BHJ Products, Inc.
Parts List & Instructions

Product Name: **Lifter-Tru Kit for General Motors LS V8**
BHJ Part#: **LTK-GM-LS**

Kit Contents:

2x End Plates
1x Front Angle Bracket
2x Angle Adapter Blocks *
1x Cam Tunnel Mandrel *
1x Upper Guide Plate *
1x Positioning Ring * - See note pg. 2
1x Piloted Cutter
(Customer Specified Diameter)

2x Threaded Adjustment Sleeves
2x M10-1.5 x 65 Hex Head Bolts *
2x M10 SAE Washers *
1x 3/8 x 2" OD Clamp Washer
7x 3/8–16 x 1" Allen Head Bolts
5x 3/8–16 x 1" Allen Head Bolts *

Items with * above are included in Lifter-Tru Step-Up Kit for this application.

Description
BHJ's Lifter-Tru Kit blueprinting fixture allows machinists to re-machine the lifter bores and correct their position in an engine block front-to-rear and up-and-down, as well as to restore the correct lifter bore angle as referenced from the cam-crank centerline. In addition, blocks without finished lifter bosses may also be machined with new lifter bores, with the addition of optional cutters in the process.

NOTE: Since most shops utilize a Bridgeport or similar style vertical milling machine, bear in mind that it will be necessary to install a column riser under the head of the machine to achieve a minimum of 20-1/2" of "Z" axis height to accommodate this fixture.

Instructions (Please read completely prior to use)

Block Preparation
Align bore the mains prior to using the Lifter-Tru, if it is your intention to do so. The ultimate end result will be achieved if the camshaft bearing bores are align bored. This should be done by zeroing in on the front or rear cam bearing bore, whichever one is adjacent to the distributor drive gear on the camshaft. The location of this bearing is critical, since it establishes the distributor gear mesh. The objective is to bore the cam tunnel parallel to the mains. Install the front and rear cam bearings.

1. If this kit has been supplied as a "STEP-UP" Kit, it <u>will</u> be necessary to drill and tap the front End Plate for proper Adjustment Sleeve and Support Bracket hole location. A drilling diagram has been attached to the back of this instruction sheet.

2. Set the cylinder block on a bench upside down with a pair of wooden blocks underneath the intake valley rails to elevate it as shown in Photo #1 (Next page). Install the 2-Inch Precision Support Bar and Main Bearing Bore Adapter Rings in the block. With the Adapter Rings registering in the front and rear bearing bores, attach the front and rear main bearing caps.

NOTE: Block must be installed in the fixture backwards, with the bellhousing surface toward the front end plate.

3. Slide the Cam Tunnel Mandrel into the block with cam bearings installed in the front and rear bearing bores. The drill bushings in the Cam Tunnel Mandrel should be in line with and facing up at the bottom of the lifter bores. Take note of the FRONT and REAR markings on the Cam Tunnel Mandrel. The end marked front goes into the front plate and the rear with the rear plate. DO NOT CONFUSE THESE WITH THE FRONT AND REAR OF THE BLOCK.

4. Slide the positioning ring over the front end of the cam tunnel mandrel until it contacts the rear of the block.

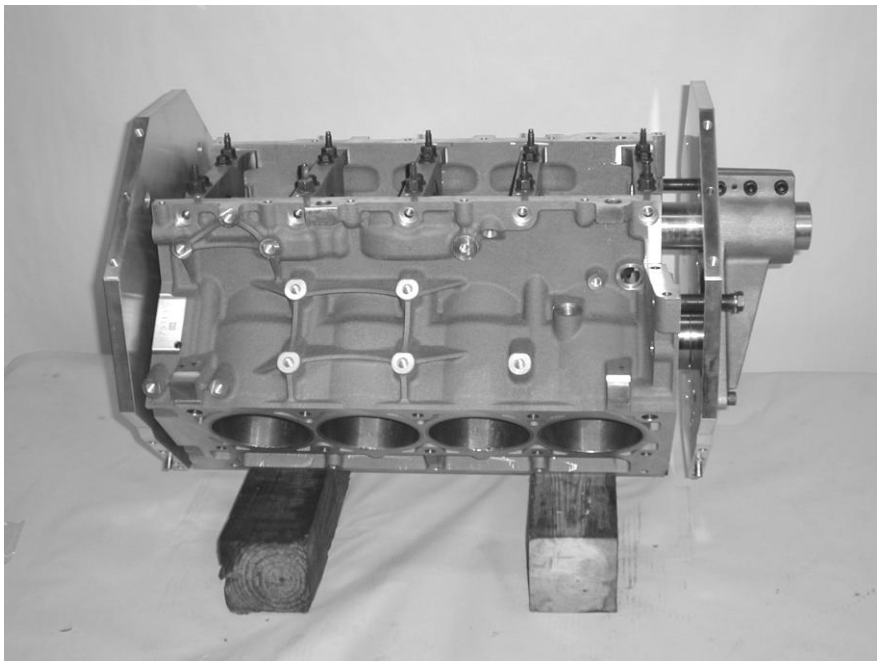

Photo #1

NOTE: As of January 2006. The long positioning tube was superseded by a Positioning Ring used on the Cam Tunnel Mandrel. All other instructions remain the same.

5. Slide the End Plates onto the 2-Inch Precision Support Bar (the End Plates slide easier if you push them directly alongside the 2" bored hole). The End Plate with the tapped holes goes on the **rear** of the block with the engraved side facing outward. The rear End Plate is installed on the **front** of the block with the stamped "R" facing outward. Slide the Angle Bracket onto the 2-Inch Precision Support Bar at the rear of the block and align the three mounting holes on the Support Bracket with their corresponding

holes in the front End Plate and install three 3/8-16 x 1 Allen Bolts loosely. Tighten the three bolts that clamp the Angle Bracket to the 2-Inch Precision Support Bar; then tighten the three bolts that fasten it to the front End Plate.

6. Slide the rear End Plate forward until its front face contacts the Positioning Ring. At the same time, engage the key in the rear of the Cam Tunnel Mandrel into the slot in the rear End Plate until the front face of the End Plate contacts the rear face of the Cam Tunnel Mandrel. Install the two Adjustment Sleeves in the tapped holes in the rear End Plate that align with the bell housing bolt holes. Thread the Adjustment Sleeves in until they just make contact with the rear face of the block as shown in Photo #2 (Next page). Install the Hex Head Bolts with the Flat Washers through the Adjustment Sleeves and into the bell housing bolt holes and tighten. Install a 3/8-16 x 1 Allen Bolt with the 3/8 x 2" O.D. Clamp Washer into the Cam Tunnel Mandrel and tighten. Slide the front End Plate rearward and engage the key in the Cam Tunnel Mandrel until the rear face of the End Plate makes contact with the front face of the Cam Tunnel Mandrel. When this portion of the set-up is completed there should be no air gap between the front face of the rear End Plate and the Positioning Ring; and the Positioning Ring and the block.

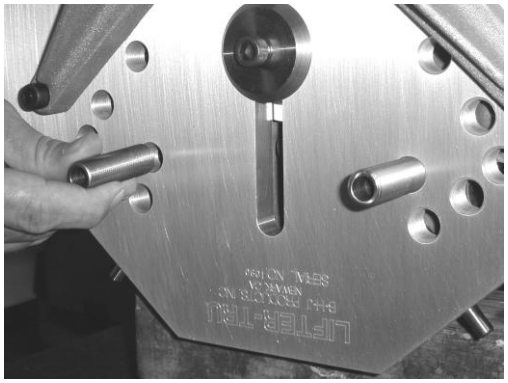

Photo #2

7. Turn the assembly over so that it rests on the bottom edges of the End Plates with the doweled edges facing upward. Install the Angle Adapter Blocks on the dowels located on the top edges of the End Plates with the side marked "OUT" facing outward. Fasten using the four 3/8-16 x 1" Allen Bolts. Install the Upper Guide Plate on the dowels located on the top edges of the Angle Adapter Blocks. Fasten using the four 3/8-16 x 1" Allen Bolts. Slight repositioning of the FRONT End Plate may be necessary so the Upper Guide Plate will install completely.

8. At this point, if you intend to enlarge the existing lifter bores to accept a larger diameter lifter, check to see if all 16 lifter bores will clean up by inserting the appropriate diameter Piloted Cutter or optional Alignment Pilot down through the fixturing and examining the lifter bore position visually. It has been found that while one bank of lifter bores may be correctly positioned, the other bank may be sufficiently far out of

position to the front or rear that they will not clean up. If this is the case there are three alternatives: 1) Give the block away. 2) Enlarge the lifter bores to 1" and sleeve them. 3) Remove the Positioning Ring and reposition the fixturing on the block until both banks will clean up.

9. Place the complete assembly onto the milling machine table. Tilt the head back 4º to line up with the lifter bores. Liberally grease the bushings in the Upper Guide Plate. Insert the Piloted Cutter down through the Upper Guide Plate into the lifter bore, be sure the pilot on the nose of the Piloted Cutter engages the drill bushing in the Cam Tunnel Mandrel prior to starting the cut. Position the assembly so that the spindle can be brought down over the cutter shank and tighten the ¾" collet. Experience indicates that it is not necessary to clamp the assembly to the mill table, however it is recommended that an anti-rotation stop be inserted in a table slot. Turn on power to the machine and machine lifter bores following the speed and feed instructions shown in section 9 of this instruction manual.

10. Piloted Cutters supplied with the Lifter-Tru are first quality, high speed steel tools. The following information is supplied by the manufacturers for optimum tool life and surface finish.

    Speed: 40–60 RPM

    Power Feed: .006–.012" Per Revolution

    Coolant: Flood or High Pressure Mist with soluble oil. The coolant is of the utmost importance. By either flooding the cutter or using a high pressure mist, not only is the cutter kept cool but more importantly, the chips are constantly flushed away preventing scoring of the finish. Experience shows that either type of cutter supplied gives a mirror finish when used according to the above recommendations.

NOTE: BHJ Lifter-Tru Piloted Cutters are available in two pilot lengths, "Standard" Pilot and "Long" Pilot.

Standard Pilot-length cutters incorporate a 2.0625" length pilot and will accommodate OEM-configuration lifter boss heights in the majority of blocks.

In cases where a block has a taller lifter boss, as is the case with many aftermarket blocks, GM LS-Series blocks and others, it is necessary to begin cutting the lifter bore using an equivalent-size Long Pilot Cutter. The pilot length of Long Pilot Cutters is 2.250". In some cases, it is necessary to begin cutting the lifter boss using a Long Pilot Cutter and finish the cut with a Standard Pilot Cutter, as the longer pilot may bottom-out in the cam tunnel of the block before completing the cut.

10. If this kit comes as a "Step-Up" it may be necessary for you to drill and tap adjustment sleeve holes in your front end plate. A sketch giving the positions for these holes may be attached in this case.

The following accessories are available to complement your Lifter-Tru:

Alignment Pilot
Insert this pilot in place of the cutter to determine if the lifter bore is out of position. Also used to determine if a .843" hole will clean-up at .875", as well as if a .875" hole will clean-up at .906".

Angle Adapter Feet
Mimic the angle of the intake and exhaust Angle Adapter Blocks, which will align the Cutter at 90 degrees to the table surface, thus eliminating the need to tilt the mill head.

Bushing Installation Drivers
Simplifies Bushing installation.

1.062" Cutter and Top Guide Plate
Allows installation of 1.062" OD Lifter Bushings.

Cam Tunnel Mandrel Adapter Sleeves
Allows use of Cam Tunnel Mandrel in blocks with oversized cam bearings, including roller-bearings.

Oil Galley Drill
3/8" or 7/16" diameter, 18" long drill for ease in re-drilling oil holes in blocks.

Lifter Bore Hone
Rigid type hone for final sizing of lifter bores. Accommodates bore sizes from .843 through .937. Larger size adapters available separately.

Dial Bore Gauge
Dial Bore Gauge for .750-1.500" I.D. measurements to accurately check lifter bore dimensions.

Call BHJ at (510) 797-7680 or email at sales@bhjinc.com with any questions regarding additional Lifter-Tru options.