



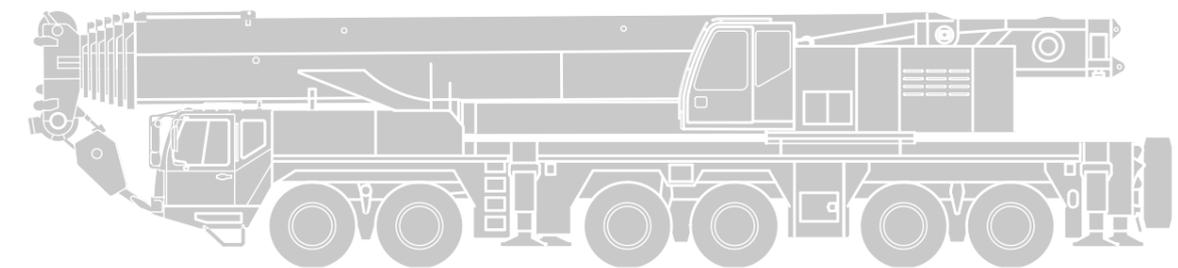
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TRUCK CRANE

# OPERATOR'S MANUAL FOR TRUCK CRANE

OPERATOR'S MANUAL



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**Zoomlion Heavy Industry Science and Technology Co., Ltd.**



**ZLJ5459JQZ70V TRUCK CRANE**

# **OPERATOR'S MANUAL**

Edition 1 05, 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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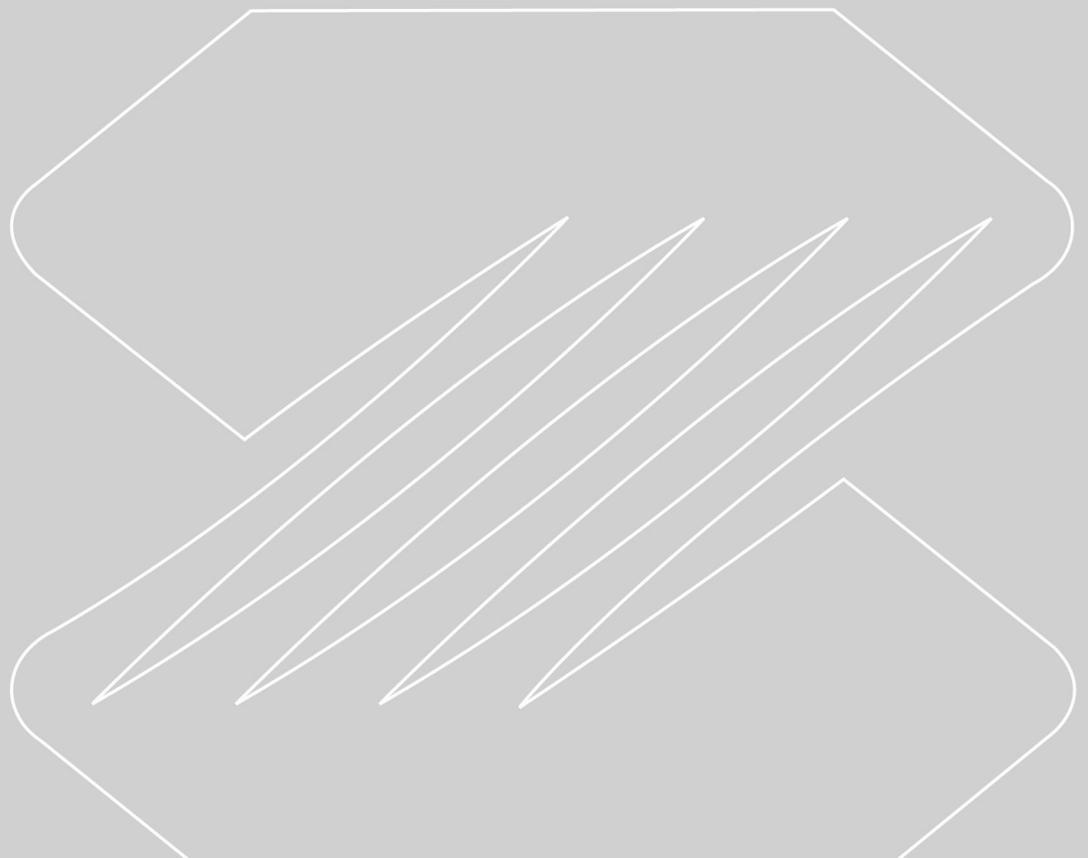
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## OPERATOR' S MANUAL FOR TRUCK CRANE

### Chapter 1 Description of crane





## 1.1 Model and name plates

### 1.1.1 Model

- Model in auto industry: ZLJ5459JQZ70V
- Model in engineering industry: QY70V
- Chassis model: ZLJ5455JQZ

### 1.1.2 Name plates

For name plate of the crane, refer to Fig. 01 – 01.

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

With WP10.375 engine

ZOOMLION 中联		汽车起重机 TRUCK CRANE	
品牌及型号	Trade Mark & Model	中联牌 ZLJ5459JQZ70V	
产品特征号	Product Characteristic Code	QY70V532	
最大额定总起重量	Max. Lifting Capacity	70000	kg
发动机型号	Engine Model	WP10.375	
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	45000	kg
整车整备质量	Complete Vehicle Kerb Mass	44870	kg
外形尺寸(长×宽×高)	Overall Dimensions	14100 mm× 2750 mm× 3750 mm	
车辆识别代号	VIN	L5E5H5D3XXAXXXXX	
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.			

Fig. 01 – 01

		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 4 5 5 V	
产品特征号	Product Characteristic Code	ZLJ5455V3.5	
最大设计总质量	Max. Designed Gross Mass	45200	kg
整备质量	Kerb Mass	16800	kg
发动机型号	Engine Model	WP10.375	
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	L5E5H5D3XXAXXXXXX	
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.

Fig. 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 the right longitudinal beam of chassis frame. For exact installation locations, please refer to Fig. 01 – 03 and Fig. 01 – 04 respectively.

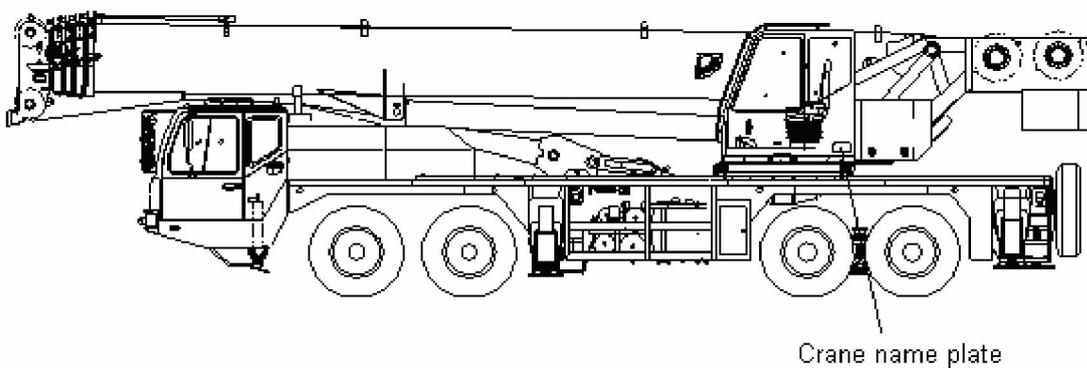


Fig. 01 – 03

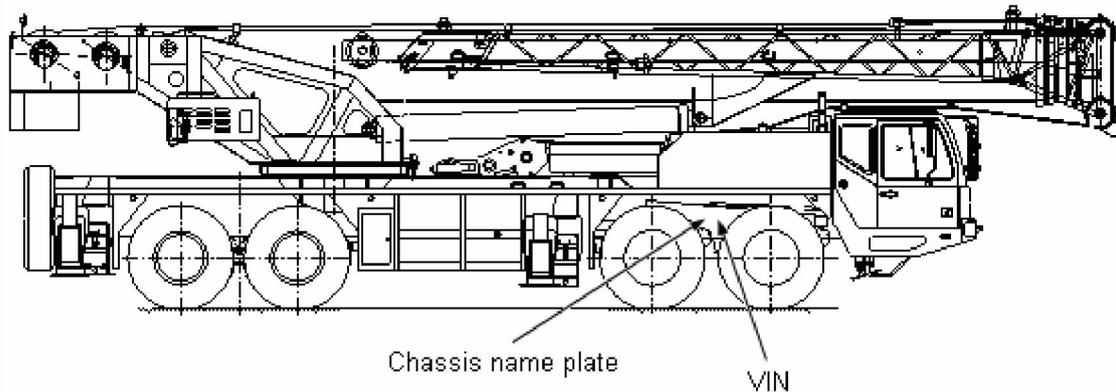


Fig. 01 - 04

#### 1.1.4 Vehicle identification number (VIN) and its location

The VIN of ZLJ5459JQZ70V truck crane is L5E5H5D3××A××××××, and is stamped in the crane name plate and chassis name plate respectively. It is also stamped in the right side longitudinal beam of chassis frame with the steel seal. For details, please refer to Fig. 01 - 04.

#### 1.1.5 Engine model and its manufacturer

Engine model: WP10.375

Manufacturer: WEICHAI POWER Co., Ltd.

#### 1.1.6 Engine code, name plate and their locations

The engine code is printed on the right part of engine near the gear chamber. The exact location is shown in Fig. 01 - 05.

The engine name plate can be found on the left part of engine. The exact location is shown in Fig. 01 - 06.

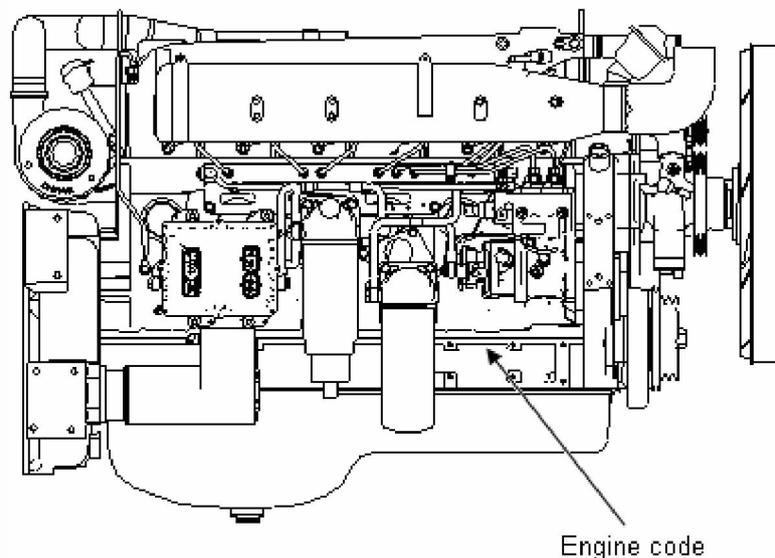


Fig. 01 - 05

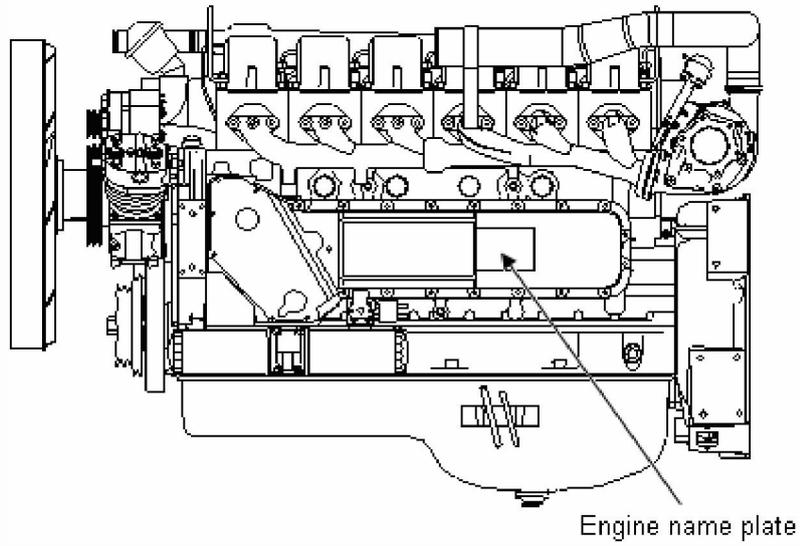


Fig. 01 – 06

**NOTE**

Have the above data available when communicating with us.

## 1.2 Main components and configurations

### 1.2.1 Main components

#### — Illustration of crane chassis

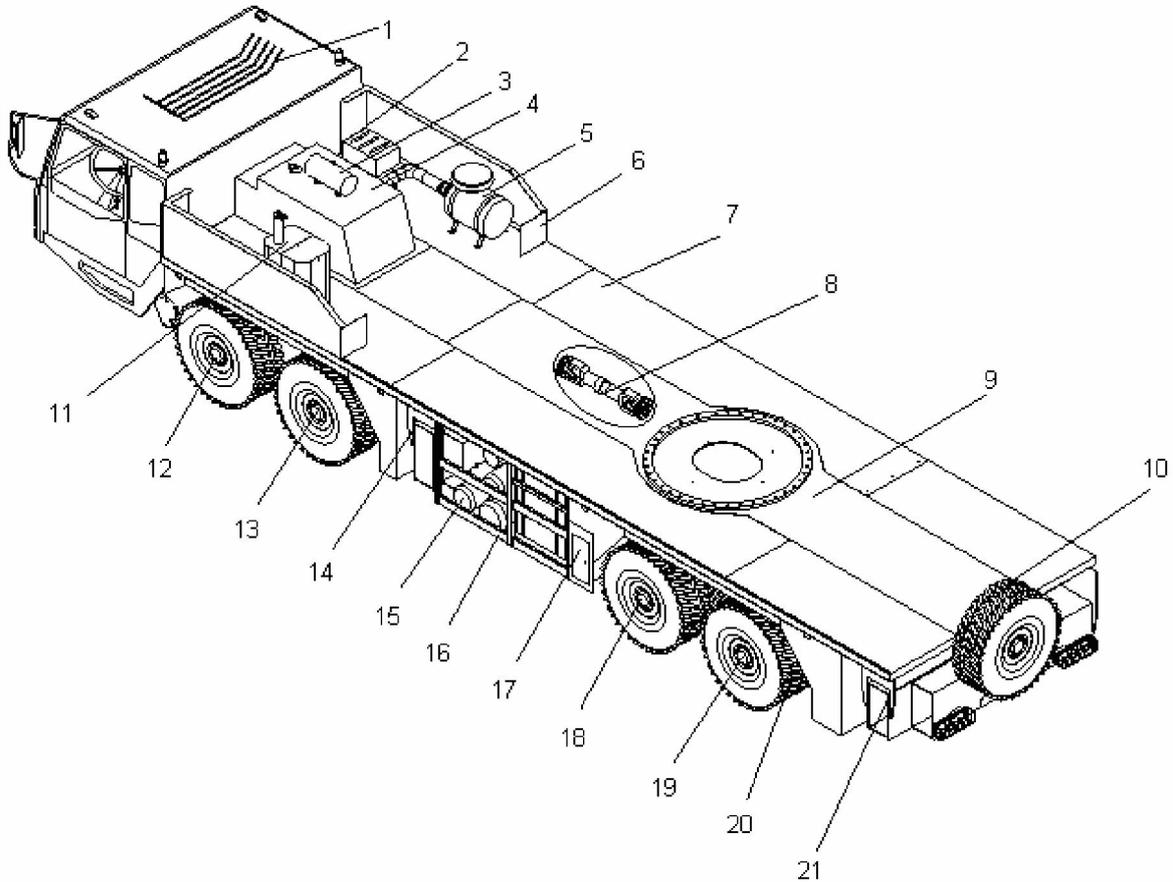


Fig. 01 – 07

- 1 Driver's cab
- 2 Chassis electric
- 3 Cooling system
- 4 Engine housing
- 5 Air intake system
- 6 Boarding
- 7 Platform
- 8 Drive shaft
- 9 Chassis frame
- 10 Spare tire
- 11 Exhaust system

- Description of crane
- 12 Axle 1
  - 13 Axle 2
  - 14 Front outrigger box
  - 15 Air brake system
  - 16 Guard rail
  - 17 Toolbox
  - 18 Intermediate axle
  - 19 Rear axle
  - 20 Wheel
  - 21 Rear outrigger box

## — Illustration of complete vehicle

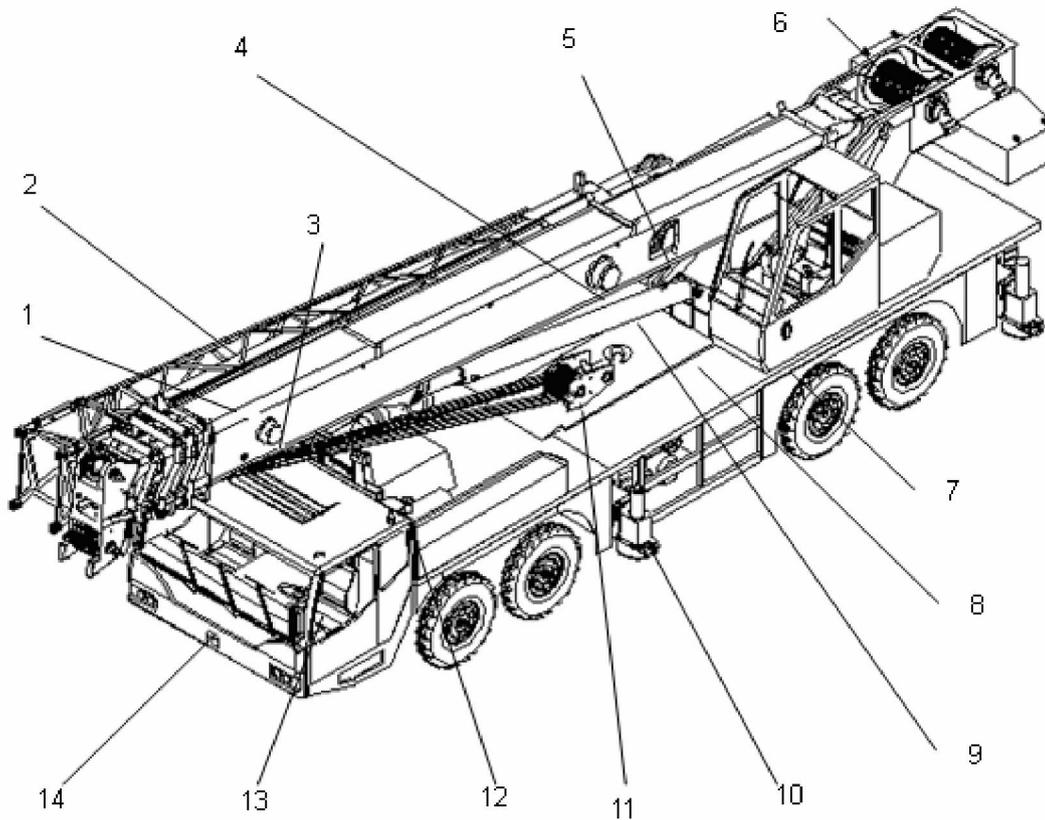


Fig. 01 – 08

- 1 Main boom
- 2 Jib
- 3 Length detector
- 4 Length / angle detector
- 5 Angle indicator
- 6 Auxiliary winch
- 7 Operator's cab
- 8 Slewing gear
- 9 Derricking gear
- 10 Outrigger
- 11 Main hook
- 12 Auxiliary hook
- 13 The 5<sup>th</sup> outrigger
- 14 Special purpose chassis for truck crane

## 1.2.2 Product description

### — Crane chassis

<b>Driver's cab</b>	Low-mounted full-width cab made of steel, with front-mounted instrument console, adjustable steering wheel, hydraulic damping seat with upper backrest, manually operated door windows, sun visor, air conditioning & cab heater and sleeper berth, etc., providing comfortable working environment
<b>Chassis frame</b>	Distortion-resistant and load-bearing box-shaped structure welded from high-tensile steel
<b>Engine</b>	Special purpose high-pressure common-rail fuel injection diesel engine for construction machinery
<b>Clutch</b>	Dry single-plate clutch
<b>Transmission</b>	9-speed mechanical transmission with contrate gear output
<b>Suspension</b>	The front axles are with longitudinal leaf spring suspension. The rear axles adopt leaf spring + equalizer beam + thrust rod suspension. Bogie balance suspension is applied.
<b>Wheels</b>	With special rim and inflated tires
<b>Steering system</b>	Consisting of integral circulating ball-type booster steering gear, steering pump and steering drive system
<b>Brake system</b>	<p>It consists of service brake (driving brake), parking brake (emergency brake) and auxiliary brake.</p> <p>Service brake: dual-circuit compressed air brake acting on all wheel hubs</p> <p>Parking brake: spring-loaded brake acting on wheel hubs for intermediate and rear axles</p> <p>Auxiliary brake: engine exhaust brake</p>
<b>Drive shaft</b>	Styre Series drive shaft assy., opened-type drive, contrate gear connected

## — Crane superstructure

<b>Operator's cab</b>	Steel construction, with adjustable instrument console, adjustable seat with headrest, air conditioning & cab heater, sun visor, pilot-operated joysticks, windshield wiper and washing system
<b>Main boom and telescoping system</b>	It consists of 1 basic boom and 4 telescopic boom sections. It is made from low-alloy high-tensile steel, providing the boom with good bending-resistance capability. Built-in slide block and slide block compensation technology applied have its guidance capability and lifting capacity improved. The boom is telescoped via two telescoping cylinders and two sets of boom extension / retraction rope.
<b>Derricking gear</b>	1 front-mounted derricking cylinder with balance valve
<b>Hoist gear</b>	Consisting of hydraulic motor, winch reducer, hoisting limit switch, lowering limit switch and hoist rope.
<b>Slewing gear</b>	Consisting of hydraulic motor, slewing reducer and slewing bearing
<b>Hydraulic system</b>	Open-type, pilot-operated proportional controlled, with proportional speed-regulating system It is driven by variable pump and two gear pumps.
<b>Load moment limiter</b>	Composed of mentor, pressure sensor, length sensor and angle sensor

**1.2.3 Boom**

Including main boom and jib

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

Main boom length L: 11.6 m – 44 m

Jib lengths: 9.5 m, 16 m

When the fully extended main boom is fitted with jib (2 offsets: 0° or 30°), the boom length L is 53.5 m (44 m + 9.5 m) or 60 m (44 m + 16 m)

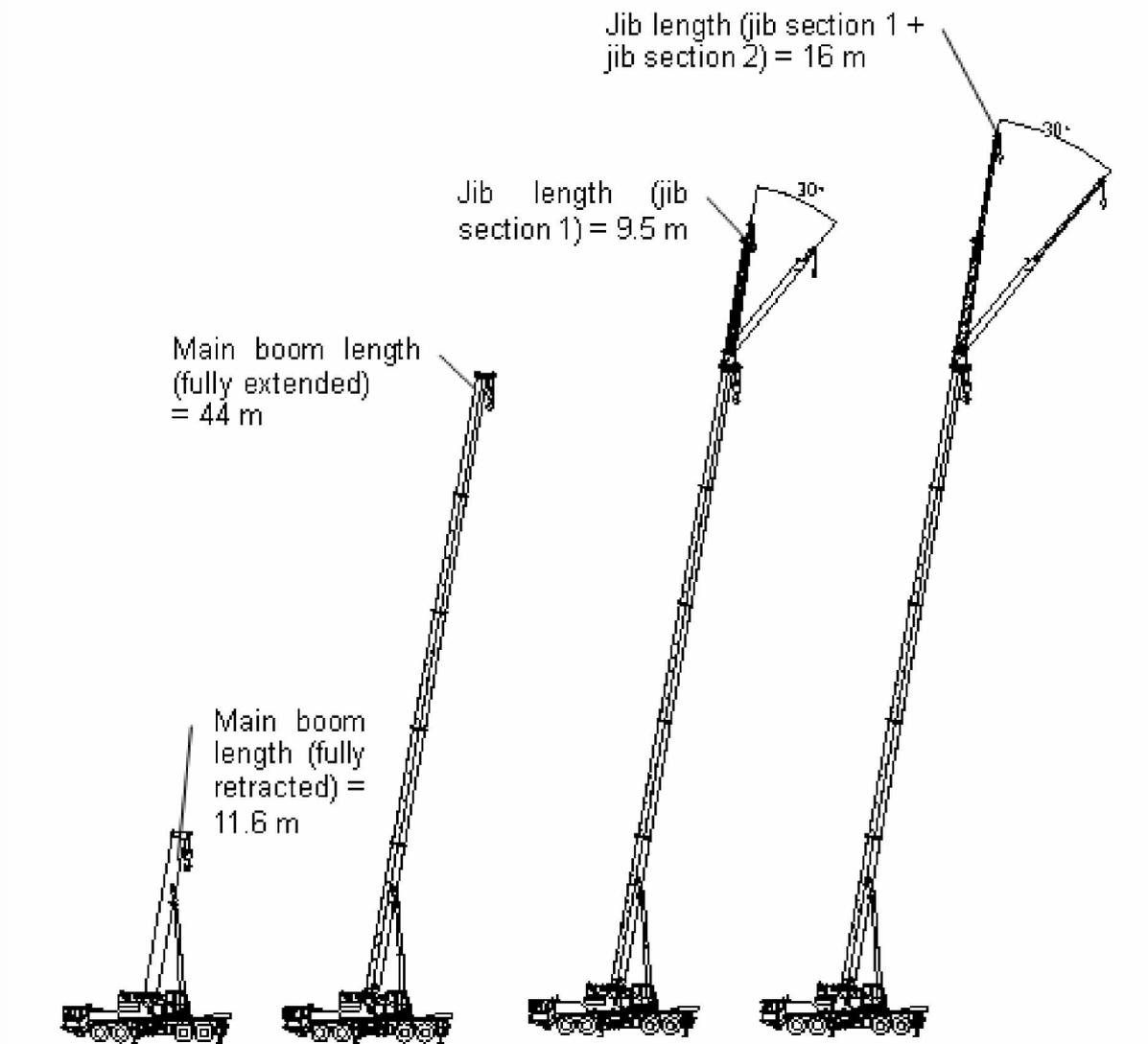


Fig. 01 – 09

1.3 Technical data

1.3.1 Overall view (Unit: Metric mm)

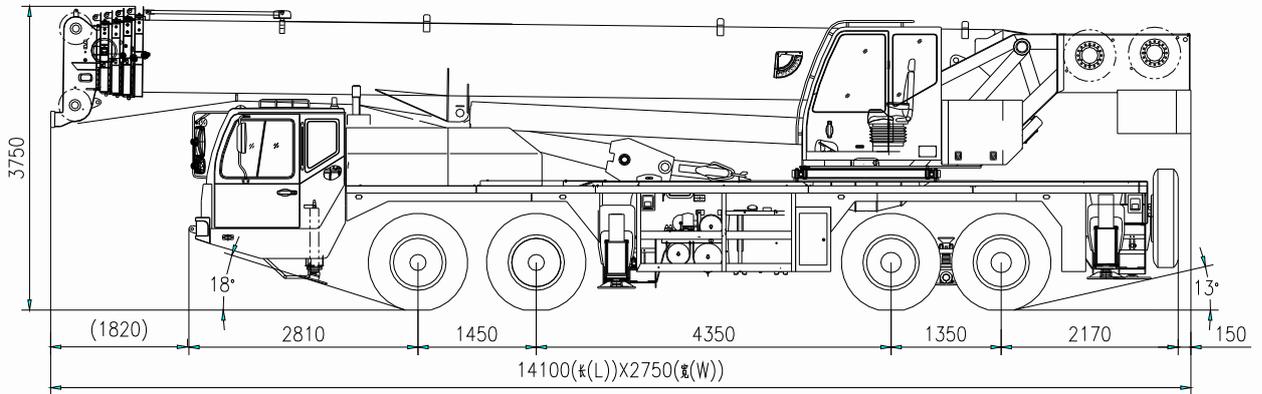


Fig. 01 - 10 - 1

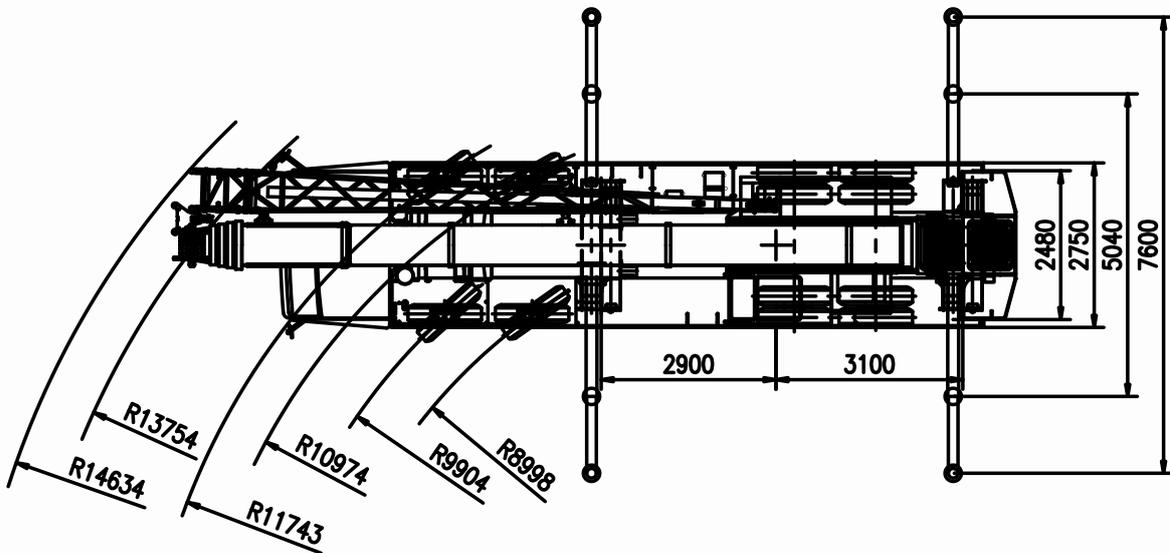


Fig. 01 - 10 - 2

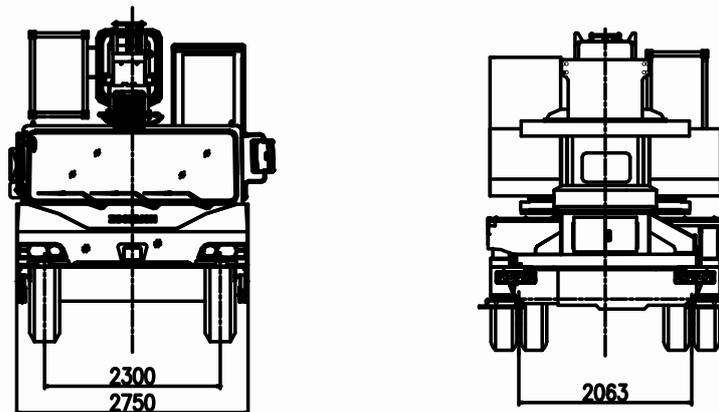


Fig. 01 - 10 - 3

## 1.3.2 Technical data

Item		Value	Remarks	
Work performance	Max. rated lifting capacity	kg	70000	
	Max. load moment of basic boom	kN.m	2352	
	Max. load moment of main boom (fully extended)	kN.m	1098	
	Max. lifting height of basic boom	m	12.2	
	Max. lifting height of main boom (fully extended)	m	44.2	These parameters do not include deflection of main boom and jib.
	Max. lifting height of jib	m	60.2	
	Max. hoist rope speed (Main winch)	m/min	135	At 4 <sup>th</sup> layer
	Max. hoist rope speed (Auxiliary winch)	m/min	110	At 2 <sup>nd</sup> layer
	Boom derricking up time	s	57	
	Boom telescoping out time	s	107	
	Slowing speed	r/min	0 – 1.8	
Driving	Max. driving speed	km/h	75	
	Max. gradeability	%	37	
	Min. turning diameter	m	≤24	
	Min. ground clearance	mm	280	
	Limits for exhaust pollutants and smoke		Comply with related standards	GB3847-2005 / GB17691-2005 (National stage III)
	Oil consumption per hundred kilometer	L	46	
	Front / rear overhang angle	°	18/15	
	Brake distance	m	≤10	Initial speed: 30 km/h
Mass	Deadweight in driving condition	kg	45000	
	Complete vehicle kerb mass	kg	44870	
	Front axle load	kg	19000	
	Rear axle load	kg	26000	
Dimensions	Overall dimensions (L × W × H)	mm	14100 × 2750 × 3750	
	Outrigger spread (L)	m	6.00	

Item		Value	Remarks	
	Outrigger spread (W)	m	Fully extended: 7.6, intermediately extended: 5.04	
	Main boom length	m	11.6 – 44	
	Boom angle	°	-2 – 80	
	Jib length	m	9.5, 16	
	Offset	°	0, 30	
	Front / rear overhang	mm	2810 / 2170	
	Number of axles		4	
	Wheelbase	mm	1450+4350+1350	
	Treads	Front	mm	2300/2300
		Rear	mm	2063/2063
Tail slewing radius			4020	
Engine	Model		WP10.375	
	Type		6-cylinder in-line, turbo-charged, intercooled	
	Fuel type		Light diesel oil	
	Displacement	ml	9726	
	Rated power / RPM	kW/r/min	276/2200	
	Max. torque / RPM	N.m/r/min	1460/1200 – 1600	
Transmission	Model		9JS150T-B	
	Type		Mechanical stepped speed change	
	Operating mode		Mechanical manual operation	
	Number of speeds		9 forward and 1 reverse speeds	
	Speed ratio		Forward speeds: 12.65 / 8.38 / 6.22 / 4.57 / 3.40 / 2.46 / 1.83 / 1.34 / 1.00 Reverse speed: 13.22	
Steering system	Steering type		Steering wheel	
	Outer diameter of steering wheel	mm	500	

Item		Value	Remarks
	Steering column	Universal coupling	
Steering gear	Model	PY-ZJ120C-Z/Y	
	Type	Integral circulating ball-type hydraulic booster steering gear	
Steering pump	Model	QC32/13-WP-PY	Outer circulation
	Type	Gear pump	
Drive axles	Drive type	8 × 4	
	Speed ratio	6.5 (Dajiang axle) / 6.723 (Meritor axle)	
Number of leaf springs (front)		12/12/10	
Cab capacity		2	
Fuel tank capacity		L 300	
Hydraulic oil tank capacity		L 720	

### 1.3.3 Work parameters

— **Max. support strength per outrigger**

When working within the rated lifting capacity, the max. support strength per outrigger is 73 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	130000

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

Boom length (m)	11.6	11.6 – 19.6	19.6 – 31.8	31.8 – 44.0	44.0 + 9.5
Reeving	12	9	5	3	1
Boom length (m)	44.0 + 16.0				
Reeving	1				

**⚠ CAUTION**

- (1) If rope reevings are less than the value listed in the above table 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: Metric kg

Working radius (m)	Telescoping cylinder I and outriggers fully extended, with 4.5 t fixed counterweight, over side and over rear						
	Main boom length (m)						
	11.6	15.6	19.6	25.7	31.8	37.9	44.0
3.0	70000	50000	40000				
3.5	64000	50000	40000				
4.0	56000	48000	40000	28000			
4.5	52000	44000	40000	28000			
5.0	48000	43000	38500	27000			
5.5	43000	39000	36000	26000	18000		
6.0	39000	37000	34000	25000	18000		
6.5	35000	33000	31500	24000	18000		
7.0	30000	28700	28700	23000	18000	14100	
7.5	26500	25000	25000	22000	18000	14100	
8.0	23500	22500	22500	21000	17500	14100	
9.0	18200	18200	18200	18500	16000	14100	10000
10.0		14700	14700	15300	14500	13300	10000
11.0		12200	12200	12700	13000	12000	9500
12.0		10000	10200	11000	11500	11300	9200
14.0			7100	8200	8800	9300	8200
16.0			5300	6000	6700	7200	7300
18.0				4700	5200	5500	5900
20.0				3500	4000	4300	4600
22.0					3100	3450	3800
24.0					2300	2750	3050
26.0					1700	2100	2450
28.0						1600	1950
30.0						1200	1500
32.0							1200
I	0	4.0	8.0	8.0	8.0	8.0	8.0
II	0	0	0	6.1	12.2	18.3	24.4
Reeving	12	9	9	5	5	3	3
Hook	70 t						

Table 2

Unit: Metric kg

Working radius (m)	Telescoping cylinder I intermediately extended and outriggers fully extended, with 4.5 t fixed counterweight, over side and over rear					
	Main boom length (m)					
	11.6	15.6	21.7	27.8	33.9	40.0
3.0	70000	50000				
3.5	64000	50000	28000			
4.0	56000	48000	28000			
4.5	52000	44000	28000			
5.0	48000	43000	27000	18000		
5.5	43000	39000	26000	18000		
6.0	39000	37000	25000	18000		
6.5	35000	33000	24000	18000	14000	
7.0	30000	28700	23000	17500	14000	
7.5	26500	25000	22000	17000	14000	
8.0	23500	22500	21000	16500	14000	9500
9.0	18200	18200	19100	16000	14000	9000
10.0		14700	15600	14500	13000	8500
11.0		12200	13000	13800	12000	8000
12.0		10000	11000	11700	11000	7700
14.0			8200	8800	9300	7200
16.0			6100	6700	7200	6800
18.0				5200	5700	6000
20.0				4100	4500	4800
22.0				3200	3700	3900
24.0					2900	3200
26.0					2300	2600
28.0					1800	2100
30.0						1600
32.0						1300
I	0	4.0	4.0	4.0	4.0	4.0
II	0	0	6.1	12.2	18.3	24.4
Reeving	12	9	5	5	3	3
Hook	70 t					

Table 3

Unit: Metric kg

Working radius (m)	Telescoping cylinder I fully retracted and outriggers fully extended, with 4.5 t fixed counterweight, over side and over rear				
	Main boom length (m)				
	11.6	17.7	23.8	29.9	36.0
3.0	70000	28000			
3.5	64000	28000			
4.0	56000	28000	17800		
4.5	52000	28000	17600		
5.0	48000	27000	17400	14000	
5.5	43000	26000	17200	14000	
6.0	39000	25000	17000	14000	
6.5	35000	24000	16800	14000	
7.0	30000	23000	16500	14000	9000
7.5	26500	22000	16000	14000	9000
8.0	23500	21000	15500	13000	9000
9.0	18200	19800	15000	12100	8800
10.0		16300	14500	11300	8600
11.0		13700	14000	10500	8300
12.0		11700	12400	9700	8000
14.0			9400	8600	7500
16.0			7400	7600	6800
18.0				6000	6000
20.0				4900	5200
22.0				4100	4300
24.0					3600
26.0					3000
28.0					2500
30.0					
32.0					
I	0	0	0	0	0
II	0	6.1	12.2	18.3	24.4
Reeving	12	5	5	3	3
Hook	70 t				

Table 4

Unit: Metric kg

Working radius (m)	Telescoping cylinder I fully extended and outriggers intermediately extended, with 4.5 t fixed counterweight, over side and over rear						
	Main boom length (m)						
	11.6	15.6	19.6	25.7	31.8	37.9	44.0
3.0	60000	50000	40000				
3.5	50000	45000	40000				
4.0	40000	40000	40000	28000			
4.5	35000	35000	35000	28000			
5.0	32800	32000	31500	27000			
5.5	26500	25700	25200	26000	18000		
6.0	21900	21200	20800	22200	18000		
6.5	18500	17800	17500	18800	18000		
7.0	15800	15200	14900	16200	17000	14000	
7.5	13700	13100	12800	14000	14800	14000	
8.0	12000	11400	11100	12300	13000	13500	
9.0	9300	8800	8500	9700	10400	10900	10000
10.0		6900	6600	7700	8400	8800	9200
11.0		5400	5100	6200	6800	7200	7600
12.0		4200	4000	5000	5600	6000	6400
14.0			2300	3300	3900	4300	4600
16.0				2000	2600	3000	3300
18.0					1700	2100	2300
20.0					1000	1400	1600
22.0						900	1100
24.0							
I	0	4.0	8.0	8.0	8.0	8.0	8.0
II	0	0	0	6.1	12.2	18.3	24.4
Reeving	12	9	9	5	5	3	3
Hook	70 t						

Table 5

Unit: Metric kg

Working radius (m)	Telescoping cylinder I and outriggers intermediately extended, with 4.5 t fixed counterweight, over side and over rear					
	Main boom length (m)					
	11.6	15.6	21.7	27.8	33.9	40.0
3.0	60000	50000				
3.5	50000	45000	28000			
4.0	40000	40000	28000			
4.5	35000	35000	28000			
5.0	32800	32000	27000	18000		
5.5	26500	25700	26000	18000		
6.0	21900	21200	22900	18000		
6.5	18500	17800	19400	17500	14000	
7.0	15800	15200	16700	17000	14000	
7.5	13700	13100	14600	15400	14000	
8.0	12000	11400	12800	13600	13500	9500
9.0	9300	8800	10200	10800	11300	9000
10.0		6900	8200	8800	9300	8500
11.0		5400	6700	7300	7700	8100
12.0		4200	5500	6100	6500	6800
14.0			3700	4300	4700	5000
16.0				3000	3400	3700
18.0					2500	2800
20.0					1800	2000
22.0						1400
24.0						
I	0	4.0	4.0	4.0	4.0	4.0
II	0	0	6.1	12.2	18.3	24.4
Reeving	12	9	5	5	3	3
Hook	70 t					

Table 6

Unit: Metric kg

Working radius (m)	Telescoping cylinder I fully retracted and outriggers intermediately extended, with 4.5 t fixed counterweight, over side and over rear				
	Main boom length (m)				
	11.6	17.7	23.8	29.9	36.0
3.0	60000	28000			
3.5	50000	28000			
4.0	40000	28000	17800		
4.5	35000	28000	17600		
5.0	32800	27000	17400	14000	
5.5	26500	26000	17200	14000	
6.0	21900	23800	17000	14000	
6.5	18500	20200	16800	14000	
7.0	15800	17500	16500	14000	9000
7.5	13700	15300	16000	14000	9000
8.0	12000	13500	14200	13000	9000
9.0	9300	10800	11400	11800	8800
10.0		8800	9400	9800	8600
11.0		7200	7800	8200	8300
12.0		6000	6600	7000	7200
14.0			4800	5100	5300
16.0			3500	3800	4000
18.0				2900	3100
20.0				2200	2400
22.0				1600	1800
24.0					1300
I	0	0	0	0	0
II	0	6.1	12.2	18.3	24.4
Reeving	12	5	5	3	3
Hook			70 t		

Table 7

Unit: Metric kg

Working radius (m)	Telescoping cylinder I and outriggers fully extended, with 4.5 t fixed counterweight + 2 t moveable counterweight, over side and over rear						
	Main boom length (m)						
	11.6	15.6	19.6	25.7	31.8	37.9	44
3.0	70000	50000	40000				
3.5	64000	50000	40000				
4.0	56000	48000	40000	28000			
4.5	52000	44000	40000	28000			
5.0	48000	43000	39000	27600			
5.5	43000	39000	36000	26000	18000		
6.0	39000	37000	34200	25500	18000		
6.5	35000	33000	31500	24000	18000		
7.0	30000	29500	29000	23500	18000	14000	
7.5	26500	25000	25000	22500	18000	14000	
8.0	24000	23400	23300	21500	17500	14000	
9.0	18900	18700	18500	19100	16000	14000	10000
10.0		15200	15100	16300	14500	13300	10000
11.0		12200	12200	13200	13000	12000	9600
12.0		10500	10400	11500	12200	11300	9400
14.0			7400	8500	9200	9600	8300
16.0			5300	6400	7100	7400	7500
18.0				4800	5500	6000	6100
20.0				3650	4300	4800	4900
22.0					3350	3800	3900
24.0					2650	3100	3250
26.0					2000	2400	2700
28.0						1900	2150
30.0						1450	1700
32.0							1350
I	0	4.0	8.0	8.0	8.0	8.0	8.0
II	0	0	0	6.1	12.2	18.3	24.4
Reeving	12	9	9	5	5	3	3
Hook	70 t						

Table 8

Unit: Metric kg

Working radius (m)	Telescoping cylinder I intermediately extended and outriggers fully extended, with 4.5 t fixed counterweight + 2 t moveable counterweight, over side and over rear					
	Main boom length (m)					
	11.6	15.6	21.7	27.8	33.9	40.0
3.0	70000	50000				
3.5	64000	50000	28000			
4.0	56000	48000	28000			
4.5	52000	44000	28000			
5.0	48000	43000	27000	18000		
5.5	43000	39000	26000	18000		
6.0	39000	37000	25000	18000		
6.5	35000	33000	24000	18000	14000	
7.0	30000	29500	23000	17500	14000	
7.5	26500	25000	22000	17000	14000	
8.0	24000	23400	21000	16500	14000	9500
9.0	18900	18700	19500	16000	14000	9000
10.0		15200	16500	14500	13000	8500
11.0		12200	13300	13800	12000	8000
12.0		10500	11600	12300	11000	7700
14.0			8600	9300	9300	7300
16.0			6500	7200	7600	6900
18.0				5600	6200	6200
20.0				4400	5000	5000
22.0				3450	4000	4100
24.0					3300	3300
26.0					2650	2800
28.0					2100	2250
30.0						1800
32.0						1450
I	0	4.0	4.0	4.0	4.0	4.0
II	0	0	6.1	12.2	18.3	24.4
Reeving	12	9	5	5	3	3
Hook	70 t					

Table 9

Unit: Metric kg

Working radius (m)	Telescoping cylinder I fully retracted and outriggers fully extended, with 4.5 t fixed counterweight + 2 t moveable counterweight, over side and over rear				
	Main boom length (m)				
	11.6	17.7	23.8	29.9	36.0
3.0	70000	28000			
3.5	64000	28000			
4.0	56000	28000	17800		
4.5	52000	28000	17600		
5.0	48000	27000	17400	14000	
5.5	43000	26000	17200	14000	
6.0	39000	25000	17000	14000	
6.5	35000	24000	16800	14000	
7.0	30000	23000	16500	14000	9000
7.5	26500	22000	16000	14000	9000
8.0	24000	21000	15500	13000	9000
9.0	18900	20000	15000	12100	8800
10.0		17000	14500	11300	8600
11.0		13800	14000	10500	8300
12.0		12000	13000	9700	8000
14.0			10000	8600	7500
16.0			7900	7600	6800
18.0				6500	6000
20.0				5400	5200
22.0				4400	4400
24.0					3700
26.0					3200
28.0					2650
30.0					
32.0					
I	0	0	0	0	0
II	0	6.1	12.2	18.3	24.4
Reeving	12	5	5	3	3
Hook	70 t				

Table 10

Unit: Metric kg

Working radius (m)	Telescoping cylinder I fully extended and outriggers intermediately extended, with 4.5 t fixed counterweight + 2 t moveable counterweight, over side and over rear						
	Main boom length (m)						
	11.6	15.6	19.6	25.7	31.8	37.9	44.0
3.0	60000	50000	40000				
3.5	50000	45000	40000				
4.0	40000	40000	40000	28000			
4.5	35000	35000	35000	28000			
5.0	32800	32000	31500	27000			
5.5	26500	25700	25200	26000	18000		
6.0	21900	21200	20800	22200	18000		
6.5	18500	17800	17500	18800	18000		
7.0	17000	15200	14900	16200	17000	14000	
7.5	14000	13100	12800	14000	14800	14000	
8.0	13000	12700	12300	13500	13000	13500	
9.0	10000	9900	9700	10800	10400	12000	10000
10.0		7900	7600	8700	9500	9900	9200
11.0		5900	5800	6800	7400	8000	7600
12.0		5000	4800	5900	6500	7000	7300
14.0			3000	4000	4700	5100	5400
16.0				2600	3400	3800	4100
18.0					2400	2800	3100
20.0					1700	2100	2300
22.0						1500	1700
24.0							
I	0	4.0	8.0	8.0	8.0	8.0	8.0
II	0	0	0	6.1	12.2	18.3	24.4
Reeving	12	9	9	5	5	3	3
Hook	70 t						

Table 11

Unit: Metric kg

Working radius (m)	Telescoping cylinder I and outriggers intermediately extended, with 4.5 t fixed counterweight + 2 t moveable counterweight, over side and over rear					
	Main boom length (m)					
	11.6	15.6	21.7	27.8	33.9	40.0
3.0	60000	50000				
3.5	50000	45000	28000			
4.0	40000	40000	28000			
4.5	35000	35000	28000			
5.0	32800	32000	27000	18000		
5.5	26500	25700	26000	18000		
6.0	21900	21200	22900	18000		
6.5	18500	17800	19400	17500	14000	
7.0	17000	15200	16700	17000	14000	
7.5	14000	13100	14600	15400	14000	
8.0	13000	12700	13800	13600	13500	9500
9.0	10000	9900	11200	10800	12300	9000
10.0		7900	9200	9800	10000	8500
11.0		5900	7500	8100	8500	8100
12.0		5000	6300	6900	7300	7600
14.0			4300	4900	5300	5600
16.0				3500	3900	4500
18.0					3000	3300
20.0					2200	2400
22.0						1800
24.0						
I	0	4.0	4.0	4.0	4.0	4.0
II	0	0	6.1	12.2	18.3	24.4
Reeving	12	9	5	5	3	3
Hook	70 t					

Table 12

Unit: Metric kg

Working radius (m)	Telescoping cylinder I fully retracted and outriggers intermediately extended, with 4.5 t fixed counterweight + 2 t moveable counterweight, over side and over rear				
	Main boom length (m)				
	11.6	17.7	23.8	29.9	36.0
3.0	60000	28000			
3.5	50000	28000			
4.0	40000	28000	17800		
4.5	35000	28000	17600		
5.0	32800	27000	17400	14000	
5.5	26500	26000	17200	14000	
6.0	21900	23800	17000	14000	
6.5	18500	20200	16800	14000	
7.0	17000	17500	16500	14000	9000
7.5	14000	15300	16000	14000	9000
8.0	13000	14500	14200	13000	9000
9.0	10000	11800	11400	12000	8800
10.0		9800	10400	10500	8600
11.0		8000	8800	8800	8300
12.0		6800	7400	7800	8000
14.0			5400	5700	5900
16.0			4000	4300	4500
18.0				3400	3600
20.0				2600	2800
22.0				2000	2200
24.0					1700
I	0	0	0	0	0
II	0	6.1	12.2	18.3	24.4
Reeving	12	5	5	3	3
Hook			70 t		

Table 13

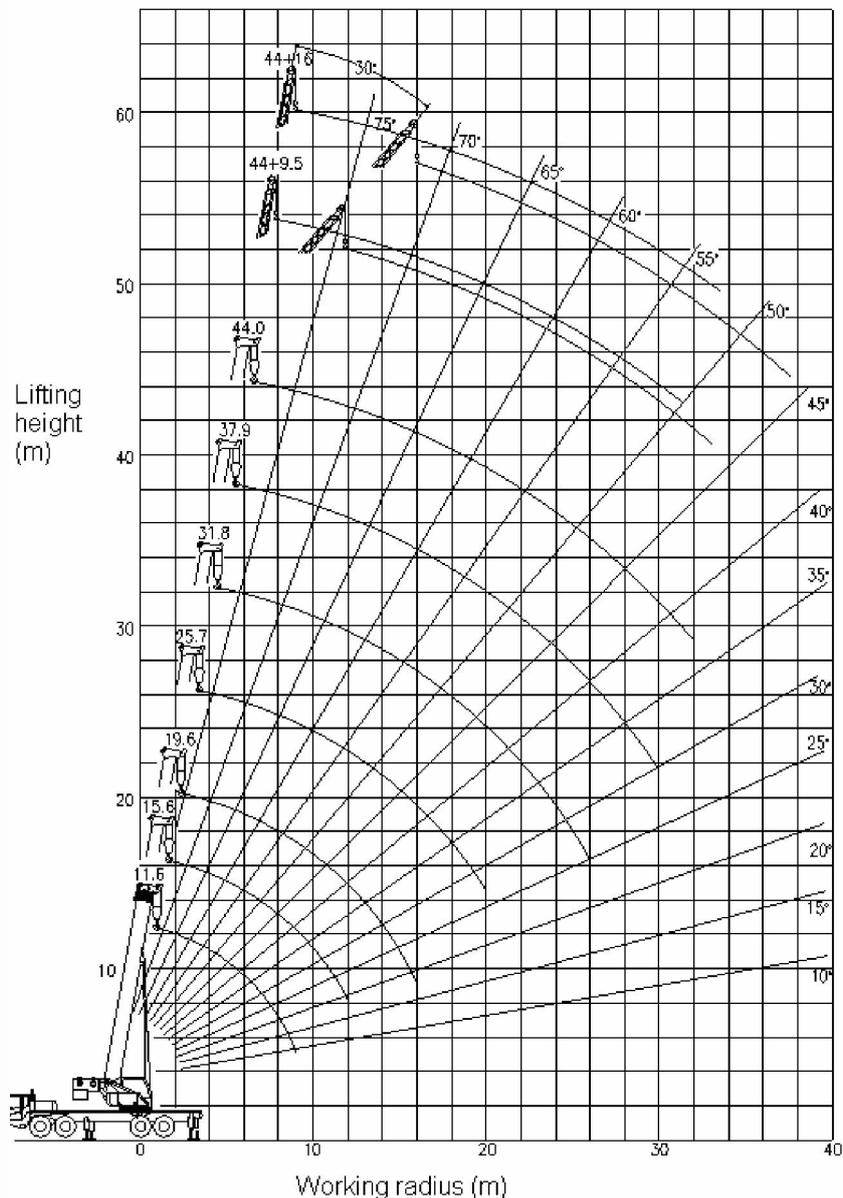
Unit: Metric kg

Boom angle	Outriggers fully extended, over side and over rear			
	Main boom length (m) + jib length (m)			
	44.0 + 9.5		44.0 + 16.0	
	0°	30°	0°	30°
80°	5000	3000	3000	1300
78°	4700	2850	2700	1200
76°	4400	2600	2400	1150
74°	4100	2450	2100	1100
72°	3800	2300	1850	1050
70°	3500	2200	1700	1000
68°	3200	2100	1600	970
66°	2800	2000	1500	940
64°	2400	1900	1400	910
62°	2100	1800	1300	880
60°	1850	1650	1200	850
58°	1600	1350	1100	800
56°	1300	1150	1000	750
54°	1000	900	800	
52°	800			
Reeving	1			
Hook	5 t auxiliary hook			

**NOTE**

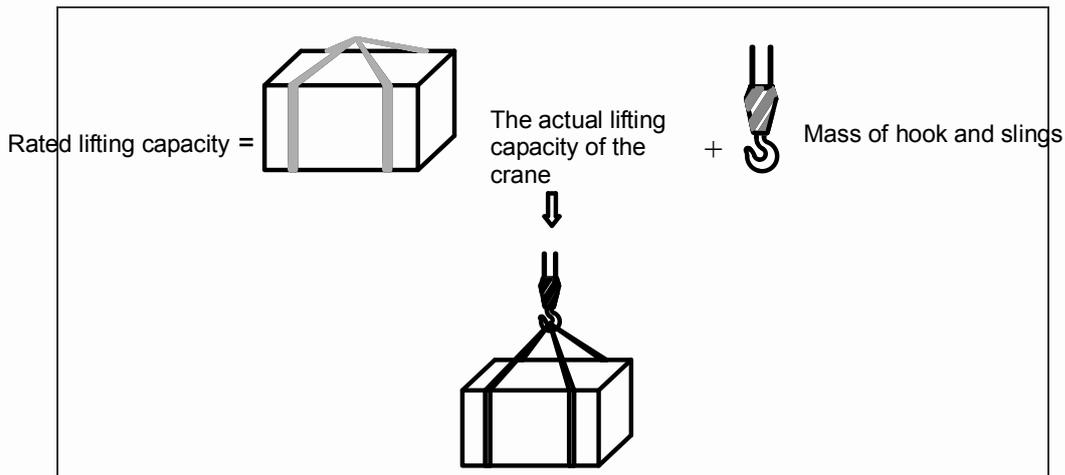
This crane is provided with several rated lifting capacity tables. The operator should select proper rated lifting load referring to resp. lifting capacity tables according to actual OM.

### 1.3.5 Lifting height chart



**⚠ CAUTION**

- (1) All the OMs referred above are with outriggers completely or intermediately extended. Do not lift a load without outriggers extended.
- (2) The crane can operate over full range with the 5<sup>th</sup> outrigger extended. Do not work over front without the 5<sup>th</sup> outrigger extended.
- (3) The lifting capacity table indicates the maximum load, namely the rated lifting capacity, which can be lifted by this crane in different OMs and with specified requirements. The values as given in the tables include the mass of the hook (main hook of 560 kg and auxiliary of 140 kg) and slings.



- (4) The working radius in lifting capacity table refers to the level distance from hook center to slewing center.
- (5) If the actual boom length and working radius are between two adjacent values given in the lifting capacity table, the bigger one should be referred to.

For example:

If the actual boom length is 18 m and the working radius is 4.8 m, the value corresponding to the boom length of 19.6 m and working radius of 5.0 m in the rated lifting capacity table should be referred to determine the rated lifting capacity (38500 kg).

- (6) When using the boom with jib assembled, 2000 kg plus the mass of hook block and slings should be subtracted from the rated lifting capacities.
- (7) The Max. rated lifting capacity for the rooster sheave is 5000 kg. If the rated lifting capacity for the telescopic boom checked from the table is below 5000 kg, the value referred to the rated lifting capacity table should be taken.

For example:

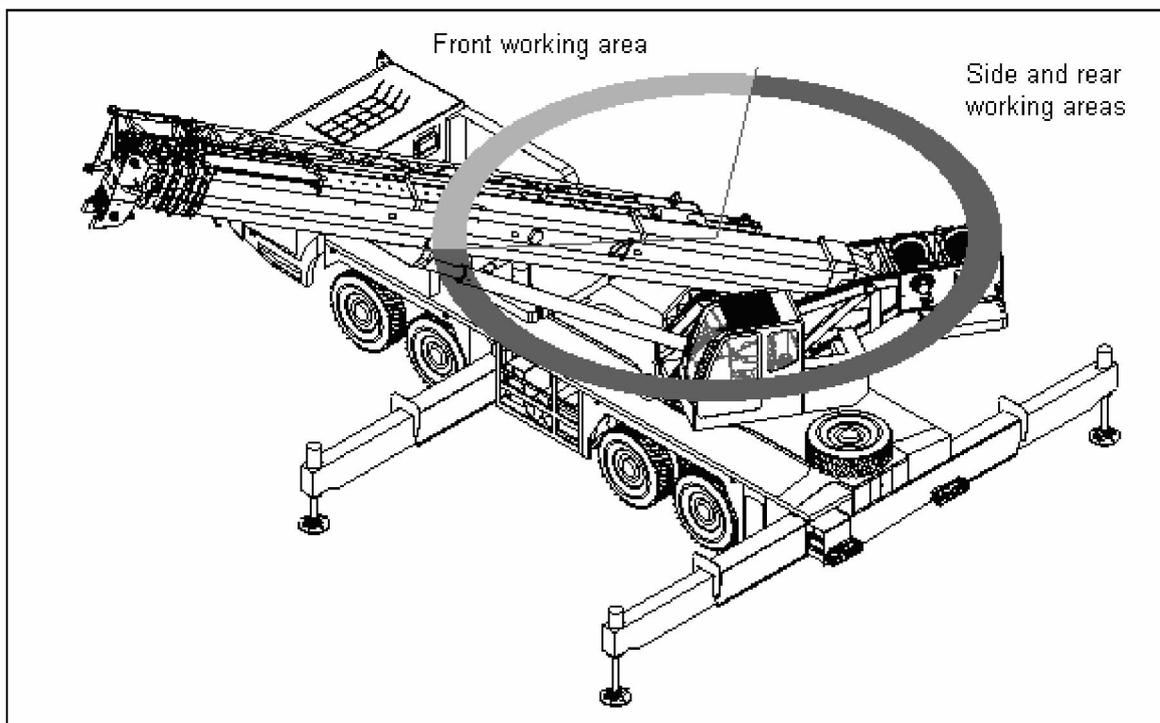
- If the actual boom length is 19.6 m and the working radius is 6.5 m, the rated lifting capacity is 5000 kg.
- If the actual boom length is 31.8 m and the working radius is 20 m, the rated lifting capacity should be referred to the table of 4000 kg.

- (8) During operation, do not lift a load with both the 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.

**⚠ WARNING**

When the boom length is more than 30 m, the boom derricking should be operated strictly according to the lifting height chart. Otherwise the crane may topple.

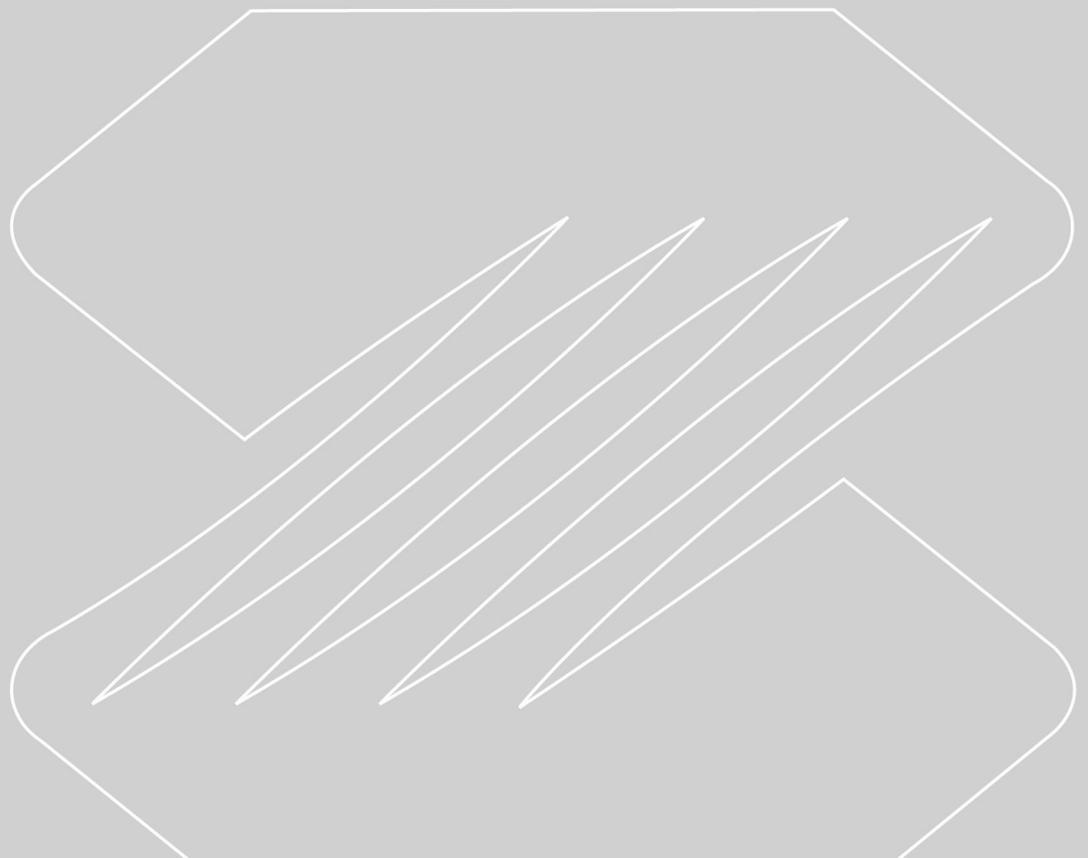
### 1.3.6 Working areas





## 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 road.
- b) No person is allowed to stay in operator's cab during driving.
- c) The crane must be made to comply with the relevant local traffic regulations, before it is driven on public streets, roads and other places. The weights, axle loads and dimensions specified in the permits must be maintained.
- d) The relevant persons should be trained to ensure safe operation. The crane operator must obtain or receive the necessary information in the operating instructions in a timely fashion before driving to the work site.
- e) Comply with the safety signs on the crane to avoid serious injuries or casualties.
- f) 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 Fig. 02 – 01.
- b) Points for attention:
  - 1) The signs for all the potential danger referred in the operating instructions have been stuck on specified positions. Do not move the signs without permission!
  - 2) The safety signs on the potentially dangerous parts should be maintained regularly. Once there is any fading or damage, modify or replace them immediately to ensure the signs are always clean, complete, correct and legible.

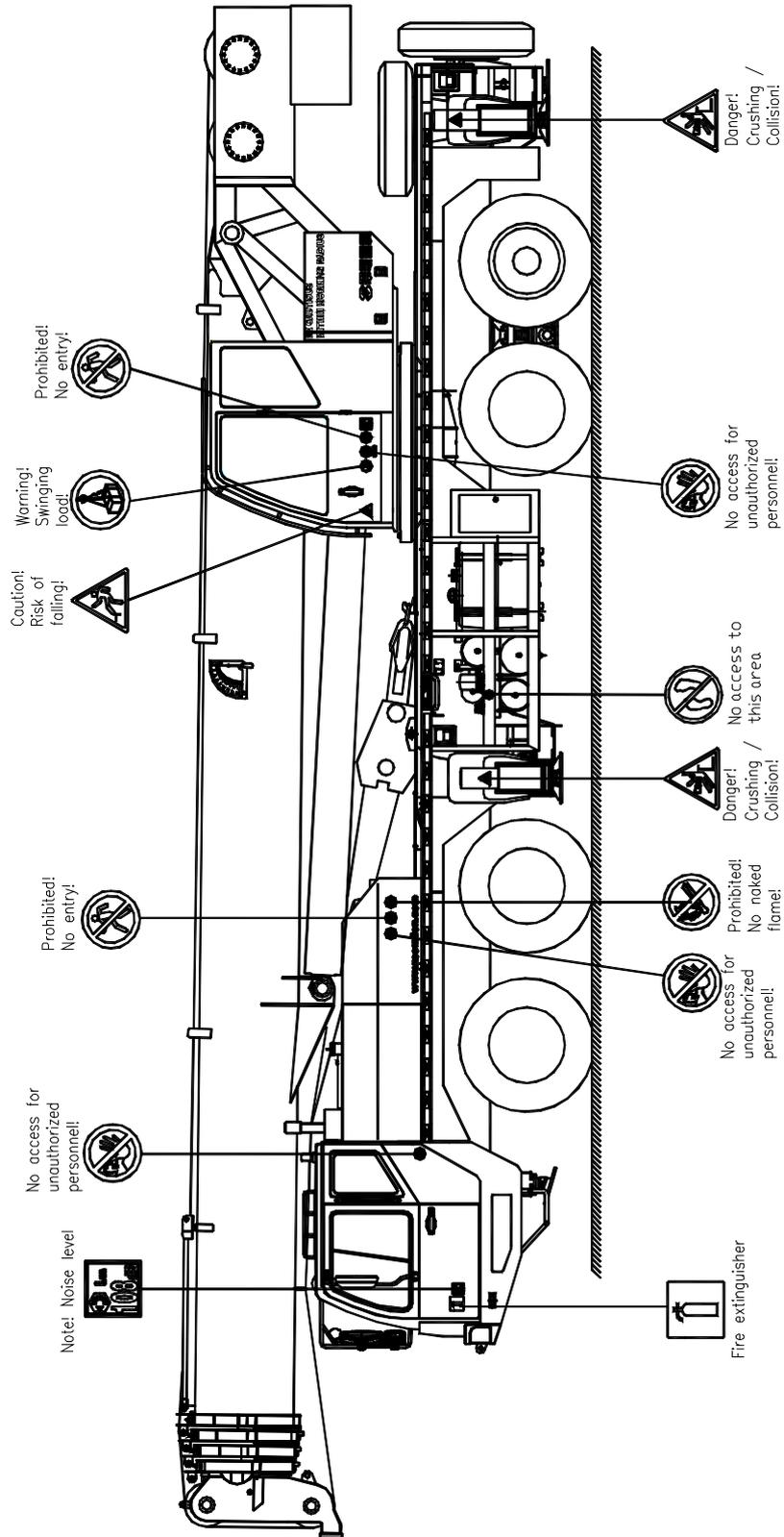


Fig. 02 - 01

## 2.2 Planning crane operation

In addition to a perfectly working crane and a well-trained crew, crane operation planning is an important principle for 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 working radius
- 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:

- a) Load hook / hook block
- b) Separate lifting accessories
- c) Jib
- d) Underlay materials for outrigger pads.



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

- a) During initial crane operation (less than 100 operating hours), you must follow the below instructions during this time period:
  - The work load and work speed must not be too high.
  - The maximum lifting capacity should not be larger than 80% of the rate one.
  - Do not operate the crane at a speed that is more than the maximum limits.
- b) Do not drive the crane at the driving speed higher than 55 km / h and with the engine speed higher than 1800 rpm within the first 600 km.
- 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 each 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 brake disk temperature may not exceed 200°C.



**The risk of accident increases when new brake linings are subjected to one or more braking operations over extended period of time or if the vehicle is forced to a stop by hard braking from high 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 conductor

The primary responsibilities of crane operator, rigger and conductor are 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 safety hazards of entering into the working area.
- f) The ability to estimate and monitor load is enough.
- g) Be able to estimate and monitor the distance, height, clearance and load correctly.
- h) Be familiar with the *Operator's Manual* for the crane, and know the working principle, structural performance and the function and adjusting method of the safety devices, as well as master the operation essentials and maintenance skills.
- i) Be familiar with safety rules, safety signals and symbols.
- j) Be qualified with the work in hearing, eyesight and reaction ability. Have the requisite physical to operate the crane safely.
- 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.



- (1) Operator should check brakes, hook block, wire rope and safety devices before operation. If there is something abnormal, fix it as soon as possible.**
- (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 loading equipment and lifting accessories to be used in accordance with work plan. Rigger is also responsible for conducting safe operation 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 loading equipment and lifting accessories 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 conductor**

The conductor is to transfer signal from the rigger to operator. He can substitute for the rigger to do conducting and rigging work, but such work can only be done by one person at any time.

Qualifications for conductor:

- 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) The operation of the crane 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 formula for calculating the safety clearance is as follows:

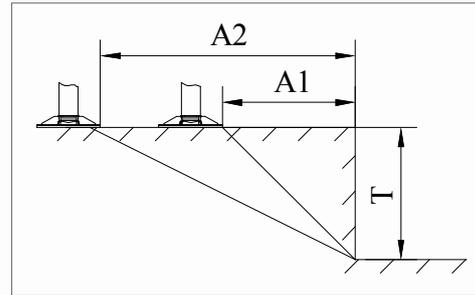
For non-cohesive and soft cohesive ground:

$$A_2 = 2T$$

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, 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 follows:

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

Permissible ground pressure is shown in the following table:

Soil type		Permissible ground pressure (kg / cm <sup>2</sup> )
A	Back-filled, not naturally compacted ground	0 – 1
	Natural, clearly undisturbed ground:	
	1. Mud, peat, marshy soil	0
	2. Non-cohesive ground, sufficient compactly layered soil	
	Fine to medium grained sand	1.5
	Coarse-grained sand to gravel	2.0
B	3. Cohesive ground:	
	Sludgy	0
	Soft	0.4
	Firm	1.0
	Semi-compact	2.0
	Hard	4.0
	4. Rock with few fissures, in healthy, unweathered condition and in a favorable location:	
	In cohesive layer order	15
	In massive or column-style shape	30

C	Artificially compacted ground:	
	5) Asphalt	5 – 15
	6) 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.

**⚠ CAUTION**

**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

- Before operation, all the wheels must be away from the ground.
- Before extending the vertical outriggers, extend the sliding beams to the specified positions.
- All the sliding beams must be extended according to the data in the lifting capacity chart and secured with pins.
- Before operation, the crane must be leveled. Under any working conditions, the inclination angle  $\alpha$  of the crane can not be more than  $0.6^\circ$ . Refer to Fig. 02 – 02.

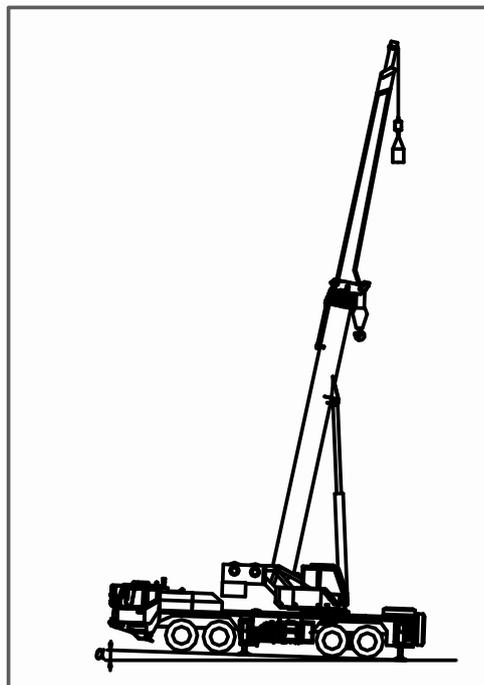


Fig. 02 – 02

**⚠ DANGER**

If the crane is positioned at an incline, and if the boom is turned towards the downslope direction, 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 sufficient distance to ditches and slopes.
- d) All outriggers have been extended to the specified positions.
- e) The outriggers are secured with pins.
- f) The outrigger pads are secured.
- g) The crane has been leveled.
- h) The 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:
  - Stop the work (safely lower the load).
  - Telescope in the boom.
  - Correctly stow the boom.

**⚠ DANGER**

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

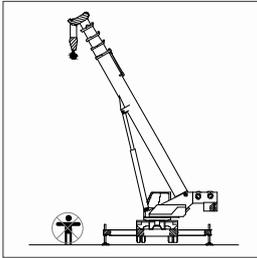
- c) Strong electromagnetic fields are likely to be present if the construction site is close to a transmitter. Under this condition, consult a high frequency specialist or contact the local franchiser or the manufacturer.



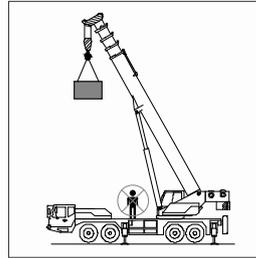
**Electromagnetic field can pose direct or indirect danger to persons, equipment and objects, for example, effect on human organs due to radiation and make spark or electric arc occur.**

**2.4.5 Points for attention for safe operation**

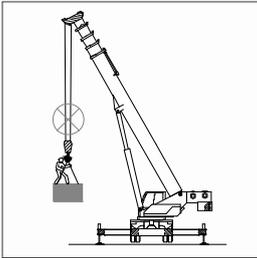
- a) Personnel must stay away from the area below the boom.



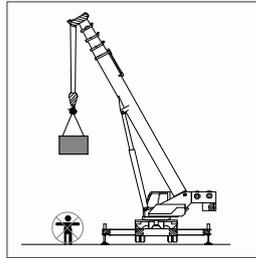
- b) Do not let personnel on the slewing table while you operate the crane.



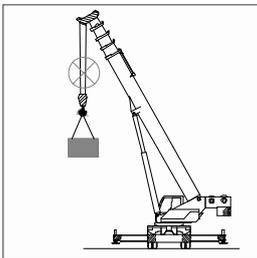
- c) Do not move personnel on the load or other equipment used to lift.



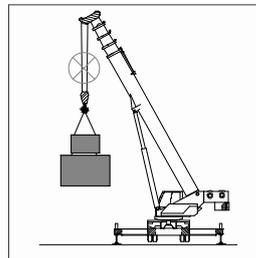
- d) Do not move a load above personnel.



- e) Support the crane on outriggers before operation.

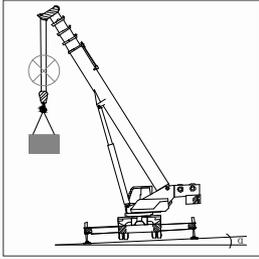


- f) Do not lift a load that is above the capacity of the crane.

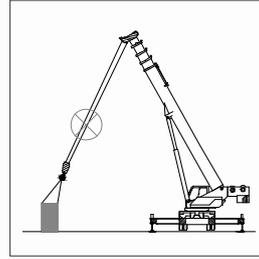


- g) The crane, with extended outriggers, must be on the ground with a slope of less than 0.6°.

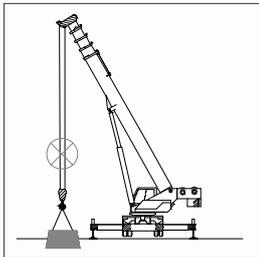
- h) Do not pull load at an angle and do not lift a load that is not in balance.



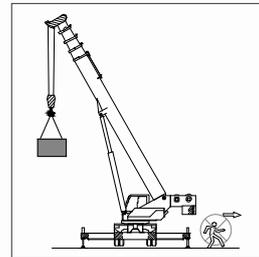
i) Do not try to lift a load that is buried or frozen on the ground.



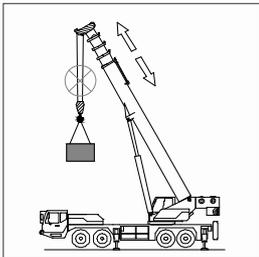
j) When the load is off the ground, the operator must stay in the cab.



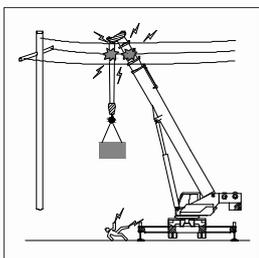
k) Do not telescope the boom with a suspended load.



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 operation in case of 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 protective measures against thunder to ensure safety.
- u) When starting and stopping the crane operation, ensure the movable parts and movable load in the 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 send out slow acoustic warning. At the time, much attention should be paid to the operation.
- w) Easy and smooth movements are necessary when you do an 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

### 1. Start

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



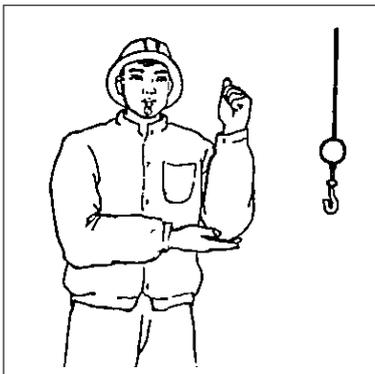
### 2. Use main winch

Tap fist on head, then use regular signal.



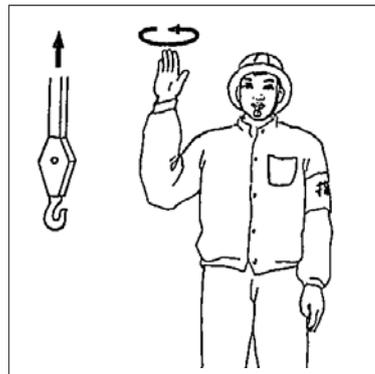
### 3. Use auxiliary winch

Tap elbow with one hand, then use regular signal.



### 4. Lift the load

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



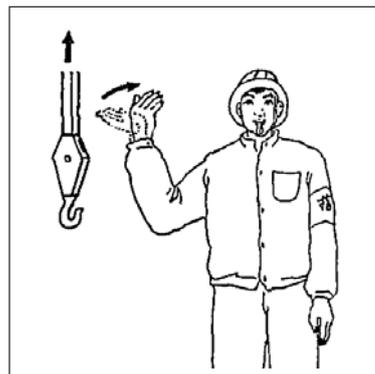
### 5. Lower the load

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



### 6. Lift the load slowly

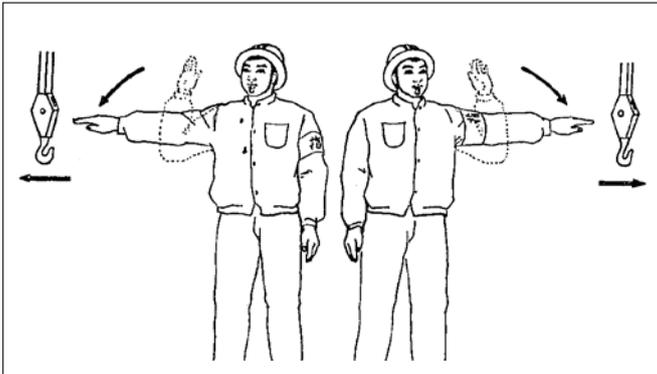
With forearm vertical, palm of the hand facing upwards, wave hand up repeatedly.



### 7. Rotate

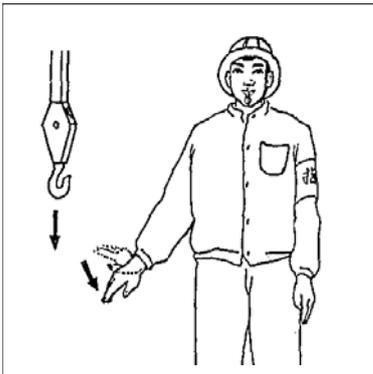
Turn left: With right forearm vertical, the palm of the hand facing outwards, lower the forearm sideways horizontally, fingers pointing in the direction of rotation.

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.



### 8. Lower the load slowly

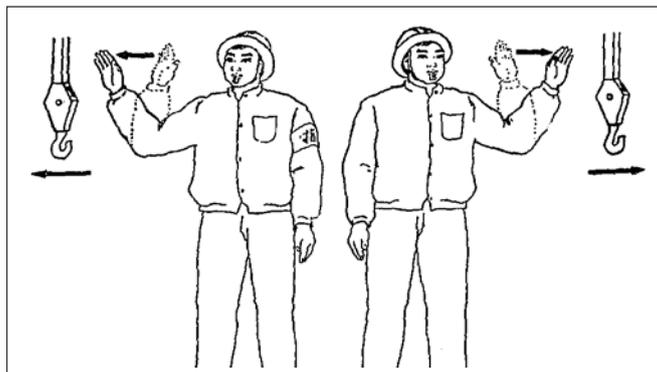
With arm extended downwards with a 30° angle to the body, palm of the hand facing downwards, wave hand down repeatedly.



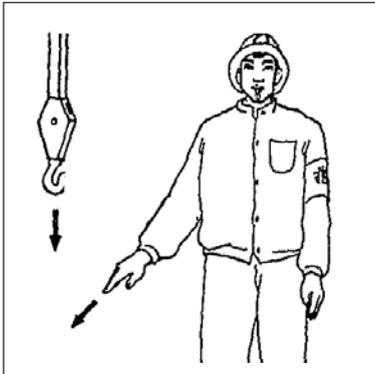
### 9. Rotate slowly

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.



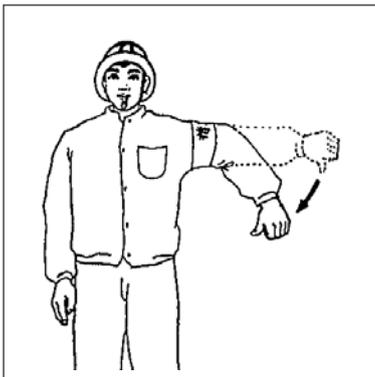
10. Indicate load lowering position  
Extend the fingers to point at the position the load should fall on.



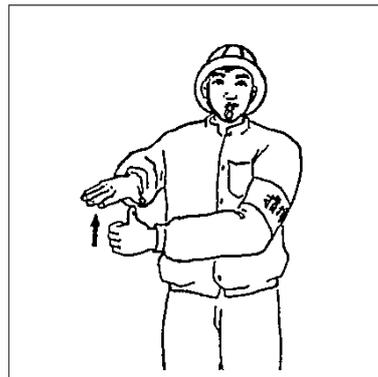
11. Raise boom  
Arm extended, finger closed, thumb pointing upward.



12. Lower boom  
Arm extended, finger closed, thumb pointing downward.



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



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



15. Extend boom  
Both fists in front of body with thumbs pointing outwards.

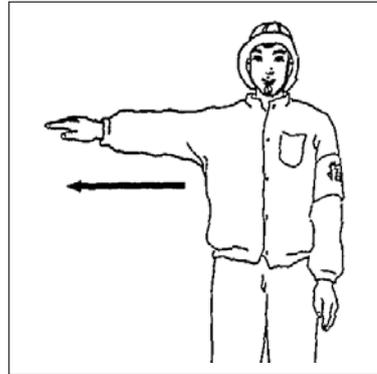


**16. Retract boom**

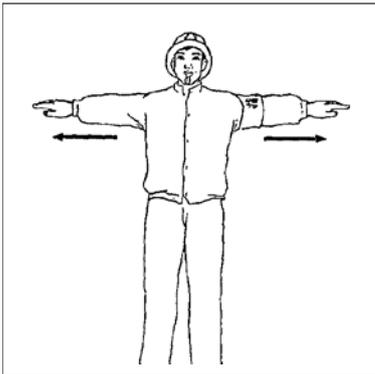
Both fists in front of body with thumbs pointing toward each other.

**17. Stop**

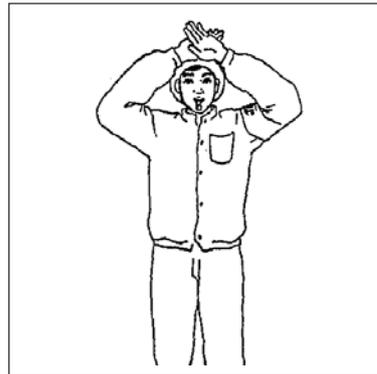
Arm extended, palm down, and move the arm back and forth horizontally.

**18. Emergency stop**

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

**19. End a movement**

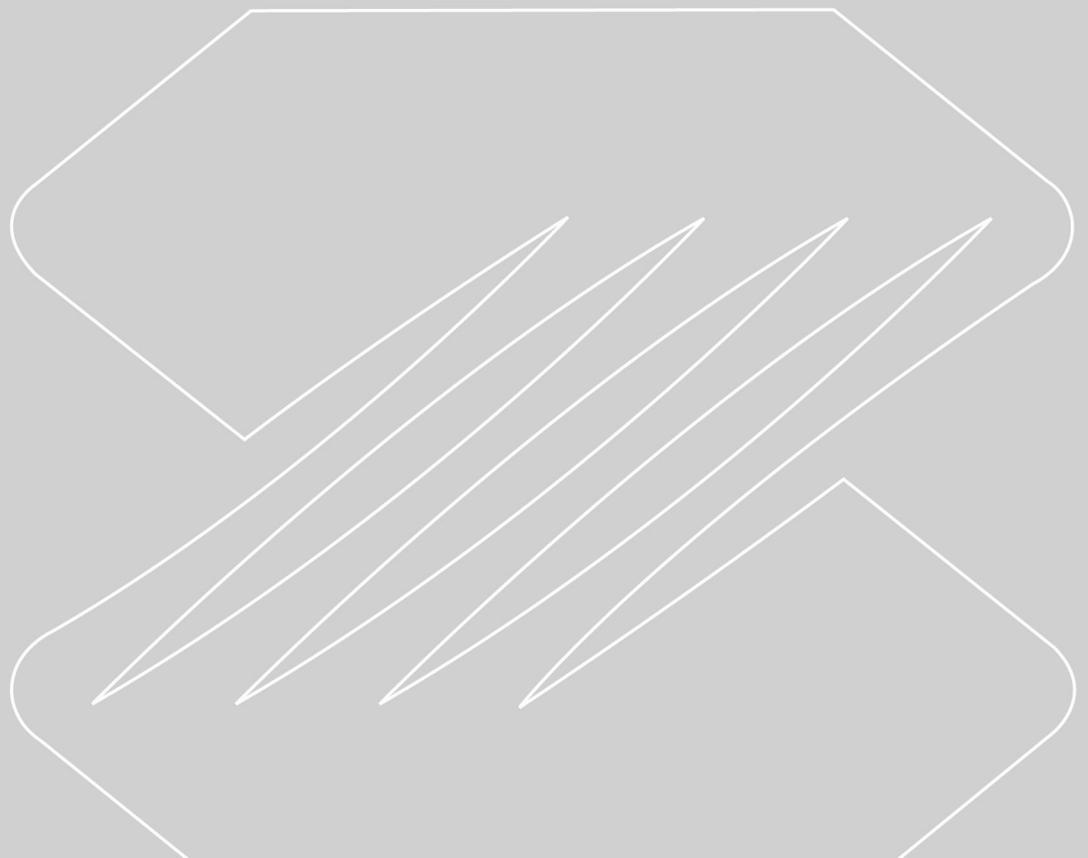
Cross your hands in front of your forehead.





## OPERATOR' S MANUAL FOR TRUCK CRANE

### Chapter 3 Operation – crane chassis





### 3.1 Driver's cab

#### 3.1.1 Overview

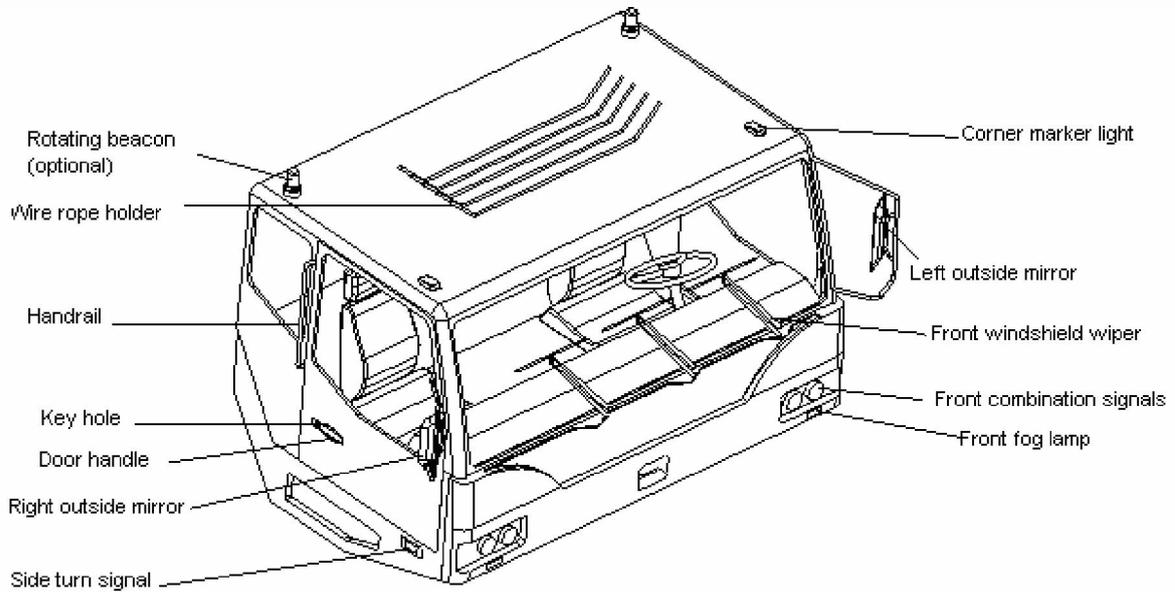


Fig. 03 - 01

**NOTE**

The rotating beacon is optional.

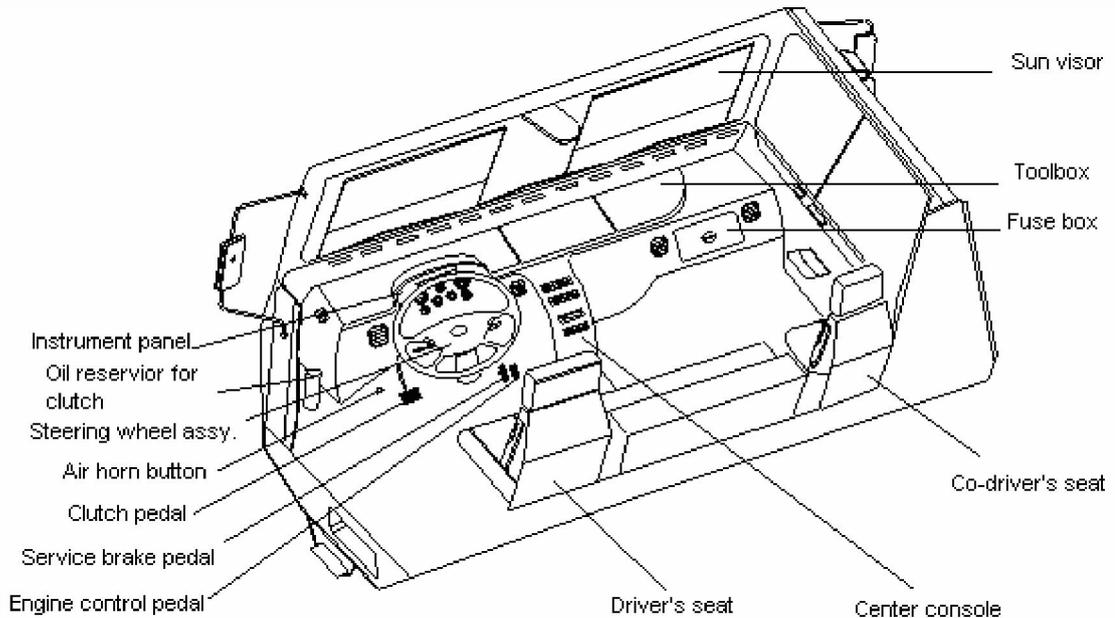


Fig. 03 - 02

**3.1.2 Steering wheel assy.**

Steering wheel assy. consists of steering wheel, steering wheel adjustment handle, steering column switches, electric horn button and ignition starter switch. Please refer to Fig. 03 – 03.

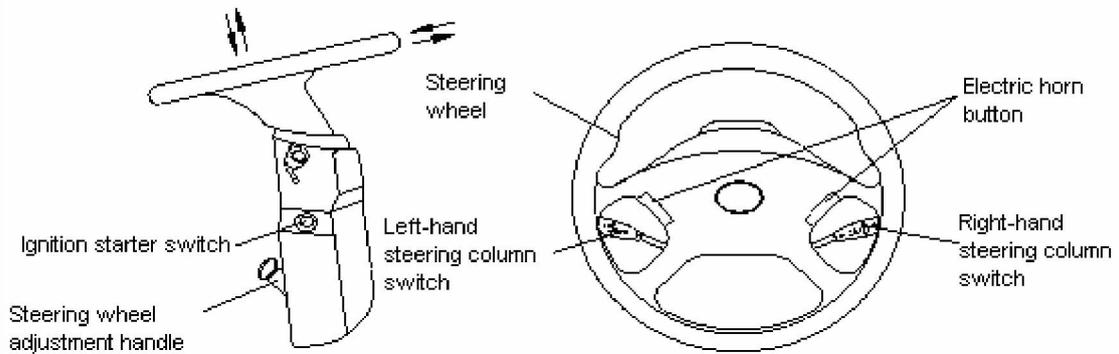


Fig. 03 – 03

– **Steering wheel adjustment handle**

The steering wheel angle and height can be adjusted by the driver. Turn the adjustment handle upwards to adjust the height and angle of the steering wheel.



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

– **Left-hand steering column switch**

As shown in Fig. 03 – 04.

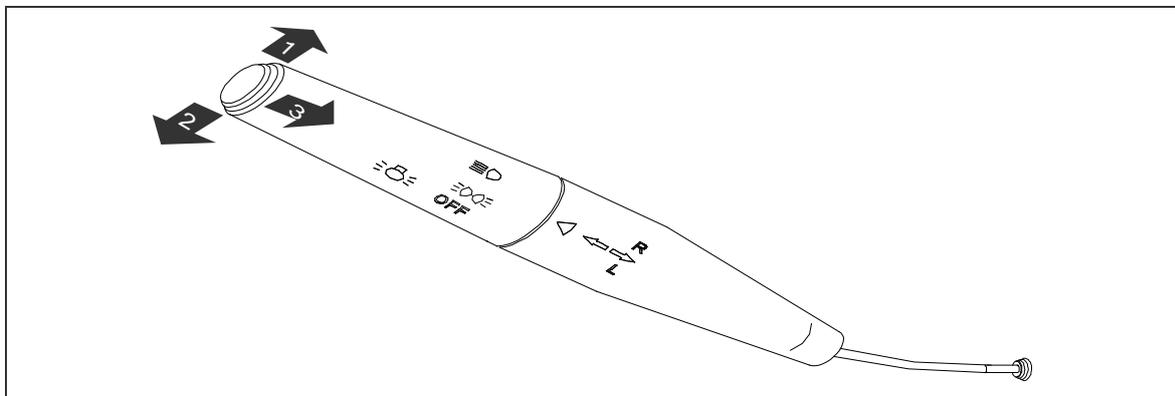


Fig. 03 – 04

- a) Turn signal activation (left / right)
  - Jog steering column forwards (direction 1): turn signal (right) activation
  - Jog steering column backwards (direction 2): turn signal (left) activation
- b) Switch from low beam to high beam and operate headlamp flasher

Jog the switch upwards (direction 3) to turn on the high beam and headlamp.

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

No matter what working conditions other lamps are in, once the headlamp flasher is on, the headlamp will light up.

c) Lighting switch

Rotate the end of the steering column switch to the  position to activate the front width lamps, rear width lamps, corner marker lights, 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.

– **Right-hand steering column switch**

As shown in Fig. 03 – 05.

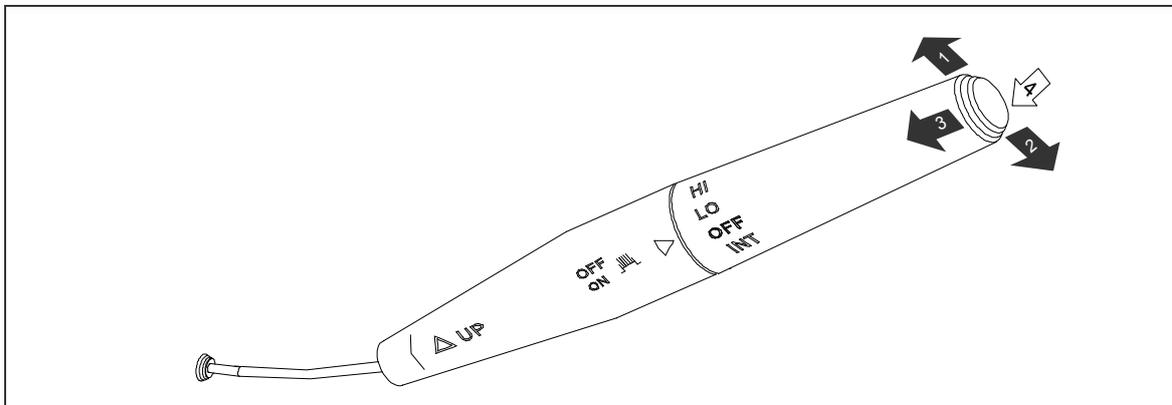


Fig. 03 – 05

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

Push the button (direction 4), on the end of this steering column switch, to spray washer fluid onto the window. They will not stop working until the button is released.

 **CAUTION**

The spray of washer fluid stops after 15 seconds or if the washer fluid tank is empty. Do not operate the wiper on hot sunny days unless you use spray the window with wiper fluid. When the temperature is below freezing, make sure that the wiper blades are not stuck to the window before you activate the wiper.

c) Activate engine exhaust brake

Jog the switch backwards (direction 2) to switch on engine exhaust brake.

Jog the switch forwards (direction 1) to switch off engine exhaust brake.

 **CAUTION**

You can depress the engine control pedal or clutch pedal to deactivate the engine exhaust brake temporarily. However, the engine exhaust brake will be activated automatically after releasing the pedal.

If engine RPM is lower than 1200 r/min, the engine exhaust brake is switched off automatically.

d) Activate parking signal

Jog the switch upwards (direction 3) to activate the left and right turn signals simultaneously, thus to light up the parking signal. 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 (See Fig. 03 – 03).

– **Ignition starter switch**

The 4 positions of the switch (in clockwise sequence) are as follows:

**LOCK** All circuits are OFF. You can plug in or pull out the key.

**ACC** Battery begins to work to supply electricity to part of the electrical devices.

**ON** All circuits, excluding the starter, are ON.

**S** A temporary position, use it to operate the starter. The key will return to ON automatically after you release the key.

 **CAUTION**

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

### 3.1.3 General operating instruments

#### – Instrument assy.

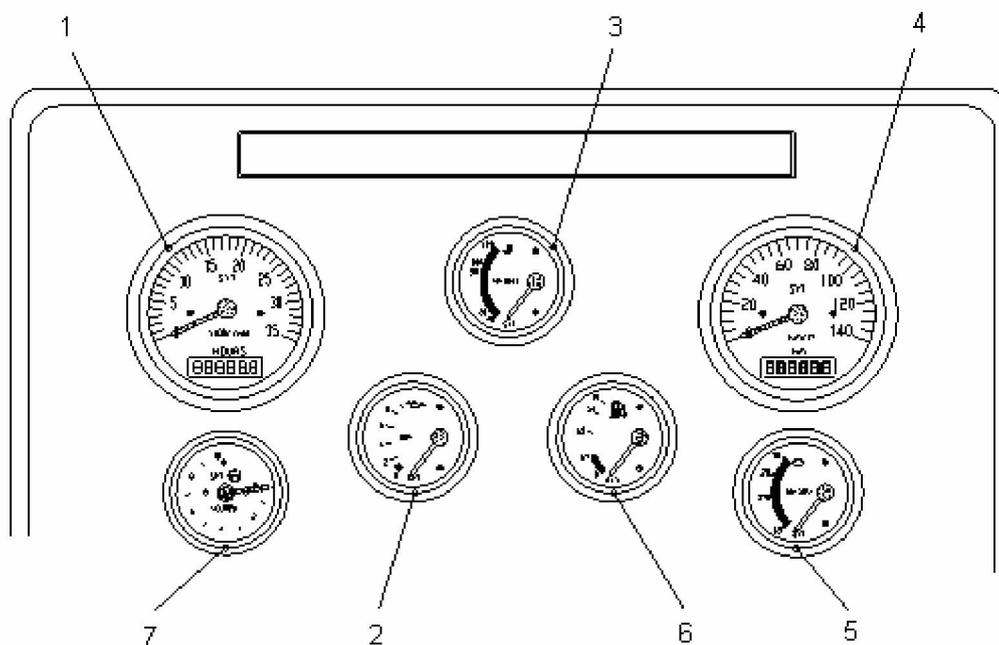


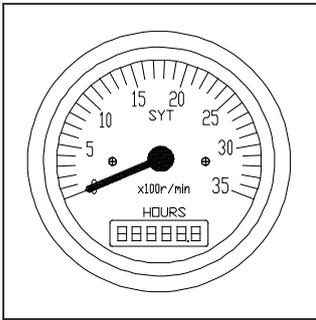
Fig. 03 – 06

#### – Instruments

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

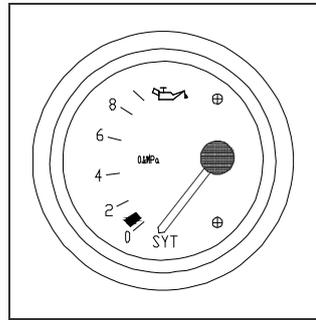
### 1 Tachometer

Displays engine speed (RPM) and actual running time.



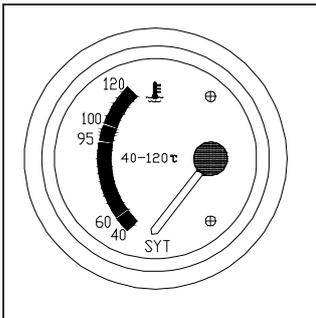
### 2 Engine oil pressure gauge

Displays the engine oil pressure during engine running.



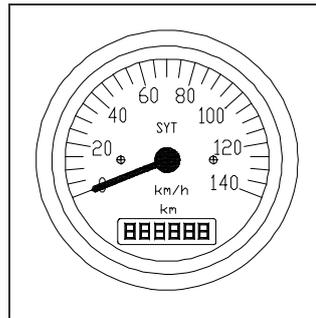
### 3 Water thermometer

Displays the engine coolant temperature in degrees Celsius (°C).



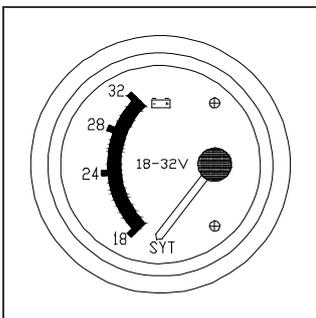
### 4 Odometer

Displays the vehicle speed in kilometers per hour (km/h) and the total driving distance in kilometer.



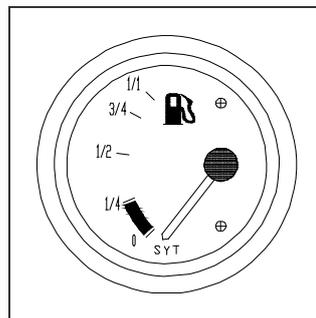
### 5 Voltmeter

Displays the voltage of generator during engine running and displays the voltage of battery without engine running.



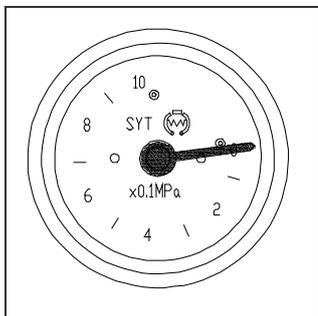
### 6 Fuel gauge

Displays the fuel reserves.



## 7 Barometer

The two pointers of the barometer resp. display the air pressure of brake air reservoirs for front axles and intermediate / rear axles.



- Display unit 1

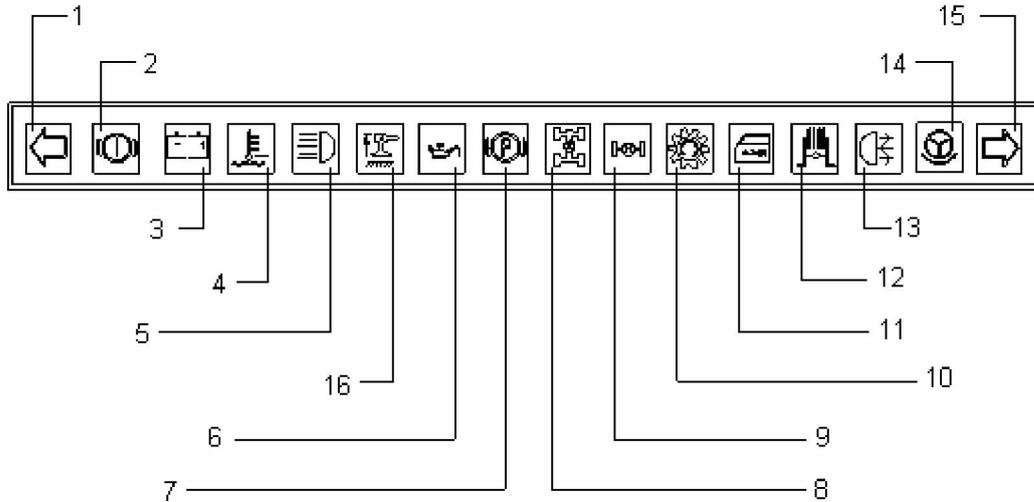
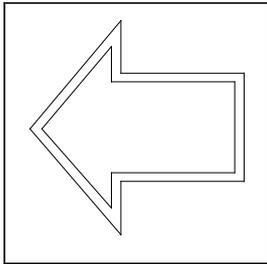


Fig. 03 – 07

- |    |               |   |
|----|---------------|---|
| 1  | Control light | Vehicle direction of travel left              |
| 2  | Warning light | Brake pressure too low                        |
| 3  | Warning light | Charge 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                          |
| 13 | Control light | Rear fog lamp                                 |
| 14 | Control light | Emergency steering                            |
| 15 | Control light | Vehicle direction of travel right             |
| 16 | Control light | The 5 <sup>th</sup> outrigger fully retracted |

**1 Control light****Vehicle direction of travel left****Illuminates:**

The vehicle travels left.

**3 Warning light Charging monitoring****Illuminates:**

Ignition starter switch is in ON position.

**Extinguishes:**

- Engine starts.
- The generator begins to charge the battery.



**If the warning light does not extinguish during engine running, the generator defects. Stop and check at once!**

**2 Warning light****Brake pressure too low****Illuminates:**

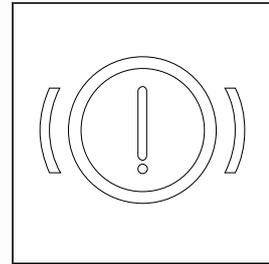
The brake pressure is too low.

**Extinguishes:**

Brake pressure increases to the specified value.



**Do not drive the vehicle if the warning light illuminates!**

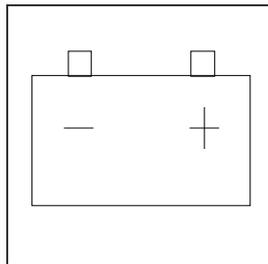
**4 Warning light****Engine coolant temperature too high****Illuminates:**

Engine coolant temperature is too high.

Check the water thermometer and stop the vehicle to check the engine cooling system.



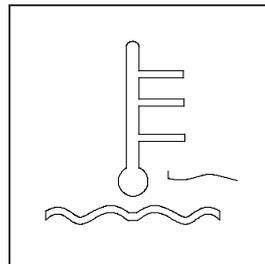
**Under this condition, do not stop the engine at once. Run the engine at idle speed for several minutes. Otherwise, the engine oil will be clung to the engine inside due to sudden temperature decreasing.**



### 5 Control light High beam

**Illuminates:**

High beam or headlamp flasher is active.



### 6 Warning light

**Engine oil pressure too low**

**Illuminates:**

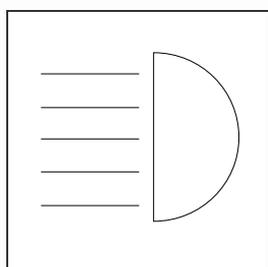
Ignition starter switch is in ON position under normal condition.

**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 soiled. Immediately bring the crane to a standstill and rectify! Otherwise the engine will be damaged seriously!**

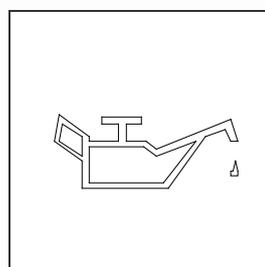


### 7 Control light Parking brake closed

**Illuminates:**

Parking brake is closed.

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

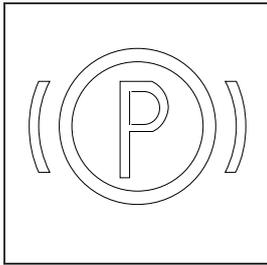


### 8 Control light

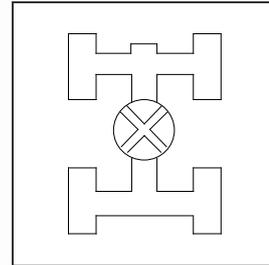
**Longitudinal differential lock**

**Illuminates:**

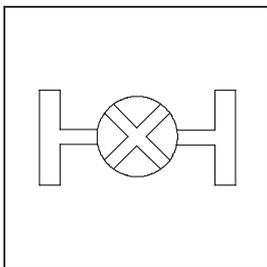
The button "Longitudinal and transversal differential locks" is active and the longitudinal differential is locked.

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

The button “Longitudinal and transversal differential locks” is active and the transversal differential is locked.

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

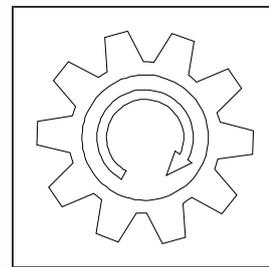
The PTO is engaged.

**11 Warning light Door opened****Illuminates:**

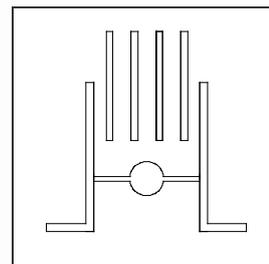
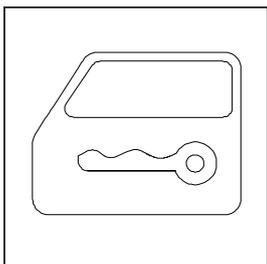
The door is opened.



**Do not drive the vehicle when the warning light illuminates!**

**12 Control light****Engine exhaust brake****Illuminates:**

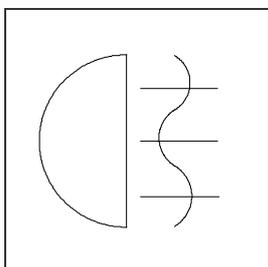
The engine exhaust brake is ready for work or it is active.



**13 Control light Rear fog lamp**

**Illuminates:**

Rear fog lamp is active.

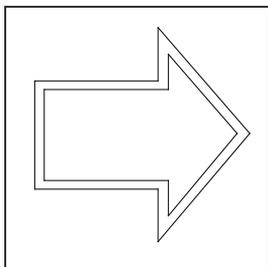


**15 Control light**

**Vehicle direction of travel right**

**Illuminates:**

Vehicle travels right.



**14 Control light Emergency steering**

It is optional.

**Illuminates:**

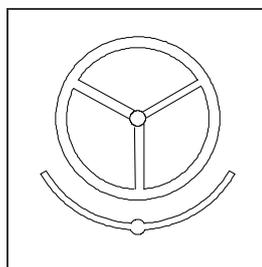
The ignition starter switch is in ON position.

**Extinguishes:**

The vehicle speed is above 15 km/h.



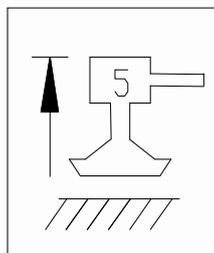
**If the vehicle is not equipped with emergency steering system, the control light will never illuminate.**



**16 Control light**

**The 5<sup>th</sup> outrigger fully retracted**

It is optional.



#### **3.1.4 Air horn button**

It is situated on the side of driver's left foot.

Pressed: Air horn alarms.

Released: Air horn stops alarming.

#### **3.1.5 Engine control pedal**

The engine control is an electron accelerator. Apply it to accelerate or release it to decelerate the vehicle.

#### **3.1.6 Service brake pedal**

Apply the service brake to decelerate or stop the vehicle.

#### **3.1.7 Clutch pedal**

Depress the foot pedal to disengage the clutch.

### 3.1.8 Center console

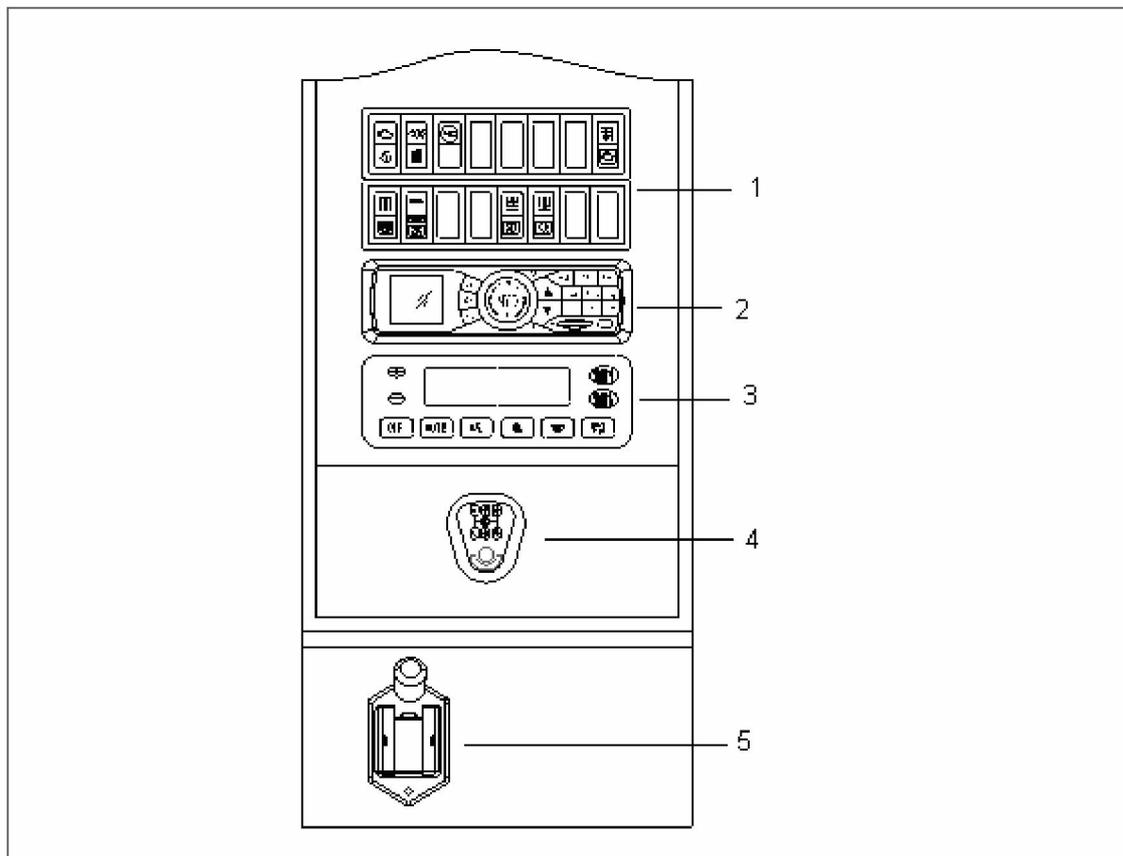


Fig. 03 – 08

- 1 Keyboard and display unit
- 2 Media player
- 3 Control panel, air conditioning and cab heater
- 4 Range selector
- 5 Parking brake hand lever

– Keyboard and display unit 2

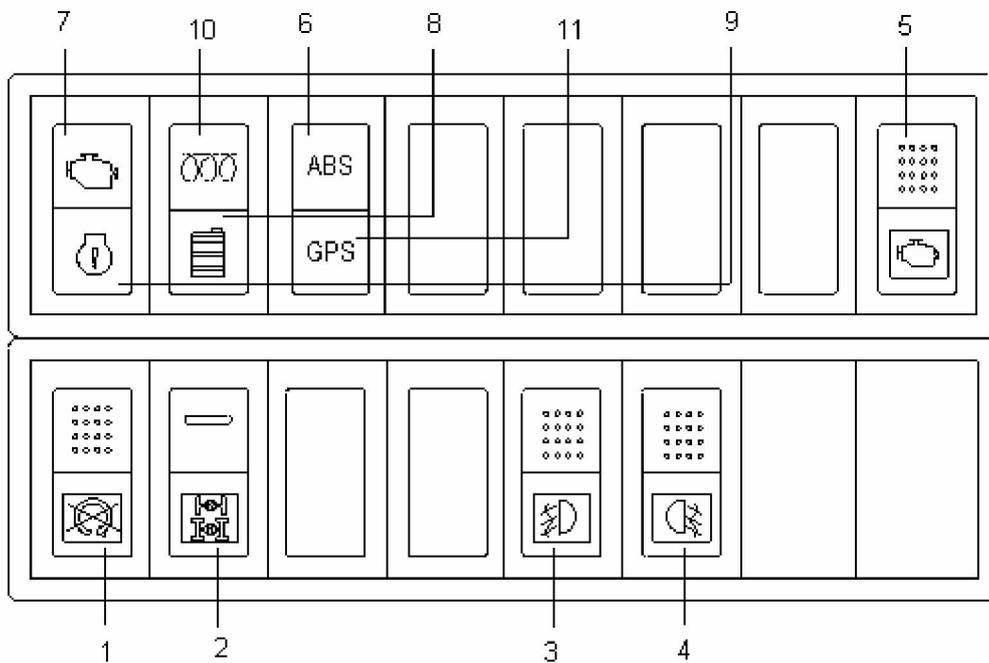


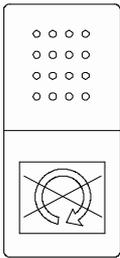
Fig. 03 – 09

- |    |               |   |
|----|---------------|---|
| 1  | Button        | Engine off                                      |
| 2  | Button        | Longitudinal and transversal differential locks |
| 3  | Button        | Front fog lamp                                  |
| 4  | Button        | Rear fog lamp                                   |
| 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                                  |
| 10 | Control light | Diesel engine preheating system                 |
| 11 | Control light | GPS   |

**1 Button Engine off**

**Pressed and held for 2 – 3 seconds:**

The engine stops running.


**2 Button**

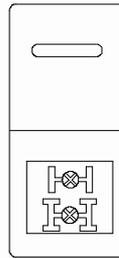
**Longitudinal and transversal differential locks**

**Pressed:**

The longitudinal and transversal differential locks are activated.

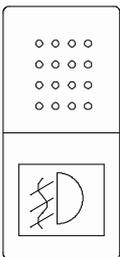


**It can only be activated when the vehicle is stationary.**


**3 Button Front fog lamp**

**Pressed:**

The front fog lamp is activated.

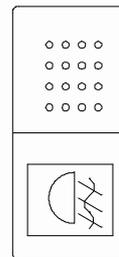

**4 Button Rear fog lamp**

**Pressed:**

The rear fog lamp lights up.



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

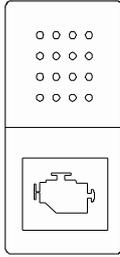

**5 Button Engine fault diagnosis**

**Pressed and released:**

The warning light 7 displays the flash code if warning light 7 or 9 illuminates all the time.

**6 Warning light ABS defects**

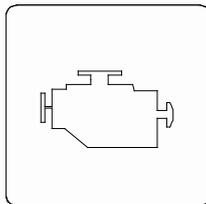
It is optional.

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

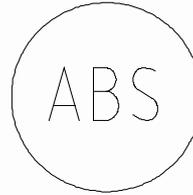
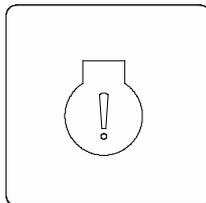
Engine defects. Rectify it right away.



**The warning light can flash out the flash codes after you press the button 5.**

**9 Warning light****Engine defects**

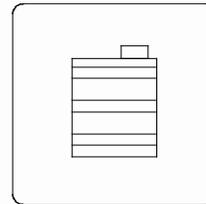
The warning light is not used. It always extinguishes.

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

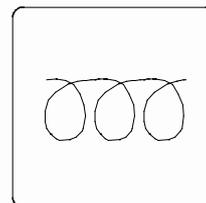
Engine coolant level in expansion tank is too low.



**Under this condition, add coolant after coolant temperature decreases. Otherwise, the engine oil will be clung to the engine inside due to sudden temperature decreasing.**

**10 Control light****Diesel engine preheating system****Illuminates:**

Preheat the engine.



**11 Control light GPS**

**Flashes for 3 times and extinguishes when the ignition starter switch has been placed to position ON:**

GPS is in normal function.

**Flashes:**

The crane is to be locked or GPS terminal defects.

**Illuminates:**

The crane is locked.



**When the warning light flashes all the time, bring the vehicle to a standstill and rectify it.**



– Media player

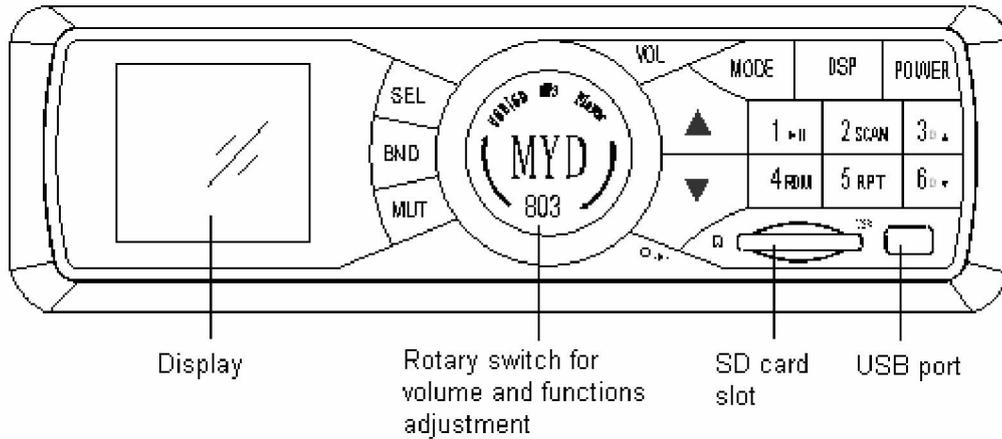


Fig. 03 – 10

- 1) Button Power source



- 3) Button Band control



- 5) Button MUTE  
Muting of noise



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



- 2) Button

Changeover radio / SD / USB



- 4) Button Sound effect selection



- 6) Button Time set

**Press and release:**

The time will be displayed.

**Press and hold for 3s:**

Buttons ▲ or ▼ can be used to set time.



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



9) Preset button 1 (receive)

**Press and release:**

Play the first song.

**Press and hold:**

Pause.



10) Preset button 2 (receive)

**Press and release:**

Play the second song.



11) Preset button 3 (receive)

**Press and release:**

Play the third song.

**Press and hold:**

Select the next file.



12) Preset button 4 (receive)

**Press and release:**

Play the fourth song.

**Press and hold:**

Play at random.



13) Preset button 5 (receive)

**Press and release:**

Play the fifth song.

**Press and hold:**

Repeat.



14) Preset button 6 (receive)

**Press and release:**

Play the sixth song.

**Press and hold:**

Select the next file.



For details, please refer to the *Media Player Operating Manual* attached to the crane.

**NOTE**

**Turn the ignition starter switch to "ACC" when using media player without engine running.**

– **Range selector**

The range selector 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**

Apply it to activate the parking brake and emergency brake.

### 3.1.9 Crane lighting

#### – Front combination signals

Take the lights on the left as an example. The lights on right side are the same as the left ones. Refer to Fig. 03 – 11.

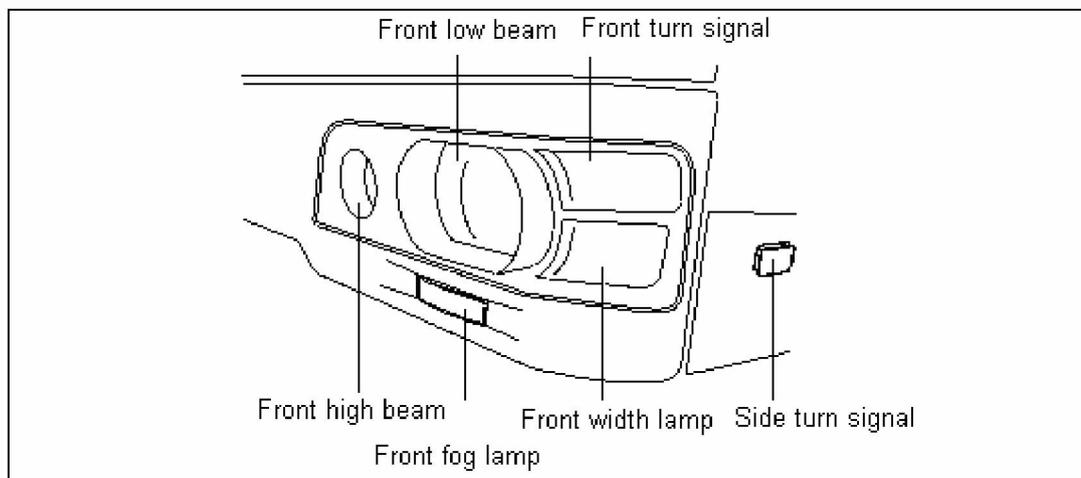


Fig. 03 – 11

#### – 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.

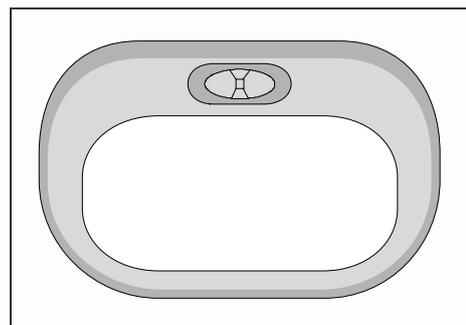
The small lamp button is a 2-handed button. The direction of small lamp can be adjusted by pressing its edge.

The door lamp button is a 3-handed button:

Center position: off

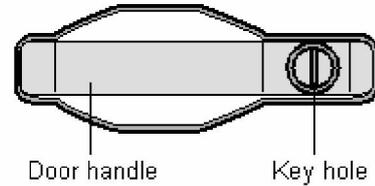
Left and right positions: on

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



**3.1.10 Door – driver's cab**

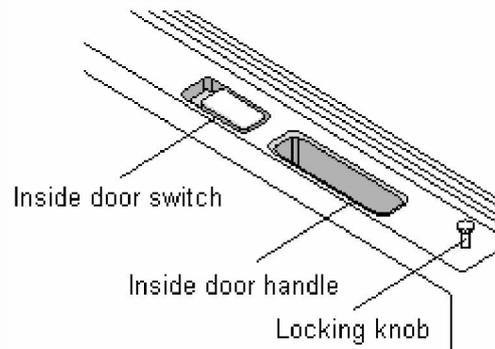
- a) Open the door from outside:  
Hold the handle and pull it outwards.
- b) Close the door:  
The door will be locked automatically when the door is closed.



**NOTE**

**Ensure the door is closed well before driving.**

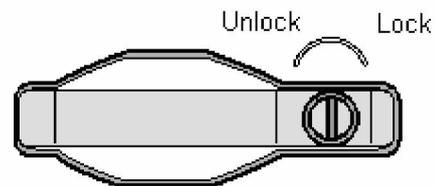
- c) Open the door from inside:  
Pull the inside door switch upwards and hold the handle to push the door outwards.
- d) Lock the door from inside:  
The locking knob is at the bottom of door window.  
Press the locking knob to lock the door from inside.  
Pull the locking knob upwards before opening the door.



**NOTE**

**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.  
Switch it clockwise to lock the door.



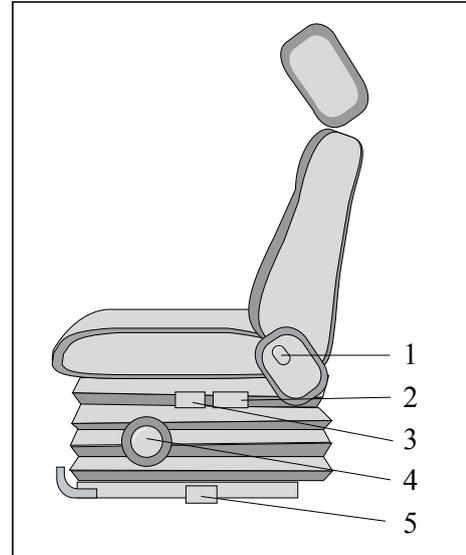
### 3.1.11 Seats in driver's cab

#### – Driver's seat

The suspended seat can be adjusted to suitable position 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 Handle, adjust seat cushion angle (rear section)
- 3 Handle, adjust seat cushion angle (front section)
- 4 Rotary switch, 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 drive.**

### 3.1.12 Attachments

#### a) Sun visor

The sun visor is located above front windshield inside driver's cab. Pull the sun visor downward to keep the sun out. Pull it upward for retraction.

#### b) Toolbox

The toolbox is in the operating panel of the driver's cab, in which there are two tool boxes in different sizes.

Push the box switch down to open the toolboxes. Push the box cover down to close the toolboxes.

#### c) Cigarette lighter

Press the cigarette lighter for 3 to 5 sec. Pull it out to light cigarette. After using it,

return it back.



Turn the ignition starter switch to "ACC" when using the cigarette lighter without engine running.

## 3.2 Before starting up the vehicle

### 3.2.1 Operating conditions

- a) Check to ensure the crane is in proper working condition (without damage or abnormalities).
- b) Always use the correct light diesel fuel and engine oil. Make your selection on the lowest ambient temperature where you are to do the work. Obey the *Operation and Service Manual for the WP10 Series Diesel Engine (National Stage III)* to choose the brand.

### 3.2.2 General checks before setting off

- a) Do a check of the level of coolant and add more if below the cold engine level.
- b) Do a check of the fuel level and make sure that you have more than is necessary to complete the task.
- c) Make sure that the parts in the steering and brake systems are flexible, safe, and reliable.
- d) Make sure that the liquid levels in steering oil reservoir and clutch liquid reservoir comply with the requirements.
- e) Make sure that the parts that follow are tight:
  - Bolt for steering shaft universal joint
  - Leaf spring bolt
  - U-bolt
  - Wheel bolt, etc.
- f) Examine the leaf spring for crack.
- g) Make sure that the tire pressure is at the correct level.
- h) Examining the items that follow for damage:
  - Tires
  - Door locks
  - Doors
  - Windows
  - Operating mechanisms.
- i) Examine the fittings of oil pipes, air pipes and water pipes for leakage.
- j) Examine the air reservoir for condensation (drain the water as necessary).
- k) Examine the battery terminals for too much corrosion and make sure that the power wires are tight.

- l) Examine the level of the battery electrolyte.
- m) Examine the control light of air filter. If the control light is red, clean or replace the filter element.
- n) Turn the ignition starter switch to stage "ON" and examine the functions of the items that follow:
  - Instruments
  - Switches
  - All lights
  - Control / warning lights
  - Wipers, etc.
- o) Examine the outside mirrors for proper positions.
- p) Make sure the pressure of the centralizing cylinder in the steering system is within the normal work range (3 – 5.5 MPa).

### 3.2.3 General checks at vehicle start up

- a) Check the following instruments for functions:
  - 1) Examine the engine oil pressure gauge.
    - Idle speed: the engine oil pressure must be more than 0.1 MPa.
    - When engine speed is 1200 r/min, the engine oil pressure must be in the range of 0.35 – 0.55 MPa.
  - 2) Examine the barometer.

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!
  - 3) Examine the water thermometer.

The pointer must point to the green range (above 60°C).
- b) Make sure that the PTO is disengaged.
- c) Make sure that the parking brake is released.
- d) Do not engage the clutch at high engine RPM (above 1600 rpm) when starting the vehicle slowly with low gear.

### 3.3 Driving the crane

#### 3.3.1 Starting and stopping the engine

##### – Starting the engine

- a) Examine the items that follow:
  - 1) Engine oil for correct level and make sure that it is clean.
  - 2) Coolant for correct level.
  - 3) Fuel tank for correct level.
- b) How to start the engine:
  - 1) Put the transmission in the "neutral" position.
  - 2) Apply the parking brake.
  - 3) Turn the ignition starter switch to stage "ON" for preparation.
  - 4) Disengage the PTO. (The control light "PTO" does not illuminate.)
  - 5) In winter, the engine will be preheated automatically before starting (The control light "Diesel engine preheating system" lights up).
  - 6) After the control light "Diesel engine preheating system" goes off, apply the engine control and turn the ignition starter switch to stage "S" to start the engine.

**⚠ CAUTION**

- (1) Turn the ignition starter switch to stage "S" within 30 s after the control light "Diesel engine preheating system" extinguishes.
- (2) The starter can be operated three times for 15 seconds per attempt with a pause in between of 30 s respectively. If the engine cannot be started for 3 times, rectify the errors.

**⚠ WARNING**

**In order to avoid accidentally starting the vehicle, depress the clutch pedal when starting the engine.**

- c) Preheat the engine and check instruments for functions:

After the engine is started, release the engine control pedal slowly and run the engine at idle speed for several minutes. At this time, check the instruments and control / warning lights for functions.

**⚠ NOTE**

- (1) In order to make the engine oil flow into each part of the engine and ensure normal fuel combustion, the engine must be preheated to make the

temperature of engine cooling water raise up.

- (2) It is prohibited to run the engine at high speed without load during preheating. Otherwise, the engine may be damaged and the service life if the engine will be shortened.
- (3) Do not run the engine at idle speed for a long time. Otherwise, the engine performance may be decreased.
- (4) It is forbidden to run the engine at high speed with heavy load when the coolant temperature is below 60°C.
- (5) When the engine is running at idle speed, the engine oil pressure cannot be less than 0.1 MPa. During the engine preheating, the engine oil pressure will raise up to a stable value.

 **WARNING**

**Do not run the engine if there may be inflammable gas around. Since the gas may be inhaled into the engine via the air intake system. Not only the engine may speed up even be overspeeded, but also may result in fire hazard even explosion. Risk of heavy property loss!**

– **Turning off the engine**

- a) Apply the service brake pedal slightly to slow down the vehicle, and shift down the transmission to gear 1.
- b) When the engine slows down to the low speed, depress the clutch pedal and the service brake pedal to bring the vehicle to a standstill at the specified location.

 **CAUTION**

**Do not depress the service brake pedal jerkily except in a clear emergency!**

- c) Pull the parking brake hand lever backwards to activate the parking brake.
- d) Put the transmission in the "neutral" position.
- e) Run the engine at idle speed for several minutes to cool down the engine.
- f) Press down the button "Engine off" for 2 to 3 sec. to stop the chassis engine.
- g) Remove the ignition starter switch after the engine is turned off for 30 sec.
- h) Make sure that ignition starter switch is not in the "ON" or "ACC" position for a long time when the crane is parked. The battery drains in these conditions.
- i) If you park the crane on a slope, you must put the chocks before and behind the wheels.
- j) Make sure that the hazard lights illuminate when the vehicle is parked on the road at night.

### 3.3.2 Transmission and clutch operation

#### – Transmission

##### a) Description

The transmission consists of a main transmission and an auxiliary transmission. The main transmission is manually and mechanically controlled, and the auxiliary one is pneumatically controlled.

The shifting pressure should be more than 0.41 MPa.

For details, please refer to Fig. 03 – 12.

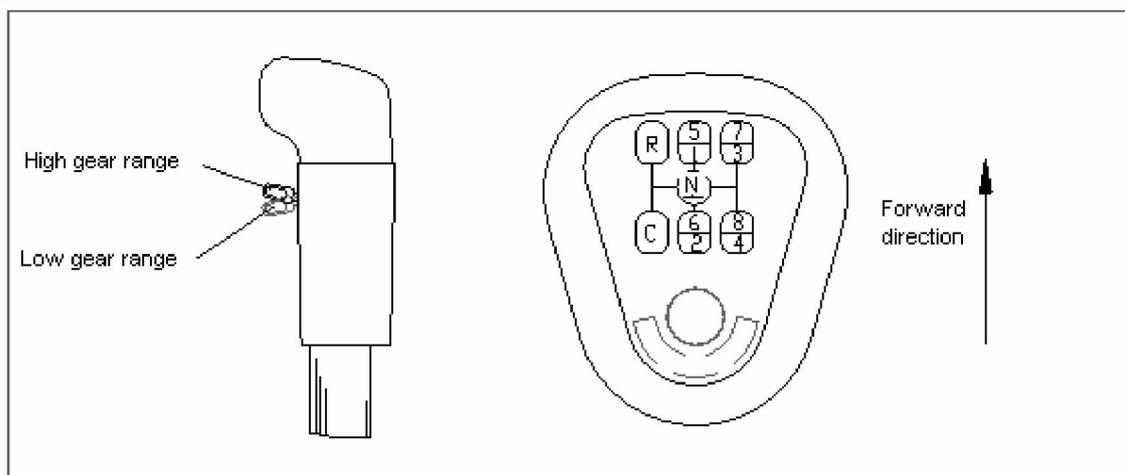


Fig. 03 – 12

##### b) Shifting

- 1) Start the vehicle in gear stage 1, and the switch “Pre-selection of high / low gear range” should be changed into low gear range.
- 2) When shifting, fully disengage the clutch, and shift the range selector in position.
- 3) Both the high and low gear ranges have neutral positions. When parking the vehicle, the range selector should be shifted in the neutral position of low gear range.
- 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 gears when changing gears between low gear range and high gear range. Otherwise, risk of serious damage to the synchronizer of auxiliary transmission.



**Use the switch “Pre-selection of high / low gear range” when changing between**

**gears 5 and 6.**

- 6) When driving on a descending gradient, it is forbidden to shift between high and low gear range.
- 7) If there is any abnormal sound in the transmission or it is difficult to operate the mechanism, bring the vehicle to a standstill and rectify it at once.
- 8) Inspect the lubricating grease level of transmission after stopping the vehicle for several minutes.

 **CAUTION**

**The temperature of transmission should be within the range of -40 °C – 120 °C during working. If the temperature is higher than 120°C, the lubricating grease will be decomposed and the 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.

 **WARNING**

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

 – **Clutch**

## a) Description

In the drive system, clutch is 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

- During driving, it is forbidden to place the foot on clutch pedal if it is not used.
- To decelerate and shift down, depress the service brake pedal to slow down the vehicle. After that, depress the clutch pedal and shift to the proper gear stage.

 **NOTE**

**When shifting during driving, depress and release the clutch pedal rapidly. Otherwise there is a risk of increasing clutch abrasion.**

- Do not depress the clutch pedal unless you will brake the vehicle at low speed.

 **CAUTION**

**Only when the compressed air pressure P is above 0.4 MPa, can the clutch be fully disengaged.**

### 3.3.3 Steering operation

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

- a) The steering wheel has a mechanical limit. Do not keep the wheel at the limit for 5 seconds. Otherwise, the steering gear will be damaged.
- b) Decrease the speed slowly while you turn the steering-wheel in the same direction as the turn.
- c) If you over-steer, decrease the speed while you turn the wheel in the opposite direction of the turn.



**Do not turn the steering-wheel quickly in one direction unless it is an emergency. Make your turns smoothly to keep the crane laterally stable.**

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

### 3.3.4 Braking operation

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

#### - Operation

- a) Service brake

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

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

possible. As a result, the accident will be avoided.



**If the rapid brake is applied frequently, the abrasion of tires, 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.**

b) Engine exhaust brake

When driving on a long descending gradient, the engine exhaust brake is recommended. Under this condition, the vehicle decelerates by engine operation instead of service brake. In doing so, the driving safety is improved, and the braking performance decreasing and the brake failure which caused by brake drum overheating by applying service brake frequently can be avoided.

Release the engine control pedal and jog the right-hand steering column switch backwards, the engine exhaust brake is activated and the control light for engine exhaust brake lights up.



**Depress the clutch pedal or engine control pedal to deactivate the engine exhaust brake.**

c) Parking brake (emergency brake)

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



**You can also use the parking brake to park the vehicle in normal conditions and on slopes.**

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

- **Points for attention**

- a) After the engine control pedal is released, do not step on the service brake pedal when there is no necessity to brake the vehicle.
- b) Do not apply the parking brake when the vehicle drives on the narrow, frozen or muddy road or in a rainy / snowy day. Under the conditions, such as crossing the railway or 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 shutdown.
- c) After driving on a road with pools of water, depress the service brake pedal for

several times to eliminate the water on the braking shoe so as to ensure the brake performance.

- d) Before driving on a long descending gradient, shift the range selector to low-gear range. Under this condition, the driving speed is mainly controlled by the traction resistance from the engine (engine exhaust brake) and with the assistance of service brake. Do not let the vehicle move forward when transmission is in neutral.
- e) When the parking brake is applied as the auxiliary brake, do not pull back the hand lever of parking brake to the limit position. When you park the vehicle under any conditions especially parking the vehicle on a slope, pull back the hand lever of parking brake as far as the stop in the hand lever's longitudinal direction. Otherwise, risk of fatal injury and accident!

### 3.3.5 PTO operation

#### - Engaging the PTO

For details, please refer to Fig. 03 – 13.

- a) Open the shutoff gate valve of hydraulic oil tank to connect the hydraulic oil tank and oil line.
- b) Start the engine.
- c) Check the barometer to ensure that the air pressure is within the range of 0.6 MPa – 0.8 MPa after the engine runs stably.
- d) Depress the clutch pedal.
- e) Apply the parking brake and shift the range selector into the gear 4.
- f) Pull up the PTO switch to engage the PTO, and then the control light “PTO engaged” lights up.
- g) Release the clutch pedal slowly. The crane is ready to work.

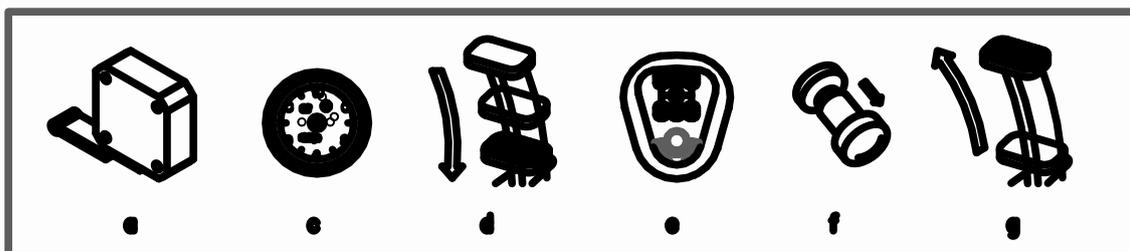


Fig. 03 – 13

#### - Disengaging the PTO

For details, please refer to Fig. 03 – 14.

- a) Depress the clutch pedal.
- b) Press the PTO switch to deactivate the PTO, and then the control light “PTO

engaged” extinguishes.

- c) Shift the range selector into neutral position.
- d) Release the clutch pedal slowly. The crane is in non-working state.

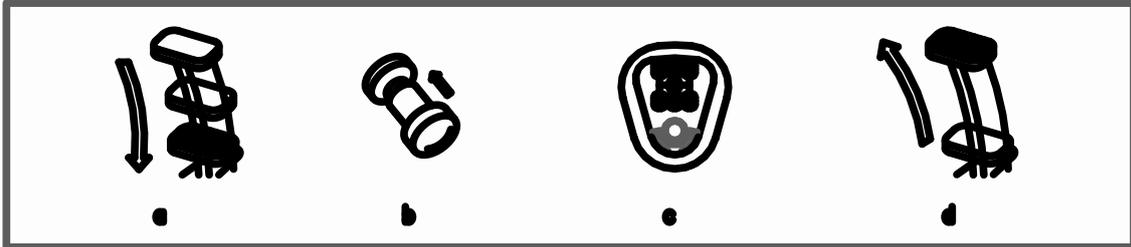


Fig. 03 – 14

**CAUTION**

- (1) Depress the clutch pedal slowly and gently.
- (2) When maintaining or replacing the PTO or oil pump drive device, place a caution board on the ignition starter switch in driver’s cab. Otherwise, it is very dangerous!



**When taking off power, the transmission should be in neutral position and the parking brake should be applied!**

**3.3.6 Towing**

There is a towing coupling at both the front and rear ends of the crane. You should obey the following towing regulations:

- a) Use the tow bar to connect with the towing coupling to tow the crane. Start the towing vehicle slowly to decrease the impact on towing coupling of the towed crane.
- b) Run the engine of the towed crane to ensure the emergency brake can be applied and steering operation can be realized. Otherwise, risk of danger!



**Do not tow the crane if its engine can not be started!**

- c) Shift the range selector of the towed crane in neutral position.
- d) If the towed crane is with a defective transmission, dismantle the drive shaft.
- e) If the differential gear or rear axle of the towed crane is defective, dismantle the left and right half shafts.

**NOTE**

**The engine exhaust brake system will be invalid after the drive shaft or half shaft is dismantled.**

### 3.4 Driving operation

#### 3.4.1 Move the crane to the job site

- a) Do not skip a gear when you move through the gear cycle.
- b) During driving, if there is any abnormal sound, smell, vibration or acceleration, bring the vehicle to a standstill immediately and check. If the cause of problem is unclear or if the problem cannot be rectified, send the vehicle to the specialized repair factory.
- c) If a warning light illuminates, decrease your speed immediately and stop at a safe location for maintenance checks.
- d) Examine all the instruments and gauges (barometers, engine oil pressure gauge and water thermometer, etc.) for the correct values.
- e) Put the crane in a lower gear before you move up a slope to decrease the load on the engine and drive-line.
- f) Do the items that follow before you drive on long descending gradients:
  - 1) Make sure that the brake system can stop the crane before you go onto the slope.
  - 2) Correctly use the engine exhaust brake as possible as you can to relax the service brake. Put the transmission in the low gear range before you go down the slope.
  - 3) Prevent engine racing. Otherwise, the engine will be driven by the wheels, which causes that engine RPM exceeds the maximum permits.

 **IMPORTANT**

- (1) **Engine racing will cause damage to the engine.**
  - (2) **Slow the crane down before you change to a lower gear. When downshifting from gear 4, the engine RPM should be below 1500 rpm. When downshifting from gear 3, the engine RPM should below 1200 rpm. Otherwise, engine racing may occur and the engine is apt to be damaged.**
- g) If the engine stops because the fuel tank is empty, air can go into the fuel system. When this occurs, you remove the air from the fuel lines.



**Do not let the vehicle move forward after the engine is turned off.**

### 3.4.2 Off-road driving

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

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

### 3.4.3 Park the vehicle

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



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

### 3.4.4 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, rear 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.
- e) 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

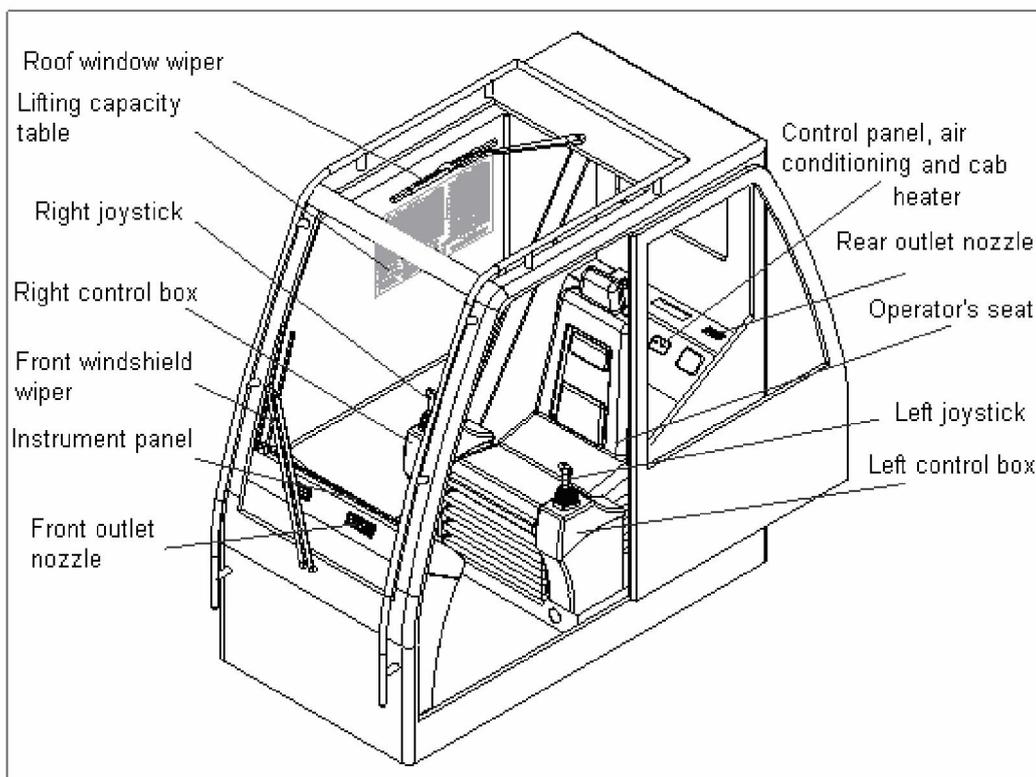


Fig. 04 – 01

### 4.1.2 Instrument console

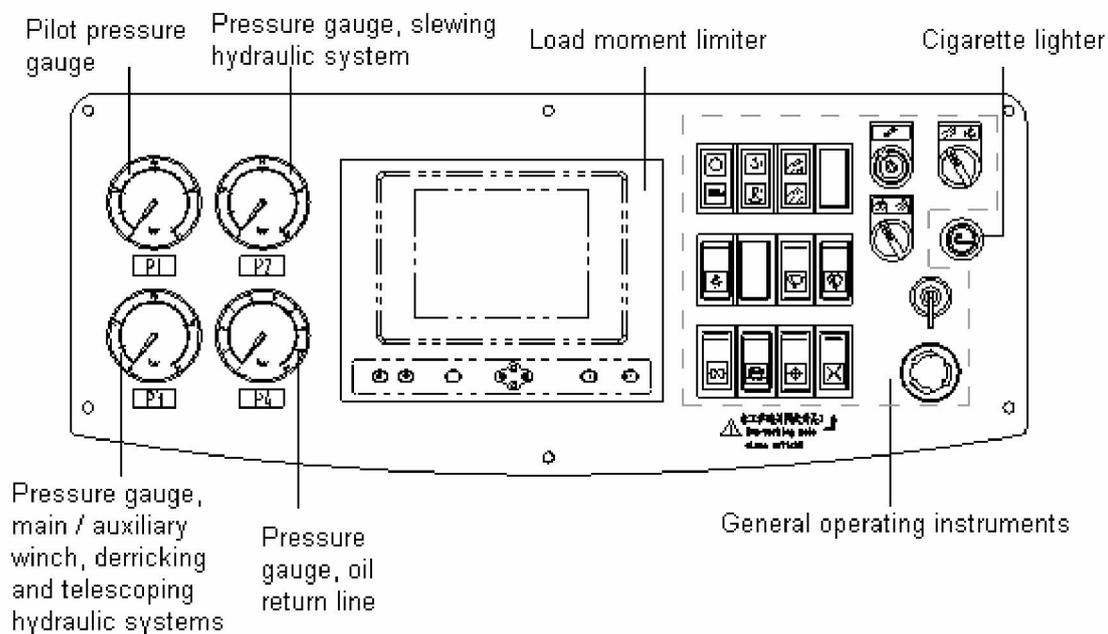


Fig. 04 – 02

## – General operating instruments

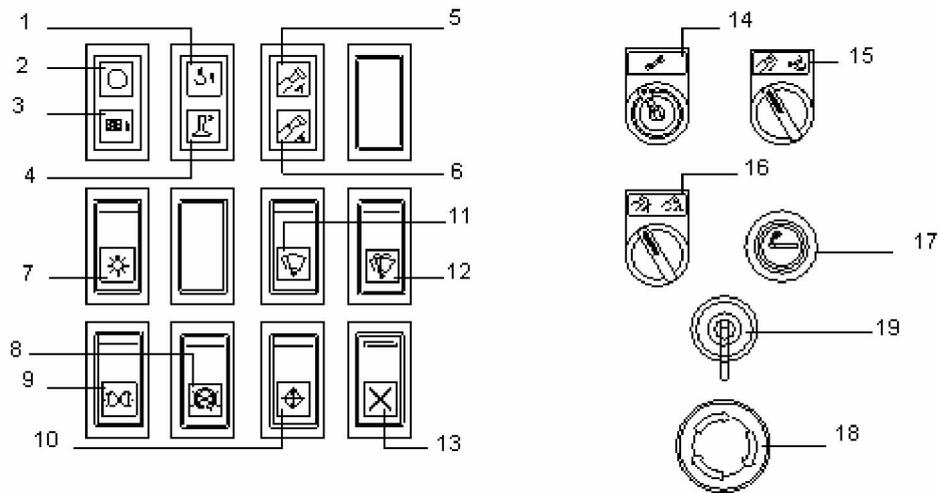


Fig. 04 – 03

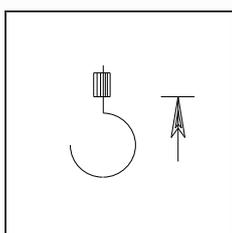
- |    |                         |   |
|----|-------------------------|---|
| 1  | Warning light           | Main / auxiliary winch approaching upper limit                    |
| 2  | Control light           | Power source  |
| 3  | Warning light           | Main / auxiliary winch approaching lower limit                    |
| 4  | Warning light           | The 5 <sup>th</sup> outrigger pressure too high                   |
| 5  | Control light           | Telescoping cylinder I  |
| 6  | Control light           | Telescoping cylinder II   |
| 7  | Button                  | Work lights   |
| 8  | Button                  | Engine off  |
| 9  | Button                  | Work lights on boom head  |
| 10 | Button                  | Oil cooler  |
| 11 | Button                  | Window wiper front window   |
| 12 | Button                  | Window washer system front window                                 |
| 13 | Deadman switch          |   |
| 14 | Bypass key switch       |   |
| 15 | Switch                  | Pre-selection of telescope / auxiliary winch                      |
| 16 | Switch                  | Pre-selection of telescoping cylinder I / telescoping cylinder II |
| 17 | Cigarette lighter       |   |
| 18 | Emergency off switch    |   |
| 19 | Ignition starter switch |   |

## 1 Warning light

Main / auxiliary winch approaching upper limit

**Illuminates:**

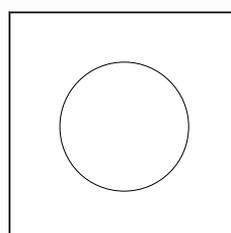
Main / auxiliary winch approaches upper limit. (For position of the warning light, please refer to the load moment limiter.)



## 2 Control light Power source

**Illuminates:**

The ignition starter switch is turned to position I.

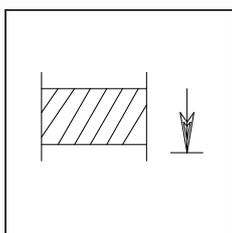


## 3 Warning light

Main / auxiliary winch approaching lower limit

**Illuminates:**

Main / auxiliary winch approaches lower limit.

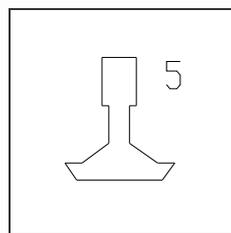


## 4 Warning light

The 5<sup>th</sup> outrigger pressure too high

**Illuminates:**

Pressure of the 5<sup>th</sup> outrigger pressure exceeds the maximum permissible value.



## 5 Control light Telescoping cylinder I

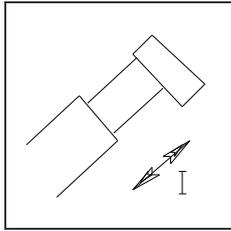
**Illuminates:**

The pre-selection switch "Telescoping cylinder I / Telescoping cylinder II" is turned to the left position.

## 6 Control light Telescoping cylinder II

**Illuminates:**

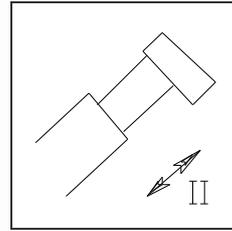
The pre-selection switch "Telescoping cylinder I / Telescoping cylinder II" is turned to the right position.


**7 Button Work lights**
**Position 1:**

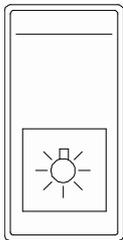
Switches background lighting on.

**Position 2:**

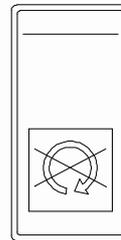
Switches background lighting, work lights on slewing table and boom on.


**8 Button Engine off**
**Pressed for 1 to 2 seconds:**

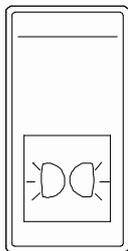
Engine stops. (This switch will be invalid if the deadman switch is activated.)


**9 Button**
**Work lights on boom head**
**Pressed:**

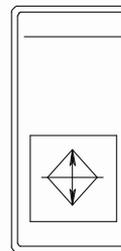
Work lights on boom head are on.


**10 Button Oil cooler**
**Pressed:**

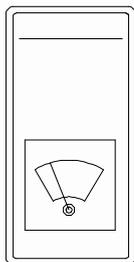
The fan of oil cooler begins to work.


**11 Button**
**Window wiper front window**
**Pressed:**

The window wiper on the front window begins to work


**12 Button**
**Window washer system front window**
**Pressed:**

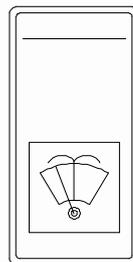
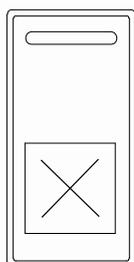
Switch on the windshield washer system on the front window.



### 13 Deadman switch

#### Pressed:

All operations controlled by left / right joystick will be valid even if deadman switches on the joysticks are not activated. (Deactivate the switch after operation.)



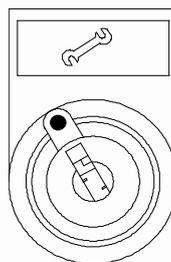
### 14 Bypass key switch

If the hook block contacts the hoisting limit switches during its upward movement, the hook block contacts the lowering limit switch during its downward movement, the maximum permissible load moment is exceeded, or safety devices are not installed during installation and commissioning, dangerous crane movements will be switched off. Turn the bypass key switch clockwise to release the limitation.

The switch can only be activated during commissioning and maintenance.



**Do not activate the switch during normal operation! Otherwise, there will be life-threatening hazards or serious damages to property.**



**15 Switch**

**Pre-selection of telescope / auxiliary winch**

**Left position:**

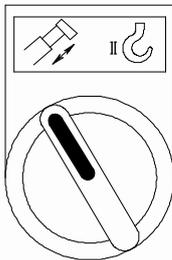
Telescope the boom.

**Right position:**

Spool up / reel off auxiliary winch.



**Do not operate the switch when you telescope the boom or operate the auxiliary winch.**


**16 Switch**

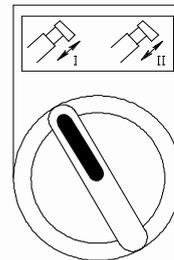
**Pre-selection of Telescoping cylinder I / Telescoping cylinder II**

**Left position:**

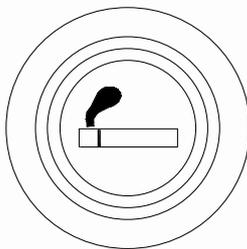
Telescope the telescopic section 1 via telescoping cylinder I.

**Right position:**

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

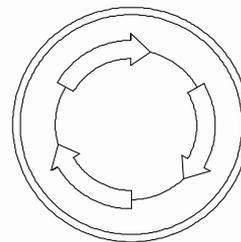

**17 Cigarette lighter**

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


**18 Emergency off switch**

**Pressed:**

All superstructure movements are cut off.


**19 Ignition starter switch**

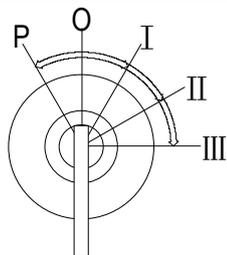
The 5 positions of the switch (in clockwise sequence) are as follows:

- "P" and "O" – All circuits are OFF. 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 starter.

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.

 **CAUTION**

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



**4.1.3 Control boxes**

**Left joystick:**

Functions: Spool auxiliary winch up, reel auxiliary winch off, telescope telescopic boom out, telescope telescopic boom in, slew to the left and slew to the right.

**Right joystick:**

Functions: Spool main winch up, reel main winch off, derrick main boom up and derrick main boom down.

For details, please refer to Fig. 04 – 04.

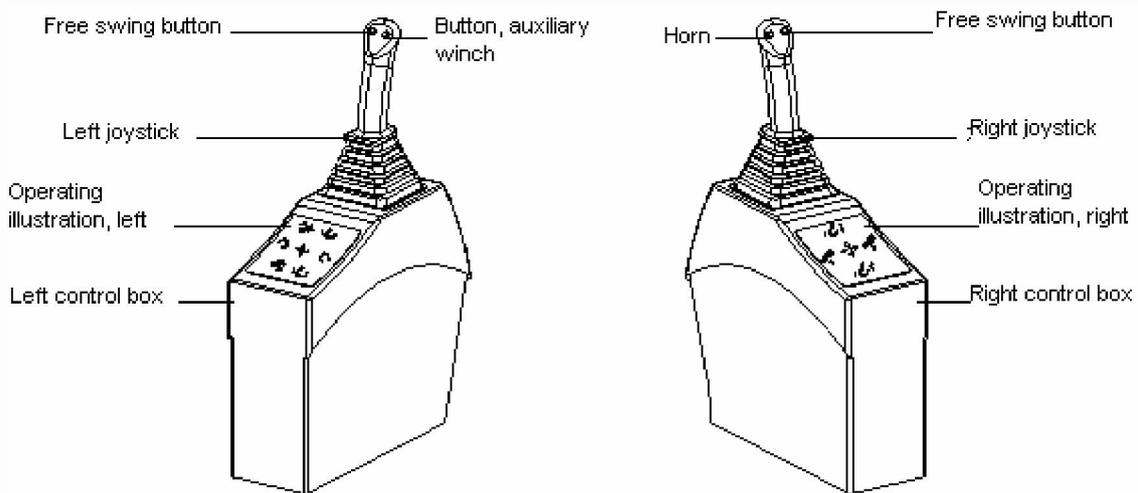


Fig. 04 – 04

Both the left and right joysticks are fitted with free swing button and deadman switch, see Fig. 04 – 05.

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

Deadman switch – This switch sends or stops all command signals that go through the left and right joysticks. Push and hold the deadman switch to operate the functions of the right / left joystick.

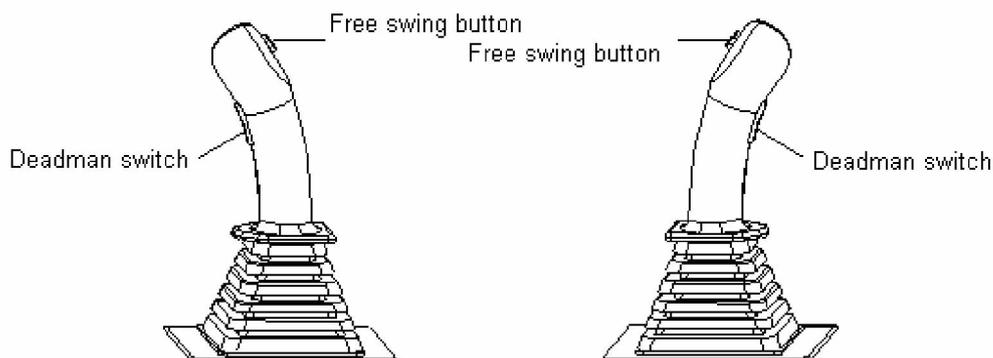


Fig. 04 – 05



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.



Do not press the button for auxiliary winch “  ” if auxiliary winch is not used.

#### 4.1.4 Engine control pedal

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

#### 4.1.5 Operator's seat

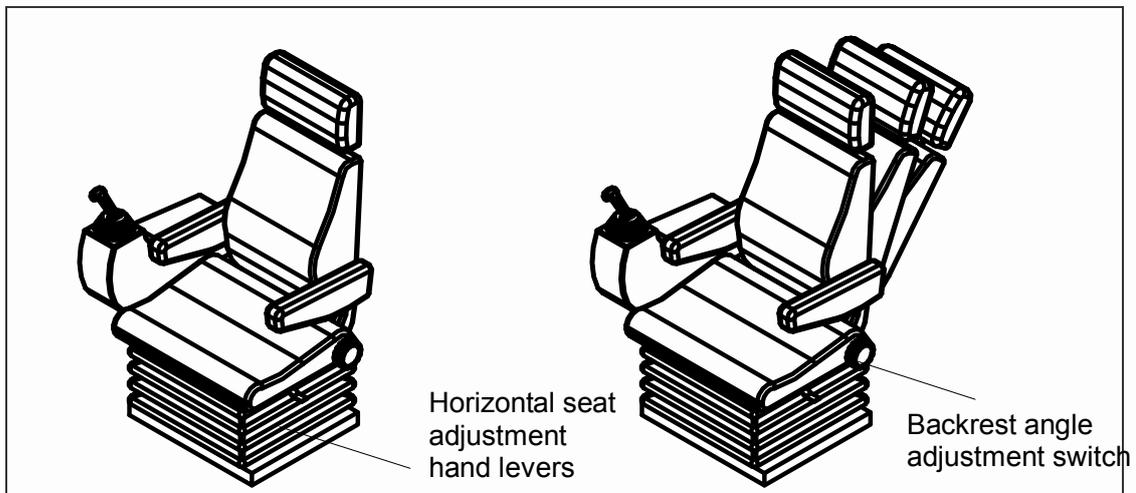


Fig. 04 – 06

## 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 sensors, angle sensors 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, engine RPM and fuel reserve 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.

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 injures, thus ensures safe operation of the crane. However, do not rely entirely on the load moment limiter. If the rated lifting load displayed on the load moment limiter is different from the one shown in the lifting capacity table, refer to the lifting capacity table.**

### NOTE

**Setting the operating mode correctly is the vital factor for ensuring correct using of this system and crane. Only the operator who is skillful at operating this crane and system can set the operating mode. In normal situations, the operating mode must be set in accordance with actual operating mode.**

### IMPORTANT

**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 dipstick and clean it.
  - 3) Re-insert it into oil and pull out again.
  - 4) Check whether the oil level is between MIN. and MAX. markings.

**! NOTE**

**If the oil level is lower than the Min. marking, fill oil. Otherwise, the engine will be damaged seriously!**

- b) Checking oil level in the hydraulic oil tank

Oil level in the hydraulic oil tank must be between MIN. and MAX markings. Open the shutoff gate valve of hydraulic oil tank to connect oil tank and oil line.

Position of the shutoff gate valve is shown in Fig. 04 – 07. Operate the lever for shutoff gate valve of hydraulic oil tank in the arrow direction to connect hydraulic oil tank and oil line.

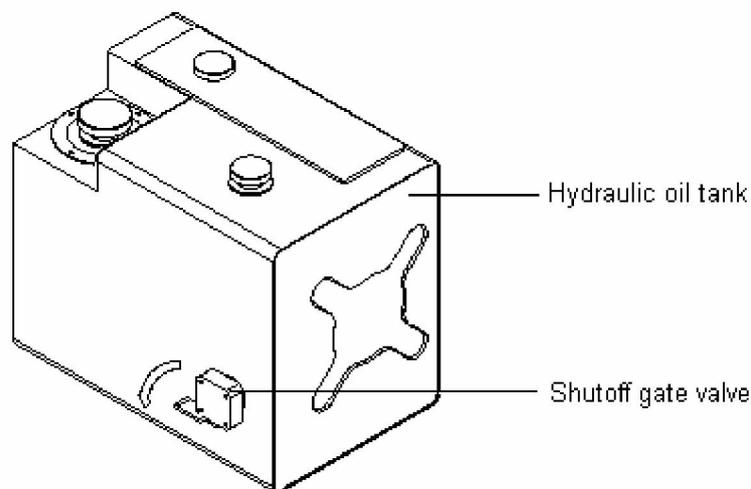


Fig. 04 – 07

- c) Checking the fuel reserve

The fuel reserve is displayed on the fuel gauge in the driver's cab. Add it timely once it is not sufficient.

**NOTE**

**Deaerate the fuel system before adding fuel.**

**If the fuel tank has been run dry, always deaerate the whole fuel system.**

**Do not run the fuel tank dry!**

- d) Checking the coolant level  
Add it timely once the coolant level is too low.
- e) Checking general conditions of crane
  - 1) Examine lubricating conditions of each moving part of the crane. Add lubricating oil or grease timely to ensure lubricating effect.
  - 2) Make sure that the crane is properly supported on a level load-bearing surface, and has been set up horizontally.
  - 3) Make sure that the toothed ring of the slewing bearing is clean.
  - 4) Make sure that the front and rear parts of oil cooler and A/C radiator have been cleaned and are free of blockage.
  - 5) Make sure that there are no people or objects in the crane danger zone.
  - 6) Make sure that the cable / rope drums and sensors are free of snow and ice.
  - 7) Make sure that there are no loose parts on the superstructure (specially on the telescopic boom).
  - 8) Make sure that the joysticks in operator's cab are in their neutral positions before engaging the PTO.
  - 9) Make sure 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 the starting and stopping of the chassis engine, please refer to the operating instructions in Chapter 3 "Operation – crane chassis".

Starting and stopping the superstructure engine should be carried out in accordance with the following operating instructions.

a) Stopping the engine

Press and hold the button "Engine off" on the instrument panel for 1 to 2 seconds to switch off the engine.

Press the "Emergency off switch" to switch off the engine in an emergency.

b) Starting the engine

The ignition starter switch on the instrument panel can be used 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. At this time, turn the ignition starter switch to start the engine. Otherwise, the ignition starter switch is invalid.

## 4.4 Safety devices

### 4.4.1 Level gauge

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. Extend the outriggers to ensure the crane is level before operation.

After adjustment, bubbles 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 Fig. 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 rated lifting capacity tables and lifting height charts.

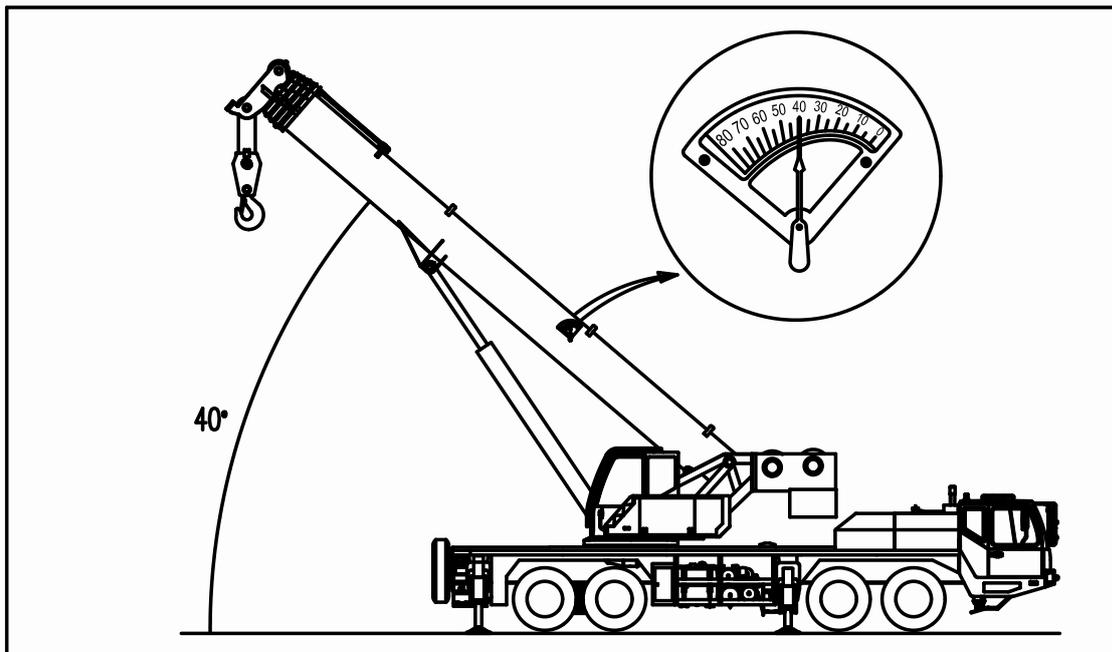


Fig. 04 – 08

#### 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 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 boom in" can be switched on. See Fig. 04 – 09.

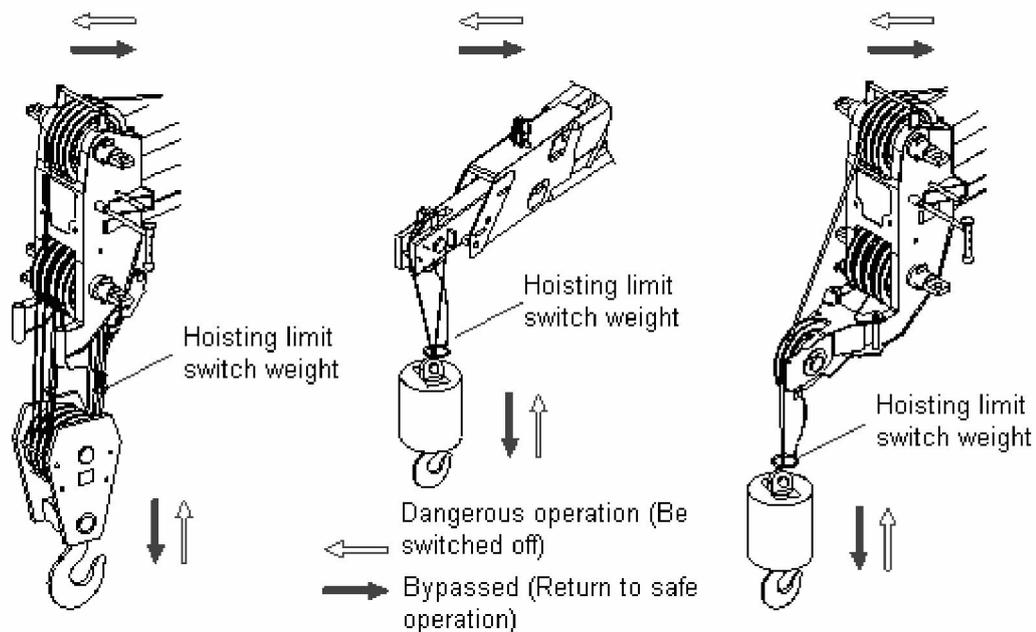


Fig. 04 – 09

Press the bypass key switch on the instrument console to bypass the switch-off.



#### Do not use the bypass key switch in normal operation!

Follow the steps below to connect and install hoisting limit switches on jib and rooster sheave:

- When the jib is used, remove the bypass aviation socket on the position "5 ↑ II" of the terminal box and install aviation socket which is connected to the hoisting limit switch on the auxiliary winch into the terminal box. And then connect the plug on the jib to the socket on the boom head. See Fig. 04 – 10.

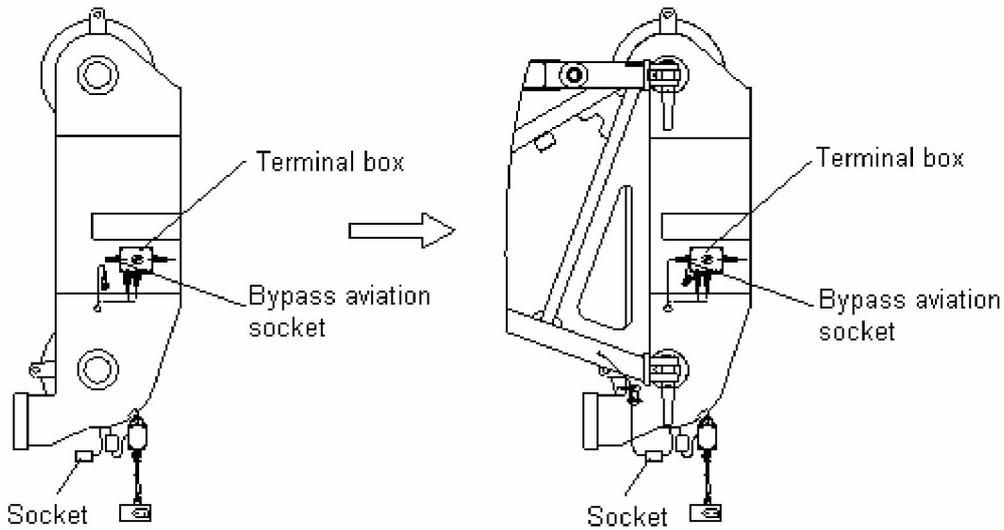


Fig. 04 - 10

- b) When the rooster sheave is used, dismantle the hoisting limit switch on the jib and connect the plug on the hoisting limit switch to the socket on the rooster sheave. 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 terminal box and connect the aviation socket on the hoisting limit switch on the auxiliary winch into the terminal box. And then, connect the plug on the rooster sheave to the socket on the main boom head. See Fig. 04 - 11.

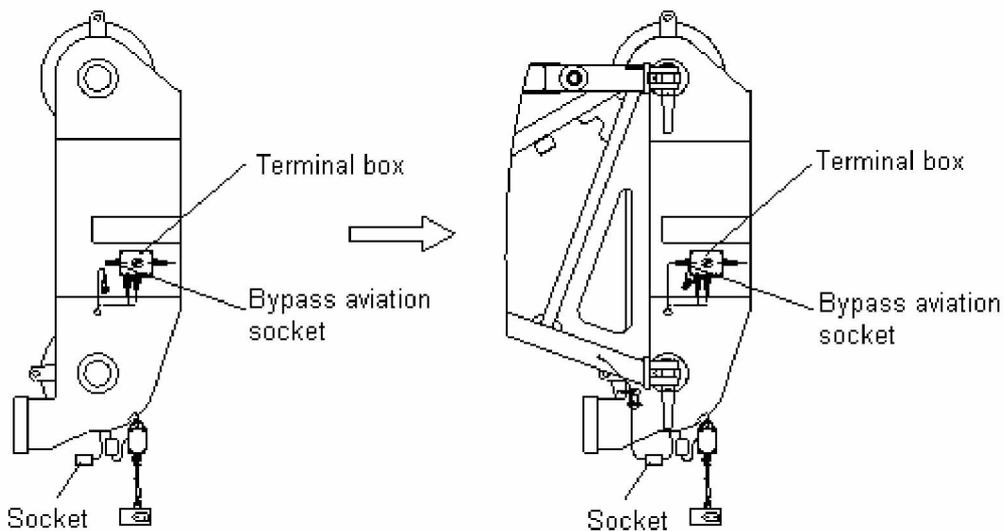


Fig. 04 - 11

#### 4.4.4 Lowering limit switch

In order to prevent the wire rope from being spooled up automatically after being reeled off fully, the lowering limit switches installed beside the winches will automatically switch off the movement “Reel off winches” if there are only 3 rope windings remaining on the winches.

In this case, the acoustic sound will be sent out and only the crane movement “Spool up winches” is permitted. During commissioning and maintenance, activate the bypass key switch on the control console to release the limitation. See Fig. 04 – 12.



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

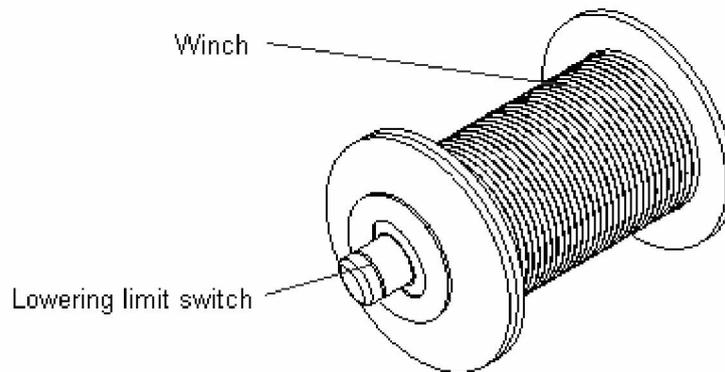


Fig. 04 – 12

#### 4.4.5 Hydraulic safety devices

##### 4.4.5.1 Relief valves in hydraulic system

The relief valves in hydraulic system can prevent the pressure in the circuit from excessively rising, thus preventing hydraulic pump and hydraulic motor against damage and hydraulic system from being overloaded.

##### 4.4.5.2 Outrigger locking device

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

##### 4.4.5.3 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 balancing 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.

#### 4.4.5.4 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 balancing 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.

#### 4.4.5.5 The 5<sup>th</sup> outrigger overpressure warning system

In order to prevent the front of vehicle from bending and deformation caused by overpressure on the 5<sup>th</sup> outrigger, a pressure relay is installed in the 5<sup>th</sup> outrigger cylinder. When lifting operation is carried out over front, once the pressure of hydraulic system detected in the 5<sup>th</sup> outrigger exceeds the maximum permissible value, the warning light “The 5<sup>th</sup> outrigger pressure too high” lights up and the buzzer sends out acoustic warning. At the same time, the warning light outputs control signal and the control system cuts off all the dangerous operation.



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

#### 4.4.5.6 System pressure monitoring

There are four pressure gauges on the instrument panel in the operator’s cab, see Fig. 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: monitor the pressure of oil circuit in slewing gear.

Pressure gauge 3: monitor the pressure of oil circuits in main winch, auxiliary winch, derricking gear and telescoping system.

Pressure gauge 4: monitoring the pressure of oil return circuit.

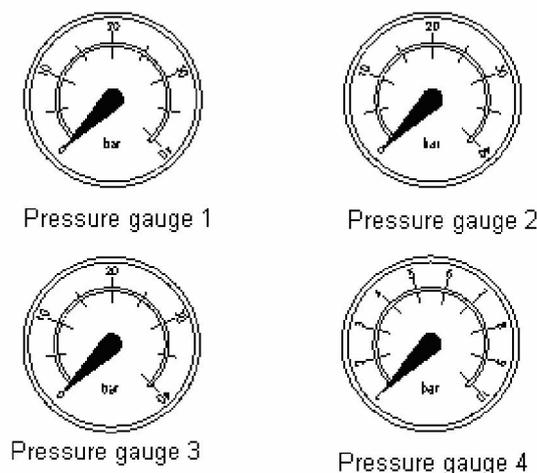


Fig. 04 – 13

**Pressure limits are as follows:**

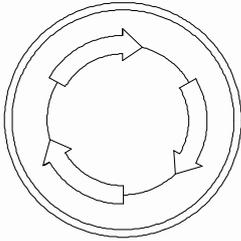
Pressure of spooling up oil circuit in main / auxiliary winch:  $\leq 28$  MPa, pressure of reeling off oil circuit in main / auxiliary winch: 5 – 8 MPa.

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

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

Pressure of slewing oil circuit:  $\leq 12$  MPa.

Pressure of control oil circuit:  $\leq 3.5$  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. If it is operated, the engine and electrical crane control are switched off. Every movement carried out will be immediately stopped. At this time, the engine can not be started.

After emergency is removed, the switch-off can be bypassed by turning it in the arrow direction.



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

**Use of the “Emergency off switch” for normal operation is not permitted!**

## 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.

 **CAUTION**

- (1) **Fuel reserve of the fuel tank is more than 1/4 of the tank capacity (Check the fuel gauge).**
- (2) **The oil level in hydraulic reservoir should be between the low and full 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**

**In order to protect the crane and reduce the danger of accidents, always operate the joysticks 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 Fig. 04 – 14.

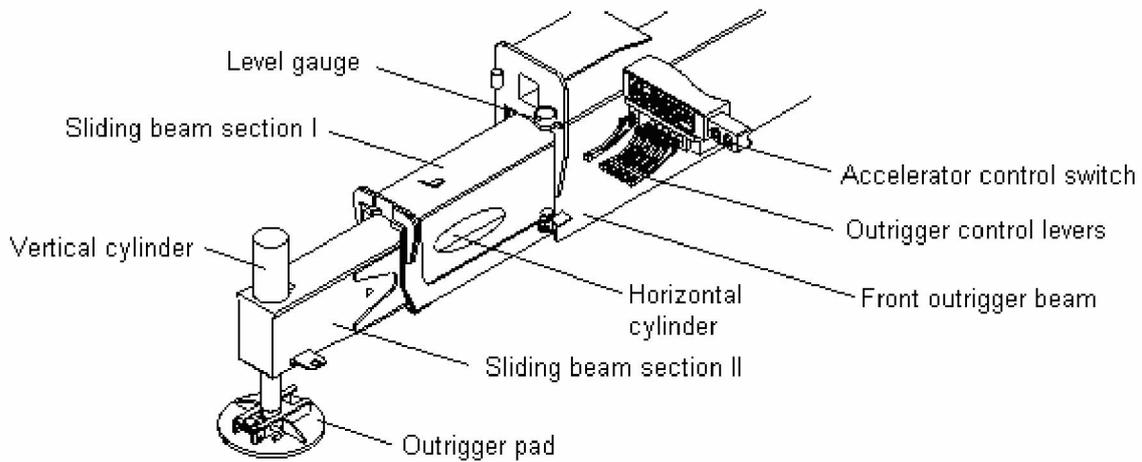


Fig. 04 – 14

**! IMPORTANT**

**Extend outriggers before crane operation. Select even and solid working sites. If the working site is soft or uneven, put suitable materials and bases beneath the outrigger pads.**

##### 4.5.2.1 Outrigger control levers

Outrigger control levers are shown in Fig. 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 horizontal / vertical cylinder.
  - 2) Neutral position: stop the cylinder's movement.
  - 3) Move lever 1 downwards: extend 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 moving lever 1 to initiate corresponding movements.

- 1) Move levers 3 – 6 upwards and move lever 1 upwards or downwards: extend /

retract horizontal cylinders.

- 2) Move levers 3 – 6 downwards and move lever 1 upwards or downwards: extend / retract vertical cylinders.

- d) Control lever 2: select the 5<sup>th</sup> outrigger

Move lever 2 downwards and move lever 1 upwards: retract the 5<sup>th</sup> outrigger.

Move lever 2 downwards and move lever 1 downwards: extend the 5<sup>th</sup> 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 outrigger pads are in contact with the ground!

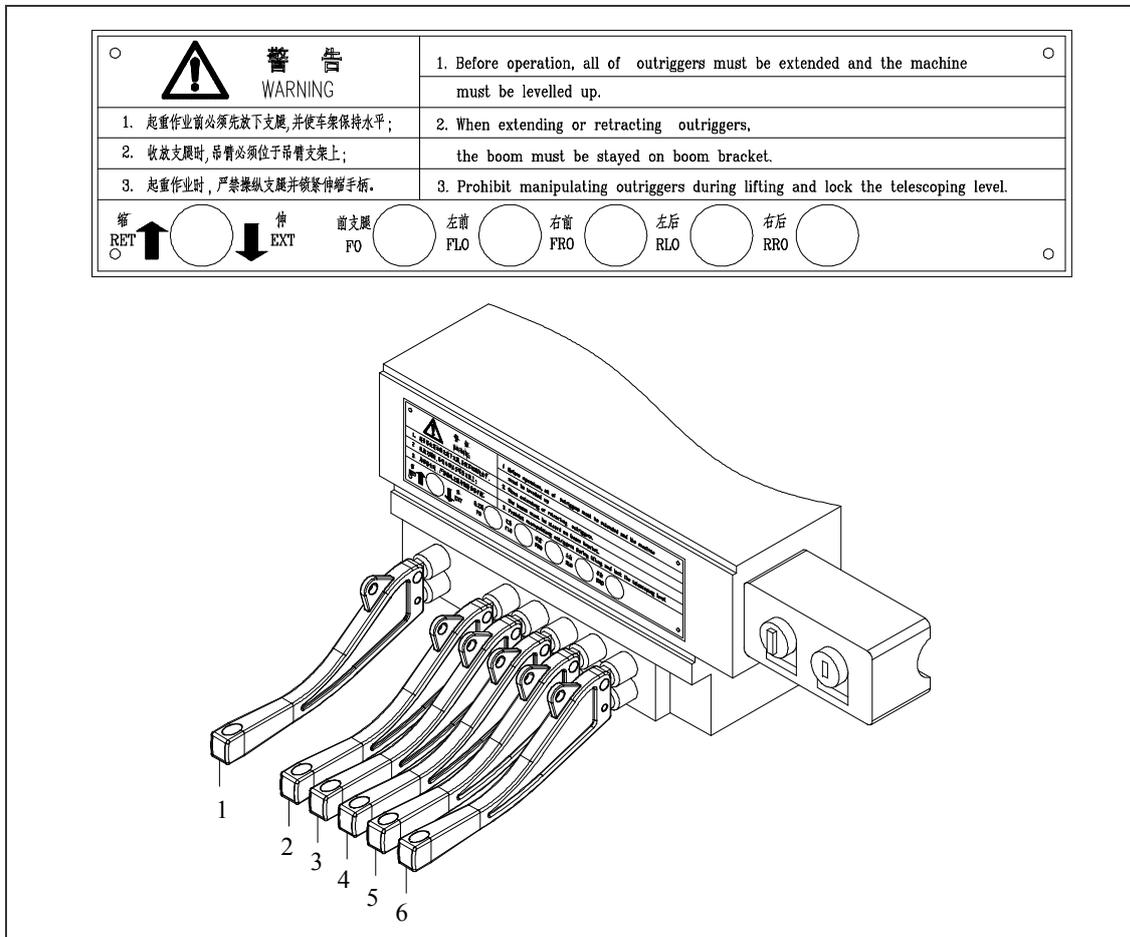


Fig. 04 – 15

#### 4.5.2.2 Outrigger extension

- a) Remove the pins of sliding beam.

As illustrated in Fig. 04 – 16:

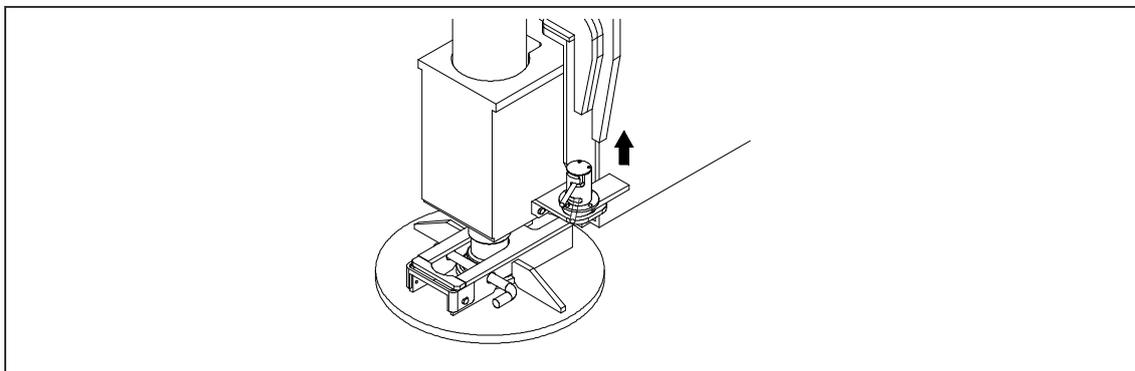


Fig. 04 – 16

- b) As illustrated in Fig. 04 – 17:

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

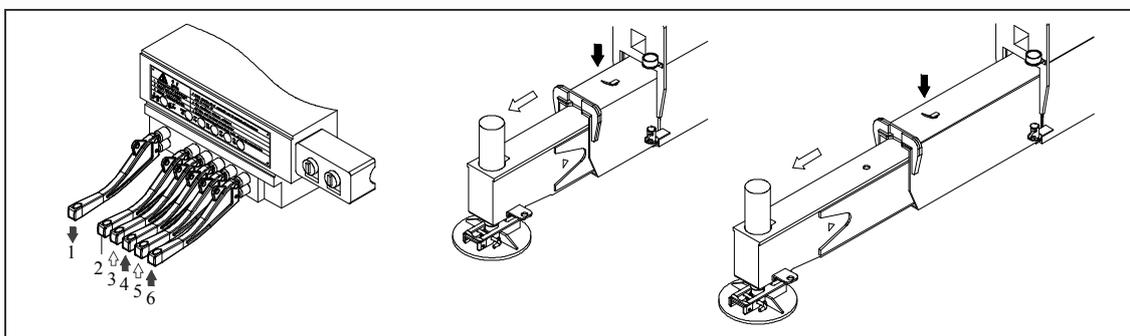


Fig. 04 – 17



The marks “” on outriggers must fully exposed and the pins must be secured if the crane is working with outriggers intermediately extended. Otherwise, the crane may topple.

c) As illustrated in Fig. 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.

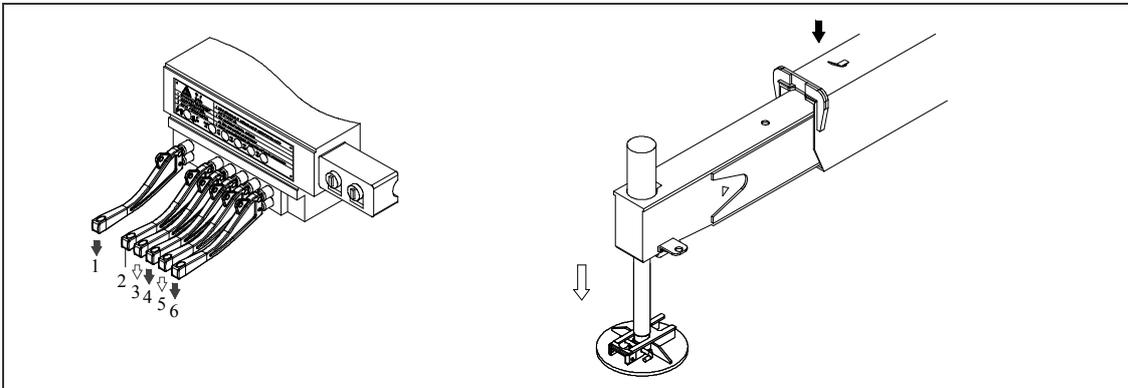


Fig. 04 – 18

d) After all the vertical outriggers are fully extended, observe whether the bubble of level gauge is in the center. If not, level it according to the following instructions:

**How to level the vehicle:**

If the right side of vehicle is higher than the left side (See Fig. 04 – 19)

- 1) Move levers 4 and 6 downwards slowly.
- 2) Move lever 1 upwards.
- 3) Observe the level gauge. Once the vehicle is leveled, move levers to neutral positions.

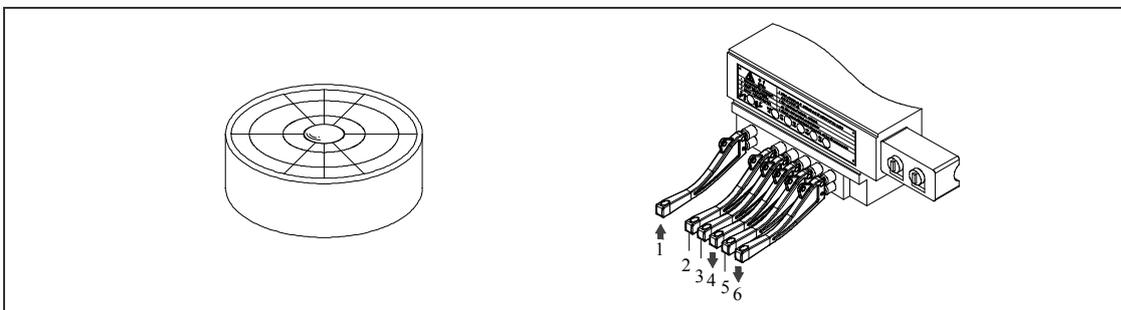


Fig. 04 – 19

e) After the vehicle is leveled, move levers to their neutral positions.

f) When the crane is working over front with the same lifting capacities as over side and over rear, the 5<sup>th</sup> outrigger should be used.

**How to extend the 5<sup>th</sup> outrigger:**

- 1) Move lever 2 downwards.

- 2) Move lever 1 downwards until the 5<sup>th</sup> outrigger is 5 – 10 mm away from the ground. See Fig. 04 – 20.

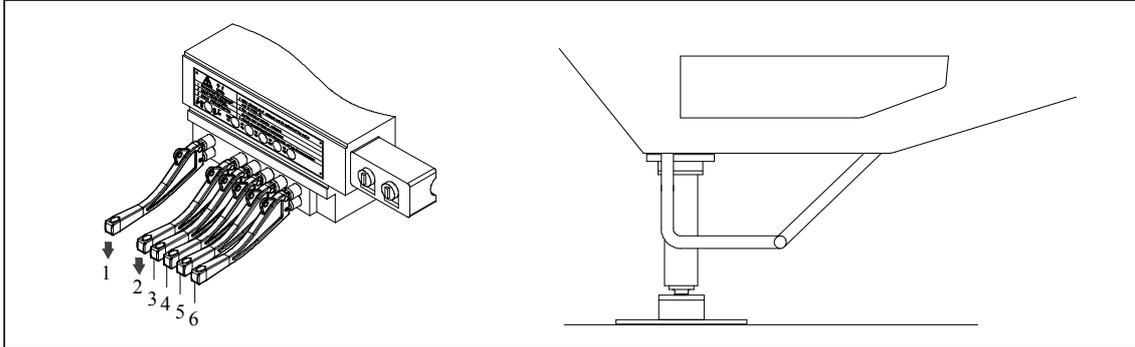


Fig. 04 – 20

- g) Insert the pins of sliding beam. The crane is ready to work.



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

#### 4.5.2.3 Outrigger retraction



**After crane operation is finished, telescope in the boom fully and secure it on the boom support. After that, retract the 5<sup>th</sup> outrigger before retracting all the other outriggers.**

- a) Remove the pins of sliding beam.

As illustrated in Fig. 04 – 21:

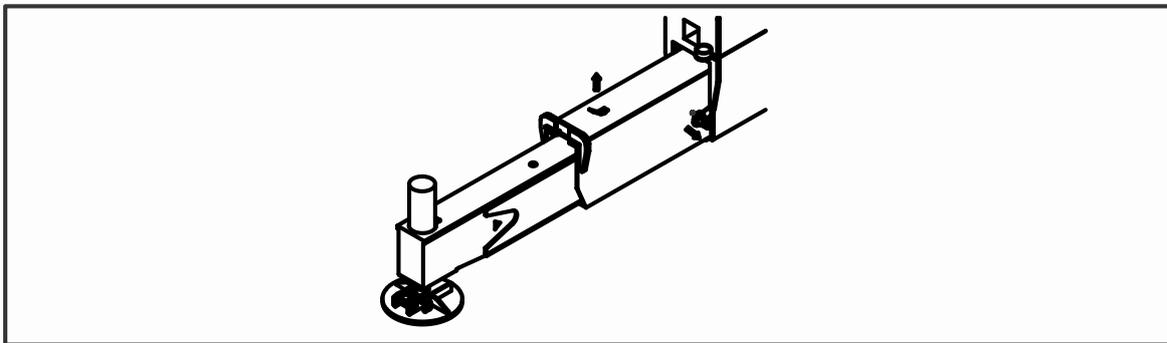


Fig. 04 – 21

- b) How to retract the 5<sup>th</sup> outrigger:
- 1) Move lever 2 downwards.
  - 2) Move lever 1 upwards until the 5<sup>th</sup> outrigger is fully retracted. See Fig. 04 – 22.

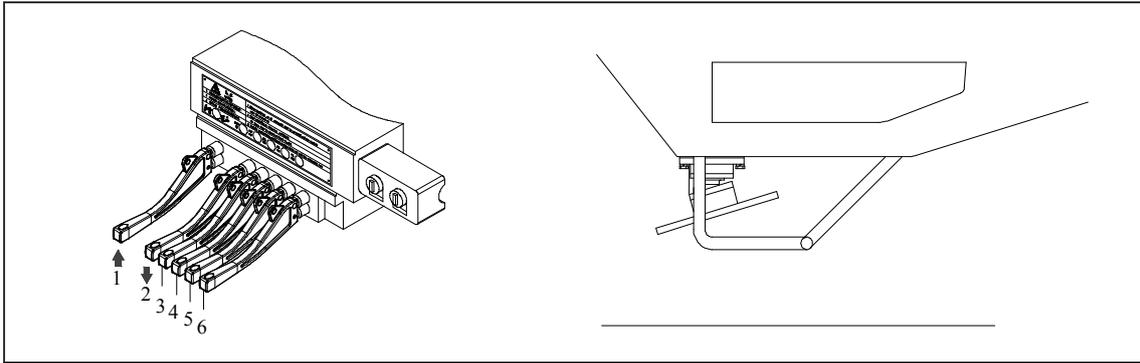


Fig. 04 – 22

c) As illustrated in Fig. 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 fully retract vertical cylinders.

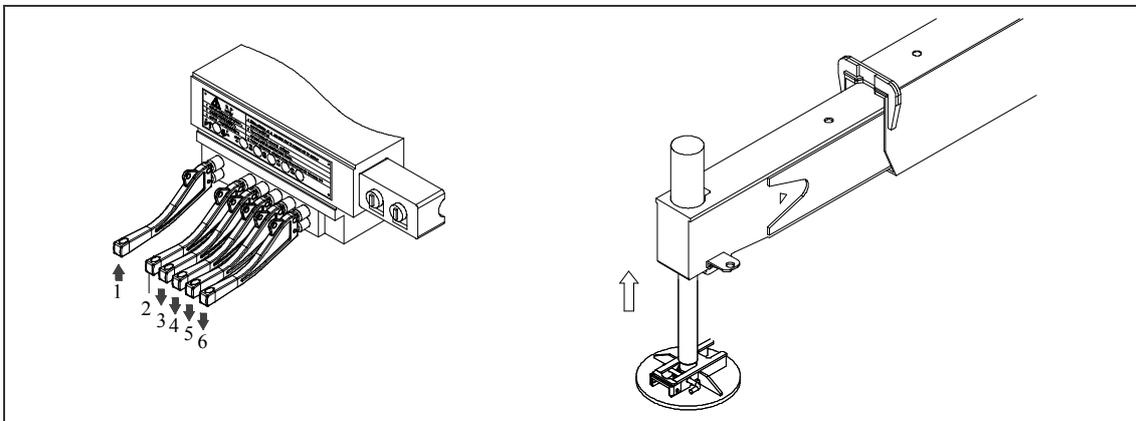


Fig. 04 – 23

d) As illustrated in Fig. 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 fully retract horizontal cylinders.

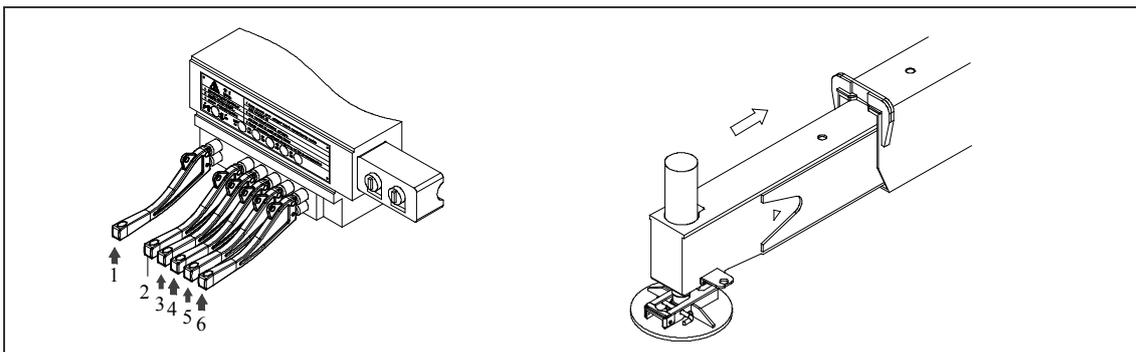


Fig. 04 – 24

- e) Secure the pins for sliding beam after outriggers are fully retracted. As illustrated in Fig. 04 – 25.

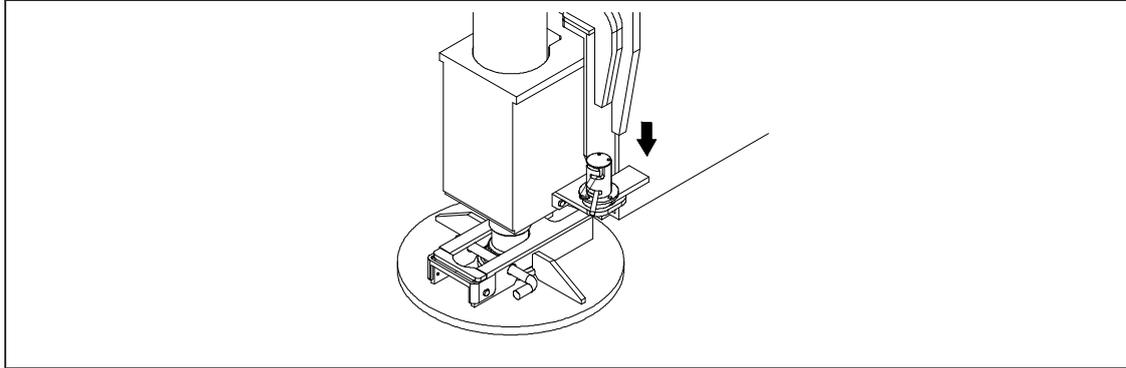


Fig. 04 – 25

#### 4.5.2.4 Installing and removing the outrigger pads

Outrigger pad is shown in Fig. 04 – 26.

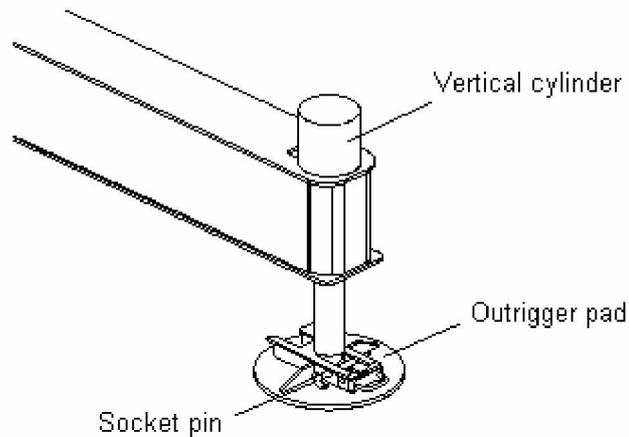


Fig. 04 – 26

- a) Installing the outrigger pad

Before the outriggers are extended, remove the socket pin and pull outrigger pad outwards until its center is perpendicular to the vertical cylinder. Insert socket pins and secure them.

Weight of outrigger pad: about 42 kg.

- b) Removing the outrigger pad

After the outriggers are retracted, remove the socket pin and slide outrigger pad inwards until it reaches the limit position. Insert socket pins and secure them.

**! NOTE**

- (1) Keep enough space when operating the outriggers so as to avoid injuring persons or damaging the crane and other objects.
- (2) Outrigger pads should be installed before outriggers are operated.
- (3) Ensure that all the outrigger pads (except the 5<sup>th</sup> outrigger pad) are in

contact with the ground during operation.

- (4) The 5<sup>th</sup> outrigger can only be extended to the position where its outrigger pad is about 5 – 10 mm above the ground. It is not permitted that the two front outriggers are away from the ground due to excessive extending of the 5<sup>th</sup> outrigger.
- (5) All the tires should be lifted away from the ground before operation.
- (6) Check the level gauge for proper work. If not, adjust the nuts beneath the level gauge.



**Do not operate the outrigger control levers during lifting operation.**

### 4.5.3 Derricking

As it is illustrated in Fig. 04 – 27:

The derricking gear is controlled by the right joystick.

- Deflect the joystick in direction ③ (leftwards)

**Results:**

- The telescopic boom is derricked up.

- Deflect the joystick in direction ④ (rightwards)

**Results:**

- The telescopic boom is derricked down.

- Deflect the joystick in neutral

**Results:**

- The telescopic boom stops derricking.

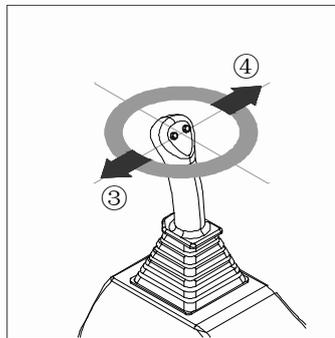


Fig. 04 – 27

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

The speed of crane derricking down movement can be controlled by moving the right joystick. You can increase the deflection angle of the right joystick to speed up the derricking down movement.

Do not change the derricking speed jerkily to ensure stable crane operations.



**Crane movement “Derricking down” can not be accelerated 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 can transmit information of the boom angle to the load moment limiter and display it on the screen. See Fig. 04 – 28.

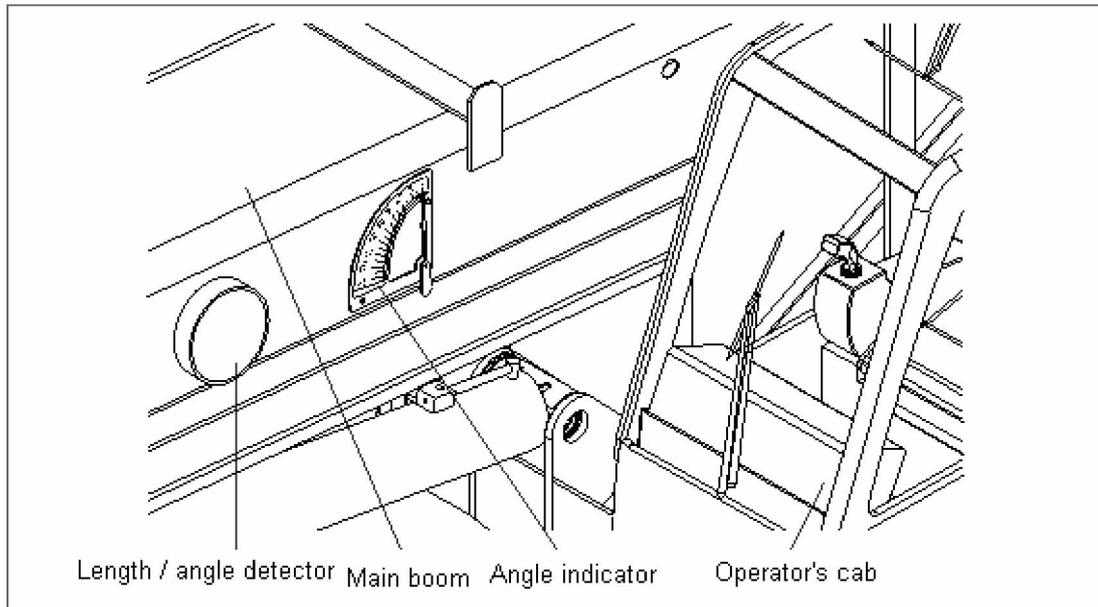


Fig. 04 – 28

**⚠ WARNING**

- (1) Derricking operation should be carried out stably. Jerky operation is prohibited!**
- (2) The derricking angle and working radius should be restricted according to the lifting capacity tables.**

#### 4.5.4 Telescoping

Main boom adopts 1 basic boom and 4 telescopic sections. The telescoping system is composed of two telescoping cylinders, boom extension ropes and boom retraction ropes, etc.

The movement “Telescope boom in / out” is controlled by the two telescoping cylinders and the boom extension / retraction ropes used together. See Fig. 04 – 29.

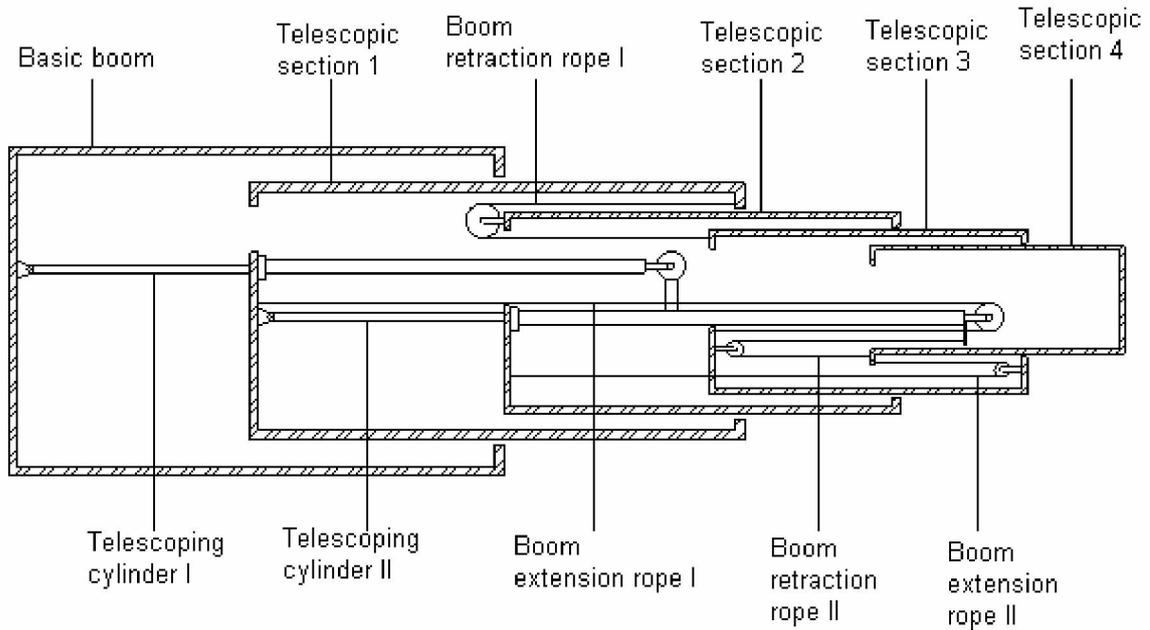


Fig. 04 – 29

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

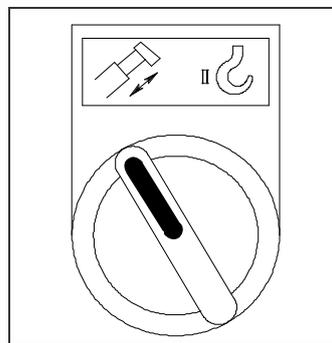


Fig. 04 – 30

- b) As illustrated in Fig. 04 – 31:

The telescoping system is controlled by the left joystick.

- Deflect the joystick in direction ① (forwards)

Results:

- The telescopic boom is telescoped out.

- Deflect the joystick in direction ② (backwards)

**Results:**

- The telescopic boom is telescoped in.

- Deflect the joystick in neutral

**Results:**

- The telescopic boom stops telescoping.

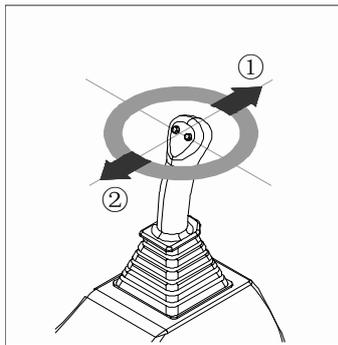


Fig. 04 – 31

**⚠ CAUTION**

- (1) If the hook block contacts the hoisting limit switch weight during its upward movement, the buzzer sends out fast acoustic warning and the crane movement “Telescope boom out” is cut off. Reel off the wire rope a little if the boom still needs to be telescoped out.
- (2) The speed of crane movement “Telescoping” is controlled by moving the left joystick and by applying the engine control pedal. Depress the engine control pedal or increase the deflection angle of joystick to speed up the telescoping movement. Do not change the telescoping speed jerkily to ensure stable crane operations.
- (3) Telescope the boom stably and at constant speed.
- (4) Do not telescope the boom out immediately after the boom is telescoped in. Initiate telescoping movement after 2 seconds.
- (5) The bypass key switch can only be activated during commissioning and maintenance. Do not use the bypass key switch in normal operation!
- (6) Operator should strictly carry out the telescoping operation according to *Lifting Capacity Tables*. Otherwise, the crane may topple or be damaged.



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

### 4.5.5.1 Preparations for lifting / lowering

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

**How to look up rated lifting capacity in the *Rated lifting capacity table* (See Fig. 04 – 32):**

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

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

 **NOTE**

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

For example:

If outriggers are fully extended and the main boom is over side and over rear, look up the rated lifting capacity according to Fig. 04 – 32:

The rated lifting capacity with working radius of R:

If the main boom length is L2 m, the rated lifting capacity is W2 kg.

If the main boom length is L3 m, the rated lifting capacity is W3 kg.

 **CAUTION**

**(1) Look up the corresponding rated lifting capacity table according to actual working conditions.**

**(2) Observe the notes shown below the rated lifting capacity table.**

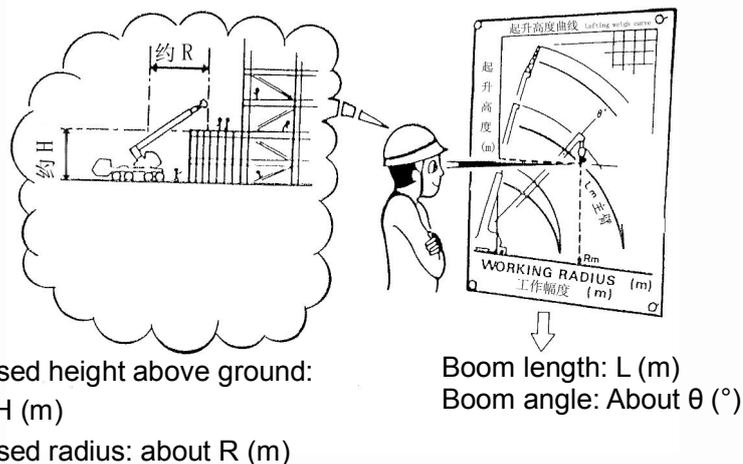


Fig. 04 – 32

**! IMPORTANT**

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

Rated lifting capacities are changed with working radius.

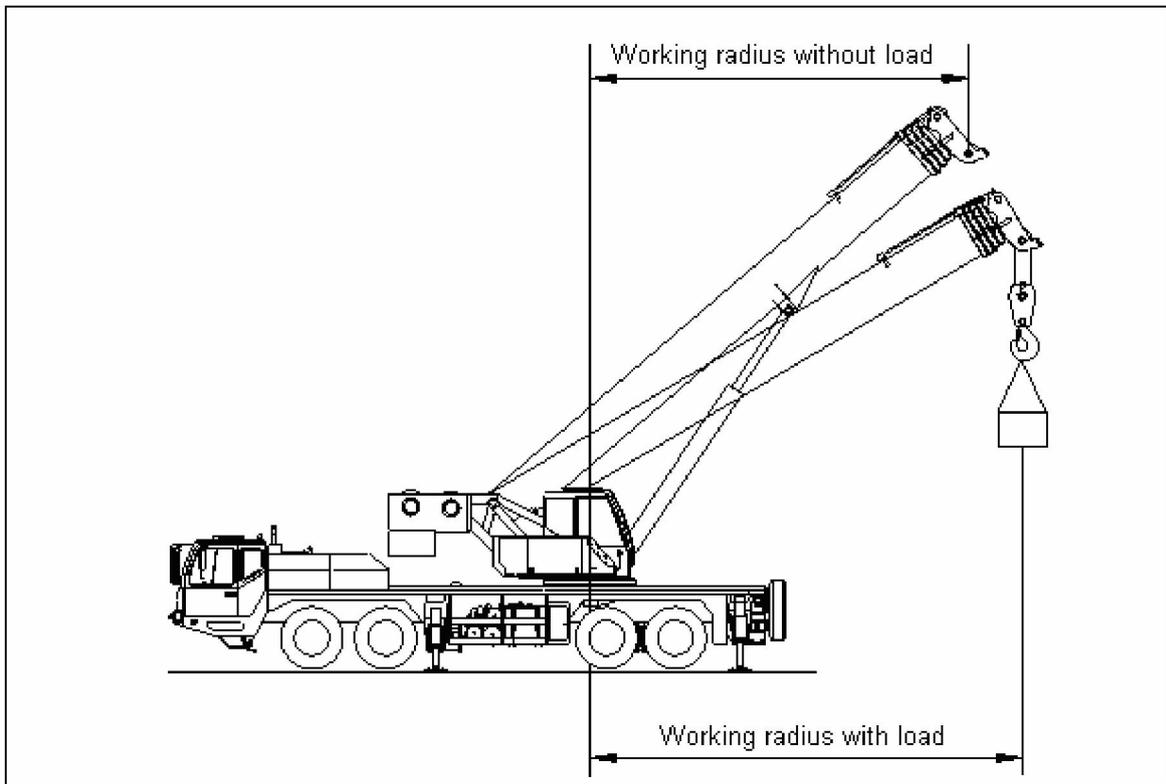


Fig. 04 – 33

**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	11.6	15.6	21.7
							60000	50000	
							50000	45000	28000
R		W2					40000	40000	28000
							63000	58000	35000

Fig. 04 – 34

**! NOTE**

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

#### 4.5.5.2 Spooling up / reeling off main winch

a) Right joystick:

As it is illustrated in Fig. 04 – 35:

Spooling up / reeling off the main winch is controlled by the right joystick.

- Deflect the joystick in direction ① (forwards)

**Results:**

- Main winch reels off and the load is lowered.

- Deflect the joystick in direction ② (backwards)

**Results:**

- Main winch spools up and the load is lifted.

- Deflect the joystick in neutral

**Results:**

- The main winch stops working.

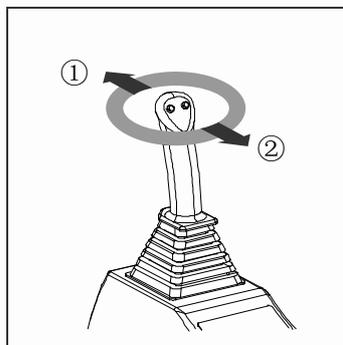


Fig. 04 – 35

b) The main winch is working. Refer to Fig. 04 – 36.

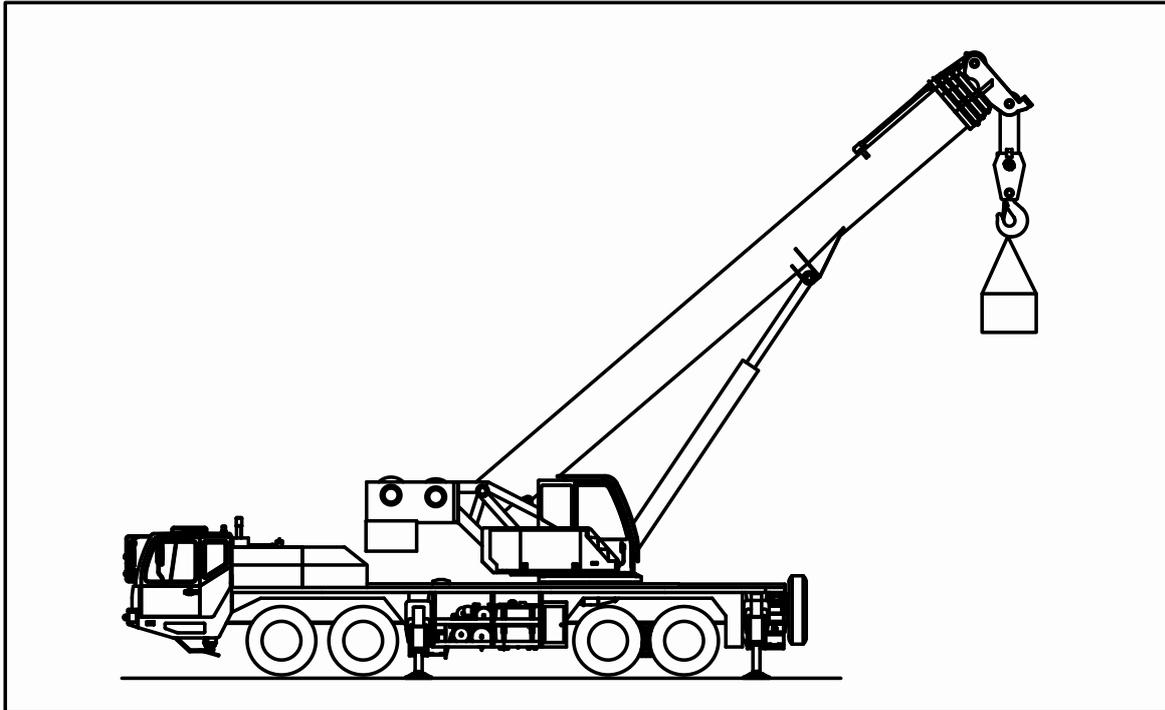


Fig. 04 – 36

#### 4.5.5.3 Spooling up / reeling off auxiliary winch

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

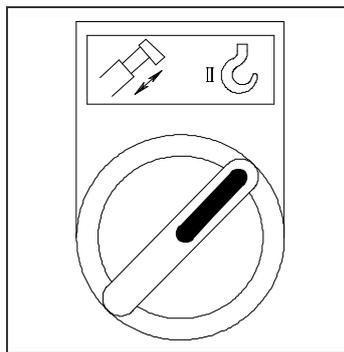


Fig. 04 – 37

- b) Left joystick:

As it is illustrated in Fig. 04 – 38:

Spooling up / reeling off the auxiliary winch is controlled by the left joystick.

- Deflect the joystick in direction ① (forwards)

**Results:**

- Auxiliary winch reels off and the load is lowered.
- Deflect the joystick in direction ② (backwards)

**Results:**

- Auxiliary winch spools up and the load is lifted.
- Deflect the joystick in neutral

**Results:**

- The auxiliary winch stops working.

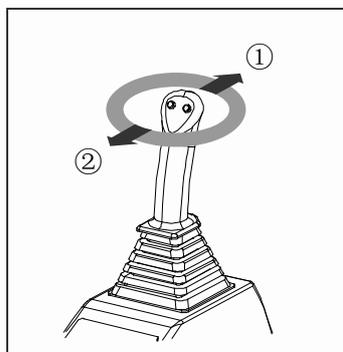


Fig. 04 – 38

- c) The auxiliary winch is working. Refer to Fig. 04 – 39.

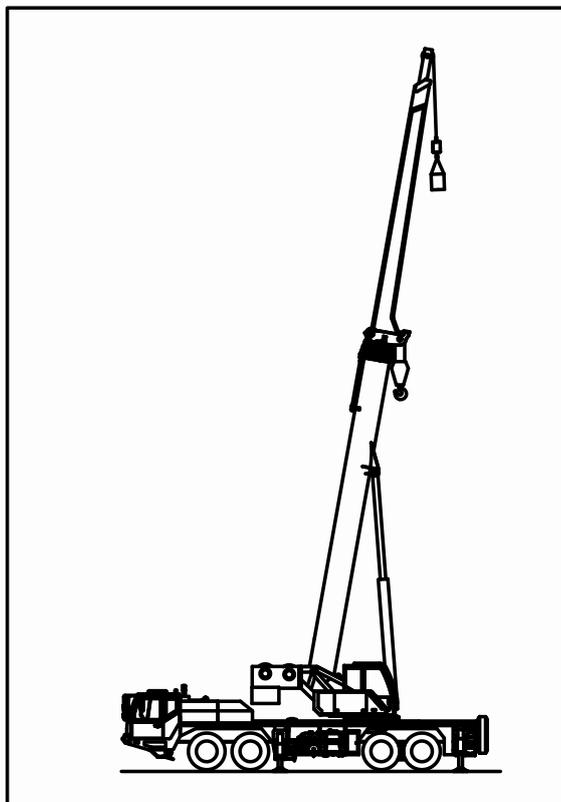


Fig. 04 – 39

Return the joystick to the neutral position slowly and then the hoist gear stops working immediately.

The speed of crane movement "Spooling up / reeling off main / auxiliary winch" can be controlled by moving the joystick and by applying the engine control pedal. Depress the engine control pedal or increase the deflection angle of the joystick to speed up the hoist movement. (When deflection angle of the joystick is small, it is not recommended to depress the engine control pedal.) Do not change the hoist speed jerkily to ensure stable crane operations.

If the hook block contacts the hoisting limit switches during its upward movement, or less than three windings of rope are left on the drum during its downward movement or the maximum permissible load moment is exceeded, the buzzer sends out fast acoustic warning and the crane movement "Spool up / reel off winches" is cut off. At this time, the crane can only work towards safe directions till the dangerous operation is deactivated.

**! IMPORTANT**

- (1) Choose the correct reevings for the boom length and load weights. Before changing 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) When a load is lifted away from the ground, it should first be suspended in the air for a moment. Do not lift the load until the operator confirms that there is no safety hazard. Do not derrick up and telescope out the boom to lift the load if the load does not leave away from the ground.**
- (5) Do not change quickly between "reel off" and "spool up". Let the winch stop before you continue to move the hook. Otherwise, the machine will be damaged.**
- (6) The slings must be of enough strength. The lifting capacity includes the mass of the hook and slings.**
- (7) Do not stand on the load.**
- (8) If the hook rotates due to twisted rope, lay down the load on the ground. Do not lift the load until the rope is totally untangled.**
- (9) It is not allowed to lift a load with main and auxiliary winch together.**

## 4.5.6 Slewing

### 4.5.6.1 Operation

As it is illustrated in Fig. 04 – 40:

The slewing gear is controlled by the left joystick.

- Deflect the joystick in direction ④ (leftwards)

**Results:**

- The crane superstructure slews to the left.

- Deflect the joystick in direction ③ (rightwards)

**Results:**

- The crane superstructure slews to the right.

- Deflect the joystick in neutral

**Results:**

- The crane superstructure stops slewing.

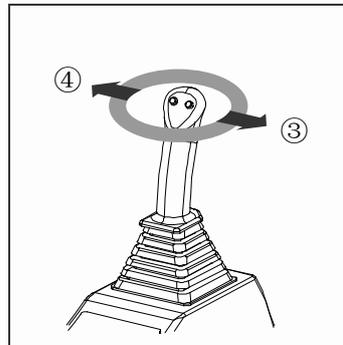


Fig. 04 – 40

The speed of crane movement “Slewing” can be controlled by moving the left joystick and by applying the engine control pedal. Depress the engine control pedal or increase the deflection angle of the joystick to speed up the slewing movement. (When deflection angle of the joystick is small, it is not recommended to depress the engine control pedal.) Do not change the slewing speed jerkily to ensure stable crane operations.

**! IMPORTANT**

- (1) Operator’s field of vision is greatly restricted over side and over rear during slewing operation. Therefore, operate the crane with maximum care.
- (2) Ensure that there are no obstacles in the crane slewing area (within slewing radius R) and no persons in the danger zone. Give a short warning signal (horn) before starting a crane movement.

#### 4.5.6.2 Lockout device for slewing operation

The lockout device for slewing operation is installed in 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 Fig. 04 – 41.

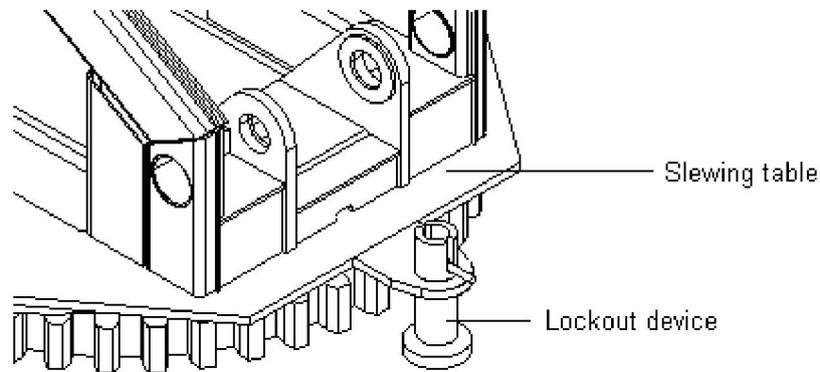


Fig. 04 – 41

**! IMPORTANT**

- (1) Make sure that you do not make fast movements or suddenly stop the slewing movement.
- (2) When you operate a new crane, check the bolts for slewing bearing after the initial 100 working hours. After that, check the bolts at these intervals: 500 and 1000 hours of operation.
  - The torque on the bolts must be 900 N·m.
- (3) The crane can slew with load. 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.
- (4) Check whether the outriggers are extended intermediately / fully before slewing operation.
- (5) Ensure there is enough space for the crane slewing operation.
- (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, refer to that the crane can carry out 2 movements simultaneously. However, because the simultaneous crane movements are towards two different directions, the operator should take maximum care to avoid accidents. This crane has 9 simultaneous movements.

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

- Depress engine control pedal.
- Do not deflect the joysticks to limit positions.



**Simultaneous crane movements should only be carried out after the load is lifted away from ground. It is prohibited to telescope the boom with a suspended load.**

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

Ser. No.	Simultaneous crane movements	Illustration		Operating instructions
		Left joystick	Right joystick	
2	Main winch + Auxiliary winch			<ol style="list-style-type: none"> <li>Turn the pre-selection switch "Telescope / auxiliary winch" to the right position.</li> <li>Operate left joystick and right joystick at the same time according to left figures to make auxiliary winch and main winch work simultaneously.</li> <li>Left joystick:                             <ol style="list-style-type: none"> <li>Reel auxiliary winch off.</li> <li>Spool auxiliary winch up.</li> </ol> </li> <li>Right joystick:                             <ol style="list-style-type: none"> <li>Reel main winch off.</li> <li>Spool main winch up.</li> </ol> </li> </ol>
3	Derrick + Telescope			<ol style="list-style-type: none"> <li>Turn the pre-selection switch "Telescope / auxiliary winch" to the left position.</li> <li>Operate left joystick and right joystick at the same time according to left figures to make telescoping system derricking gear work simultaneously.</li> <li>Left joystick:                             <ol style="list-style-type: none"> <li>Telescope telescopic boom out.</li> <li>Telescope telescopic boom in.</li> </ol> </li> <li>Right joystick:                             <ol style="list-style-type: none"> <li>Derrick main boom up.</li> <li>Derrick main boom down.</li> </ol> </li> </ol>

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

Ser. No.	Simultaneous crane movements	Illustration		Operating instructions
		Left joystick	Right joystick	
6	Slew + Main winch			<p>a. Operate left joystick and right joystick 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"> <li>③ Slew to the right.</li> <li>④ Slewing to the left.</li> </ul> <p>c. Right joystick:</p> <ul style="list-style-type: none"> <li>① Reel main winch off.</li> <li>② Spool main winch up.</li> </ul>
7	Derrick + Main winch			<p>a. Deflect the right joystick according to the left figures to make main winch and derricking gear work simultaneously.</p> <p>b. Right joystick:</p> <ul style="list-style-type: none"> <li>⑤ Derrick main boom down / spool main winch up.</li> <li>⑥ Derrick main boom up / reel main winch off.</li> <li>⑦ Derrick main boom down / reel main winch off.</li> <li>⑧ Derrick main boom up / spool main winch up</li> </ul>
8	Slew + Auxiliary winch			<p>a. Turn the pre-selection switch "Telescope / auxiliary winch" to the right position.</p> <p>b. Deflect the left joystick according to the left figures to make slewing gear and auxiliary winch work</p>

Ser. No.	Simultaneous crane movements	Illustration		Operating instructions
		Left joystick	Right joystick	
				<p>simultaneously.</p> <p>c. Left joystick:</p> <ul style="list-style-type: none"> <li>⑤ Slew to the left / spool auxiliary winch up.</li> <li>⑥ Slew to the right / reel auxiliary winch off.</li> <li>⑦ Slew to the left / reel auxiliary winch off.</li> <li>⑧ Slew to the right / spool auxiliary winch up.</li> </ul>
9	Slew + telescope			<p>a. Turn the pre-selection switch "Telescope / auxiliary winch" to the left position.</p> <p>b. Deflect the left joystick according to the left figures to make slewing gear and telescoping gear work simultaneously.</p> <p>c. Left joystick:</p> <ul style="list-style-type: none"> <li>⑤ Slew to the left / telescope telescopic boom in.</li> <li>⑥ Slew to the right / telescope telescopic boom out.</li> <li>⑦ Slew to the left / telescope telescopic boom out.</li> <li>⑧ Slew to the right / telescope telescopic boom in.</li> </ul>

#### 4.5.8 Rope reeving

Before you start to change the wire rope reevings, completely retract the boom and move it to the side or rear of the crane.

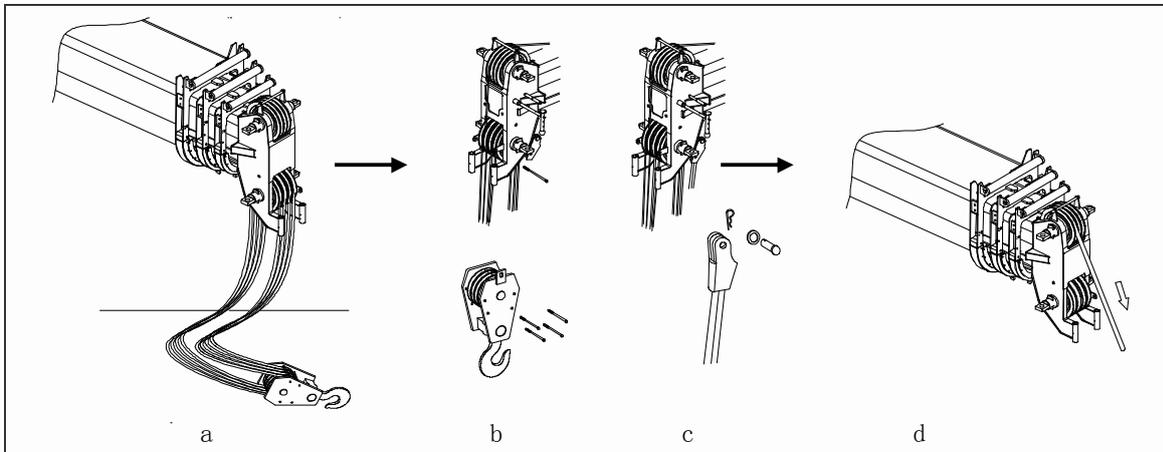


Fig. 04 – 42

Change the wire rope reevings as follows (See Fig. 04 – 42.):

- a) Derrick the boom down to put the hook (a) on the ground.
- b) Remove the pins (b) on the hook block and boom head to let the wire rope unreeve.
- c) Remove the hoisting limit switch weight (c).
- d) Remove the wedge and socket assembly (beckett).
- e) Dead end the rope on the hook block for an odd reeving number, and on the boom head for an even reeving number.
- f) Change rope reevings (d).

**⚠ CAUTION**

- (1) You must change the location of the hoisting limit switch weight if you have a different number of wire rope reevings. See Fig. 04 – 43.

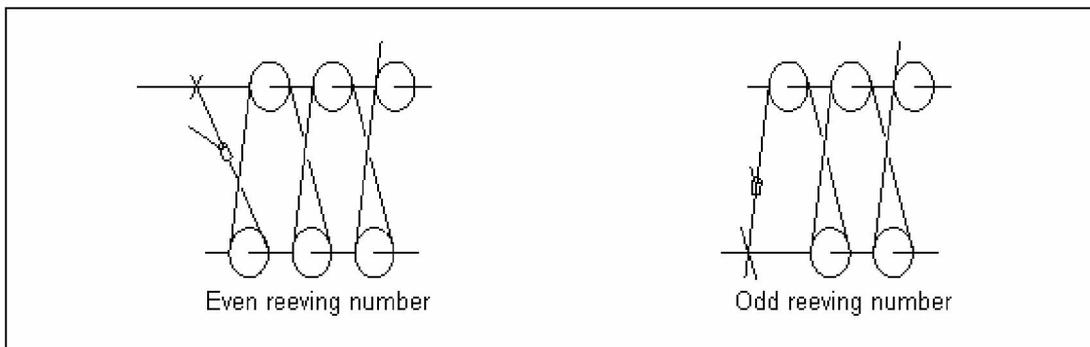


Fig. 04 – 43

- (2) Put the wire rope on the winch spool smoothly and in sequence.

(3) Install the socket and wire rope clamp. Refer to Figure 04 – 44.

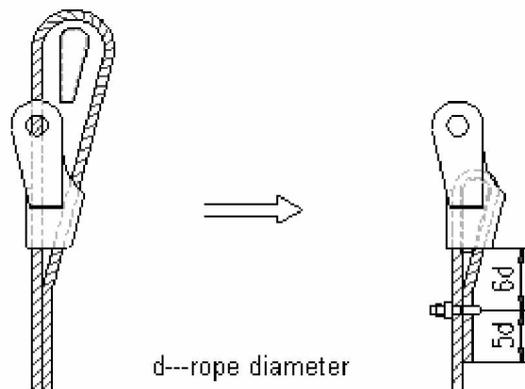
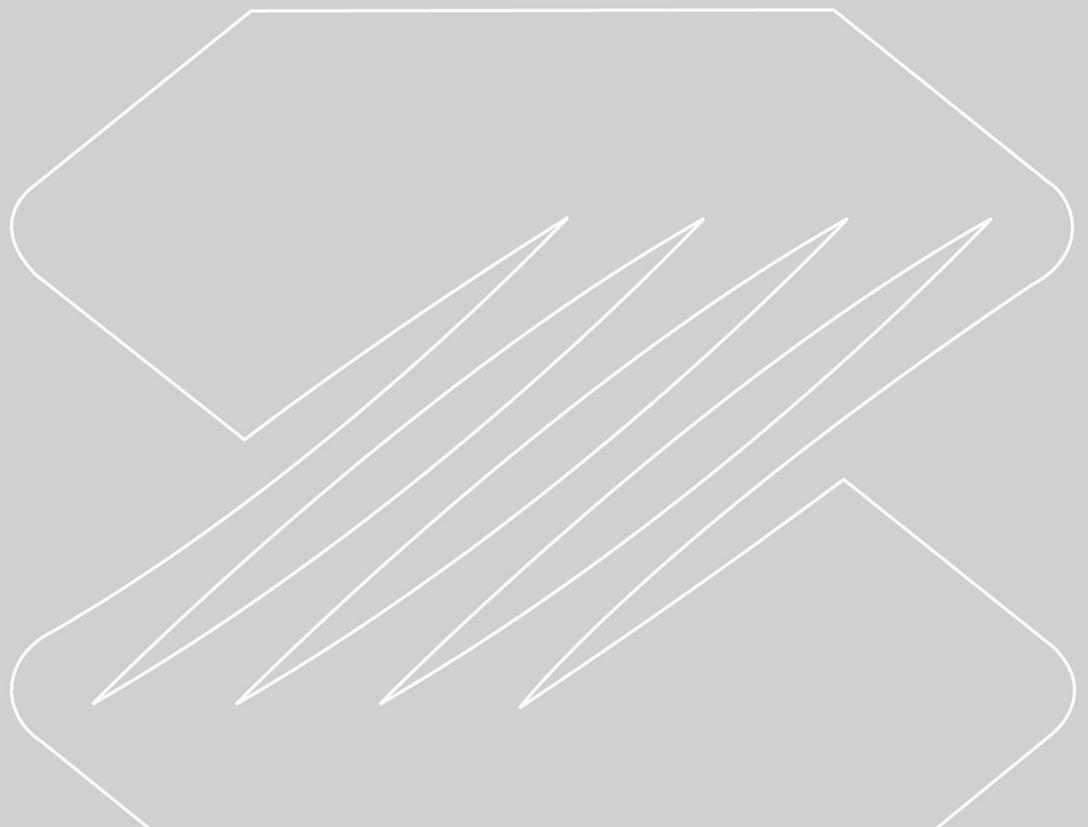


Fig. 04 – 44



**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  $0^\circ$ , or  $30^\circ$  to the telescopic boom according to job requirements.

Assemble the jib below an angle of  $0^\circ$  in the following steps:

- a) Extend the outriggers and level the crane with level gauge;
- b) Telescope main boom in completely and derrick it down to the rear or the side in the  $-2^\circ$  position. Ensure that there is 30m slewing range to the slewing center; See Fig.05-01;

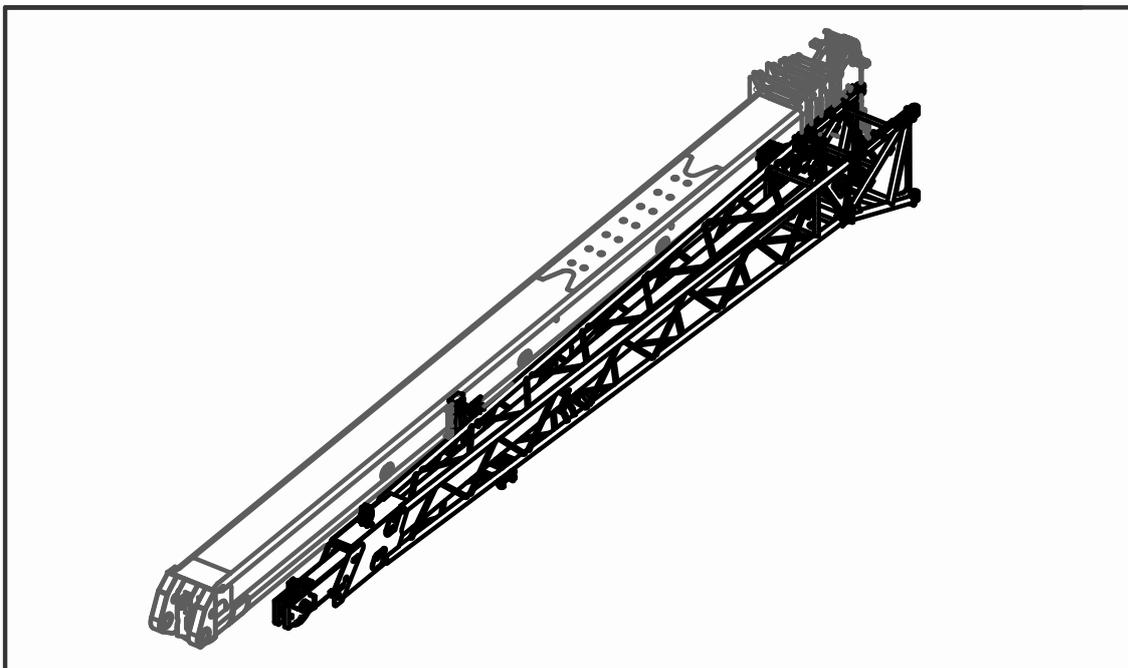


Fig. 05-01

- c) Remove inserted pin. Unfold the folded adaptor and secure it with the inserted pin. See Fig.05-02;

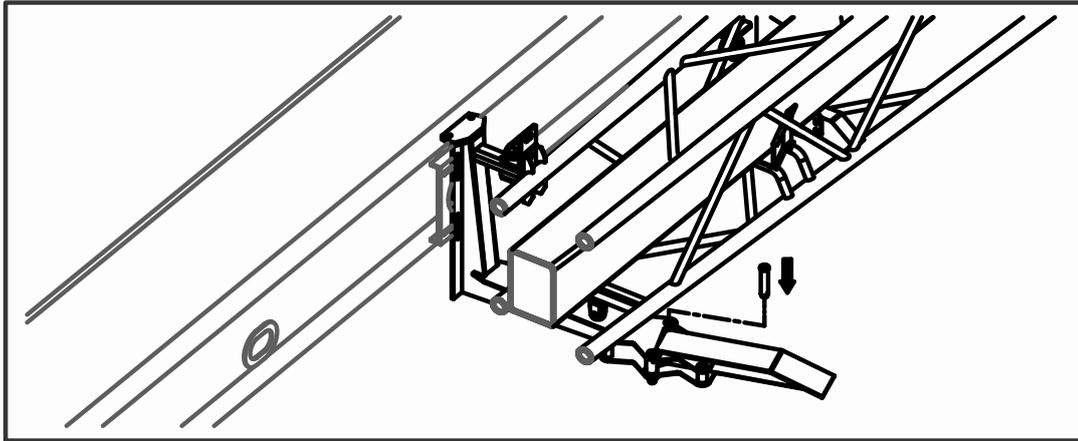


Fig.05-02

- d) Unfold the intermediate adaptor and remove the inserted pin I. See Fig.05-03;

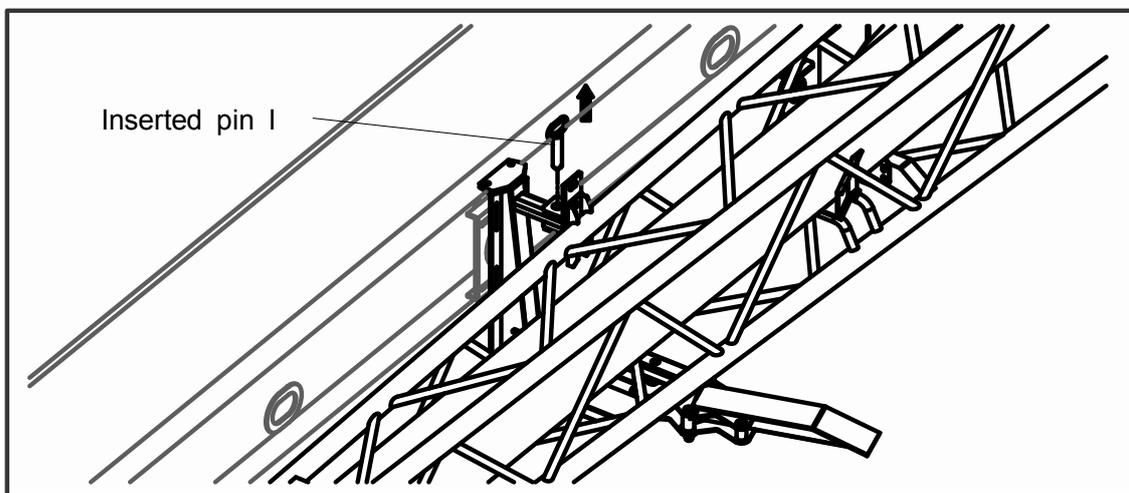


Fig.05-03

- e) Rotate the jib around inserted pin II. See Fig.05-04;

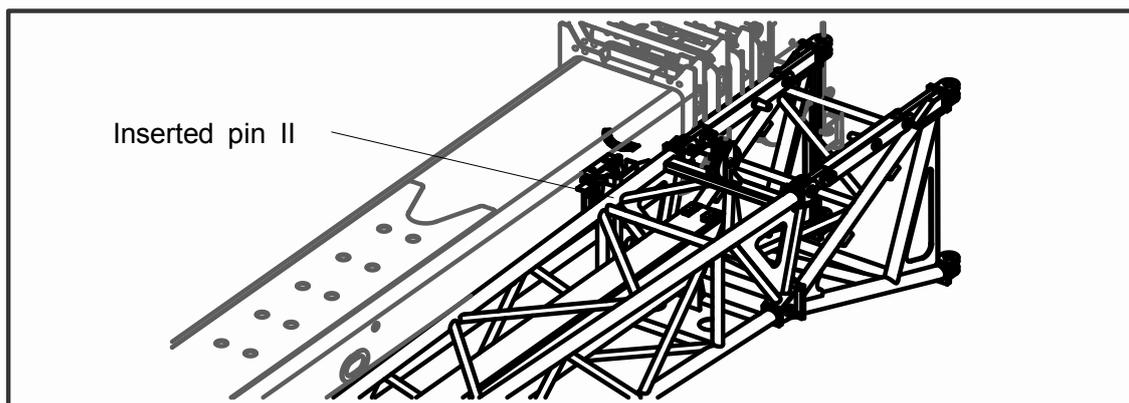


Fig.05-04

- f) 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 Fig.05-05;

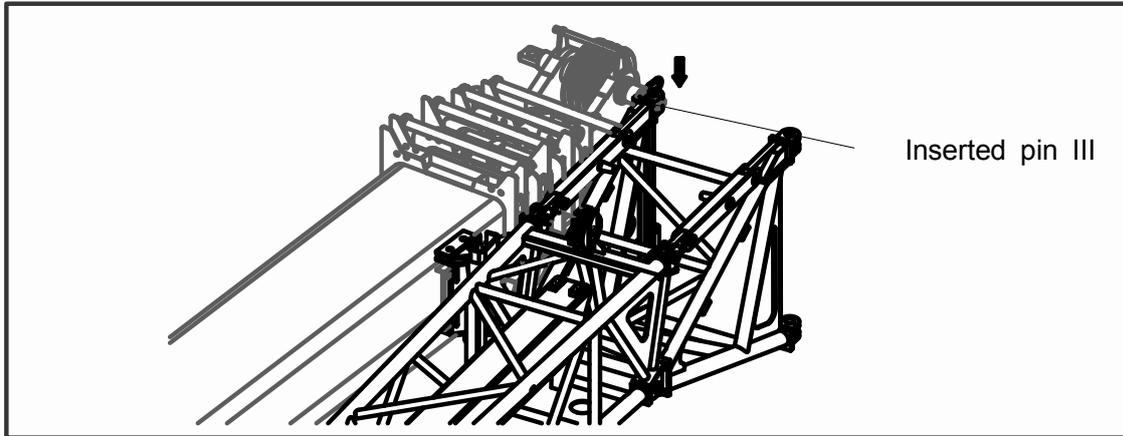
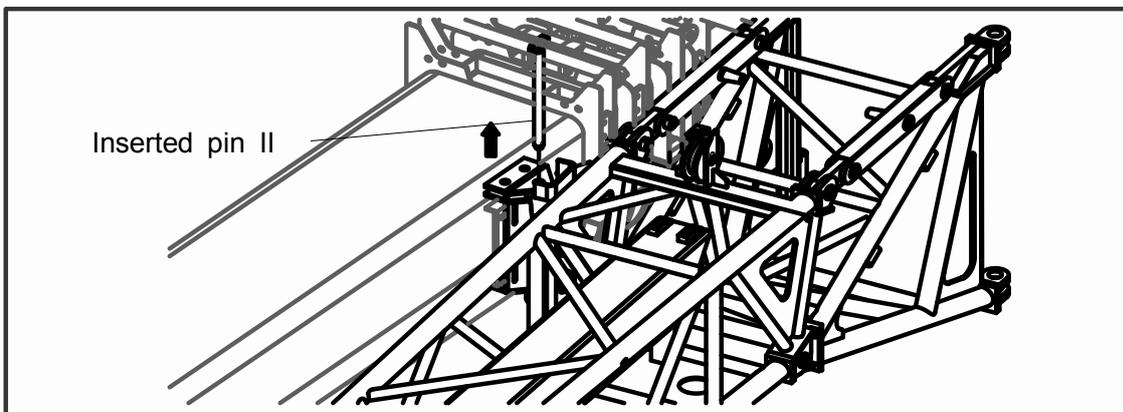


Fig.05-05

- g) Remove inserted pin II. See Fig.05-06;



See Fig.05-06

- h) Rotate the jib around inserted pin III in the same direction to the front of the main boom. See Fig.05-07;

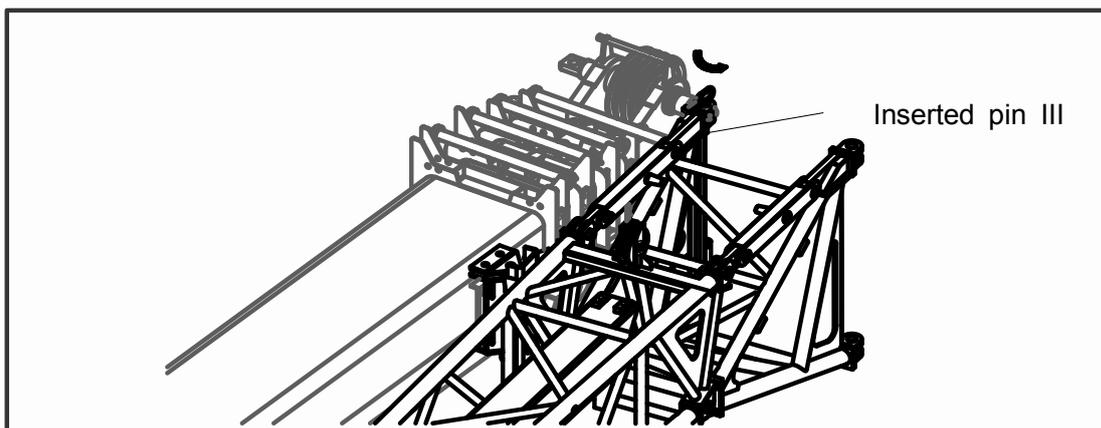


Fig.05-07

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

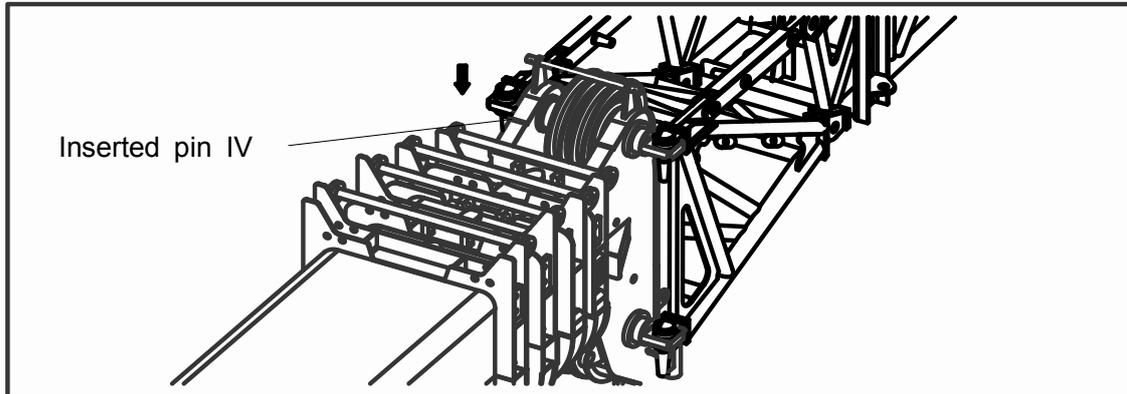


Fig.05-08

- j) Remove inserted pin V and spring-loaded pin if jib section 2 is to be used. See Fig.05-09;

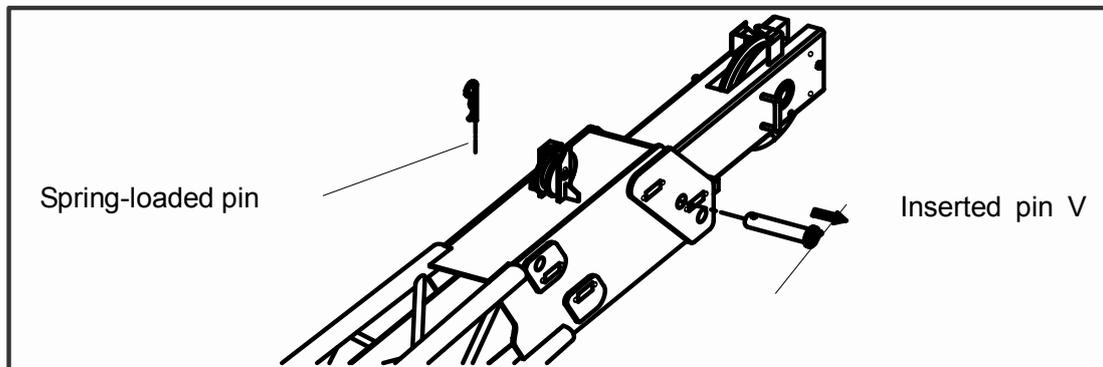


Fig.05-09

- k) 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 Fig.05-10;

**NOTE**

The nylon slide blocks on the both sides of the connecting box can be adjusted to make the pulling movement smooth.

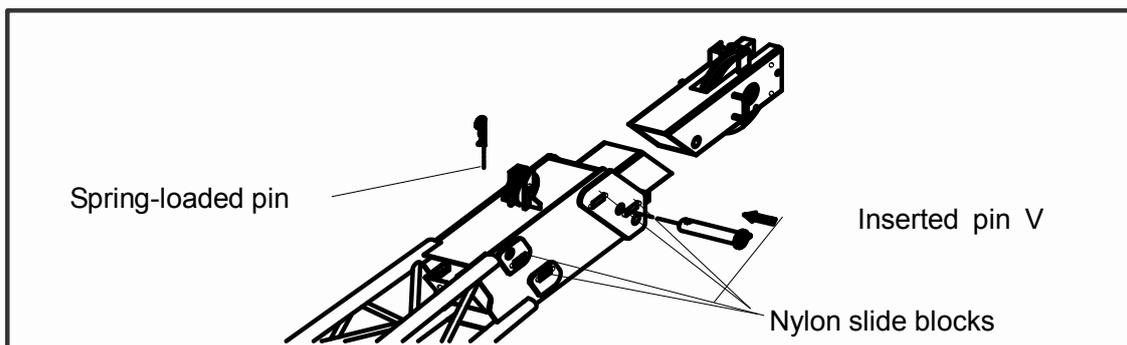


Fig.05-10

- l) 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.

**! DANGER**

**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  $30^\circ$  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  $30^\circ$ :
  - 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  $30^\circ$ . See Fig.05-11.

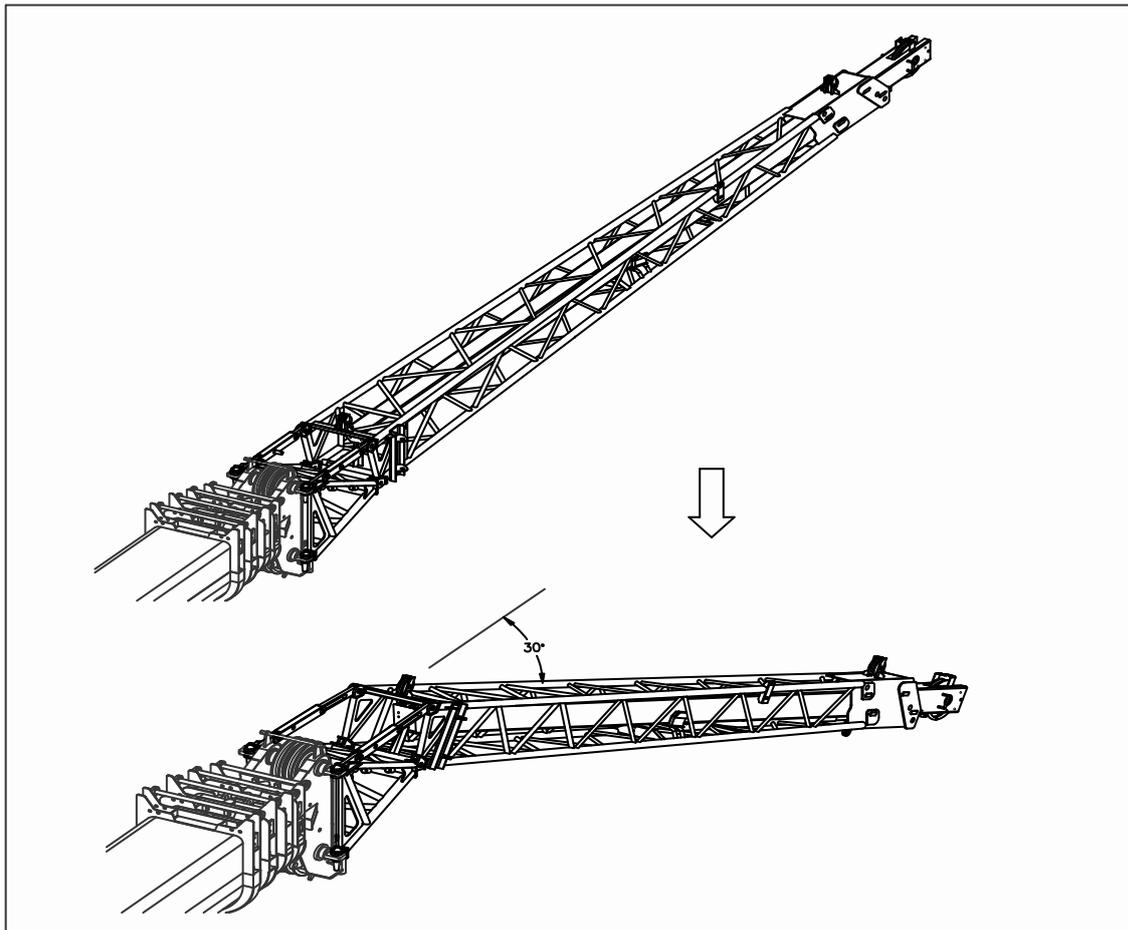


Fig.05-11

### 5.2.4 Dismantling

Proceed analogously, in the reverse order.



**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 Fig. 05-12.

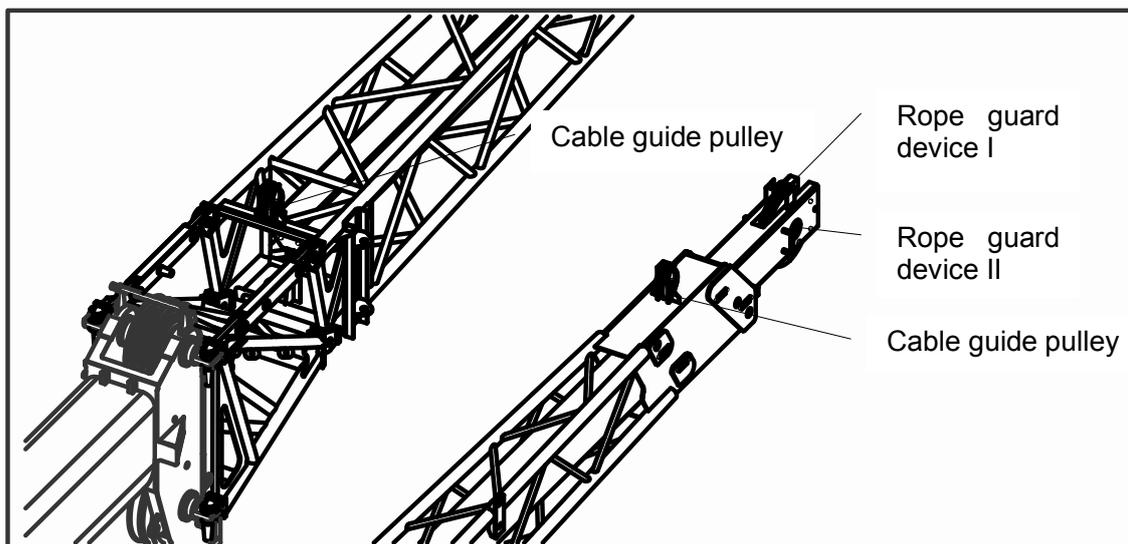


Fig. 05-12

### 5.2.6 Connection of hoisting limit switch

As for the connection of hoisting limit switch, please refer to Fig.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 Fig.05-13-01.

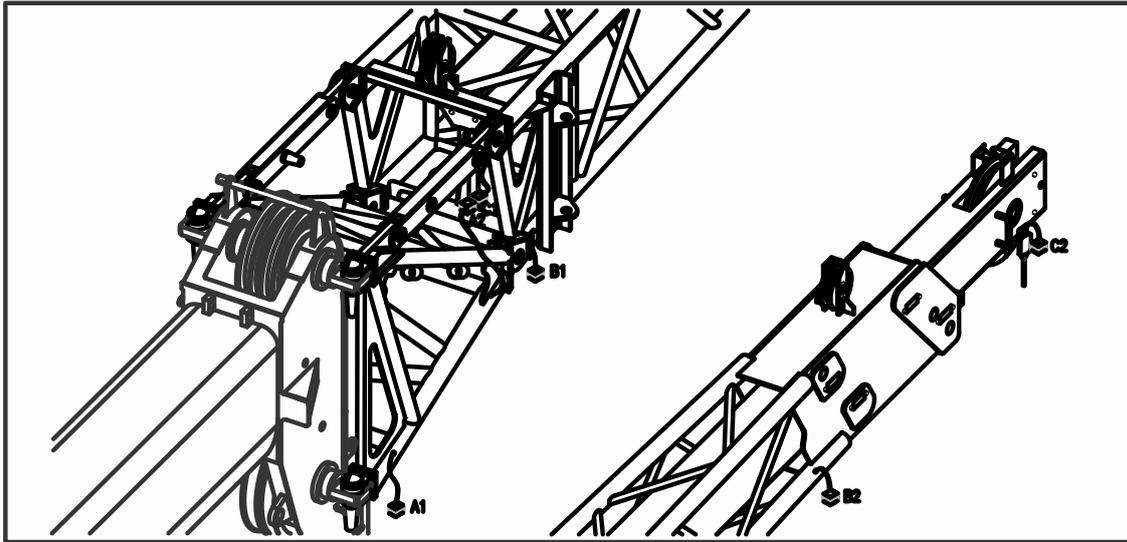


Fig.05-13-01

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 Fig.05-13-02.

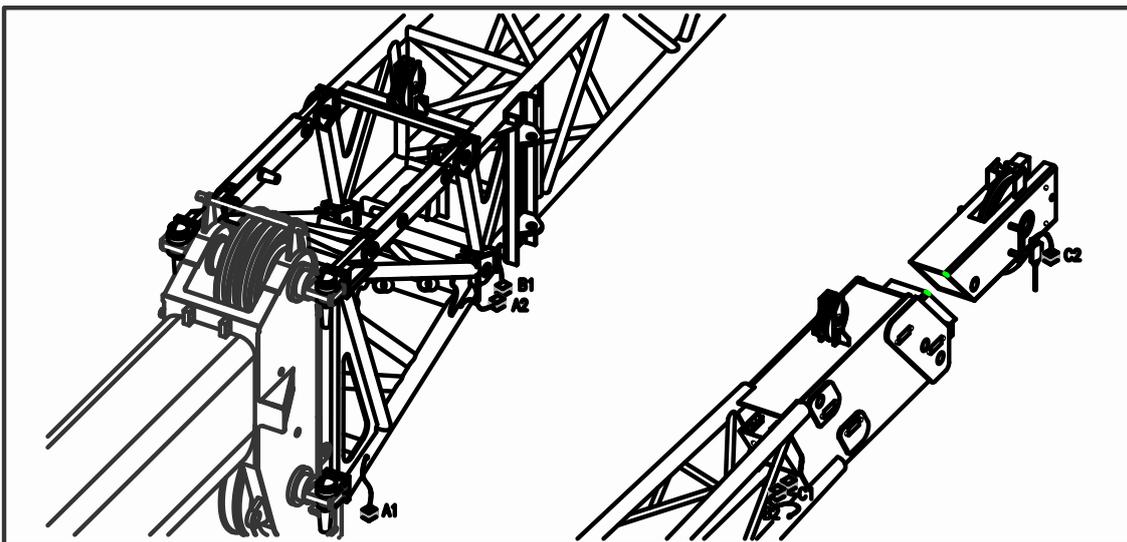


Fig.05-13-02

**⚠ CAREFUL**

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 to the rear or to the side in  $-2^{\circ}$  position.
- b) Release the securing pin and turn the rooster sheave bracket until connecting pin can be bolted. See Fig.05-14.

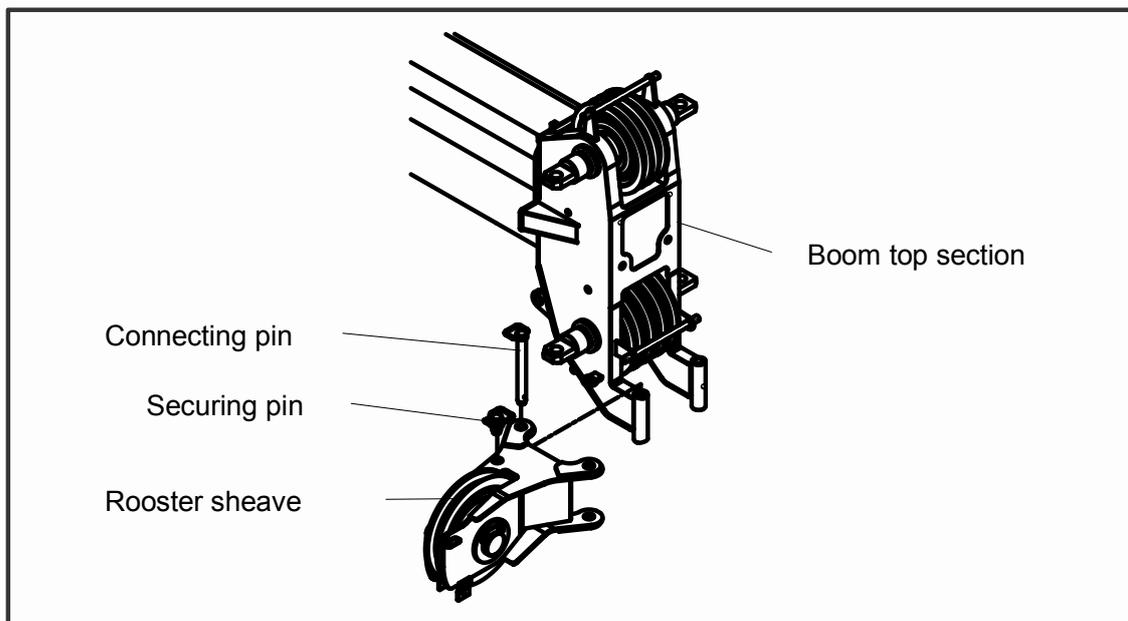


Fig.05-14

- 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

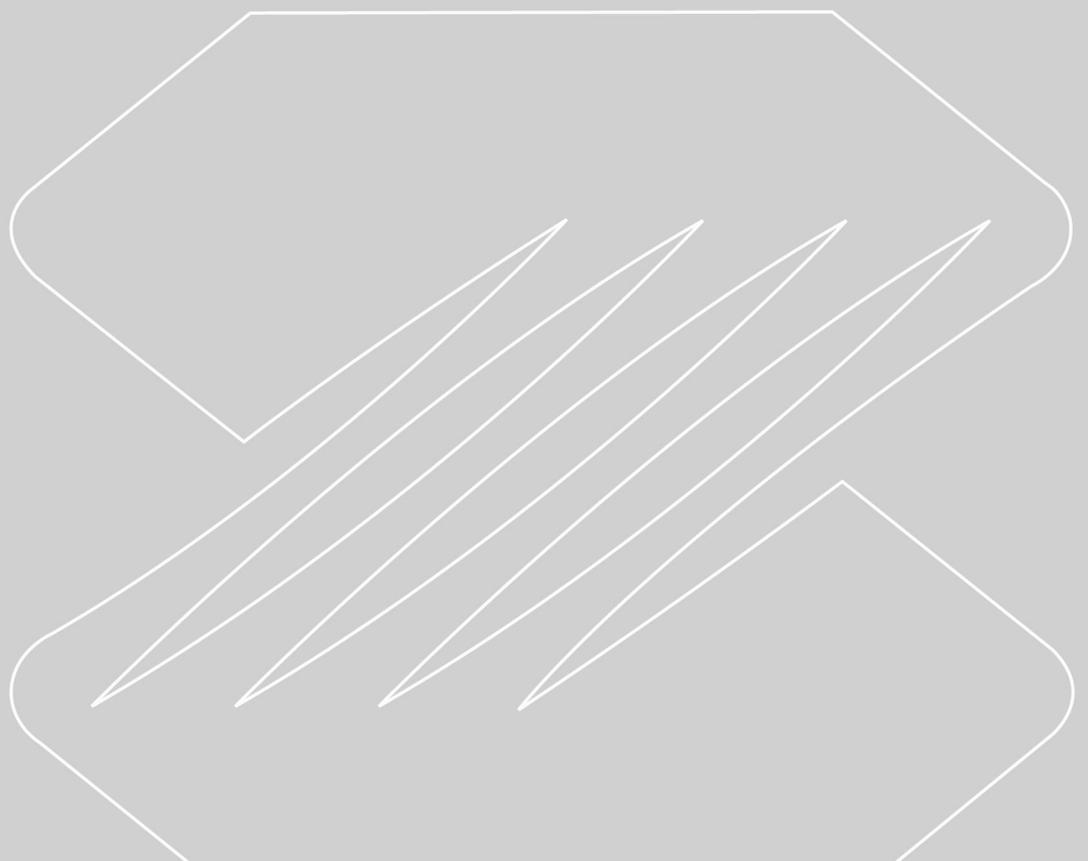
Proceed analogously, in the reverse order.

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



**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 are shown as follows:

<b>SET</b>	set
<b>AUTO</b>	Auto
	Temperature
	Outer air circulation
	Interior air circulation
	Footwell air supply
	Fresh air
	Front window air supply
	Refrigeration

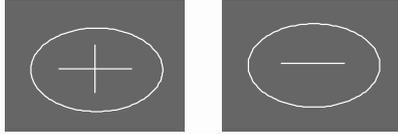
#### Fan speed bar chart:

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



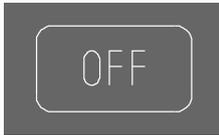
## 2) Fan speed button

Pressed: adjust the fan speed.



## 3) OFF button

Pressed: air conditioning system is turned off.



## 4) AUTO button

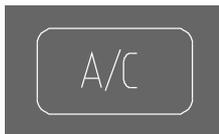
Press AUTO: auto operating mode is activated.

Press AUTO twice, 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

Pressed: 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 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 unusual vibrations, noises or smells during operation, stop and examine the crane immediately. Do not operate the crane that has a malfunction.
- (7) Keep the surface of the condenser clean. When you clean the condenser, do not use steam. Clean it with compressed air or cold water.
- (8) Do not disassemble the belt or pipeline of compressor 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 operating environment for the operator, operator's cab of our crane 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.

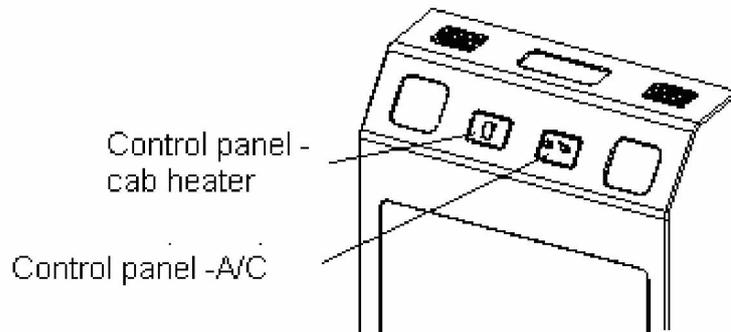


Fig. 06 – 02

### 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 temperature in the cab by adjusting the temperature of air blew out.

b) Fan speed switch

This switch controls the speed of the evaporator fan to obtain proper fan speed.

c) Control light

The compressor is started and the cooling system is in working state when the control light lights up.

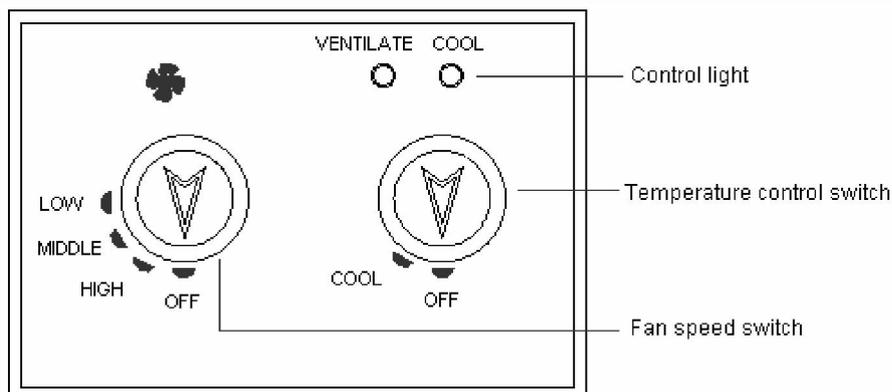


Fig. 06 – 03

### – 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) Evaporator lowers the temperature in the cab at its high gear position, and keeps the temperature in cab at medium 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 on the control panel. The rocker switch has two control lights. One is a power control light, the other is a control light of the switch.

- a) Rocker switch

The rotary switch is used to control the heater automatically.

- b) Power control light

This control light is used to indicate whether the power is switched on.

- c) Control light of the switch

This control light is used to indicate the working state of the heater and the error code.

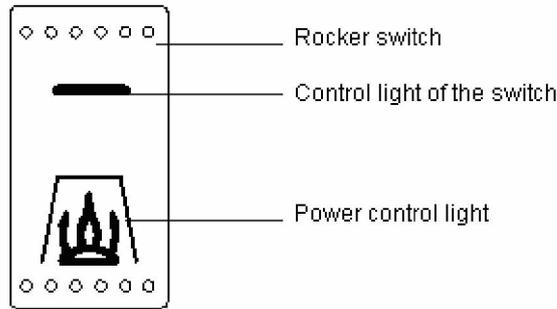


Fig. 06 – 04

– **Operating conditions**

- a) Ambient temperature  $\geq -40^{\circ}\text{C}$ , altitude  $\leq 3000$  m.
- b) It can not be immersed into water, and can'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
<b>Fuel</b>	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°C antifreeze fluid	-40°C antifreeze fluid

### – Operating methods

The rocker switch has two stages. When the switch is in the stage 1, only the water pump works. When it is in stage 2, both the water pump and heater work. At this time, the fan speed switch is turned on to blow out warm air.

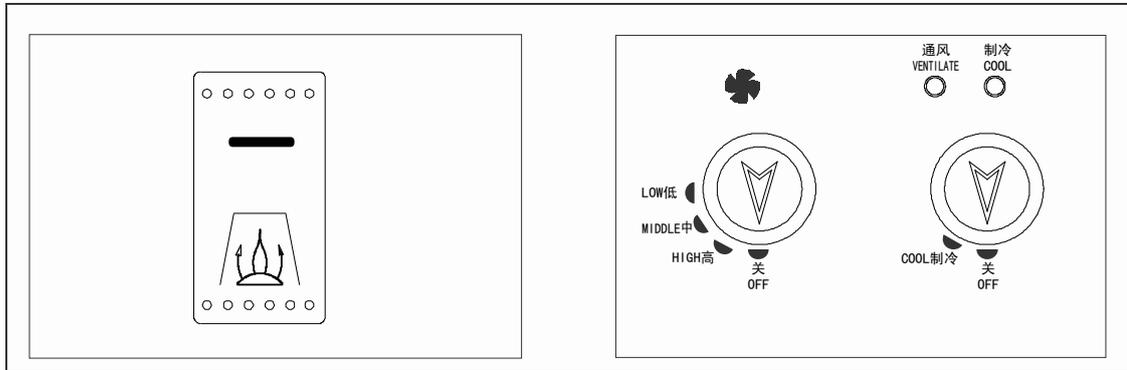


Fig. 06 – 05

When the water outlet temperature reaches 80°C, the heater stops work and the control light of the switch goes out. When the water temperature is lower than 65°C, the heater will work again. The above operations will repeat in cycles.

When the heater is used for the first time in cold seasons, first check the heater condition to ensure there are no foreign matters blocked in the air passage, the heater rotates freely, the combustion-supporting air inlet and the exhaust gas outlet are not blocked with clay etc. and air intake & air exhaust are smooth.

When the heater is not used, the switch should be turned off to stop the heater. At this time, control light of the switch extinguishes after 3 minutes.

#### CAUTION

**Turn the heater off after the control light of the switch extinguishes. Otherwise, the heater can not radiate, and thus it fails.**

## – Troubleshooting

Problem	Cause	Remedy
No warm air blows out.	Fan speed switch on the air conditioning control panel is not turned on.	Turn on fan speed switch on the air conditioning control panel.
The heater does not stop working within 60 seconds after the fuel supply is cut off.	The solenoid valve is dirty or can not be closed completely, or the flame detector is short-circuited.	Clean oil pipe and check the connection, the control box and the flame detector.
The power is unstable.	The wave of power supply is big and unstable.	Check whether the power supply is stable (especially when the stabilized power supply is applied), or replace control panel.
The voltage is too high.	The voltage of heater is higher than 32 V for 5 seconds (for the heater whose rated voltage is 12 V, it means that the voltage is higher than 16 V for 5 seconds).	Check voltage. If the voltage is too high, check voltage regulator of the engine. If it is not too high, replace the control box.
The voltage is too low.	The voltage of heater is lower than 20 V (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 heater, and then check the generator and line voltage. If the voltage is not too low, replace control panel.
The 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.
When the relay of motor is switched off, it is still electrified.	The contact point is connected, or the control switch fails.	Replace control panel.
The solenoid valve relay is still electrified when it is switched off or the solenoid valve coil breaks off.	The contact point is connected or the coil breaks off, or the control panel fails.	Replace control panel or its coil.
The fuse breaks off.	The fuse breaks off, the wire is disconnected, or the control panel fails.	Reset the fuse, check connection or replace control panel.

Problem	Cause	Remedy
When the relay of solenoid valve is electrified, it can not output signals.	The control panel is damaged.	Replace control panel.
When the motor relay is electrified, it can not output signals.	The relay or control panel fails.	Replace control panel.
The motor can not work.	The main motor can not work after it is electrified or the rotational speed is too low.	Check motor connection. Pull out plug to check motor, if it can not work or the rotational speed is too low, replace motor. Otherwise replace the control panel.
The water temperature sensor is short-circuited.	There is water in sensor or the circuit board is wet.	Replace sensor or control box.
The water temperature sensor breaks.	The sensor line breaks off or the circuit board fails.	Replace sensor or control box.
The flame detector can not be ignited.	The flame detector does not output flame signal.	Check connection of flame detector, replace the detector or control panel.
Extinguish flame during burning.	Extinguish flame during burning and can not burn again.	If the oil tank is short of oil, add oil. If the oil pipe leaks, tighten or replace it. replace short-circuited flame detector and control box.
Strong interference	Other interferences.	Close other interference source, replace control panel.
The ignition plug breaks.	The ignition plug burn out or the line looses.	Fasten connection, replace ignition plug.
The ignition plug is short-circuited.	It is short-circuited.	Check it.
The ignition plug relay has no output signal.	The relay or the control panel fails.	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.**

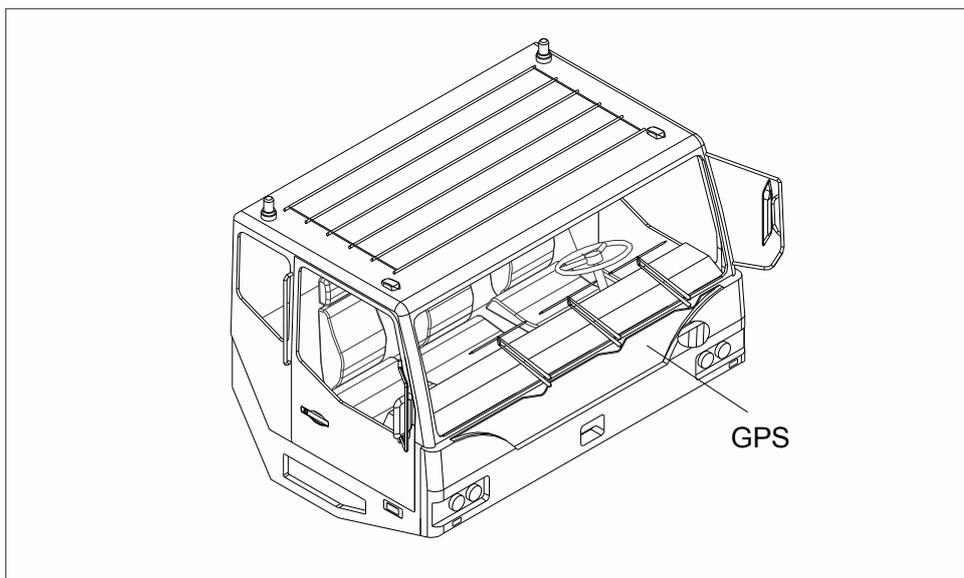


Fig. 06 – 06

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

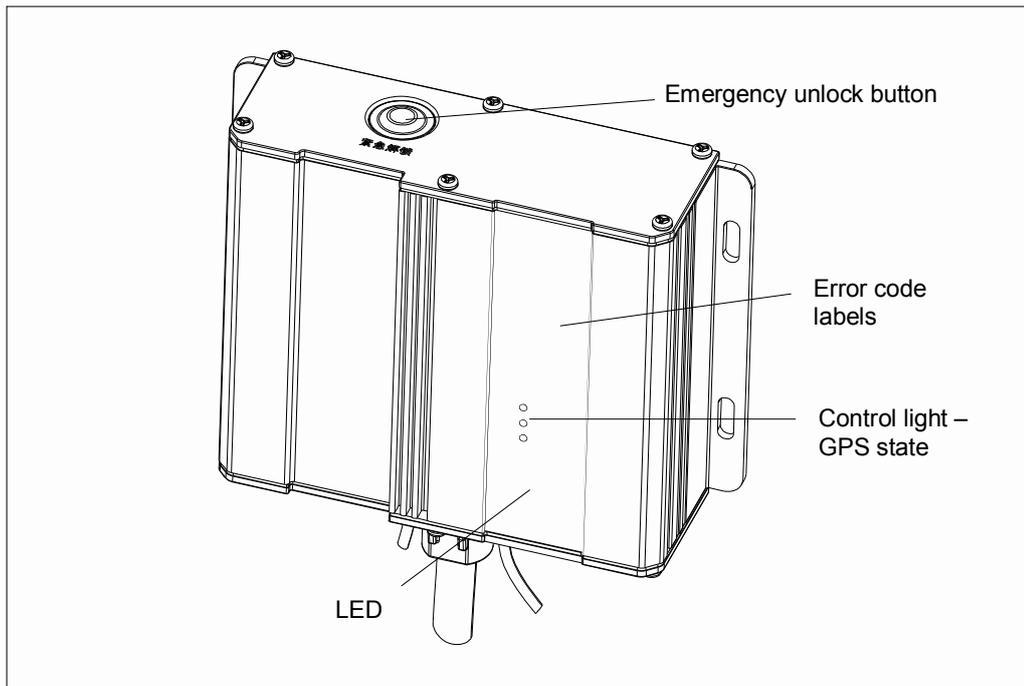


Fig. 06 – 07

### 6.3.1 Digital display

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

The error codes are as follows:

<b>0:</b> Main power defect	<b>1:</b> Locked automatically because of no network signal	<b>2:</b> Receive locking command from the platform
<b>3:</b> ON position signal fault	<b>4:</b> Locked because of CAN bus communication fault	<b>5:</b> Note: To be locked
<b>6:</b> SIM card fault	<b>7:</b> RS232 communication fault	<b>8:</b> LED self-inspection
<b>9:</b> 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 unlock

When the crane enters into areas that without China Mobile network signal coverage or there is SIM card fault (including the condition that it is behind the payment) after a certain time, GPS terminal will lock the crane automatically.

If the crane needs to be operated immediately, unlock the crane temporarily by activating the emergency unlock button.

Please remove the defects according to the actual conditions.



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

Carry out emergency unlocking operation in the following steps:

- a) Dial Zoomlion service hot line 400-800-1680 and provide the VIN and GPS error code. Zoomlion service center will give you the emergency unlock 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.
- c) 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.
- d) Continue to input the next numeral of the password.
- e) 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, the LED displays "C" for 10 seconds. The emergency unlocking operation fails.



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



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

### 6.3.3 GPS state control light

There are 3 control lights in different colors on the GPS. All the control lights flash under normal condition. When there is abnormality, obey the items in the table to remove the defects.

Abnormal state of control lights		Failures	Causes
Yellow	Illuminates / extinguishes	The GPS is off-line, the command as well as the text message are sent out unsuccessfully.	GSM can not receive mobile network.
Red	Illuminates / extinguishes	GPS can not navigate the crane or the position fixing is inaccurate.	GPS receives weak network signal because the GPS antenna is not connected well.
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 and points for attention

The crane can be driven by its power or be transported by train or other carriers for a long distance. During transportation, chock the wheels and make the crane safe with wire ropes. Fully close the windows and door to keep rain and moisture out of the cab. Lock the door and windows. The lifting positions on the chassis frame and slewing table are shown in the Fig. 07 – 01:

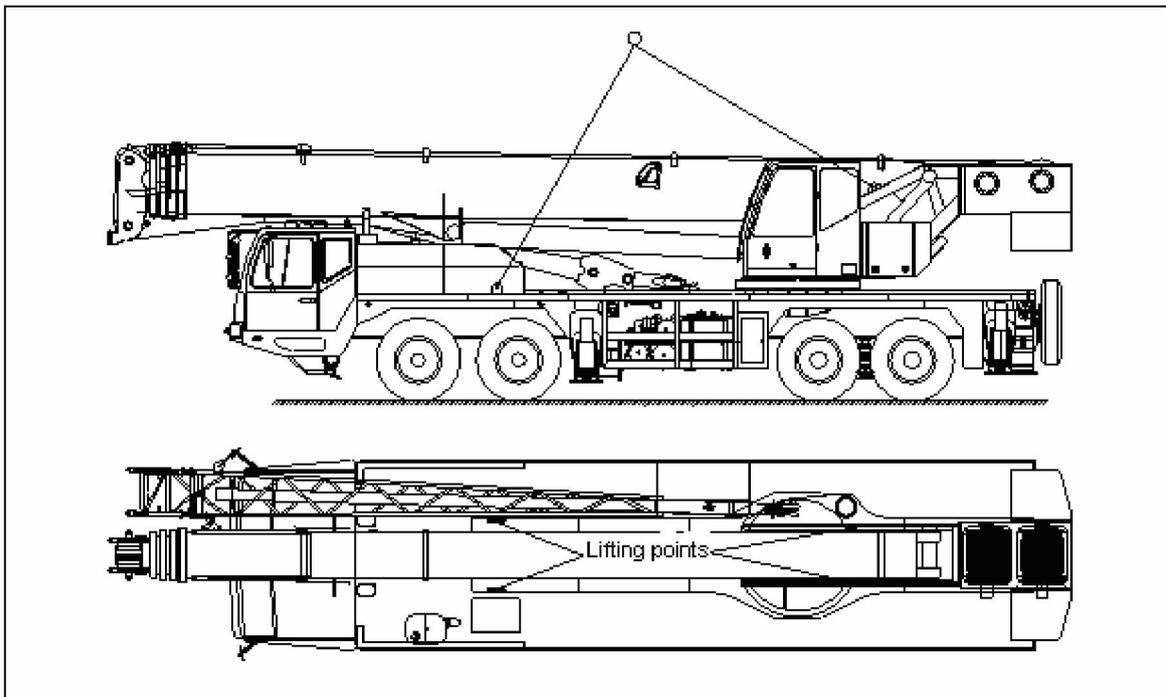


Fig. 07 – 01

 **WARNING**

**Slings must be of enough strength!**

## 7.2 Storage conditions and the points for attention in 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 of the crane.
- c) Retract all the piston rods of the cylinders (except vertical cylinders) to their Min. length.
- d) Extend the vertical cylinders to keep tires away from the ground.
- e) Inflate the tires to specified pressure and put wooden blocks beneath 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 the connecting wire from the battery to the electrical system. If it is not used for a long period, charge it every three months.
- h) You must lubricate the surfaces of all the exposed metal components to prevent corrosion.
- i) Clean out dust and sand from wire ropes and grease those with ZG-3 graphite calcium based grease.
- j) The crane should be stored in a garage. If not, take measures against rain, thunder and freeze.
- k) Operate the engine for more than 1 hour every three months. Examine the mechanisms at idle speed to make sure that they operate correctly.
- l) As for the crane which has been stored for more than one and half years, besides routine cleaning and maintenance, carry out a thorough inspection and maintenance on the complete vehicle. Decide whether to replace the diesel oil filter element, air filter element, to clean the cooling system or to change diesel oil and coolant according to actual conditions.
- m) Make sure that one person keeps the crane prepared for operation.