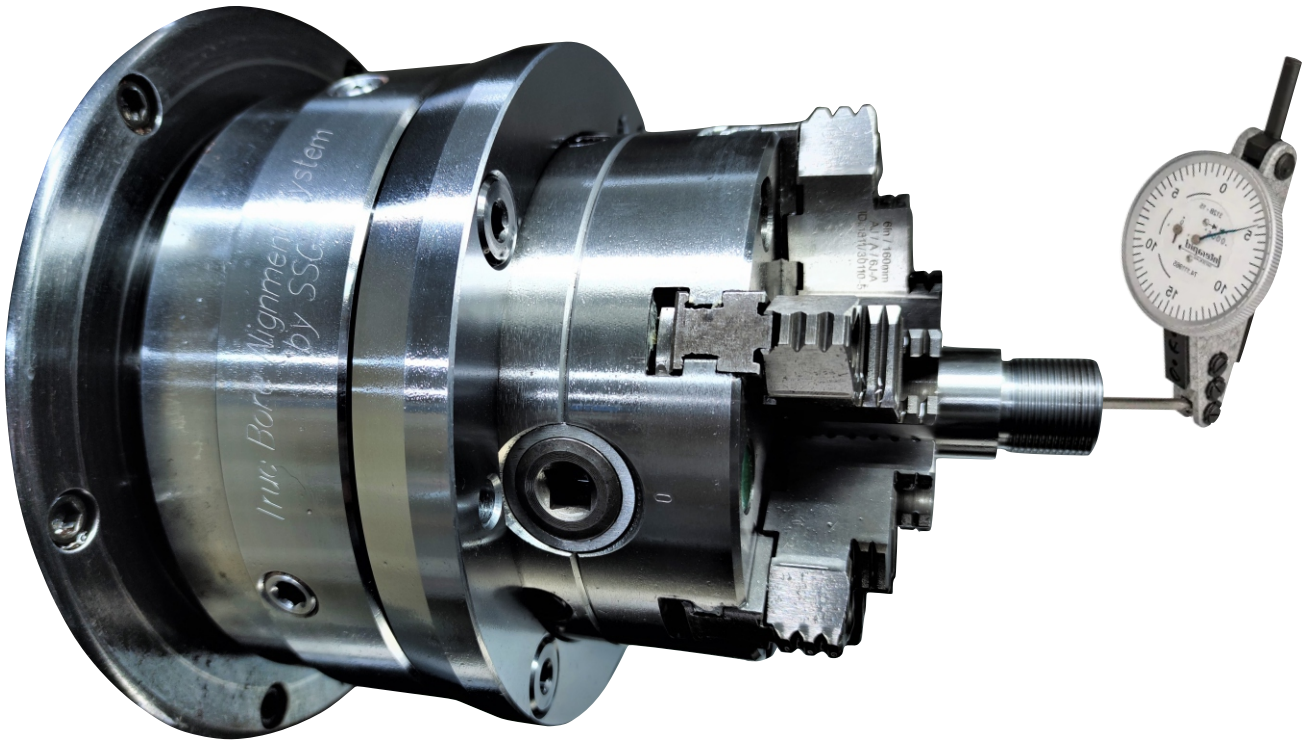
True Bore Alignment System©

User Guide



Radial & Axial Adjust-True Spindle fixture

MFG Exclusively By: Straight Shot Gunsmithing.

PLEASE READ THROUGH THE INSTRUCTIONS CAREFULLY BEFORE USING THIS PRODUCT.

INTRODUCTION

I developed the True Bore Alignment System in 2011.

I wasn't happy with the current action truing fixtures that were available on the market. I felt they put too much stress on the action during the truing process.

Although you could dial in an action to .0001 TIR. using a spider system, when adjustment screws were relieved and the action moved back to a stress-free state, the truing cuts were no longer true with the stress free action therefore possibly not even improving the action during the truing process. This encouraged me to press on with designing the True Bore Alignment System.

In 2011 I purchased my first Haas TL-1, this gave me the ability to machine the ball and socket into my fixture. After many design adjustments and many long hours the True Bore Alignment System was created. It was a success from the start! It made my job in the shop so much easier! Quick dial in time, near stress-free work holding, maintaining .0001 TIR through machining processes, allowing me to hold short barrels and long barrels while bringing two points of the bore into alignment. All things that contribute to a superior accurate rifle!

Up until March of 2021 the True Bore Alignment System has seen almost no design changes, but in March of 2021 I decided to update the radial cast front plate, primarily due to the castings that I purchase from a manufacturer having an 8 month lead time and my product supply being almost gone. I decided to use this opportunity to improve rigidity as well as aesthetics and that brings us up to date.

I have over 250 of these in service at some of the biggest named manufacturers in the industry as well as many accuracy minded sole proprietors and hobbyists and I am excited to serve many more of you with my innovative precision work holding and rifle building solutions. The True Bore Alignment system was engineered and has always been manufactured here at Straight Shot Gunsmithing.

Be sure to check out our website
www.straightshotgunsmithing.com
for upcoming new products and innovations.
Published: April 15, 2021

TBAS PACKING CONTENTS:

QTY.1 - RADIAL PLATE (fig.1.0)
QTY.1 - AXIAL PLATE (fig.1.1)
QTY.1 - SPINDLE ADAPTOR (fig.1.2)
QTY.4 - RADIAL ADJUSTMENT BOLTS (fig.2.0)
QTY.4 - AXIAL ADJUSTMENT SET SCREW (fig.3.0)
QTY.2 - 5/16 HEX WRENCHES (fig.4.0)
QTY.1 - 5/16 LONG HEX SOCKET (fig.5.0)

(pre-installed)

(fig.2.0)

(fig.1.2)

(fig.1.1)

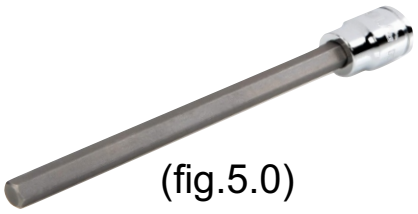
(fig. 1.0)

(pre-assembled)

(pre-installed)

(fig.3.0)

(fig.4.0)



(fig.5.0)

Assembly Dimensions & Weight

To calculate complete system length from bare spindle face to the face of the chuck jaws add 2.375” (TBAS length) + Spindle adaptor length + chuck length. You can also calculate system weight by adding 31.4 lb (TBAS weight) + Adaptor weight + chuck weight.

Example: 1.18” (D1-5), + 2.375” (TBAS), + 4.136” (TMX chuck (back removed), = 7.691” (OAL.) and 68.4 lb (OAW.)

The TBAS has an 8.4” swing Diameter and 2.1” through hole.
Max RPM 2000. *Recommend 0-1400 RPM

Chuck options

Gator 6 jaw (6.25”) chuck, 23.2 lb, length: 4.387”, through hole 1.654” can be bored to 2” through hole #1-103-0600

TMX 6 jaw (6.25”) chuck, with back removed 20 lb, length: 4.136”, through hole 1.654. Can be bored to 2” through hole.
#3-868-0600P

Bison 6 jaw (6.25”) chuck, 23.2 lb, length: 4.39”, through hole 1.654”. Can be bored to 2” through hole. #7-868-0600

TMX 16C collet chuck, 21lb, length: 4.508” max collet size 1.625”
#3-862-0601P

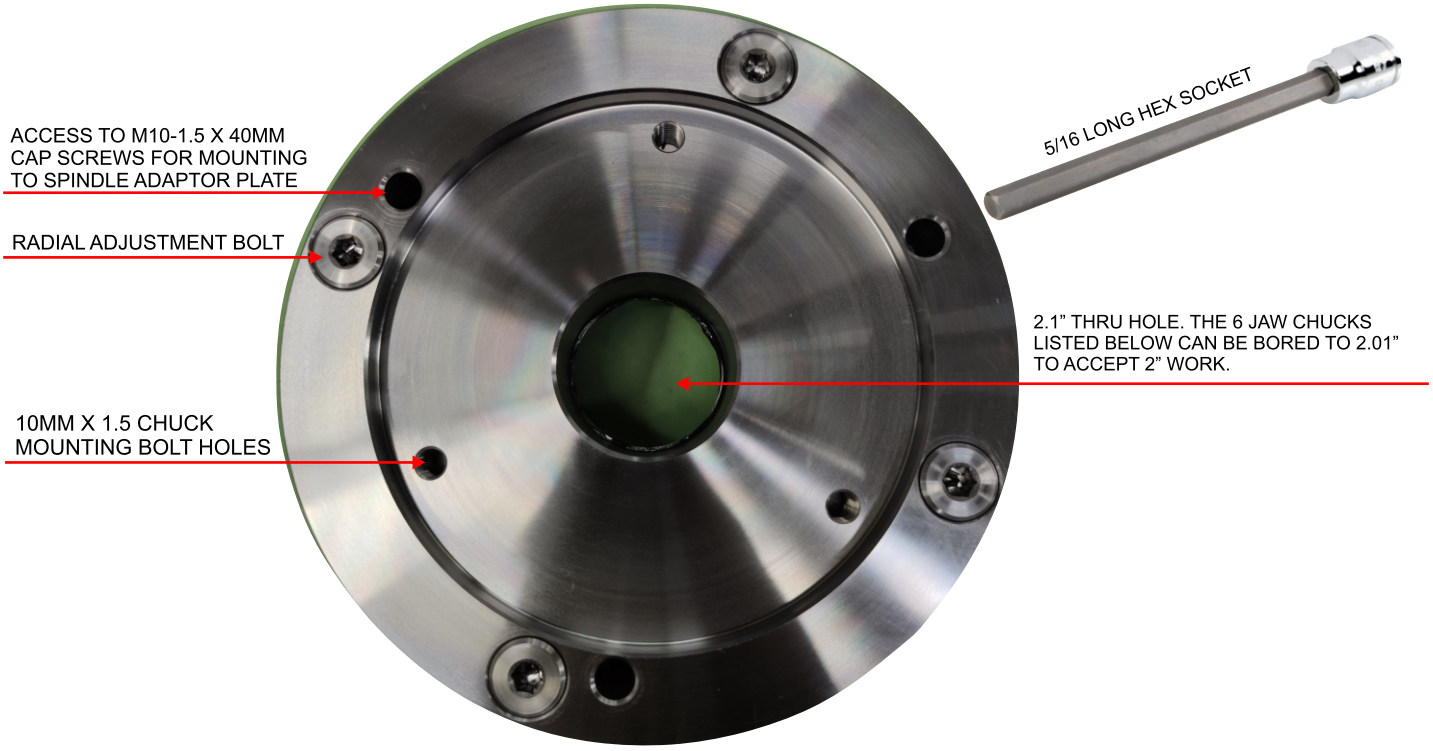
SPINDLE ADAPTOR OPTIONS:

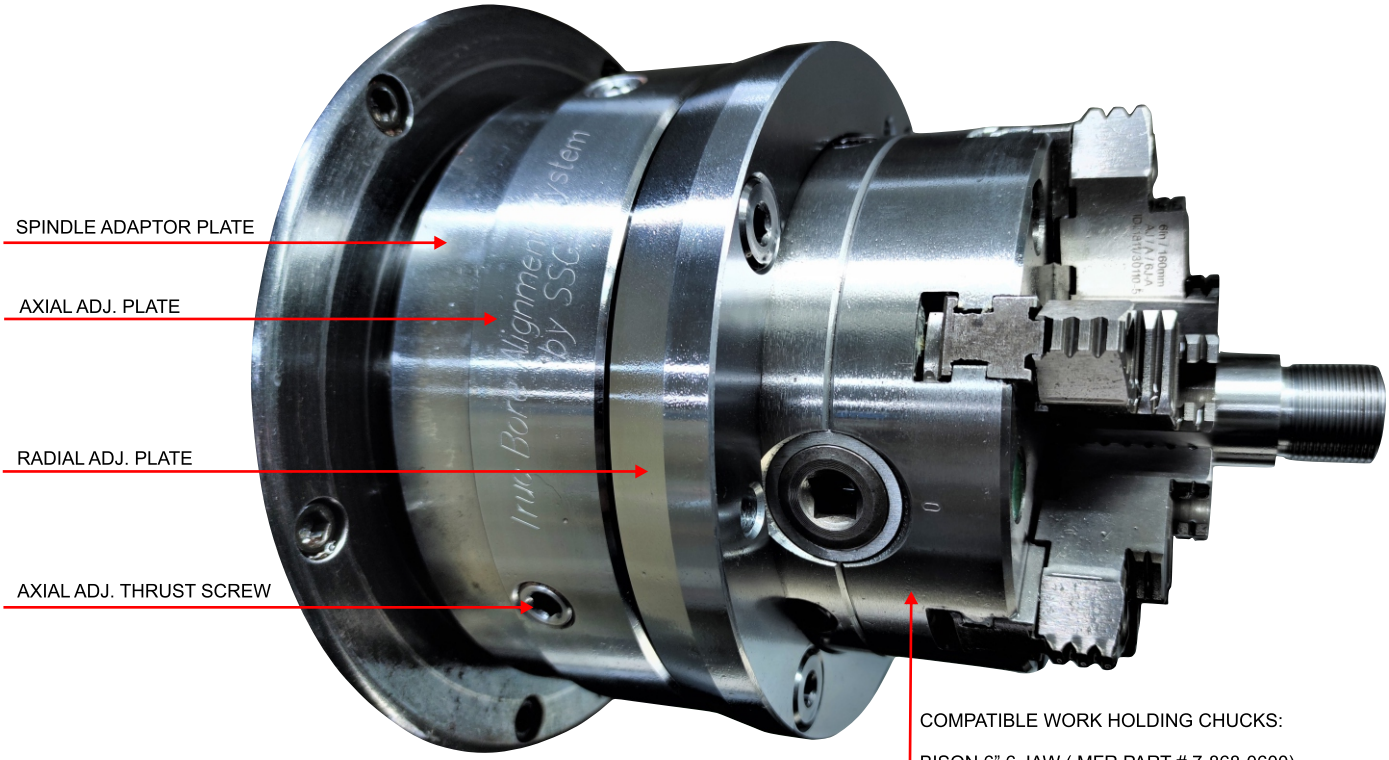
TYPE A SPINDLES
A2-5, 11lb length .79”
A2-6, 11lb length .82”

TYPE D SPINDLES
D1-3, 11lb length .63
D1-4, 11lb length .63”
D1-5, 17lb length 1.18
D1-6, 19lb length 1.34
D1-8, 19lb length 1.338

TYPE L SPINDLES
L00 16lb length 1.89”
L0 16lb length 1.89”
L1 17lb length 2.32”

THREADED SPINDLES
1.1/2-8TPI 11lb length 1.3”
2.1/4-8TPI 12lb length 1.38”
2.3/8-6TPI 14lb length 1.38”





COMPATIBLE WORK HOLDING CHUCKS:

BISON 6” 6 JAW (MFR PART # 7-868-0600)

GATOR 6” 6 JAW STEEL (MFR PART #1-103-0600)

GATOR 6” 6 JAW SEMI STEEL (MFR PART # 1-153-0600)

TMX 6” 6 JAW (MFR PART # 3-868-0600P)

TMX 16C COLLET CHUCK (MFR PART # 3-862-0601P)

OTHER CHUCKS MAY BE FITTED BY CUSTOMER.
LIMITATIONS: CHUCK BODY CANNOT BE LARGER
THAN 6.3”DIA.
I DO NOT RECOMMEND INDEPENDENT JAW CHUCKS.

Installation Instructions

Step 1 For "A" style spindles:

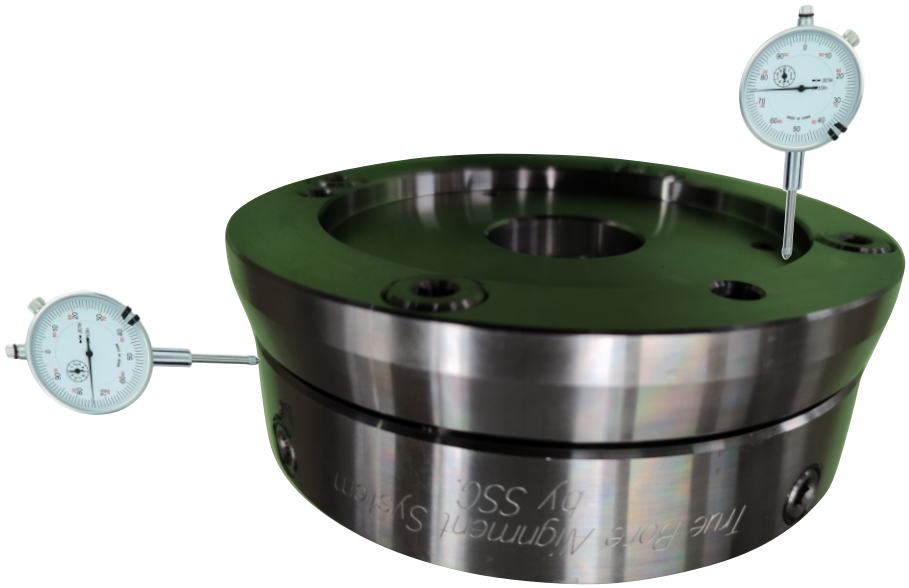
First remove adapter plate from T.B.A.S. by backing off axial adjustment screws two rotations using 5/16 allen wrench, next use 5/16" long hex bit socket to remove the three 10 mm x 40 cap screws (located through access holes in front radial plate. These cap screw heads are trapped between the plates,(loosen all three bolts in sequence to prevent binding), now bolt the adapter plate to spindle. Then re-attach T.B.A.S. to adapter plate, using the three 10mm bolts. (Tighten in sequence to prevent binding.) Torque the three 10mm x 40 bolts 30-35 ft-lb

Step 1 For "D" style spindles:

Install cam lock pins in spindle adapter plate. Next install T.B.A.S. with adapter plate to spindle using cam lock. Torque the three 10mm x 40 bolts.(These can be accessed through holes in the front radial plate without removing it.)Torque to 30-35 ft-lb.

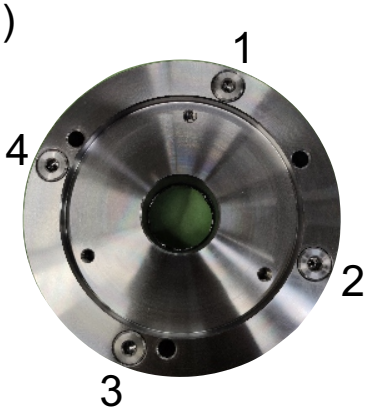
Step 2

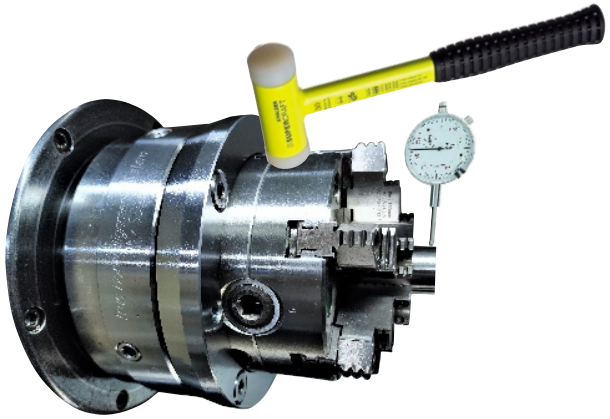
Place a .001 dial indicator on the outside diameter of the axial adjustment plate In front of the engraving, now tighten and loosen opposing axial adjustment screws to remove run out, next place dial indicator on the face of the radial adjustment plate (just outside the chuck bolt hole pattern) now tighten and loosen opposing radial adjustment screws to remove run out. Use only 10-15 ft-lb for this process while the chuck is not installed. (Normal adjustment torque for these bolts will be 25-35 ftlb with chuck installed and while dialing barrels and actions into alignment.)



Next, mount the chuck (not included) to the True Bore Alignment System with the three 10 mm mounting bolts. Initially use very light torque as you will be drifting the chuck into alignment with the True Bore Alignment System. Next install a ground shaft in the chuck jaws, place a dial indicator on the outer shaft diameter. (you can also use this shaft to practice the barrel dial in procedure) Use a .001 dial indicator instead of a test indicator. (it will give you more travel for initial setup.)

Now with a dead blow hammer tap on the outer chuck body to bring the shaft into axial alignment. Finish tightening the chuck mounting bolts to 50 ft-lb. Now the True Bore Alignment System is set up for your first workpiece.
before turning workpiece be sure to increase the torque on the radial adjustment screws to the range of 25 to 35 ft-lb. (Maintaining consistent tension on radial adjustment bolts is critical for work holding rigidity.)





DIALING IN BARRELS AND ACTIONS

Remember Radial misalignment is observed when jogging test the indicator from one end of the rod to the other. Axial misalignment is observed by rotating the spindle.

First place .0005 test indicator on lathe carriage, next place test indicator needle on indicating rod, rotate spindle in order to line up indicator contact point with axial adjustment screw #1. Jog “Z” axis with indicator attached so the indicator moves from one end of the rod to the other. Now tighten and loosen radial adjust screw #1 and #3 until your indicator reads 0 from one end of the rod to the other (while lined up with radial adjustment screw #1.) Next, line up indicator with opposing adjustment screw #3 (do not try to adjust this so you have zero indicator movement from one end of the rod to the other) ,
You need to look at the radial error while lined up with screw #3 and split that between screw #1 and #3. Example: If adjustment screw #1 reads 0 and #3 reads .0015 when jogging from one end of the rod to the other, then both #1 and #3 screws will need to be set to deliver .00075 TIR. from one end of the rod to the other.

Repeat these steps for screw #2 and #4. Note that for screw #2 and #4 you will already know the approximate error between sides. This radial error is caused by many things (indicator bushing tolerance, rod flex due to spring tension from the indicator and the alignment between the spindle and the lathe ways.)

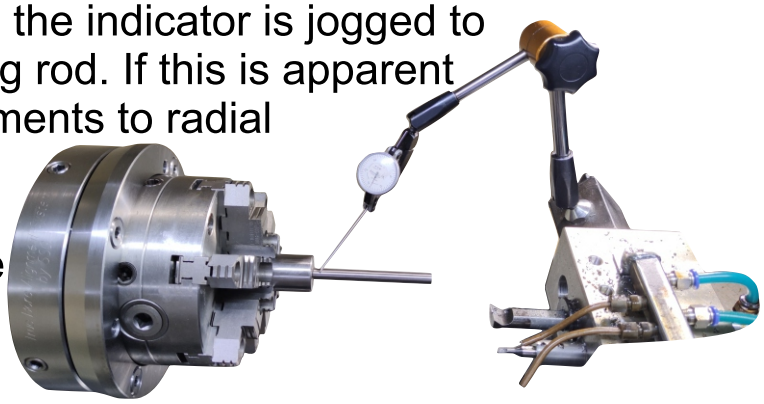
Once radial adjustment screws are all set you can now move onto axial adjustment. Set indicator near barrel, adjust axial set screws by tightening and loosening until zero run out is achieved. Now jog indicator to the end of the rod, (if your radial alignment was set properly you will have zero axial run out at this end of the rod as well.) Note: with the indicator set at zero near the barrel you will still see the divided radial deflection when you jog to the end of the rod, but you will have near zero axial TIR. at both ends of the rod and now two points of the bore will be in line with the spindle bearings.

Do not try to use two test indicators (one on either end of the rod.) This will complicate the process greatly. It is not critical that your test indicator is always set at zero for these adjustments, you are just looking at total indicator movement.

Greater accuracy can be achieved by removing the indicator rod and finishing with a test indicator directly in the bore. Although we do recommend the use of our proprietary Range Rods for quick efficient dial in, hwever they do have a tolerance that can add error to the system.

The most common problem when dialing in barrels Is not splitting radial error between sides.

There is no need to adjust axial alignment until radial alignment is set. Because all adjustments are made in front of the T.B.A.S. pivot, All radial adjustment will affect axial alignment, but axial adjustments will not affect radial alignment. This is why we always start with radial adjustments and then move to axial adjustments. If your radial alignment was not properly set it will be apparent after axial adjustments are made and the indicator is jogged to the opposite end of the indicating rod. If this is apparent go back and make micro adjustments to radial alignment then finish by making axial adjustments once again. Look at TIR. on both ends of the indicating rod.



Workholding tips

It is important to have at least an inch of straight shank to chuck on, to maintain work holding stability. Although the system can handle 2000 RPM;1400 RPM limit is recommended or perhaps even less depending on the weight of the machine to eliminate vibration in the machine due to the system being off center in order to bring a barrel or action into alignment.

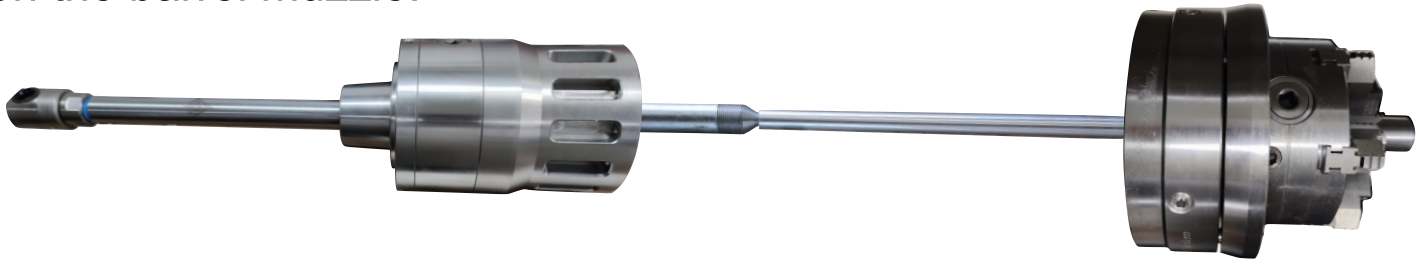
The muzzle end of most barrels is tapered so you will need to figure out your taper per inch then add corresponding shim stock to the smaller diameter of the barrel towards the end of the chuck jaws. To account for the barrel taper in order to maintain work holding stability and influence radial alignment. The other option is to make a split bushing that is tapered on the inside matching Barrel taper with a cylindrical outside to hold in the chuck jaws .
This is not needed for clamping on a straight breach diameter or when truing Remington actions.

Outboard spindle support:

Although it is not necessary it can have several advantages such as attaching a through bore flush system. As well as adding additional support for the work holding system.

Outboard Coolant System example:

This is the way we have added more productivity to our shop. It is a 5C collet chuck adapted to the outboard lathe spindle. It holds a coolant shaft with a live HP swivel that can be slid in and out for various barrel lengths. 60 degree tapered end for a steel to steel seal on the barrel muzzle.



We offer these outboard coolant systems for the Haas TL lathes. contact us to purchase or for more info. 701-794-3276

Extra tips & tools that help the process .

When making adjustments on radial adjustment screws You can install 5/16 Allen wrench in axial adjustment screws To keep spindle from rotating while you tighten and loosen on axial adjustments.

Try our proprietary Range rods! They add great efficiency and speed while dialing in radial and axial alignment. They use common HSS. reamer bushings by JGS, PTG and Manson. Two sets of bushings per caliber are not typically needed as most barrels except a slightly larger bushing right at the breach. The #1 rod Accepts 22cal-.243/6mm, The #2 rod Accepts 25cal-.284/7mm and the #3 rod Accepts 30cal-.375. Rod length is 7” OAL, (4” extends from the barrel.)

The Yellow jacket torque wrench Is a great addition as well, It is very compact and alarms you when you are in a sufficient torque range.
You can keep multiple torque settings in memory, with a range from 7.4-59 ft-lb

:Torque wrench model 60648.
:3/8 insert drive Wera #078205
:5/16 hex drive Wera #136001

Servicing The True Bore Alinment System

Service Every six months or 400 barrels.

Remove True Bore Alignment assembly from lathe. Set on a clean flat surface with the radial adjustment plate facing up. (the chuck can be left on but it is easier to remove it first.)

Remove radial adjustment bolts.

Remove radial plate from axial plate by gently using a screwdriver to pry between them to brake grease surface tension.

Remove all the old grease completely from both ball and socket (be careful that no debris gets between these surfaces.)

Re-apply sufficient high pressure moly grease, now set radial plate back on axial plate. Rotate the radial plate until the three 10mm x 40 bolt access holes line up with the 10mm bolts below the radial plate. Before re-installing the radial adjustment bolts clean grease off of radiused bolt shoulder and recessed socket. apply high pressure grease to radial bolt threads and radiused shoulder, now reinstall.

Next, remove the 4 axial adjustment screws. Remove old grease. Apply a new light film of high pressure grease on the threads and pushing surface, now re-install.

follow initial setup procedure to reinstall on machine

Contact us for replacement parts if needed.

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