



ZLJ5500JQZ80V TRUCK CRANE

OPERATOR'S MANUAL

Edition 1 06, 2013

Foreword

Thank you for purchasing our product. Do read, understand and master the recognized safety technical regulations prior to operating the crane.

This manual introduces the safety instructions, technical data and safety operation of truck crane with intent to safely operate the crane for users and optimize the working performance of truck crane during operation. Always keep this manual handy in the driver's or operator's cab.

This manual must be read and understood by all persons who are involved in operation and maintenance of the crane. If there are any questions, please contact service engineer of our company. Our company assumes no liability for your operation of the crane not in terms of this manual.

The operator's manual belongs to the crane. If you transfer the ownership of this crane, the operator's manual should be given to the new users.

The information and illustrations contained in this manual may not be copied or distributed, nor used for competitive purposes. All rights are expressly reserved in accordance with copyright laws.

Our product and technical documents are subject to technical improvements and will change without notice. Therefore, please acquaint yourself with our latest technology information. These operating instructions have been translated to be best of one's knowledge. Zoomlion assumes no liability for translation errors.

The Chinese version of the operating instructions is solely applicable for factual accuracy. If you find any errors or if any misunderstanding arises when reading these operating instructions, please contact Zoomlion immediately.

Thank you for your trust and support to Zoomlion.

Safety Instruction

The following terms that are used in these operating instructions "Danger", "Warning", "Caution", "Careful", "Note" and "Important" are intended to point out certain important rules of conduct to all persons who work with the crane. The meanings of the terms are as follows:



The term "DANGER" is used to provide a warning about life-threatening hazards.



The term "WARNING" is used to provide a warning about potentially serious personal injury or damage to property.



The term "CAUTION" is used to provide a warning about potential minor or medium personal injury, or damage to machinery or parts.



The term "CAREFUL" is used to provide a warning about damage to property.



The term "NOTE" is used to draw attention to certain matters.



The term "IMPORTANT" is used to highlight certain matters.



The term is used to forbid certain operations which are not conformed to safety regulations. They may lead to life-threatening hazards.

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OPERATOR' S MANUAL FOR TRUCK CRANE

Chapter 1 Description of crane



1.1 Model and name plates

1.1.1 Model

Model in auto industry: ZLJ5500JQZ80V

Model in engineering industry: QY80V

Chassis model: ZLJ5500JQZ

1.1.2 Name plates

For name plate of crane, refer to Figure 01 – 01.

For name plate of chassis, refer to Figure 01 – 02.

 ZOOMLION 中联		汽车起重机 TRUCK CRANE	
品牌及型号	Trade Mark & Model	中联牌 ZLJ5500JQZ80V	
产品特征号	Product Characteristic Code	QY80V532	
最大额定总起重量	Max. Lifting Capacity	80000	kg
发动机型号	Engine Model	WP12.375N	
发动机额定功率	Engine Rated Power	276	kW
发动机净功率	Engine Net Power	274	kW
最大设计总质量	Max. Design Total Mass	50000	kg
整车整备质量	Complete Vehicle Kerb Mass	49870	kg
外形尺寸(长×宽×高)	Overall Dimensions	14600 mm× 2800 mm× 3800 mm	
车辆识别代号	VIN	L5E5H5D4XXAXXXXX	
出厂编号	Production No.		
生产日期	Production Date	年(Y.)	月(M.)
制造国	Production Country	中国	China
中联重科股份有限公司制造 MANUFACTURER: ZOOMLION HEAVY INDUSTRY SCIENCE & TECHNOLOGY CO., LTD.			

Figure 01 – 01

 ZOOMLION 中联		汽车起重机专用底盘 TRUCK CRANE SPECIAL PURPOSE CHASSIS	
品牌及型号	Trade Mark & Model	中联牌 Z L J 5 5 0 0 J Q Z	
产品特征号	Product Characteristic Code	ZLJ5500JQZV3	
最大设计总质量	Max. Designed Gross Mass	50000	kg
整备质量	Kerb Mass	18200	kg
发动机型号	Engine Model	WP12.375N	
发动机额定功率	Engine Rated Power	276	kW
发动机净功率	Engine Net Power	274	kW
车辆识别代号	VIN	L5E5H5D4XXAXXXXX	
出厂编号	Production No.		
生产日期	Production Date	年(Y.)	月(M.)
制造国	Production Country	中国	China
中联重科股份有限公司制造 MANUFACTURER: ZOOMLION HEAVY INDUSTRY SCIENCE & TECHNOLOGY CO., LTD.			

Figure 01 – 02

1.1.3 Name plates installation locations

The name plates of crane and chassis are respectively installed on the right side of operator's cab and on the right longitudinal beam of chassis frame.

For exact installation locations, please refer to Figure 01 – 03 and Figure 01 – 04.

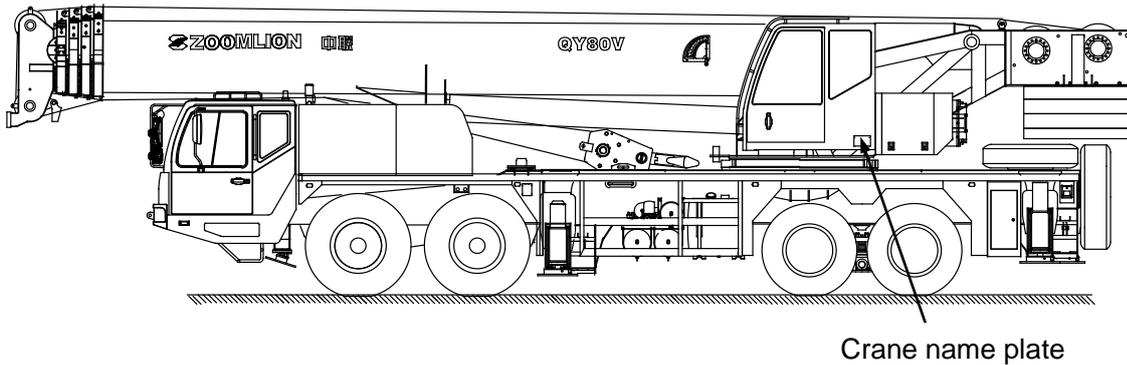


Figure 01 – 03

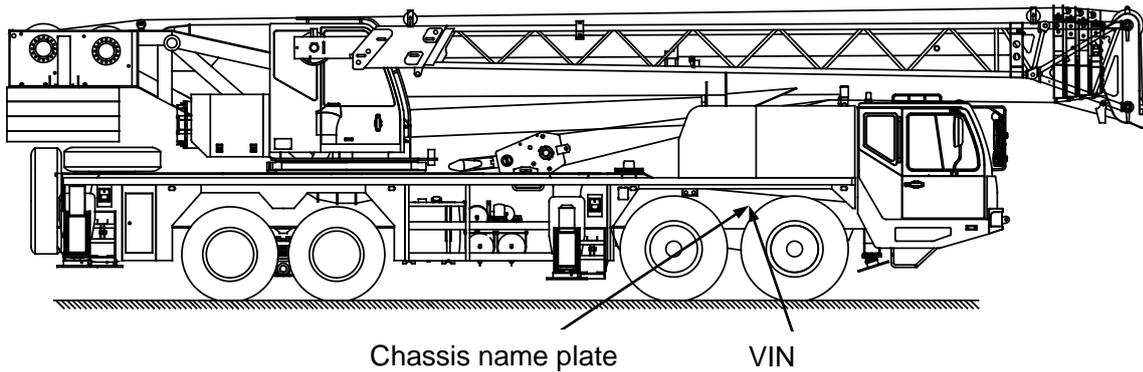


Figure 01 – 04

1.1.4 Vehicle identification number (VIN) and its locations

The VIN of ZLJ5500JQZ80V is L5E5H5D4xxAxxxxxx, and is stamped in the crane name plate, chassis name plate and right longitudinal beam of chassis frame.

Exact location is shown in Figure 01 – 04.

1.1.5 Engine model and its manufacturer

Engine model: WP12.375N

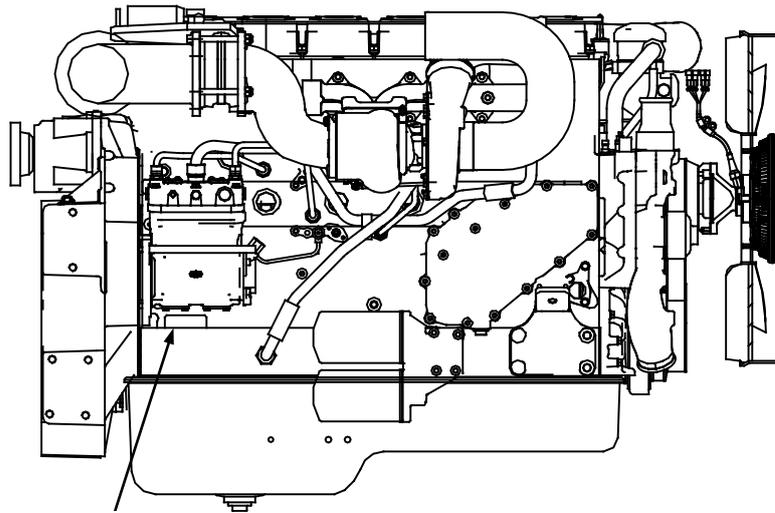
Manufacturer: WEICHAI POWER Co., Ltd.

1.1.6 Engine code, name plate and their locations

The engine code is stamped on the right part of engine near lower plane of air compressor (scrape off the painting).

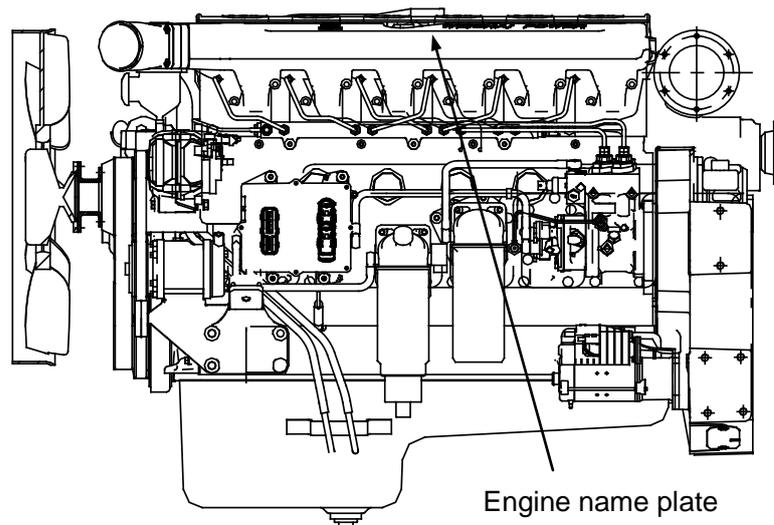
The engine name plate is installed on the left part of engine.

The exact locations are shown in Figures 01 – 05 and 01 – 06.



Engine code

Figure 01 – 05



Engine name plate

Figure 01 – 06

 **NOTE**

Have the above engine data available when communicating with us.

1.2 Crane components and product description

1.2.1 Crane components

– Crane chassis

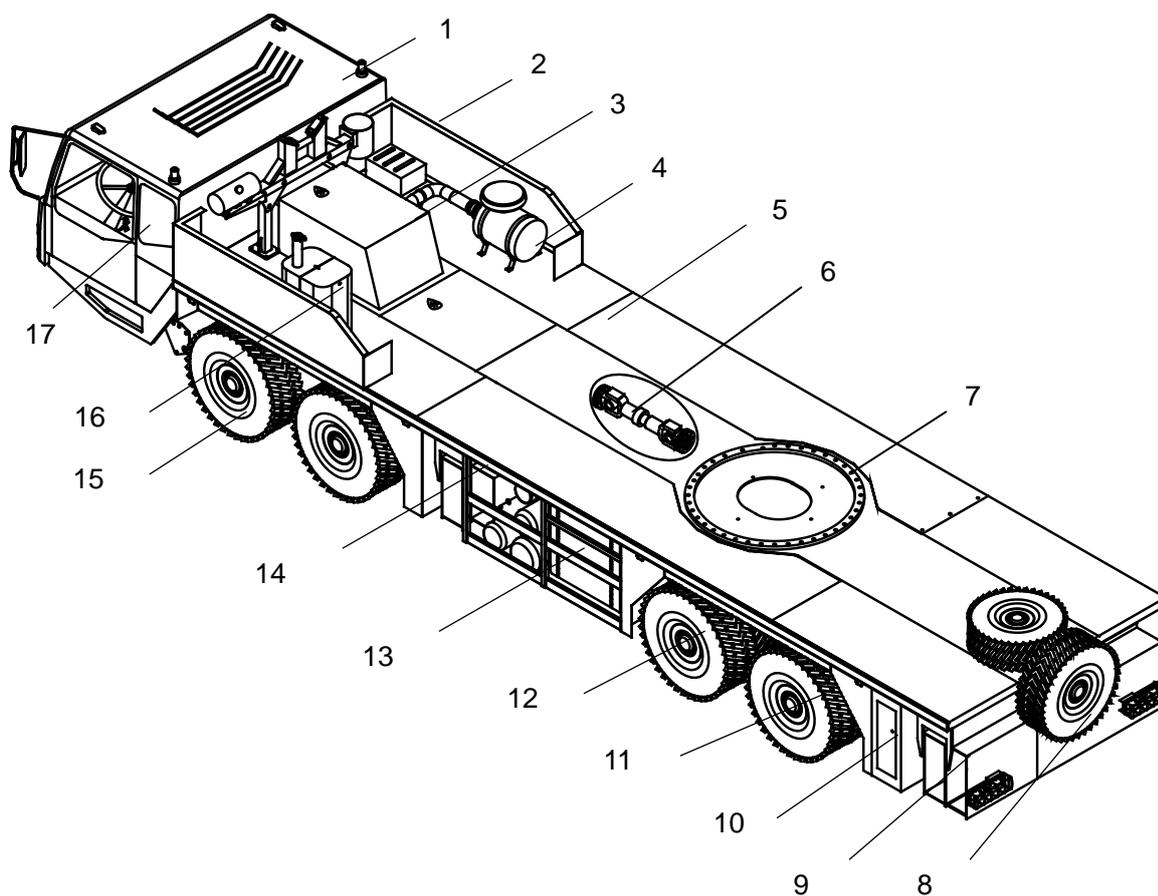


Figure 01 – 07

- | | |
|------------------------|-------------------------|
| 1. Driver's cab | 10. Toolbox |
| 2. Boarding | 11. Rear axle |
| 3. Engine hood | 12. Intermediate axle |
| 4. Air intake system | 13. Guard rail |
| 5. Platform | 14. Front outrigger box |
| 6. Propeller shaft | 15. Front axle |
| 7. Chassis frame assy. | 16. Exhaust system |
| 8. Spare tire | 17. Clutch |
| 9. Rear outrigger box | |

– Complete vehicle

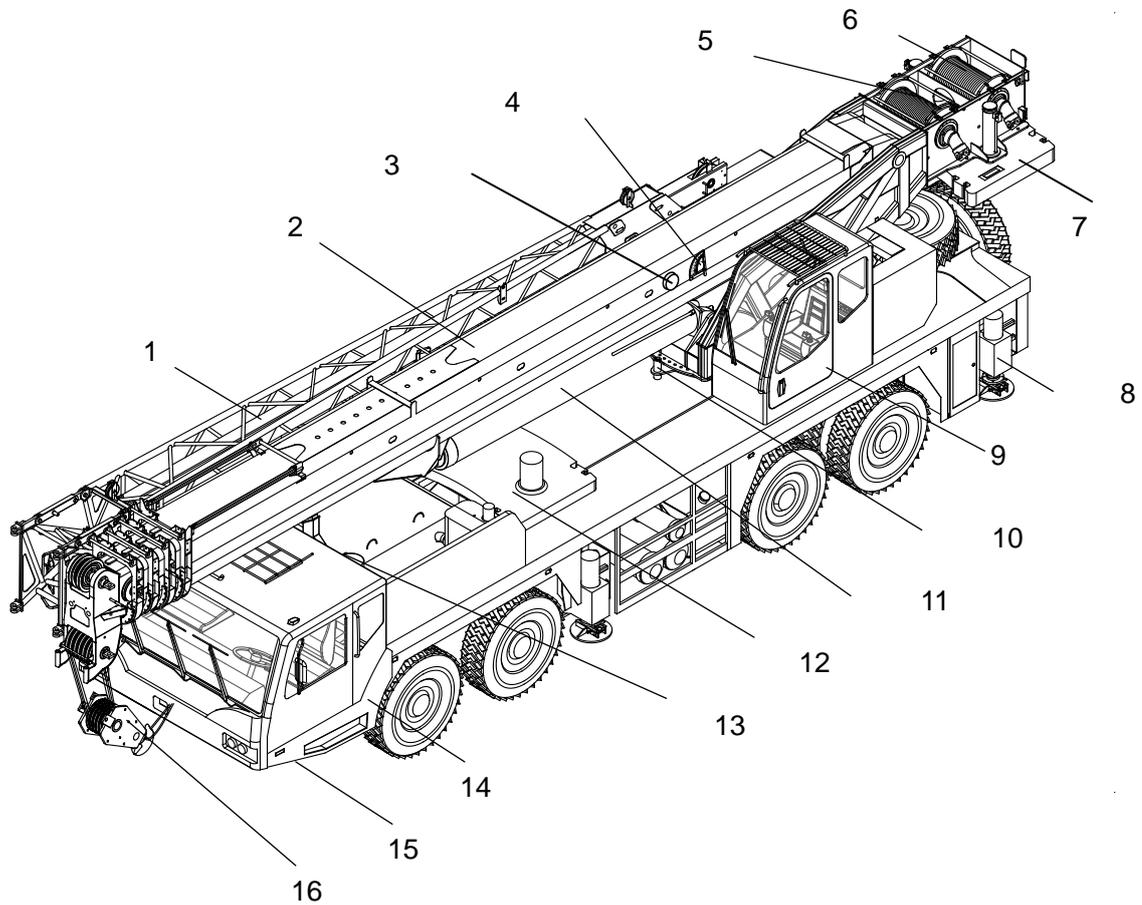


Figure 01 – 08

- | | |
|------------------------|-----------------------------------|
| 1. Jib | 9. Operator's cab |
| 2. Main boom | 10. Slewing gear |
| 3. Length indicator | 11. Derricking gear |
| 4. Angle indicator | 12. Movable counterweight |
| 5. Auxiliary winch | 13. Auxiliary hook |
| 6. Main winch | 14. Special purpose chassis |
| 7. Fixed counterweight | 15. The 5 th outrigger |
| 8. Sliding beam | 16. Main hook |

1.2.2 Product description

– Crane chassis

Driver's cab

The low-mounted full-width sheet steel cab offers a comfortable and functional working environment.

The control elements and displays are ergonomically arranged. Thus a safe and fatigue free working is assured.

The cab has the following features:

- Air-cushioned seat with upper backrest
- Sun visor, sliding windows
- Steering wheel can be easily adjusted to suitable position before setting off.

Chassis frame

Distortion-resistant and load-bearing box structure made of high-strength steel.

Engine

High-pressure common-rail electric fuel injection diesel engine special for construction machinery.

Clutch

Dry pull type single-plate clutch

Transmission

10-speed mechanical transmission with contrate gear output. Main and auxiliary transmissions are with a synchronizer.

Suspension

Front axle with longitudinal leaf spring suspension, and rear axle with leaf spring + equalizer beam + thrust rod suspension

Tandem-axle balanced suspension is applied.

Wheel

Special wheel rim and inflated tires.

Steering system

Including integral circulating ball-type power steering gear, steering pump and steering drive mechanism.

Brake system

It consists of service brake (driving brake), parking brake (emergency brake) and auxiliary brake.

Service brake: all-wheel power-assisted compressed air brake, dual-circuit system.

Parking brake: spring-loaded brake acting on wheel hubs of intermediate and rear axles.

Auxiliary brake: engine brake.

Propeller shaft

Styre Series open-type drive shaft assy. with flange connected.

– Crane superstructure

Operator's cab

The sheet steel cab offers a comfortable and functional working environment.

The cab has the following features:

- Adjustable seat with headrest
- Pilot-operated joysticks
- Windshield wiper and washing system.

Main boom and telescoping system

5-section (1 basic boom, 4 telescopic sections) main boom

Weight-optimized design made of low-alloy and high-tensile steel provides the boom with excellent bending resistance.

Built-in slide block designed with compensation technology applied have the guidance capability and lifting capacity improved.

Main boom can be telescoped in and out by means of two telescoping cylinders with synchronous boom extension / retraction wire rope.

Derricking gear

A front-mounted oil cylinder with balance valve

Hoist gear

Consisting of hydraulic motor, winch reducer, hoisting limit switch, lowering limit switch and hoist rope

Slewing gear

Consisting of hydraulic motor, slewing reducer and slewing bearing

Hydraulic system

Open-type, hydraulic pilot proportional control, with proportional speed-regulating function

Driven by variable pump and gear pump

Load moment limiter

It is composed of mentor, pressure sensor, length sensor and angle sensor.

1.2.3 Boom

It includes main boom and jib.

Main boom includes 1 basic boom and 4 telescopic boom sections.

Main boom length L: 12.1 – 46.5 m.

Jib length: 10.3 m, 17.5 m.

When the fully extended main boom is fitted with jib (2 offsets: 0°, and 30°), the boom length L is 64 m (46.5 m + 17.5 m).

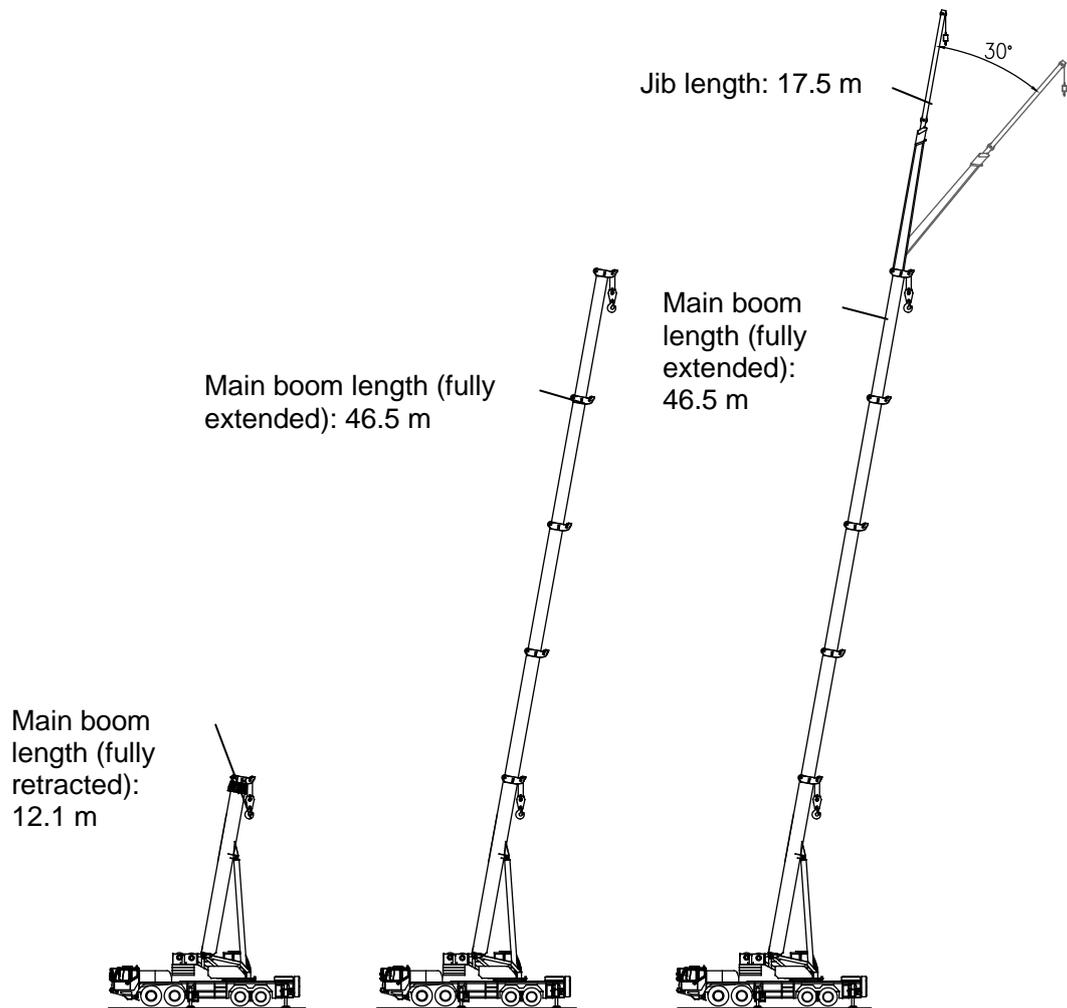


Figure 01 – 09

1.3 Technical data

1.3.1 Overall view (Unit: Metric mm)

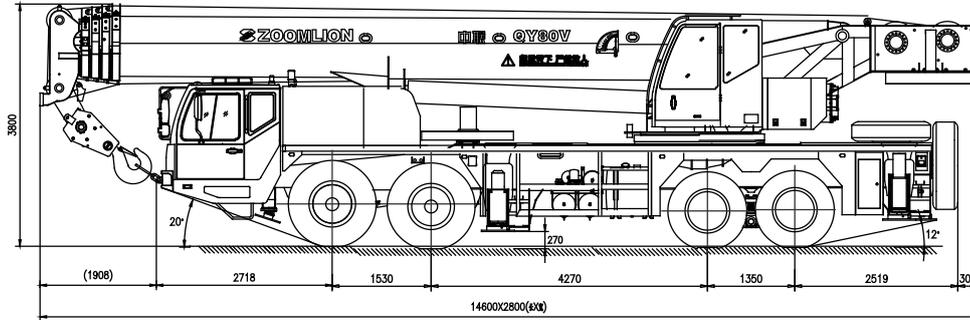


Fig. 01 - 10 - 01

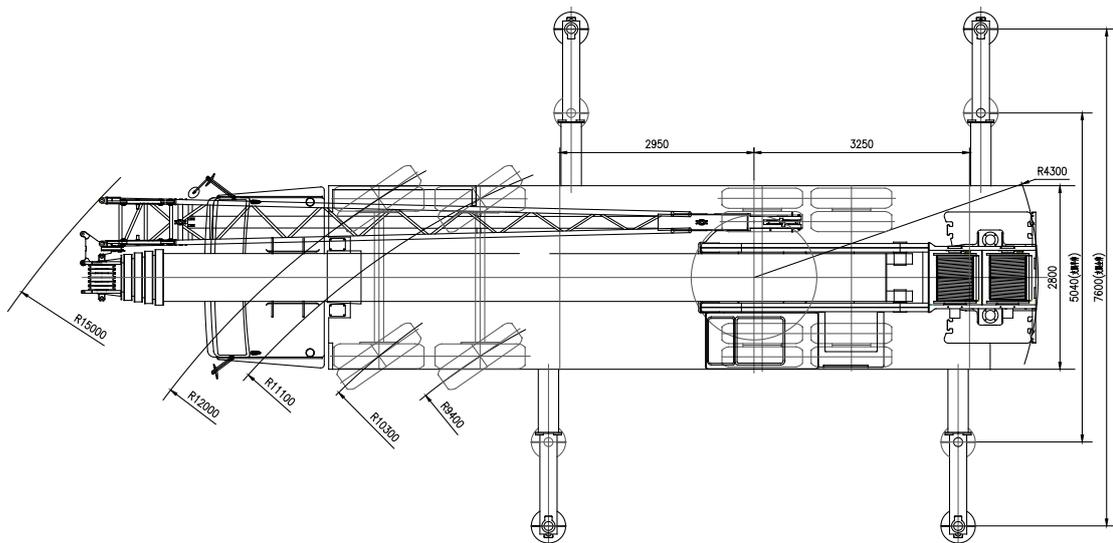


Fig. 01 - 10 - 02

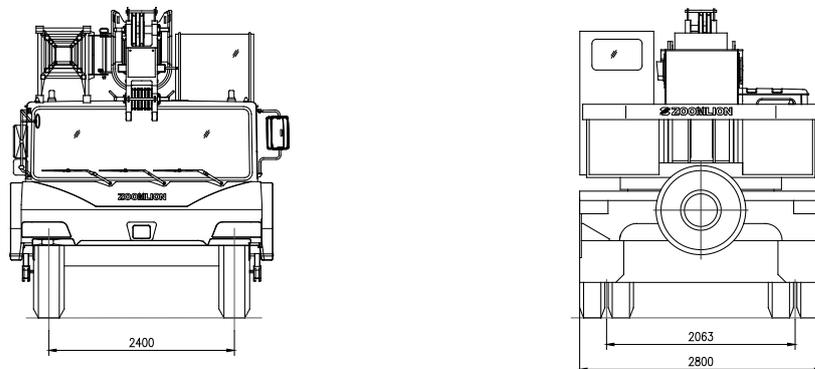


Fig. 01 - 10 - 03

1.3.2 Technical data

Item		Value	Remarks	
Work performance	Max. rated lifting capacity	kg	80000	
	Max. load moment of basic boom	kN.m	2940	
	Max. load moment of main boom (fully extended)	kN.m	1440	
	Max. lifting height of basic boom	m	13.2	
	Max. lifting height of main boom (fully extended)	m	47.2	These parameters do not include deflection of boom and jib.
	Max. lifting height of jib	m	64.5	
	Max. hoist rope speed (main winch)	m/min	130	Drum 4 th layer
	Max. hoist rope speed (auxiliary winch)	m/min	110	Drum 2 nd layer
	Boom derricking up time	s	70	
	Boom telescoping out time	s	140	
	Slewing speed	r/min	0 - 2.2	
Driving	Max. driving speed	km/h	75	
	Max. gradeability	%	38	
	Min. turning diameter	m	≤24	
	Min. ground clearance	mm	270	
	Limits for exhaust pollutants and smoke		Conform to related standard	GB3847-2005/ GB17691-2005 (National standard III)
	Oil consumption per hundred kilometers	L	52	
	Front / rear overhang angle	°	20/12	
	Brake distance	m	≤10	Initial speed 30km/h
Mass	Deadweight in driving condition	kg	50000	
	Complete vehicle kerb mass	kg	49870	
	Front axle load	kg	24000	
	Rear axle load	kg	26000	

Item		Value	Remarks	
Dimensions	Overall dimensions (L x W x H)	mm	14600x2800x3800	
	Outrigger spread (L)	m	6.20	
	Outrigger spread (W)	m	Fully extended:7.06, Intermediately extended:5.04	
	Main boom length	m	12.1 - 46.5	
	Boom angle	°	-2 - 80	
	Jib length	m	10.3, 17.5	
	Offset	°	0, 30	
	Front / rear overhang	mm	2718/2519	
	Number of axles		4	
	Wheelbase	mm	1530+4270+1350	
	Treads	Front	mm	2400
		Rear	mm	2063
	Tail slewing radius	mm	4300	
Engine	Model		WP12.375N	
	Type		6-cylinder in line, turbo-charged, inter-cooling	
	Fuel type		Light diesel oil	
	Displacement	ml	11596	
	Rated power / RPM	kW/r/min	276/1900	
	Max. torque / RPM	N.m/r/min	1800/1000 - 1400	
Transmission	Model		10JSD180A	
	Type		Mechanical stepped speed change	
	Operating method		Mechanical manual operation	
	Number of speeds		10 forward and 2 reverse speeds	
	Speed ratio		Forward speeds: 11.03 / 8.12 / 5.98 / 4.46 / 3.30 / 2.47 / 1.83 / 1.34 / 1.00 / 0.74. Reverse speed: 10.55 / 2.37	

Item		Value	Remarks	
Steering system	Steering type	Steering wheel		
	Outer diameter of steering wheel	mm 480		
	Steering column	Universal coupling		
	Steering gear	Model	SF100-01	
		Type	Integral circulating ball-type hydraulic booster steering gear	
	Steering pump	Model	QC40/15-WP12	
		Type	Gear pump	
Drive axle	Drive type	8x4		
	Speed ratio	6.723		
Number of leaf springs (front /rear)		12/12/10		
Cab capacity		2		
Fuel tank capacity		L 300		
Hydraulic oil tank capacity		L 900		

1.3.3 Work parameters

- **Max. support strength per outrigger**

When the crane is working within the rated lifting capacities, the max. support strength per outrigger is 82.5 t.

- **Rope specification and length**

	Standard code	Specification	Length(mm)
Main hoist rope	GB8918-2006	4V*48S+5FC-20.0-1870-left-hand ordinary lay	220000
Auxiliary hoist rope	GB 8918-2006	4V*48S+5FC-20.0-1870-left-hand ordinary lay	140000

- **Standard rope reevings for various boom lengths**

Boom length (m)	12.1	12.1 - 16.4	16.4 - 20.7	20.7 - 27.2	27.2 - 33.6
Reeving	12	11	8	6	5
Boom length (m)	33.6 - 40.1	40.1 - 46.5	46.5+10.3	46.5+17.5	
Reeving	4	3	1	1	

 **CAUTION**

- (1) If rope reevings are less than the value listed in the above tables during lifting, check the load on single wire rope to make sure that it is no more than the max. permissible lifting capacity of single wire rope.
- (2) Max. permissible lifting capacity of single wire rope is 6000 kg.

1.3.4 Lifting capacity tables

Table 1

Unit: kg

Working radius (m)	Main boom (m)						
	Outriggers and telescoping cylinder I fully extended, over sides and rear, with 3t counterweight assembled						
	12.1	16.4	20.7	27.2	33.6	40.1	46.5
3.0	80000*	65000					
3.5	75000*	61000	44000				
4.0	67000	57000	44000				
4.5	62000	54000	44000	32000			
5.0	54000	49000	42000	32000			
5.5	48000	46000	39000	31000	25000		
6.0	45000	43000	37000	30000	24000		
7.0	35000	34000	33500	27500	22000		
8.0	26000	25500	25000	24500	20000	17000	
9.0	20400	20000	19500	21300	18600	15500	
10.0		16000	15500	17200	17200	14500	12500
11.0		12800	12500	14000	15200	13300	12000
12.0		10400	10100	11600	12600	12500	11000
14.0			6700	8100	9000	9700	9900
16.0			4500	5700	6600	7200	7900
18.0				4100	5000	5600	6000
20.0				3000	3700	4200	4800
22.0				2000	2700	3300	3700
24.0					2000	2400	2800
26.0					1300	1800	2200
28.0						1200	1700
30.0							1200
32.0							
34.0							
36.0							
I	0	4.3	8.6	8.6	8.6	8.6	8.6
II	0	0	0	6.5	12.9	19.4	25.8
Reeving	12	11	8	6	5	4	3
Hook	70t hook						

Table 2

Unit: Kg

Working radius m	Main boom (m)					
	Outriggers fully extended and telescopic cylinder I intermediately extended, over sides and rear, with 3t counterweight assembled					
	12.1	16.4	22.9	29.3	35.8	42.2
3.0	80000*	65000	32000			
3.5	75000*	61000	32000			
4.0	67000	57000	32000			
4.5	62000	54000	32000			
5.0	54000	49000	32000	27000		
5.5	48000	46000	31000	26000		
6.0	45000	43000	30000	25000		
7.0	35000	34000	29000	24000	19000	
8.0	26000	25500	27000	23000	18000	
9.0	20400	20000	21800	22000	16800	13000
10.0		16000	17700	18800	15600	12500
11.0		12800	14600	15600	14500	12000
12.0		10400	12200	13100	13600	11000
14.0			8700	9500	10200	9900
16.0			6200	7100	7800	8000
18.0			4600	5400	6000	6100
20.0				4200	4700	5000
22.0				3200	3700	4000
24.0				2400	2900	3200
26.0					2200	2500
28.0					1600	2000
30.0					1100	1500
32.0						1100
34.0						
36.0						
I	0	4.3	4.3	4.3	4.3	4.3
II	0	0	6.5	12.9	19.4	25.8
Reeving	12	11	6	5	4	3
Hook	70t hook					

Table 3

Unit: Kg

Working radius m	Main boom (m)				
	Outriggers fully extended and telescopic cylinder I fully retracted, over sides and rear, with 3t counterweight assembled				
	12.1	18.6	25.0	31.5	37.9
3.0	80000*	32000			
3.5	75000*	32000			
4.0	67000	32000	28000		
4.5	62000	32000	28000		
5.0	54000	32000	27000		
5.5	48000	31000	26000	20000	
6.0	45000	30000	25000	19000	
7.0	35000	29000	24000	18000	
8.0	26000	27000	22200	17000	13000
9.0	20400	22800	20800	16000	13000
10.0		18600	19400	15000	12500
11.0		15400	16200	13800	12000
12.0		13000	13800	12800	11000
14.0		9400	10200	10800	9600
16.0			7900	8300	8500
18.0			6100	6600	6900
20.0			4800	5200	5500
22.0				4200	4600
24.0				3400	3700
26.0				2800	3000
28.0					2400
30.0					2000
32.0					1600
34.0					
36.0					
I	0	0	0	0	0
II	0	6.5	12.9	19.4	25.8
Reeving	12	6	5	4	3
Hook	70t hook				

Table 4

Unit: Kg

Working radius m	Main boom (m)						
	Outriggers intermediately extended and telescopic cylinder I fully extended, over sides and rear, with 3t counterweight assembled						
	12.1	16.4	20.7	27.2	33.6	40.1	46.5
3.0	70000	62000					
3.5	67000	60000	44000				
4.0	60000	54000	42000				
4.5	45600	42000	40000	32000			
5.0	36000	34000	32000	31000			
5.5	29000	28000	26500	27000	25000		
6.0	24000	23000	22300	23200	23500		
7.0	17000	16200	16000	17500	18000		
8.0	12800	12200	11700	13400	14200	14400	
9.0	9900	9300	8900	10300	11500	12000	
10.0		7200	6900	8200	9200	9700	10000
11.0		5500	5200	6600	7500	8000	8600
12.0		4200	3900	5300	6100	6800	7200
14.0			2000	3300	4100	4700	5100
16.0				2000	2700	3200	3600
18.0					1700	2100	2500
20.0						1400	1800
22.0							1100
24.0							
26.0							
28.0							
I	0	4.3	8.6	8.6	8.6	8.6	8.6
II	0	0	0	6.5	12.9	19.4	25.8
Reeving	12	11	8	6	5	4	3
Hook	70t hook						

Table 5

Unit: Kg

Working radius m	Main boom (m)					
	Outriggers and telescopic cylinder I intermediately extended, over sides and rear, with 3t counterweight assembled					
	12.1	16.4	22.9	29.3	35.8	42.2
3.0	70000	62000	32000			
3.5	67000	60000	32000			
4.0	60000	54000	32000			
4.5	45600	42000	32000			
5.0	36000	34000	31000	27000		
5.5	29000	28000	28000	26000		
6.0	24000	23000	24400	24500		
7.0	17000	16200	18200	19000	18500	
8.0	12800	12200	13800	14900	15400	
9.0	9900	9300	10800	11800	12400	12000
10.0		7200	8700	9500	10200	10600
11.0		5500	7000	7900	8400	9000
12.0		4200	5700	6500	7100	7500
14.0			3800	4600	5000	5400
16.0			2300	3100	3600	4000
18.0			1300	2100	2500	2900
20.0				1300	1800	2100
22.0					1100	1500
24.0						1000
26.0						
28.0						
I	0	4.3	4.3	4.3	4.3	4.3
II	0	0	6.5	12.9	19.4	25.8
Reeving	12	11	6	5	4	3
Hook	70t hook					

Table 6

Unit: Kg

Working radius m	Main boom (m)				
	Outriggers intermediately extended and telescopic cylinder I fully retracted, over sides and rear, with 3t counterweight assembled				
	12.1	18.6	25.0	31.5	37.9
3.0	70000	32000			
3.5	67000	32000			
4.0	60000	32000	28000		
4.5	45600	32000	28000		
5.0	36000	32000	27000		
5.5	29000	30000	26000	20000	
6.0	24000	26000	25000	19000	
7.0	17000	19000	20000	18000	
8.0	12800	14700	15700	16400	13000
9.0	9900	11700	12600	13100	12000
10.0		9500	10200	10800	11000
11.0		7700	8600	9100	9400
12.0		6400	7200	7700	8000
14.0		4400	5100	5600	5900
16.0			3800	4200	4400
18.0			2700	3100	3400
20.0			1800	2200	2500
22.0				1600	1800
24.0				1000	1400
26.0					1000
28.0					
I	0	0	0	0	0
II	0	6.5	12.9	19.4	25.8
Reeving	12	6	5	4	3
Hook	70t hook				

Table 7

Unit: Kg

Working radius m	Main boom (m)						
	Outriggers and telescopic cylinder I fully extended, over sides and rear, with 3t fixed counterweight and 2.5t movable counterweight assembled						
	12.1	16.4	20.7	27.2	33.6	40.1	46.5
3.0	80000*	65000					
3.5	75000*	62000	44000				
4.0	68000	59000	44000				
4.5	63000	58000	44000	32000			
5.0	55000	51000	42000	32000			
5.5	50000	47000	39000	31000	25000		
6.0	47000	44000	37000	30000	24000		
7.0	38000	37500	33500	27500	22000		
8.0	29000	28400	27800	24500	20000	17000	
9.0	22500	22400	21800	23000	18800	15500	
10.0		18100	17600	19500	17400	14500	12500
11.0		14800	14400	16100	16100	13300	12000
12.0		12200	12100	13400	14500	12500	11000
14.0			8400	9600	10500	10500	10000
16.0			5900	7100	8000	8500	8900
18.0				5200	6100	6700	7100
20.0				4000	4600	5200	5600
22.0				2900	3500	4100	4500
24.0					2600	3100	3500
26.0					2000	2400	2850
28.0					1400	1900	2250
30.0						1300	1650
32.0							1300
34.0							
36.0							
I	0	4.3	8.6	8.6	8.6	8.6	8.6
II	0	0	0	6.5	12.9	19.4	25.8
Reeving	12	11	8	6	5	4	3
Hook	70t hook						

Table 8

Unit: Kg

Working radius m	Main boom (m)					
	Outriggers fully extended and telescopic cylinder I intermediately extended, over sides and rear, with 3t fixed counterweight and 2.5t movable counterweight assembled					
	12.1	16.4	22.9	29.3	35.8	42.2
3.0	80000*	65000	32000			
3.5	75000*	62000	32000			
4.0	68000	59000	32000			
4.5	63000	58000	32000			
5.0	55000	51000	32000	27000		
5.5	50000	47000	31000	26000		
6.0	47000	44000	30000	25000		
7.0	38000	37500	29000	24000	19000	
8.0	29000	28400	28000	23000	18000	
9.0	22500	22400	24200	22000	16800	13000
10.0		18100	19700	20500	15600	12500
11.0		14800	16500	17500	14500	12000
12.0		12200	13800	15000	13600	11000
14.0			10100	11000	11600	10000
16.0			7600	8400	9000	9000
18.0			5700	6500	7100	7500
20.0				5100	5600	6000
22.0				4000	4500	4800
24.0				3000	3600	3950
26.0					2850	3150
28.0					2250	2550
30.0					1700	2050
32.0						1600
34.0						1200
36.0						
I	0	4.3	4.3	4.3	4.3	4.3
II	0	0	6.5	12.9	19.4	25.8
Reeving	12	11	6	5	4	3
Hook	70t hook					

Table 9

Unit: Kg

Working radius m	Main boom (m)				
	Outriggers fully extended and telescopic cylinder I fully retracted, over sides and rear, with 3t fixed counterweight and 2.5t movable counterweight assembled				
	12.1	18.6	25.0	31.5	37.9
3.0	80000*	32000			
3.5	75000*	32000			
4.0	68000	32000	28000		
4.5	63000	32000	28000		
5.0	55000	32000	27000		
5.5	50000	31000	26000	20000	
6.0	47000	30000	25000	19000	
7.0	38000	29000	24000	18000	
8.0	29000	28000	22200	17000	13000
9.0	22500	25000	20800	16000	13000
10.0		20600	19800	15000	12500
11.0		17300	18100	13800	12000
12.0		14600	15600	12800	11000
14.0		10700	11600	11200	9600
16.0			9000	9500	8600
18.0			7100	7500	7600
20.0			5600	6100	6400
22.0				5000	5300
24.0				4100	4400
26.0				3300	3600
28.0					3000
30.0					2400
32.0					2000
34.0					
36.0					
I	0	0	0	0	0
II	0	6.5	12.9	19.4	25.8
Reeving	12	6	5	4	3
Hook	70t hook				

Table 10

Unit: Kg

Working radius m	Main boom (m)						
	Outriggers intermediately extended and telescopic cylinder I fully extended, over sides and rear, with 3t fixed counterweight and 2.5t movable counterweight assembled						
	12.1	16.4	20.7	27.2	33.6	40.1	46.5
3.0	70000	62000					
3.5	67000	60000	44000				
4.0	61000	57000	44000				
4.5	51000	47500	44000	32000			
5.0	40000	38000	36000	32000			
5.5	32000	31500	30000	30000	25000		
6.0	23500	23000	25500	26500	24000		
7.0	19400	18700	18500	20200	20400		
8.0	14700	14000	13800	15400	16200	16700	
9.0	11400	11000	10600	12100	13200	13700	
10.0		8600	8300	9700	10600	11300	11700
11.0		6800	6500	8000	8800	9400	9800
12.0		5400	5000	6500	7300	7900	8400
14.0			3000	4300	5000	5600	6100
16.0			1500	2800	3500	4100	4400
18.0				1500	2400	2900	3200
20.0					1500	2000	2400
22.0						1300	1500
24.0							1000
26.0							
28.0							
I	0	4.3	8.6	8.6	8.6	8.6	8.6
II	0	0	0	6.5	12.9	19.4	25.8
Reeving	12	11	8	6	5	4	3
Hook	70t hook						

Table 11

Unit: Kg

Working radius m	Main boom (m)					
	Outriggers and telescopic cylinder I intermediately extended, over sides and rear, with 3t fixed counterweight and 2.5t movable counterweight assembled					
	12.1	16.4	22.9	29.3	35.8	42.2
3.0	70000	62000	32000			
3.5	67000	60000	32000			
4.0	61000	57000	32000			
4.5	51000	47500	32000			
5.0	40000	38000	32000	27000		
5.5	32000	31500	31000	26000		
6.0	23500	23000	27500	25000		
7.0	19400	18700	20700	21200	19000	
8.0	14700	14000	15900	16900	17400	
9.0	11400	11000	12600	13500	14200	13000
10.0		8600	10100	11100	11800	12000
11.0		6800	8300	9100	9800	10200
12.0		5400	6900	7700	8300	8700
14.0			4700	5500	6000	6400
16.0			3200	4000	4500	4800
18.0			2000	2800	3200	3700
20.0				2000	2400	2700
22.0					1600	2000
24.0						1500
26.0						
28.0						
I	0	4.3	4.3	4.3	4.3	4.3
II	0	0	6.5	12.9	19.4	25.8
Reeving	12	11	6	5	4	3
Hook	70t hook					

Table 12

Unit: Kg

Working radius m	Main boom (m)				
	Outriggers intermediately extended and telescopic cylinder I fully retracted, over sides and rear, with 3t fixed counterweight and 2.5t movable counterweight assembled				
	12.1	18.6	25.0	31.5	37.9
3.0	70000	32000			
3.5	67000	32000			
4.0	61000	32000	28000		
4.5	51000	32000	28000		
5.0	40000	32000	27000		
5.5	32000	31000	26000	20000	
6.0	23500	29000	25000	19000	
7.0	19400	21600	22500	18000	
8.0	14700	16800	17700	17000	13000
9.0	11400	13400	14300	14800	13000
10.0		10900	11900	12300	12200
11.0		9100	9900	10400	10800
12.0		7600	8400	8900	9300
14.0		5400	6200	6600	6900
16.0			4600	5000	5400
18.0			3400	3800	4100
20.0			2500	2900	3200
22.0				2200	2400
24.0				1600	1800
26.0				1100	1300
28.0					1000
I	0	0	0	0	0
II	0	6.5	12.9	19.4	25.8
Reeving	12	6	5	4	3
Hook	70t hook				

Table 13

Unit: Kg

Working radius m	Main boom (m)						
	Outriggers and telescopic cylinder I fully extended, over sides and rear, with 3t fixed counterweight and 5.5t movable counterweight assembled						
	12.1	16.4	20.7	27.2	33.6	40.1	46.5
3.0	80000*	65000					
3.5	75000*	63000	44000				
4.0	68000	61000	44000				
4.5	64000	60000	44000	32000			
5.0	57000	54000	42000	32000			
5.5	52000	50000	40000	31000	25000		
6.0	48000	45000	38000	30000	24000		
7.0	40000	39000	33700	28000	22000		
8.0	32000	31500	30200	25000	20000	17000	
9.0	25500	25000	24800	23200	18800	15800	
10.0		20400	20100	21600	17500	14800	12500
11.0		17000	16700	18100	16200	13600	12000
12.0		14400	14100	15300	15000	12800	11000
14.0			9900	11300	12300	11400	10000
16.0			7100	8500	9400	10000	9000
18.0				6400	7300	7900	8000
20.0				4900	5700	6200	6700
22.0				3700	4500	5100	5500
24.0					3500	4100	4400
26.0					2700	3300	3700
28.0					2100	2600	3000
30.0						2000	2400
32.0						1500	1800
34.0						1000	1300
36.0							1000
I	0	4.3	8.6	8.6	8.6	8.6	8.6
II	0	0	0	6.5	12.9	19.4	25.8
Reeving	12	11	8	6	5	4	3
Hook	70t hook						

Table 14

Unit: Kg

Working radius m	Main boom (m)					
	Outriggers fully extended and telescopic cylinder I intermediately extended, over sides and rear, with 3t fixed counterweight and 5.5t movable counterweight assembled					
	12.1	16.4	22.9	29.3	35.8	42.2
3.0	80000*	65000	32000			
3.5	75000*	63000	32000			
4.0	68000	61000	32000			
4.5	64000	60000	32000			
5.0	57000	54000	32000	27000		
5.5	52000	50000	31000	26000		
6.0	48000	45000	30000	25000		
7.0	40000	39000	29000	24000	19000	
8.0	32000	31500	28000	23000	18000	
9.0	25500	25000	27000	22000	16800	13000
10.0		20400	22200	21000	15600	12500
11.0		17000	18600	19600	14500	12000
12.0		14400	15800	16800	13600	11000
14.0			11700	12700	12000	10000
16.0			8900	9800	10400	9000
18.0			6900	7700	8300	8000
20.0				6100	6700	7000
22.0				5000	5300	5800
24.0				4000	4400	4800
26.0					3600	3900
28.0					2900	3200
30.0					2300	2600
32.0						2100
34.0						1700
36.0						1300
I	0	4.3	4.3	4.3	4.3	4.3
II	0	0	6.5	12.9	19.4	25.8
Reeving	12	11	6	5	4	3
Hook	70t hook					

Table 15

Unit: Kg

Working radius m	Main boom (m)				
	Outriggers fully extended and telescopic cylinder I fully retracted, over sides and rear, with 3t fixed counterweight and 5.5t movable counterweight assembled				
	12.1	18.6	25.0	31.5	37.9
3.0	80000*	32000			
3.5	75000*	32000			
4.0	68000	32000	28000		
4.5	64000	32000	28000		
5.0	57000	32000	27000		
5.5	52000	31000	26000	20000	
6.0	48000	30000	25000	19000	
7.0	40000	29000	24000	18000	
8.0	32000	28000	22200	17000	13000
9.0	25500	26800	20800	16000	13000
10.0		23000	19800	15000	12500
11.0		19400	18800	14000	12000
12.0		16600	17400	13000	11000
14.0		12600	13300	11400	9600
16.0			10400	10200	8600
18.0			8300	8800	7600
20.0			6700	7200	6900
22.0				6000	6200
24.0				5000	5200
26.0				4200	4400
28.0					3700
30.0					3100
32.0					2600
34.0					
36.0					
I	0	0	0	0	0
II	0	6.5	12.9	19.4	25.8
Reeving	12	6	5	4	3
Hook	70t hook				

Table 16

Unit: Kg

Working radius m	Main boom (m)						
	Outriggers intermediately extended and telescopic cylinder I fully extended, over sides and rear, with 3t fixed counterweight and 5.5t movable counterweight assembled						
	12.1	16.4	20.7	27.2	33.6	40.1	46.5
3.0	70000	62000					
3.5	67000	62000	44000				
4.0	62000	60000	44000				
4.5	55000	55000	44000	32000			
5.0	46300	44000	42000	32000			
5.5	37400	37600	35000	31000	25000		
6.0	31100	30200	29600	30000	24000		
7.0	22700	22000	21600	23300	22000		
8.0	17400	16800	16400	18100	19000	17000	
9.0	13800	13200	12800	14400	15400	15800	
10.0		10400	10200	11600	12800	13300	12200
11.0		8400	8100	9500	10600	11100	11500
12.0		7000	6500	8000	8800	9500	9900
14.0			4200	5500	6300	6900	7400
16.0			2500	3800	4600	5100	5600
18.0				2500	3300	3800	4200
20.0				1500	2300	2800	3200
22.0					1500	2000	2400
24.0						1400	1800
26.0							1200
28.0							
I	0	4.3	8.6	8.6	8.6	8.6	8.6
II	0	0	0	6.5	12.9	19.4	25.8
Reeving	12	11	8	6	5	4	3
Hook	70t hook						

Table 17

Unit: Kg

Working radius m	Main boom (m)					
	Outriggers and telescopic cylinder I intermediately extended, over sides and rear, with 3t fixed counterweight and 5.5t movable counterweight assembled					
	12.1	16.4	22.9	29.3	35.8	42.2
3.0	70000	62000	32000			
3.5	67000	62000	32000			
4.0	62000	60000	32000			
4.5	55000	55000	32000			
5.0	46300	44000	32000	27000		
5.5	37400	37600	31000	26000		
6.0	31100	30200	30000	25000		
7.0	22700	22000	24000	24000	19000	
8.0	17400	16800	18600	19700	18000	
9.0	13800	13200	14900	15900	16500	13000
10.0		10400	12100	13100	13500	12200
11.0		8400	10000	10900	11500	11500
12.0		7000	8400	9200	9800	10200
14.0			5900	6700	7300	7700
16.0			4200	5000	5500	5800
18.0			2900	3700	4200	4500
20.0				2700	3200	3500
22.0				2000	2400	2700
24.0				1300	1800	2000
26.0					1100	1500
28.0						1100
I	0	4.3	4.3	4.3	4.3	4.3
II	0	0	6.5	12.9	19.4	25.8
Reeving	12	11	6	5	4	3
Hook	70t hook					

Table 18

Unit: Kg

Working radius m	Main boom (m)				
	Outriggers intermediately extended and telescopic cylinder I fully retracted, over sides and rear, with 3t fixed counterweight and 5.5t movable counterweight assembled				
	12.1	18.6	25.0	31.5	37.9
3.0	70000	32000			
3.5	67000	32000			
4.0	62000	32000	28000		
4.5	55000	32000	28000		
5.0	46300	32000	27000		
5.5	37400	31000	26000	20000	
6.0	31100	30000	25000	19000	
7.0	22700	24900	24000	18000	
8.0	17400	19500	20400	17000	13000
9.0	13800	15600	16600	16000	13000
10.0		12800	13800	14300	12200
11.0		10700	11500	12000	11800
12.0		9100	9900	10300	10600
14.0		6600	7400	7800	8200
16.0			5600	6000	6400
18.0			4300	4600	5000
20.0			3300	3600	4000
22.0				2900	3200
24.0				2200	2500
26.0				1700	2000
28.0					1500
I	0	0	0	0	0
II	0	6.5	12.9	19.4	25.8
Reeving	12	6	5	4	3
Hook	70t hook				

Table 19

Unit: Kg

Working radius m	Main boom (m)						
	Outriggers and telescopic cylinder I fully extended, over sides and rear, with 3t fixed counterweight and 8.5t movable counterweight assembled						
	12.1	16.4	20.7	27.2	33.6	40.1	46.5
3.0	80000*	65000					
3.5	75000*	63000	44000				
4.0	68000	61000	44000				
4.5	65000	60000	44000	32000			
5.0	58000	54000	42000	32000			
5.5	54000	50000	40000	31000	25000		
6.0	50000	46000	38000	30000	24000		
7.0	41500	40000	33700	28000	22000		
8.0	35000	34500	30200	25000	20000	17000	
9.0	28000	27300	27300	23200	18800	15800	
10.0		22600	22000	21700	17500	14800	12500
11.0		19000	18500	19900	16200	13600	12000
12.0		16000	15600	17000	15100	12800	11000
14.0			11400	12800	13200	11400	10000
16.0			8400	9800	10700	10000	9000
18.0				7600	8400	9000	8000
20.0				5900	6700	7300	7200
22.0				4700	5400	6000	6400
24.0					4400	4900	5200
26.0					3500	4000	4400
28.0					2700	3200	3600
30.0						2600	3000
32.0						2100	2400
34.0						1600	2000
36.0							1500
I	0	4.3	8.6	8.6	8.6	8.6	8.6
II	0	0	0	6.5	12.9	19.4	25.8
Reeving	12	11	8	6	5	4	3
Hook	70t hook						

Table 20

Unit: Kg

Working radius m	Main boom (m)					
	Outriggers fully extended and telescopic cylinder I intermediately extended, over sides and rear, with 3t fixed counterweight and 8.5t movable counterweight assembled					
	12.1	16.4	22.9	29.3	35.8	42.2
3.0	80000*	65000	32000			
3.5	75000*	63000	32000			
4.0	68000	61000	32000			
4.5	65000	60000	32000			
5.0	58000	54000	32000	27000		
5.5	54000	50000	31000	26000		
6.0	50000	46000	30000	25000		
7.0	41500	40000	29000	24000	19000	
8.0	35000	34500	28000	23000	18000	
9.0	28000	27300	27000	22000	16800	13000
10.0		22600	24500	21000	15600	12500
11.0		19000	20500	20200	14500	12000
12.0		16000	17500	18500	13600	11000
14.0			13200	14200	12000	10000
16.0			10200	11200	11000	9100
18.0			8000	8900	9400	8200
20.0				7200	7700	7400
22.0				5800	6300	6600
24.0				4800	5200	5600
26.0					4400	4700
28.0					3600	4000
30.0					3000	3300
32.0						2800
34.0						2300
36.0						1900
I	0	4.3	4.3	4.3	4.3	4.3
II	0	0	6.5	12.9	19.4	25.8
Reeving	12	11	6	5	4	3
Hook	70t hook					

Table 21

Unit: Kg

Working radius m	Main boom (m)				
	Outriggers fully extended and telescopic cylinder I fully retracted, over sides and rear, with 3t fixed counterweight and 8.5t movable counterweight assembled				
	12.1	18.6	25.0	31.5	37.9
3.0	80000*	32000			
3.5	75000*	32000			
4.0	68000	32000	28000		
4.5	65000	32000	28000		
5.0	58000	32000	27000		
5.5	54000	31000	26000	20000	
6.0	50000	30000	25000	19000	
7.0	41500	29000	24000	18000	
8.0	35000	28000	22800	17000	13000
9.0	28000	27000	21500	16000	13000
10.0		25000	20200	15000	12500
11.0		21400	19100	14000	12000
12.0		18400	18100	13200	11000
14.0		14000	14700	11600	9600
16.0			11800	10400	8700
18.0			9500	9300	7700
20.0			7800	8200	6900
22.0				6900	6200
24.0				5800	5700
26.0				4900	5200
28.0					4400
30.0					3800
32.0					3200
34.0					
36.0					
I	0	0	0	0	0
II	0	6.5	12.9	19.4	25.8
Reeving	12	6	5	4	3
Hook	70t hook				

Table 22

Unit: Kg

Working radius m	Main boom (m)						
	Outriggers intermediately extended and telescopic cylinder I fully extended, over sides and rear, with 3t fixed counterweight and 8.5t movable counterweight assembled						
	12.1	16.4	20.7	27.2	33.6	40.1	46.5
3.0	70000	62000					
3.5	67000	62000	44000				
4.0	64000	60000	44000				
4.5	57000	55000	44000	32000			
5.0	50000	49000	42000	32000			
5.5	42000	41000	39000	31000	25000		
6.0	34900	34000	33300	30000	24000		
7.0	25500	24800	24400	26200	22000		
8.0	19800	19100	18700	20500	20000	17000	
9.0	15800	15100	14600	16400	17400	15800	
10.0		12200	11600	13300	14400	14700	12500
11.0		9900	9700	11000	12000	12600	11500
12.0		8100	7900	9300	10100	10700	10000
14.0			5300	6600	7400	7900	8500
16.0			3400	4700	5500	6000	6500
18.0				3300	4000	4600	5000
20.0				2200	2900	3500	3900
22.0				1400	2100	2600	3000
24.0					1400	1900	2300
26.0						1300	1700
28.0							1200
I	0	4.3	8.6	8.6	8.6	8.6	8.6
II	0	0	0	6.5	12.9	19.4	25.8
Reeving	12	11	8	6	5	4	3
Hook	70t hook						

Table 23

Unit: Kg

Working radius m	Main boom (m)					
	Outriggers and telescopic cylinder I intermediately extended, over sides and rear, with 3t fixed counterweight and 8.5t movable counterweight assembled					
	12.1	16.4	22.9	29.3	35.8	42.2
3.0	70000	62000	32000			
3.5	67000	62000	32000			
4.0	64000	60000	32000			
4.5	57000	55000	32000			
5.0	50000	49000	32000	27000		
5.5	41500	41000	31000	26000		
6.0	34500	34000	30000	25000		
7.0	25500	24800	27000	24000	19000	
8.0	19800	19100	21000	22000	18000	
9.0	15800	15100	16800	17800	16800	13000
10.0		12200	13600	14800	15000	12500
11.0		9900	11500	12400	13000	11500
12.0		8100	9700	10500	11200	10500
14.0			7000	7900	8400	8900
16.0			5100	5900	6400	6800
18.0			3700	4500	4900	5400
20.0				3500	3800	4300
22.0				2600	3000	3400
24.0				1900	2300	2700
26.0					1700	2100
28.0					1200	1500
I	0	4.3	4.3	4.3	4.3	4.3
II	0	0	6.5	12.9	19.4	25.8
Reeving	12	11	6	5	4	3
Hook	70t hook					

Table 24

Unit: Kg

Working radius m	Main boom (m)				
	Outriggers intermediately extended and telescopic cylinder I fully retracted, over sides and rear, with 3t fixed counterweight and 8.5t movable counterweight assembled				
	12.1	18.6	25.0	31.5	37.9
3.0	70000	32000			
3.5	67000	32000			
4.0	64000	32000	28000		
4.5	57000	32000	28000		
5.0	50000	32000	27000		
5.5	41500	31000	26000	20000	
6.0	34500	30000	25000	19000	
7.0	25500	27800	24000	18000	
8.0	19800	21800	22800	17000	13000
9.0	15800	17700	18600	16000	13000
10.0		14700	15400	15000	12500
11.0		12300	13100	13500	12000
12.0		10500	11300	11600	11000
14.0		7700	8500	9000	9400
16.0			6600	7000	7400
18.0			5200	5600	5900
20.0			4000	4400	4700
22.0				3500	3800
24.0				2800	3100
26.0				2200	2500
28.0					2000
I	0	0	0	0	0
II	0	6.5	12.9	19.4	25.8
Reeving	12	6	5	4	3
Hook	70t hook				

Table 25

Unit: Kg

Boom angle °	Main boom (m) + jib (m)			
	Outriggers fully extended, over sides and rear, with 3t fixed counterweight assembled			
	46.5+10.3		46.5+17.5	
	0°	30°	0°	30°
80	6000	4000	3500	1500
78	6000	4000	3500	1500
76	6000	3800	3300	1400
74	5500	3600	3000	1300
72	5100	3500	2700	1300
70	4300	3200	2300	1200
68	3600	3000	2100	1100
66	3000	2500	1800	1000
64	2500	2100	1600	900
62	2000	1700	1500	900
60	1600	1400	1300	850
58	1300	1100	1000	800
56	900			
54				
52				
Reeving	1			
Hook	6t hook			

Table 26

Unit: Kg

Boom angle °	Main boom (m) + jib (m)			
	Outriggers fully extended, over sides and rear, with 3t fixed counterweight and 2.5t movable counterweight assembled			
	46.5+10.3		46.5+17.5	
	0°	30°	0°	30°
80	6000	4000	3500	1500
78	6000	4000	3500	1500
76	6000	3800	3300	1400
74	5500	3600	3000	1300
72	5100	3500	2700	1300
70	4700	3300	2400	1300
68	4200	3200	2200	1200
66	3500	2800	1900	1050
64	3000	2600	1700	950
62	2500	2200	1600	950
60	2100	1800	1500	950
58	1700	1500	1400	900
56	1400	1200	1100	900
54	1100	1000	800	
52	800			
Reeving	1			
Hook	6t hook			

Table 27

Unit: Kg

Boom angle °	Main boom (m) + jib (m)			
	Outriggers fully extended, over sides and rear, with 3t fixed counterweight and 5.5t movable counterweight assembled			
	46.5+10.3		46.5+17.5	
	0°	30°	0°	30°
80	6000	4000	3500	1500
78	6000	4000	3500	1500
76	6000	3800	3300	1400
74	5500	3600	3000	1300
72	5100	3500	2700	1300
70	4700	3300	2400	1300
68	4200	3200	2200	1200
66	3900	2900	2000	1100
64	3600	2800	1800	1000
62	3100	2600	1700	1000
60	2600	2300	1600	1000
58	2200	2000	1500	950
56	1900	1700	1400	950
54	1600	1400	1300	950
52	1300	1200	1000	850
Reeving	1			
Hook	6t hook			

Table 28

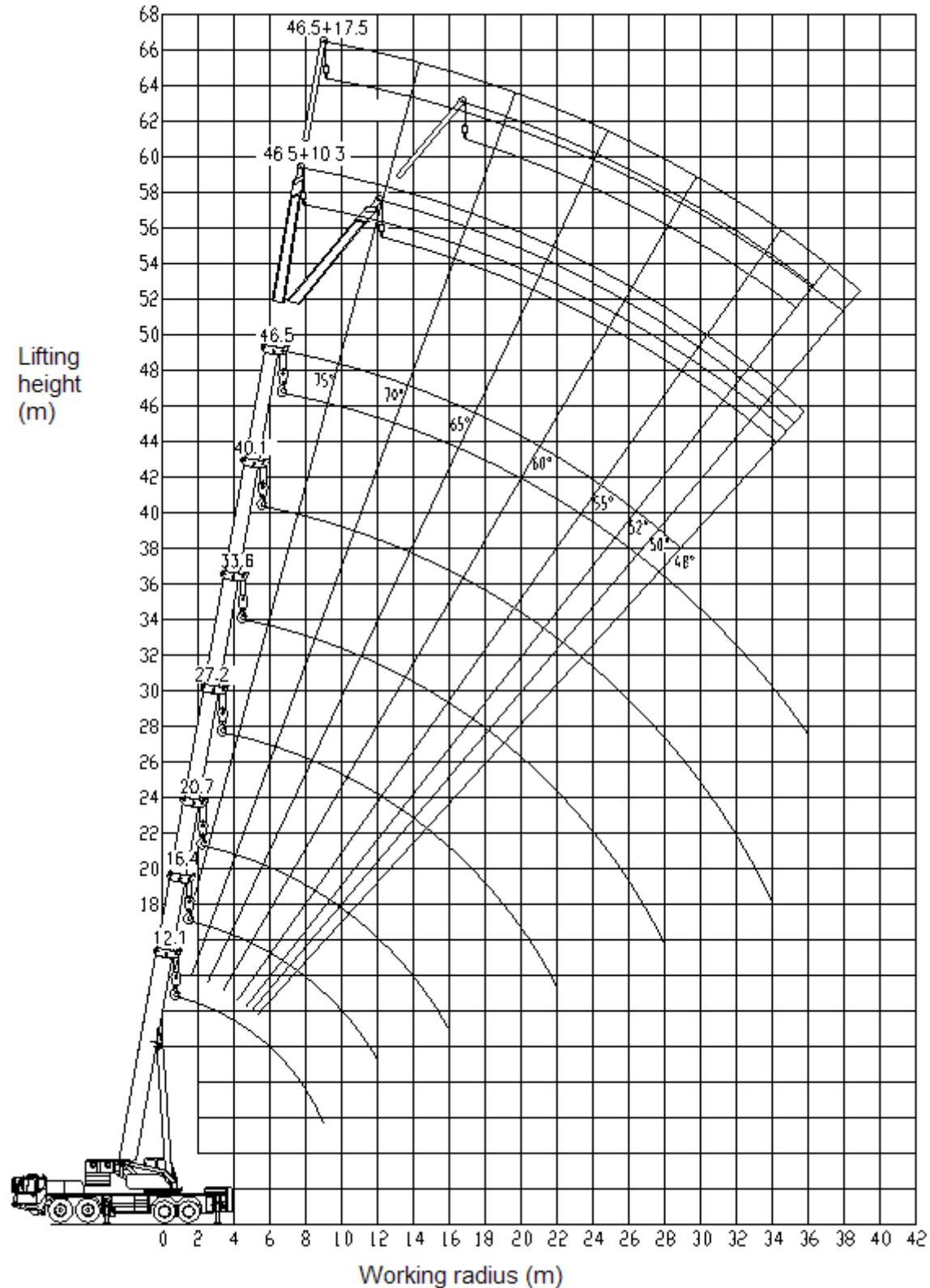
Unit: Kg

Boom angle °	Main boom (m) + jib (m)			
	Outriggers fully extended, over sides and rear, with 3t fixed counterweight and 8.5t movable counterweight assembled			
	46.5+10.3		46.5+17.5	
	0°	30°	0°	30°
80	6000	4000	3500	1500
78	6000	4000	3500	1500
76	6000	3800	3300	1400
74	5500	3600	3000	1300
72	5100	3500	2700	1300
70	4700	3300	2400	1300
68	4200	3200	2200	1200
66	4000	3000	2100	1200
64	3700	2900	1900	1100
62	3300	2700	1800	1100
60	2900	2400	1700	1100
58	2500	2300	1600	1000
56	2200	1900	1500	1000
54	1900	1700	1400	1000
52	1600	1400	1300	900
50	1300	1200	1200	
48	1100	1000		
Reeving	1			
Hook	6t hook			

 **NOTE**

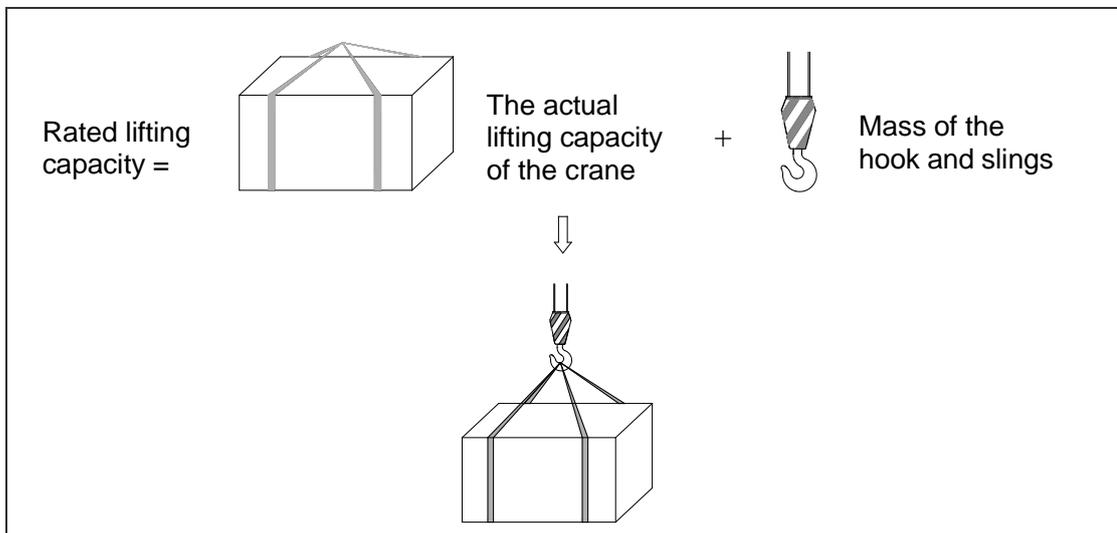
This crane is provided with several load capacity tables. The operator should select proper rated lifting load referring to resp. load capacity tables according to actual working conditions.

1.3.5 Lifting height chart



⚠ CAUTION

- (1) The sliding beams of outriggers must be extended (to a uniform length on both sides) to the extent stated in the load capacity table. The sliding beams must be secured by pins. All wheels must be raised clear of the ground.
- (2) Extend the 5th outrigger. The values given in the load capacity tables are suitable for full range operation.
- (3) The stated load capacities contain the weights of the load bearing, lifting and slinging tackle, such as main hook of 580 kg and auxiliary hook of 140 kg. The possible weight for the load to be lifted is therefore reduced according to the weights of the afore-mentioned tackle.



- (4) The working radius is the horizontal gravity center distance of the hook block from the rotational axis of the crane superstructure measured at the ground. The radius stated is valid under load conditions.
- (5) If the actual boom length and working radius are between two adjacent values given in the load capacity table, the bigger one should be referred to.

For example:

If the crane is working with 18 m long main boom and under 4.8 m working radius over sides and rear, the lifting capacity found out in the load capacity table of bigger values – 20.7 m long main boom and 5.0 m working radius - should be referred to. That is to say, the load capacity 42000 kg should be referred to.

- (6) If the jib is mounted on the main boom head during crane operation, then the possible load is reduced further corresponding weight of the jib (2250 kg).
- (7) The maximum lifting capacity for the rooster sheave is 6000 kg. If the rated lifting capacity found out in the load capacity table is less than 6000 kg according to the actual working conditions, the lifting capacity found out in the table should be referred to.

For example:

The rated lifting capacity is 6000 kg only when the crane is working with 27.2 m long main boom and under 6 m working radius.

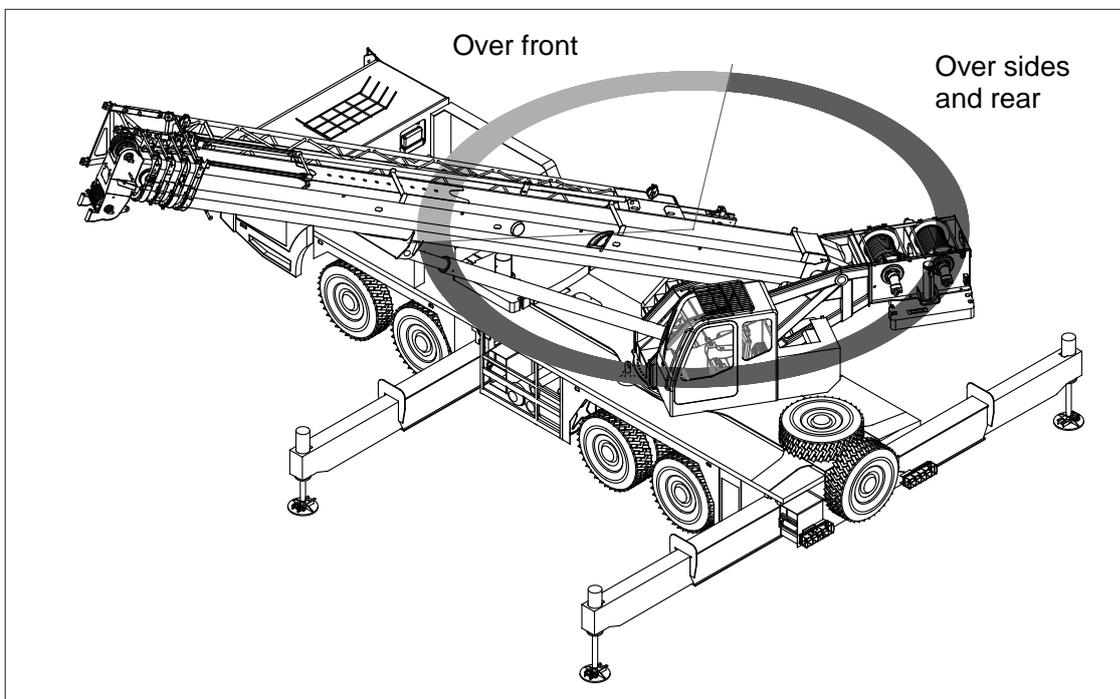
The rated lifting capacity is 5400 kg if the crane is working with 33.6 m long main boom and under 22 m working radius.

- (8) During operation, it is forbidden to lift a load with both main hook and auxiliary hook simultaneously.
- (9) All the working radius and lifting height in lifting height charts do not include the deflection of main boom and jib.
- (10) Mark * indicated in load capacity tables are the working condition, namely, over sides & rear and 14 reevings should be used. Besides, additional equipments should be assembled.

⚠ WARNING

If the boom is more than 30 m long, derrick main boom according to the lifting height chart, even if the crane is without a load. Otherwise, the crane may topple.

1.3.6 Working areas





OPERATOR' S MANUAL FOR TRUCK CRANE

Chapter 2 Safety



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.

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.
- c) The relevant persons should be trained to ensure safety operation. Initial commissioning and starting must only be undertaken by a competent person who has read and fully understands the information provided in the *Operator's Manual*.
- d) Comply with the safety signs on the crane to avoid serious injuries or casualties.
- e) All the assembly, commissioning, operation, maintenance and service of crane should only be carried out by special personnel.



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

2.1.2 Safety signs

- a) The locations of safety signs are as shown in Figure 02 – 01.
- 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!
 - 2) The safety signs on the potentially dangerous parts should be checked regularly. Once there is any fading or damage, modify or replace them immediately to ensure the signs are clean, complete, correct and legible.

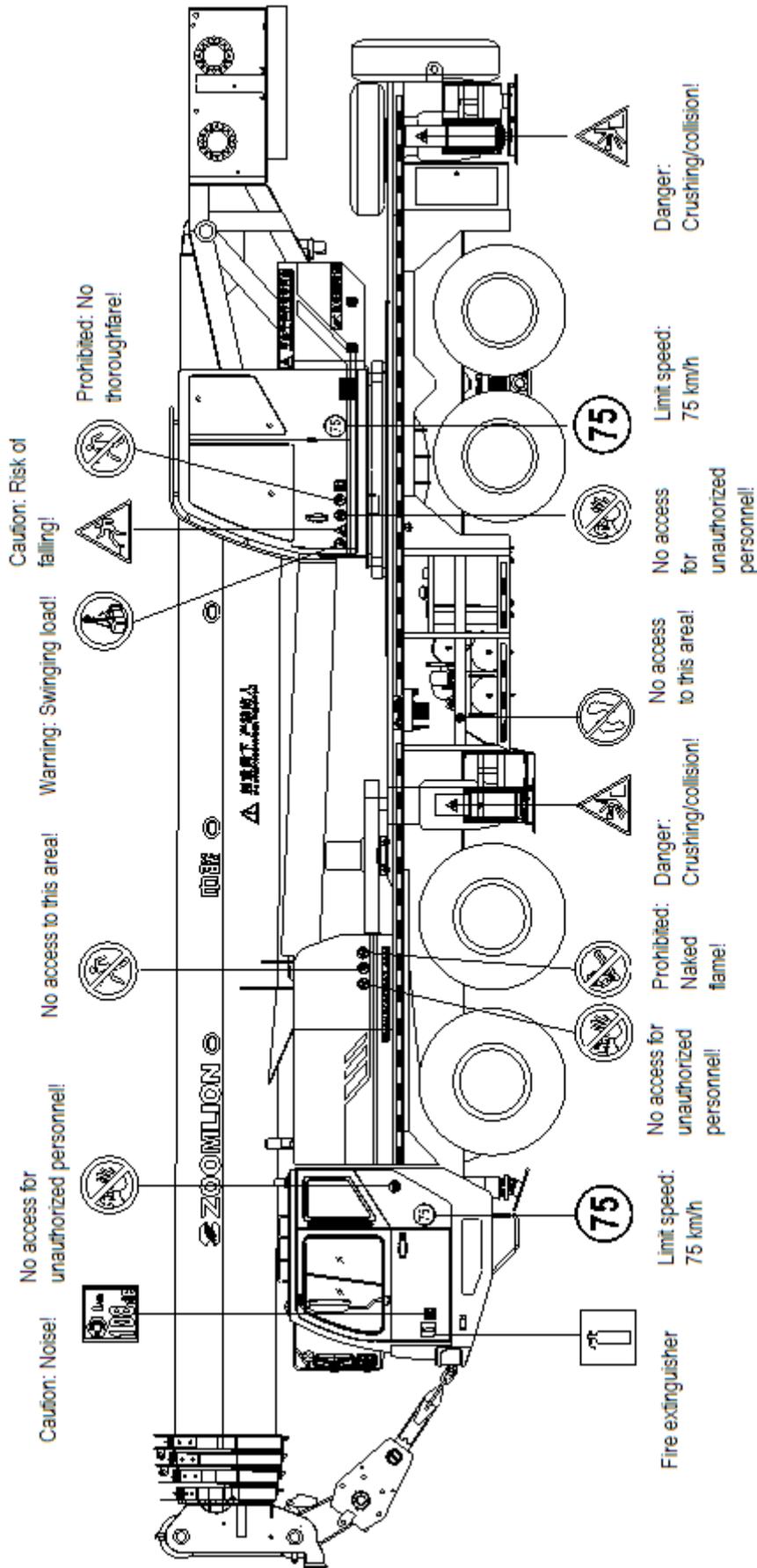


Figure 02 - 01

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 work site. In particular:

- a) Natural environment of work site.
- b) Work site and travel distance.
- c) Route.
- d) Height and width clearance measurements.
- e) Electric transmission lines (including voltage).
- f) Space restrictions at the work site.
- g) Movement restrictions caused by buildings.
- h) Weight and dimensions of the loads to be lifted and the required hoisting height and boom projection.
- i) Ground bearing capacity at the work site.

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

- 1) Load hook/hook block
- 2) Load handling device
- 3) Counterweight
- 4) Jib
- 5) 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.

2.3 Break-in instructions

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 maximum speed.
- b) Do not drive the crane at the driving speed higher than 55 km / h and with the engine speed higher than 1800 rpm 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 brake drum or braking lining temperature 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 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.

— General 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) The operator must 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) Crane operator and signalman should be familiar with safety rules, safety signals and symbols.
- 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.

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

 **DANGER**

- (1) Operator should check brakes, hook block, wire rope and safety devices before operation. Any irregularities detected during inspection should be removed immediately.**
- (2) The operator must focus his attention on his work during operation and is forbidden to chat with others. Generally speaking, 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. Prohibit drinking and driving.**

— **General qualifications for rigger**

During operation of the machine, 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. 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 work.

— **General qualifications for signalman**

The signalman is to transfer signal from the rigger to operator. He can substitute for the rigger to do conducting and hanging work, 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 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 selecting 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 ground with sufficient load bearing capacity.
- c) The ground pressure should comply with the permitted and expected value under the crane with a required lifting load.

— **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:

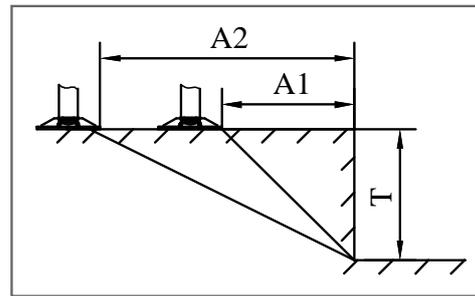
For non-cohesive and soft cohesive ground:

$$A_2 = 2T$$

For stiff or semi-solid cohesive ground:

$$A_1 = T$$

T refers to the depth of ditch.



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

— Permissible ground pressure of outrigger

When the crane is supported with a load, 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 calculation of required support area is as follows:

Support area = crane support force / load bearing capacity of the ground

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

If there is any doubt about the load bearing capacity of the ground at the placement site, soil tests should be carried out with a special detecting instrument.



Only strong materials may be used for the outrigger pad bases such as properly dimensioned wooden timbers.

In order to ensure that pressure is evenly distributed over the base surface, the outrigger pads must be positioned 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 extending the vertical cylinder, extend the sliding beams to the specified positions.
- c) All the sliding beams must be extended according to the data in the lifting capacity table and secured by pins.
- d) Before operation, the crane must be leveled. Under any working conditions, the inclination angle α of the crane can not be more than 0.6° . Refer to Figure 02 – 02.

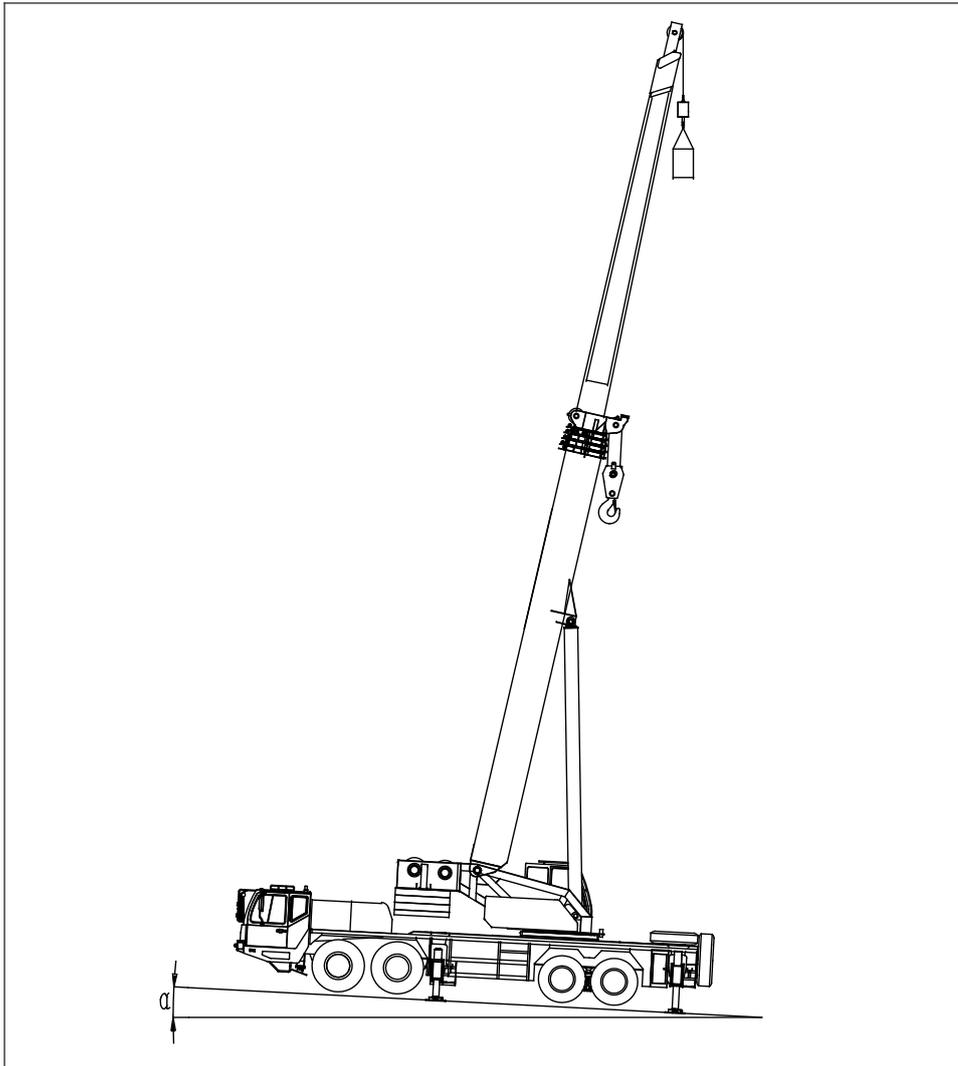


Figure 02 – 02

⚠ DANGER

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

After the crane is supported, check 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 position.
- 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) It has been ensured that 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

- a) Do not operate the crane if the temperature at the job-site is more than -20° C to + 40° C.
- b) If wind speed is greater than the permissible value (greater than grade 6) or in case of thunderstorms, while the crane is in operation, do the tasks that follow:
 - 1) Stop the work (safely lower the load)
 - 2) Telescope in the boom
 - 3) Correctly stow the boom.



Operate the crane according to the above instructions, otherwise accidents may occur!

To make an estimate of the wind speed, use the table that follows:

Wind force		Wind speed		Effect of the wind on the land
Beaufort	Description	m/s	km/h	
0	Calm	0 - 0.2	0 - 0.7	No wind, smoke rises vertically
1	Light air	0.4 - 1.4	1 - 5	Wind direction shown by smoke drift but not by wind vanes
2	Light breeze	1.6 - 3	6 - 11	Wind felt on face, leaves rustle, vanes moved by wind
3	Gentle breeze	3.4 - 5.3	12 - 19	Leaves and small twigs in constant motion, wind extends light flag
4	Moderate breeze	5.5 - 7.8	20 - 28	Raise dust, loose paper, small branches moved
5	Fresh breeze	8 - 10.6	29 - 38	Small trees in leaf begin to sway, crested wavelets on inland water
6	Strong wind	10.8 - 13.7	39 - 49	Large branches in motion; difficult to use umbrellas, whistling heard in telegraph wires
7	Near gale	13.9 - 17	50 - 61	Whole trees in motion, difficult to walk against the wind
8	Gale	17.2 - 20.6	62 - 74	Breaks twigs off trees, impedes progress
9	Strong gale	20.8 - 24.5	75 - 88	Slight structural damage (roof tiles and chimney covers, etc. blown off)
10	Storm	24.7 - 28.3	89 - 102	Trees uprooted, considerable damage occurs

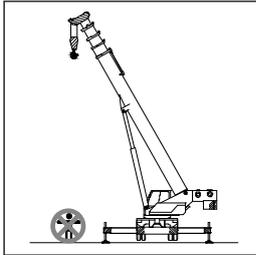
- c) Strong electromagnetic fields are likely to be present if the construction site is close to a transmitter. Under this condition, be sure to consult a high frequency specialist or contact the local franchiser or the manufacturer.

 **DANGER**

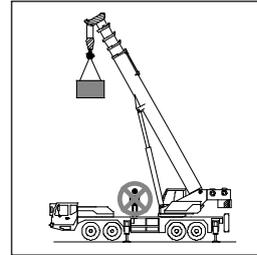
Electromagnetic field can pose direct or indirect danger to persons, equipment and objects, for example, effect on human organs due to radiation and make spark or electric arc occur.

2.4.5 Points for attention for safe operation

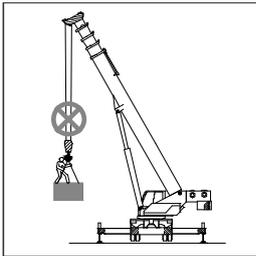
- a) Personnel must stay away from the area below the boom.



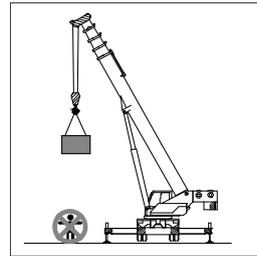
- b) Do not let personnel on the slewing table while you operate the crane.



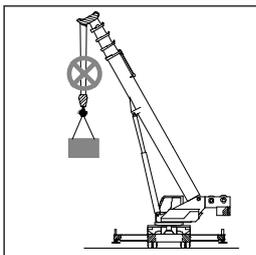
- c) Do not move personnel on the load or other equipment used to lift.



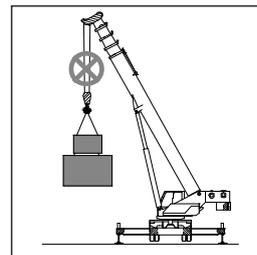
- d) Do not move a load above personnel.



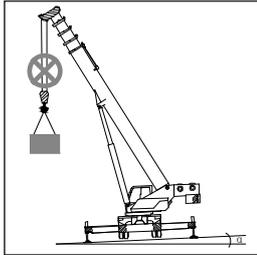
- e) Support the crane on outriggers before operation.



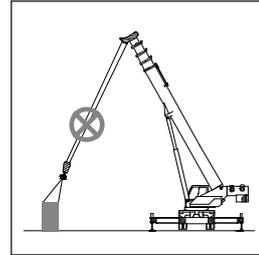
- f) Do not lift a load that is above the capacity of the crane.



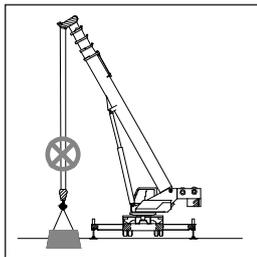
- g) The crane, with extended outriggers, must be on the ground with a slope α of less than 0.6° during operation.



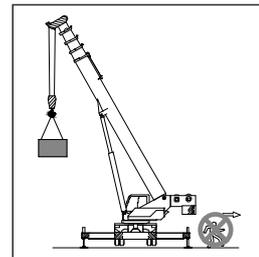
- h) Do not pull load at an angle and do not lift a load that is not in balance.



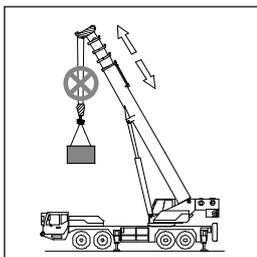
- i) Do not try to lift a load that is buried or frozen on the ground.



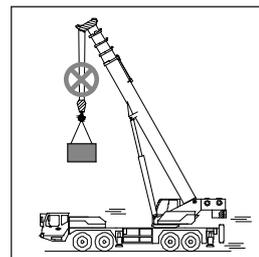
- j) When the load is off the ground, the operator must stay in the cab.



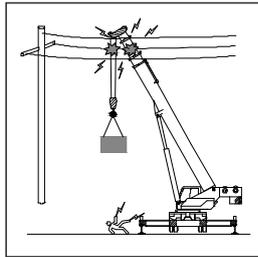
- k) Do not telescope the boom with a suspended load.



- l) Do not pick-and-carry a load.



- m) When the job-site is near live power lines, you must keep a safe distance. Make sure that the dangerous area has a cover or is fenced off.



- n) Personnel must stay away from the reach of the boom.
- o) Stop the crane in an emergency.
- p) Do not adjust the brake of hoist gear when you lift a load.
- q) Keep a minimum of 3 wraps of rope on the winch while you operate the crane.
- r) Before crane operation, adjust the slings (rope or chain) to make the hook block on the upright position of load gravity center.
- s) Prevent the load or lifting equipment from collision with crane.
- t) If it is thundering and lightening during operation, stop working and retract the boom completely. Take thunder protection measures to ensure safety.
- u) When starting and stopping the crane operation, ensure the movable parts and movable load in danger zone will not interrupt any persons and objects.
- v) When the actual lifting load reaches 90% of the rated one, the warning light will light up and the buzzer will sound the alarm. At the time, much attention should be paid to the operation.
- w) The operation should be stable and gentle. Do not carry out any jerky movements with the joysticks. Avoid any sudden acceleration or braking or conversion operation.

 **DANGER**

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

- **An overload or if the weight of the load is unknown.**
- **The load lift moves out of position, the rigging becomes too loose or the load is out of balance.**
- **The protective material between the edges of load and wire rope is missing.**

- **The light level at the job-site goes below a safe work condition.**
- **Equipment malfunction or damage to the crane that decreases the safe operation of the crane, such as failure of brake and safety devices or damage to wire rope.**

2.5 Hand signals

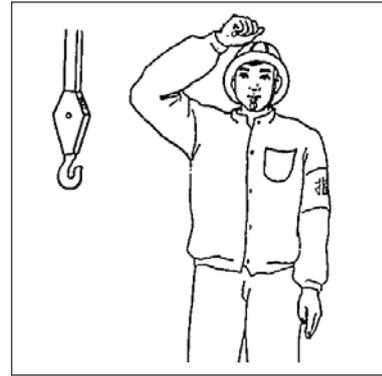
a) Start

Hold the right arm stretched vertically upwards. The palm faces forwards.



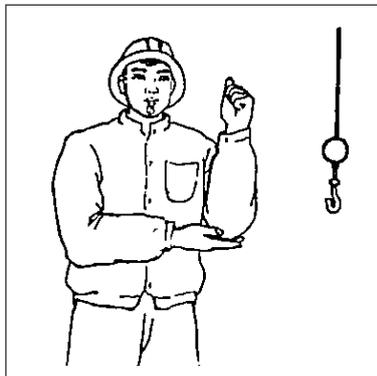
b) Use main winch

Tap fist on head; then use regular signal.



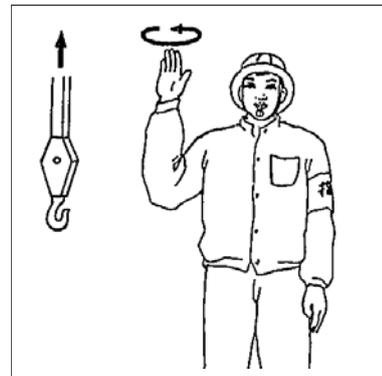
c) Use auxiliary winch

Tap elbow with one hand; then use regular signal.



d) Lift the load

With forearm vertical, extended fingers pointing up, move hand in small horizontal circle.



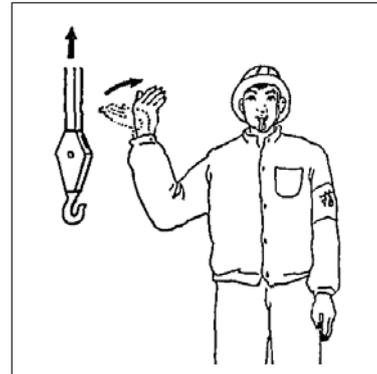
e) Lower the load

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

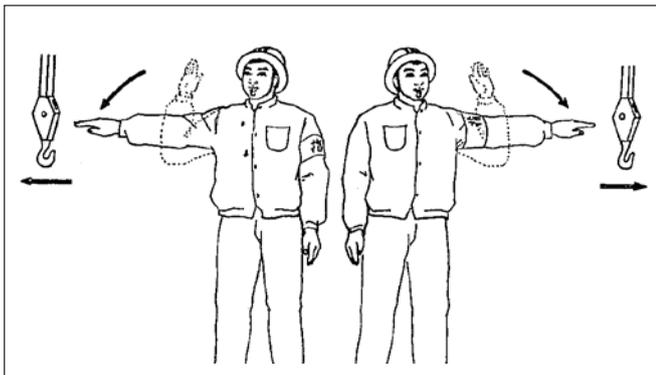
With forearm vertical, palm of the hand facing upwards, wave hand up repeatedly.



g) Rotate

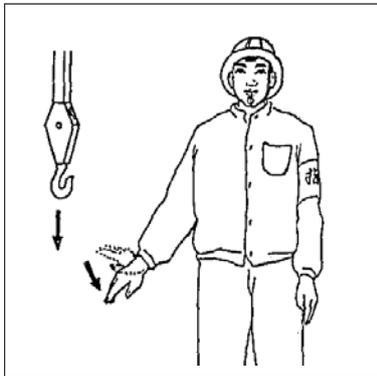
Turn left: With right forearm vertical, the palm of the hand facing outwards, lower the forearm sideways horizontally, fingers pointing in the direction of rotation.

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.



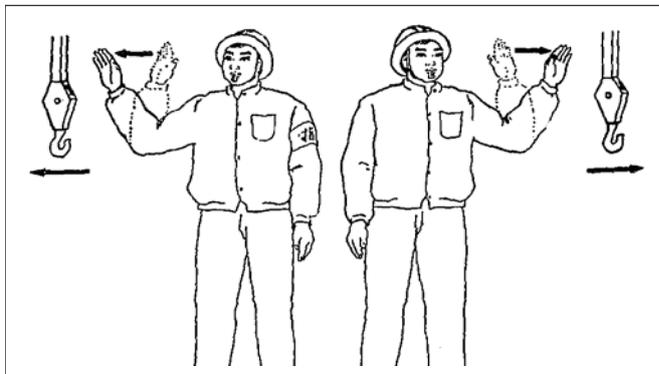
h) Lower the load slowly

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



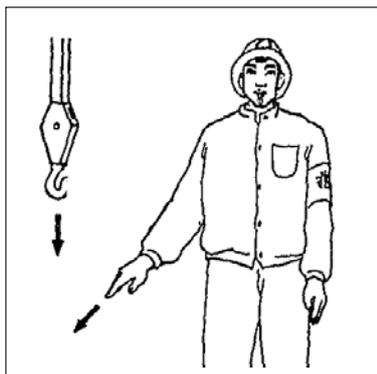
i) Rotate slowly

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.



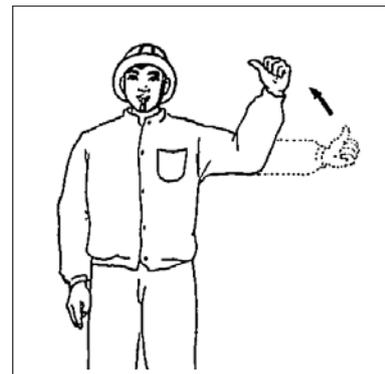
j) Indicate load lowering position

Extend the fingers to point at the position the load should fall on.



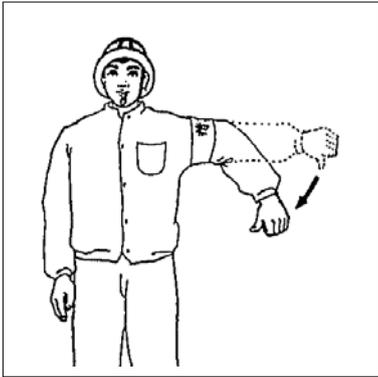
k) Raise boom

Arm extended, finger closed, thumb pointing upward.



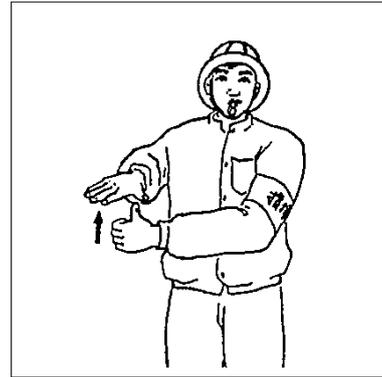
l) Lower boom

Arm extended, finger closed, thumb pointing downward.



m) Raise boom slowly

Forearm extends in front of body with palm facing downwards, another hand moves up and down with thumb pointing upwards.



n) Lower boom slowly

Forearm extends in front of body with palm facing upwards, another hand moves up and down with thumb pointing downwards.



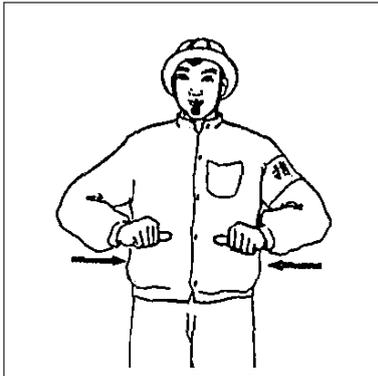
o) Extend boom

Both fists in front of body with thumbs pointing outwards.



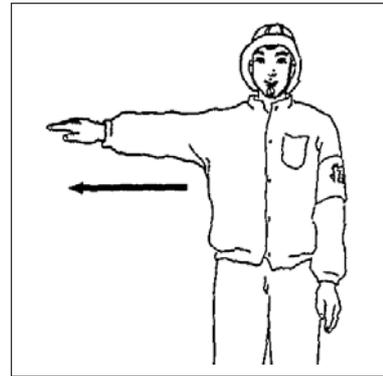
p) Retract boom

Both fists in front of body with thumbs pointing toward each other.



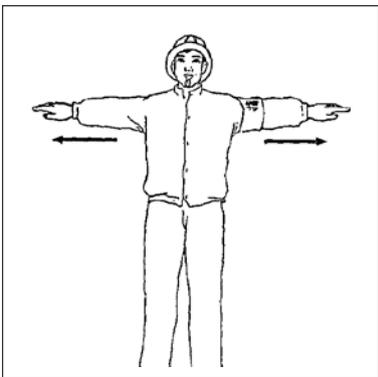
q) Stop

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



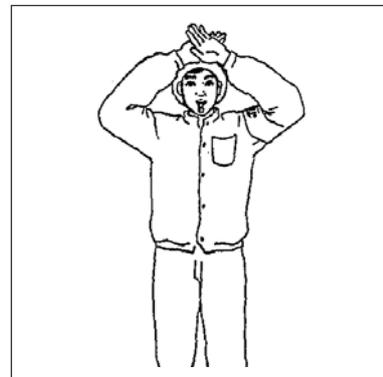
r) Emergency stop

Both arms extended, palms down, move arms back and forth horizontally.



s) End a movement

Cross your hands in front of your forehead.





OPERATOR' S MANUAL FOR TRUCK CRANE

Chapter 3 Operation – crane chassis



3.1 Driver's cab

3.1.1 Overview

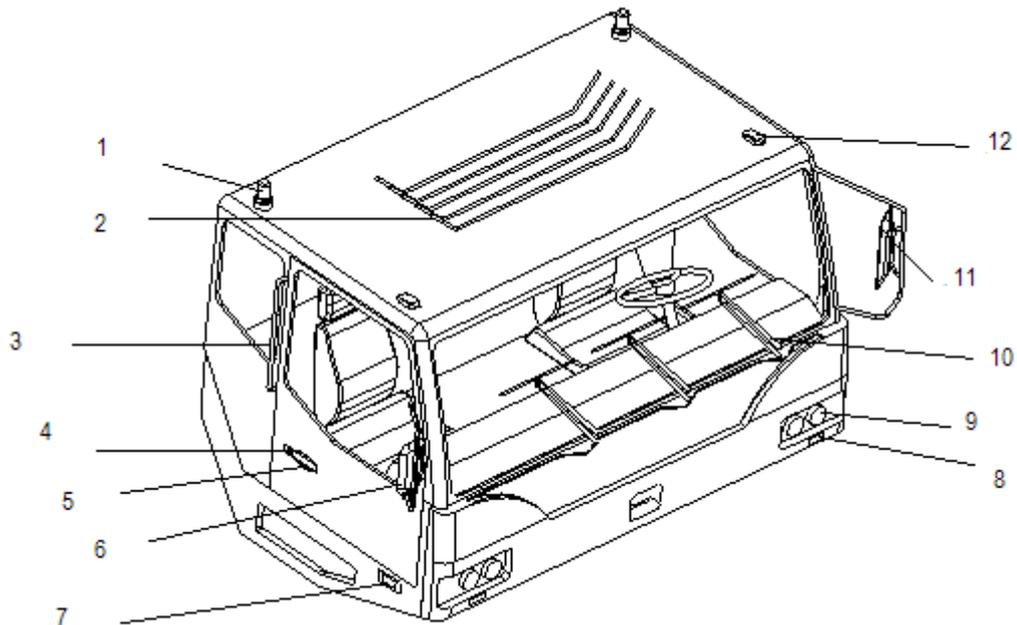


Figure 03 – 01

- 1 Rotating beacon (optional)
- 2 Wire rope holder
- 3 Handrail
- 4 Key hole
- 5 Door handle
- 6 Mirrors (on the right side)
- 7 Side turn signal
- 8 Front fog light
- 9 High/low beam
- 10 Front windshield wiper
- 11 Mirrors (on the left side)
- 12 Corner marker light

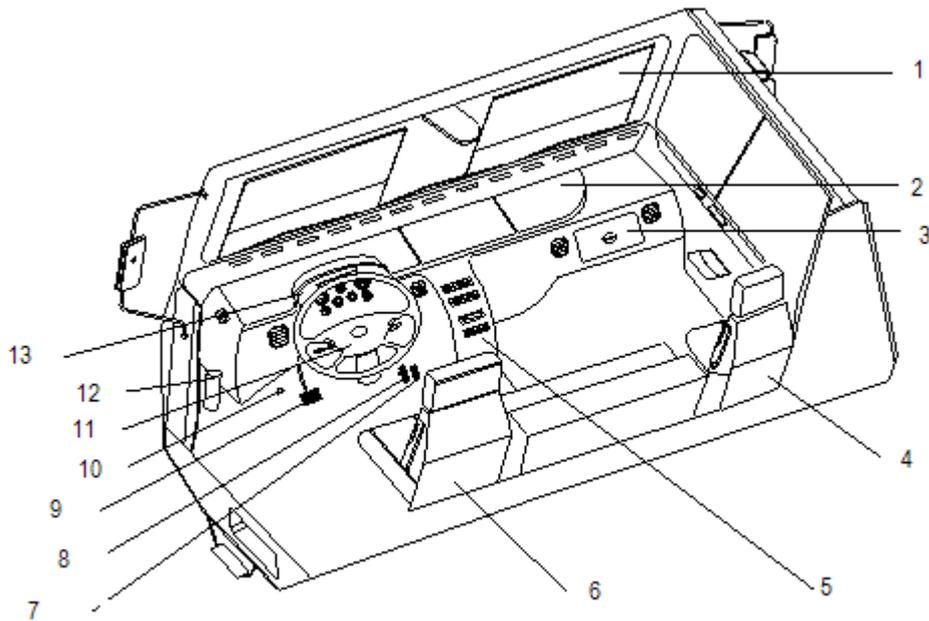


Figure 03 – 02

- 1 Sun visor
- 2 Toolbox
- 3 Fuse box
- 4 Co-driver's seat
- 5 Center console
- 6 Driver's seat
- 7 Foot pedal (R): Engine control
- 8 Foot pedal (M): Service brake
- 9 Foot pedal (L): Clutch
- 10 Air horn switch
- 11 Steering wheel assy.
- 12 Oil reservoir for clutch
- 13 Instruments console

3.1.2 Steering wheel assy.

The components of the steering wheel assy. are as follows:

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

See Figure 03 – 03.

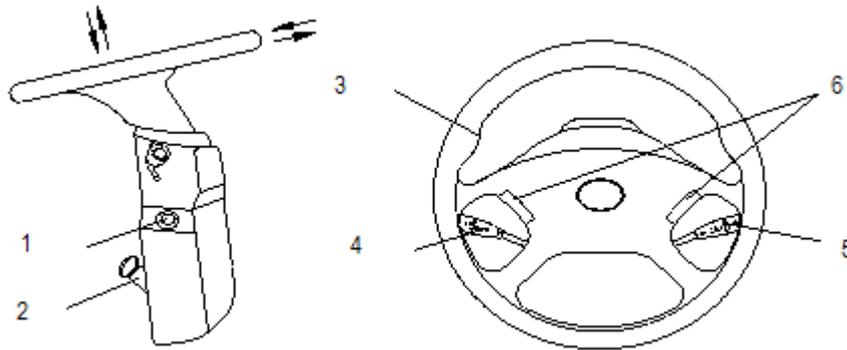


Figure 03 – 03

– **Steering wheel adjustment handle**

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

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



- (1) Risk of fatal injury if adjust the steering wheel while driving!**
- (2) Pull the handle downwards to lock the steering wheel after adjustment.**

– **Left-hand steering column switch**

See Figure 03 – 04.

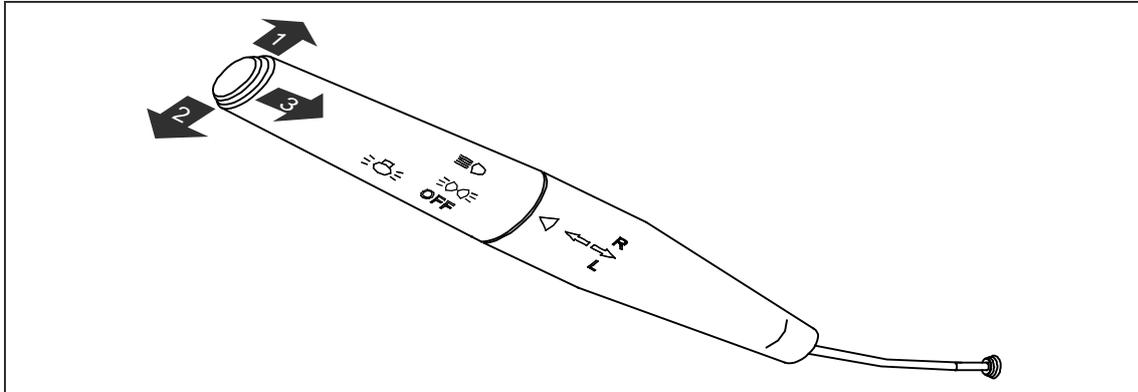


Figure 03 – 04

- 1) Activation of turn signal (left / right)

Jog steering column switch forwards (in direction 1): turn signal (right) is activated;

Jog steering column switch backwards (in direction 2): turn signal (left) is activated.
- 2) Switch between low beam and high beam and operate headlamp flasher

If there is a need to pass over the other vehicles, jog the switch upwards (in direction 3), the high beam of the headlamp will light up simultaneously.

Jog the switch upwards and downwards continuously to operate headlamp flasher.

Once the headlamp flasher is on, the headlamp will light up no matter what working conditions the other lamps are in.
- 3) Activation of illumination

Rotate the end of the steering column switch to the  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  position to activate the high beam.

– **Left-hand steering column switch**

See Figure 03 – 05.

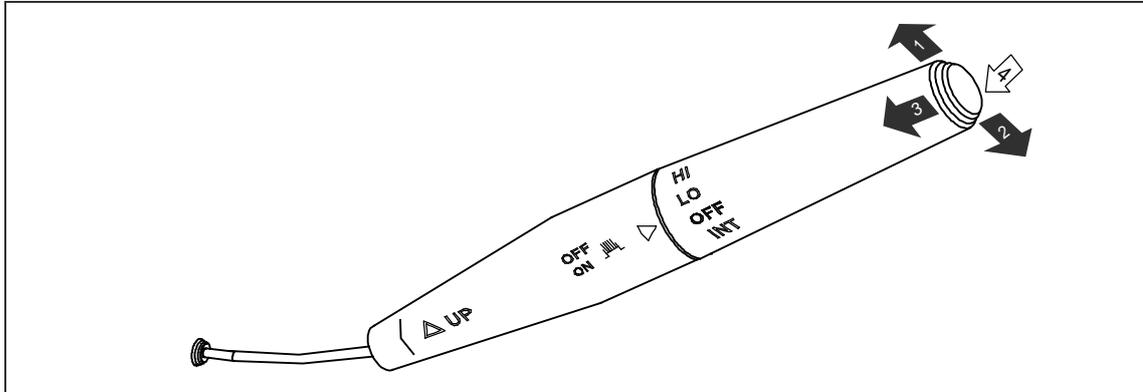


Figure 03 – 05

a) **Activate 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 windshield wiper 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.

⚠ CAUTION

If the washer continues working for 15 seconds or the liquid container is empty, the wiper will stop its work. In sunny days, the wiper should be used together with washer to avoid windshield being scraped. In cold days, precautions should be taken to prevent the wiper from being frozen on the windshield.

c) **Activate exhaust brake**

Jog the switch backwards (in direction 2) to activate exhaust brake; jog it forwards (in direction 1) to deactivate the exhaust brake.

⚠ CAUTION

Depressing the engine control pedal or clutch pedal can deactivate the exhaust brake temporarily when exhaust brake is activated. However, the exhaust brake will be activated automatically after releasing the engine

control pedal or clutch pedal. When the engine RPM is below 1200 rpm, the exhaust brake will be deactivated automatically.

d) Activate 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 again, the switch will return to neutral position.

– **Electric horn button**

It is 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.

– **Ignition starter switch**

LOCK	No electricity is supplied to the entire electrical system. The key can be plugged in and pulled out.
ACC	The battery begins to supply electricity and some electrical systems begin to work.
ON	The entire electrical system is electrified.
S	The engine starts. Release the key, and it will return to ON position automatically.



The key can only be pulled out in LOCK position.

3.1.3 Instrument panel and display unit

- Instrument panel

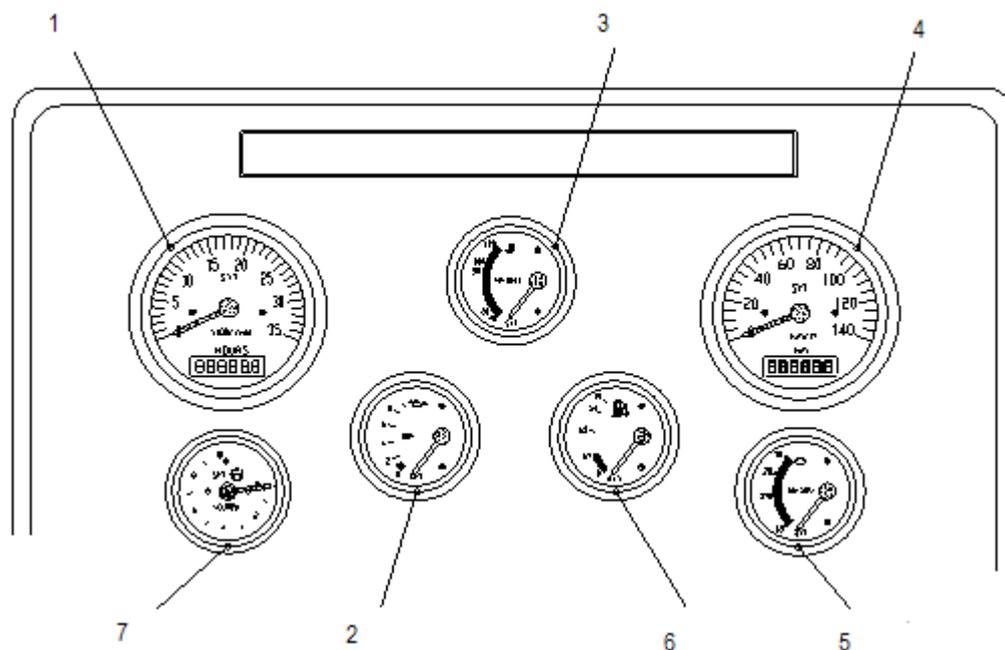


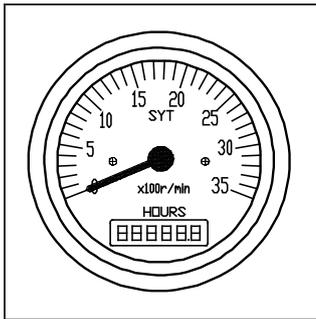
Figure 03 – 06

- 1 Tachometer
- 2 Engine oil pressure gauge
- 3 Water thermometer
- 4 Odometer
- 5 Voltmeter
- 6 Fuel gauge
- 7 Barometer

- Instruments

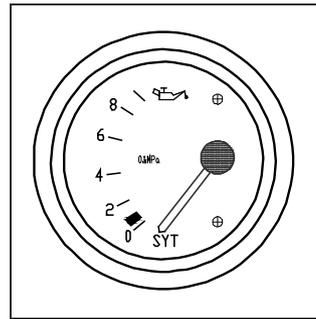
1 Tachometer

Displays engine speed (RPM) and its actual running time.



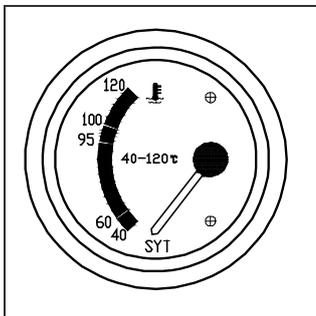
2 Engine oil pressure gauge

Displays the engine oil pressure when the engine is running.



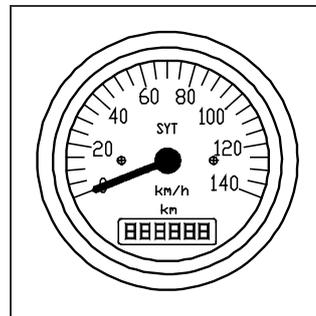
3 Water thermometer

Displays the coolant temperature of the engine.



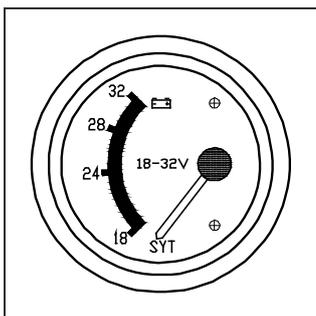
4 Odometer

Displays the vehicle speed and the total driving distance of the vehicle.



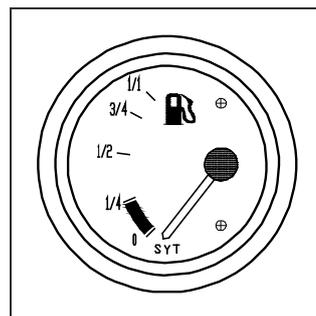
5 Voltmeter

Displays the voltage of generator during engine running or displays the voltage of battery when engine stops.



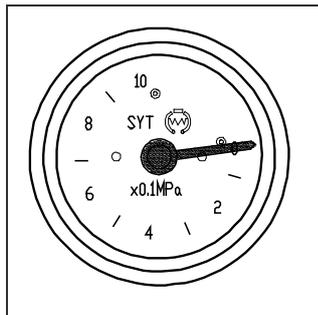
6 Fuel gauge

Displays the fuel reserves.



7 Barometer

The two pointers resp. display the pressure of air reservoirs for front axle and intermediate & rear axles.



- Display unit

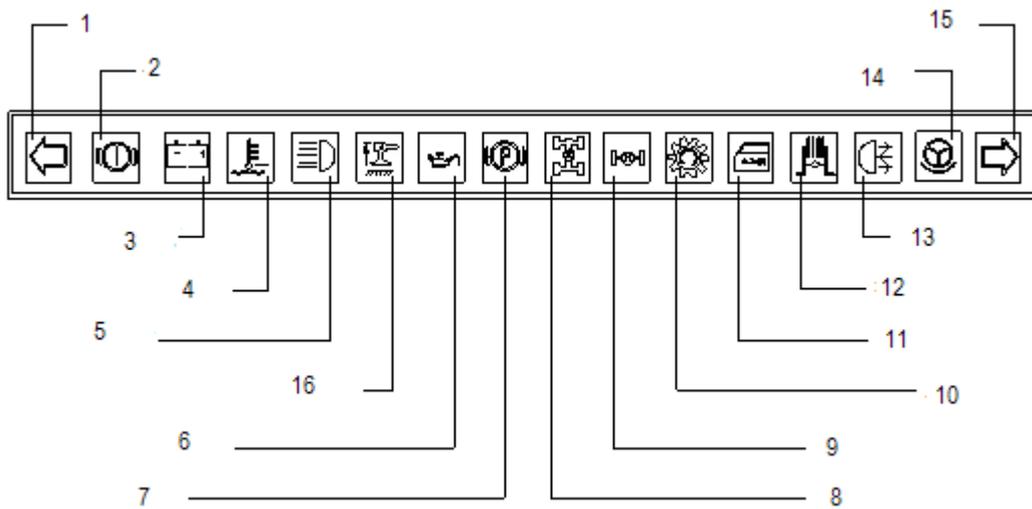


Figure 03 – 07

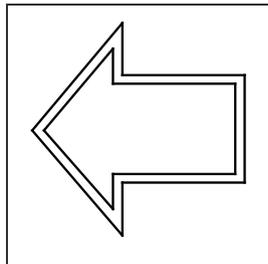
1	Control light	Vehicle direction of travel left
2	Warning light	Brake pressure too low
3	Warning light	Charging monitoring
4	Warning light	Engine coolant temperature too high
5	Control light	High beam
6	Warning light	Engine oil pressure too low
7	Control light	Parking brake closed
8	Control light	Longitudinal differential lock
9	Control light	Transversal differential lock
10	Control light	PTO engaged
11	Warning light	Door opened
12	Control light	Engine exhaust brake active
13	Control light	Rear fog light
14	Control light	Emergency steering (optional)
15	Control light	Vehicle direction of travel right
16	Control light	The 5 th outrigger fully retracted (optional)

1 Control light

Vehicle direction of travel left

Illuminates:

Vehicle is to turn left.



2 Warning light

Brake pressure too low

Illuminates:

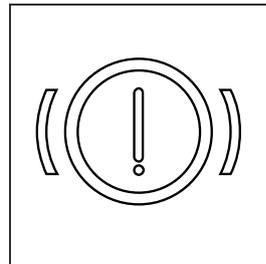
Brake pressure is too low.

Extinguishes:

Brake pressure increases to the specified value.

 **CAUTION**

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



3 Warning light

Charging monitoring

Illuminates:

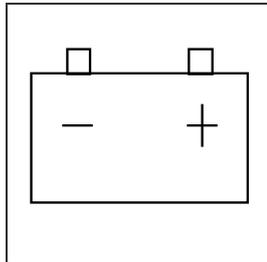
Ignition starter switch is in position ON.

Extinguishes after engine starts:

Generator begins to charge battery.



If the warning light illuminates during engine running, it means that the generator fails. Stop to check at once!



4 Warning light

Engine coolant temperature too high

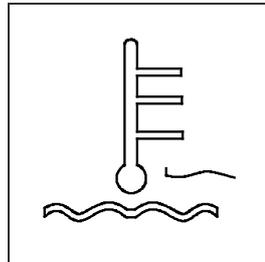
Illuminates:

Engine coolant temperature is too high.

Check the water thermometer and bring the vehicle to a standstill to check the engine cooling system.

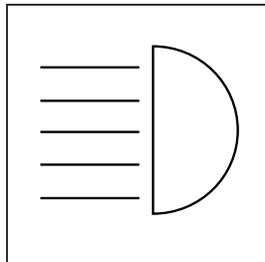


Under this condition, do not stop the engine at once. Run the engine at idle speed for several minutes. Otherwise, the engine oil will be clung to the engine inside owing to the sudden decrease of the coolant temperature.



5 Control light High beam**Illuminates:**

High beam or headlamp flasher is activated.

**6 Warning light****Engine oil pressure too low****Illuminates:**

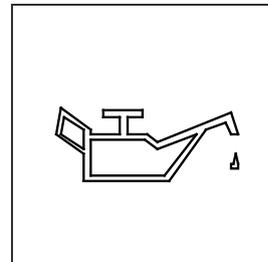
Ignition starter switch is in position ON under normal condition.

Extinguishes:

Engine starts.



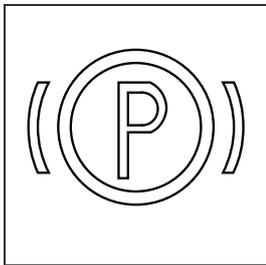
If the warning light illuminates during engine running, the engine oil pressure is too low or the engine oil filter element is clogged. Immediately bring the crane to a standstill and rectify! Otherwise the engine will be damaged seriously!



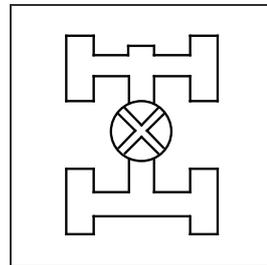
7 Control light**Parking brake closed****Illuminates:**

Parking brake is closed.

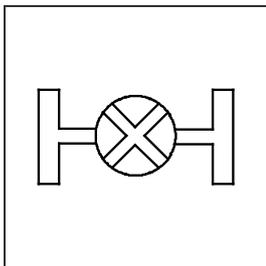
Do not start the vehicle until the parking brake is released and the control light extinguishes.

**8 Control light****Longitudinal differential lock****Illuminates:**

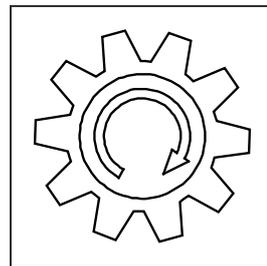
The button "Longitudinal and transversal differential locks" is switched on and the longitudinal differential is locked.

**9 Control light****Transversal differential lock****Illuminates:**

The button "Longitudinal and transversal differential locks" is switched on and the transversal differential is locked.

**10 Control light****PTO engaged****Illuminates:**

PTO is engaged.

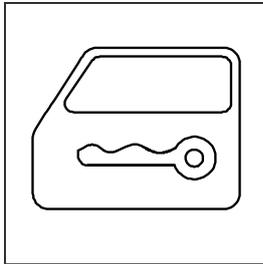


11 Warning light**Door opened****illuminates:**

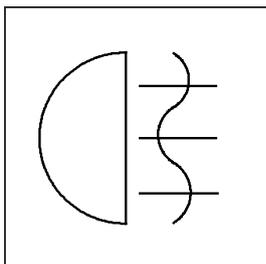
The door is opened.



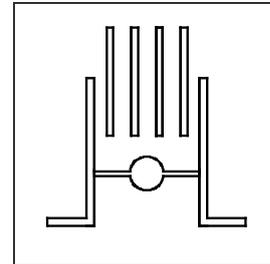
Do not drive the vehicle if the warning light lights up!

**13 Control light Rear fog light****illuminates:**

Rear fog light is on.

**12 Control light****Engine exhaust brake active****illuminates:**

Engine exhaust brake is ready for work or it is active.

**14 Control light Emergency steering**

The emergency steering system is optional.

illuminates:

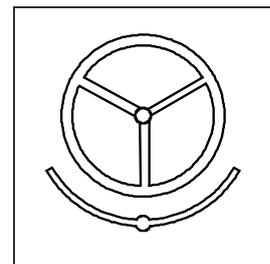
Turn the ignition starter switch to ON.

Extinguishes:

The vehicle speed is greater than 15 km/h.



If the emergency steering system is not available, this control light is standby.

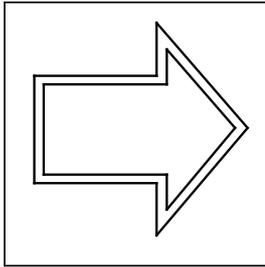


15 Control light

Vehicle direction of travel right

Illuminates:

Vehicle is to turn right.



3.1.4 Air horn switch

It is located on the outside of clutch pedal and on the left side of driver.

Depressed: Air horn alarms.

Released: Air horn stops alarming

3.1.5 Engine control pedal

It is an electron pedal.

Depressed: the vehicle accelerates;

Released: the vehicle decelerates.

3.1.6 Foot pedal (M): Service brake

Depress the service brake to decelerate and stop the vehicle.

3.1.7 Foot pedal (L): Clutch brake

Depress the clutch pedal to disengage the clutch.

3.1.8 Center console

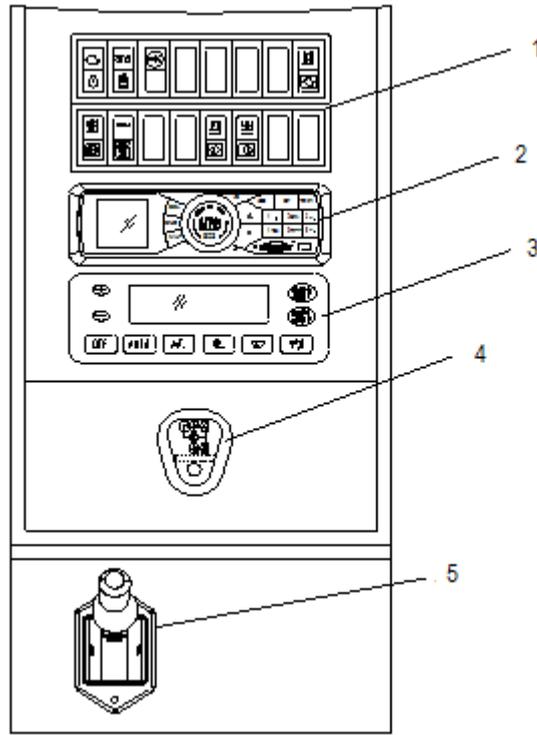


Figure 03 – 08

- 1 Switches
- 2 Media player
- 3 Control buttons – A/C and heater
- 4 Range selector
- 5 Parking brake control lever

- **Media player**

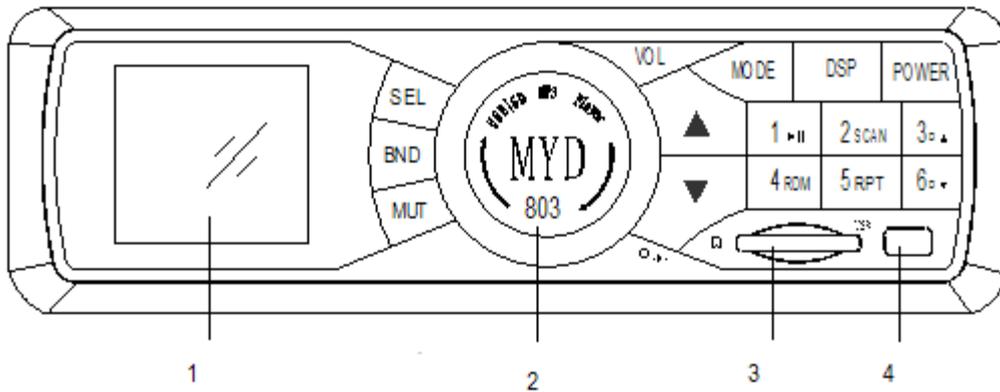


Figure 03 – 09

- 1 Display
- 2 Rotary switch for volume and functions adjustment
- 3 SD card slot
- 4 USB port

a) Button Power source



c) Button Band control



e) Button MUTE



b) Button

Changeover radio / SD / USB



d) Button

Sound effect selection



f) Button Time set

Press and release:

The time will be displayed;

Keep it pressed for 3s:

Buttons ▲ or ▼ can be used to set time.



- g) Button
High-frequency scan (receive) /
Skip next



- i) Preset button 1 (receive)
Press and release:
Play the first song;
Keep it pressed for a long time:
Pause.



- k) Preset button 3 (receive)
Press and release:
Play the third song;
Keep it pressed for a long time:
Select the next file.



- m) Preset button 5 (receive)
Press and release:
Play the fifth song;
Keep it pressed for a long time:
Repeat.



- h) Button
Low-frequency scan (receive) /
Skip previous



- j) Preset button 2 (receive)
Press and release:
Play the second song.



- l) Preset button 4 (receive)
Press and release:
Play the fourth song;
Press it pressed for a long time:
Play at random.



- n) Preset button 6 (receive)
Press and release:
Play the sixth song;
Keep it pressed for a long time:
Select the next file.



 **NOTE**

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

- **Gear lever**

The gear lever is installed on the right-hand side of the driver.

Jog the selector leftwards, rightwards, forwards and backwards to select and changeover the gear.

- **Parking brake hand lever**

Pull the hand lever backwards to activate the parking brake and emergency brake.

– Keyboard and display unit

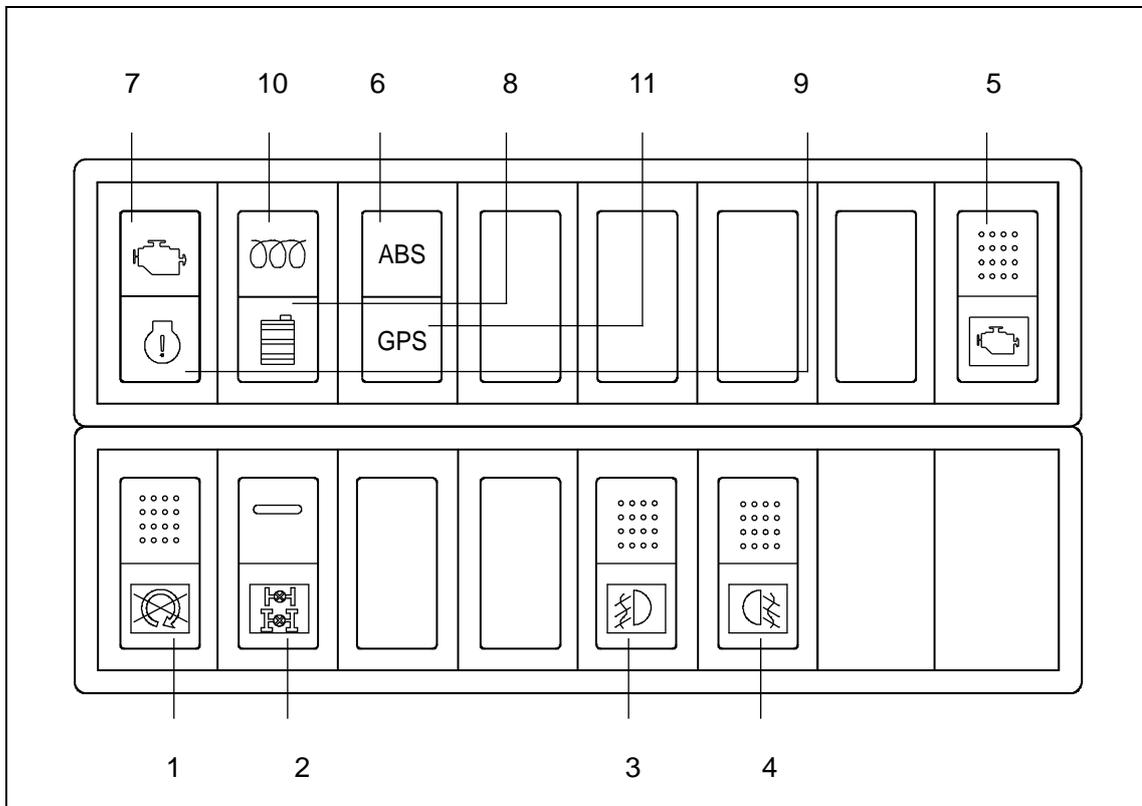


Figure 03 – 10

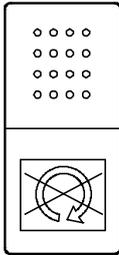
1	Button	Engine stop
2	Button	Longitudinal and transversal differential locks
3	Button	Front fog light
4	Button	Rear fog light
5	Button	Engine fault diagnosis
6	Warning light	ABS defects
7	Warning light	Engine error code displayed
8	Warning light	Engine coolant level too low
9	Warning light	Engine defects (for Cummins engine)
10	Control light	Diesel engine preheating system
11	Control light	GPS state

1 Button

Engine stop

Keep it pressed for 2 – 3 seconds:

The engine stops running.

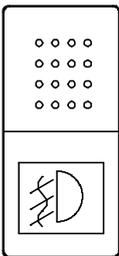


3 Button

Front fog light

Pressed:

The front fog light lights up.



2 Button

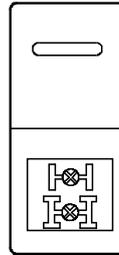
Longitudinal and transversal differential locks

Pressed:

The longitudinal and transversal differential locks are activated.



It can only be activated when the vehicle is stationary.



4 Button

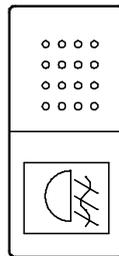
Rear fog light

Pressed:

The rear fog light lights up.

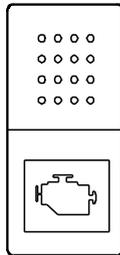


The rear fog light can be activated only when the high beam, low beam or front fog light is active.



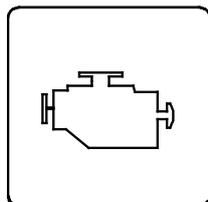
5 Button**Engine fault diagnosis****Pressed and released:**

The warning light "Engine error code displayed" will display the flash code if warning light "Engine error code displayed" or warning light "Engine defects" illuminates all the time.

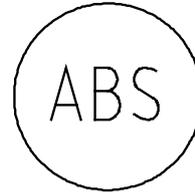
**7 Warning light****Engine error code displayed****Illuminates:**

Engine defects. Rectify it right away.

After you press the button 5, the warning light "Engine error code displayed" will display the flash code if warning light "Engine error code displayed" or warning light "Engine defects" illuminates all the time.

**6 Warning light****ABS defects**

It is optional.

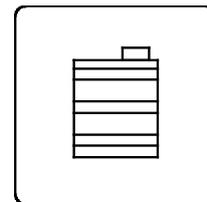
**8 Warning light****Engine coolant level too low****Illuminates:**

Engine coolant level in expansion tank is too low.



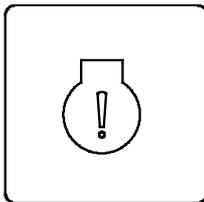
Under this condition, add coolant after the cooling water cools down.

Otherwise, the engine oil will be clung to the engine inside due to sudden temperature decreasing.

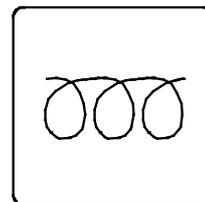


9 Warning light
Engine defects (For Cummins engine)

It is not used. It always extinguishes.


10 Control light
Diesel engine preheating system
Illuminates:

Preheat the engine.


11 Control light GPS state

The control light has 3 states when the ignition starter switch is placed to position ON:

- **Flashes 3 times and then extinguishes::**
GPS terminal works normally.
- **Flashes:**
The crane is to be locked or GPS terminal defects.
- **Illuminates:**

The crane has been locked.

The light does not light up if the vehicle is not equipped with GPS system.



When control light flashes, stop crane at once. Check and repair the failures.

3.1.9 Crane lighting

a) Front combination signals

Take the lights on the left as an example, the right lights are the same as the left ones. For the details, refer to Fig. 03 – 11.

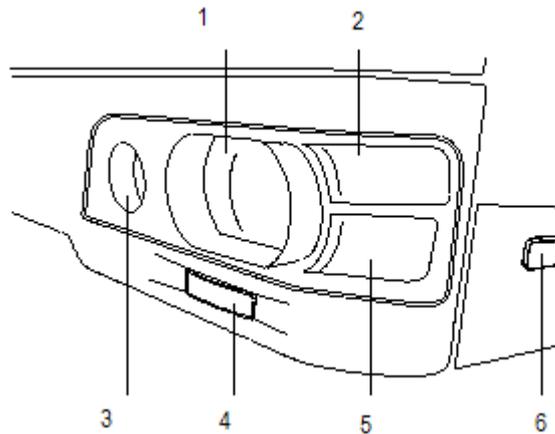


Figure 03 – 11

- 1 Front low beam
- 2 Front turn signal
- 3 Front high beam
- 4 Front fog light
- 5 Front width lamp
- 6 Side turn signal

b) Interior illumination

The interior illumination is located at the roof of the driver's cab, including small lamp & its button and door lamp & its button.

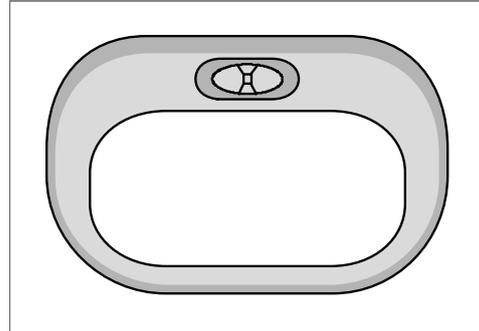
The direction of small lamp can be adjusted by pressing its edge. The small lamp button is a 2-handed button.

The door lamp button is a 3-handed button:

Center position: off

Left and right positions: on

The door lamp will light up automatically if any door is open. If the doors are closed well, the door lamp will extinguish. In addition, the door lamp can also be controlled manually.

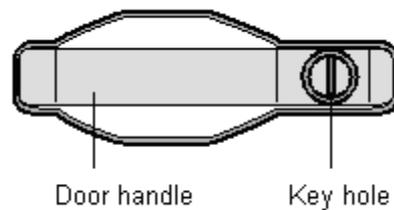

3.1.10 Door, driver's cab

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.



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.

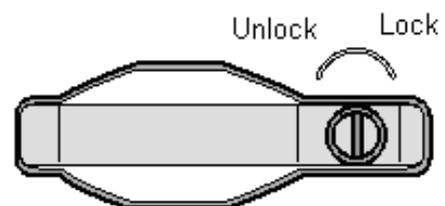
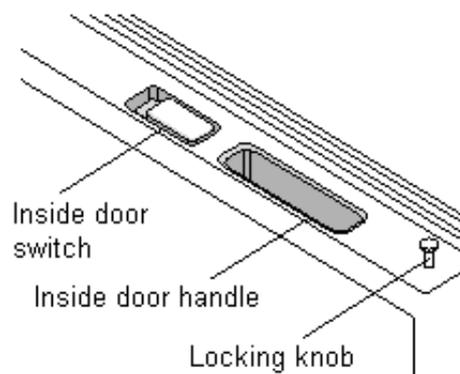
Pull the locking knob upwards before opening the door.



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

- 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.



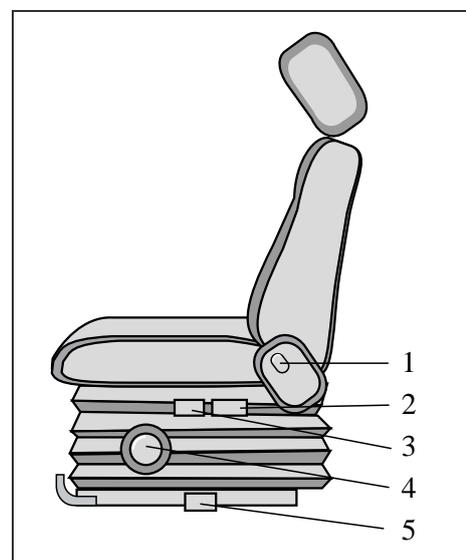
3.1.11 Seats in driver's cab

– Seat adjustment

This crane is equipped with a suspension seat, which can be adjusted to suit any driver height or size before setting off.

When adjusting the stiffness of the seat, please set the red pointer within the range from 40 kg to 130 kg.

1. Switch, adjust backrest setting
2. Switch, adjust seat cushion angle (rear section)
3. Switch, adjust seat cushion angle (front section)
4. Rotary knob, adjust stiffness
5. Switch, adjust horizontal setting



– **Putting on seat belt**

Fasten and adjust the three-point seat belt to suitable position before setting off.

Insert tongue piece into belt lacer to fasten the belt.

Press the button to unfasten the belt.



Risk of fatal injury if seat belt is not worn!

All occupants must be belted in before setting off in the crane and during the driving.

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 tool boxes in different sizes.

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

c) Cigarette lighter

Push-in the cigarette lighter for 3 to 5 sec. Pull it out to use it. After you use it, put it in its initial position.



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

3.2 Before starting up the vehicle

3.2.1 Prerequisites

- a) If the crane is used for the first time, ensure there is no damage and abnormality.
- b) The used light diesel oil and engine oil should be suitable for the lowest ambient temperature at working site. For the details, please refer to the *Operation and Service Manual for the WP 12 Series Diesel Engine (National Stage III)*.

3.2.2 General checks before setting off

- a) Examine the coolant level. Top up with coolant if required. Check fuel reserve via fuel gauge in driver's cab.
- b) Examine the parts in steering and brake systems for flexibility, safety and reliability, Check the steering fluid level and the clutch fluid level.
- c) Examine the following parts, such as universal joint bolts of steering shaft, leaf spring bolts, U-bolt and wheel bolts, etc. for proper seating, and check leaf springs for crack.
- d) Examine the tire pressure. Tires must be inflated to the pressure specified for the tires mounted on the crane. Examine the tires, door locks, windows and operating mechanisms for functional work.
- e) Examine the fittings of oil pipes, air pipes and water pipes for leakage. Examine the air reservoir for condensation (drain the water as necessary).
- f) Examine the battery terminals for too much corrosion and make sure that the power wires are tight. Examine the level of the battery electrolyte.
- g) Examine the air filter control light. If the control light is red, clean or replace the filter element.
- h) Turn the ignition key to position ON, and examine the instruments, switches, lighting, control lights and wipers for functions and outside mirrors for proper position.

3.2.3 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.
 - 2) When engine speed is 1200 r/min, the engine oil pressure must be in the range of 0.35 – 0.55 MPa.
- b) Examine the barometers.

If the brake pressure is less than 0.55 MPa, the warning light "Brake pressure too low" will illuminate and the buzzer will send out alarm. Risk of danger if start off at

this time!

- c) Examine the water thermometer

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

- d) Make sure that the PTO is disengaged.
- e) Make sure that the parking brake is released.
- f) Start up the vehicle slowly with low gear. Do not engage the clutch when the engine is running at excessively high speed (above 1600 rpm).

3.3 Driving the crane

3.3.1 Starting and stopping the engine

– Starting the engine

a) Checks

- 1) Check engine oil level and check engine oil for clean.
- 2) Check the coolant level.
- 3) Check the fuel reserve.

b) Before starting the engine, ensure the following prerequisites are met:

- 1) Put the gear lever in neutral.
- 2) Apply the parking brake.
- 3) Turn the ignition starter switch to position "ON".
- 4) Disengage the PTO (At this time, the control light "PTO engaged" does not illuminate).
- 5) In winter, the engine will preheat automatically (The control light "Diesel engine preheating system" lights up at the same time).
- 6) After the control light "Diesel engine preheating system" extinguishes, depress the accelerator pedal softly and turn the ignition starter switch to position S to start the engine.

 **CAUTION**

- (1) Turn the ignition starter switch to position S within 30 sec. after the control light "Diesel engine preheating system" extinguishes.**
- (2) If you cannot start the engine in a maximum of 15 seconds, wait for 30 sec. Then try to start the engine again to avoid engine damage.**

If the engine can not be started for three consecutive times, fix it right away.

 **WARNING**

Depress the clutch pedal when starting the engine in order to avoid inadvertent starting of the vehicle.

c) Preheat the engine and check instruments for functions:

Release the accelerator pedal slowly and run the engine at idle speed for several minutes to warm up the engine. At this time, check the instruments and control lights for functions.

⚠ 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.

⚠ WARNING

Do not run the engine in a place where the 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.

– **Stopping the engine**

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

⚠ CAUTION

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

- c) Pull the parking brake hand lever backwards to the locking position to park the vehicle and then shift the transmission to neutral position.
- d) Run the engine at idle speed for several minutes after the vehicle stops so as to cool the engine down gradually.
- e) Press down the button "Engine Stop" for 2 to 3 sec. to stop the chassis engine.
- f) Turn the ignition starter switch to position "LOCK" and pull it out after the engine is stopped about 30 seconds.
- g) Do not keep the ignition starter switch in the "ON" or "ACC" position after you park the crane. The battery drains in these conditions.

- h) When you park the vehicle on a slope, place wheel chocks before or behind the wheels to avoid accident.
- i) To prevent an accident when you park the crane in the dark, you must turn on the hazard lights.

3.3.2 Transmission and clutch operation

– Transmission

a) Description

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 air pressure should be more than 0.41 MPa.

For details, please refer to Figure 03 – 12.

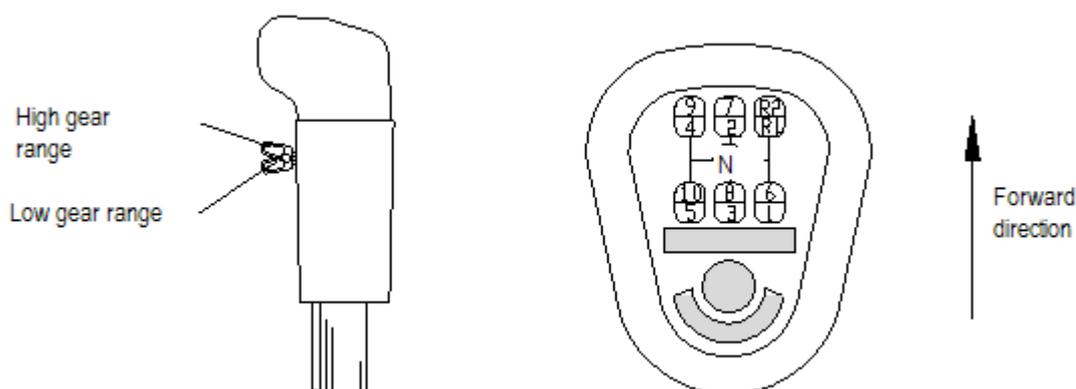


Figure 03 – 12

b) Gear shifting

- 1) The vehicle starts in gear 1, and the switch “Pre-selection of high / low gear range” should be changed into low gear range.
- 2) When shifting, the clutch must be disengaged completely, and the gear lever should be shifted in position.
- 3) Both the high gear and low gear areas have a neutral position. The gear lever should be positioned in neutral in low gear area when parking.
- 4) When it is engaged into reverse gear, stop the vehicle firstly and then change gear to avoid damaging the transmission. When engaging the reverse gear, large force should be used to overcome resistance of the reverse lock.

- 5) Do not skip a gear when you move through low gear range and high gear range. Otherwise, risk of serious damage to the synchronizer of auxiliary transmission.

⚠ WARNING

You should use the switch “Pre-selection of high / low gear range” when changing gear between gears 5 and 6.

- 6) When you drive on a descending gradient, do not shift gear between high and low gear range.
- 7) When there is abnormal noise in the transmission or it is difficult to shift gear, bring the vehicle to a standstill and rectify it at once.
- 8) Inspect the grease level of transmission after you stop the vehicle for several minutes.

⚠ CAUTION

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 service life of transmission will be shortened.

- c) Points for attention

Depress the clutch pedal when shifting gears. During downshifting, accelerate at the neutral position to make the connecting parts have the same rotational speed.

Only when the vehicle starts off or it is driving in the off-road condition, can the creeper gear be applied.

⚠ WARNING

Do not move the vehicle when the gear lever is in neutral position.

– Clutch operation

- a) Description

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.

- b) Points for attention

- 1) During driving, never place the foot on clutch pedal if it is not used.
- 2) During downshifting, depress the service brake to decelerate the vehicle, and then depress the clutch pedal properly to change into proper gear.

⚠ CAUTION

When shifting the gear during driving, depress the clutch pedal and then release it rapidly, otherwise there is a risk of increasing clutch abrasion.

- 3) Do not depress the clutch pedal as possible as you can except parking at low speed.

⚠ CAUTION

Only when the compressed air pressure P is above 0.6 MPa, can the clutch be completely disengaged.

3.3.3 Steering operation

- a) 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.
- b) 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.
- c) If the vehicle is steered insufficiently, decrease the speed slowly while you turn the steering-wheel in the same direction as the turn.
- d) If you over-steer, release the engine control pedal or depress the service brake while you turn the wheel in the opposite direction of the turn.

⚠ CAUTION

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 the neutral position to prevent an unstable condition.

- e) Decrease the speed of the vehicle and move down the transmission gear if you have a sharp turn.

3.3.4 Brake operation

– Description

The brake system consists of driving brake (service brake), engine exhaust brake and emergency brake (parking brake). The emergency brake can also be selected to park the vehicle in normal condition and on slopes.

– Operation

- 1) Driving brake

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

- Normal brake during driving, release the accelerator 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 depress the service brake to slow down stably or stop the vehicle.
- Slow brake after rapid brake: when there is an accident in front, depress the service brake rapidly and then depress 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, depress the accelerator pedal to drive at normal speed.
- Cadence brake: depress the service brake and release it. Repeat the operation to decelerate the vehicle gradually. The operation should be very gentle.
- Rapid brake: in a sudden emergency, release the engine control pedal immediately and depress 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.



If rapid brake is used frequently, the abrasion of tire, brake drum and friction lining will be increased, and the service life of each part will be shortened. Therefore, do not apply rapid brake except in an emergency, especially in rainy days or on frozen road.

2) Engine exhaust brake

When vehicle is traveling on a long descending gradient, engine exhaust brake is recommended. Under this condition, the vehicle decelerates via engine instead of service brake. In this way, the driving safety can be improved, and the braking performance decreasing and the brake failure, caused by depressing service brake frequently to make brake drum overheat, can be avoided.

How to activate the engine exhaust brake:

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

Result:

- Engine exhaust brake is activated and control light for engine exhaust brake lights up.



You can depress the clutch pedal or accelerator pedal at the same time to temporarily deactivate the engine exhaust brake.

3) Emergency brake (parking brake)

If service brake fails or cannot be applied in time during driving, pull the parking brake hand lever backwards to the locking position to activate the emergency brake. Push the control lever forwards to the unlocking position to deactivate the emergency brake.



(1) Emergency brake (namely parking brake) can also be selected to park the vehicle in normal condition or on slopes.

(2) Deactivate the emergency brake before driving.

– Points for attention

- 1) After the accelerator pedal is released during driving, do not step on the brake pedal when there is no necessity to brake the vehicle.
- 2) Do not apply emergency brake when the vehicle is driving on the narrow, frozen or muddy road or in a rainy / snowy day. Under the conditions, such as crossing the railway, driving under the 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.
- 3) After driving across a road with pools of water, depress the brake pedal for several times to eliminate the water on the braking shoe so as to ensure the brake performance.
- 4) Before driving on a long descending gradient, shift the gear lever to 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 exhaust brake and service brake. Do not move the vehicle with the transmission in neutral position.
- 5) When the parking brake is used as the auxiliary brake, never pull the hand lever to its limit position. When parking the vehicle under any conditions, the parking brake should be pulled back to the position, especially parking the vehicle on a slope. Risk of fatal injury and accident!

3.3.5 PTO operation

– Engaging PTO

See Figure 03 – 13.

- a) Open the shutoff gate valve on the hydraulic oil tank to connect the hydraulic oil tank and the oil lines.
- b) Start the engine.
- c) Check the barometer to see if the air pressure is between 0.6 and 0.8 MPa after the engine runs stably.
- d) Depress the clutch pedal.

- e) Apply the parking brake and shift the gear lever into gear 4.
- f) Pull out the PTO switch to engage the PTO, and then PTO control light lights up.
- g) Slowly release the clutch pedal, and the crane is ready to work.

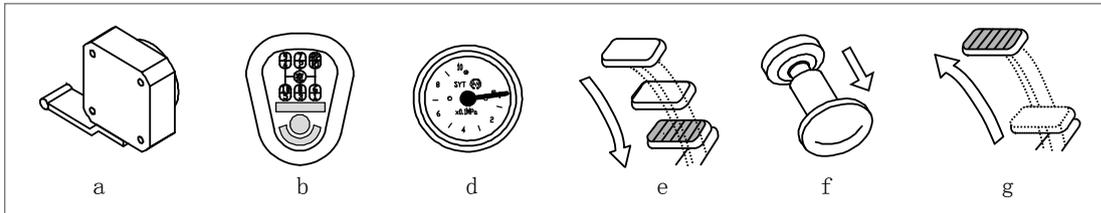


Figure 03 - 13

- Disengaging the PTO

See Figure 03 - 14.

- a) Depress the clutch pedal.
- b) Press the PTO switch to deactivate the PTO, and then the control light for PTO extinguishes.
- c) Release the clutch pedal slowly, and then the crane is in non-working state.

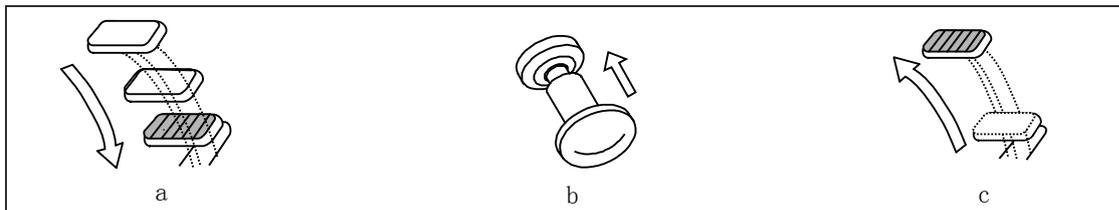


Figure 03 - 14

CAUTION

- (1) Depress and release the clutch pedal slowly.
- (2) If the PTO and the drive device for oil pump need repairing or replacing, put a warning board on the ignition starter switch. Otherwise, risk of danger may occur!

WARNING

When the PTO is engaged, keep the gear lever at gear 4 and apply the parking brake.

3.3.6 Towing

There is a towing coupling at both the front and rear ends of the crane. The following towing regulations must be adhered to:

- a) Attach a strong towing rope onto the tow coupling at the front under the bumper. Start slowly to avoid impact.
- b) Engine of the towed vehicle must be started to ensure it can realize emergency brake and steering operation. Otherwise it will be very dangerous.

 **WARNING**

If the engine of the towed crane cannot operate, do not tow the crane.

- c) Place the gear lever in neutral position.
- d) If the transmission breaks down, remove the propeller shaft.
- e) If the differential gear or the rear axle is in malfunction, remove left and right half shaft.

 **CAUTION**

Engine exhaust brake system will be invalid if the propeller shaft or the half shaft is removed.

3.4 Points for attention

3.4.1 Road driving

- a) Do not skip a gear when you move through the gear cycle.
- b) During driving, if abnormal sound, smell, vibration or acceleration happens to the vehicle, or the steering wheel and brake work abnormally, decelerate immediately and stop the vehicle at a safe place for checks. If the cause of malfunction can not be determined or the problem cannot be rectified, send the vehicle to the specialized repair factory.
- c) Once the warning lights light up, decelerate immediately and stop the vehicle at a safe place for checks.
- d) Pay attention to the display of instruments (including barometer, engine oil pressure gauge, water thermometer, etc.) to ensure they comply with the requirements.
- e) Before climbing an ascending gradient, the driver should downshift in advance to reduce the load of engine and driving system.
- f) Points for attention on descending gradients:
 - 1) Check the brake system for function before the vehicle is on descending gradients.
 - 2) On a long descending gradient, engine exhaust brake is recommended. Put the gear lever to the low gear position to make the brake work more efficiently.
 - 3) Prevent the engine from overturning. 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.

 **CAUTION**

(1) Engine is easily damaged by overrunning.

(2) Downshift operation should be done after deceleration. When downshifting from shift 4, the engine RPM should be below 1500 rpm, and when downshifting from shift 3, the RPM should be below 1200 rpm. Otherwise, overrunning may occur.

- g) When oil shortage occurs during driving, air may enter into the fuel system. Under this situation, if the engine still can not be started after adding the fuel, deaerate the fuel system.

 **WARNING**

Do not move the vehicle after engine shutdown.

3.4.2 Off-road driving

When it is difficult for the vehicle to drive in off-road condition or it falls into a quagmire, the following measures should be taken:

- a) Apply the transversal differential lock and longitudinal differential lock.
- b) Shift the gear lever to the low gear range and then engage the clutch slowly, otherwise the service life of the crane will be shortened.
- c) Run the engine at a RPM with maximum engine torque.
- d) If the crane still cannot leave under this condition, tow it or place some rigid objects such as woods or iron plates under the wheels.

3.4.3 Parking

- a) When you park the vehicle on an ascending gradient or in a rainy / snowy day, keep a long distance away from the front and rear vehicles.
- b) After bringing the vehicle to a standstill, pull back the parking brake hand lever to locking position. If parking the vehicle on an ascending gradient, place wheel chocks directly before and behind the wheels.
- c) Shift the gear lever to the neutral position of low gear range.
- d) Gently depress the engine control pedal for 2 – 3 times before engine shutdown, so as to ensure each part of engine can be lubricated completely. After that, run the engine at idle speed for several minutes until the coolant temperature decreases.



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

3.4.4 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 (drive shaft, axle) failure 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.

If you cannot repair the vehicle, tell the servicing and repair facility.



OPERATOR' S MANUAL FOR TRUCK CRANE

Chapter 4 Operation – crane superstructure



4.1 Operator's cab

4.1.1 Overview

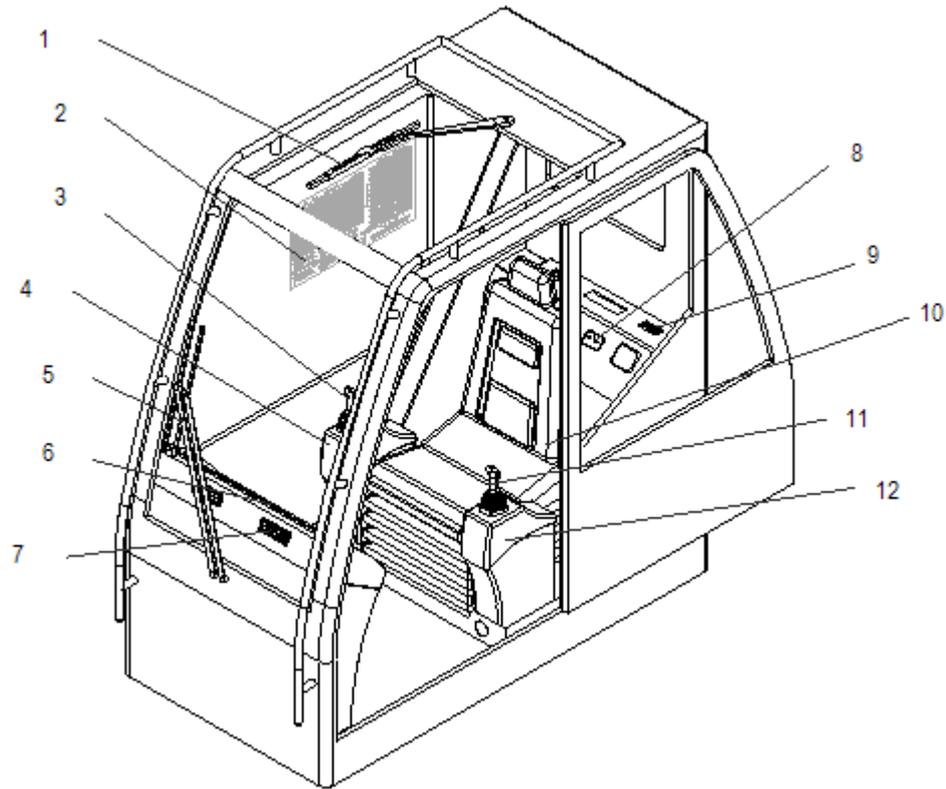


Figure 04 – 01

- 1 Roof window wiper
- 2 Lifting capacity table
- 3 Right joystick
- 4 Control box, right
- 5 Front windshield wiper
- 6 Instrument panel
- 7 Outlet nozzle, front
- 8 Control panel, A/C and cab heater
- 9 Outlet nozzle, rear
- 10 Operator's seat
- 11 Left joystick
- 12 Control box, left

4.1.2 Instrument console

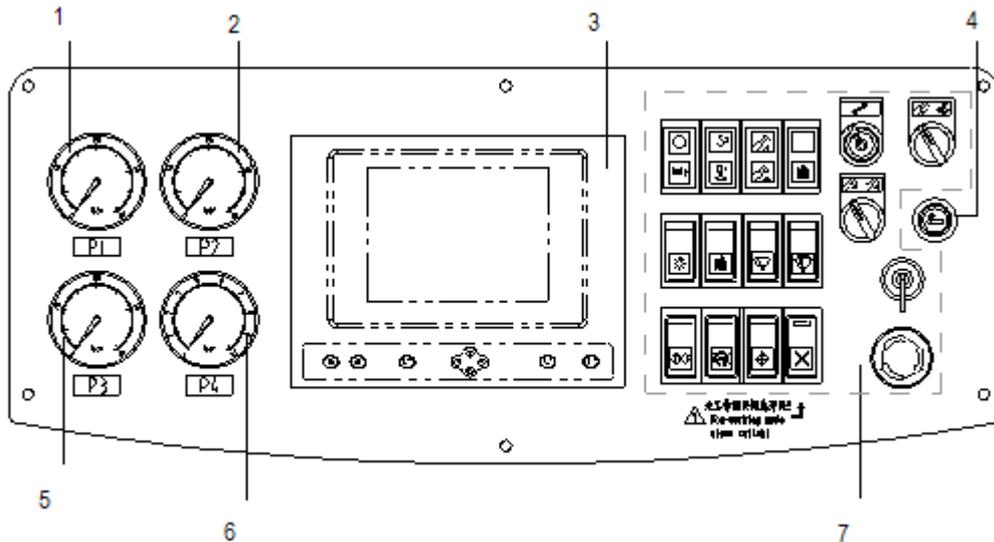


Figure 04 – 02

- 1 Pilot pressure gauge
- 2 Pressure gauge, slewing hydraulic system
- 3 Load moment limiter
- 4 Cigarette lighter
- 5 Pressure gauge, hydraulic system of main / auxiliary winch, derricking gear and telescoping system
- 6 Pressure gauge, counterweight / A/C
- 7 General operating instruments

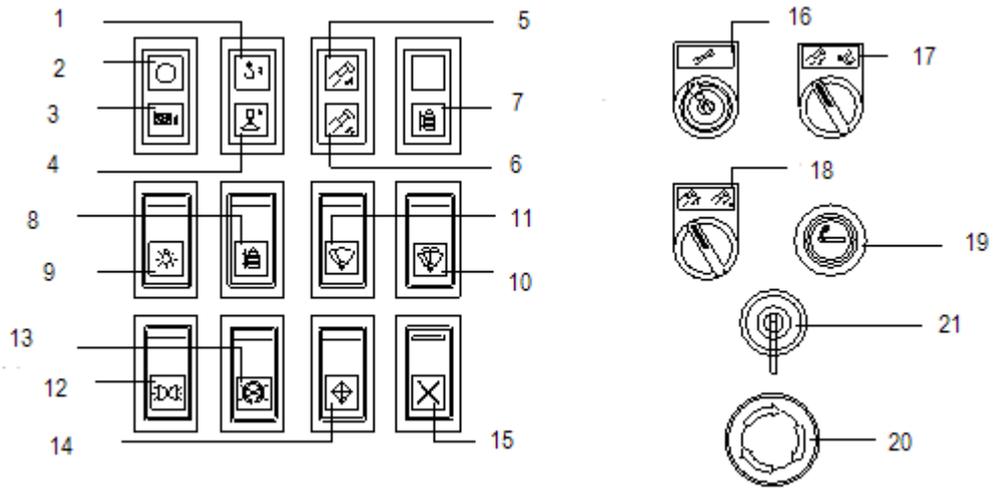


Figure 04 – 03

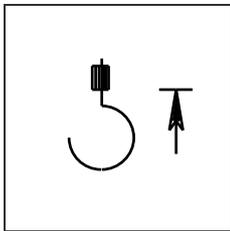
- | | | |
|----|-------------------------|-------------------------------------------------------------------|
| 1 | Warning light | Hoisting limit switch |
| 2 | Control light | Power source |
| 3 | Warning light | Lowering limit switch |
| 4 | Warning light | The 5 th outrigger pressure too high |
| 5 | Control light | Telescoping cylinder I |
| 6 | Control light | Telescoping cylinder II |
| 7 | Control light | Movable counterweight activated |
| 8 | Button | Movable counterweight activated |
| 9 | Button | Work lights |
| 10 | Button | Front windshield washer system |
| 11 | Button | Front windshield wiper |
| 12 | Button | Work light on boom head |
| 13 | Button | Engine off |
| 14 | Button | Oil cooler |
| 15 | Deadman switch | |
| 16 | Bypass key switch | |
| 17 | Switch | Pre-selection of telescope / auxiliary winch |
| 18 | Switch | Pre-selection of telescoping cylinder I / telescoping cylinder II |
| 19 | Cigarette lighter | |
| 20 | Emergency off switch | |
| 21 | Ignition starter switch | |

1 Warning light
Hoisting limit switch
Illuminates:

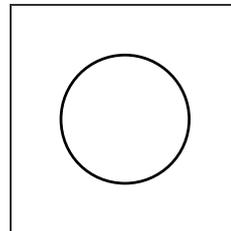
The hoisting limit switch is activated.



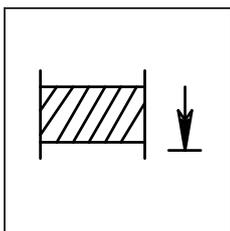
Its location is determined by load moment limiter.


2 Control light
Power source
Illuminates:

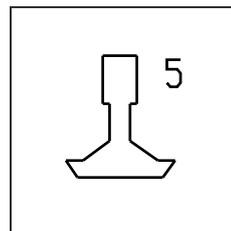
The ignition starter switch is turned to position I.


3 Warning light
Lowering limit switch
Illuminates:

The lowering limit switch is activated.

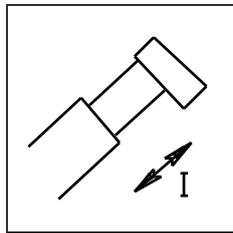

4 Warning light
The 5th outrigger pressure too high
Illuminates:

Pressure of the 5th outrigger exceeds the maximum permissible value.

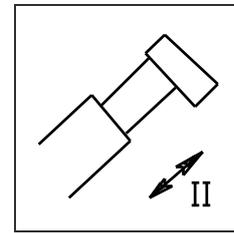


5 Control light**Telescoping cylinder I****Illuminates:**

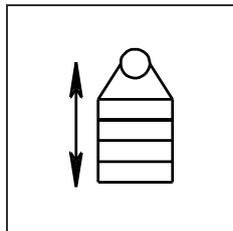
The switch "Pre-selection of telescoping cylinder I / telescoping cylinder II" is turned to the left position

**6 Control light****Telescoping cylinder II****Illuminates:**

The switch "Pre-selection of telescoping cylinder I / telescoping cylinder II" is turned to the right position

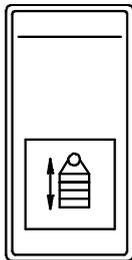
**7 Control light****Movable counterweight activated****Illuminates:**

The movable counterweight remote control box is activated to control movable counterweight.



8 Button**Movable counterweight activated****Pressed:**

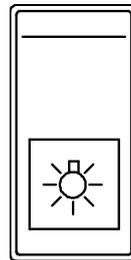
The movable counterweight remote control box is activated.

**9 Button Work lights****Position 1:**

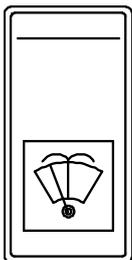
Switch on background lighting.

Position 2:

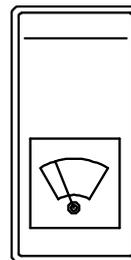
Switch on background lighting, work lights on slewing table and boom.

**10 Button****Front windshield washer system****Pressed:**

Switch on the front windshield washer system.

**11 Button****Front windshield wiper****Pressed:**

Front windshield wiper begins to work.

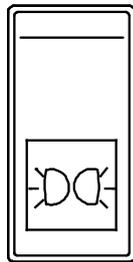


12 Button

Work light on boom head

Pressed:

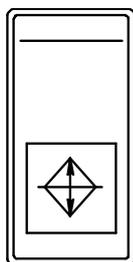
Switch on work light on boom head.



14 Button Oil cooler

Pressed:

The oil cooler fan begins to work.



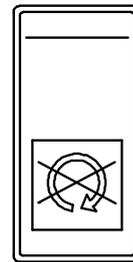
13 Button Engine off

Pressed and held for 1 to 2 seconds:

Engine stops.



It is invalid when deadman switch is activated.



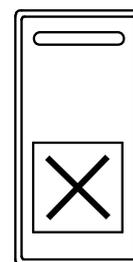
15 Deadman switch

Pressed:

The crane movements can be performed via joysticks.



This switch must be deactivated when the crane doesn't work.



16 Bypass key switch

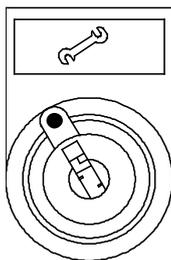
When the hook block touches the hoisting limit switch weight, when less than three windings of rope are left on the drum, when the maximum permissible load moment is exceeded or safety devices are not installed during installation and commissioning, dangerous crane movements will be switched off.

During commissioning and maintenance, turn the bypass key switch clockwise to release the limitation.



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

Otherwise, there will be life-threatening hazards or serious damages to property.



17 Switch

Pre-selection of telescope / auxiliary winch

Left position:

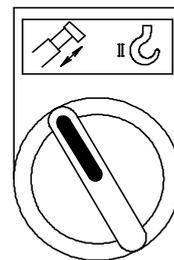
Telescope the boom.

Right position:

Spool up / reel off auxiliary winch.



It is forbidden to use this switch when boom is telescoped or auxiliary winch is activated.

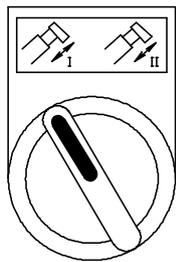


18 Switch**Pre-selection of telescopic cylinder I / telescopic cylinder II****Left position:**

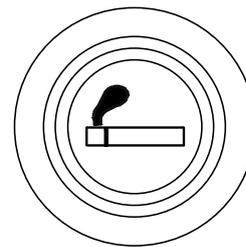
Telescope the telescopic boom section 1 via telescopic cylinder I.

Right position:

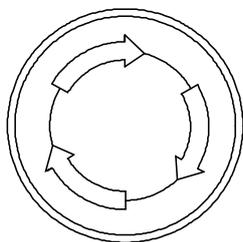
Telescope the telescopic boom sections 2, 3 and 4 via telescopic cylinder II.

**19 Cigarette lighter**

Press it for several seconds and pull it out to light a cigarette.

**20 Emergency off switch****Pressed:**

All crane movements are cut off.



21 Ignition starter switch

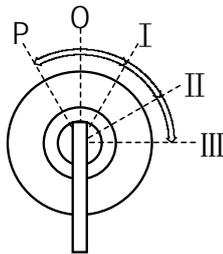
The 5 positions of the switch (in clockwise direction) are as follows:

- "P" and "O" –You can plug in or pull out the key.
- "I" – Battery begins to work to supply electricity to superstructure control system.
- "II" – This position does not have a function.
- "III" – A temporary position, use it to operate the engine.

The key will return to position "I" automatically after you release the key when the engine starts. Return key to Position P or Position O first if you want to restart the engine.



You cannot remove the key from the ignition starter switch until the switch is in the position "P" or "O".



4.1.3 Joysticks

Left joystick:

Telescope the boom in / out, spool up / reel off auxiliary winch, slew to the left / right.

Right joystick:

Spool up / reel off main winch, derrick boom up / down.

For details, please refer to Figure 04 – 04.

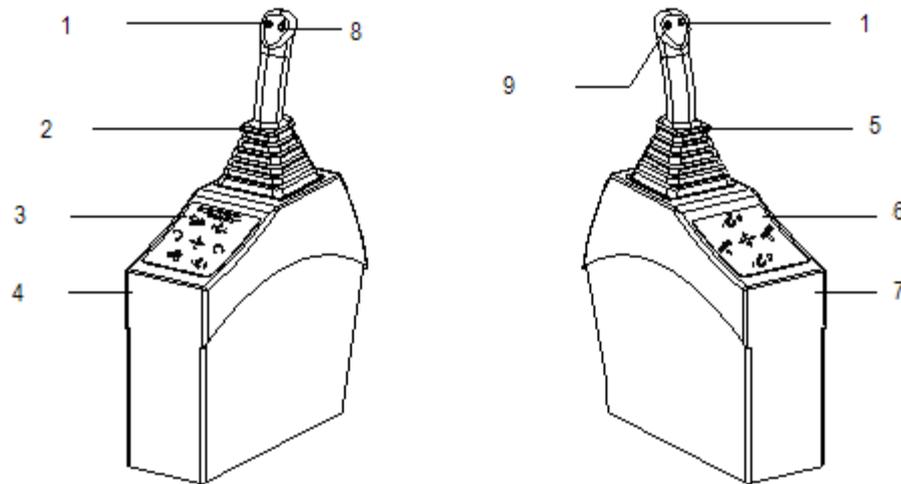


Figure 04 – 04

- 1 Free swing button
- 2 Left joystick
- 3 Operating illustration, left
- 4 Control box, left
- 5 Right joystick
- 6 Operating illustration, right
- 7 Control box, right
- 8 Button Auxiliary winch
- 9 Rapid gear button for derricking down movement

Both the left and right joysticks are fitted with the free swing button and deadman switch, and the left joystick is also fitted with auxiliary winch button, see Figure 04 – 05.

Free swing button – Push to operate the FREE SWING. Push again to release this function.

Deadman switch – Press the deadman switch to operate the functions of the joystick.

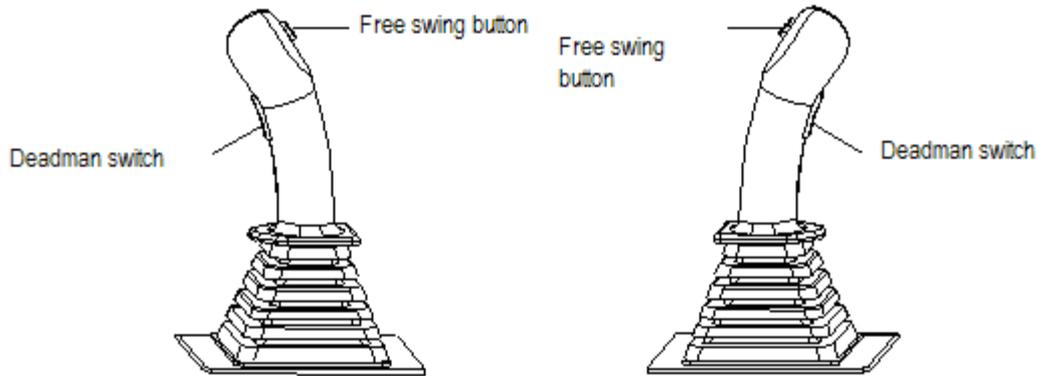


Figure 04 – 05

⚠ WARNING

Do not press the free swing button after the load is away from the ground during lifting operation. Otherwise, there will be life-threatening hazards or serious damages to property.

⚠ WARNING

Do not press the button “” on left joystick when auxiliary winch is not used.

⚠ WARNING

Do not press the button “” during lifting operation. It can be only used to speed up the derricking down movement.

4.1.4 Accelerator pedal

Depress the accelerator pedal to accelerate slewing, derricking, telescoping and hoist movements.

4.1.5 Operator's seat

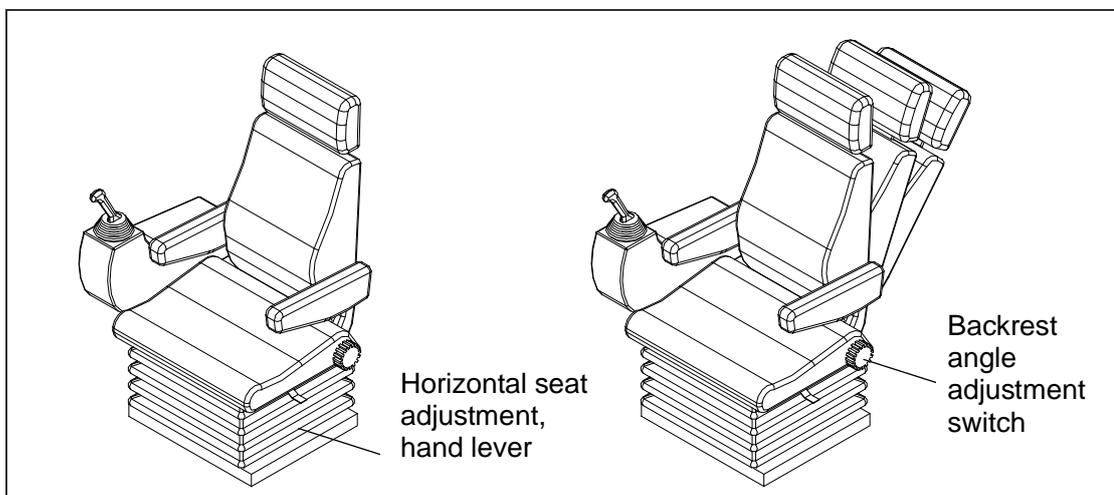


Figure 04 – 06

4.2 Computer system

The load moment limiter is a computer system for controlling and monitoring mobile cranes.

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 LCD.

If the actual load reaches 90% – 100% of the rated one, the warning light lights up and buzzer sends out slow acoustic warning. At this time, the operator should pay much attention to the operation.

If the actual load reaches 100% of the rated one, the warning light lights up and buzzer sends out fast acoustic warning and all dangerous crane movements are switched off.

CAUTION

The load moment limiter can prevent crane from toppling or boom destructed and personnel death and injuries, thus ensuring safe operation of the crane. However, do not rely entirely on the load moment limiter. If the rated lifting capacity displayed on the load moment limiter is different from the one shown in the lifting capacity table, refer to the lifting capacity table.

CAUTION

Make sure that the load moment limiter is set to the proper configuration before operation. It is dangerous to set the load moment limiter incorrectly. Only the operator who is skillful at operating this crane and system can set the OM. In normal situations, make sure that the load moment limiter is set to match the crane actual OM.

WARNING

The load moment limiter should only be commissioned by technical personnel!

For details, please refer to *Load Moment Limiter Operating Instructions* attached to the crane.

4.3 Starting up the crane

4.3.1 Checks before starting up

Ensure that the following prerequisites are met before starting up:

- a) Checking the engine oil level
 - 1) The machine has been leveled.
 - 2) Pull out the oil dipstick and wipe off it.
 - 3) Re-insert it into oil and pull out again.
 - 4) The oil level must be between the Min. and Max. marks on the oil dipstick.



Danger of damaging the engine!

If the oil level has dropped below the Min. mark, add engine oil until the oil level is between the Min. and Max. marks.

Top up engine oil and check again.

- b) Checking oil level in the hydraulic oil tank

The oil level must be between the Min. and Max. marks on the oil dipstick.

The position of shutoff gate valve is shown in Figure 04 – 07. Operate the lever for shutoff gate valve on hydraulic oil tank to connect hydraulic oil tank and oil line.

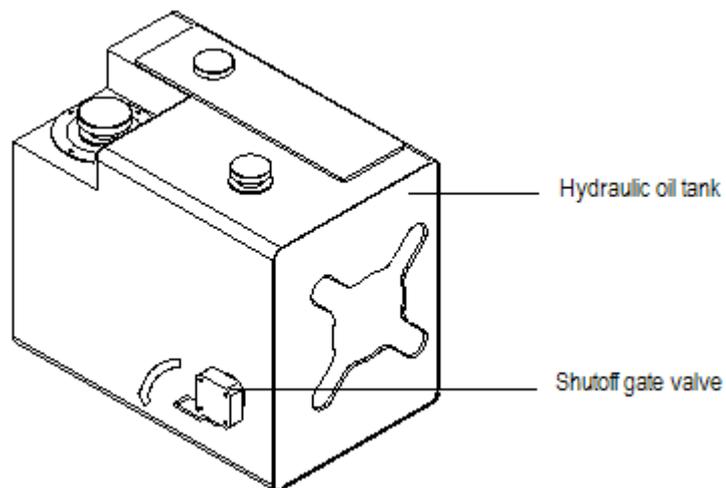


Figure 04 – 07

- c) Checking the fuel reserve

Check fuel reserve at fuel gauge in driver's cab. Add fuel timely once it is not sufficient.

⚠ CAUTION

Deaerate the fuel supply system before adding fuel.

If the fuel tank has been run dry, always deaerate the whole fuel supply system before adding fuel.

Do not run the fuel tank dry!

- d) Checking the coolant level
Add coolant timely once the coolant level is too low.
- e) Checking general conditions of crane
 - 1) Check lubricating conditions of each moving part of the crane. Add lubricating oil or grease timely to ensure lubricating effect.
 - 2) Check that the crane is properly supported on a level load-bearing surface, and has been set up horizontally.
 - 3) Check that the gear of the slewing bearing connection is clean.
 - 4) Check that the front and rear parts of oil cooler and A/C radiator have been cleaned and are free of blockage.
 - 5) Ensure that there are no people or objects in the crane danger zone.
 - 6) Make sure that the cable / rope drums and sensors are free of snow and ice.
 - 7) Make sure that there are no loose parts on the superstructure (especially on the telescopic boom).
 - 8) Ensure that all of joysticks in operator's cab are in their neutral positions before engaging the PTO.
 - 9) Ensure that all the outrigger control levers are in their neutral positions.
 - 10) Make sure that parking brake is applied.

4.3.2 Starting and stopping the engine

For starting and stopping the engine in driver's cab, please refer to the operating instructions in Chapter 3 "Operation – crane chassis".

Starting and stopping the engine in operator's cab should be carried out in accordance with the following operating instructions.

- a) Stopping the engine

Keep the button "Engine off" on the control panel pressed for 1 to 2 seconds to switch off the engine.

In an emergency, you can also press the Emergency off switch to switch off the engine.

b) Starting the engine

You can use the ignition starter switch to switch on the engine if the following prerequisites are met:

- 1) PTO has been engaged.
- 2) The transmission is in the required position.

If the emergency off switch is activated in an emergency, turn the switch clockwise to remove the limitation. Otherwise, the ignition starter switch is invalid.

4.4 Safety devices

4.4.1 Level gauge

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

A level gauge on chassis, which is located near outrigger control mechanism, is attached to each side of the vehicle for observing the crane levelness.

After the crane is horizontally aligned, the bubble in the level gauge should be in the exact center position of the level gauge.



Check the level gauge for proper work. If not, adjust the nuts beneath the level gauge.

4.4.2 Angle indicator

The angle indicator is installed on the lower rear part of the basic boom (on the right side of the operator's cab), see Figure 04 – 08. The operator can observe it clearly from the cab. The angle indicator, which can indicate the included angle between the main boom and the horizontal plane, should be used in combination with lifting capacity tables and lifting height chart.

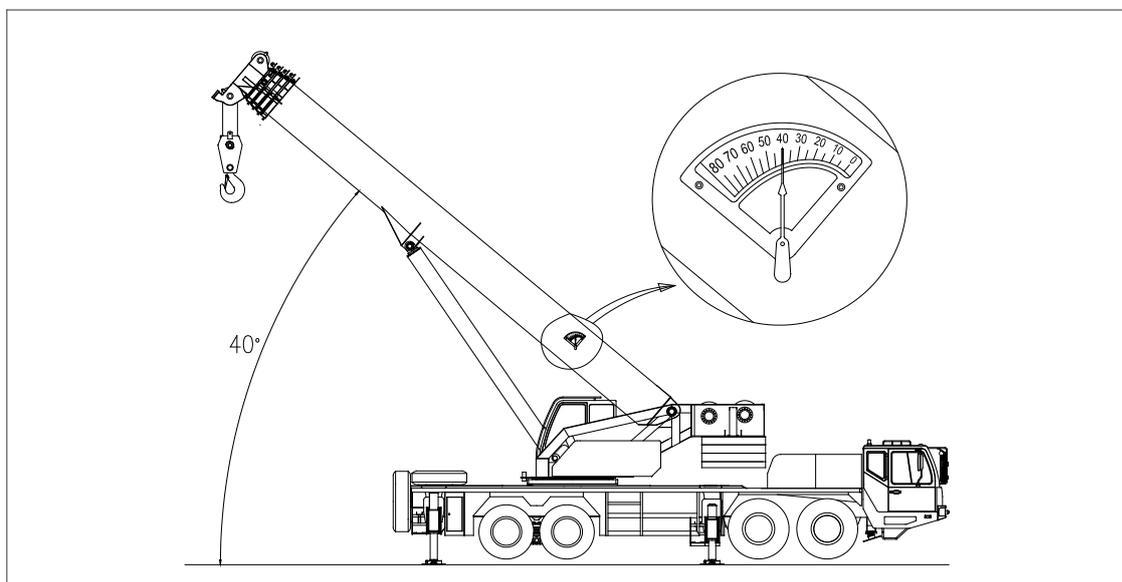


Figure 04 – 08

4.4.3 Hoisting limit switch

The hoisting limit switch is 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 dangerous crane movements “Spool up winches”, “Derrick main boom down” and “Telescope main boom out” are switched off automatically and acoustic warning will be sent. At this time, only the crane movements “Reel off winches”, “Derrick main boom up” and “Telescope main boom in” can be switched on. See Figure 04 – 09.

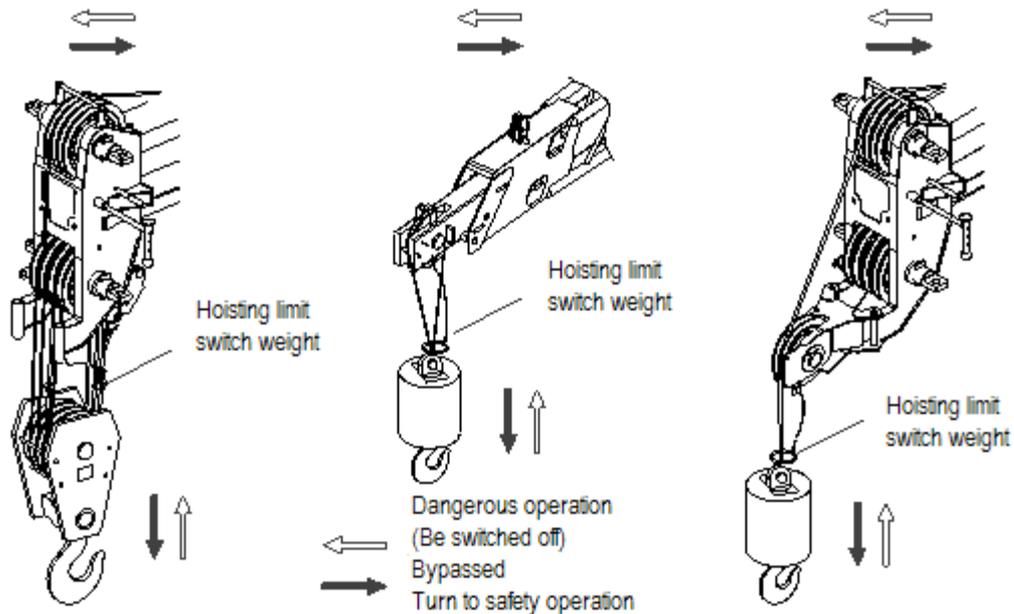


Figure 04 – 09

Press the bypass key switch to bypass the switch-off during commissioning and maintenance.

⚠ WARNING

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

Connection and installation of hoisting limit switches on jib and rooster sheave are as follows:

- a) When the jib is used, remove the bypass aviation socket on the position “ ST II ” of the junction box and install aviation socket which is connected to the hoisting limit switch on the auxiliary winch into the junction box. And then connect the plug on the jib to the socket on the boom head. See Figure 04 – 10.

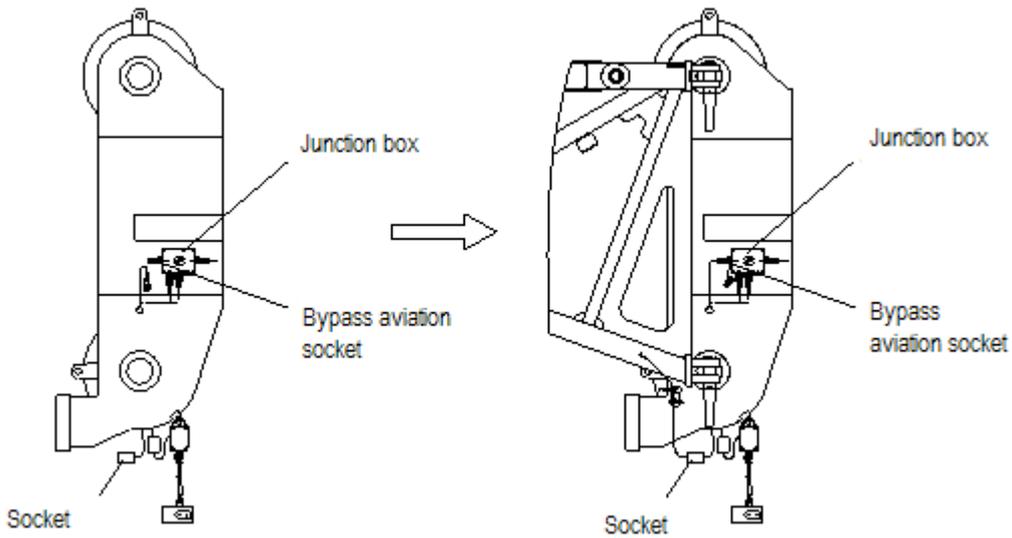


Figure 04 – 10

- b) When the rooster sheave is used, remove the hoisting limit switch on the jib and connect the plug on the hoisting limit switch to the socket on the rooster sheave. See the following figure. After the hoisting limit switch on the rooster sheave is installed, remove the bypass aviation socket on the position “ $\text{S} \uparrow \text{II}$ ” of junction box and connect the aviation socket on the hoisting limit switch on the auxiliary winch into the junction box. And then, connect the plug on the rooster sheave to the socket on the main boom head. See Figure 04 – 11.

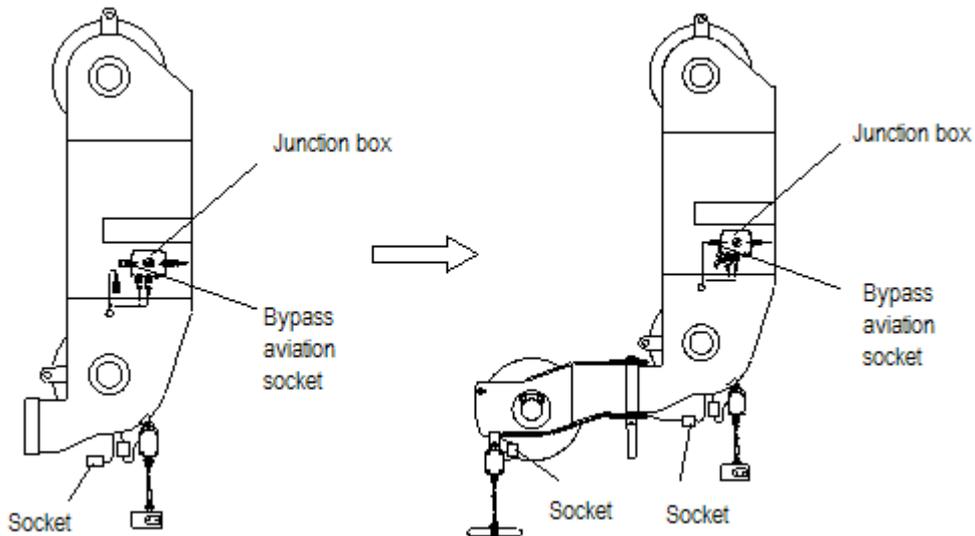


Figure 04 – 11

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 switches installed beside the winches will automatically switch off the movements "Reel off winches" if there are only 3 rope windings remaining on the winches.

In this case, the acoustic warning will be sent out and only the upward movement of the hook is permitted. During commissioning and maintenance, activate the bypass key switch to release the limitation. See Figure 04 – 12.



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

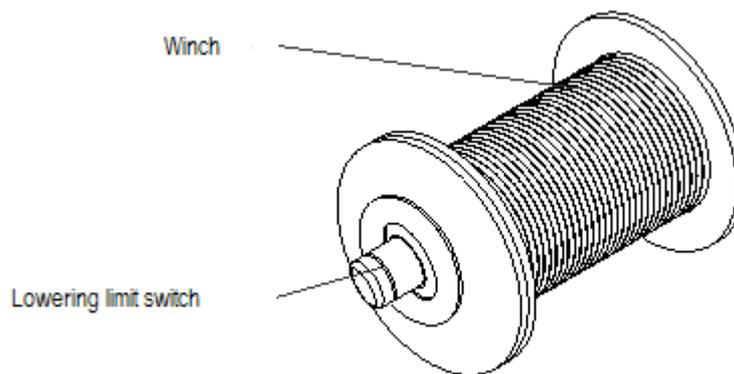


Figure 04 – 12

4.4.5 Hydraulic safety devices

- **Relief valves in the hydraulic system**

Relief valves in the hydraulic system can prevent the pressure in the circuit from excessively rising, thus avoid hydraulic pump and hydraulic motor from being damaged and hydraulic system from being overloaded.

- **Outrigger locking 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 stop the pressure oil in both sides of outrigger cylinder to prevent the outrigger from retracting or extending inadvertently, and thus ensure the safe operation of the crane.

- **Locking device for crane movement "Derrick main boom up"**

If the high-pressure oil pipe in the hydraulic circuit of derricking cylinder is damaged, the balance valve in the hydraulic circuit can stop the hydraulic oil in the derricking cylinder piston side immediately to prevent the boom from falling down inadvertently, and thus ensure the safe operation of the crane.

- **Locking device for crane movement “Telescope main boom out”**

If the high-pressure oil pipe in the hydraulic circuit of telescoping cylinder is damaged, the balance valve in the hydraulic circuit can stop the hydraulic oil in the telescoping cylinder piston side immediately to prevent the telescopic boom sections from retracting inadvertently, and thus ensure the safe operation of the crane.

- **Counterweight locking device**

If the high-pressure oil pipe which is connected to lifting cylinder is damaged, the two-way hydraulic lock in the lifting cylinder hydraulic circuit can stop the pressure oil in both sides of lifting cylinder to prevent the cylinder from retracting or extending inadvertently, and thus ensure the safe operation of the crane.

- **The 5th outrigger overpressure warning system**

In order to prevent the vehicle front from bending and deformation caused by overpressure on the 5th outrigger, a pressure relay is installed in the 5th outrigger cylinder. When you carry out lifting operation over front, once the detected pressure of piston rod side of the 5th outrigger exceeds the maximum permissible value, the warning light “The 5th outrigger pressure too high” will light up and the buzzer will sound.



Do not carry out lifting operation over front when the warning light “The 5th outrigger pressure too high” lights up and buzzer sends out acoustic warning.

- **System pressure monitoring**

There are four pressure gauges on the instrument panel in the operator’s cab, see Figure 04 – 13. Functions of the pressure gauges are as follows:

Pressure gauge 1: monitor the pressure of oil circuit in control system.

Pressure gauge 2: monitoring the pressure of oil circuit in slewing mechanism.

Pressure gauge 3: monitor the pressure of oil circuit in main winch, auxiliary winch, derricking and telescoping mechanism.

Pressure gauge 4: monitor the pressure of oil circuit in A/C of operator’s cab and counterweight.

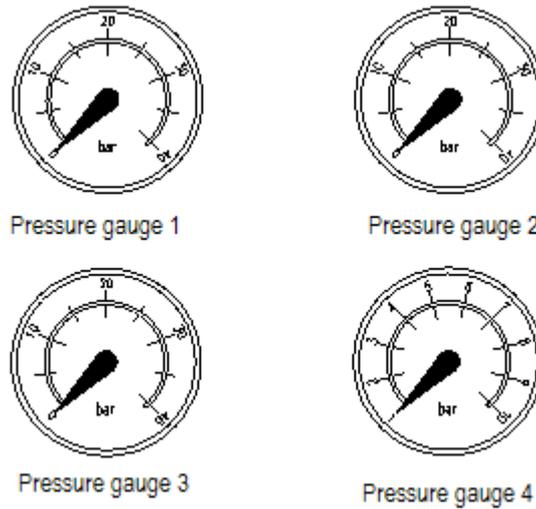


Figure 04 – 13

Pressure limits are as follows:

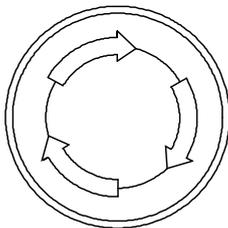
Pressure of spooling up oil circuit in main / auxiliary winch: ≤ 24 MPa, pressure of reeling off oil circuit in main / auxiliary winch: 8 – 10 MPa.

Pressure of derricking up oil circuit: ≤ 24 MPa, pressure of derricking down oil circuit: 2 – 5 MPa.

Pressure of telescoping out oil circuit: 14 MPa, pressure of telescoping in oil circuit: 16 MPa.

Pressure of slewing oil circuit: ≤ 10 MPa.

Pressure of control oil circuit: ≤ 3.5 MPa.

4.4.6 Emergency off switch

The “Emergency off switch” (See the Fig. on the left) is fitted on the instrument console in operator’s cab. In an emergency, push this button to immediately STOP all crane functions. Turn the button clockwise to release the button.



Only use the “Emergency off switch” in the event of a clear emergency!

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

4.5 Crane operation

4.5.1 Preparations for crane operation

Ensure that following checks are operated before operation:

- a) Assess the load condition.
- b) Check the crane location, ground condition and surface bearing condition.
- c) Check wire ropes (including wire rope's connections, winding drum and pulleys).
- d) Check the liquid level and power source of the crane.

NOTE

(1) Fuel reserve of the fuel tank should be more than 1/4 of the tank capacity (Check the fuel gauge).

(2) The oil level in hydraulic reservoir should be between the Minimum and Maximum marks in the driving condition.

- e) Ensure that there are no obstacles in the crane working area and no persons in the danger zone. Check the communication system of operator and conductor to ensure that nothing will hinder the operation.
- f) Check safety devices for functional work.
- g) Remain the communication between the operator and the rigger.

WARNING

Risk of accident!

Danger of damaging the crane!

Always operate the control levers slowly and sensitively.

DANGER

Ensure 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 Outrigger operation

The accelerator control switch, outrigger control levers and level gauge are attached to both sides of chassis frame of the vehicle. You can operate the control levers to extend or retract the outriggers simultaneously or independently. See Figure 04 – 14.

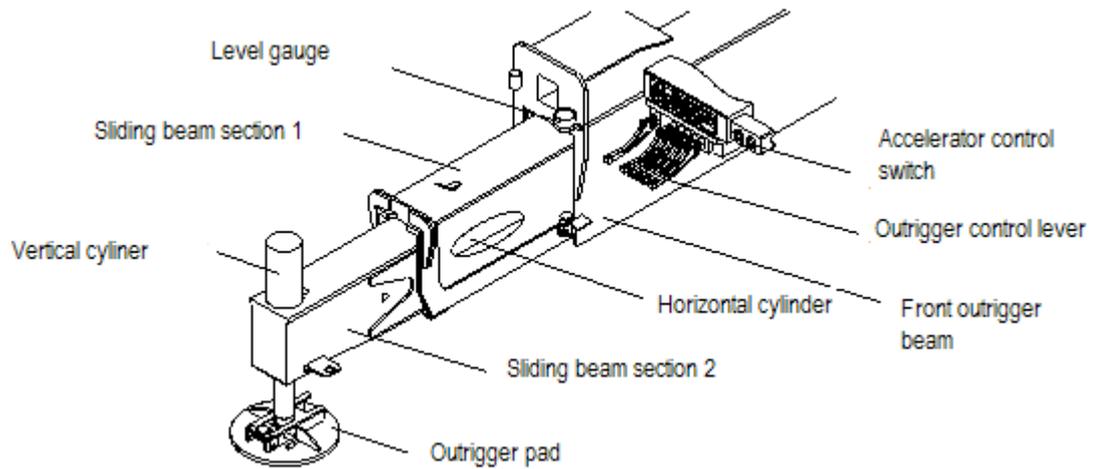


Figure 04 – 14

⚠ 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.

- Outrigger control levers

Outrigger control levers are shown in Figure 04 – 15.

- a) Outrigger control direction illustrations and points for attention are printed in the outrigger control label.
- b) Control lever 1: extend or retract the horizontal or vertical cylinder
 - 1) Move lever 1 upwards: retract the horizontal / vertical cylinder.
 - 2) Neutral position: stop the cylinder's movement.
 - 3) Move lever 1 downwards: extend the horizontal / vertical cylinder.
- c) Control lever 3: select left front outrigger
 Control lever 4: select right front outrigger
 Control lever 5: select left rear outrigger
 Control lever 6: select right rear outrigger
 Move levers 3, 4, 5 and 6 together with lever 1 to initiate corresponding movements.
 - 1) Move levers 3 – 6 upwards and move lever 1 upwards or downwards: extend / retract the horizontal cylinders.
 - 2) Move levers 3 – 6 downwards and move lever 1 upwards or downwards:

extend / retract the vertical cylinders.

d) Control lever 2: select the 5th outrigger

Move lever 2 downwards and move lever 1 upwards: retract the 5th outrigger

Move lever 2 downwards and move lever 1 downwards: extend the 5th outrigger.

CAUTION

During operation of outriggers, turn the accelerator control switch clockwise to increase working speed of outriggers.

WARNING

Do not extend or retract horizontal cylinders after the outrigger pads are in contact with the ground!

 警告 WARNING	1. Before operation, all of outriggers must be extended and the machine must be levelled up.
1. 起重作业前必须先放下支腿,并使车架保持水平;	2. When extending or retracting outriggers,
2. 收放支腿时,吊臂必须位于吊臂支架上;	the boom must be stayed on boom bracket.
3. 起重作业时,严禁操纵支腿并锁紧伸缩手柄。	3. Prohibit manipulating outriggers during lifting and lock the telescoping level.
缩 RET ↑ ○	伸 EXT ↓ ○
前支腿 FO	左前 FLO
右前 FRO	左后 RLO
右后 RRO	○

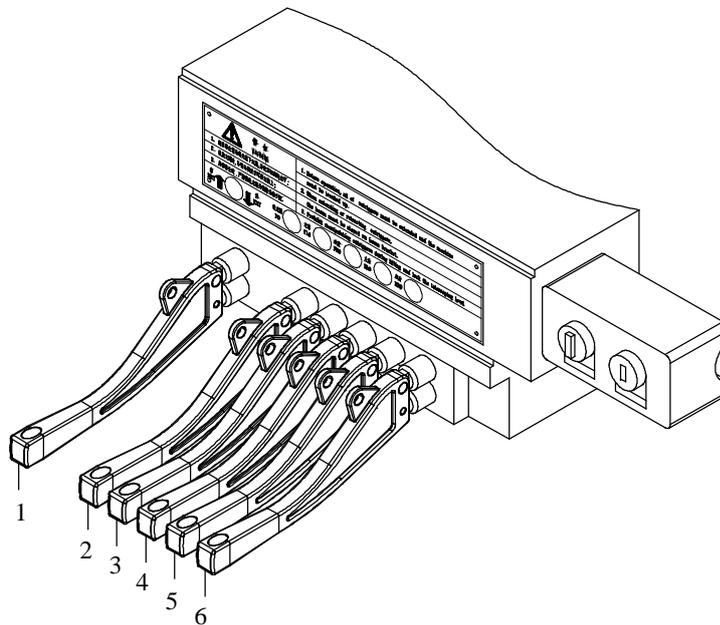


Figure 04 – 15

- Outrigger extension

- a) Remove the pins of sliding beam. See Figure 04 – 16.

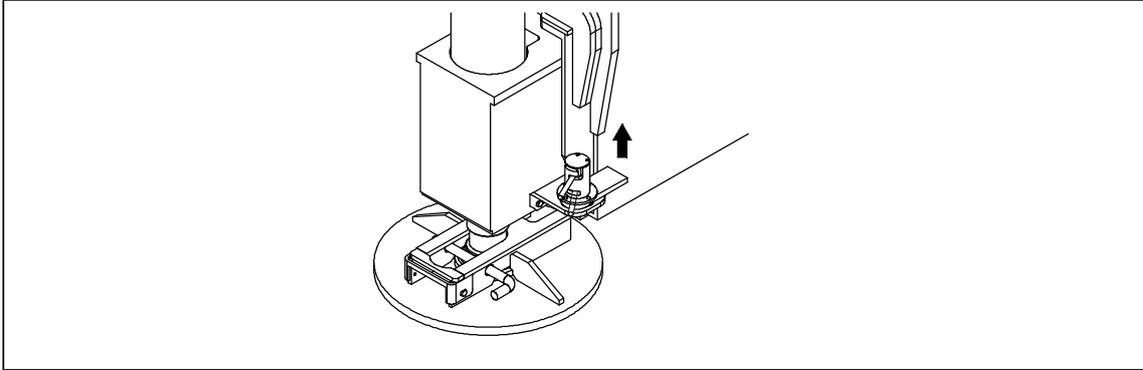


Figure 04 – 16

- b) As illustrated in Figure 04 – 17:

- 1) Stand on the right (or left) side of the crane.
- 2) Move levers 3, 4, 5 and 6 upwards.
- 3) Move lever 1 downwards till the marks “◁” are exposed, that is to say the sliding beams are intermediately extended.
- 4) Continue moving lever 1 to fully extend the sliding beams.
- 5) Move the levers to neutral positions after the sliding beams are fully extended.
- 6) Walk to the other side of the crane to extend sliding beams on the other side.

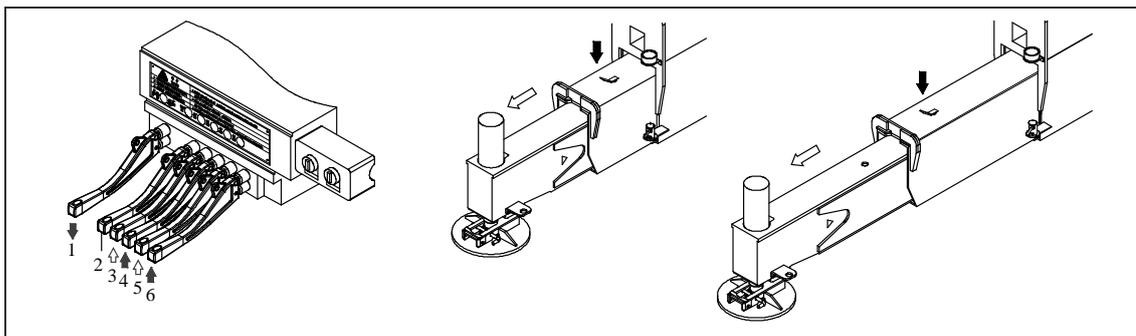


Figure 04 – 17



Completely expose the mid-position marks “◁” and install the retaining pins if the crane is working with outriggers intermediately extended. Otherwise, the crane may topple.

- c) As illustrated in Figure 04 – 18:

- 1) Stand on the left (or right) side of the crane.
- 2) Move levers 3, 4, 5 and 6 downwards.
- 3) Move lever 1 downwards to fully extend the vertical cylinders.

- 4) Walk to the other side of the crane to extend vertical cylinders on the other side.

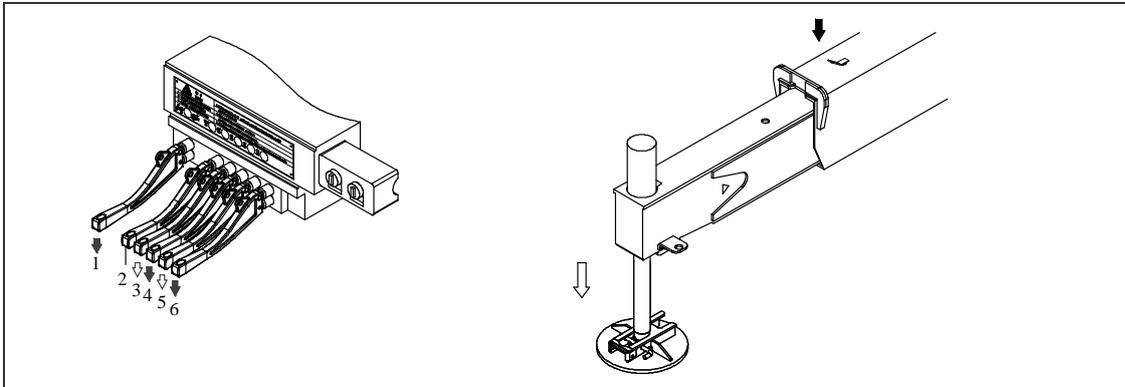


Figure 04 – 18

- d) Observe the level gauge to check if the crane is level. If the bubble in the level gauge does not show a level indication, you can adjust the outrigger to make the crane level.

Move the levers to neutral positions after the complete vehicle is leveled.

How to level the vehicle:

For example: If vehicle right side is higher than the left one (See Figure 04 – 19),

- Move levers 4 and 6 downwards slowly.
- Move lever 1 upwards.
- Observe the level gauge.

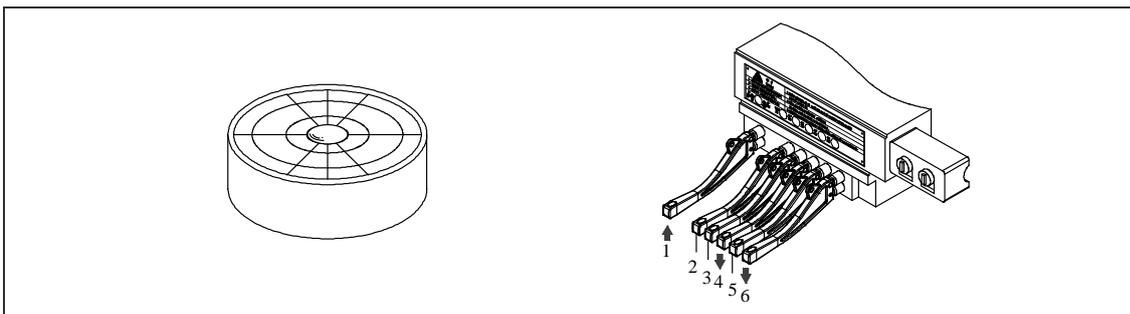


Figure 04 – 19

- e) When the bubble is at the correct position, release the lever 1 and move levers 4 and 6 to neutral positions.
- f) When the crane is working over front with the same lifting capacities as over sides and rear, the 5th outrigger should be used.

How to extend the 5th outrigger:

- 1) Move lever 2 downwards.
- 2) Move lever 1 downwards until the 5th outrigger is 5 – 10 mm away from the ground. See Figure 04 – 20.

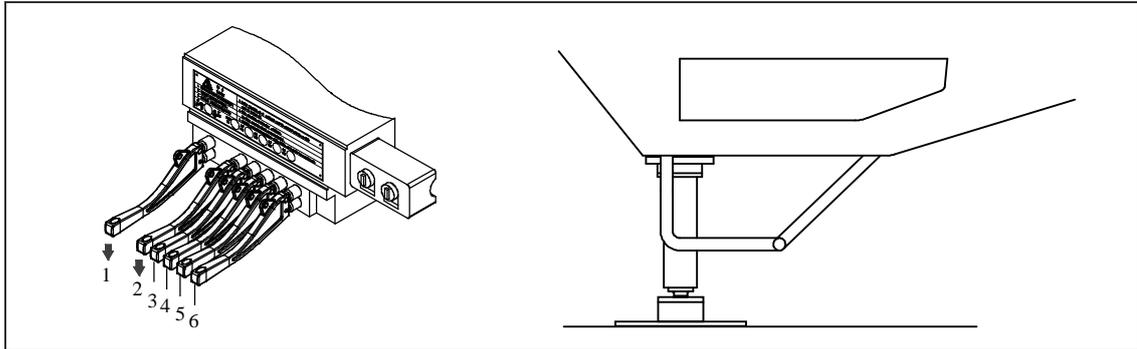


Figure 04 – 20

⚠ CAUTION

Lever 1 can return to neutral position automatically after being released, while other levers should be returned manually.

- **Outrigger retraction**

⚠ WARNING

After crane operation is finished, fully telescope in the boom and secure it on the boom support. After that, retract the 5th outrigger before you retract all the other outriggers.

- a) Remove the pins of sliding beam section 2.

As illustrated in Figure 04 – 21:

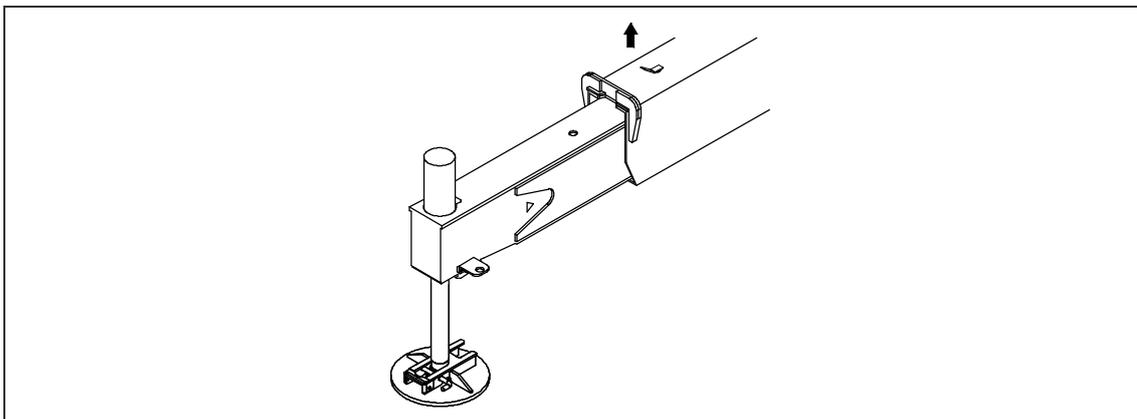


Figure 04 – 21

- b) How to retract the 5th outrigger:

- 1) Move lever 2 downwards.
- 2) Move lever 1 upwards until the 5th outrigger is fully retracted. See Figure 04 – 22.

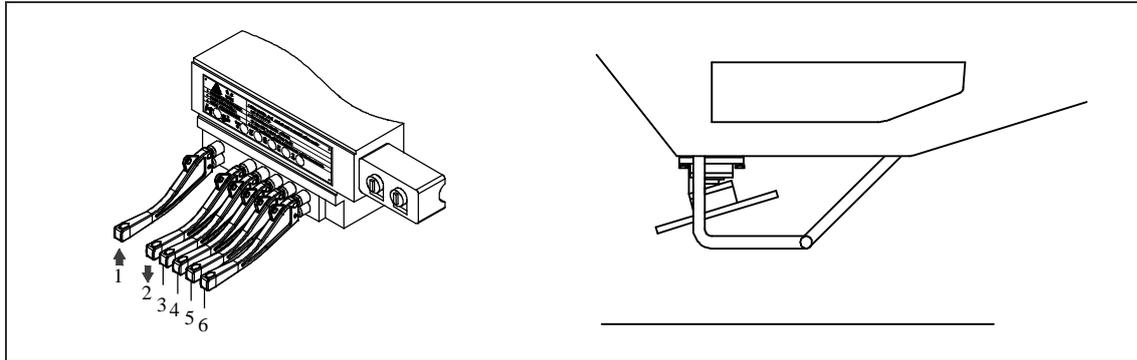


Figure 04 – 22

c) As illustrated in Figure 04 – 23:

- 1) Stand on the left (or right) side of the crane.
- 2) Move levers 3, 4, 5 and 6 downwards.
- 3) Move lever 1 upwards to retract vertical cylinders completely.

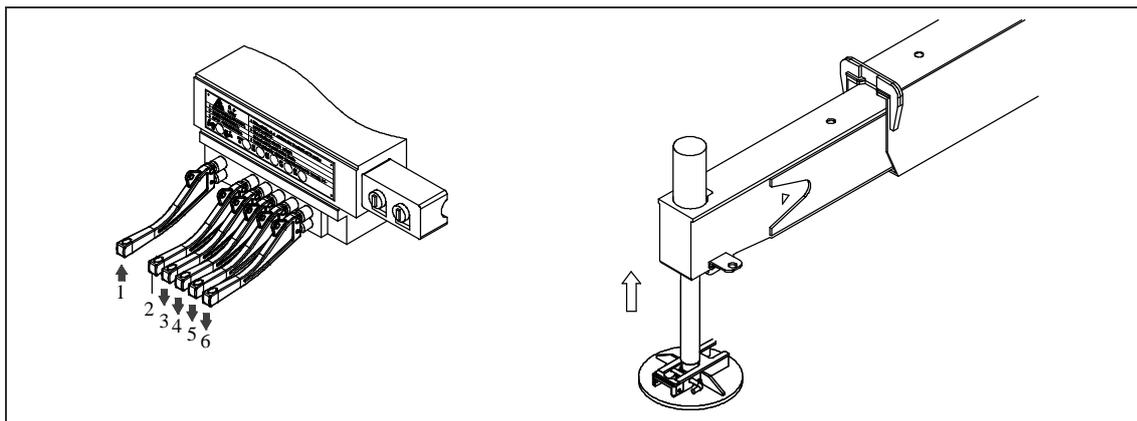


Figure 04 – 23

d) As illustrated in Figure 04 – 24:

- 1) Stand on the left (or right) side of the crane.
- 2) Move levers 3, 4, 5 and 6 upwards.
- 3) Move lever 1 upwards to retract the sliding beams completely.

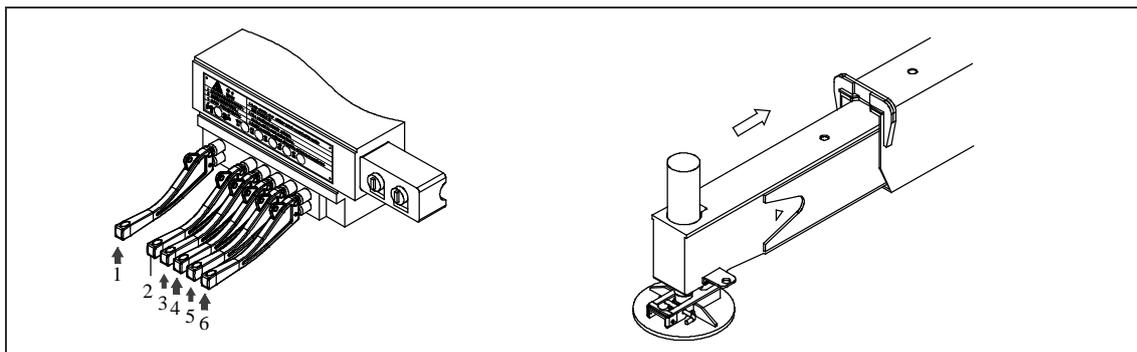


Figure 04 – 24

- e) Install the outrigger retaining pins after outriggers are fully retracted. See Figure 04 – 25.

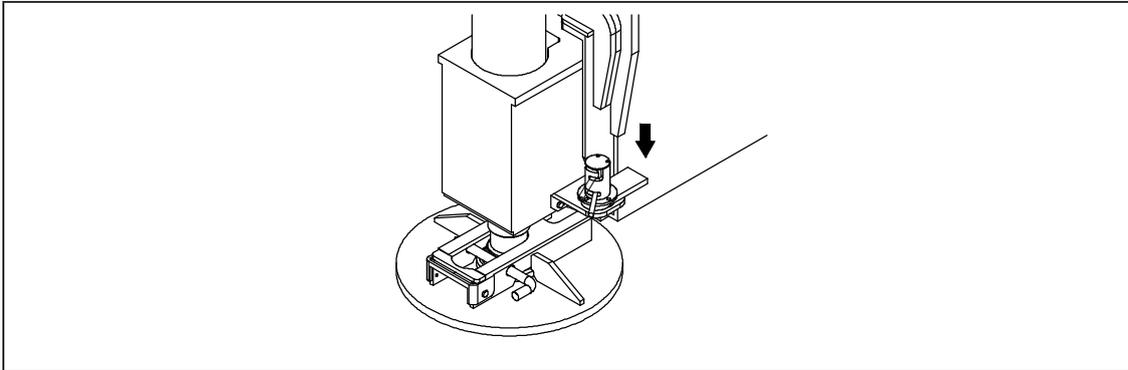


Figure 04 – 25

- Installing and removing the outrigger pads

- a) Outrigger pad is shown in Figure 04 – 26.

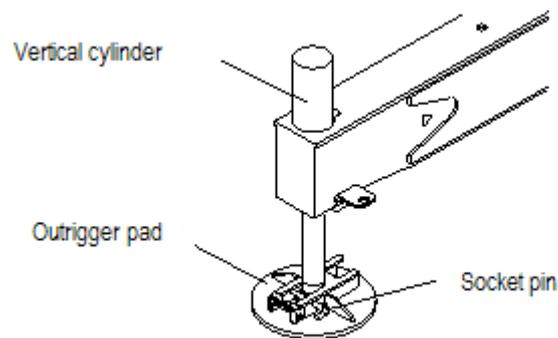


Figure 04 – 26

- a) Installation

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.

Weight of outrigger pad: about 42 kg.

- b) Removal

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.

CAUTION

- (1) Before you move the outriggers, make sure that there is clearance to prevent injury to personnel or damage to the crane and other objects.
- (2) Make sure that you install the outrigger pads before you move the outriggers.

- (3) Ensure that all the outrigger pads (except the 5th outrigger pad) contact with the ground.
- (4) You can only extend the 5th outrigger to the position where its outrigger pad is about 5 – 10mm off the ground. It is not permitted that the two front outriggers are away from the ground due to excessive extending of the 5th outrigger.
- (5) Make sure that all the tires are off the ground (crane weight held up by the outriggers) before you start to lift a load.
- (6) When the crane is on a level area, examine the level gauge. The bubble shows in the middle of the gauge. If not, adjust the nuts below the level gauge.



Do not operate the outrigger control levers during lifting operation.

4.5.3 Derricking

As it is illustrated in Figure 04 – 27:

The right joystick controls the derricking gear.

Neutral position: stop the derricking movements.

- Move the joystick leftwards (direction ③).

Result:

- The telescopic boom is derricked up.

- Move the joystick rightwards (direction ④).

Result:

- The telescopic boom is derricked down.

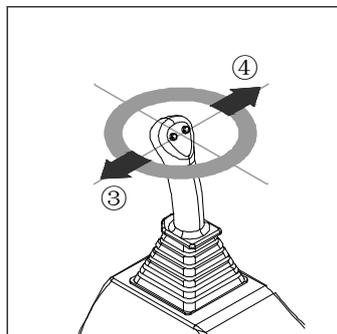


Figure 04 – 27

The speed of crane derricking up movement can be controlled by moving right joystick and by applying the engine control pedal. You can depress the engine control pedal or increase the inclination angle of the right joystick to speed up the derricking up movement. (When deflection angle of the joystick is small, it is recommended not to

apply the engine control pedal.) Do not change the derricking speed jerkily to ensure stable crane operations.

The speed of crane derricking down movement can be controlled by moving right joystick. You can increase the inclination angle of the right joystick to speed up the derricking down movement. Besides, push the button “” on joystick to speed up derricking down movement

⚠ CAUTION

The movement “derricking down” cannot be controlled by applying the engine control pedal.

An angle indicator and an angle detector are fitted on main boom. You can read the boom angle from the angle indicator. The angle detector is an electronic device which can transmit information of the boom angle to the load moment limiter and display it on the screen. See Figure 04 – 28.

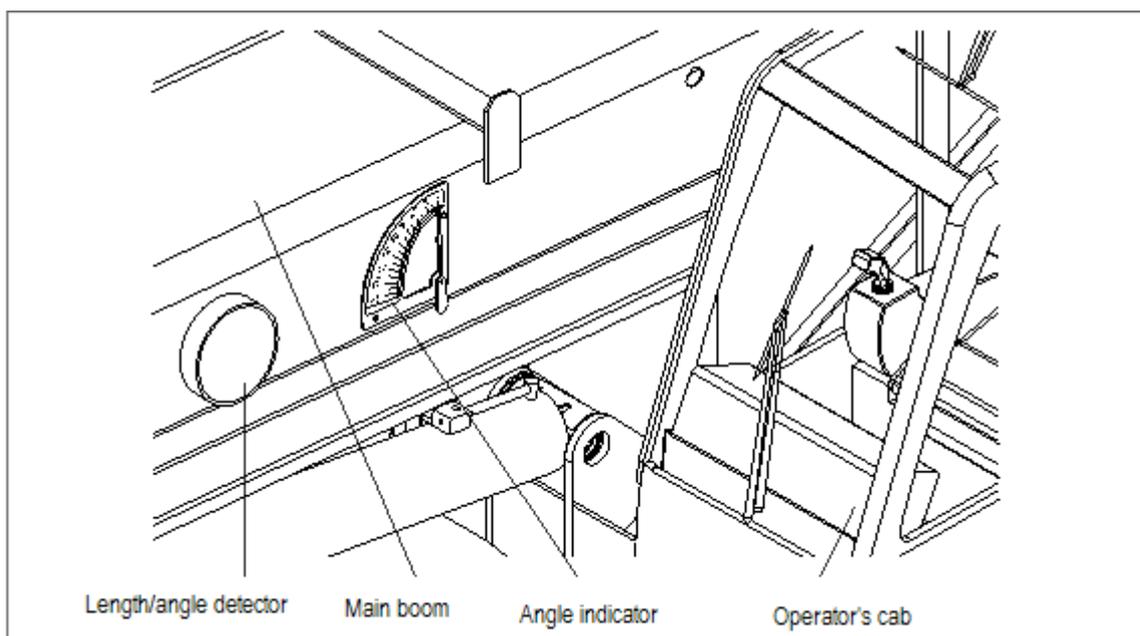


Figure 04 – 28

⚠ WARNING

- (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) The derricking angle and working radius should be restricted according to the lifting capacity tables.

4.5.4 Telescoping

The main boom includes a basic boom and four U-type telescopic sections.

To extend and retract the boom, a telescoping system is attached in the boom structure. The components of the telescoping system are as follows:

- Telescoping cylinder I
- Telescoping cylinder II
- Boom extension ropes
- Boom retraction ropes

Telescoping cylinder I drives telescopic section 1 to extend or retract. Telescopic cylinder II drives telescopic sections 2, 3 and 4 to extend or retract together with boom extension / retraction ropes.

The figure below shows the telescoping principle:

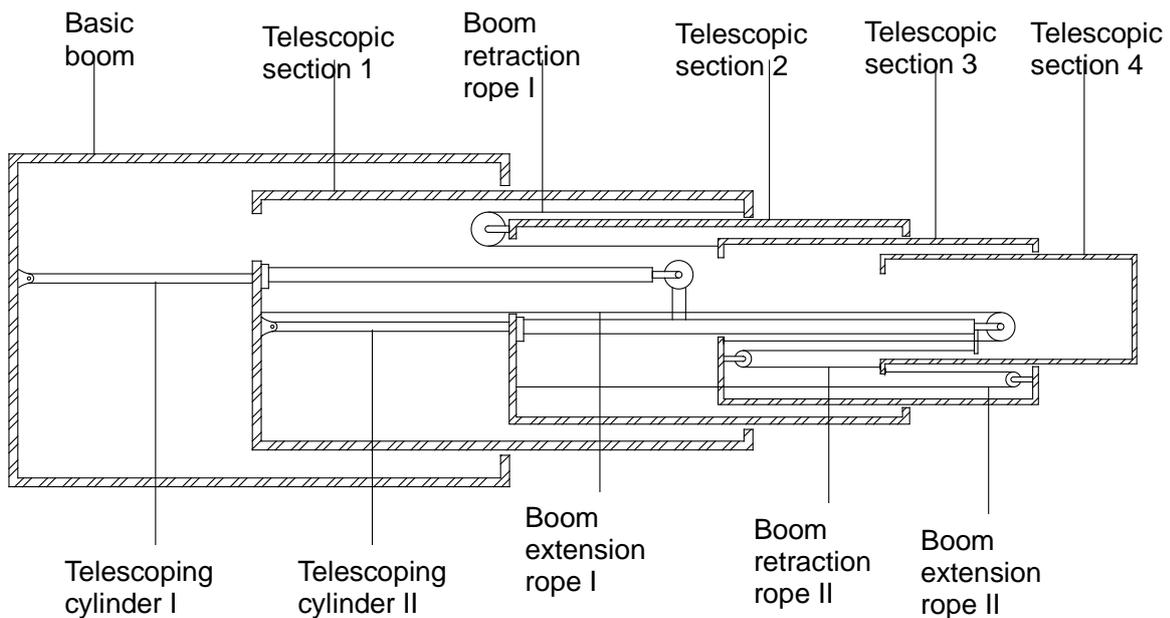


Figure 04 – 29

- a) Turn the switch “Pre-selection of derrick / telescope” to the left position “”. See Figure 04 – 30.

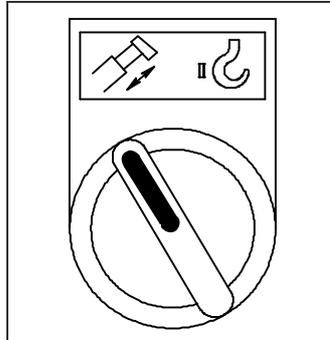


Figure 04 – 30

- b) As illustrated in Figure 04 – 31.

The left joystick controls the telescoping system.

Neutral position: stop the telescoping movements.

- Move the joystick forwards (direction ①).

Result:

- The telescopic sections are telescoped out.

- Move the joystick backwards (direction ②).

Result:

- The telescopic sections are telescoped in.

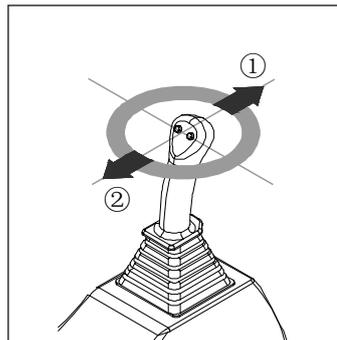


Figure 04 – 31

⚠ CAUTION

- (1) **When you extend the boom and the hook block touches the hoisting limit switch weight, the items below occur:**

- A warning noise sounds
- A warning light illuminates.

When the warning occurs, stop boom extension.

If you must extend the boom more, use the reel-off function (right joystick forward) to lower the hook block.

(2) The speed of the telescoping movement is changed by:

- Joystick - how far you move the joystick forward or backward
- Engine control pedal - increase or decrease the engine RPMs.

Do the telescoping movement smoothly. You can cause damage to the crane if you change speed rapidly.

(3) Telescope the boom stably and at constant speed.

(4) When the boom is fully retracted, it can be two seconds before the boom starts to move.

(5) The bypass key switch can only be activated during commissioning and maintenance. Do not use the bypass key switch when you do usual crane operations.

(6) Operator should strictly carry out the telescoping operation according to *Lifting Capacity Tables*. Otherwise, the crane may topple or be damaged.

⚠ WARNING

Do not telescope the telescopic boom with a suspended load. Otherwise:

- (1) The telescoping cylinder and boom extension / retraction ropes may be damaged.
- (2) The crane may topple.

4.5.5 Lifting / lowering

– Preparations for lifting / lowering

Read *Lifting capacity tables* and *Lifting height chart* before lifting / lowering operation. (Refer to Chapter 1).

How to look up lifting capacity in the *Lifting capacity table* (See Figure 04 – 32):

Look up the main boom length according to the lifting height and working radius in lifting height chart.

Look up the lifting capacity according to the checked main boom length in the lifting capacity tables.

NOTE

If the jib is fitted, look up the load capacity according to the boom angle in the table.

For example:

If outriggers are fully extended and the main boom is over sides and rear, look up the lifting capacity according to the following figure:

When working radius is R, the rated lifting capacity is W2kg with L2 boom length and the rated lifting capacity is W3kg with L3 boom length.

CAUTION

- (1) Look up the corresponding lifting capacity according to actual working conditions.
- (2) Observe the notes shown below the lifting capacity table.

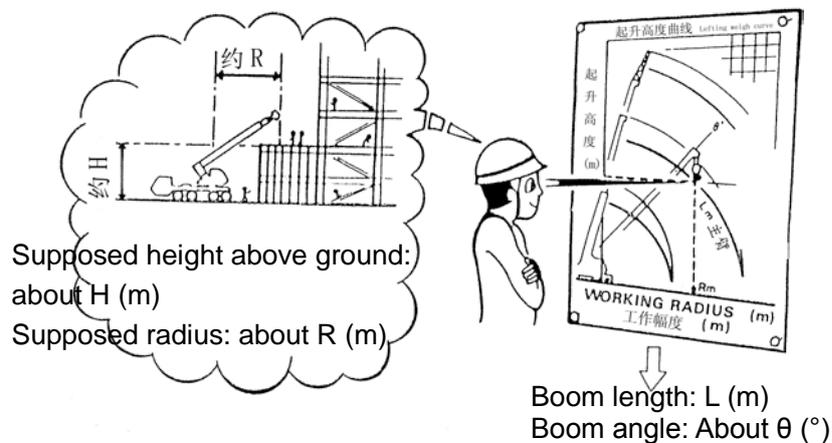


Figure 04 – 32

CAUTION

The parameters shown in the lifting height chart do not include the deflection of main boom.

Rated lifting capacities are changed with working radius.

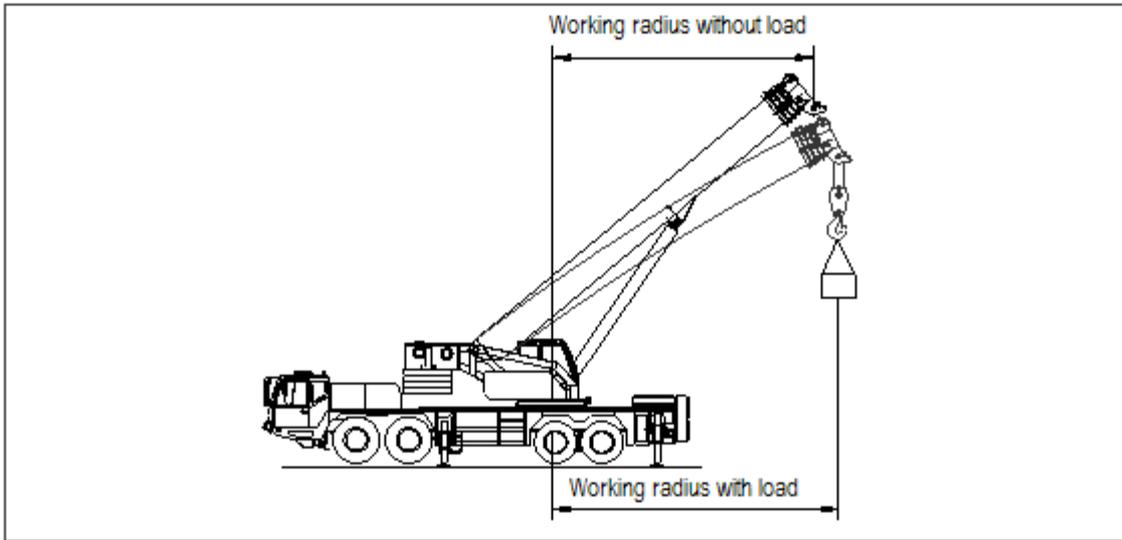


Figure 04 – 33

RATED LIFTING CAPACITY TABLE

Working radius (m)	Main boom (m)									
	Outriggers fully extended, over side and over rear						Outriggers intermediately extended			
	L1	L2		L3	L4	L5	L6	12.1	16.4	20.7
								80000*	65000	
								75000*	62000	44000
R		W2						68000	59000	44000
								63000	58000	44000

NOTE

L2 refers to main boom length. W2 refers to rated lifting capacity.

Figure 04 – 34

– **Spooling up / reeling off main winch**

a) Right joystick:

See Figure 04 – 35.

The right joystick controls the main winch.

Neutral position: stop spooling up / reeling off main winch.

- Move the joystick forwards (direction ①).

Result:

- Main winch is reeled off and the load is lowered.

- Move the joystick backwards (direction ②).

Result:

- Main winch is spooled up and the load is lifted.

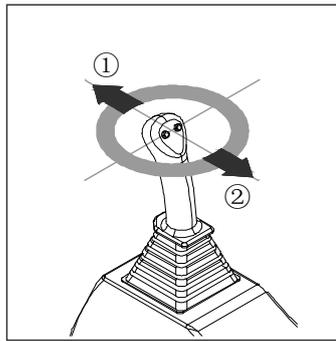


Figure 04 – 35

b) Main hoist gear is working. Refer to Figure 04 – 36.

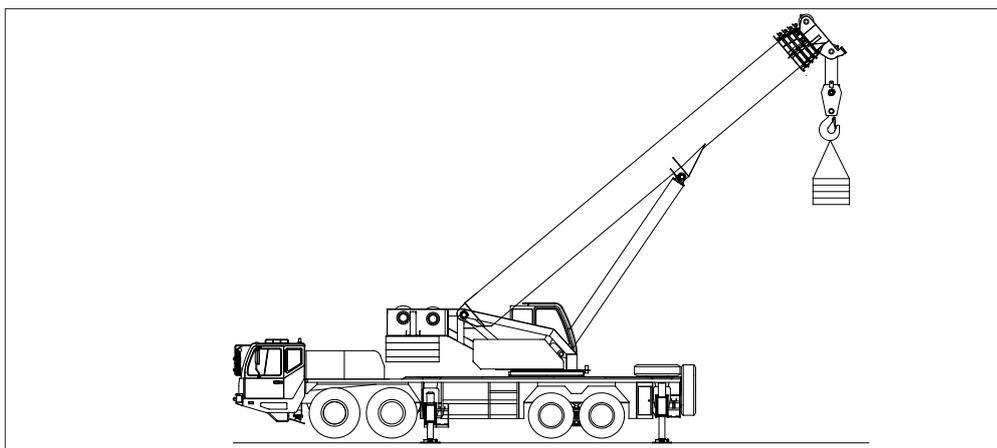


Figure 04 – 36

- **Spooling up / reeling off auxiliary winch**

- a) Turn the switch “Pre-selection of telescope / auxiliary winch” to the right position “II” or press the button “II” on left joystick. See Figure 04 – 37.

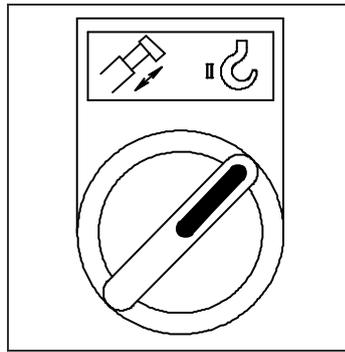


Figure 04 – 37

- b) Left joystick:

See Figure 04 – 38.

The left joystick controls the auxiliary winch.

Neutral position: stop spooling up / reeling off auxiliary winch.

- Move the joystick forwards (direction ①).

Result:

- Auxiliary winch is reeled off and the load is lowered.

- Move the joystick backwards (direction ②).

Result:

- Auxiliary winch is spooled up and the load is lifted.

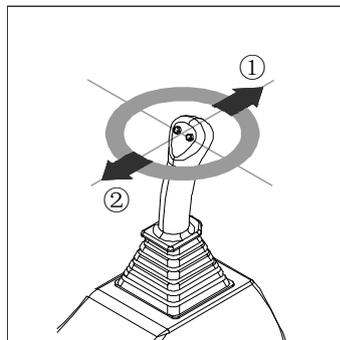


Figure 04 – 38

- c) Auxiliary hoist gear is working. Refer to Figure 04 – 39.

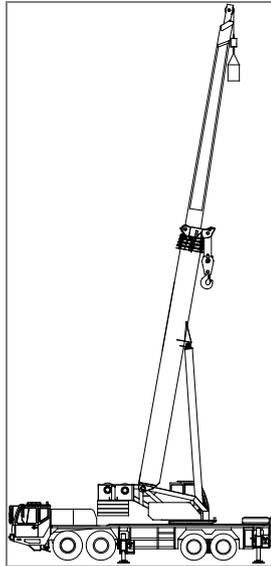


Figure 04 – 39

After you complete the movement, move the joystick to the neutral position slowly to stop the movements.

The speed of the main winch / auxiliary winch movement is changed by:

- Joystick - how far you move the joystick forward or backward
- Accelerator pedal - increase or decrease the engine RPMs.

⚠ CAUTION

Spool up / reel off the winches smoothly. You can cause damage to the crane if you change speed rapidly.

Do not apply the accelerator pedal when the joystick travel distance is short.

When the hook block touches the hoisting limit switch weight, when less than three windings of rope are left on the drum or when the maximum permissible load moment is exceeded, the items below occur:

- A warning noise sounds
- A warning light illuminates.

When the warning occurs, stop winch operation. The crane can only work towards safe directions till the dangerous operation is deactivated.

⚠ CAUTION

- (1) **Choose the correct reeving for the boom length and load weights in accordance with the *Lifting capacity tables*. Before you change the reeving numbers, fit the hoisting limit switch weight.**
- (2) **Keep a minimum of 3 windings of rope on the winch while you operate the**

crane.

- (3) Lift the load vertically. Do not drag the load that is still on the ground. Do not pull a load at an angle.
- (4) Monitor the area as you lift a load. Do not move a load unless the conditions are safe. 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 connects to a load on the ground.
 - 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.
- (5) The slings must be of enough strength. The lifting capacity includes the mass of the hook and slings.
- (6) Do not use the crane to lift personnel.
- (7) If the hook turns because of the rope, put the load on the ground. Do not lift the load until the rope is straight.

4.5.6 Slewing

- Operation

As it is illustrated in Figure 04 – 40.

The left joystick controls the slewing gear.

Neutral position: stop the slewing movements.

- Move the joystick rightwards (direction ③).

Result:

- Slew to the right.

- Move the joystick leftwards (direction ④).

Result:

- Slew to the left.

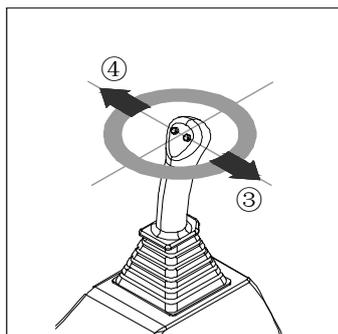


Figure 04 – 40

The speed of the main winch / auxiliary winch movement is changed by:

- Joystick - how far you move the joystick left or right
- Accelerator pedal - increase or decrease the engine RPMs.

⚠ CAUTION

Do not apply the accelerator pedal when the joystick travel distance is short.

Do the slewing movement smoothly. You can cause damage to the crane if you change speed rapidly.

⚠ CAUTION

- (1) **When you turn the crane, your view to the rear and side can be blocked. Be careful.**
 - (2) **Make sure that work-site personnel and equipment are clear from crane slewing area (within slewing radius R). Give a short warning signal (horn) before starting a crane movement.**
- **Slewing lockout device**

The slewing lockout device attaches on the front of the slewing table. Ensure that the superstructure is unpinned before initiating the slewing movement. Insert and secure the pin after finishing this operation. See Figure 04 – 41.

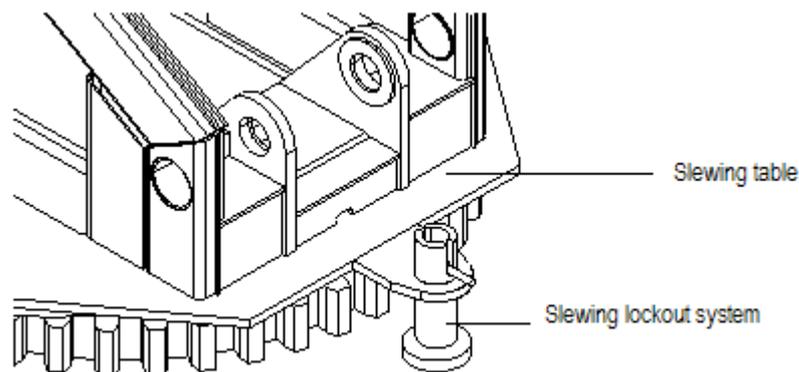


Figure 04 – 41

⚠ CAUTION

- (1) **Make sure that you do not make fast movements or suddenly stop the turn.**
- (2) **When you operate a new crane, check the slewing bearing bolts after the initial 100 working hours. After that, check the bolts at the interval of 500 hours of operation.**
 - **The torque on the bolts must be 1350 N-m.**
- (3) **The crane can slew with load. Do not try to lift the load diagonally. Do not pull a load across the ground.**

- (4) Make sure that the outriggers are in the correct position before you slew the superstructure with a load on the boom.
- (5) Monitor the area as you move a load. Do not move a load unless the conditions are safe.
- (6) Lubricate the slewing bearing at regular intervals.

4.5.7 Simultaneous crane movements

The simultaneous crane movements, which can greatly improve the work efficiency, mean that the crane can carry out 2 and or more movements simultaneously.

There are 9 simultaneous crane movements. For the details, please refer to the table below.

Ensure that the following preconditions are met when initiating simultaneous crane movements:

- Apply the accelerator pedal.
- Do not move the joysticks to limit positions.



You can only use simultaneous crane movements when there is no load attached on the hook (or when you lift the load away from the ground).

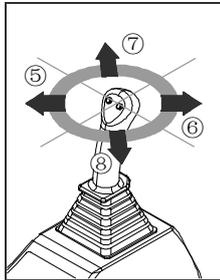
Do not telescope the boom with a suspended load!

Ser. No.	Simultaneous crane movements	Illustration		Illustration
		Left joystick	Right joystick	
1	Main winch + Telescoping			<ul style="list-style-type: none"> a. Turn the switch "Pre-selection of telescope / auxiliary winch" to the "telescoping" position. b. Operate left and right joysticks at the same time according to left figures to make main winch and telescoping system work simultaneously. c. Left joystick: <ul style="list-style-type: none"> ① Telescope main boom out. ② Telescope main boom in. d. Right joystick: <ul style="list-style-type: none"> ① Reel main winch off. ② Spool main winch up.

Ser. No.	Simultaneous crane movements	Illustration		Illustration
		Left joystick	Right joystick	
2	Main winch + Auxiliary winch			<p>a. Turn the switch "Pre-selection of telescope / auxiliary winch" to the "auxiliary winch" position.</p> <p>b. Operate left and right joysticks at the same time according to left figures to make main and auxiliary winches work simultaneously.</p> <p>c. Left joystick:</p> <ul style="list-style-type: none"> ① Reel auxiliary winch off. ② Spool auxiliary winch up. <p>d. Right joystick:</p> <ul style="list-style-type: none"> ① Reel main winch off. ② Spool main winch up.
3	Derricking + Telescoping			<p>a. Turn the switch "Pre-selection of telescope / auxiliary winch" to the "telescoping" position.</p> <p>b. Operate left and right joysticks at the same time according to left figures to make derricking gear and telescoping system work simultaneously.</p> <p>c. Left joystick:</p> <ul style="list-style-type: none"> ① Telescope main boom out. ② Telescope main boom in. <p>d. Right joystick:</p> <ul style="list-style-type: none"> ③ Derrick main boom up. ④ Derrick main boom down.

Ser. No.	Simultaneous crane movements	Illustration		Illustration
		Left joystick	Right joystick	
4	Derricking + Auxiliary winch			<p>a. Turn the switch "Pre-selection of telescope / auxiliary winch" to the "auxiliary winch" position.</p> <p>b. Operate left and right joysticks at the same time according to left figures to make derricking gear and auxiliary winch work simultaneously.</p> <p>c. Left joystick:</p> <ul style="list-style-type: none"> ① Reel auxiliary winch off. ② Spool auxiliary winch up. <p>d. Right joystick:</p> <ul style="list-style-type: none"> ③ Derrick main boom up. ④ Derrick main boom down.
5	Slewing + Derricking			<p>a. Operate left and right joysticks at the same time according to left figures to make slewing and derricking gears work simultaneously.</p> <p>b. Left joystick:</p> <ul style="list-style-type: none"> ① Slew to the right. ② Slew to the left. <p>c. Right joystick:</p> <ul style="list-style-type: none"> ③ Derrick main boom up. ④ Derrick main boom down.
6	Slewing + Main winch			<p>a. Operate left and right joysticks at the same time according to left figures to make slewing gear and main winch work simultaneously.</p> <p>b. Left joystick:</p> <ul style="list-style-type: none"> ① Slew to the right. ② Slew to the left. <p>c. Right joystick:</p> <ul style="list-style-type: none"> ③ Reel main winch off. ④ Spool main winch up.

Ser. No.	Simultaneous crane movements	Illustration		Illustration
		Left joystick	Right joystick	
7	Derricking + Main winch			<p>a. Deflect the right joystick between any two adjacent arrows with an angle of 45° to make derricking gear and main winch initiate relevant movements simultaneously. See left figure.</p> <p>b. Right joystick:</p> <ol style="list-style-type: none"> ① Derrick main boom down / spool main winch up. ② Derrick main boom up / reel main winch off. ③ Derrick main boom down / reel main winch off. ④ Derrick main boom up / spool main winch up.
8	Slewing + Auxiliary winch			<p>a. Turn the switch "Pre-selection of telescope / auxiliary winch" to the "auxiliary winch" position.</p> <p>b. Deflect the left joystick between any two adjacent arrows with an angle of 45° to make slewing gear and auxiliary winch initiate relevant movements simultaneously. See left figure.</p> <p>c. Left joystick:</p> <ol style="list-style-type: none"> ① Slew to the left / spool auxiliary winch up. ② Slew to the right / reel auxiliary winch off. ③ Slew to the left / reel auxiliary winch off. ④ Slew to the right / spool auxiliary winch up.

Ser. No.	Simultaneous crane movements	Illustration		Illustration
		Left joystick	Right joystick	
9	Slewing + Telescoping			a. Turn the switch "Pre-selection of telescope / auxiliary winch" to the "telescoping" position. b. Deflect the left joystick between any two adjacent arrows with an angle of 45° to make slewing gear and telescoping system initiate relevant movements simultaneously. See left figure. c. Left joystick: <ol style="list-style-type: none"> ① Slew to the left / telescope main boom in. ② Slew to the right / telescope main boom out. ③ Slew to the left / telescope main boom out. ④ Slew to the right / telescope main boom in.

4.5.8 Rope reeving

Ensure that the following preconditions are fulfilled:

- The outriggers have already been extended.
- The main boom has been fully telescoped in and turned to the side or rear working area.

See Figure 04 – 42.

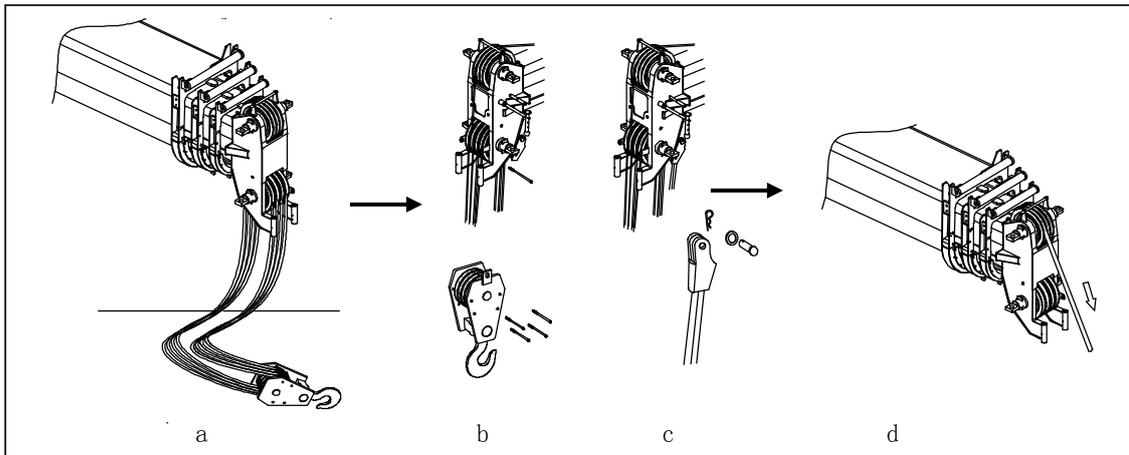


Figure 04 – 42

- a) Derrick boom down and place hook (a) on the ground.
- b) Remove the rope securing tube (b).
- c) Remove hoisting limit switch weight (c) from wire rope.
- d) Remove the pouch socket.
- e) When rope reeving is in odd reeving number, install the pouch socket onto the hook.
- f) Change rope reevings (d).

NOTE

- (1) Position of the hoisting limit switch weight, please see Figure 04 – 43.

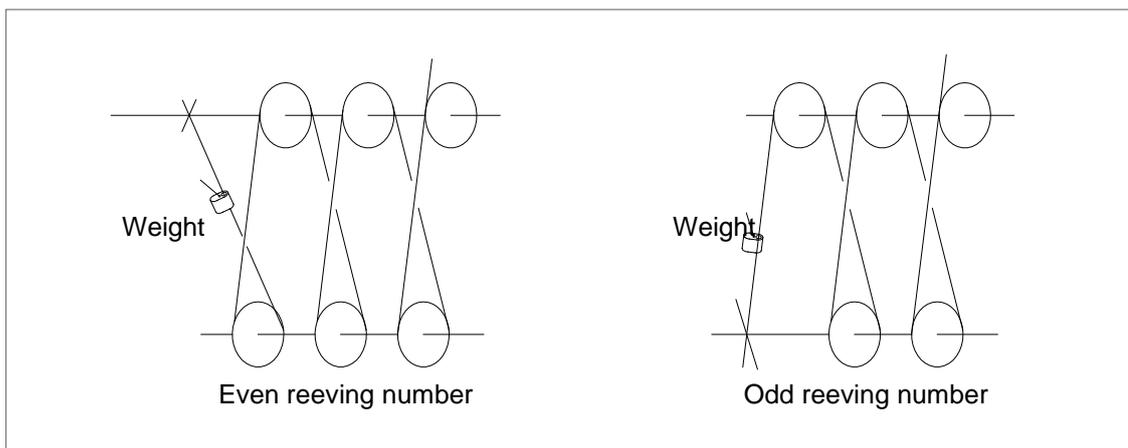


Figure 04 – 43

- (2) Put the wire rope on the winch spool smoothly and in sequence.
- (3) For methods of installing socket and rope clamp, please refer to Figure 04 – 44.

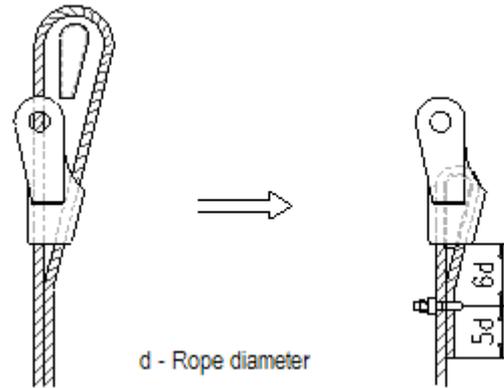


Figure 04 – 44



OPERATOR' S MANUAL FOR TRUCK CRANE

Chapter 5 Equipment



5.1 Safety technical guidelines

- a) The hoist rope must be reeved between the rope pulley on the boom head and hook pulley in accordance with the corresponding reevings specified in lifting capacity table.
- b) Counterweight plates must be fitted according to lifting capacity tables.
- c) The jib which is not in contact with ground during assembly and dismantling must be supported by appropriate and stable materials.

 **DANGER**

- (1) All assembly work must be carried out using 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) Check whether the safety precautions comply with the requirements.
- e) Before assembling and dismantling the jib, ensure that the following prerequisites are met:
 - 1) The crane is properly supported and leveled.
 - 2) The telescopic boom is fully telescoped in.
 - 3) Fit the jib according to the rated lifting capacity table.
 - 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 placed in the rope pulleys with the rope securing tubes to prevent it from jumping out.
 - 7) There are no loose parts on the jib.

 **DANGER**

In winter, the telescopic boom, jib and associated components (limit switches, cable drums, corner marker lights, wind speed sensor etc.) must be kept free of snow and ice.

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

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 changing offset.

This crane is equipped with a 2-section jib. Jib section 1 is in lattice-shaped structure and jib section 2 is in box-shaped structure. The jib section 2 is secured to the jib section 1 via pins during driving, and the whole jib is secured to the right side of the main boom via inserted pins.



Do not lift a load with the jib until the outriggers are extended!

5.2.2. Assembly

The jib can be assembled below an angle of 0° or 30° to the telescopic boom according to job requirements.

Assemble the jib below an angle of 0° in the following steps:

- 1) Extend the outriggers and level the crane with level gauge.
- 2) Fully telescope main boom in and derrick it down over sides and rear in the -2° position. Ensure that there is 30m slewing range to the slewing center; See Figure 05 – 01.

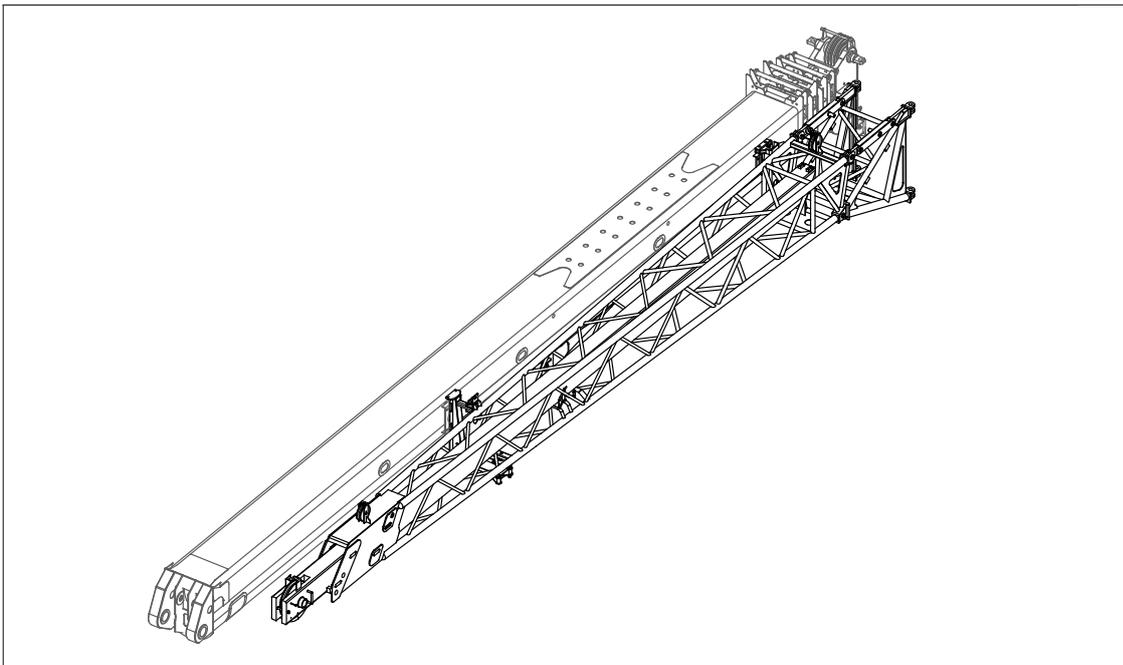


Figure 05 – 01

- 3) Remove inserted pin. Unfold the folded adaptor and secure it with the inserted pin. See Figure 05 – 02.

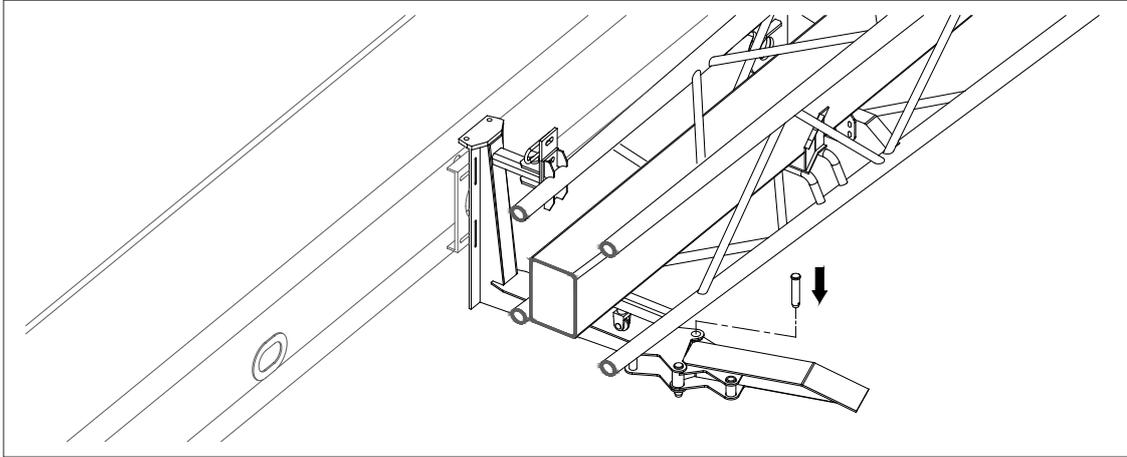


Figure 05 – 02

- 4) Unfold the intermediate adaptor and remove the inserted pin I. See Figure 05 – 03.

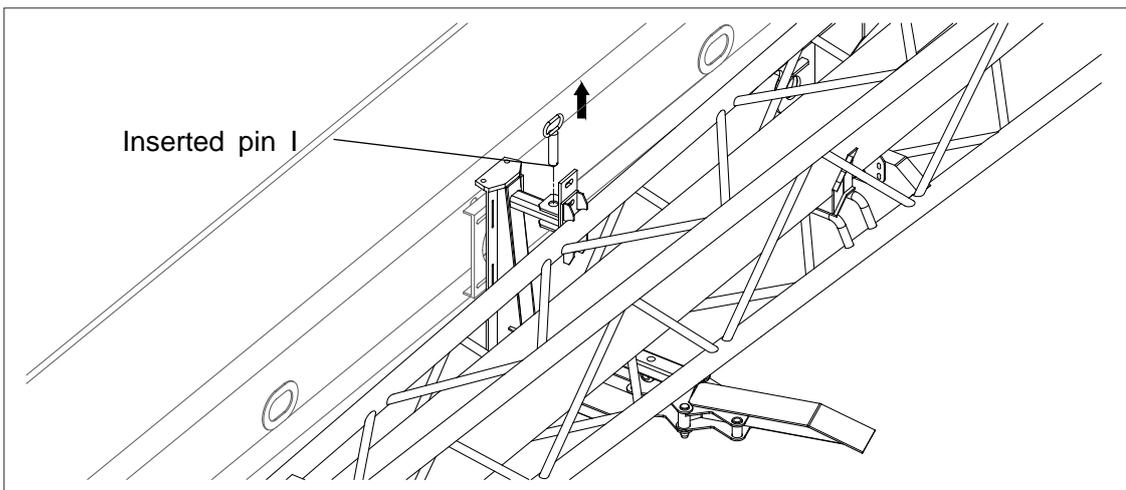


Figure 05 – 03

- 5) Rotate the jib around inserted pin III. See Figure 05 – 04.

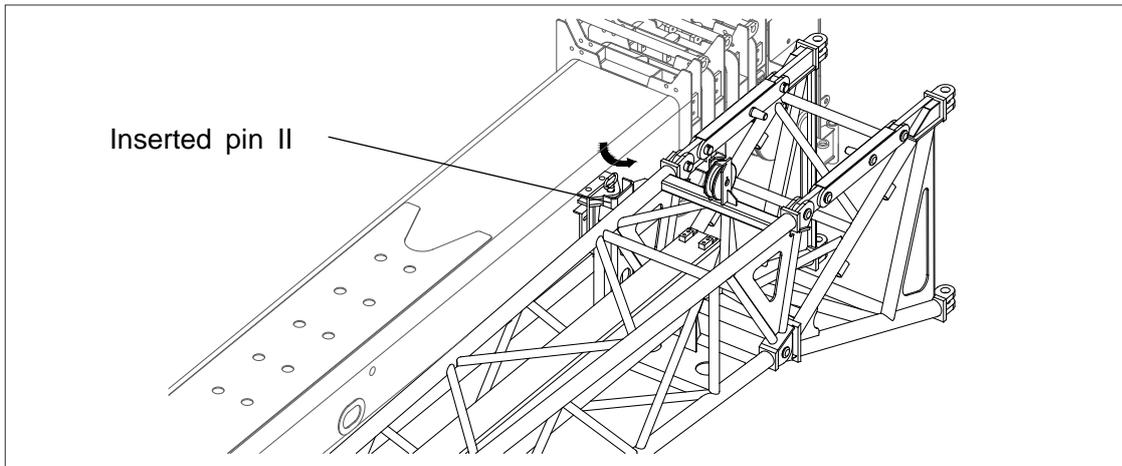


Figure 05 – 04

- 6) Unfold the jib till the connecting fork aligns with their holes on the right side of telescopic boom section 4 and secure with inserted pin III and spring-loaded pins; See Figure 05 – 05.

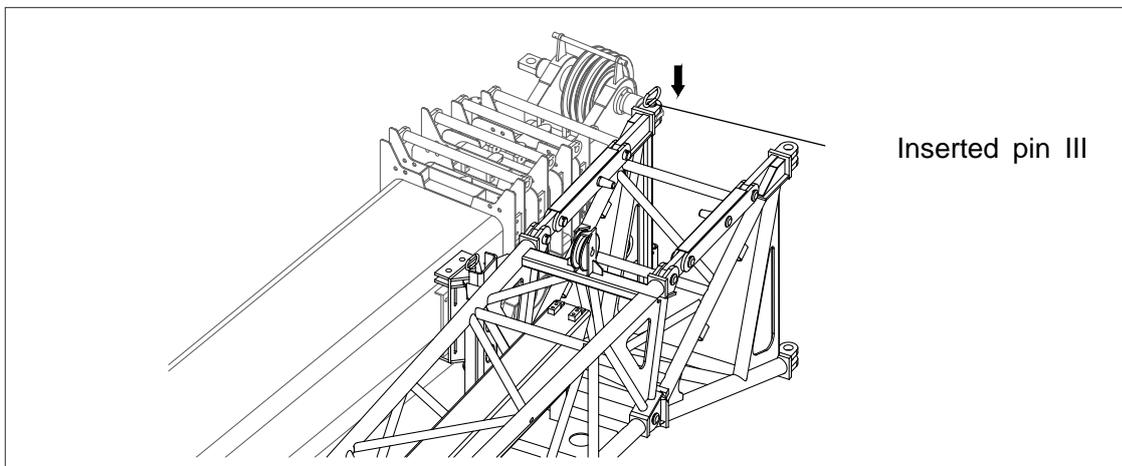


Figure 05 – 05

- 7) Remove inserted pin II. See Figure 05 – 06.

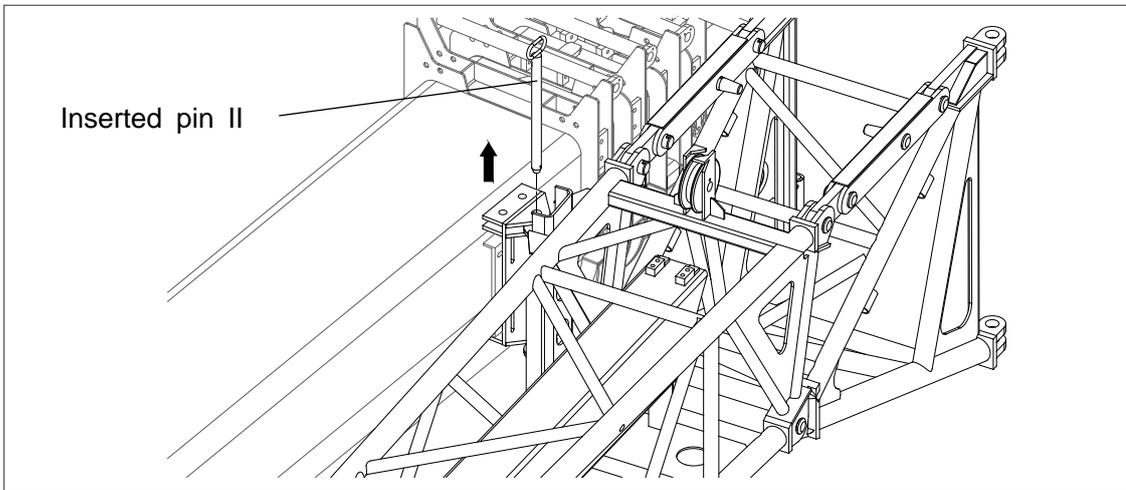


Figure 05 – 06

- 8) Rotate the jib around inserted pin III in the same direction to the front of the main boom. See Figure 05 – 07.

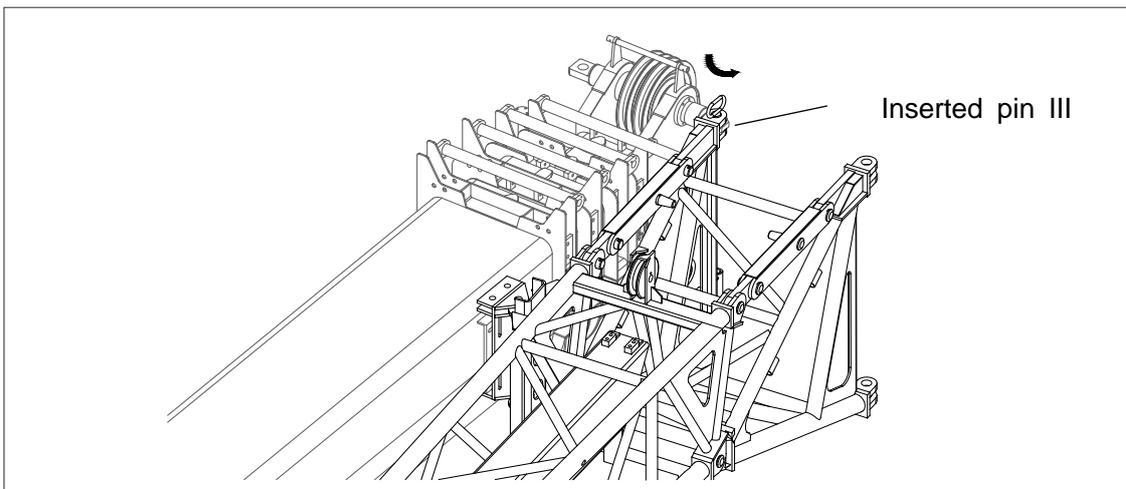


Figure 05 – 07

- 9) Unfold the jib till the connecting fork on the other side of jib aligns with their holes on the left side of telescopic boom section 4 and secure with inserted pin IV and spring-loaded pins; See Figure 05 – 08.

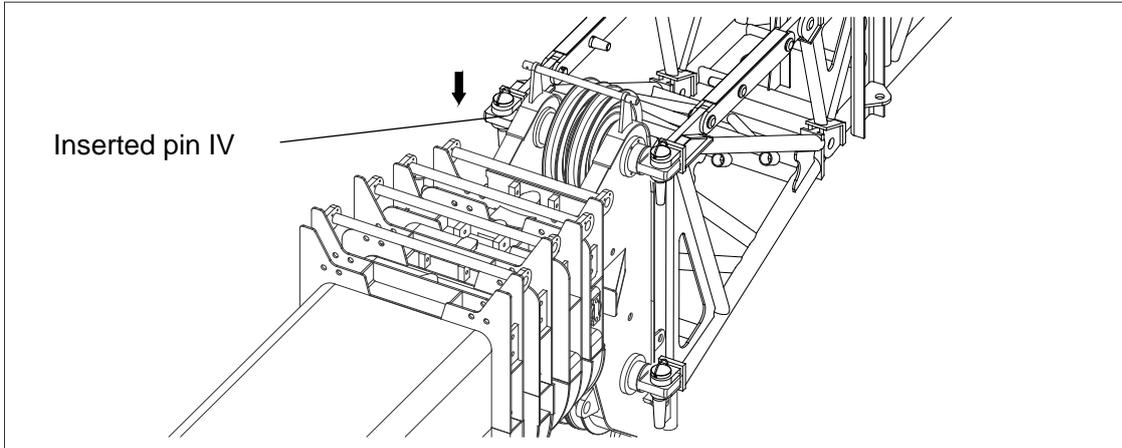


Figure 05 – 08

- 10) Remove inserted pin V and spring-loaded pin if jib section 2 is to be used. See Figure 05 – 09.

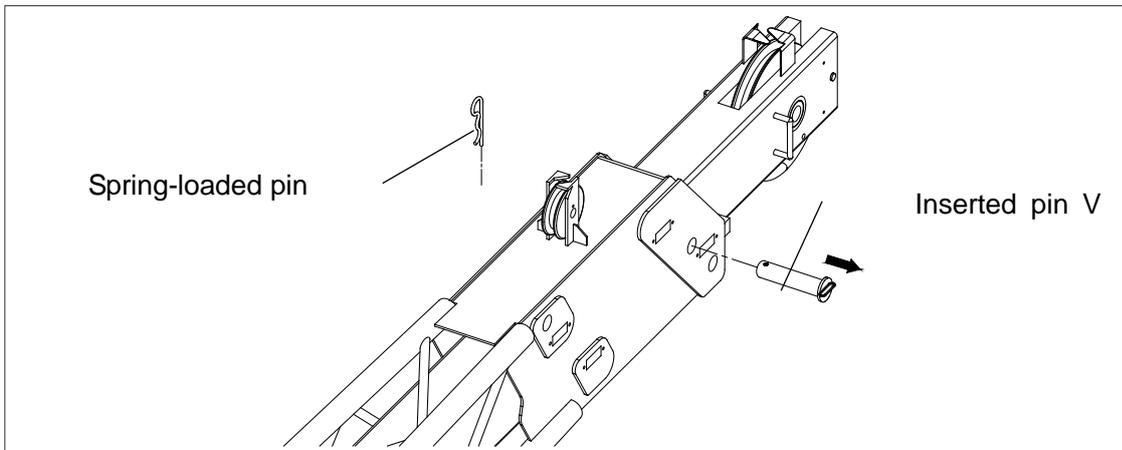


Figure 05 – 09

- 11) Unfold the jib section 2 till it touches its retainer, and align it with pin holes. Pin the inserted pin V and spring-loaded pins. See Figure 05 – 10.

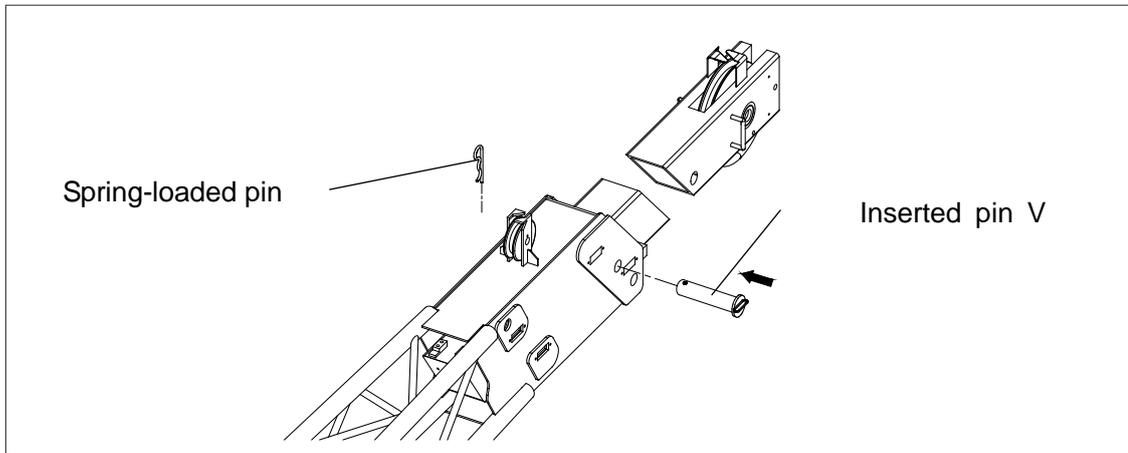


Figure 05 – 10

- 12) Reeve in the auxiliary hoist rope; install the auxiliary hook and the hoisting limit switch. Check the jib for proper assembling. At this time, jib assembly is finished.



Prohibit standing under the boom during assembly! Otherwise, there will be life-threatening hazards.

5.2.3 Angle settings

Before the assembly, first take out the auxiliary hook from the hook holder.

Assemble the jib below an angle of 30° in the following steps:

- a) Move left joystick to reel off the auxiliary hoist rope for 2 m to 3 m at low speed;
- b) Change offset to 30°:
 - 1) Unpin the pin and spring-loaded pin at the adjusting plate of adapter at jib end;
 - 2) Derrick the main boom up slowly until the long groove of adjusting plate is supported.

As a result, the offset is set to 30°. See Figure 05 – 11.

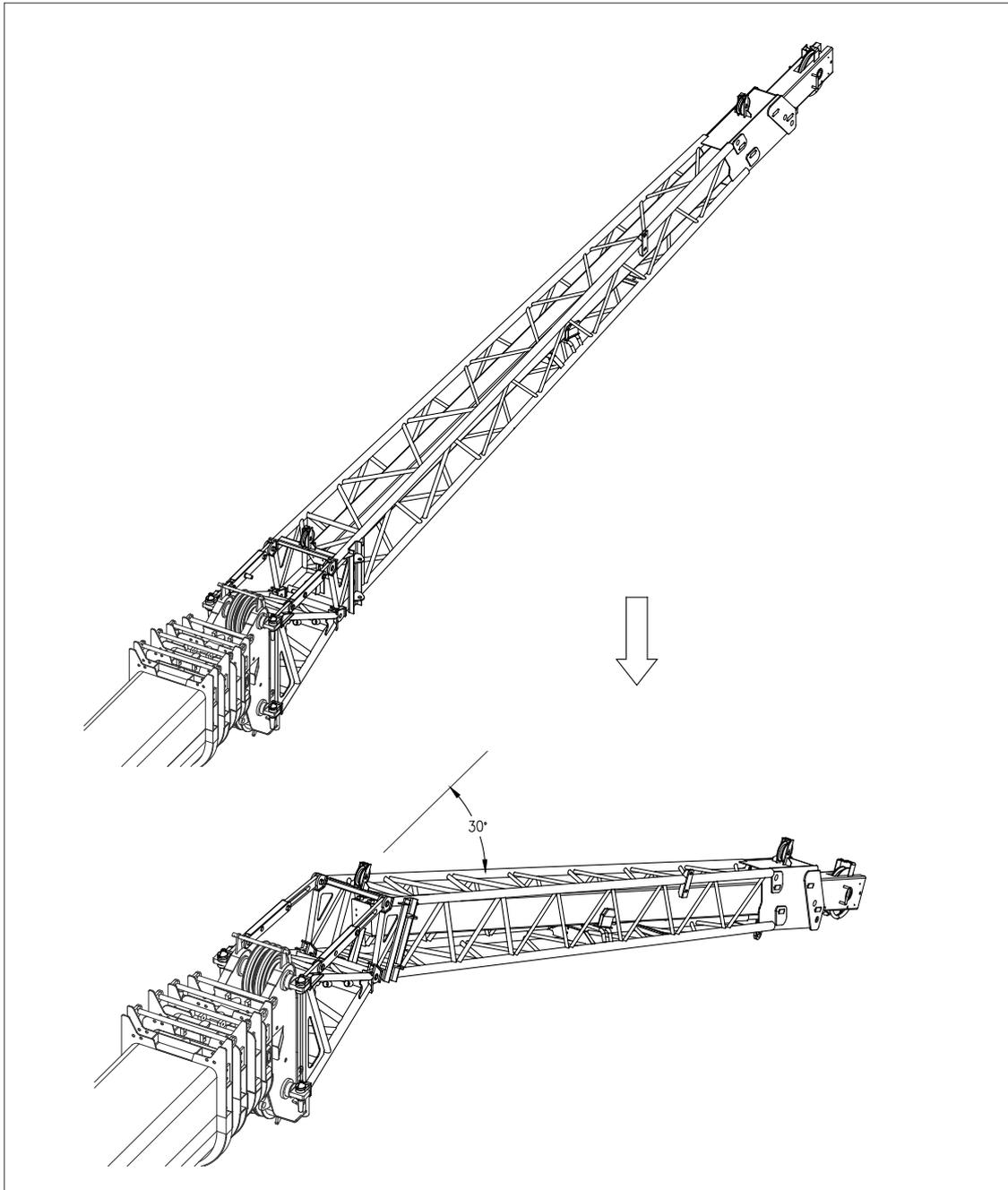


Figure 05 – 11

5.2.4 Dismantling

Proceed analogously, in the reverse order.

⚠ CAUTION

When folding the jib, do not wind the hoist rope for auxiliary winch excessively.

5.2.5 Reeving in the auxiliary hoist rope

- a) Reeve the auxiliary hoist rope through the hoist rope guide.
- b) Reeve the auxiliary hoist rope through the cable guide pulleys and the pulley on the jib head.
- c) Reeve over rope guard device I and rope guard device II.
- d) When the rope is reeved through the rope guard device II, remove rope guard and spring-loaded pin.
- e) Reeve the rope head over the wedge sleeve and connect with the auxiliary hook.
- f) Install the rope guard device II.
- g) For details, please refer to Figure 05 – 12.

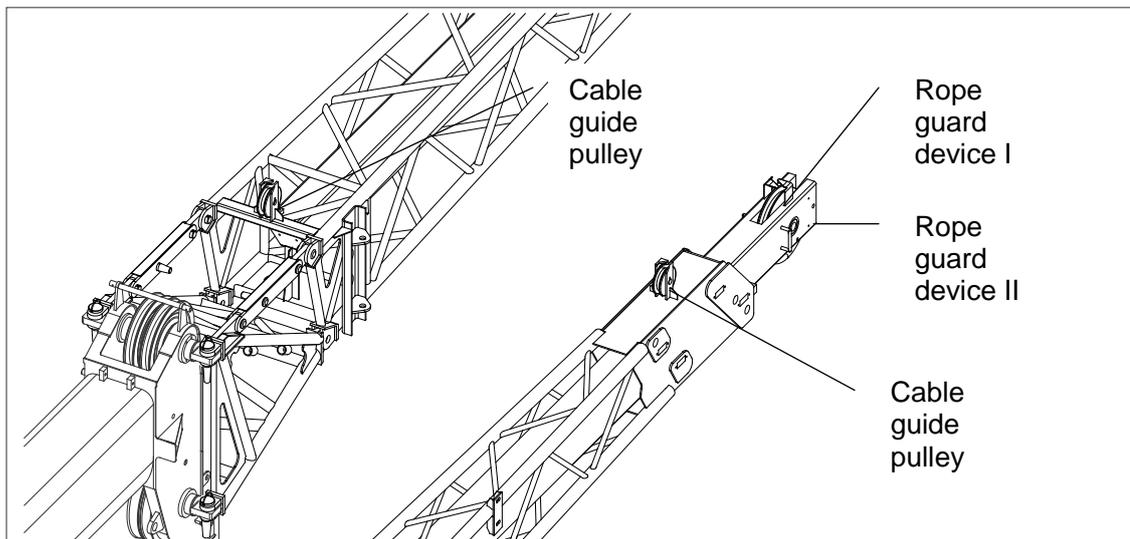


Figure 05 – 12

5.2.6 Connection of hoisting limit switch

As for the connection of hoisting limit switch, please refer to Figure 05 – 13.

Under the jib working condition without using the jib section 2, connect the cable bundle A2 on the hoisting limit switch of auxiliary winch to cable bundle C1 on the box-shaped structure to activate the hoisting limit switch of auxiliary winch. See Figure 05 – 13 – 01.

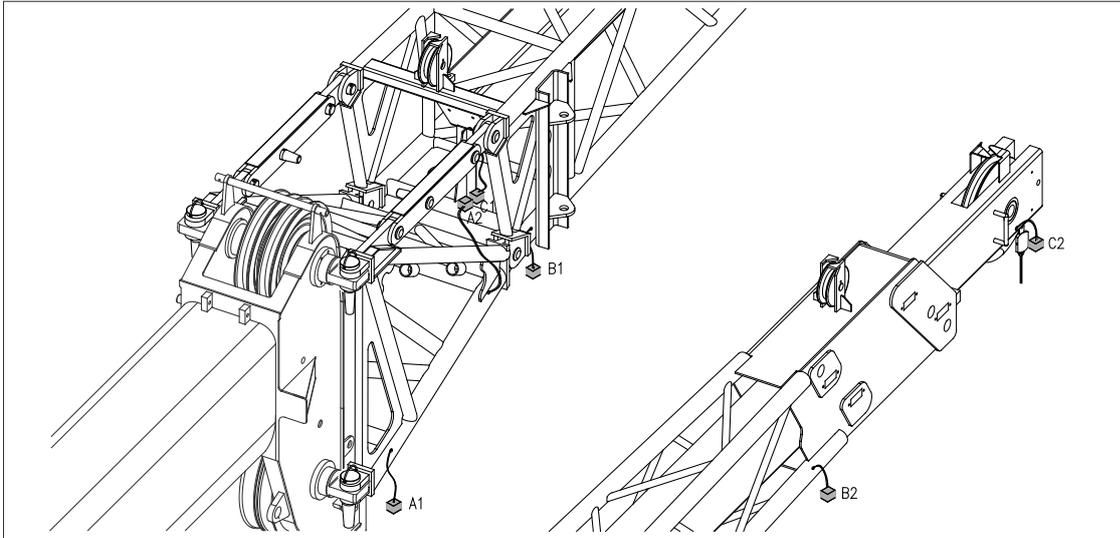


Figure 05 – 13 – 01

Under the jib working condition without using the jib section 2, first connect the cable bundle A2 on hoisting limit switch of auxiliary winch to cable bundle B1 on lattice jib. After that, connect the cable bundle B2 on lattice jib to cable bundle C1 on box-shaped jib to activate the hoisting limit switch of auxiliary winch. See Figure 05 – 13 – 02.

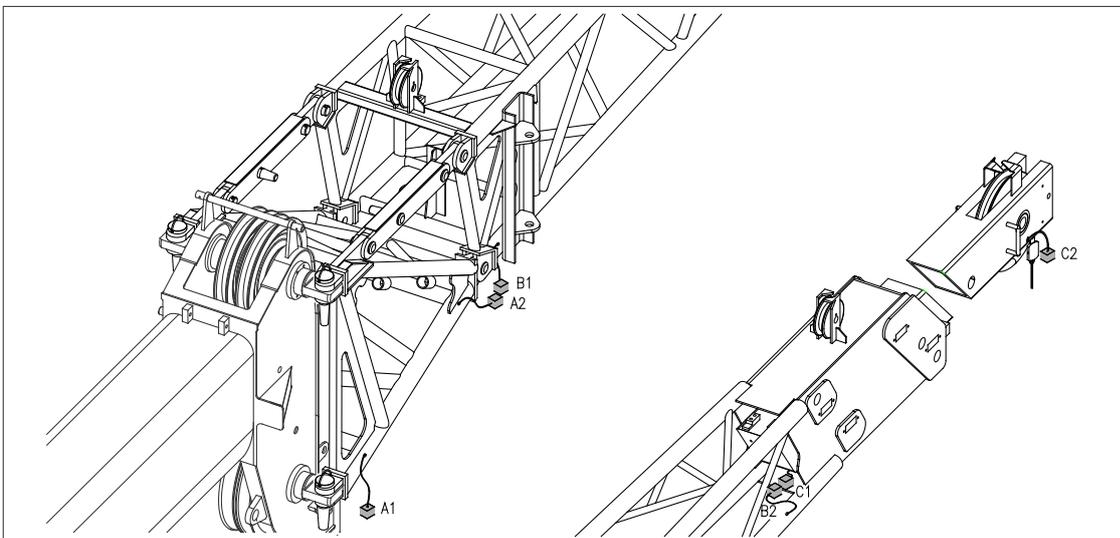


Figure 05 – 13 – 02

⚠ CAUTION

Before dismantling the jib, disconnect the cable bundle between the hoisting limiting switch on the auxiliary winch and jib first. Otherwise, the cable bundle may be broken!

5.3 Rooster sheave

The rooster sheave is composed of bracket, rope pulley shaft, pulley and pins. When the crane is not used or in driving condition, it is mounted on the outside of top boom section head.

Rooster sheave is set up for rapid hoists over the boom nose to improve the working efficiency when the loads are light.

5.3.1 Assembly

- a) Derrick down the telescopic boom over sides and rear in -2° position.
- b) Release the securing pin and turn the rooster sheave bracket until connecting pin can be bolted. See Figure 05 – 14.

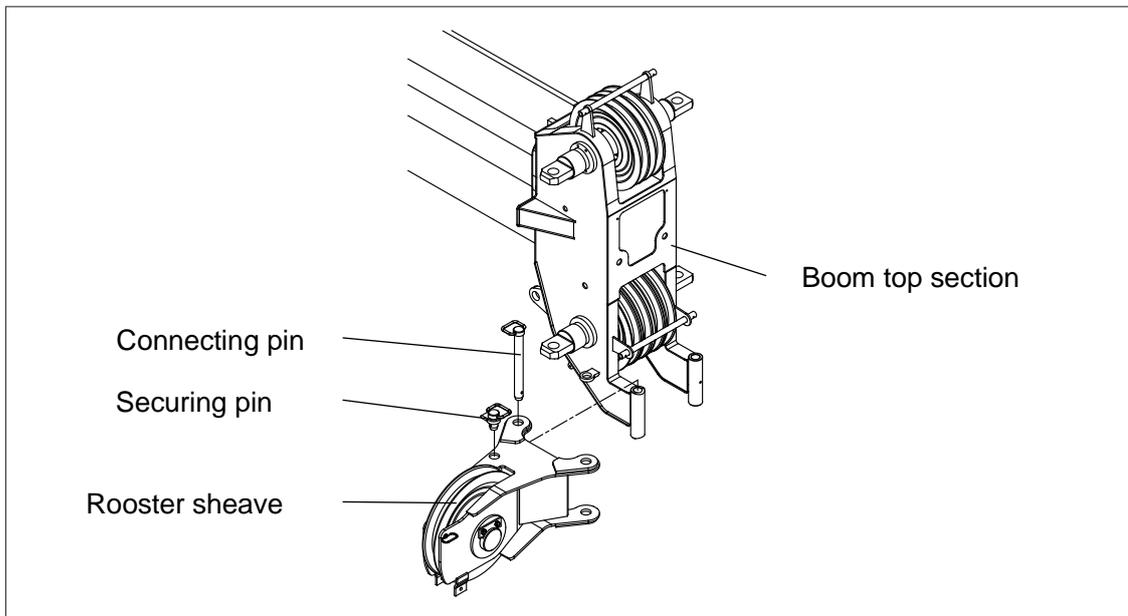


Figure 05 – 14

- c) Run auxiliary hoist rope over the upper pulley on boom head and reeve in the rooster sheave. Attach the auxiliary hook and its hoisting limit switch.

5.3.2 Dismantling

Proceed analogously, in the reverse order.

Turn it to the outside of top boom section and secure it.

5.4 Counterweight

5.4.1 Counterweight and counterweight handler

The counterweight consists of a 3 t fixed counterweight, a 2.5 t base counterweight plate, a 3 t intermediate movable counterweight plate and a 3 t upper movable counterweight plate.

Total weight: 11.5 t

4 variants:

- 3 t fixed counterweight
- 3 t fixed counterweight + 2.5 t base counterweight plate
- 3 t fixed counterweight + 2.5 t base counterweight plate + 3 t intermediate movable counterweight plate
- 3 t fixed counterweight + 2.5 t base counterweight plate + 3 t intermediate movable counterweight plate + 3 t upper movable counterweight plate

The counterweight handler consists of 2 counterweight lifting cylinders and 2 hydraulic locks and auxiliary elements. See Figure 05 – 15.

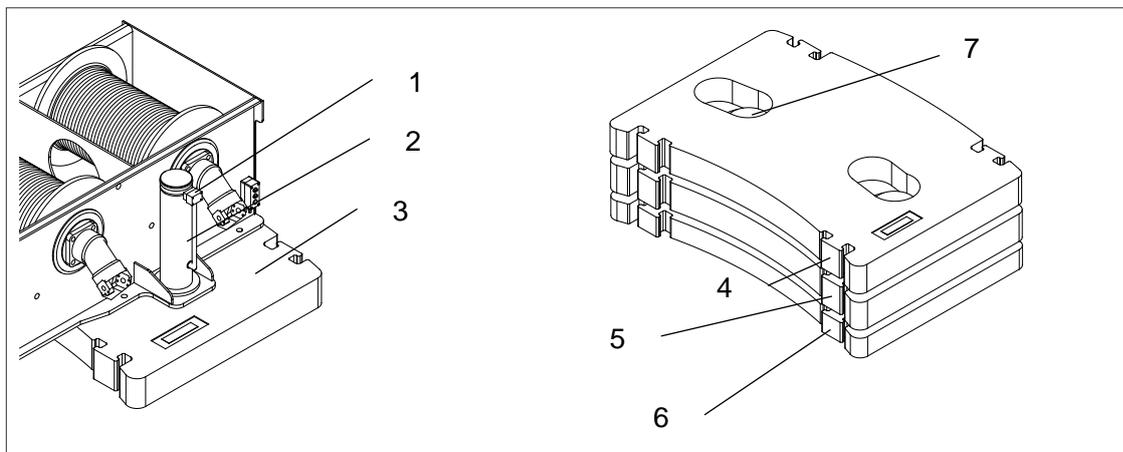


Figure 05 – 15

- 1 Hydraulic lock
- 2 Counterweight lifting cylinder
- 3 Fixed counterweight
- 4 Upper movable counterweight plate
- 5 Intermediate movable counterweight plate
- 6 Base counterweight plate
- 7 Counterweight assembling point

⚠ CAUTION

If a different counterweight than the one listed in the load lifting capacity table is used, the crane may be damaged or topple over.

5.4.2 Assembly

Ensure that the following prerequisites are fulfilled:

- The crane is properly supported and aligned horizontally.
- The counterweight lifting cylinders are completely retracted.
- There is no personnel and equipment within slewing radius.
- The slings have sufficient strength.

Assembly process:

- Attach movable counterweight on the centering cones of the chassis frame using the crane itself.
- Deposit the required counterweight plates on the movable counterweight.
- After the counterweights are assembled, press the switch for counterweight lifting cylinder on the instrument panel in operator's cab.
- Connect the counterweight remote control box to socket on the rear part of slewing table to carry out relevant operations. As shown in Figure 05 – 16.

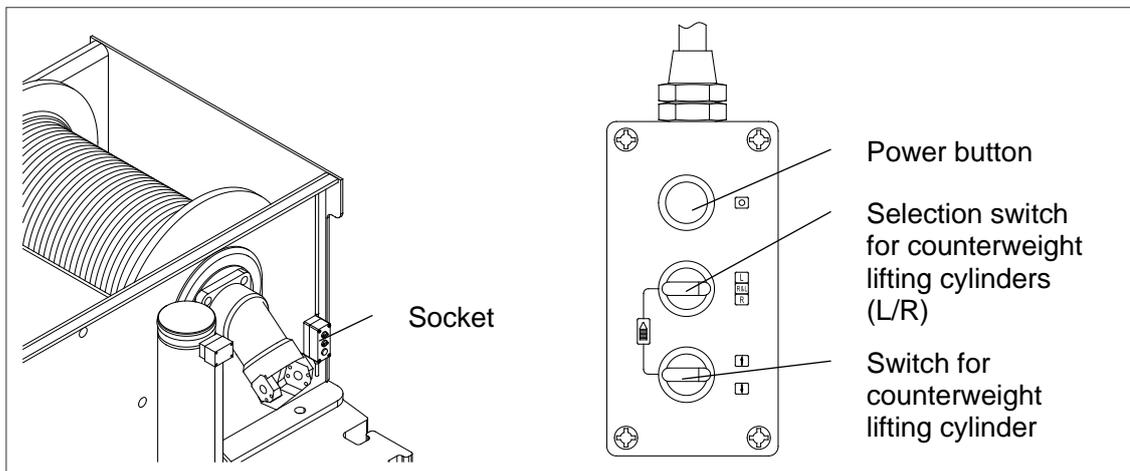


Figure 05 – 16

Operation – counterweight remote control box:

- Power button:

When the button is pressed, the background light illuminates. At this time, operation for counterweight lifting cylinder can be started.

2) Selection switch for counterweight lifting cylinders (L/R):

 position: left counterweight lifting cylinder begins to work.

 position: right counterweight lifting cylinder begins to work.

 position: counterweight lifting cylinders (L/R) can work together.

3) Switch for counterweight lifting cylinder:

 position: retract the counterweight lifting cylinder.

 position: extend the counterweight lifting cylinder.

- e) Connect the counterweight remote control box and use it to turn the slewing table clockwise. Do not stop turning till the counterweight lifting cylinder reaches the side of installation slot on the lifting drum.
- f) Extend the counterweight lifting cylinder till it is completely extended.
- g) Continue turning the slewing table clockwise till counterweight lifting cylinder moves into the installation slot.
- h) Retract the counterweight lifting cylinder till relief valve sends out overflowing sound. At this time, counterweight lifting cylinder is placed in a required position.

 **CAUTION**

When the crane is traveling, base counterweight plate can be attached on crane, two movable counterweight plates should be transported by special trailer. Otherwise, the axles may be damaged by excessive axle load.



OPERATOR' S MANUAL FOR TRUCK CRANE

Chapter 6 Additional equipment



6.1 Air conditioning in driver's cab

6.1.1 Operating methods

The control panel is on the center console in the driver's cab.

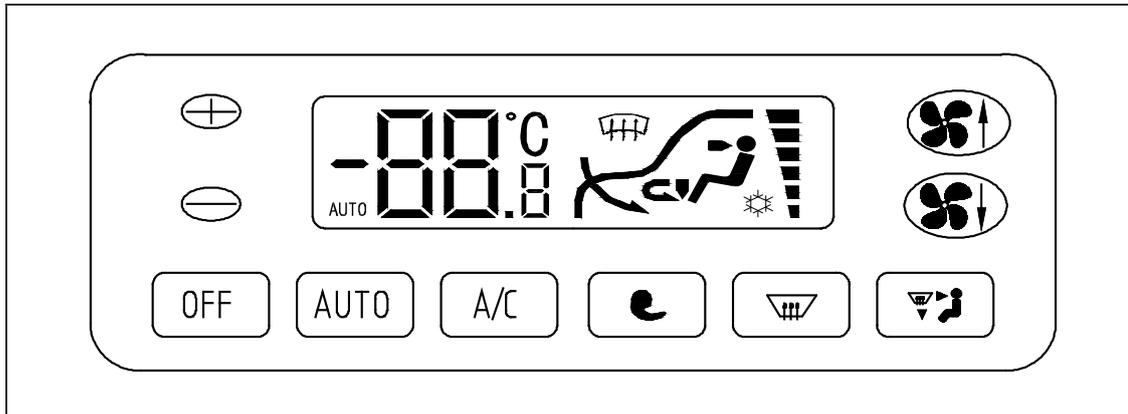


Fig. 06 – 01

a) The description of symbols on display screen is shown as follows:

SET set

AUTO Auto

00.0°C Temperature

 Outer air circulation

 Interior air circulation

 Footwell air supply

 Fresh air

 Front window air supply

 Refrigeration

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:	
Vehicle body:	

b) Operating instructions for push-buttons:

1) Temperature adjustment button

Pressed: set the temperature.



2) Fan speed button

Pressed: adjust the fan speed.



3) OFF button

Pressed: turn off air conditioning system.



4) AUTO button

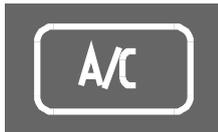
Press AUTO button: activate auto operating mode.

Press AUTO button again, or press A/C or front window air supply: exit auto operating mode.



5) A/C button

Pressed: A/C begins to refrigerate.



6) Circulation button

Pressed: Changeover interior / outer air circulation.



7) Front window air supply button

Pressed: enter the front window air supply mode.



8) Mode button

Press the button: Changeover among different control modes.

 **WARNING**

Never use the cab heater during driving if engine coolant temperature is below 70°C.

 **CAUTION**

- (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 ensure 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 abnormal vibration, noise or smell during operation, stop and examine the machine 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 after using the air conditioning.

- (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.

6.2 Air conditioning in operator's cab

In order to provide a comfortable environment, operator's cab can be equipped with an air conditioning and cab heater according to customer's requirement. The control panel behind the operator's seat is used to adjust the room temperature.

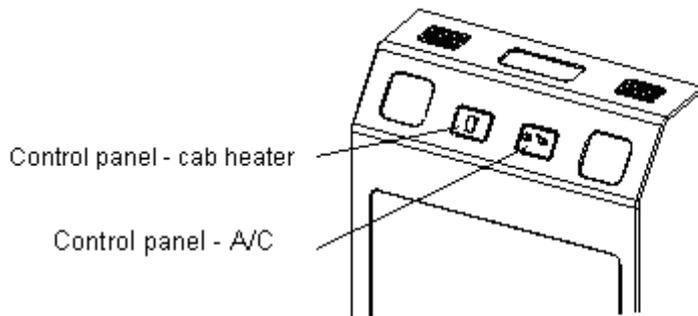


Fig. 06 – 02

6.2.1 Air conditioning

The air conditioning control panel is on the housing of air conditioning interior machine in operator's cab. There are two rotary switches and a control light on the control panel. See Fig. 06 – 03.

a) Temperature control switch

The rotary switch is used to control the room temperature by adjusting the temperature of air blew out.

b) Fan speed switch

Adjust this switch to obtain desired fan speed.

c) Control light

Both the compressor and the cooling system work when the control light lights up.

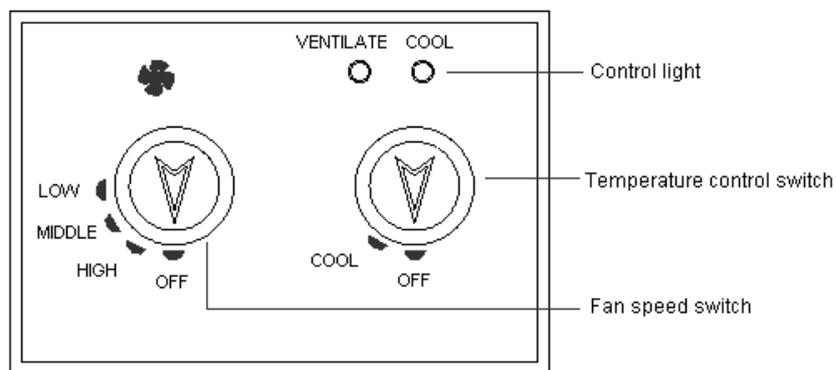


Fig. 06 – 03

– Operating methods

When the air conditioning is turned on, turn the fan speed switch to the “HIGH” position and hold it in “HIGH” position for 5 minutes. Then turn the temperature control switch to the “COOL” position. At this time, the temperature in the cab starts to fall down. When the required temperature is obtained, turn the temperature control switch anticlockwise slowly until the control light goes out and the compressor stops working. At this moment, the temperature in the cab is at its set value.

When the temperature in the cab is higher than the set value, the control light lights up, the compressor starts automatically and the cooling system begins to work.

Adjusting the angle of the air outlet can change the direction of the cold wind; Different kinds of air volume can be obtained by setting the fan speed switch respectively in “HIGH”, “MIDDLE” or “LOW” position.

When the air conditioning is used, do not turn the temperature control switch to the “COOL” position otherwise the evaporator may get frost to impair the cooling effect.

CAUTION

- (1) It is forbidden to dismantle the air conditioning system without manufacturer's permission.
- (2) Check the tension of the compressor belt periodically and adjust it in time.
- (3) Wash off the dirt on the surface of the radiating rib of the condenser to avoid reducing the cooling effect of system.
- (4) When changing the components of air conditioning system, add refrigerant oil according to corresponding requirements. The oil brand of the new refrigerant oil should be the same as that of refrigerant oil used in the compressor.
- (5) The brand and type of newly-added refrigerant should be the same as that used in the system when the refrigerant is added or changed.
- (6) Air conditioning lowers the temperature in the cab at its high gear position, and keeps the temperature in cab at middle gear position or low gear position.
- (7) When the components in the system break down, replace them with the spare parts supplied or designated by the manufacturer in order to protect the system against damage.
- (8) Under the condition of low temperature & high humidity, do not make the evaporator work at low gear position in order to prevent the evaporator from freezing.
- (9) When the air conditioning is not used in winter, run it for 10 minutes every month to make the freezing oil soak the whole system to avoid refrigerant leakage.

– Requirements for periodic maintenance of air conditioning system

Item	Maintenance	Repair interval
Condenser fan motor	Check and repair	Once per quarter
Evaporator fan motor	Check and repair	Once per quarter
Condenser	Check condenser for blockage. If necessary, clean it.	Once a month or shorten the maintenance interval depending on actual working condition.
Evaporator	Check the evaporator for functional work and abnormal sound. Clean the air inlet.	Once per quarter or short the maintenance interval depending on actual working condition.
Solenoid clutch	Check it for functional work, and clean it if necessary.	Once per quarter
Connectors	Check that the wire connector is fitted tightly.	Once a month

Explanation:

- a) Evaporator--- the square box in the driver's cab from which the cold air is blown out. There are several air vents on it.
- b) Condenser---the device is used for the exchange of the hot air outside the driver's cab. In some vehicle, it is mounted between water tank and fan (without the condenser fan motor) while in the others, it is on the side of the vehicle (with the condenser fan motor).
- c) Condenser fan motor---it is mounted with the condenser to help the hot air exchange of the condenser.

6.2.2 Cab heater

The heater control panel is on the housing of air conditioning interior machine in operator's cab. There is a rocker switch and two control lights (control lights "power source" and "heater state") on the control panel.

- a) Rocker switch

The rocker switch is used to control the heater.

- b) Control light – Power source

It is used to indicate whether the power is switched on.

- c) Control light – Heater state

It is used to indicate the working state of the heater and the error code.

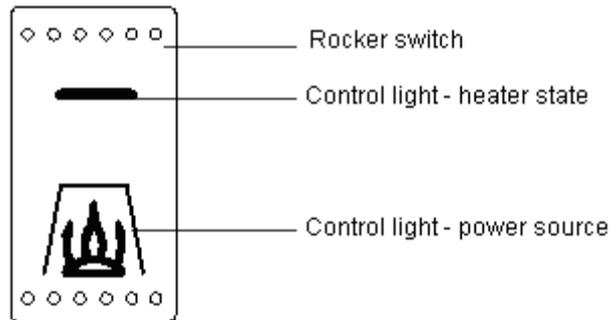


Fig. 06 – 04

– Operating conditions

- a) Ambient temperature $\geq -40\text{ }^{\circ}\text{C}$, altitude $\leq 3000\text{ m}$.
- b) It can not be immersed into water. Don't wash it with water directly.
- c) The heater should use the antifreeze fluid or the diesel oil that is suitable for the ambient temperature.



It is forbidden to use the gasoline.

For the selection of the fuel type, please refer to the following table.

Ambient temperature	Above 5°C	Above -5°C	Above -15°C	Above -30°C	Above -40°C
Fuel	0# diesel oil	10# diesel oil	20# diesel oil	35# diesel oil	50# diesel oil

For the selection of the antifreeze fluid, please refer to the following table.

Ambient temperature	Above -25°C	Above -40°C
Antifreeze fluid	-25° antifreeze fluid	-40°C antifreeze fluid

– Operating methods

This rocker switch has 2 positions:

Position 1:

Only water pump works

Position 2:

Both the water pump and heater work.

At this time, switch on the fan speed switch on the control panel to blow out warm air.

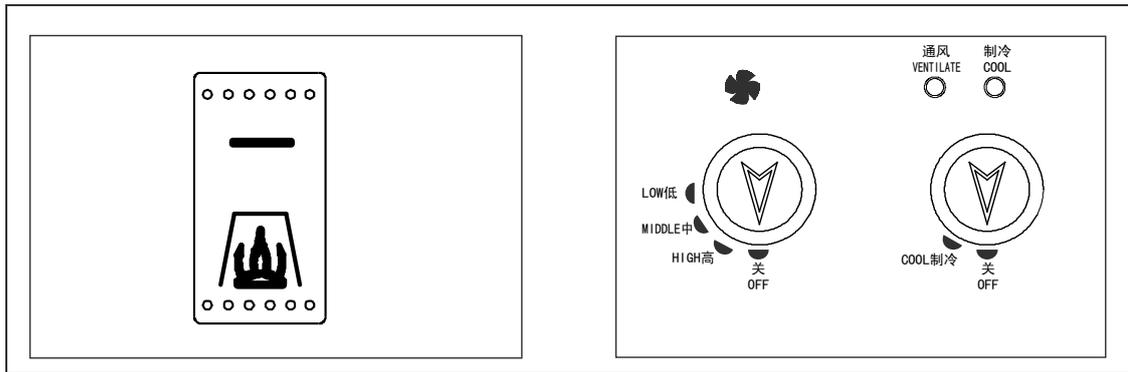


Fig. 06 – 05

When the water temperature reaches 80°C, the heater stops work automatically and control light "heater state" extinguishes. When the water temperature is lower than 65°C, heater starts again. In this way, the process is repeated in circles.

When the heater is used in cold seasons, it should be checked to ensure that there are no foreign matters blocking the air passage, the heater runs smoothly, there is no dirt in combustion air inlet and exhaust outlet.

When the heater is not used, press the rocker switch in OFF position to stop the heater. At the same time, the control light "heater state" extinguishes after 3 minutes.



Turn the heater off after the control light "heater state" extinguishes. Otherwise, the heater can not radiate, and thus it fails.

– Troubleshooting for common failures

Problem	Causes	Remedy
No warm air blows out.	Fan speed switch on the control panel is not turned on.	Turn on fan speed switch.
The heater does not stop working within 60 s after the fuel supply is cut off.	Solenoid valve is dirty and can not be closed well, or the flame detector is short-circuited.	Clean oil line, check wire connection, control box and flame detector.
The power is unstable.	Power ripple is strong and unstable.	Check if the power supply is stable (especially when the stabilized power supply is adopted), or replace control panel.
The voltage is too high.	The voltage of heater exceeds 32 V in 5 seconds (for the heater whose rated voltage is 12 V, it means that the voltage exceeds 16 V for 5 seconds)	Inspect the voltage. If it is too high, check engine pressure regulator. If it is too low, replace control box.

Problem	Causes	Remedy
The voltage is too low.	The voltage of heater is lower than 20 V in 5 seconds (for the heater whose rated voltage is 12 V, it means that the voltage is lower than 10 V for 5 seconds)	Start the engine and turn on the heater. Check generator and the line voltage to see if it is lower. If the voltage is not low, replace control panel.
Flame detector is short-circuited.	When the heater does not work, the flame detector still show working state.	Check whether the line is short-circuited. Replace flame detector or control panel.
Motor relay still has electricity after its power supply is cut off.	Relay contactor is clung or the control switch fails.	Replace control panel.
Solenoid valve relay still has electricity after its power supply is cut off, or the valve coil breaks off.	Relay contactor is clung, or the coil has broken, or other parts of control panel defect.	Replace control panel or coil.
Thermocutout is cut off.	Thermocutout is cut off, conductive wire is disconnected or control panel is damaged.	Reset the thermocutout, check connection or replace control panel.
No signal is output from solenoid valve relay after it is electrified.	Control panel is damaged.	Replace control panel.
No signal is output from motor relay after it is electrified.	Replay or control panel is damaged.	Replace control panel.
Motor does not run.	Main motor does not run after it is electrified or the rotation speed is too low for blockage.	Check motor connection. Pull out the plug to test the motor. If it does not run or rotation speed is too low, replace motor. Otherwise, replace control panel.
Water temperature sensor is short-circuited.	The water permeates the sensor or the circuit board is wet.	Replace sensor or control box.
Water temperature sensor is disconnected.	Sensor line is disconnected or circuit board defects.	Replace sensor or control box.

Problem	Causes	Remedy
Engine can not be started.	Flame detector does not output signal.	Check flame detector for connection, replace flame detector or control panel.
Heater stops burning.	Heater stops burning during working.	If oil tank lacks oil, fill oil. If oil line leaks gas, tighten or replace oil line. Replace flame detector or control box.
Strong interference	Other interference	Close those strong interference resource, replace control panel.
Glow plug is disconnected.	Glow plug blew out, or line is loose.	Tighten connection or replace glow plug.
Glow plug is short-circuited.	Short-circuited.	Check glow plug.
No signal is output from the glow plug relay.	Replay or control panel is damaged.	Replace control panel.

6.3 GPS

GPS is the standard equipment for the cranes sold in mainland China. For its installed location, please refer to Fig. 06 – 06.

It is optional for the cranes sold in other regions.

NOTE

If the crane sold in mainland China needs to work beyond the region, please contact local Sales and Service Center of Zoomlion in advance. Otherwise, the GPS may be unable to work normally.

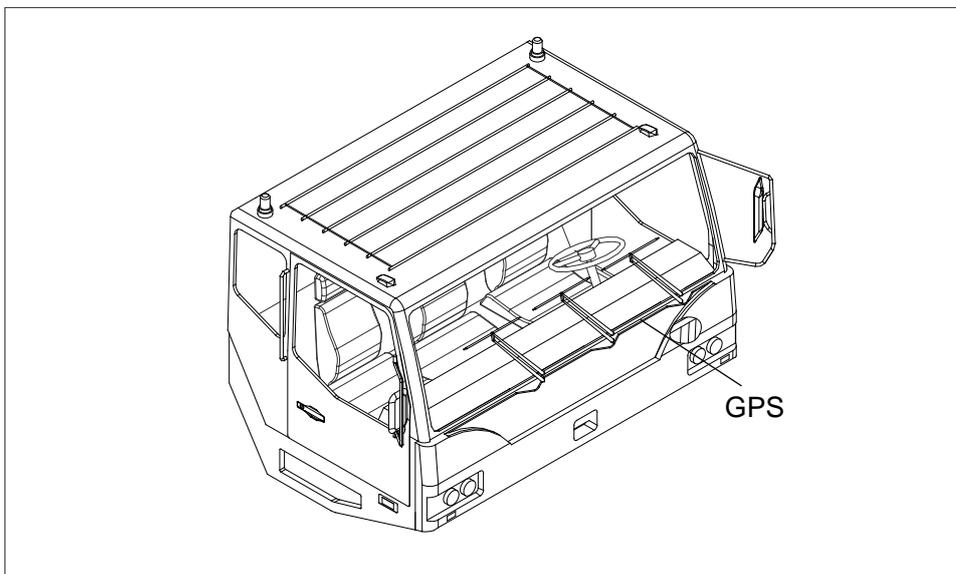


Fig. 06 – 06

Overall view of GPS is shown in the Fig. 06 – 07.

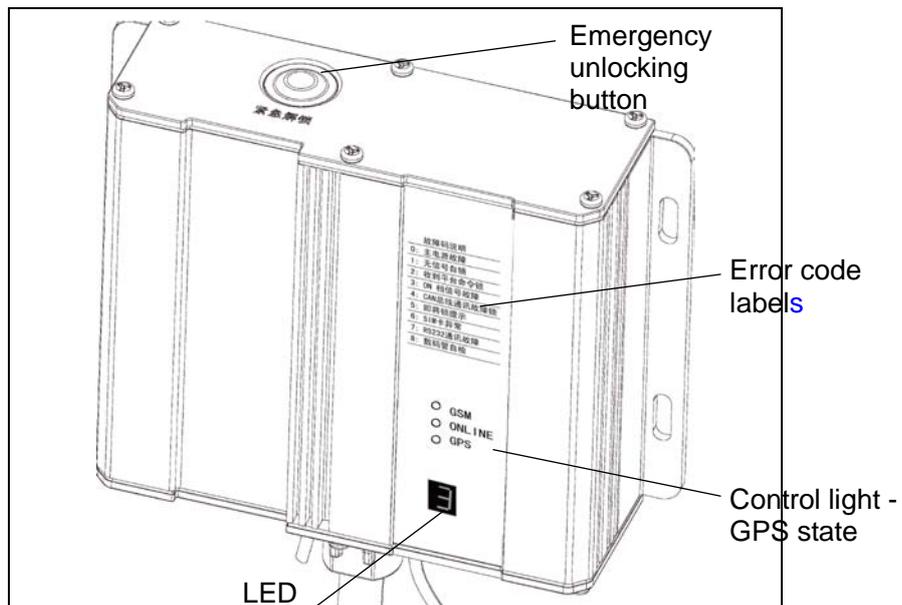


Fig. 06 – 07

6.3.1 Digital display

The LED can display the state of GPS and show the error codes in digit.

The contents of error code are as follows:

0: Main power defects.	1: Locked automatically because of no network signal	2: Receive locking command from the platform
3: Position ON signal defects.	4: Locked because of CAN bus communication defects	5: Note: To be locked
6: SIM card fault	7: RS232 communication defects.	8: LED self-inspection
9: Standby (no label referred)		

 **NOTE**

The information in the above table is for reference only. During actual operation, please refer to the error code labels on the GPS.

6.3.2 Emergency unlocking

When the crane travels in the region without China Mobile network signal coverage or SIM card inside GPS terminal defects (including the condition that it is behind the payment) after a certain time, GPS terminal will lock the crane automatically.

If the crane must be used, temporarily unlock the crane by activating the emergency unlocking button. Please remove the defects according to the actual conditions.

 **CAUTION**

When the crane is locked, the engine RPM will decrease, thus affect the normal operation.

How to unlock the crane in an emergency:

- a) You can dial the service hot line 400-800-1680 and provide us the VIN of your crane and GPS error code. The service center will give you the unlocking password according to the actual condition.
- b) Press the emergency unlock button and hold for 5 seconds, the LED flashes "A". Release the button, GPS begins to clock the emergency unlocking operation. Press the button within 5 seconds to input the first numeral of the password. The numeral increases as the button is pressed. If the button is pressed for more than 9 times, the numeral returns to 0.
- d) The password consists of 4 numerals. If the button is not pressed within 3 seconds, the numeral input in this position is finished. At this time, the LED will display the

finished numeral and flashes.

- e) Continue to input the next numeral of the password.
- f) If 4 numerals are not input completely and the button is not pressed within 10 seconds, the password input is supposed being finished.

When you input the correct password:

- The LED displays “A”.
- The emergency unlocking operation is finished successfully.

When you input the wrong password:

- LED displays “C” for 10 seconds.
- The emergency unlocking operation fails.

 **NOTE**

If the emergency unlocking operation fails because of the incorrect password, repeat the above steps.

 **IMPORTANT**

The password is valid in terms of the current date calculation.

Since the password is calculated according to the current date, ensure the red control light flashes during emergency unlocking operation.

6.3.3 Control light - GPS terminal state

GPS terminal is fitted with 3 control lights (yellow, red and green ones). When the GPS terminal works normally, the control lights flash. When the GPS terminal works abnormally, obey the items in the table to remove the defect:

State of the control light		Failures	Causes
Yellow	Illuminates / extinguishes	The GPS is off-line. The signal and text message fail to send out.	GSM can not receive the network of China Mobile.
Red	Illuminates / extinguishes	GPS can not navigate the crane or the position fixing is inaccurate.	GPS receives weak network signal due to poorly connected GPS antenna.
Green	Illuminates / extinguishes	The GPS is off-line, the command is sent unsuccessfully, but the command can be sent out by text message.	The terminal fails to make connection with the server.



OPERATOR' S MANUAL FOR TRUCK CRANE

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 (train or ship). 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 (on chassis frame and slewing table) to lift the crane are shown in the Figure 07 – 01. Follow applicable rules while you lift.

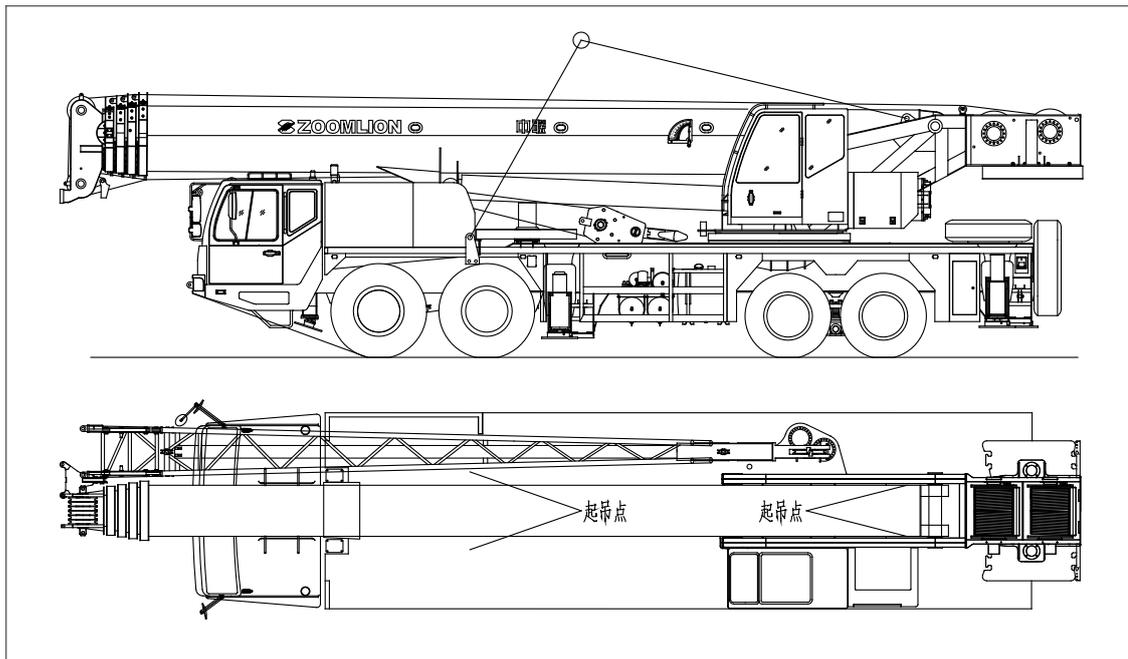


Figure 07 – 01

 **WARNING**

Before you lift, make sure that the slings have 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:

- a) Lock the doors and the windows, and switch off control instruments.
- b) Clean contamination off the crane.
- 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 wooden blocks below the tires.
- f) Turn off the engine and switch off the battery master switch.
- 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.
- i) Remove all contamination (dust and sand) from the wire ropes and lubricate them with ZG-3 calcium based graphite grease.
- j) Store the crane in a garage. If not, protect the crane from the rain, thunder and freeze.
- k) If you do not operate the crane for more than three months:
Operate the engine at idle speed for one hour in the three month interval.
- l) 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 air filters.
- m) Make sure that one person keeps the crane prepared for operation.