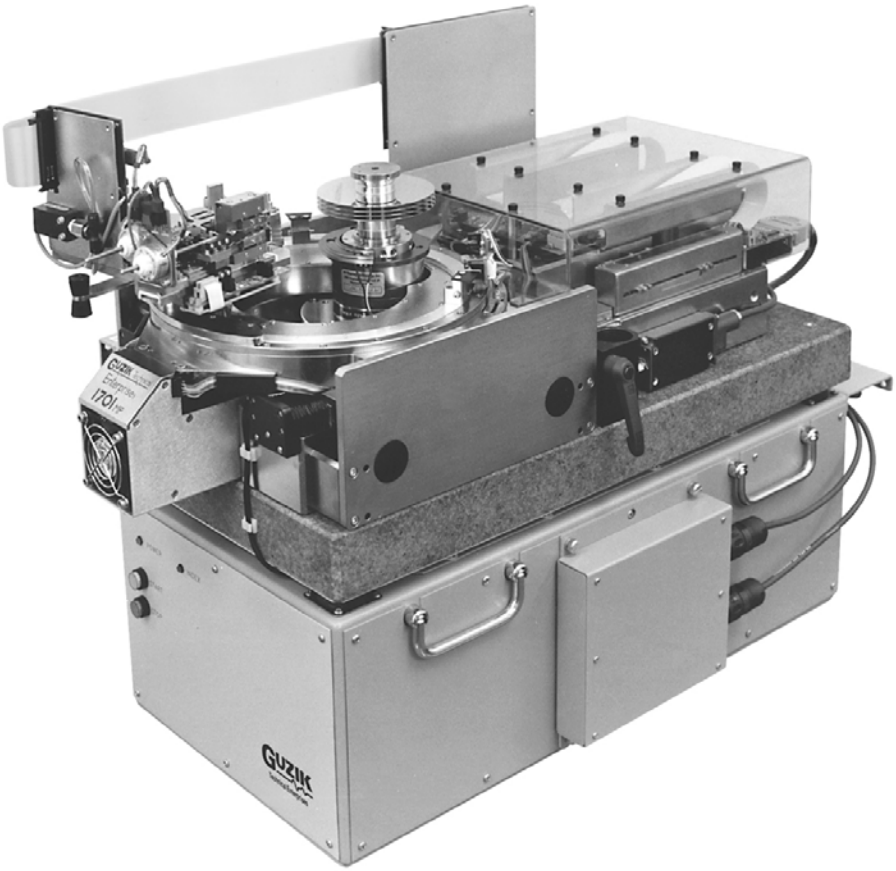
GUZIK
Technical Enterprises

Spinstand

S-1701

User's Manual

Revision **2.1**



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While every effort has been made to verify the accuracy of the information contained herein, this publication may contain technical as well as typographical errors. This publication contains descriptions of products which evolve with time. Changes and additional information will be incorporated into new editions of this publication.

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1. INTRODUCTION

A Spinstand is a device designed to mount and operate hard disk drive components (specifically heads, head stacks, and disks), simulating the conditions found in the actual hard disk drive. The conditions include the required mounting, spinning, and positioning of the components. With this capability the Spinstand when combined with a Guzik Read Write Analyzer (RWA) can be used for many Engineering and Production applications.

1.1 Main Differences Between Spinstands Of The 1701 Family

This manual identifies the mechanical features of the Guzik S1701, S1701MP, S1701-CF, and S1701MP-CF model Spinstands. It also describes the initial installation, configuration, and alignment of these Spinstands.

The S1701 Spinstand is the base model Spinstand designed for standard Engineering and Production applications and does not include the micropositioning system.

The S1701MP Spinstand is equipped with a patented closed loop micropositioning system consisting of a piezo actuator driven by feedback from two precision optical scales.

The models with suffix CF involve several microprocessors, and represent the new generation of Guzik Spinstands. The CF models possess the following new features and advantages in comparison with the older models:

- The speed of communication with the host computer increased approximately 6 times.
- Significant decrease in the overhead of spinstand operations.
- DSP control for linear, rotatory, and spindle motors, as well as the piezo actuator.
- S-curve profiles for linear and rotary motions.
- Simultaneous linear and rotary movements, decreasing test time and simulating the real drive conditions for heads during seek track operations.

Unless otherwise noted, S1701, S1701MP, S1701-CF, and S1701MP-CF Spinstands will be identified as **1701** in the following text.

Configuration and alignment of the 1701 Spinstand is done using the WITE Device Control Program (WDCP) and the Optical Alignment Program (with the optical alignment hardware).

2. DESCRIPTION OF 1701 SPINSTANDS

2.1 Description Of Functionality

The 1701 Spinstand provides software controlled, skew angle adjustment through a patented software controlled mechanical configuration. By locating the head gap in the center of a rotational system, skew angle control is accomplished by rotating the head around the head gap. In this manner the skew angle can be changed while remaining on the same track.

The unique capability of changing skew angles while remaining on track allows the user to perform a variety of measurements, including track profile analysis on a previously written track at varying skew angles. This unique measurement can produce a comb-shaped, single-track, profile plot, identifying head gap geometry with high resolution.

Through a very simple mechanical conversion, the 1701 can be used for either head (HGA) or head stack (HSA) testing.

2.2 1701 Specifications

The specifications for the 1701 Spinstands are as follows:

POSITIONING MECHANISM:

Skew Angle resolution:	1 minute of an arc

1701MP POSITIONING MECHANISM:

Linear positioning repeatability and local positioning accuracy: [1]	± 0.4 μInch typical, ± 1.0 μInch maximum
Absolute positioning accuracy over the entire linear travel: [1, 2]	± 8 μInch typical
Linear scale resolution:	0.04 μInch
Hysteresis:	Closed loop system, no hysteresis

[1] The repeatability and accuracy can be affected by temperature variations. Due to its low heat capacity the disk exhibits the fastest response to these variations. Best performance will be achieved at stable environmental temperatures and after a warm-up period of approximately one hour.

[2] Absolute accuracy over the entire range of travel is determined by the accuracy of the linear encoders. Higher precision encoders can be provided on demand, with absolute accuracy of 4 μInch (maximum) over the entire range.

1701 POSITIONING MECHANISM:

Ball Screw Hysteresis:	100 μInch maximum, 50 μInch typical
Ball Screw step resolution:	6.15 for 1701 spinstand and 0.384μInch for 1701-CF

SPINDLE

Bearings:	Air bearing
Interchangeable Spindle Chucks:	1.3", 1.8", 2.5", 3.0", 3.5", 5.25"
Motor:	Brushless DC, programmable 200 to-15,000 RPM
Acceleration:	0-10,000 RPM in approximately 3.25 seconds with a 3.5" disk mounted
RPM Jitter:	0.005% typical
Radial/Axial Runout	≤1.0 μInch pp non-repeatable

OPTICAL ALIGNMENT

Zoom ratio:	≈100:1
Alignment accuracy:	< 0.001"

PHYSICAL

Size:	24" × 12" × 18"
Weight:	175 lbs
Shipping Weight:	250 lbs
Power:	110 vac ± 15%, 50/60 Hz, 3 amps appr. 230 vac ± 15%, 50/60 Hz, 2 amps appr.

ENVIRONMENTAL

Operational:	15° C to 40° C, 90% maximum relative humidity with no condensation

2.3 Skew Angles And Track Positioning On 1701 Spinstands

Skew Angles in a hard disk drive are defined as the angles between the head and the tangential of the track at each track location (see figure below). Non-zero skew angles across the disk surface are generally a result of the head being mounted on a rotary actuator, whereas skew angles of zero result from using a linear actuator system. Because skew angles change as a function of track location, the skew angles will be largest and smallest at the OD and ID locations, respectively.

The 1701 Spinstand performs skew angle and track positioning using a combination of Rotary and Linear Positioners, respectively. Examples of this positioning system are portrayed in the following figures.

The 1701 Linear Positioner performs track positioning by moving the head gap radially along the center axis of the disk. This is done using a stepper motor and ball screw assembly to position the entire Rotary Housing of the Spinstand.

The 1701 Rotary Positioner performs skew angle positioning by rotating the head on a given track around the head gap. To do this the head gap must be located in the center of the Rotary Positioner, which is done once during the optical alignment procedure. The Rotary Positioner is controlled by a stepper motor and gear assembly.

A complete seek to a track is done both by moving the Linear Positioner to the radial track position and by rotating the head to the required skew angle with the Rotary Positioner. The result is that **exactly** the same skew angles as in the drive configuration are achieved. The sequence of linear and rotary movements for 1701 and 1701MP spinstands depends on the direction of travel. If the direction of travel is from ID to OD then the linear positioning is done first. If the direction of travel is from OD to ID then the rotary positioning is done first. For the 1701-CF and 1701MP-CF Spinstands both movements (linear and rotatory) can be performed simultaneously, thus achieving the same skew angle as in the real drive not only for the destination point, but during the entire period of movement.[1]

[1] If necessary, for the 1701-CF and 1701MP-CF spinstands, the user can choose the sequential mode of movement as in the previous models.

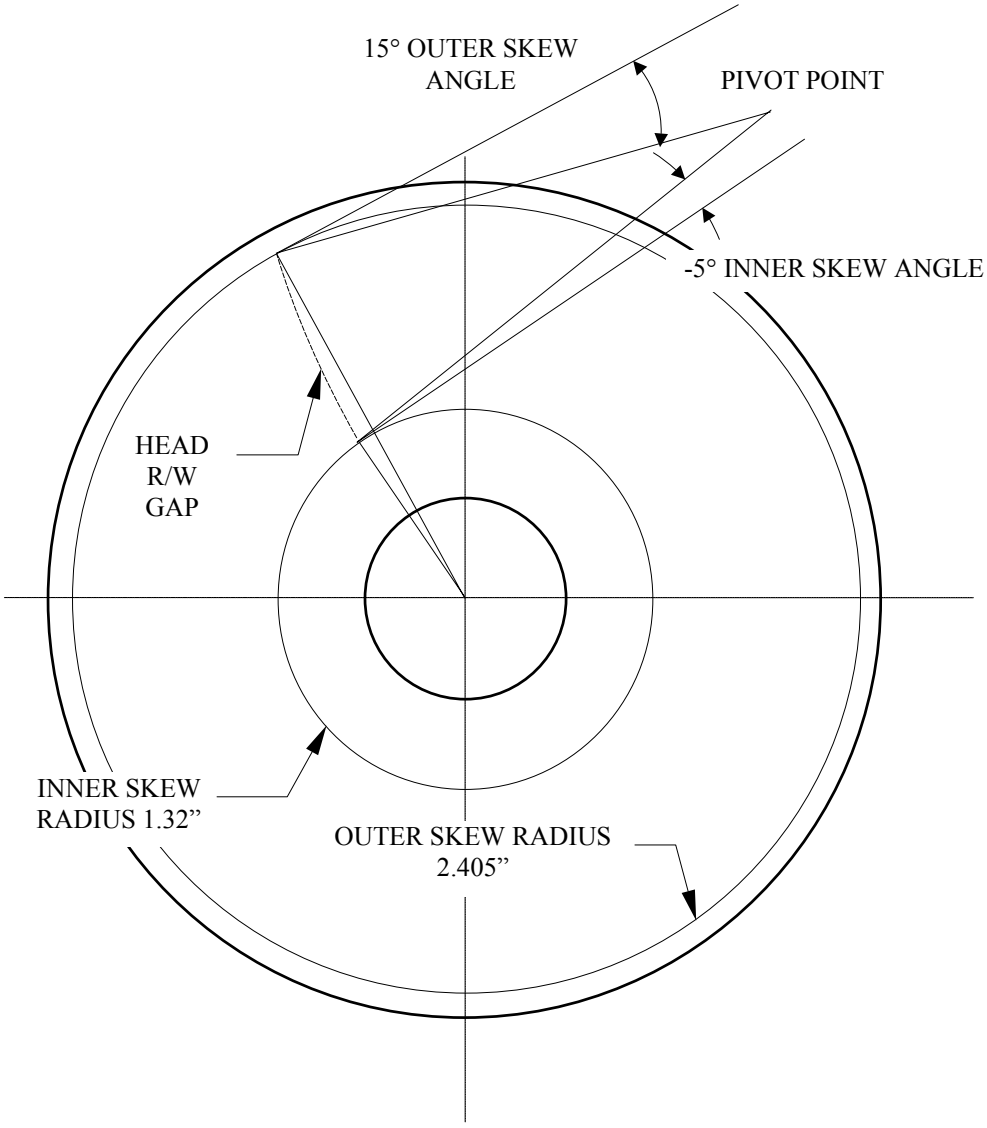


Figure 1. Drive Skew Configuration

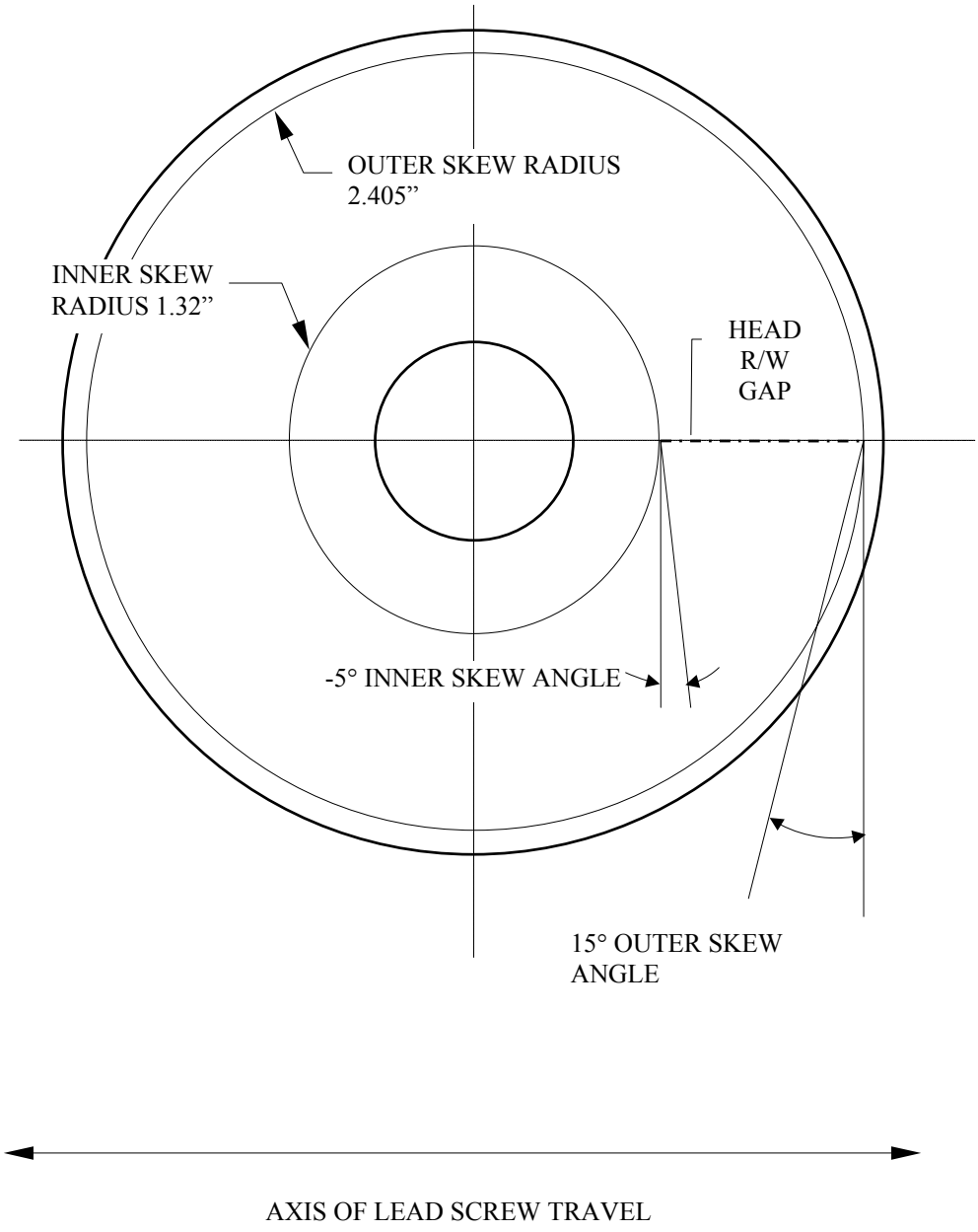


Figure 2. S1701 Spinstand Skew Configuration Example

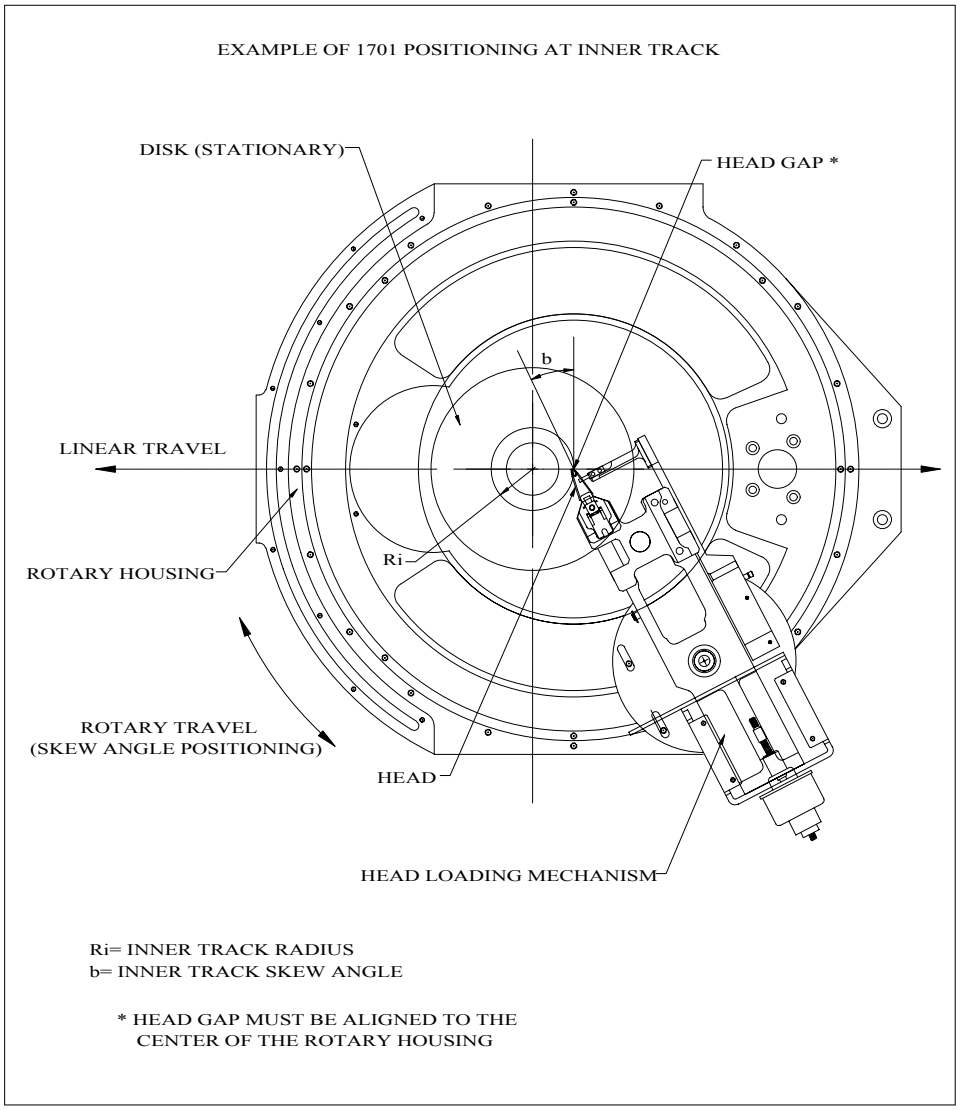


Figure 3. S1701 Spinstand Positioning System At Inner Track

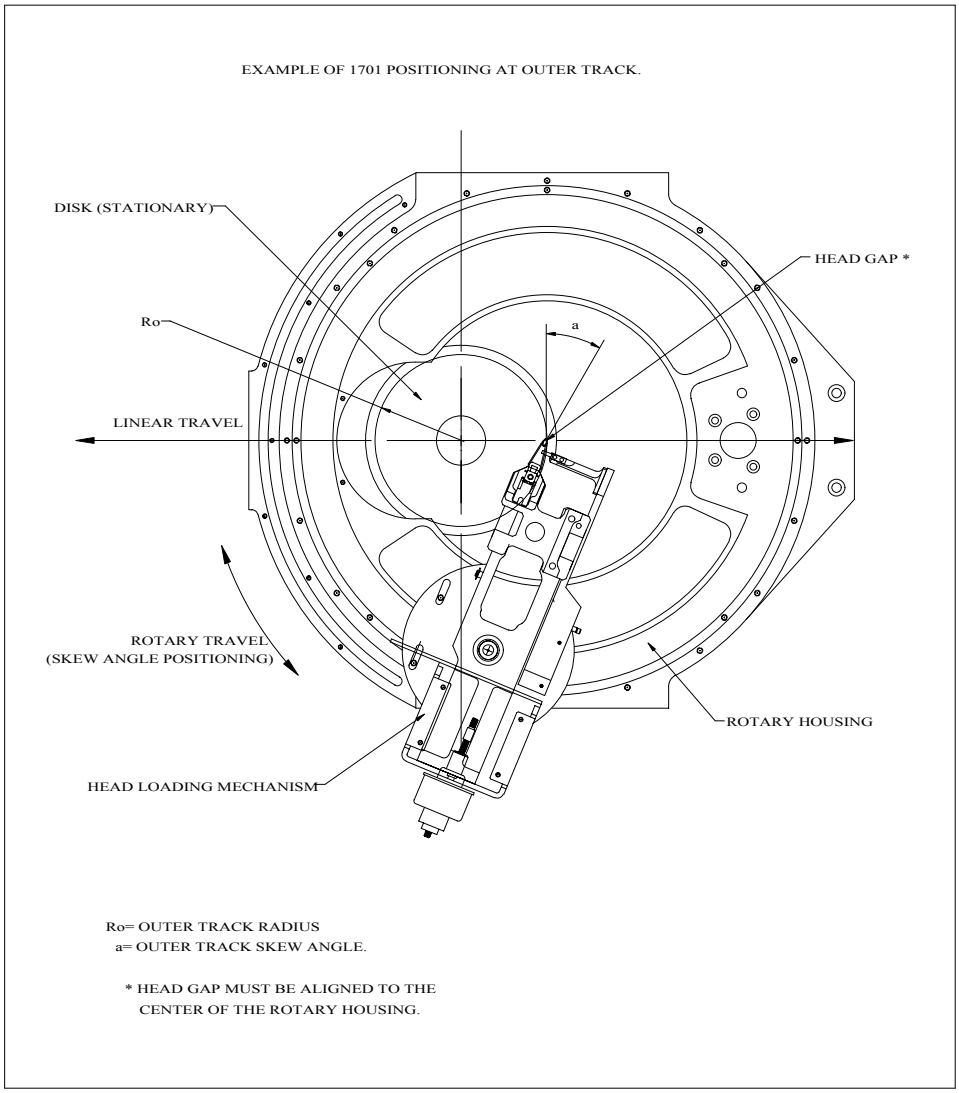


Figure 4. S1701 Spinstand Positioning System At Outer Track

3. 1701 SPINSTAND OVERVIEW

The following figure shows the main components of the 1701 and 1701MP Spinstands listed below. The following text describes in detail each of these components.

- Linear Positioning System
  - Linear Sensor Channel
- Rotary Positioning System
  - Rotary Sensors
- Spindle and Spindle Chucks
  - Air Bearing
- Head Loading Mechanism / Cartridges
- Micropositioning System
  - Piezo Actuator
  - Linear Scales / Readers
  - Piezo Controller Board
- Optical Alignment System

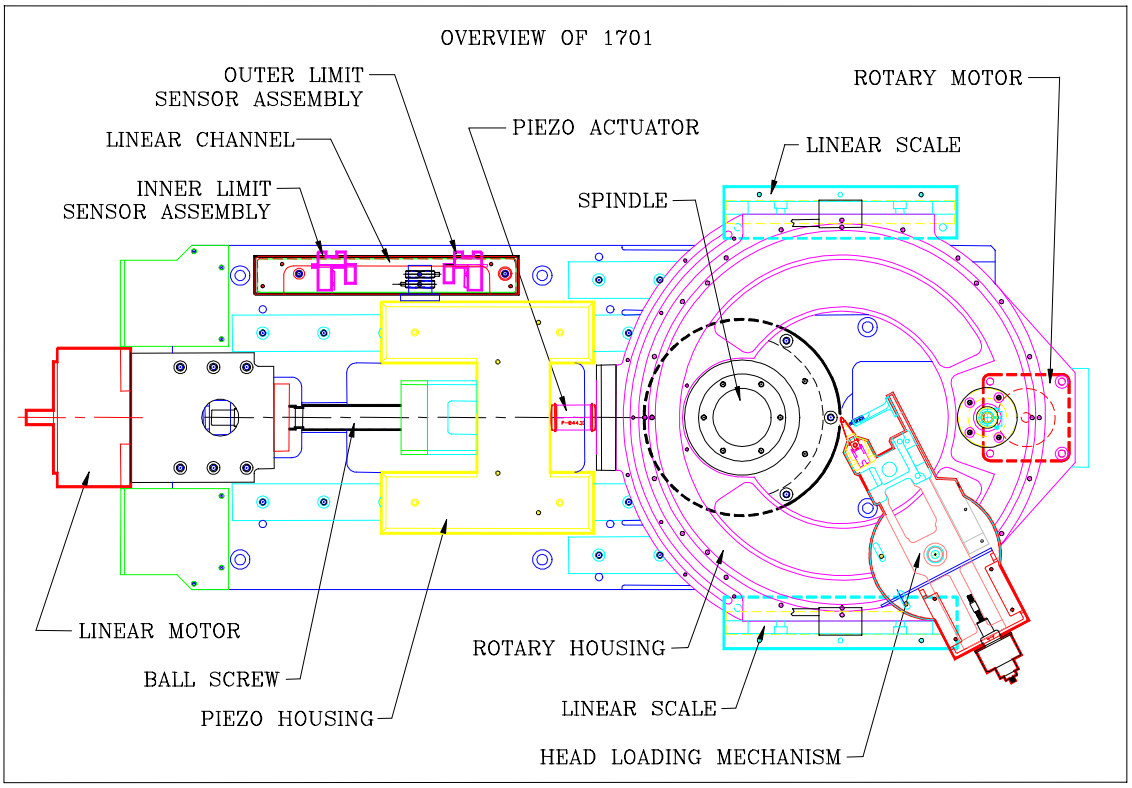


Figure 5. Overview Of 1701 Components

3.1 Linear Positioning System

The Linear Positioning System provides radial track positioning on the 1701 Spinstand by moving the entire Rotary Housing on which the head is mounted. During Start/Stop operations the Linear Positioning System seeks the heads between the Reset/Home and the disk. The Linear Positioning system is driven by a microstepper board inside the Spinstand, using a +48V power supply.

The components of the Linear Positioning System are the Stepper Motor, Motor Mount, Ball Screw, Piezo Housing/Slide assembly, and Linear Sensor Channel. In addition, the 1701MP Spinstands also use a Piezo Actuator and two Linear Scales for closed-loop micropositioning.

3.1.1 Linear Sensor Channel

The Linear Sensor Channel is equipped with 2 sensor assemblies mounted at each end of the channel. The function of these assemblies is to limit the travel of the Linear Positioning System. These assemblies are called the Inner and Outer Limit Sensor Assemblies; each is equipped with 1 sensor and one switch. The sensor on each assembly will always be activated before the switch. Activation of the sensors/switches is caused by a flag and plunger assembly mounted on the Linear Positioning System.

The Outer Limit Sensor Assembly is designed to prevent the rotary housing (see Figures 3-5 for reference) from hitting the spindle. The position of this assembly is fixed by the factory and **should not be adjusted**. The sensor on this assembly, called the Reset Sensor, is used as a reference location, and will be sought to during any Reset operation. The radius of the Reset Sensor will be calculated during the Sensor Alignment procedure in the WDCP Alignment program and saved in the Spinstand.

The Inner Limit Sensor Assembly is a user-adjustable assembly intended to prevent the head from crashing into the Spindle. Activation of the sensor on this assembly will cause the Spinstand to perform a reset operation and an error message to appear. The adjustment of this assembly is performed during the Sensor Alignment procedure in the WDCP Alignment program.

The switches on each of the sensor assemblies are used for emergency stop protection. If either of these switches is activated, all Spinstand operations, including positioning, will be immediately stopped. To resume operation the Spinstand must be turned off and the positioning system moved (by rotating the shaft of the stepper motor manually) away from the limit switch. After this the Spinstand can be powered on and reset.

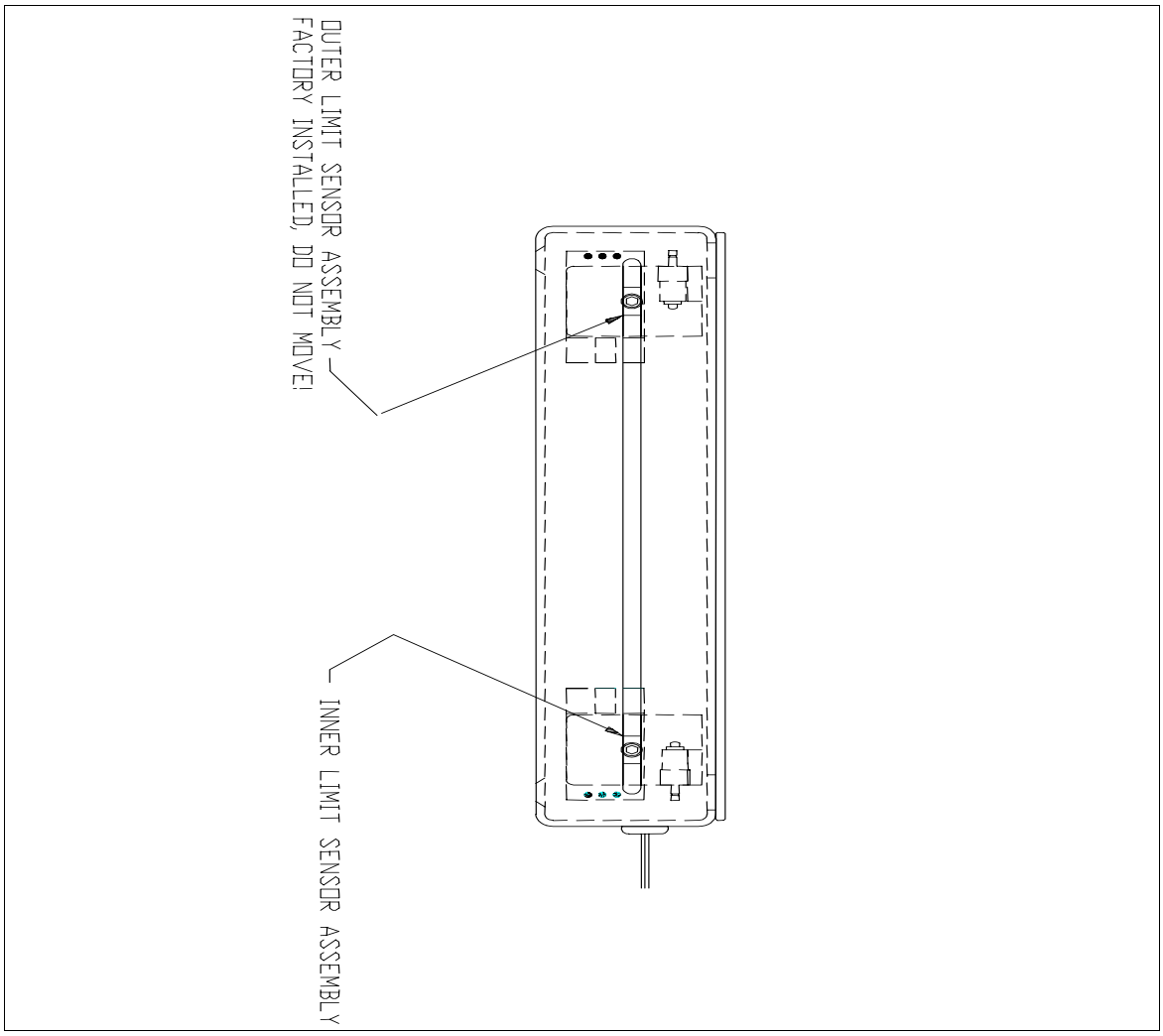


Figure 6. Linear Positioner Sensor Channel, Side View

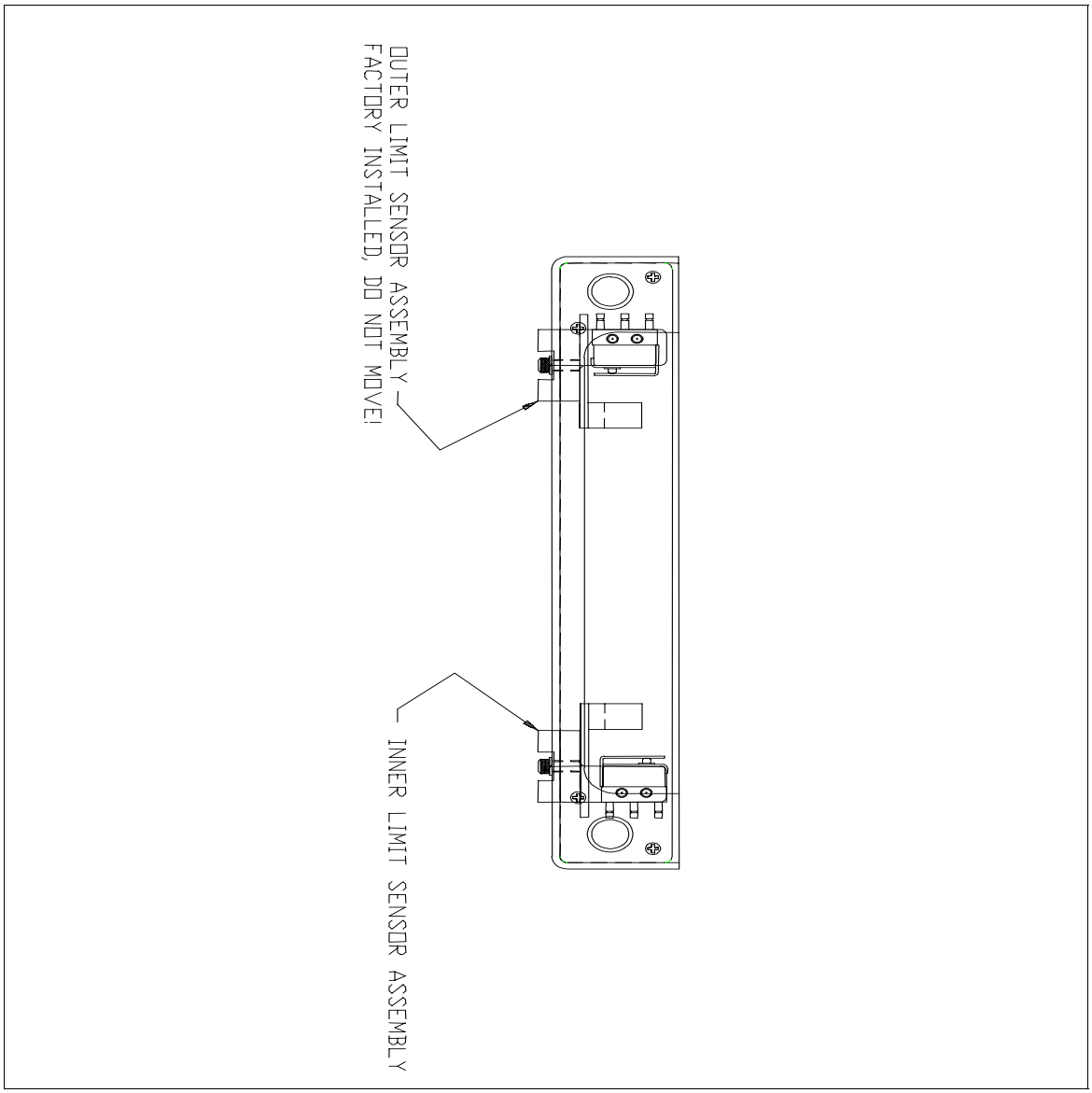


Figure 7. Linear Positioner Sensor Channel, Top View

3.2 Rotary Positioning System

The Rotary Positioning System provides skew angle control on the 1701 Spinstand by rotating the head about the head gap. During Stop operations the Rotary Positioning System will rotate until the CCW rotary sensor is activated. This is the unload position of the heads. The Rotary Positioning system is driven by a custom microstepper board inside the Spinstand, using a +48V power supply.

The components of the Rotary Positioning System are the Rotary Stepper Motor, Gear Assembly, Rotary Housing/Slide Assembly (including Housing, Gear, and Slides), and Rotary Sensors.

3.2.1 Rotary Sensors

The Rotary Sensors are sensors designed to limit the amount of rotation, i.e. skew that can be performed by the Rotary Positioning System. The Rotary Sensors are composed of 2 assemblies, called the CW Rotary Switch/Sensor Assembly and the CCW Rotary Switch/Sensor Assembly, respectively (see following figure). These are mounted at the Rotary Housing. With the exception of some head-stack applications these assemblies do not generally require adjustment.

The function of sensors is to limit the negative (CW) and positive (CCW) skew angle rotation of the Rotary Positioning System. Both assemblies are equipped with 1 sensor and 1 switch. These are activated by a corresponding Rotary Flag and Plunger. In either direction the sensor will be activated before the switch. Activation of the sensors on these assemblies will cause the Spinstand to perform a reset operation and an error message to appear.

The switches on each of the sensor assemblies are used for emergency stop protection. If either of these switches is activated all Spinstand operations, including positioning, will be immediately stopped. To resume operation the Spinstand must be turned off and the positioning system moved manually away from the limit switch. After this the Spinstand can be powered on and reset.

The locations of both assemblies are set in the factory per CCW Headloader configuration and can be changed by the user to obtain the desired configuration for CW Headloader, CW, or CCW Headstacks[1].

The CCW Rotary Sensor (the CW Rotary Sensor for clockwise headstack arrangement) also functions as a reference sensor for the Rotary Positioning System. A reset of the Spinstand will cause the Spinstand to rotate CCW until the Rotary Sensor is activated. The location of this sensor is maintained in the Spinstand EEPROM. For details on this refer to “The Optical Alignment Program” on page 51.

[1] Please consult Guzik Technical Enterprises for the required configuration for the CW/CCW Headstack or CW Headloader.

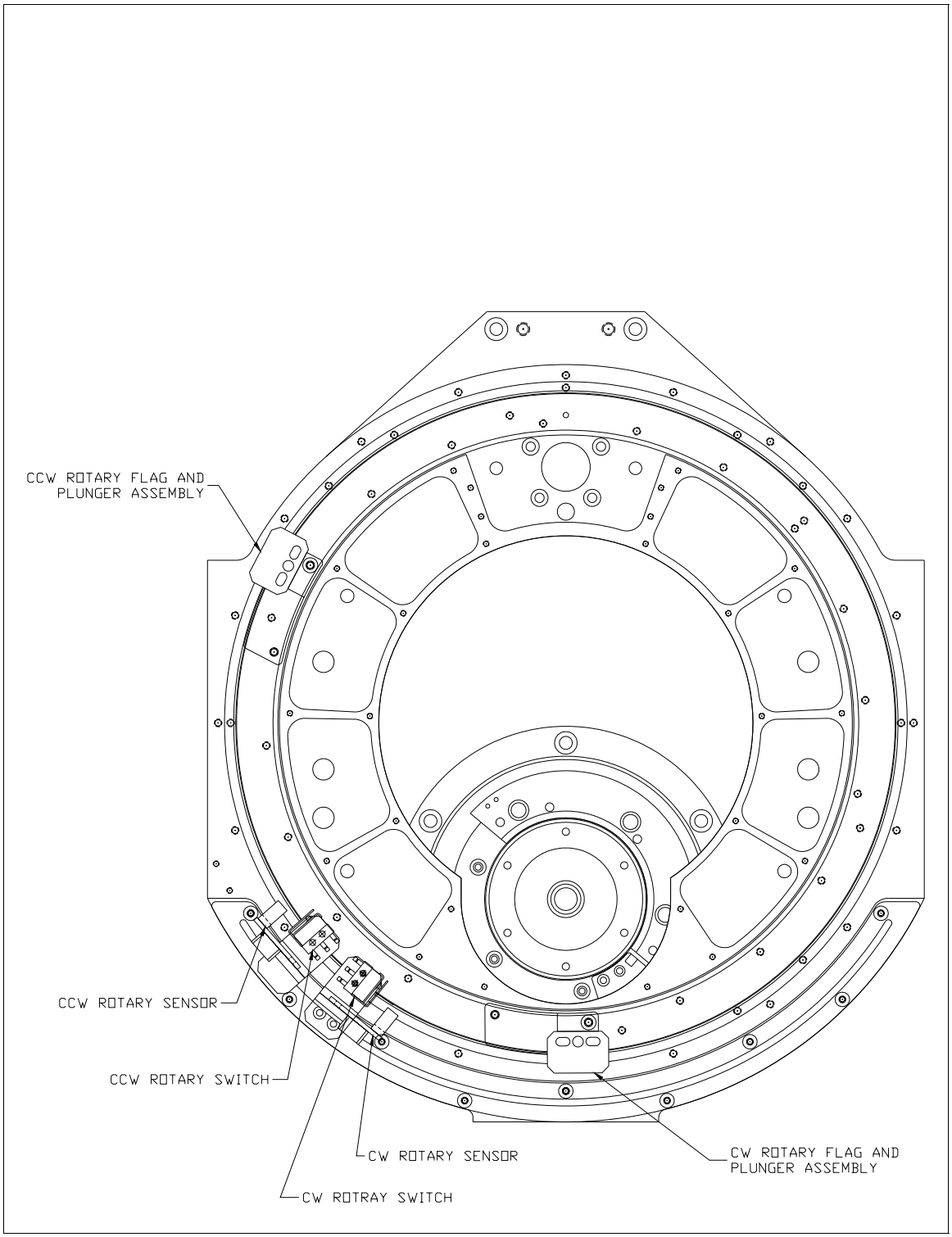


Figure 8. Rotary Sensors And Switches

3.3 Spindle and Spindle Chucks

The 1701 Spinstand is equipped with an Air Bearing Spindle. The Air Bearing Spindle requires an air supply from the Guzik Air Box.

The Spindle Chucks are adapters that mount onto the Spindle to accommodate different disk diameters and thicknesses. The Spindle provides a centering bushing and 6 screw holes for the installation of the chuck. For head stack applications, disk packs supporting multiple disks are available.

The Spindle Chuck clamps the disk using up to 9 nylon balls pressed by a rubber cone inside the chuck. The force of the clamp is determined by a spring installed inside the chuck at the factory, and therefore no adjustment is necessary. Chucks for smaller disk sizes use lighter clamping springs, so that the smaller disks will not be affected by the clamp.

Balancing of both the Spindles and chucks is performed at the factory. The Spindles and chucks are balanced independently, and therefore are interchangeable. The balancing of the chuck is performed by adjusting set screws on the side of the flange base on the chuck, and **adjustment should not be done** by the user without using a proper balancing system.

For Head Stack testing, a Disk Pack can be used for mounting several disks.

Air Bearing Chucks are available in the following sizes:

DISK DIAMETER (In)	DISK THICKNESS (In)
5.25	0.050
3.5	0.050, 0.0315
3.0	0.0315
2.5	0.035, 0.025
1.8	0.025
1.3	0.015
Disk Pack	Depends on customer specifications

3.3.1 Air Bearing Spindles And Spindle Chucks

The Air Bearing Spindle uses air pressure to provide a bearing of air for rotation. This eliminates friction between parts and provides very low non-repeatable runout specifications. **CAUTION: The Air Bearing Spindle must not be rotated without air pressure.**

A Spinstand with an Air Bearing Spindle is equipped with the following components: Air Bearing Spindle, Air Bearing Spindle Chuck, Air Box, Air Reservoir, Air Filter, and Cables. For a connection diagram of these components refer to the following figures.

The Air Box is an external box connected to the 1701 Spinstand in order to control the airflow to the Air Spindle. The Air Box has regulators for regulating the air pressure to the clamp and Spindle. These regulators have been adjusted at the factory and should not be adjusted by the user. Sensors are installed in the Air Box to monitor these air pressures. In the event that the sensor detects a loss of air pressure in the Spindle, the Spindle will be immediately stopped.

The airline input is connected to the Air Box. It is recommended to install a line dryer on the airline before making the connection to the Guzik Air Box in order to reduce humidity of the air.

An Air Filter and Air Reservoir have been installed inside the Spinstand. The Air Reservoir provides air to the Spindle in the event that a sudden loss of air pressure is detected. An additional filter and reservoir have been installed inside the Air Box for additional protection.

The specifications for the Air Spindle, Air Box, and connections are as follows:

ITEM	**SPECIFICATION**
CLAMP pressure into Spinstand:[1]	70 psi
AIR pressure into Spindle:[1]	80 psi
Air volume (1 Air Spindle):	40 cf/h at 80 psi
Input Line air specifications:	90-110 psi (100 psi recommended) at dew point 35° F.
Line connection:	1/4" tubing
Guzik line filter specifications:	Input filter: 5 microns. Spindle filter: 0.01 microns. Clamp filter: 0.01 microns

[1] Factory adjusted.

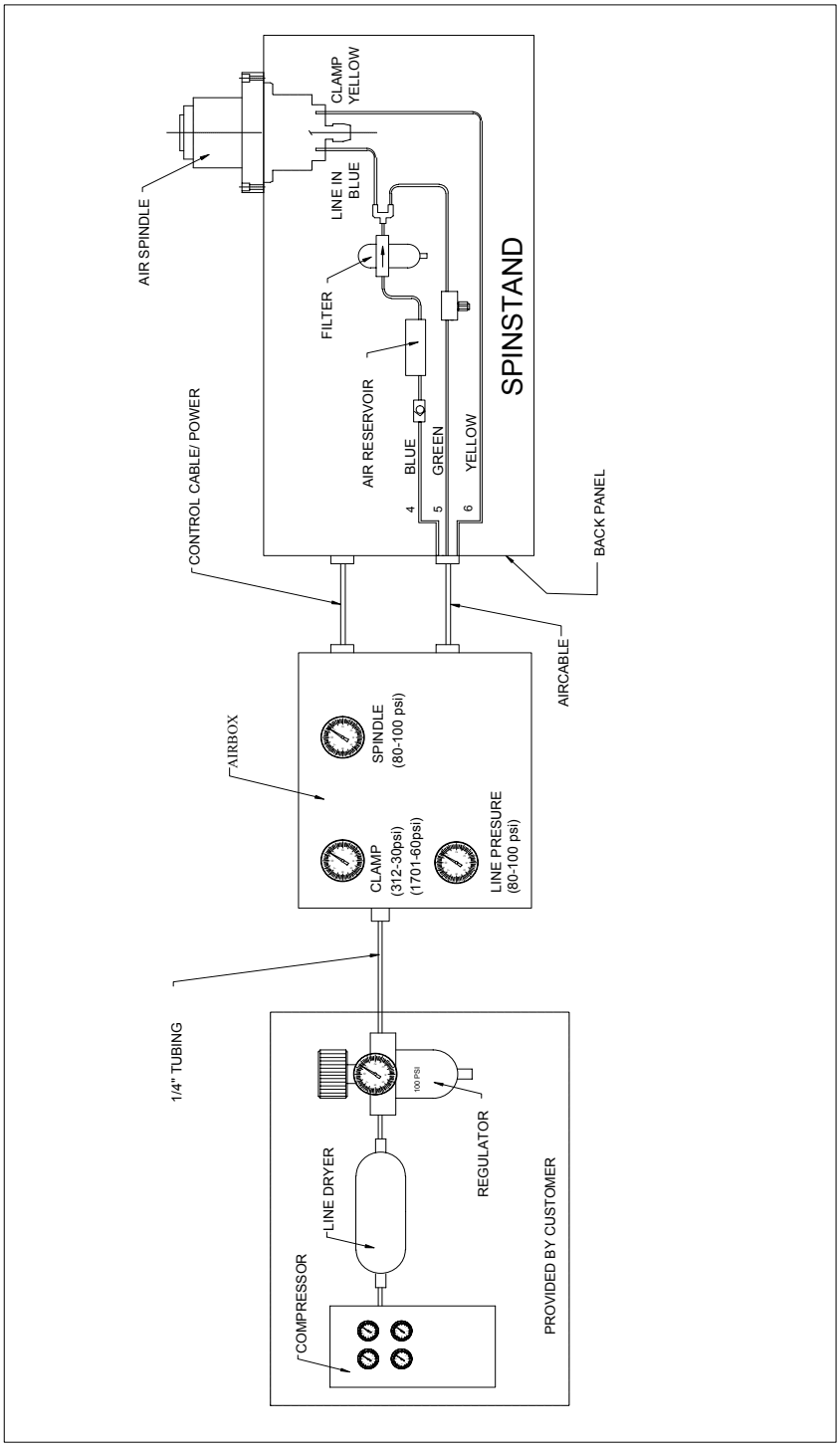


Figure 9. Air Spindle Connection Diagram

3.3.2 Spindle Installation And Removal

To remove the Spindle the following steps must be performed.

- Power off the Spinstand.
- Turn off the air supply to the Air Box at the line input.
- Open the left side panel (below the Universal Preamplifier) and disconnect the Encoder cable connection to the Motor Controller Board.
- Loosen the Inner Limit Switch Assembly and move it towards the rear of the Spinstand.
- Move the Rotary Housing towards the front of the Spinstand by rotating the Linear Motor shaft by hand. Stop when the Spindle is in the center of the Rotary Housing.
- Remove the screws that mount the Spindle to the Baseplate.
- Lift the Spindle vertically up from the Baseplate until the bottom of the Spindle clears the Rotary Housing. During this process the Spindle must be lifted from the main shaft body, **NOT** from the rotating section.
- Disconnect all cables between the Spindle and the Spinstand. Disconnect the Spindle (Blue) and Clamp (Yellow) Air Hose lines from the Spindle.
- Remove the Spindle.

To install the Spindle these steps must be reversed. Note that when installing the Spindle the bottom of the Spindle and the mating Baseplate surface must be thoroughly cleaned with alcohol.

3.3.3 Spindle Chuck Installation And Removal

To remove the Spindle Chuck the following steps must be performed.

- Make sure there is an air supply to the Spindle (the rotor is free to rotate).
- Power off the Spinstand. On Air Bearing Spindles this is very important because the Spindle will be placed in the Clamped position.
- Remove the 6 screws that mount the Spindle Chuck. On Air Bearing Spindles these are precision screws (marked with blue paint) so **standard screws must not be used**.
- Vertically lift off the Spindle Chuck.

To install the Spindle Chuck the following steps must be performed.

- Make sure there is an air supply to the Spindle (the rotor is free to rotate).
- Power off the Spinstand. On Air Bearing Spindles this is very important because the Spindle will be placed in the Clamped position.
- Clean the top surface of the Spindle, the bottom surface of the Spindle Chuck, and the disk-mounting surface of the Spindle Chuck with alcohol.
- Mount the Spindle Chuck on the Spindle.
- Install the 6 mounting screws but do not tighten them. The chuck must be able to move laterally with a small amount of force.
- Turn on the air supply to the Air Box at the line input.
- Place an indicator on the Centering Ring of the Air Chuck. While rotating the Spindle, tap the sides of the chuck flange to center the chuck while monitoring

the variations measured by the indicator. It is recommended that the chuck be centered to better than **70 µIn**.

- Tighten the 6 mounting screws. During this process tighten screws gradually in a star-shaped pattern.

1701 AIR BEARING SPINDLE CHUCK CENTERING ADJUSTMENT

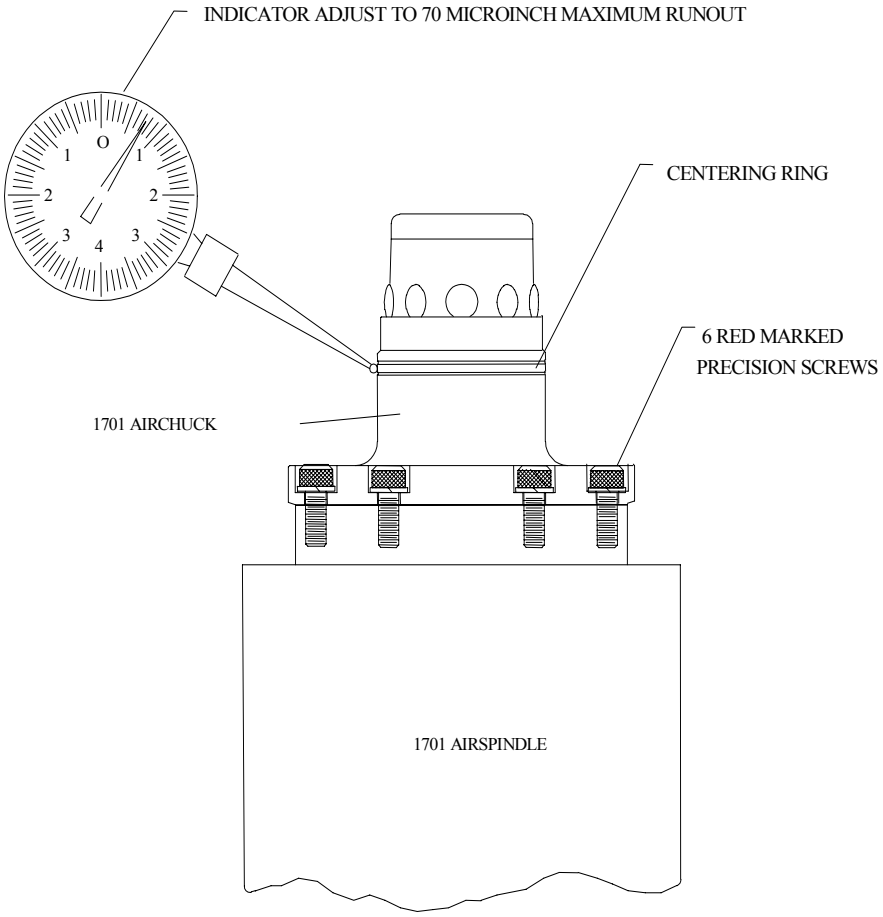


Figure 10. Air Chuck Centering

3.4 Head Loading Mechanism And Cartridges

The Head Loading Mechanism and Cartridges (the tools where the heads are mounted) are the devices used to mount the heads and Preamplifier Boards. By Spinstand control the Head Loading Mechanism also loads and unloads the heads onto the disk.

3.4.1 Cartridges

The 1701 Spinstand can be used only with the Head Loading Mechanism and Cartridges, in which the Preamplifier Boards are located underneath the Cartridges (Universal Preamplifier 6 or greater). The older version of the 311/312 Head Loading Mechanism and Cartridges are not compatible with the 1701 Spinstand.

The new Head Loading Mechanism can be used either with the Lifting Knife or Camming Mounting Blocks. Note that these Head Loading Mechanisms must be equipped with the new Loading Ramp in order to be used with the Camming Mounting Blocks. Depending on the way an adjustment can be performed (using spacer, or adjustment screw), the type of the head wire connection (flexible, ordinary), and the position of head amplifier board (on a cartridge, or not) Camming style mounting blocks are available in following types:

- Regular – with the shim (spacer) for 'Z'- height adjustment, and for the head with ordinary wires.
- 'Z'- height adjustable – with the adjustment screw, and for the head with ordinary wires.
- TSA cartridges – with the adjustment screw, flex wire connection, and the head amplifier board placed on the cartridge. Currently there are several types of TSA cartridges designed for different types of heads.

Regular Camming Style Cartridge is shown in Figure 11, and 'Z'- height adjustable Camming Style Cartridge – in Figure 12.

The Cartridges have the following configuration components:

ITEM	FUNCTION	VARIATIONS
Shim	Controls 'Z'- height distance from head to disk. The thickness of the shim is dependent on thickness of disk and required 'Z'- height.	Disk Thickness: 0.075" - 0.015" 'Z'- height: 0.100" - 0.023" A special **90° Shim** is available for heads with wires connected across the back of the suspension (Lifting Knife only).
'Z'- height adjustment screw and Lock Set Screw for Adjustment Screw	Controls 'Z'- height distance from head to disk.	Disk Thickness: 0.075" - 0.015" 'Z'- height: 0.100" - 0.023" Available in Camming-style head lifting designs.

Mounting Block	Actual mounting interface for installation of the head. Depends on the type of head used.	Hutchinson suspensions: 8, 13, 14, 16, 19 Male or Female (custom suspensions can be developed). Available in Lifting Knife or Camming-style head lifting designs. Camming-style requires special Shims and cannot be used with 90° Shims. Note that the Camming-style design requires the new Loading Ramp to be installed in the Head Loading Mechanism.
Wire Termination Board	The board for connecting head wires.	Dual Paddle Board or Paddle Board with Connector or Head Amplifier Board on Cartridge.

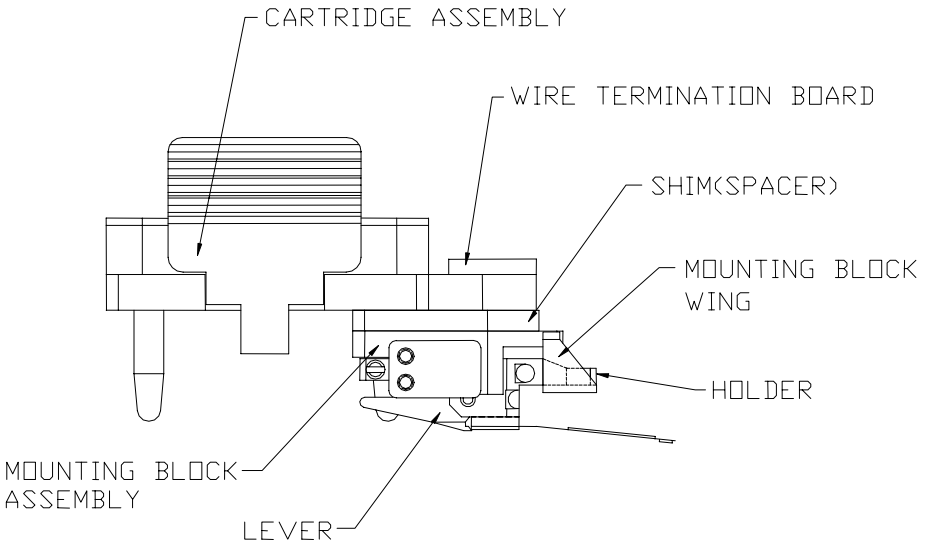


Figure 11. Camming Style Cartridge Components

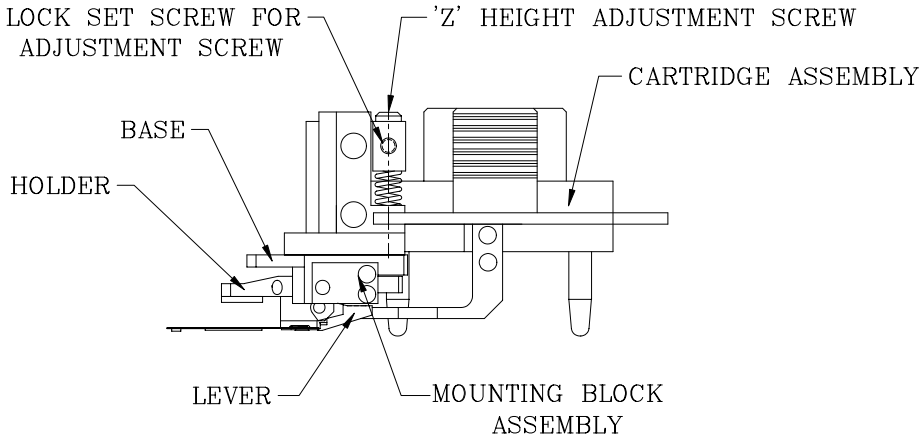


Figure 12. 'Z'- Height Adjustable Camming Style Cartridge Components

3.4.1.1 Head Lifting Knives and Lifting Wings

There are two methods available for lifting the heads off of the disk. The first uses a knife located underneath the suspension and lifts the suspension with respect to the stationary base plate of the head. The second uses a camming method, where the entire head is pivoted away from the disk.

When using the knife method, a pair of knives is installed on the end of the lifting blades on the Head Loading Mechanism. When installing these knives they must be adjusted parallel to the disk surface when the Head Loading Mechanism is in the "Loaded" position, and must be adjusted to contact the head at the required lifting location.

When using the camming method, the knives must be removed and replaced with lifting wings. These wings must be adjusted parallel to the disk when the Head Loading Mechanism is in the "Loaded" position, and must be located directly under the Mounting Block Wing (refer to Figure 11).

3.4.1.2 Cartridge Alignment (After Mounting Block/Shim Changes)

During installation of the Mounting Block (such as after changing the Mounting Block or Shim) onto the Cartridge it must be aligned using the Cartridge Alignment Tool[1]. The Cartridge Alignment Tool is composed of the main tool body and several Cartridge Alignment Blades (head simulation blades) matching different head suspension types. To align the Cartridges the following steps must be performed:

- Remove the screws mounting the Wire Termination board and remove this board from the Cartridge.
- Install but do not tighten the Mounting Screws that mount the Shim/Mounting Block onto the Cartridge.
- Attach a Cartridge Alignment Blade to the Mounting Block of the Cartridge. The Cartridge Alignment Blade must match the type of Mounting Block used.
- Install the Cartridge on the Cartridge Alignment Tool. The pins or retractable pins[2] of the tool should pass into the holes in the Cartridge Alignment Blade.
- Tighten the Mounting Screws that mount the Shim/Mounting Block.
- In the case of a Camming-style cartridge retract the pins from the holes in the Cartridge Alignment Blade.
- Remove the Cartridge from the Cartridge Alignment Tool. Remove the Cartridge Alignment Blade from the Cartridge.
- Reinstall the Wire Termination board.

[1] This procedure is not required for 'Z' height adjustable Camming-style cartridges.
[2] For Camming-style cartridges the pins of the tool should be retractable, otherwise it is impossible to save the results of alignment when removing the cartridge from the Alignment Tool.

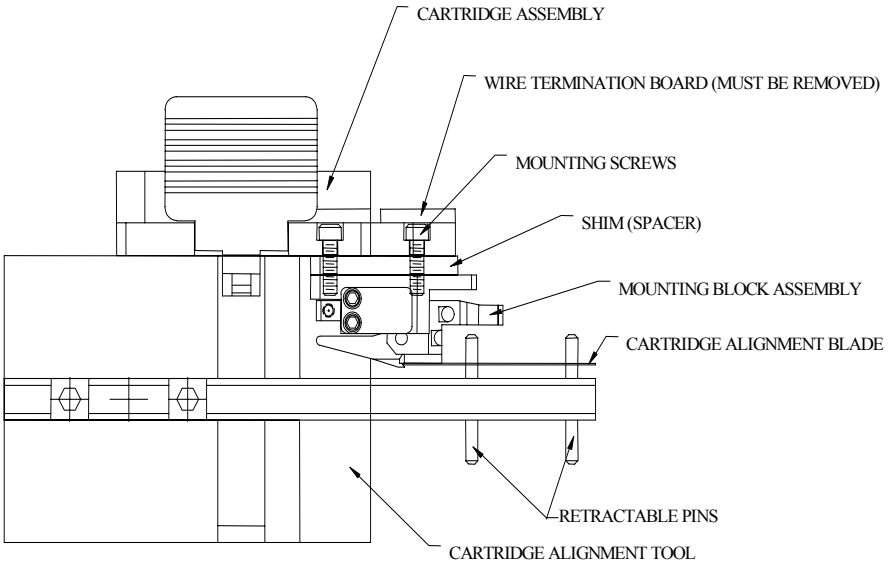


Figure 13. Cartridge Alignment Tool

3.4.1.3 Head Lifting Arm Adjustment On The Head Loading Mechanism

When using Camming–style cartridges there is no need to change the adjustment of the Head Loading Mechanism (performed during production) for a wide range of disk thicknesses and 'Z'- heights. The special cases when additional adjustment for Camming-style cartridges is necessary are:

- The Lifting Wing of the Head Loading Mechanism touches the Mounting Block Wing in Load position.
- The head is not yet unloaded in Unload position.
- When the head is unloaded and there is a mechanical contact between Holder and Base surfaces, or between the rear edge of lever and the disk (see Figure 12 for reference).

The reasons for adjustment when using Head Lifting Knives are:

- The Lifting Knife touches the suspension or the disk surface when the head is loaded.
- The head is not yet unloaded in Unload position.

To perform the adjustment for the Head Loader there are 4 set screws – 2 for the "Unloaded" adjustment and 2 for the "Loaded" adjustment (refer to Figure 14 and Figure 15). When this adjustment is complete 4 set screws are provided for locking this adjustment.

This adjustment must be performed ***prior*** to the Optical Alignment of the 1701 Spinstand, as the needed set screws are not accessible after Optical Alignment.

To perform this adjustment the following must be available with the intended test configuration: Cartridges (of correct 'Z'- height and disk thickness), Spindle Chuck and disk (of correct disk thickness), and heads (upper and lower).

The adjustment of both the top and bottom lifting arms is identical, and is very similar when using either the Lifting Knife or Camming-style head loading designs. The adjustment can be performed on the Knife Alignment Tool or on the Spinstand itself. The following steps require the loading and unloading of the heads, which can be done by software (recommended) or manually by pushing/pulling the shaft of the lead screw motor until it reaches each end.

The steps in performing this adjustment are as follows:

- Install the heads on the Cartridges. Install the Cartridges on the Head Loading Mechanism. Install the disk on the Spindle/Tool and clamp the disk. Move the positioner so that the heads are positioned over the disk.
- Loosen the 4 locking set screws.
- When using the Camming-style:
  - Move the Head Loading Mechanism to the “Loaded” position and adjust the “Loaded” set screws so that the lifting wings of Head Loading Mechanism are not touching the Mounting Block Wings, and the lifting wings are slightly below the lifting arms on the Camming Mounting Block (> 0.050" gap).
  - Move the Head Loading Mechanism to the “Unloaded” position adjust “Unloaded” set screws such that the heads are lifted from the disk, and neither the rear edge of the Lever touches the disk nor the surfaces of the Holder and Base are in contact with each other (refer to Figure 11 and Figure 12).
  - Verify the “Loaded” position adjustment.
- Tighten the 4 locking set screws.
- When using the Lifting Knives:
  - Move the Head Loading Mechanism to the “Loaded” position and adjust the “Loaded” set screws so that the lifting blades are not contacting either the heads or the disk.
  - Move the Head Loading Mechanism to the “Unloaded” position and adjust the “Unloaded” set screws so that the heads are lifted slightly off the disk. Caution should be observed not to lift the heads beyond the head manufacturer's specifications.

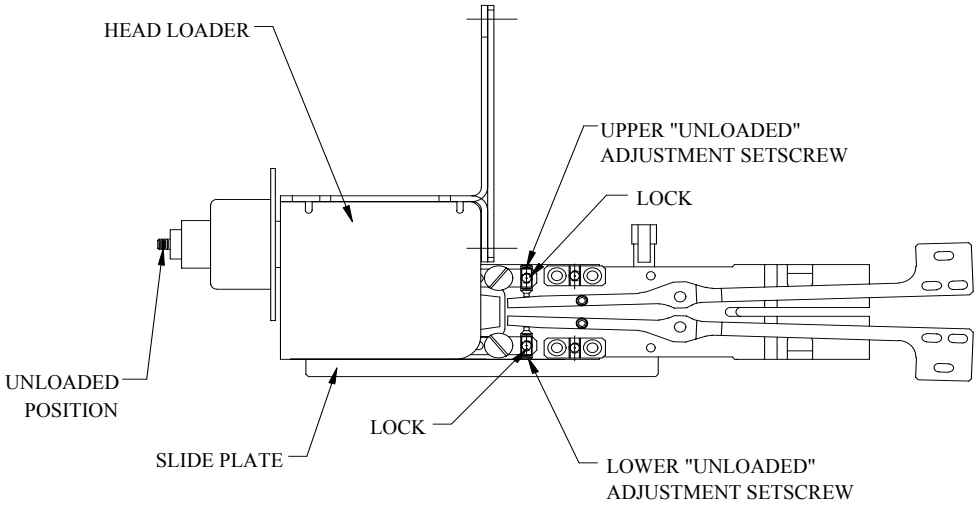


Figure 14. Head Loading Mechanism "Unloaded" Adjustment

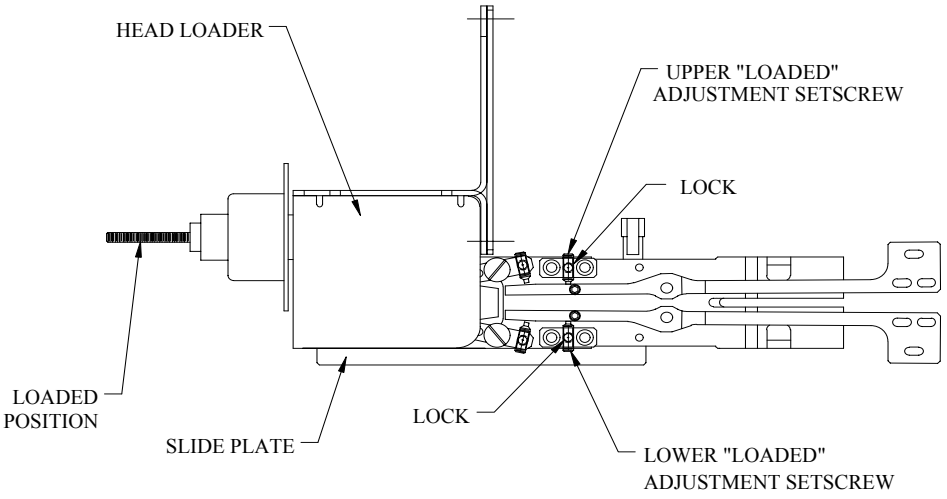


Figure 15. Head Loading Mechanism "Loaded" Adjustment

3.4.2 Using The 1701 Spinstand With Head Stacks

The 1701 Spinstand can be used for Head Stack testing. For this, additional customized mechanics and electronics are required, including a Disk Pack Chuck, a HSA Mounting Plate, and an Interface PCB. To perform this integration the following items are required from the customer:

- Head Stack geometry including:

Distance from pivot point to head gap

Skew angles and radial locations at ID and OD

Drawings/Specifications of the Head Stack Assembly, specifically including all outside dimensions/tolerances and the profile of the inner block body between heads

Drawing of the drive base

Reference points for locating the pivot point

Head drawings

- Disk information including:

  Disk diameter, thickness, and number of disks

  Thickness of spacers between disks

  Whether Ball or Air Bearing Spindle is to be used

- Manufacturing information including:

  Direction for installing the head separating comb

  Recommended layout of cable

  Recommended mounting and locating configuration

- Schematics/pinout of electronic interface

  Preamplifier specification

3.4.2.1 Head Stack Adjustment

There are two sets of setscrews used to adjust the loaded and unloaded positions of the lifting

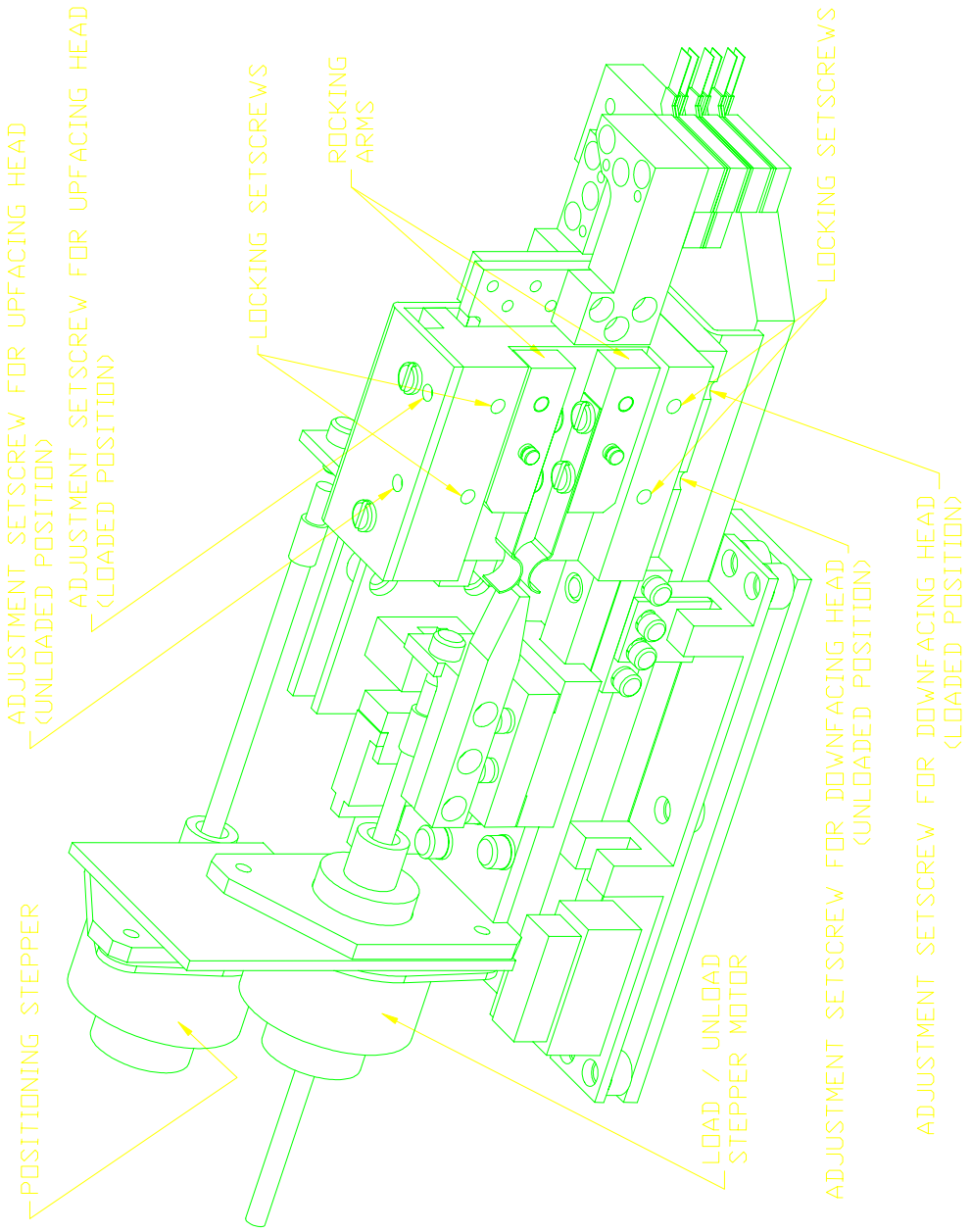


Figure 16. Head Stack Components

blades. These setscrews are called the adjustment setscrews. They limit the movement of the rocking arm when the stepper motor moves in/out (refer to Figure 16).

Before you make any adjustments, turn the spinstand off. Then push the positioning stepper motor shaft all the way out (towards the disks).

You should manually move the spinstand to bring the blades over the disk. This way it is easier to follow the positions of the blades against the disks.

The adjustment for the loaded position should be performed for upfacing and downfacing heads and then repeated for the unloaded position.[1] It is similar for both types of heads and includes the following steps:

i. Pull [push] the shaft of the load/unload stepper motor all the way to the back [front]. This will disengage the wedge from the springs on the rocking arms [in the case of adjustment for the unloaded position spread the rocking arms].

ii. Unscrew the locking set screw that locks the set screw governing the loaded [unloaded] position (towards the load/unload knives). Do not remove it as 1-2 turns is all you need to release the lock.

iii. Turn the adjustment set screw and watch the knives move. Only the corresponding set of knives (either the ones that lift up or the ones that lift down) will move.

iv. When you have reached the desired position, move the load/unload stepper in and out 2-3 times to make sure the mechanism works as desired.

v. Use the locking set screw to lock the position of the adjustment set screw. The locking set screw should be snug, but not overtight.

After all of the adjustments are complete, exercise the load/unload motor manually without power in order to make sure the loaded and unloaded positions remain as desired.

In the event that the lifting blades become damaged and need to be replaced refer to Figure 17.

Untighten only the screws that hold the stack together, and not the screws that hold the mounting block. Pay attention to the order in which the spacers are arranged BEFORE you remove them. You need to put them back together in the same order.

There are three types of spacers:

1. Top spacer. This is the one closest to the mounting block.
2. Middle spacer(s). These are the ones between the blade stacks.
3. Bottom spacer. This is the one with the threaded holes.

The blade stack consists of two types of parts: two support blades and one lifting blade. The support blades need to be placed on both sides of the lifting blade.

[1] In the following description (steps i-v), the terms in square brackets correspond to an adjustment for the unloaded position.

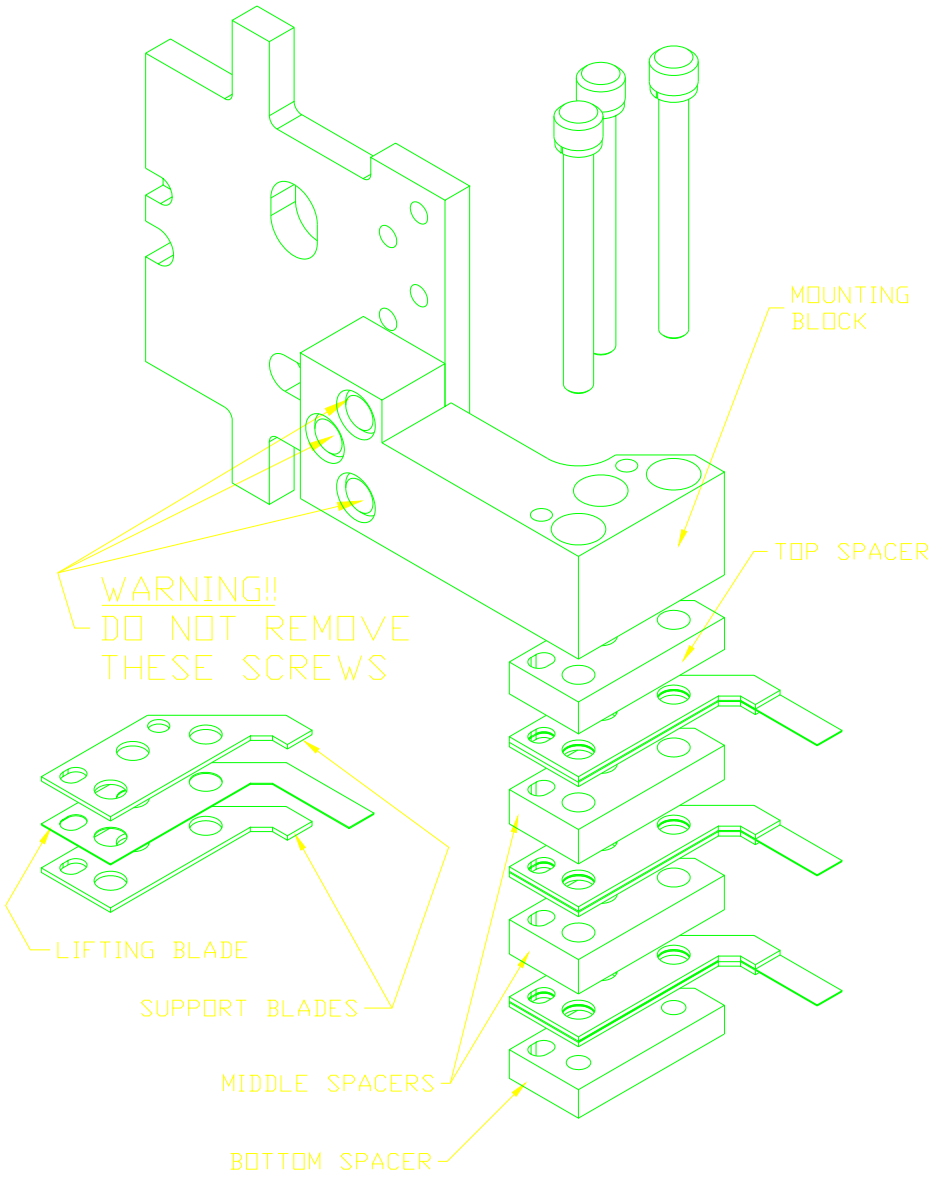


Figure 17. Blade Stack Components

3.4.3 Micropositioning (MP) System

The 1701 Spinstand is available in Standard (1701) and Micropositioning (1701MP) versions. The Micropositioning Spinstand uses a closed-loop positioning system consisting of additional components. Caution should be observed when handling any of these components as they can be easily damaged. The additional components of the 1701MP Spinstand are as follows:

- Piezo Actuator
- Linear Scales and Readers
- Piezo DSP Controller Board
- Additional +48V Power Supply

Two Piezo Actuators have been used. The first version uses a total stroke of ≈1200 μIn, whereas the later versions have a shorter total stroke of ≈600 μIn.

The Linear Scales and Readers are adjusted at the factory and do not require readjustment. **Do not touch the bottom surface of the Linear Scale or the Reader Assembly** as they can be easily damaged. If necessary, clean the bottom surface of the Linear Scale with a clean soft cloth and a glass/optical cleaner. Be very careful not to scratch the surface of the Linear Scale or the Reader Assembly.

The Piezo DSP Controller Board is an additional board installed into the motherboard of the Spinstand. No adjustments of this board are required. For cable connections refer to "Figure 38. 1701 Internal Connection Diagram" in this manual.

Upgrades from 1701 to 1701MP Spinstands can only be performed at the factory.

3.5 Optical Alignment System

To align the 1701 Spinstand the Optical Alignment System is required. The Optical Alignment System consists of the following components:

OPTICAL ALIGNMENT TOOL
- Horizontal Shaft assembly
- Post assembly
- Zoom Lens and Lens Tube
- Black and White CCD Camera with AC Adapter
- Fluorescent Light Source with AC adapter
- Post Holder (mounted on Spinstand)

OPTICAL ALIGNMENT VIDEO PACKAGE
- Video Board and cable
- Guzik Optical Alignment Software

Because this system is a tool used only for alignment, one system can be used to align many Spinstands. Common configurations of this system are described below, and the best configuration should be selected based on the user's applications.

CONFIGURATION	DESCRIPTION
Dedicated Optical Alignment Tool per Spinstand	Each Guzik RWA/Spinstand station is equipped with its own Optical Alignment Tool and Video Package.
Dedicated Optical Alignment Video Package per Spinstand	The computer at the RWA/Spinstand station is equipped with its own Video Package, but the Optical Alignment Tool is shared between stations.
Optical Alignment System installed on moving cart	A separate mobile computer station equipped with the entire Optical Alignment System is used. The mobile station is taken to each station for alignment.

The components of the Optical Alignment Tool are assembled at the factory, but may be disassembled for shipment. For assembly instructions refer to the section "Assembly Of The Optical Alignment Tool" on page 37.

3.5.1 Connecting The Optical Alignment System

The following figure shows the connection of the Optical Alignment Tool to the Optical Alignment Video Package.

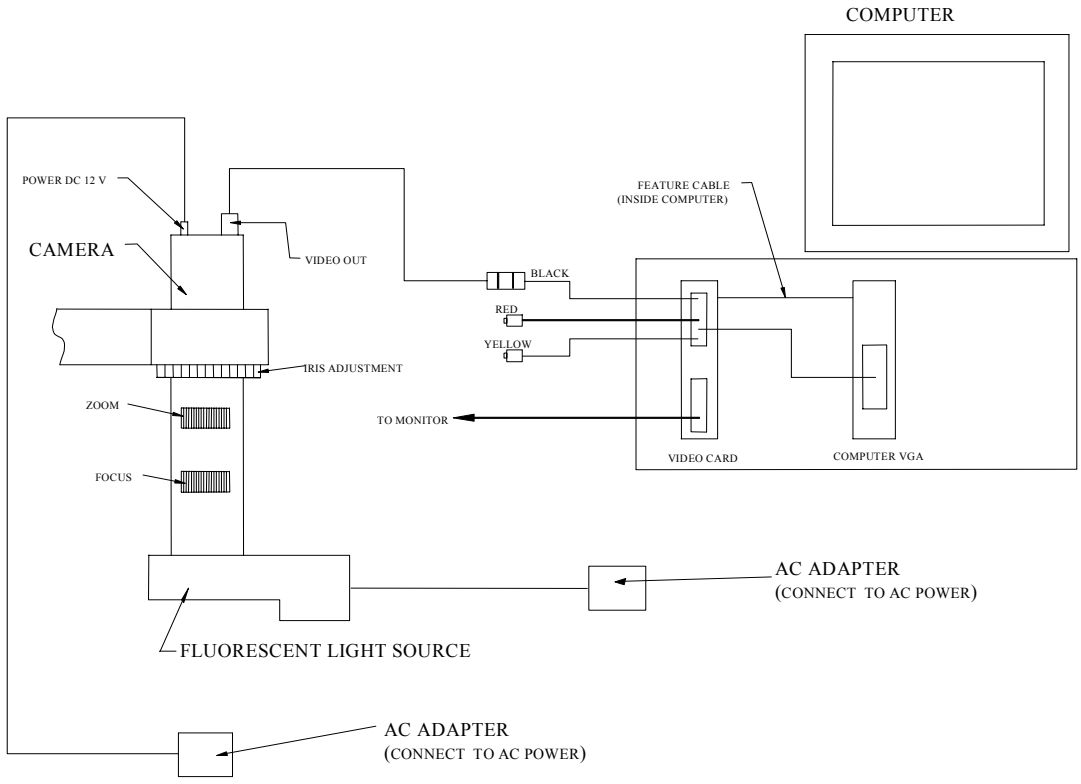


Figure 18. Connecting The Optical Alignment System

3.5.2 The Optical Alignment Tool

The Optical Alignment is used during alignment of the Spinstand to locate with high accuracy the head gap with respect to the center of rotation of rotary housing. The following figure shows the components of the Optical Alignment Tool.

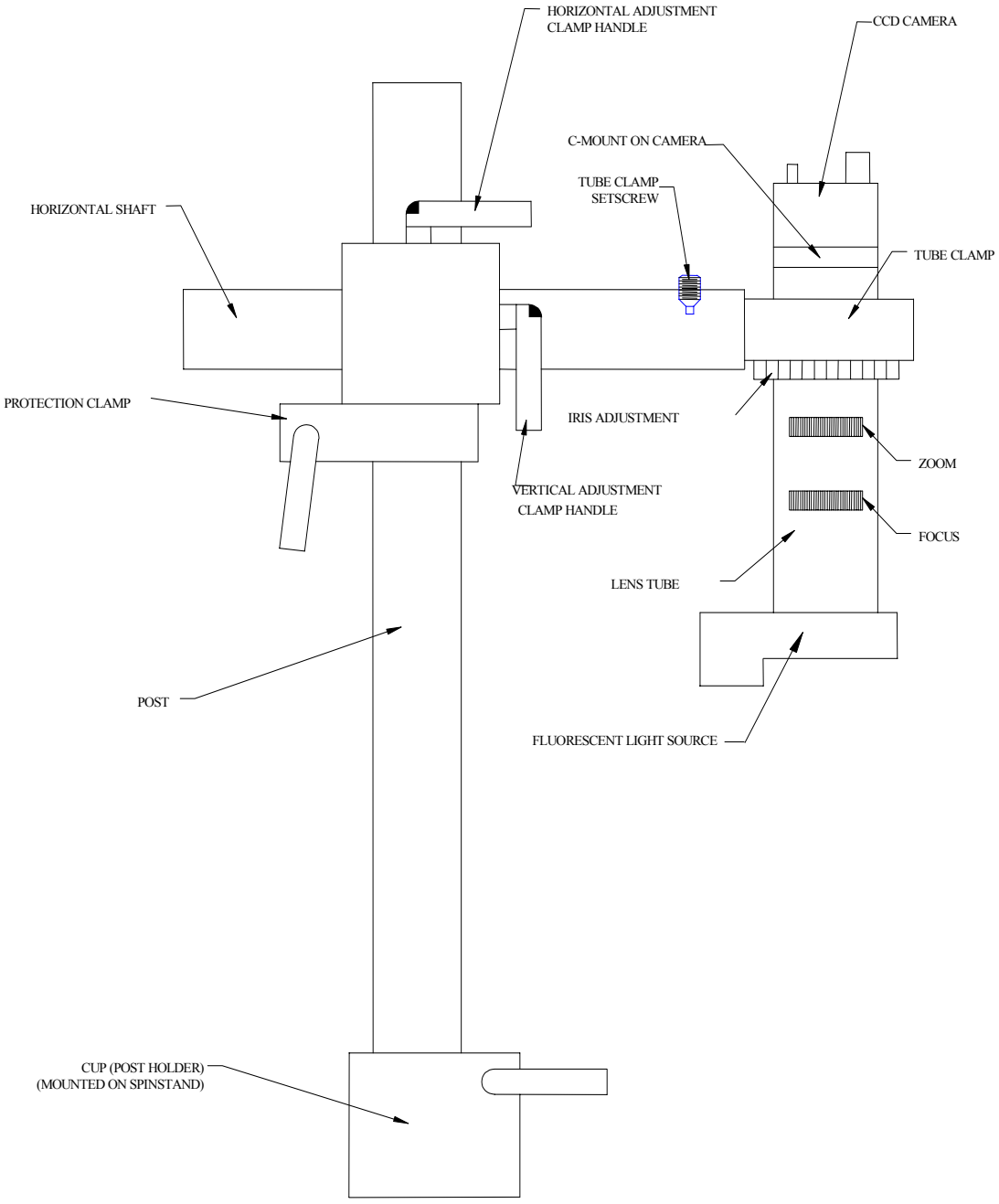


Figure 19. Components Of The Optical Alignment Tool

3.5.3 Assembly Of The Optical Alignment Tool

The assembly of the Optical Alignment Tool is performed as follows:

- Slip the Tube Clamp onto the Lens Tube and tighten the screw of the clamp so that it holds the Lens Tube tightly.
- Screw the CCD Camera into the Lens Tube. After this step the camera can be rotated to any position by loosening the setscrew on the Lens Tube using a 5/64 size hex wrench.
- If not already assembled, screw the zoom lens into the other end of the Lens Tube. Make sure that the diaphragm adjustment ring sits properly on the rotating pin on the diaphragm.
- Attach the Fluorescent Light Source to the other end of the Lens Tube by slipping the tube's flange into the groove on the Light Source cover until latched.
- Slip the Protection Clamp onto the Post and tighten the clamp handle. The adjustment of the height of this clamp will be done during the optical alignment operation.
- Attach the Horizontal Shaft to the Post and tighten the Vertical and Horizontal Adjustment Clamp Handles. Adjustment of these will be done during the optical alignment operation.
- Install the Post into the Post Holder on the Spinstand.

3.5.4 Optical Alignment Tool Adjustments

The Optical Alignment Tool has several adjustments, described below:

ADJUSTMENT ITEM	**PURPOSE**
Post Holder Handle	For rotation of the entire Optical Alignment Tool to aim the Camera at the center of the Rotary Housing.
Horizontal Adjustment Clamp Handle	For horizontal adjustment of the camera. Combined with the Post Holder Handle allows the Camera to be aimed at the center of the Rotary Housing.
Vertical Adjustment Clamp Handle	For height adjustment of the Camera as a coarse focus adjustment.
Protection Clamp Handle	Height adjustment protection. After the height has been adjusted using the Vertical Adjustment Clamp Handle this clamp should be located under the Horizontal Shaft.
Focus	Adjusts focus of the image. This is a fine adjustment that is done after the coarse height adjustment performed with the Vertical Adjustment Clamp Handle.
Zoom	Adjusts the Zoom of the image. Maximum magnification is approximately 100:1.
Light Intensity Adjustment	Adjusts the intensity of the light source to the Illuminator.

Iris Adjustment	Adjusts the amount of light that passes through the Lens Tube. In combination with the Light Intensity Adjustment this should be adjusted for ideal light conditions.

3.5.5 Optical Alignment Video Package Description

The Optical Alignment Video Package is the video system installed in the computer and composed of a video board, software drivers, and cables. Two brands of video boards have been used, the Marvel board and the AVER Video Commander Board. The AVER Video Commander is the model currently being shipped, with software based under Windows. The Marvel board uses a DOS-based software video package and requires a different installation procedure.

The following text describes the installation and usage of the Optical Alignment Video Package using the AVER Video Commander system. For information on the Marvel board system refer to the Appendix.

3.5.6 Optical Alignment Video Board Installation

To install the AVER Video Commander Video Board the following steps must be performed. Prior to this operation Windows should be installed in the computer and a mouse should be attached. For more detailed information on this installation refer to the documentation supplied with the AVER Video Commander Board.

The following procedure must be performed in the order given. Problems with the output image (such as a pink screen) or changes in parameter settings require a complete reinstallation of all software packages. It is not possible to bypass any of the steps of this installation procedure.

For proper installation of the Video Board the standard VGA board should be configured to a 640x480 resolution.

- Turn off the computer.
- Install the AVER Video Commander Board into the computer:
  - The default jumper settings of the AVER Video Commander Board should not be modified.
  - Open the computer and install the AVER Video Commander Board in a slot near the standard VGA board.
  - Connect the flat-ribbon 'Feature' cable from the standard VGA board to the AVER Video Commander Board. Observe the pin 1 (square pad) designations on both boards.
  - Close the computer.
- Disconnect the cable from the monitor to the standard video board and attach it to the lower connector on the AVER Video Commander Board.
- Connect the passover jumper cable (supplied with the AVER Video Commander Board) from the standard VGA connector to the upper connector on the AVER

Video Commander Board. The jumper must be installed in such a way that the black/red/yellow jacks come from the AVER Video Commander Board connector. NOTE: only the black jack will be used, the other two are not connected.

- Turn on the computer. The monitor should display information properly.
- Enable the feature connector in the computer (as applicable):
  - On Dell computers the item 'Feature Connector' in the CMOS setup must be set to 'Enabled'.
- Enable the feature connector in the Windows' driver setup of the standard VGA board (as applicable). Each VGA board may require different installation procedures (refer to the documentation supplied with the board). The following identifies the procedure for the Number9 VGA board, and is documented in the HELP/Technical Questions sections in the software driver:
  - Copy the program fcon.exe from the Number9 diskette to the ...\NUMBER9 subdirectory.
  - Add the item "...\NUMBER9\FCON E P" to the AUTOEXEC.BAT file.
  - In Windows, enter the Options menu of the EXE-STATUS application and enable the option 'Enable Loop Through'.
  - Exit Windows and reboot the computer.
- Connect the cable from the OUTPUT connection on the CCD Camera to the **black** connector on the jumper cable at the back of the AVER Video Commander Board. Plug the AC Adapter in the CCD Camera.
- Enter Windows.
- Install the AVER Video Commander driver:
  - Insert the AVER diskette labeled 'Video Commander' into the floppy drive and type A:\INSTALL (**DO NOT** install the AVER diskette labeled 'AVI Drivers / Video for Windows').
  - During installation choose all default parameters, except for choosing **'Linear Addressing Mode'** when requested.
- Select the AVER VIDEO COMMANDER icon. The image from the CCD Camera should be visible on the screen. In the 'Setup' menu the following parameters should be set:
  - 'Output Viewport' item - Change the start, stop, and pan items to center the image on the screen. Also choose the best 'VGA DAC Skew' for minimal shadowing.
  - 'VGA Parameters' item - Select the best 'VGA Clock Adjust' and 'Skew Clock' settings for best picture clarity. Note that the 'Output Viewport' parameters may require readjustment if these parameters are changed.
  - 'Save Settings' item - Save all settings when complete.
- Install the Guzik Video Alignment program by running A:\SETUP. No additional parameters are necessary.
- Exit Windows and reenter.
- Select the VIDEO ALIGNMENT icon. The image from the CCD Camera should appear on the center of the screen.

After installation is complete, the parameter 'frbuf' in the file \WINDOWS\VMPLUS.USR can be changed to **frbuf=14**. This will conserve system memory, but disables the capture of video images to the file.

4. INSTALLATION OF THE 1701 SPINSTAND

The following steps must be performed when installing the 1701 Spinstand:

- Unpacking the Spinstand
- Installation and configuration of all mechanical components
- Installation of the Guzik software
- Attachment of cables to the Spinstand
- Power Up and IPL initialization of the Spinstand
- Selection of the 1701 Device Driver
- Alignment of the Spinstand

Warnings

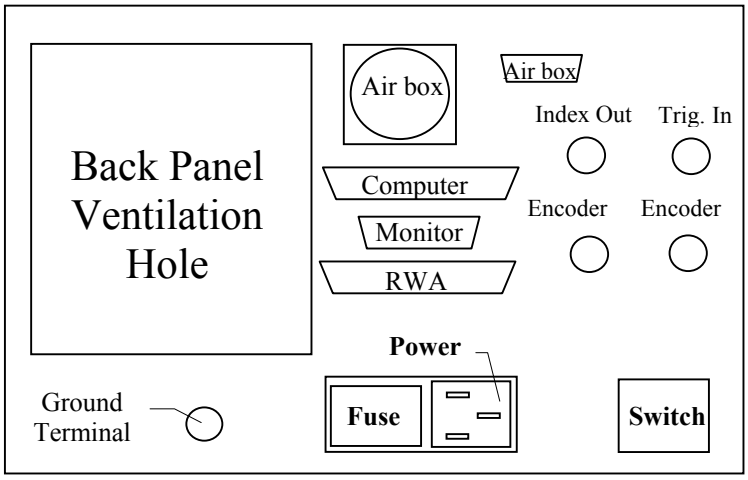
Before operating the Spinstand Optical Alignment and Sensor Alignment must be performed by a trained operator!

To keep the Spinstand in working condition, do not place it near anything that prevents adequate air circulation by blocking the ventilation holes.

Disconnect the power cable before replacing the fuse (refer to the following sketch). For continued protection against fire, replace only with fuse of the same type and ratings (see label at the machine).

Do not operate the Spinstand without eye protection! Avoid contact with moving and spinning parts! Keep a safe distance while machine is running!

Electrostatic Sensitive Devices. Use a ground strap when handling the Universal Preamplifier, the Head Amplifier Interface Board, the Head Amplifier Boards and the head cartridges.



Spinstand Rear Panel View

4.1 Uncrating The 1701 Spinstand

Spinstands shipped locally do not require any packing/unpacking preparation and are generally shipped in an assembled condition to the customer. Spinstands shipped over long distances are generally shipped in a shipping crate and require additional packing/unpacking procedures. For a description of these procedures refer to the section "B.5 1701 Spinstand Crate Unpacking Instructions" on page 81.

4.2 Cable Attachments To The Spinstand

The following cables must be attached to operate the 312MP spinstand (refer to Figure 9. Air Spindle Connection Diagram).

Connection	Purpose	Cable Type
SPINSTAND TO HOST COMPUTER	Provides Serial Communication between HOST COMPUTER and the Spinstand.	25-pin Female to 9-pin Female (or 25-pin Female if applicable). Spinstand Port (COMPUTER) to HOST COMPUTER Serial Interface (COM1 or COM2).
SPINSTAND TO RWA	Provides the Spinstand Index and other signals to RWA.	37-pin Male to 37-pin Male. Spinstand (RWA) to RWA (DRIVE CONTROL)
SPINSTAND POWER CORD	A power connection is provided on the back panel.	The female end of the power cable connects to the Power Input (refer to Rear Panel View). The other end connects to a grounded 120 or 240 VAC outlet.
SPINSTAND TO AIRBOX (air connection)	Provides the necessary air pressure to the Spinstand.	6-tube connector cable.
SPINSTAND TO AIRBOX (control)	Provides Communication to the air box.	9-pin male on both sides.

NOTE: A Ground Strap connection has been mounted on the back panel of the Spinstand for inter-system grounding. Cables for this purpose are shipped with the Spinstand.

4.3 Powering Up And IPL Initialization Of The Spinstand

4.3.1 Power Up

A power switch on the back panel of the Spinstand is provided for power on and off. When the Spinstand is powered on, the small green led on the front panel of the Spinstand will turn on. On power up the Spinstand will default to IPL Mode.

4.3.2 IPL Mode

The 1701 Spinstands have the capability of downloading the Spinstand Program from the Host Computer to the Spinstand. This operation is called Initial Program Loading, or IPL. To do this operation the Spinstand must be in IPL Mode, which is the default mode on power on of the Spinstand.

The IPL Mode is signified by the blinking of the green START button on the front panel of the Spinstand. Once the Spinstand is in IPL Mode, the software in the Host computer detects it and a message appears informing the user, who can then choose either to start downloading the code or to bypass it by pressing the green start button. If chosen, downloading takes about 30 seconds.

4.3.3 When Must IPL Be Performed?

The IPL procedure needs to be performed only under one condition. This is:

- The Spinstand Program currently residing in the Spinstand has been corrupted, resulting in an abnormal error condition.

Under all other conditions the IPL procedure can be avoided. This includes installation of a new software set. After a new software set has been installed the software will detect the fact that the currently loaded Spinstand program is out of date, and will automatically download the new program to the Spinstand.

4.3.4 Placing the Spinstand Into and Out of IPL Mode

The Spinstand can be placed into IPL Mode by one of two methods. They are:

- Powering Off and On the Spinstand.
- Pressing the red STOP button on the front panel of the Spinstand.

The Spinstand Program in the 1701 Spinstands is battery backed-up and saved during Power OFF. When the Spinstand is in IPL Mode, pressing the green START button can restore the Spinstand Program residing in the Spinstand. At this time the Green START button will stop blinking and remain on, the Spinstand will perform a reset operation, and the IPL procedure will be avoided.

When the IPL procedure is performed, during the downloading of the program the green START button will turn off. At the conclusion of this procedure the green START button will turn on and the Spinstand will perform a reset operation. This action will be identical to the conditions described above when the green START button was pressed.

If the revision of the Spinstand Program installed in the Host Computer does not match the revision downloaded to the Spinstand, the Guzik software will automatically start the IPL procedure, even if the green START button is not blinking. If the revisions do match (and the green START button is not blinking) the IPL procedure will be avoided.

4.4 Selecting The Spinstand Driver

The Guzik software communicates with the device (Spinstand, drive, etc.) through the software Device Driver. There exists a different Device Driver for each different device (ex. 311, 312/312MP, and 1701 Guzik Spinstand Drivers). For each product the user must select the Device Driver to be used for that product. The Device Driver is selected in the Driver's Menu of the Guzik Shell Program for each product.

When the system is powered up and the Guzik software is entered, the software Device Driver must be selected. This must be done before any operations are performed. There are four different Guzik Spinstand Device Drivers for Read-Write Engineering/ Certification modes. They are:

211:	Guzik 211 Spinstands and early Guzik 215, 225, 311, and 511 Spinstands without the serial communication 'Computer' port.
311:	Guzik 215, 225, 311, and 511 Spinstands.
312:	Guzik 312 Spinstand.
312MP:	Guzik 312MP Spinstand.
312MPCF:	Guzik 312MP-CF Spinstand.
1701:	Guzik 1701 and 1701MP Spinstands.
1701CF:	Guzik 1701-CF and 1701MP-CF Spinstands.

NOTE: Once a Device Driver for a particular product has been selected, that driver will be loaded each time a program within that product is executed. Therefore the Device Driver for a particular product needs to be selected only once, unless the device used for that product has changed.

5. ALIGNING 1701 SPINSTANDS

Prior to the alignment of the Spinstand all mechanical configurations must be performed:

- Cartridge configuration and alignment ('Z'- height and Mounting Block).
- Head Loading Mechanism Lifting Knife adjustment (or in the case of a camming style Lifting Wing adjustment).
- Spindle Chuck installation.
- Head Preamplifier Boards installation.

The alignment of 1701 Spinstands consists of two steps (in order), Optical Alignment and Sensor Alignment. Both steps are performed using either the WITE Spinstand Alignment Program or the WITE Device Control Program (WDCP).

The first step is the *Optical Alignment* procedure. This procedure aligns the head gap with the center of the Rotary Housing of the 1701 and also finds the zero skew angle reference. This is done using the Optical Alignment System.

The second step is the *Sensor Alignment* procedure. The procedure consists of a configuration of test parameters, hardware configuration, and skew angles. After this configuration is performed the user must align the limit and reference sensors for the Linear and Rotary Positioning systems.

5.1 When Must Alignment Be Performed?

The Optical Alignment procedure must be performed when one of the following occurs:

- A head with new geometry is installed.
- The Head Loading Mechanism is removed and/or relocated on the 1701 Spinstand.

Unlike the 311/312 Spinstands it is NOT NECESSARY to perform alignment when changing skew angles. Skew angles on the 1701 Spinstand are completely software-controlled and do not require mechanical readjustment.

The Sensor Alignment procedure must be performed when one of the following occurs:

- Optical Alignment is performed.
- The disk size is changed.

5.2 Sensor Alignment Procedure

The Sensor Alignment procedure is done through the WDCP program called from WITE or in a standalone version, and consists of 5 steps:

1. Set Product Parameters (see section “Product Parameters” on page 46).
2. Set Alignment Menu parameters (see section “Alignment Menu Window” on page 49).
3. Do Inner Limit Sensor Alignment.
4. Do Reset Radius Alignment (see section “Inner Limit Sensor and Reset Radius Alignment” on page 56).
5. As necessary, do Off-Center Compensation (see section “Off-Center Compensation Procedure” on page 56).

For information on the WDCP Alignment Program refer to the section “Alignment Menu Window” on page 49.

5.2.1 Where Is The Alignment Data Saved?

There are two types of parameters used in the configuration and alignment of the Spinstand. They are:

PARAMETER TYPE	EXAMPLES	SAVED IN
Product Parameters	ID, OD, RPM, Maxtrack, Loading Radius, Initial Track, Skew Angles, ...	Product data file in computer
Spinstand Parameters	Spindle Type, Spinstand type, Reset Radius, rotary positioner zero angle reference...	EEPROM in Spinstand

The Product Parameters are parameters configured for each individual product. They are set in the Product Parameters Window of the WDCP program (see section “Product Parameters” on page 46). When the “Save” button is pressed[1], these parameters will be stored into a data file in the product subdirectory. The saved parameters can later be used by simply selecting the product for which they were saved. These parameters are unique for each individual product.

The Spinstand Parameters are parameters that identify a certain mechanical configuration of the Spinstand, such as the type of Spindle and type of Spinstand (S1701 or S1701MP). These parameters are stored in an EEPROM inside the Spinstand (preserved on power down) and are common for all products. The Spinstand parameters are displayed (and can be modified if necessary) in the *Spinstand Parameters Menu* of the WITE Device Control Program (WDCP) or in the WITE Spinstand Alignment Program. One exception to this is the item Reset Radius, which is the reference radius for the Linear Positioning System. The Reset Radius is displayed on both the *Product Parameters Menu* and *Spinstand Parameters Menu* of WDCP.

[1] When exiting after making changes by pressing only the “Close ” button the user will be asked if it is necessary to save them.

6. THE WITE DEVICE CONTROL PROGRAM

6.1 Entering The WITE Device Control Program

The WITE Device Control Program program is entered from within the WITE program. To do this, select *Configure* | *Device...* menu items from the WITE Main Menu (for more information refer to **"**WITE User's Guide**"**). The Device Config dialog box will appear.

Press the 

button to invoke the WDCP program.

6.2 WDCP Main Window

The first window of the WDCP Program is the Spinstand Alignment window:

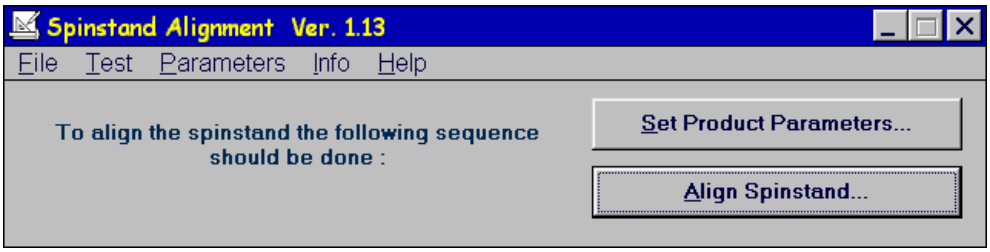


Figure 20. WDCP Main Window

Below is a description of each of the items in this window.

Invokes the Product Parameters Dialog Box, which allows the user to specify the product parameters. For more information see the section **"**Product Parameters**"** on page 46.

Invokes the Alignment Parameters Dialog Box that allows the user to specify the alignment parameters and to perform the alignment procedures. For more information see the section "Alignment Menu Window**"** on page 49.

6.2.1 Product Parameters

Initial Product parameters must be changed using the WDCP program. This information is shared with all of the Guzik programs executed in the current product. Some of these parameters can be changed in the other programs. Product parameters are changed in the Product Parameters Dialog Box of WDCP

To view or change product parameters, press 

button. The following dialog box will appear:

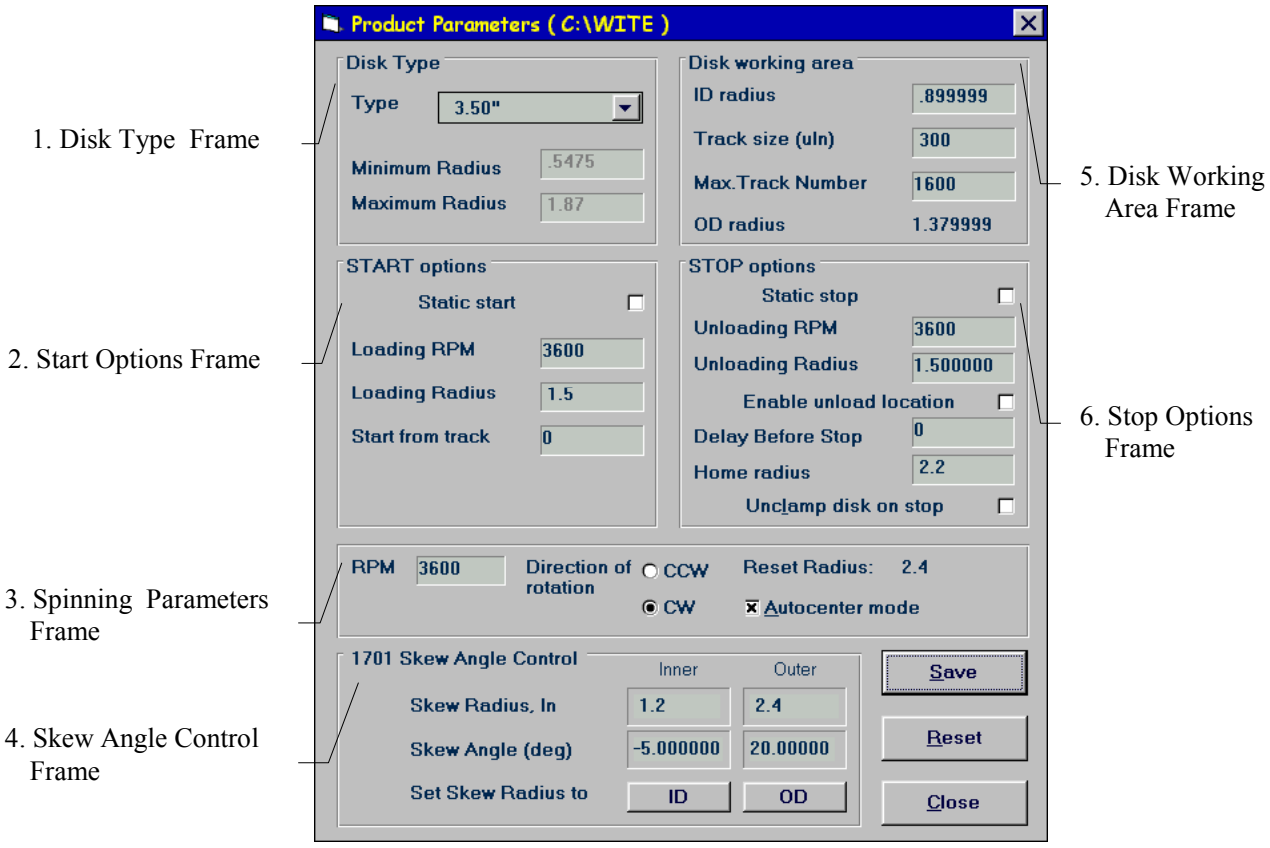


Figure 21. Product Parameters Window

1. Disk Type Frame allows the user to select the needed disk type. The Minimum and Maximum Radii, displayed in the Minimum Radius and Maximum Radius text boxes, will be set based on this selection, and the WDCP Program will use these radii to perform user parameter validation.

Type This combo box allows the user to select Disk Type.

The following types are available in the list:

1.30”

1.80”

2.50”

3.00”

3.50”

5.25”

8.00” 63mm

8.00” 100mm

9.00” 63mm

9.00” 100mm

10.5” 63mm

10.5” 100mm

Special

Minimum Radius — This text box shows the Minimum Radius based on the current Disk Type selection. This text box is enabled for editing only if Special Disk Type is selected.

Maximum Radius — This text box shows the Maximum Radius based on the current Disk Type selection. This text box is enabled for editing only if Special Disk Type is selected.

2. Start Options Frame determines the procedure of disk starting.

*Static Star*t — If this box is checked, heads will be loaded before the disk starts its rotation.

Loading RPM — Rotational Speed of Spindle during head loading operation (in RPM).

Loading Radius — Radius to load heads (in In).

Start from Track — Initial track to be sought after Spinstand Start.

3. Spinning Parameters Frame contains controls for the direction and speed of rotation:

RPM — Allows the user to specify the rotational speed (in RPM).

Direction of Rotation — Allows the user to specify the direction of rotation (Clockwise or Counterclockwise).

Autocenter mode — If this option is checked, the Seek Track operation will move the head to the center of the track, even if the previous head position was at nonzero offset.

4. Skew Angle Control Frame allows to the user to configure the skew angles for corresponding radii

Inner Skew Radius — Inner Skew Radius of disk (in In).

Outer Skew Radius — Outer Skew Radius of disk (in In).

Inner Skew Angle — Specify the skew angle of the head at the Inner Skew Radius (in deg). By convention, the Inner Skew Angle is less than the Outer Skew Angle. A negative skew implies the head is angled toward the spindle center in relationship to the track.

Outer Skew Angle — Specify the skew angle of the head at the Outer Skew Radius (in deg). By convention, the Outer Skew Angle is greater than the Inner Skew Angle (generally positive). A positive skew implies the head is angled away from the spindle center in relationship to the track.

Set Skew Radius To ID and OD — Set skew radii to ID and OD set in the parameters Menu.

5. Disk Working Area Frame specifies the dimensions of the working area:

ID Radius — Inner Radius of the R/W area of the disk (in In).

Track size (uIn) — Width of each track (in uIn).

Max. Track Number — Maximum number of tracks.

OD Radius — Outer Radius of the R/W area of the disk (in In). This is a value calculated from the formula: OD *RADIUS = Track Size × Max. Track Number + ID Radius.*

6. Stop Options Frame determines the procedure of disk stopping:

Static Stop — If this box is checked, heads will be unloaded only after the disk stops its rotation.

Unloading RPM — Rotational Speed of Spindle during head unloading operation (in RPM).

Unloading Radius — Radius to unload heads (in In).

Enable Unload Location — If this item is checked then the positioner will seek out the unloading radius and change the spindle speed to the unloading RPM before unloading the heads during the stop. Otherwise, the heads can be unloaded at any radius on the disk at the current rotational speed.

Delay Before Stop — Time before the disk will stop rotation after the STOP command is issued. If START is issued before this time expires, the disk will continue spinning.

NOTE: 1000 is approximately equal to 30 seconds for 1701MP and 1.2 second for 1701MPCF spinstand.

Home Radius — User-defined radial location to seek to in case of a normal STOP operation. This parameter must be greater than the Maximum Radius but less than the Reset Radius.

Unclamp disk on stop — If this option is checked, the disk will be unclamped automatically after the stop.

6.2.2 Alignment Menu Window

To configure the Alignment Parameters and to perform alignment procedures press Align Spinstand button in the Spinstand Alignment window. The following dialog box will appear:

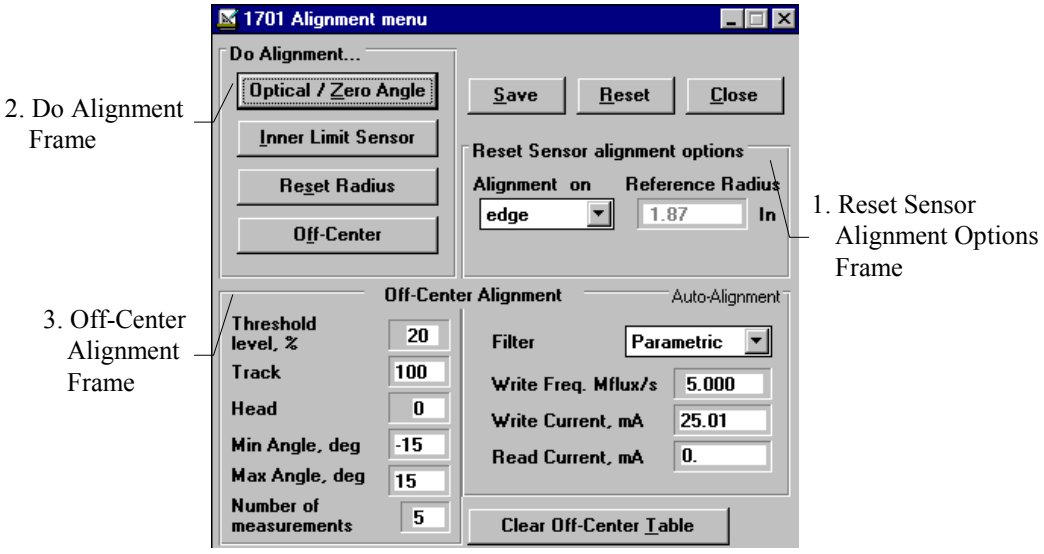


Figure 22. Alignment Menu Window

1. Reset Sensors Alignment Options Frame allows the user to specify alignment options

Alignment On — An initial reference point is required for the calculation of the reference sensor radius.

Edge — Align the spinstand to the edge-of-disk radius.

Reference Align the spinstand to the specified Reference Radius.

Signal Using an oscilloscope connected to the Universal Preamplifier, align the spinstand to a prewritten Signal at the specified Reference Radius.

Auto Using the RWA, align the spinstand to a prewritten Signal at the specified Reference Radius. Note that additional items in the Reset Radius alignment options frame must be specified.

For more information refer to section **"**Auto Alignment**"** on page 56.

Reference Radius Radius of Reference position in inches. This radius must correspond to the selection of the "Alignment On" item.

2. Do Alignment Frame allows the user to perform Optical Alignment procedures for Zero Angle, Inner Limit Sensor, and Reset radius.

If pressed invokes the Optical Alignment Program. For details see section "The Optical Alignment Program" on page 51.

If pressed invokes the Jog Menu for the Inner Limit Sensor Alignment (see section "Inner Limit Sensor and Reset Radius Alignment" on page 56).

If pressed invokes the Jog Menu for the Reset Radius Alignment (see section "Inner Limit Sensor and Reset Radius Alignment" on page 56).

If pressed, starts the test and off center calculation. At the end of this operation the write-gap location with respect to the center of rotation and also the read-gap offset from the write-gap will be displayed in the form of two dimensional vectors. The second element of the vector is along the linear movement axis and points towards the Spindle. The first element of the vector is along the axis that is obtained by rotating the second axis 90° clockwise (see "Off-Center Compensation Procedure" on page 56).

3. Off-Center Alignment Frame allows the user to specify in the following text boxes the parameters for the Off-Center Alignment procedure:

Threshold level This item specifies the level of signal that will determine the start and the end of the track while searching for the previously written signal with different skew angles. It is defined in terms of the percentage of the TAA measured in proportion to the TAA that was measured when the signal was first written with a zero skew angle.

Track The track number where the test will be performed.

Head The number of the head which will be used during alignment.

Min Angle The smallest skew angle (deg) that will be used during the test at the track specified in the *Track* item. The bigger the range of the skew angles as specified by the minimum and maximum skew angles, the more accurate the result of the Off-Center calculation will be. Depending on the track location specified, certain skew angles may be dangerous because of the interference of the Head Loading Mechanism with the spindle. Also, flying height limitations should be taken into account when specifying the minimum skew angle.

Max Angle The largest skew angle (deg) that will be used during the test at the track specified in the *Track* item. This angle is limited by the maximum skew angle the Spinstand can do before the flag on the rotary stage hits the outer limit sensor while rotating in a counterclockwise direction. Also, flying height limitations should be taken into account when specifying the maximum skew

	angle.
Number of Measurements	Specify at how many intermediate skew angle positions between the minimum and the maximum skew angle measurements should be done in order to accumulate data for the off center calculation. This number must be greater than or equal to 3, but 5 samples are recommended for a more accurate result.
Filter	The type of filter that will be used during auto alignment procedure. It is recommended to use a filter with a low cutoff frequency.
Write Frequency	The frequency of the written signal that will be used during alignment (Mflux/sec). It is recommended to use a very low frequency (e.g., 5 Mflux/sec)
Write Current	The write current that will be used during alignment (mA).
Read Current	Specify the read current to be used in the case of a MR head presence.
Clear Off-Center Table	If pressed, the old compensation table in the Spinstand will be deleted. This button should be pressed at the end of each Optical Alignment procedure.

6.2.3 The Optical Alignment Program

The function of the Optical Alignment Program is to:

- **i.** Position the head gap in the center of the Rotary Housing.
- **ii.** Find the reference for the zero skew angle.

Therefore, it should be used whenever the geometry of the head changes causing the head gap to be relocated from the center of the Rotary Housing.

Before using the Optical Alignment Program, the Optical Alignment Video Package must be installed and the Optical Alignment Tool must be connected. After installation the Optical Alignment Program can be entered either via WITE (WDCP) or in the standalone mode by selecting the "Video Alignment" icon in the WITE group[1].

The following figure shows the menu of the Optical Alignment Program. The features of this program are described below.

[1] In which case some of the functions, such as jogging, will not be available.

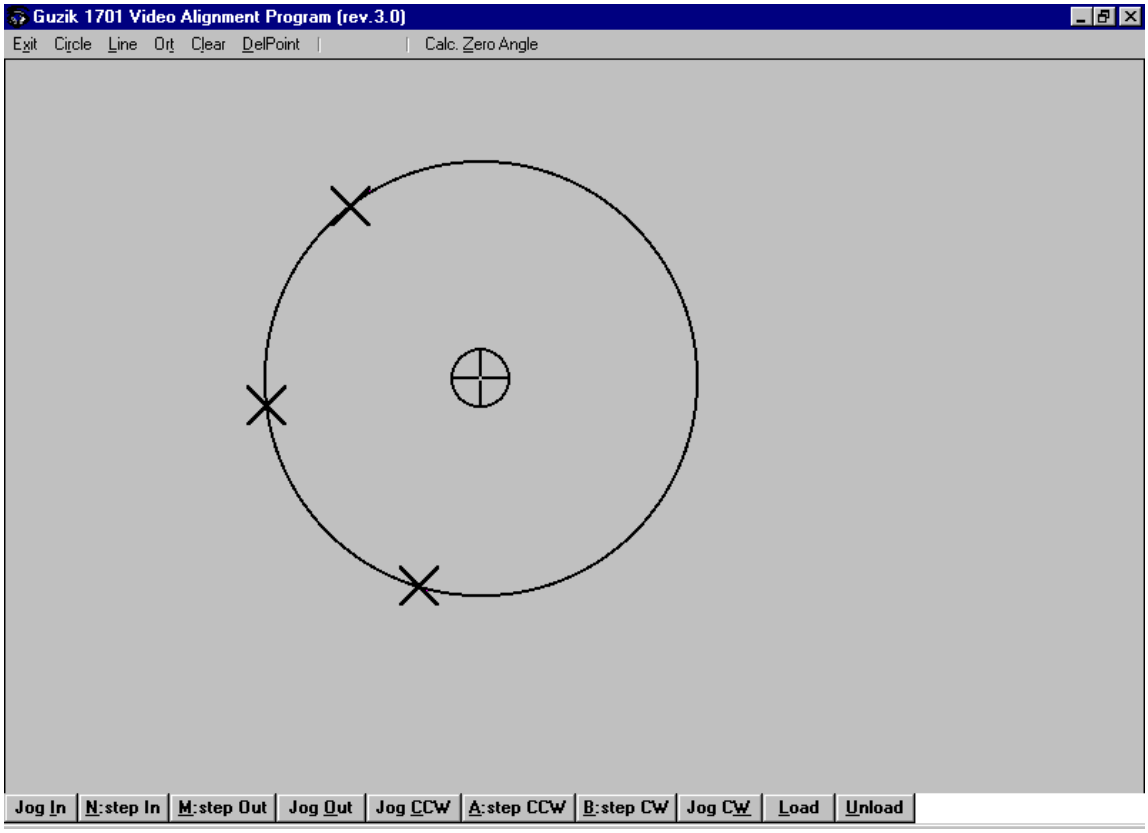


Figure 23. Optical Alignment Program Menu

(Point)	Marks a point at the current location. This is performed by clicking the left button of the mouse.
Circle	Finds and draws the circle that best fits the points that were marked. A minimum 3 points is required to define a circle. More points can be marked for a more accurate circle definition.
Line	Draws the line that passes through the two points that were marked.
Ort	Draws the perpendicular from the point that was marked to the last line drawn.
Clear	Clears the screen.
DelPoint	Removes the last action taken.
Jog In, N:step In, M:step Out, Jog Out, Jog CCW, A: Step CCW, B:Step CW, Jog CW	Moves the Rotary and Linear Positioners by computer. The functionality of these buttons is similar to the controls of the Jog Menu Window (refer to the section "Jog Menu" on page 59).
Load, Unload	Load and Unload Head.

Calc. Zero Angle From the current position the Zero Skew Angle Rotary Position will be calculated and a Reset operation will be performed. The result will be saved in the Spinstand EEPROM.

To position the head gap in the center of the Rotary Housing and to find the reference to the Zero Skew Angle position the following sequence of steps should be performed:

Step 1: Bring The Head Into Focus

The goal of this step is to focus the Camera on the Head and to aim the Camera close to the center of the Rotary Housing.

- Power on the Spinstand and press the green START button to reset the Spinstand.
- Set the Zoom adjustment to minimum. Rotate the Focus adjustment on the Lens Tube close to the middle of the adjustment range.
- Install the Head and put the Head Loading Mechanism into the locked position. The gap of the Head should be close to the center of the Rotary Housing.
- Load the Head.
- Release the Post and Horizontal Adjustment Clamp Handles. Position the Camera so that it is aimed close at the center of the Rotary Housing. The Head should be seen on the screen. Lock both handles.
- Release the Vertical Adjustment Clamp Handle and vertically adjust the height of the Camera until the Head is in focus. Note that the Protection Clamp may need to be moved up or down for this procedure. Lock this handle.
- Release the Protection Clamp Handle and slide the Protection Clamp up against the adjustment clamp. Lock this handle.

Step 2: Align The Head Gap To The Center Of Rotation

The goal of this step is to locate the Camera and adjust the Head to the center of the Rotary Housing.

- Rotate the Rotary Housing while observing the picture on the screen. Adjust the magnification to the maximum level at which the head gap does not move out of the screen.
- Rotate the Rotary Housing in a clockwise direction. Check for mechanical limits and the CW rotary switch. If there is a disk installed make sure that the head loader does not hit the disk. In the case of a headstack check that the crash protector assembly is not hit.
- Choose a point on the Head that can be identified easily (e.g., a corner) and mark it by clicking the left mouse button. Rotate the Rotary Positioner counterclockwise and mark this same point on the Head at discrete rotary intervals. Stop this procedure when the Reset Rotary Sensor Flag is close to the Rotary Sensor (maximum CCW position).[1]
- Make a circle through these points by selecting the *Circle* item in the menu. The center of this circle will be displayed on the screen. This point is the center of the

[1] In the case of a headstack with clockwise rotation the same precautions as before (concerning mechanical limitations) should be taken when moving in a counterclockwise direction.

Rotary Housing. If the center of the circle is off of the screen then repeat this entire step at a lower magnification.

- Move the gap of the Head to the marked center.

  For forward-backward adjustment:

  Release on the Slide Plate under the Head Loading Mechanism the 4 screws that mount the Head Loading Mechanism to the Spinstand. Move the Head Loading Mechanism forward or backward. Tighten the screws when done.

  For side-to-side adjustment:

  Release the 5 screws that hold the Locking Clamp. Rotate the clamp in the required direction. Tighten the screws when done[1].

- Repeat this entire step until the gap of the Head is located at the center of rotation at the highest magnification level. Note that minor horizontal and vertical adjustments may be necessary on the tool to move precisely the Camera to the center of the Rotary Housing.

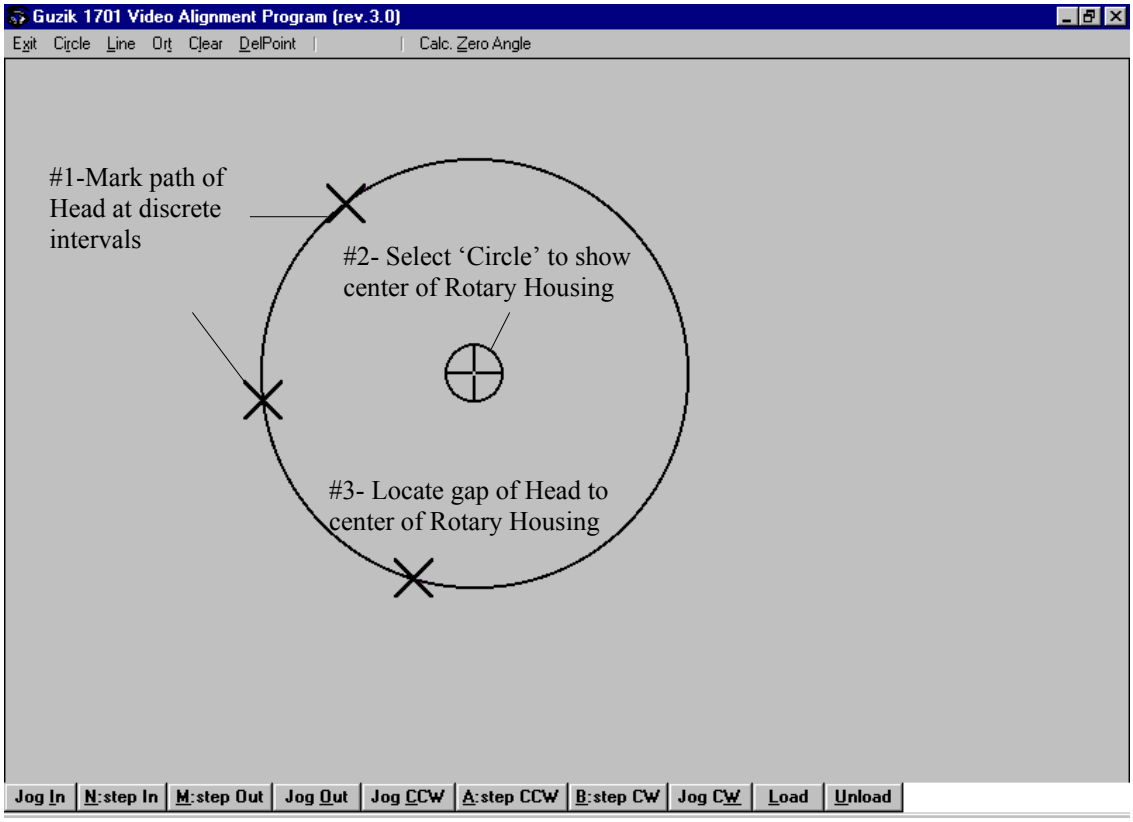


Figure 24. Aligning The Head Gap To The Center Of Rotation

Step 3: Mark/Calculate The Zero Angle Reference

The goal of this step is to mark or calculate the Zero Skew Angle position. If the Optical Alignment Program is invoked from the WITE Spinstand Alignment Program then the Zero Skew Angle position should be calculated and saved to the Spinstand EEPROM during this procedure.

[1] Usually there is no need to remove the adapter boards in order to release the screws on the Slide Plate and the screws that hold the Locking Clamp. But for certain types of Head Stack tooling it may be necessary.

- Reduce the Zoom to the medium/low magnification level.
- Rotate the Rotary Housing so that the head is approximately at the zero skew angle position.
- Move the Linear Positioning System so that the Head is on one edge of the screen.
- Choose a point on the Head that can be identified easily (e.g., a corner) and mark it by clicking the left mouse button. It is recommended to choose a point on the edge of the slider because for most of the heads this edge will be parallel (or perpendicular) to the zero skew angle line of the head.
- Move the Linear Positioning System so that the marked point on the Head is on the opposite edge of the screen.
- Draw a line between these two points by selecting the *Line* item in the menu. This marks the axis of travel of the Linear Positioning System.
- Move the Linear and Rotary Positioning systems so that the zero skew line of the head is perpendicular to the axis of travel. You can also select another point on a different edge of the slider that is perpendicular to the zero skew angle line and mark this point by clicking the left mouse button. Then click on the *Ort* item in order to draw a line perpendicular to the axis of travel and then use this line and the second edge to find the zero skew angle for the head.
- Calculate and save this position by selecting the item *Calc.Zero Angle* in the menu.

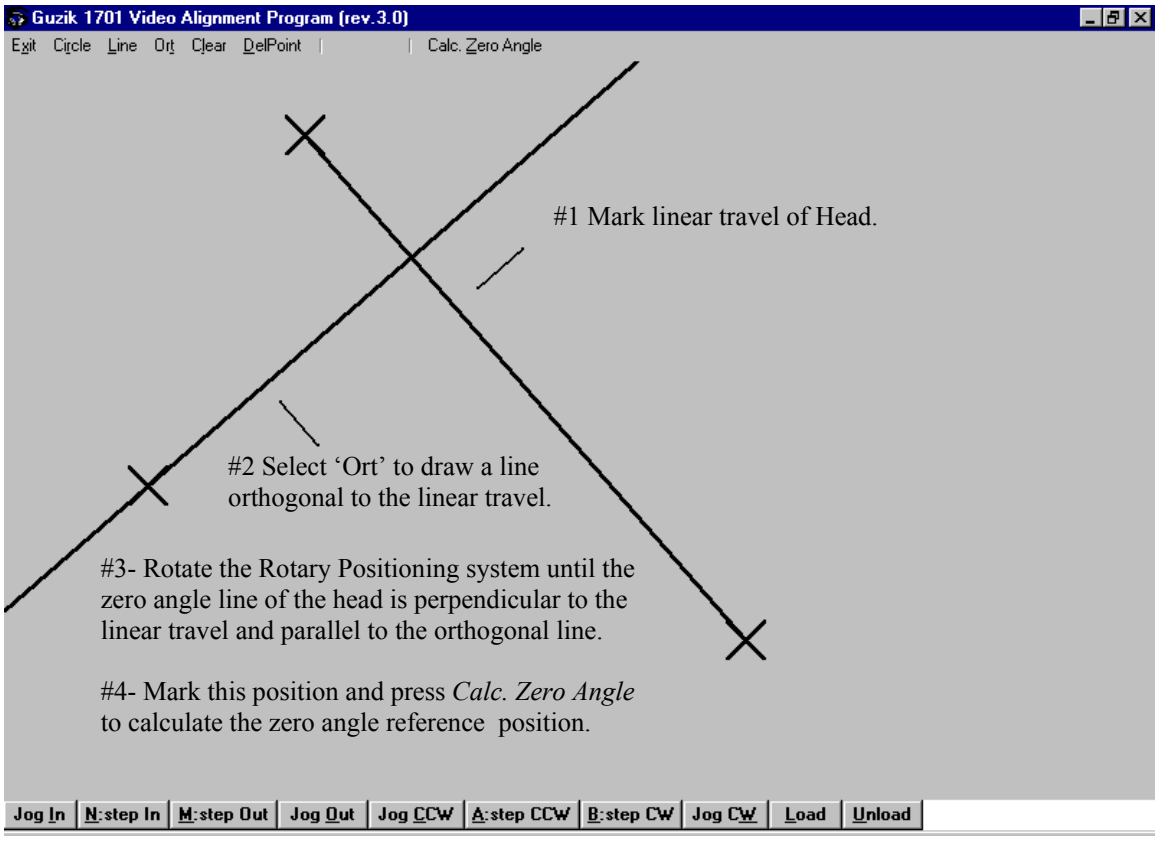


Figure 25. Locating The Zero Skew Angle Position

6.2.4 Inner Limit Sensor and Reset Radius Alignment

After the Positioner Alignment, Inner Limit Alignment and the Reset Radius Alignment must be performed. Detailed step by step instructions will be provided during the Alignment procedure. Refer to Figure 6. Linear Positioner Sensor Channel, Side View and Figure 7. Linear Positioner Sensor Channel, Top View, for two views of the 1701 Sensor Channel.

On the 1701 Spinstands, there are 2 sensor assemblies, each assembly composed of a sensor and a crash-stop switch. The position of the outer limit sensor assembly (Reset Sensor and Outer Limit Switch) is set at the factory and should NOT be repositioned. Inner Limit Alignment sets the position of the Inner Limit Sensor Assembly. Reset Radius Alignment uses the options selected in the Reset Sensor Alignment Options Frame in order to determine the distance between the center of the disk and the head gap at reset position. This distance is called Reset Radius and is saved in EEPROM in Spinstand. (See the Section "Where Is The Alignment Data Saved?" on page 45.)

When the last step of Alignment, Reset Radius Alignment, is completed the question "Do you want to save data in EEPROM?" will appear. If the Alignment is correct, press Yes button. If not, press No and restart the Alignment procedure.

6.2.5 Off-Center Compensation Procedure

Off-Center Compensation should be performed after the optical alignment and the sensor alignment are done in order to find the locations of the write and read (MR heads) gaps of the head with respect to the center of rotation of the Rotary Positioning System. This checks how well the Optical Alignment was done and also compensates for small offsets from the center. The software calculates the amount of compensation by writing and reading at a specified track location with different skew angles while observing the shift of the track center with respect to skew angle.

6.2.6 Auto Alignment

If *Auto* Alignment Mode is chosen (*Alignment On* item in the Alignment Parameters dialog box), the RWA will be used to search for the alignment signal on a reference disk.

Prior to the alignment procedure the user will need to prepare a disk with a written signal at a known reference location. For greater ease of detection, it is advisable to write several tracks around the reference location.

The algorithm for finding the previously written reference signal (*Auto* mode selected) during the Sensor Alignment procedure will be as follows:

1. The user will be asked to align the Inner Limit Sensor and Inner Limit Switch as normal.

2. The user will be asked to jog the head to a location outside (towards OD) of the reference signal. After this the user will be required to start the spindle motor and load the head.

3. Using the specified head, the WDCP program will write and measure the TAA of the head based on the parameters defined in the Auto-Alignment Frame. The WDCP program will then erase the signal and determine the ratio between signal and noise. If the noise amplitude is greater than 25% of the signal amplitude, then the measurement will be considered invalid and an error message will appear, aborting the procedure.

4. The WDCP program will set the Reference Threshold in order to find the reference signal. The Reference Threshold will be 20% of the difference between signal and noise levels based on the formula:

    a) $0.20 \times (\text{Signal TAA} - \text{Noise TAA}) + \text{Noise TAA}$

5. The WDCP program will seek towards the spindle (ID) from the current location (OD) at 2 track increments, measuring the TAA at each increment. This step will end when:

    a) The Inner Limit Sensor is activated causing an error message and aborting the Sensor Alignment procedure.

    b) A signal of the TAA level exceeding the Reference Threshold is found. In this case proceed to Step 6.

6. The WDCP program will then seek to the center track of the reference signal. There the heads will be unloaded and the spindle motor will be stopped. The radial location of this position is assumed to be the position defined by the user in the Item "Reference Radius" in the Alignment Parameters dialog box.

7. The remainder of the Sensor Alignment procedure will continue normally.

6.3 Main Menu Bar

Main Menu Bar contains the following items: 

The Test Menu item looks as follows:

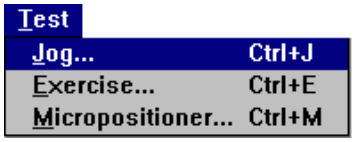


Figure 26. Test Menu

Jog... Allows the user to send manually Step Pulses from the keyboard to the spinstand. For more information see section the **"**Jog Menu**"** on page 59.

Exercise... Invokes the Exercise Menu window that allows the user to exercise manually the Spinstand (see the section **"**Exercise Menu**"** on page 60).

Micropositioner... Invokes the Micropositioner Exercise Menu window. For more information see the section **“**Micropositioner Menu**“** on page 61.

The Info Menu item looks as follows:

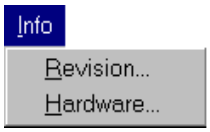


Figure 27. Info Menu

Revision... Displays the revision information in the following format:

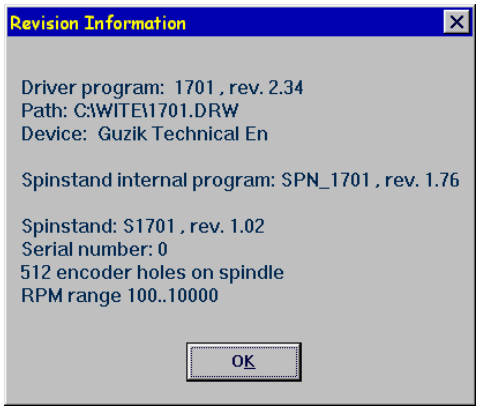


Figure 28. Revision Information Window

Hardware... Displays the hardware parameters of the spinstand. All of these parameters are saved in the EEPROM in the spinstand. It is recommended that users make a printout of this window and save it for future reference.

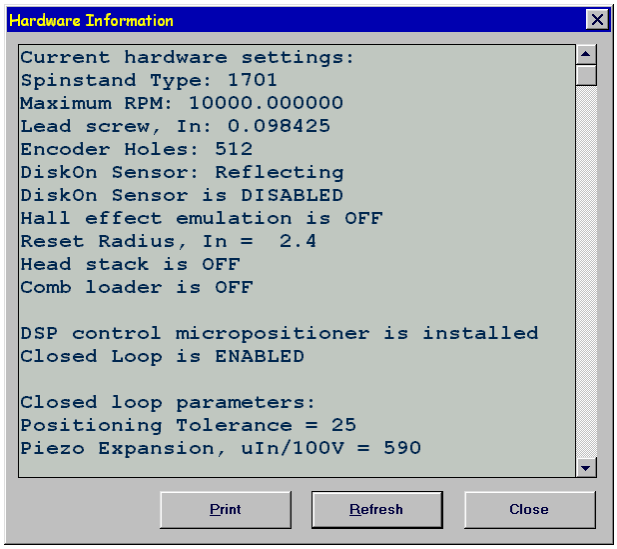


Figure 29. Spinstand Hardware Information Window

6.3.1 Jog Menu

Jogging is a means for the user to manually issue Step Pulses from the keyboard to the spinstand. The Jog Menu window looks as follows:

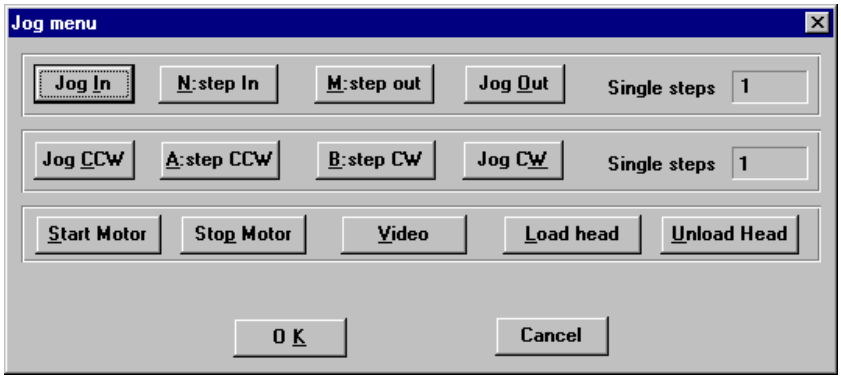


Figure 30. Jog Menu Window

Jog In	If this button is pressed, the Positioner, after a specified number of single steps, will accelerate in the ID direction. To stop this motion, release the button.
Jog Out	If this button is pressed, the Positioner, after a specified number of single steps, will accelerate in the OD direction. To stop this motion, release the button.
Jog CCW	If this button is pressed, the Rotary Positioner, after a specified number of single steps, will accelerate in the CCW direction. To stop this motion, release the button.
Jog CW	If this button is pressed, the Rotary Positioner, after a specified number of single steps, will accelerate in the CW direction. To stop this motion, release the button.
Single Steps	Specifies the number of single steps before acceleration.
N:step In	If this button is pressed, the Positioner will step in until the button is released.
M:step out	If this button is pressed, the Positioner will step out until the button is released.
A:step CCW	If this button is pressed, the Rotary Positioner will step counterclockwise until the button is released.
B:step CW	If this button is pressed, the Rotary Positioner will step clockwise until the button is released.
Start Motor	Starts the spindle motor. Disk will be clamped automatically. Makes no action if the motor is already running.
Stop Motor	Stops the spindle motor. Disk will be unclamped automatically. Makes no action if the motor is already stopped.
Load head	Loads the head(s).
Unload Head	Unloads the head(s).
Video	This button allows the user to perform jogging operations with the Optical Alignment Video Package, if the latter is installed.

6.3.2 *Exercise Menu*

The Exercise Menu is designed to allow the user to perform many functions of the spinstand manually. The Exercise Menu Dialog Box looks as follows:

Figure 31. Exercise Menu Window

1. Spindle Frame contains buttons for spindle control:

Start Motor	Starts the Spindle motor. Disk will be clamped automatically.
Stop Motor	Stops the Spindle motor. Disk will be unclamped automatically.
Clamp	Clamps the disk.
Unclamp	Unclamps the disk.
Disk On IN Disk On OUT	These buttons are not used for the 1701 spinstand.

2. Loader Frame contains buttons for head loading and unloading:

Load head 1	Loads heads on the first loader.
Unload Head 1	Unloads heads on the first loader.
Load Head 2	Loads heads on the second loader.[1]
Unload Head 2	Unloads heads on the second loader. [1]

3. Seek Frame contains Positioner controls:

[1] The scissors-loading mechanism for headstack.

Step In	After START, seeks one track IN (towards ID and the Spindle Center).
Step Out	After START, seeks one track OUT (towards OD and away from the Spindle Center).
Step Indx In	After START, seeks one track IN on INDEX (towards ID and the Spindle Center).
Step Indx Out	After START, seeks one track OUT on INDEX (towards OD and away from the Spindle Center).
Stp Offs Idx In	After START, seeks offset (specified by the item *Offs Stp Size*) IN on INDEX (towards ID and the Spindle Center).
Stp Offs Idx Out	After START, seeks offset (specified by the item *Offs Stp Size*) OUT on INDEX (towards OD and away from the Spindle Center).
Offs Stp Size 0 0	Sets the Offset Step size in micro steps or microInches specified in the following text boxes, and used as a reference unit in the Seek Offset operation.
Seek to track # 1000	After START, performs the Track Seek operation to the track, specified in the following text box.
Seek Offset 0 0	After START, moves head off track to the number of Offset Steps or microInches specified in the following text boxes.
Stand alone test	If pressed, starts the test sequence of "seek to track", "load/unload", and "clamp/unclamp" operations in the infinite loop in order to check spinstand performance.

6.3.3 Micropositioner Menu

The Micropositioner Exercise menu is intended for experienced users only and is used mostly in the quality control procedure during the production of Spinstands. The Micropositioner Exercise window looks as follows:

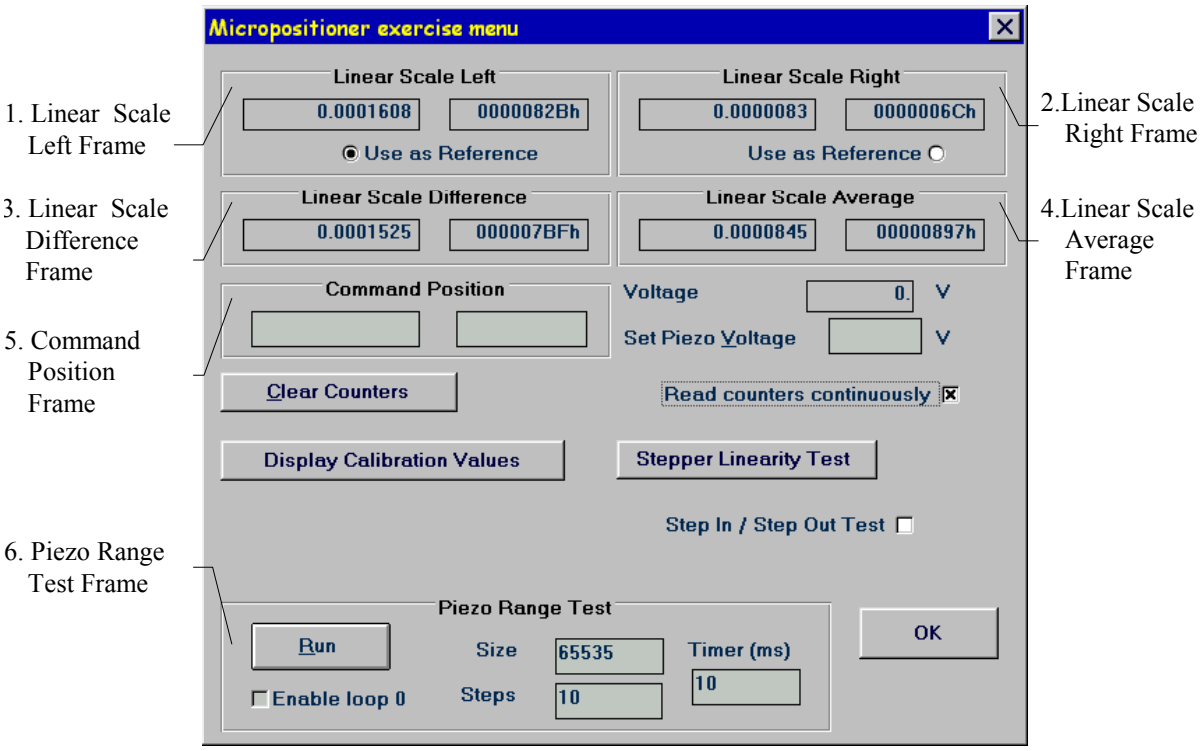


Figure 32. Micropositioner Exercise Menu Window

1. Linear Scale Left Frame allows the user to get the distance of the head from the Reset Radius, in inches read from the Left scale.
2. Linear Scale Right Frame allows the user to get the distance of the head from the Reset Radius, in inches read from the Right scale.
3. Linear Scale Difference Frame allows the user to get the difference of distances read from the Left and Right scales.
4. Linear Scale Average Frame allows the user to get the distance of the head from the Reset Radius, in inches calculated as the average of the readings from the left and right scales.
5. Command Position Frame.[1]
6. Piezo Range Test Frame allows the user to check the total range of the piezo.

Run	Starts the Piezo Range test. During the test the piezo expansion with respect to the applied voltage is measured both in a forward and in a backward direction. The results are presented in the Distance Plot window:
Size	The range of piezo voltage used in the test in DAC steps. Maximum of 100V corresponds to 65535 (FFFFh).
Steps	Specifies the number of steps to be performed in forward and backward directions during the test.
Timer	Allows specifying the minimum time delay between steps during the test, in ms.
Enable Loop 0	If this box is checked, the feedback will be enabled during the test.

[1] The controls in this frame should not be altered by the user.

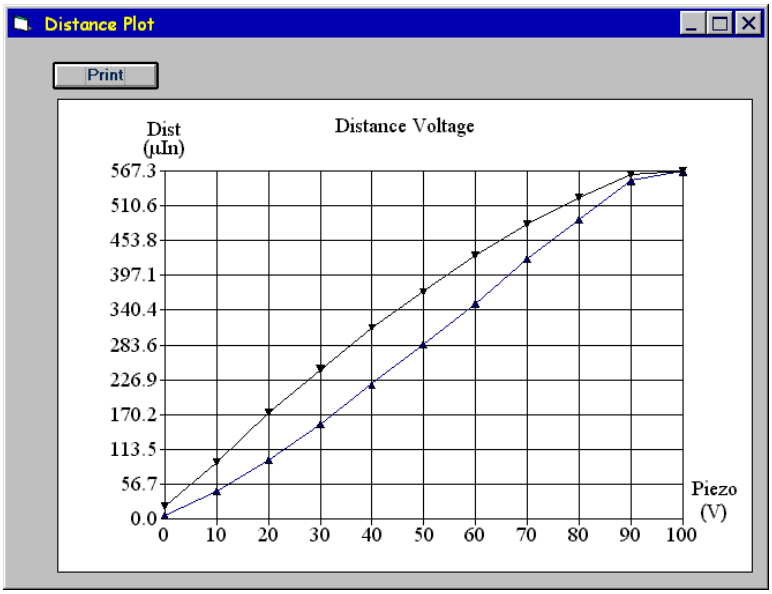


Figure 33. Distance Plot Window

Voltage	Displays the actual voltage level applied to the piezo crystal.
Read Counters Continuously	Continuously updates the linear scale position and the voltage information.
Set Piezo Voltage[1]	
Step In / Step Out Test[1]	
Clear Contents[2]	
Display Calibration Values[2]	
Stepper Linearity Test[2]	

6.3.4 Spinstand Parameters

Since the spinstand is composed of different interchangeable components, to operate properly it must be aware of exactly what components (and what revisions) are attached. These components include the Spinstand type, Spindle type, Piezo type, etc. Once set, these parameters are read from the EEPROM of the Microprocessor Board in the spinstand.

The Spinstand Parameters Dialog Box allows the user to store the exact hardware component configuration into the spinstand memory. Unless the hardware components are changed, or the Spinstand Microprocessor board is replaced, or the configuration is incorrect, the items on this menu NEVER need to be modified. This menu will be updated as the number of configurable components is increased.

[1] This control should not be altered by the user.
[2] This button is not intended for customer use.

In the event that one or more of these items are modified, the user MUST save the new configuration to the spinstand EEPROM. Failure to do this will cause these parameters to return to the initial values after Power OFF and ON.

To view and configure the Spinstand Parameters select the *Parameters/Spinstand Parameters...* menu item. The following dialog box will appear:

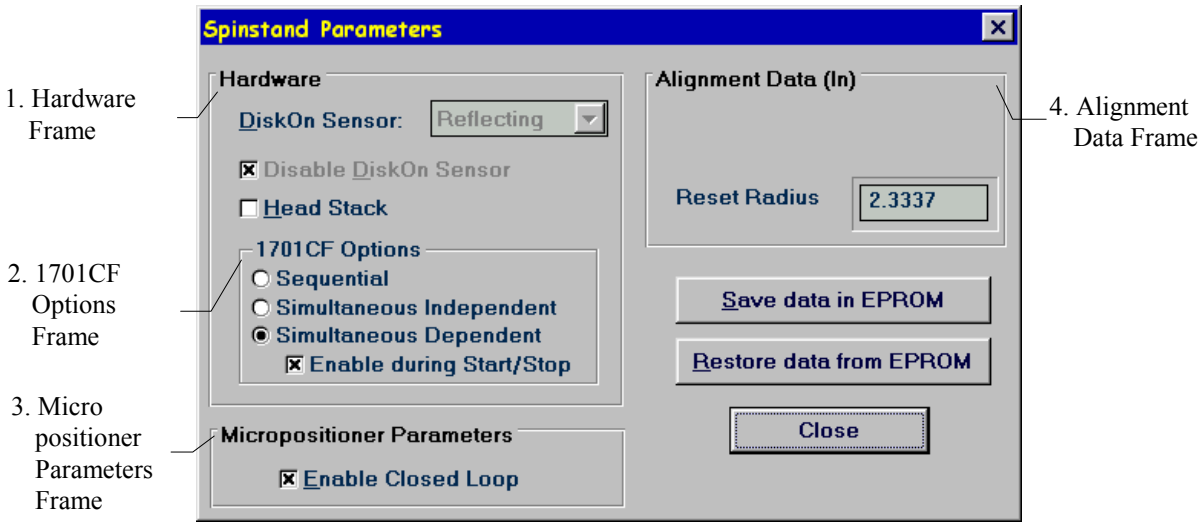


Figure 34. Spinstand Parameters Window

1. Hardware Frame allows the user to specify the hardware parameters:

DiskOn Sensor
Disable DiskOn Sensor

These two items are shown in gray for S1701, because there is no diskon sensor on the 1701 spinstand.

Head Stack

This box should be checked only when the Head Stack additional mechanics and electronics are integrated into the Spinstand.

2. 1701CF Options Frame.

These radio buttons allow the user to choose the mode of performing the linear and rotary movements when positioning. In the *Sequential* mode, movements will be done one after the other, as in the case of 68000- based 1701 Spinstands. In the *Simultaneous Independent* mode, both movements will start at the same time and continue asynchronously. In the *Simultaneous Dependent* mode, both movements will start simultaneously and during seek track operations will be synchronized to finish at the same time. In this mode the heads will have correct skew angle at each radius during the positioning operation[1].

This check box is accessible only when the *Simultaneous Dependent* radio button is set. If it is checked, the heads will be loaded/unloaded at the load/unload radii with the corresponding skew angles. Otherwise the zero skew angle will be used for these radii[1].

[1] These controls are accessible for 1701-CF and 1701MP-CF spinstands only.

3. Micropositioner Parameters Frame.

Enable Closed Loop — If this box is checked, the feedback will be enabled during linear positioning operations.

Reset Radius — This item is calculated during the Alignment Procedure as the radius from the spindle center to the Head Gap when the Reset Sensor is activated.

Saves modified data in the spinstand EEPROM

If spinstand parameters were modified but not saved, this button restores the previous settings.

6.4 Factory Setting Mode

For experienced users there is the possibility to access additional information stored in EEPROMs on Spinstand boards. This information concerns parameters that normally are not supposed to be changed by the user and that are set during the production process. The appropriate access level is provided via a password that can be given to the user by Guzik Technical Enterprises if necessary. Using the password the user gains access to the so-called Factory Settings Mode. In this mode an expanded form of the Spinstand Parameters Menu, an additional Head Stack Parameters Menu, and a Piezo DSP Parameters Menu are available.

6.4.1 Expanded Spinstand Parameters Menu

If Factory Setting Mode is on, the following box appears after the *Parameters/Spinstand Parameters* item is selected:

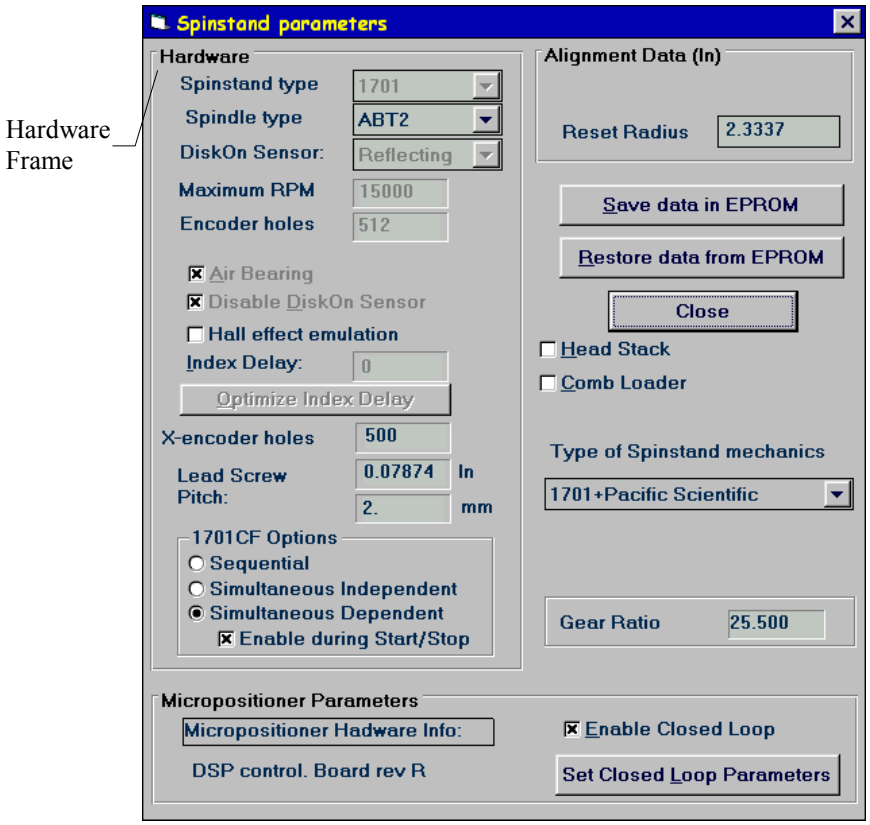


Figure 35. Expanded Spinstand Parameters Menu

Hardware Frame, in comparison with the standard form, has additional parameters:

Spinstand Type In this text box the Spinstand type should be selected from the pop-up list.

Spindle Type In this text box the type of spindle should be specified.

Maximum RPM The maximum value of RPM is shown in this text box.

Encoder Holes The number of holes for the Spindle motor encoder is specified in this text box.

Air Bearing	This check box allows one to specify the absence/presence of air bearing for the spindle.[1]
Hall Effect Emulation	If this box is checked the Hall-effect emulation for the spindle motor will be enabled.
Optimize Index Delay	If pressed, starts the test sequence in order to estimate the optimum Index Delay for Hall-effect emulation. The result of the test is shown in the *Index Delay* text box.
Index Delay	The optimum value for Index Delay as the result of the Hall-effect emulation test is shown in this text box, after test completion.
X-encoder holes	The number of holes for the linear stepper motor encoder is shown in this text box.
Lead Screw Pitch	The lead screw pitch in inches and mm is specified in two text boxes, respectively.

Other additional parameters and controls involved in this window are:

Comb Loader	Check this box if the head-separating comb is mounted.
Type of Spinstand Mechanics	This parameter should be selected from the pop-up list and should correspond to the type of mechanical arrangement of the Spinstand and the type of stepper motor actually used.
Gear Ratio	Gear ratio for rotary gear assembly is specified in this text box.
Set Closed Loop Parameters	This button is not intended for customer use.

6.4.2 Head Stack Parameters Menu

In case of a Head Stack arrangement the following window is accessible in the Factory Setting Mode:

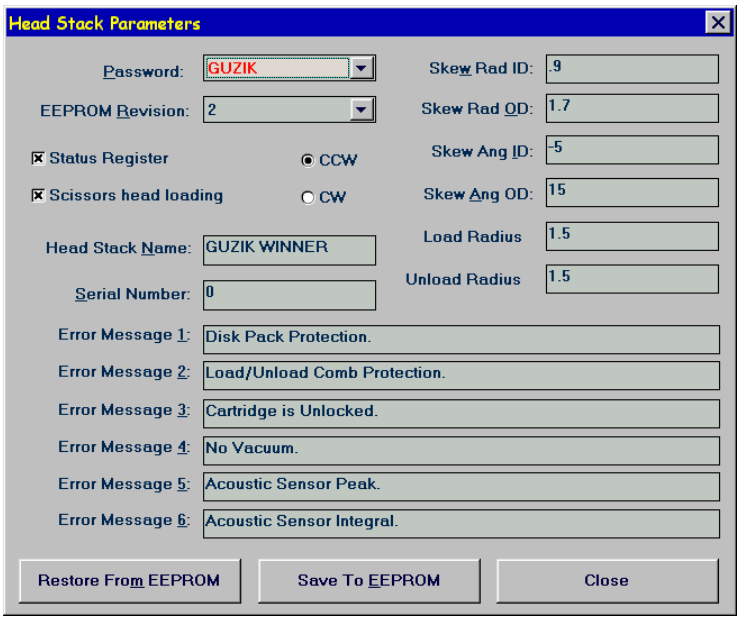


Figure 36. Head Stack Parameters Window

[1] This check box is visible for 1701-CF and 1701MP-CF spinstands only. Normally it is gray and not accessible to the user except in the case of a *Special* spindle type.

Password, EEPROM Revision [1]

Status Register	This box should be checked if a Guzik Technical Enterprises interface board for the Head Stack arrangement is used, and should be unchecked otherwise.
Scissors head loading	This box should be checked if a scissors head loading mechanism is present.
CCW, CW	These buttons define the direction of spindle rotation. According to this setting, the direction of rotation for the rotary stage during reset operation will be determined.
Head Stack Name	The contents of this text box should be changed only in the case of custom head stack usage.
Serial Number	This text box is intended to show or specify the serial number of the head stack.

The following text boxes allow the user to read or to specify skew angles and inner, outer, load and unload radii. The priority of data set in this window is higher than in the Product *Parameters* window. If headstack is selected in the Spinstand Parameters Menu, then these parameters cannot be changed in the Product *Parameters* window and will be gray.

Skew Rad ID	The radius corresponding to the minimum skew angle (in inches).
Skew Rad OD	The radius corresponding to the maximum skew angle (in inches).
Skew Ang ID	Minimum skew angle (deg).
Skew Ang OD	Maximum skew angle (deg).
Load Radius	Radius to load heads (in inches).
Unload Radius	Radius to unload heads (in inches).

The last 6 text boxes contain the text of Error messages for different cases of improper Head Stack performance. In the case of a custom Head Stack arrangement they could be changed as necessary.

[1] These items are not intended for customer use.

6.5 Executing WDCP In Standalone Mode

It is possible to execute the WDCP program in the standalone mode. To do so double click the WDCP Application icon in WITE group in Windows. The WDCP Application icon looks as follows. This feature is provided for advanced users. To invoke the WDCP program the user should specify the driver name and the full path to the product directory with –DRV and –PDIR switches. For example the command line may look as following:

C:\WITE\WDCP.EXE -DRV1701 -PDIRC:\WITE\PROD0002

The user can provide this data in the *File* | *Run* | *Command Line* menu item or in the *File* | *Properties* | *Command Line* menu item. If the user omits the product path argument, WDCP places the Product Parameters file in the current directory.

There are several restrictions while running WDCP in the standalone mode:

- User can not control the RWA box
- Auto Alignment command is disabled
- Alignment on Signal with MR head is disabled

APPENDIX

A.1 Internal Connection Diagram for 1701MP-CF Spinstand

The following figure shows the internal connection diagram of the 1701MP-CF Spinstand.

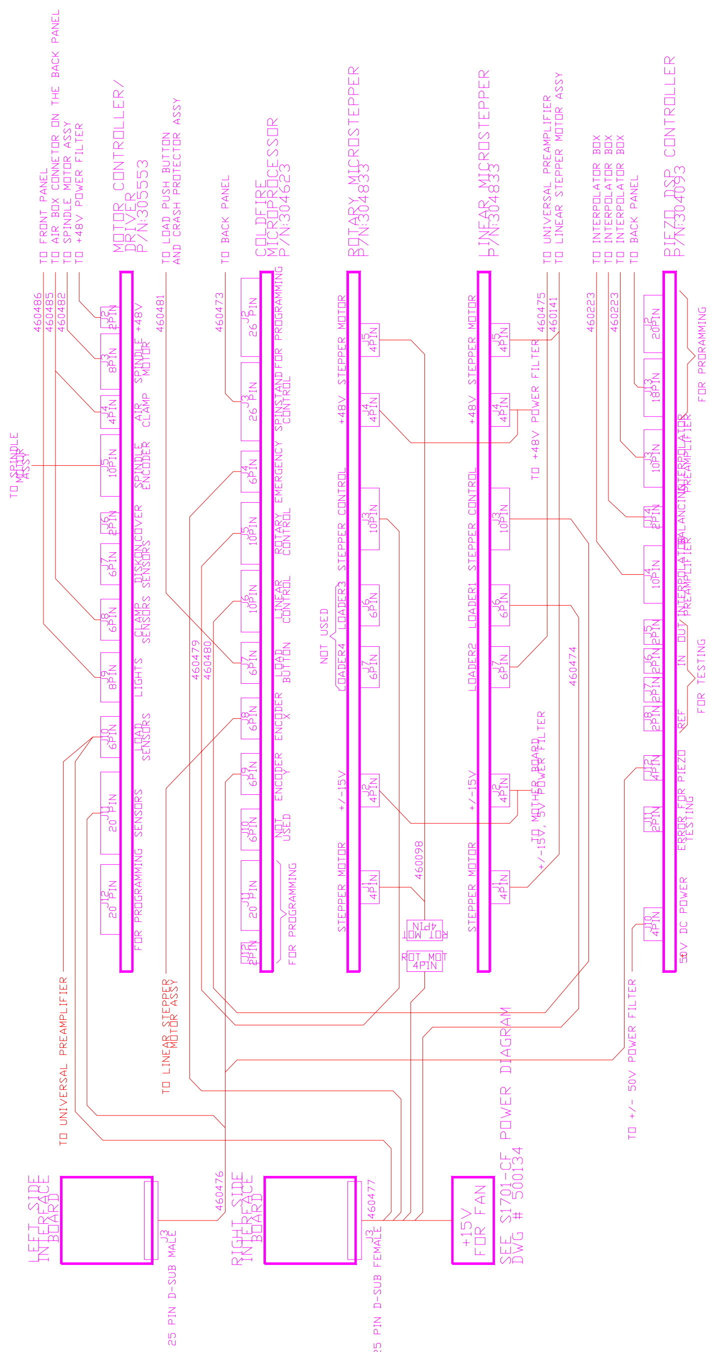


Figure 37. 1701-CF Internal Connection Diagram

B.1 Internal Connection Diagram for 1701 Spinstand

The information given in Appendix B refers to older versions of Guzik spinstands controlled using the 68000 Microprocessor.

The following figure shows the internal connection diagram of the 1701 Spinstand.

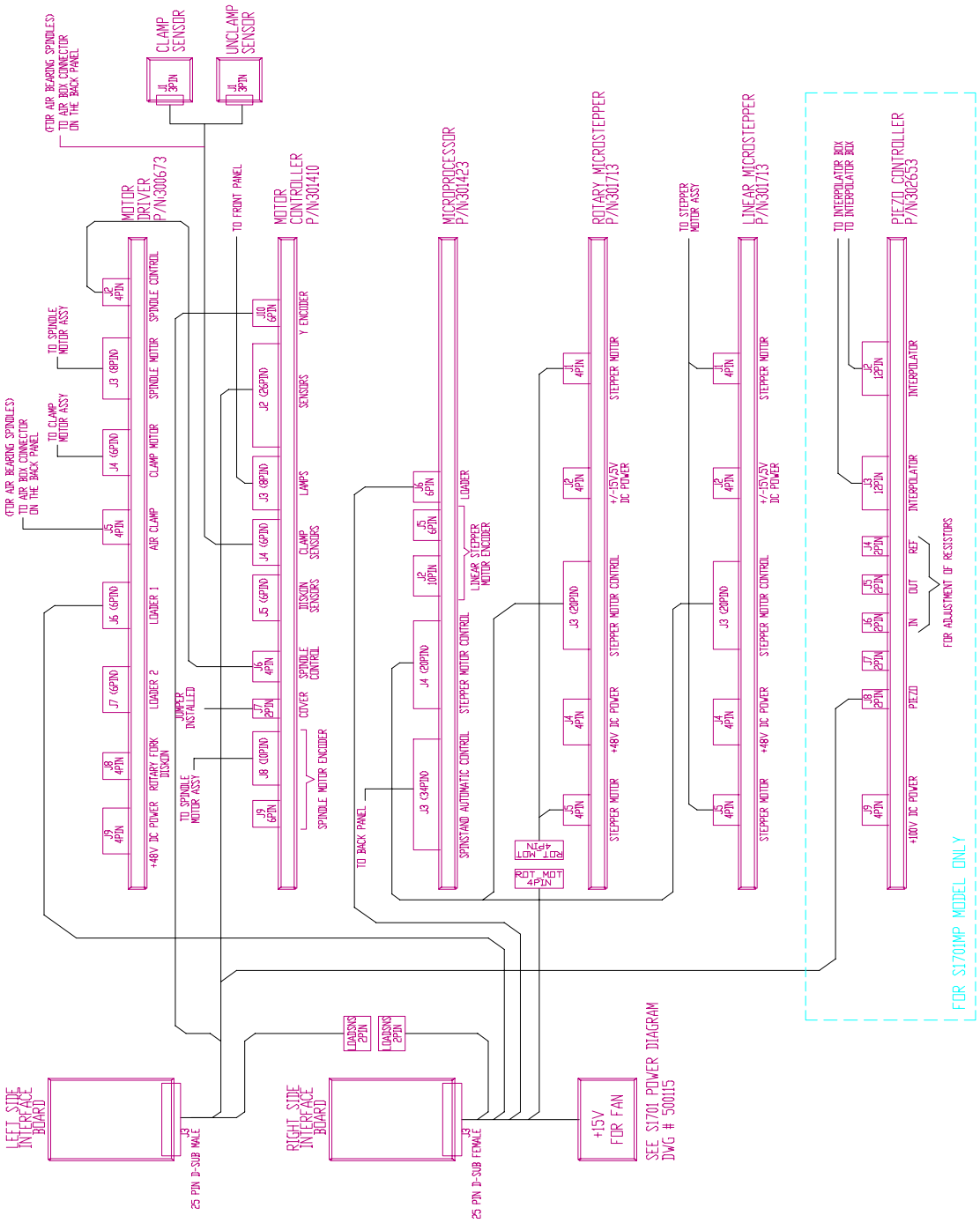


Figure 38. 1701 Internal Connection Diagram

B.2 Hardware Configuration

There are 5 main PC Boards inside the Spinstand frame. These are:

1. 68000 Microprocessor Board
2. Motor Controller Board
3. Motor Driver Board
4. Micro Stepper Board
5. Piezo Controller Board

The jumpers on these boards must be configured correctly depending on the revision of the boards and the following items of hardware setup.

- Air Bearing or Ball Bearing Spindles.
- Simulated or Real Hall-effect Signals.
- Reflecting Diskon Sensor or Rotary Fork Diskon Sensor.
- Spinstand type (S215, S225, S311, S511, S216, S226, S312, S512, S1701, S1701MP).
- Spindle type.
- Type of positioner encoder.
- Type of micro stepper board.
- Battery Backup capability.
- Spinstand cover.
- Number of positioner axes.
- Closed loop positioning.

Boards can be interchanged between Spinstands only if these items and the compatibility between the different revisions of the boards are taken into account, and in the case where the boards are compatible the jumper setup is done correctly as described below.

AIR BEARING OR BALL BEARING SPINSTANDS

Involved Boards: Motor Controller, Motor Driver

Motor Controller Board:

For air bearing Spindles use motor controller board fab revision E or higher. Previous revisions of this board are designed for ball bearing Spindles only. Use the following chart to configure the later revisions of this board.

Jumper positions for fab revision E:

Jumper	Air Bearing	Ball Bearing
W6	3	1
W8	1	3

Jumper positions for fab revisions F, G, H, and J:

Jumper	Air Bearing	Ball Bearing
W5	1	3
W6	1	3

Motor Driver Board:

Fab revisions H or higher support air bearing Spindles. But on some boards the ICs necessary for an air bearing Spindle system are not installed. For fab revision H, the board can be used with air bearing Spindles if U11, U12, Q13, R37, R39, C66, and C67 are installed. For air bearing Spindles with air brakes additional elements U10, Q14, R38, R40, C68, and C69 must be installed.

SIMULATED OR REAL HALL-EFFECT SIGNALS

Involved Boards: 68000 Microprocessor, Motor Controller, Motor Driver

Hall-effect signals carry information about the polarity of the magnetic field of the Spindle rotor as it rotates with respect to the stator. The currents of the stator windings are controlled using this information to drive the Spindle motor. In the case of real Hall effect signals, information from the Hall-effect sensors, installed at fixed locations on the stator, are used. In the case of simulated Hall-effect signals, the magnetic field information is simulated using the encoder on the Spindle motor shaft.

If a Spinstand is configured for simulated Hall-effect signals, then during power-on, after the green start button is pressed, the Spindle will rotate to find the index of the encoder in order to initialize the magnetic field information into the hardware ports (index delay variable which is stored in the EEPROM in the 68000 Microprocessor board).

NOTE: Air Bearing Spindles use ONLY Real Hall-effect mode.

68000 Microprocessor Board:

For simulated Hall-effect signals use fab revision C or higher of this board. If the hardware is configured for simulated Hall-effect signals, when changing the Spindle or the Microprocessor Board, make sure to save the correct value of the index delay for that particular Spindle in the EEPROM. All revisions are compatible with real Hall-effect signals.

Motor Controller Board:

Simulated Hall-effect signals can be used with fab revision F or higher. All revisions are compatible with real Hall-effect signals.

To configure the motor controller board fab revisions F and higher for simulated Hall-effect s signals, jumpers W1, W2, and W3 must be closed (jumpers installed). For real Hall-effect signals W1, W2, and W3 must be left open (jumpers not installed).

Motor Driver Board:

For simulated Hall-effect signals use fab revisions G or higher. All revisions are also compatible with real Hall-effect signals.

For simulated Hall-effect signals: In fab G pin numbers 2, 4, and 6 of the IC U6 must be cut. In fab H pin numbers 2, 4, and 6 of the IC U4 must be cut. For real Hall-effect signals these pins should not be cut.

REFLECTING DISKON SENSOR OR ROTARY FORK DISKON SENSOR (Not used on 1701 Spinstands)

Involved Boards: Motor Controller, Motor Driver

Motor Controller Board:

Fab revisions E or higher support reflecting diskon sensors. All revisions support rotary fork diskon sensors.

Motor Driver Board:

All revisions support reflecting diskon sensor. Fab revisions previous to H support rotary fork diskon sensors. Fab revision H can be used with rotary fork diskon sensors if IC's such as U20, U21, U22, U23, Q15, Q16, etc. are installed on the board. (These IC's are installed only for old systems with rotary fork diskon sensors.)

SPINDLE TYPE

Involved Boards: Motor Controller

Motor Controller Board:

The Spindle type can be determined from the Spinstand Parameters Menu of the Spinstand Exercise, Alignment Program. Depending on the type, use the following chart to configure the motor controller board.

Revision	Jumper	Guzik A	Guzik B	Guzik C	Seagull	Dover	ABT
Fab E	W9	3	1	1	1	3	3
Fab F,G,H	W8	3	1	1	1	3	3

Jumper Locations for different Spindle Types

SPINSTAND TYPE
(S215, S225, S311, S511, S216, S226, S312, S512, S1701, S1701MP)

Involved Boards: 68000 Microprocessor, Motor Controller, Motor Driver, Piezo Controller

68000 Microprocessor Board:

Spinstand types S215, S225, S311, and S511 use device driver 311. Spinstand types S216, S226, S312, and S512 use device driver 312. Spinstand types S1701 and S1701MP use device driver 1701. Spinstands using device driver 312 must use 68000 Microprocessor Board fab revision C and assembly revision H or higher. In these revisions three 128K RAM's are installed (U15, U21, U32) on the board. In assembly revisions previous to H (for fab revision C) U32 is not installed. Spinstands using device driver 1701 must use 68000 Microprocessor Board fab revision E or higher. In fab revision E, the 6-pin dupont connector J6 (loader) is used only for 1701 Spinstands. For all other Spinstands this connector is not used.

The two jumpers W2 and W3 in fab revision D, E, and F should be installed only for 1701 Spinstands. They should be left open for all other Spinstand types.

Motor Controller Board:

Fab revisions C or smaller can not be used with S215, S225, S216, and S226. For higher revisions there is a jumper which selects the type of Spinstand.

Revision	Jumper	215	225	311	511	216	226	312	512	1701	1701MP
Fab D/E	W7	215	215	311	311	215	215	311	311	311	----
Fab F,G,H,J	W4	215	215	311	311	215	215	311	311	311	311

Jumper Locations for different Spinstand Types

1701 Spinstands are supported by fab revisions F and higher. In these revisions the 6-pin dupont connector J10 (Y Encoder) is used only for 1701 Spinstands. For all other Spinstands this connector is not used.

Motor Driver Board:

Some versions of S215, S216, S225, and S226 Spinstands use a 24V-power supply instead of a 48V-power supply. Motor Driver board fab revision G must be configured correctly depending on the power supply voltage. Other fab revisions of this board do not support 24V-power supply Spinstands. For fab revision G, if 1N4116 is installed at locations CR43, CR44, and CR47, then the board is configured for 48V power supplies. If 1N963 is installed at locations CR43, CR44, and CR47, then the board is configured for 24V power supplies.

For 511 Spinstands the motor driver board is modified to increase the Spindle motor current and therefore they should not be interchanged with motor driver boards in other types of Spinstands.

Piezo Controller Board:

The Piezo controller board is installed only in the case of 1701 Spinstands with closed loop positioning capability (S1701MP).

TYPE OF POSITIONER ENCODER

Involved Boards: 68000 Microprocessor Board

There is an encoder on the linear stepper motor shaft for Spinstands using 312 and 1701 device drivers. For 312 Spinstands two different encoders have been used in the past. One type is HEDS 6210 and these are mounted in such a way that they are visible when looking at the joining point of the lead screw with the stepper motor. The color of the encoder is black and a light blue 10-pin flat ribbon cable comes out of the encoder.

The other type is HEDS 9040. These encoders are covered by the stepper motor housing and are not visible. Newer 312 Spinstands and all 1701 Spinstands use the HEDS 9040 type encoder.

68000 Microprocessor Board:

68000 Microprocessor board fab revisions older than fab C do not support any encoder connection. In fab revision C, if pins 5 and 6 of U3 are cut and on the solder side there is a jumper wire between pins 6 and 8 of U3, then the board can be used with the HEDS 9040 type of encoder only. Other revisions of fab C can only be used with the HEDS 6210 type of encoder. Fab revision D, E, and F can be configured for either type of encoder. In the case of HEDS 6210, at W1 jumper must be installed at position 3; in the case of HEDS 9040 a jumper must be installed at position 1.

One more compatibility requirement is the type of encoder connector. Fab C supports only a 10-pin flat ribbon cable connector for the encoder connection. Fab D, E, and F support a 10-pin flat ribbon (J2) or a 6 pin Dupont (J5) connector for the encoder connection. For these fabs, an appropriate connector should be used depending on the type of encoder cable, the other one should be left open.

TYPE OF MICRO STEPPER BOARD

Involved Boards: Micro stepper board

In older Spinstands the micro stepper driver consisted of two separate boards. In later revisions these boards are combined into a single board. Two-board micro steppers can be interchanged with two-board micro steppers, while single-board micro steppers can be interchanged with single-board micro steppers only.

BATTERY BACKUP CAPABILITY

Involved Boards: 68000 Microprocessor

68000 Microprocessor Board:

Fab revisions C and higher have battery backup for program memory. Therefore, the Spinstand program does not have to be loaded after a power-up if the green start button is flashing fast (which means the program inside the Microprocessor board is correct). Boards with or without the battery backup capability can be interchanged if all of the other compatibility requirements discussed above are met.

SPINSTAND COVER

Involved Boards: Motor Controller

Motor Controller Board:

Motor Controller board fab revisions D and newer support Spinstand cover option. In fab revisions D and higher a 2 pin Molex connector J7 is used for the cover connector. For Spinstands without cover, a jumper must be installed at connector J7.

NUMBER OF POSITIONER AXES

Involved Boards: Micro Stepper

1701 Spinstands have 2 positioning axes: linear and rotary. All other Spinstands have only the linear positioning axes.

Micro Stepper Board:

Micro Stepper Board fab revision E and higher can be configured for either the linear or the rotary positioner. Use the following table to configure boards with fab revision E.

	JUMPERS				SW1 POSITION							
	W1	**W2**	**W3**	**W4**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**
Linear Positioner	LR	HI	LIN	LIN	ON	ON	ON	OFF	ON	ON	OFF	OFF
Rotary Positioner	LR	HI	ROT	ROT	OFF	ON	OFF	ON	ON	ON	OFF	OFF

Fab revision E and higher are downward compatible with Spinstands having only one positioning axes. For these Spinstands the board should be configured for a linear positioner.

B.3 Marvel Video Board Installation

There are two different types of Marvel board: with or without the on-board Tseng VGA. The choice of a type depends on the configuration of the computer where it will be installed. If the computer does not have a VGA (on mother board or plug-in), or the video adapter does not support a 26 pin feature connector, then a Marvel board with on-board VGA should be used (MM/VGA32K). If the computer is equipped with a VGA with a feature connector, then a Marvel board without on-board VGA can be used (MM/LC).

To install the Marvel board, open your computer and plug the Marvel board into one of the available 16-bit card slots. Note that the short card slots are 8-bit slots and the long ones are 16-bit slots. In the case where an external VGA is used, it is better to use the card slot near the VGA board or near the feature connector on the motherboard. Connect the 26-pin connector on the Marvel board to the external VGA feature connector by using the flat ribbon cable that came with the Marvel board. For the Marvel board with on-board VGA, remove the currently used VGA video adapter from the computer or disable it following directions in the corresponding VGA or computer User Guide.

Connect the video monitor to the 15-pin VGA connector on the Marvel board. Connect the 25-pin large connector on the MM-Cable to the 25-pin connector on the Marvel board. In the case of an external VGA, connect the 15-pin connector that comes from the MM-Cable to the external VGA output.

This completes the installation of the Marvel board. For more detailed installation instructions refer to the MARVEL Installation/Interface Guide that came with the Marvel board.

B.3.1 Software Installation For Marvel Board

In order to run the Optical Alignment Software, a Matrox Marvel board driver must be installed in addition to GUZIK software. To do this, insert the Marvel Utilities diskette in your source drive, make this drive current, and type *INSTALL*. Follow the instructions on the screen to choose the directory where you want to put the Marvel Utilities.

- Answer *Y* to the question: “Do you want the Marvel Device Driver to be installed (Y/N)?” in order to update your CONFIG.SYS file.
- Answer *N* for NTSC to the question “Will you use NTSC or PAL inputs (N/P)?”
- Answer *1* to the question “How many Marvel boards will you be using (1/2/3)?”
- Answer *5* to the question “Which IRQ line do you want to use for board # 1 (5/0/1)?”
- Answer *N* to the question “Do you want to update your AUTOEXEC.BAT file (Y/N)?”

This completes the installation of Marvel board software.

B.3.2 Marvel Board Optical Alignment Program

The DOS based Optical Alignment Program for the Marvel board is entered from the Drivers Menu (Item F8 in the Program Menu) in the Guzik Shell Program by selecting the item "Optical Alignment". This item will be present only if the selected driver is 1701.

Once the Optical Alignment Program is entered the menu shown in the following figure will appear on the screen.

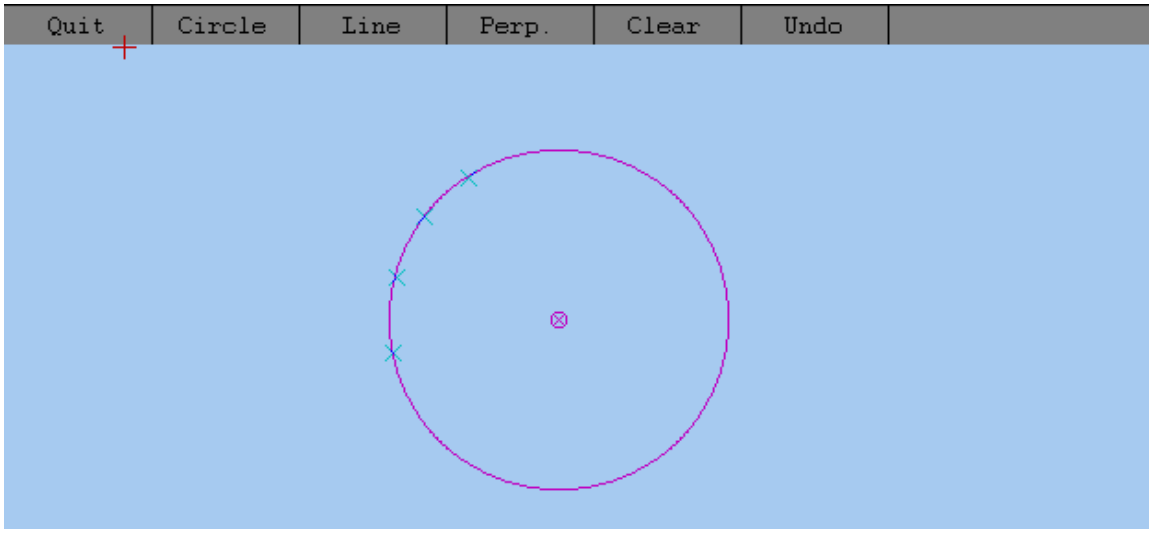
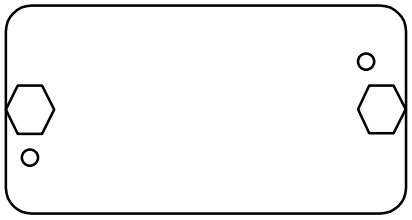


Figure 39. Marvel Board Optical Alignment Program Menu

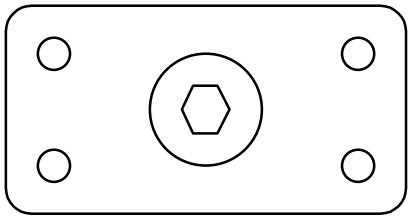
Quit	Quits the program and returns to GSHELL
Circle	Finds and draws the circle and the center of the circle that fits best the points that were marked. A minimum of 3 points is required to define a circle. But more points can be marked in which case the least-squares error method will be used to find the best circle.
Line	Draws the line that passes through the two points that were marked.
Perp	Draws the perpendicular from the point that was marked to the line that was drawn before.
Clear	Clears all points, circles, and lines previously drawn.
Undo	Removes the last point that was marked on the screen

B.4 Old Versions of Piezo Housing Mount

In old versions of 1701MP Spinstands the piezo housing was placed in such a way that its rear part could be seen. Thanks to this, it was easily distinguishable whether the Spinstand was equipped with a piezo actuator of 1200µIn, or 600µIn (see following figure):



REAR OF PIEZO HOUSING MOUNT - SHORT PIEZO



REAR OF PIEZO HOUSING MOUNT - LONG PIEZO
(Not to be shipped using the Shipping Crate)

Figure 40. Short Vs. Long Piezo Actuator Identification

B.5 1701 Spinstand Crate Unpacking Instructions

The following are instructions on how to remove the Guzik 1701 Spinstand from the Shipping Crate. **NOTE:** The Shipping Crate is reusable. All materials related to shipping the system should be kept for future use. Note that all parts used for shipping are generally golden in color.

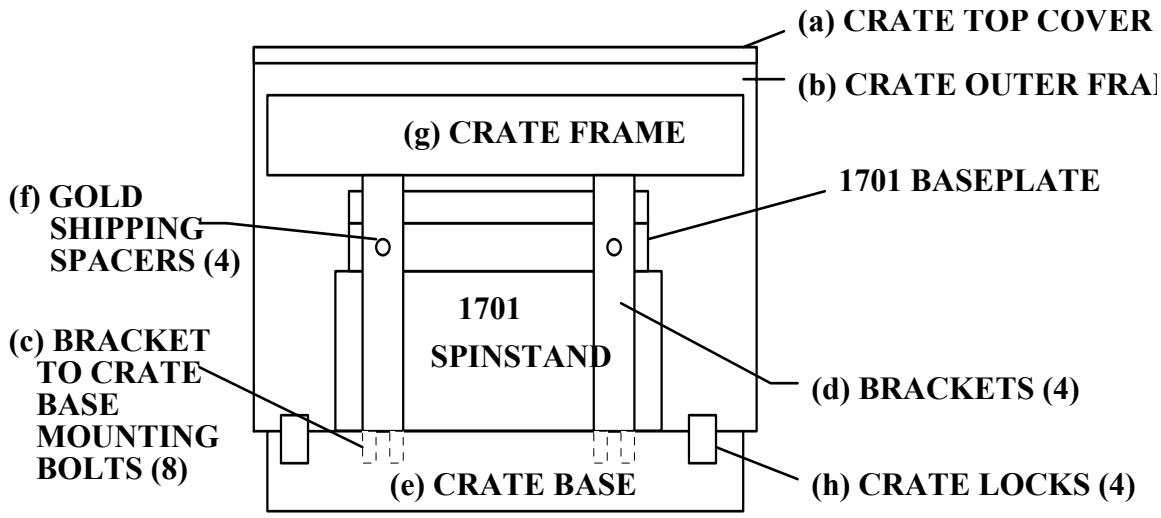
The following tools are required and ***will be shipped with each system inside the 1701 Shipping Crate***:

7/16" wrench, 3/4" wrench, 7/16" socket, 9/16" socket with extender, 3/32" allen wrench, 5/32" allen wrench, 3/16" allen wrench

B.5.1 Unpacking Instructions

- Remove any straps that may be around the crate.
- Unlock the 4 Locks (h) on the bottom of the crate.
- Unclamp the top clamps and remove the Crate Top Cover (a).
- Carefully lift off the Crate Outer Frame (b) and remove it.
- Using a 7/16" wrench or socket, remove the 8 bolts (c) mounting the Brackets (d) to the Crate Base (e).

- Using a 9/16" socket with extender remove the 4 bolts mounting the Brackets (d) to the Gold Shipping Spacers (f).
- Carefully lift the Crate Frame (g) together with Brackets (d) off of the Spinstand.
- Using a 3/4" wrench remove the 4 Gold Shipping Spacers (f) and install the 2 black front hole plugs.
- Using the 4 side handles on the Spinstand lift the Spinstand out of the Crate Base (e).
- Remove the plastic dust wrap.



B.5.2 Spinstand Preparation Instructions After Unpacking

The following procedure describes preparation of the Spinstand after shipping. This must be done carefully by a responsible operator as the equipment can be damaged if this is done incorrectly. See diagram below for reference.

- Remove the plastic Top Cover.
- Manually rotate the STEPPER MOTOR counterclockwise to move the 9" HOUSING towards the Front of the Spinstand. Stop when the LIMIT FLAG is 1/2" from the OUTER LIMIT SENSOR.
- Using a 3/32" allen wrench temporarily move the INNER LIMIT SENSOR towards the front of the Spinstand as far as possible and tighten it.
- Install the Head Loader on the HEAD LOADER MOUNTING BASE using 4 screws. Install the knives on the Head Loader and connect the 4-pin sensor cable to the Interface Board.
- Install the UNIVERSAL PREAMPLIFIER MOUNTING PLATE and reposition the mounting standoff. Feed the 14-pin flat-ribbon cable through the Mounting Plate and connect it to the Universal Preamplifier. Connect the white Flex cable between the Universal Preamplifier and the Interface Board.
- Install the REAR BUMPER PLATE, as necessary.
- Reinstall the plastic Top Cover.

Before operating the Spinstand Optical Alignment and Sensor Alignment must be performed by a trained operator!

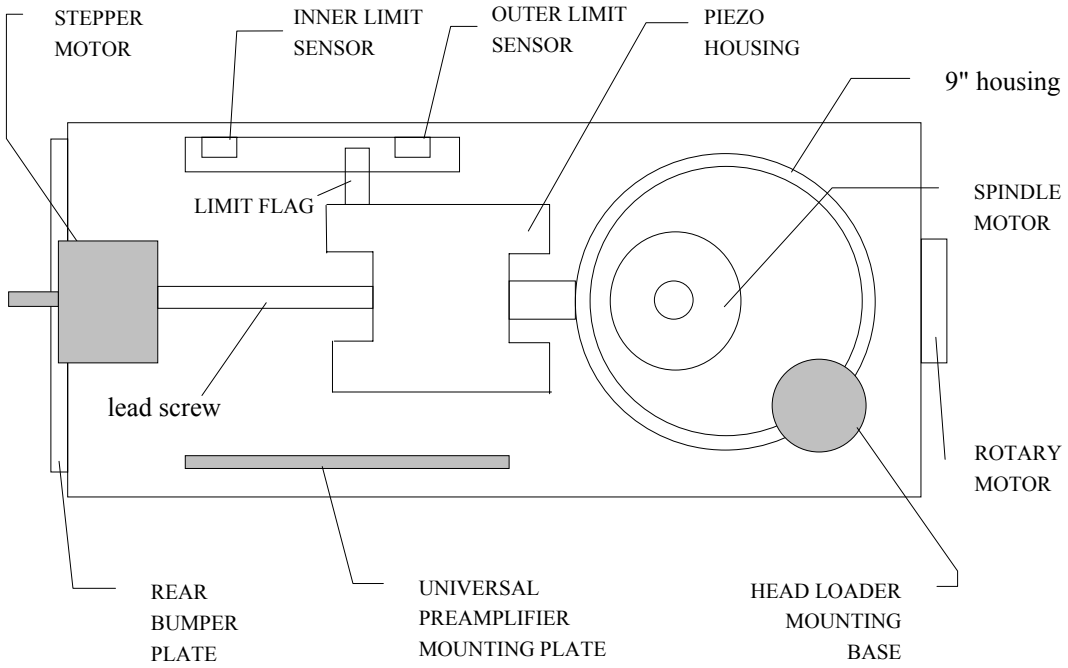


Figure 41. 1701 Spinstand Top View During Shipping

B.6 1701 Spinstand Error Messages

The error messages produced by the 1701 downloaded Spinstand program fall into many groups. The error message appearing on the screen shows the group name, error number, and error text. The following example shows an error from group "SNS" with error text "Loaded and Unloaded".

ERROR 4005: [SNS] LOADED AND UNLOADED

The following is a description of each group, with a description of common errors that may appear in each group.

B.6.1 [OPER] Group Error Messages

ERROR TEXT	**DESCRIPTION**	**SUGGESTED SOLUTION(S)**
Disk is not installed	DiskOn sensor detects no disk installed (reflecting DiskOn sensor only).	- Install disk - Check DiskOn sensor and cables.
Timeout in DISKON	DiskOn sensor times out before providing In, Out, or Disk ON/OFF information (rotary fork DiskOn sensor only).	- Check DiskOn sensor and cables.
Disk is not sitting flat	Disk is sitting at an angle on the Spindle Chuck (reflecting DiskOn sensor only).	- Check disk for wobble. - Check mounting surface of disk for dirt. - Check DiskOn sensor and cables.
Timeout in DISKON - CENTER	DiskOn sensor times out before providing In, Out, or Disk ON/OFF information (rotary fork DiskOn sensor only).	- Check DiskOn sensor and cables.
DC MOTOR UTS timeout	Spindle does not spin Up-To-Speed (UTS) before a timeout occurs.	- Check all cable connections to spindle. - Verify configuration of either "Real" or "Simulated" Hall-effect signals. - Verify if Index Delay value (in "Simulated" mode) is correct. - Check +48V Power Supply
DC MOTOR STOPPED timeout	Spindle does not stop before a timeout occurs.	- Hardware failure.

B.6.2 [SNS] Group Error Messages

ERROR TEXT	DESCRIPTION	SUGGESTED SOLUTION(S)
Loaded and Unloaded 1	Head Loading Mechanism is detected as being Loaded and Unloaded.	- Connect Head Loading Mechanism to Spinstand.
Clamped and Unclamped	Spindle sensors detect disk clamped and unclamped.	- Check all cables to spindle.
Cover is open!	Cover closed protection detects cover open.	- If cover is installed, close cover and check switch. - If no cover is installed, verify that jumper is installed in Motor Controller Cover connection (J7).
Stopped and UTS	Spindle detects both stopped and Up-To-Speed (UTS) conditions.	- Check all cables to spindle.
Reset and Inner sensor, Home and Inner sensor, Outer and Inner sensor, Diskon In and Out, Diskon Out & Diskon On	Mutually exclusive sensors detecting ON conditions at the same time.	- Check all cables to sensors.
Air Pressure Failure	Air Box detected loss of air pressure.	- Check air line input. - Check all connections between Air Box and Spinstand. - Exchange Air Boxes.
Inner/Outer limit switch X is ON	Inner/Outer Limit Linear Positioner switch is ON.	- If switch is ON, turn Spinstand OFF and manually move positioner off of the switch. - If switch is OFF, check condition of switch.
Inner/Outer limit switch Y is ON	Inner/Outer Limit Rotary Positioner switch is ON.	- If switch is ON, turn Spinstand OFF and manually move positioner off of the switch. - If switch is OFF, check condition of switch.
Ondisk sensor detected	A limit sensor is detected while the positioner is on the disk.	- Check linear/rotary sensors and cables. - Perform Sensor Alignment

B.6.3 Error Messages Without Group Name

ERROR TEXT	DESCRIPTION	SUGGESTED SOLUTION(S)
X/Y POSITIONING ERROR! [#steps attempted] - [#steps read from encoder]	A linear (X) or rotary (Y) positioning error has been detected by the encoder in the Stepper Motor. First value is the number of steps attempted to seek. Second value is number of steps actually moved, as read from encoder. Generally these 2 numbers should differ by increments of appr. 256.	- Check binding of Linear/Rotary Positioning systems. - Check all cable connections between Spinstand and positioning motor. - Check all cable connections between boards inside Spinstand.
Linear scale positioning error: [#steps read from encoder] - [#steps attempted], ADC = [0-255]	The linear encoders on the 1701MP Spinstand have detected a linear positioning error. First value is the number of steps read from the encoders. Second value is the number of steps attempted to seek. Third value is the position of the Piezo Actuator.	- Check all cable connections from the Piezo Controller Board to the Piezo Actuator and to the Linear Encoders/Readers.
Sensor not found	Sensor not detected when requested.	- Replace Motor Controller board.
Sensor detected	Sensor detected when not expected.	- Replace Motor Controller board.
Timeout on EOS	End-Of-Seek (EOS) did not appear before a timeout occurred.	- Check Linear and Rotary Positioning Systems for binding. - Replace Linear/Rotary Microstepper boards.
Loading radius is outside the limits	Loading radius is detected to appear outside of disk limits.	- Change loading radius in software.
Head Stack Crash Protection.	Disk crash protector for Head Stack is detected.	- Check skew angle parameters.
Head Loader is not locked!	Head Loading Mechanism is not in the locked position.	- Lock Head Loading Mechanism into position. - Check cable connections to Head Loading Mechanism.
Simulation hardware not present sim_hall set to 0	'Simulated' Hall-effect mode selected in software but not configured in hardware.	- Change software to “Real” Hall-effect mode. - Change hardware/software to “Simulated” Hall-effect mode.

Simulated Hall effect signals are not selected	"Real" Hall effect mode is configured in software but the "DELAY" value has not been calculated.	- Change hardware/software to "Simulated" Hall effect mode. - Verify that the correct "DELAY" value has been entered.
Piezocontroller board is not installed	Closed loop positioning is enabled but the Piezo Controller board is not detected.	- Install/reseat the Piezo Controller board.
Can't start motor or no index	Spindle does rotate at least one revolution until the index is reached or the index from spindle does not appear at all. "Simulated" Hall effect configuration only.	- Check all cable connections to spindle. - Verify configuration of either "Real" or "Simulated" Hall effect signals. - Check +48V Power Supply
DC MOTOR RPM out of range %f:	RPM value greater than maximum value for the Spindle has been specified.	- Reduce RPM.
Heads are not unloaded. Please unload them manually	Special head lifting type (i.e. comb) is used, such as Head Stack Applications, and it is not safe to unload the heads by software.	- Unload Heads manually.

B.6.4 Other Group Error Messages

Other error messages are not generally seen by the user. The groups are described below:

GROUP	**DESCRIPTION**	**SUGGESTED SOLUTION(S)**
INDX_WAIT	Timeout waiting for Spindle Index.	- Perform IPL of Spinstand - Check cable connections between boards. - Replace Microprocessor board.
PRGR	Internal spinstand program error.	- Perform IPL of Spinstand - Replace Microprocessor board.
RMP	Invalid calculation of seek ramp.	- Perform IPL of Spinstand - Replace Microprocessor board.
PARS / FINT / COMM	Invalid communication between computer and Spinstand.	- Check serial port on computer. - Swap serial ports on computer. - Change serial interface cable between computer and Spinstand. - Replace Microprocessor board.
INTRP	Software error.	- Perform IPL of Spinstand - Replace Microprocessor board.

NOPR	Normally caused by no disk installed.	- Install disk - Check DiskOn sensor and cables. - Replace Motor Controller and Motor Driver boards.
OTS	Single Track Seek error.	- Perform IPL of Spinstand - Replace Microprocessor board.
UNKNOWN	Unknown error from Spinstand.	- Perform IPL of Spinstand - Replace Microprocessor board.

Customer Support Information

If You need technical assistance, please contact:

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