LIGHTENING THE FLYWHEEL

Jim Hockert
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Lightening the flywheel by shaving off apparently unneeded material is a favorite modification to improve engine response and thereby overall performance. However, changing the weight of the flywheel changes the dynamics of the engine/drive train of the car, and these changes should be carefully considered before going ahead with this modification — you can't put the weight back on the flywheel!

By lightening the flywheel you achieve less rotational weight, and that means less inertial mass to spin up and spin down (think of a bicycle with 20 pounds on the wheel rims or off of the wheel rims). All other variables being the same, an engine with a lighter flywheel has the potential to rev faster and slow down faster. The closer to the outside edge of the flywheel that the material is removed, the more dramatic the effect.

However, let's consider a few pros and cons:

PROs:

- Faster acceleration.
- Faster slowing down.
- Very good for racing and rallying.

CONs:

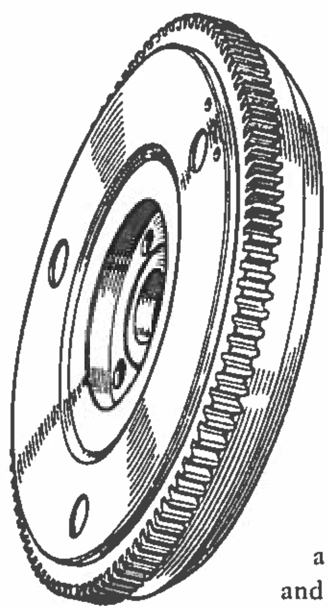
- Removing material from a cast iron flywheel can materially effect the strength of the flywheel (if it is removed from the wrong area).
- Less inertial weight to maintain smooth slow speed idle.
- Less inertial weight to maintain smooth cruising speed on the highway.
- Much more feathering of the clutch needed when leaving from a standing start in order to avoid embarrassing engine kills.
- Should be re-balanced both separately and as a unit with the crank and harmonic balancer after weight removal. This means removing crankshaft.
- Not very good for city driving, but it depends on how much it is lightened.

If, for example, you reduce a standard flywheel (about 28 pounds) to just 16 pounds, you have made a dramatic change to the drive train dynamics, and you will feel a dramatic difference in driving the car. Yes, it will rev faster both up and down. However, you will also find it harder to get the car going from a dead stop, and it will be less smooth at idle. Additionally, you may lose some of the steadiness of the engine at cruising speed.

You should have your machinist carefully look at the dimensioning where the material is to be removed. A cast iron flywheel can be seriously denigrated in strength if overly lightened, and you don't want it exploding next to your legs at 5,000 rpm.

The factory rally cars used lightened flywheels with a weight of about 15 pounds (including ring gear). They discovered that below that figure, there was not enough flywheel momentum to help carry the engine through the shifts from gear to gear. Below 15 pounds, the car itself becomes the flywheel for the engine.

For a big Healey used for "normal" driving — that is, freeway driving, back roads touring, and the occasional short trip in town — you probably would not want to lighten your stock flywheel by more than five or six pounds. For a big Healey used frequently for commuting, short trips in town, and in other stop-and-go situations, you should probably not lighten your flywheel at all.

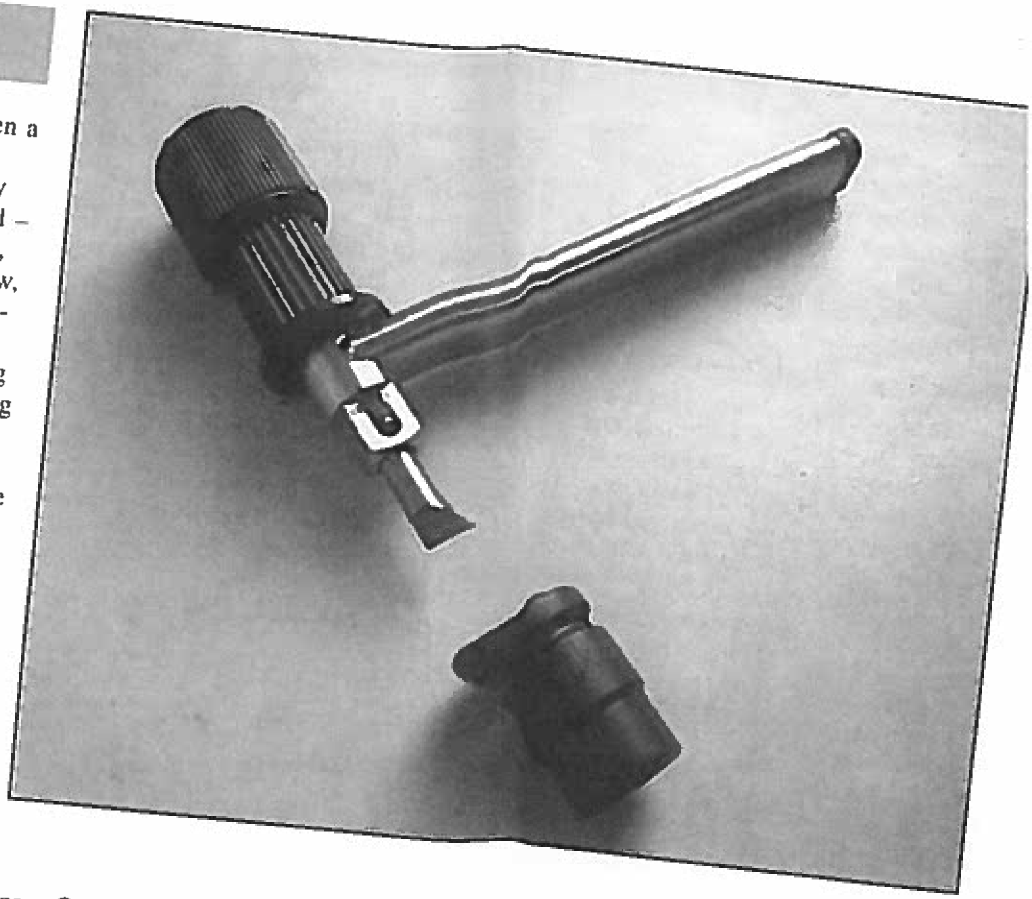


On the other hand, if you are only going to race your car, 15 pounds is a good figure for autocross/rally. Some of the circuit-track competitors use flywheel weights down to 10 pounds with very good results, but that is a very specialized segment of the hobby and would not be appropriate for the average enthusiast.

Personally I run a lightened flywheel of about 16 pounds on my rally car, but it was milled from billet steel which is much stronger than the cast iron original.

An Interesting Tool for Simplifying Valve Adjustment

By Roger Moment, Rocky Mountain AHC



Adjusting valves has always been a bit of a juggling act which I have found useful for tuning my dexterity skills. There are three tools involved – feeler gage to measure the clearance, screwdriver to adjust the tappet screw, and wrench for loosening and retightening the locknut. Having only two hands, the challenge comes in holding the clearance gap fixed while checking with the feeler gage and then tightening the locknut.

Special valve adjustment tools have been available for some time that make the screwdriver-wrench operation easier. However recently I became aware of a similar device that allows you to do the job with just the one tool – no feeler gage is needed. As a result you can get accurate reproducible gap settings with less hassle.

The item is called Clickadjust (from England, sold by Moss — item # 386-205) and is constructed similarly to other valve adjustment tools. That is, it has a 1/2" square drive (for the locknut socket — bought separately) and an integral flat blade screwdriver that passes through a hole in the square drive and is operated by a knob. The drive part has a short handle for operating the socket. What sets the Clickadjust apart from other such tools is that the screwdriver knob has a built in clicker that indicates a step (both by feel and audibly) as the screwdriver is turned relative to the socket drive handle. Operation is fairly simple. However, first you must calibrate the clicker, and this is done using a feeler gage and counting the clicks required to obtain the desired gap. Once the tool is calibrated, you can put the feeler aside.

To adjust a valve, rotate the engine until the rocker arm is in the fully released position, loosen the locknut, run the adjusting screw down until a "stop-click" in the Clickadjust tool sounds, back off the adjusting screw the calibrated number of clicks for the desired gap setting (while holding the socket drive handle perfectly still), and finally, while holding the screwdriver knob still, tighten the locknut. One hand for the screwdriver, one for the socket drive handle.

After a little practice, I found that I could get reproducible settings to within 0.001" of the desired gap every time. There are 30 clicks per revolution of the screwdriver knob, so the calibration for a Whitworth adjuster (found on 100s – actually BSF) and UNF ones (on all 6-cylinder cars) will not be the same for a given gap setting, the Whitworth/BSF thread requiring fewer clicks since it has a slightly coarser thread.

Finally, you will need to obtain a standard height 1/2" drive socket for the locknut — 5/16" Whitworth for the 100, and 9/16" (SAE) for 6-cylinder engines. And I recommend 6-point sockets, rather than 12-point ones, to minimize damage to locknut corners.

ROCKER PEDESTAL OIL FEED

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On the majority of Healeys that I have been working on, I have found a couple of important imperfections and faults regarding the oil feed to the rocker pedestal.

The first imperfection is that the factory used a very fine thread for the oil feed banjo bolt and for the hole in the pedestal. If someone tightens the banjo bolt too hard, it is very easy to strip the threads out of the hole in the pedestal, since it is made out of aluminum.

The second fault is that owners or mechanics have assembled the rocker gear onto the head before they mounted the banjo bolt in its place on the pedestal. There is a hole in the rocker shaft that must be perfectly aligned with the threaded hole in the pedestal. If the rocker gear is mounted to the head without first screwing the banjo bolt in place so that it engages the hole in the rocker shaft, thus aligning the two holes, it is very easy to get them misaligned. When one then tries to screw in the banjo bolt it will strip the threads in the pedestal, due to the resistance from the misaligned hole in the shaft. Once this has happened, which is the case on many Healey engines, the joint between the oil feed pipe banjo, the pedestal and the banjo bolt will not be tight, resulting in lost oil pressure for the rockers and shaft. I suspect that this might be one big reason for the common problem with worn Healey rocker shafts.

Always fit the banjo bolt to the pedestal before mounting the rocker gear to the head.

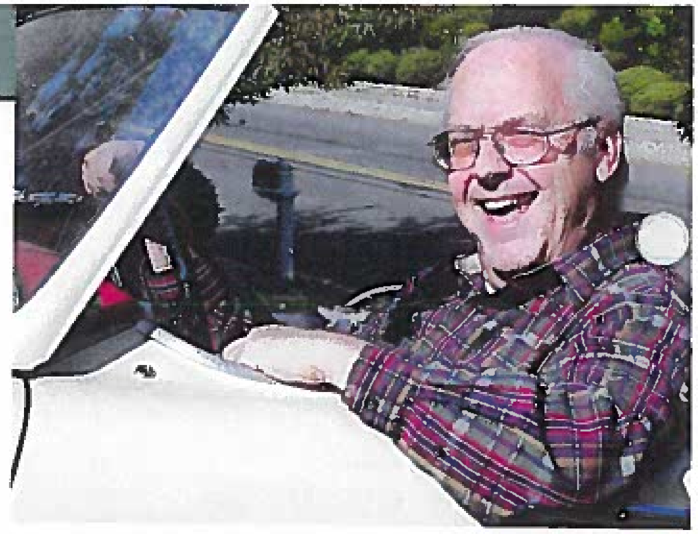
One good remedy for this problem is to make a new banjo bolt with 3/8 UNF threads and to mount a helicoil thread of the same size into the rocker pedestal. A second remedy, regardless if you are using the original bolt or not, is to always fit the banjo to the pedestal before mounting the rocker gear. The banjo bolt can then easily be removed in order to fit the oil pipe.

Rocker Arm Bushes

I had a call from a nice person down south about rocker arm bushings. It's been so long since I had done them I had to think a bit about what is involved. I remember the steel rocker shaft tends to gall on its bottom side, and then it leaks oil into the valve cover and causes the car to smoke. Many of us have figured this out on our own.

I ended up going out to my spare engine and pulling off the tappet as well as checking the service manual. The new bushings are pressed into the rocker arm with the split facing upwards and the half oil groove facing level (i.e., from 90 to 270 degrees if 0 and 360 are at 12 o'clock). The top oil way hole is drilled down with a .0785 drill. Then the rivet must be ground off, and a .089 hole is drilled horizontally through the bush. This latter hole must be filled with a rivet that is peened over and then lightly welded to keep it in place.

Ideally, the bushings can be reamed to fit with a clearance of .0005 or .001 maximum. The tighter the longer you will have before having to do this job again. I found once to be more than enough.



John Sims
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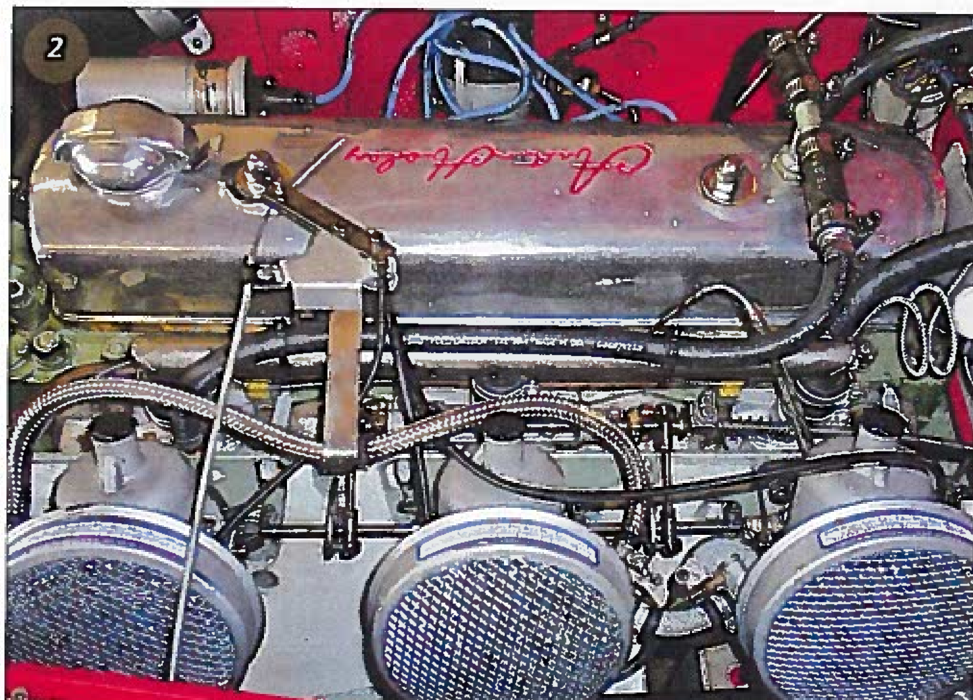
HEALEY MARQUE Columnist

INSTALLATION OF A PCV VALVE

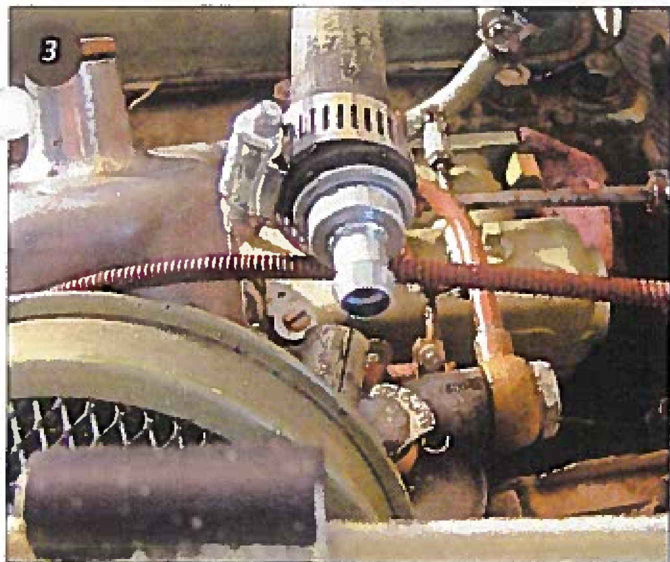
Recently there was quite a discussion on the Healey Mail List about the installation of a *Positive Crankcase Ventilation (PCV)* valve on a Healey. Without going into all of the reasons why one would perform this installation, it did prompt many email exchanges on the list and it is therefore apparent that this is a subject that is of interest to the Healey community.

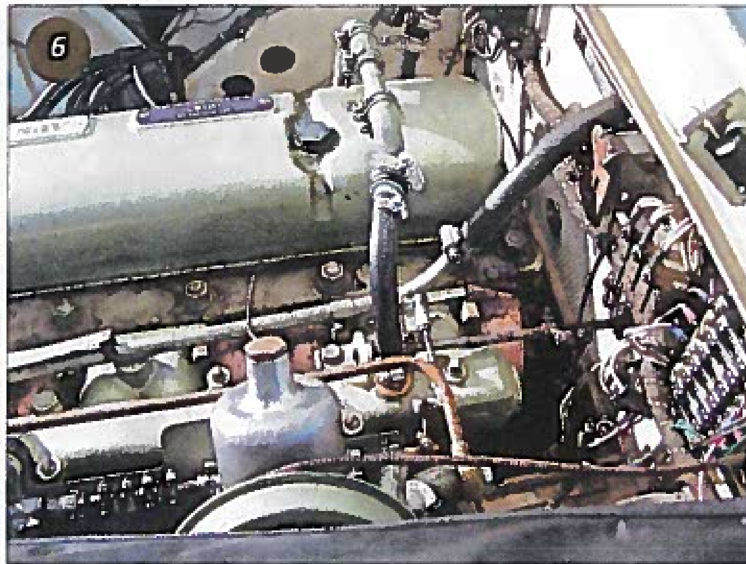
One of the frequent contributors to the list gave examples of an installation on a tri-carb Healey and, after seeing this, I decided to install a PCV valve on my BN6 and found that the installation for both the tri-carb and a twin-carb engine is rather straightforward with the exception of those cars equipped with a brake servo, as will be discussed later. The parts, which are readily available at most local auto parts stores are Purolator PCV Valve PV770, Brass Tite fitting #43075, a length of 3/8-inch inside diameter fuel injector hose, and the clamps necessary to put the assembly together. The total cost to make this installation is around $10. Photo 1 shows the items needed to make this installation.

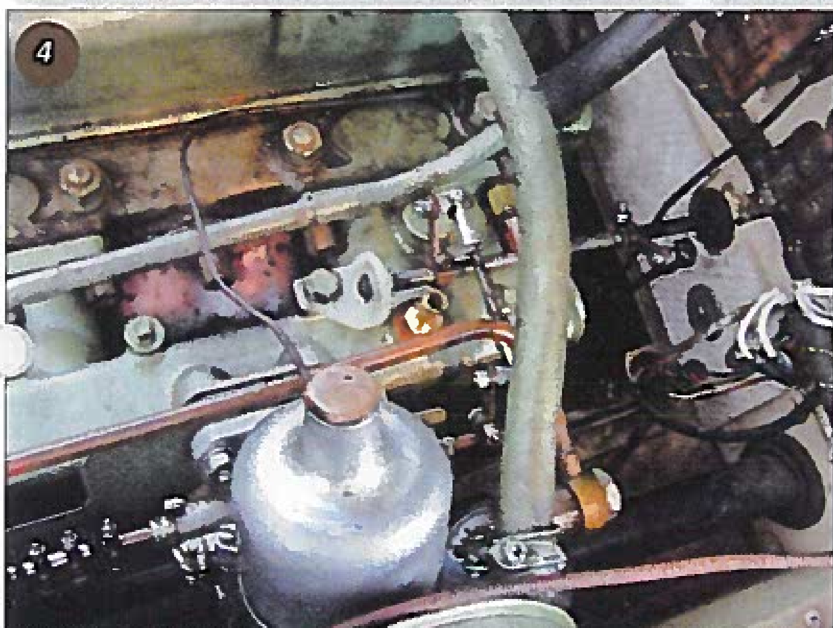
The intake manifold on the six-cylinder cars has a threaded hole plugged with a brass plug near the rear of the manifold that is used on brake servo-equipped cars as a vacuum source. The exception to this is on the tri-carbs in which this threaded hole is at the front intake manifold. Photo 2 shows the location on a tri-carb.



The basic installation of a PCV valve is to insert the valve in line between the "T" fitting from the valve cover to the threaded manifold hole. In order to do this, the existing hose from the "T" fitting to the rear carb must be disconnected at the rear carburetor air intake filter. Cut this hose to about 5 inches, ream it as necessary, and insert the PCV valve into it,







clamping it tight. Photo 3 shows the PCV valve inserted into the hose that extends from the valve cover "T" fitting.

At this point, remove the brass plug on the manifold being careful to retain the brass washers. Insert the fuel line fitting in place of the plug, using the washers that were removed and tighten. This is shown in Photo 4.

Measure a length of the fuel injection hose, install it between the PCV valve and the fuel line fitting, clamp in place and you are finished. Views of the final installation on a twin-carb engine are shown in Photos 5 and 6, while the installation on a tri-carb can be seen in Photo 2.

Since cars equipped with a brake servo use the intake manifold plug for the vacuum hose for the servo, it will be necessary on those cars to use a "Y" or "T" fitting in place of the regular fuel line fitting, as shown in these photos, so that both the servo and PCV valve hoses can be connected.

The installation of a PCV valve should eliminate or reduce any timing cover oil leak and there should be less engine smell. There was a noticeable difference in my car after I made this change. Also, this installation may cause the rear carb to run a little leaner, so tweaking the richness may be necessary.

Vital Statistics

These messages and others can be found in the Healey Mail List archives. If you are interested in joining the Healeys Mail List or in viewing the archives, all that is necessary is to go to this website: **autox.team.net/mailman/listinfo/healeys** and follow the instructions there. You will not be disappointed. HM

THE "HEALEY HUNTER" ENGINE

John Wheatley
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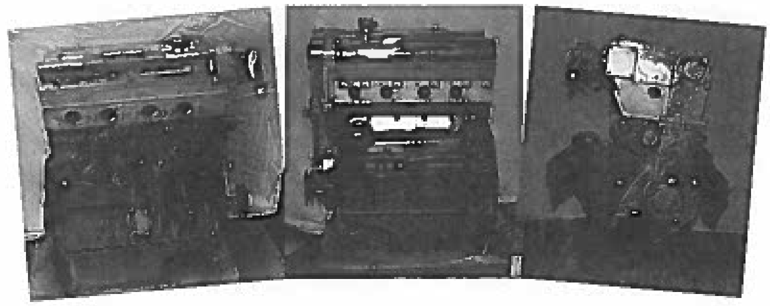

From time to time in the past, the "Healey Hunter" engine has been written about with extravagant claims for the power output and suggestions made that it should have been developed by the Austin Motor Company as high a performance unit for the Austin-Healey 100. I have always been dubious about these claims because my motor industry lifetime experience tells me that it is simply not possible to design, build and develop any power unit or driveline component in a backyard shed, which is essentially what the published material tells us is the Hunter case. A complex component such as a motor vehicle engine can not be produced without the resource of a large and experienced designs office backed up by a well equipped development facility.

Add to this that there are the problems of installation. Although there are one or two such engines known to exist, photographs of it do not show induction or exhaust systems fitted. Also very significantly, there does not appear to be any photographs of an engine installed in an Austin-Healey 100 or 100S, which would mean two layouts would have to be designed in order to suit the two different under bonnet systems: the LHD cars sent to North America and RHD 100S cars. All 100S cars were RHD and there is no known surviving 100S ever having been so converted to LHD. Until I see certified copies of power curves and good clear photographs of in-car installations, I do not believe that this engine produces the claimed output and performance. (My first name is Thomas, as my wife often reminds me!)

It is also alleged that an engine or cylinder head was sent to the Austin Motor Company for evaluation. This is absolutely not true. I have provided copies of the published articles to John Barnett and discussed the topic with him and he knows nothing about this Hunter project. Who is John Barnett? John was an Engineer in Engine Development at Longbridge, having joined the Company in 1952 and the last years of his career was as Chief Engineer, Engines at Land Rover. He worked on the 100/100S development programmes and I have many copies of his 100S development Test Reports. I worked for John in 1955 during my Engineering Apprenticeship and within the last twelve Months John and I have met with several other former members of Longbridge Product Engineering and continue to meet from time to time for a very convivial Pub Lunch and talk about some of the things we worked on and how things are in our old Company now, which is not good at all and we fear for its future.