



DEEP LOGGING WINCH

Operations and Maintenance Manual

July 25, 2019

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1.0 PURPOSE

1.1 This document outlines proper set up and operation of the Deep Logging Winch.

2.0 SCOPE

2.1 This document applies to all personnel working with the Deep Logging Winch.

3.0 REFERENCES

- 3.1** 8626-0007 Markey Winch Operation Manual
- 3.2** 8626-0008 LCI-90i User Manual
- 3.3** 8626-0009 Lika Encoder User Manual
- 3.4** 8626-0010 3PS Signal Conditioner Installation and Operator's Manual
- 3.5** 8626-0011 Logging Winch Cable Specification
- 3.6** 8626-0012 Deep Winch User Summary Information
- 3.7** 8626-0074 Deep Logging Winch Tower Assembly

4.0 DEFINITIONS

- 4.1** DLW – Deep Logging Winch
- 4.2** IDP – U.S. Ice Drilling Program, formerly IDDO
- 4.3** LW – Level Wind
- 4.4** PI – Principal Investigator
- 4.5** PM – Preventative Maintenance
- 4.6** PPE – Personal Protective Equipment
- 4.7** QAS – Quality Assurance and Safety group
- 4.8** SSEC – University of Wisconsin-Space Science & Engineering Center

5.0 RESPONSIBILITIES

- 5.1** IDP Engineering is responsible for the generation and maintenance of this document.
- 5.2** SSEC QAS is responsible for ensuring that this document is created, reviewed, approved, maintained, and changed per applicable SSEC processes.
- 5.3** Project personnel are responsible for understanding this manual for safe set up and operation of the Deep Logging Winch

6.0 RECORDS

- 6.1** None

7.0 SAFETY

- 7.1 Only trained personnel approved by IDP should operate the Deep Logging Winch. All operators should read and understand the following safety precautions.
- 7.2 Situational Safety
 - 7.2.1 The DLW system can be operated by one person, but it is highly recommended that two people are always present during operations.
 - 7.2.2 The winch and cable should be monitored at all times during operation. The winch should never be left unattended while powered on or in motion.
- 7.3 Personal Protective Equipment (PPE)
 - 7.3.1 PPE – Workers shall wear appropriate hand, eye, and ear protection during the entire winch operations – logging, handling fluids, etc.
- 7.4 Mechanical Safety
 - 7.4.1 Pinch Points – There are several areas on the equipment where a finger, hand, arm or clothing could be pinched. Operators should identify all pinch points prior to operation and should be mindful of all such points during operation.
 - 7.4.2 Rotating Components – Sheaves and the drum may be rotating and exposed to the operator on the surface. Keep hands, limbs, loose clothing, and hair away from any rotating components during operations.
 - 7.4.3 Eye Protection – Operation of the winch requires eye protection be worn by operators at all times.
 - 7.4.4 Burn Hazard – Avoid contact with hot components. If service is required, allow time for the components to cool.
 - 7.4.5 Cold Hazard – Metal components and drilling fluid may be extremely cold after being in the borehole. Always wear appropriate gloves when handling.
 - 7.4.6 Slippery Surfaces – Rig footing and surrounding ice may become slippery when wet with drilling fluid. Use caution whenever walking around the winch operations area.
 - 7.4.7 Overhead Masses – Equipment may be above head level. Be mindful of hazards and always work as a team when using the winch. Ensure composite toe boots are worn when suspended masses are present.
- 7.5 Electrical Safety
 - 7.5.1 Voltage – Extreme care shall be taken when assembling, disassembling and servicing electrical equipment. Always disconnect power before servicing equipment.

7.5.2 Grounding – Because the winch sits upon a large thickness of ice, a common earth ground cannot be established. Workers shall ensure that all drilling equipment is bonded together to a common ground back to the generator.

7.6 Chemical Safety

7.6.1 PPE - Use fluid resistant gloves and eye protection whenever handling drilling fluid.

7.6.2 Other Chemicals - Use care and observe all safety warnings when handling Ethanol and/or other chemicals.

7.7 Environmental Safety

7.7.1 Cold – This winch will be deployed to extremely cold climates. Operators shall wear outerwear suitable to protect themselves from the cold, and should monitor their own and fellow workers' activities for exposure to cold.

8.0 DEEP LOGGING WINCH SYSTEM OVERVIEW

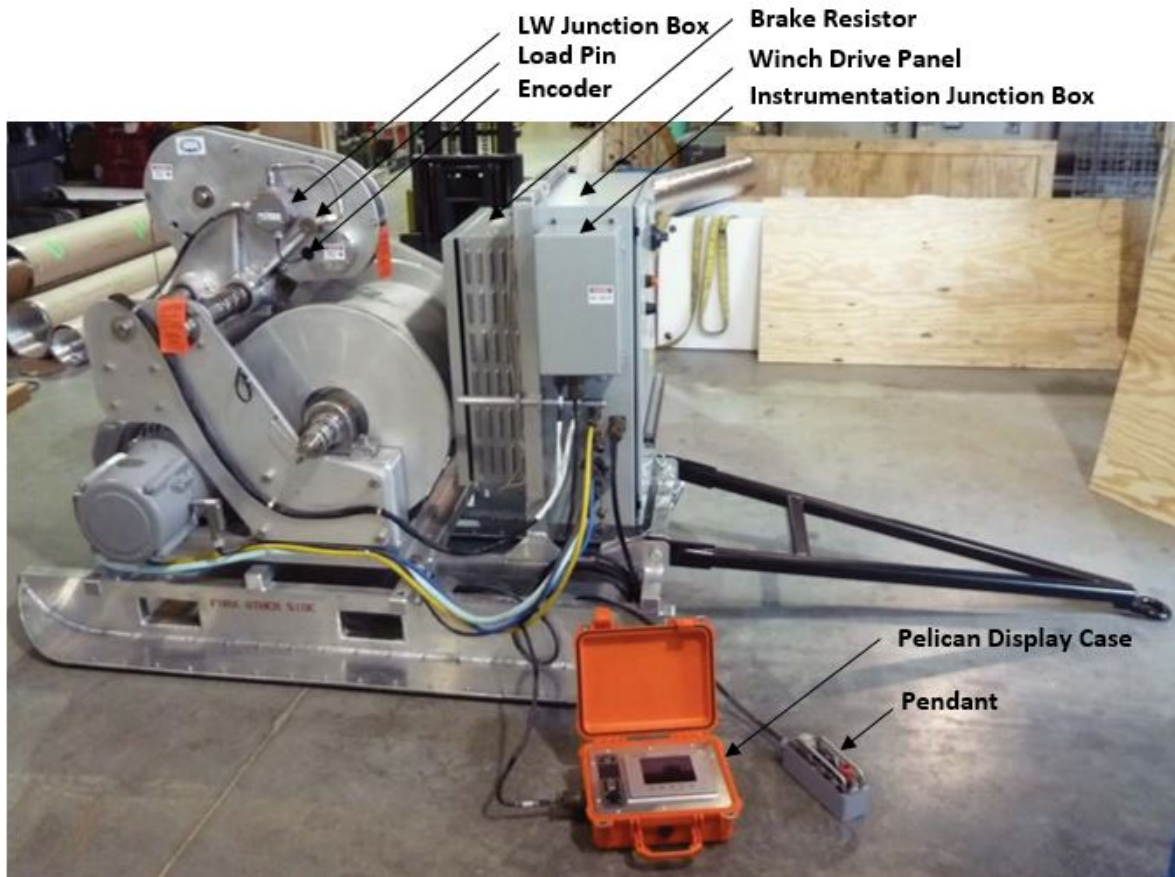


Figure 1: Deep Logging Winch

9.0 ASSEMBLY

- 9.1 Remove the winch control cabinet from its case and bolt it onto the winch sled as shown (Figure 1).
- 9.2 Level the surface where the winch is going to be placed.
 - 9.2.1 If the location is in the sun or the winch will be in place for several days, it is recommended to place a large sheet of plywood onto the level surface to prevent the winch from melting or settling into the surface.
- 9.3 Place the winch onto the leveled surface.
- 9.4 Run two separate chains off the back of the winch sled and anchor to two separate points in the surface. (Dead-men in firm or V-threads in ice.) This is to prevent the winch from being pulled towards the borehole.
- 9.5 Slide the drip tray directly underneath the winch drum.
- 9.6 Connect all electrical cables as labeled.
- 9.7 Payout cable to feed through the logging tower or tripod.
- 9.8 Determine a method and place for adding the cable wiper between the winch and borehole. It can be secured in place by chaining it to a staked bamboo pole or other fixture (Figure 2).
 - 9.8.1 The cable wiper should only be on the cable while paying in.



Figure 2: Cable Wiper

10.0 OPERATIONS

10.1 For detailed operation instructions, please refer to SSEC Document 8626-0007 Markey Winch Operation Manual.

10.2 The winch and cable should be monitored at all times during operation. The winch should never be left unattended while powered on or in motion.

11.0 ATTACHING LOGGING TOOLS

11.1 Logging tools are connected to the winch through the Gearhart-Owen 1"-OD 4-conductor cablehead on the end of the winch cable.

11.2 Secure this connection by tightening with two wrenches.

11.2.1 Do not use the strain relief wrench to hold the cablehead.

11.3 Using the weight stack:

11.3.1 If a logging tool weighs less than 20 lbs or is nearly buoyant because of internally sealed gas (including air), the weight stack must be installed above the logging tool.

11.3.2 Use the strain relief wrench to remove the strain relief coil from the Gearhart Owen connector on the winch cable and slide it a few meters up the cable.

11.3.3 Align the U-channels along the length of the weight stack.

11.3.4 Lay the winch cable through the weight stack with the weight stack in between the cablehead and strain relief coil (Figure 3).

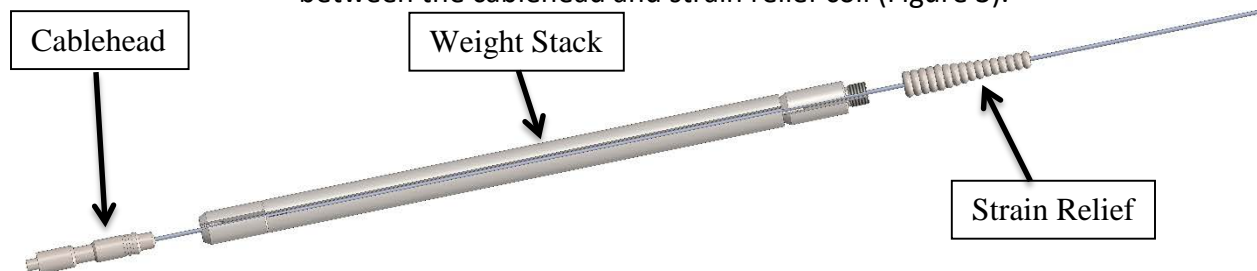


Figure 3: Weight stack assembly

11.3.5 Tighten both the upper and lower brackets of the weight stack.

11.3.6 Screw the entire weight stack onto the cablehead where the strain relief coil was previously attached.

11.3.7 Attach the strain relief to the top of the weight stack.

12.0 DEEP LOGGING WINCH LCI-90I OPERATIONS QUICK GUIDE

12.1 To zero the payout reading:

- When on the main "RUN" screen, press the "RSET" twice within two seconds

- 12.2** To add tare to the tension reading (or remove tare):
- Press “MENU”
 - Select “2 CALIBRATION” and press “ENT”
 - Select “8 TENSION TARE” and press “ENT”
 - Select either “ON” or “OFF” and press “ENT”
 - When Tension Tare is switched to “ON”, the tension input at that moment will be saved and subtracted from all future displayed values.
 - Note: Any alarms will still be triggered by the actual line tension, not the displayed tare tension.
- 12.3** Serial Settings:
- Menu 4.8.3.3 should display the following: “19200”, “MTNW 1”, and “BRDCST”
- 12.4** Default Payout Calibration:
- Menu 2.3 should display the following in its first three fields: “720.007 P/M”, “0.000M”, and “QUAD 4X”
- 12.5** Default Tension Calibration:
- Menu 2.2 should display the following: “SCL/OFS”, “144 KGMS”, and “-123 KGMS”
- 12.6** If field calibration of Tension is necessary:
- Reference page 174 of the Markey manual (page 35 of LCI manual) and follow the steps in “6.4.2 Two-point live calibration”

13.0 DISPLAY CASE AND WINCH ENCODER INFORMATION

13.1 Level Wind (LW) Junction Box Wiring:

Encoder to Display Case

Wire Color		Identifier	Wire Color
Green		E1	Red
Yellow		E1	Yellow
Red		E2	Red

Load Pin to Display Case

White	LX White		Orange	LY White
Black	LX Black		Yellow	LY Black
Red	LX Red		Brown	LY Red
Green	LX Green		Blue	LY Green

13.1.1 Instrumentation Junction Box Wiring

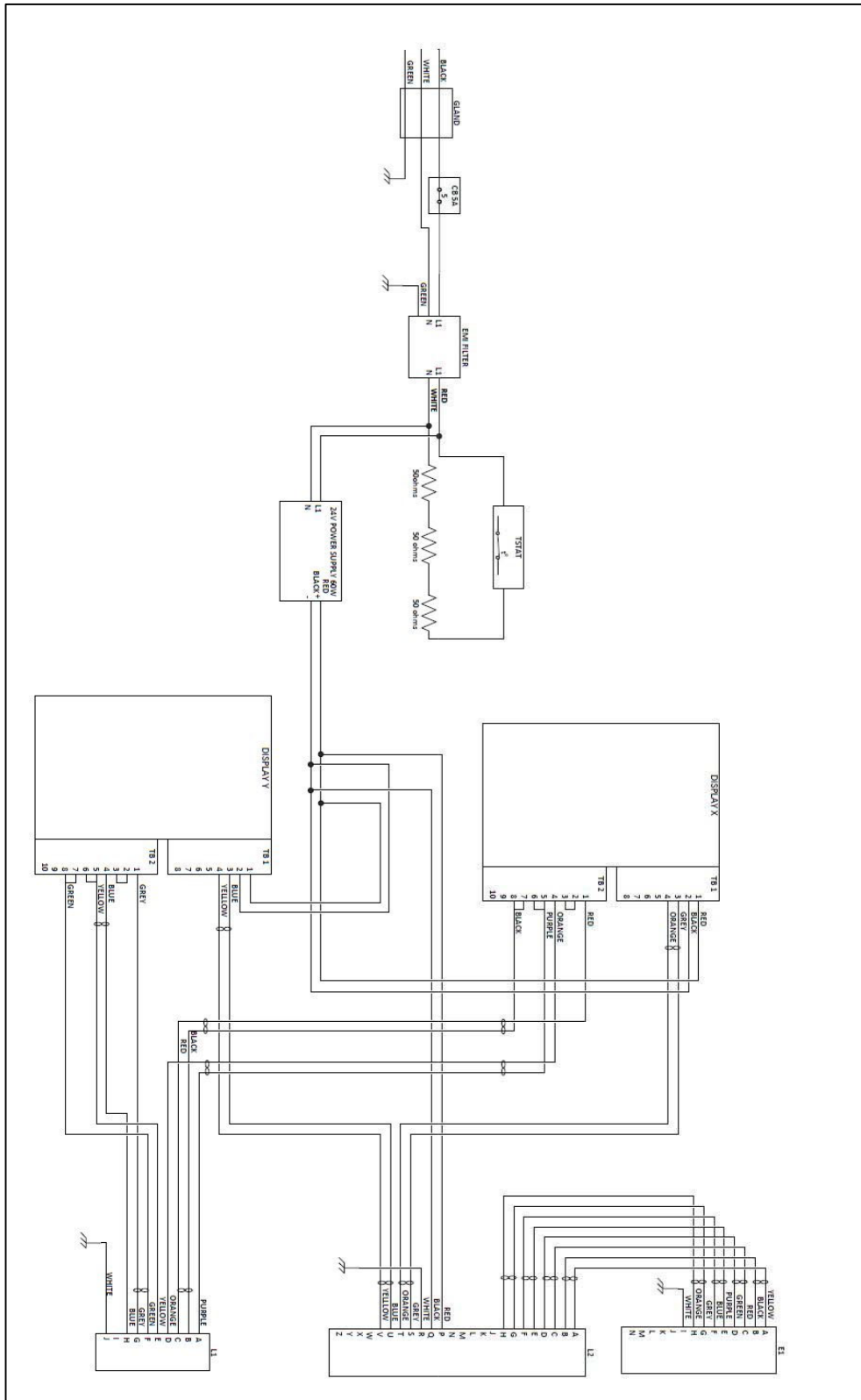


Figure 4: Instrumentation junction box wiring diagram

13.2 Pelican Display Case Wiring



Figure 5: Pelican display case wiring

13.3 Module Descriptions:

- Drum Encoder Mfg Model: Lika SMK YC 2 500 N 2 and MRI 114 72 5 100
- Load Pin Signal Conditioner Mfg Model: 3PS DOC OM XSC313 00001_B
- Display Mfg Model: MTNW LCI90i

14.0 DEEP LOGGING WINCH PM CHECKLISTS

DLW Preventive Maintenance Checklist			
SEASONAL CHECKS			
(to be performed once per season or before shipment to field)			
ITEM	ACTION	DATE	INITIAL
SYSTEM			
Packing list	Verify that complete system is packed		
CABLE			
Cable/cable termination	Inspect for damage		
Cable	Verify that cable is properly wrapped and tensioned		
CONTROL SYSTEM			
Control box wiring	Check for loose connections		
System	Verify all operations		
ELECTRICAL			
Power and signal cords	Inspect for damage		
Cable conductivity	Check for correct cable conductivity		
SAFETY EQUIPMENT			
Ropes	Inspect for damage/wear		
WINCH			
Winch system	Inspect for damage		
Oil	Refill gear box and gear case with Syn ISO 68 EP Gear Oil		
Calibration	Verify depth and tension calibrations		
Winch motor	Inspect for functionality/brake operation		
COMMENTS:			

DLW Preventive Maintenance Checklist			
WEEKLY CHECKS		WEEK OF:	
ITEM	ACTION	DATE	INITIALS
POWER DISTRIBUTION			
Generators	Inspect for damage / check oil		
Cables	Inspect for cable damage		
TOOLS			
Tools	Inspect for damaged/missing tools		
WINCH SYSTEM			
Logging cable	Inspect for damage		
Bolts	Check all bolts for tightness		
Level wind	Grease level wind fairlead with Aeroshell 22		
Grease zerks	Grease all 6 zerks with Aeroshell 22		
Oil	Check oil fill levels and refill with Syn ISO 68 EP Gear Oil		
Brake	Inspect brake operation		
Pulleys	Clean material buildup from pulleys and wheels		
Levelness	Relevel the sled if necessary		
COMMENTS:			

15.0 DEEP LOGGING WINCH PACKING CHECKLIST

Contents of the Winch Crate:				
	Item	Std Qty	Qty Packed	Notes
1	Winch Sled	1 Each		
2	Tow Bar	1 Each		
3	Drip Tray	1 Each		
4	Logging Sheave	2 Each		Optional
5	Weight Stack	1 Each		Optional
6	L21-30 208V Power Cord	1 Each		
7	L5-20 125V Power Cord	1 Each		
8	48" Level	1 Each		
9	Syn ISO 68 EP Gear Oil	1 Each		
10	Gray Hardigg	1 Each		
11	Yellow Spares Hardigg	1 Each		
12	Tool Case	1 Each		
13	Logging Tower Case	1 Each		Optional; see separate packing list
Contents of the Gray Hardigg:				
14	Control Pendant	1 Each		
15	All-in-One Card Reader	1 Each		
16	SD Card with Drill Files	1 Each		
17	LCI Amphenol Cable	1 Each		
18	Cable Wiper	1 Each		
19	Documentation Binder	1 Each		
20	Serial to USB cable	1 Each		
21	Set of Sheave Hardware	1 Each		Optional
22	Funnel	1 Each		
23	Grease Gun	1 Each		
Contents of the Yellow Spares Hardigg:				
24	Spare Control Drive	1 Each		
25	Spare GO Cablehead	1 Each		
26	Cablehead Strain Relief Wrench	1 Each		
27	Spare PWS Power Supply	1 Each		
28	Spare Traco Power Supply	1 Each		
29	Spare Load Pin	1 Each		
30	Spare 60A 600V Fuse	3 Each		
31	Spare 5A 600V Fuse	10 Each		
32	Spare Slip Ring Amphenol	1 Each		
33	Spare Encoder SMK	1 Each		
34	Spare Encoder Ring MRI	1 Each		
35	Spare Display Interface Power Supply	1 Each		
36	Spare L5-20 Plug	1 Each		
37	Cable Grips	2 Each		
Contents of the Tool Bag:				
38	Channel Lock	2 Each		
39	Crescent Wrench	2 Each		
40	English Allen Wrench Set	1 Each		
41	Rubber Mallet	1 Each		
42	Needle Nose Pliers	1 Each		
43	Aeroshell 22 Grease Tube	1 Each		
44	Brush	1 Each		
45	Tape Measure	1 Each		
46	Phillips Screwdriver	1 Each		
47	Flathead Screwdriver	2 Each		
Contents of the Winch Control Hardigg:				
48	Winch Control Cabinet	1 Each		
49	Lifting Handle	2 Each		
50	Lifting Bundle (Screws and Wrench)	1 Each		
51	LCI-90i Display Case	1 Each		