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PT 2050-D PORTA-MATIC INSTRUCTIONS



HEAVY DUTY DIVISION

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PT 2050-D PORTA-MATIC INSTRUCTIONS

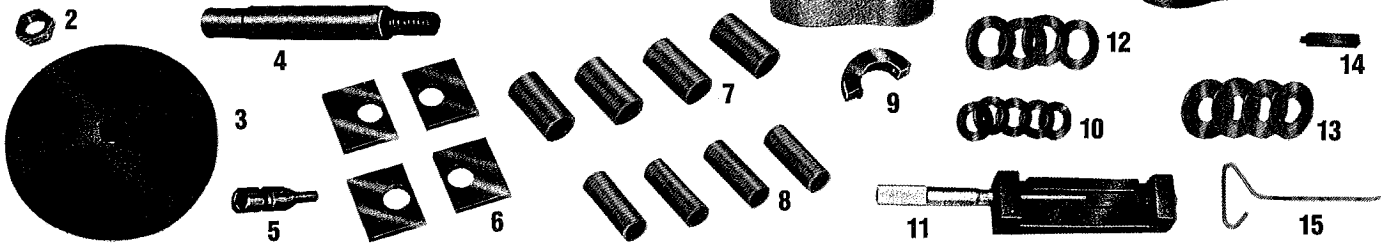
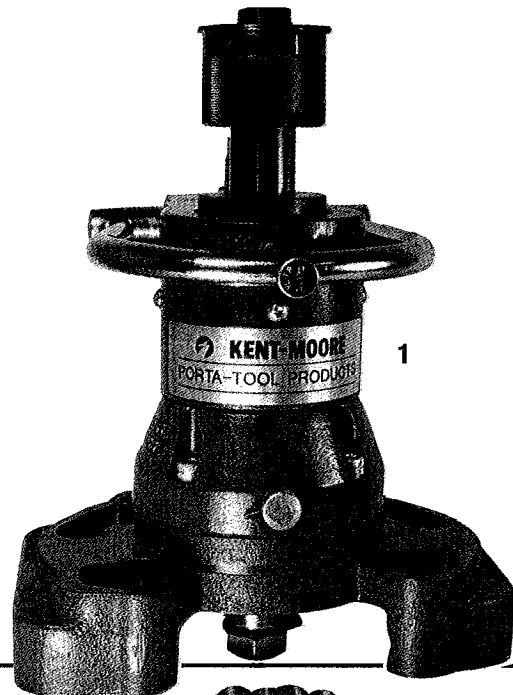
TOOL FUNCTION:

PT 2050-D Porta-Matic is used to salvage engine block counter bores which are cracked, damaged or have been counter bored to their maximum depth. The original counterbore ledge is machined out using the Porta-Matic, and a Kent-Moore repair bushing is installed. When installed, the repair bushing creates a new counterbore which must be finished cut using PT 2250-A Counterbore Cutter to bring it back to original manufacturer's specifications.

Additional kits and accessories available for use with PT 2050-D. See below for details and engine application.

NOTE:

A typical conversion kit used with PT 2050-D consists of the following: cutter, cutter plate, driver plate, guide plate, and driver shaft.



PT 2050-D CONSISTS OF:

DET NO.	PART NO.	DESCRIPTION	AMOUNT
1	PT 2000-413	Basic Machine	1
2	RTS 3601-175	Jam Nut	1
3	PT 2000-018	Driver Plate	1
4	PT 2000-019	Driver Handle	1
5	PT 1000-020A	Universal Drive	1
6	PT 2000-062	7/8" Off-Set Washer	4
7	PT 2000-016	Stud Adapter	4
8	PT 2000-021	Stud Adapter	4
9	PT 2000-138	Depth Set Collar (Optional)	1
10	RS 13500-300	5/8" Washer	5
11	PT 2000-178	Micrometer Block	1
12	RS 13300-300	7/8" SAE Washer	4
13	RS 13500-325	3/4" Plain Washer	4
14	PT 2000-029	Micrometer Setting Standard	1
15	PT 2000-028	Cutter Removal Key	1
16	PT 2100-50	Steel Box (Not Shown)	1
17	PT 2000-212	Micrometer Storage Box (Not Shown)	1
18	RS 15100-225	5/32" Short Arm Hex Key (Not Shown)	1
19	RS 15100-175	1/8" Short Arm Hex Key (Not Shown)	1
20	RS 15100-100	3/16" Short Arm Hex Key (Not Shown)	1
21	RS 15100-200	3/32" Short Arm Hex Key (Not Shown)	1

	CUMMINS 5-1/2 NH VT/VTA 1710	CUMMINS 5-1/8 NH	CUMMINS 903	CUMMINS K, 7.4 & 7.5	CUMMINS VAL-VALE	MAK TRUCK 865/866 8 CYL.	CAT 5.4 EXCEPT D346, D348, 3406, 3408 & 1693	CAT 4.75 1673C 1674 & 3306	CAT 4.5 (D330, D333) 1670 & 1673	CAT 5.4, 3406 0346, D348	DDA 92 SERIES
PT 2000-195 CONVERSION KIT	•		•				•			•	
PT 2000-023 GUIDE PLATE		•									
PT 2000-024 GUIDE PLATE			•								
PT 2000-025 DRIVER SHAFT		•									
PT 2000-026 DRIVER SHAFT			•								
PT 2000-050 CUTTER PLATE ASSEMBLY			•								
PT 2000-082 CONVERSION KIT					•						
PT 2060 CONVERSION KIT				•							
PT 2030-002 CONVERSION KIT						•					
PT 2000-027 CONVERSION KIT									•		
PT 2000-078 CONVERSION KIT								•			
PT 2100-046 GUIDE PLATE										•	
PT 2100-045 DRIVER SHAFT										•	
PT 2040-001 CONVERSION KIT											•
*PT 2000-198 CUTTER PLATE	•										

*Re-centers in bore if repair bushing has been pulled out

PT 2050-D

Your Port-Matic has been manufactured to very precise specifications. A great deal of care and craftsmanship went into the manufacturing of this tool so that you may enjoy years of trouble-free service. Each and every Porta-Matic is tried and tested before it leaves our factory. Your Porta-Matic is a precision piece of machinery which requires all the care you would provide for any type of precision equipment. Care and maintenance is simple and need only be done periodically to insure complete satisfaction from this tool.

Please adhere to the following guidelines for years and years of trouble-free machining:

PREPARATION FOR MACHINING

A. CARE AND MAINTENANCE OF THE HYDRAULIC FEED HOUSING

1. Although your Porta-Matic was inspected and tested before leaving our factory, the oil level should always be checked prior to your initial use. The oil seals will absorb some of the oil creating a low oil condition and tool chatter could occur. Your oil level should also be checked periodically to prevent chatter (once a month is sufficient).

TO CHECK OIL LEVEL:

(Add only 30 weight non-detergent motor oil.)

Lay the feed unit on its side with the oil port in the highest position (see page 10). Support the feed unit so that it lays in the horizontal position. Remove the oil port plug. The feed unit is full when the oil is filled up into the threads. If the oil level is below the threads then top off using only 30 weight non-detergent motor oil. Open feed valve and slowly rotate and push the mainshaft in and out. Top off oil level any time the oil level drops below threads, continue this procedure until no more bubbles appear and oil level is maintained into the threaded area. Replace oil port plug.

NOTE:

The hydraulic feed may slowly settle down into a rest position when left in up position. This is normal and does not indicate a problem with the Porta-Matic unit. If this happens, it will be necessary to unlock the feed to return unit to its full up position.

B. CUTTER PLATE INSPECTION

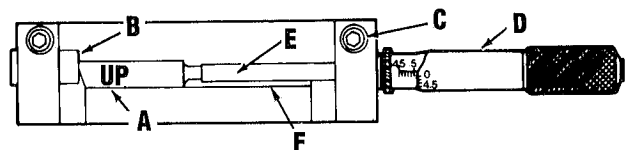
Always inspect your cutter plate before proceeding. Make sure you have the correct plate for your application. Inspect it for burrs or sharp edges (it should be smooth). Inspect and adjust the ball spring plunger screw (brass colored) which provides tension to the cutter bit. To adjust

this screw to the proper tension, you must first install a cutter bit into the cutter slot. Tighten down the tension screw completely. Then back the screw 1/4 of a turn. Cutter tension is now properly adjusted.

C. VERIFYING THE MICROMETER BLOCK

The micrometer is pre-set at the factory. However, due to handling during shipping, it may be out of specification. It is recommended that the Micrometer Block be checked prior to setting cutter. Always clean all measuring surfaces before using micrometer, setting standard or cutter. Inspect cutter stop (B) and cutter tip for nicks, if damaged, replace.

1. Use PT 2000-029 Setting Standard (A) to verify the Micrometer reading. Place setting standard with side stamped "UP" between cutter stop "B" and the micrometer spindle (E). Hold setting standard firmly against cutter stop (B) and surface (F) when checking setting standard or setting cutter. Turn Micrometer Thimble until spindle (E) fits snugly against the setting standard. The Micrometer should read 5.000".
2. When Micrometer adjustment is required, loosen socket head set screw (C) and move Micrometer slightly away from cutter stop (B). Set Micrometer to read 5.000".
3. Slide Micrometer to fit snugly against setting standard (A) and securely tighten socket head cap screw (C).
4. Back off Micrometer (D) and re-tighten to fit snugly against setting standard (A). Recheck the Micrometer which should read 5.000".



D. VERIFYING THE SETTING STANDARD

If you suspect your setting standard to be damaged or inaccurate, use the following procedure.

1. Always check Micrometer Block first. See "Verifying the Micrometer Block" instruction.
2. Use Scrap Engine Block to perform this check.
3. Measure bore in block, add +.040" to measured bore. This will be your test bore dimension.

Example: Bore measured	6.295"
Add	+.040"
Test bore size	6.335"

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- Set cutter to 6.335" dimension.
- Bore hole and measure.
- Compare against set cutter dimension. Example: If measured bore is 6.336" it is oversize by .001". Setting Standard would require .0005" material removal, lap to size by removing material from stem side of setting master.

If bore measures undersize, example 6.334", then Setting Standard (PT-2000-29) should be replaced. Order Setting Standard Oversize (PT-2000-29) and follow instruction "Machining Setting Standard to Size".

NOTE:

Undersize bore cuts can be caused by damaged setting standard, or worn bushings in machine.

E. MACHINING SETTING STANDARD TO SIZE

NOTE:

Use Scrap Engine Block to perform this test.

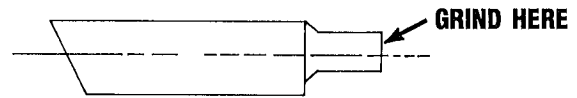
- Measure bore in block, add +.040" to measured bore. This will be your test bore dimension.

Example: Bore measured	6.295"
Add	<u>+.040"</u>
Test bore size	6.335"
- Set Cutter, bore block and measure.
- Verify cutter still measures original setting 6.335".
- If size of newly cut bore is different than the 6.335" cutter setting then loosen micrometer holding screw and adjust micrometer to read actual bore size of newly cut hole.
- Tighten micrometer holding screw at this measurement.
- Place setting standard into micrometer and turn micrometer thimble down until spindle touches the setting standard.

NOTE:

Setting Standard is .010" to .020" oversize.

- Read your micrometer.
- The difference between your micrometer reading and 5.000" is half the amount you will need to grind or lap the end of the setting standard (indicated by arrow) to read 5.000" on the micrometer.



PT 2000-29 REPLACEMENT SETTING STANDARD

- CAREFULLY GRIND OR LAP SETTING STANDARD TO SIZE. When you are finished, your micrometer should read 5.000". Your micrometer and setting standard are now set correctly!

F. SETTING CUTTER FOR BORE DIAMETER

- Loosen the set screw in the back end of cutter. Push spring loaded adjusting pin into body of cutter all the way. Tighten set screw.
- After verifying the Micrometer Block, set Micrometer for .040" less than the size bore your application calls for:

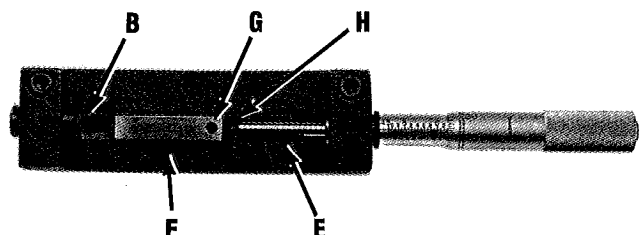
Example:	Application	Bore to Dimension
1st Cut	NH 5-1/2 Bore, V12	6.710 Dia.
Final Cut		6.750 Dia.

NOTE:

It has been determined through testing, that when you take two cuts to machine for a bushing, your bore will be much more accurate and have a higher quality surface finish. Kent-Moore Heavy Duty Division and the Cummins Engine Company recommend two cuts to achieve your final bore diameter. Your final cut must be .040".

Other engine applications and bore size information are detailed on Kent-Moore's bushing information sheet (Form #PT 84-509).

- Place cutter in Micrometer Block and hold it firmly against the micrometer spindle - E and surface - F.
- Loosen set screw - G on cutter and allow adjusting pin - H to push out against the Micrometer spindle. While holding cutter in place, slowly allow the cutter tip to come in contact with cutter stop - B. Tighten set screw.
- Back off Micrometer thimble and recheck cutter setting. Back off Micrometer and remove cutter from Micrometer Block.



G. PREPARING BLOCK FOR BORING

1. Steam clean block. Remove all top deck dowels and studs using PT 6200 Stud-Out Tool or equivalent.
2. Remove all burrs and high spots from top deck with a large mill cut file (PT 2000-400 File).
3. Using Scotch Brite Pads PT 2901, remove all dents, dirt, and burrs from the INSIDE DIAMETERS OF THE COUNTERBORE. This area is used by cutter plates to center the Porta-Matic over the bore.

MACHINING THE UPPER DECK BORE FOR A REPAIR BUSHING

FEED VALVE OPERATION

To close feed valve, turn valve knob to the right so pointer is horizontal (Figure 1). To open feed valve, turn knob to the left so pointer is in vertical position (Figure 2).

HELPFUL HINT:

Note the position of the Feed Valve in each of the following photos.

NOTE:

Prior to placing the boring machine on engine block, make sure that the bottom surface of base plate is clean and burr free. The cutter should be removed from the cutter plate, and all screws are securely fastened.

1. Select proper cutter plate, install plate on shaft of Porta-Matic and secure with nut and washer. (Figure 3.)

2. Place PT 2050-D Porta-Matic over bore to be cut. Open Feed Valve and lower the cutter plate into the bore. Push down firmly on the mainshaft while rotating the cutter plate in the bore to ensure proper alignment. (See Figure 4.)
3. With cutter plate centered in bore, align base plate with (4) cylinder head bolt holes in block maintaining as much baseplate-to-block contact as possible. Install washers, stud adapters and cap screws through baseplate and into block. (Handle may be swung up for easy access to cap screws).

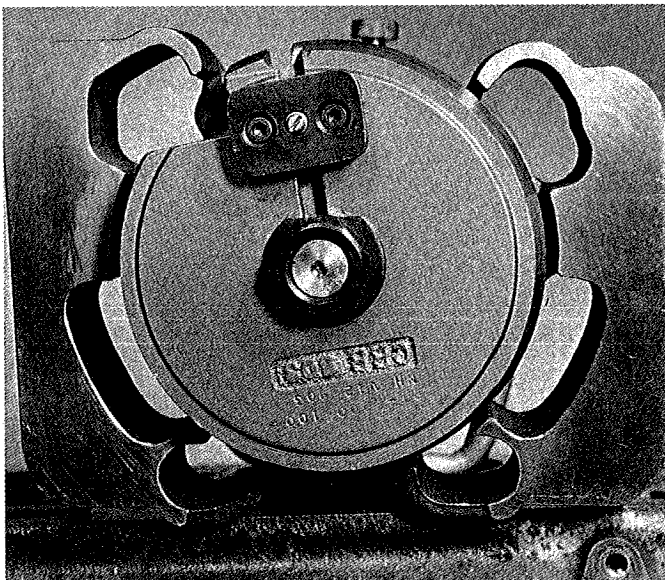
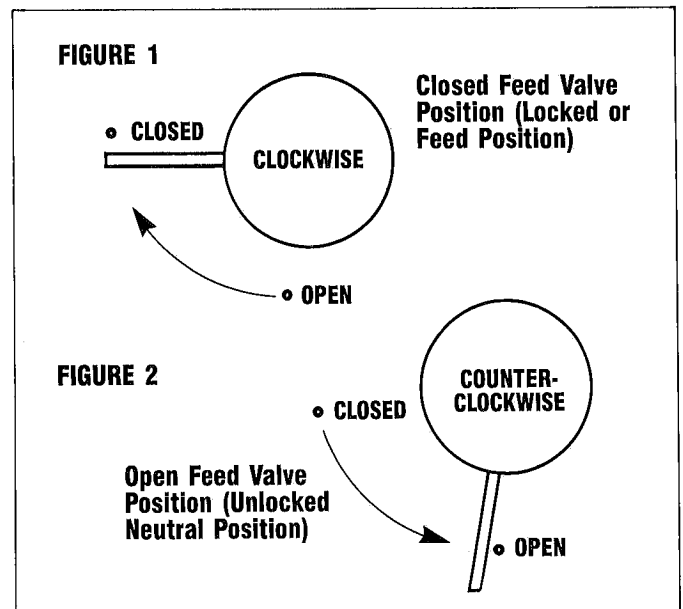


FIGURE 3

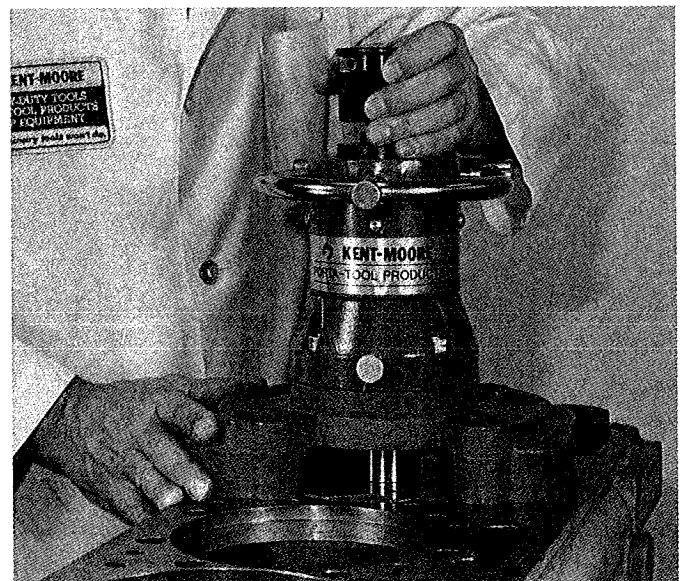


FIGURE 4

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4. Cross torque the (4) cylinder head bolts gradually to 50 ft/lbs. Swing handle down and lock in position. Rotate mainshaft of boring tool to ensure cutter plate is centered in bore. If binding occurs, loosen head bolts and repeat Steps 3 and 4. (See Figure 5.)
5. Retract the cutter plate from the bore and lock it in the full up position. (See Figure 6.)

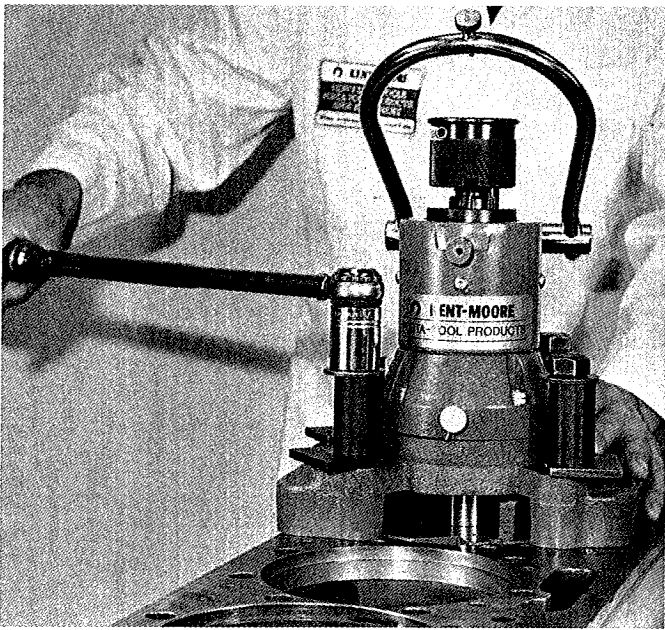


FIGURE 5



FIGURE 6

6. Insert the cutter all the way into the cutter plate and tighten cutter plate swivel pad set screw. Cutter should enter with noticeable drag due to ball spring detent on bottom of cutter holder plate. The cutter must fully contact the main shaft of the boring tool to assure accurate boring.

NOTE:

The cutter must be inserted into the cutter holder slot with the tip to the lower left side of slot. (See Figure 7.)

NOTE:

Cutter has a shallow hole which will face downward when cutter is properly inserted into slot.

7. Place a 0.004 inch feeler gauge between the block and the cutter. Open Feed Valve and lower cutter plate until it rests on the feeler gauge. (See Figure 8.) Tighten swivel pad set screw to secure cutter in place.

NOTE:

OPTIONAL DEPTH SET SPACER INSTRUCTIONS:

Loosen the set screw on the depth set collar and adjust it up. In most cases such as the 5-1/2 NH Engine, you can attach the PT 2000-138 Depth Set Spacer Block onto the mainshaft, below the collar and resting on the Porta-Matic housing. (See Figure 9.) There are some applications where PT 2000-138 cannot be used. When using the PT 2000-138 Depth Set Spacer, place the repair bushing between the Depth Set Spacer and Collar. Lower Depth Set Collar down the mainshaft so that it rests squarely on the repair bushing and securely tighten the set screw. (See Figure 10.)

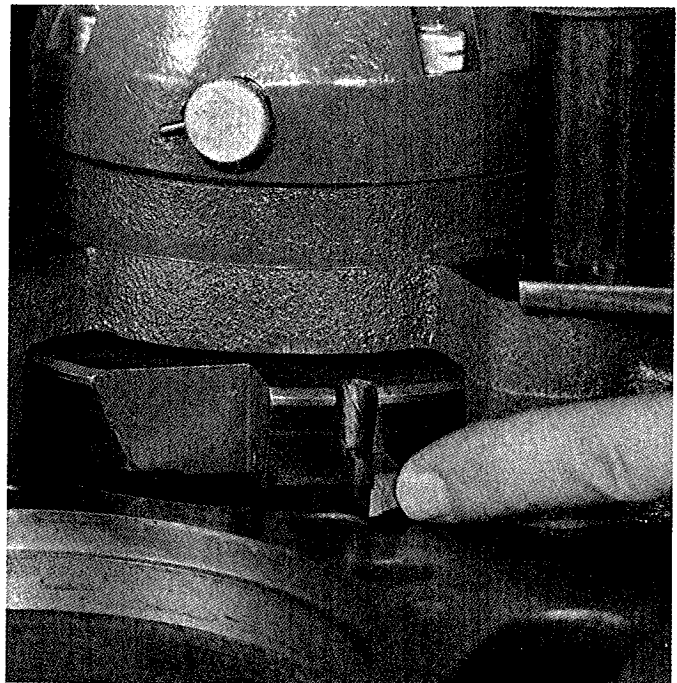


FIGURE 7

8. Place the bushing between the Depth Set Collar and the main housing. Then adjust the Depth Set Collar down the mainshaft so that it rests squarely on the repair bushing and securely tighten the set screw. Remove the repair bushing. This spaces the Depth Set Collar to cut 0.004 inches less than the total height of the repair bushing being used.



FIGURE 8

9. Pull mainshaft to the full upright position and lock Feed Valve in closed position. Remove feeler gauge. (See Figure 11.)

10. Chuck the 1/2" universal drive adapter into a 5/8" or 3/4" heavy duty (8 AMP or more) electric drill (300-600 RPM) (PT7145).

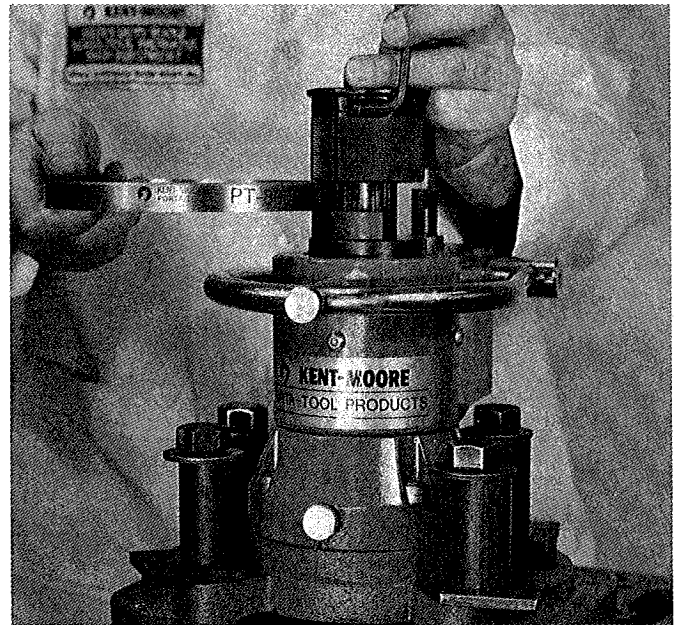


FIGURE 10

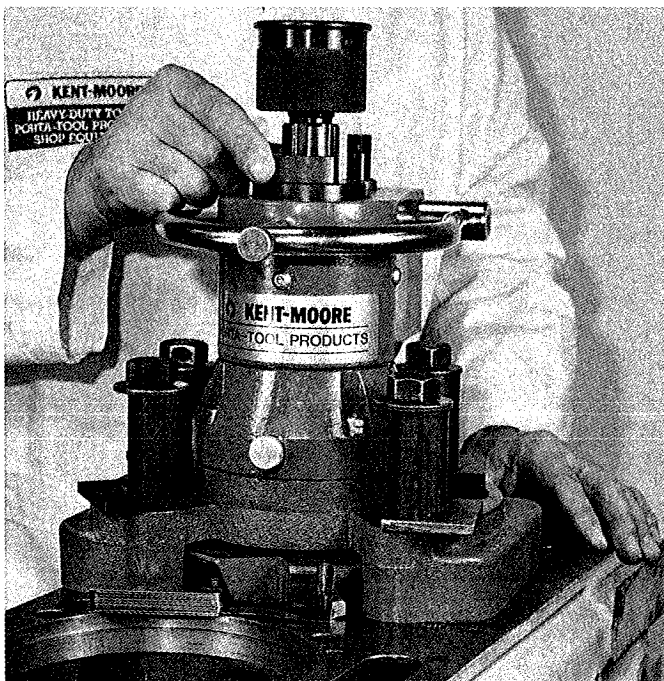


FIGURE 9



FIGURE 11

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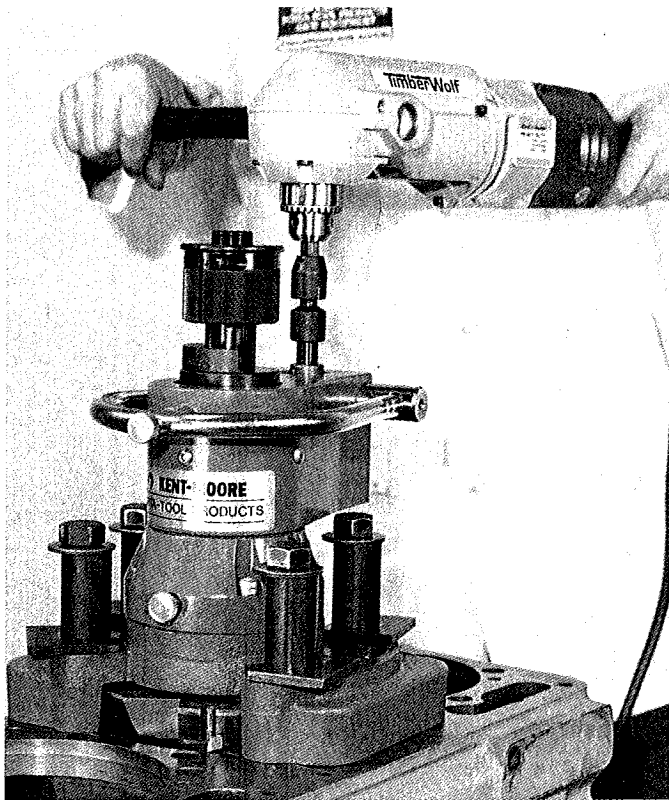


FIGURE 12

11. Install universal drive adapter and drill onto driveshaft of Porta-Matic and prepare to bore without stopping until the machine freewheels. (See Figure 12.)

NOTE:

Approximately half way through the cut, the operator should be prepared for the increased load put on the machine caused by the additional material being cut. A firm grip and a balanced stance are recommended. Operation is complete when boring machine freewheels.

12. Remove the electric drill from boring machine. Open Feed Valve and retract cutter plate to its full up position. Close Feed Valve to lock in up position. (See Figure 13.)



FIGURE 13

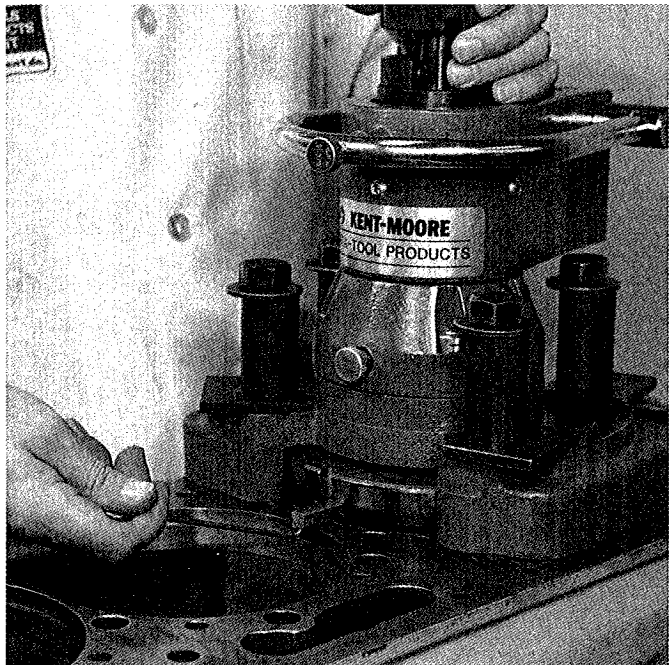


FIGURE 14

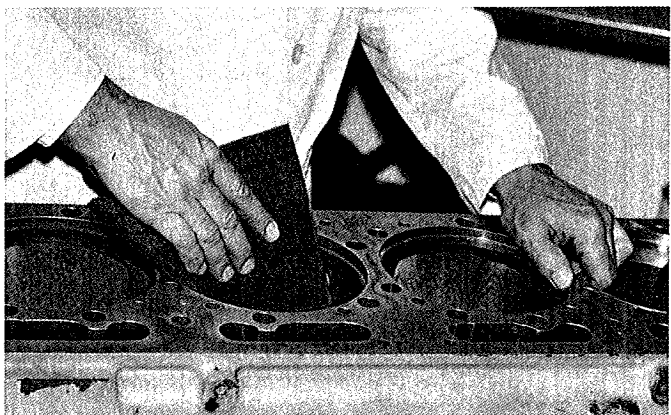


FIGURE 15

13. Loosen swivel pad set screw and insert cutter removal key into shallow hole in bottom of cutter and pull to remove cutter from plate. Remove boring machine. (See Figure 14.)
14. Clean away all shavings and deburr bore with Scotch Brite Pad PT 2901. (See Figure 15.)

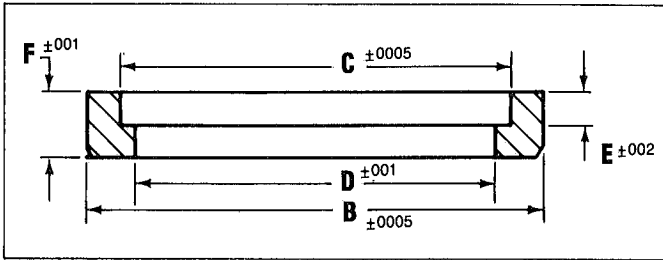


FIGURE 16

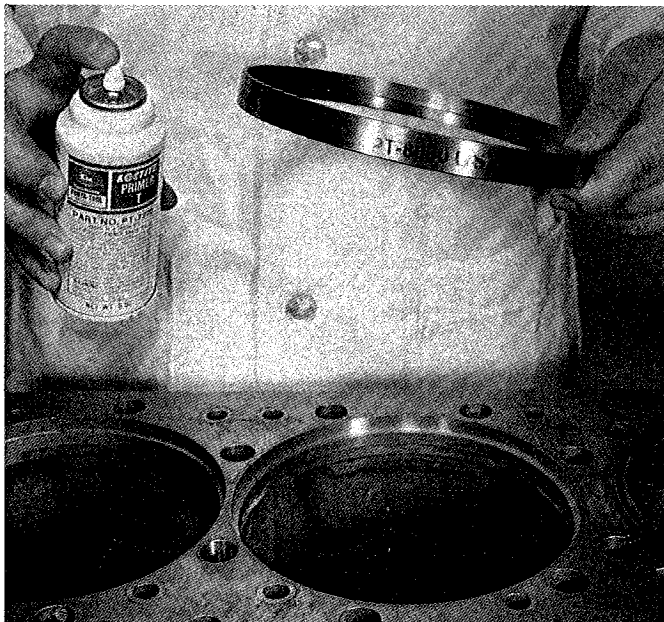


FIGURE 17



FIGURE 18

15. Remove all chips and foreign material from the cutter recess and the access area where the cutter contacts the mainshaft. It is very simple to clean these areas with a cotton swab. Foreign material in these areas could cause the next bore to be cut oversize.

NOTE:

Diameters of the finished cut bores must be $\pm.001$ " of the specified bore size. A cutter that has been resharpened on the flat of the carbide loses its center line and will have a different setting from that of a new cutter. A resharpened cutter should be test bored before using to determine its accuracy. If a bore is cut oversize, a special oversize bushing can be ordered. Kent-Moore stocks several oversized bushings for the 5-1/2 NH engine for immediate delivery. You may also order a custom made oversize bushing manufactured to fit any existing bore so that no additional cutting will be required. See Figure 16 for ordering information required to make a special bushing.

NOTE:

Install the Counterbore repair bushing and finish file it flush with deck before going on to the next bore. Never attempt to cut all the bores and then install repair sleeves.

16. If the block is to be resurfaced, all repair bushings should be installed first. Allow at least 4 hours after the last bushing repair before resurfacing the block. This time period is required to allow the Loctite to cure.

INSTALLING A REPAIR BUSHING

1. Clean bore and bushing outside diameter thoroughly with PT 7270 Primer T. (See Figure 17.)
2. Lightly coat the inside diameter and bottom of newly cut bore with PT 7260 Loctite Compound. (See Figure 18.) Insert bushing on driver. (See Figure 19.) Using

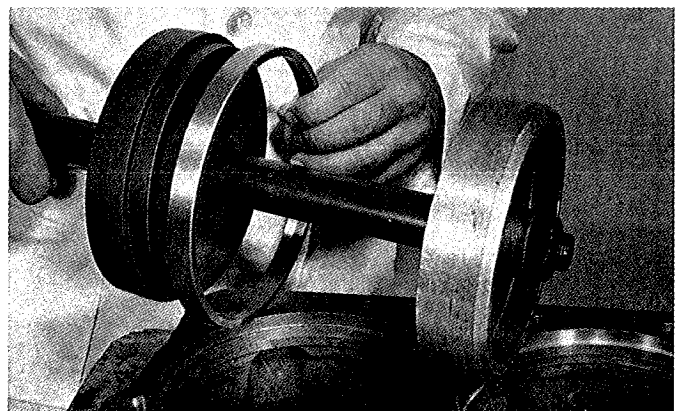


FIGURE 19

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hammer and the bushing driver assembly install bushing into bore until it bottoms. A solid sound can be heard when bushing bottoms. (See Figure 20.)



FIGURE 20

3. When fully installed, the bushing will protrude slightly above the top of the block approximately 0.004". This protrusion must be filed even with the top of the deck. (PT 2000-400 File.) Remove all burrs using a scotch pad. Sand paper should never be used. (See Figure 21.)

NOTE:

Refer to the instruction sheet included with the PT 2000-207 cutter plate for "Lower Press Fit" (LPF) liner machining instructions.



FIGURE 21

PT 2050-D PORTA-MATIC SERVICE PARTS LIST

- A** = PT 2000-15 Base Plate
- B** = PT 2000-137 Drive Unit
- C** = PT 2000-54 Drive Bracket Assembly

A 1A. PT 2000-15 BASE PLATE

- 1B. RS 9104-300 Socket Head Cap Screw (3/8 - 16 x 1-3/4)**

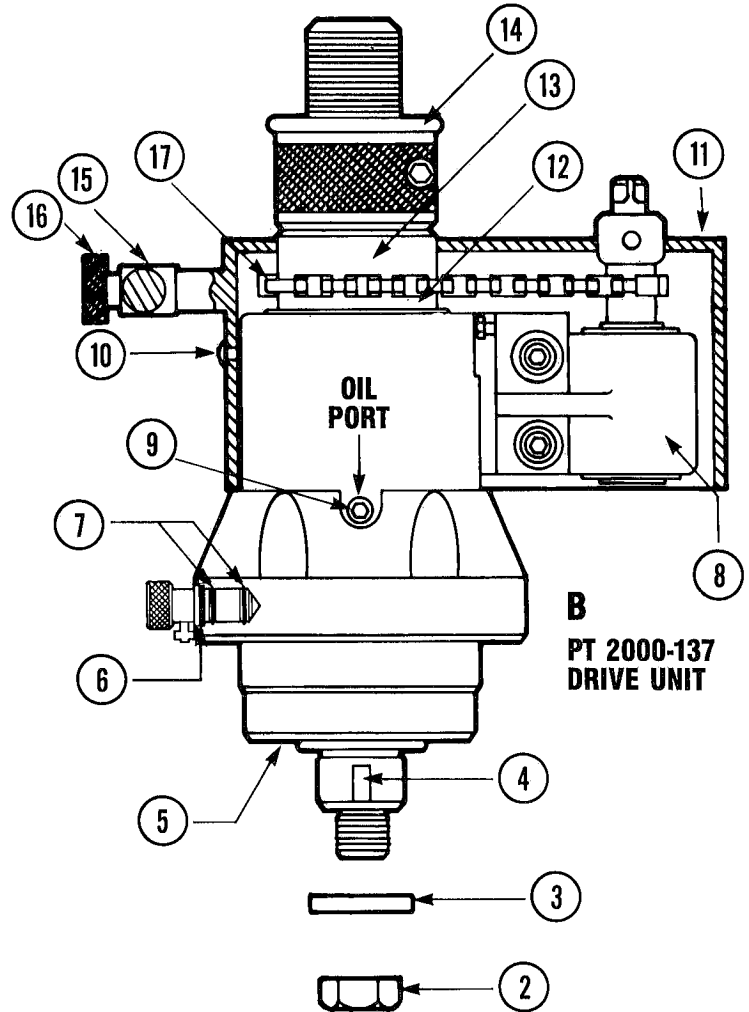
B PT 2000-137 DRIVE UNIT

- | | | | |
|------------|--------------|--------------------------------------|---|
| 2. | RS 3601-175 | Jam Nut (7/8) - 14 Thread) | 1 |
| 3. | PT 2000-17 | Cut Off Washer | 1 |
| 4. | PT 2000-42 | 1/4" Square Key | 1 |
| 5. | PT 2000-148 | Lower Seal | 1 |
| 6. | RS 22200-32 | Retaining Ring | 1 |
| 7. | RS 3000-30 | "O" Ring | 2 |
| 8. | PT 2000-54 | Drive Bracket Assembly | 1 |
| 9. | RS 31004-900 | Hex. Socket Pipe Plug (1/8-27 NPT) | 1 |
| 10. | RS 9106-660 | Button Head Cap Screw (1/2-20 x 1/2) | 3 |
| 11. | PT 2000-143 | Chain Guard Assembly | 1 |
| 12. | PT 2000-5 | Spline Washer | 1 |
| 13. | PT 2100-10 | Spline Sprocket | 1 |
| 14. | PT 2000-203 | Depth Set Collar | 1 |
| 15. | PT 2000-204 | Handle | 1 |
| 16. | PT 2000-149 | Handle Screw (3/8 Thread) | 1 |
| 17. | PT 2000-056 | Drive Chain Assembly | 1 |

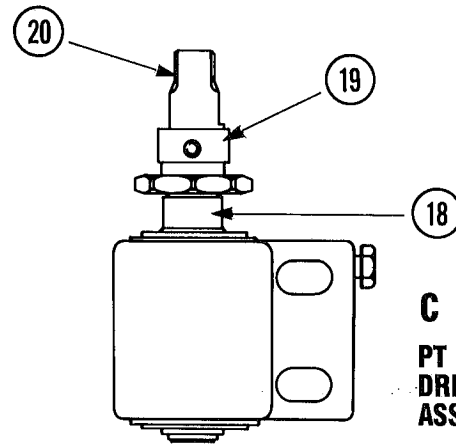
C PT 2000-54 DRIVE BRACKET ASSEMBLY

- | | | | |
|------------|-------------|----------------|---|
| 18. | PT 2000-57 | Spacer | 1 |
| 19. | PT 2000-105 | Drive Sprocket | 1 |
| 20. | PT 2000-3 | Drive Shaft | 1 |

QTY

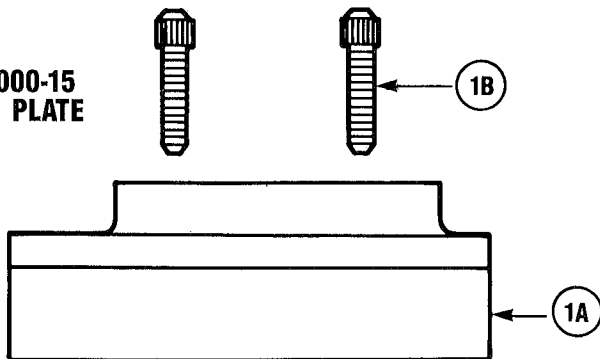


B
PT 2000-137
DRIVE UNIT



C
PT 2000-54
DRIVE BRACKET
ASSEMBLY

A
PT 2000-15
BASE PLATE



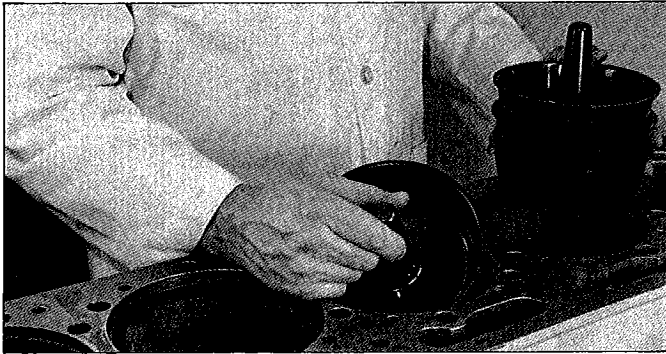
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PORTA-MATIC ACCESSORIES

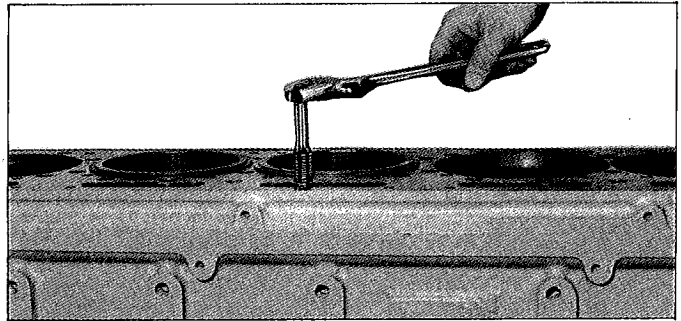
PT 2000-400
Finishing File



PT 2000-101
Chip Catcher



PT 7230
Thread Chasing Tap



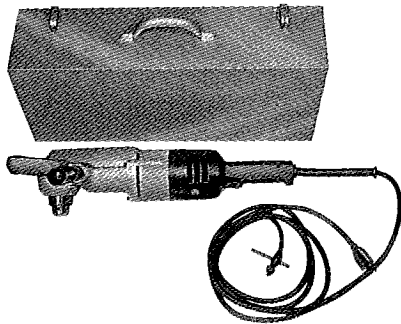
PT 7260
Loctite
Retaining
Compound



PT 7270
Loctite
Primer T

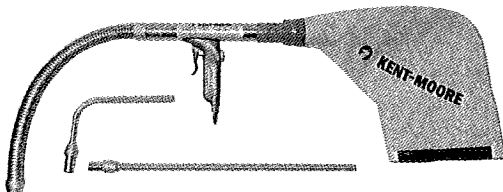


PT 7145
Right Angle Drill



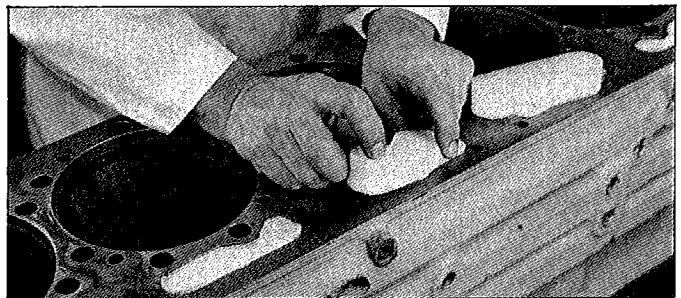
PT 2900
Super Chip Vacuum

Vacuum metal chips instead of blowing them around. Compact and easier to handle than a shop vac. OSHA approved. Operates on shop air 80-150 PSI. Large reusable bag. Weighs only one pound.



PT 2902
Engine Saver Block Plug Kit

Package of six disposable block plugs keeps debris from falling into push tube cavity in block deck.



SPX

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Heavy Duty Division
SPX Corporation*

Exponent of Excellence

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29784 Little Mack
Roseville, MI 48066-2298
1-800-328-6657 (USA, Canada)

Telex 244040 KMTR UR
Fax 313-774-9870