MAQ SONAR

Technical and Installation Manual

(STABILIZED)

Revised 2022

©MAQ Sonar Company

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Notes:

Notes:

Preface

Note:

MAQ Sonar makes every effort to ensure the information contained within this document is correct. However, our equipment is continuously updated, so we cannot assume liability for errors, which may occur.

Warning:

MAQ Sonar disclaims any responsibility for damage or injury caused by improper installation, use or maintenance of the equipment.

References:

This Technical Manual is intended as a reference only. The information contained in this document is to be used in conjunction with the shipyards own vessel drawings, documentation and engineers. Standards for installation are to be certified by the installing shipyard, engineers and dealers. Further information about MAQ Sonar can be found in the MAQ Sonar Operators Manual.

Manuals:

This manual must be kept aboard the vessel at all times. The information contained herein is subject to change without notice.

Introduction:

The main purpose of this manual is to provide the information and basic drawings required for installation of the MAQ Sonar system. In addition this manual contains technical information which may be required in the future.

The MAQ Sonar electronics is capable of driving three different frequency transducers. This is a generalized manual for all three types of transducers.

Responsibilities:

The installer is responsible for the equipment during the installation. The warranty is only valid when the installation is made in accordance with this manual.

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CHAPTER 1

Operation Panel

Mode of Operation

Operator Panel

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Installation Requirements

I. **Approvals:** Sea-Chest installations must be approved on a case-by-case basis with regard to the vessel's national registry and corresponding maritime authority. The ship owner and shipyard performing the installation are responsible for obtaining installation approval.

II. **Power supply:** For the Processor Units AC power we recommend the use of an Uninterruptible Power Supply (UPS). The UPS should have the ability to maintain power for 10 minutes; this allows shut off of the equipment in the case of an AC power failure. This also prevents shut off due to power surges/loses due to other vessel equipment. Many Vessels are equipped with AC inverts. These must be Pure Sine inverters with sufficient power to support the system. Hoist DC power must be supplied from Vessel Power sources. The 22KHz hoist will also require 230 or 440VAC 3 phase power for the motor.

III. **Dry Dock:** Ensure proper clearance under Sea-Chest for sonar installation. Avoid placing supporting blocks in the area of the Sea-Chest. In the *Note* section of this manual, log the position of the Sea-Chest for future reference.

IV. **Wiring:** All cables must be supported or protected along its entire length. Conduit or cable trays should be used. Cables must be installed so as not to run in the areas of high-power supplies, antenna cables or other sources of interference.

V. **Vibration:** Vibration on any of the equipment's must be monitored. Excessive vibration will require dampeners to be installed. Improper installation on Transducer Guides can result in Flow related vibration.

VI. **Temperature and Humidity:** All equipment, unless otherwise specified, must be protected from extremes in temperature and humidity.

VII. **Warranty:** The warranty is only valid when the installation is made in accordance with this manual. Note that the Warranty Registration Card must be returned by the vessel to MAQ SONAR within 30 days of the installation to be validated.

Components of the MAQ Sonar System

1. Computer interface unit (Processor) with Joystick unit. (An optional Keypad Control is Available)
2. Hoist with Hoist Control unit (60 KHz and 90 KHz unit the same hoist system)
3. Transceiver Unit
4. Optional RDT Transmitter Unit (not Shown)
5. Transducer (90 KHz, 60 KHz or 22 KHz)
6. Monitor (not supplied by MAQ Sonar)

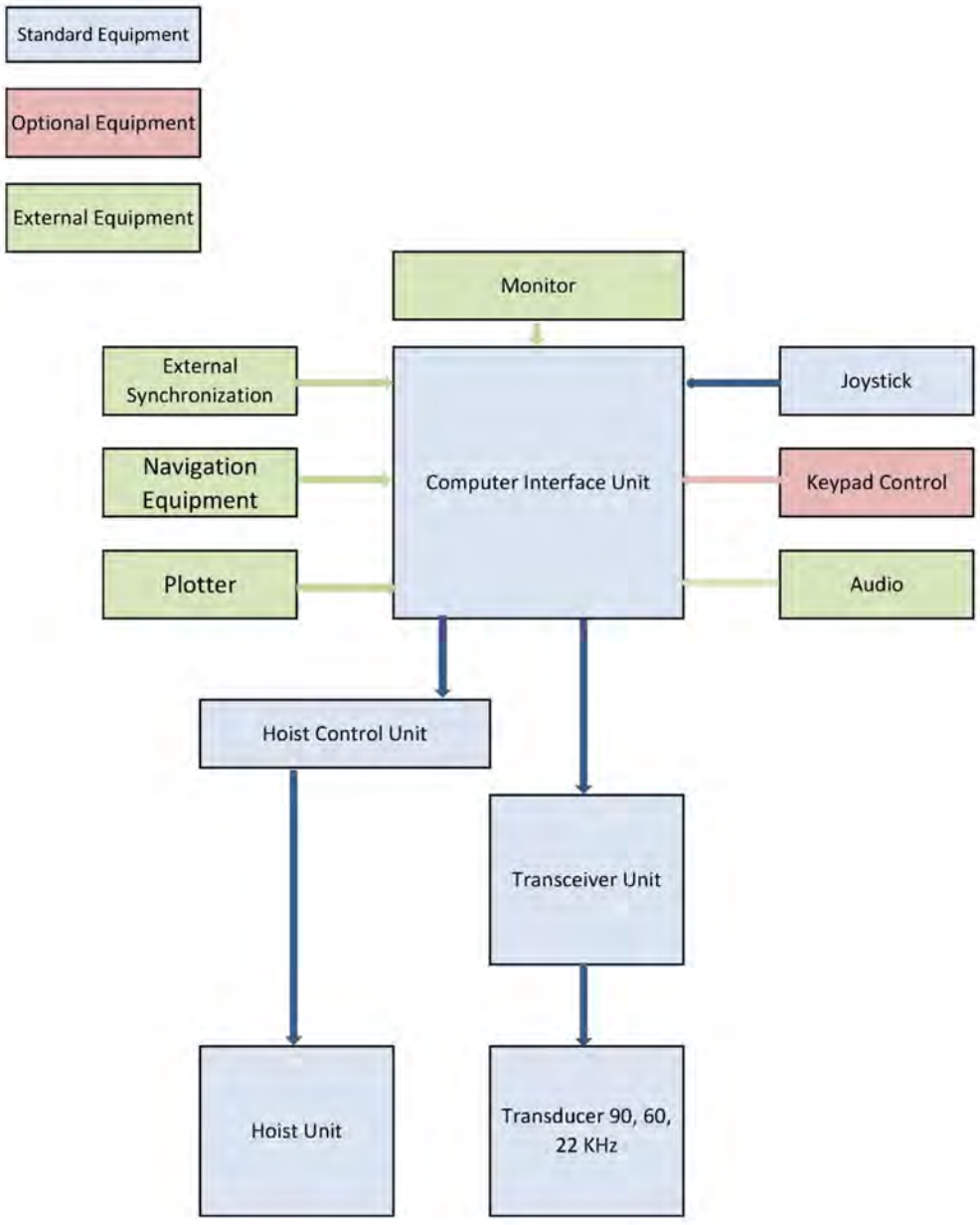

Figure 1 : Components of a MAQ Sonar

Sea-Chest Installation References

Approvals:

Sea-Chest installations must be approved on a case-by-case basis with regard to the vessel's national registry and corresponding maritime authority. The ship owner and shipyard performing the installation are responsible for obtaining installation approval.

Dry Dock:

Ensure proper clearance under Sea-Chest for Sonar installation. Avoid placing supporting blocks in the area of the Sea-Chest. Ensure you record the position of the Sea-Chest for future reference. Sonar have been installed in existing Sea-Chest without placing the vessel in Dry Dock but this is at the discretion of the vessel owners and Dealers.

Sea-Chest:

MAQ Sonar is one of the simplest and fastest Omni Sonar to install. This Sonar was designed to fit on vessels with existing Sea-Chests and can be installed in as little as one day.

The Sea-Chest is probably the most important consideration when installing Sonar. For best performance the transducer must extend properly out of the Sea-Chest in order that the active face is fully exposed (Short Stroke). When it is extended farther below the keel it will not be exposed to air bubbles which may be driven under the vessel which will reduce Sonar performance (Long Stroke). Many vessels do not have an issue with air bubbles from the Bow of the vessel and short stroke installations are more than adequate.

The recommended location for the Sea-Chest is 1/3 of the vessel length from the Bow and as close to the keel as possible. For assistance Please contact the factory *tech@maqsonar.com*.

There are several other considerations for locating a Sea-Chest. When the vessel is already equipped with Sonar this Sonar may extend in front of or next to the MAQ. If the equipment is in the line of sight of the MAQ they will create a shadow or block the detection of the Sonar in this direction.

Although MAQ Sonar will fit in any 8" (90KHz and 60KHz) or 18" (22KHz) Sea-Chest, Sea-Chest extensions may have to be added to accommodate the MAQ.

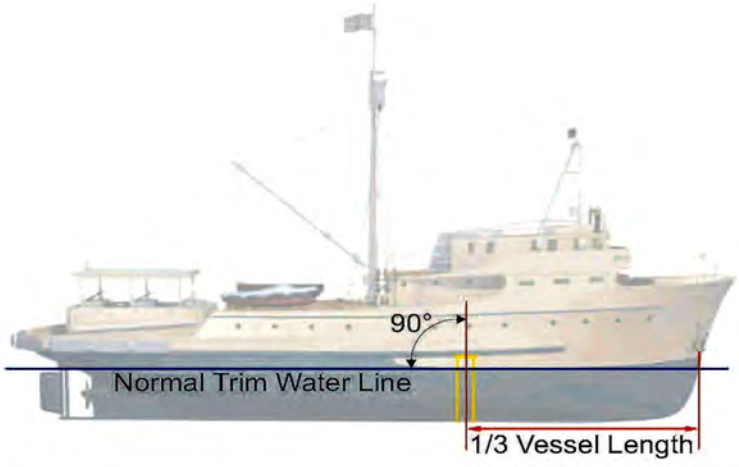

Figure 2 : Example of Sea-Chest Location

It is critical that the I.D. of a Sea-Chest extension matches the original Sea-Chest I.D. and that the extension is aligned properly with the original Sea-Chest.

Before proceeding with the installation, please reference the attached Installation drawings and diagrams. These drawing show typical lengths and dimensions for short stroke and standard stroke hoist installations of the 90KHz, 60KHz and 22KHz Sonar.

Before installing the Sea-Chest or Sonar it is IMPORTANT to measure the angle of a vessel during typical search and catch situations as well as pitch and Roll measurements. Sea-Chests, that were angled as much as 10° off the typical vessel angles during standard Sonar operation have been observed in the past. This will make operation of OMNI Sonar very difficult and also reduces performance greatly.

These issues should all be considered on installations in new or existing Sea-Chests.

Sea Chest and Hoist Size Listings:

Table 1

MODEL	60/90kHz	22kHz
Sea Chest Size	8”	18” pipe (Flange 16”)
Inside Diameter Sea Chest Pipe	7.625” (194mm) to 7.981” (203mm)	16.8” (427mm) to 18” (406mm)

Table 2

FLANGE	60/90kHz	22kHz
Outside Diameter	13.7” (348mm)	23.6” (600mm)
Bolt Circle Diameter	11.7” (297mm)	21.25” (540mm)
Flange Hole Diameter	0.875” (22mm)	1.125” (28mm)
Number of Holes	8	16
Mounting Bolts	60/90KHz3/4”-10 x 3” SS M18-2.5 x 70mm SS	1”-8x 4” SS M24-3 x 120mm SS

Table 3

HOIST	Short Stroke	60/90kHz	22kHz
Stroke	18” (457mm)	32” (813mm)	47.25” (1200mm)
Hoist Height Above Flange	40” (1016mm)	52” (1320mm)	75” (1900mm)

CONSULT FACTORY FOR MINIMUM SEA CHEST LENGTHS AS SHORT SEA CHEST MAY CAUSE EXCESSIVE VIBRATION. CONSULT FACTORY WITH SEA CHEST DIMENSIONS FOR APPROVAL.

INSTALLATION OF 22 KHz TRANSDUCERS IN 16” SEA CHESTS IS NOT RECOMMENDED. PLEASE CONSULT FACTORY WITH SEA CHEST DIMENSIONS FOR APPROVAL

Grounding and Zinc Anodes:

NOTE: MAQ Sonar's Transducer Pipe, Transceiver and Processor Units must be electrically connected to the ships main ground. Zinc Anodes must be installed on Transducer pipes and inspected and replaced yearly. Poor grounding will cause excessive zinc erosion.

Hoist and Transducer Installation Illustrations:

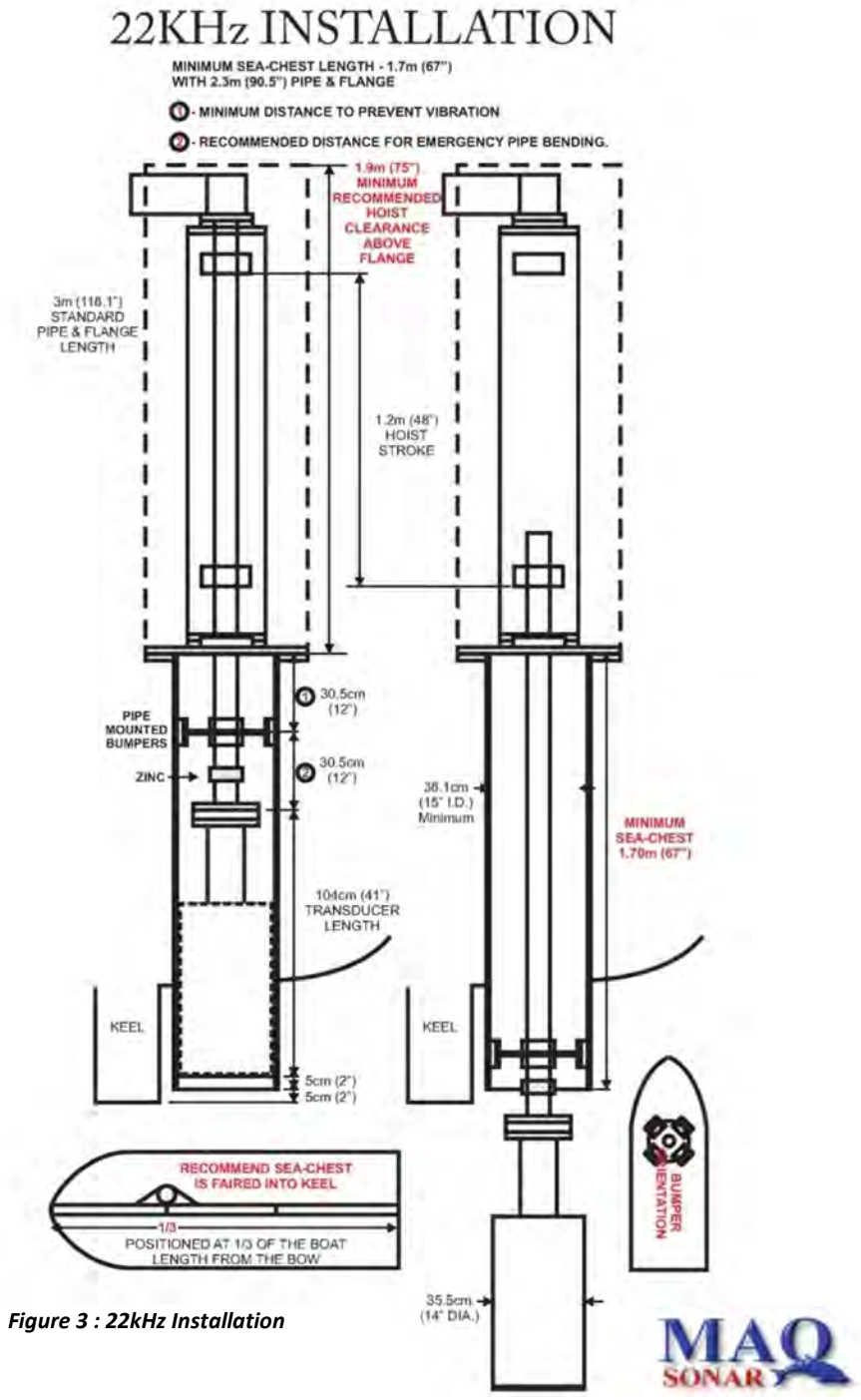

Figure 3 : 22kHz Installation

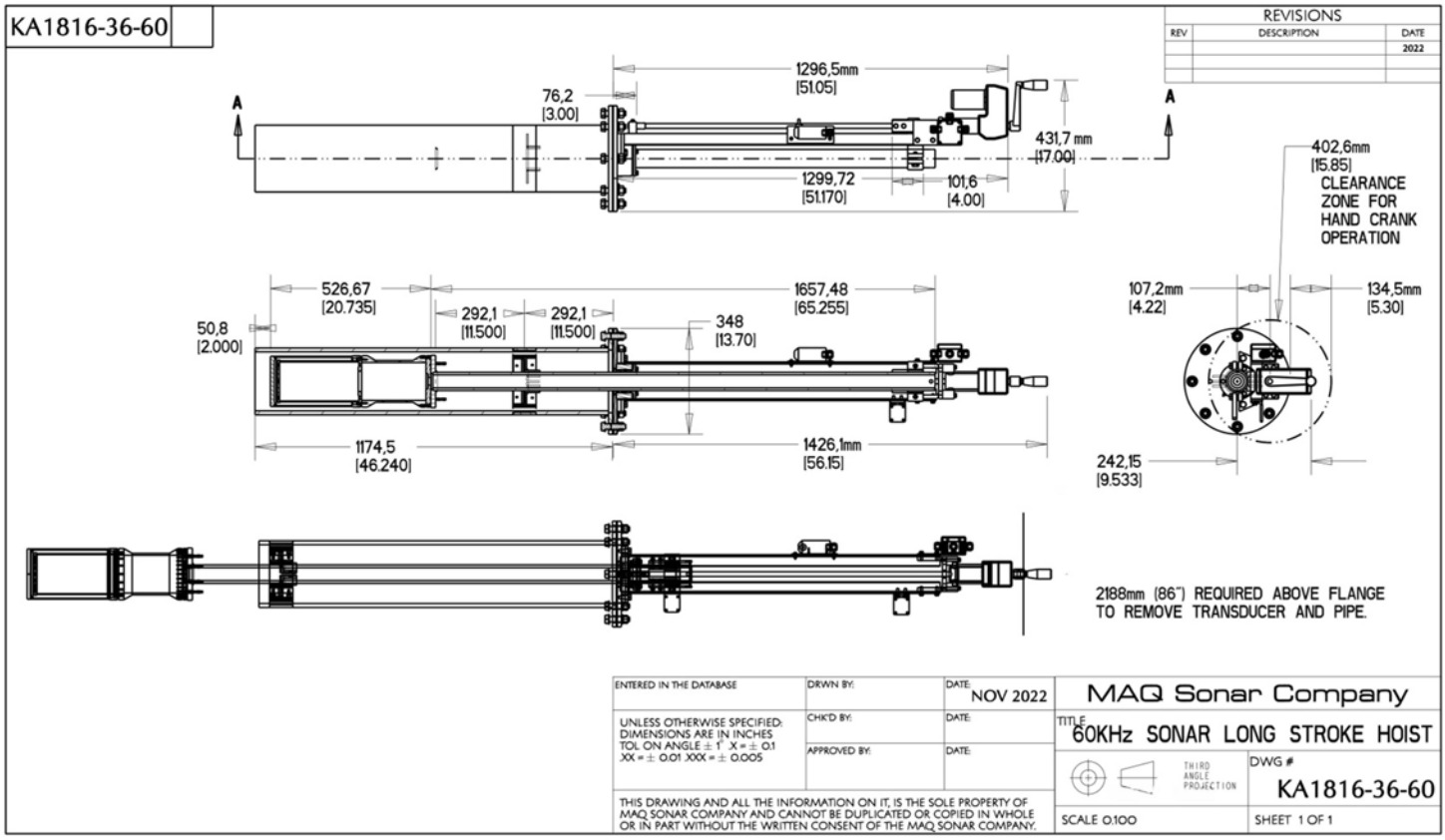

Figure 4: 60kHz Long Stroke Installation

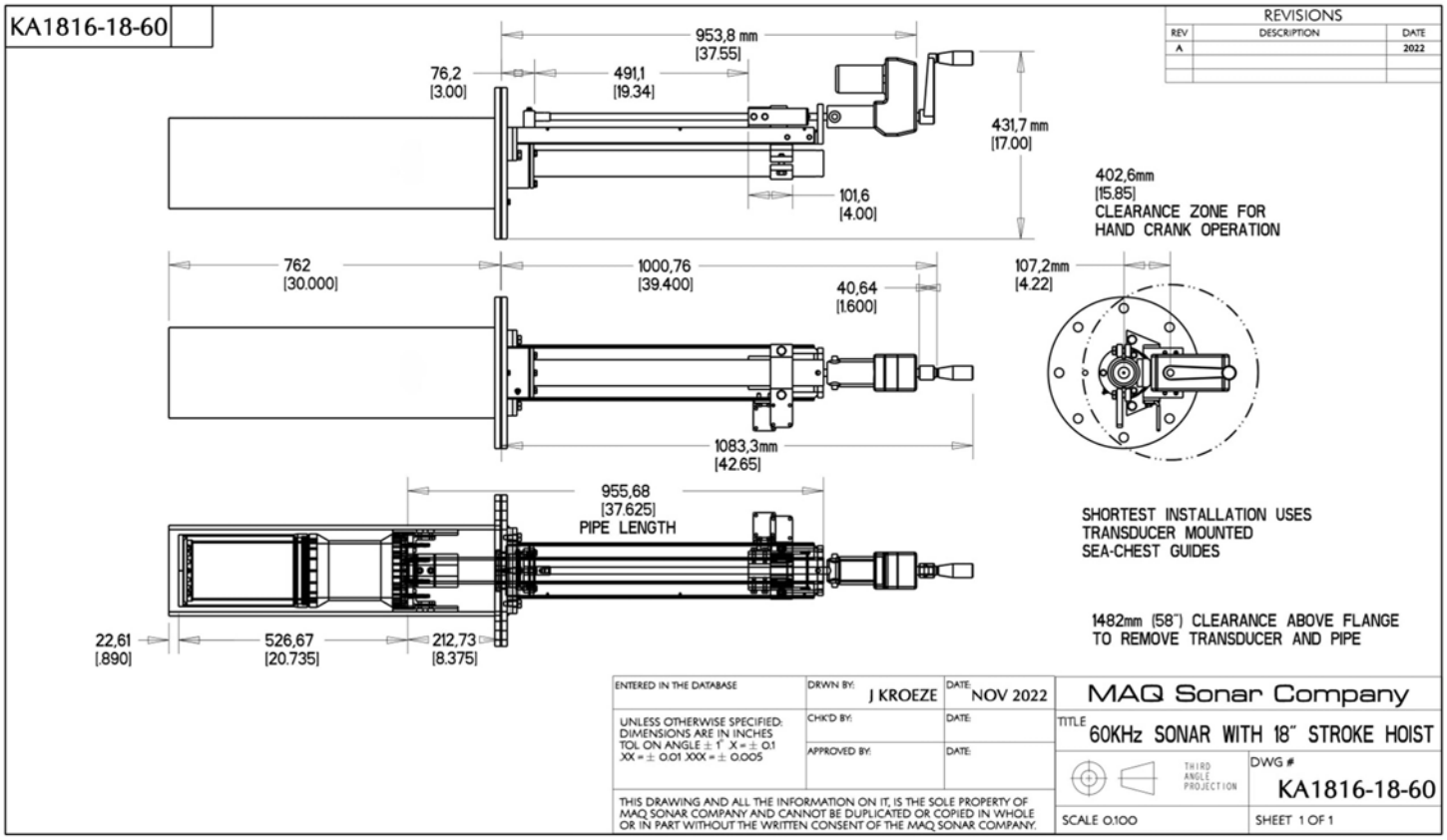

Figure 5: 60kHz Short Stroke Installation

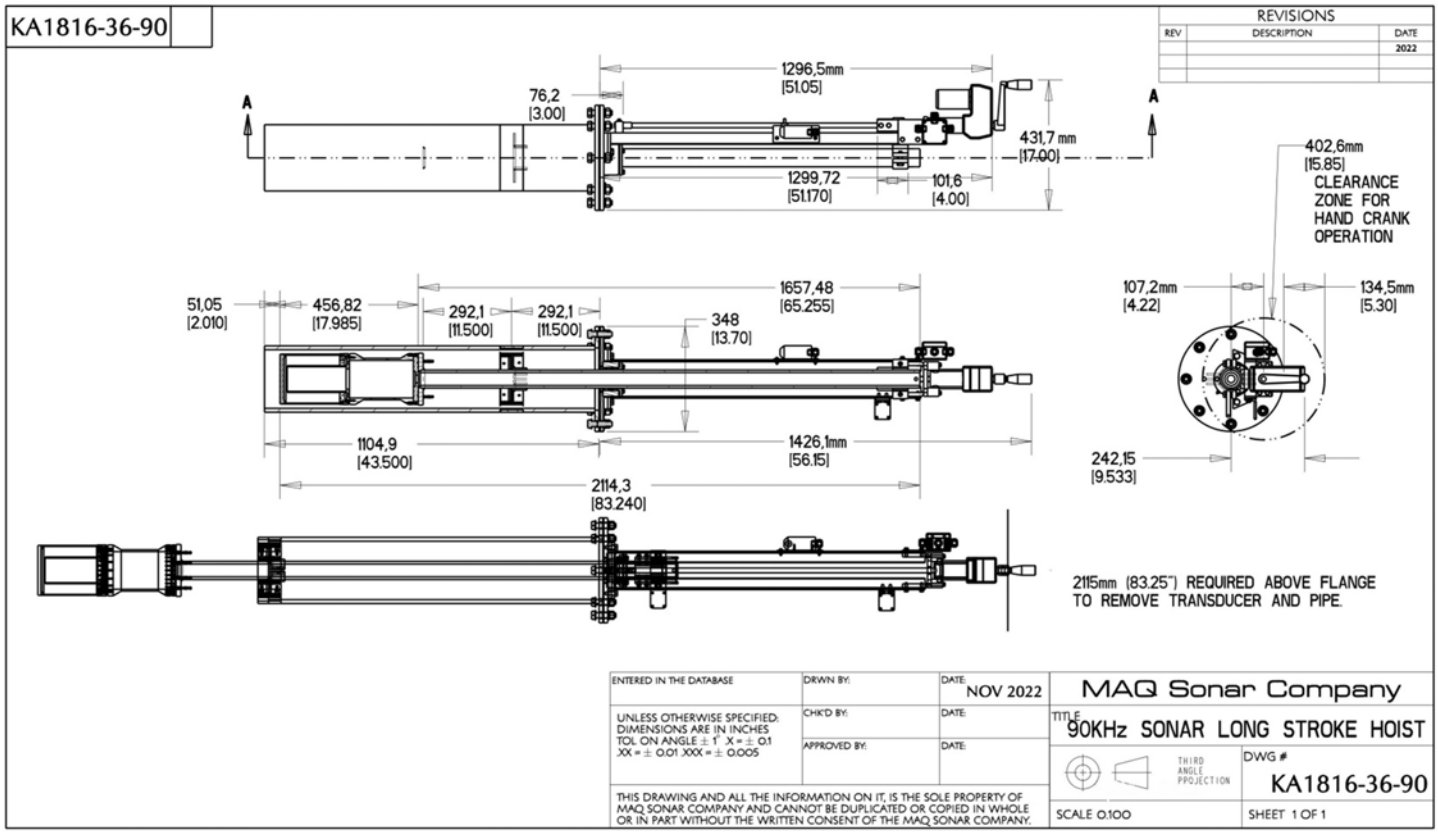

Figure 6: 90kHz Long Stroke Installation

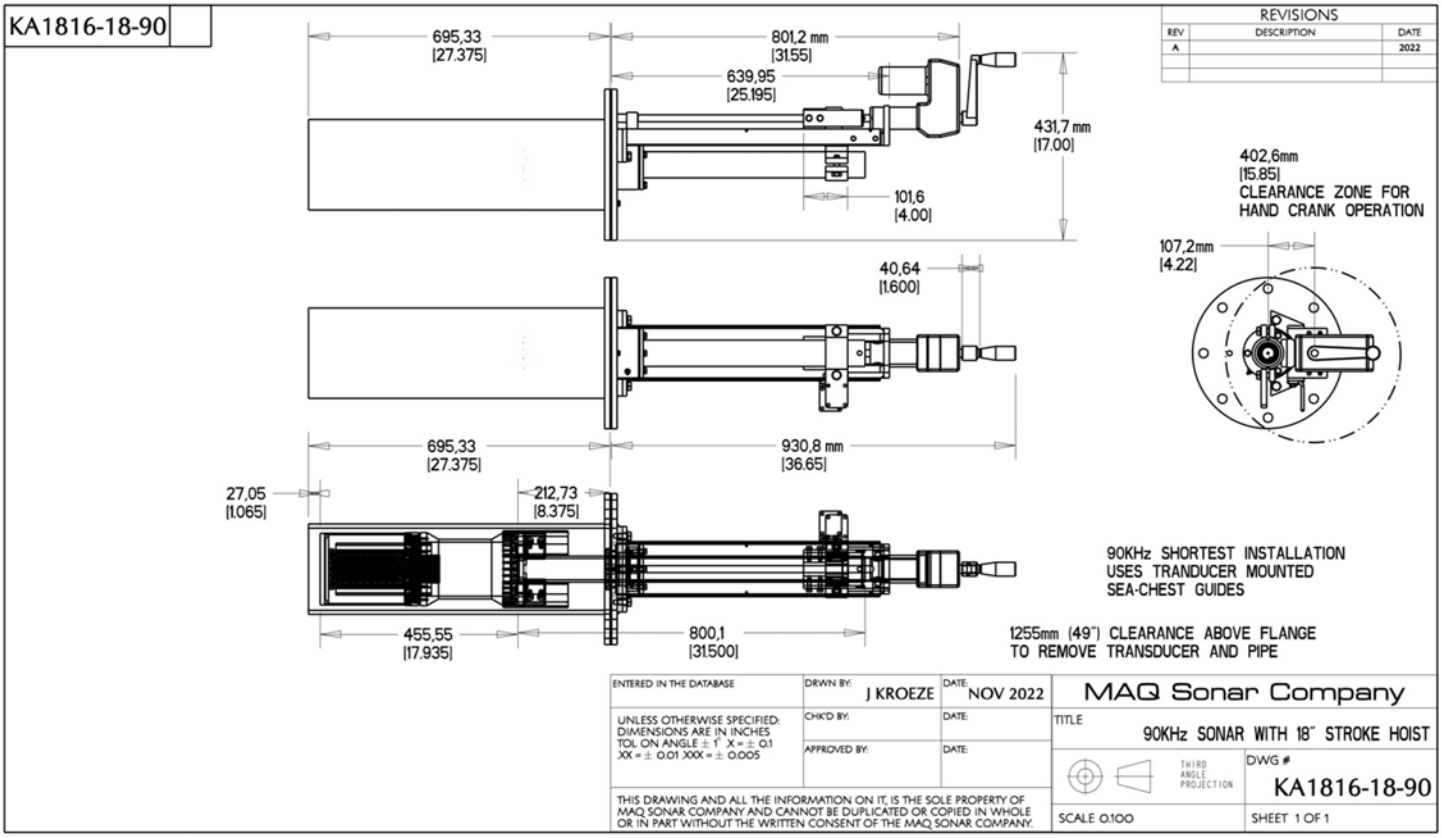

Figure 7: 60kHz Short Stroke Installation

CHAPTER 2

Drawings and Illustrations

Mechanical Drawings

Installation Wiring Diagram

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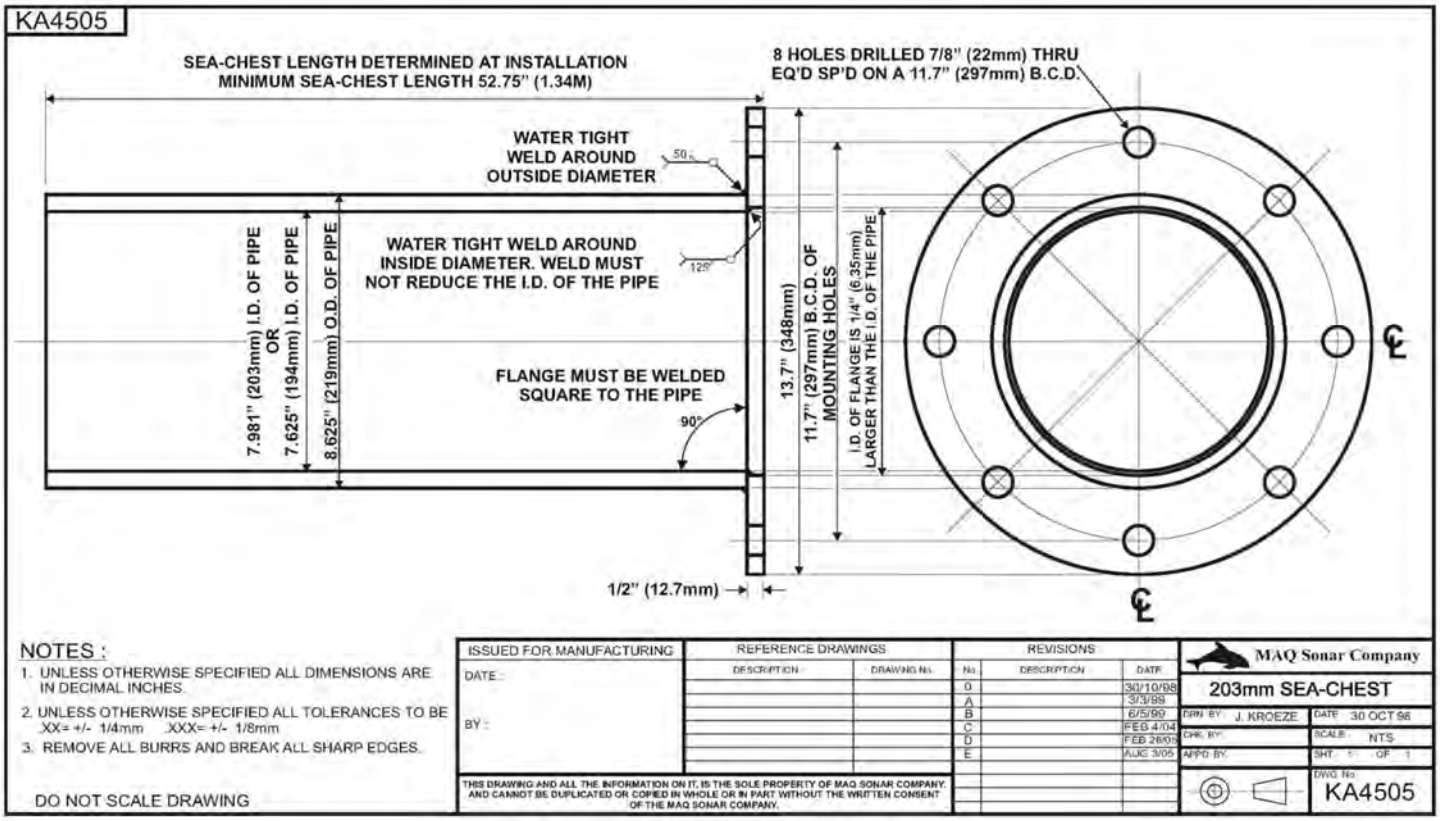


Figure 8 : 60/90kHz Sea-Chest

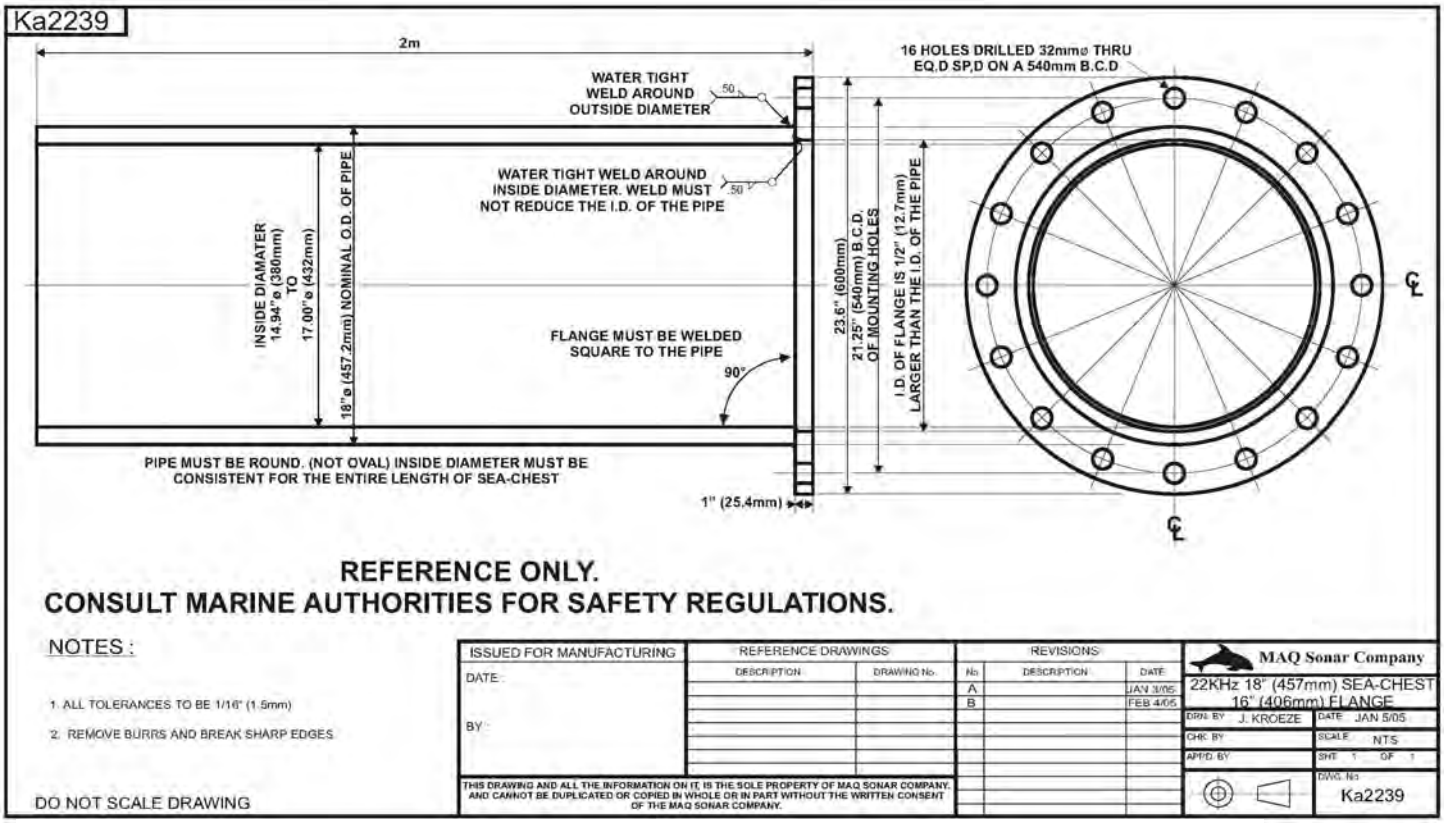


Figure 9 : 22kHz Sea-Chest

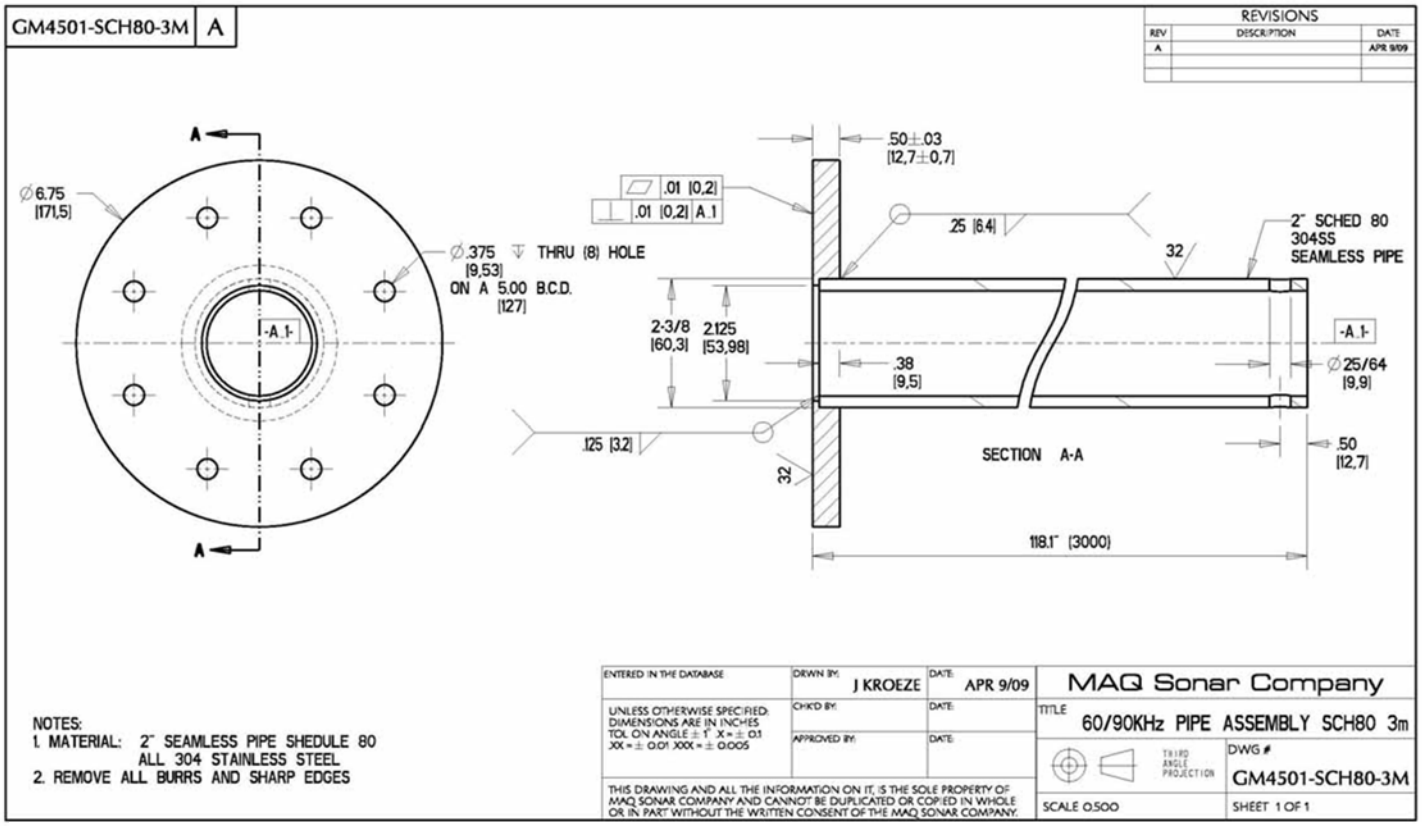


Figure 10 : 60/90kHz Transducer Pipe With Flange

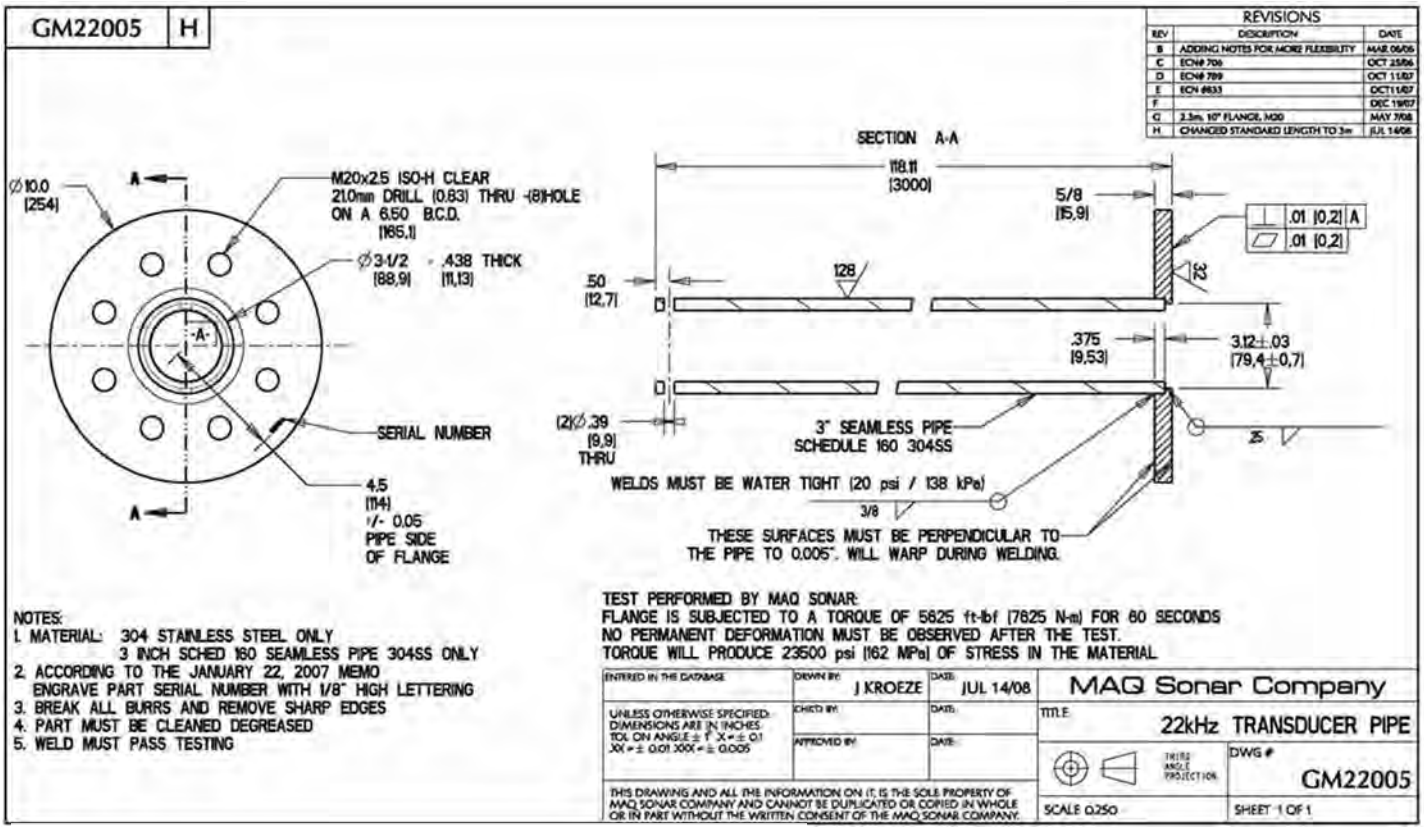
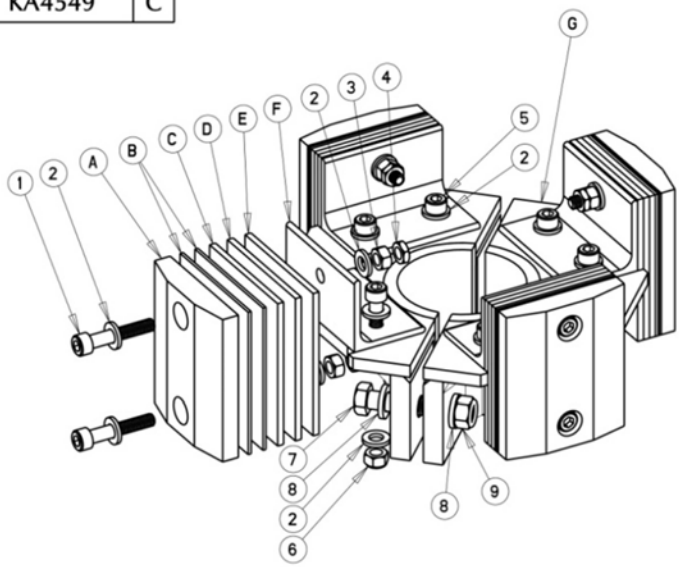


Figure 11 : 22kHz Pipe With Flange

KA4549 | C

REVISIONS		
REV	DESCRIPTION	DATE
A	ECN# 560	APR 22/03
B	ECN# 767	MAY 23/07
C	ECN# 808	JUL 04/07



ITM	P/N	DESCRIPTION	QTY
A	GM4527 Rev C	8" ADJUSTABLE BUMPER UHMW	4
B	GM4528-062 Rev A	8" ADJUSTABLE BUMPER 0.062" PVC SPACER	8
C	GM4528-125 Rev A	8" ADJUSTABLE BUMPER 0.125" PVC SPACER	4
D	GM4532 Rev A	8" ADJUSTABLE BUMPER 0.125" POLYMER SPACER	4
E	GM9032 Rev C	SPRING BUMPER PLATE	4
F	GM4526 Rev E	8" BUMPER BRACKET	4
G	GM4547 Rev A	8" SEACHEST BUMPER SUPPORT	1
1	M6-1.0X35-SHCS-304SS	M6-1.0 X 35mm SOCKET HEAD CAP SCREW 304SS	8
2	M6-FW-304SS	M6 FLAT WASHER NARROW 304SS	32
3	M6-1.0-HN-304SS	M6-1.0 HEX NUT 304SS	8
4	M6-1.0-JHN-304SS	M6-1.0 JAM NUT 304SS	16
5	M6-1.0X25-SHCS-304SS	M6-1.0 X 25mm SOCKET HEAD CAP SCREW 304SS	8
6	M6-1.0-HN-NLK-304SS	M6-1.0 HEX NUT NYLOCK 304SS	8
7	M8-1.25X40-HHCS-304SS	M8-1.25 X 40mm HEX HEAD CAP SCREW 304SS	2
8	M8-FW-304SS	M8 FLAT WASHER 304SS	4
9	M8-1.25-HN-NLK-304SS	M8-1.25 HEX NUT NYLOCK 304SS	2

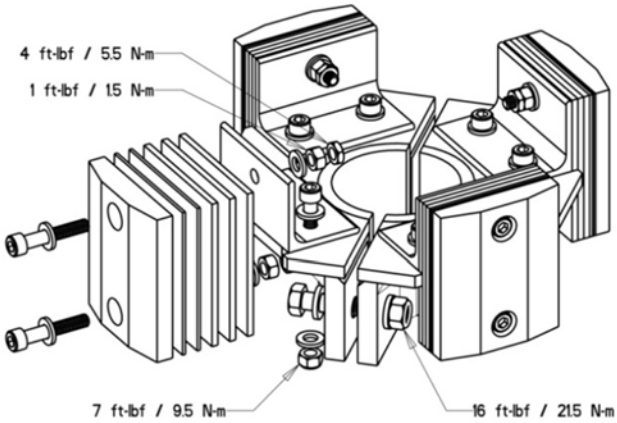
KA4549C SPARE PARTS INCLUDED
ITEM #1 - 2 PIECES
ITEM #2 - 8 PIECES
ITEM #3 - 2 PIECES
ITEM #4 - 2 PIECES
ITEM #6 - 2 PIECES
ITEM #7 - 1 PIECE
ITEM #8 - 2 PIECES

ENTERED IN THE DATABASE	DRAWN BY: M GAUDREAU	DATE: JUL 04/07	MAQ Sonar Company
UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES TOL ON ANGLE ± 1° X = ± 0.1 .XX = ± 0.01 .XXX = ± 0.005	CHK'D BY:	DATE:	TITLE: 8" BUMPER ASSEMBLY
	APPROVED BY:	DATE:	THIRD ANGLE PROJECTION — DWG # KA4549
THIS DRAWING AND ALL THE INFORMATION ON IT, IS THE SOLE PROPERTY OF MAQ SONAR COMPANY AND CANNOT BE DUPLICATED OR COPIED IN WHOLE OR IN PART WITHOUT THE WRITTEN CONSENT OF THE MAQ SONAR COMPANY.			SCALE 0.500 — SHEET 1 OF 3

Figure 12 : 60/90kHz Sea-Chest Guides

KA4549 | C

REVISIONS		
REV	DESCRIPTION	DATE
A	ECN# 560	APR 22/03
B	ECN# 767	MAY 23/07
C	ECN# 808	JUL 04/07



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UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES TOL ON ANGLE ± 1° X = ± 0.1 .XX = ± 0.01 .XXX = ± 0.005	CHK'D BY:	DATE:	TITLE: 8" BUMPER ASSEMBLY TORQUE SPECIFICATIONS
	APPROVED BY:	DATE:	THIRD ANGLE PROJECTION — DWG # KA4549
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Figure 13 : 60/90kHz Sea-Chest Guides

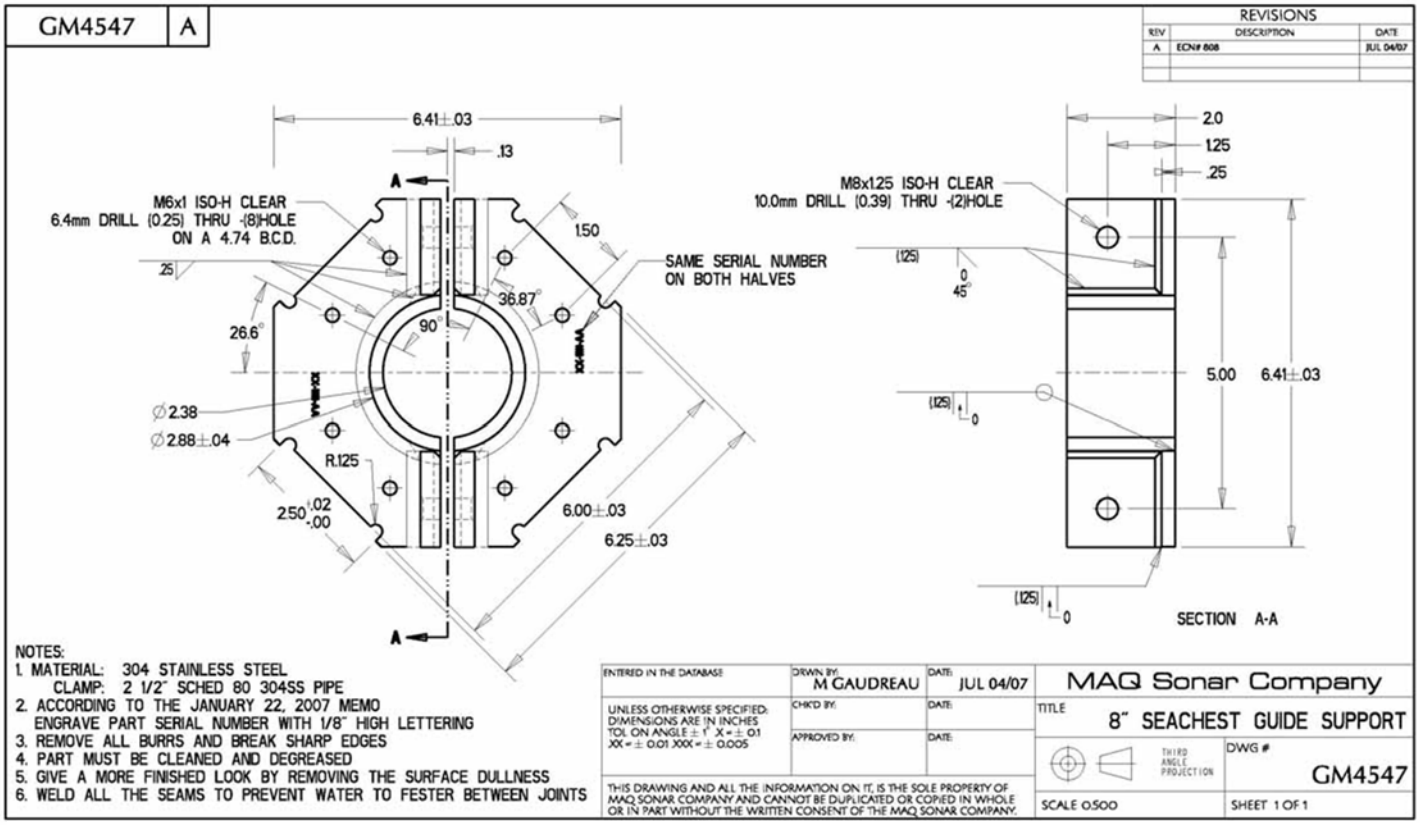


Figure 14 : 60/90kHz Guide Support

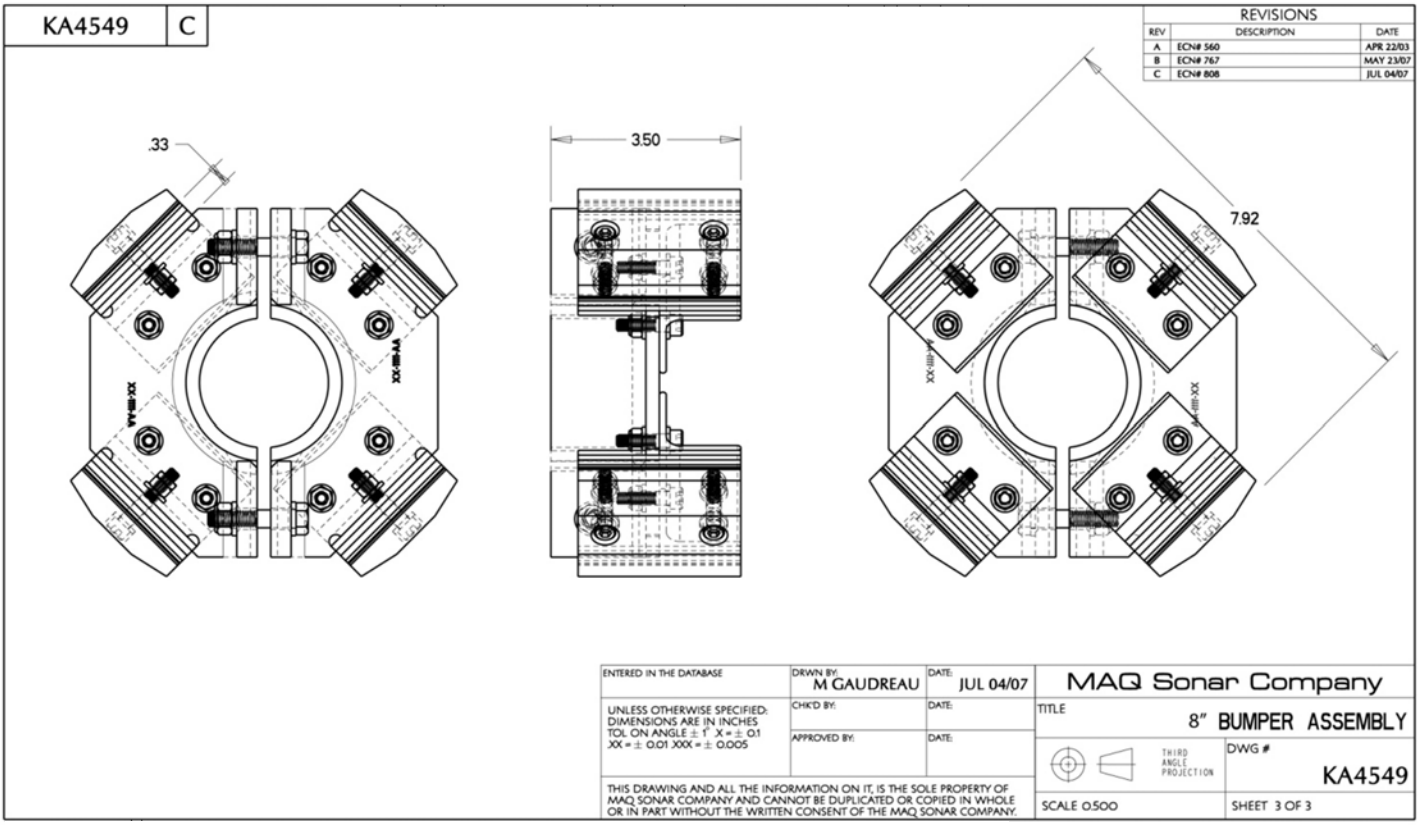


Figure 15 : 60/90kHz Bumper Assembly

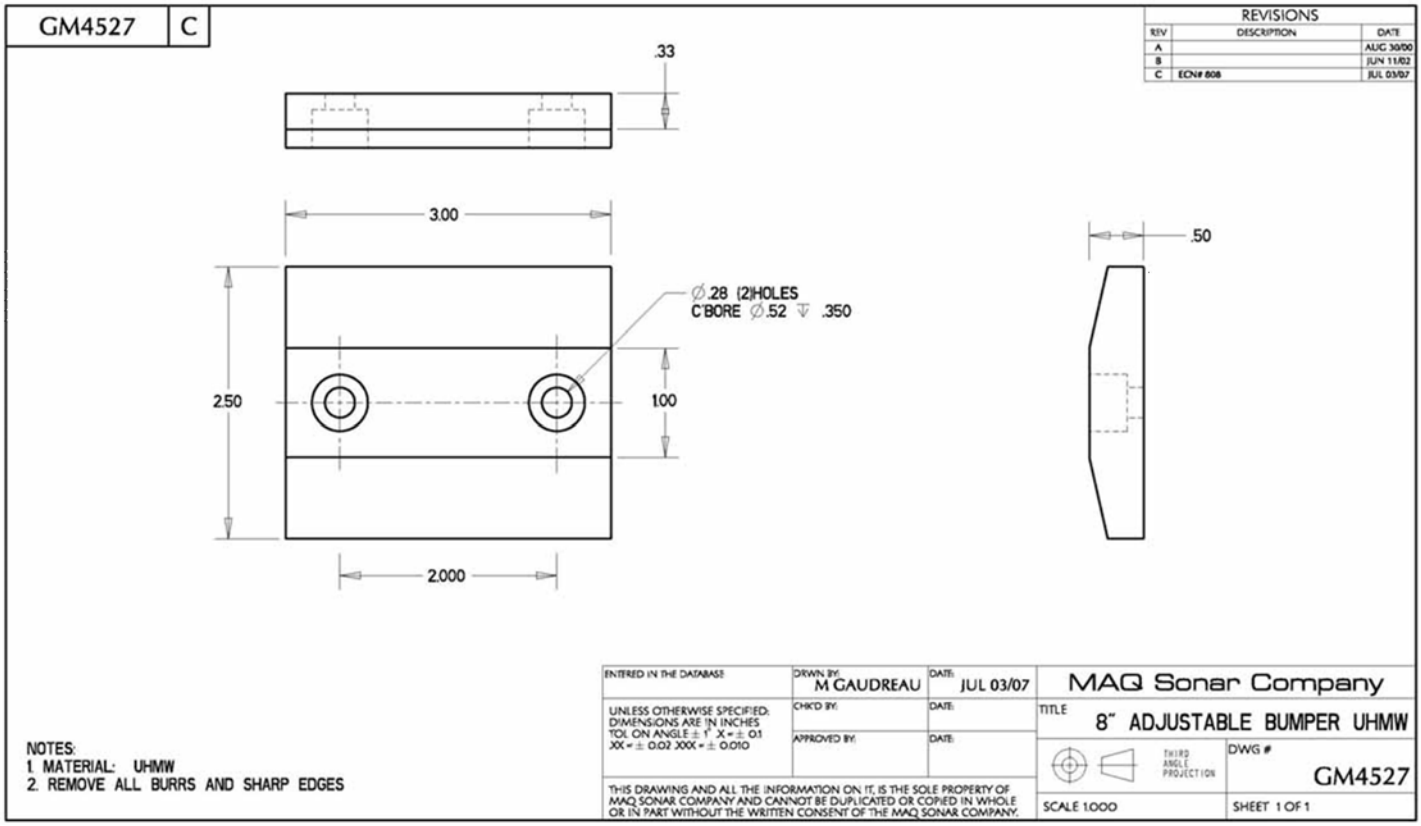


Figure 16 : 60/90kHz Adjustable Bumper

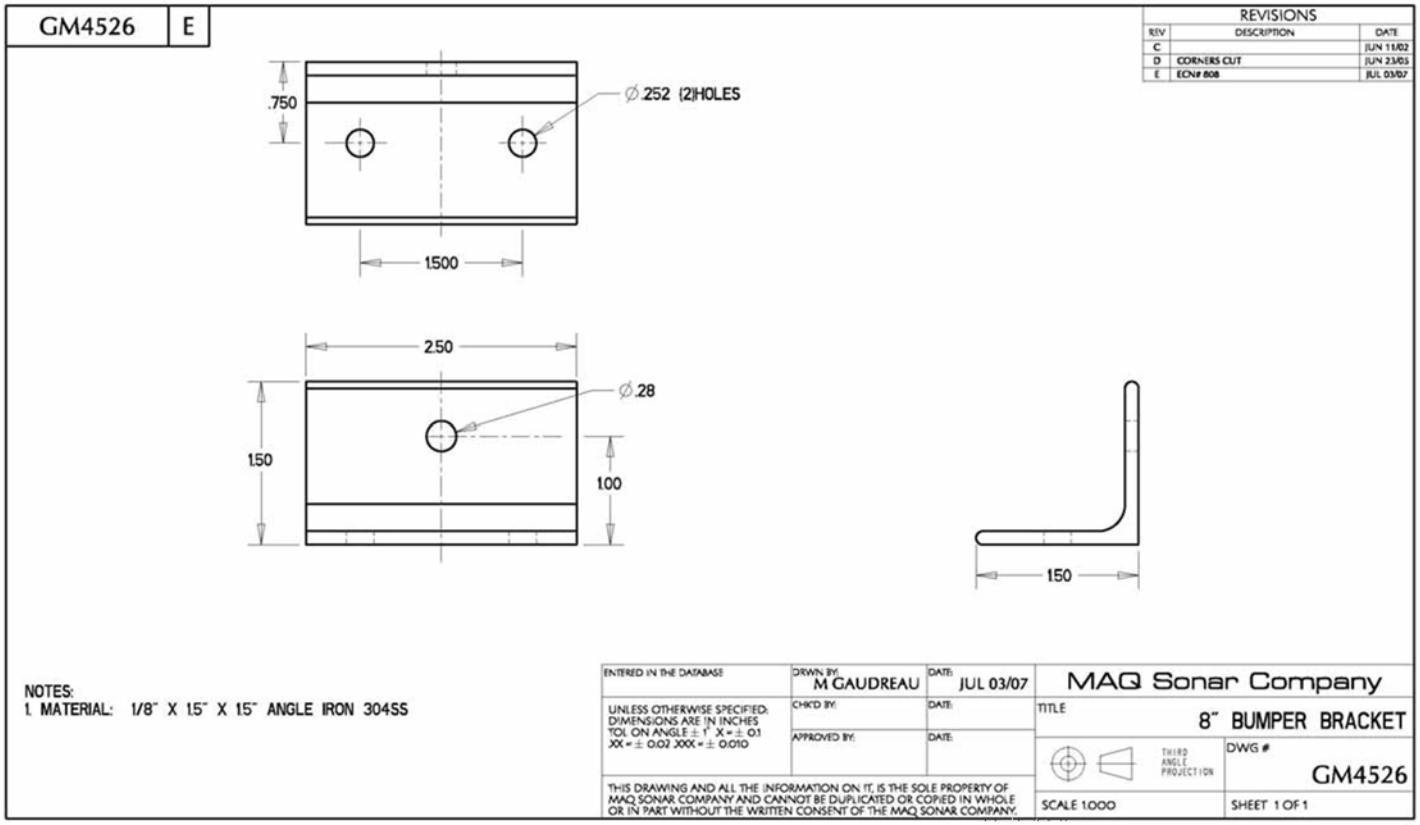


Figure 17 : 60/90kHz Bumper Bracket

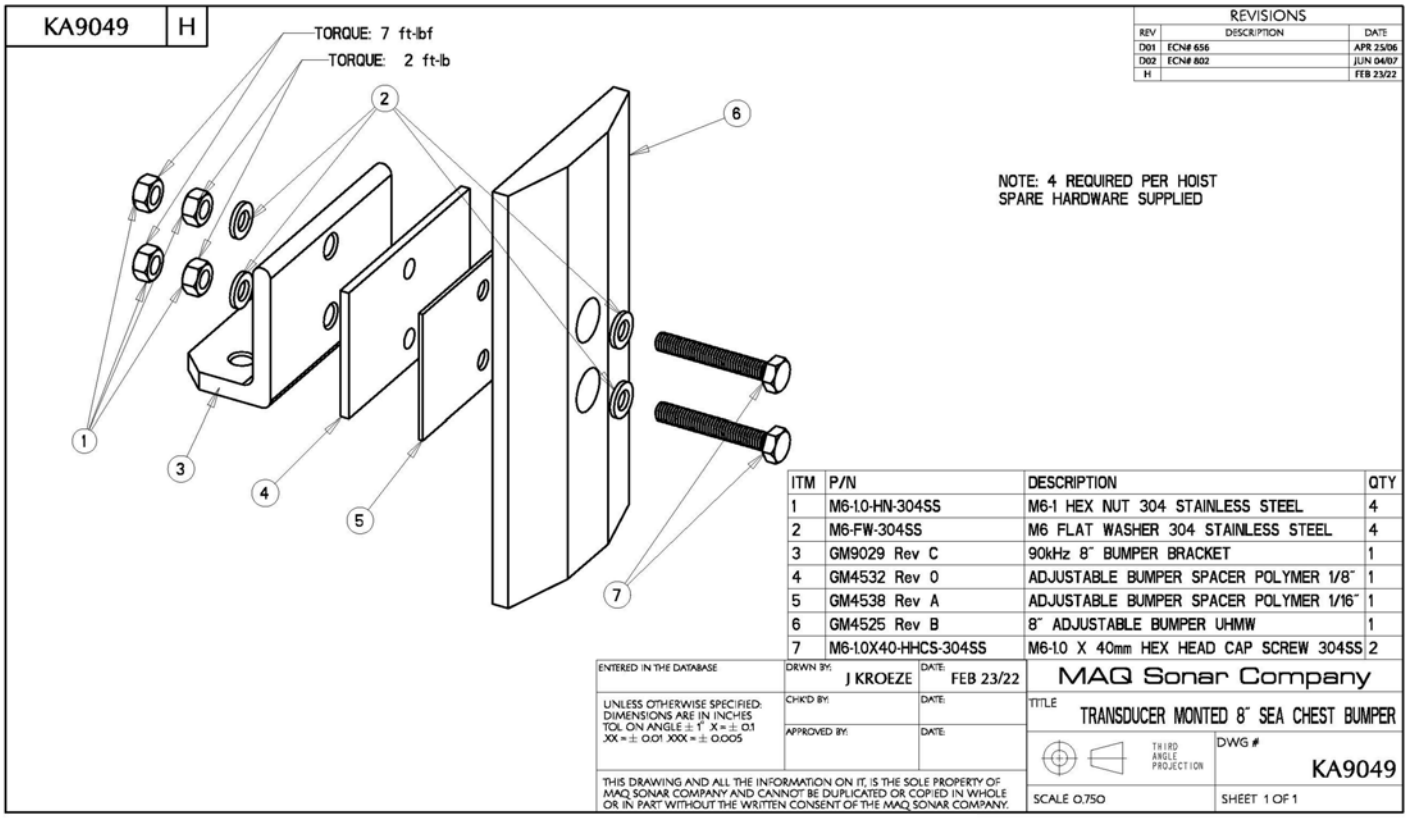


Figure 18 : 60/90kHz Transducer Mounted Bumpers

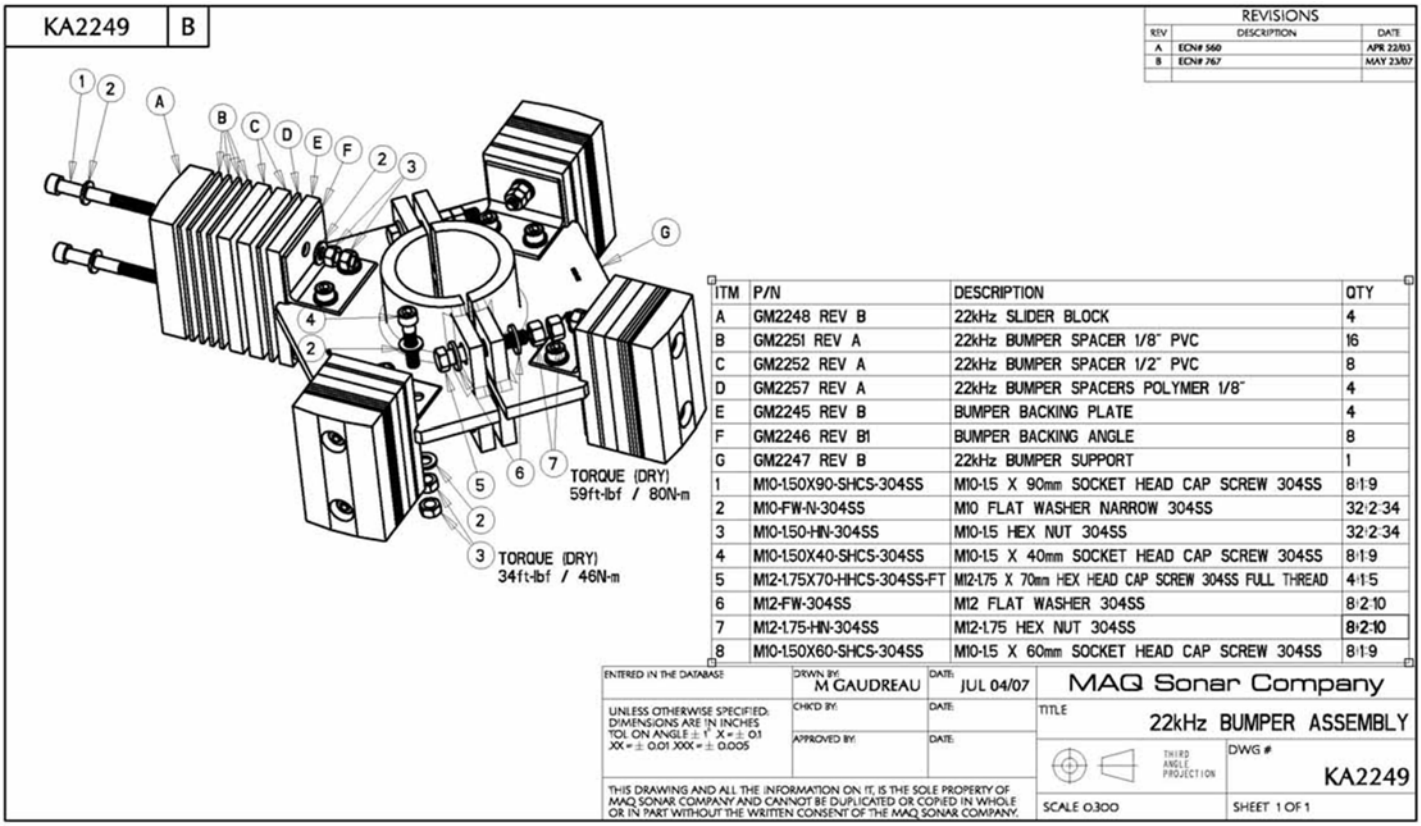


Figure 19 : 22kHz Sea-Chest Guides

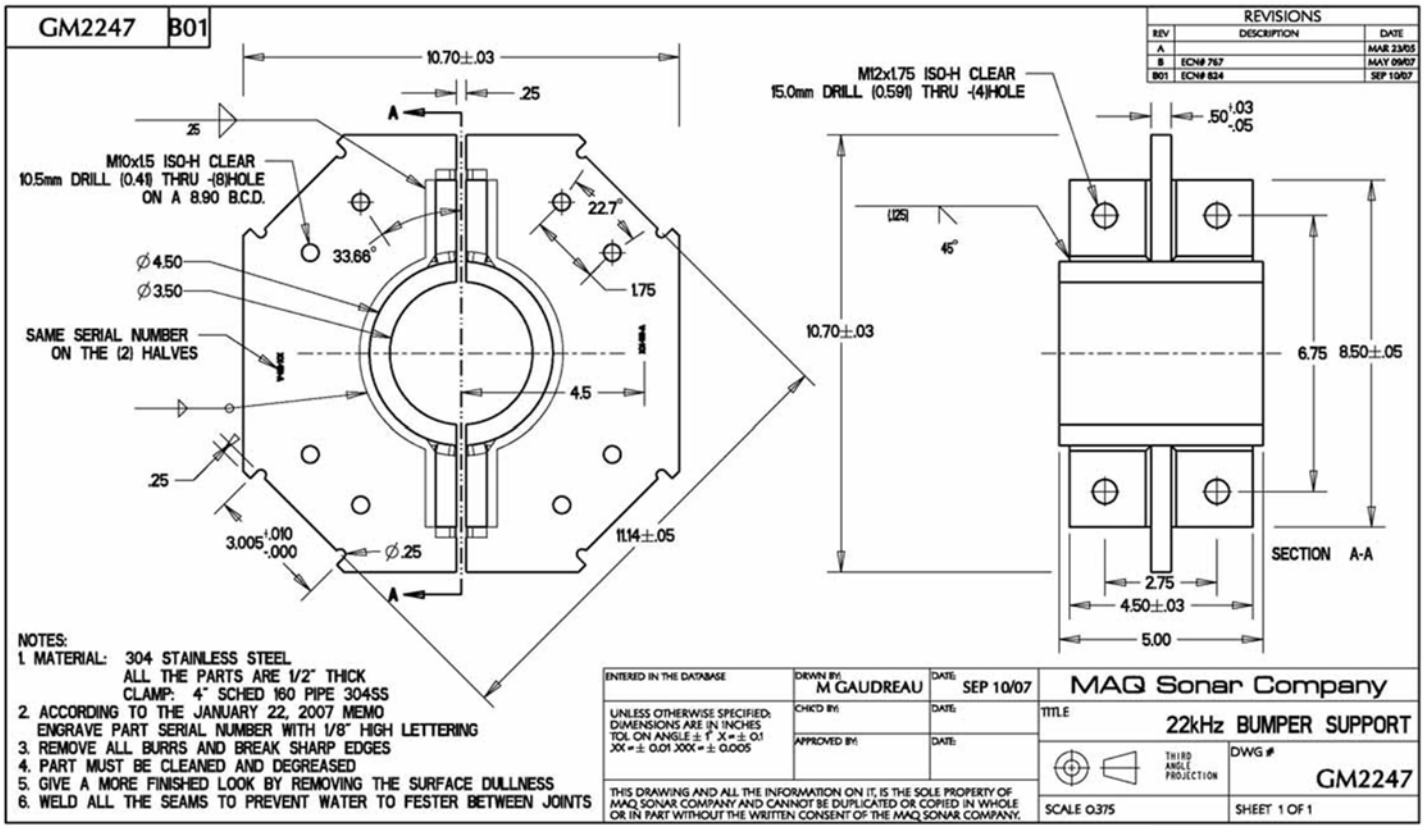


Figure 20 : 22Hz Bumper Support

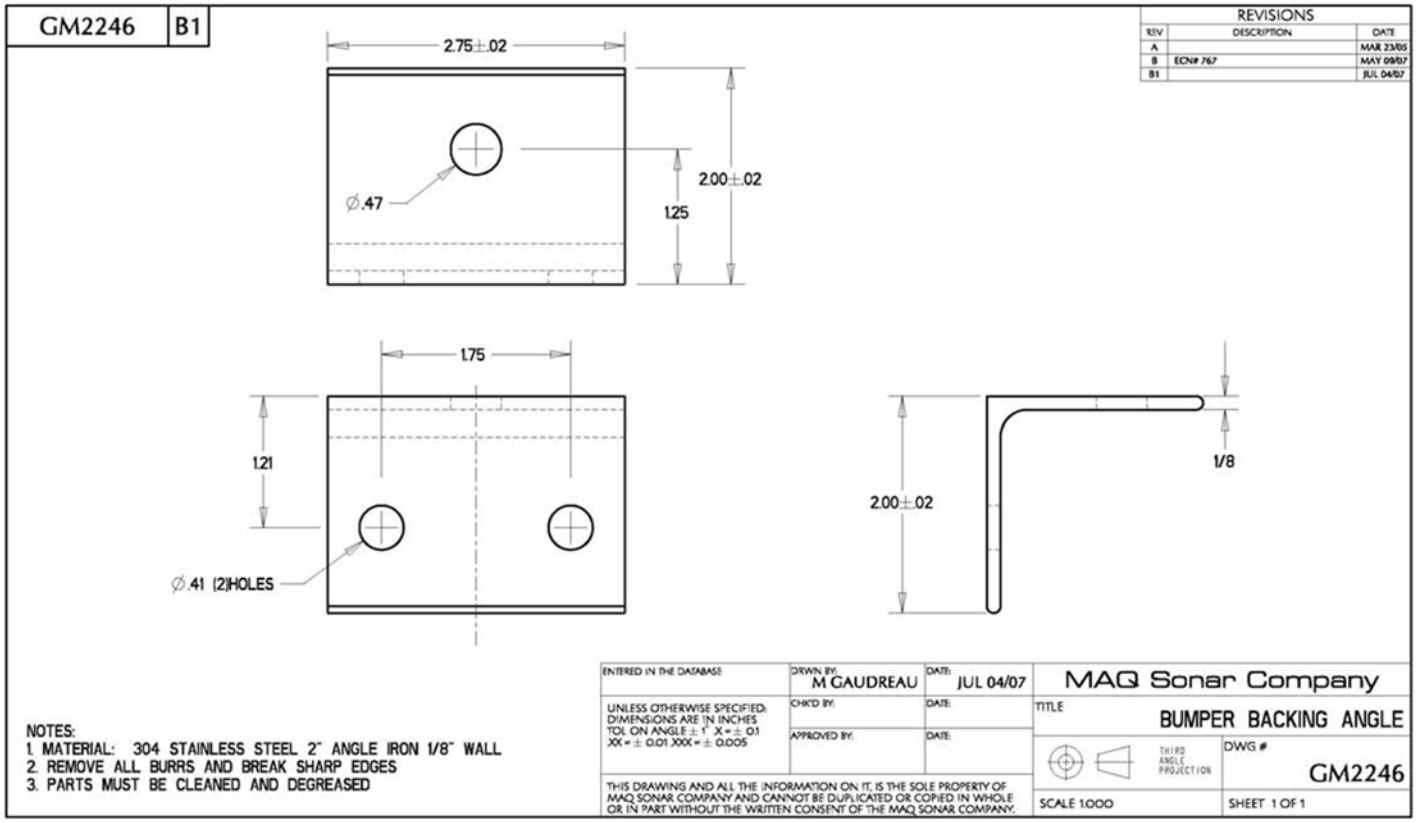


Figure 21 : 22Hz Bumper Backing Angle

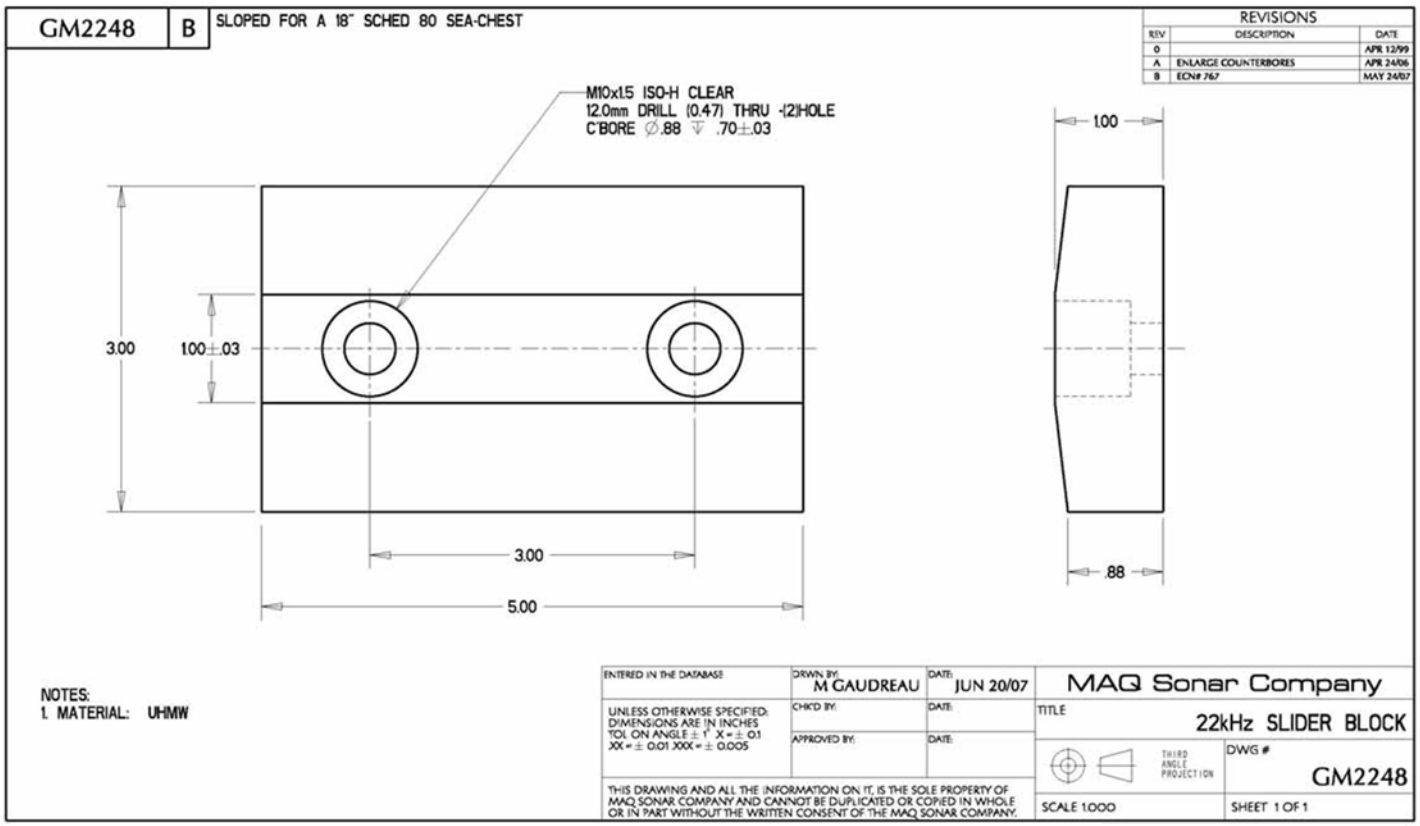


Figure 22 : 22Hz Slider Block

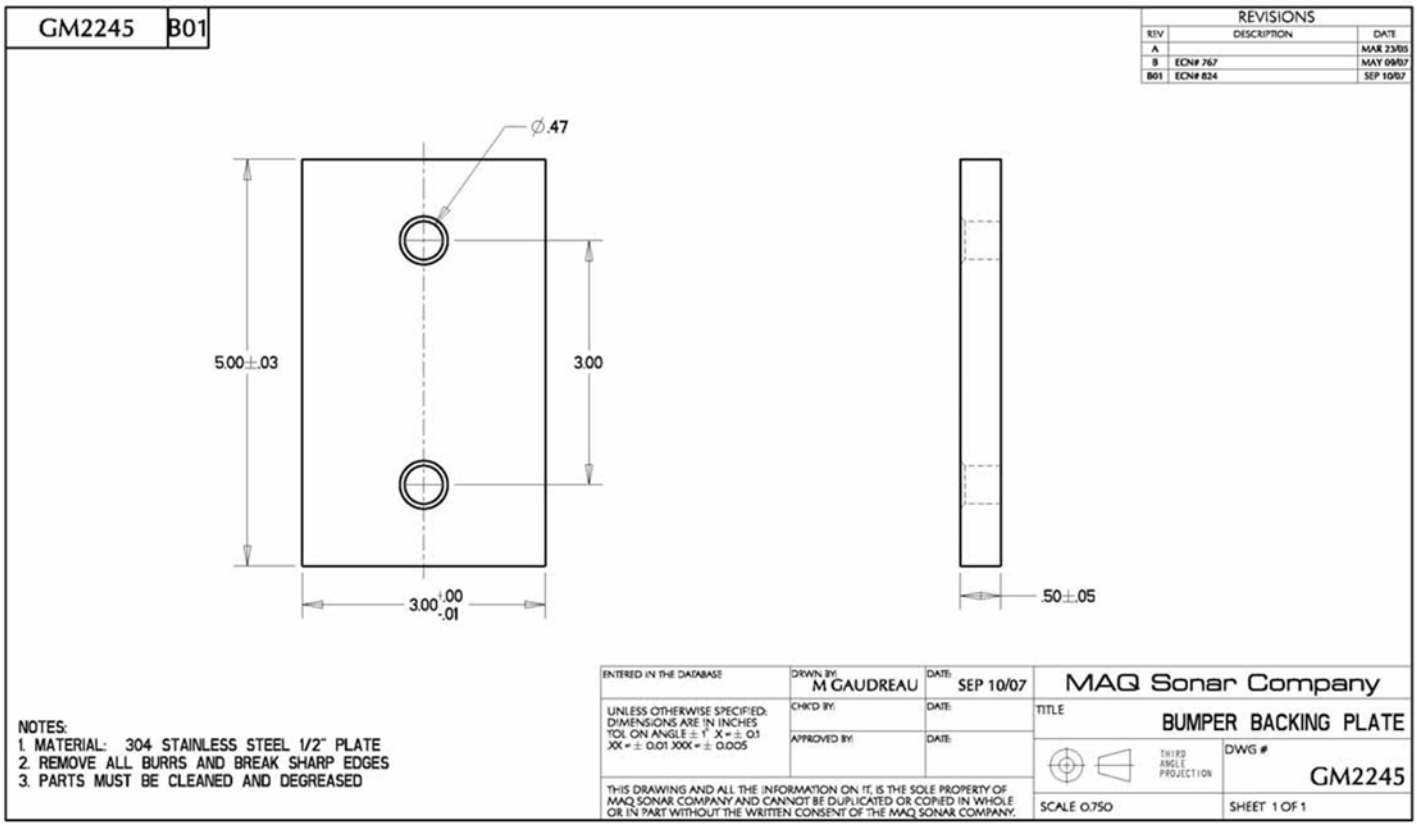


Figure 23 : 22Hz Bumper Backing Plate

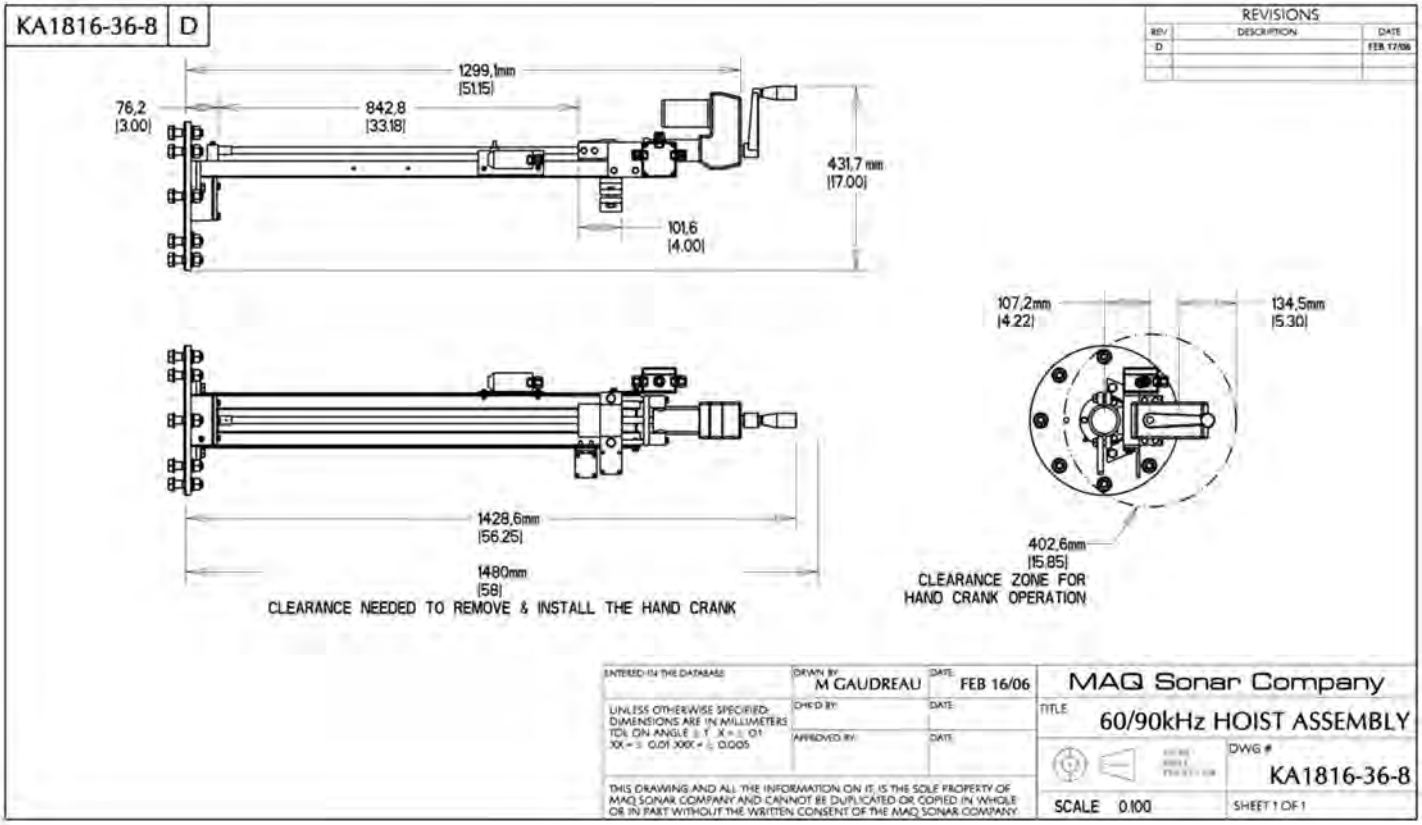


Figure 24 : 60/90kHz Hoist

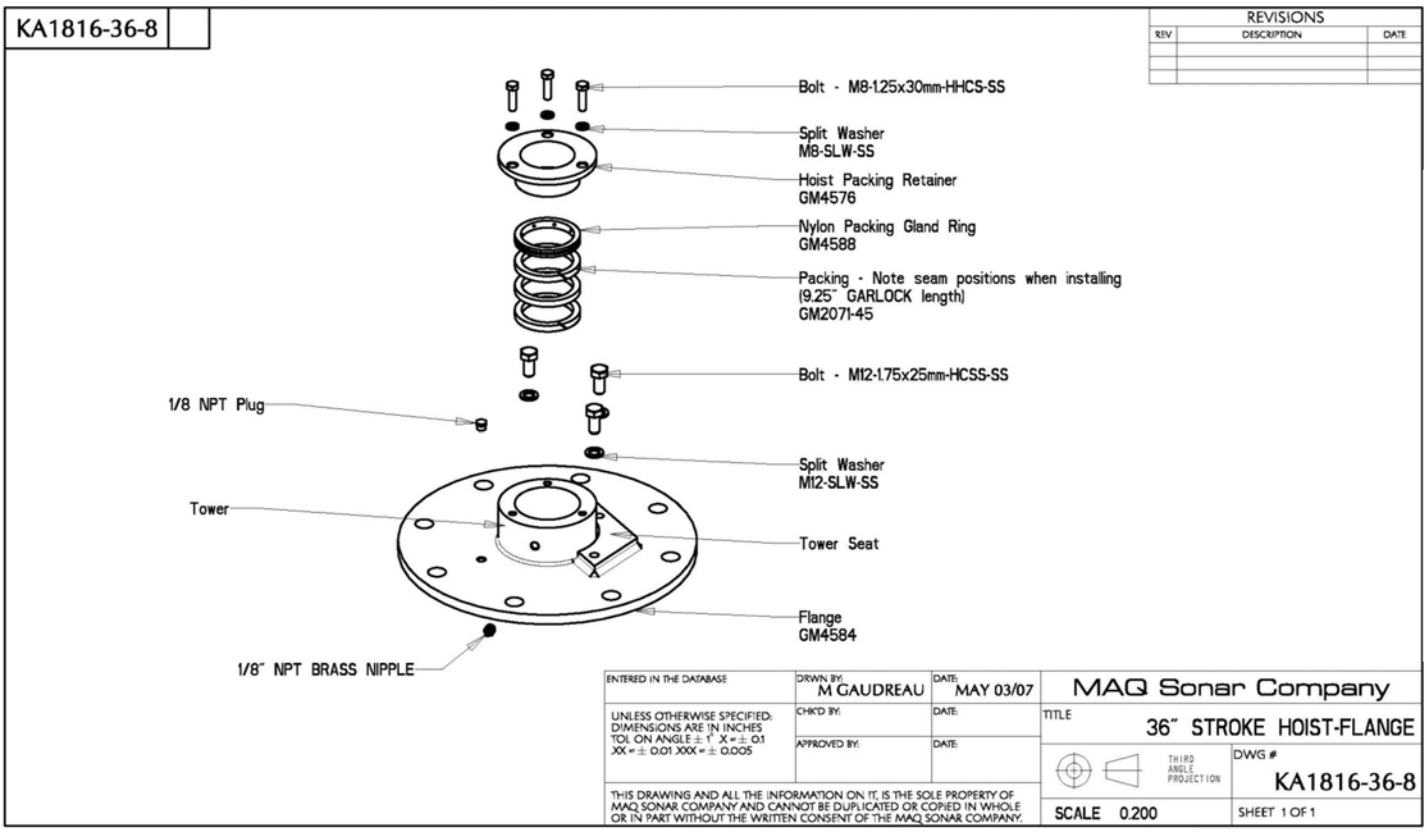


Figure 25 : 60/90kHz Hoist

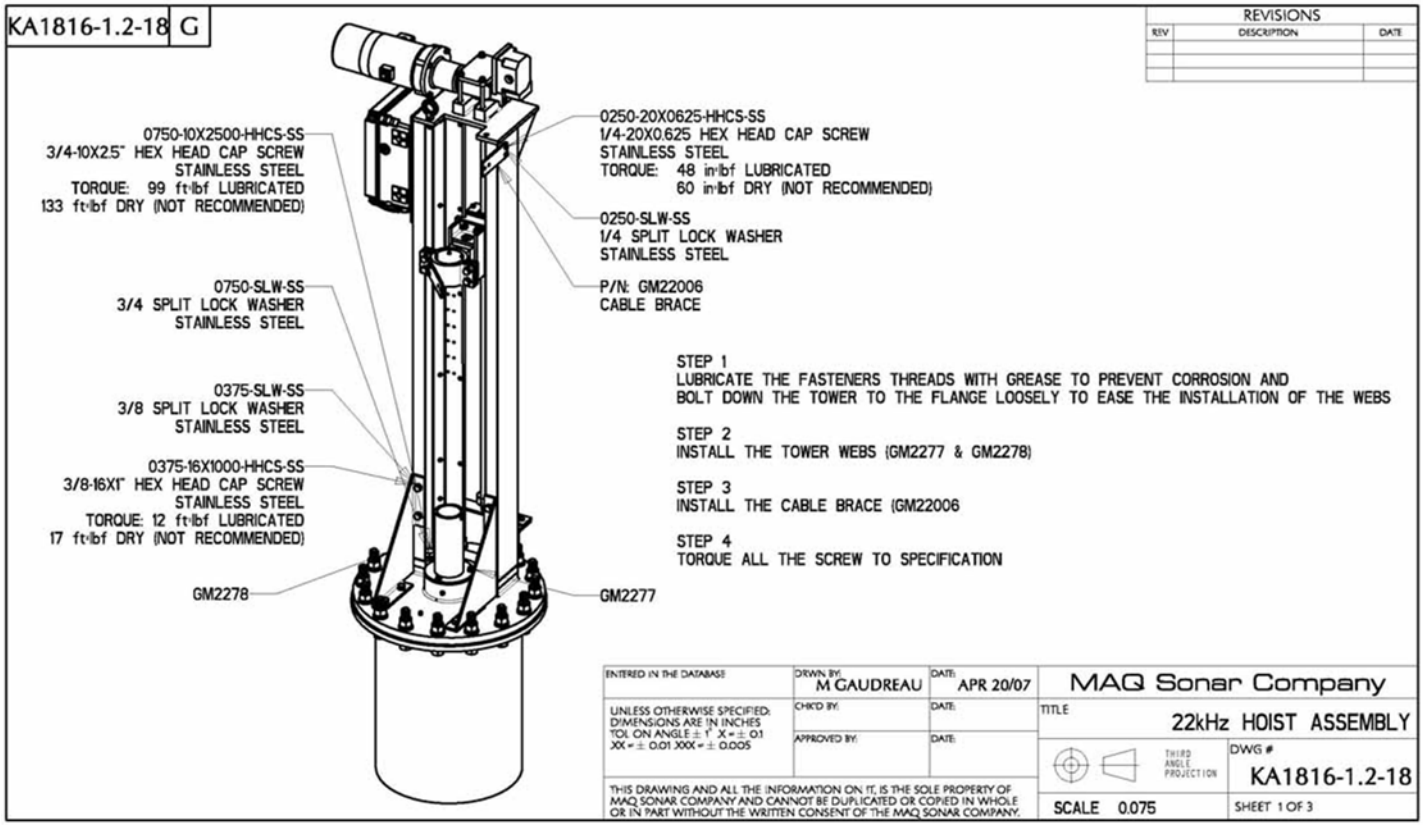


Figure 26 : 22Hz Hoist

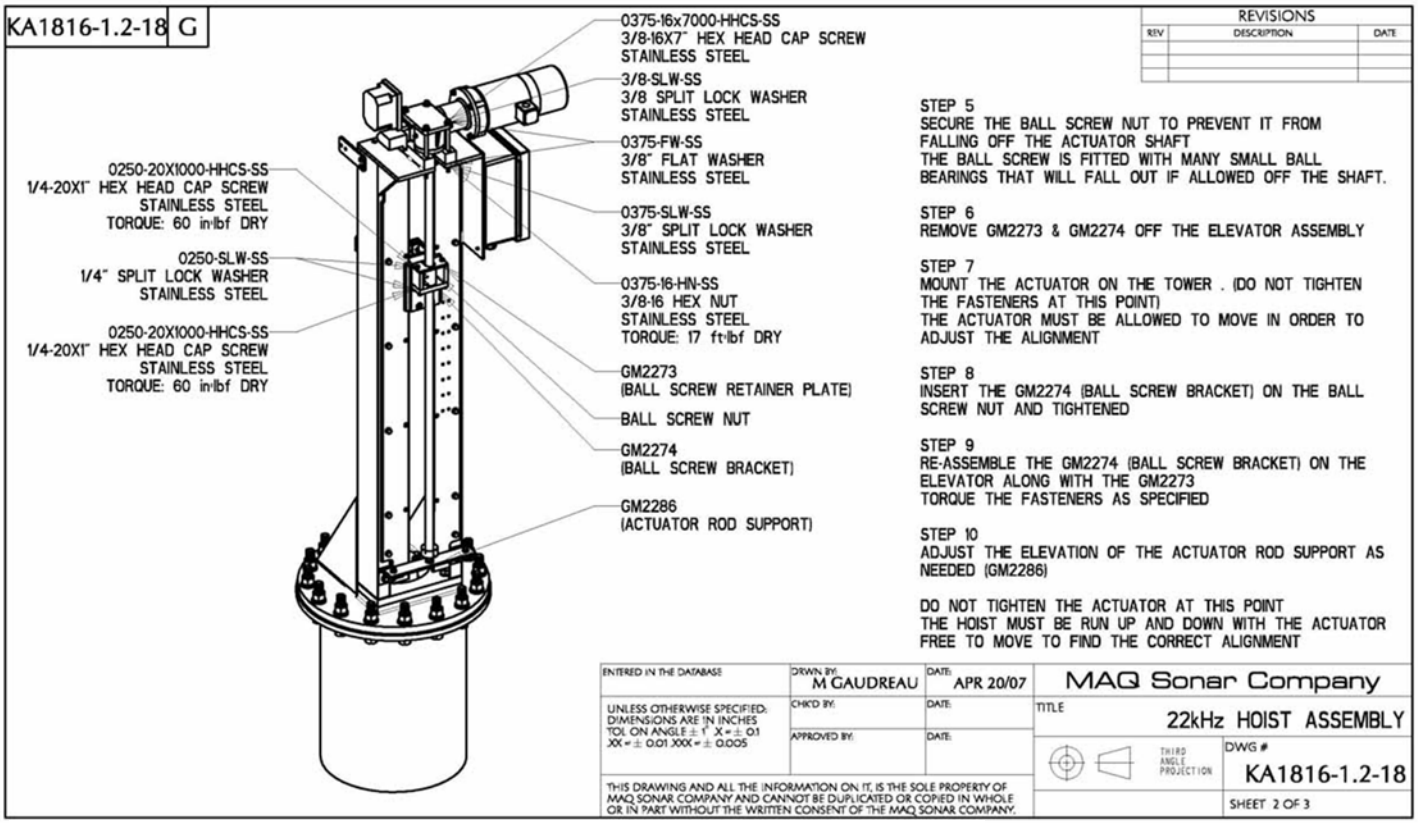


Figure 27 : 22Hz Hoist

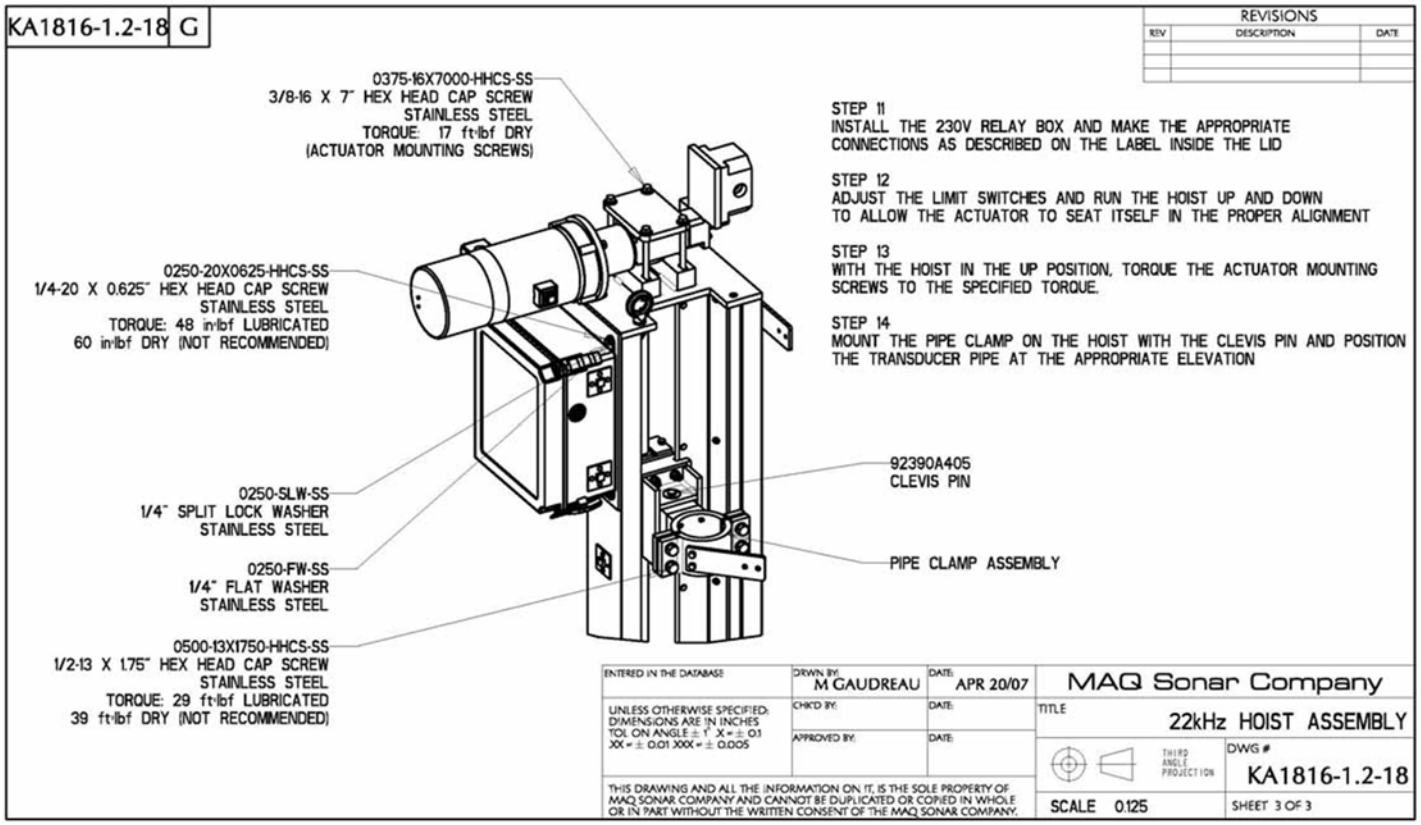


Figure 28 : 22Hz Hoist

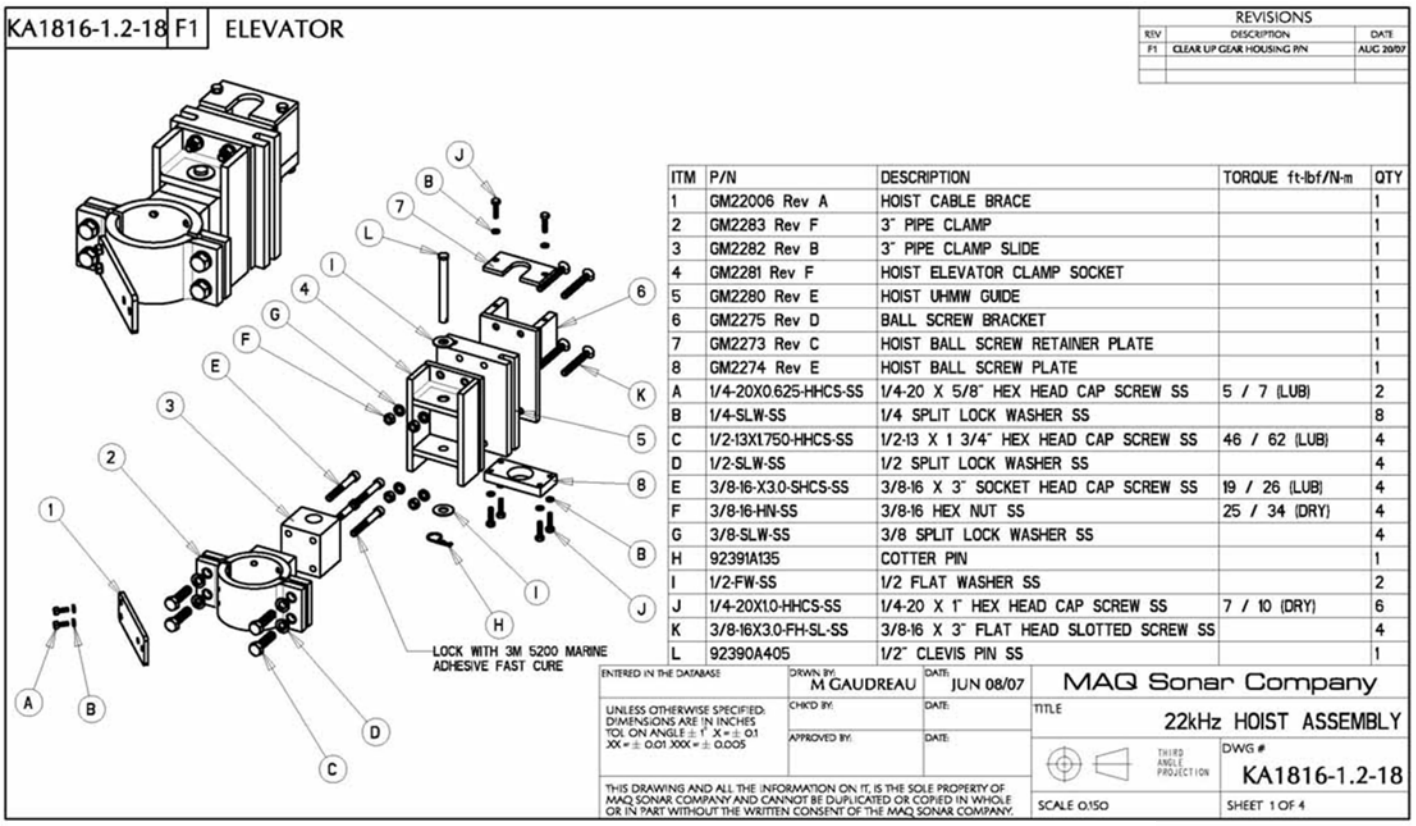
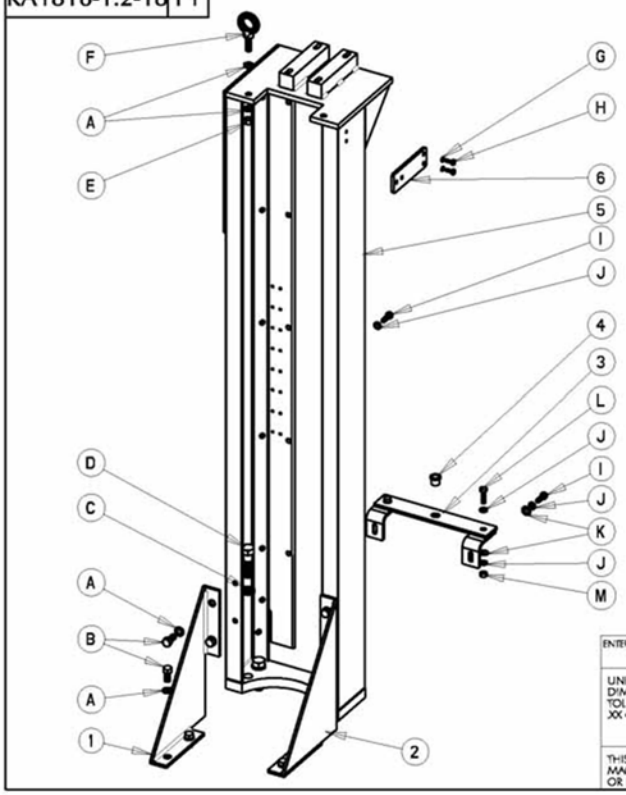


Figure 29: 22Hz Hoist

KA1816-1.2-18 F1



REVISIONS

REV	DESCRIPTION	DATE
F1	CLEAR UP GEAR HOUSING P/N	AUG 29/07

ITM	P/N	DESCRIPTION	TORQUE ft-lbf/N-m	QTY
1	GM2277 Rev D	HOIST LEFT BRACE PLATE		
2	GM2278 Rev D	HOIST RIGHT BRACE PLATE		
3	GM2286 Rev E	ACTUATOR ROD SUPPORT		
4	57785K26	NON METALLIC FLANGED BEARING		
5	GM2285-48 Rev C	48" STROKE HOIST FRAME		
6	GM22006 Rev A	HOIST CABLE BRACE		
A	1/2-SLW-SS	1/2 SPLIT LOCK WASHER SS		
B	1/2-13X1.0-HHCS-SS	1/2-13 X 1" HEX HEAD CAP SCREW SS	46 / 62 (LUB)	
C	3/4-SLW-SS	3/4 SPLIT LOCK WASHER SS		
D	3/4-10X2.5-HHCS-SS	3/4-10 X 2 1/2" HEX HEAD CAP SCREW SS	160 / 215 (LUB)	
E	1/2-13-HN-SS	1/2-13 HEX NUT SS	60 / 80 (DRY)	
F	33045T82	1/2" EYE BOLT WITH SHOULDER SS		
G	1/4-SLW-SS	1/4 SPLIT LOCK WASHER SS		
H	1/4-20X0.625-HHCS-SS	1/4-20 X 5/8" HEX HEAD CAP SCREW SS	5 / 7 (LUB)	
I	3/8-16X1.0-HHCS-SS	3/8-16 X 1" HEX HEAD CAP SCREW SS	19 / 26 (LUB)	
J	3/8-SLW-SS	3/8 SPLIT LOCK WASHER SS		
K	3/8-FW-SS	3/8 FLAT WASHER SS		
L	3/8-16X1.25-HHCS-SS	3/8-16 X 1 1/4" HEX HEAD CAP SCREW SS	25 / 34 (DRY)	
M	3/8-16-HN-SS	3/8-16 HEX NUT SS	25 / 34 (DRY)	

ENTERED IN THE DATABASE | DRWN BY: M GAUDREAU | DATE: JUN 08/07 | MAQ Sonar Company

UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES TOL ON ANGLE ± 1° X = ± 0.1 XX = ± 0.01 XXX = ± 0.005 | CHK'D BY: | DATE: | APPROVED BY: | DATE:

TITLE: 22kHz HOIST ASSEMBLY

THIRD ANGLE PROJECTION | DWG # KA1816-1.2-18

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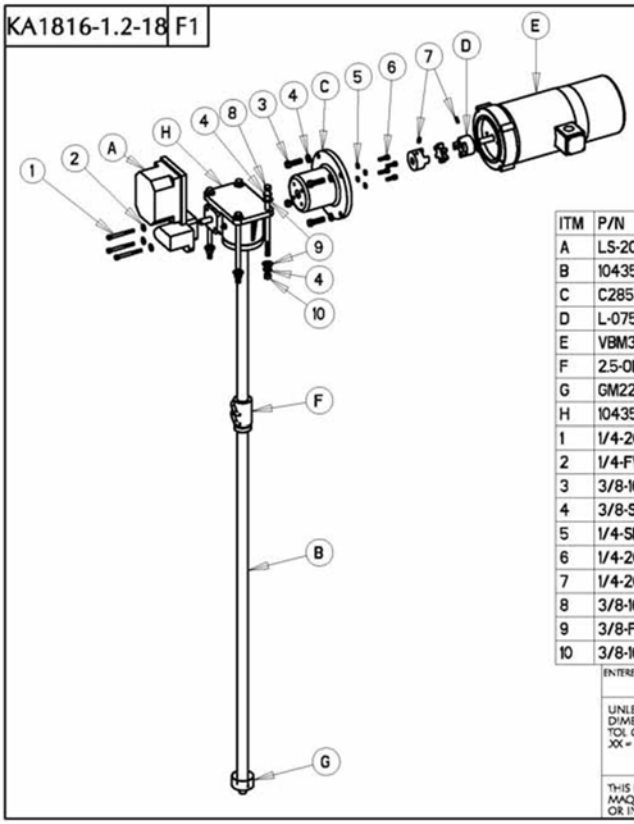
SCALE 0.150 | SHEET 2 OF 4

Figure 30 : 22Hz Hoist

KA1816-1.2-18 F1



REVISIONS

REV	DESCRIPTION	DATE
F1	CLEAR UP GEAR HOUSING P/N	AUG 29/07

ITM	P/N	DESCRIPTION	QTY
A	LS-2C-340A	LIMIT SWITCH	1
B	10435-02-06	LIFTING SCREW	1
C	C2851-00-01	MOTOR ADAPTOR	1
D	L-075	1/2" LOVEJOY SHAFT JOINT	1
E	VBM3554	3-PHASE BRAKE MOTOR 230VAC, 1-1/2HP, 1800RPM, "C" FACE ADAPTER, TEFC	1
F	2.5-OB-X-07509	BALL NUT	1
G	GM2261 Rev 0	22kHz ACTUATOR ROD EXTENSION (USE LOCTITE 242)	1
H	10435-02-05	GEAR HOUSING	
1	1/4-20X2.5-SHCS-STL-BO	1/4-20 X 2-1/2" SOCKET HEAD CAP SCREW - BLACK OXIDE STEEL	4
2	1/4-FW-SS	1/4" FLAT WASHER STAINLESS STEEL	4
3	3/8-16X1250-HHCS-SS	3/8-16 X 1-1/4" HEX HEAD CAP SCREW - STAINLESS STEEL	4
4	3/8-SLW-SS	3/8 SPLIT LOCK WASHER - STAINLESS STEEL	12
5	1/4-SLW-SS	1/4 SPLIT LOCK WASHER - STAINLESS STEEL	4
6	1/4-20X0750-SHCS-STL-BO	1/4-20 X 3/4" HEX HEAD CAP SCREW - BLACK OXIDE STEEL	4
7	1/4-20X0500-STS-STL-BO	1/4-20 SET SCREW - BLACK OXIDE STEEL	2
8	3/8-16X7.0-HHCS-SS	3/8-16 X 7" HEX HEAD CAP SCREW - STAINLESS STEEL	4
9	3/8-FW-SS	3/8 FLAT WASHER - STAINLESS STEEL	8
10	3/8-16-HN-SS	3/8-16 HEX NUT - STAINLESS STEEL	4

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TITLE: 10435-02-00 ACTUATOR

THIRD ANGLE PROJECTION | DWG # KA1816-1.2-18

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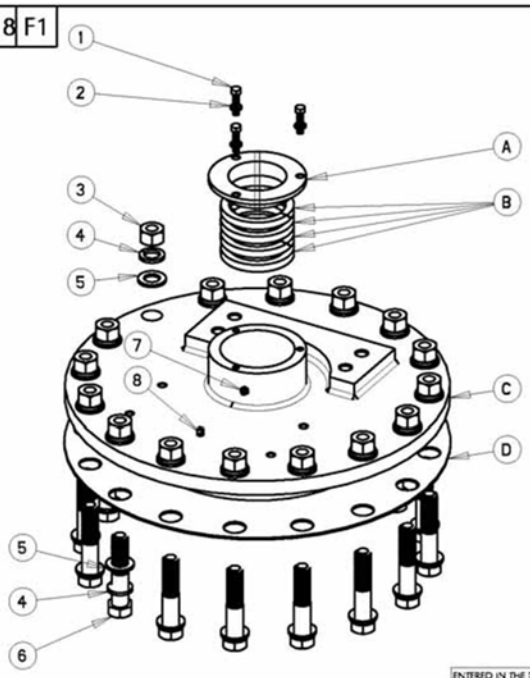
SCALE 0.150 | SHEET 3 OF 4

Figure 31 : 22Hz Hoist

KA1816-1.2-18 F1



REVISIONS		
REV	DESCRIPTION	DATE
F1	CLEAR UP GEAR HOUSING P/N	AUG 20/07

ITM	P/N	DESCRIPTION	QTY
A	GM2279 Rev B	HOIST PACKING GLAND COMPRESSION PLATE	1
B	GM2071-22 Rev A	SQUARE BRAIDED COMPRESSION PACKING	4
C	GM2289 Rev C	16" SEA CHEST HOIST FLANGE - 23.5" DIA	1
D	GM2295-16 Rev B	16" SEA CHEST FLANGE GASKET	1
C	GM2284 Rev F	18" SEA CHEST HOIST FLANGE - 25" DIA	1
D	GM2295-18 Rev B	18" SEA CHEST FLANGE GASKET	1
1	3/8-16X1.5-HHCS-SS	3/8-16 X 1-1/2" HEX HEAD CAP SCREW 18-8SS	3
2	3/8-SLW-SS	3/8 SPLIT LOCK WASHER 18-8SS	3
3	M24-3.0-HN-SS	M24-3.0 HEX NUT 18-8SS	16
4	M24-SLW-SS	M24 SPLIT LOCK WASHER 18-8SS	32
5	M24-FW-SS	M24 FLAT WASHER 18-8SS	32
6	M24-3.0X120-HHCS-SS	M24-3.0 X 120mm HEX HEAD CAP SCREW 18-8SS	16
7	3088K16	GREASE NIPPLE STRAIGHT 1/8 NPT	1
8	50785K21	1/8 NPT BRASS HEX HEAD PLUG (HOLLOW)	1

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CHK'D BY: | DATE: | APPROVED BY: | DATE:

TITLE: 22kHz HOIST ASSEMBLY

THIRD ANGLE PROJECTION | DWG # KA1816-1.2-18

SCALE 0.150 | SHEET 4 OF 4

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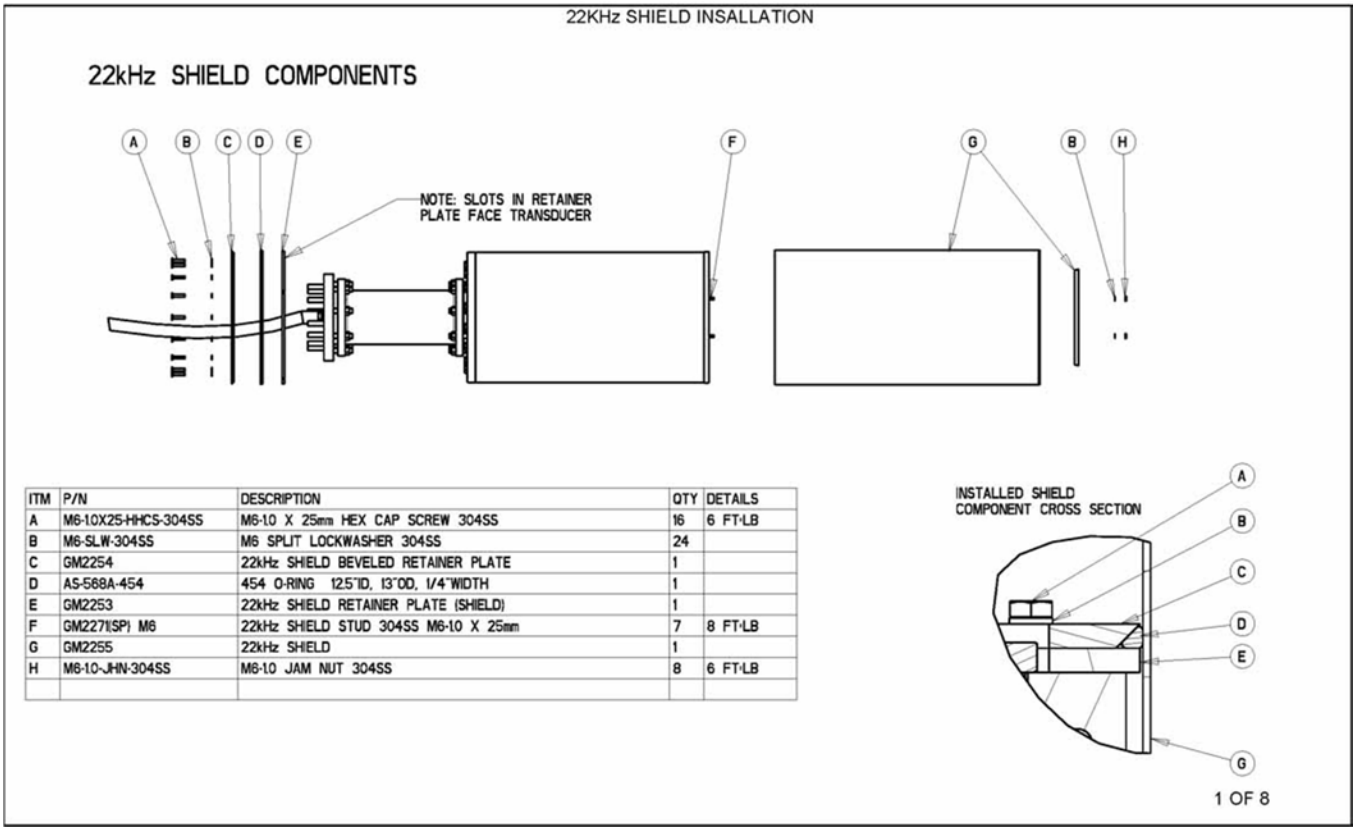
Figure 32 : 22Hz Flange



ITM	P/N	DESCRIPTION	QTY	DETAILS
A	M6-1.0X25-HHCS-304SS	M6-1.0 X 25mm HEX CAP SCREW 304SS	16	6 FT-LB
B	M6-SLW-304SS	M6 SPLIT LOCKWASHER 304SS	24	
C	GM2254	22kHz SHIELD BEVELED RETAINER PLATE	1	
D	AS-568A-454	454 O-RING 12.5"ID, 13"OD, 1/4"WIDTH	1	
E	GM2253	22kHz SHIELD RETAINER PLATE (SHIELD)	1	
F	GM2271(SP) M6	22kHz SHIELD STUD 304SS M6-1.0 X 25mm	7	8 FT-LB
G	GM2255	22kHz SHIELD	1	
H	M6-1.0-JHN-304SS	M6-1.0 JAM NUT 304SS	8	6 FT-LB

Figure 33 : 22Hz Shield Installation

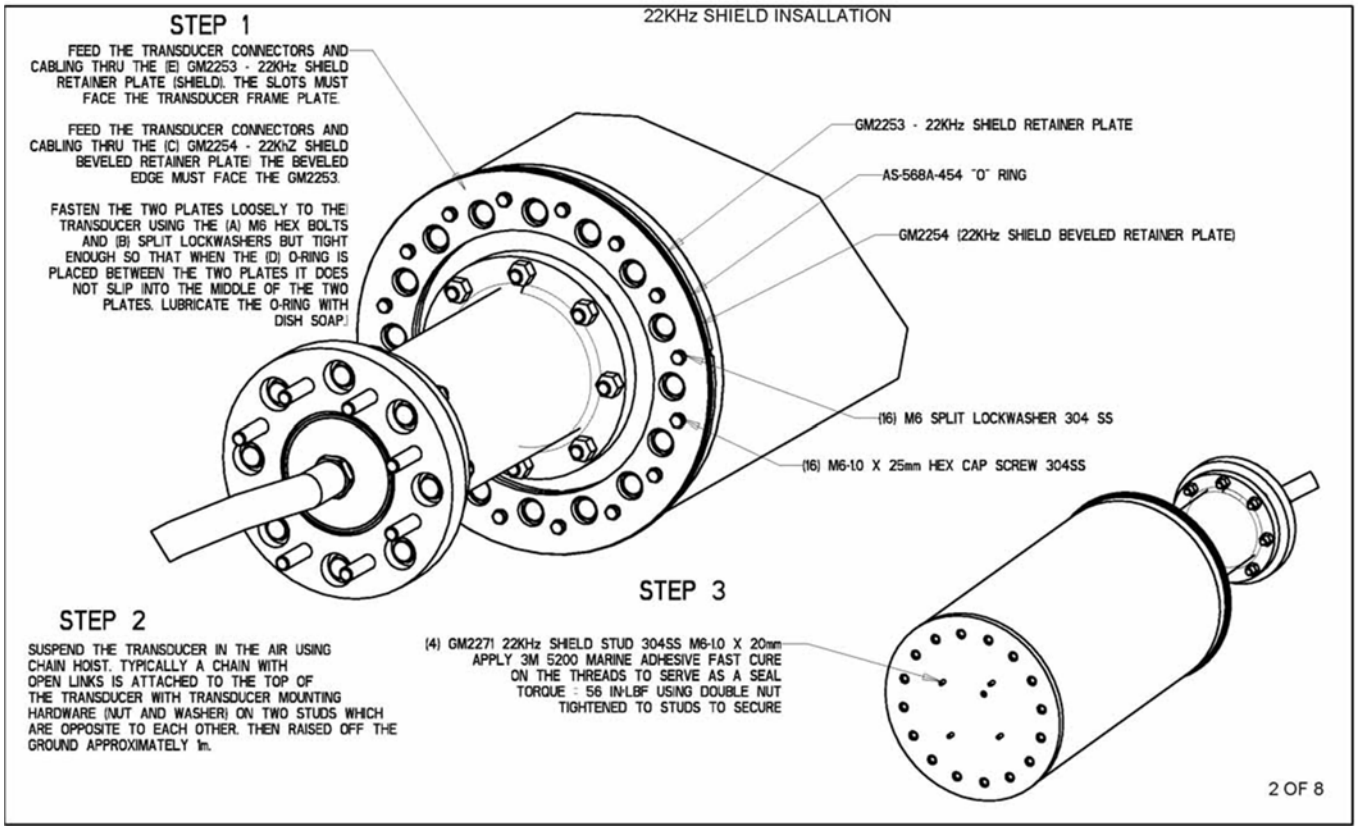


Figure 34 : 22Hz Shield Installation

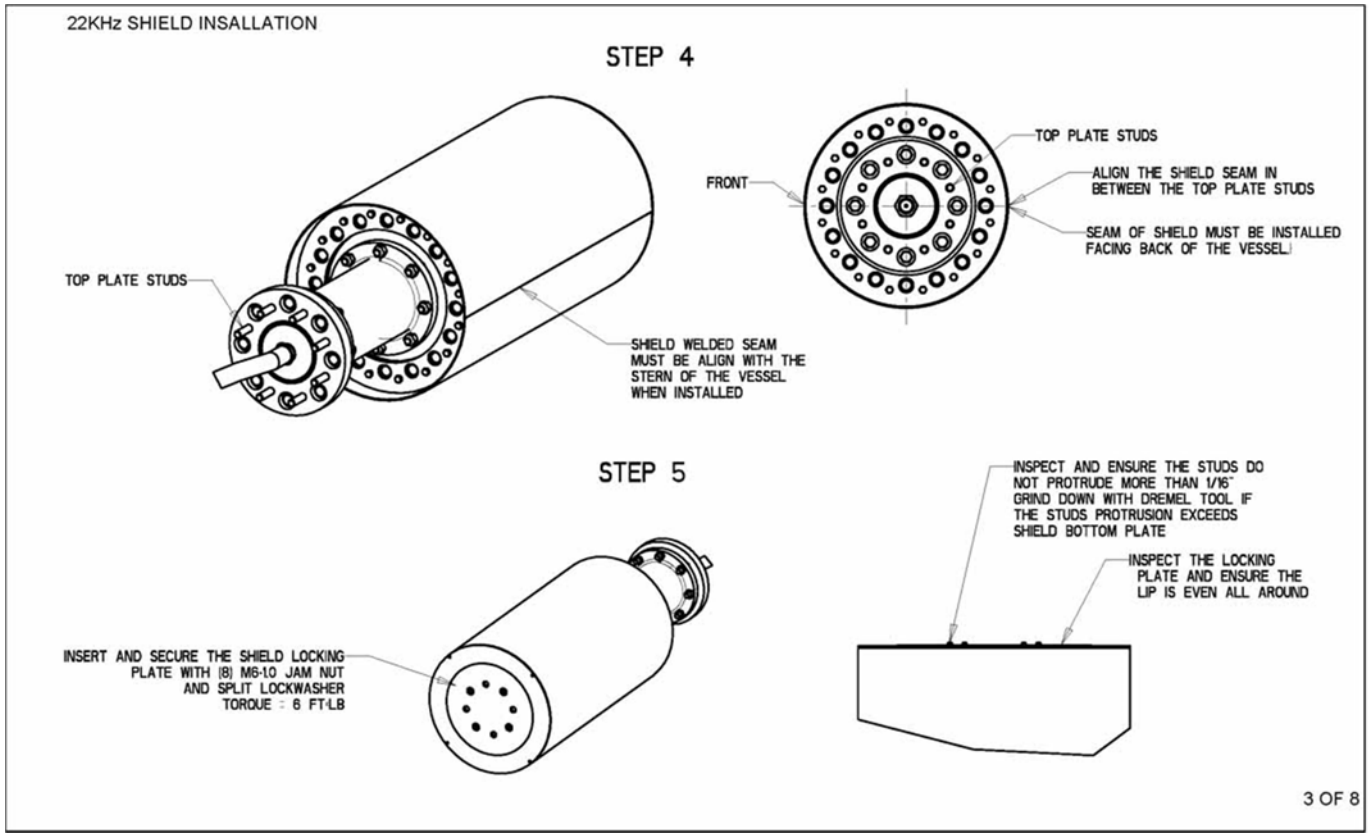


Figure 35: 22Hz Shield Installation

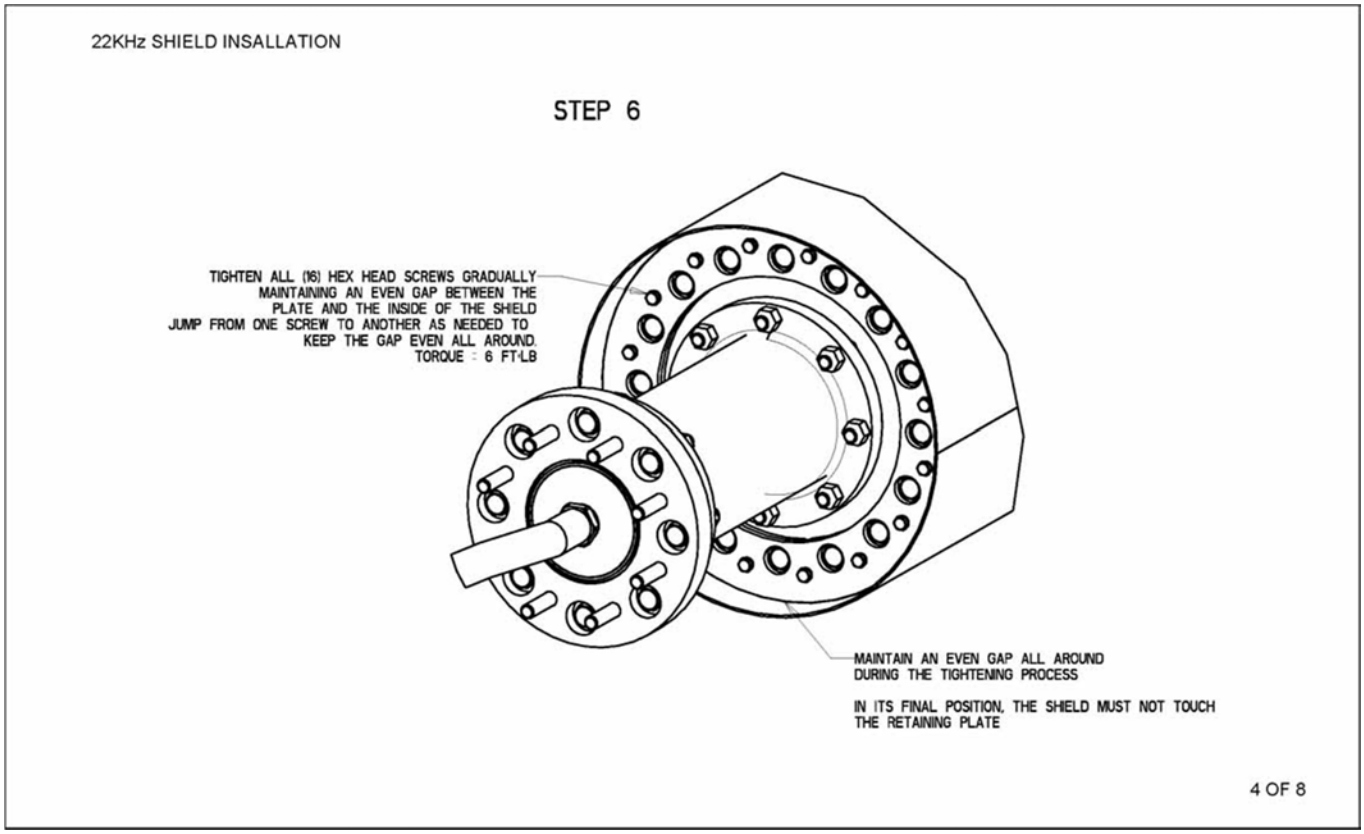


Figure 36 : 22Hz Shield Installation

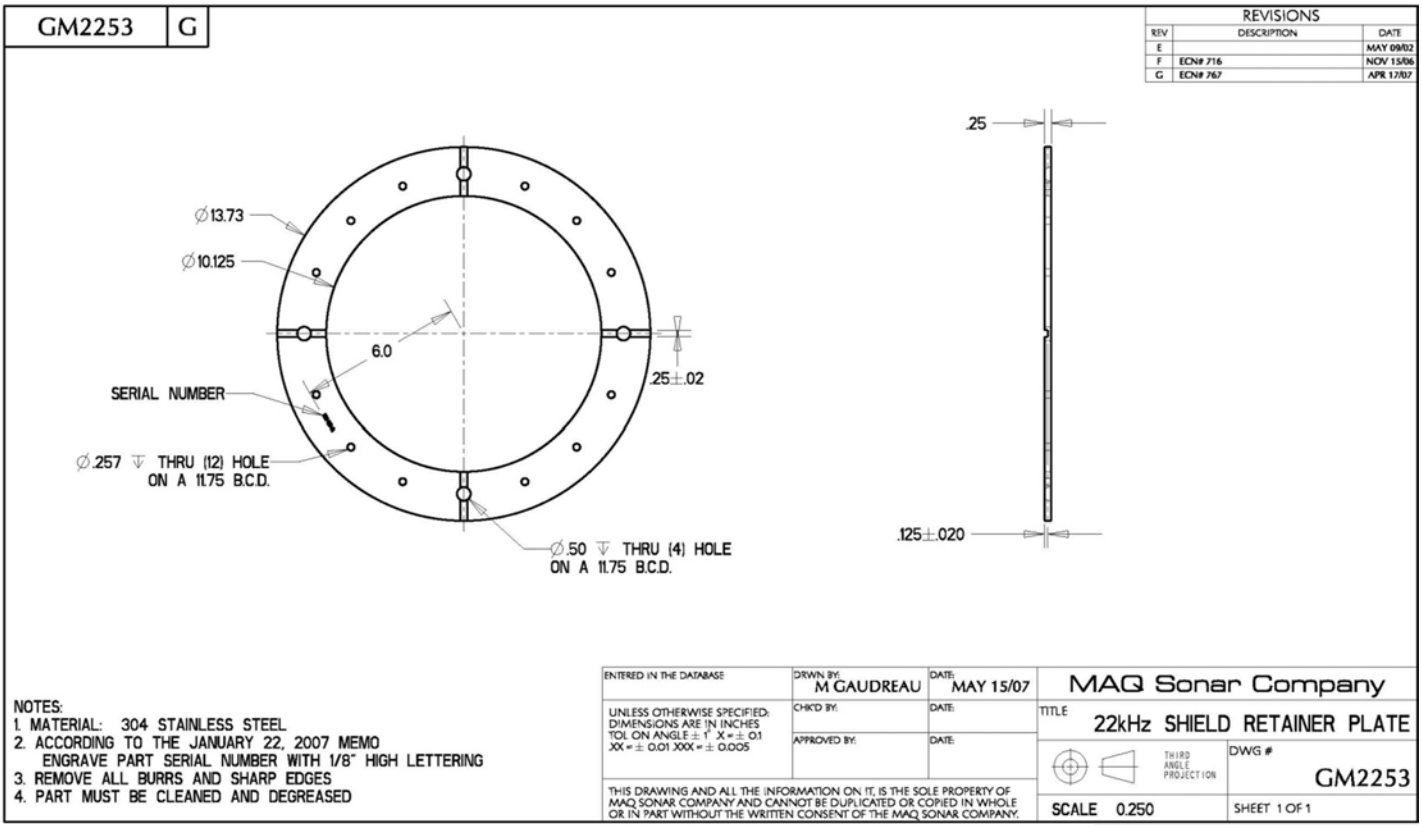


Figure 37 : 22Hz Shield Retainer Plate

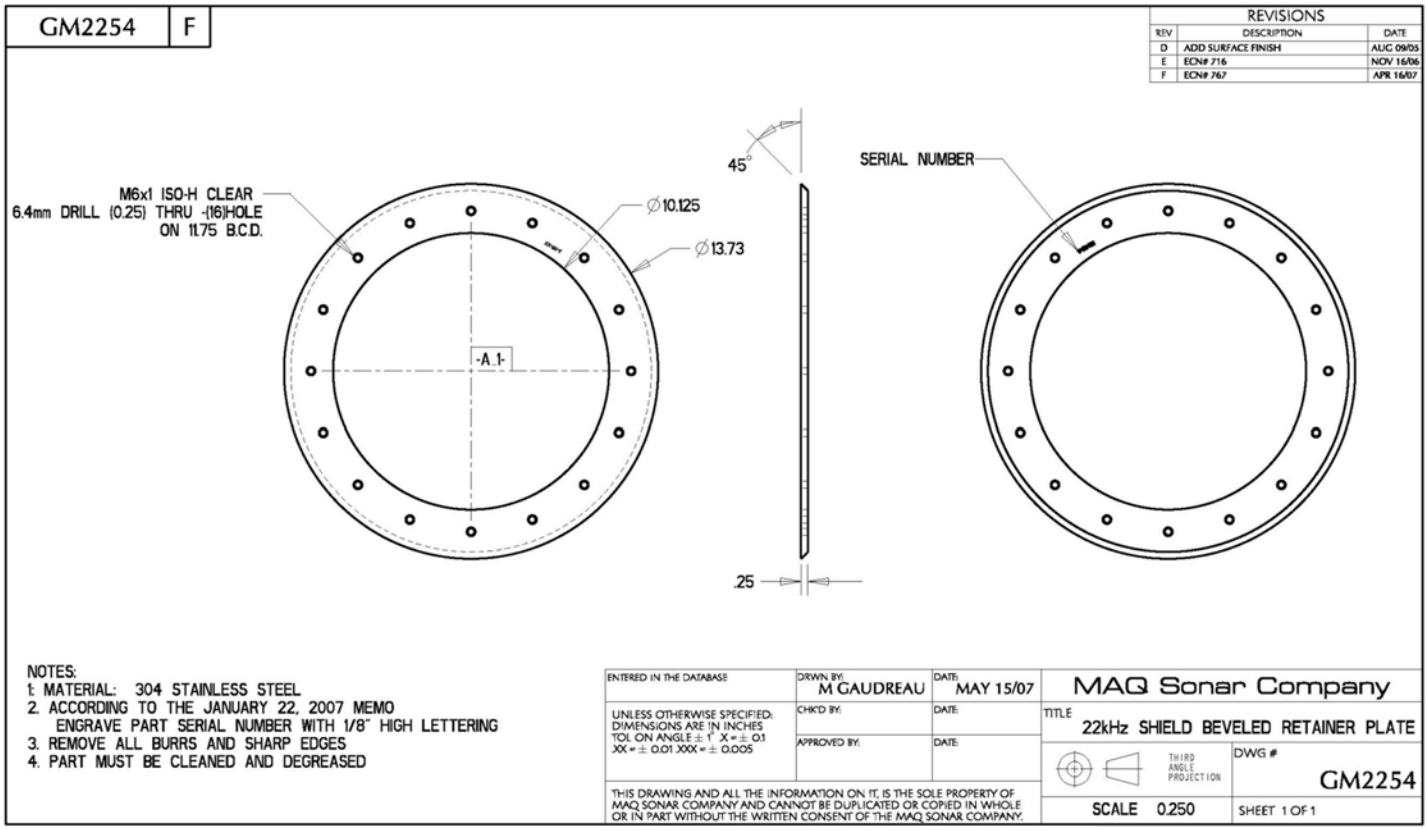


Figure 38 : 22Hz Shield Beveled RetainerPlate

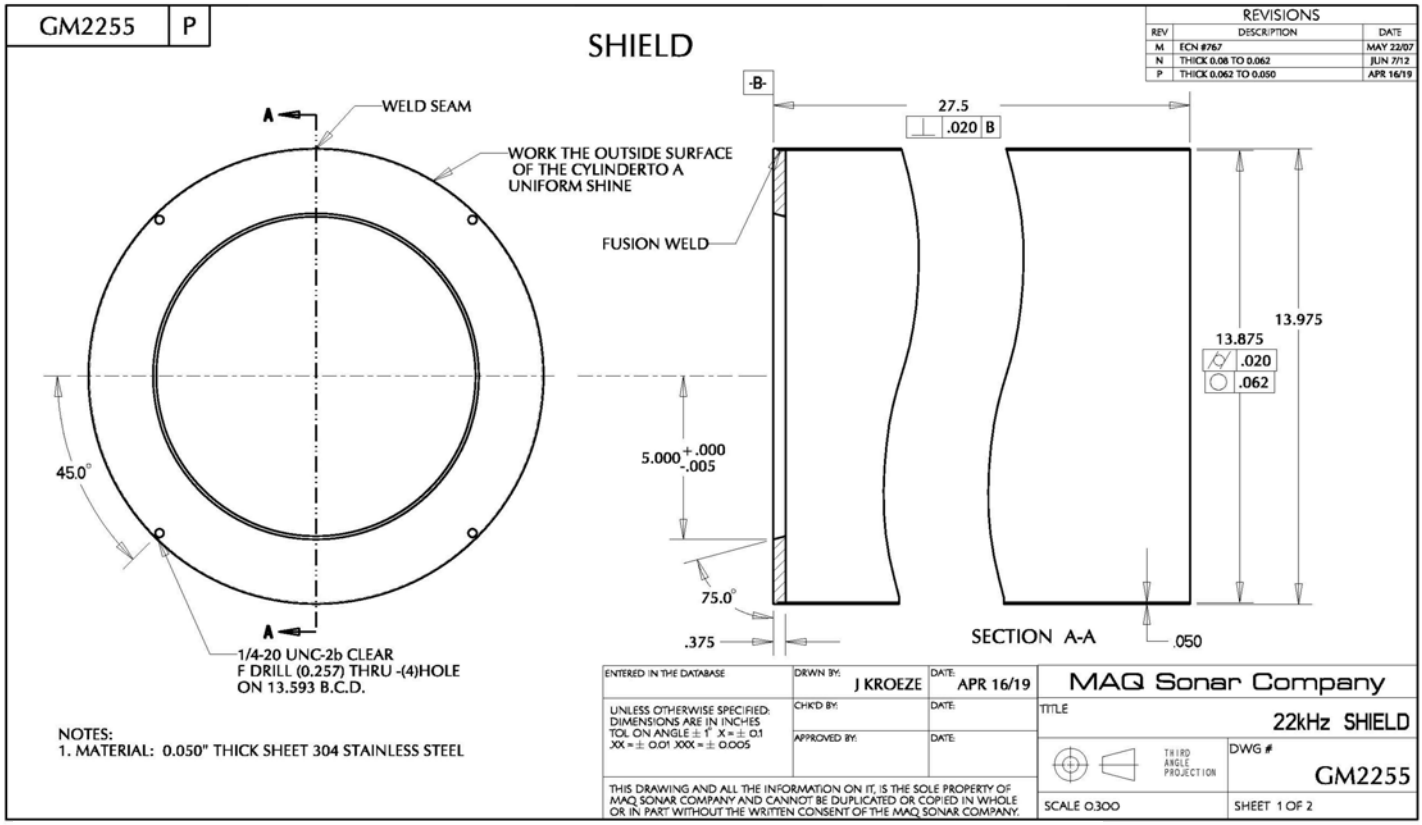


Figure 39 : 22Hz Shield

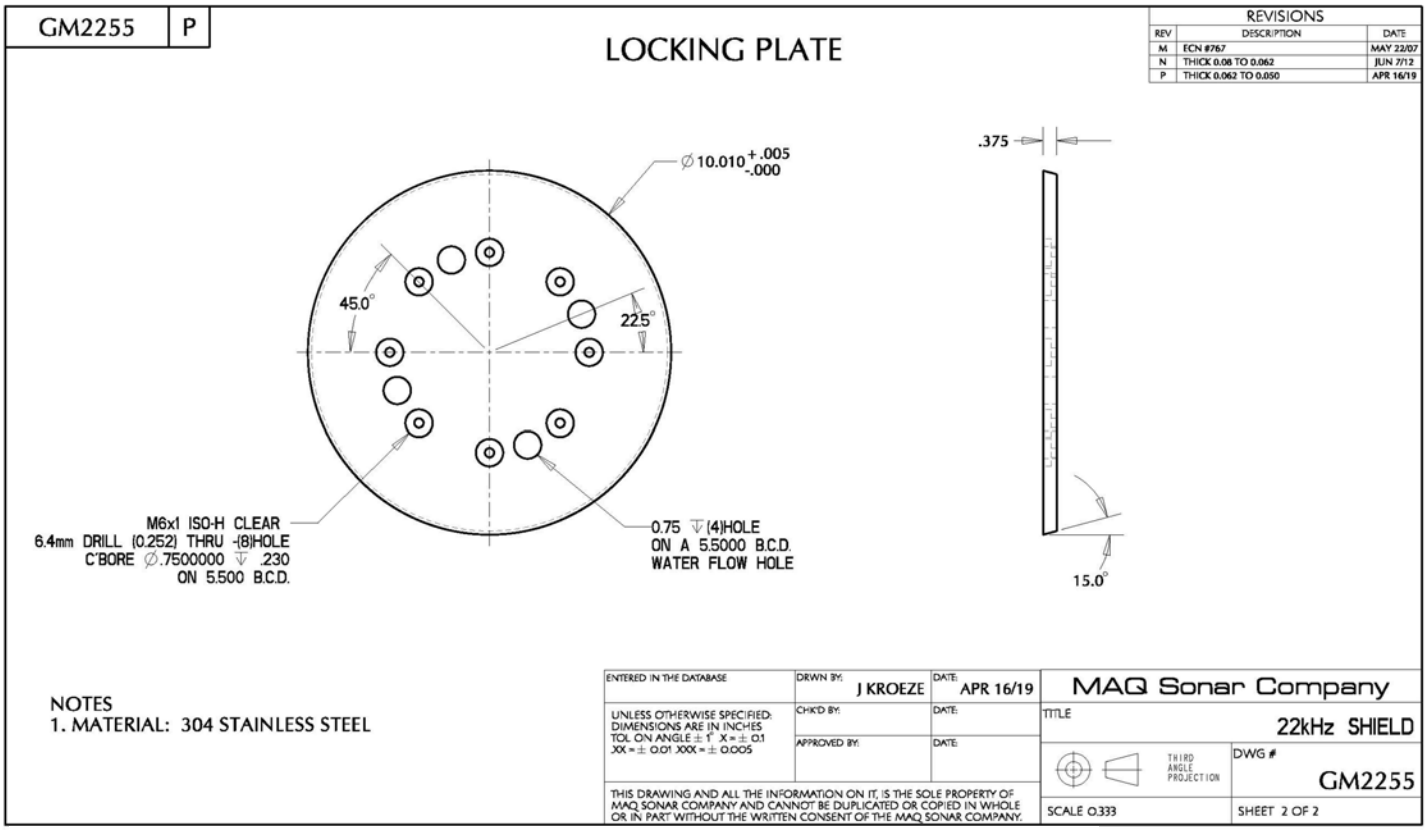


Figure 40 : 22Hz Locking Plate

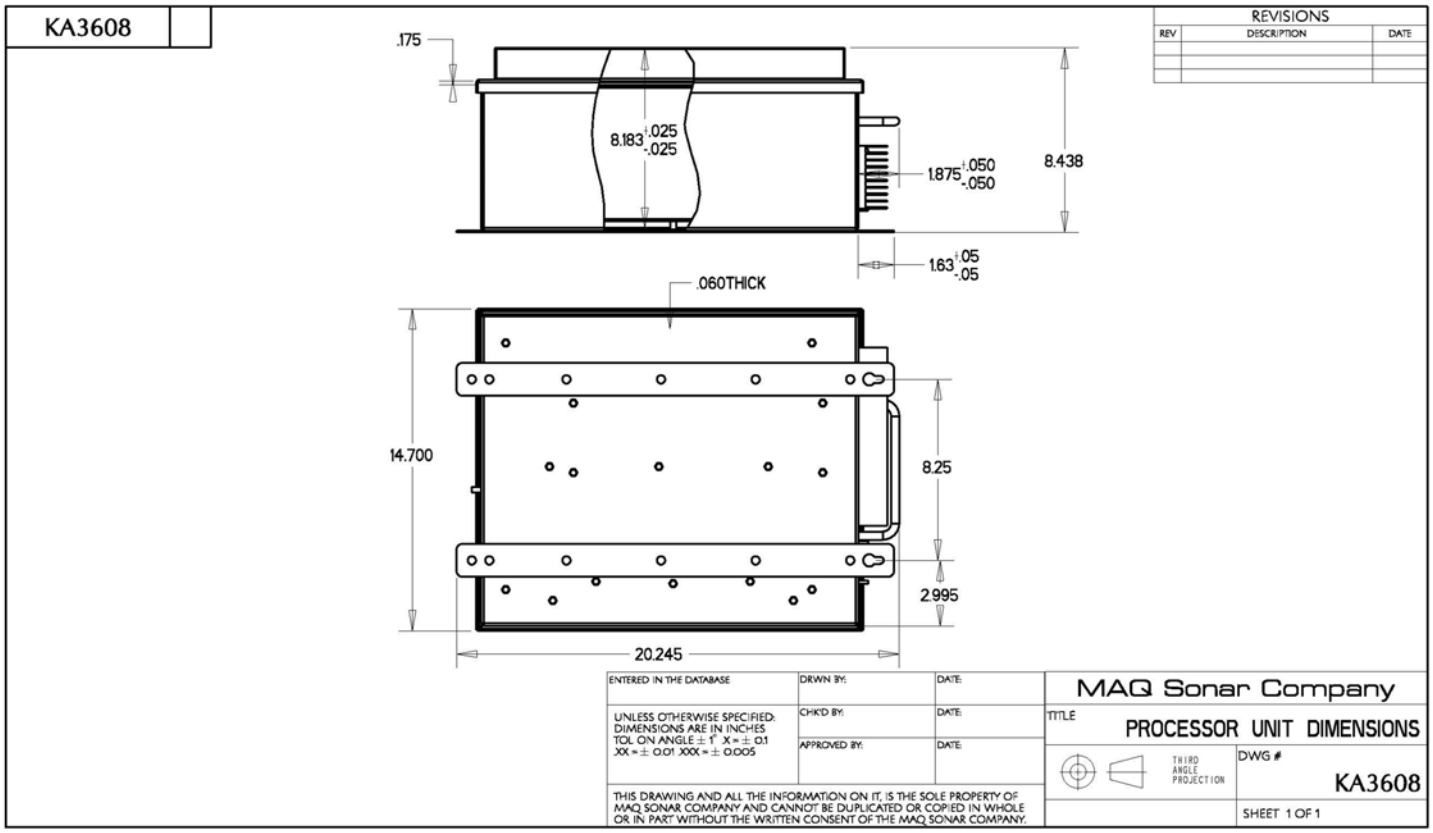


Figure 41 : Processor Unit

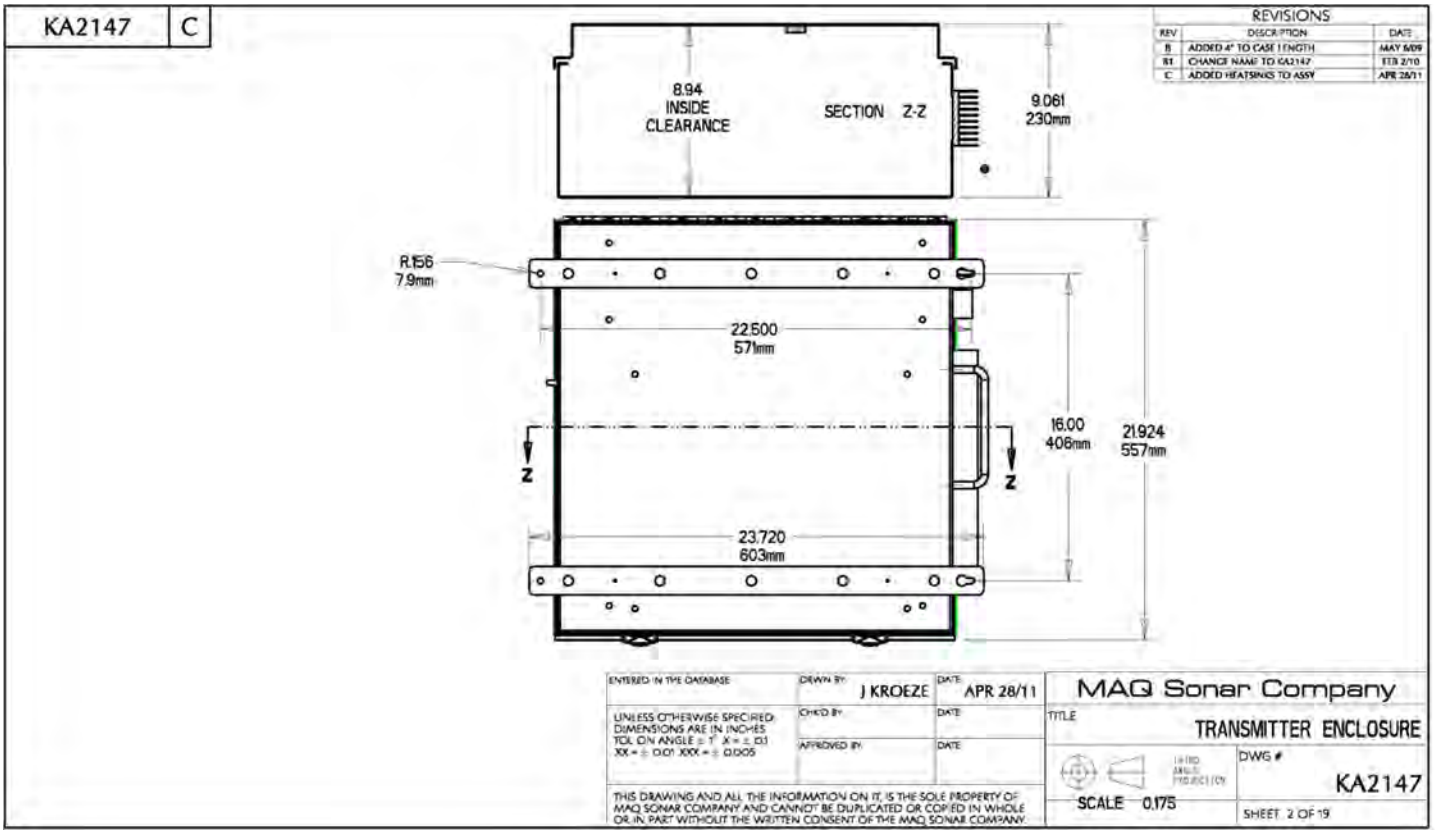


Figure 42 : Transceiver/ Transmitter Unit

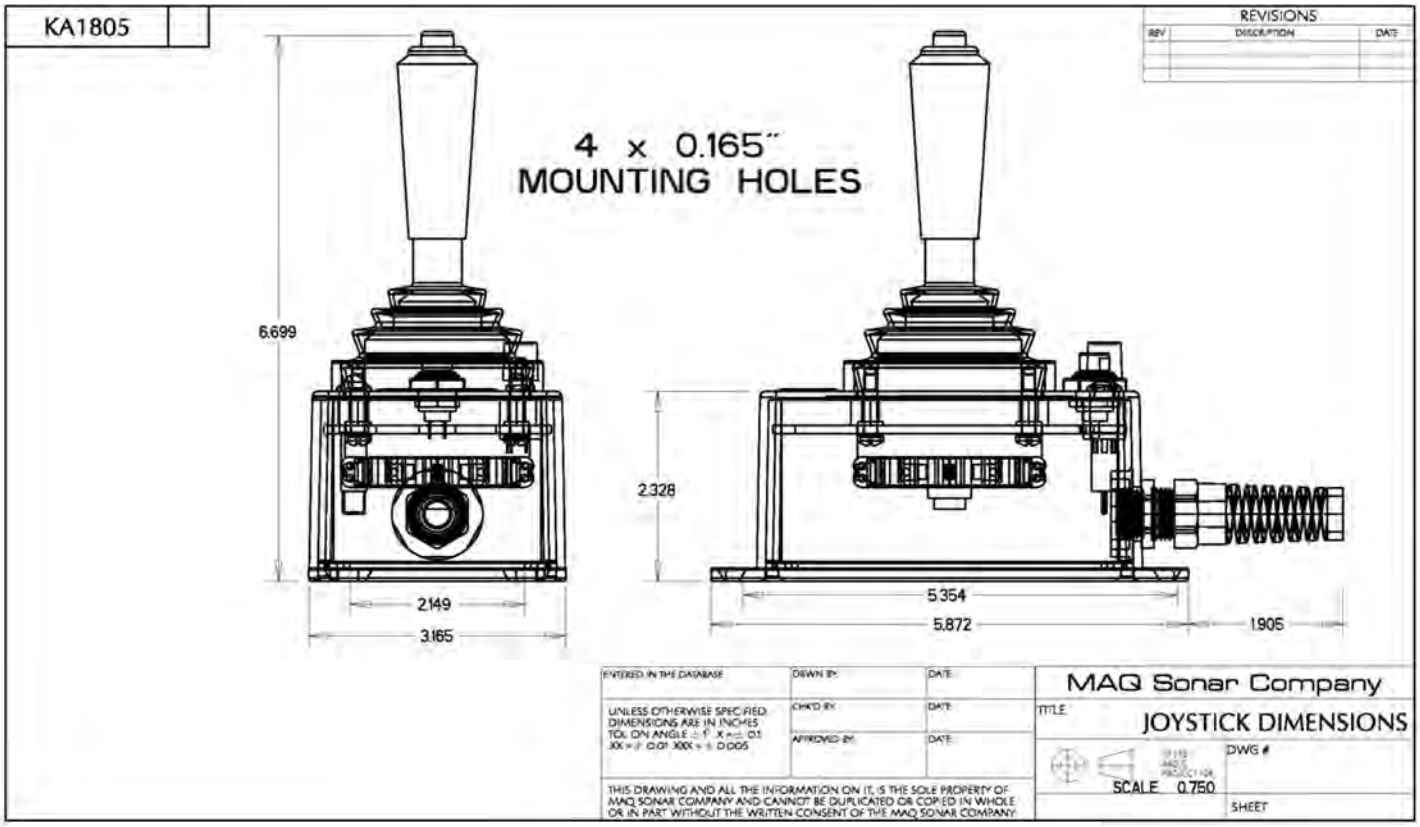


Figure 43 : Joystick Enclosure

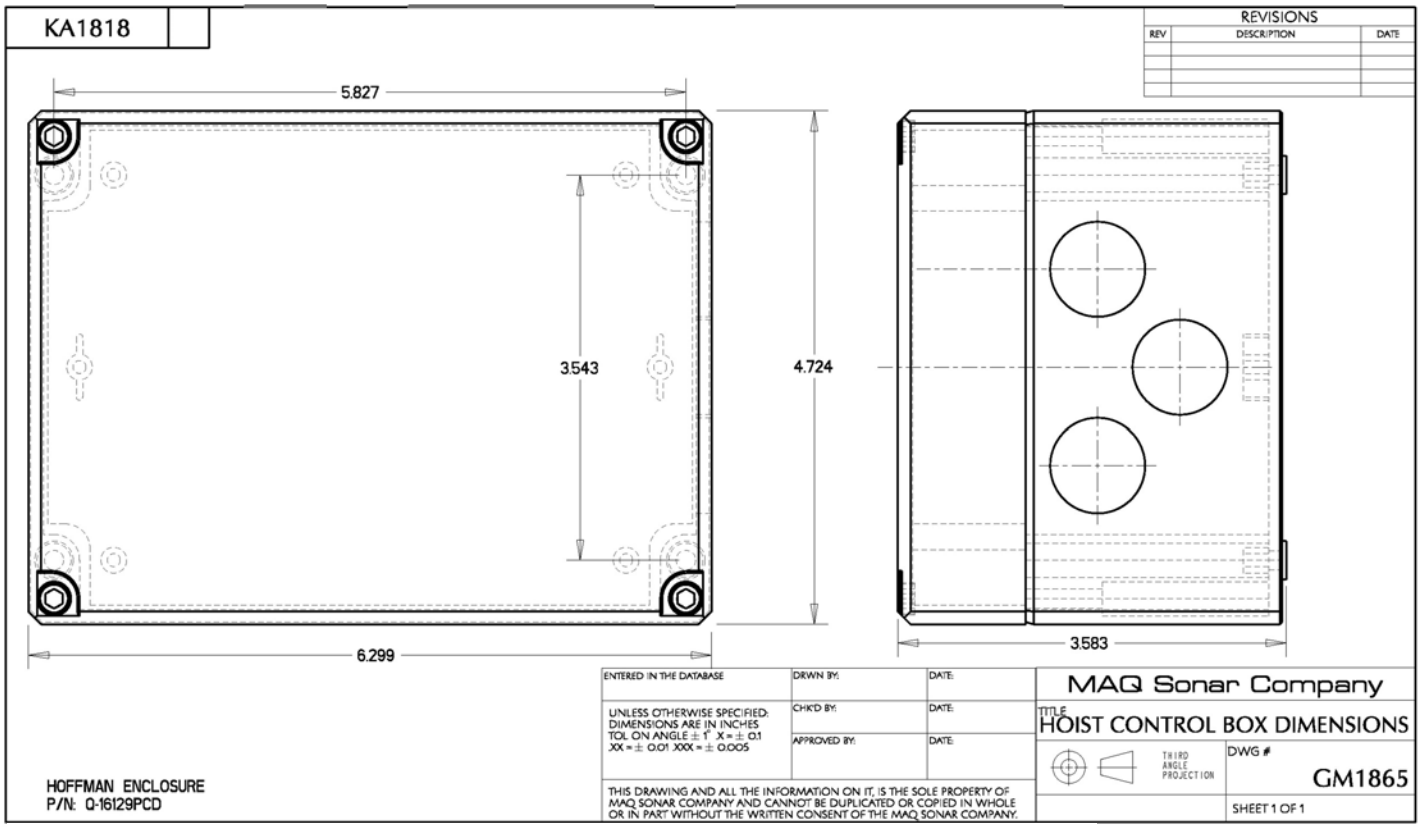


Figure 44 : Hoist Control Box

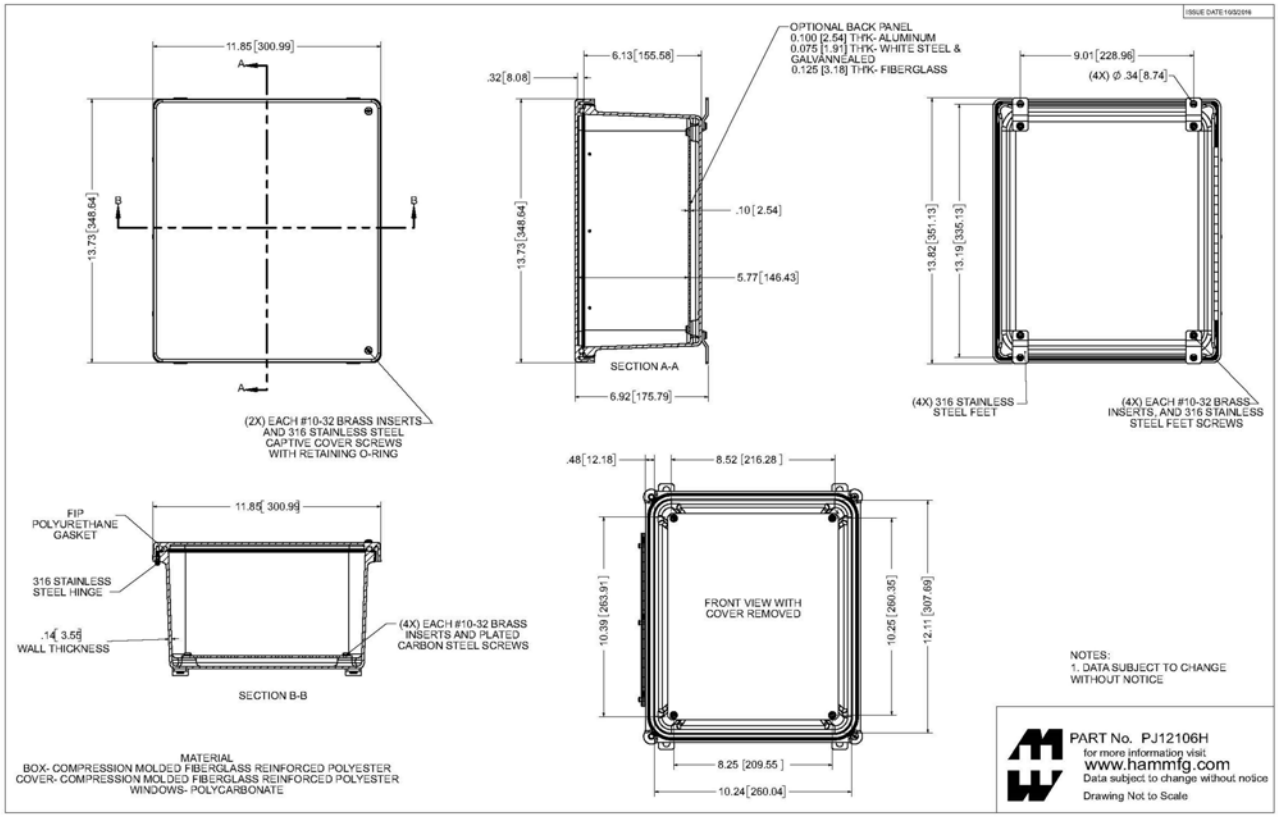


Figure 45 : Junction Box

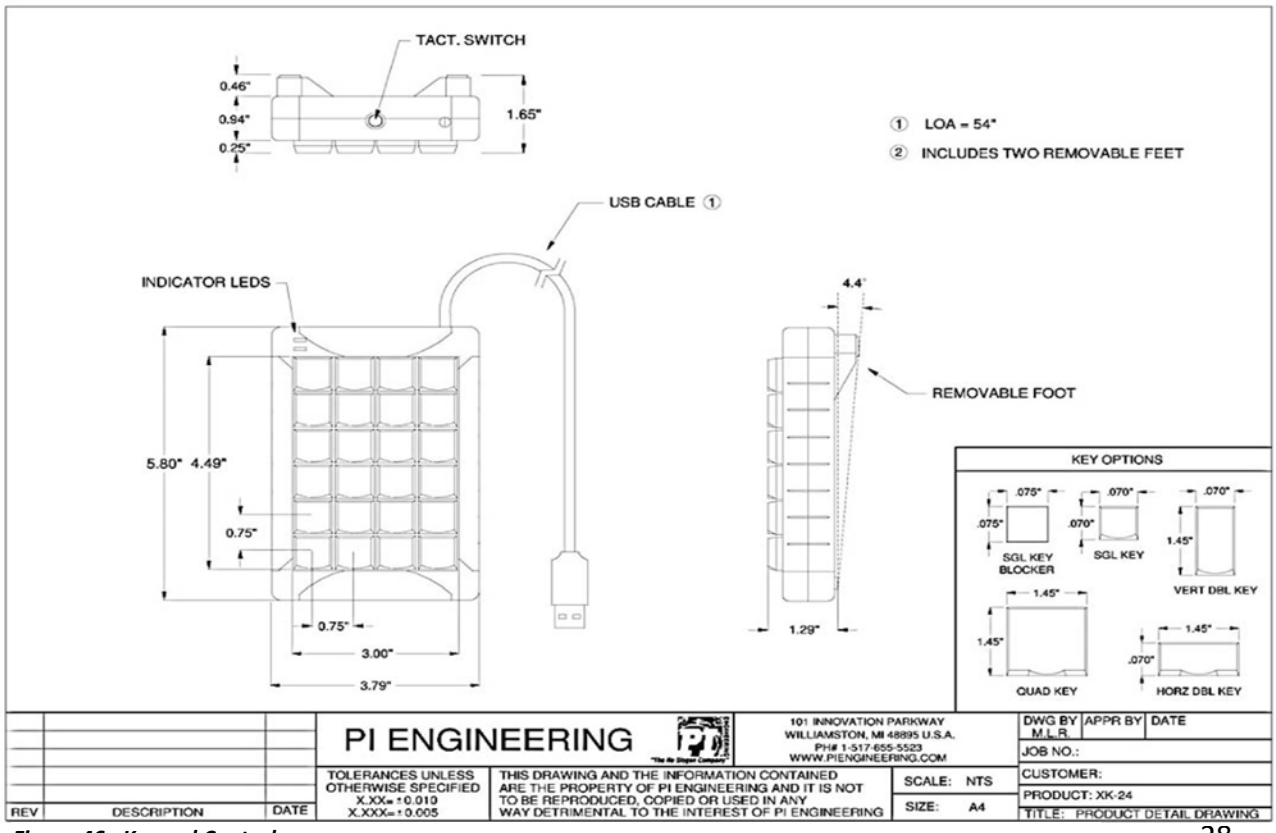


Figure 46 : Keypad Control

Figure 47 : Trackball Keypad Control

Installation Wiring Diagrams

KA3608 – Processor Unit

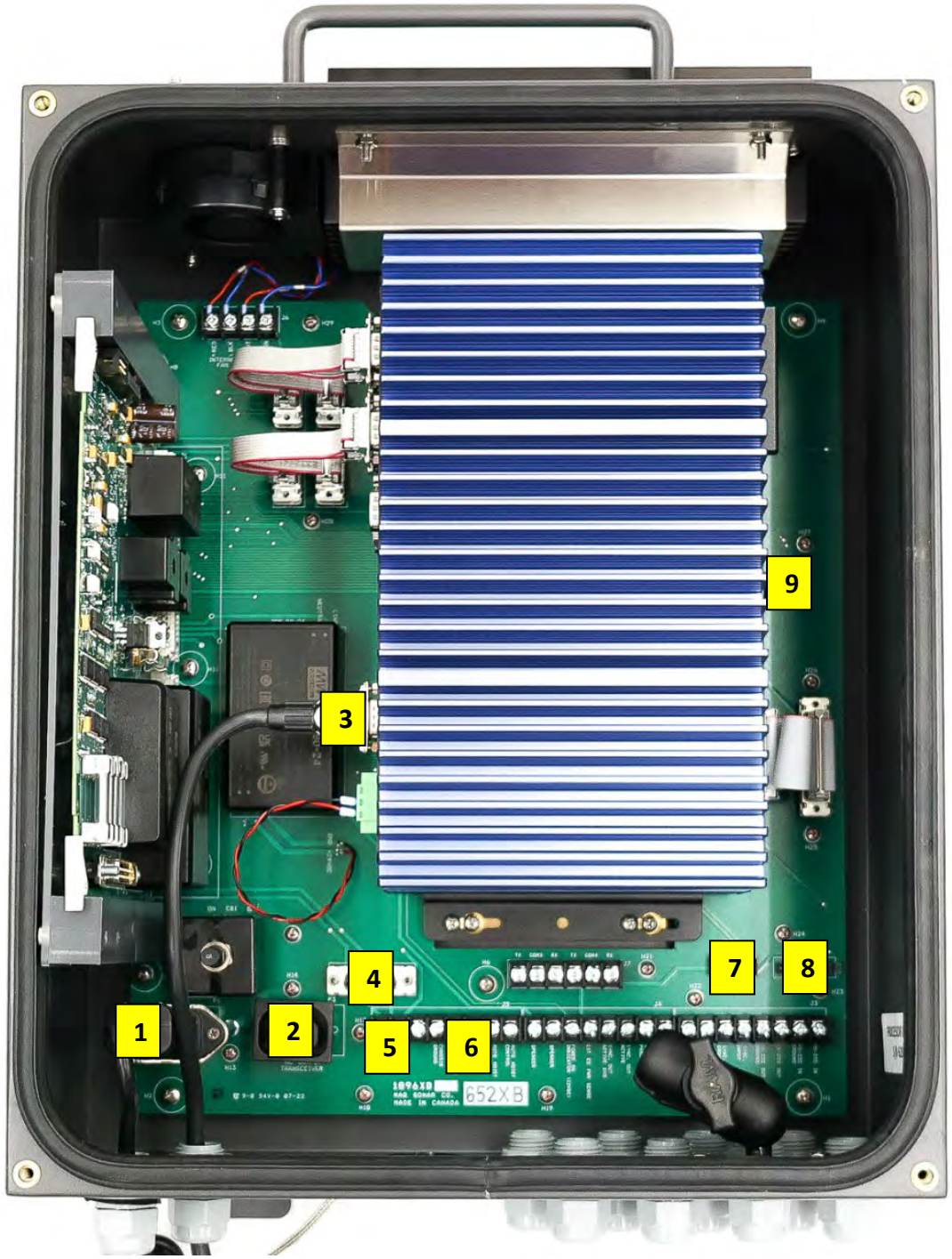


Figure 48 : KA3608 Wiring Diagram

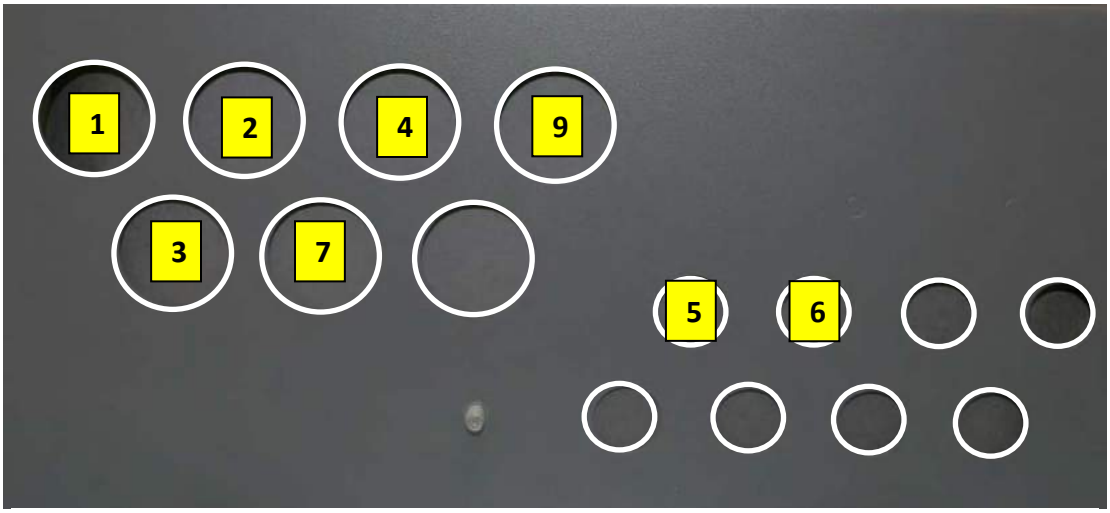


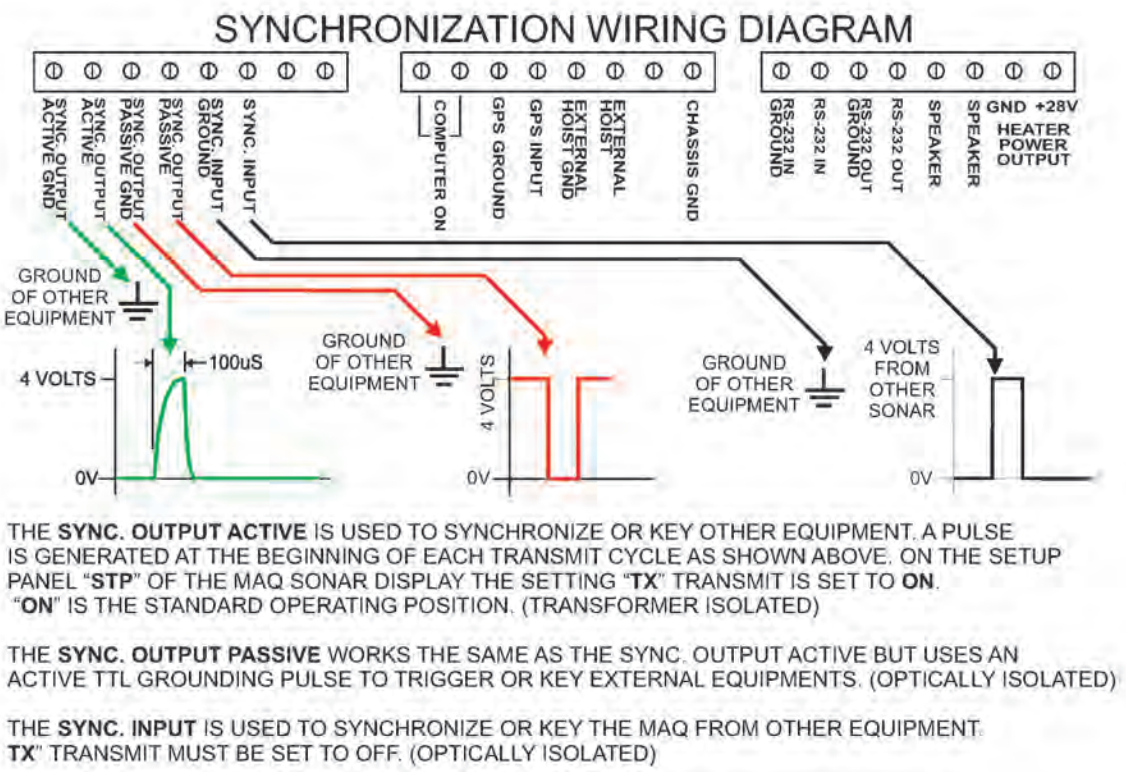
Figure 49 : KA3608 Wiring Diagram

Table 4 : List of Cables in Processor Unit

	Part Number	Description
1	KA1835	AC Power In
2	KA1839	AC Power Out
3	KA1832	VGA
4	KA1805	Joystick
5	KA1831	+24V Heater Output
6	N/A	GPS Signal
7	KA3619	Hoist Control
8	KA36001	Inclinometer (Assembly in Processor Unit)
9	KA1833	Ethernet

All cables supplied by MAQ Sonar will be labeled with a part number and revision (ex.KA1234-A), and are also labeled at each end with the unit it is intended for (Processor or Transceiver).

Figure 50 : Example of Label



THE **SYNC. OUTPUT ACTIVE** IS USED TO SYNCHRONIZE OR KEY OTHER EQUIPMENT. A PULSE IS GENERATED AT THE BEGINNING OF EACH TRANSMIT CYCLE AS SHOWN ABOVE. ON THE SETUP PANEL "**STP**" OF THE MAQ SONAR DISPLAY THE SETTING "**TX**" TRANSMIT IS SET TO **ON**. "**ON**" IS THE STANDARD OPERATING POSITION. (TRANSFORMER ISOLATED)

THE **SYNC. OUTPUT PASSIVE** WORKS THE SAME AS THE SYNC. OUTPUT ACTIVE BUT USES AN ACTIVE TTL GROUNDING PULSE TO TRIGGER OR KEY EXTERNAL EQUIPMENTS. (OPTICALLY ISOLATED)

THE **SYNC. INPUT** IS USED TO SYNCHRONIZE OR KEY THE MAQ FROM OTHER EQUIPMENT. **TX**" TRANSMIT MUST BE SET TO OFF. (OPTICALLY ISOLATED)

GPS and NEMA:

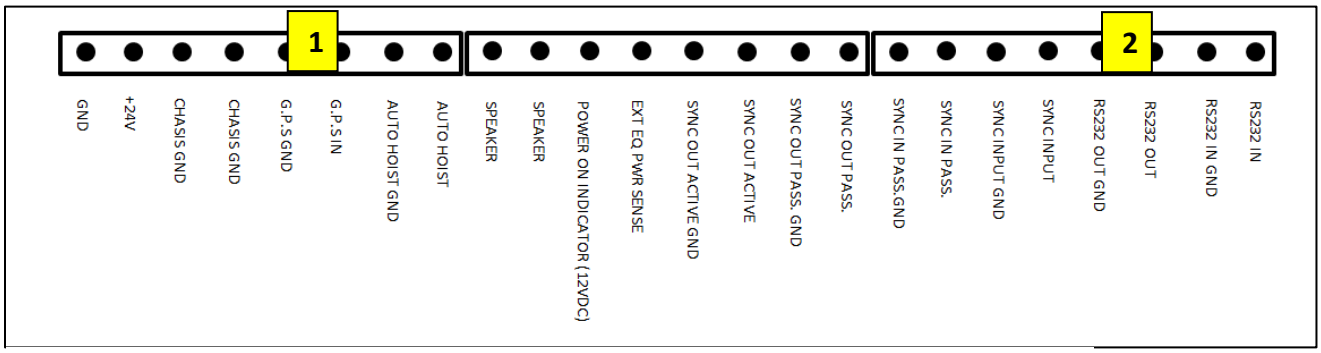


Figure 51 : GPS (1) and RS232 (2) Location

The G.P.S Input requires a NMEA0183 data sentence from a G.P.S. which contains a minimum RMC sentence output. The sentences will require the following data information: LAT\LONG, SPEED and HEADING.
If more accurate sentences are available they can be selected on the ***NAV*** panel.

The RS-232 OUT will send NMEA0183 data to plotters when MM (Manual Mark) is selected on the OPR (Operate Panel). It also outputs the temperature sensor data of the transducer using MQWTM and MQMTW NMEA sentences.

NMEA Data Sentences:

The following NMEA data sentences are recognized by the system:

Heading Information:

RMC (Recommended Minimum Navigation Information)
HDT (Heading - True)
HDM (Heading - Magnetic)
HDG (Magnetic heading, deviation, variation)
VHW (Water Speed and Heading)
VTG (Track Made Good and Ground Speed)
ATT (Proprietary Heading, Pitch and Roll information)

Speed Information:

RMC (Recommended Minimum Navigation Information)
VHW (Water Speed and Heading)
VTG (Track Made Good and Ground Speed)

Latitude/Longitude Information:

RMC (Recommended Minimum Navigation Information)
GLL (Geographic Position Latitude/Longitude)
GGA (Global Positioning System Fix Data)

KA3602 – Transceiver Unit

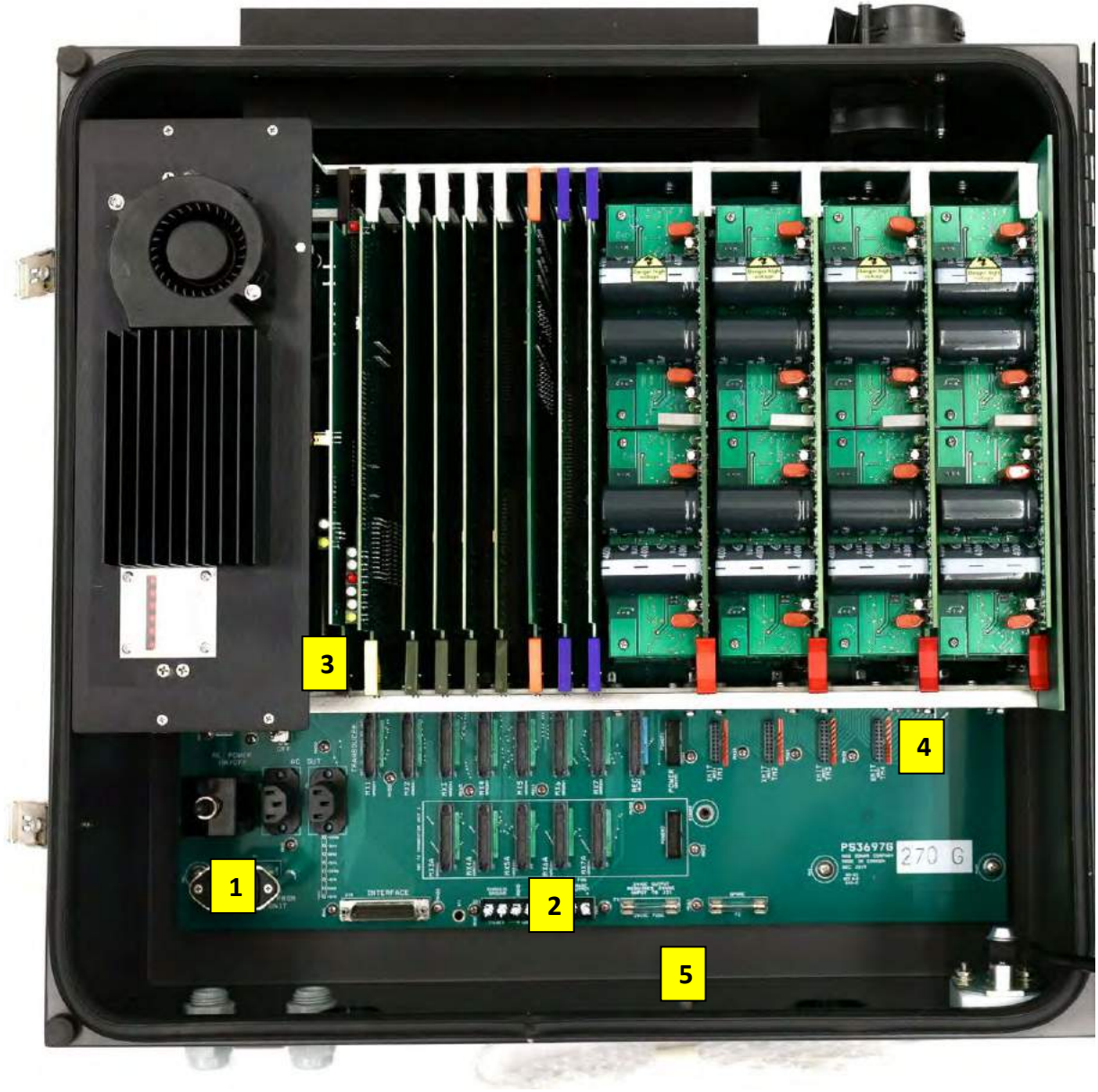


Figure 52 : KA3602 Unit Wiring

Figure 53 : KA3602 Unit Wiring

Table 5 : List of Cables for Transceiver Unit

	Part Number	Description
1	KA1839	AC Power In From Processor Unit
2	KA1831	+24V From Processor Unit
3	KA1833	Ethernet From Processor Unit
4	22/60/90kHz	Transducer
5	22/60/90kHz	Transducer Ground Wire

Figure 54 : Transducer Connection Inside KA3602 Transceiver Unit

Figure 55 : Ethernet Connection in Transceiver Unit

Install *"Transceiver"* end of KA1833 Ethernet cable into KA1849 (**BLACK**) board that is in first position of card file. The tab on the Ethernet connector is towards the left .

KA1849 (**BLACK**) board must be installed before installing KA1817 transceiver unit power supply.

Note: All boards in Transceiver Unit (KA3602) are color coded and each card slot inside the Transceiver Unit is labeled with a color that corresponds with a board. All boards that are the same color can be interchanged. Boards with different revision should not be mixed in a system. Reference *Table 6* for Transceiver Unit components.

Table 6 : KA3602 Transceiver Unit Boards

Position	Part Number/Color Code	Description/Amount per System
1	KA1817	Power Supply (1)
2	KA1849 (BLACK)	Interface Board (1)
3	KA3645 (YELLOW)	Control Board (1)
4	KA3603 (GREEN)	Tilt Board (4)
5	KA1814 (ORANGE)	MUX Board (1)
6	KA1891 (BLUE)	Receiver Board (2)
7	KA3690 (RED)	Transmitter Board (4)

Note: Each Transceiver Unit (KA3602) is capable of operating on 115 or 230V AC. Each Transceiver must be check to ensure it is set for the proper voltage BEFORE turning on the power. Jumpers are added to the Transceiver Unit Motherboard (KA3697), located behind the Power Supply (KA1817), which sets the operating voltage. *Figure VAC* is set to 230 V AC.

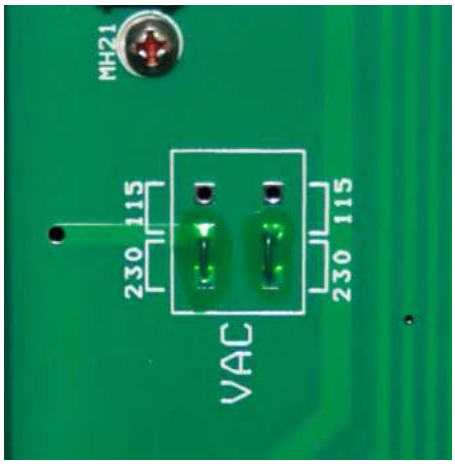
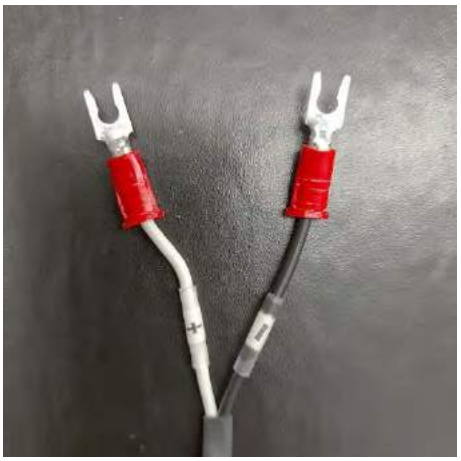


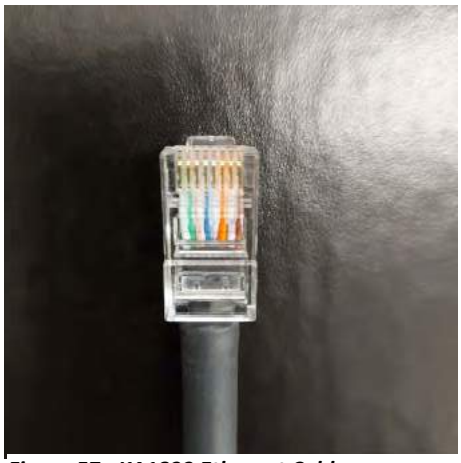
Figure VAC : Operating Voltage for KA3602

Interconnect Cables



KA1831 DC Power Cable does not have specified units for each end but ensure the "***+***" & "***-***"are on the correct terminals ***+24V*** and ***GND***. Location for connection is shown as ***"5"*** in processor wiring diagram and ***"2"*** in transceiver wiring diagram.

Figure 56 : KA1831 DC Power Cable



KA1833 Ethernet Cable does have specified units for each end (Processor and Transceiver). Location for connection is shown as ***"9"*** in processor wiring diagram and ***"3"*** in transceiver wiring diagram.

Figure 57 : KA1833 Ethernet Cable

KA1839 AC Power Cable does have specified units for each end (Processor and Transceiver). Location for connection is shown as ***"2"*** in processor wiring diagram and ***"1"*** in transceiver wiring diagram.

Figure 58 : KA1839 AC Power Cable

Hoist Control Connections

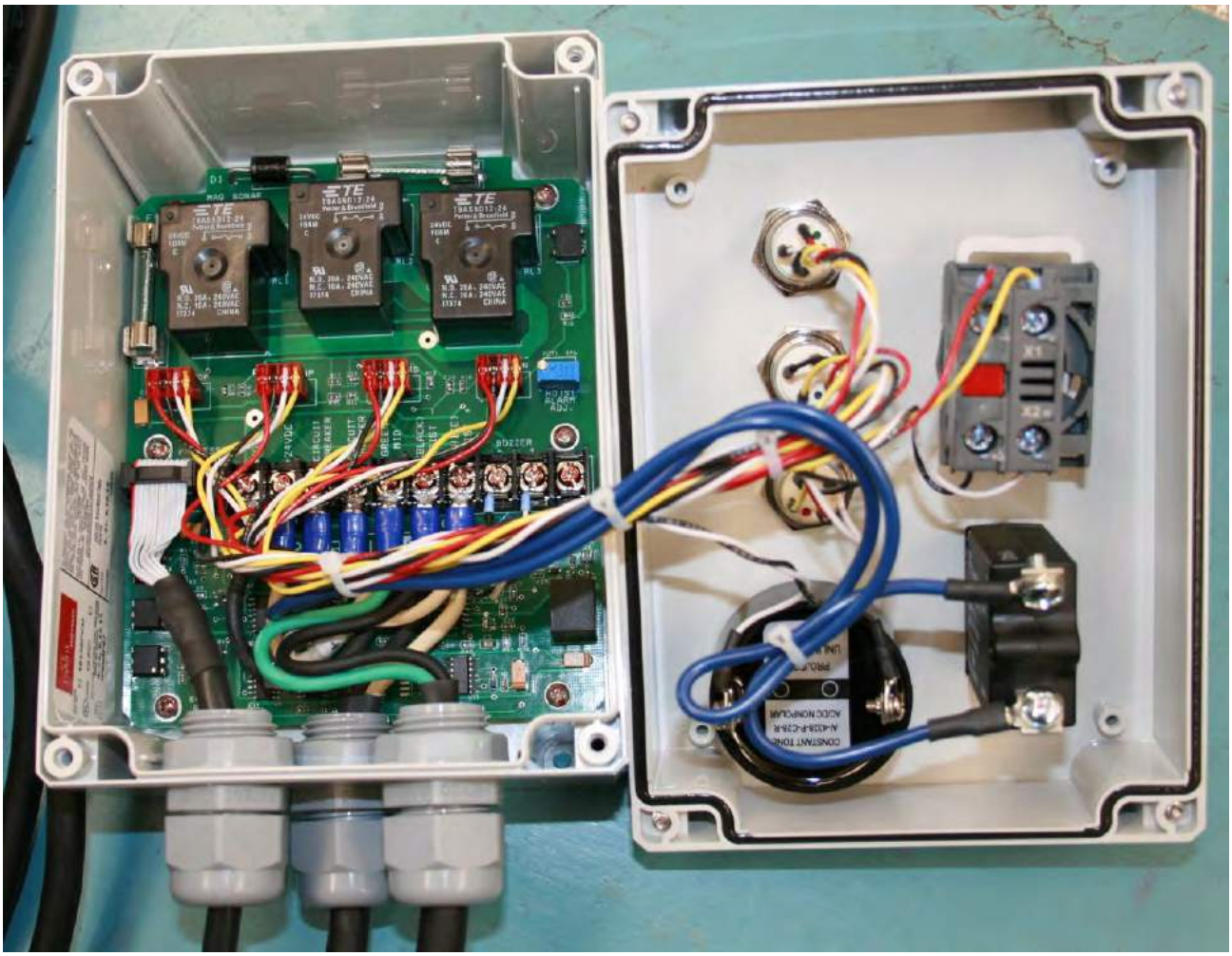


Figure 59 : Hoist Control Box

Table 6 : Control Box Cables

	Part Number	Description
1	KA1864	+24V Boat Supply
2	KA3619	Processor Control
3	KA1956	Control Box to Actuator

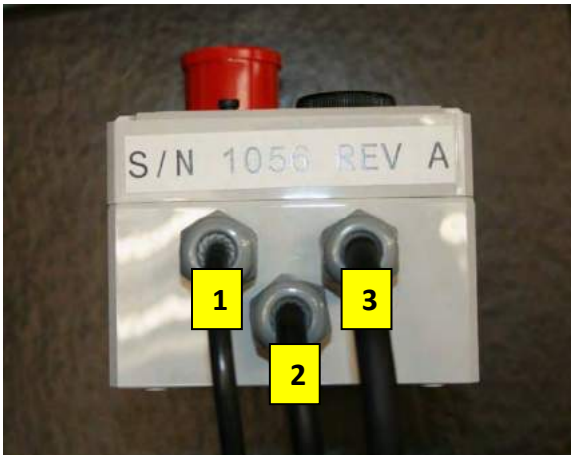


Figure 60 : Control Box Cables

CHAPTER 3

Inclinometer

Inclinometer Type "G" Setup

P.O. Box 199,
Finch, ON, Canada
K0C 1K0

Tel: (1) 613-984-9000
Fax: (613) 984-0909
Email: info@maqsonar.com

Inclinometer Type “G”

Requirements for Setup:

- Digital level
- Possibly two people.

This procedure must be performed after the transducer is installed, and the processor is in its final position and permanently mounted.

Setup Needed If:

The Inclinometer suffers any position change inside the Processor Unit. (Even the smallest of position change will upset the alignment),

- The Processor Unit is moved,
- The processor computer hard disk is reformatted, or;
- New software is installed.

Inclinometer Mechanical Setup:

For accurate Inclinometer alignment the vessel should be in port with the vessel motionless.

The Inclinometer is located inside the Processor Unit on an adjustable mounting arm. The label on the back of the inclinometer reads “This Side Stern” and the inclinometer type which, for this case, is type “G”.

Using the adjustable mounting arm, position the inclinometer so the “This Side Stern” Label is aligned with the vessel’s stern as accurately as possible. While do this align the bubble, on the top of the Inclinometer, to the vertical position. (Tighten adjustable arm firmly)

If Inclinometer is not aligned correctly the stabilization TR (Track) & SR (Search Modes) will not be effective.

Inclinometer Alignment:

Once the Inclinometer has been correctly positioned according to the description above, turn on the Sonar.

Wait at least 1 minute while the sonar is operating before performing the next procedures to allow the Inclinometer to fully stabilize.

1) Using the SYS (*System*) Panel, select the Inclinometer type to “type G”.
2) Using the OPR (*Operate*) Panel select the MC (Mode Control) to TR (Track Mode).
3) Selecting the SYS (*System*) Panel will display the “Bow” and “Port” readouts for the Inclinometer angle.

- A positive Bow angle indicates that the bow is angled up and a negative Bow angle indicates that the bow is angled down.
- A positive Port angle indicates that the Port is angled up and a negative Port angle indicates that the Port is angled down.

4) To align the transducer with the Inclinometer, the vertical alignment of the transducer in the sea chest must be measured. Precise stabilization only occurs when the transducer alignment matches the Inclinometer. Extreme care must be exercised when conducting this procedure.

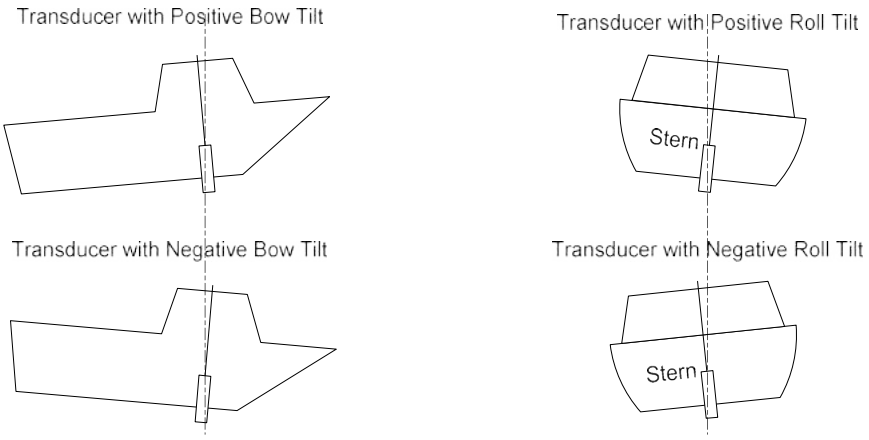


Figure 72 : Tilt Angle Description

If possible the transducer tilt measurements should be performed while the transducer is fully deployed. (Hoist in the down position). **Ensure there is clearance below the vessel before lowering the transducer.**

Place the digital level on the transducer pipe and align it with the Bow of the vessel. Measure the pitch angles in accordance with the diagram shown above.

Repeat the measurement for the roll measurement.

5) Now using the joystick, adjust the “Bow (pitch)” and “Port (roll)” angles shown in the menus of the Sys Panel display to match the transducer/pipe measured angles.

The Inclinometer offsets are displayed on the circular omni display. The Inclinometer offsets are a combination of the adjustment for the transducer position and the slight misalignment of the inclinometer.

6) Save the Inclinometer offsets and record these numbers for future reference in case someone tampers with your sonar settings.

Important:

- **If the Inclinometer, Processor Unit is moved or if there is maintenance carried out on the sea chest then this procedure must be repeated.**
- **If the processor computer is reformatted or new software is installed you must also repeat this procedure.**

The Inclinometer Offsets can be restored to the sonar if new software has been loaded into the sonar and the Inclinometer position has not been disturbed.

CHAPTER 4

Startup

System Power Up
Initializing Sequence
Screen Layout
Menu Panel
On Screen Display

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System Power Up

Main Power Control:

Power On Sequence:

Start the sonar by pressing the menu select and On/Off buttons simultaneously on the joystick.

Power Off Sequence

Shut down the sonar by pressing the menu select and On/Off buttons simultaneously on the joystick.

Power On Indicator

The power on indicator presents the status of the system.

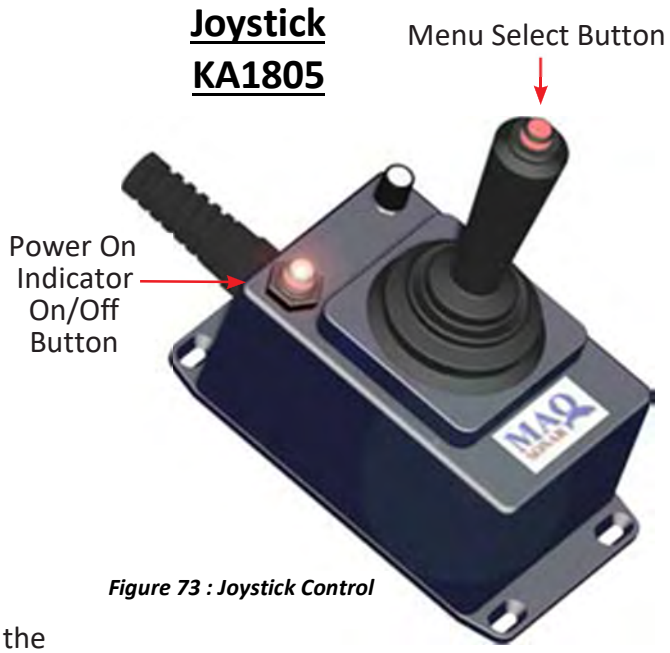

Figure 73 : Joystick Control

NOTE:
The transducer is designed to operate immersed in water only. The unit can be damaged if the system is forced to transmit when exposed to open air. The system must NOT be powered up while the vessel is in dry dock unless the Transceiver Unit HIGH VOLT switch is in the OFF position. Disconnecting Main Power to the system is recommended when in Dry Dock.

Initialization Sequence

The first screen presented displays the current software version *(V XX.XX.XX in this example)*, date of release *(Month Date, Year)* and initialization status:

Figure 74 : Initialization Screen

Initializing Signal Processing … Complete

The sonar is setting up the interface system and loading the previous menu settings.

Initializing Transceiver … Complete

The sonar has established a communications link between the Computer Interface Unit and the Transceiver Unit.

Initializing Switchover System … Complete

The system has performed diagnostics to determine the status of the switchover unit.

If the sonar system is unable to establish communications between the Computer Interface Unit and the Transceiver Unit, the computer will sound an audible alarm and following message will appear:

Figure 75 : Initialization Failed

Initializing Transceiver … Failed

Possible errors:

- No power in the Transceiver Unit.
- One or more of the cables between the Computer Interface Unit and the computer itself may be disconnected.
- The EPROM in the Transceiver Unit is missing or not the correct version.
- The communication port cables are interchanged *on a new installation*. Change physically or change in the software on the System Panel.

Screen Layout

Main Screen:

The *Main Screen* is divided into two basic sections.

Menu Panel:

The *Menu Panel* provides user access to the operation and system control features.

To change the current menu selection *(highlighted in yellow at right)*, press down on the menu select button on the top of the joystick.

- Moving the joystick up or down while holding this button will shift the focus of the control to a new menu item.
- Moving the joystick left or right while holding this button will alter
  the menu parameter setting.

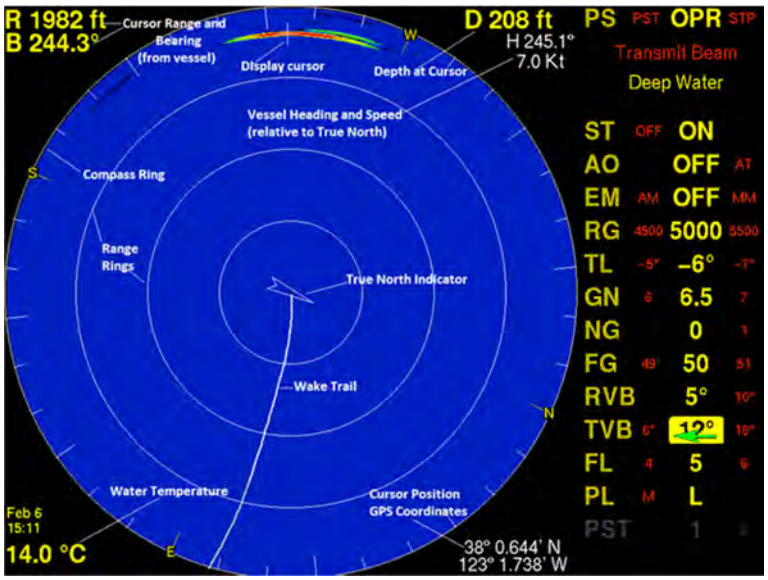

Figure 76 : Screen Layout

Sonar Display:

The *Sonar Display* provides the sonar presentation as well as current information on the system status.

To change the position of the cursor (the crosshair symbol highlighted in the upper/right quadrant of this display), simply move the joystick control while the menu select button is released.

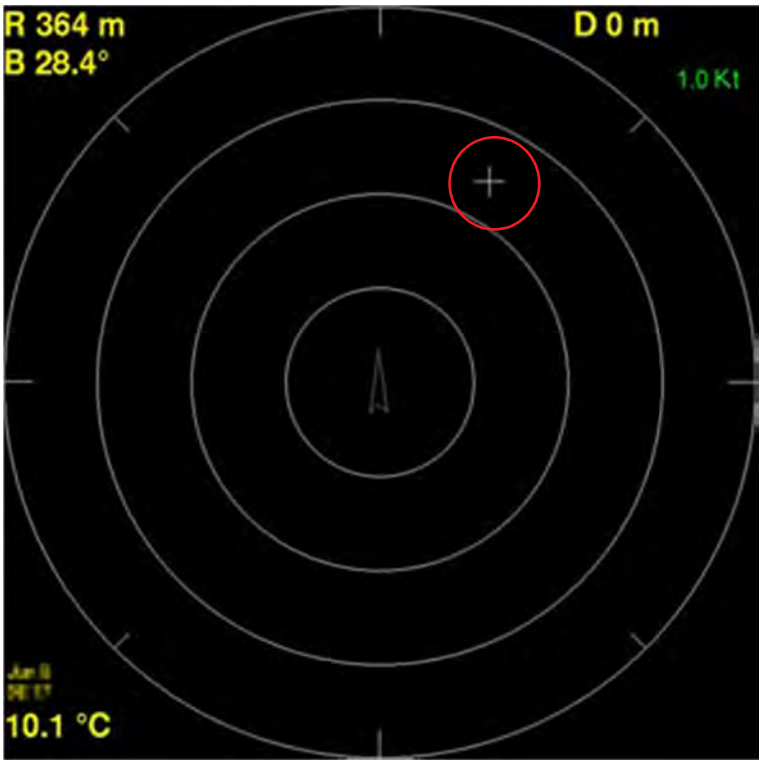

Figure 77 : Cursor

Menu Panel

The Menu Panel is divided into the following sections

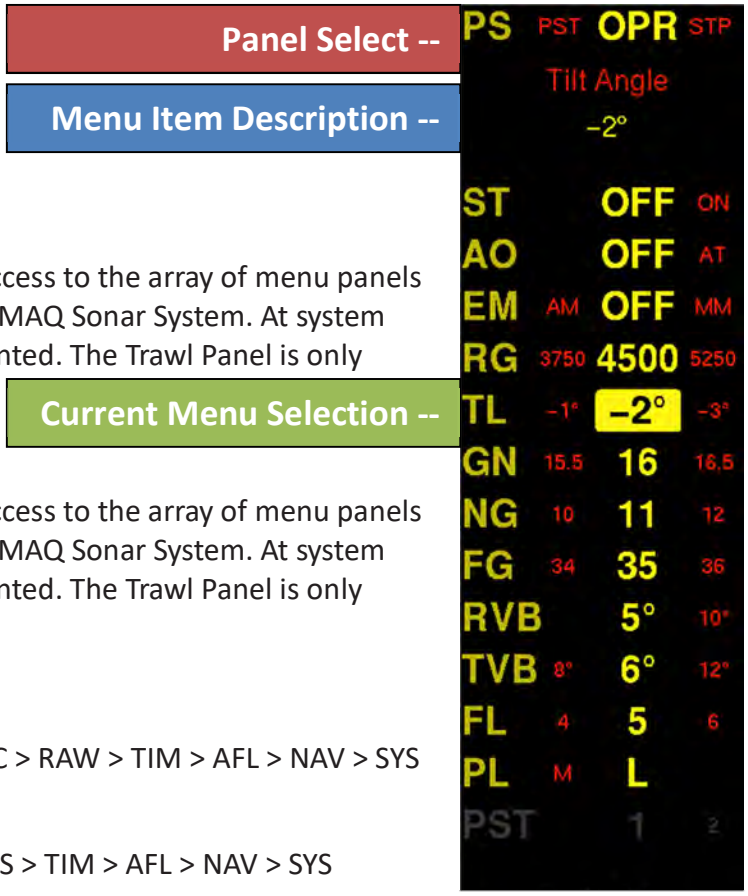

Figure 78 : Menu Breakdown

Panel Select:

The Panel Select area provides user access to the array of menu panels for operation and configuration of the MAQ Sonar System. At system start, the Operate Panel (OPR) is presented. The Trawl Panel is only present in Trawl Mode.

The Panel Select area provides user access to the array of menu panels for operation and configuration of the MAQ Sonar System. At system start, the Operate Panel (OPR) is presented. The Trawl Panel is only present in Trawl Mode.

The standard panel array is:

TON < NET<PST < OPR > STP > DIS > PIC > RAW > TIM > AFL > NAV > SYS

In Trawl Mode the panel array is:

TON < NET<PST < OPR > **TRL** > STP > DIS > TIM > AFL > NAV > SYS

Note: To access the System Panel (SYS), click to the right multiple times from the Navigation Panel while holding the menu select button on the joystick. This is to minimize the risk of the operator unintentionally changing the vital system parameters.

Menu Item Description:

The Menu Item Description displays a short phrase to give details about the current menu focus.

This area is also used to display certain system messages: Should the communications link between the Processor Unit and the Transceiver Unit fail, a NO DATA RECEIVED message will flash in alternating colors.

When using the Auto Mark feature, the target speed and heading will be displayed in this area *(Operate Panel only)*.

On Screen Display

Below is a typical sonar screen which has a brief explanation of the various items which might be seen on a sonar screen.

On the right hand side is the Main Menu and in this particular screen shot the Operator OPR panel is on the display. This is the panel the operator will use the majority of the time for fishing operations.

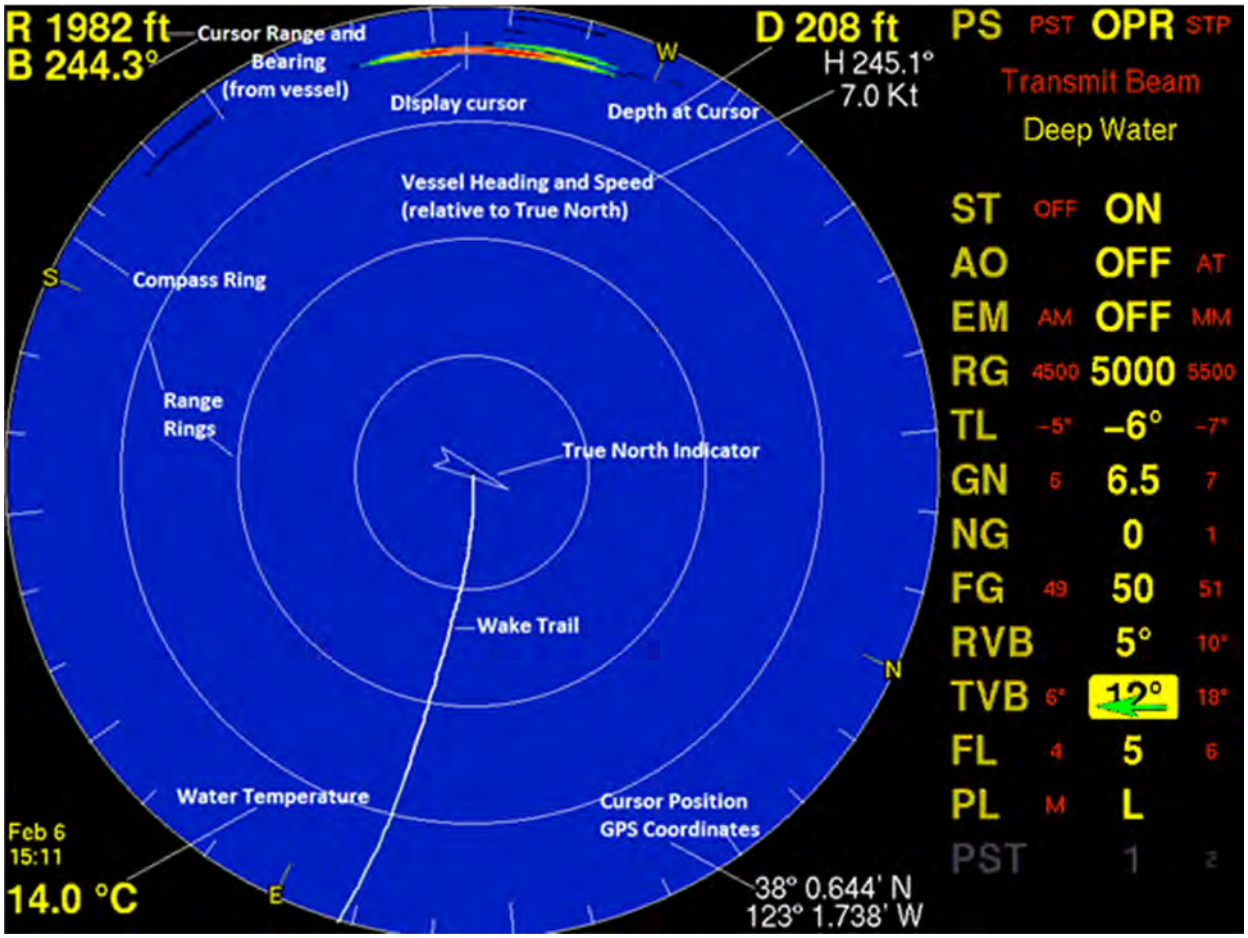

Figure 79 : List of on Screen Items

Highlighted Items:

Water temperature, cursor position, GPS coordinates, wake trail, true north indicator, range rings, compass rings, vessel heading and speed relative to true north, depth at cursor, cursor range and bearing (from vessel) and display cursor.

CHAPTER 5

Setup

System Setup
Preferences
Setting Time
Navigation Setup NEMA Sentences

P.O. Box 199,
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K0C 1K0

Tel: (1) 613-984-9000
Fax: (613) 984-0909
Email: info@maqsonar.com

System Setup:

Transducer Alignment:

The transducer alignment may require alteration as the transducer serviced or when a replacement transducer is installed.

Figure 80 : Transducer Shield

(Tsh) Transducer Shield:

OFF Stainless Steel transducer shield removed or 60/90 kHz ABS shield installed.

ON Stainless Steel shield installed.

Note that if the transducer shield is removed or replaced the Frequency Adjust *(below)* calibration must be confirmed.

(FQ) Frequency Adjust:

Figure 81 : Frequency Adjust

Figure 82 : Frequency Display

Tuning the transducer is similar to checking the resonance of bell or tuning fork. Resonance can vary from transducer to transducer and can change slightly as the transducer ages. The transducer frequency must be tuned for maximum performance

While stationary in port, switch to OMNI mode and adjust the Range, Gain, Near Gain and Far Gain controls *(on the Operate panel)* to obtain a stable target on the display of medium strength. Choose a fixed position target such as the shoreline or a standing vessel.

Switch to the System Panel and vary the Frequency Adjust to ensure maximum target strength.

DO NOT attempt to adjust the Frequency while the vessel is underway.

(DA) Display Alignment:

NOTE: Bow Up Display must be selected on the Navigation Panel when making this adjustment.

Adjust to compensate for any misalignment of the transducer during installation to ensure the bow appears at the top of the Sonar display (12 o'clock position).

Figure 83 : Display Alignment

In port, the dock or wharf may be used to align the dock or wharf with the boat.

When at sea, noise from the vessel's propeller may be used to position the noise immediately to stern (6 o'clock) on the Sonar display.

(TA) Temperature Adjust:

Figure 84 : Temperature Adjust

Compensates for any offset in the water temperature readout on the Sonar display. Use a known reference to calibrate the temperature sensor.

Inclinometer:

The inclinometer is used in stabilized modes to sense the attitude of the vessel. Please refer to separate section on Inclinometer Type G which is included with each new system. Below are instructions to be used in older systems.

(INC) Inclinometer Type:

Figure 85 : Inclinometer Type

Adjust to indicate which type of inclinometer is connected to the system. Except for the E type sensor which is external to the system, each inclinometer is marked with the appropriate letter and can be found *located inside the Processor Unit*. The type chosen must match the inclinometer type installed in the system.

Selections:

OFF	Inclinometer disabled
Type G	The system will use the MAQ gyro inclinometer sensor for pitch and roll information

Note: Reference chapter 3 Inclinometer Setup Procedure for type "G" Inclinometer.

(BW) Bow (Pitch) Adjust/ PT Port (Roll) Adjust:

Figure 86 : Bow Adjust

Compensates for pitch related to inclinometer installation offset.

Selections: 0.1 degree increments from -4.0° to 4.0°

Figure 87 : Port Adjust

In order to make this adjustment, the system must be in stabilized mode:

- On the Operate Panel select Stabilized mode (ST) must be ON.
- Ensure inclinometer type is set to Type G on the System Panel.

Figure 89 : SYS Panel

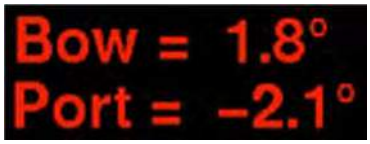

Figure 88 : Bow and Port Adjust

Reference chapter 3 Inclinometer Setup Procedure for type "G" Inclinometer.

When correctly adjusted, the readout on the display should reflect the current pitch offset of the Transducer pipe.

Preferences:

Operating Language:

The operating language is selected on the Setup Panel.

Figure 90 : Operating Language

Sets the language displayed in the menu item description. There are eleven languages presently available *(standard)*.

(Eng)	English	**(Tür)**	Turkish	**(CH)**	Chinese
(Fra)	French	**(Ita)**	Italian	**(Dan)**	Danish
(Esp)	Spanish	**(Rus)**	Russian	**(Pt)**	Portuguese
(Sve)	Swedish	**(Nor)**	Norwegian		

Range Units:

Figure 91 : Range Units

The setting for the Range Units is located on the Setup Panel.

Sets the unit of measurement for range and depth. Selections available are:

(feet)	Feet	**(fm)**	Fathoms
(m)	Meters	**(yd)**	Yards

Adjusting the Display:

The brightness levels for the menu text and the Sonar display can be independently preset on the Display *(DIS)* Panel.

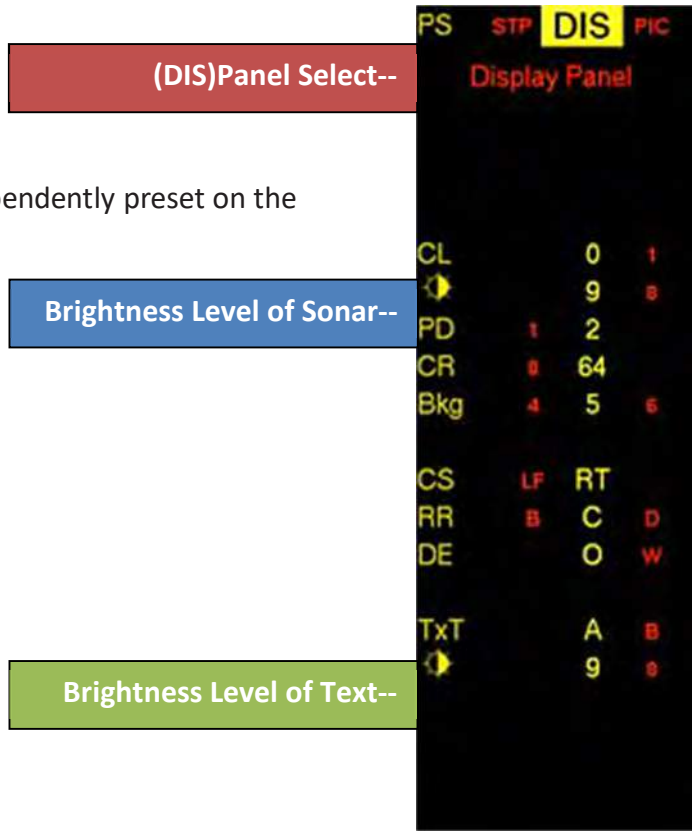

Figure 92 : Display Panel

Setting the Time

The system time is seen on the bottom/left corner of the Sonar display. One use is to time stamp tonnage pictures stored for easier identification on retrieval.

Settings are found on the Time *(TIM)* Panel.

(YR) Sets the current year.

Figure 93 : Year Select

(MO) Sets the current month.

Figure 94 : Month Select

(DA) Sets the current day of the month.

Figure 95 : Day Select

(HR) Sets the current hour.

Figure 96 : Hour Select

(MN) Sets the current minute.

Figure 97 : Minute Select

Navigation Setup

Equipment Connections

The MAQ Sonar system is able to interface with many types of NMEA based systems. In order to connect more than one NMEA device to the Sonar system a NMEA multiplexer or combiner will be required. **NOTE: A Satellite Compass is strongly recommended for accurate Wake Trail Display.**

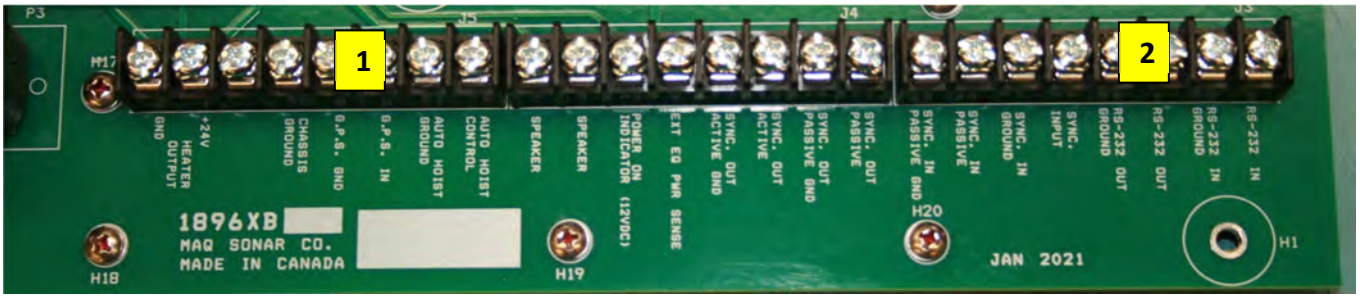

Figure 98 : KA1896 Terminal Strip

NMEA Data Sentences:

The following NMEA data sentences are recognized by the system:

Heading Information

- RMC *(Recommended Minimum Navigation Information)*
- HDT *(Heading - True)*
- HDM *(Heading - Magnetic)*
- HDG *(Magnetic heading, deviation, variation)*
- VHW *(Water Speed and Heading)*
- VTG *(Track Made Good and Ground Speed)*
- ATT *(Proprietary Heading, Pitch and Roll information)*

Speed Information

- RMC *(Recommended Minimum Navigation Information)*
- VHW *(Water Speed and Heading)*
- VTG *(Track Made Good and Ground Speed)*

Latitude/Longitude Information

- RMC *(Recommended Minimum Navigation Information)*
- GLL *(Geographic Position Latitude/Longitude)*
- GGA *(Global Positioning System Fix Data)*

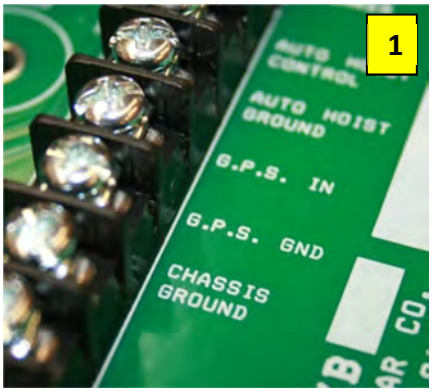

Figure 99 : GPS Terminal

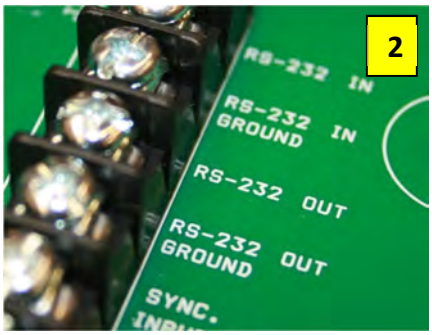

Figure 100 : RS232 Terminal

CHAPTER 6

Operating

Basic Operations

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Email: info@maqsonar.com

Basic Operation

This assumes the sonar has been installed, the vessel is in the water and there is clearance under the vessel to deploy the transducer safely below the vessel. Also the High voltage has been turned on in the Transceiver.

Note: If the auto Hoist has been connected a Beeping sound will be heard from the Hoist control unit to warn the operator that the Hoist is lowering or raising during Startup or Turn OFF.

Press and hold down on the button lens to the front/left of the joystick paddle using the left hand. Press down on the fire button on the top of the joystick using the thumb of the right hand. As you move the left hand away, the lens will illuminate indicating power to the system.

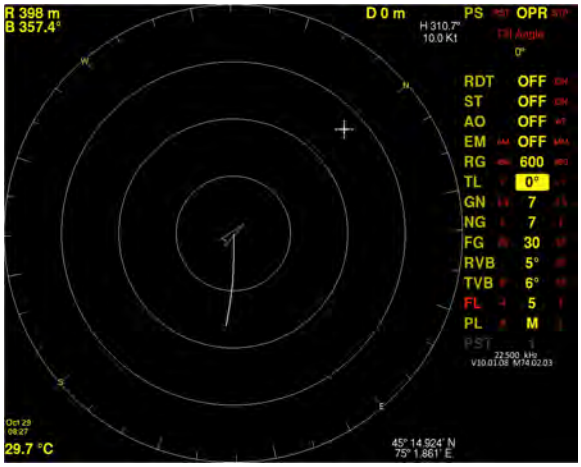

Figure 101 : OPR Panel

After a brief screen describing system version and startup status the Operate Panel will be presented--the Tilt menu item is selected by default on startup.

Pick a nearby target (such as a wharf or some other stationary object).

Press the fire button on the top of the joystick and set the Tilt (TL) control to -3°. This setting Main Screen will place the upper region of the transmit and receive beams just below the surface of the water. At a range of 270 meters the beam would be about 2 meters below the surface at the outer regions - the height of the 5° beam at that point would be approximately 27 meters.

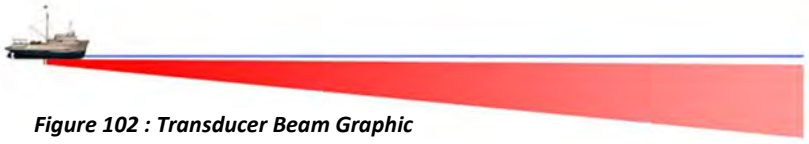
Figure 102 : Transducer Beam Graphic

Press the fire button on the top of the joystick and move up to select the Range (RG) menu item. Set the system range to a value twice the estimated distance of the target. This will place your target between the second and third rings of the display.

Move down to the Gain (GN) control and adjust to obtain a clearly defined image of the target. Setting this control too high will cause the display to become cluttered. If the target object does not appear in correct orientation to the vessel see the System Setup - Transducer Alignment section. Adjust the gain control until the level of the background clutter is visible without overpowering the display.

The Near (NG) and Far (FG) gain controls should only be adjusted with the vessel under way. Factors such as salt content and water temperature affect these adjustments.

Reference Operators manual for typical settings.

Switch the Pulse length (PL) to Short pulse. The resolution of the display will increase to display finer detail. The clutter level viewed previously has also increased as the higher system bandwidth used in short pulse transmission opens to acquire this detail. For your reference short pulse is used to obtain maximum resolution on short to medium range targets. Medium to Long pulse settings increase the transmit power and distance while the bandwidth reduces correspondingly to reduce the effect of greater power on the insignificant targets. With the pulse length set to Short pulse, adjust the gain control until the background clutter is easily viewed.

Move up to the top of the menu panel and right-click to the Display menu.

Adjusting the Color Resolution (CR) will affect the appearance and discrimination of the display. 8 colors palette provides distinct transitions while the 64 color palette provides a finer view of the target characteristics.

Peak Detection (PD) increases the high level signal handling of the display to increase the ability to pinpoint the densest population of a school.

Move to select the Clutter Level (CL) control.
Display Menu

The first stages of the Clutter Level control (selections 1 through 6) will cause the system to drop out successive color levels as the control level is increased. Low level signals such as the clutter will fade into the background while higher level targets remain untouched. The upper stages of the Clutter Level control (selections 1a through 6a) compress the lower curve of the color discrimination to reduce clutter detection while maintaining fine level target indication. Higher level targets remain untouched.

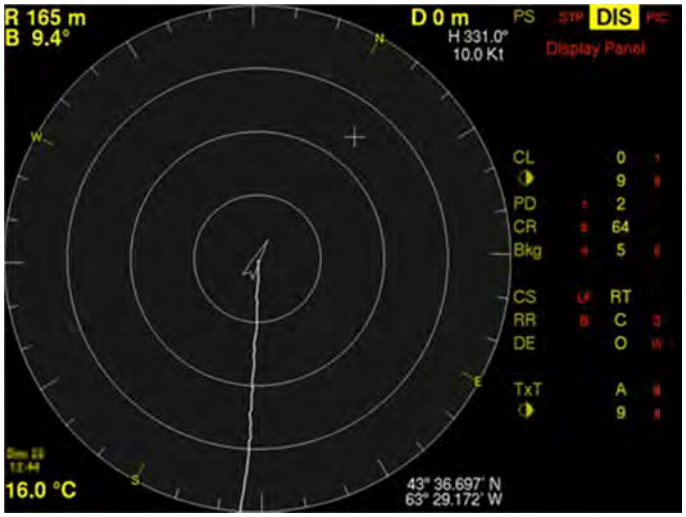

Figure 103 : DIS Panel

CHAPTER 7

Panels

TIM Time Panel
AFL Auto Fault Locator Panel
NAV Navigation Panel
SYS System Panel

P.O. Box 199,
Finch, ON, Canada
K0C 1K0

Tel: (1) 613-984-9000
Fax: (613) 984-0909
Email: info@maqsonar.com

TIM Time Panel

This panel allows the operator to set the current time and date. The time and date is
used for the current time displayed on the sonar display and to time stamp tonnage
pictures stored for easier identification on retrieval.

***(YR)* Year Adjust:**

- Sets the current **year** for the system.

Figure 104 : Year Select

***(MO)* Month Adjust**

- Sets the current **month** for the system.

Figure 105 : Month Select

***(DA)* Date Adjust**

- Sets the current **day of the month** for the system.

Figure 106 : Day Select

***(HR)* Hour Adjust**

- Sets the current **hour** for the system.

Figure 107 : Hour Select

***(MN)* Minute Adjust**

- Sets the current **minut**e for the system.

Figure 108 : Minute Select

AFL Automatic Fault Locator Panel

Software Revision Levels:

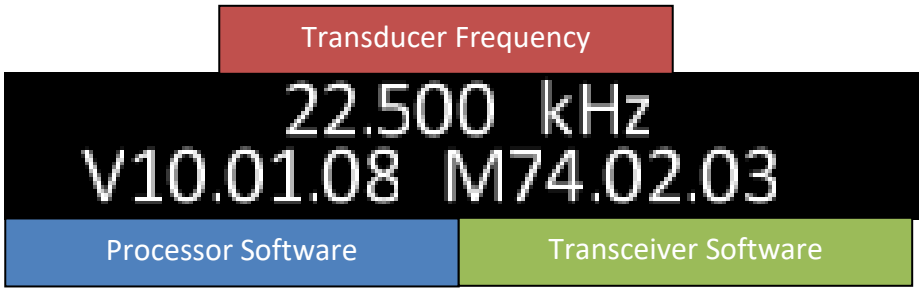

Figure 109 : Software Revisions

Displays the Software Version of the operating system installed along with the software version of the EPROM in the Transceiver Unit.

Figure 110 : AFL Panel

I/O Display NMEA Input/Output:

Displays all NMEA data received or transmitted by the sonar system. For use diagnosing GPS or "Compass and Ships Log" data. Each data string received will be displayed as it is received. This data will be the only information on the display. Press the Joystick Menu Select Button to exit.

Figure 111 : I/O Selection

Selections:

OFF	Normal operation.
IN	Displays NMEA data entering the sonar through the GPS input Terminals *(data strings will fill display)*.
OUT	Displays the last data sent to the plotter when a Manual Mark is performed on the Event Marker feature *(Operate Panel)*.

PM Process Message:

Setting Process Message to 1 will display the Interface software version, date of release and the Transceiver Unit software versions to be overlaid on the sonar display.

Figure 112 : Process Message Select

Setting Process Message to 2 will cause the mark history for both Event Marks and Vessel Marks to be overlaid on the sonar display in latitude/longitude coordinates.

ML Menu Lock:

When set to ON this selections will lock every Menu selection that are currently selected. The operator can change any setting but when the Sonar is restarted it will revert back to the Menu settings that were stored when the ML was set to ON.

Figure 113 : Menu Lock

Figure 114 : Receive Test

RT Receive Test:

Injects a test signal into the Receiver boards to verify the receive circuitry is operating properly. Note: Gains may have to be adjusted.

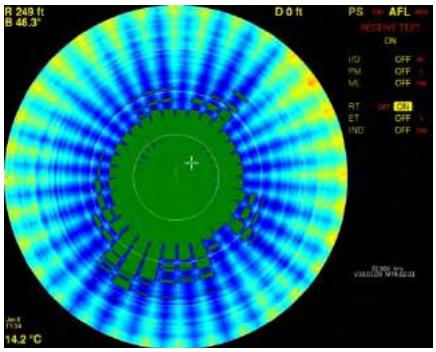

Figure 115 : Receive Test

ET Element Test:

Element test selections 1 to 16 enables hardware for element receive testing. When 1 is selected the lowest 16 elements on the transducer will be connected to test signal. This will produce a flower type display.

Figure 116 : Element Test

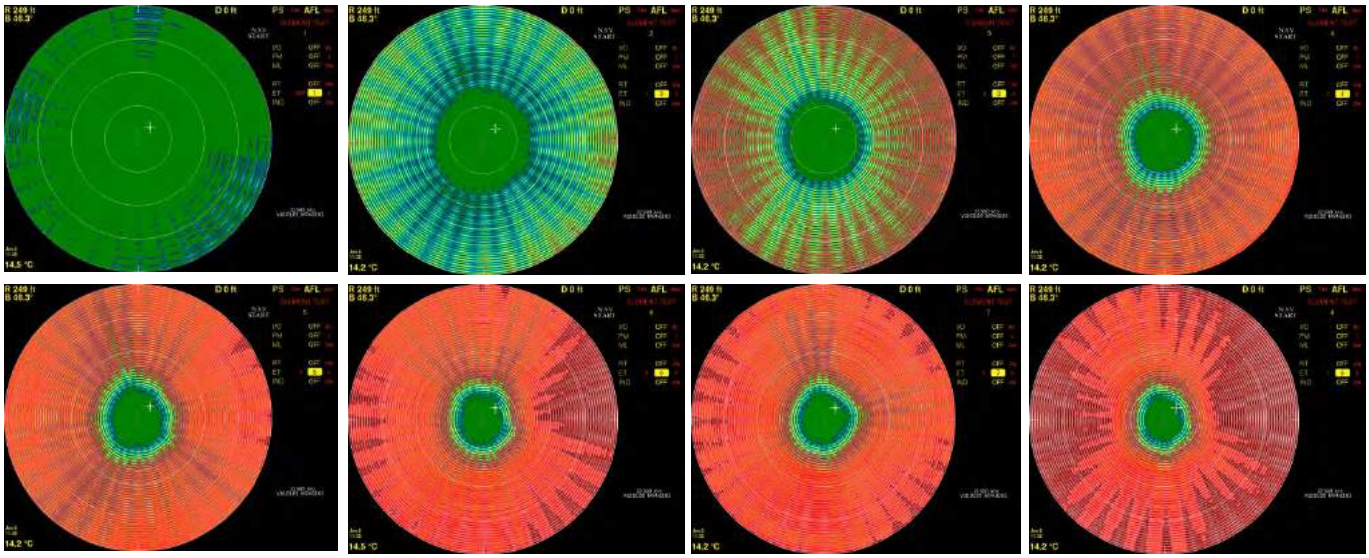

Figure 117 : Element Test 1 - 8

The signal strength for each element will increase in strength and reduce in strength as shown on the above pictures from 1 to 8 and down from 9 to 16. This test must be performed when the vessel is not in motion. Gains will have to be adjusted to provide enough signal strength.

IND Process Message:

Figure 118 : Inclinometer Test

Inclinometer testing feature
Displays the current output reading of the Inclinometers Pitch and Roll in a visual display.

Stabilization must be ON and Inclinometer must be set to type "**G**".

AUD Audio Select:

Figure 119 : Audio Selection

Audio Select allows the user to eliminate lower strength signals and noise from audio output.

Selections:

A	Filtering OFF
B	Filtering ON

MMT Manual Mark Tracking:

Figure 120 : Manual Mark Tracking

Manual Mark Tracking when enabled will maintain the depth at the manual mark latitude and longitude position by automatically tilting. If a new manual mark is added the system will begin tracking the most recent mark. If the mark is out of the display range the system will stop tracking.

Figure 121 : Manual Mark Tracking Display

R: Range to Manual Mark.

B: Bearing to Manual Mark.

D: Depth at Manual Mark.

TD: Tracking Depth, this is the depth when the manual mark was placed, the system adjusts tilt angles to keep the depth at the manual mark position.

NAV Navigation Panel

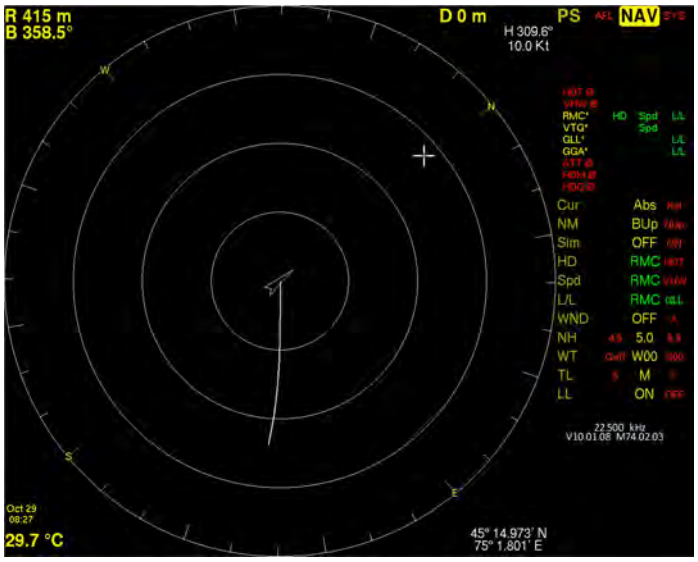

Figure 122 : Navigation Panel

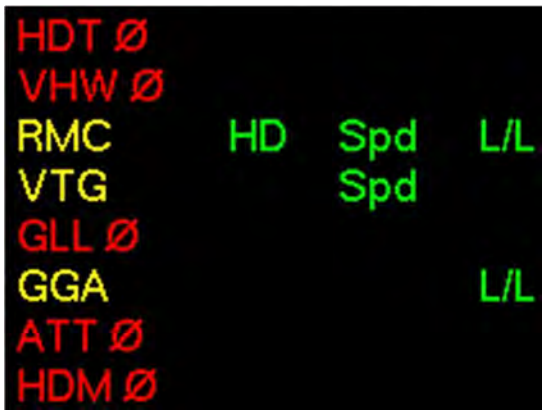

Figure 123 : Navigation Panel Example

This panel allows the operator to set the various aspects of the navigation system.

The upper section of the panel displays the navigation status of the external device interfaced to the GPS terminals of the sonar allowing the operator to easily determine which NMEA sentences contain valid information.

The operator selects the most accurate NMEA sentence available for heading, speed and latitude/longitude system information. Interfacing to a Satellite Compass is recommended.

In this example the RMC, VTG, GLL and GGA indicators at left (highlight color) are recognized by the system. Valid HD (heading), Spd (speed) and L/L (latitude/longitude) data packets were located for each sentence as demonstrated by the green text to the right of the header.

NMEA headers shown at left (in red text) terminated by a NULL character (Ø) were not found by the system in the incoming navigation data.

Net height adjustment, Wake Trail/Range Ring color and minimum speed to be used by the system are also available.

Navigation Status:

The current status of the navigation system is also reflected in the HD (heading), Spd (speed) and L/L (latitude/longitude) menu item selection text.

Selections presented in the green color indicate a valid choice while selections presented in red were not found to be present in the navigation data and therefore should not be used.

Cursor Bearing:

Figure 124 : Cursor Bearing Select

Sets the cursor bearing readout on the sonar display to be either **(Abs)** Absolute *(with respect to North)* or **(Rel)** Relative to the vessel.

Figure 125 : Navigation Mode Select

NM Navigation Mode:

Selects the display mode for navigation. Two modes are available:

(BUp) Bow Up Display:

The display is rotated to position the bow of the vessel pointing to the top of the screen. Echoes move through a combination of the target movement and the speed and course of the vessel.

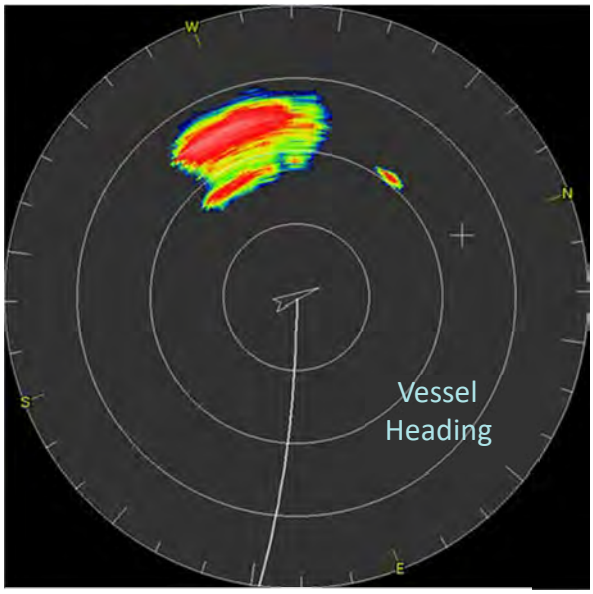

Figure 126 : Bow Up Display

(NUp) North Up Display:

This feature requires that latitude/longitude information is available through the GPS port.

The display is rotated to position true north at the top of the screen. Echoes move through a combination of the target movement and the speed and course of the vessel. A dotted line on the display indicates the direction of the bow.

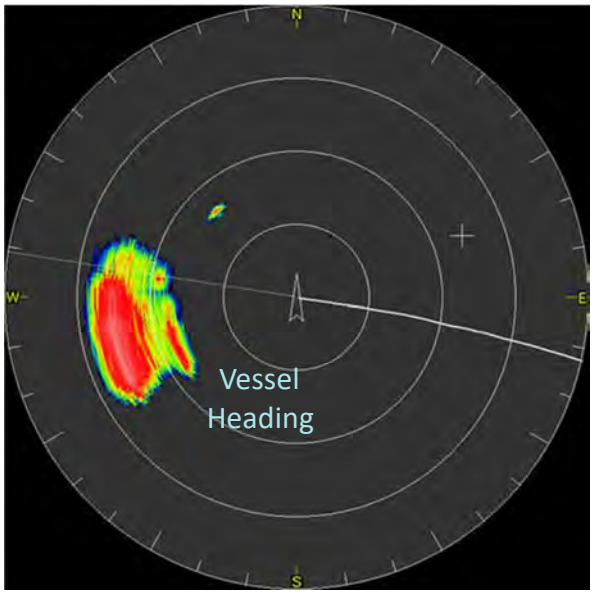

Figure 127 : North Up Display

(HD) Heading Selection:

Selects the NMEA type to determine heading for the system.

Figure 128 : Heading Selection

(Spd) Speed Selection:

Selects the NMEA type to determine vessel speed for the system.

Figure 129 : Speed Selection

(L/L) Latitude/Longitude Selection:

Selects the NMEA type to determine latitude/longitude for the system.

Figure 130 : Longitude/Latitude Selection

(WND) Wind Speed Indicator:

Enable the Wind speed Graphic. This NMEA sentence MWV must be combined into the GPS Input. This sentence must be provided from other equipment. It will display a graphic representation of the wind speed and direction on the sonar display.

Figure 131 : Wind Speed Indicator

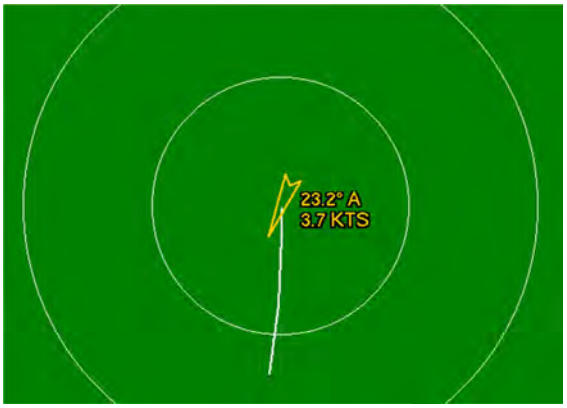

Figure 132 : Wind Speed Indicator

NH Net Height Adjust

Presets the height of the trawl net in use by the vessel. If an ITI net monitoring system is connected the Vertical Profile option in the Auto Operations (AO) feature *(Operate Panel)* will present the depth and height of the net in the display. The operator can then determine if the net is in proper position and depth to capture the school of fish. Net height units are always in meters.

Figure 133 : Net Height Adjust Selection

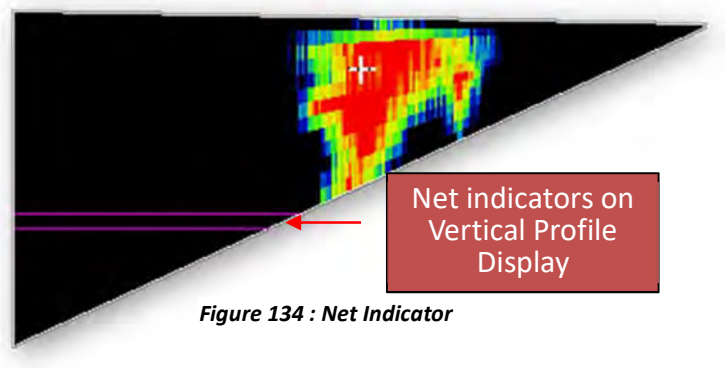

Figure 134 : Net Indicator

(WT) Wake Trail Display:

Figure 135 : Wake Trail Display

This feature allows the operator to decide a number of parameters:

- Wake Trail presence.
- Wake Trail/Range Ring color.
- Minimum speed from the navigation equipment for use by the system.

Selections:

Woff White range rings - wake trail disabled.
Goff Gray range rings - wake trail disabled.

The Navigation Mode setting determines the characteristics of the wake trail:

Bow Up Display Wake trail is solid white or gray.
North Up Display Wake trail is aged to darken over time from either white or gray.

The information provided by GPS-based navigation equipment can become unreliable at very low speeds (for example when the vessel is coming around on a slow turn). Provision is made to allow the operator to preset a minimum speed to be acknowledged by the system.

W00 → W25 White wake trail and range rings. Minimum speed 0 → 2.5 knots.
G00 → G25 Gray wake trail and range rings. Minimum speed 0 → 2.5 knots.

Below this present speed the system will:

- **Ignore any Event Marker selections.**
- **Disable the wake trail.**
- **Use the Vessel Speed (VS) selection preset on the Setup Panel for filtering and the speed indication on the sonar display.**

LL Latitude Longitude display:

Allows the operator to enable or disable the Lat/Long text display on the sonar display.

SYS System Panel

DA Display Alignment:

Bow Up Display must be selected on the Navigation Panel when making this adjustment.

Figure 136 : Display Alignment

Adjust to compensate for any misalignment of the transducer during installation to ensure the bow appears at the top of the sonar display (12 o'clock position). When at sea, noise from the vessel's propeller may be used to position the noise immediately to stern (6 o'clock) on the sonar display.

Selections:

0 → 127 *(Numbers wrap around)*

INC Inclinometer Type:

Figure 137 : Inclinometers Type Selection

Adjust to indicate which type of inclinometer is connected to the system.

Reference: Inclinometer Setup Procedure for Type "G" Inclinometer.

Except for the E type sensor which is external to the system, each inclinometer is marked with the appropriate letter and can be found *located inside the Processor Unit*. The type chosen must match the inclinometer type installed in the system.

Selections:

OFF Inclinometer disabled

E The system will use FEC sentences from a satellite compass at the GPS terminals of the sonar for pitch and roll information.

F or G The system will use the MAQ gyro inclinometer sensor for pitch and roll information.

BW Bow (Pitch) Adjust:

Figure 138 : Bow Adjust

Compensates for pitch related to inclinometer installation offset.

Selections: 0.1 degree increments from -4.0° to 4.0°

In order to make this adjustment, the system must be in stabilized mode:

On the Operate Panel select either Tracking mode (TR), Search mode (SR) or Vertical Tracking mode (VTR).

Ensure that the correct inclinometer type is selected on the System Panel.

When correctly adjusted, the readout on the display should reflect the current pitch offset of the vessel.

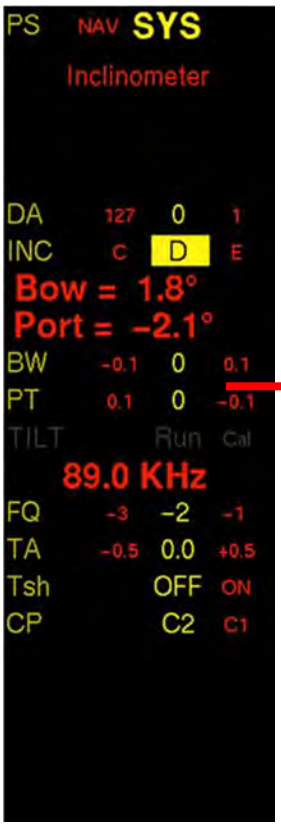

Figure 140 : System Panel

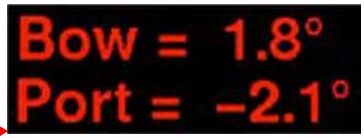

Figure 139 : Inclinometer Tilt Display

PT Port (Roll) Adjust:

Figure 141 : Port Adjust

Compensates for roll related to inclinometer installation offset.

Selections: 0.1 degree increments from -4.0° to 4.0°

In order to make this adjustment, the system must be in stabilized mode:

On the Operate Panel select either Tracking mode (TR), Search mode (SR) or Vertical Tracking mode (VTR).

Ensure that the correct inclinometer type is selected on the System Panel.

When correctly adjusted, the readout on the display should reflect the current pitch offset of the vessel.

FQ Frequency Adjust:

Figure 142 : Frequency Adjust

Adjust to fine tune the transducer frequency to ensure maximum target strength. The transducer frequency is displayed above FQ (e.g. 20.500 kHz). The optimum frequency will vary slightly for each unit. The frequency changes in discrete steps (e.g. 0.500 kHz steps for a 90 kHz transducer).

This setting is essential for best sonar performance.

Adjustment:

22 KHz	0.125 kHz steps *(19.625 kHz to 25.375 kHz)*.
60 KHz	0.333 kHz steps *(52.333 kHz to 68.00 kHz)*.
90 KHz	0.500 kHz steps *(78.50 kHz to 101.50 kHz)*.

Tuning the transducer is similar to checking the resonance of bell or tuning fork.
Resonance can vary from transducer to transducer and can change slightly as the Transducer ages. The transducer frequency must be tuned for maximum performance.

While stationary in port adjust the Range, Gain, Near Gain and Far Gain controls (on the Operate panel) to obtain a stable target on the display of medium strength. Choose a fixed position target such as the shoreline or a standing vessel.

Switch to the System Panel and vary the Frequency Adjust to ensure maximum target Strength.

TA Temperature Adjust:

Compensates for any offset in the water temperature readout on the sonar display.

Adjustment:

- ±5.0° *(Centigrade)* in 0.5° steps.

Figure 143 : Temperature Adjust

Tsh Transducer Shield:

Figure 144 : Transducer Shield

Compensates for signal attenuation due to the transducer shield *(if installed)*. Attenuation increases with greater tilt angles for shielded transducers.

Adjustment:

OFF	Stainless Steel transducer shield removed or 60/90 kHz ABS shield installed.
ON	22 KHz Stainless Steel shield installed.

CP Communications Port:

Figure 145 : COM Port Select

This selection should never be adjusted.
If a com port fails the 2 com port cables could be interchanged and the CP selection on the system panel must be changed to allow temporary operation using the other com port.

Selects the serial port on the Computer Interface Unit which communicates with the Transceiver Unit *(hardware cable connection)*. This setting should not be altered unless a change in the system wiring is causing a NO DATA RECEIVED condition.

Selections:

C2 Serial port COM2.

C1 Serial port COM1.

CHAPTER 8

Electronics

Electronics Descriptions
Troubleshooting Electronics

P.O. Box 199,
Finch, ON, Canada
K0C 1K0

Tel: (1) 613-984-9000
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Email: info@maqsonar.com

Electronics Descriptions

KA3608 PROCESSOR UNIT ASSEMBLY:

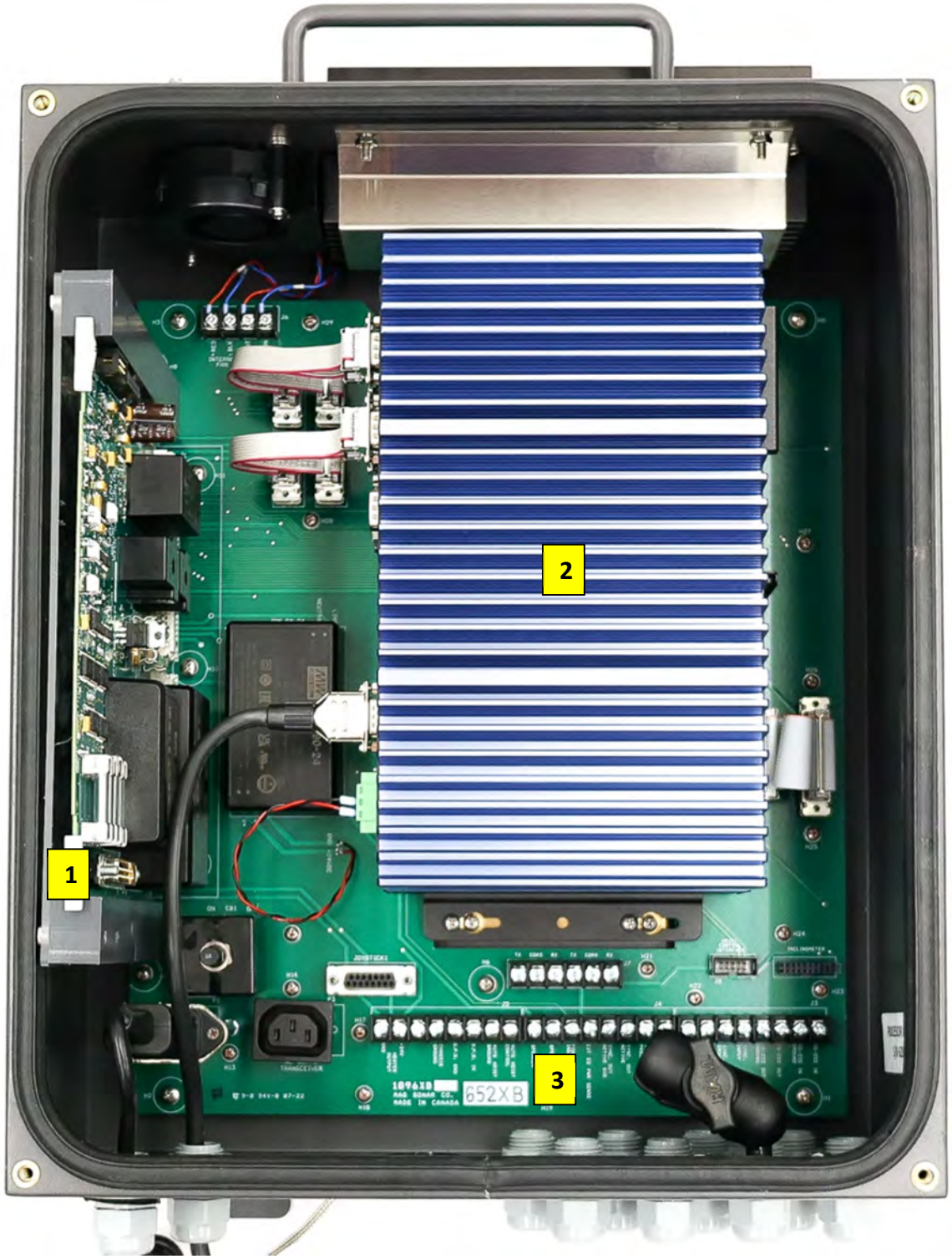

Figure 146 : KA3608 Processor Unit

KA3602 TRANSCEIVER UNIT ASSEMBLY:

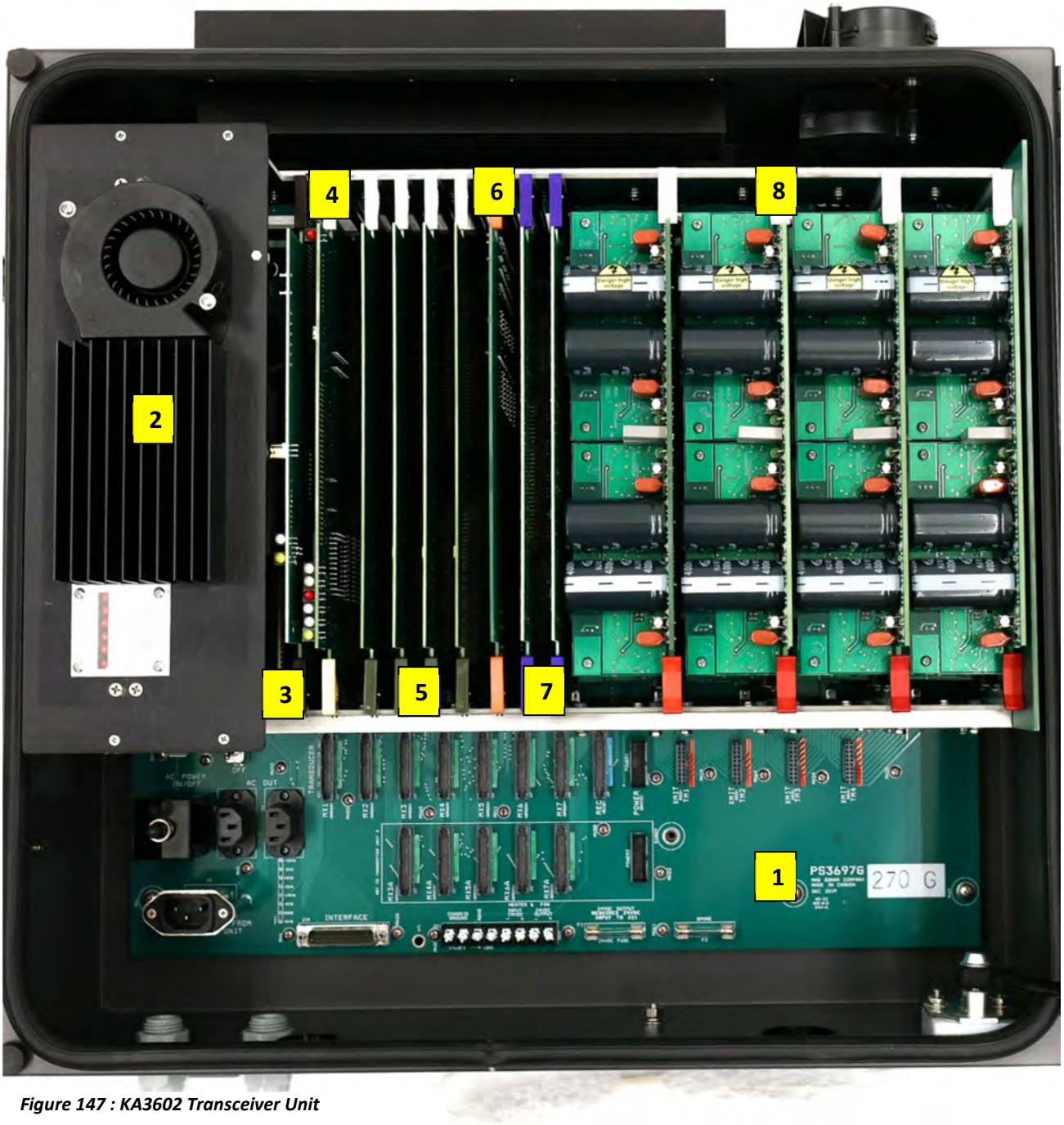

Figure 147 : KA3602 Transceiver Unit

KA3608 – Processor Unit

- Controls the system and presents the display to the operator.
- Typically in the Wheel house in a well ventilated area.

1. **KA1872**-Processor Unit Interface Board
   -Supplies Digital power for the processor Unit and all System Fans. ---
   -Interfaces all
   -External inputs from Joystick, Navigation and Synchronization to Industrial computer as well as supports Ethernet I/O from Transceiver
2. **KA3669**-Industrial Computer Assembly
   -Receives all Data I/O thru the KA1872
   -Performs all Digital Signal Processing as well as Display and user interface.
3. **KA1896**-Processor Unit Motherboard

KA3602 – Transceiver Unit

-Analog and digital circuitry for transmit and receive.
- Typically in Sonar room or engine Room. Room temperature but not mounted near engine or heat source. Less than **50°C** several meters from the hoist unit.

1. **KA3697**-Transceiver Motherboard
2. **KA1817**-Transceiver Power Supply
   -Supplies all Digital and Analog Voltages for the Transceiver as well as Isolating and Controlling Charging voltage for Transmitters.
3. **KA1849**-Transceiver Interface Board **(Black)**
   -Interfaces the Processor to Transceiver I/O data. The VCO's (Voltage Controlled Oscillators) which allow Different Frequency Transducer to connect to the same set of electronics are also on the board.
4. **KA3645**-Transceiver Control Board **(Yellow)**
   -Contains the Microcontroller and software as well the bus control timing for driving the transceiver.
   -Performs the Analog to Digital conversion of all received signal and passes the digital samples to the KA1849 Interface Board to be sent to the Processor Unit for signal processing.

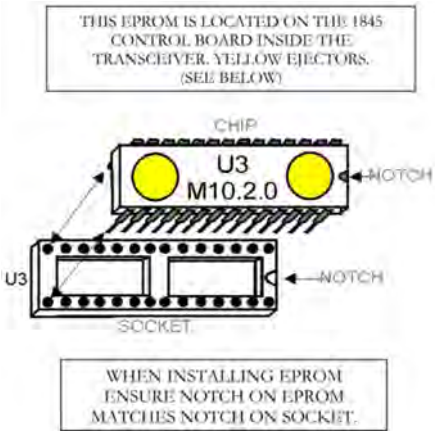

Figure 148 : EEPROM (KA3645)

5. **KA3603**-Transceiver Tilt Board **(Green)**
   -4 per system 64 channels per board
   -Generates all transmitters and receive drives for the Sonar transmit and receive samples and tilt control.
6. **KA1814**-Transceiver Mux Board **(Orange)**
   -1 per system 4 Channels per board
   -Multiplexes all Receiver board channels to the Control Board for the A/D converters.
7. **KA1891**-Receiver Board **(Blue)**
   -2 per system 16 channels per board
   -Receiver all Analog Receive Data filters and amplifies the Data for the A/D converters
8. **KA3690**-Transmitter Board **(Red)**
   - 4 per system 16 channels per board (256 channels per RDT system)
   -Generates +/-350V outputs for the transmitter pulses of the transducer. Inputs from the KA360303 Tilt boards. Outputs to transducer.

All paired (same color) boards can be interchanged. Revisions should not be mixed. Newest revision Boards are backward compatible.

KA9004-90KHz Transducer – 8” Sea-Chest
KA6004-60KHz Transducer– 8” Sea-Chest
KA2204-22KHz Transducer– 18” Sea-Chest
KA1805-Joystick Assembly - Mounted near operator.

Troubleshooting Electronics

Note: All Systems shipped from Factory are preset at 230VAC operation for the electronics.

1) **Problem "No Data Received".**

Disconnect Transducer while troubleshooting.

Processor

+12 Volt FAN light on KA1872 board inside the PROCESSOR UNIT must be on (This indicates there is AC power supplied to the Processor Unit). If not check power source and fuses on KA1872 board (Processor Unit Interface Board). Replace KA1872.

Power ON Sonar by simultaneously pressing both the red buttons of the Joystick. You must hear the start-up beep of the computer on power-up. MAQ Sonar Operator's panel must appear on the monitor.

LED1 Flashing (Trans)

LED1 will flash at a steady rate. This indicates the proper computer serial port is sending messages to the KA1872 and it is sending the message to the Transceiver (this will vary with range scales). Latest system uses Ethernet communications.

- If LED1 is not flashing change CP (Com Port Select) setting on SYS (system panel ref. operators manual)
- Ensure correct Software revision and reformat computer and reload software
- Check cable connection from computer to motherboard
- Replace KA1872
- Replace computer
- Replace motherboard

Transceiver

All lights on lid of case must be ON (1817 power supply LEDs VOLTAGE INDICATORS)

- Check AC from Processor unit. Check power cable for AC.
- Check 24VDC heater voltage on Heater Input Voltage on J21.
- Replace Power Supply KA1817.

LED2 Flashing

Indicates **KA1849** Black Board is receiving message from Processor Unit KA1849 PCB.
(this will vary with range scales and should match the rate of the Trans LED on the KA1872 board)

- If not flashing in synchronization with KA1872 LED1 check cable connection KA1837 Interface cable / Ethernet cable.
- Replace KA1849 (Interface Board)
- Replace KA1837 (Interface Cable) / Ethernet cable.
- Replace motherboard in Processor KA1896
- Replace motherboard in Transceiver KA1897

LED3 Flashing

Indicates **KA1849** has transferred message from KA1845 and understands the message.

- If not Flashing ensure correct software revisions.
- Replace KA1845
- Replace motherboard

LEDS4

KA3690 (64) Lights all flashing Indicates transmitters are operating properly and there are no damaged channels. (Transmitter channels are damaged when transducers are damaged) (LEDs flash rate must match 1845 LED flash rate).

- If no lights on the KA1890 are flashing check High Voltage switch is set to ON
- If some lights are not flashing disconnect transducer and replace board if all lights are still not flashing. Individual Channel Boards can also be replaced. Typically Fuse is blown on channel boards if they have failed.
- Replace Power Supply KA1817
- Replace motherboard
- LEDS5

KA1872 Lights all flashing indicates Message received from transceiver to processor and “NO DATA RECEIVED” on the display indicates message is not correct.

- Reformat and reload software. (Ensure Correct Revision Levels)
- If LEDS are not all flashing in synchronization replace KA1872.
- Replace KA1849
- Check cable connection KA1837 Interface cable.
- Replace KA1837 Interface Cable
- Replace motherboard

If “No Data Received” is still flashing check the connection of the 100pin SCSI cable from the Computer to the motherboard of the Processor unit. If not change PCI-7300 I/O board. I/O board must be detected on the BIOS start-up page of the Computer.

- Replace Computer

CHAPTER 9

Maintenance

Standard Maintenance Checks
EU Declaration Conformity

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MAQ Standard Maintenance Checks:

Transducers:

1. Zinc Anodes mounted on transducer pipes must be inspected when possible and replaced yearly. (excessive erosion of Zinc Anodes indicates improper grounding)
2. Transducer must be inspected yearly. Signs of aquatic life accumulation on the shield or inside the shield must be corrected for best sonar performance (see transducer maintenance procedure). Remove shield if required and clean transducer active face and shield with muriatic acid.

Hoists:

1. Hoists Actuators should be inspected monthly for sufficient grease on Actuator shaft.
2. Packing glands should be greased and checked for leaks regularly. Replace packing material as required. (Caution do not over tighten hoist compression gland as it will overload the actuator)
3. Hoist pipe and Sea-chest must not vibrate. If this is occurring inspect Sea-Chest guides for excessive wear or improper adjustment and readjust or replace UHMW slider blocks or improve support to Sea-Chest.
4. Hoist pipes must be connected to ships electrical ground at all times. (ensure pipe is properly grounded)
5. Hoist pipe openings must not be exposed to water or spray. If water is detected inside hoist pipes this may indicates problems with the transducer to pipe interface and should be corrected immediately.

Electronics:

1. All cases must be connected to ships electrical ground at all times.
2. When inspecting electronics, ensure AC power is disconnected before changing boards, connecting cables, or removing, or replacing parts.
3. Fans must be checked for free running operation regularly.
4. All Indicator Lights must be Lit or flashing appropriately. (See troubleshooting section)
5. Cases must be positioned in areas free of continuous water spray and in an area with maximum ambient temperature of 40°C.
6. Case seals should be inspected for signs of water leakage. Cases should be inspected for signs of corrosion.
7. Appropriate fuses must be installed if changing main AC supply voltages or upgrading to RDT. (Standard fuse will be installed before shipping from factory)
8. Ensure all cable connections are securely fastened.