Engine Bearing Fundamentals:
Lugs or No Lugs

The AERA Technical Committee offers the following information on the fundamentals of engine bearing "Lugs". Through conversations it has been determined it is a popular belief that a bearing lug prevents bearing rotation within a housing bore. While it may physically appear to be its purpose, those statements are not so.

The locating lug on a half shell bearing registers with a mating slot in the housing to locate the bearing shell as shown in Figure 1 below. The lug is not intended to prevent bearing rotation. Crush holds the bearings in place and prevents spinning just as press fit holds bushings in place which have no locating lugs. Each ½ shell bearing has approximately .004" of crush. That is to say: each shell is slightly bigger than the ½ circle it's located in. When the two halves are assembled and caps torqued to specification, the extra bearing material creates radial force (crush) against the housing bore. This holds the bearing shell in place, insuring the required, good heat transfer.

Bearing Lugs may be positioned differently on upper and lower halves or varied in width to prevent miss-assembly. An increasing number of late-model engines have even eliminated the location lug completely. So, regardless of lug or no lug, proper positioning of a crankshaft bearing is essential to ensure oil hole alignment with the housing and to prevent interference between the edge of the bearing and the crankshaft fillet radius. Some engine manufacturers (Perkins, AERA TB 2431) even provide an alignment tool (jig) to assist in locating the bearing shells within their bores.

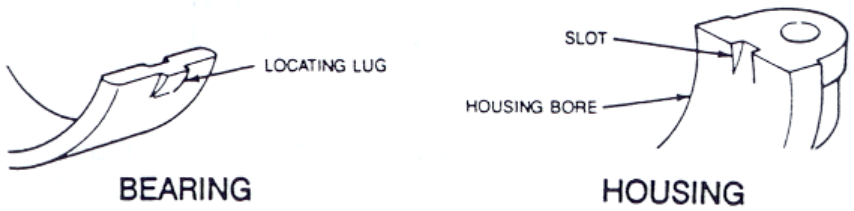

FIGURE 1

Some confusion has arisen over the "Lug-No Lug" bearing issue when one engine uses them and the next, seeming same engine does not. As an example, the 4.7L Chrysler V-8 when they made a production change during the life of the 4.7L going from a lugged design on the bearings to a non-lugged design. Shortly after that change most bearing manufacturers, elected to supersede the lugged design to the non-lugged design. The non-lugged part will work in the earlier designs, but, of course the reverse is not true.

For other modern engines like the 6.7L Ford diesel, it is quite simple. Every Ford 6.7L diesel engine that has been manufactured has both main and rod bearings with no locating lug so supplying an

aftermarket set from companies like Mahle-Clevite is very simple: no lugs! In the case of aftermarket connecting rods for this engine with a locating slot, it will just remain unused.

Positioning the non-lugged bearings requires a bit of care so the edge of the bearing shell does not interfere with the radii on the crank. Proper positioning may not be 100% centered in housing. Once you have the shell positioned, free-spread provides the good fit that holds the bearing in that position while you assemble the engine.

Finally, just in case you are wondering about the removal of location lugs by engine manufacturers, it is a matter of simple economics. Take a popular example like the current 6.7L Ford diesel. The engine has five main bearings and eight connecting rod bearings. Eliminating the five lug slots in the block and main caps reduces the machining cuts by a total of ten which do not have to be made at the factory. Then, add another sixteen machining cuts eliminated on the rods and you can understand why. By not machining those slots, just the savings in tool bits would be substantial, not to mention operator and machine time savings as well.