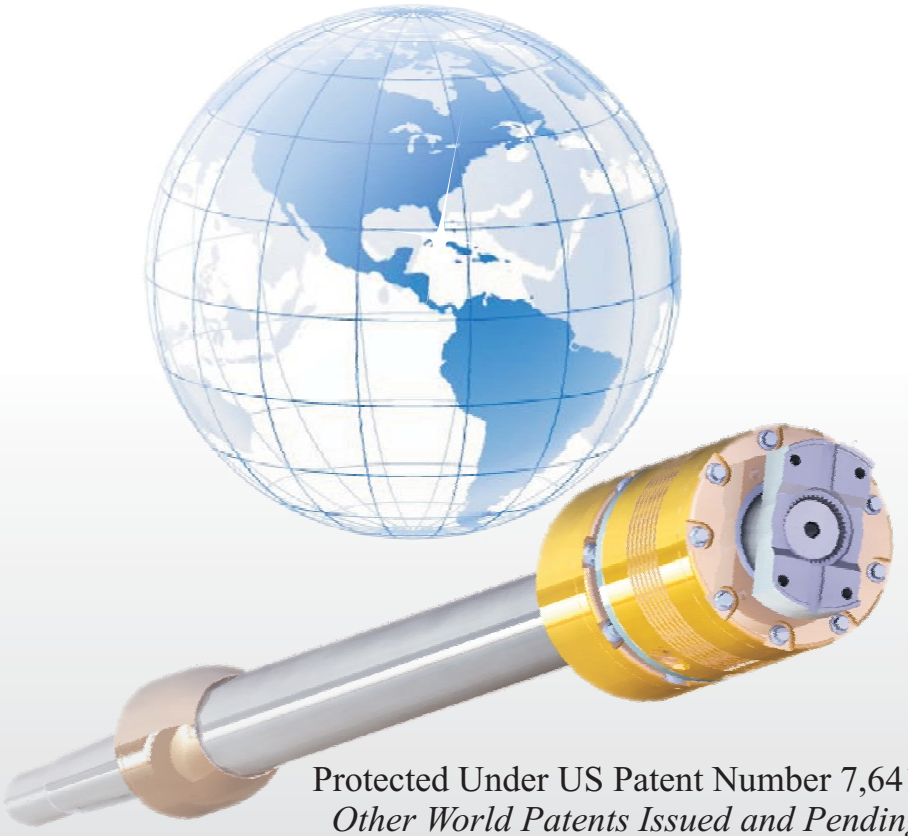
SEATORQUE

What Moves You



Protected Under US Patent Number 7,641,528 B2
Other World Patents Issued and Pending Apply

OWNERS HANDBOOK AND SERVICE MANUAL

For Sales and Service Contact
Seatorque Control Systems LLC
2779 SE Monroe Street
Stuart, Florida 34997, USA
Tel: +1-772-220-3020 Fax: +1-772-220-3012
www.seatorque.com

SEATORQUE SHAFT SYSTEM ALL SERIES
OWNERS HANDBOOK & SERVICE MANUAL,

OVERVIEW

Congratulations! You are the proud owner of a SEATORQUE *BOSS*™ equipped vessel. Seatorque Control Systems has been manufacturing marine shaft systems, marine mufflers, power steering and hydraulic control systems since 1994. The latest model of Seatorque Enclosed Shaft System is now installed in your vessel. This system will operate seamlessly in the background, reducing vibrations, mechanical noise transmission and reducing maintenance to a minimum. However, as with all mechanical equipment, certain routine operations should be followed. At Seatorque, significant attention has been paid towards reducing routine maintenance on your SCS Shaft System to just a few minutes a week. Happily, most of this time will be spent in observation rather than work.

Along with the benefits outlined above, are a few subtle attributes that will be realized over time. These include increased horsepower to the propeller, reduced mechanical losses, increased range under power and reduced stress on the propulsion system. In order to promote the enjoyment of your time afloat, please take the time to read the service manual and thoroughly familiarize yourself with the system and its operation. A few moments spent now will help provide years of trouble free service.

Please note that although an SCS System will provide enhanced operation of your vessel, it is connected to other mechanical components on board your vessel. Any complications or shortfalls that may arise with other equipment, components, installations or accessories (including but not limited to engines, engine mounts, transmissions, propellers, etc.) may affect the operation or performance of your SCS system and therefore may be beyond the control of SCS.

Please take the time to complete your Warranty Paperwork and register your SCS System as soon as possible. The warranty will automatically start 90 days after delivery from SCS factory to Builder unless the owner registration paperwork is completed, Warranty will then start from date of vessel purchase.

Thank you for choosing Seatorque Control Systems.
THE FUTURE……IS ENCLOSED

Service & Maintenance

Daily or before every use:
Check oil level in reservoir, replenish if necessary.
Visually check system for loose bolts, hoses, fittings and leaks.
Check condition of oil in Reservoir - (presence of water).
Drain any water from reservoir through the drain valve on the bottom left of the tank (2013 systems on)

Additional Once Monthly:
Spray housings and couplings with rust inhibitor (WD40 or Equiv), wipe down with a clean cloth.

Every six months:
Check tightness of mounting bolts on Cardan Shaft to recommended torque specifications.
Visually check thrust housing seal for signs of oil weeps or drips
Grease Cardan Shaft with Lithium #2 grease:
(**Lithium complex soap PAO EP2 according to spec DIN51825-KP2-K-20**)
To Grease:

1. Clean Zerk fitting before use.
2. Spider Bearings (UJ's): pump grease until it purges out of all spider bearing block Seals
3. Sliding section (Slip Joint): pump no more than 30 grams of grease

Check hoses from oil reservoir for chafing or leaking fittings, Tighten/replace as necessary
Check condition of oil for level and presence of water, drain if required
Check thrust bearing oil seal between coupling and housing face for signs of weeping oil
Check Isolator housing for signs of water leaks

Annual:
During haul out, check propeller-bearing seals for signs of oil leaks
Make sure water injection port on propeller seal carrier is clear and unobstructed
Check shaft casing through strut barrel to Isolator through-hull in Pocket, making sure that casing is firm, Secure, dry and free from corrosion
Visually check condition of Main mounting studs and nuts holding thrust housing Through Isolator Mount at Hull pocket
Clean and prepare casing and underwater housings and re-paint with fresh Anti-fouling paint

3 Years or 3000 Hours (see detail on page 3.)
Oil and Seal change
Minor Service inspection recommended

10 Years or 10,000 Hours
Major overhaul of complete system and all ancillary equipment

Third Year or 3000 Hours of service:

A Minor Service inspection is recommended and this should be performed by an official Seatorque service center or service technician. (See note on Page 6 – 3000 Minor Service Inspection).
In the event that inspection is not possible. Then the following minimum maintenance must be performed.

BASIC 3000 HOUR MAINTENANCE CYCLE

To perform a 3-year or 3000-hour oil change on your Seatorque Shaft System, the vessel must be out of the water and the propellers removed. The Seal Carrier (or end cap) at the aft end of the Propeller housing must be removed in order for the seals and o-rings to be replaced, and for the oil to be drained from the system.

What you will need to perform your Oil Change*:

Seatorque Shaft Oil
Oil Seals and O-rings - for the specific model of shaft system
Mineral Spirits or Kerosene (Paraffin) – 1 gallon per shaft
(5) Gallon Bucket
Loctite™ 271 or 2701
Allen Key of correct size

*Seatorque service Kits for 3000 hour Oil changes can be purchased from the factory or SCS service center.

1) Position a bucket under the propeller housing to catch the shaft oil, the oil will start to drain as soon as the seal carrier is removed.

2) Remove Allan Head Bolts from seal carrier at aft end of propeller housing, and remove seal carrier by pulling toward you. The Allen head bolts were installed with Loctite™ from the factory, but should break free with use of the correct Allen key. See the fasteners and tool requirement guide in the installation manual for the correct size key for your system. With the seal carrier removed, oil will now drain from the system.

3) Once oil has drained, go to the Seatorque oil reservoir tank mounted in the engine room and remove the gold colored cap from the tank. Pour approximately (1) gallon of Mineral spirit, Paraffin (Kerosene) into the tank. Keep refilling and allow the system to flush until the solvent turns clear at the propeller end. Leave system to air dry for approximately 30 minutes.

4) To Remove and replace the o-rings on the outside nose of the seal carrier (step 8, page 4) place the index finger and thumb on opposite sides of the carrier nose and squeeze upwards stretching the ring. With the other hand pull the O-ring out of the groove and discard.

Note: Never use a metal tool or knife to pry the ring from the groove as this can damage the groove and cause leaks during service.

5) Remove Oil seals in the seal carrier being careful to note the direction of the seals, they are opposing, one seals oil in, and one seals water out. Be sure to replace these in their proper orientation. The seals are mirrored back to back with springs facing out (see Fig 8). Seals are all rubber and therefore very flexible, in most instances they can be pressed into position very easily without special tools, whichever method used, make sure that the seals are pressed evenly against the back surface of the seal carrier and to each other being sure not to damage the lips and other sealing surfaces. Do not replace seals with any other type than genuine Seatorque seals, other seal types and makes are constructed of rubber in a steel case which will corrode underwater and are NOT compatible with the rest of the Seatorque components.

6) With a small drill bit, chase out the water injection port on the seal carrier to ensure that it is not plugged with paint or debris. IMPORTANT this port supplies lubricating water to the main water seal when the vessel is under way.

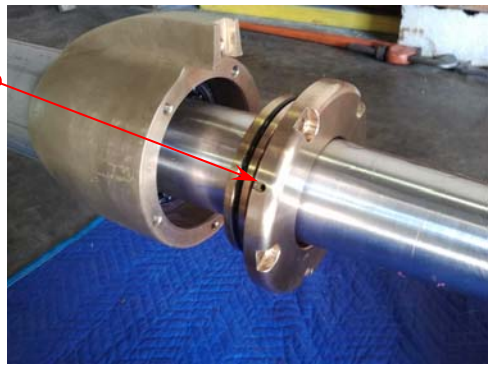


Fig (7)

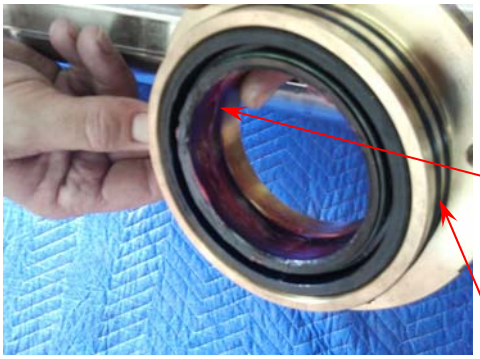


Fig (8)

7) Apply grease in-between the lips of the newly installed oil seals completely filling the valley formed between the lips, leave grease flush across the two seals. This will aid in the primary seal when first launched as well as lubricate the seal during initial break-in.

8) Replace the O-ring seals on the outside of the carrier nose with new correctly sized rings for system and lubricate with oil. Carefully position the seal carrier over the Shaft (see fig 7) and push the seal carrier back into the propeller housing making sure that bolt holes are aligned and that the water injection port is positioned towards the Left or Right quadrants of the housing.

NOTE: Never position the port under the line cutter holder (if fitted) or at the bottom of the housing.

9) Use Loctite™ 271 or 2701 on the Allen head bolts that fasten the seal carrier to the housing and evenly tighten hand tight.

Note: If Allen head bolts are damaged during removal, replace with new A4 grade Stainless Steel Bolts to the correct length and diameter as original.

Fig (10)

10) Clean any grease from the propeller taper area of the shaft before re-installing propellers.

11) Your system in now ready to be re-filled with oil. Fill the Seatorque Oil reservoir with Seatorque Shaft Oil. Continue filling until the oil level remains steady at the Max Fill Line on the reservoir. This may take some time for air to purge completely and for oil to fill the system (as much as 24 hours depending on shaft size); hand turning the propeller may help accelerate flow down the length of the shaft.

12) When complete, check the propeller housing for any signs of oil drips, to make sure it has been correctly re-assembled and that the seals are dry.

Note: Once the vessel has been launched, oil levels in the shaft reservoir should be monitored, it is normal for the systems internal oil pump to purge any air trapped during the filling process. Do not operate the vessel above light loads until all air has been expelled and the reservoir level is stable. Keep adding oil to the reservoir as required. Once oil levels remain at constant maximum level, full operation of the vessel can be resumed.

SYSTEM BREAK IN PERIOD

New seals will require a period of time to break in or bed. It is important that the seals are properly greased during installation to ensure proper lubrication of the rubber sealing lips during the initial period. Break in can take from 1 hour at the propeller seals to as much as 20 or 30 hours at the thrust housing. to coupling seal. Please read the important note at the beginning of page 9 which defines an oil leak and how to diagnose and report.

CARDAN SHAFT SERVICE

Cardan shafts require grease at regular intervals. It is normal for the Cardan shaft to sling a light line of grease which will be seen as a fine stripe of droplets aligned at each end of the assembly. When the Cardan shafts stops this process it is time to re-grease the assembly. This requires 3 pumps of a grease per grease point with a gun filled with Lithium #2 Grease.
The 3 grease points are located, one in the center of the yoke at the slip joint and one at each end on the bearing spider (cross). After three strokes of the grease gun, there should be evidence of grease escaping around the spider bearings, excess grease should be wiped up with a cloth.
This maintenance should be done every three to six months depending on operating hours. When maintained on a regular basis, life of the Cardan Shaft is expected to be 8 to 10 years.

It is recommended that the universal joint assembly (Cardan Shaft) be examined regularly or at least annually for wear or damage; assemblies of this kind are designed for 5000 hour life span, the design calculation is based on continuous operation at 500 RPM and full rated load. Mechanically this represents a worst case condition, operation at lesser load or higher RPM will increase life exponentially.

In a marine environment mechanical equipment life is impacted by generally harsh conditions and is further dependant on initial deflection and co-planar alignments during construction of the vessel, for this reason SCS recommends that when required, the bearings and spiders (crosses) are replaced using only genuine Seatorque replacement parts. In the event of Life failure, Cardan shaft assemblies are high cost items, this simple and relatively low cost precaution will return the Cardan Shaft to a new 5000 hour condition.

3000 HOUR SERVICE INSPECTION

Forward and Reverse Thrust bearing pack inspected.
Propeller needle bearing and Inner ring inspection.
Any of these components should be replaced with genuine Seatorque replacement parts if found to be worn or defective. SCS specifies only the highest quality bearings. They are selected based on load factors and duty cycles, for this reason no substitute bearings should be used as load ratings may not be sufficient. (Note: Inner ring can only be replaced using special service tools; they are designed to be pressed onto the shaft and must be located precisely within the propeller housing to line up with the needle bearing).
Check Cardan Shaft Alignments for Co-Planar and Deflection angles, adjust engine if necessary.

Notes:
Replace oil in system with only genuine Seatorque Full synthetic SAE 75W-90 or Optional Seatorque SAE 150 Biodegradable shaft oil.

If alternate non marine or mineral based SAE 90 oils are used, the required major maintenance cycle is reduced from 3000 hours or three years, to 500 hours or annually.

Replace propeller and thrust housing seals with genuine Seatorque replacement parts. Do not replace with alternate make or size, only Seatorque genuine parts are compatible and can be obtained from any Seatorque service center or factory direct.

Service kits are available from Seatorque, which include all parts required to complete a 3000 Hour overhaul.

10,000 HOUR MAJOR OVERHAUL

Thrust and Needle Bearing packs are designed to carry a minimum service life of at least 10 years or 10,000 hours under normal properly maintained running conditions. After this period, irrespective of duty hours, SCS recommends that all bearings are replaced.

Please contact your nearest Sales and Service Center or Seatorque factory Direct for more information. This is a factory specific service as certain aspects of the overhaul will require specialized service tools, adjustments and components.

SHAFT LUBRICANTS FOR EXTENDED DUTY CYCLES

SAE 75W-90 FULL SYNTHETIC SHAFT GEAR OIL

Seatorque Shaft Oil is specially developed to give extended service life under extreme pressure in a marine environment. It contains additives designed to separate water from component surfaces, allowing complete surface coverage with uniform film thickness on all bearing surfaces. Inhibitors protect components against corrosion and other additives reduce molecular breakdown under extreme condition of service and temperature as well as binding and trapping any water in the form of an emulsion. SCS Synthetic oil is blended from the best base stocks available, the molecular structure is further refined to provide superior lubricity at high operating temperatures compared to regular gear oils. When water is emulsified the performance of the oil is not diminished and as long as the vessel is in constant use the water will remained entrained and the system will be protected against damage.

OPTIONAL HIGH PERFORMANCE SAE 150 BIODEGRADABLE OIL

SCS Fully Bio-degradable base oil is made from fully sustainable resources and formulated to Biodegrade 90% within 28 days, the balance of additives Biodegrade within 40 days. SCS Bio-degradable oil has no odor and is a very high viscosity lubricant designed to reduce friction as well as present no harm to marine life and the marine environment in the event of a spill. SCS Bio-degradable oil contains a harmless additive to provide a tell tale sheen on the water surface to alert the boat operator that there may be oil escaping the system.

This oil has the same 3000 hour duty cycle to the regular SCS Full Synthetic Hydrocarbon based shaft oil and complies fully with the Seatorque shaft system published maintenance cycle of 3000 Hours or three years. Further testing has proven that SCS Biodegradable oil can extend life of the shaft bearings by as much as 15%.

SEATORQUE SHAFT SYSTEM ALL SERIES
Service & maintenance: *Continued:*

IMPORTANT NOTE:
Seatorque units are oil filled and occasionally during normal use a small amount of oil may weep from the thrust housing as seals are bedding in, etc. An occasional oil droplet from the thrust housing area of 3 centimeters in diameter or less is not cause for alarm, nor is it a sign of an operational problem. Oil droplets can be occasionally expected. Should an excessive or persistent oil leak be detected please first confirm the fluid is from the Seatorque equipment and not from other engine room machinery. In the event an oil leak is found follow the trouble shooting guide below to ascertain the probable cause, and then contact your Seatorque Service center for assistance.

Problem Checks and procedures

Oil level falls in reservoir	System has not been fully purged	Top up oil level
	Leaking Hoses	Check that Seatorque supplied hose fittings were used and that NO hose clamps are present on these connections. Hose clamps on a Pushlock fitting will create leaks. Tighten all hose fittings Check Oil hoses for Kinks or cracks Fix or replace as needed
Oil Level Rises in Reservoir	Possible Water Intrusion	Check the system has not been damaged through collision or grounding of vessel Check for debris or fishing line in Propeller housing seals. Check the Oil Cooler (if fitted) For cracks, leaks, worn or blocked internal Tube bundles
Water leak at Rear of Thrust Housing	Loose Nuts on Main Isolator Mounting Studs.	At first available haul-out Inspect Condition of Isolator Bushings, If damaged Replace Or Re-tighten to factory torque (Check with Service for Torque Specifications)

Sources of Vibration or Excessive Noise During normal operation	Worn Cardan Shaft or Universal Joint driveline assembly	Lack of Regular Maintenance Overhaul Required on Cardan Shaft (Replace spider or cross Bearing Assemblies as soon as Possible)
	Loose Cardan Retaining Bolts	Tighten to Torque Values Listed in This Manual
	Debris (Weed or Rope) on Propeller	Check & Clear propeller
	Damaged Propeller Blades	Have Propeller serviced
	Propeller incorrectly mounted Or Key-bound	Have propeller re-mounted
	Thrust bearings or propeller Bearing Damaged or Worn	conduct service inspection Replace as necessary
	Engine Mounts Damaged, Worn Or Broken	Check Condition, Re-align Or Replace as required
	Other Equipment Connected to The Main Propulsion System	Check Exhaust Supports, Hoses, Hangers etc fouling Structure Fix or Replace as Necessary
High operating temperatures	Low Oil Level in Reservoir	Check and Replenish if Low
Above 200° F - (93º C)	Thrust bearings Damaged or Worn	conduct service inspection Replace as necessary
		Fit Oil Cooler if required. (Check with Service)
Oil present on face of Thrust Housing or excessive Oil Visible in Bilge area	Leaking thrust housing seal	Replace seal
		Break in Period not reached (see note on page 7)
	Oil coming from Interface between Faceplate & Thrust Housing	*Replace faceplate O-ring Seals

* Factory Sealed unit may require special service tools or attention from an authorized SCS Service Technician (Please check with service before attempting).

ADDENDUM

CARDAN SHAFT GUARDS

It is the vessel owners/operators responsibility to ensure safety on board his vessel at all times and SCS therefore highly recommends that a suitable guard be installed around the universal joint driveline assembly to guard against inadvertent contact with rotating parts and to support the rotating assembly in the unlikely event of mechanical failure. With proper care, maintenance and use, these assemblies will provide several hundreds of hours between overhaul and must be included in the regular inspection & maintenance schedule that all machinery requires on-board any vessel. Please contact the sales department at the Seatorque factory or your local Seatorque distributor for more information on these options.

CARE OF FINISH

Wherever possible, certain steel components on a SEATORQUE shaft system are treated and sealed with "Gun Black" to retard or inhibit rust or corrosion. If possible it is recommended that builders paint or Awlgrip™ the steel components as with other engine room components to maintain a nice clean finish. If painting the steel coupling and transmission adapter, take care not to paint the mating surfaces of these components, specifically the surfaces that mate to the universal joint, or in seal contact areas without first masking them off. Generally no further protection is required other than the general maintenance outlined in the owner's service maintenance bulletin. All aluminum components are Class II Hard Anodized, whilst decorative in appearance, they are specifically hot sealed for color stability and protection against corrosion from the marine environment, with care the finish will last many years, use only regular detergent based products to clean these anodized housings, rinse with water immediately after and do not use any caustic based products, which may strip the protective anodize coatings exposing raw aluminum. Spray all anodized and Gun blacked steel surfaces with WD40™, Corrosion-X™ or similar on a regular basis or after washing to disperse any water which might accumulate on them promoting oxidation or dulling of the finish.

INCEPTION OF WARRANTY

Please complete and return the Warranty Registration Card and the Engine Hour Affidavit to register the commissioning date of the system and to activate the Warranty. This must be completed within 10 days of purchase of the vessel.

Factory Direct Parts – FDP

Service parts are available in most cases within 48-72 hours worldwide with the Seatorque FDP service (Factory Direct Parts).

Please contact your local area SCS Sales & Service Centers for ordering information

Within the United States:
Seatorque Control Systems, LLC
2779 SE Monroe Street
Stuart, Florida 34997
Tel: +1(772) 220-3020
Fax:+1 (772) 220-3012
sales@seatorque.com
www.seatorque.com

Europe
United Kingdom
Seatorque Europe
Contact: Roland McIldowie
Roland@seatorque-europe.com

Asia
Taiwan & Mainland China
Seatorque Asia
Contact: David Yen
seatorqueasia@gmail.com

China Office:
ZHUHAI,CHINA
TEL:+86-756-3225350
TEL:+86-13672780177

Taiwan Office:
KAOHSIUNG, TAIWAN
:+886-929696700

North East US & Canada
Delta Marine Services
2075 Tryon Road, Sidney B.C. V8L 3X9
Westport Marina in Tsehum Harbour
Contact: Brian Coverly
Tel: (250) 656-2639
Fax: (250) 656-2619
Service@Delta-Marine.com
www.delta-marine.com

Southern Mediterranean
Egypt
Mapso Marine Propulsion & Supply, S.A.E.
Contact: Philippe Maari
Tel: +(202) 7353328
Fax: +(202) 7355096
pm@mapso.com
www.mapso.com

Central & Southern America
MCP Yachts
Contact: Damien Chaves
Rua Maria Máximo, 170
Santos, SP/Brazil - 11030-100
Tel.:(13) 3261-5327
Fax: (13) 3261-5547
www.mcpyachts.com.br

SEATORQUE

Recommended Torque Values for all Fasteners Used In a Seatorque Systen

Shaft Model		100	175	200	225	250	275	300	350	400	450	500
Shaft Coupling Bolt	(Nm)	27	115	115	115	115	136	136	136	203	tba	tba
To Shaft	Ft/Lbs	20	85	85	85	85	100	100	100	150	By application	
(Pretorque to 50%) - Lubricated	Bolt	3/8-24	5/8-18	5/8-18	5/8-18	5/8-18	3/4-16	3/4-16	1-14	1 1/4-12		

Shaft Model		100	175	200	225	250	275	300	350	400	450	500
M3 Isolator	(Nm)	7	14	20	27	27	27	27	27	34	tba	tba
Stud Nuts	Ft/Lbs	5	10	15	20	20	20	20	20	25	By application	
For urethane Mounting Bushings Only		(Tighten Twice At Value Shown - Resulting Torque applied will be double the listed value)										

CARDAN SHAFT (Universal Joint)		DIN Model 2C	5C	7C	8.5C	10C	12.5C
Bolt	(Grade)	(8)	(8)	(8)	(8)	(8)	(10.9)
Diameter	Inches	5/16-24 UNF	3/8-24 UNF	1/2-20 UNF	1/2-20 UNF	5/8-18 UNF	M18-1.5
Pre-Torque Setting		2C	5C	7C	8.5C	10C	12.5C
Lubricated	(Nm)	19	54	88	88	136	203
	Ft/Lbs	14	40	65	65	100	150
Final Torque Setting		2C	5C	7C	8.5C	10C	12.5C
Lubricated	(Nm)	27	68	115	115	203	271
	Ft/Lbs	20	50	85	85	150	200

Transmission Adapter												
		SAE				METRIC						
Min/Max	Stud Size	7/16"	5/8"	3/4"	1"	M10	M16	M18	M20	M22	M24	
Torque	(Nm) Min	54	171	285	569	33	142	190	285	379	522	
Settings	Max	79	244	407	813	47	203	271	407	542	745	
Threads Dry	Ft/Lbs Min	40	126	210	420	24	105	140	210	280	385	
	Max	58	180	300	600	35	150	200	300	400	550	

PROPELLER NUT TORQUE Recommended For SAE J755 Shaft Tapers - DRY THREADS												
Shaft Model		100	175	200	225	250	275	300	350	400	450	500
	(Nm)	7	318	436	573	637	799	982	1272	1745	2127	2728
	Ft/Lbs	5	235	322	423	470	590	725	939	1288	1570	2013