

Operation & Maintenance Manual



NRC INDUSTRIES INC.
2430 PRINCIPALE
ST-PAUL D'ABBOTSFORD
QUÉBEC, CANADA
J0E 1A0

TEL.: (450) 379-5796
FAX.: (450) 379-5995

SERVICES@INDUSTRIESNRC.COM
[HTTP://NRC-INDUSTRIES.COM](http://NRC-INDUSTRIES.COM)

Composite Sliding Rotator Models 40/50 and 50/65

Intellectual Property Notice

Copyright © 2011 NRC Industries Inc. All rights reserved. This manual may not be copied, photocopied, reproduced, translated or converted to any electronic or machine readable format in whole or in part without prior written approval of NRC Industries Inc. NRC Industries Inc. reserves the right to modify the information provided herein at any time without notice.

Please send your comments and questions to:

NRC Industries Inc.

2430 Principale
St-Paul d'Abbotsford QC J0E 1A0
CANADA
Tel: (450) 379-5796
Fax: (450) 379-5995

You can also contact directly the winch manufacturer at:

DP Manufacturing, Inc.

PO Box 471710
Tulsa, OK 74147
Tel: (918) 250-2450, 1-800-dp Winch
Fax: (918) 250-0690
Website: www.dpwinch.com

Ramsey Winch Company

PO Box 581510
Tulsa, OK 74158-1510
Tel: (918) 438-2760
Fax: (918) 438-6688

Table of Contents

Limited Warranty	9
About This Manual	11
1 Introduction	13
1.1 Description of the Wrecker	13
1.1.1 Chassis.....	14
1.1.2 Outriggers	15
1.1.3 Boom.....	16
1.1.4 Winch	16
1.1.5 Axle-Lift.....	17
1.1.6 Control Panels	18
1.1.7 Remote Control	22
1.1.8 Hydraulic and Pneumatic System	23
1.1.9 Electrical System.....	23
1.2 Technical Specifications	24
1.2.1 General Specifications	24
1.2.2 Chassis.....	25
1.2.3 Dimensions.....	26
1.2.4 Hydraulic System	31
1.2.5 Winches.....	31
1.2.6 Axle-Lift	32
1.2.7 Lifting Capacity.....	33
2 Safety	39
2.1 Intended Use.....	39
2.2 NRC Responsibilities	39
2.3 Supervisory Responsibilities.....	40
2.4 Operator Responsibilities	40
2.4.1 Wear Protective Clothing.....	40
2.4.2 Follow Safety Rules.....	40
2.4.3 Avoid Danger Zones.....	41
2.4.4 Set up a Danger Zone for Bystanders	41
3 Operation	43
3.1 Principles of Operation	43
3.1.1 Distributing the Wrecker Weight	44
3.1.2 Lifting from the Rear of the Wrecker	44
3.1.3 Lifting from the Side of the Wrecker.....	44
3.1.4 Using the Wrecker for the First Time	45
3.2 Preparing the Wrecker for Optimal Operation.....	45

3.3	Safety Guidelines.....	47
3.4	Become Familiar with the Equipment	47
3.5	Emergency Hydraulic Bypass	48
3.6	Common Operational Procedures	48
3.6.1	Engaging the Power Take Off	48
3.6.2	Upon Arrival at the Job Site	49
3.6.3	Before Leaving the Job Site	49
3.7	Using the Outriggers.....	50
3.7.1	Stabilize the Wrecker using the Outriggers	50
3.7.2	Level the Wrecker	51
3.7.3	Storing the Outriggers.....	51
3.8	Using the Axle-Lift.....	52
3.8.1	Towing Another Vehicle	53
3.8.2	Unhooking the Axle-Lift from the Boom.....	55
3.8.3	Attaching the Axle Lift to the Boom.....	57
3.8.4	Removing the Axle-Lift from the Wrecker.....	57
3.8.5	Removing the Tag Axle from the Wrecker	61
3.8.6	Attaching the Axle-Lift to the Wrecker	62
3.9	Using the Boom	63
3.9.1	Preparing the Slider	63
3.9.2	Rotating the Boom	64
3.9.3	Sliding the Boom	64
3.9.4	Locking the Boom in Travelling Position.....	65
3.10	Using the Winch.....	65
3.10.1	Recommended Break-in Procedure	66
3.10.2	Disengaging and Engaging the Winch.....	66
3.10.3	Winding and Unwinding the Winch Cable	66
3.10.4	Resetting the Winch Control Mechanism	66
3.10.5	Locking the Winches in Storage Position.....	67
3.11	Using the Remote Control	67
3.11.1	Preparing the Wrecker for Use of the Remote Control	67
3.11.2	Operating the Wrecker with the Remote Control	67
3.12	Using the Console	69
3.12.1	Using the Console Menus and Buttons.....	69
3.12.2	Unlocking the Console (Warning).....	71
3.12.3	Calibrating the Levelling System.....	72
3.12.4	Adjusting Settings for Measurement Points.....	73
3.12.5	Viewing Measurements	73
4	Maintenance.....	75
4.1	Safety Guidelines.....	75
4.2	Maintenance Schedule.....	75
4.2.1	General Wrecker Maintenance.....	75
4.2.2	Inspecting and Adjusting Pressure Settings	76

4.2.3	Lubrication Schedule	77
4.2.4	Lubrication Points	78
4.3	Maintaining the Winch	81
4.4	Adjusting the Hydraulic Pressure for the 40/50 CSR	82
4.5	Adjusting the Hydraulic Pressure for the 50/65 CSR	83
4.6	Adjusting the Cushioning Valve of the Axle-Lift	84
4.7	Adjusting the Pressure Cartridge (CBCG-LJN)	86
4.8	Aligning the Boom	87
5	Troubleshooting	89
5.1	Troubleshooting Common Problems	89
5.2	Verifying the Boom Cylinder	94
5.3	Verifying the PTO	95
	Operator's Logbook	97

Limited Warranty

All new equipment built by NRC Industries Inc. has a one (1) year warranty against all defects in material or workmanship and under normal use of service. This concerns only the parts manufactured by NRC Industries Inc.

NRC Industries offers a five (5) year warranty on the Sliding System.

Our warranty covers the replacement of all defective parts and the labour. This is only for the repairs done at our plant. For repairs outside our plant, NRC Industries will supply all replacement parts at no cost and allow a certain amount of money for labour upon agreement between both parties. All warranty claims must be approved by NRC prior to doing the repair.

If any damage occurs due to a lack of appropriate maintenance or mishandling of the equipment, NRC Industries reserves the right to refuse to apply the warranty. NRC Industries will be the sole judge of these issues.

NRC Industries is not responsible for body or truck frame damage that may result from the use of the underlift.

NRC Industries reserves the right to make any changes to parts that they judge necessary without notice.

NRC Industries inc.

2430 Principale
St-Paul d'Abbotsford QC J0E 1A0
CANADA
Tel: (450) 379-5796
Fax: (450) 379-5995

About This Manual

This manual will teach you how to operate and maintain your 40/50 Composite Sliding Rotator (CSR) and your 50/65 CSR in a secure way.

This manual contains the following chapters:

- Chapter 1 presents the wrecker models, their components and their technical specifications
- Chapter 2 contains safety information for operating, maintaining and troubleshooting the wrecker
- Chapter 3 contains operation principles and procedures
- Chapter 4 contains maintenance information and procedures
- Chapter 5 contains troubleshooting information and procedures

Important Notices

Note: Notes provide additional information about the topic.



Provide information which must be read to avoid damaging the equipment.



Provide information which must be read to avoid injury to persons. Not following these instructions may lead to serious injury or even death.

Disclaimer

This manual, including specifications of the equipment, is subject to change without notice. All ratings are based on structural factors only, not vehicle capacities or capabilities.

1 Introduction

The NRC CSR is a dream machine, a tough and versatile unit for recovery work and extra-heavy towing. Especially designed for the most difficult operations, the CSR with its rotating boom and sliding system will bring you the best "USABLE BOOM CAPACITY".

This chapter describes the components of wrecker models 40/50 CSR and 50/65 CSR and lists their technical specifications.

1.1 Description of the Wrecker

The 40/50 CSR and the 50/65 CSR are manufactured with the same main components. Only the size and capacity of certain components are different. Refer to section 1.2 for the specifications of the 40/50 CSR and the 50/65 CSR wrecker models.

There are two models of chassis: the 40/50 CSR and the 50/65 CSR. Either model can be equipped with a two-stage boom or a three-stage boom.

There are five models of axle-lift as listed below. Either CSR model can be equipped with any of the axle-lift models.

- Heavy Duty (HD)
- Super Heavy Duty (SHD)
- Short Super Heavy Duty – 4 stages (SSHD-4)
- Long Super Heavy Duty – 3 stages (LSHD-3)
- Long Super Heavy Duty – 4 stages (LSHD-4)

Characteristics for the chassis, boom and axle-lift are presented in the following sections.

1.1.1 Chassis

The chassis supports all components of the wrecker. Figure 1 and Figure 2 show the wrecker with and without its axle-lift.

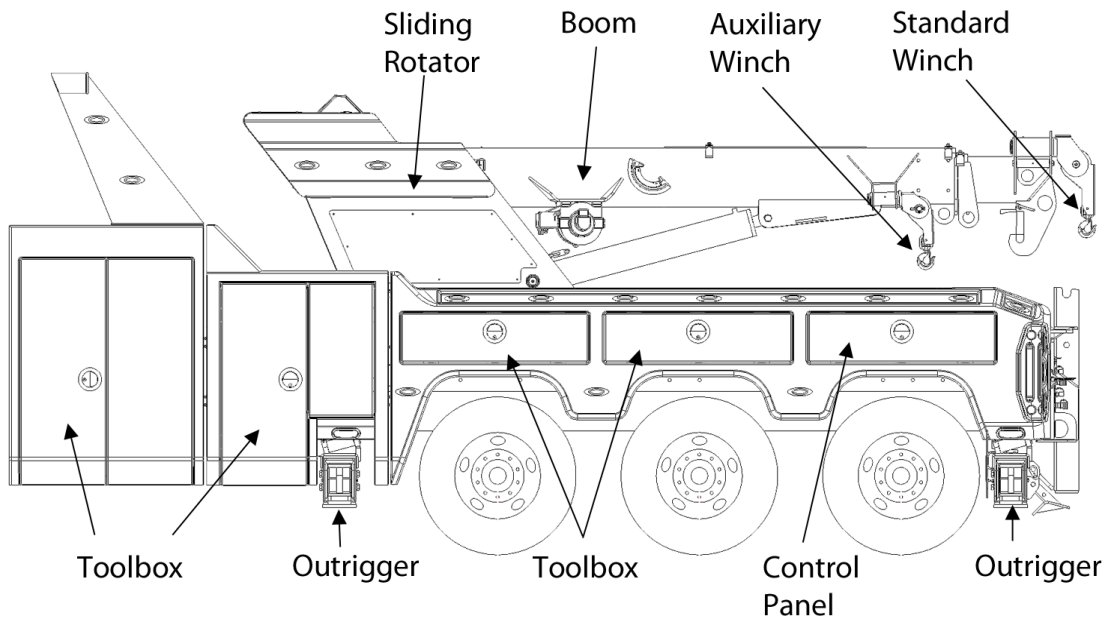


Figure 1 – Chassis without Axle-Lift

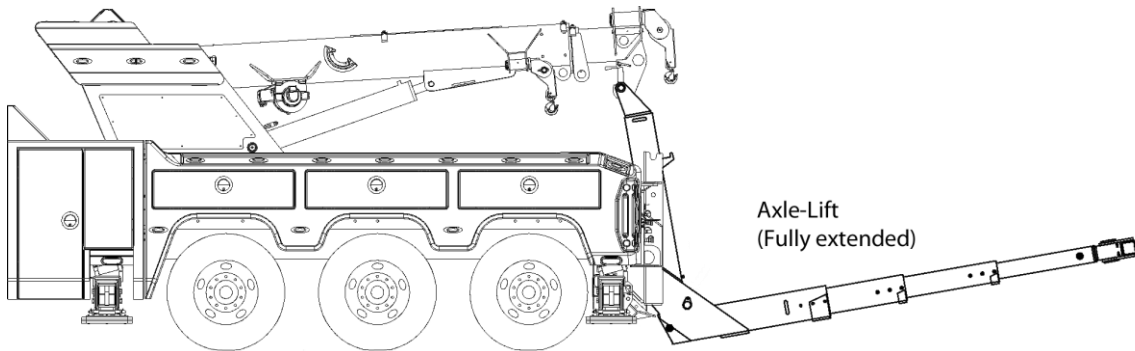


Figure 2 – Chassis with Axle-Lift

1.1.2 Outriggers

The wrecker has four outriggers: front-left, front-right, back-left and back-right. They can be either two-stage (standard) or three-stage (optional). Figure 3 shows the components of the outrigger.

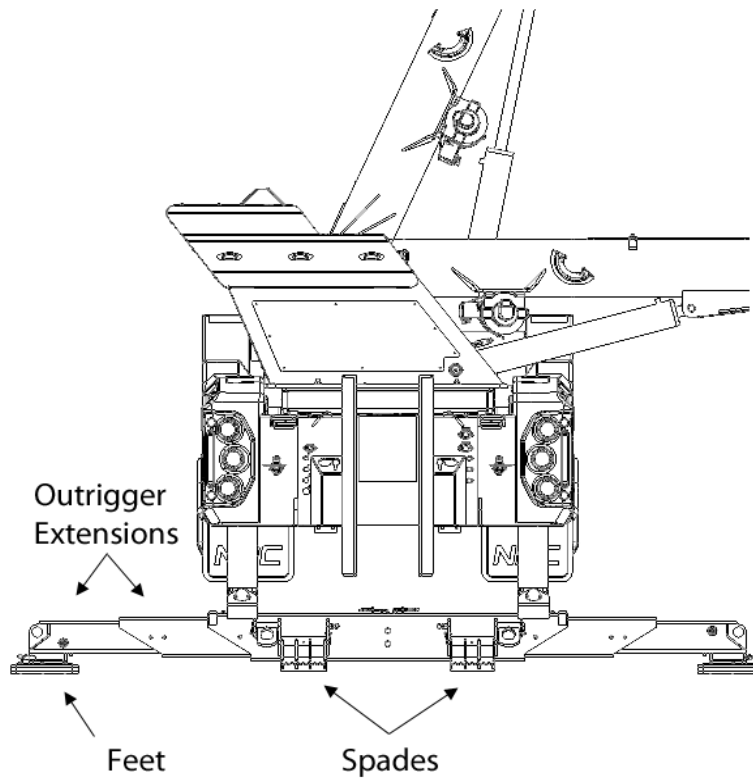


Figure 3 – Outriggers

1.1.3 Boom

The mast has two or three boom sections depending on the option you selected. Figure 4 shows a three-section boom and its components.

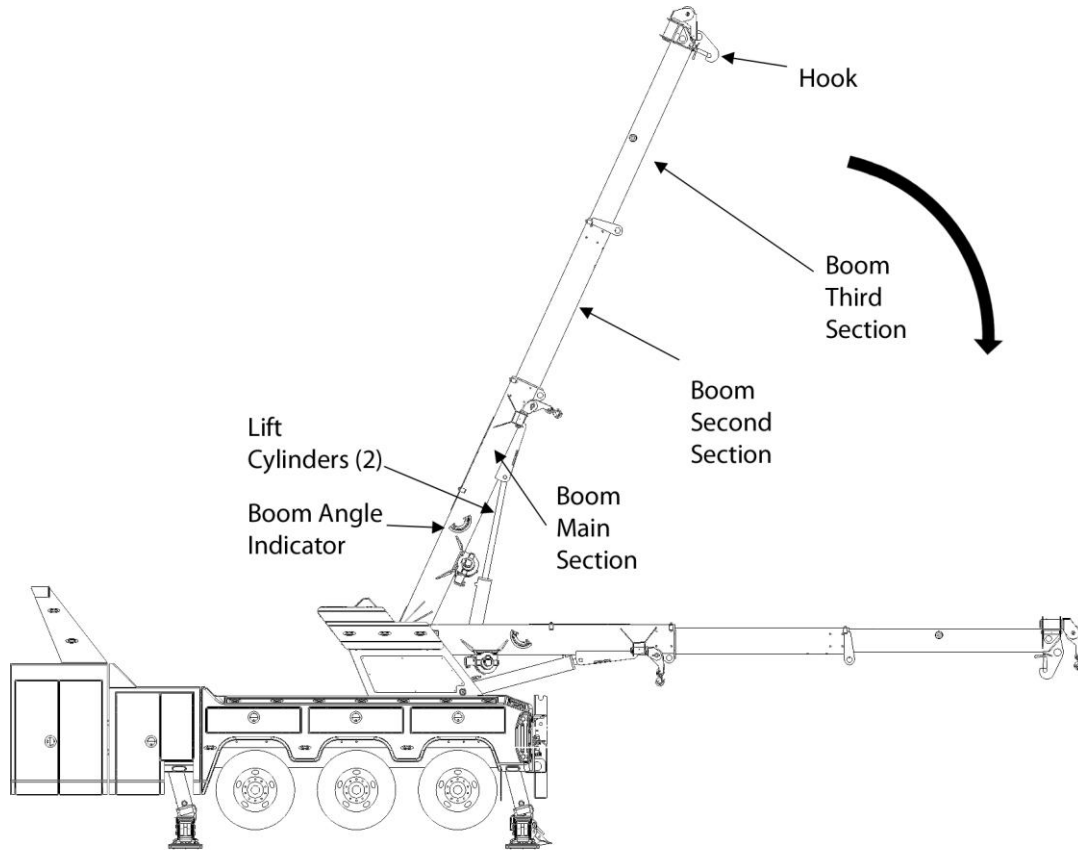


Figure 4 – Boom

1.1.4 Winch

The wrecker is equipped with up to four winches. There are two standard winches and two optional auxiliary winches, which differ in capacity. Figure 1 shows the location of each type of winch.

1.1.5 Axle-Lift

The axle lift has a vertical section, a horizontal telescopic stinger and a T-Bar, as shown in Figure 5. The horizontal sections can be extended and retracted to allow the T-bar to reach the vehicle to be towed.

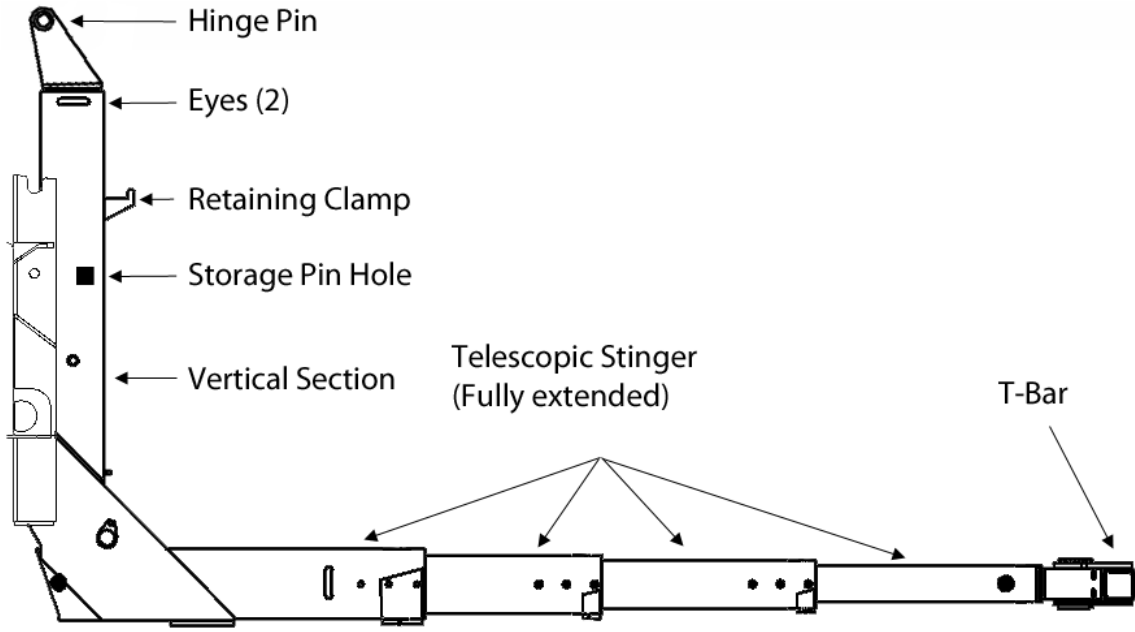


Figure 5 – Axle-Lift

1.1.6 Control Panels

The wrecker features two control panels: one on each side. They each provide the same control over the wrecker components. The electronic control panel is located on the driver's side. The hydraulic control panel is located on the passenger's side.

Most of the controls are proportional. This means that speed and power increase with the amount of pressure applied to the control lever. Proportional controls allow you to use very low speeds to gain maximum control of the load being lifted.

Figure 6 shows an electronic control panel and Table I and Table II explain the pictograms used for the switches and levers. These introductory descriptions are not operating instructions; to know how to operate any component you must refer to the procedures in this manual.

Note: The panels may differ slightly for a 40/50 CSR and the 50/65 CSR.

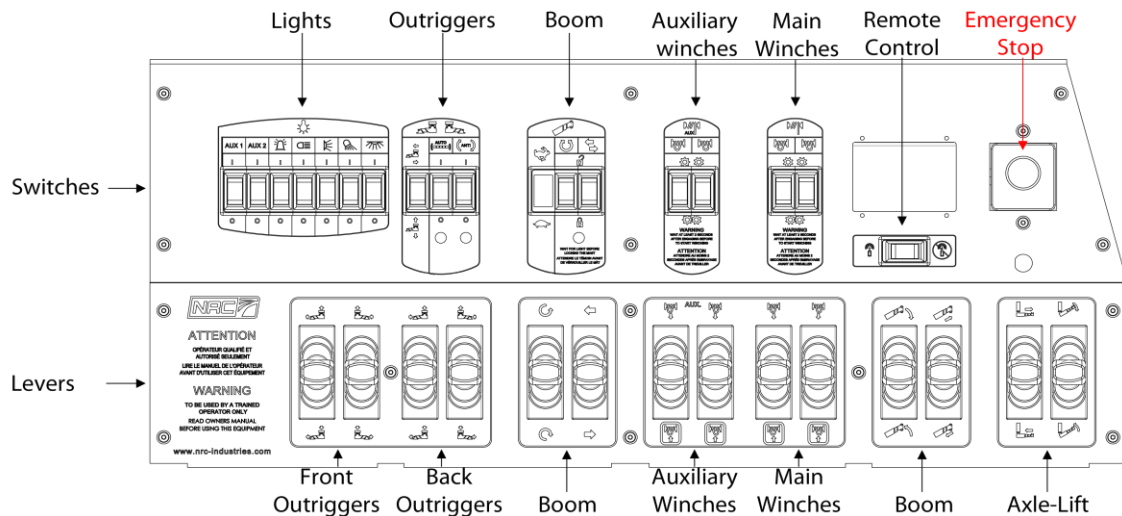





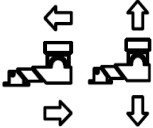




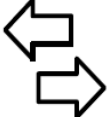



Figure 6 – Control Panel (Driver's Side)

Note: For all switches, "I" is ON and "O" is OFF.

Table I – Control Panel Switches

Element	Description
Lights	
AUX 1	Auxiliary light 1
AUX 2	Auxiliary light 2
	Rotating beacon light

Element	Description
	Work lights
	Side lights
	Lower running lights
	Toolbox lights
Outriggers (to operate the outriggers, refer to section 3.7)	
	Set the direction of movement for the outriggers to horizontal or vertical.
	Auto-level the wrecker. The light below the control switch turns OFF when the wrecker is levelled.
	Anti-twist is used for levelling the wrecker. The light below the control switch turns OFF when the wrecker is untwisted.
Boom (to operate the boom, refer to section 3.9)	
	High speed and low speed for the boom and the two main winches.
	Boom rotation locked (🔒) or unlocked (🔓). The light below the control switch must be OFF before you lock the boom.
	Boom sliding system locked (🔒) or unlocked (🔓). The light below the control switch must be OFF before you lock the boom.
Winches (to operate the winches, refer to section 3.10)	
	Left winch engaged (⚙️⚙️) or disengaged (⚙️ ⚙️).























Element	Description
	Right winch engaged () or disengaged ().
Remote Control (to operate the remote control, refer to section 3.11)	
	Remote control on/off. When the remote control is on, the control panel does not operate.

Table II – Control Panel Levers

Element	Description
Outriggers (to operate the outriggers, refer to section 3.7)	
	Retracts left outrigger when the direction switch is set to horizontal. Moves left outrigger up when the direction switch is set to vertical.
	Extends left outrigger when the direction switch is set to horizontal. Moves left outrigger down when the direction switch is set to vertical.
	Retracts right outrigger when the direction switch is set to horizontal. Moves right outrigger up when the direction switch is set to vertical.
	Extends right outrigger when the direction switch is set to horizontal. Moves right outrigger down when the direction switch is set to vertical.
Boom (to operate the boom, refer to section 3.9)	
	Rotates the boom counter-clockwise (when the boom rotation is unlocked).
	Rotates the boom clockwise (when the boom rotation is unlocked).

Element	Description
	Moves the boom toward the front of the wrecker (when the sliding system is unlocked).
	Moves the boom toward the back of the wrecker (when the sliding system is unlocked).
	Moves the boom down.
	Moves the boom up.
	Extends the boom.
	Retracts the boom.
Winches (to operate the winches, refer to section 3.10)	
	Unwinds the winch cables.
	Winds the winch cables in.
Axle-Lift (to operate the axle-lift, refer to section 3.8)	
	Extends the axle-lift.
	Retracts the axle-lift.
	Unfolds the axle-lift stinger.
	Folds the axle-lift stinger.

1.1.7 Remote Control

Your wrecker may be equipped with a remote control. The remote control provides most of the functions that are available from the main control panels of the wrecker.

Figure 7 shows a remote control and Table III explains the pictograms that are unique to the remote control. The remaining pictograms are also used in the control panels and are therefore explained in Table I and Table II.

These introductory descriptions are not operating instructions; to know how to operate any component you must refer to the procedures in this manual.

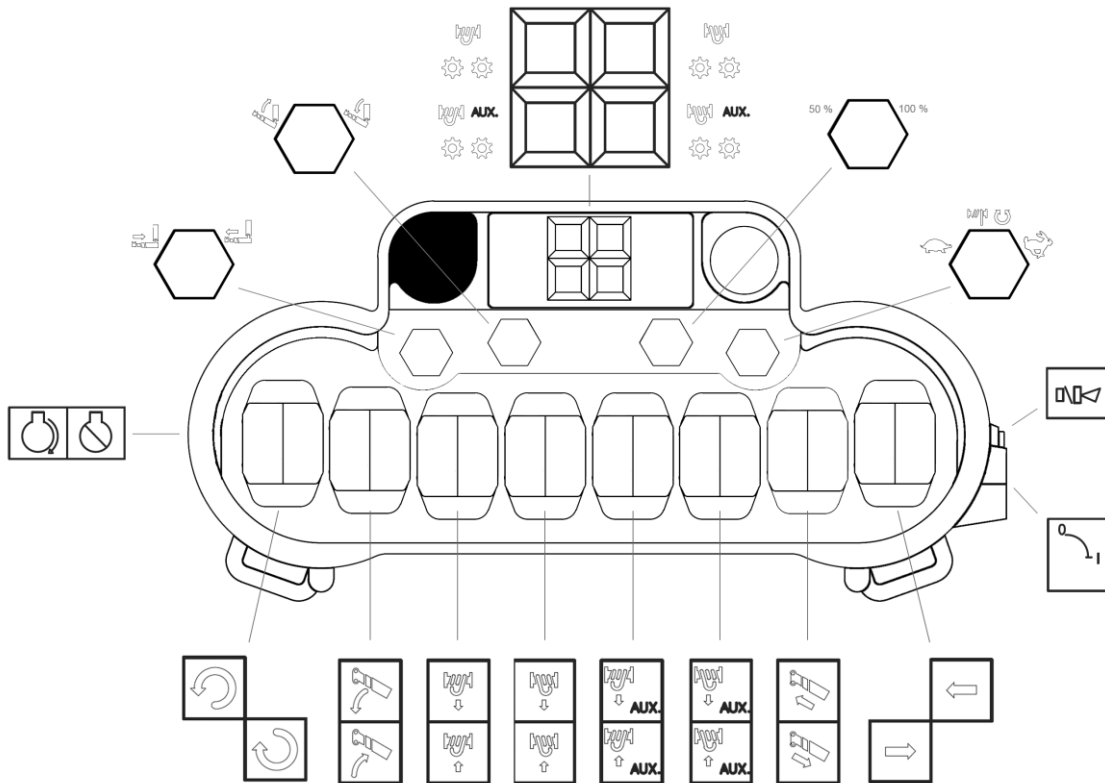





Figure 7 – Remote Control

Table III – Remote Control Switches, Buttons and Levers

Element	Description
	Starts and stops the engine.
	Sounds the horn.
	Turns the remote control ON or OFF.
50% / 100%	Half-speed or full-speed operation.

For more information, refer to section 1.1.6.

1.1.8 Hydraulic and Pneumatic System

The 40/50 CSR and the 50/65 CSR feature an electro-hydraulic system that provides and distributes the hydraulic power for the operation of the boom, the axle-lift, etc.

1.1.9 Electrical System

The 40/50 CSR and the 50/65 CSR feature an electrical system that provides the electrical power for operating the wrecker's electrical components. The electrical system includes a main electrical panel with breakers and relays that distribute the electrical power to valve banks, electronic control modules, sensors and lighting.

1.2 Technical Specifications

Technical specifications of the components of both wrecker models are listed in the following sections.

1.2.1 General Specifications

Table IV – General Specifications (in metric [imperial])

Element	40/50 CSR	50/65 CSR
Safe Lifting Capacity	356 kN [40 tons]	445 kN [50 tons]
Structural rating	445 kN [50 tons]	578 kN [65 tons]
Testing Lifting Capacity	445 kN [50 tons]	578 kN [65 tons]
Boom structural rating: fully retracted	445 kN [100,000 lb] *	578 kN [130,000 lb] **
Boom structural rating: fully extended (2 nd stage)	178 kN [40,000 lb] *	222 kN [50,000 lb] **
Boom structural rating: fully extended (optional 3 rd stage)	89 kN [20,000 lb] *	111 kN [25,000 lb] **
Reach past tailgate with 2-stage boom	5,300 mm [209"]	6,400 mm [252"]
Reach past tailgate with 3-stage boom	6,400 mm [299"]	9,475 mm [373"]
Maximum working height with 2-stage boom	9,090 mm [358"]	10,440 mm [411"]
Maximum working height with 3-stage boom	11.2 m [440"]	13.4 m [526"]
Boom range of elevation	0–65 °	0–73 °
Approximate wrecker weight: excluding chassis	14,000 kg [31,000 lb]	19,000 kg [42,000 lb]
Approximate wrecker weight: including carrier truck	25,000 kg [56,000 lb]	31,750 kg [70,000 lb]
Body width	2,588 mm [102"]	2,588 mm [102"]
Distance from back of cab to center of rearmost axle	4,825 mm + [190" +]	6,250 mm + [246" +]

* Rating @ 65° boom elevation

** Rating @ 60° boom elevation

1.2.2 Chassis

Table V – Specifications of the Chassis (in metric [imperial])

Element	40/50 CSR	50/65 CSR
Front axle (minimum)	8.5 tons [18,000 lb]	9 tons [20,000 lb]
Rear axle (minimum)	21 tons [46,000 lb]	29 tons [64,000 lb]
Frame Resisting Bending Moment (RBM) (minimum)	508 kN-m [4,500,000 lb-in]	655 kN-m [5,800,000 lb-in]

1.2.3 Dimensions

Figure 8 to Figure 12 and Table VI to Table X present the dimensions of the wrecker models and their components.

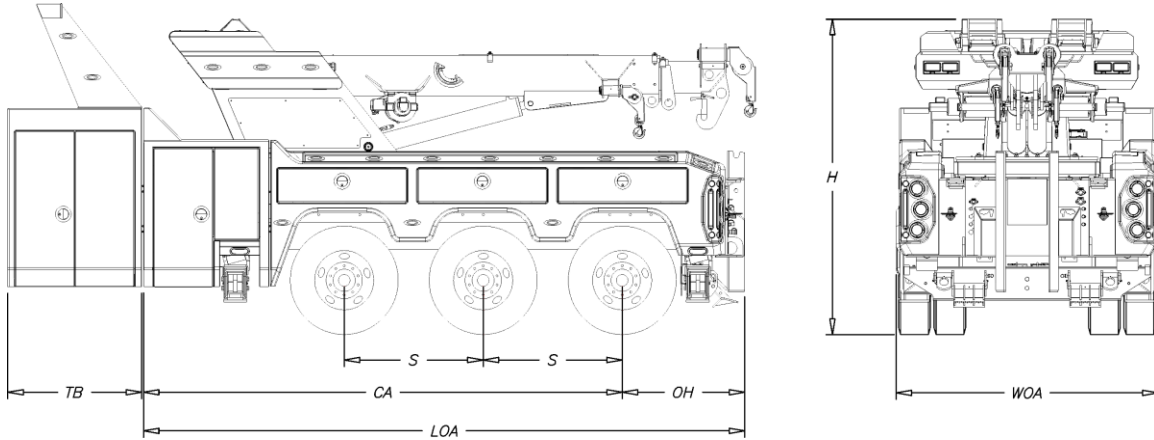


Figure 8 – Dimensions of the Chassis

Table VI – Dimensions of the Chassis (in mm [in])

Dimension	40/50 CSR	50/65 CSR
S	1,372 [54]	1,372 [54]
CA (min)	4,724 [186]	6,248 [246]
WOA	2,590 [102]	2,590 [102]
LOA	5,740 [226]	7,315 [288]
OH	1,016 [40]	1,067 [42]
TB	711–1830 [28–72]	1,016–1830 [40–72]
H	3,100 [122]	3,226 [127]

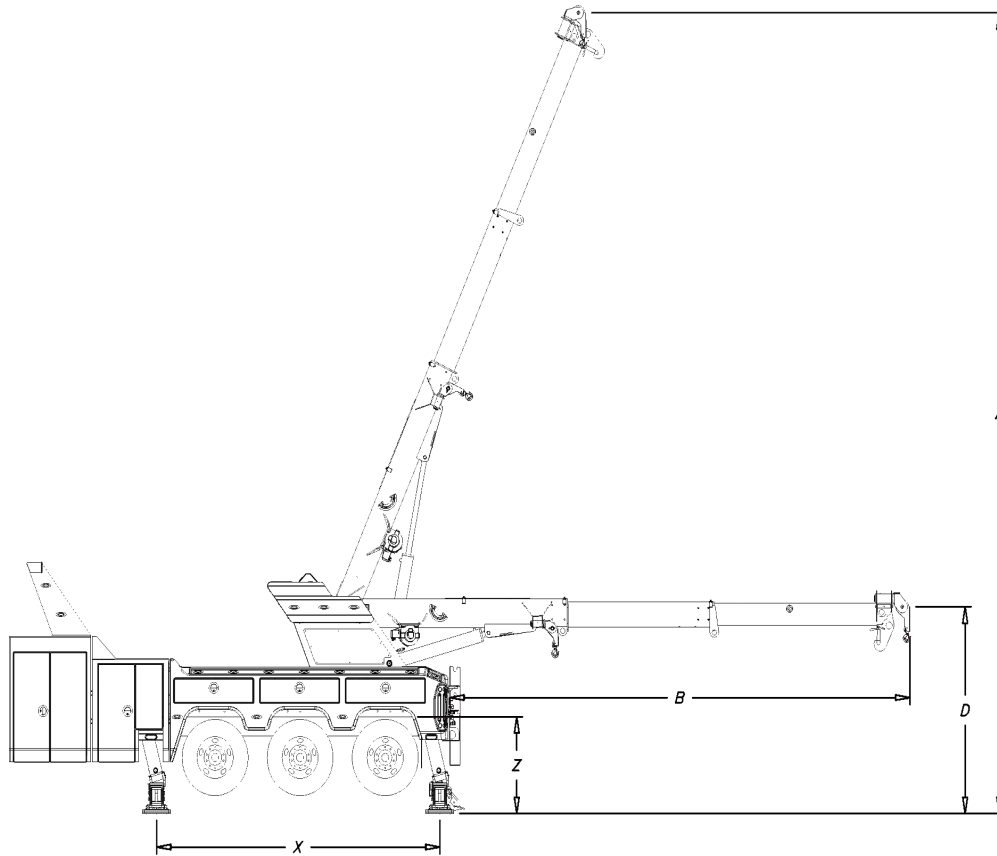


Figure 9 – Dimensions of the Boom and Outriggers—Side View

Table VII – Dimensions of the Boom and Outriggers—Side View (in m [ft-in])

Dimension	40/50 CSR 2 STAGES	40/50 CSR 3 STAGES	50/65 CSR 2 STAGES	50/65 CSR 3 STAGES
A	9.1 [29' 10"]	11.18 [36' 8"]	10.44 [34' 3"]	13.36 [43' 10"]
B	5.31 [17' 5"]	7.42 [24' 4"]	6.4 [21']	9.47 [31' 1"]
D	2.9 [9' 6"]	2.9 [9' 6"]	2.82 [9' 3"]	2.82 [9' 3"]
X	4.572 [15']	4.572 [15']	5.283 [17' 4"]	5.283 [17' 4"]
Z	1.370 [54"]	1.370 [54"]	1.370 [54"]	1.370 [54"]

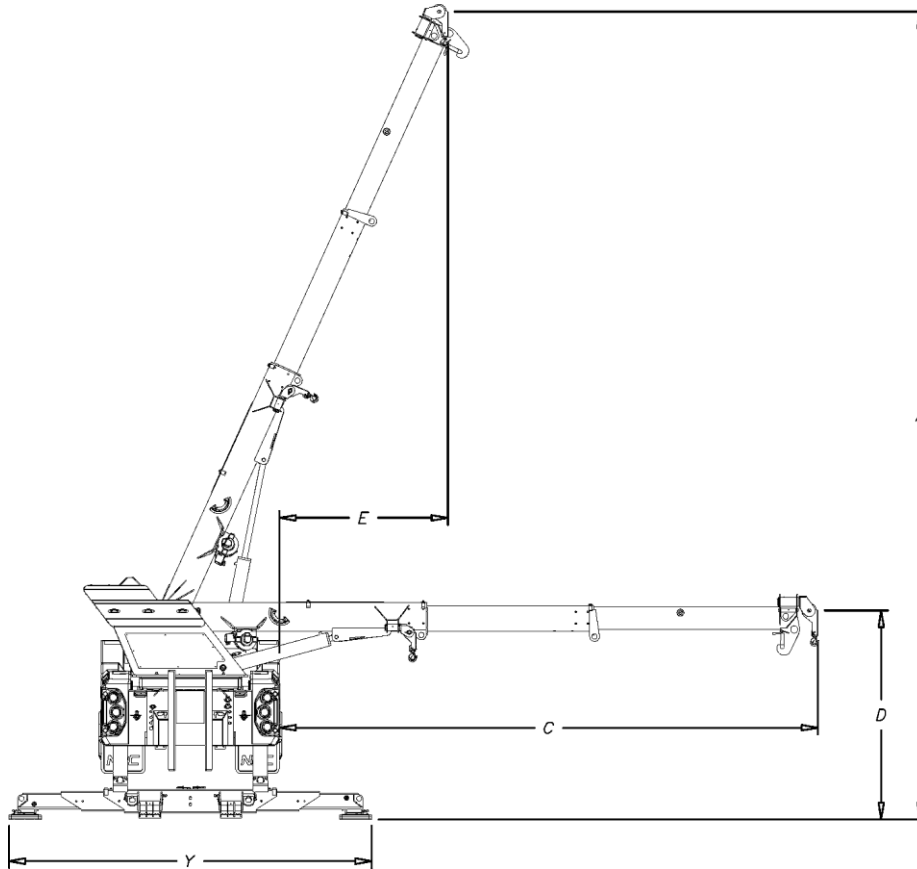


Figure 10 – Dimensions of the Boom and Outriggers—Rear View

Table VIII – Dimensions of the Boom and Outriggers—Rear View (in m [ft-in])

Dimension	40/50 CSR 2 STAGES	40/50 CSR 3 STAGES	50/65 CSR 2 STAGES	50/65 CSR 3 STAGES
A	9.1 [29' 10"]	11.18 [36' 8"]	10.44 [34' 3"]	13.36 [43' 10"]
C	5.28 [17' 4"]	7.57 [24' 10"]	6.45 [21' 2"]	9.53 [31' 3"]
D	2.9 [9' 6"]	2.9 [9' 6"]	2.82 [9' 3"]	2.82 [9' 3"]
E	1.4 [4' 7"]	2.36 [7' 9"]	0.81 [2' 8"]	1.75 [5' 9"]
Y	N/A	5.13 [16' 10"]	5.80 [19' 0"]	6.63 [21' 9"]

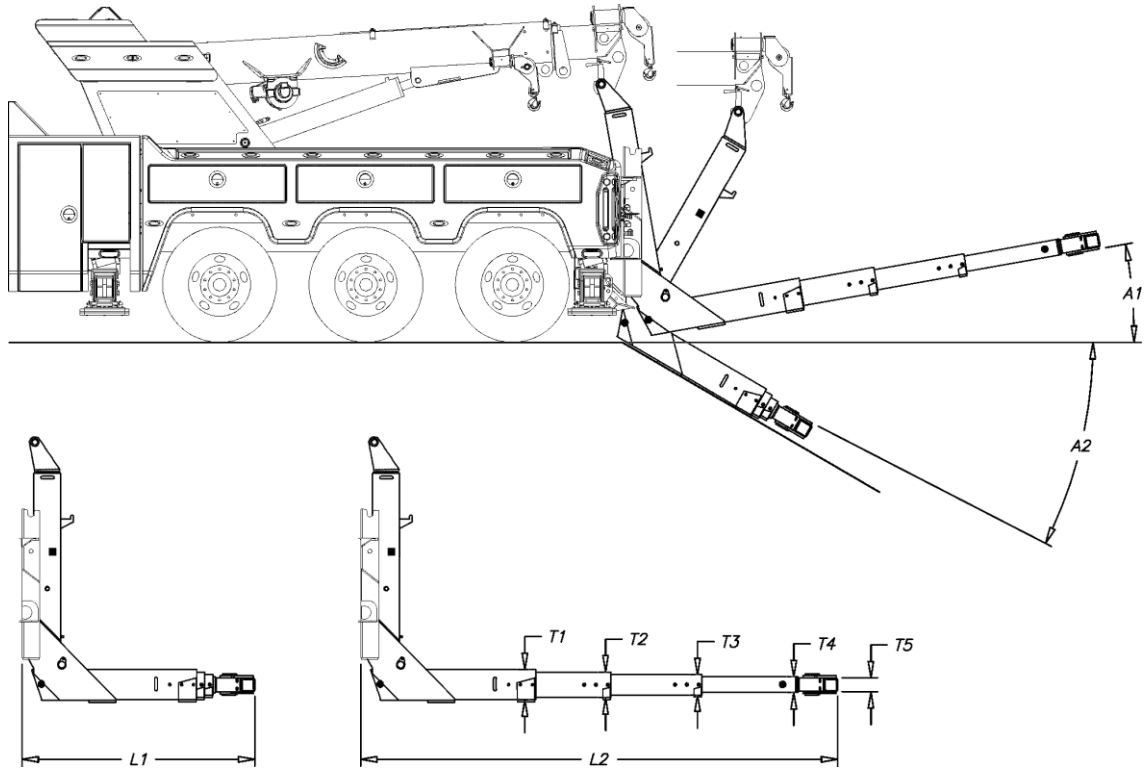


Figure 11 – Dimensions of the Axle-Lift

Table IX – Dimensions of the Axle-Lift (in mm [in])

Dimension	HD	SHD	SSHD-4	LSHD-3	LSHD-4
A1	10°	10°	10°	10°	10°
A2	30°	30°	30°	30°	30°
L1	1,860 [73.25]	2,172 [85.5]	1,905 [75]	2,362 [93]	2,184 [86]
L2	2,832 [111.5]	3,448 [135.75]	3,810 [150]	4,420 [174]	4,470 [176]
T1	203 [8]	254 [10]	281 [11.0625]	235 [9.25]	281 [11.0625]
T2	152 [6]	203 [8]	235 [9.25]	189 [7.4375]	235 [9.25]
T3	127 [5]	152 [6]	189 [7.4375]	146 [5.75]	189 [7.4375]
T4	N/A	N/A	146 [5.75]	N/A	146 [5.75]
T5	127 [5]	127 [5]	127 [5]	76 [3]	127 [5]

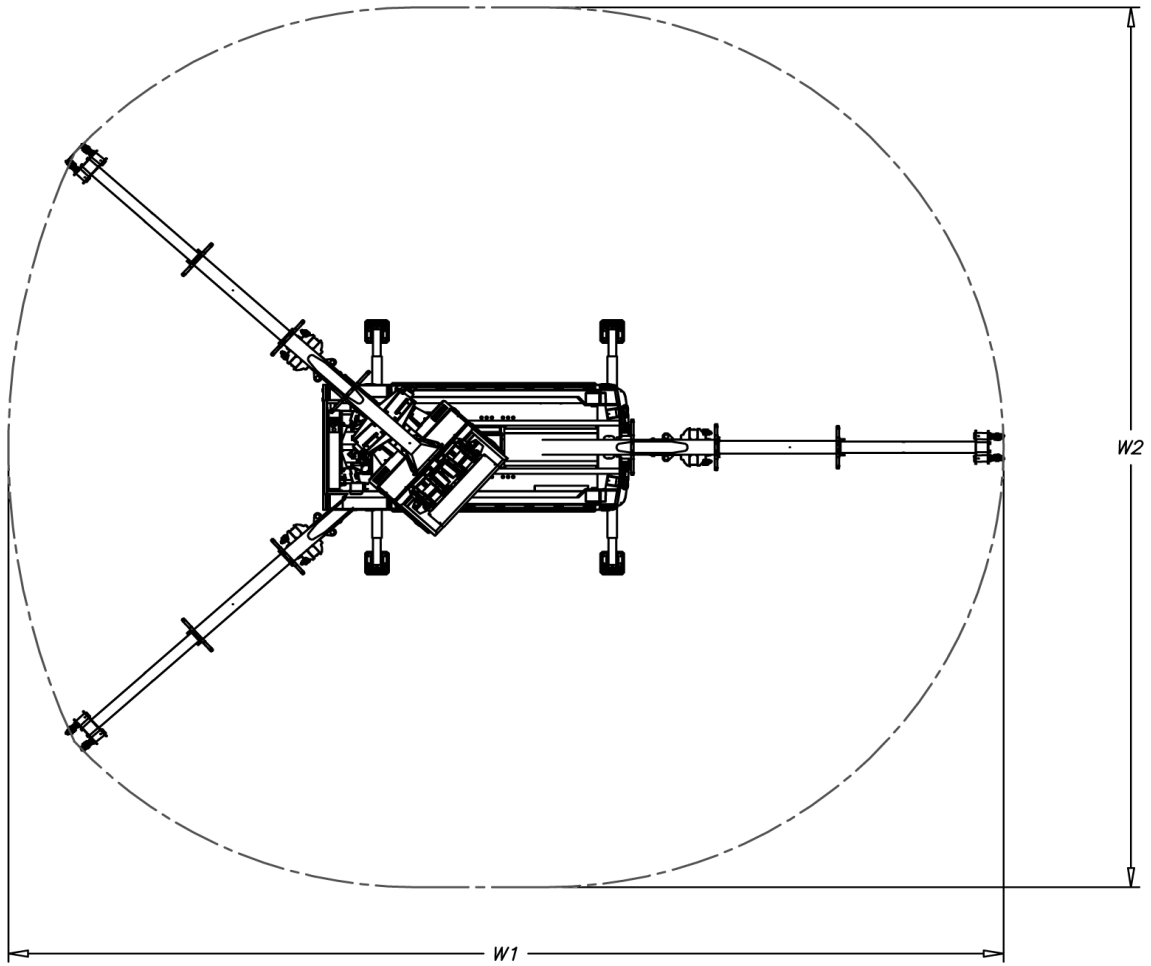


Figure 12 – Working Area Dimensions—Top View

Table X – Working Area Dimensions—Top View (in m [ft-in])

Dimension	40/50 CSR 2 STAGES	40/50 CSR 3 STAGES	50/65 CSR 2 STAGES	50/65 CSR 3 STAGES
W1	11.45 [37' 7"]	14.63 [48']	18.4 [60' 5"]	21.67 [71' 1"]
W2	12.24 [40' 2"]	16.97 [55' 8"]	14.68 [48' 2"]	20.82 [68' 4"]

1.2.4 Hydraulic System

Table XI – Specifications of the Hydraulic System (in metric [imperial])

Element	40/50 CSR	50/65 CSR
Hydraulic pump	Direct mount Double, 12 G.P.M	Drive shaft driven Dual Piston Pump
Working hydraulic pressure	211 bar [3000 psi]	246 bar [3500 psi]
Slide cylinder stroke	2540 mm [100"]	3250 mm [128"]
Boom elevation cylinder	Dual $\varnothing 6 \frac{1}{2}$ " x 65 $\frac{3}{16}$ "	Dual $\varnothing 6 \frac{1}{2}$ " x 71 $\frac{3}{4}$ "

1.2.5 Winches

Note: See also the manual provided by the winch manufacturer for more information.

Table XII – Winch Specifications (in metric [imperial])

Element	40/50 CSR	50/65 CSR
Main winch capacity	177.9 kN [40,000 lb]	222 kN [50,000 lb]
Main winch type	Two-speed planetary	Two-speed planetary
Standard cable	19 mm x 61 m [3/4" x 200']	22 mm x 61 m [7/8" x 200']
Auxiliary winch capacity	66.7 kN [15,000 lb]	89 kN [20,000 lb]
Auxiliary winch type	Planetary	Planetary
Auxiliary winch cable	14 mm x 61 m [9/16" x 200']	16 mm x 61 m [5/8" x 200']

1.2.6 Axle-Lift

Note: Axle-lift specifications are based on the static structural rating.

Table XIII – Axle-Lifts' Specifications (in metric [imperial])

Dimension	HD	SHD	SSHD-4	LSHD-3	LSHD-4
Tow capacity	356 kN [80,000 lb]	400 kN [90,000 lb]	356 kN [80,000 lb]	356 kN [80,000 lb]	356 kN [80,000 lb]
Lift capacity when extended	67 kN [15,000 lb]	89 kN [20,000 lb]	102 kN [23,000 lb]	89 kN [20,000 lb]	89 kN [20,000 lb]
Lift capacity when retracted	156 kN [35,000 lb]	222 kN [50,000 lb]	311 kN [70,000 lb]	222 kN [50,000 lb]	267 kN [60,000 lb]
Reach when extended	2,845 mm [112"]	3,353 mm [132"]	3,734 mm [147"]	4,305 mm [169.5"]	4,470 mm [176"]
Reach when retracted	1,854 mm [73"]	2,083 mm [82"]	1,829 mm [72"]	2,248 mm [88.5"]	2,184 mm [86"]
Extension length	991 mm [39"]	1,270 mm [50"]	1,905 mm [75"]	2,057 mm [81"]	2,743 mm [108"]

1.2.7 Lifting Capacity

Lifting capacities are presented in the following order:

- Figure 13 – Lifting Capacity of the 40/50 CSR from Behind
- Figure 14 – Lifting Capacity of the 40/50 CSR from the Side
- Figure 15 – Lifting Capacity of the 50/65 CSR from Behind
- Figure 16 – Lifting Capacity of the 50/65 CSR from the Side



WARNING

Note that capacities in dotted cells in the tables of this section are based on stability limits and do not exceed 80% of tipping.

Lifting capacity is defined for up to three boom stages. If your CSR has a two-stage boom, then refer only to the capacities for the first and second stage.

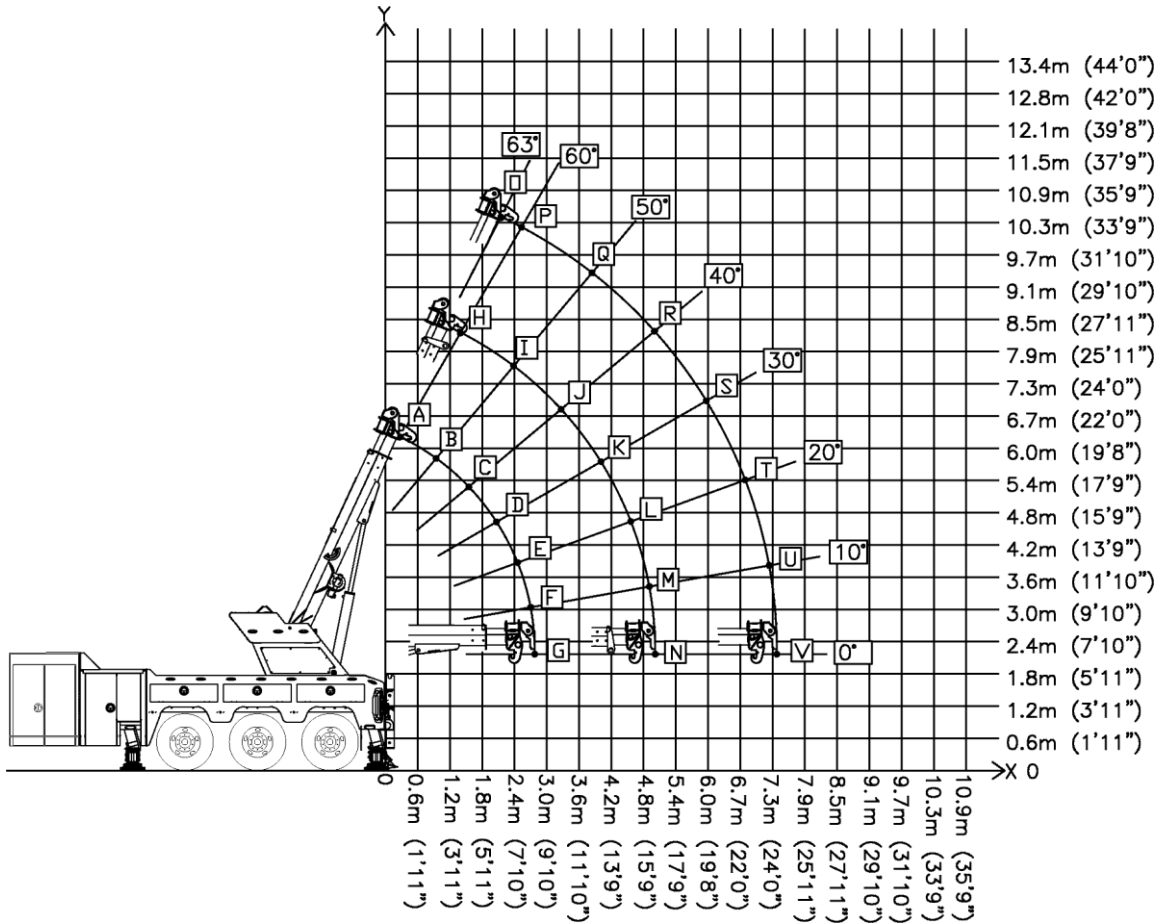


Figure 13 – Lifting Capacity of the 40/50 CSR from Behind

Table XIV – Lifting Capacity of the 40/50 CSR from Behind (in kg [lb])

Angle (deg)	1st stage radius		2nd stage radius		3rd stage radius	
	ID	Capacity (x1000)	ID	Capacity (x1000)	ID	Capacity (x1000)
63	-	51 [112.5]	-	0 [0]	O	18.1 [40.0]
60	A	49.1 [108.3]	H	22.7 [50.0]	P	13.8 [30.5]
50	B	40.5 [89.3]	I	18.3 [40.4]	Q	12.2 [27.0]
40	C	36.3 [80.0]	J	15.4 [34.0]	R	10.3 [22.6]
30	D	32.6 [71.9]	K	13.6 [30.0]	S	9.1 [20.0]
20	E	28.2 [62.1]	L	12.2 [27.0]	T	8.3 [18.4]
10	F	26 [57.4]	M	11.6 [25.5]	U	7.9 [17.5]
0	G	25.4 [55.9]	N	11.3 [25.0]	V	7.7 [17.0]

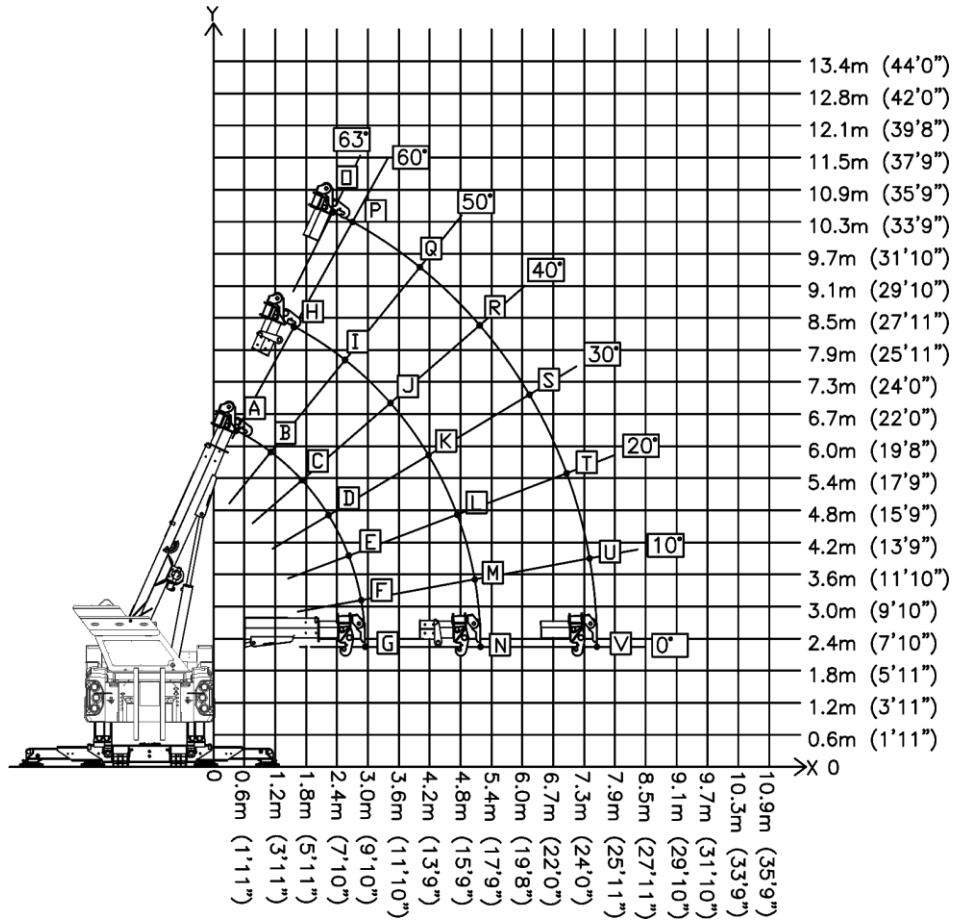


Figure 14 – Lifting Capacity of the 40/50 CSR from the Side

Table XV – Lifting Capacity of the 40/50 CSR from the Side (in kg [lb])

Angle (deg)	1st stage radius		2nd stage radius		3rd stage radius	
	ID	Capacity* (x1000)	ID	Capacity* (x1000)	ID	Capacity* (x1000)
63	-	37.2 [82]	-	0 [0]	O	13.6 [30.0]
60	A	34.9 [77]	H	18.1 [40.0]	P	12.5 [27.5]
50	B	30.5 [67.3]	I	14.1 [31.1]	Q	9.7 [21.4]
40	C	27.5 [60.7]	J	11.8 [26.1]	R	8.2 [18.0]
30	D	25.5 [56.2]	K	10.5 [23.1]	S	7.2 [15.8]
20	E	24.4 [53.7]	L	9.7 [21.3]	T	6.6 [14.6]
10	F	23.5 [51.7]	M	9.2 [20.3]	U	6.4 [14.0]
0	G	23.2 [51.2]	N	9.1 [20.0]	V	6.2 [13.7]

* Over front outrigger

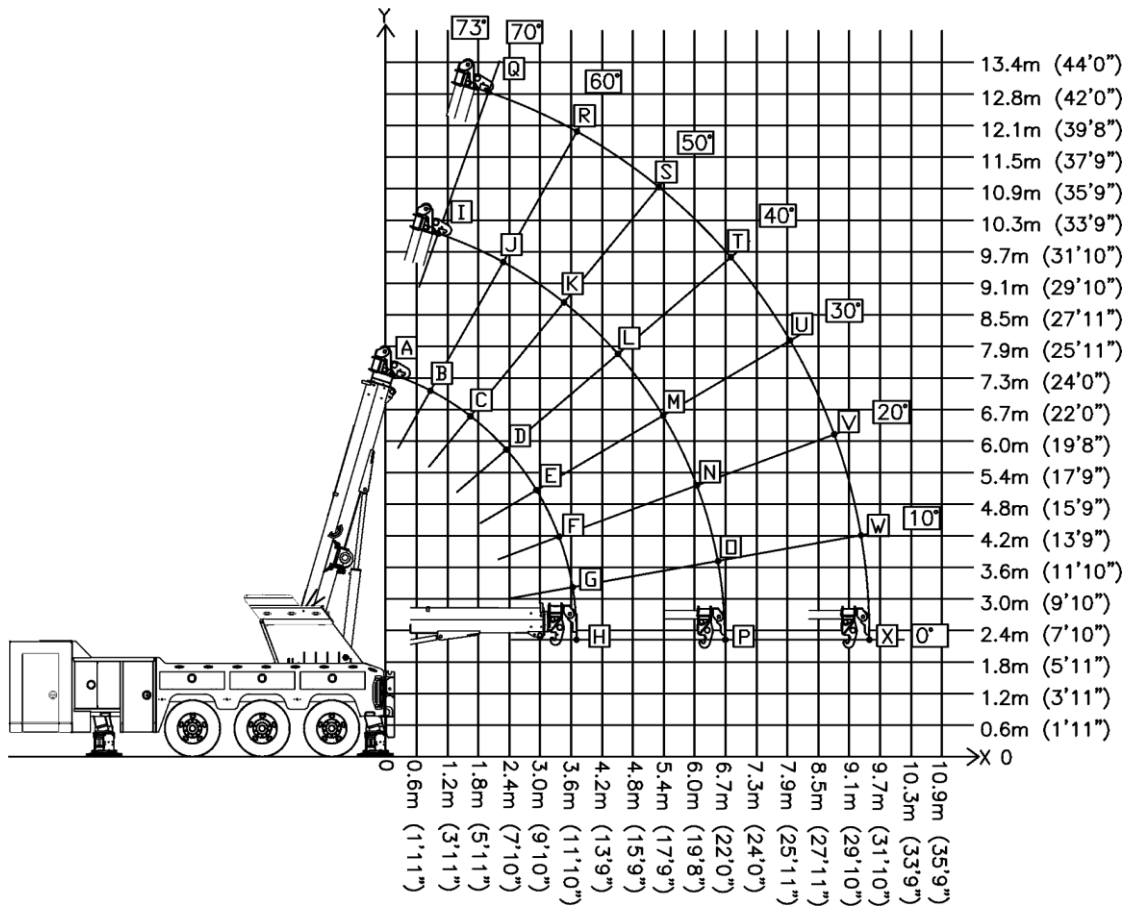


Figure 15 – Lifting Capacity of the 50/65 CSR from Behind

Table XVI – Lifting Capacity of the 50/65 CSR from Behind—Two-stage and Three-stage outriggers (in kg [lb])

Angle (deg)	1st stage radius		2nd stage radius		3rd stage radius	
	ID	Capacity (x1000)	ID	Capacity (x1000)	ID	Capacity (x1000)
73	-	60.7 [133.9]	-	40.3 [88.9]	-	21.3 [46.9]
70	A	56.6 [124.8]	I	36.8 [81.1]	Q	21.2 [46.7]
60	B	47.2 [104.0]	J	25.9 [57.0]	R	14.5 [32.0]
50	C	36.7 [80.9]	K	22.6 [49.8]	S	11.3 [24.9]
40	D	30.8 [67.8]	L	18.6 [41.0]	T	9.5 [20.9]
30	E	27.4 [60.4]	M	15.8 [34.9]	U	8.4 [18.5]
20	F	25.8 [56.8]	N	14.2 [31.4]	V	7.7 [17.0]
10	G	24.1 [53.1]	O	13.4 [29.6]	W	7.3 [16.2]
0	H	23.5 [51.9]	P	13.2 [29.1]	X	7.3 [16.0]

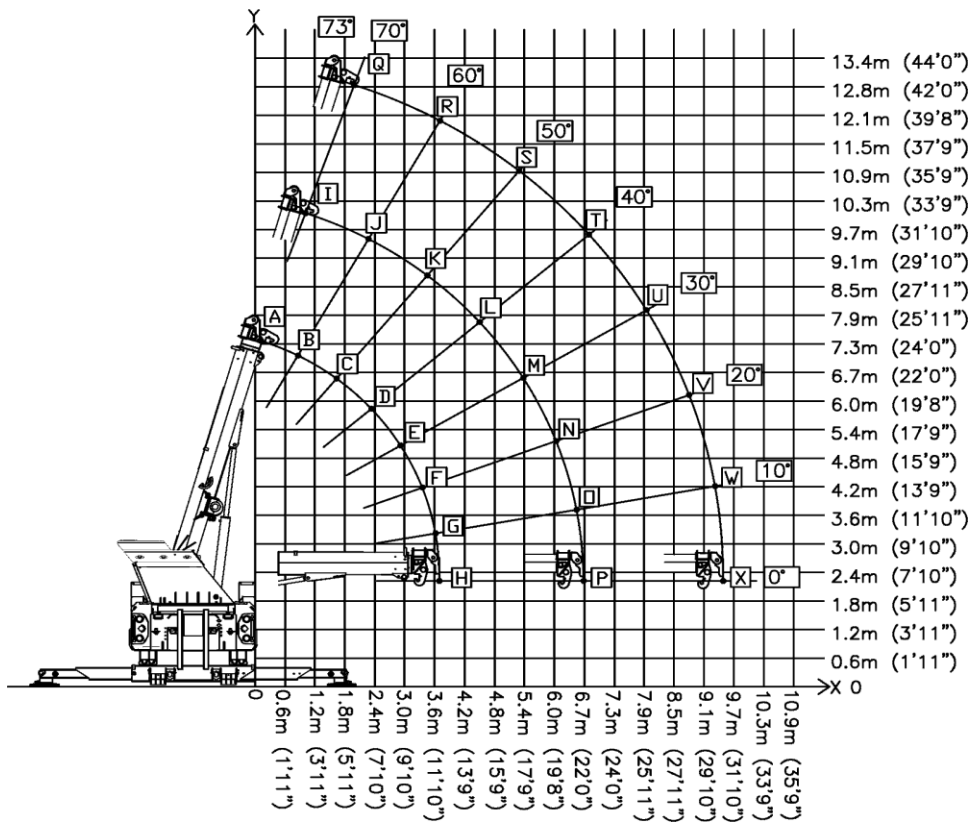


Figure 16 – Lifting Capacity of the 50/65 CSR from the Side

Table XVII – Lifting Capacity of the 50/65 CSR from the Side—Two-stage outriggers (in kg [lb])

Angle (deg)	1st stage radius		2nd stage radius		3rd stage radius	
	ID	Capacity* (x1000)	ID	Capacity* (x1000)	ID	Capacity* (x1000)
73	-	36.7 [80.8]	-	29.5 [65.0]	-	21.3 [46.9]
70	A	33.7 [74.2]	I	27.2 [60.0]	Q	21.2 [46.7]
60	B	28 [61.8]	J	21.7 [47.9]	R	14.5 [32.0]
50	C	24.4 [53.7]	K	18.4 [40.6]	S	11.2 [24.8]
40	D	21.9 [48.2]	L	16.1 [35.6]	T	9.4 [20.8]
30	E	20.2 [44.5]	M	13 [28.6]	U	8.1 [17.8]
20	F	19.1 [42.2]	N	11.3 [25.0]	V	7.2 [15.9]
10	G	18.6 [40.9]	O	10.5 [23.2]	W	6.8 [14.9]
0	H	18.2 [40.2]	P	10.3 [22.6]	X	6.6 [14.6]

* Over front outrigger

Table XVIII – Lifting Capacity of the 50/65 CSR from the Side—Three-stage outriggers (in kg [lb])

Angle (deg)	1st stage radius		2nd stage radius		3rd stage radius	
	ID	Capacity* (x1000)	ID	Capacity* (x1000)	ID	Capacity* (x1000)
73	-	42,9 [94,6]	-	30,6 [67,5]	-	21,3 [46,9]
70	A	39,7 [87,6]	I	31 [68,3]	Q	21,2 [46,7]
60	B	33,6 [74,0]	J	26,5 [58,4]	R	14,5 [32,0]
50	C	29,5 [65,0]	K	22,6 [49,9]	S	11,2 [24,8]
40	D	31,2 [68,7]	L	20,1 [44,4]	T	9,5 [20,9]
30	E	24,7 [54,5]	M	16,7 [36,8]	U	8,4 [18,5]
20	F	23,5 [51,8]	N	14,4 [31,7]	V	7,7 [17,0]
10	G	22,8 [50,3]	O	13,3 [29,3]	W	7,3 [16,2]
0	H	22,6 [49,8]	P	12,9 [28,5]	X	7,3 [16,0]

* Over front outrigger

2 Safety



Safety must be your top priority when operating and maintaining this equipment. Improper use of this equipment is dangerous and can result in bodily injury to the operator and bystanders.

Should this manual not provide sufficient information concerning the operation and maintenance of NRC Industries equipment, please contact your nearest distributor for more details.

2.1 Intended Use

NRC Industries equipment is intended for use only by trained professional operators who have carefully read and understood the contents of this manual.

This product is intended to recover and tow vehicles that do not exceed the lift or tow ratings of the equipment being used.

This manual shows how to properly use the towing equipment. However, one must also refer to towing recommendations of the vehicle manufacturer or a certified towing manual to avoid damage to transmissions or other components of the towed vehicle.

This product is not intended for lifting persons and shall not be used for that purpose.

2.2 NRC Responsibilities

NRC INDUSTRIES INC. REJECTS ANY LIABILITY CLAIM THAT MAY RESULT FROM THE INCORRECT OR UNLAWFUL APPLICATION OF ITS EQUIPMENT.

NRC recommends that the mounting plates for any CSR be inspected on a regular basis by an official NRC distributor. Any observed structural cracking should initiate immediate termination of vehicle use until safety of the CSR can be verified by an NRC distributor.

NRC recommends that hydraulic systems on any CSR be checked at least once a year, **ONLY** by an NRC distributor.

2.3 Supervisory Responsibilities

A full understanding of this manual is essential for safe operation and maintenance of this equipment. Make sure that all operators read this manual carefully and understand it before you allow them to operate or maintain the equipment. When an operator has read the manual, have them sign the Operator's Logbook at the end of this manual.

Give the PIN code for unlocking the console ONLY to trained personnel who understand the effect of modifying settings that may affect the equipment operation.

The equipment made by NRC Industries is intended for use by persons engaged in towing and recovery as a profession. They are not intended for use by persons unskilled or untrained in this field. The equipment should not be loaned, rented or leased to anyone lacking such skills.

NRC recommends fitting emergency beacons on ALL vehicles fitted with a CSR, complying with any local laws regarding road flares and additional safety lighting.

2.4 Operator Responsibilities

Read and understand this manual before attempting to operate or maintain the CSR. Read all safety precaution labels on the equipment. Always use good judgement and common sense while using a CSR.

Never operate any CSR under the influence of drugs or alcohol.

EMERGENCIES: use the emergency stop to halt the machinery.

2.4.1 Wear Protective Clothing

Always wear protective gloves.

Wear a protective helmet and safety footwear when walking on any CSR deck.

Wear reflective clothing at night and at other times of poor visibility.

Wear protective glasses.

2.4.2 Follow Safety Rules

Check that the Power Take Off (PTO) is disengaged before driving the vehicle:

- lever controls should be non-functional
- the warning light in the cab should be OFF

Never exceed equipment or chassis ratings. This could cause bodily injury and/or equipment damage.

Always use safety chains when towing and lifting.

Suspend loads from the boom/winch cables *only*. Applying a load to the vehicle by another means is expressly forbidden. Any lateral or vertical force applied to the boom may damage the vehicle and injure the operator.

When operating the vehicle on the roadside or in any dangerous area, select the controls situated away from the danger or traffic to ensure maximum safety.

When the vehicle is not in use, turn off the engine and disengage the PTO.

Inspect all wire ropes regularly and replace any worn or damaged ones.

2.4.3 Avoid Danger Zones

The area underneath the rotating crane mast/boom/job/load is a DANGER ZONE. No one should be on the CSR deck while the CSR is in operation.

Keep your hands away from the following places while the machine is in use:

- where the winch cables pass through the fairlead at the end of the boom
- where the winch cables wind onto the boom

These areas present the danger of drawing your hands in.

Keep clear of moving winch ropes. While the relatively low speed of the winches will keep any risks to a minimum, no one should enter the danger zone around the winches while they are in use.

2.4.4 Set up a Danger Zone for Bystanders

You must set up a danger zone of at least 150 feet around the vehicle and any load to be pulled or lifted. Do not allow anyone to enter this danger zone when you are using the machine.

IN ADDITION, do not allow anyone within 250 feet of a winch cable.

3 Operation

This chapter describes how to operate the wrecker. Operating a wrecker involves many simultaneous actions on many components. To take advantage of all the capabilities of your wrecker, you must first understand the general principles of operation.

3.1 Principles of Operation



A sliding rotator is a powerful machine. Always think about what you are about to do before operating the crane, and make sure you follow the principles of vehicle equilibrium as described in this section.

The main principles that you need to understand are as follows:

1. The more you extend the boom, the less weight you will be able to lift with it.
2. You can lift more weight from the rear of the wrecker than you can from the side.
3. Lifting from the side of the wrecker works best from over the front outriggers.
4. You can use the outriggers to shift the wrecker weight to the front or back, in order to counter balance the load, which is particularly useful when lifting from the side.

Lifting capacities for lifting from the back and from the side are specified in section 0

3.1.1 Distributing the Wrecker Weight

The wrecker weight can be moved to the front or the back of the wrecker using the outriggers. If the front wheels are lifted just off the ground there will be more weight on the front outriggers and less on the back. If the front wheels are left on the ground, there will be less weight on the front outriggers and more on the back ones.



WARNING

Make sure that ONLY the outrigger feet touch the ground. Any other part of the outrigger touching the ground will destabilize the wrecker.

Should an outrigger foot start to leave the ground for any reason, stop the operation of the crane (if lifting something, put it down) and check to see what is causing this to happen. You may need to reset the outriggers so that the counterweight corrects the situation and helps to complete the lift.

3.1.2 Lifting from the Rear of the Wrecker

The best point for lifting is from the rear of the wrecker as you will benefit from the maximum counterweight effect here: the weight of the wrecker will be spread over the full length of the chassis, 35 feet in some cases.

3.1.3 Lifting from the Side of the Wrecker

From the side of the wrecker you will not be able to lift as much since the only available counterweight is the width of the vehicle, some 100 inches or so. It is very important therefore to understand the counterweight effect because it can be altered and used to advantage.

Because the front outriggers are normally located very close to the center of gravity of the vehicle, this is the point from which you will be able to pick up the most weight from the side. To lift a load from the side, it is best to slide the crane to above the front outriggers, thus putting the maximum weight possible on the front outriggers. Do this as follows: first, lift the rear axles completely off the ground and then lift the front axle just enough to get it off the ground.

Important: If you do not put the maximum possible weight on the front outriggers, you will **not** be able to pick up the maximum load possible in this position.

If all the weight is on the front outriggers and you want to slide and rotate the load, when the crane is level with the rear outriggers (its weakest point) the rear outriggers may start to leave the ground. Should this happen, then proceed as follows:

- Proceed with caution, put down the load and redistribute the weight of the vehicle.

- Redistribute the vehicle weight by transferring some weight to the rear by lowering the front of the vehicle (the front axle) onto the ground.

3.1.4 Using the Wrecker for the First Time

When using the wrecker for the first time, we recommend that you keep at least 50% of the front axle weight on the ground with the rear axles completely off the ground and in the air. Do this until you have acquired some experience of how to deal with the counterweight effect. This set-up gives approximately the same lifting capacity all around the vehicle.

3.2 Preparing the Wrecker for Optimal Operation

Position the wrecker on flat, solid ground, with its rear as close as possible to the load that will be moved. Refer to section 0 and make sure you position the wrecker so you have sufficient reach and lifting capacity to safely proceed.

If the load weight is close to the capacity of your wrecker, you can move the load and wrecker closer by removing the axle-lift from the wrecker chassis (refer to section 3.8.4). Positioning the wrecker closer to the load increases the boom's lifting capacity.

There will be significant weight on each outrigger when lifting a heavy load. You must ensure the ground is solid so the outriggers will not sink.



Make sure that ONLY the outrigger feet touch the ground. Any other part of the outrigger touching the ground will destabilize the wrecker.

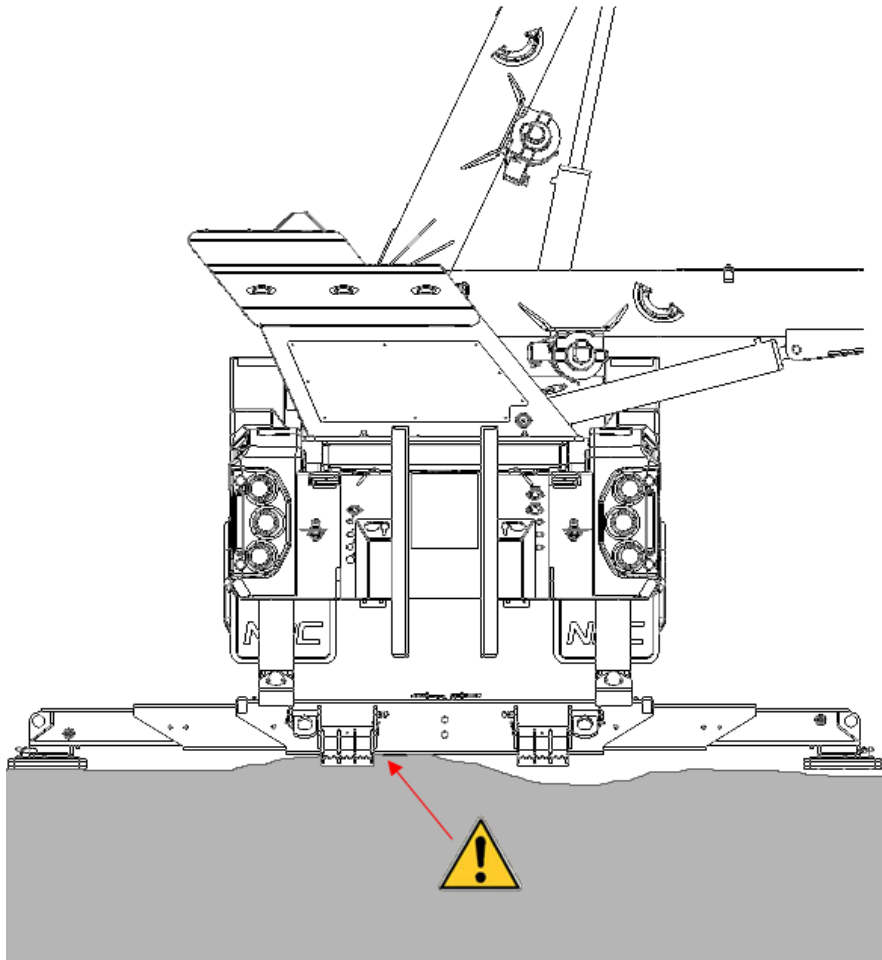


Figure 17 – Outriggers Touching the Ground

Decide whether you will keep the axle-lift in place or remove it from the wrecker chassis and put it on the ground. Operating the boom with the axle-lift attached limits the field of operation of the boom. The hydraulic lifting cylinders of the boom may come into contact with the top of the axle-lift stinger when the boom is lowered and slid to the back of the chassis. To know how to remove the axle-lift, refer to section 3.8.3.



WARNING

Care should be taken when using the crane with the axle-lift attached as damage can be caused by contact between the boom and the axle-lift.

3.3 Safety Guidelines

Before operating the axle-lift, the boom or the winches, always ensure the following:

- You fully understand all safety rules as described in Chapter 2 Safety.
- You are familiar with the wrecker and you have positioned it for optimal and safe operation. See section 3.4.
- The truck is levelled and stabilized properly. See sections 3.7.1 and 3.7.2.

After the truck is levelled and stabilized, before operating the axle-lift, the boom or the winches, always verify the following:

- The auto-levelling system is set to OFF.
- The anti-twist system is set to OFF.

If the anti-twist system buzzer sounds, stop the operation right away. Look carefully along the vehicle body to find why the body is twisted. To correct this, you may have to put the load down temporarily in order to move the truck to a position that allows better levelling and stabilisation.

If for any reason you need to stop all operations right away, press the emergency stop button. One is located on each control panel.

Note: Before restarting the engine, make sure to pull the emergency stop button.

3.4 Become Familiar with the Equipment

Before using the equipment, open the control panels on the side of the wrecker and become familiar with the controls and their layout. Most of the controls are proportional. This means that the speed and power of the operation increases with the amount of pressure applied to the control lever. Proportional controls allow you to use very low speeds to gain maximum control of the load being lifted.

When becoming familiar with the equipment, we suggest you run the engine at low speed. We recommend adjusting the throttle to between 600 and 800 RPM.

3.5 Emergency Hydraulic Bypass

If you are having trouble with the control panel on the driver's side, you can instead use the hydraulic levers on the passenger's side to finish your work.

For the 50/65 CSR only, you will need to close the emergency ball valve located inside the toolbox at the front on the left. This will allow you to use the manual controls. You will need to contact your nearest NRC dealer to reset the controls.



Closing this valve disables all hydraulic emergency stop functions.

Do this only in an emergency or for getting the unit into a position for travelling.

3.6 Common Operational Procedures

This section explains procedures for turning on the engine, arriving at the job site, and leaving the job site.

3.6.1 Engaging the Power Take Off

Engaging the Power Take Off (PTO) renders all lever controls functional. When the PTO is engaged, a warning light in the cab warns you not to drive the wrecker with the PTO engaged. Before driving the wrecker, check the PTO warning light and the PTO switch to make sure it is not engaged.



Stop the wrecker engine and disengage the PTO whenever the wrecker is not in use.



The area under any lifting device is a DANGER ZONE and everyone should keep as far away as possible from the danger zone while the machinery is in operation.

To engage the P.T.O, proceed as follows:

1. Make sure that the PTO is disengaged.
2. Start the engine of the truck.
3. Press the clutch, engage the PTO and release the clutch to start the hydraulic system. The hydraulic system provides the power to operate the boom, axle-lift, winch, etc.

The control panels are automatically turned ON when you engage the PTO. If the control panels are OFF, one of the emergency stop buttons has been pressed. To correct this, pull the emergency stop buttons completely.

3.6.2 Upon Arrival at the Job Site

Before operating the wrecker on a job site, you must complete each of the following steps in order.

4. Prepare and position the wrecker for optimal and safe operation. Refer to section 3.2.
5. Stabilize the wrecker. Refer to section 3.7.1.
6. Level the wrecker. Refer to section 3.7.2.
7. Unhook the axle-lift from the boom (section 3.8.2) or remove the axle-lift from the wrecker body (section 3.8.4).

3.6.3 Before Leaving the Job Site

After the job is finished, you must store the boom and the axle-lift and prepare the wrecker for safe travel as follows:

- Attaching the Axle Lift to the Boom. Refer to section 3.8.3.
- Locking the Boom in Travelling Position. Refer to section 3.9.4.
- Locking the Winches in Storage Position. Refer to section 3.10.5.

3.7 Using the Outriggers

The following sections explain how to use the outriggers to stabilize the wrecker, how to level the wrecker, and how to store the outriggers after use.

3.7.1 Stabilize the Wrecker using the Outriggers

Following the principle of vehicle equilibrium described in section 3.1, proceed as follows to stabilize and level the wrecker.

1. Go to the control panel on the driver's side.
 - a. Position the OUT/IN and UP/DOWN outrigger switches to the **OUT/IN** position. This turns the green light on.
 - b. Using the levers on the driver's side, extend completely the front and rear outriggers *on the driver's side only*.



Make sure you see the outriggers when you extend them or lower them to ensure they do not hit any person or object.

2. Go to the passenger side of the wrecker and use the control panel to extend the front and rear outriggers on this side.
3. Put a wooden pad onto each of the four outriggers. Lock them in place using the locking pin.

Note: The wooden pads are stored in toolboxes on each side of the wrecker. Hold the wooden pad by its pin to install it more easily.

4. Go to the driver's side and lower the front and rear outriggers on this side to the ground.
 - a. Position the OUT/IN / UP/DOWN outriggers switch to the **UP/DOWN** position. This turns the red light on.
 - b. Using the levers on the driver's side, lower both outriggers on the driver's side to the ground at the same time, without jacking up the wrecker.
5. Go to the passenger side of the wrecker and use the control panel to lower both outriggers on this side.
6. Go to the driver's side and lower *both* front outriggers further so that the wrecker is lighter at the front end, but not off the ground.

Note: Leave between 30% and 50% of the vehicle weight on the front wheel. You can evaluate the weight percentage on the front wheel by looking at the deformation of the tire and the fender's clearance.

7. Lower both rear outriggers at the same time, just enough to get the rear axle off the ground for both wheels.



Make sure that ONLY the outrigger feet touch the ground. Any other part of the outrigger touching the ground will destabilize the wrecker. If this is the case, move the vehicle to more level ground and try again,

3.7.2 Level the Wrecker

1. Level the wrecker along the front-back axis using the outrigger control levers and a level.
2. Turn the anti-twist switch to ON (up). The body is untwisted when the light below the switch goes off.



This is extremely important as it untwists the body and significantly reduces the risk of damaging the body.

3. Turn the auto-levelling switch to ON (up). This enables the wrecker to level itself. While this happens, the control levers move automatically. The truck is level when the light below the switch goes off.
4. When the auto-levelling and the anti-twist system are done, turn both switches to OFF.

3.7.3 Storing the Outriggers

Once the job is complete, you need to store the outriggers in their travelling position as follows:

1. Go to the control panel on the driver's side. Position the OUT/IN and UP/DOWN outrigger switch to the **UP/DOWN** position. This turns the red light ON.

2. Using the levers on the driver's side, raise all four outriggers completely at the same time.
3. For all four outriggers, remove the locking pins that hold the wooden pad on each outrigger. Remove the wooden pads and put the locking pin back in place. Store the wooden pads in the toolboxes located on each side of the wrecker.
4. Go to the control panel on the driver's side. Position the OUT/IN / UP/DOWN outrigger switch to the **OUT/IN** position. This turns the green light ON.
5. Using the levers on the driver's side, retract all four outriggers completely at the same time.

3.8 Using the Axle-Lift

The axle-lift is normally used to tow another vehicle.

For safety purposes, the axle-lift must be hooked to the boom for transportation.



Do not drive the wrecker with the axle-lift resting on the storage pin.

Before operating the boom, you must unhook the axle-lift from it. You can also completely remove the axle-lift from the wrecker body in order to bring the wrecker closer to the load.

The following sections describe all axle-lift operations.

3.8.1 Towing Another Vehicle



If you are using the NRC Bus Adapter (an optional towing attachment) take special care when installing it onto the axle-lift as some parts of the bus adapter are heavy. Position yourself correctly while lifting heavy objects.

1. Disengage all winches. See section 3.10.2.

Note: This will prevent damaging or breaking winches or cables when extending the boom.

2. Extend the axle-lift stinger a few inches to allow it to clear its retaining clamp.
3. Lower the axle-lift stinger completely using the lever.
4. Lower and extend the boom of the crane to put the axle-lift stinger in the position desired.

Note: The boom is attached to the axle-lift, so they move together.

5. Choose a lifting point on the vehicle to be towed: it must be both strong enough and have enough clearance for the axle-lift stinger to move.



A poorly chosen lifting point may result in damage to the vehicle being towed and could cause an accident.

6. If needed, carefully back up the wrecker closer to the vehicle to be towed, in order to enable the axle-lift stinger to reach the chosen lifting point.

Note: From this stage, if your wrecker is equipped with a remote control, you can use it to operate the axle-lift stinger. Alternatively, use the control panel levers.

7. Choose the towing attachments needed and put them into position on the T-bar.
8. Lift the vehicle high enough to attach the safety chains and tensioner to hold the vehicle in place on the axle-lift's T-bar.

9. Install the long safety chains that run from the anchor points on the back of the tow truck, through the two guides on either side of the middle of the main section of the axle-lift stinger. Attach the chains either to the axle or the chassis of the vehicle being towed.
10. Lower the axle-lift stinger to the position desired for safe lifting and towing.
11. Shorten the axle-lift stinger to the minimum, leaving enough clearance for a 70-degree turn. The shorter the distance between the back of the truck and the vehicle being towed, the better. It increases weight transferred from rear to front axle, improving manoeuvrability of the wrecker,



Leave enough space for a 70-degree turn between the two vehicles to ensure that they do not touch when turning. Failure to leave enough space may result in damage to one or both vehicles.

12. Re-engage the two winches (see section 3.10.2), attach the hooks to a suitable point, and then gently tighten the cables. Never tighten the cables to their maximum capacity as this could cause damage to the winches, the cables or parts of the boom and axle-lift.
13. Prepare the vehicle to be towed.
 - a. Install the tow lights.
 - b. Connect the air supply to the towed vehicle, brake pilot line and test brake.
 - c. Remove and secure the drive shaft of any drive axle on the ground.

Note: For more detailed information on how to tow this vehicle, refer to its owner's manual or towing guide.

The wrecker is ready to tow the vehicle. Before leaving, refer to section 3.6.3: Before Leaving the Job Site.

3.8.2 Unhooking the Axle-Lift from the Boom

1. Disengage all winches. See section 3.10.2.

Note: This will prevent damaging or breaking the winch cables.

2. Slowly lift the axle-lift with the boom, just enough to allow the storage pin to be slid into place through the pin hole in the axle-lift. This is shown in Figure 18.

Note: Storage pins are normally stored in the front locker.



Figure 18 – Inserting the Storage Pin

3. Slide the storage pin into the pin hole.

4. Unlock the safety clip at the top of the axle-lift, as shown in the following figure, to allow removal of the boom head.

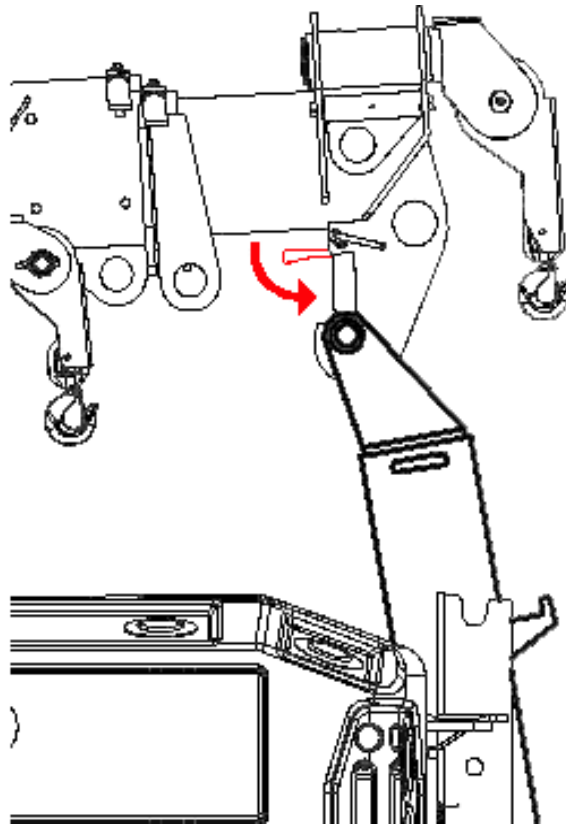


Figure 19 – Unlocking the Safety Clip

5. Slowly lower the boom so that the weight of the axle-lift is supported by the storage pin.



WARNING

Make sure the safety clip is unlocked before lowering the boom. This prevents potential damage to the boom and the axle-lift.

6. Lower the boom just enough to allow the hooks on the boom head to pass under the hinge pin in the top of the axle-lift.
7. Extend the boom so that the axle-lift is completely detached and is supported on the storage pin.

This completes the unhooking of the axle-lift and the boom is ready for use.

3.8.3 Attaching the Axle Lift to the Boom

1. If the mast is not completely at the front of the wrecker, slide it completely forward to be in place behind the wrecker cab.
2. If the boom has been rotated or extended, rotate it and retract it to a position from where you can hook the axle-lift.
3. When the boom hook is just below the storage pin in the top of the axle-lift, lift the boom until the safety clip locks the boom to the axle-lift.
4. Using the boom, slowly lift the axle-lift just enough to allow the storage pin to be slid out of the hole.
5. Slide the storage pin out and store it in the front locker.

The axle-lift is hooked to the boom.

3.8.4 Removing the Axle-Lift from the Wrecker

1. Unhook the axle-lift from the boom, as described in section 3.8.2.
2. Stop the hydraulic pumps by either turning off the truck engine or disengaging the PTO.
3. From the **control panel on the passenger's side**, move the axle-lift fold and axle-lift extension levers back and forth a few times to relief any pressure that there may be in the lines.

Note: Using the driver's side lever would not remove the pressure.

4. Disconnect the four hydraulic lines that connect the axle-lift to the body. Attach them two-by-two to the eye near the bottom of the axle-lift. This is shown in the figure below. Alternatively, put a protective cover over the exposed end of each line before attaching them to the eye.

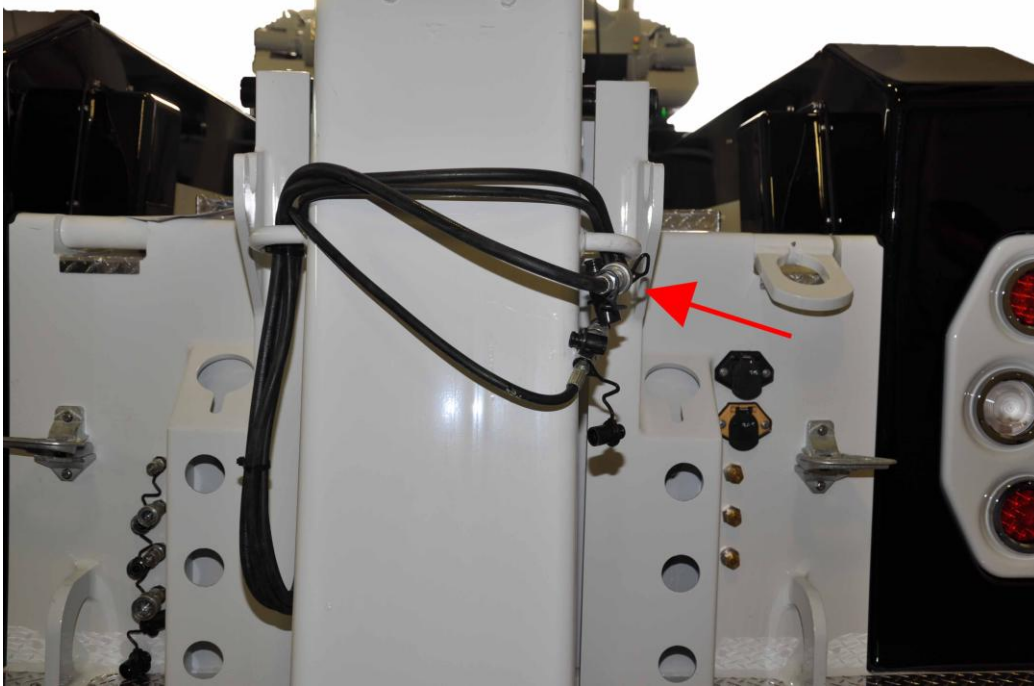


Figure 20 – Attaching the Hydraulic Lines to the Eye

5. Restart the engine or engage the PTO.
6. Lift the boom so that there is space between it and the top of the axle-lift.

7. Gently unwind the main winch cables and attach the hooks to the eyes near the top of the axle-lift.

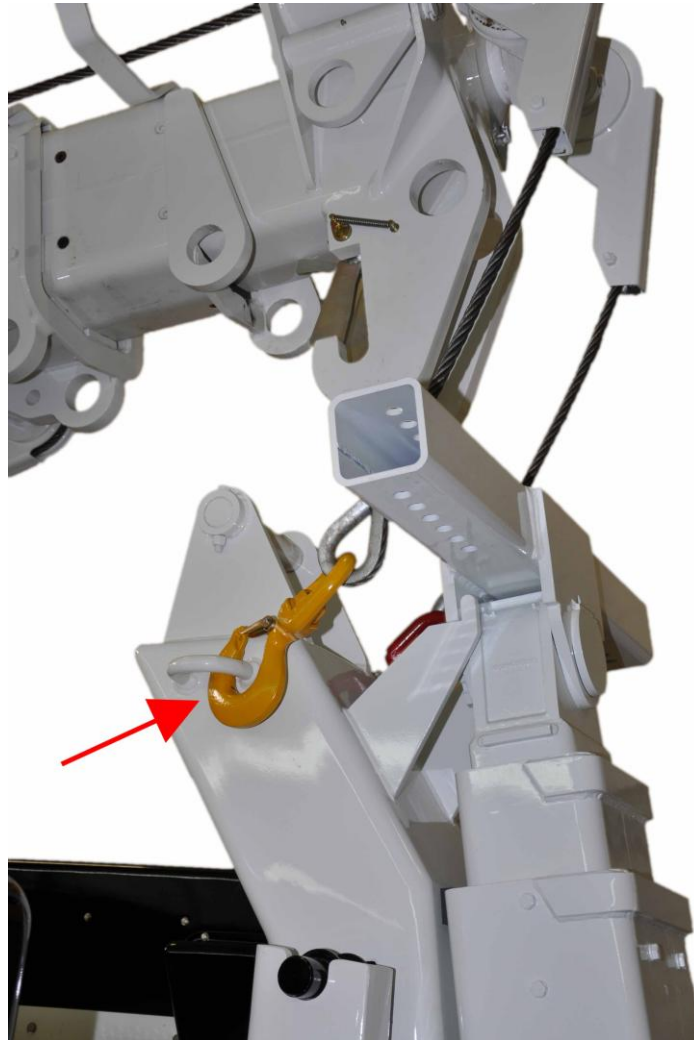


Figure 21 – Attaching the Hooks to the Eyes

8. Raise and extend the boom to start lifting the entire axle-lift. Maintain the axle-lift in the vertical position while lifting it. Continue lifting until you start to see the rollers of the axle-lift.



Stop lifting the axle-lift before the rollers leave their rail guides.

9. Position the center of gravity of the axle-lift by extending or retracting the boom until pressure is no longer exerted on the two roller guides in the rails of the axle-lift. This pressure is relieved when the axle-lift forms an angle of 25-30 degrees vertically and the rollers are not touching the rails at the points indicated by arrows in the figure below.



You need to find the center of gravity for the axle-lift to avoid the unit swinging when it is lifted out of the rails. An axle-lift that swings too much could hit the vehicle.

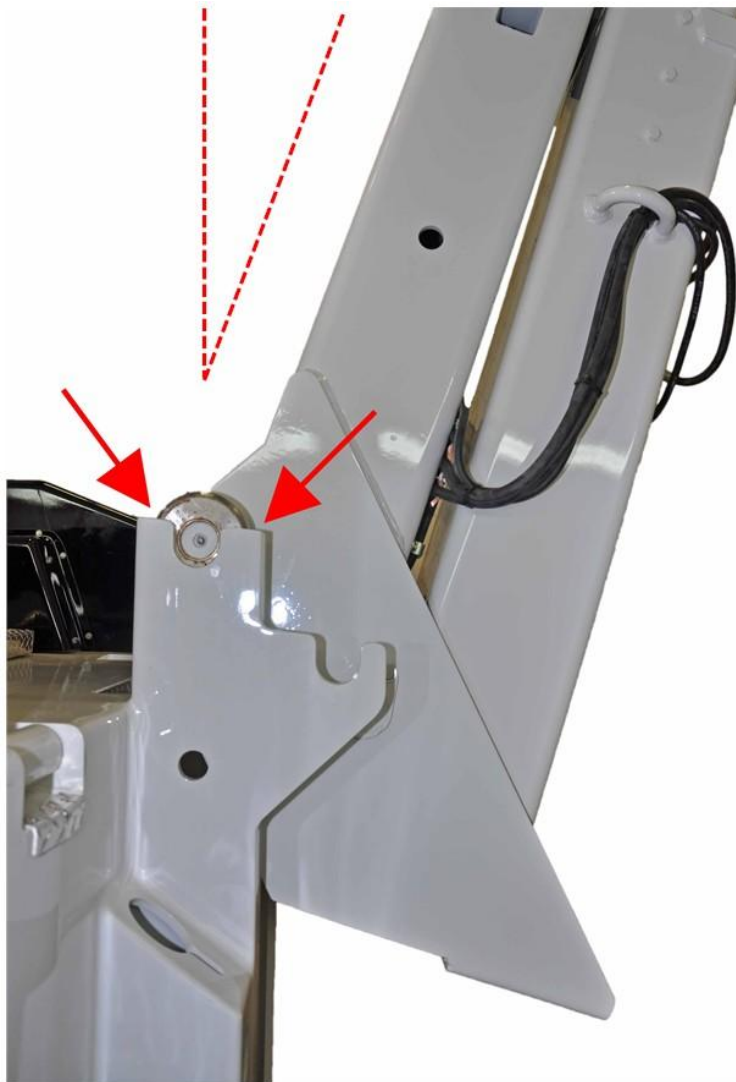


Figure 22 – Positioning the Axle-Lift in the Rails

10. Raise the boom until the axle-lift clears the rails.
11. Move the boom to put the axle-lift down on a firm surface. It is recommended that you lay the axle-lift down flat right behind the truck. When you first put the axle-lift down on its vertical axis, leave enough space behind the truck to allow for the axle-lift to be laid down flat. By unwinding the winch cables and possibly retracting the boom, you will be able to bring the axle-lift down completely. This is shown in the figure below.

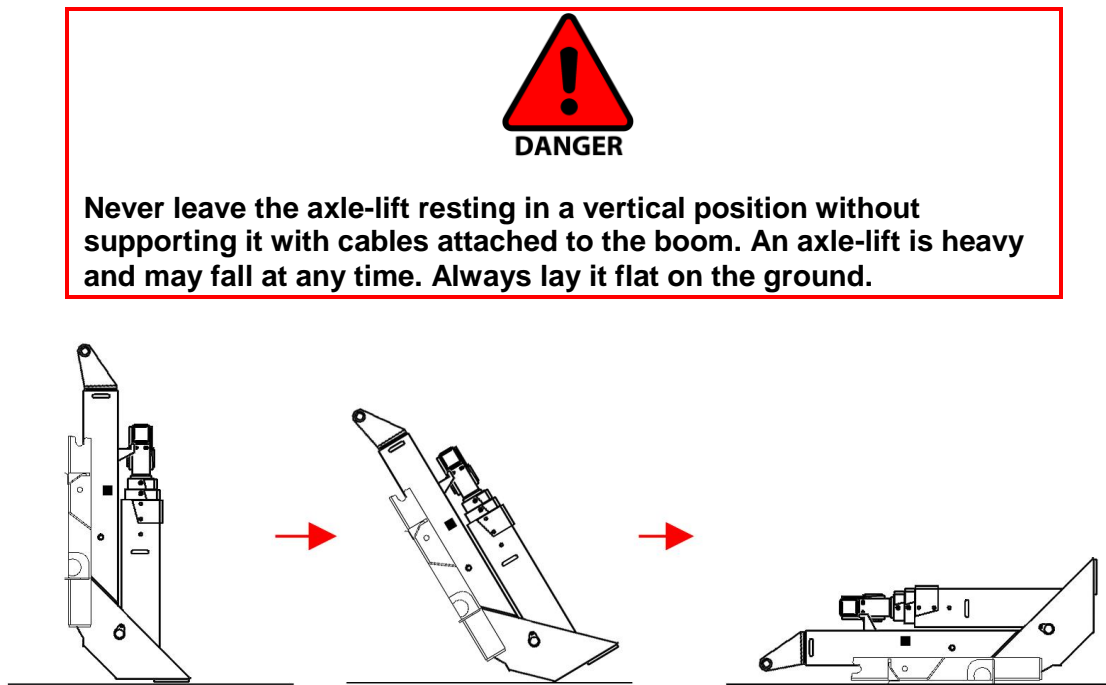


Figure 23 – Positioning the Axle-Lift on a Flat Surface

12. Disconnect the two winch cables. The boom is now ready for use.

3.8.5 Removing the Tag Axle from the Wrecker

1. Unhook the axle-lift from the boom. See section 3.8.2.
2. Lock the axle-lift and the axle-lift extension together with its locking pin. This will allow removal of the axle-lift extension along with the axle-lift.

Note: The axle-lift locking pin is stored in the toolbox.

3. Stop the hydraulic pumps by either turning off the truck engine or disengaging the PTO.

4. From the **control panel on the passenger's side**, move the axle-lift fold and axle-lift extension levers back and forth a few times to relief any pressure that may be in the lines.

Note: Using the driver's side lever would not remove the pressure.

5. Disconnect the nine hydraulic lines (four on one side and five on the other side) that connect the axle-lift extension to the body. Attach them, two-by-two, to the eye near the bottom of the axle-lift. This is shown in Figure 20. Alternatively, put the protective covers over the exposed ends of all lines before attaching them to the eye.
6. Restart the engine or engage the PTO
7. Lift the boom so that there is space between it and the top of the axle-lift.
8. Gently unwind the main winch cables and attach the hooks to the eyes near the top of the axle-lift stinger. This is shown in Figure 21.
9. Raise and extend the boom to start lifting the entire axle-lift extension. Maintain the axle-lift in the vertical position while lifting it.
10. Move the boom to put the axle-lift extension down on a firm surface. Put stoppers in front of and behind the wheels so the axle-lift extension cannot move.



Never leave the axle-lift extension on the ground without stoppers in front of and behind the wheels to prevent it from moving. Also, be careful when working around the axle-lift extension: bumping the axle-lift extension may make it fall flat on the ground. An axle-lift extension is heavy and may fall at any time, potentially causing serious injury or even death.

11. Disconnect the two winch cables. The boom is now ready for use.

3.8.6 Attaching the Axle-Lift to the Wrecker

When the axle-lift has been removed, you need to put it back on the wrecker before leaving the site.

1. Make sure the storage pin is in the pin hole in the axle-lift. The pin will support the axle-lift in place.
2. Position the boom and the winch so you can attach the winch to the axle-lift.

3. Connect the two winch cables to the eyes near the top of the axle-lift stinger.
4. Wind in the winch cables and, if needed, extend the boom to lift the axle-lift.
5. Raise the boom so the axle-lift is high enough to clear the axle-lift rail guide.
6. Lower the boom and align the axle-lift rollers with the rail guides. Continue lowering and possibly retracting the boom so the axle-lift goes into its rails, while maintaining the axle-lift in a vertical position. Stop when the axle-lift is supported on its storage pin.
7. Stop the hydraulic pumps by either turning off the truck engine or disengaging the PTO.
8. Reconnect the four hydraulic lines that connect the axle-lift to the wrecker. The line ends are designed to fit in only one position.
9. Restart the engine or engage the PTO.
10. Hook the axle-lift to the boom. See section 3.8.3.

3.9 Using the Boom

The boom is normally used to lift a load or to bring another vehicle into position for towing. The boom can be rotated and slid forward or backward on the vehicle, thus allowing you to lift a load from anywhere around the wrecker. The load's position and weight will determine which boom procedures in this section you will need to use.



Before operating the boom, make sure you understand the principles of operation in section 3.1 and follow the safety guidelines in section 3.3. Also be sure you perform all required preliminary steps to ensure that the wrecker is stable and level. See sections 3.4, 3.7.1 and 3.7.2.

3.9.1 Preparing the Slider

You need to unlock the slider and the rotator to allow the boom to move.

To unlock the slider, set the slider unlock switch to ON. This illuminates the red light on the switch and frees the boom to slide. You may have to push the slider control lever up and down to release the pressure on the locks.

To unlock the rotator, set the rotation unlock switch to ON. This illuminates the red light on the switch and frees the boom to rotate. You may have to push the rotation control lever up and down to release the pressure on the locks.

If you are planning to move the boom forward or backward, proceed as follows:

1. Verify that the two rails are well lubricated.

Note: Use Teflon grease to lubricate the rails. Refer to section 4.2.2 for lubricating the sliding rails.

2. Slide the crane completely backward and forward a few times in order to spread out the grease evenly.

3.9.2 Rotating the Boom

Push the boom rotation lever up or down to rotate the boom in one or the other direction.

Note: You can double the rotation speed of the boom by turning the speed control switch ON. The red light on the switch will illuminate. This switch also controls the winding and unwinding speed for the two main winch cables.

Put the speed control switch down to operate at low speed.

The 40/50 CSR wrecker model provides a mechanical stop mechanism that prevents the boom from rotating over the cab.

The 50/65 CSR model allows the operation of the boom over the cab. The first time you rotate the boom towards the cabin, when you are close enough, a safety stop will activate. You will need to use the console to deactivate this warning in order to operate the boom over the cab. Refer to section 3.12.2.



Once you deactivate the warning, you will be able to rotate the boom over the cab again and again. The warning will not be reactivated. Make sure that you continuously verify that the boom and the load are at a safe distance from the cab.

3.9.3 Sliding the Boom

Push the boom sliding lever up or down to slide the boom forward or backward.

3.9.4 Locking the Boom in Travelling Position

Once you have completed a job, you need to lock the boom in its storage position.

1. From the control panel on the driver's side, verify that the yellow light just below the rotation and the slider buttons is ON. This means that the rotator and slider can be locked in place. If the light is OFF, use the rotation and slider levers to slide the boom completely forward and set it straight.
2. When the yellow light is ON, lock both the rotator and the slider by pushing the buttons down. The light on each button will turn OFF.
3. Push the rotation lever up and down to ensure that the locks are activated (the boom does not rotate) and that the boom is safe in its travelling position.
4. Push the slider lever up and down to ensure that the locks are activated (the boom does not slide forward or backward) and the boom is safely stored.

3.10 Using the Winch

There are four winches on the wrecker. You can use them for towing or for lifting a load or another vehicle.

You can operate the winches from either side of the wrecker using the winch levers and switches on either control panel.

When operating the wrecker, you will need to engage one or more winches, depending on the load size and weight. On other occasions, you will need to disengage the winches to perform operations such as extending the boom.



DANGER! When the winches are engaged, do not extend the boom or do anything else that would overextend the winch cables or put too much pressure on them. Damage to cables, winches and sheave heads could occur, as could injury or even death.

Note: See also the manual provided by the winch manufacturer for more information.

3.10.1 Recommended Break-in Procedure

We recommend that the first time you use the winch you fully extend the cables and make three complete pulls at approximately half the rated capacities. This will extend the life of both the cable and the winch.

3.10.2 Disengaging and Engaging the Winch

Each winch has its own lever and a corresponding switch above the lever.

To disengage a winch, turn the corresponding winch switch up. The red light on the switch will illuminate. You may have to push the corresponding winch lever up and down to release the hydraulic pressure from the gear, thus allowing the clutches to disengage correctly.

To engage a winch, place the corresponding winch switch down.

Note: After engaging the winch, wait at least five seconds before using the winch to make sure the air clutch is properly engaged.

Note: Ramsey 15,000 lb winches have a green light just above their lever. This light illuminates when the winch is properly engaged. Do not perform any lift with the auxiliary winch if green light is not ON.

3.10.3 Winding and Unwinding the Winch Cable

Once a winch is engaged, you can push its lever up or down to wind or unwind its cable.

You can double the winding and unwinding speed of a main winch cable by putting the speed control switch up. The red light on the switch will illuminate. This switch also controls the speed of the boom rotation.

Put the switch down to operate at low speed.

3.10.4 Resetting the Winch Control Mechanism

If power is cut (by disengaging the PTO or pushing the emergency stop button), all the free spool clutches will be engaged for safety purposes. To be able to use the winches again, you must reset the clutches by putting all four winch switches into the engaged position.

3.10.5 Locking the Winches in Storage Position

1. Engage each winch.
2. Wind the winch cable in fully.



Do not over-wind the winch cables. Damage could occur to cables or sheave heads.

3.11 Using the Remote Control

Your wrecker may be equipped with a remote control. The remote control is used to control the wrecker as you do with the control panels, but allows you to move around to better see what you are doing and to be in a safer place while you operate the wrecker.

3.11.1 Preparing the Wrecker for Use of the Remote Control

To prepare the wrecker for remote control operation, use the control panel on the driver's side to proceed as follows:

1. Set the remote control switch to the remote control position. The red light on the switch will illuminate. This means the remote control receiver is ON and that the control levers on the control panel are disabled.
2. Engage all winches by putting the four winch switches down. The red light on each switch will turn off. Doing this will allow you to disengage and engage the winches using the remote control.
3. Set the speed control switch to slow operation. The red light on the switch will turn off. Doing this will allow you to control the speed using the remote control.

3.11.2 Operating the Wrecker with the Remote Control

To prepare the remote control for operation:

1. Install the remote control on yourself so you are comfortable using it. For example, install it with the belt around your waist or your neck. Installing it on your waist will allow you to move the remote control to your back, which will protect it while you perform other tasks.
2. Turn the key clockwise to turn the remote control ON.

3. Push the green button just beside the key to verify that the remote control's signal is being received by the wrecker receiver. The wrecker will make a sound indicating reception of the remote control signal. The green light located in the middle of the remote control will also blink. If the green light does not blink, the remote control battery may be bad or you may be too far from the wrecker.
4. Make sure the remote control emergency stop button is pulled out.

To operate the wrecker using the remote control:

- Use the two buttons on the side of the remote control to turn the wrecker engine ON or OFF.
- Push and hold a winch button to disengage the corresponding winch. Releasing the button engages the winch.
- Push and hold the speed button to double the speed of the boom rotation and the winding and unwinding of the winch cables. When you release the button, the speed returns to slow.
- You can perform all other functions using the remote control levers as you would with the control panel.

3.12 Using the Console

The console has been designed to help you troubleshoot, adjust and diagnose the wrecker. It provides the following functions:

- Viewing hours of operations
- Viewing pump pressures and swing motor pressures
- Calibrating the anti-twist and levelling set points
- Adjusting many wrecker settings
- Viewing measurement points
- Setting console preferences
- Viewing console info

3.12.1 Using the Console Menus and Buttons

The console provides many functions via its function and menu buttons, which are identified in the figure below.

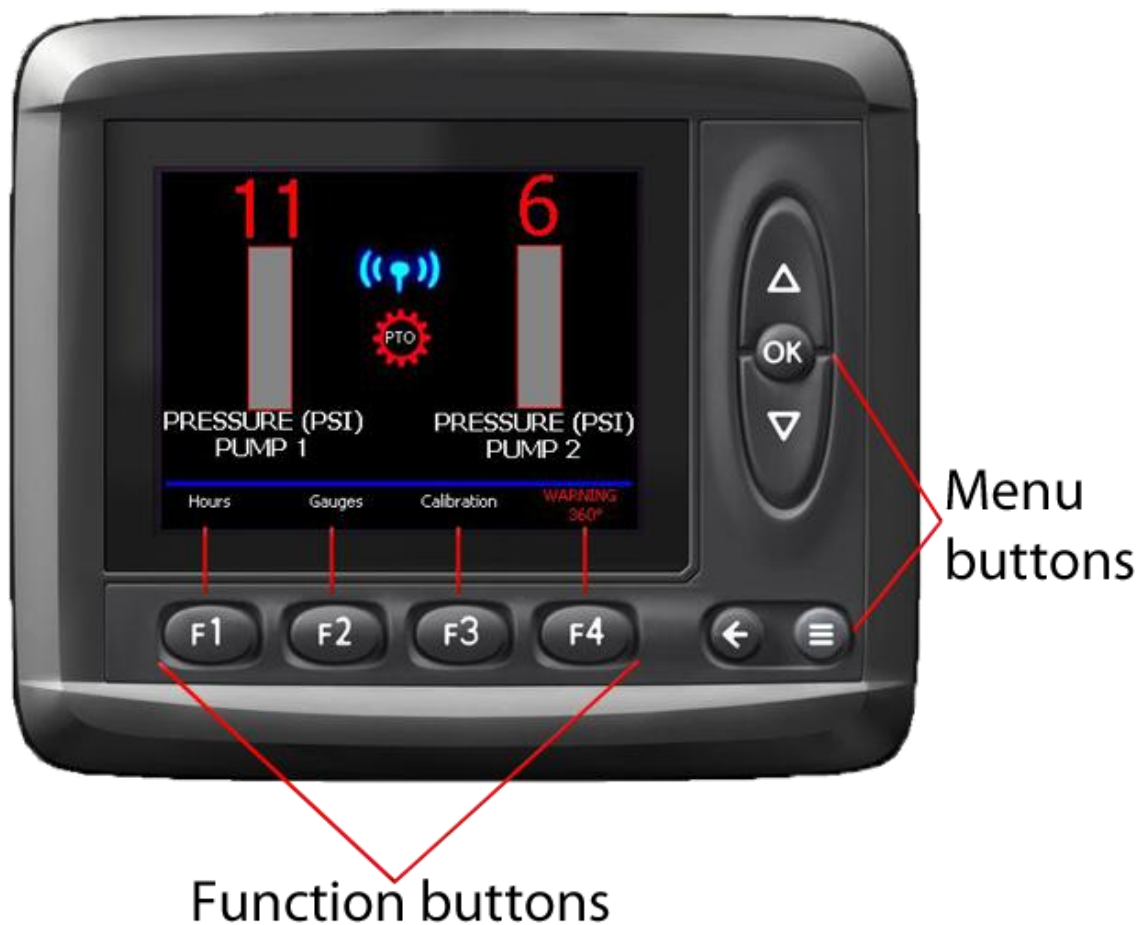


Figure 24 – Console Home Page

Function buttons F1 to F4 work as follows:

F1 (Hours): Displays the time the system was turned on and how long it remained on with the PTO engaged.

F2 (Gauges): Displays swing gauges or all gauges.

F3 (Calibration): For Calibrating the Levelling System as described in section 3.12.3.

F4 (WARNING 360°): Turns off the rotation warning and shows the PIN code page for unlocking the console. This warning occurs when you rotate the boom so that it is too close to the truck cabin. If you want to rotate the boom above the cabin, you first need to turn off the warning, which allows the boom to move. On the 50/65 CSR wrecker, you can do this by pressing the F4 button when the warning page is shown.





Turning off the Warning 360° will allow you to rotate the boom above the cabin. Be sure to keep the boom and all material attached to it at a safe distance from your wrecker.

Warning 360° can be turned off only on the 50/65 CSR wrecker. The 40/50 CSR wrecker instead has a mechanical safety device to prevent the boom from operating too closely above the wrecker cabin.

After selecting any function, use the function buttons to access the sub-menu and to go back to the home page.

The menu buttons work as follows:

- : Displays the main menu, as shown in Figure 25.
- : Returns to the previous page.

On the main menu page, use the function buttons to access the sub-menu.



Figure 25 – Console Main Menu

The main menu options are as follows:

Adjust: Access many settings. For more information, see section 3.12.4 Adjusting Settings for Measurement Points.


Measure: Display measurement points. For more information, see section 3.12.5 Viewing Measurements.

Preferences: Set preferences for the console, such as language.

Info: View the console version.

3.12.2 Unlocking the Console (Warning)

In order to prevent accidental modification of important settings, the console is equipped with a locking mechanism. The lock prevents modification of any setting that may affect the equipment operation. It also locks the **Warning 360°** function.

Functions that are locked are marked with the symbol .



Once unlocked, the console allows you to modify **ALL** settings.

Give the **PIN** code for unlocking the console **ONLY** to trained personnel who understand the effect of modifying settings that may affect the equipment operation.

You should have the **PIN** code for unlocking the console only if you are fully trained and fully understand the effect of modifying the settings.

To unlock the console, proceed as follows:

1. In the PIN code window, press **F2 (Enter PIN)**.

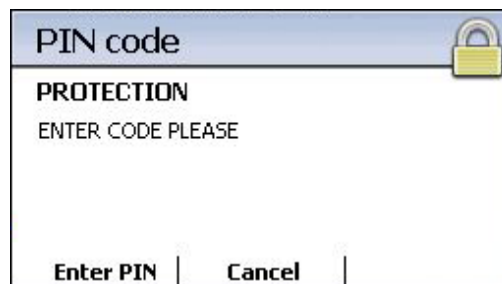


Figure 26 – Console Pin Code Window

2. Enter the PIN code using the **up/down** arrows to modify the numbers and the **OK** buttons to enter the next digit.

Note: To know the PIN code, contact NRC Industries.

3. Press the **OK** button when done.

3.12.3 Calibrating the Levelling System

The wrecker is equipped with an automatic anti-twist and levelling system. This system allows you to level the wrecker along the left-to-right axis in two places: at the front and the rear of the platform. This ensures the platform is straight (not twisted). It is important that the platform is correctly levelled and not twisted in order to be able to operate the equipment at its best and to its maximum capacity.

Since the anti-twist and levelling settings are calibrated at NRC Industries plant, you should not have to recalibrate them. However, when troubleshooting the wrecker, you may have to recalibrate these settings.

To calibrate the anti-twist and levelling settings of the wreckers, proceed as follows:

1. Using a level and the electronic or hydraulic joysticks, level the front and the rear of the platform by lowering/raising the front and rear outriggers.
2. When the level is good at the platform front and rear, go to the console.
3. From the console home page, press **F3** to go to the calibration page.
4. Press **F2 (Calibrate)** to calibrate the anti-twist and levelling set points.

The calibration is complete.

3.12.4 Adjusting Settings for Measurement Points


The wrecker is equipped with many sensors and measuring devices to ensure optimal performance.

These settings are calibrated at NRC Industries plant, and should not have to be modified. However, when troubleshooting the wrecker, you may need to modify some of these settings.



Make sure you understand the impact of modifying any of the settings before doing so. Not following this advice may result in damage to equipment and dangerous operation of the wrecker.


To adjust the settings of the wreckers, proceed as follows:

1. Press  to go to the main menu.
2. Press **F1 (Adjust)** to go to the Adjust page.
3. Using the **up/down** arrows and the **OK** buttons, select the settings you want to modify.
4. Using the **up/down** arrows, modify the setting and press **OK** when done.

3.12.5 Viewing Measurements

The wrecker is equipped with many sensors and measurement devices. The console displays readings from each sensor, helping in troubleshooting the wrecker.

To view sensor readings of the wreckers, proceed as follows:

1. Press  to go to the main menu.
2. Press **F2 (Measure)** to go to the Measure page.
3. Using the **up/down** arrows and the **OK** buttons, select the measurement point you want to view.

Note: This function allows you to view sensor readings, not to modify them.

4 Maintenance

Regular maintenance can prevent problems and damage to equipment. This chapter presents safety guidelines, the recommended maintenance schedule and procedures.

Note: See winch manufacturer manual for more information about the maintenance of the winches.

4.1 Safety Guidelines

While maintaining the wrecker, the axle-lift, the boom or the winches, always follow these guidelines:

- Be sure you fully understand all safety rules described in Chapter 2 Safety.
- Wear protective clothes and equipment (glasses, protective gloves, etc.)
- Watch for moving parts.
- Watch for hot components.
- When working under the truck, make sure the parking brake is set and use the wheel chock.
- When performing overhead work, use rated jack stands and proceed with caution.

For the safety guidelines for the winch, see winch manufacturer manual.

4.2 Maintenance Schedule

Note: Keep in mind that regular maintenance of the equipment will keep it in good condition for a long time and will avoid costly repairs.

4.2.1 General Wrecker Maintenance

First use of the wrecker

- Inspect the bolts securing the steel plate to the chassis after the first month and then once every three months. Make sure they are tight and in good conditions.
- Change the oil filter after the first six months and then every year.

After each use

Inspect the equipment to be certain that it is in good condition for the next job:

- Inspect the general condition of the wire ropes and see that they are properly wound.
- Look for oil leaks from cylinders or hoses.
- Verify that the slider rails are properly lubricated.

- Inspect all anchors and D-Rings for cracks, deformations, etc.

Every two weeks

- Verify all high pressure indicators. They should always be green. When they turn red, replace the filter.

Every three months

- Inspect the bolts securing the steel plate to the chassis. Make sure they are suitably tightened and in good condition.

Every six months

- Verify the condition of the high pressure oil filter. If the indicator is red, replace the high pressure filter.

Every year

- Replace oil filters (both the pressure and return filters).

4.2.2 Inspecting and Adjusting Pressure Settings

- Adjust the hydraulic pressure. Refer to section 4.4 for the 40/50 CSR and to section 4.5 for the 50/65 CSR.
- Adjust the cushioning valve of the axle-lift. Refer to section 4.6.
- Adjust the pressure cartridge. Refer to section 4.7.
- Verify the dial on the right side of the wrecker just beside the auxiliary winch drum. The dial should indicate a pressure of approximately 72 Bar in order to maintain the cable correct pressure.

4.2.3 Lubrication Schedule

Table XIX presents lubrication schedule for various wrecker parts and specifies the lubricant type.

Note: For all grease fittings (zerts), look for lubrication stickers located just beside each zert.

Table XIX – Lubrication Schedule

Element	Lubricant Type	Interval
Cables	Cable lubricant	Four to six months
Winch oil level	Oil SAE 90EP	Six months. Remove the plug on the side of the winch reservoir and insert your finder. If you cannot touch the oil, the oil level is too low and you should add oil.
Winch grease fittings	Waterproof grease	After the first six months and then every year.
Oil tank	T-22 or T-32 or AW-32	Check the oil level every week. Keep the level at 3" from the top of the tank. To access the reservoir, move the sliding rotator toward the back of the wrecker.
Boom plates & outriggers	Waterproof grease	Three months
Axle-lift plates	Waterproof grease	One month
All other grease fittings	Waterproof grease	One month
Axle-lift grease fittings (zerts)	Waterproof grease	One week
Valves	Antifreeze white grease	One year
Slider tube	Teflon grease	One week. All around the tubing.
Swing drive (tork hub)	Shell omala 220	Look at the swing drive manual.

Element	Lubricant Type	Interval
Pinion that rotates the boom	Waterproof grease	One month. To grease the pinion that rotates the boom, remove the aluminium plate from the bottom of the crane. Use a brush to cover the teeth with grease and rotate the boom. After rotating the boom, apply more grease to the teeth to be sure that all the pinion teeth are well lubricated.

4.2.4 Lubrication Points

Table XX – Lubrication Points – Axle-Lift

Name (number of lubrication points)	Type	Location / Note
T-Bar pivot point (4)	Grease fitting	Near the T-bar.
Extension (2)	Grease fitting	Near the T-bar on the side of the last extension.
Sliding surfaces of each extension	Slide	Extend the axle-lift completely. Lubricate each sliding surface (4) of every extension. Move the axle-lift in and out a couple of time to spread the grease evenly on all surfaces.
Main fold pivot (2)	Grease fitting	Axle-lift base (pivot).
Fold up cylinder (2)	Grease fitting	One at the axle-lift base vertical arm.
Extension cylinder (1)	Grease fitting	One in the middle of the axle lift vertical arm.
Storage pin (1)	Slide	Between the axle-lift and the wrecker frame
Axle-lift roller (2)	Grease fitting	One roller on each side of the axle-lift that goes inside the rail guide.
Wheel-lift and axle-lift brackets (?)	Grease fitting	They are stored in one of the wrecker toolbox.

Table XXI – Lubrication Points – Outriggers

Name (number of lubrication points)	Type	Location / Note
T-Bar pivot point (4)	Grease fitting	Near the T-bar.
Extension (2)	Grease fitting	Near the T-bar on the side of the last extension.
Outrigger extensions (6 per outrigger, 24 in total)	Grease fitting	At the end of the outriggers and on the extensions.
Sliding surface of each extension	Slide	Extend the outriggers completely. Lubricate each sliding surface (top, sides, bottom) of every extension. Move the outriggers in and out a couple of times to spread the grease evenly on all surfaces. It is important to grease the outriggers often and well so their surfaces are always greasy and protected from corrosion.
Pivot pin (2 per outrigger, 8 in total)	Rotating axis	Underneath the wrecker, on each side of each outrigger.
Main spade (1 per outrigger side, 4 in total)	Rotating axis	Underneath the wrecker, on each side of each outrigger.
Top of the outrigger (2 per outrigger, 8 in total)	Grease fitting	Remove the access cover on the wrecker body above each outrigger

Table XXII – Lubrication Points – Wrecker

Name (number of lubrication points)	Type	Location / Note
Mechanism	Moving parts	Put spray grease on all moving parts to allow free movement.

Table XXIII – Lubrication Points – Boom and Winches

Name (number of lubrication points)	Type	Location / Note
Pivot of the Boom up-and-down cylinder (3 per side, 6 in total)	Grease fitting	At the base of the boom cylinder pivot.
Boom extension cylinder (2 per extension)	Grease fitting	At the base of each boom extension.
Boom safety clip (3)	Grease fitting	Two on the boom, one on the safety clip.
D-Ring (2)	Grease fitting	Rear of the wrecker, close to the axle-lift, one on each side.
Bullwheel (2)	Grease fitting	End of the last boom extension, close to the main winches.
Bullwheel (2)	Grease fitting	End of the first boom extension, close to the auxiliary winches.
Main winches (2 per side, 4 in total)	Grease fitting	Main winches.
Auxiliary winches (2 per side, 4 in total)	Grease fitting	Auxiliary winches.
Winch	Grease fitting	See winch manufacturer manual.

Table XXIV – Lubrication Points – Sliding Rotator

Name (number of lubrication points)	Type	Location / Note
For all following lubrication points, move the sliding rotator completely to the front of the wrecker.		
Sliding locks (2)	Grease fitting	In the center body, inside and below the slider rails.
Main slide cylinder (1)	Grease fitting	On the bushing, at the end of the cylinder rod.
Rotator (2 per side, 4 in total)	Grease fitting	Base of the sliding rotator
Underneath the rotator (2 per side, 4 in total)	Grease fitting	Rotate the sliding rotator to access the hole on the stainless steel floor underneath the rotator.
Pinion cover (1 per corner of the floor, 4 in total)	Grease fitting	Underneath the rail, one in each corner of the stainless steel floor.
Rail	Slide	Grease with Teflon at all times. Underneath, on the sides and on the top of the each rail.
Rotator main gear	Pinion	Remove the pinion cover (stainless steel), one on each side at the base of the rotator. Using a brush, put grease on each gear tooth through the holes (pinion cover). Turn the rotator slightly and continue for all gear teeth.
For all following lubrication points, move the sliding rotator completely to the back of the wrecker.		
Rotating locks (2)	Grease fitting	Just behind the oil reservoir.

4.3 Maintaining the Winch

Refer to winch manufacturer manual.

4.4 Adjusting the Hydraulic Pressure for the 40/50 CSR

The 40/50 CSR model has a dual hydraulic system. The pressure has to be adjusted on each hydraulic valve bank.

1. Start the engine and set the throttle to between 600 and 800 RPM.

Note: this will ensure appropriate reading of the pressure gage.

2. Engage the PTO.
3. Unscrew the locking device on the corresponding valve, pull or push the lever control, and turn the adjusting device until the pressure reaches 3000 PSI on the pressure gage. Then lock the locking device.

Note: The pressure gage for each valve bank is located in the control compartment on driver's side.

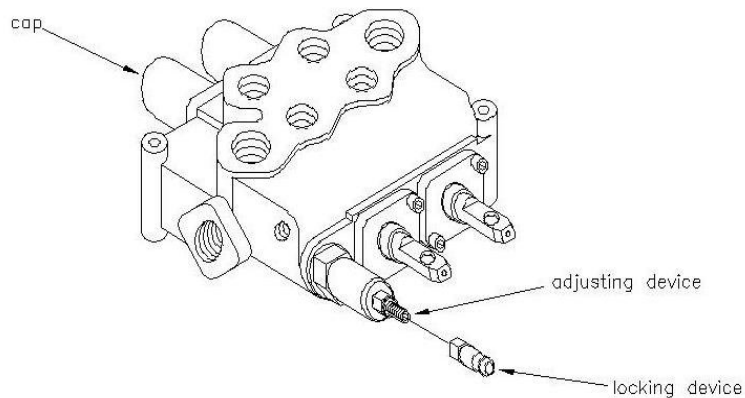


Figure 27 – Adjusting the Hydraulic Pressure

4.5 Adjusting the Hydraulic Pressure for the 50/65 CSR

The 50/65 CSR model has a dual hydraulic system. The pressure has to be adjusted for each hydraulic pump.

1. Start the engine and fix the throttle between 600 and 800 RPM.

Note: this will ensure appropriate reading of the pressure gage.

2. Hold the lever that controls the right outrigger up (when the outrigger is already completely up). Read the pressure gauge as soon the arrow has stopped to move. If the pressure is not 3500 PSI, readjust it on the pump.

Note: The pump is normally located at the rear, underneath the tunnel tool box.

3. Hold the lever that controls the left outrigger up (when the outrigger is already completely up). Read the pressure gauge as soon the arrow stops moving. If the pressure is not 3500 PSI, readjust it on the pump.

Note: The pump is normally located at the front underneath the tunnel tool box.

4. Unscrew the locking device on the corresponding valve, pull or push the lever control, and turn the adjusting device until the pressure reaches 3,500 PSI and then lock the locking device.

4.6 Adjusting the Cushioning Valve of the Axle-Lift

The cushioning valve of the axle-lift is located inside the rear bumper. You may have to adjust it if you have problems folding or unfolding the axle-lift. The **B+A** cartridge controls the folding of the axle-lift. The **C+D** cartridge controls the unfolding of the axle-lift. The adjustment required for both cartridges is 2,000 PSI. Make sure the hoses are as shown in the following figure.

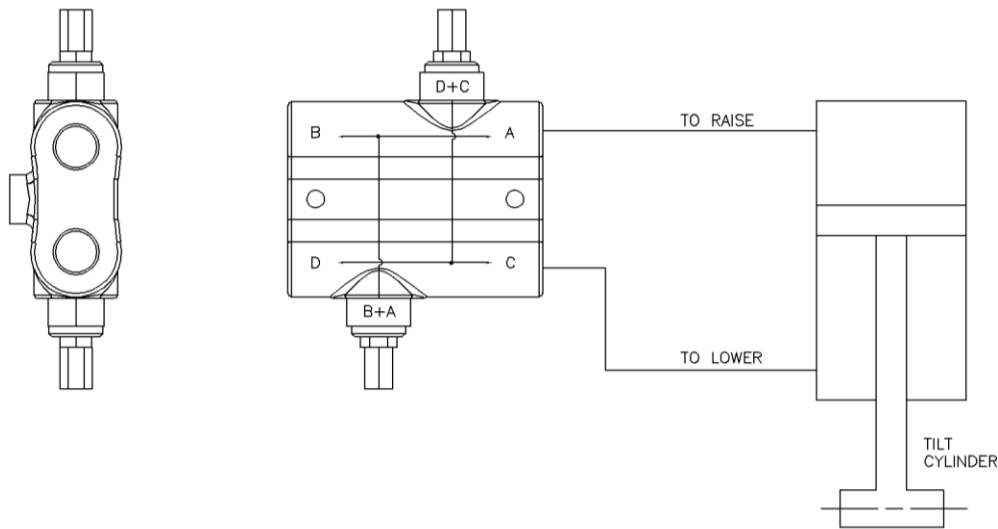


Figure 28 – Adjusting the Cushioning Valve of the Axle-Lift

1. Completely unfold the axle-lift.
2. Completely retract the axle-lift. It is highly recommended not to have any adaptors mounted on it.
3. Try folding up the axle-lift. If it can be folded up, the cushioning valve is correctly adjusted. If not, proceed as follows to adjust the cushioning valve.
4. Unscrew the locking device.

Note: Make sure to choose the appropriate cushioning valve.

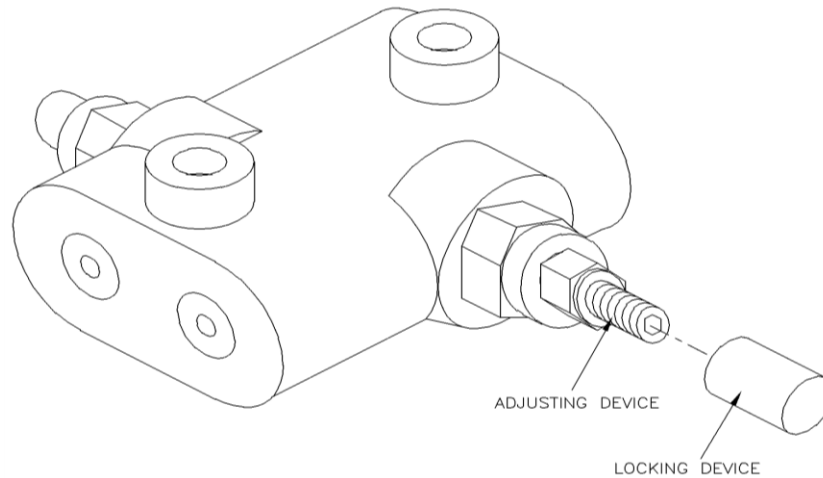


Figure 29 – Adjusting the Cushioning Valve

5. Turn the adjusting device no more than $\frac{1}{4}$ turn.
6. Pull the lever control to fold up the axle-lift. If you cannot fold up the axle-lift, repeat steps 4 and 5 until the axle-lift folds up correctly. Do not over-increase the pressure. Just use the minimum you need to fold it correctly.
7. Screw in the locking device.

4.7 Adjusting the Pressure Cartridge (CBCG-LJN)

There are six pressure cartridges on the wrecker. They all need different adjustments.

- One is used to control the pressure of the boom's up/down cylinder. It is located on the lift cylinder at the bottom of the boom. Adjustment required: $1\frac{3}{4}$ turns.
- One is used to control the pressure of the boom's in/out cylinder. It is located inside the boom. Adjustment required: $\frac{3}{4}$ of a turn.
- One is used to control the pressure of each outrigger's up/down cylinder. It is located on top of each outrigger up/down cylinder. Adjustment required: $\frac{1}{2}$ of a turn.

1. Loosen the nut that locks the set screw on the cartridge.

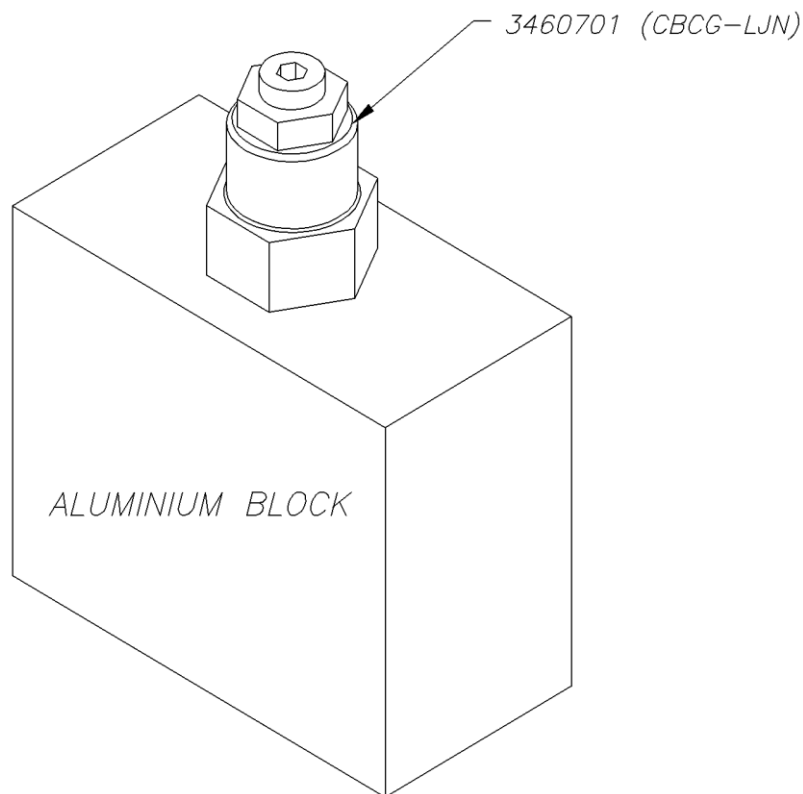


Figure 30 – Adjusting the Pressure Cartridge (CBCG-LJN)

2. Turn the set screw counter clockwise until it stops.
3. Turn the set screw clockwise for the appropriate setting (described above) and keep the screw in this position while you tighten the locking nut on the set screw.

Note: Place the Allen key in a position to be able to easily count how many turns you make when setting the screw.

4.8 Aligning the Boom



Lock the rotation and the slider into position before verifying the boom alignment.

Verify the boom alignment

1. Slowly position the boom precisely in the center of the underlift rails at the rear of the body until it stops in its locks.
2. Check whether the boom is in or out of alignment, which should be apparent to the eye. It can also be checked by placing a straight edge on the boom and measuring each side.
3. If the boom is out of alignment, check to see if the mast is loose. If the front or back of the mast can move sideways, it can affect the alignment.

If the boom is not perfectly aligned, this may be caused by wear on the Teflon pads that sits on the surface of the skates situated under the slider rails, which are bolted onto the slider base plate. Proceed as follows to align the boom.

Align the boom by adjusting the screws on the front locks

1. Loosen the locking nuts that secure the adjustment bolts.
2. Screw the bolts in or out to move the boom toward the desired side. Re-tighten the locking nuts on the locks.

5 Troubleshooting

This chapter presents most common problems, their main causes and corrective measures. Table XXV summarizes the problems, causes and solutions. The sections following the table give detailed procedures for some of the solutions.

5.1 Troubleshooting Common Problems

Table XXV – Troubleshooting

Problem	Causes	Solutions
All levers on the driver's side control panel are not operating	The remote control switch is in the remote control position	Set the remote control switch to the Control Panel Position (no remote).
	Faulty PTO switch	Check the PTO switch and have it repaired. Refer to section 5.3 for this procedure.
	Electrical power down on the control panel	Check the DC power (12 VDC in north America and 24 VDC otherwise) on the main electrical panel (main relay) and check the electrical wiring to the control panel.
	Hydraulic power down	Verify whether the passenger's side control panel is operating. If not, troubleshoot the hydraulic system.
The winches cannot be engaged	One of the winches was disengaged before starting the wrecker	Stop the wrecker completely, disengage the PTO, engage all winches and start over.
	Air pressure too low	Check for an air leak or bent hose.
The winches cannot be disengaged	A winch was disengaged before starting the wrecker	Stop the wrecker completely, disengage the PTO, engage all winches and start over.
	Electrical power down on the solenoid	Check the power on the wiring to the solenoid with a multimeter.
	Air pressure too low	Check for an air leak or bent hose.

Problem	Causes	Solutions
	The solenoid for this winch is defective	Replace the solenoid. Follow the air line to locate the solenoid. It is located near the winch.
	Cylinder plunger can be broken or bent (Only for RPH15000 type winch)	Replace the cylinder.
A main winch cable cannot be disengaged	Air pressure too low	Check for an air leak or bent hose.
	The solenoid is burned out	Replace the solenoid located right on the winch.
An auxiliary winch cannot be disengaged	Air pressure to the solenoid is too low	Check for an air leak or bent hose.
	The solenoid is burned out	Replace the auxiliary winch's solenoid. It is located on the side of the winch drum.
	For the 40/50 CSR with RPH15,000 only, the plunger of the free spool cylinder is broken	Check for a damaged plunger and replace the free spool cylinder. See your winch manufacturer manual for more details.
The outriggers cannot be moved in and out, but can be moved up or down	The solenoid for the diverter of this outrigger is burned out	Replace the solenoid. The solenoid for the front outriggers is located close to the main sliding cylinder. The solenoid for the rear outriggers is located below the aluminum diamond plate at the back of the wrecker.
Outriggers don't move in one direction, in-and-out or up-and-down	Electrical power down on the solenoid	Check power on wiring to the solenoid with a voltmeter.
	The solenoid for this outrigger is defective	Replace the solenoid. The solenoid for the front outriggers is located close to the main sliding cylinder. The solenoid for the rear outriggers is located under the aluminum plate at the back of the wrecker.
	Plunger can be broken or bent	Replace the plunger.

Problem	Causes	Solutions
Lack of power and slow operation of the wrecker	The pressure filter is clogged and the high pressure indicator of the pressure filter is red	Replace the filter.
The control panel does not indicate when the boom is centered	The boom center position sensor is burned out	Replace the sensor. It is located in the center (left-right) of the wrecker behind the oil reservoir. To access it, move the sliding rotator to the back of the wrecker.
The winches' cable stop too quickly or too slowly in free spool mode (disengaged)	The air pressure on cable tensioner is too low or too high	Increase or decrease the air pressure of the cable tensioner. The regulator is located between the main winches. This is a trial and error adjustment. Keep adjusting the air pressure of the cable clamp balloon until you find the right adjustment.
The wrecker is out of electricity	The main solenoid does not receive any signal from ignition to activate the solenoid	Check for power and verify that the ground to the solenoid is good. Replace damaged wiring.
	The main solenoid is burned out	Replace the main solenoid located in the main electrical panel.
The rotator or the slide of the sliding rotator cannot be unlocked	Air pressure to the solenoid is too low	Check for an air leak or bent hose.
	The wiring to the solenoid is damaged	Check for power and verify that the ground to the solenoid is good. Replace damaged wiring.
	The solenoid is burned out	Replace the solenoid. It is located behind the control panel on the passenger's side.
	The lock cylinders are damaged	Replace damaged cylinder
Problem folding or unfolding the axle-lift	The cushioning valve is not properly adjusted.	Adjust the cushioning valve, referring to section 4.6.
One or more axle-lift extensions have trouble moving in	The hydraulic pressure is too low	Check the hydraulic pressure. Refer to section 4.4 for the 40/50 CSR and to section 4.5 for the 50/65 CSR.

Problem	Causes	Solutions
(being retracted)	The spool on the valve bank does not complete its stroke	Verify the neighbouring spool and make sure the spool completes its stroke. If this spool does not cover complete its full stroke, something is preventing it from moving freely. Remove the obstruction.
	The wear pads are not in place or not lubricated enough	Make sure that all wear pads are in place and well lubricated.
	One or more axle-lift sections are bent	Use a straight edge to see if all your axle-lift sections are straight. If one is bent, have it repaired. You can also gradually remove the steel spacers one by one and see if that makes a difference.
	The IN\OUT cylinder is bypassing	Completely retract the cylinder. Disconnect the very bottom hose from the tail board. Remove the male quick coupler from the hose and put the opened end of the hose in a pail. Start the hydraulic system and pull the lever to retract it again even if it is already retracted. If oil comes from the hose in the pail, there is something wrong with the cylinder—have it repaired.
The remote control does not control the wrecker	The remote control battery is dead	Recharge the battery. The battery charger is stored inside the electrical panel.
	The antenna of the receiver of the remote control is broken	Replace the antenna. It is located on the right side of the wrecker just above the oil reservoir.
Boom lowers on its own	Holding valves are not properly adjusted	Adjust the holding valves.

Problem	Causes	Solutions
	Rubber or silicone particles in hydraulic fluid are wedged in holding valves or cartridges	Move the boom completely down. Loosen the nut that locks the set screw on the cartridge. Then turn the set screw clockwise until it stops. This opens the valve completely. Retract and extend the boom completely a couple of times. This flushes the cartridge and may release particles. Adjust the cartridge by following section 4.7. Try the boom again to see if this corrects the problem.
	Faulty cartridge	Replace cartridge and adjust it, following section 4.7.
	Faulty boom cylinder	Verify the boom cylinder and have it repaired or rebuilt. Refer to section 5.2 for this procedure.
Oil leaks	Oil leak from hydraulic line	Check all hydraulic lines for oil leaks. Repair any leak found.
	Oil leak due to connection being too tight or too loose	Check all hydraulic connections for oil leaks due to possible over-tightening or under-tightening. Tighten or loosen the oil connection.
No power on electronic control	Faulty PTO switch	Verify the PTO switch and have it repaired. Refer to section 5.3 for this procedure.
Boom extends with a load on axle-lift or retracts by itself with a load on the winch cables	External oil leak	Check for external oil leaks and repair any found.
	The pressure cartridge is not properly adjusted.	Adjust the pressure cartridge. Refer to section 4.7 for CBCG-LJN cartridge.
	Faulty boom cylinder	Verify the boom cylinder and have it repaired or rebuilt. Refer to section 5.2 for this procedure.
Levelling system does not seem to level the wrecker correctly	The levelling system is not calibrated.	Recalibrate the levelling system in the console (only for wreckers equipped with a console). Refer to section 3.12.3.

Problem	Causes	Solutions
Sensor problems: - Levelling/Anti-twist (2) - Front lock - Slewing limit switches - Boom angle indicator (optional) - Boom length ind (opt) - Lift cylinder Pressure sensor (opt)	The sensor is not properly calibrated.	Re-adjust the corresponding sensor in the console. Refer to section 3.12.4

5.2 Verifying the Boom Cylinder

You need to verify the boom cylinder in either of the following situations:

- Boom retracts by itself when lifting a (heavy) load with the winches.
- Boom extends by itself when lifting a load on the axle-lift. The axle-lift tilts down as a result of the boom extending.

The problem might be due to a leaking piston or a broken cartridge in the lock valve block.

The purpose of the following troubleshooting procedure is to isolate a boom cylinder and check it for leakage. If you push oil onto one side of a cylinder and the other side is vented, there should be no oil leaking, unless the piston is broken.

Note: You will need a load (e.g. another vehicle) for this procedure.

1. Lower the axle-lift stinger completely.
2. Choose a lifting point on the vehicle to be towed: it must be both strong enough and have enough clearance for the axle-lift stinger to move.



Using a poor lifting point may damage the vehicle being towed and could cause an accident.

3. Lift the vehicle high enough to attach the safety chains and tensioner to hold the vehicle in place on the axle-lift's T-bar.
4. Retract the boom completely and keep it retracted by using one winch cable hooked to the D-Ring on the wrecker.
5. Stop the hydraulic system.
6. For a two-stage boom, disconnect the two hoses from the lock valves coming from the bottom of the cylinder.

Note: DO NOT DISCONNECT the hose from the pipe that runs along the cylinder itself.

7. For a three-stage boom, disconnect the two hoses coming from the bottom of the big square bushings at the end of the rods of the boom cylinder.
8. Close the end of each hose with plugs. This prevents the oil from leaving the cylinder through the hoses.
9. Start the hydraulic system.
10. Disengage the winch that is holding the boom retracted. If the boom does not stay retracted one cylinder has to be rebuilt or replaced.

5.3 Verifying the PTO

1. Make sure the hydraulic pump is functioning.
2. Verify whether there is power in the control box: you can try to activate the toggle switch located outside the control box on the left side (the control box is located in the left standard tool box). This switch should return the electrical power to the computer.

This is a temporary solution only. The cause of the PTO malfunction must be investigated immediately and the toggle switch turned off as soon as possible.

Operator's Logbook

I hereby certify that I have read this entire manual and that I understand the instructions given for safety, operation, and maintenance of the NRC models 40/50 CSR and 50/65 CSR.

Operator's Name	Date