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1 Introduction

1.1 Thank you

Thank you for your purchase of a Raytech Measuring Systems barstock measuring machine. You have purchased a versatile and high quality system that will provide you with years of quality measurements.

We have tried to supply essential information to assist the operator in getting up to speed as soon as possible. It is strongly advised that you keep this manual with the machine as a reference guide. It is possible for anyone to learn the basic functions of this machine in a matter of minutes. This assures you that everyone can be making measurements and assuring your customers of quality.

If you have any questions, comments, or requests, please feel free to call us at

1-800-852-6403

or visit our website at

<http://www.raytech-measuring.com>

2 Measuring

2.1 Startup

- (1) Flip the power switch on the back of the readout.
The readout will go through its self-test, and if everything tests correctly, you'll be shown the ND 780 splash screen with a message at the top that says:

"Power was off. Press any key to continue."
- (2) Press any key on the readout.
The "REF" indicator will blink next to the X axis.
- (3) Slide the probe until the "REF" indicator stops blinking and stays solid.

2.2 Zero Setting

- (1) Look above the X axis to see if the indicator reads "ZERO"
If it does not, press the left/right arrow key until the 4th softkey reads "SET/ZERO" and press the 4th softkey.
- (2) Slide the probe against the stop bar.
- (3) Press the X axis key to set the display to zero.

2.3 Datum Setting

- (1) Look above the X axis to see if the indicator reads "SET"
If it does not, press the left/right arrow key until the 4th softkey reads "SET/ZERO" and press the 4th softkey.
- (2) Slide the probe against the stop bar.
- (3) Press the X axis key to pre-set a value.
- (4) Using the numeric keypad, key in the desired offset.
- (5) Press the "ENTER" key.

2.4 Measuring Length and Width

- (1) Place your part against the stop bar so that it is square.
- (2) Move the probe against the part and hold it with the same pressure you used when pressing the zero key. (Treat the machine like you would any other measuring device and use consistent pressure for all of your measurements.)
- (3) The number in the DRO window is the measurement of your part.

2.5 Measuring Hole Diameters

- (1) Hold the part against the stop bar.
- (2) With the part against the stop bar, hold the probe against the edge of the hole closest to the stop bar.
(Note: you will have to slide the part back and forth along the stop bar with the probe held against the edge of the hole in order to find the lowest reading.)
- (3) Set a datum equal to the diameter of the probe. See section 2.3 for details
- (4) With the part held against the stop bar, and without moving the part, hold the probe against the opposite edge of the hole.
- (5) The DRO will show the diameter of the hole.

2.6 Measuring Hole to Edge Distances

2.6.1 Small Center to Edge

- (1) Set a datum equal to half the diameter of the probe. See section 2.3 for details
- (2) Place the probe in the hole to be measured.
- (3) With the probe in the hole, slide the part against the stop bar.
- (4) The DRO will show the distance from the center of the hole to the edge of the part.

Note: once the datum for half the probe diameter is set, you can check multiple holes and multiple edges without any additional changes.

2.6.2 Large Center to Edge

- (1) Set a datum equal to half the diameter of the probe. See section 2.3 for details
- (2) Press the left/right arrow key until the 1st softkey says "DATUM".
- (3) Press the 1st softkey labeled "DATUM".
- (4) Press the 1st softkey labeled "PROBE".
- (5) Press the 2nd softkey labeled "CENTER LINE".
- (6) With the part against the stop bar, place the probe on one edge of the hole.
- (7) Press the 3rd softkey labeled "NOTE".
- (8) Without moving the part, move the probe to the opposite edge of the hole.
- (9) Press the 3rd softkey labeled "NOTE".
At this point, the DRO will show you the distance from the edge of the part to the center of the large hole.
- (10) To measure another hole, repeat from step 5.
- (11) When you're finished, press the "CLEAR" key three times.

2.7 Measuring Hole to Hole Distances

2.7.1 Measuring Small Center to Small Center

- (1) Place the probe in the first hole to be measured.
- (2) With the probe in the first hole, push the part against the stop bar.
- (3) Zero the readout. See section 2.2 for details.
- (4) Place the probe in the second hole to be measured.
- (5) With the probe in the second hole, push the part against the stop bar.
The DRO will show you the distance between hole centers.

2.7.2 Measuring Large Center to Small Center

- (1) Press the left/right arrow key until the 1st softkey says "DATUM".
- (2) Press the 1st softkey labeled "DATUM".
- (3) Press the 1st softkey labeled "PROBE".
- (4) Press the 2nd softkey labeled "CENTER LINE".
- (5) With the part against the stop bar, place the probe on one edge of the hole.
- (6) Press the 3rd softkey labeled "NOTE".
- (7) Without moving the part, move the probe to the opposite edge of the hole.
- (8) Press the 3rd softkey labeled "NOTE".

- (9) Press the "0" key.
- (10) Press the "ENTER" key.
- (11) Place the probe in the small hole to be measured.
- (12) With the probe in the hole, press the part against the stop bar.
The DRO will show you the distance between the large hole and the small hole.

2.7.3 Measuring Small Center to Large Center

- (1) Place the probe in the first hole to be measured.
- (2) With the probe in the first hole, push the part against the stop bar.
- (3) Zero the readout. See section 2.2 for details.
- (4) Press the left/right arrow key until the 1st softkey says "DATUM".
- (5) Press the 1st softkey labeled "DATUM".
- (6) Press the 1st softkey labeled "PROBE".
- (7) Press the 2nd softkey labeled "CENTER LINE".
- (8) With the part against the stop bar, place the probe on one edge of the hole.
- (9) Press the 3rd softkey labeled "NOTE".
- (10) Without moving the part, move the probe to the opposite edge of the hole.
- (11) Press the 3rd softkey labeled "NOTE".
The DRO will show the distance between the small hole and the large hole.
- (12) To measure more large holes, repeat from step 7.
- (13) When finished, press the "CLEAR" key three times.

2.7.4 Measuring Large Center to Large Center

- (1) Press the left/right arrow key until the 1st softkey says "DATUM".
- (2) Press the 1st softkey labeled "DATUM".
- (3) Press the 1st softkey labeled "PROBE".
- (4) Press the 2nd softkey labeled "CENTER LINE".
- (5) With the part against the stop bar, place the probe on one edge of the hole.
- (6) Press the 3rd softkey labeled "NOTE".
- (7) Without moving the part, move the probe to the opposite edge of the hole.
- (8) Press the 3rd softkey labeled "NOTE".
- (9) Press the "0" key.
- (10) Press the "ENTER" key.
- (11) Repeat steps 1-8 above for the second hole.

- (12) The DRO will show the distance between the first large hole and the second large hole.
- (13) To measure more holes, repeat steps 4-8 above.
- (14) When finished, press the "CLEAR" key three times.

3 Setup

3.1 Changing units (in/mm)

- (1) Press the left/right arrow key until the 4th softkey says "INCH/MM".
- (2) Press the 4th softkey.
You will notice the unit indicator at the top of the screen change from "INCH" to "MM" as you toggle between the units.

3.2 Changing resolution

- (1) Press the left/right arrow key until the 1st softkey says "SETUP".
- (2) Press the 1st softkey.
- (3) Press the 1st softkey (labeled "INSTALL. SETUP").
- (4) If prompted for it, enter the password using the numeric keypad and press "ENTER".
- (5) Press the down arrow key to highlight "DISPLAY CFG".
- (6) Press the "ENTER" key to get into the display configuration screen.
- (7) With "DISPLAY 1" selected, press the "ENTER" key.
- (8) Using the down arrow key, highlight the "DISPLAY RESOLUTION" field.
- (9) Press the softkey labeled "COARSER" or "FINER" depending on which way you would like to adjust the display resolution.
- (10) When you have selected the desired resolution, press the "ENTER" key to lock in that change.
- (11) Press the "CLEAR" key to back out of the display configuration menu.
- (12) Press the "CLEAR" key to exit the setup menu and return to measuring.

3.3 Calibration

Raytech Measuring Systems typically recommends calibration of your measuring system once every year. This seems to be in accordance with most companies' quality programs. When the time comes to calibrate your table you have a few options:

- Bring in an outside service to perform a calibration. They will have certified standards and be able to provide certification for your records.
- Have an internal department of your company perform the calibration. This leaves

you with the overhead of maintaining standards, but if you have them, this is the least expensive method.

- Have Raytech Measuring Systems calibrate your table. We use a NIST traceable laser system to calibrate your machines in our plant before they leave, and we use the same laser in your plant to calibrate. The only drawback is, we're not a calibration service, and as a result, we aren't as equipped to travel on short notice, and our distance to your facility may require more travel.

The following instructions will be useful for either your internal calibration or for an outside service.

3.3.1 Clearing old compensation values

- (1) Press the left/right arrow key until the 1st softkey reads "SETUP".
- (2) Press the 1st softkey labeled "SETUP".
- (3) Press the 1st softkey labeled "INSTALL. SETUP".
- (4) If prompted for it, enter the password using the numeric keypad and press "ENTER".
- (5) Using the up/down arrow keys, highlight "ERROR COMPENSATION".
- (6) Press the "ENTER" key to enter the error compensation menu.
- (7) Make sure the "INPUT X1" box is set to "NON-LINEAR".
If it is not, press the 1st softkey labeled "TYPE" until "NON-LINEAR" is selected.
- (8) Press the 2nd softkey labeled "EDIT TABLE".
- (9) Press the 2nd softkey labeled "CLEAR TABLE".
- (10) Press the 1st softkey labeled "YES".
- (11) Once you have cleared the values, press the "CLEAR" key to exit the table edit screen.
- (12) Press the "CLEAR" key to exit the error compensation screen.
- (13) Press the "CLEAR" key to exit the setup screen and return to the measuring screen.

3.3.2 Acquiring new values

Using a traceable standard, acquire readings. Due to the software in the ND 780 system, it is possible to take readings and enter compensation values at every 1" increment through the measuring length of the machine, as long as the machine measures under 200" in length. For machines beyond 200" in length, points will be taken every 2" instead of every 1".

3.3.3 Entering new values

- (1) Press the left/right arrow key until the 1st softkey reads "SETUP".
- (2) Press the 1st softkey labeled "SETUP".
- (3) Press the 1st softkey labeled "INSTALL. SETUP".

- (4) If prompted for it, enter the password using the numeric keypad and press "ENTER".
- (5) Using the up/down arrow keys, highlight "ERROR COMPENSATION".
- (6) Press the "ENTER" key to enter the error compensation menu.
- (7) Make sure the "INPUT X1" box is set to "NON-LINEAR".
If it is not, press the 1st softkey labeled "TYPE" until "NON-LINEAR" is selected.
- (8) Press the 2nd softkey labeled "EDIT TABLE".
- (9) With the "SPACING=" line highlighted, press the "ENTER" key.
- (10) Enter the spacing factor.
If the measuring length of the table is 199" or less, key in "1" and press the "DOWN ARROW" key.
If the measuring length of the table is longer than 199", key in "2" and press the "DOWN ARROW" key.
- (11) Move the probe against the stop bar.
- (12) Press the 1st softkey labeled "TEACH POSITION".
- (13) Press the "ENTER" key to lock in those changes and return to the error correction table.
- (14) Use the up/down arrow keys to move to the compensation points. To enter a correction value, press the "ENTER" key when you have highlighted the compensation point you want to edit.
- (15) Using the numeric keypad, key in the correction and press the "ENTER" key.
- (16) When you have finished entering the correction values, press the "CLEAR" key to return to the error correction menu.
- (17) Press the "CLEAR" key again to return to the installation setup menu.
- (18) Press the "CLEAR" key again to return to the measurement display.

4 Accessories

4.1 Squareness Gage

The squareness gage will allow you to check one edge of a part to another to see if they are perpendicular to each other. To use the squareness gage:

- (1) Place the part against the stop bar securely and evenly.
- (2) Slide the part so that it hangs over the edge of the table enough for the indicator to read.
- (3) With the squareness gauge at the stop bar end of the table, set the dial indicator to zero.
- (4) Move the squareness gauge down the length of your part. The deviations will be shown on the dial indicator.

4.2 Diagonal Blocks

The diagonal blocks are used to check corner to corner variation on parts. To use the diagonal blocks:

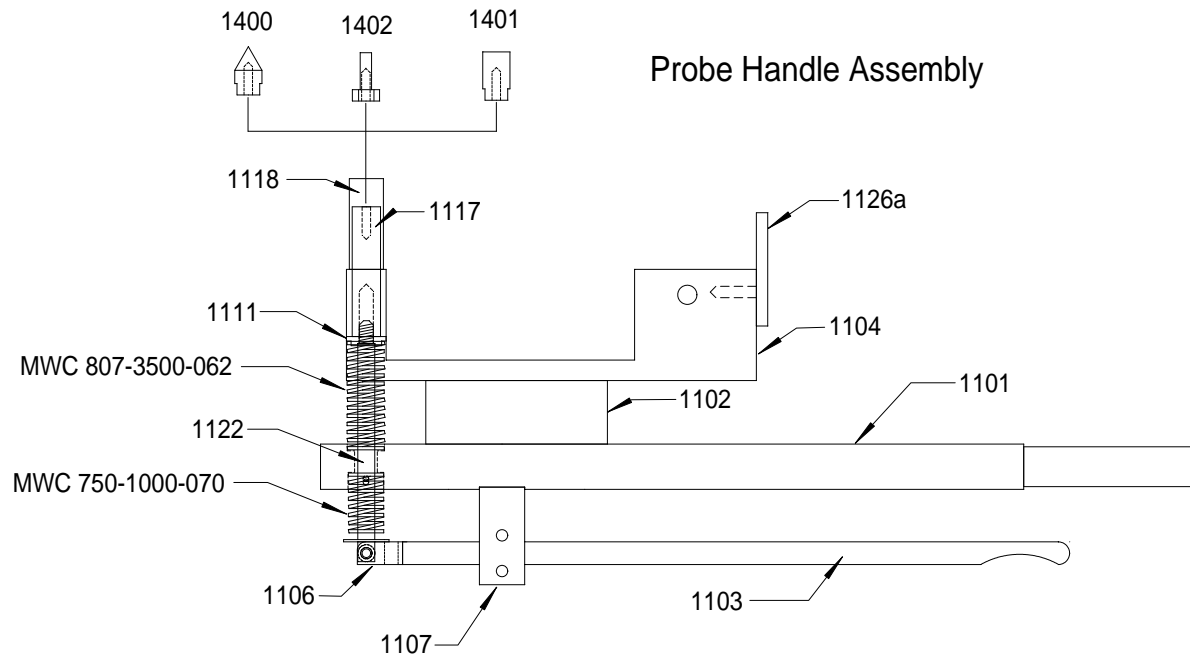
- (1) Place the diagonal block with the base into the slot of the table, with the base against the stop bar.
- (2) Place the diagonal block with the hole over the probe.
- (3) Place the part to be measured between the blocks securely.
- (4) Zero the readout. See section 2.2 for details.
- (5) Place the part in the diagonal blocks so that the opposite corners are in the blocks.
The deviation will be displayed on the DRO.

4.3 Profile Gage

The profile gage allows you to check the flatness of sheets. It also has a squareness gage attachment. To use the squareness attachment, follow the instructions in section 4.1 To use the profile gauge:

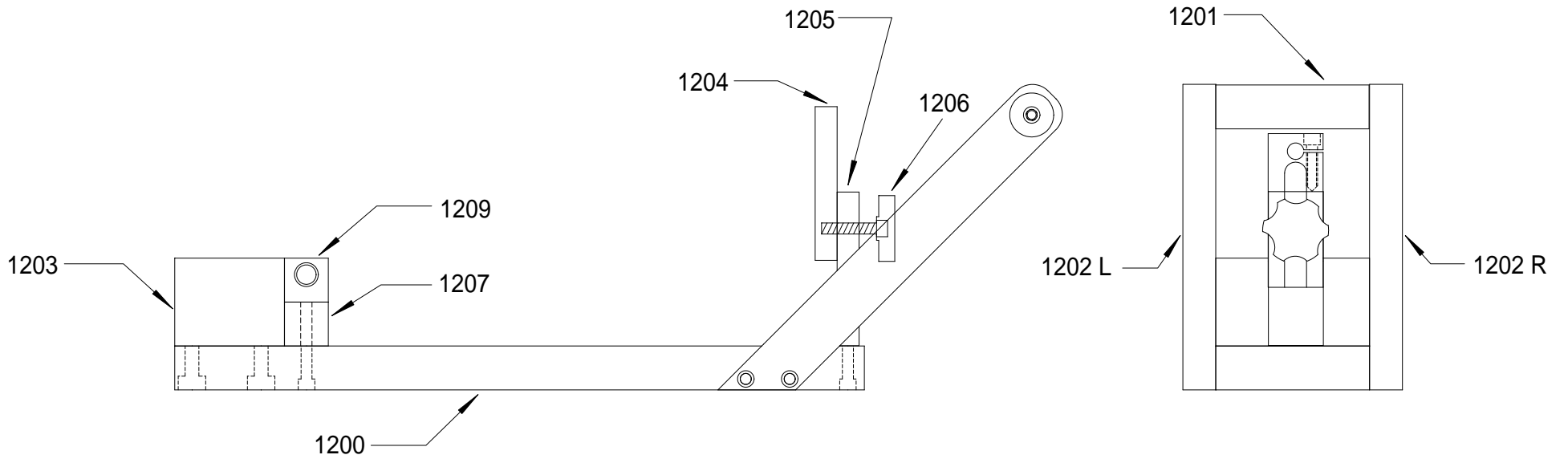
- (1) Make sure that the part you want to check will clear the gantry throughout the travel.
- (2) Bring the overhead dial indicator down to make contact with the part. Typically, this is done in the corner nearest the stop bar and the operating side of the table.
- (3) Set the dial indicator to read zero.
- (4) Move the dial indicator and the gantry over the surface of your part. The variations will be shown on the dial indicator.

Interchangeable probes



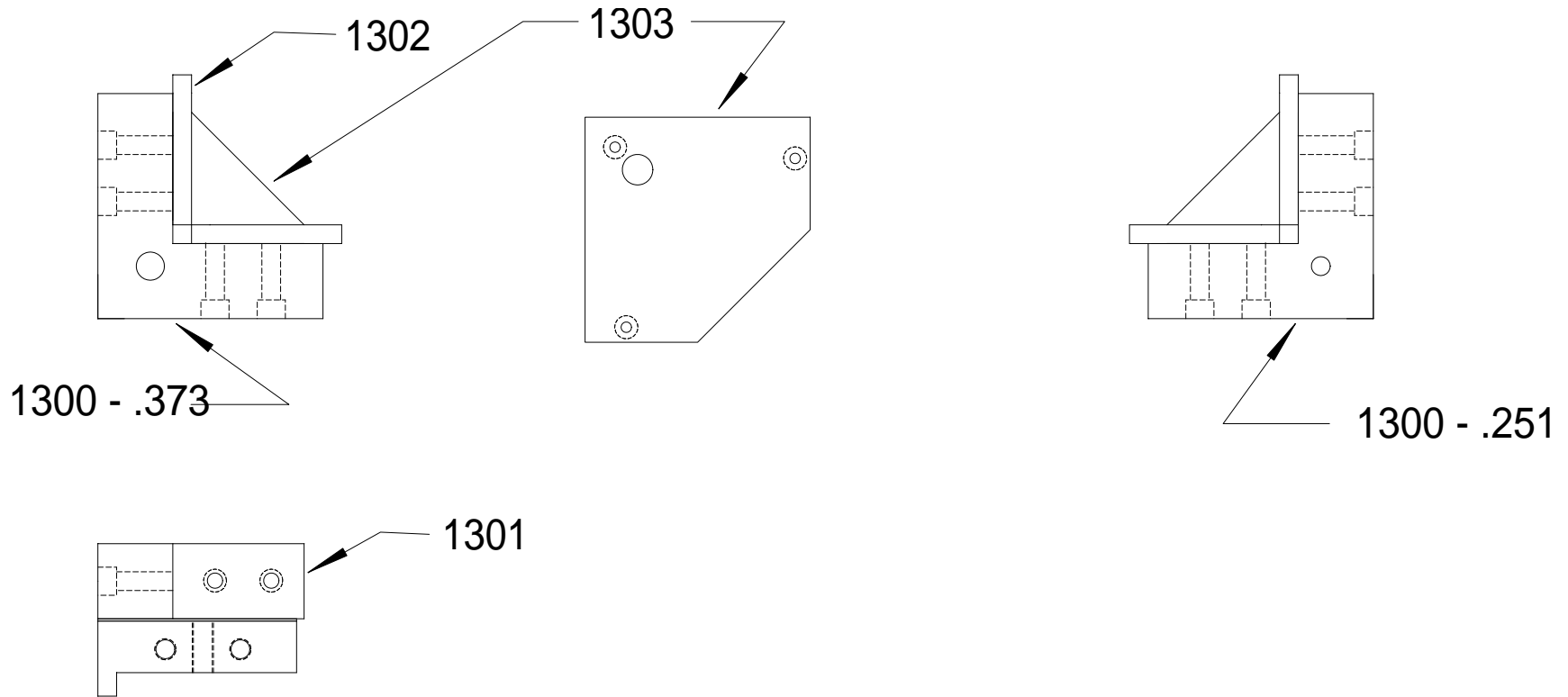
Probe Handle Assembly

Part number	Part name	Quantity	Vendor
1101	Grip handle	1	Raytech
1102	Spacer Block	1	Raytech
1103	Push button	1	Raytech
1104	Reader head block	1	Raytech
1106	Center connector link	1	Raytech
1107	Pivot support	1	Raytech
1111	Spring retainer	1	Raytech
1117	Locator pin	1	Raytech
1118	Probe block	1	Raytech
1122	Locator pin extension	1	Raytech
1126a	Encoder mount for LB302	1	Raytech
MWC 750-1000-070	Short spring	1	Raytech
MWC 807-3500-062	Long spring	1	Raytech
1400	Pointed .600 probe	1	Raytech
1401	Straight .600 probe	1	Raytech
1402	1/4" dia. probe	1	Raytech



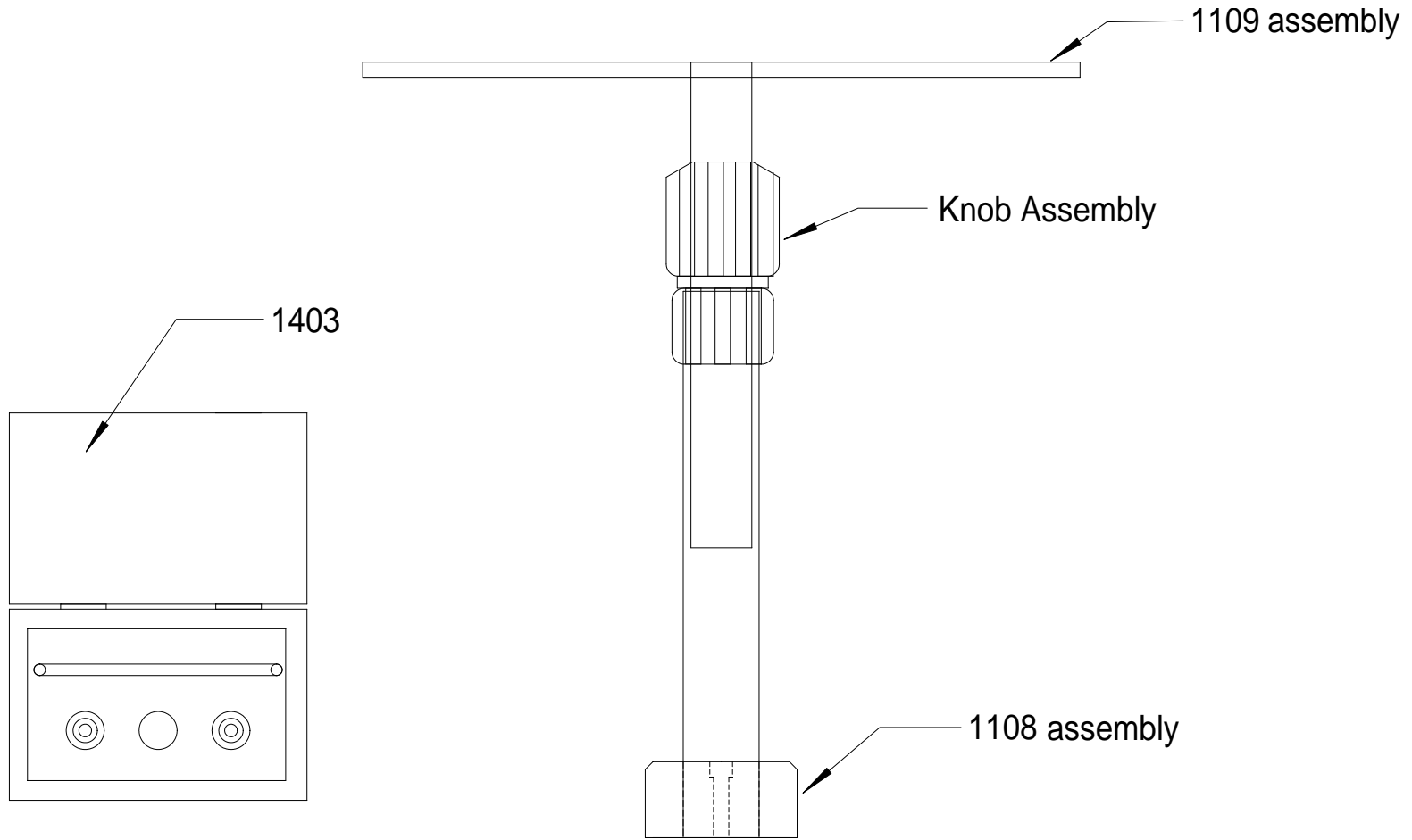
Squarness Gauge

Part number	Part name	Quantity	Vendor
1200	Base	1	Raytech
1201	Handle	1	Raytech
1202 L	Squareness arm L	1	Raytech
1202 R	Squareness arm R	1	Raytech
1203	Block spacer	1	Raytech
1204	Indicator support	1	Raytech
1205	Indicator support base	1	Raytech
1206	Knob assembly	1	Raytech
1207	Bumper stop spacer	1	Raytech
1209	Bumper stop	1	Raytech



Diagonal Block set

Part number	Part name	Quantity	Vendor
1300 .373	Diagonal block	1	Raytech
1300 .251	Diagonal block	1	Raytech
1301	Pivot bracket	1	Raytech
1302	Diagonal block insert	2	Raytech
1303	Diagonal block bottom plate	1	Raytech
84985A54	Ball plunger (not shown)	2	McMaster
	3/8" x 1" shoulder bolt	1	Raytech



Digital Readout Mount

Part number	Part name	Quantity	Vendor
1108	DRO mount	1	Raytech
1109	Counter box stand	1	Raytech
	Knob Assembly	1	Raytech
1403	Probe box	1	Raytech
5403 A 12	Probe wrench (not shown)	1	Raytech