REVISIONS				
REV.	ZONE	DESCRIPTION	DATE	APPROVED
2		1. UPDATED VIEWS TO REFLECT CURRENT CONFIG. 2. ADDED NOTE 8.	17JULY08	BHS JDA
3		1. SHT 2 - ADDED TOOL CLEARANCE NOTES AND DIMENSIONS FOR CYLINDER REMOVAL FROM ROD-END AND AFT PORT HOSE REMOVAL FROM CYLINDERS. 2. SHT 4 - UPDATED CLEARANCE DIMENSION FOR MOTOR POWER CABLE WHEN PRECESSED +60°.	01DEC08	BHS JDA

NOTES:

1) SEE SEAKEEPER MODEL 7000 GYRO SPECIFICATION FOR TECHNICAL DETAILS.

2) MOTOR DRIVE AND CONTROL JUNCTION BOXES AND ASSOCIATED CABLES NOT SHOWN FOR CLARITY.

3) GYRO WILL BE SHIPPED WITH A TEMPORARY FORWARD BRACE THAT WILL MAINTAIN REQUIRED ALIGNMENT OF FOUNDATION UNTIL IT HAS BEEN BONDED TO VESSEL STRUCTURE. ONCE THE FOUNDATION ADHESIVE HAS CURED, THE FORWARD BRACE CAN BE REMOVED AND DISCARDED.

4) SEE REFERENCES 1 THROUGH 8 FOR RELATED ELECTRICAL / ELECTRONICS AND COOLING CIRCUIT DRAWINGS.

5) GYRO ASSEMBLY WEIGHT = 430 kg (948 lbs.)

6) RAW WATER COOLING REQUIREMENT IS 8 LITRES/MIN. CONTINUOUS FLOW. PROVIDED CONNECTIONS ARE 1/2" HOSE BARB. USE OF RAW WATER STRAINER IS REQUIRED.

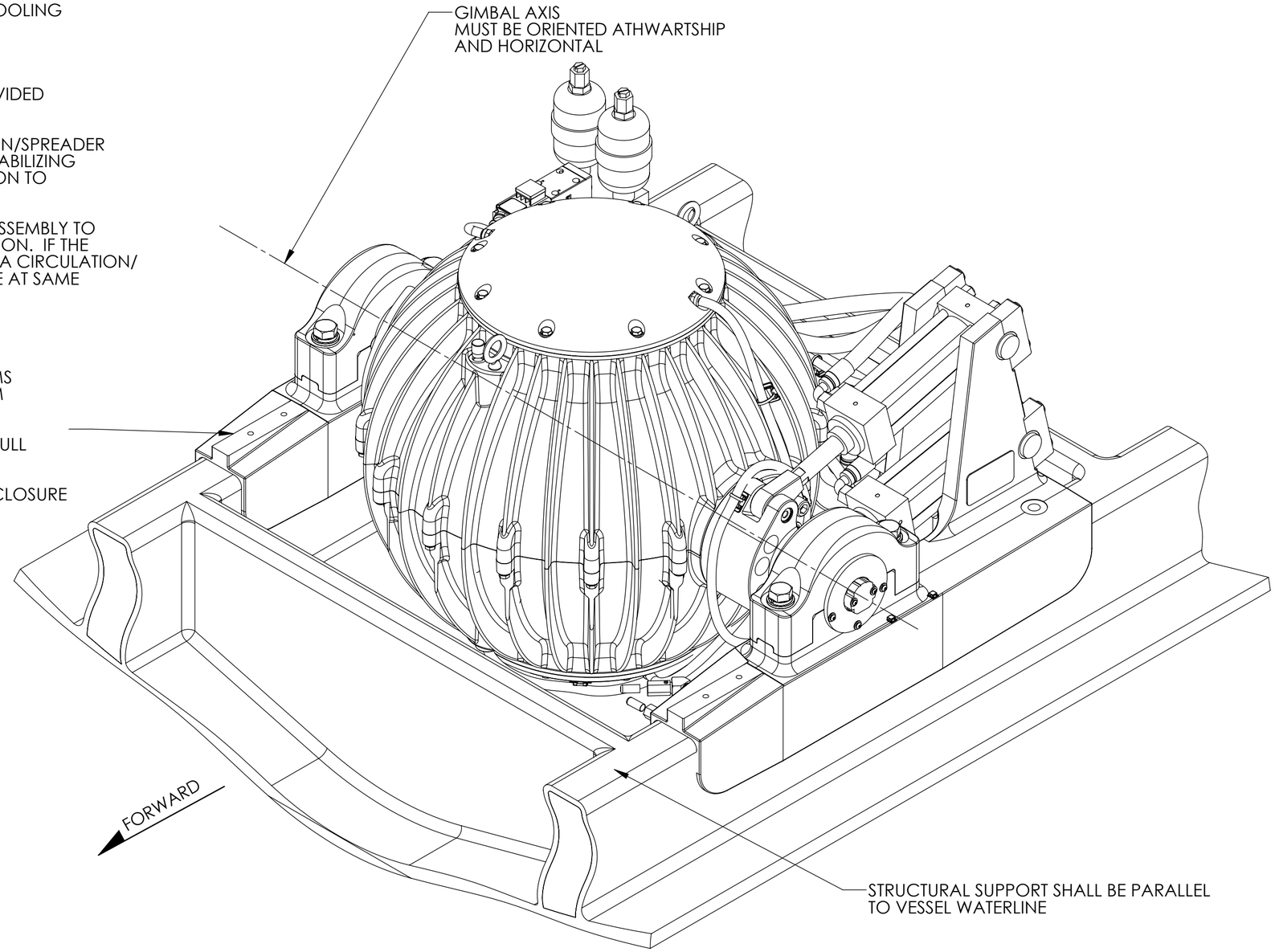
7) TWO LIFTING EYES ARE POVIDED ON THE TOP OF THE GYRO FOR USE WITH A CHAIN/SPREADER BAR (SEE SHEET 3). THE OFFSET CENTER OF GRAVITY LOCATION WILL REQUIRE A STABILIZING LINE BE ATTACHED BETWEEN THE SPREADER BAR AND THE TOP CYLINDER TRUNNION TO LEVEL THE GYRO.

8) IT IS RECOMMENDED THAT A SAFETY ENCLOSURE BE INSTALLED AROUND GYRO ASSEMBLY TO PREVENT PERSONNEL OR EQUIPMENT ENTANGLEMENT WHILE GYRO IS IN OPERATION. IF THE ENCLOSURE WILL ALSO SERVE TO DAMPEN SOUND BEING EMITTED FROM GYRO, A CIRCULATION/ EXCHANGE FAN IS RECOMMENDED TO MAINTAIN AIR INSIDE SOUND ENCLOSURE AT SAME TEMPERATURE AS COMPARTMENT IN WHICH GYRO IS INSTALLED.

ALUMINUM SADDLE BEAMS
TO BE BONDED TO BUILDER
PROVIDED GRP LONGITUDINAL BEAMS
SEE SHEET 2 FOR GYRO SADDLE BEAM
DIMENSIONAL TOLERANCES.

SEE SHEET 5 FOR GYRO LOADS FOR HULL FOUNDATION DESIGN.

SEE NOTE 8 FOR SAFETY / SOUND ENCLOSURE



REF	DWG NO.	TITLE
8	90009	MODEL 7000 GYRO OPERATOR DISPLAY ENVELOPE & MOUNTING DETAILS
7	90008	MODEL 7000 GYRO OPERATOR KEYPAD ENVELOPE & MOUNTING DETAILS
6	90010	MODEL 7000 GYRO NETWORK CONNECTION BOX ENVELOPE & MOUNTING DETAILS
5	90006	MODEL 7000 GYRO CONTROL J-BOX ENVELOPE & MOUNTING DETAILS
4	90007	MODEL 7000 GYRO MOTOR DRIVE J-BOX ENVELOPE & MOUNTING DETAILS
3	90011	ONE MODEL 7000 GYRO INTERCONNECT WIRING DIAGRAM
2	90005	ONE MODEL 7000 GYRO CABLE BLOCK DIAGRAM
1	90003	MODEL 7000 GYRO COOLING WATER SCHEMATIC

THIRD ANGLE PROJECTION

UNLESS OTHERWISE SPECIFIED:
DIMENSIONS ARE IN MILLIMETERS
TOLERANCES:
-TWO PLACE DECIMAL
-THREE PLACE DECIMAL
-ALL DIAMETERS RUNOUT TO DATUM SURFACES
-ALL FACES PERPENDICULAR TO DATUM SURFACES
-ALL EDGE BREAKS
-ALL FILLET RADII

-SURFACE FINISH

DO NOT SCALE DRAWING

	NAME	DATE
DRAWN	BHS	14JAN08
CHECKED	JDA	03FEB08
QLTY APPR.	WED	03FEB08
ENG APPR.	JDA	03FEB08

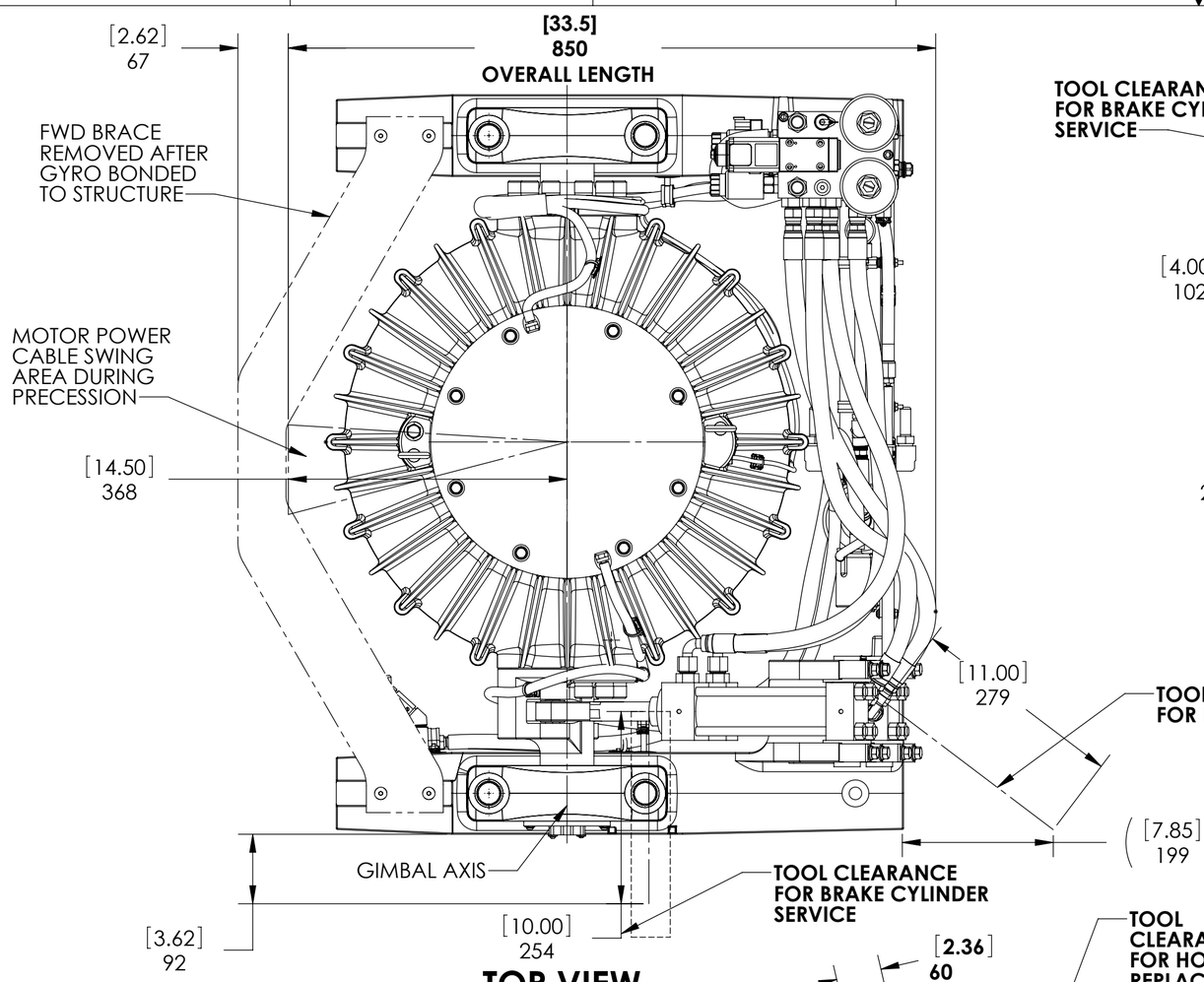
COMMENTS:

SEAKEEPER™
P.O. BOX 999
SOLOMONS, MARYLAND 20688, USA
PHONE: (410) 326-1590 FAX: (410) 326-1199

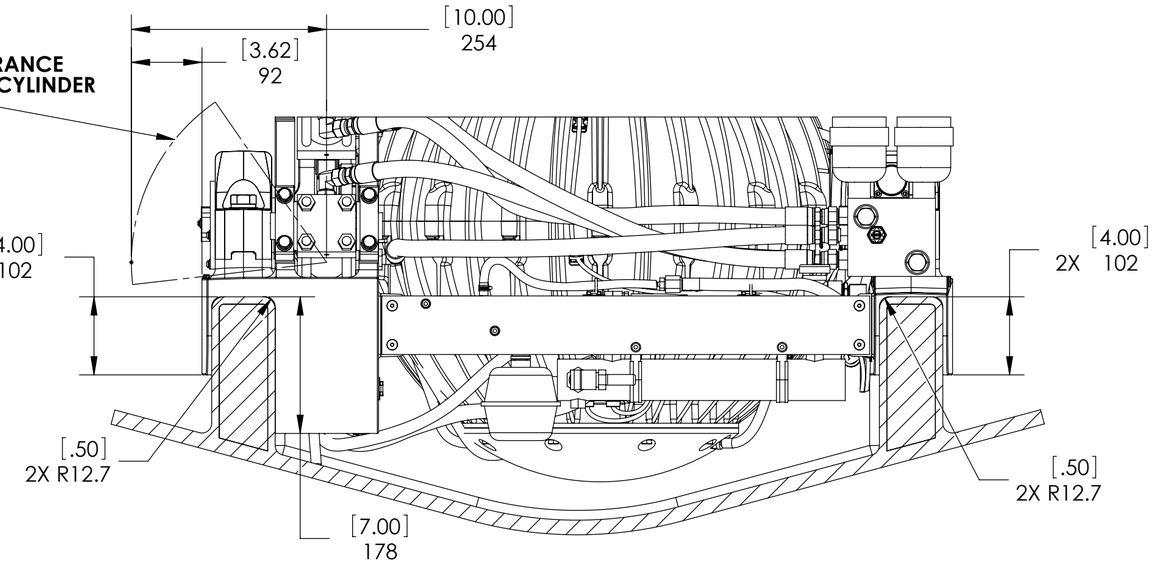
TITLE:
MODEL 7000 GYRO INSTALLATION DETAILS

SIZE	DWG. NO.	REV
C	90002	3

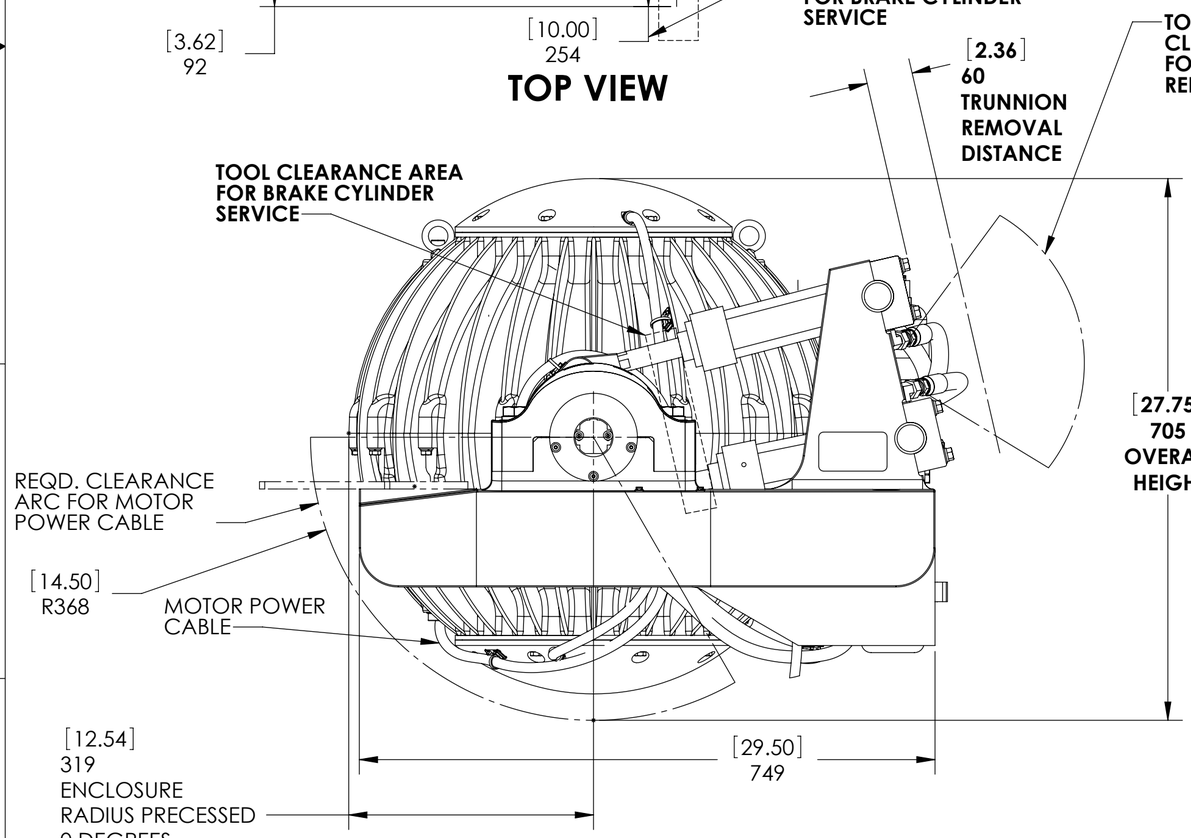
SCALE: | WEIGHT: | SHEET 1 OF 5



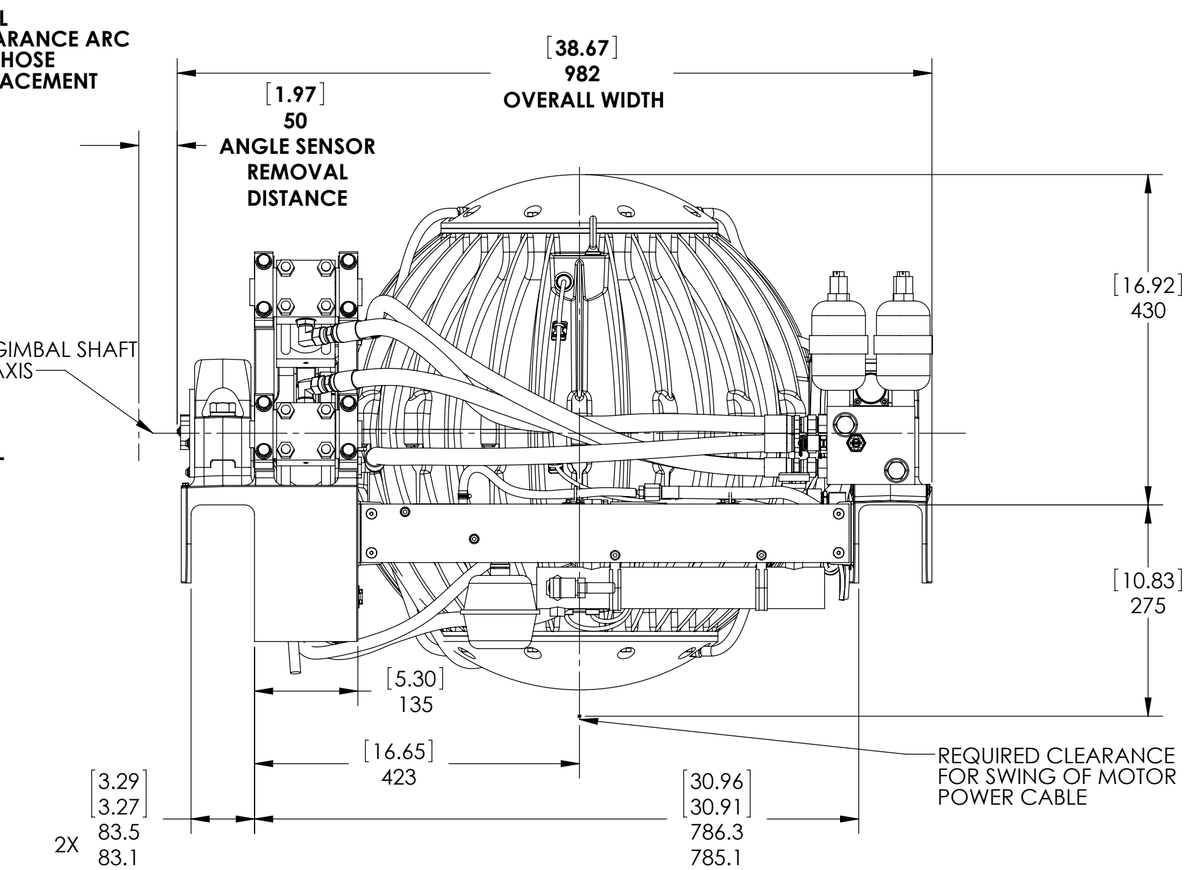
TOP VIEW



AFT VIEW WITH NOTIONAL HULL STRUCTURE

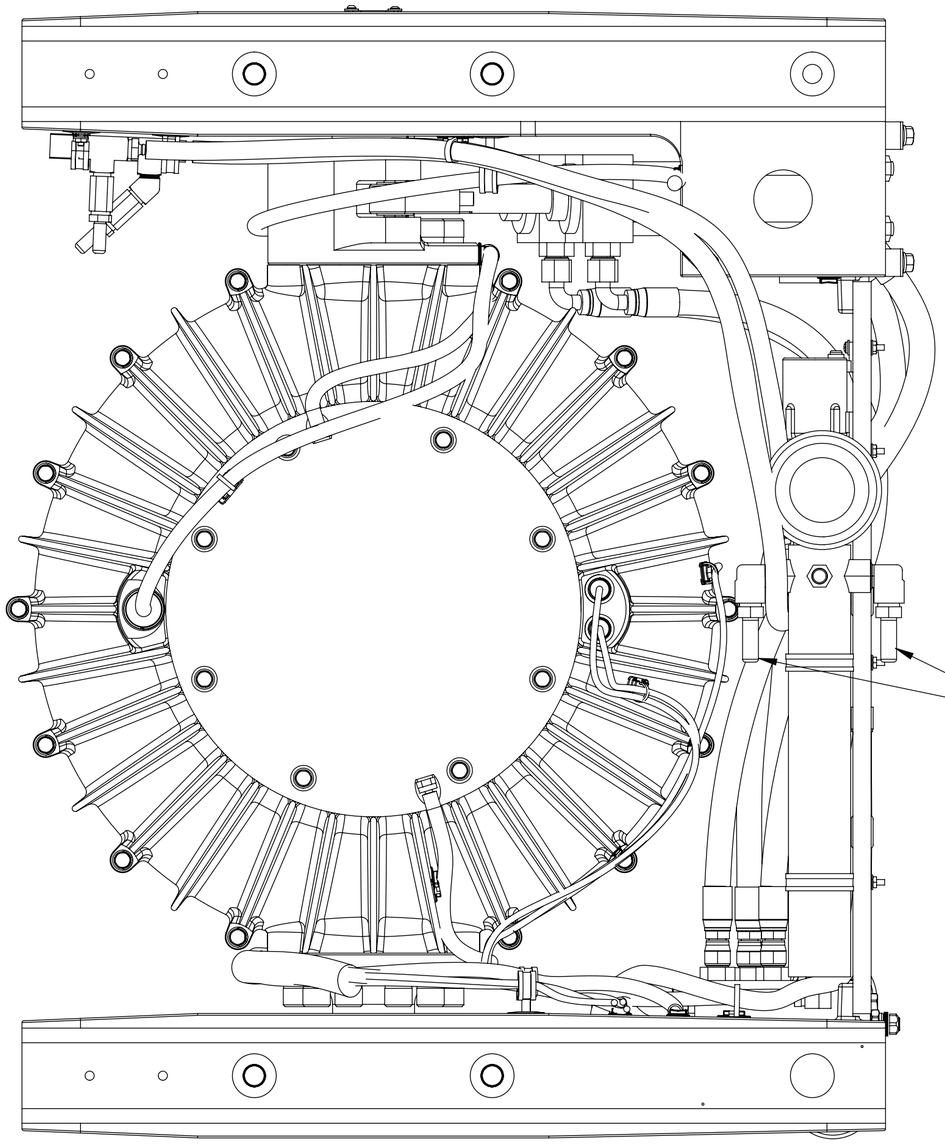


PORT SIDE VIEW

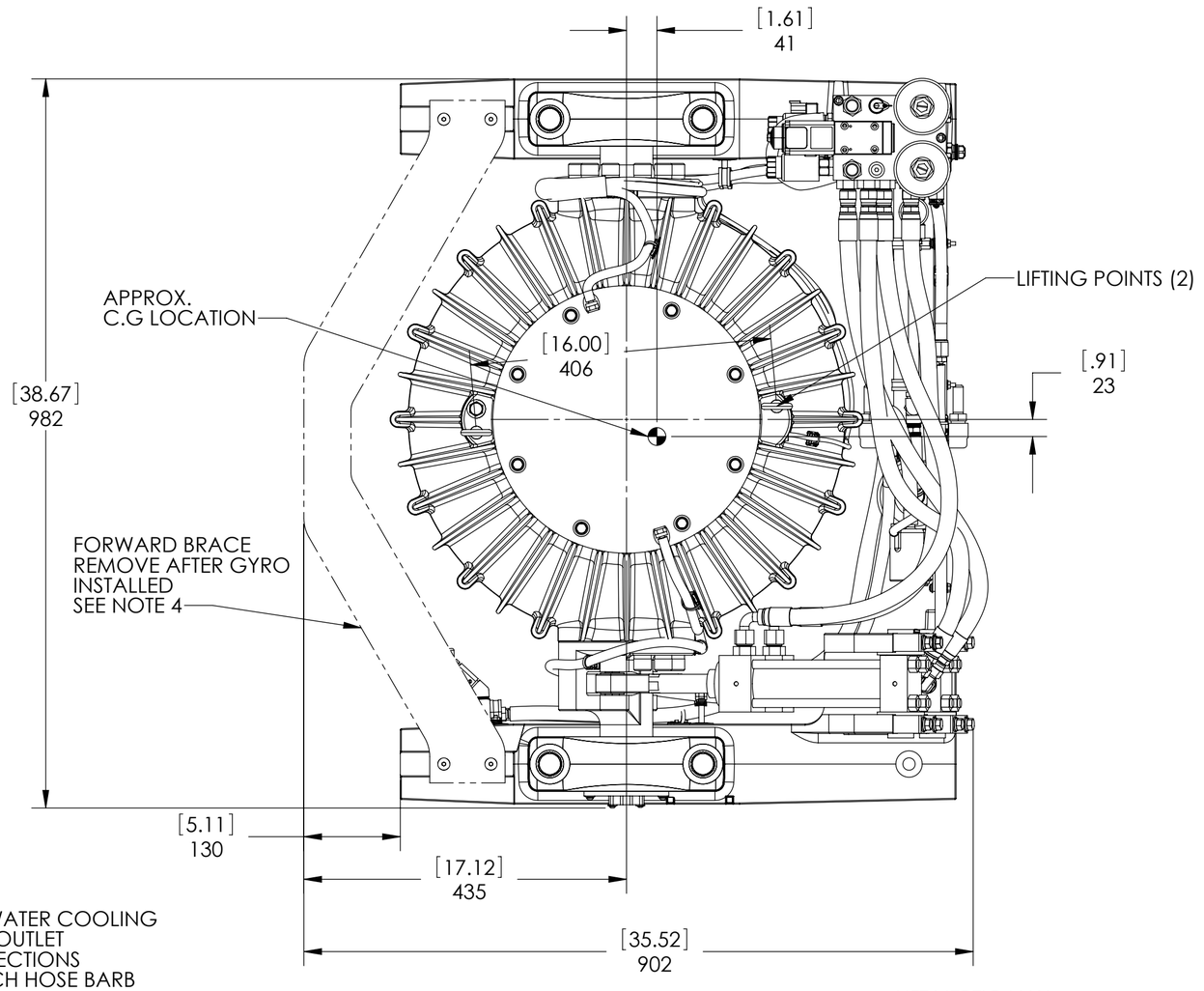


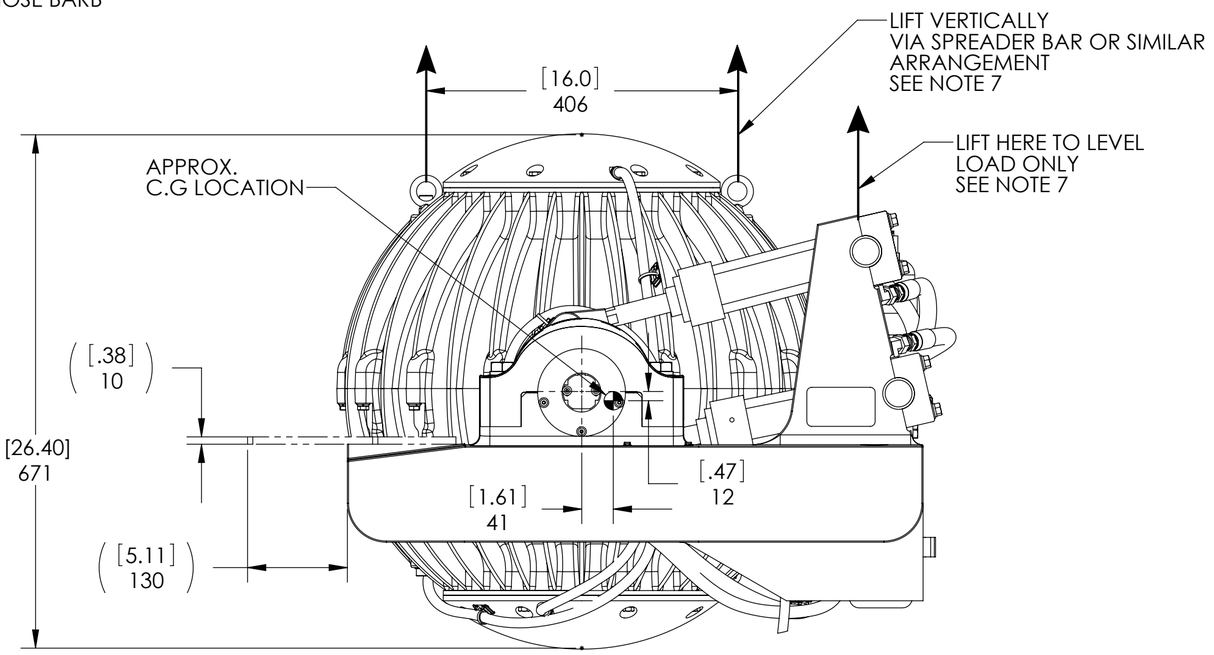
AFT VIEW

SIZE	DWG. NO.	REV
C	90002	3
SCALE: 1:10	WEIGHT:	SHEET 2



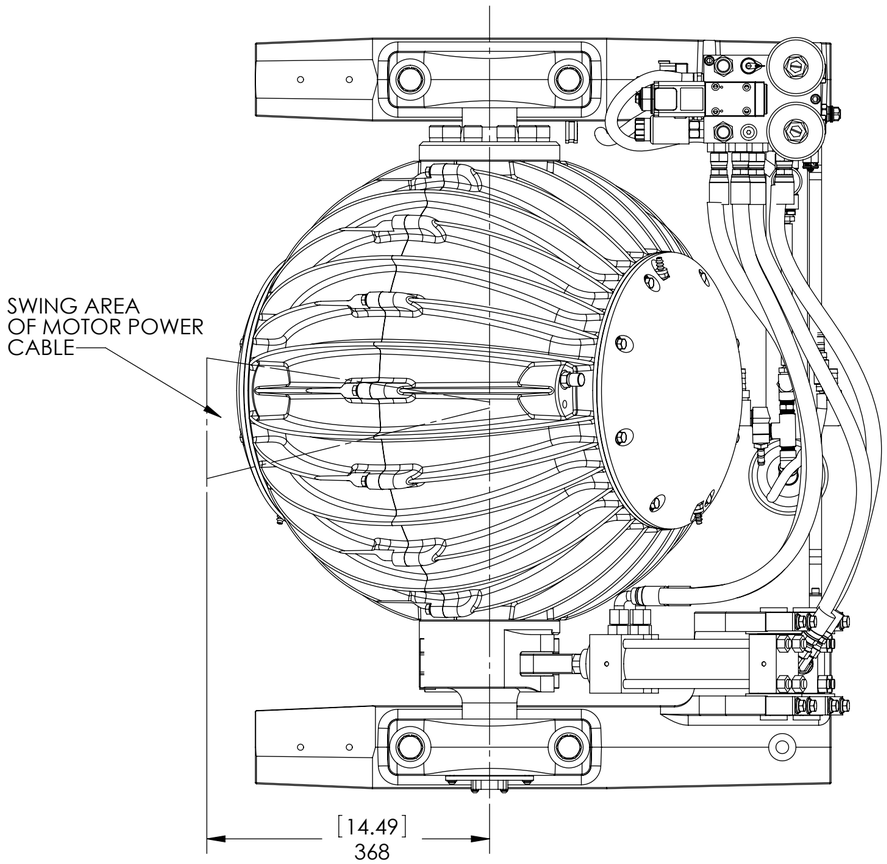
BOTTOM VIEW



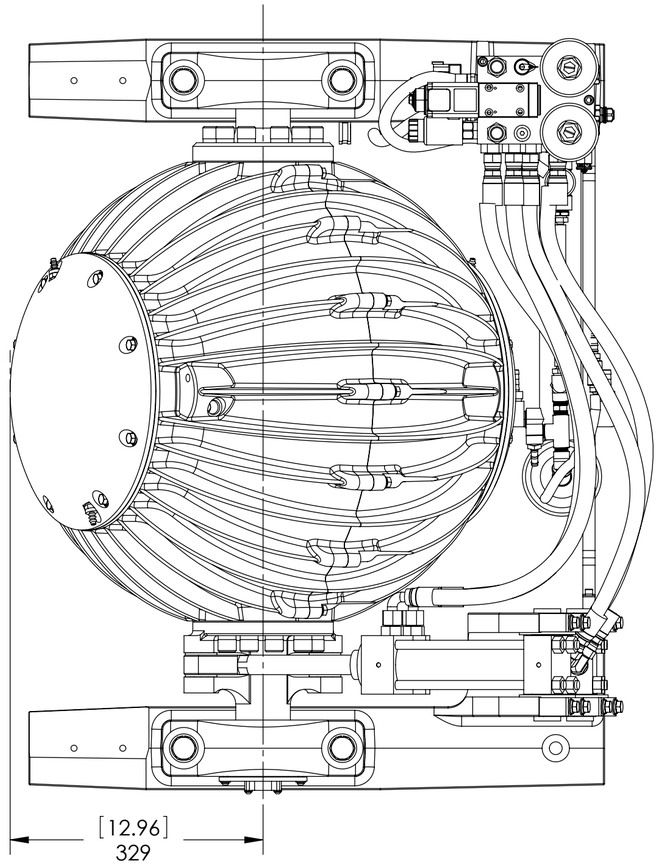


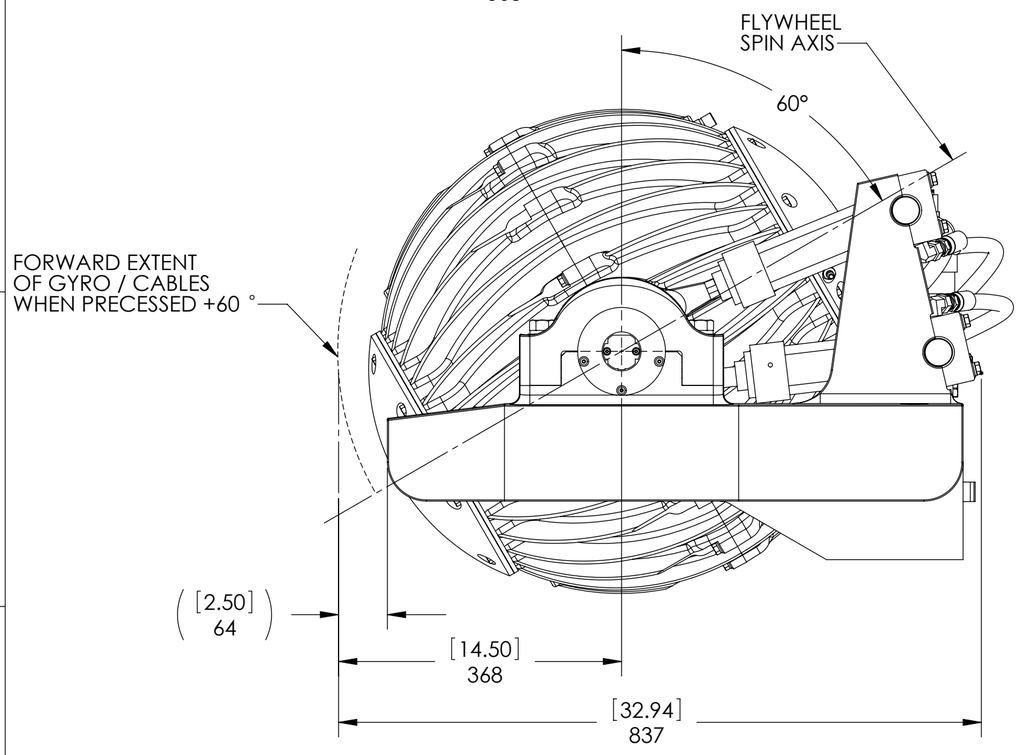
GYRO WITH TEMPORARY SHIPPING / INSTALLATION BRACE

SIZE	DWG. NO.	REV
C	90002	3
SCALE: 1:10	WEIGHT:	SHEET 3

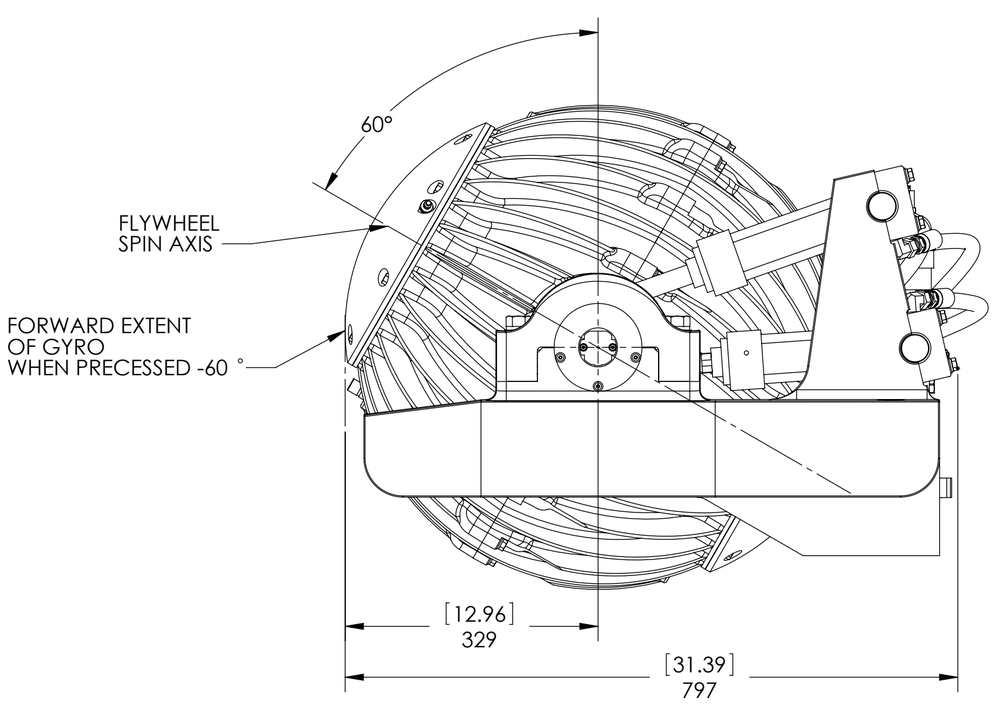


FLYWHEEL





GYRO SHOWN PRECESSED TO POSITIVE LIMIT (+60 °)



GYRO SHOWN PRECESSED TO NEGATIVE LIMIT (-60 °)

SIZE	DWG. NO.	REV
C	90002	3
SCALE: 1:10	WEIGHT:	SHEET 4

GYRO LOADS FOR STRUCTURAL DESIGN:

The Gyro is mounted in two gimbal bearings each of which is supported by an aluminum saddle beam made of A356-T6 cast aluminum. 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 unit is **not** designed to be bolted to the hull structure and this method of attachment should never be attempted without consultation with Seakeeper.

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 saddle beam gimbal bearings and at the brake cylinder attachment points on the port saddle beam..

In order to simplify structural analysis of the hull foundation that supports the saddle beams, these latter forces and moments have been resolved into resultant forces and moments at a single point. Also, for simplicity, they have been reduced to a single force set, from examination of a large number of possible loading combinations. The reference point is the intersection of the gimbal axis and the centerline plane of the port beam. The resultant forces and moments at this point are illustrated on the adjacent figure and values to be used for foundation design are summarized below:

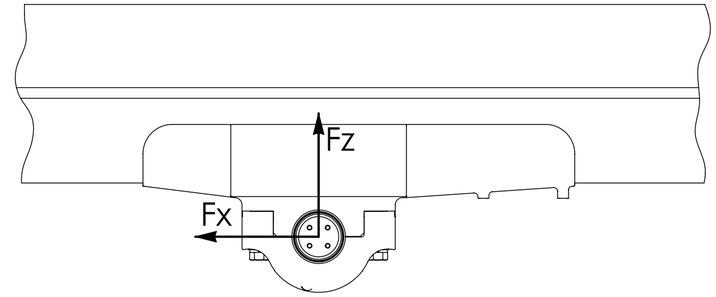
Pitch Moment (M) = 5.6 kN - M [4100 Ft-Lb]
Yaw Moment (N) = 1.2 kN - M [900 Ft-Lb]
Vertical Force (Fz) = 23.5kN [5300 Lb]
Longitudinal Force(Fx) = 9.5kN [2100 Lb]
Lateral Force (Fy) = 4.4 kN [1000 Lb]

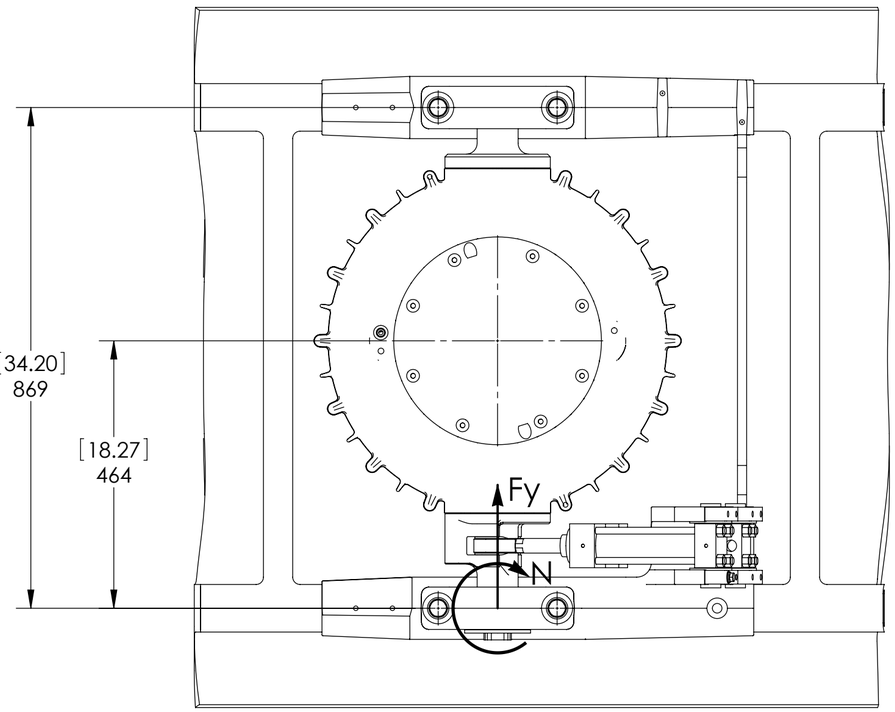
These forces and moments should be considered to be:

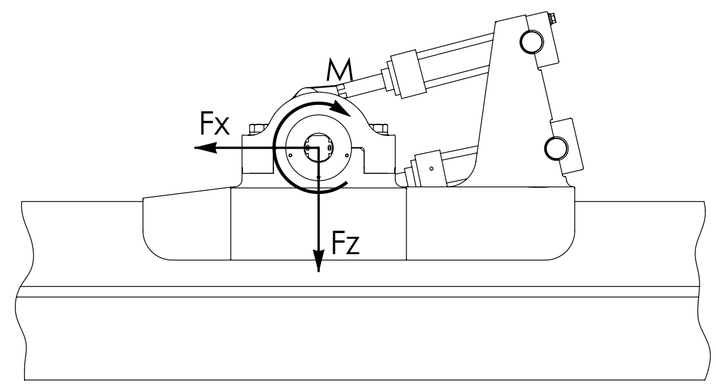
- Acting simultaneously
- Fully reversing (i.e., acting in either direction)
- Repeated an infinite number of times
- Applicable to the starboard beam even though it does not have brake cylinders

The boat builder or the gyro installer is responsible for designing the hull foundation to which the gyro is attached to accommodate the above forces and moments plus a reasonable Factory of Safety. A Factor of Safety of 3.0 (Margin of Safety of 2) is suggested.

The boat builder or gyro installer is also fully responsible for selecting the structural adhesive to secure the aluminum saddle beams to the GRP hull beams. The calculated shear stress in the structural adhesive between the saddles and the hull foundation beams for the above loads and 100% adhesive contact is 2.3 MPa (337 psi). Seakeeper recommends that the builder or installer use a structural adhesive with a minimum shear strength of 13.8 MPa (2000 psi) to give a Factor of Safety of 6 (Margin of Safety of 5). Additionally, it is strongly suggested that the builder or installer test the compatibility of his structural adhesive with cast A356 T6 aluminum and his hull materials by doing mechanical property tests.







SIZE	DWG. NO.	REV
C	90002	3
SCALE: 1:10	WEIGHT:	SHEET 5