Instructions For

Sportsman Shaft-Mounted Rocker Arms

For Ford 289-302-5.0L H.O./351W V-8's

Part Number(s) 44809-1

For more information, see www.cranecams.com

Applications: Edelbrock® Victor® Ford; Edelbrock®/Chapman Victor® CNC, World Products®: Windsor Sr.®; Windsor Sr. Lite®; Roush 200®

NOTE: Crane **44809-1** Shaft mount rockers cannot be used on any OE Ford factory heads or heads with OE valve and rocker stud spacing. Crane # 44808-1 fits OE type heads as well as Edelbrock® Victor Jr.® and Performer RPM® heads.

Your new Crane Sportsman Shaft-mounted Rocker Arm system has been designed for the serious Sportsman and Semi-Professional racer. This system was designed to take advantage of the latest developments in advanced composite materials technology, metallurgy, finite element analysis, laser traced valvetrain analysis, and all of the experience of the Crane R&D department.

HOW CRANE SHAFT-MOUNTED ROCKERS INCREASE POWER AND ENDURANCE…

During the opening and closing of the valves, the needles in traditional needle bearing roller rocker arms roll in one direction as the valve opens. They stop rotation at the maximum open point and then must reverse direction. This stopping and starting of the bearings is called "bearing inertia." It **consumes horsepower**, and its effect increases with the square of engine speed. In addition, needle-bearing rocker arms use what is termed "full complement" bearings (where the needles lay against each other resulting in rolling friction) as opposed to "caged" bearings (where the needles are separated from each other). With a "full complement" bearing rocker, all the needles are rolling in the same direction, but the adjoining surfaces are rotating in opposite directions creating **friction** (See fig. 1)

Bearing inertia has been of concern for years and the most common way it has been minimized has been by reducing the diameter of the fulcrum shaft. Unfortunately, this results in at least three other problems. The spring load on the reduced shaft increases the "unit loading" on the shaft and bearings that (1) increases **friction** and (2) increases shaft wear. In addition, the smaller diameter shafts (3) flex more resulting in nose wheel chatter and valve guide wear.

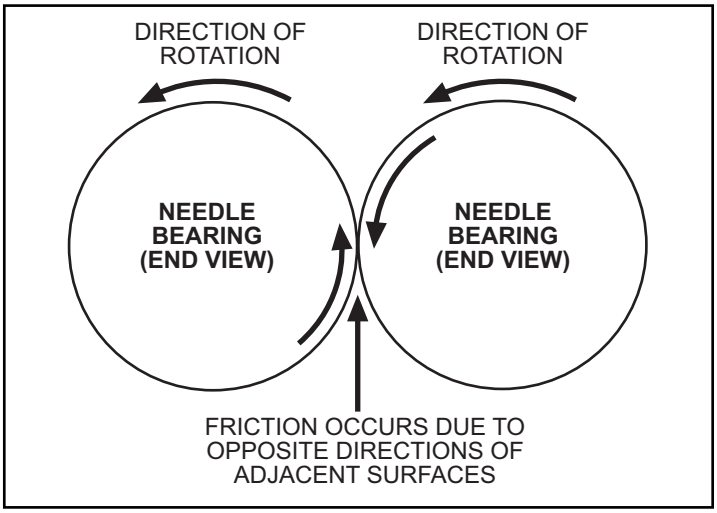

Figure 1.

By eliminating needle roller bearings and substituting an advanced **polymer-matrix composite bearing** on a specially finished shaft of substantial diameter; we have developed a rocker system with exceptional strength, zero bearing inertia, and unequalled structural rigidity. What this means to you is Crane Cams Shaft-mounted Rockers operate with **less friction**, deliver **more horsepower**, reduce valve guide wear, and have a **longer useful life** than any other rocker arm system.

Horsepower gains are also realized through the unique geometry of the Crane Shaft-mount rocker system. Unlike other rocker arm systems, Crane Shaft-mounts lift the valve off the seat at a rate higher than the advertised rocker ratio. For example: a 1.6 ratio Crane Shaft-mount rocker opens the valve from the seat with a starting ratio of 1.72 to 1. As the valve is opening the ratio reduces due to the geometry so that the 1.6 ratio is achieved at about .300 valve lift and the 1.6 ratio is maintained throughout the remainder of the valve lift. This feature improves flow to the cylinder in the early period of crank rotation, which helps to **maximize cylinder pressure and peak power**.

CRANE CAMS, INC. 530 Fentress Blvd., Daytona Beach, FL 32114

www.cranecams.com **Tech Line: (386) 258-6174 Fax: (386) 258-6167**

Parts List

Item No.	Part Number	Description	Quantity
1	448113ZB	Intake Rocker 1.6 Ratio	8
2	448203ZB	Exhaust Rocker 1.6 Ratio	8
3	99785ASP	Pushrod Adjusting Screw 5/16 cup	16
4	99785JNP	Jam Nut 7/16 12pt	16
5	7865B	Jam Nut Washer .583x.378x.032	16
6	11809CF3L	Rocker Arm Stand	8
7	7833BL	Rocker Arm Shaft	8
8	7802B	Retaining snap ring	8
9	13729MPBT	7/16-14x1, 12pt shaft stand mounting bolt	16
10	11810SHB	Shaft Mount Stand Shim, .100"	8
11	7848B	Thrust Washer .910x.640x.015	16
12	7808B	Thrust Washer 1.125x.625x.031	16
13	7862B	#45 Torx Bolt 5/16-18x1	8
14	7863B	#45 Torx Bolt 5/16-18x1.25	16
15	7876B	Geometry Checking Fixture (See fig. 3)	1
not shown	99008B	4 oz. Assembly lube	1
not shown	99725B	Checking Pushrod	1
not shown	99726B	Checking Pushrod	1
not shown	519E	Instruction Sheet	1

Finally, strength and durability has been maximized by building these rockers from a new alloy of aluminum that has far greater strength in the critical 250-300F temperature range seen by today's high output engines.

DESIGN CONSIDERATIONS AND SUGGESTIONS FOR USE

1. Shaft mounted rocker arms are designed to improve valve train stability and increase power under high valve spring pressures and high RPMs associated with roller camshaft/lifter systems. While shaft mount rockers will work well with flat tappet valve trains, their prime advantages are realized with roller systems.

2. The high airflow capabilities of roller cams are usually maximized with the use of aftermarket cylinder heads with larger than stock intake and exhaust ports, and longer than stock valve lengths. Crane Sportsman Shaft-mount rockers were designed for heads with .050" to .100" longer than stock valves. **Crane 44809-1 Shaft-mounted rockers cannot be used on any OE Ford factory heads. Crane #44808-1 rocker arms fit OE type heads as well as Edelbrock® Victor Jr.® and Performer RPM® heads.**

CAUTIONS BEFORE INSTALLATION

1. The shafts in your Crane Shaft-mount system have been treated to a special metal finishing process. Take care not to ding or damage these shafts. Treat them as the precision pieces they are! Any dings or damage to the shafts will compromise the performance and life of the system.

2. Do not run the pushrod seat more than 2 turns out from the seated position. If proper geometry cannot be achieved within 2 turns of the pushrod seat, change pushrod length. This is required to achieve proper operational geometry, assure adequate internal oiling to the bearings, and minimize wear of the pushrod seat and tip.

3. **Do not use oil restrictors in the lifter galleries or restrict oil to the rockers in any way!** High valve spring pressures generate heat that builds in the rocker body. Full oil flow to the rockers is mandatory to cool the rocker body and reduce friction.

4. Check heads for pushrod clearance through the pushrod holes. Assure clearance through the full range of valve motion. Grind clearance in the pushrod holes as needed. Grind in the plane of

operation; which is in line with the pushrod and valve stem. Be careful not to grind through the sides of the intake ports.

5. Clean all rocker stud holes with a clean tap (7/16 x 14) to assure that no debris has collected in the bottom of the holes that might interfere with proper tightening of mounting bolts.

6. Use liberal amounts of assembly lube on the shafts, rocker arm bearings, and rocker nose wheel.

7. Use oil or lube on all fasteners before tightening to proper torque spec.

8. Do not over torque or under torque fasteners.

9. Do not install or remove shaft bolts with spring pressure working on the rockers.

10. Check for adequate valve cover and breather clearance before starting engine. Do this by turning the engine through several revolutions with the spark plugs removed.

SPECIAL TOOLS NECESSARY FOR INSTALLATION

T-45 Torx® (6-lobe) socket

5/8-12pt socket

7/16-12 pt socket

Snap ring pliers

TORQUE SPECIFICATIONS (WITH OIL)

Bolt Description	Torque (lbs/ft)
7/16-14; 12 pt stand bolts (iron heads)	65-70
7/16-14; 12 pt stand bolts (aluminum heads)	60-65
5/16-18; 6-lobe shaft bolts	26-28
7/16; 12 pt pushrod seat adjuster nut	22-24

ASSEMBLE TO HEAD

1. Install rocker stands on the cylinder head. (NOTE: Sportsman Series rockers use stands made from cast steel material. A minimal amount of casting porosity is normal.) The **exhaust rockers** operate in the **narrower** slots, **intake** in the **wider** slots. Torque stand bolts to appropriate spec (**See Torque Specs, Figure 4**) using oil as a lubricant. (Shake excess oil from threads so that no oil accumulates in the bottom of the stud holes causing the bolts to hydraulic before adequately securing the stands to the heads)

2. Install the stand height ***checking tool*** (item No. 15, fig 3) onto a shaft and install the shaft on a stand. (**See Figure 3**). Lightly snug the shaft to the stand with 1 short and 2 long, #45 Torx® shaft mounting bolts. Gently slide the ***checking tool*** adjacent to the valve stem tip or over the valve stem tip. The stands are at the proper height if the tip of the valve is within (+or -) .030" of the bottom of the ***checking too***l as shown in **Figure No. 5**. **NOTE:** the rear stud of the checking tool must rest on the shaft stand when comparing the valve tip height.

3. If the tip of the valve is higher than .030" from the bottom edge of the ***checking tool***, it will be necessary to install the 11810SHB shaft shims (.100") between the bottom of the stands and the cylinder head to achieve a position of the valve stem tip that is within +or - .030" of the bottom edge of the ***checking tool***. (Note: thinner, .050" shims are available as part # 11810SHA). If the tip of the valve is more than .030" below the edge of the ***checking tool***, the rocker arm stud bosses must be milled that amount to allow the shaft stands to sit lower on the cylinder head and put the tip of the valve in the correct position to the ***checking tool. (Longer valves or valve lash caps could also be used to achieve the same result).*** Shaft mount height and rocker geometry is considered correct when the rocker arm nose wheel is just inboard of the valve stem centerline when the valve is closed. **See Figure No. 6** for proper nose wheel position as the rocker body moves through its entire range of movement. Notice that at mid-lift the nose wheel travels just outboard of the valve stem centerline and at maximum lift it comes back close to the valve stem centerline (**See Figure No. 6**).

4. Lubricate the pushrod adjuster threads and install them in the rockers from the bottom side. Screw in until the adjuster **bottoms** in the recess in the rocker body and then **back out one full turn from fully seated. Caution: Never run the pushrod adjuster more than two turns out from fully seated. This assures that the internal oil passage in the adjuster aligns with the internal oil passage in the rocker arm body. If the adjuster is more than two turns from seated, the oil flow to the rockers will be restricted which could compromise bearing life.**

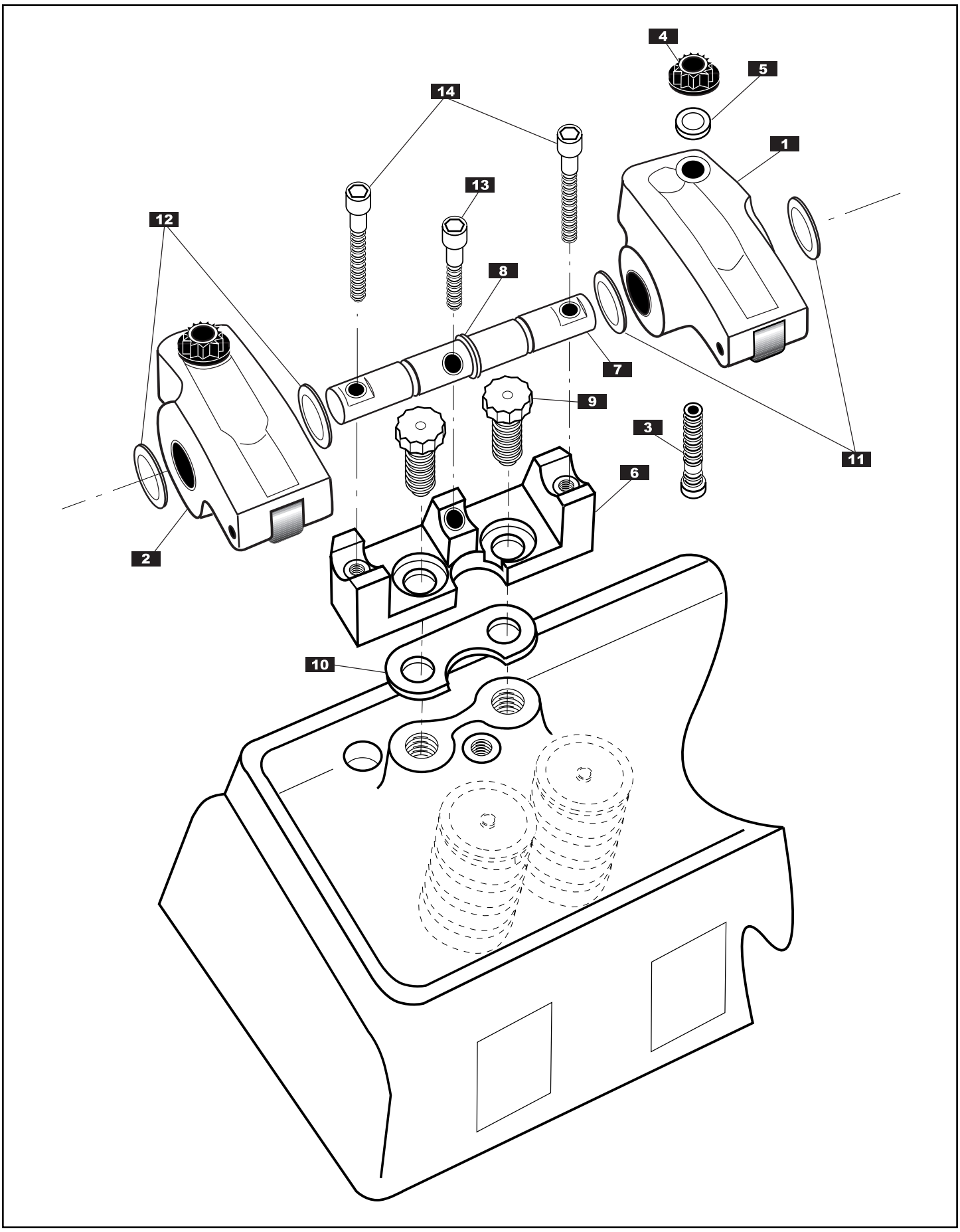

Figure 2.

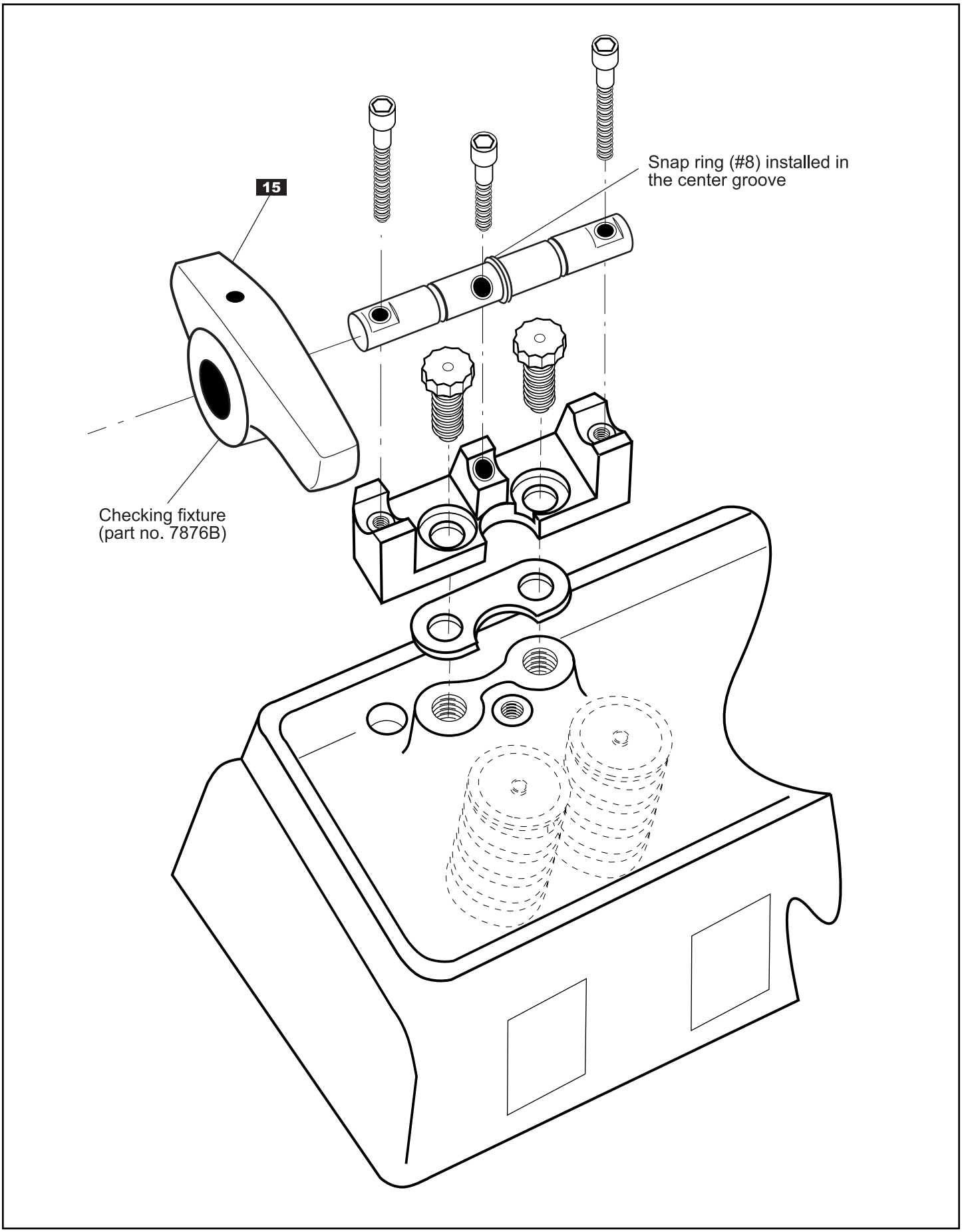
15
Snap ring (#8) installed in
the center groove
Checking fixture
(part no. 7876B)

Figure 3.

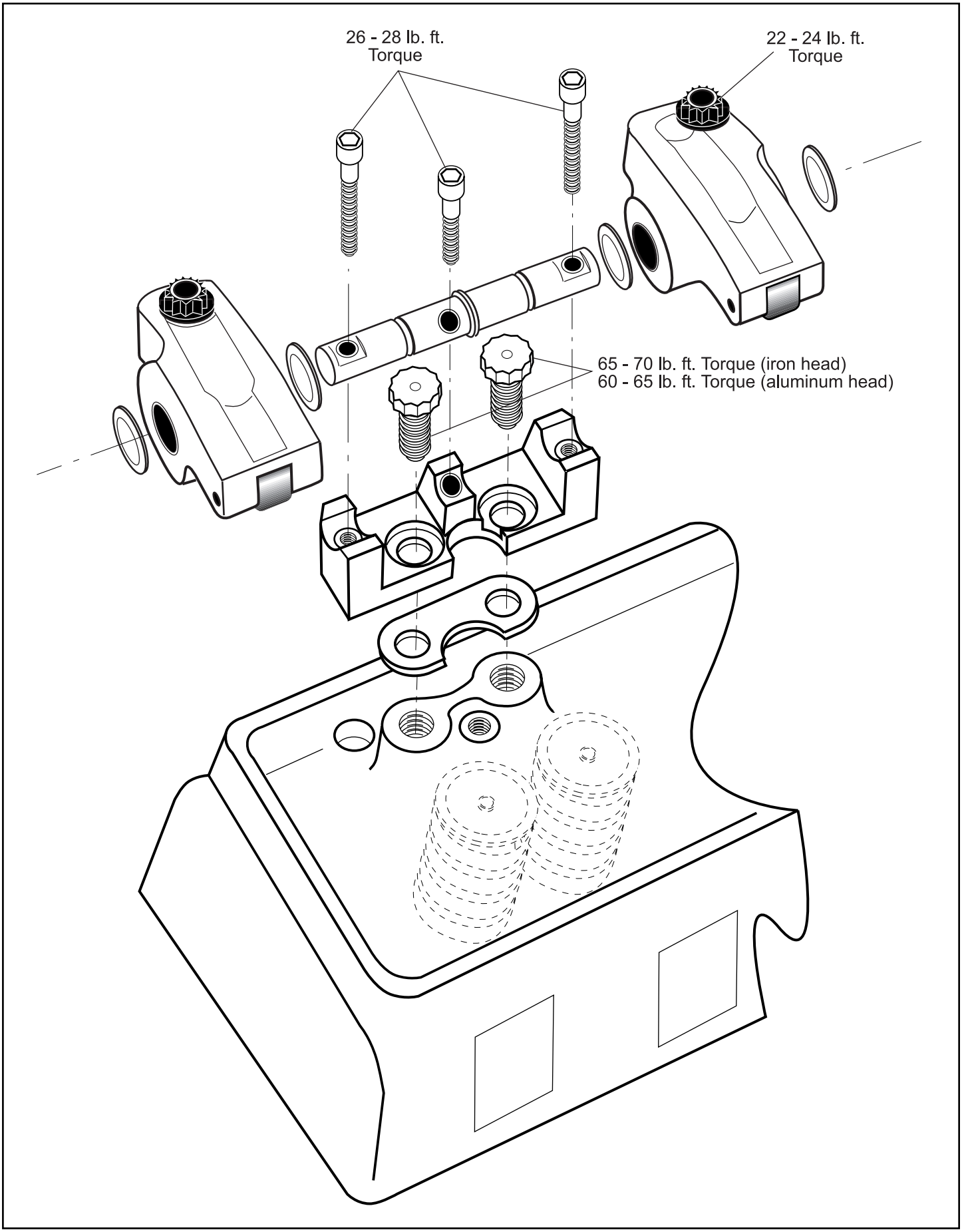
26 - 28 lb. ft.
Torque
22 - 24 lb. ft.
Torque
65 - 70 lb. ft. Torque (iron head)
60 - 65 lb. ft. Torque (aluminum head)

Figure 4.

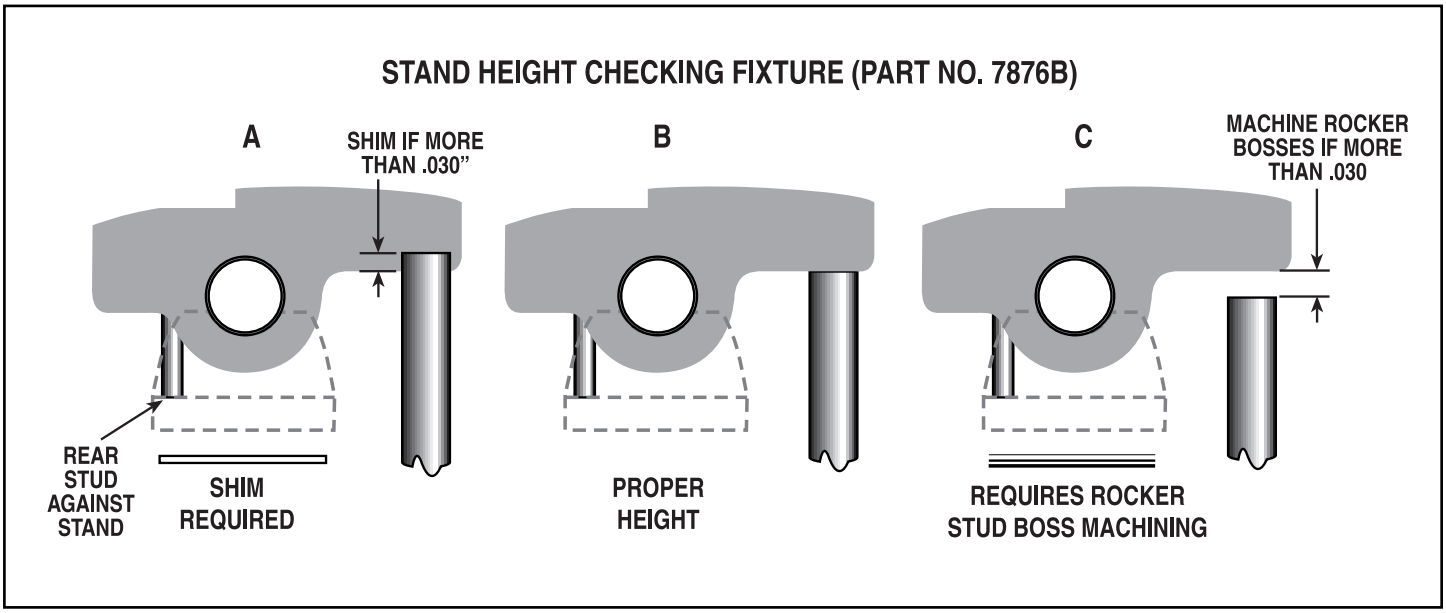

Figure 5.

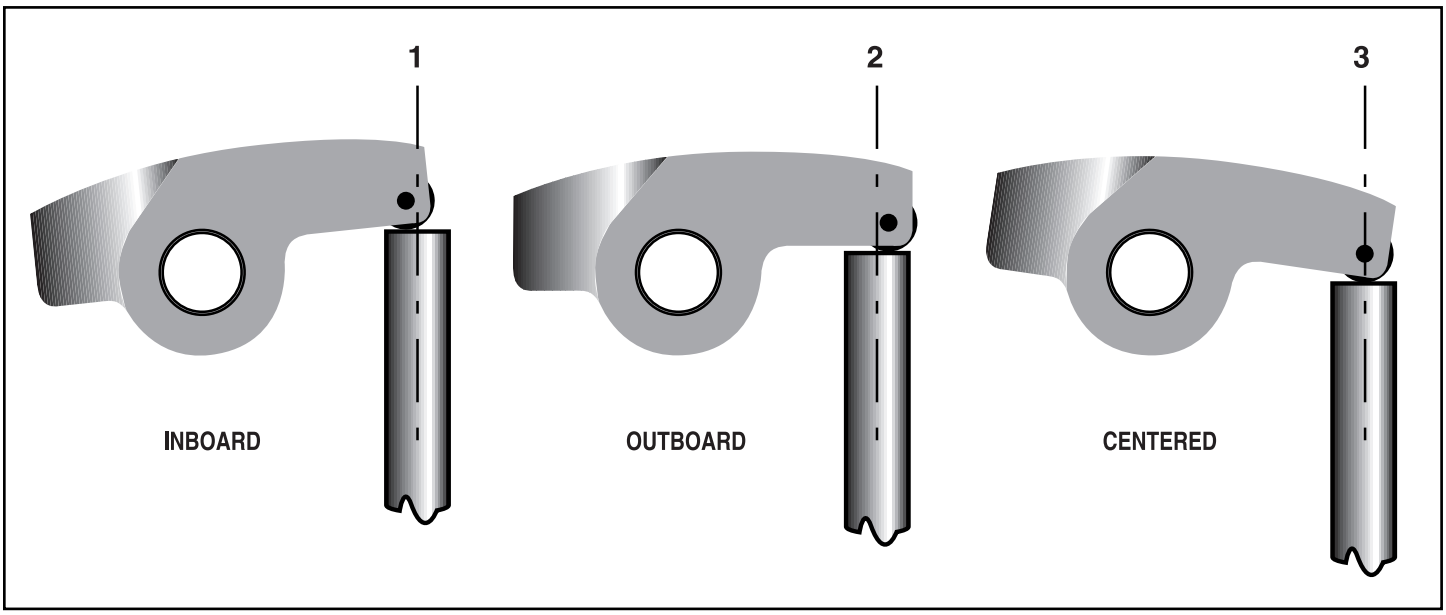

Figure 6.

5. On the top of the rocker body, install the **thin washer** (item #5) and adjuster jam nut and lightly snug. **NOTE: The small setscrew in the back, vertical, radiused corner of the intake rocker body is there to seal an internal oil passage. It is not a locking setscrew for the pushrod adjuster. Do not remove or tighten this setscrew!**

6. Install one snap ring in the middle (thin) groove of each shaft. **(See Figure 3) NOTE:** ***Do not scratch, ding, or scrape the surface of the shaft!*** Treat the shaft surface exactly as you would a main or rod bearing insert!

7. Lube the bearings and shaft and carefully assemble the bodies and thrust washers on the shafts. **Note: the thin thrust washers (.015") must be installed on both sides of the intake rockers. The thicker thrust washers (.031") must be installed on both sides of the exhaust rockers. (See figure #2).**

8. Start installation with #1 cylinder at TDC at the end of the compression stroke (both lifters will be on the cam base circle). Install the adjustable pushrod, lubricate pushrod tip where it engages the pushrod adjuster seat.

9. Install the shaft with rocker bodies and shims onto the stands. Take care to assure shims and spacers are in their proper positions. **Caution: Do not install or remove the rocker arm/shaft assembly under spring load.**

10. Lube the two long and one short shaft bolts and install and torque to spec. (See fig. 4)

11. Determine pushrod length by adjusting valve lash with the adjustable pushrod. **(NOTE: Keep in mind that the pushrod seat adjuster must operate in a range of "just off its seat" to 2 turns out from its seat. This provides about .070" of useful adjustment. Any further adjustment off the seat will limit oil flow to the rocker bearings!)** Measure the pushrod length and record for both intake and exhaust. Measure pushrod length on at least two cylinders on each bank. When checking pushrod length, keep in mind that custom pushrods are available in .050" length increments. **NOTE: Two lengths of pushrods are supplied with this kit. The shorter length, part # 99725B, is for use with 289/302 deck height blocks. The longer length, part # 99726B, is for use with 351W deck height blocks. These pushrods are provided to determine pushrod length with the *valves closed.* They are *not strong enough* to open the valves against the pressure of high-rate springs. *Do not use this pushrod with any spring pressure over 75 lbs.!***

12. With **correct length pushrods** installed, rotate the engine through several revolutions and recheck pushrod clearance through the pushrod holes.

13. Start with cylinder #1, positioned so that the lifters are on the base circle of the camshaft, and adjust the valve lash (for mechanical camshafts) or set the lifter preload (on hydraulic camshafts pushrod length must be determined with the hydraulic lifters at proper preload). Proceed through the firing order rotating the crankshaft 90 degrees between each cylinder adjustment.

14. With all rockers and shafts installed, recheck shaft bolt torque and recheck valve lash. Assure that all pushrod seat jam nuts are tightened to proper torque spec.

15. Install valve cover, and rotate engine to make sure there is no interference with the valve train. Correct as necessary.

16. Prime oil pump with a drill motor and priming tool before firing engine. ***Do not start engine until oil is seen coming out of rockers at the shafts or nose wheel area.***

17. Fire engine, warm up to operating temperature. Shut off engine and verify valve adjustment.

18. **Do not operate this rocker arm system with restrictors in the oiling passages to the lifters and rocker arms.**