

Small H.P. Seminar

20 H.P., 20/25, 25/30, Wraith

The Vintage Garage, No. Brookfield, MA May 2-3, 1997

Reported by Gil Fuqua, TN

The Small H.P. Seminar was hosted by the staff at The Vintage Garage, including Bill Cooke, Tracey Cormier, Peter Krawczyk and John Desplaines. In addition, Ed Lake contributed with a session on the rebuilding and maintenance of the Royce type carburetter – he's overhauled more than 600 of them. The seminar covered a wide range of topics focused on rebuilding the small h.p. engine and included a number of demonstrations and examples on existing engines in the shop for rebuild.

Engine Rebuilding Points

Break-in on a newly rebuilt engine can take 1,000-2,000 miles because of their low compression. The owner should take care to vary the speed and load of the engine during the break-in period.

Use of synthetic oil is not recommended during the break-in period, as synthetic oil does not allow for piston rings to seat as fast as conventional oils do owing to the superior lubricating ability of synthetics.

You can use synthetic oil in the engine after the parts seat following the initial break-in; however, a high-grade mineral oil will provide excellent lubrication. It was recommended that the oil be changed at least once a year, regardless of mileage or type of oil used.

Consider fitting a full-flow oil filter kit. The original oil 'filters' are no more than wire mesh screens adequately sized to strain small rocks. The Vintage Ga-

rage manufactures full-flow oil filter kits for most pre-war Rolls-Royce cars.

You can use cast iron rings on pistons. The use of chrome or chrome-moly rings on pistons is not necessary since the engines do not run fast enough to warrant the improved wear characteristics and added cost of the chrome rings.

You should pressurize the entire oil system prior to starting a newly rebuilt engine – to be sure you have no leaks and that fresh oil is fed to all parts of the engine before it is started. The Vintage Garage has adapted a pressurized paint container (Sears - Part No. 16104) for this purpose. Fill the paint container with oil, hook up the outlet on the pressure tank to an inlet on the engine, and apply about 20 lbs. of air pressure. You will have to blank off numerous passages to fully pressurize the engine. [See also Neal Kirkham re pre-oiler on FL5248. Ed.]

A newly rebuilt engine should not be left at idle for very long. Get it on the road and running to get the pieces working against each other. Vary engine speeds and don't run it too hard at first. Be sure to check periodically for water and oil leaks during the test runs.

Clean off the aluminum block by using Scotch Brite pads. Do not spray the blocks with aluminum paint since it will come off and eventually look worse than the plain aluminum block. You can spray on WD-40 or a silicone spray to lightly coat the bare aluminum to help keep it clean and retard oxidation.

Head-y Considerations

Take care of your old head – new ones are expensive. They are available in cast aluminum from Richard Shaw and currently cost about \$5,700. The original heads fitted to the small h.p. series were cast iron. Although the new aluminum heads have proven fine in service, you must take special precautions with them since they are softer than the originals.

Old engine heads and blocks are typically full of scale, grit and other debris. Bill Cooke showed off two one-gallon bags full of sandy grit that came from the blocks of a recent Ghost engine overhaul. You will need to pick, scrape and gouge out the scale to clean it all out.

You can reuse a head gasket if it is not torn since the torque on the head nuts is only around 20-25 lbs. Re-fit the head gasket with a sealer. The Vintage Garage uses 'Perfect Seal', a non-hardening sealer made by Ford Motor Company (part no. 85A-19554-A). Perfect Seal is also used on both sides of paper engine gaskets. Paint on a light coat of sealer on the engine part, put down the gasket, paint sealer on the top of the gasket and refit the parts. [Is it really wise to re-use a head gasket? Labor is the chief cost, not materials. Ed.]

In descaling and cleaning a head during restoration, it is best to remove the internal water tubes in the head to gain maximum access to the head passages. The tubes are made of copper and should be gently pressed or tapped out with the use of a pilot bar inside the tube to keep them from collapsing within the head upon removal. New tubes can be made from standard copper pipe by annealing the ends to soften them and then swage fit them to the head at each end.

You may want to consider blocking off the water passages at the front of the head to increase circulation at the back of the head, thus improving cooling.

Clean out the rocker arm shafts by unsoldering the caps on each end and flushing out. You can also use a bronze brush designed for shotgun barrels to run through the tube for cleaning out oily grunge. You can refit the end caps with red Loctite or re-solder (acid core).

Bores can be cut to about .060" over-size unless the block is deeply pitted on the outside which can affect structural strength. If the blocks are overly corroded, you can re-sleeve them with cast iron liners.

If the engine weeps oil around the rocker arm cover, you can make a gasket by putting a small bead of silicone caulk around the rocker arm cover. You must thoroughly clean and de-grease the cover before the silicone will stick. Allow the silicone bead to cure before refitting.

Use chilled cast iron or stellite valve seats as replacements. Replacement valve seats should be pressed in after heating up the head since there is only about .002" clearance.

New engine gaskets are available from various suppliers. It was noted they seldom 'fit' and that you can soak paper gaskets in hot water for 5-10 minutes to swell them to the proper size.

Micarta disks are used as replacements for the oiled cotton duck washers in the slipper flywheel.

You should carefully mark the gear teeth on the slipper flywheel prior to removing to assist in re-timing the engine. If the timing is off after refitting the slipper flywheel, you can estimate that one tooth movement in the gears is approximately $\frac{3}{4}$ " movement on the timing mark on the flywheel.

Owners should be able to rebuild the water pump – it usually requires a new impeller, shaft and packing material – available from The Vintage Garage and Fiennes.

You can use the 'Rule of Seven' to

assist in setting the valve clearance. For example, to find top dead center of No. 1 cylinder, where both intake and exhaust valve clearance can be adjusted, watch the valve action of No. 6 cylinder. When these valves are at a point of rocking – exhaust closed, intake starting to open – No. 1 will be at top dead center firing ($1 + 6 = 7$). The same applies to cylinders $2 + 5 = 7$, and so forth. Note the firing order is 1, 4, 2, 6, 3, 5.

Use split skirt pistons to insure the tightest possible piston fit in the bore – about .0015" clearance at the skirt. The top of the pistons should be about .020-.025" less than the bore to assure they do not scrape.

Egge and Jahns carry pistons in the U.S. that will fit small h.p. cars. Check new pistons carefully for porosity. Pistons from the UK, Peter Hepworth Components, are generally of higher quality but cost more.

The small h.p. pistons tend to have too much clearance on either side of the wrist pins ('gudgeon pins' in RR parlance) resulting in some side-to-side movement. This extra clearance should be used to center the pistons on the crank by shimming up each side of the wrist pin to accomplish the centering. It may take several fittings with different size shims to correctly center each piston. You should end up with about .005" side-to-side clearance at the wrist pins. Use milling machine shims (arbor shims) that are hardened.

Consider balancing the crank, rods and pistons in an engine rebuild.

Leonard Reece in the UK can regrind pear-shaped lobes on small h.p. cams.

Lower End – Connecting Rods

All small h.p. cars have a small hole in the top of the connecting rod bearing to feed oil up a tube to the wrist pin. This passageway must be clean for the

oil to move. Be sure to clean out the tube and check that you do not have any leaks under pressure. It is typical for the tubes to leak around the ends where they are soldered to the connecting rod arm. Clean and pressure test by plugging one side of the wrist pin hole and using an air nozzle fitted with a rubber stopper to the opposite side to create an air-tight chamber.

Connecting rod bearings in small h.p. cars are made from Babbitt material (89% tin, 4% copper, 3% antimony, according to Ed Lake) that is poured into a steel shell and fitted to the rod – see FL2922 for step by step description and illustrations. It is important to keep bearing surfaces square to insure exact alignment of the crank and pistons.

When new bearings are ground, be sure to make a slight radius in the oil hole in the connecting rod so that it will not scrape on the crank.

Rods should be carefully measured so that the center-to-center distance between the wrist pin hole and connecting rod hole is the same. This distance should be exactly the same on all connecting rods in each engine.

Rods and bearings on the crankshaft should be cut to have a clearance of .002- .0025".

Take care to get a good radius on the outside edge of the bearing on the number 7 rod since it rides next to the shaft.

Connecting rods are very springy – take care in handling. The rod should not be put into a vise to tighten up the bearing caps since you might twist the rod. Clamp on the bearing edge so that you don't twist the rod as you apply torque to the bearing bolts.

Don't Lose Your Cool – Radiator Basics

The later small h.p. cars have a pressurized cap that maintains about 2-3 lbs. pressure in the radiator. Check your

car to be sure it has a spring-loaded bulb under the cap to maintain radiator pressure and maximize cooling. Fiennes sells the parts for the pressure cap.

On 20 H.P. cars (also British Phantom I and Ghost) with radiator shutters that bolt on through the honeycomb radiator, you should be careful in refitting the radiator bolts so that you do not puncture the soft copper honeycomb tube. You can seal the tube by shooting it full of silicone sealant and then putting the radiator shutter mounting bolt through the tube to seal leaks.

In summer, straight water in the cooling system won't foam like antifreeze. The downside of using straight water compared with a 50/50 water and antifreeze mix is that water does not have any corrosion inhibitors. If you use straight water, you might want to consider adding a corrosion inhibitor such as No-Rosion or StayClean. Be sure you flush the radiator annually and add antifreeze in the winter or risk a freeze-cracked head.

If you use antifreeze and have trouble with the radiator foaming, try adding 1-2 tablespoons of castor oil.

Try using a 'water-wetter' to improve the temperature dispersion in the head. 'Super Cool' is a product available from Redline Racing, Moss Motors, and other specialized automotive supply houses.

Spring Check-Up

Take the rocker arm cover off prior to your first spring run to inspect the core plugs to see if they are weeping any antifreeze.

Drain 1-2 cups of oil from the sump into a glass jar to check for antifreeze in the oil. Since oil floats on antifreeze, any green liquid in your drained oil will indicate a leak. Oil and antifreeze do not mix and the source of the leak must be

Sources Mentioned in this Article

Coldwell Engineering, Coldwell Lane, Sheffield S10 5JT, Great Britain, Tel 0114 230 1541, Fax 0114 263 0400.

Egge Parts House, 11707 Slauson Ave, Santa Fe, CA 90670, 800-866-EGGE or 562-945-3419 (pistons).

Fiennes Engineering, Clanfield Mill, Little Clanfield, Oxfordshire OX18 2RX England, Tel 01367 810438, Fax 01367 810532 (specialist in small h.p. parts, catalogue available).

Peter Hepworth Components, Crayke, York, North Yorkshire YO6 4TH England, Tel 01347 821340, Fax 01347 822942 (pistons).

Jahns Pistons, 1360 North Jefferson St., Anaheim, CA 92807, 800-225-0277 or 714-579-3795.

No-Rosion is available from Applied Chemical, P.O. Box 241597, Omaha, NE 68124, 800-845-8523 or Marshall Antique & Classic Restorations, 3714 Old Philadelphia Pike, Bethlehem, PA 18015, 610-868-7765, Fax 610-868-7529.

Leonard Reece & Co. Ltd., Clifton Road, Huntingdon, Cambridgeshire PE 18 7EJ England, Tel 01480 451976/433447, Fax 01480 453009 (precision camshafts, cams repaired and reprofiled).

Richard Shaw, A.T.H. Alden Ltd., Unit A, Sutherland House, Sutherland Road, London E17 6BU England, Tel 0181 531 3358, Fax 0181 527 9105 (new cylinder heads for 20 H.P. and 20/25, new distributor caps for 20, 20/25 and 25/30).

Ristes Motor Company Limited, Gamble St., Nottingham, England, Tel 0115 978 5834, Fax 0115 942 4351 (small h.p. cylinder blocks, various newly manufactured parts).

The Vintage Garage, North Brookfield, MA 01535, 508-867-2892, Fax 508-867-9210.

determined and fixed prior to driving.

To improve top end lubrication after the car has been sitting over the winter, drizzle a little oil down each rocker arm before starting.

Turn the engine over a few times with the ignition off to see that the valves are moving. One seminar participant recommended a light tap on the top of each valve with a rubber mallet to be sure the valves are not sticking.

Use a pressurized oil can to pre-lubricate the engine prior to spring starting. If you fit a full-flow oil filter, you can tap into the filter housing through the top of one of the lines with a fitting that can be adapted to the pressurized oil can.

Put a small amount of Vaseline (for lubrication) on the distributor shaft where it touches the fiber block on the points as the distributor turns.

Miscellaneous Tidbits

You can make pin extractors for the core plugs and other four-holed plugs on the Rolls-Royce engine by taking appropriately sized hex stock, drilling correctly spaced holes and inserting roll pins. This simple tool is strong and can then be used in a socket or combination wrench. Use roll pins instead of drill stock since the roll pins are easier to replace if they break off.

Before torquing a bolt, always back off the nut first. Then retorque it. This technique assures you do not get a false reading due to the nut being seized on the bolt.

If you plan on storing your car more than about six weeks, it's best to drain the fuel from the carburettor so that gum does not form on needles and seats.