ZTC1500V Truck Crane Operator's Manual

Edition 1 May 2018



To Users

Zoomlion appreciates your selection of ZOOMLION truck crane for your application.

No one should operate the crane unless they read and understand the information in this manual.

This manual contains the instructions and data on the safety and operation of the truck crane. Follow the operation procedures to make sure that your machine operates at MAXIMUM EFFICIENCY. The operator must keep this manual in the cab of the crane.

If there is anything in the manual that is not clear or you do not understand, please contact our service technician. We (Zoomlion) are NOT responsible for damages from an operator who does not obey the instructions in the *OPERATOR'S MANUAL*.

The *OPERATOR'S MANUAL* is an important part of the crane. If the crane becomes the property of a different person, make sure that the manual stays in the cab of the crane.

The data (data, specifications, illustrations) in this manual is for cranes in production at the time of this manuals publication. We reserve the right to make changes to this manual at any time, without obligation.

The manual has been translated to be best of our knowledge. Zoomlion assumes no liability for translation errors. The Chinese version of the *OPERATOR'S MANUAL* is solely applicable for factual accuracy.

Thank you!

Mobile Crane Branch Company of Zoomlion Heavy Industry Science and Technology Co., Ltd.

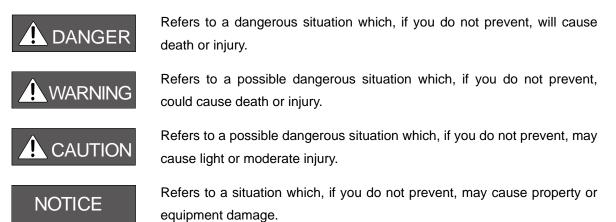
Copyright

Copyright @ 20XX, Zoomlion Heavy Industry Science and Technology Co., Ltd. All rights reserved.

Under the copyright laws, this manual may not be copied, photocopied, reproduced, translated, or reduced to any electronic medium or machine readable form, in whole or part, without the prior written consent of Zoomlion Heavy Industry Science and Technology Co., Ltd.

Safety Instructions

DANGER, WARNING, CAUTION and NOTICE labels are on signs and decals, and as you read this manual to show important instructions. In this manual, the labels follow the paragraph or item they apply to. The markers are as follows:





Contents

To Users				
Safety Ir	nstructi	ons		
Chapter	1 Des	cription of Crane		
1.1	Models	s and name plates	1-1	
	1.1.1	Models		
	1.1.2	Name plates		
	1.1.3	Name plates installation locations	1-2	
	1.1.4	Vehicle identification number (VIN) and its locations		
	1.1.5	Engine model and its manufacturer		
	1.1.6	Engine name plate installation location		
1.2	Crane	components and product description		
	1.2.1	Crane components		
	1.2.2	Product description		
	1.2.3	Boom	1-13	
1.3	Techni	cal data		
	1.3.1	Dimensions		
	1.3.2	Rope diameter & length		
	1.3.3	Lifting capacity		
	1.3.4	Lifting height		
	1.3.5	Axle loads		
	1.3.6	Wheel alignment		
	1.3.7	Protection devices		
	1.3.8	Hook		
	1.3.9	Maximum support strength per outrigger		
	1.3.10	Driving speeds in road driving condition		
	1.3.11	Crane speeds		
	1.3.12	Energy consumption and environmental protection		
	1.3.13	Workplace-related emission value		
	1.3.14			
	1.3.15	Lifting height charts	1-76	



Chapter 2 Safety Guidelines

2.1	Safety	Safety instructions and safety signs2-1		
	2.1.1	Safety instructions	2-1	
	2.1.2	Safety signs	2-1	
2.2	Planni	ng crane operation	2-3	
2.3	Break	in instructions	2-4	
2.4	Gener	al safety technical guidelines	2-5	
	2.4.1	Requirements of the crane operator, rigger and signalman	2-5	
	2.4.2	Selecting an operating site	2-7	
	2.4.3	Supporting	2-9	
	2.4.4	Working conditions	2-11	
	2.4.5	Points for attention for safe operation	2-14	
2.5	5 Hand signals2-19			

Chapter 3 Operation – Crane Chassis

3.1	Driver's cab		3-1
	3.1.1	Overall view	3-1
	3.1.2	Steering wheel assy	3-3
	3.1.3	Instrument panel assy. and display units	3-7
	3.1.4	Center console	3-21
	3.1.5	Air horn button	3-35
	3.1.6	Foot pedal: Engine control	3-35
	3.1.7	Foot pedal: Service brake	3-35
	3.1.8	Foot pedal: Clutch	3-35
	3.1.9	Crane lighting	3-35
	3.1.10	Door – driver's cab	3-37
	3.1.11	Seats in driver's cab	3-38
	3.1.12	2 Attachments	3-41
3.2	Before	e starting up the vehicle	3-42
	3.2.1	Operating conditions	3-42
	3.2.2	General checks before setting off	3-42
	3.2.3	Axle suspension / axle locking system	3-48
	3.2.4	General checks at vehicle start up	3-50
3.3	Driving	g the crane	3-51
	3.3.1	Crane driving conditions	3-51
	3.3.2	Starting and stopping the engine	3-51
	3.3.3	Driving	3-53

	3.3.4	Important control instruments while driving	3-55
	3.3.5	Transmission and clutch operation	3-56
	3.3.6	Steering operation	3-57
	3.3.7	Braking operation	3-58
	3.3.8	Off-road driving	3-60
	3.3.9	Cruise control	3-60
	3.3.10) PTO operation	3-62
	3.3.11	Towing	3-63
	3.3.12	2 Finishing driving operations	3-63
	3.3.13	B Engine error codes and fault diagnosis	3-64
3.4	Outrig	ger operation	3-74
	3.4.1	Install and remove the outrigger pads	3-75
	3.4.2	Extend and retract the outriggers	3-76
3.5	Driving	g operation	3-85
	3.5.1	Move the crane to the job site	3-85
	3.5.2	Crane movement in off-road conditions	
	3.5.3	Park the vehicle	3-86
	3.5.4	Emergency stop on the roadway	
		-	

Chapter 4 Operation – Crane Superstructure

4.1	I.1 Operator's cab		
	4.1.1	Overall view	4-1
	4.1.2	Instrument panel	4-2
	4.1.3	Control boxes	4-15
	4.1.4	Engine control pedal	4-19
	4.1.5	Operator's seat	4-19
4.2	Comp	uter system	4-20
	4.2.1	General	4-20
	4.2.2	Programs	4-22
4.3	Startin	g up the crane	4-45
	4.3.1	Checks before starting up	4-45
	4.3.2	Starting the engine	4-46
4.4	Safety	devices	4-48
	4.4.1	Support control unit	4-48
	4.4.2	Load moment limiter	4-49
	4.4.3	Hoisting limit switch	4-49
	4.4.4	Lowering limit switch	4-51
	4.4.5	Hydraulic safety devices	4-52



	4.4.6	Bypass operation	4-54
	4.4.7	Wind speed warning system	4-55
	4.4.8	Emergency stop button	4-56
4.5	Crane	operation	4-57
	4.5.1	Preparations for crane operation	4-57
	4.5.2	Derricking	4-58
	4.5.3	Telescoping	4-59
	4.5.4	Lifting / lowering	4-60
	4.5.5	Slewing	4-61
	4.5.6	Simultaneous crane movements	4-63
	4.5.7	Rope reeving	4-70
		Central lubricating system	

Chapter 5 Equipment

5.1	Safety technical guidelines for assembly			
5.2	Jib		5-2	
	5.2.1	General	5-2	
	5.2.2	Assembly	5-4	
	5.2.3	Angle settings	5-8	
	5.2.4	Disassembly	5-9	
	5.2.5	Reeving in the auxiliary hoist rope	5-10	
	5.2.6	Electrical connection	5-12	
5.3	Tip bo	om	5-14	
	5.3.1	General	5-14	
	5.3.2	Assembly	5-15	
	5.3.3	Angle settings	5-16	
	5.3.4	Disassembly	5-17	
	5.3.5	Reeving in the hoist rope	5-19	
	5.3.6	Electrical connection	5-21	
5.4	Roost	er sheave	5-22	
	5.4.1	Assembly	5-22	
	5.4.2	Disassembly	5-22	
5.5	Count	erweight	5-23	
	5.5.1	Counterweight and counterweight handler	5-23	
	5.5.2	Assembly	5-25	



Chapter 6 Additional Equipment

6.1	Air conditioning in driver's cab6-		
6.2	Air cor	ditioning in operator's cab	6-1
	6.2.1	System technical data	6-1
	6.2.2	Operating instructions	6-2
	6.2.3	Points for attention	6-3
	6.2.4	Troubleshooting for common failures	6-4
6.3	Remot	e controller (optional)	6-8

Chapter 7 Transportation and Storage

7.1	Transportation	.7-1
7.2	Storage	.7-2

Truck Orane Operator'S Manual

Chapter 1 Description of Crane





Chapter 1 Description of Crane

1.1 Models and name plates

1.1.1 Models

Model in engineering industry: ZTC1500V Chassis model: ZLJ5550JQZV3.2

1.1.2 Name plates

For name plate of crane, refer to Figure 1-1. For name plate of chassis, refer to Figure 1-2.

r r Øzoc	MLION DE	
品牌及型号	Trade Mark & Model] 中联牌 ZTC1500V
产品特征号	Product Characteristic Code	Z T C 1 5 0 0 V
最大额定总起重量	Max. Lifting Capacity	150000 kg
发动机型号	Engine Model	WP12.430N
发动机额定功率	Engine Rated Power] [3 1 6 kW]
发动机净功率	Engine Net Power	314 kW
最大设计总质量	Max. Design Total Mass	54900 kg
整车整备质量	Complete Vehicle Kerb Mass	54705 kg
外形尺寸(长×宽×	高) Overall Dimensions] 15400mm×3000mm×3940mm
车辆识别代号	VIN	
出厂编号	Production No.	
生产日期	Production Date]20×× 年(Y)×× 月(M)]
制造国	Production Country) 中国 China
	中联重科股份	有限公司制造
MANUE	ACTURER: ZOOMLION HEAVY INC	DUSTRY SCIENCE & TECHNOLOGY CO. LTD.

Figure 1-1 Name plate of crane

0 	MLION @#	汽车起重机专用底 TRUCK CRANE SPECIAL PURPOSE CH	盘 ASSIS
品牌及型号	Trade Mark & Model	中联牌ZLJ5550JQZ	
产品特征号	Product Characteristic Code	Z L J 5 5 5 0 J Q Z V 3 . 2	
最大设计总质量	Max. Designed Gross Mass	55000	kg
整备质量	Kerb Mass	2 1 5 0 5	kg
发动机型号	Engine Model	WP12.430N	
发动机额定功率	Engine Rated Power	316	kW
发动机净功率	Engine Net Power	314	kW
车辆识别代号	VIN	$L 5 E 6 H 5 D 4 \times A \times X \times X \times X$	
出厂编号	Production No.	XXXXX	
生产日期	Production Date	20×× 年(Y.) ××	月(M.)
制造国	Production Country	中国	China
	<u>中联重科股份有</u> ACTURER: ZOOMLION HEAVY INDUS		(

Figure 1-2 Name plate of chassis



1.1.3 Name plates installation locations

The name plate of crane is installed on the lower part of operator's cab. Refer to Figure 1-3. The name plate of chassis is installed on the right longitudinal beam of chassis frame. Refer to Figure 1-4.

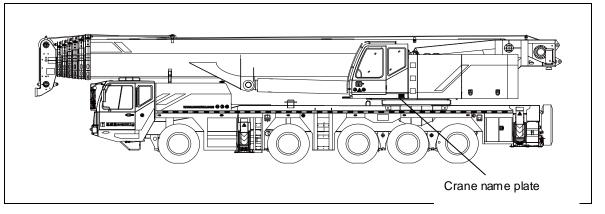


Figure 1-3 Crane name plate

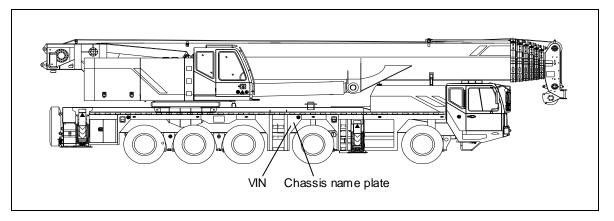


Figure 1-4 Chassis name plate

1.1.4 Vehicle identification number (VIN) and its locations

The VIN of ZTC1500V is L5E6H5D4××A××××, and is stamped in the crane name plate, chassis name plate and chassis frame right side plate behind the center of axle 2. The exact location is shown in Figure 1-4.

1.1.5 Engine model and its manufacturer

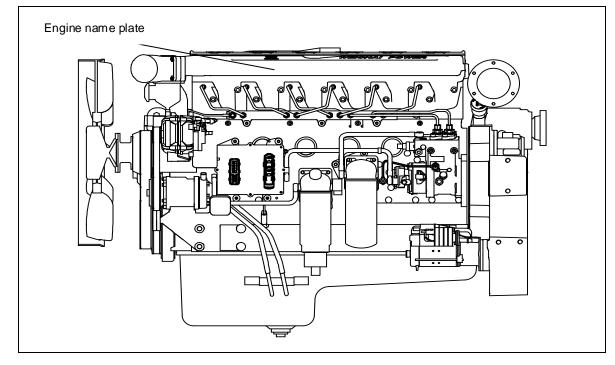
Engine model: WP12.430N Manufacturer: Weichai Power Co., Ltd.

1.1.6 Engine name plate installation location

The engine name plate is installed on the left upper part of the engine. The exact location is shown in Figure 1-5.









Note: Have the above engine data available when communicating with us.



1.2 Crane components and product description

1.2.1 Crane components

For the locations of crane components, please refer to Figures 1-6-1 and 1-6-2. For the description of crane components, please refer to Table 1-1.

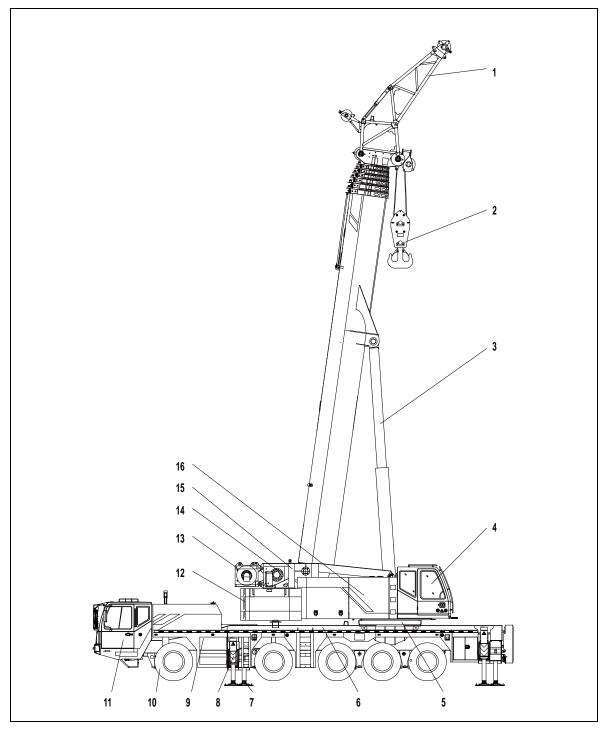


Figure 1-6-1 Crane components I



Pos.	Description	Pos.	Description
1	Tip boom	15	Slewing table
2	Hook block	16	Engine, superstructure
3	Derricking gear	17	Basic boom
4	Operator's cab	18	Telescopic section I
5	Slewing gear	19	Telescopic section II
6	5-axle chassis	20	Telescopic section III
7	Outrigger pad	21	Telescopic section IV
8	Sliding beam	22	Telescopic section V
9	Engine, chassis	23	Telescopic section VI
10	Tire	24	Adapter I
11	Driver's cab	25	Adapter II
12	Counterweight	26	Extension
13	Auxiliary winch	27	Jib section 1
14	Main winch	28	Jib section 2

Table 1-1 Main components of crane



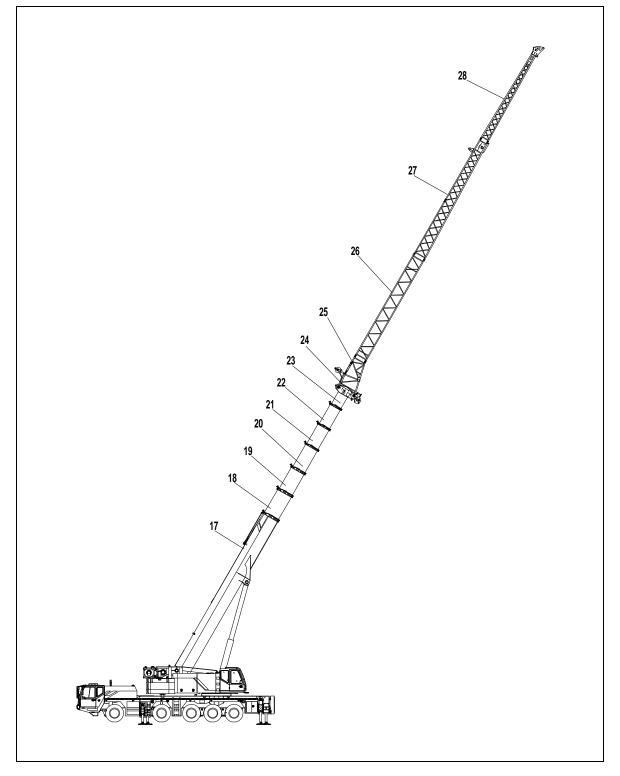


Figure 1-6-2 Crane components II



Pos.	Description	Pos.	Description
1	Tip boom	15	Slewing table
2	Hook block	16	Engine, superstructure
3	Derricking gear	17	Basic boom
4	Operator's cab	18	Telescopic section I
5	Slewing gear	19	Telescopic section II
6	5-axle chassis	20	Telescopic section III
7	Outrigger pad	21	Telescopic section IV
8	Sliding beam	22	Telescopic section V
9	Engine, chassis	23	Telescopic section VI
10	Tire	24	Adapter I
11	Driver's cab	25	Adapter II
12	Counterweight	26	Extension
13	Auxiliary winch	27	Jib section 1
14	Main winch	28	Jib section 2

Table 1-1 Main components of crane



1.2.2 Product description

1.2.2.1 Crane chassis

	105515	
Driver's cab	 Full-width spacious cab made of thin metal plate, with the following features: Safety glass 3 seats with upper backrests & armrests, driver's seat cushioned pneumatically Seat belts, height and inclination adjustable steering wheel Electronic instruments, buttons, control lights Cigarette lighter, hat-and-coat hook Fire extinguisher, MP3 player Rearview camera Electrically controlled combination air conditioning & cab heater. 	
Chassis frame	Distortion-resistant box structure welded from high-tensile steel	
Engine	6-cylinder in-line electronic fuel injection diesel, manufactured by Weichai, model WP12.430N, turbo-charged, inter-cooled (air to air) Performance: 316 kW at 1900 r/min. Maximum output torque: 2060 N·m at 1000 r/min. – 1400 r/min Fuel tank: 400 L	
Sliding beam	2-section sliding beams, extendable and retractable simultaneously	
Clutch	Maintenance-free, dry single-plate pull-type clutch manufactured by Eaton	
Transmission	10-speed 10JSD220A transmission system with manual switching system (mechanically controlled) manufactured by Shaanxi Fast Auto Drive Co., Ltd.	
Transfer case	ZQC2500-10 transfer case, manufactured by Zhuzhou Gear Co., Ltd. With front output and differential, interface for the oil cooler pipeline and interface for ZF stand-by steering pump	
Axles	Manufacturer: Shaanxi Hande Axle Co., Ltd. Total speed ratio (drive axle): 7.63 Axle 4 with longitudinal and transversal differentials and differential locks Axles 2 and 5 with transversal differential and differential lock	
Suspansion	Front suspension: hydro-phoumatic suspension	

SuspensionFront suspension: hydro-pneumatic suspensionRear suspension: leaf spring + balance beam



Description

Number of leaf sprin	g : 0-0/7-7-7
----------------------	---------------

Tires	Axles 1, 2 and 3 are equipped with single tire and axles 4 and 5 are equipped
	with dual tire.
	Tire size: 12.00R24
	Tire pressure: 900 KPa
Steering	SF100-01 steering gear manufactured by Jiangmen Xingjiang Steering Gear
	Co., Ltd. or Nantong Huanqiu Steering Gear Manufacturing Company
	Axles 1, 2 and 5 are steerable.
	Maximum inner steering angle for axle 1: 40°
	Minimum turning diameter:≤23 m
	6 steering cylinders in total
	Each steer axle is installed with two steering cylinders on both sides, thus to
	improve the force acting on the drag link in the steering mechanism.
Brakes	It consists of service brake, parking brake (emergency brake) and auxiliary
	brake.
	Service brake: acting on all wheels
	Parking brake: acting on axles 3, 4 and 5
	Auxiliary brake: consisting of engine compression brake & engine exhaust brake
	Stroke of brake pedal: 95 mm
ABS	With ABS
Electrical system	24 Volt DC, 2 batteries, each with 195 Ah
	Lighting system complies with National Standards, equipped with sliding beam
	illumination.
Air conditioning	Combined air conditioning & cab heater
Platform	All aluminium alloy platform with aluminium alloy forming molding



1.2.2.2 Crane superstructure

Operator's cab	All superstructure switches and display units are arranged in it. Equipped with safety glass The cab can be tilted backwards for 20° during operation.
Main boom	1 basic boom and 6 telescopic sections All telescopic sections are hydraulically controlled and extendable independently of one another via the rapid-cycle single cylinder telescoping system with hydraulic interlocking device. Main boom length: 13.5 m to 72 m
Slewing table	High-tailed, distortion-resistant box structure, providing unlimited horizontal rotation for superstructure components
Engine	WP6 series 6-cylinder in-line diesel, manufactured by Weichai, turbo-charged, inter-cooled (water to air) Performance: 154kW at 2300 r/min. Maximum output torque: 900 N·m at 1200 r/min. – 1800 r/min. Fuel tank: 220 L
Crane drive	Diesel engine and hydraulic pump power system, consisting of 3 axial plunger pumps, with servo control and power control The hydraulic pump in a compact design is flanged directly onto the engine.
Controls	Modern CAN bus technology, computer integrated control, engine load-limit control, computer monitoring diagnosis, electron pedal Variable hydraulic system for open and closed loop operation, with electro-hydraulic proportional control Two 4-way joysticks, self-centering, realizing infinitely variable control of all crane movements
Safety system	Load moment limiter overload protection system, balance valves to prevent pipe and hose breakage, hoisting limit switch and lowering limit switch
Derricking gear	One hydraulic cylinder with a balance valve lifts and lowers the boom from -0.5° to 82°.





Hoist gear	It consists of two winches: main and auxiliary winches.		
	Hydraulic motor with planetary reducer and brake		
	The main winch is driven by a variable motor and the auxiliary		
	winch is driven by a constant motor.		
	Wire rope diameter: φ19 mm		
Slewing gear	Slewing drive device, constant hydraulic motor, planetary reducer and brake		
	The crane is equipped with dual slewing gears.		
Electrical system	24 Volt DC, 2 batteries, each with 185 Ah		
Counterweight	6 moveable counterweight plates can be assembled and		
	disassembled by the counterweight handler on the tail of slewing		
	table.		
	Total weight: 45 tons		
	Weight variants: 0 tons, 10 tons, 17 tons, 24 tons, 32 tons, 45 tons		
Hook block	5 hooks		
	The maximum lifting capacity in various reevings: 110 tons		
	(optional), 90 tons, 55 tons, 25 tons (optional) and 7 tons (1		
	reeving)		
Central lubricating system	All the lubricating points are automatically supplied with the correct grease quantity.		



1.2.2.3 Additional equipment

Jib assy.	2-section reduction-structured lattice jib, can be attached below 0° or 30° in
	relation to the main boom via adapter I and adapter II.
	Length of adapter I + adapter II + jib section 1: 11 m
	Length of adapter I + adapter II + jib section 1 + jib section 2: 18.6 m
	The jib section 2 cannot be used individually.
Jib extension	One optional constant lattice component (8 m)
	The extension connects adapter 2 and jib section 1
	Jib variants:
	Jib variant 1 (11 m): adapter I + adapter II + jib section 1
	Jib variant 2 (18.6 m): adapter I + adapter II + jib section 1 + jib section 2
	Jib variant 3 (26.6 m): adapter I + adapter II + extension + jib section 1 + jib
	section 2
Tip boom	Consisting of one adapter and one-section reduction-structured lattice
	component
	The lattice component is attachable below 0° or 30° in relation to the adapter.
	When the operation does not use the tip boom, assemble the lattice
	component at an angle of 0° to the adapter and install it on the side of the boom.
	Before you begin a lift operation, assemble the tip boom at an angle of 30° to the adapter.
Rooster sheave	Inserted at the boom head of telescopic section VI, 1 reeving
	This option is set up for rapid hoists over the boom nose to improve the working efficiency when the loads are light.
	working emolency when the loads are light.
Air conditioning	Separate air conditionings and cab heaters for operator's cab and driver's cab



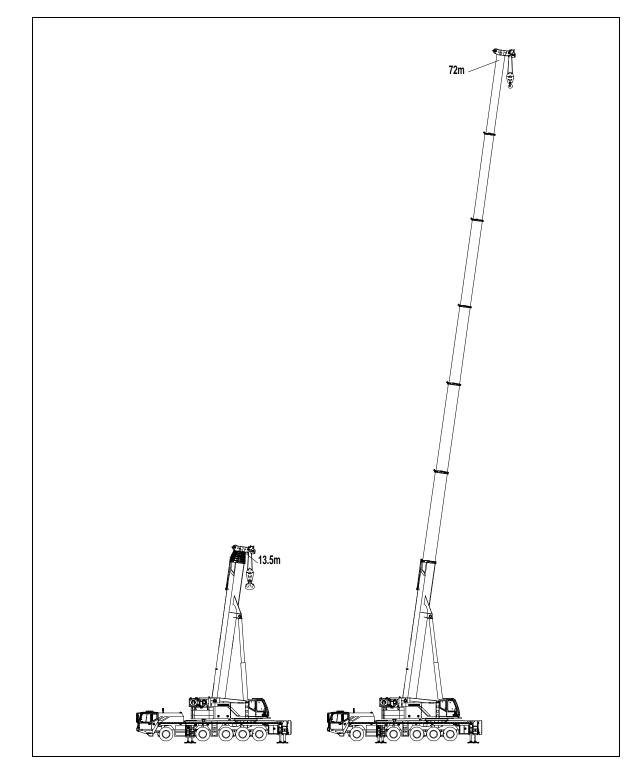
1.2.3 Boom

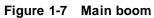
Including main boom, jib and jib extension

1.2.3.1 Main boom

1 basic boom and 6 telescopic sections Main boom length (L): 13.5 m to 72 m Refer to Figure 1-7.









1.2.3.2 Main boom + jib

Main boom length: 63 m or 67.5 m

2 offsets: 0° or 30°

Note:

For jib variant 3 (26.6 m), you can only assemble the jib at an offset of 0° to the telescopic boom.

Adapter I + adapter II length: 2.41 m Jib section 1 length: 8.59 m Jib section 2 length: 7.6 m Extention length: 8 m Tip boom length: 4 m

1.2.3.2.1 Main boom + jib variant 1 (11 m)

Boom lengths:

- Boom length 1 (L) = 63 m + 11 m = 74 m
- Boom length 2 (L) = 67.5 m + 11 m = 78.5 m.

Refer to Figure 1-8.

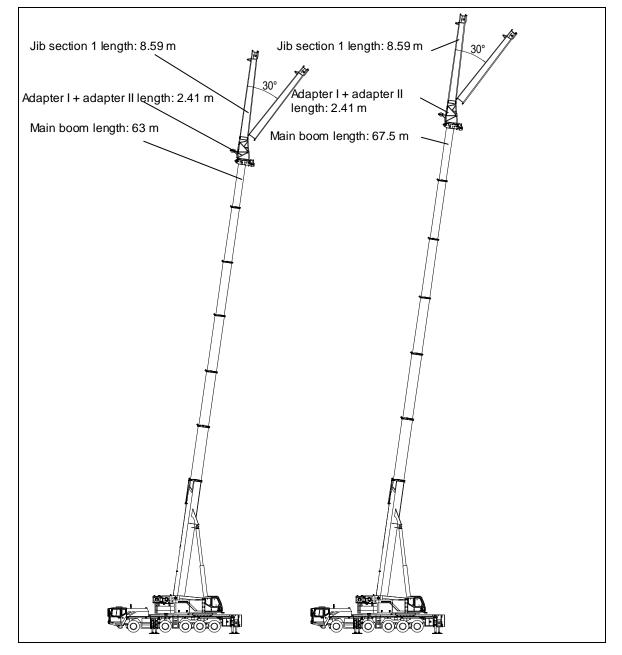


Figure 1-8 Main boom + jib variant 1 (11 m)



1.2.3.2.2 Main boom + jib variant 2 (18.6 m)

Boom lengths:

- Boom length 1 (L) = 63 m + 11 m + 7.6 m = 81.6 m
- Boom length 2 (L) = 67.5 m + 11 m + 7.6 m = 86.1 m.

Refer to Figure 1-9.

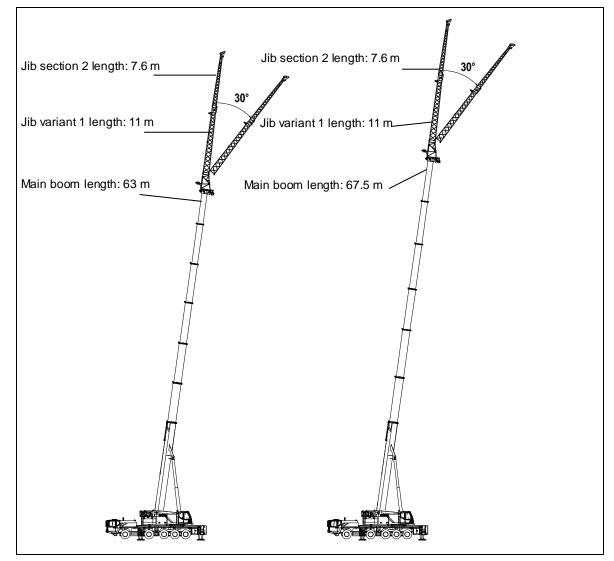


Figure 1-9 Main boom + jib variant 2 (18.6 m)

1.2.3.2.3 Main boom + jib variant 3 (26.6 m)

Boom lengths:

- Boom length 1 (L) = 63 m + 18.6 m + 8 m = 89.6 m
- Boom length 2 (L) = 67.5 m + 18.6 m + 8 m = 94.1 m.
 Refer to Figure 1-10.

scription of Orar

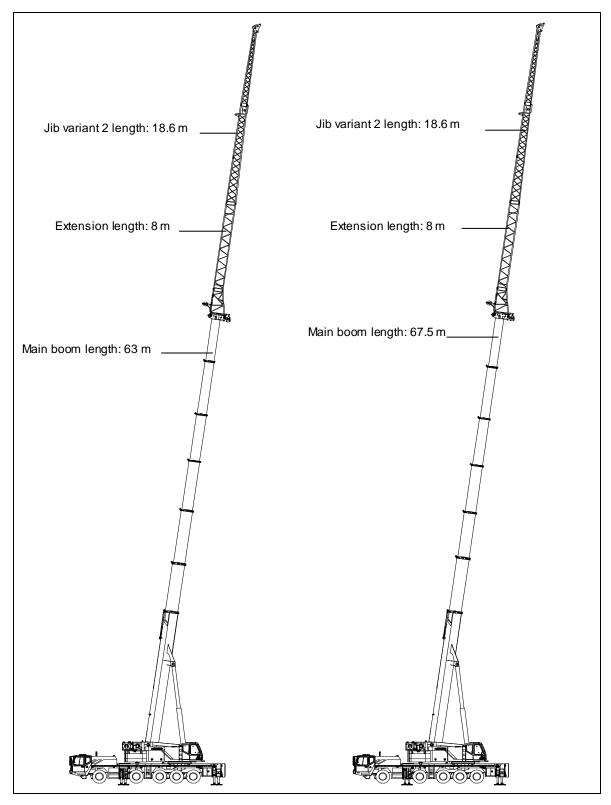


Figure 1-10 Main boom + jib variant 3 (26.6 m)

1.2.3.3 Main boom + tip boom

The combination of the main boom in different length variants and the tip boom can meet your needs. Refer to Figure 1-11.

Note: Before you begin a lift operation with the tip boom, assemble it in an offset of 30°.

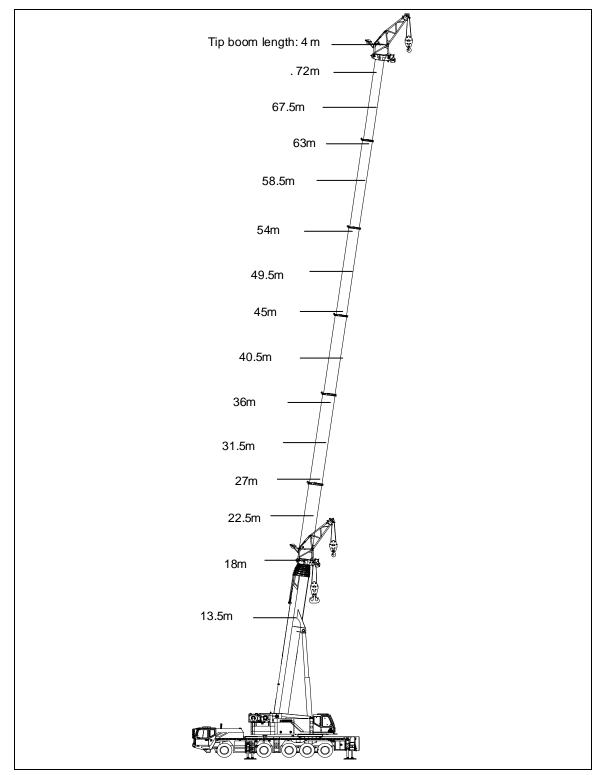


Figure 1-11 Main boom + tip boom

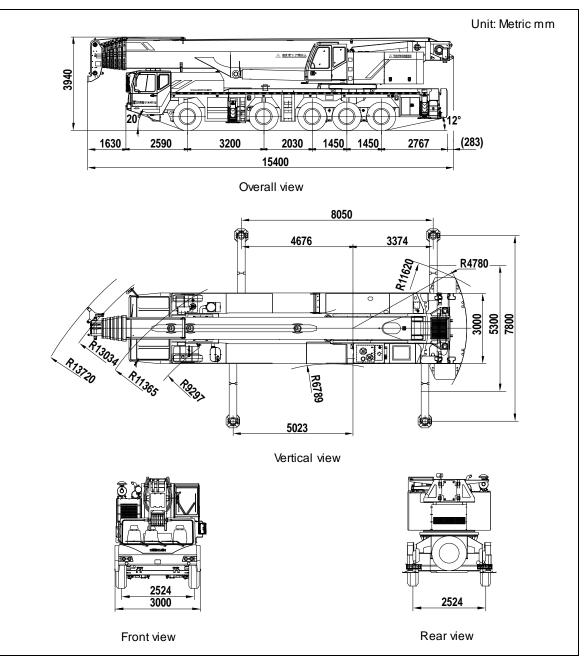
ZOOMLION

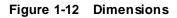


1.3 Technical data

1.3.1 Dimensions

For crane dimensions, refer to Figure 1-12.





1.3.2 Rope diameter & length

Refer to Table 1-2.

Table 1-2 Rope diameter & length

Type of rope	Diameter (mm)	Length (m)	
Main hoist rope	Ф19	350	
Auxiliary hoist rope	Ф19	220	

1.3.3 Lifting capacity

Refer to Table 1-3.

Table 1-3 Lifting capacity

Maximum rated lifting	Maximum load moment of	Maximum load moment of	
capacity (kg)	13.5 m main boom (kN.m)	72 m main boom (kN.m)	
150000	4704	1505	

1.3.4 Lifting height

Refer to Table 1-4.

Table 1-4 Lifting height

Unit: Metric m

ZOOMLION

Maximum lifting height of 13.5 m main boom	Maximum lifting height of 72 m main boom	Maximum lifting height of jib	
13	72.5	87 (95)	

1.3.5 Axle loads

In order to maintain 54900 kg crane deadweight, you should dismantle the items below to avoid axle overload:

- Hook block
- Jib
- Auxiliary winch (including wire ropes)
- Tip boom
- Counterweight
- Other attachments.

For the axle loads with 54900 kg crane deadweight, refer to Table 1-5.

Table 1-5 Axle loads with 54900 kg crane deadweight

						Unit: kg
Axle	1	2	3	4	5	Total weight
Weight	9950	9950	12625	12625	9750	54900

1.3.6 Wheel alignment

Refer to Table 1-6.

Table 1-6 Wheel alignment

ι	Jnit:	o

			Unit: •
Axle	1	2	5
Kingpin inclination angle	5	5	5
Kingpin caster angle	0	0	0
Wheel camber angle	1	1	1

1.3.7 Protection devices

Materials: cold-drawn 08, 16Mn and 960 steel Chassis protection devices (Refer to Figure 1-13.):

- Side protection:
 - Ladder
 - Guard plate
 - Mudguard, etc.
- Rear protection:
 - Rear outrigger boxes
 - Bumper, etc.



Operator's Manual for Truck Orane

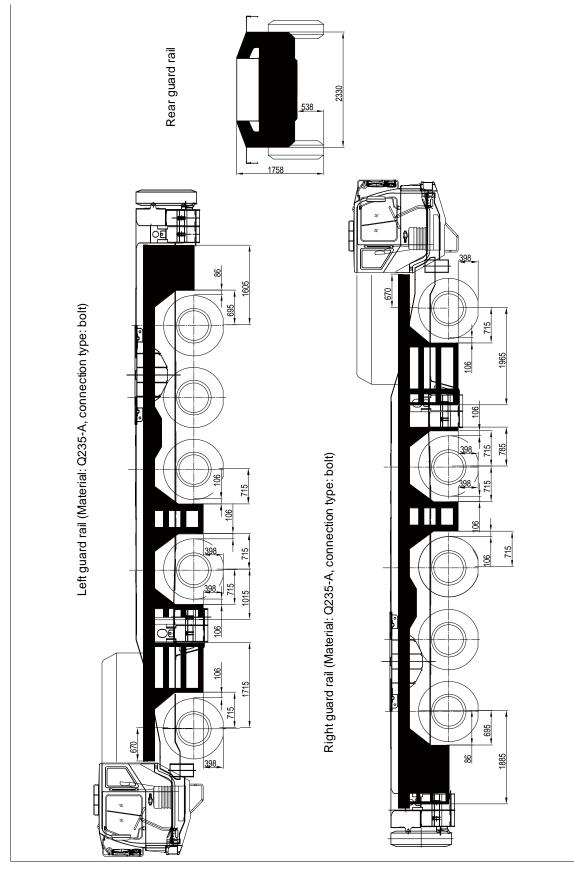


Figure 1-13 Protection devices

1.3.8 Hook

Refer to Table 1-7.

Model (tons)	Number of pulleys	Maximum reeving	Weight (kg)	Remarks
110	7	14	1150	Straight shank with ramshorn hook (optional)
90	7	14	830	Straight shank with ramshorn hook
55	4	8	650	
25	1	3	400	Optional
7	0	1	240	

Table 1-7 Hook configurations

If rope reevings are less than the value listed in the above table during lifting, examine the load on single wire rope to make sure that it is no more than the Maximum permissible lifting capacity of single wire rope.

1.3.9 Maximum support strength per outrigger

Refer to Table 1-8.

 Table 1-8
 Maximum support strength per outrigger

Unit: N

Front	Rear
741000	861000



1.3.10 Driving speeds in road driving condition

Refer to Table 1-9.

Road	1	2	3	4	5	6	7	8	9	10			
gear									-				
Speed	5.4	7.3	9.9	13.3	18.0	24.1	32.5	44.4	59.4	78			
(km/h)	5.4	7.5	9.9	15.5	10.0	24.1	52.5	44.4	59.4	70			
Road	R1	R2						Ν	laximu	n			
gear	ΓI	ΓZ						gr	adeabil	ity			
Speed	5.0	05.4						40% (T	he heigh	nt above			
(km/h)	5.6	25.1						sea le	evel≤20	00 m)			
Minimum g	ground cl	earance	320 mm										
Minimum t	urning di	ameter	≤ 23m										
	Mini	mum brak	e distar	e distance ≤ 10 m (At an initial speed of 30 km/h)									

Table 1-9 Driving speeds in road driving condition

1.3.11 Crane speeds

The drives on crane superstructure can realize infinitely variable control. Refer to Table 1-10.

Drives	Speeds	Remarks
Maximum hoist rope speed (main winch)	114 m/min.	Drum 4 th layer
Maximum hoist rope speed (auxiliary winch)	75 m/min.	Drum 3 rd layer
Slewing gear	0 – 1.4 r/min.	
Derricking gear	Approx. 94 seconds	-0.5° to 82°
Telescoping system	Approx. 860 seconds	13.5 m to 72 m Affected by temperature and engine RPM



1.3.12 Energy consumption and environmental protection

Refer to Table 1-11.

Table 1-11 Energy consumption and environmental protection

Engino	Limits for exhaust pollutants and	Fuel	Fuel standards			
Engine	smoke	consumption	Fuel Standards			
		78 L/100 km				
Chassis	GB3847-2005 GB17691-2005 Tier 3	(The height	Diesel oil (National			
C112 551 5	GD3647-2003 GD17691-2003 Het 3	above sea level	stage III and above)			
		≤ 2000 m)				
Superstructure	GB3847-2005 GB17691-2005 Tier 3		Diesel oil (National			
Superstructure	GB3047-2003 GB17091-2005 Her 3		stage III and above)			

1.3.13 Workplace-related emission value

Refer to Table 1-12.

Table 1-12	Workplace-related emission value
------------	----------------------------------

		Unit: db						
Sound pressure level at	Stationary noise							
nominal RPM	Left ear	Right ear						
Driver's cab, driver's side	87	87						
Driver's cab, passenger's side	٤	37						
Operator's cab	87	87						

1.3.14 Lifting capacity tables

For the lifting capacity tables for the main boom, please refer to Table 1-13 to Table 1-21. For the lifting capacity tables for the main boom + jib, please refer to Table 1-22 to Table 1-42. For the lifting capacity tables for the main boom + tip boom, please refer to Table 1-43 to Table 1-46.

The OMs for the data indicated with an asterisk (*) in the lifting capacity tables are as follows:

- With 110 tons hook
- Rope reeving of 14.



Table 1-13 Main boom

Unit: Metric tons

		Outr	iaaers	fully e	extend	ed. wit	h 45 to	ons co	ounterv	veight	over	full ra			etric tons
Radius		Outi	199013				boom			Cigin			ige		Radius
(m)	13.5	18	22.5	27	31.5	36	40.5	45	49.5	54	58.5	63	67.5	72	(m)
3	150*	100*	90												3
3.5	105*	95*	87	75											3.5
4	100*	90	83	75											4
4.5	96*	85	78	75	60										4.5
5	92*	80	73	70	58										5
5.5	86	75	68	65	55	45									5.5
6	80	70	63	60	52	45									6
7	67	65	58	55	49	45	35								7
8	58	58	53	50	46	43	33								8
9	50	50	50	47	43	41	30.5	28							9
10		44	44	44	40	38	29	28							10
11		39	39	39	37.5	35.5	27.5	26	23						11
12		35	35	35	35	33	26	24	21.5	19					12
14			28	27.5	28.5	29	23.5	21.4	19	17	15				14
16			22.5	22	23	23.5	21.5	19.2	17.2	15.4	13.5	12			16
18				18	18.8	19.5	19.5	17	15.6	13.9	12.5	11	9		18
20				15	15.8	16.5	17	15.2	14	12.6	11.5	10.1	8.2	7	20
22					13.3	14	14.5	13.4	12.4	11.3	10.5	9.3	7.6	6.5	22
24					11.4	12.1	12.5	11.8	11.1	10.2	9.5	8.5	7.1	6.1	24
26						10.4	11	10.4	10	9.2	8.6	7.8	6.6	5.7	26
28						9	9.6	9	8.9	8.4	7.9	7.2	6.2	5.4	28
30							8.4	7.8	7.8	7.6	7.2	6.7	5.8	5.1	30
32							7.4	6.8	6.8	6.8	6.5	6.2	5.4	4.8	32
34								6	6	6.1	5.9	5.7	5	4.5	34
36								5.2	5.2	5.3	5.3	5.2	4.7	4.2	36
38 40				1					4.5 3.9	4.6 4	4.7 4.2	4.7 4.3	4.4 4.1	3.9 3.7	38 40
40									3.9	3.4	3.7	4.3 3.9	3.8	3.7	40
42										3.4 2.9	3.7	3.9 3.5	3.0 3.5	3.5	42
44										2.9	2.7	3.1	3.3	3	44
40											2.7	2.7	3.3	2.8	40
50											2.5	2.7	2.7	2.5	50
52												1.9	2.7	2.3	52
54												1.3	1.9	2.5	54
56													1.6	1.7	56
58													1.0	1.4	58
60														1.4	60
Reeving	14	14	12	10	8	6	5	4	3	3	2	2	2	2	Reeving
Hook			90 t	10	v	•	55 t		•	v	25		-	-	Hook
	1	1	1	2	2	2	2	3	3	3	3	3	3	4	
	1	2	2	2	2	2	2	2	3	3	3	3	3	4	
≣ ge	1	1	2	2	2	2	2	2	2	3	3	3	3	4	g bi
escopi mode ≷	1	1	1	1	2	2	2	2	2	2	3	3	3	4	escopi mode
Telescoping mode <	1	1	1	1	1	2	2	2	2	2	2	3	3	4	 < ⊰ ≡ = Telescoping mode
	1	1		1	1	1	2	2	2	2	2	2	3	4	
Not				-			_	-	_		_		-		<u> </u>

Note:

The data indicated with an asterisk (*) are suitable for 110 tons hook. (150 tons hook is nominal one.)



Table 1-14 Main boom

			Outr	iaaers	fully e	extend	ed. wit	h 32 te	ons co	ounterv	veight	over	full rai			
Rad	ius		Outi	199010			Main I				reigin	, 0 101		igo		Radius
(m		13.5	18	22.5	27	31.5	36	40.5	45	49.5	54	58.5	63	67.5	72	(m)
3		110*	100*	90												3
3.5		105*	95*	87	75											3.5
4		100*	90	83	75											4
4.5		94*	85	78	75	60										4.5
5		88	80	73	70	58										5
5.5		82	75	68	65	55	45									5.5
6		76	70	63	60	52	45									6
7		62	61	58	55	49	45	35								7
8		53	53	53	50	46	43	33								8
9		46	46	46	46	43	41	30.5	28							9
10			40	40	40	40	38	29	28							10
11			35	35	35	36	35.5	27.5	26	23	10					11
12			31	31	30.5	31	32	26	24	21.5	19	1.5				12
14				24	23.5	24	25	23.5	21.4	19	17	15	46			14
16				19	18.5	19	20	21	19.2	17.2	15.4	13.5	12	•		16
18					15	15.5	16	17	16.5	15.6	13.9	12.5	11	9	-	18
20					12	13	13.5	14.5	13.8	13.8	12.6	11.5	10.1	8.2	7	20
22						10.5	11	12	11.5	11.5	11.3	10.5	9.3	7.6	6.5	22
24						9	9.5	10.5	10	10	10	9.5	8.5	7.1	6.1	24
26							8.2	9	8.5	8.5	8.6	8.6	7.8	6.6	5.7	26
28							7.2	8	7.4	7.4	7.5	7.8	7.2	6.2	5.4	28
30 32								6.8 6	6.3 5.4	6.3 5.4	6.4 5.5	6.7 5.8	6.7 6.1	5.8 5.4	5.1 4.8	30 32
34								0	4.6	4.6	4.7	5.0	5.3	5.4	4.0	34
34 36									4.6 3.9	4.6 3.9	4.7	5 4.3	5.3 4.6	5 4.6	4.5	36
38									5.9	3.3	3.4	3.7	4.0	4.0	3.9	38
40										2.7	2.9	3.2	3.5	3.8	3.7	40
42										2.1	2.3	2.7	3	3.4	3.4	40
44											1.9	2.2	2.5	2.9	3	44
46											1.5	1.8	2.3	2.3	2.5	46
48												1.4	1.7	2.1	2.2	48
50													1.4	1.7	1.8	50
52														1.4	1.5	52
54														1.1	1.2	54
Reev	/ina	14	14	12	10	8	6	5	4	3	3	2	2	2	2	Reevin
Hoo				90 t				55 t				- 25		_	_	Hook
	Ι	1	1	1	2	2	2	2	3	3	3	3	3	3	4	
p l	П	1	2	2	2	2	2	2	2	3	3	3	3	3	4	<u> </u>
ll de ll		1	1	2	2	2	2	2	2	2	3	3	3	3	4	ei Bi
esc mo	IV	1	1	1	1	2	2	2	2	2	2	3	3	3	4	 < <l< td=""></l<>
lelescoping mode	V	1	1	1	1	1	2	2	2	2	2	2	3	3	4	Leik
	VI	1	1	1	1	1	1	2	2	2	2	2	2	3	4	VI

Note :



Table 1-15 Main boom

		Outr	iggers	s fully (extend	led, wi	th 24 to	ons co	ounterv	veight	, over	full ra	nge		
Radius						Main I	boom	lengt	h (m)						Radius
(m)	13.5	18	22.5	27	31.5	36	40.5	45	49.5	54	58.5	63	67.5	72	(m)
3	110*	100*	90												3
3.5	105*	95*	87	75											3.5
4	100*	90	83	75											4
4.5	91*	85	78	75	60										4.5
5	84	80	73	70	58										5
5.5	78	75	68	65	55	45									5.5
6	71	70	63	60	52	45									6
7	57	56	56	55	49	45	35								7
8	48	48	48	47	46	43	33								8
9	41	41	41	41	42	41	30.5	28							9
10		35	36	36	36.5	37.5	29	28							10
11		30	31	30	30.5	32	27.5	26	23						11
12		26	27	26	26.5	27.5	25.8	24	21.5	19					12
14			20.5	19.5	20	21.5	22	21.2	19	17	15				14
16			16	15	15.5	17	17.5	17	17	15.4	13.5	12			16
18				12	12.5	13.5	14.3	13.8	13.6	13.8	12.5	11	9		18
20				9.5	10.5	11	12	11	11	11.2	11.5	10.1	8.2	7	20
22					8.5	9.3	10	9.4	9.4	9.6	10	9.3	7.6	6.5	22
24					7	7.8	8.5	8	8	8.2	8.5	8.5	7.1	6.1	24
26						6.6	7.3	6.7	6.7	6.9	7.2	7.5	6.6	5.7	26
28						5.5	6.2	5.7	5.7	5.9	6.2	6.5	6.1	5.4	28
30							5.3	4.8	4.8	4.9	5.2	5.5	5.6	5.1	30
32							4.5	4	4	4.1	4.4	4.7	5.1	4.8	32
34								3.3	3.3	3.4	3.7	4.1	4.5	4.5	34
36								2.6	2.6	2.7	3	3.4	3.8	3.8	36
38									2.1	2.2	2.5	2.9	3.3	3.3	38
40									1.6	1.7	2	2.4	2.8	2.8	40
42										1.2	1.5	1.9	2.3	2.3	42
44											1.1	1.5	1.9	1.9	44
46												1.1	1.5	1.5	46
48													1.2	1.2	48
Reeving	14	14	12	10	8	6	5	4	3	3	2	2	2	2	Reeving
Hook			90 t				55 t				25	t			Hook
l g	1	1	1	2	2	2	2	3	3	3	3	3	3	4	de l
Telescoping mode	1	2	2	2	2	2	2	2	3	3	3	3	3	4	≤ < < ≡ = -
ing III	1	1	2	2	2	2	2	2	2	3	3	3	3	4	ing III
do IV	1	1	1	1	2	2	2	2	2	2	3	3	3	4	IV g
V	1	1	1	1	1	2	2	2	2	2	2	3	3	4	ele v
ΨVI	1	1	1	1	1	1	2	2	2	2	2	2	3	4	νĔ

Note:



Table 1-16 Main boom

Unit: Metric tons

			Outrig	ggersf	iully ex	ktende	d, wi	th 17 to	ons co	ounterv	veight	, over	full ra	ange		
Rad	ius				-			boom						<u> </u>		Radius
(m	ו)	13.5	18	22.5	27	31.5	36	40.5	45	49.5	54	58.5	63	67.5	72	(m)
3	3	110*	100*	90												3
3.	5	105*	95*	87	75											3.5
4	1	96*	90	83	75											4
4.	5	86	85	78	75	60										4.5
5	5	78	77	73	70	58										5
5.	5	69	68	68	65	55	45									5.5
6	6	61	60	61	60	52	45									6
7	7	49	49	50	49	47	44	35								7
8	3	44	44	44	44	44	43	33								8
g		34	34	34	35	34	34	30	27							9
1(29	29	29	30	30	28	27							10
1			23	23	23	23	23	23	23	23						11
1:	2		21	21	21	21	21	21	21	19	18					12
14				16	15.5	16	16	17	16.5	16.5	16	16				14
10	6			12	12	12	13	13.5	13	13	13	13	12			16
18					9.8	10	10	10	10	10	10	10	9	7		18
20					6.4	7.2	8	8.5	8.2	8.2	8.2	8.2	8	6	6	20
22						5.7	6.4	7.2	6.6	6.6	6.7	7	7.3	5.5	5.5	22
24						4	4.7	5.4	4.8	4.8	4.9	5.1	5.3	5.3	5.3	24
20							3.7	4.4	3.8	3.8	3.9	4.2	4.5	5	5	26
28							2.9	3.6	3.1	3.1	3.2	3.5	3.8	4.2	4.2	28
30								2.8	2.3	2.3	2.7	2.7	3	3.4	3.4	30
32								2.2	1.6	1.6	1.9	1.9	2.3	2.7	2.7	32
34									1.2	1.2	1.5	1.5	1.8	2.2	2.2	34
30											1.2	1.2	1.4	1.8	1.8	36
38													1.2	1.5	1.5	38
														1.2	1.2	40
Ree		14	14	12	10	8	6	5	4	3	3	2	2	2	2	Reeving
Ho	ok			90 t				55 t				25	t			Hook
d)	Ι	1	1	2	2	2	2	3	3	3	3	3	3	4	4	I
nod	Ш	2	2	2	2	2	2	2	3	3	3	3	3	4	4	II por
ing r	III	1	2	2	2	2	2	2	2	3	3	3	3	4	4	≣ig III
cop	IV	1	1	1	2	2	2	2	2	2	3	3	3	4	4	IV g
Telescoping mode	V	1	1	1	1	2	2	2	2	2	2	3	3	4	4	Telescoping mode
F	VI	1	1	1	1	1	2	2	2	2	2	2	3	4	4	V

Note :



Table 1-17 Main boom

		(Dutriac	jers fu	llv ex	tende	d. wit	h 10 to	ons co	ounter	weiał	nt. ove	r full	range	01110	
Radi	ius		Jan ige					boom			noigi	n, 010		lange		Radius
(m		13.5	18	22.5	27	31.5	36	40.5	45	49.5	54	58.5	63	67.5	72	(m)
3	;	110*	100*	90												3
3.	5	105*	95*	87	75											3.5
4	ļ	96*	90	83	75											4
4.	5	86	85	78	75	60										4.5
5	;	78	77	73	70	58										5
5.	5	69	68	68	65	55	45									5.5
6	;	61	60	61	60	52	45									6
7	•	49	49	50	49	47	44	35								7
8	;	40	40	40	40	40	40	33								8
9)	31	31	32	31	32	33	30	27							9
10	0		25	26	25	26	27	28	26							10
11	1		21	22	21	22	23	24	23	22						11
12	2		18	18.5	18	18.5	19	20	19	18	18					12
14	4			13.5	13	13.5	14	15	14	14	14	14				14
16	6			10.3	9.8	10.5	11	11.5	11	11	11	11	10			16
18					7.3	8	8.5	9	9	9	9	9	9	7		18
20	C				5.4	6.2	7	7.5	7.2	7.2	7.2	7.5	8	6	6	20
22	2					4.7	5.4	6.2	5.6	5.6	5.7	6	6.3	5.5	5.5	22
24						3.5	4.2	4.9	4.3	4.3	4.4	4.7	5	5	5	24
26	ô						3.2	3.9	3.3	3.3	3.4	3.7	4	4.5	4.5	26
28							2.4	3.1	2.5	2.5	2.7	3	3.3	3.7	3.7	28
30								2.4	1.8	1.8	2	2.2	2.5	3	3	30
32	2							1.7	1.1	1.1	1.3	1.5	1.9	2.3	2.3	32
34													1.4	1.8	1.8	34
36	6													1.3	1.3	36
Reev	ving	14	14	12	10	8	6	5	4	3	3	2	2	2	2	Reeving
Ho	ok			90 t				55 t				25	t			Hook
۵	Ι	1	1	1	2	2	2	2	3	3	3	3	3	3	4	I
node	Ш	1	2	2	2	2	2	2	2	3	3	3	3	3	4	= pou
ing r	III	1	1	2	2	2	2	2	2	2	3	3	3	3	4	ing r
cob	IV	1	1	1	1	2	2	2	2	2	2	3	3	3	4	IV IV
Telescoping mode	V	1	1	1	1	1	2	2	2	2	2	2	3	3	4	<
F	VI	1	1	1	1	1	1	2	2	2	2	2	2	3	4	V F

Note:



Table 1-18 Main boom

			Outri	iqqers	fully e	extend	led, w	vithout	coui	nterwe	eight,	over f	ull ra	nge		101110	
Ra	dius			00				oom l						0		Ra	dius
(m)	13.5	18	22.5	27	31.5	36	40.5	45	49.5	54	58.5	63	67.5	72	(m)
	3	105*	100*	90													3
;	3.5	98*	95*	87	75											3	3.5
	4	90	90	83	75												4
4	4.5	78	78	78	75	60										4	1.5
	5	69	69	69	68	58											5
Ę	5.5	60	60	60	60	55	45									5	5.5
	6	52	52	52	52	48	45										6
	7	39	39	40	39	39	40	34									7
	8	29	29	30	29	30	31	31									8
	9	22	22	22	21.5	22	23	25	23								9
	10		18	18	17.5	18	19	20	19								10
	11		14.5	15	14	15	16	17	16	16							11
	12		11.5	12	11	12	13	14	13	13	13						12
	14			8.5	7.5	8.5	9.2	10	9.5	9.5	9.5	10					14
	16			6	5	6	6.5	7.2	6.6	6.6	6.8	7	7				16
	18				3.2	4	4.5	5.2	4.6	4.6	4.8	5	5	5			18
:	20				1.8	2.6	3.5	4.2	3.6	3.6	3.8	4	4	4	4	:	20
:	22					1.5	2.3	3	2.4	2.4	2.6	2.8	2.8	3.5	3.5	2	22
	24						1.3	2.2	1.4	1.4	1.6	1.8	1.8	2.6	2.6	2	24
:	26							1.3				1.1	1.1	1.9	1.9	2	26
	28													1.2	1.2	1	28
Ree	eving	14	14	12	10	8	6	5	3	3	2	2	2	2	2	Ree	ving
Н	ook			90 t				55 t				2	5 t			H	ook
е С	I	1	1	1	2	2	2	2	3	3	3	3	3	3	4	Ι	<u>e</u>
Telescoping mode		1	2	2	2	2	2	2	2	3	3	3	3	3	4		Telescoping mode
ping	III	1	1	2	2	2	2	2	2	2	3	3	3	3	4	III IV	ping
esco	IV V	1	1	1	1	2	2	2	2	2	2	3 2	3 3	3 3	4	IV V	escc
Tel	VI	1	1	1	1	1	2	2	2	2	2	2	3 2	3	4	V	Tel
	VI	· ·						2	2	2	2	2	2	5	-1	VI	

Note:



Table 1-19 Main boom

Unit: Metric tons

	Outri	ggers	intern	nediate	ely ext	ende	d, witl	h 45 to	ons co	unterv	veight	, over	full ra	nge	
Radius						Main	boom	lengt	h (m)						Radius
(m)	13.5	18	22.5	27	31.5	36	40.5	45	49.5	54	58.5	63	67.5	72	(m)
3	110*	100*	90												3
3.5	104*	95*	87	75											3.5
4	96*	90	83	75											4
4.5	88	85	78	75	60										4.5
5	82	80	73	70	58										5
5.5	76	75	68	65	55	45									5.5
6	69	69	63	60	52	45									6
7	56	56	56	55	49	45	35								7
8	48	48	48	48	45	43	33								8
9	40	40	40	40	40	40	30.5	28							9
10		34	34	33.5	34	35	29	28							10
11		29	29	28.5	29	30	27.5	26	23						11
12		25	25	24.5	25	26	25.5	24	21.5	19					12
14			19	18.5	19	20	21	20.5	19	17	15				14
16			15	14.5	15	16	17	16	16	15.4	13.5	12			16
18				11.5	12	13	14	13.3	13.3	13.5	12.5	11	9		18
20				9.5	10	11	11.5	11	11	11.2	11.4	10.1	8.2	7	20
22					8.5	9	9.6	9.2	9.2	9.3	9.5	9.3	7.6	6.5	22
24					7	7.6	8.3	7.8	7.7	7.8	8	8.4	7.1	6.1	24
26						6.5	7.2	6.6	6.5	6.7	7	7.4	6.6	5.7	26
28						5.5	6.2	5.6	5.5	5.7	6	6.2	6.1	5.4	28
30							5.2	4.6	4.5	4.7	5	5.4	5.6	5.1	30
32							4.4	3.9	3.8	4	4.3	4.7	5	4.7	32
34								3.2	3.1	3.3	3.6	4	4.3	4.3	34
36								2.6	2.5	2.7	3	3.4	3.8	3.8	36
38									2	2.2	2.5	2.8	3.2	3.2	38
40									1.5	1.7	2	2.3	2.7	2.7	40
42										1.2	1.5	1.8	2.2	2.2	42
44											1.1	1.4	1.7	1.7	44
46												1.1	1.4	1.4	46
48													1.1	1.1	48
Reeving	16	14	12	10	8	6	5	4	3	3	2	2	2	2	Reevin
Hook			90 t				55 t				25	t			Hook
1	1	1	1	2	2	2	2	3	3	3	3	3	3	4	
	1	2	2	2	2	2	2	2	3	3	3	3	3	4	i =
mode III ⊳	1	1	2	2	2	2	2	2	2	3	3	3	3	4	lescopi
	1	1	1	1	2	2	2	2	2	2	3 2	<u>3</u> 3	3	4	<
VI	1	1	1	1	1	1	2	2	2	2	2	2	3	4	VI .

Note:

The data indicated with an **asterisk** (*) are suitable for 110 tons hook.

Des

Table 1-20 Main boom

Unit: Metric tons

		Outr	iggers	intern	nediate	ely ext	ended	, with	32 ton	s cour	nterw	eight,	over f	full rar	nge	
Rad	lius						Main b	oom le	ength ((m)						Radius
(m	n)	13.5	18	22.5	27	31.5	36	40.5	45	49.5	54	58.5	63	67.5	72	(m)
3	3	110*	100*	90												3
3.	.5	102*	95*	87	75											3.5
2	4	93*	90	83	75											4
4.	.5	84	84	78	75	60										4.5
5	5	77	77	73	70	58										5
5.	.5	72	72	68	65	55	45									5.5
6	6	63	63	63	60	52	45									6
7	7	51	51	51	52	48	45	35								7
8	3	42	42	43	42	43	43	33								8
ç	9	34	34	35	34	35	36	30.5	28							9
1	0		28	29	28	29	30	28.5	28							10
1	1		24	25	24	25	26	26.5	26	23						11
1	2		20	21	20	21	22	23	22.5	21.5	19					12
1	4			16	15.2	16	17	18	17.5	17.5	17	15				14
1	6			12.5	11.7	12.5	13.5	14.3	13.8	13.8	14	13.5	12			16
1	8				9.2	10	11	11.4	10.8	10.8	11	11.3	11	9		18
2	0				7.4	8.2	9	9.5	9	9	9.2	9.5	9.8	8.2	7	20
2	2					6.5	7.3	8	7.3	7.3	7.5	7.7	8.2	7.4	6.5	22
2	4					5.3	6	6.6	6.1	6.1	6.3	6.5	7	6.6	6	24
2							5	5.5	5	5	5.2	5.5	5.8	5.8	5.5	26
2	8						4	4.6	4.1	4.1	4.3	4.5	4.8	5	5	28
3	0							3.8	3.3	3.3	3.5	3.7	4.1	4.5	4.5	30
3	2							3.1	2.6	2.6	2.8	3	3.3	3.7	3.7	32
3	4								1.9	1.9	2.1	2.3	2.6	3	3	34
3	6								1.4	1.4	1.6	1.8	2.1	2.5	2.5	36
3											1.1	1.3	1.6	2	2	38
4	0												1.2	1.6	1.6	40
4	2													1.2	1.2	42
Reev	ving	14	14	12	10	8	6	5	4	3	3	2	2	2	2	Reeving
Ho	ok			90 t				55 t				25				Hook
e	Ι	1	1	1	2	2	2	2	3	3	3	3	3	3	4	<u>ه</u> ۱
moc	II	1	2	2	2	2	2	2	2	3	3	3	3	3	4	II pom
ing	III	1	1	2	2	2	2	2	2	2	3	3	3	3	4	III I
scop	N	1	1	1	1	2	2	2	2	2	2	3	3	3	4	IV dog
Telescoping mode	V	1	1	1	1	1	2	2	2	2	2	2	3	3	4	Telescoping mode
н	VI	1	1	1	1	1	1	2	2	2	2	2	2	3	4	VI F

Note:



Table 1-21 Main boom

Unit: Metric tons

		Outri	iggers	interm	nediat	ely ex	tended	l, with	24 tor	ns cou	nterw	eight,	over	full ra	nge		
Rad							Main I	oom l	ength	(m)						Rac	dius
(n	n)	13.5	18	22.5	27	31.5	36	40.5	45	49.5	54	58.5	63	67.5	72	(r	n)
З	3	110*	100*	90													3
3.	.5	101*	95*	87	75											3	8.5
4	ł	92*	90	83	75												4
4.	.5	83	83	78	75	60										4	.5
5	5	75	75	73	70	58										:	5
5.	5	67	67	66	65	55	45									5	5.5
6	6	58	58	58	57	52	45									ĺ	6
7	7	45	45	45	44	44	44	35									7
8	3	35	35	36	35	35	36	33								••	8
ç)	28	28	29	28	29	30	30	28							U,	9
1	0		23	24	23	24	25	26	25							1	0
1	1		19.5	20	19	20	21	22	21	20						1	1
1:	2		16.5	17	16	17	17.5	18	18	18	16					1	2
1	4			13	12	12.5	13	13.5	13.5	13.5	13	13				1	4
1	6			10	9.3	10	10.5	11.2	10.9	10.9	11	11	11			1	6
18	8				7	7.6	8.4	9.2	8.6	8.6	8.7	9	9	8.5		1	8
2	0				5.3	6	6.6	7.4	6.9	6.9	7	7.3	7.5	7.5	7	2	20
2	2					4.6	5.3	6	5.5	5.4	5.5	5.8	6	6.5	6	2	22
2	4					3.5	4.2	5	4.4	4.3	4.4	4.7	5	5.5	5	2	24
2	6						3.2	4	3.4	3.3	3.5	3.8	4.1	4.5	4.2	2	26
2	8						2.4	3.2	2.6	2.5	2.7	3	3.3	3.7	3.7	2	28
3	0							2.4	1.9	1.8	2	2.3	2.6	3	3	3	30
3	2							1.8	1.3	1.2	1.4	1.7	2	2.4	2.4	3	32
3	4											1.1	1.4	1.8	1.8	3	34
3	6													1.4	1.4	3	36
Ree	ving	16	14	12	10	8	6	5	4	3	3	2	2	2	2	Ree	eving
Ho	ok			90 t				55 t				25	i t			Ho	ook
Ð	Ι	1	1	1	2	2	2	2	3	3	3	3	3	3	4	Ι	đ
mode	Ш	1	2	2	2	2	2	2	2	3	3	3	3	3	4	Ш	nod∉
ing r	III	1	1	2	2	2	2	2	2	2	3	3	3	3	4	III	ing r
scop	IV	1	1	1	1	2	2	2	2	2	2	3	3	3	4	IV	scop
Telescoping mode	V	1	1	1	1	1	2	2	2	2	2	2	3	3	4	V	Telescoping mode
•	VI	1	1	1	1	1	1	2	2	2	2	2	2	3	4	VI	

Note :

The data indicated with an $\ensuremath{\textit{asterisk}}\xspace$ (*) are suitable for 110 tons hook.

Des



Table 1-22 Main boom

Unit: Metric tons

		Outrig	gers i	nterme	ediate	ely exte	endeo	l, with	17 to	ns co	unter	weight	, ove	r full ra	ange	
Radiu	s						Main	boom l	ength	(m)						Radius
(m)		13.5	18	22.5	27	31.5	36	40.5	45	49.5	54	58.5	63	67.5	72	(m)
3		110*	100*	90												3
3.5		101*	95*	87	75											3.5
4		90	85	75	75											4
4.5		73	73	73	75	60										4.5
5		62	62	62	62	58										5
5.5		52	52	52	52	52	43									5.5
6		47	47	47	47	45	41									6
7		35	35	35	35	35	35	30								7
8		25	25	25	25	25	25	25								8
9		20	20	20	20	20	20	20	19							9
10			16	16	16	16	16	16	15							10
11			13	13	13	13	13	13	12	12						11
12			11	11	11	11	11	11.5	11	11	11					12
14				8	8	8	8.5	9	9	9	9	9				14
16				6	6	6	6.5	7	6.7	6.7	7	7	7			16
18					3.5	4	4.5	5	4.7	4.7	5	5	5	5		18
20					2.3	2.7	3.2	4	3.7	3.7	3.8	4	4	4.5	4.5	20
22						2	2.5	3	2.7	2.7	2.7	2.7	3	3.5	3.5	22
24							2	2.5	2.2	2.2	2.2	2.2	2.2	2.5	2.5	24
26								2	2	2	2	2	2	2.2	2.2	26
28													1.5	2	2	28
30														1.5	1.5	30
32																32
34																34
36																36
38																38
40																40
Reevir	ng	14	14	12	10	8	6	5	4	3	3	2	2	2	2	Reeving
Hool	ĸ			90t				55t				25	ōt			
0	1	1	1	2	2	2	2	3	3	3	3	3	3	4	4	
pon [1	2	2	2	2	2	2	2	3	3	3	3	3	4	4	node
u ĝu	1	1	2	2	2	2	2	2	2	3	3	3	3	4	4	u ĝu
copi	1	1	1	1	2	2	2	2	2	2	3	3	3	4	4	copii Copii
Telescoping mode	1	1	1	1	1	2	2	2	2	2	2	3	3	4	4	 < <a> < <a> < <a> < <a> < <a> < <a>
F	1	1	1	1	1	1	2	2	2	2	2	2	3	4	4	VI Ĕ

Note :



Table 1-23 Main boom

		Outri	ggers	interm	ediat	ely ext	ended	, with	10 to	ns cou	Interv	veight	over	full ra	inge		
Rad	ius						Main b	oom le	ength	(m)		_			-	Ra	dius
(m	ו)	13.5	18	22.5	27	31.5	36	40.5	45	49.5	54	58.5	63	67.5	72	(m)
3	;	100*	100*	90													3
3.	5	90	90	84	75											65	3.5
4		80	80	75	70												4
4.	5	63	63	62	58	58										2	1.5
5	,	54	54	53	53	53											5
5.	5	45	45	44	42	42	42									5	5.5
6	;	40	40	39	38	38	38										6
7	,	29	29	29	29	29	29	28									7
8	}	22	22	23	22	23	23	23									8
9)	17	17	18	17	18	18.5	19	18								9
1(0		14	15	14	15	15.5	16	15								10
11			11	12	11	12	12.5	13	12	12							11
12			9	10	9	10	10.5	11	10	10	10						12
14	4			7	6.2	7.2	7.7	8.4	8	8	8	8					14
16	6			4.7	4.2	5	5.5	6.2	5.8	5.8	6	6	6				16
18					2.5	3.3	4	4.5	4	3.8	4	4.4	4.7	5			18
20					1.3	2	2.6	3.4	2.8	2.8	3	3.2	3.5	4	4		20
22							1.6	2.4	1.8	1.8	2	2.2	2.5	3	3		22
24								1.5			1.1	1.4	1.6	2	2		24
26													1.1	1.4	1.4		26
Reev	-	14	14	12	10	8	6	4	3	2	2	2	2	2	2		eving
Ho	1			90 t				5 t	6			25 t	6				ook
e	1	1	1	1	2	2	2	2	3	3	3	3	3	3	4		<u>e</u>
moc		1	2	2	2	2	2	2	2	3	3	3	3	3	4		mod
Telescoping mode		1	1	2	2	2	2	2	2	2	3	3	3	3	4		Telescoping mode
lescc	IV	1	1	1	1	2	2	2	2	2	2	3	3	3	4	IV V	escc
Tel	V	1	1	1	1	1	2	2	2	2	2	2	3	3	4		Tel
	VI	1	1	1	1	1	1	2	2	2	2	2	2	3	4	VI	

Note:

Table 1-24 Main boom + jib

	Outriggers fu	ully extended	l (7.8 m), with	45 tons cour	nterweight, ov	ver full range	
Jib	length		11.0	0 m		Jib le	ngth
Main bo	oom length	63.	0 m	67.	5 m	Main boo	m length
Boor	n angle	0°	30°	0°	30°	Boom	angle
	82°	6.5	4.5	5.5	4	82	<u>2</u> °
	80°	6.5	4.4	5.5	3.9	80)°
	78°	6.5	4.3	5.5	3.8	78	}°
	76°	6.2	4.2	5.2	3.7	76	6°
	74°	5.9	4.1	4.8	3.6	74	1°
	72°	5.6	4	4.5	3.5	72	<u>2</u> °
	70°	5.2	3.9	4.2	3.4	7()°
	68°	4.8	3.8	3.9	3.3	68	}°
	66°	4.5	3.7	3.6	3.1	66	6°
	64°	4.2	3.6	3.3	2.9	64	t°
	62°	3.9	3.4	3.1	2.8	62	<u>2</u> °
	60°	3.6	3.2	2.9	2.6	60)°
	58°	3.4	3.0	2.7	2.4	58	3°
	56°	3.2	2.8	2.5	2.3	56	6°
	54°	3.0	2.7	2.4	2.2	54	t°
	52°	2.7	2.5	2.2	2.0	52	<u>2</u> °
	50°	2.5	2.3	2.0	1.9	50)°
	48°	2.1	2.0	1.8	1.7	48	3°
	46°	1.9	1.8	1.6	1.5	46	6°
	44°	1.7	1.6	1.4	1.3	44	t°
	42°	1.5	1.4	1.2	1.1	42	<u>2</u> °
	40°	1.3	1.2			4()°
Re	eeving			1		Reev	/ing
ŀ	Hook		7	't		Ho	ok
4	I	3	3	3	3	Ι	
node	II	3	3	3	3	II	node
ing n	III	3	3	3	3	III	ing n
scopi	IV	3	3	3	3	IV	scop
Telescoping mode	V	3	3	3	3	V	Telescoping mode
	VI	2	2	3	3	VI	F



	Outriggers for	ully extended	l (7.8 m), with	32 tons cou	nterweight, o	ver full range	
Jib le	ength		11.	0 m		Jib le	ngth
Main boo	om length	63.	0 m	67.	5 m	Main boo	m length
Boom	angle	0°	30°	0°	30°	Boom	angle
8	2°	6.5	4.5	5.5	4	8	2°
8	0°	6.5	4.4	5.5	3.9	8	0°
7	8°	6.5	4.3	5.5	3.8	7	B°
7	6°	6.2	4.2	5.2	3.7	7	6°
7	4°	5.9	4.1	4.8	3.6	7	4°
7	2°	5.6	4.0	4.5	3.5	7	2°
7	0°	5.2	3.9	4.2	3.4	7	0°
6	8°	4.8	3.8	3.9	3.3	6	8°
6	6°	4.5	3.7	3.6	3.1	6	6°
6	4°	4.2	3.6	3.3	2.9	6	4°
6	2°	3.8	3.4	3.1	2.8	6	2°
6	0°	3.4	3.1	2.8	2.6	6	0°
5	8°	3.0	2.8	2.6	2.3	5	B°
5	6°	2.6	2.5	2.3	2.1	5	6°
5	4°	2.3	2.1	1.9	1.8	5	4°
5	2°	2.0	1.8	1.6	1.5	5	2°
5	0°	1.7	1.5	1.4	1.3	5	0°
4	8°	1.5	1.3	1.1	1.0	4	8°
4	6°	1.2	1.1			4	6°
4	4°	1.0	0.9			4	4°
Ree	eving			1		Ree	ving
Ho	ook		7	7 t		Ho	ok
	I	3	3	3	3	I	
node	П	3	3	3	3	Π	node
ing n	III	3	3	3	3	=	ing n
Telescoping mode	IV	3	3	3	3	IV	Telescoping mode
Teles	V	3	3	3	3	V	Teles
	VI	2	2	3	3	VI	1

Table 1-25 Main boom + jib

Table 1-26 Main boom + jib

	Outriggers f	ully extended	l (7.8 m), with	24 tons cour	nterweight, o	ver full range	
Jib l	ength		11.0	0 m		Jib le	ngth
Main bo	om length	63.	0 m	67.	5 m	Main boo	m length
Boom	n angle	0°	30°	0°	30°	Boom	angle
8	32°	6.5	4.5	5.5	4	8	2°
8	30°	6.5	4.4	5.5	3.9	8	0°
7	78°	6.5	4.3	5.5	3.8	7	8°
7	76°	6.2	4.2	5.2	3.7	7	6°
7	74°	5.9	4.1	4.8	3.6	7	4°
7	72°	5.6	4.0	4.5	3.5	7.	2°
7	70°	5.2	3.9	4.2	3.4	7	0°
6	58°	4.7	3.8	3.9	3.3	6	8°
6	66°	4.2	3.6	3.5	3.0	6	6°
6	64°	3.6	3.2	3.1	2.8	6	4°
6	62°	3.1	2.8	2.6	2.4	6	2°
6	50°	2.6	2.4	2.2	2.0	6	0°
5	58°	2.2	2.0	1.8	1.7	5	B°
5	56°	1.8	1.7	1.5	1.4	5	6°
5	54°	1.5	1.4	1.2	1.1	5	4°
5	52°	1.2	1.1			5	2°
Ree	eving		,	1		Ree	ving
Н	ook		7	't		Ha	ok
	1	3	3	3	3	I	
ode	II	3	3	3	3	II	ode
m Bu	III	3	3	3	3		m Bu
copii	IV	3	3	3	3	IV	copii
Telescoping mode	V	3	3	3	3	V	Telescoping mode
F	VI	2	2	3	3	VI	F



	Outriggers fu	ully extended	l (7.8 m), with	17 tons cour	nterweight, o	ver full range	
Jib le	ength		11.	0 m		Jib le	ength
Main boo	m length	63.	0 m	67.	5 m	Main boo	m length
Boom	angle	0°	30°	0°	30°	Boom	angle
8	2°	6.5	4.5	5.5	4	8	2°
8	0°	6.5	4.4	5.5	3.9	8	0°
7	8°	6.5	4.3	5.5	3.8	7	8°
7	6°	6.2	4.2	5.2	3.7	7	6°
7	4°	5.5	4.1	4.5	3.5	7	4°
7.	2°	4.5	3.8	3.7	3.1	7	2°
7	0°	3.8	3.2	3.3	2.8	7	0°
6	8°	3.2	2.6	2.7	2.3	6	8°
6	6°	2.5	2.1	2.1	1.9	6	6°
6	4°	2	1.6	1.6	1.3	6	4°
6	2°	1.5	1.2	1.2	1.1	6	2°
6	0°	1.2	1			6	0°
Ree	ving			1		Ree	ving
Ho	ook		7	't		Ho	ok
	I	3	3	3	3	I	
lode	П	3	3	3	3	II	node
Telescoping mode	III	3	3	3	3	III	Telescoping mode
scop	IV	3	3	3	3	IV	scop
Teles	V	3	3	3	3	V	Teles
	VI	2	2	3	3	VI	

Table 1-27 Main boom + jib



Table 1-28 Main boom + jib

	Outriggers fu	ully extended	l (7.8 m), with	10 tons cour	nterweight, o	ver full range	•
Jib le	ength		11.	0 m		Jib le	ength
Main boo	om length	63.	0 m	67.	5 m	Main boo	m length
Boom	angle	0°	30°	0°	30°	Boom	angle
8	2°	6.5	4.5	5.5	4	8	2°
8	0°	6.5	4.5	5.5	3.9	8	0°
7	'8°	6.5	4.3	5.5	3.8	7	8°
7	′6°	6.2	4.2	5.2	3.7	7	6°
7	′4°	5.3	4.1	4.5	3.5	7	4°
7	′2°	4.3	3.6	3.7	3.1	7.	2°
7	′0°	3.6	3.0	3.0	2.5	7	0°
6	8°	2.9	2.4	2.4	2.0	6	8°
6	6°	2.2	1.9	1.8	1.6	6	6°
6	64°	1.7	1.4	1.3	1.1	6	4°
6	2°	1.2	1.0			6	2°
Ree	eving			1		Ree	ving
Ho	ook		7	't		Ho	ok
	I	3	3	3	3	I	
node	II	3	3	3	3	Ш	pode
ing r	III	3	3	3	3		ing r
Telescoping mode	IV	3	3	3	3	IV	Telescoping mode
Tele:	V	3	3	3	3	V	Tele:
•	VI	2	2	3	3	VI	



Table 1-29	Main boo	m + jib
------------	----------	---------

Outriggers fully extended (7.8 m), with 45 tons counterweight, over full range							
Jib le	ength		18.	6 m		Jib le	ngth
Main boo	om length	63.	0 m	67.	5 m	Main boo	m length
Boom	angle	0°	30°	0°	30°	Boom	angle
8	32°	4.5	2.5	3.5	2.0	8	<u>2</u> °
8	80°	4.3	2.5	3.5	2.0	8	С°
7	'8°	4.1	2.4	3.5	2.0	7	3°
7	′6°	3.9	2.4	3.3	1.9	7	5°
7	′4°	3.6	2.2	3.1	1.9	7.	4°
7	′2°	3.3	2.1	2.9	1.8	7:	2°
7	′0°	3.1	2.0	2.7	1.8	7)°
6	68°	2.9	1.9	2.5	1.7	68°	
6	6°	2.7	1.8	2.4	1.7	66°	
6	64°	2.5	1.8	2.2	1.6	64°	
6	62°	2.4	1.7	2.0	1.5	62°	
6	60°	2.2	1.7	1.9	1.5	60°	
5	58°	2.1	1.6	1.7	1.4	58°	
5	6°	2.0	1.6	1.6	1.4	56°	
5	54°	1.9	1.5	1.5	1.3	54°	
5	52°	1.8	1.5	1.4	1.2	52	<u>2</u> °
5	50°	1.7	1.4	1.3	1.1	5	С°
4	8°	1.5	1.3	1.2	1.0	4	3°
4	6°	1.2	1.1			4	5°
Ree	eving			1		Ree	ving
Ho	ook		7	't		Ho	ok
۵	I	3	3	3	3	I	Ø
modŧ	II	3	3	3	3	II	mod
Telescoping mode		3	3	3	3		Telescoping mode
scop	IV	3	3	3	3	IV	scop
Tele	V	3	3	3	3	V	Tele
	VI	2	2	3	3	VI	

Table 1-30 Main boom + jib

	Outriggers f	ully extended	l (7.8 m), with	32 tons cou	nterweight, ov	ver full range	i.
Jib	length		18.	6 m		Jib le	ngth
Main bo	om length	63.	63.0 m		5 m	Main boo	m length
Boon	n angle	0°	30°	0°	30°	Boom	angle
	82°	4.5	2.5	3.5	2.0	82°	
	80°	4.3	2.5	3.5	2.0	80°	
	78°	4.1	2.4	3.5	2.0	78°	
	76°	3.9	2.4	3.3	1.9	7	6°
	74°	3.6	2.2	3.1	1.9	74°	
	72°	3.3	2.1	2.9	1.8	72°	
	70°	3.1	2.0	2.7	1.8	70°	
	68°	2.9	1.9	2.5	1.7	68°	
66°		2.7	1.8	2.4	1.7	66°	
	64°	2.5	1.8	2.2	1.6	64°	
	62°	2.4	1.7	2.0	1.5	62°	
	60°	2.2	1.7	1.9	1.5	60°	
	58°	2.0	1.6	1.7	1.4	58°	
	56°	1.8	1.5	1.5	1.3	56°	
	54°	1.5	1.3	1.2	1.0	5	4°
	52°	1.2	1.1			5	2°
Re	eving			1		Ree	ving
F	look		7	t		Ho	ok
0	I	3	3	3	3	l	0
Telescoping mode	II	3	3	3	3	II	Telescoping mode
ing r		3	3	3	3	III	ing n
scop	IV	3	3	3	3	IV	scop
Teles	V	3	3	3	3	V	Teles
	VI	2	2	3	3	VI	



	Outriggers fu	ully extended	l (7.8 m), with	24 tons cour	nterweight, o	ver full range	
Jib le	ength		18.	6 m		Jib le	ngth
Main boo	om length	63.	63.0 m		67.5 m		m length
Boom	angle	0°	30°	0°	30°	Boom	angle
8	2°	4.5	2.5	3.5	2.0	82°	
8	0°	4.3	2.5	3.5	2.0	80°	
7	'8°	4.1	2.4	3.5	2.0	78°	
7	'6°	3.9	2.4	3.3	1.9	76°	
7	′4°	3.6	2.2	3.1	1.9	74°	
7	'2°	3.3	2.1	2.9	1.8	72°	
7	'0°	3.1	2.0	2.7	1.8	70°	
6	8°	2.9	1.9	2.5	1.7	6	8°
6	6°	2.7	1.8	2.4	1.7	66°	
6	4°	2.4	1.8	2.1	1.6	64°	
6	2°	2.1	1.7	1.8	1.4	62°	
6	0°	1.8	1.6	1.4	1.2	60°	
5	8°	1.4	1.2			5	8°
5	6°	1.1				5	6°
Ree	eving			1		Ree	ving
Ho	ook		7	't		Ho	ok
	I	3	3	3	3	I	
Telescoping mode	II	3	3	3	3	II	Telescoping mode
ing n		3	3	3	3	III	ing n
doos	IV	3	3	3	3	IV	scop
Teleç	V	3	3	3	3	V	Teles
	VI	2	2	3	3	VI	

Table 1-31 Main boom + jib

Table 1-32 Main boom + jib	Table	1-32	Main	boom	+ jib
----------------------------	-------	------	------	------	-------

	Outriggers for	ully extended	(7.8 m), with	17 tons cour	nterweight, ov	ver full range	
Jib le	ength		18.	6 m		Jib le	ngth
Main boo	om length	63.0	0 m	67.	5 m	Main boo	m length
Boom	angle	0°	30°	0°	30°	Boom	angle
8	2°	4.5	2.5	3.5	2.0	82°	
8	0°	4.3	2.5	3.5	2.0	80°	
7	'8°	4.1	2.4	3.5	2.0	78°	
7	'6°	3.9	2.4	3.3	1.9	76°	
7	′4°	3.5	2.2	3.1	1.8	74°	
7	'2°	3.2	2.1	2.7	1.7	72°	
7	'0°	2.8	1.9	2.2	1.6	70°	
6	8°	2.2	1.7	1.8	1.4	68°	
6	6°	1.8	1.4	1.6	1.2	66°	
6	4°	1.5	1.2	1.4	1.1	64°	
6	2°	1.2				62°	
6	0°					6	0°
Ree	eving	1					
Ho	ook		7	't			
	3	3	3	3	3	I	<i>t</i>
node	3	3	3	3	3	II	node
ing n	3	3	3	3	3	III	ing n
scopi	3	3	3	3	3	IV	scopi
Telescoping mode	3	3	3	3	3	V	Telescoping mode
	2	2	3	3	3	VI	'



Table 1-33 Main boom + jib	Table	1-33	Main	boom	+ jib
----------------------------	-------	------	------	------	-------

	Outriggers for	ully extended	l (7.8 m), with	10 tons cour	nterweight, o	ver full range	
Jib I	ength		18.	6 m		Jib le	ngth
Main bo	om length	63.	0 m	67.	5 m	Main boom le	
Boom	n angle	0°	30°	0°	30°	Boom	angle
ŧ	32°	4.5	2.5	3.5	2.0	82°	
ŧ	30°	4.3	2.5	3.5	2.0	80°	
-	78°	4.1	2.4	3.5	2.0	78°	
-	76°	3.9	2.4	3.3	1.9	76°	
-	74°	3.5	2.2	3.1	1.8	74	4°
-	72°	3.2	2.1	2.6	1.7	72	<u>2</u> °
-	70°	2.6	1.9	2.1	1.6	70°	
(68°	2.0	1.5	1.6	1.2	68°	
(66°	1.5	1.1			66°	
Re	eving			1		Ree	ving
Н	ook		7 t			Ho	ok
	I	3	3	3	3	I	
ode	II	3	3	3	3	II	apor
Telescoping mode	III	3	3	3	3	III	Telescoping mode
scopi	IV	3	3	3	3	IV	scopi
Teles	V	3	3	3	3	V	Teles
F	VI	2	2	3	3	VI	F-

Table 1-34 Main boom + jib

	Outriggers ful	ly extended (7.8 I	n), with	45 tons counter	rweight,	over full range	9
Jib	length		26.6	6 m		Jib le	ngth
Main bo	oom length	63.0 m		67.5 m		Main boom length	
Boor	m angle	0°		0°		Boom	angle
	82°	2.5		2.0		8	2°
	80°	2.5		2.0		8	С°
	78°	2.5		2.0		78	8°
	76°	2.3		1.9		7	ô°
	74°	2.1		1.8		7.	4°
	72°	1.9		1.7		72	2°
	70°	1.8		1.6		70°	
68°		1.7		1.5		68°	
66°		1.6	1.6			6	6°
64°		1.5		1.3		64°	
	62°	1.4		1.2		62°	
60°		1.3		1.1		60°	
	58°	1.2		1.0		5	8°
	56°	1.1				5	6°
	54°	1.0				54	4°
Re	eeving		1	l		Ree	ving
ł	Hook		7	t		Hook	
		3		3		I	
node	II	3		3		II	node
ing n	III	3		3		III	ing n
cop	IV	3		3		IV	doos
Telescoping mode	V	3		3		V	Telescoping mode
•	VI	2		3		VI	



Table 1	-35 I	Main	boom	+	jib
---------	-------	------	------	---	-----

	Outriggers fu	ully extended (7.8 m), with	32 tons counterweight,	over full range		
Jib le	ength	26.	6 m	Jib le	ngth	
Main boo	om length	63.0 m	67.5 m	Main boo	m length	
Boom	angle	0°	0°	Boom	angle	
8	2°	2.5	2.0	82	0	
8	0°	2.5	2.0	80	80°	
7	8°	2.5	2.0	78	3°	
7	6°	2.3	1.9	76	6°	
7	4°	2.1	1.8	74	l°	
7	2°	1.9	1.7	72	<u>o</u> o	
7	0°	1.8	1.6	70°		
6	8°	1.7	1.5	68	3°	
6	6°	1.6	1.4	66°		
6	4°	1.5	1.3	64°		
6	2°	1.4	1.2	62	62°	
6	0°	1.3	1.1	60)°	
5	8°	1.2		58	}°	
5	6°	1.1		56	°°	
Ree	eving		1	Reev	ving	
Ho	ook	7	7 t	Ho	ok	
	I	3	3	I		
node	II	3	3	II	node	
ing n	III	3	3	III	ing n	
scop	IV	3	3	IV	cob	
Telescoping mode	V	3	3	V	Telescoping mode	
	VI	2	3	VI		



Table 1-36 Main boom + jib

	Outriggers fu	ully extended (7.8 m), with	24 tons counterweight, o		
Jib le	ength	26.	6 m	Jib length	
Main boo	om length	63.0 m	67.5 m	Main boo	m length
Boom	angle	0°	0°	Boom	angle
8	2°	2.5	2.0	82	2°
8	0°	2.5	2.0	80°	
7	8°	2.5	2.0	78	3°
7	6°	2.3	1.9	7	6°
7	4°	2.1	1.8	74	4°
7	2°	1.9	1.7	72°	
7	0°	1.8	1.6	70)°
6	8°	1.7	1.5	68°	
6	6°	1.6	1.4	66°	
6	4°	1.5	1.3	64°	
6	2°	1.3	1.1	62	2°
6	0°	1.2		6)°
Ree	ving		1	Ree	ving
Ho	ook	7	't	Ho	ok
	I	3	3	I	
node	II	3	3	II	node
ing n	III	3	3	III	ing n
Telescoping mode	IV	3	3	IV	Telescoping mode
Tele:	V	3	3	V	Tele
-	VI	2	3	VI	



Table 1-37	Main	boom	+ jib
------------	------	------	-------

	Outriggers f	ully extended	l (7.8 m), with	17 tons cou	nterweight, o	ver full range	
Jib l	ength		26.	Jib le	ngth		
Main bo	om length	63.	0 m	67.	5 m	Main boo	m length
Boom	angle	C)°	0)°	Boom	angle
8	32°	2	.5	2	.0	8	2°
8	30°	2	.5	2	.0	8	С°
7	78°	2	.5	2	.0	73	3°
7	′6°	2	.3	1	.9	7	6°
7	74°	2	.1	1	.8	7.	4°
7	′2°	1	.9	1.6		72°	
7	' 0°	1.	.8	1.4		70°	
e	68°	1	.5	1.2		68°	
6	6°	1.	.3	1.1		6	5°
6	64°	1	.1			6	4°
Ree	eving			1		Ree	ving
Н	ook		7	′t		Hook	
	I	3		3		I	
node	II	3		3		Π	node
ing n	III	3		3		III	ing n
scop	IV	3		3		IV	scop
Telescoping mode	V	3		3		V	Telescoping mode
	VI	2		2		VI	



Table 1-38 Main boom + jib

	Outriggers fu	ully extended (7.8 m), with	10 tons counterweight, o	ver full range		
Jib le	ength	Jib le	ngth			
Main boo	m length	63.0 m	67.5 m	Main boo	m length	
Boom	angle	0°	0°	Boom	angle	
8	2°	2.5	2.0	8	2°	
8	0°	2.5	2.0	8	0°	
7	8°	2.5	2.0	73	8°	
7	6°	2.3	1.9	7	ô°	
7	4°	2.1	1.8	74	0	
7.	2°	1.9	1.6	7:	2°	
7	0°	1.8	1.4	7	0°	
6	8°	1.3		6	8°	
Ree	ving		1	Ree	ving	
Ho	Hook		ťt	Ho	ok	
	I	3	3	I		
opor	II	3	3	II	Jode	
ng n	III	3	3	III	n gn	
cop	IV	3	3	IV	scop	
Telescoping mode	V	3	3	V	Telescoping mode	
•	VI	2	3	VI		



Out	riggers intern	nediately exte	nded (5.3 m)	, with 45 tons	counterweig		ange
Jib	length		11.	0 m		Jib le	ngth
Main bo	om length	63.	0 m	67.	5 m	Main boo	m length
Boor	n angle	0°	30°	0°	30°	Boom	angle
	82°	6.5	4.5	5.5	4	8	2°
	80°	6.5	4.5	5.5	3.9	8	0°
	78°	6.5	4.3	5.5	3.8	7	8°
	76°	6.2	4.2	5.2	3.7	7	6°
	74°	5.9	4.1	4.8	3.6	7	4°
	72°	5.6	4.0	4.5	3.5	7	2°
	70°	5.2	3.9	4.2	3.4	7	0°
	68°	4.7	3.8	3.9	3.2	6	8°
	66°	4.1	3.6	3.5	3.0	6	6°
	64°	3.6	3.2	3.1	2.8	6	4°
	62°	3.1	2.8	2.7	2.4	6	2°
	60°	2.6	2.4	2.2	2.0	6	0°
	58°	2.2	2.0	1.9	1.7	5	8°
	56°	1.8	1.6	1.5	1.4	5	6°
	54°	1.5	1.3	1.2	1.1	5	4°
	52°	1.2	1.0			5	2°
Re	eving			1		Ree	ving
F	look		7	7 t		Ho	ok
	I	3	3	3	3	I	_
Telescoping mode	II	3	3	3	3	II	Telescoping mode
ing n	III	3	3	3	3	III	ing n
scopi	IV	3	3	3	3	IV	scop
Tele:	V	3	3	3	3	V	Teles
·	VI	2	2	3	3	VI	•

Table 1-39 Main boom + jib



Table 1-40 Main boom + jib

Outr	iggers interm	nediately exte	nded (5.3 m),	with 32 tons	counterweig	ht, over full r	ange
Jib le	ength		11.0	0 m		Jib le	ngth
Main boo	om length	63.	0 m	67.5	5 m	Main boom length	
Boom	angle	0°	30°	0°	30°	Boom	angle
8	2°	6.5	4.5	5.5	4	8	2°
8	0°	6.5	4.4	5.5	3.9	8	0°
7	8°	6.5	4.3	5.5	3.8	7	8°
7	6°	6.2	4.2	5.2	3.7	7	6°
7	4°	5.9	4.1	4.8	3.6	7	4°
7	2°	5.5	4.0	4.5	3.5	7	2°
7	0°	4.6	3.9	4.0	3.3	7	0°
6	8°	4.0	3.4	3.4	3.0	6	8°
6	6°	3.3	2.9	2.8	2.5	66°	
6	4°	2.7	2.4	2.3	2.0	6	4°
6	2°	2.2	2.0	1.9	1.7	6	2°
6	0°	1.8	1.6	1.5	1.3	6	0°
5	8°	1.4	1.2	1.1	1.0	5	8°
Ree	eving			1		Ree	ving
Ho	ook		7	't		Ho	ok
<i>.</i>	I	3	3	3	3	Ι	4
node	II	3	3	3	3	II	node
ing n	III	3	3	3	3		ing n
Telescoping mode	IV	3	3	3	3	IV	Telescoping mode
Teles	V	3	3	3	3	V	Teles
•	VI	2	2	3	3	VI	



Table 1-41	Main boom + j	jib
------------	---------------	-----

Outr	iggers interm	ediately exte	nded (5.3 m),	with 24 tons	counterweig	ht, over full ra	ange
Jib le	ength		11.	0 m		Jib le	ngth
Main boo	om length	63.	63.0 m 67.5 m		Main boo	m length	
Boom	angle	0°	30°	0°	30°	Boom	angle
8	2°	6.5	4.5	5.5	4	82	<u>2</u> °
8	0°	6.5	4.4	5.5	3.9	8)°
7	8°	6.5	4.3	5.5	3.8	78	3°
7	6°	6.2	4.2	5.2	3.6	7	5°
7	'4°	5.3	4.1	4.5	3.4	74	1°
7	2°	4.4	3.6	3.7	3.1	72°	
7	70°		3.1	3.0	2.5	70°	
6	8°	2.9	2.5	2.4	2.0	6	3°
6	6°	2.3	2.0	1.9	1.6	6	6°
6	4°	1.7	1.5	1.4	1.2	64	4°
6	2°	1.3	1.1			62	<u>2</u> °
Ree	eving			1		Ree	ving
Ho	ook		7	't		Ho	ok
	I	3	3	3	3	Ι	4
Telescoping mode	II	3	3	3	3	II	Telescoping mode
ing n	III	3	3	3	3	III	ing n
copi	IV	3	3	3	3	IV	cop
Teleç	V	3	3	3	3	V	Teles
	VI	2	2	3	3	VI	·

Out	riggers intern	nediately exte	nded (5.3 m),	with 45 tons	counterweig	ht, over full r	ange
Jib I	length		18.	6 m		Jib le	ngth
Main bo	om length	63.	0 m	67.	5 m	Main boo	m length
Boon	n angle	0°	30°	0°	30°	Boom	angle
ł	82°	4.5	2.5	3.5	2.0	82	<u>2</u> °
ł	80°	4.3	2.5	3.5	2.0	80)°
-	78°	4.1	2.4	3.5	2.0	78	3°
-	76°	3.9	2.4	3.3	1.9	70	6°
-	74°	3.6	2.2	3.1	1.9	74	1°
-	72°	3.3	2.1	2.9	1.8	72	<u>2</u> °
-	70°	3.1	2.0	2.7	1.8	70)°
(68°	2.9	1.9	2.5	1.7	68	3°
(66°	2.7	1.8	2.4	1.7	60	5°
(64°	2.4	1.8	2.1	1.6	64	4°
(62°	2.2	1.7	1.8	1.4	62	<u>2</u> °
(60°	1.8	1.5	1.5	1.2	60)°
į	58°	1.5	1.2	1.2	1.0	58	3°
Ę	56°	1.2	1.0			50	5°
Re	eving			1		Ree	ving
Н	look		7	′t		Ho	ok
	I	3	3	3	3	I	
apor	II	3	3	3	3	II	apor
n gri	III	3	3	3	3	=	ng n
scopi	IV	3	3	3	3	IV	scopi
Telescoping mode	V	3	3	3	3	V	Telescoping mode
	VI	2	2	3	3	VI	F



Table 1-43	Main	boom	+ jib
------------	------	------	-------

	ength			.6 m	counterweig	Jib le	-
Main boo	om length	63	.0 m	67.	5 m	Main boom lengt	
Boom	angle	0°	30°	0°	30°	Boom	angle
8	2°	4.5	2.5	3.5	2.0	82	2°
8	0°	4.3	2.5	3.5	2.0	80)°
7	'8°	4.1	2.4	3.5	2.0	78	3°
7	6°	3.9	2.4	3.3	1.9	70	5°
7	′4°	3.6	2.2	3.1	1.9	74	4°
7	2°	3.3	2.1	2.8	1.8	72	<u>2</u> °
7	'0°	3.1	2.0	2.6	1.7	7()°
6	8°	2.7	1.8	2.4	1.6	68	3°
6	6°	2.3	1.7	1.9	1.5	60	5°
6	4°	1.9	1.5	1.5	1.2	64	4°
6	2°	1.5	1.2			62	2°
6	0°	1.1				60	С°
Ree	eving			1		Ree	ving
Ho	ook		7	7 t		Ho	ok
۵.	I	3	3	3	3	I	Ô
pou	II	3	3	3	3	II	node
ing r	III	3	3	3	3	III	ing r
Telescoping mode	IV	3	3	3	3	IV	Telescoping mode
Tele	V	3	3	3	3	V	Tele
•	VI	2	2	3	3	VI	

Table 1-44 Main boom + jib

Unit: Metric tons

Jib I	Jib length 18.6 m						ength
Main bo	om length	63	.0 m	67.	5 m	Main boo	m length
Boom	angle	0°	30°	0°	30°	Boom	angle
8	32°	4.5	2.5	3.5	2.0	8	2°
8	30°	4.3	2.5	3.5	2.0	8	0°
7	' 8°	4.1	2.4	3.5	2.0	7	8°
7	′6°	3.8	2.4	3.3	1.9	7	6°
7	74°	3.5	2.2	3.1	1.8	7	4°
7	′2°	3.2	2.0	2.6	1.7	7	2°
7	' 0°	2.6	1.8	2.1	1.6	7	0°
6	68°	2.0	1.5	1.6	1.2	6	8°
6	6°	1.5	1.1			6	6°
Ree	eving			1		Ree	ving
Н	ook		7	′t		Ho	ook
	I	3	3	3	3	Ι	
apor	II	3	3	3	3	=	apor
ng m	III	3	3	3	3	Ш	μĝ
Telescoping mode	IV	3	3	3	3	IV	Telescoping mode
Teles	V	3	3	3	3	V	leles
-	VI	2	2	3	3	VI	



Jib length		26.6 m		Jib length		
Main boom length		63.0 m 67.5 m		Main boom length		
Boom angle		0°	0°	Boom	Boom angle	
82°		2.5	2.0	82	82°	
80°		2.5	2.0	80	80°	
78°		2.5	2.0	78	78°	
76°		2.3	1.9	76	76°	
74°		2.1	1.8	74	74°	
72°		1.9	1.7	72	72°	
70°		1.8	1.6	70	70°	
68°		1.7	1.5	68	68°	
66°		1.6	1.4	66	66°	
64°		1.5	1.2	64	64°	
62°		1.3	1.1	62	62°	
60°		1.2		60	60°	
Reeving		1		Reeving		
Hook		7 t		Hook		
Telescoping mode	I	3	3	I	<i>.</i>	
	II	3	3	П	node	
	III	3	3		Telescoping mode	
	IV	3	3	IV		
	V	3	3	V		
	VI	2	3	VI		



Table 1-46 Main boom + jib

Unit: Metric tons

Jib I	ength	26.6	βm	Jib le	ength	
Main bo	om length	63.0 m	67.5 m	Main boo	om length	
Boom	angle	0°	0°	Boom	angle	
8	32°	2.5	2.0	8	2°	
8	30°	2.5	2.0	8	0°	
7	' 8°	2.5	2.0	7	8°	
7	′6°	2.3	1.9	7	6°	
7	74°	2.1	1.8	7	4°	
7	′2°	1.9	1.7	7	2°	
7	' 0°	1.8	1.6	7	0°	
6	68°	1.7	1.4	6	8°	
6	6°	1.6	1.2	6	6°	
6	64°	1.2		6	4°	
Re	eving	1		Ree	ving	
Н	ook	7	t	Ho	ook	
	I	3	3	I		
node	II	3	3	I	node	
Telescoping mode	III	3	3	III	Telescoping mode	
scop	IV	3	3	IV	scop	
Tele	V	3	3	V de		
	VI	2	3	VI		



Table 1	-47 M	ain bo	om +	jib
---------	-------	--------	------	-----

Outr	iggers interm	ediately extended (5.3 m),	with 24 tons counterweig	jht, over full r	ange	
Jib k	ength	26.	Jib length			
Main boo	om length	63.0 m	67.5 m	Main boo	m length	
Boom	angle	0°	0°	Boom	angle	
8	2°	2.5	2.0	8	2°	
8	0°	2.5	2.0	8	0°	
7	'8°	2.5	2.0	7	8°	
7	'6°	2.3	1.9	7	6°	
7	′4°	2.1	1.8	7	4°	
7	′2°	1.9	1.6	7	<u>2</u> °	
7	′0°	1.7	1.4	7	0°	
6	8°	1.3	1.0	6	8°	
Ree	eving		Reeving			
Ho	ook	7	't	Hook		
	I	3	3	I		
Jode	II	3	3	II	Jode	
ngn	III	3	3	III	ngn	
idoog	IV	3	3	IV		
Telescoping mode	V	3	3	Telescoping mode		
'	VI	2	3	VI		

Table 1-48 Main boom + tip boom

	(Outrigg	jers fu	lly exte	ended	(7.8 m), with	45 tor	ns cou	nterw	eight, c	over fu	III rang	e	
Radius	-					-	-	length							Radius
(m)	13.5	18.0	22.5	27.0	31.5	36.0	40.5	45.0	49.5	54.0	58.5	63.0	67.5	72.0	(m)
3.0	28														3.0
3.5	27	27													3.5
4.0	26.5	26.5	27												4.0
4.5	26	26	26.5												4.5
5.0	25.5	25.5	26	27											5.0
5.5	25	25	25.5	26.5											5.5
6.0	24.5	24.5	25	26	26										6.0
7.0	23.5	24	24.5	25.5	26	24									7.0
8.0	22.5	23.5	24	25	25.5	24	22								8.0
9.0	21.5	23	23.5	24.5	25	24	21								9.0
10.0	20.5	22.5	23	24	24.5	24	20	20							10.0
11.0	20	22	22.5	23.5	24	23.5	19	19	18						11.0
12.0	19.5	21.5	22	23	23.5	23	18	18	17	15					12.0
14.0		20.5	21.5	22.5	23	22.5	16.5	17	16	14	12				14.0
16.0		19.5	20.5	21.5	22	21.5	15	16	15	13	11	9			16.0
18.0			19.5	19	19.5	19.5	14	15	14	12	10.4	8.5	7		18.0
20.0			16.5	16	16.5	16.5	13	14	12.5	11	9.8	8	6.6	5	20.0
22.0				13	14	14.5	12	12.5	11.5	10.2	9.2	7.5	6.3	5	22.0
24.0				11	12	12.5	11	11.5	10.5	9.4	8.6	7.2	6	5	24.0
26.0					10	10.5	10.5	10.5	9.5	8.7	8	6.9	5.7	4.8	26.0
28.0					8.5	9	9.5	9.2	8.6	8	7.4	6.6	5.4	4.5	28.0
30.0						8	8.5	8.2	7.8	7.4	6.9	6.3	5.1	4.3	30.0
32.0						7	7.5	7.2	7.2	6.8	6.4	5.8	4.8	4.1	32.0
34.0							6.5	6.2	6.2	6.2	5.9	5.4	4.5	3.9	34.0
36.0							5.7	5.4	5.4	5.6	5.4	5.1	4.2	3.7	36.0
38.0								4.6	4.6	4.8	4.9	4.7	3.9	3.5	38.0
40.0								4	4	4.2	4.4	4.3	3.6	3.3	40.0
42.0									3.4	3.6	3.8	4	3.4	3.1	42.0
44.0									2.9	3.1	3.3	3.6	3.2	2.9	44.0
46.0										2.6	2.8	3.1	3	2.7	46.0
48.0										2.2	2.4	2.7	2.8	2.5	48.0
50.0											2	2.3	2.5	2.3	50.0
52.0											1.6	2	2.2	2.1	52.0
54.0												1.6	1.9	1.9	54.0
56.0												1.3	1.6	1.7	56.0
58.0													1.3	1.4	58.0
60.0														1.1	60.0
Reevin	g 4	4	4	4	4	3	3	3	3	2	2	2	2	2	Reeving
Hook			55 t							25 t					Hook
	l 1	1	2	2	2	2	2	3	3	3	3	3	3	4	
p I	l 1	2	2	2	2	2	2	2	3	3	3	3	3	4	ll gu
Telescoping mode	1	1	1	2	2	2	2	2	2	3	3	3	3	4	ill id g
mode	V 1	1	1	1	2	2	2	2	2	2	3	3	3	4	 < <a> Telescoping
	/ 1	1	1	1	1	2	2	2	2	2	2	3	3	4	⊥e I
1	/ 1	1	1	1	1	1	2	2	2	2	2	2	3	4	VI



Table 1-49 Main boom + tip boom

Unit: Metric tons

		Outriggers fully extended (7.8 m), with 32 tons counterweight, over full range														
Rad	ius						-	-	lengtl			•				Radius
(n	ו)	13.5	18.0	22.5	27.0	31.5	36.0	40.5	45.0	49.5	54.0	58.5	63.0	67.5	72.0	(m)
3.	0	28														3.0
3.	5	27	27													3.5
4.	0	26.5	26.5	27												4.0
4.	5	26	26	26.5												4.5
5.	0	25.5	25.5	26	27											5.0
5.	5	25	25	25.5	26.5											5.5
6.	0	24.5	24.5	25	26	26										6.0
7.	0	23.5	24	24.5	25.5	26	24									7.0
8.	0	22.5	23.5	24	25	25.5	24	22								8.0
9.	0	21.5	23	23.5	24.5	25	24	21								9.0
10	.0	20.5	22.5	23	24	24.5	24	20	20							10.0
11	.0	20	22	22.5	23.5	24	23.5	19	19	18						11.0
12	.0	19.5	21.5	22	23	23.5	23	18	18	17	15					12.0
14	.0		20.5	21.5	22.5	23	22.5	16.5	17	16	14	12				14.0
16	.0		19.5	20.5	20.5	21	21	15	16	15	13	11	9			16.0
18	.0			17.2	16.7	17.2	17.5	14	15	14	12	10.4	8.5	7		18.0
20	.0			14	13.5	14.1	14.5	13	13.5	12.5	11	9.8	8	6.6	5	20.0
22	.0				11	11.6	12	11.8	12	11.5	10.2	9.2	7.5	6.3	5	22.0
24	.0				9.4	10	10.4	10.8	10.5	10.3	9.4	8.6	7.2	6	5	24.0
26	.0					8.4	9	9.5	9.2	9	8.7	8	6.9	5.7	4.8	26.0
28	.0					7.2	7.8	8.4	8.0	7.9	8	7.4	6.6	5.4	4.5	28.0
30	.0						6.6	7.3	6.8	6.7	6.8	6.7	6.3	5.1	4.3	30.0
32	.0						5.7	6.4	5.9	5.8	5.9	6	5.7	4.8	4.1	32.0
34	.0							5.5	5.1	5	5.1	5.3	5.2	4.5	3.9	34.0
36	.0							4.7	4.3	4.2	4.3	4.6	4.6	4.2	3.7	36.0
38	.0								3.6	3.6	3.7	4	4	3.9	3.5	38.0
40	.0								3	3	3.1	3.3	3.3	3.6	3.3	40.0
42	.0									2.4	2.5	2.7	2.7	3.3	3.1	42.0
44	.0									1.9	2.1	2.3	2.3	2.8	2.8	44.0
46	.0										1.6	1.8	1.8	2.5	2.5	46.0
48	.0										1.2	1.4	1.4	2.1	2.1	48.0
50	.0											1.1	1.1	1.7	1.7	50.0
52	.0													1.4	1.4	52.0
54	.0													1.1	1.1	54.0
Reev	ving	4	4	4	4	4	3	3	3	3	2	2	2	2	2	Reeving
Ho	ok			55 t							25 t					Hook
		1	1	2	2	2	2	2	3	3	3	3	3	3	4	1
ğ		1	2	2	2	2	2	2	2	3	3	3	3	3	4	။ ဥာ
bir te		1	1	1	2	2	2	2	2	2	3	3	3	3	4	ill gen
Telescoping mode	IV	1	1	1	1	2	2	2	2	2	2	3	3	3	4	escopi escopi
ŢĘ	V	1	1	1	1	1	2	2	2	2	2	2	3	3	4	 < < Telescoping mode
•	VI	1	1	1	1	1	1	2	2	2	2	2	2	3	4	VI

Des



Table 1-50	Main boom	n + tip	boom

	Outriggers fully extended (7.8 m), with 24 tons counterweight, over full range														
Radius						Main	boom	length	י (m)						Radius
(m)	13.5	18.0	22.5	27.0	31.5	36.0	40.5	45.0	49.5	54.0	58.5	63.0	67.5	72.0	(m)
3.0	28														3.0
3.5	27	27													3.5
4.0	26.5	26.5	27												4.0
4.5	26	26	26.5												4.5
5.0	25.5	25.5	26	27											5.0
5.5	25	25	25.5	26.5											5.5
6.0	24.5	24.5	25	26	26										6.0
7.0	23.5	24	24.5	25.5	26	24									7.0
8.0	22.5	23.5	24	25	25.5	24	22								8.0
9.0	21.5	23	23.5	24.5	25	24	21								9.0
10.0	20.5	22.5	23	24	24.5	24	20	20							10.0
11.0	20	22	22.5	23.5	24	23.5	19	19	18						11.0
12.0	19.5	21.5	22	23	23.5	23	18	18	17	15					12.0
14.0		20.5	21	21.5	22	22	16.5	17	16	14	12				14.0
16.0		17	17.5	17	17.5	18	15	16	15	13	11	9			16.0
18.0			14	13.5	14	14.5	14	14.5	13.5	12	10.4	8.5	7		18.0
20.0			11.5	11	11.5	12	12.5	12	12	11	9.8	8	6.6	5	20.0
22.0				9	9.5	10	10.5	10	10	10	9.2	7.5	6.3	5	22.0
24.0				7.6	8.1	8.6	9.2	8.6	8.6	8.7	8.4	7.2	6	5	24.0
26.0					6.7	7.2	7.8	7.3	7.3	7.4	7.6	6.9	5.7	4.8	26.0
28.0					5.6	6.1	6.7	6.2	6.2	6.3	6.5	6.4	5.4	4.5	28.0
30.0						5.1	5.7	5.2	5.2	5.3	5.5	5.8	5.1	4.3	30.0
32.0						4.2	4.8	4.3	4.3	4.4	4.6	5	4.8	4.1	32.0
34.0							4.1	3.6	3.6	3.7	3.9	4.3	4.5	3.9	34.0
36.0							3.4	3	2.9	3	3.3	3.6	4	3.7	36.0
38.0								2.4	2.3	2.4	2.7	3	3.4	3.4	38.0
40.0								1.8	1.7	1.8	2.1	2.4	2.8	2.8	40.0
42.0										1.4	1.7	2	2.3	2.3	42.0
44.0											1.2	1.5	1.9	1.9	44.0
46.0												1.1	1.5	1.5	46.0
48.0													1.1	1.1	48.0
Reeving	4	4	4	4	4	3	3	3	3	2	2	2	2	2	Reeving
Hook			55 t							25 t					Hook
υI	1	1	2	2	2	2	2	3	3	3	3	3	3	4	<u>ه</u> ا
Telescoping mode ≤ < < = = = =	1	2	2	2	2	2	2	2	3	3	3	3	3	4	 ≤ < <
u B⊓	1	1	1	2	2	2	2	2	2	3	3	3	3	4	III p
ild IV	1	1	1	1	2	2	2	2	2	2	3	3	3	4	IV Sopi
V	1	1	1	1	1	2	2	2	2	2	2	3	3	4	lesc V
[⊕] VI	1	1	1	1	1	1	2	2	2	2	2	2	3	4	N ⊢



Table 1-51	Main	boom	+	tip	boom
------------	------	------	---	-----	------

	Outriggers fully extended (7.8 m), with 17 tons counterweight, over full range														
Radius						Main	boom	lengtl	n (m)						Radius
(m)	13.5	18.0	22.5	27.0	31.5	36.0	40.5	45.0	49.5	54.0	58.5	63.0	67.5	72.0	(m)
3.0	28														3.0
3.5	27	27													3.5
4.0	26.5	26.5	27												4.0
4.5	26	26	26.5												4.5
5.0	25.5	25.5	26.5	27											5.0
5.5	25	25	25.5	26.5											5.5
6.0	24.5	24.5	25	26	26										6.0
7.0	23.5	24	24.5	25.5	26	24									7.0
8.0	22.5	23.5	24	25	25.5	24	22								8.0
9.0	21.5	23	23.5	24.5	25	24	21								9.0
10.0	20.5	22.5	23	24	24.5	24	20	19							10.0
11.0	20	22	22.5	22.5	23	22.5	19	19	17						11.0
12.0	19.5	20	20.5	19.5	20	20	18	18	17	14					12.0
14.0		17	17	17	17	17	16	16	15	13	11				14.0
16.0		13.5	13.5	13	13.5	13.5	13.5	13	13	12	10	8			16.0
18.0			11	10	10.5	11	11.5	11	11	11	9.5	8	5.5		18.0
20.0			9	8.5	9	9.5	9.5	9	9	9	8.5	7.5	5.5	4.5	20.0
22.0				6	6.5	7	7.5	7	7	7	7	7	5.5	4.5	22.0
24.0				4.5	5.2	6	6.2	6	6	6	6	6.2	5.2	4.2	24.0
26.0					4	4.5	5	4.5	4.5	4.5	4.6	4.7	4.5	3.8	26.0
28.0					3	3.5	4	3.5	3.5	3.6	3.7	3.8	4	3.6	28.0
30.0						3	3.2	3	3	3.1	3.2	3.4	3.5	3.4	30.0
32.0						2	2.5	2.1	2	2.1	2.2	2.3	2.7	2.7	32.0
34.0							2	1.8	1.5	1.5	1.6	1.8	2	2	34.0
36.0							1.4	1.2	1.2	1.2	1.4	1.5	1.7	1.7	36.0
38.0											1.1	1.3	1.4	1.4	38.0
40.0												1.1	1.1	1.1	40.0
42.0															42.0
44.0															44.0
46.0															46.0
Reeving	4	4	4	4	4	3	3	3	3	2	2	2	2	2	Reeving
Hook		1	55 t	1	1					25 t		1	1		Hook
υI	1	1	2	2	2	2	2	3	3	3	3	3	3	4	<u>ں</u> ا
Telescoping mode ≤ < Z ≡ = _	1	2	2	2	2	2	2	2	3	3	3	3	3	4	≤ < < = = - Telescoping mode
bn ∏	1	1	1	2	2	2	2	2	2	3	3	3	3	4	ll g
id IV	1	1	1	1	2	2	2	2	2	2	3	3	3	4	IV
V selesc	1	1	1	1	1	2	2	2	2	2	2	3	3	4	<pre>></pre>
Р VI	1	1	1	1	1	1	2	2	2	2	2	2	3	4	N L



Table 1-52 Main boom + tip boon

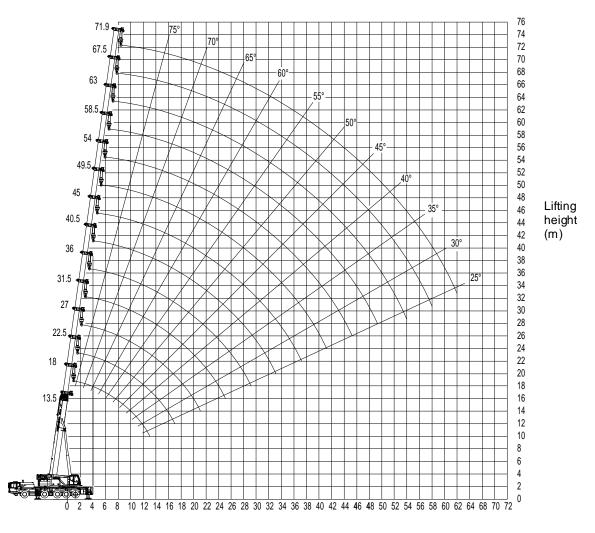
Outriggers fully extended (7.8 m), with 10 tons counterweight, over full range																
Rad	ius				•				lengt			•		-		Radius
(m		13.5	18.0	22.5	27.0	31.5	36.0	40.5	45.0	49.5	54.0	58.5	63.0	67.5	72.0	(m)
3.	0	28														3.0
3.	5	27	27													3.5
4.	0	26.5	26.5	27												4.0
4.	5	26	26	26.5												4.5
5.	0	25.5	25.5	26.5	27											5.0
5.	5	25	25	25.5	26.5											5.5
6.	0	24.5	24.5	25	26	26										6.0
7.	0	23.5	24	24.5	25.5	26	24									7.0
8.	0	22.5	23.5	24	25	25.5	24	22								8.0
9.	0	21.5	23	23.5	24.5	25	24	21								9.0
10	.0	20.5	22.5	23	24	24.5	24	20	19							10.0
11	.0	20	22	22.5	22.5	23	22.5	19	19	17						11.0
12	.0	19.5	20	20.5	19.5	20	20	18	18	17	14					12.0
14	.0		15	15.5	14.5	15	15.5	15	16	15	13	11				14.0
16	.0		11.5	12	11	11.5	12	12.5	12	12	12	10	8			16.0
18	.0			9.5	8.5	9	9.5	10	9.5	9.5	9.5	9.5	7.5	5		18.0
20	.0			7.5	6.7	7.3	8.0	8.5	8	8	8	8	7	5	4	20.0
22	.0				5.1	5.7	6.4	6.9	6.4	6.4	6.4	6.5	6.5	5	4	22.0
24	.0				3.7	4.3	5	5.5	5	5	5.1	5.3	5.5	4.8	3.8	24.0
26	.0					3.2	3.9	4.5	4	4	4.1	4.3	4.5	4.3	3.6	26.0
28	.0					2.3	3	3.6	3.1	3	3.1	3.3	3.5	3.8	3.4	28.0
30	.0						2.2	2.8	2.3	2.2	2.3	2.5	2.8	3.2	3.2	30.0
32	.0						1.5	2.1	1.6	1.5	1.6	1.8	2.1	2.5	2.5	32.0
34	.0										1.1	1.3	1.5	1.9	1.9	34.0
36	.0												1.1	1.4	1.4	36.0
Reev	ving	4	4	4	4	4	3	3	3	3	2	2	2	2	2	Reeving
Ho	ok			55 t							25 t					Hook
e	Ι	1	1	2	2	2	2	2	3	3	3	3	3	3	4	۱ _و
ыо	II	1	2	2	2	2	2	2	2	3	3	3	3	3	4	l De
ing	III	1	1	1	2	2	2	2	2	2	3	3	3	3	4	III - Bui
cop	IV	1	1	1	1	2	2	2	2	2	2	3	3	3	4	lV do
Telescoping mode	V	1	1	1	1	1	2	2	2	2	2	2	3	3	4	≤ <
Ť	VI	1	1	1	1	1	1	2	2	2	2	2	2	3	4	Ϋ́



1.3.15 Lifting height charts

1.3.15.1 Main boom

Refer to Figure 1-14.



Working radius (m)

Figure 1-14 Main boom



1.3.15.2 Main boom + jib

1.3.15.2.1 Main boom + jib variant 1 (11 m)

a) For the lifting height chart for 63 m main boom + jib variant 1 (11 m), refer to Figure 1-15.

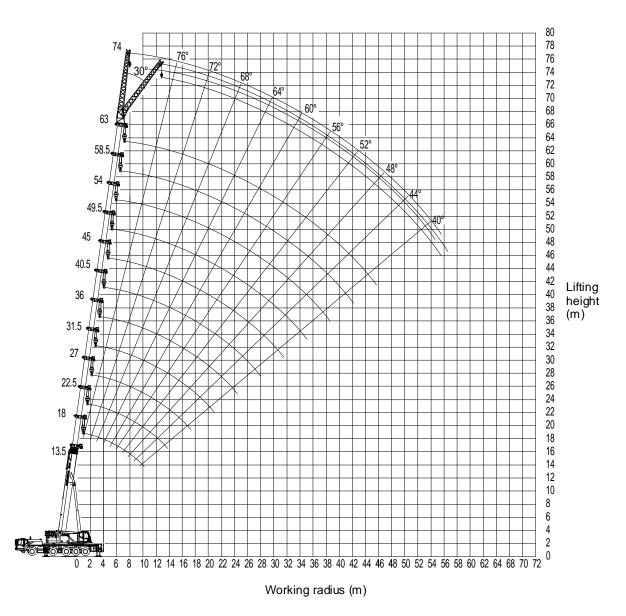
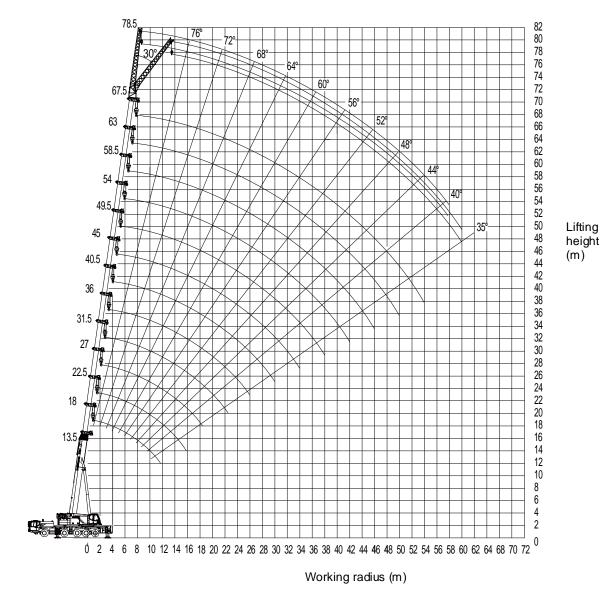


Figure 1-15 63 m main boom + jib variant 1 (11 m)

ZOOMLION





b) For the lifting height chart for 67.5 m main boom + jib variant 1 (11 m), refer to Figure 1-16.

Figure 1-16 67.5 m main boom + jib variant 1 (11 m)



1.3.15.2.2 Main boom + jib variant 2 (18.6 m)

a) For the lifting height chart for 63 m main boom + jib variant 2 (18.6 m), refer to Figure 1-17.

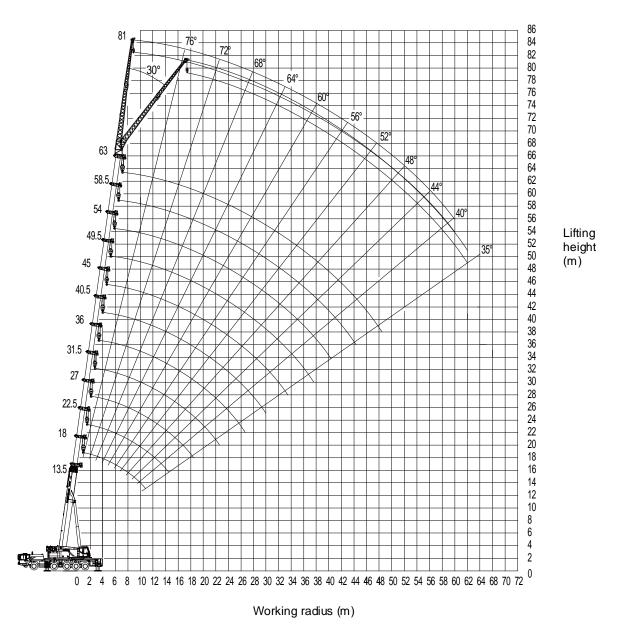


Figure 1-17 63 m main boom + jib variant 2 (18.6 m)

b) For the lifting height chart for 67.5 m main boom + jib variant 2 (18.6 m), refer to Figure 1-18.

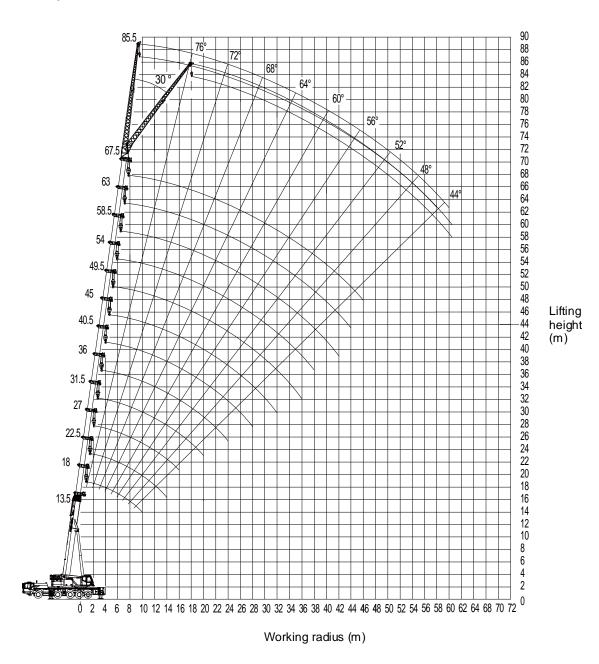


Figure 1-18 67.5 m main boom + jib variant 2 (18.6 m)

ZOOMLION



1.3.15.2.3 Main boom + jib variant 3 (26.6 m)

a) For the lifting height chart for 63 m main boom + jib variant 3 (26.6 m), refer to Figure 1-19.

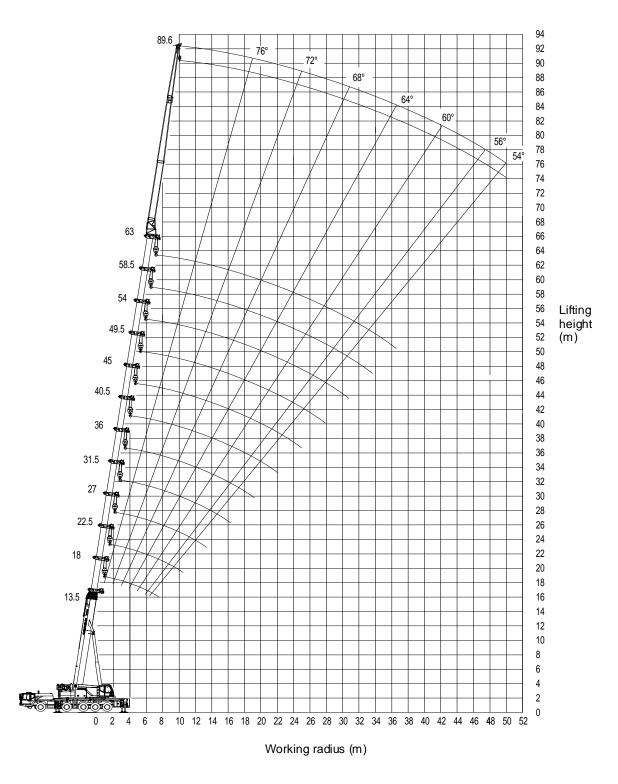


Figure 1-19 63 m main boom + jib variant 3 (26.6 m)



b) For the lifting height chart for 67.5 m main boom + jib variant 3 (26.6 m), refer to Figure 1-20.

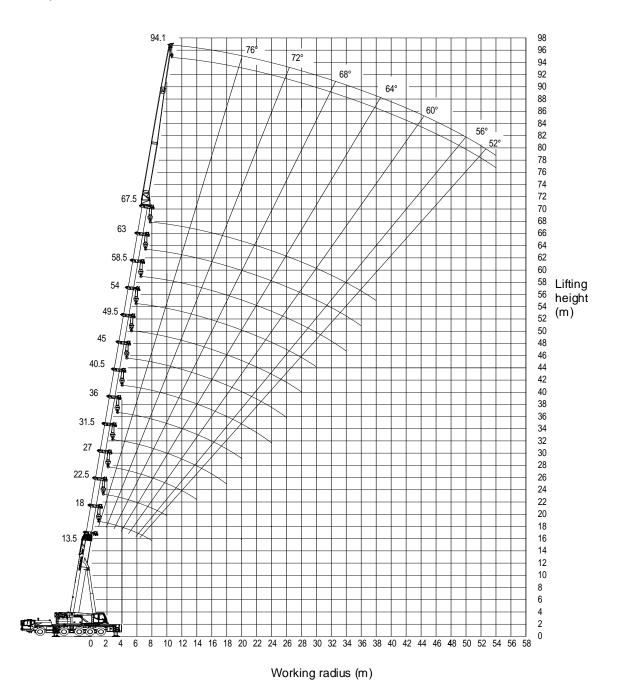
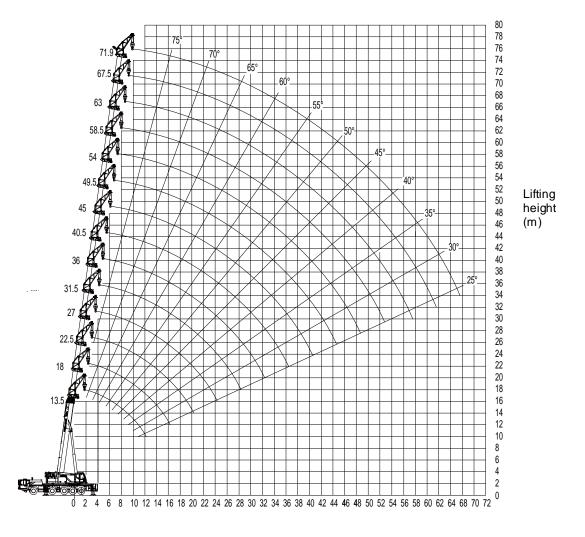


Figure 1-20 67.5 m main boom + jib variant 3 (26.6 m)



1.3.15.3 Main boom + tip boom

For the lifting height chart for the main boom in different length variants + tip boom (4 m), refer to Figure 1-21.



Working radius (m)

Figure 1-21 Main boom + tip boom



- (1) The sliding beams of outriggers must be extended (to a uniform length on both sides) to the extent stated in the lifting capacity table. All wheels must be raised clear of the ground.
- (2) The values in the lifting capacity tables are suitable for 360° full range operation.
- (3) The values given in the lifting capacity tables are the Maximum permissible lifting capacities under various OMs and specified operating conditions. The values as given in the tables include the mass of the hook (Refer to Table 1-6 Hook configurations) and slings. For the rated lifting capacity, refer to Figure 1-22.

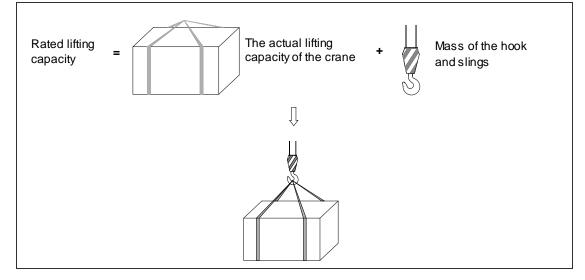


Figure 1-22 Rated lifting capacity

- (4) The working radius in lifting capacity table is measured from hook center to slewing centerline. Its unit is metric meters. The radius stated is valid under load conditions.
- (5) Use next lower rated capacity when working at radius between the figures on the rated lifting capacity table.
- (6) The numbers I, II, III, IV, V and VI in the table indicate the corresponding telescopic sections (highest number = furthest telescopic section). The numbers, 1, 2, 3 and 4, display the boom status of the telescope. 1 represents the telescope extends 0%, 2 represents the telescope extends 46%, 3 represents the telescope extends 92% and 4 represents the telescope extends 100%.
- (7) The Maximum rated lifting capacity for the rooster sheave is 7 tons. If the rated lifting capacity found out in the lifting capacity table is less than 7 tons according to the actual working conditions, take the value in the rated lifting capacity table.

For example (Refer to Table 1-12, main boom OM: outrigger fully extended, with 40 tons counterweight):

- The rated lifting capacity is 7 tons when the actual boom length is of 40.5 m and working radius of 12 m.
- The rated lifting capacity is 4.7 tons when the actual boom length is of 63 m and working radius of 38 m.
- (8) During operation:

ZOOMLION

- Do not lift a load with both main hook and auxiliary hook simultaneously.
- Do not lift a load with both main hook and tip boom hook simultaneously.
- (9) All the working radius and lifting heights in lifting height charts do not include the deflection of main boom and jib.
- (10) The working radius of the crane must be strictly limited within the range listed in the lifting capacity table. If the specified working radius is exceeded, the crane will tip over even without a load.
- (11) Before crane operation, extend the sliding beams (to a uniform length on both sides) to the extent stated in the lifting capacity tables. After the sliding beams are in position, install the retaining pins.
- (12) Before you begin a lift operation, support the crane on outriggers.
- (13) Level the crane with the support control unit prior to lifting loads, examine frequently and relevel when necessary during operation.
- (14) The lifting capacity for the main boom is the value calculated without jib assembled.
 - When you use the main boom with jib assembled:
 - 3.1 tons plus the mass of hook block and slings should be subtracted from the rated lifting capacities.
 - When you use the main boom with tip boom assembled:
 0.6 tons plus the mass of hook block and slings should be subtracted from the rated lifting capacities.
- (15) Do not telescope the boom with a suspended load.



Truck Crane Operator'S Manual

Chapter 2 Safety Guidelines





Chapter 2 Safety Guidelines

2.1 Safety instructions and safety signs

2.1.1 Safety instructions

- a) Be sure to comply with all valid national and regional traffic regulations when driving the crane on roads!
- b) No person is allowed to stay in operator's cab during driving.
- c) The crane must be made to comply with the relevant local traffic regulations, before it is driven on public streets, roads and other places. Make sure the weights, axle loads and dimensions are within the permits specified in the vehicle license.
- d) The relevant persons should be trained to ensure safe operation. Initial commissioning and starting must only be undertaken by a competent person who has read and fully understood the information provided in the *Operator's Manual*.
- e) Comply with the safety signs on the crane to avoid serious injuries or casualties.
- All the assembly, commissioning, operation, maintenance and service of crane should only be carried out by specialized personnel.

Do not allow the hook block to impair the driver's field of vision when you drive the crane on public roads!

2.1.2 Safety signs

- a) The locations of safety signs are as shown in Figure 2-1.
- b) Points for attention:
 - 1) The signs for all the potential danger referred in the *Operator's Manual* have been stuck on specified positions. Do not move the signs without permission!
 - Examine the safety signs on the potentially dangerous parts at a regular interval. Replace all missing or damaged safety signs to make sure that the decals show and are in good condition.

ZOOMLION

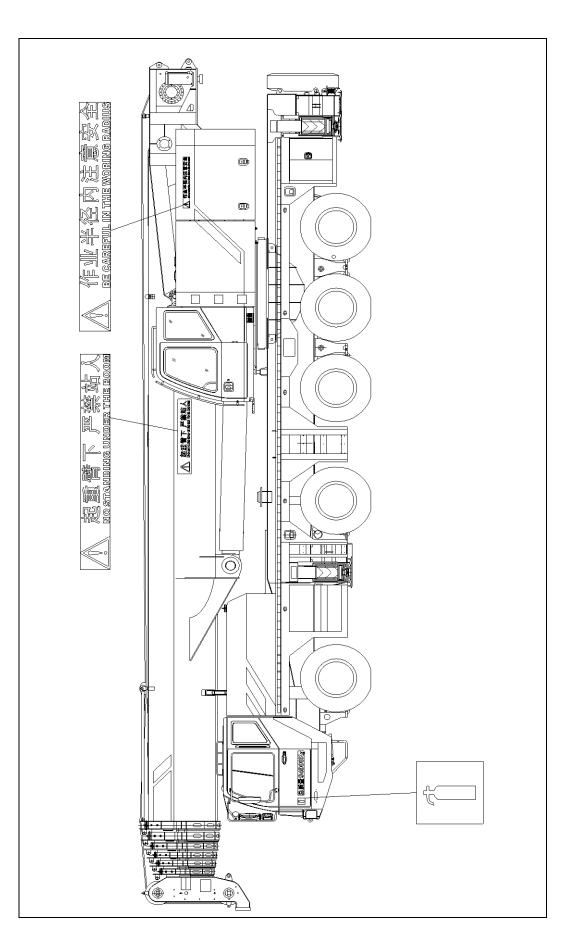


Figure 2-1 Safety sign locations

2.2 Planning crane operation

In addition to a perfectly working crane and a well-trained crew, crane operation planning is an important principle of safe crane operation.

The crane operator must obtain or receive the necessary information in a timely fashion before driving to the job-site. In particular:

- a) Natural environment of job-site
- b) Job-site and travel distance
- c) Route
- d) Height and width clearance measurements
- e) Electric transmission lines
- f) Space restrictions at the job-site
- g) Movement restrictions caused by buildings
- h) Weight and dimensions of the loads to be lifted and the required lifting height and working radius
- i) Geological conditions or ground bearing capacity at the job-site.

Basing on the above information, the crane operator must assemble the equipment required to operate the crane:

- a) Load hook / hook block
- b) Load handling device
- c) Counterweight
- d) Jib
- e) Underlay materials for outrigger pads.

WARNING

Crane operation may not be possible or improvisation can result if a crane operator does not have all the required data.

ZOOMLION

2.3 Break-in instructions

ZOOMLION

The purpose of crane break-in is to improve its adaptability to the environment. Proper break-in operation can extend crane service life, increase work reliability and save energy consumption. Pay attention to the following items during the break-in period:

- a) During initial crane operation (less than 100 operating hours), you must follow the below instructions during this time period:
 - The work load and work speed must not be too high.
 - The maximum lifting capacity should not be larger than 80% of the rate one.
 - Do not operate the crane at a speed that is more than the maximum limits..
- b) Do not drive the crane at a driving speed higher than 55 km/h and with an engine speed higher than 1800 r/min. within the first 600 km. Drive the vehicle on even road.
- c) Replace the engine oil after the first 600 km and 1500 km.
- d) Increase the driving speed or engine RPM gradually after the first 600 km and 2000 km.
- e) Do start and stop the vehicle slowly and gently. Shift the transmission frequently to break in it at every gear position.
- f) Break in the brake linings:

To achieve optimum braking performance, all new brake linings must be broken in by activating the brakes. Activate the brakes by pumping them at low to high speed. Hard braking is not permitted. In general, the break-in distance depends on the type of vehicle, but a minimum of 500 km is recommended. During this phase, the maximum temperature of brake drum or braking disc may not exceed 200°C.

Risk of accident!

The risk of accident increases when new brake linings are subjected to one or more braking operations over extended periods of time or if the vehicle is forced to a stop by hard braking from maximum speed several times.

Hard braking and continuous braking are not permitted!





2.4 General safety technical guidelines

2.4.1 Requirements of the crane operator, rigger and signalman

The primary responsibility of crane operator, rigger and signalman is to control, operate, adjust the crane and conduct the operation in a manner that is safe for both themselves and others. Many crane accidents are caused by incorrect crane operation.

The main **operating errors**, which are made again and again while operating or driving a crane, are as follows:

- a) Not paying careful attention while working, for example:
 - 1) Slewing too quickly
 - 2) Quick braking of the load
 - 3) Diagonal pulling when the load is still on the ground
 - 4) Loose wire rope formations.
- b) Overloading.
- c) Crashing into bridges, roofs or high voltage wiring due to insufficient vertical clearance.

d) Unsuitable operation when lifting a load with several cranes at the same time.

About 20% of crane damages are caused by improper maintenance:

- a) Insufficient lubricating oil, lubricating grease or antifreeze
- b) Broken wire rope, worn parts
- c) Limit switches or load moment limiter not operating properly
- d) Brake or transmission failure
- e) Hydraulic system defects (for example: cracked hoses)
- f) Loose bolts.

In the interest of both yourself and others, make sure you understand how your crane operates and familiarize yourself with all the risks associated with the work to be done.

2.4.1.1 General qualifications for operator

Make sure that only authorized personnel are allowed to operate the crane.

Qualifications for operator:

- a) The person who has been trained with the safety knowledge about the crane operation
- b) Healthy and agile
- c) Eyesight (remedied eyesight included) is above 0.7, no color blindness.
- d) Hearing is qualified.
- e) Know about the possible fatalness existing in the working area.
- f) The ability to estimate and monitor load is enough.
- g) Be able to estimate and monitor the distance, height, clearance and load correctly.

- h) Be familiar with the *Operator's Manual* for the crane, and know the working principle, lifting performance, structural performance and the function and adjusting method of the safety devices as well as master the operation essentials and maintenance skills.
- i) Be familiar with safety rules, safety signals and symbols.

ZOOMLION

- j) Be qualified with the work in hearing, eyesight and reaction ability. Have the requisite physical to operate the crane safely. Be able to estimate the distance, height and clearance correctly.
- k) Know how to administer first aid and know how to use a fire extinguisher. Know how to survive in an emergency.

NOTICE

- (1) The operator should examine the brakes, hook block, wire rope and safety devices before operation. Correct the malfunction.
- (2) The operator must focus his attention on his work during operation and is forbidden to chat with others. Generally speaking, the operator can only follow the signal sent out by appointed persons. However, for a stop signal, the operator should obey it at all times, no matter who send it out. He should refuse to follow signal which violates operation regulations. Stop the crane immediately if somebody is found climbing the crane.
- (3) Operator who is in low spirits or poor health is not allowed to operate the crane. Do not drink before operation.

2.4.1.2 General qualifications for rigger

The rigger is responsible for ensuring that the load is slung or released safely and carefully and decides which hook and load handling device to be used in accordance with work plan. The rigger is also responsible for the safety of the crane.

Qualifications for rigger:

- a) With crane operation certificate.
- b) Be qualified with the work in hearing, eyesight and reaction ability.
- c) Be able to estimate and monitor the distance, height, clearance and load correctly.
- d) Have been trained in the skill of handling load.
- e) Be able to choose the proper hook and load handling device according to conditions of the load.
- f) Have been trained in hand signals for operation and is familiar to use them.
- g) Be able to safely use audio equipment (such as interphone) to send out oral order exactly and clearly.
- h) Make sure that only authorized personnel are allowed to carry out the work.



2.4.1.3 General qualifications for signalman

The signalman is to transfer the signal from the rigger to operator. He can substitute for the rigger to conduct the crane operation, but such work can only be done by one person at any time.

Qualifications for signalman:

- a) Be qualified with the work in hearing, eyesight and reaction ability.
- b) Be able to estimate the distance, height and clearance correctly.
- c) Have been trained in hand signals for operating and is familiar to use them.
- d) Be able to safely use audio equipment (such as interphone) to send out oral order exactly and clearly.
- e) Make sure that only authorized personnel are allowed to carry out the work.

2.4.2 Selecting an operating site

It is very important to choose an appropriate location for crane operation in order to minimize safety risks.

When you select the placement location of the crane, observe the following:

- a) Crane operations can be carried out within the necessary radius (working radius and counterweight slewing radius).
- b) Support the crane and other things only on the ground with sufficient load bearing capacity.
- c) The ground pressure should comply with the permitted and expected value with a required lifting load.

2.4.2.1 Slopes and ditches

The crane may not be set up too close to slopes or ditches. Maintain adequate safety clearances in accordance with the type of soil. The formulas for calculating the safety clearance are as follows:

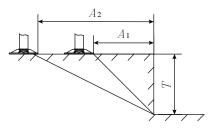
For non-cohesive and soft cohesive ground:

$$A_2 = 2T$$

For stiff or semi-solid cohesive ground:

$$A_1 = T$$

T refers to the depth of ditch.



If the safety distance cannot be maintained, fill and level up the slope and ditch. Otherwise the crane may topple!

2.4.2.2 Permissible ground pressure of outrigger

When the crane is supported on outriggers for a lift operation, the outriggers transmit significant forces to the ground. In certain cases, a single outrigger has to transmit almost the entire weight of the crane, plus the load weight, to the ground. The ground must be able to safely absorb this pressure every time. If the outrigger pad area is inadequate, then it must be supported from below according to the load bearing capacity of the ground.

The formula for calculating the required support area is as follows:

Support area = maximum crane support force / load bearing capacity of the ground The pressure strength of a variety of ground types are show in Table 2-1, and it is for reference only.

	1	Soil type	Load bearing capacity (kg/cm ²)
А	Bac	ck-filled, naturally compacted ground	0 – 1
	Nat	ural, clearly undisturbed ground:	
	1.	Mud, peat, marshy soil	0
	2.	Non-cohesive ground, sufficient compactly layered soil	
		Fine to medium grained sand	1.5
		Coarse-grained sand to gravel	2.0
	3.	Cohesive ground:	
		Sludgy	0
В		Soft	0.4
		Firm	1.0
		Semi-compact	2.0
		Hard	4.0
	4.	Rock with few fissures, in healthy, unweathered condition	
		and in a favorable location:	
		In cohesive layer order	15
		In massive or column-style shape	30
	Arti	ficially compacted ground:	
	1.	Asphalt	5 – 15
С	2.	Concrete	
		Concrete group B I	50 – 250
		Concrete group B II	350 – 550

Table 2-1 Load bearing capacity of the ground



Note:

If there is anything about the load bearing capacity of the ground at the placement site that you do not understand, use a special detecting instrument to do a soil test.

Only use strong materials, such as properly dimensioned wooden timbers, for the outrigger pad bases.

In order to make sure that pressure is evenly distributed over the base surface, position the outrigger pads in the center of the support base.

2.4.3 Supporting

- a) Before operation, all wheels must be raised clear of the ground.
- b) Before you extend the vertical cylinders, extend the sliding beams to the specified positions.
- c) Extend all the sliding beams according to the data in the lifting capacity tables and secure them by pins.
- d) Before operation, level the crane. Under any working conditions, the inclination angle α of the crane cannot be more than 0.6°. Refer to Figure 2-2.



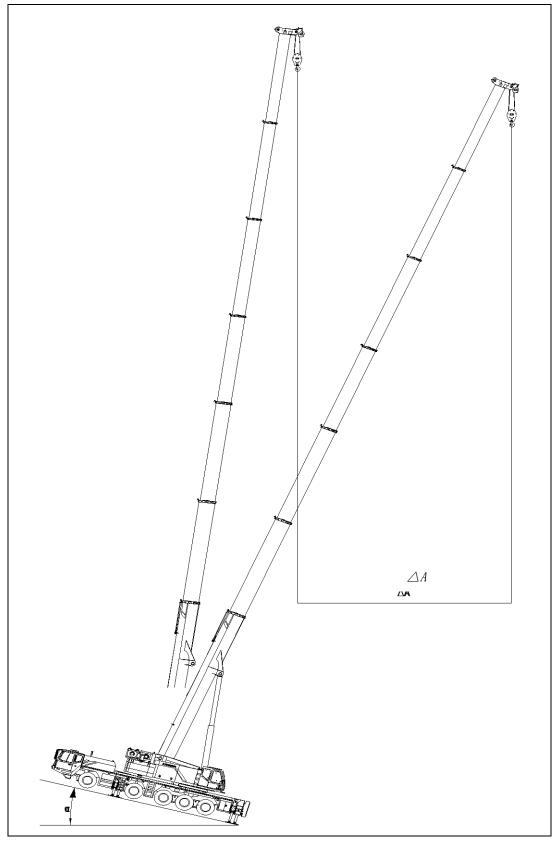


Figure 2-2 Inclination angle of crane



If the crane is positioned at an incline and the boom is turned towards the downslope, then the radius is increased as a result. It is possible that the crane can topple in extreme cases.

After the crane is supported, examine the following safety measures:

- a) The placement location has been selected in such a way that the crane can be operated with the least possible radius.
- b) The load bearing capacity of the ground is adequate.
- c) There is a sufficient safe distance to slopes or ditches.
- d) All outriggers have been extended to the specified positions.
- e) The outriggers are secured with pins.
- f) The outrigger pads are secured.
- g) The crane has been leveled.
- h) All tires do not touch the ground.
- i) There are no live electrical wires within the working range of the crane.
- j) There are no obstacles which will hinder the required crane movements.

2.4.4 Working conditions

2.4.4.1 Temperature

Do not operate the crane if the temperature at the job-site is not in the proper range (-20°C to 40°C).

NOTICE

Pay attention to the ambient temperature in the job-site.

2.4.4.2 Wind load

Before operation, measure the wind speed with the anemometer on boom head. At the same time, judge the instantaneous wind speed according to physical phenomenon. The maximum wind force during crane operation is Beaufort 5. That is to say, the wind speed is 14.1 m/s and the wind pressure is 125 N/m^2 .

2.4.4.2.1 Wind speed

During operation, the instantaneous wind speed should be taken as the actual one. Wind speed during crane operation should not exceed 14.1 m/s.

The wind speed during crane operation (3 seconds instantaneous wind speed) = average value of wind speed for 10 minutes of 10 m above the ground \times conversion coefficient 1.5.

For the Beaufort and wind speed in weather forecast, please refer to Table 2-2.

Beaufort	Description	Average wind speed (m/s)	Instantaneous wind speed (m/s)	Effect of the wind on the land		
0	Calm	0 – 0.2	0 – 0.3	No wind, smoke rises vertically		
1	Slight air (draft)	0.3 – 1.5	0.5 – 2.3	Wind direction shown by smoke drift but not by wind vanes		
2	Light breeze	1.6 - 3.3 2.4 - 5.0		Wind felt on face, leaves rustle, vanes move by wind		
3	Gentle breeze	3.4 – 5.4 5.1 – 8.1		Leaves and small twigs in constant motion, wind extends light flag		
4	Moderate breeze	5.5 – 7.9 8.3 – 11.9		Dust swirls up, small branches move		
5	Fresh breeze	8.0 – 10.7	12 – 16.1	Small trees in leaf begin to sway		
6	Strong breeze	10.8 – 13.8 16.2 – 20.7		Large branches in motion, difficult to use umbrellas, whistling heard in telegraph wires		
7	Stiff wind	13.9 – 17.1	20.9 – 25.7	Whole trees in motion, difficult to walk against the wind		
8	Gale force wind	17.2 – 20.7	25.8 – 31.1	Breaks twigs off trees, impedes progress		
9	Gale	20.8 – 24.4	31.2 – 36.6	Slight structural damage (roof tiles and chimney covers, etc. blown off)		
10	Severe gale	24.5 – 28.4	36.8 – 42.6	Trees uprooted, considerable damage occurs		
11	Violent storm	28.5 – 32.6	42.8 – 48.9	Extensive, widespread storm damage		
12	Hurricane	> 32.7	> 49.1	Major destruction		

Table 2-2 Wind speed

2.4.4.2.2 Wind pressure

Crane operation is affected by wind speed. The higher the height above the ground is, the stronger the wind speed is, and the higher the wind pressure is.

Wind pressure = ground wind pressure × height changing coefficient of wind pressure

The equation of wind pressure and wind speed: $p = 0.625 v_s^2$ (where, p represents wind pressure (unit: N/m²), and v_s represents average instantaneous wind speed (unit: m/s).

K_h represents height changing coefficient of wind pressure.

Take the ground wind speed of 14.1 m/s as an example. For the wind pressure and wind speed of different heights, please refer to Table 2-3.

Height above ground (m)	≤ 10	10 – 20	20 – 30	30 – 40	40 – 50	50 – 60	60 – 70	70 – 80
K _h	1	1.13	1.32	1.46	1.57	1.67	1.75	1.83
Wind speed v _s (m/s)	14.1	15.03	16.25	17.09	17.72	20.02	20.49	20.96
Height above ground (m)	80 – 90	90 – 100	100 – 110	110 – 120	120 – 130	130 – 140	140 – 150	
K _h	1.90	1.96	2.02	2.08	2.13	2.18	2.23	
Wind speed v _s (m/s)	21.35	21.69	22.02	22.34	22.61	22.87	23.13	

 Table 2-3
 Wind speeds for different heights above ground

WARNING

If the instantaneous wind speed is greater than the permissible value of 14.1 m/s (beaufort 5), while the crane is in operation, do the tasks that follow:

- (1) Stop the work (safely lower the load).
- (2) Retract the boom.
- (3) Correctly stow the boom.

2.4.4.3 Height above sea level

During crane operation, the height above sea level of the job-site should not be higher than 2000 m.

If the height above sea level of the job-site is higher than 2000 m, have the crane made to order.

The technical data of this crane such as gradeability and fuel consumption etc. are applied to the job-site of which the height above sea level is below 2000 m.

ZOOMLION



NOTICE

The higher the height above sea level is, the lower the air pressure is, and the less the oxygen content is.

The height above sea level is higher than 2000 m, the following crane performance will be affected:

- (1) The gradeability is reduced.
- (2) The fuel consumption is increased.
- (3) The boiling temperature of the engine coolant decreases.
- (4) The exhaust system emits black smoke.

2.4.4.4 Other conditions

- a) During crane operation, if the visibility is less than 200 m, do the tasks that follow:
 - 1) Stop the work (safely lower the load).
 - 2) Retract the boom.
 - 3) Correctly stow the boom.
- b) During crane operation, stop working in case of thunderbolt or rainstorm. At the same time, take action to prevent lightning and thunderbolt to ensure personnel safety.

During crane operation, stop working in case of thunderbolt or rainstorm. At the same time, fully retract and correctly stow the boom.

c) Strong electromagnetic fields are likely to be present if the construction site is close to a transmitter. Before you operate a crane in the vicinity of transmitters, consult a high frequency specialist or contact the local distributor and the manufacturer.

Electromagnetic fields can expose people and objects to direct and indirect risks, such as:

- Effect on human organs due to radiation
- Spark or electric arc formation.

2.4.5 Points for attention for safe operation

Before you begin a lift operation, meet the requirements below:

- The crane is in safe operating conditions.
- All safety devices, such as load moment limiter, hoisting limit switch, lowering limit switch, brakes, etc., are functional.

Set the load moment limiter to the current crane configuration. Obey the lifting capacity table in a lift operation. Do not try to lift a load that weighs more than the lifting capacity of the crane.

The slings, load carriers and ropes must meet specified requirements. The rated load in the lifting capacity tables includes the weight of the hook and slings.

The counterweight required depends on:

- The weight of the load to be lifted
- The boom radius required for operation.

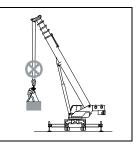
The deciding factor for the selection of the counterweight is the data in the corresponding lifting capacity table.

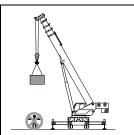
🔔 DANGER

- (1) The crane may topple over if the counterweight is not installed according to the lifting capacity table!
- (2) In a lift operation, use the reevings in the lifting capacity table. Otherwise the wire rope may break off and the winch reducer and motor may be damaged.
- a) Personnel must stay away from the area below the boom.

- b) Do not let personnel on the slewing table while you operate the crane.
- c) Do not move personnel on the load or other equipment used to lift.
- d) Do not move a load above personnel.



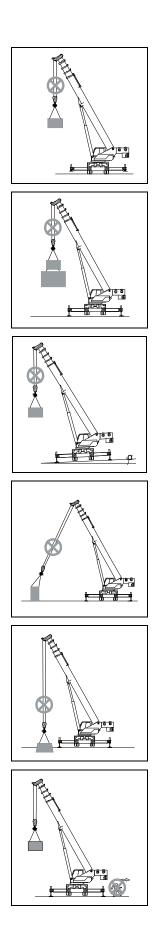






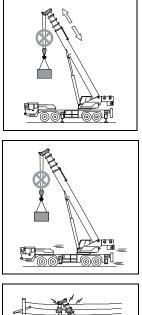
ZOOMLION

- e) Support the crane on outriggers before operation.
- f) Do not lift a load that is above the capacity of the crane.
- g) The crane, with extended outriggers, must be on the ground with a slope α of less than 0.6° during operation.
- h) Do not pull load at an angle and do not lift a load that is not in balance.
- i) Do not try to lift a load that is buried or frozen on the ground.
- j) When the load is off the ground, the operator must stay in the cab.



- k) Do not telescope the boom with a suspended load.
- I) Do not pick-and-carry a load.

 m) When the job-site is in the vicinity of live power lines, you must keep a safe distance. Make sure that you comply with the related regulations. For the minimum safe distance, refer to Table 2-4.



ZOOMLION

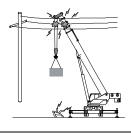


Table 2-4 Minimum safe distance to power lines

Rated voltage (kV)	Minimum safe distance (m)		
< 1	1.5		
1 – 20	2		
35 – 110	4		
154	5		
220	6		
330	7		

- n) Personnel must stay away from the reach of the boom.
- o) Do not adjust the hoist gear brake when the crane is with a load.
- p) Keep no less than 3 wraps of wire rope on the drum.
- q) When the load is off the ground, move the load in a slow and smooth direction. Do not carry out any jerky movements with the joysticks. Avoid any sudden acceleration or braking or conversion operation.
- r) Examine the crane frequently during operation. If you find a malfunction, find out the cause and correct the malfunction.
- s) When the actual lifting load reaches 90% of the rated one, the warning light will light up

and the buzzer will send out acoustic warning. When this occurs, be careful as you continue to lift.

- t) No modification of the crane is allowed. Otherwise, you must bear full responsibility for all the consequences arising therefrom.
- u) Do not lift a load with two or more cranes at the same time.

🚹 DANGER

ZOOMLION

Stop the operation or do not start to lift a load, if one of the items that follow occurs:

- (1) An overload or if the weight of the load is unknown.
- (2) The load lift moves out of position, the rigging becomes too loose or the load is out of balance.
- (3) The protective material between the edges of load and wire rope is missing.
- (4) The light level at the job-site goes below a safe work condition.
- (5) Equipment malfunction or damage to the crane (such as failure of brake and safety devices or damage to wire rope) that decreases the safe operation of the crane.

2.5 Hand signals

- a) Start
 - Hold the right arm stretched
 - vertically upwards. The palm faces
- forwards.

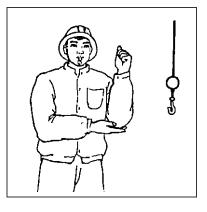
d)

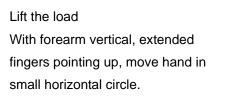


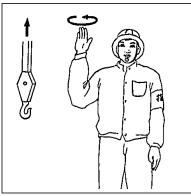
b) Use the main winch
 Tap fist on head, then use regular signal.



c) Use the auxiliary winchTap elbow with one hand, then use regular signal.





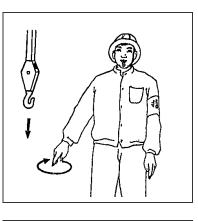


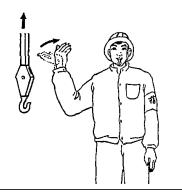
Operator's Manual for Truck Crane

e) Lower the load

With arm extended downward with a 30° angle to the body, forefinger pointing down, move hand in small horizontal circle.

 f) Lift the load slowly
 With forearm vertical, palm of the hand facing upwards, wave hand up repeatedly.

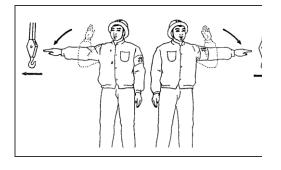


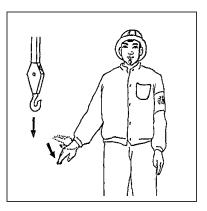


g) Rotate

Turn left: With right forearm vertical, the palm of the hand facing outwards, lower the forearm sideways horizontally, fingers pointing in the direction of rotation. Turn right: With left forearm vertical, the palm of the hand facing outwards, lower the forearm sideways horizontally, fingers pointing in the direction of rotation.

h) Lower the load slowly
 With arm extended downwards
 with a 30° angle to the body, palm
 of the hand facing downwards,
 wave hand down repeatedly.



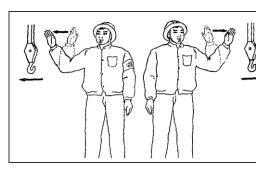


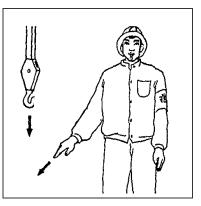


- Rotate slowly
 Turn left: With right forearm
 vertical, the palm of the hand
 - facing outwards, move forearm
 - horizontally and repeatedly,
 - fingers pointing in the direction of rotation.

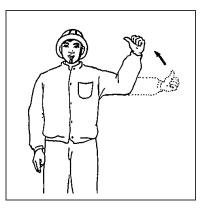
Turn right: With left forearm vertical, the palm of the hand facing outwards, move forearm horizontally and repeatedly, fingers pointing in the direction of rotation.

J) Indicate the load lowering position
 Extend the fingers to point at the position the load should fall on.





k) Raise the boomArm extended, finger closed, thumb pointing upward.

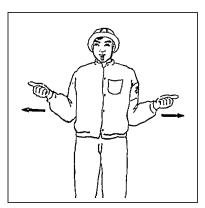


Operator's Manual for Truck Crane

I) Lower the boom
 Arm extended, finger closed,
 thumb pointing downward.

- m) Raise the boom slowly
 Forearm extends in front of body
 with palm facing downwards,
 another hand moves up and down
 with thumb pointing upwards.
- n) Lower the boom slowly
 Forearm extends in front of body
 with palm facing upwards, another
 hand moves up and down with
 thumb pointing downwards.
- extend the boom
 Both fists in front of body with thumbs pointing outwards.









Operator's Manual for Truck Crane

 p) Retract the boom
 Both fists in front of body with thumbs pointing toward each other.

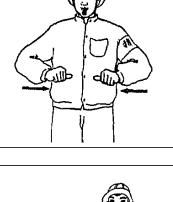
> Arm extended, palm down, and move the arm back and forth horizontally.

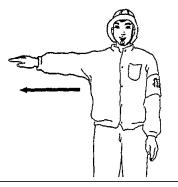
Stop

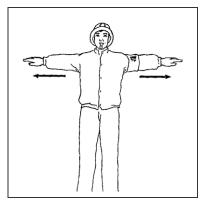
q)

r) Emergency stop
 Both arms extended, palms down,
 move arms back and forth
 horizontally.

s) End a movement
 Cross your hands in front of your forehead.











Truck Crane Operator'S Manual

Chapter 3 Operation – Crane Chassis





Chapter 3 Operation – Crane Chassis

ZOOMLION

3.1 Driver's cab

3.1.1 Overall view

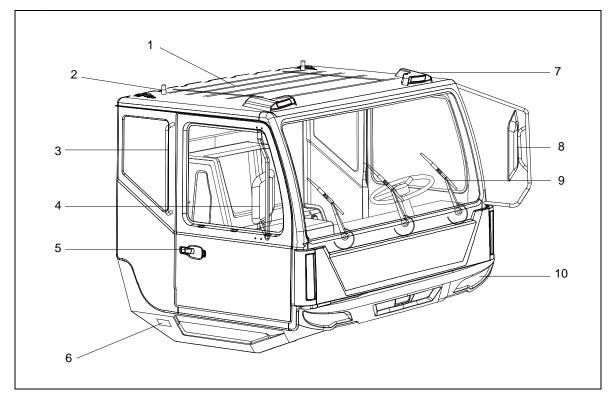


Figure 3-1 Cab exterior

Pos.	Description	Pos.	Description
1	Wire rope holder	6	Side turn signal
2	Rotating beacon (optional)	7	Corner marker light
3	Handrail	8	Mirror (L)
4	Mirrors (R)	9	Front windshield wiper
5	Door handle	10	Front combination signals



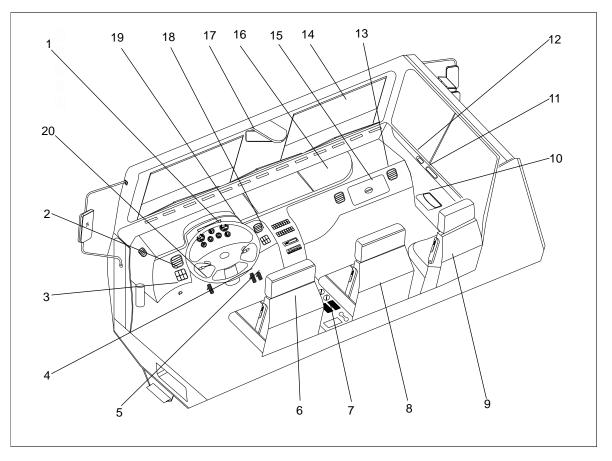


Figure 3-2 Cab interior

Pos.	Description	Pos.	Description
1	Instrument console	11	Inside door handle
2	Left-hand buttons	12	Inside door switch
3	Air horn button	13	Outlet nozzle
4	Foot pedal: Service brake	14	Sun visor
5	Foot pedal: Engine control	15	Fuse box
6	Driver's seat	16	Toolbox
7	Center console	17	LCD
8	Passenger's seat	18	Right-hand buttons
9	Co-driver's seat	19	Steering wheel assy.
10	Glove compartment	20	Clutch pedal



3.1.2 Steering wheel assy.

Refer to Figure 3-3.

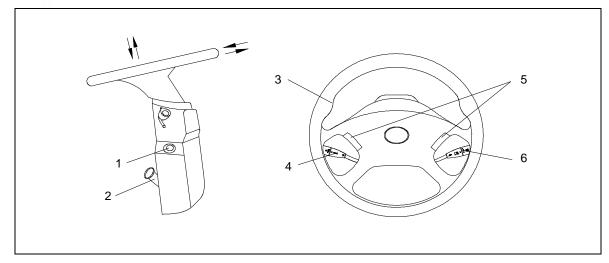


Figure 3-3 Steering wheel assy.

Pos.	Description	Pos.	Description
1	Ignition starter switch	4	Left-hand steering column switch
2	Steering wheel adjustment handle	5	Electric horn buttons
3	Steering wheel	6	Right-hand steering column switch

3.1.2.1 Steering wheel adjustment handle

The angle and height of the steering wheel can be adjusted to suit the driver.

You can adjust the height and angle of the steering wheel when you pull the adjustment handle on the steering column upwards.

- (1) DO NOT adjust the steering wheel while you move the crane. This can kill you.
- (2) Pull the handle downwards to lock the steering wheel after adjustment.



3.1.2.2 Left-hand steering column switch

Refer to Figure 3-4.

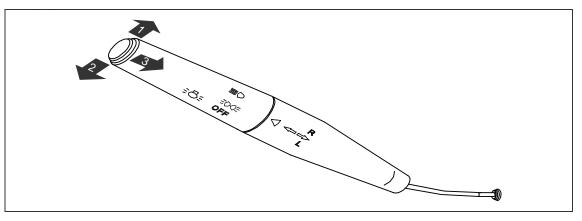


Figure 3-4 Left-hand steering column switch

- a) Turn signal activation (left / right)
 Jog the steering column switch forwards (in direction 1): activate the turn signal (right).
 Jog the steering column switch backwards (in direction 2): activate the turn signal (left).
- b) Switch between the low beam and high beam and operate the headlamp flasher
 Jog the switch upwards (in direction 3) to turn on the high beam and headlamp.
 Jog the switch upwards and downwards continuously to operate the headlamp flasher.
 No matter what working conditions other lamps are in, once the headlamp flasher is on, the headlamp will light up.
- c) Switch on the lighting

Rotate the end of the steering column switch to the $\exists OO \exists$ position to activate the front width lamp, rear width lamp, corner marker light, license plate lamp, operating instrument lamp and low beam.

Rotate the end of the steering column switch to the $\equiv O$ position to activate the high beam.



3.1.2.3 Right-hand steering column switch

Refer to Figure 3-5.

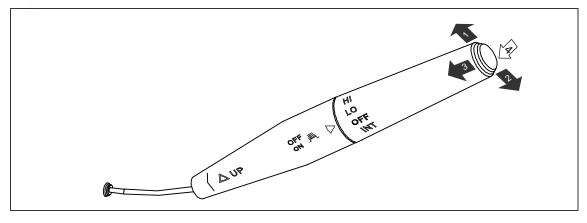


Figure 3-5 Right-hand steering column switch

a) Activate the windshield wiper

Rotate the end of this steering column switch to activate the windshield wiper. The windshield wiper has 4 stages:

INT:	Intermittent
LOW:	Low speed
HI:	High speed

OFF: Off

b) Activate the windshield washer system

Press the button (in position 4) on the end of this steering column switch. The washer and wiper begin to work. They will not stop working until the button is released.

ACAUTION

The wiper stops if the washer system sprays washer fluid for 15 seconds or if the washer fluid tank is empty.

Do not operate the wipers on sunny days unless you spray the window with wiper fluid.

When the temperature is below freezing, make sure that the wiper blades are not stuck to the window before you set the wipers to ON.

c) Activate the retarder

When engine RPM exceeds 1100 r/min.:

- Jog the switch backwards (in direction 2) to activate the retarder.
- Jog the switch forwards (in direction 1) to deactivate the retarder.

The retarder consists of compression release engine brake and engine exhaust brake.



You can depress the engine control pedal or clutch pedal to deactivate the retarder temporarily. The retarder will continue its work after you release the pedal. When the engine RPM is below 1200 r/min., the retarder will be deactivated automatically.

d) Activate the parking signal

Jog the switch upwards (in direction 3) to activate the left and right turn signals simultaneously, thus the parking signal is given. Repeat the operation, the switch will return to the neutral position.

3.1.2.4 Electric horn buttons

They are in the central area of the steering wheel. Press either of the two buttons on the left or right side of the central area to activate the electric horn.

3.1.2.5 Ignition starter switch

The 4 positions of the switch in clockwise direction are as follows:

LOCK	All circuits are OFF. You can plug in or pull out the key.
ACC	The battery begins to supply electricity and parts of the electrical system begin to work.
ON	The entire electrical system is electrified.
S	A temporary position, use it to operate the starter. The key will return to the "ON" position automatically after being released when the engine starts.

You cannot remove the key from the ignition until the switch is in the "LOCK" position.



3.1.3 Instrument panel assy. and display units

3.1.3.1 Instrument panel assy.

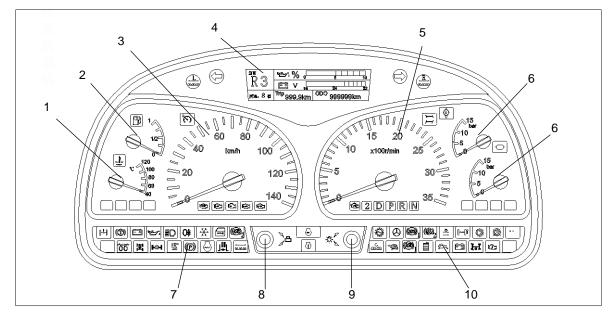


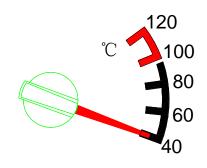
Figure 3-6 Instrument panel assy.

Pos.	Description	Pos.	Description
1	Water thermometer	6	Barometers
2	Fuel gauge	7	Display unit 1
3	Speedometer	8	Left-hand rotary switch
4	LCD and its diagnosis screens	9	Right-hand rotary switch
5	Tachometer	10	Display unit 2

3.1.3.2 Instruments

1 Water thermometer

Displays the engine coolant temperature in degrees Celsius (°C) after you switch the ignition starter switch to the "ON" position. WHITE – normal range RED – the crane is moving in high-temperature areas at high speed or climbing ascending gradients.



2 Fuel gauge

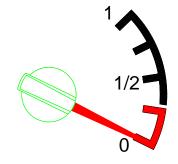
Displays the fuel reserve after you switch the ignition starter switch to the "ON" position.

1 means the fuel tank is full. 0 means the fuel tank is empty.

Add clean fuel into the fuel tank when the pointer is near 0 to ensure normal driving.

3 Speedometer

Displays the speed of the crane in kilometers per hour (km/h) when the crane is moving.





5 Tachometer

Displays the engine speed (RPM).



bar

ZOOMLION

6 Barometers

The two barometers resp. display the pressure of air reservoir for the front axle and air reservoir for the intermediate and rear axles.

If the air pressure is less than 5.5 bar, the warning light "Brake pressure low" will illuminate and the buzzer will send out alarm. Risk of danger if start off at this time!

3.1.3.3 Left-hand rotary switch

Switchover data setting / diagnosis For details, refer to the actual screen of LCD.

3.1.3.4 Right-hand rotary switch

Switchover brightness adjustment / instrument display screens Pressed: set to display screens of instruments Turned: set to brightness adjustment

3.1.3.5 LCD and its diagnosis screens

Display screens of instruments: Press the right-hand rotary switch to set display screens. Set sequence: Main screen \rightarrow Auxiliary screen \rightarrow Next auxiliary screen \rightarrow Diagnosis screen If no button is pressed within 3 to 5 seconds, it will return to the main screen automatically.

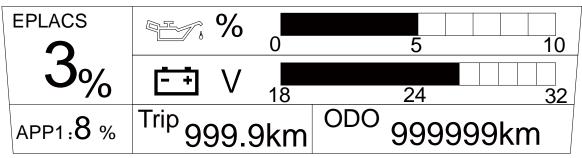
Note:

EPLACS: Engine Percent Load at Current Speed

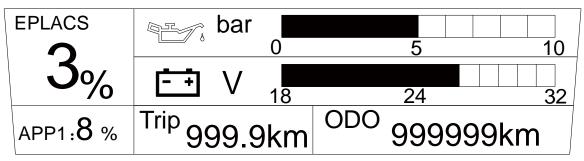
APP1: Engine Control Pedal for Chassis

RmtAPP: Remote Engine Control Pedal

- TCG: Transmission Current Gear
- TSG: Transmission Selected Gear
- a) Main screen
 - Displays engine oil level, engine oil pressure, battery voltage, trip and total trip, etc.
 - 1) Engine oil level (no display on this crane) and battery voltage will be displayed if the engine is not started.



2) Engine oil pressure and engine voltage in working conditions will be displayed after the engine is started.



Press the left-hand rotary switch and hold to clear up trip.

b) Auxiliary screen

Actual Engine-Percent Torque 80		
\mathbf{J}_{Gear}	Engine Total Hours of Operation 8000h	
TSG: 8 Gear	12:15 6.10.2008	

Displays actual engine torque, engine total operating hours, the current gear, time and date etc.

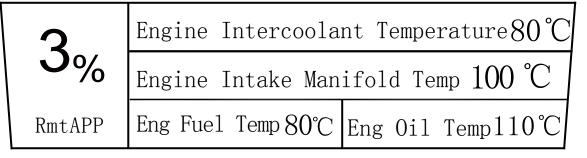
ZOOMLION

- Press the left-hand rotary switch to set Hour.
 - Turn the left-hand rotary switch to set Hour when the figure of "Hour" flashes.
- Press the left-hand rotary switch again to set Minute.
- Turn the left-hand rotary switch to set Minute when the figure of "Minute" flashes. The setting sequence is as follows:

 $\text{Hour} \rightarrow \text{Minute} \rightarrow \text{Year} \rightarrow \text{Month} \rightarrow \text{Date} \rightarrow \text{Time}$

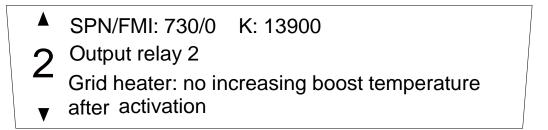
Wait for 3 seconds to exit this mode.

c) Next auxiliary screen



Displays engine coolant temperature, intake manifold air temperature, fuel and engine oil temperature, etc.

d) Diagnosis screen



Turn the left-hand rotary switch for page up / down.

When errors are activated, the last error is displayed.

Turn left: page up

Turn right: page down

1 One error	More than 1 error. 1 Current: the 1st error. Press arrow to ▼ page down.	 More than 2 errors. Current: the 2nd error. Press arrows to page down or up. 	Just 3 errors. Current: last error. Press arrow to page up.
-------------	---	---	--

If no error is activated, press the right-hand rotary switch to switch to the diagnosis screen.

The diagnosis screen displays "No error".



3.1.3.6 Display units

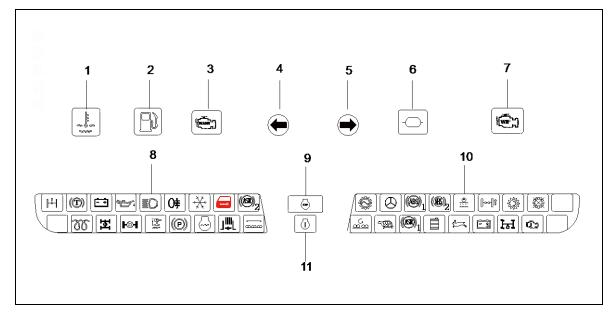


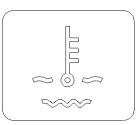
Figure 3-7 Display unit

Pos.	Description	Pos.	Description	
1	Warning light	7	Warning light	
	Engine coolant temperature high	1	Water in fuel	
0	Warning light	0		
2	Fuel level low	8	Display unit 1	
0	Warning light	0	Warning light	
3	Engine error code displayed	9	Engine stop owing to serious engine defects	
	Control light	10		
4	Vehicle direction of travel left	10	Display unit 2	
-	Control light		Warning light	
5	Vehicle direction of travel right	11	Engine defects	
6	Warning light			
6	Brake pressure low			



- Warning light
 Engine coolant temperature high
 Illuminates:
 The engine coolant temperature is high.
 Find the cause of the out-of-tolerance
- indication. Do the steps to decrease the coolant temperature.
- Warning light
 Fuel level low
 Illuminates:
 The fuel level is low.
 Note:
 Add fuel at once.
- 3 Warning light Engine error code displayed Illuminates: It will display the engine error code.
- 4 Control light Vehicle direction of travel left Illuminates: The vehicle is to turn left.
- 5 Control light Vehicle direction of travel right Illuminates:

The vehicle is to turn right.











6 Warning light

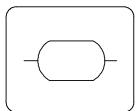
Brake pressure low

Illuminates:

The brake pressure is low.

Extinguishes:

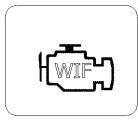
The brake pressure has increased to the specified value.



Do not drive the vehicle if the warning light lights up.

- 7 Warning light
 - Water in fuel
 - Illuminates:

Water in fuel exceeds the permits.



9 Warning light

Engine stop owing to serious engine defects

Illuminates:

The engine shuts down owing to serious engine defects.

Never start up the engine until rectify it.

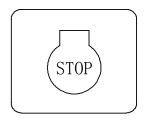
11 Warning light

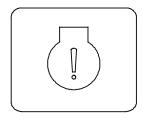
Engine defects

Illuminates:

The engine is defective.

Bring the vehicle to a standstill and rectify it.







3.1.3.7 Display unit 1

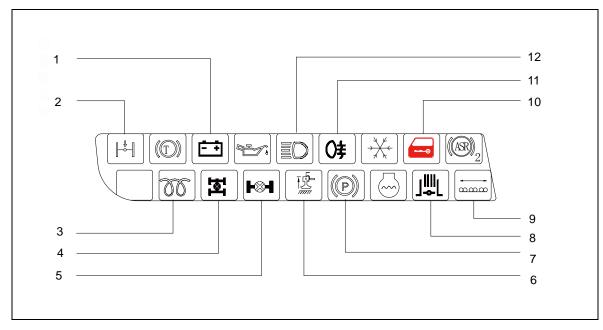


Figure 3-8 Display unit 1

Pos.	Description	Pos.	Description
4	Warning light	7	Control light
1	Charge monitoring	7	Parking brake closed
2	Control light	8	Control light
2	Axle suspension unlocked	0	Engine exhaust brake
2	Control light	0	Control light
3	Diesel engine preheating system	9	Suspensions of axles 1 and 2 leveled
4	Control light	Warning light	
4	Longitudinal differential lock	10	Door opened
5	Control light	44	Control light
5	Transversal differential lock	11	Rear fog lamp
G	Control light (Not used)	12	Control light
6	The 5 th outrigger fully retracted	12	High beam

1 Warning light

Charge monitoring

Illuminates:

The ignition starter switch is in the "ON" position.

Extinguishes after the engine starts: The engine begins to charge the battery.

If the warning light illuminates during battery charging, it means that the generator or charging system is defective. Stop to examine at once!

2 Control light

Axle suspension unlocked Illuminates:

The suspensions of axles 1 and 2 are not in the locked position.

3 Control light

Diesel engine preheating system

In winter, preheat the engine before starting. Turn the ignition starter switch to the "ON" position.

Illuminates:

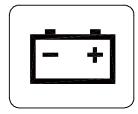
Preheat the chassis engine.

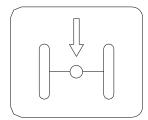
Extinguishes after flashing for 3 times:

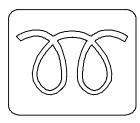
The preheating process is finished. You can start the engine.

Note:

After the engine is started, the engine is still preheated but the control light does not illuminate. The preheating process interrupts if you start the engine when the control light illuminates or flashes.









- Control light
 Longitudinal differential lock
 Illuminates:
 The longitudinal differential lock is activated and locked.
- 5 Control light Transversal differential lock
 Illuminates: The transversal differential lock is activated

and locked.

6 Control light

The 5th outrigger fully retracted Note:

The control light is NOT USED in this crane.

7 Control light

Parking brake closed Illuminates:

The parking brake is applied. Do not start the vehicle until the parking brake is released and the control light extinguishes.

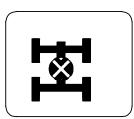
8 Control light

Engine exhaust brake Illuminates: The engine exhaust brake is activated.

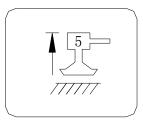
9 Control light

Suspensions of axles 1 and 2 leveled Illuminates:

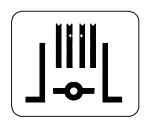
The suspensions of axles 1 and 2 are leveled.

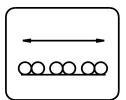












10 Warning light

Door opened

Illuminates:

The door is opened.

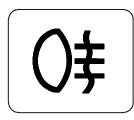


Do not drive the vehicle if the warning light lights up!

11 Control light Rear fog lamp Illuminates:

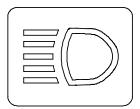
The rear fog lamp is ON.





12	Control light	
	High beam	
	Illuminates:	

The high beam or headlamp flasher is ON.



Operation ₁ Crane Chassis

3.1.3.8 Display unit 2

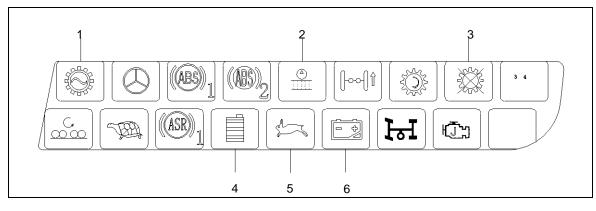


Figure 3-9 Display unit 2

Pos.	Description	Pos.	Description
4	Control light	4	Warning light
1	Transmission creeper gear	4	Engine coolant level low
2	Warning light	_	Warning light
	Filter soiled	5	Engine speed high
3	Warning light	2	Warning light
	Transmission defects	6	Battery voltage low

1 Control light

Transmission creeper gear Note:

The control light is NOT USED in this crane.

2 Warning light

Filter soiled

Illuminates:

The filter in chassis hydraulic system is soiled.

Clean or replace the filter element.

3 Warning light

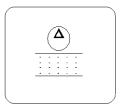
Transmission defects

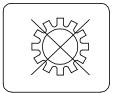
Note:

The warning light is NOT USED in this crane.



ZOOMLION

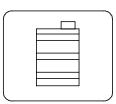


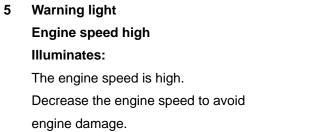


Operator's Manual for Truck Crane

ZOOMLION

Warning light
 Engine coolant level low
 Illuminates:
 Engine coolant level is low.
 Add coolant in time.





6 Warning light Battery voltage low Note:

The warning light is NOT USED in this crane.





3.1.4 Center console

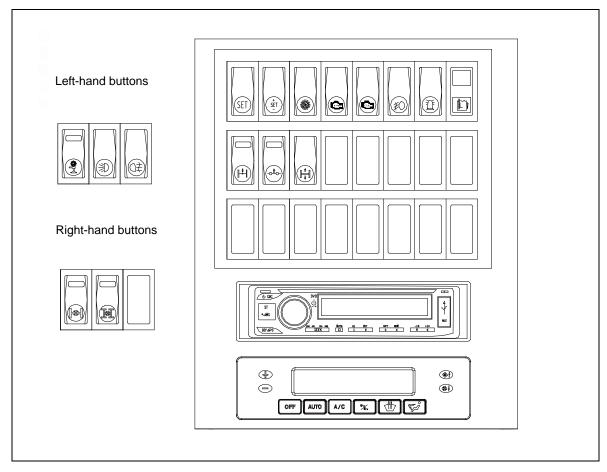


Figure 3-10 Center console

3.1.4.1 Left-hand buttons

1 Button

Outrigger power source

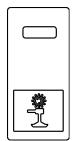
This button is with a lock.

Before you activate this button, move

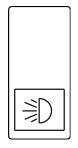
the lock downwards.

Pressed:

Outrigger power source is switched on. The support control units are operational.



2 Button
 Sliding beam illumination
 Pressed:
 The sliding beam illumination is ON.





3.1.4.2 Right-hand buttons

Button

Pressed:

Rear fog lamp

The rear fog lamp is ON.

1 Button

3

Transversal differential lock

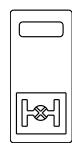
Pressed down:

The transversal differential lock is activated. Activate this button in off-road driving to prevent wheels from skidding.

Pressed up:

The transversal differential lock is deactivated.

- Only operate the button when the vehicle is stationary. Once it drives on road, press up the button to release the transversal differential lock to avoid axle damage.
- (2) Only add the differential lock when the vehicle is stationary. Do not add the differential lock when the wheels are turning.
- (3) Do not attempt to corner after you add the transversal differential lock.
- (4) Only add the differential lock within the standard crane weight (without the counterweight).
- (5) Start off at low engine speed.







2 Button

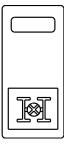
Longitudinal differential lock

- Pressed down:
- The longitudinal differential lock is activated.
- Activate it in off-road driving to prevent front / rear
- wheels from skidding.

Pressed up:

The longitudinal differential lock is deactivated.

- Only operate the button when the vehicle is stationary. Once it drives on road, press up the button to release the longitudinal differential lock to avoid axle damage.
- (2) Only add the differential lock when the vehicle is stationary. Do not add the differential lock when the wheels are turning.
- (3) Be cautious when you attempt to corner after you add the longitudinal differential lock.
- (4) Only add the differential lock within the standard crane weight (without the counterweight).
- (6) Start off at low engine speed.





3.1.4.3 Keyboard

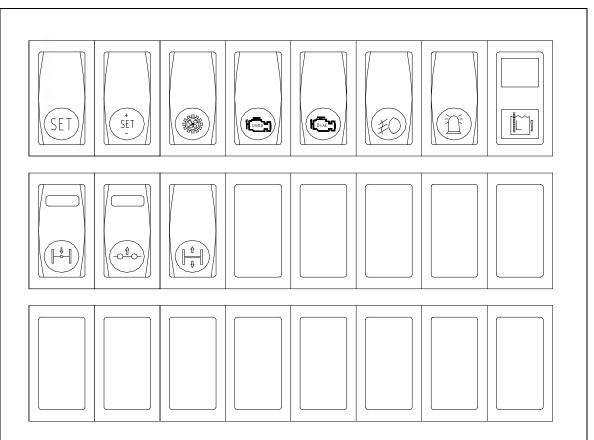


Figure 3-11 Keyboard

1 Button

Tempomat

This button is a multiple-stage automatic resetting button.

Pressed up:

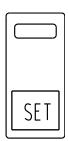
The tempomat is deactivated.

Pressed down:

The interrupted tempomat is activated or resumed.

Note:

The tempomat refers to driving the vehicle at a constant speed set by the ECU without applying the engine control. It is usually used in long-distance driving to release the driver's fatigue.



Operation ₁ Crane Chassis



2 Button

Tempest

This button is a 3-stage automatic resetting button.

- Pressed up / down:
 - The temposet is activated.
- Note:

You can increase/ decrease the speed via the button..

3 Button

Switch radiator-fan of transfer case ON Pressed:

The radiator-fan of transfer case is activated.

4 Button

Multifunctional fuel filter Pressed: The multifunctional fuel filter is activated. Note:

The button is NOT USED in this crane.

5 Button

Engine fault diagnosis

Pressed and released:

The ECU will send out the engine error code via the warning light "Engine error code displayed".

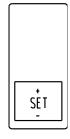
The warning light "Engine defects" will illuminate all the time if you press and hold the button.

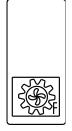
6 Button

Rotating beacons

Pressed:

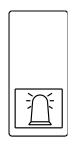
The rotating beacons on the roof of driver's cab and the tail of slewing table are activated.











Operator's Manual for Truck Crane

7 Warning light

Hydraulic oil level low Illuminates: The hydraulic oil level is lower than the permitted value. Add hydraulic oil to the required level.

8 2-handed button

Unlocking the axle suspension Pressed:

The axle suspension is unlocked.

Released:

The axle suspension is locked.

WARNING

Only operate the button when the vehicle is stationary. Unlock the axle suspension before driving.

9 Button

Automatic level control, suspensions of axles 1 and 2 Pressed:

The suspensions of axles 1 and 2 are leveled automatically. You can apply the engine control to increase engine RPM if this function is selected.

10 3-handed button

Suspensions of axles 1 and 2 raised or lowered Pressed up:

The suspensions of axles 1 and 2 are raised.

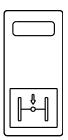
Pressed down:

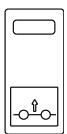
The suspensions of axles 1 and 2 are lowered.

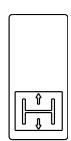
Pressed on the middle position:

The suspensions of axles 1 and 2 are kept on its original height.

Ĩĭ
٢









3.1.4.4 MP3 player

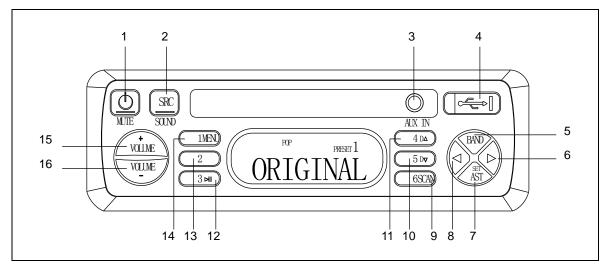


Figure 3-12 MP3 player

Pos.	Description	Function 1	Function 2	Function 3
1	POWER/MUTE	Pressed and held:	Pressed and released:	
		Switch on / off the	Mute	
		power.		
2	SRC/SOUND	Pressed and held:	Pressed and released:	
		Set the mode of sound	Changeover sound	
		effect.	source.	
3	AUX IN	Standard audio input		
		interface		
4	USB PLUG	USB port		
5	BAND	Select the band		
6		Search next (Radio	Skip next (USB mode)	Set the minute
		mode)		(Clock set mode)
7	AST/SET	Pressed and	Pressed and held:	
		released:	Enter / exit set	
		Automatically reserve		
		the radio station		
8		Search previous	Skip previous (USB	Set the hour
		(Radio mode)	mode)	(Clock set mode)
9	6 SCAN	Reserved button 6	Track browsing (USB	
3			mode)	
10	5 D 🔻	Reserved button 5	Next file (USB mode)	

Table 3-1 Descriptions and functions of MP3 player



Pos.	Description	Function 1	Function 2	Function 3
11	4 D ▲	Reserved button 4	Previous file (USB mode)	
12	3 📕	Reserved button 3	Pause \ play (USB mode)	
13	2	Reserved button 2		
14	1 MENU	Reserved button 1	Track location (USB mode)	
15	VALUME+	Volume +		
16	VALUME-	Volume -		



- (1) Do not remove the USB stick when the sound files in the stick are playing. Otherwise, the files will be damaged. Remove the stick after you turn off the MP3 player.
- (2) Do not extend the USB cable. Otherwise, the files in the USB stick may not be read because the USB extension cable not provided by the manufacturer may not meet the requirements for the cable length, resistance and signal time-relay stated in the *USB Specification*.
- (3) Set the ignition starter switch to the "ACC" position, when you use the MP3 player with the engine in the "OFF" position.

3.1.4.5 A/C control panel

Refer to Figure 3-13.

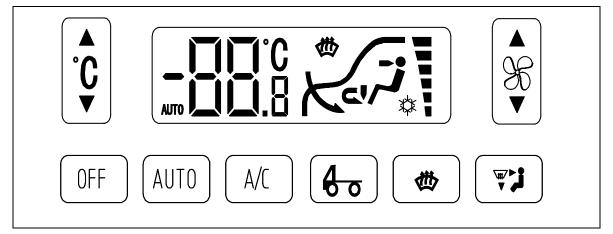


Figure 3-13 A/C control panel

Operator's Manual for Truck Crane



1 Temperature adjustment button Pressed: Increase / decrease the temperature.

- Fan speed button
 Pressed:
 Increase / decrease the fan speed.
- 3 OFF button
 Pressed:
 Turn off the air conditioning system.

4 AUTO button

Pressed:

Activate the auto operating mode.

5 A/C button

Pressed:

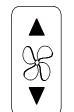
The A/C begins to refrigerate.

6 Circulation button

Pressed:

Changeover interior / outer air circulation.

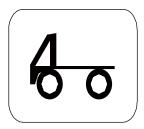












7 Front window air supply button

Pressed:

Activate the front window air supply mode.

8 Mode button

Pressed:

Changeover different air supply modes.





Description	Symbol	Description	Symbol
Set	SET	Refrigeration	*
Auto	AUT0	1 bar – stage 1	U
Temperature		2 bars – stage 2	1
Outer air circulation	L L	3 bars – stage 3	ļ
Interior air circulation	C	4 bars – stage 4	Ţ
Footwell air supply	U	5 bars – stage 5	
Fresh air		6 bars – stage 6	Ţ
Front window air supply	母	Vehicle body	i,

Table 3-2 Symbol identification

Detailed information:

- (1) Temperature
 - 1) Interior temperature range: -30.0°C to 80.0°C
 - If the interior temperature sensor is defective, 25.0°C will be displayed and never changed.
- (2) Fan speed bar chart
 - 1 bar stage 1 2 bars stage 2 3 bars stage 3

4 bars - stage 4 5 bars - stage 5 6 bars - stage 6

(3) Fan speed button

Arrow up - fan speed (blower), faster

Arrow down - fan speed (blower), slower



If the fan speed button is not activated, arrows up / down are invalid.

If the fan speed button is activated, press arrows up / down to increase / decrease the fan speed.

If the fan speed is increased / decreased to the highest / lowest stage, arrows up / down will be invalid.

(4) Mode button

Changeover front window supply / footwell supply / footwell and defrosting air supply

(5) A/C button

The control light illuminates: The compressor activated

The control light extinguishes: The compressor deactivated

(6) Temperature adjustment button

Temperature range: 17°C to 29°C.

Pressed: The temperature is increased or decreased by 1°C between 17°C and 29°C

Press and hold this button, the temperature will be continuously increased or decreased.

The set temperature will flash and the interior temperature will be displayed after 5 seconds.

LO: set temperature below 17°C

HI: set temperature above 29°C

The air conditioning system is of diagnosis function.

- a) Press and hold OFF.
- b) The error codes will appear on the display after 10 seconds.

C0: Normal

- C3: The interior temperature sensor uninstalled or defects
- C5: The evaporator temperature sensor uninstalled or defects
- C6: Water valve steering gear uninstalled or defects
- C7: Air door for mode adjustment uninstalled or defects

How to correct the malfunctions:

- For C3 and C5, install or repair the sensor.
- For C6, install or repair the steering gear and then restart the air conditioning system.
- For C7, install or repair the air door and then restart the air conditioning system.

A WARNING

Do not use the cab heater during driving if engine coolant temperature is below 70°C.

- (1) Make sure that the A/C is in the OFF mode when the engine is OFF or at idle speed for a long time. The battery drains in these conditions.
- (2) When you move the crane for a long distance at low speed, with the A/C in the ON mode, put the transmission in a low gear. This increases the engine RPM and decreases the load on the transmission.
- (3) Set the A/C to the OFF position when you do one of the items that follow:
 - Move the crane quickly.
 - Move up a long hill slope.
- (4) In winter or other periods without using air conditioning, run the air conditioning for several minutes once a month to benefit the lubricating circulation and make sure the system in good state.
- (5) Make sure that the refrigerant in the A/C system is at the correct level at regular intervals.
- (6) If there are unusual vibrations, noises or smells during operation, stop and examine the crane immediately. Do not operate the crane that has a malfunction.
- (7) Keep the surface of the condenser clean. When you clean the condenser, do not use steam. Clean it with compressed air or cold water.
- (8) Do not disassemble the belt or pipeline of compressor when you do not use it for a long time.
- (9) In summer, close the shutoff gate valve on the hot-water pipe of heater at the bottom of driver's cab. Otherwise, refrigeration effect may be affected. In winter, open the shutoff gate valve to make hot water enter into the heater. For hot water type heater, engine coolant temperature will affect the interior temperature. If the engine coolant temperature cannot be heated, the driver's cab will not be warmed.



3.1.4.6 Center console

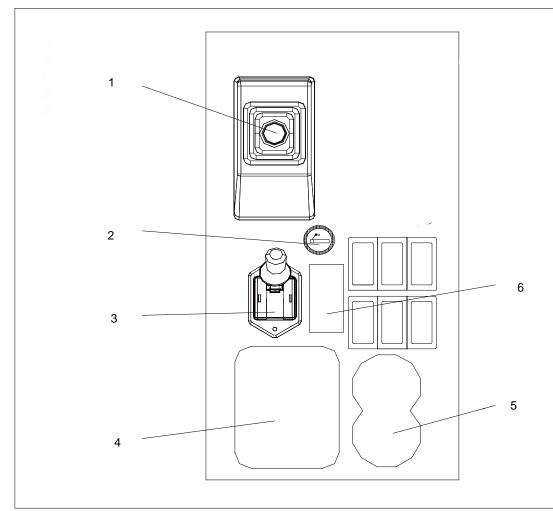


Figure 3-14 Center console

Pos.	Description	Pos.	Description	Pos.	Description
1	Gear lever	2	Cigarette lighter	3	Parking brake hand lever
4	Storage compartment	5	Cup holder	6	Ashtray

1 Gear lever

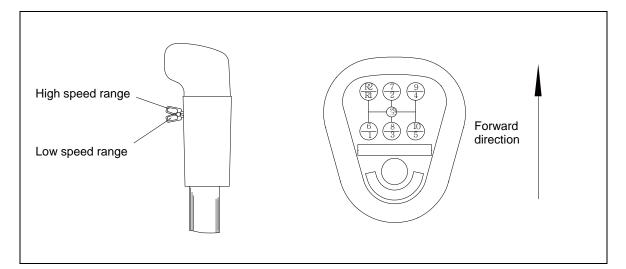
The crane is fitted with a main transmission and an auxiliary transmission.

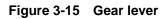
The main transmission is mechanically and manually controlled, and the auxiliary one is pneumatically controlled.

The gearshift pressure should be more than 0.6 MPa.

For details, please refer to Figure 3-15.







2 Cigarette lighter

Press the cigarette lighter for 3 to 5 seconds. Pull it out to light cigarette. After you use it, return it back.

AUTION

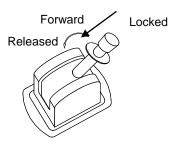
Set the ignition starter switch to the "ACC" position, when you use the cigarette lighter with the engine in the "OFF" position.

3 Parking brake hand lever

Pull the hand lever of parking brake backwards to lock the vehicle. Pull back the hand lever of parking brake as far as the stop in the hand lever's longitudinal direction and push forward to release vehicle locking. Release the parking brake before driving.

Do not start the vehicle unless the parking brake is released and the control light "Parking brake closed" extinguishes.







3.1.5 Air horn button

It is situated on the side of driver's left foot and the base of the steering wheel. Pressed: The air horn alarms. Released: The air horn stops alarming.

3.1.6 Foot pedal: Engine control

It is an electron pedal. Depressed: The vehicle accelerates. Released: The vehicle decelerates.

3.1.7 Foot pedal: Service brake

Depressed: The vehicle decelerates or stops.

3.1.8 Foot pedal: Clutch

Depressed: The clutch is disengaged.

3.1.9 Crane lighting

3.1.9.1 Front combination signals

Take the lights on the left as an example. The lights on right side are the same as the left ones. For details, refer to Figure 3-16.

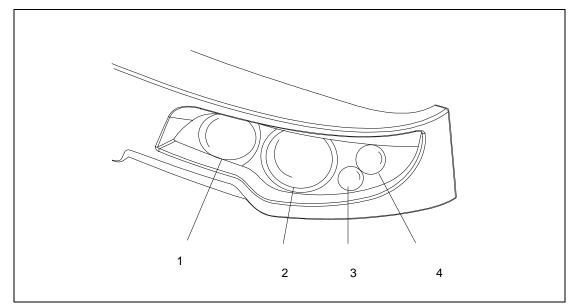


Figure 3-16 Front combination signals

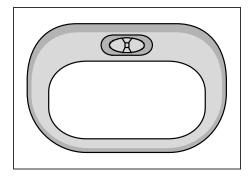
Pos.	Description	Pos.	Description	Pos.	Description
1	Front high beam	2	Front low beam	3	Front corner marker light
4	Front turn signal				



3.1.9.2 Interior illumination

It is installed on the roof of the driver's cab to supply interior illumination. The door lamp button is a 3-handed button: Center position: off Left and right positions: on The door lamp will light up if any door is

open. If the doors are closed well, the door lamp will go out.



3.1.9.3 Reversing system

The display of the reversing system is installed at the middle top position above the front panel of driver's cab.

For detailed information, please refer to the operating instructions attached to the crane.

Set the ignition starter switch to the "ACC" position, when you use the reversing system with the engine in the "OFF" position.

3.1.9.4 Reversing radar

Introduction:

The crane is mounted with reversing radars to measure the distances to nearby objects. They can be used to alert the driver to unseen obstacles during reversing maneuvers. Depending on the speed of the vehicle and the distance to the obstacle, the system will warn the driver by audible means about the risk of collision.

Work process:

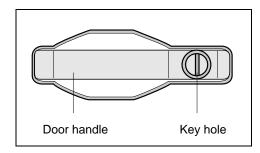
The reversing radars will be automatically activated after you turn the drive range switch to "R". When you move the vehicle slowly and smoothly toward rear, the radars will give signals of presence of the obstacle and the car's computer voice issues the warning statement once detected the obstacle.

When the distance to the nearby object is between 1.5 m and 3 m, the car's computer voice issues "The actual distance". When the distance is less than 1.5 m, the car's computer voice issues the "Stop" statement, warning the driver to stop immediately to avoid collision.

The display of the reversing system in the driver's cab has four bar graphs. The scales of the bar graph change according to the distance from the vehicle tail to the nearby object.

3.1.10 Door - driver's cab

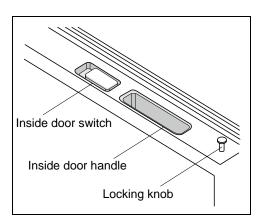
- a) Open the door from outside
 Hold the handle and pull it outwards.
- b) Close the door The door will be locked automatically when the door is closed.



ZOOMLION

Do not drive the vehicle if the doors are not properly closed and locked!

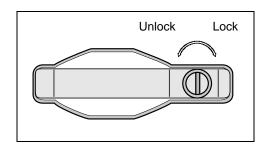
- c) Open the door from inside
 Pull the inside door switch upwards and hold the handle to push the door outwards.
- d) Lock the door from inside The locking knob is on the lower edge of door window.
 Press down the locking knob to lock the door from inside.
 Pull the locking knob upwards before you open the door.





If the door is not closed well, the locking knob cannot be pressed.

 e) Lock the door from outside Insert vehicle key into the key hole. Turn it clockwise to lock the door, turn it counterclockwise to unlock the door.





3.1.11 Seats in driver's cab

3.1.11.1 Driver's seat

The driver's seat with single armrest has pneumatic suspension and can be adjusted to suit any driver's height or size. Adjust driver's seat before setting off. Refer to Figure 3-17.

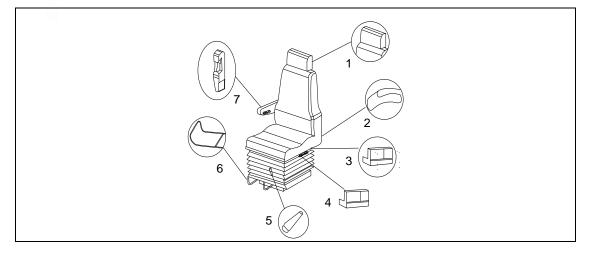


Figure 3-17 Driver's seat

Pos.	Description		Description
1	Switch, adjust headrest setting	5	Handle, adjust damper
2	Handle, adjust backrest setting	6	Lever, adjust horizontal setting
3	Handle, adjust seat cushion angle (rear section)	7	Rotary switch
4	Handle, adjust seat cushion angle (front section)		

1 Switch, adjust headrest setting

Press this switch to move the headrest upwards or downwards. Release the switch to lock the headrest.

2 Handle, adjust backrest setting

Pull handle 2 forwards. Release it until the backrest stops at a suitable angle.

- Handle, adjust seat cushion angle (rear section)Pull handle 3 upwards. Release it until the cushion (rear section) stops at a suitable angle.
- 4 Handle, adjust seat cushion angle (front section)

Pull handle 4 upwards. Release it until the cushion (front section) stops at a suitable angle.

For handles 3 and 4, shake the seat after seat adjustment to make sure the seat is locked.



5 Handle, adjust damper

Rotate handle 5 anticlockwise to lock the damper for air bag. Rotate it clockwise to unlock and activate the damper.

6 Lever, adjust horizontal setting

Pull lever 6 upwards. Release it until the cushion stops at a suitable position.

7 Rotary switch

Turn the switch clockwise to raise the armrest and anticlockwise to lower the armrest.

3.1.11.2 Co-driver's seat

The co-driver's seat is equipped with double armrests. Its stiffness of suspension is adjusted mechanically. Refer to Figure 3-18.

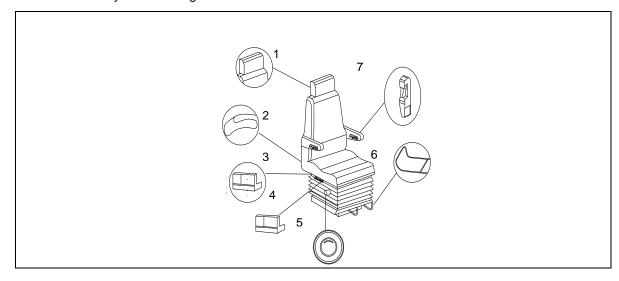


Figure 3-18 Co-driver's seat

Pos.	Description		Description
1	Switch, adjust headrest setting	5	Handle, adjust damper
2	Handle, adjust backrest setting	6	Lever, adjust horizontal setting
3	Handle, adjust seat cushion angle (rear section)	7	Rotary switch
4	Handle, adjust seat cushion angle (front section)		

1 Switch, adjust headrest setting

ZOOMLION

Press this switch to move the headrest upwards or downwards. Release the switch to lock the headrest.

- Handle, adjust backrest settingPull handle 2 forwards. Release it until the backrest stops at a suitable angle.
- Handle, adjust seat cushion angle (rear section)Pull handle 3 upwards. Release it until the cushion (rear section) stops at a suitable angle.
- 4 Handle, adjust seat cushion angle (front section)Pull handle 4 upwards. Release it until the cushion (front section) stops at a suitable angle.



For handles 3 and 4, shake the seat after seat adjustment to make sure the seat is locked.

5 Rotary switch, adjust stiffness of the suspension

Turn the switch clockwise or anticlockwise to adjust the seat cushion depth according to co-driver's actual conditions.

Do not turn the switch below the range of 40 kg or above the range of 130 kg.

6 Lever, adjust horizontal setting

Pull lever 6 upwards. Release it until the cushion stops at a suitable position.

7 Rotary switch

Turn the switch clockwise to raise the armrest and anticlockwise to lower the armrest.

3.1.11.2 Passenger's seat

The passenger's seat is equipped with fixed double armrests and two-point seat belt. Refer to Figure 3-19.

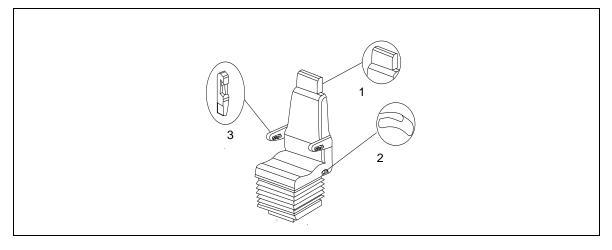


Figure 3-19 Passenger's seat



Pos.	Description		Description
1	Switch, adjust headrest setting	3	Rotary switch
2	Handle, adjust backrest setting		

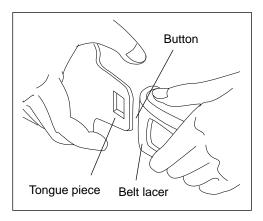
Note: The operating modes of the switches or handle are the same as the driver's seat's.

Putting on seat belt:

Fasten and adjust the seat belt to a suitable position before setting off.

Insert the tongue piece into the belt lacer to fasten the belt.

Press the button to unfasten the belt.



3.1.12 Attachments

a) Sun visor

The sun visor is located above front windshield inside driver's cab. Pull the sun visor downwards to shut out the sunshine.

Push the sun visor upwards to roll it up.

b) Toolbox

The toolbox is in the instrument console of the driver's cab, in which there are two toolboxes in different sizes.

Press the switch to open the toolbox and push down the cover to close it.



3.2 Before starting up the vehicle

3.2.1 Operating conditions

- a) If the crane is used for the first time, make sure the crane is in proper working condition (without damage or abnormalities).
- b) Always use the correct light diesel oil and engine oil. Make your selection on the lowest ambient temperature where you are to do the work. Obey the *Operation and Maintenance Manual for WP12 Series Diesel Engine* to choose the brand.

3.2.2 General checks before setting off

- a) Examining the oil level
 - 1) Examine oil level in the vehicle engine.
 - 2) Examine oil level in transmission, transfer case and axles.
 - 3) Examine oil level in chassis hydraulic oil tank.
- b) Examining the fuel reserve

Examine fuel reserve at fuel gauge in driver's cab.

Do not run the fuel tank dry!

If the fuel tank has been run dry, always de-aerate the entire fuel system.

c) Examining the coolant level

Examine the coolant level from the liquid level gauge in the expansion tank. Fill auxiliary coolant reservoir up to near the "MAX" mark.

Risk of injury due to scalding of the skin. Engine must be cold when performing cooling water level check.

- d) Examining the tires
 - 1) Examine working conditions of the tires.
 - 2) Examine air pressure and inflate tires to 0.9 MPa.



Do not exceed the maximum air pressure during inflation.

- e) Examining the mounting connections
 - 1) Make sure that the parts that follow are tight:
 - Bolts in steering and drive systems
 - Wheel bolts.
 - 2) Make sure that the parts in the steering and brake systems are flexible, safe, and reliable. Especially make sure that the parts that follow are tight:

ZOOMLION

- Fittings of steering drag link
- Retaining bolts of steering wheels
- Brake chambers of axles
- Pipes.
- f) Examining the items that follow for damage:
 - Door locks
 - Doors
 - Windows
 - Operating mechanisms.
- g) Examining the outside mirrors for proper position.
- h) Examining the electrical system
 - 1) Examine the battery terminals for too much corrosion and make sure that the power wires are tight.
 - 2) Examine the level of the battery electrolyte.
 - Turn the ignition starter switch to the "ON" position and examine the functions of the items that follow:
 - Instruments
 - Switches and buttons
 - Lighting
 - Control lights and warning lights
 - Wipers.
- i) Examining the pipes
 - 1) Examine the fittings of oil pipes, air pipes and water pipes for leakage.
 - 2) Examine the air reservoir for condensation (drain the water as necessary).



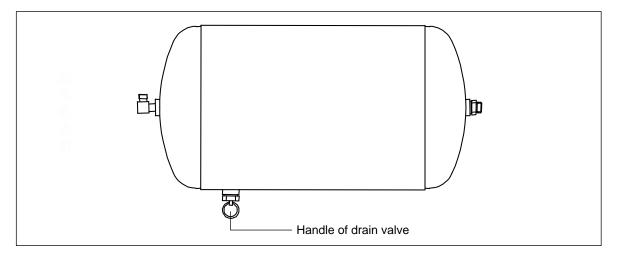


Figure 3-20 Air reservoir

- (1) Prop up or withdraw the handle of drain valve to drain the water.
- (2) Do not start up the vehicle until the drain valve is closed after the water is drained out.
- j) Examine the air filter vacuum actuated indicator. If the light is in the red area, clean or replace the filter element.

Remove all contamination (dust and sand) from the dust collector at the bottom of the air filter.

- k) Before the crane can be driven on public roads, make sure that the following prerequisites are met:
 - All loose parts are secured onto the crane.
 - The axle suspension is unlocked.
 - The operator's cab is in the driving direction and secured mechanically.
 - The telescopic boom is fully retracted and placed on the boom support.
 - The doors and windows of the operator's cab are closed.
 - Sliding beams must be fully retracted and secured with pins.
 - Engine housing and toolbox door have been locked.
- I) Examining the lighting

Turn the ignition starter switch to the "ACC" position, and examine the lighting before setting off. Refer to Figure 3-21.



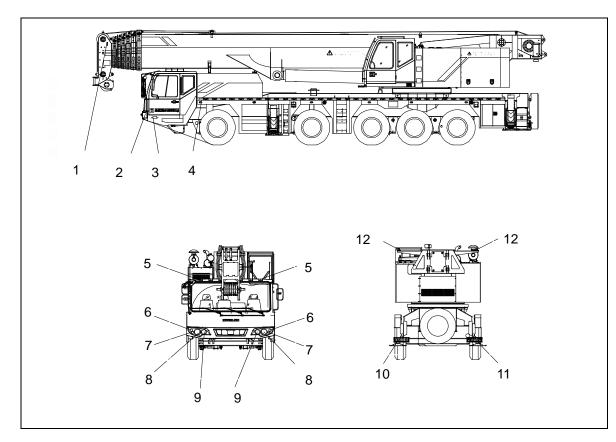


Figure 3-21 Vehicle lighting

Examine the lighting (Refer to Figure 3-21) before setting off:

- 1 Boom head lamp
- 2 Front headlamps
- 3 Side turn signals
- 4 Side marking lights and reflectors
- 5 Front upper corner marker lights
- 6 Front turn signals
- 7 Front width lamps
- 8 Front low beam
- 9 Front high beam

Note:

High / low beam is used to light up the road and the lighting color is white. The low beam is anti-dazzle.

ZOOMLION

- 10 Left rear combination signals (on chassis frame left rear part) Refer to Figure 3-22.
 - The left rear combination signals are combined in a rectangle plate.

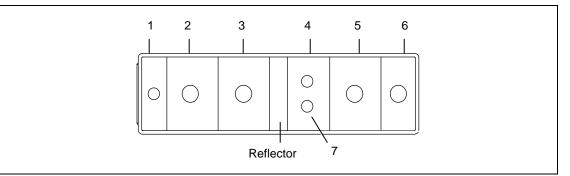


Figure 3-22 Left rear combination signals

Pos.	Description	Pos.	Description
1	Corner marker light (red)	5	Rear fog lamp (red)
2	Turn signal (Amber)	6	Reversing light (white)
3	Brake lights (red)	7	License plate lamp (not used)
4	Rear width lamp (red)		

- Right rear combination signals (on chassis frame right rear part)The right rear combination signals are the same as the left rear combination signals.
- 12 Rear upper corner marker lights

Examine the following illuminations and warning devices before setting off.

13 Interior illumination

ZOOMLION

It is installed on the roof of the driver's cab to supply interior illumination.

14 Sliding beam illumination

They are installed near the outrigger boxes to supply illumination for sliding beams. It is convenient for the operator to observe working conditions of sliding beams at night.

15 Buzzer

The reversing light will illuminate and the buzzer will send out slow alarm when reversing gear is applied.

The warning light "Brake pressure low" will illuminate and the buzzer will send out slow alarm when the pressure of the air brake system is low.

The warning light "Engine coolant temperature high" will illuminate and the buzzer will send out slow alarm when the engine coolant temperature is high.

Danger of accident if lighting is defective!

Arrange to have any defective lights repaired by an expert before setting off!



- m) Driver's cab
 - 1) Adjusting driver's seat

The driver's seat can be adjusted to suit any driver's height or size. Adjust the driver's seat before setting off.

- Backrest setting
- Seat cushion angle (rear section)
- Seat cushion angle (front section)
- Horizontal setting
- Damper.

The functions of driver's seat are not completely the same as the co-driver's seat. For detailed information, refer to Section 3.1.11.

2) Adjusting the mirror

Clean outside mirrors before setting off and adjust them to suit driver's field of view. Adjust the outside mirrors manually.

Result:

- You can switch between the left and right outside mirrors.
- The mirrors are adjusted.
- 3) Adjusting the steering wheel

The steering wheel is adjusted mechanically.

Operate the steering wheel adjustment handle (Refer to Section 3.1.2). **Result:**

- The angle and height of the steering wheel are adjusted to suit the driver.

🔔 DANGER

Do not adjust the steering wheel, driver's seat and outside mirrors while driving.

4) Turning heater / ventilation on

The cab can be heated or ventilated to the desired temperature.

For a detailed operation, refer to Section 3.1.4.5.

To adjust the heater or ventilation, use the buttons in A/C control panel.

Turn off the shutoff gate valve on the hot-water pipe of heater at the bottom of driver's cab when you use the air conditioning in summer and turn on the valve in winter.

5) Examining main controls

Make sure that the battery master switch is on when you do the following checks. Examine the following components:

- High beam
- Rear fog lamp
- Horn

ZOOMLION

- Rotating beacons
- Windshield wiper / washer system / windshield washing fluid container

Danger of fatal injury due to defective main controls! Arrange to have any defective functions repaired by an expert before setting off.

n) Fuse

- 1) Open the cover of the center console and take it out.
- 2) Open the cover of fuse box.
- 3) Examine the fuse and replace the defective one.



Use the fuse of same size and specification. Otherwise, the electrical system will be damaged.

3.2.3 Axle suspension / axle locking system

3.2.3.1 General

Axles 1 and 2 have hydro-pneumatic suspension. Axles 3, 4 and 5 have leaf-spring suspension. The height of axles 1 and 2 can be adjusted and be locked hydraulically. Before you activate the 2-handed button "Unlocking the axle suspension", the suspensions for axles 1 and 2 are locked.

3.2.3.2 Controls and functions of hydro-pneumatic suspension

The following controls are automatic:

a) Automatic level control, suspensions of axles 1 and 2

The button "Automatic level control, suspensions of axles 1 and 2" operates the automatic level control of the suspensions of axles 1 and 2. The crane is automatically moved to a level position (driving height for road driving). Press the button and depress the engine control pedal to increase the engine RPM until the control light "Suspensions of axles 1 and 2 leveled" lights up. Turn off the button after the suspensions of axles 1 and 2 are leveled.

For level control, make sure that the following preconditions are met:



- 1) The vehicle is on a level surface.
- 2) The chassis engine is running.
- 3) The axle suspension is unlocked.
- 4) The transmission is in the neutral position.



Level the crane on a level and load-bearing surface before road driving.

- b) Raising the suspensions of axles 1 and 2
 - Press the upper part of the 3-handed button "Suspensions of axles 1 and 2 raised or lowered".

Result:

The suspensions of axles 1 and 2 are raised.

For raising the suspensions of axles 1 and 2, make sure that the following preconditions are met:

- 1) The vehicle is on a level surface.
- 2) The chassis engine is running.
- 3) The axle suspension is unlocked.
- 4) The transmission is in the neutral position.
- c) Lowering the suspensions of axles 1 and 2
 - Press the lower part of the 3-handed button "Suspensions of axles 1 and 2 raised or lowered".

Result:

The suspensions of axles 1 and 2 are lowered.

For lowering the suspensions of axles 1 and 2, make sure that the following preconditions are met:

- 1) The vehicle is on a level surface.
- 2) The chassis engine is running.
- 3) The axle suspension is unlocked.
- 4) The transmission is in the neutral position.

A detailed description of the above buttons can be found in Section 3.1.4.3.

WARNING

- (1) The above 3 controls must only be performed when the axle suspension is unlocked and the vehicle is stationary!
- (2) Performing level control is only permitted in order to adapt the crane to special situations such as lowering the crane to drive under a bridge. Once the special situation is finished, level the vehicle and reset it to the normal driving condition.
- (3) Risk of injury when operating axle suspension / axle locking system! Make sure that no persons are presented in the crane danger zone! Perform level control on a level and load-bearing surface.

3.2.4 General checks at vehicle start up

Examine the controls and instruments.

- a) Examine the engine oil pressure gauge.
 - 1) Idle speed: The engine oil pressure must be more than 0.1 MPa.
 - Engine RPM (1200 r/min.): The engine oil pressure must be not less than 0.35 MPa 0.55 MPa.
- b) Examine the barometers.

If the brake pressure is less than 0.55 MPa, the warning light "Brake pressure low" will illuminate. Risk of danger if start off at this time!

c) Examine the thermometer.

The pointer must point to the green range (above 60°C)

d) Make sure that the parking brake is released.



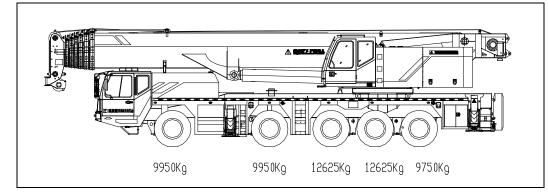
3.3 Driving the crane

3.3.1 Crane driving conditions

Before the crane can be driven on public roads, make sure that the following prerequisites are met:

- Fully retract the telescopic boom and place it on the boom support.
- Fully retract the sliding beams and secure them with pins. Remove the outrigger pads.
- The vehicle is at the level setting for road driving.

Do not drive the crane on public roads with hook block, counterweight, tip boom, jib and auxiliary winch. Otherwise, the axle will be overloaded.





3.3.2 Starting and stopping the engine

3.3.2.1 Starting the engine

- a) Examine the items that follow:
 - 1) Engine oil for correct level and make sure that it is clean.
 - 2) Coolant for correct level.
 - 3) Fuel tank for correct level.
- b) How to start the engine:
 - 1) Put the transmission in the neutral position.
 - 2) Apply the parking brake.
 - 3) Turn the ignition starter switch to the "ON" position for preparation.
 - 4) In winter, the engine will be preheated automatically before starting (The control light "Diesel engine preheating system" lights up).
 - 5) After the control light "Diesel engine preheating system" goes off, slightly apply the engine control and turn the ignition starter switch to the "S" position to start the engine.



- (1) Turn the ignition starter switch to the "S" position within 30 seconds after the control light "Diesel engine preheating system" extinguishes.
- (2) If the engine does not start after a maximum of 15 seconds, wait for 30 seconds. The starter can be operated three times for 15 seconds per attempt with a pause in between of 30 seconds respectively. If the engine cannot be started for 3 times, rectify the errors.
- c) Preheat the engine and examine instruments for functions:

After the engine is started, run the engine at idle speed for several minutes. During this time, examine the instruments and control lights / warning lights for functions.

L CAUTION

- (1) In order to make the engine oil flow into each part of engine and raise up water temperature to burn the fuel normally, it is necessary to warm up the engine before starting.
- (2) Do not run the engine at high speed without a load during warming up. Otherwise, the engine will be damaged and its service life will be shortened.
- (3) Do not run the engine at idle speed for a long time. Otherwise, the engine performance might be weakened.
- (4) Do not run the engine at high speed with a heavy load when the coolant temperature is below 60°C.
- (5) The engine oil pressure should not be lower than 0.1 MPa when the engine runs at idle speed. With the engine warming up, the oil pressure is going to be stable gradually.

Do not run the engine in a place where combustible gas exists.

The gas may be inhaled into the engine through the air intake system to make the engine speed up even overspeed, which may cause fire, explosion and heavy wealth losses.

3.3.2.2 Turning off the engine

a) Depress the service brake pedal slightly to decelerate the vehicle, at the same time, gradually shift down the transmission to the 1st gear position.

ZOOMLION

b) When the engine decelerates to the low speed, depress the clutch pedal and the service brake pedal at the same time to bring the vehicle to a standstill at the specified location.

🔔 DANGER

Except in an emergency, do not depress the service brake pedal jerkily!

- 1) Pull the parking brake hand lever backwards to the locking position to park the vehicle and then shift the transmission to the neutral position.
- Run the engine at idle speed for several minutes after the vehicle stops so as to cool the engine down gradually.
- Turn the ignition starter switch to the "LOCK" position and pull the key out after the engine is stopped for about 30 seconds.
- 4) Do not keep the ignition starter switch in the "ON" or "ACC" position after you park the crane. The battery drains in these conditions.
- 5) If you park the crane on a slope, you must put chocks before and behind the wheels to avoid accident.
- 6) To prevent an accident when you park the crane in the dark, you must turn on the hazard lights.

3.3.3 Driving

a) Changing the idling speed

Depress the clutch pedal before shifting from "N" to "D". The engine RPM will be decreased a little after you select the required gear.

NARNING

Run the engine at idle speed before shifting from "N" to "D" or "R" when the crane is stationary.

- b) Setting axle suspension and applying level control Unlock the axle suspension and level the vehicle.
- c) Releasing parking brake

Pull back the hand lever of parking brake as far as the stop in the hand lever's longitudinal direction and push forward.



ACAUTION

- (1) Do not release parking brake until the warning light "Brake pressure low" goes off (air pressure achieves 5.5 bar). Pull the hand lever again and fill compressed air until the warning light turns off!
- (2) When the parking brake is released, the crane can immediately start moving.
- d) Examining the brake system
 - 1) Service brake

Depress engine control pedal to increase engine RPM. The vehicle begins to move. Depress service brake pedal and examine the service brake.

2) Retarder

The retarder is the engine exhaust brake.

WARNING

Utmost care should be taken when you operate the engine exhaust brake!

Only operate the engine exhaust brake with engine running.

Sensible use of the retarder with anticipating driving methods reduces wear on the service brake and thereby reduces operating cost.

On long descending gradients

On long descending gradients, select a switching stage that leaves further switching stages available for any other adjusting braking procedures which may be required. Correctly use the engine exhaust brake as possible as you can to relax the service brake.

On snow, ice and dirty road surfaces

Careful use of the engine exhaust brake will ensure safe and sure deceleration even under bad road conditions.

WARNING

In the event that the wheels lock when operating the engine exhaust brake, select a lower switching stage!



3.3.4 Important control instruments while driving

a) Examining the engine oil pressure

Engine oil pressure display on bar chart in display unit of 1 bar – 5.5 bar.



In case of low oil pressure (the engine oil pressure is below 0.06 MPa), there is no engine lubrication. This results in engine damage. Immediately bring the crane to a standstill and turn off the engine. Examine the lubricating system.

b) Examining the compressed air supply

The two pointers resp. display the pressure of main brake air reservoir for the front axle and the pressure of main brake air reservoir for the intermediate and rear axles.



If the pressures of the air reservoirs are below 0.55 MPa, the warning light "Brake pressure low" will light up and the buzzer will send out alarm simultaneously. Immediately bring the crane to a standstill and rectify the cause of the defect. Otherwise, it is very dangerous.

c) Examining the fuel reserve

Fuel quantity display on bar chart in 1 or 0

1 means the fuel tank is full. 0 means the fuel tank is empty.

If the pointer is near "0", refill the fuel reserve. Do not drive when the fuel tank is empty, or the fuel system will have to be vented.

d) Examining the coolant temperature

The coolant temperature displays on the water thermometer. In normal conditions, the pointer points to the green range. The pointer will point to the red range when driving in high temperature area or climbing slopes.

If the pointer points to the red range for a long time while driving, immediately bring the crane to a standstill and examine the engine cooling system. Otherwise, this will result in engine damage.

3.3.5 Transmission and clutch operation

3.3.5.1 Gear shifting

- a) Always engage the first gear and push down the range-change switch to engage the low range when driving away.
- b) Always depress the clutch pedal fully when you shift gears. Push the gear lever smoothly when shifting until the gear is engaged.
- c) Both the low and the high speed ranges have a neutral position. Put the gear lever in neutral in the low speed range when you park the crane.
- d) Wait until the vehicle is at a standstill before you engage the creeper gear or the reverse gear. Failure to do so may result in serious damage to the transmission. When you engage the reverse gear, apply large force to overcome resistance of the reverse lock.
- e) Do not skip a gear when you move through the low gear range and the high gear range.
 Otherwise, you will shorten the service life of synchronizer of auxiliary transmission.

You should use the range-change switch when you shift between gears 5 and 6.

- f) When you drive downwards the slope, do not shift gear between high and low gear ranges.
- g) When you hear an unusual noise in the transmission or it is hard to operate the gear lever, stop the crane immediately. Correct the malfunction.
- h) Do a check of the grease level of transmission after you stop the vehicle for several minutes.

The temperature of transmission should be between -40°C – 120°C during continuous working.

When the temperature exceeds 120°C, the grease will be decomposed and the service life of the transmission will be shortened.

3.3.5.2 Points for attention

- a) Depress the clutch pedal when you shift the gears. When you downshift the gear, accelerate at the neutral position to make the connecting parts have the same rotational speed.
- b) Engage the creeper gear only at vehicle start up or when the crane operates in the off-road conditions.





Do not let the vehicle move forward when transmission is in the neutral position.

3.3.5.3 Clutch operation

In the drive system, clutch is a part directly connected with the engine. Its function is to effectively engage or disengage its driving and driven parts under driver's operation.

3.3.5.4 Points for attention

- a) During driving, do not place the foot on the clutch pedal if it is not used.
- b) When you downshift the gear, depress the service brake pedal to decelerate the vehicle, and then depress the clutch pedal properly to change into the proper gear.



When you shift the gear during driving, fully depress the clutch pedal and then release it rapidly. Otherwise, there is a risk of increasing clutch abrasion.



- (1) Do not depress the clutch pedal as possible as you can except parking at low speed.
- (2) Only when the compressed air pressure P is above 0.6 MPa, can the clutch be completely disengaged.

3.3.6 Steering operation

When you go into a corner, look around before you turn the steering wheel. Turn the steering wheel after you make sure that it is safe to move. Then put the transmission in a lower gear and apply a small quantity of pressure on the service brake.

- a) The steering wheel has a mechanical limit. Do not continue to turn the wheel when at the limit. Do not keep the wheel at the limit for more than 5 seconds.
- b) If the vehicle is steered insufficiently, decrease the speed slowly while you turn the steering wheel in the same direction as the turn.
- c) If you over-steer, release the engine control pedal or slightly depress the service brake pedal while you turn the wheel in the opposite direction of the turn.

Do not turn the steering wheel quickly in one direction unless it is an emergency. Make your turns smoothly to keep the crane laterally stable. When you complete the turn, lightly and immediately turn the steering wheel to neutral to prevent an unstable condition. d) Decrease the speed of the vehicle and move down the transmission gear if you have a sharp turn.

3.3.7 Braking operation

ZOOMLION

The brake system consists of service brake, engine exhaust brake and parking brake (emergency brake). You can also use the parking brake to park the vehicle in normal conditions and on slopes.

3.3.7.1 Operation

a) Service brake

There are several cases of braking. For details, please refer to the following instructions:

- Normal brake: during driving, release the engine control pedal ahead to slow down the vehicle according to the actual road conditions (with regard to the road surface, traffic, etc.), and then continuously or intermittently apply the service brake to slow down stably or stop the vehicle.
- 2) Slow brake after rapid brake: when there is an accident in front, apply the service brake rapidly and then apply it again slowly. Release the pedal slowly according to the distance away from the accident spot and shift gear in accordance with the actual driving speed. At last, apply the engine control pedal to drive at normal speed.
- 3) Cadence brake: apply the service brake and release it. Repeat the operation to decelerate the vehicle gradually. The operation should be very gentle.
- 4) Rapid brake: in a sudden emergency, release the engine control pedal immediately and apply the service brake jerkily (sometimes apply the parking brake at the same time) to bring the vehicle to a standstill as soon as possible. As a result, the accident will be avoided.

When you make many hard brake stops, the tire, brake drum and brake lining wear prematurely and the service life of each part shortens. Use more caution when the roads are wet or frozen.

b) Engine auxiliary brake

When you drive the vehicle downwards a long slope, use the engine auxiliary brake. The vehicle decelerates via engine instead of service brake.

The engine auxiliary brake has the advantages below:

- To improve driving safety.
- To ensure the brake performance and to avoid brake failure.



Note:

When you depress the service brake pedal frequently, the brake drum will be overheated.

How to activate the engine auxiliary brake:

- Release the engine control pedal.
- Jog the right-hand steering column switch backwards.

Result:

The engine auxiliary brake is activated and the control light "Engine auxiliary brake" lights up.

You can depress the clutch pedal or engine control pedal to temporarily deactivate the engine auxiliary brake.

c) Parking brake (emergency brake)

If the service brake fails or there is no time to apply the service brake during driving, you can pull the hand lever of parking brake backwards to lock the vehicle. To release the parking brake, pull back the hand lever of parking brake as far as the stop in the hand lever's longitudinal direction and push forward.

L CAUTION

- (1) You can also use the emergency brake (namely parking brake) to park the vehicle in normal conditions or on slopes.
- (2) Do not start the vehicle unless the parking brake is released and the control light "Parking brake closed" extinguishes.

3.3.7.2 Points for attention

- a) After the engine control pedal is released during driving, do not step on the service brake pedal when there is no necessity to brake the vehicle.
- b) Do not apply the emergency brake when the vehicle is driving on a narrow, frozen or muddy road or in a rainy / snowy day. Under the conditions, such as crossing a railway, driving under a bridge, or driving on a road with pools of water, or one side of the vehicle is driving on frozen or muddy road, avoid applying the service brake as much as possible. Otherwise, the vehicle may be shut down suddenly.
- c) After driving across a road with pools of water, depress the service brake pedal for several times to eliminate the water on the braking shoe so as to ensure the brake performance.
- d) Before you drive on a long descending gradient, shift the gear lever to the low gear range. Under this condition, the driving speed is mainly controlled by the traction resistance from the engine and with the assistance of engine auxiliary brake and service brake. Do not let the vehicle move forward when transmission is in the neutral position.

e) When the parking brake is used as the auxiliary brake, do not pull the hand lever to its limit position. When you park the vehicle under any conditions, pull back the parking brake hand lever into locking position, especially parking the vehicle on a slope. Otherwise, risk of fatal injury and accident!

3.3.8 Off-road driving

ZOOMLION

This vehicle is equipped with such off-road drive devices for driving off-road, on tracks and in winery conditions:

- Longitudinal differential lock in transfer case
- Longitudinal differential lock for axle 4
- Transversal differential locks for axles 2, 4 and 5.

Add the differential locks when the vehicle is stationary!

In order to avoid damage to drive axles, make sure that the following prerequisites are met:

- (1) Only add the differential locks when the vehicle is stationary!
- (2) Do not add the differential locks when the wheels are turning! Otherwise, risk of serious damage to the drive axles!
- (3) Do not start jerkily and do not drive at full throttle!
- (4) Only drive on straight routes and do not attempt to corner!
- (5) Only drive on difficult terrain (e.g. sand, slush, loose or slippery subsoil etc.) with differential locks.
- (6) Danger of damage to the drive axles and entire drive train! Considerable damage can be caused by driving on solid subsoil with good grip when a differential lock is on. Turn the differential locks off as soon as possible.

3.3.9 Cruise control

- a) In the cruise control mode (Press (set+) or (set-) on the button "Temposet" to enter the cruise control mode.):
 - The lowest gear: 9
 - Engine RPM: 1200 r/min. 2100 r/min.
 - Tip up (on the button "Temposet"): the speed is increased by 2 km/h
 - Tip down (on the button "Temposet"): the speed is decreased by 1.5 km/h
 - The minimum vehicle starting speed: 45 km/h
 - The maximum vehicle starting speed: 75 km/h
 - Driving speed: 45 km/h 75 km/h.

b) Risk of danger! When the cruise control mode is activated, the driving speed will not be controlled by the engine control pedal. Do one of the following operations to reliably deactivate the cruise control:

ZOOMLION

- Depress the service brake pedal.
- Exit the "Tempomat".
 - Depress the clutch pedal.
- Activate the engine auxiliary brake.
- c) The following defects will make the cruise control invalid:
 - The button "Temposet" defective
 - Brake switch defective
 - Engine control pedal defective
 - Clutch switch defective
 - Engine RPM monitor defective
 - Vehicle speed sensor defective
 - Supercharge pressure sensor defective
 - Rail pressure sensor defective.
- d) Use the steps that follow to operate the cruise control:
 - 1) Energize:

The cruise control can be activated (NEUTR).

2) Activate the cruise control mode and change the current driving speed

When the gear, driving speed and engine RPM comply with the requirements for cruise control, press the (set+) or (set-) to activate button "Temposet" and hold. At this time, you can change the driving speed in the steps below:

- Accelerating (acc): Press the (set+) on the button "Temposet" and hold, the engine RPM is continuously increased and the driving speed is increased accordingly.
- Decelerating (dec): Press the (set-) on the button "Temposet" and hold, the engine RPM is continuously decreased and the driving speed is decreased accordingly.
- Tip up: Press the (set+) on the button "Temposet", the specific vehicle speed is increased by the set value and the driving speed is increased accordingly.
- Tip down: Press the (set-) on the button "Temposet", the specific vehicle speed is decreased by the set value and the driving speed is decreased accordingly.

e) Turn off the cruise control

Press up the button "Tempomat" to turn off the Temposet completely. Under this condition, the cruise control cannot be resumed by pressing down the button "Tempomat". But you can press (set+) or (set-) on button "Temposet" to start a new cruise control.

If the corresponding switches are engaged to the ECU, you can turn off the cruise control by depressing the clutch pedal, service brake pedal or activate the exhaust brake. After you exit the cruise control, press down the button "Tempomat" to resume cruise control on the condition that requirements for cruise control are still fulfilled.

You can also turn off the cruise control by depressing the engine control pedal. Under the cruise control mode, if accelerator signal is detected, the ECU will make a comparison between cruise torque and pedal torque. The larger one will be used for the overtaking during cruise control. Under this condition, the cruise control will be resumed automatically after you release the engine control pedal.

ZOOMLION

- (1) Only use the cruise control when traffic conditions permit a steady speed. It may not be possible to maintain the speed on ascending or descending gradients or in off-road condition. Otherwise, the cruise control will be locked due to excessively large acceleration or deceleration. As a result, the cruise control can only be resumed by resetting the ECU.
- (2) The requirements for cruise control are rigorous. If you cannot activate the cruise control, examine the button for functional work.

For example:

If the clutch switch is damaged, the clutch signal sent to the ECU is 1. It means that you have depressed the clutch pedal. At this time, you cannot activate the cruise control function for the sake of safety. So do the other switches.

(3) Do not hold the button "Temposet" for a long time. If the button is pressed for more than 30 seconds, the warning light will always illuminate and display the error code "341". Make sure the button is in the neutral position after operation.

3.3.10 PTO operation

The crane is not equipped with PTO.



3.3.11 Towing

General towing regulations

WARNING

The following towing regulations must be adhered to:

- (1) Release the parking brake when towing, or the brake system will be damaged.
- (2) When towing, the speed must always remain below 20 km/h.
- (3) Use the towing coupling to tow the vehicle.
- (4) Only tow with a tow bar.
- (5) Turn on the hazard lights and the driving light.
- a) Towing with a defective drive motor and / or shift transmission

If the driving motor cannot be started, a compressed air supply must be established from the towing vehicle to the mobile crane. A hose coupling is attached at the front under the bumper to supply compressed air to the mobile crane to be towed.

Use a hose pipe to connect this attachment for the external supply with the towing vehicle.

WARNING

The supply pressure of the compressed air brake system of the mobile crane to be towed must be at least 6 bar.

After you turn off the engine, keep the vehicle speed between 5 km/h and 10 km/h.

- b) Towing with an intact drive motor
 - 1) Towing with damage to the transfer case
 - Disconnect the propeller shafts from the transfer case to the drive axles at the drive axles and tie up.
 - Disconnect the propeller shafts from the transmission to the transfer case at the drive axles and tie up.
 - Shift the transmission to the neutral position.
 - Allow the engine to run at idling speed.
 - 2) Towing with damage to the drive axles

Remove the damaged one.

3.3.12 Finishing driving operations

- a) Stopping
 - 1) Brake the crane until it comes to a standstill.
 - 2) The selected drive range can remain switched on.
 - Use the service brake or parking brake to make sure that the crane does not roll away.



If you have stopped the crane for more than 1 minute, shift the transmission to the neutral position to avoid wear on the clutch.

- b) Stopping the vehicle when the engine is running
 - 1) Brake the crane until it comes to a standstill.
 - 2) Shift the transmission into the neutral position.
 - 3) Apply the parking brake and the control light "Parking brake closed" illuminates.

3.3.13 Engine error codes and fault diagnosis

3.3.13.1 Self-diagnosis

The ECU of Weichai engine is of diagnostic function. If the ECU detects errors occurred in electrical control system, it will:

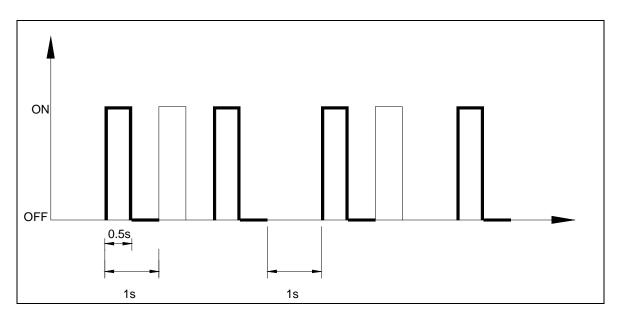
- send error codes and store them in.
- make warning light illuminate.
- automatically activate different protective measures.
 - If the warning light "Engine defects" illuminates, it indicates the engine is defective. Stop the crane and remedy till the warning light goes off.
 - If the warning light "Engine defects" does not illuminate, but the error code is still displayed, it indicates stored error codes or not very serious defect which will not affect normal operation.
 - Under most circumstances, the protective measure activated will decrease the engine RPM to guarantee the engine running with fault (namely the "Limp home" mode).
 However, the serious fault will lead to engine shutdown.

3.3.13.2 Read the engine error codes

- Read the error codes from the fault diagnostic system.
- Read the error codes by the warning light "Engine error code displayed".
 - Press and release the "Engine fault diagnosis" button. The error codes will be flashed out in the warning light "Engine error code displayed". Refer to the *Blink code list* for detailed information.
 - The ECU can store 10 error codes.

A blink code consists of 3 digital numbers. Each digital number flashes every 1 second, such as 3—2—1.







If the "Engine fault diagnosis" button is activated, the warning light "Engine error code displayed" will illuminate.

- Clear up the stored error:
 - 1) Press the "Engine fault diagnosis" button.
 - 2) Turn on the ignition starter switch (T15).
 - 3) Hold the "Engine fault diagnosis" button for 4 to 8 seconds and then release.
 - 4) Turn off the circuit breaker close to the battery to disengage the ECU.
 - 5) Start the engine again.

Only the stored error can be cleared up. The current error cannot be cleared up. Before you clear up the error stored in the ECU, remedy the current error first. If the error codes cannot be cleared up, contact our service technician as soon as possible.

ZOOMLION

3.3.13.3 Blink code list

ZOOMLION

a) Classification of blink codes (according to system)

1	2	3	4	5
System running relative	Important sensors	Accessory functions	Injector & CAN	External tests
Start relative, synchronization	Fuel filter	Cooling component	Metwork manage	Misfire- detection
Start relative, components	Propulsion component	Air heater	Frame manager CAN	Engine test
Power supply, main relay	Air system component	ErlpCD	Frame manager CAN	
Bank & Chip	Cooling & lubrication	Accessory button	Frame manager CAN	
Injector system	Rail pressure monitoring	EGR (not used in EIII)	Governor deviation	
CRS component	ECU & overrun monitoring			

Table 3-2	Classification	of	blink	codes
	•••••••			

b) Blink code list

A blink code consists of 3 digital numbers. The 1st number refers to the defective systems, such as ECU, hydraulic component, sensor and actuator. The 2nd number refers to the defective components. The 3rd number refers to defective path (Abbr. Dfps).

System	Component	Dfps	Blink code		ode
start relative	ECU Supply AD	Dfp_ADCMon	1	1	1
start relative		Dfp_EngMCrS1	1	1	2
start relative	Synchronization	Dfp_EngMCaS1	1	1	3
start relative		Dfp_EngMBackUp	1	1	4
start relative	ECU time processing unit	Dfp_TPUMon	1	1	5
start relative	ECU internal	Dfp_SOPTst	1	1	6
start relative		Dfp_StrtCDHS	1	2	1
start relative	Starting relay, start system	Dfp_StrtCDLS	1	2	1
start relative	Start system T15	Dfp_T50CD	1	2	2
start relative	Start system T50	Dfp_T15CD	1	2	3
start relative	Battery	Dfp_BattCD	1	2	4
start relative	Start system	Dfp_FMTC_NonMonotonMap	1	2	5
start relative		Dfp_SSpMon1	1	3	1
start relative		Dfp_SSpMon12V	1	3	1
start relative	ECU power supply	Dfp_SSpMon2	1	3	1
start relative		Dfp_SSpMon3	1	3	1
start relative		Dfp_MnRly1_SCB	1	3	2
start relative	Main relay	Dfp_MnRly1_SCG	1	3	2
start relative		Dfp_MRlyCD	1	3	2
CRS component	D ''	Dfp_RailCD	1	3	3
CRS component	Rail pressure sensor	Dfp_RailCDOfsTst	1	3	3
CRS component	Pressure relief valve of CRS	Dfp_PRVMon	1	3	4
CRS component	Flow-measurement unit	Dfp_MeUnCD_ADC	1	3	5
CRS component	Flow-measurement unit	Dfp_MeUnCDNoLoad	1	3	5

Table 3	3-3 B	link c	:ode	list

System	Component	Dfps	Bli	nk co	de
CRS component	F 1	Dfp_MeUnCDSCBat	1	3	5
CRS component	Flow-measurement unit	Dfp_MeUnCDSCGnd	1	3	5
Cylinder1		Dfp_InjVlvCyI1A	1	4	1
Cylinder1	Cylinder 1 injector	Dfp_InjVlvCyI1B	1	4	1
Cylinder2		Dfp_InjVlvCyl2A	1	4	2
Cylinder2	Cylinder 2 injector	Dfp_InjVlvCyl2B	1	4	2
Cylinder3		Dfp_InjVlvCyl3A	1	4	3
Cylinder3	Cylinder 3 injector	Dfp_InjVlvCyl3B	1	4	3
Cylinder4		Dfp_InjVlvCyl4A	1	4	4
Cylinder4	Cylinder 4 injector	Dfp_InjVlvCyl4B	1	4	4
Cylinder5		Dfp_InjVlvCyl5A	1	4	5
Cylinder5	Cylinder 5 injector	Dfp_InjVlvCyl5B	1	4	5
Cylinder6		Dfp_InjVlvCyl6A	1	4	6
Cylinder6	Cylinder 6 injector	Dfp_InjVlvCyl6B	1	4	6
Bank	Bank 1 (control injectors 1,	Dfp_InjVlvBnk1A	1	5	1
Bank	2, 3)	Dfp_InjVlvBnk1B	1	5	1
Bank	Bank 2 (control injectors 4,	Dfp_InjVlvBnk2A	1	5	2
Bank	5, 6)	Dfp_InjVlvBnk2B	1	5	2
Chip		Dfp_InjVlvChipA	1	5	3
Chip	Chip (control fuel injection)	Dfp_InjVlvChipB	1	5	3
Injection	Insufficient number of working injector	Dfp_InjVlvNumMinInj	1	5	4
Injection	ECU limits fuel injection	Dfp_InjCrv_InjLim	1	5	5
important function	Water in fuel	Dfp_FlSys_WtDet	2	1	1
important function	Propulsion	Dfp_APP1	2	2	1
important function	Propulsion	Dfp_APP2	2	2	1
important function	Propulsion	Dfp_ConvCD	2	2	2
important function	Propulsion	Dfp_BrkCD	2	2	3

Operator's	Manual fo	r Truck Cra	ne
-------------------	-----------	-------------	----

System	Component	Dfps	Blink code		ode
important function	Propulsion	Dfp_AccPedPlausBrk	2	2	5
important function	Propulsion	Dfp_EngPrtOvrSpd	2	2	6
important function	Propulsion	Dfp_GearbxIncMax	2	2	7
important function	Propulsion	Dfp_CoVMDCSh	2	2	8
important function	Air system	Dfp_BPSCD	2	3	1
important function	Air system	Dfp_APSCD	2	3	2
important function	Air system	Dfp_IATSCD	2	3	3
important function	Cooling system	Dfp_CTSCD	2	4	1
important function	Cooling system	Dfp_CTSCDOvrTemp	2	4	2
important function	Cooling system	Dfp_OPSCD	2	4	3
important function	Cooling system	Dfp_OPSCD1	2	4	3
important function	Cooling system	Dfp_OTSCD	2	4	4
important function	Cooling system	Dfp_OTSCD1	2	4	4
important function		Dfp_Clg_AbsTst	2	4	5
important function	Cooling system	Dfp_Clg_DynTst	2	4	5
Rail Pressure Monitoring		Dfp_RailMeUn0	2	5	1
Rail Pressure Monitoring		Dfp_RailMeUn1	2	5	2
Rail Pressure Monitoring		Dfp_RailMeUn3	2	5	3
Rail Pressure Monitoring	Rail Meun	Dfp_RailMeUn4	2	5	3
Rail Pressure Monitoring	High / low pressure oil line leakage	Dfp_RailMeUn12	2	5	4
Rail Pressure Monitoring		Dfp_RailMeUn2	2	5	4
Rail Pressure		Dfp_RailMeUn7	2	5	5
Monitoring					
Rail Pressure Monitoring		Dfp_RailMeUn10	2	5	6



System	Component	Dfps	Blink code		ode
Rail Pressure Monitoring	Rail Meun High / low pressure oil line leakage	Dfp_RailMeUn6	2	5	7
start relative	ECU Recovery	Dfp_HWEMonRcyLocked	2	6	1
start relative	ECU Recovery	Dfp_HWEMonRcySuppressed	2	6	1
start relative	ECU Recovery	Dfp_HWEMonRcyVisible	2	6	1
start relative	OurMan	Dfp_OvRMon	2	6	2
start relative	OvrMon	Dfp_OvRMonSigA	2	6	2
start relative	ECU Recovery	Dfp_HWEMonCom	2	6	3
start relative	ECU Monitoring	Dfp_HWEMonUMaxSupply	2	6	3
start relative	ECU Monitoring	Dfp_HWEMonUMinSupply	2	6	3
start relative	ECU Monitoring	Dfp_Montr	2	6	4
start relative	ECU Monitoring	Dfp_HWEMonEEPROM	2	6	5
accessory		Dfp_ExFICD_Max	3	1	1
accessory	Exhaust Flap	Dfp_ExFICD_Min	3	1	1
accessory		Dfp_ExFICD_SigNpl	3	1	1
accessory	A/C compressor relay	Dfp_ACCDCmpr	3	1	3
accessory		Dfp_ArHt1	3	2	1
accessory		Dfp_AirHtStickOn	3	2	2
accessory	Glow system	Dfp_AirHt_Test1	3	2	3
accessory		Dfp_AirHt_Test2	3	2	3
important function		Dfp_VSSCD1	3	2	4
important function	Propulsion	Dfp_VSSCD2	3	2	4
important function		Dfp_VSSCD3	3	2	4
accessory	Switch	Dfp_MSSCD	3	2	7
accessory	System lamp	Dfp_SysLamp	3	3	1
accessory	Cold start lamp	Dfp_CSLPCD	3	3	2
accessory	Warning lamp	Dfp_Wrn	3	3	2
accessory	Water in fuel level sensor	Dfp_Gen1	3	3	4



System	Component	Dfps B		nk co	ode
accessory	Warning lamp	Dfp_Gen3	3	3	4
accessory	Tempomet switch	Dfp_MFLvCrCtlMode	3	4	1
accessory	Exhaust brake switch	Dfp_EBSwPreSelPlaus	3	4	2
accessory	Engine on button	Dfp_ECBtCD	3	4	3
external test		Dfp_CmbChbMisfire1	5	1	1
external test	External test	Dfp_CmbChbMisfire2	5	1	2
external test		Dfp_CmbChbMisfire3	5	1	3
external test	External test	Dfp_CmbChbMisfireMul	5	1	4
external test		Dfp_ComprTst	5	2	1
external test	External test	Dfp_HpTst	5	2	2
external test		Dfp_RunUpTst	5	2	3
external test		Dfp_CmbChbMisfire4	5	3	1
external test	External test	Dfp_CmbChbMisfire5	5	3	2
external test		Dfp_CmbChbMisfire6	5	3	3
external test	External test	Dfp_ShOffTst	5	3	4
start relative	Synchronization signal	Dfp_EngMOfsCaSCrS	5	4	1



If "ECU error" is flashed out, please contact our after-sales department.



Blink codes with CAN bus assembled (Not used in this crane temporarily):

System	Component	Dfps	Blink Code		de
accessory		Dfp_ACCDSwtin	3	1	3
CAN message	Network manage	Dfp_NetMngCANAOff	4	1	1
CAN message	Network manage	Dfp_NetMngCANBOff	4	1	2
CAN message	Network manage	Dfp_NetMngCANCOff	4	1	3
CAN message	Communication Monitoring	Dfp_WdCom	4	1	4
CAN message	Receive timeout	Dfp_FrmMngTOEngGsFlo wRt	4	1	5
CAN message	Receive timeout	Dfp_FrmMngTOHRVD	4	1	6
CAN message	Receive timeout	Dfp_FrmMngTOTimeDate	4	1	7
CAN message		Dfp_FrmMngTOTSC1AE	4	2	1
CAN message		Dfp_FrmMngTOTSC1AR	4	2	1
CAN message		Dfp_FrmMngTOTSC1DE	4	2	2
CAN message		Dfp_FrmMngTOTSC1DR	4	2	2
CAN message		Dfp_FrmMngTOTSC1PE	4	2	3
CAN message		Dfp_FrmMngTOTSC1TE	4	2	4
CAN message		Dfp_FrmMngTOTSC1TR	4	2	4
CAN message		Dfp_FrmMngTOTSC1VE	4	2	5
CAN message		Dfp_FrmMngTOTSC1VR	4	2	5
CAN message	Communication Monitoring	Dfp_FrmMngTxTO	4	3	1
CAN message	Receive timeout	Dfp_FrmMngRxEngTmp2S ens	4	3	2
CAN message	Receive timeout	Dfp_FrmMngEngGsFIRtHtr	4	3	3
CAN message	Receive timeout-no used	Dfp_FrmMngTODashDspl	4	3	4
CAN message		Dfp_FrmMngTOWSI	4	3	5

Table 3-4 CAN blind code list



System	Component	Dfps BI		Blink Code	
CAN message	Receive timeout	Dfp_FrmMngTOEBC1	4	4	1
CAN message	Receive timeout	Dfp_FrmMngTOERC1DR	4	4	2
CAN message	Receive timeout	Dfp_FrmMngTOETC1	4	4	3
CAN message	Receive timeout-no used	Dfp_FrmMngTORxAMCON	4	4	4
CAN message	Receive timeout-no used	Dfp_FrmMngTORxCCVS	4	4	5
CAN message	Receive timeout	Dfp_FrmMngTOTCO1	4	4	6
CAN message	Receive timeout	Dfp_FrmMngTORxEngTem	4	5	1
		p2			
CAN message	Receive timeout	Dfp_FrmMngTOTF	4	5	2



If "ECU error" is flashed out, please contact our after-sales department.

3.4 Outrigger operation

ZOOMLION

The crane is equipped with 4 outriggers. Their outrigger boxes are connected with the chassis frame and the 2 sections of sliding beams can extend and retract synchronously. A support control unit with buttons is attached to both sides of the vehicle (behind the front outrigger box) for controlling 4 sliding beams to extend and retract simultaneously or independently.

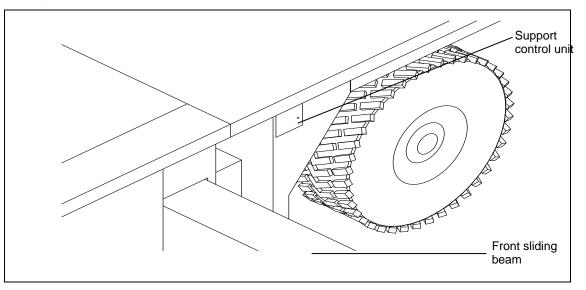


Figure 3-25 Outrigger and support control unit

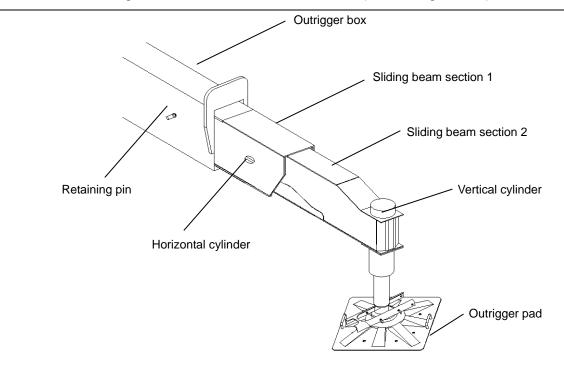


Illustration – Sliding beam sections 1 and 2 both extended (Refer to Figure 3-26)

Figure 3-26 Sliding beam sections 1 and 2 both extended



WARNING

Extend the outriggers before crane operation.

Make sure that you do all of the work on level ground that is hard. The ground must hold more than the load bearing capacity.

Use material (such as wooden timbers) below the outrigger pads if the work area is soft or not flat.

3.4.1 Install and remove the outrigger pads

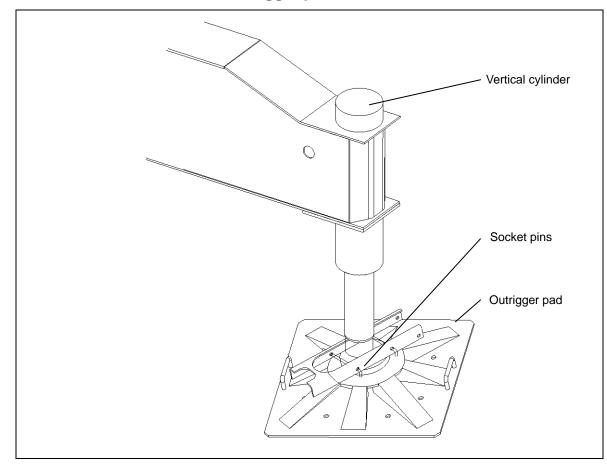


Figure 3-27 Outrigger pad

a) Installing the outrigger pad

Before you extend the outriggers, remove the socket pin from the outrigger pads and pull out the outrigger pads. When the hole aligns with the vertical cylinder, install the socket pin.

b) Removing the outrigger pad

After you fully retract the outriggers, remove the socket pin and push in the outrigger pad until it is in the correct position. Install the socket pins.



3.4.2 Extend and retract the outriggers

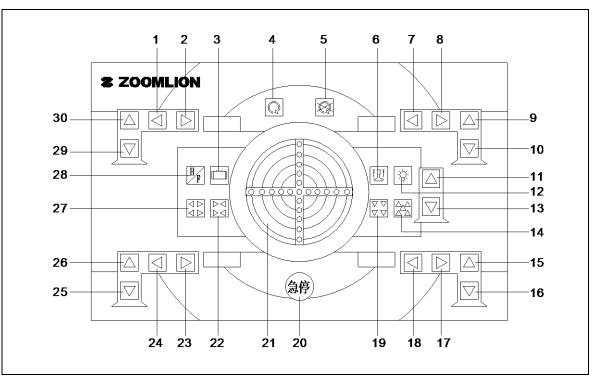
The two support control units with buttons are attached to both sides of the vehicle. Their functions are the same and the layouts of their buttons are symmetrically arranged. The extending / retracting of the outrigger horizontal cylinders and vertical cylinders, engine on / off and engine RPM regulation, etc. can be controlled simultaneously or independently. The inclinometers on the center of the units display the crane's deviation (at the slewing bearing). The two support control units are connected by cables. The signals of the right support control unit (auxiliary control unit) are transmitted to the left support control unit (main control unit) via the cables, and then to the valves and engine controllers etc.

Note:

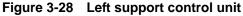
Extend the outriggers before crane operation.

Make sure that you do all of the work on level ground that is hard. The ground must hold more than the load bearing capacity.

Use material (such as wooden timbers) below the outrigger pads if the work area is soft or not flat.



For the left support control unit, refer to Figure 3-28.

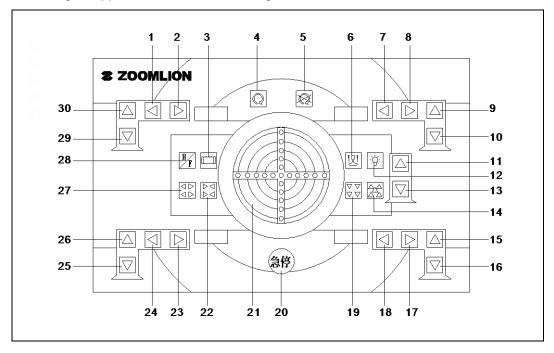




Pos.	Description	Pos.	Description
1	Extend right front horizontal cylinder	16	Extend left rear vertical cylinder
2	Retract right front horizontal cylinder	17	Extend left rear horizontal cylinder
3	Changeover engine RPM / idle speed	18	Retract left rear horizontal cylinder
4	Engine on	19	Extend all vertical cylinders
5	Engine off	20	Emergency stop
6	Force-retract vertical cylinders	21	Inclinometer
7	Retract right rear horizontal cylinder	22	Retract all horizontal cylinders
8	Extend right rear horizontal cylinder	23	Retract left front horizontal cylinder
9	Retract right rear vertical cylinder	24	Extend left front horizontal cylinder
10	Extend right rear vertical cylinder	25	Extend left front vertical cylinder
11	Retract the 5 th outrigger	26	Retract left front vertical cylinder
12	Background lighting	27	Extend all horizontal cylinders
13	Extend the 5 th outrigger	28	Changeover outrigger full / intermediate extension
14	Retract all vertical cylinders	29	Extend right front vertical cylinder
15	Retract left rear vertical cylinder	30	Retract right front vertical cylinder

Table 3-5 Descriptions of buttons on the left support control unit





For the right support control unit, refer to Figure 3-29.

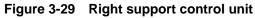
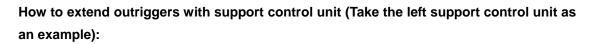


Table 3-6 Descriptions of buttons on the right support control un

Pos.	Description	Pos.	Description
1	Extend left rear horizontal cylinder	16	Extend right front vertical cylinder
2	Retract left rear horizontal cylinder	17	Extend right front horizontal cylinder
3	Changeover engine RPM / idle speed	18	Retract right front horizontal cylinder
4	Engine on	19	Extend all vertical cylinders
5	Engine off	20	Emergency stop
6	Force-retract vertical cylinders	21	Inclinometer
7	Retract left front horizontal cylinder	22	Retract all horizontal cylinders
8	Extend left front horizontal cylinder	23	Retract right rear horizontal cylinder
9	Retract left front vertical cylinder	24	Extend right rear horizontal cylinder
10	Extend left front vertical cylinder	25	Extend right rear vertical cylinder
11	Retract the 5 th outrigger	26	Retract right rear vertical cylinder
12	Background lighting	27	Extend all horizontal cylinders
13	Extend the 5 th outrigger	28	Changeover outrigger full / intermediate extension
14	Retract all vertical cylinders	29	Extend left rear vertical cylinder
15	Retract right front vertical cylinder	30	Retract left rear vertical cylinder



Press down the button "Outrigger power source" on the center console to switch on the outrigger power source (For detailed information, refer to Section 3.1.4.1). Only when the left and right outriggers control boxes are energized and the power control light illuminates, the following procedures can be activated. Make sure that both emergency stop buttons are not pressed down and the superstructure power supply is not switched on before you operate the outriggers with the support control unit.

- a) Put the outrigger pad to working position according to Section 3.4.1.
- b) Remove the retaining pins from the sliding beams (Refer to Figure 3-30).

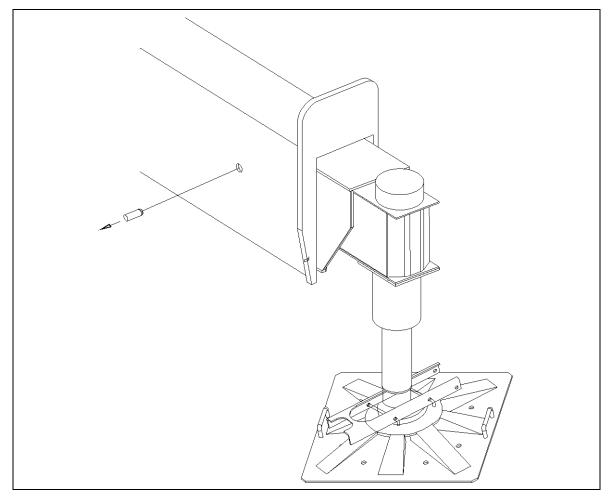


Figure 3-30 Retaining pins removal

- c) Open the cover of support control unit with its key.
- d) Press down the button "Engine on" to start the chassis engine and the hydraulic system.
- e) Press corresponding buttons to extend the right rear sliding beam and the right front sliding beam. Release the buttons until the sliding beams are extended to the required position.

Press corresponding buttons to extend the left rear sliding beam and the left front sliding beam. Release the buttons until the sliding beams are extended to the required position. **Note:**

You can also press the corresponding button to extend all sliding beams simultaneously.

f) Press corresponding buttons to extend the right front, left front, right rear and left rear vertical cylinders to lift the crane up.

Note:

You can also press the corresponding button to extend all vertical cylinders simultaneously. Press corresponding buttons to retract the right front, left front, right rear and left rear vertical cylinders to lift the crane up.

Note:

You can also press the corresponding button to retract all vertical cylinders simultaneously.

g) Examine whether the crane is level with the inclinometer (Refer to Figure 3-31). Inclination angle should be no more than 0.1°. Press buttons to align the crane horizontally. If the vehicle is not horizontal, retract or extend the outrigger to level the crane.

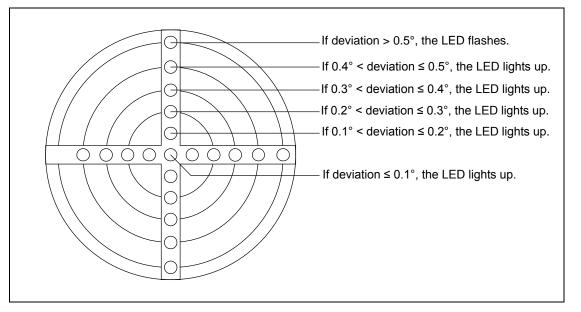


Figure 3-31 Inclinometer

h) Secure and lock the sliding beams with retaining pins when the outriggers are extended to a desired position.

ZOOMLION

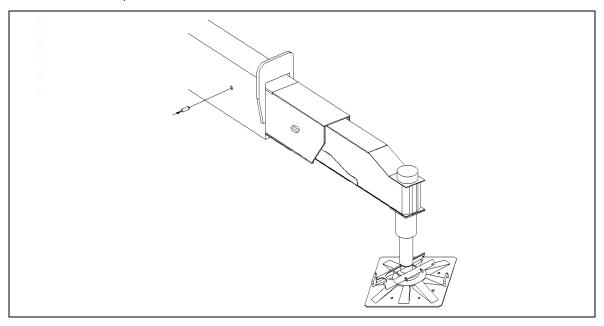


Figure 3-32 Secure and lock the sliding beams

Retract the outriggers according to the reverse sequences.



- (1) Press down the button "Engine off" to stop the chassis engine.
- (2) Press down the button "Changeover engine RPM / idle speed" to changeover engine RPM / idle speed to increase engine RPM. Press again to return to idle speed. The outrigger speed can be changed via operating this button. Press button "Background lighting" to light up the background lighting. Press again to turn off the lighting.
- (3) The extension and retraction movements for the same outrigger are interlocked. The movements of horizontal cylinder and vertical cylinder are interlocked. For the allowable outrigger simultaneous movements, refer to Table 3-7.

For example: When you extend the left front horizontal cylinder, you can only extend the left rear horizontal cylinder or retract the left rear horizontal cylinder at the same time.

When one outrigger is operated, the keys 14, 19, 22 and 27 cannot be operated. When the keys 14, 19, 22 and 27 are operated, one outrigger cannot be operated.

(4) You can operate the left support control unit and the right support control unit at the same time.

Note:

ZOOMLION

- Only two buttons (including non-action buttons, e.g. "Changeover engine RPM
 / idle speed", "Engine on" and "Engine off") are operational at the one time.
- When you press two buttons with the same function on both support control units simultaneously, only one button is operational.
- When you press another two buttons, the first two buttons are operational. The first two buttons should also obey the above requirements.
- (5) The outrigger box has a proximity switch. The sliding beam has a sensor for detecting the full extension and intermediate extension signals which can be observed from the monitor. The superstructure controller can decide whether the OM (full extension or intermediate extension) is valid according to the detection signal and vehicle deviation value. If the set value does not conform to the actual one, alarm sounds to remind you to extend or retract the outrigger to the required length.
- (6) Calibrating vehicle deviation sensor to 0°.

The vehicle deviation sensor must be calibrated to 0° if you have reinstalled or replaced the sensor or if you have replaced the left support control unit. How to calibrate:

- Extend the sliding beams and vertical cylinders.
- Level the crane (Be sure the crane is level!).
- Press and hold buttons "Emergency stop", "Extend the 5th outrigger" and "Retract the 5th outrigger" simultaneously for more than 10 seconds.
- Release these buttons until the central LED on the inclinometer lights up.
- (7) Before calibration, you should level the vehicle.

How to level:

- Make sure that you do the work on level ground that is hard.
- Fully extend the 4 horizontal cylinders and vertical cylinders.
- Make sure that the outrigger pads are in the center position below the outrigger.
- Install all the counterweight plates.
- Derrick up the boom to about 80°.
- Clean the contamination off the chassis frame horizontal plane. Put the level gauge or inclinometer on the left front, left rear, right front & right rear positions and at 1:30, 4:30, 7:30 & 10:30 clock positions of the crane. Look at the level gauge or inclinometer to tell if the crane is level.
- If the level gauge or inclinometer shows a level indication (the bubble does not change its position in the level gauge or the Inclination angle on the inclinometer is less than 0.1°), the crane is level.
- If the level gauge or inclinometer does not show a level indication (the bubble changes its position in the level gauge the Inclination angle on the inclinometer is more than 0.1°), you can move each vertical cylinder to make the crane level.



For the allowable outrigger simultaneous movements, refer to Table 3-1.

Current movement	Simultaneous movements		
Extend left front borizontal avlinder	Extend left rear horizontal cylinder		
Extend left front horizontal cylinder	Retract left rear horizontal cylinder		
Detrect left front herizentel eulisder	Extend left rear horizontal cylinder		
Retract left front horizontal cylinder	Retract left rear horizontal cylinder		
Estend left soon besizes to be dealer	Extend left front horizontal cylinder		
Extend left rear horizontal cylinder	Retract left front horizontal cylinder		
	Extend left front horizontal cylinder		
Retract left rear horizontal cylinder	Retract left front horizontal cylinder		
Eutopol visikt frank i spisovstal ovdia do v	Extend right rear horizontal cylinder		
Extend right front horizontal cylinder	Retract right rear horizontal cylinder		
	Extend right rear horizontal cylinder		
Retract right front horizontal cylinder	Retract right rear horizontal cylinder		
	Extend right front horizontal cylinder		
Extend right rear horizontal cylinder	Retract right front horizontal cylinder		
Detre et vielet as en le vie entel en lie de r	Extend right front horizontal cylinder		
Retract right rear horizontal cylinder	Retract right front horizontal cylinder		
Entered left for at contined or diades	Extend right front vertical cylinder		
Extend left front vertical cylinder	Extend left rear vertical cylinder		
Detrect left front vertical ovlinder	Retract right front vertical cylinder		
Retract left front vertical cylinder	Retract left rear vertical cylinder		
Extend left rear vertical avlinder	Extend right rear vertical cylinder		
Extend left rear vertical cylinder	Extend left front vertical cylinder		
Potract left rear vertical ovlinder	Retract right rear vertical cylinder		
Retract left rear vertical cylinder	Retract left front vertical cylinder		
Evtend right front vertical ovlinder	Extend left front vertical cylinder		
Extend right front vertical cylinder	Extend right rear vertical cylinder		
Detreet right front vertical avlinder	Retract left front vertical cylinder		
Retract right front vertical cylinder	Retract right rear vertical cylinder		
Extend right roor vertical a diader	Extend left rear vertical cylinder		
Extend right rear vertical cylinder	Extend right front vertical cylinder		
Potract right roor vertical ovlinder	Retract left rear vertical cylinder		
Retract right rear vertical cylinder	Retract right front vertical cylinder		

Table 3-7 Outrigger simultaneous movements



Points for attention:

- (1) Turn off the chassis engine when the crane superstructure works.
- (2) Remove the retaining pins from outriggers before extending and retracting the outriggers. Install all retaining pins after the outriggers are fully retracted.
- (3) The speed for extending or retracting the outriggers can be adjusted by the engine control.
- (4) The clearance between sliding beam and outrigger box can be regulated by the adjusting bolts.
- (5) Set down the telescopic boom on the boom support before you retract the outriggers.
- (6) Close the covers for the support control units after operation or before cleaning the crane, so as to prevent water from entering. If any of the emergency stop buttons is pressed, other buttons will be invalid.
- (7) If any of the emergency stop buttons is pressed, other buttons will be invalid.

Only operate the crane with outriggers intermediately or fully extended. Install the retaining pins after the outriggers are in position.

Completely expose the mark (full or intermediate) on the sliding beam sections 2 after you fully or intermediately extend the outrigger.



3.5 Driving operation

3.5.1 Move the crane to the job site

- a) Do not skip a gear when you move through the gear cycle.
- b) Stop the vehicle if there are unusual conditions with the items in the below list:
 - Steering
 - Braking
 - Sounds or smells
 - Vibrations
 - Sudden speed increase or decrease.

If you cannot find or correct the problem, send the vehicle for repair.

- c) Do not operate a vehicle if a warning light illuminates. Stop the vehicle and have it repaired.
- d) Examine the following instruments for functions:
 - Barometer
 - Engine oil pressure gauge
 - Water thermometer, etc.
- e) Put the crane in a lower gear before you move up a slope to decrease the load on the engine and drive-line.
- f) Do the items that follow before you go down a long hill slope:
 - Make sure that the brake system can stop the crane before you go down the slope.
 - Put the transmission in the low gear range before you go down the slope. Activate the engine exhaust brake.
 - Prevent the engine from overrunning. Overrunning of the engine refers to the phenomenon that the engine driven by the wheel runs at the RPM which exceeds its rated maximum engine RPM.

AUTION

- (1) Engine overrunning will cause damage to the engine.
- (2) Slow the crane down before you change to a lower gear.
- (3) If the engine stops because the fuel tank is empty, air can go into the fuel system. When this occurs, remove the air from the fuel lines.

🔔 DANGER

Do not let the vehicle move forward when the engine is off.

3.5.2 Crane movement in off-road conditions

When the axles are in the mud (no traction) or on rough terrain, follow these steps:

- a) Add transversal and longitudinal differential locks to axles. Add longitudinal differential locks to the transfer case.
- b) Put the transmission in the low gear. Otherwise, the crane service life will be shortened.
- c) Make sure that the engine RPM is around maximum.
- d) Tow the vehicle or put rigid materials, e.g. pieces of wood or iron plates, below the wheels.

3.5.3 Park the vehicle

- a) When you park the vehicle, follow the instructions below:
 - 1) In bad weather condition (rain, snow, ice) or on a slope, make sure that there is a lot of clearance in front and to the aft of the vehicle.
 - 2) Apply the parking brake. Always put the chocks before and behind the wheels on a slope.
 - 3) Put the transmission in the neutral position.
- b) Before you stop the engine, do the items that follow:
 - Depress the engine control pedal 2 or 3 times to increase the engine RPM. This makes the oil flow into each part of the engine.
 - 2) Let the engine idle while you monitor the coolant temperature.
 - 3) Stop the engine, when the coolant temperature is in the correct range.

Make sure that the hazard lights illuminate when the vehicle is parked on the road at night.

3.5.4 Emergency stop on the roadway

If the crane malfunctions on the roadway, do the items that follow:

- a) Stop the crane in a safe place.
- b) Set the hazard lights to ON and put the warning triangle in position.
- c) Apply the parking brake if you stop because of a drive train (propeller shaft, axle) fault or you make an emergency stop on a slope. Put the chocks before and behind the wheels
- d) Examine the vehicle to find the part that caused the malfunction. Be careful of the road conditions while you move around the vehicle.
- e) If you cannot repair the vehicle, contact the manufacturer or tell the servicing and repair facility.

Truck Crane Operator'S Manual

Chapter 4 Operation-Crane Superstructure





Chapter 4 Operation – Crane Superstructure

4.1 Operator's cab

4.1.1 Overall view

For the overall view of the cab interior, refer to Figure 4-1. For the operating elements in the cab, refer to Table 4-1.

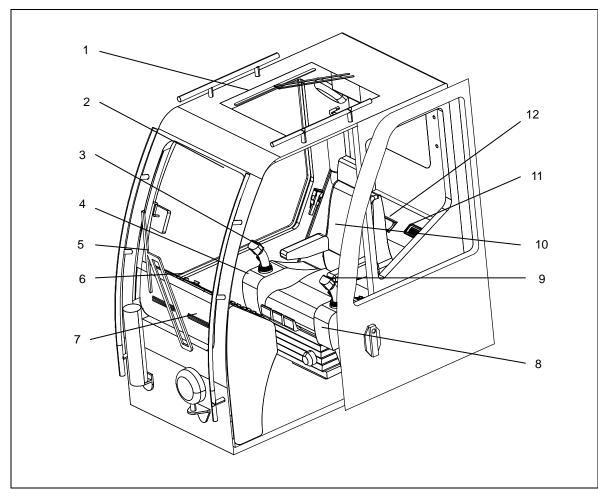


Figure 4-1 Cab interior

Table 4-1	Operating elements in the cab
-----------	-------------------------------

Pos.	Description	Pos.	Description
1	Roof window wiper	7	Front outlet nozzle
2	Label	8	Left control box
3	Right joystick	9	Left joystick
4	Right control box	10	Operator's seat
5	Front windshield wiper	11	Rear outlet nozzle
6	Instrument panel	12	Control panel, A/C and cab heater

4.1.2 Instrument panel

ZOOMLION

a) For the instrument panel, refer to Figure 4-2. For the operating instruments on the instrument panel, refer to Table 4-2.

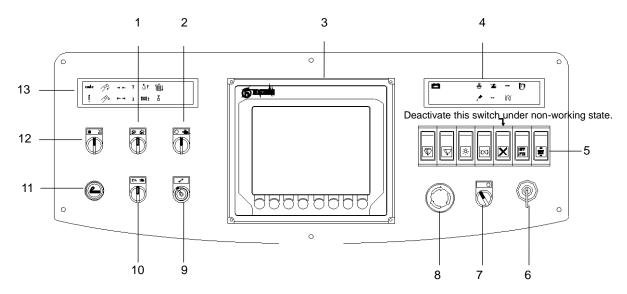


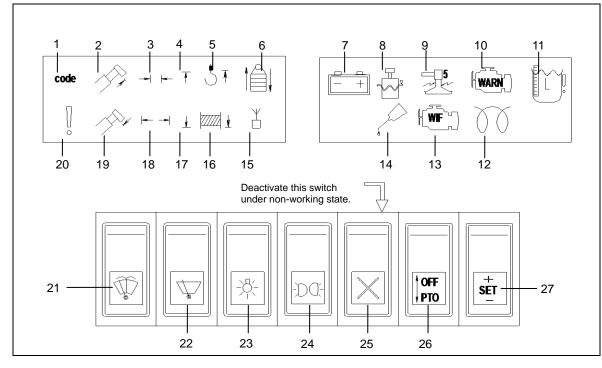
Figure 4-2 Instrument panel

Table 4-2	Operating instruments on the instrument panel
	• p • · · · · · · · · · · · · · · · · ·

Pos.	Description	Pos.	Description
1	Switch Pre-selection of operator's cab tilting mechanism operation	8	Emergency stop button
2	Switch Pre-selection of supplying hydraulic oil / engine fault diagnosis	9	Bypass key switch
3	Load moment limiter	10	Switch Pre-selection of normal speed / low speed / extremely low speed
4	Display unit 2	11	Cigarette lighter
5	Keyboard	12	Switch Pre-selection of counterweight remote control box / remote controller
6	Ignition starter switch	13	Display unit 1
7	Battery master switch		

b) For the display units and keyboard, refer to Figure 4-3. For the description of the display units and keyboard, refer to Table 4-3.

ZOOMLION



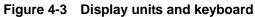


Table 4-3 Display units and keyboard			
Pos.	Description	Pos.	Description
1	Control light	9	Warning light (not used)
·	Boom code		The 5 th outrigger pressure high
2	Control light	10	Warning light
2	Cylinder pin not reaching its target hole	10	Engine error code displayed
3	Control light	11	Warning light
3	Telescoping cylinder unlocked	11	Hydraulic oil level low
	Control light	12	Control light
4	•		Superstructure engine preheating
	Boom section pinned		system
5	Warning light	13	Warning light
5	Hoisting limit switch	15	Water in fuel
6	Control light	14	Warning light
0	Counterweight operational		Central lubricating system
7	Warning light	15	Control light
	Charge monitoring		Remote controller
8	Warning light	16	Warning light
ð	Engine coolant level low		Lowering limit switch

Pos.	Description	Pos.	Description
47	Control light	00	Button
17	Boom section unpinned	23	Work lights
	Control light		Button
18		24	Corner marker lights and work lights on
	Telescoping cylinder locked		boom head
4.0	Control light	25	Decideran hutter
19	Cylinder pin exceeding its target hole		Deadman button
00	Control light	26	Button
20	Boom pin operational		РТО
	Button	~-	Button
21	Front windshield washer system	27	Set engine RPM
22	Button		
	Front windshield wiper		

1 Control light

Boom code

The times that the control light flashes every interval indicate the corresponding telescopic section the telescoping cylinder is in.

2 Control light

Cylinder pin not reaching its target hole Illuminates:

The cylinder pin does not reach its target hole. Extend the cylinder a little to align the cylinder pin with its target hole.

3 Control light

Telescoping cylinder unlocked Illuminates:

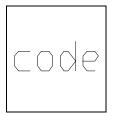
The telescoping cylinder is unlocked with the telescopic boom.

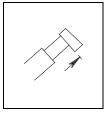
4 Control light

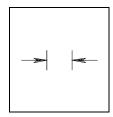
Boom section pinned

Illuminates:

The telescopic section is pinned.









- 5 Warning light Hoisting limit switch Illuminates: The hoisting limit switch is activated.
- 6 Control light

Counterweight operational The counterweight is operational via the counterweight remote control box.

7 Warning light

Charge monitoring

Illuminates:

The ignition starter switch is turned to position 1.

Extinguishes after enging starting:

The battery is charged.

Illuminates after engine starting:

The charging system is defective. Rectify at once.

- 8 Warning light Engine coolant level low Illuminates: The engine coolant level is low.
- 9 Warning light (not used)
 The 5th outrigger pressure high
 Illuminates:
 The 5th outrigger pressure is more than the rated

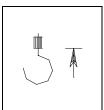
one.

Note:

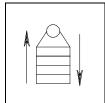
This crane is not equipped with the 5th outrigger.

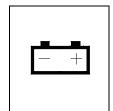
10 Warning light Engine error code displayed Illuminates:

You can read the engine error code.



ZOOMLION











Operator's Manual for Truck Crane

11 Warning light

Hydraulic oil level low

Illuminates:

Hydraulic oil level is low due to oil leakage or other losses.

Stop the crane and fill the hydraulic oil tank to the specified level.

12 Control light

Superstructure engine preheating system

When you turn the ignition starter switch to position 1, the ECU will decide whether to activate the flame starting device according to actual coolant temperature and charge-air temperature.

Illuminates:

Preheat the superstructure engine.

Extinguishes:

The superstructure engine has been preheated. You can start the engine.

Note:

Do not start the engine until the control light extinguishes.

13 Warning light

Water in fuel

Illuminates:

The water in fuel exceeds the permits.

14 Warning light

Central lubricating system

Illuminates:

The central lubricating system is working.

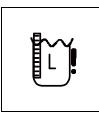
15 Control light

Remote controller

Illuminates:

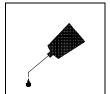
The remote controller is operational.

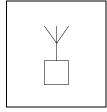
Note: The remote controller is optional.











- 16 Warning light
 Lowering limit switch
 Illuminates:
 The lowering limit switch is activated.
- 17 Control light Boom section unpinned Illuminates: The telescopic section is unpinned.

18 Control light

Telescoping cylinder locked Illuminates: The telescoping cylinder is locked with the telescopic boom.

19 Control light

Cylinder pin exceeding its target hole Illuminates:

The cylinder pin exceeds its target hole. Retract the cylinder a little to align the cylinder pin with its target hole.

Note:

If the cylinder pin is aligned with its target hole, the control lights 2 and 19 will light up simultaneously.

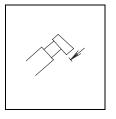
20 Control light

Boom pin operational Illuminates:

It is permitted to close the boom pin. Do not close the boom pin until the control light lights up.





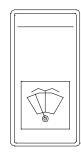




ZOOMLION

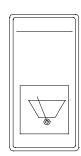
21 Button

Front windshield washer system Pressed: Turn on the windshield washer system on the front window.



22 Button

Front windshield wiper 2 stages: Intermittent Wipe



23 Button

Work lights

2 stages:

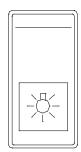
- 1 Background lighting
- 2 Background lighting, work lights on cab front and boom sections

24 Button

Corner marker lights and work lights on boom head

Pressed:

Turn on the corner marker lights and work lights on boom head.







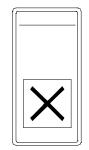
25 Deadman button

Pressed:

Operate the functions of the joysticks. If you do not push this button, the commands from the joysticks cannot operate.

It has the same function as the deadman buttons on the left and right joysticks.

Press either deadman button to operate the joysticks.



Deactivate the button after operation. Otherwise, risk of inestimable losses!

26 Button

ΡΤΟ

Pressed down:

Engage the PTO.

Superstructure engine RPM is increased to 1000 r/min.

Pressed up:

Disengage the PTO.

Superstructure engine RPM is decreased to idle speed.

Engage the PTO before you begin a lift operation.

27 Button

Set engine RPM

Pressed up once:

The superstructure engine RPM is increased by

200 r/min. until 1600 r/min. is reached.

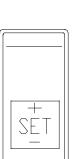
(Sequence: 1000 r/min. \rightarrow 1200 r/min. \rightarrow 1400

r/min.→1600 r/min.)

Pressed down once:

The superstructure engine RPM is decreased by 200 r/min.





Operator's Manual for Truck Crane

28 Switch

Pre-selection of counterweight remote control box / remote controller

Left position:

You can operate the counterweight via the remote control box.

Right position:

You can operate the crane via the remote controller.

Neutral position:

The counterweight is not operational.

Note:

The remote controller is optional. The right position can only be activated when the remote controller is provided.

29 Switch

Pre-selection of operator's cab tilting mechanism operation

Left position:

Tilting the cab downwards

Right position:

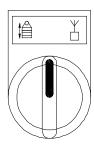
Tilting the cab upwards

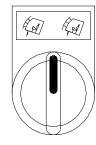
Note:

The cab can be tilted downward and upward for 20° in a maximum.

30 Cigarette lighter

Push-in the cigarette lighter for several seconds. Pull it out to use it.









31 Switch

Pre-selection of normal speed / low speed / extremely low speed Left position:

Apply all crane movements with normal speed.

Neutral position:

Apply all crane movements with low speed.

Right position:

Apply all crane movements with extremely low speed.

When you carry out simultaneous crane movements, put the switch in neutral position to achieve better simultaneous performance.

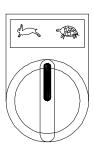
32 Emergency stop button

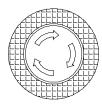
Pressed:

All superstructure movements are cut off.

33 Battery master switch Right position:

- The battery master switch near the battery on slewing table is switched on.
- The switch background lights up.
- The superstructure is energized.







34 Ignition starter switch

The positions of the switch (in clockwise direction) are as follows:

Position 0:

All circuits are OFF.

Position 1:

The battery begins to work to supply electricity to the superstructure electrical system.

Position 2:

The engine starts (from position 1 to position 2).

Release the key to position 1 when the engine starts. Return the key to the "0" position first if you want to restart the engine.

35 Switch

Pre-selection of supplying hydraulic oil / engine fault diagnosis

Left position:

Supply hydraulic oil to the winch.

Right position:

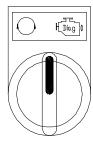
Engine fault diagnosis.

Supplying hydraulic oil:

This switch should always be used in conjunction with the joysticks to supply hydraulic oil to winches. Detailed operating method is as follows:

- a) Supplying hydraulic oil to the main winch
 - Turn the switch to the left position and deflect the right joystick forwards until the buzzer sends out slow acoustic warning.
 - Turn the switch to the neutral position and deflect the joystick to the neutral position.





- b) Supplying hydraulic oil to the auxiliary winch
 - Turn the switch to the left position and deflect the left joystick forwards until the buzzer sends out slow acoustic warning.
 - Turn the switch to the neutral position and deflect the joystick to the neutral position.

Do not stop supplying hydraulic oil to main / auxiliary winch until the buzzer sends out slow acoustic warning (Frequency: 0.5 HZ). One supplying circle is about 3 minutes. If the load is suspended in the air for a period of

time due to crane shutdown, supply hydraulic oil to the winches before you operate the winches. The supplying circle is determined by the crane downtime (T):

(Preheat the machine for 15 to 30 minutes in winter)

- a) If 0.5 hours $\leq T \leq 6$ hours, supply oil 1 circle at 1000 r/min. for 3 minutes.
- b) If 6 hours ≤ T ≤ 12 hours, supply oil 2 circles at 1000 r/min. (each circle for 3 minutes).
- c) If T ≥ 12 hours, supply oil 3 circles at 1000
 r/min. (each circle for 3 minutes).

Do not push and hold the deadman button on the left / right joystick and do not activate the deadman button on the keyboard when you supply hydraulic oil to the winch. ZOOMLION

Operator's Manual for Truck Crane

ZOOMLION

36 Bypass key switch

When the main or auxiliary winch is in the spool-up mode and the hook block touches the hoisting limit switch weight, the buzzer sends out fast acoustic warning. When the warning occurs, the function of the items below stop:

- Spool up winches.
- Telescope out.
- Derrick down.

When the sensor senses that the main winch has 3 wraps of wire-rope on it, the buzzer sends out fast acoustic warning. When the warning occurs, the function of the items below stop:

- Reel off winches.

When the sensor senses that the load weight is more than the load weight in the system, the buzzer sends out fast acoustic warning. When the warning occurs, the function of the items below stop:

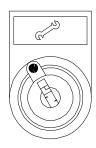
- Spool up winches.
- Telescope out / in (in auto mode only).
- Derrick down.

If necessary, this switch-off can be bypassed by turning the bypass key switch clockwise on the instrument panel.

Increased accident risk when bypassing the dangerous movements!

Carry bypassing movements with maximum care and minimum speed.

Do not telescope the boom with a suspended load!



4.1.3 Control boxes

4.1.3.1 Left control box

For the left control box, refer to Figure 4-4.

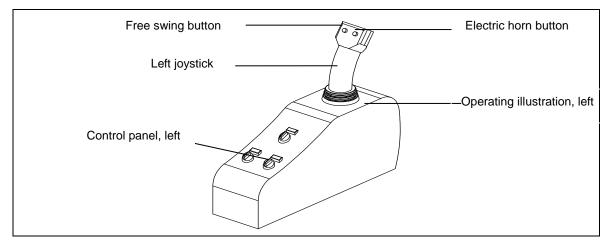


Figure 4-4 Left control box

For the left joystick and its operating illustration, refer to Figure 4-5.

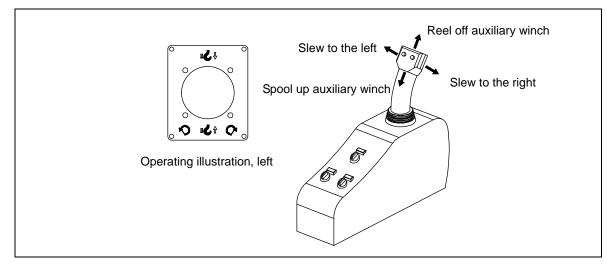
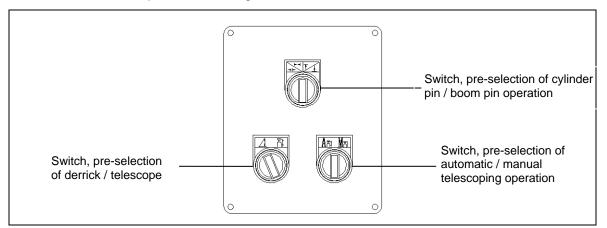


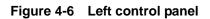
Figure 4-5 Left joystick and its operating illustration

ZOOMLION



For the left control panel, refer to Figure 4-6.





1 Switch

Pre-selection of cylinder pin / boom pin operation Left position:

Close the cylinder pin.

Middle position:

Open the cylinder pin / boom pin.

Right position:

Close the boom pin.

2 Switch

Pre-selection of derrick / telescope

Left position:

The boom derricking movement is operational via the right joystick.

Right position:

The boom telescoping movement is operational via the right joystick.

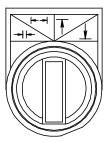
3 Switch

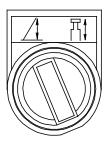
Pre-selection of automatic / manual telescoping operation Left position:

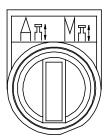
Automatic telescoping

Right position:

Manual telescoping







4.1.3.2 Right control box

For the right control box, refer to Figure 4-7.

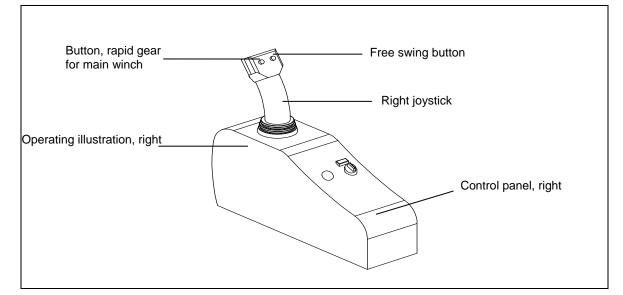
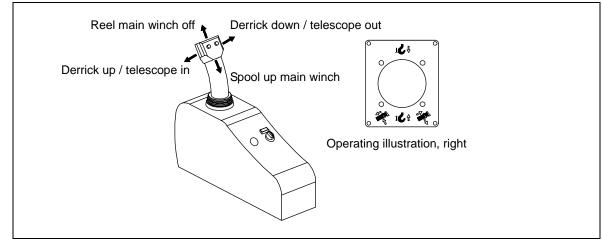
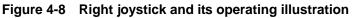


Figure 4-7 Right control box

For the right joystick and its operating illustration, refer to Figure 4-8.





ZOOMLION



For the right control panel, refer to Figure 4-9.

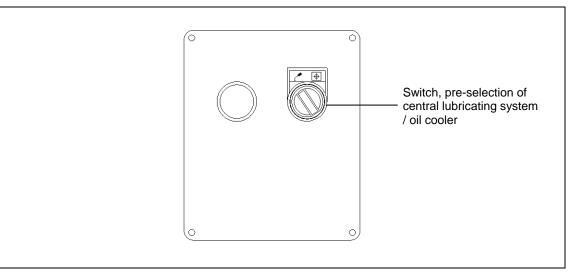


Figure 4-9 Right control panel

Switch Pre-selection of central lubricating system / oil cooler

3-stage non-resetting switch

Left position:

The central lubricating system is energized and begins to work.

Neutral position:

Normal condition

Right position:

The oil cooler fan begins to work. The oil cooler fan automatically works if one of the following conditions is met:

- When the hydraulic oil temperature in the closed loop exceeds 60°C and the engine is working.
- When the hydraulic oil temperature in the open loop exceeds 60°C and the engine is working.

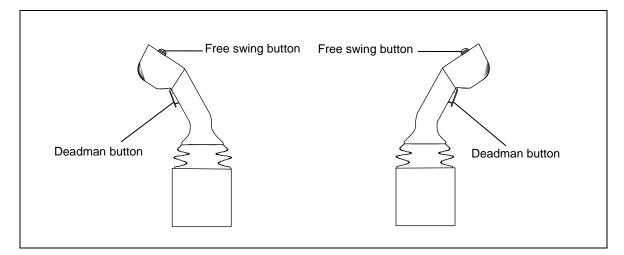
Note:

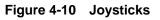
When the oil temperature gets lower than 56°C or the power supply is switched off, the oil cooler fan stops working.

The free swing button is located on both joysticks. Push the free swing button to let the slewing table turn without rotational tension. Push the button again to release this function.

The left / right deadman button is located on the backside of left / right joystick. Push and hold-in the deadman button to operate the functions of the left / right joysticks. If you do not push and hold-in this button or activate the deadman button on the keyboard, the commands from the left or right joystick cannot operate. Refer to Figure 4-10.









Do not activate the free swing button when the crane is operated with a suspended load. Do not push and hold-in the deadman button on the joysticks or activate the deadman button on the keyboard for a long time with tools! Otherwise, risk of inestimable loss.

4.1.4 Engine control pedal

You can depress the engine control pedal to increase the engine RPM, thus to accelerate the slewing, derricking, telescoping and hoisting movements.

4.1.5 Operator's seat

For the operator's seat, refer to Figure 4-11.

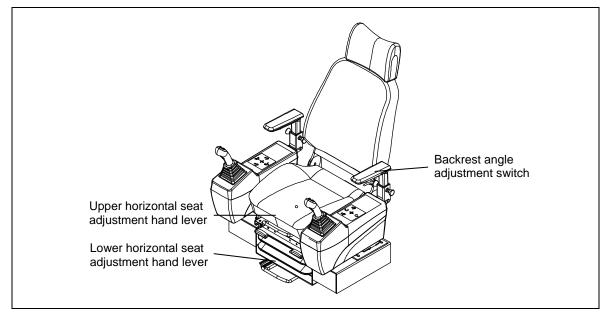


Figure 4-11 Operator's seat

4.2 Computer system

ZOOMLION

4.2.1 General

The load moment limiter is a computer system for controlling and monitoring mobile cranes. In addition to controlling the boom telescoping via computer programs, it is also of self-diagnosis function.

The load moment limiter calculates data from the pressure sensors, length sensor, angle sensor and other monitoring devices to judge whether the crane is in safe working conditions, and displays the basic parameters, such as boom length, boom angle, working radius, rated lifting capacity etc., on the monitor.

The "Advance warning" icon appears and the buzzer sends out slow acoustic warning if the current load exceeds the (90%) limit programmed in for advance warning. At this time, the operator should pay much attention to the operation.

The "Stop" icon appears, the buzzer sends out fast acoustic warning and all dangerous crane movements are switched off if the current load exceeds the 100% mark.

The crane can only work towards safe directions till the dangerous operation is deactivated.

The load moment limiter can prevent crane from tippling or being destructed, thus ensures safe operation of the crane. However, do not rely entirely on the load moment limiter. If the rated lifting load displayed on the load moment limiter is different from the one shown in lifting capacity table, refer to the lifting capacity table.

For the main screen of the load moment limiter, refer to Figure 4-12. For the elements of main screen, refer to Table 4-4.

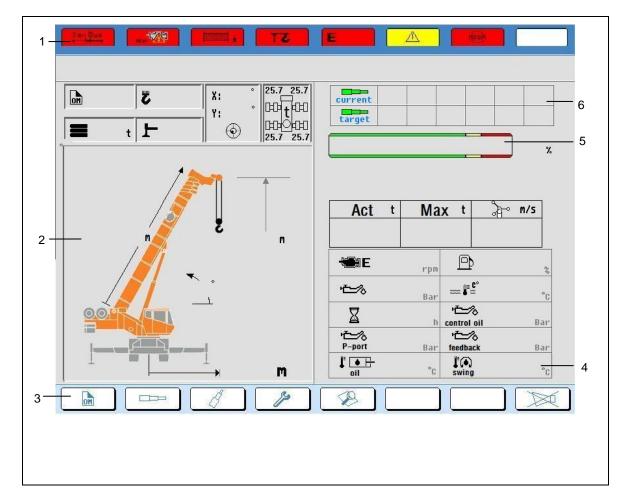


Figure 4-12 Main screen

Table 4-4 Elements of main screen

Pos.	Description	Pos.	Description	Pos.	Description
1	Warning icons	2	OM display	3	Function icons
4	Instruments display	5	Load information	6	Boom extension status



The monitor illustrations in this chapter are only examples. The numerical values in the individual icons and tables do not necessarily match exactly to the crane.

ZOOMLION

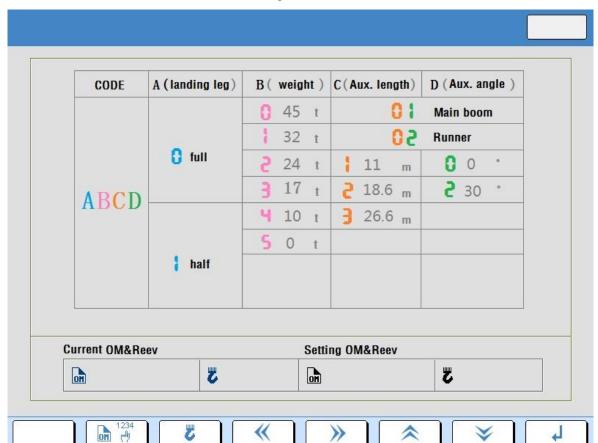
4.2.2 Programs

4.2.2.1 Switching on the computer system and performing self-test

After the computer system is switched on, the load moment limiter performs a self-test to examine whether the three PLC controllers and their respective mentor nodes are on line. If no errors are found during the system test, the monitor displays the following screen (Refer to Figure 4-13). Shortly after that, the screen as shown in Figure 4-14 appears on the monitor. For the "Self-test passed" screen, refer to Figure 4-13.



Figure 4-13 Self-test passed



For the "OM selection" screen, refer to Figure 4-14.

Figure 4-14 OM selection

If a connection error is found during the test, the corresponding controller cannot pass the test and the monitor shows the following screen (Refer to Figure 4-15).

Troubleshooting:

If an error message appears on the monitor:

- a) Turn off the engine and rectify the errors (especially examining the connectors).
- b) Start to perform self-test again.



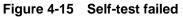
If an error is found during communication, the buzzer will not stop sending alarm after you turn on the computer. It is a normal phenomenon. Please rectify the communication fault.

ZOOMLION



For the "Self-test failed" screen, refer to Figure 4-15.





4.2.2.2 Main screen – configuration program

After the OM is selected, it switches automatically to the Main screen – configuration program (Refer to Figure 4-16). Many parameters can be monitored from this screen in real time.

ZOOMLION

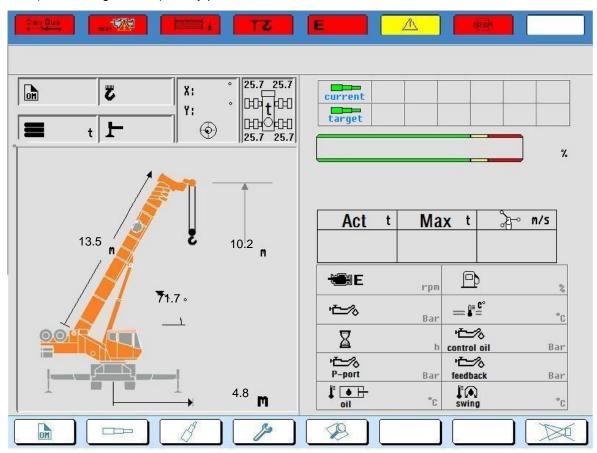


Figure 4-16 Main screen – configuration program

The functions of the individual monitor operating elements are program-dependent, and can be different in any running program. Therefore, the description of the individual programs will be described in detail.

a) Function key line

The function key line consists of the function keys F1 to F8 and the function key icons line above them. (Refer to Figure 4-17.)

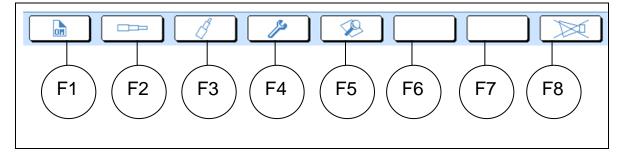


Figure 4-17 Function key line



If the hoisting limit switch, lowering limit switch, overload protection, hydraulic level low warning or pipe overpressure protection is activated, press function key F8 to switch off the alarm. But the current error cannot be eliminated. The error can only be rectified manually according to actual working conditions or the hints given by the system. How to find the error hint:

- (1) Press F5 to switch to relevant figure.
- (2) Press F5 in switched figure.
- (3) In the switched figure, press F4 again.
- b) Boom status

Displays main boom length, angle, radius, height etc. If the jib is selected, it will also show the configuration of jib. Refer to Figure 4-18.

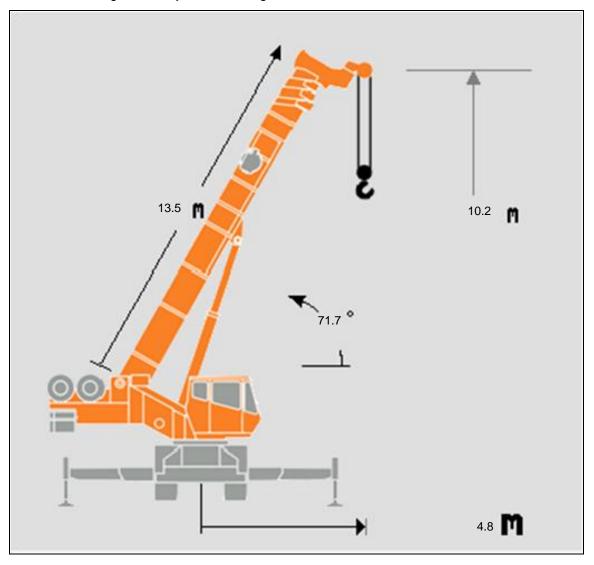


Figure 4-18 Boom status

c) Display of OM code, counterweight, reeving, crane inclination angle in real time and outrigger status, etc. Refer to Figure 4-19.

ZOOMLION



Figure 4-19 OM display

d) Displays

For the displays, refer to Figure 4-20. For the description of displays, refer to Table 4-5.

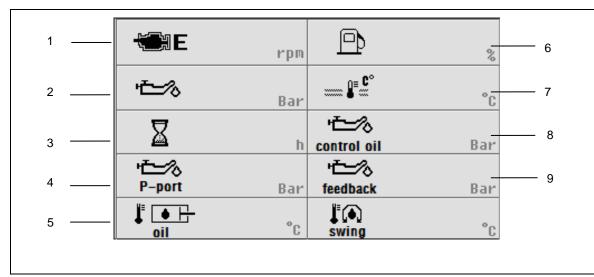


Figure 4-20 Displays



Pos.	Description	Pos.	Description
1	Engine RPM	6	Fuel reserve
2	Engine oil pressure	7	Coolant temperature
3	Engine working hours	8	Control oil pressure
4	Pressure at port P	9	Feedback pressure
5	Hydraulic oil temperature		



e) Load information (Refer to Figure 4-21)

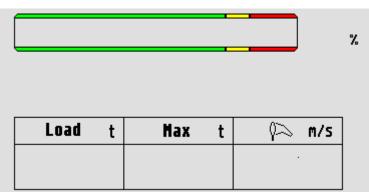


Figure 4-21 Load information

Display of load capacity bar (in percent, digital and graph), load weight, maximum load and wind speed.

f) Boom extension status (Refer to Figure 4-22.)

Displays the current extension status and target extension status of individual telescopic section.

current			
target			

Figure 4-22 Boom extension status

g) For the warning icons, refer to Figure 4-23. For the description of the warning icons, refer to Table 4-6.

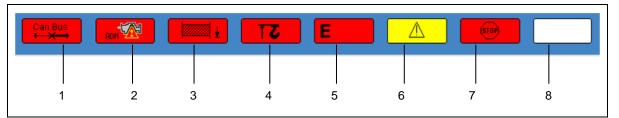


Figure 4-23 Warning icons

Pos.	Description	Pos.	Description
1	Can bus error	5	Error code for load moment limiter
2	Engine defects	6	Warning
3	Lowering limit switch	7	Stop
4	Hoisting limit switch	8	Current time

 Table 4-6
 Description of warning icons

ZOOMLION

4.2.2.3 Setting up operating mode

Set main operating mode and boom extension status before telescoping.

Press function key F1 in Figure 4-16 (Main screen – configuration program) to switch to Figure 4-24.

CODE	A (landing leg)	B(we	ight)	C(Au	x. length)	D (Aux	. angle)
		(40) t		01	Main b	noom
		32	? t		50	Runne	r
	🕻 full	2 24	l t		11 m	0	0 °
ABCD		3 10) t	2	18.6 m	- 5 e	30°
ADCD		4 0	t	3	26.6 m		
	half						
rrent OMℜ	ev		Setti	ng OM	&Reev		
H		ON			3		

Figure 4-24 Set main operating mode

- F2: select OM
- F3: select reeving number
- F4: arrow left (Move to the left. The selected data is highlighted in red.)
- F5: arrow right (Move to the right. The selected data is highlighted in red.)

- ZOOMLION
 - F6: arrow up (Increase the value. Range: 0 9)
 - F7: arrow down (Decrease the value. Range: 0 9)
 - F8: exit Figure 4-24 after confirmation

For example:

If the monitor shows 0101 04 , it indicates:

- outriggers fully extended
- 10 tons counterweight
- main boom working condition
- 4 reevings.

Press function key F2 in Figure 4-16 to switch to Figure 4-25.

							tel	e-co	D							-
No.	T2	T3	T4	T5	T6	T7	Len.		No.	T2	T3	T4	T5	T6	T7	Len.
1	1	1	1	1	1	1	13.5 <mark>m</mark>		12	3	3	3	3	3	2	63 m
2	1	2	1	1	1	1	18 m		13	3	3	3	3	3	3	67.5 m
3	1	2	2	1	1	1	22.5 m		14	4	4	4	4	4	4	72 m
4	2	2	2	1	1	1	27 m		15	4	1	1	1	1	1	23.3 m
5	2	2	2	2	1	1	31.5 m		16	1	4	1	1	1	1	23.3 m
6	2	2	2	2	2	1	36 m		17	1	1	4	1	1	1	23.3 m
7	2	2	2	2	2	2	40.5 m		18	1	1	1	4	1	1	23.25 m
8	3	2	2	2	2	2	45 m		19	1	1	1	1	4	1	23.15 m
9	3	3	2	2	2	2	49.5 m		20	1	1	1	1	1	4	23.05 m
10	3	3	3	2	2	2	54 m									
11	3	3	3	3	2	2	58.5 m									
			· · · · · · · · · · · · · · · · · · ·			· · · · · · · · · · · · · · · · · · ·		Atte	ntion:	15,16	,17,1	8,19,2	20,is n	iot all	owed	to load!
				curi	ent						S	elect				
		~													_	

Figure 4-25 Individual telescopic section extension status

- F1 / F2: select data (The selected data is highlighted in red.)
- F3: arrow up (Increase the value. Range: 0 9)
- F4: arrow down (Decrease the value. Range: 0 9)
- F5: match current telescopic combination with the selected one
- F8: exit Figure 4-25 after confirmation



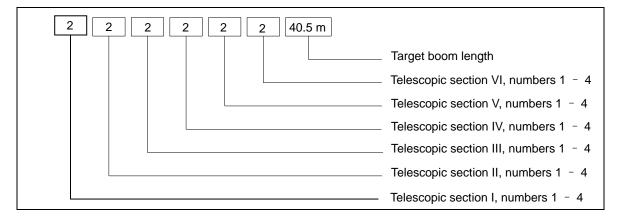
- (1) Only when the set OM is valid, can the telescoping operation be carried out.
- (2) The operating mode highlighted in orange is only for greasing the boom. Do not do lift operation at this time!

4.2.2.4 Telescoping operation

Two telescoping operations: manual / automatic

Automatic telescoping is strongly recommended.

The manual telescoping can only be activated when automatic telescoping is invalid. Boom combination illustration (Refer to Figure 4-26):





Numbers "I – VI": the corresponding telescopic section (highest number = furthest telescopic section)

Numbers "1 – 4": Telescopic section extension status (in percent %)

1: 0% 2: 46% 3: 92% 4: 100%

Automatic telescoping

The automatic telescoping has 3 steps in total.

Prerequisites:

Make sure that the following prerequisites are met:

- The valid operating mode has been set.
- The boom angle should not be less than 80°.
- The hoisting limit switch and lowering limit switch are not activated.
- Switch A as shown in Figure 4-27 has been set to "Telescope".
- Switch B as shown in Figure 4-27 is in neutral position.
- Switch C as shown in Figure 4-27 is in neutral position.
- Icon boost appear. (As for how to find the current errors and how to clear up the stored errors, please refer to the following contents.)



- (1) If a telescoping error is detected (the above red icon illuminates), telescope the boom manually until the error is removed.
- (2) All prerequisites mentioned above must be met. Otherwise, the automatic telescoping operation cannot be activated.

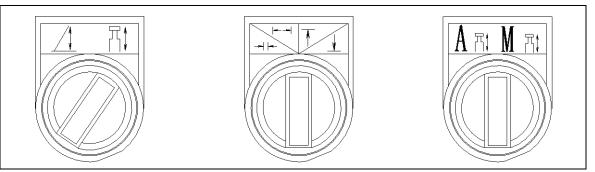


Figure 4-27 Automatic telescoping

Boom status

a) Make sure the current boom status is correct.

Press function key F3 in Figure 4-16 to switch to Figure 4-28. Confirm current boom status.

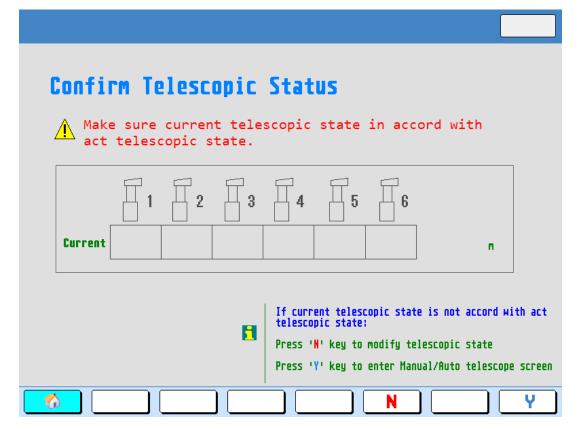


Figure 4-28 Confirm current boom status

If the current boom status matches with the actual one, press function key F8 for confirmation.

ZOOMLION

If the current boom status does not match with the actual one, press function key F6 for modification. As for how to modify the boom status, please refer to following instructions. Refer to Figure 4-32.

It is very important to confirm the current boom status!

Improper setting will result in incorrect telescoping movement and cause fatal accidents!

After current boom status is confirmed, the system will switch to Figure 4-29.

Top display area displays the following parameters:

- Boom length
- Boom angle
- Working radius
- Wind speed.

Main display area displays:

- Control light icons
- Current boom status
- Target boom status
- Information about boom pin, cylinder pin and other related information.



	m/s	₹_		₫ ₩	5 • :		m		•	m
			\langle	¢.		>				0
									code1 code2	code3
	1	2	3	4	5	6				
Current								m	Tele, speed	mm/s
Target							_	m	Cylinder Length	MM
									Unpin Position	MM
₽ Port			bar	Engine	Speed	R/mir			Pin Position	mm
 Central			bar						Control value	
ual	a second								Star	t 📄

Figure 4-29 Telescoping

Control light icons: (the icons on the upper side are corresponding to the control lights on the instrument panel)

Refer to Figure 4-30.

For the description of control light icons, refer to Table 4-7.

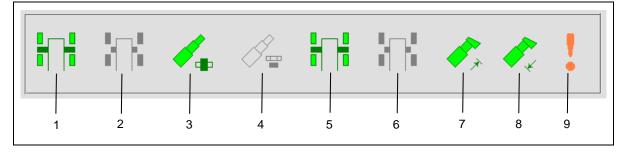


Figure 4-30 Control light icons

	Table 4-7 Description	on of con	trol light icons
Pos.	Description	Pos.	Description
1	Left cylinder pin opened	6	Right cylinder pin closed
2	Left cylinder pin closed	7	Cylinder pin not reaching its target hole
3	Boom pinned	8	Cylinder pin exceeding its target hole
4	Boom unpinned	9	Boom pin operational
5	Right cylinder pin opened		
b)	Telescope the boom sections automatic	cally	
	 Key Start is highlighted in Press function key F7. Keys Manual, and Start 3) Set the switch "Pre-selection of au position. The telescopic boom beg Note: 	re highlig green. will be f utomatic / ins to initi	hted in green. highlighted in grey. annual telescoping operation" to the left iate automatic telescoping movement. hlighted in green if the telescopic sections
	a	e highligh	the telescoping movements will stop nted in red. error information.
	0 0		

Table 4-7	Description	of control	liaht icons
	Dooonption	01 001101	ingine loonlo

ZOOMLION

Rectify the errors manually according to the instructions.



invalid target tel state	cylinder down out of range	
invalid current tel state	boom up out of range	
invalid boom pin	boom down out of range	
invalid left cylinder pin	invalid tel switch state	
invalid right cylinder pin	cylinder pin not extend	
cylinder length out of range	cylinder pin not retracted	
invalid boom code	Boom pin pulling time out	
boom pin not retracted	cylinder pin aligning time out	
cylinder pin not retracted	invalid tel direction detect	
cylinder up out of range	angle less than 80°	

Figure 4-31 Boom telescope errors

Modify the current boom status:

Before switching to Figure 4-29, confirm the current boom status (Refer to Figure 4-28) first.

If the displayed boom status differs from the actual one, press function key F6 "N" to switch to Figure 4-32 for modification.

How to modify the current boom status (Refer to Figure 4-32):

- a) Enter correct password.
- b) Enter correct values.
- c) Press function key F7 "Y" for confirmation.
- d) Press function keys F1, F2 and F3 to select the corresponding telescopic section which needs to be modified.
- e) Press function keys F5 / F6 to increase / decrease the numerical values.
- Press function key F7 "Y" to switch to Figure 4-33. f)



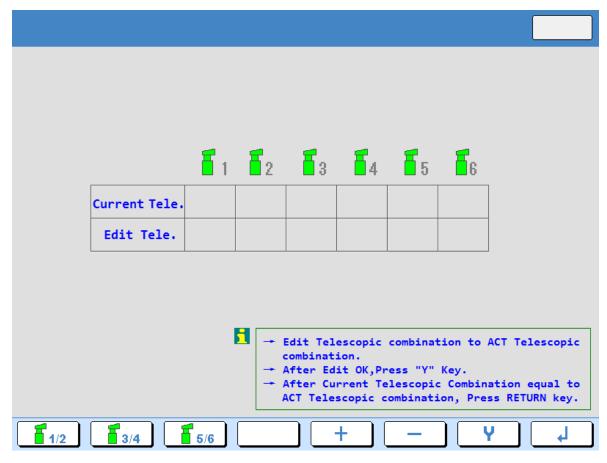


Figure 4-32 Current boom status modification



Password:	* * * * *			
	4/5 6/7	8/9	Y	4

Figure 4-33 Enter password



It is very important to confirm the current boom status. If the current boom status is set incorrectly, risk of fatal danger! If you need the password, please contact our technician.

Manual telescoping

Because the manual telescoping is complex, it is recommended to initiate manual telescoping only when the automatic telescoping is invalid.

The manual telescoping has 6 steps in total.

- a) The valid operating mode has been set. For details, please refer to the instructions in "Automatic telescoping".
- b) Switch A is set to right position.
- c) Switch B is in neutral position.
- d) Switch C is in neutral position (Refer to Figure 4-27).



The boom angle is permitted to be lower than 80°. However, the operator should select a safe angle according to actual boom length to ensure the safety of telescoping.

- e) Press function key F1 in Figure 4-29 to switch to Figure 4-34.
- f) Telescope boom sections manually.
 In Figure 4-34, if the above prerequisites are met, key Manual will be highlighted in green.
 In that case:
 - Press function key F7. Keys and will be highlighted in grey.
 - 2) Set switch C to the right position.
 - 3) Move the right joystick.
 - 4) Set switches B to the required position to telescope boom sections manually.

		m/s		₫ŧ ,	5 • :		m		• •		m		
1 –		U U n n	\langle			>				P,	Ø,	0	
2 –									code1	l coc	l <u>e</u> 2 c	ode3	•
3 -	\longrightarrow	t I	3	4	5	6							_11
	Current							M	Tele	speed		mm/s	\vdash
	Target							M	Cylinder	Length		<u>mm</u>	_
4 –]		Unpin Po	osition		mm	-
5 —	₽ Port		bar	Engine	Speed	R/min			Pin Po	osition		MM	_
5-	Central		bar						Control	l value			
							_						

Figure 4-34 Boom status during manual telescoping

Pos.	Description	Pos.	Description
1	Control light icons	7	Cylinder length 2
2	Target status	8	Cylinder length 1
3	Current status	9	Current cylinder length
4	Target telescopic section	10	Telescope speed
5	Pressure and engine RPM	11	Boom code
6	Control value		

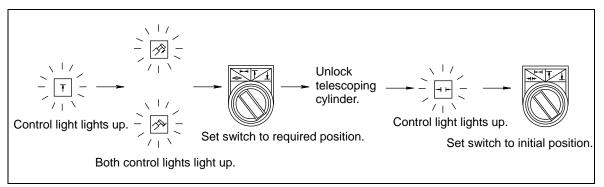
Table 4-8 Description of boom status during manual telescoping



ZOOMLION

Observe the following instructions when carrying out manual telescoping operation.

a) Unlock the telescoping cylinder







Do not unlock the cylinder until the icon "Boom pinned" lights up. Otherwise, risk of serious damage!

b) Lock the telescoping cylinder

When you unlock the telescoping cylinder manually, you can extend the cylinder pin in advance. That is to say, when the telescoping cylinder enters into the target telescopic section and the corresponding control light "Target telescopic section" illuminates, you can extend the cylinder pin. Then you extend or retract the telescoping cylinder continuously until the telescoping cylinder is locked with the telescopic section.

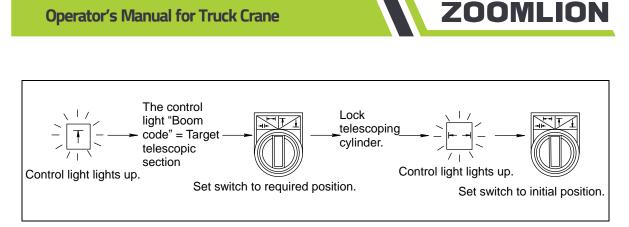
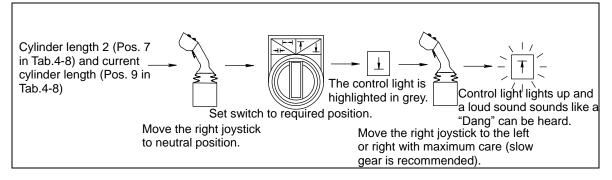
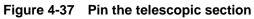


Figure 4-36 Lock the telescoping cylinder

c) Pin the telescopic section

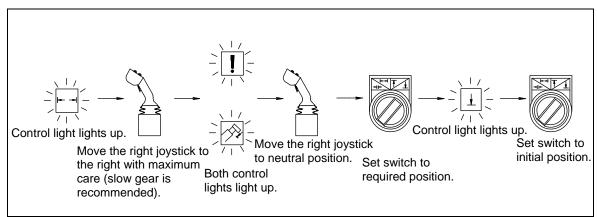




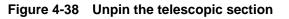


Initiate the movement "Telescope boom out / in" slowly if boom pin is released. Turn the switch "Pre-selection of normal speed / low speed / extremely low speed" to the right position to apply the slow gear to the telescoping movement.

It is recommended to activate the right joystick and slowly telescope the boom in / out to prevent the boom pin from exceeding its target pin hole.

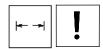


d) Unpin the telescopic section





Make sure the telescoping cylinder is locked and the boom pin is operational (the two icons on the right light up) before unpinning the telescopic sections.



If the icon "Boom pinned" goes out after the switch "Pre-selection of cylinder pin / boom pin operation" is set to the right position, but icon "Boom unpinned" does not light up and the value shown on pressure gauge keeps about 130 bar.

- 1) Stop closing the boom pin.
- 2) Release boom pin till icon "Boom pinned" lights up.
- 3) Close the boom pin again.

- (1) During manual telescoping, slowly telescope the boom with a large boom angle (slow gear is recommended) if the boom section is unpinned. The icon "Boom pin operational" must be on during boom telescoped-in process. Accelerate telescoping operation after the telescoping cylinder retracts for a certain length.
- (2) In the automatic telescoping operation, examine the icon "Boom pin operational" for illumination. If not, grease the boom sections.
- e) Limitations for manual telescoping operation

The movement "Extend the telescoping cylinder" will be switched off automatically to prevent the telescoping cylinder from being damaged if following prerequisites are met:

- 1) All telescopic sections are fully retracted.
- 2) Telescoping cylinder is unlocked.
- 3) Telescoping cylinder is in the tail of telescopic section VI.
- 4) Both icons "Cylinder pin exceeding its target hole" and "Boom pin operational" light up.
- f) Methods for identifying which boom section is carrying out movement

Method 1:

The lighted boom codes show that the corresponding telescopic section will carry out movements.

Control light "Boom code" lights up: 1

Control light "Boom code" goes out: 0

Number of telescopic section = "Code 1" * 1 + "Code 2" * 2 + "Code 3" * 4

For example:

If control lights on Code 1 and Code 2 light up, the telescopic section III will carry out movements.



Method 2:

Observe the boom code from the following area of Figure 4-39.

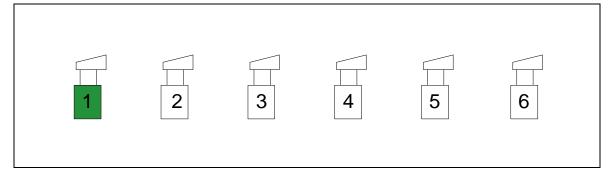


Figure 4-39 Current telescopic section display

The icon of telescopic section I is highlighted in green which indicates the telescopic section I is to carry out relevant movements.

Method 3:

You can read the boom code from the control light "Boom code" on the instrument panel. The times that the control light flashes every interval indicate the corresponding telescopic section the telescoping cylinder in.

g) If the boom section is unpinned, icon 8 displays the cylinder length 1 and icon 7 displays cylinder length 2.

Note:

Cylinder length 1 indicates the position to close the boom pin. Cylinder length 2 indicates the position to open the boom pin. Refer to Figure 4-34.

The length of telescoping cylinder shown in icon 9 will vary with the moving of joystick.

 Icon 4 (the target telescopic section) indicates that the corresponding boom section highlighted in green will carry out relevant movements in manual telescoping mode.
 For example, in screen "Boom status during manual telescoping" (Figure 4-34), the highlighted section is telescopic section I. So, the telescopic section I is to carry out telescoping movements.

(1) In the automatic telescoping operation, the telescoping cylinder will drive the boom to retract automatically if the telescopic section is unpinned (the control light "Boom unpinned" lights up).

If the boom does not retract for a long time:

- Change into manual telescoping.
- Extend the boom for 5 14 mm with slow gear (the second stage).
- Retract it again with slow gear (the second stage).

Note:

ZOOMLION

Crane movements "Telescope" have 2 stages:

- 1 (extremely slow): intermediately deflect the right joystick to the right / left
- 2 (slow): fully deflect the right joystick to the right / left
- In this case, the operator must observe the above procedures. Otherwise, risk of great impact on the boom during retracting.
- (2) If the boom pin cannot be closed during the process of telescoping in the boom automatically:
 - Change into manual telescoping.
 - Open the boom pin manually until the icon "Boom pinned" lights up.
 - Change to automatic telescoping again.

If the boom pin still cannot be closed, repeat above steps.

- (3) If the icon "Boom telescoping fault" lights up during automatic telescoping operation under the condition that the crane has worked for a long time:
 - Change automatic telescoping to manual telescoping.
 - Extend the telescoping cylinder with slow gear (the second stage) until the length of the telescoping cylinder varies.
 - If the control light "Boom pin operational" lights up during extending the cylinder, retract the telescoping cylinder till both the control light "Cylinder pin exceeding its target hole" and control light "Cylinder pin not reaching its target hole" all light up.
 - Change to automatic telescoping again.

4.3 Starting up the crane

4.3.1 Checks before starting up

Make sure that the following prerequisites are met before starting up:

- a) Examining the engine oil level
 - 1) The crane has been leveled.
 - 2) Pull out the dipstick and clean it.
 - 3) Re-insert it into oil and pull out again.
 - 4) Examine whether the oil level is between MIN. and MAX. marks.

WARNING

If the oil level is lower than the MIN. mark, fill oil. Otherwise, the engine will be damaged seriously!

ZOOMLION

b) Examining the oil level in the hydraulic oil tank

The oil level in the hydraulic oil tank must be between MIN. and MAX. marks.

Turn the shutoff gate valve for 90° to connect the hydraulic oil tank with the oil line. Refer to Figure 4-40.

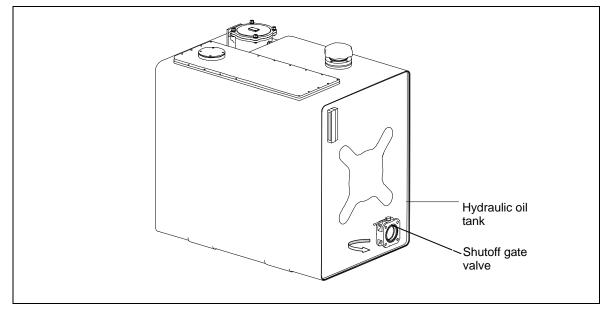


Figure 4-40 Shutoff gate valve

c) Examining the fuel reserve

The fuel reserve is displayed on the fuel gauge in the driver's cab. Examine the fuel reserve and add fuel if necessary.

ZOOMLION

ACAUTION

Deaerate the fuel system before adding fuel. If the fuel tank has been run dry, always deaerate the whole fuel system. Do not run the fuel tank dry!

d) Examining the coolant level

Make sure that the engine coolant is at the correct level. Add more if below the cold engine level.

- e) Examining general conditions of crane
 - 1) Examine lubrication status of each moving parts and make sure that all moving parts are lubricated. Add grease if necessary.
 - 2) Make sure that the crane is properly supported on a level load-bearing surface, and has been set up horizontally.
 - 3) Make sure that the gear of the slewing bearing connection is clean.
 - 4) Make sure that the front and rear parts of oil cooler and A/C radiator have been cleaned and are free of blockage.
 - 5) Make sure that there are no people or objects in the crane danger zone.
 - 6) Make sure that the wire rope, cable / rope drums and sensors are free of snow and ice.
 - 7) Make sure that there are no loose parts on the superstructure or the telescopic boom.
 - 8) Set the joysticks in the neutral positions before you start the superstructure engine.
 - 9) Make sure that the parking brake is applied.

4.3.2 Starting the engine

- a) Switching on the battery master switch
 - The battery master switch near the battery on slewing table is switched on.
 - 2) The switch background lights up.
 - 3) The superstructure is energized.

b) Switching on the engine

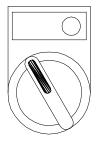
The positions of the switch (in clockwise direction) are as follows:

Position 0:

All circuits are OFF.

Position 1:

The battery begins to supply electricity to superstructure electrical system.







Position 2:

Engine starts (From position 1 to position 2).



- (1) Release the key to position 1 when the engine starts. Return the key to the "0" position first if you want to restart the engine.
- (2) Do not run the motor for 15 seconds continuously. The motor can be operated twice per attempt with a pause in between of several minutes to avoid battery discharging electricity and starting motor being damaged. If the engine cannot be started after 3 attempts, rectify the malfunctions before you start the engine again.

4.4 Safety devices

4.4.1 Support control unit

To ensure the working safety of the crane, the crane must be properly supported on a level load-bearing surface, and be set up horizontally.

A support control unit with buttons is attached to each side of the vehicle for operating the outriggers, together with an electronic inclinometer from which the operator can observe horizontal alignment of the crane. Refer to Figure 4-41.

The maximum permitted deviation from the horizontal position of the crane is \pm 0.4°. Otherwise, fatal accidents may be increased.

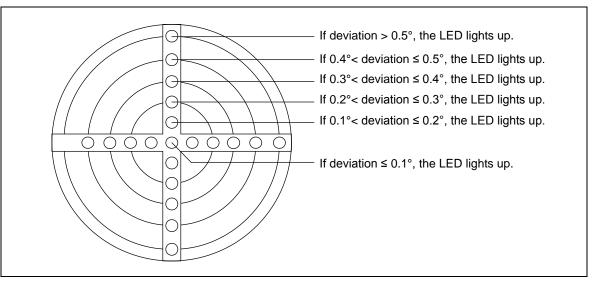


Figure 4-41 Electronic inclinometer

4.4.2 Load moment limiter

The load moment limiter is a vital safety device for controlling and monitoring the movements of the crane.

The "Advance warning" icon appears and the buzzer sends out slow acoustic warning if the current load exceeds the (90%) limit programmed in for advance warning.

The "Stop" icon appears, the buzzer sends out fast acoustic warning and all dangerous crane movements are switched off if the current load exceeds the 100% mark.

The crane can only work towards safe directions till the dangerous operation is deactivated.

4.4.3 Hoisting limit switch

The hoisting limit switches installed on the main boom, jib or rooster sheave are intended to prevent the hook block from colliding with the rope pulley. When the distance detected between the hook block and the pulley is less than the safety one, the hoisting limit switch is triggered and the buzzer sounds the alarm. The crane movements "Spool up winches", "Derrick down" and "Telescope out" are switched off. At this time, only the crane movements "Reel off winches", "Derrick up" and "Telescope in" can be switched on. Refer to Figure 4-42.

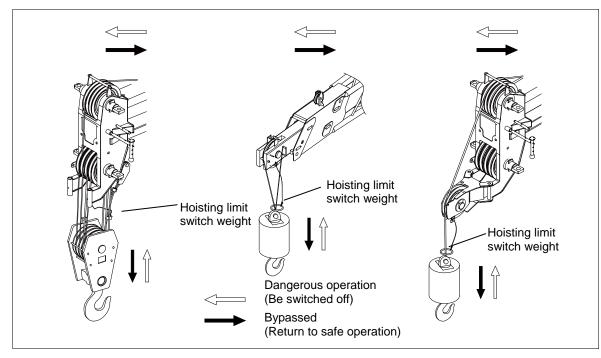


Figure 4-42 Hoisting limit switch

Turn the bypass key switch on the instrument panel to the right position to bypass the switch-off during commissioning and maintenance.

WARNING

Do not use the bypass key switch when you do usual crane operations.

How to connect and install the hoisting limit switches for the auxiliary winch and rooster sheave:

a) When the jib is used:

ZOOMLION

- 1) Remove the aviation socket on the position "5 T II " of the junction box.
- 2) Install aviation socket which is connected to the hoisting limit switch for the auxiliary winch into the junction box.
- 3) Connect the plug on the jib to the socket on the main boom head.
- Refer to Figure 4-43.

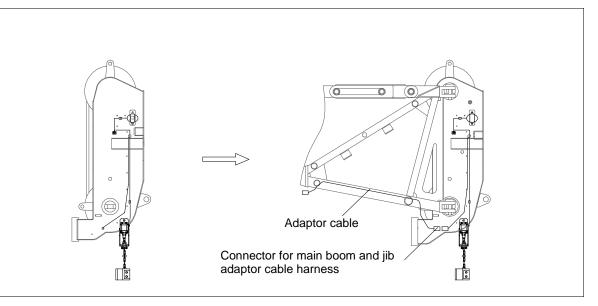
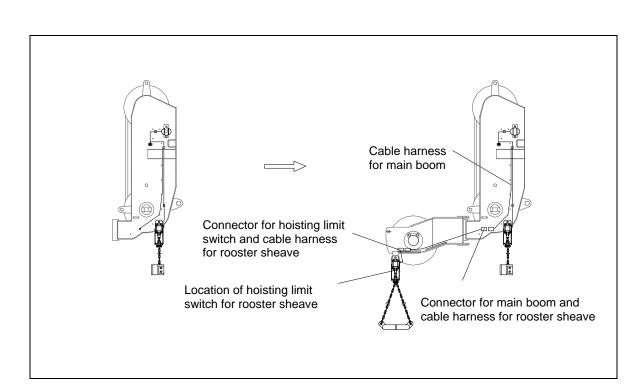


Figure 4-43 Connection and installation of hoisting limit switch for the auxiliary winch

- b) When the rooster sheave is used:
 - 1) Remove the hoisting limit switch for the auxiliary winch.
 - 2) Install the hoisting limit switch onto the position shown in Figure 4-45.
 - 3) Connect the plug on the hoisting limit switch to the socket on the rooster sheave.
 - 4) Remove the aviation socket on the position "5 T II " of junction box.
 - 5) Connect the aviation socket on the hoisting limit switch for the auxiliary winch into the junction box.
 - 6) Connect the plug on the rooster sheave to the socket on the main boom head. Refer to Figure 4-44.





4.4.4 Lowering limit switch

In order to prevent the wire rope from being spooled up automatically after being reeled off completely, the lowering limit switch installed beside the winch will automatically switch off the movements "Reel winches off" if there are only 3 wraps of wire rope remaining on the winch. In this case, the buzzer sounds the alarm, the warning light illuminates and only the upward movement of the hook is permitted. During commissioning and maintenance, activate the bypass key switch to bypass the switch-off. Refer to Figure 4-45.



Do not use the bypass key switch when you do usual crane operations.

ZOOMLION



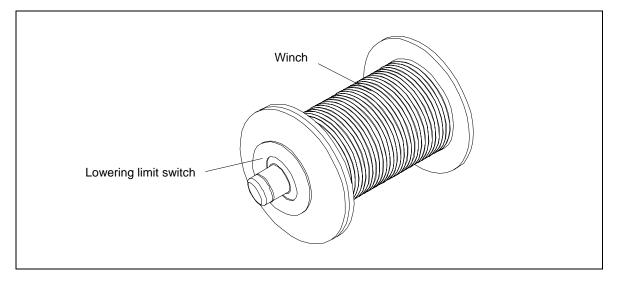


Figure 4-45 Lowering limit switch

4.4.5 Hydraulic safety devices

a) Relief valves in the hydraulic system

The relief values in hydraulic system can prevent the pressure in the circuit from rising too high, thus avoid hydraulic pump and hydraulic motor from being damaged and hydraulic system from being overloaded.

b) Outrigger lockout device

If the high-pressure oil pipe which is connected to vertical cylinder is damaged, the two-way hydraulic lock in the outrigger hydraulic circuit can block the pressure oil in both sides of outrigger cylinder to prevent the outrigger from retracting or extending, and thus ensure the safe operation of the crane.

c) Lockout device for crane movement "Derrick up"

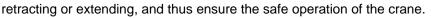
If the high-pressure oil pipe in the hydraulic circuit of derricking cylinder is damaged, the balance valve in the hydraulic circuit can lock the hydraulic oil in the piston side of derricking cylinder immediately to prevent the boom from derricking down, and thus ensure the safe operation of the crane.

d) Lockout device for crane movement "Telescope out"

If the high-pressure oil pipe in the hydraulic circuit of telescoping cylinder is damaged, the balance valve in the hydraulic circuit can lock the hydraulic oil in the piston side of telescoping cylinder immediately to prevent the telescopic sections from retracting naturally, and thus ensure the safe operation of the crane.

e) Safety device for counterweight

If the high-pressure oil pipe which is connected to counterweight lifting cylinder is damaged, the two-way hydraulic lock in the counterweight hydraulic circuit can block the pressure oil in both sides of counterweight lifting cylinder to prevent the cylinder from



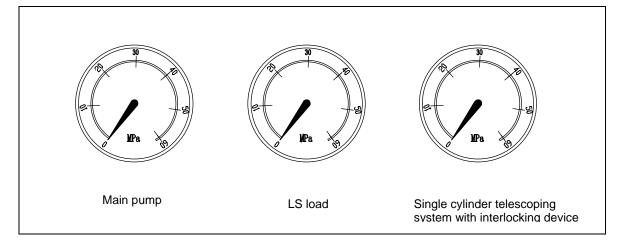
f) System pressure monitoring

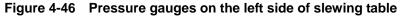
There are 3 pressure gauges on both side of the hood of the slewing table. For pressure gauges on the left side of the slewing table, please refer to Figure 4-46. For pressure gauges on the right side of the slewing table, please refer to Figure 4-47. The pressure gauges show and monitor the pressure of the hydraulic system of the superstructure under different OMs.

ZOOMLION

Note:

The load moment limiter in the operator's cab also shows the pressure in real time. Refer to Figure 4-20.





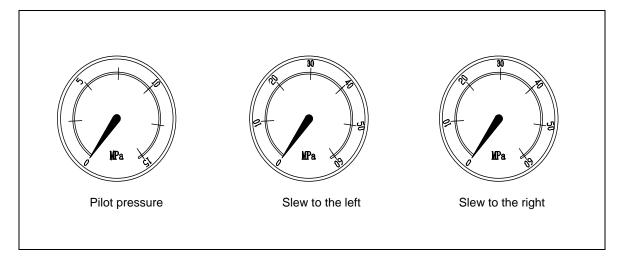


Figure 4-47 Pressure gauges on the right side of slewing table

Pressure ranges are as follows:

Pressure of spooling up oil circuit in main / auxiliary winch: ≤ 35 Mpa Pressure of reeling off oil circuit in main / auxiliary winch: 4 MPa – 6 MPa Pressure of derricking up oil circuit: ≤ 35 Mpa

ZOOMLION

Pressure of derricking down oil circuit: 4 MPa Pressure of telescoping out oil circuit: \leq 15 Mpa Pessure of telescoping in oil circuit: \leq 25 MPa Pressure of slewing oil circuit: \leq 35 MPa Pressure of control oil circuit: (3.5 ± 0.5) MPa.

4.4.6 Bypass operation

When the hoisting limit switch or lowering limit switch is triggered, or when the crane sensor senses that the load weight is more than the load weight in the system, the system will switch off the dangerous movements and the buzzer sounds.

If necessary, bypass this switch-off via the bypass key switch on the instrument panel. For details, please refer to Section 4.1.2. For movements allowed or blocked under overloading, overwinding and overlowering conditions, refer to Table 4-9.

Table 4-9 Movements allowed or blocked under overloading, overwinding and overlowering conditions

Operation	Main winch		Auxiliary winch		Derrick		Slew		Telescope	
	up	down	up	down	up	down	left	right	out	in
Overloading	×	\checkmark	×	\checkmark	\checkmark	×	\checkmark	\checkmark	\checkmark	\checkmark
Overwinding	×	\checkmark	×	\checkmark	\checkmark	×	\checkmark	\checkmark	×	\checkmark
Overlowering	\checkmark	×	\checkmark	×	\checkmark	×	\checkmark	\checkmark	\checkmark	\checkmark

Note:

"×" means that the system will switch off the movement. " $\sqrt{}$ " means that the system will not switch off the movement.

If there is a need to lift or lower the hook a little under special conditions, the operator can activate the "Bypass key switch" on the instrument panel to bypass the switch-off movements. Such operation should be performed with utmost caution to avoid accident. Do not telescope the telescopic boom with a suspended load. The boom angle must exceed 80°. Otherwise, you must bear full responsibility for all the consequences arising therefrom.

4.4.7 Wind speed warning system

The anemometer is fitted on the main boom head to detect the wind speed in real time. Refer to Figure 4-48. The wind speed is displayed on the monitor of load moment limiter. If the actual wind speed exceeds the maximum value, while the crane is in operation, do the tasks that follow:

ZOOMLION

- a) Stop the work (safely lower the load).
- b) Retract the boom.
- c) Correctly stow the boom.

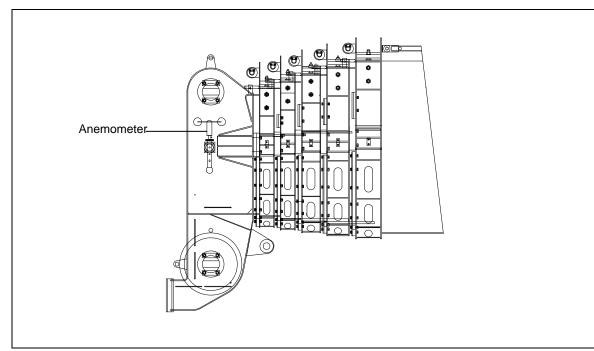


Figure 4-48 Anemometer



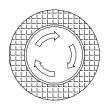
The crane can topple over!

If the crane is operated at wind speeds which are larger than the maximum permissible value, then it can topple over!



4.4.8 Emergency stop button

You can find the emergency stop button on the instrument panel in the operator's cab. When you push the button, all crane operations immediately STOP (including the engine). Turn the button clockwise to release it and continue usual crane operations.



WARNING

Only use the button in a clear emergency!

4.5 Crane operation

4.5.1 Preparations for crane operation

Make sure that following checks are operated before operation:

- a) Assess the load condition prior to lifting it.
- b) Examine the crane position, ground condition and surface bearing condition.
- c) Examine wire ropes (including wire rope end, winding drum and pulleys).
- d) Examine the liquid level and power source of the crane.

Note:

(1) Examine the fuel gauge to make sure the fuel reserve is more than 1/4 of the tank capacity.

ZOOMLION

- (2) The oil level in hydraulic oil tank should be between MIN. and MAX. marks in driving condition.
- e) The loading and working area should be visible and without obstacles within it. Examine the communication system of operator and supervisor to make sure that nothing will hinder the operation.
- f) Examine safety devices for function.
- g) Remain the communication between the operator and the rigger.

WARNING

Risk of accident! Danger of damaging the crane! Always operate the joysticks slowly and sensitively.

Make sure that there are no obstacles in the crane working area and no persons in danger zone. Give a short warning signal (horn) before starting a crane movement.

4.5.2 Derricking

ZOOMLION

To move the boom up or down (derricking), hydraulic oil is "pumped in" or "vented out" of one "derricking cylinder".

The boom angle (derricking) can be adjusted from -1.5° to 82°, by the "derricking cylinder".

Turn the switch "Pre-selection of derrick / telescope" to the left position. Refer to Figure 4-49. Operate the right joystick to derrick the boom up / down.

The boom length and derricking speed have an inverse relationship. Therefore, the longer the boom length is, the slower the derricking speed is. And the shorter the boom length is, the higher the derricking speed is.

Speed of crane movement "Derricking" has 3 stages, normal speed, low speed and extremely low speed.

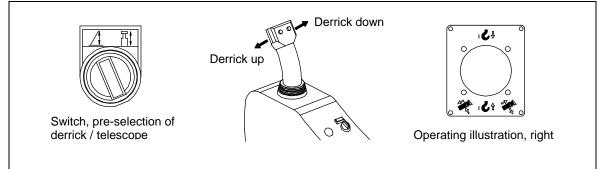


Figure 4-49 Derricking

The "derricking cylinder" has a "balance valve". The "balance valve", in the hydraulic system, helps the derricking components move smoothly. When the boom is set at the correct position, the valve stops the hydraulic oil flow out of the "derricking cylinder". This helps to lock the boom in position.

- (1) Do all derricking movements smoothly. You can cause damage to the crane if you move the load up or down with quick stops.
- (2) You can cause a dangerous condition if you try to lift a load with the boom at a low angle. Make sure that you obey the lifting capacity tables.
- (3) Lower the hook fully before you derrick up the boom.
- (4) For the sake of safety, do not derrick down the boom at high speed.



4.5.3 Telescoping

The boom consists of 7 oval boom sections made from low-alloy and high-tensile steel. The telescopic boom is telescoped in / out automatically via a telescoping cylinder. For manual operation, you can operate the right joystick to telescope the boom in / out. Every telescopic section can be varied in 4 lengths: 0% of its total, 46% of its total, 92% of its total and 100% of its total. The telescoping cylinder cannot bear any load.

Before telescoping, turn the switch "Pre-selection of derrick / telescope" to the right position. Refer to Figure 4-50.

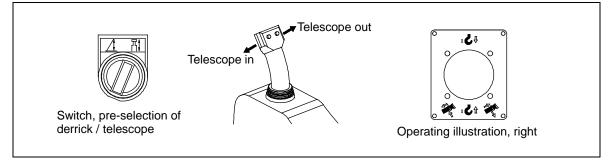


Figure 4-50 Telescoping

For the details of telescoping operation, refer to Section 4.2.2.

The "balance valve", in the hydraulic system, helps the telescoping components move smoothly. When the boom is set the correct length, the valve causes a blockage of the hydraulic oil flow out of the cylinder. This helps to lock the boom in position.

- (1) When auto telescoping mode is performed, the boom angle should exceed 80°.
- (2) The hook will be lifted or lowered with the crane movements "Telescope telescopic boom in or out". Therefore, operate the joystick to adjust the height of hook during telescoping.
- (3) Carry out telescoping movements with maximum care and minimum speed. Do not telescope the telescopic boom with a suspended load.
- (4) Do not telescope the boom out immediately after the boom is telescoped in. Initiate telescoping movement after 2 seconds.
- (5) Do not pull a load at an angle to avoid lateral force on the boom.

Before you carry out telescoping movement, examine whether the block at the head of telescopic sections is in contact with its adjacent telescopic sections tail completely. If not, adjust the shim to make them contact completely and make sure that the boom pin and cylinder pin bear no load under the condition of "Boom telescoped in completely".

4.5.4 Lifting / lowering

ZOOMLION

The hoist gear consists of hydraulic motor, balance valve, reducer, brake, lowering limit switch, hoisting limit switch, wire rope, main hook, auxiliary hook and so on.

The hoist gear consists of two parts: main winch and auxiliary winch. You should remove the auxiliary winch from the slewing table before driving. The main / auxiliary winch is controlled by the right or left joystick in the operator's cab. Refer to Figure 4-51 and Figure 4-52.

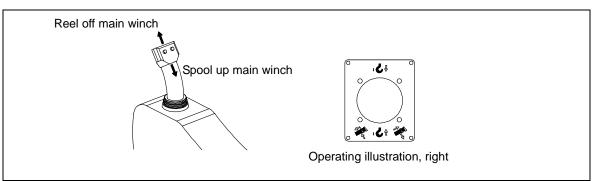


Figure 4-51 Spooling up / reeling off main winch

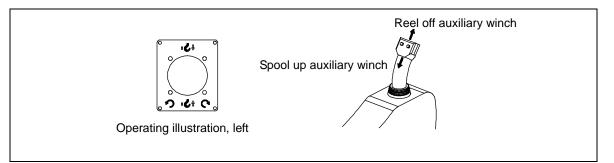


Figure 4-52 Spooling up / reeling off auxiliary winch

The crane movement "Spool up main winch" or "Reef off main winch" has 4 stages: high speed, normal speed, low speed and extremely low speed.

The crane movement "Spool up auxiliary winch" or "Reef off auxiliary winch" has 3 stages: normal speed, low speed and extremely low speed.

For detailed operation, please refer to Section 4.1.2.

Main winch:

High speed

- Set the switch "Pre-selection of normal speed / low speed / extremely low speed" to the left position.
- Press the button "Rapid gear for main winch" on the right joystick.
- Deflect the right joystick forward or backward.

Result:

Rapid gear is applied to crane movements "Spool up main winch" and "Reef off main winch".

The balance valve in the hoist gear makes sure that the movement of the hoist is stable. It also makes the load stop at the necessary location.

ZOOMLION

When you increase the boom length and height, you must increase the length of the hoist rope. You can change the reevings to get a longer rope. You must install the hoisting limit switch weight before you change the parts. For standard reeving numbers for various boom lengths, please refer to the lifting capacity tables.

- (1) Choose the correct reevings for the boom length and load weights.
- (2) Keep a minimum of 3 wraps of rope on the winch while you operate the crane.
- (3) Monitor the area as you lift a load. Do not move a load unless the conditions are safe.
- (4) Do not derrick the boom up and extend the boom at the same time if:
 - The crane has a part of the load weight.
 - The crane is connected to a load on the ground.
- (5) Do not change quickly between "reel off" and "spool up". Let the winch stop before you continue to move the hook. Otherwise, the machine will be damaged.
- (6) The slings must be of enough strength.
- (7) The lifting capacity includes the mass of the hook and slings.

4.5.5 Slewing

The slewing system consists of slewing bearing and slewing gear which includes hydraulic motor, planetary gear reducer, slewing brake valve, brake, drive gear and so on.

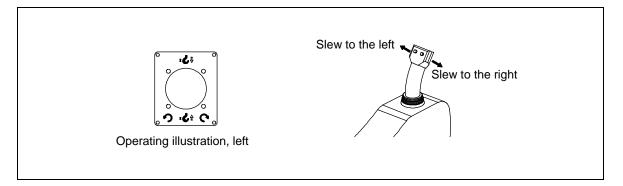
a) Slewing speed

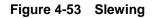
The speed of the crane movements "Slewing", varying within 0 r/min. – 1.5 r/min., is controlled by the deflection of the left joystick. The slewing speed has 3 stage, normal speed, low speed and extreme low speed, which can be activated by the switch "Pre-selection of normal speed / low speed / extremely low speed". The low speed offers good micro-positioning performance.

b) Slewing operation

Slewing movements can be activated by the deflection of the left joystick fitted in the operator's cab. Refer to Figure 4-53.







- (1) Make sure that the slewing table is unpinned before initiating the slewing movement. Install the pin after finishing this operation.
- (2) Make sure that there are no obstacles in the crane slewing area and no persons in the danger zone. Give a short warning signal (horn) before starting a crane movement.
- (3) Make sure that you do not make fast movements or suddenly stop the slewing movement.
- (4) Longer boom lower slewing speed.
- (5) Heavier load lower slewing speed.
- (6) When you operate a new crane, examine the slewing bearing bolts after the initial 100 working hours. After that, examine the bolts at these intervals: 100, 300 and 500 hours of operation.
 - The torque on the bolts must be 1500 N·m.
- (7) Turn the switch "Pre-selection of counterweight remote control box / remote controller" to the neutral position. Otherwise, buttons and switches on the instrument panel are inactivated and the left joystick cannot initiate slewing movements. The slewing movement is still controlled by the remote controller.

4.5.6 Simultaneous crane movements

The crane can do two operations at the same time. This increases the quantity of work that the crane can do and greatly improves the work efficiency. However, because the simultaneous crane movements are toward two different directions, the operator should take maximum care to avoid accident.

ZOOMLION

Before you start, make sure that you examine or do the items that follow:

- The hydraulic system works correctly and gives a sufficient flow for simultaneous crane movements.
- Make sure that you increase the engine RPMs (Engage the PTO).
- Do not move the joysticks to their limit positions. Easy, smooth movements are necessary when you do an operation for simultaneous crane movements.

There are 9 simultaneous crane movements available:

a) Auxiliary winch + Main winch

To move the auxiliary winch and the main winch at the same time, move (push and/or pull) the left and right joysticks. The auxiliary hook and main hook move up and/or down. Refer to Figure 4-54.

- 1) The more the joysticks are deflected upward or downward, the faster the relevant movements will be.
- Press and hold button "Rapid gear for main winch" with the "Pre-selection of normal speed / low speed / extremely low speed" to the left position to achieve rapid movements of main winch.
- Set the switch "Pre-selection of normal speed / low speed / extremely low speed" to the neutral or right position to make relevant movements get slower.

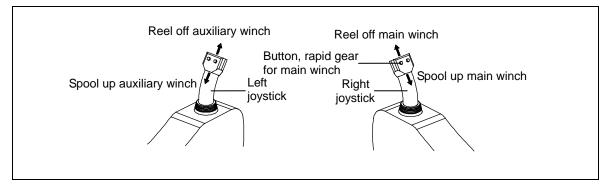


Figure 4-54 Auxiliary winch + Main winch

b) Auxiliary winch + Derrick

ZOOMLION

You can move the auxiliary hook up or down and derrick the boom up or down at the same time. To do this, push or pull the left joystick and move the right joystick left or right. Refer to Figure 4-55.

- 1) Set the switch "Pre-selection of derrick / telescope" (on the left control box) to the left position.
- 2) The more the left joystick is deflected upward or downward and right joystick is deflected leftward or rightward, the faster the relevant movements will be.
- 3) Set the switch "Pre-selection of normal speed / low speed / extremely low speed" to the neutral or right position to make relevant movements get slower.

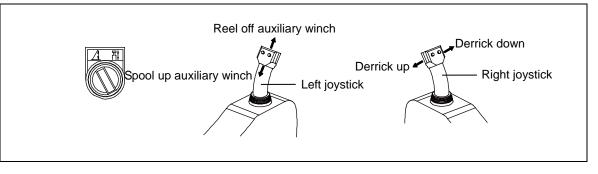


Figure 4-55 Auxiliary winch + Derrick

c) Auxiliary winch + Telescope

You can move the auxiliary hook up or down and telescope the boom out / in at the same time. To do this, push or pull the left joystick and move the right joystick left or right. Refer to Figure 4-56.

- 1) Set the switch "Pre-selection of derrick / telescope" (on the left control box) to the right position.
- 2) The more the left joystick is deflected upward or downward and right joystick is deflected leftward or rightward, the faster the relevant movements will be.
- Set the switch "Pre-selection of normal speed / low speed / extremely low speed" to the neutral or right position to make relevant movements get slower.
 Note:

When you select the automatic telescoping mode, the right joystick and the switch "Pre-selection of normal speed / low speed / extremely low speed" are invalid.



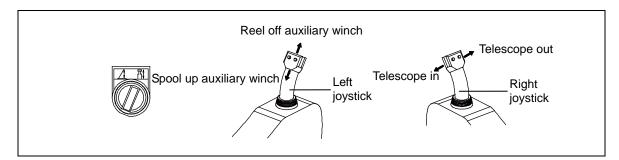


Figure 4-56 Auxiliary winch + Telescope



It is strongly recommended to select the automatic telescoping mode for telescoping operation.

d) Slew + Main winch

You can slew to the left or right and move the main hook up or down at the same time. To do this, move the left joystick left or right and push or pull the right joystick. Refer to Figure 4-57.

- 1) The more the left joystick is deflected leftward or rightward and right joystick is deflected upward or downward, the faster the relevant movements will be.
- Press and hold button "Rapid gear for main winch" with the "Pre-selection of normal speed / low speed / extremely low speed" to the left position to achieve rapid movements of main winch.
- Set the switch "Pre-selection of normal speed / low speed / extremely low speed" to the neutral or right position to make relevant movements get slower.

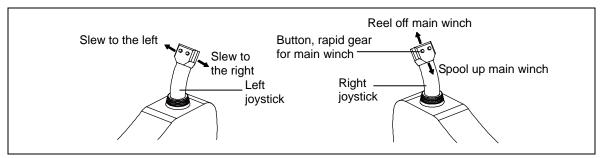


Figure 4-57 Slew + Main winch

e) Slew + Telescope

ZOOMLION

You can slew to the left or right and telescope the boom out / in at the same time. To do this, move the left and right joysticks to the left or right. Refer to Figure 4-58.

- 1) Set the switch "Pre-selection of derrick / telescope" (on the left control box) to the right position.
- 2) The more the left / right joystick is deflected leftward or rightward, the faster the relevant movements will be.
- Set the switch "Pre-selection of normal speed / low speed / extremely low speed" to the neutral or right position to make relevant movements get slower.

Note:

When you select the automatic telescoping mode, the right joystick and the switch "Pre-selection of normal speed / low speed / extremely low speed" are invalid.

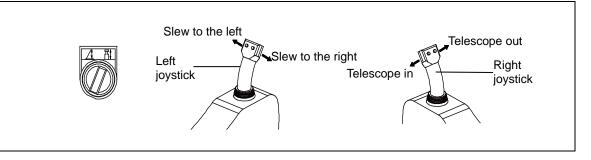


Figure 4-58 Slew + Telescope

It is strongly recommended to select the automatic telescoping mode for telescoping operation.

f) Slew + Derrick

You can slew to the left or right and derrick the boom up / down at the same time. To do this, move the left and right joystick to the left or right. Refer to Figure 4-59.

- 1) Set the switch "Pre-selection of derrick / telescope" (on the left control box) to the left position.
- 2) The more the left / right joystick is deflected leftward or rightward, the faster the relevant movements will be.
- Set the switch "Pre-selection of normal speed / low speed / extremely low speed" to the neutral or right position to make relevant movements get slower.



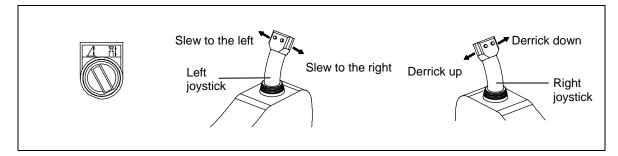


Figure 4-59 Slew + Derrick

g) Slew + Auxiliary winch

You can slew to the left or right and move the auxiliary hook up or down at the same time. For this type of move, it is necessary for the operator to move the left joystick two adjacent directions. For example, to move slewing table right and move the auxiliary hook down, push the left joystick up and to the right (1:30 clock position). Refer to Figure 4-60.

The other movements on the left joystick are as follows: (Refer to Figure 4-60.)

- 1) Push up and to the left (10:30 clock position) the slewing table moves left and the auxiliary hook moves down.
- 2) Pull aft and to the right (4:30 clock position) the slewing table moves right and the auxiliary hook moves up.
- Pull aft and to the left (7:30 clock position) the slewing table moves left and the auxiliary hook moves up.
- 4) The more the joystick is deflected leftward or rightward, the faster the slewing movements become and the slower the winch movements.
- 5) The more the joystick is deflected upward or downward, the faster the winch movements become and the slower the slewing movements.
- 6) Set the switch "Pre-selection of normal speed / low speed / extremely low speed" to the neutral or right position make relevant movements get slower.

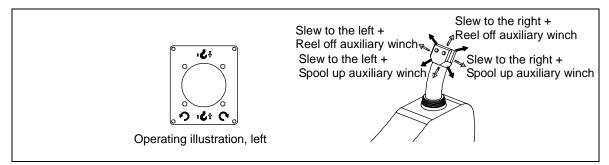


Figure 4-60 Slew + Auxiliary winch

ZOOMLION

h) Main winch + Derrick

You can derrick the boom up / down and move the main hook up or down at the same time. For this type of move, it is necessary for the operator to move the right joystick two adjacent directions. For example, to move the boom down and main hook down, push the right joystick up and to the right (1:30 clock position). Refer to Figure 4-61. The other movements on the right joystick are as follows:

Push up and to the left (10:30 clock position) – the boom moves up and the main hook moves down.

Pull aft and to the right (4:30 clock position) – the boom moves down and the main hook moves up.

Pull aft and to the left (7:30 clock position) – the boom moves up and the main hook moves up.

- 1) Set the switch "Pre-selection of derrick / telescope" to the left position.
- Press and hold button "Rapid gear for main winch" with the "Pre-selection of normal speed / low speed / extremely low speed" to the left position to achieve rapid movements of main winch.
- 3) The more the joystick is deflected leftward or rightward, the faster the derricking movements become and the slower the winch movements.
- 4) The more the joystick is deflected upward or downward, the faster the winch movements become and the slower the derricking movements.
- 5) Set the switch "Pre-selection of normal speed / low speed / extremely low speed" to the neutral or right position to make relevant movements get slower.

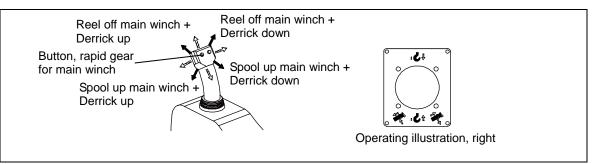


Figure 4-61 Main winch + Derrick

ZOOMLION

i) Main winch + Telescope

You can telescope the main boom in / out and move the main hook up or down at the same time. For this type of move, it is necessary for the operator to move the right joystick two adjacent directions. For example, to move main hook down and telescope out, push the right joystick up and to the right (1:30 clock position). Refer to Figure 4-62. The other movements on the right joystick are as follows:

Push up and to the left (10:30 clock position) – the boom telescopes in and the main hook moves down.

Pull aft and to the right (4:30 clock position) – the boom telescopes out and the main hook moves up.

Pull aft and to the left (7:30 clock position) – the telescopes in and the main hook moves up.

- 1) Set the switch "Pre-selection of derrick / telescope" to the right position.
- Press and hold button "Rapid gear for main winch" with the "Pre-selection of normal speed / low speed / extremely low speed" to the left position to achieve rapid movements of main winch.
- 3) The more the joystick is deflected leftward or rightward, the faster the telescoping movements become and the slower the winch movements.
- 4) The more the joystick is deflected upward or downward, the faster the winch movements become and the slower the telescoping movements.
- 5) Set the switch "Pre-selection of normal speed / low speed / extremely low speed" to the neutral or right position to make relevant movements get slower.

Note:

When you select the automatic telescoping mode, the right joystick and the switch "Pre-selection of normal speed / low speed / extremely low speed" are invalid.

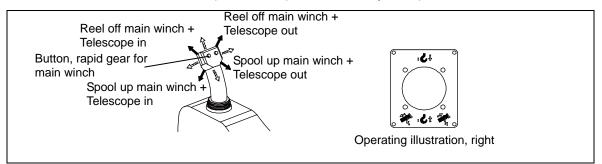


Figure 4-62 Main winch + Telescope

WARNING

Carry out simultaneous crane movements without taking a load or with a suspended load. Do not telescope the boom with a suspended load.

4.5.7 Rope reeving

Before you start to change the wire rope reevings:

- Support the crane on outriggers.

ZOOMLION

- Fully retract the boom and move it to the side or rear of the crane.

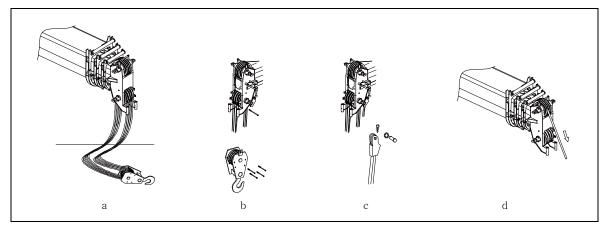


Figure 4-63 Rope reeving

Change the wire rope reevings as follows (Refer to Figure 4-63):

- a) Derrick boom down and put the hook (a) on the ground.
- b) Remove the pins (b) on the hook block and boom head to let the wire rope unreeve.
- c) Remove the hoisting limit switch weight (c).
- d) Remove the wedge and socket assembly (beckett).
- e) Dead end the rope on the hook block for an odd reeving number, and on the boom head for an even reeving number.
- f) Change rope reevings (d).

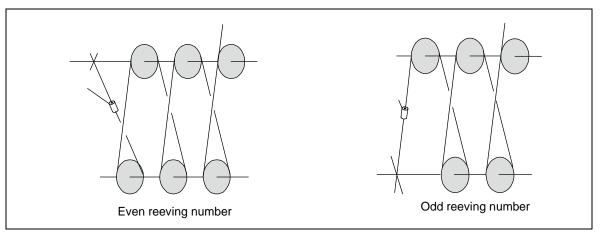


Figure 4-64 Location of hoisting limit switch weight



Note:

- (1) You must change the location of the hoisting limit switch weight if you have a different number of wire rope reevings. Refer to Figure 4-64.
- (2) Put the wire rope on the winch spool smoothly and in sequence.

Make sure that you do all of the work on level ground that is hard. The ground must hold more than the load bearing capacity.

4.5.8 Central lubricating system

ZOOMLION

The crane superstructure is equipped with central lubricating system. After you switch on the power switch of central lubricating system or ignition starter switch, the electric greasing pumps begin to lubricate the lubricating points at specified intervals.

A lubrication cycle consists of pump running interval and their running time. Once the pump running interval reaches the set value, the pump will start running and time its running. And when its running time reaches the set value, the pump will stop lubricating and time the interval. The lubricating cycle will repeat as long as the system works.

For the structure of the central lubricating system and the overall view of its controller, refer to Figure 4-65 and Figure 4-66.

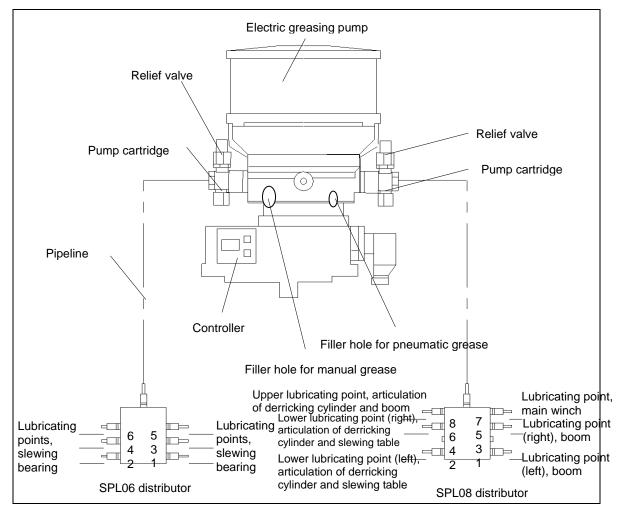


Figure 4-65 Central lubricating system





You can program using the select key and enter / override key in Figure 4-66.

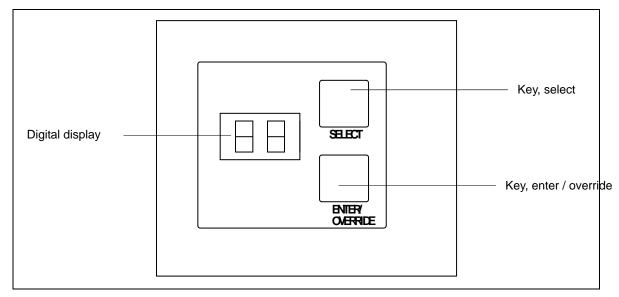
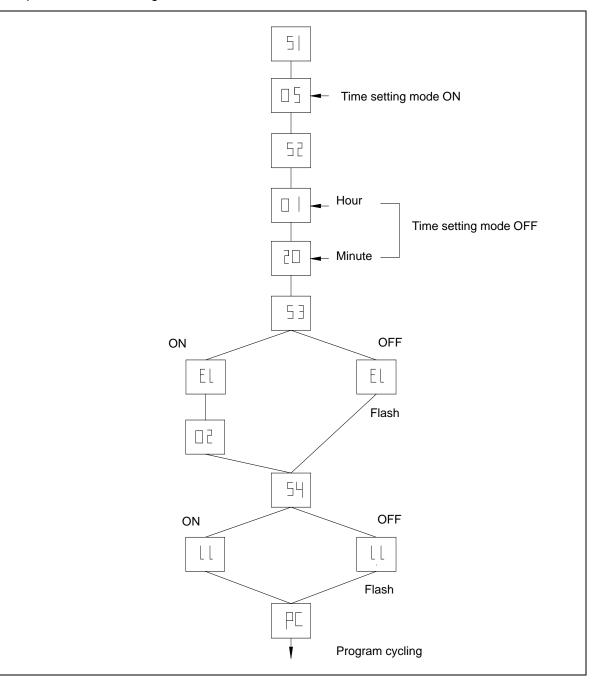


Figure 4-66 Overall view of the controller



The detailed setting information will be shown on the digital display. For the detailed setting procedure, refer to Figure 4-67.







a) Pump running time

When the time setting mode (t) is ON, you can set the pump running time. Setting range: 1 minute – 99 minutes

- b) Pump running interval
 Setting range: 1 minute 99 hours and 59 minutes
- c) Time setting mode ON / OFF

Press and hold the select key and the enter / override key at the same time for 5 seconds to enter the programming mode.

- 1) "S1" (pump running time) is shown on the display. Set S1:
 - Press the enter / override key.
 - Press the select key.
 - Set the pump running time. you can choose a number from 01 to 99 (for example, 05, which refers to 5 minutes).
 - Press the enter / override key to confirm.
- 2) "S2" (pump running interval) is shown on the display. Set S2:
 - Press the enter / override key.
 - Set the pump running interval.

For example, if you want to set 1 hour and 20 minutes as the interval:

- Press the select key.
- Select "01".
- Press the enter / override key.
- Press the select key.
- Select "20".
- Press the enter / override key to confirm.
- 3) "S3" (terminal switch setting) is shown on the display. Set S3:
 - Press the enter / override key. "EL" appears on the display.
 - Press the select key to select a) or b).

Note:

a): The terminal sensor is OFF when "EL" flashes.

- b): The terminal sensor is ON when "EL" always illuminates.
- Press the enter / override key to confirm.
- Set the lubrication recycling times. If the terminal switch is ON, "01" appears on the display. Select a number between 01 and 10.
- Press the enter / override key to confirm.

ZOOMLION

- 4) "S4" (grease level low setting) is shown on the display. Set S4:
 - Press the enter / override key. "LL" appears on the display.
 - Press the select key to select a) or b).
 - Note:
 - a): The grease level low sensor is OFF when "LL" flashes.
 - b): The grease level low sensor is ON when "LL" always illuminates.
 - Press the enter / override key to confirm.
- 5) "PC" appears on the display (which indicates the programming is finished). The pump will return to the running mode after 10 seconds.
- d) Look up the current program settings:

Press and hold the select key for 10 seconds to activate the program look up mode. The settings of every step will display for 3 seconds. After "PC" displays for 3 seconds, the pump returns to running mode.

- e) Activate the override function:
 - 1) When the electric grease pump is OFF, press and hold the enter / override key for 5 seconds to activate the pump to run a cycle automatically.
 - You can also press the button "Central lubricating system" on the instrument panel to activate the central lubricating system. The central lubricating system begins to lubricate every lubricating point automatically.

The correct cycle setting for the central lubricating system:

- Pump running time: 5 minutes
- Pump running interval: 4 hours.

That is to say, after being energized for 4 hours, the electric greasing pump runs for 5 minutes automatically. The correct settings are as follows:

- (1) S1: 05 minutes
- (2) S2: 04 hours 00 minutes
- (3) S3: OFF
- (4) S4: OFF
- (5) If the lubrication is inadequate, you need to activate the override function.



Truck Crane Operator'S Manual

Chapter 5 Equipment





Chapter 5 Equipment

5.1 Safety technical guidelines for assembly

- a) Reeve the hoist rope between the rope pulley on the boom head and hook pulley in accordance with the corresponding reevings specified in lifting capacity tables.
- b) Assemble the counterweight plates according to lifting capacity tables.
- c) If the jib is not in contact with ground during assembly and dismantling, put appropriate and stable materials below the jib.

🔔 DANGER

- (1) Do the assembly work with suitable aids (scaffolding or lifting platforms, etc.)! If this is not observed, personnel could fall and suffer life-threatening injuries.
- (2) Do not stand beneath the boom especially when the jib is being pinned or unpinned.
- d) If the lattice components are pushed inside each other for transportation purposes, they each must be secured with two chains.
- e) Perform the safety measure checks before supporting the crane.
- f) Before setting-up and taking-down the jib, make sure that the following prerequisites are met:
 - 1) The crane is properly supported and level.
 - 2) The telescopic boom is fully retracted.
 - 3) The jib has been fitted in accordance with lifting capacity tables.
 - 4) All pinned connections have been secured.
 - 5) All limit switches have been correctly fitted and are fully operational.
 - 6) The hoist rope has been correctly reeved through the rope pulleys with the rope securing tubes to prevent it from jumping out.
 - 7) There are no loose parts on the boom and jib.

- (1) In winter, the boom, jib and associated components (limit switches, cable drums, corner marker light, anemometer etc.) must be kept free of snow and ice.
- (2) Incorrectly fitted or faulty limit switches and falling parts (pins, spring-loaded safety pins, ice etc.) can cause injury!



5.2 Jib

5.2.1 General

The jib is one of the important components of truck crane. It is auxiliary equipment used to increase the crane lifting height. With the jib assembled, the load can be lifted to a higher height and the working radius can be enlarged via offset changed.

This crane is equipped with two lattice jib sections and one jib extension (optional) (Refer to Figure 5-1). They connect to boom by pins.



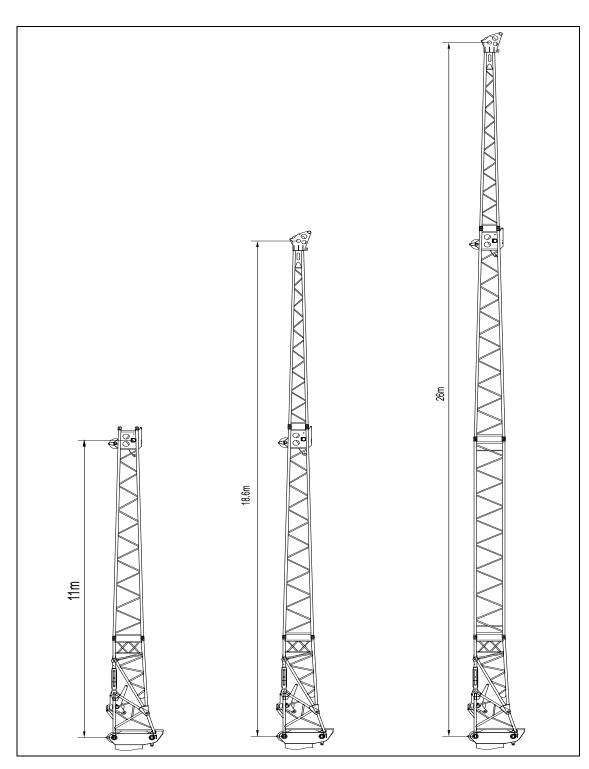


Figure 5-1 Jib variants



You cannot use the jib when you lift a load if the outriggers are not in the correct position.

ZOOMLION

5.2.2 Assembly

You can assemble the jib at an angle of 0° or 30° to the telescopic boom according to work requirements.

Assemble the jib (Take 0° offset for example.). Refer to Figure 5-2 to Figure 5-6.

- a) Extend the outriggers and make the crane level with the support control unit.
- b) Retract the boom fully.

ZOOMLION

- c) Move the boom to the side or rear of the crane and position it to the minimum angle.
- d) Make sure there is 50 m slewing range to the slewing center.
- e) Connection of adapter I and adapter II:
 - 1) Align the end of the adapter I with the connection points on the end of the adapter II.
 - 2) Install the pins and the retaining clips.
 - Refer to Figure 5-2.

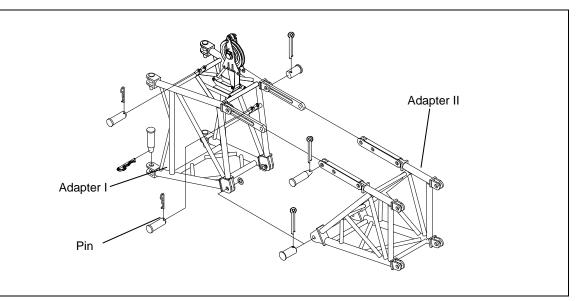


Figure 5-2 Connection of adapter I and adapter II

- f) Connection of jib variant 1 (11 m):
 - Align the end of the adapter II with the connection points on the end of the jib section
 1.
 - 2) Install the pins and the retaining clips.

Refer to Figure 5-3.



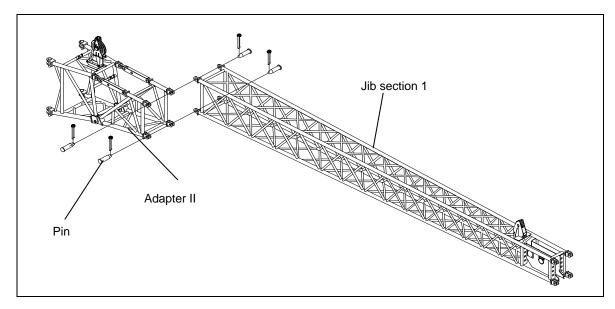


Figure 5-3 Connection of jib variant 1 (11 m)

- g) Connection of main boom and jib variant 1 (11 m):
 - 1) Lift the assembled jib variant 1 (jib section 1 and adapters) with an auxiliary crane.
 - 2) Align the end of the adapter I with connection points on the head of the main boom.
 - 3) Install the pins and the retaining clips.



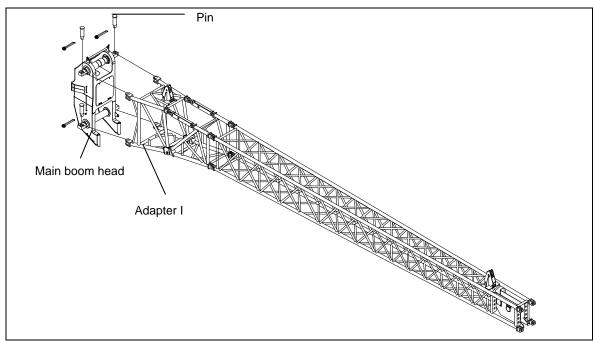


Figure 5-4 Connection of main boom and jib variant 1 (11 m)

- h) Connection of jib variant 2 (18.6 m):
 - 1) Lift the jib section 2 with an auxiliary crane.
 - Align the end of jib section 2 with the connection points on the head of the jib section
 1.
 - 3) Install the pins and the retaining clips.

Refer to Figure 5-5.

ZOOMLION

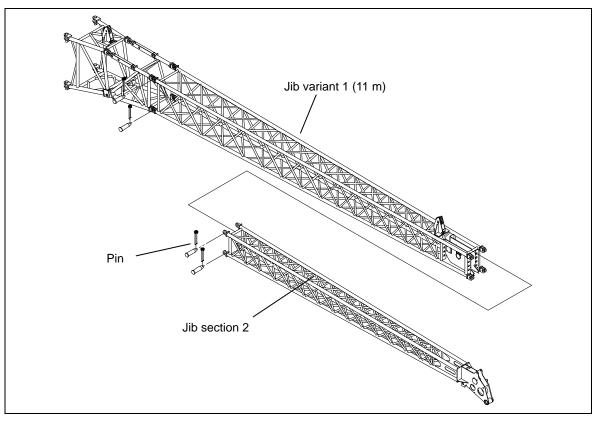


Figure 5-5 Connection of jib variant 2 (18.6 m)

- i) Connection of jib variant 3 (26.6 m):
 - Align the end of the adapter II with the connection points on the end of the extension. Install the pins and the retaining clips.
 - Align the other end of the extension with the connection points on the end of the jib section 1.Install the pins and the retaining clips.
 - 3) Align the end of jib section 2 with the connection points on the head of the jib section1. Install the pins and the retaining clips.

Refer to Figure 5-6.

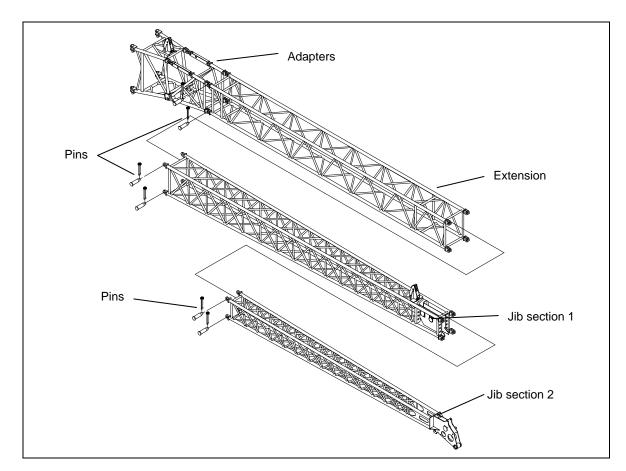


Figure 5-6 Connection of jib variant 3 (26.6 m)

 J) Install the counterweight plates, auxiliary winch, auxiliary hook and hoisting limit switch. Examine them for proper assembly.



Danger of fatal injuries due to falling components! Do not stand under the boom or jib during assembly. The jib or other components can fall down due to assembly error.

ZOOMLION



5.2.3 Angle settings

The jib can be operated in angles of 0° and 30°. The relevant angle is set using pins on the pull bracket of the adapter II. Refer to Figure 5-7.

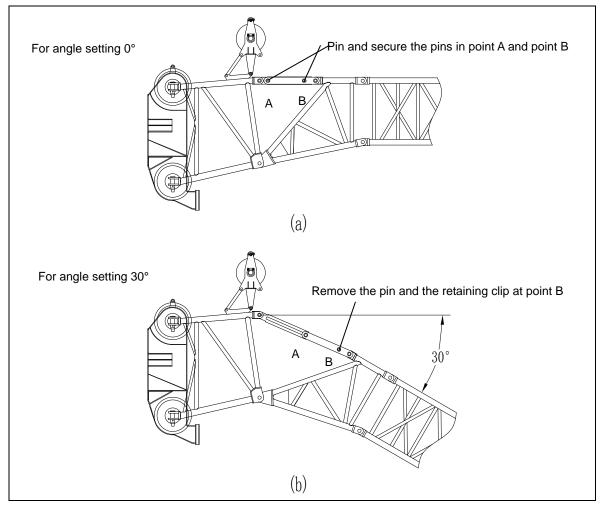


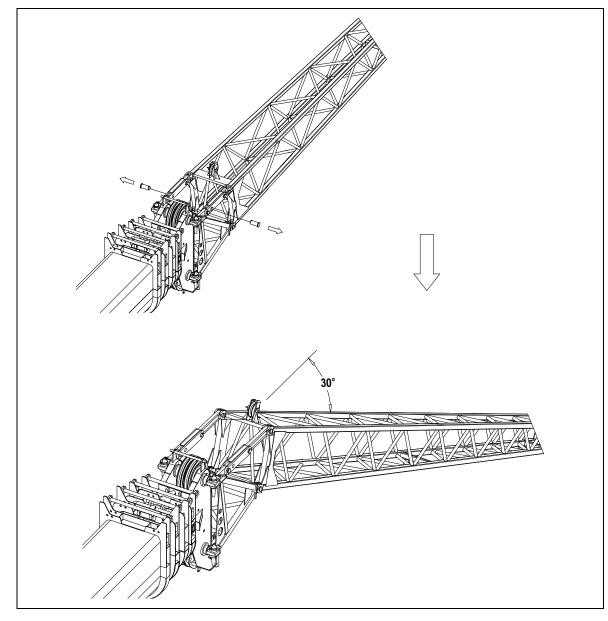
Figure 5-7 Offset positions

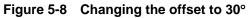
Change the jib offset from 0° to 30° (Refer to Figure 5-7 and Figure 5-8.):

- a) Reel off the auxiliary hoist rope for 2 m to 3 m by moving the left joystick.
- b) Derrick boom down to the minimum angle until the jib comes into contact with the ground or is properly supported.
- c) Remove the pin and the retaining clip at point B.
- d) Derrick boom up slowly until the pull bracket touches the appropriate pin and the offset is changed to 30°.









5.2.4 Disassembly

After you complete the jib operation, dismantle the jib in reverse order of the assemble steps.



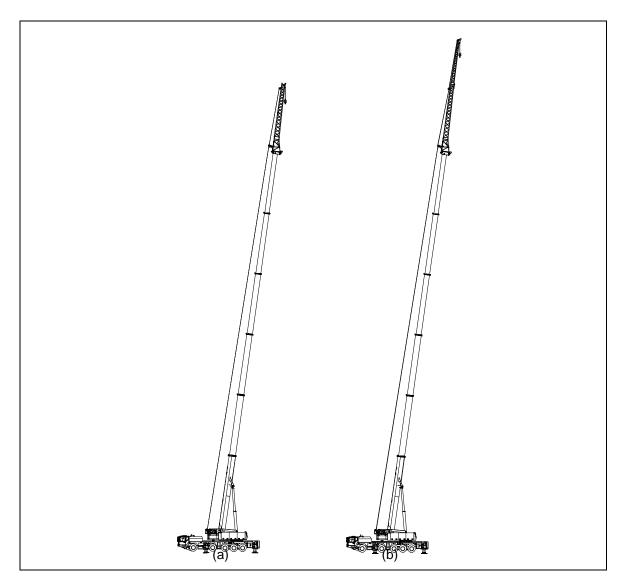
Do not excessively spool up the auxiliary winch when you disassemble the jib.

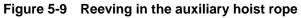
5.2.5 Reeving in the auxiliary hoist rope

ZOOMLION

- For crane operation with 11 m jib (jib variant 1), the procedure of reeving in the auxiliary hoist rope is shown in the Figure 5-9 (a).
 - a) Reeve the hoist rope from the main winch or auxiliary winch and pull it at rope guide pulley bracket on the adapter.
 - b) Remove the small pulley on the rope guide pulley bracket.
 - c) Reeve the hoist rope through the rope guide pulley.
 - d) Install the small pulley.
 - e) Guide the hoist rope to the pulley on the head of jib section 1.
 - f) Remove the rope securing tubes.
 - g) Reeve the hoist rope through the two pulleys on jib section 1.
 - h) Install the rope securing tubes.
 - i) Reeve in the auxiliary hook with the hoist rope.
- For crane operation with 18.6 m jib (jib variant 2), the procedure of reeving in the auxiliary hoist rope is shown in the Figure 5-9 (b).
 - a) Reeve the hoist rope from the main winch or auxiliary winch and pull it at rope guide pulley bracket on the adapter.
 - b) Remove the small pulley on the rope guide pulley bracket.
 - c) Reeve the hoist rope through the rope guide pulley.
 - d) Install the small pulley.
 - e) Guide the hoist rope to the pulley (smaller one of the two pulleys) on the head of the jib section 1.
 - f) Guide the hoist rope to the pulley on the head of the jib section 2.
 - g) Remove the rope securing tubes.
 - h) Reeve the hoist rope through the pulley on the head of the jib section 2.
 - i) Install the rope securing tubes.
 - j) Reeve in the auxiliary hook with the hoist rope.







For crane operation with 26.6 m jib (install the extension between the adapter II and the jib section 1), the procedure of reeving in the auxiliary hoist rope is similar to the above steps.



5.2.6 Electrical connection

For electrical connection of jib, please refer to Figure 5-10.

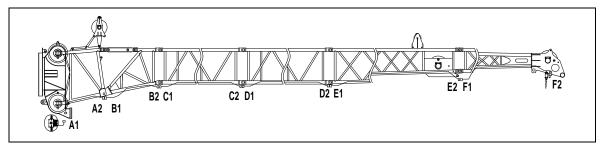


Figure 5-10 Electrical connection of jib

- (1) Protect the plugs and sockets used for electrical connection with black protective shells against contamination and dust.
- (2) Before you disassemble the jib, disconnect the cable harness of the hoisting limiting switch for the auxiliary winch and the cable harness of the jib. Otherwise, the cable harness may be broken!
- (3) The main electrical element is the hoisting limit switch for the auxiliary winch.

5.2.6.1 Jib variant 1 (11 m)

- a) Connect the terminal A1 of the cable harness on the adapter I to the cable harness plugging element on the hoisting limit switch (for auxiliary winch) of the terminal box on the main boom head.
- b) Connect the terminal A2 of the cable harness on the adapter I to the terminal B1 of the cable harness on the adapter II.
- c) Connect the terminal B2 of the cable harness on the adapter II to the terminal E1 of the cable harness on the jib section 1.
- d) Connect the terminal E2 of the cable harness on the jib section 1 to the plugging element on the hoisting limit switch for auxiliary winch.

5.2.6.2 Jib variant 2 (18.6 m)

a) Connect the terminal A1 of the cable harness on the adapter I to the cable harness plugging element on the hoisting limit switch (for auxiliary winch) of the terminal box on the main boom head.

ZOOMLION

- b) Connect the terminal A2 of the cable harness on the adapter I to the terminal B1 of the cable harness on the adapter II.
- c) Connect the terminal B2 of the cable harness on the adapter II to the terminal E1 of the cable harness on jib section 1.
- d) Connect the terminal E2 of the cable harness on jib section 1 to the terminal F1 of the cable harness on jib section 2.
- e) Connect the terminal F2 of the cable harness on jib section 2 to the plugging element on the hoisting limit switch for auxiliary winch.

5.2.6.3 Jib variant 3 (26.6 m)

- a) Connect the terminal A1 of the cable harness on the adapter I to the cable harness plugging element on the hoisting limit switch (for auxiliary winch) of the terminal box on the main boom head.
- b) Connect the terminal A2 of the cable harness on the adapter I to the terminal B1 of the cable harness on the adapter II.
- c) Connect the terminal B2 of the cable harness on the adapter II to the terminal D1 of the cable harness on extension.
- d) Connect the terminal D2 of the cable harness on extension to the terminal E1 of the cable harness on jib section 1.
- e) Connect the terminal E2 of the cable harness on jib section 1 to the terminal F1 of the cable harness on jib section 2.
- f) Connect the terminal F2 of the cable harness on jib section 2 to the plugging element on the hoisting limit switch for auxiliary winch.



5.3 Tip boom

5.3.1 General

The tip boom is one of the important components of truck crane. With the tip boom assembled, the load can be lifted to a higher height and the working radius can be enlarged. The one-section tip boom connects to boom by pins. The assembly of tip boom is the same as the jib. Refer to Figure 5-11.

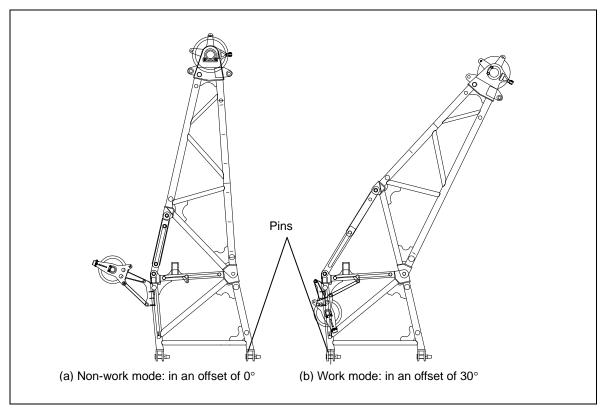


Figure 5-11 Tip boom

- (1) You cannot use the tip boom when you lift a load if the crane is not supported on outriggers.
- (2) Set the offset of tip boom to 30° before you begin a lift operation. Set the offset to 0° when the operation does not use the tip boom.



The tip boom has two offsets of 0° and 30° . When the operation does not use the tip boom, it is installed on the side of the main boom in an offset of 0° . Before you begin a lift operation, assemble the tip boom in an offset of 30° .

ZOOMLION

Assemble the tip boom (Take 0° offset for example.).

- a) Extend the outriggers and make the crane level.
- b) Retract the boom fully.
- c) Move the boom to the side or rear of the crane and position it to the minimum angle.
- d) Make sure there is 20 m slewing range to the slewing center.
- e) Align the end of the adapter with the connection points on the end of triangle frame. Install the pins and the retaining clips. Refer to Figure 5-12.

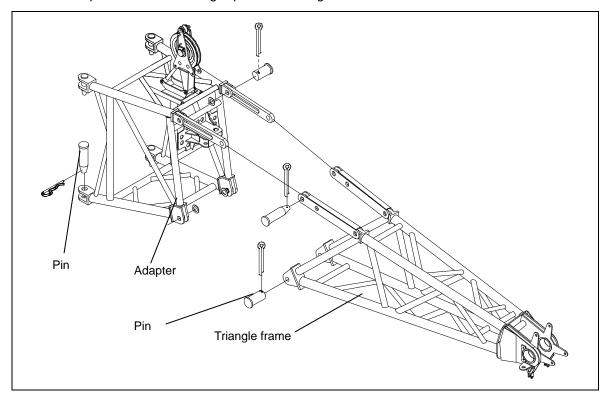


Figure 5-12 Assembly of tip boom

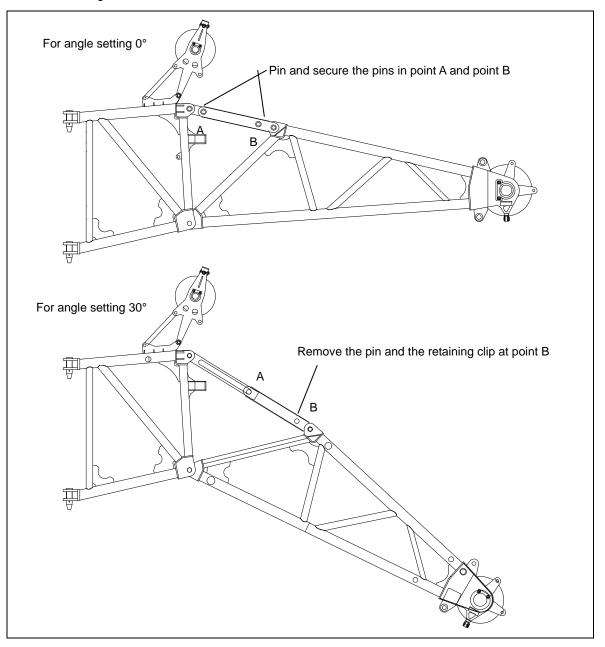
- f) Lift the assembled tip boom with an auxiliary crane until the connection points on the adapter are aligned with those connection points on the head of the main boom. Install the pins and the retaining clips.
- g) Install the counterweight plates and hoisting limit switch. Examine them for proper assembly.

ZOOMLION

Danger of fatal injuries due to falling components! Do not stand under the boom or tip boom during assembly. The tip boom or other components can fall down due to assembly error.

5.3.3 Angle settings

The tip boom can be operated in angles of 0° and 30° . The relevant angle is set using pins. Refer to Figure 5-13.





Change the offset of tip boom from 0° to 30° (Refer to Figure 5-13.):

- a) Reel off the auxiliary hoist rope for 2 m to 3 m by moving the joystick.
- b) Derrick boom down to the minimum angle until the tip boom comes into contact with the ground or is properly supported.

ZOOMLION

- c) Remove the pin and the retaining clip at point B.
- d) Derrick boom up slowly until the pull bracket touches the appropriate pin and the offset is changed to 30°.

5.3.4 Disassembly

5.3.4.1 Removal

After you complete the tip boom operation, remove the tip boom in reverse order of the assemble steps.

5.3.4.2 Attaching the tip boom to the side of the main boom

After you complete the tip boom operation, you can also attach the tip boom to the right side of the main boom. Refer to Figure 5-14.

For assembly parts of tip boom, refer to Table 5-1.



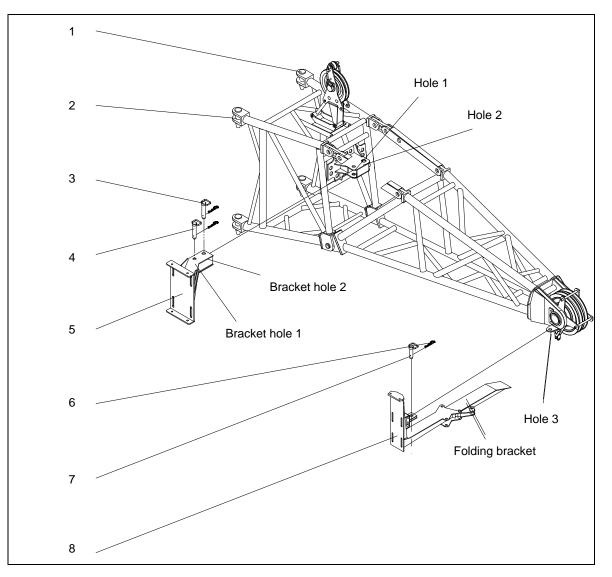


Figure 5-14 Attaching the tip boom to the side of the main boom

 Table 5-1
 Assembly parts of tip boom

Pos.	Description	Pos.	Description
1	Pin on the left side of main boom	5	Mounting bracket 1 (on the main boom)
2	Pin on the right side of main boom	6	Retaining clip
3	Pin 2	7	Pin 3
4	Pin 1	8	Mounting bracket 2 (on the main boom)

Do the steps below to attach the tip boom to the side of the main boom:

- a) Spool up the hoist rope after the tip boom is set to 0° offset.
- b) Remove the pins (upper and lower) on the left side of the main boom.
- c) Move the tip boom rightward (pivots on the pins (upper and lower) on the right side of the main boom).

ZOOMLION

- d) Align the hole 1 on the tip boom with the bracket hole 1 on the mounting bracket 1 (on the main boom). Install the pin 1 and the retaining clip.
- e) Remove the pins (upper and lower) on the right side of the main boom.
- f) Move the tip boom rightward (pivots on the pin 1) to make the front end of tip boom touches the folding bracket.
- g) Align the hole 2 on the tip boom with the bracket hole 2 on the mounting bracket 1 (on the main boom). Install the pin 2 and the retaining clip.
- h) Align the hole 3 on the tip boom with the bracket hole 3 on the mounting bracket 2 (on the main boom). Install the pin 3 and the retaining clip.
- i) Fold the front end of the front folding bracket for 180°.

Note:

Before you begin a lift operation, install the tip boom to the front of the main boom head in reverse order of the above steps.

ACAUTION

Do not attach the tip boom to the side of main boom during vehicle driving. Otherwise, axles will be seriously damaged due to overload. You can attach it to the side of the main boom during short-distance transit, but the vehicle speed must be limited to 30 km/h.

5.3.5 Reeving in the hoist rope

- a) Reeve the hoist rope from the main winch or auxiliary winch and pull it at rope guide pulley bracket on the adapter.
- b) Remove the rope securing tubes.
- c) Reeve the hoist rope through the rope guide pulley bracket.
- d) Install the rope securing tubes.
- e) Guide the hoist rope to pulley on the top of tip boom.
- f) Remove the rope securing tubes.
- g) Reeve the hoist rope through the pulley on the tip boom head and the hook pulley.
- h) Install the rope securing tubes.
- i) Connect the wedge and socket assembly to the mounting plate on the lower part of the tip boom head.

Refer to Figure 5-15.

Equipment



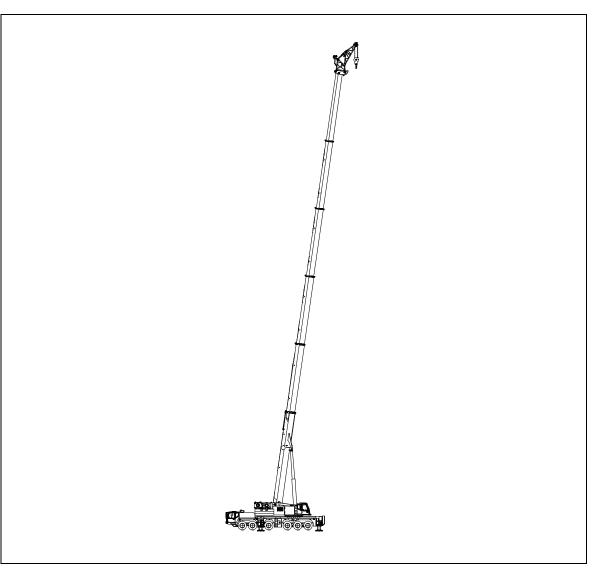
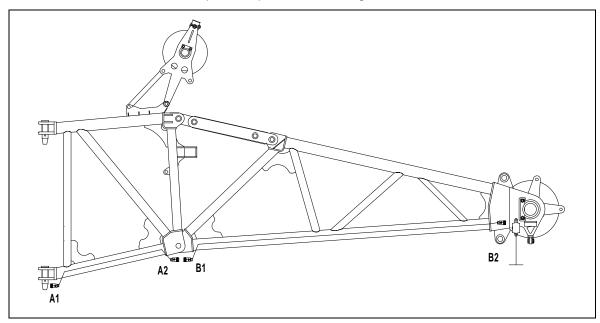


Figure 5-15 Reeving in the hoist rope for tip boom

It is recommended to use the hoist rope on the main winch for the tip boom. When you use the hoist rope on the auxiliary winch, make sure that the rope is long enough.

5.3.6 Electrical connection

For electrical connection of tip boom, please refer to Figure 5-16.



ZOOMLION

Figure 5-16 Electrical connection of tip boom

- (1) Protect the plugs and sockets used for electrical connection with black protective shell against contamination and dust.
- (2) Before you disassemble the tip boom, disconnect the cable harness of the hoisting limiting switch for the tip boom and the cable harness of the tip boom. Otherwise, the cable harness may be broken!
- (3) The main electrical element is the hoisting limit switch for the winch.

How to connect:

- a) Connect the terminal A1 of the cable harness on the adapter I to the cable harness plugging element on the hoisting limit switch (for main / auxiliary winch) of the terminal box on the main boom head.
- b) Connect the terminal A2 of the cable harness on the adapter to the terminal B1 of cable harness on the triangle frame.
- c) Connect the terminal B2 of the cable harness on the triangle frame to the plugging element on the hoisting limit switch.



5.4 Rooster sheave

The components of the rooster sheave are as follows:

- Bracket
- Sheave spindle
- Sheave
- Pins.

When it is not necessary to use the rooster sheave, make sure that it is attached to the side of the boom.

When the crane is to lift a light load, use the rooster sheave. This is the most efficient way to move a lighter object.

5.4.1 Assembly

- a) Fully retract the boom.
- b) Move the boom to the side or rear of the crane and position it to the minimum angle.
- c) Remove the securing pin and move the bracket to the front of the boom. Align the connection points. Install the connecting pin. Refer to Figure 5-17.
- d) Reeve auxiliary hoist rope through the rooster sheave. Install the auxiliary hook and the hoisting limit switch. Make sure that all connections are tight.

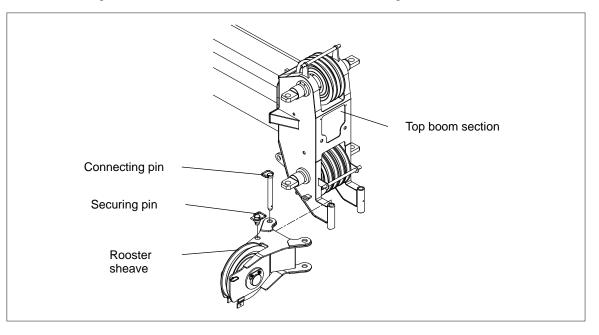


Figure 5-17 Assembly of rooster sheave

5.4.2 Disassembly

When it is not necessary to use the rooster sheave, remove and store it in a safe place. Disassemble it in the reverse order of the assemble procedure.



5.5 Counterweight

5.5.1 Counterweight and counterweight handler

The components of the crane counterweight are as follows (Refer to Figure 5-18):

- Counterweight plate 1
- Counterweight plates 2 and 3
- Counterweight plate 4
- Additional ballasts 5 and 6.

Total weight: 45 tons

For counterweight components, refer to Table 5-2.

There are five counterweight combinations available. Refer to Table 5-3.

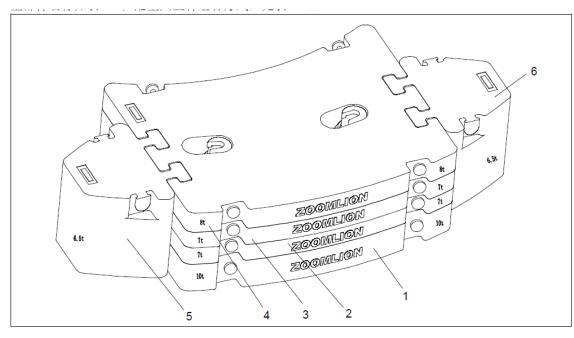


Figure 5-18 Counterweight

Table 5-2	Counterweight components
-----------	--------------------------

Pos.	Description	Pos.	Description
1	Counterweight plate 1 (10 tons)	4	Counterweight plate 4 (8 tons)
2	Counterweight plate 2 (7 tons)	5	Additional ballast (6.5 tons)
3	Counterweight plate 3 (7 tons)	6	Additional ballast (6.5 tons)

Counterweight	1	2	3	4	5	6
combinations	10 tons	7 tons	7 tons	8 tons	6.5 tons	6.5 tons
0 tons						
10 tons	\checkmark					
24 tons	\checkmark	\checkmark	\checkmark			
32 tons	\checkmark	\checkmark	\checkmark	\checkmark		
45 tons	\checkmark	\checkmark	\checkmark	\checkmark	\checkmark	\checkmark

Table 5-3 Counterweight combinations

The components of the counterweight handler are as follows:

Counterweight lifting cylinders (left and right)

ZOOMLION

- Counterweight and other auxiliary elements.

Refer to Figure 5-19.

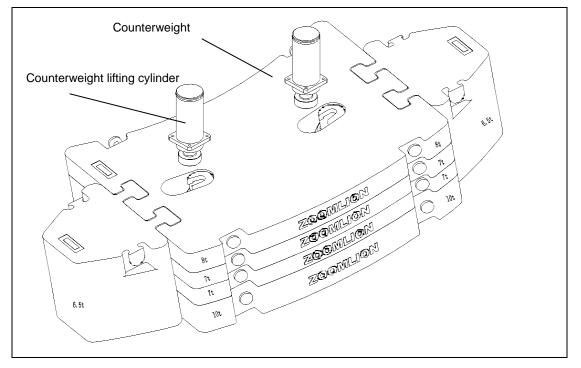


Figure 5-19 Counterweight handler

Risk of accident from toppling of the crane!

Attach counterweight in accordance with the information in the lifting capacity tables. The counterweight plates 2 and 3 should be combined together!

ZOOMLION

5.5.2 Assembly

Make sure that the following prerequisites are fulfilled:

- The crane is properly supported and horizontally aligned.
- The counterweight lifting cylinders are fully retracted.
- There is no personnel and equipment within the slewing radius.
- The slings have sufficient strength.

Assembly process:

- a) Attach counterweight plate 1 on the centering cones of storage frame on the chassis frame using the crane itself.
- b) Deposit the required counterweight plates on the counterweight plate 1.
- c) Turn the switch "Pre-selection of counterweight remote control box / remote controller" to the left position on the instrument console of operator's cab. For the position of the switch, refer to Figure 4-2 in Chapter 4.
- d) Connect the plug of counterweight remote control box into its socket on the rear section of the slewing table. The counterweight remote control box is operational. Refer to Figure 5-20.

ZOOMLION

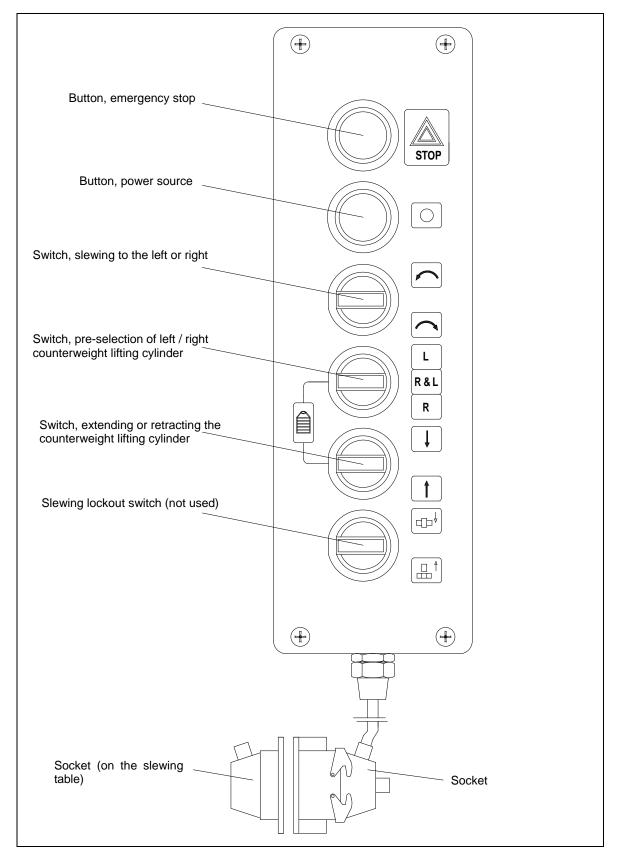


Figure 5-20 Counterweight remote control box



5.5.2.1 Counterweight remote control box

5.5.2.1.1 Detailed information about the counterweight remote control box

- a) Button, emergency stop
 - Pressed:

Cut off the output of remote controller power supply to ensure safe operation of the crane in the event of a clear emergency.

Turned in the arrow direction:

Release the button. The counterweight remote control box is operational.

b) Button, power source

Pressed:

The button background lighting illuminates and the counterweight is operational.

c) Switch, extending or retracting the counterweight lifting cylinder

Position	Ţ	:
----------	---	---

Extend the counterweight lifting cylinder(s).

	- F	
B 141		
Position		
I USILIUII	ت	•

Retract the counterweight lifting cylinder(s).

d) Switch, pre-selection of left / right counterweight lifting cylinder

Position

The left counterweight lifting cylinder is operational.

Position $\mathbb{R}^{\mathbb{R}}$:

Both the counterweight lifting cylinders are operational.

Position \mathbb{R} :

The right counterweight lifting cylinder is operational.

e) Switch, slewing to the left or right

Position

Slew to the left.

Position

Slew to the right.

f) Slewing lockout switch
 The switch is NOT USED in this crane.

5.5.2.1.2 Operating instructions

- a) Connect the plug of counterweight remote control box.
- b) Slew the slewing table clockwise.

Result:

The counterweight lifting cylinders are near the cylinder mounting slots.

c) Operate the counterweight remote control box to fully extend the counterweight lifting cylinders.



d) Continue to turn the slewing table clockwise.

Result:

The counterweight lifting cylinders are stuck into the cylinder mounting slots.

e) Retract counterweight lifting cylinders until the counterweight plates are lifted to proper position.



Truck Crane Operator'S Manual

Chapter 6 Additional Equipment





Chapter 6 Additional Equipment

6.1 Air conditioning in driver's cab

The A/C control panel is on the center console in the driver's cab. For detailed operating instructions, please refer to Section 3.1.4 in Chapter 3.

6.2 Air conditioning in operator's cab

In order to provide a comfortable operating environment for the operator, the operator's cab of our crane is equipped with the combined air conditioning and cab heater, which refrigerates in summer and supplies heat in winter. The working medium of refrigerant is HFC134a, and the working medium of heat supply is circulating cooling water of engine.

6.2.1 System technical data

For system technical data, refer to Table 6-1.

Ser. No.	Description	Data	Remarks
1	Refrigerating output	4000 W	
2	Heating output	5000 W	
3	Air supply output	600 m ³ /h	
4	Voltage	24 V.DC	
5	Gross power	≤ 310W	
6	Refrigerant oil		Depending on compressor
7	Refrigerant		Working medium: HFC134a
8	Refrigerant charge	1200 g ± 150 g	

Table	6-1	S	ystem	techn	ical	data
labic	0-1	U	yatem	100mm	icai	uata

6.2.2 Operating instructions

The control panel is on the housing of air conditioning interior machine in the operator's cab. There are two rotary switches and two control lights on the control panel. Refer to Figure 6-1.

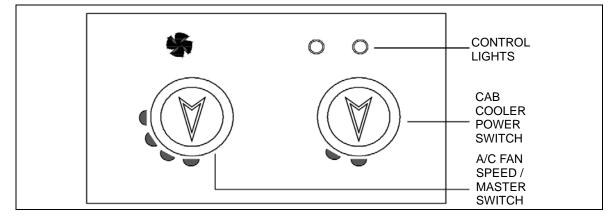


Figure 6-1 A/C control panel

6.2.2.1 Functions

- a) A/C FAN SPEED / MASTER SWITCH
 - Used to control the evaporator fan speed: OFF, HI, MID, LOW It is also the master power to the REFRIGERATION mode function and must be ON (HI, MID, LOW) for the functions to operate.
- b) CAB COOLER POWER SWITCH

Refrigeration on / off

- c) Control lights
 - FAN POWER CONTROL LIGHT:
 - Illuminates: The system is in the ventilation work mode.
 - COOL MODE CONTROL LIGHT
 Illuminates: The compressor starts and the refrigerating system is working.

6.2.2.2 Operating instructions

- a) Refrigeration
 - Set the CAB COOLER POWER SWITCH to position "COOL"

Result:

The cool mode indicator illuminates.

 Turn the A/C FAN SPEED / MASTER SWITCH counter-clockwise to fan speed (HI, MID or LOW) to get the necessary temperature.



- b) Heat mode
 - Set the CAB COOLER POWER SWITCH to position OFF.
 - Result:

The cool mode indicator goes off.

- Turn the A/C FAN SPEED / MASTER SWITCH counter-clockwise to fan speed (HI, MID or LOW).
- Open the hot-water valve.
 Result:

Hot air blows out.

- c) Ventilation
 - Set the CAB COOLER POWER SWITCH to position OFF.
 - Turn the A/C FAN SPEED / MASTER SWITCH counter-clockwise to fan speed (HI, MID or LOW).

Note:

You can adjust the angle of the air outlet to change the direction of the cold wind. And you can use the A/C FAN SPEED / MASTER SWITCH to control the evaporator fan speed: OFF, HI, MID, LOW.

- (1) When the engine is working at idle speed, the battery drains. Set the A/C FAN SPEED / MASTER SWITCH to position LOW and increase the engine RPM.
- (2) The cab heating system is connected with water tank via a valve. When the ambient temperature is below 0°C, add antifreeze into the system to prevent brass pipe of radiator from freezing within -30°C.

6.2.3 Points for attention

- a) Do not disassemble A/C system without consent from the A/C manufacturer to prevent refrigerant leakage.
- b) Examine the condition and tension of the compressor belt at a regular interval. If necessary, adjust the tension on the belt.
- c) The antifreeze in proper proportion has been added into the water pipe lines and the system circulation has been activated for no less than 15 minutes before delivery to prevent the heating pipelines from freezing under low temperature.
- d) In summer, make sure the hot-water valve is closed before you turn on the air conditioning. The hot-water valve in the heating pipelines can only be opened in winter.
- e) You must clean the condenser at regular intervals.
- f) Examine and tighten the connections of pipelines in air conditioning system at regular intervals to prevent them from loosening and leaking after you use them for a long period.
- g) Add refrigerant fluid after you replace the parts. For quantity of refrigerant fluid, refer to Table 6-2.

Name of parts	Quantity of refrigerant fluid (CC)
Condenser	40 – 50
Evaporator	40 – 50
Circulating hose for refrigeration	10 – 20
Fluid reservoir	15 – 25

Table 6-2 Quantity of refrigerant fluid

6.2.4 Troubleshooting for common failures

6.2.4.1 Refrigeration fault

For the troubleshooting, please refer to Table 6-3.

	The evaporator fan motor is working.	The condenser	The compressor is working.	Examine fittings of fan motor for tight connection and normal grounding, and examine fan motor for damage.	
		The condenser fan motor is not working.	The compressor is not working.	Examine the temperature control switch for damage, examine the relay for switching on, and examine the terminal connector of relay for well connection.	
Refrigeration fault		The condenser fan motor is working.	The compressor is not working.	Examine the clutch for damage, examine the terminal connector for tight connection and examine the belt for tightness and sliding.	
	Th	The condenser	Examine the A/C FAN SPEED / MASTER		
		fan motor and	SWITCH for malfunction, and examine the factor		
	The	compressor are	motor wire for well connection and grounding		
	evaporator	working.	wire of fan motor for normal connection.		
	fan motor is not working.	The condenser	Examine whether the fuse is broken, exar the relay for normal working and examine connecting wire of relay for tight seating.		
		fan motor and			
		the compressor			
		are not working.	connecting wire of relay for tight seating.		

Refrigeration fault	The compressor is working.	The evaporator fan motor and the condenser fan motor are working.	 HFC134a is filled too much into the system. Examine whether it meets the required value with a high / low pressure gauge. It is not used for a period of time, so HFC134a in the system has a leakage. Examine whether HFC134a exists in the system with a high/low pressure gauge.
Insufficient refrigerating output	The compressor is working.	The evaporator fan motor, the condenser fan motor, the evaporator and the condenser are all working. The fan motors and other devices are working.	Inlet / outlet of fluid reservoir are connected in reverse. Examine whether the expansion valve is blocked with ice or dirt. If it is, replace fluid reservoir. Replace HFC134a. Examine whether the surface of condenser is blocked with dirt.

ZOOMLION

6.2.4.2 Heating fault

For the troubleshooting, please refer to Table 6-4.

	The evaporator fan motor is working.	Examine whether the solenoid valve is switched on. Examine whether other valves of the heating pipelines are closed.
Heating fault	The evaporator fan motor is not working.	Examine the A/C FAN SPEED / MASTER SWITCH for malfunction, and examine the fan motor wire and grounding wire for normal connection. Examine whether the fuse is broken and examine the connecting wire for tight seating.

Table 6-4 Troubleshooting for heating fault



6.2.4.3 Troubleshooting for other failures

For the troubleshooting, please refer to Table 6-5.

Ser. No.	Phenomenon	Possible causes	Remedies
1	Refrigerating effect of the system is good at the beginning, but refrigerating output is not enough after using for a period. The bubbles appear in the inspection hole of fluid reservoir, and the "Values" shown in the high / low pressure gauge are low.	Owing to off-road conditions during crane driving such as uneven road surface, the fittings are loose, thus causing air leakage.	Find out the leaking point with a leak-detecting instrument and tighten the loosened parts carefully.
2	The refrigeration does not work, outlet nozzle blows hot air, no temperature difference between the inlet and outlet of expansion valve appears and the value shown in the low-pressure gauge is extremely low.	Improper use. The temperature-sensitive capsule wears and leaks which results in valve hole closed.	Replace the expansion valve, and refill HFC134a.
3	The air from the outlet nozzle is not cold enough, and the temperature of compressor increases. The value in the low-pressure gauge descends rapidly (approaches to "0"), and the value in the high-pressure gauge is high.	The system is mixed with impurities, the filtering screen of expansion valve is blocked and thin frost appears at expansion valve.	Open the air conditioning system intermittently to eliminate instantaneous blocking if blocking is not serious. Or dismantle the expansion valve to wash it with alcohol, and refill HFC134a after you deaerate the system.
4	The refrigerating output is not enough, and the evaporator is frosted. The values in the high / low pressure gauge are all low.	Throttle bore inside the expansion valve is not in function.	Deaerate the system, replace the expansion valve and refill HFC134a.

Table 6-5 Troubleshooting for other failures



Ser. No.	Phenomenon	Possible causes	Remedies
5	Refrigerating output of the system descends gradually after the system is running for a period. The values in the high-pressure gauge are high but the value in the low- pressure gauge is lower than 0.4 Mpa.	Drying agent in the fluid reservoir is saturated, and throttle point in expansion valve is blocked with ice.	Deaerate the system, replace the fluid reservoir, and refill HFC134a.
6	After you switch on the air conditioning system, only air (not cool air) blows and the values in high / low pressure gauge do not vary.	The temperature control switch is poorly connected. Or the electromagnetic clutch coil for compressor is damaged.	Use the universal meter to examine the temperature control switch for damage. Replace the electromagnetic clutch for compressor.
7	The electromagnetic clutch for compressor is frequently operative but short-time engaged. The cab cannot be cooled down but the values in high / low pressure gauge are normal.	The compressor stops running automatically caused by excessively small opening degree of temperature control switch, so the refrigerating output is insufficient.	Examine the temperature control switch and set it to the Max. degree (Cold).

6.3 Remote controller (optional)

ZOOMLION

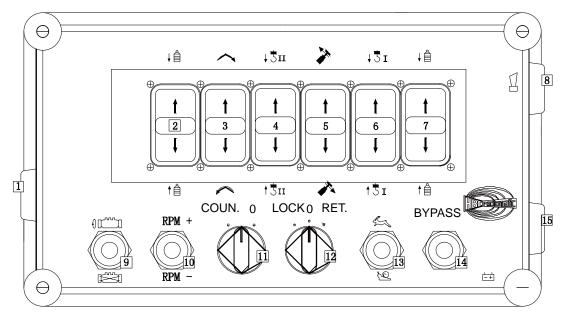


Figure 6-2 Control panel, remote controller

Pos.	Description	Pos.	Description
1	iON key	9	Toggle switch Engine on / off
2	Button Extending or retracting the left counterweight cylinder	10	Tumbler pushbutton Increasing / decreasing engine RPM
3	Button Slewing to the left or right	11	Rotary switch Counterweight operational
4	Button Spooling up / reeling off auxiliary winch	12	(Not used)
5	Button Derricking main boom up / down	13	Toggle switch Pre-selection of rapid gear / slow gear
6	Button Spooling up / reeling off main winch	14	Bypass switch
7	Button Extending or retracting the right counterweight cylinder		Button Emergency stop
8	Button Horn		

Table 6-6	Buttons and switches on the control panel
-----------	---

This manual only introduces the simple operating instructions. For details, refer to the *Operating Instructions for Remote Controller*.

ZOOMLION

Operating instructions

Make sure that the following prerequisites are met before you operate the remote controller:

- The button 15 is turned off.
- The iON key 1 (which records the frequency and address code of the remote control system) is inserted.

Result:

- LED flashes in red.

Press button 8 till the LED flashes in green that the remote controller is in function.

Operate the buttons or switches to activate the corresponding movements:

Button 2:

Extend or retract the left counterweight cylinder.

Button 3:

Slew to the left or right.

Button 4:

Spool up / reel off the auxiliary winch.

Button 5:

Derrick the boom up or down.

Button 6:

Spool up / reel off the main winch.

Button 7:

Extend or retract the right counterweight cylinder.

Button 8:

Operate the horn.

Switch 9:

Turn on and off the engine.

Switch 10:

Increase and decrease the engine RPM.

Switch 11:

Turn to the left position, and the buttons 2 and 7 are valid.

Button 13:

Upper position: The winch works at high speed.

Lower position: The slewing, derricking and main & auxiliary winch movements are at low speed.

Switch 14:

Bypass the switch-off of dangerous movements.



Truck Crane Operator'S Manual

Chapter 7 Transportation and Storage





Chapter 7 Transportation and Storage

7.1 Transportation

You can move the crane by its power for road-driving or by other carriers for a long distance. During transportation, chock the wheels and make the crane safe with wire ropes. Fully close the windows and door to keep rain and moisture out of the cab. Lock the door and windows. The positions to lift the crane are shown in the Figure 7-1.

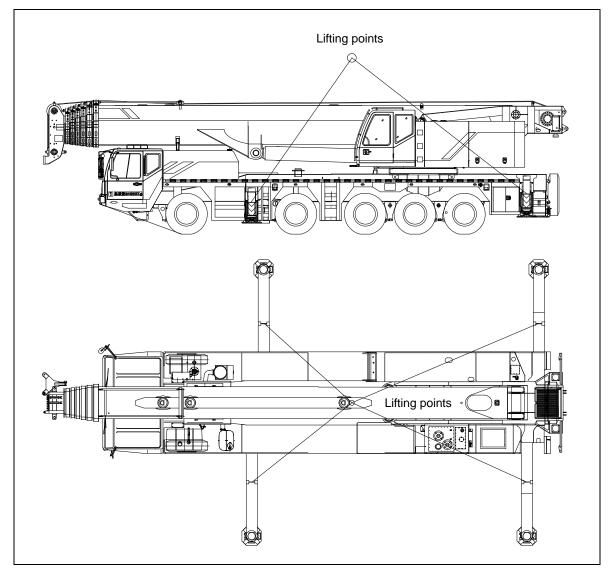


Figure 7-1 Crane lifting points



Before you lift, make sure that the sling has sufficient strength to hold the crane.

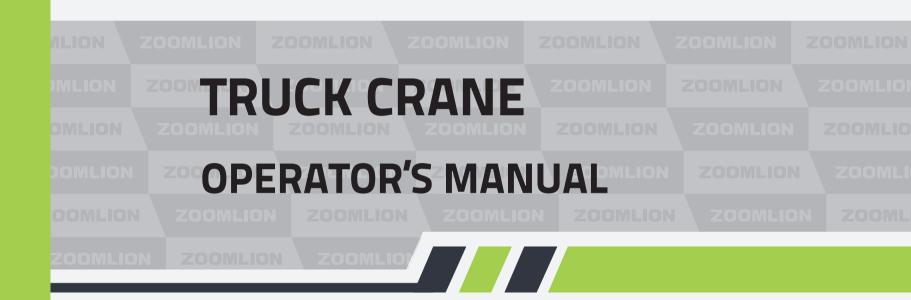
7.2 Storage

Do the steps that follow if you do not use the crane for a long time (more than three months):

- a) Lock the doors and the windows and switch off control instruments.
- b) Clean contamination off the crane.

ZOOMLION

- c) Fully retract all the cylinder pistons (except vertical cylinders).
- d) Fully extend the vertical cylinders to lift the tires away from the ground.
- e) Inflate the tires to specified pressure and put moisture-proof wooden wedges below the tires.
- f) Turn off the engine and cut off the power supply.
- g) If the battery is not used over a month, disconnect its connecting wire to the electrical system. If the crane is not used for a long period of time, charge it every three months.
- h) You must lubricate the surfaces of all the exposed metal components to prevent corrosion.
- Remove all contamination (dust and sand) from the wire ropes and lubricate them with ZG-3 calcium based graphite grease.
- j) Keep the crane in a garage. If not, take measures against rain, thunder and freeze.
- k) Operate the engine for more than 1 hour every three months. Examine the mechanisms at idle speed to make sure that they operate correctly.
- I) If you do not operate the crane for more than 18 months:
 - 1) Keep the crane clean and do the usual maintenance.
 - 2) Replace aged seal components.
 - 3) Do a general inspection of the engine to see if you must replace the coolant, diesel oil, and filters.
- m) Make sure that one person keeps the crane prepared for operation.



Zoomlion Heavy Industry Science & Technology Co.,Ltd.

Address: Quantang Industrial Park, No. 1636, 2nd Yuanda Road, Changsha, Hunan Province, China Postcode: 410131 Website: http://www.zoomlion.com Email: Sos-service@zoomlion.com



ZOOMLION

Copyright © 2015 Zoomlion Heavy Industry Science&Technology Co., Ltd. All rights reserved