AGM DRILL ANALYZER

AGM-91

Available through ICS Cutting Tools
www.icscuttingtools.com

The 3 axis AGM-92 is also available. Contact ICS Cutting Tools for details.

AGM-91 DRILL ANALYZER - Item No: M-DA-AGM-91

The growth of modern manufacturing techniques using sophisticated machinery, has today resulted in the demand for greater accuracy from the most widely used cutting tool - the twist drill. The many dimensions of twist drill geometry are extremely important, as the use of correct twist drill geometry can result in large savings in time, materials and money. The Drill Analyzer was developed for the precise examination, measurement and control of twist drill geometry.

FEATURES:

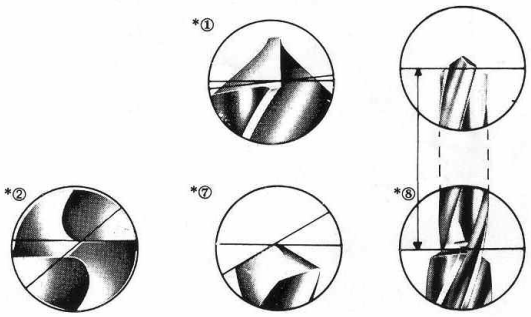
✦ Wide range

Twist drills ranging from 3mm to 75mm diameter can be inspected and measured on the Goniometer.

✦ Versatility

The Drill Analyzer can inspect and measure the following geometrical features of drills.

*1. Lip clearance angles
*2. Chisel angle.
3. Drill web concentricity
4. Chisel edge concentricity
5. Concentricity of pilot to body diameters on step and subland drills
6. Relative lip height errors
*7. Drill point angles
*8. Step lengths on any multi-diameter drills
9. Helix angle



✦ Speed

Inspection and measurement of all aspects of drill geometry with remarkable speed is made possible by the Drill Analyzer's unique design.

✦ Accuracy

Exceptional accuracy is achieved through the combination of angular measurement by optical goniometer and linear measurement by micrometer or dial indicator.

✦ Ease of application

Difficulties and wasted time in trying to measure drill geometry by rule-of-thumb methods are eliminated by the Drill Analyzer.

✦ Compactness

With the compact design of the Drill Analyzer, only a minimum of bench space is required.

✦ Lighting

For maximum clarity of readings, low volt lighting has been incorporated into the unit.

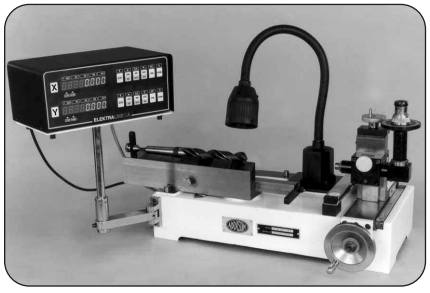
✦ Economy

Time, materials and cost can be saved at the production stage, as the equipment takes care of the drill geometry inspection and measurement, besides eliminating costly scrap due to faulty tooling. The Drill Analyzer is the finest unit available for this purpose.

RANGE:

Twist drills 3mm to 75mm diameter.
2, 3 or 4 flutes.
Straight or taper shank, Straight or spiral flute, Right or left hand spiral.
Multi-diameter drills such as subland and step drills.

AGM-91



ASSEMBLY

1. Mount the main vee block into the base unit.
2. Mount the optical instrument into the vertical side securing it with the three screws supplied.

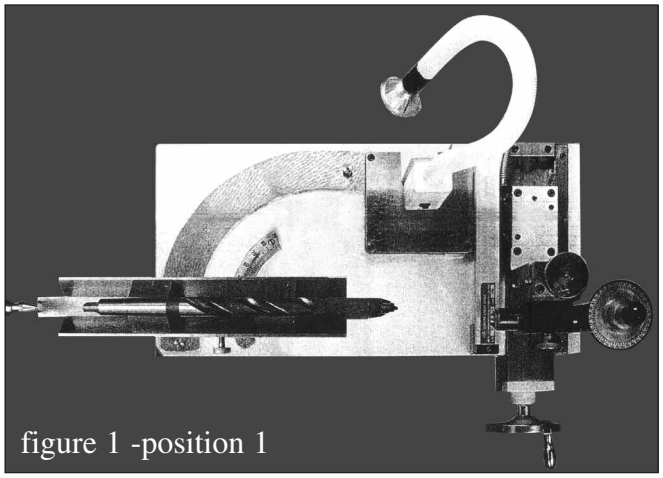


figure 1 -position 1

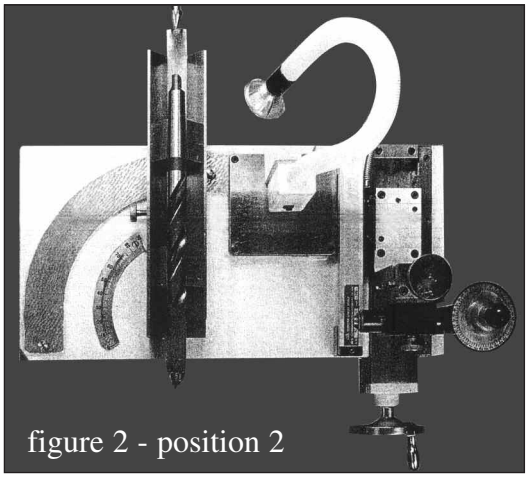


figure 2 - position 2

CHECKING AND ZEROING OF THE OPTICAL INSTRUMENT

1. Set the machine to position2, shown in figure 2.
2. Set the eyepiece vernier to zero.
3. By adjustment of the two sideways (i.e. vertical & horizontal) and the focal slide, focus on the datum of the man vee block.
4. Superimpose the optical hair line on this edge. If the hair line cannot be superimposed on this edge, re-zero the instrument as follows :-
5. Release the eyepiece stem locking ring.
6. Rotate the eyepiece stem until the hair line can be superimposed on the datum edge of the main vee block.
7. Clamp eyepiece stem locking ring.

NOTE: Zero position of eyepiece to be as shown in figure 2.

OPERATING INSTRUCTIONS

Periodically check that the instrument is correctly zeroed.

LOADING THE DRILL

1. The drill is rested in the appropriate vee with its point approxiamately over the front face of the main vee block.
2. When checking the features with the instrument set in position 1 release locking handle on the side of the main vee block and position the back stop in contact with the drill shank. Lock handle.
3. When checking features with the instrument set in position 2, release locking handle on the side of the main vee block and position either the back stop in contact with the drill shank or the front stop in contact with the drill point. Lock handle.

CHECKING CHISEL ANGLE

1. Set the instrument in position 1, as shown in figure 1.
2. Focus on the drill point and superimpose the fixed hair line on one cutting edge and the movable hair line on the chisel edge by rotation of eyepiece.

   The chisel angle is indicated directly on the goniometer scale.

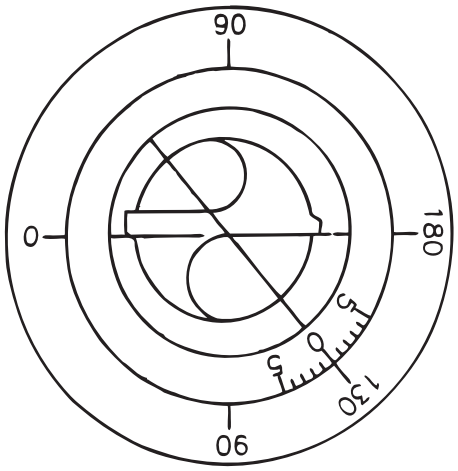


Figure 3

CHECKING CHISEL EDGE CONCENTRICITY

1. Set the instrument in position 1, as shown in figure 1.
2. Superimpose the fixed hair line on the chisel edge keeping the drill against its back stop. Rotate the drill through 180° - the hair line should still be superimposed on the chisel edge if the chisel edge is in center.
3. If an error is indicated, make DRO (Digital Read Out) reading zero. Adjust the slide with the handwheel until the hair line is again superimposed on the chisel edge.
4. The DRO reading directly gives twice the eccentricity of the chisel.

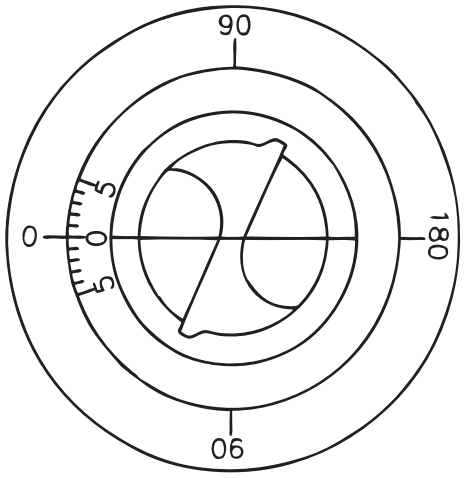


Figure 4

CHECKING THE WEB CONCENTRICITY

1. Set the instrument in position 1, as shown in figure 1.
2. Set the eyepiece to read 90° and by adjustment of vertical slide and rotation of the drill in its vee, superimpose the movable hair line on the chisel edge.
3. Adjust horizontal slide until the fixed hair line is tangential with the base of the flute (see figure 5) and rotate the drill against its back stop through 180° until the movable hair line is again, superimposed on, or parallel with the chisel edge. If the web is concentric, the base of the flute should be tangential with the base of the flute.
4. If this is not the case, make the DRO reading zero. Adjust the slide with handwheel until the fixed hairline is again tangential with the base of the flute.
5. The DRO reading directly gives twice the eccentricity of the web.

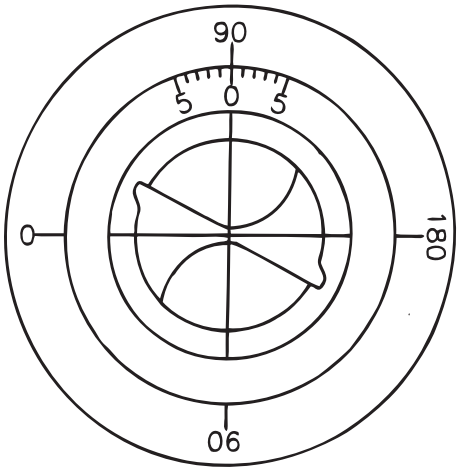


Figure 5

CHECKING THE CONCENTRICITY OF STEP DIAMETER TO BODY DIAMETER ON SUBLAND DRILLS

1. Set the instrument in position 1, as shown in figure 1.
2. Set the eyepiece to read 90° and by adjustment of the horizontal and vertical slides, superimpose the movable hair line on the cutting lip of the primary point with the fixed hair line tangential to the step diameter.
3. Rotate the drill against its back stop through 180° until the movable hair line is superimposed on, or parallel with the cutting lip. The fixed hair line should again be tangential to the step margin if the pilot is concentric with the body.
4. If this is not the case, make the DRO reading zero. Adjust the slide with the handwheel until the fixed hair line is again tangential to the margin of the step diameter.
5. The DRO reading directly gives twice the eccentricity of the step diameter to the body diameter.

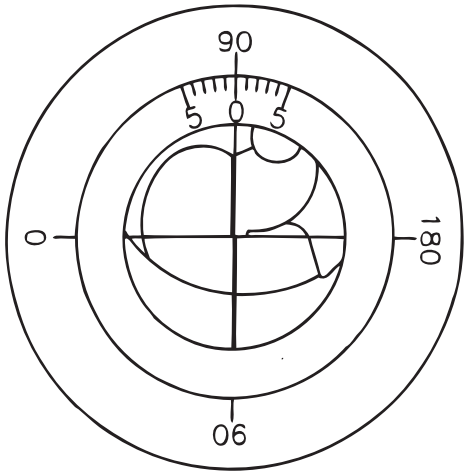


Figure 6

CHECKING THE LIP CLEARANCE ANGLE

1. Set the instrument in position 1, as shown in figure 1.
2. Set the eyepiece to read 90° and by adjustment of the horizontal and vertical slides, superimpose the movable hair line on the cutting lip.
3. Set the instrument in position 2, as shown in figure 2.
4. Rotate the eyepiece to superimpose the movable hair line on the lip clearance angle; the angle of clearance can be read directly on the scale.

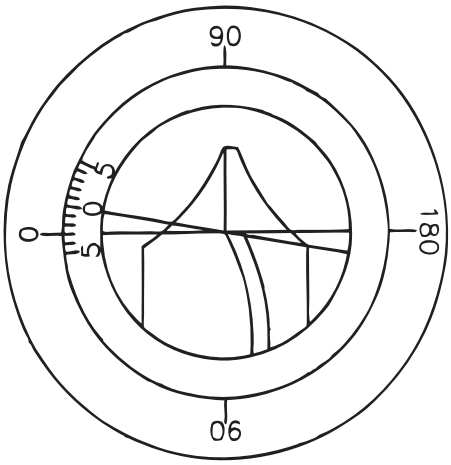


Figure 7

CHECKING OF LIP HEIGHTS

1. Set the instrument in position 1, as shown in figure 1.
2. Set the eyepiece to read 90° and by adjustment of the horizontal and vertical slides, superimpose the movable hair line on the cutting lip.
3. Set the instrument in position 2, as shown in figure 2.
4. Adjust the vertical slide until the intersection of the cutting lip and the land are on the fixed hair line.
5. Rotate the drill through 180° until the movable hair line is again superimposed on the cutting lip. If the drill is correctly ground and the lip heights are identical, the intersection of the cutting lip and the land will be on the fixed hair line.
6. If this is not the case, take the DRO reading of the position of the horizontal slide. Adjust the slide with the handwheel until the intersection of the cutting lip and the land is again on the fixed hair line.
7. Take the second DRO reading and the differenence between the two readings is equal to the difference in the height of the cutting lips.

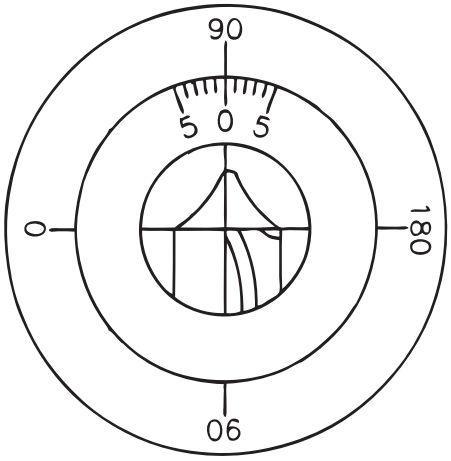


Figure 8

CHECKING THE POINT ANGLE

1. Set the instrument in position 1, as shown in figure 1.
2. By adjustment of the horizontal and vertical slides, superimpose the fixed hair line on the cutting lip.
3. Set the instrument in position 2, as shown in figure 2.
4. Superimpose the hairline on a cutting lip. The compliment of half the included point anlge can be read directly on the scale.

N.B. The point angle = 180° -- 2x the reading on the scale.

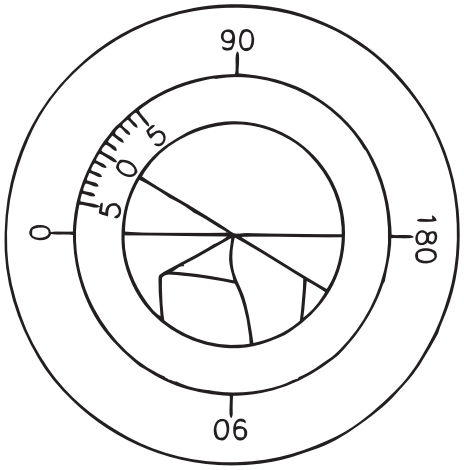


Figure 9

NOTE: Point angles can only be accurately checked on drills up to 1-1/2" dia. Due to the depth of field limit of the optical instrument, only a portion of the cutting lip of larger drills is visible and, consequently, and concavity or convexity of the cutting lip would give an incorrect reading.

MEASURING STEP LENGTHS ON MULTI-DIAMETER DRILLS

1. Set the instrument in position 2, as shown in figure 2.
2. Rest the drill in the appropriate vee with the step point approximately over the front face of the main vee block.
3. Engage either front of back stop on the shank or drill point.
4. Set the eyepiece to 90° and superimpose the fixed hair line on the extreme corner of the cutting lip of the step point. Make the DRO reading zero.
5. Advance the horizontal slide until the extreme corner of the cutting lip of the primary point is on the fixed hair line. The reading on the DRO directly gives the step length of the drill measured.

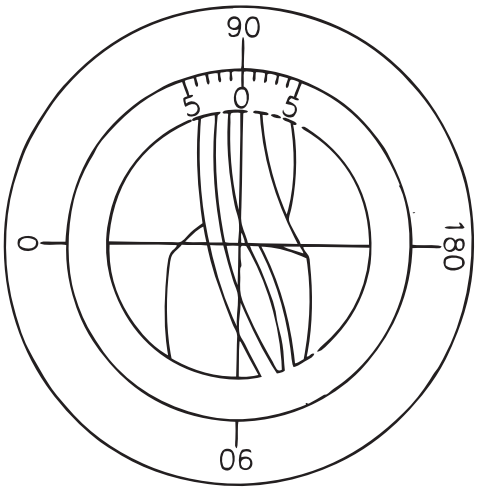


Figure 10

DIGITAL READ OUT UNIT (DRO)

The goniometer is supplied with a linear digital measuring unit that facilitates quick and accurate linear measurements that are easy to read, reducing the risk of human error and taking up very little extra space.

The maximum length that can be measured is 125mm (5”) with a guaranteed accuracy of 0.005mm. Any length within 0-125mm can be measured in steps of 0.005mm.

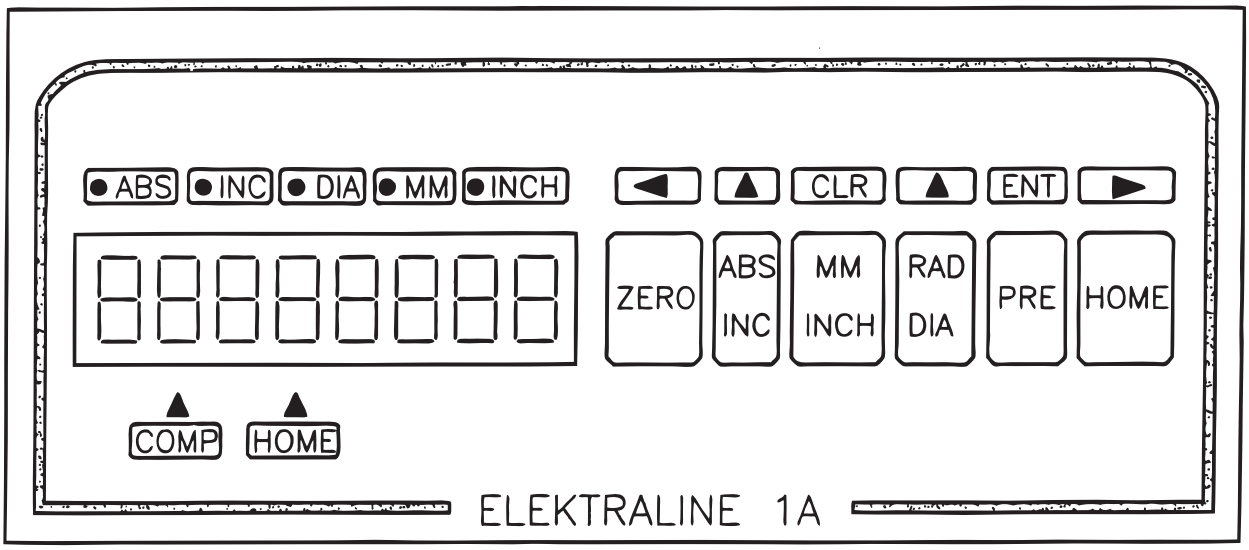


Figure 11

OPERATING PROCEDURE

When the goniometer is set to any datum point from which measurement to be taken, the digital display unit can be zeroed by pressing push button ZERO. Turn the linear movement handwheel until the feature to be measured has lined up in the eyepiece. The exact amount of movement away from the datum can be seen on the display unit.

Alternatively, a pre-selected measurement can be entered into the unit using PRESET MODE as detailed in the DRO manual. Line up the feature to be measured in the eyepiece ensuring it is the point nearest the operator. Next proceed to wind the linear movement handwheel in a clockwise direction until the point to be measured is reached. If the length is correct, the display should read zero. If the length is short, the exact anount will be shown preceded by a minus sign. Conversely, if the length is too long, the amount will be shown without any preceding sign.

You can select mm/inch measurement. Radius/Diameter measurement is also possible.

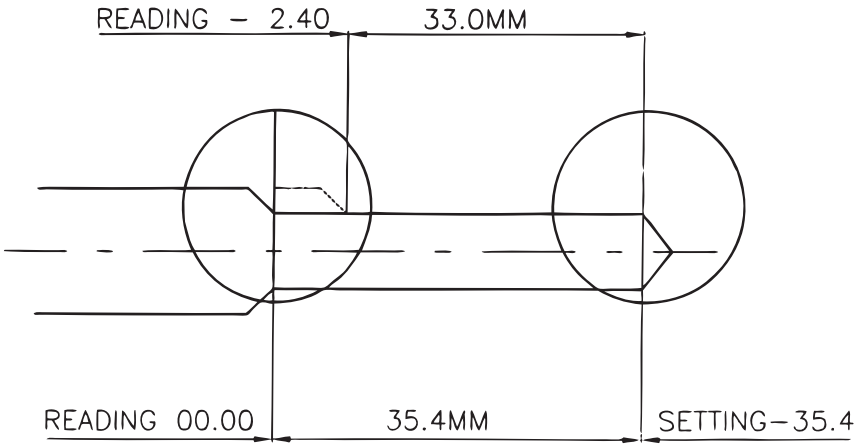
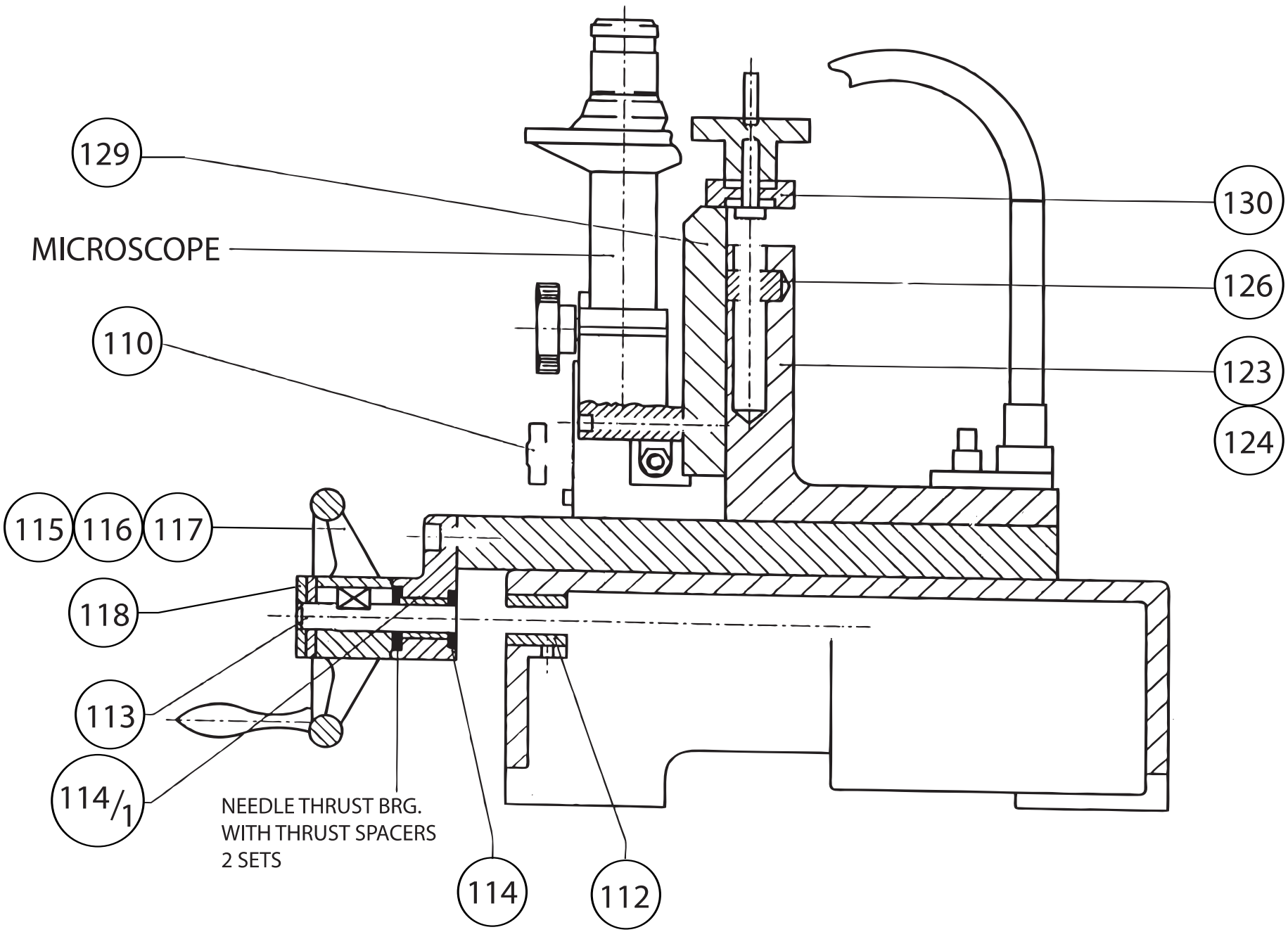


Figure 12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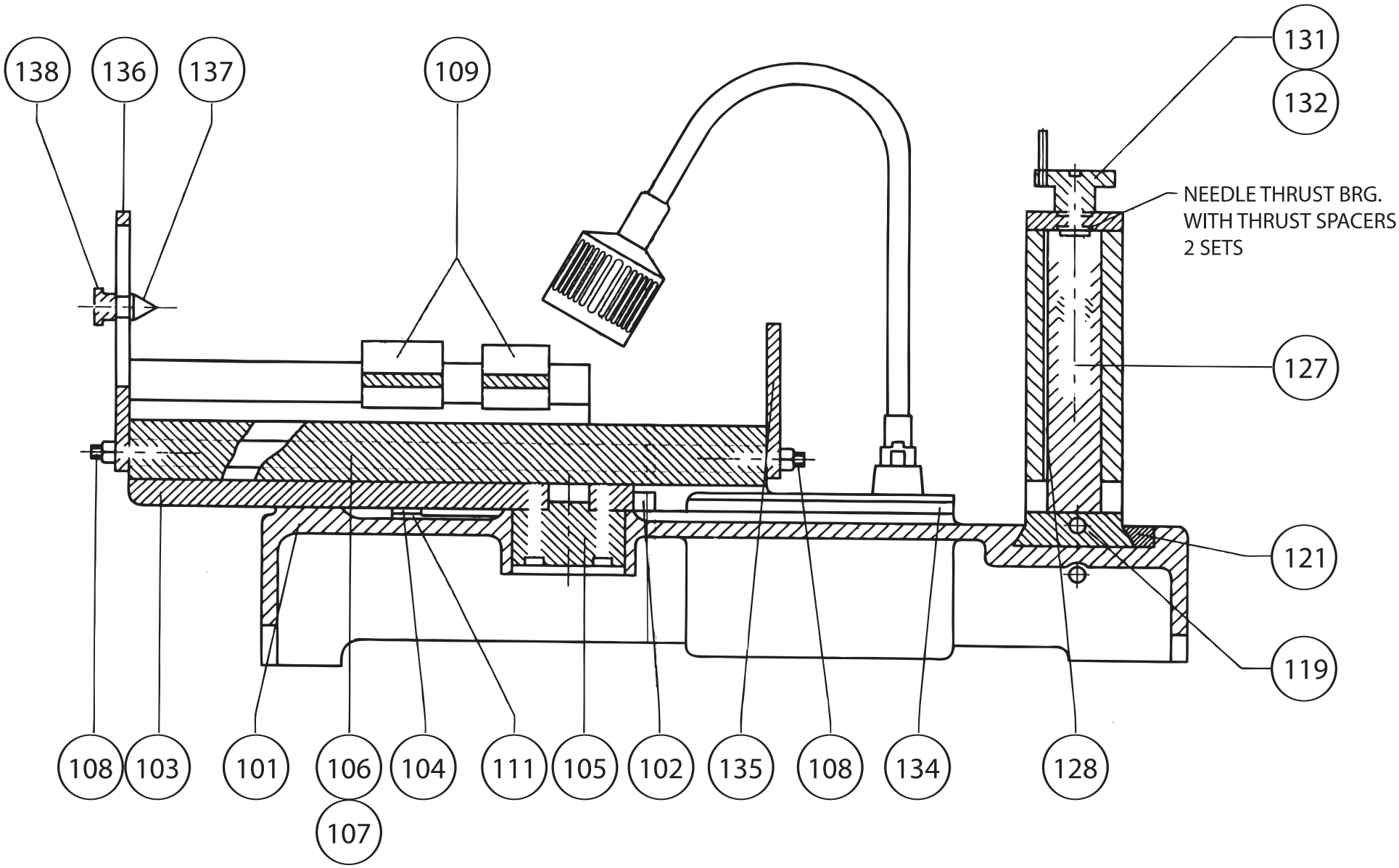
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