

MOOS MOORING WINCH

Manufactured for:

MBARI

Serial Numbers:

843101W

843102D

843103EALW

843104LC

843105EHPU

843202D

APPROVED BY:

DATE:

PRESIDENT:

EXECUTIVE VICE PRESIDENT:

SALES:

PROJECT MANAGER:

FACTORY ACCEPTANCE
TEST SUPERVISOR:

ELECTRONICS:

HYDRAULICS:

QUALITY
ASSURANCE:

CUSTOMER
REPRESENTATIVE:

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ARE:
FRACTIONS DECIMALS ANGLES
 $\pm 1/16$ XX $\pm .02$ $\pm 1/2^\circ$
.XXX $\pm .005$
REMOVE BURRS, BREAK SHARP EDGES.

CUSTOMER P.O. No.

DYNACON
JOB No. 0843

APPROVALS

DATE

DRAWN

PRC

22JAN04

DRAFTING
CHECK

ENGINEERING
CHECK

ENGINEERING
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PRODUCTION
APPROVAL

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831 INDUSTRIAL BLVD.
BRYAN, TEXAS USA 77803

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FACTORY ACCEPTANCE TEST PROCEDURES

FINISH 125/

APPROX. WT, LBS

ENGINEERING
APPROVAL

SIZE
A

CAGE CODE

DWG NO.

0843-0009-01

REV

-

DO NOT SCALE DRAWING

SCALE N/A

FILE 0843FAT\0843-0009-01

SHEET 1 OF 16

26JAN04

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Verification of System Readiness

Test Procedure: The following steps verify the winch system is properly lubricated and ready for testing.

Verify system check list is completed and signed by each department.

*Initial upon verification*_____

Verify all fluid levels are at the correct levels, including, but not limited to the following:

Description	Tag Number	Ref. Schematic	Initial Upon Verification
EHPU Oil Reservoir	RSV-1	0843-8001-01	

Verify the following have been manually lubricated over their entire length, including, but not limited to:

Description	Initial Upon Verification
Levelwind Guide Bars	
Levelwind Lead Screw	
Winch Drum Gear	
Winch Drive Pinion Gear (2)	
Spare Drum Gear	

Verify that all grease fittings (zerks) have been properly greased, including, but not limited to the following:

Description	Initial Upon Verification
Levelwind Carriage Grease Fittings (6)	
Levelwind Bearing Housing Grease Fitting (Motor end)	
Levelwind Bearing Housing Grease Fitting (Bearing end)	
Levelwind Sensor Assembly (3)	
Winch Bearing Housing Grease Fitting (2)	
Spare Winch Drum Bearing Housing Grease Fitting (2)	
Electric Motor Grease Fittings (2) EM-1	

1 System Settings

1.1 Test Procedure: This test ensures that the system pressures are adjusted correctly before the start of testing.

1.1.1 System Specifications

Specified Bare Drum Max Line Pull 7500 lbs. (SWL x 1.25)

Gear Ratio: 8.43:1

Bare Drum Diameter: 47.102 in

Motor Displacement: 32.7in³/rev (2)

Stalled Efficiency 0.8 (From Motor Performance Data)

Charge Pressure 350 psi

1.1.2 Calculated System Requirements

1.1.2.1 Required Motor Torque

Required Drum Torque = 176633 in-lbs

Required Motor Torque = 10476 in-lbs

1.1.2.2 System Pressure

Motor ?? = 2013 psi

System Pressure = 2866 psi

1.1.3 HPU

1.1.3.1 Verify the Motor Case Drain Ports are properly connected.
Initial: _____ Start the HPU and let the system reach a steady state operating temperature.

1.1.3.2 Verify the LEVELWIND PRESSURE is set to 2000 psi (+/- 100 psi).

LEVELWIND PRESSURE: _____

- 1.1.3.3 Verify the CHARGE PRESSURE is set between 340 psi and 360 psi.

CHARGE PRESSURE: _____

- 1.1.3.4 For the following test, either disable the failsafe brake release pressure or disconnect the A and B port lines from the winch.
- 1.1.3.5 Verify the A-PORT pressure is set to 2900 psi (+/- 100 psi) by hauling in on the joystick with the system stalled. This value may be adjusted during the Line Pull Test and needs to be re-recorded if changed.

A-PORT: _____

- 1.1.3.6 Verify the B-PORT pressure is set to 1500 psi (+/- 100 psi) by paying out on the joystick with the system stalled.

B-PORT: _____

- 1.1.3.7 Low Tension Mode – Switch the system into “Low Tension” and Haul In on the joystick with the system stalled. Verify on the A-port gauge that the pressure is limited to approximately 1600 (+/- 100 psi). This value may be adjusted during the Line Pull Test and needs to be re-recorded if changed.

LOW TENSION A-PORT: _____

- 1.1.3.8 *Initial upon completion* _____

2 Controls and Indicators Function Verification

2.1 Test Procedure: The following procedures verify the proper function of all controls and indicators connected to the Winch, Levelwind and Hydraulic Power Unit.

- 2.1.1. Ensure the system is secured to the test pad on shop floor and connected to the appropriate power source. Verify the Motor Case Drain Ports are properly connected. Initial: _____

2.2. Main Voltage Enclosure (Drawing 0804-9002-02)

On proper function
Initial

- 2.2.1. _____ *Power Fault Lamp*- Verify that the lamp is lit when a power fault is present, and verify that the electric motor will not start under this condition.
- 2.2.2. _____ *Power OK Lamp*- Verify lamp is lit when power is OK.
- 2.2.3. _____ *HPU Start Push Button*- Verify that the HPU starts when pushbutton is depressed. HPU should not start if joystick is out of the neutral position.
- 2.2.4. _____ *HPU Stop Pushbutton*- Verify HPU stops when push button is depressed.

2.3. Local Control Enclosure (Drawing 0843-9002-01)

On proper function
Initial

- 2.3.1. _____ *HPU Running Lamp*- Verify that the lamp is lit when the HPU begins to run and goes out when the HPU is stopped.
- 2.3.2. _____ *HPU Stop - Start* the HPU. Verify that when pushbutton is depressed that the HPU stops.
- 2.3.3. _____ *Winch Brake Release Lamp*- Verify lamp is lit when brake is released by moving the winch haul in/ pay out joystick from the center position. (Pressure switch setting _____ psi)

- 2.3.4 _____ *Levelwind Corrector and Travel Test*- Verify the levelwind jogs left when corrector is switched left and right when switched right. (Make sure the levelwind travels through its full range of motion in both directions. See note for setup.).

Note: The levelwind end of travel (EOT) sensor rods should be assembled to the levelwind drive to allow the levelwind carriage to travel across the drum so that the center line of the carriage travels from ½” inside the flange on one side to ½” inside the flange on the other side during operation. For Ø28 mm cable the travel is 82 ½”.

- 2.3.5 _____ *Levelwind Speed Verification* – Using the levelwind sensor to move the levelwind from left to right across the drum, measure the time it takes for the levelwind to travel through its full range. Record as **t**. Calculate the speed of the levelwind, V_{L-R} . The speed requirements are:

$$3.3 \text{ FPM} = V_{L-R} = 3 \text{ FPM}$$

$$t = \text{_____ sec.} \quad V_{L-R} = (6.875 \text{ ft.}) \div (t \div 60) = \text{_____ FPM}$$

Repeat the above procedure moving the levelwind right to left.

$$3.3 \text{ FPM} = V_{R-L} = 3 \text{ FPM}$$

$$t = \text{_____ sec.} \quad V_{R-L} = (6.875 \text{ ft.}) \div (t \div 60) = \text{_____ FPM}$$

- 2.3.6 _____ *Tension High/Low*-Disable brakes and haul in on the joystick. Verify system pressure drops to low tension operating pressure (1600 psi nominal) when toggle switch is switched to low tension and raises to high tension operating pressure (2900 psi nominal) when toggle switch is switched to high tension. High/low function will be tested during test 3 (3.1.6.8 and 3.1.7.8) and test 5.
- 2.3.7 _____ *Low Tension Enabled Lamp* – Verify lamp is lit when toggle switch is switched to low tension.
- 2.3.8 _____ *Winch Haul in / Pay out Joystick* - Verify that when the joystick is moved to the pay out position, the winch rotates in a direction that would pay out cable. Move joystick to the haul in position and the winch should rotate in the direction that would haul in cable.

3 Winch No Load Speed Test

3.1 Test Procedure: The following procedures are to be utilized to verify the speed of the winch in High and Low Tension Modes.

Verify the Motor Case Drain Ports are properly connected. Initial: _____

3.1.1 System specifications

Specified High Tension Mode Line Speed: 100 fpm
(Bare Drum)

Specified Low Tension Mode Line Speed: 200 fpm
(Bare Drum)

Bare drum diameter : 47.102 in

Motor displacement 32.7 in³/rev (2)

Gear Ratio 8.43:1

Hydraulic Pump Displacement: 85 cc (5.2 in³/rev)
(100 cc Pump)

3.1.1.1 Theoretical Drum Speed (RPM)

Drum rpm1 = 8.1 RPM
High Tension

Drum rpm2 = 16.2 RPM
Low Tension

3.1.2 Test data

3.1.2.1 With the winch set to **High Tension Mode**, use a stopwatch, record as T, the time it takes for the drum to make 10 revolutions

Haul in High Tension: T = _____ sec.

Drum Speed_{High1} = 600 ÷ T = _____ RPM

Record Tachometer reading: _____ FPM

Pay out High Tension: T = _____ sec.

Drum Speed_{High2} = 600 ÷ T = _____ RPM

Record Tachometer reading: _____ FPM

3.1.2.2 With the winch set to **Low Tension Mode**, use a stopwatch, record as **T**, the time it takes for the drum to make 10 revolutions

Haul in Low Tension: T = _____ sec.

Drum Speed $_{Low1} = 600 \div T =$ _____ RPM

Record Tachometer reading: _____ FPM

Pay out Low Tension: T = _____ sec.

Drum Speed $_{Low2} = 600 \div T =$ _____ RPM

Record Tachometer reading: _____ FPM

3.1.3 Calculate line speed using formula below:

Line Speed $_{High} = [(drum\ RPM) \times (drum\ core\ diameter) \times (p)] \div 12 =$ _____ FPM

Line Speed $_{Low} = [(drum\ RPM) \times (drum\ core\ diameter) \times (p)] \div 12 =$ _____ FPM

3.1.4 Test check

3.1.4.1 Are the following conditions true?

110 FPM = Line Speed $_{High} = 100$ FPM YES NO

8.9 RPM = Drum Speed $_{High1} = 8.1$ RPM YES NO

8.9 RPM = Drum Speed $_{High2} = 8.1$ RPM YES NO

220 FPM = Line Speed $_{Low} = 200$ FPM YES NO

17.8 RPM = Drum Speed $_{Low1} = 16.2$ RPM YES NO

17.8 RPM = Drum Speed $_{Low2} = 16.2$ RPM YES NO

If the answer is NO to any of the above questions contact the project manager/engineer for this job.

3.1.5 Initial upon completion _____

4 Line Pull Test

4.1 Test Procedure: The following procedures will verify that the winch will pull 1.25 X SWL at bare drum and verifies the Low Tension Mode setting.

Verify the Motor Case Drain Ports are properly connected. Initial: _____

4.1.1 Reeve the test cable thru the Levelwind and attach the end to an appropriate load cell and hydraulic cylinder. Secure the other end on the winch drum with sufficient number of turns to prevent the cable from slipping on the drum (8-12 turns).

4.1.2 Start the HPU

4.1.3 Specified **High Tension** SWL at bare drum: 6000 lbs

4.1.4 Max Line Pull:

$$6000 \text{ lbs SWL} \times 1.25 = 7500 \text{ lbs Max Line Pull at bare drum}$$

4.1.5 Ensure that the system is in **High Tension Mode**. Haul in on the joystick until the system stalls. The line tension at **bare drum** should be at least the calculated bare drum line pull of 7500 lbs, but no greater than the calculated bare drum line pull of $7500 \text{ lbs} \times 1.10 = 8250 \text{ lbs}$.

Adjust the A-Port pressure as necessary to achieve this range of values and re-record the pressure setting.

Record load reading here: (high tension) _____ lbs.

A-Port Pressure: (high tension) _____ psi

4.1.6 Specified **Low Tension** SWL at bare drum: 3000 lbs

4.1.7 Switch the unit into **Low Tension Mode**. Haul in on the joystick until the system stalls. The line tension at **bare drum** should be at least the low tension line pull 3000 lbs but no greater than 3300 lbs.

Adjust the low tension relief as necessary to achieve the stated line pull and re-record the pressure setting.

Record load reading here: (low tension) _____ lbs.

A-Port pressure (low tension): _____ psi

4.1.8 *Initial upon completion* _____

4.2 Attachments

4.2.1 Load measuring device calibration certificate.

Manufacturer: _____

Serial Number: _____

Model Number: _____

Load Capacity: _____

5 Structural and Brake Test

5.1 Test Procedure: The following procedures will verify the structural design load of the winch and the brake holding force

Verify the Motor Case Drain Ports are properly connected. Initial: _____

5.1.1 This test uses the same test setup as the Line Pull Test

5.1.2 Specified braking capacity at bare drum: 10000 lbs

5.1.3 Ensure the brakes are set.

5.1.4 Retract the hydraulic cylinder until the load cell reads at least the
brake holding force 10000 lbs

But do not exceed (1.05 x brake holding force) 10500 lbs
(at bare drum). **Brakes should not slip.**

Record pulled load here _____ *Initials* _____

5.2 Attachments

5.2.1 Load Measuring Device Calibration Certificate:

Manufacturer: _____

Serial Number: _____

Model Number: _____

Load Capacity: _____

Oil Cleanliness Report

FILTRATION

Dynacon recommends that an oil cleanliness class of 21/16/13, according to ISO 4406(99) be maintained for safe operation of the HPU. This can be achieved by using a 10 micron filter. Improper maintenance can result in system failure.

CLEANLINESS CLASS AT TIME OF SHIPPING: ___/___/___

DATE: ___/___/___

Attach oil cleanliness data sheet to this page.

SIGNATURE: _____

System Weight Record

Technicians Initials: _____

Date: _____

ITEM	SERIAL NUMBER	WEIGHT (LBS.)
Winch (No Umbilical)	843101W, 843102D (Drum)	
Levelwind	843103EALW	
Local Control	843104LC	
HPU (wet)	843105EHPU	
Spare Drum	843202D	

Acceptance Report

Date of acceptance Testing: _____

Location of Acceptance Testing: DYNACON, Inc., Bryan, Texas

Serial number(s) of Unit(s) Tested: _____

The Factory Acceptance Tests of the Winch System contained herein were conducted and completed to the satisfaction of the participants and witnesses whose signatures appear below.

DYNACON, Inc.

MBARI

_____	_____
_____	_____
_____	_____
_____	_____

Test Equipment

Job 0843 Winch and Levelwind

Job 0843 EHPU

Approximately 200 ft of Ø_____ test wire rope (must withstand brake test (Test 5))

Load cell rated to 15000 lbs. (must withstand brake test (Test 5))

Hydraulic cylinder rated to 15000 lbs.

Stopwatch

Tachometer

Test Power Unit