QY25K5 TRUCK CRANE

OPERATION MANUAL

(Hydraulic pilot control)

XUZHOU HEAVY MACHINERY CO., LTD.
XUZHOU CONSTRUCTION MACHINERY GROUP CO., LTD. CHINA

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Pages: 1 up to 107

VIN	
Date	

The operation manual is part of the crane!

Always keep on hand!

This equipment is designed and manufactured by complying with the standard of Q/320301JAF25—2007 or Q/320301JAF145—2007 or Q/320301JAF94—2006 and GB6068-2005 or JB9738-2000

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QY25K5 Truck Crane Packing List

Serial number:

No.	Name	Qty	Package	Remark
1	QY25K5 Truck Crane	1	No package	With 20 L of fuel
2	QY25K5 Product Certificate	1		
3	QY25K5 Operation Manual	1		
4	QY25K5 Parts Catalogue	1		
5	QY25K5 Maintenance Manual	1		
6	LMI Operation Instruction	1		
7	Supplied Spare Parts List	1		
8	Supplied Spare Parts	1 set	Crate	

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Preface

This manual describes the correct operation, inspection and adjustment for QY25K5 Truck Crane. In order to give full rein to the crane high performance, please read, understand and use the operating instructions in this manual to ensure safety and high efficiency work for a long time. And pay more attention to the contents of "Danger", "Caution" and "Note" in this manual. For special application, please contact the technical department of our company.

Moreover, this manual contains the detailed description of all parts and control components as well as superstructure and chassis.

All regulations and guidelines applicable to the job site, such as accident prevention regulations and all guidelines and regulations stated in the manual must be strictly adhered to.

All cranes have been checked strictly in our factory and are supplied to Customers with all control components correctly set.

The machine has a 12-months warranty beginning from the date of the machine delivery to Customers. Warranty policy should be returned to manufacture after warranty period, items repaired and equipment situations should be recorded in the warranty policy.

⚠ **Only the trained and qualified personnel can work on this crane.**

Pay attention to periodic inspections of crane safety devices and don't use reluctantly the devices with any defects and abnormalities. What you should always keep in mind is **"Safety Is Top Priority ".**

Please keep the supplied technical documents and operation manual carefully, and operate the machine according to instructions in them. Our warranty is voided if your machine is not operated and maintained in accordance with our directions.

We reserve the right to modify the design without notice for improvement.

Contents

Description of this crane

I. General Safe Operation Practices

1.1 Definition

1.1.1 Supervisor: person who possesses necessary theoretical and practical knowledge and has experience related in correctly operating cranes and lifting equipments.

1.1.2 Driver (operator): person who performs lifting operation or crane installation.

1.1.3 Employer: person or organization who employs employees to carry out lifting operation.

1.1.4 Rated load: the max. load which crane can lift in specified conditions.

1.1.5 Equipment conditions

1.1.5.1 Working conditions: the conditions under permissible wind velocity in which crane can handle rated load and other conditions stipulated by standard and/or manufacturer.

1.1.5.2 Non-working conditions: the conditions that crane is in downtime, no load applied, and other conditions stipulated by standard and/or manufacturer.

1.1.6 The center of gravity: the point in which all mass of a load is regarded to centralize, or the point on which all parts of an object is balanced.

1.1.7 Operation: any process of working using or operating crane, such as transporting, installing, disassembling, maintaining crane as well as handling load.

1.1.8 User(s): supervisor or organization who manages lifting operation.

1.1.9 Designated person: person who is authorized to manage crane operation and represent the organization that owns the load to be handled.

1.2 Crane Operation Management

1.2.1 System for Safe Working

System for safe working should be built, and it must be obeyed whenever one single operation or a group of cyclic work is performed, as well as operation in unfixed or fixed place (in a factory or dock). The system consists of:

1.2.1.1 Work planning

Working plan must be done for crane safe operation to ensure that all potential dangers at the jobsite are considered. It should be observed in operation;

1.2.1.2 Select, supply and operate cranes and lifting equipments properly;

1.2.1.3 Maintain, check and inspect cranes and lifting equipments;

1.2.1.4 Develop specialized training plan and designate supervisor and crew related to crane operation;

1.2.1.5 Entire supervision should be done by an authorized person who is specially trained and in possession of necessary limits of authority;

1.2.1.6 Obtain necessary certifies and other valid documents;

1.2.1.7 Using or operating cranes by an unqualified person is not allowed;

1.2.1.8 Watch out for the safety of person who is not related to crane operation;

1.2.1.9 Cooperate with other organization to prevent harmful accident or for safety protection;

1.2.1.10 The communication which personnel including crane operator can understand should be equipped. All system for safe working should be reported to all departments concerned.

1.2.2 Crane Operation Management

For fulfillment of the system for safe working, a person should be designated to supervise crane operation instead of the organization that owns the load to be handled. He should be trained and has practical experience.

1.2.3 Contract Conditions

1.2.3.1 Contract for crane operation

Employer may make contract with "user" who is to undertake crane operation. The contents of the contract is:

1.2.3.1.1 All works should be done according to the requirements explained in this section;

1.2.3.1.2 User should employ personnel who satisfies employer as explained in item 2.2;

1.2.3.1.3 Employer should inform user all information in written form;

User should observe all requirements stipulated in the section. User should be authorized to fulfill related duties, including the right to manage and direct personnel who belongs to employer. Before signing a contract, employer has a duty to satisfy the user's right for performing work according to the requirements explained in this section.

1.2.3.2 Lender's responsibility

When a user (or organization) rents crane and operator for lifting operation, the lender has the responsibility to designate qualified operator and lend a crane, which has been maintained, checked and inspected.

1.2.3.3 User's responsibility

User (or organization) has a duty to designate a supervisor according to the requirements explained in item 1.2.2. Although the owner of the crane has supplied some recommendation for crane selection and other items, user still has the right to ensure that the crane with proper type, dimension and lifting capacity is used and the working plan is performed.

1.3. Personnel Selection, Responsibilities and Basic Requirements

1.3.1 Basic Requirements

Safety of the machine depends on the selection of the supervisor.

1.3.2 Driver's Responsibility

Safety is the priority that operator must take into consideration and be on alert. He must refuse to operate when he knows it is unsafe, and consult his supervisor when safety is in doubt.

He must read and understand the 'Operator's Manual' and see that the machine is in proper order (especially the tightness of slings and rope sockets) before operating.

He must understand how to read the lifting load table and know that his machine can safely lift each load before attempting to lift it.

He must be alert, physically fit, and free from the influences of alcohol, drugs, or medications that might affect his eyesight, hearing, reactions and judgment.

He should check the job site in person before operation. He must see that unnecessary people, equipment, and material are kept out of the work area. The area around the machine should be properly barricaded.

When an operator's vision is restricted or when operating in hazardous places such as near electrical power lines or around people, a signalman must be used. Because the operator is not always in the best position to judge distances and can not see all parts of the jobsite, a signalman may also be necessary at other times. Operators must understand standard crane signals and take signals only from designated signalmen.

Operators must respond to emergency stop signal whenever and whoever sent.

Operator must not leave the crane unattended during working.

1.3.3 Signalman's Responsibility

The primary duty of a signalman is to assist the operator in safe and efficient operation. Operators depend on designated signalmen to assist them in making movements without endangering people or property.

Signalmen must have a clear understanding of the work to be done so that they can safely coordinate each job with operators and crew.

Signalmen must place themselves where they can be clearly seen and where they can safely

observe the entire operation. Standard crane signals must be used unless other methods of signaling such as two way radios or flags have been agreed upon.

1.3.4 Responsibility of All Crew

Inspect the tightness of slings and rope sockets.

Any unsafe condition or practice must be corrected or reported to the job supervisor.

Everyone who works around the crane, including riggers and maintenance personnel, must obey all warning signs and watch out for his own safety and the safety of others. Crew setting up machines or handling loads are expected to know proper machine erection and rigging procedures.

Watch out for hazards during operations and alert the operator and signalmen of dangers such as power lines, the unexpected presence of people, other equipment or unstable ground conditions.

1.3.5 Management's Responsibility

See that operators are trained, competent, physically fit and, if required, licensed. Good vision is required, as are good judgment, coordination and mental ability. Any person who lacks any of these qualities must not be allowed to operate a crane.

Signalmen must have good vision and sound judgment, know standard crane signals and be able to give signals clearly. They must have enough experience to be able to recognize hazards and signal the operator to avoid them.

Riggers must be trained to determine weights and distances and to select proper lifting tackle. It is management's responsibility to employ qualified riggers.

Crew must be given specific safety responsibilities and instructed to report any unsafe conditions to their supervisors.

1.3.6 Planning the Job

Most accidents can be avoided by careful job planning. The person in charge must have a clear understanding of the work to be done and equipment capabilities. He must consider all dangers at the jobsite, develop a plan to do the job safely, and then explain the plan to all concerned. Factors such as these should be considered:

(1) What crew is needed and what responsibilities will they be given?

(2) What is the weight and volume of load to be lifted, working radius, boom length and angle, and crane lifting performance?

(3) How will the signalmen communicate with the operator?

(4) What equipment is required to do the job safely? Is a crane the best equipment for the

job?

(5) How can the equipment be safely transported to the jobsite?

(6) Are there gas lines, power lines or structures that must be moved or avoided?

(7) Is the surface strong enough to support the machine and load?

(8) How will loads be rigged? What special safety precautions must be taken if more than one crane is needed to lift a load?

(9) What safety precautions must be taken when encounter unusual weather conditions such as winds, extreme cold, rain and snow?

(10) What steps will be taken to keep unnecessary people and equipment safely away from the work area?

(11) Try to use the shortest boom and radius possible.

1.3.7 Operator's Checklist

The operator must make a safety check before starting to work each day to see that the machine is in proper order. Checklist is as the following:

(1) Do the checking of regular service.

(2) Check the machine log to see that periodic maintenance and inspections have been performed and all necessary repairs made.

(3) Check the operation of safety devices and indicators.

(4) Carefully inspect load-bearing parts such as wire rope, boom, outriggers, hooks, and rigging.

(5) Check the wear of slings and hooks.

(6) Be sure no unauthorized field modifications have been made, such as counterweights increased or decreased and booms that have been improperly repaired.

(7) Check for fuel and hydraulic oil leaks.

(8) Test all controls for proper operation.

(9) After starting the engine, check all gauges for proper readings.

(10) Check the operation of brake and clutch.

1.3.8 Operation Precautions

Mistakes in calculating lifting capacity can cause accidents. So the following should be taken into consideration:

(1) Working radius is the horizontal distance from centerline of rotation to a vertical line through the center of gravity of the load. Note that the working radius will increase when the load is lifted.

(2) Weight of the load, hooks and slings.

(3) Boom length, jib, working radius and parts of line and operating area (side, rear).

(4) Use the next lower rated capacity when working at boom lengths or radius between the figures on the rating chart. It is dangerous to guess the capacity for boom lengths or radius between those listed on the rating plate.

(5) Trying to lift a load without knowing whether it is within the rated capacity while expecting the crane to start to tip to warn of an overload is very dangerous and should never be done. Cranes may suddenly tip over or collapse if the load is too heavy.

(6) Safety protective equipments (safety belt, helmet) should be worn when work on structural parts.

(7) The rated load is based on condition that the crane is set on firm ground horizontally. Cranes may tip over or collapse if the operating surface can't support their weight. Timber mats, steel plates may be needed under crane to distribute the load under it so that the bearing strength of the ground is not exceeded. Never place crane on sewer or underground pipeline or air-raid shelter.

(8) Never slewing with a load when the crane is leveled more than 1 %of grade. No person and objects piled are permitted within slewing radius.

(9) Avoid overloading, side loading and lifting load sideway. Trying to lift a load that is stuck, frozen or attached to something else may result in tipping, boom collapse or other damage. Be sure that loads are free before lifting.

(10) Never use the crane as a lifter for transferring person.

(11) Never operate the crane before extending jacks and outrigger beams fully.

(12) It is not allowed to interrupt common operation by using emergency stop device.

(13) The safety regulations must be obeyed.

(14) The operation should be stopped whenever the wind speed exceed grade 7 and the wind pressure is greater than 125N.m

(15) The crane operation is forbidden whenever the thundering happens.

(16) The boom should not be lowered to the extent, which exceeds the valve specified in the Total Lifted Load.

(17) The crane is forbidden to travel when the jib pin is extracted; otherwise, the jib may fall off.

(18) The welding of the vehicle is forbidden when the truck is with power. Before welding, the positive pole and negative pole should be dismantled from the battery. The welding parts should be 0.61m from the ground cable of the welding machine. The ground cable of the welding machine should not be connected to the generator.

(19) Operate the PTO, only after the clutch is disengaged

(20) The engine running should strictly obey the Engine Operation and Maintenance Manual.

(21) When operate crane near power electrical lines, the safe clearances keeping any part of crane from the lines should comply with those shown in table 1—1, otherwise serious injury or death will occur, and then consequent power failure accidents such as civil electricity, electricity for hospital endangering patient, civil airport and traffic chaos and factory stopping work.

Minimum distance between boom, load and electrical overhead wires Table 1—1

Voltage of power lines (kV)	V < 1	1< V ≤15	15< V ≤40	40< V ≤100	100< V ≤220
Safety distance (m)	1.5	3	4	5	6

1.3.9 Emergency Methods When Electrical Accident Occurs

(1) Notify the electrical power company immediately.

(2) It any part of the crane or rigging contacts a high voltage line, the safest procedure for the operator is to stay at his post until the contact is cleared, or the power has been shut off. If the operator must leave the machine, he should jump off, rather than climb off.

(3) In case someone gets electric shock, artificial respiration and heart massage must be carried out at once.

(4) If the lines are broken, inform people around to keep out the lines and barricade this area.

(5) After an accident, if reuse the crane, inspect all instruments.

1.3.10 Precautions Against Lightning and Earthquake

When lightning or earthquake occurs, immediately do the following:

(1) Stop the work, and lower the load onto the ground. Retract the boom fully and position it on boom rest.

(2) Engage the brakes, stop the engine, and turn off the electrical power of all electric circuits.

(3) Advise all personnel to stay away from the surrounding area of the machine.

1.3.11 Influence of Wind

Influence of the wind on the machine becomes larger in proportion to the size of a lifted load, lifting height, and boom length. Especially, the following cases are very dangerous, so utmost care is necessary for operation.

(1) When lifting a load of wide area, against which the wind blows hard, the wind could cause the overturn of the machine and damage to the boom. The wind could also blow the load

against the boom, and could cause damage.

(2) When the boom is fully raised without a load, the wind could blow the boom backward resulting in an overturn of the machine.

1.3.12 Cautions for Wind

When performing crane operation in strong wind, utmost cautions are required according to the wind velocity, machine condition and working environment. The wind velocity is different on the ground than in the high air. It is also different on flat ground and in city air. Always considering these conditions and taking proper measures to meet the situation. The wind velocity mentioned here means the instantaneous wind speed.

1.3.13 Method of Wind Velocity Measurement

The position where the wind works against the machine is the height above the ground that corresponds to 60% of the boom length at that time. Since the wind velocity of the weather report is the average wind speed for 10 minutes at a height of 10 meters above the ground, it is necessary to convert it into the instantaneous wind speed.

Conversion Table of wind velocity **Table 1—2**

Wind velocity of weather report (m/s) / Height above ground (m)	3				5				8				10			
	Flat area		City area		Flat area		City area		Flat area		City area		Flat area		City area	
	Av.	Inst.	Av.	Inst.	Av.	Inst.	Av.	Inst.	Av.	Inst.	Av.	Inst.	Av.	Inst.	Av.	Inst.
5	2.7	9.8	2.5	0.0	4.5	11.7	4.2	11.4	7.1	14.5	6.7	14.0	8.9	16.3	8.4	15.8
10	3.0	10.2	3.0	10.2	5.0	12.3	5.0	12.3	8.0	15.4	8.0	15.4	10.0	17.5	10.0	17.5
15	3.2	10.4	3.3	10.5	5.4	12.7	5.6	12.9	8.6	16.0	8.9	16.3	10.7	18.2	11.1	18.7
20	3.4	10.5	3.6	10.8	5.6	12.9	6.0	13.3	9.0	16.5	9.5	17.0	11.2	18.8	11.9	19.5
25	3.5	10.7	3.8	11.0	5.9	13.2	6.3	13.6	9.4	16.9	10.1	17.6	11.7	19.3	12.6	20.2
30	3.6	10.8	4.0	11.2	6.0	13.3	6.6	13.9	9.6	17.1	10.6	18.1	12.0	19.6	13.2	20.9
40	3.8	11.0	4.2	11.5	6.3	13.6	7.1	14.5	10.1	17.6	11.3	18.9	12.6	20.2	14.1	21.8
50	3.9	11.1	4.5	11.7	6.6	13.9	7.5	14.9	10.5	18.0	12.0	19.6	13.1	20.8	15.0	22.8
75	4.2	11.4	5.0	12.2	7.0	14.4	8.3	15.7	11.2	18.8	13.2	20.9	14.0	21.7	16.5	24.8
100	4.4	11.6	5.3	12.6	7.4	14.8	8.9	16.3	11.8	19.4	14.2	21.9	14.7	22.4	17.8	26.7

If an instantaneous anemometer is provided in the machine, measure the wind velocity with the anemometer provided on the boom tip section. If an instantaneous anemometer is not provided in the machine, the wind velocity given by a weather report can be converted to the instantaneous wind speed. The instantaneous wind speed can be approximated by the table below.

Wind Speed Description **Table 1—3**

Wind speed (m /s)	Name	Beaufort number	Effects observed on land
≤0.3	Calm	0	Calm; smoke rises vertically.
0.3~1.6	Light air	1	Smoke drift indicates wind direction.
1.6~3.4	Light breeze	2	Wind felt on face; leaves rustle.
3.4~5.5	Gentle breeze	3	Leaves, small twigs in constant motion, light flags extended.
5.5~8.0	Moderate breeze	4	Dust, leaves and loose paper rises up.
8.0~10.8	Fresh breeze	5	Small trees in leaf begin to sway, and there are waves on the surfaces of pool and natural pond.
10.8~13.9	Strong breeze	6	Larger branches of trees in motion, whistling heard in wires; umbrella uneasy to open.
13.9~17.2	Moderate gale	7	Whole trees in motion; resistance felt in walking against wind.
17.2~20.8	Fresh gale	8	Twigs and small branches broken off trees; progress generally impeded.
20.8~24.5	Strong gale	9	Slight structural damage occurs (chimney broken, slate blown from roofs).
24.5~28.5	Whole gale	10	Trees broken or uprooted; considerable structural damage occurs.
28.5~32.7	Storm	11	Very rarely experienced on land; usually accompanied by widespread damage.
≥32.7~		12	

1.3.14 Precautions Against Wind

When the wind velocity exceeds 10m/sec. stop the work and lower the load onto the ground and release hook block. Retract the boom fully and position it on boom rest and stop engine.

1.3.15 Environment Influence to Cranes

Suitable working temperature for crane operation is -25～40℃. Beyond the range, the working life of crane and operation safety will be reduced. When operating the crane out of this temperature range:

(1) Viscosity of hydraulic oil, lubricant and grease will be changed, and consequently executive components are damaged mechanically;

(2) Radiation of the crane, the starting of cooling system and engine will be influenced too. Stop operation if atmospheric temperature is beyond normal working temperature.

1.3.16 Precautions against disasters and measures for survival

Fire: when fire occurs, operator should stop operation immediately and carry out emergency measures to avoid risk. Meanwhile, dial the fire number of the country where you stay in. Rescue with the on board fire extinguisher can be performed on the condition that operator's life will not be endangered before rescuers arrive.

Accident: when the doors can not be opened due to accident, operator and (or) driver may break the glasses with the breaker equipped in the cabs.

Lightning strike: when lightning strike occurs during operation, driver shouldn't be confused. Stay in the cab and don't touch any metal items in the cab to avoid lightning strike.

1.3.17 Cleaning of the crane

The crane should be cleaned after a period of operation. Flush the greasy dirt on the outside surface of the crane with washer solvent. The ones in cabs should be removed with cleaning cloth, plus related washer solvents if necessary. Prevent washer solvent entering into load moment indicator and instrument panel, otherwise short circuit will occur.

1.3.18 Noise

Noise level at seated position is ≤90 dB(A), exterior noise level during acceleration traveling is ≤88 dB(A), exterior noise level during traveling with uniform velocity is ≤84 dB(A), and noise level in operator's cab during operation is 118 dB(A).

II. Applications and Features

QY25K5 truck crane is suitable for lifting operation and installation work in plants, mines, oil field, ports, construction sites, etc.

The features of QY25K5 are as the following:

1. The machine with high-tech, designed and developed by our company, has taken out many patents from China Patent Agency, and gained "Three C" certification. Main technical data and performance are ahead of all other countries;
2. The vehicle consists of chassis, lifting boom, turntable, jib, winch system, slewing system, telescoping system, elevating system, hydraulic system, electric system, counterweight and operator's cab, etc.;
3. Full dimension flat-head cab for chassis, all covered walking surface, double H-type outriggers, a fifth jack are available, as well as 360° operation of boom, power system with various options.
4. Five-section boom of octagonal cross-section extends from 10.1m to 38.5m. Special sliders, aligning device and high-tension steel plates contribute to smooth telescoping, reliable alignment, light boom weight and strong lifting capacity.
5. Double-cylinder plus ropes for boom telescoping.
6. Hydraulic transmission for both superstructure and chassis. Each mechanism speed can be changed steplessly, so smooth movement and easy operation are gained.
7. Main and auxiliary winch systems of same model, equipped with integrated planetary reducers arranged in drum. The motor of variable displacement contributes lower speed with heavy load and higher speed with light load as well as high efficiency.
8. Slewing system with planetary reducer and constant closed-type brake has free-sliding function. Straight-tooth slewing bearing activated by a motor and a buffer valve fitted in the hydraulic system contribute to free sliding and reliable inching control.
9. Equipped with perfect safety devices: Load moment indicator (LMI), height limiter, outrigger pinning system and electric level gauge. And illuminators facilitate night operations.
10. Operator's cab with overall view of vision, equipped with heater and air conditioner, screen

adjustable shock-absorber seats, is noise & heat insulation.

11. Lower center of gravity, good stability and maneuverability, faster travel speed, suitable for rapid work-site transfer.

III. Technical Performance and Specifications

3.1 Crane Outline and Specifications

(1). Refer to Fig. 3—1 for Truck Crane Outlines of XZJ5310JQZ25K and XZJ5311JQZ25K
Refer to Fig. 3—1a for Truck Crane Outline of XZJ5328JQZ25K

(2). Refer to Tables 3—1 and 3—2 for Technical Specifications of XZJ5310JQZ25K and XZJ5311JQZ25K
Refer to Tables 3—1a and 3—2 for Technical Specifications of XZJ5328JQZ25K

(3). Total Rated Lifting Load for Boom (see Tables 3—3 and 3—4)

(4). Total Rated Lifting Load for Jib (see Tables 3—5 and 3—6)

(5). Crane Lifting Height Curves (see Figs. 3-2 and 3—3)

(6). Refer to Figs. 3—4 and 3—5 for Crane Working Areas of XZJ5310JQZ25K and XZJ5311JQZ25K
Refer to Figs. 3—4a and 3—5a for Crane Working Areas of XZJ5328JQZ25K

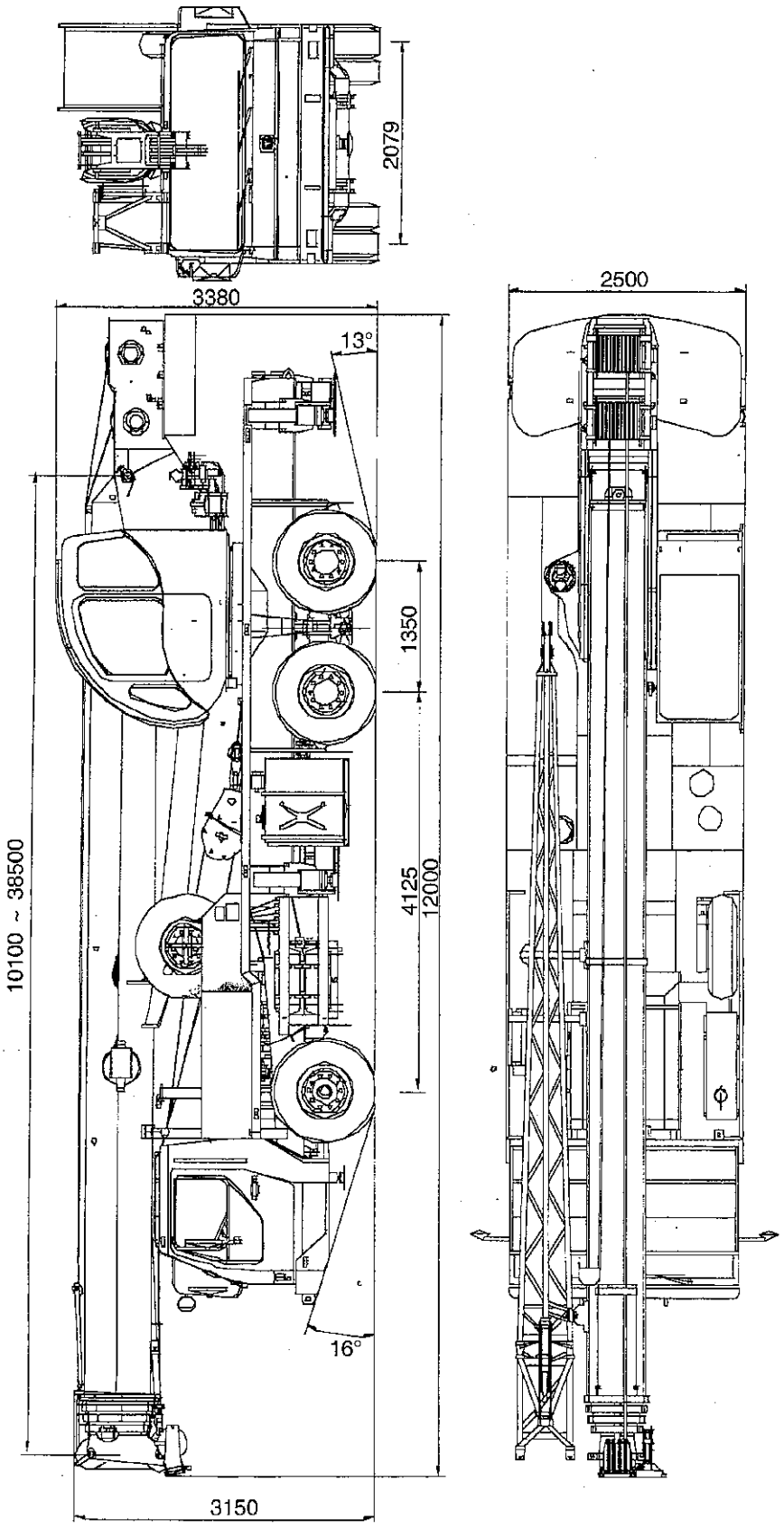


Fig. 3—1

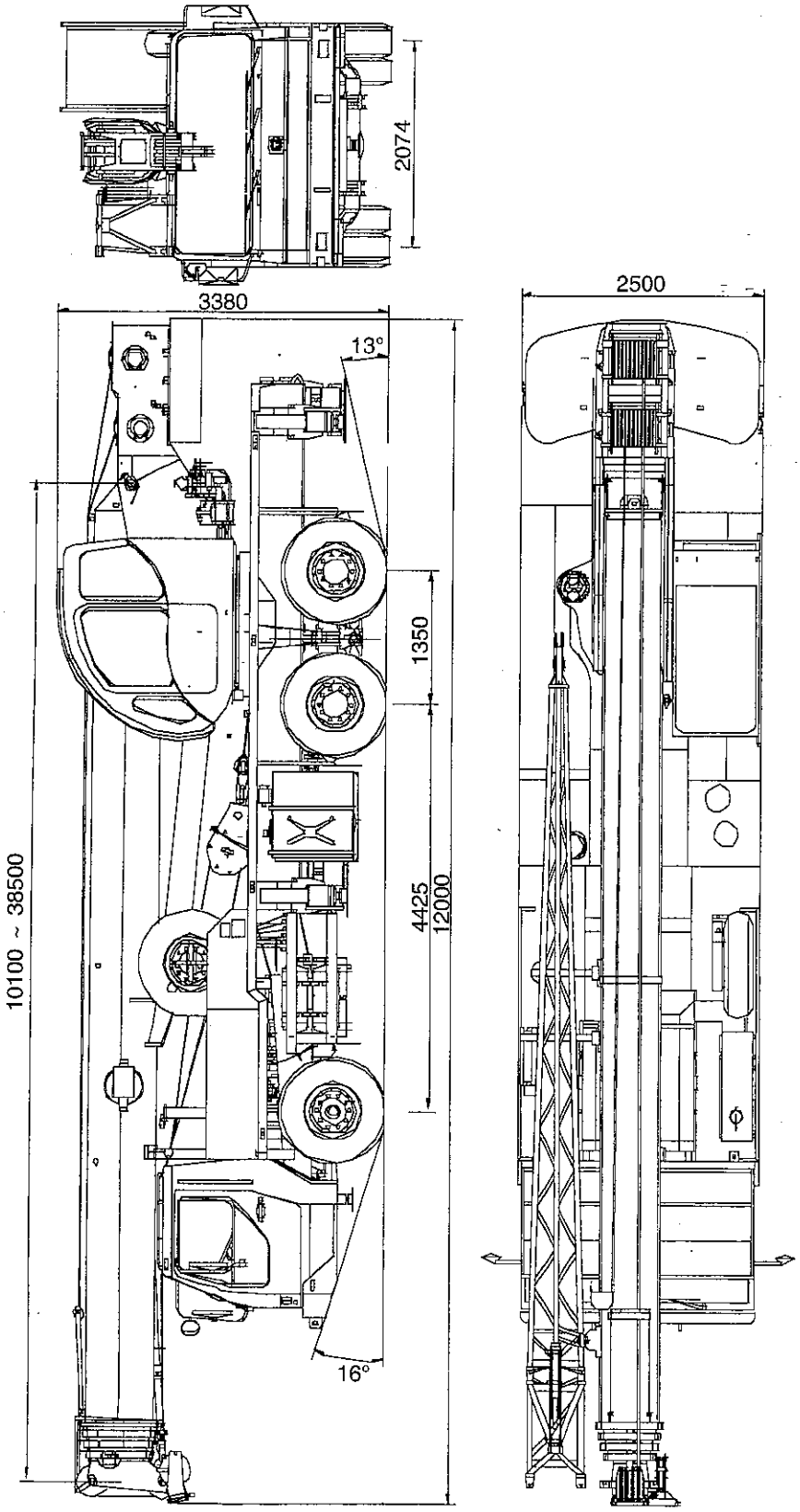


Fig. 3－1a

QY25K5 Truck Crane Main Technical Data for Lifting Operation Table 3—2

Category	Item			Unit	Parameter	
Lifting performance	Max. total rated lifting capacity			t	25	
	Min. rated working radius			m	3	
	Turning radius at turntable tail			mm	3065	
	Max. load moment	Base boom		kN · m	961	
		Full-extend boom		kN · m	450	
		Full-extend boom + Jib		kN · m	436	
	Outrigger span	Longitudinal distance		m	4.8	5.14
		Lateral distance		m	6.0	
	Lifting height	Base boom		m	10.2	
		Full-extend boom		m	38.6	
		Full-extend boom + Jib		m	47.6	
	Boom length	Base boom		m	10.1	
		Full-extend boom		m	38.5	
		Full-extend boom + Jib		m	46.8	
	Jib offset angle				0° , 15° , 30°	
Working speed	Elevating time	Boom raising		s	68	
	Telescoping time	Boom fully extending		s	150	
	Max. swing speed			r/min	2.5	
	Outrigger extending/ retracting time	Outrigger beam	Extending synchronously	s	35	
			Retracting synchronously	s	30	
		Outrigger jack	Extending synchronously	s	40	
			Retracting synchronously	s	35	
	Hoisting speed	Main winch	Full load	m/min	75	
			No load	m/min	125	
		Auxiliary winch	Full load	m/min	75	
			No load	m/min	125	
Noise limit	Cab exterior noise			dB(A)	≤118	
	Noise at seated position			dB(A)	≤90	

Total Rated Lifting Load for Boom (with fully-extended outriggers) Table 3—3

With fully-extended outriggers, without front jack, boom over side or over rear; with fully-extended outriggers and front jack down, 360° operation of the boom																					
Working radius	Base boom 10.1m			Mid-extended boom 13.65m			Mid-extended boom 17.2m			Mid-extended boom 22.52m			Mid-extended boom 27.85m			Mid-extended boom 33.18m			Fully-extended boom 38.5m		
	Lifting load	Boom angle	Lifting height	Lifting load	Boom angle	Lifting height	Lifting load	Boom angle	Lifting height	Lifting load	Boom angle	Lifting height	Lifting load	Boom angle	Lifting height	Lifting load	Boom angle	Lifting height	Lifting load	Boom angle	Lifting height
3	25000	66.6	10.2	22000	73.0	14.0															
3.5	25000	63.5	9.9	21500	70.8	13.8															
4	24200	60.2	9.6	20000	68.5	13.6	17000	73.1	17.4												
4.5	21800	56.7	9.3	18000	66.2	13.4	16000	71.4	17.2	12000	75.9	22.8									
5	19100	53.2	8.9	16500	63.9	13.1	15000	69.6	17.0	11400	74.6	22.7	9500	77.6	28.2						
5.5	17300	49.4	8.4	15000	61.5	12.8	14000	67.8	16.8	10800	73.3	22.5	8800	76.5	28.0						
6	15800	45.4	7.9	13500	59.0	12.5	13000	66.0	16.6	10400	71.9	22.3	8400	75.5	27.9	6600	77.9	33.4			
6.5	13800	41.1	7.4	12200	56.5	12.2	12200	64.1	16.3	9900	70.6	22.2	8000	74.4	27.8	6200	77.0	33.3			
7	12200	36.3	6.7	11200	53.9	11.8	11500	62.2	16.1	9400	69.2	22.0	7600	73.3	27.6	6000	76.1	33.2	5000	78.0	38.6
8	10500	24.0	4.8	10500	48.3	11.0	10200	58.3	15.5	8500	66.4	21.5	7300	71.2	27.3	5600	74.3	32.9	4600	76.5	38.4
9				8600	42.2	9.9	8430	54.2	14.8	7800	63.6	21.0	6600	69.0	26.9	5300	72.5	32.6	4300	75.0	38.1
10				7000	35.2	8.6	6930	49.9	14.0	7100	60.7	20.5	6100	66.7	26.5	4900	70.6	32.2	4000	73.4	37.8
11				5900	26.6	6.8	5760	45.3	13.0	6370	57.7	19.9	5600	64.5	26.0	4600	68.8	31.8	3800	71.9	37.5
12							4830	40.3	11.9	5420	54.6	19.2	5200	62.1	25.5	4300	66.9	31.4	3500	70.3	37.1
13							4070	34.6	10.5	4660	51.4	18.4	4700	59.8	24.9	4000	65.0	31.0	3370	68.7	36.8
14							3440	27.9	8.7	4020	48.0	17.5	4260	57.3	24.3	3700	63.1	30.4	3160	67.1	36.3
15							2800	19.0	6.3	3480	44.4	16.5	3720	54.8	23.6	3400	61.1	29.9	2960	65.4	35.9
16										3020	40.5	15.4	3260	52.2	22.8	3100	59.1	29.3	2850	63.8	35.4
18										2260	31.7	12.5	2500	46.7	21.0	2720	55.0	28.0	2550	60.4	34.3
20										1680	19.3	8.1	2010	40.7	18.9	2130	50.6	26.4	2160	56.9	33.1
22													1540	33.7	16.2	1660	45.9	24.6	1820	53.2	31.6
24													1160	25.1	12.5	1380	40.8	22.4	1450	49.4	30.0
26																1060	35.1	19.8	1140	45.3	28.1
28																780	28.4	16.5	880	40.9	25.9
30																550	19.6	11.8	660	36.0	23.3
32																			480	30.5	20.2
34																			320	23.8	16.2
Parts of line	10			10			6			5			4			3			3		
Telescoping rate of boom section %	2nd	0		50%			100%			100%			100%			100%			100%		
	3rd	0		0			0			25%			50%			75%			100%		
	4th	0		0			0			25%			50%			75%			100%		
	5th	0		0			0			25%			50%			75%			100%		
Min. boom angle	24			26.6			19			19.3			25.1			19.6			23.8		
Max. boom angle	66.6			73			73.1			75.9			77.6			77.9			78		

Total Rated Lifting Load for Boom (with half-extended outriggers of 4.34m)

Table 3—4

With half -extended outriggers, without front jack, boom over side or over rear; With half-extended outriggers and front jack down, 360° operation of the boom

Working radius	Base boom 10.1m			Mid-extended boom 13.65m			Mid-extended boom 17.2m			Mid-extended boom 22.52m			Mid-extended boom 27.85m			Mid-extended boom 33.18m			Fully-extended boom 38.5m		
	Lifting load	Boom angle	Lifting height	Lifting load	Boom angle	Lifting height	Lifting load	Boom angle	Lifting height	Lifting load	Boom angle	Lifting height	Lifting load	Boom angle	Lifting height	Lifting load	Boom angle	Lifting height	Lifting load	Boom angle	Lifting height
3	25000	66.6	10.2	22000	73.0	14.0															
3.5	25000	63.5	9.9	21500	70.8	13.8															
4	24200	60.2	9.6	20000	68.5	13.6	17000	73.1	17.4												
4.5	21800	56.7	9.3	18000	66.2	13.4	16000	71.4	17.2	12000	75.9	22.8									
5	18200	53.2	8.9	16500	63.9	13.1	15000	69.6	17.0	11400	74.6	22.7	9500	77.6	28.2						
5.5	15000	49.4	8.4	14600	61.5	12.8	14000	67.8	16.8	10800	73.3	22.5	8800	76.5	28.0						
6	12500	45.4	7.9	12100	59.0	12.5	12000	66.0	16.6	10400	71.9	22.3	8400	75.5	27.9	6600	77.9	33.4			
6.5	10600	41.1	7.4	10200	56.5	12.2	10100	64.1	16.3	9900	70.6	22.2	8000	74.4	27.8	6200	77.0	33.3			
7	9200	36.3	6.7	8900	53.9	11.8	8800	62.2	16.1	9400	69.2	22.0	7600	73.3	27.6	6000	76.1	33.2	5000	78.0	38.6
8	7000	24.0	4.8	6500	48.3	11.0	6500	58.3	15.5	7500	66.4	21.5	7300	71.2	27.3	5600	74.3	32.9	4600	76.5	38.4
9				5200	42.2	9.9	5200	54.2	14.8	5600	63.6	21.0	6400	69.0	26.9	5300	72.5	32.6	4300	75.0	38.1
10				4000	35.2	8.6	4000	49.9	14.0	4800	60.7	20.5	5200	66.7	26.5	4900	70.6	32.2	4000	73.4	37.8
11				3200	26.6	6.8	3200	45.3	13.0	3800	57.7	19.9	4300	64.5	26.0	4500	68.8	31.8	3800	71.9	37.5
12							2600	40.3	11.9	3100	54.6	19.2	3600	62.1	25.5	3800	66.9	31.4	3500	70.3	37.1
13							2000	34.6	10.5	2600	51.4	18.4	3000	59.8	24.9	3200	65.0	31.0	3370	68.7	36.8
14							1500	27.9	8.7	2000	48.0	17.5	2500	57.3	24.3	2700	63.1	30.4	2900	67.1	36.3
15							1000	19.0	6.3	1700	44.4	16.5	2100	54.8	23.6	2400	61.1	29.9	2600	65.4	35.9
16										1420	40.5	15.4	1700	52.2	22.8	2000	59.1	29.3	2200	63.8	35.4
18										950	31.7	12.5	1250	46.7	21.0	1450	55.0	28.0	1600	60.4	34.3
20										520	19.3	8.1	820	40.7	18.9	950	50.6	26.4	1200	56.9	33.1
22													450	33.7	16.2	700	45.9	24.6	850	53.2	31.6
24																400	40.8	22.4	580	49.4	30.0
26																			350	45.3	28.1
Parts of line	10			10			6			5			4			3			3		
Telescoping rate of boom section %	2nd	0		50%			100%			100%			100%			100%			100%		
	3rd	0		0			0			25%			50%			75%			100%		
	4th	0		0			0			25%			50%			75%			100%		
	5th	0		0			0			25%			50%			75%			100%		
Min. boom angle	24			26.6			19			19.3			33.7			40.8			45.3		
Max. boom angle	66.6			73			73.1			75.9			77.6			77.9			78		

When boom is over side or over rear and boom angle is 0° , max. permissible boom length is 26m.

Total Rated Lifting Load for Jib (with fully-extended outriggers) **Table 3—5**

With fully-extended outriggers, without front jack, boom over side or over rear; with fully-extended outriggers and front jack down, 360° operation of the boom									
38.5m Boom, 8.3m Jib									
Boom angle	0° offset angle			15° offset angle			30° offset angle		
	Lifting load	Working radius	Lifting height	Lifting load	Working radius	Lifting height	Lifting load	Working radius	Lifting height
78	2800	10.7	47.6	2500	12.1	47.2	1900	13.4	46.1
75	2800	13.1	47.3	2400	14.4	46.4	1750	15.6	45.2
72	2750	15.3	46.4	2200	16.7	45.5	1700	17.8	44.2
70	2650	16.8	45.8	2100	18.2	44.8	1600	19.3	43.5
65	2150	20.4	44.1	1800	21.7	42.9	1500	22.7	41.5
60	1800	23.9	42.1	1600	25.1	40.8	1400	26.1	39.2
55	1200	27.2	39.7	1140	28.3	38.3	1050	29.1	36.6
50	800	30.2	37.1	750	31.3	35.6	700	31.9	33.8
40	280	35.6	31.1	260	36.4	29.4	250	36.8	27.6
Weight of hook block: 55kg									

Total Rated Lifting Load for Jib (with half-extended outriggers) **Table 3—6**

With half-extended outriggers, without front jack, boom over side or over rear; with half-extended outriggers and front jack down, 360° operation of the boom									
38.5m Boom, 8.3m Jib									
Boom angle	0° offset angle			15° offset angle			30° offset angle		
	Lifting load	Working radius	Lifting height	Lifting load	Working radius	Lifting height	Lifting load	Working radius	Lifting height
78	2800	10.7	47.6	2500	12.1	47.2	1900	13.4	46.1
75	2800	13.1	47.3	2400	14.4	46.4	1750	15.6	45.2
72	2750	15.3	46.4	2200	16.7	45.5	1700	17.8	44.2
70	2550	16.8	45.8	2100	18.2	44.8	1600	19.3	43.5
65	1470	20.4	44.1	1320	21.7	42.9	1220	22.7	41.5
60	790	23.9	42.1	730	25.1	40.8	680	26.1	39.2
55	350	27.2	39.7	320	28.3	38.3	300	29.1	36.6
Weight of hook block: 55kg									

Notes on Tables 3—3, 3—4, 3—5 and 3—6:

(1). Total rated loads shown in the tables are based on condition that the crane is set on firm ground horizontally.

(2). Each total rated load includes weight of the hooks and slings.

(3). The working radius in the Tables is the actual value including loaded boom deflection. So boom deflection must be taken into consideration before lifting operation.

(4). The 75 % of the tipping load takes into account wind force 7, i.e. lifting operation is not permissible when wind pressure exceeds 125N/m^2.

(5). The boom angle and lifting height in Tables are values for reference. Carry out operation according to the working radius.

(6). 360° operation of the boom is permissible only after the front jack is lowered down. Otherwise, operation with boom over front is not allowed.

(7). Total rated lifting load for single top is the same as that for main boom, but its max. value shouldn't exceed 2800kg.

(8). Use the next lower value when boom length or working radius is between the figures on the tables.

(9). When operate main boom with jib attached, at least 400kg must be deducted from the rated lifting load.

(10). Before operation, the boom 2nd section must be extended before sections 3, 4 and 5; and sections 3, 4 and 5 must be retracted before the 2nd one.

(11). Max. pull line both for main and auxiliary winches is 2800kg. Rope length of main winch is 165m, 105m for auxiliary winch.

(12). Max. outrigger reaction force is 300000N.

(13). Observe the boom angle limit. Never operate the crane with the boom angle beyond limit even without a load lifted. Otherwise, tipping of the crane will occur.

(14). The working radius is in m, lifting load in kg, lifting height in m and boom angle in°

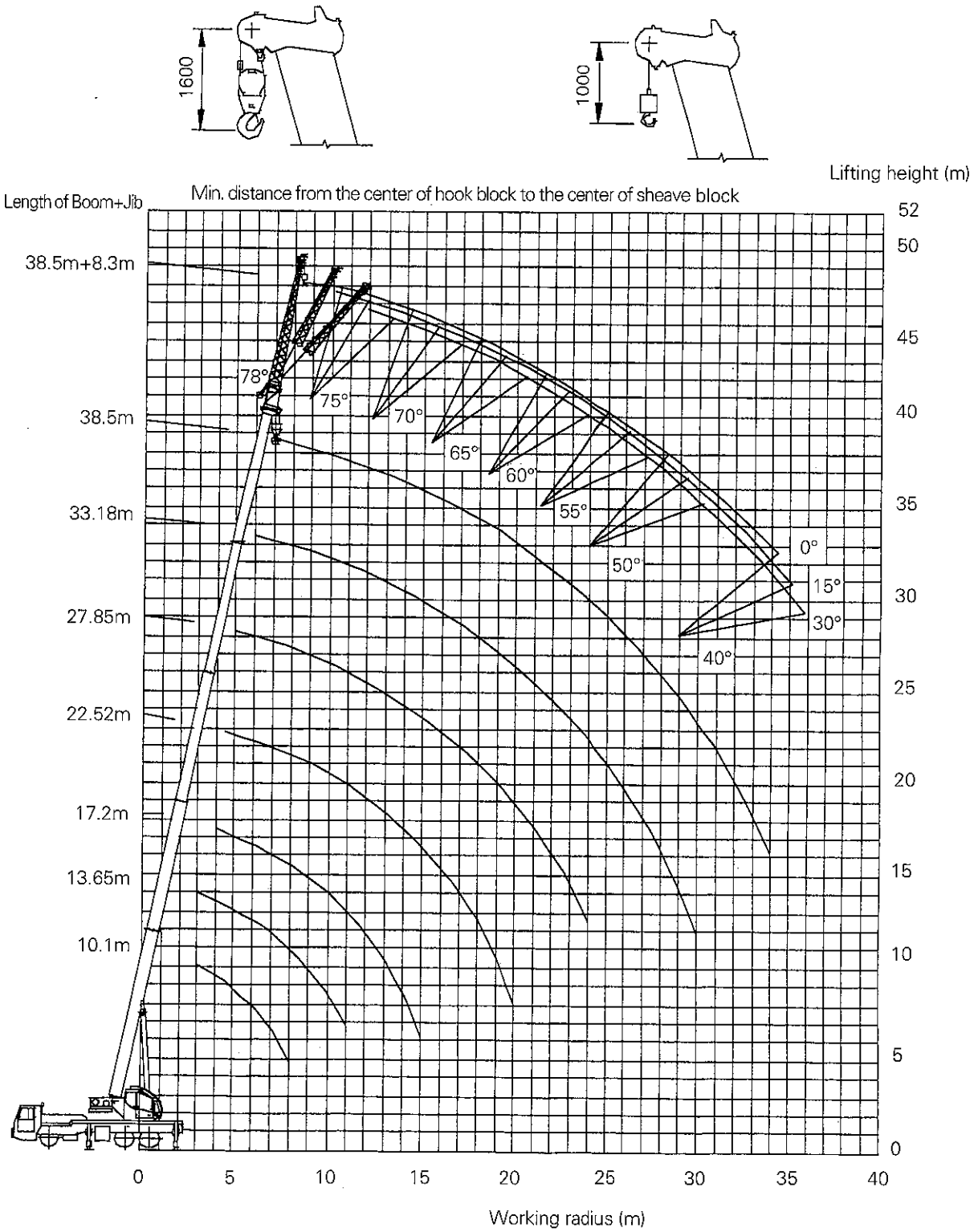


Fig. 3—2 Crane Lifting Height Curves (with fully-extended outriggers)

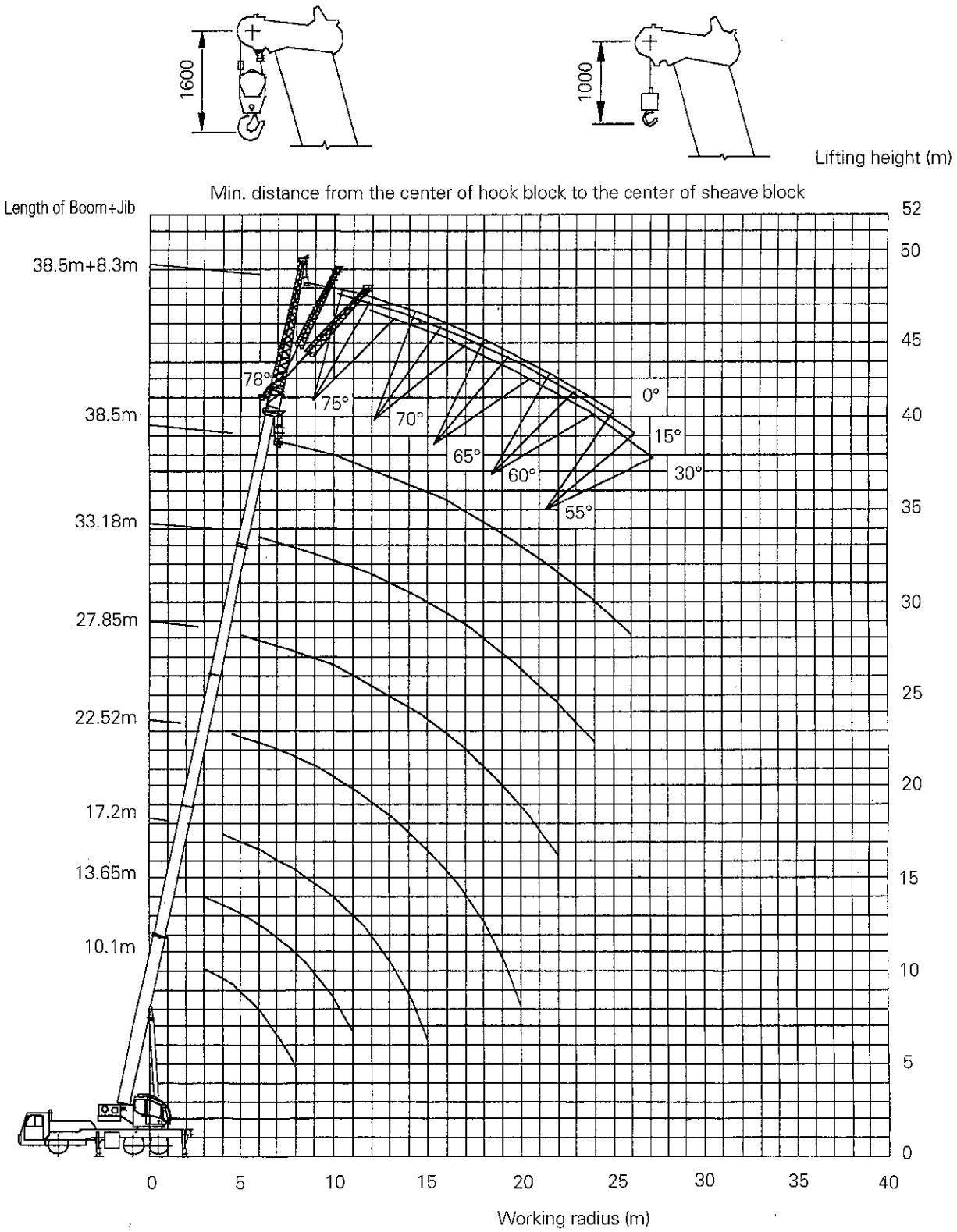


Fig. 3—3 Crane Lifting Height Curves (with half-extended outriggers)

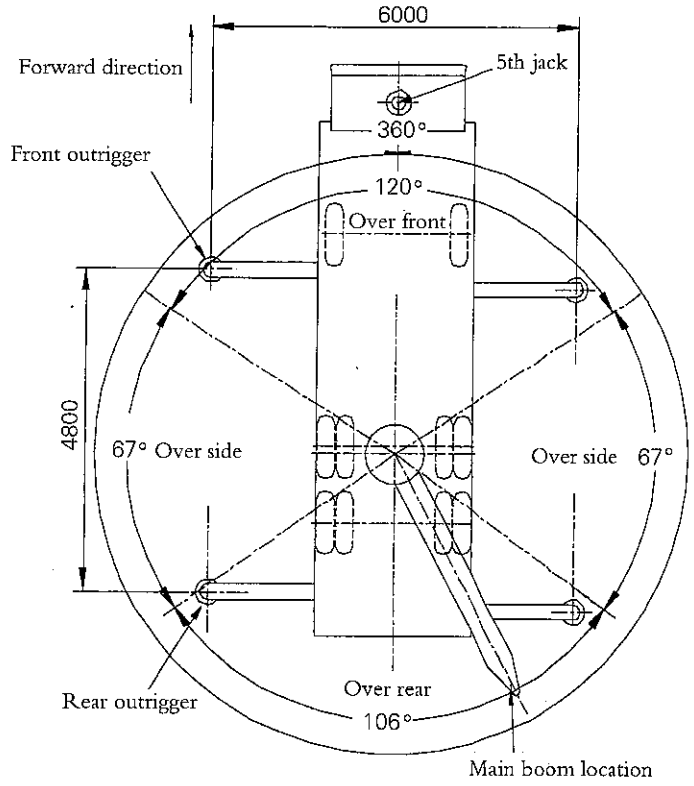


Fig. 3—4 Crane Working Area (for fully-extended outriggers)

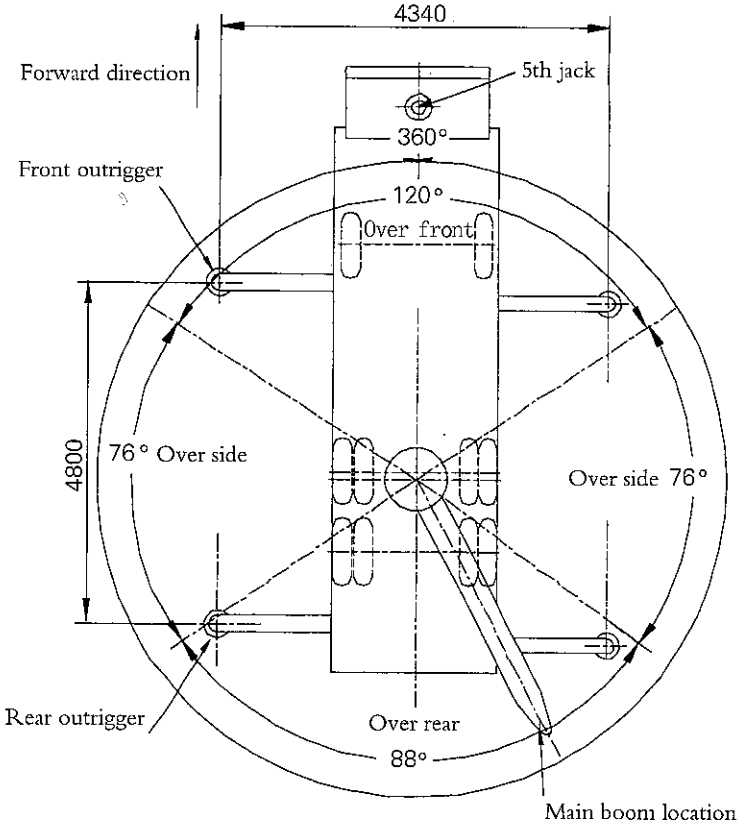


Fig. 3—5 Crane Working Area (for half-extended outriggers)

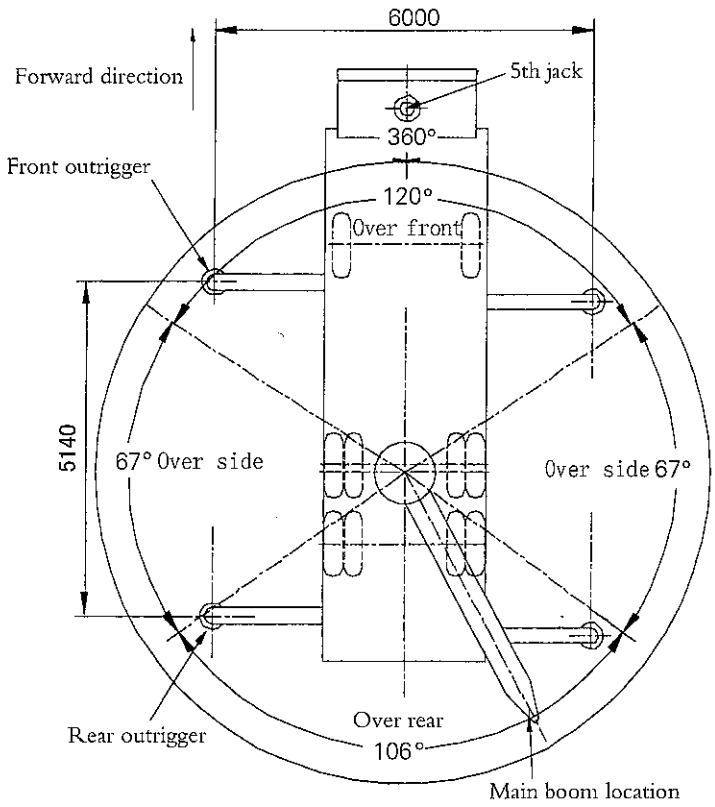


Fig. 3—4 a Crane Working Area (for fully-extended outriggers)

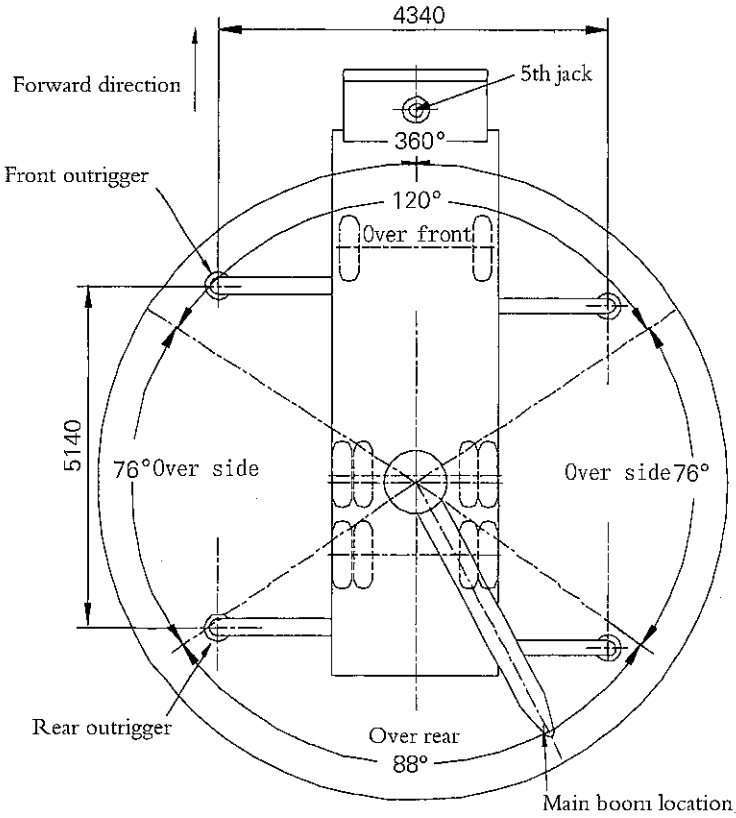


Fig. 3—5a Crane Working Area (for half-extended outriggers)

3.2 Main Parts Structure and Specifications

(1). Slewing Ring

Single-row four-point contact ball slewing ring as the connection of the crane and the carrier, 360° swing.

Model: 011.35.1250.101.04.11

(2). Oil Pump

Model: CB-Kp63/50/32/08

Rated working pressure: 21MPa Peak pressure: 25MPa

(3). Slewing Gear

Model: GJB17T3-79-01 planetary reducer

Reduction ratio: 78.9

Motor: A2F28W6.1Z4 axial piston motor

(4). Winch (main and auxiliary)

Model: GJT17W2B45-11 planetary reducer

Reduction ratio: 45.4

Motor: A6V80HD1D2FZ20550 axial piston variable displacement motor

Wire rope type: 14NAT 4V×39S－FC－1870

Wire rope length: 165m (main winch), 105m (auxiliary winch)

(5). Boom

1 base boom and 4-telescopic section, with round angle octagon cross-section profile.

Double-cylinder plus wire ropes, sequential and synchronous telescoping.

Boom length: 10.1m (min.), 38.5m (max.)

(6). Jib

Lattice type structure Jib length: 8.3m

(7). Elevating Cylinder

Single cylinder for front support elevation

Stroke: 2. 215m

(8). Telescoping Cylinder

Double-cylinder plus wire ropes, oil circuits of two cylinders are connected by core pipe.

Stroke: 7.1m

(9). Operator's Cab

Streamlined glass reinforced plastic structure, equipped with safety glass, heater and control instruments, and with wide field of vision.

(10) Turntable

Single-plate with reinforced rib anti-torsion structure with turntable lock pin fitted.

(11) Crane Superstructure Main Valve

Model: SBDL25F

(12) Load moment indicator (LMI)

Model: HC4900

Max. sensing load: 32500kg

Length: 40000mm

Sensing angle range: 80°

Overall accuracy: ±5%

Located in: operator's cab

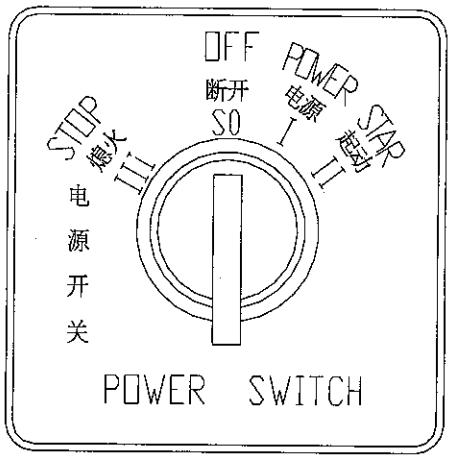
IV. Crane Operation

4.1 Starting and Stopping the Engine

4.1.1 Starting the engine

With hand brake handle engaged and transmission control lever in neutral, insert the starting key into the starter switch (SO), and turn it clockwise to I position to turn on power source. Depress accelerator pedal to proper position (about a quarter of its stroke) and further turn the key to II position, and then the engine will be started. Return the key to POWER position if the engine cannot be started within 12 seconds. The engine starting time for once can't exceed 12 seconds and the interval for each engine starting is not less than 2 minutes.

Caution: If the engine can't be started for 3 times, stop starting and check the causes.

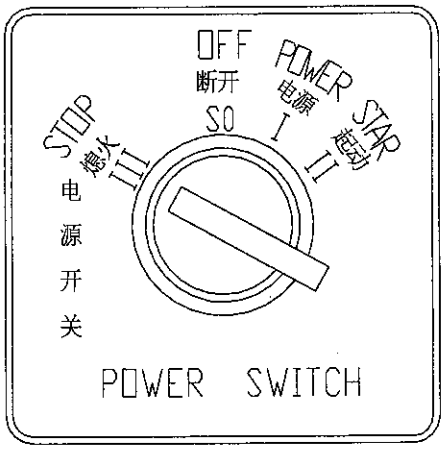


4.1.2 Preheating the engine

Preheating the engine should be performed after starting, and under idle speed. Only 60℃of water temperature is reached, can the engine run. In winter or cold area, the time of preheating the engine should be enlarged to increase cylinder temperature and make the surfaces to be lubricated sufficiently. Using the engine after starting without preheating will lead to serious wear and reduce the working life of engine.

4.1.3 Stopping the engine

Turn the starting key counterclockwise to III (STOP) position, after delaying for 1~2 seconds, the engine will stop, then release the key and the switch will reset to OFF position.



4.2 Operating PTO

4.2.1 Engaging PTO

Note: before engaging PTO, make sure that all control levers in crane and carrier are in neutral. Air pressure of pneumatic circuit is more than 0.45Mpa. First, fully depress the clutch pedal, and then pull up PTO, release the clutch pedal slowly, engage the PTO.

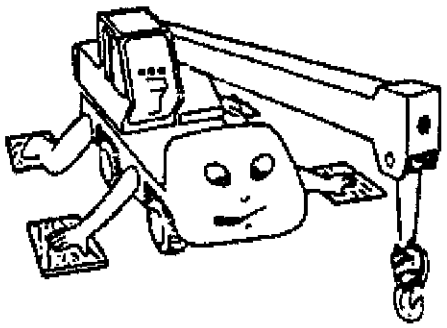
In winter, let the hydraulic pump run idle for 15~20 minutes for warming up.

4.2.2 Disengaging PTO

Fully depress the clutch pedal. Disengage the transmission PTO. Release the clutch pedal. Stop the engine. Turn off the carrier starter switch.

Note: after engaging the PTO, start the engine with the starter switch in operator's cab and stop the engine with the engine stop switch.

4.3 Operating Outriggers



4.3.1 Notes on operation

1. Pull out outrigger beam lock pins before extending the outrigger beam. Otherwise pin shafts will be damaged.

2. When extending outriggers, extend outrigger beams before outrigger jacks; when retracting, retract outrigger jacks before outrigger beams.

3. Keep the tires off the ground.

4. Set up the crane on level and firm ground. In case of setting up the crane with outrigger on soft and slant ground, set up the crane level by using wood blocks suited to the ground conditions.

5. After setting up the crane, make sure that all the outrigger floats are in complete contact with the ground and no the risk of sinking.

6. Outrigger longitudinal span is 4.8m or 5.14m; lateral span is 6.0m for full extension and 4.34m for half extension.

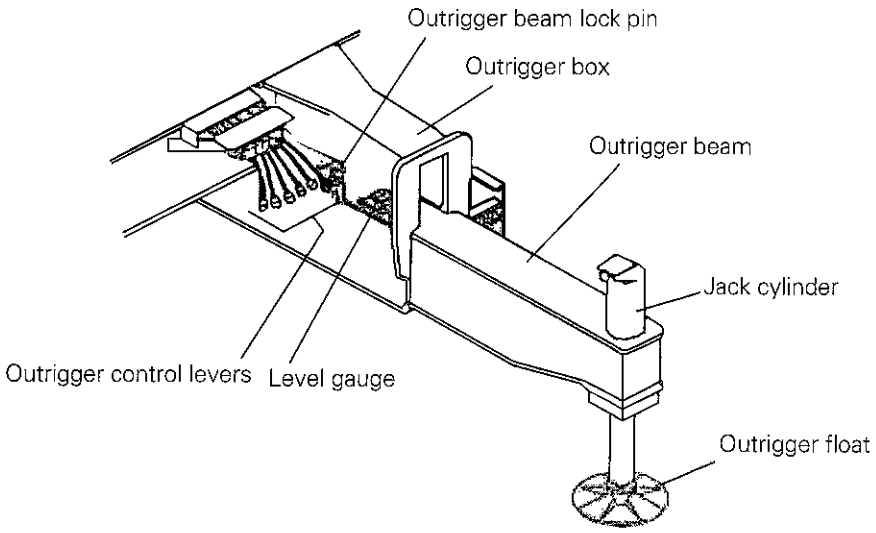
Note: Carry out operation by observing related rated load table.

7. Danger: it is not permitted to set up the crane without setting the outrigger beams in place (half-extended or fully-extended).

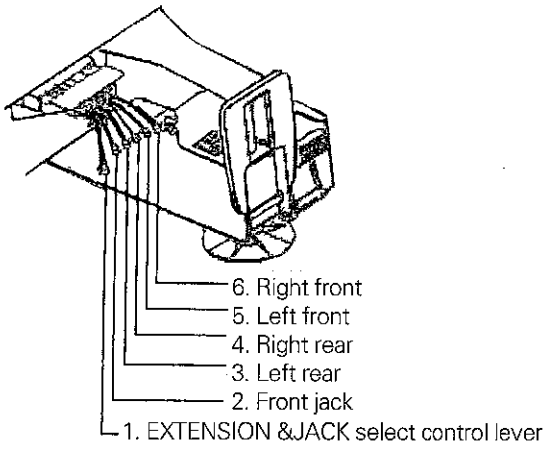
8. After setting and stowing the outriggers, make sure that the outrigger beam lock pins are completely inserted.

9. Never extend front jack before extending outrigger beams and jacks. Retract the front jack before retracting outrigger beams and jacks.

4.3.2 Names of outrigger parts

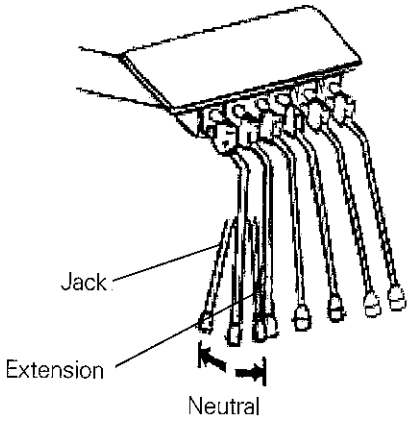


4.3.3 Outrigger control levers



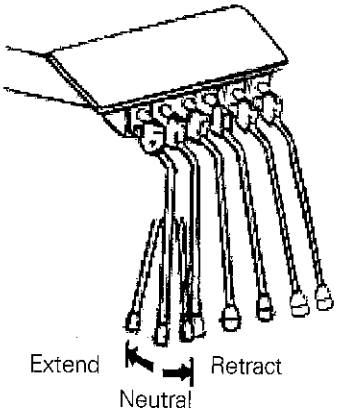
Notes:

a. The extension circuit or jack circuit is selected by the select levers.



Note: return the select levers to Neutral immediately after finishing operation. And before starting crane operation, make sure that the levers are in Neutral.

b. Outrigger beams or jacks will extend or retract when the Extension & Jack control lever 1 is moved.



4.3.4 Extend and retract outrigger beam

Position the select levers 3, 4, 5 and 6 to Extension, and then push the select lever 1 to Neutral, the four outrigger beams extend synchronously. After the outrigger beams being extended fully, return all control levers to Neutral. The outrigger beam extending has been finished. Preparations of retracting the outrigger beam are the same as above except pulling the select lever 1 to Retract.

4.3.5 Extend and retract outrigger jack

Position the select levers 3, 4, 5 and 6 to Jack, and then push the select lever 1 to Neutral, the four outrigger jacks extend synchronously. After the tires off the ground, return all control levers to Neutral. The outrigger beam extending has been finished. Preparations of retracting the outrigger jack are the same as above except pulling select lever 1 to Retract.

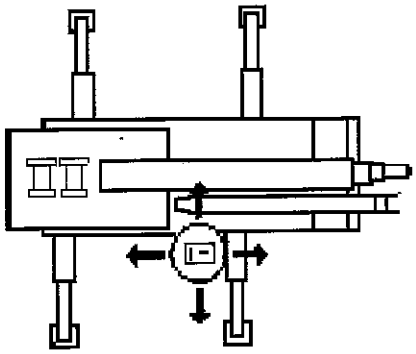
4.3.6 **Front jack** (5th outrigger)

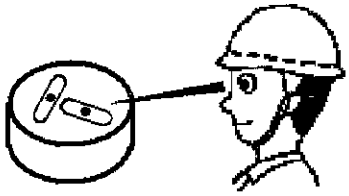
When use front jack, position lever 2 to Jack and push control lever 1 to Extend, the front jack will extend out, and then return all levers to neutral; preparations of retracting the front jack is the same as above except pulling the select lever 1 to Retract.

4.3.7 How to level the crane

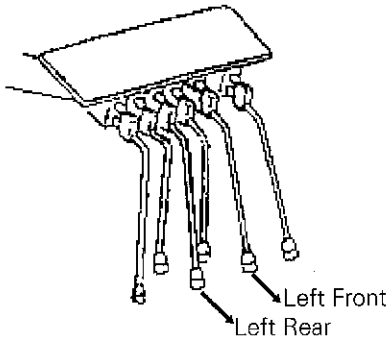
If the crane is not level with the jacks extended, level it as follows.

Example: When the right side is higher.





a. Return the left front 2 and left rear 4 select levers to Neutral.



Note: be careful not to move the select levers over to Extension.

b. While observing the level gauge, inch Extension & Jack control lever 1 to Retract.

c. After the crane is leveled, return the remaining select levers to Neutral.

Note: make sure that all outrigger floats are in complete contact with the ground after crane tires clear of the ground.

4.4 Acceleration

Acceleration makes engine speed up and speed down by using hydrostatic oil. Depress the accelerator pedal, and the speed will be increased in engine, winch as well as in boom telescoping, boom elevation and swing operation. Remove your foot, the accelerator pedal will reset by spring

force, and engine returns to idle.

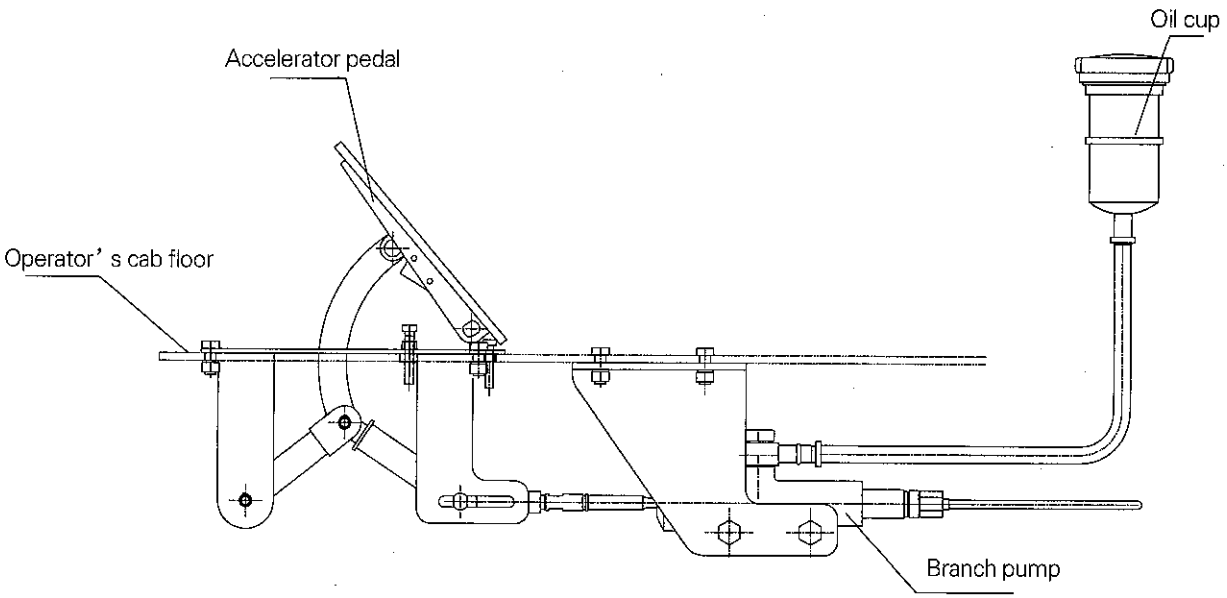
4.4.1 During crane operation, never depress the accelerator pedal abruptly in prevention of accident and damage.

4.4.2 Max. engine rotation torque is gained when it is running at 1400 r/min.

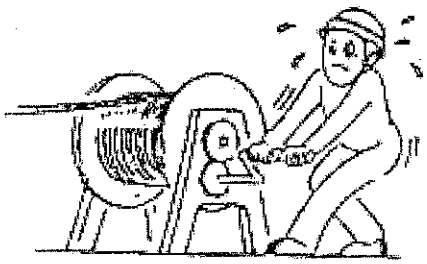
4.4.3 The accelerator has been set fully, and no necessary to reset. Reset it only when bad return of the accelerator pedal or lumpy movement of accelerator pedal is found. Adjust the accelerator wire at engine accelerator arm and pushrod of main cylinder below pedal. After resetting the free stroke should be 2—5mm, 800 r/min of idle speed be reached, and 2200 r/min should not be exceeded when the accelerator is depressed to the bottom.

4.4.4 heck oil cup level regularly. Refill in time if it is lower than the mid-mark. The brake liquid is KF—01 made by Xuzhou Automobile Chemicals Factory.

Note: Different brands of brake fluid should not be mixed.



4.5 Operating Winches



Notes on operation

① Lift up loads in vertical direction only. Avoid side-loading or dragging loads on the ground.

② Do not abruptly move the winch control lever.

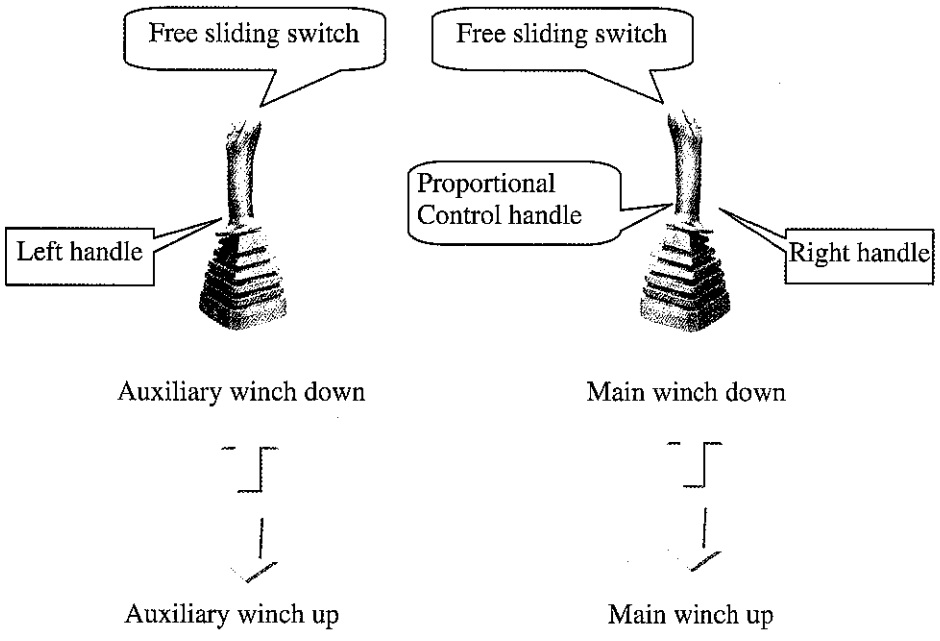
③ Before operating, apply the winch brake, lock the winch control lever.

(1) Main winch control handle (right handle)

Push forward the control handle, the hook block will lower; pull backward, the hook block will raise. The raising and lowering speeds are adjusted by the control handle and accelerator.

(2) Auxiliary winch control handle (left handle)

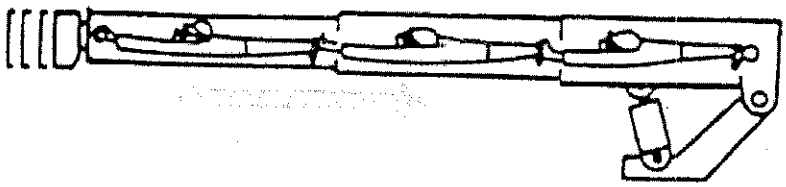
Push forward the control handle, the hook block will lower; pull backward, the hook block will raise. The raising and lowering speeds are adjusted by the control handle and accelerator.



Note: ⚠

In order to avoid lateral force during lifting operation, while moving the main winch control handle, press and hold the switch for free swing, the turntable can align automatically to swing the boom to the center of gravity over the load, and release the switch after the load lifted off the ground.

4.6 Boom Telescoping Operation



Notes on operation

① The hook block will rise or lower when the boom is telescoped. Compensate for this by simultaneously letting out or taking in the winch rope.

② An extended boom can change its length as time passes. This is mainly because the volume of oil in the telescoping cylinder expands or contracts when temperature changes. If oil temperature lowers 10℃, for instance, a boom extended by 5m will retract approx. 40 mm. The extent of length change also depends on the boom length, elevation angle, lubrication condition, etc. To prevent boom retraction, observe the following:

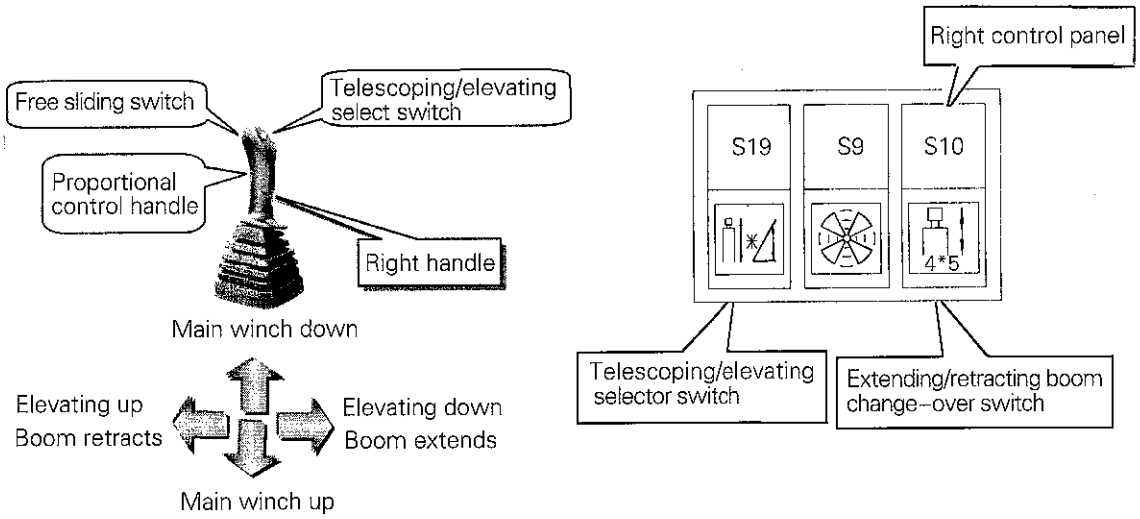
a. Do not raise the oil temperature excessively.

b. When boom retract, compensate it by telescoping boom.

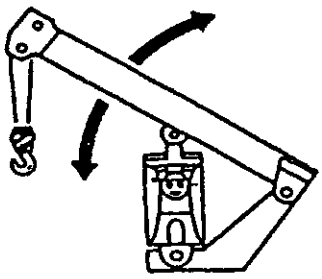
③ Telescoping with a load is not permissible.

Danger! When extend boom, press switch S10 after the 2nd boom section is extended in place, and then extend sections 3rd, 4th and 5th to required length; when retract boom, do the reverse procedures. Otherwise, telescoping cylinder will be damaged during lifting operation, and there is a risk of boom being broken.

Move the right handle to the left with the telescoping/elevating selector switch(on control panel or on the right handle)pressed to extend boom sections; move the handle to the right to retract boom sections. Telescoping speed is adjusted by the control handle and accelerator



4.7 Boom Elevating Operation



Notes on operation

① Lift up loads in vertical direction only. Avoid side-loading or dragging loads on the ground.

② Observe the boom angle limit.

③ Move the elevating control lever slowly when starting and stopping boom motions.

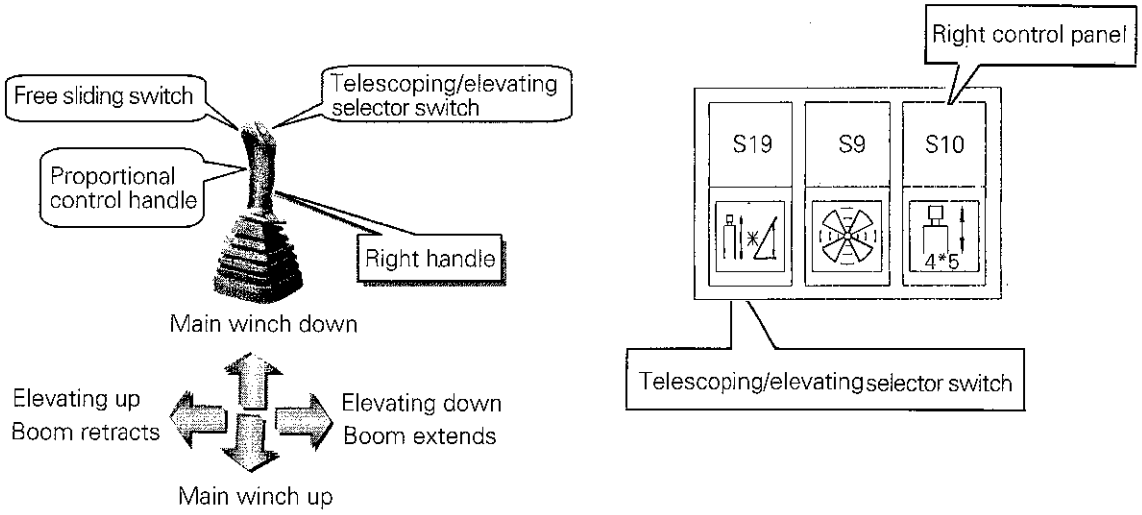
(1) Boom elevating control handle (right handle)

With switch for Telescoping/Elevating exchange pressed down, move the elevating control handle (right handle) to the right, the boom will lower; move the elevating control handle to the left, the boom will rise. The elevating speed is adjusted by the control handle and accelerator.

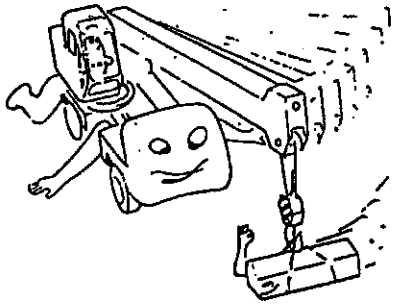
(2) Relationship among boom angle, total rated load and working radius

When the boom is lowered, the working radius increases and the value of the total rated load decreases; when the boom is raised, the working radius decreases and the value of the total rated load increases.

Note: when boom must be lowered down for installation of jib, reeving of wire rope, the outriggers must be extended first and boom retracted fully. After operation, raise up the boom and extend it to required length.



4.8 Swing Operation



Notes on operation

① Lift up loads in vertical direction only. Avoid side-loading or dragging loads on the ground.

② Before swing operation, check outrigger extension width.

③ Make sure that there is enough operating space.

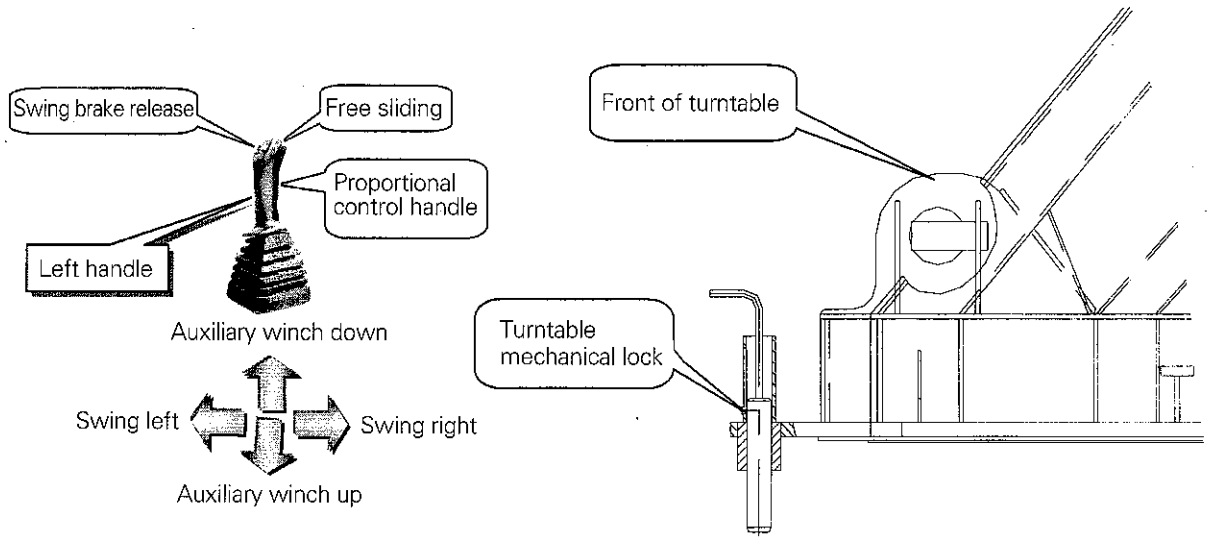
④ Move the swing control lever slowly when starting and stopping swing.

⑤ Apply the swing brake when the boom is not swung.

⑥ Unlock the turntable locking device before starting to swing.

(1) Swing control handle (left handle)

Before swing operation, first release the mechanical lock, and then press and hold the swing brake release switch, move the control handle to the right, the turntable will turn right; move the control handle to the left, the turntable will turn left.



4.9 Indication Plates

a. Nameplate

The nameplate is located outside operator's cab door (refer to figure below). The crane name, model, total rated lifting load, manufacture date, manufacturer, etc. are shown on the nameplate.

b. Lifting performance indication plate

The lifting performance indication plate is located inside operator's cab. Refer to figure below. Please perform operation according to indication on the plate. Never overload.

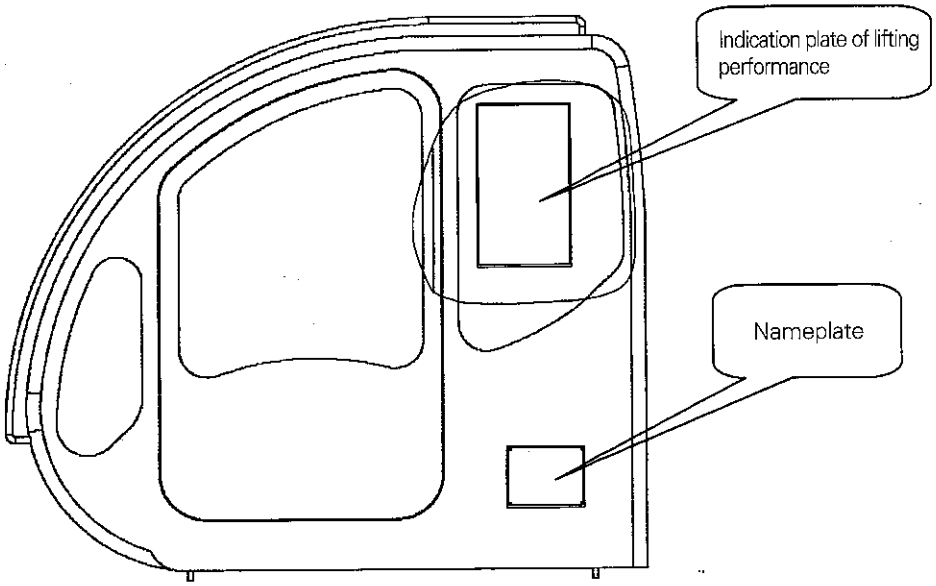
Lifting performance indication plate contains:

QY25K5 Truck Crane Rated Lifting Load Table

QY25K5 Truck Crane Lifting Height Chart

QY25K5 Truck Crane Working Area

In the total rated lifting load table, each working radius has a corresponding lifting load and lifting height. Before lifting operation, crane operator must know the weight of the load and working area, then choose an appropriate working mode for crane operation, and do not exceed the total rated load in the table.

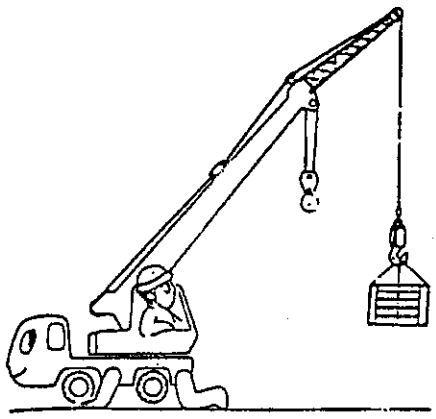


c. Operation indicating plates

Operation indicating plates contain indication plate and warning plate for guiding maintenance and drawing attention to dangerous factors during crane operation and maintenance.

V. Accessories

5.1 Jib



Notes on operation

(1) Extend the outriggers fully and set them.

(2) When erecting the jib, no person is permitted under the jib.

(3) Before erecting and stowing the jib, make sure that there are enough space for the operation.

(4) **Danger!** To erect and stow the jib, be sure to follow the procedure given in this manual. Observe the following, otherwise the jib or other parts can be damaged.

a. Do not lower the boom with the auxiliary hook block in contact with the jib head.

b. Do not operate the crane or drive the carrier with the jib stowing pin extracted.

c. To fold and unfold the jib, move it slowly.

To climb to a high position use a ladder for safety.

(5) To climb to a high position use a ladder for safety.

Jib Erecting

The jib is triangle lattice type, simple structure, light weight and easy erecting.

(1) Operate the jib with outriggers half or fully extended.

(2) Erecting procedure (refer to Fig. 5—1):

a. Retract the boom fully, and stow it over side or rear of the crane.

b. Remove pin shaft No.1 on jib after unfolding jib bracket, and swing the jib around pin shaft No.2 to align the jib pin hole with the boom pin hole, insert pin shaft A.

c. Remove pin shaft No.2, swing the jib around pin shaft A to align the other side jib pin hole with the other side boom pin hole, and insert another pin shaft A. At this time, jib length is 8.3m.

d. Set up sheave bracket and let wire rope out of the sheave on jib top.

e. Reeve the wire rope over the sheave bracket and jib head sheave.

f. Turn on the jib hoist limiter switch, connect the plug on jib end and terminal board on boom head, then attach the hoist limiter weight.

g. Take out the auxiliary hook block and fit it to the jib.

(3) Change of offset from 0° to 15°

Install the slings of auxiliary winch wire rope on jib head (refer to Fig. 5—2) after removing them from hook block, and then make the auxiliary winch wire rope in tension state by raise up the auxiliary winch slowly. Removing and installing pin shafts according to Fig. 5—2, and let out the auxiliary winch wire rope slowly until 15° offset is reached. Remove the slings from jib, and install them on the hook block. Now the jib with 15° offset are ready for use.

(4) Change of offset from 0° to 30°

Install the slings of auxiliary winch wire rope on jib head (refer to Fig. 5—3) after removing them from hook block, and then make the auxiliary winch wire rope in tension state by raise up the auxiliary winch slowly. Removing and installing pin shafts according to Fig. 5—2, and let out the auxiliary winch wire rope slowly until 30° offset is reached. Remove the slings from jib, and install them on the hook block. Now the jib with 30° offset are ready for use.

(5) Installation of 0° offset

Install the slings of auxiliary winch wire rope on jib head (according to the preceding description) after removing them from hook block. Remove pin shaft d on jib and then raise up the auxiliary winch slowly until jib and boom are in relatively horizontal state. Installing pin shafts c and d according to installation diagram of 0° offset. Now the jib with 0° offset are ready for use.

(6) Jib Stowing

After use of the jib, remove the jib in reverse order of erecting, and fix the jib at the right side of base boom, i.e. remove the pin shaft on the left of base boom head, and then swing the jib around the pin shaft on the right of base boom head until the pin shaft No. 2 shown in Fig. 5—1 can be inserted. Remove the pin shaft on the right of base boom head, and then swing the jib around the pin shaft No. 2 until the pin shaft No. 1 can be inserted. At last fold jib bracket.

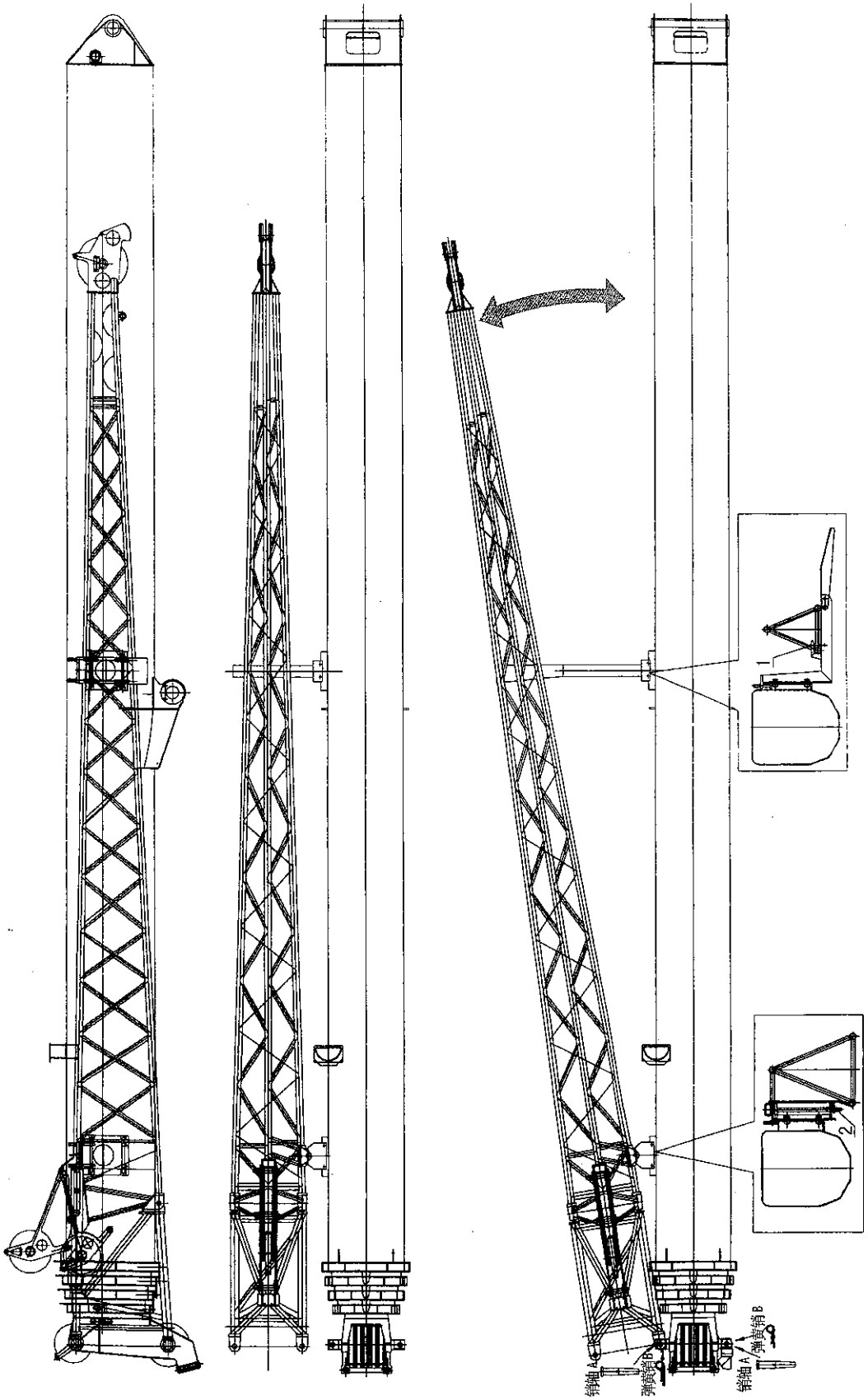


Fig. 5－1

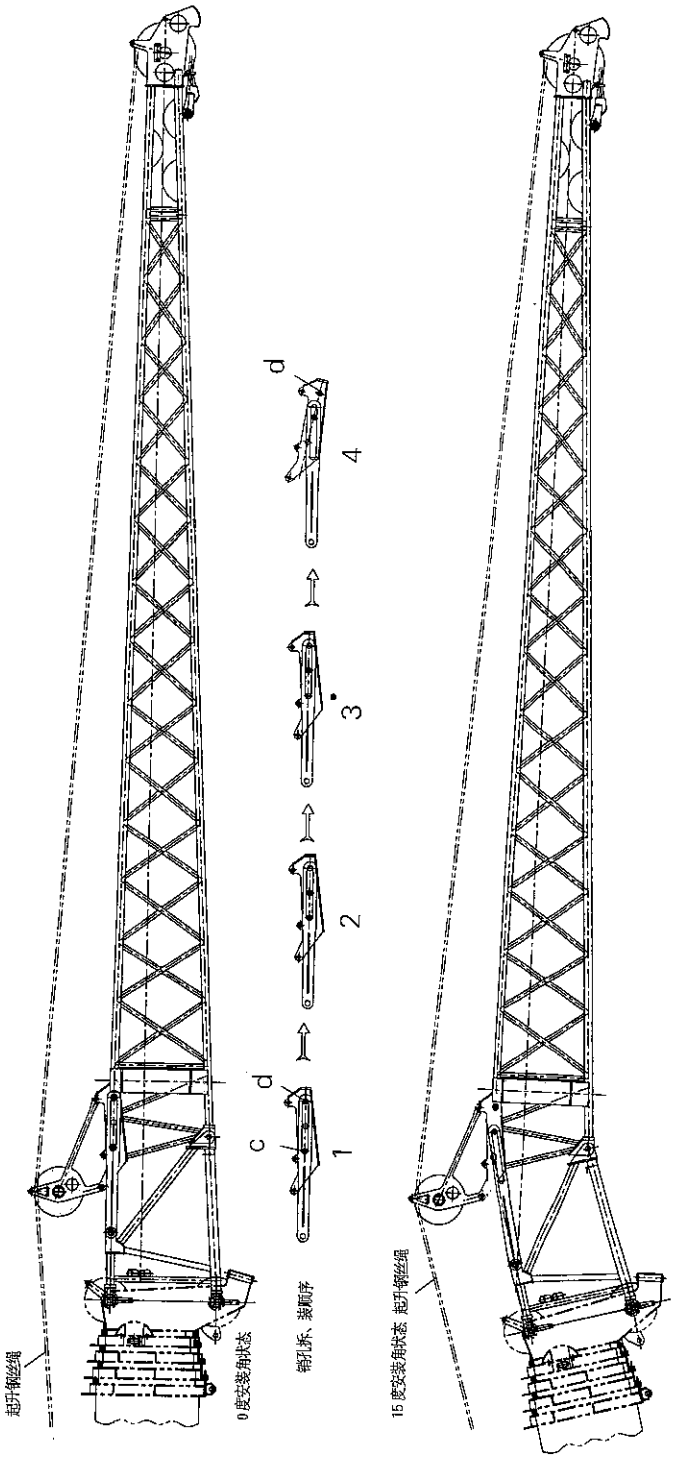


Fig. 5—2

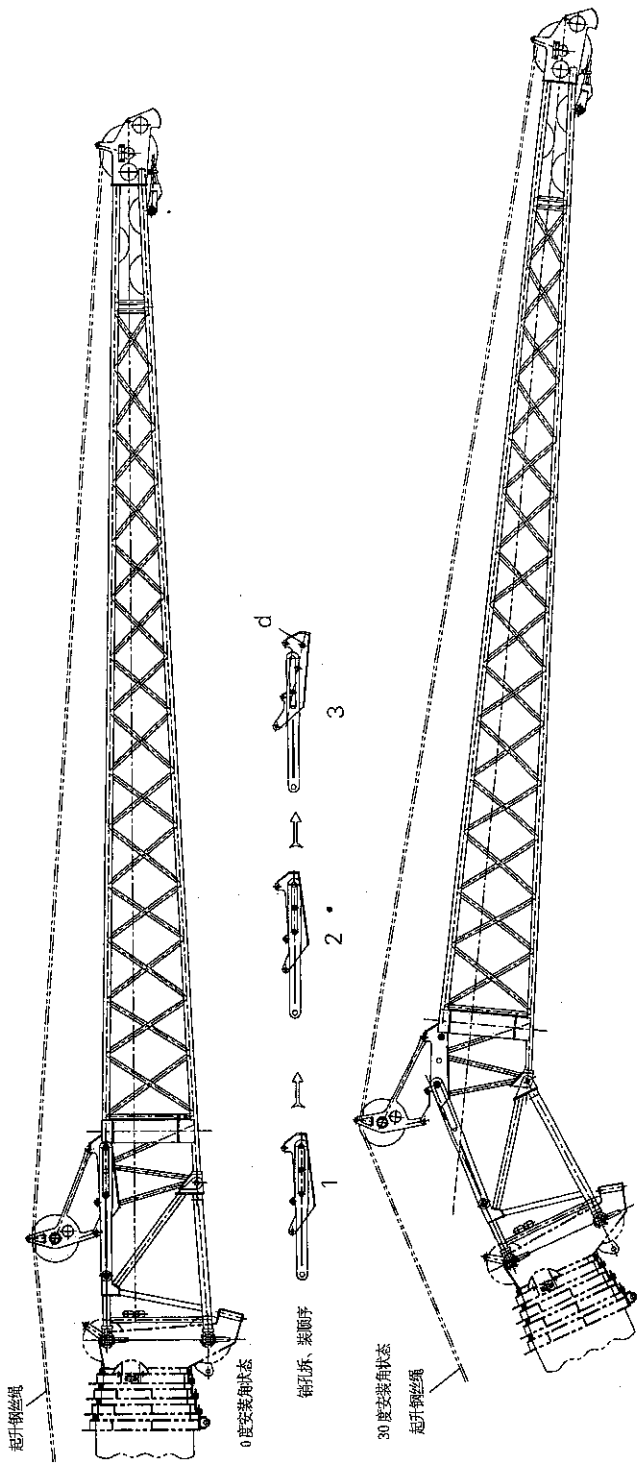


Fig. 5—3

5.2 Slewing Ring

(1) Basic structure

The structure of the slewing ring is shown as Fig. 5—4. It is not only the support of the crane rotation part but also the connection of the superstructure and the carrier. The inner ring is fixed under the crane turntable by 40 pieces of M24 bolt 2 equally spaced in concentric circles. The outer ring is fixed on the carrier frame by 40 pieces of M24 bolt 1 equally spaced in concentric circles.

(2) Notes on use of slewing ring

a. The bolt used for connecting the slewing ring is made of 40 Cr (or 42CrMo) steel material through heat treatment, strength is grade10.9. Do not replace it by common bolt.

b. The pre-tighten moment of the bolt is 700~900 N.m. Check it after the slewing ring works 100 hours, then check it completely every 500 working hours.

c. In common case, lubricate it every 100 hours. Fill in calcium base grease (ZG—3) from oil ports. Fill enough grease into it till the grease leak from the sealing ring.

d. Pay attention to the change of noise and slewing drag torque while operating it. If abnormal case occurs, it should be stopped and inspected.

e. The tooth surface should be cleared every 10 days, and recoated with grease.

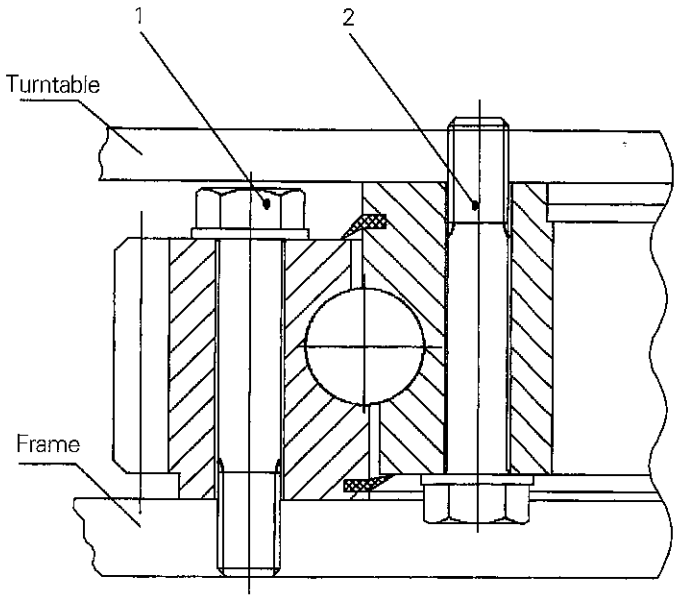


Fig 5—4 Slewing ring structure diagram

5.3 Main and Auxiliary Hook Blocks

(1) The structure of main and auxiliary hook blocks refer to Fig. 5—5.

(2) Inspection:

The hook block must be discarded when one of the follows occurs (welding is not allowed on hook block).

a. Cracks and damage on hook surface.

b. Hook opening exceeds 10% of the nominal dimension (refer to the nameplates of main and auxiliary hook block).

c. Critical section exceeds 10% of the nominal dimension.

d. Wear of rope touching surface exceeds 5% of the original height.

e. Twisting deformation of hook exceeds 10° .

f. Plastic distortion on critical section of hook tail and threads.

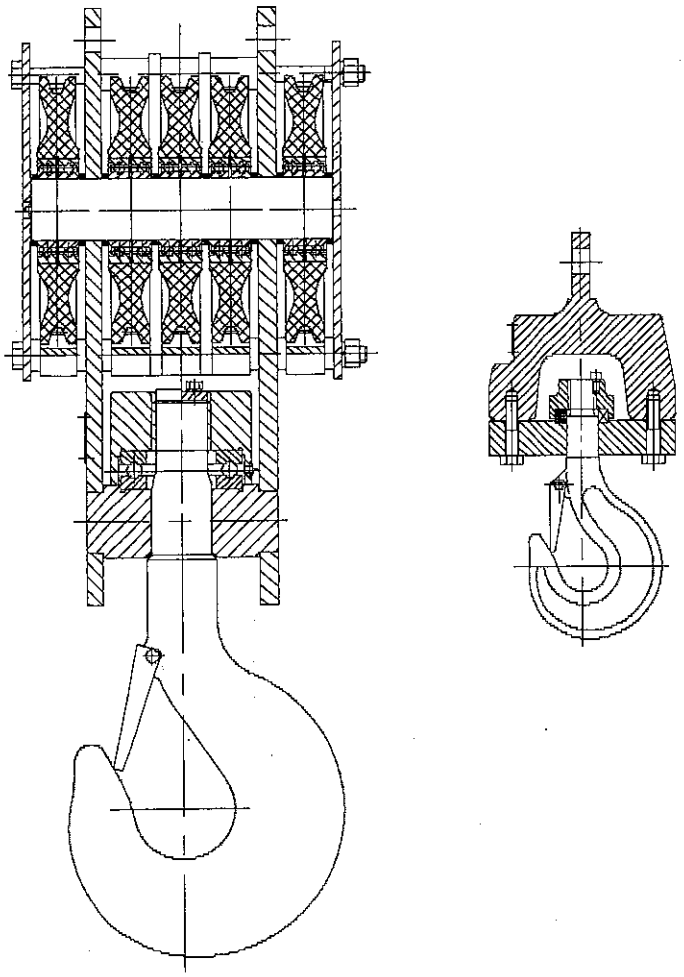


Fig. 5—5

5.4 Wire Rope

5.4.1 Working Conditions

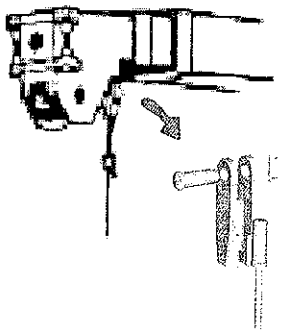
Extend and set the outriggers, fully retract the boom and swing it over side or rear.

a. Place the hook block on the ground by lowering the boom.

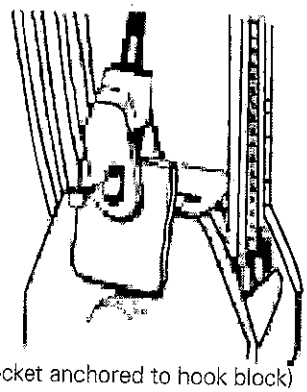
b. Remove the rope guard at the boom head and the rope guard on the hook block.

c. Remove the over-wind cutout device weight from the winch rope.

d. Disconnect the rope socket.



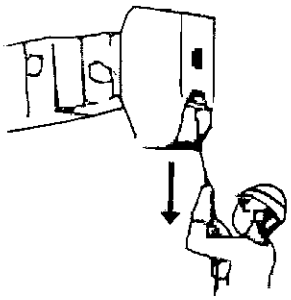
(Rope socket anchored to boom)



(Rope socket anchored to hook block)

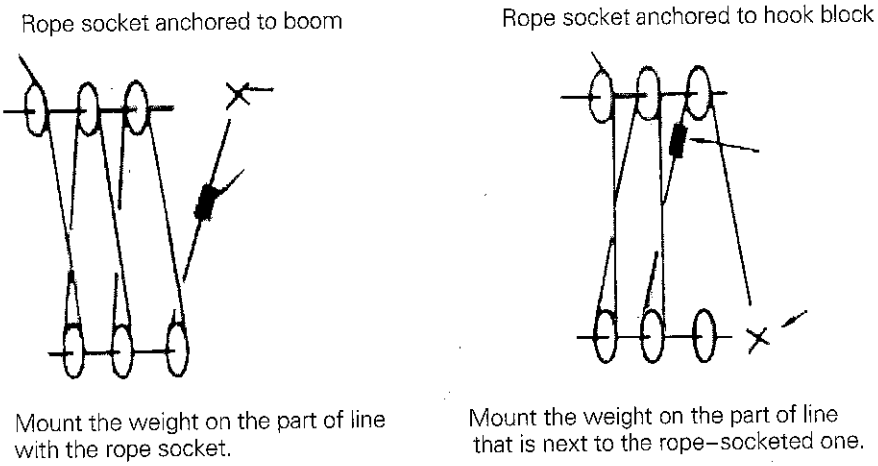
e. Reeve the winch rope in the desired number of parts of line.

When pulling out the winch rope, run the winch and pull the rope by hand.



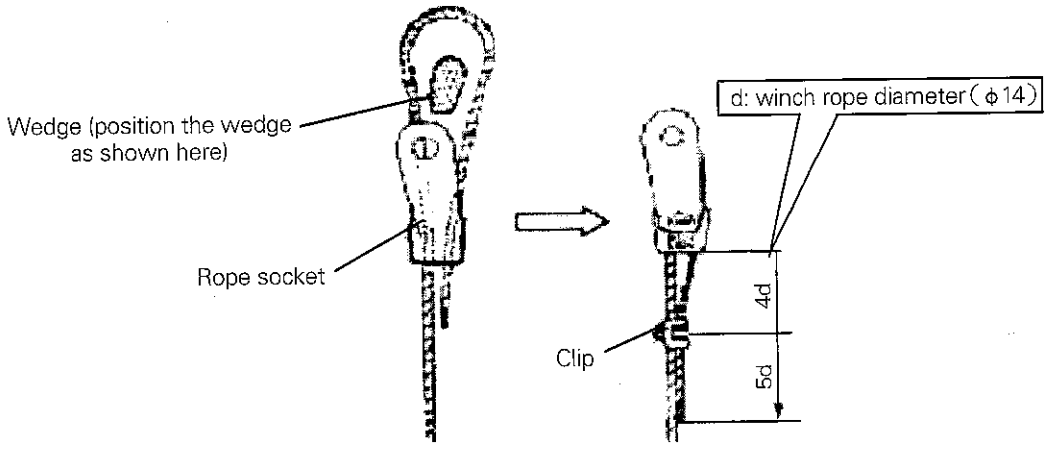
5.4.2 Notes:

a. The mounting position of the over-wind cutout device weight is determined by the position in which the rope socket is attached, the anchor on the boom or that on the hook block.



b. Make sure that the winch rope is wound neatly.

Mount the rope socket and clip as shown below:



c. During operation, apply proper tension to the rope. Do not further operate the winch when the hook block touches the ground and there is no load on the rope, otherwise rope disorder will occur.

d. Select proper parts of line according to load and lifting performance table. If the number of parts of is too small, overload on single line will occur; if the number of parts of is too big, the hook block could not reach the ground, and only low hoist speed is gained.

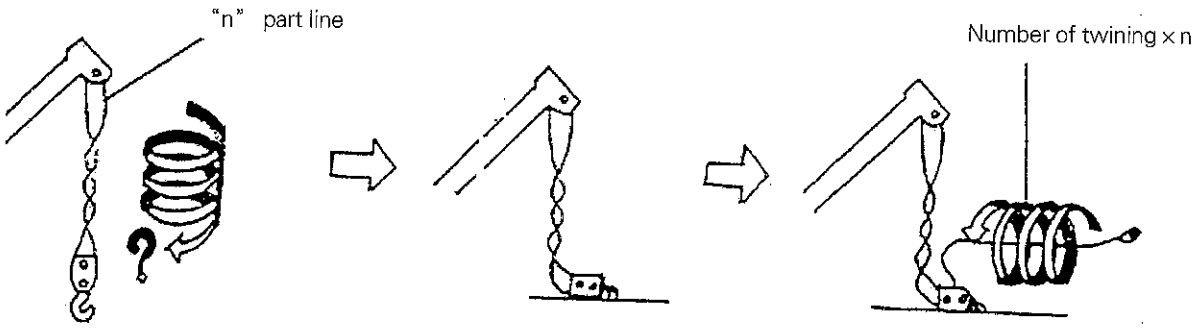
5.4.3 Cautions In Handling Winch Rope

(1) When winding a new wire rope on the winch drum, take care not to twine the rope.

(2) After installing a new wire rope on the winch drum, repeat hoist up and down a load of 10 % rated load several times.

(3) Inspect and discard wire rope according to GB/T5972-2006.

(4) When the winch rope becomes twined, correct it as follows:



a. Check the direction of the twining and count the number of twining turns.

b. Lower the hook block to the ground. (If the hook block cannot be hoisted down, lower the boom.)

c. Disconnect the rope socket from the hook block (or boom head). Turn the rope end in the twine direction "n" times the number of twines as counted in step a. before attaching the rope socket to the hook block (or boom head).

Note: Do not turn the rope five turns or more at a time.

d. Fully extend the boom and raise it to the maximum angle. Repeat hoisting up and down the hook block several times.

e. Repeat the procedure above until no twining remains.

Note: If twining still remains after the above measures, replace the rope with a new one.

(5) Wind the first layer of wire rope on the winch drum uniformly and with proper tension applied to it.

(6) It is recommended that the hook end and the drum end of the winch rope be periodically reversed to extend the rope life.

(7) Check the winch rope every working day to find the conditions of damage and deformation. Especially pay attention to fixing position of the winch rope. Inspected the positions as follows:

a. Common positions

Pay attention to the following positions:

The beginning and the end of the winch rope.

The rope section reeved through sheaves.

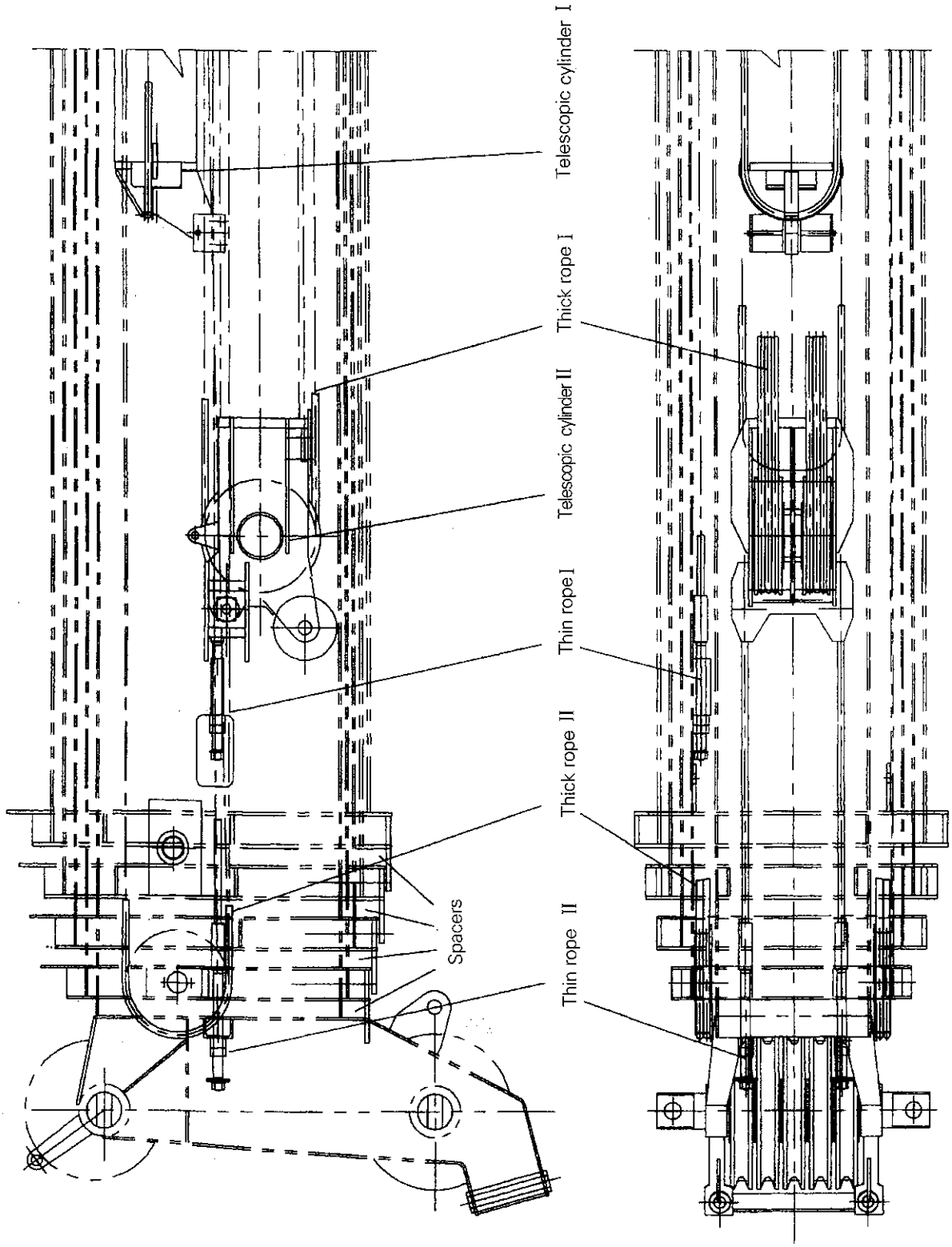
b. Rope end

Check the inner of wedge, broken wire and rusty to ensure the tightness for the wedge and rope clips.

5.4.4 Rope Adjustment

During lifting operation, the length of tension ropes will change due to pulling force. So check and adjust the ropes monthly. If asynchronous telescoping or shaking occurs to the ropes,

adjust them in time. Otherwise the ropes will disengage from sheave grooves and breaking will happen, and cause serious result. Please regularly adjust the ropes for the vehicle running well.



Adjustment method is as the follows:

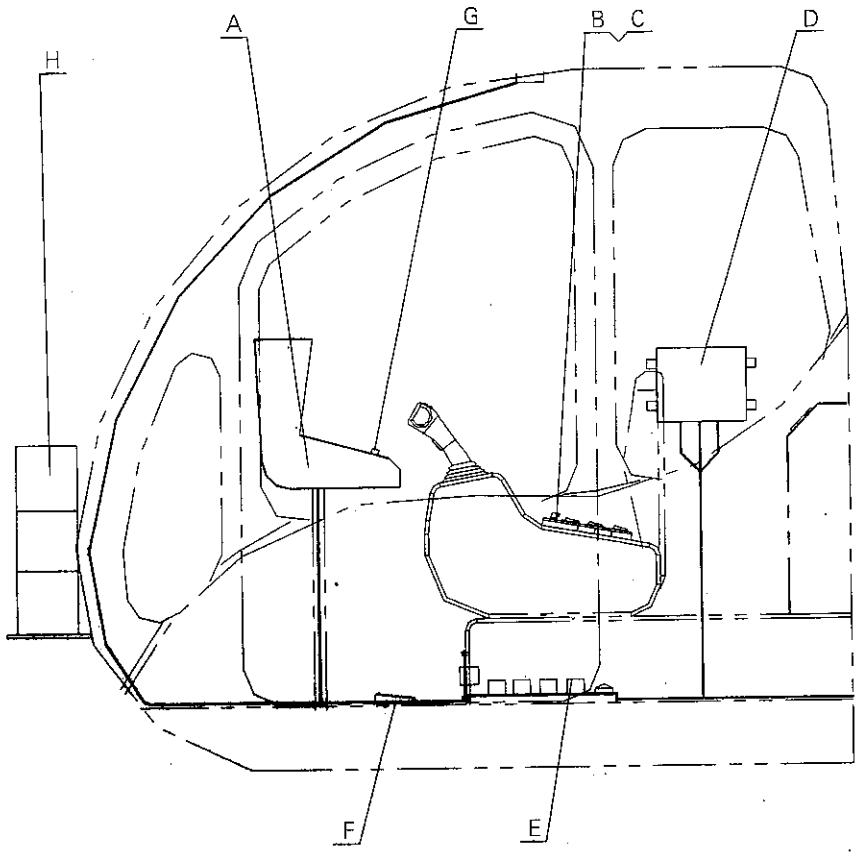
Extend all sections out after elevating the boom to 60°, and retract them in fully, repeat several times. Elevate the boom down after 3rd, 4th and 5th sections extending a little, and adjust the nuts on thin ropes II of 5th section synchronously as well as nuts on thin ropes I of 4th section, till 3rd, 4th and 5th sections can telescope synchronously and no shaking. Tighten nuts on thin ropes. If there is a clearance of more than 1 —2mm between sections on boom heads with all sections retracted, insert adjusting shims in front of boom head to prevent influencing cylinders and ropes movements.

Notes: 1. If boom shakes while adjusting, coat sliding surface of slide block with grease.

2. Only coat with two boom sections extended out and lowered down, not all boom sections out and down.
3. Prevent rope rotating while tighten nuts.

VI. Crane Electric System

6.1 Devices in Operator's Cab



A) — Instrument panel assembly: to display working and safety conditions

B) —Right controller: to control working conditions

C) —Left controller: to control safety conditions

D) —LMI CPU

E) —Control board assembly: logical control unit

F) —Switch: to select auxiliary winch

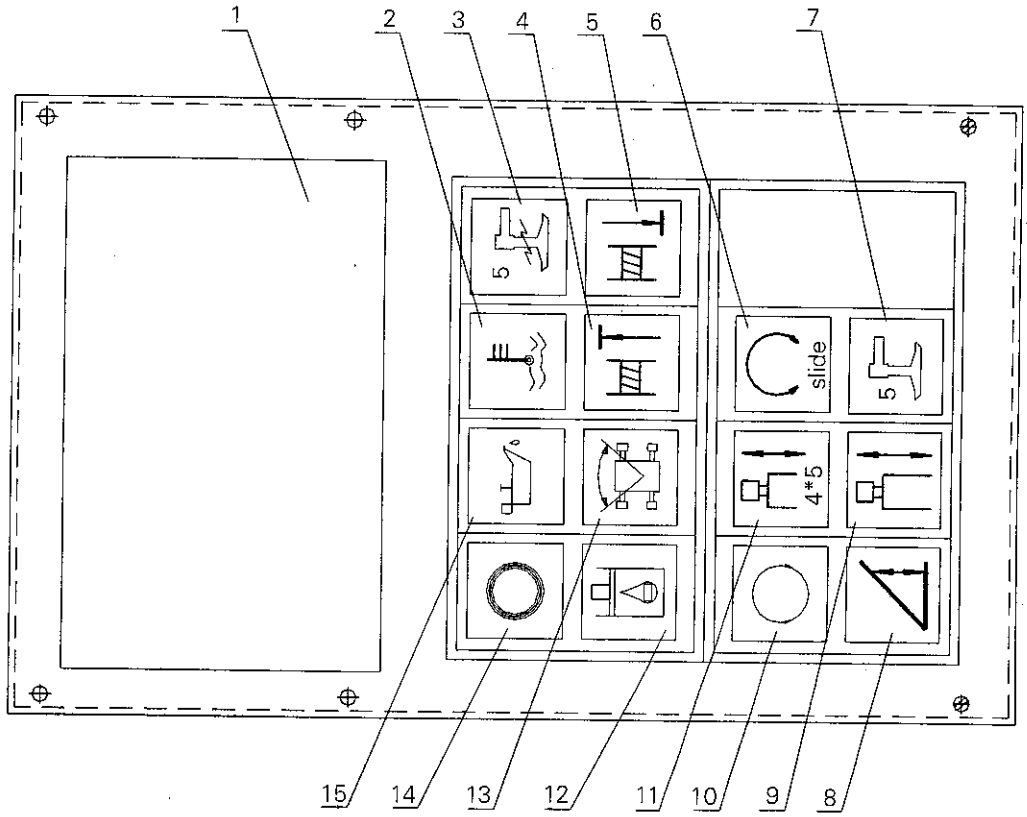
G) —Switch: for emergency stop

H) —LMI warning lamps: Green: to indicate normal working state

Amber: to forecast warning

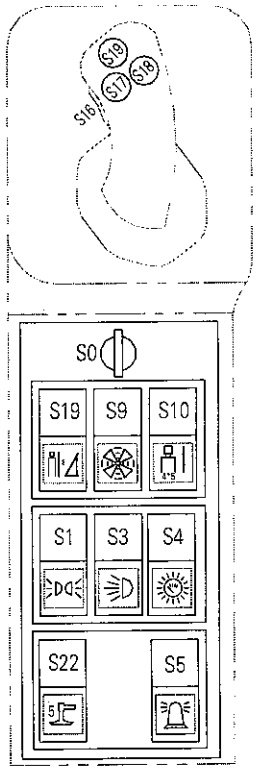
Red: to indicate warning and unloading working state

6.2 LMI Display



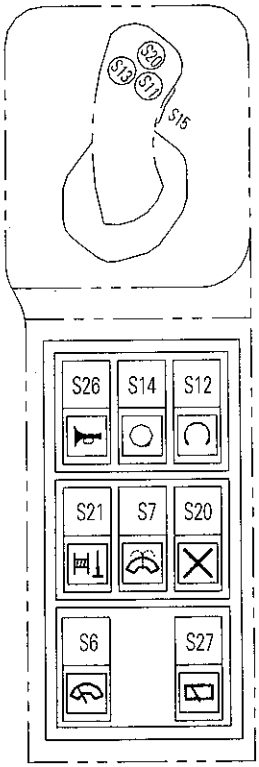
1. Display —Load moment indicator (LMI) display
2. Indicator lamp —High engine water temperature
3. Indicator lamp —5th outrigger over-load indication
4. Indicator lamp —Winch rope over-winding warning
5. Indicator lamp —Winch rope over-releasing warning
6. Indicator lamp —Free sliding
7. Indicator lamp —5th outrigger working
8. Indicator lamp —Boom elevating
9. Indicator lamp —Boom telescoping
10. Indicator lamp —Hydraulic pilot system pressure
11. Indicator lamp —3rd, 4th, 5th boom section telescoping
12. Indicator lamp —Hydraulic oil filter blocked
13. Indicator lamp —boom over front area
14. Indicator lamp —Crane power
15. Indicator lamp —Low engine oil pressure

6.3 Right Controller



S0 — Starter switch:
Position Ⅰ: Battery power
Position Ⅱ: Engine starting
Position Ⅲ: Engine stopping
S16 — Pilot system pressure button
S17 — Free sliding button
S18 — Telescoping/Elevating exchange button
S19 — Horn button
S19 — Switch for Telescoping/Elevating exchange
OFF: Boom elevating
ON: Boom telescoping
S9 —Hydraulic system cooling fan switch
S10: 2nd-stage cylinder selector switch
S1: Fender indicator switch
S3: Working lamp switch
S4: Switch for control switch illuminator
S22: 5th outrigger switch
Press the switch for operation with front jack. The LMI system will work according to performance table under this working condition.
S5: Warning lamp switch

6.4 Left controller



S15: Hydraulic pilot system working pressure button
S13: Slewing brake release button
S11: Free sliding button
It is equipped to avoid the lateral loading while the load is lifted. The turntable is in the state of free slewing with the switch turned on.
S20: Horn button
S26: Horn switch
S14: Hydraulic pilot system pressure switch
It is equipped to avoid touching control handle by mistakes as access and egress operator's cab. Before operation the switch is pressed, the pressure in the hydraulic system may emerge for operation. Otherwise the crane may not work normally. Turn off the switch before leaving the cab.
S12: Slewing brake release switch
It is used to control the brake of slewing reducer. When the switch is turned on, the slewing brake is unlocked. And then slewing operation may be carried out.

S21: Winch over-release cutout switch

Note: when there are only 3 to 5 turns of winch rope left on the winch drum, the rope-end limiter automatically activates to stop hook lowering. At this time, press the switch, the limiter control will be canceled and the hook lowering will be resumed.

S20: Overload release switch

When crane operation beyond the working range is detected by the LMI, the movement of hoisting up, elevating down and boom extending will be stopped automatically. Pressing the switch can release limiter control.

S6: Windshield wiper switch for front window

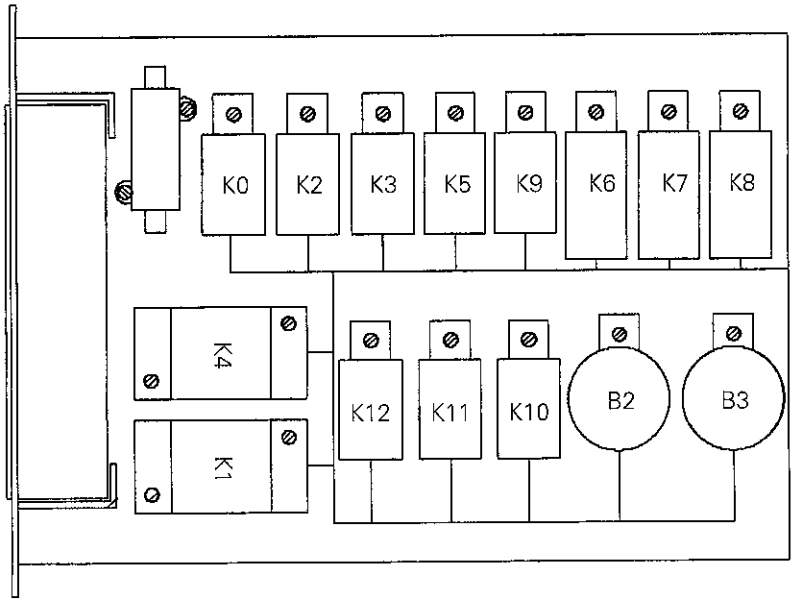
Ⅰ Position: low speed

Ⅱ Position: high speed

S27: Windshield wiper switch for roof window

S7: Washer switch

6.5 Relays



K0（JQ201S-PLO）: Relay for controlling power

K2 (JQ202S-KLO): Relay for controlling slewing brake

K3, K11 (JQ202S-KLO): Relays for controlling system pressure

K5 (JQ202S-KLO): Relay for controlling overload

K10、K9 (JQ202S-KLO) Relays for controlling front area

K6 (JS157): Relay for controlling over-wind warning

K7 (JS157): Relay for controlling over-release warning

K8 (JS157): Relay for controlling front area warning

K1 (67147): Relay for controlling free sliding

K4 (67147): Relay for controlling selection of oil cylinder

B2 (FM-24V): Buzzer for over-wind/release warning

B3 (FM-24V): Buzzer for front area warning

6.6 Notes on operation

a. Position all the control levers in neutral before turning on the main power.

An overload relief switch (S20) is fitted in the system. Use this switch carefully when the crane is

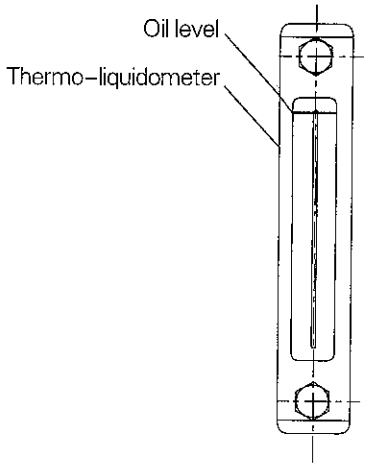
b. in overload. In general, do not use this switch. (**Danger!**)

c.Read "Load Moment Indicator (LMI) Operation Instruction" carefully before lifting operation.

VII. Hydraulic System

7.1 Check the Level of Hydraulic Oil Tank

Check the level of hydraulic oil tank prior to lifting operation. Add hydraulic oil when the oil level becomes below the level required.



7.2 Hydraulic System Description

The hydraulic system of QY25K5 truck crane consists of crane hydraulic system and carrier hydraulic system. The hydraulic system adopts open type constant displacement pump and variable displacement motor system. Driving unit is a quadruple gear pump. The winch motor is a bend axial plunger motor.

(1) Carrier hydraulic system

The pressure of the carrier hydraulic circuit is supplied by a gear pump with displacement of 32ml/r. The setting pressure of relief valve is 20Mpa. A manual multi-element change valve controls the moving directions of outrigger beam and jack. The outriggers can be operated on both sides of the machine. The outrigger beam or jack can be operated separately or synchronously. A pressure limit valve is fitted in the new multi-element change valve for protection of the piston rod of the extension cylinder against deflection. Two-way hydraulic valve fitted in each jack cylinder not only could prevent the piston rod of the jack cylinder from retracting during lifting operation but also from automatically extending during vehicle travel.

(2) Crane hydraulic system

In the hydraulic pilot control system of multi-way change valve, the main control valve is load sensitive proportional multi-way change valve. And anti-shock and anti-corrosion by gases valves are equipped in each valve block. The pilot valve uses an imported proportional relief valve. The moving angle of the pilot valve handle is directly proportional to the output pressure, so does the movement of the main control valve element. Thus fine inching control is available in the whole machine. Meanwhile, load sensitive valve makes the speed of actuator have no relationship with load, thus operation difficulty is reduced and labor saving is gained. Variable displacement motor in winch system makes a feature of high speed with light load and low speed with heavy load.

a. Winch oil circuit:

Max. pump displacement: 113ml/r, variable motor displacement: 80 ml/r.

The winch brake for winch oil circuit is constant-closed type. When operate the pilot control valve controlling the main winch, the pressure oil delivered by the pilot control valve changes the flow direction of change valve via shuttle valve, and causes the pressure oil (3MPa) delivered by pilot pump to open the winch brake via hydraulic control change valve, thus performing normal winding or unwinding operations.

When the pilot control valve returns to the neutral, the pressure oil in control circuit will flow back oil tank from the pilot control valve, the hydraulic control change valve back to its original state by the action of returning spring, causing the pressure oil in winch brake to return into oil tank via hydraulic control change valve, the brake is activated by the spring.

Note: Do not adjust the pressure valve on counterbalance valve.

b. Swing oil circuit:

Max. pump displacement: 32 ml/r, constant piston motor displacement: 28 ml/r.

The opening of swing brake is controlled by a solenoid valve. If there is no current in the solenoid valve, the brake is engaged; if there is current in the solenoid valve, the brake opens by the action of pressure oil. So, during swing operation, operator must press S2, S3 on the pilot control valve handles or S12 switch on left controller (total three switches) to control the swing movement.

The swing main oil circuit has free sliding function. During lifting operation when boom is under lateral pull, press any one of free sliding switches, the turntable can align automatically, that is the boom center of gravity is in the same plane with the load center of gravity in prevention of boom deflection or damage due to lateral pull.

c. Elevating oil circuit:

Max. pump displacement: 63 ml/r.

The system max. setting pressure is 8 MPa during boom lowering. In order to lower the boom smoothly or stop lowering reliably, a counterbalance valve is fitted in the circuit. A rod-side unload oil circuit is designed in the change valve in order to supply a stable pressure signal to the moment limiter.

d. Telescoping oil circuit:

Max. pump displacement: 63 ml/r.

The crane's telescoping system consists of four boom sections and two telescoping cylinders. One cylinder drives 2nd, the other one drives 3rd, 4th and 5th boom sections extending and retracting synchronously. In order to preventing piston rod from deflection due to high pressure during boom extending, the setting pressure of pressure limit valve is 19MPa. A counterbalance valve is fitted in the telescoping system for boom stable retraction and reliable stopping.

Note: please carry out operation according to the telescoping procedure.

e. Hydraulic system for air conditioning device

There is a hydraulic system for air conditioning device in operator's cab. Hydraulic motor drives compressor through electric magnetic clutch for cooling; hydraulic motor drives series-shaft gear pump for heating.

f. Control oil circuit:

The pressure in pilot control circuit is provided by a gear pump with displacement 10ml/r, the setting pressure of relief valve is 3MPa.

A solenoid valve for pilot control of the oil flow is fitted in the circuit. Only there is current in the solenoid valve can various mechanisms of the crane be actuated, otherwise no any action.

A safety unload solenoid valve is fitted in the circuit, and controlled by automatic moment limiter. When load moment reaches or exceeds the nominal load capacity the solenoid valve is activated to cut out all movement increasing moment.

A rope-end limit solenoid valve is fitted in the circuit. When 3~5 turns of wire rope left on main or auxiliary winch drum, the solenoid valve is activated to stop rope releasing.

Swing system and auxiliary winch share one pilot control valve (on left seat armrest). Push forward the handle to lower auxiliary hook block; pull backward it to rise auxiliary hook block. Move the handle left, the turntable swings left; move it right, the turntable swings right.

Telescoping (elevating) system and main winch share one pilot control valve (on right seat armrest). Push forward the handle to lower main hook block; pull it backward to rise main hook block. Move the handle left to retract (rise) the boom; move it right to extend (lower) the boom.

Swing and auxiliary winch share one pilot control lever (on left handrail). Push the lever forward,

auxiliary hook block down; pull backward, it up. Move the lever left, the turntable turn left; move right, it turns right.

Telescoping (elevating) and main winch share a pilot control lever (on right handrail). Push the lever forward, main hook block down; pull backward, it up. Move the lever left, telescoping (elevating) retracts (rises); move right, telescoping (elevating) extends (lowers).

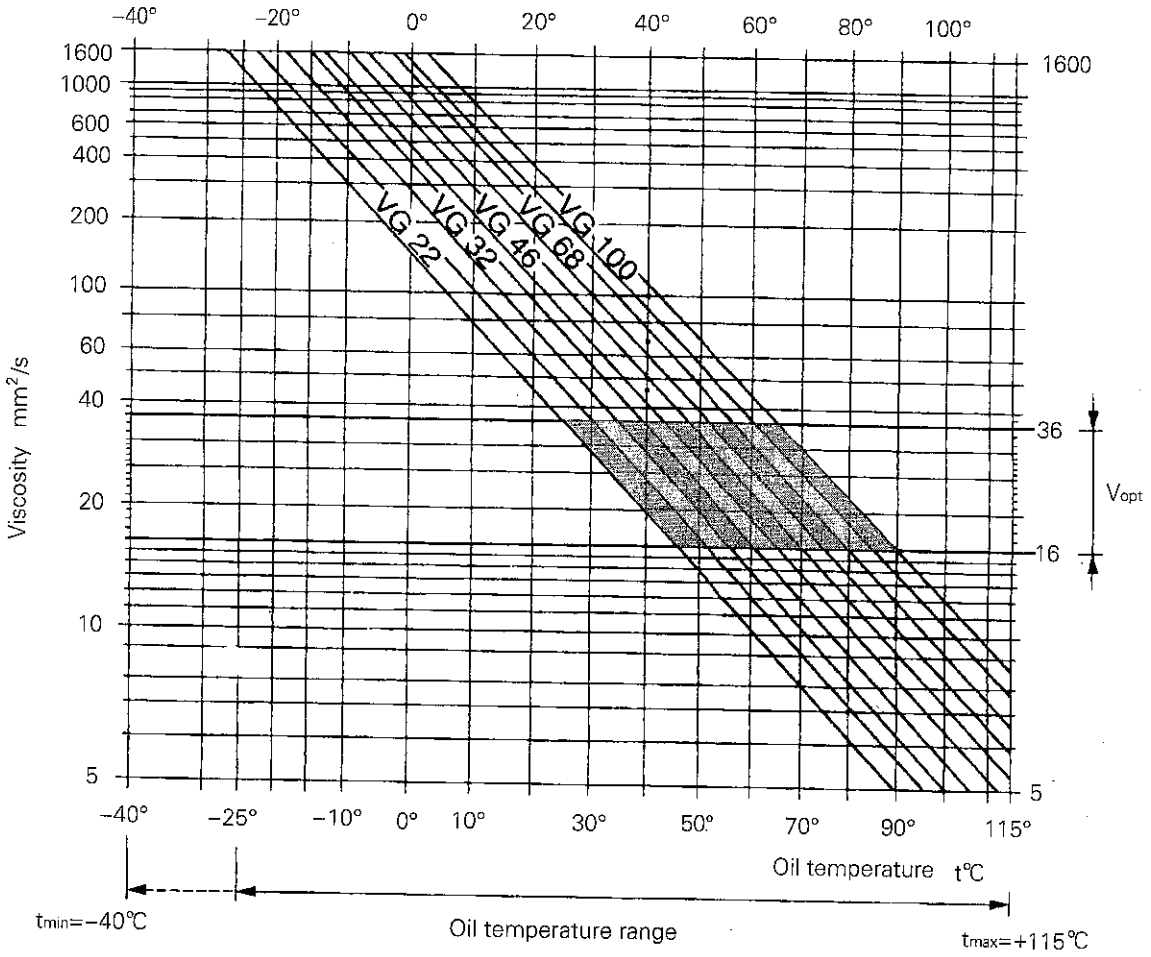
7.3 Specifications

Main circuit working pressure	21 MPa
(refer to nominal value in "Hydraulic system diagram" for setting value of per relief valve)	
Oil tank capacity	468L
Oil suction filter accuracy	180 μ
Oil return filter accuracy	20 μ
Oil control filter accuracy	10 μ
Hydraulic oil brand:	Ambient temperature
L-HM 46	above 5℃
L-HM 32	−15℃~5℃
L-HV 22	−30℃~ −15℃
No. 10 aviation hydraulic oil	below −30℃

7.4 Hydraulic Oil

The suitable temperature for hydraulic system working is about 60℃. When the temperature is more than 80℃, the volume efficiency of power parts and the sealing performance in hydraulic system will lower sharply, especially under idle engine. Consequently result in hydraulic system faulty; and when the temperature is lower than -20℃, hysteresis of hydraulic system will occur. In practical working, select open and close of hydraulic oil radiator as well as viscosity according to environmental temperature and working conditions. Refer to the diagram below for working temperature related to environmental temperature when select hydraulic oil.

Example: when environmental temperature is X℃, the working temperature in hydraulic system oil tank is 60℃, optimum viscosity range is in shadow, corresponding viscosity grade is VG46 or VG68, the VG68 should be selected.


−40°
−20°
0°
20°
40°
60°
80°
100°
1600
1000
600
400
200
100
60
40
20
10
5
Viscosity mm²/s
VG 22
VG 32
VG 46
VG 68
VG 100
1600
36
16
5
Vopt
−40°
−25°
−10°
0°
10°
30°
50°
70°
90°
115°
Oil temperature t℃
tmin=−40℃
Oil temperature range
tmax=+115℃

VIII. Safety Devices

8.1 Load Moment Indicator (LMI)

(1) Working principle

The computer in the moment limiter will calculate the crane working radius based on the signals of boom length and boom angle input by various sensors. The computer will also calculate the loading force of the elevating cylinder based on the signal input by pressure sensor, then figure out the crane lifting load moment, and finally compare these data with the maximum value of total rated lifting capacity stored in the data base and display the corresponding information on the screen.

(2) Safety function

When an overload occurs, the moment limiter will automatically cut the crane motions which increase the load moment (boom extending, boom lowering and hoist up) and only remain those which decrease the load moment (boom retracting, boom raising and hoist down).

(3) Hoist height limit function

When hook block approaches boom head sheave (approx. 750 mm), the hoist limit switch will turn on to ground the 4.7k electric-resistance in boom length detector. After being "local" processed, it stops boom extending and hook block winding. At the same time the display warning lamp lights up.

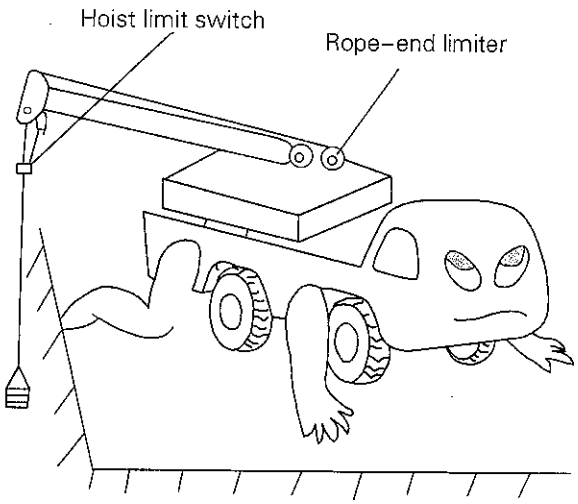
Notes:

a. Please read carefully the load moment indicator (LMI) operation manual before lifting operation.

b. Although the crane is equipped with the load moment limiter, operator should still pay attention to safety. Before lifting, operator should estimate the weight of the load to be lifted, and determine if the crane can lift the load or not in comparison to the total rated load table. The load moment limiter is a very important safety device for the crane. Do not carry out the impermissible operations with the load moment limiter switched off (such as extending boom with a lifted load).

8.2 Rope-End Limiter

When lifting a load below the crane level and the wire rope unwinding until 3~5 turns left on the winch drum, the rope-end limiter automatically activates to stop hook lowering, at the same time, the buzzer sounds and the over-release warning lamp lights up.



8.3 Hydraulic System Pressure Switch

It is equipped to avoid touching control handle by mistakes as access and egress operator's cab. Before operation only the switches (S1, S12) are pressed, the pressure in the hydraulic system may emerge for operation.

8.4 Hydraulic Safety Valve

It is used to prevent overloading. It can cut operations that will increase the load moment (boom extending, boom lowering and hoist up) and only reserve those operations that will decrease the load moment (boom retracting, boom raising and hoist down).

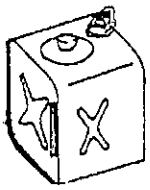
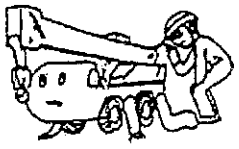
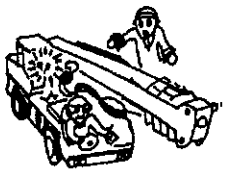
8.5 Hydraulic Oil filter Blocked Warning Lamp

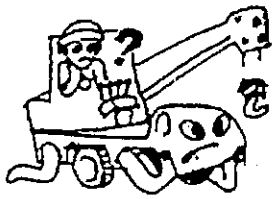
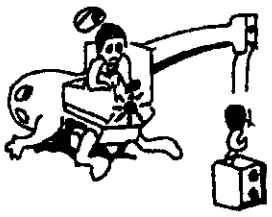
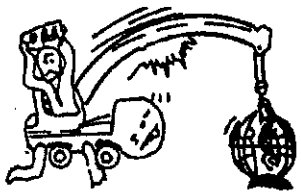
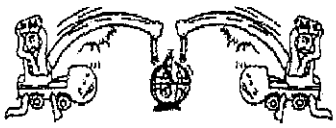
When the oil filter is clogged, the warning lamp comes on. At this time, stop operation and replace the oil filter.

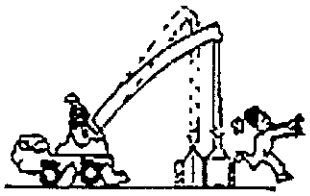
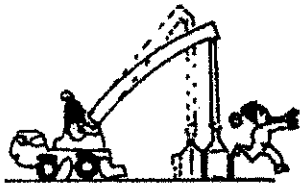
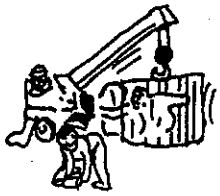
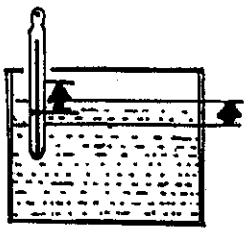
IX. General Cautions In Operation

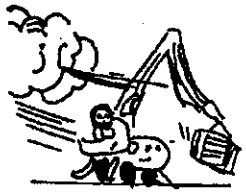
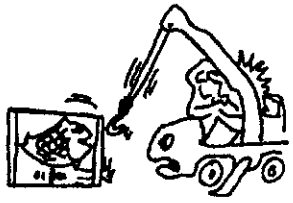
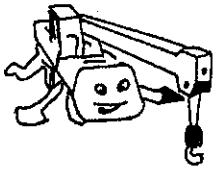
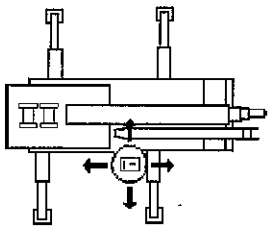
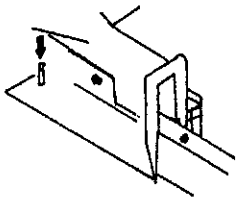
9.1 Cautions

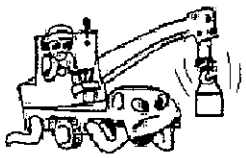
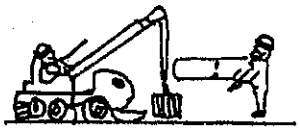
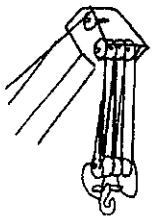
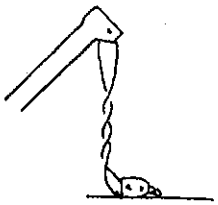
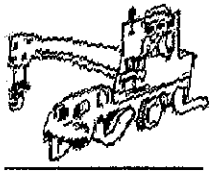
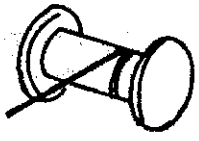
Cautions in operating the crane are summarized here. Before starting to operate your crane, carefully read and thoroughly understand them for safe operation.

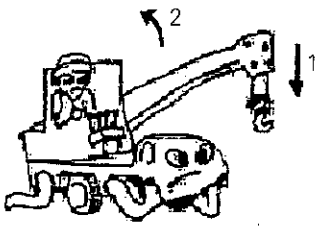
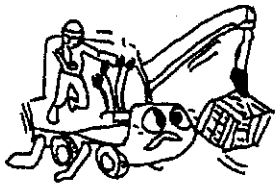
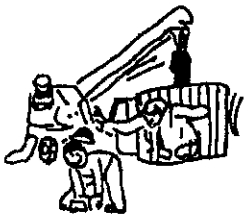
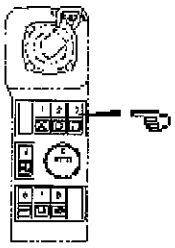
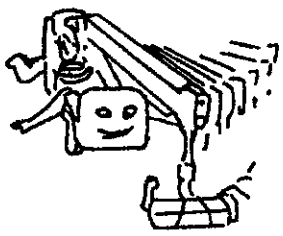
No.	Illustrations	Cautions	Remark
1.		Observe the "Starting and Stopping Engine" item in the carrier instruction manual.	Preoperational checks
2.		Check the hydraulic oil level with the crane in the traveling configuration, to make sure that the specified quantity is in the tank.	
3.		Check all the members for defects and abnormalities. If abnormalities occur, remove immediately.	
4.		Do not check and repair the crane when it is in lifting operation.	
5.		After starting the engine, run it at low speeds to warm it up sufficiently.	
6.		Before starting the engine, make sure that the various levers and switches are in their neutral or off positions.	

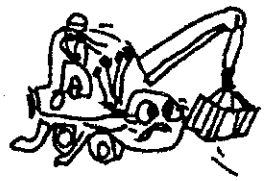
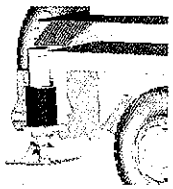
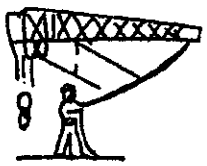
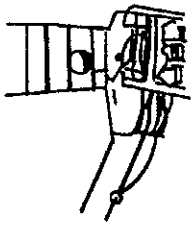
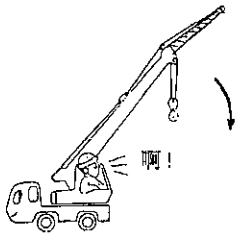
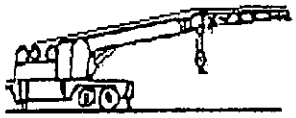
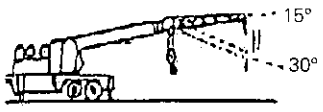
No.	Illustrations	Cautions	Remark
7.		Move the control levers and switches without load to check for correct crane functions. If any crane operation is faulty, repair immediately.	Preoperational checks
8.		Perform the specified preoperational checks of the Load moment indicator (LMI). (Refer to the Load moment indicator instructions.)	
9.		Check all other safety devices for proper function. (e.g. pressure gauge, etc.)	
10.		Turn on the power switch and starter switch in operator's cab before starting to operate the crane.	
11.		Do not lift loads in excess of the total rated loads. Do not overload the crane. Avoid side- loading or dragging loads on the ground. Do not try to take a load pressed by other loads or lift a load buried or stuck on the ground due to freezing.	During crane operation
12.		In general, lifting a load with two or more cranes at the same time is not permitted. If a load must be lifted with two or more cranes, carry out the lifting operation with straight wire ropes, synchronous movements of cranes and on condition that load on each crane must not exceed 80% of its rated load capacity.	

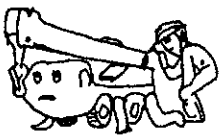
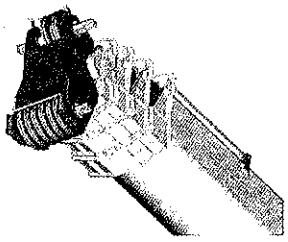
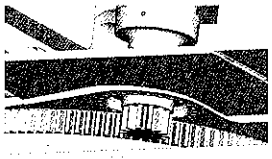
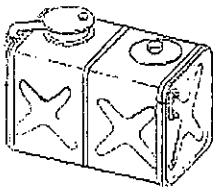
No.	Illustrations	Cautions	Remark
13.		The boom deflects under loads and the working radius increases. When calculating the total rated load, take this into consideration.	During crane operation
14.		Operate the crane slowly while you are familiarizing yourself with its operation	
15.		Do not look to the side when operating the crane. Operators must take signals only from designated signalmen. Operators must respond to emergency stop signal whenever and whoever sent.	
16.		Check safety conditions around the crane during operation. Operator should not leave the machine with a load suspended unattended.	
17.		Pay attention to the hydraulic oil temperature, and stop operation when the temperature rises above 80℃. Note that the amount of oil in the cylinders, tanks, etc. changes when the temperature changes. Therefore, when the boom is extended with the hydraulic oil at high temperatures, the boom retracts as the oiltemperature drops. Compensate the boom retraction by extending the boom further.	

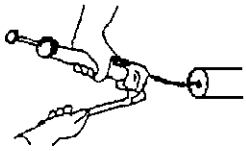
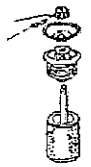
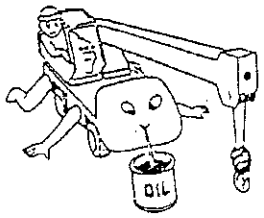
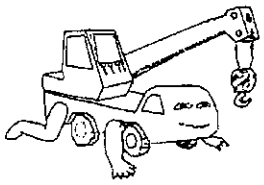
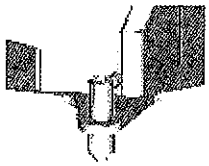
No.	Illustrations	Cautions	Remark
18.		Take note of weather report 1) Where the wind velocity is over 10m/sec. do not operate the crane. 2) If it is very windy or thundering, stop operating the crane and stow the boom.	During crane operation
19.		Avoid side loading or dragging loads on the ground.	
20.		Set up the crane level on a firm and even supporting surface (Where the ground is suspected to be soft, place strong wood blocks on the ground and set up the crane on them.)	Outrigger operation
21.		After setting up the crane, check that all the tires are clear of the ground and that the crane is level by monitoring the level gauge.	
22.		Extend the outriggers to the specified position, and lock them with the lock pins.	

No.	Illustrations	Cautions	Remark
23.		Do not abruptly move the winch control lever.	Winch operation
24.		During hoisting, lift the load off the ground 150~200mm, hold down for 10 minutes and check brake, and ascertain safety before further hoisting the load. Do not lift a load off the ground by raising the boom or extending the boom.	
25.		Reeve the winch rope in a proper number of parts of line according to the boom length in order to improve working speed and enlarge wire rope life.	
26.		If the winch rope twines and the hook block rotates, fully untwine the rope before lifting loads.	
27.		Do not lower the boom excessively even if no load to prevent crane tipping. Observe boom angle limit. When boom length is less than 30.4m, the min. boom angle may be reached.	
28.		When lowering the hook block, leave at least three turns of the winch rope on the winch drum.	

No.	Illustrations	Cautions	Remark
29.		Sufficiently lower the hook block before extending the boom.	Boom elevating
30.		With the boom fully retracted, check the length indication of the LMI. Extend the boom only after making sure that the indication is within the specified range.	
31.		Do not abruptly move the elevating control lever.	
32.		Before swinging the boom, make sure that area in the swing path is clear of personnel and obstructions.	Boo m swinging
33.		Before swinging the boom, check the preset position of swing brake release switch. Never move the switch during swinging.	
34.		While the SWING FREE/LOCK select switch is in FREE, take care to prevent the boom from drifting under tilt, wind pressure, or inertia. When carry out operation on tires, pay special attention to the influence caused by frame inclination to free sliding.	

No.	Illustrations	Cautions	Remark
35.		Do not abruptly move the swing control lever. Reset the control lever smoothly, and release swing brake release switch on handle after the lever returning to neutral.	Boo m swinging
36.		Keep the swing brake applied when the boom is not swung.	
37.		Pull out outrigger floats before setting up the outriggers.	Jib
38.		When folding and unfolding the jib, hold it by the auxiliary winch rope or the like, and swing it slowly. In prevention risk due to jib rotating seriously by gravity.	
39.		When the jib is erected (stowed), connect (disconnect) the plug of jib height limiter to (from) the boom side.	
40.		Do not operate the crane or drive the carrier with the stowing pin extracted, otherwise the jib may drop off.	
41.		When stowing the jib, do not over-wind the auxiliary winch rope.	
42.		Do not lower the boom immediately after changing the offset to 30° or 15° .	

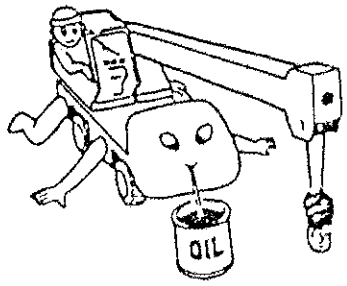
No.	Illustrations	Cautions	Remark
43.		Before changing the jib offset or extending, secure sufficient clearance above the ground by raising the boom.	Jib
44.		Once every month and every year, periodically inspect the crane	Maintenance and servicing
45.		Check and adjust boom cables regularly, at least every month. If cable looseness occurs, it may cause serious problem such as cable out of pulley groove, consequently retracting boom is impossible.	
46.		Lubricate boom telescoping chute regularly.	
47.		Check the condition of slewing bearing nuts tension regularly. If looseness is found, tighten in time.	
48.		Clean or replace the hydraulic oil at regular intervals to keep it always clean.	
49.		Replace the gear oil and other lubricants regularly.	

No.	Illustrations	Cautions	Remark
50.		Grease all the specified greasing points, and other rotating and sliding members regularly.	Maintenance and servicing
51.		Replace the filter element regularly.	
52.		Before each operation, check the oil levels of the hydraulic oil, gear oil, and other lubricating oils for correct quantity, and refill as necessary.	
53.		Keep all parts properly adjusted (e.g. brakes). Keep them free from deformation, damage, loose mounting, etc.	
54.		Stow the hook block in the specified position and secure it.	Driving the vehicle
55.		Secure the turntable swing brake pin.	
56.		Retract outriggers fully and lock with pins.	

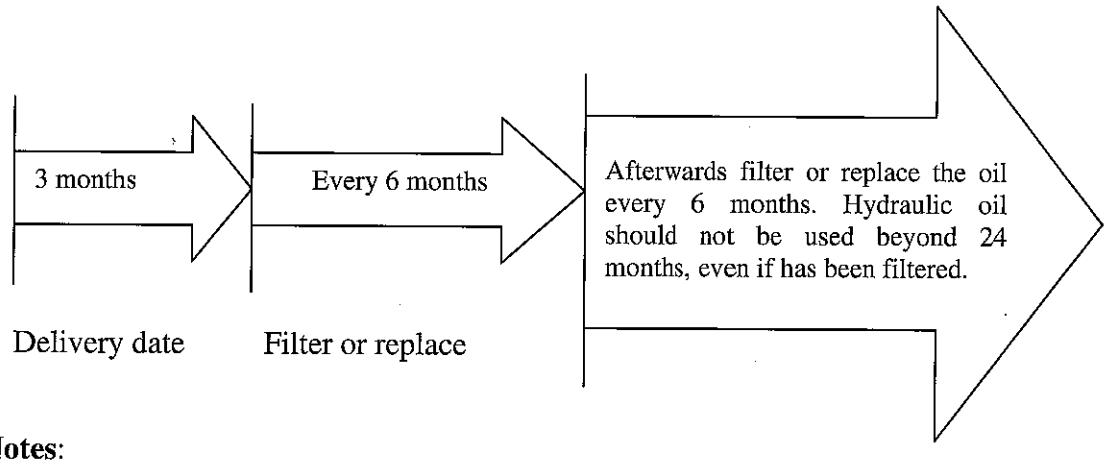
X. Oil

Different brands of hydraulic oil, gear oil and grease should not be mixed.

10.1 Hydraulic Oil



(1) Filtration and replacement schedule



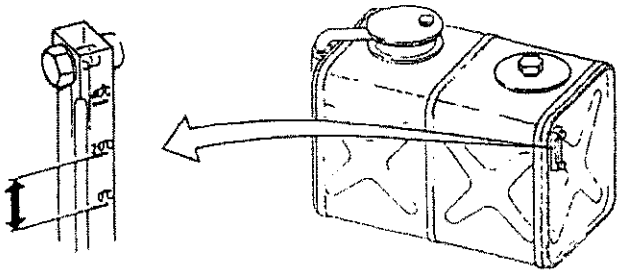
Notes:

a. Whenever oil becomes excessively contaminated, filter or replace it even before the scheduled filtration or replacement time. Hydraulic oil is replaced according to JB/T9737.3—2000.

b. Use suitable oil depending on the atmospheric temperature.

(2) Hydraulic oil temperature

The oil temperature should always be below 80℃.



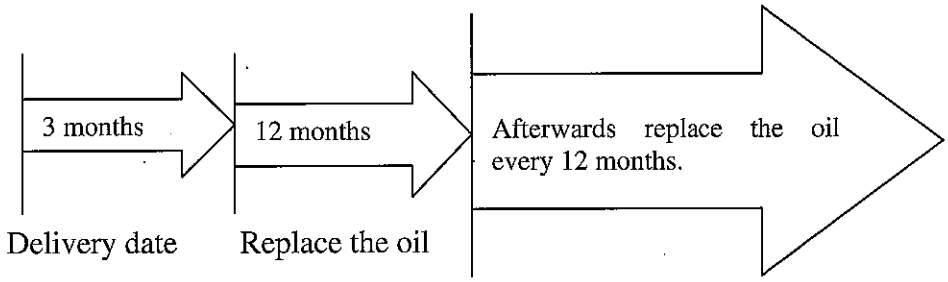
(3) Quantity of hydraulic oil

Required quantity of hydraulic oil is 468L.

Checking hydraulic oil level: check the oil level with the crane in travel configuration. The thermo-liquidometer not only can show the oil level, but also the hydraulic oil temperature. When checking the oil level, make sure that the oil level is above the middle mark of the thermo-liquidometer. If the oil level is lower than the middle mark, add hydraulic oil.

10.2 Gear Oil

(1) Replacement schedule



Notes:

a. Whenever oil becomes excessively contaminated, replace it even before the scheduled time of replacement.

b. Frequently check the oil level, and refill if the level is lower than the specified level.

(2) Winch

Filling amount: about 2.0L.

Oil brand: Mobil SHC220 in winter; L—CKD220 ~320 EP gear oil in summer.

Remove wire rope to reveal drum bottom, and then remove the plug and refill enough oil.

(3) Swing system

Filling amount: about 1.5L.

Oil brand: Mobil SHC220 in winter; L—CKD220 ~320 EP gear oil in summer.

Remove the plug and refill enough oil.

10.3 Grease

No.	Greasing Position	Greasing interval	Methods
1.	Main hook block sheaves	Weekly	Grease pump
2.	Boom winch sheaves	Weekly	Grease pump
3.	Slide blocks between 2nd, 3rd, 4th boom sections	Weekly	Coat, grease pump
4.	Sliding surfaces of slide block between 2nd, 3rd, 4th boom sections	Weekly	Coat
5.	Elevating cylinder upper and lower pivot shafts	Weekly	Grease pump
6.	Jib sheaves	Before use	Grease pump
7.	Boom rear pivot shaft	Weekly	Coat, grease pump
8.	Slewing bearing	Acc. to section 5.2	Grease pump
9.	Pinions in swing system	Weekly	Coat
10.	Auxiliary hook block	Before use	Coat
11.	Winch rope	Weekly	Coat
12.	Telescoping wire rope	Weekly	Coat
13.	Outrigger jack floats	Weekly	Grease pump
14.	Winch bearing seat	Weekly	Grease pump

Notes:

(1). Clean the grease cup and the surface to be coated with grease before greasing.

(2). The sliding surfaces, which are not indicated in the list above, also require periodic greasing.

(3). Monthly apply a thin coat of grease to the exposed portion of the elevating cylinder piston rod with the boom placed on the boom rest.

10.4 Hydrostatic pressure oil

The filling amount of hydrostatic pressurized oil is approx. 2.5 kg.

The crane is filled with the hydrostatic pressurized oil when it is delivered. If it is needed to replenish oil, refill with KF-01 brake fluid (made by Xuzhou Automobile Chemicals Factory).

Notes:

(1) Different brands of brake fluid should not be mixed.

(2) Use the brake fluid of the crane accelerator specified by our company. Do not replace it with other brands, otherwise the operating pump and the rotary joint sealing will be damaged.

10.5 Comparison between oil brands abroad and domestic

Category	Hydraulic system	Winch speed reducer, Slewing speed reducer	Bearing, slider, slewing bearing, wire rope, boom pivot, elevating pivots
Name	Anti-friction hydraulic oil	Heavy load industrial gear oil	EP Lithium base grease
China Petroleum	L-HV22, L-HM 32, L-HM 46	L-CKD220, L-CKD320	No. 2
MOBIL	Mobil DTE 11M, 13M, 15M	Mobilger630, Mobilger632	No. 2
SHELL	Tellus 22, 32, 46	Omala220, Omala320	No. 2
CALTEX	Rando oil HD 32, 46	Meropa220, Meropa320	No. 2
CASTROL	Hyspin AWS 15, 32, 46; Hyspin AWH 15, 32, 46	Alpha Max220, Alpha Max320	No. 2
TOTAL	AZOLLAZS 32, 46	Carter EP220, Carter EP320	No. 2
BP	Bartran HV 22, Energol HLP-HM 32, 46	Energol GR-XF220, Energol GR-XF320	No. 2

10.6 Disposal of oil and antifreeze fluid

Various lubricants, greases, fuels and antifreeze fluids used in cranes are to cause direct or indirect pollution to environment. Antifreeze fluid and hydraulic oil are toxic. If they can't be used, dispose them according to the laws of the respective country. Recover used antifreeze fluid and hydraulic oil with permissible disposal equipment (including disposal equipment in service station and those supplied by automobile service station). Any doubt, contact local environmental protection department for help.

XI. Common Troubles and Troubleshooting

11.1 Troubleshooting

Section	Trouble	Cause	Remedy
Pump system	Noise	1. Insufficient oil. 2. Air entering through suction line. 3. Mounting bolt loose. 4. Contaminated hydraulic oil. 5. Propeller shaft vibration. 6. Universal joint worn. 7. Pump faulty.	Add oil. Repair and bleed air. Tighten. Replace or filter. Repair. Replace. Repair or replace.
Outrigger system	Outriggers inoperative.	1. Relief valve pressure setting faulty in carrier multi-valve. 2. Dirt blocks up relief valve element. 3. Control valve faulty.	Adjust. Disassembly and clean. Repair.
	Movement is sluggish.	1. Inner of control valve faulty. 2. Relief valve pressure setting too low.	Repair. Adjust.
	Jack automatically retracts or extends during operation or road travel.	1. Double-way hydraulic valve faulty. 2. Internal leakage in cylinder. 3. External leakage in cylinder.	Repair. Repair. Repair.
Swing system	Swing brake ineffective.	1. Brake lining worn or oil on brake lining. 2. Air entered brake oil circuit. 3. Brake cylinder faulty.	Repair or replace. Bleed air. Repair.
	Sluggish swing.	1. Relief valve in main valve pressure setting too low. 2. Hydraulic motor leakage. 3. Insufficient pressure in control circuit or pilot valve faulty. 4. Internal leakage in main valve or change faulty.	Adjust. Repair or replace. Check and repair. Check and replace sealing.

Section	Trouble	Cause	Remedy
Swing system	Boom will not swing.	1. Relief valve pressure setting too low or leakage with sticking. 2. Main valve faulty. 3. Motor faulty. 4. Speed reducer faulty. 5. Pilot valve faulty. 6. Relief valve in pilot oil circuit faulty. 7. Blocked pilot oil circuit.	Repair and adjust. Repair. Repair or replace. Repair. Repair. Adjust after repair. Check oil circuit.
	Big starting shock	1. Pilot valve faulty. 2. Reservoir inflation pressure too high.	Check and repair. Adjust.
	Unsteady swing brake	1. Swing brake faulty. 2. Main swing valve faulty.	Check and repair. Check and repair.
	Free/lock change system inoperative.	1. Solenoid valve stuck or change faulty. 2. Brake pressure of inlet circuit too low. 3. Pressure of free-sliding relief valve too high.	Check and repair. Adjust pressure-relief valve and relief valve of pilot oil circuit. Adjust.
Elevating system	Boom elevation cylinder will not extend.	1. Relief valve pressure setting too low in crane multi-valve. 2. Internal leakage in control valve, control pressure too low. 3. Internal leakage in cylinder. 4. Master pump pressure too ow. 5. No pressure in pilot oil circuit, solenoid valve faulty. 6. Pilot valve faulty. 7. Unloading solenoid valve faulty. 8. LMI faulty, unloading signal remains.	Adjust. Check, repair and adjust. Check and repair. Check and repair. Check, repair and adjust. Check and repair. Check and repair. Check and repair.

Section	Trouble	Cause	Remedy
Elevating system	Boom elevation cylinder will not retract.	1. It is same as items 5, 6, 7 and 8 in Boom elevation cylinder will not extend. 2. Counterbalance valve faulty. 3. Back pressure of main return oil circuit too high. 4. Blocked control oil circuit of counterbalance valve.	Check and repair. Check and repair. Check and repair. Check and repair.
	Cylinder retracts during operation.	1. Internal leakage in cylinder. 2. Counterbalance valve faulty.	Repair or replace. Repair or replace.
Telescoping system	Boom will not extend.	1.Too low pressure setting of relief-valve in telescoping control valve of crane multi-valve. 2. It is the same as items 2, 3, 4, 5, 6, 7 and 8 in Boom elevation cylinder will not extend.	Adjust. Check, repair and adjust.
	Boom will not retract.	1. Relief valve pressure setting too low in crane multi-valve. 2. Counterbalance valve faulty. 3. It is the same as items 2, 4, 5 and 6 in Boom elevation cylinder will not extend.	Adjust. Check and repair or replace. Check, repair and adjust.
	Boom retracts during operation.	1. Counterbalance valve faulty. 2. Internal leakage in cylinder. 3. External leakage in cylinder, valve or piping joints.	Repair. Repair. Repair.
Winch system	Brake is ineffective.	1. Oil on brake friction disc. 2. Friction disc worn. 3. Air entered. 4. Master cylinder faulty.	Clean. Adjust or replace. Trouble-shooting. Repair

Section	Trouble	Cause	Remedy
Winch system	Winch will not hoist up loads.	1. Too low pressure setting of relief valve in crane multi-valve.	Adjust.
		2. Hydraulic motor faulty.	Check and repair.
		3. Internal leakage in main valve.	Check and repair.
		4. Main pump pressure too low.	Check and repair.
		5. No pressure in pilot oil circuit.	Check and repair.
		6. Pilot handle faulty.	Check and repair.
		7. Unloading solenoid valve faulty, in unloading state.	Check and repair.
		8. ALM faulty, unloading signal continuous.	Check and repair.
		9. Winch brake faulty.	Check and repair.
	Winch will not let out rope in power hoist-down mode.	1. Counterbalance valve faulty.	Check and repair.
		2. Control oil circuit of counterbalance valve blocked.	Check and repair.
		3. Winch brake faulty.	Check and repair.
		4. No pressure in brake inlet circuit.	Check change valve.
		5. No pressure in pilot oil circuit.	Check and repair.
		6. Pilot valve faulty.	Repair or replace.
		7. Leakage in winch motor.	Repair.
Functional parts	Fine control, controllable and proportional function insensitive	1. Pressure in control oil circuit too low.	Adjust.
		2. Pilot relief valve faulty.	Check and repair.
		3. Main valve faulty.	Check and repair.
Hydraulic system	Overheat hydraulic oil, low speed of functional parts.	1. Internal leakage in main pump.	Check and repair.
		2. Relief-valve in multi-valve faulty.	Check and repair.
		3. Counterbalance valve opening pressure too high.	Check and repair.
		4. Leakage in winch motor.	Check and repair.
		5. Relief-valve pressure setting in main pump too low	Check and repair.

Section	Trouble	Cause	Remedy
Electrical system	1. Work lamps will not light 2. Boom lamp will not light. 3. Room lamp will not light.	1. Bulb burned out. 2. Fuse blown. 3. Earthing faulty. 4. Wire broken. 5. Switch faulty.	Replace. Replace. Repair. Repair. Repair or replace.
	Wipers inoperative.	1. Fuse blown. 2. Switch faulty. 3. Motor faulty. 4. Earthing faulty. 5. Wire broken.	Replace. Replace. Replace. Repair. Repair.
	Buzzer will not sound	1. Earthing faulty. 2. Switch faulty. 3. Relay faulty. 4. Wire broken. 5. Buzzer faulty. 6. LMI faulty.	Repair Replace. Replace. Repair Repair or replace. Contact our service station.
	Starter will not be operated from crane operator's cab	1. Main fuse blown or loose. 2. Wire broken, switch faulty.	Repair or replace. Repair or replace.
	Load moment indicator faulty	1. Fuse blown. 2. Relay faulty. 3. Solenoid faulty. 4. Solenoid valve earthing faulty. 5. Others.	Replace. Replace. Replace. Replace. Contact our service station.
	Height limiter inoperative.	1. Fuse blown. 2. Cord reel faulty. 3. Wire broken. 4. Limit switch faulty. 5. Weight rope broken. 6. Solenoid valve faulty. 7. Solenoid valve earthing faulty. 8. Limit switch earthing faulty. 9. LMI faulty.	Replace. Repair or replace. Repair. Replace. Replace Repair or replace. Repair. Repair. Contact our service station.

11.2 Replacing wire ropes

11.2.1 Wire rope replacement standard

Wire ropes are fatigued with use, and to continue to use them without paying attention to fatigue is very dangerous. Inspection and replace wire rope according to GB/T5972-2006 ***Cranes Wire Rope Code of practice for examination and discard***, and replace any wire ropes which fall into one or more of the categories below.

(1) Steel wires of more than 10 % of wires (excluding filler wires) in the most external strand in one lay are broken.

(2) Reduction of wire rope diameter exceeds 7 % of nominal diameter.

(3) Evidence of kinking.

(4) Excessively deformed (indented strand, protrusion of wires, bird-caging) or corrode wire ropes.

(5) Wire ropes with an abnormal rope end.

11.2.2 Requirements of replacement wire rope

In general, replace wire rope with the same type and size as the original one. If the rope is not the same type, the rope performance not less than the original one's should be ensured, and fit grooves on drum and sheaves.

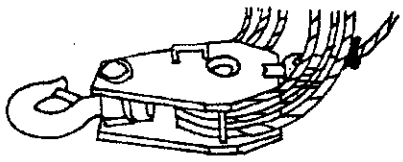
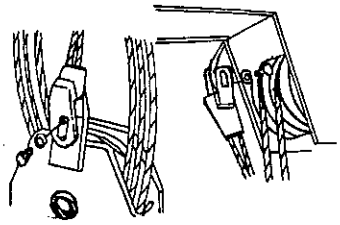
If the rope is cut from a long one, the rope ends should be bound with a wire or vinyl tape to prevent rope loosening.

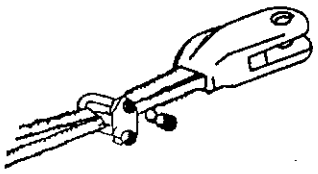
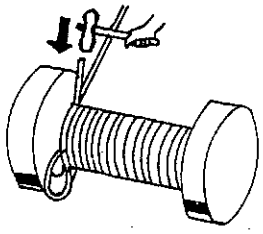
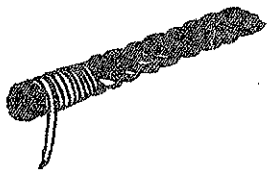
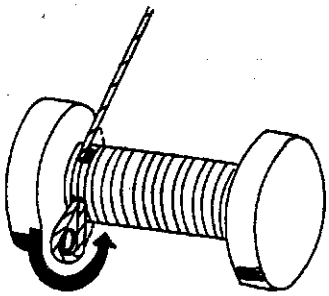
11.2.3 Working conditions of replacing main winch rope

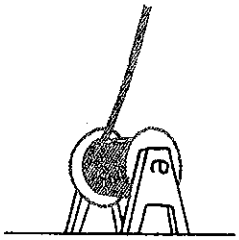
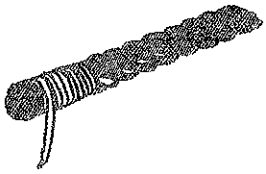
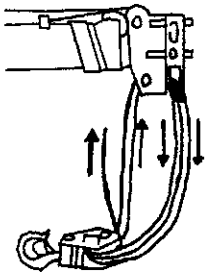
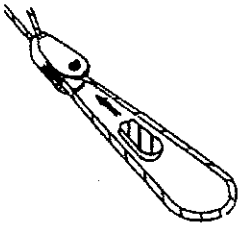
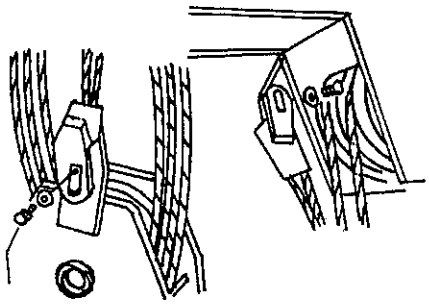
Take main winch wire rope for example:

a) Set up the crane on firm, level ground.

b) Fully retract the boom.

No.	Procedure	Note	Tools
1	Place the main hook block on the ground. 	Avoid disorderly rope winding on the drum.	
2	Disconnect the rope socket from the boom head or main hook block. 	Keep the parts carefully so as not to lose them.	Wrench

No.	Procedure	Note	Tools
3	Remove the rope from the rope socket. 	Keep the parts carefully so as not to lose them.	Bar Hammer Wrench
4	Let out the rope by turning the winch under power.	Pull the rope.	
5	Remove the rope end from the winch drum. 	Keep the wedge.	Bar Hammer
6	Reeve the new rope over all the sheaves.	Through the correct route. Bind the rope end with a wire or vinyl tape. 	Wire or vinyl tape
7	Install the rope end to the winch drum. 	1. Put the wedge in the correct orientation. 2. The rope end must not protrude from the external periphery of the drum. 	Hammer

No.	Procedure	Note	Tools
8	Wind the rope on the drum. 	1. Avoid disorderly rope winding on the drum. 2. Bind the rope end with a wire or vinyl tape. 	Wire or vinyl tape
9	Reeve the rope over the sheaves at the boom head and the hook block. 	Exercise care to route the rope correctly.	Bar Hammer
10	Attach the rope socket and rope clamp to the rope. 	Put the wedge in the correct orientation.	Hammer Wrench
11	Attach the rope socket to the boom head or the hook block depending on the number of parts of line. 		Wrench

No.	Procedure	Note	Tools
12	Raise and extend the boom, then lower the hook block until no turn of the rope remains on the winch drum.	Don't lower the hook block excessively. Otherwise the rope may be damaged.	Bar Hammer
13	Wind the rope on the drum while hoisting a weight which applies aprox.30 % of the "maximum permissible load for winch rope" to the rope.	Do not exceed the total rated load. The load limit for winch rope: 2800kg.	Hammer Wrench
14	Remove the weight from the hook.		

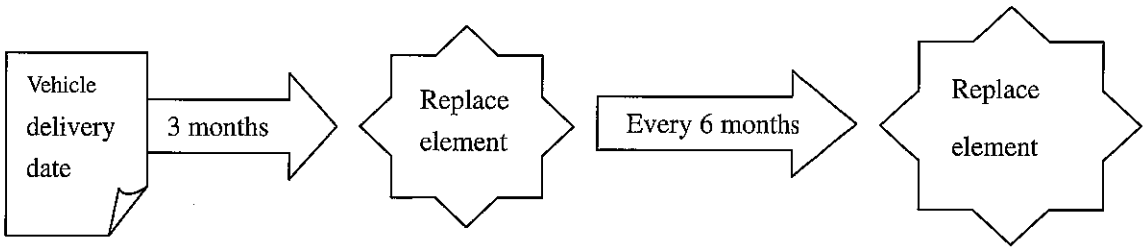
11.3 Return Filter

(1). Notes on operation

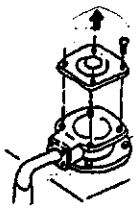
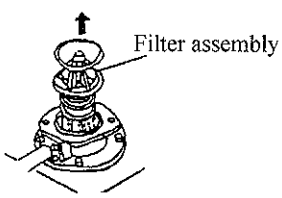
a. Stow the boom.

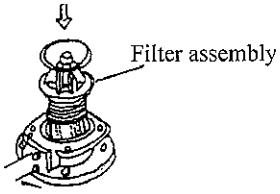
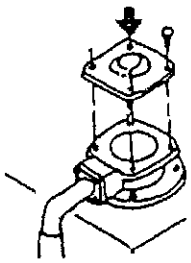
b. Stop the pump.

c. Replace the filter element at the intervals shown below.



(2). Replacement of the filter element

No.	Procedure	Note	Tools
1	Remove the cover. 		Wrench
2	Remove the filter assembly. 		

3	Remove the snap pin, loosen the nut and remove the filter element. 		Wrench
4	Replace the filter element and assemble the filter. 	Tighten the nut gradually. After the sealing surface makes contact with the element evenly, further tighten the nut within one turn and insert the snap pin. 	Wrench
5	Install the filter assembly. 		
6	Install the cover. 		Wrench

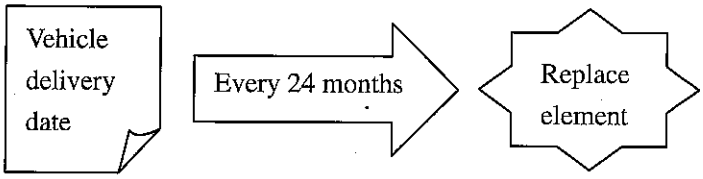
11.4. Line Filters (replace the element)

(1). Notes on operation:

a. Stow the boom.

b. Stop the pump.

c. Replace the filter element at intervals shown below.



XII. Periodic Inspections

The crane should be kept in such a condition as will assure the full performance of each crane function. This is essential for both the assurance of safety and high work efficiency. Inspection items are described below.

Make repairs immediately when unusual conditions are found during periodic inspections.

Be sure to perform the preoperational inspections of:

(1) Outriggers.

(2) Crane mechanisms: boom swinging, elevation and telescoping and rope winding.

(3) Brake systems.

(4) Electrical system.

(5) Safety devices.

Inspection items	
Pump drive system	Control levers and switches 1. Operating condition.
	PTO (power take off) 1. Loose installation and leakage. 2. Abnormal noise and heating.
Hydraulic system	Hydraulic oil tank 1. Loose installation and damage. 2. Cracks and leakage. 3. Oil level, contamination and viscosity.
	Hydraulic pump 1. Loose installation and damage. 2. Abnormal noise vibration and heating. 3. Leakage. 4. Suction line condition (air entry). 5. Delivery pressure. 6. Loose and leaking piping joints.

	Inspection items
Boom swing system	Brake 1. Braking performance. 2. Deformation and wear of links. 3. Lubrication.
	Rotary joint 1. Leakage. 2. Turning condition, noise, vibration and heating. 3. Electrical conductivity between carbon brush and slip ring.
	Speed reducer and swing bearing. 1. Oil level and contamination. 2. Cracks, deformations of gearbox and oil leakage from it. 3. Abnormal noise and vibration. 4. Loose installation. 5. Hydraulic motor operating pressure. 6. Loose and leaking piping joints.
Boom elevating system	Elevating cylinder 1. Wear and damage of pivot pins. 2. Tightness of bolts for pivot pin retaining plate. 3. Leakage. 4. Vibration and noise. 5. Erratic cylinder retraction during load lifting. 6. Deterioration, twisting and deformation of hoses.
	Counterbalance valve 1. Leakage. 2. Pulsation. 3. Loose and leaking piping joints.
	Boom 1. Cracks, damage and deformation. 2. Tightness of bolts for boom pivot pin retaining plate. 3. Scratches on sliding surfaces. 4. Wear and damage of pivot pin bosses. 5. Lubrication of sliding surfaces. 6. Deformations and cracks of boom rest.

Inspection items	
Boom telescoping system	Telescoping cylinders 1. Pulsation, and noise. 2. Operational sequence. 3. Leakage. 4. Function of counterbalance valve. 5. Loose piping joints.
	Jib 1. Cracks and deformations. 2. Lubrication of connecting pins and bosses.
	Winch rope 1. Diameter. 2. Wire breakage. 3. Kinks. 4. Deformation. 5. Corrosion. 6. Lubrication. 7. Tightness.
Winch system	Speed reducer 1. Tightness of mounting bolts. 2. Noise. 3. Crack and deformation of gearbox. 4. Wear of bearings. 5. Lubrication. 6. Leakage.
	Brakes 1. Wear of brake disc and lining. 2. Loose and leaking piping joints. 3. Deformations of spring.
	Counterbalance valve 1. Leakage. 2. Loose and leaking piping joints. 3. Pulsation.

Inspection items	
Winch system	Drums 1. Cracks. 2. Disorderly rope winding.
	Hooks and sheaves 1. Rotation of hook. 2. Deformation. 3. Movement of trunnion. 4. Connections between trunnion and hook. 5. Deformation of rope guard. 6. Rotation of sheave (abnormal noise). 7. Cracks and wear of sheaves. 8. Deformation and damage of sheave support and protecting pieces. 9. Lubrication.
	Jib 1. Cracks and deformations. 2. Lubrication of connecting pins and bosses.
	Winch rope 1. Diameter. 2. Wire breakage. 3. Kinks. 4. Deformation. 5. Corrosion. 6. Is the rope socket wedge in place? 7. Connection of the rope and rope socket. 8. Wear and cracks of rope socket boss and pin. 9. Reeved through correct sheaves.
Hydraulic devices	Relief valves 1. Pressure setting.
	Control valves 1. Operating conditions. 2. Leakage. 3. Tightness of mounting bolts.

Inspection items	
Hydraulic devices	Master valve. 1. Operating conditions. 2. Leakage. 3. Brake fluid level. 4. Deterioration, twisting and damage of hoses.
Crane controls instruments safety devices	Starter switch 1. Function. 2. Installation. 3. Lighting of pilot lamp.
	Wipers (Windshield, roof window) 1. Function. 2. Wear and damage of blade.
	Room lamp 1. Lighting.
	Buzzer 1. Function.
	Load moment indicator 1. Operation. 2. Accuracy.
	Over-wind cutout device (hoist limit switch) 1. Function. 2. Damage of wire rope for weight. 3. Installation. 4. Operation of solenoid valve.
	Cab 1. Tightness of nuts and bolts. 2. Function of window and door locks.
	Pressure gauges 1. Smooth movement of needle. 2. Tightness of connections.

	Inspection items
Crane controls instruments safety devices	Control levers and pedals 1. Function. 2. Play.
	Work lamps 1. Lighting. 2. Damage. 3. Installation
	Lamp on boom head 1. Lighting. 2. Installation
Outrigger system	Jack 1. Retraction during load lifting. 2. Extension during road travel. 3. Leakage. 4. Function of pilot check valve. 5. Tightness of piping joints. 6. Noise and vibration. 7. Deformation and damage of outrigger floats.
	Outrigger box, outrigger beam, extension cylinder 1. Deformation and damage. 2. Tightness of beam lock pins and bosses. 3. Deformation and cracks of bracket. 4. Noise and vibration. 5. Loose piping and loose connections, and deteriorated hose. 6. Leakage.
	Control valve 1. Operating conditions. 2. Tightness of piping joints. 3. Tightness of mounting bolts. 4. Leakage.

Inspection items	
Outrigger system	Level gauge 1. Scratches and deformation. 2. Installation. 3. Bubble conditions.
	Master cylinder 1. Operating conditions. 2. Leakage. 3. Brake fluid level. 4. Deterioration, twisting and damage of hoses.
Miscellaneous	Accessories 1. Damaged or missing
Hydraulic device	Hydraulic circuit 1. Loose connections. 2. Leakage. 3. Loose and cracks of supports. 4. Deterioration, twisting and damage of hoses.
Note	Re-tightening of slewing ring mounting bolts: during monthly periodic inspection, when looseness of slewing ring mounting bolts are found, the bolts should be re-tightened in service station. Moreover, it is recommended that carry out inspection once a year and re-tight slewing ring mounting bolts conforming to the specified tightening torque. The tightening torque for the mounting bolts is 700~900 N.m.

◇ The inspection interval for regular inspection should be based on working condition and working environment, but not less than monthly once.

◇ The inspection interval for periodic inspection should be based on working condition and

working environment, but not less than annual once.

◇ The following cranes should be carried out inspection and testing according to the relevant standards:

◎ The crane in normal operation, once every two years;

◎ The crane of overhaul, newly assembled and modified, before delivery;

◎ The crane being laid idle over one year, before reusing;

◎ The crane that its structural parts and mechanisms are damaged in strength, rigid and stability due to storm, earthquake and accident, before reusing.

XIII. Transportation

1. Railroad transportation

1). The crane can be transported on railway flat-car.

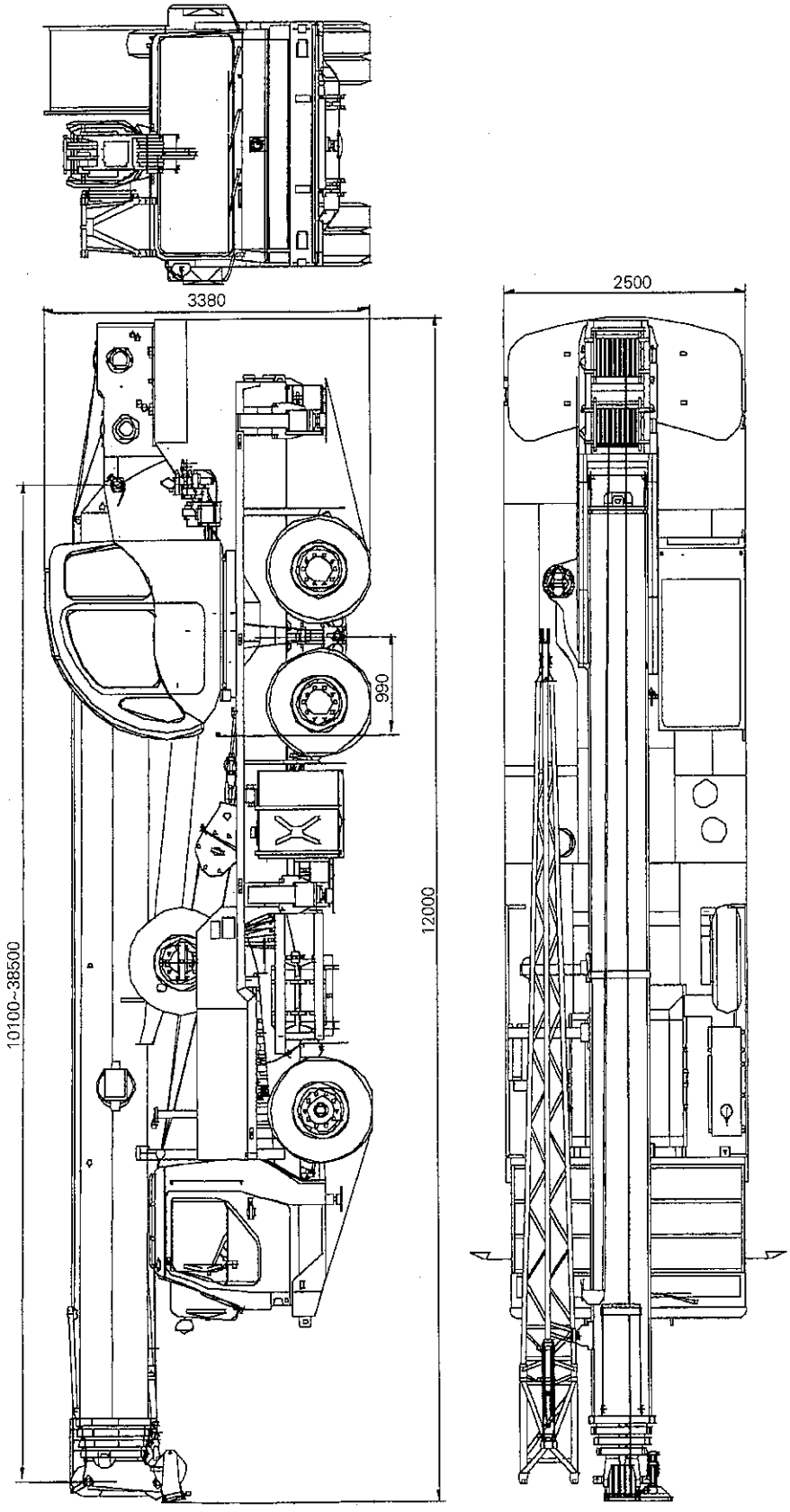
2). Block the crane wheels with wood wedges or cement blocks.

3). Tie the crane and the flat-car with ropes tightly.

4). The gravity center of the vehicle lies in the front of the rear axle. The distance between the gravity center and the center of rear axle is 990mm. Refer to the figure below.

5). All control levers and switches of the crane must be in neutral and off positions.

6). After loading the crane, lock all the doors and windows to prevent opening during transportation.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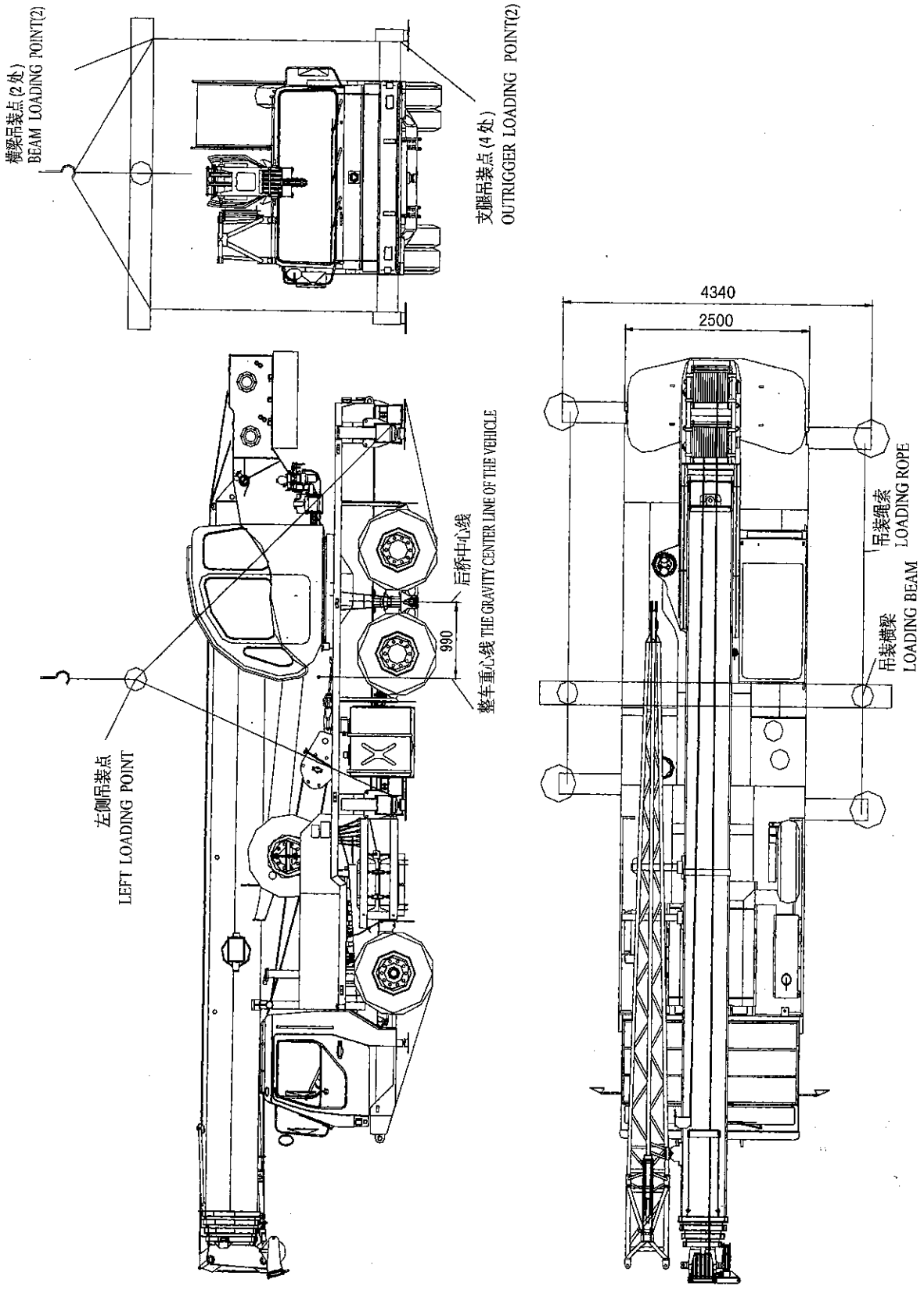


Diagram for loading the crane

2. Notes on the road transportation:

1) Cranes are allowed to travel on the road.

2) The relevant transportation laws should be observed when the cranes travels on the road.

3) The control handles of the superstructure and the carrier should be kept in neutral and the power should be in Off position

3. Notes on the sea transportation:

1). The roll-on-roll-off ship is recommended on the crane transportation which will save a lot of time and money. The crane could travel to the roll-on-roll-off position.

2). When the crane has to be dismantled for transporting in a container, please contact our company and we will provide the dimension and weight of the relating parts so as to make the transportation convenient.

XIV. Appendix

14.1 Main Parts

Main Parts List

No.	Name	Model	Qty	Assembled Position
1.	All terrain crane carrier	XZ25K	1	
2.	Slewing ring	011.45.1250.101.04.11F1	1	Turntable-carrier frame
3.	Slewing reducer	GJT17T3－79－01	1	Turntable
4.	Motor	A2F28W6.1Z4	1	Slewing gear
5.	Winch reducer	GJT17W2B45－11	2	Winch (main, auxiliary)
6.	Motor	A6V80HD1D2FZ20550	1	Winch (main, auxiliary)
7.	Main valve	SBDL25F	1	Turntable
8.	Wire rope	14NAT 4VX39S＋5FC－1870	165m	Main winch
			105m	Auxiliary winch

14.2 Easy Wear Parts

Easy Wear Parts List

No.	Drawing No.	Name	Material	Qty	Assembled Position
1	QY25K5.02.1－4	Slider	804 Plastics	8	Heads of boom sections 1, 2, 3 and 4 (upper)
2	QY25K5.02.1－5	Slider	804 Plastics	8	Heads of boom sections 1, 2, 3 and 4 (lower)
3	QY25K5.02.1－6	Slider	804 Plastics	8	Heads of boom sections 1, 2, 3 and 4 (lower)
4	QY25K5.02.1－7	Slider	804 Plastics	8	Heads of boom sections 1, 2, 3 and 4 (lower)
5	QY25K5.02.1－12A	Slider	804 Plastics	2	Heads of boom sections 1 and 2 (lower)

No.	Drawing No.	Name	Material	Qty	Assembled Position
6	QY25K5.02.1－13A	Slider	804 Plastics	2	Heads of boom sections 1 and 2 (lower)
7	QY25K5.02.2－5	Slider	804 Plastics	2	Tail of boom section 2 (upper)
8	QY25K5.02.2－8	Slider	804 Plastics	12	Tail of boom section 2 (side)
9	QY25K5.02.2－9	Slider	804 Plastics	6	Tail of boom sections 2, 3 and 4 (lower)
10	QY25K5.02.3－5	Slider	804 Plastics	2	Tail of boom section 3 (upper)
11	QY25K5.02.3－10	Slider	804 Plastics	2	Head of boom section 3 (lower)
12	QY25K5.02.3－11	Slider	804 Plastics	2	Head of boom section 3 (lower)
13	QY25K5.02.4－8	Slider	804 Plastics	2	Tail of boom section 4 (upper)
14	QY25K5.02.4－4	Slider	804 Plastics	2	Head of boom section 4 (upper)
15	QY25K5.02.4－14	Slider	804 Plastics	2	Head of boom section 4 (lower)
16	QY25K5.02.4－15	Slider	804 Plastics	2	Head of boom section 4 (lower)
17	QY25K5.02.4－16	Slider	804 Plastics	2	Head of boom section 4 (lower)
18	QY25K5.02.5－10	Slider	804 Plastics	2	Tail of boom section 4 (upper)
19	QY25K5.02.5－13	Slider	804 Plastics	2	Tail of boom section 4 (side)

14.3 Supplied Tools and Spare Parts

(1) Refer to XZ25K Supplied Tools for QY25K5 Supplied Tools

(2) Supplied Spare Parts

Supplied Spare Parts List

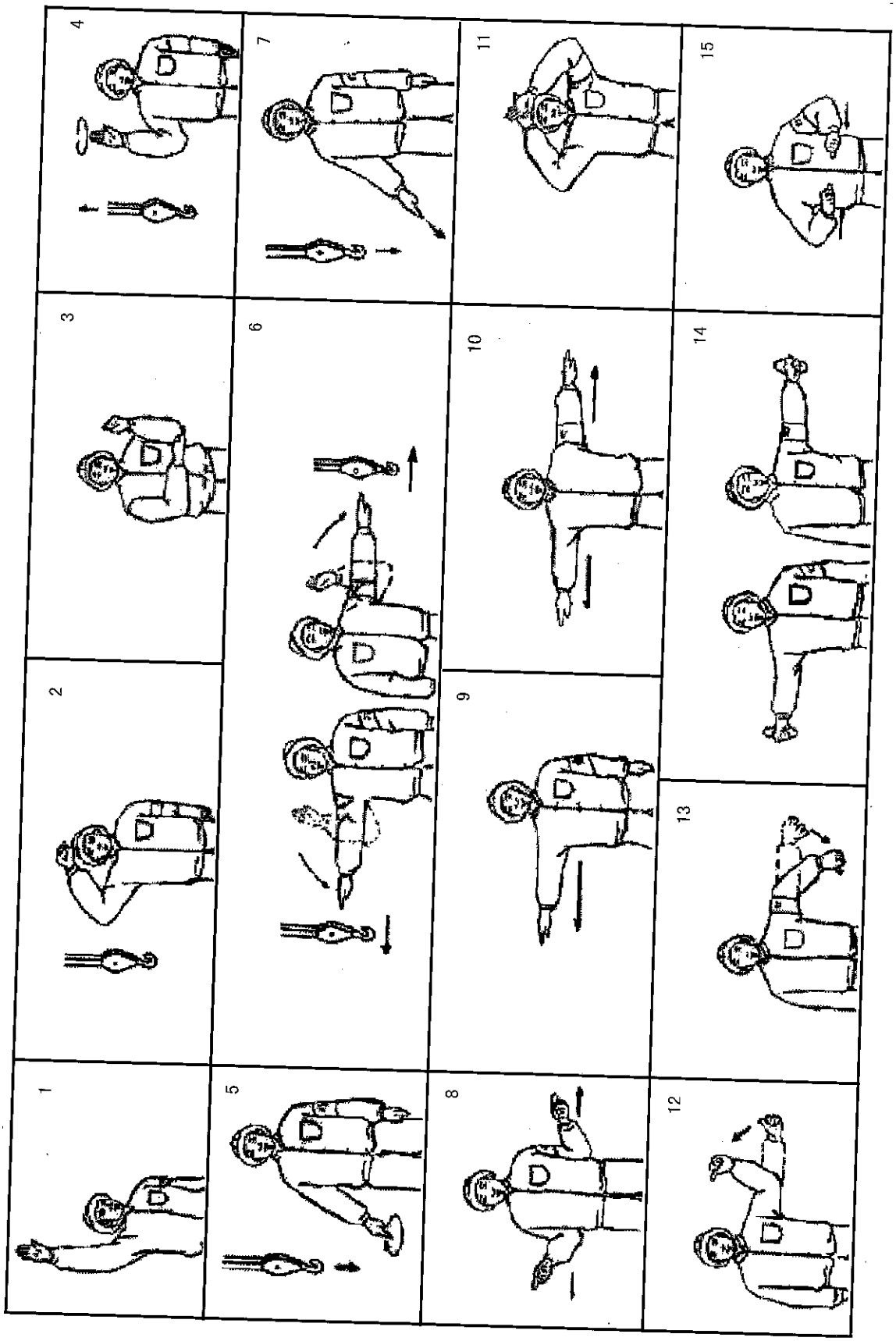
No.	Model	Name	Qty
1	PTB-H2/P1－40－1000	Pressure testing device	1
2	DJ7011－6.3－10	Single core combined plug	1
3	JB982－77	Washer 14	1
4	JB982－77	Washer 33	1
5	GB/T3452.1－1992	"O" ring 7×1.8G	1
6	GB/T3452.1－1992	"O" ring 9.5×1.8G	3
7	GB/T3452.1－1992	"O" ring 16×2.65G	3

No.	Model	Name	Qty
8	GB/T3452.1－1992	"O" ring 22.4×2.65G	5
9	GB/T3452.1－1992	"O" ring 26.5×2.65G	2
10	JK932-006	Toggle switch	1
11	JQ202S－KLO (24V)	Relay	1
12	JS157	Flasher Relay	1
13	DJ7011－6.3－20	Single core combined socket	1

XV. Hand Signs

Explanation of hand signs

1. Ready (Attention)
2. Main hook block
3. Auxiliary hook block
4. Hoist up
5. Hoist down
6. Hook block moves this way
7. Load lowering this way
8. Extend boom
9. Stop!
10. Stop immediately
11. Finish
12. Raise boom
13. Lower boom
14. Slewing this way
15. Retract boom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QY25K5 TRUCK CRANE

MAINTENANCE MANUAL

XUZHOU HEAVY MACHINERY CO., LTD.
XUZHOU CONSTRUCTION MACHINERY GROUP CO., LTD. CHINA

Preface

This maintenance manual is written in order to service and maintain QY25K5 truck crane correctly so as to give full rein to the crane high performance, to increase crane's working efficiency and ensure safety and normal service life. It aims at understanding the each main parts performance and working principle so as to use and maintain this QY25K5 truck crane as soon as possible.

In this manual, main parts structure and principle diagram of QY25K5 is attached. During maintenance, users can check out the spare parts that need to be replaced conveniently according to ***QY25K5 Truck Crane Parts Catalog***.

Please carefully preserve this maintenance manual together with other technical documents as the basis of using and maintaining this crane. To the parts that need qualified personnel to maintain and signed in the manual, users have no right to maintain, otherwise they should bear all the responsibilities.

Our company will reserve the right to modify the design without notice for improvement.

Contents

I. Boom and Telescoping System

1. Parts Function Description

① Boom and its telescoping system

Boom is the main component to which force is applied; it bears all kinds of external loads during working besides the dead weight of crane. Telescoping system is the necessary system to realize the boom length changing.

② 5300 valve spool

5300 valve spool in the telescoping system can prevent retraction of the cylinder when the control lever is in the neutral position, but also avoid the phenomenon of runaway of the boom retracting speed caused by lifting loads when the lever is in the retraction position. Besides, 5300 valve spool also has the function of preventing oil cylinder rapid retracting when the damage occurs to hose of boom telescoping pipeline.

2. Working Principle (see Fig.1－1)

Truck crane has five boom sections, the 2nd, 3rd, 4th and 5th boom sections driven by two telescoping cylinders telescope sequentially and synchronously. That is the first-stage cylinder drives the 2nd boom section with 3rd, 4th and 5th boom sections in it to stretch out, after that, second-stage cylinder and ropes drive 3rd, 4th and 5th boom sections extend sequentially and synchronously; when retract boom sections, the second-stage cylinder and ropes drive 3rd, 4th and 5th boom sections retract sequentially and synchronously, and then the first-stage cylinder drives the 2nd boom section with 3rd, 4th and 5th boom sections in it to retract. The pressure of pressure-limited valve is adjusted to 14 MPa in order to avoid piston rod crooking because of too high pressure when the boom is extending. 5300 balance valve is fitted in the oil circuit in order to keep the boom steady or stopping safely when it is retracting.

3. Adjustment of Wire Ropes and Slide Block

① Users should check and adjust boom extension and retraction every month, because while using truck crane, force is applied to wire ropes and cables in the boom working process and its length will change. If the boom does not extend and retract synchronously or vibration appears, users should adjust in time and begin operating until these phenomena disappear. Otherwise, wire ropes and cables will remove from the chute and be cracked so as to cause serious results. Please do periodic adjustments in order to keep normal operation. The method is

as following:

Operate the boom elevation angle to 60° , keep each boom section fully extended and then retracted, repeat for several times. Extend the 3rd, 4th and 5th boom sections for some distance, and then lower the booms, synchronously adjust the nut on the thin rope Ⅱ of 5th boom section and nut on the thin rope Ⅰ 4th boom section until the 3rd, 4th and 5th boom sections telescope simultaneously with no vibration. Then tighten the nut on thin rope. When booms are fully retracted, if the clearance between the booms on the boom head exceeds 1~2mm, weld spacers in front of boom head, otherwise the force applied to oil cylinder and rope will be influenced.

Note:

◇ If boom shakes while adjusting, coat sliding surface of slide block with grease.

◇ Only coat with two boom sections extended out and lowered down, not all boom sections out and down.

② The slide blocks have all been adjusted well when the truck crane is delivered to consumers. No adjustment is needed only when boom crooking, lateral loading and deflection increasing because of serious frictional damage or some other reasons. Users can adjust the slide block on the boom head by themselves, but the slide block on the base boom must be adjusted by qualified personnel.

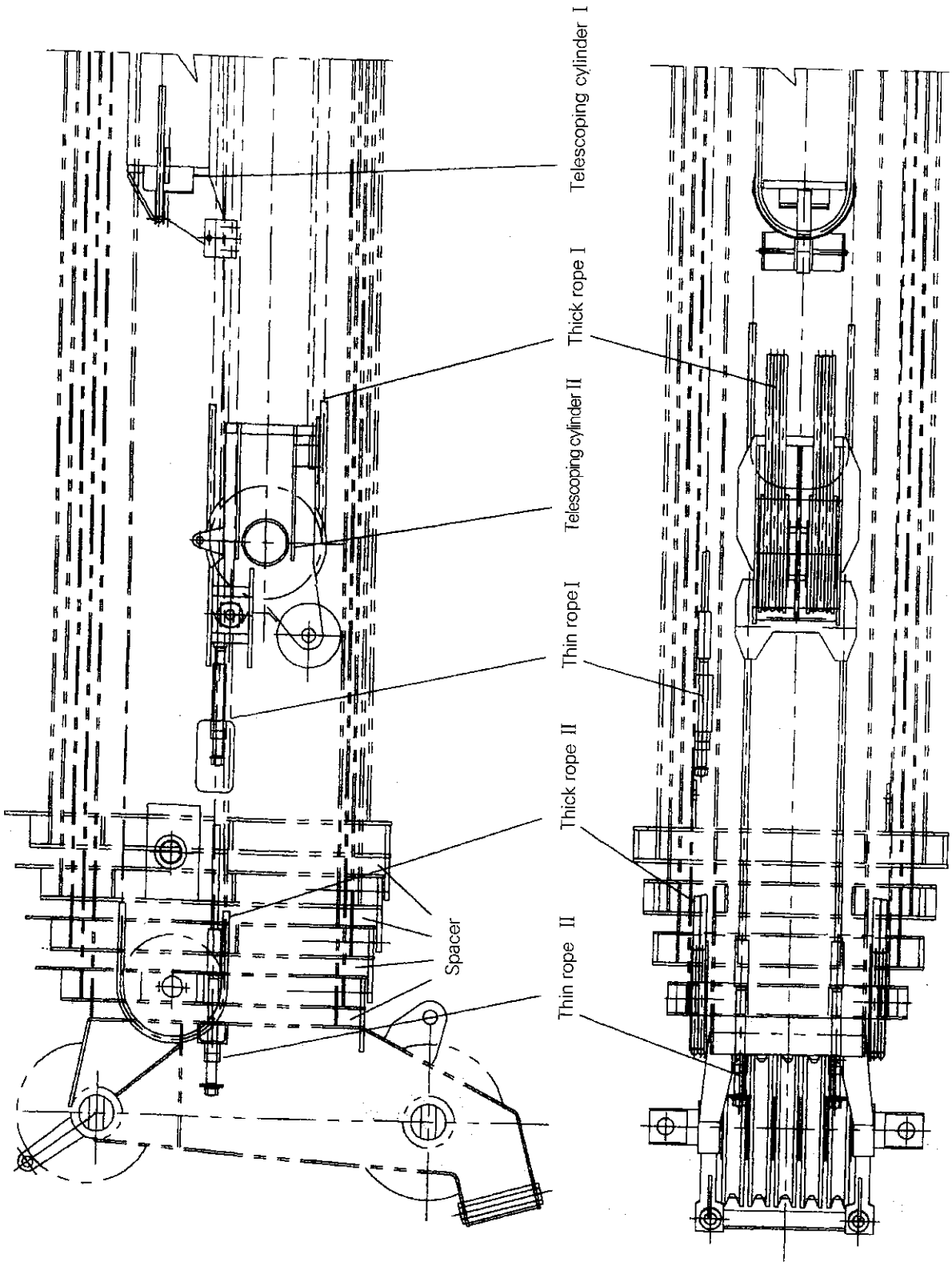

Telescoping cylinder I
Thick rope I
Telescoping cylinder II
Thin rope I
Thick rope II
Spacer
Thin rope II

Fig. 1—1

II. Winch System (Main and Auxiliary Winch)

1. Brief Introduction to winch system

Winch system consists of winch drum and reducer. This reducer is a 2-stage planetary gear reducer mechanism, the bearings in the reducer are roller bearing with high load-bearing capacity, and type of internal lubrication is oil-bath lubrication. The output shaft of reducer is connected with winch drum through bolts; wet brake is installed on the input shaft. The diagram is as following:

2. Use and Operation

During working, observe whether there is any oil leakage on the interface of brake and motor and loose bolts and screws. Deal with the abnormal phenomena in time.

Replace oil after a new vehicle works for 100 hours, and then replace oil for the second time after 500 hours. Hereafter replace lubrication oil every 1000 hours or one year (replace oil every year if the vehicle works no more than 1000 hours in one year). It is better to operate the crane for 15 minutes when replacing oil so as to exhaust lubricated oil.

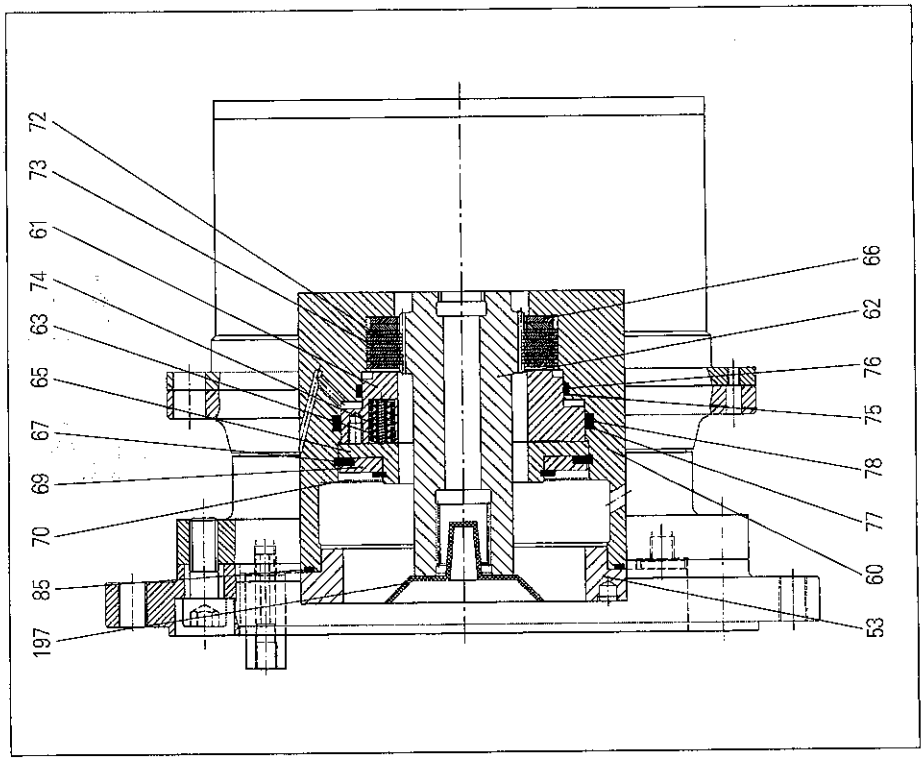


Fig. 2−1 Winch Speed Reducer Brake Structure

No.	Part No.	Part Name	Qty	**Remark**
053	908520	Motor stand	1.00	
060	908769	Supporting shaft	1.00	
061	908426	Piston	1.00	
062	908521	Drive shaft	1.00	
063	16423354	Spring 2.5×11.5×37	16.00	
065	908665	Retaining ring	1.00	
066	908309	Retaining ring	2.00	
067	452285	Snap ring 140×4	1.00	
069	908666	Retaining ring	1.00	
070	452609	Snap ring 90	1.00	
072	103915	Internal friction disc	5.00	
073	103936	External friction disc	6.00	
074	16423355	Spring 1.6×6.5×37	10.00	
075	461643	Seal ring 112×118.4×1.4P	2.00	
076	470003	X-ring ZP0347	1.00	
077	461672	Seal ring 136×145.4×1.4P	2.00	
078	470001	X-ring ZP0346	1.00	
085	300408	O-ring 170×3.55	1.00	
197	469518	Retainer cup H15	1.00	

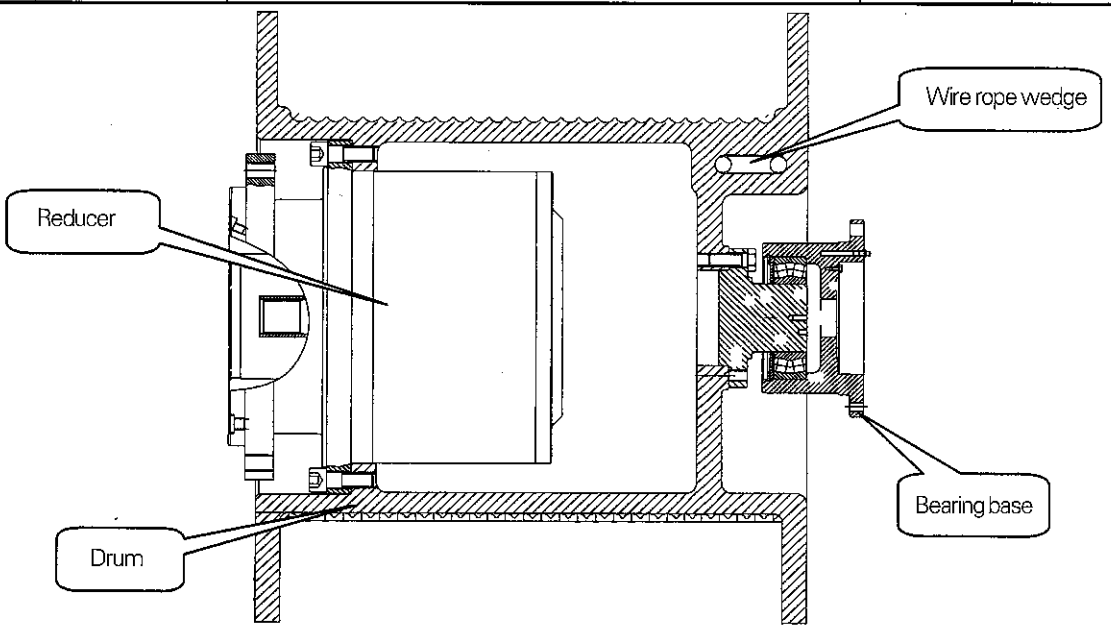


Fig. 2−2 Winch Reducer Structure Diagram

III. Slewing System

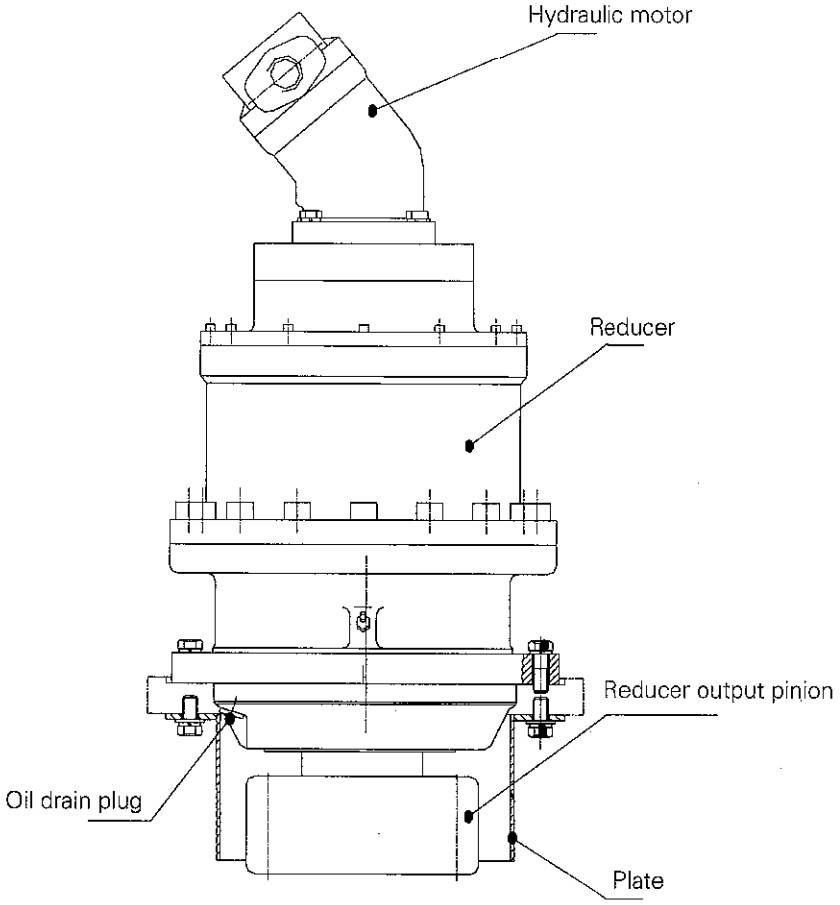
1. Parts Working Principle and Structure

Slewing reducer is installed on the turntable; this mechanism consists of slewing reducer and hydraulic motor. High-speed hydraulic motor drives 3-stage planetary reducer to output power through pinion, which does external meshing action with the slewing ring, fixed on the frame. Its revolution and rotation drive the superstructure rotating.

The brake in swing mechanism is multi-disc wet brake that is in constant-closed state. The brake stays in constant-open state when the pressure oil is filled into it, so the mechanism can work freely.

2. Use and Maintenance

Swing mechanism cannot be deposited and operated in the environment with corrosive gas such as acid and alkali. Swing mechanism should not work beyond its rated loads. The environmental temperature should be in the specified scale, and the trademark of the lubrication oil and replacement period are referred to operation manual.



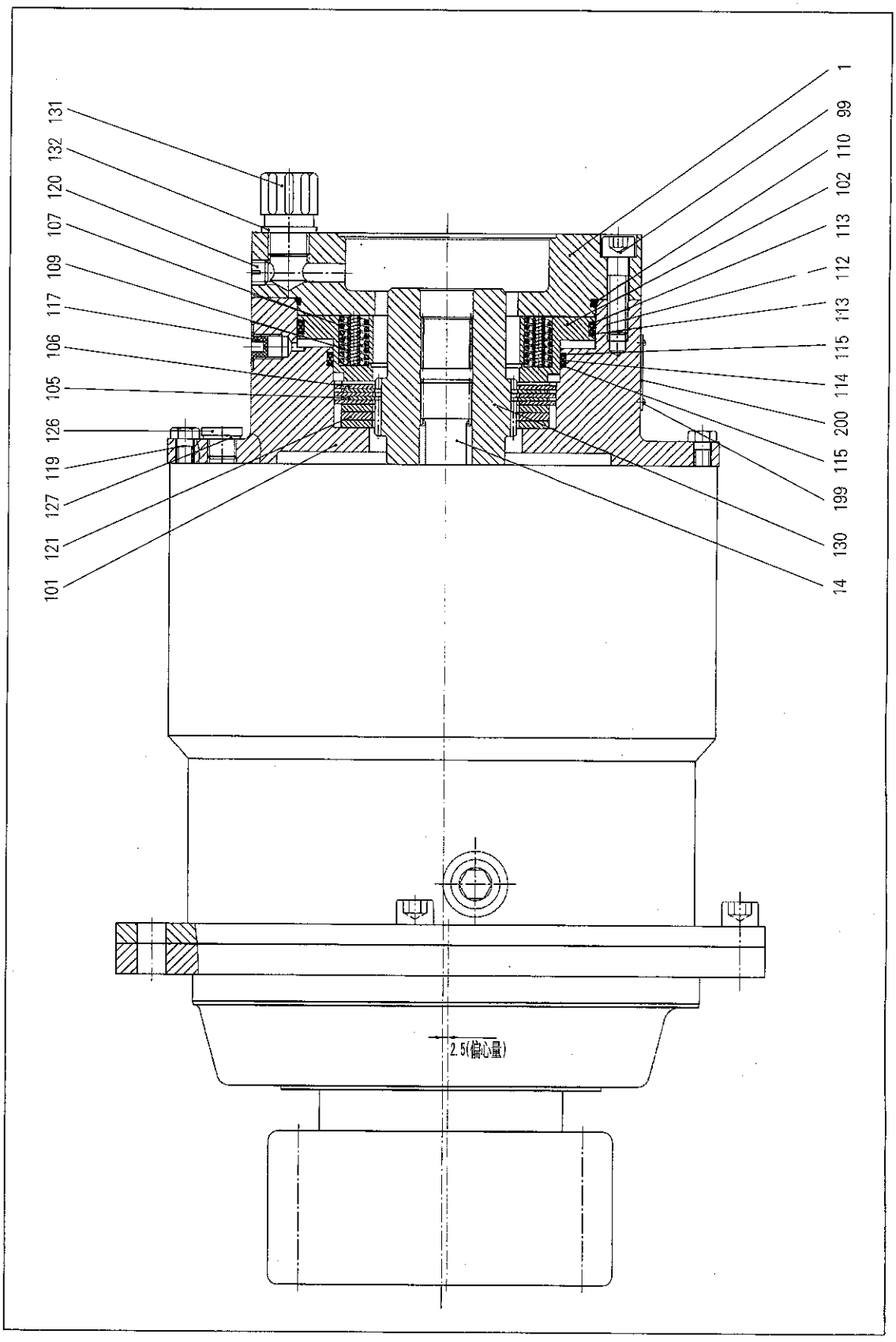


Fig. 3－1 Slewing reducer

No.	Part No.	Part Name	Qty	Remark
001	800398	Motor stand	1.00	
014	908351	Sun gear	1.00	
099	300123	Socket head cap screw M10×35—8.8	12.00	
101	908821	Brake housing	1.00	
102	16936283	Piston	1.00	
105	103915	Internal friction disc	2.00	
106	103936	External friction disc	3.00	
107	16423354	Spring 2.5×11.5×37	16.00	
109	16423355	Spring 1.6×6.5×37	12.00	
110	467550	O-ring 140×2.65	1.00	
112	470002	X-ring ZP0350	1.00	
113	461727	Seal ring 140.6×147×1.4P	2.00	
114	470003	X-ring ZP0347	1.00	
115	461643	Seal ring 112×118.4×1.4P	2.00	
117	469501	Protecting plug N98	1.00	
119	441136	Hexagon head bolt M8×25—8.8	12.00	
120	444505	Oil plug M12×1.5	1.00	
121	908309	Retaining ring	3.00	
126	444509	Hexagon head screw plug M14×1.5	1.00	
127	462803	Combined seal ring 14	1.00	
130	800400	Drive shaft	1.00	
131	16432124	Vent G1/2	1.00	
132	462805	Combined seal ring 22	1.00	
199	448702	Nameplate rivet 1.88×3.2	4.00	
200	455501	Nameplate 52×37×1 A	1.00	

IV. Slewing Ring

1. Parts Function

This part is a bearing device fitted for the connection of crane superstructure and crane carrier. It can bear superstructure swing part and the weight and moment of loads.

2. Working Principle

The structure type is 3-row roller type slewing ring. The outer circle of the slewing ring is connected with turntable and the inner circle is connected with crane frame. Steel ball is installed between the outer and inner circles to contact with circular arc sliding track by 4 points, it can bear axial force, radial force and tipping moment at the same time.

The pre-tightening torque of the bolt is 700～900N.m. Check it after the slewing bearing works 500 hours and lubricate sliding track once every 1000 hours.

3. Check and Maintain Standards of the Slewing Ring

Item / Diameter	Axial Clearance	Radial Clearance
500～710	0.1~0.2	0.04~0.2
710～1120	0.1~0.3	0.05~0.3
1120~1800	0.1~0.4	0.06~0.4
1800~2800	0.1~0.5	0.07~0.5

Note: The sliding track diameter is marked on the slewing ring nameplate.

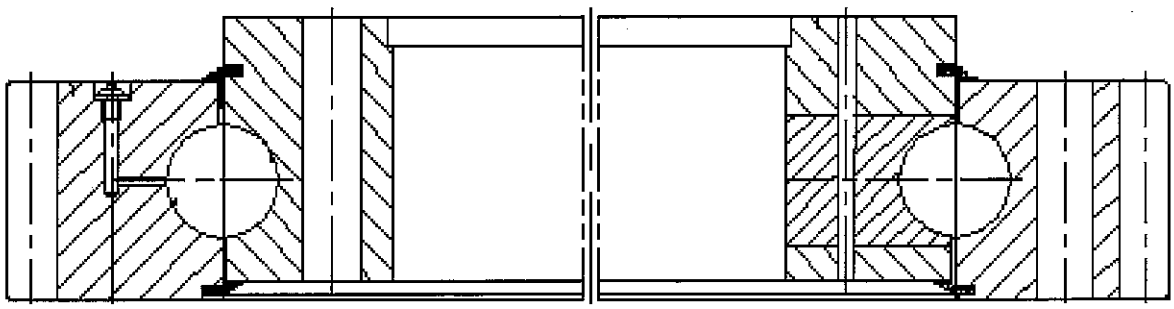


Fig. 4－1 Slewing Ring Structure

V. Electrical System Maintenance and Diagrams

The crane superstructure electrical system consists of power supply circuit, starting circuit, pilot control circuit, unloading circuit, rope-end protection circuit, instrument indication circuit, lighting circuit, moment limiter system and auxiliary circuit, etc.

◇ Trouble 1 : None electricity in crane superstructure

Circuit composition: central rotary body power supply→fuse F1→super- structure starting switch→power relay K0→superstructure electric load→ground cable

Cause and Solution:

Fuse F1 (30A) burned-out	Replace
Starting switch out of order	Repair (takes Acc port instead of Br port) or replace
Power supply relay burned	Replace, connect wire 9 with wire 1L for temporary treatment
Lead disconnected	Reconnect wire or lay cables

◎ Troubles in lighting circuit take reference to treatment of carrier lighting circuit.

◇ Trouble 2: Indicator lamp of return filter is constant illuminated (hydraulic oil in normal condition)

Cause: Pressure difference spring is soft.

Solution: remove valve spool and add spring, repair or replace.

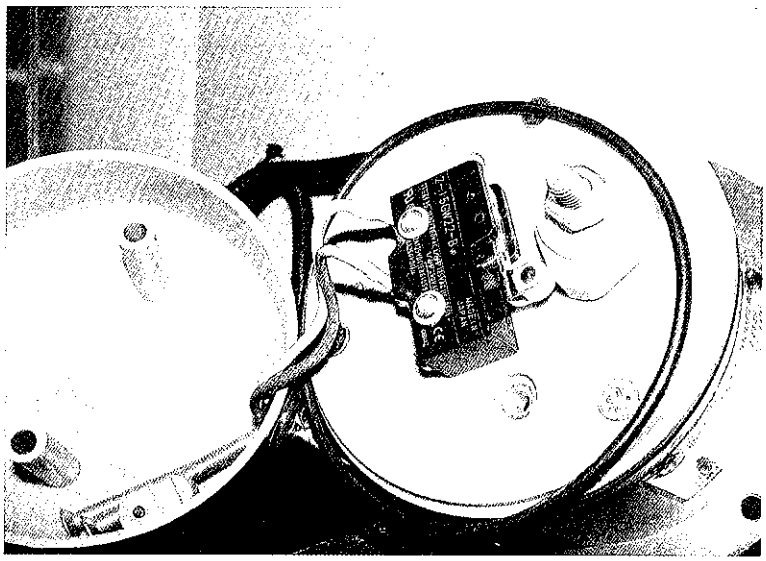
◇ Trouble 3: Winch, telescoping and elevating cannot be operated at the same time.

Electric circuit analysis: this part of electric circuit consists of moment limiter testing circuit, relay K5, unloading solenoid valve Y6.

Cause and Solution:

No electric signal from moment limiter (No pressure in No. 43 wire)	Check moment limiter
Relay K5 out of order	Repair or replace
Unloading valve Y6 broken	Repair or replace
Lead disconnected	Reconnect wire or lay cables

◇ Trouble 4: Rope-end limiter inoperative



Circuit composition: power supply → fuse F13 → forced release switch S21→ rope-end limiter switch A2 (main winch), A3 (auxiliary winch) → rope-end solenoid valve Y7 →ground cable

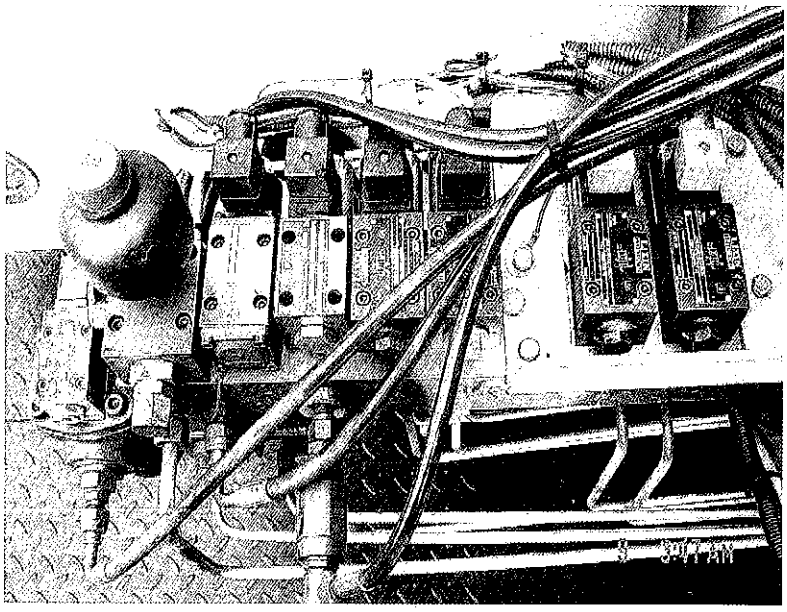
Cause: it most happens in rope-end limiter, switch A2 and A3 are not adjusted well or A2 and A3 are inoperative; then in the circuitry.

Solution:

(1) Open the rear cover of rope-end limiter and adjust wire rope three to five circles to make it inosculated with switch contact or repair and replace A2、A3

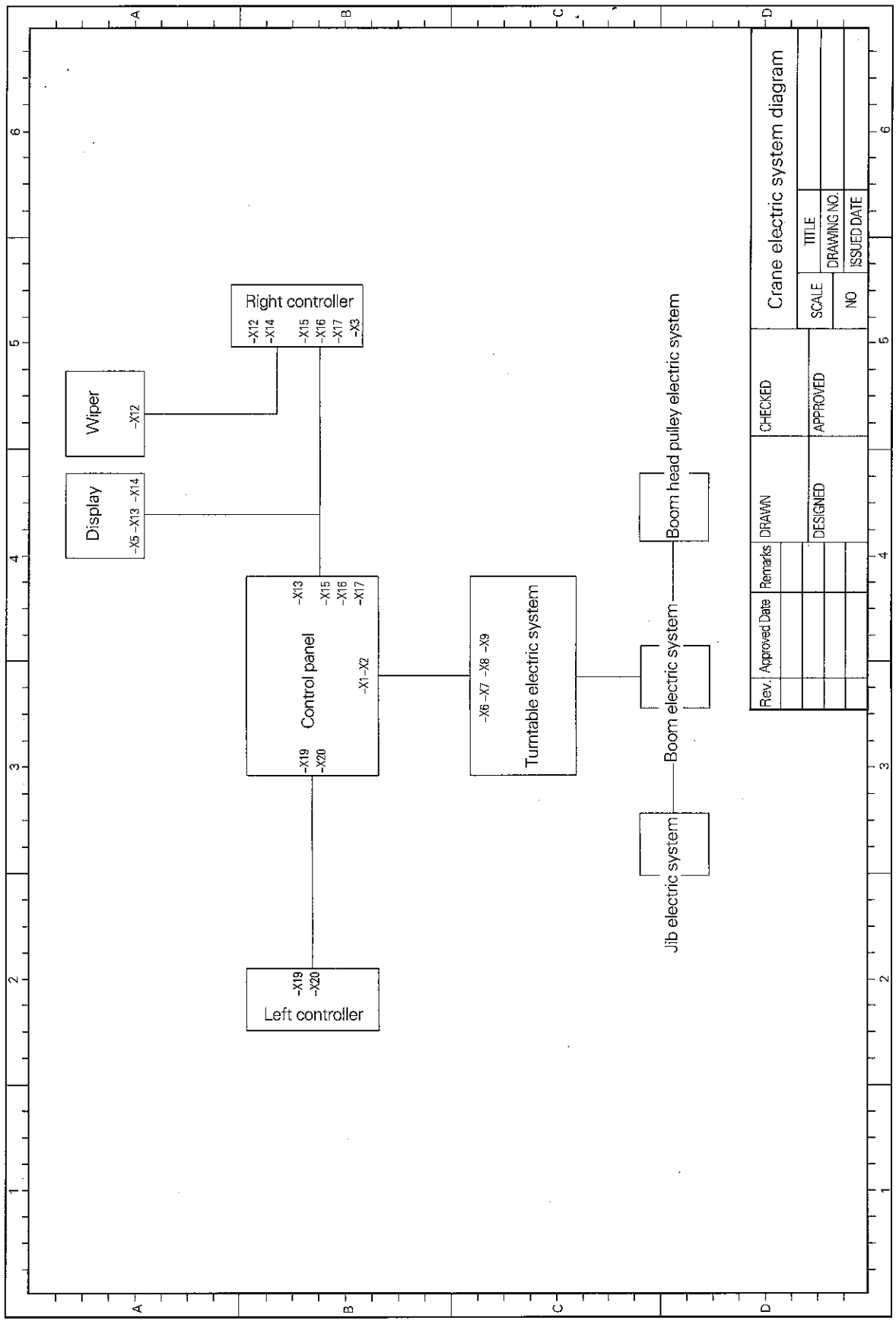
(2) Check the circuitry and repair.

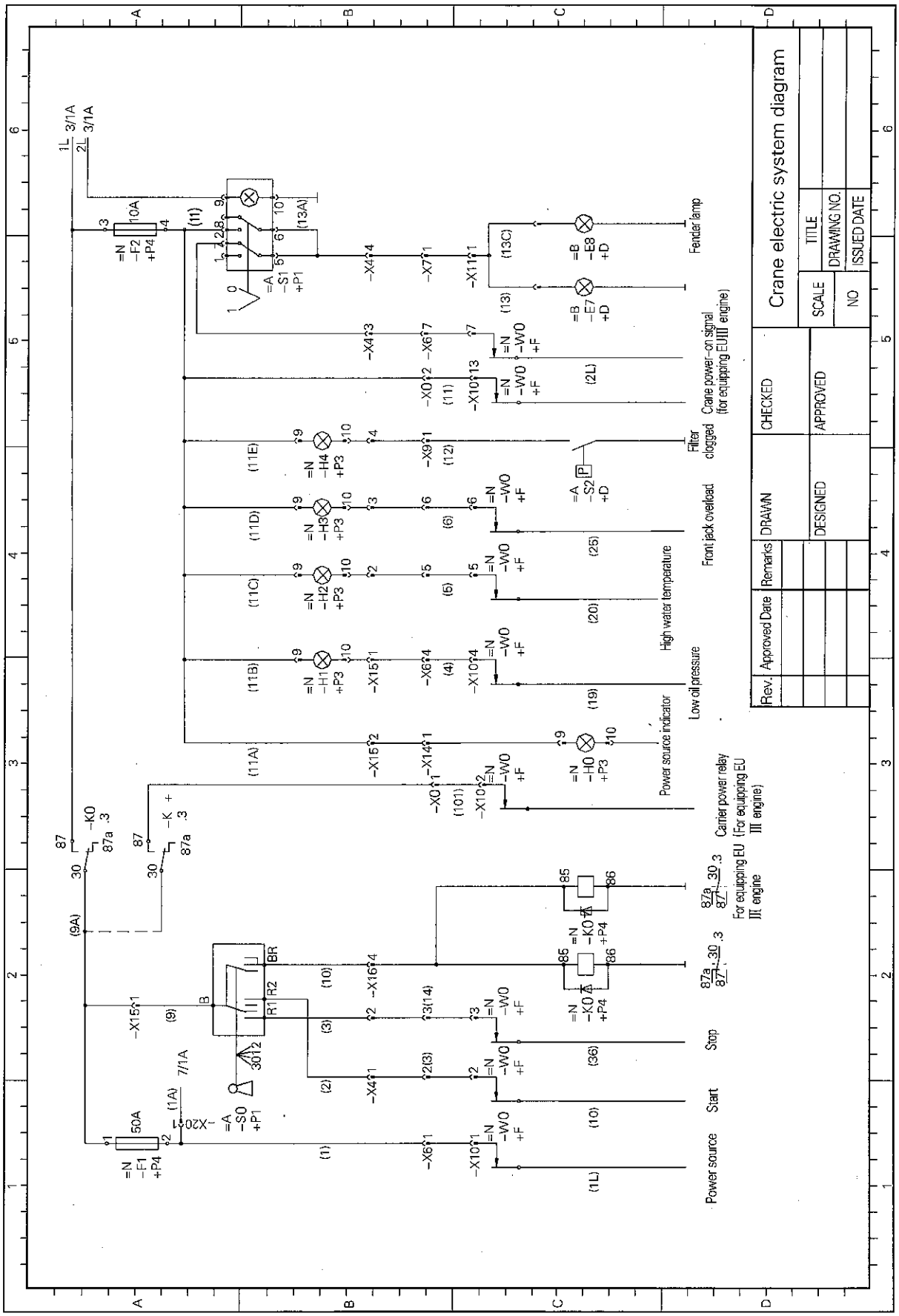
◇ Trouble 5: Inoperative pilot and slewing brake releasing, rope-end limiter, safe and direction, working condition select and booms shift, free slewing solenoid valve.

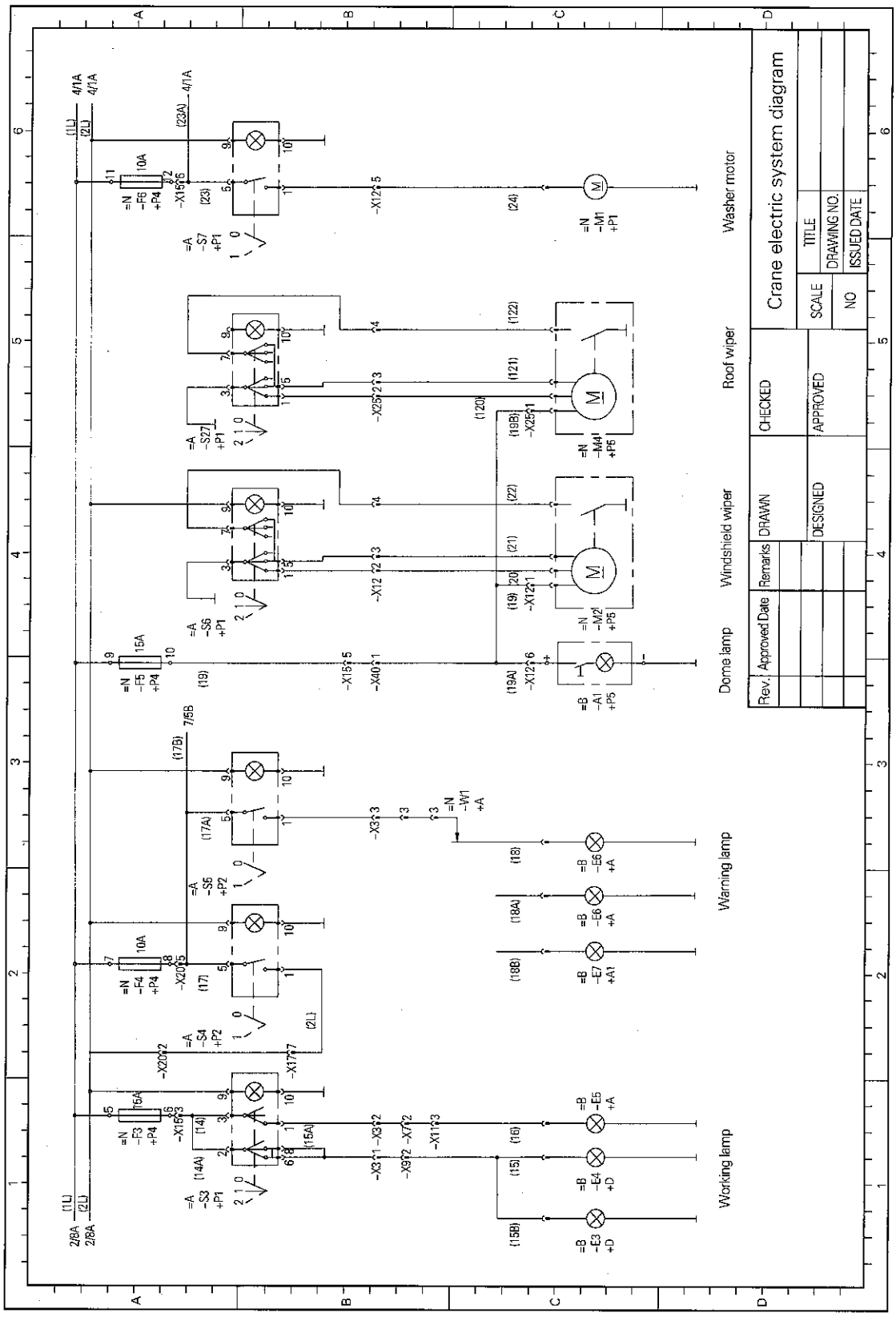


Circuit construction is similar to carrier air-controlled valve.

Cause and solution: it most happens when solenoid valve is burned and valve spool is out of order (especially the free slewing valve) except lead is disconnected and the connecting element is loose.


Right controller
-X12 -X14 -X15 -X16 -X17 -X3
Wiper
-X12
Display
-X5 -X13 -X14
Control panel
-X13 -X15 -X16 -X17
-X1 -X2
-X19 -X20
Turntable electric system
-X6 -X7 -X8 -X9
Boom head pulley electric system
Boom electric system
Jib electric system
-X19 -X20
Left controller
Crane electric system diagram
TITLE
DRAWING NO.
ISSUED DATE
SCALE
NO
CHECKED
APPROVED
DRAWN
DESIGNED
Remarks
Approved Date
Rev.


Crane electric system diagram
Power source
Start
Stop
Carrier power relay (For equipping EU III engine)
Power source indicator
Low oil pressure
High water temperature
Front jack overload
Filter clogged
Crane power-on signal (for equipping EUIII engine)
Fender lamp
Rev.
Aproved Date
Remarks
DRAWN
CHECKED
DESIGNED
APPROVED
SCALE
NO
TITLE
DRAWING NO.
ISSUED DATE


Crane electric system diagram
Washer motor
Roof wiper
Windshield wiper
Dome lamp
Warning lamp
Working lamp
Rev.
Approved Date
Remarks
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SCALE
TITLE
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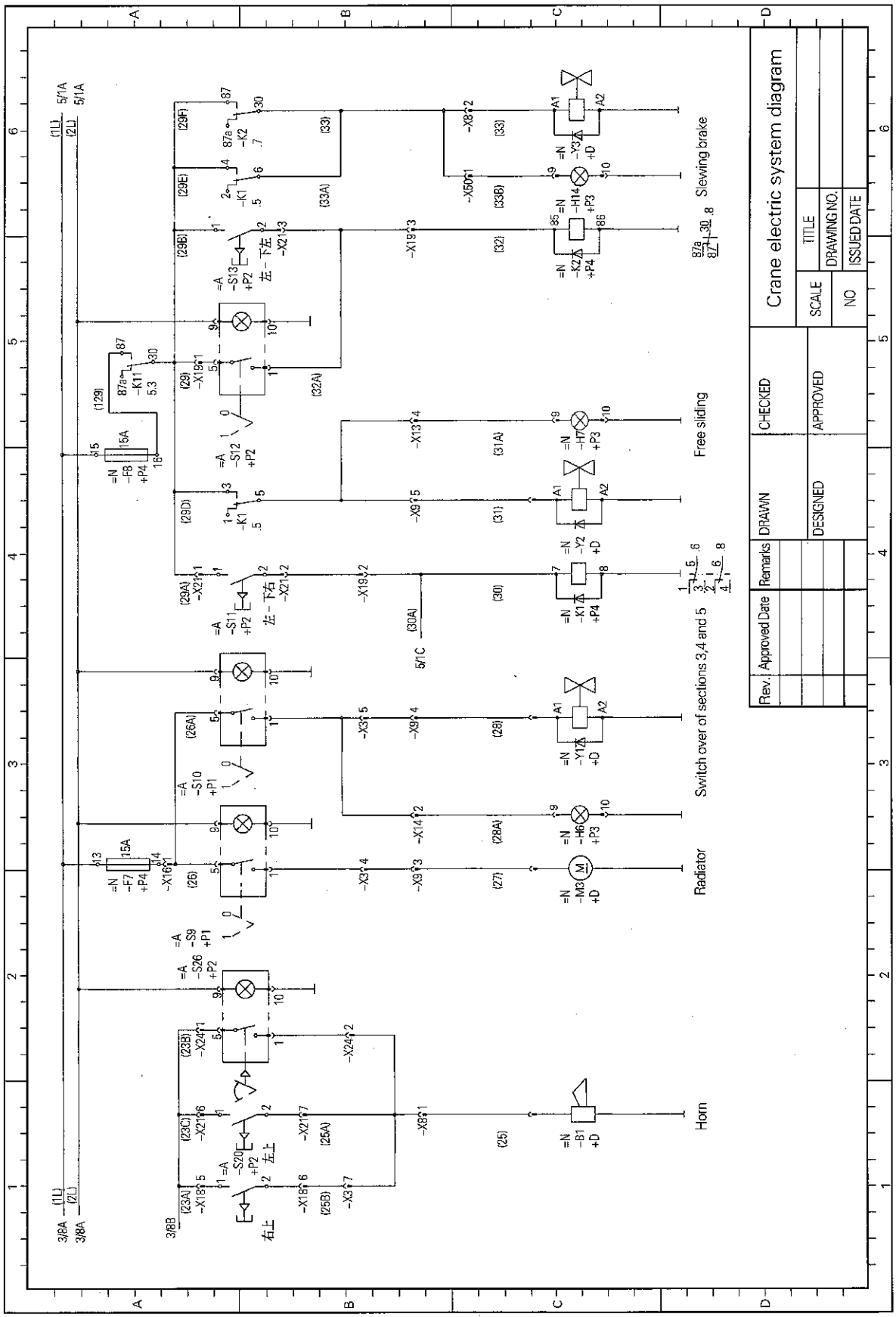
NO
ISSUED DATE


Crane electric system diagram
Rev.
Approved Date
Remarks
DRAWN
CHECKED
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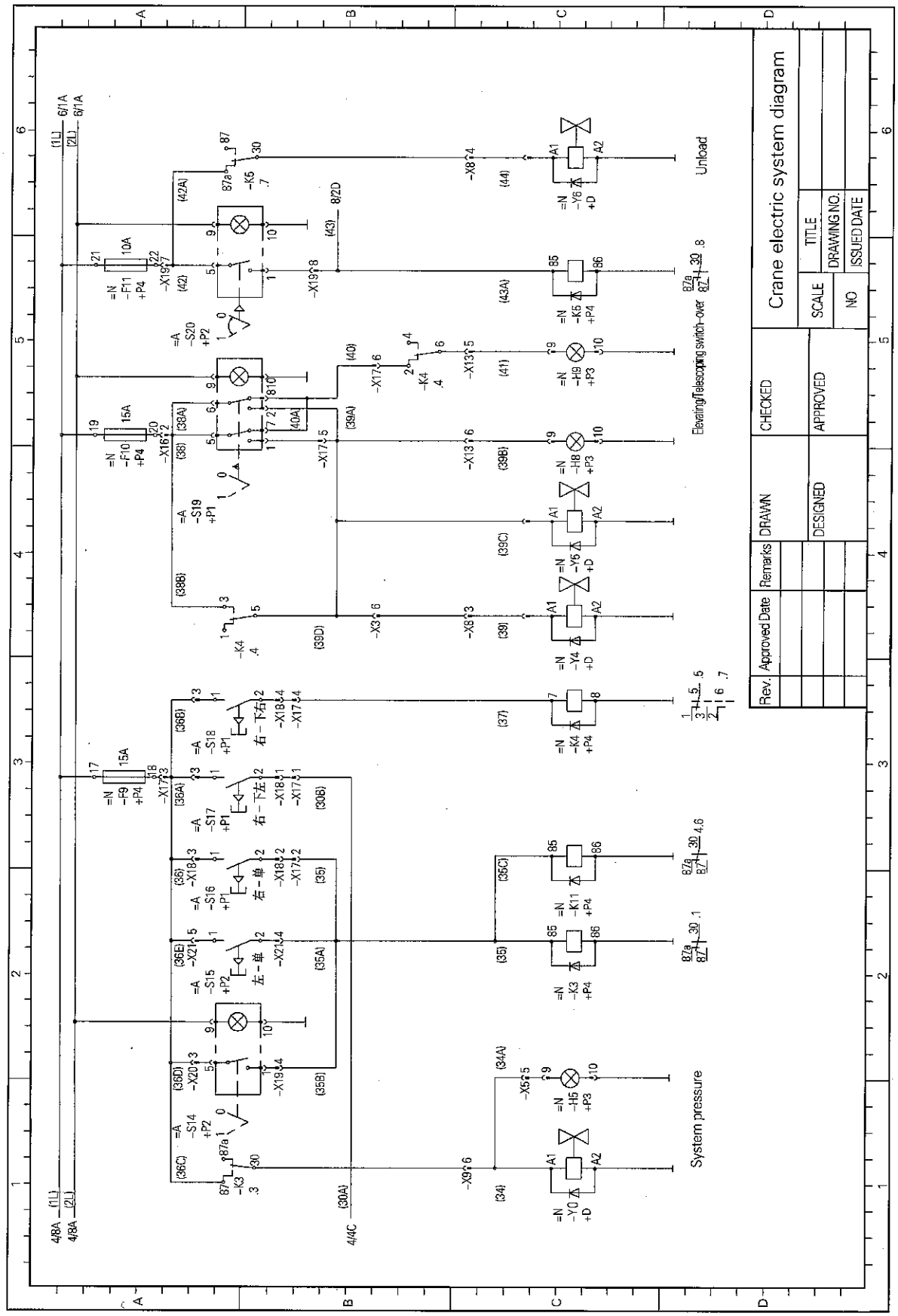
SCALE
TITLE
NO
DRAWING NO.
ISSUED DATE
Slewing brake
Free siding
Switch over of sections 3,4 and 5
Radiator
Horn


Crane electric system diagram
Rev.
Approved Date
Remarks
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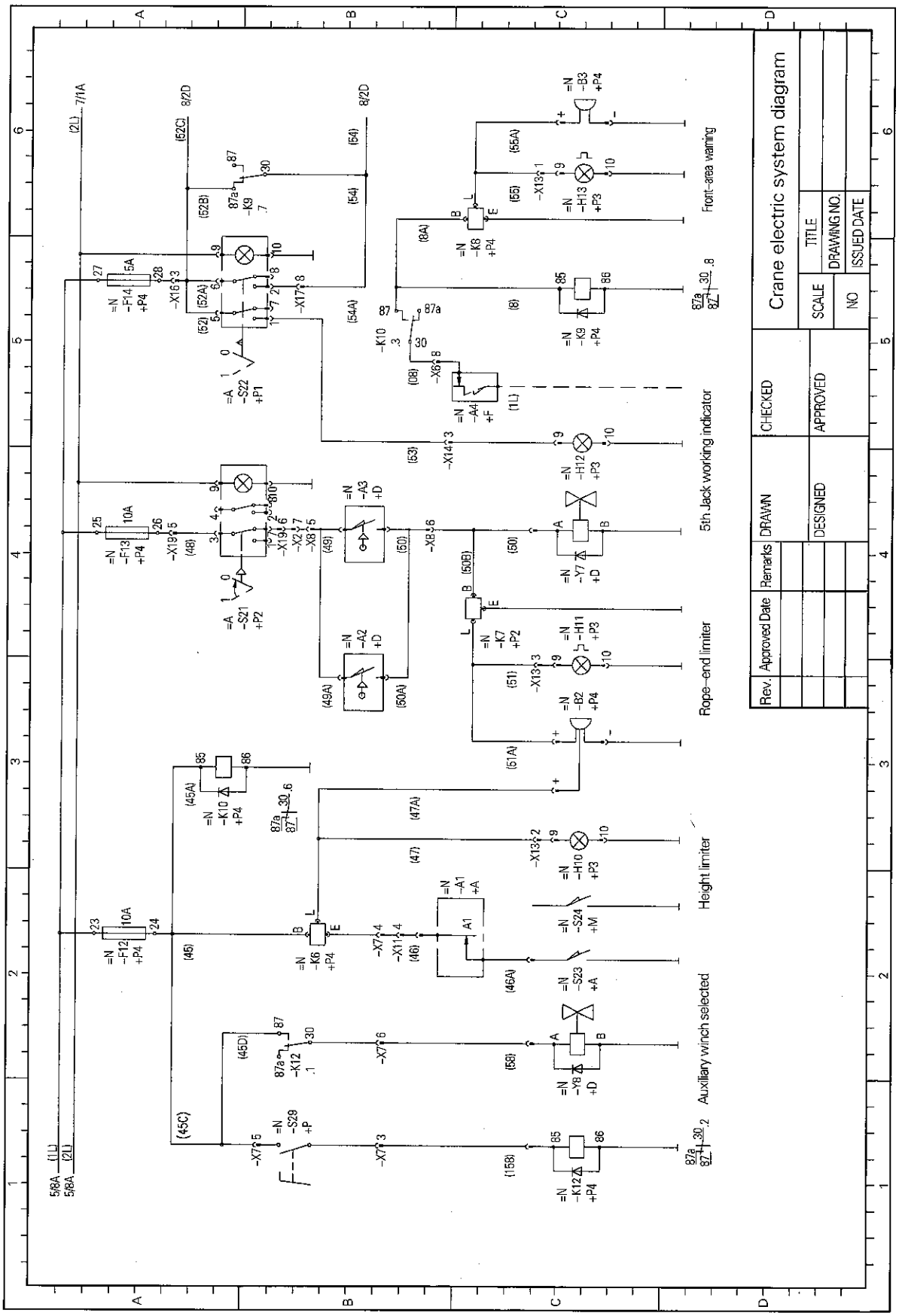
Unload
Elevating/Telescoping switch-over
System pressure


Crane electric system diagram
Front-area warning
5th Jack working indicator
Rope-end limiter
Height limiter
Auxiliary winch selected
Rev.
Approved Date
Remarks
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APPROVED
DESIGNED
SCALE
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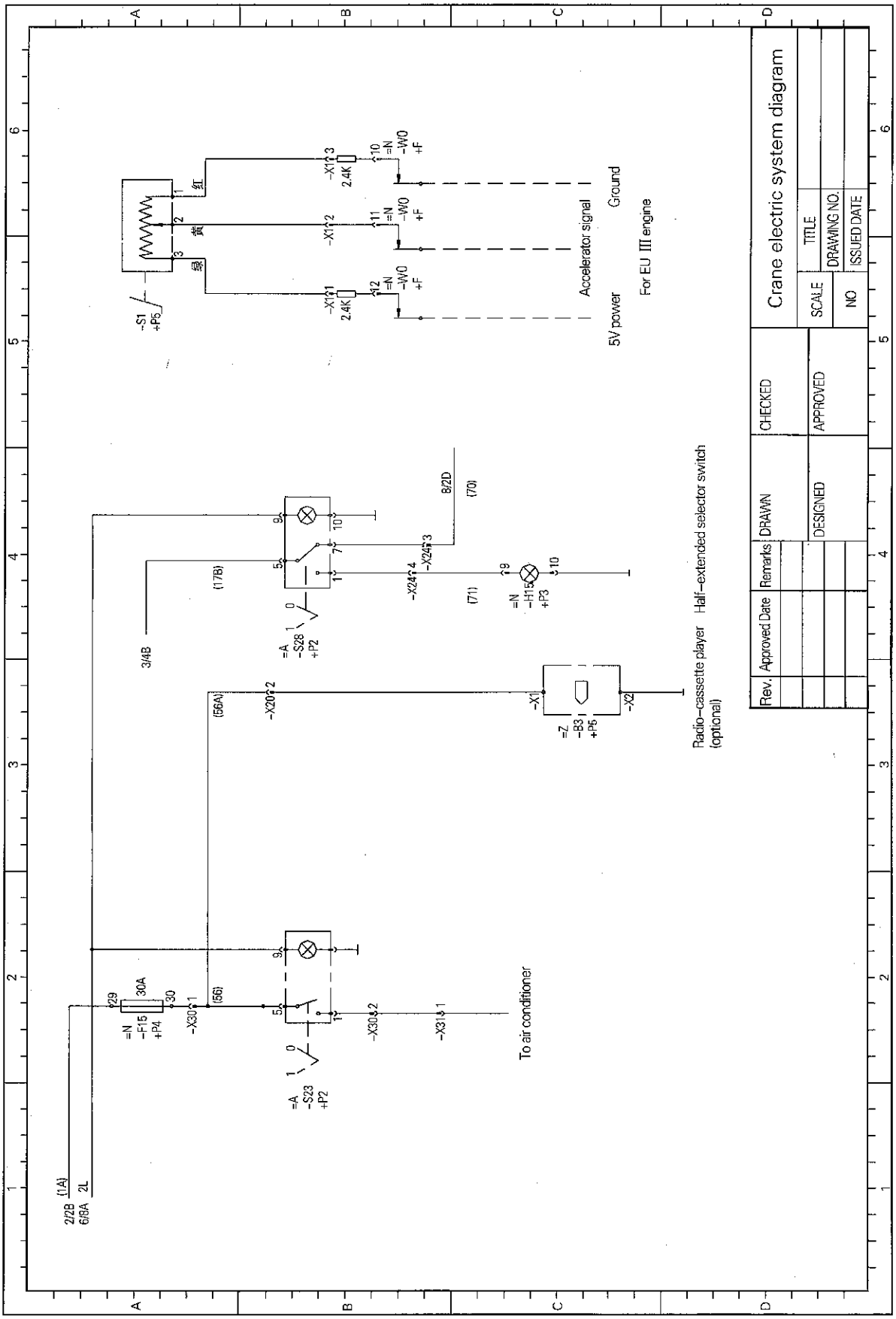
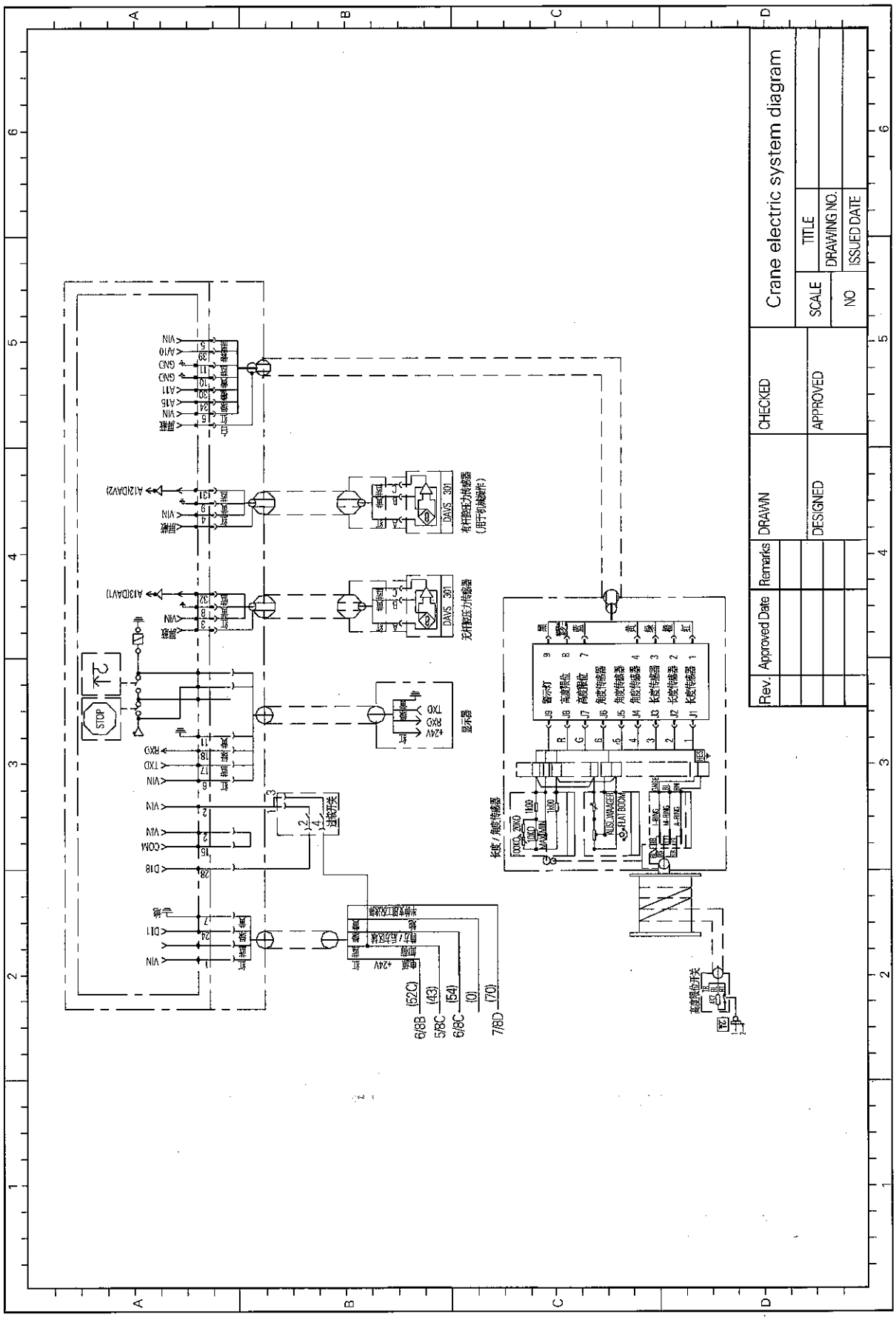
DRAWING NO.
NO
ISSUED DATE


Crane electric system diagram
Rev.
Approved Date
Remarks
DRAWN
CHECKED
DESIGNED
APPROVED
SCALE
TITLE
NO
DRAWING NO.
ISSUED DATE
Accelerator signal
Ground
5V power
For EU III engine
Radio-cassette player
Half-extended selector switch
(optional)
To air conditioner
2/2B
6/8A
(1A)
2L
3/4B
(178)
(56A)
(56)
(71)
(70)
8/2D
30A
=N -F15 +P4
=A -S23 +P2
=A -S28 +P2
=N -H15 +P3
=Z -B3 -P5
-S1 +P5
-X1
-X2
-X20:2
-X24:3
-X24:4
-X30:1
-X30:2
-X31:1
-X123
-X122
-X121
2.4K
=N -W0 +F
A
B
C
D


Crane electric system diagram
TITLE
DRAWING NO.
ISSUED DATE
SCALE
NO
CHECKED
APPROVED
DESIGNED
DRAWN
Remarks
Approved Date
Rev.
STOP
显示器
有杆腔压力传感器
无杆腔压力传感器
长度/角度传感器
高度限位开关
6/8B (52Q)
5/8C (43)
6/8C (54)
6/8C (0)
7/8D (70)

VI. Hydraulic System Diagram

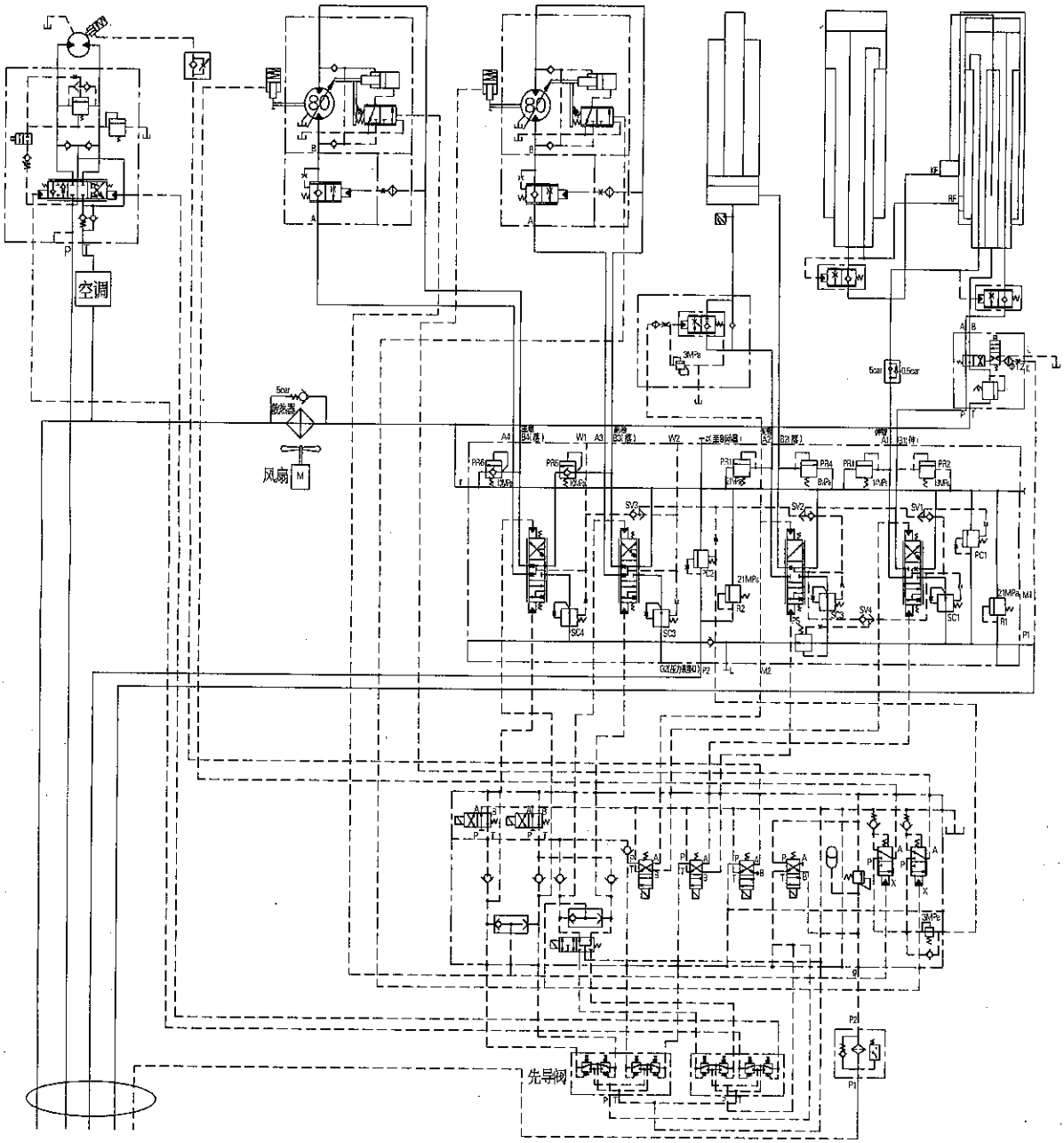


Fig. 6—1

VII. Hydraulic Pump

1. Structure and Function

(1) Hydraulic pump structure:

Basically, this hydraulic pump consists of four gear pumps connected by couplings. The delivery oil pressure is conducted to the back side of side plates to maintain the side clearance of gears at a proper size to maintain high volumetric efficiency.

(2) Gear pump working principle:

8 is housing, 5, 6 are end covers, 1, 2 are a pair of gears sealed in the housing, involutes is chosen as the shape of gears, 3 is driven shaft, engine (engine— PTO) drives gear pump to rotate through driving gear shaft 4.

As arrowhead in the figure shown, the driving gear 2 rotates anticlockwise and the driven gear 1 which is meshed with it rotates clockwise. Because the gears are sealed in the housing and the surface of the gears are contacting, two isolated chamber A and B are formed in the pump. In the rotating process, the volume of chamber A decreases periodically and the volume of chamber B increases periodically. On condition that the whole pump, including chamber A and B are all filled with oil, chamber A is exhaust chamber, chamber B is suction chamber. When the driving gear is rotating continuously, chamber B sucks oil and chamber A exhausts oil continuously, and then continuous displacement is brought by gear pump. If the driving gear rotates anticlockwise, then chamber A is suction chamber and chamber B is exhaust chamber.

The working principle of gear pumps can be summarized as the following three points: ① some airtight oil chamber must be formed; ② the chambers should be divided into high pressure chamber and low pressure chamber; ③ airtight volume of the oil chambers must change continuously. This is the common working principle of volumetric pump (or motor).

Replacement of hydraulic pump: the oil pump must be replaced if there is something wrong with it, pay attention to the contamination of the system in the process of dismounting and remounting and try to reduce the contamination to the minimum extend. The oil port should be bound up by plastic fabric. After the installation of new oil pump, hydraulic oil must be filled in from the four pressure oil ports of the pump until the oil tank is full. When the pipelines are connected, the oil pump can work after 15 minutes rotation in a slack state.

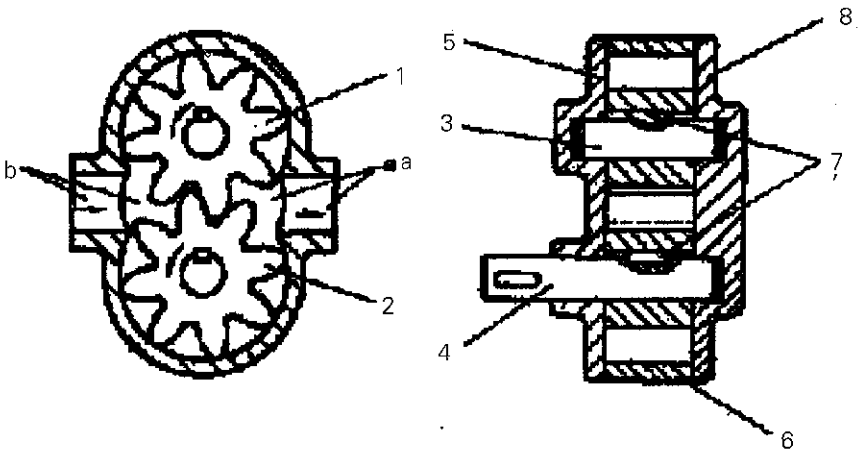


Fig. 7—1 Gear Pump Working Principle

1. Driven gear 2. Driving gear 3. Driven shaft 4. Driving shaft
5. Cover 6. Cover 7. Key 8. Housing

VIII. Swing Buffer Valve

1. Structure and Function

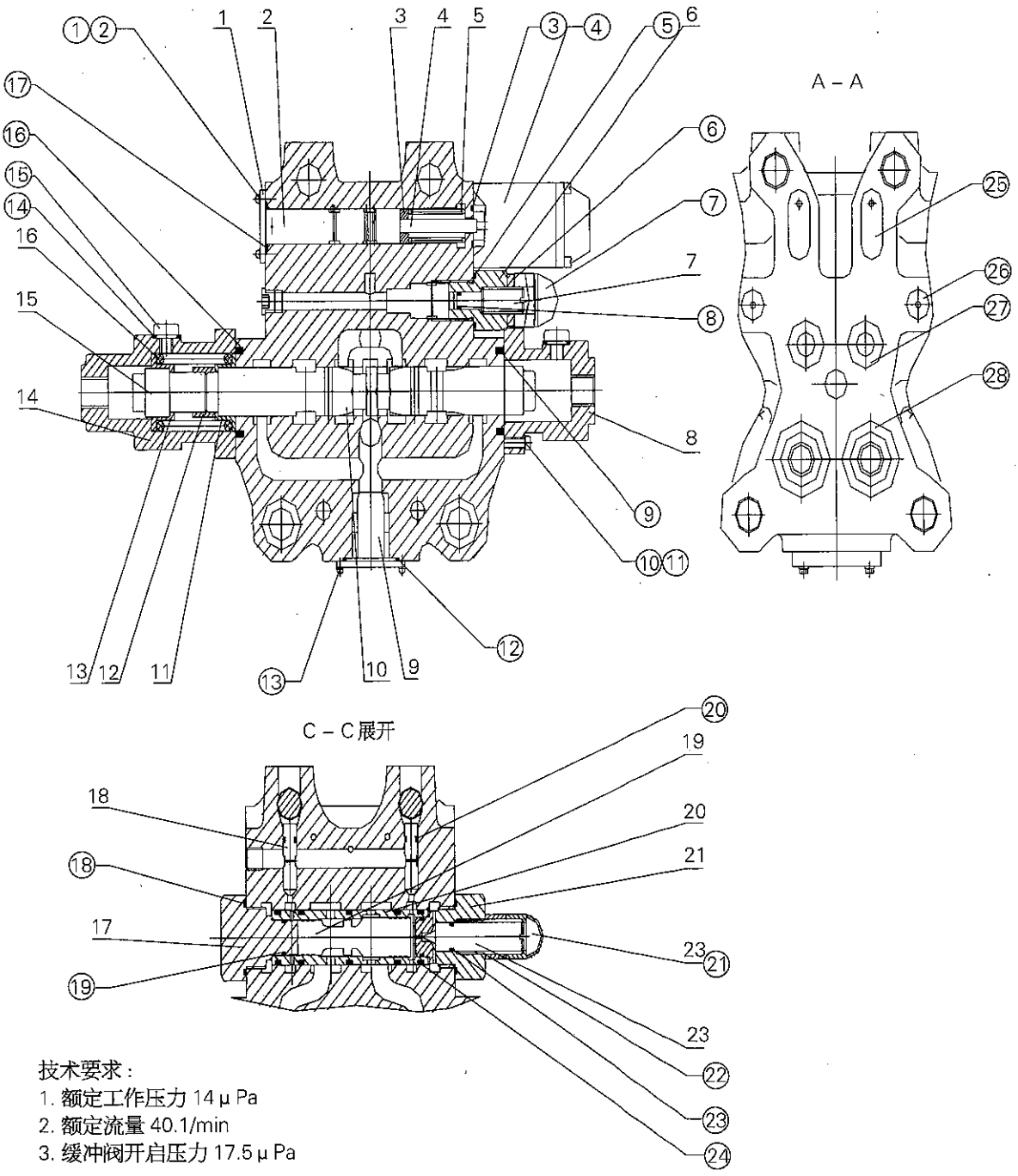


Fig. 8—1

No.	Part No.	Part Name	Qty	Remark
1		Cover plate	1	
2		Valve sleeve	1	
3		Backup ring	1	
4		Thrust rod	1	
5		Spring	1	
6		Cap	1	
7		Adjustable screw	1	
8		Cover	1	
9		Valve seat	1	
10		Socket sleeve	2	
11		Spring seat	1	
12		Guide base	1	
13		Spring seat	1	
14		Cover	1	
15		Valve spool	1	
16		Spring	1	
17		Cover	1	
18		Throttle valve	2	
19		Valve spool	1	
20		Socket sleeve	1	
21		Guide valve	1	
22		Spring	1	
23		Adjustable screw	1	

No.	Part No.	Part Name	Qty	Remark
①	GB93-76	Spring washer 4	4	
②	GB/T70-1985	Hex. socket head column screw M4×12	4	
③	GB3452.1-92	O-ring 15×1.8	2	
④	MF21-1.5YC	Solenoid valve	1	
⑤	GB3452.1-92	O-ring 21.2×1.8	1	
⑥	GB52-76	Nut M12	1	
⑦	GB802-76	Nut M12	1	
⑧	GB3452.1-92	O-ring 5×1.8	3	
⑨	GB3452.1-92	O-ring 33.5×1.8	1	
⑩	GB/T70-1985	Hex. socket head column screw M5×25	8	
⑪	GB93-76	Spring washer 5	8	
⑫	GB3452.1-92	O-ring 30×1.8	1	
⑬	GB/T70-1985	Hex. socket head column screw M6×16	4	
⑭	GB93-76	Combined washer 8	2	
⑮	GB/T70-1985	M8×1 plug	2	
⑯	GB3452.1-92	O-ring 37.5×1.8	1	
⑰	GB3452.1-92	O-ring 30×1.8	1	
⑱	GB3452.1-92	O-ring 30×1.8	3	
⑲	GB3452.1-92	O-ring 13.2×1.8	1	

No.	Part No.	Part Name	Qty	Remark
⑳	GB3452.1-92	O-ring 5×1.8	1	
㉑	GB802-76	Nut M 16	1	
㉒	GB52-76	Nut M 16	1	
㉓	GB3452.1-92	O-ring 10×1.8	1	
㉔	GB3452.1-92	O-ring 20×2.65	5	
㉕	GB3452.1-92	O-ring 25×2.4	2	
㉖	GB3452.1-92	O-ring 14×2.4	3	
㉗	GB3452.1-92	O-ring 22×2.4	2	
㉘	GB3452.1-92	O-ring 3×3.1	2	

2. Function

Buffer breaking on the swing mechanism can lower the inertia quantum while breaking in the state of heavy loads.

3. Working principle

The basic working principle of swing buffer valve is overflow and energy consumption to the swing hydraulic system. It can make the swing mechanism of truck crane brake in time, and not make the braking process too brief so as to realize the efficiency of swing braking and buffering.

(1) Reverse rotating position

In neutral position, hydraulic control change valve is in braking state. When the slewing pilot control lever in the operator's cab is pulled outside, the oil filled from hydraulic control oil port keep hydraulic control change valve in the left position as the figure shows, the pressure oil flows from P to A, A that connects with slewing motor drives turntable rotating to the left of the truck crane, that is anticlockwise rotation. When the slewing pilot control lever is pulled inside, the oil filled from hydraulic control oil port b keep hydraulic control change valve in the right position as the figure shows, the pressure oil flows from P to B, B that connects with slewing

motor drives turntable rotating to the right of the truck crane, that is clockwise rotation.

(2) Neutral brake position

When slewing brake is needed, slewing pilot control lever returns to the original position, that means hydraulic control change valve is in neutral position, and oil circuit channels A and B are blocked. At this time, if swing system has no mechanical braking, the turntable continues to rotate along the original direction and the inertia impact will be caused. The pressure at oil circuit exit goes up rapidly, when the pressure goes up to 20Mpa adjusted by relief valve, the oil liquid exhausted from the oil circuit exit will overflow from the relief valve and enter another oil port, the vacuum in that oil port will be filled up by check valve. Then the motor and relief valve form loop to circulate.

Because energy will be consumed when opening the relief valve, inertia energy in the swing system is consumed to achieve braking in the process of opening relief valve. But the needed time is longer than that of mechanical brake, so it can cut down the braking impact. The cushioning effect, that is the needed time for braking, can be adjusted by the pressure of relief valve.

(3) Free swing

When a certain angle exists between the wire rope on the hook and the heavy loads that have already feel to the ground, keep the wire rope vertical in order to eliminate the angle, solenoid valve is electrified to keep the pilot relief valve and exhaust port L1 interlinked which means the pressure in the oil port of motor is approaching zero. At this time pilot lever of winch raises, the turntable is rotated by the pulling force of the heavy loads when the wire rope is tightened, vacuum in the oil port will be filled up by check valve.

IX. Elevating Cylinder

1. Structure and Function

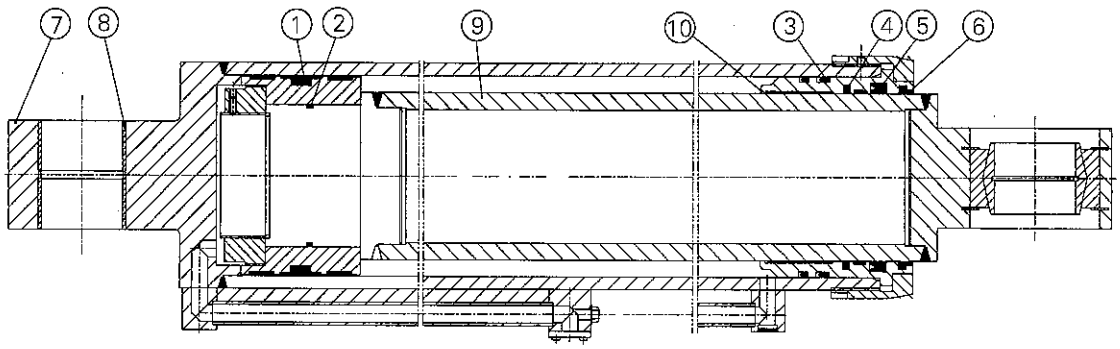


Fig. 9—1

No.	Part No.	Part Name	Qty	Remark
1	QY25K5.28-01	Cylinder	1	
2	QY25K5.28-03	Piston	1	45
3	QY25K5.28-04	Rod	1	
4	QY25K5.28-05	Guide sleeve	1	45
5	PCBOA2400-NCRO	Assembled Seal	1	NCRO
6	GB1235-76	O-Ring 170×5.7	4	Rubber-3
7	GB1235-76	O-Ring 240×8.6	1	Rubber-3
8		Assembled Seal 200×221×8.1	1	
9	BS L025 P5008	Rod Seal d200×225×18.2	1	P5008
10	A5 L025 N3587	Dust ring d200×220×18	1	N3587

2. Disassembly and Reassembly

(1) Support ring, sealing ring

New parts should be replaced in principle. Coat hydraulic oil or grease before reassembly, pay attention not to break or damage them when assembling.

(2) Piston rod, piston and cylinder

If small scratch is found on the sliding surface, use fine oilstone to polish it.

X. Telescoping Cylinders

1. Structure and Function of Telescoping Cylinder Ⅰ:

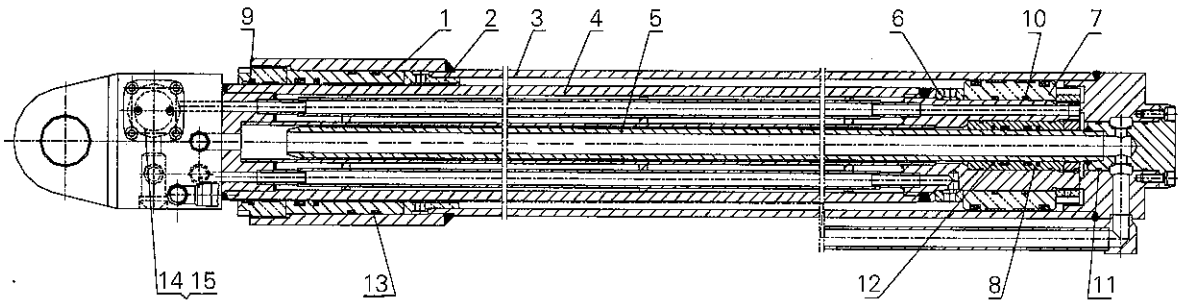


Fig. 10—1

No.	Part No.	Part Name	Qty	Remark
1	QY25B.16.1ⅡA-09	Guide sleeve	1	
2	QY25K5.16.1-02	Spacer sleeve	1	
3	QY25K5.16.1-03	Cylinder	1	
4	QY25K5.16.1-04	Piston rod	1	
5	QY25K5.16.1-05	Core pipe	1	
6	QY25B.16.1ⅡA-05	Front spacer sleeve	1	
7	QY25B.16.1ⅡA-04	Piston	1	
8	QY25B.16.1ⅡA-12	Guide sleeve	1	
9	CL0179C1	Dust Ring d140×153×9.5	1	
10	GB1235-76	O-Ring 120×5.7	2	
11		O-Ring 54.4×3.1	4	
12		Assembled Seal d38×49×4.2	2	
13	GB1235-76	O-Ring 175×5.7	2	
14	GB1235-76	O-Ring 50×3.1	1	
15	5300	Balance valve	1	

Disassembly and Reassembly

(1) When the piston rod assembly is pulled out from cylinder, pay attention not to damage

the surface of piston rod, piston and sealing ring.

(2) In order to make the piston rod cover easy to rotate, the cylinder should be aimed at the central of piston rod.

(3) Support ring, sealing ring

New parts should be replaced in principle. Coat hydraulic oil or grease before reassembly, pay attention not to break or damage them when assembling.

(4) Piston rod, piston and cylinder

If small scratch is found on the sliding surface, use fine oilstone to polish it.

When the piston rod assembly is inserted into cylinder, coat enough hydraulic oil on the sliding surface beforehand to avoid the damage of support ring, sealing ring, etc.

2. Structure and Function of Telescoping Cylinder Ⅱ :

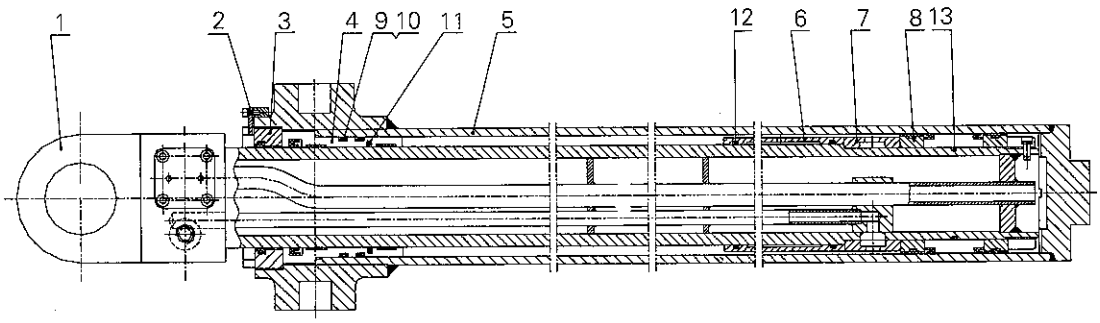


Fig. 10—2

No.	Part No.	Part Name	Qty	Remark
1		Piston rod	1	
2		Shim	1	
3		Cover	1	
4		Guide sleeve	1	
5		Cylinder	1	
6		Spacer sleeve 1	1	
7		Spacer sleeve 2	1	
8		Retaining plate	2	
9	2-357	O-Ring 139.07×5.33	2	
10	8-357	Backup Ring 140.41×4.65	2	
11	S55013 series	Assembled Seal d125×6.3	1	
12	GB3452.1-86	O-Ring 125×5.3	2	
13	2-346	O-Ring 104.14×5.33	1	

Disassembly and Reassembly

(1) When the piston rod assembly is pulled out from cylinder, pay attention not to damage the surface of piston rod, piston and sealing ring.

(2) In order to make the piston rod cover easy to rotate, the cylinder should be aimed at the central of piston rod.

(3) Support ring, sealing ring

New parts should be replaced in principle. Coat hydraulic oil or grease before reassembly, pay attention not to break or damage them when assembling.

(4) Piston rod, piston and cylinder

If small scratch is found on the sliding surface, use fine oilstone to polish it.

When the piston rod assembly is inserted into cylinder, coat enough hydraulic oil on the sliding surface beforehand to avoid the damage of support ring, sealing ring, etc.

XI. Telescoping Balance Valve Spool

1. Structure and Function

(1) Function:

Ensure that the telescoping mechanism of truck crane can stop at any height, and take the effect of closedown no matter the engine stops working or not and the time is long or short.

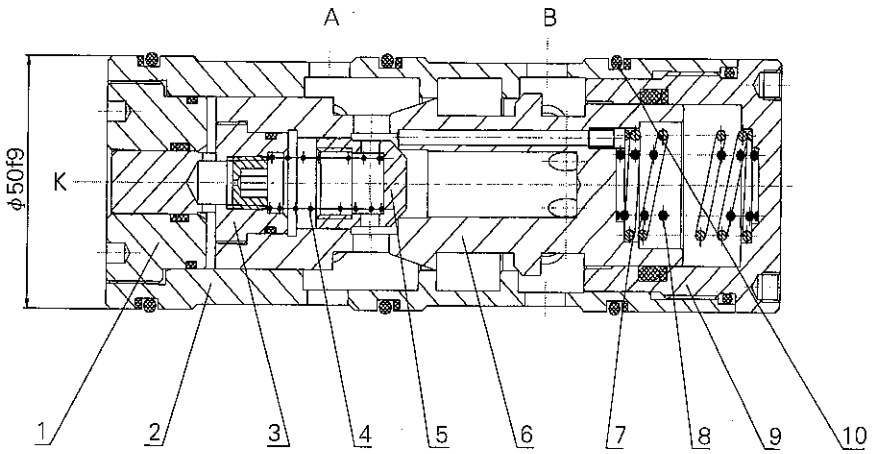


Fig. 11—1

1. Controlled piston 2. Sleeve 3. Controlled piston 4. Check valve spring
5. Check valve 6. Balance valve spool 7. Balance valve spool outer spring
8. Balance valve spool inner spring 9. Rear cover 10. O-Ring

2. Working principle

(1) Telescoping cylinder extension

The oil entering from port B opens the check valve and flows to port A, that means oil flows to large chamber of telescoping cylinder, the telescoping cylinder is in extending operation.

(2) Telescoping cylinder Retraction

The oil liquid in large chamber of telescoping cylinder flows to port A and is blocked by check valve, at this time, the oil liquid in small chamber of telescoping cylinder acts on the port K of control piston and impulses the balance valve spool compressing two main springs to move right as the figure shows with a pressure of 45 bar. The flow from port A to port B realizes the retraction of telescoping cylinder.

3. Use and Repair

(1) Dismounting and remounting of CCBH140/350 telescoping balance valve

The tool for dismounting and remounting is shown in Fig.11－2, use 2—M5 screw and rear cover 9 to connect rotation lever to pull out CCBH140/350 telescoping balance valve.

(2) Installation of CCBH140/350 telescoping balance valve

The specification of O-ring 10 is Φ50×3.1, push CCBH140/350 telescoping balance valve in after buttering on the O-ring.

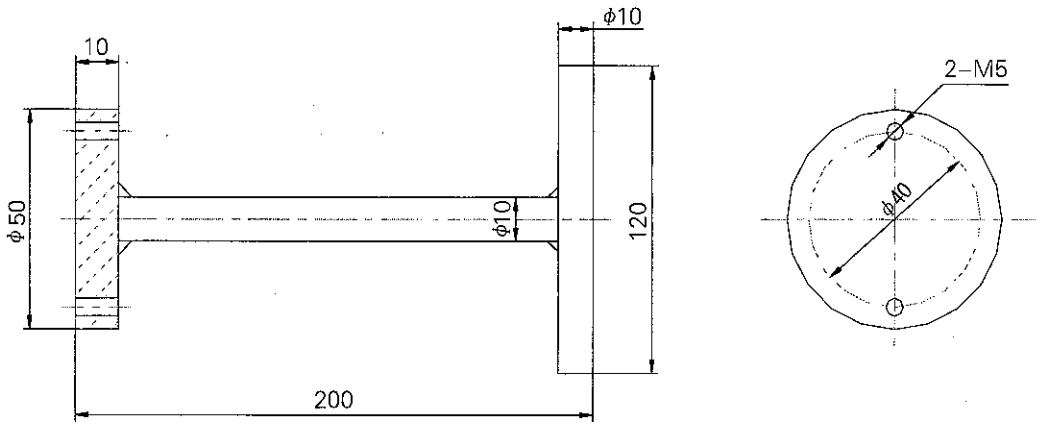


Fig. 11－2

XII. Winch Balance Valve

1. Structure

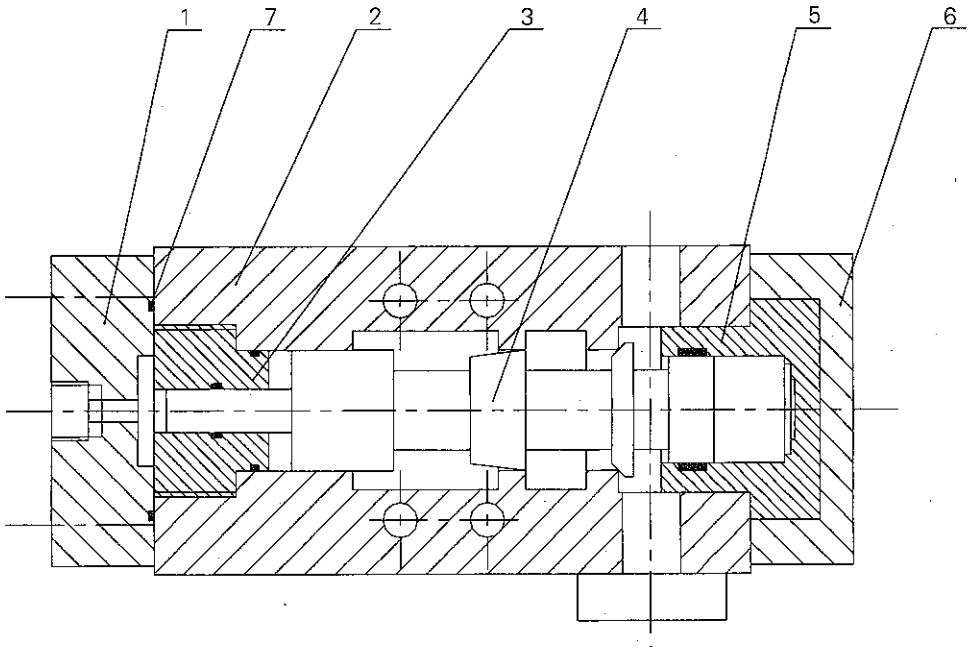


Fig. 12—1

No.	Part No.	Part name	Qty	Remark
1		Blind flange	1	
2		Valve body	1	
3		Bush	1	
4		Valve spool	1	
5		Bush 2	1	
6		Blind flange 2	1	
7		O-Ring	1	
8				

2. Function

This valve is used to avoid the runaway of hydraulic motor's rotating speed caused by the

weight of lifting loads (the rotating speed of hydraulic motor exceeds oil supply quantity).

3. Working principle

When the hydraulic motor is descending, the hydraulic oil on the descending side flows into hydraulic motor and acts on the piston of balance valve through choke as the pilot pressure. When this pressure exceeds spring tension, the piston is pushed upwards, the hydraulic oil that flows from port C2 to V2 keeps the pressure caused by loads, the loads are descending at the same time.

4. Disassembly and Reassembly

(1) Sealing ring

New parts should be replaced in principle. Coat hydraulic oil or grease before reassembly, pay attention not to break or damage them when assembling.

(2) Valve rod, piston and choke

Check whether the choke is blocked.

Check the sliding surface, if small scratch is found on the sliding surface, use fine emery cloth or oilstone to polish it.

When the valve rod and piston are inserted into valve, coat hydraulic oil on the sliding surface beforehand, and pay attention not to rotate them.

After the valve rod and piston are inserted into valve, check whether the motion is smooth.

XIII. Hydraulic Motor

1. Structure and Function

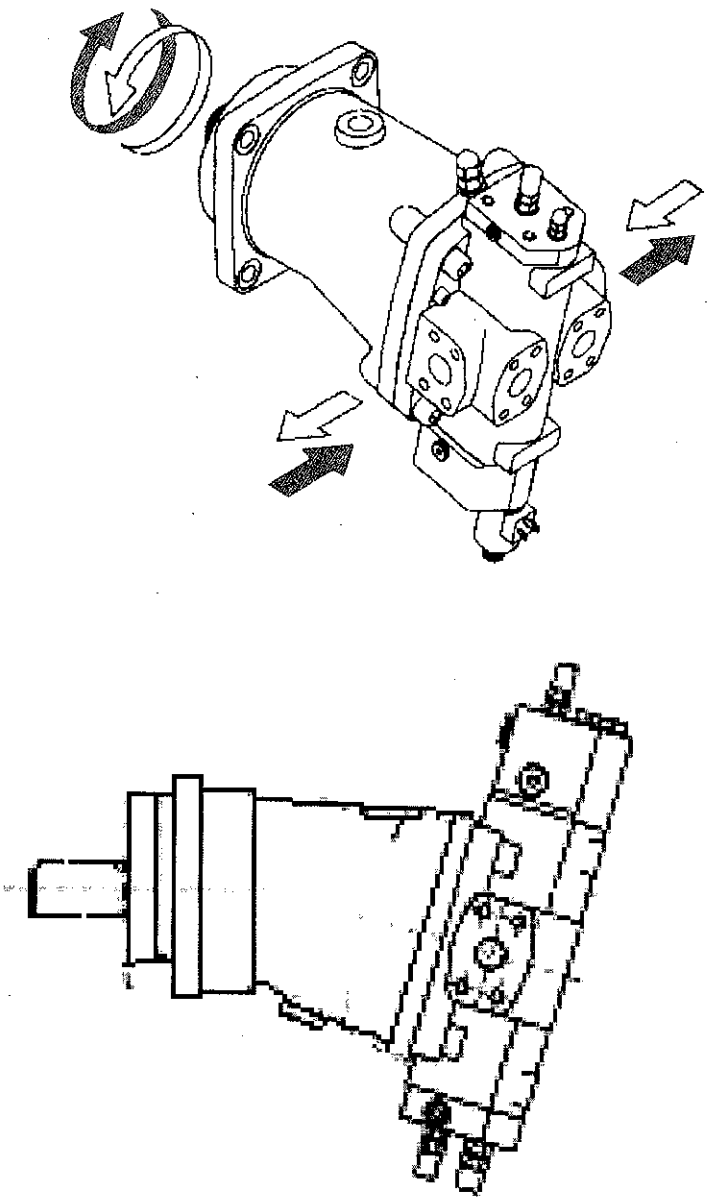


Fig. 13－1

2. Function

Hydraulic motor with bend axial piston type design is variable motor. It is the actuator part of system that is responsible to change hydraulic energy into mechanical energy.

3. Working principle

The hydraulic motor works when an inclination exists between cylinder and output shaft. Changing the inclination between cylinder and output shaft can change the oil suction quantity of hydraulic motor in order to change the rotation speed and torque of the motor (see the figure). The torque of hydraulic motor depends on its working volume, input pressure and flow. When input pressure is certain, working volume is larger, torque of hydraulic motor is bigger. When input flow is certain, working volume is smaller, rotation speed of hydraulic motor is higher. This is the basic working principle of variable hydraulic motor.

4. Troubles and Causes

(1) No pressure in hydraulic motor

Open the leakage oil pipe of the motor to check the leakage. The motor without troubles has very low leakage, if the leakage is high, troubles of no pressure will be caused.

(2) Loads cannot be elevated with normal pressure and no motor leakage.

The variable mechanism of motor is out of order, or the bolts are adjusted incorrectly.

XIV. Central Rotary Joint

1. Structure and Function

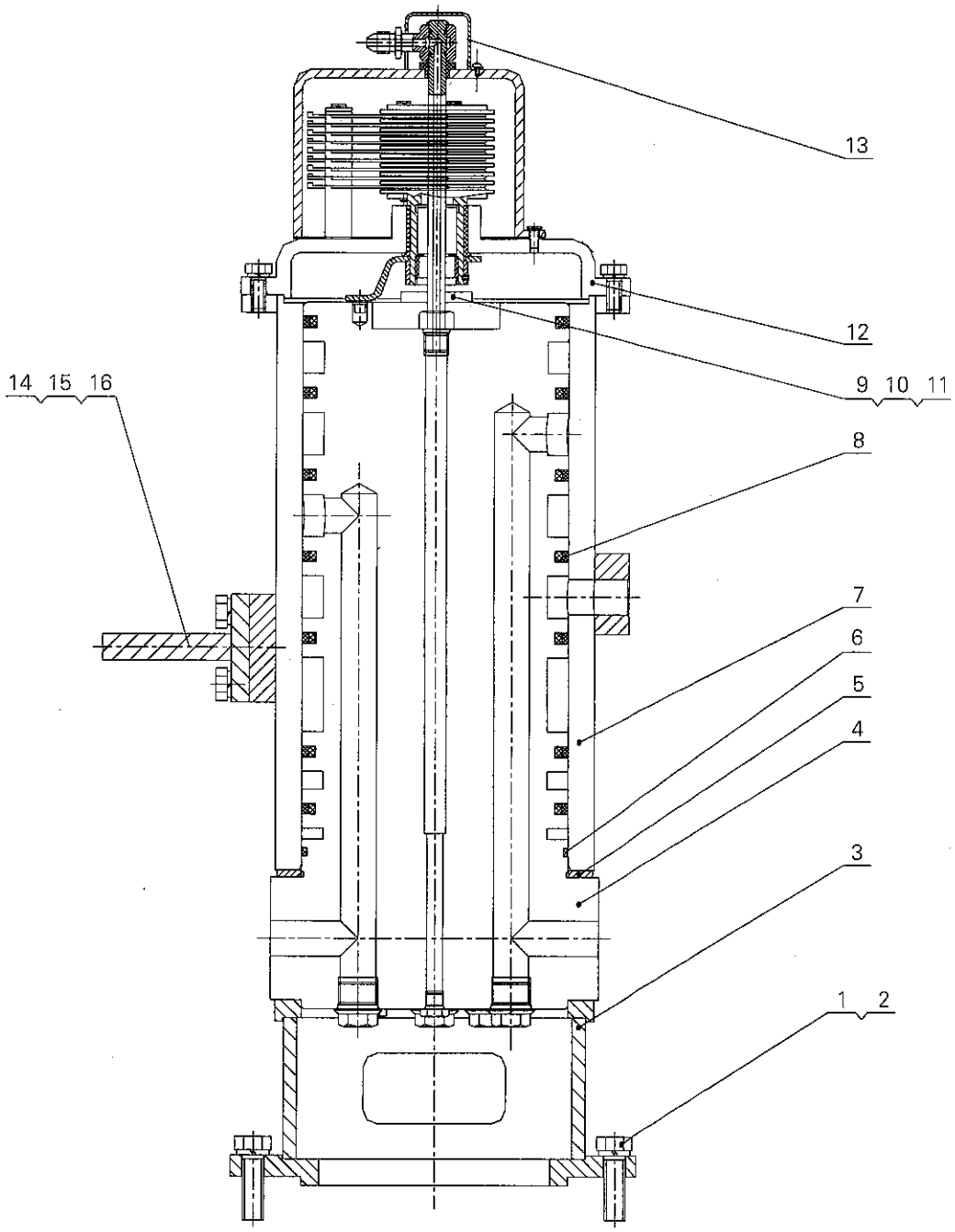


Fig. 14—1

No.	Part No.	Part Name	Qty	Remark
1		Washer 12	4	
2		Bolt M12×40	4	
3		Support	1	
4		Fix body	1	
5		Ring	1	
6		O- seal ring 142.47*3.53	1	
7		Sleeve assembly	1	
8		Revolving seal	7	
9		Pressing plate	2	
10		Washer 8	6	
11		Bolt M8×20	6	
12		Electric brush assembly	1	
13		Connector	1	
14		Transmission fork	1	
15		Bolt M10×25	4	
16		Washer 10	4	

2. Disassembly and Reassembly

(1) O-ring, sealing stuffing and sealing ring

New parts should be replaced in principle. Coat hydraulic oil or grease before reassembly, pay attention not to break or damage them when assembling.

(2) Sealing ring

Assemble the sealing ring, first squeeze the O-ring into the trough, and then push the sealing packings into the trough at full tilt.

XV. Superstructure Combined Valve

1. Structure and Function

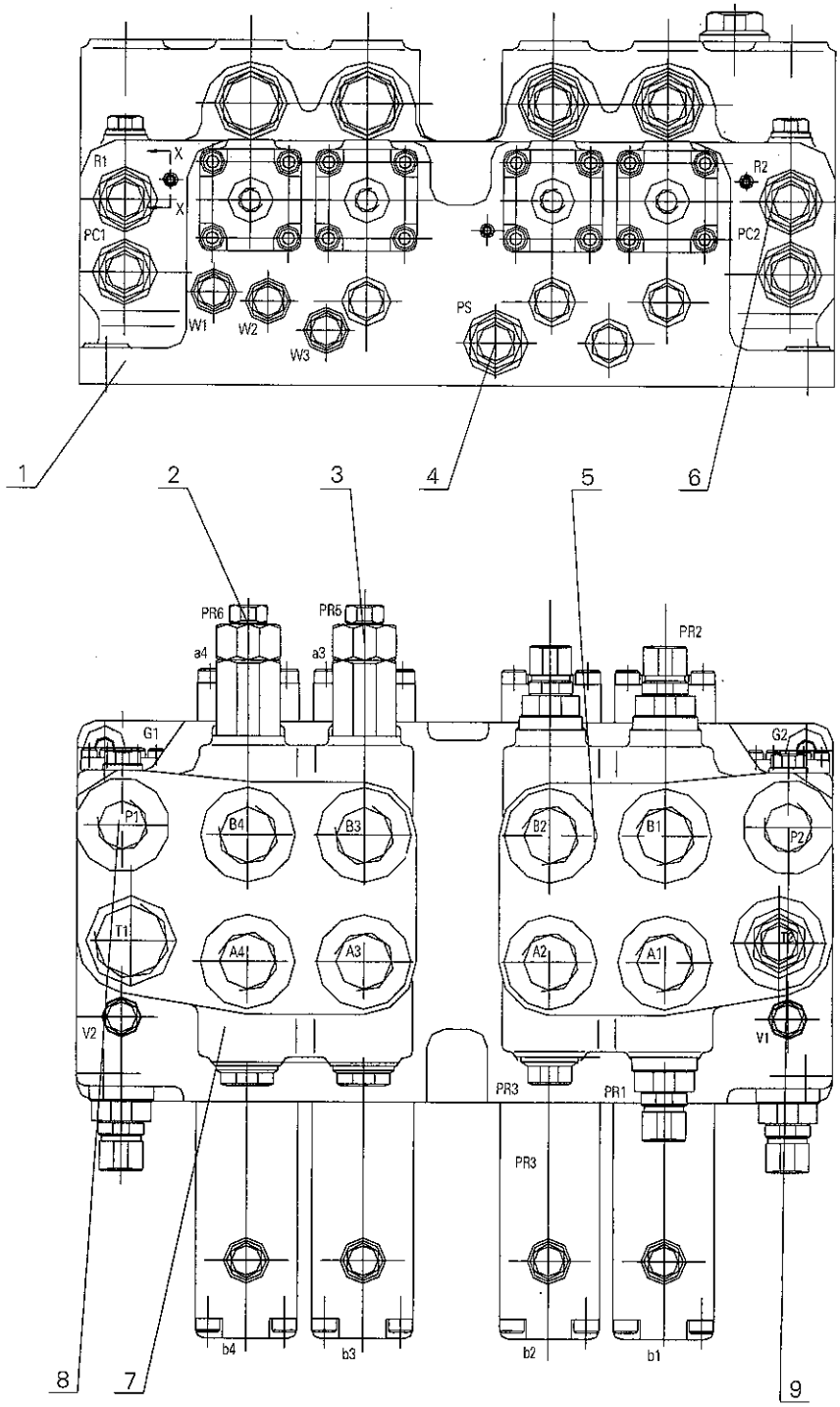


Fig. 15—1

No.	Part No.	Part Name	Qty	Remark
1		Valve body	1	
2		Overflow valve	2	
3		Confluent valve	1	
4		Overflow valve 2	1	
5		Valve for Telescoping /Elevating	1	
6		High-pressure overflow valve	2	
7		Valve for Main /Auxiliary winch	1	
8		Valve for pump 2 inlet	1	
9		Valve for pump 2 inlet	1	

2. Function

The combined valve can complete the action of superstructure hydraulic loop, and realize the automatic shift between single pump and double pumps to supply oil in telescoping system, elevating system, main winch and auxiliary winch. Also it can realize the composite proportional hydraulic control of direction, flow and pressure, and achieve proportional stepless speed governing of several actuators when operating simultaneously with different loads.

3. Disassembly and Reassembly

(1) Valve block

Don't grease on th e O-rings among each block.

(2) Sealing ring

New parts should be replaced in principle.

Install the oil seal into valve rod from the both ends, and don't put oil seal through the recess of valve rod.

(3) Valve rod and check valve

Check the sliding surface, if small scratch is found on the sliding surface, use fine emery cloth or oilstone to polish it.

When the valve rod and piston are inserted into valve, coat hydraulic oil on the sliding surface beforehand, and pay attention not to rotate them.

After the valve rod and piston are inserted into valve, check if the motion is smooth. After some valve blocks are disassembled, the valve rod should be assembled in the original valve block.

XVI. Pilot Control Valve

1. Structure and Function

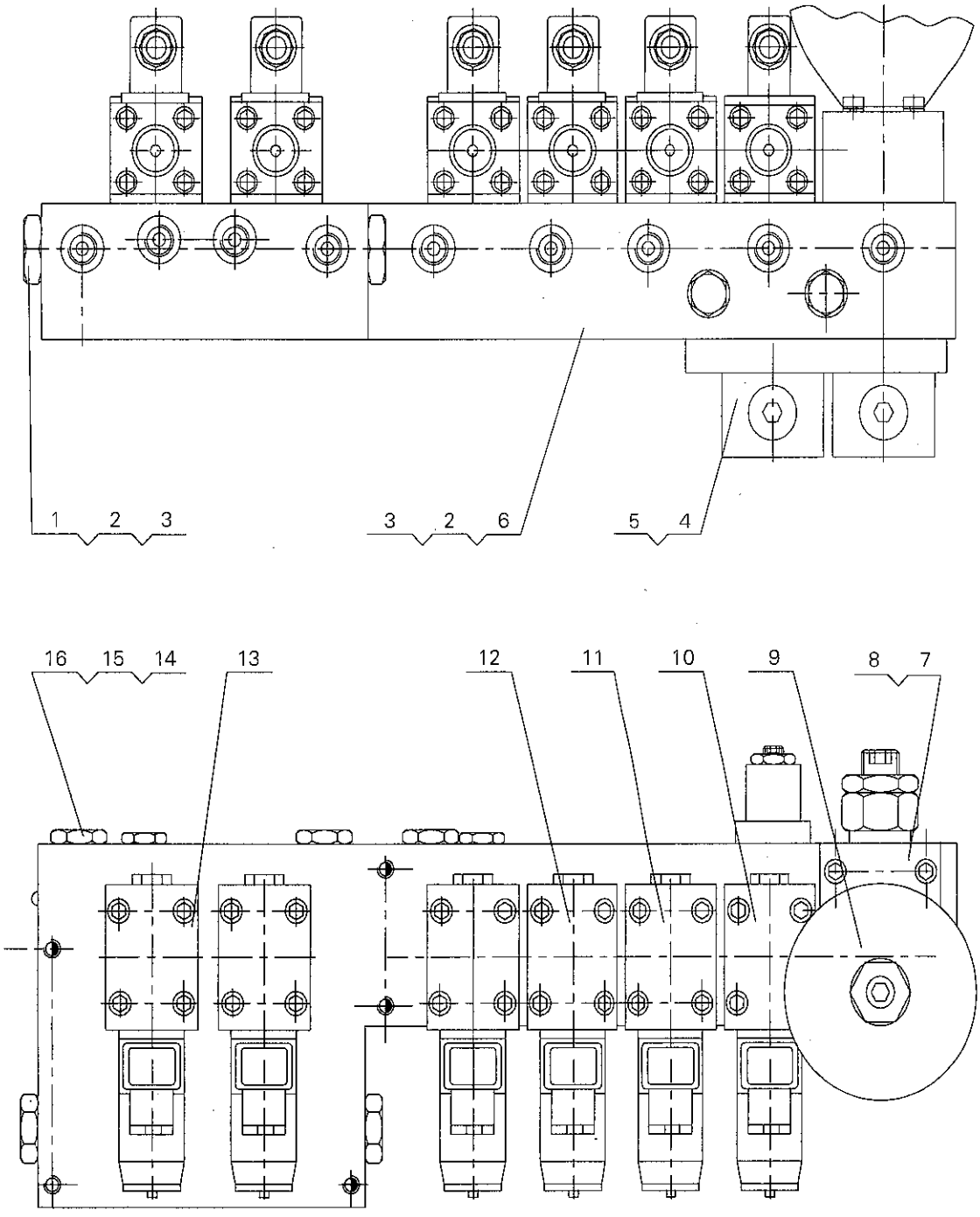


Fig. 16—1

No.	Part No.	Part Name	Qty	Remark
1		Shuttle valve	2	DQKZF.01
2		O-ring 19×2.65	3	GB3452.1-82
3		O-ring 15×1.8	3	GB3452.1-82
4		Arrester control valve	2	DQKZF.02
5		O-ring 15×2.65	2	GB3452.1-82
6		Pressure relief valve	1	CJF1
7		Overflow valve	1	DQKZF.03
8		O-ring 16×2.4	1	GB1235-76
9		Accumulator	1	0531600603
10		Solenoid valve	1	DHI-0631/2-24DC
11		Solenoid valve	1	DHI-0631/2/A-24DC
12		Solenoid valve	2	4WE6Y6X/EG24NZ4
13		Solenoid valve	2	4WE6D6X/EG24NZ4
14		Check valve	5	SO-K08L.01
15		O-ring 18×2.4	5	GB1235-76
16		O-ring 24×2.4	5	GB1235-76

Valve location:

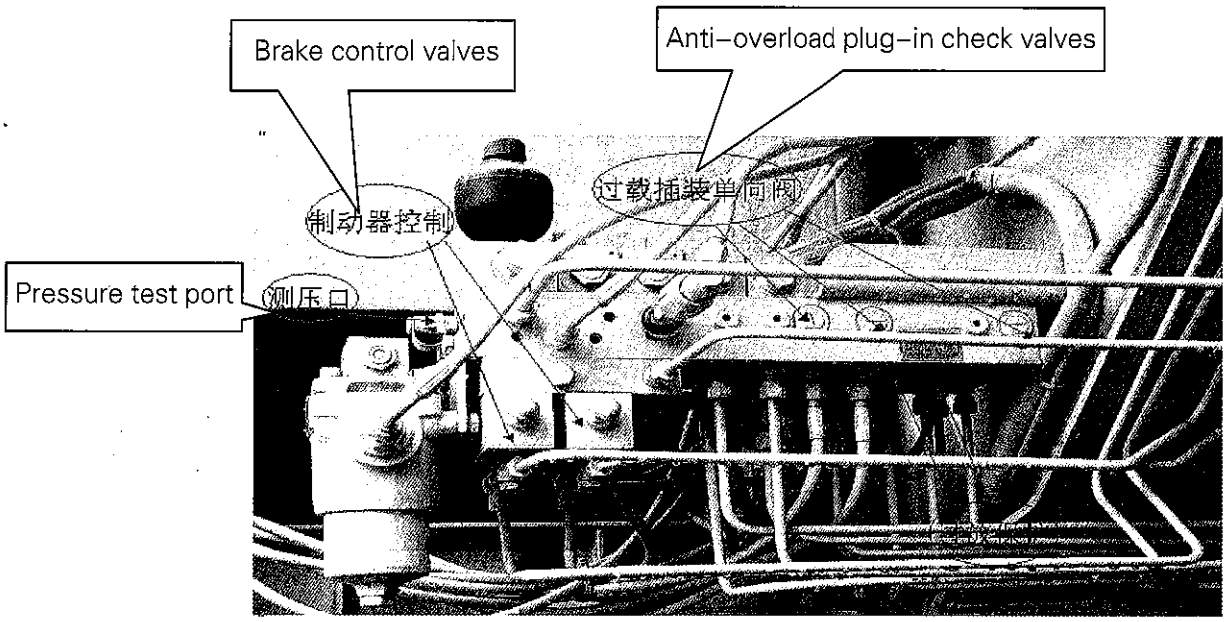


Fig. 16—2

2. Function

The pilot control valve has the function of pilot oil supply, superstructure combined valve reversing, winch brake opening, swing brake opening, safe loading and rope-end protection.

Function of solenoid valve:

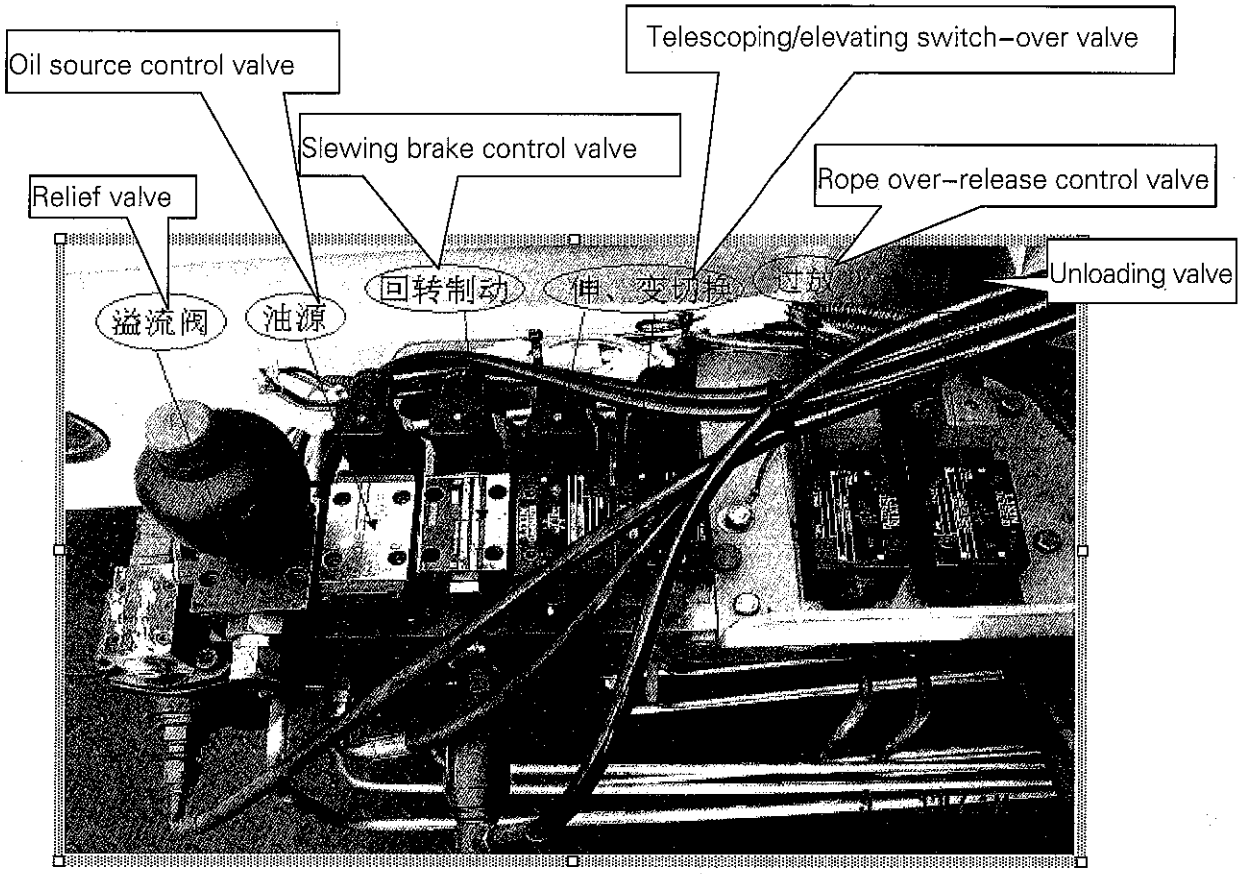


Fig. 16—3

3. Disassembly and Reassembly

① Sealing ring

New parts should be replaced in principle.

Install the oil seal into valve rod from the both ends, and don't put oil seal through the recess of valve rod.

② Valve rod and check valve

Check the sliding surface, if small scratch is found on the sliding surface, use fine emery cloth or oilstone to polish it.

When the valve rod and piston are inserted into valve, coat hydraulic oil on the sliding surface beforehand, and pay attention not to rotate them.

After the valve rod and piston are inserted into valve, check whether the motion is smooth.

XVII. Maintenance

1. Oil Filter Cleaning and Replacing

Unavoidable contamination will attack the system because of many reasons. Keep the system clean in order to ensure the normal working of hydraulic system, so suction filter and return filter are installed on the hydraulic oil tank. The suction filter and return filter are the positions that contaminant gathers, if contaminant gathers to a certain degree, the flow of the two oil filters and the normal working of the system are influenced. Generally clean the oil filters of a new truck crane with gasoline and terylene cloth or silk after 100 working days. Then clean once every 300 working days.

2. Filtering and replacement of hydraulic oil, cleaning if oil tank

If hydraulic oil is serious contaminated but not deteriorated, filter the hydraulic oil and reuse it. Hydraulic oil must be replaced if it is deteriorated and cannot be reused. The brand of hydraulic oil and its adding level can be seen in the ***Operation Manual.*** Clean the oil tank when replacing hydraulic oil in order to avoid the contamination of liquid oil.

XVIII. Troubles and Troubleshooting

1. Outrigger does no extend and retract or move slowly.

① Faulty relief valve; Check whether relief valve is in normal state.

② Damaged piston seal in oil cylinder; Replace seal.

③ Faulty pilot check valve in vertical cylinder; Repair or replace check valve.

2. Pressure lower than designed value

① Low pressure in relief valve; Reset pressure.

② High pump leakage; Replace oil pump.

3. Outrigger beam automatic retraction and extension

① Double-way lock unlocked; Clean or replace double-way lock.

② Internal leakage of oil cylinder; Replace seal or oil cylinder.

4. Cause analysis of hoist speed not reaching the designed demand without loads:

① Low volumetric efficiency in pump.

② Open diffluent valve in multi-way valve.

③ Inoperative confluent valve in multi-way valve.

④ Faulty multi-way valve.

⑤ High leakage in main safe valve.

⑥ High leakage in hydraulic motor.

⑦ If the motor is variable hydraulic motor, check whether the displacement is in the specified minimum value.

5. Cause analysis of no pressure in swing system:

① No pressure or low pressure in hydraulic system: it has nothing to do with hydraulic pump and the relief valve on chassis multi-way valve if the outriggers can be operated normally. Check whether the outrigger valve lever on chassis multi-way valve is in neutral position. Check the relief valve and swing valve on the central rotary joint and superstructure multi-way valve. Check whether the pressure of relief valve on the hydraulic pump and chassis multi-way valve reaches the specified value if the outriggers cannot be operated normally.

② Internal leakage in swing valve.

③ High drain flow rate in swing motor.

6. Cause analysis of no swing movement but with high swing pressure:

① Brake lock cannot be released while rotating.

② Seized swing motor.

7. Cause analysis of swing to only one direction:

① Check whether the bolt on valve rod of swing valve is loose, valve rod cannot reach one direction.

② Damaged cylinder barrel plate in one direction on the slewing motor and high leakage.

8. Cause analysis of no free swing in swing operation:

① Faulty rotary solenoid valve.

② Over high pressure in rotary counterbalance valve.

9. Cause analysis of low or no pressure in elevating operation:

① Over low or no pressure in elevating system: check pump and safe valve on multi-way valve (check it at the same time with telescoping system).

② Internal leakage caused by damaged elevating valve in multi-way valve.

③ Separated damper of confluent valve in multi-way valve.

④ Internal leakage in elevating cylinder.

⑤ Faulty confluent valve in multi-way valve.

10. Cause analysis of unable to lower the boom with normal elevating pressure:

① Seized control valve in elevating balance valve cannot push the slide valve.

② Blocked throttle hole on control piston of elevation balance valve.

11. Cause analysis of unable to lower boom in elevating operation:

① Internal leakage in cylinder and over low pressure cannot open the balance valve so that oil in the chamber without rod cannot return to oil tank or the oil tank will extend outward.

② Over low pressure adjustment of secondary relief valve on elevating valve of multi-way valve.

12. Cause analysis of automatic boom lowering in elevating operation:

① Un-tighten internal seal in balance valve.

② Internal damage in oil cylinder.

③ Balance valve open because of high pressure in control system.

13. Cause analysis of vibration in elevation:

① Vibration in both elevation raising and lowering

Vibration and noise in both elevation raising and lowering, especially in the situation of over high oil temperature and environmental temperature.

Elevating cylinder is over tight, mainly because the guide sleeve in the elevating cylinder or nylon supporting ring on the piston are influenced by the environmental temperature and expand.

② Cause analysis of elevation vibrating during lowering:

Over high opening pressure in balance valve.

Over big throttle hole on the control piston of balance valve.

Over high pressure adjustment of secondary relief valve on elevating valve of multi-way valve.

14. Cause analysis of hoist speed not reaching designed demand with heavy load:

① Low volumetric efficiency in pump.

② Open diffluent valve in multi-way valve.

③ Inoperative confluent valve in multi-way valve.

④ Faulty multi-way valve.

⑤ High leakage in main safe valve.

⑥ High leakage in hydraulic motor.

⑦ If the motor is variable hydraulic motor, check whether the displacement is in the specified minimum value.

15. Cause analysis of no winch rotation because of low pressure:

① Faulty main safe valve.

② High leakage in hydraulic motor.

③ Little internal leakage in hydraulic pump.

④ Faulty multi-way valve.

16. Cause analysis of no winch rotation when pressure is normal:

① Overload.

② Inoperative brake.

③ Brake friction plate serious worn.

④ Contaminated brake friction plate

⑤ Air in the brake piping.

⑥ Leakage of brake liquid or defect in brake piping.

⑦ Faulty hydraulic motor.

⑧ Faulty speed reducer.

17. Cause analysis of winch vibrating:

① Not fully opened brake.

② Faulty multi-way valve.

③ Faulty hydraulic motor.

④ Faulty multi-way valve.

⑤ Unsteady winch system.

⑥ Over high pressure adjustment of secondary relief valve on winch valve of multi-way valve.

18. Cause analysis of rotation speed decreasing when winch is in operation:

① High leakage in main safe valve.

② High leakage in hydraulic motor.

③ Low oil displacement in hydraulic motor.

④ Faulty multi-way valve.

⑤ Overload.

19. Cause analysis of automatic lowering when a load is lifted:

① High counter pressure in return circuit.

② Inoperative brake.

③ High leakage in hydraulic motor.

④ Faulty balance valve.

20. Cause analysis of abnormal noise in winch operation:

① damaged hydraulic motor.

② Damaged speed reducer.

③ Faulty balance valve.

④ High oil viscosity.

⑤ Air entering.

⑥ Influence of outside vibration.

⑦ Contaminated oil.

⑧ Over high pressure adjustment of secondary relief valve on winch valve.

21. Cause analysis of no telescoping motion in telescoping system:

① Low system pressure; Check hydraulic pump and relief valve in multi-way valve (including safe valve and secondary relief valve).

② Internal leakage in damaged telescoping valve of multi-way valve.

③ Internal damage in telescoping cylinder.

④ Separated damper in confluent valve in multi-way valve.

22. Cause analysis of no retraction of boom and high pressure:

① Seized control piston in telescoping balance valve spool cannot push the slide valve.

② Blocked throttle hole on control piston in telescoping balance valve spool.

23. Cause analysis of vibrated boom telescoping:

① The guide sleeve in the elevating cylinder or nylon supporting ring on the piston are influenced by the environmental temperature and expand.

② Over tight slide block on boom, bad lubrication.

24. Telescopic troubles in boom sections:

Cause analysis of no extension and retraction of 3rd, 4th and 5th boom sections and high pressure:

① Valve spool is seized or control circuit are broken.

② Solenoid valve spool is seized in opening position.

Cause analysis of no extension and retraction of 2nd boom section and high pressure:

① Solenoid valve spool is seized in opening position.

② Main valve spool is seized in the position where oil cylinder is coupled.

25. Cause analysis of automatic retraction of boom:

① Un-tighten internal seal in balance valve.

② Internal damage in oil cylinder.

③ Balance valve open because of high pressure in control system.

26. Cause analysis of automatic extension of boom:

Boom section (s) will extend out automatically after engine shutdown: i.e. 3rd, 4th and 5th boom sections will extend out automatically while 2nd boom section is been retracting, or the 2nd one will extend out automatically while the 3rd, 4th and 5th ones are been retracting.

① Internal damage in oil cylinder.

② Balance valve damaged.

③ Extending/retracting switch-over valve faulty.

徐州工程机械集团有限公司　徐州重型机械有限公司

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XZ25K TRUCK CRANE CARRIER

OPERATION MANUAL

(Equipped with Shanghai Diesel SC8DK engine
and Hangzhou Engine WD615 engine)

XUZHOU HEAVY MACHINERY CO., LTD.
XUZHOU CONSTRUCTION MACHINERY GROUP CO., LTD. CHINA

XZ25K TRUCK CRANE CARRIER

OPERATION MANUAL

Pages: 1 up to 27

VIN	
Date	

The operation manual is part of the crane!

Always keep on hand!

This equipment is designed and manufactured by complying with the standard of Q/320301JAF02

XUZHOU HEAVY MACHINERY CO., LTD.
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Post code: 221004

XZ25K Truck Carrier Packing List

No.	Name	Qty	Package	Remark
1	XZ25K Truck Crane Carrier Operation Manual, Maintenance Manual and Parts Catalogue	1		
2	XZ25K Truck Crane Carrier Certificate (for the carrier supplied outside)	1		
3	XZ25K Truck Crane Carrier	1	No package	Integrated with superstructure.
4	Installation Certificate of rear fog lamp	1		
5	Engine Certificate	1		
6	Engine Maintenance Manual	1		
7	Transmission Certificate	1		
8	Transmission Maintenance Manual	1		
9	Air conditioner operation manual			
10	Supplied Tools List	1		Refer to Supplied Tools List in maintenance manual
11	Supplied Tools	1	Metal box	
12	Supplied Spare Parts List	1		Refer to Supplied Spare Parts List in maintenance manual
13	Supplied Spare Parts	1	Crate	

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Preface

This manual supplies technical information about the performance, structure, operation, service and adjustment of XZ25K Truck crane chassis with China GB III engine (Shanghai Diesel and Hangzhou Engine) equipped to drivers and maintenance workers for reading and vehicle managers and technicians for reference.

Please operate and maintain the vehicle strictly in accordance with the specified requirements in this manual and keep record of periodical maintenance. There may be some slight difference between these two engines when operating them, don't neglect it.

It is recommended to understand notes and cautions in relation to operation and maintenance in the manual.

Always use the same type of parts with the original ones for eventual replacement of parts in order to ensure machine's performance.

All staff in the service stations authorized by our company has been trained professionally and able to supply service of technical support and spare parts. If there is any problem that couldn't be solved there, please contact the office of Xuzhou Heavy nearest to you.

Due to the product modification and improvement, what described in this manual may slightly vary from the real chassis, we reserve the right to modify the design without notice.

About the manual:

Metric units for measurement are adopted in the manual.

Illustrations and symbols are used for helping understand the meanings of text in the manual. Symbols and their meanings are as the following:

⚠ **Note:** the term "Note" is used whenever the nonobservance of certain instructions or notes may injure persons and damage to parts of the crane.

Caution: the term "Caution" is used whenever damage to the crane can occur if the operating instruction(s) is not observed and adhered to.

Check: carry out relative check according to requirements specified by the manufacturer.

⚠ **Cautions:**

◇ Read the manual carefully and familiar with operating methods & notes before operate the vehicle. Otherwise, never operate it.

◇ Never extend hand and any part of body or clothing into the moving parts during operation. Personal protective equipment (such as helmet, gloves and so on) has to be worn during operation.

◇ Before starting, make sure that there is no unauthorized person around the machine. Only when there is no person within the dangerous area, the machine can be operated. Otherwise, never activate it.

◇ Keep the manual well for future reference.

October 2007

Contents

Ⅰ. Safety

Cautions

◇ Related certificate is necessary for person who operates the vehicle. Avoid injury to personnel due to mis-operation.

◇ Never perform any operation and maintenance when the operator is unable to do work normally due to bad health or drinking alcohol or taking medicine.

◇ Any improper operation or casualness will cause injure or death of persons and damage to the crane.

◇ Before driving, make sure that all outriggers are retracted fully in place and secure with lock pins.

◇ Comply with road travel and crane operating regulations in the place where you are working.

◇ During traveling, no person is allowed to stay outside of the driver's cab.

◇ During traveling, observe the conditions of instrumentation and indicator lamps in the driver's cab. If any abnormality occurs, park the vehicle in a safe place and repair in time.

◇ When the vehicle has to be towed, the propeller shaft must be disengaged or the drive wheel must clear off the ground.

◇ There is an increased danger of accidents if parts are damaged due to the machine has not been maintained according to the operating instructions.

◇ Personal protective equipment such as spectacles, protective clothing and safety shoes has to be worn during maintenance.

◇ Before perform maintenance, confirm that the machine has been set up well, and a warning board of "In maintenance, no operation" in the driver's cab must be present.

◇ Prior to maintaining engine and other moveable parts, in order to prevent accidental engine starting, the battery must be disconnected (the negative cable first), and all condensers be discharged.

◇ Prior to disassembling pipelines, connectors or related parts, release the pressure in them to prevent injury to personnel. Never check leakage of pressure with hand.

◇ In order to avoid scald, watch out for scorching parts and pipelines as well as liquid and

gas in pipelines and cavities.

◇ Hydraulic oil may be toxic and flammable. Store it in a place where children are not likely to reach. Avoid breathing evaporative emission or contact used oil for a long time. Clean skin with soap and water as soon as possible after touching oil. If there is oil entering into eyes, rinse with water for 15 minutes and then visit a doctor.

◇ In order to avoid being stifled or frostbite, maintenance of fuel system and air conditioner system must be carried out in a well-ventilated environment.

◇ The PTO switch must be in "OFF " position during traveling.

◇ The clutch must be disengaged fully while PTO is being operated.

◇ Set outriggers fully and secure with lock pins before lifting operation.

◇ Operating instructions on the machine are valid equally with instructions in this operation manual.

◇ In prevention of damage to components of control system, positive and negative wires should be disconnected from power source before carrying out welding operation.

Ⅱ. Product description

1. Vehicle number

The carrier series number is marked in the nameplate on the right side beam of the frame.

The nameplate consists of

1. Name and model;
2. Series number;
3. Engine number;
4. Delivery date;
5. Manufacturer

When you claim compensation, order spare parts or contact with our service department, please give the following correctly and clearly:

Vehicle Model: _____

Series No.: _____

Engine No.: _____

Delivery Date: _____

2. Main assembly structure features and technical Parameters

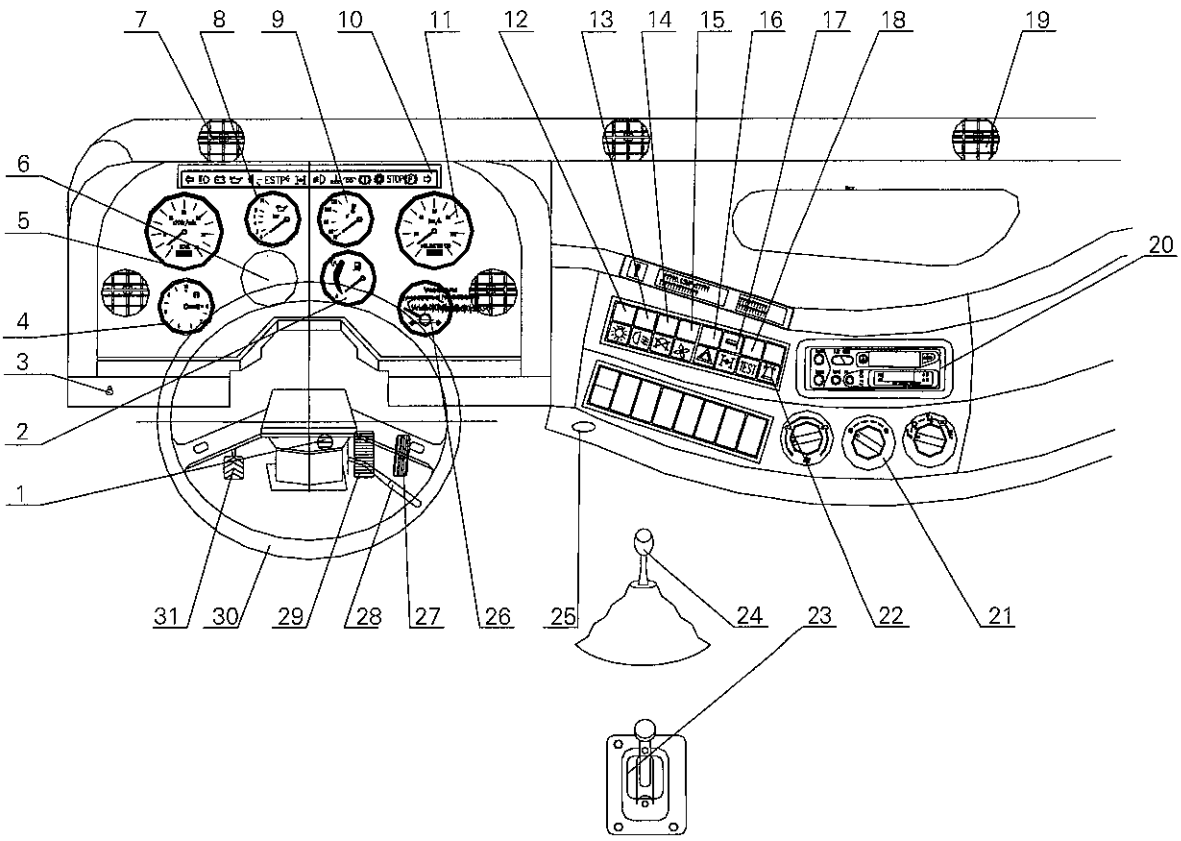
Model:	XZ25K
Driving type:	6×4
Crew:	2
Chassis outline dimension (L×W×H) (mm):	10069×2500×2480
Wheel base:	4425+1350
Track:	2074（front axle ）
	1834（rear axle）
Total chassis curb weight (kg):	13850
Total chassis weight (kg):	32000
Permissible axle load (kg):	7000 （front axle ）
	12500×2（rear axle）
Shanghai Diesel Engine model:	SC8DK280Q3

Ⅲ. Vehicle operation

1. Arrangement in cab

Arrangement in cab consists of instrument panel, controllers and seat, etc.

(1) Instrument panel and controllers



Instrument panel includes instrumentation, switches and indicators. Refer to figures 3—1 and 3—2.

Fig. 3—1 Instrument panel and controllers

1. Starter switch
2. Fuel gauge
3. Power take-off switch gauge
4. Double-pointer air pressure
5. Engine tachometer
6. Cover
7. Ventilating hole
8. Engine oil pressure gauge

9. Water temperature gauge
10. Signal lamps assembly
11. Speedometer
12. Lamp master switch
13. Fog lamp switch
14. Stop switch
15. Air conditioner switch
16. Emergency signal switch
17. Differential lock switch
18. Engine diagnosis switch
19. Ventilating hole
20. CD player
21. Warm air adjusting knob
22. Warning lamp switch
23. Hand brake handle
24. Transmission control lever
25. Cigarette lighter
26. Ammeter
27. Accelerator pedal
28. Combined switch
29. Foot brake pedal
30. Steering wheel
31. Clutch pedal

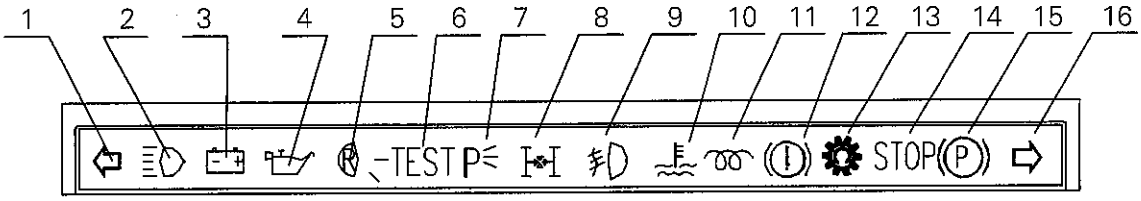


Fig. 3—2 Signal lamps assembly

1. Left turning indicator lamp
2. Beam indicator lamp
3. Charging indicator lamp
4. Oil pressure warning lamp
5. Reversing indicator lamp
6. Engine diagnosis indicator lamp
7. Foot brake indicator lamp
8. Differential lock indicator lamp
9. Fog lamp indicator lamp
10. Water temperature warning lamp
11. Pre-heating indicator lamp
12. Low air pressure warning lamp
13. Power take-off indicator lamp
14. Engine trouble indicator lamp
15. Hand brake indicator lamp
16. Right turning indicator lamp

Press down the switch, air conditioner can work (refer to air conditioner operation manual), reset the switch when air conditioner isn't used.

(14) Emergency signal switch (No. 16 in Fig. 3－1)

The emergency signal switch must be used when truck has to park in dangerous place. Turn on the switch, the danger warning lamp lights and makes all the turning indicator lamps flash. The danger warning lamp works even if the starting key in position OFF. Turn off the switch to release the danger warning.

(15) Differential lock switch (No. 17 in Fig. 3－1)

And Differential indicator lamp (No. 8 in Fig. 3 －2)

When rear wheels get into a pit and couldn't get out, press down the switch to link the drive axle rigidly by electric-pneumatic control devices. When use the switch, the differential lock indicator lamp comes on. If it is not light, stop the vehicle and check cause.

⚠ **Notes:**

△ Before engaging or disengaging the differential lock, engine power output must be cut off and the truck must be in static condition or in very lower speed;

△ Only When the truck drives in straight line can the switch be used;

△ In case the truck drives on a good road, the switch must be disengaged at once. Keeping on use of the switch will result in damage of transmission and increase of fuel consumption.

(16) Warm air adjusting knob (No. 21 in Fig. 3－1)

Air-flow, direction and temperature may be adjusted according to requirements.

(17) Hand brake handle (No. 23 in Fig. 3 －1)

And Hand brake indicator lamp (No. 15 in Fig. 3 －2)

Before leaving the truck, apply the hand brake handle. At this time, hand brake indicator lamp illuminates, it indicates that the vehicle is in parking brake. Before traveling, release it (hand brake indicator lamp goes out).

When emergency brake is necessary in danger and foot brake is out of order, apply hand brake handle to brake the vehicle.

When service brake is damaged and the vehicle has to be towed, apply hand brake instead of service brake.

⚠ **Warning:** do not use the parking brake and the service brake at the same time to prevent the braking system from damage.

(18) Ammeter (No. 26 in Fig. 3 －1)

The ammeter indicates charging and discharging of the battery. Ammeter pointer pointing to

" + " area indicates that power generated by alternator is larger than that of consumed by electric equipments, at this time the battery is in charging; in reverse, the battery is in discharging.

(19) Engine diagnosis switch (No. 18 in Fig. 3－1)

When trouble occurs in engine, engine trouble indicator lamp (No.14 in figure 3－2) will light, press down this switch and observe the flashing numbers of engine diagnosis indicator lamp carefully, then find out and remove the trouble according to the operation manual or contact professional maintenance technician.

(20) Combined Switch (No. 28 in Fig. 3－1)

Refer to Fig 3－4 for combined switch.

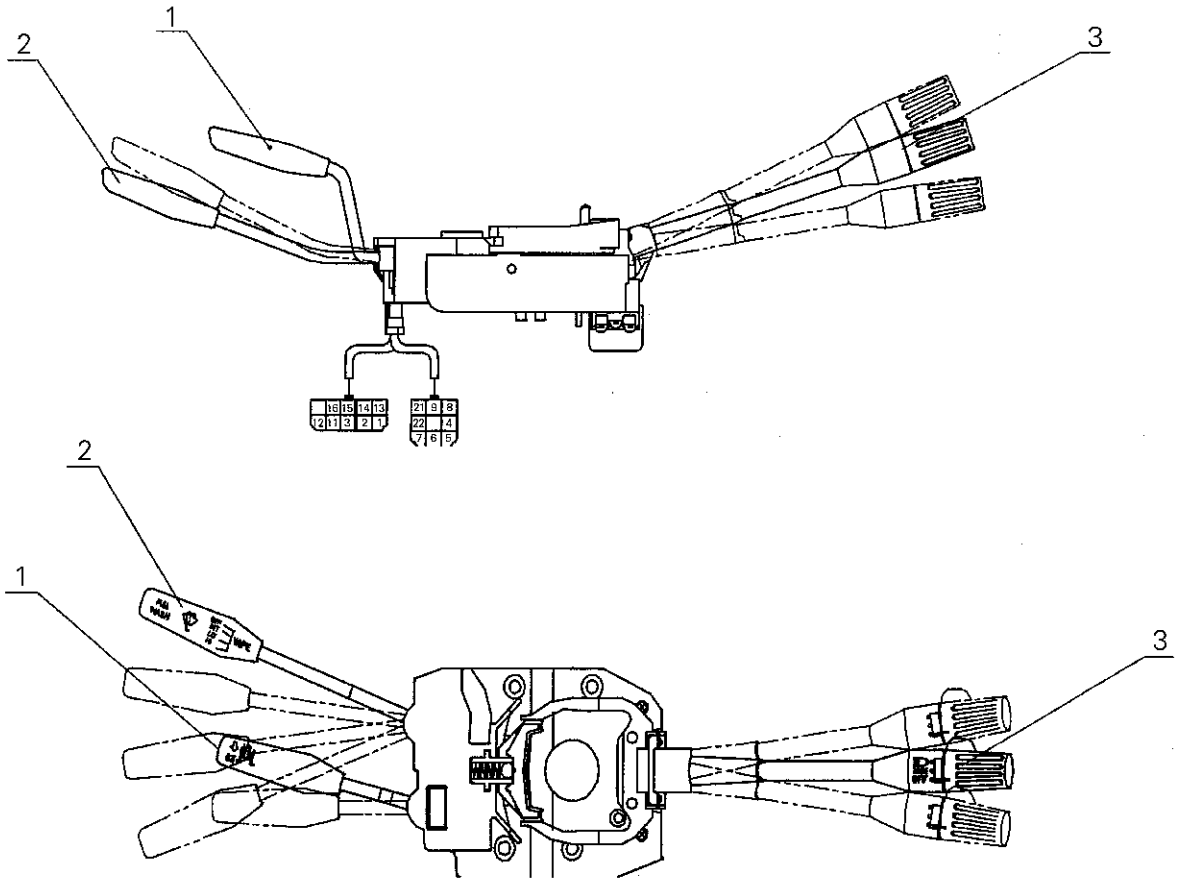


Fig. 3－4 Combined switch

1. Exhaust brake switch 2. Wiper switch of front windshield 3. Dimmer switch

1) Exhaust brake switch: when the vehicle travels on a long downhill, pulling the switch

backwards can realize exhaust brake. This can avoid not only the vehicle speeding up to dangerous extent by deadweight but also the brake temperature going too high by less use of brake. Reset the switch when it isn't used.

⚠ **Note:** never stop engine when the vehicle travels on a long downhill with the switch activated.

2) Wiper switch of front windshield: lifting the switch up can start washing motor to clean front windshield; pulling the switch backwards can control wiper motor to run in low speed and high speed.

3) Dimmer switch: with lamp master switch (No.12 in Fig. 3—1) pressed, push the switch forwards to turn on left steering lamp, left steering indicator lamp (No.1 in Fig. 3—2) and traveling left steering lamp on instrument panel flash; The control lever should be returned to neutral position after steering. Operation of changing roadway is the same as the operation of steering signal switch. Lift the switch up for dimmer; position it in mid-position for dim light; pull it downward for beam light; turning the small switch on the end of dimmer switch, the first gear is for turning on traveling lamp, the second gear is for turning on headlight.

(21). Charging indicator lamp (No. 3 in Fig. 3—2)

The lamp comes on when starter switch is in ON position, indicating that power is turned on and the engine may be started. When engine is running normally, the lamp goes out. If it does not go out, make engine accelerator work at middle rotation speed. If it still remains light, it means that engine doesn't work, stop for check.

(22). Adjust the driver's seat

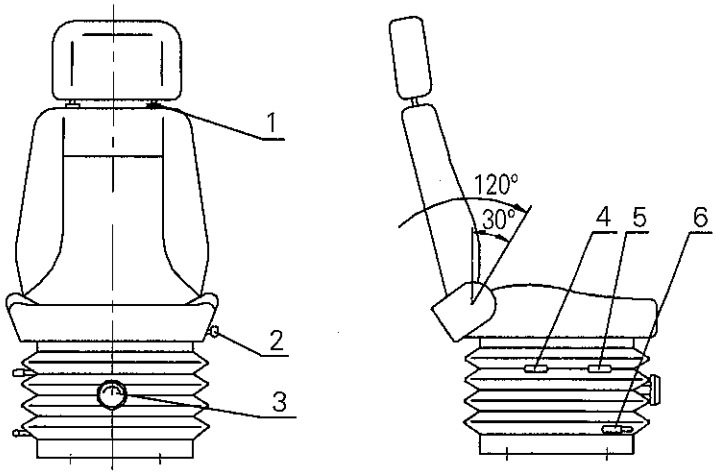


Fig. 3—5 Seat outline

1. Head rest adjustor switch
2. Back rest angle adjusting lever
3. Seat damper adjusting lever
4. Seat height adjusting lever
5. Seat height adjusting lever
6. Seat sliding control lever

There are two seats in the driver's cab, they may be adjusted to fit any body size. Controllers on both seats are installed symmetrically. Take one of them for an example: the seat height may change in range of 60mm, the distance adjusted forward and backward is 170mm, the adjustment of back rest angle is 120°. The stroke of seat damper can be adjusted steplessly according to body weight of 40~130kg, max stroke is 50mm. Head rest height may be changed 40mm.

3. Preparation before driving

The preparation before driving includes routine inspection before driving and engine starting.

(1) Routine inspection before driving:

1) Check coolant level

Check coolant level through the sight-hole of expansion tank. If no coolant is found, fill coolant till it is found. Then start engine, when it is running at approx.1000 rpm refill coolant to specified level.

⚠ Notes:

1. When truck in normal traveling, checking coolant level must prevent hot water and steam from injury of person.

2. Do not fill coolant when engine still in high temperature.

2) Check fuel level:

Position the key switch of power supply to ON position, check fuel level on fuel gauge, and replenish fuel if necessary.

3) Check engine oil level:

Pull out the dipstick (see Engine Operation Manual), replenish the specified engine oil depending on the level mark of the dipstick.

4) Check transmission oil level:

The transmission oil level must be not lower than the position of the side sight-hole on the transmission case, i.e., not lower than the centerline of transmission countershaft.

5) Check the water condensed in the air reservoir

Drain the condensed water in the air reservoir by removing the manual drain valve under the air reservoir, and replace drying agent in dryer.

6) Check tire pressure, and inflate the tire if necessary.

7) Check tightness of the tire bolts.

8) Check function of the whole electric system.

9) Check leakage of oil air and coolant.

10) Check air filter.

Empty and clean the dust-collector everyday if the truck works in dusty environment. If red line in air filter negative pressure indicator occurs, clean the filter element.

(2) Engine starting:

1). Requirements for engine operation see Engine Operation Manual.

2). Operation of power source switch (see Fig.3－3).

Switching the key from position OFF to ON can turn on the power for starting the engine. Turning the key from position ON to START can start engine. After starting engine, release your hand, the key will automatically return to position ON, and then the starter switch resets.

⚠ **Note:** when starting the engine by wire-contact, the wire can only be connected to the battery and never to the starting motor.

3) Auxiliary starting device:

A pre-heating device is equipped in engine. When the temperature of coolant in the engine is lower than －10℃, the device is automatically activated to heat inlet air.

⚠ **Notes:**

① Before starting, insert key switch and turn it from position OFF to ON to turn on the pre-heating device. At this time, indicator lamp comes on.

② After indicator lamp flashes and goes out, turn the key switch from position ON to START to start engine.

4) Starting process:

With hand brake handle in braking condition, put shift lever in neutral position, turn the starting key to START position to start the engine. If fail to start within 12 seconds, return the key to position ON immediately, after 2 minutes to start again. If continually fail starting for 3 times, stop starting and check the cause.

5) Engine oil pressure after starting:

After starting, the engine oil pressure gauge should display the reading within 15 seconds and the reading should be in line with the engine operation requirement (see engine operation manual). If the pointer does not move, stop engine at once and check the cause.

6) Preheating of the engine:

After starting, engine idle time can't exceed 5 minutes, increase rotation speed gradually up

to 1000 ~ 1200 r/min and begin running with a partial load. Only when water temperature is higher than 75 ℃, engine oil pressure is higher than 0.1 MPa, can the engine run with a full load.

⚠ **Note:** the rotation speed should be increased slowly (especially in low temperature) to make sure that the bearings get sufficient lubricating and stable oil pressure, especially after starting the engine in low ambient temperature. It is not allowed to depress accelerator pedal abruptly without a load applied.

(3) Stop the engine:

After finishing of running with a full load, let the engine run idle for 3~5 minutes to cool down gradually.

Press the stopping switch to stop the engine.

4. Starting and shifting:

(1) Starting

Release the hand brake handle. Only when the pressure of air reservoir in braking system is up to 0.45Mpa, the hand brake indicator lamp and low air pressure warning lamp going out, the spring brake can be released. And then the truck can be started. The truck can't be started before the hand brake indicator lamp goes out. After the hand brake indicator lamp goes out, all the air-powered systems can be operated.

(2) Operating method of transmission:

Before driving, depress clutch pedal to disengage clutch fully. And then move shift lever to required position and release clutch pedal for driving.

Shift up: (1) Set the shift lever (No. 24 in Fig. 3－1) in neutral position for starting engine.

(2) Shift to 1st gear to start running the truck.

(3) Consecutively change gears in order from the 1st one to the 2nd, the 3rd and the 4th, and finally to the highest gear.

Shift down: When shifting down, shifting from the highest gear to the 1st gear can be operated consecutively.

⚠ **Notes:**

1) During shifting, the clutch must be disengaged, and shift lever in place.

2) Use the 1st gear for starting the truck.

3) During traveling, check regularly oil pressure gauge, engine techometer and water temperature gauge.

4) Never travel with a shift lever in neutral or slide with an engine stopped for transmission lubricating and safety. Never depress clutch and put shift lever in neutral while engine exhaust is

engaging.

5) Select different gears according to road conditions to meet traveling requirements.

6) Never shift gears with accelerator pedal depressed.

(3) Stopping and parking:

The vehicle can be stopped with foot brake or hand brake whenever shift lever is in whatever gears. For temporary stopping, shift lever position may not be changed. If leaving the truck for a long time, the operating lever must be in neutral position. When parking is necessary, apply the hand brake switch (No. 23 in Fig. 3－1).

(4) Operations in emergency:

1) When the transmission has a trouble and the truck must be moved, the traveling speed for the truck towed can not exceed 10 km / h, and the emergency signal switch (No. 16 in Fig. 3－1) must be turned on and turning indicator lamps of towing vehicle should also be turned on.

2) When engine and transmission are damaged, propeller shaft should be disassembled in principle.

3) When driven shaft or drive shaft is damaged, if possible lift the front or rear section of the truck up.

5. Control of clutch:

Clutch is controlled by static pressure oil with the aid of air-assisted device. With clutch pedal depressed to the 3/4 of its stroke, clutch friction disc can disengage with engine flywheel fully to cut out power.

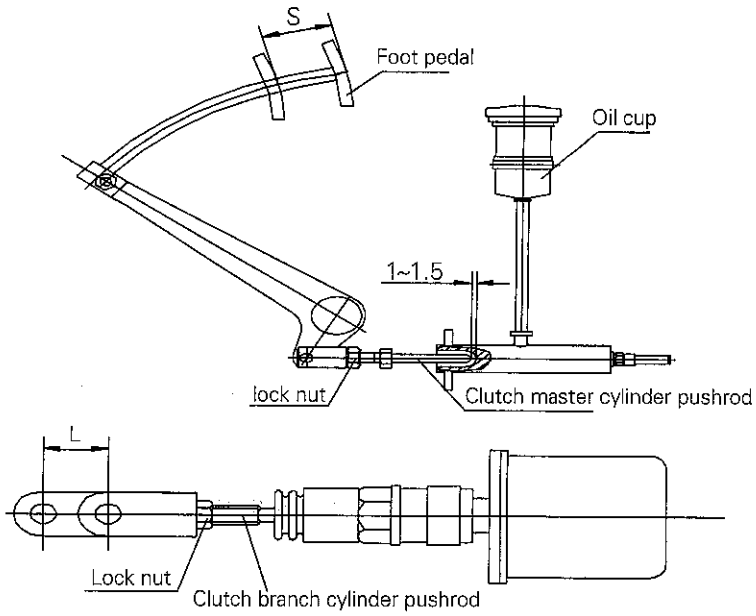


Fig. 3－6 Clutch control diagram

Clutch pedal free stroke S should be in range of 40~60 mm when clutch release rod does not move. If not, check the clearance of master cylinder pushrod and check if there is air in the static pressure oil circuit.

On the condition of clutch pedal depressed to its full stroke, the clutch should be disengaged fully, if not, that means there is air in the static pressure oil circuit.

(1) The adjusting method of clutch control system:

Since the clutch system is controlled by static pressure oil, first fill the system with static pressure oil and bleed the system.

1) Open the cover of oil cup in driver's cab, and fill brake oil into the oil cup until the oil level up to the 3/4 to 4/5 of the cup height.

2) Remove the rubber cover on the branch cylinder bleeding cap, do the following:

Loosen the bleeding cap on the branch cylinder, repeatedly depress the clutch pedal until brake oil sprays out of the bleeding cap. And then depress the clutch pedal and tighten the bleeding cap. During operation pay attention to the oil level in the oil cup and replenish oil according to requirements. The length of clutch branch cylinder pushrod couldn't be adjusted manually.

6. Control of steering

Power steering and hydraulic-powered steering are available. Driver may drive the vehicle straightly or steer by controlling the steering wheel.

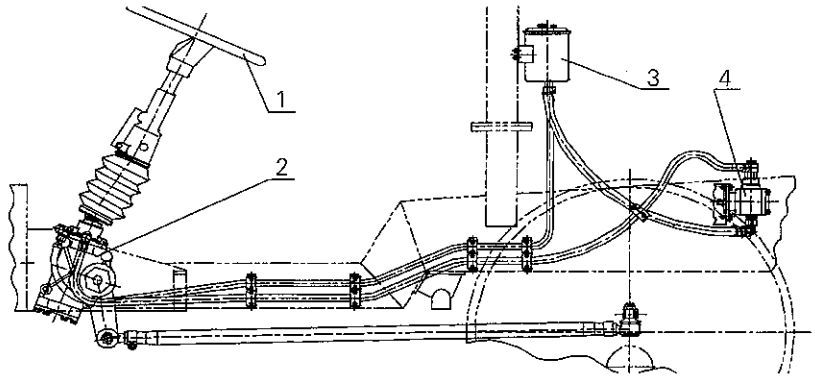


Fig. 3—7 Steering system diagram

1. Steering wheel 2. Steering gear 3. Steering oil tank 4. Steering pump

Steering procedure:

(1). Mid-position: the vehicle is driven to go straight while the steering wheel is in the position. Driver does not apply steering force on the steering wheel. The steering wheel remains unmoved.

(2). Steering procedure: when it is necessary to change driving direction, driver steer the steering wheel for steering. Move the steering wheel left to turn the vehicle left; move it right to turn the vehicle right.

(3). Return: after finishing steering, with the steering wheel static the vehicle wheels will move towards straight-line motion direction under return moment of force, till reach straight-line motion direction.

(4). Road sense effect: it is a direct sense to road conditions and the change of steering resistance obtained by the driver from the steering wheel while steering motion is performing. When the driver applies force to the steering wheel, the force works on the steering arm on the steering gear at the same time and makes it deform. Deformation is in direct proportion to steering resistance.

⚠ **Notes:**

1) The movement of power steering gear is performed through the steering pump activated by engine. The vehicle should not slide with the engine shutdown, otherwise steering is heavy and it is easy to result in an accident.

2) When steering system trouble caused by oil pump or circuit appears, the steering gear may be taken as a mechanical steering gear for forcing the vehicle to reach repair station. But compulsory steering for a long time may damage the steering gear.

3) Never move the steering wheel to limit.

Steering resistances vary according to diffident road conditions, so driver should apply diffident forces to the steering wheel.

7. Braking system:

The braking system consists of service brake (foot brake), parking brake (hand brake) and auxiliary brake (engine exhaust brake).

(1). Service brake:

The service brake is foot pedal control (No. 29 in Fig. 3－1) with double-circuit air pressure brake. Its working pressure is 0.8Mpa. The 1st circuit acts on the wheels of the 1st axle, and the 2nd circuit acts on the wheels of the 2nd and 3rd axles. In case the air pressure of one air reservoir in two circuits drops below 0.45Mpa, stop the truck and find the cause of low pressure.

Repeated braking in a short time may cause pressure down below 0.45Mpa.

(2). Parking brake:

Parking brake is air-release spring brake acting on mid and rear axles. It gives effect on all axles by the spring-loaded air chambers. After stopping the truck, applying hand brake handle can hold the truck at original place. This is parking brake. Only with hand brake released and the pressure in 23rd circuit of braking system more than 0.45Mpa (low pressure warning lamp goes out) and hand brake indicator lamp go out as well as the spring returns to its original place by the force of compressed air, the parking brake could be released fully. Apply hand brake handle for emergency brake when service brake does not work or there is no enough time to use foot brake. When service brake is damaged and the vehicle has to be towed, apply hand brake instead of service brake.

(3). Auxiliary brake

Auxiliary brake is engine exhaust brake. In order to prolong brake life during a long downhill travel, press down exhaust brake switch (No. 1 in Fig. 3－3), the butterfly-valve on exhaust pipe is closed by solenoid valve and air cylinder to realize engine exhaust brake.

⚠ **Caution:** never depress clutch pedal and disengage transmission while engine exhaust brake is engaging.

(4). Cautions in braking system operation:

1) Releasing of spring brake air chamber:

When self-braking happens due to leakage of pipeline, do the following to release (see Fig. 3－8a):

a. Open the plug at the tail of brake air chamber;

b. Remove nut on bolt and take off the bolt;

c. Insert the bolt into brake air chamber from its tail and lock it (see Fig. 3－8b).

d. Leting the bolt out by tightening the nut can release braking.

When parking the truck on a slope, before releasing the spring brake, wedges must be put under the wheels to block the truck in prevention of slipping.

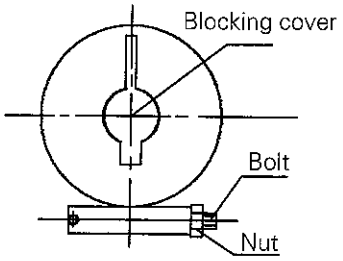


Fig. 3－8a Brake air chamber

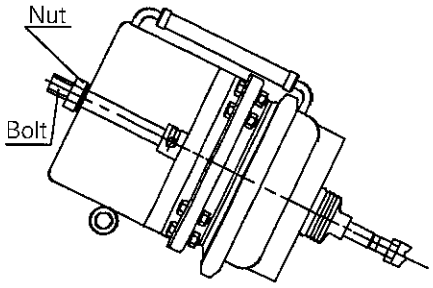


Fig. 3－8b Brake air chamber

8. Operation of PTO:

After parking the truck on a safe place for extending outriggers and lifting operation, position transmission control lever (No. 24 in Fig. 3－1) in neutral, with engine running in idle speed depress clutch pedal (No. 31 in Fig. 3－1) to disengage the clutch fully, pull PTO switch (No. 3 in Fig. 3－1) out and release the clutch pedal, at this time, PTO gear will mesh with transmission gear smoothly, PTO begins to work.

In reverse, depress clutch pedal to disengage clutch fully, push PTO switch backward, position the transmission control lever to position N and release clutch pedal, at this time, PTO gear will disengage with transmission gear smoothly.

⚠ **Notes:** (1).Before operate the PTO switch, pressure in pneumatic circuit should be more than 0.45 MPa. (low air pressure warning lamp goes out).

(2). When traveling, the PTO switch must be in position OFF.

(3). When operate the PTO switch, clutch must be disengaged fully.

9. Outriggers operation:

(1) Check hydraulic oil level

Before operate outriggers, check hydraulic oil level and temperature from the thermo-liquidometer on the side of hydraulic oil tank (refer to Fig. 3－9). If the level is lower than the mark required, refill to specified level. Open the cover of air filter on the upper side of hydraulic oil tank, refill the same brand hydraulic oil through filter screen.

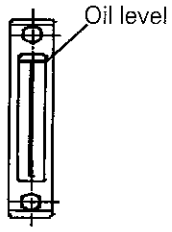


Fig.3－9 Thermo-liquidometer

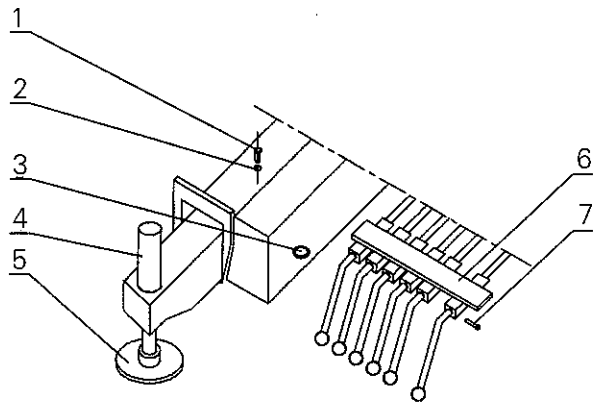
(2) Engage PTO

Start engine by the key shown in Fig. 3—3. When the reading on air pressure gauge (No. 4 in Fig. 3—1) is 0.8Mpa, depress the clutch pedal (No. 31 in Fig. 3—1), move the transmission control lever (No. 24 in Fig. 3—1) to position N and pull PTO switch (No. 3 in Fig. 3—1) out. At this time, PTO indicator lamp (No. 13 in Fig. 3—2) comes on. Make the clutch pedal in natural position by removing your foot slowly.

(3) Operation of outriggers

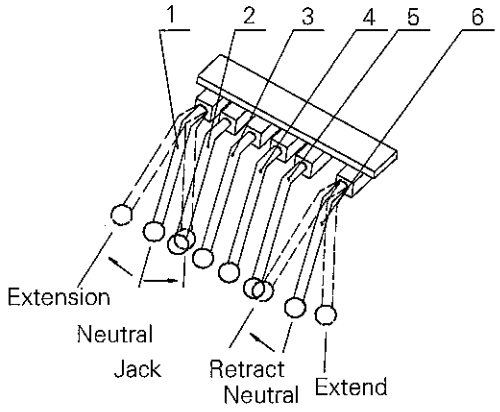
⚠ **Note:** all floats must rest on firm ground or pads.

(4) Names of outrigger parts



1. Outrigger beam lock pin
2. Lock pin hole
3. Level gauge
4. Jack cylinder
5. Outrigger float
6. Outrigger select levers
7. Outrigger select lever lock pin

Fig. 3—10 Names of left outrigger parts



1. Left rear outrigger select lever
2. Right rear outrigger select lever
3. Left front outrigger select lever
4. Right front outrigger select lever
5. 5th jack control lever
6. Outrigger position select lever

Fig. 3—11 Control levers

(5) Setting outriggers

1) Pull out the outrigger beam lock pins.

2) Pull out the outrigger select lever lock pins.

3) Turn on power switch for outriggers accelerator.

4) Position select levers (No.1~No. 4 in Fig. 3－11)to "Extension".

5) Move outrigger position select lever (No. 6 in Fig. 3－11) to "extend" to extend outrigger beams.

(6) After outrigger beams are fully extended, return the outrigger position select lever (No.6) to "Neutral".

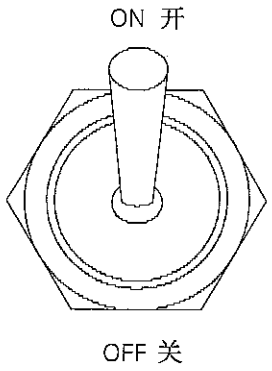


Fig. 3－12 Outrigger accelerator switch

(7) Position select levers (No.1~No. 4 in Fig. 3－11) to "Jack".

(8) Move outrigger position select lever (No. 6 in Fig. 3－11) to "Extend" to extend outrigger jacks.

(9) After outrigger jacks are fully extended, move the outrigger position select lever (No. 6 in Fig. 3－11) to "Neutral".

(10) Move 5th jack control lever (No. 5 in Fig. 3－11) to "Jack".

(11) Move outrigger position select lever (No. 6 in Fig. 3－11) to "Extend" to lower down 5th jack float on the ground or pad.

(12) After outrigger jacks are fully extended, check if the carrier is level by using level gauge. If it is level, return all select levers to "Neutral". If it is not level, level it according to method described in item (6).

(13) Insert the outrigger select lever lock pin (No. 7 in Fig. 3－10) into its pin hole.

(6) How to level crane:

Move 5th jack control lever (No. 5 in Fig. 3－11) to "Retract". When 5th jack doesn't contact with the ground by moving outrigger position select lever (No. 6 in Fig. 3－11), position 5th jack control lever to "Neutral"; moving any one or more of the select levers (No.1~No. 4 in Fig. 3－11), and positioning outrigger position select lever (No. 6 in Fig. 3－11) to "Extend" or "Retract" may extend or retract outrigger jack(s) selected. After the carrier is leveled, move the select levers (No.1~No. 4 in Fig. 3－11) to "Neutral"; lower 5th jack on the ground at the state of loading slight force and position 5th jack control lever to "Neutral"; and insert the outrigger select lever lock pin into position select lever lock pin hole. Operation of leveling carrier is finished.

Example: when the crane right side is higher, return the "Right front" and "Right rear"

select levers to "Jack". While observing level gauge, inch outrigger position select lever (No.6 in Fig.3－11) to "Retract". After the crane is leveled, return the remaining select levers to "Neutral".

⚠ **Note:** the carrier must be set up levelly before lifting operation.

(7). Stowing outriggers:

⚠ **Caution:** stow the main boom and jib beforehand before operation.

1). Turn on power switch for outriggers accelerator.

2). Pull out outrigger select lever lock pin.

3). Move 5th jack control lever (No. 5 in Fig. 3－11) to "Jack". Retract 5th jack fully by moving outrigger position select lever (No. 6 in Fig. 3－11).

4). Move select levers to "Jack" and then move outrigger position select lever (No. 6 in Fig. 3－11) to "Retract" to retract outrigger jacks fully.

5). Position select levers to "Extension" and then move outrigger position select lever (No. 6 in Fig. 3－11) to "Retract" to retract outrigger beams fully.

6). Return all select levers to "Neutral".

7). Insert outrigger select lever lock pin.

8). Insert outrigger beam lock pin 1 into lock pin hole 2.

9). Turn off outrigger accelerator power switch.

10). Turn off PTO switch.

(8). Notes on operation: ⚠

1). Make the job site flat before the chassis entering it.

2). Do not set the outrigger jacks without extending beams.

3). After setting up outriggers, make sure that all outrigger floats are in complete contact with the ground.

4). Keep the tires off the ground.

5). After stowing or extending the outriggers in place, make sure that the outrigger beam lock pins are completely inserted.

6). Return select levers to "Neutral" immediately after finishing outrigger operation. Before starting crane operation, make sure that select levers are in "Neutral".

10. Operation in winter

(1). Cooling system

The coolant for cooling system should comply with the requirements of engine. It should be soft water or softened water, otherwise the scales formed and deposited will affect the cooling effect.

Hard water can be softened by the following methods:

1). Heating and boiling;

2). Add sodium carbonate (Na_2CO_3) 0.5~1.5g to each liter of water;

3). Add sodium hydroxide (Na OH) 0.5~0.8g to each liter of water.

JFL－318 (0℃～－10℃) or JFL-338(－10℃～－26℃) can be used as antifreeze coolant. It can also be made according to the methods in the following table:

Table 3－1

Limited temperature of freezing point for anti-freeze coolant (℃)	Glycerin –water		Ethylene glycol –water	
	Glycerin Weight %	Density D	Ethylene glycol weight %	Density D
－10	32	1.0780	28.4	1.0340
－20	51	1.1290	38.5	1.0506
－30	64	1.1647	47.8	1.0627
－40	75	1.1894	54.7	1.0713

Cautions:

Do not use alcohol- water to cool engine.

Never use sea water to cool engine directly.

Antifreeze coolant may be added according to the operation requirements of engine. When using antifreeze coolant, the freezing point of antifreeze coolant should be lower 5℃ than the lowest temperature in the area.

(2). Braking device:

Do not forget to drain the water condensed in the air reservoir before traveling.

(3). Battery

Regularly check the level and density of the battery electrolyte. The level should be 10-15 mm above the electrode plates and the density should be more than 1.28g/cm^3. If do not use the truck for a long time and ambient temperature is very low, it is better to remove the battery from chassis and stow it in a warm room.

1). Notes on battery checking:

⚠ Keep the battery clean and dry. Release the terminal for cleaning if it is contaminated, and then lubricate it with clean, no-acid and acid-proof grease. Do not coat the grease on the

filling port.

⚠ Do not put tools on the battery.

⚠ Forbid to remove the battery wire while the engine is running.

⚠ In summer, check the electrolyte acid quantity once a week, in other seasons check it once a month, and fill distilled water if necessary.

2). Charging the battery: use hydrometer to check the electrolyte density once a month and the value measured can indicate battery charging condition (see Table 3—2). If distilled water has been refilled, measure the battery after half an hour. Ambient temperature for measuring the electrolyte density should be 20℃. In very cold season, due to heavy power consumption for the battery, especially pay attention to charge the battery for its service requirement.

Table 3—2

Density	Battery charging condition
1.28	Good
1.20	Half charged, filling in time
1.12	Lack of power, charging at once

If charging the battery, only charge with DC power and charging power can't exceed 1/10 of battery capacity. For example: charge a 165Ah battery, the charging currency should not be more than 16.5 A.

11. Run-in of new truck

The run-in mileage for a new truck is 1500Km. Before run-in, routine inspection should be carried out for ensuring the truck in normal working condition.

1) After cold starting, do not accelerate the engine immediately, firstly let it run at 1000r/min of idle speed for 3~5 minutes. Increase engine speed only when normal working temperature is reached. In run-in time, the engine rotation speed should be limited within 80% of its highest speed.

2) During run-in time, the truck should travel on level and flat roads.

3) In traveling, select proper shift gears according to load and road conditions. And avoid abrupt accelerating and emergent braking.

4) Check and control engine oil pressure and coolant working temperature.

5) Check regularly wheel hubs of mid/rear axles and brake drum temperature. If serious

overheating occurs, find the cause and adjust or repair immediately.

6) After initial traveling of 50Km or every time changing tires, tighten wheel nuts according to the specified torque.

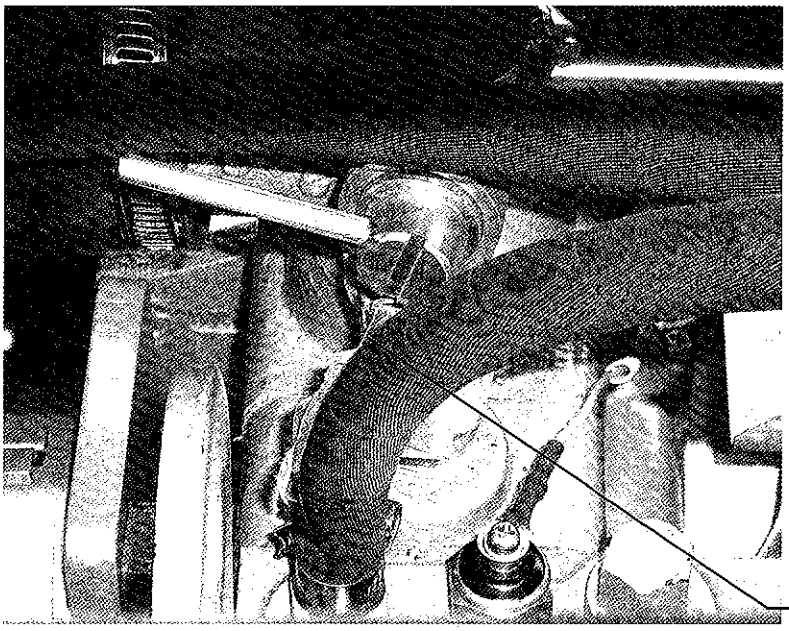
After run-in time, check and maintain the truck according to the "First check" items specified in maintenance manual and the requirements in engine and transmission operation manuals.

12. Use of air conditioner

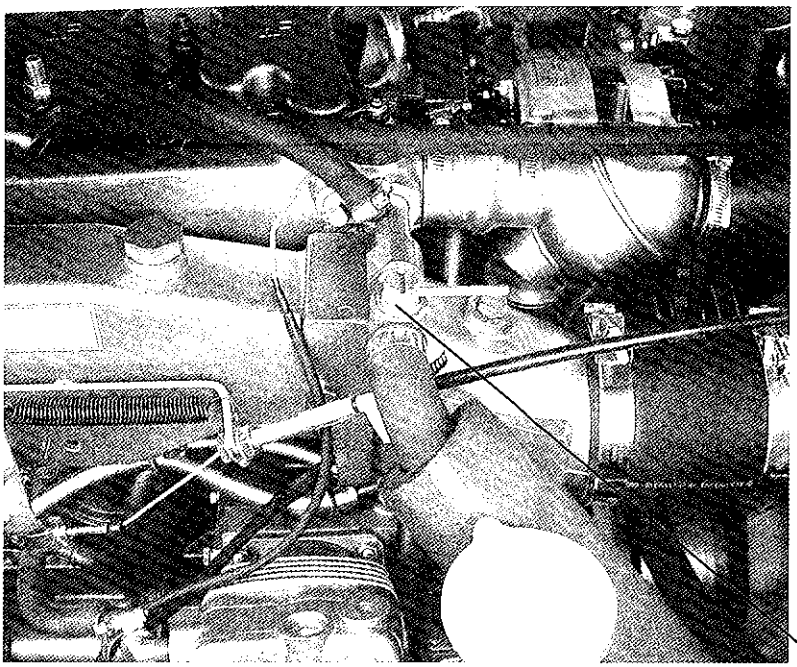
The products adopt heating and air conditioning system.

Warm air is utilizing engine cyclical hot water; cold air is supported by refrigerant circulated in air conditioner system. In winter when use the warm air, open hot water valve (on connection of engine and warm air hot water pipe, refer to the figure below) in warm air pipeline, and then press down the No. 15 switch in Fig. 3—1. In summer when use the cold air, close hot water valve in warm air pipeline and then press down the No. 15 switch in Fig. 3—1, and last press down A/C switch on the air conditioner. Refer to air conditioner operation manual for details.

⚠ **Note:** be sure to close hot water valve when use cold air, be sure to open hot water valve when use warm air. In winter, if drain off the water in engine cooling system, the water in warm air pipeline must be drained at the same time.



Hot water valve location (Shanghai diesel engine)



Hot water valve location (Hangzhou engine)