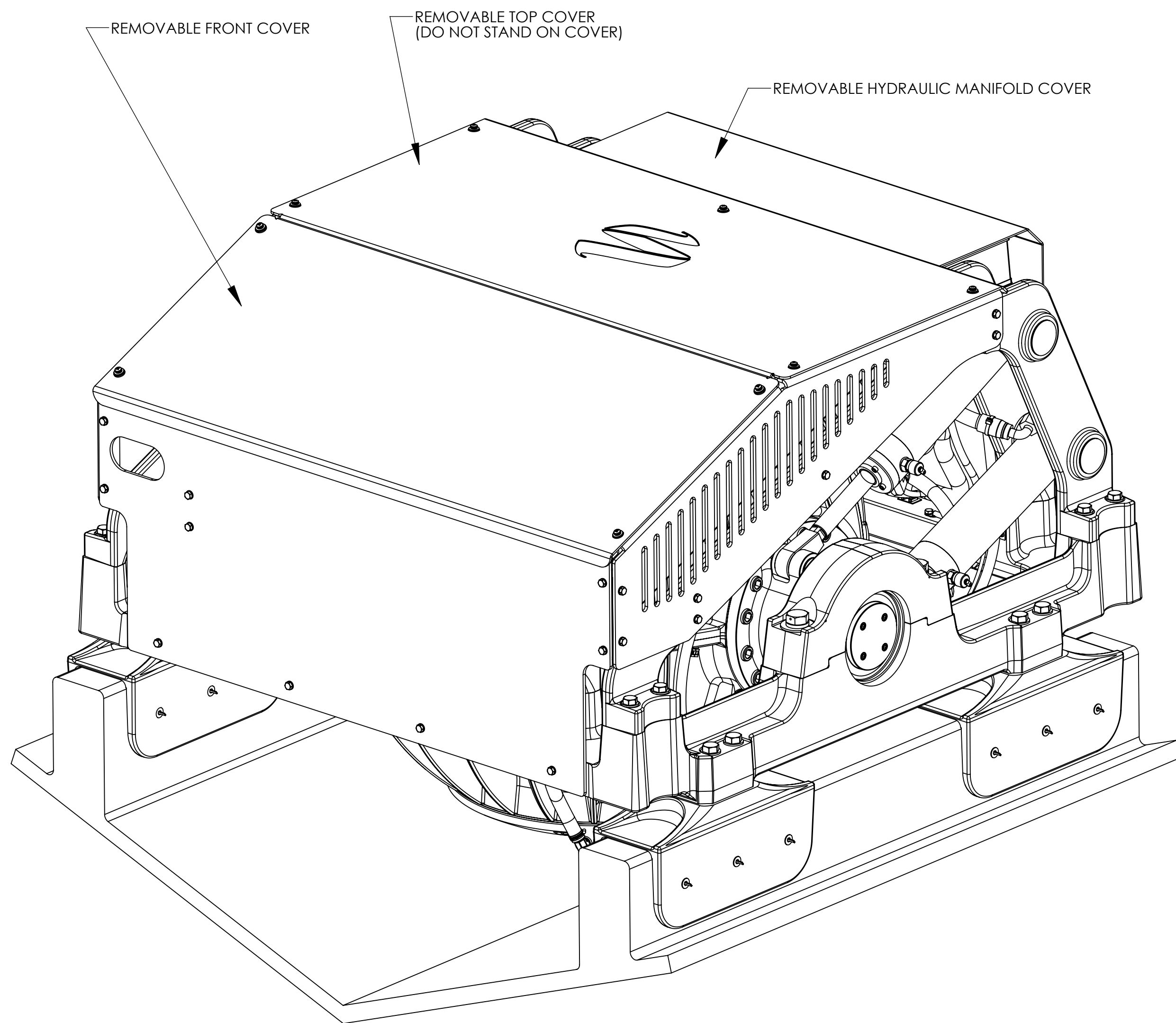


NOTES:

- 1) SEE REFERENCES 1 THROUGH 5 FOR RELATED INSTALLATION MANUAL AND ELECTRICAL / ELECTRONIC AND COOLING CIRCUIT DRAWINGS.
- 2) GYRO ASSEMBLY WEIGHT = 2,105 LBS. (955 Kg)
- 3) RAW WATER COOLING REQUIREMENT IS 15 LPM (4 GPM) MINIMUM AND 30 LPM (8 GPM) MAXIMUM CONTINUOUS FLOW. PROVIDED CONNECTIONS ARE 19mm (3/4" INCH) HOSE BARB. USE OF RAW WATER STRAINER IS REQUIRED.
- 4) TWO LIFTING EYES 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.
- 7) ADHESIVE INJECTION HOLES ARE PROVIDED AS A SECONDARY MEANS TO ADD ADHESIVE IN AREAS THAT ARE LACKING ADHESIVE BETWEEN THE SADDLE SIDES AND HULL STRUCTURE. THE INJECTION PROCESS IS ONLY USED TO RECOVER FROM INADEQUATE OR UN-EVEN ADHESIVE APPLICATION. REFER TO INSTALLATION MANUAL FOR ADHESIVE INSTALLATION PROCEDURE. NO FASTENERS ARE TO BE USED IN THE INJECTION HOLES.
- 8) 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. THE BOND-IN ADAPTOR SADDLES USED IN THIS INSTALLATION APPLICATION, MUST BE ORIENTED SO THAT EACH LEFT AND RIGHT SIDE SADDLE OFFSETS TO THE REAR OF THE GYRO UNIT.
- 9) WHEN INSTALLING GYRO SEAKEEPER RECOMMENDS USING A SADDLE LOCATION FIXTURE # 90282 AVAILABLE FROM SEAKEEPER. THIS FIXTURE WILL PROPERLY SPACE AND ALIGN SADDLES FOR THE BONDING PROCESS. SEE REFERENCE 5 FOR DETAILS OF INSTALLATION PROCESS.



REF.	DWG. NO.	DWG. TITLE
1	90305	SEAKEEPER 16 GYRO COOLING WATER SCHEMATIC
2	90306	SEAKEEPER 16 GYRO CABLE BLOCK DIAGRAM
3	90337	OPERATOR DISPLAY ENVELOPE & MOUNTING DETAILS
4	90282	SEAKEEPER 16 GYRO INSTALLATION FIXTURE KIT
5	90308	SEAKEEPER 16 GYRO INSTALLATION MANUAL
6	90262	SEAKEEPER 16 BOND-IN INSTALLATION KIT

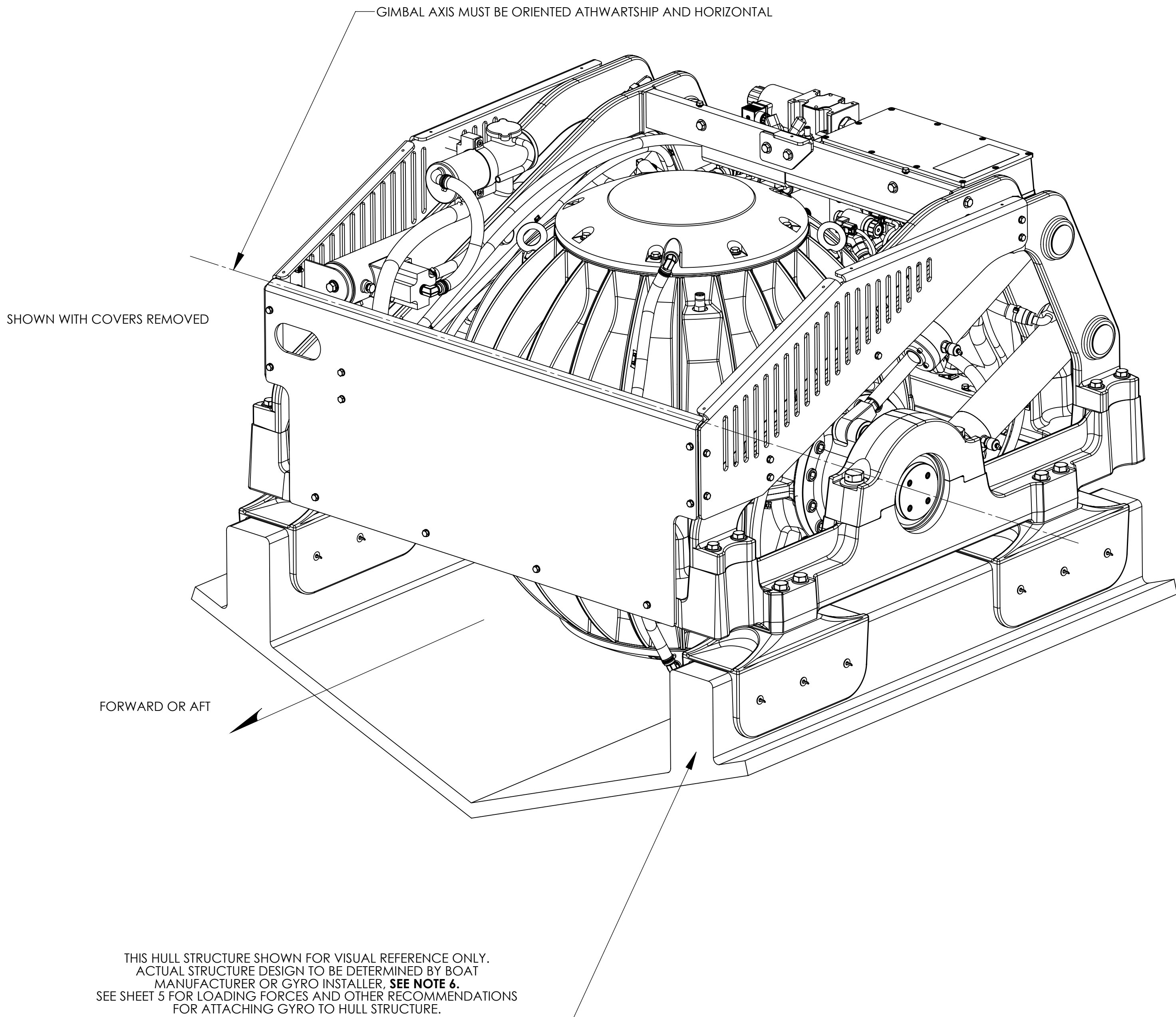
**SHEET 2 - GYRO FOUNDATION DIMENSIONS.**


**SHEET 3 - RECOMMENDED CLEARANCES TO HULL STRUCTURE.**

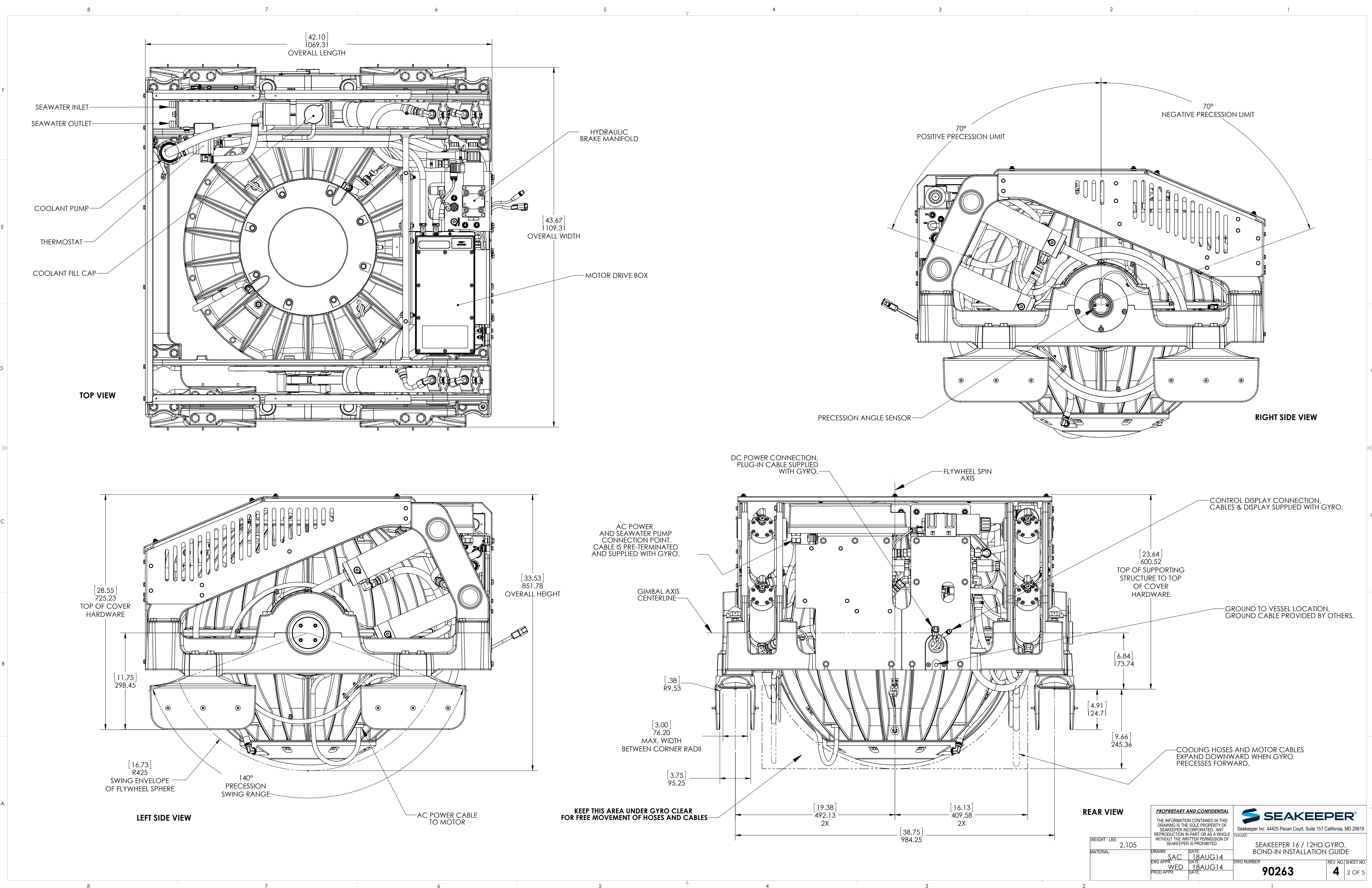
**SHEET 4 - RECOMMENDED LIFTING POINTS.**

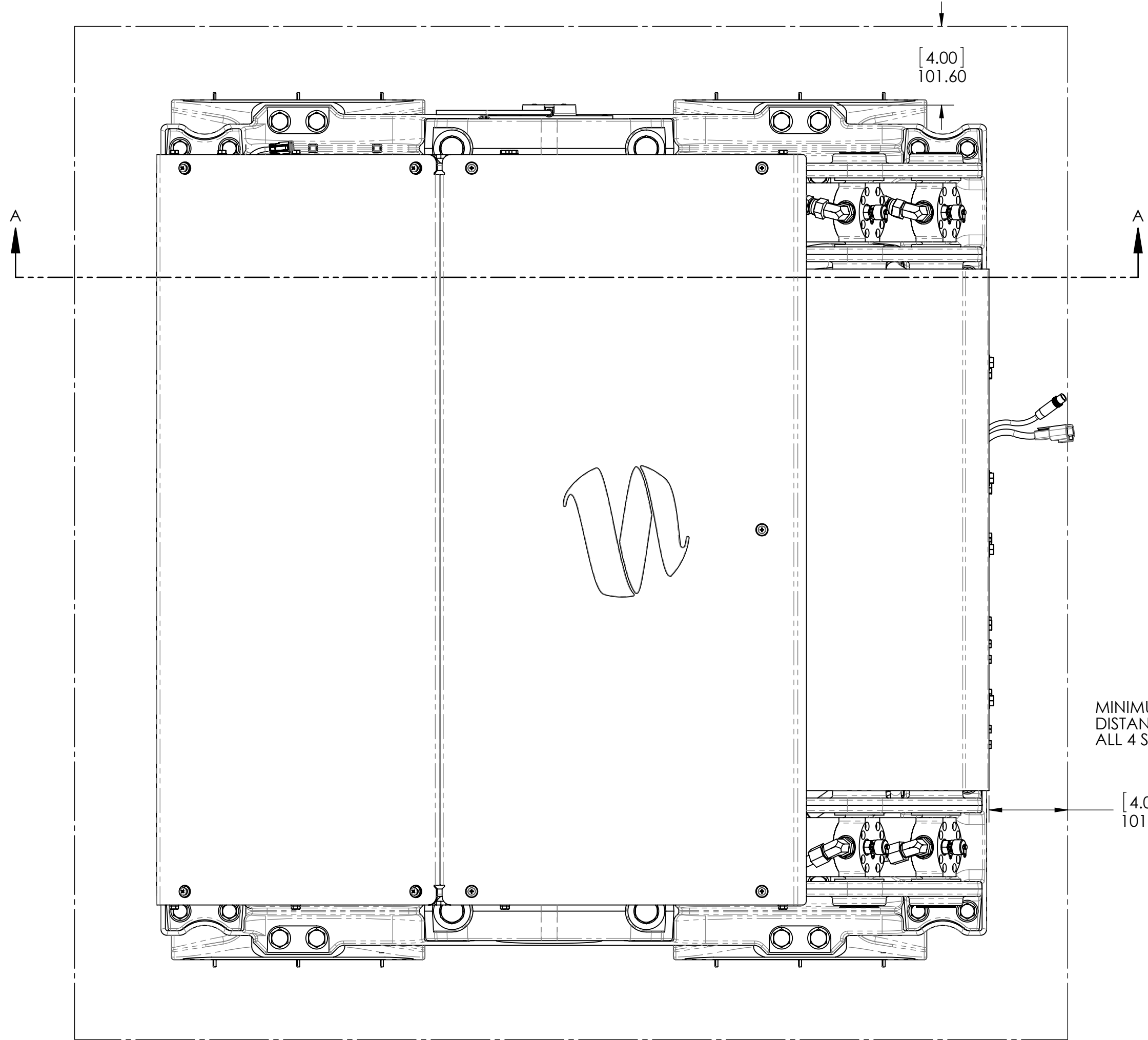
**SHEET 5 - GYRO LOADS FOR HULL STRUCTURE DESIGN.**

REV NO.	ECN NO.	ZONE	DESCRIPTION	DATE	APPRVD
1	0178		RELEASED FOR PUBLICATION	8/18/2014	WED
2	0272	SHT 2	REVISED REAR VIEW ON SHEET 2, RE-DIMENSIONED HOSE CLEARANCE AREA	1/28/2015	RSK
3	0324		SEAKEEPER REBRANDING CHANGE, SADDLE BONDING AREA REVISED, SEE NOTES ON SHEET 5	6/2/2015	SAC
4	0467		ADDED 12HD TO TITLE BLOCK.	11/23/2016	BRD



		<p align="center"><b><u>PROPRIETARY AND CONFIDENTIAL</u></b></p> <p>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.</p>		 <p><b>SEAKEEPER®</b></p> <p>Seakeeper Inc. 44425 Pecan Court, Suite 151 California, MD 20619</p>	
WEIGHT - LBS : 2,105		NAME:		SEAKEEPER 16 / 12HD GYRO, BOND-IN INSTALLATION GUIDE	
MATERIAL:		DRAWN: <u>SAC</u> ENG APPR: <u>DATE: AUG 14</u> PROD APPR: <u>WED 18 AUG 14</u> DATE:		DWG NUMBER <b>90263</b> REV. NO. <b>4</b> SHEET NO. <b>1</b> OF <b>5</b>	





MINIMUM RECOMMENDED  
DISTANCE FOR TOOL CLEARANCE  
ALL 4 SIDES.

[4.00]  
101.60

SECTION A-A

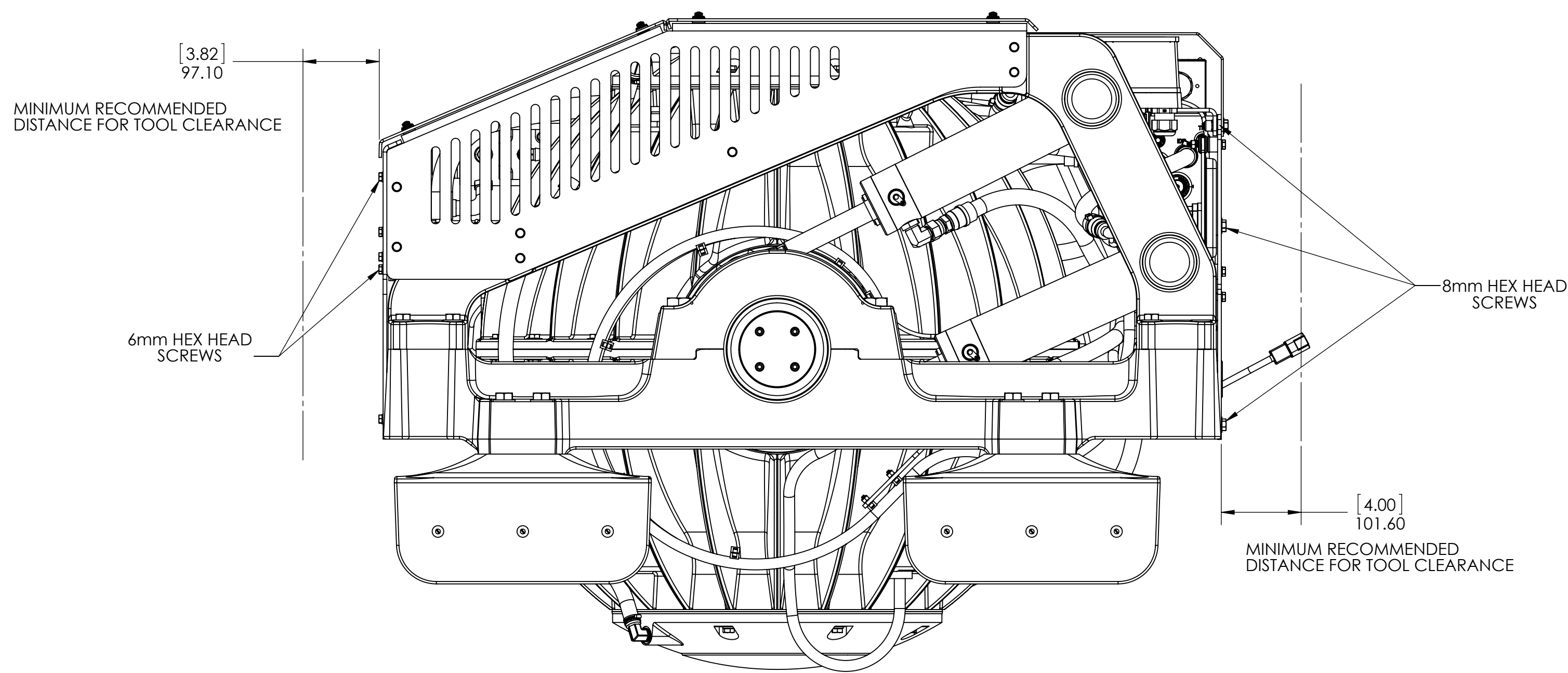
HULL STRUCTURE  
SIMULATION  
FOR REFERENCE ONLY

[1.00]  
25.41

MINIMUM RECOMMENDED  
DISTANCE FROM GYRO FRAME  
TO ANY TRANSVERSE BEAM

[1.00]  
25.40

MINIMUM RECOMMENDED  
DISTANCE FROM GYRO FRAME  
TO ANY TRANSVERSE BEAM



MINIMUM RECOMMENDED  
DISTANCE FOR TOOL CLEARANCE

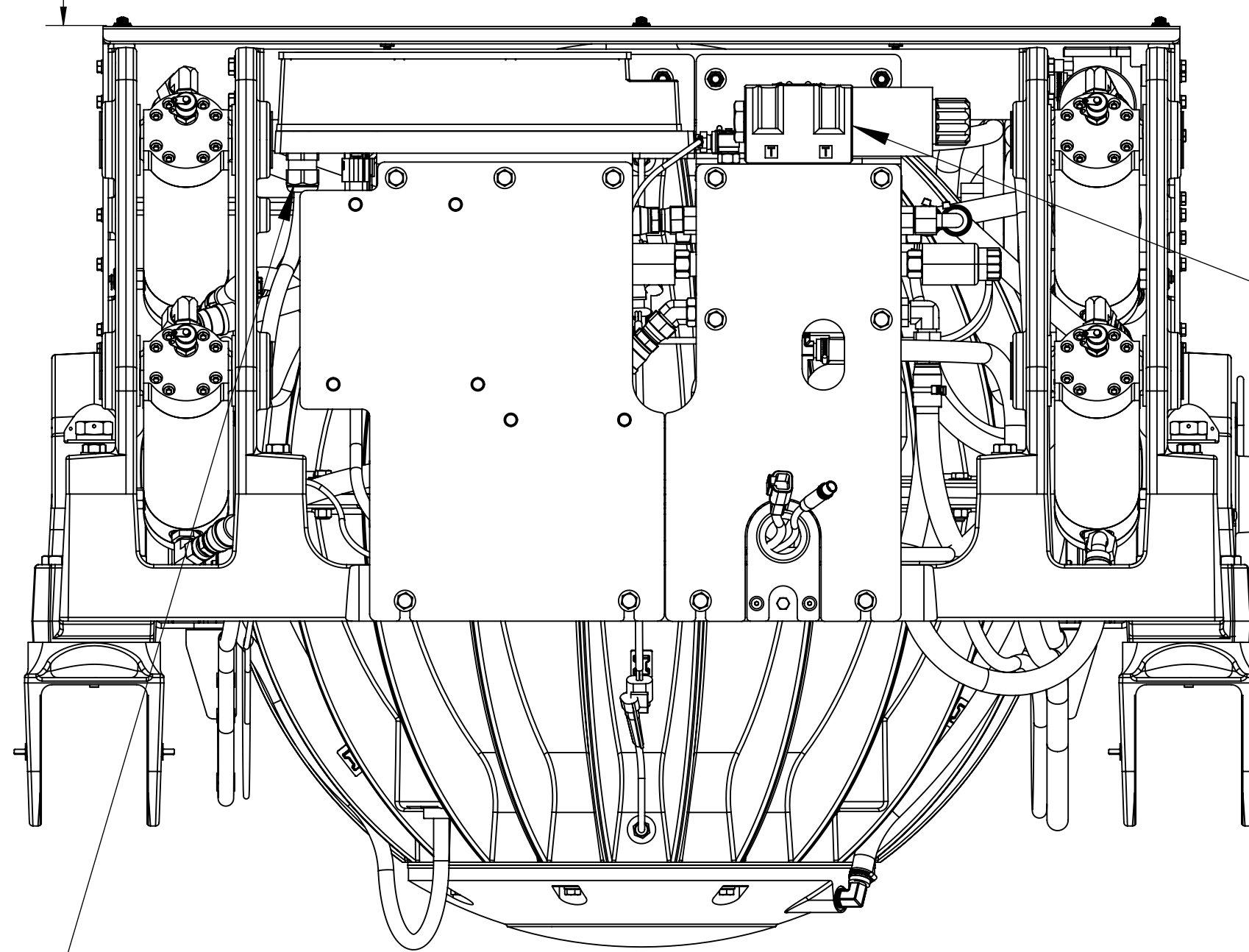
6mm HEX HEAD  
SCREWS

8mm HEX HEAD  
SCREWS

MINIMUM RECOMMENDED  
DISTANCE FOR TOOL CLEARANCE

[4.00]  
101.60

[3.00]  
76.20 RECOMMENDED MINIMUM CLEARANCE ABOVE GYRO  
FOR REMOVAL OF COVER

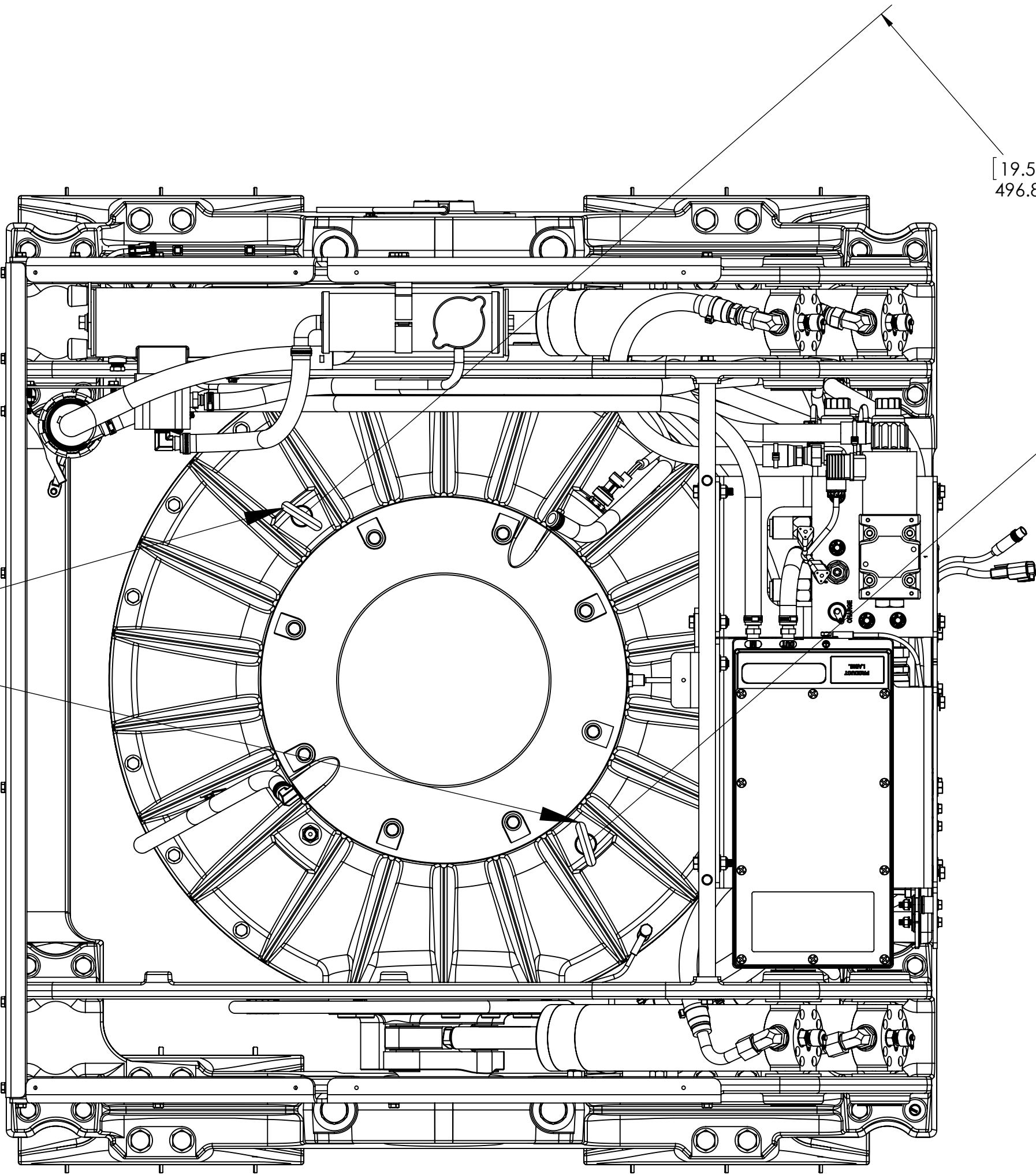


HYDRAULIC BRAKE MANIFOLD  
MUST BE ACCESSIBLE  
(REAR UTILITY COVER SHOWN REMOVED)

AC POWER AND SEAWATER PUMP  
CABLE CONNECTION

VIEWS SHOWING RECOMMENDED CLEARANCE AROUND GYRO  
FOR USE OF HAND TOOLS, EASE OF MAINTENANCE, INSTALLATION  
AND PROPER OPERATION.

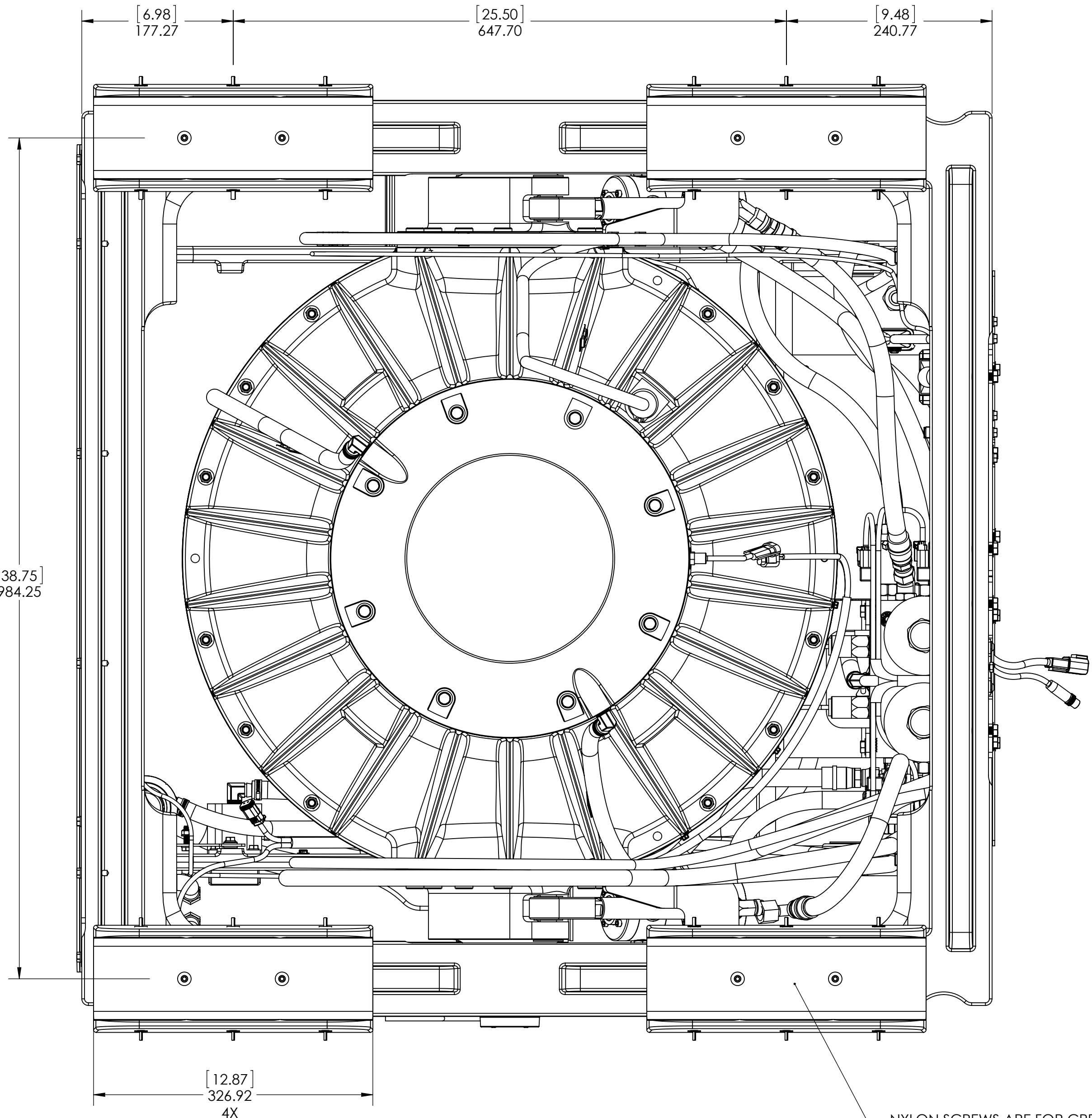
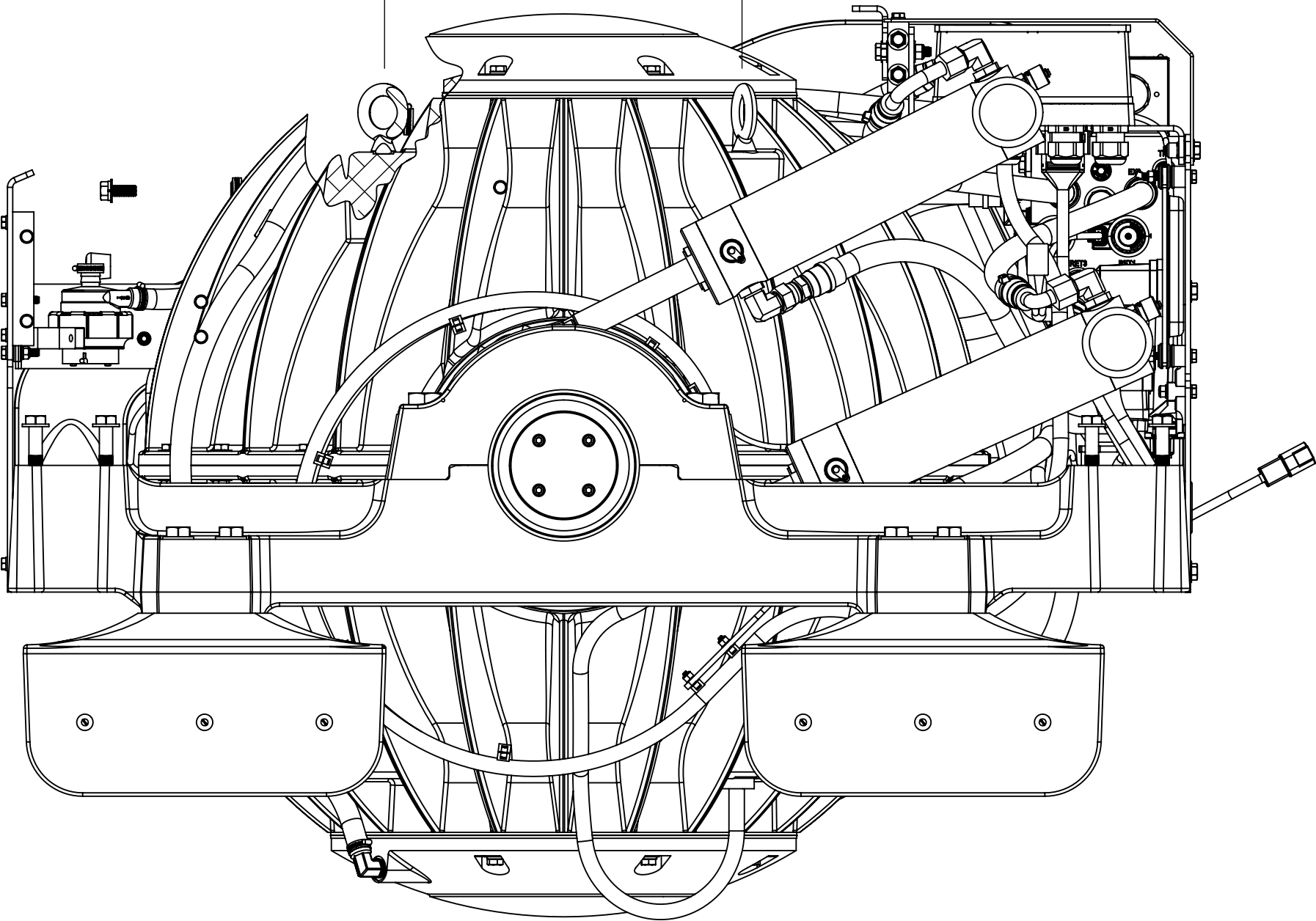
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WEIGHT - LBS : 2,105	DRAWN : SAC	DATE : 18AUG14	NAME : SEAKEEPER 16 / 12HD GYRO, BOND-IN INSTALLATION GUIDE
MATERIAL :	ENG APPR : WED	DATE : 18AUG14	DWG NUMBER : 90263
PROD APPR :	DATE :		REV. NO.   SHEET NO. 4   3 OF 5



LIFTING POINTS  
(2)

**CAUTION :** ALWAYS USE A MINIMUM OF (2) LIFTING POINTS,  
NEVER LIFT GYRO FROM ONLY 1 LIFT POINT.

LIFT VERTICALLY USING  
A SPREADER BAR OR SIMILAR  
ARRANGEMENT



NYLON SCREWS ARE FOR CREATING A SPACE  
FOR BONDING ADHESIVE BETWEEN TOP SURFACE  
OF HULL STRUCTURE AND SADDLE CASTING.

SCALE 1 : 4

**BOTTOM VIEW**

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SEAKEEPER 16 / 12HD GYRO,  
BOND-IN INSTALLATION GUIDE

DWG NUMBER  
**90263**

REV. NO. | SHEET NO.  
**4** | 4 OF 5

WEIGHT - LBS :  
**2,105**

MATERIAL:

DRAWN: **SAC** DATE: **18AUG14**

ENG APPR: **WED** DATE: **18AUG14**

PROD APPR: DATE:

### GYRO LOADS FOR HULL STRUCTURE DESIGN :

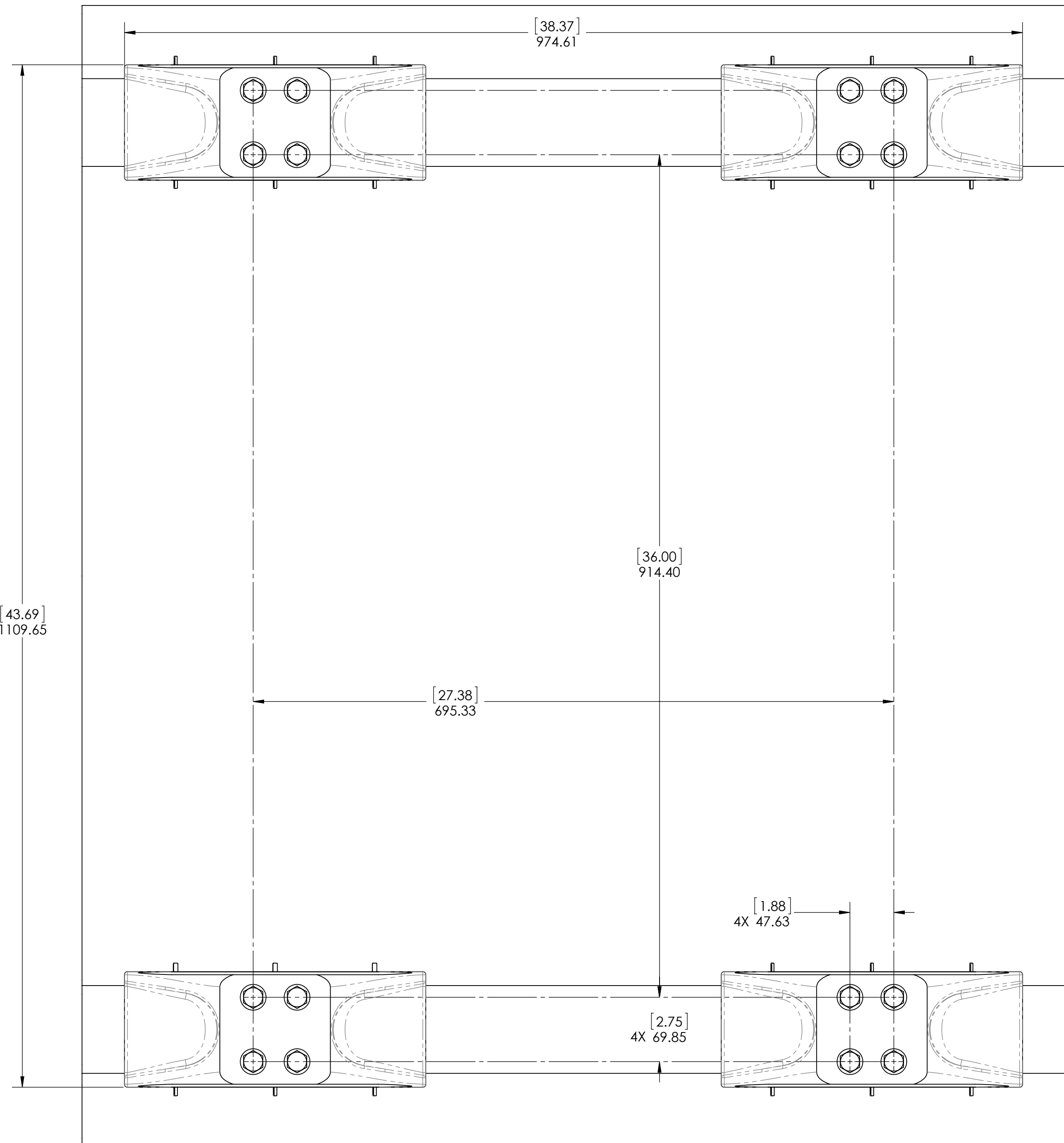
- (1) GYRO IS MOUNTED IN A FOUNDATION FRAME WHICH IS BOLTED TO FOUR SADDLE FITTINGS MADE OF A356-T6 CAST ALUMINUM. THE GYRO FRAME INCORPORATES SEMI-ELASTIC ANTI-VIBRATION ISOLATORS ENCASEING THE GIMBAL BEARINGS THAT DAMPEN VIBRATIONS THAT COULD TRANSMIT INTO THE HULL STRUCTURE. THE SADDLES ARE DESIGNED TO BE PERMANENTLY ATTACHED TO LONGITUDINAL GRP HULL BEAMS WITH A STRUCTURAL ADHESIVE. THIS MOUNTING ARRANGEMENT DISTRIBUTES THE CYCLIC, FULLY REVERSING FORCES AND MOMENTS GENERATED BY THE GYRO OVER A LARGE SURFACE AREA. THE BONDED IN SADDLES ARE **NOT** DESIGNED TO BE BOLTED TO THE HULL STRUCTURE AND THIS METHOD OF ATTACHMENT SHOULD NEVER BE ATTEMPTED WITHOUT CONSULTATION WITH SEAKEEPER INC.
- (2) 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 SADDLE FITTINGS. 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) = 5,450 LBS. (24.24 kN) - **(APPLIED AT EACH OF THE 4 MOUNTING POINTS.)**  
 LONGITUDINAL FORCE (Fx) = 2,999 LBS. (13.34 kN) - **(APPLIED AT EACH OF THE 4 MOUNTING POINTS.)**  
 LATERAL FORCE (Fy) = 500 lbs. (2.22 kN) - **(APPLIED AT EACH OF THE 4 MOUNTING POINTS.)**

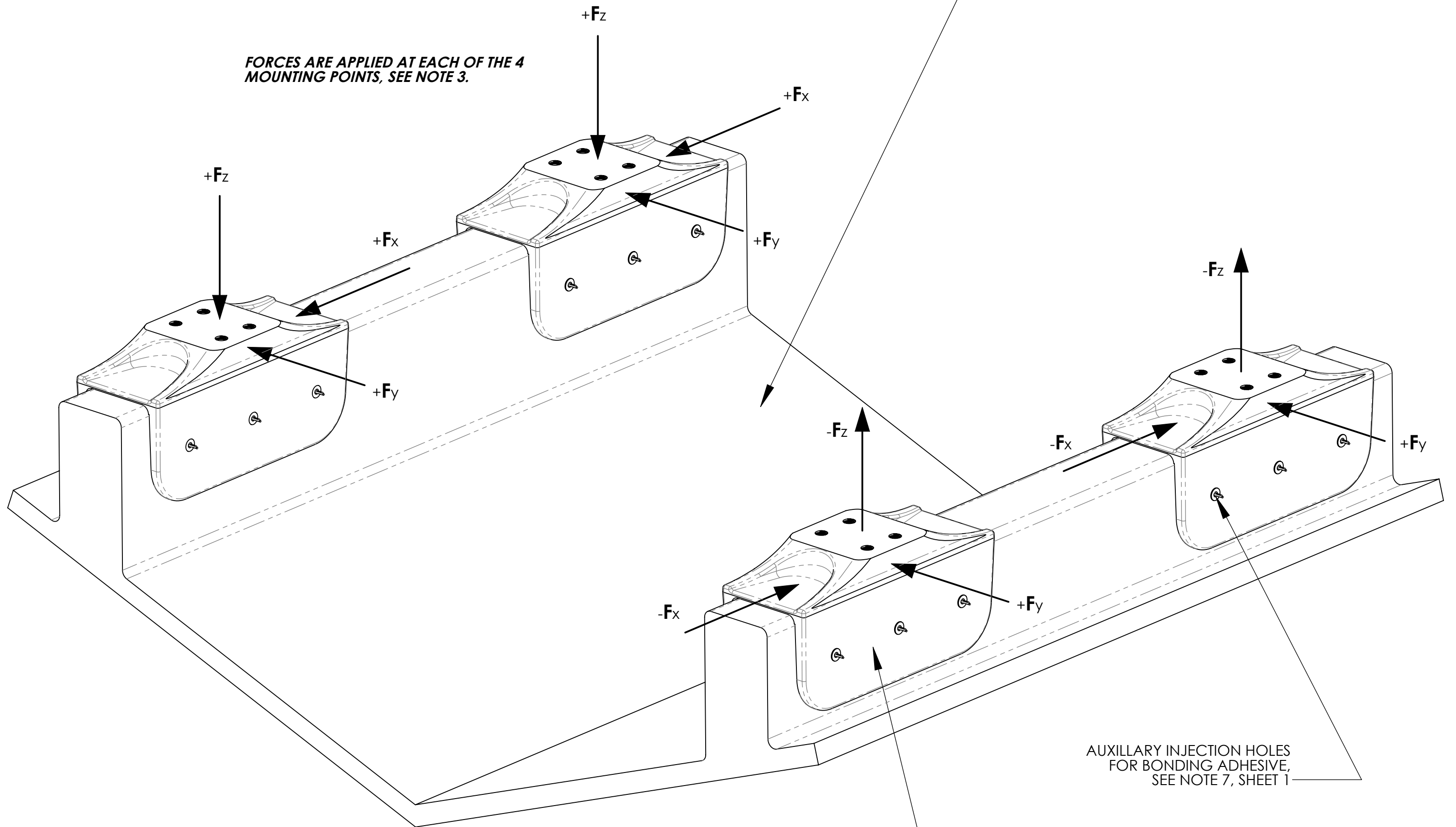
THESE FORCES SHOULD BE CONSIDERED TO BE ACTING SIMULTANEOUSLY, FULLY REVERSING IN BOTH DIRECTIONS, AND WILL REPEAT AN INFINITE NUMBER OF TIMES.

- (3) 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)


- (4) THE BOAT BUILDER OR GYRO INSTALLER IS ALSO FULLY RESPONSIBLE FOR SELECTING THE STRUCTURAL ADHESIVE TO SECURE THE ALUMINUM SADDLE FITTINGS TO THE GRP HULL BEAMS. SEAKEEPER RECOMMENDS THAT THE BUILDER OR INSTALLER USE A STRUCTURAL ADHESIVE WITH A MINIMUM SHEAR STRENGTH OF 13.8 MPa (2000 psi). ADDITIONALLY IT IS STRONGLY SUGGESTED THAT THE BUILDER OR INSTALLER TEST THE COMPATIBILITY OF THE SELECTED ADHESIVE WITH THE 356 T6 ALUMINUM AND PLANNED HULL MATERIALS BY PERFORMING MECHANICAL PROPERTIES TESTING TO AID IN DETERMINING THE QUANTITY OF ADHESIVE REQUIRED, THE INTERIOR SURFACE AREA (BONDING SURFACES) OF EACH SADDLE FITTING IS 1.058 SQ. CM. (164 SQ. IN.) TOTAL BONDED SURFACE AREA FOR ALL 4 SADDLES = 4.232 SQ. CM. (656 SQ.IN.)



SHOWN FOR REFERENCE ONLY, ACTUAL STRUCTURE DESIGN TO BE  
DETERMINED BY BOAT MANUFACTURER OR GYRO INSTALLER.  
**SUPPORT STRUCTURE MUST BE PARALLEL WITH WATERLINE.**  
SEE NOTE 4



BUDDER/INSTALLER IS TO INSTALL 4 SADDLE FITTINGS USING STRUCTURAL ADHESIVE. SEAKEEPER RECOMMENDS USING AN INSTALLATION FIXTURE #90282 AVAILABLE FROM SEAKEEPER. TO MAINTAIN ALIGNMENT AND LOCATION OF SADDLES DURING THE BONDING PROCESS, AFTER ADHESIVE IS FULLY CURED, THE GYRO FRAME IS THEN FASTENED TO THE SADDLES USING THE HARDWARE INCLUDED WITH THE BOND IN SADDLE KIT #90262. M14-2.0 X 90mm LONG, ALLOY STEEL HEX HEAD CAP SCREWS, TORQUED TO 100 FT/LBS. [135.6 Nm] USE WITH THREAD LOCKING COMPOUND SUCH AS LOC-TITE #243, BLUE. SEE INSTALLATION MANUAL #90308 FOR DETAILS OF INSTALLATION PROCEDURE.

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