ELECTRO-MOTIVE

M.I. 317

MAINTENANCE INSTRUCTION

UPPER DECK BORING BAR FIXTURE FOR 567 A, B, AND BC ENGINES

GENERAL DESCRIPTION

The upper deck boring fixture, Fig. 1, is a tool designed to remove metal from the cylinder head retainer. It is of rigid construction and fits into the cylinder bore with the cylinder head, piston, connecting rod, and liner removed. The upper portion of the tool is a circular rotating table on which is mounted a sliding cutting head assembly that can be moved horizontally by a handwheel or automatically while cutting across the cylinder head ring seat by contacting a feed pawl, (I) Fig. 1, mounted on the retainer wall.

Two cutting tool assemblies are used with the boring fixture. One is mounted on the rotating plate for cutting horizontally across the retainer seat, (K) Fig. 1. The other, a vertical cutting assembly, Fig. 2, is mounted on the horizontal assembly by four socket head cap screws and is used for vertical cuts on the retainer wall, (M) Fig. 1. The tool bits used with these assemblies are: 8116829 (3/4" x 3/4" x 4-3/4") used for making horizontal cuts across the retainer seat. 8122418 (1/2" x 1/2" x 2") used for vertical cuts on the retainer wall, and 8122419 (1/2" x 1/2" x 2") for forming the radius on the retainer shoulder.

The rotating table is driven by a multivane type air motor which fits on the No. 4 Morse taper drive shank. The speed is reduced through reduction gears in the gear box of the boring bar.

The entire boring bar is held rigid in the cylinder bore by a connecting rod anchor which bolts over the engine crankshaft crankpin when at top dead center. This is an integral part of the boring bar, and holds it stationary in the crankcase. If the crankshaft is removed from the engine a special seat ring is used which is attached to the lower water manifold plate as a locator, Fig. 3.

Aligning clamps fit across two bosses located at the bottom of the gear case. These clamps are applied to the top of the engine stress plate inspection holes, and drawn tight by 1/2" studs and nuts, one on the rear stress plate and one on the front stress plate, (F) Fig. 1. Four shimming areas are also provided above this point on the gear case for accurate alignment to prevent cocking and taper bore, (C) Fig. 1.

Special gauges are provided with the boring bar fixture for measuring the inside diameter of the bore after cutting, and master gauges are supplied for calibrating these gauges.

INSTALLATION OF BORING BAR INTO CYLINDER BORE

1. Drain engine cooling water, and oil from engine oil pan. Remove power assembly of cylinder bore to be worked on.

2. Bring crankpin of cylinder to be worked on to top dead center.

3. Clean area around air box and cylinder head retainer completely.

4. Install boring fixture lifting hooks by removing plate anchor setscrews, (E) Fig. 4, so hooks can be bolted to the tool. Remove connecting rod anchor bearing cap.

5. Set the fixture in the crankcase. The top of the rotating table will be slightly below the ring seat surface when fixture is completely down on crankpin.

6. Use a .0015" feeler gauge and check at points (A) Fig. 1 to be sure that crankpin is directly on top dead center and that the bar is positioned correctly on the crankpin.

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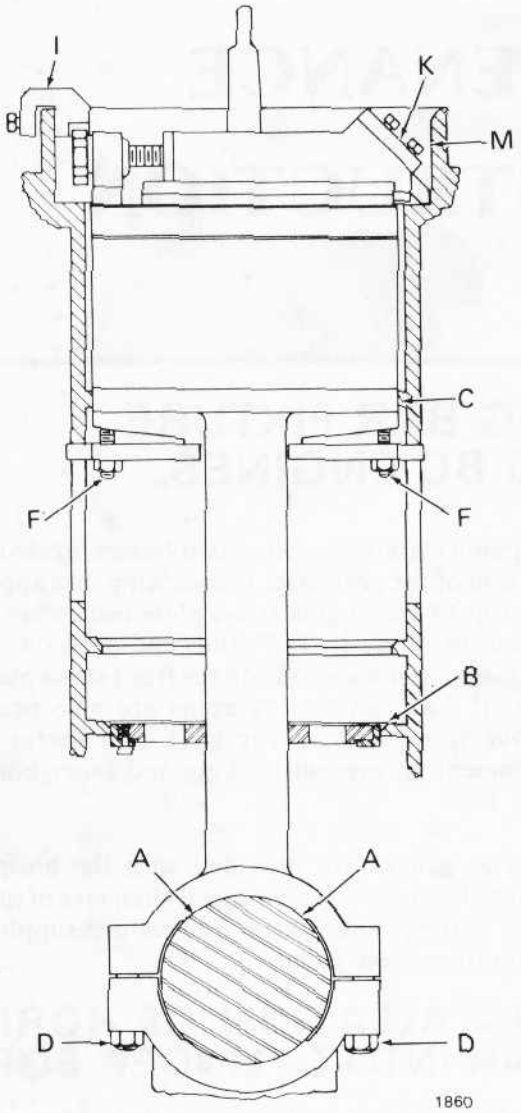

Fig.1 - Upper Deck Boring Fixture

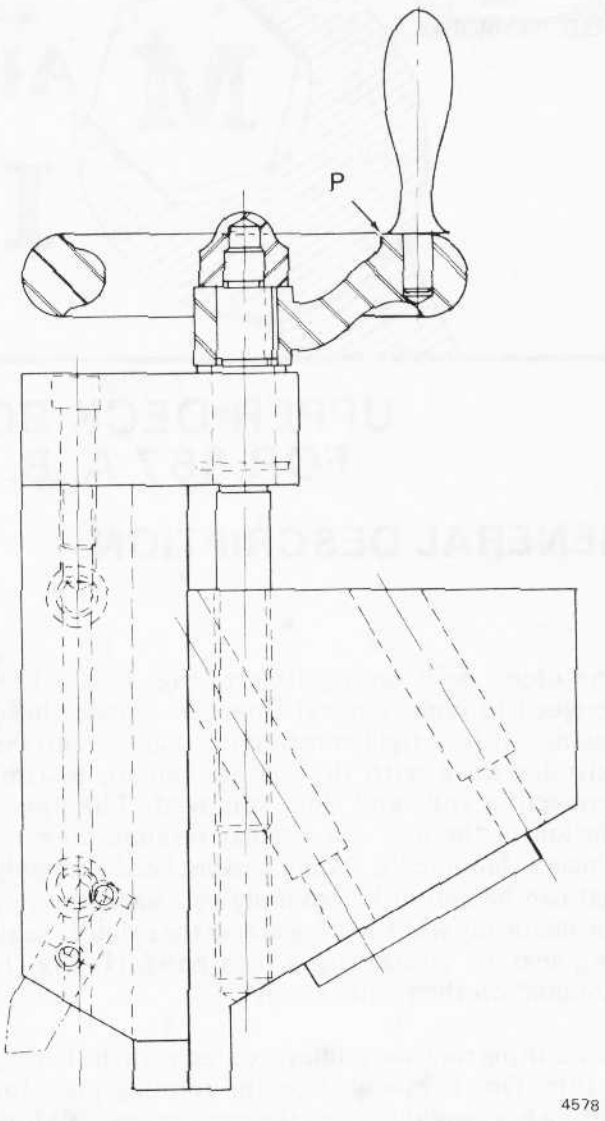

Fig.2 - Vertical Boring Feed

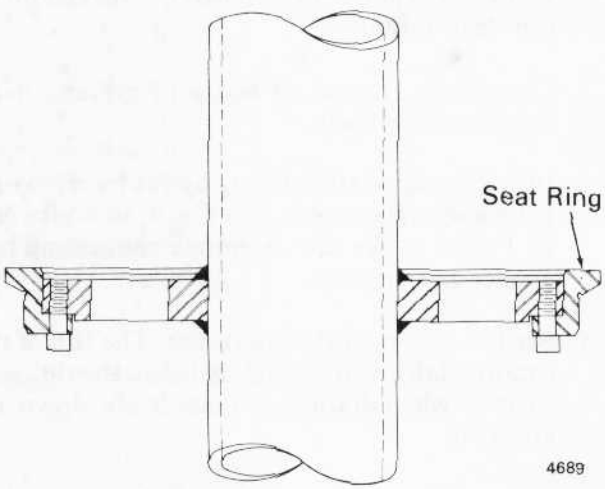

Fig.3 - Special Seat Ring

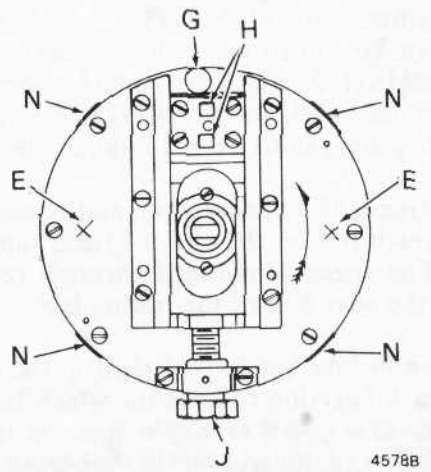

Fig.4 - Top View Of Boring Fixture

7. Install the connecting rod anchor lower cap, and secure with bolts, (D) Fig. 1.

NOTE

If the special seat locating ring, Fig. 3, is used, Steps 6 and 7 may be disregarded. The special seat ring is fitted to the bar with which it is shipped, therefore, it is not interchangeable from one boring bar to another.

8. Use an .008" feeler gauge, to check around circular locating ring at lower water manifold plate, (B) Fig. 1. Shim this locator at four points, if necessary, to maintain center of cylinder bore.

9. Employing the same method as in Step 8, check the top locator at bottom of gear case, (C) Fig. 1. Note that this locator has clearance to allow for any out-of-round due to heat from the exhaust ports, and has four checking points. Check these points, (N) Fig. 4, to prevent cocking of the fixture and taper boring.

10. To insure proper location of the fixture install two dial indicators, by clamps and extensions. Locate them on the rotating plate 180° apart at points, (E) Fig. 4.

11. Depress dial indicators to give about .050" reading and set dials to zero.

12. Install clamps and nuts, (F) Fig. 1. Tighten clamps until both indicators read .005" minus.

13. Check both indicators without changing their position to see that they read the same. If not, adjust at clamps F until they do. Add necessary shims to secure solid position of boring bar in crankcase.

14. Remove the dial indicators and extensions. After the bar has been properly aligned and secured in the crankcase, the vertical or the horizontal boring operation may be performed.

BORING OPERATION OF CYLINDER HEAD SEAT RING SURFACE (HORIZONTAL)

The following procedure is used for facing the cylinder head seat ring surface for application of cylinder head seat ring 8049596 where it replaces either original narrow seat ring 8042656 or standard ring 8050512. Cylinder head seat ring 8049596 is .038" oversize or .230" thick. Standard cylinder head seat ring is .192" thick.

1. Set the .105" tool setting gauge, provided with the fixture, on the gauge button of the rotating plate, (G) Fig. 4. Bring cutting edge of the horizontal tool bit down snug on top of the .105" gauge, then tighten tool. Remove the gauge. The cutting tool will then be set for the rough cut.

2. Run the cutting tool sliding assembly out manually by using the ratchet on the adjusting screw, (J) Fig. 4, until tool just clears the metal to be removed.

3. Set the automatic feed pawl, (I) Fig. 1, on the retainer shoulder and rotate the turning plate which carries the cutting tool, by hand, to see if the feed pawl contacts the adjusting screw in proper relation.

4. Set the air motor on the fixture drive shank and be sure the motor is completely down on the shank.

5. Place the air motor stop post on adjacent crab bolt and bring the motor arm in contact with the post to absorb the motor torque.

6. Place a sheet metal chute in the air box under the fixture to direct the chips outside the engine.

7. Start the motor and take a rough cut across the retainer cylinder head seat almost to the retainer wall, (M) Fig. 1, until the 13.675" I.D. gauge slips in.

8. After stopping the rough cut at the 13.675" dimension, move the cutting tool toward the center of the rotating plate, to prepare for another cut.

9. Set the .085" cutting tool gauge on the gauge button, (G) Fig. 4, of the rotating plate, and bring the cutting tool down snug on this gauge. This will allow the cutting tool .020" for the finish cut. Make sure that the edge of cutting tool is sharp.

10. With the cutting tool set to the .085" gauge, tighten tool, take this finish cut and check again to the 13.675" dimension.

11. The cut mentioned in Step 10 finishes this machining operation and boring tool may be removed. Clean cylinder and bore of chips.

APPLICATION OF RETAINER STEEL INSERT RING

In cases where excessive corrosion and pitting of the retainer wall has occurred, the application of a steel insert ring 8102926 to the wall may be necessary. In such cases follow Steps 1 to 16 that follow.

1. Apply the vertical feed attachment 8081135 to the boring fixture. This attachment is shown in Fig. 2. It is applied to the fixture by four socket head capscrews 138244 supplied with boring bar.

2. Apply the vertical cutting tool 8122418 to the vertical feed assembly. This tool is 1/2" x 1/2" x 2".

3. Raise the cutting tool with the vertical feed until it is at the top of the wall to be cut. Set the cross feed with the horizontal adjusting screw, (J) Fig. 4, to allow a moderate cut. Lower the tool bit with the vertical adjusting wheel, (P) Fig. 2.

4. Apply air motor to driving shank and apply air motor stop post to crab bolt. Bring motor arm in contact with post to absorb motor torque. Make provision in the air box under fixture to divert chips outside of crankcase.

5. Start the motor and take a light cut. If satisfactory, continue with boring operation.

6. Cut the vertical bore down even with the cylinder head retainer seat, exercising care not to cut too deeply into the corner.

7. Continue boring operation by taking at least three cuts until a finished diameter of 13.850" ± .003" is reached. Check bore diameter frequently using gauges provided with the bar.

8. When boring is finished remove vertical feed attachment from boring fixture, remove fixture and clean all chips.

NOTE

After boring the cylinder head retainer, but before actually applying the insert, each retainer should be magnetic particle inspected for any possible cracks or porosity. The reason for this is that cooling water can leak from the upper manifold through a cracked or porous retainer into the space between the retainer and insert, and this will result in water contamination of the lube oil. Any fault found should be ground out and welded using E-6012 electrodes before applying the insert to the retainer.

9. Apply the insert to the bore by tapping in place with a rawhide or wooden mallet, without collapsing the insert.

10. Be sure to line up evenly the water outlet holes of the insert with the outlet holes in the retainer, leaving equal welding area around each outlet.

11. After application, grind notches in the insert to retainer junction in at least 8 places, beginning above the center of the water outlet holes, on the top edge of the insert. Space the notches evenly around the insert. These notches should be about 1/4" wide x 1/4" deep x 1/2" long. Fill these ground out portions by skip welding, one on one side then one opposite, with 3/32" AWS Class E-6012 welding electrode. If stainless steel insert is installed, use 3/32" stabilized stainless steel AWS type 308 electrodes.

12. Weld around edge of each water outlet hole to retainer. Minimize distortion by welding partly on one then on another. Avoid slag pockets on the water outlet welds, as these must be water tight. After welding around the outlet holes, grind out the center portion of the insert between outlet holes and weld the top and bottom edges.

13. After welding application of the insert, peen the welds and the entire inner area of the insert with a one pound hammer. Peening is necessary to ensure the retainer insert will be tight against the cylinder head retainer shoulder. Install the boring bar again and bore to an inside diameter of 13.687" ± .000"-.005".

14. With radius forming tool, blend top shoulder of retainer to original radius. This is to allow the cylinder head water seal ring to slip into retainer without restriction. The entire insert may be polished with fine emery cloth to remove tool marks.

15. Remove boring fixture and clean up.

16. Water test all inserts and water jackets at one application to at least 60 psi. Provide fittings and blanks for water inlets and outlets having an air bleed-off line in the top of the system and a gauge in the system to determine pressure. Blank fittings are available: 8081034 for cylinder head retainer water ports, and 8190189 for the lower water deck.

PRECAUTIONS TO BE TAKEN IN USE OF BORING FIXTURE

1. In the event the crankshaft has been ground, it will be necesary to shim at (A) Fig. 1, to attain

standard size, or use the special seat ring (B) Fig. 1, supplied with the tool.

2. When applying the boring fixture connecting rod anchor, always be sure it is tight on crankpin before starting to bore.

3. The boring fixture must enter crankcase without driving or forcing, as this may cock it causing taper cutting.

4. Take care not to put hands below gear case while lowering tool into the crankcase.

5. Always contact motor arm against crab bolt extension provided with the fixture before starting motor.

6. Be sure drive motor is completely down on drive shank before starting motor.

7. Make certain that no loose clothing, personal apparel, or loose cleaning cloths are caught in the tool.

8. Always stop boring operations before removing chips.

9. Run cutting tool assembly in on the tool slide before handling fixture, so tool will not protrude beyond rotating plate.

10. To obtain best results, use moderate cutting and feeding speeds and a cutting lubricant.

MAINTENANCE

The only boring bar maintenance necessary is cleaning and oiling of exposed parts. Oil feed screw and vertical feed attachment slide. For boring bar shipment or storage, coat all machined surfaces with a rust preventive.

EQUIPMENT LIST
(Supplied With Fixture)

QTY.	DESCRIPTION	PART NUMBER
1	Upper deck boring bar	8048353
1	Non-reversible multivane air motor	8359402
1	Nut	8040808
1	Attachment for upper deck boring bar	8081135
1	Index Clamp	8088281
1	Ratchet wrench	8122412
1	Lifting hook	8122415
1	Gauge for cylinder head ring seat .085"	8173380
1	Gauge for cylinder head ring seat .105"	8173378
1	Gauge for cylinder head ring seat 13.675"	8173384
1	Gauge for stainless steel retainer 13.687"	8122417
1	Gauge for stainless steel retainer 13.853"	8122416
2	Clamps for boring bar	8122414
1	Top plate	8122413
2	Setscrews 1/2" -13 x 1-1/4" long, dog point	113032
4	Socket head screws 3/8"-16 x 1-1/2" long	138244
1	Set of Allen wrenches	8048322
6	Radius forming tools 1/2" x 1/2" x 2-1/2" long	8122419
6	Boring tool 1/2" x 1/2" x 2" long	8122418
4	Facing tool bit	8116829
1	Master gauge 13.675" x .005"	8173383
1	Master gauge 13.682" x .005"	8126175
1	Master gauge 13.848" x .005"	8126174
1	Special seat ring for boring bar	8122411
1	Taper shank No. 4 male to female	8122420
2	Socket head screw 1/2" x 1-1/4"	138291