OPERATION AND MAINTENANCE MANUAL

HYDRA-PRO™

MARINE CRANE

MODEL NUMBER: HP50-25F

SERIAL NUMBER: 11457

Dear Valued Customer,

At this time, all of us at Rapp Hydra Pro, wish to thank you for the purchase and installation of high quality Rapp Hydra Pro crane.

It is our desire that your installation and operation experiences go smoothly and are as professional as possible. There is specific information contained within this manual that will assist you in that process. We urge you to please take the time to read through this manual and become familiar with the information and contacts. Along with performance, maintenance and service information, there is also a list of installation, start-up and operation instructions for the crane. Being familiar with all of this information will help to ensure a hassle free ownership.

At any time, please do not hesitate to contact us should you need any further assistance.

Once again, thank you for your business and we hope you will remember us the next time a crane is needed.

Sincerely,

Rapp Hydra Pro staff

CONTACT INFORMATION

PHONE: 206 285-9578
FAX: 206 285-9579

Sales	**Reed Okawa**	**Ext: 104**	**reedo@hydrapro.com**
	Griffin Manchester	**Ext: 105**	**gbmanchester@hydrapro.com**
Project Management	**Chris Hahn**	**Ext: 110**	**chahn@hydrapro.com**
Parts/ Service	**Steve Skieens**	**Ext: 120**	**steve.skieens@hydrapro.com**
Tech Support	**Chris Hammer**	**Ext: 107**	**chammer@hydrapro.com**

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CRANE TECHNICAL SPECIFICATIONS - HP50-25F

GENERAL

NOTE: THIS CRANE IS NOT CERTIFIED FOR LIFTING PERSONNEL.

MAXIMUM RADIUS	15 M
MINIMUM RADIUS	3 M
BOOM ANGLE	0-70 DEGREES
DESIGN PRESSURE (MAX.)	2,600 PSI
DESIGN FLOW (MAX.)	70 GPM
HYDRAULIC FLUID	ISO AW32
CRANE WEIGHT	34,000 LBS APPROX.

HOIST(S)

MAIN	PLANETARY, HYDRAULIC-DRIVEN
MAIN WINCH LINE SPEED (BARE DRUM)	38 MPM
MAIN WINCH LINE PULL (BARE DRUM)	7 MT

BOOM CYLINDER

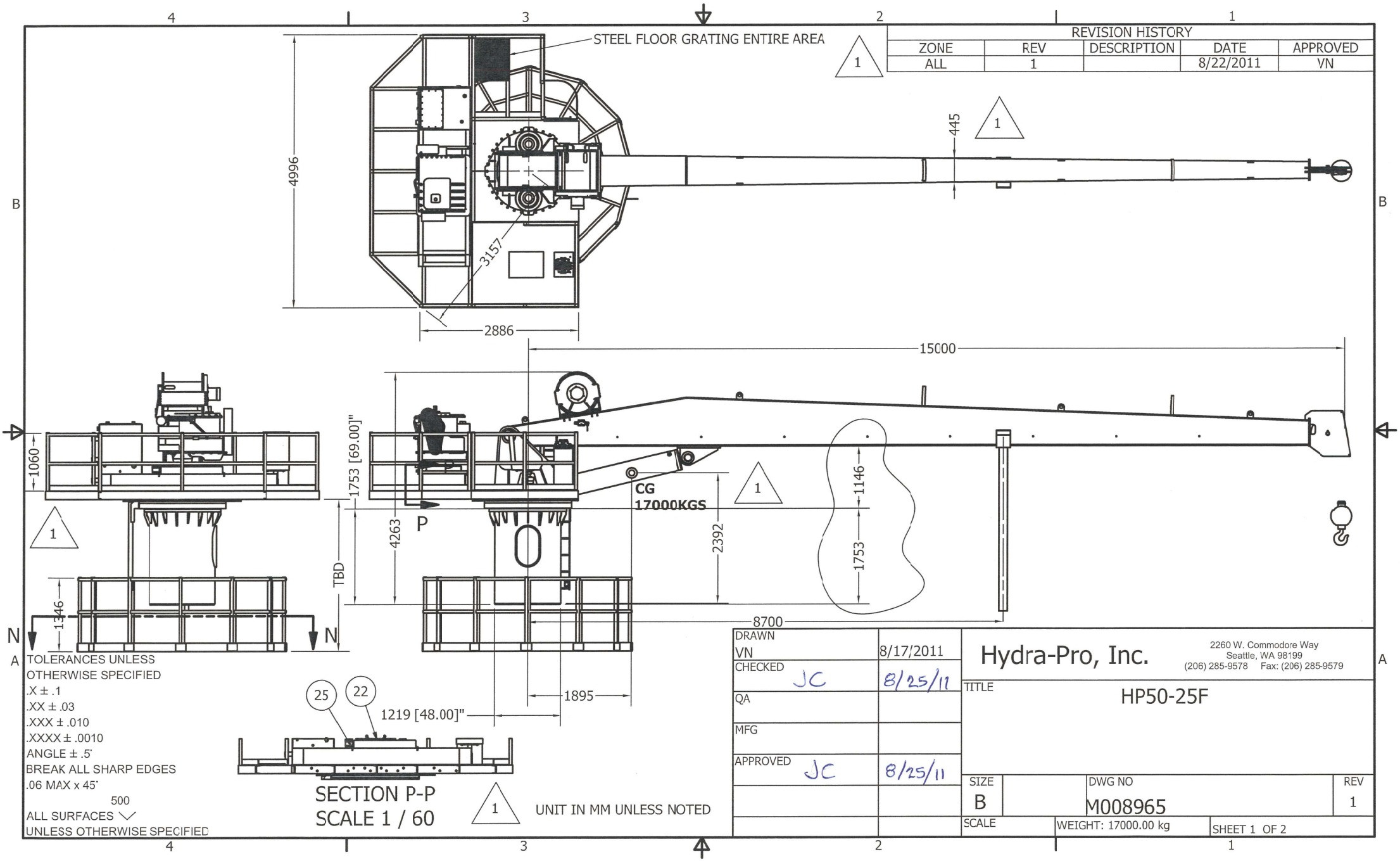
TYPE	DOUBLE-ACTING, SINGLE COUNTERBALANCE VALVE
DISPLACEMENT	12” BORE X 68.5” STROKE X 6.5” ROD

SWING DRIVE

TYPE	DUAL HYDRAULIC DRIVE WITH PLANETARY GEARING AND SPRING APPLIED HYDRAULIC RELEASE BRAKE
SPEED	0-1.5 RPM
SWING TRAVEL	350 DEGREE NON-CONTINUOUS ROTATION

HPU

DIESEL ENGINE	PERKINS
PUMP	140CC VARIABLE VOLUME PRESSURE COMPENSATED



REVISION HISTORY				
ZONE	REV	DESCRIPTION	DATE	APPROVED
ALL	1		8/22/2011	VN

TOLERANCES UNLESS OTHERWISE SPECIFIED
.X ± .1
.XX ± .03
.XXX ± .010
.XXXX ± .0010
ANGLE ± .5°
BREAK ALL SHARP EDGES
.06 MAX x 45°
500
ALL SURFACES
UNLESS OTHERWISE SPECIFIED

DRAWN	VN	8/17/2011
CHECKED	JC	8/25/11
QA		
MFG		
APPROVED	JC	8/25/11

Hydra-Pro, Inc.
2260 W. Commodore Way
Seattle, WA 98199
(206) 285-9578 Fax: (206) 285-9579

TITLE: HP50-25F

SIZE	DWG NO	REV
B	M008965	1

SCALE | WEIGHT: 17000.00 kg | SHEET 1 OF 2

10”

8”

Grafico De Capacidade De Carga
Hydra Pro Modelo Da Grua HP50/25F (04-8-2011)
Cliente: Promon Engenharia
Numero De Projecto: C0164000

Alcance A Bordo M	Graus De Inclinação	Carga KGS	Alcance Fora De Bordo M	Graus De Inclinação	Carga KGS
3	78.46	18,167	3	78.46	17,377
4	74.53	13,420	4	74.53	12,837
5	70.53	10,573	5	70.53	10,113
6	66.42	8,674	6	66.42	8,29
7	62.18	7,318	7	62.18	***7,000
8	57.77	6,534	8	57.77	6,250
9	53.13	5,750	9	53.13	5,500
10	48.19	4,965	10	48.19	4,750
11	42.83	4,181	11	42.83	4,000
12	36.87	3,397	12	36.87	3,250
13	29.93	2,613	13	29.93	2,500
14	21.04	1,830	14	21.04	1,750
15	0.00	1,045	15	0.00	1,000

Momento Máximo De Capotamento 182,250 M-KGF
Força Máxima Axial 71,450 KGF
Peso Básico Da Grua 11,500 KGS
***Tracção Máxima Para O Guincho CH280A

CORDOARIA
OLIVEIRA SÁ
MANUEL RODRIGUES DE OLIVEIRA SÁ & FILHOS, S.A
RUA DO OUTEIRO, 936 - 4475-150 GEMUNDE - PORTUGAL

Declaração de Conformidade Tipo 2.1
Declaration of Conformity Type 2.1
(EN 10204: 2004)

Declaração nº / Manufacture Declaration No. **11/M-0114**

WIRECO WORLDGROUP

12200 NW AMBASSADOR DR.
Kansas City, MO 64163-1244
U.S.A

Cordoaria Oliveira Sá declara que o produto a seguir cumpre os requisitos relevantes da Directiva Máquinas 2006/42/CE. Certificamos também que o produto descrito foi por nós testado e cumpre os termos do contrato.
Cordoaria Oliveira Sá declares that the following product fulfils all the relevant requirements of EC Machinery Directive 2006/42/EC. We hereby also certify that the described material has been tested and complies with the terms to the order contract.

Encomenda/ Purchaser's Order No.	:		
Ordem de Fabrico/ Works Order No.	:	W073419	
Comprimento do Cabo/ Length of Rope	:	3657m	m
Peso/ Weight	:	8420	kg

Diâmetro/ Diameter	:	22,00	mm
Construção/ Construction	:	34(W)x7	NR Maxipact
Tipo de Torção/ Type of Lay	:	Lang's Lay	
Direcção de Torção/ Direction of Lay	:	zZ	
Revestimento de Superfície/ Type of Finish	:	GB	
Alma/ Core	:	Aço Steel [X] Sintetic Fiber [ ] Natural Fiber [ ]	
Carga de rotura mínima/ Minimum breaking force ($F_{c\,min}$)	:	467,37	kN
Peso/metro nom./ Nominal mass/metre	:	2,309	kg/m
Classe de resistência/ Rope grade (R_r)	:	2160	

Foram usadas as normas a seguir (onde aplicável)/ Where applicable the following standards were used:

EN ISO 12100-1	Safety of machinery - Basic concepts, general principles for design - Part 1: Basic terminology, methodology.
EN 12385-1+A1	Steel wire ropes - Safety - Part 1: General requirements.
EN 12385-2+A1	Steel wire ropes - Safety - Part 2: Definitions, designation and classification.
EN 12385-4+A1	Steel wire ropes - Safety - Part 4: Stranded ropes for general lifting applications.
EN 12385-5+A1	Steel wire ropes - Safety - Part 5: Stranded ropes for lifts (only applicable to lift ropes).

Foram também usadas as seguintes normas e especificações/ The following technical standards and specifications were also used:

EN 10264-1	Steel wire and wire products - Steel wire for ropes - Part 1: General requirements.
EN 10264-2	Steel wire and wire products - Steel wire for ropes - Part 2: Cold drawn non alloy steel wire for ropes for general applications.

Esta declaração perde a validade no caso de alterações não autorizadas ao produto ou no caso de não cumprimento das regras de segurança das normas "EN 12385-3 - Steel wire ropes - Safety - Part 3: Information for use and maintenance" e "ISO 4309 - Cranes - Wire ropes - Care and maintenance, inspection and discard".
This declaration looses its validity in case of any changes of the product not agreed upon with the manufacturer and also in case of non-attention of the security notes of the standards "EN 12385-3 - Steel wire ropes - Safety - Part 3: Information for use and maintenance" and "ISO 4309 - Cranes - Wire ropes - Care and maintenance, inspection and discard".

(Emitido por/ Issued by)

(Validado por/ Validated by)

Maia, 28-04-2011

CE

CERTIFICATE OF COMPLIANCE

MILLER Order No.: 206691

Description: *M133224110 Weight Ball/Econo-Link 15A320*

Serial No.: 16743

WLL: *15 ton* ***Design Factor:*** *4:1*

Customer Name: *West Coast Wire Rope & Rigging, Inc. Seattle*

Customer No.: 88692

Customer P.O.: 6027570

Issue Date: July 2011

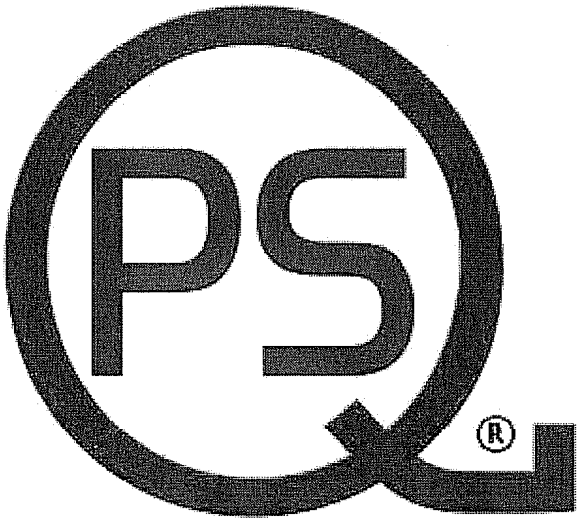
We, the Miller Products Division of GHM Industries, Inc., certify that the work performed on the above referenced purchase order complies with the requirements of the purchase order and Miller Products' design requirements.

(Authorized signature)

Miller Products, GHM Industries

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since 1935
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Energy Efficiency Verification - CB Scheme - IECEx Scheme
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Tel: 416-241-8857 – Fax: 416-241-0682

www.QPS.ca
Toll free: 1-877-746-4777

CERTIFICATION RECORD – CANADA

FILE NUMBER: LR 3109

Applicant	Cranesmart Systems Inc. 4908 – 97 Street Edmonton, AB T6E 5S1
Manufacturer	Same as above
Factory/Labeling Location	Same as above

PRODUCT CATEGORY: **Hazardous Locations**

Product Description:

LR 3109-1	**900 Series Display Panel – rated at 32 Vdc, 8A; Ex nA IIB + H2, T4; hard wired.**

Notes: **Transfer of LPC Report No. LPC 73109-01 to LR Program.**

CUSTOMER FILE HISTORY

File Number: LR 3109

Cranesmart Systems Inc.

Report/Application Number	Issue Date	Description
LR 3109-1	October 12, 2010	Transfer of LPC Report No. LPC 73109-01 to LR Program. 900 Series Display Panel – rated at 32 Vdc, 8A; Ex nA IIB + H2, T4; hard wired.

File
LR 3109

CERTIFICATE OF COMPLIANCE
(ISO TYPE 3 CERTIFICATION SYSTEM)

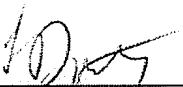
Product:	Display Panel
Model/Type/Catalogue Number:	900 Series Display Panel
Name and Address of Applicant:	Cranesmart Systems Inc. 4908 - 97 Street Edmonton, Alberta T6E 5S1 Canada
Contact:	Mike Nachai
Name and Address of Manufacturer/Factory:	Same as Applicant
Contact:	Same as Applicant
Rating and Principal Characteristics:	Ex nA IIB+H2 T4 32VDC, 8A
Trademark (if any):	
A sample of the Product was tested and found to be in compliance with:	CAN/CSA E60079-15:02 CSA C22.2 No. 142-87, CEC(2006)
As shown in Certification Report No:	**LR 3109-1**

Products in compliance with the Certification Report are eligible to bear the QPS Certification Mark

Issued by: QPS Evaluation Services Inc.
Toronto, ON Canada

Date: **October 12, 2010**

Alfonso Mattucci
Quality Assurance

Customer File No: LR 73109	Report No: LR 73109-01	Issue Date: October 12, 2010
Issued By:  **Bill Stephenson CET**	**Reviewed By:**  **Tom Bartoffy, P. Eng.**	
Customer Name: Cranesmart Systems Inc.	**Address:** 4908 - 97 Street Edmonton, Alberta T6E 5S1 Canada	

Contents: Certificate of Conformity; Report: Pages 1 to 8; Photographs: Page 6

Attachments: (1) Ultramid 8333 GHI;
(2) LMI IP54;
(3) chimassorb_944TDS;
(4) 016057A2 MEC APPROVAL;
(5) 5-30 Thermocouple Extension Cable;
(6) LMI3 CPU LCD Driver Schematic;
(7) LMI3 CPU Main Schematic;
(8) LMI3 CPU Serial Schematic;
(9) LMI3 Power Schematic;
(10) LMI3BOM;
(11) E60079-15-02

Project No. & Date	Revised By:	Reviewed By (QPS):	Pages:	Description of Changes:
LR 3109-01 October 12, 2010	**Bill Stephenson**	**Tom Bartoffy**	**Revised: Report same as Report No. LPC 73109-01**	**Transfer of original LPC Report No. LPC 73109-01 to LR Program.**

SUBJECT

Model: 900 SERIES DISPLAY PANEL
Display Panel
Ex nA IIB+H2 T4
32VDC, 8A
HARD WIRED

APPLICABLE STANDARDS

The labelled product was tested/evaluated to the following standards/codes:

CAN/CSA E60079-15:02
CSA C22.2 No. 142-87, CEC (2006)

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MODIFICATIONS REQUIRED

Upon examination of the subject product, the modifications listed below were required to bring the product into compliance with the applicable standard(s) and have been incorporated into the product.

(a) Markings as above shall appear on each unit. - OK
(b) Email a photo of the proposed nameplate or artwork of the nameplate-
(c) And the following (already rectified):

- Requires that the plastic enclosure be of a UL material and suitable for the area- OK refer to attached specs and IP testing letter
- Requires extra reinforcement for the LCD lens- OK new sample tested and passed
- SSR track width information is required- OK far exceeds the spacing requirements (refer to the report)
- Ratings for each PCB is required.—OK refer to the report

MARKINGS

a) **Markings on the Equipment:** The product is plainly marked in a permanent manner in a place where the details are readily visible after installation with the following:
- the "QPS Certification" Label;
- Manufacturer's name or trademark;
- model designation;
- date code/serial number; As indicated on the log sheets
- complete electrical ratings;
- hazardous location designation;
- Fuse type and rating adjacent to accessible fuses
- On (|) and Off (O) positions of the mains switch; (when applicable)

b) **Warning/Caution Notices**:

- Do not service unless area is known to be non-hazardous
- Substitution of components may impair the suitability for DIVISION 2
- DO NOT OPEN WHEN ENERGIZED
- Do not rub with a dry cloth
- This equipments' TC wiring must be installed with the appropriate Tray-cable system or other suitable means as Outlined in the CEC.To maintain a Div 2 rating this unit mu
- Only be supplied with 14VDC Transient protected power only for the low voltage Circuits.

Note: Jurisdictions in Canada may require markings to be also in French. It is the responsibility of the Customer to provide bilingual marking, where applicable, in accordance with the requirements of the Provincial Regulatory Authorities.

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CONDITIONS OF ACCEPTABILITY/CERTIFICATION

- The product certified and labelled has been altered to include the required modifications outlined above.
- The approved construction of the product is as described below in this report.
- Certification is voided if the product has been modified or changed by the manufacturer or end user after Limited Production Certification labeling, unless the changes have been reviewed and approved in writing by QPS Verbal approval is not permitted.
- Certification covers only safety from electric shock and fire/explosion hazards, and apply only to the construction elements described in this report.
- QPS did not evaluate the suitability of the use of equipment involving toxic or corrosive gases; steam locations defined as hazardous locations by the Canadian Electrical Code or the National Electrical Code.

DESCRIPTION OF CERTIFIED PRODUCT

General:

The voltage values are under 32v and are therefore exempt from being a General Electrical Hazard. The unit met all requirements of the appropriate spacing in table 2 of standard CAN/CSA 60079-15:02, only when a supplementary coat of electrical sealing varnish was applied over the PCB. (Solder mask was considered to be one coat).

Refer to the schematic diagram for further component listing.

Enclosure

The enclosure was considered to be IP54 (Type 4) and enclosed bare live parts.- refer to the attached letter of attestation from QPS

The enclosures adequately secure the internal circuitry and require the aid of a tool to open.
The gaskets used are urethane/foam and have inherent memory retention exempting it from the gasket compression test and was secured to one of the mating faces.
All housings and terminal boxes are of the approved type 4. – (IP54 equivalent)

The housing was a polymeric material of 1/8"-thickness and was already Ul approved for HB.. It has also been marked "Do not rub with a dry cloth".

Power Connections:

POWER SUPPLY:
(-SEE PLUGS)

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BATTERIES:
No batteries were in the device

PLUGS:
The external plugs have been mechanically secured to prevent unintentional separation and have the appropriate warnings. "Friction fit" was not used as a means of securement and was approved for general purpose locations
The male/female plugs were already approved for the area (as cited on the component list)

Grounding/Bonding:
No shock or energy hazardous bare live parts and basic insulated wiring are accessible without the use of a tool.
Since the device is ELV, The negative has been used as the Grounding plane and chassis ground to ensure signal and cct integrity.

Interconnecting Cables:
Certified TC rated cable was used between devices with the appropriate connector and tray (Also refer to the warnings)

Internal Wiring:
Internal wiring had a basic insulation >0.3mm thick polyethylene and is Rated 300v
The unit was a plug in device. (-see plugs)

All internal wiring is certified and is reliably routed and secured away from sharp edges having a radius less than 1.5mm.

Additional insulation is provided where wiring passes over sharp edges and through holes
Primary and Extra Low Voltage wires are routed and secured away from each other.

T-Code Review and Evaluation
For the CPU, LCD, and Radio PCB
The track widths are > 0.2mm and conducts Less than 1.2 continuous amps and therefore suitable for T4. -The circuit board has no component with surface area greater than 10cm² or a wattage dissipation of greater then 1.3 watts (-excluding wiring) or a temperature of greater than 200 degrees Celsius. The temperature code applied for has been deemed acceptable and therefore been awarded for the POWER and LCD PCB-Refer to temperature tests.

SPACING:
The PCB tracking index was deemed to be equivalent to Group B / 90 (GROUP I) for the purposes of this report, considering that the printed circuit board was made from a glass cloth base epoxy resin with a copper clad laminate. With a high-temperature solder mask.
A high-temperature solder mask, nominal 200 degrees, has been implemented. (Type A).

The internal trace-spaces were designed using general-purpose industry standards for the PCB Spacing. Spacing requirements from table 2 are exempted for ZONE 2 in standard 60079-15 , since the enclosure is equivalent to IP 54 and the voltage is <60V and is of a low wattage (<20W) and the components consists only of cct's for measurement, control / communication. A solder mask was also

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implemented on the PCB (type A). (60079-15/clause-12)- refer to warnings regarding power requirements– *Transient suppression is evident due to the front-end component power supply with built-in, component-level suppressers and regulators.*
Conforms to table 7 (std 61010) requirements. (0.04mm @24v).-

VENTILLATION:
No ventilation is required for the unit.

SWITCHES
The maximum available energy to each membrane switch is equivalent to 12 vdc across a 10Kohm resistor. The total available current is therefore no more than 1.2ma. Based upon the minimum ignition currents and voltages the unit was deemed acceptable, and deemed non-incendive and suitable for DIVISION 2

FUSES:
The fuse is in a non-operator-accessible fuse holder in an incendive circuit (PCB soldered) can be removable only with the use of a tool.

RELAYS:
The relays were solid state and completely encapsulated and mounted with good thermal conductivity against the back pan.

POTS:
No user potentiometers were incorporated on the device.

FANS:
No fan was incorporated.

WINDINGS:
No motors are incorporated in the device

HEATERS:
The LCD heater is 12VDC, 3.8 watt self limiting type and is used only for the LCD display (refer to temp tests)

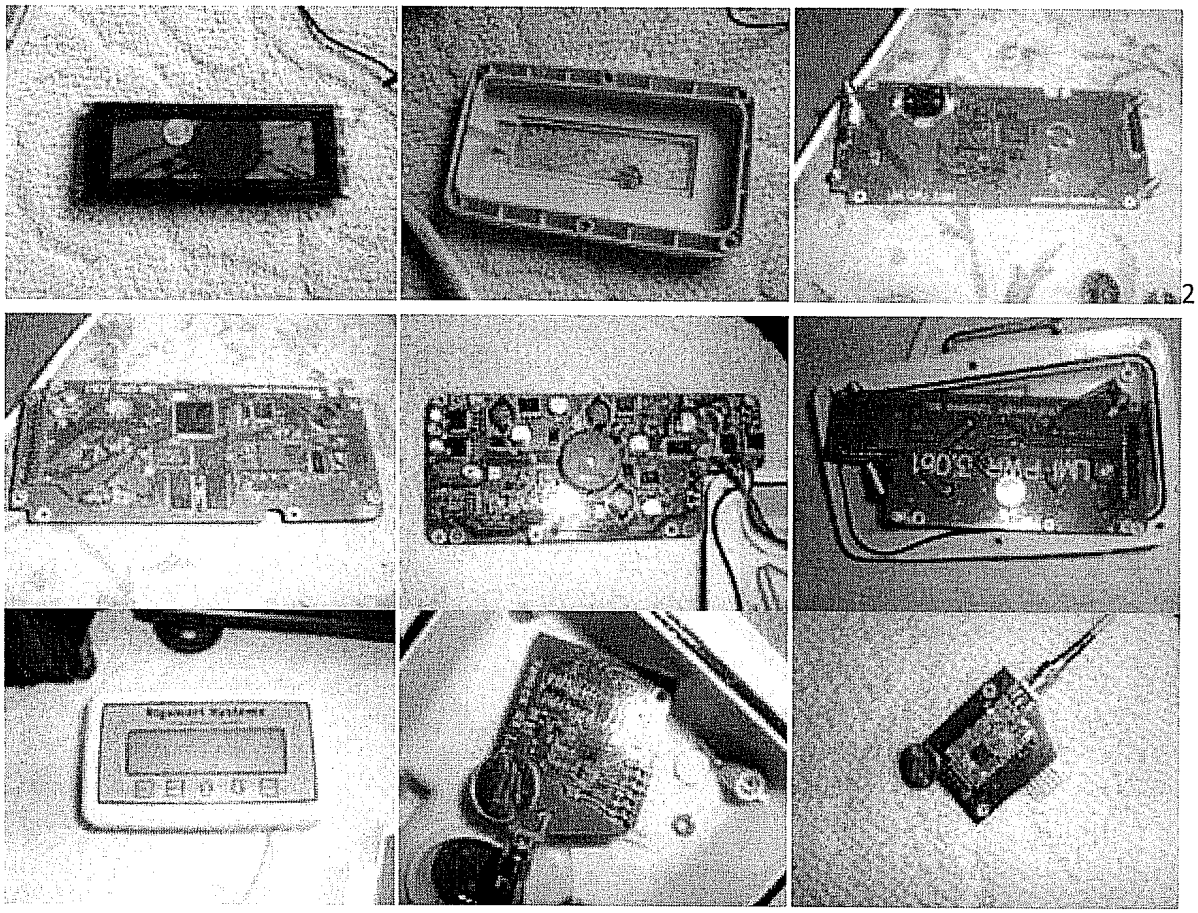
FACTORY TESTS
Due to the number of already CSA approved components and the appropriate construction techniques and low voltage, utilized within the subject, Factory tests were not deemed necessary.

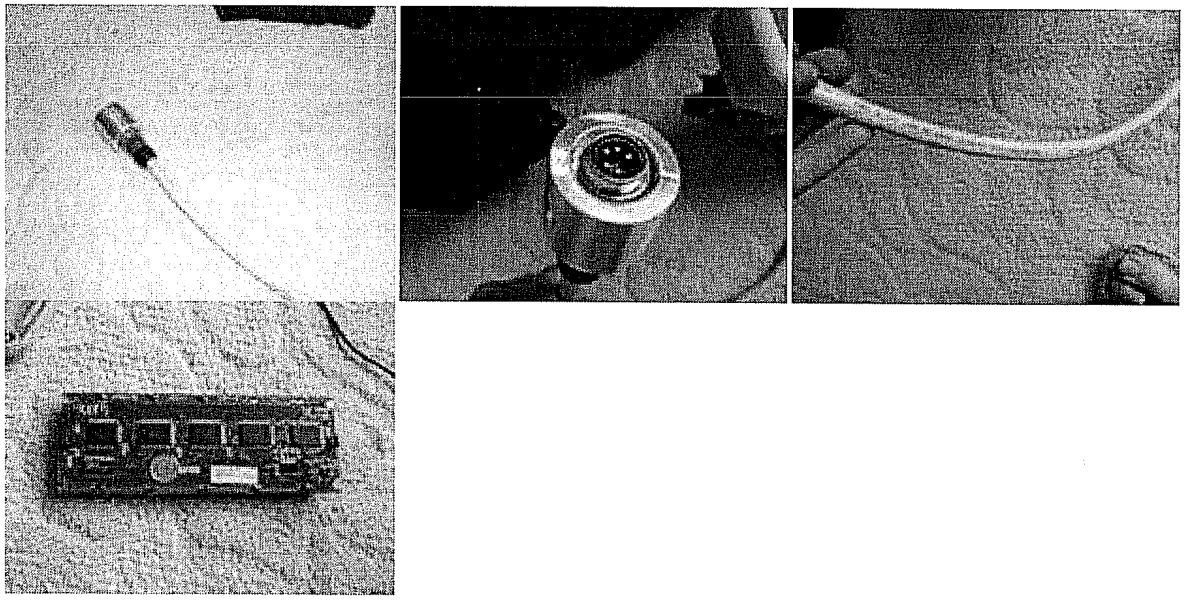
Critical Components:
See "Table of Critical Components" below

Bill of Material
Refer to attached

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Photographs





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Tests

<table>
<tr><td rowspan="2">General</td><td colspan="4">Temperature test: measured at the hot spot at 23deg C. and adjusted for 40deg C with a safety factor of 1.2 times

LCD heater:_____23 deg rise
Powerfets:_____32 deg rise</td><td rowspan="2">PASS</td></tr>
<tr><td>Wavetek 28XT</td><td>Multi Meter x 28XT, Thermocouple K Type</td><td>Temp, V,A,R</td><td>11/2/2008</td></tr>
<tr><td rowspan="2">Clause No. 22.4.3.1-(60079-0.)</td><td colspan="4">The enclosure was subjected to a force test for group II, by dropping a 1kg weight from a height of .7 meters /(7J) three times.Clause No. 22.4.3.1-(60079-0.)</td><td rowspan="2">Second sample PASSED</td></tr>
<tr><td>Acculab</td><td>Weight Scale V-IC-3101</td><td>.1g-3000g</td><td>AUG 20 2008</td></tr>
</table>

[X] The test methods and results of the above tests have been reviewed and found to be in compliance with the applicable requirements of the applicable standards/codes indicated above.

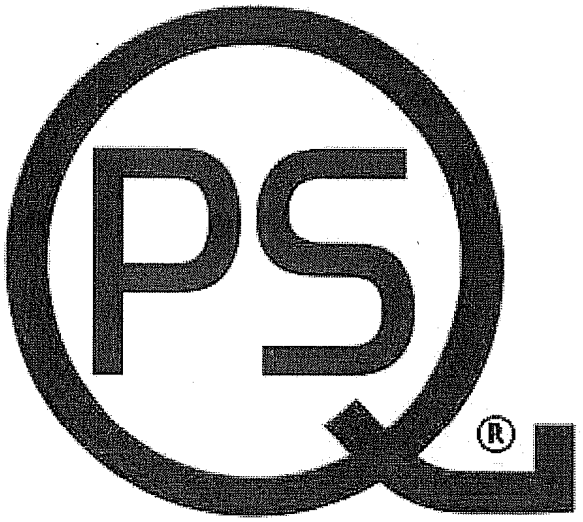
This test report was transferred from original LPC Report No. LPC 73109-01 to this report (LR Program).

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Critical Components Table

Component (Customer P/N)	Manufacturer	Mfg P/N	Technical Description	Ratings (electrical/other)	Mark(s) of conformity[1]
Plug end	Woodhead	44	Ex nA IIB T3	12VDC , 5 AMP	entela
TC cable	cransmart	16 awg	PLTC/TC	16AWG,2/C	UL
Plastic housing	Base F	Ultramid 8333GHI	UL94 HB	-	UL

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Tel: 416-241-8857 – Fax: 416-241-0682

www.QPS.ca
Toll free: 1-877-746-4777

CERTIFICATION RECORD – CANADA

FILE NUMBER: LPC 73109

Applicant	Cranesmart Systems Inc. 4908 – 97 Street Edmonton, AB T6E 5S1
Manufacturer	Same as above
Factory/Labeling Location	Same as above

PRODUCT CATEGORY: **Hazardous Locations**

Product Description

–01	900 Series Display Panel – rated at 32 Vdc, 8A; Ex nA IIB + H2, T4; hard wired.
–01A	Re-Inspection: 900 Series Display Panel – rated at 32 Vdc, 8A; Ex nA IIB + H2, T4; hard wired.
–02	Universal Transducer, Model 900-UTX – rated at 3.6Vdc, 30mA; Ex ia IIB T4, Intrinsically Safe; hard wired.
–02.1	Re-Inspection: Universal Transducer, Model 900-UTX – rated at 3.6Vdc, 30mA; Ex ia IIB T4, Intrinsically Safe; hard wired.
–02.A	**Re-Inspection: Universal Transducer, Model 900-UTX – rated at 3.6Vdc, 30mA; Ex ia IIB T4, Intrinsically Safe; hard wired.**
–03	Minihub 2.0, Model RD-028 – rated at 12/24 Vdc, 30 mA; Class I, Division 2, Groups B, C & D; Ex nA IIB T4 X; hard wired.

Notes:

CUSTOMER FILE HISTORY

File Number: LPC 73109

Cranesmart Systems Inc.

Report/Application Number	Issue Date	Description
LPC 73109-01	January 19, 2009	**Original Report:** 900 Series Display Panel – rated at 32 Vdc, 8A; Ex nA IIB + H2, T4; hard wired.
LPC 73109-01A	July 21, 2009	**Re-Inspection Report (QSD 152)** 900 Series Display Panel – rated at 32 Vdc, 8A; Ex nA IIB + H2, T4; hard wired.
LPC 73109-02	March 24, 2009	**Original Report:** Universal Transducer, Model 900-UTX – rated at 3.6Vdc, 30mA; Ex ia IIB T4, Intrinsically Safe; hard wired.
LPC 73109-02.1	November 05, 2009	**Re-Inspection Report (QSD 152):** Universal Transducer, Model 900-UTX – rated at 3.6Vdc, 30mA; Ex ia IIB T4, Intrinsically Safe; hard wired.
LPC 73109-02A	**February 26, 2010**	**Re-Inspection Report (QSD 152):** **Universal Transducer, Model 900-UTX – rated at 3.6Vdc, 30mA; Ex ia IIB T4, Intrinsically Safe; hard wired.**
LPC 73109-03	April 18, 2009	**Original Report:** Minihub 2.0, Model RD-028 – rated at 12/24 Vdc, 30 mA; Class I, Division 2, Groups B, C & D; Ex nA IIB T4 X; hard wired.

CERTIFICATE OF COMPLIANCE
(ISO TYPE 1 CERTIFICATION SYSTEM)
LIMITED PRODUCTION CERTIFICATION (LPC)

Report No. LPC73109-02A

Applicant:	Cranesmart Systems Inc.
Address:	4908 - 97 Street Edmonton, Alberta T6E 5S1 Canada
Contact:	Mike Nachai
Product:	Universal Transmitter
Model/Type Number:	900-UTX
Trademark (if any):	
Rating and Principal Characteristics:	3.6VDC 30mA Ex ia IIB T4, Intrinsically Safe
Inspection Location: **(if different from applicant)**	Same as Applicant
Standard(s):	CAN/CSA E60079-11:02, CSA C22.2 No. 157-92 (R2006) CSA C22.2 No. 142-M1987 (R2004)

Statement of Compliance: The product(s) identified in this Certificate and described in the above referenced Report have been investigated and found to be in compliance with the relevant requirements of the above referenced standard(s). As such, they are eligible to bear the QPS Certification Label under the provisions of QPS's Limited Production Certification (LPC) Service and subject to the conditions stipulated below.

Conditions of Acceptance:

- This Certificate covers only the units identified below:
  - Number of units eligible for labeling: **THREE HUNDRED (300)**
  - Serial Numbers of QPS Certification Labels to be applied on the said units:
    From: **QA 123201** To: **QA 123500**
- Each of the units labeled meets the provisions set forth in the LPC Report.
- The applicant/customer meets the provisions stipulated in the LPC Service Agreement.

Issued by: Quality Assurance

Alfonso Mattucci

Dated: October 18, 2010

QPS Evaluation Services Inc.

INSPECTION REPORT
LIMITED PRODUCTION CERTIFICATION (LPC)

Inspector:	Bill Stephenson CET	Page 1 of 1	
Product:	900-UTX	Date:	Feb 26/10
Applicant:	Cranesmart Systems Inc.	Inspection Report #:	LPC73109-02A
Manufacturer:	Cranesmart Systems Inc.	Reference LPC Report #:	LPC73109-02
Factory Address:	4908 - 97 Street, Edmonton, Alberta, Canada	Telephone #:	780 437 2986
Factory Representative:	Mike Nachai	Duration of Inspection	1

INSPECTOR: VERIFY THAT PRODUCT COMPLIES WITH ALL ITEMS SPECIFIED IN THE ABOVE REFERENCED LPC REPORT AND THAT PRODUCTION LINE TESTS AND PROCEDURES SPECIFIED IN THE REPORT ARE BEING CONDUCTED. ALL VARIATIONS SHOULD BE REPORTED IN WRITING ON THIS FORM.

Items Verified/Reviewed During Inspection:

- ☑ Visual Inspection of Representative Sample:
- ☑ Test Equipment for Production Line Testing:
- ☑ Production Line Testing Procedure:
- ☑ Calibration System: NA
- ☐ Batch Identification & Quantity of Labeled Product:
- ☐ Labeling Documents & Procedure:
- ☐ Customer Complaint File: NONE
- ☑ Status of Labelling

General Comments: Labels QA/23201 & QA/23500

I acknowledge receipt of a copy of this Inspection Report issued by QPS, Inc.

Dennis Hardin
Printed Name (Applicant's Representative):

Applicant's Representative Signature

Inspector's Signature

QA Review Signature and Date Feb 27/2010

QPS Inc.
81 Kelfield St., Units 8-9, Toronto, ON M9W 5A3, Canada Tel: 416-241-8857; Fax: 416-241-0682

Western Regional Office
9410 - 95 Street
Edmonton, AB T6C 3X3
Canada

Letter Of Finding

Issued To: Cranesmart Systems
4908 - 97 St. Edmonton, AB

Date: July 21, 2008

This letter of interim approval is valid only when following the requirements set out in report QFC3109 are met

Issued By: Bill Stephenson, C.E.T.

Signature:

Product: models listed below:

Intrinsically Safe (C1D1)
900 –UTX (A2B, Angle, Load Cell, Linerider, Load Pin, Windspeed, Cable Reel, Level), LED Indicator, Ram Transducer, ESD, Sandline Monitor, 365 Angle, 777 Load Monitor, 959 A2B

Non-Arcing, Non-Sparking (C1D2)
Display Panel, BDT, Throttle Limiter (Transducer and Pneumatics Box), Power Box, Drill Line Payout, Airkill, Alarm Hub (Solid State and Dry Contact), Solenoid Head and Valve (12V and 24V), Marine Power Converter, Woodhead Connectors (Male and Female)

A log- sheet showing the date of manufacture and QPS label numbers must be available at any time that is requested by QPS

ONLY VALID FOR PRODUCTS THAT HAVE BEEN/ARE MANUFACTURED AND LABELLED FROM THE DATE SHOWN ABOVE AND UP TILL 6 MONTHS LATER

On the Equipment Exterior:

Equipment is plainly marked in a permanent manner in a place where the details will be readily visible after installation with the following:

- Applicant's identification - company name, trademark or QPS file reference
- Model designation;
- Date code/serial number;
- Complete electrical ratings - eg. V~, Hz, A; and
- Hazardous location designation

Warnings

Refer to the reports QFC3109 series

CERTIFICATE OF
STRENGTH AND CALIBRATION
THE CRANESMART SYSTEM

Cranesmart System's crane safety equipment is approved and or meets or exceeds the guidelines set fourth by the following global regulatory bodies: ANSI – API – U.S. Navy – SAE – DNV – U.S. Army Corp of Engineers – ASME – FCC – U.S. Coast Guard – OSHA – ABS – CAL/OSHA – UL – CSA – International Makers of Explosives – and many others

Cranesmart load cells and all load bearing components such as pins and links are engineered and manufactured with a 5-1 or greater safety factor. The Load Cells for S/N CS.10516 are proof load tested to 2.5 times rated capacity. Cranesmart Systems utilizes the reliable and advanced technology of temperature compensating strain gauges in the manufacture of load cells. Our meticulous load cell strain gauge calibration procedure has repeatedly produced accuracy readings of +/- 1%. These results have been further verified through actual in-situ field testing and are also verified by four outside, independent sources of calibration. This strain measurement is then digitally encoded and sent to the receiver panel. To further ensure reliable signal reception, the system incorporates five levels of error detection encoding which ensures an accurate display for each lift. Load Cells are repeatable permanently and calibration can be restored from the panel without the need of a known weight.

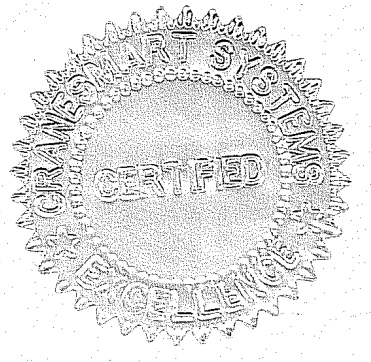
Capacity: **25,000 lb.**

Serial number: **CS.10516**

Q. C. date: **August 17, 2011**

Shipping date: **August 17, 2011**

System Rated I.S. Class 1 Div 2



Cranesmart Systems

Edmonton, Alberta – Canada

OPERATING INSTRUCTIONS

Refer to the crane installation and start-up section for steps required prior to operation of the crane

The following steps should be taken **before each use of the crane.**

1. Fully inspect the crane for damage or hydraulic fluid leaks.

2. Verify adequate hydraulic fluid supply.

3. Confirm that all periodic maintenance has been performed according to this Owner's Manual.

4. Confirm that the work area is free from obstructions.

5. Notify personnel in the work area of pending crane operations.

The crane should only be operated according to the following rules:

1. All of the safety precautions outlined in the previous section should be followed at all times.

2. Always verify the planned movement is within the crane rating.

3. When moving a control handle to and from neutral position, do so slowly to execute the crane function smoothly. This smooth operation will increase the service life of the crane.

When the crane is not in use, always stow the boom in a boom rest and/or secure properly to prevent its movement wile underway.

RAPP HYDRA PRO, INC.
FAT TEST PROCEDURE
PROMON/PETROBRAS P.O# 4500021217

DATE: _ 10/13/2011

CRANE OWNER: _____PETROBRAS

PLATFORM/VESSEL: _____PIGGING PLATFORM MOP-1

CRANE MANUFACTURER: _____HYDRA-PRO, INC

CRANE MODEL: _____HP50-25F

CRANE CONTRACT NUMBER: _____C0164000

CRANE SERIAL NUMBER: ___11457

BOOM LENGTH MAIN: _____ 15 METERS

PARTS OF LINE, MAIN HOIST: _____1

WIRE ROPE DESCRIPTION: _ 7/8" HIGH STRENGTH GALVANIZED WITH STEEL CORE

CRANE OWNER REPRESENTATIVE: PALMERINO MACEDO DA SILVA FILHO; JOAO PAULO SACRAMENTO DE VENEZA; BRUNO SANTOS CARLOS

HYDRA-PRO, INC. REPRESENTATIVE: _ CHRIS HAHN Chris L. Hahn 10/15/11

QUALIFIED INSPECTOR: _JASON JARRETT Jason Jarrett 10-15-11

INSPECTOR'S COMPANY/AGENCY: _INTERTEK MOODY

1. Test weight should be verified for accuracy. Type: CONCRETE TEST WEIGHTS (LOAD CELL VERIFICATION) 5500, 16520, 21960 Lb. Capacity

2. Crane load indicators shall not be used to test cranes, but the readings should be recorded on each lift where load indicators are installed on the crane.

3. Relief valves on hydraulic cranes should not be adjusted above manufacturer's recommended pressure to increase available line pull.

4. The test load for all lifts shall be based on crane rating chart, wire rope strength, available hoist line pull and number of parts of line.

Load test crane accordingly and applicable

JJ

CLH

MAIN HOIST

LOAD TEST

1 Metric Ton @ 15M_____MULTIPLY BY 2.00 _____2 Metric Tons _____

7 Metric Ton @ 7M _____ MULTIPLY BY 1.33 _____9.3 Metric Tons _____

TEST LOAD @ 15M: ** TESTED @ 15M ** ACTUAL: _ 2.49 MT (2490 KG) ___

TEST LOAD @ 7M: ** TESTED @ 23' 8" ** ACTUAL: _ 9.96 MT (9960 KG) ___

HYDRAULIC HOIST PRESSURE@193 BAR MAXIMUM: ACTUAL: _193 BAR (2800 PSI) ___

5. Check Radius or Boom Angle Indicator at three (3) locations including maximum and minimum

ACTUAL RADIUS MEASURED		**INDICATED RADIUS**
MINIMUM_ 15.03 (49'-4") @ 0° _____	**Meter**	**15 METERS_____**
INTERMEDIATE: _ 8.13 (26'-8") @ 57.5°	**Meter**	**8.1 METERS_____**
MAXIMUM: _ 3.05 (10'-0") @ 78° _____	**Meter**	**3.1 METERS_____**

FUNCTION TEST THE FOLLOWING AND RECORD RESULTS

		NO LOAD:	**W/LOAD:**
SWING BOOM RIGHT 1 RPM MINIMUM:	*DEMONSTRATED SWING STOP OPERATION*	**ACTUAL: 1.02 RPM / 1.07 RPM @ 7000 KG**	
SWING BOOM LEFT 1 RPM MINIMUM:	*DEMONSTRATED SWING STOP OPERATION*	**ACTUAL: 1.09 RPM / 1.09 RPM @ 7000 KG**	
BOOM UP 90 SECONDS MINIMUM:		**ACTUAL: 30 SEC / 32 SEC @ 1052 KG**	
BOOM DOWN 90 SECONDS MINIMUM:		**ACTUAL: 60 SEC / 54 SEC @ 1052 KG**	
HOIST LINE SPEED 7MT @ 38 MPM MINIMUM:		**ACTUAL: 39.00 MPM / 36.6 MPM @ 4100 KG**	

CLH

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FUNCTION TEST continued

MAIN HOIST ANTI-TWO BLOCK: YES____ X _____ NO_____

CHECK CONTROL VALVE FOR LEAKS: YES____ X _____ NO_____

CHECK SWING DRIVE ASSEMBLY FOR LEAKS: YES____ X _____ NO_____

MANUAL LOAD LOWERING WITHOUT POWER: YES____ X _____ NO_____

OPERATE 2 FUNCTIONS SIMULTANEOUSLY: YES____ X _____ NO_____

OPERATE ELECTRICAL COMPONENTS

BOOM SERVICE LIGHT: YES____ X _____ NO_____

AIRCRAFT WARNING LIGHT: YES_____ NO___*NOT TESTED*___

HORN INDICATES CRANE MOVEMENT: YES *WITH COMMENTS* NO_____

EMERGENCY SHUTDOWN: YES____ X _____ NO_____

OPERATE PLC INDICATIONS AND ALARMS

INDICATION OF ACTUAL LOAD ON THE HOOK: YES____ X _____NO_____

HYDRAULIC OIL TEMPERATURE: YES____ X _____NO_____

INDICATION AND ALARM OVERLOAD WHICH SHALL BE INTERMITTENT WHEN THE LOAD REACHES 90% OF SWL:

YES____ X _____NO_____

INDICATION AND ALARM OF OVERLOAD WHICH SHALL BE CONTINUOUS WHEN THE LOAD REACHES 100% OF SWL:

YES____ X _____NO_____

INTERMITTENT ALARM IIYDRAULIC OIL TEMPERATURE REACHES MAXIMUM LIMIT 82°C

YES____ X _____NO_____

INTERMITTENT ALARM HYDRAULIC OIL FILTER: YES_____ NO___*NOT TESTED*___

CLH JJ JOW

OPERATE PLC INDICATIONS AND ALARMS continued

INTERMITTENT ALARM LOW LEVEL HYDRAULIC OIL: **YES____ X _____NO_____**

ELECTRICAL SYSTEM FAILURE: **YES____ X _____NO_____**

OPERATIONAL TEST DIESEL POWER UNIT

OIL PRESSURE @ IDLE .68 BAR MINIMUM: **ACTUAL_ 2.75 BAR (40 PSI) ___**

LOW PRESSURE SHUTDOWN @ 0BAR MINIMUM: **ACTUAL_ 2.28 BAR (33 PSI) __**

HIGH TEMPERATURE SHUT DOWN @ 105° C **ACTUAL_ 105° C _____**

OPERATING SPEED @ 2.06 BAR MINIMUM: **ACTUAL_ 3.9 BAR (56.5 PSI) __**

RECORD PRESSURES ON THE FOLLOWING HYDRAULIC FUNCTIONS

MAIN HOIST PRESSURE @ 193 BAR MAXIMUM: **ACTUAL_193 BAR (2800 PSI) _**

BOOM PRESSURE @ 179 BAR MAXIMUM: **ACTUAL_103 BAR (1500 PSI) _**

SWING PRESSURE @ 179 BAR MAXIMUM: **ACTUAL_62.1 BAR (900 PSI) _**

OVERALL OPERATING PRESSURE @ 193 BAR MAXIMUM: **ACTUAL_193 BAR (2800 PSI) _**

RAPP HYDRA PRO, INC. TESTING TECHNICIANS

NAME: PALMERINO MACEDO DA SILVA FILHO_____ DATE: _ 10/15/2011

NAME: JOAO PAULO SACRAMENTO DE VENEZA _____ DATE: _ 10/15/2011

NAME: BRUNO SANTOS CARLOS _____ DATE: _ 10/15/2011

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****SEE ATTACHED COMMENTS****

CLH

CRANE INSTALLATION

Step 1: Read the installation and start-up instructions before assembling the crane. Inspect all components for damage and any items that might be missing.

Step 2: Weld down the pedestal to your structure using the weld procedure supplied by your engineering department. Use the bearing flange to make sure that the pedestal is level not the pedestal tube.

Step 2 The main crane assembly can be assembled before installation onto the pedestal. Using the supplied 1 ¼" hardware bolt down the two side platforms to the turret and torque the bolts to 1571ft/lbs. The rear platform can now be installed using the supplied 1" hardware and torque to 680 ft/lbs. There are 2 sets of handrail straps that you will install next the supplied ¾" hardware will torque to 250 ft/lbs. Note – All hardware to be lubricated or never seized before installation.

Step 3: The plumbing and wiring will now need to be connected. Each connection has been match marked to aid in the reconnection process

Step 4: Lift crane and place on pedestal. Make sure the two mating surfaces are clean The pick points for the lift once the unit is assembled are the ones on the boom to the rear of the winch and the ones just forward of the winch. Make sure the pick is as level as possible it will ease the installation of the bolts. Install lubricated bearing bolts and torque to 1571ft/lbs.

Step 5: There is a hydraulic swing stop installed the valve and the stop will need to be mounted. The valve has a fixed mounting position on the platform and mounts using 2 bolts. The stop will need to be placed once you decide where you want it and will mount to the pedestal using 2 longer bearing bolts. Remember that the bolts will need to be torqued.

Step 6: The wiring thru the pedestal to the electrical box will need to be made using material supplied by you. A loop will need to be made inside the pedestal so that the crane can turn without twisting the wire.

Step 7: When you believe that you are ready to start the crane recheck the following items:

A: Check all hose connections they may have come loose during shipment or installation

B: Re-check the wiring to make sure there are no loose connections or incorrect connections.

C: Make sure all the bolts have been installed and torqued. Marking the bolts you have torqued during installation will aid you during your check.

Step 8: Conduct the crane Start-up Procedures and load test. Only authorized persons having read and understood this Owner's Manual, should perform the load test and ongoing operation of the crane.

Step 9: After approximately 50 hours of operation, recheck the bearing bolts for proper torque. Refer to Section 3 for bearing maintenance for additional periodic checks of the bearing bolt torques during crane service life.



CRANE START-UP PROCEDURE

Step 1: Ensure the hydraulic reservoir is filled with suitable hydraulic fluid and the engine oil has been checked.

Step 2: Ensure suction valve is fully open. Bleed the air from the hydraulic pump at the suction port of the pump. Fill pump case with hydraulic oil. See manual for port position.

Step 3: Ensure that the pump start-up valve is closed before starting the engine. If it is open then the engine will not start. Start the engine and leave it at idle and with pump running crack a fitting on the pressure line between the pump and valve checking for oil, when present retighten the fitting. The start valve can now be opened to bring the system to operating pressure and check for leaks. When ready bring the engine to its full operating rpm to begin operations.

Step 4: Operate all crane functions using the manual operators at the operator station checking for any leaks as well as ensuring the proper operation of each. When finished repeat with the wireless remote.

Step 5: Monitor the reservoir oil level and filter elements. Add oil as required. Change elements if filter is in bypass condition.

Step 6: Conduct operator and maintenance person training prior to operations.

CRANE OPERATION

The crane can be operated from two positions one is at the operator's station and the other is remotely using the wireless control. The functions operate the same for either station so no additional learning is required.

The functions as viewed from the operator's position left to right are:

SWING, WINCH, BOOM

When the lever is actuated each function moves in a particular pattern as such:

Swing: move lever away the crane swings right, pull it towards you it moves left
Winch: move lever away and the winch lowers pull it towards you and it raises
Boom: move lever away and the boom lowers pull it towards you and it raises

When the crane is operated from the control station on the platform the deadman switch must be depressed first before the functions will operate.

SECTION 3

SAFETY PRECAUTIONS

QUALIFICATION

The minimum qualifications for an employee selected to operate a crane are as follows:

- Must have good hearing and vision (with or without correction) and must have good depth perception.
- Be of sufficient height to operate controls and to have an unobstructed view over the controls into the work area.
- Have coordination between eyes, hands, and feet.
- Person must not be afflicted with any known heart or other health conditions that might cause sudden loss of ability to react.
- Person must have been adequately instructed in crane operation

CRANE RIGGING AND SAFETY PRECAUTIONS

Before operating a crane with which the operator is not familiar, the operator must read the instructions provided by the manufacturer and note any special instructions, paying particular attention to the function and operation of each control.

Each operator should be held directly responsible for safe operation of the crane. Wherever there is any doubt as to safety, the operator should stop the crane and refuse to handle loads until safe conditions have been restored.

In addition to improper rigging, cranes hitting overhead obstacles represent the most frequent hazards of crane operation. Before beginning a lift, clearly inspect the entire proposed path of the crane, paying particular attention to overhead obstacles (especially overhead electrical hazards which could be fatal and whether the path of the crane boom will pass directly overhead of any individual. Always have a spotter available, particularly in blind spots.

A crane is a vertical lifting device. It should never be used to drag or pull a load. Always position the boom directly perpendicular to the load to be lifted. Non-vertical lifts can damage both the crane and the rigging material and may result in improper wrapping around the drum. If the drum wraps are not seated in the proper position, immediately cease crane operation and inform maintenance personnel.

Incase of any suspected failure the operator should immediately cease operation and remove power to the crane.

- Only authorized and trained personnel should operate the crane.
- The crane should be operated only after the complete Installation, Start-up and Load Test procedures outlined in this Owner's Manual have been successfully performed.
- The crane should only be operated within the load ratings outlined on the Load Capacity Chart
- The crane should only be operated after the required periodic maintenance has been performed according to this Owner's Manual and the included manual for the hoist(s).
- **This crane is NOT certified for lifting personnel. Never ride the hoisting line.**
- Inspect rigging before use. The crane should not be operated if the crane or rigging is damaged in any way.
- Know limitations of hoisting device
- Know the center of gravity of the load to make sure the load is balance and secure.
- The crane should only be used for lifting and lowering loads vertically.
- Avoid side pull or end pull, and quick reversal operations
- Lift the load a few inches and verify rigging before completing the lift.
- Check for any loose items.
- Start and stop **SLOWLY!** Maintain load control at all times.
- Make sure you take up slack slowly to avoid kinking, twisting or bird caging of the wire rope
- Do not allow the crane or the lifted load to contact any obstruction during operation.
- The crane should not be used in areas where it may be swung within fifteen (15) feet of high voltage power lines.
- Loads should never be lifted over the heads of personnel.
- Use appropriate hand signals.
- Never leave a load unattended.

The most important job of any crane operation is rigging of the load. Poor rigging may result in personnel injury, property damage or other serious hazards. Rigging is the most time consuming of any crane operation and represents the single most hazardous potential of crane operation. In a multi sling operation, each leg must be of the same length and must contribute equally to load distribution. Rigging should be checked by lifting the load a few inches off the ground to ensure that no swing develops and that the load is completely secure. Remember it is important to take the time to accomplish this task correctly. Not doing so may result in catastrophic consequences.

One of the most important things is to check before lifting a load is to look for loose items, such as screws or tools which may have been used to secure the load. Such items can become projectiles during a lift. This is the reason why crane operators or tag line operators should wear hard hats when operation the crane and why it is essential to make sure the path of the boom does not pass over the head of any individual.

It is always important in rigging practice to rig the load so that it is stable. A stable load is one in which the center of gravity of the load is directly below the main hook and below the lowest point of attachment. The center of gravity of an object is that point at which the object will balance. The entire weight may be considered as concentrated at this point. A suspended object will always move so that the center of gravity is below the point of support. In order to make a level or stable lift, the crane or hook block must be directly above this point. Thus the load which is slung above and through the center of gravity will be stable.

Predicting the center of mass or an object to be lifted is not a trivial matter. It may require several attempts at rigging to find the appropriate balance point. Many objects are not rectangular such that predicting the center of mass is often difficult. In all crane lifts the center of mass must remain below the hook and below the point of attachment for any rigging. A center of mass above the hook is inherently unstable and will cause the load to flip. The overall stability of the load is a combination of balance with respect to center of mass, weight distribution, and rigging tightness.

Rigging requires years of practice to perfect. If in doubt about the security of your rigging, ask for help.

OPERATOR DOS AND DON'TS

- Don't eat or drink.
- Do not sleep.
- Never divert attention when there is a load.
- No practical jokes
- Do not use alcohol or other intoxicants.
- Do not operate if taking medication.

HAND SIGNALS



SWING



STOP



DOG EVERYTHING





FLOAT IN



KNUCKLE



FLOAT OUT





WIRE DOWN WIRE UP





WIRE DOWN WIRE UP

SLOWLY





TELESCOPE OUT TELESCOPE IN

ONE HAND





BOOM UP BOOM DOWN



TELESCOPE IN TELESCOPE OUT



EMERGENCY STOP

SECTION 4

CRANE SWING BEARING BOLT MAINTENANCE

Safe crane operation and the service life of the Swing Bearing depend on maintaining proper torque in the Swing Bearing Bolts.

The required bolt torque is _____1571_____ft-lbs. This value is based on the threads being lubricated with lubricant or anti-seize.

Periodically check the torque of the bolts as follows:

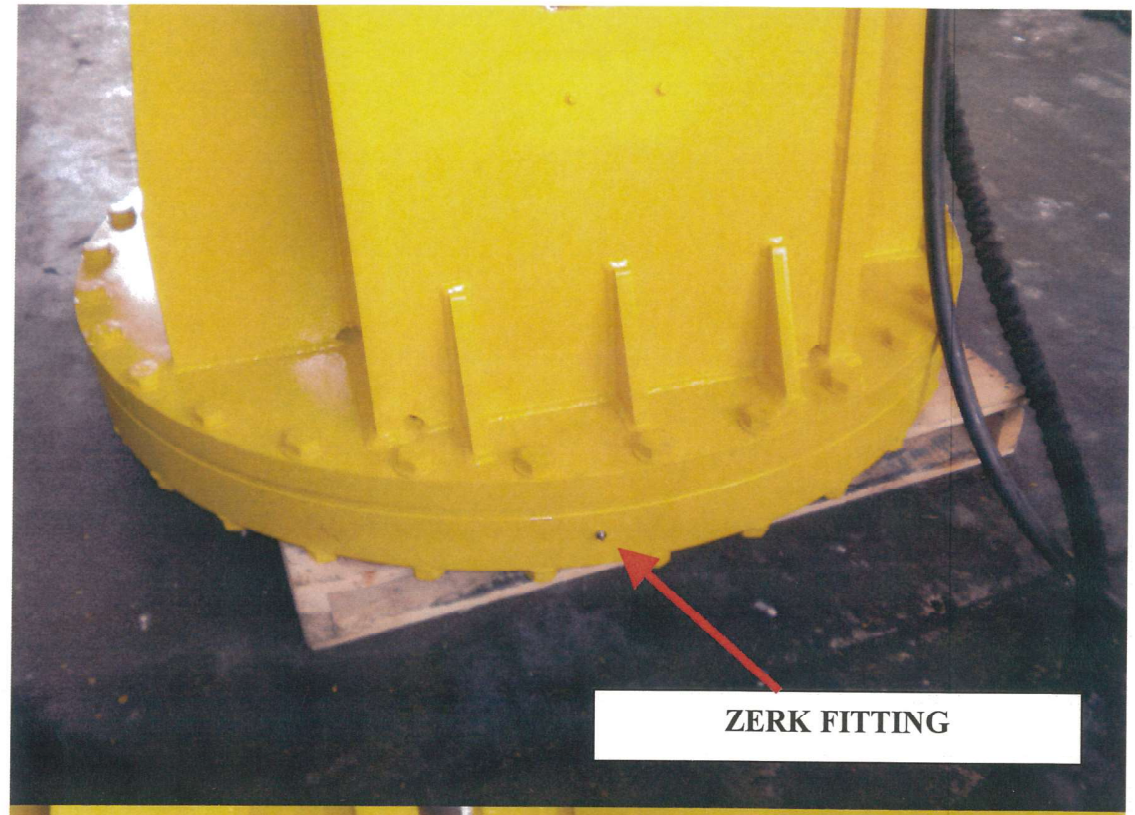
After crane installation:

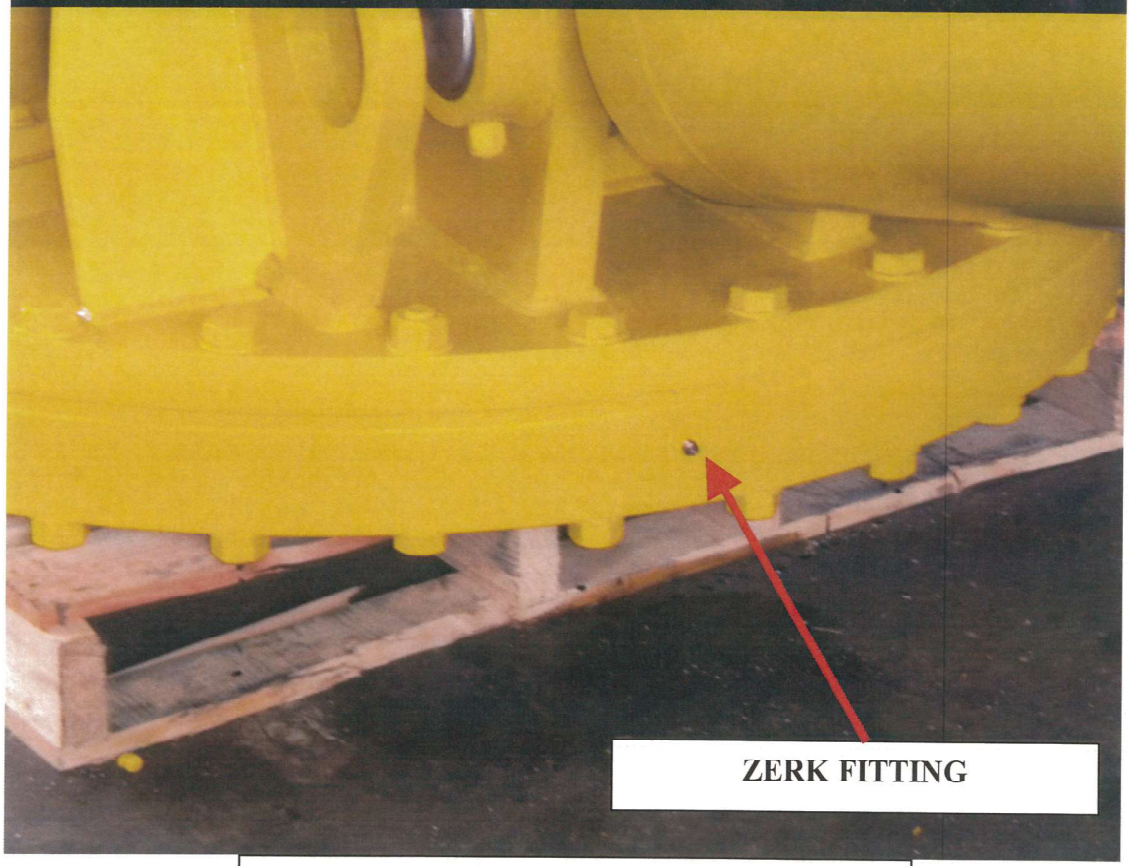
Re-check the bolts for proper torque after approximately 50 hours of operation.

During the crane service life:

After the 50-hour post-installation check, check the bolts for proper torque after each 300 hours of operation.

LUBRICATION POINTS

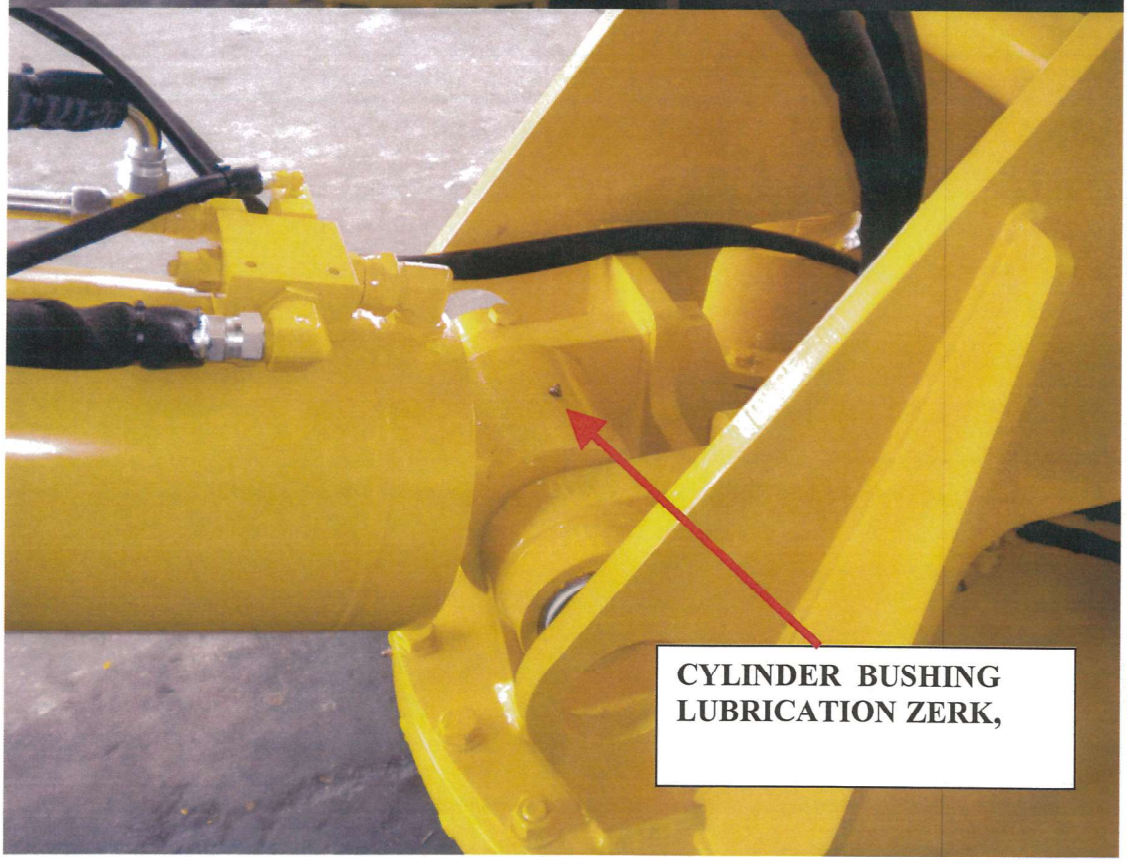




GREASE ROTATIONAL BEARING EVERY 50 HOURS OF USE w/OPEN GEAR GREASE

LUBRICATION POINTS





LUBRICATION POINTS



LUBRICATE BUSHINGS EVERY 10 HOURS OF OPERATION
w/MOLY-FILLED, LITHIUM BASED EP GREASE

LUBRICATION POINTS



DRAIN AND REPLACE GEARBOX OIL EVERY YEAR w/EP-90 GEAR LUBE

CRANE TROUBLESHOOTING

Problem	Possible Cause	Solution
No response to controls.	Electrical problem (electrically actuated valves only.)	Ensure electrical signal is reaching directional valve.
	Suction valve closed or suction strainer clogged (if applicable.)	Open valve or clean suction strainer. **Note:** check pump for internal damage.
	Hydraulic fluid level low.	Replenish fluid. **Note:** check pump for internal damage.
	Relief valve setting low or defective relief valve.	Adjust, repair or replace as required.
	Defective hydraulic pump.	Repair or replace as required.
Slow crane movement, especially when operating near maximum loads.	Relief valve setting low or defective relief valve.	Adjust, repair or replace as required.
	Defective hydraulic pump.	Repair or replace as required.
Boom drops when control handle is centered.	Counterbalance setting low or defective counterbalance valve.	Adjust or replace as required.
	Cylinder piston seals worn or damaged.	Repair or replace cylinder as required.
Load drops when control handle is centered. **Note:** Additional troubleshooting information for the winch is available in section 4.	Excessive backpressure in tank line.	Change return filter element or check for other source of backpressure in tank line.
	Winch brake worn or damaged.	Repair or replace winch as required.
External leak of hydraulic fluid from cylinder.	Worn or damaged seal(s) or cylinder rod	Repair or replace cylinder as required.
Excessive heat in hydraulic system.	Relief valve setting low or defective relief valve.	Adjust, repair or replace as required.
	Heat exchanger not functioning (if applicable.)	Check for proper operation. Repair or replace as required.
	Excessive ambient temperature or operation beyond duty cycle.	Stop operation of crane to allow cooling of system.
Excessive noise from crane during operation	Insufficient lubrication of pins, bushings and/or bearings.	Lubricate crane according to owner's manual.

Handling and Care of Wire Rope

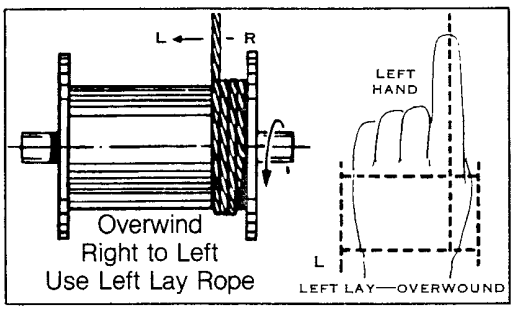
Installation

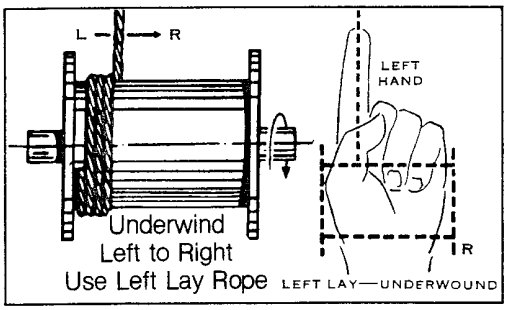
To properly install a rope on a machine winding drum or winch, the reel containing the rope should first be set up on a shaft supported on two jacks or other suitable stands. A simple braking device such as a plank or strip of sheet metal should be rigged to bear down on one or both of the reel flanges so that ample tension can be maintained throughout the winding of the rope.

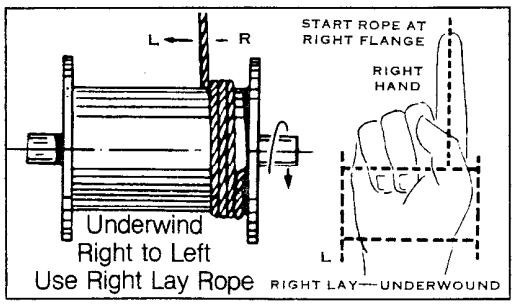
The position of the anchorage point of the rope to the drum should be located in relation to the direction of lay of the rope. A right hand laid rope under tension tends to unlay or rotate in a counter-clockwise direction, with the observer standing behind the winch drum. This forces a right hand laid rope, overwinding on the drum, toward the left hand flange. For this reason it is good practice to start winding a right hand laid rope from the left hand flange of the winch drum, the rope over winding and the observer standing behind the drum.

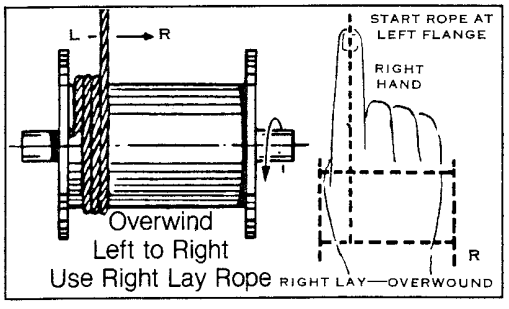
The opposite is true for a left hand laid rope; that is, the anchorage should be at the right hand flange of the winch drum, with the observer standing behind the drum. This practice results in the turns winding tightly together.

In the initial winding it is important that all turns of the first layer on the drum be tight and true, particularly those turns which will not be off the drum with the rope fully payed out under load. Open or wavy winding will result in serious damage to multiple layer wound rope. Adjacent turns should be tapped against each other with a soft metal or wooden hammer.









Use the right fist for Right Lay Rope, left fist for Left Lay Rope. For overwound rope keep your fist back up. For underwound rope, palm up. Index finger pointed to the drum will indicate how the rope should lead from the drum and from which flange.

Handling and Care of Wire Rope

Overwinding and Crosswinding

While the ideal winding condition would be a single layer of rope on the drum, this is not always possible. Where it cannot be avoided the succeeding layers should not cross-wind but should wind regularly in the groove formed between successive turns of the preceding layer of rope.

Initial Operation

After installing a new rope it is advisable to run through its normal operating cycle for a number of trips under light load and at reduced speed. This permits the new rope to adjust itself gradually to working conditions and enables the strands to become seated and some stretch to occur, the rope then being less liable to damage when the full load is applied.

Shock Loading

Never lift or stop a load with a jerk; the load so imposed may equal several times the static working load and such practice may break a rope. Jerks which do not break the rope cause rapid deterioration resulting in reduced rope life.

Rope Speed

Experience indicates that rope wear increases with speed. Rope economy results from moderately increasing the load and reducing rope speed. Some authorities suggest that when ropes are running light, rope speed should not exceed 60 ft/sec. whether hoisting or lowering.

In-Service Lubrication

Whether stationary or in motion, steel wire ropes must be protected from corrosion, and when in motion must be lubricated to minimize wear between the metal-to-metal (wire-to-wire) surrounding surfaces. During manufacture a lubricant which will satisfy both these requirements at least for a time is built into the strands of wire and into the core. Exposure to the elements, normal rope operation over sheaves and on and off drums will gradually deplete and contaminate the lubricant.

A few ropes, for instance scraper ropes and small excavator drag ropes, which are continually working through dirt and grit may not show improved results through relubrication in service. Most ropes however should be lubricated at intervals depending on the type of service to minimize corrosion and wear and extend rope life.

A used rope should be cleaned with wire brushes, scrapers, compressed air, or superheated steam. In some instances it may be necessary to soften the old lubricant and accumulation of dirt with a penetrating oil or a good grade of kerosene.

A lubricant suited to the conditions under which the rope is operating should then be applied. Several methods are suggested, and the one most suited to the installation and lubricant being used may be chosen. It is better to lubricate lightly and frequently than heavily and infrequently.

A suitable rope lubricant should have the following properties:

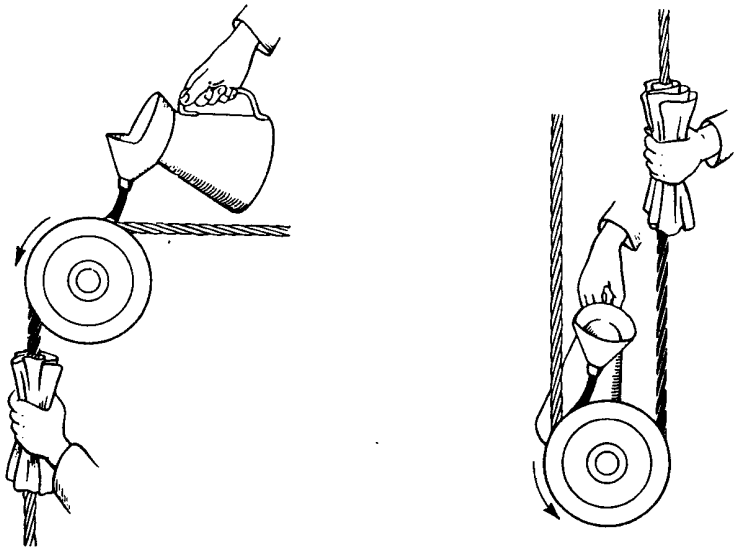
1) Freedom from acids and alkalies.
2) Sufficient adhesive strength to stay on the rope without throw-off at maximum rope speed.
3) Ability to penetrate between strands and reach the core.
4) Non-solubility under conditions of rope use.
5) Resistance to oxidation.
6) High film strength an advantage.

When a wire rope is taken out of service for storage against possible future use it should first be cleaned, then lubricated. The rope should then be covered and stored in a dry location and protected against mechanical damage.

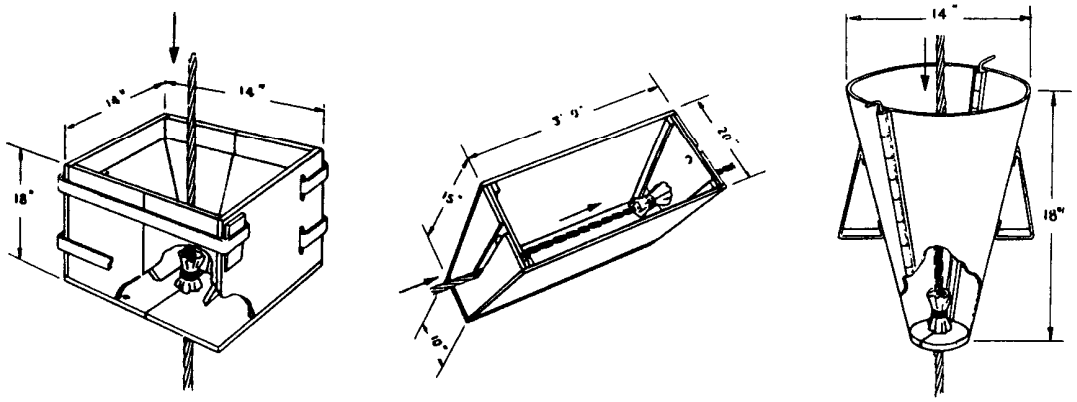
Handling and Care of Wire Rope

Lubricating Methods

Below are illustrated some simple methods of lubricating ropes externally while in use. There are of course other lubricators and cleaning devices available commercially, and still others which can readily be fabricated in a plant or local work-shop. For details of these contact your Wire Rope Industries Ltd. sales representative or our Engineering Department.



Drip and Swab Application



Split wooden or metal boxes.
Rope passes through burlap or similar wiper at outlet end of box.

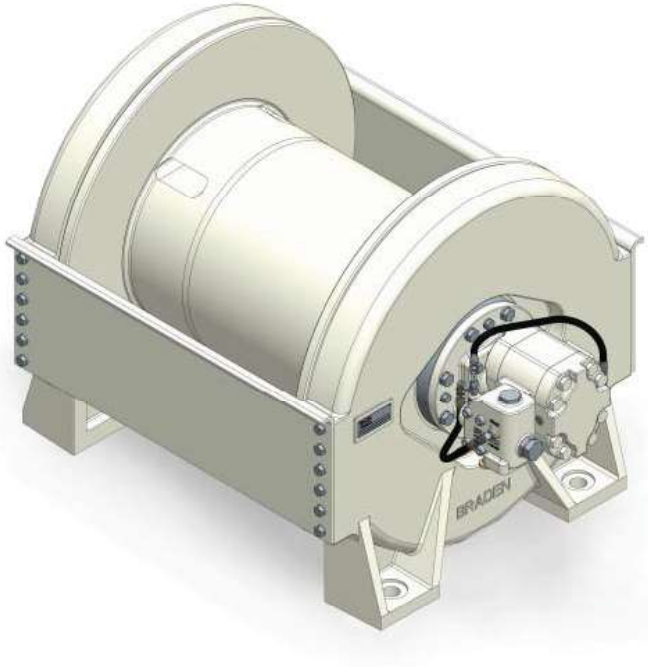
HOIST SALES INFO

CH280A Construction Hoist

28,000 LB Capacity

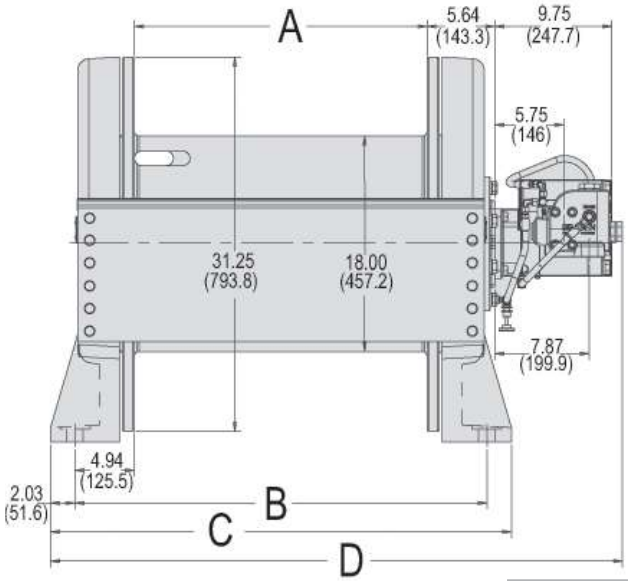
BRADEN
PACCAR WINCH DIVISION

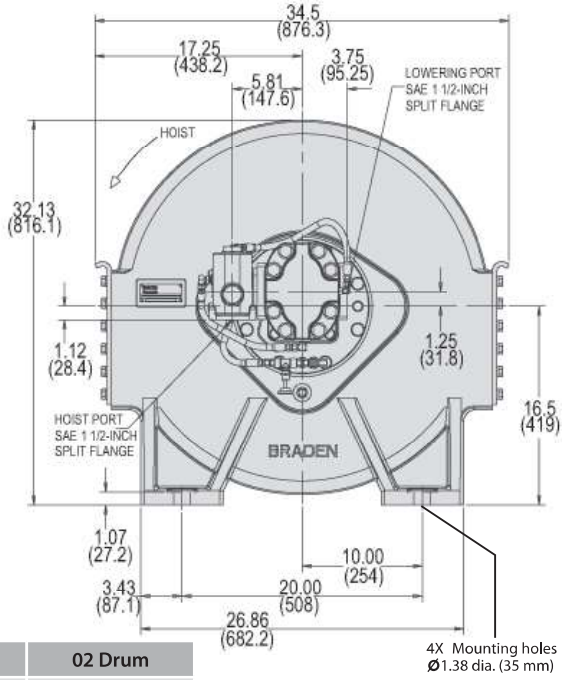




Standard Features:

- Multi-disc spring applied, hydraulically released brake to hold the load even if a hydraulic line breaks
- Anti-friction bearings used throughout to maximize efficiency
- Brake valve for smooth performance
- Full load wire rope anchor
- High efficiency motor





	01 Drum	02 Drum
A	24.36 (618.8)	38.61 (981)
B	34.29 (870.9)	48.54 (1233)
C	38.36 (974.3)	52.61 (1336)
D	47.61 (1209.3)	61.86 (1571)

PACCAR WINCH DIVISION
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LIT-2345
REV 2
AUG 2008

Specifications

CH280A-54090-01 & 02

9.0 cu in. Motor (148 cc)
3,000 PSI (206 bar) @ 125 gpm (473 lpm)
Wire Rope Diameter: 1 in.

	LINE PULL		LINE SPEED	
	LB	KG	FPM	MPM
1	18,500	8,414	269	82
2	16,750	7,614	297	91
3	15,290	6,950	325	99
4	14,070	6,395	354	108
5	13,020	5,918	382	116
6	12,130	5,514	411	125

CH280A-54110-01 & 02

11.0 cu in. Motor (181 cc)
3,000 PSI (206 bar) @ 155 gpm (587 lpm)
Wire Rope Diameter: 1 in.

	LINE PULL		LINE SPEED	
	LB	KG	FPM	MPM
1	23,280	10,582	277	84
2	21,060	9,573	307	94
3	19,230	8,741	336	102
4	17,690	8,041	365	111
5	16,380	7,445	394	120
6	15,250	6,932	424	129

CH280A-54120-01 & 02

12.0 cu in. Motor (197 cc)
3,000 PSI (206 bar) @ 170 gpm (643 lpm)
Wire Rope Diameter: 1 in.

	LINE PULL		LINE SPEED	
	LB	KG	FPM	MPM
1	25,660	11,664	280	85
2	23,220	10,555	310	94
3	21,200	9,636	340	104
4	19,500	8,864	369	112
5	18,060	8,209	399	122
6	16,810	7,641	428	130

CH280A-54144-01 & 02

14.4 cu in. Motor (236 cc)
2,700 PSI (186 bar) @ 200 gpm (757 lpm)
Wire Rope Diameter: 1 in.

	LINE PULL		LINE SPEED	
	LB	KG	FPM	MPM
1	28,000	12,727	264	80
2	25,330	11,514	291	89
3	23,130	10,514	319	97
4	21,280	9,673	347	106
5	19,700	8,955	375	114
6	18,350	8,341	402	123

Wire Rope Storage Capacities

	01 DRUM ROPE CAPACITY (1 in. ROPE)		02 DRUM ROPE CAPACITY (1 in. ROPE)	
	FT	M	FT	M
1	121	37	192	59
2	254	77	404	123
3	400	122	636	194
4	559	170	888	271
5	731	223	1,160	354
6	915	279	1,453	443

Model Number Explanation

CH 280 A - 54 144 - 01 - 1

CH	CONSTRUCTION HOIST
280	MODEL SIZE
A	MODEL SERIES RELATING TO DESIGN CHANGES
54	TOTAL GEAR REDUCTION
144	HYDRAULIC MOTOR DISPLACEMENT (144 - 14.4 cu in./rev)
01	DRUM SIZE
1	SPECIAL OPTION (Personnel Handling)