

# BHJ Products, Inc.

## Parts List & Instructions

Product Name: **O-Ring Groove Cutter Adjustable Tool Block Upgrade**  
BHJ Part#: **ORG-3-UPGD**

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### Prototype Kit Contents:

<b>1x</b> Adjustable Tool Block	<b>1x</b> 1/8" Registration Pin
<b>1x</b> Adjustable Tool Holder	<b>6x</b> Tool Block Adjustment Shims (.001", .002", .003", .007", .015", .025")
<b>1x</b> Graduated Adjusting Screw	

**These Parts are designed and sold exclusively to be installed on a preexisting ORG-1 or ORG-2 Cutter Head.**

### Description

The concept behind the O-Ring Groove Cutter Adjustable Tool Block is to reduce time and improve ease of setup of groove-diameter adjustment of the BHJ O-Ring Groove Cutter, while maintaining the current degree of accuracy.

As a result of incorporating this Adjustable Tool Block assembly into the ORG Cutter Head, the OD-checking Dial Indicator, which currently mounts in one end of the O-Ring Register Plate to check the cutter-insert position, has become obsolete, as all measurements are calculated in the Adjustable Tool Block itself, independent of the O-Ring Register Plate being used.

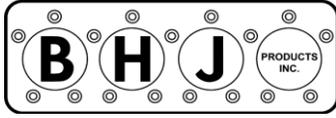
**NOTE: All references to groove size are now in diameter, not radius, as used with the OD-checking Dial Indicator of the ORG-1 & ORG-2 system. Be sure to keep this in mind when making your calculations.**

The enclosed 1/8" Registration Pin is used to establish a known 4.00" groove diameter on Centerline (C/L), when inserted in the holes through both the Tool Block and Tool Holder. All groove diameter adjustments are then made as a plus or minus from that known 4.00" dimension.

Note that there are two (2) slots for installing the Graduated Adjusting Screw in the underside of the Tool Block. The inboard slot location (closest to pivot-point of the Tool Block) is used for large-bore applications and the outboard slot location is used for small-bore applications. The diameter range with the Graduated Adjusting Screw in the large-bore (inboard) location is 4.000-5.250" on C/L, while the range in the small-bore (outboard) location is 3.000"-4.245" on C/L.

An additional benefit of this new Adjustable Tool Block design, is a more compact size overall, allowing easier installation and removal of the ORG Cutter Head when using small-bore Register Plates.

**Installation Of Adjustable Tool Block** (next page)



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### Installation Of Adjustable Tool Block

1. Find an appropriate method to secure the O-Ring Groove Cutter Head on a bench top, with the underside of the Cutter Head facing up. The handle should be securely held in place and should not be able to move.
2. Use a soft-faced hammer to tap on one end of the existing Tool Block in a manner that it will turn the Tool Block counter-clockwise on the shaft to loosen it. Once the Tool Block is loosened, continue to rotate it until it is free of the shaft.
3. Install the new Adjustable Tool Block using the reverse process, rotating it clockwise until tight. Once bottomed-out, tap the Tool Block to snug it down in similar fashion as explained to loosen it above.
4. The orientation of the Tool Block should allow for the Tool Holder to position the Cutter Insert directly below the handle. If the orientation is not correct, use the supplied shims (either alone, or stacked) to change the rotation of the Tool Block, once tightened, as close to this suggested orientation as possible.

### Cutter Head Diameter Set-Up

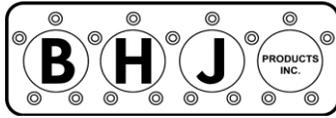
**NOTE: For consistency, groove Centerline (C/L) is used as the primary measurement reference in these instructions. To determine the O.D. of the groove to be cut, simply add the full width of the Insert being used to the C/L measurement. Likewise, to determine the I.D. of the groove to be cut, subtract the full width of the Insert being used to the C/L measurement. (Example: 4.250" groove O.D. = 4.211" groove C/L + Insert width of .039")**

5. Determine the O-ring groove application and groove diameter to be cut. If the groove C/L diameter falls into the large bore range of 4.000-5.250" on C/L, install the Graduated Adjusting Screw into the inboard slot of the Tool Block (slot closest to the center shaft). If the groove diameter falls into the small bore range of 3.000"-4.245" on C/L, install the Graduated Adjusting Screw into the outboard slot (slot furthest from the center shaft).

**NOTE: The threaded portion of the Adjusting Screw must be completely free of the Tool Holder before it can be moved from one slot to the other.**

6. Using the supplied 1/8" Hex Wrench, turn the Graduated Adjusting Screw until the Registration Pin can pass into the non-threaded holes of both the Tool Block and Tool Holder (photo right). This will establish the 4.00" diameter reference point.





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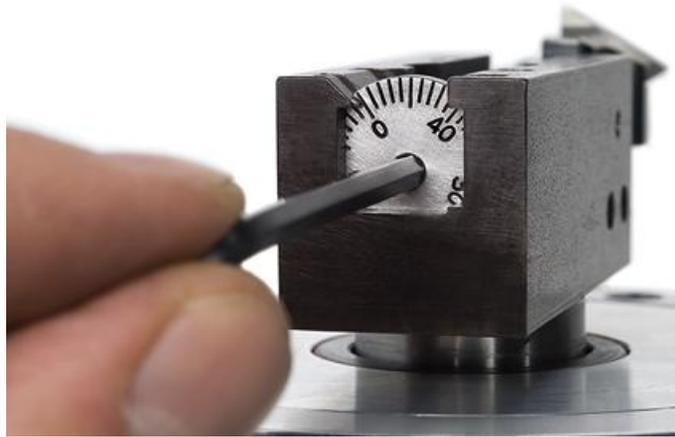
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7. Look at the adjustment-end of the tool block (opposite the tool holder) to view the graduated scale on the Adjusting Screw and the pointer (45 degree machined angle) on the Tool Block. Note the position of the scale to the pointer at the 4.00" starting point for your records, so it can be referenced while adjusting to the working groove diameter setting.
  - Increments on the Adjusting Screw dial are .001" diameter
  - One full turn of the Adjusting Screw equals .050" diameter

8. Remove the Registration Pin from the Tool Block, once the 4.00" reference point has been established and you are ready to adjust the cutter to the working diameter.

9. If the working diameter setting is greater than the 4.00" starting point, turn the Adjusting Screw clockwise. Likewise, if the working diameter setting is smaller than the 4.00" starting point, turn the Adjusting Screw counter-clockwise IN, until it is past the final setting point, then turn the Adjusting Screw clockwise, back OUT to the final setting.

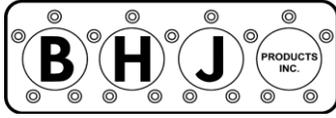


**NOTE: As with any gear-drive or screw-drive device, there will be a small amount of "clearance" in the threaded interface between the Graduated Adjusting Screw and the Tool Holder. In consideration of this "clearance" factor, it is BHJ's recommendation that all diameter adjustments be made by turning the Graduated Adjusting Screw "OUTWARD" (clockwise) to the final dimension. If you overshoot your desired setting at any point, turn the Adjusting Screw in (counter-clockwise), past your desired position, then turn it back out to the final location.**

10. Once the final diameter setting has been achieved, tighten both Allen head screws in the Tool Block to secure the Tool Holder in place, using the included 5/32" hex wrench.

**NOTE: Do not attempt to turn the Adjusting Screw while the Allen head tightening screws are snug, as this will lead to excessive wear of the Adjusting Screw, Tool Block and Tool Holder.**





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### O-Ring Groove Cutting Procedure

**\* It Is Strongly Recommended That You Practice On A Scrap Cylinder Head Or Block, To Familiarize Yourself With The Technique Involved.**

- A. Install the supplied Dowel Pins into the locating holes on the underside of the Register Plate.
- B. Install the Register Plate onto the cylinder head or block. Install and tighten the Plate Clamping Bolts. Be sure that the cylinder head, or block deck surface, is absolutely clean and free of high spots.

**NOTE: Do Not Torque the fasteners when installing the Register Plate, as this will typically cause the plate to warp and potentially cause uneven groove depths. It is also strongly recommended that the cylinder head and block deck be checked for straightness and surfaced if necessary, before installing the O-Ring Groove Register Plate.**

- C. Set the cutting depth by gently allowing the Insert cutting tip to contact the cylinder head or block deck. Adjust the lower Depth-Adjustment Ring below the Handle, until the Cutter can be rotated and just barely contacts the deck surface when turning the Handle with a gentle downward pressure.

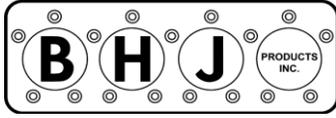
- D. Rotate the lower Depth-Adjustment Ring one-half turn or more counter-clockwise to set the starting groove depth – Each mark on the Depth-Adjustment Ring equals .001", thus one full turn equals .020" (see photo). Tighten the top Depth-Locking Knob to lock the setting at the desired depth.



**NOTE: It is highly recommended that the desired final depth NOT be dialed-in at the start, to avoid accidentally over-cutting the groove depth for the application.**

- E. Rotate the Handle rapidly and smoothly, using steady, downward palm pressure to cut the groove. When pressing downward as described above and the cutting resistance fades, the groove is finished.

**NOTE: Cutter Inserts May Break & Groove Damage Can Occur If Excessive Downward Force Is Applied To The Cutter Handle During The Operation.**



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- F. When using the optional O-Ring Groove Depth Gauge (see photo next page), verify the new groove depth and evenness as follows:
- I. Leaving the Register Plate attached, remove the Cutter Head from the Register Plate after making the initial cut.
  - II. Position the O-Ring Groove Depth Gauge on the Register Plate top-surface, with the Indicator Stem passing through one of the four slots in the O.D. of the cylinder bore.
  - III. Zero the Indicator Tip on the deck surface at least 1/8" from the edge of the groove.
  - IV. Reposition the Indicator to allow the Tip to settle into the newly cut groove and check the groove-depth measurement. Record the groove depth and verify, based on the initial depth dialed-into the Depth-Adjustment Ring.
  - V. Repeat the depth check at the remaining three slots to verify the groove depth is even all the way around the bore.



**NOTE: Uneven groove depth may be an indication that the deck surface is not even, or was not properly cleaned before installing the Register Plate. An uneven groove depth may also result if the Cutter Head is not installed securely on the Register Plate.**

- G. Replace the Cutter Head onto the Register Plate and make any groove-depth adjustments necessary, using the Depth-Adjustment Ring, to achieve the final groove depth.

**NOTE: It Is Advisable To Double-Check The Diameter And Depth Settings Of The Cutter And Ensure The Depth-Locking Knob Is Securely Tightened Before Proceeding With Further Cuts.**

- H. Once the final groove depth is achieved, repeat the groove-cutting process for the remaining cylinders.

When cutting is complete, it may be necessary to gently flat-file the head/deck surfaces to remove any burrs or raised edges.

**Call BHJ at (510) 797-6780 with any questions regarding the part, setup, or operation.**