

Engine Leaks and Cures

The following information, printed in blue, is taken with permission from the website of Antique Engine Rebuilding located in Skokie Illinois. I have inserted a few pictures within Rich's document to help visualize his suggestions.

After 30 plus year experience with the Model A & B engines, the most common problem is a rear main oil leak. This problem can be very simple to correct or it can turn into costly time consuming job. What is important is a correct diagnosis. You do not want to rebuild an engine if you have a bad oil filler cap. Do not assume the worst until you have checked out the problem thoroughly.

- 1. After wiping clean the flywheel housing; check that oil is leaking from out of cotter pin hole at bottom of flywheel housing. If oil does not leak out of cotter pin hole you have a leak some place else, suggestions oil pan, timing case cover, front seal, valve cover, oil pipe to mention a few. Most oil leaks drip off of the cotter pin. You need to determine that oil is leaking out of cotter pin hole not off of cotter pin to be a rear main leak. If oil is leaking out of cotter pin hole go to step2.*
- 2. Remove oil filler cap check to see that oil filler pipe is not restricted or plugged. With oil filler cap removed from car take car for a drive. If leak stopped oil filler cap is bad. There are tabs bent over under top of cap to stop cap from seating all the way down and the stops are bent or missing on your cap. This will seal crankcase pressures in and will force oil out. Replace oil filler cap. This is a common problem, is often overlooked and is easy to fix.*
- 3. Hold a plastic food storage bag around oil filler pipe and bring engine to high idle. Bag should flutter if does not and fills up with air, you have excessive blow by in crankcase. This can be caused by bad rings, pistons, cylinders or possibly valves and guides. Excessive pressures in crankcase will cause oil to leak out rear main and any other place not sealed.*
- 4. If above is all good now remove the half-moon inspection cover on flywheel housing, three hex head screws. Chock wheels. Check to see if inside of flywheel is wet with oil. If flywheel is wet inside this means oil is leaking out rear main cap and or cap to block. Start engine, with flash light look for oil leak. EXHAUST IS HOT AND MUST BE VENTED.*

POSSIBLE PLACES FOR OIL LEAK.

Checking inside flywheel housing with half moon cover removed.

Engine running

- A. Dripping or running down right side of engine around outside of rear main cap. Probably gasket between engine and flywheel housing. Remove engine and replace gasket. We seal around camshaft hole with RTV no longer use a gasket.*
- B. Dripping between rear main cap and block at shims. Cap must fit flat to engine block. Rear seal part A6335 must be filed flat with block. I use a thin film of RTV on both sides of shim to prevent leakage.*



Using a gasket with Permatex requires the brass shims at the throttle linkage bolts.



Option: Omit the gasket & shims and use a good quality gasket replacement sealant.

C. Dripping out side of rear main block could be oil running up rear main bolts, I use RTV under heads of the rear main bolts and on threads of the two upper bolts that secure flywheel housing to block. These leaks are generally slow drips and are not common.

D. Dripping or running out of back of rear main cap into flywheel is common. This is a rear main leak. If you have not seen oil leak at this time take car for a drive, immediately chock wheels and check again. If rear main leaks; remove oil pan.

*E. Check oil tube on rear main cap that it is not missing, broken or cut off. The end of this pipe must be in oil in bottom of sump. If pipe is not in oil, pressures in crankcase will blow oil out rear main. If pipe is screwed into cap too far this will restrict oil flow back to sump and cause rear main leak. **(See photo below of modification to pipe at the threaded end.)** The oil galley plug in rear main should be installed again to stop crankcase pressures from pushing oil out rear main. Next remove rear main cap, oil galley in cap must be open and clean so oil can flow back to sump. With cap removed from engine you can now inspect Babbitt for wear, cracks chips, ECT. The last quarter inch of the bearing must be full diameter of Babbitt no cuts, grooves or chips. Shims must fit tight to crankshaft. **(See photo)** Plastigage can be used to check bearing clearance at this time with engine still in car. I suggest a jack be used to apply pressure upward on crankshaft. This will seat crankshaft up into bearings in block to give you an accurate measurement. Desired clearance is .001 to .0015.*



Note area removed to allow oil to pass freely to drain pipe

By now you should have diagnosed the problem. I hope that your problem was easy to fix. I have seen newly rebuilt engines leak and many times it was just the oil filler cap. Do not assume the worst till you have checked out the problem thoroughly.

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INQUIRIES INVITED**

Engine leaks from the front of the engine can travel along the pan rail or bottom of the oil pan and be misleading as to their source. Starting from the front and working back, the following areas should be checked if you are searching for a leak.

Front seal and pulley: The original style front seal presses heavily on the surface of the pulley and with time, the packing and metal wear away leaving clearance for oil to pass. If leaking in this area, a new seal alone may fix the problem but it is advisable to also replace the pulley. The pulley surface the seal presses on needs to be very smooth. Many of the new pulleys from suppliers will require polishing with fine emery cloth to remove surface defects. The following picture shows the varying conditions of two new and one slightly used pulley.



The pulley on the left is new and prior to polishing. The upper center is a new pulley polished and ready for use. The right pulley is a used pulley showing a slight wear area from the seal packing, it could be re-used with an original style packing but not with a modern seal.

The picture below shows a modern seal offered for the front pulley area that requires no modification to original engine components. The original style packing is also shown.

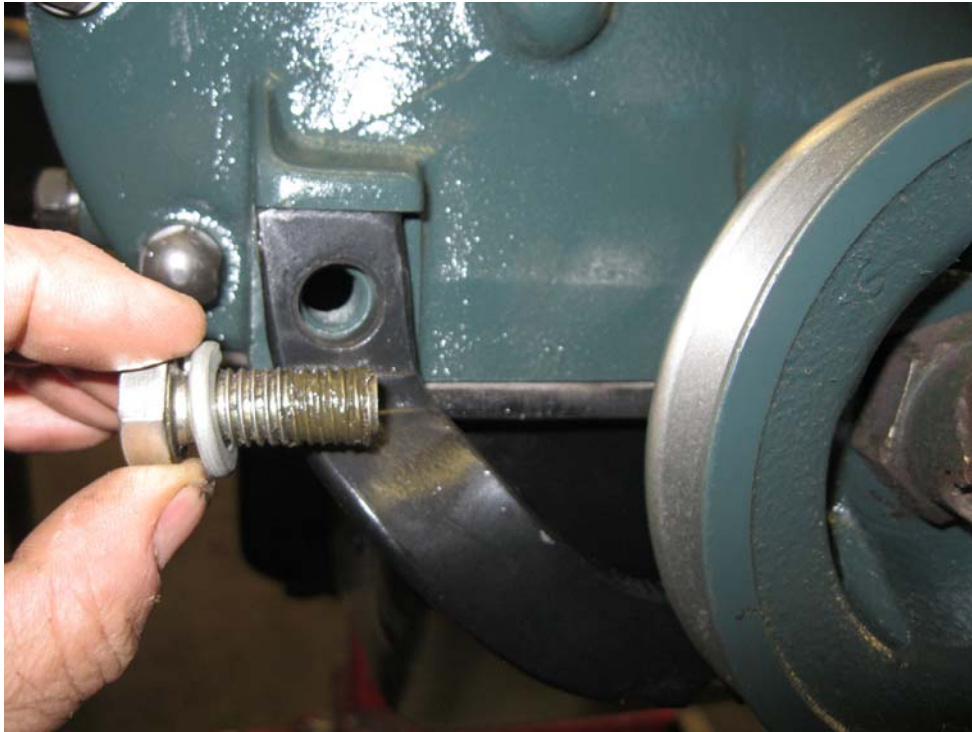


It is critical when using the modern seal to have the surface of the pulley polished and to have a full diameter of 1.625 inches for the seal to function properly. The modern replacement seal is leakless when installed properly. The photo below (left pulley) shows the slight wear that is acceptable when using an original packing. I am currently using original packings when assembling rebuilt engines.



The front pulley hub extends into the crankcase and if the fit between the crankshaft and the pulley is less than snug, a leak could occur between the surfaces. The early two piece replacement pulleys were especially prone to being loose. A small amount of Permatex #2 applied to the inside of the pulley will stop any seepage.

The front engine support yoke passenger side bolt is a source of leakage often overlooked and blamed on the front seal. This threaded opening in the front timing cover is open to the crankcase. A ring of Permatex #2 on the threads will seal the area.



Use just enough sealant to seal the threads in the tapped hole.

The timing covers came from the factory with thin paper gaskets. If these gaskets are used, they should be coated with Permatex #2 on both sides. I often do not use these gaskets when assembling engines. I use a good grade automotive gasket sealant in place of the gaskets as shown in the photo below when omitting the gaskets. Permatex Right Stuff is an excellent sealant to use in lieu of the gaskets.



The external return oil pipe is often a source of a leak due to misalignment of the ends or an actual crack in the solder used to secure the components from the factory. You can use an old block as a jig to accurately locate and re-solder the ends. The components must be very clean to obtain a strong joint.



Cleaned parts prior to fluxing



Heat the parts...not the solder

The valve chamber cover can be a source of leakage. Seal your choice of gasket to the cover with Permatex #2. When applying, spread the sealant around the bolt holes also. Install the gasket and cover on the engine with all the bolts to position and clamp the gasket to the cover while the sealant sets. When set, remove the cover and apply a coating of high temperature chassis grease to the gasket or valve chamber opening edge and re-install. The grease will keep the oil from seeping and will allow for future removal of the cover without damage to the gasket. Be careful to avoid over tightening the valve chamber cover bolts or the cover will crack. Cork gaskets require much less torque than paper gaskets. If using silicone, use a very thin coat and wipe or cut away any excess. (Be careful...small bits of silicone and bearings do not work well together.)



The oil pan drain plug can leak due to a worn copper gasket, replace when necessary. The threaded fitting in the pan can break loose and cause not only a leak but could spin and cause the removal of the drain plug to be difficult if not impossible without removing the pan to repair. (Ask me how I know!) Check the condition of this area of the pan when you have the pan removed from your car and repair as necessary.

The rear main is the greatest source of leaks in the Model A. Assembled correctly, it can be made almost leakless if all tolerances are within the required specifications.

Important engine conditions that must be met to have a leak free rear main are as follows:

- 1) Bearing to crankshaft clearance between .001 and .0015
- 2) Properly cut oil grooves in the rear main bearing with full babbitt round the rear ¼” and no chips or missing babbitt near the rear thrust surface
- 3) Round rear cap bearing surfaces...not oval shaped babbitt
- 4) Endplay of crankshaft between .001 and .005
- 5) No excessive cylinder blow by
- 6) Clear path for return oil through the rear main cap
- 7) Flat rear cap at the mating surface to the block (Use a very thin coat of sealant on the shims and mating surfaces of the cap and block during assembly.)

Prior to any assembly work, check that the aluminum seal in the rear of the block is not protruding above the surface of the block. File flush with the block of necessary. If using the brass replacement combination thrust and seal check its fit and file for a flush fit to the block, then use a gasket seal to seat it in the block. Install the crankshaft and adjust the clearances.

INSTALLING THE PAN

1. *Installing the engine pan improperly will result in leaks.*
2. *Check the pan for bent flanges, cracks, dents or holes. Repair the damaged areas prior to painting and installation. Place a straight edge on the pan rail surface to discover distortion and make the required repairs. Often, finding a replacement pan is a simple answer for a severely damaged pan.*
3. *Check the fit of the dipper tray or sub pan assembly it must fit snugly in the pan. Install the sub pan assembly in the oil pan and verify that all the indents are seated fully to the ridges on the dipper assembly.*
4. *Install the oil pan plug. Check that the gasket seats properly and that the tapped “bung” is securely installed in the pan. Finding you have a loose threaded insert after you have the pan installed is not a pleasant experience. Tighten it as you would when changing oil. Hint: To avoid loosing your oil or creating a leak...consider this advice from an old mechanic friend who is no longer with us...”An oil plug should either be out of the drain hole or installed and tightened. Never half way between!”*
5. *Now is a good time to check that all cotter pins are in place and secure. Make sure that everything is properly installed and that there are not loose pieces inside the engine. (Like that socket you set on the pan rail and can now not find!)*
6. *Check the oil pump...make sure it is securely mated to the block. Make sure there is a spring to hold the oil pump in position. Early pans had a spring mounted to the removable cleanout, some transition pans had the spring mounted to a raised receiver surrounding the oil drain hole and most later oil pumps had a spring retainer mounted to the oil pump that captured a spring.*

7. *Dry fit the oil pan gasket and make the necessary adjustments for the holes to line up. Fit the rear cork seal area. There is a tab on each gasket that fits into a groove on the rear main cap. This groove width varies and the tab may need to be trimmed. If using a modern front seal, cut the gasket to fit around the seal.*
8. *Use Permatex #1 gasket sealant on the area of the block that is covered by the oil pan gaskets. Use a liberal amount of this sealer in the corners where the gasket tabs fit into the rear main cap groove. Also use a liberal amount of gasket sealer where the front of the oil pan gaskets meet the front oil seal.*
9. *If the rope style seal is used, coat the groove in the oil pan with #1 gasket sealant and install the rope seal in the oil pan. Use the sides of a pipe or socket slightly smaller than the front pulley to seat the seal. Tap the ends of this seal until they slightly protrude from the top of the pan. Cut away any of the plastic inner core that sticks above the surface of the seal. An option to this is to cut away the excess seal leaving about 1/16" of the seal protruding above the pan.*
10. *There are two widths of grooves on rear main caps. Some parts suppliers stock both sizes. Obtain the correct width if possible. Coat the rear main groove with Permatex #2 placing more at the ends where the cork will butt to the flat pan gasket and then force the cork gasket into this groove until it seats. You will need to cut the cork gasket to the correct length...be careful to avoid cutting it short. The cork gasket must fit snugly to the oil pan gasket. Coat the outer surface of the cork gasket to provide a good seal to the pan.*
11. *If using paper gaskets, coat the surface of the oil pan side gaskets with #2 gasket sealant. If using a cork gasket, omit the sealant if you wish to be able to remove the pan without damaging the gasket.*
12. *Place a light coat of Permatex #2 on the ends of the rope seal. Remember to apply a liberal coat of assembly grease to the wear surface of the rope seals prior to assembly.*
13. *Carefully position the pan over the engine and lower it to the block making sure the oil drain pipe passes between the pan and the dipper tray.*
14. *If a modern front seal is used, guide it into the groove of the oil pan.*
15. *Install the rear and front bolts first if possible. Do not pull them down until you have all of the other bolts started. In a random pattern that pulls alternately from side to side, start turning the bolts down. The objective is to pull the pan down evenly. If using a cork gasket, seat the pan to the gasket and turn the bolts another 1/2 turn and stop. If you pull it down tight, the cork may be forced out from between the pan and the block. If using a paper gasket, you can turn the bolts down snug. 20 ftlb torque should be adequate.*

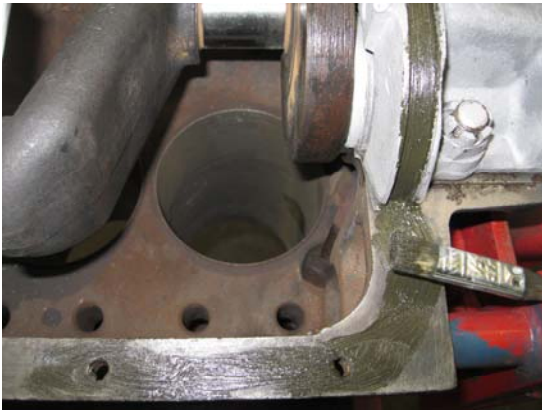
A small paint brush with the bristles cut short works good for applying the Permatex



Typical sealants



Pre-fit pan gaskets dry



Seal around the pan bolts



Apply sealant over the rear cap cork

At this point you should have a leak free engine if all the tolerances are within spec and the sealants were applied as narrated. Remember to seal the rear of the camshaft as the flywheel housing is installed after finalizing the flywheel housing alignment.

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For additional "Do it Yourself" tips go to my website
www.durableperformance.net