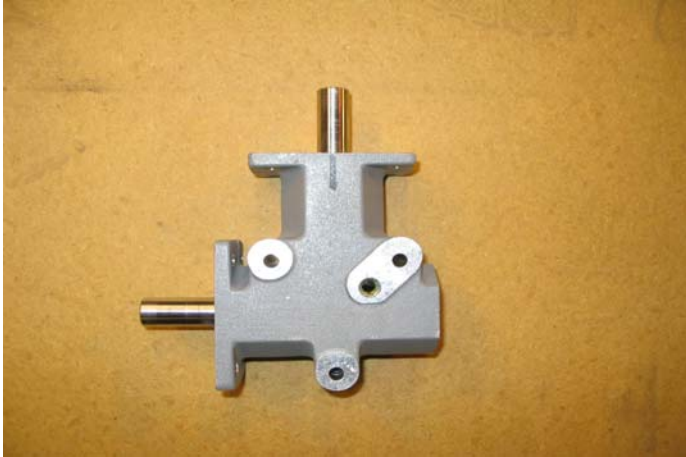


J&J Service Instructions

January 5, 2005

Mitropak Gearbox Inspection and Rebuild

Gearbox maintenance should only be performed by a qualified mechanic. Set up requires a strong understanding of mechanics. Gearbox inspection is recommended to be done yearly.



Begin your gearbox inspection by removing the unit from the drive shaft housing. Unit will have to be further disassembled if yes is answered to any of these questions below.

- Is the grease in the gearbox watery, grey, or exist at all? Check this by removing the inspection plug and inserting a Q-tip.
- Is there any corrosion build up on shafts near the seal region?
- Do the shafts rotate rough or bind?
- Can any in/out movement be detected of the input/output shafts?



- To further disassemble start by removing all lock nuts.
- Use spanner tool #2-70-0076
- Due to thread lock compound being applied to the lock nuts, heating of the gear box case with a propane torch may be necessary.

⚠ WARNING Remove inspection plug or grease fitting prior to heating.



- If necessary heat with torch, direct the heat to the gear box area that surrounds the lock nut.

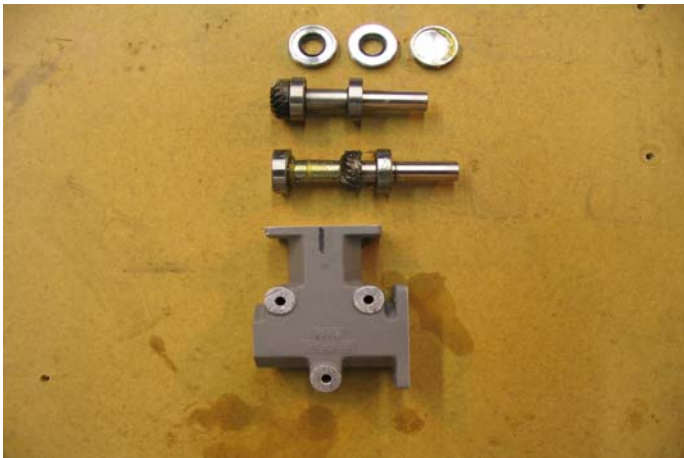
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- To remove the input shaft carefully clamp shaft in the vise using soft jaws.
- Lightly tap on casing exercise careful alignment of bearing with the housing bore.
- The out shaft can be tapped out either direction.



- Clean all pieces with a high flash point solvent. Inspect all pieces for wear: shaft seal surface, rough bearings, gear teeth.
- If wear is detected on any of the items they are recommended to be replaced. Seals are to be replaced before reassembly.



- To remove seal thread the locknut into the gearbox as shown. This will help hold the locknut to aid in seal removal.
- By using a small screw driver carefully pry the seal out of the lock nut.
- Press in new seal by hand and finishing pressing in seal till it bottoms out on lock nut.
- Make sure to install the seal in same direction as it was removed.
- Apply light coat of grease on the seal lip. This will reduce the chance of ripping the seal when installing the locknut.

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- If bearings need replacement start by removing the C-clips.
- Position the shaft in the press so that the bearing is supported and the supports are not making contact with the shaft.
- Press shaft out through bearings. If press is not available shaft can be carefully tapped out using a soft blow hammer.
- Installation of the bearings is done by reversing the order of disassembly.
- Bearings are sealed and do not need to be greased.



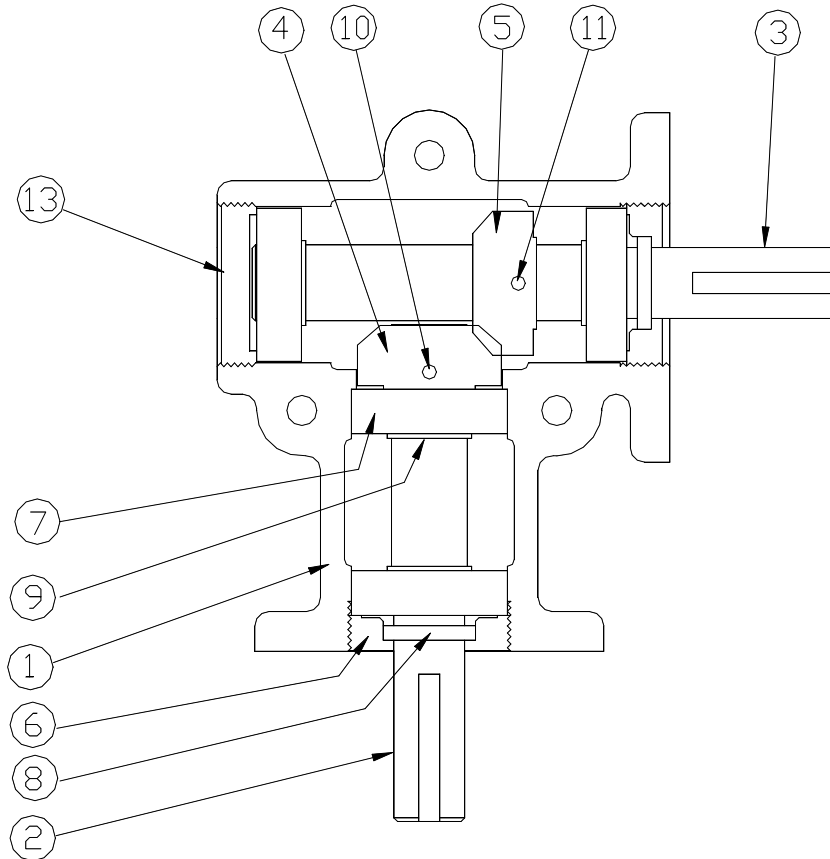
Steps to reassemble

1. Apply grease to the gears using Exxon Nebula EP-0 or equivalent. A total of 1 Cu. In. is recommended. Do not overfill as this will cause excess heat and lead to failure.
2. When installing the locknuts use thread lock. Insert the long shaft into the gear box. Install the lock nuts but do not seat yet.
3. The short shaft is to be installed next. Tighten the lock nut enough to seat the bearing and to allow no in/out movement of shaft. No pre load is to be applied to bearing.
4. Backlash (amount one shaft turns before gears engage) needs to be set by making adjustment to the long shafts locknuts. Tighten the lock nut unit gears mesh and bind slightly. Carefully loosen the lock nut until the unit begins to rotate freely. Shaft needs to be set with no in/out movement. Adjustments will have to be made to both locknuts in order to obtain the correct backlash and clearance. No bearing preload is recommended.
5. Shaft should rotate smoothly without binds and have a consistent feel.
6. Allow 24 hrs. for thread lock to cure before returning unit to service.

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Mitropak Gearbox Inspection and Rebuild



Ref#	Part #	Qty.	Description	Price
1	2-60-0010	1	Gear Box, Housing Electric Boat Motor (MTW)	\$124.10
2	2-60-0011	1	Gear Box, Shaft Drive Electric Boat Motor (MTW)	\$101.35
3	2-60-0012	1	Gear Box, Shaft Driven Electric Boat Motor (MTW)	\$77.20
4	2-60-0013	1	Gear Box, Pinion Electric Boat Motor (MTW)	\$78.25
5	2-60-0014	1	Gear Box, Gear Electric Boat Motor (MTW)	\$78.10
6	2-60-0015	2	Gear Box, Locknut Bearing Drive Electric Boat Motor (MTW)	\$19.50
7	2-60-0016	4	Gear Box, Bearing Electric Boat Motor (MTW)	\$11.45
8	2-60-0017	2	Gear Box, Seal Electric Boat Motor (MTW)	\$9.55
9	2-60-0018	4	Gear Box, Ring-Retaining Electric Boat Motor (MTW)	\$0.40
10	2-60-0019	1	Gear Box, Pin-Roll Drive Electric Boat Motor (MTW)	\$0.40
11	2-60-0020	1	Gear Box, Pin Roll Driven Electric Boat Motor (MTW)	\$0.40
12	2-60-0021	2	Gear Box, Pipe Plug Electric Boat Motor (MTW)	\$1.05
13	2-60-0022	1	Gear Box, Locknut Bearing Driven Electric Boat Motor (MTW)	\$20.50
**	2-60-0006	1	Gear Box Assy., Electric Boat Motor (MTW)	\$273.00

ALL PRICES ARE SUBJECT TO CHANGE WITHOUT PRIOR NOTICE