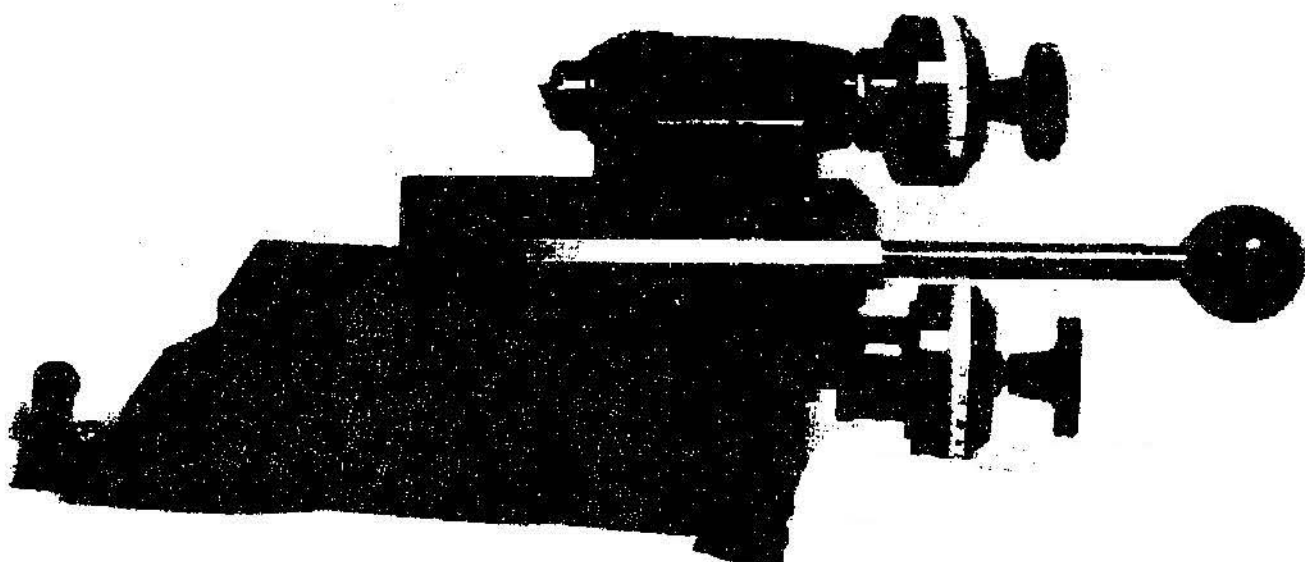




D14 AND L9  
RADIUS TURNING ATTACHMENT

**OPERATING INSTRUCTIONS  
AND  
PARTS LIST**



HARDINGE BROTHERS, INC.  
Elmira, N.Y. 14902

M-138

## READ MANUAL CAREFULLY BEFORE OPERATING RADIUS TURNING ATTACHMENT

When this instruction book was printed the information was current. However, since we are constantly improving the design of our machines, it is possible that the illustrations and descriptions may vary from the machine you received. This means that the machine you received is the latest improved model to better fulfill your requirements.

### HARDINGE SAFETY RECOMMENDATIONS

Your Hardinge attachment is designed and built for maximum ease and safety of operation.

However, some previously accepted shop practices may not reflect current safety practices and procedures and should be reexamined to insure compliance with current safety and health standards.

We recommend that all shop supervisors, maintenance personnel, setup personnel and machine operators be advised of the importance of safe maintenance, setup and operation of Hardinge-built equipment. Our recommendations are described below:

- DO be sure equipment is properly grounded.
- DO disconnect main electrical power before attempting repair or maintenance.
- DO wear appropriate eye and foot protection and when necessary, respirator, helmet, gloves and ear muffs or plugs.
- DO be sure proper guarding is in place and all doors are closed and secured.
- DO keep chemical and flammable material away from electrical or operating equipment.
- DO provide a safe, clean work area which is free of slippery surfaces.
- DO read appropriate manual or instructions before attempting operation or maintenance of a machine.
- DON'T leave machine unattended while it is operating.
- DON'T exceed the rated capacity of a machine.
- DON'T operate equipment unless proper maintenance has been regularly performed and the equipment is known to be in good working order.
- DON'T operate any equipment if unusual noise or vibration occurs.
- DON'T operate any equipment while any part of the body is in the proximity of potentially hazardous areas.
- DON'T use toxic or flammable substances as solvent cleaners or coolants.
- DON'T allow the operation or repair of equipment by untrained personnel.

(Continued on next page)

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DON'T check finishes or dimensions of workpiece near running spindles.

DON'T clean machine with air hose.

DON'T operate any machine while wearing rings, watches, jewelry, loose clothing, ties, or long hair which is not contained in a net or shop cap.

FOR YOUR OWN PROTECTION -- WORK SAFELY

## GENERAL DESCRIPTION

The Hardinge Radius Turning Attachment allows the operator to machine concave and convex surfaces up to 1.50 inches (38 mm) radius. A special RTA gage is supplied with each radius turning attachment. The gage makes it possible to accurately position the cutting tool for cutting either an internal or external radius. Dials graduated in thousandths of an inch (English) or hundredths of a millimeter (Metric) are located at the cross slide and tool slide adjusting knobs to aid in accurately setting up and adjusting the Radius Turning Attachment.

## SETUP AND ALIGNMENT

It is imperative that the radius turning attachment be aligned parallel to the centerline of the machine spindle. The alignment procedure is the same regardless of the type of radius to be turned. Align the radius turning attachment as follows:

**CAUTION:** Be sure bed is clean and ways are free of chips before installing Radius Turning Attachment onto machine bed.

1. Place radius turning attachment onto machine bed and lock in position with handle "F", Figure 1. Pull handle toward bed to lock and away from bed to unlock. Use safety latch "S", Figure 2, to keep attachment from tipping off bed when attachment is moved on bed.

**Note:** Some shims may be required to place tool on center with workpiece.

2. Install a 5/16 inch (7.92 mm) tool bit in tool holder with a minimum overhang and tighten lock screw "B", Figure 1.

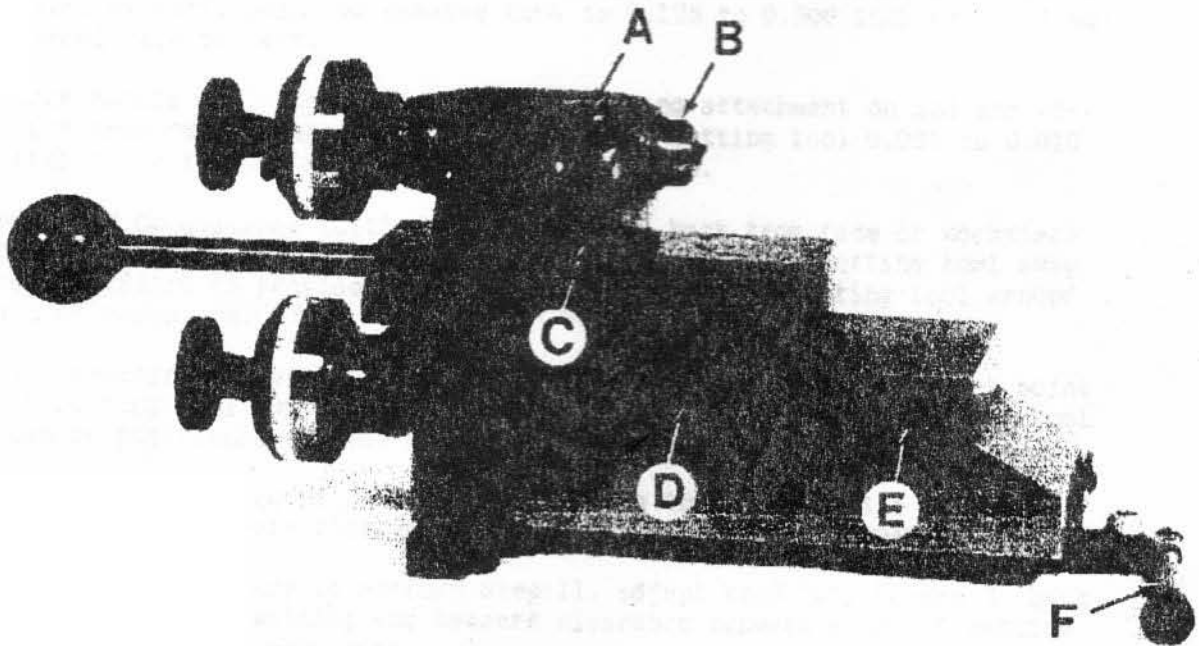


Figure 1 - Radius Turning Attachment

Note: If point of cutting tool is past pivot point on swivel post, a concave radius will be formed. If point of cutting tool is back from pivot point on swivel post, a convex radius will be formed.

3. Loosen two screws "C", Figure 1, and position tool slide so that base of tool slide is approximately 3-3/16 inches (81 mm) back from front edge of swivel base. This will cause a convex radius to be turned.

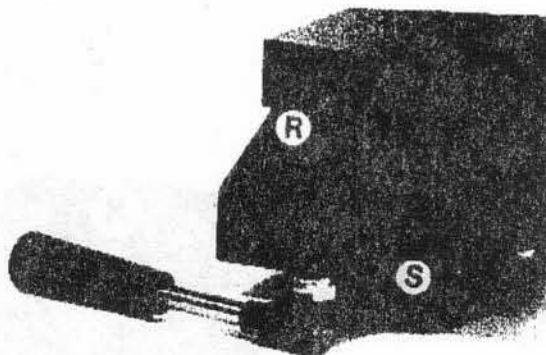


Figure 2 - Safety Latch and Bottom Slide Gib

4. Tighten screws "C", Figure 1.

5. Place a piece of one inch (25 mm) bar stock in collet. Be sure stock is long enough to allow adequate space for positioning radius turning attachment on side of workpiece.

Note: It may be necessary to use an extended nose collet in spindle in order to position part an adequate distance from the spindle face.

6. Loosen lock screw "D", Figure 1, so that radius turning attachment can be positioned parallel to centerline of spindle.
7. Unlock handle "F", Figure 1, and slide radius turning attachment toward spindle.
8. Use lever "M", Figure 3, to rotate tool slide to side of work piece.
9. Refer to Figure 4 and slide radius turning attachment along bed (toward spindle) until point of cutting tool is 0.125 to 0.500 inch (3 to 13 mm) beyond face of part.
10. Lock handle "F", Figure 1, to secure turning attachment on bed and adjust knob "N", Figure 3, to bring point of cutting tool 0.005 to 0.010 inch (0.13 to 0.25 mm) from side of workpiece.

Note: Depending on distance cutting tool is placed back from face of workpiece (toward spindle), it may be necessary to back point of cutting tool away from workpiece to provide enough clearance to rotate cutting tool around face of workpiece.

11. If necessary, adjust knob "L", Figure 3, counterclockwise to back point of cutting tool away from workpiece. Note reading on dial so that tool can be positioned to same setting on opposite side of part.
12. Use lever "M", Figure 3, to rotate cutting tool to opposite side of workpiece. Measure clearance between point of cutting tool and part.
13. If it was necessary to perform Step 11, adjust knob "L", Figure 3, back to its original setting and measure clearance between point of cutting tool and side of work piece.
14. If clearance is the same on both sides, proceed with Step 16.

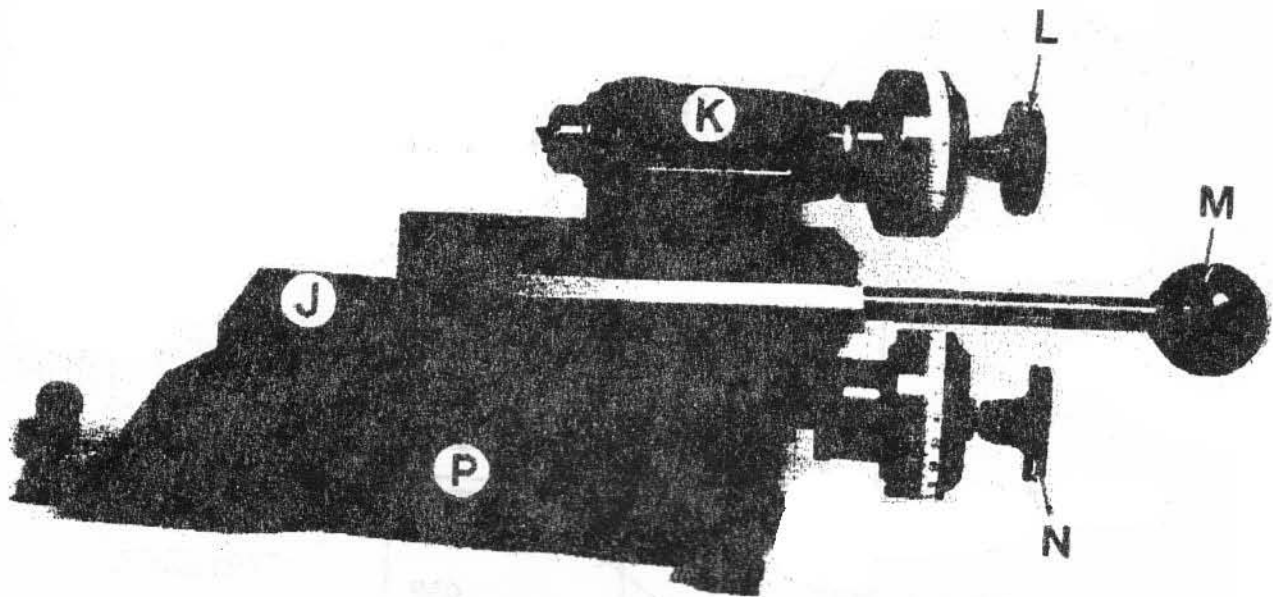


Figure 3 - Bottom Slide and Tool Slide Adjustment

15. If clearance is not equal on both sides, adjust knobs "N" and "L", Figure 3, until clearance is equal on both sides of workpiece.

Note: To fine adjust alignment, it is necessary to cut a sample sphere.

16. Position radius turning attachment so that sufficient stock can be removed to form a sample sphere and lock handle "F" Figure 1.
17. Start machine and select desired cutting speed.
18. Turn tool slide adjustment knob "L", Figure 3, clockwise to move cutting tool into workpiece and use lever "M", Figure 3, to rotate tool slide around part to cut sample sphere.
19. Stop the machine and measure the sphere.

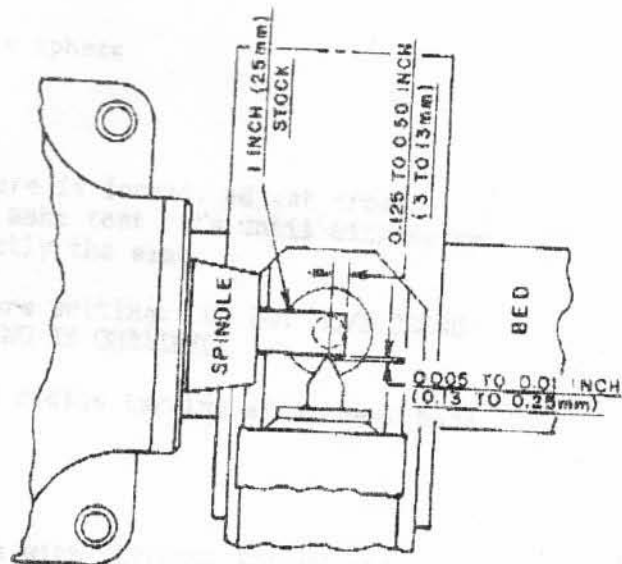


Figure 4 - Radius Turning Attachment Alignment

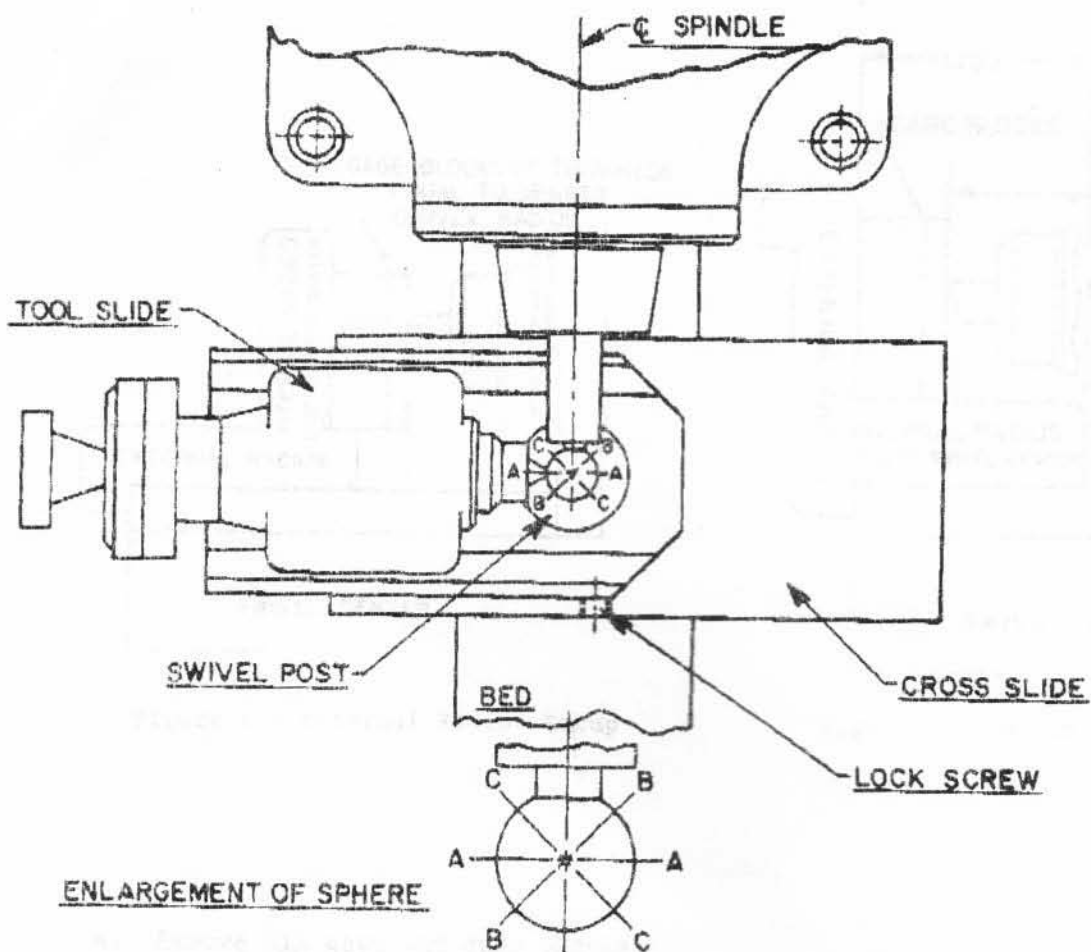


Figure 5 - Cutting Sample Sphere

20. To set cross slide so that a perfect sphere is formed, adjust cross slide adjustment knob "N", Figure 3, and make test cuts until micrometer readings AA, BB and CC Figure 5, are exactly the same.
21. Tighten lock screw "D", Figure 1, to secure setting. **DO NOT MOVE CROSS SLIDE ADJUSTMENT KNOB AFTER CORRECT SETTING IS OBTAINED.**
22. Unlock handle "F", Figure 1, and move the radius turning attachment back from spindle to set radius.

#### SETTING EXTERNAL RADIUS

1. Place RTA gage onto tool slide swivel base with **EXTERNAL RADIUS** side resting on swivel base as shown in Figure 6.
2. Place gage block or blocks of thickness equal to the radius to be turned on RTA gage. Be certain RTA gage is flat on tool slide.
3. Slide tool slide "K", Figure 3, forward on swivel base until tip of cutting tool just touches gage block. Zero dial on tool slide. Tighten lock screws "C", Figure 1.



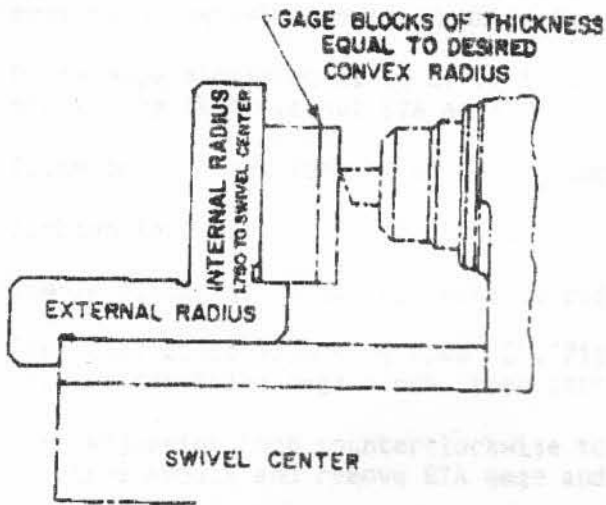


Figure 6 - External Radius Setup

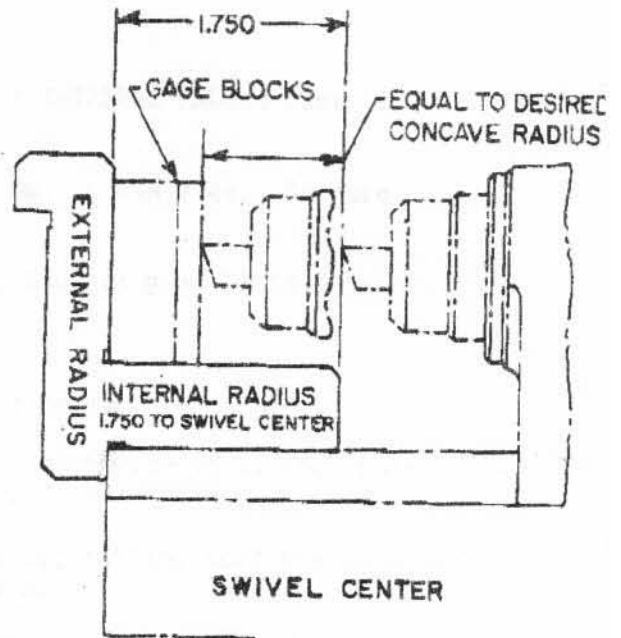


Figure 7 - Internal Radius Setup

4. Remove RTA gage and gage blocks.
5. Secure a piece of stock in work holding device.
6. Slide radius turning attachment assembly toward spindle until point of cutting tool is touching the face of workpiece. Lock in position with handle "F", Figure 1.
7. If part is semifinished, it may be desirable to cut radius in one pass. Therefore, dial would not have to be moved off from zero. However, if it is desired to turn radius in a series of cuts, turn tool slide adjustment knob "L", Figure 3, counterclockwise to back the cutting tool away from the workpiece the desired amount.
8. Start the machine and select cutting speed.
9. Use lever "M", Figure 3, to rotate the tool slide around the part.
10. If radius is being turned in a series of cuts, turn tool slide adjusting knob "L", Figure 3, clockwise to move the cutting tool into the workpiece. When the dial is back to the zero position, part has been machined to the desired convex radius.
11. To change the position of the radius on workpiece, unlock handle "F", Figure 1, and move the entire assembly toward or away from the spindle. Then lock handle to secure position.



## SETTING INTERNAL RADIUS

1. Place RTA gage on tool slide swivel base with INTERNAL RADIUS side resting on swivel base as shown in Figure 7.
2. Place gage blocks equal to 1.750 inch (44.4 mm) on RTA gage. Be sure blocks are flat against RTA gage.
3. Slide tool holder forward until cutting tool touches gage block.
4. Tighten lock screws "C", Figure 1.
5. Remove blocks of thickness equal to radius to be cut.
6. Turn tool slide adjusting knob "L", Figure 3, clockwise until tool point touches remaining gage block, then zero dial.
7. Turn adjusting knob counterclockwise to back off cutting tool the required amount and remove RTA gage and gage block.
8. Slide radius turning attachment toward spindle and position at the desired location where radius is to be cut. Lock handle "F", Figure 1, to secure position.
9. Start machine and select cutting speed.
10. Use lever "M", Figure 3, to rotate tool slide.
11. Make cuts while turning tool slide adjusting knob clockwise back to zero position. When dial is at zero position, part will have the desired concave radius.
12. To change the position of the radius on workpiece, unlock handle "F", Figure 1, and move the entire assembly toward or away from the spindle. Then lock handle to secure position.

## ALTERNATE METHOD FOR SETTING INTERNAL RADIUS

1. Follow Steps 1 thru 4 above to set cutting tool on center with swivel post. Zero dial on tool slide.
2. Remove RTA gage blocks and gage.
3. Turn tool slide adjusting knob "L", Figure 3, clockwise to move cutting tool point a distance equal to the radius to be turned and rezero dial.
4. Turn tool slide adjusting knob counterclockwise and back off cutting tool the required amount.
5. Proceed with Step 8 above.

## CLEANING AND LUBRICATING SLIDES

It is recommended that slides be cleaned and lubricated once a month.

1. Loosen two screws "C", Figure 1, and remove tool slide from swivel base.

2. Lift safety latch "S", Figure 2. Unlock handle "F", Figure 1, and remove radius turning attachment from machine bed. Move to a bench for further disassembly.
3. Loosen lock screw "D", Figure 1, and turn bottom slide adjustment knob "N", Figure 3, counter-clockwise until feed screw "X", Figure 8, is disengaged from feed screw nut "W".
4. Slide bottom slide "J", Figure 3, from base "P".
5. Clean feed screw, feed screw nut, and mating dove tails.
6. Lubricate these same areas with Mobil "Vactra" No. 2 oil or equivalent and reassemble all parts.
7. Realign following steps under "Setup and Alignment".

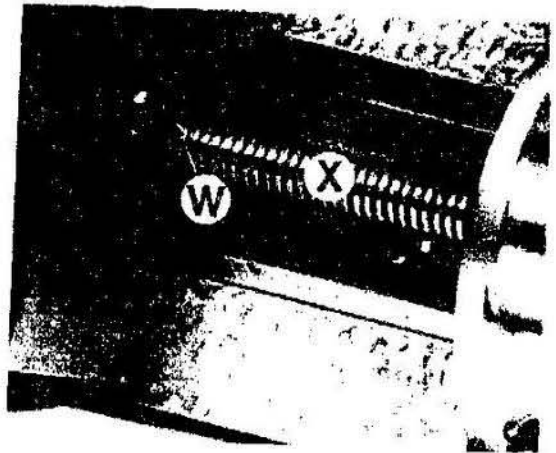


Figure 8 - Cross Slide Feed Screw and Nut

#### BED LOCK ADJUSTMENT

Should it be necessary to adjust bed lock, proceed as follows:

1. Loosen lock screw "D", Figure 1, and back bottom slide off enough to expose hex nut "B", Figure 9.
2. While holding screw "A", Figure 9, with hex pin wrench, loosen hex nut "B".
3. Turn screw slightly to obtain desired tension on clamp.

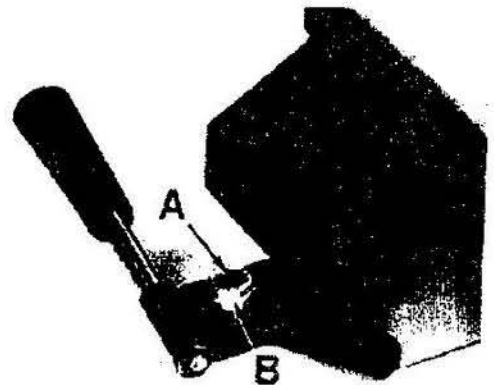


Figure 9 - Bed Lock Adjustment

NOTE: Screw has an eccentric section and requires only a small portion of a turn to obtain desired setting. Clamp should be adjusted just tight enough to "Snap Over" with light pressure of index finger.

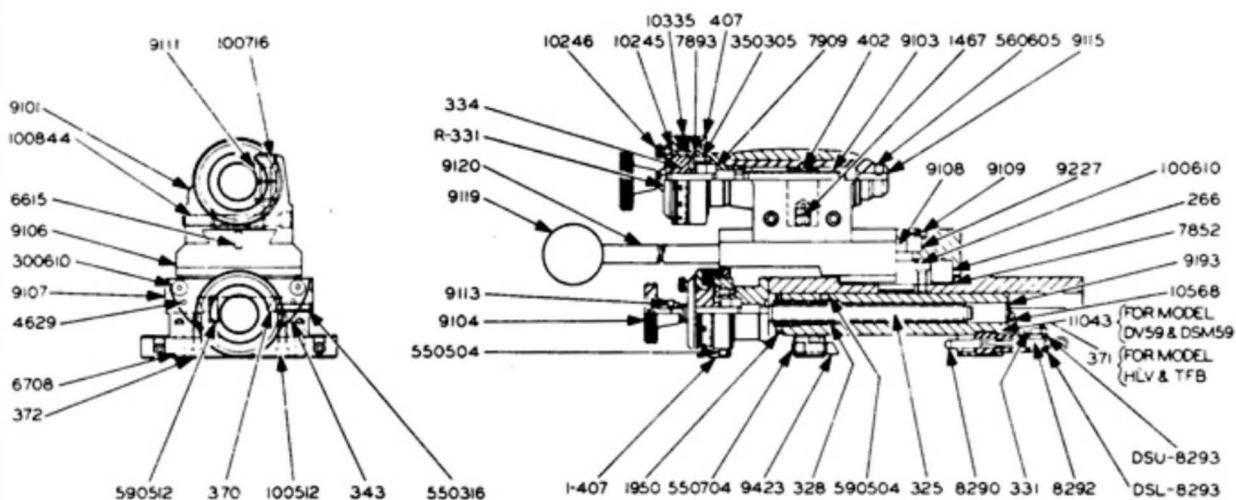
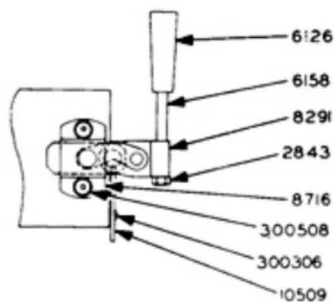
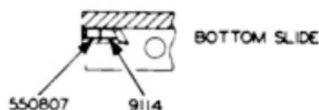
4. Hold screw in position with hex pin wrench and tighten hex nut.
5. Realign following steps under "Setup and Alignment".

#### GIB ADJUSTMENT

CAUTION: Excessive gip pressure or drag does not improve performance.

The bottom slide gib "R", Figure 2, is the straight type with adjustment accomplished by turning four screws "E", Figure 1, evenly until slide has a slight drag.

**RADIUS TURNING ATTACHMENT**  
For Models HLV-H and TFB-H Starting Serial Number 100



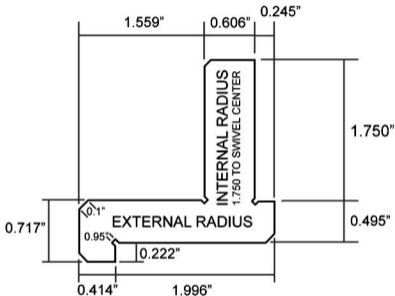
Part No.	No. Used	Part Name	Part No.	No. Used	Part Name	Part No.	No. Used	Part Name
266	1	Bearing	7909	2 Pr.	Ball Bearings	10245	2	Plugs
325	1	Feed Screw	8290	1	Plunger	10246	2	Washer and Dial Lock Assemblies
328	1	Feed Screw Nut	8291	1	Locking Handle Link	10335	2	Dial & Support Assemblies
R-331	2	Dial Washer Nuts	8292	1	Adjusting Screw	10509	1	Safety Latch
331	1	Bed Clamp Nut	DSU-8293	1	Upper Link	10568	1	Bushing
334	2	Bushings	DSL-8293	1	Lower Link	11043	1	Base
343	1	End Cap	8716	1	Bracket	100512	2	Stop Block Screws
370	1	Gib	9101	1	Tool Holder Body	100610	4	Pivot Post Screws
371	1	Bottom Slide Base	9103	1	Spindle Screw	100716	1	Binding Nut Screw
372	1	Bed Stop	9104	2	Screw Handles	100844	2	Tool Holder Screws
402	1	Feed Screw Nut	9106	1	Swivel Base	300306	1	Safety Latch Screw
407	1	End Bearing	9107	1	Bottom Slide	300508	2	Link Screws
1-407	2	Zero Rings	9108	1	Pivot Post	300610	2	End Cap Screws
1467	1	Pipe Plug	9109	1	Bearing Nut	350305	8	Bearing Plate Screws
1950	1	Feed Screw Lock Nut	9111	1	Binding Nut	550316	4	Gib Screws
2843	1	Nut	9113	2	Lock Screws	550504	1	Screw
4629	2	Dowel Pins	9114	1	Locking Plug	550704	4	Push & Lock Screws
6126	1	Knob	9115	1	Spindle	550807	1	Locking Plug Screw
6158	1	Handle	9119	1	Lever Ball	560605	1	Tool Bit Screw
6615	2	Dowel Pins	9120	1	Lever	590504	1	Screw
6708	2	Bed Stop Pins	9193	1	Expansion Plug	590512	1	Slide Screw
7852	1	Sealing Ring	9227	1	Upper Bearing			
7893	2	Bearing Plates	9423	2	Lock Plugs			

WHEN ORDERING, GIVE PART NUMBER, NAME OF PART, QUANTITY WANTED AND SERIAL NUMBER WHICH IS STAMPED ON REAR OF BED

**HARDINGE MACHINE TOOLS LTD.** Marsh Green Road, Exeter EX2 8PN

# Radius Turning Attachment Setting Gauge

(Hardinge part number: RT 0010498)



## Notes

This gauge is made from 0.975" plate

All surfaces are ground

Inscriptions are exactly as shown

INTERNAL RADIUS  
1750 TO SWIVEL CENTER

EXTERNAL RADIUS