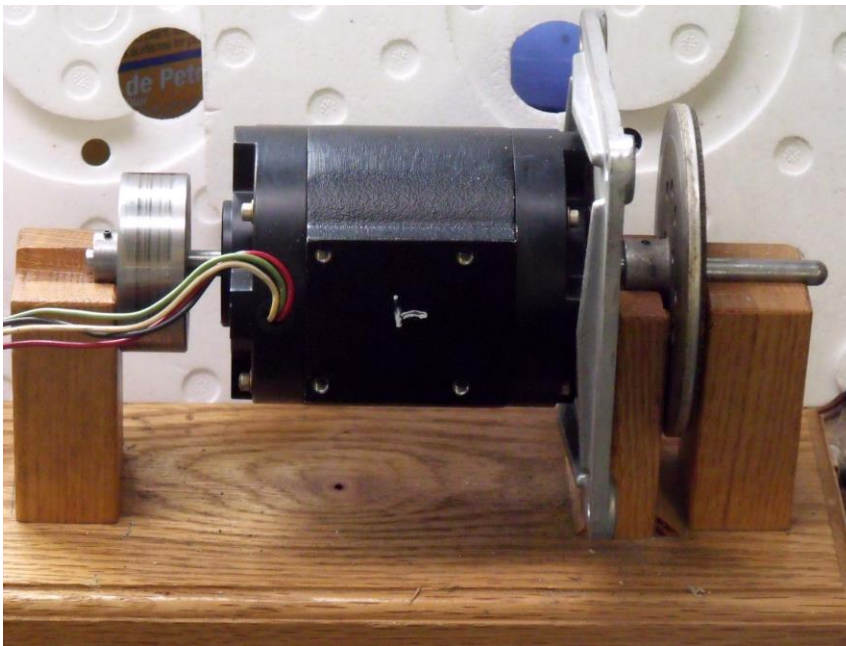


Quick notes on Ampex reel motor overhauling

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Note: The reel motor shown here is an Ashland but the same procedure apply to all Ampex reel motors used on the Ampex 300 up through the Ampex AG-440 series (excluding -8 versions). This includes motors made by **Bodine, Ashland, Cyclohm, General Electric, and Takanawa.**

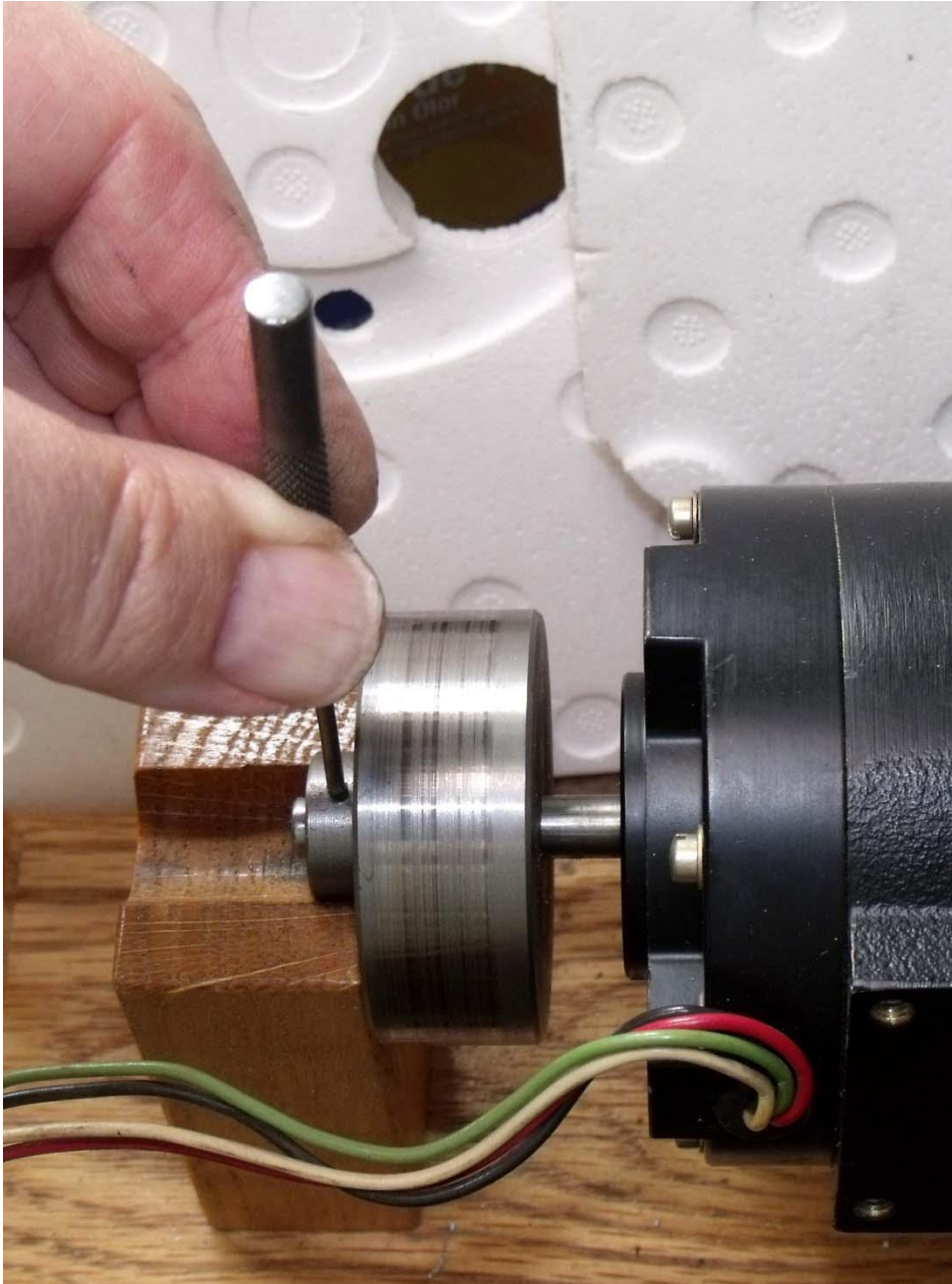
Disclaimer: The purpose of this document is to avoid damaging your Ampex reel motors while attempting to replace their bearings. These notes do not constitute a comprehensive training course and are offered for educational purposes only—also note that the motor and associated parts illustrated here are in less-than-ideal condition and not fully cleaned. Note also that some steps have been condensed or deleted. *Proceed at your own risk.*



- 1) Mount reel motor on special fixture. This is necessary to avoid bending the rotor shaft while pressing out the 3/32-inch roll pins. You will need a No. 3 roll-pin punch (such as Mayhew brand) and a 2-oz or 4-oz ball-peen hammer (photo below shows 2 oz on the left and 4 oz on the right). To avoid damaging or jamming the roll pin, **do not use a flat punch**. And to avoid bending the rotor shaft, **do not use a larger hammer**.



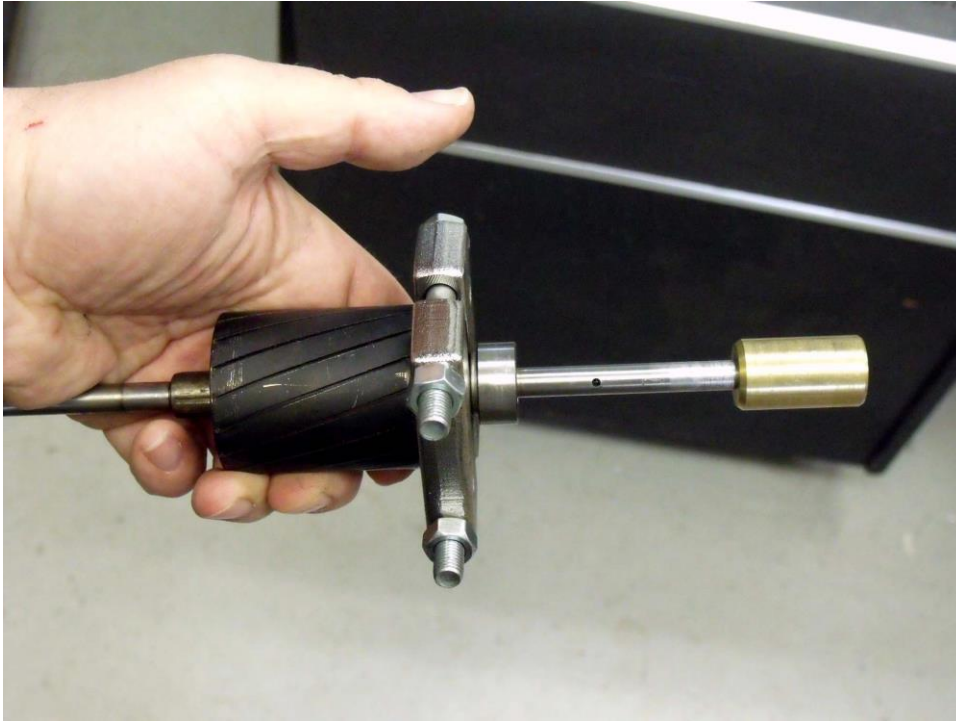
Note: you may want to check the runout on the reel motor spindle before replacing the bearings. Due to its complexity, this procedure will not be covered now but might be in a subsequent issue of these notes.



- 2) Mark orientation of brake drum and turntable relative to rotor shaft by making a light scratch (witness mark) on both the small part of the drum and on the end of the rotor shaft. Then mark the turntable and the front spindle in a similar way.

Note: A witness mark is necessary to line up the brake drum and the turntable with their respective roll-pin holes when you are ready to re-insert the roll pins. The roll-pin holes were drilled at the factory and line up in one direction only—this is why **brake drums and turntables are not interchangeable with different reel motor rotor assemblies**.

Then press out roll the pins (put some penetrating oil on the roll pin first and let it soak in for a bit) with many light blows from the **small** ball-peen hammer—this ensures that the shaft is not bent during the bearing installation as it might be if you used an arbor press.



- 3) After removing brake drum and turntable from the rotor rotor, remove the die-cast support plate. Then mark the orientation of the upper motor end bell by scratching across the junction between the end bell and the motor housing (you do not need to remove the lower end bell).

Heat the end bell with a heat gun to expand it a bit and then using a stout knife, gently pry it loose, a little bit on each side to remove it without canting to one side or the other. **Save all shim springs and washers.**

Then fit a flat-type bearing puller behind the upper bearing (photo shows rotor with lower bearing already removed) and fit a machined **spindle-protector** over the rounded end of the shaft—be sure to put a dab of grease on the end of the spindle first.

Note: The spindle protector (the brass piece shown in the above photo) is a special part that must be machined with an 8mm bore (with a rounded bottom of the 8mm hole); it must also have a center hole drilled on the other end to anchor the pivot of the wheel puller. The exact dimensions are not critical but the center-drilled hole must be large enough to accommodate your puller but not deep enough to break through the rounded bottom of the 8mm hole on the other end of the protector.

Note on bearings: Many **Bodine** and **Ashland** reel motors used **C8008** or **8008** bearings which are no longer made; these bearings had an extended inner race 10.3mm wide. A **628ZZ** bearing is the same ID and OD (8mm x 24mm) as the C8008 and 8008 but is only 8mm wide. One could machine a narrow spacer 2.3mm long with an 8mm bore to extend the inner race of the 628ZZ bearing but an easier workaround is to simply add two shims per bearing. Order these from McMaster-Carr: p/n 98089A441 (18-8 Stainless Steel Round Shim 2mm Thick, 8mm ID) and p/n 98089A293 (18-8 Stainless Steel Round Shim 0.3mm Thick, 8mm ID). **Install shims between the bearing and the motor rotor.**



- 4) Making sure you have greased the spindle where it fits in the spindle puller, put large wheel/gear puller in a vise, then grease the puller pivot. Now working in concert with the flat puller assembly, carefully remove the upper reel-motor bearing. It is a good idea to heat the inner bearing race a bit with a pencil torch but this is not always necessary—be careful not the heat the spindle shaft.

Repeat this process for the lower reel-motor bearing (already removed in the above photo). Note that the spindle protector is not required to remove the lower bearing.



- 5) Bearing installation requires a special bearing pusher. This can be machined from a piece of cold-rolled steel. The most critical requirement is that it be carefully drilled and then reamed to **8mm ID at a depth of 4 inches**.

Other characteristics are not critical. The pusher I made is as follows:

Length: 8 inches

Outside diameter: 3/4 inches (the pushing end necked down to 5/8 inches)

Inner diameter: drilled and reamed to 8mm at a *depth of 4 inches*

Pushing face: machined to a ridge approximately 7/16 inches OD to ensure that the pusher will contact only the inner race of the bearing.

Note that not all reel motors use the same bearing but all require the use of an 8mm pusher.

Photo below shows the pusher orientation.



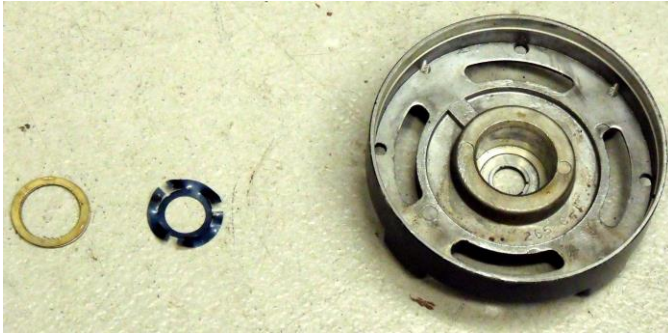


- 6) Wipe the rotor's bearing surface with a lint-free wiper and then oil lightly. Wipe the inner race of the bearing as well.

Then hold the rotor assembly in your hand and carefully tap on the pusher with your other hand using a 2-oz or 4-oz ball-peen hammer. Use many light blows to set the bearing.

You may want to heat the inner race of the bearing first by setting it on a small incandescent lamp (such as an xmas tree lamp) for a few minutes.

Note: for easier installation, ensure the rotor's bearing surfaces are clean and rust-free; some polishing with lapping film may be required.



- 7) Place rotor back in the motor housing with the rounded (long) end up. You may need to heat the lower end bell slightly to permit easier installation.

Then install bearings spring and shims in correct sequence (see photos) into the upper end bell and carefully install the upper end bell (you may need to heat the end bell slightly to permit easier installation).

Note that the bearing spring and shims are installed on the upper end bell only. This avoids a situation where the reel turntable moves up and down while the tape machine is in use. Sometimes these parts are not installed correctly, so be careful here.

- 8) Re-assemble motor in reverse order using the support fixture when pressing in the roll pins.

Note: Before re-attaching the brake drum, clean it with liquid detergent and a plastic scouring pad. Dry it completely before re-installing it onto the rotor shaft.

- 9) Before re-attaching the brake assembly, wipe the brake drum and the “Raybestos” brake lining with alcohol.

If you have **felt** brake bands, they should be brushed clean *but not cleaned with alcohol—felt bands should be lubed with powdered graphite and a light solvent.*