

NOTES:  
 1) SEE REFERENCES 1 THROUGH 6 FOR RELATED INSTALLATION MANUAL AND ELECTRICAL / ELECTRONIC AND COOLING CIRCUIT DRAWINGS.

2) GYRO ASSEMBLY WEIGHT = 870 LBS (395KG)

3) REFERENCE 90397 SEAKEEPER COOLING WATER SCHEMATIC FOR COOLING SYSTEM REQUIREMENTS.

4) TWO LIFTING EYEBOLTS(M10-1.5 X 20MM THREAD LG) ARE PROVIDED ON THE TOP OF THE GYRO SPHERE FOR USE WITH A CHAIN/SPREADER BAR (SEE SHEET 4) TOP COVER MUST BE REMOVED TO ACCESS LIFTING EYES.

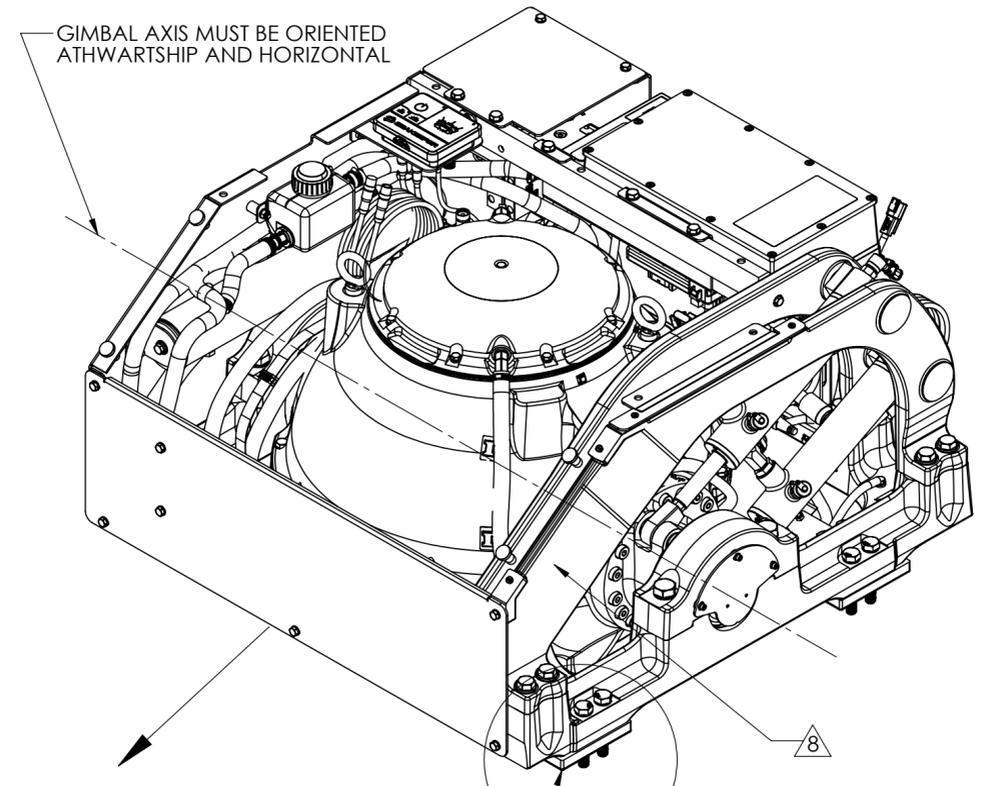
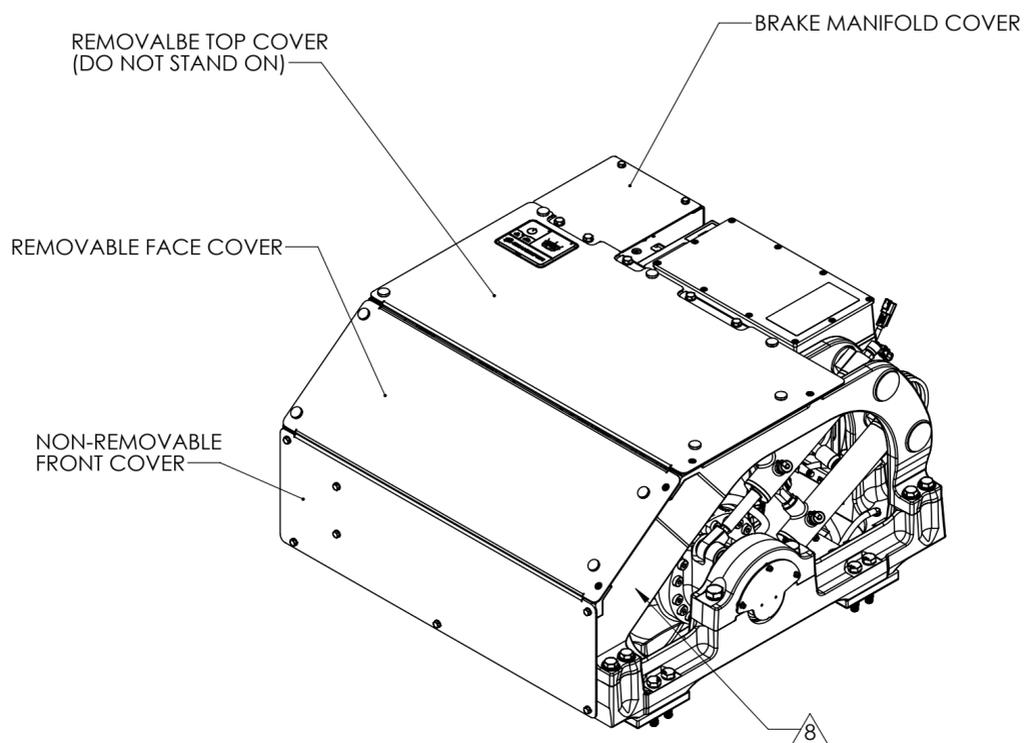
5) COVERS ARE PROVIDED TO PREVENT PERSONNEL OR EQUIPMENT ENTANGLEMENT WHILE GYRO IS IN OPERATION. THESE COVERS ARE NOT TO BE STOOD ON OR TO HAVE ANYTHING STORED ON TOP OF. SEAKEEPER RECOMMENDS THE COVERS TO ALWAYS BE IN PLACE DURING OPERATION.

6) THE GYRO MUST BE INSTALLED AFT OF AMIDSHIP TO MINIMIZE HIGH ACCELERATION LOADING DUE TO HULL/WAVE IMPACTS DURING OPERATION AT HIGH SPEED OR IN LARGE WAVES. GYRO DOES NOT NEED TO BE MOUNTED ON CENTERLINE OF KEEL. GYRO SUPPORT STRUCTURE MUST BE PARALLEL TO VESSEL WATERLINE, WITH UP TO 2 DEGREE ALLOWANCE FOR TRIM.

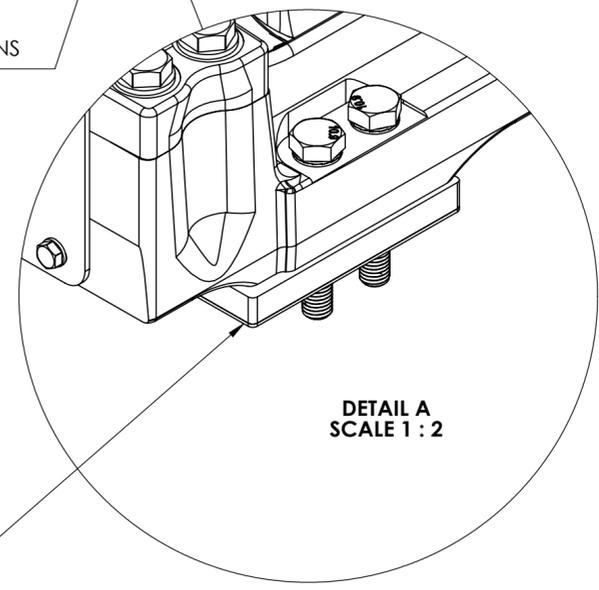
7) GYRO MAY BE INSTALLED FACING FORWARD OR AFT AS SHOWN. GYRO ORIENTATION SHOULD BE SELECTED TO PROVIDE THE MOST ACCESSIBILITY FOR FUTURE SERVICE AND MAINTENANCE. INSTALLATION, START-UP, AND OPERATION IS THE SAME REGARDLESS OF GYRO ORIENTATION.

8) WHEN INSTALLING GYRO SEAKEEPER RECOMMENDS USING A BOLT HOLE LOCATION FIXTURE #90392 AVAILABLE FROM SEAKEEPER. THIS FIXTURE WILL PROPERLY SPACE AND LOCATE HOLES TO BE DRILLED IN HULL STRUCTURE FOR BOLT-IN OF GYRO FOUNDATION. SEE INSTALLATION MANUAL FOR DETAILS OF INSTALLATION PROCESS.

REV NO.	ECN NO.	ZONE	DESCRIPTION	DATE	DRAWN BY	APRVD. BY
7	1059		UPDATED VIEWS WITH CONNECTBOX. DESCRIPTION CHANGE FROM "BOLT-IN KIT" TO "BLIND-HOLE KIT". ADDED 90558 REF TABLE. ADDED LIFTING EYEBOLT THREAD SPEC. REQUIRED AFT CLEARANCE INCREASED FROM 4" TO 6" AND TOP FROM 3" TO 5". ADDED CLEARANCE NOTES.	20APR2023	RMF	DMF
8	1194	B6, C2, 2-C6, 2-D6, 2-D7, 2-E8	UPDATED VIEWS WITH A NEW REVISION OF THE OUTBOARD CYLINDER BRACE. UPDATED CENTER OF MASS LOCATION.	08/01/2024	CLF	BRD



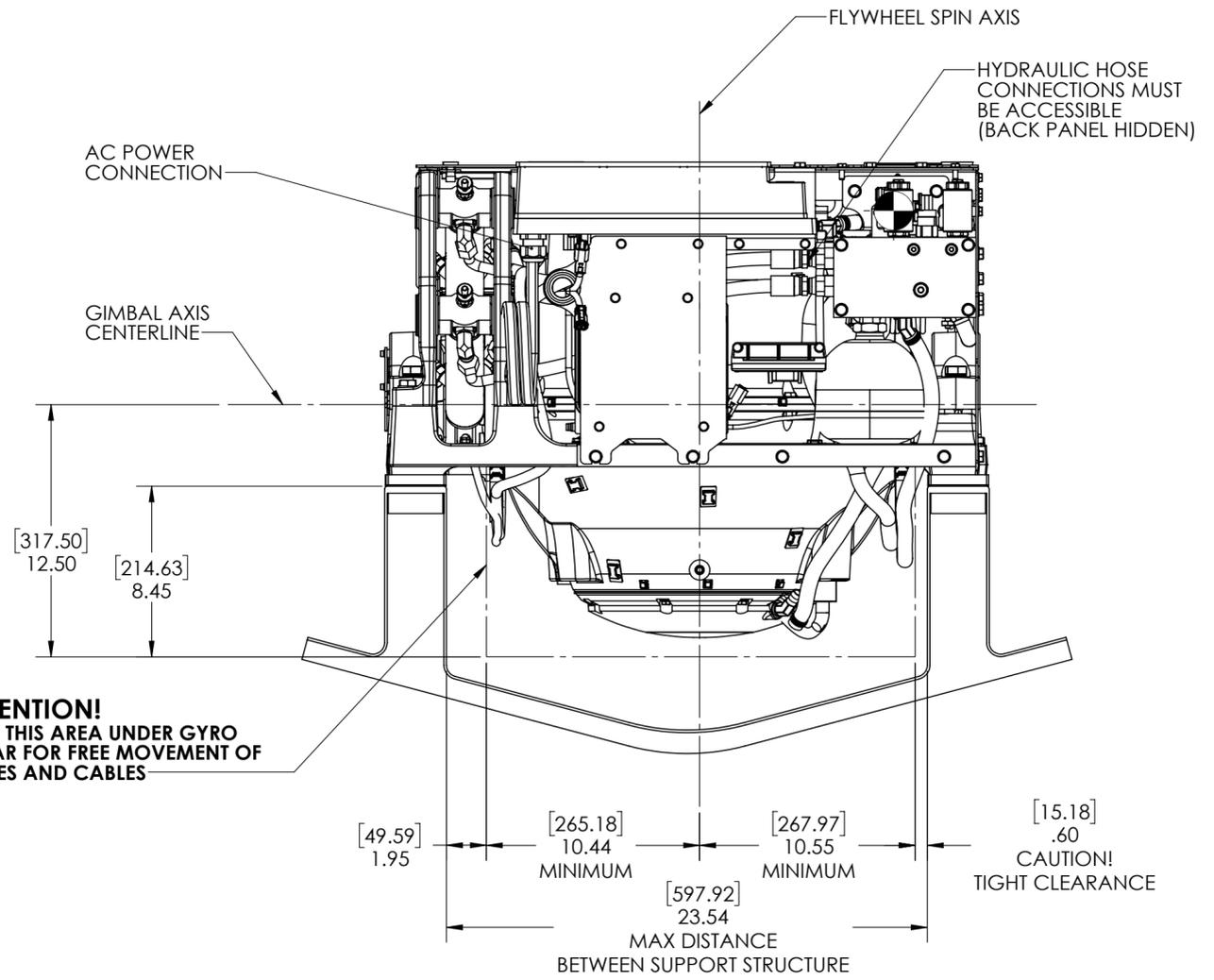
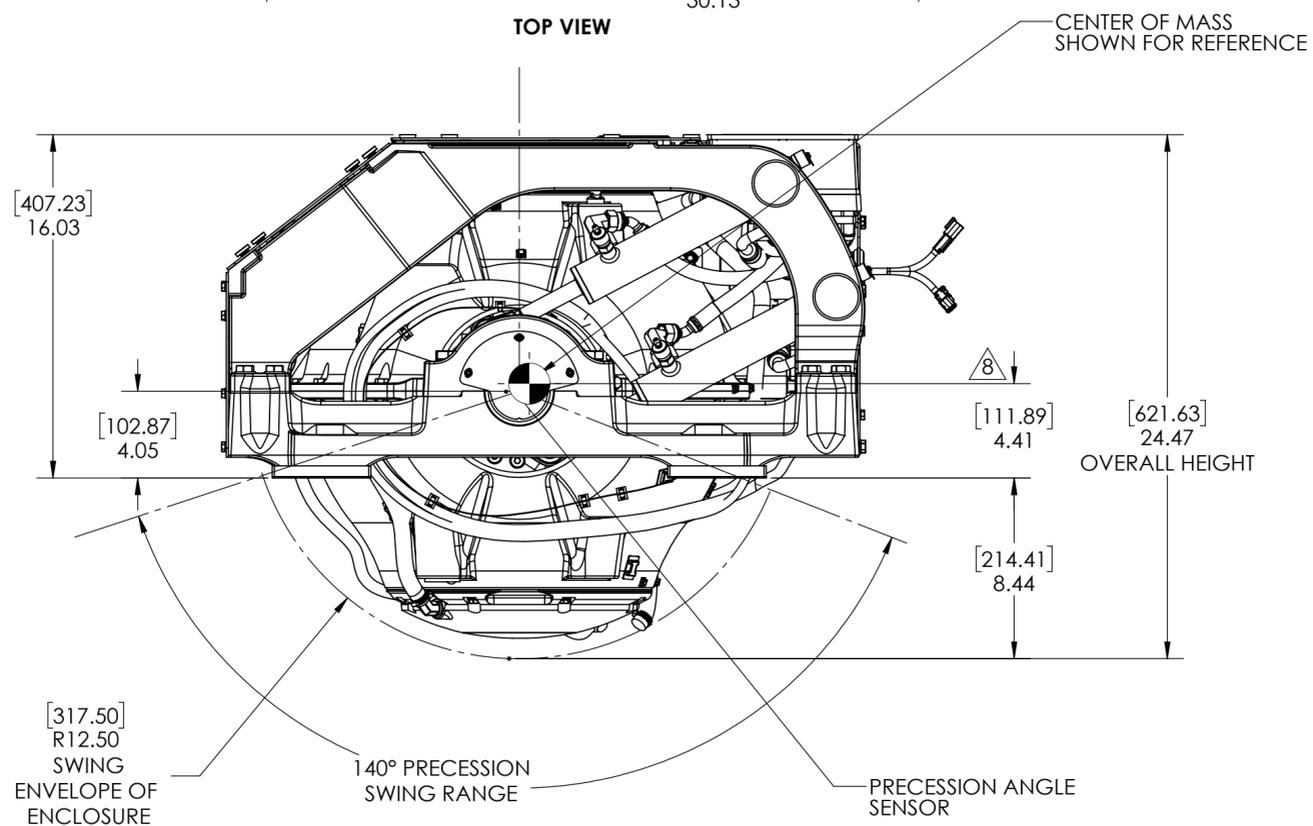
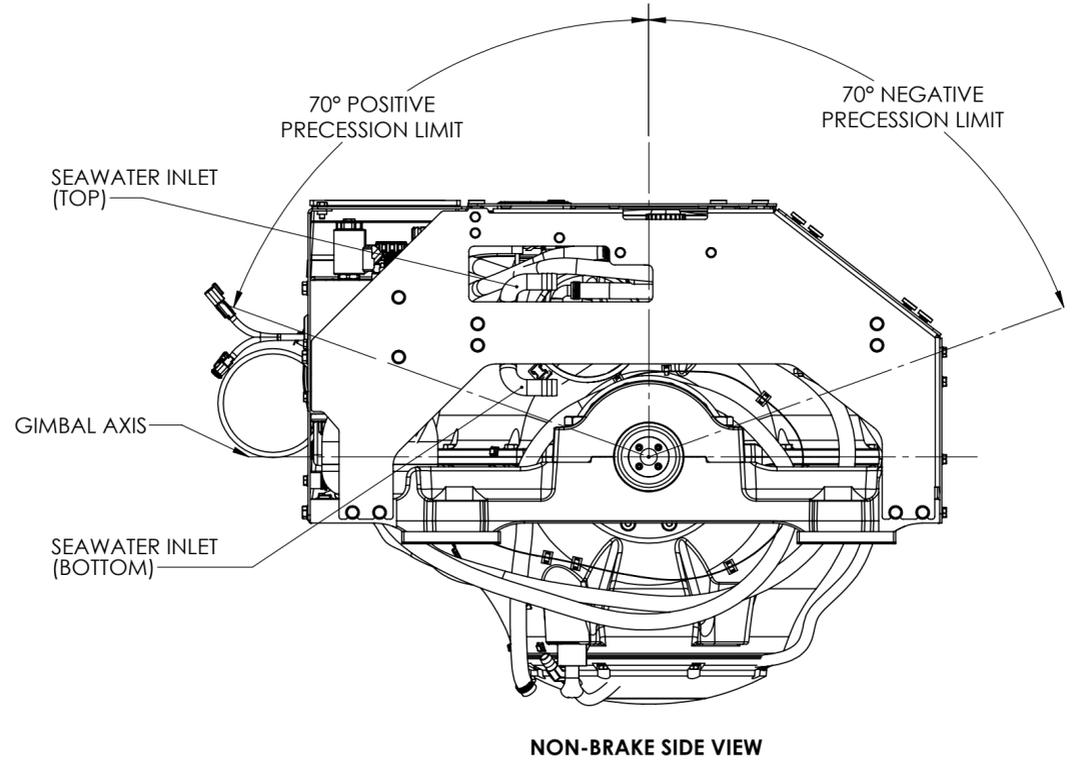
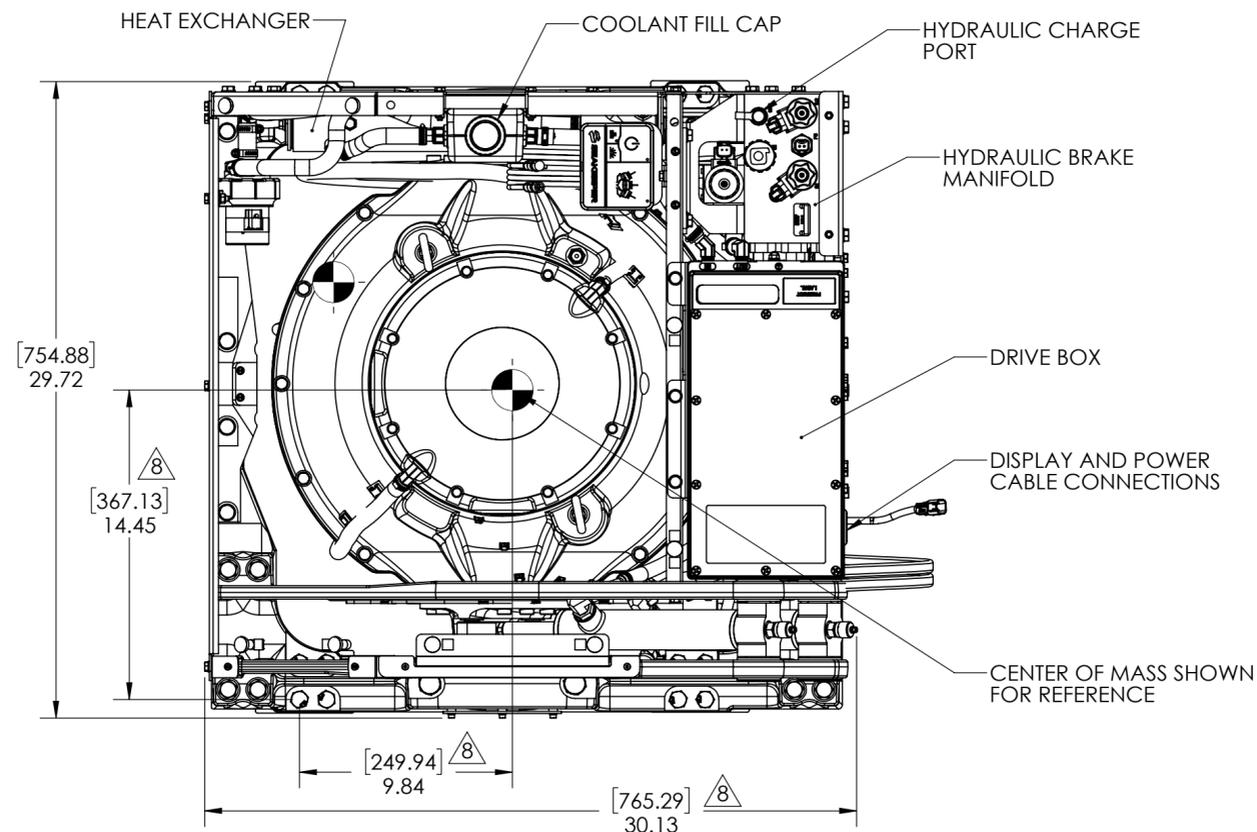
SEE SHEET 5 FOR LOADING FORCES AND OTHER RECOMMENDATIONS FOR ATTACHING GYRO TO HULL STRUCTURE



WHEN ATTACHING GYRO DIRECTLY TO ANY STRUCTURE, (4) FOUNDATION SPACERS (#11241) ARE PROVIDED TO GO BETWEEN GYRO FRAME AND HULL STRUCTURE. THESE WILL PROVIDE CLEARANCE FOR THE MOVING PARTS OF THE GYRO. WHEN MOUNTING TO A NON-ALUMINUM, METAL STRUCTURE (4) ISOLATION GASKETS (#11145) MUST BE USED BETWEEN THE FOUNDATION SPACER AND THE HULL STRUCTURE TO PREVENT DISSIMILAR METAL TO METAL CORROSION. APPLY THIN FILM OF MARINE GRADE POLY-SULFIDE SEALANT TO ALL MATING SURFACES OF GASKET AND SPACER TO SEAL OUT SEAWATER.

REF.	DWG NO.	DWG. TITLE
1	90397	SEAKEEPER 6 COOLING WATER SCHEMATIC
2	90396	SEAKEEPER 6 CABLE BLOCK DIAGRAM
3	90392	SEAKEEPER 6 INSTALLATION FIXTURE KIT
4	90402	SEAKEEPER 6 INSTALLATION MANUAL
5	90400	SEAKEEPER 6 BLIND-HOLE KIT
6	90448	SEAKEEPER 6 GENERIC INSTALLATION GUIDE
7	90558	CONNECTBOX HELM MOUNTING KIT
8	90660	SEAKEEPER 6 THRU-BOLT KIT

<b>PROPRIETARY AND CONFIDENTIAL</b> THE INFORMATION CONTAINED IN THIS DRAWING IS THE SOLE PROPERTY OF SEAKEEPER INCORPORATED. ANY REPRODUCTION IN PART OR AS A WHOLE WITHOUT THE WRITTEN PERMISSION OF SEAKEEPER IS PROHIBITED.  THIS DRAWING SUPERSEDES ALL OTHER FILE FORMAT TYPES UNLESS OTHERWISE SPECIFIED DO NOT SCALE DRAWING	3rd ANGLE PROJECTION 	 Seakeeper Inc. 45310 Abell House Lane, Suite 350 California, MD 20619 <b>DESCRIPTION:</b> SEAKEEPER 5-6 BOLT IN INSTALLATION DETAILS		
	WEIGHT - LBS : --- MATERIAL : ---		<b>DRAWING NO:</b> 90398	<b>REV NO:</b> 8



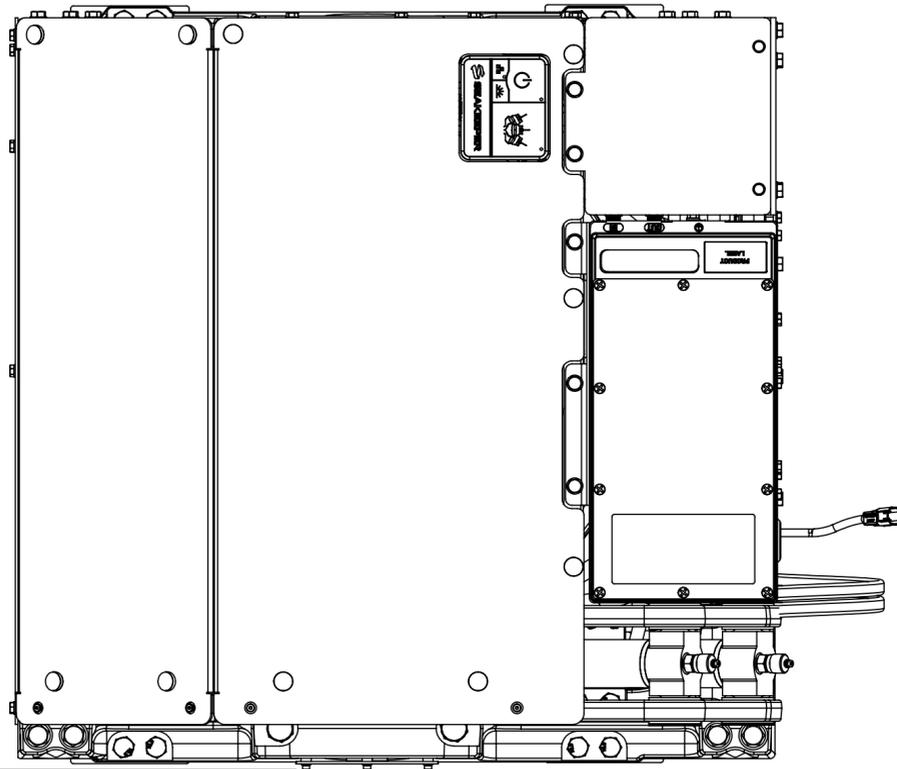
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	WEIGHT - LBS : --- MATERIAL : ---	

**VIEWS SHOWING REQUIRED CLEARANCES AROUND SEAKEEPER**

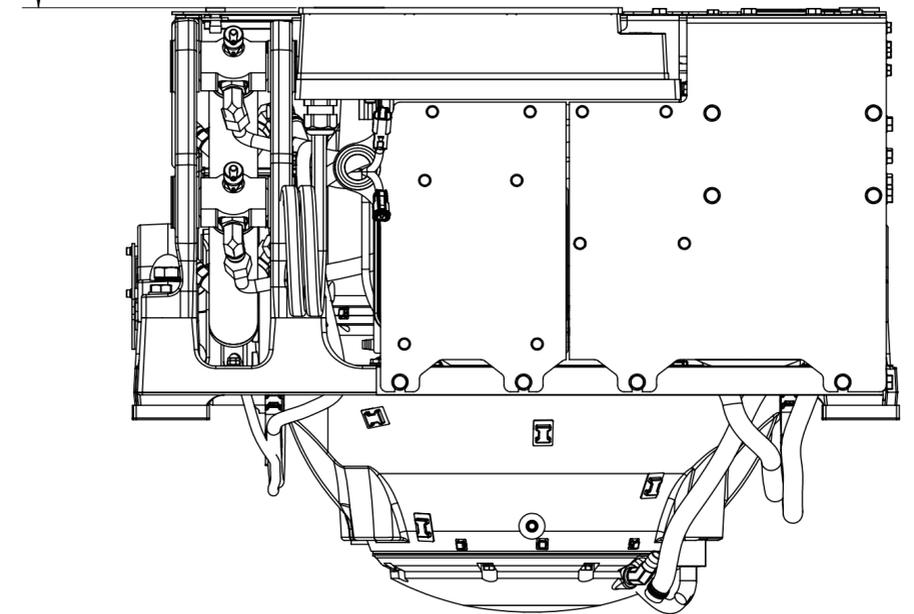
**CLEARANCE REQUIREMENTS NOTES:**

1. THE MINIMUM SERVICE CLEARANCES ARE BASED ON THE SIZE OF SERVICEABLE COMPONENTS AND TOOLS REQUIRED TO REMOVAL AND REPLACEMENT OF THESE COMPONENTS. THE CLEARANCES DO NOT CONSIDER HOW THE TECHNICIAN WILL BE POSITIONED FOR ACCESS TO THESE AREAS. ACCESS FOR A TECHNICIAN MUST BE CONSIDERED BY THE INSTALLER.
2. THE CLEARANCE AND ACCESS REQUIREMENTS DO NOT NEED TO BE PERMANENT AND CAN BE PROVIDED VIA HATCHES, REMOVABLE PANELS, OR OTHER TEMPORARY MEANS WHERE APPLICABLE.
3. THE DESIGNER / INSTALLER SHOULD CONSIDER ALL OF THESE FACTORS FOR SERVICEABILITY WHEN DEFINING THE INSTALLATION ARRANGEMENT.

[101.60]  
4.00  
MINIMUM REQUIRED  
DISTANCE FOR TOOL AND  
SERVICE CLEARANCES  
BOTH SIDES

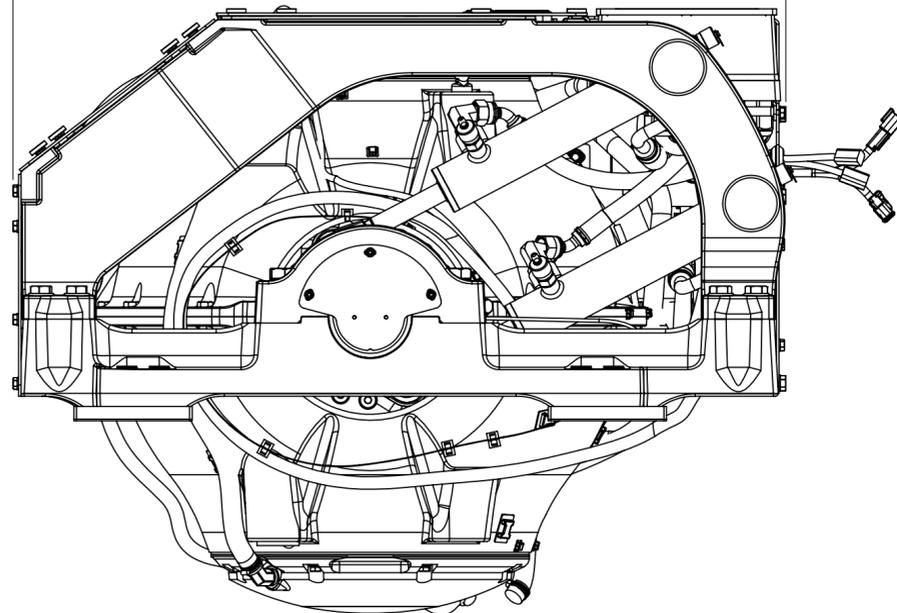


[127]  
5.00  
MINIMUM REQUIRED  
DISTANCE FOR TOOL AND  
SERVICE CLEARANCES.



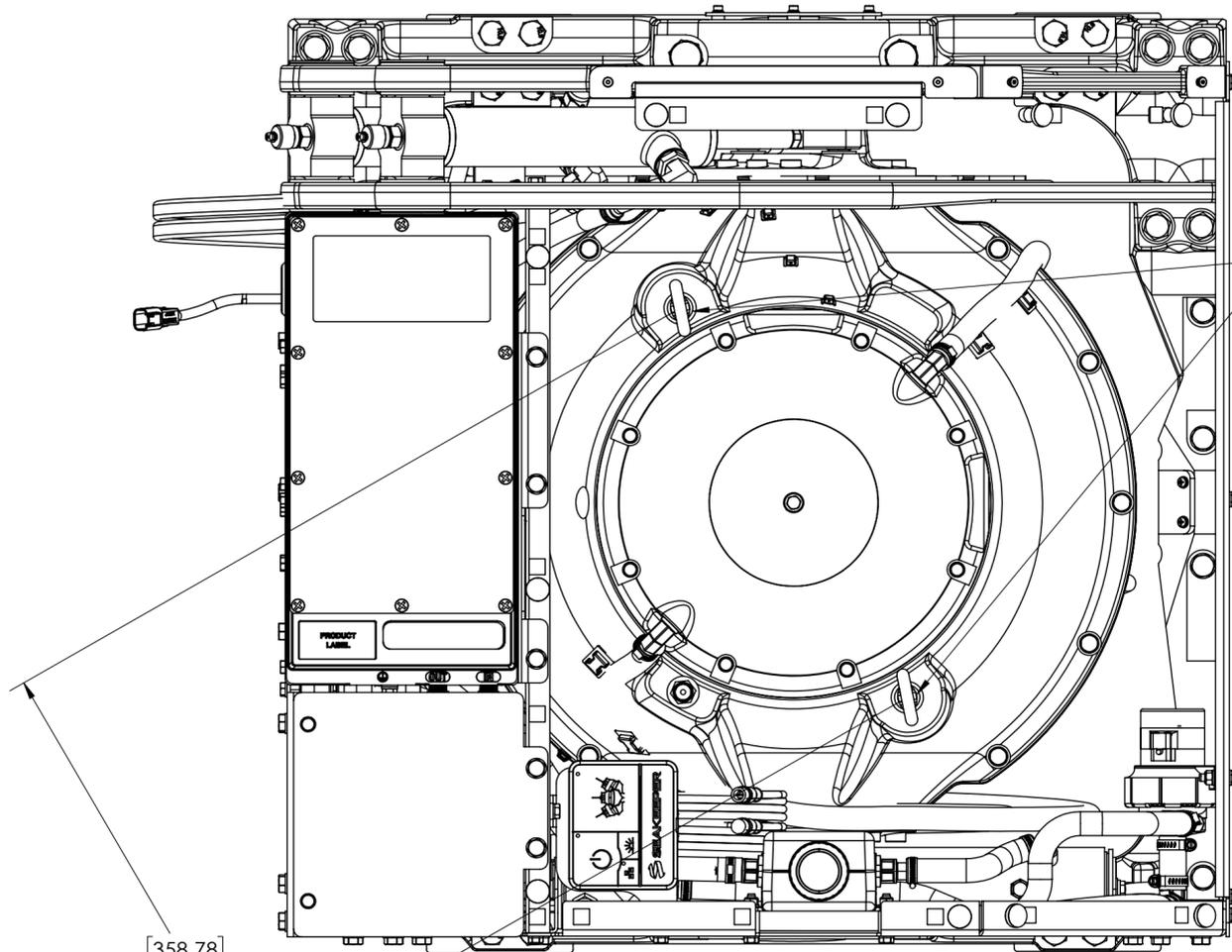
[50.80]  
2.00  
MINIMUM REQUIRED  
DISTANCE FOR TOOL AND  
SERVICE CLEARANCES.

[152.40]  
6.00  
MINIMUM REQUIRED  
DISTANCE FOR TOOL AND  
SERVICE CLEARANCES.



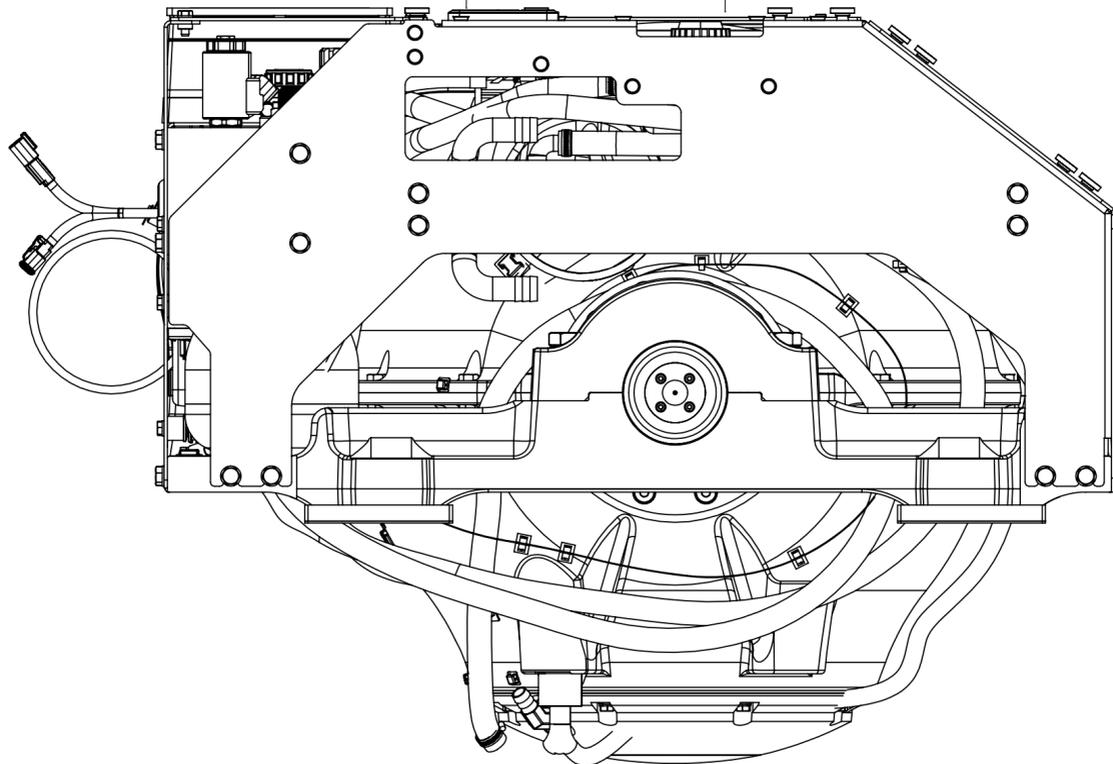
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	<p>WEIGHT - LBS : ---</p> <p>MATERIAL: ---</p>	

**TOP DOWN ACCESS MUST BE INCORPORATED INTO THE INSTALLATION DESIGN TO ALLOW FOR ADEQUATE REGULAR MAINTENANCE, SERVICE, AND REPAIR OF COMPONENTS**

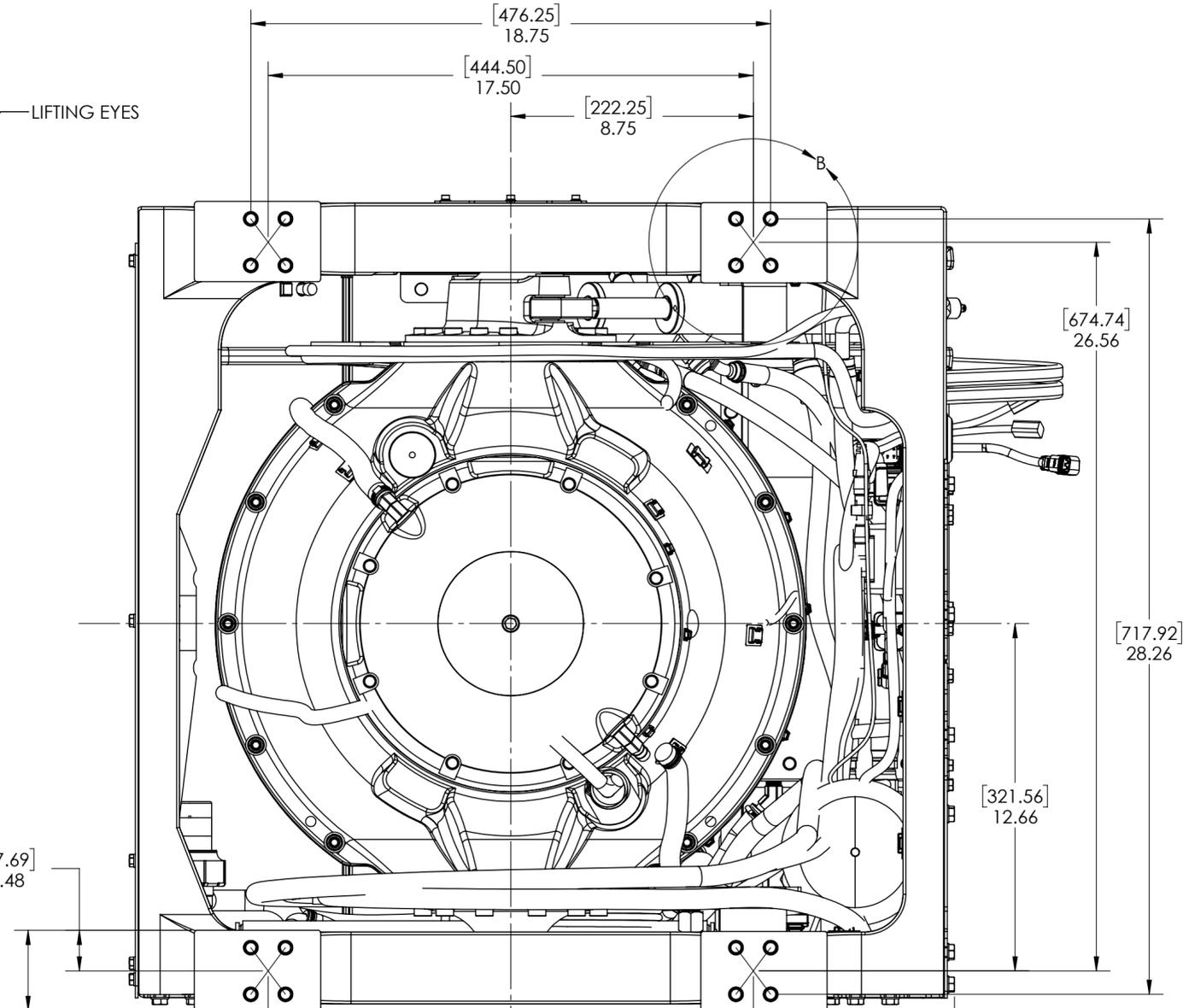


**CAUTION: ALWAYS USE A MINIMUM OF 2 LIFTING POINTS. NEVER LIFT A GYRO FROM ONLY ONE LIFT POINT.**

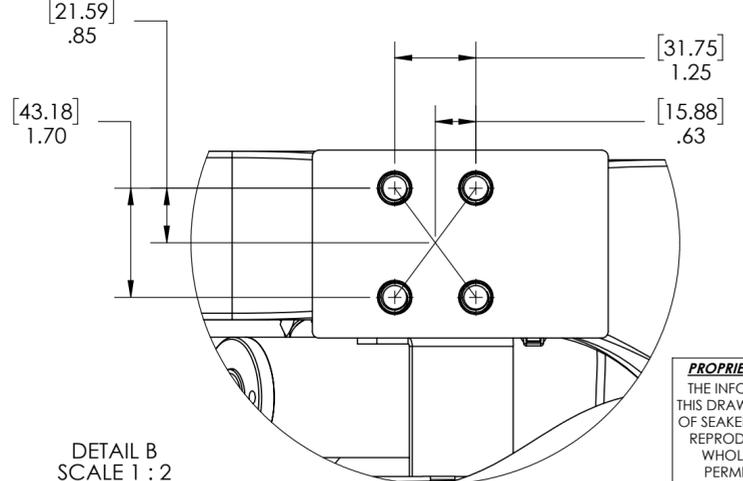
**LIFT VERTICALLY USING A SPREADER BAR SEAKEEPER P/N 80067**



DETAIL B  
SCALE 1 : 2  
4 MOUNTING FEET



**SEAKEEPER RECOMMENDS BUILDER/INSTALLER USING INSTALLATION FIXTURE #90392 AVAILABLE FROM SEAKEEPER TO LOCATE BOLT HOLE POSITIONS WHEN DRILLING HULL STRUCTURE.**



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	<p>WEIGHT - LBS : ---</p> <p>MATERIAL : ---</p>	
<p>DRAWING NO: <b>90398</b></p>		<p>REV NO: SCALE: SHEET NO: <b>8 1:8 4 OF 5</b></p>

**GYRO LOADS FOR HULL STRUCTURE DESIGN :**

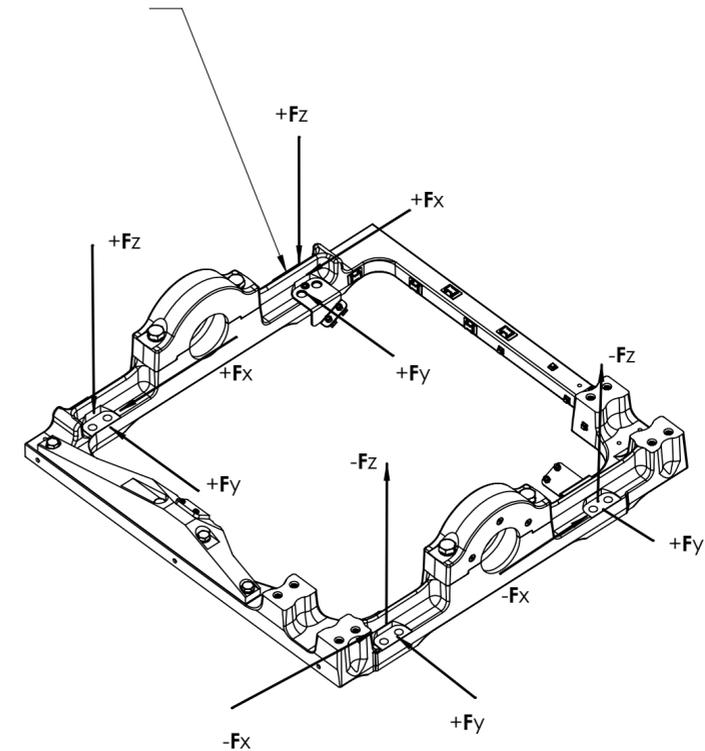
- 1) THE GYRO IS MOUNTED IN A RIGID FOUNDATION FRAME WHICH INCORPORATES SEMI-ELASTIC ANTI-VIBRATION ISOLATORS ENCASING THE GIMBAL BEARINGS THAT DAMPEN VIBRATIONS THAT COULD TRANSMIT INTO THE HULL STRUCTURE.
- 2) IF THE GYRO FOUNDATION IS BOLTED TO A NON-ALUMINUM, METAL HULL STRUCTURE AN ISOLATION GASKET MUST BE USED BETWEEN THE ALUMINUM FRAME AND THE HULL STRUCTURE SURFACE. APPLY A THIN FILM OF MARINE GRADE, POLY-SULFIDE SEALANT TO BOTH SIDES TO PREVENT GALVANIC CORROSION. ISOLATION GASKET IS NOT TO BE USED ON FIBERGLASS INSTALLATIONS. SEAKEEPER ISOLATION GASKETS ARE INCLUDED IN THE SEAKEEPER 5-6 BOLT-IN KIT P/N: 90400 AND THE SEAKEEPER 5-6 THRU-BOLT KIT P/N: 90660. THE BOLTING SURFACE OF THE HULL STRUCTURE MUST BE FLAT SO THAT THE 4 CONTACT POINTS OF THE GYRO FRAME ARE TOUCHING THE HULL STRUCTURE SIMULTANEOUSLY WITH NO NOTICEABLE ROCKING. THE BOAT BUILDER OR GYRO INSTALLER IS RESPONSIBLE TO DESIGN AND BUILD A HULL STRUCTURE THAT WILL ENSURE A FLAT BOLT SURFACE AS TO AVOID ANY INDUCED STRESSES INTO THE FRAME CASTING ONCE BOLTED DOWN. SEAKEEPER RECOMMENDS A SURFACE FLATNESS WITHIN 1.5 MILLIMETERS.
- 3) THE GYRO GENERATES PITCH MOMENTS, ROLL MOMENTS, YAW MOMENTS, AND VERTICAL AND HORIZONTAL FORCES - THE MAGNITUDE OF WHICH IS CONTROLLED BY THE GYRO'S ACTIVE BRAKE SYSTEM. THESE GYRO GENERATED FORCES AND MOMENTS RESULT IN LOADS BEING APPLIED AT THE FOUR POINTS WHERE THE GYRO FRAME BOLTS TO THE TOP FACE OF THE HULL STRUCTURE. THE RESULTANT FORCES AT THESE POINTS ARE ILLUSTRATED ON THE ADJACENT FIGURE AND THE VALUES TO BE USED FOR HULL STRUCTURE DESIGN ARE SUMMARIZED BELOW:

VERTICAL FORCE (Fz) = 3820 lbs (17.0 kN)  
 LONGITUDINAL FORCE (Fx) = 2335 lbs (10.4 kN)  
 LATERAL FORCE (Fy) = 209 lbs (0.93 kN)

THESE FORCES SHOULD BE CONSIDERED TO BE ACTING SIMULTANEOUSLY, FULLY REVERSING IN BOTH DIRECTIONS, AND WILL REPEAT AN INFINITE NUMBER OF TIMES. THESE FORCES DO NOT INCLUDE VESSEL MOTION ACCELERATIONS INCLUDING VERTICAL SLAM LOADS WHICH CAN BE HIGH FOR HIGHER SPEED VESSELS.

- 4) THE BOAT BUILDER OR THE GYRO INSTALLER IS RESPONSIBLE FOR DESIGNING THE HULL STRUCTURE TO WHICH THE GYRO IS ATTACHED TO ACCOMMODATE THE ABOVE FORCES AND MOMENTS PLUS A REASONABLE FACTOR OF SAFETY. SEAKEEPER SUGGESTS A SAFETY FACTOR OF 3.0 (YIELDING A SAFETY MARGIN OF 2.0). THIS FACTOR OF SAFETY MAY NEED TO BE INCREASED DEPENDING ON THE OPERATIONAL PROFILE OF THE VESSEL IN WHICH THE GYRO IS TO BE INSTALLED.

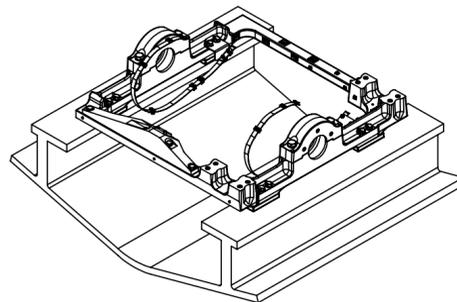
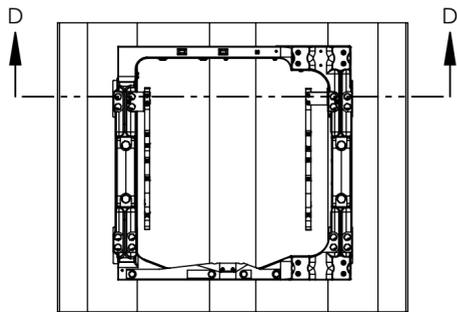
THE GYRO FRAME IS BOLTED TO HULL STRUCTURE USING:  
 M12X1.75 ZI-NI PLTD STEEL, HEX HEAD CAP SCREWS,  
 GRADE 10.9, 16 PLACES.



**NOTIONAL METAL STRUCTURE, THROUGH-BOLT INSTALLATION**

STRUCTURE SHOWN BELOW IS FOR REFERENCE PURPOSE ONLY  
 APPLY MARINE GRADE SEALANT UNDER BOLT HEADS AND WASHERS.  
 APPLY NICKEL-BASE ANTI-SEIZE TO THREADS, TORQUE TO 95 FT-LBS (129 N-M).

USE P/N 90660, SEAKEEPER 5-6 THRU-BOLT KIT



P/N 11241. FOUNDATION SPACER  
 APPLY THIN FILM OF MARINE GRADE, POLY-SULFIDE SEALANT TO BOTH SIDES

IF MOUNTING SEAKEEPER TO A METAL SURFACE OTHER THAN ALUMINUM, P/N 11145, ISOLATION GASKET MUST BE USED BETWEEN THE SEAKEEPER'S FRAME AND THE HULL STRUCTURE TO PREVENT GALVANIC CORROSION. APPLY A FILM OF MARINE GRADE, POLY-SULFIDE SEALANT TO BOTH SIDES.

[100]  
 3.94  
 BOLT LENGTH  
 1.15  
 MAX FLANGE THICKNESS

SECTION D-D  
 SCALE 1 : 2

P/N 60845, M12-1.75 X 100MM LONG  
 HEX HEAD CAP SCREW, GRADE 10.9 Zn-Ni PLATED  
**TORQUE TO 95 FT-LBS.**  
 4 PLACES

P/N 60844  
 WEDGELOCK WASHER M12  
 MUST BE USED WHEN MOUNTING

[12.70]  
 .50  
 FOUNDATION SPACER  
 [37.15]  
 1.46  
 SEAKEEPER FOUNDATION

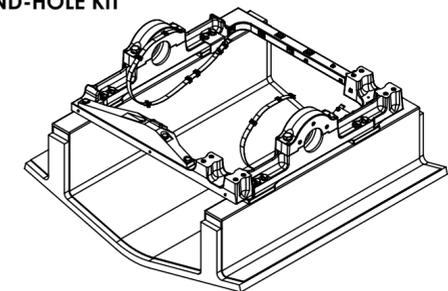
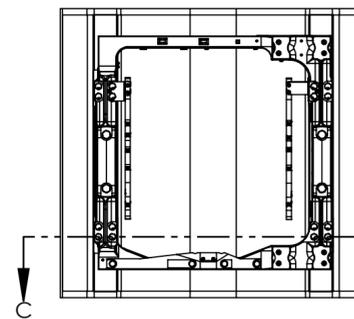
HULL STRUCTURE REFERENCE. IF THICKER FLANGE IS USED, INSTALLER IS RESPONSIBLE FOR SUPPLYING GRADE 10.9 BOLTS THAT MEET THREAD ENGAGEMENT REQUIREMENTS. MUST BE A MINIMUM OF 2 THREADS PROTRUDING PAST NUT.

P/N 60847, M12-1.75 HEX NUT

**NOTIONAL GRP HULL, BLIND-HOLE INSTALLATION**

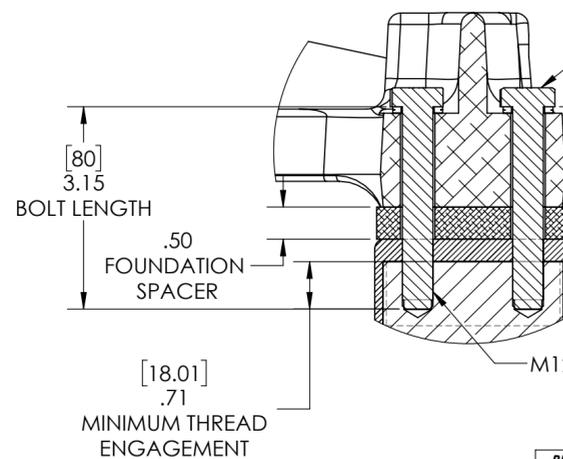
STRUCTURE SHOWN BELOW IS FOR REFERENCE PURPOSE ONLY  
 APPLY MARINE GRADE SEALANT UNDER BOLT HEADS AND WASHERS.  
 APPLY NICKEL-BASE ANTI-SEIZE TO THREADS, TORQUE TO 95 FT-LBS (129 N-M).

USE P/N 90400, SEAKEEPER 5-6 BLIND-HOLE KIT



P/N 60846, M12-1.75 X 80MM LONG  
 HEX HEAD CAP SCREW, GRADE 10.9 Zn-Ni PLATED  
**TORQUE TO 95 FT-LBS.**  
 4 PLACES

[52.35]  
 2.06  
 SEAKEEPER FOUNDATION, FOUNDATION SPACER AND WEDGELOCK WASHER (.10 IN/2.54MM) TOTAL THICKNESS



P/N 11241 FOUNDATION SPACER  
 APPLY THIN FILM OF MARINE GRADE, POLY-SULFIDE SEALANT TO BOTH SIDES

[9]  
 .35  
 ASSUMED FIBERGLASS THICKNESS IF THICKER FIBERGLASS IS USED, INSTALLER IS RESPONSIBLE FOR SUPPLYING GRADE 10.9 BOLTS THAT MEET THE MINIMUM THREAD ENGAGEMENT.

[80]  
 3.15  
 BOLT LENGTH

.50  
 FOUNDATION SPACER

[18.01]  
 .71  
 MINIMUM THREAD ENGAGEMENT

SECTION C-C  
 SCALE 1 : 2

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 DO NOT SCALE DRAWING

3rd ANGLE PROJECTION  
 WEIGHT - LBS : ---  
 MATERIAL : ---

**SEAKEEPER**  
 Seakeeper Inc., 45310 Abell House Lane, Suite 350 California, MD 20619  
 DESCRIPTION:  
 SEAKEEPER 5-6 BOLT IN INSTALLATION DETAILS

DRAWING NO: 90398  
 REV NO: 8  
 SCALE: 1:8  
 SHEET NO: 5 OF 5