QUY50 CRAWLER CRANE

OPERATION AND MAINTENANCE MANUAL

XUZHOU HEAVY MACHINERY WORKS

XUZHOU CONSTRUCTION MACHINERY GROUP CO., LTD.

Contents

1. INTRODUCTION

QUY50 Crawler Crane is designed and developed by Xuzhou Heavy Machinery Works in absorption of foreign advanced technology. It is a hydraulic drive, full swing and lattice boom crawler crane, easy operation, stable traveling and reasonable arrangement in structure. The maximum lifting capacity is 50t, boom length 13m ~ 52m, jib length 9.15m ~ 15.25m, suitable for lifting and installation work in construction sites, mines and dock warehouses, etc.

The features of QUY50:

1). Advanced technology of fully hydraulic drive, infinitely variable speeds and fine motion control.

2). Multi-stage planetary gear reducer for hoisting, elevating and swing, compact structure, light weight, steady operation and reliable safety.

3). Four-tubular lattice type boom, light weight, heavy load bearing capacity and beautiful outlook.

4). Single-plate operator's cab, spacious, bright and comfortable, equipped with adjustable seat for operator to work easily and freely.

2. TECHNICAL PERFORMANCE AND WORKING CONDITIONS

2.1 Outline Dimensions (refer to Fig. 1):

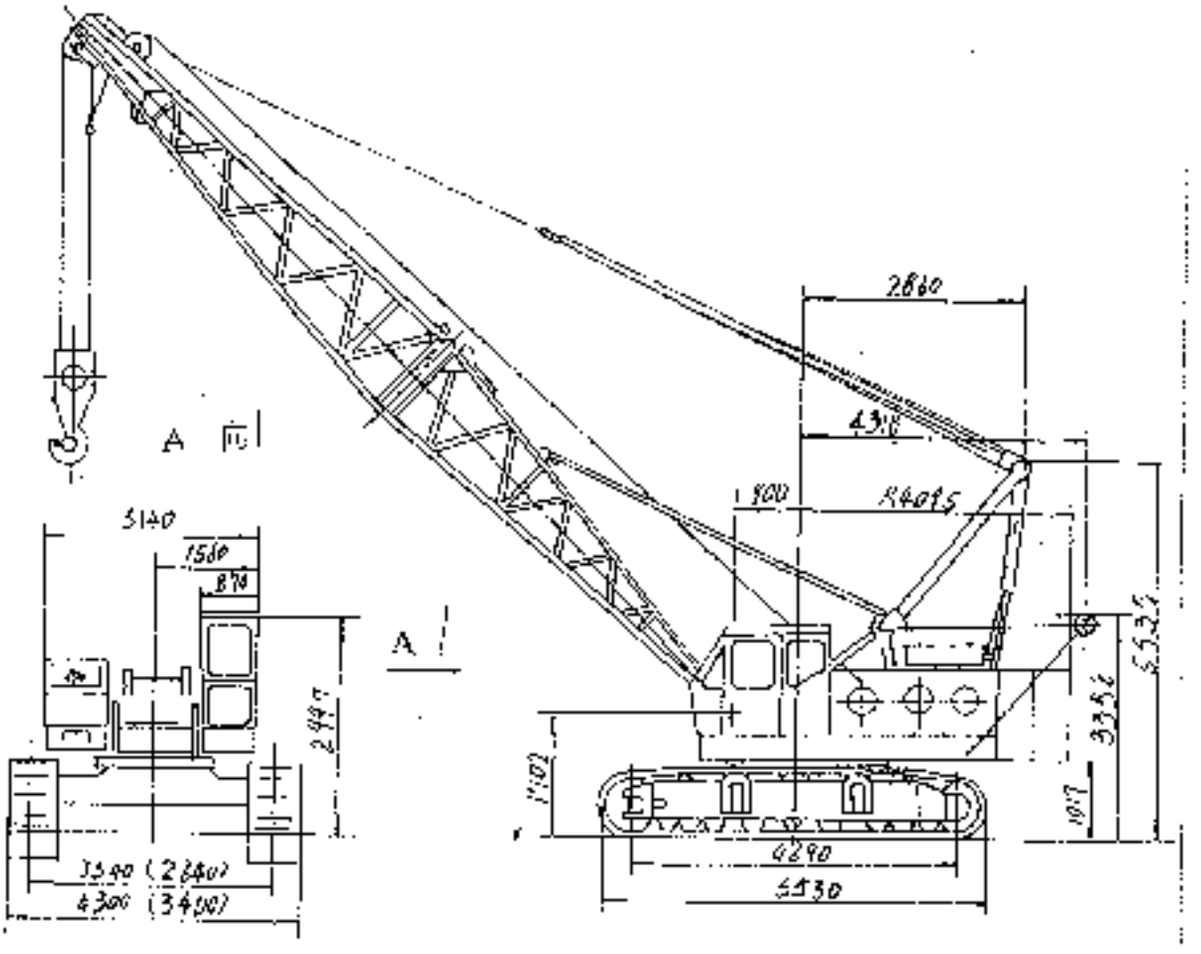


Fig. 1 QUY50 Crawler Crane Outline

Dimensions in brackets are the ones for retracted crawler

2.2 Main Technical Specifications (refer to Table 1)

Table 1

Item		Unit	Data
Max. rated lifting capacity		t	50
Max. load moment		kN.m	1815
Main boom length		m	13~52
Main boom angle		(°)	30~80
Single line speed	Main winch	m / min	0~65
	Auxiliary winch	m / min	0~65
	Elevating drum	m / min	0~52
Grade ability		(°)	20
Swing speed		r / min	0~1.5
Traveling speed		km / h	0~1.1
Ground pressure		MPa	0.069
Max. engine output		kW	115
Jib length		m	9.15~15.25
Jib offset angle		(°)	10/30

2.3 Working Range (refer to Fig. 2)

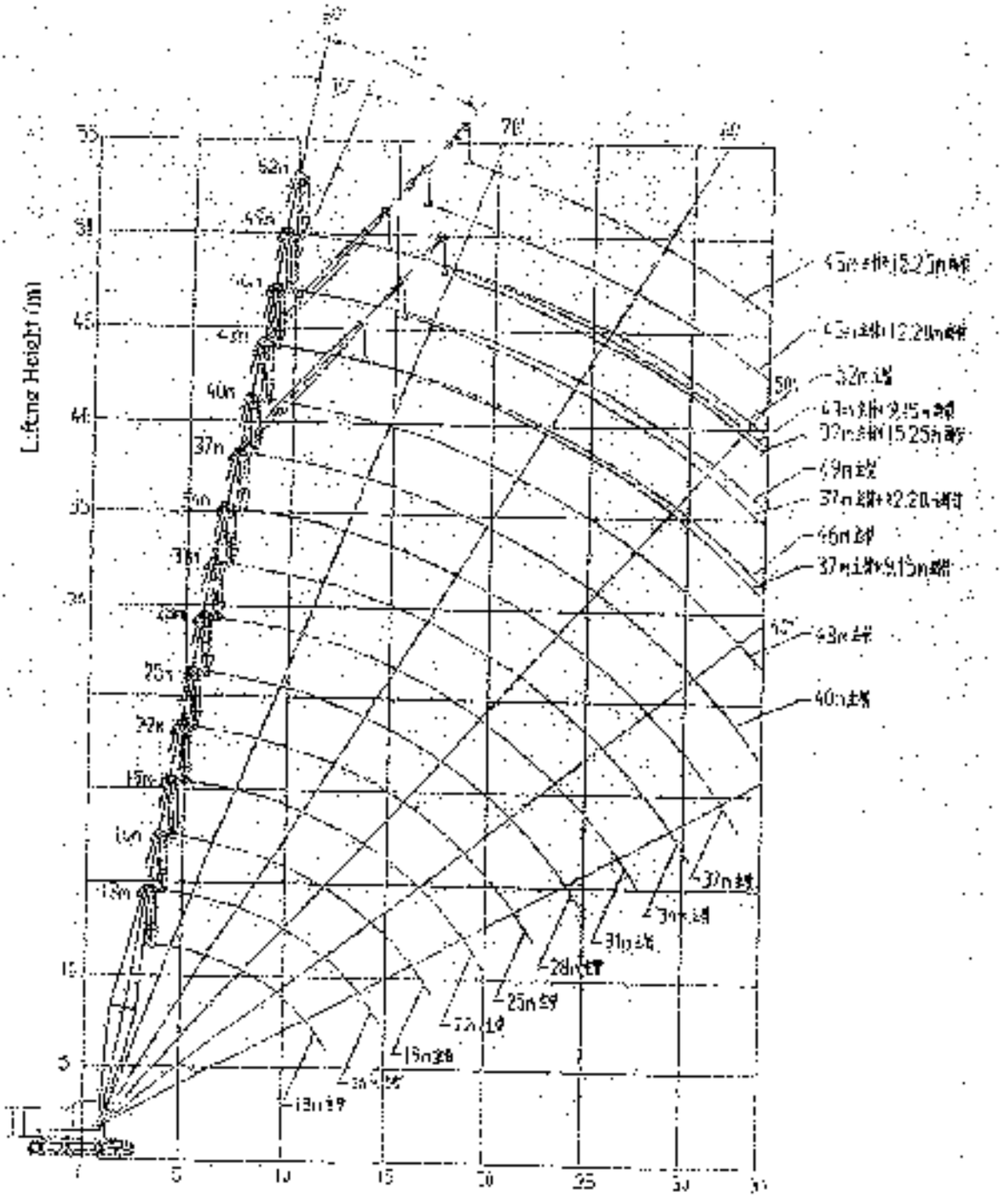


Fig. 2 QUY50 Crawler Crane Working Range

2.4 Lifting Performance Table (refer to Table 2 and Table 3)

Rated Lifting Load for Boom — Table 2

Operating radius (m)	Boom length (m)													
	13	16	19	22	25	28	31	34	37	40	43	46	49	52
3.7	50.00													
4.0	43.00	45.00												
4.5	36.00	37.00	37.50											
5.0	31.00	31.00	30.50	29.50										
5.5	26.50	27.00	27.00	27.00	26.00									
6.0	22.00	23.40	24.00	24.00	24.00	22.50								
7.0	19.00	19.00	19.00	19.00	19.50	18.80	18.50							
8.0	15.50	15.50	16.00	16.00	15.80	15.20	15.00	15.00	14.90					
10.0	11.00	12.00	11.50	11.50	11.40	11.50	11.30	11.20	11.00	10.80	10.70	10.40	10.30	
12.0	9.00	9.50	9.50	9.00	8.90	8.80	8.60	8.60	8.60	8.50	8.40	8.20	8.10	8.00
14.0		7.50	7.50	7.50	7.30	7.40	7.10	7.00	6.80	6.50	6.60	6.50	6.30	6.20
16.0			6.50	6.50	6.40	6.40	6.00	5.80	5.80	5.70	5.50	5.30	5.00	5.00
18.0				5.40	5.40	5.30	5.00	4.70	4.60	4.50	4.40	4.30	4.20	4.10
20.0				4.60	4.50	4.30	4.20	4.10	4.00	3.80	3.80	3.70	3.50	3.30
22.0					3.80	3.70	3.50	3.50	3.40	3.30	3.20	3.00	2.80	2.70
24.0						3.50	3.00	2.90	3.00	2.80	2.60	2.50	2.30	2.10
26.0							2.80	2.60	2.50	2.20	2.10	2.00	1.80	1.60
28.0									2.10	1.90	1.80	1.60	1.40	1.20
30.0									1.80	1.60	1.50	1.30	1.20	1.10
32.0									1.50	1.50	1.30	1.10	1.00	0.90
34.0										1.40	1.20	1.00	0.90	0.80

Notes:

1. The unit of lifting loads in the table is metric ton.
2. Extending the crawler before lifting operation and operating the crane on firm and level ground.
3. The lifting loads in the table include the weights of hook blocks and slings.
4. The lifting loads in the table do not exceed 75% of tipping loads.
5. With jib on main boom head, the lifting load should be deducted 2.5t ; with single top, the boom length is not more than 49m and the lifting load should be deducted 0.4t ; the lifting load for single top is not more than 4t.

2.5 Relation Between Parts of Line and Rated Lifting Load (Table 4)

Table 4

Boom length (m)	13	16	19	22	25	28	31
No. of parts of line	12	10	8	7	6	5	4
Lifting load (t)	50	45	37.5	29.5	26	22.5	18.5
Boom length (m)	34	37	40	43	46	49	52
No. of parts of line	4	4	3	3	3	3	2
Lifting load (t)	15	14.9	10.8	10.7	10.4	10.3	8.00

2.6 Hook Block Weight and Max. Lifting Load (refer to Table 5)

Table 5

	Max. lifting load (t)	Weight (t)
Main hook block	50	0.51
Hook block for mid-extended boom	26	0.205
Auxiliary hook block	4	0.087

2.7 Working Conditions

1). Operating the crane on horizontal and firm ground. The ground gradient should not more than 5%, and no sinking of ground during operation.

2). The ambient temperature: -20℃~ 40℃.

3). The crane can be operated in 360° working area

4). Operating the crane when the wind speed is less than 10m/s, refer to Table 6 for wind speed.

Wind Speed Description

Table 6

Wind speed (m/s)	Name	Beaufort number	Effects observed on land
0~0.5	Calm	0	Calm, smoke rises vertically.
0.6~1.7	Light air	1	Smoke drift indicates wind direction.
1.6~3.3	Light breeze	2	Wind felt on face; leaves rustle.
3.4~5.2	Gentle breeze	3	Leaves, small twigs in constant motion, light flags extended.
5.3~7.4	Moderate breeze	4	Dust, leaves and loose paper rises up.
7.5~9.8	Fresh breeze	5	Small trees in leaf begin to sway, there are waves on the surfaces of pool and natural pond.
9.9~12.4	Strong breeze	6	Larger branches of trees in motion, whistling heard in wires; umbrella uneasy to open.
12.5~15.2	Moderate gale	7	Whole trees in motion; resistance felt in walking against wind
15.3~18.2	Fresh gale	8	Twigs and small branches broken off trees; progress generally impeded.
18.3~21.5	Strong gale	9	Slight structural damage occurs (chimney broken, slate blown from roofs).
21.6~25.1	Whole gale	10	Trees broken or uprooted; considerable structural damage occurs
25.2~29.0	Storm	11	Very rarely experienced on land; usually accompanied by widespread damage.
29.1~	Hurricane	12	

Note: The wind speed indicates that one 10m above the ground surface.

3. CRANE OPERATION

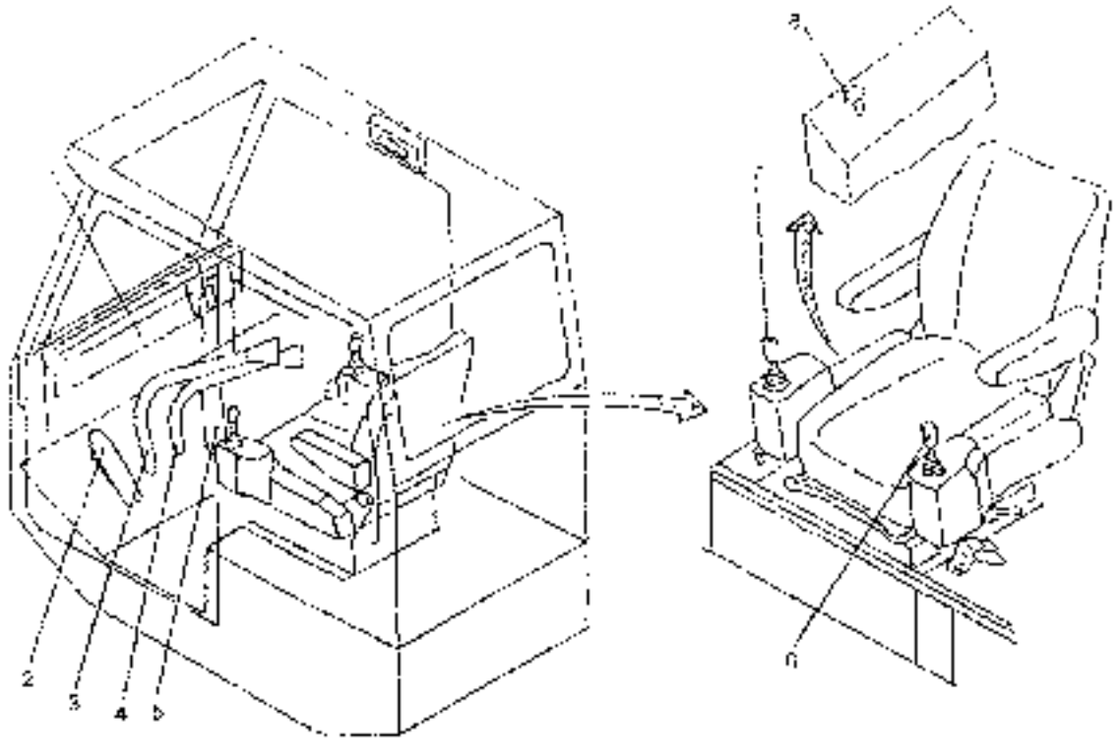


Fig. 3 Crane Operation Controls

1. Instrument panel
2. Swing brake pedal
3. 4. Control levers for traveling
5. Accelerator pedal
6. Control handle for auxiliary winch and swing
7. Control handle for main winch and elevating
8. Control handle for elevating drum ratchet

3.1 Starting the engine (refer to Fig. 4)

Turn on the engine starting switch on the instrument panel.

a. Do not use the starter continuously. If the engine cannot be started one time, start it once again after 30 seconds, and each starting time should be less than 15 seconds.

b. Run the engine for warming up. Let the engine run idle for 5~10 minutes after the water temperature rises up to 60℃. Double the warming up time when start the engine in winter or in cold area.

c. Refer to engine operation manual and section 3.6 in this manual for the normal values of water temperature gauge, oil pressure gauge and ammeter when the engine is in working.

d. Do not turn off the power switch when the crane is in working state.

e. The cooling water in engine must be drained out to prevent the engine from damage by freezing in winter if no anti-freeze coolant applied.

f. Run the engine idle for 5 minutes after work, and then stop the engine.

3.2 Crawler Extension (refer to section 4.1)

a. Pull out the crawler extend/retract handle (see Fig. 9).

b. Push forward the left control lever for traveling (see No. 3 in Fig. 3).

Notes:

1). Crawler must be fully extended and be locked in position. Otherwise the stability for the whole machine will be affected and overturning will occur.

2). Read carefully section 4.1 in this manual.

3.3 Operating Winches

1). Main winch: hoist up by pulling the No.7 handle in Fig. 3 backward, and hoist down by pushing it forward.

2). Auxiliary winch: hoists up by pulling the No.6 handle in Fig. 3 backward, and hoist down by pushing it forward.

Note: do not operate the main and auxiliary winches simultaneously.

3.4 Elevating Operation

1). Pull the No. 8 handle in Fig. 3 upward to release the ratchet locking of elevating drum.

2). Turn the No.7 handle in Fig. 3 left to raise up the boom, turn it right to lower down the boom

Note: before elevating boom, make sure to release the ratchet locking of elevating drum. If the ratchet sticks the drum, turn left the No. 7 handle in Fig. 3

to raise the boom slightly, and the ratchet may be released.

3.5 Swing Operation

1). Pull the swing lock pin out to unlock swing operation.

2). Turn the No. 6 handle in Fig. 3 left for left swing, turn it right for right swing.

Notes:

a. Insert the swing lock pin if do not use the crane for a long time after stopping the engine.

b. .Swing the boom slowly, and do not apply the swing brake abruptly during operation in prevention of danger.

3.6 Crawler Operation

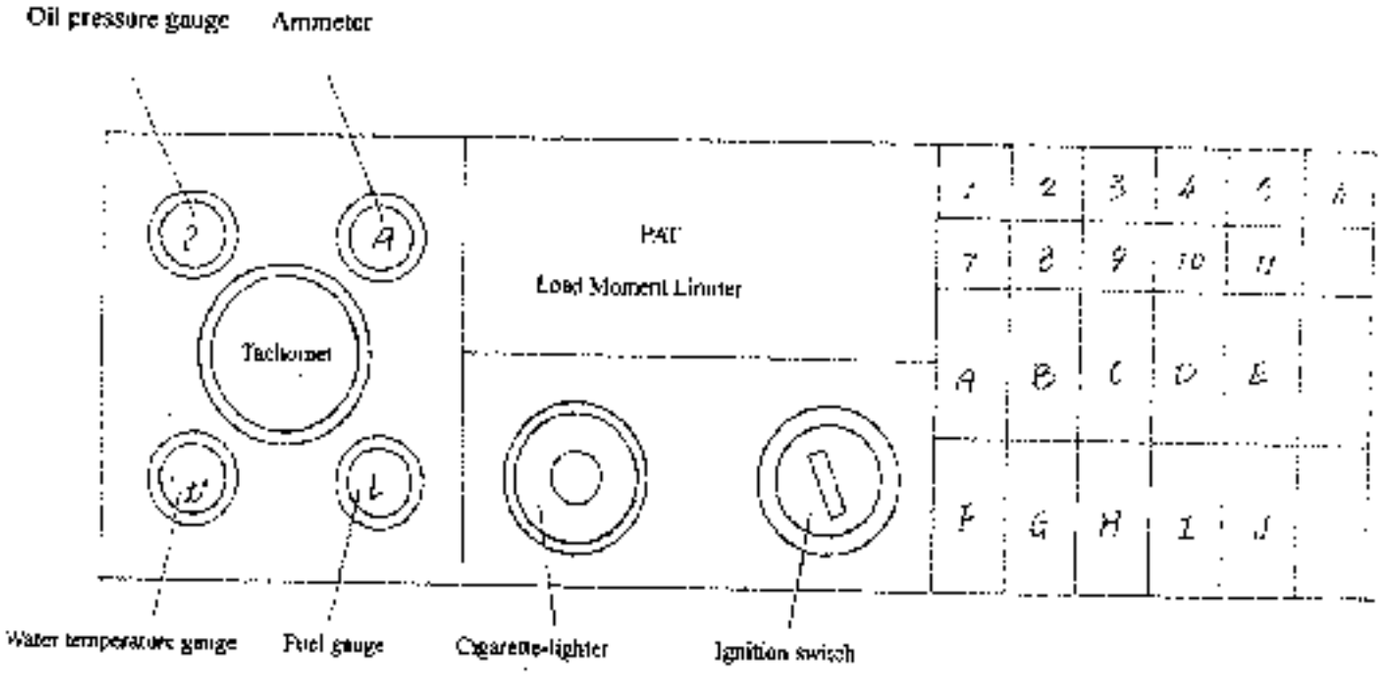
1). Push the No. 3 lever in Fig. 3 forward for left crawler moving forward; pull it backward for left crawler moving backward.

2). Push the No. 4 lever in Fig. 3 forward for right crawler moving forward; pull it backward for right crawler moving backward.

Notes:

a. Please position the crawler motor on the rear of the crane when traveling for a long distance.

b. Travel with a lifted load is allowed, but the boom must be over the front of the crane, and the weight of the load below 70% of the rated lifting capacity, gradient less than 5%, and the ground clearance for the load less than 250mm.



1. Power charging indicator lamp
2. Oil pressure indicator lamp
3. Water temperature indicator lamp
4. Crane working indicator lamp
5. Height limiter indicator lamp
6. Servo-system pressure indicator lamp
7. Ratchet locking indicator lamp
8. Fuel level indicator lamp
9. Free swing indicator lamp
10. Carrier working indicator lamp
11. Rope-end limiter indicator lamp

A. Crane/Carrier exchange switch
B. Control switch for servo-system pressure
C. Free swing switch
D. Wiper switch
E. Hydraulic protection relief switch
F. Horn switch
G. Instrument lamp switch
H. Working lamp switch
I. Fan switch
J. Warning lamp switch

Fig. 4 Instrument panel

3.7 Description of Instrument and Levers

Instrument is the display to indicate working condition of the machine. During crane operation, observe the instrument constantly. If any abnormality occurs, stop operation immediately and check the cause for troubleshooting. The lever is the media between operator and machine. Before operation, operators should be thoroughly familiar with all functions of each lever.

3.7.1 Instrument Description (refer to Fig. 4)

There is a main power switch beside operator's seat. Turning on the switch and setting the starting switch to I shift can connect the crane system with power supply. Turning the switch to II shift can start the engine. Release your hand, and the starting switch will return to I shift automatically. At this time, the battery is in charging and the power charging indicator lamp lights.

1. Power charging indicator lamp lights: indicates that battery is in charging.
2. Oil pressure indicator lamp lights: indicates that oil pressure is not enough. Stop engine for troubleshooting.
3. Water temperature indicator lamp lights: indicates that water temperature is too high. Stop engine for checking.
4. Crane working indicator lamp lights: indicates that the crane is ready for operation.
5. Height limiter indicator lamp lights: indicates that winch rope is over-wind. Lower hook block immediately.
6. Servo-system pressure indicator lamp lights: indicates that the pressure in servo-system has formed for operation.
7. Elevating drum ratchet locking indicator lamp lights: indicates that the ratchet of elevating drum is in locking state.
8. Fuel level indicator lamp lights: indicates that the fuel amount is not enough.
9. Free swing indicator lamp lights: indicates that the turntable swing freely is available.
10. Carrier working indicator lamp lights: indicates that the crawler system is ready for travel.
11. Rope-end limiter indicator lamp lights: indicates that winch rope is over-released

A. Crane/Carrier exchange switch: the crane and the carrier can't be operated at the same time, select one of them with the switch.

B. Servo-system pressure control switch: turn on the switch, pressure can form

in the system, No. 6 lamp lights.

C. Free swing switch: turn on the switch, No. 9 lamp lights and the turntable can swing freely.

D. Windshield wiper switch: turn on the switch, and the windshield wiper can work.

E. Hydraulic protection relief switch: a safety control system is available for the crane. During crane operation, the hydraulic system can be unloaded and stopped working when an overload occurs. At this time, turn on the switch, and the hydraulic protection can be released.

F. Horn switch: press the switch to sound the horn.

G. Instrument lamp switch: turn on the switch to light instrument lamp.

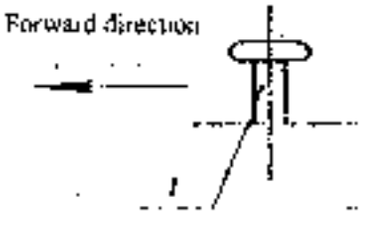
H. Working lamp switch: turn on the switch to light job site lamp.

I. Fan switch: turn on the switch to start fan.

J. Warning lamp switch: turn on the switch, warning lamp shines.

3.7.2 Levers Description

1). There is one lever at the right side of the operator's seat. (Fig. 5). Lever 1: pull it up to release the locking on ratchet of elevating drum; press it down to lock the ratchet of elevating drum.



Fig

There is one lever on each handrail (Fig. 6) separately for operating the crane.

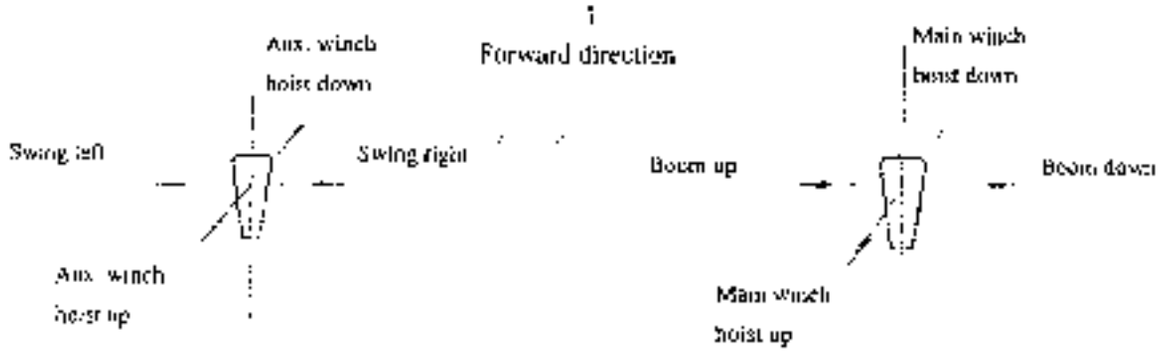


Fig. 6

2). There are two levers at the front of the operator's seat for controlling crane travel, refer to Fig. 7.

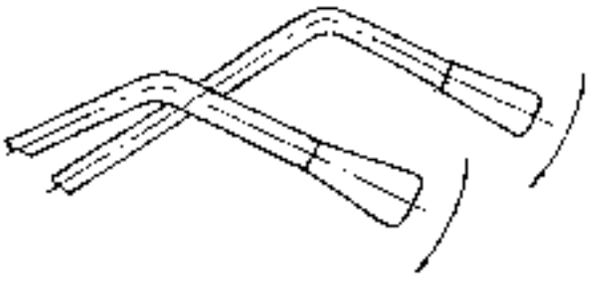


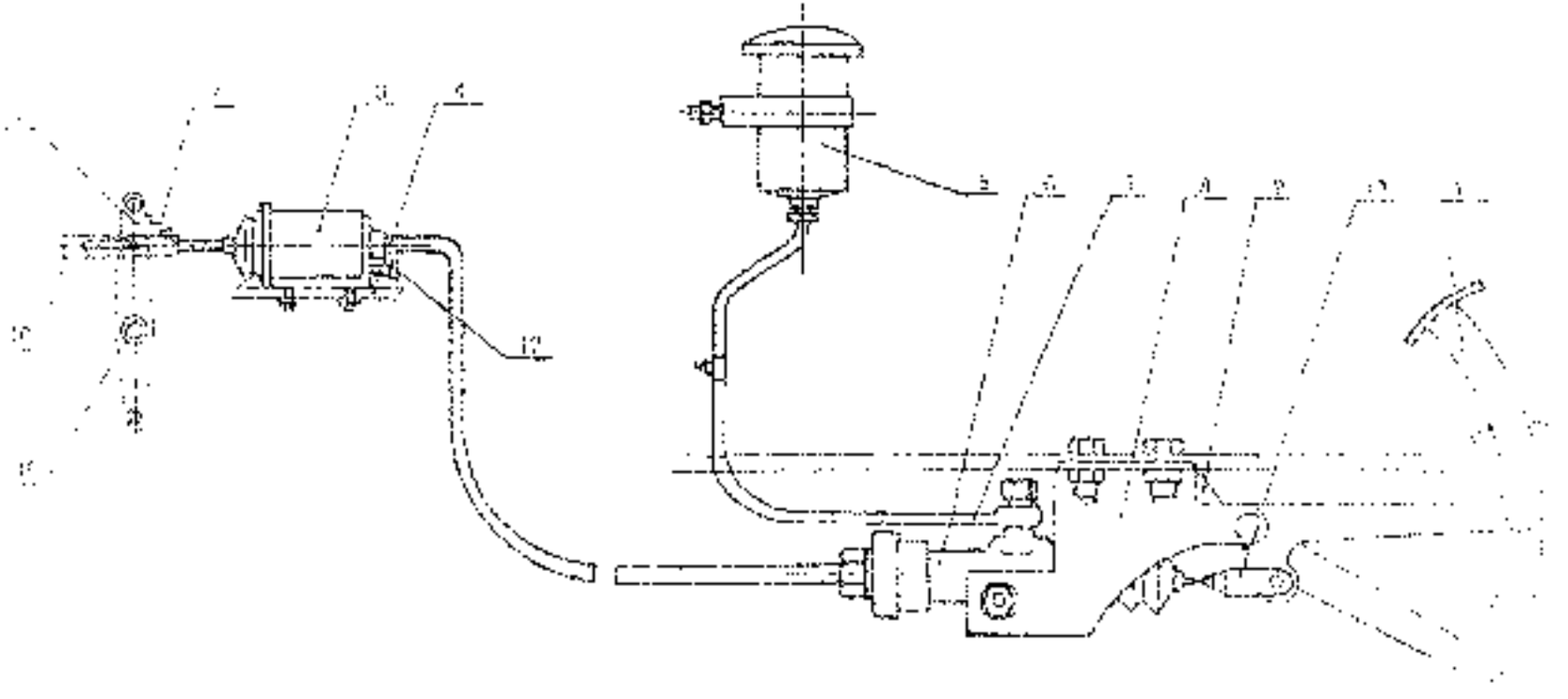
Fig. 7

3) There is an accelerator pedal at right front of operator's seat (refer to Fig. 8). A plastic oil cup at the back side of operator's cab is used for refilling brake fluid.

4). There is a pedal at left front of operator's seat for swing brake. Depress it down to brake crane swing.

3.7.3 Automatic Moment Limiter (AML)

Please refer to "Automatic Moment Limiter (AML) Operation Instruction."



1. Arm 2. 9. Springs 3. Acting cylinder (operating cylinder) 4. 8. Supports
5. Oil cup 6. Master cylinder 7. Oil tube 10. Rod 11. Crane accelerator pedal
15. Engine accelerator arm shaft 16. Rod 17. Air bleed screw

Fig. 8 Accelerator Control System

4. CRANE ASSEMBLY

This crane has no function for long distance travel due to its bulky size, so it is necessary to disassemble the crane for site-transfer and transport, and assemble the crane on site. The assembly procedures are as follows:

1). Extend crawlers;

2). Install counterweight;

3). Reeve elevating rope;

4). Change lower gantry to higher gantry;

5). Combine boom sections according to requirement.

4.1 Crawler Extension and Adjustment

4.1.1 Crawler Extension

1). Select a firm and horizontal ground, turn the crane 90° from straight ahead to crawler side.

2). Pull out the crawler extend/retract handle. (Fig. 9)

3). Pull 4 lock pins out of the pinhole C. (Fig. 9)

4). Push forward the left crawler control lever, the crawler will be extended. When the guide pin touches the end of the long pinhole, return the left crawler control lever to neutral.

5). Insert 4 lock pins into pinhole A to lock the crawler. At last, push the crawler extend/retract lever forward to "Travel Position."

Notes on crawler extension:

1). The ground surface for crawler extension must be firm and horizontal, and strengthened if it is soft. First level the crane, and then extend the crawler.

2). Crawler extension/retraction only can be performed under the condition of the crane with boom butt and 30° of boom angle, and never perform this operation with a lifted load. With boom of more than 16m on the crane, make sure to extend/retract crawler before assembly.

3). When boom and hook block are not mounted on the crane, first make sure to reduce a piece of counterweight then retract the crawler, and clean the crawler sliding part before retracting crawler.

4). After the crawler extended, fix the bevel plates with bolts and leave at least 2--3 mm clearance between crawler track and the bevel plates. Before retracting the crawler, remove the bevel plates, stow them on the bracket of crawler track and fix with bolts. The procedures for removing the bevel plates: swing the turntable tail to the crawler side, let the extension/retraction cylinder having a little thrust, and thus the bevel plates can be easily removed.

5). Before crawler extension, clean sliding part of crawler and coat with grease.

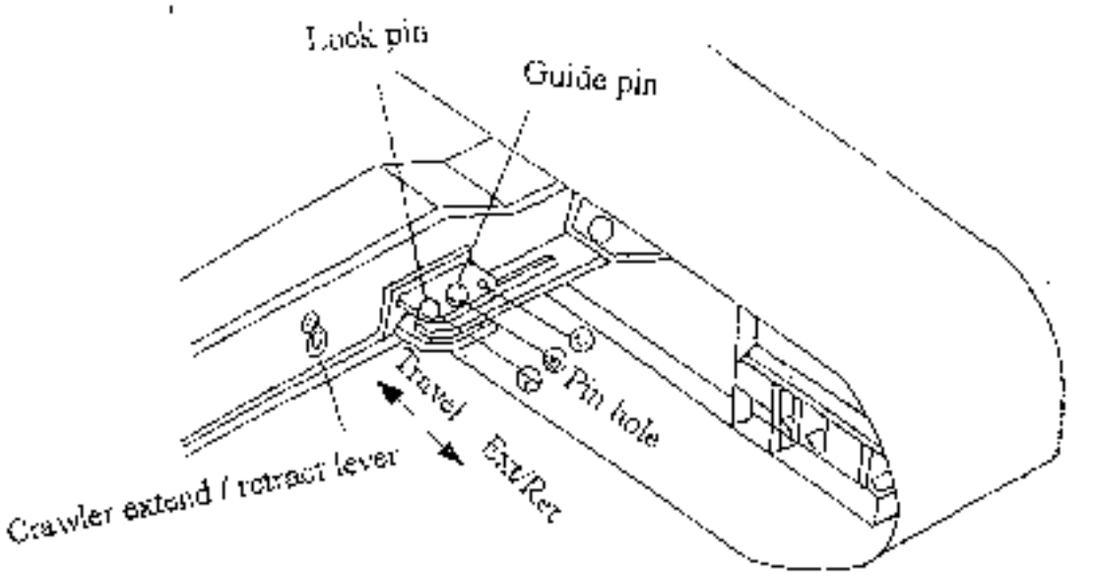


Fig. 9 Crawler in Extended State

Pin Positions

	Guide pin	Lock pin
Crawler retracted	B	C
Crawler in extension/retraction	B	Pull out
Crawler extended	B	A

4.1.2 Adjustment of Chain links

Extending and retracting the track adjuster at the side of front wheel (idler wheel) for replacing chain links of track shoes partial damaged, or adjusting the track shoes lengthened due to wear.

1). Retract the track adjuster ① (refer to Fig. 10).

2). Replace the track shoe on the idler wheel.

3). Adjust chain links tension of track shoes by the track adjuster.

4). The track adjusters are in pairs, and each pair should be adjusted equally.

5). The stroke difference of both cylinders of track adjusters do not exceed 2mm.

Adjusting the chain links of track shoes on horizontal ground and let the chain link deflection stack on drive wheel by driving the crane forward a little. Follow the method shown in Fig. 10.

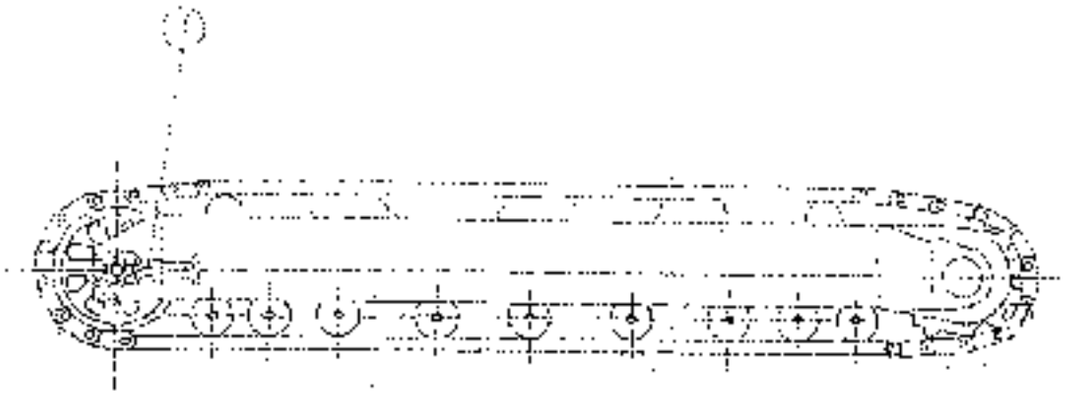


Fig. 10 Adjustment of Crawler Track

4.2 Reeve Elevating Rope (refer to Fig. 11)

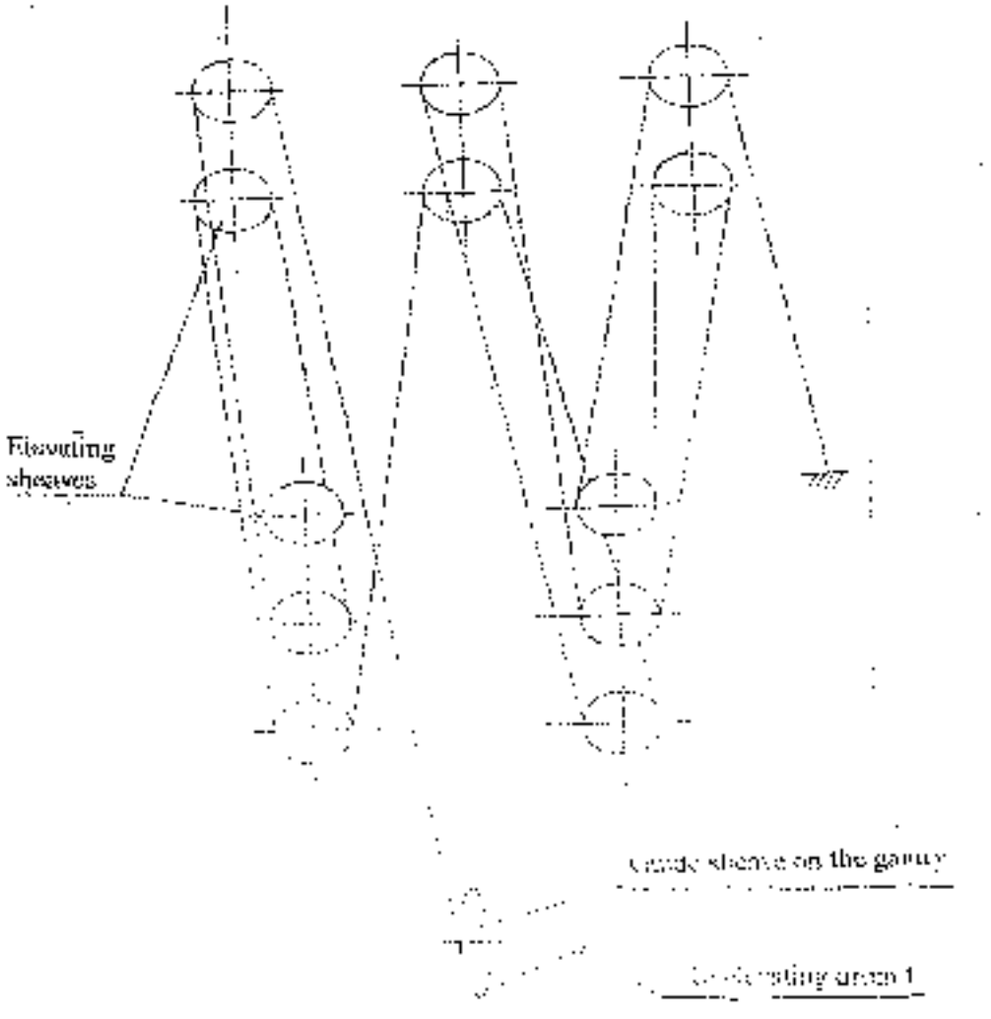


Fig. 11

4.3 Folding the Gantry

There are two kinds of height for the gantry. The higher gantry is used for lifting job and the lower gantry is used for travel under electric transmission line or for transport with trailer. Do not use the lower gantry for lifting job.

1). The procedures of changing higher gantry to lower gantry:

a). Let the engine runs at low speed.

b). Lower the boom down on a table.

c). Loose the elevating rope slowly, pull out pin **A**; (see Fig. 12).

d). Loose the elevating rope further, take **C** as the center to lower the gantry slowly. (see Fig. 12).

e). Align the lower hole **A** and the upper hole **B**, insert the pin pulled out from **A**. Reverse the procedures if changing lower gantry to higher gantry.

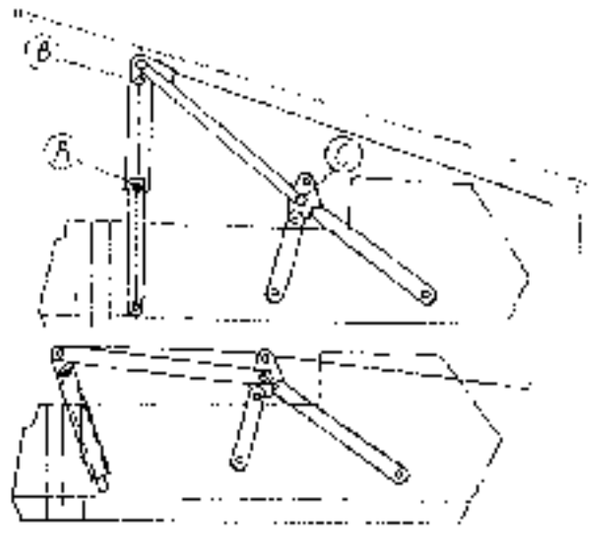


Fig. 12

2). Cautions on changing the gantry:

a). To change the gantry must be performed with boom top, otherwise the gantry will fall. If change gantry only with boom butt, please use auxiliary crane.

b). When changing higher gantry to lower gantry, if loose elevating rope too quickly, there will be a danger for the gantry to fall down due to the pin being pulled out.

c). When inserting into or pulling out the pins on **A** and **B**, avoid knocking with hummer.

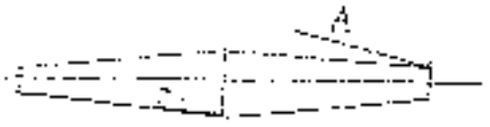
d). With 16m or more long boom, the gantry can not be changed lower.

4.4 Boom Assembly and Disassembly

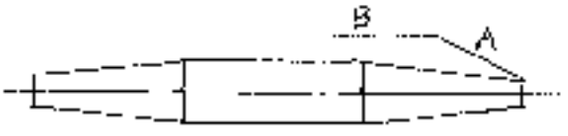
4.41 Main boom structure (Fig. 13)

The main boom consists of base boom 13m (boom top 6.5m and boom butt 6.5m) and boom inserts 3m, 6m and 9m. The method to connect the boom is shown in the following diagram. Assembly of boom inserts can combine the boom length from 13m to 52m. Each insert is 3m.

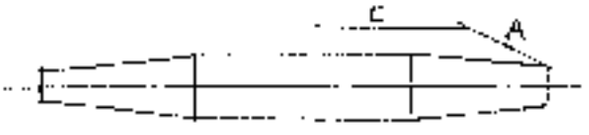
13m boom



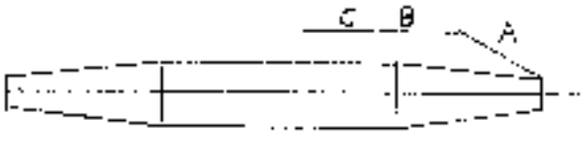
16m boom



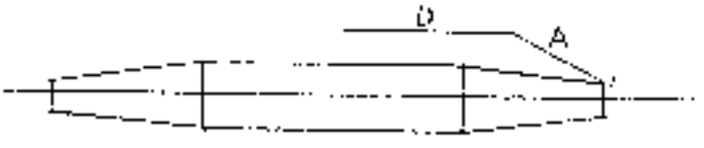
19m boom



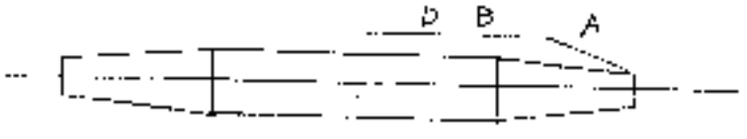
22m boom



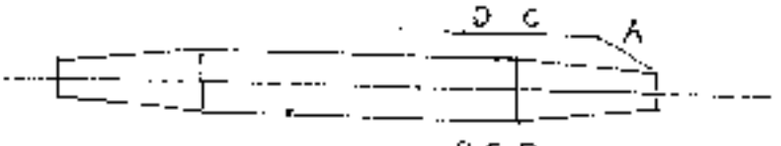
25m boom



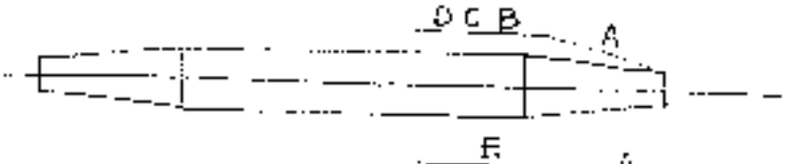
28m boom



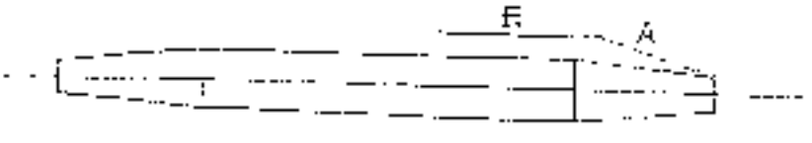
31 m boom



34 m boom



37 m boom



Elevating rope length

A	6.454m
B	2.7m
C	5.7m
D	11.7m
E	23.7m

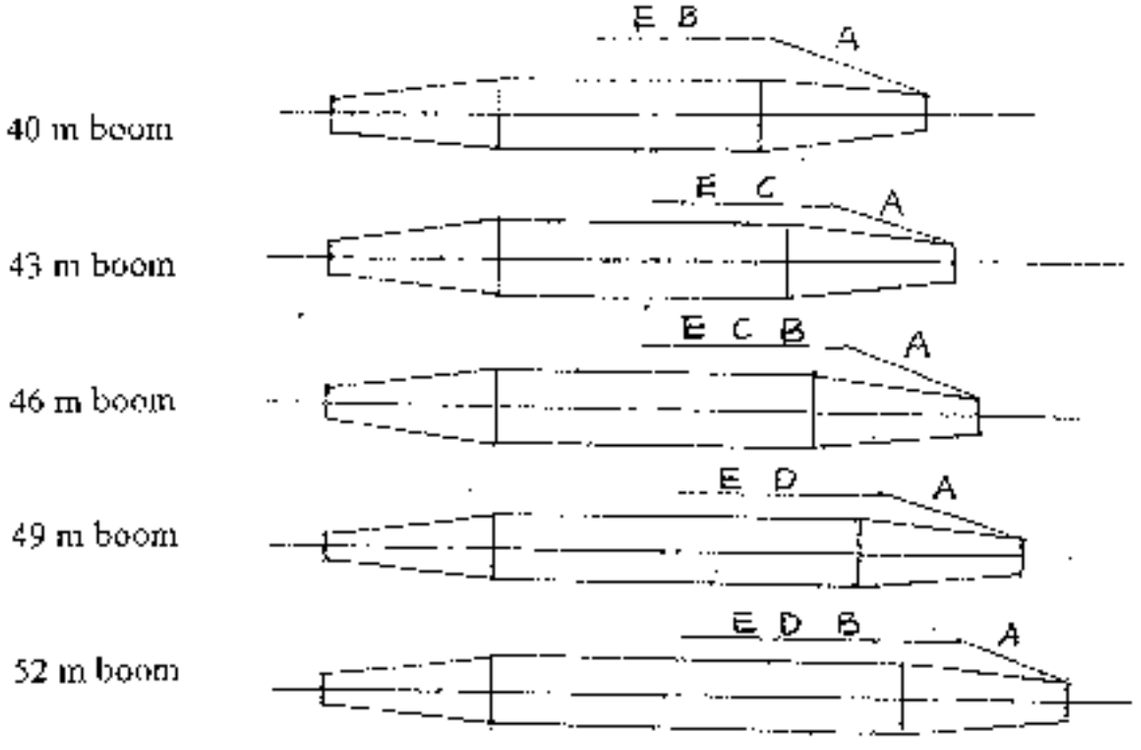

40 m boom
E B
A
43 m boom
E C
A
46 m boom
E C B
A
49 m boom
E D
A
52 m boom
E D B
A

Fig. 13

4.4.2 Main Boom Assembly and Disassembly

4.4.2.1 Base Boom (13m) Assembly and Disassembly

1). Prepare the followings before work:

Boom section

Elevating sheave frame

Elevating rope

Anti-tipping lever

Connection pin and spring pin

2). Combine boom top and boom butt into 13m boom with connection pin and spring pin on the ground.

3). Lift up boom butt with a simple lift equipment

4). Drive the crane forward to align the mounting hole on turntable with the pin hole on boom butt, then put into connection pin and spring pin.

5). Use elevating rope to connect boom top with elevating sheave frame

6). Install anti-tipping lever between gantry and boom butt.

7). Wind elevating drum to erect the boom.

8). Reverse above procedures for boom disassembly.

4.4.2.2 Boom Inserts Combination

Combine a 3m insert to assemble 16m boom, and use the same method, combine each boom insert to assemble 52m boom.

1). Combine the boom insert with the boom top, install elevating rope on the boom top.

2). Use the pin to connect elevating sheaves with boom butt.

3). Hoist the elevating drum slowly to raise the front end of boom butt 100mm off the ground.

4). Drive the crane forward to connect the boom butt with the assembled boom top, put pins into holes to connect the upper part of the boom.

5) Hoist the elevating drum slowly, align the pin holes on the lower part of the boom, put into the pins.

6). Lower the boom slowly, disassemble elevating sheave frame and connect it with elevating rope.

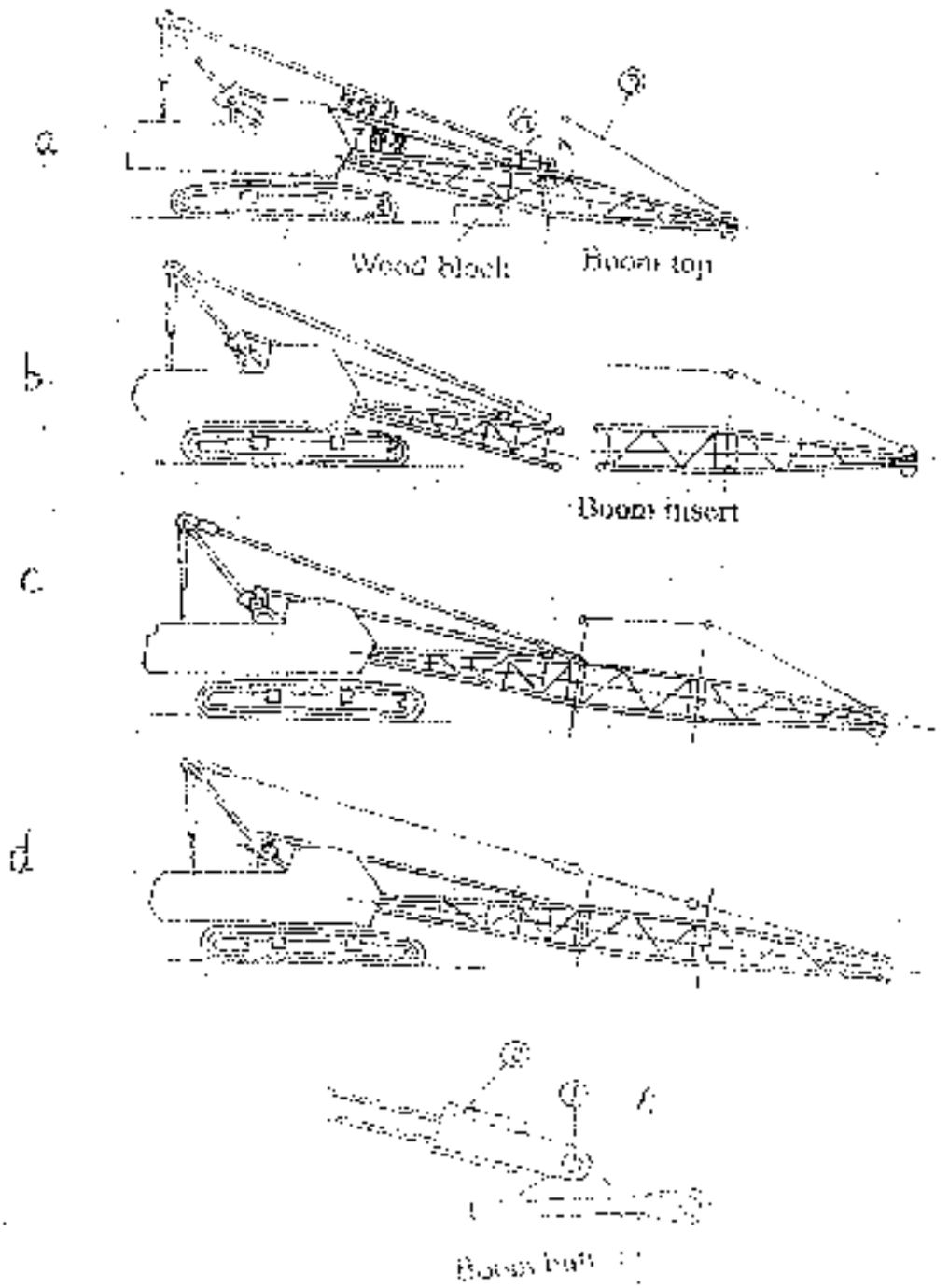
7). Hoisting the elevating drum slowly, the boom can be erected.

8). Reeve proper parts of line for hoist rope and hook block.

9) Wind the elevating rope and the crane is ready for lifting operation.

10) Reverse above procedures for boom disassembly.

Cautions: during assembly and disassembly, the boom head cannot clear off the ground, any persons are forbidden under the boom in prevention of injury. The above procedures are shown as follows: (refer to Fig. 14)



Even if the elevating sheaves ② are connected with wire rope ③, the boom still has a danger to fall when removing boom connection pins. The elevating sheaves must be assembled on the boom butt shown in the above figure. Support the boom butt with wood block, and then remove boom connection pins.

In " **A** " state, make sure to give proper tension to elevating rope when removing boom connection pins. If the rope is too loose, there will be a danger for the boom to fall.

When self-erecting the boom, put hook block on the ground, erect the boom to 30°, then lift the hook block.

During assembly and disassembly, use wood blocks under the boom in prevention of damage to the boom.

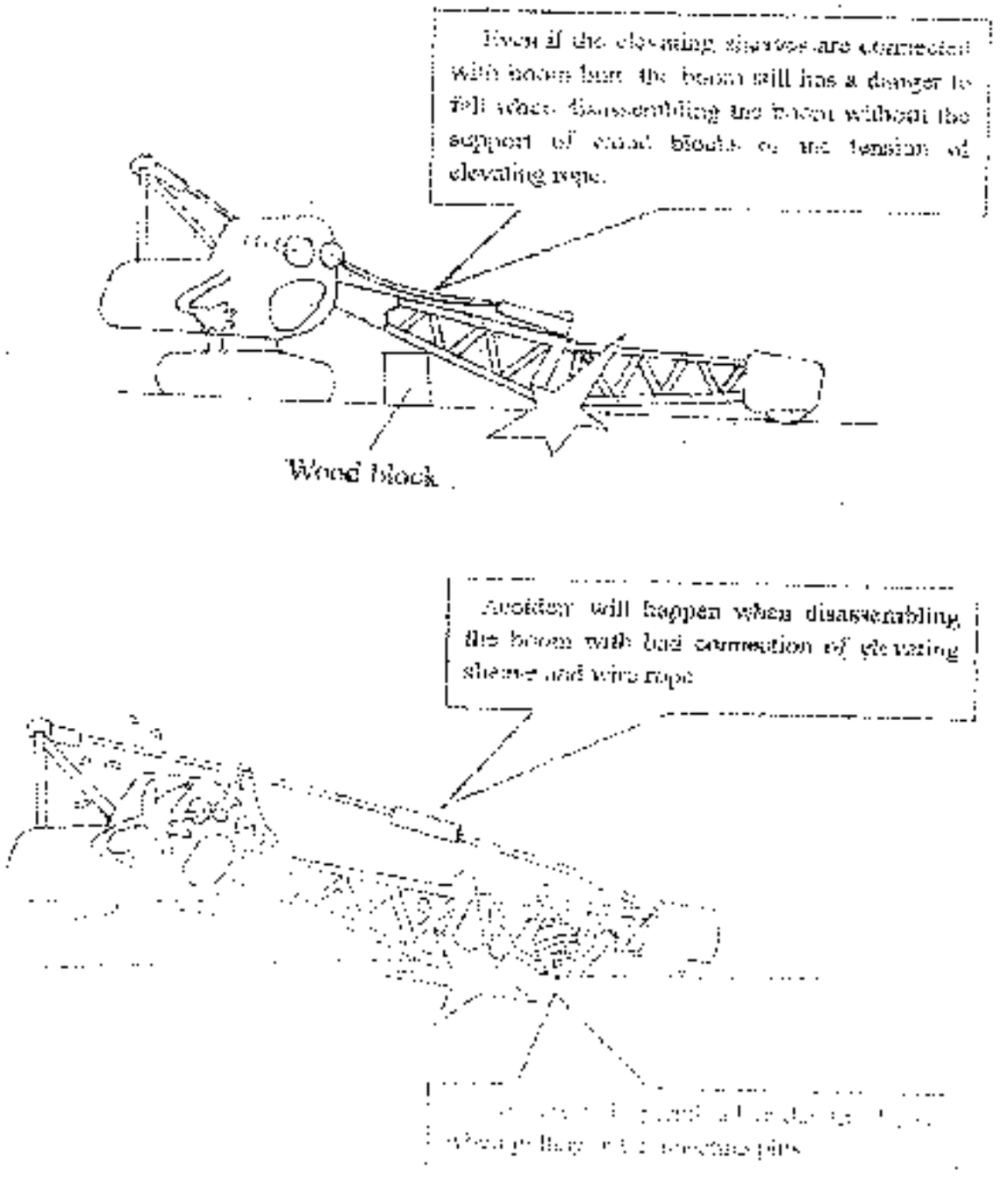


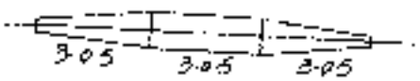
Fig. 14

4.4.3 Jib

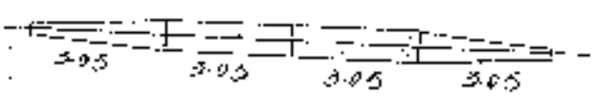
4.4.3.1 Jib Structure

The jib length is 9.15m, 12.20m and 15.25m respectively, and can be used for 25m, 28m, 31m, 34m, 37m, 40m and 43m boom.

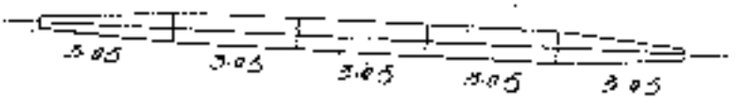
9.15m Jib



12.20m Jib



15.25m Jib



4.4.3.2 Installation Position for Jib Guy Cable

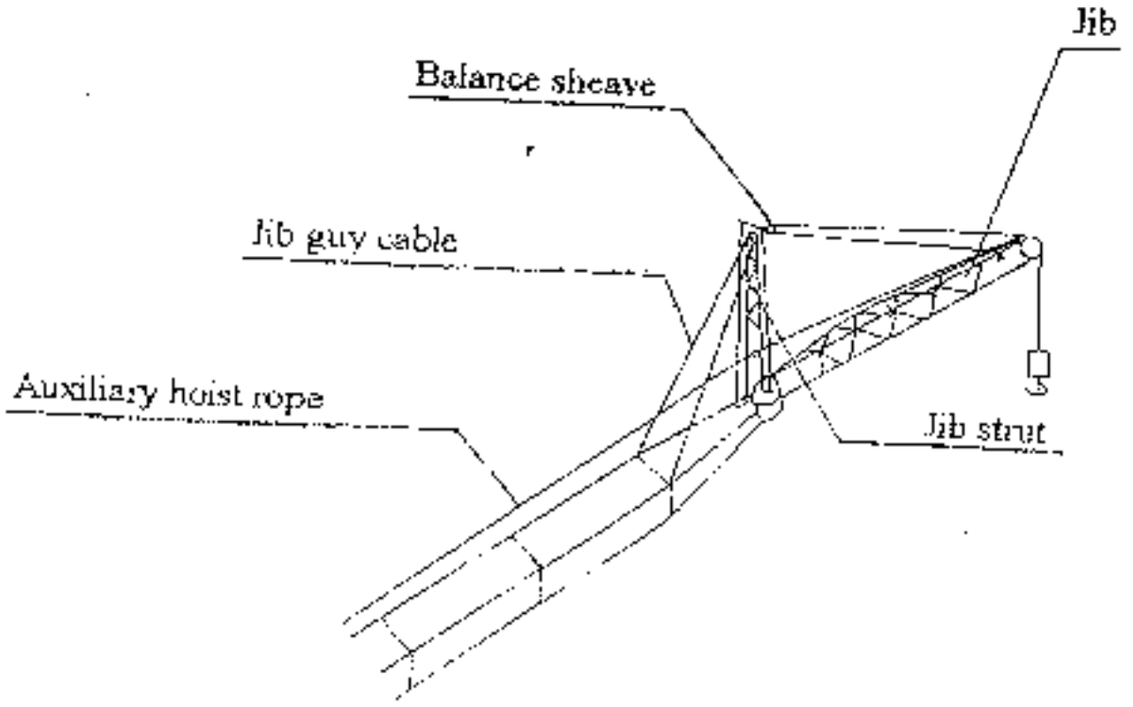


Fig. 15

4.4.3.3 Six kinds of Guy Cable Combined for Jib (refer to Table 7)

Guy Cables Combined

Table 7

Jib length (m) \ Jib offset angle	10° and 30°	Length (m)	10°	Length (m)	30°	Length (m)
9.15	C+D	19.68	B	13.26	A+B	15.10
12.20	D+C+D	25.37	B	13.26	A+B	15.10
15.25	D+C+D+D	31.06	B	13.26	A+B	15.10

Cable length:

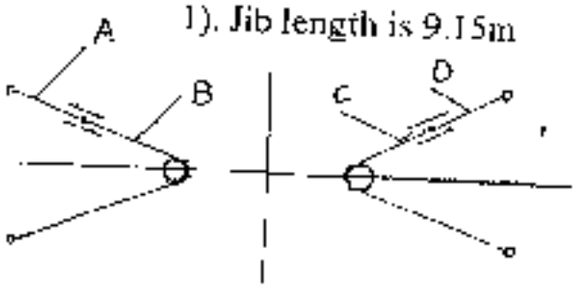
A=1.75m B=13.26m C=13.99m D=5.69m

Note: the jib guy cable must be passed through balance sheave and combined according to above table, otherwise damage will occur to the jib.

4.4.3.4 Diagrams of Six Combined Guy Cables for the Jib

a. Jib offset angle 30°

1). Jib length is 9.15m



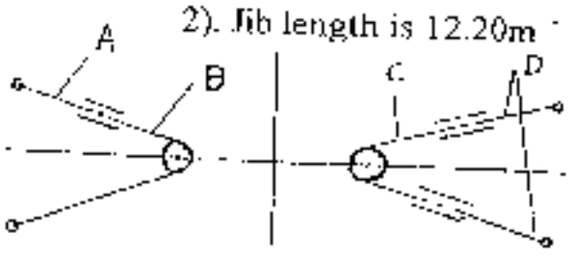
Cable length between boom and strut

A+B = 1.75+13.26 = 15.01m

Cable length between jib and strut

C+D = 13.99+5.69 = 19.68

2). Jib length is 12.20m



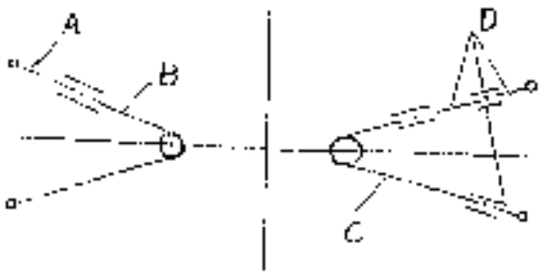
Cable length between boom and strut

A+B = 1.75+13.26 = 15.01m

Cable length between jib and strut

C+D+D = 13.99+5.69×2 = 25.37m

3). Jig length is 15.25m



Cable length between boom and strut

A+B = 1.75+13.26 = 15.01m

Cable length between jib and strut

C+D+D+D = 13.99+5.69×3= 31.06m

b. 10° of angle between jib and main boom

(1). Cable length between boom and strut, B=13.26m

(2). Cable length between jib and strut is same as that shown in **a.**

4.4.3.5 Jib Assembly

The jib consists of 3 sections, jib top 3.05m, jib butt 3.05m and jib insert 3.05m. Assemble the jib according to the following procedures:

1). Combine the strut with the jib, put the jib on wood blocks and support the jib at the same level of the boom (refer to Fig. 16).

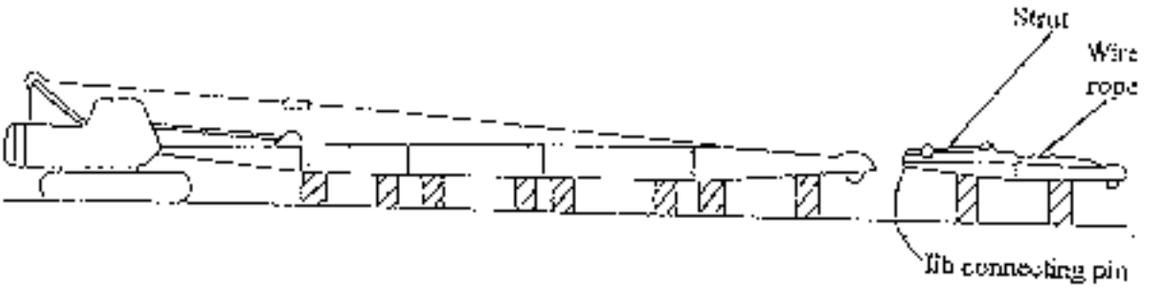


Fig. 16

2). Drive the crane, let the boom approaching the jib, and connect the boom with jib by the jib pins, then support the combined boom with wood blocks.

3). Pass the tension cable for boom and jib through the jib strut, and connect the cable to the pivot on boom top (refer to Fig. 17).

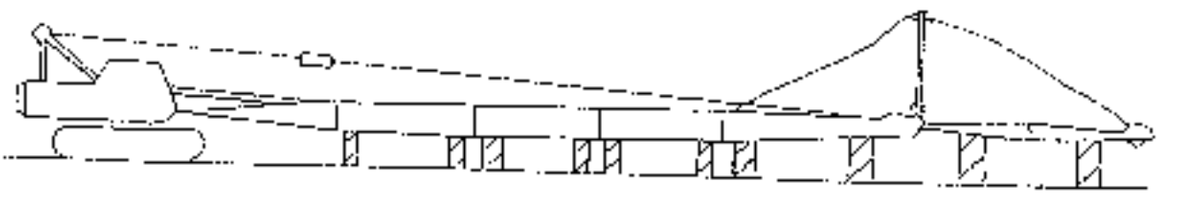


Fig. 17

4). Same as the boom, install the auxiliary hook block over-wind cutout device on the jib.

5). After all the procedures completed, raise the boom slowly until the jib clear off the ground in a proper offset angle, if not, adjust the auxiliary hoist rope again to ensure a correct offset for the jib.

4.4.3.6 Cautions on Lifting Operation

1). Before operation, check automatic moment limiter (AML), anti-tipping device, hook block over-wind cutout device for their normal working conditions.

2). When raise up or lower down the boom with attached jib, make the boom at

the straight front of the crane, with boom angle in range of 0°~30° . The hook block can't be off the ground when raise up or lower down the boom.

3). For lifting operation with attached jib, 2.5t should be deducted from the boom rated load capacity.

4). The radius in the lifting performance table is the horizontal distance from hook centerline to crane swing center.

5). Do not operate the main and auxiliary hook blocks at the same time.

6). Operate swing and elevation slowly, avoid hook block swaying form side to side.

7). For lifting operation with jib attached on boom, if hook block is not used, hoist it to the height, but not in contact with the boom.

8). Stop lifting operation when wind speed is more than 10m/s, and lower the boom on the ground.

9). Don't drive the crane with a load lifted on the jib.

4.4.3.7 Safety Devices

1). Automatic Moment Limiter (AML)

When an overload occurs, the moment limiter will automatically give warning and cut out crane motions. The use of the moment limiter is detailed in 《The Automatic Moment Limiter (AML) Operation Instruction》.

2). Auxiliary Hook Block Over-wind Cutout Device: (refer to Fig.18)

When auxiliary hook block approaches the ring, stroke limiter switch will send a signal to control box, the control box at the same time will give a warning and cut out the crane power in prevention of over-wind for the hook block.

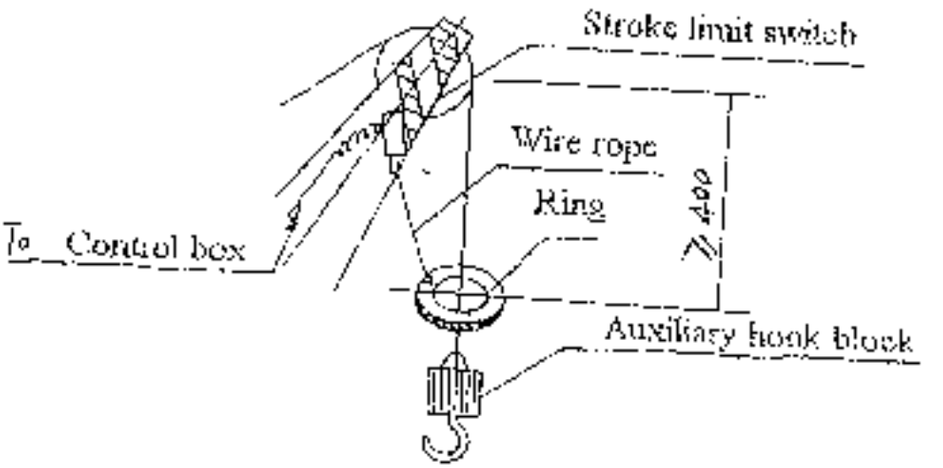


Fig. 18

5. CAUTIONS ON SAFETY OPERATION

The crane motions contain hoist, elevation, swing and travel. The boom combinations consist of one 3m insert, three 6m inserts and two 9m inserts. The boom length can be combined from 13m to 52m. Main hook block (for 50t and 26t load) and auxiliary hook block (for 4t load) are available for the crane.

Cautions on crane operation:

1). Be sure to make the following checks before lifting work:

a). Is the load capacity conformity with the number of parts of line for hook block and wire rope ? Is wire rope damaged ?

b). Is boom damaged ?

c). Does hoist limit switch work normally ?

d). Does elevating limit switch work normally ?

2). When lifting a load, the elevating rope is extended due to deformation, so working radius is also enlarged, especially for a long time operation with the boom.

3). Operate the crane slowly for swing and elevating, do not sway the load.

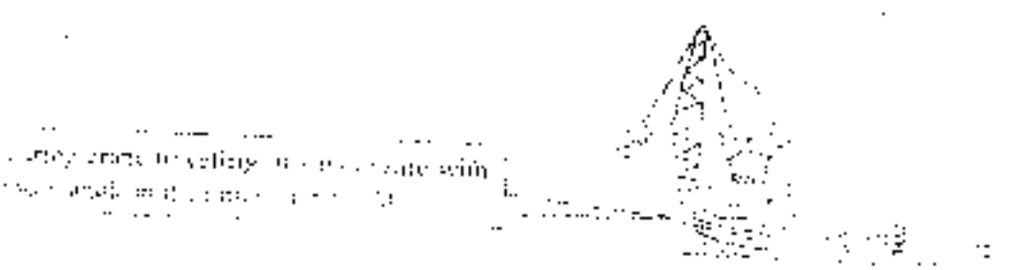
4). Elevating the boom slowly when raising from horizontal position or lowering to horizontal position, because at this time maximum tension is on the elevating rope.

5). Where there is a moderate gale, stop operating the crane and lower the boom on the ground, especially for typhoon, the boom must be lowered on the ground.

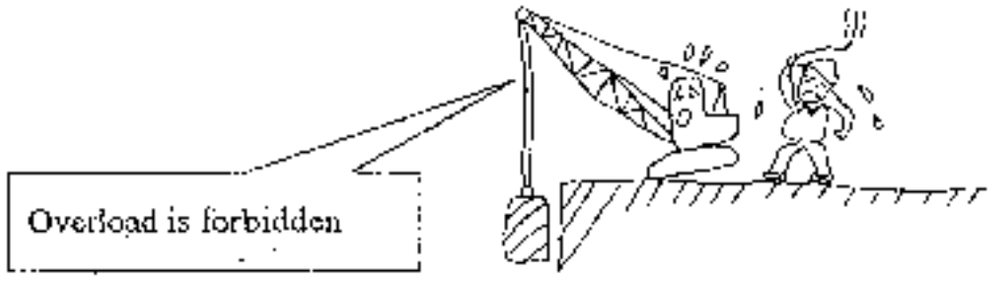
6). For the long boom (31m or more), when raising the boom from horizontal position, the boom must be raised at longitudinal direction of crawler and at forward direction of the crane (with crawler motor at the rear).

7). It is very dangerous even the boom has a little deflection. The boom only can be used again after the damage is fixed completely. Boom fixing needs a high level technique, so please contact our factory for boom fixing.

8). During crane traveling, the boom will sway with a large angle, so there will be a danger for the boom to fall backward, especially for a long boom. When stopping operation, lower the boom within 40°.



9). During lifting operation, do not exceed the working radius and the total rated loads because overload is very dangerous for the crane.



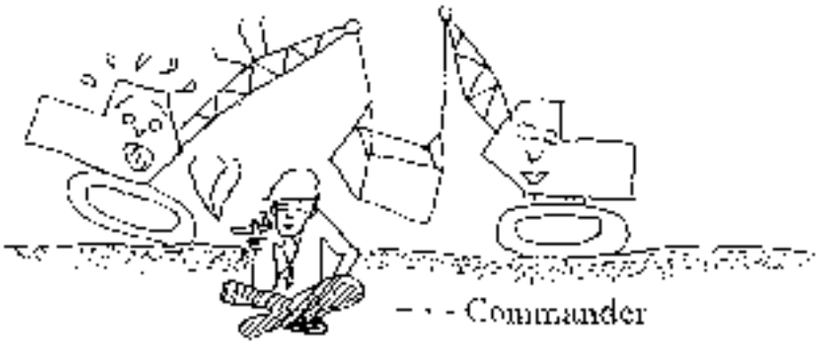
10). Cautions on leaving off the operator's cab:

a). Lower the load on the ground;

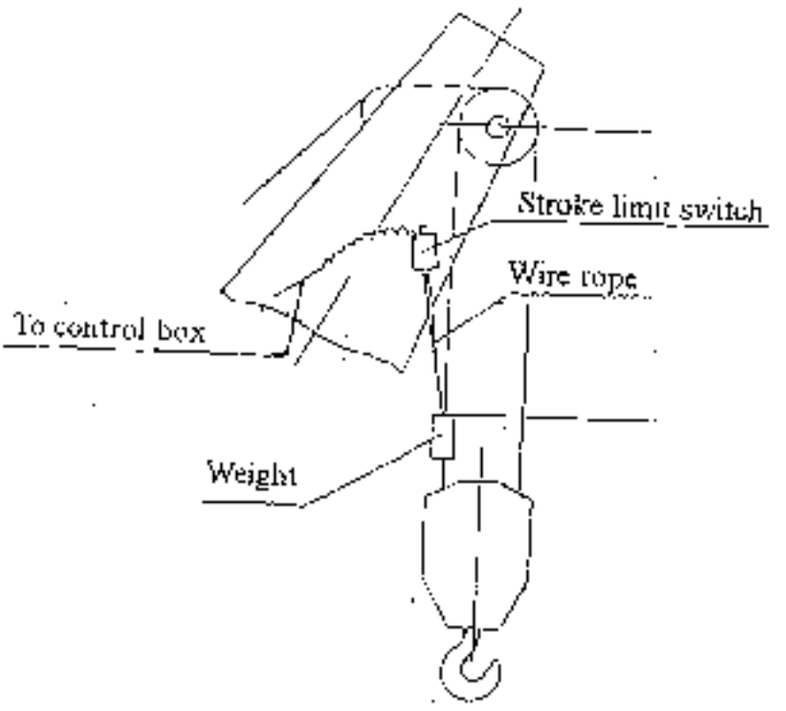
b). Stop the engine.

11). Check the ground surface for firmness and strengthen the ground if it is soft, and level the crane.

12). In principle, it is forbidden to lift a load together with two or more cranes, but if a heavy load must be lifted with more cranes commonly, try to use the same size of crane. Maintain the wire rope vertically, keep same working speed and operate the crane slowly. The load capacity subjected to each crane should not exceed 80% of the total rated load for each crane. A chief engineer should be in command of the lifting operation on site.



13). Over-wind cutout device (refer to Fig. 19)



L ≥ 0.85m over 2 parts of line
L ≥ 1.75m 1 part of line

Fig. 19 Over-wind Cutout Device

When hook block approaches the weight, stroke limit switch will send a signal to control box, and then the control box gives a warning, No. 5 lamp flickers, buzzer sounds, at the same time winch hoist is stopped in prevention of over-wind.

14). The Minimum Distance Between Boom and Electric Transmission line.

Table 8

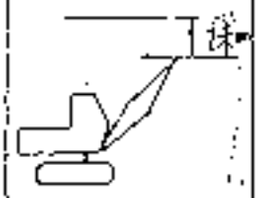
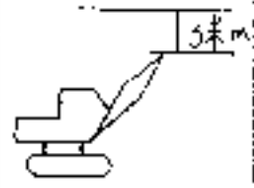
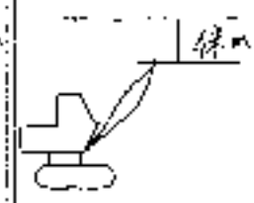
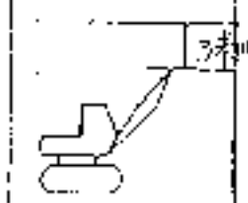
Voltage of electric transmission lines (kV)	<1	1--35	>60
Minimum distance (m)	1.5	3	0.01(V-50)+3

In practical work, the number of the insulator on electric transmission line also can be taken into account to decide the distance for safety operation, but the minimum distance must be in conformity with Table 8.

(For lifting job on this kind work site, it is recommended to contact with local power supply company in advance.)

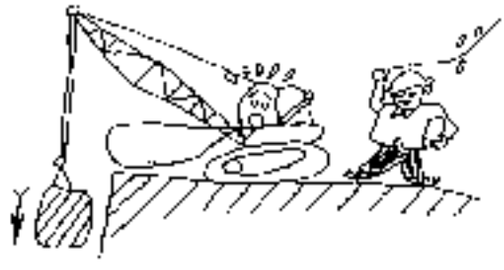
The Relation Between the Number of Insulator and the Minimum Distance

Table 8-1

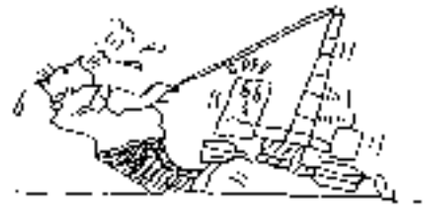
No. of insulator	17~24	10~14	5~8	2~4
Distance				

15). Diagrams of safe operation

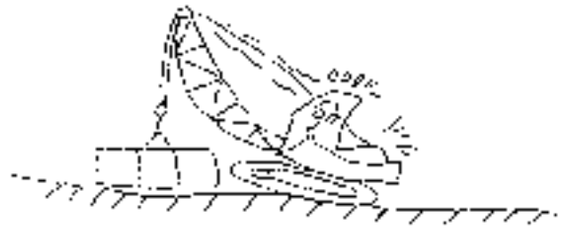
(1) No over-release is permitted. If it occurs, rope-end limiter will send a signal. No (1) lamp will flicker and buzzer sound. At the same time, system cuts off the power



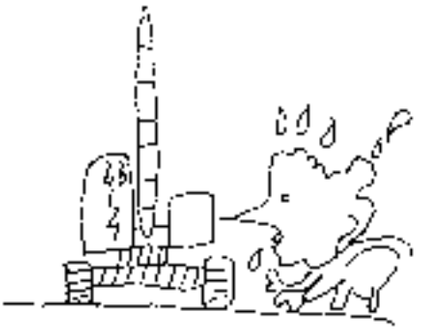
(2) Avoid side-loading.



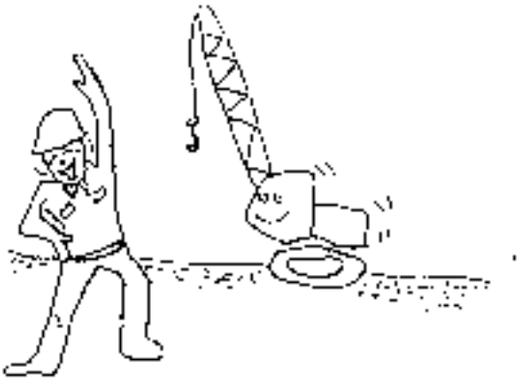
(3) The gantry has two kinds of height. When the crawler crane working, the gantry must be in the higher state



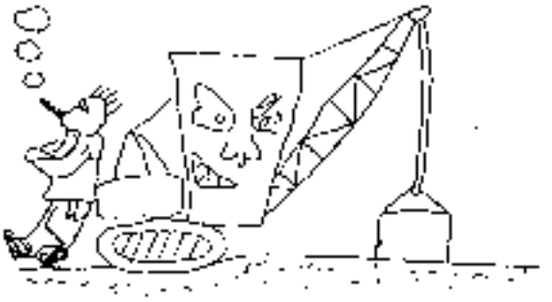
(4) Do not adjust hydraulic parts casually.



(5). Preheat the machine before operating.



(6). Before leaving operator's cab, lower the load on the ground, return all the control levers in neutral, and press down the ratchet lever to lock the ratchet of elevating drum.



(7). During crane working, if the engine extinguishes, return the control lever in neutral, and lock the ratchet of elevating drum

(8). Don't travel with a lifted load

Don't travel on soft ground with a lifted load

Don't travel on 5% slope with a lifted load

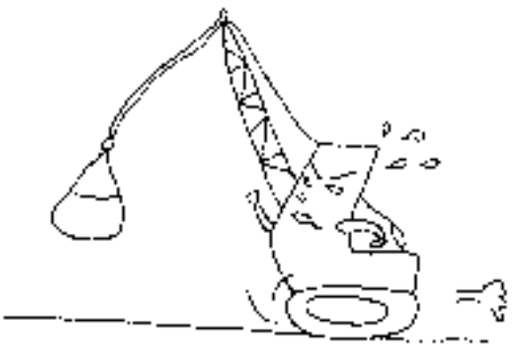
Don't travel with a lifted load on the jib

Travel within 70% of rated load is permitted, but must.

a). on firm ground and within 5% gradient.

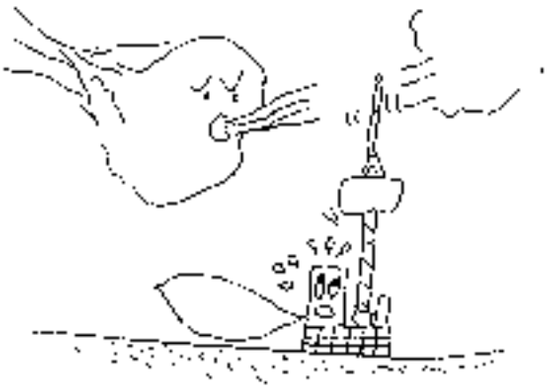
b). load ground clearance 0.25m

c). boom at forward direction.

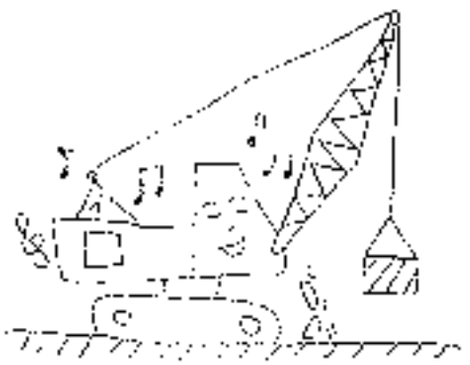


(9). Set the crane on firm and level ground.

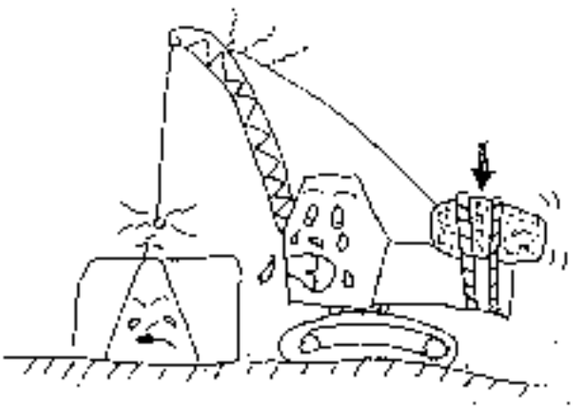
(10). Take note of weather report. When wind speed is over 10m/s, don't operate the crane, lower the boom within 40°.



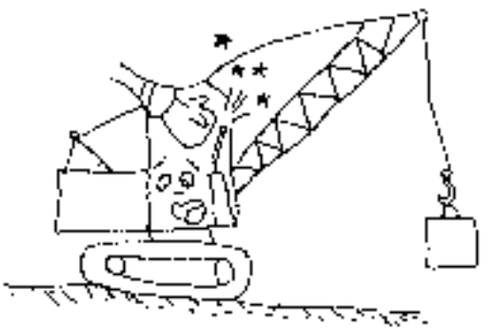
(11). Pay more attention to abnormalities and hearing of hydraulic circuit



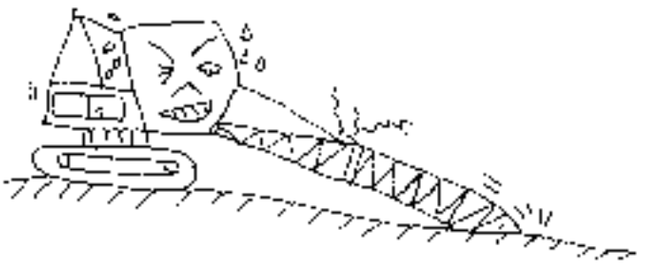
(12). Don't add counterweight or decrease the parts of line for wire rope casually.



(13). Don't apply starting or braking abruptly, especially when lifting a load, large working radius or high load.

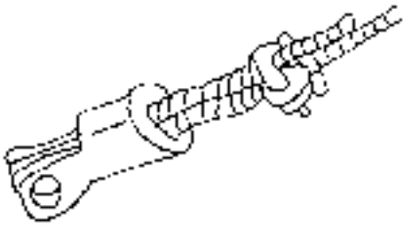


(14). Lower the boom slowly. Don't take the boom head off the ground when elevating rope is connected with boom butt.

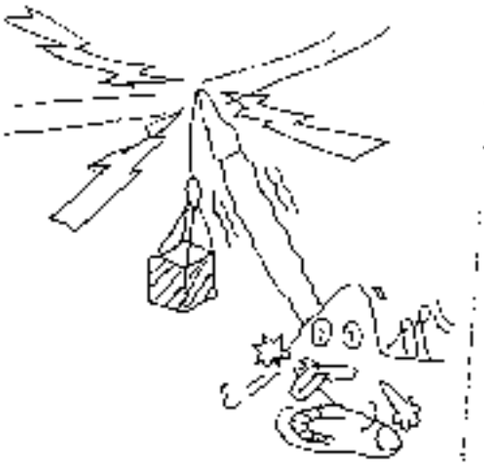


(15). Don't turn off the starting switch during engine running.

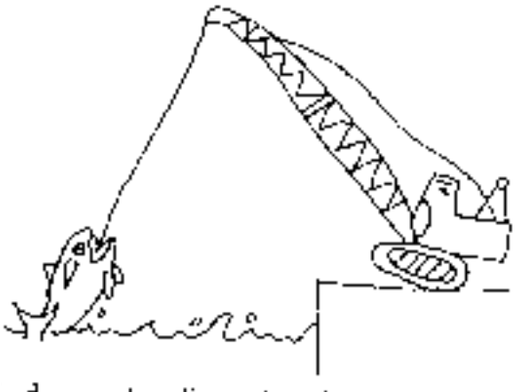
(16). When use the rope wedge, make sure to use the rope clip for fixing the rope end



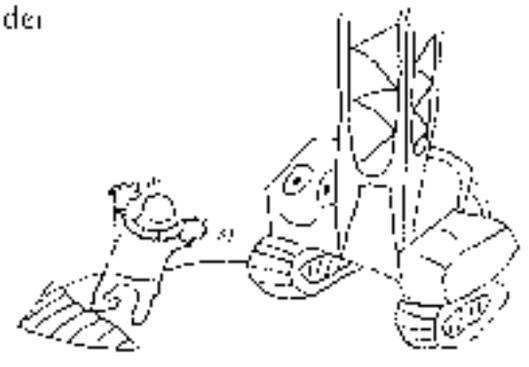
(17). Work in an area with electric transmission line, keep necessary distance from the line



(18). Don't do other work except lifting.

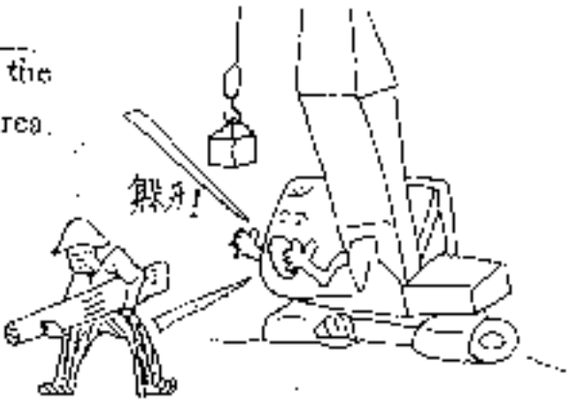


(19) Don't approach cliff edge and soft road end. If have to do so, it's necessary to lead by a leader

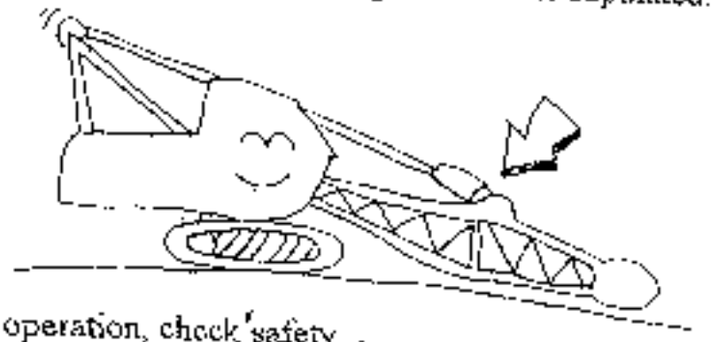


(20) Repair work should be conducted on level ground. If on slope, wedges must be used to prevent the machine from sliding. In addition lock the ratchet of elevating drum by pressing the ratchet lever.

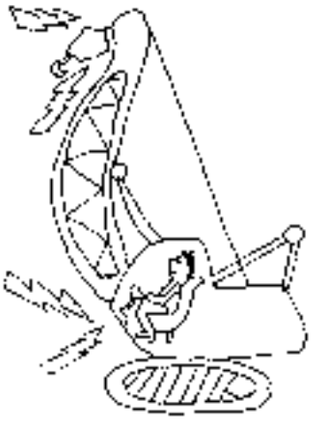
(21). No person is permitted under the boom and within the crane swing area.



(22). Boom combination should be according to the order stipulated. Don't stand under the boom.



(23). Before lifting operation, check safety devices and instruments for accuracy



(24) Modification of the crane electric circuit will cause fire, so do not modify the electric circuit casually.

6. INSPECTIONS

Inspections and maintenance are divided into once daily and once monthly.

1). Daily Inspections and Maintenance (before and after work per day)

(1). Inspections and maintenance before work

Position	Inspection items	Remarks
Engine	1. Oil level and contamination.	
	2. Cooling water level. (Anti-freeze coolant level in winter)	
	3 Tension and damage of fan belt.	
	4 Engine starting and engine exhaust, and abnormal noise and smell of the engine.	
	5. All instruments and switches	
	6. Leakages of water, fuel and oil of the engine. and hose damage	
	7. Loose bolts and nuts.	
Upper Part of Turntable	1. Fuel level in tank.	Oil level in oil tank should be in the stipulated range.
	2. Oil level in tank Leakage and contamination.	
	3. Action of control levers.	
	4. Action of hydraulic components. Hose leakage and damage.	
	5. Damages on instruments.	
	6. Deformation, damage and abnormal noise as well as smell	
	7. Loose bolts and nuts.	
Crawler	1 Track tension.	
	2. Leakage of upper and lower rollers, drive sprocket and idler wheel as well as reducer	
	3. Action of hydraulic components. Pipe circuit leakage	
	4. Loose bolts and nuts	
Operating Parts	1 Damage and deformation on boom and hook block.	
	2 Broken and twisted wire rope	
	3. Action of each part.	
	4 Bolts and nuts.	
Others	1 Safety devices and warning devices.	Be careful on checks
	2 Action of pointers of instruments.	

During crane operation, if any abnormal noise and smell are found, stop the engine immediately for check and repair.

(2). Inspection and maintenance after work

a). Clean each part of the machine, and then check the leakage of water and oil, and the loose of bolts and nuts.

b). Replenish fuel.

c). In winter, drain out the water in radiator to prevent from freeze.

2). Monthly Inspections and Maintenance (every 150~250 running hours)

Position	Inspection items	Remarks
Engine	1. Oil level and contamination. 2 Blocked fuel filter. 3. Blocked and damaged air filter. 4 Cooling water level. Blocked and deformation of radiator. 5. Tension and damage of fan belt. 6. Battery power, and corrosion of connectors. 7. Abnormal noise and smell of engine exhaust 8. Action and damage of instruments and switches. 9. Loose wire, short circuit and damage. 10. Leakage of water, fuel and oil and damage of hose. 11. Bolts and nuts. 12. Lubrication of each part.	
Upper Part of Turntable	1. Blocked hydraulic oil filter. 2. Action of control levers. 3. Action of locking device. 4 Action of hydraulic components. Damage to circuit 5. Damage of instruments. 6. Deformation and damage on parts. 7. Cracks and deformation of turntable. 8. Lubrication of each part 9. Loose wire, short circuit 10. Loose bolts and nuts. 11. Oil level of each reducer and oil leakage	
Safety Devices	1. Over-wind device between boom and hook block. 2. Switches of safety device and instruments. 3. Tightness of electric wire sockets and damage. 4 Boom over-hoist limiter.	

Position	Inspection items	Remarks
Operating Parts	1. Cracks and deformation on boom and hook block. 2. Broken and twisted wire rope. Connection of two ends 3. Action of hook block. 4 Deformation of shafts of sheave and hook block. 5. Lubrication. 6. Loose electric wire, short circuit. 7. Loose bolts and nuts.	
Crawler	1. Track tension 2. Leakage of upper and lower rollers, sprocket and idler. 3. Abnormal noise and leakage. Oil level in reducer. 4. Cracks on track shoe. 5. Action of hydraulic components. Leakage in pipe circuit. 6. Loose bolts and nuts.	
Others	1. Warning lamp and illuminator 2. Swing lock. 3. Working oil.	

7. GENERAL REQUIREMENT ON MAINTENANCE AND SERVICE

In order to operate and maintain the crane correctly, it is necessary to understand the structure and working principle of the machine. Observe the safety operation rules and perform specified lubrication. Discover in time and effectively solve the trouble problems so as to ensure the crane work normally long time and offer its best function.

1). All lubricating parts of the crane need adequate lubrication. For a new crane it must avoid long time full load running within its initial 50 hours to facilitate run-in of the engine. Every day before work, check its lubrication condition.

2). Check regularly the worn conditions of wire rope, if any defect happens, replace it in time. Replace the wire rope according to GB5972-2004/ ISO4309-1990《Cranes—Wire Rope—Code of practice for examination and discard》. Also replace the wire rope which fall into one or more of the categories below:

a). Wire ropes of which 10 % or more of all the wires (excluding the filled wires) are broken in one rope lay.

b). Reduction in diameter exceeds 7 % of the nominal diameter.

c). Kinked wire ropes.

d). Excessively deformed (indented strand, protrusion of wires bird caging) or wire ropes rusted.

e). If the rope end has broken wires, and the length of the rope is enough, shorten the rope and fix the rope socket.

3). Regularly inspect the indication of meters for correctness and respective control handles for its correct position and reliability.

4). Regularly check the rope clip and the rope socket for tightness.

5). Change the hydraulic oil according to ambient temperature.

Ambient temperature (℃)	Hydraulic oil
Above -15℃	L-HM46 wear-proof hydraulic oil
Above -30℃	L-HV32 wear-proof hydraulic oil
Above -40℃	L-HS32 wear-proof hydraulic oil

6). Pay attention to cleanness while changing oil, the inner side of oil tank must be cleaned, and at the same time cleaning oil filter, filling new oil through strainer.

7). When the crane is in working state, ensure that there is enough hydraulic oil in the tank and oil level reaches the scale of transparent tube.

8). Before delivery of the crane, all the adjustment for valves in hydraulic system have been done in the factory, in general, there is no need for customers to adjust.

9). Replace or filter the hydraulic oil every half-year under normal working condition. Replace or filter the hydraulic oil after working three months for a new crane or an after-repaired crane. Whenever find the oil is excessively contaminated, replace or filter it immediately.

12). Do not use the hydraulic oil over two years. After two years, even the filtered hydraulic oil should not be used.

11). How to replace the hydraulic oil: At first, let out the oil in the tank, then clean it with the kerosene or pure chemical cleaning agent. After the tank is dry, clean it with new hydraulic oil, then drain out the cleaning oil, and then refill in new hydraulic oil or filtered hydraulic oil through strainer. Disconnect the oil return tube from the tank and connect it to another container. Then start the engine and run it at a low speed to run the oil pump, manipulating all the system to force the old oil out by new oil. After all the system is full with new oil, join the oil return tube to the oil tank, at the same times, replenish hydraulic oil to the stipulated level. Notice: when replace hydraulic oil to each of the tube, it is necessary to replenish new oil continuously to the tank so as to prevent the pump suction.

12). Hook block

a). No cracks on the surface of hook block. Discard the hook block with cracks.

b). Discard the hook block if the opening or measured length is more than 10% of actual dimension before use.

c). Discard the hook block if the twisting angle of hook body is more than10%.

d). No plastic distortion of hook bar, otherwise discard the hook block.

e) If wear of critical section reaches 5% of original dimension, discard the hook block.

f). No wear on hook block threads.

g). No welding on the defect of hook block

8. TRANSPORT

8.1 Travel

The crane can travel at 1.1km/h when the engine runs at high speed. But try to travel on a flat asphalt road, and at low speed if travel on slope. Set the travel motor at the rear of the crane if travel for a long distance.

8.2 Transport with Trailer

Before transport, retract the crawler and lower the gantry. The crawler can climb on a trailer over 20° slant frame, and climb backward. (i.e. driver's cab is at the rear).

8.3 After loading on a trailer, lock the swing lock and put wood block, bind the crane with wire rope to ensure stability while the trailer traveling.

8.4 Tools for Loading

Prepare 180mm square wood block 3.5m long 4 pieces

300mm square wood block 0.5m long 6 piece

8.5 Weight and Measurement for Transport (total weight 53.5t)

Parts Name	Weight (t)	Length (m)	Width (m)	Height (m)	Remarks
Base machine	31	7.1	3.4	5.5	With gantry and boom butt
Counterweight (I)	8	3.14	0.53	1.46	
Counterweight (II)	8	3.14	0.58	1.46	
9m boom insert	0.803	9	1.4	1.4	
6m boom insert	0.535	6	1.4	1.4	
3m boom insert	0.306	3	1.4	1.4	
Upper strut	0.795	6.5	1.4	1.4	
Hook for 50t load	0.51	1.56	0.51	0.55	
Hook for 26t load	0.205	1.2	0.29	0.48	
Hook for 4t load	0.087	0.5	0.3	0.3	
Jib top	0.103	3.35	0. 605	0.54	
Jib butt	0.124	3.165	0.605	0.54	
Jib insert	0.083	3.12	0.605	0.54	
Jib strut	0.145	3.1	0.61	0.45	
Guy cable, pin shaft	1				

8.7 Transport with Truck

Parts can be disassembled for transport:

1). Counterweight

2). Boom (do not disassembly boom butt)

3). Lower gantry (do not disassemble the gantry, only lower it).

8.8 Transport of Disassembled Parts

Parts can be disassembled:

1). Boom 2). Turntable 3). Gantry 4). Crawler

5). Operator's cab 6). Hoist drum 7). Elevating drum 8). Diesel engine

9). Fuel tank 10). Counterweight

9. Supplied Tools List

No.	Name	Specifications	Q'ty	Remarks
1	Double-end spanner	6×7	1	
2	Double-end spanner	8×10	1	
3	Double-end spanner	12×14	1	
4	Double-end spanner	14×17	1	
5	Double-end spanner	17×19	1	
6	Double-end spanner	22×24	1	
7	Double-end spariner	30×32	1	
8	Double-end spanner	32×36	1	
9	Double-end spanner	41×46	1	
10	Ring spanner	12×14	1	
11	Ring spanner	17×19	1	
12	Socket spanner	10-32-17 set	1	
13	Adjustable spanner	300×36	1	
14	Adjustable spanner	150×19	1	
15	Cross-head screwdriver	75×5	1	
16	Plain screwdriver	150×7	1	
17	Pliers with insulated handle	175mm	1	
18	Hammer	0.5kg	1	
19	Grease pump	Lever type	1	
20	Working lamp assembly	24v	1	
21	Hose assembly for measuring pressure and pressure gauge	SMA6-2000/103 A2B1-4100040	1	
22	Manual oil pump assembly	QUY50.189.18	1	
23	Inner hex-nut wrench	4	1	
24	Inner hex-nut wrench	5	1	
25	Inner hex-nut wrench	6		
26	Inner hex-nut wrench	8	1	
27	Inner hex-nut wrench	10	1	
28	Inner hex-nut wrench	12	1	
29	Inner hex-nut wrench	14	1	
30	First-aid box	AK-120	1	

10. Supplied Spare Parts List

No.	Name	Standard No.	Specifications	Q'ty
1	O-ring seals	GB1235-76	8×1.9	6
2	O-ring seals	GB1235-76	11×1.9	20
3	O-ring seals	GB1235-76	16×2.4	4
4	O-ring seals	GB1235-76	20×2.4	10
5	O-ring seals	GB1235-76	30×3.1	10
6	O-ring seals	GB1235-76	35×3.1	10
7	O-ring seals	GB1235-76	60×3.1	2
8	O-ring seals	GB3452.1-92	28.3×3.55G	10
9	O-ring seals	GB3452.1-92	65×3.55G	1
10	Washer	JB982-77	12	4
11	Washer	JB982-77	14	20
12	Washer	JB982-77	18	4
13	Washer	JB982-77	22	6
14	Washer	JB982-77	27	2
15	Washer	JB982-77	33	2
16	Washer	JB982-77	34	2

11. Parts List for Crane Assembly

No.	Drawing No.	Parts Name	Q'ty	Remarks
1	QUY50.01	Main hook block for 50t load	1	
2	QUY50.34	Mid-extend boom hook block for 26t load	1	
3	QUY50.29	Auxiliary hook block for 4t load	1	
4	QUY50.02.3	9m boom insert	2	Boom
5	QUY50.02.4	6 m boom insert	3	Boom
6	QUY50.02.5	3m boom insert	1	Boom
7	QUY50.02.6	Boom top	1	Boom
8	QUY50.02-30	Spring clip (Φ 6)	46	Boom
9	QUY50.02-31	Shaft (Φ 50 $\times$ 165)	28	Boom
10	QUY50.14.1	Jib top	1	Boom
11	QUY50.14.2	Jib insert	3	Jib
12	QUY50.14.3	Jib butt	1	Jib
13	QUY50.14-8	Pin shaft (Φ 30 $\times$ 140)	16	Jib
14	QUY50.14-9A	Spring clip (Φ 7)	30	Jib
15	QUY50.14.12.1	Wire rope A for jib (L=1.75m)	1	Jib
16	QUY50.14.12.2	Wire rope B for jib (L=13.26m)	1	Jib
17	QUY50.14.12.3	Wire rope C for jib (L=13.99m)	1	Jib
18	QUY50.14.12.4	Wire rope D for jib (L=5.69m)	3	Jib
19	QUY50.14.12-6	Connection plate	12	Jib
20	QUY50.14.12-7	Pin shaft (Φ 35 $\times$ 89)	14	Jib

No.	Drawing No.	Parts Name	Q'ty	Remarks
21	QUY50.49.8.1B	**Wire rope A for boom (L=6.454m)**	2	Boom
22	QUY50.49.8.2B	**Wire rope B for boom (L=2.7m)**	2	Boom
23	QUY50.49.8.3B	**Wire rope C for boom (L=5.7m)**	2	Boom
24	QUY50.49.8.4B	**Wire rope D for boom (L=11.7m)**	2	Boom
25	QUY50.49.8.5B	**Wire rope E for boom (L=23.7m)**	2	Boom
26	QUY50.49.8-6 B	Connection plate	6	Boom
27	QUY50.49-10B	Pin shaft ($\Phi 50 \times 158$)	14	Boom
28	QUY50.90	Rope wedge and socket assy.	2	
29	QUY50.02.33	Support roller	2	

12. Lubrication

12.1. Gear Oil

(1). Replacement schedule

Replace oil after 3 working months for a new crane, after that change it every 12 months. Inspect oil level frequently, refill it if the level is below specified mark; if oil is contaminated, replace it immediately.

(2). Winches

No.90 EP industrial gear oil. The filling quantity is approx. 1.5--2.0L. Refilling method: expose the drum bottom by removing winch rope and remove the filling plug, refill required quantity of oil.

(3). Swing system

No.90 EP industrial gear oil. Refilling method: remove the filling plug, and refill required quantity of oil according to indication plate and oil dipstick on the swing system.

(4). Crawler drive system

220 (40°) LS2 industrial gear oil. The filling amount is approx. 8.5L. Refilling method: remove the filling plug and oil level plug, and refill required quantity of oil according to indication plate and oil dipstick on the crawler system.

12.2. Lubrication Oil for Crawler Drive System

(1). Replacement schedule

Replace oil after 3 working months for a new crane, after that change it every 6 months. Inspect oil level frequently, refill it if the level is below specified mark; if oil is contaminated, replace it immediately.

(2). Guide wheel

HC-8 or HC-11 (in winter) and HC-14 (in summer) lubricant. The filling quantity is approx. 0.165L. Refilling method: remove the filling plugs at both sides, and refill required quantity of oil. If replacing oil, disassemble the guide wheel and drain out old oil, and then fill new one.

(3). Support wheel

HC-8 or HC-11 (in winter) and HC-14 (in summer) lubricant. The filling quantity is approx. 0.140L. Refilling method: remove the filling plugs at both sides, and refill required quantity of oil. If replacing oil, disassemble the support wheel and drain out old oil, and then fill new one.

(4). Support sprocket

HC-8 or HC-11 (in winter) and HC-14 (in summer) lubricant. The filling

quantity is approx. 0.070L. Refilling method: remove the filling plugs at both sides, and refill required quantity of oil. If replacing oil, disassemble the support sprocket and drain out old oil, and then fill new one.

12.3. Hydrostatic Pressure Oil

The brand of hydrostatic pressure oil is KF-01 brake fluid (made by Xuzhou Automobile Chemical Product Factory). The filling amount is approx. 2.5 kg. Note: Different brands of brake fluid should not be mixed. The brake fluid used for the crane accelerator is our special oil, and do not replace it by other brand of brake fluid, otherwise the operating cylinder of the accelerator will be damaged.

12.4. Grease

No.	Greasing positions	Greasing interval	Methods
1	Main and mid-extend boom hook block sheaves	Weekly	Grease pump
2	Boom hoist sheaves and guide sheave	Weekly	Grease pump
3	Boom rear pivot pin	Every 2 days	Grease pump
4	Slewing ring	100 hours	Grease pump
5	Gantry pivot pin and guide sheave	Daily	Coat
6	Wire rope	Weekly	Coat
7	Winch bearing seat	Weekly	Grease pump
8	Boom elevating sheaves	Weekly	Grease pump
9	Sliding path for crawler extension	Before use	Coat

Notes:

(1). Clean the grease nipples and the surfaces to be coated with grease before greasing

(2). The sliding and rotating surfaces which are not indicated in the above chart also require periodical greasing.

13. Packing List

1). Technical Specifications

2). Operation and Maintenance Manual

3). Product Certificate

4). Supplied Tools List

(refer to Operation and Maintenance Manual)

5). Supplied Spare Parts List

(refer to Operation and Maintenance Manual)

6). Parts List for Crane Assembly

(refer to Operation and Maintenance Manual)

7). Load Moment Limiter Operation Instruction

8). Engine operation Instruction