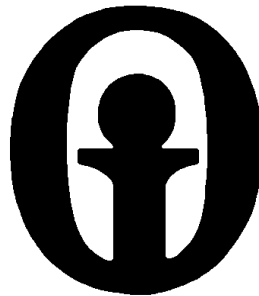


Model 10031-5HLW Winch

Operation, Installation and Maintenance Manual

Job # 7-6164-000

March 26, 2015



InterOcean Systems, Inc.
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San Diego, California 92123 USA

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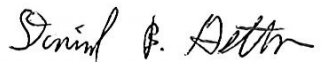
E-Mail: sales@interoceansystems.com

Model 10031-5HLW Winch Operation, Installation and Maintenance Manual

Manual Part No.: 4 76164 0100 00 Rev. A

Original Release: March 26, 2015

Approved by:



Daniel B. Gertler
Project Engineer

March 26, 2015

Date

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Revision History

Rev	Date	Description
A	26 March 2015	Original Issue

WARNING

ANY WINCH, NO MATTER HOW SMALL, CAN PRODUCE SUFFICIENT FORCES TO CAUSE MAJOR INJURY TO PERSONNEL IF NOT PROPERLY CONTROLLED.

KEEP PERSONNEL AWAY FROM ALL MOVING COMPONENTS INCLUDING THE WINCH PAYLOAD.

WARNING

DE-PRESSURIZE ALL HOSES TO THE WINCH DURING ANY INSTALLATION OR MAINTENANCE PROCEDURES.

1.0 Specifications

Wire Capacity	4100 ft (1250 m) at 0.380 in (9.65 mm) Cable Mfg: Falmat Mfg P/N: FM088095-2MOD1
Load: (Bare Drum)	470 lbs (213 kg)
Speed: (Bare Drum)	147 fpm (45 m/min)
Horsepower:	5 HP
Hydraulic Power Input:	6 GPM @ 1500 psi
Drum Diameter:	20.0 in (50.8 cm)
Flange Diameter:	34.0 in (86.4 cm)
Drum Width:	15.2 in (38.6 cm)
Overall Dimensions	
Length:	48 in (122 cm)
Width:	40 in (102 cm)
Height:	39 in (99 cm)
Weight	550 lbs (250 kg) without cable; 780 lbs (355 kg) with 1,000m of cable installed
Material:	Aluminum
Level Wind:	Yes
Slip Ring	Yes; 2 Channel
Brakes:	Pressure to Release Fail Safe Brake; Manual Pawl Brake
Control Station	Control Valve: Manual Handle

2.0 Unpacking

Upon receiving the winch, inspect for any external signs of any shipping damage. If shipping damage has occurred, immediately file a claim with the carrier and contact InterOcean Systems.

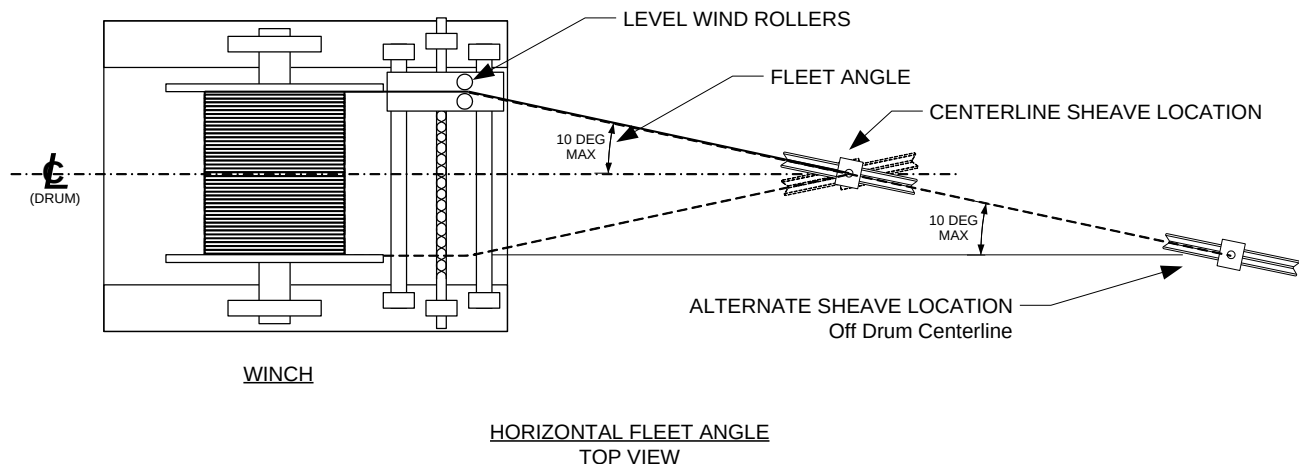
3.0 Installation

3.1 Winch Installation

Select a location for the winch that will support the weight of the winch plus the vertical and horizontal loads imparted by the winch during full rated load operation. It is recommended to add a Factor of Safety compliant to local structural standards to determine the required deck and fastener load requirements.

Fleet Angle

The maximum fleet angle at the level wind rollers must not exceed 10 degrees. See diagram below:



3.2 Hydraulic Connections

The winch has two external hydraulic connections: a -6 (3/8") pressure line and a -8 (1/2") tank line, located on a horizontal plate below the motor. These are both JIC male fittings to be connected to the ship's 1500 psi 6 GPM hydraulic power supply.

The hydraulic operating valve is mounted on the winch elevated behind the drum bearing. The valve has four hoses: a supply line from the ship, a drain line to the ship, and A & B supply hoses to drive the motor. The winch motor is capable of 2 speed operation but in this application only the high speed mode is used; the low speed port is plumbed to drain and hence disabled.

All hydraulic fittings are encapsulated in Denso tape to protect against corrosion and the connections to the ship's system should be similarly protected after final installation and test. It is recommended that if possible full flow shut off valves be installed to permit hydraulic isolation of the winch if desired.

4.0 Operation

4.1 Winch Operation

Winch drum operation is controlled entirely by the hydraulic valve. The valve's handle controls drum rotation direction and speed. Detailed operations are explained below: When the valve handle is in the center-stop position, the winch will be stopped and the motor's self-contained parking brake engaged. When the winch is commanded to rotate via the handle being moved out of the center position, the hydraulic pressure applied to the motor disengages the brake. If the handle is moved in the PAY IN direction, the winch will retrieve the cable, and moving the handle in the opposite direction will deploy the cable. The further the joystick is moved from the center position, the faster the drum will rotate. Returning the joystick to the center position will slow down the drum and bring it to a stop while applying the motor brake again. Speed is set by the relative position of the valve handle, regardless of load (within operating specifications). If there is a load on the cable during pay out, the winch will still maintain speed control according to the handle's position due to the valve restricting hydraulic fluid flow released by the motor.

The valve handle is spring-centered, thus if the handle is suddenly released while in either the PAY OUT or PAY IN direction, the handle will automatically return to the center-stop position and bring the winch drum to a stop.

4.2 Deploying Cable

- a) Connect ship's hydraulic hoses to the winch.
- b) Pressurize hydraulic system.
- c) If necessary, disengage the pawl brake.
- d) Move the valve handle in the PAY OUT direction. Cable deployment speed is controlled by how far the handle is moved in the PAY OUT direction.
- e) To stop the cable, return the handle to the center-stop position.

4.3 Retrieving Cable

- a) Connect ship's hydraulic hoses to the winch.
- b) Pressurize hydraulic system.
- c) If necessary, disengage the pawl brake.
- d) Move the Joystick in the PAY IN direction. Cable retrieval speed is controlled by how far the Joystick is moved in the PAY IN direction.
- e) To stop the cable, return the joystick to the center-stop position.

CAUTION

In normal operations, the drum should have at least 10 wraps of cable. Less than 10 wraps may exert excessive tension on the cable clamp, possibly resulting in the loss of the cable and payload and a hazardous situation to personnel.

4.4 General Operation Notes

If the hydraulic system shuts down or unexpectedly loses pressure, return the valve handle to the center-stop position immediately. The integral motor parking brake will engage and will not release, even under load.

5.0 Winch Maintenance

5.1 Lubrication

Motor	The hydraulic motor is self-lubricated and uses VG-46 rated anti-wear oil (eg Mobil DTE 25). Hydraulic oil must be kept clean, cooled below 80°C and run through a 10 micron filter to prolong pump life.
Level Wind Chains	The chains are initially lubricated at the factory with a light grease. Application of a good quality grease such as Shell Gadus S3 V220C2 ((NLGI Consistency Number “2” and moisture resistant) or equivalent weekly will assure good performance.
Level Wind	The level wind guide bars, diamond screw, and shuttle are factory lubricated and require no initial lubrication procedures. However, in an environment of dirt and/or extreme moisture, re-lubrication after 1 to 4 months of operation is recommended. Experience will determine the best interval for each specific application. To lubricate the shuttle, use a grease gun and inject the grease into the grease nipple found on the bottom side of the shuttle carrier. Use a good quality grease such as the Shell Gadus S3 V220C2 or equivalent.

CAUTION

Failure of the level wind shuttle due to lack of maintenance may cause additional damage to the level wind system

Level Wind Shuttle:	Periodically remove the level wind shuttle and inspect for wear. The level wind shuttle should be replaced if excessive wear is observed. To remove the shuttle, remove the 4 fasteners and cover from the bottom of the level wind carriage. If necessary, “rock” the adjustment handwheel back and forth to drop the shuttle from the carriage.
Bearings	Bearings are factory lubricated and require no re-lubrication under normal operating condition. However, in an environment of dirt and/or extreme moisture, re-lubrication after 1 to 4 months of operation is recommended. Experience will determine the best interval for each specific application. When lubricating bearings, add grease slowly via the grease nipples, while shaft is rotating. When grease begins to come out of the seals, the bearings will contain the correct amount of grease. Use a good quality grease such as the Shell Gadus S3 V220C2 or equivalent.

5.2 **Hydraulics**

Gear Oil

The motor requires SAE-30-CD oil for the internal gears, which is kept separate from the hydraulic fluid. Recommended life is 200 hours of use between oil changes, however this time will vary based on other factors (see supporting documentation in Section 8.0).

5.3 **Painting and Corrosion Protection**

The winch is constructed of aluminum and steel components. Stainless steel components do not require paint under normal operations with proper maintenance and cleaning. Steel components are painted as described below. Some components containing both aluminum and steel parts, such as the drive motor, are painted.

Painted components are mechanically cleaned and etched or roughened and primed with a zinc rich epoxy primer, and coat of epoxy followed by a topcoat of polyurethane. Prior to this treatment, any bare aluminum to be painted is first coated with strontium epoxy primer. Any paint repairs must be consistent and compatible with this paint system.

Where unpainted steel comes in contact with unpainted stainless steel, the bare metal surfaces are subject to bi-metallic corrosion. To prevent this, the contact surfaces are coated with a thin layer of Loctite 767, a marine-grade anti-seize compound. The winch is assembled with stainless steel fasteners which are also coated with Loctite 767, anti-seize compound or equivalent including those fasteners which utilize lock (Nylok) nuts. Where the drum is supported by bearings, the shaft and bearing races are also coated with Loctite 767. During maintenance or other occasions when components are dis-assembled and re-assembled it is important that these components are re-coated with Loctite 767 or equivalent.

5.4 **Fresh Water Wash Down**

The winch should be kept clean and well lubricated to assure the best performance. While in use, it should be washed down with fresh water and wiped down daily after operations are complete.

6.0 Troubleshooting

6.1 Troubleshooting Guide

Symptom	Cause	Solution
Winch drum/motor is sluggish.	Low hydraulic flow	Check hydraulic pump flow rate
	Ambient temperature below gear oil operating range.	Ensure gear oil is of proper viscosity for ambient temperature.
Winch does not lift load	Insufficient hydraulic pressure	Check pump
Winch stops during PayIn	Excessive load or speed.	Reduce the load or pay in at a slower speed.
Winch stops during PayOut	Excessive speed at full rated load.	If load is at or near full rated winch load, payout at a slower speed.
Level wind does not move	Foreign object caught in level wind screw groove.	Inspect the entire groove of the diamond screw for damage or foreign objects.
	Shuttle is broken.	Replace the shuttle. See Note 1. IMPORTANT: It is recommended to determine the cause of the broken shuttle and rectify the problem.
	A level wind chain is broken or other level wind drive components have failed.	Inspect all level wind drive components. Remove the chain covers as necessary.
Cable not spooling correctly	Level wind carriage out of position.	Adjust level wind carriage position as described in this manual. See table of contents.
Short or open circuit in sea cable	Bad Slip Ring	Verify continuity through slip ring. Repair/replace as required.
	Bad slip ring connection	Check mating connector on cable. Re-terminate as required.
	Bad sea cable or wet end termination	Re-terminate, repair or replace as necessary.

Notes:

- 1) Shuttle Replacement: **IMPORTANT:** Before inspecting or removing the shuttle, determine the location of the level wind carriage (measure its location from one of the bearing flanges) and attempt to not rotate the drum while there is no shuttle. This will save time after the new shuttle is installed so that re-aligning the level wind will not be necessary.
Remove the shuttle for inspection. The shuttle is inside the level wind carriage and is accessed from the bottom side of the carriage. Refer to assembly drawings in this manual. When replacing the shuttle, thoroughly clean old grease from inside the shuttle housing. Apply grease to all surfaces of the new shuttle and re-install.

6.2 Adjusting the Level Wind

This procedure adjusts the relative level wind carriage position to the cable lay on the drum.

NOTE: If the winch is delivered with the cable already spooled onto the drum, the level wind carriage is already properly positioned. However, over time, it may be necessary to make an adjustment.

The desired position of the level wind carriage is for the cable in the carriage to *lag behind* the cable position on the drum by approximately $\frac{1}{2}$ to 1 cable diameters. This will assure that each cable wrap is held firmly against the preceding wrap. To adjust the carriage position, drum operation must be stopped first. Pull out on the level wind handwheel and rotate at the same time to move the carriage. Adjust the carriage position only one notch at a time. The adjustment wheel must re-seat and lock into the carriage shaft to complete the adjustment.

7.0 Appendix

DRAWINGS

<u>Drawing #</u>	<u>Rev</u>	<u>Title</u>
76164 8000	A	Major Assembly, 10031-5HLW
76164 8000 01	A	Major Assembly Parts List
76164 5000	A	Hydraulic Schematic
76164 6300	A	Level Wind Assembly
76164 6300 01	A	Level Wind Assembly Parts List
2010 6302	D	Level Wind Carriage Assembly
2010 6302 01	D	Level Wind Carriage Assembly Parts List
76164 6103	A	Level Wind Idler Assembly
76164 6103 01	A	Level Wind Idler Assembly Parts List
76164 5001	A	Slip Ring Wiring Diagram

DOCUMENTS

<u>Document #</u>	<u>Rev</u>	<u>Title</u>
0407 1139	D	Winch Test Report

8.0 Supporting Documentation

The following documents can be found on the included CD titled: "7-6164-000 Documentation CD".

Wheel Motor Interface Drawing

TITLE	2 Speed Type Wheel Motor
MFG PN	PHV-2B-20***-P-10
EDITION/VERSION	21 OCT 2005
FILENAME	NACHI PHK-PHV-2B MOTOR.pdf

Wheel Motor Manual

TITLE	Wheel Motor Instruction Manual
MFG PN	HD0-020701
EDITION/VERSION	JUL 2007
FILENAME	NACHI_PHV-2B_SERVICE_MANUAL.pdf

Proportional Control Valve Data Sheet

TITLE	Monoblock Directional Control Valve SD5
MFG PN	SD5
EDITION/VERSION	DAU003A
FILENAME	Walvoil_SD5_Manual_Valve_TDS.PDF

Slip Ring Data Sheet

TITLE	Product Data Sheet/Wiring Diagram
MFG PN	BXAN-2-MS2-2FT
EDITION/VERSION	26 AUG 2010
FILENAME	BXAN-2-MS2-2FT.pdf

Winch Cable Data Sheet

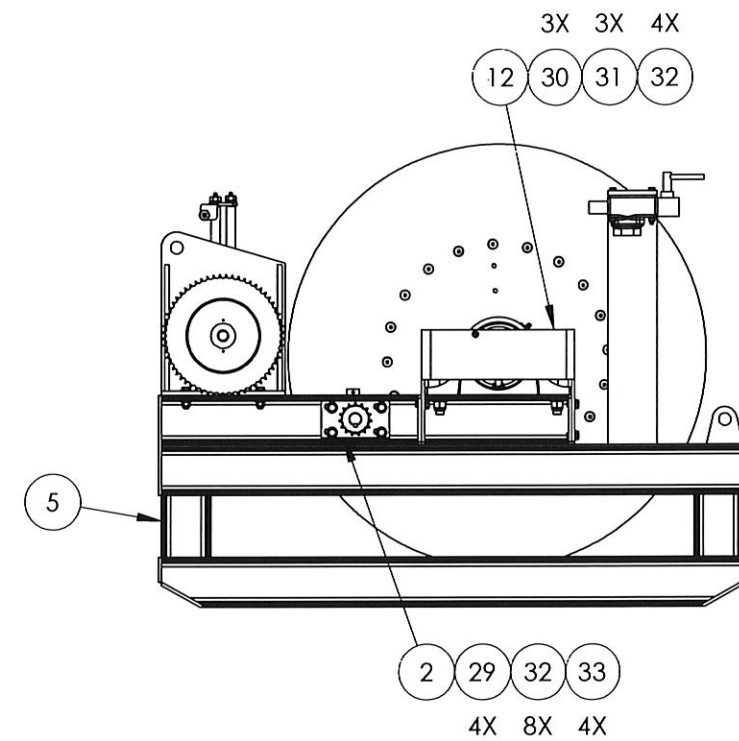
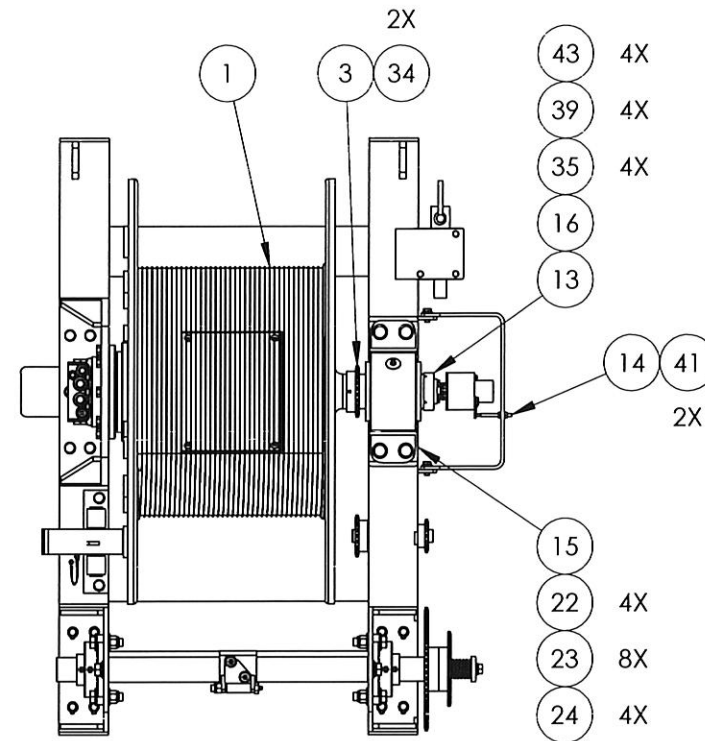
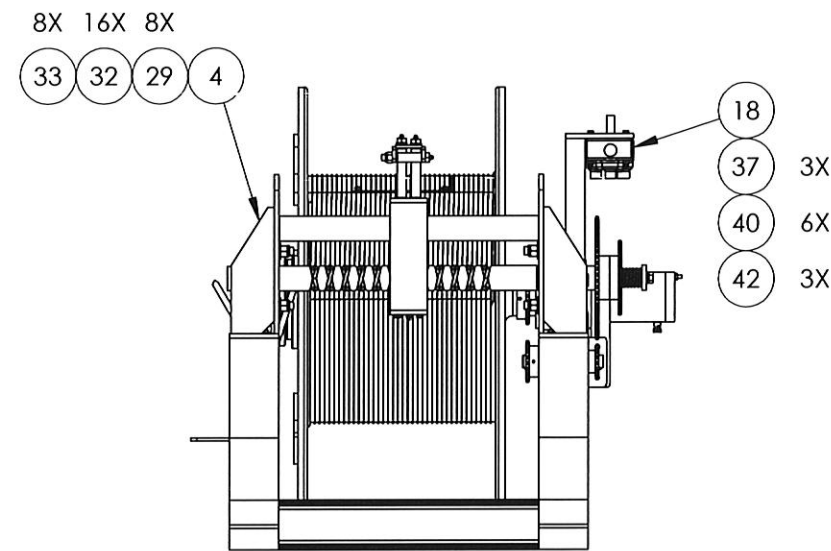
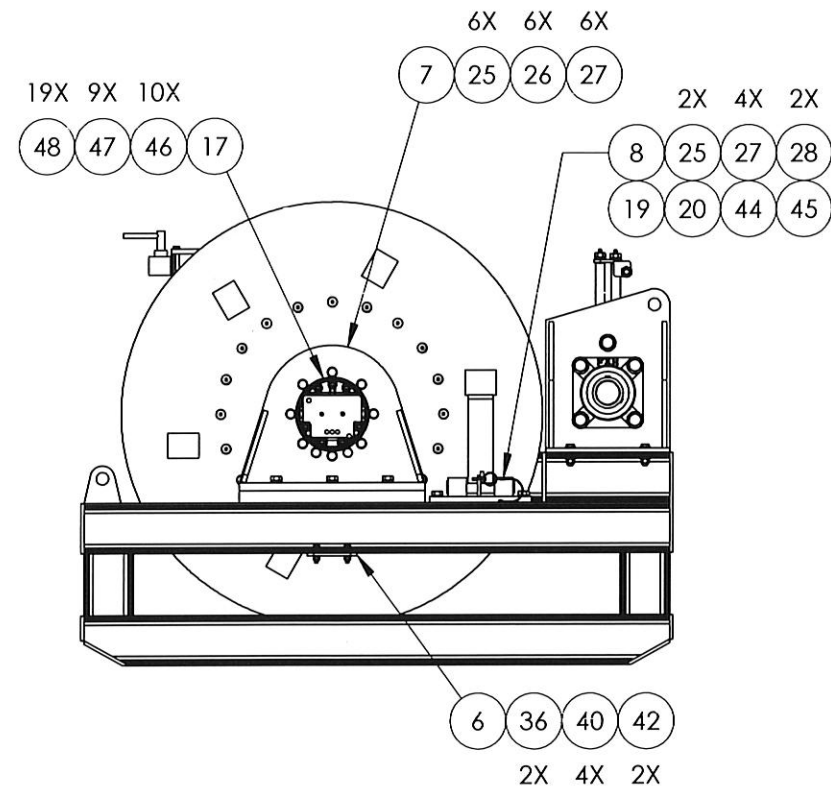
TITLE	Diver Communication Cable
MFG PN	FM088095-2
FILENAME	Falmat_FM088095-2.pdf

NOTES: UNLESS OTHERWISE SPECIFIED

1. SEE SHEET 2 FOR CHAIN GUARDS AND HARDWARE.

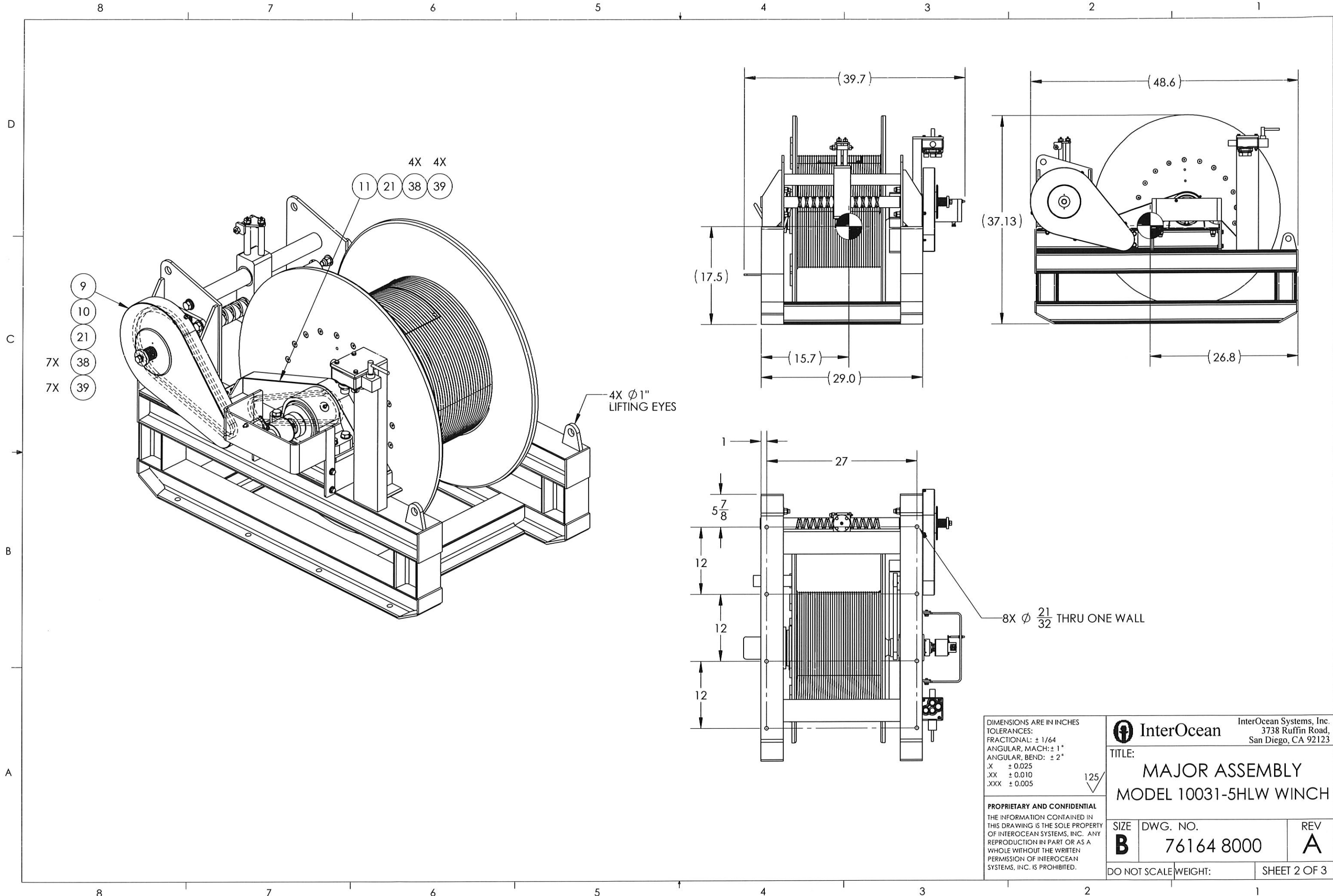
2. SEE SHEET 3 FOR HYDRAULIC HOSES AND FITTINGS.

REVISIONS					
ZONE	REV.	DESCRIPTION	ECO	DATE	APPROVED
N/A	A	INITIAL DRAWING RELEASE	N/A	3/30/15	PG



COMMENTS: PART NUMBER IS: 4-76164 8000-01	DIMENSIONS ARE IN INCHES TOLERANCES: FRACTIONAL: ± 1/64 ANGULAR, MACH: ± 1° ANGULAR, BEND: ± 2° .X ± 0.025 .XX ± 0.010 .XXX ± 0.005	125/✓		NAME	DATE	 InterOcean InterOcean Systems, Inc. 3738 Ruffin Road, San Diego, CA 92123		
			DRAWN	M. KLICK	01/22/15	TITLE: MAJOR ASSEMBLY MODEL 10031-5HLW WINCH		
			PROJ ENGR	DG	3/30/15			
			PROD MGR	DQ	3/30/15			
			OPS/MFG	DM	3-30-15			
PROPRIETARY AND CONFIDENTIAL THE INFORMATION CONTAINED IN THIS DRAWING IS THE SOLE PROPERTY OF INTEROCEAN SYSTEMS, INC. ANY REPRODUCTION IN PART OR AS A WHOLE WITHOUT THE WRITTEN PERMISSION OF INTEROCEAN SYSTEMS, INC. IS PROHIBITED.	INTERPRET TOLERANCING PER: ASME Y14.5-1994		OPS/MFG	DTZ	3/30/15	SIZE B	DWG. NO. 76164 8000	REV A
	MATERIAL SEE PARTS LIST		QA/QMS					
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	DO NOT SCALE DRAWING	ENGR MGR	MC	3/30/15				

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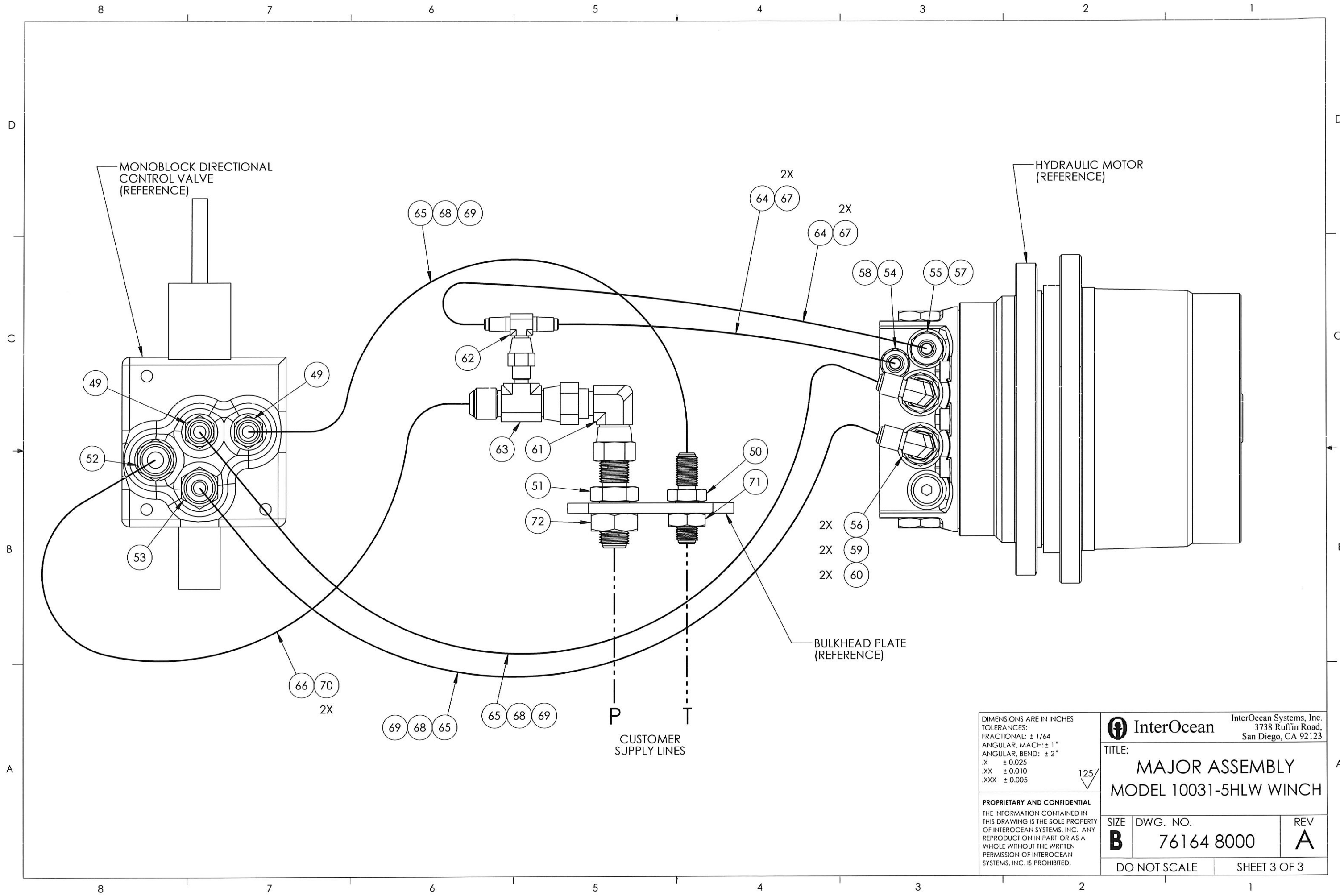
DIMENSIONS ARE IN INCHES
TOLERANCES:
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ANGULAR, MACH: ± 1°
ANGULAR, BEND: ± 2°
.X ± 0.025
.XX ± 0.010
.XXX ± 0.005

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TITLE: MAJOR ASSEMBLY MODEL 10031-5HLW WINCH		
SIZE B	DWG. NO. 76164 8000	REV A
DO NOT SCALE WEIGHT:		SHEET 2 OF 3

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DIMENSIONS ARE IN INCHES
TOLERANCES:
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ANGULAR, MACH: $\pm 1^\circ$
ANGULAR, BEND: $\pm 2^\circ$
.X ± 0.025
.XX ± 0.010
.XXX ± 0.005

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SIZE B	DWG. NO. 76164 8000	REV A
DO NOT SCALE		SHEET 3 OF 3

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1.00	EA	10	1	476164610001	C	DRUM ASSEMBLY	B			
1.00	EA	20	2	476164610301	A	IDLER ASSEMBLY	B			
1.00	EA	30	3	476164610401	A	SPROCKET MOD 40BS24	B			
1.00	EA	40	4	476164630001	A	LEVEL WIND ASSEMBLY	B			
1.00	EA	50	5	476164900001	A	BASE FRAME	B			
1.00	EA	60	6	476164900101	A	BULKHEAD PLATE	B			
1.00	EA	70	7	476164910301	A	MOTOR MOUNT	B			
1.00	EA	80	8	476164910501	A	DRUM SAFETY LOCK	B			

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1.00	EA	100	10	476164910902	A	CHAIN GUARD LEVEL WIND TO IDLER BASE PLATE	B			
1.00	EA	110	11	476164911001	A	CHAIN GUARD DRUM TO IDLER	B			
1.00	EA	120	12	476164940201		BASH GUARD				
1.00	EA	130	13	474392940100	-	SLIP RING ADAPTER 10031-25HLW WINCH	B			
1.00	EA	140	14	42010900003	-	ANTI ROTATION PIN 3"	A			
1.00	EA	150	15	951300246		BEARING, 4 BOLT PILLOW BLOCK, 2-3/4" BORE TIMKEN # E-P4B-TRB-2 3/4				
1.00	EA	160	16	952000047		SLIP RING, 2 CHANNEL, ALUMINUM HOUSING, 2" DRIVE FLANGE, MS CONNECTOR (WITH MATE) FROM HOUSING & 3 FT LEADS FROM FLANGE				

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1.00	EA	170	17	950011158		WHEEL MOTOR, 2 SPEED, HYDRAULIC NACHI # PHV-2B-2022B-P-10				
1.00	EA	180	18	950500252		CONTROL VALVE, MONOBLOCK DIRECTIONAL WALVOIL # SD5/1-P(JG3-120)/ICEX8L/AET-SAE				
1.00	EA	190	19	980982004		QUICK RELEASE PIN, 3/16" DIA, 18-8SS, .7" USABLE LENGTH McMASTER CARR # 98404A007				
1.00	EA	200	20	951202622		LANYARD 308SS NYLON COATED LOOP TO EYE FITTING 8", McMASTER CARR # 30345T8				
8.00	FT	210	21	951200400		CHAIN ROLLER (#40) MARTIN # RS-40				
4.00	EA	220	22	980845528		BOLT 5/8-11 x 3-1/2 HEX SS				
8.00	EA	230	23	980960580		WASHER 5/8" X 1.188" X 0.06 FLAT SS				
4.00	EA	240	24	980956078		LOCKNUT 5/8-11 NYLON INSERT 18-8SS				

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8.00	EA	250	25	980844414		BOLT 1/2-13 x 1-3/4 HEX SS				
6.00	EA	260	26	980962500		WASHER 1/2" SPLIT LOCK SS				
10.00	EA	270	27	980960496		WASHER 1/2" x 7/8" OD FLAT SS				
2.00	EA	280	28	980956080		LOCKNUT 1/2-13 NYLON INSERT 18-8SS UNC				
12.00	EA	290	29	980842212		BOLT 3/8-16 x 1-1/2 HEX SS				
4.00	EA	300	30	980842207		BOLT 3/8-16 x 7/8 HEX SS				
4.00	EA	310	31	980962380		WASHER 3/8" SPLIT LOCK SS				
28.00	EA	320	32	980960381		WASHER 3/8" x 13/16" SAE FLAT SS				

 InterOcean Parts List				FSCM No. 11420		Title: MODEL 10031-5HLW WINCH			P/L No: 476164800001		Revision: A	
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4.00	EA	350	35	980840005		BOLT 1/4-20 x 5/8 HEX SS						
2.00	EA	360	36	980840010		BOLT 1/4-20 x 1-1/4 HEX SS						
3.00	EA	370	37	980840022		BOLT 1/4-20 x 2-3/4 HEX SS						
11.00	EA	380	38	980704005		SCREW 1/4-20 X 1/2 PAN HEAD PHILLIPS						
15.00	EA	390	39	980962250		WASHER 1/4" SPLIT LOCK SS						
10.00	EA	400	40	980960251		WASHER 1/4" x 1/2" OD FLAT SS						



**InterOcean
Parts List**

FSCM No.
11420

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476164800001

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A

Dwg Size:
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By:

Approved:
03/30/15

By:

Page 6 of 9

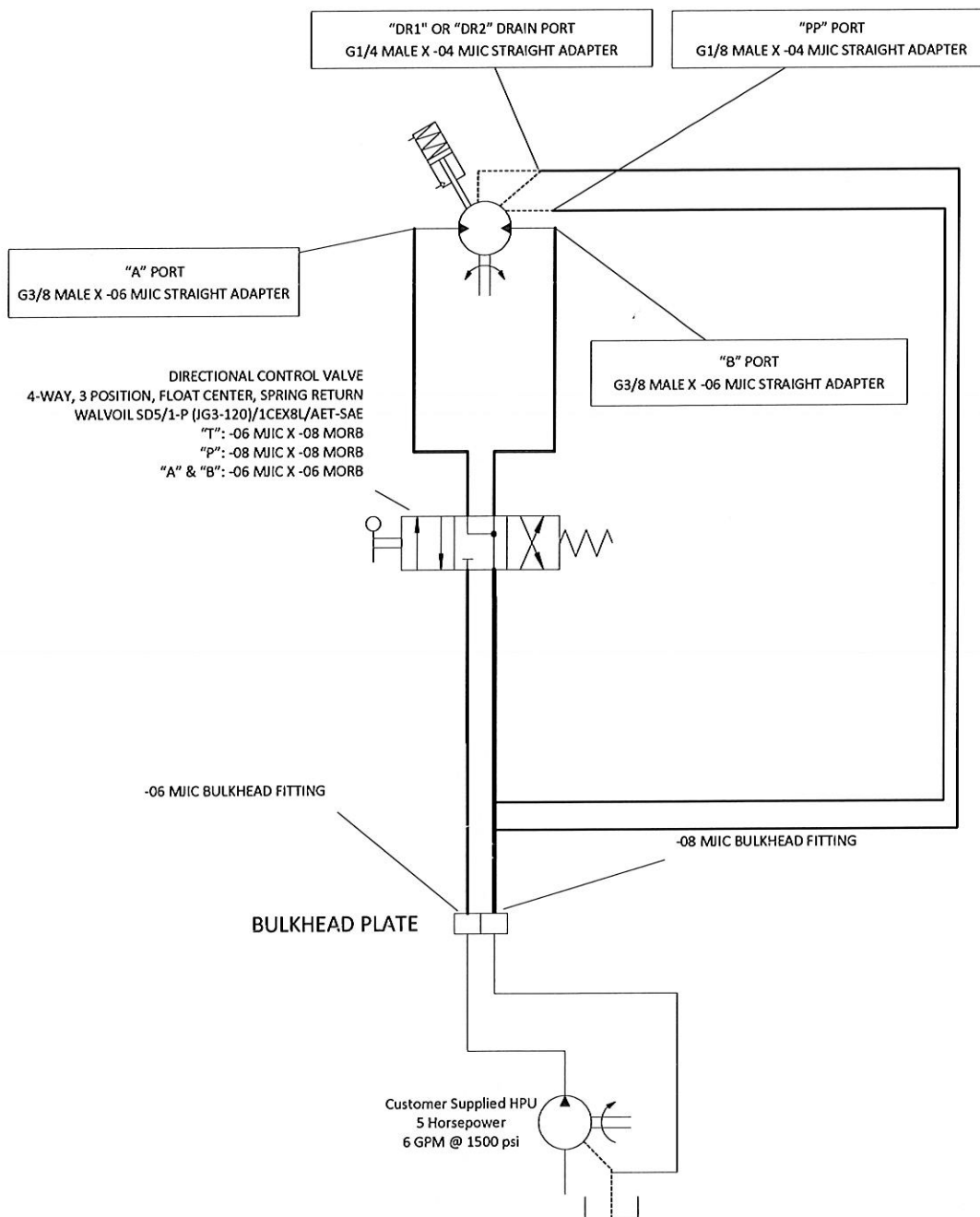
Qty/ Assy	UOM	Seq Num	Bubble Num	InterOcean Systems Part Number	Rev	Description	Dwg Size	Ref. Designators MfgComments:	Notes:
2.00	EA	410	41	980951000		NUT 1/4-20 HEX 18-8 SS			
5.00	EA	420	42	980956100		LOCKNUT 1/4-20 NYLON INSERT 18-8 SS			
4.00	EA	430	43	980527802		SETSCREW 8-32 X 1/8 18-8SS			
1.00	EA	440	44	980007808		SCREW 8-32 x 1/2 PAN PHIL SS			
1.00	EA	450	45	980962080		WASHER # 8 SPLIT LOCK SS			
10.00	EA	460	46	980838847		BOLT METRIC HEX M10-1.5 X 30mm 18-8(A2)SS			
9.00	EA	470	47	980838850		BOLT METRIC HEX M10-1.5 X 35mm 18-8(A2)SS			
19.00	EA	480	48	980962555		WASHER 7/16" SPLIT LOCK SS			

 InterOcean Parts List				FSCM No. 11420	Title: MODEL 10031-5HLW WINCH			P/L No: 476164800001		Revision: A
					Dwg Size: B	Orig Date: By:	By:	Approved: 03/30/15	By:	Page 7 of 9
Qty/ Assy	UOM	Seq Num	Bubble Num	InterOcean Systems Part Number	Rev	Description	Dwg Size	Ref. Designators MfgComments:	Notes:	
2.00	EA	490	49	954100912		ADAPTER STEEL -6 MALE JIC -6 MALE O RING BOSS ST BRENNAN # 6400-06-06-O				
1.00	EA	500	50	954101854		ADAPTER STEEL -6 MALE JIC BULKHEAD CONNECTOR BRENNAN # 2700-06-06				
1.00	EA	510	51	954101881		ADAPTER, STEEL, -8 MALE JIC BULKHEAD CONNECTOR BRENNAN # 2700-08-08				
1.00	EA	520	52	954101902		ADAPTER STEEL 1/2" MALE JIC x 1/2" MALE O-RING BOSS BRENNAN # 6400-08-08-O				
1.00	EA	530	53	954101959		ADAPTER, STEEL, -6 MALE JIC x -8 MALE ORING BOSS BRENNAN # 6400-06-08-O				
1.00	EA	540	54	954101966		ADAPTER, STEEL, -4 MALE JIC x -2 MALE BRITISH STRAIGHT PIPE BRENNAN # 7002-04-02				
1.00	EA	550	55	954101967		ADAPTER, STEEL, -4 MALE JIC x -4 MALE BRITISH STRAIGHT PIPE BRENNAN # 7002-04-04				
2.00	EA	560	56	954101968		ADAPTER, STEEL, -6 MALE JIC x -6 MALE BRITISH STRAIGHT PIPE BRENNAN # 7002-06-06				

 InterOcean Parts List				FSCM No. 11420	Title: MODEL 10031-5HLW WINCH			P/L No: 476164800001		Revision: A
					Dwg Size: B	Orig Date: By:	By:	Approved: 03/30/15	By:	Page 8 of 9
Qty/ Assy	UOM	Seq Num	Bubble Num	InterOcean Systems Part Number	Rev	Description	Dwg Size	Ref. Designators MfgComments:	Notes:	
1.00	EA	570	57	980964008		SEAL WASHER STEEL, -4 BRITISH BONDED SEAL, BRENNAN # 9900-04				
1.00	EA	580	58	980964010		SEAL WASHER STEEL, -2 BRITISH BONDED SEAL BRENNAN # 9900-02				
2.00	EA	590	59	980964016		SEAL WASHER STEEL, -6 BRITISH BONDED SEAL BRENNAN # 9900-06				
2.00	EA	600	60	954100210		ADAPTER STEEL -6 MALE JIC X -6 FEMALE JIC SWIVEL, 90 DEGREE ELBOW BRENNAN # 6500-06-06				
1.00	EA	610	61	954107160		1/2 M 37deg JIC X 1/2 F 37dg JIC SWIVEL, 90deg AEROQUIP # 2071-8-8S				
1.00	EA	620	62	954100861		ADAPTER STEEL -4 MALE JIC X MALE JIC X FEMALE JIC SWIVEL BRENNAN # 6600-04-04-04				
1.00	EA	630	63	954100848		ADAPTER, STEEL TEE, -8 MALE JIC x -8 FEMALE JIC x -4 MALE JIC BRENNAN # 6602-08-08-04-FG				
6.00	FT	640	64	954114514		HOSE, 1/4" 3000 psi HYDRAULIC HOSE PARKER # 451TC-4				

 InterOcean Parts List				FSCM No. 11420		Title: MODEL 10031-5HLW WINCH			P/L No: 476164800001		Revision: A	
						Dwg Size: B	Orig Date: By:	By:	Approved: 03/30/15	By:	Page 9 of 9	
Qty/ Assy	UOM	Seq Num	Bubble Num	InterOcean Systems Part Number	Rev	Description	Dwg Size	Ref. Designators MfgComments:	Notes:			
15.00	FT	650	65	954114515		HYDRAULIC HOSE, 3/8", 3000 psi PARKER # 451TC-4						
6.00	FT	660	66	954114517		HYDRAULIC HOSE, 1/2", 3000 psi PARKER # 451TC-8						
4.00	EA	670	67	954040405		HOSE FITTING, -4 HOSE X -4 FEMALE JIC SWIVEL 90 DEGREE ELBOW AEROQUIP # 1AA4FJB4C						
3.00	EA	680	68	954040406		HOSE END CRIMP FITTING, -6 HOSE X -6 FEMALE JIC SWIVEL PARKER # 10643-6-6						
2.00	EA	690	69	954110407		HOSE END CRIMP FITTING, -6 HOSE X -6 FEMALE JIC SWIVEL, 90 DEGREE ELBOW PARKER 13943-6-6						
3.00	EA	700	70	954110408		HOSE END CRIMP FITTING, -8 HOSE X -8 FEMALE JIC SWIVEL PARKER # 10643-8-8						
1.00	EA	710	71	980951451		JAMNUT 9/16-18 HEX						
1.00	EA	720	72	989765116		JAMNUT 3/4-16 18-8SS						

REVISIONS					
ZONE	REV.	DESCRIPTION	ECO	DATE	APPROVED
	A	INITIAL DRAWING RELEASE		3/30/15	DG



COMMENTS:
PART NUMBER IS:
4-76164 5000-00

DIMENSIONS ARE IN INCHES
TOLERANCES:
FRACTIONAL: $\pm 1/64$
ANGULAR, MACH: $\pm 1^\circ$
ANGULAR, BEND: $\pm 2^\circ$
.X ± 0.025
.XX ± 0.010
.XXX ± 0.005

INTERPRET TOLERANCING
PER: ASME Y14.5-1994

MATERIAL
NONE

FINISH
NONE

DO NOT SCALE DRAWING

	NAME	DATE
DRAWN	M. KLICK	03/23/15
PROJ ENGR	DG	3/30/15
PROD MGR	DL	3/30/15
OPS/MFG	P.O.	3/30/15
OPS/MFG		
QA/QMS		
DOC CTL	rwj	3/30/15
ENGR MGR	dcw	3/30/15

InterOcean
InterOcean Systems, Inc.
3738 Ruffin Road,
San Diego, CA 92123

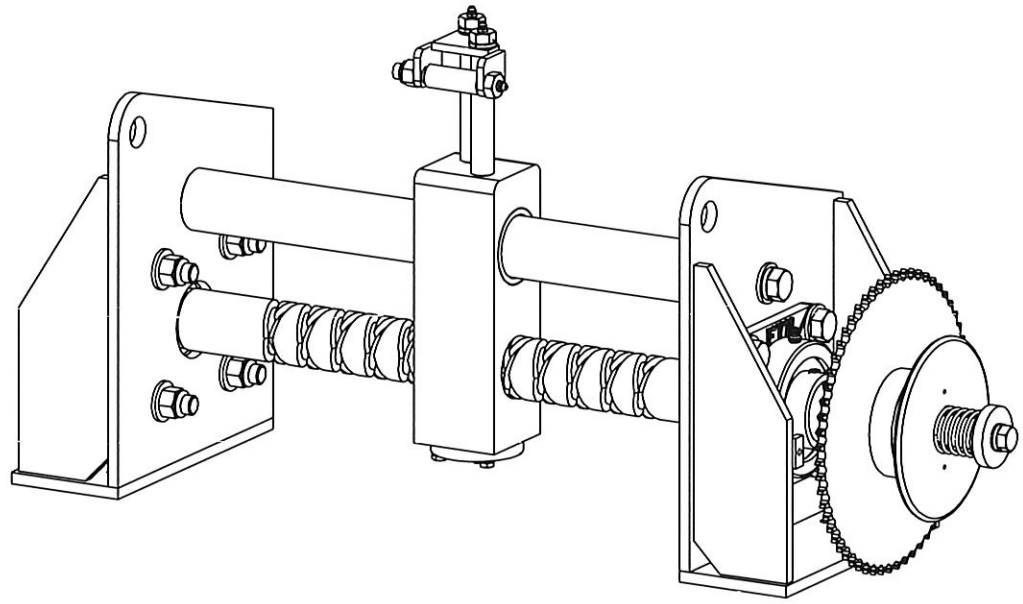
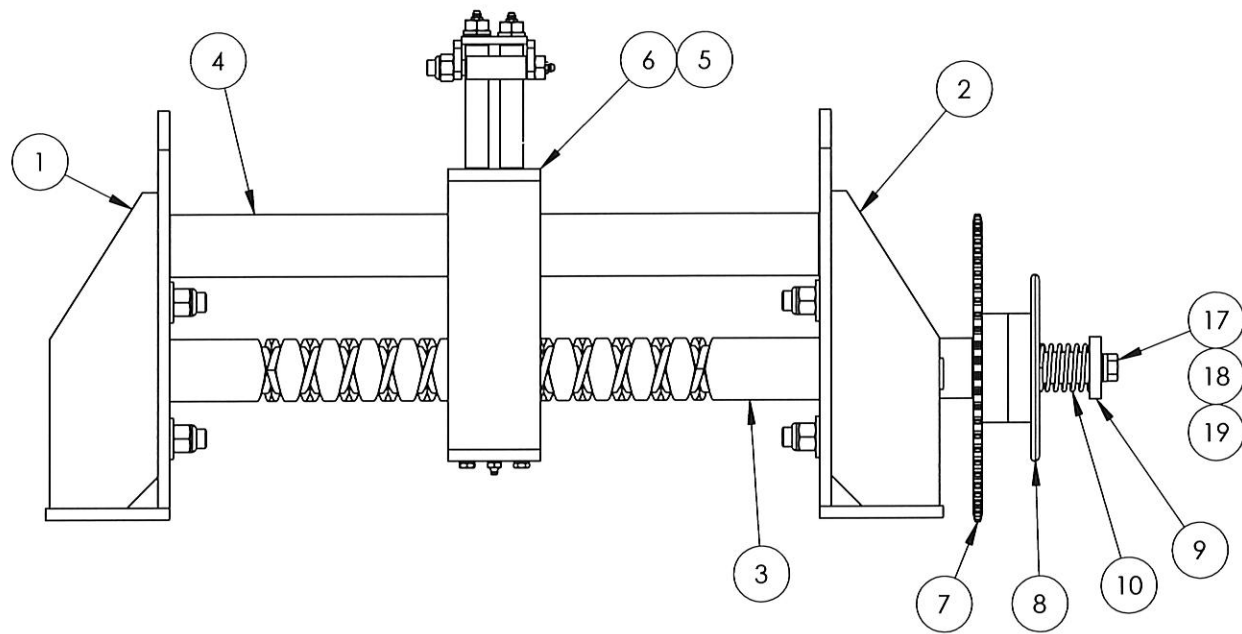
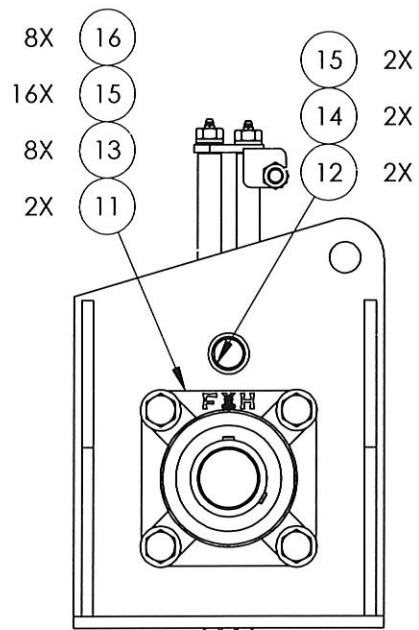
TITLE:
**HYDRAULIC SCHEMATIC
MODEL 10031-5HLW WINCH**

SIZE **A** DWG. NO. **76164 5000** REV **A**

DO NOT SCALE

SHEET 1 OF 1

REVISIONS					
ZONE	REV.	DESCRIPTION	ECO	DATE	APPROVED
N/A	A	INITIAL DRAWING RELEASE	N/A	3/30/15	DG



SEE SEPARATE PARTS LIST

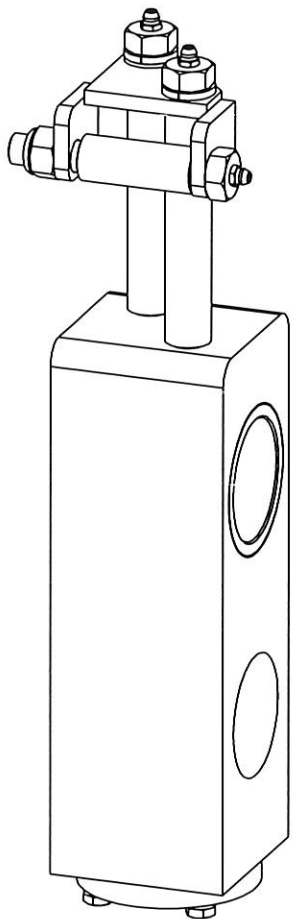
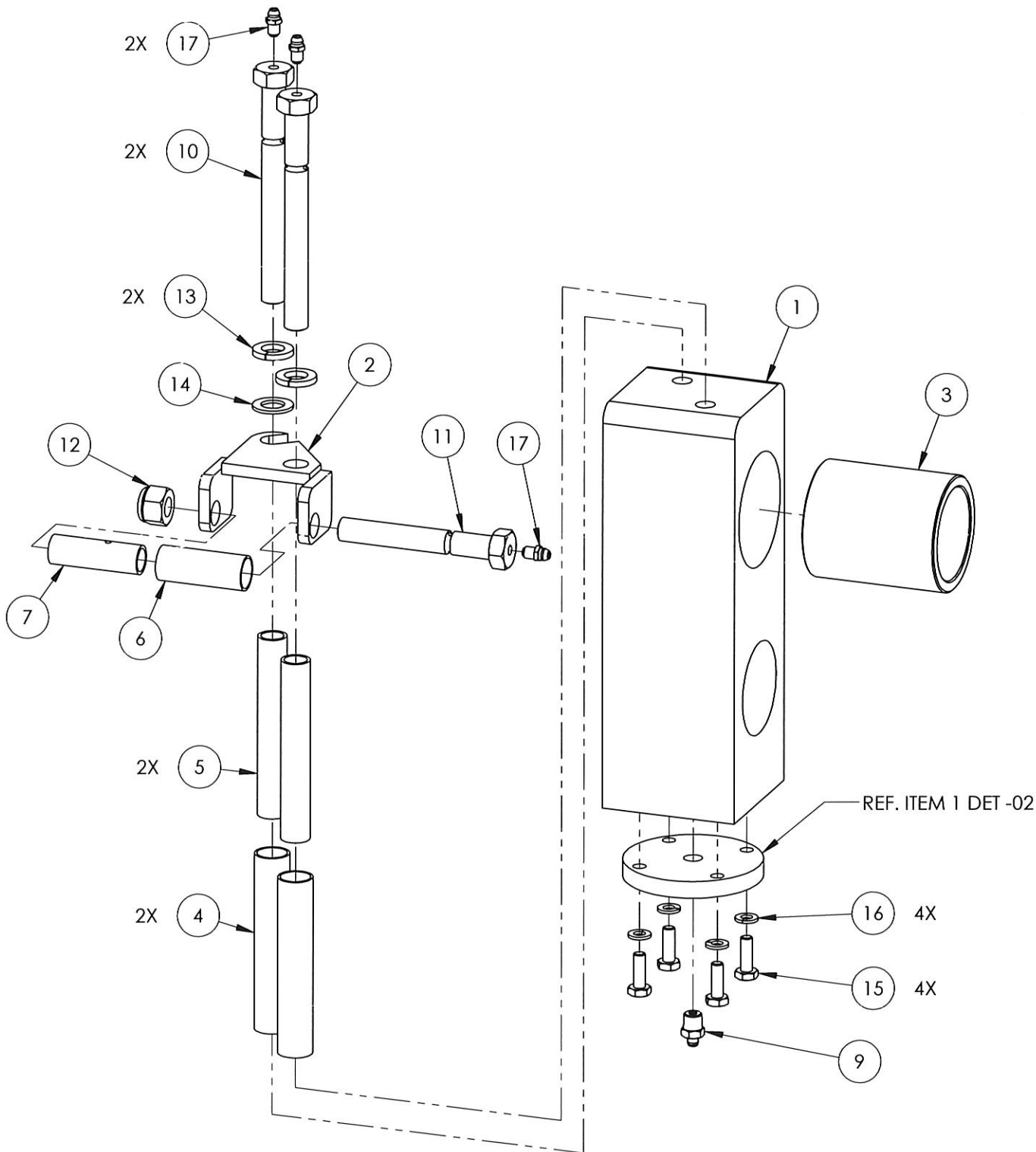
COMMENTS: PART NUMBER IS: 4-76164 6300-01	DIMENSIONS ARE IN INCHES TOLERANCES: FRACTIONAL: ± 1/64 ANGULAR, MACH: ± 1° ANGULAR, BEND: ± 2° .X ± 0.025 .XX ± 0.010 .XXX ± 0.005	125/✓		NAME	DATE	 InterOcean InterOcean Systems, Inc. 3738 Ruffin Road, San Diego, CA 92123			
			DRAWN	M. KLICK	01/27/15				
			PROJ ENGR	DG	3/30/15				
			PROD MGR	DJ	3/30/15				
PROPRIETARY AND CONFIDENTIAL THE INFORMATION CONTAINED IN THIS DRAWING IS THE SOLE PROPERTY OF INTEROCEAN SYSTEMS, INC. ANY REPRODUCTION IN PART OR AS A WHOLE WITHOUT THE WRITTEN PERMISSION OF INTEROCEAN SYSTEMS, INC. IS PROHIBITED.	INTERPRET TOLERANCING PER: ASME Y14.5-1994		OPS/MFG			TITLE: LEVEL WIND ASSEMBLY MODEL 10031-5HLW WINCH			
	MATERIAL SEE PARTS LIST		OPS/MFG	DTZ	3/30/15				
	FINISH NONE		QA/QMS						
	DO NOT SCALE DRAWING	ENGR MGR	NW	3/30/15					
							SIZE B	DWG. NO. 76164 6300	REV A
							DO NOT SCALE		SHEET 1 OF 1

 InterOcean Parts List				FSCM No. 11420		Title: LEVEL WIND ASSEMBLY			P/L No: 476164630001		Revision: A	
						Dwg Size: B	Orig Date: By:	By:	Approved: 03/30/15	By: DG	Page 1 of 3	
Qty/ Assy	UOM	Seq Num	Bubble Num	InterOcean Systems Part Number	Rev	Description	Dwg Size	Ref. Designators MfgComments:	Notes:			
1.00	EA	10	1	476164930001	A	LEVEL WIND BRACKET NON DRIVE SIDE	B					
1.00	EA	20	2	476164930002	A	LEVEL WIND BRACKET DRIVE SIDE	B					
1.00	EA	30	3	476164930101	A	DIAMOND SCREW, MODEL 10031-5HLE WINCH	B					
4.00	EA	40	4	476164931201	A	GUIDE ROD	B					
1.00	EA	50	5	42010630001	B	SHUTTLE FOR 2" DIAMOND SCREWS 1.001 TO 1.500 PITCH	B					
1.00	EA	60	6	42010630206	D	LEVEL WIND CARRAGE ASSEMBLY 3/8" CABLE DIAMETER	B					
1.00	EA	70	7	42010630301	B	DIAMOND SCREW SPROCKET 40B60 MOD	B					
1.00	EA	80	8	42010930102	B	LEVEL WIND HAND WHEEL 6061 ALUMINUM	B					

 InterOcean Parts List				FSCM No. 11420		Title: LEVEL WIND ASSEMBLY			P/L No: 476164630001		Revision: A	
						Dwg Size: B	Orig Date: By:	By:	Approved: 03/30/15	By:	Page 2 of 2	
Qty/ Assy	UOM	Seq Num	Bubble Num	InterOcean Systems Part Number	Rev	Description	Dwg Size	Ref. Designators MfgComments:	Notes:			
1.00	EA	90	9	42010930300	-	LEVEL WIND CLUTCH SPRING KEEPER	B					
1.00	EA	100	10	949248100		COMPRESSION SPRING, S.S. CENTURY SPRING # 10835						
2.00	EA	110	11	951300331		BEARING 4 BOLT FLANGE 1-15/16" BORE FYH # UCF-210-31E						
2.00	EA	120	12	980845512		BOLT 5/8-11 x 1-1/2 HEX SS						
8.00	EA	130	13	980845518		BOLT 5/8-11 x 2-1/4 HEX SS						
2.00	EA	140	14	980962625		WASHER 5/8" SPLIT LOCK SS						
18.00	EA	150	15	980960627		WASHER 5/8" X 1-5/16" OD x 3/32 THK FLAT SS						
8.00	EA	160	16	980956078		LOCKNUT 5/8-11 NYLON INSERT 18-8SS						

 InterOcean Parts List				FSCM No. 11420		Title: LEVEL WIND ASSEMBLY			P/L No: 476164630001		Revision: A
						Dwg Size: B	Orig Date: By:	By:	Approved: 03/30/15	By:	Page 3 of 3
Qty/ Assy	UOM	Seq Num	Bubble Num	InterOcean Systems Part Number	Rev	Description			Dwg Size	Ref. Designators MfgComments:	Notes:
1.00	EA	170	17	980844407		BOLT 1/2-13 X 7/8 HEX SS					
1.00	EA	180	18	980962500		WASHER 1/2" SPLIT LOCK SS					
1.00	EA	190	19	980960496		WASHER 1/2" x 7/8" OD FLAT SS					

REVISIONS					
ZONE	REV.	DESCRIPTION	ECO	DATE	APPROVED
N/A	A	ADDED ITEM NO. 17, ADDED -05 ASSEMBLY		10/23/09	R. SPURR
N/A	B	CHANGED ITEM NO. 9	5678	01/04/10	R. SPURR
N/A	C	ADDED -10 ASSEMBLY	5698	03/08/10	R. SPURR
N/A	D	ADDED -11 ASSEMBLY, REDRAWN IN SOLIDWORKS	5877	3/25/15	DG



SEE SEPARATE PARTS LIST

PROPRIETARY AND CONFIDENTIAL THE INFORMATION CONTAINED IN THIS DRAWING IS THE SOLE PROPERTY OF INTEROCEAN SYSTEMS, INC. ANY REPRODUCTION IN PART OR AS A WHOLE WITHOUT THE WRITTEN PERMISSION OF INTEROCEAN SYSTEMS, INC. IS PROHIBITED.	INTERPRET TOLERANCING PER: ASME Y14.5-1994			CARRIAGE ASSEMBLY		
	MATERIAL SEE PARTS LIST	COMMENTS: PART NUMBER IS: AS NOTED		SIZE B	DWG. NO. 2010 6302	REV D
	FINISH NONE					
	DO NOT SCALE DRAWING					

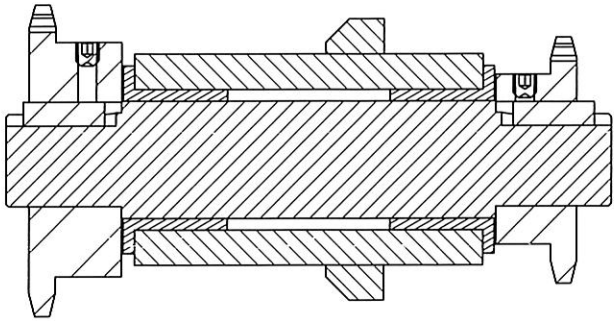
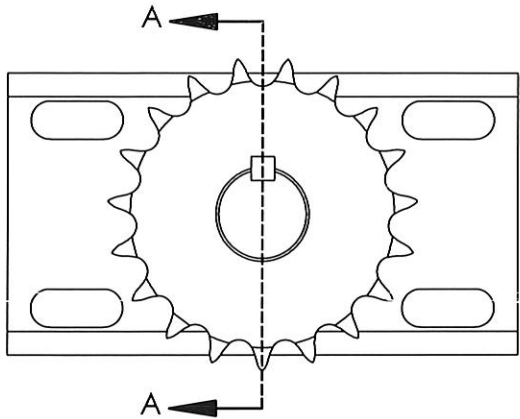
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 InterOcean Parts List				FSCM No. 11420		Title: LEVEL WIND CARRAGE ASSEMBLY 3/8" CABLE DIAMETER			P/L No: 42010630206			Revision: D	
						Dwg Size: B		Orig Date: By:		By:		Approved: 03/30/15	
Qty/ Assy	UOM	Seq Num	Bubble Num	InterOcean Systems Part Number	Rev	Description			Dwg Size	Ref. Designators MfgComments:		Notes:	
1.00	EA	10	1	42010930406	A	SMALL LEVEL WIND CARRIAGE, 0.375 DIA.			B				
1.00	EA	20	2	42010930906	A	TOP PLATE WITH ROLLER, SMALL LEVEL WIND CARRIAGE 0.375 DIA			B				
1.00	EA	30	3	42010930500	-	LEVEL WIND BUSHING			B				
2.00	EA	40	4	42010930700	-	VERTICAL CABLE GUIDE SMALL LEVEL WIND CARRIAGE			A				
2.00	EA	50	5	42010930800	A	VERTICAL CABLE GUIDE SHAFT			A				
1.00	EA	60	6	42010931006	A	HORIZONTAL CABLE GUIDE 0.375 DIA SMALL LEVEL WIND CARRIAGE			A				
1.00	EA	70	7	42010931106	C	HORIZONTAL CABLE GUIDE SHAFT 0.375 DIA SMALL LEVEL WIND CARRIAGE			A				
0.00	EA	80	8	NOT USED		Not used on this assembly							

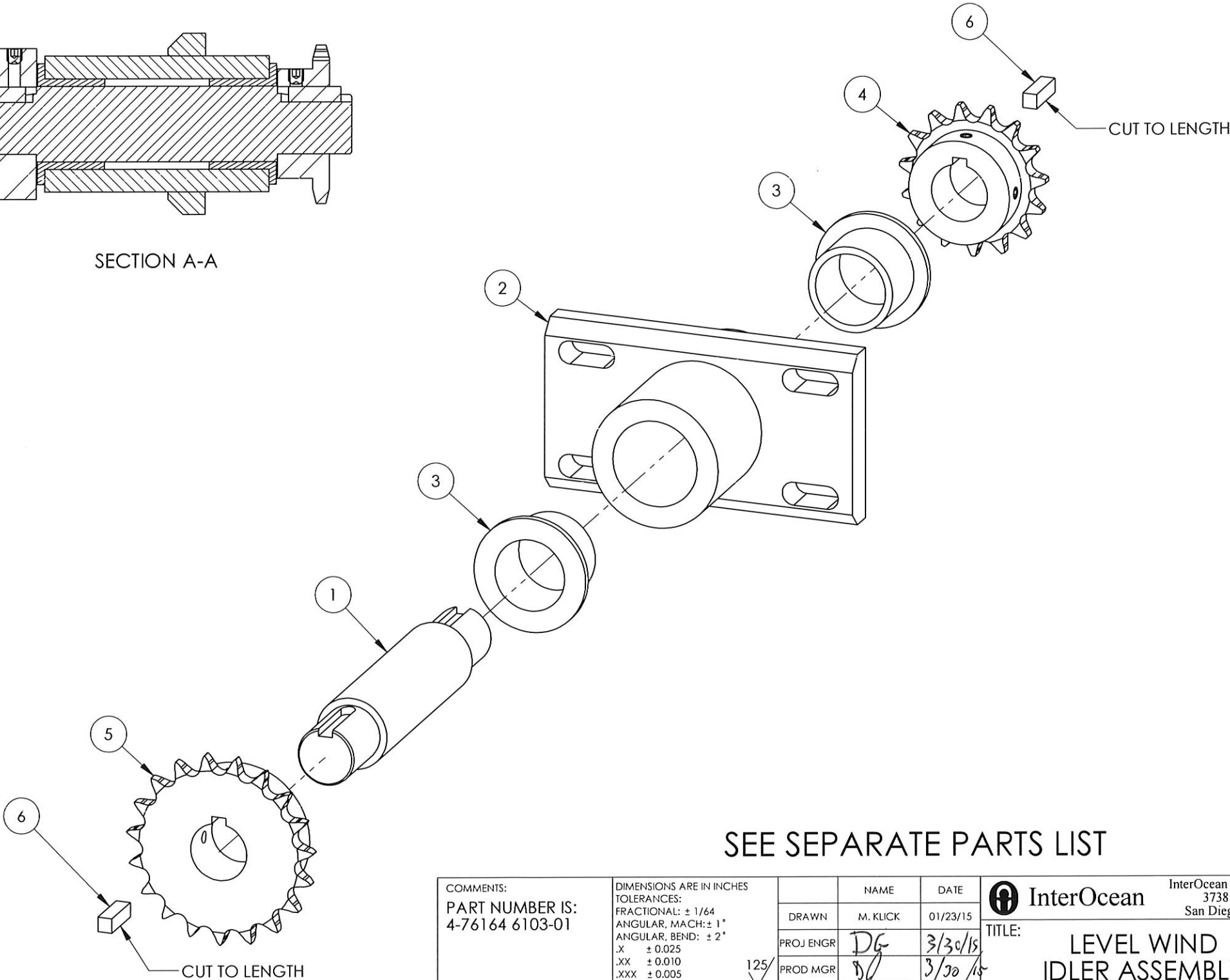
 InterOcean Parts List				FSCM No. 11420		Title: LEVEL WIND CARRAGE ASSEMBLY 3/8" CABLE DIAMETER			P/L No: 42010630206		Revision: D	
						Dwg Size: B	Orig Date: By:	By:	Approved: 03/30/15	By:	Page 2 of 3	
Qty/ Assy	UOM	Seq Num	Bubble Num	InterOcean Systems Part Number	Rev	Description	Dwg Size	Ref. Designators MfgComments:	Notes:			
1.00	EA	90	9	951295040		GREASE FITTING, 303 SS, 1/8" NPT, 90 DEG MCMaster CARR # 1293K12						
2.00	EA	100	10	42010931300	-	VERTICAL ROLLER BOLT LEVEL WIND	A					
1.00	EA	110	11	42010931400	-	HORIZONTAL ROLLER BOLT LEVEL WIND	A					
1.00	EA	120	12	989765091		LOCKNUT 1/2-13 NYLON INSERT 316SS						
2.00	EA	130	13	980962500		WASHER 1/2" SPLIT LOCK SS						
1.00	EA	140	14	980960496		WASHER 1/2" x 7/8" OD FLAT SS						
4.00	EA	150	15	980840006		BOLT 1/4-20 x 3/4 HEX SS						
4.00	EA	160	16	980962250		WASHER 1/4" SPLIT LOCK SS						

 InterOcean Parts List				FSCM No. 11420		Title: LEVEL WIND CARRAGE ASSEMBLY 3/8" CABLE DIAMETER			P/L No: 42010630206		Revision: D	
						Dwg Size: B		Orig Date: By:		By:		Approved: 03/30/15
Qty/ Assy	UOM	Seq Num	Bubble Num	InterOcean Systems Part Number	Rev	Description			Dwg Size	Ref. Designators MfgComments:		Notes:
3.00	EA	170	17	951295045		GREASE FITTING, 303 STAINLESS STEEL, 1/4-28 MALE TAPER THREAD MCMASTER-CARR # 1293K42						

REVISIONS					
ZONE	REV.	DESCRIPTION	ECO	DATE	APPROVED
N/A	A	INITIAL DRAWING RELEASE	N/A	3/30/15	DG



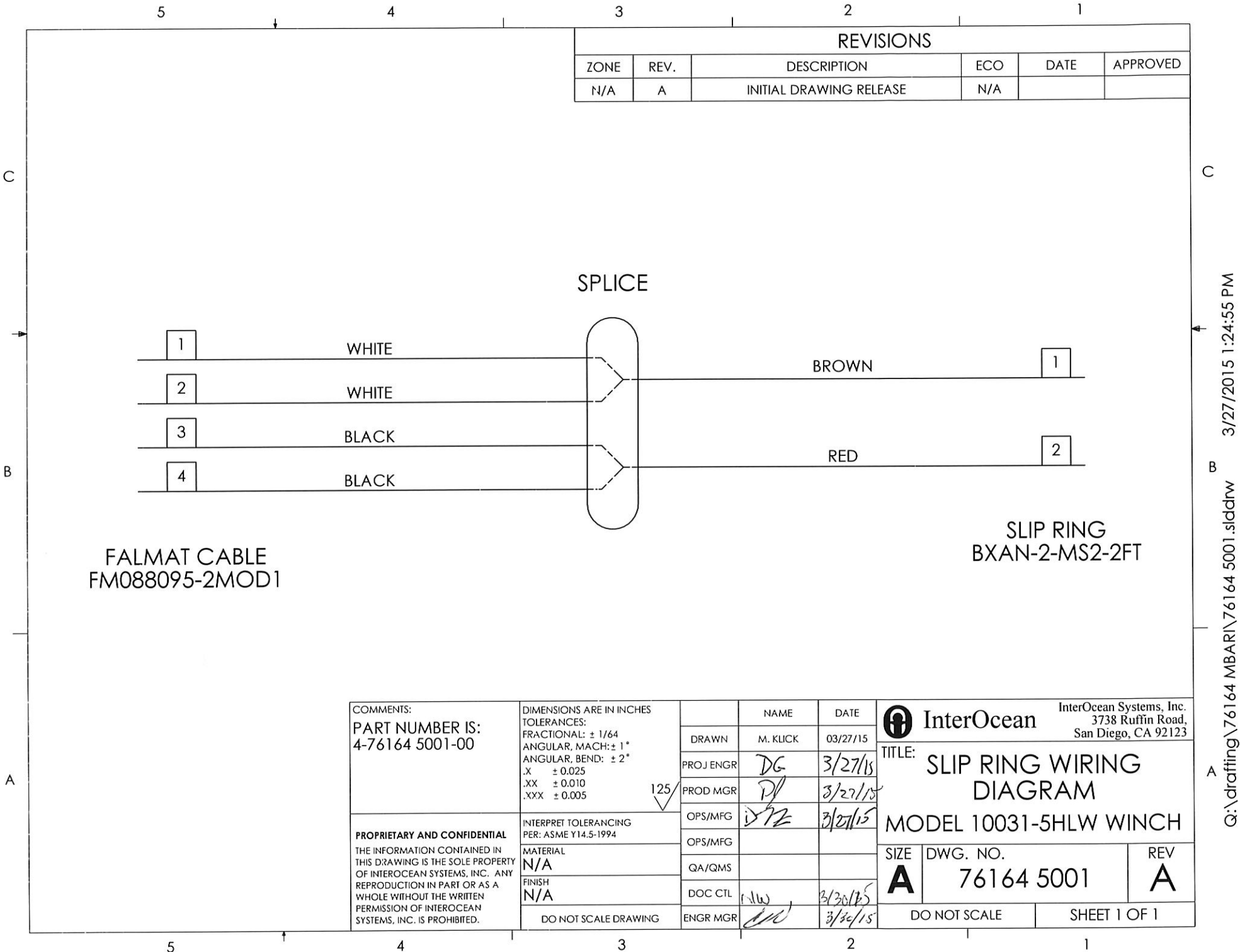
SECTION A-A



SEE SEPARATE PARTS LIST

COMMENTS: PART NUMBER IS: 4-76164 6103-01		DIMENSIONS ARE IN INCHES TOLERANCES: FRACTIONAL: $\pm 1/64$ ANGULAR, MACH: $\pm 1^\circ$ ANGULAR, BEND: $\pm 2^\circ$.X ± 0.025 .XX ± 0.010 .XXX ± 0.005		NAME M. KLICK DATE 01/23/15		InterOcean Systems, Inc. 3738 Ruffin Road, San Diego, CA 92123	
PROPRIETARY AND CONFIDENTIAL THE INFORMATION CONTAINED IN THIS DRAWING IS THE SOLE PROPERTY OF INTEROCEAN SYSTEMS, INC. ANY REPRODUCTION IN PART OR AS A WHOLE WITHOUT THE WRITTEN PERMISSION OF INTEROCEAN SYSTEMS, INC. IS PROHIBITED.		INTERPRET TOLERANCING PER: ASME Y14.5-1994 MATERIAL SEE PARTS LIST FINISH NONE DO NOT SCALE DRAWING		TITLE: LEVEL WIND IDLER ASSEMBLY MODEL 10031-5HLW WINCH		SIZE B DWG. NO. 76164 6103 REV A	
				DO NOT SCALE		SHEET 1 OF 1	

 InterOcean Parts List				FSCM No. 11420		Title: IDLER ASSEMBLY			P/L No: 476164610301		Revision: A	
						Dwg Size: B	Orig Date: By:	By:	Approved: 03/30/15	By: DG	Page 1 of 1	
Qty/ Assy	UOM	Seq Num	Bubble Num	InterOcean Systems Part Number	Rev	Description	Dwg Size	Ref. Designators MfgComments:	Notes:			
1.00	EA	10	1	474392930700	-	LEVEL WIND IDLER SHAFT 10031-25HLW WINCH	B					
1.00	EA	20	2	476164930801	A	LEVEL WIND IDLER HOUSING	B					
2.00	EA	30	3	951191506		FLANGED BUSHING OILITE # FF-1505-5						
1.00	EA	40	4	951104515		SPROCKET STEEL 40BS15 X 1"						
1.00	EA	50	5	951104319		SPROCKET 40BS19 X 1" BORE						
2.00	EA	60	6	951192100		KEYSTOCK, SS, 1/4" x 1/4" x 12" MCMaster # 92530A136						



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INTEROCEAN SYSTEMS
WINCH TEST REPORT

JOB NO. 76164-000	CUSTOMER MBARI	DATE 3/26/15
MODEL NO. 10031-5HLW	P/N: 4-76164-8000-00	S/N 6164 1242

WINCH INFORMATION

Nominal Winch POWER: 5 HP (3.7 Kilowatts)

Type: ☐ ELECTRIC

☒ HYDRAULIC

Winch Operating Voltage: _____ VAC +/- _____ % No. Phases: _____

Rated Pressure: 1500 psi

User Control: ☐ Joystick ☒ Other: Mechanical hydraulic valve

Drum: ☒ Grooved ☐ Smooth. Drum Capacity 3280 Ft (1000 m) @ dia. 0.38 in. (9.65 mm)

Level Wind Setup: ☒ Bobbin type ☐ Scrabble type ☐ None

Pitch: 0.3948 in. (10.03 mm)

LOAD REQUIREMENTS

BARE DRUM: 470 LBS @ 148 Ft/min (45 m/min)

FULL DRUM: 300 LBS @ 230 Ft/min (70 m/min)

PHYSICAL INSPECTION

a) Welds (Prior to ass'y) Pass ☒ <u>DM</u>	d) Electrical Pass ☐ <u>N/A</u>
b) Wiring Pass ☐ <u>N/A</u>	e) Lubrication Pass ☒ <u>DM</u>
c) Mechanical Pass ☒ <u>DM</u>	f) Drive Train Pass ☒ <u>DM</u>

TEST STAND

A) Controls and Functions

Checked By:

Checked By:

1. Main Power Switch N/A ☒ Pass ☐ <u>N/A</u>	6. PayIn/PayOut Correct dir. Pass ☒ <u>DG</u>
2. Motor Brake N/A ☐ Pass ☒ <u>DG</u>	7. Variable Speed Control Pass ☒ <u>DG</u>
3. Dynamic Braking N/A ☒ Pass ☐ <u>N/A</u>	8. Fast/Slow Switch N/A ☒ Pass ☐ <u>N/A</u>
4. Pawl Brake N/A ☐ Pass ☒ <u>DG</u>	9. Level Wind Operation N/A ☐ Pass ☒ <u>DG</u>
5. Start/Stop function Pass ☒ <u>DG</u>	

SIZE A	CODE INDENT NO. 11420	DRAWING NO. 0407 1139	REV D
SCALE NONE		SHEET OF 1 OF 4	

INTEROCEAN SYSTEMS WINCH TEST REPORT

JOB NO. 76164-000	CUSTOMER MBARI	DATE 3/26/15
MODEL NO. 10031-5HLW	P/N: 4-76164-8000-00	S/N 6164 1242

TEST STAND

B) Dynamic Tests

TEST LOAD: 570 lbs (259 Kgs) Supplied Voltage N/A VAC N/A Φ

1. Max. Speed PayOUT (Spec: 148 ^{Ft/Min} M/min) ACTUAL 170 ^{Ft/Min} M/min Drum: Bare [X] Full []

2. Max. Speed PayIN (Spec: 148 ^{Ft/Min} M/min) ACTUAL 170 ^{Ft/Min} M/min Drum: Bare [X] Full []

3. Electric Brake operation Test Load N/A lbs Pass []

4. Dynamic Braking operation Test Load N/A lbs Pass []

5. Pawl Brake operation Test Load 950 lbs Pass [X] N/A []

6. Variable Speed Control Pass [X]

7. Fail Safe Operation Pass [X]

C) Power Measurements

1. Max. PayIN speed at B) Test Load 1500 AMPS (PSI)

2. Max. PayOUT speed at B) Test Load 550 AMPS (PSI)

2. No Load 550 AMPS (PSI)

D) Winch Weights

Winch Weight without cable 555 lbs (251 Kgs)

Cable Weight (from cable, page3) 235 lbs (107 Kgs)

TOTAL weight (winch + cable) 790 lbs (358 Kgs)

ALL ABOVE PERFORMED AT INTEROCEAN SYSTEMS

Tested By

X [Signature]

> M. PEARLMAN
PRINT NAME

IOS
ORGANIZATION

3/30/15
DATE

Witnessed By:

X Daniel B. Grotler

> Daniel B. Grotler
PRINT NAME

IOS
ORGANIZATION

3/30/15
DATE

0407 1139D_WinchTestReportRevD5 MBARI.docx

SIZE A	CODE INDENT NO. 11420	DRAWING NO. 0407 1139	REV D
SCALE NONE		SHEET OF 2 OF 4	

INTEROCEAN SYSTEMS WINCH TEST REPORT

JOB NO. 76164-000	CUSTOMER MBARI	DATE 3/26/15
MODEL NO. 10031-5HLW	P/N: 4-76164-8000-00	S/N 6164 1242

SPOOLING

Was cable/line spooled onto the drum? No [] Yes [X]

If yes:

Provided by: Customer [X] InterOcean []
Type: ElectroMech [X] Electro/Optical Mech [] Mechanical []

Manufacturer: Falmat

Model or PN: FM088095-2MOD1 *

Diameter: 0.38 in. (9.65 mm)

Length 3444 Ft. (1050 m)

From Mfg's documentation [X]
From actual measurement []

If Electro/Optical Mechanical Cable:

No. of electrical lines: 4 @ Gage: 20 AWG

No. of electrical lines: _____ @ Gage: _____ AWG

No. of optical channels: 0

Cable terminated at sea end? No [X] Yes [] Inspected: DG *
Mechanical termination at drum? No [] Yes [X] Inspected: ST *
Electrical termination at slip ring? No [] Yes [X] Inspected: DTZ *

*Note: for items marked, see additional OEM data sheets, drawings, or test data.

Spooling supervised by:

X. [Signature] > M. PEARUMAY 3/27/15

PRINT NAME

ORGANIZATION

DATE

SLIP-RING

Was a slip ring installed? No [] Yes [X]

If yes:

Provided by: Customer [] InterOcean [X]
Type: Electrical [X] FiberOptic [] Electro/Optical []

Manufacturer: IEC

Model or PN: BXAN-2-MS2-2FT

No. of electrical channels: 2

No. of optical channels: 0

X. [Signature] > Daniel P. Gertler DOS 3/30/15
PRINT NAME ORGANIZATION DATE

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SIZE A	CODE INDENT NO. 11420	DRAWING NO. 0407 1139	REV D
SCALE NONE		SHEET OF 3 OF 4	

INTEROCEAN SYSTEMS
WINCH TEST REPORT

JOB NO. 76164-000	CUSTOMER MBARI	DATE 3/26/15
MODEL NO. 10031-5HLW	P/N: 4-76164-8000-00	S/N 6164 1242

FINAL ASSEMBLY CHECK LIST

- | | |
|---|----------------|
| 1. Check ALL fasteners for tightness. | By: <u>DM</u> |
| 2. Check ALL cable gland fittings for tightness.
(Is proper packing installed) | By: <u>N/A</u> |
| 3. Check ALL setscrews for tightness. | By: <u>DM</u> |
| 4. Verify ALL shafts have been dimpled for setscrews. | By: <u>DM</u> |
| 5. Check ALL hydraulic fittings for tightness and no leaks. | By: <u>DM</u> |
| 6. Check ALL fluid levels. | By: <u>N/A</u> |
| 7. Verify wiring is correct (post paint). | By: <u>N/A</u> |
| 8. Check ALL wiring terminations are tight. | By: <u>N/A</u> |
| 9. Verify basic winch functions (post paint). | By: <u>DM</u> |
| 10. Verify joystick PayIn/Out direction is correct. | By: <u>DM</u> |
| 11. Final controller configuration saved and archived. | By: <u>N/A</u> |
| Archived configuration filename <u>N/A</u> | |
| 12. All electrical enclosures secure. Open glands plugged. | By: <u>N/A</u> |
| 13. Lubrication (grease on chains, level wind shafts, etc.). | By: <u>DM</u> |
| 14. Level wind rollers (no binding). | By: <u>DM</u> |
| 15. Cable clamp tightness. | By: <u>N/A</u> |
| 16. Chain guards (no interference). | By: <u>DM</u> |
| 17. Paint (no chipping or bare metal). | By: <u>DM</u> |
| 18. Correct name plate. | By: <u>DM</u> |

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SIZE A	CODE INDENT NO. 11420	DRAWING NO. 0407 1139	REV D
SCALE NONE		SHEET OF 4 OF 4	