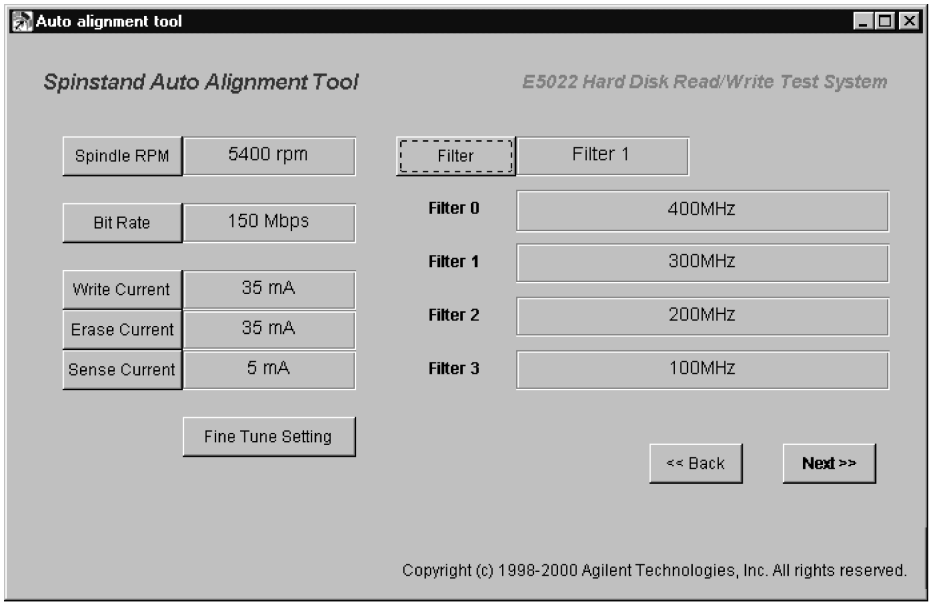
NOTE To save new HGA parameters, click on **[Save Parameter]** button and save the data in a text file. Click the **[Load Parameter]** to retrieve the saved file.

Step 6. Click the **[Set]** button, to set the cassette parameters.

Step 7. Click **[Next]** to continue.

Step 8. Check the parameters of the configuration menu displayed below, click on each button if you need to change the parameter setting.

Figure 2-33 **Configuration Menu for Auto Alignment**

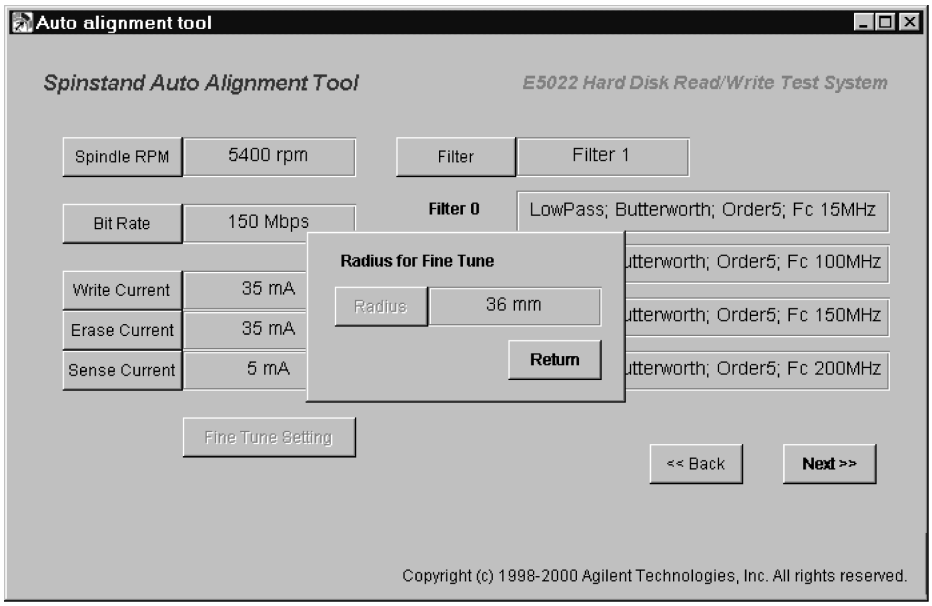


Step 9. Click the **[Fine Tune Setting]** to specify the radius of the skew for fine tuning measurement. Refer to “Determining the alignment data” on page 48.

NOTE

You can set the radius as listed below. However, it is recommended that you use either the default setting or middle value of the range.

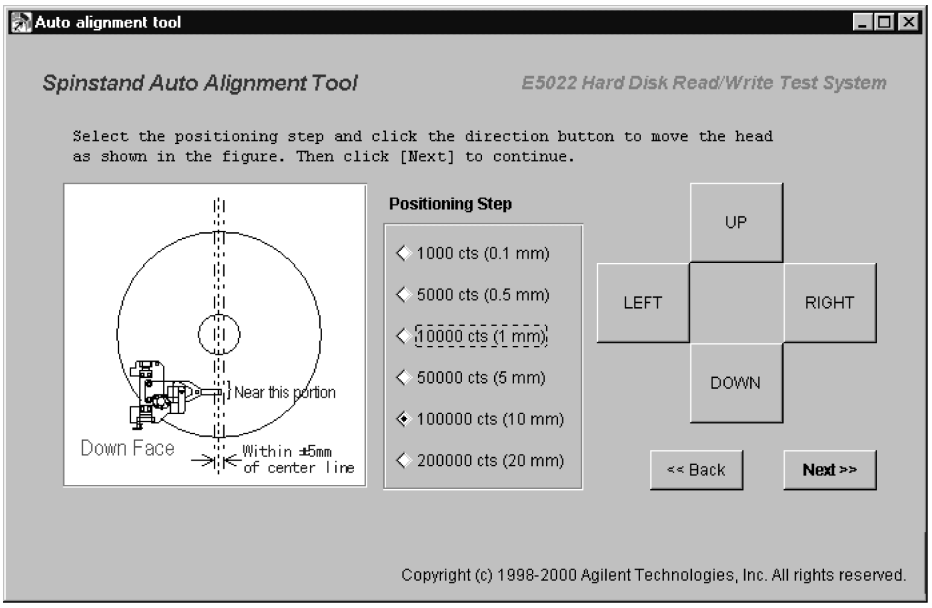
- 3.5” disk clamp - 12.5 to 47.5 [mm]
- 2.5” disk clamp - 10 to 32.5 [mm]
- 1.8” disk clamp - 6 to 24 [mm]



Step 10. Click **[Next]** to continue.

Step 11. The head positioning menu will be displayed.

Figure 2-34 **Head Positioning Menu**



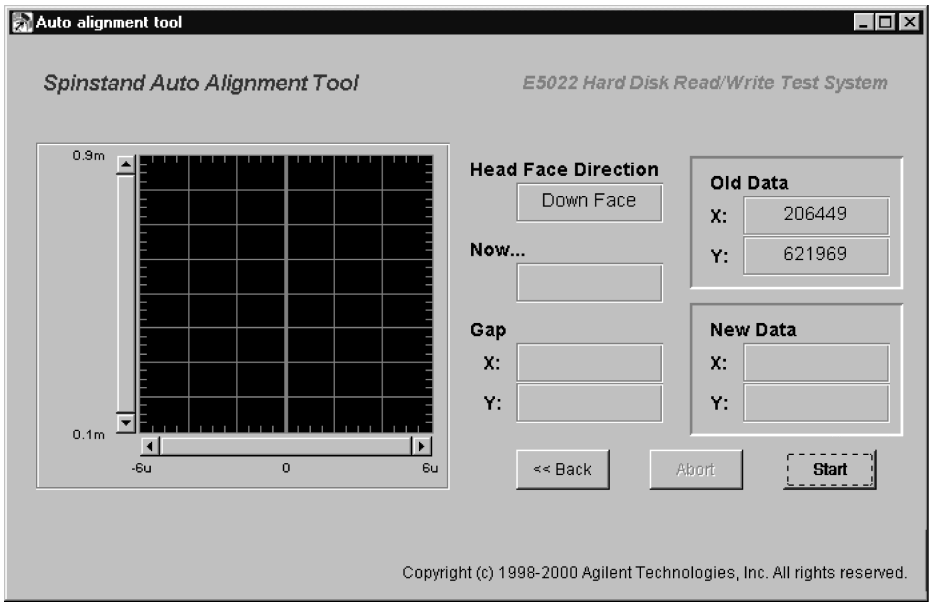
Step 12. Move the head to the location as shown in Figure 2-34, click on **[Up]**,**[Down]**,**[Left]** and **[Right]** buttons to move the spindle-HLM stage until the correct position of the head is achieved.

1. Select the amount of step from the “Positioning Step”menu. Each step is defined as the distance travelled by the stage each time the direction button is pressed. It ranges from 0.10mm to 20mm. Use a larger step value to move the head close enough to the required location, then use a smaller step value for finer adjustments.
2. The head movement is simulated by the x-y stage. The **[Up][Down]** buttons control the spindle stage, while the **[Right][Left]** buttons control the hlm stage. These buttons also show the direction of the stage movement. The **[Up]** key moves toward the back side of the spindle and media, while the **[Down]** key moves toward the front side.
3. The head should be within ± 5 mm of skew 0 deg line and positioned at the center of the media (i.e, center of ID -OD radius) as shown in Figure 2-34. If it falls outside this area it may result to alignment error.

CAUTION Take caution when you move the head. See to it that it doesn’t bump into the shroud.

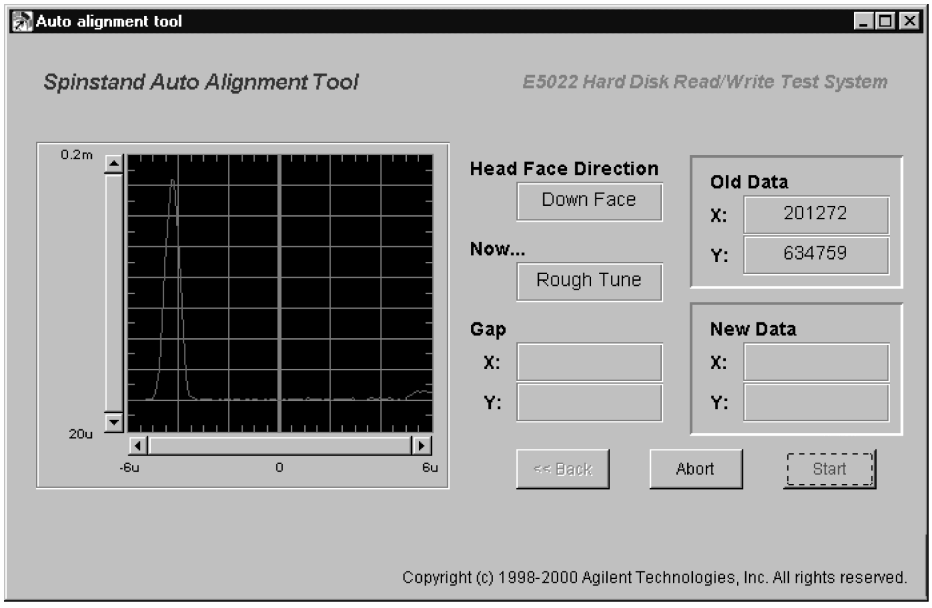
Step 13. Click **[Next]** to continue, then the spindle will rotate and the head will be loaded. The following sequence of events take place, Band Erase> Auto Configuration> Track Profile will be performed. After which the **[Start]** and **[Back]** buttons will become active as shown in Figure 2-35.

Figure 2-35 **Starting the Auto Alignment**



Step 14. Click on the **[Start]** button to start the auto alignment. It takes a few minutes to finish (approx. 5 min) the alignment.

Figure 2-36 **Alignment in Progress**



When auto alignment is in progress the following sequence take place, track is searched and traced in order to locate three arbitrary points in the circle. The spindle center can be computed based on the coordinates of these three arbitrary points.

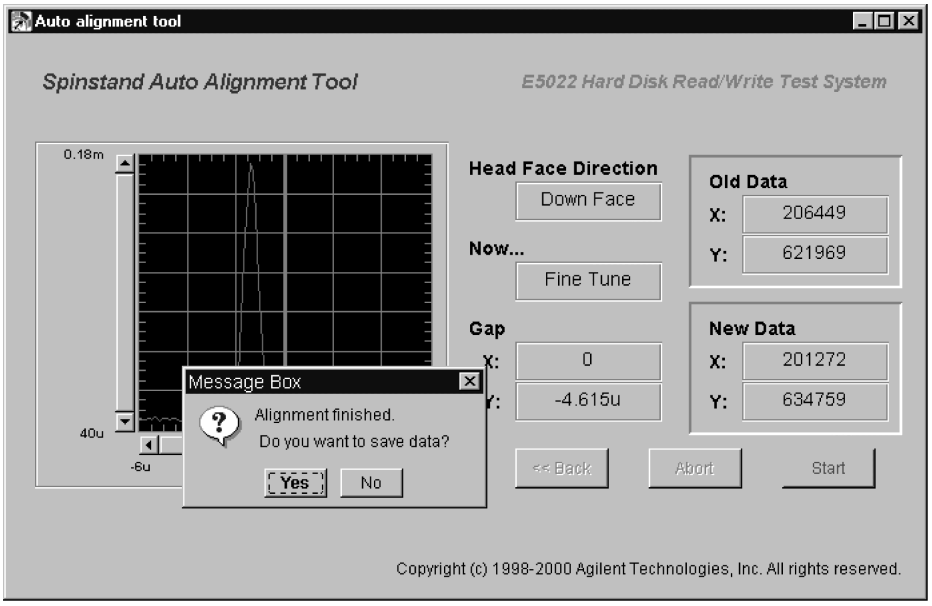
NOTE

Click on the **[Abort]** button, to abort the alignment. When you choose to abort the alignment, the following sequence will occur, the spindle will stop, the head will unload

and return to its home position. And the program will return to its main menu.

Step 15. When the auto alignment is finished, a popup window will appear that will ask you to save new alignment data. Refer to Figure 2-37. Choose **[Yes]**, to save the new alignment data to the non volatile memory of the spinstand.

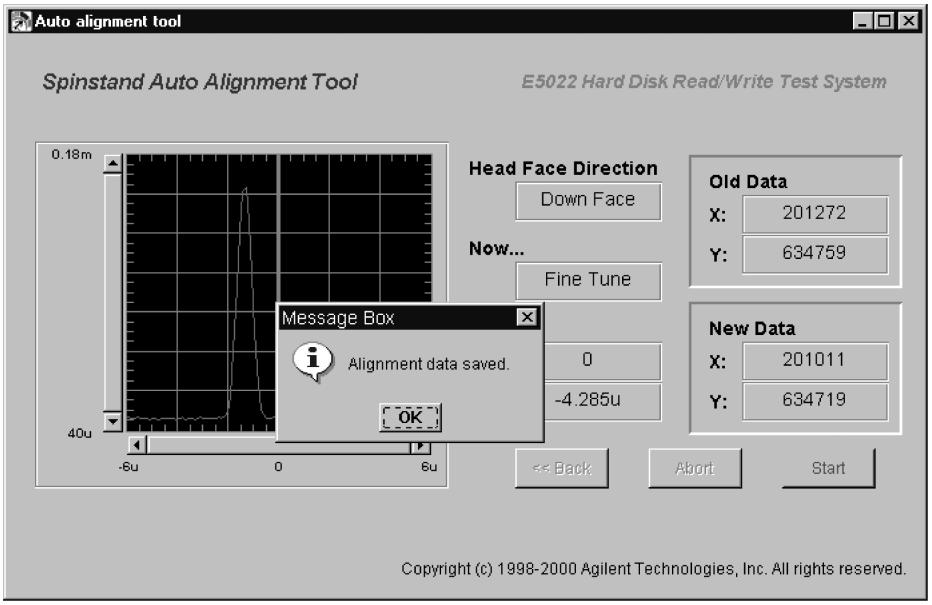
Figure 2-37 Auto Alignment



Step 16. Click **[Yes]** to save the new alignment data.

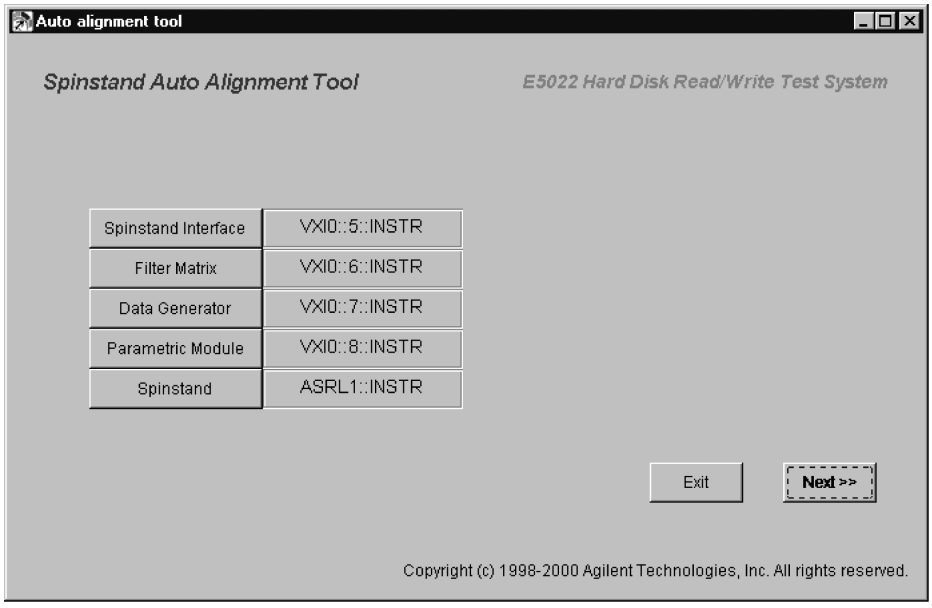
Step 17. Click **[OK]** to close the message box and return to main menu.

Figure 2-38 Saving Auto Alignment Data



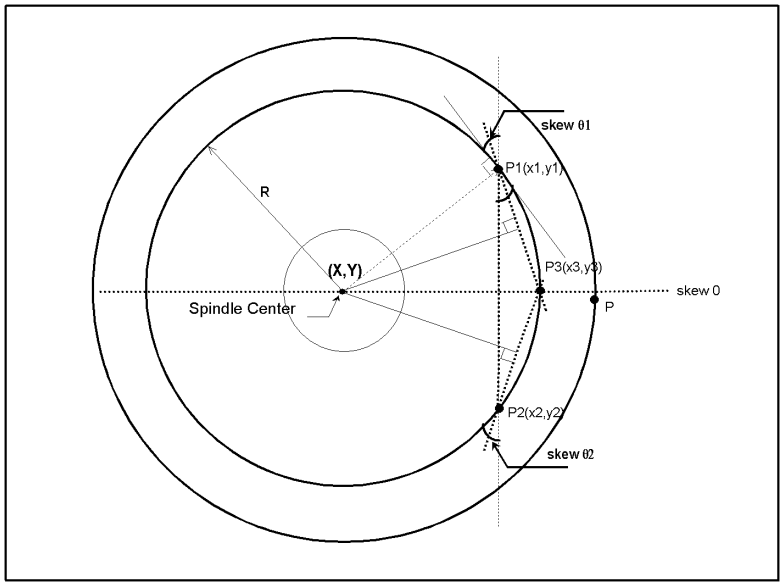
Step 18. Click **[Exit]** in the main menu to end the alignment program.

Figure 2-39 Main Menu



Determining the alignment data

Figure 2-40 **X-Y Coordinates of Spindle Center**



As shown in the illustration above, determining the spindle center in terms of X-Y coordinates requires three conditions to be satisfied (i.e, three known arbitrary points where the circle passes through) in order to measure the alignment data.

1. Determine the P1 (X_1,Y_1) coordinates at Skew θ_1
2. Determine the P2 (X_2,Y_2) coordinates at Skew θ_2
3. Determine the P3 (X_3,Y_3) coordinates at Skew 0.

The X-Y coordinates of the spindle center can be computed mathematically relative to points P1, P2 and P3. As an example, it is important that we determine points P1,P2 and P3 coordinates at the track center of radius R as accurately as possible, since the computation in finding the coordinates of the spindle center is dependent on it. By connecting a line between points P1-P3 and P2-P3 you can establish trigonometric equations between these three points that will be used to determine the center of the spindle (X,Y).