



March 2016 Revision

Operating Instructions



Cutless® Bearing Replacement Tools

Powerboats, Sailboats, Yachts, Commercial,
Tournament Ski and Wakeboard Boats

The Standard In Affordable Damage-Free Strut Bearing Replacement.

Thank you for selecting our product. Our mission is to provide you with a better product than you hoped to receive. Please read the entire manual before starting. It is written from ours and customers experiences.

WARNING

Strut Pro® is a safe and convenient tool when used properly. As with any tool it is important to have a thorough knowledge of proper use. To reduce the risk of serious injury, read the following safety instructions. Review all drawings and photos before using and please call us before using should you have any questions.

IMPORTANT:

This tool is designed to replace the most popular size strut bearings. Should you encounter a size that does not match properly to a collet, such as metric or an off standard size, shim the nearest collet that most closely matches the outer diameter of the cutless bearing. We offer a non-metallic, pressure sensitive adhesive shim material that is applied to the inside of collets. This allows you to properly space the collet to match the outer shell of the bearing. This is the most critical measurement. Do not exceed the bearing outer diameter.

Contact us if you have any questions whatsoever before you begin.

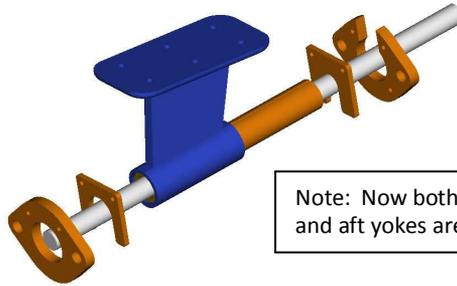
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Parts List

See exploded drawing below to view individual parts description.



Note: Now both forward and aft yokes are open.

Note: Items marked (*) are not shown on drawing.

Forward Yoke (Open)

Aft Yoke (*Now Both Yoke Are Open)

T-1 High Tensile Steel Horseshoes

Sets Horseshoe Retainers *

Hardened Steel Collets (Stackable) (Install With Seams Top and Bottom)

Hook & Loop Collet Straps *

7/8" B7 Grade Threaded Rods *

Special Machined Collared Nuts *

.030" Pressure Sensitive UHMW Tape Shim Material*

7 Gram Tube Anti-Seize

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Horseshoe and Collet Legend

Each horseshoe and collet is marked with a part code. Each dimension shown is outside diameter (O.D.). This information will assist in matching which horseshoe and collet is closest to the actual shaft and bearing dimension.

Collets are made slightly undersize to prevent the collet from being jammed inside the strut. It is important to always use the collet that is slightly smaller than the O.D. of the bearing to be removed.

Equally important is to insure the collets are not too loose. Make full contact with the bearing outer shell. This prevents the collets from pushing on the rubber which can cause them to get jammed. Not good.

Read the information about shimming to precisely match each size.

Standard Collets (O.D. Measurements)

A =	1-1/4"
B =	1-1/2"
C =	1-3/4"
D =	2"
E =	2-3/8"
F =	2-5/8"
G =	2-7/8"
H =	3"

Mega Size Collets

I =	3-1/4"
J =	3-1/2"
K =	3-3/4"
L =	4"
M =	4-1/4"

Standard Size Horseshoes

3/4"
1"
1-1/8"
1-1/4"
1-3/8"
1-1/2"
1-3/4"
2"
2 3/8"
2 5/8"
3"

Mega Size Horseshoes

2-1/2"
2-3/4"
3"
3-1/4"
3-1/2"
3-3/4"
4"
4-1/4"

Before You Begin

Thank you for choosing *Strut Pro*®. We take great pride in producing such a quality product made in U.S.A. Please review drawings and photos to familiarize you with the parts and please read the instructions carefully before proceeding.

Included with the threaded rods is a tube of copper based anti-seize. Placing anti-seize inside the forward machined nut and on the threaded rods will our rolled threads insures super smooth operation, long life and prevents galling. Keep all parts clean and free of dirt and other debris. Anti-seize is the perfect compound for keeping the threaded rods in optimum condition.

Global Marine Industries, Inc. manufactures its products with the highest standards of manufacturing. Even with our strict quality control measures, occasionally a defective part may not be discovered during our inspection process. Also, from time to time, a part necessary for operation fails to be shipped with the product. Even with the highest inspection and quality controls in place these things can happen. Please do not return the product. Contact us should this problem occur and we will immediately remedy the problem.

Global Marine Industries, Inc.

Telephone 425-397-6601

Email: info@strutpro.com

www.strutpro.com

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Setup Instructions

Remove the propeller. Remove the strut set screws. Sometimes the set screws have been painted over with antifouling paint so it's important to remove any set screws before proceeding. Removing the set screws before you start makes the job a lot easier.

Perhaps you have already ordered your new bearing. If not you will need two measurements; prop shaft diameter and outside diameter of the bearing shell (strut bore).



With these measurements you can select the collets and horseshoes you need to most closely match. The collets are precision formed to be slightly smaller diameter than the strut bore. The horseshoes will measure .020" larger than the nominal size. This provides maximum contact without any issue of jamming.

Much of learning to use a tool is common sense however for a first time user it can be somewhat confusing. This is the same with your Strut Pro tool. We have had many repair yards call or send a note that it took them 2 hours to do the first job, 30 minutes for the 2nd job. Follow these instructions and tips and you will be very pleased with the results.

Never try to force the collets if the measured outside diameter exceeds the outside diameter of the bearing. This is simply won't work since basically you are then pushing on the front of the strut. Likewise, if the collets are too small diameter they could get jammed into the rubber between the shaft and the bearing shell.

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Galvanic Corrosion Issues:

Rarely do we get that call where the bearing simply will not move. It can happen and is usually caused from lack of vessel maintenance in the form of no anodes for an extended period.

Anodes, commonly known as zincs are a critically important part of any vessel that is moored in water. How can this affect a cutless bearing? The answer is technical and you will need to review a Galvanic Corrosion Chart to understand clearly, but here are the basics: Whenever metal is exposed to water electrical current is established. This electrical activity removes metal ions (corrosion) which basically dissolves the metal components.

The underwater metal components are Cathodes (the parts we need and want to keep). Anodes, normally made from zinc or aluminum are the protective below waterline metal. They are called sacrificial metals and are least Noble (Anodic) on the chart which means they are sacrificed to the electrolyte (water) instead of the underwater fixture, usually made of bronze or stainless steel which are more Noble (Cathodic).

Now if a vessel is left in the water without Anodes the remaining metals become the Anodes. The thinnest metals are affected first and can take on a “rosy” color. You may have seen this on the tips of propellers where they take on this color. Another thin metal affected by the lack of Anodes is the Cutless bearing shell. On rare occasions the Cutless bearing shell has actually welded itself to the bore of the strut though galvanic corrosion. When finally removed the shell has totally disintegrated and crumbled into small pieces. Although this example is extreme it will show just what happens to underwater fixtures when lacking adequate Anode protection.

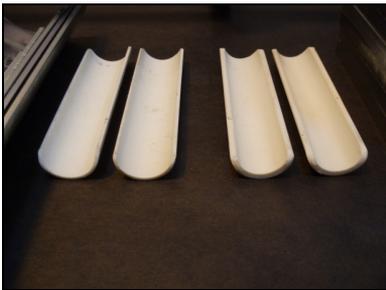
If you want to learn more about this subject a good reference site is: http://www.corrosionist.com/Seawater_Corrosion_Rates.html

Collets are the pushers and designed to be stacked if necessary to fit a wider range of prop shaft and bearing combinations.

The first step is to install the collets onto the propeller shaft. Secure the collets to the prop shaft using the hook & loop straps provided, or any other means to hold the collets parallel with the shaft. Position one strap near each end of the collet and pull snug.

Rotate the collets so the seams are on top and bottom. This will maximize the surface area of the collet to the forward horseshoe. Slide the collets aft until they make contact with the front of the old bearing. This is a very important part of set up. Properly fitting the collets first will allow you to quickly attach the tool assembly and start the removal process without any issues.

It's a good idea to use calipers to make sure the collets closely match but do not exceed the outside diameter of the bearing. The collets are precision formed to be slightly smaller than the outside diameter of the bearing. This is to insure maximum coverage against the bearing bronze outer shell. The bearing outer shell can vary from 1/16" thick so it is very important to be precise.



These special non-metallic spacers are provided for 3/4" and 7/8" shaft sizes. They shim the "A" collets away from the shaft to match up the 1-1/4" bearing outside diameter.

Assembly Instructions

Once the collets are in position set the forward and aft yokes on a clean surface. The threaded rods are shipped assembled, however if the parts were separated follow these instructions:

First remove the threaded rod protective mesh. Insert a flat steel washer and then the bronze oil impregnated bronze thrust bearing and then another flat steel washer over each threaded rod. Insert the threaded rods through the aft yoke and then through the forward yoke. Position the forward yoke with the machined nut cage facing forward.

Thread the machined tapered nuts onto the threaded rod. Apply some anti-seize (included) to the inside of each nut and the threaded rods where the nuts will turn. The nuts are machined to protrude through the forward yoke to prevent the threaded rods from ever making contact with the yoke. These nuts nest into the forward yoke and are locked into position so no wrenches are needed at the forward end. Only the aft acorn nuts are turned.

Attach the corresponding horseshoe that matches up to the bearing o.d. to the forward side of the aft yoke. Use the cotter pins or other fasteners to secure the horseshoe in place. This horseshoe will be positioned against the aft face of the strut.



horseshoe resting on the new bearing.

Tip! For a perfect alignment aid slide the new bearing over the back of the prop shaft and butt it up the old bearing. You can then rest the aft horseshoe on the new bearing which gives perfect alignment for the old bearing to slide through the aft horseshoe. Here is a tournament ski boat using this method. You can see the aft

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Assembly, continued

Select the forward horseshoe that matches the prop shaft and have it readily available. With the aft horseshoe attached to the aft yoke lift the tool assembly over the back of the prop shaft. Raise the forward yoke up and between the propeller shaft ahead of the collets you previously installed onto the shaft.

Attach the forward (prop shaft) horseshoe to the aft side of the forward yoke. Insert the horseshoe retaining pins through the horseshoe and through the yoke to hold the horseshoe in place.

Begin by turning the threaded rods clockwise by hand. This will compress the puller assembly and snug it up to the horseshoes against the collets. Once the slack has been taken up make your final adjustments and inspections.

Bearing Removal



The tool is now installed and you are about to remove the bearing. Apply equal pressure to both threaded rods. If you are using a $\frac{3}{4}$ " ratchet then about three pulls on one side then switch.

Inspect and make sure the aft horseshoe is aligned to allow the old bearing to clear the aft horseshoe as the bearing is pressed out. This is very important as there must be clearance for the old cutless bearing to slide out. Watch carefully. If the puller assembly gets tight without the bearing moving stop and examine the cause. (Also re-examine to make positive there are no hidden set screws securing the bearing into the strut).

Proceed with caution. Turn each nut no more than five cranks, then the other. Watch closely to insure alignment remains consistent between the forward and aft yokes. As you continue turning the nuts the tool will force the collet through the strut, removing the worn bearing.

Once the bearing is free it can easily be slid back and over the propeller shaft. Loosen the threaded rods and remove the collets which are now inside the strut. This might require tapping the collets to free them from the strut.

New Bearing Installation

Installing the new bearing is basically a reverse action of the removal process. Unscrew the threaded rods and reverse the horseshoes positioning the shaft horseshoe aft. This will allow the aft horseshoe to make maximum contact with the new bearing to be installed. Next attach the larger horseshoe to the forward yoke.

Note: Some struts have a steep rake angle which may be necessary to rotate the forward horseshoe 180 degrees before attaching to the forward yoke (the forward yoke has four holes for this purpose). This will provide the needed clearance so the forward horseshoe does not contact the vertical rib of the strut. ***Tip!*** Place the new bearing into a bucket of icy water or in the freezer a couple hours before installing. This will shrink the bearing shell slightly and allow easier installation. Applying a small amount of biodegradable dish soap to the bearing shell before installation is also helpful.

Slide the new bearing over the shaft and gently start it inside the strut. In some cases the new bearing can be easily pressed part way into the strut by hand. Begin compressing the threaded rods until the new bearing is in place.

Thank You and Happy Boating!

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Strut-Pro tools work whether
your bearing size is imperial or
metric. We ship world wide.

This product is protected under U.S. Patent Number 6,539,601

Strut-Pro® is a registered trademark of

Global Marine Industries, Inc.
P.O. Box 564
Lake Stevens, WA 98223

Shipping Warehouse
Anacortes, WA 98221
Telephone 425-397-6601
Website: www.strutpro.com
Email: info@strutpro.com

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