SHAFT LOG MAINTENANCE (by Capt. Alan Ross Hugenot, AMS®)

Traditional flax packing gets brittle with age, or wears out from overheating. According to Nigel Calder's book, The Boatowner's Mechanical and Electrical Manual, traditional flax packing becomes brittle after about a year and should be replaced annually. Teflon packings tend to wear longer, but tapping a standard grease fitting into the back of the gland and adding some graphite-fiber grease about once a month, or every few cruises, can extend the life of gland packing so that it only needs to be changed every other year, or every three years.

What all this means:

1. Flax packing gets brittle over time and not from use.
2. Tightening the gland so that it never drips causes the flax to overheat. This, in turn, literally wears away the packing.
3. If old and brittle flax is tightened down so that it does not drip, and then operated, it will groove and wear away the stainless steel shaft.

The dripless shaft seal alternative: For boaters who want to forget the shaft log altogether, there is the newer technology of the dripless shaft seal. They cost under $200 but, once installed, there are no more drips.

DRIPLESS SHAFT SEALS AND THEIR MAINTENANCE (compiled by Peggy Feakes, AMS®)

Maintaining your dripless shaft seal is a basic component of standard boating responsibility. This simple, easy to follow procedure will keep your bilges dry and your products functioning well for years, and should take no more than a few minutes, every few months.

First, a visual inspection of the shaft seal is a good idea. Look for obvious signs of water leaking. A clean white cloth beneath the seal will identify any sediment from a poorly seated seal. If water is leaking, the spare seal carrier mounted on the shaft (if so equipped) contains the simple solution. Follow the procedure printed in your owner's literature and replace the worn seal. Be sure to arrange a replacement seal during your next haul-out to be returned to your carrier for future use.

Second, water flow is key to longevity for shaft seals. With engines running and in neutral, remove the water feed line, cap the seal fitting and capture the flow in a bucket or jug. Flow should be about 1 gallon per minute at engine idle. Increase your throttle to insure flow at all engine speeds and repeat the procedure for the other engine, if applicable. Dress hose and secure. Complete one test before removing another line. Test cross over line as well, if so equipped. **(information taken from Tides Marine web site)**

There are a number of manufacturers of dripless shaft seals and, therefore, a variety of designs exist. Most of these units use what's called a face seal, with a flexible bellows attached to the stern tube (or stuffing box collar) that presses a fixed carbon/graphite flange against a rotating stainless-steel rotor which spins with the prop shaft, creating a seal between the rotor and flange. Dripless seals are popular because they don't require adjustment after installation and they continue to keep sea water out, even if the drive train is out of alignment.

PROBLEMS RELATED TO THE MOVEMENT OF THE ROTOR

Some DSS products use setscrews to hold the rotor in place. If the screws lose their grip, the bellows can slowly push the rotor forward on the prop shaft. Once the bellows is relaxed, the mechanical seal between the rotor and flange is lost and sea water can flow into the bilge. This happens more often than one might think. According to one manufacturer's instructions, the setscrews are never to be reused, and a new set of screws should be used each time the rotor is installed.

Another issue with a spinning rotor is that the flange and rotor are so well mated that there is a suction effect between them and the rotor can actually stretch the bellows beyond its relaxed position before the seal is broken. So, when the bellows finally returns to its natural, relaxed position, a tiny space is left between the flange and rotor.

The key to preventing setscrew and rotor movement problems is to place a hose clamp on the prop shaft up against the forward face of the rotor, so that even if the rotor works loose, the hose clamp will prevent the rotor from moving away from the flange.

PROBLEMS RELATED TO THE BELLOWS

The bellows performs two functions: it creates a watertight barrier between the stern tube and the interior of the boat and it acts like a spring, pushing the flange against the rotor. Problems associated with the bellows are related to fatigue, mechanical abuse or improper installation.

Fatigue of the bellows can occur as the bellows material deteriorates over time. Exposure to heat, vibration and accidental spills of fuel and fluids can take their toll on the bellows. The material can become brittle with age and a close inspection might reveal cracks, splits, or tears. These problems may not be readily apparent on the surface of the bellows. For a proper inspection, at the very least, the rotor should be moved a few inches out of the way so that it can relax and stretching and twisting can reveal any cracks or splitting of the material. As a general rule, if the shaft is removed, a new bellows should be installed.

The second form of fatigue consists of “compression fatigue”: the bellows loses its resistance to compression after years of being in a compressed state. As a result of compression fatigue, the pressure between the rotor and flange will be reduced, which will diminish the mechanical seal. Eventually, it will begin to leak.

An older bellows, when allowed to relax after years of compression, will typically not completely expand to its original shape and it will be shorter. On my own boat, I marked where the rotor sits on the shaft. Last spring when I relaunched, I noted that the rotor now sits a little farther aft, which confirms my theory that the bellows is shorter. My DSS is now three years old and was allowed to relax only for a few weeks during the off season.

Mechanical abuse of the bellows includes overtightening of the hose clamps (which might crush or tear the material) and being hit or stepped on.

Here is what some manufacturers have to say about the importance of maintenance:

The instructions for the PSS Shaft Seal state, “The PSS bellows must be inspected on a regular basis (i.e., no less than at least every six months under most circumstances) and checked for any signs of deterioration (cracks, splits, tears, brittleness or other signs). Upon any sign of deterioration, the bellows must be replaced. As preventive maintenance, the bellows should be replaced no less than every six years, regardless of its apparent condition.”

Lasdrop says of its shaft seals, “The Original Bellows and Generation II models will last as long as eight to 10 years before servicing...The bellows on the Original model should also be inspected and replaced, if necessary.”

This is information that every boat owner with a DSS unit should heed.

WATER INJECTION HOSE

Most DSS units have a small barb fitting on the graphite flange where a hose can be connected to ensure that water is always present right up to the rotor. From the fitting, the hose runs either to a place high above the waterline or, in the case of higher speed vessels, into the engine’s raw-water cooling system. (The instructions for the PSS Shaft Seal, for instance, make a distinction between boats that run above and below 12 knots.)

In most of these installations, the water injection hose runs unsupported from the flange to a nearby stringer, floor or bulkhead, where it is attached. It is important to use underwater-rated hose, which is quite durable but also flexible. **(information taken from an article written by an operator of a TowBoatU.S. rescue and towing boat)**