Service Instruction

Lycoming Service Instruction 1324A, Installing Oil Seals

The following is a condensation of the official Lycoming article. All text is directly quoted. The original covers 3 pages and, frankly, I didn't feel the small amount of useful information justified the space. For those of you needing "the whole 9 yards", contact Avial.

The two crankcase front bearing oil seals used in Avco Lycoming direct drive engines are the split seal and the solid ring stretch seal. The split seal is open to permit assembly around the crankshaft. The solid seal is made from a highly elastic material that allows the seal to be stretched over the crankshaft flange during assembly.

To minimize oil leaks that occur in the area of the front crankshaft oil seal and prevent the seal from rotating in the crankcase bore, a thorough cleaning of the crankcase bore and use of the correct sealant is necessary. The crankcase must be cleaned of all traces of the old sealant and oil before a new seal is installed. To accomplish the cleaning, use one of the following solvents; methly ethyl ketone, acetone, Napasco SC-200, M-17, or M-114.

Split Seal

The installation of the split nose seals P/N 76940, 78443, 78443-P50, LW-11997 or LW-11997-P50 is as follows:

1. Assemble the split seal on the crankshaft with flat side toward the crankshaft propeller flange.

2. Apply a coat of adhesive (Goodyear Pliobond No. 20 or Dow Corning Silastic No. 140) to the outside diameter and the split of the seal. Care should be excercised to keep any adhesive from the surface of the crankshaft.

3. Assemble the seal with the split at 1:00 o'clock on the standard rotation engines and at 11:00 o'clock on the reverse rotation engines. (Viewed when facing the propeller end of the crankshaft). Press the seal firmly against the seat in the crankcase bore.

Solid Ring Nose Seals

The installation for the solid ring nose seals P/N LW-13792, LW-13792-P50, LW-15628 and LW-15628-P50 is as follows:

1. Remove propeller and starter ring gear support from the crankshaft propeller flange.

2. Remove the front crankshaft oil seal from the crankcase and clean the recess with a cloth and one of the following solvents; methyl ethyl ketone, acetone, Napsco SC-200, M-17, or M-114.

3. Inspect the propeller flange, crankshaft sealing surface and the crankcase seal bore recess for any scratches or nicks that damage or cause the seal to leak; if found, remove with fine emery cloth or a small abrasive stone.

4. Remove the spring from the inside of a new seal and unhook spring.

5. Apply a thin film of Lubriko M-6 grease (Master Lubricants Co., Philadelphia, Pa) on the sealing surface of the seal; around the crankshaft at the sealing surface; and on the outer edge of the crankshaft flange.

NOTE

If the crankshaft is not reinstalled in an engine, secure it in a vise or other suitable support to prevent it from moving during assembly of the stretch seal.

6. Place seal over edge of crankshaft propeller flange with rear (open portion) of seal towards the flange.

7. Slip a brass pin approximately 9/32 inch diameter X 3 inch long through crankshaft propeller flange bushing to retain both sides of stretch seal.

8. Install tool ST-383 under seal and over edge of crankshaft propeller flange and with even pressure on the handle force the seal over the crankshaft propeller flange. Check to be certain no damage occurred to the seal while it was being installed over the flange.

NOTE

A pinion cage oil retaining housing P/N 67394 or 68293 may be used as a guard over the front of the crankshaft flange to minimize interference from the flange bushings and the hub pilot while the seal is being installed.

9. Place the seal spring around the crankshaft, join the two ends together and hook. The spring should be a continuous circle around the crankshaft with no kinks or twists.

10. Work the spring into position in the groove (open portion) provided in the rear side of the seal.

11. Wipe grease film from the crankshaft flange, outer surface of the seal and from the crankcase seal bore recess. Apply a coat of adhesive (Goodyear Pliobond No. 20 or Dow Corning Silastic No. 140) to the outside diameter of the nose seal. Care should be exercised to avoid any adhesive contacting the crankshaft.

12. Insert the seal in the crankcase bore. Apply pressure all around the nose seal until it is seated firmly in the bore.

EZ Heat

John Mc Avoy (CA) - The singular problem that plagues every EZ driver is that of staying warm. All sorts of cabin heat sources have been tried, some working better than others, but usually the front seater usually wound up with cold feet.

There I was at 17,500', it was night and -5^0 F outside. I was wearing a short sleeve shirt, one pair off pants, one pair of socks and a pair of tennis shoes. It was getting a little warm, so I turned the heat down just a little bit. Was this a dream? NO, I actually have heat in the EZ.

The idea of using an oil cooler for heat isn't new. I wasn't concerned about running oil lines in the cabin, no big deal. I just didn't want to start cutting holes in my paint job to do intake and exhaust air for the heater. Then the idea hit me, why not use a blower like on a car heater?

After spending several hours in the local junk yard, I found a candidate blower motor that would do the job. It was out of a 1982 VW Rabbit, nice and compact, light and powerful. The blower was actually easy to get to, under the hood in front of the windshield. I had to twist, turn, cuss, and pry a little, but it does come out without taking the hood off. Don't forget the ballast resistor as you will need it for low speeds.

There wasn't a lot of engineering involved, mainly cut and fit. The blower would tuck down in front of the landing gear retract mechanism. This would force air through the oil cooler and into a plenum box. On the floor of the box was a door controlled by a push cable. When this door was all the way open, in the Over board position, hot air would go out the bottom of the plenum box into the nose gear area and be drawn outside. When the door was closed, in the Cabin position, air inside the plenum box would exit through two side louvers and on to my toes. Part was also ducted through the box's top to the back seat to warm passenger's toes.

Prior to starting, I made a cardboard mockup of the entire heater system and used it to test fit. After several hours of cutting and fitting, I was satisfied that the concept would work. One area not shown on the drawings was the requirement to seal off air flow within the retract mechanism. When the plenum door was open and hot air blown was blown into the retract area, I didn't want the air leaking back into the cabin. I wanted it to escape through the bottom openings around the nose gear strut and exit outside.

The blower/cooler adapter was made using a piece of 2 inch urethane foam as a mold. I put duct tape on the blower motor to act as a release. I then super glued the 2 inch foam on the end of the blower and carved the shape I needed for it to mate up to the oil cooler. I used 4-5 plies of BID everywhere, making sure to overlap on to the blower. This is how I would mount the adapter to the blower. After cure, I popped the adapter off and carved out the rest of the foam. The edges were cleaned up and mounting holes were drilled for the cooler. The adapter was then permanently mounted to the blower by using black RTV and rivets. The oil cooler is mounted to the adapter using Tinnerman nutplates.

The plenum box is made of several pieces of .050" aluminum. I used the cardboard mockup to cut and bend the pieces to the proper size and shape. The finished box is airtight with a large cutout in the bottom. The door is controlled by a push cable that goes to the cockpit area. This helps serve as a temperature control. I used two inexpensive air vent nozzles from Aircraft Spruce, one on each side. These can be adjusted for direction and even turned off. I also put a small port on the top to connect a hose that goes to the rear seat floor area.

Getting the oil lines from the engine to the nose was no problem. During original construction, I routed 2" SCAT hose to use as the heater duct. This would be the conduit for the Aeroquip 303-8 lines that would carry the oil. Even though the #8 oil lines are running in the SCAT, there is still enough room for air flow. I plug one end in the rear seat and force air through the SCAT from the front. This helps cool the SCAT and also provoded the rear seat with warm air I started out with 30 feet of hose. Rather than cutting it I doubled it over and ran the two ends through the SCAT to the Oil cooler. I did not cut the lines until I was absolutely sure of the routing and required length. The oil lines were connected on the engine in such a manner that oil was first routed to the nose before it went to the main oil cooler. This way I get maximum heat from the heating system.

Blower wiring was simple, I used a three position switch (center off). One side was wired for full speed and the other for low speed, with the center position being OFF. I mounted the low speed ballast resistor near the blower intake where it would get plenty of air flow. I did have to add a 10 amp circuit breaker to power the blower.

OPERATION

Observations - As I've suspected, air tends to leak in through the nose gear area rather than out. If I place the temp control on full Overboard, (plenum door fully open) and turn the blower OFF, air comes in through the nose gear openings, up past the plenum door, through the oil cooler and blower and into the cabin. The end result is it starts getting warm in the cabin. Through some experimenting, I have come up with the best operational procedures.

Cold weather - Use blower speed for main cabin heat control. Leave push control in full Cabin position.

Warm weather - Leave push control in Cabin position. Turn blower OFF. No heat should be conducted inside the cockpit.

Hot weather - If oil temperature becomes excessive, place push control to Overboard and turn on the blower. This helps cool oil and dumps the heat overboard.

CONCLUSIONS

The entire installation added about 10 pounds to the nose. This number includes about 1 quart of oil.

I used one of the solid side oil coolers as they are able to withstand high pressures better than the finned side coolers.

I don't think there is significant weight difference for using a blower vs. Ram air. By the time all the glass work/ paint is complete, they should even out.

By using the blower, I have heat while taxiing out and sitting on the end of the runway. On the other hand, when it is hot, I have oil cooling while sitting on the ground.

By installing a blower instead of using ram air, there is no need to cut up the airplane. This saves time and money on the installation.

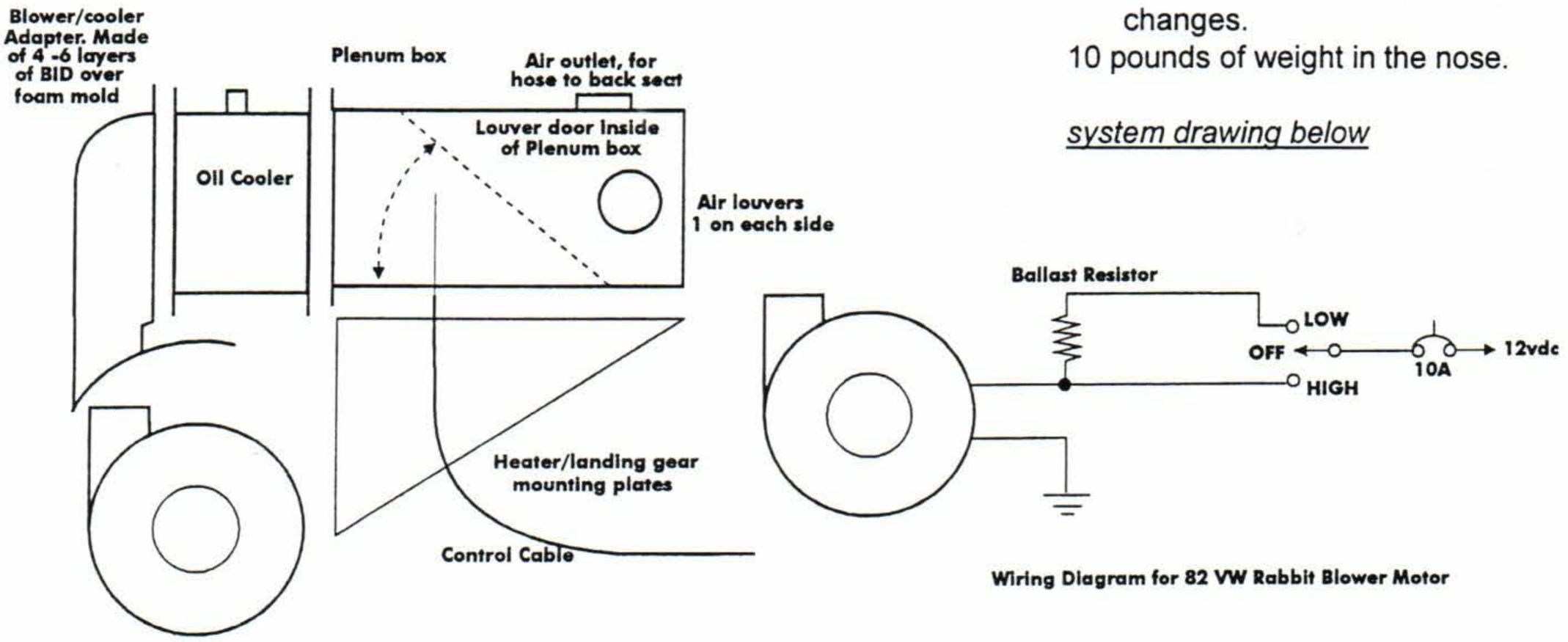
It took about two weeks at 5 hours/ day to do this installation. A lot of that was spent cutting cardboard and seeing what would fit in the small area I had to work with. There was also a day spent just looking around the auto junk yard for airplane parts.

This exchanger should be able to be produce temperature differentials of 40-60 degrees. If -10^0 ram air were used as the source, one would expect to see a 30-50 degree air temp at the heater output. However, by recirculating cabin air, the intake air is constantly increasing in temperature. A 40 degree intake temperature will easily result in an 80-100 degree heater outlet temperature, **even at 18,000 ft.**

Several disadvantages that I can think of:

No fresh air through the heater. (I can open the air vent if needed)
Getting to the gear retract mechanism is going to be a lot more difficult than it was before, if I need to do some maintenance.
There will always be a quart of oil that does not come out in the oil changes.
10 pounds of weight in the nose.

system drawing below



Wiring Diagram for 82 VW Rabbit Blower Motor

Blower Moter (82 Rabbit)