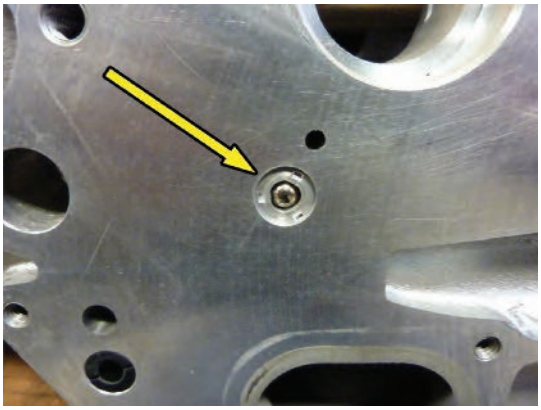
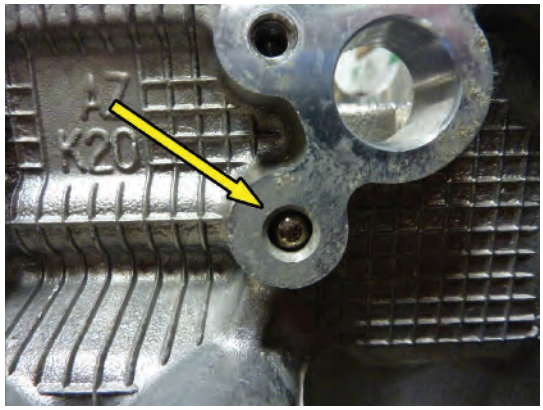
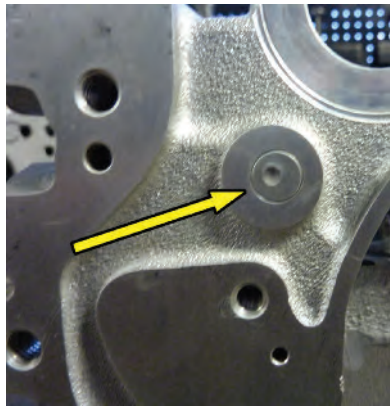






It's the little things...

Oil Galley Plugs and how to attack them

Those darn balls, solid round plugs (iron/aluminum), and the old reliable threaded pipe plugs. Are they obstacles, or opportunities? Or just necessary little evils to reckon with, preventing comebacks.

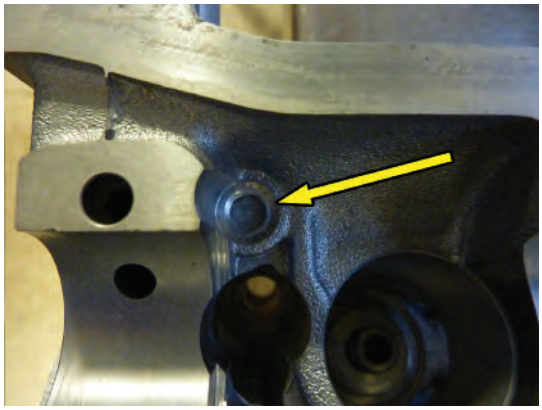
Our approach to any head with oil galley plugs, regardless of style, is to first analyze the pulmonary system. Where does the oil enter the head and flow from there? How are the cams, lifters, variable cam timing, etc. fed? A visual inspection with a wire and small flashlight, or during rinsing after the prewash, you can force pressured water into the main feed hole observing output. You may need to use a few fingers while simultaneously blocking off some feed openings, to discover others. The use of a borescope also comes in ultra-handy. They are now inexpensive.

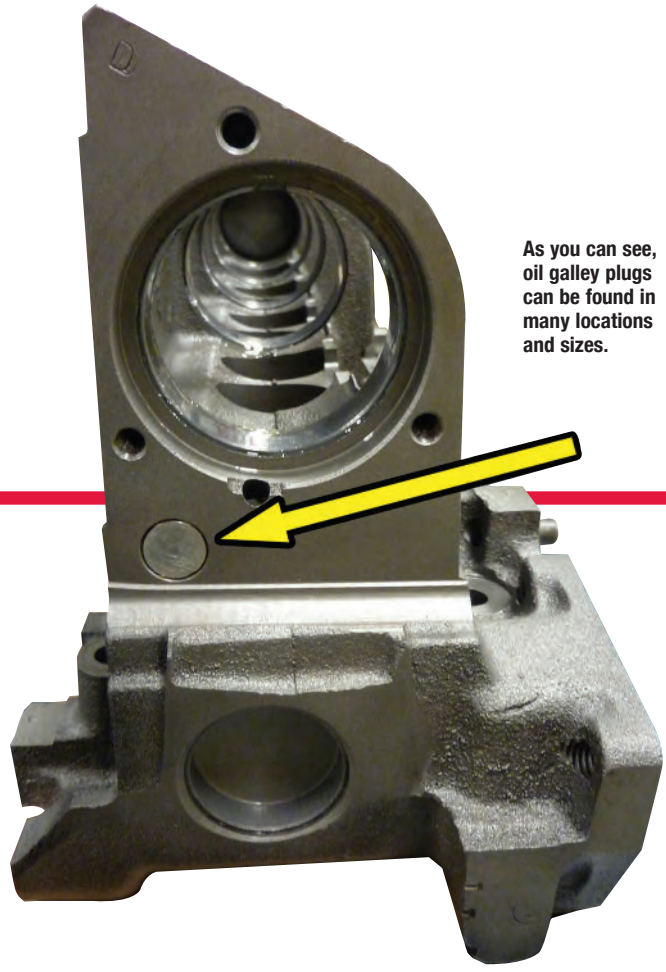
Second step is to strategically determine which plugs need to be removed (possibly all). I use the word strategic because we only remove those plugs necessary to thoroughly clean the head. As you may already know, it can take longer to remove and replace a few plugs than it does to machine 16 seats. If we can access or easily see behind a plug, we will occasionally use a can of carb spray with a straw attached. You can bend these straws into many shapes, allowing access to the hard to reach areas dissipating debris. After chemical washing and regardless of your cleaning method from this point, (glass bead blasting, soda blasting, ultrasonic cleaning or maybe you just stop after the chemical wash) the plugs just need to be removed.

More and more heads that enter our shop have come off of sludge engines. We have tried to clean these heads many different ways, only to discover that when we remove a steel ball, it is still packed with crud at the artery end. The head may not have lubricated properly, and then have risked debris coming loose, and possibly lodged in a hydraulic lifter, V-tech component, etc. Enough.

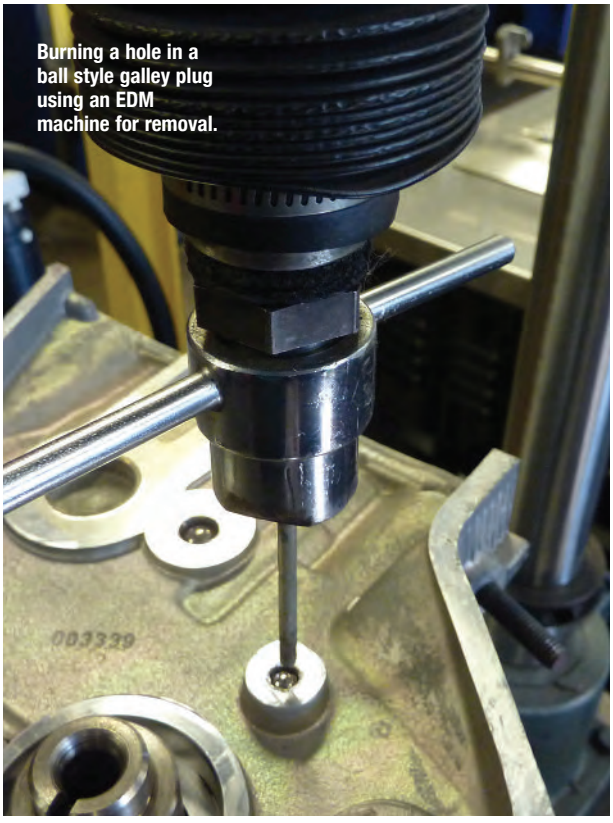
Third step is the removal/extraction of plugs. To remove threaded style plugs, a little heat goes a long way, easy. To remove solid aluminum plugs: we drill a hole, tap the center (usually 6mm), install a bolt or use a section of threaded rod that is attached to our slide-hammer vise grip. A few pulls and the plugs are removed. To remove ball style plugs: you can use an EDM machine to burn a hole in the plug, let cool and the plug will practically fall out on its own. The method we now use is super simple: with a TIG welder and stainless weld rod, we build the ball up to twice its size. This gives you something to grab onto using the vise grip slide-hammer. The plug will be loose in the hole, and with a few pulls, out they come. We save these plugs until the job is completed, for a measurable reference. (Note: After extraction, a small chamfer is placed around the hole, this helps installation.)

Fourth step is to fill the void. There are many situations where you can simply tap the hole to 1/16th or 1/8th pipe threads. This works well provided there are no intersecting oil galleys where the newly installed pipe plug would block off circulation to other vital areas. Protrusion of pipe plugs may also interfere with the machined mounting surfaces. To install an aluminum plug to be flush or below the surface, you first need to know the diameter of the hole. This can be done a few different ways. Measure the removed ball (it will be close to what you need) or

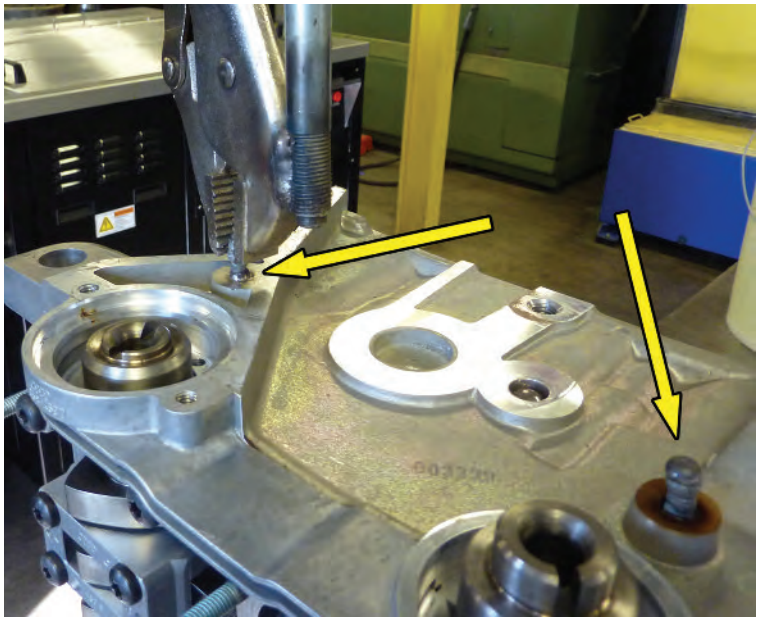




As you can see, oil galley plugs can be found in many locations and sizes.



Burning a hole in a ball style galley plug using an EDM machine for removal.



ABOVE: Building up weld material on the ball using a TIG welder and vise grip slide-hammer to remove.

LEFT: Steel plug gage set used to determine oil galley inside bore diameter.

use a ball micrometer. Another quick, simple way we determine hole size is with the use of a steel plug gage set. They come in .001 increments and we use the go-no-go method of determining hole size. Once the hole size is determined, we add .004+ press fit and select a plug from our assortment of common sizes. Special sized plugs are turned on the lathe using 7075 T6 aluminum material.

Installing the new plugs into the head: we first apply a thin layer of sealer to the inside of the hole. The sealant we use is Permatex #1 (tried and true). We have tried many other sealants, but with Permatex #1, we have never experienced a leak. Next, we use a driver in conjunction with a squaring sleeve on the outside. This starts them in perfectly straight. Now, pound in the plug, and then set the plug below the surface with a setting driver that is slightly smaller than the plug itself. DONE.

Bottom line…we do not charge enough for the service, but we DO CHARGE. Sometimes per plug, or the fee gets buried into the job itself. With profit margins as slim as they are, none of us can afford to rebuild the same head again. So… PULL YOUR HEAD OUT AND REMOVE THOSE BALLS.■

Steve Schoeben is the owner and operator of HeadWerks, Inc., an automotive machine shop serving Minneapolis and surrounding areas since 1991. HeadWerks specializes in the repair of all types of cylinder heads, ranging from industrial applications and light diesel to motorcycles, antiques, racing and European autos. For more information, please call (952) 884-6306 or email info@headwerks.com.

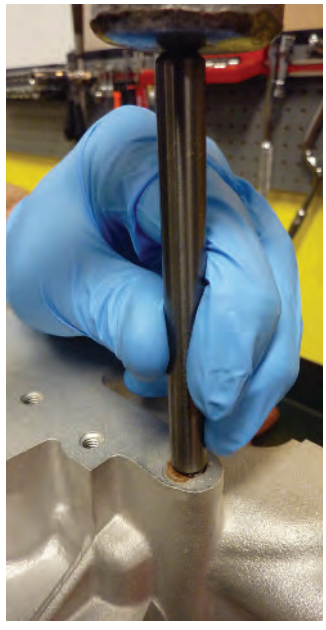
Driver with squaring sleeve, removed balls for size reference and the new plugs.

Oil galley hole chamfered and ready for the new plug to be installed.

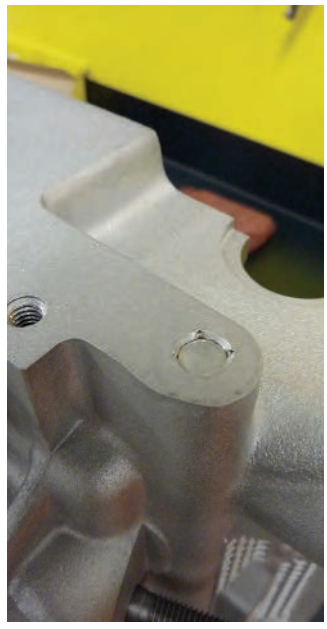
Determining hole ID with a gage pin. We use the go-no-go method for sizing small holes.

Galley plug, driver and squaring sleeve.

Driving plug into galley bore. Note how the squaring sleeve keeps driver perpendicular to the head.



Using setting driver, (which is slightly smaller than the plug itself), to set plug below surface.



Installation is complete, with a professional and sanitary look.