

OVERDRIVE PUMP PRESSURE GAUGE

This is an interesting article however, the original photos were lost due to the web site being taken down by America On Line when they discontinued hosting service. Please note that the article was written in 1995. The pressure gauge can now be purchased from:

<http://webpace.webring.com/people/tj/jholekamp/>



The numbers refer to the Overdrive type

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As many of us know, the old overdrives in big Austin-Healeys begin to shift slower and slower with age. Particularly on those long pulls when the oil temperature climbs higher than we would like. There can be several reasons for this, but isolating them is not so easy without a pump pressure measurement.

Faced with this problem and not finding anyone with an 18G251 service gauge, the dilemma still seemed solvable. The recommended pressure range for the pump in the Laycock overdrive is in the 450psi range and US Gauge makes a 600psi 1.5 inch diameter gauge with a 1/8 inch pipe thread as a bottom mount. The model number is P500, 1.5, 600 and it sells for about \$15 at gauge supply houses. A welding supply store can lead you to a gauge supply house if one is not readily known.

The gauge requires a spare overdrive operating valve plug, a little drilling and brazing and some assembly according to the accompanying sketches. I bought a 10 inch steel brake line with fittings attached and cut it in half. I then sanded the zinc coating off the end that is brazed into the drilled valve plug (for obvious toxic heavy metals reasons).

The reason for drilling the plug as shown, leaving a shoulder, is so you can attach the gauge with the check valve, ball and plunger in place. With the check valve in place, the pressure may be monitored as the overdrive is shifting.

After attaching the gauge and jacking up the rear wheels (or taking the brute for a ride with the transmission tunnel removed and a partner to watch the road), you can watch the pressure behavior as the pump delivers oil to the accumulator.

The accumulator is really a pressure relief valve with storage volume that stores a quantity of oil at a high pressure just waiting for the operating valve to be actuated. When the operating valve is actuated, the accumulator oil flows through the valve into the overdrive operating cylinders which cause the OD to shift into overdrive. The OD shifts out by the operating valve draining the operating cylinder oil back into the sump. This is why the dang thing always shifts out of overdrive quickly regardless of how old and feeble the pump is.

The pump has a piston operating at output shaft speed and a spring loaded ball check valve feeding the accumulator volume through a passage in the OD housing. When the

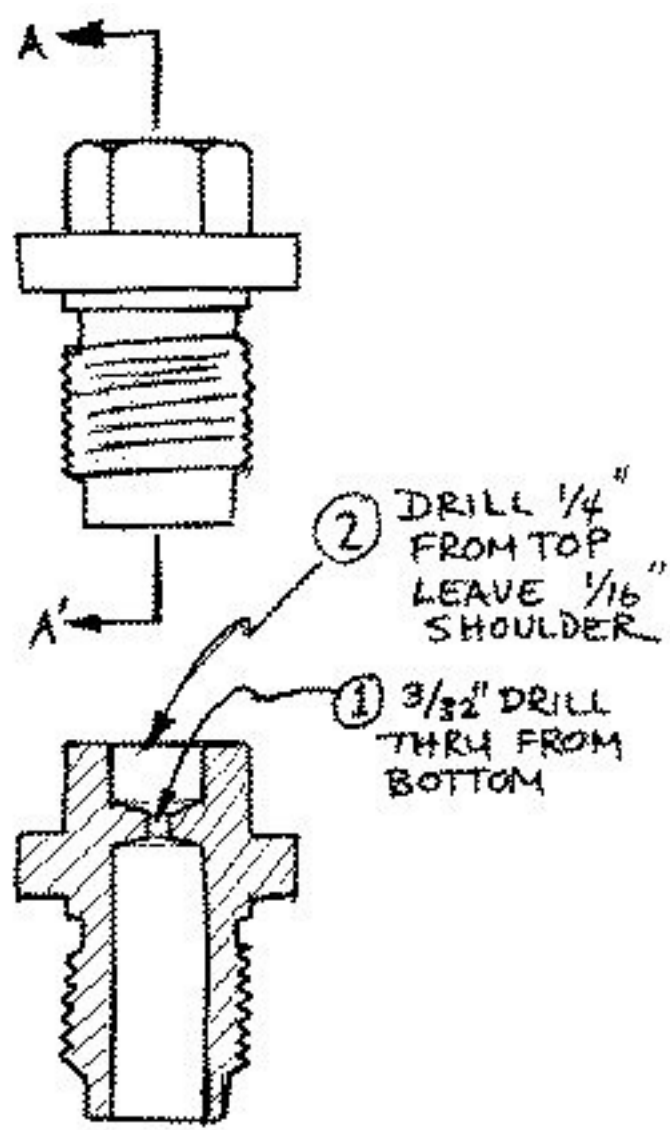
transmission output shaft starts rotating, the pump starts pumping. As the output shaft speed is increased, pressure should rise until the accumulator relief pressure is reached. At this point, the pressure should remain essentially constant even though the transmission output shaft speed continues to increase or until something is done to drain off the accumulated oil (like the operating valve being moved by the solenoid).

The pressure relief level of the accumulator is determined by that humongous spring behind the solenoid mounting plate on the side of the OD housing. I found my relief pressure was low and following the advice of Jack Summers of Northern Indiana Austin-Healey Club, shimmed it a little at the outer end with some thin steel washers. For a shim thickness of 0.020", I got about 20 psi pressure increase so I then pushed the pressure up to about 480psi using several shims.

My pump was able to deliver more than the accumulator relief pressure so this worked just fine and improved my OD shifting significantly. It is conceivable that a pump could be worn to the point that pump piston leakage would prevent the fluid pressure ever reaching the accumulator pressure relief level. If this were the case, the pressure would rise slowly as transmission output shaft speed increases and would continue to rise, never reaching the accumulator control level even at high output shaft speed.

By watching the pressure behavior as it is rising from zero, one can also get an indication of the performance of the pump check valve. In my case, the pressure surged with each pump stroke and then dropped back quite a bit. I blamed this on poor check valve performance and attempted to seat the pump check valve by removing the plug, spring and plunger and then tapping the ball lightly with a plastic dowel and light hammer. This, according to the manual, insures the ball seat is smooth and round. The results were quite noticeable as the surging was reduced and the pressure increased faster.

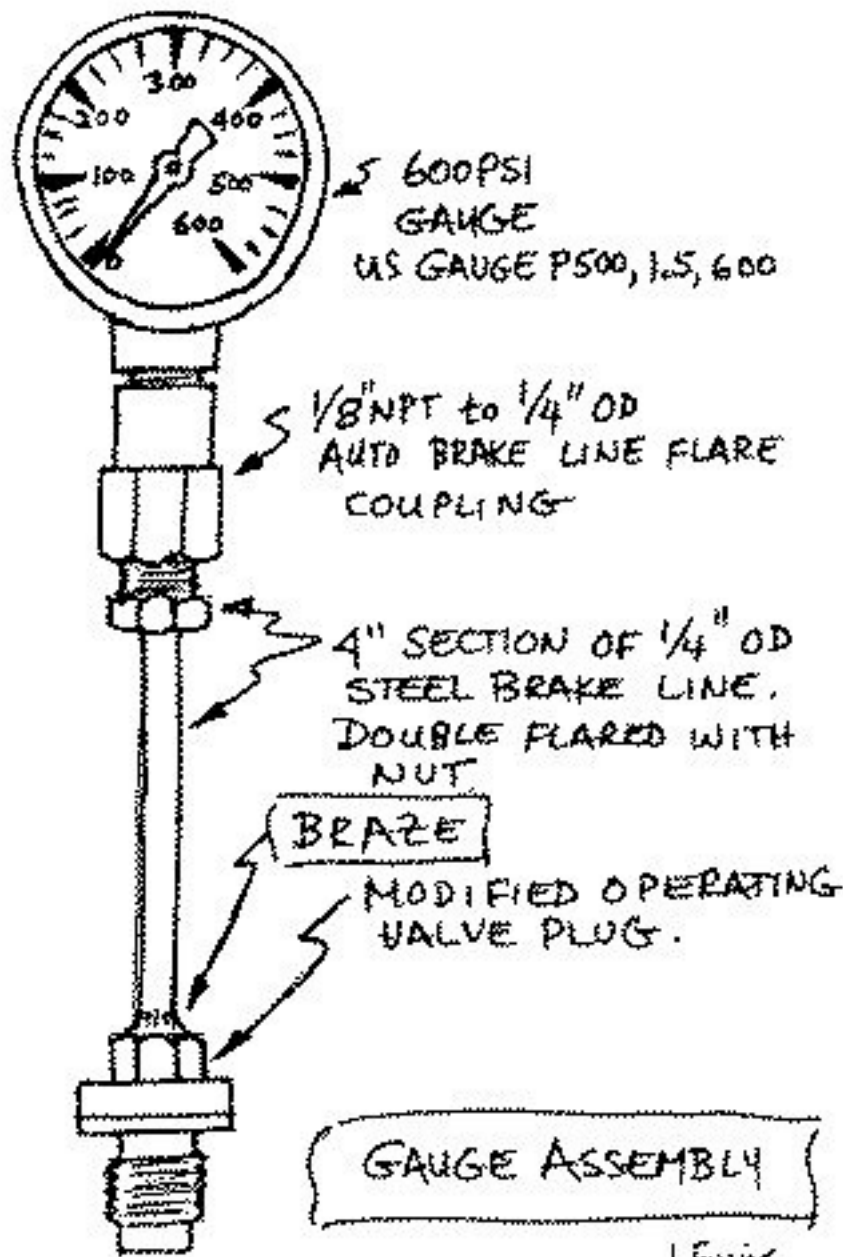
With a little thought and just a little knowledge about the theory of the Laycock OD, This little gauge can provide a lot of insight into what is going on inside that mysterious box.



SECTION AA'

OPERATING VALVE PLUG

L. Frazier
1926



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