



RATED CAPACITY LIMITER SYSTEM
DS 350

OPERATOR'S HANDBOOK

DS350/1225/1229 Consoles

HC 248H ELCAS
OPERATING CODES

Link-Belt

Construction Equipment

LATTICE BOOM CRANES

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Table of Contents

Notice.....	i
1. General Information.....	1
2. Warnings.....	1
3. System Description	2
4. Console Controls and Displays	3
5. Lockout Controls	11
6. Pre-Operational Inspection.....	12
7. System Operation.....	14
8 .Service and Maintenance	15
9. Operational Test.....	16
10. Troubleshooting Guide.....	18
11. Operating Codes	

1. GENERAL INFORMATION

The PAT DS 350 Rated Capacity Limiter (RCL) has been designed to provide the crane operator with essential information required to operate the machine within its designed parameters.

The PAT DS 350 Rated Capacity Limiter (RCL) monitors various crane functions and provides the operator with a continuous reading of the crane's rated capacity. The readings continuously change as the crane moves through the motions needed to make the lift. If a non-permitted condition is approached, the RCL is designed to warn the operator by sounding an audible alarm and illuminating a warning light.

During crane operation, The RCL provides the operator with information such as: the selected operating mode, main boom length, main boom angle, jib length, jib angle, and the total load being lifted by the crane. The total load is defined as all weight at the end of the hoist line, which includes hook block, load, rigging, etc..

This manual describes the function, operation, and maintenance of the PAT DS 350 Rated Capacity Limiter (RCL) System for Link-Belt Lattice-Boom Cranes.

This system assists the crane operator in promoting safe and efficient operation by monitoring crane loads and by warning the operator of approaching overload conditions. Always refer to operational instructions and load charts provided by the crane manufacturer for specific crane operation and load limits.

2. WARNINGS

- The PAT DS 350 Rated Capacity Limiter (RCL) is an operational aid which warns a crane operator of an approaching overload and over hoist condition which could cause damage to equipment, property, and/or injury to the operator or bystanders.
- This device is not, and shall not be a substitute for good judgment, experience, and the practice of accepted safe crane operation.
- The operator is solely responsible for the safe operation of the crane and must observe and obey all warnings and instructions supplied by PAT and the crane manufacturer.
- Prior to operating a crane, the operator must carefully and thoroughly read and understand the information in this manual and the crane manufacturer's manual to ensure that the operator understands the function and limitations of the RCL system and the crane.
- Proper operation of the RCL System is dependent upon proper inspection, maintenance, and observance of the operating instructions set forth in this manual.

3. SYSTEM DESCRIPTION

The PAT DS 350 Rated Capacity Limiter (RCL) System consists of a central microprocessor unit, operator's console, and component sensors for angle, load, and anti-two block (A2B) condition. The system uses angle sensors to measure boom and jib angle, if applicable. The hoist line tensiometers (lineriders) measure the load. And the A2B switch senses an approaching a two block condition.

The system operates on the principle of comparing real to reference data. The real data is supplied to the central unit by sensors and the operator's input settings, such as: operating code, hoist selection switch, and reeving switch. The reference data (i.e. crane capacity charts, geometry) is supplied by the crane manufacture and stored in memory chips in the central processor unit. The microprocessor evaluates the real data (sensors and operator input) to determine an operating mode. The operating mode determines the reference data required to calculate permitted operating limits. When limits are exceeded, warning signals are generated and viewed at the operator's console. Note the difference between operator's code and mode; the code is entered by the operator from Appendix, and the system defines the mode.

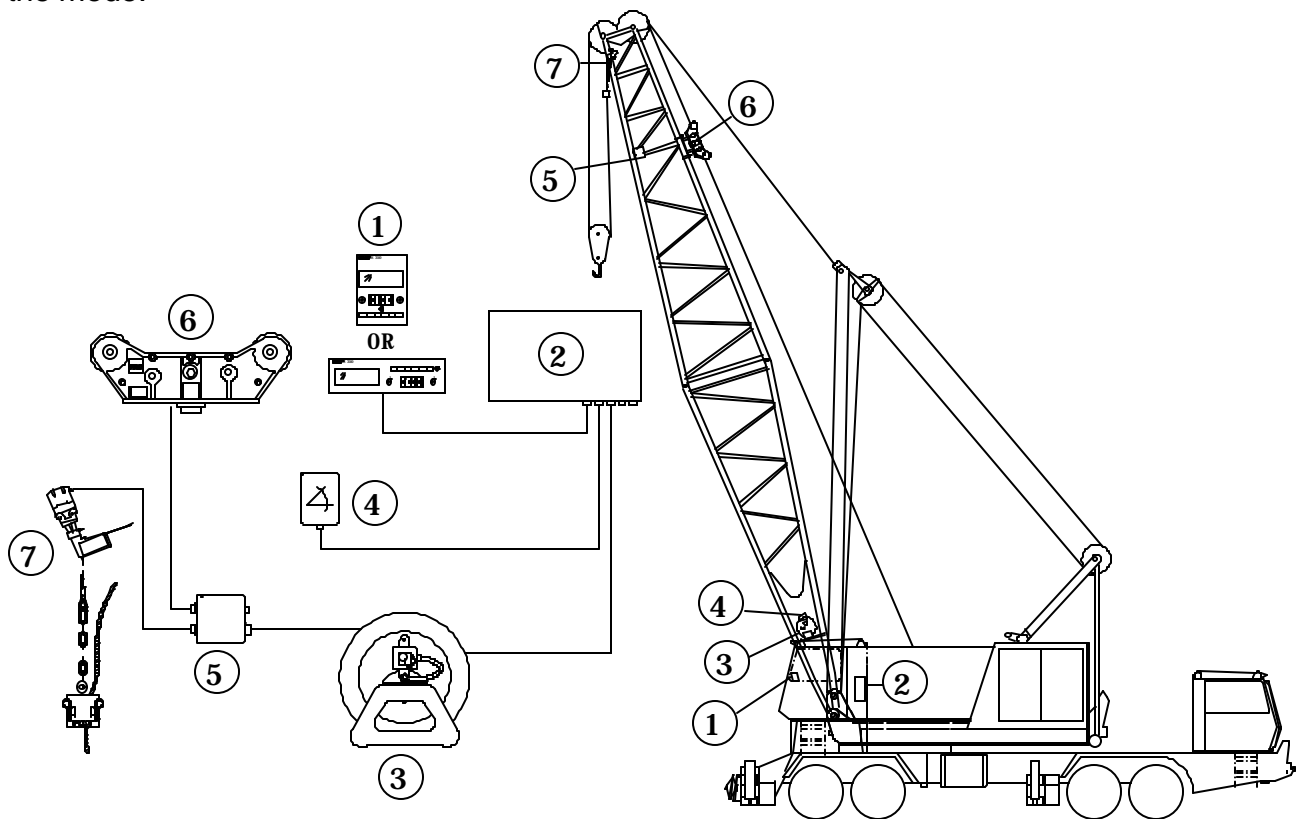


Figure 1. PAT DS 350 Rated Capacity Limiter (RCL) System Components

- | | |
|-----------------------|----------------------------|
| 1. Operator's Console | 5. Junction Box |
| 2. Central Unit | 6. Linerider (Tensiometer) |
| 3. Cable Reel | 7. A2B Switch |
| 4. Boom Angle Sensor | |

4. CONSOLE CONTROLS AND DISPLAYS

The operator's console allows the operator to controlled and identify the cranes configuration using the operating code, hoist selection, reeving, and geometry selection switches. The crane may be equipped with a horizontal (Figure 2) or a vertical (Figure 3) version, these consoles only differ in the shape of the housing. The console is located in the crane operator's cab.

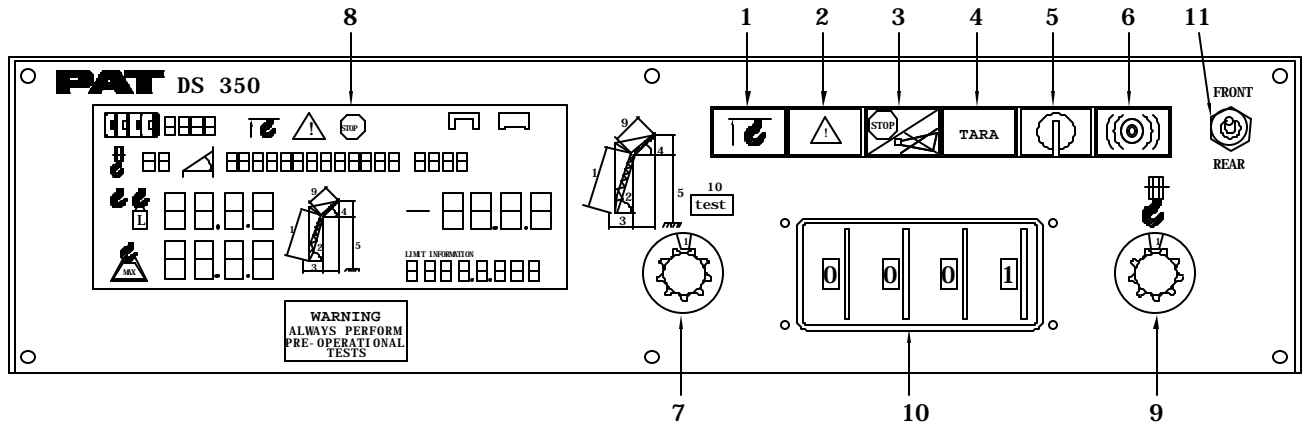


FIGURE 2. Horizontal Operator's Console.

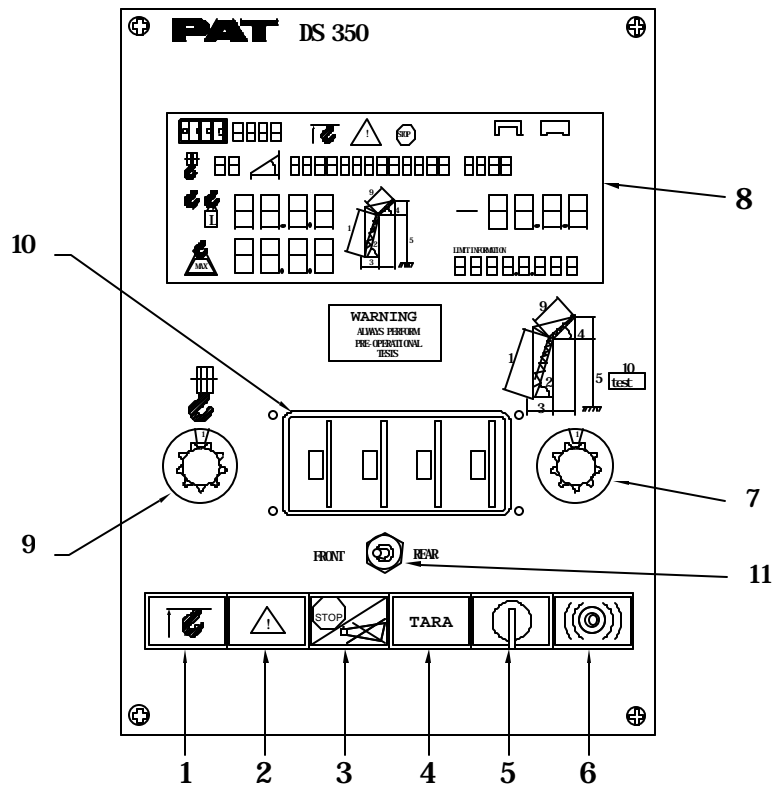
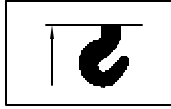


FIGURE 3. Vertical Operator's Console.

4. CONSOLE CONTROLS AND DISPLAYS (continued)

1. ANTI-TWO-BLOCK INDICATOR

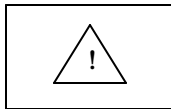


This symbol will light when the hoist A2B switch opens, indicating that a two-blocking condition is imminent. At the same time, the load hoist up functions will be disabled.

NOTE: Some **Link-Belt** machines are equipped with **Link-Belt** A2B Systems which incorporate their own horn and/or light.

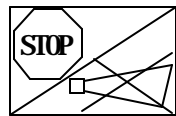
The term “two-block” is a crane term which refers to a condition when the hook block comes into contact with the boom head. This condition, if not prevented, will cause the wire rope to break, allowing the load to fall. Two-blocking can be caused by raising the load into the boom head, and by lowering the boom without paying out hoist line.

2. PREWARNING LIGHT



This yellow light will illuminate when the load on the hook is between 90% and 100% of the crane rating, indicating that an overload condition is approaching.

3. OVERLOAD LIGHT/AUDIBLE ALARM SILENCE BUTTON



A red warning light signals the operator that an overload condition has occurred. The red warning light will illuminate when the total load exceeds the crane rating or a system error occurs.

This button allows the audible alarm to be silenced.



The audible alarm must not be silenced during crane operation, as the operator may not be alerted by the red warning light alone.

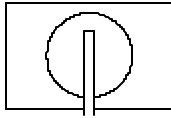
4. TARA BUTTON



This button will tare the net load. (See Section 8.G.) The tare condition will automatically be canceled, when changing the boom position.

4. CONSOLE CONTROLS AND DISPLAYS (continued)

5. KEY OVERRIDE

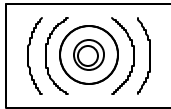


A key activated, 3-position spring loaded switch allows the operator to override the overload and A2B cut-off functions, which allows control lever operation during lockout.



NEVER use the key override to either overload or operate the crane out of the manufactures allowable or safe operating range (refer to the crane load charts).

6. BUZZER

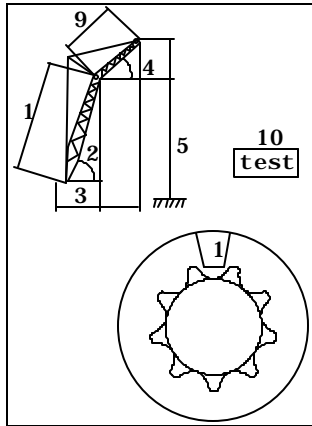


This is an audible alarm which will sound when one of the following conditions occur:

- a. Two-block condition has occurred
- b. The load on the hook has reached rated capacity
- c. System detects an error or malfunction

4. CONSOLE CONTROLS AND DISPLAYS (continued)

7. GEOMETRY SELECTOR SWITCH



The geometric selector switch determines the information to be shown on the geometry display (4.8.D). Each switch position is identified by a number (1 to 10) under the window of the control knob. The numbers 1,2,3,4,5,9 and 10 refer to the crane symbol (4.8.E) and, if selected, the corresponding arrow will flash to emphasize the displayed geometric value.

The display (4.8.D) will show one of the following selected switch positions:

Position 1: main boom length

Position 2: main boom angle

Position 3: main boom radius(including jib/extension, if any)

Position 4: jib angle

Position 5: boom tip height above ground level (including jib/extension, if any)

Position 9: jib length

Position 10: Test position. All lamps and characters of the liquid crystal display (LCD) will illuminate, when this position is selected. Only use this position to check the display.



WARNING

Selecting position 10 for extended periods of time could cause damage to the display. Only use this position to check the display.

NOTE: Position 4 and 9 will only display correct data if a jib operating mode is selected.

During this test, some characters may appear which are insignificant for operating this crane.

4. CONSOLE CONTROLS AND DISPLAYS (continued)

8. LIQUID CRYSTAL DISPLAY

The different symbols and displays of the LCD have the following functions:

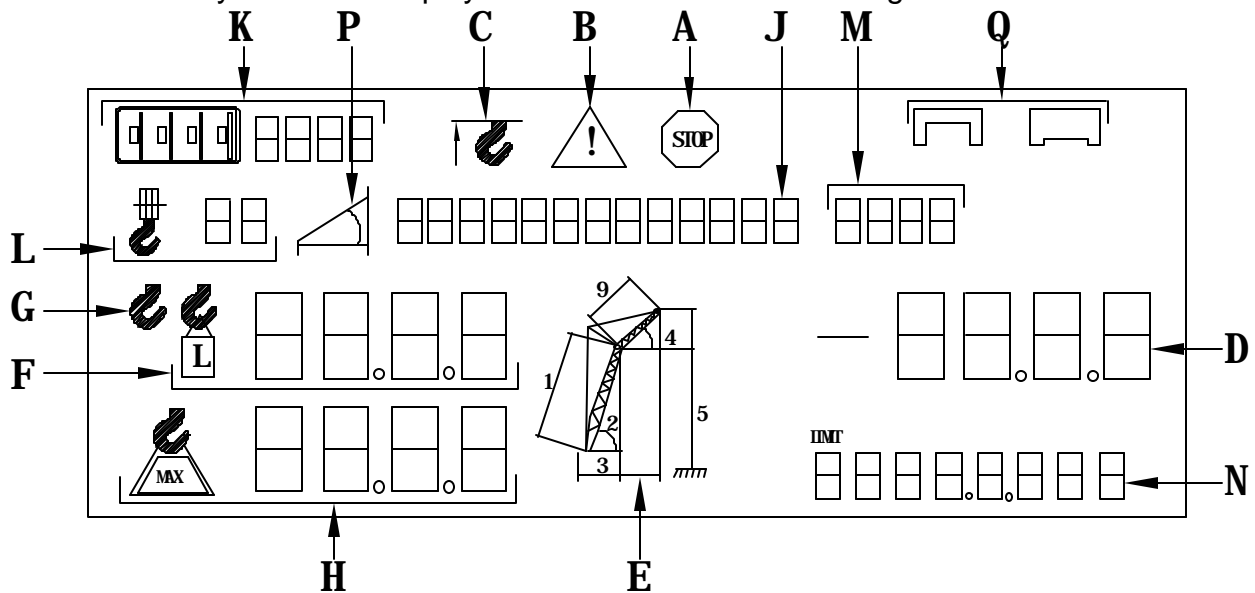


FIGURE 3. Liquid Crystal Display.

A) OVERLOAD SYMBOL

This red symbol is always visible and flashes when the total load exceeds the crane rating or a system error occurs.

B) PREWARNING SYMBOL

This yellow symbol is always visible and flashes when the load on the crane is between 90% and 100% of the crane rating, indicating that an overload condition is approaching.

C) ANTI-TWO-BLOCK SYMBOL

This symbol will light when the hoist limit switch contacts open, indicating that a two-blocking condition has occurred (see section 4.1).

D) GEOMETRY DISPLAY

This display shows the geometry selected by the geometry selector switch (7). The will show the selected geometric value (i.e. main boom length, main boom angle, main boom radius, jib angle, jib length, or boom tip height from ground level.)

4. CONSOLE CONTROLS AND DISPLAYS (continued)

E) CRANE SYMBOL

The crane symbol will flash indicating the selection for the geometry display (4.8.D).

F) LOAD DISPLAY

This digital display indicates the total load on the crane. The total load is shown in KIPS (1000's pounds). A reading of 7.6 means the lifted load is 7,600 pounds. NOTE: A load over 200,000lbs will not display a decimal point. The total load is defined as all weight at the end of the hoist line, which includes hook block, load, rigging, etc..

G) TARE SYMBOL

This symbol will light after pressing the button "TARA" (4.4) to have the net load displayed at (4.8.F). When changing the boom position, the tare condition will automatically be canceled.

H) RATED CAPACITY DISPLAY

This display shows the maximum capacity for the crane. The maximum capacity is dependent on the radius and operating mode. The total load is shown in KIPS (1000's pounds). A reading of 7.6 means the rated capacity is 7,600 pounds. NOTE: A load over 200,000lbs will not display a decimal point.

J) PERCENT OF RATED CAPACITY DISPLAY

This bar graph display indicates how much of the crane's rated capacity is being used. The rated capacity of the crane changes as the boom moves through its operating range.

The bar graph display has three sections:

1. A green "safe" section (0% to 90% of the rated capacity);
2. A yellow "prewarning" section (90% to 100% of the rated capacity);
3. A red "overload" section (beyond 100% of rated capacity).

K) OPERATING MODE DISPLAY

This display shows crane operating mode, determined by the crane configuration, capability, and the operating code selected by the crane operator. The operating mode is specified by manufacturer's reference data stored in the software. The operating mode and code may or may not be the same depending on the crane configuration and capability.

L) REEVING DISPLAY

This display shows the number of parts of line used to reeve the hook block (see 4.9 for reeving switch information).

4. CONSOLE CONTROLS AND DISPLAYS (continued)

M) ERROR CODE DISPLAY

In case of an error, this display will show a code number which describes the error (see Section 10. Troubleshooting).

N) TEXT DISPLAY

This display will show one of the system conditions:

- 1) "SYSTST" during test mode, selector switch (7) in position 10;
- 2) "SYSERR" together with "E93" in error code display (8 M);
- 3) "CU-ERR" together with "E94" in error code display (8 M).
- 4) "360 DEG" or "OVR REAR", working range definition
- 5) "RIG MODE" System is by-passed and in rigging mode

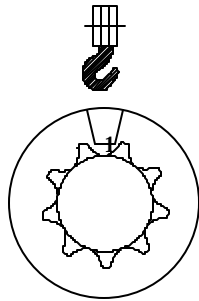
P) RADIUS/ANGLE SYMBOL

The corresponding segment of this symbol will light with regard to whether the load chart is angle-based or radius-based.

Q) LIFTING CONFIGURATION SYMBOL

The applicable symbol will illuminate, to indicate the lifting configuration of the crane, i.e., lifting "on outriggers" (outrigger symbol) or lifting "on rubber" (tire symbol). The symbol should correspond to the operating mode selected.

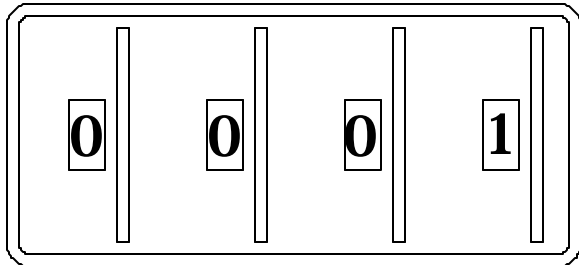
9. REEVING SWITCH



The reeving switch provides the Rated Capacity Limiter with information regarding the number of parts of line used to reeve the hook block. The operator selects the number of lines using the 16 position switch (1 to 15 and N), which are shown under the control knob window, when it is turned. The 'N' position automatically selects the maximum parts of line defined in the software for a operating mode.

4. CONSOLE CONTROLS AND DISPLAYS (continued)

10. OPERATING CODE SELECTOR SWITCH



These thumb wheel switches are used to select the operating code of the crane. Each possible configuration is shown in the Operating Codes Section. The operating or configuration codes are specific to crane model.

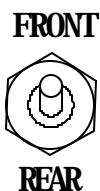


The crane operator must select the correct operating mode to match the crane configuration or the RCL System will not provide the operator with the correct information

Select the operating mode in the Operating Codes Section as follows:

- a) Locate the crane configuration in The Operating Codes Section.
- b) Identify the operating code that corresponds with the existing main boom and/or jib length.
- c) Turn each thumb wheel switch individually until the selected crane operating code is shown on the operating code selector switch.

11. HOIST SELECTOR SWITCH



A toggle switch, on the console, permits the operator to select either the FRONT HOIST or REAR HOIST, depending on the crane configuration and lifting requirements. The system will then automatically select the appropriate maximum line pull, based upon stored data for wire rope type being used.

5. LOCKOUT CONTROLS

5.1 CONTROL LOCKOUT OVERRIDE KEYSWITCH

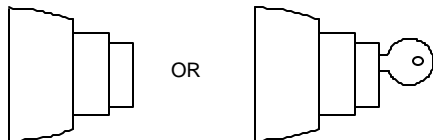
A key-actuated switch, installed on the central processor unit, enables the operator to override the control lockout feature for the load/A2B circuits. Since this switch deactivates the lockout function of the RCL system, the following instructions **MUST** be adhered to:

The bypass switch must be used with discretion. **OVERRIDING THE CONTROL LOCKOUT SYSTEM CAN RESULT IN INJURY TO PERSONNEL, DAMAGE TO THE CRANE AND/OR PROPERTY.** When overriding the system an operator must be fully aware of the crane capabilities defined by the load charts for the crane.

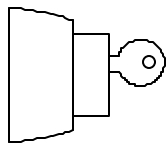


NEVER use the by-pass switch to either overload or operate the crane out of the manufactures allowable or safe operating range.

To override the lockout features: insert the key, turn the switch to the right, press in, and turn key back to the left. The key cannot be removed, and system lockouts are by-passed. To return to normal operation simply turn the key to the right and allow the key switch to spring out and to the left. The key should be remove and kept in a safe place. The following illustration shows the keyswitch positions.



KEYSWITCH IN NORMAL OPERATION, PLUNGER OUT →



KEYSWITCH IN OVERRIDE POSITION, PLUNGER IN ←

6. PRE-OPERATION INSPECTION

Prior to operating the crane, visually inspect the RCL System to ensure that the system is properly electrically connected and mounted on the crane. Inspect the console, central unit, cable reel, A2B switch(es) and weight(s), linerider(s), junction box(es), and wire cable for damages or defects.

1. Check the linerider(s) for binding.
2. Check the A2B switch(es) and weight(s) for free movement by cycling.
3. Check the anti two-block switch weight for proper installation on the main hoist load line. The hoist line runs through the A2B weight. With even parts of hoisting line, the weight shall be attached to the dead-end line. With odd parts of hoisting line, the weight shall be attached to the line of lowest speed.

PRE-OPERATION INSPECTION (continued)

4. Check the installation of the A2B retainer (when applicable - see the above section.)

Locking Procedure (see Fig. 1 and 2): Pull the cable out of the switch and bend back parallel to the boom and hold (1). Slide the retainer from left side with its slot over the cable between the crimped stop and the switch (2). Push it firmly straight onto the cable guide of the Anti Two-Block switch (3). Straighten the cable completely into the slot and release the cable (4). Turn the flag of the retainer for best visibility for the operator (5).

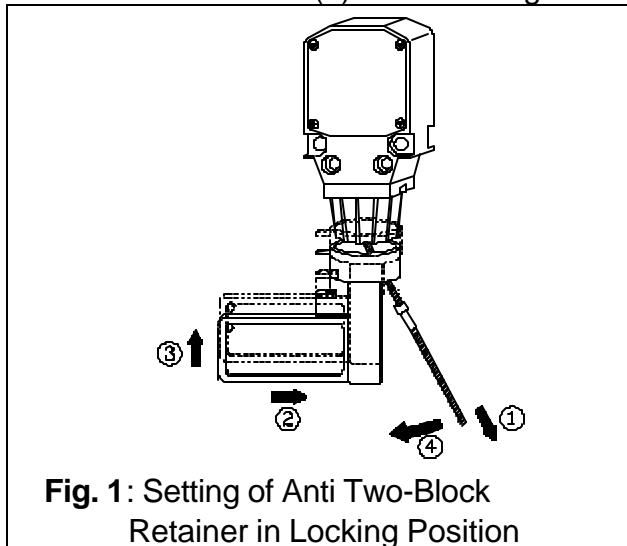


Fig. 1: Setting of Anti Two-Block Retainer in Locking Position

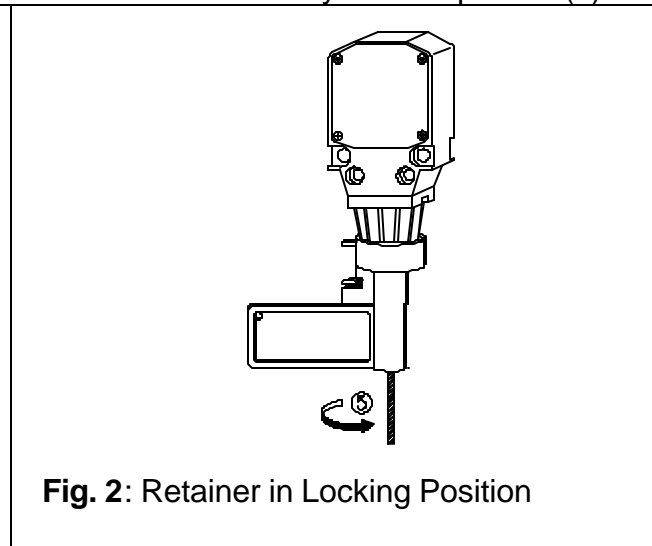


Fig. 2: Retainer in Locking Position

Removal and Storage Procedure (see Fig. 3 and 4): Pull the cable out of the switch (1) and bend back parallel to the boom and hold (2). Move the retainer down (3) and then left (4) to remove it from the Anti Two-Block switch. Release the cable. For storage slide the retainer from right side (5) over the Anti Two-Block switch until the clips (A) lock into the holes (B).

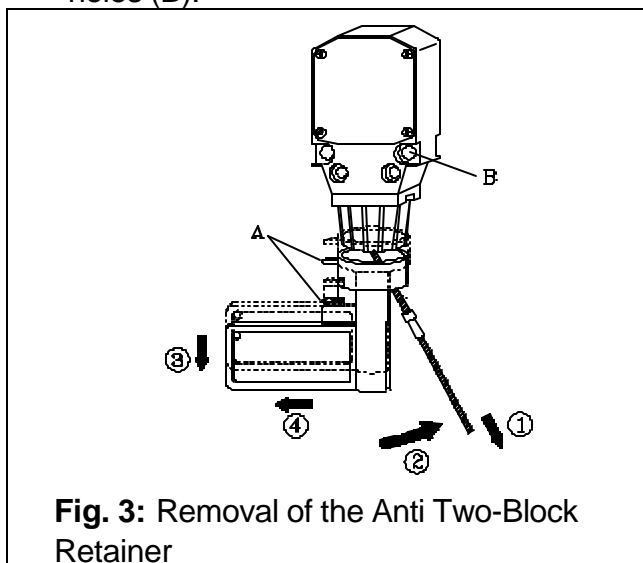


Fig. 3: Removal of the Anti Two-Block Retainer

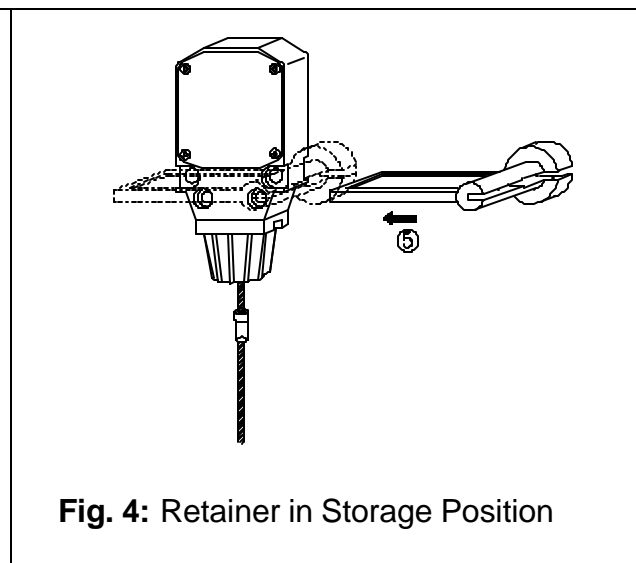


Fig. 4: Retainer in Storage Position

7. SYSTEM OPERATION

After performing the operational inspection and properly setting the operating code and parts of line for the crane configuration, the Rated Capacity Limiter (RCL) is fully automatic. Therefore, it is imperative that the system setup be completed according to the following procedure. The setup must agree with the real rigging state of the crane.

1. Select the operating code in The Operating Codes Section as follows:
 - a) Locate the crane configuration in The Operating Codes Section.
 - b) Identify the operating code that corresponds with the existing main boom and or jib length.
 - c) Turn each thumb wheel switch (4.10) individually until the selected crane operating code is shown on the operating code selection switch.



The crane operator must select the correct operating code to match the crane configuration or the RCL System will not provide the operator with the correct information

2. Select the parts of lines used during the lift (4.9)
3. Select the hoist with the hoist select switch (4.11)
4. Review section 6 to ensure A2B switch(es) and weight(s) are properly installed.

NOTE: Possible system code letter messages:

O = OVERLOAD

P = PREWARNING

H = ANTI-TWO-BLOCK WARNING

8. SERVICE AND MAINTENANCE

Daily maintenance of the load moment indicator consists of inspecting:

1. The electrical wiring connecting the various parts of the system. If electrical wiring is damaged, it shall be replaced immediately.
2. Check the anti two-block limit switches for freedom of movement.
3. Verify that the displayed main boom angle agrees with the actual angle.
4. Inspect linerider sheave. Lubricate as necessary.

Other than correcting the problems identified in the Malfunctions Table and replacing faulty mechanical parts and cables, all other repairs shall be performed by PAT Authorized Service Representatives.

9. OPERATIONAL TEST

The operation test will test the Rated Capacity Limiter System and verifies the system sensors are functioning properly. This test should be completed periodically or anytime there is an indication of inaccuracy.



The following tests shall be performed with care to prevent damage to the machine or injury to personnel. Proper system function requires successful completion of these tests before operating the machine.

If the operator cannot clearly see the hook block approaching the boom head, an assistant must watch the hook block.

The operator should be prepared to stop the machine immediately, should the Rated Capacity Limiter (RCL) System not function properly by lighting the red warning light and /or sounding the audible alarm.

Any structural modifications or changes to the crane shall require verification of the crane's RCL System calibration.

1. Start the crane in accordance with crane operator's manual.
2. Test display using the geometry selector switch.
3. Check that anti-two-block indicator and audible alarm function properly by manually lifting the weight attached to the A2B switches on the crane. When the weight is lifted, the audible alarm should sound, the anti two-block alarm light should light. (See SAE J1305 for two block warning and limit system operation)
4. Slowly raise the main boom hook block to bring it into contact with the A2B switch weight.

NOTE: If the operator cannot see the load handling device approaching the boom nose, he shall have an assistant (signal person) watch the load handling device. The operator shall be prepared to stop the machine immediately should the RCL System not function properly by lighting the red warning light, sounding the audible alarm and locking the hoist up function.

9. OPERATIONAL TEST (continued)

When the hook block contacts the weight, the red anti-two-block indicator should light and the audible alarm should sound. NOTE: The hoist up function of the crane will be disabled. Lower the hook block to eliminate the two-block condition.



If the light and audible alarm do not function as described and the crane movements are not stopped, the system is not working properly. The malfunction shall be corrected before operating the crane.

5. If the crane is equipped with a boom extension, repeat the test procedure for the boom extension anti two-block switch.
6. Check that displayed length of main boom agrees with actual length. (Verify operating code selection before checking length)
7. Check that displayed angle of main boom agrees with actual angle. (See SAE J375 for recommended tolerances)
8. Check that displayed operating radius of crane agrees with actual radius. (See SAE J375 for recommended tolerances)
9. Check the load display by lifting a load of known weight. (See SAE J376 for recommended tolerances)

NOTE: Total load include the weight of the hook block, slings, and auxiliary load handling devices. Their combined weights shall be subtracted from the listed load capacities as stated on the load capacity chart to obtain the net load to be lifted.



If any of the displays reflects a deviation between displayed and actual values, an authorized PAT service representative shall be called for repair of the system or verification of the crane's LMI calibration.

10. TROUBLESHOOTING GUIDE

The console display will indicate an error code at the geometry display (4.8.D), if an error occurs in the system.

A list of error codes are shown below. The troubleshooting guide in this section may help you correct the problem. If the problem can not be corrected, contact your dealer for further instructions.

If the error concerns electronic processing (component boards), the repair must be made by factory-trained (PAT) service personnel.

All repairs must be performed by PAT Authorized Service Representatives.

WARNING: THE ERROR MUST BE CORRECTED BEFORE OPERATING THE CRANE.

Error Codes with Description:

01: Fallen below the radius angle or range angle	27: Error in the no-load moment correction
02: Radius range exceeded	29: Error in the reference voltage
03: Prohibited slewing range	31: Error in the system program PROM 1
04: Operating mode not existing	32: Error in the system program PROM 2
06: Prohibited angle range	33: Error in the system program PROM 3
07: Error overload relay	34: Error in the system program PROM 4
08: Error hoist end switch relay	38: Error in the system program in LMI
09: Error relay 2	41: Error in the RAM memory 1
11: Error in the length registration	42: Error in the RAM memory 2
13: Error in the auxiliary force channel registration	51: Error in the data memory PROM 1
14: Error in the main force channel registration	52: Error in the data memory PROM 2
15: Error in the angle registration main boom	53: Error in the data memory PROM 3
16: Error in the angle registration jib	54: Error in the data memory PROM 4
17: Error in the no-load moment correction	55: Error in the data memory PROM 5
18: Error in the reference voltage	56: Error in the data memory PROM 6
19: Error in the reference voltage	57: Error in the data memory PROM 7
20: Error in analog voltages	58: Error in the data memory PROM 8
23: Error in the auxiliary force channel registration	59: Error in the data memory PROM 9
24: Error in the main force channel registration	91: No data transmission from the console
25: Error in the angle registration main boom	92: Error in the data transmission from the console
26: Error in the angle registration jib	93: Error in the data transmission to the console
	94: No data transmission to the console

1. ERROR CODE CHART

ERROR DISPLAY	ERROR	CAUSE	ACTION
E 01	Fallen below radius or angle range	Fallen below the minimum radius or angle given in the load chart due to rising the boom too far.	Put boom back to a radius or angle given in the load chart.
E 02	Radius or angle range exceeded.	The maximum radius or angle given in the load chart was exceed due to lowering the boom too far.	Raise boom back to a radius or angle given in the load chart.
E 03	Prohibited slewing range (no load area).	Slewing range prohibited with load.	Slew back into permissible range.
E 04	Operating mode not available.	Operating mode switch on the console set incorrectly.	Set operating mode switch correctly to the code assigned to the operating mode of the machine. (see Section 9 operator's handbook)
E 06	Angle luffing jib exceeded.	The maximum angle given in the corresponding load chart was exceeded due to lowering the luffing jib too much.	Raise luffing jib to an angle given in the load chart.
E 07	No acknowledge signal from overload relay.	Hoist limit switch relay is stuck, defective, or not being selected.	Replace relay
E 08	No acknowledge signal from hoist limit switch relay	Hoist limit switch relay is stuck, defective, or not being selected.	Replace relay
E 09	No acknowledge signal from relay 2.	Relay 2 is stuck, defective, or not being selected.	Replace relay
E 13	Fallen below lower limiting value for the measuring channel "auxiliary force".	Cable from central unit to the force transducer defective or water in the plugs. Electronic component in the measuring channel defective.	Check cable and plugs; replace items as necessary. See Section 3, force transducer adjustments.
E 14	Fallen below lower limiting value for the measuring channel "force-main hoist".	Cable from central unit to the force transducer defective or water in the plugs. Electronic component in the measuring channel defective.	Check cable and plugs; replace items as necessary. See Section 3, force transducer adjustments.
E 15	Fallen below lower limiting value for the measuring channel "angle main boom".	Cable from central unit to the angle sensor defective or loose, or water in the plugs. Electronic component the measuring channel defective.	Check cable and plugs; replace items as necessary. See Section 2, angle sensor adjustments.

1. ERROR CODE CHART (continued)

ERROR DISPLAY	ERROR	CAUSE	ACTION
E 16	Fallen below lower limiting value for the measuring channel "angle luffing jib".	Cable from central unit to the angle sensor defective or loose, or water in the plugs. Electronic component the measuring channel defective.	Check cable and plugs; replace items as necessary. See Section 2, angle sensor adjustments.
E 18	Error in the reference voltage.	Electronic component on main board defective.	Replace main board & reset force transducers as shown in Section 3.2.
E 19	Error in the reference voltage.	Electronic component on main board defective.	Replace main board & reset force transducers as shown in Section 3.2.
E 20	No analog voltage.	Crane voltage to low Short in supply voltage from crane to central unit. Voltage converter is defective on main board	Check crane voltage Check wiring Replace main board & reset force transducers as shown in Section 3.2.
E 23	Upper limiting value for the measuring channel "auxiliary-force" exceeded.	Cable from central unit to the force transducer defective or water in the plugs. Electronic component in the measuring channel defective.	Check cable and plugs; replace items as necessary. Replace main board & reset force transducers as shown in Section 3.2.
E 24	Upper limiting value for the measuring channel "force - main hoist" exceeded.	Cable from central unit to the force transducer defective or water in the plugs. Electronic component in the measuring channel defective.	Check cable and plugs; replace items as necessary. Replace main board & reset force transducers as shown in Section 3.2.
E 25	Upper limiting value for the measuring channel "angle main boom" exceeded.	Cable from central unit to the angle sensor defective or loose, or water in the plugs. Electronic component the measuring channel defective.	Check cable and plugs; replace items as necessary. See Section 2, angle sensor adjustments.
E 26	Upper limiting value for the measuring channel "angle luffing jib" exceeded.	Cable from central unit to the angle sensor defective or loose, or water in the plugs. Electronic component the measuring channel defective.	Check cable and plugs; replace items as necessary. See Section 2, angle sensor adjustments.

1. ERROR CODE CHART (continued)

ERROR DISPLAY	ERROR	CAUSE	ACTION
E 28	Error in the reference voltage.	Electronic component on main board defective.	Replace main board & reset force transducers as shown in Section 3.2.
E 31-34	Error in system software.	Eprom's with system software defective.	Replace system eprom Replace main board & reset force transducers as shown in Section 3.2.
E 37	Error in system software.	Eprom's with system software defective.	Replace system eprom Replace main board & reset force transducers as shown in Section 3.2.
E 38	Wrong system or data eprom.	Eprom's with system software does not correspond with data eprom.	Replace system eprom
E 41-42	Error on the ram.	Ram range on the main board defective.	Replace main board & reset force transducers as shown in Section 3.2.
E 45	Error in internal communications	Electronic component on main board defective.	Replace main board & reset force transducers as shown in Section 3.2.
E 45	Error in read/write memory.	Electronic component on main board defective.	Replace main board & reset force transducers as shown in Section 3.2.
E 51-59	Error in data memory.	Data eprom's defective Electronic component on main board defective.	Replace data eprom Replace main board & reset force transducers as shown in Section 3.2.
E71	Incorrect acknowledgment of the 1. Relay on the terminal board a101.	Anti two-block relay is stuck or defective. Anti two-block relay is not being selected due to a break on the terminal board a101, main board or ribbon cables.	Replace 1. Relay. Check terminal board a101, main board and ribbon cables as well as replace defective part, if necessary.
E72 - 77	analogous to E71 for the relays 2...7.	Analogous to e71 for the relays 2...7.	Analogous to E71 for the relays 2..7.
E89	Change of the operating code during lifting a load.	The operating mode switch in the console was used during lifting a load.	Lower the load and set the operating mode switch correctly to the code assigned to the actual operating mode of the crane.

1. ERROR CODE CHART (continued)

ERROR DISPLAY	ERROR	CAUSE	ACTION
E 91-92	No data transmission from console.	Plug on console loose; cable defective.	Check cable and plug; replace console, as necessary.
E 93-94	Error in the data transmission to the console.	Cable to the console not plugged in or interrupted. Eprom not installed or defective Defect in the central electronics (main board).	Check cable; attach plug properly. Replace Eproms Replace main board & reset force transducers as shown in Section 3.2.

E-19/20/29 Error in reference supply voltage. Identify supply voltage that is being shorted, (+/- 5 or + -9) disconnect ribbon cable. If power supply returns then problem is external. Reconnect ribbon cables and disconnect all components individually to identify the location of the short.

HANDBOOK REVISIONS

REV	DATE	NAME	DESCRIPTION
-	01/31/97	CSH	General operating handbook created for use with specific operating codes handbook.
A	06/20/97	CSH	Pg 11 - lockout overrides both A2B and load circuits
B	10/20/97	CSH	Pg 09 - N) Add to text display "RIG MODE" Pg 11 - Add keyswitch illustration Pg 12 - Remove 6.4 A2B condition instructions Pg 15 - Chg. Service and Maintenance

NOTICE

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REFERENCE:

- Operator's Handbook 031-300-190-023 for DS350/1225/1229 Consoles.

Read and understand all warning, operating instructions, the chart values on the lifting capacity plate(s), and in the crane rating manual provided with this machine before operating crane. Operation which does not follow these instructions may result in an accident.

TABLE OF CONTENTS

Main boom, on outriggers, with ABC + no bumper ctwt. 1

Main boom, on outriggers, with ABC+A bumper ctwt..... 2

Main boom, on outriggers, with ABC+AB bumper ctwt. 3

Main boom on tires with ABC+no bumper ctwt. 1024AG heavy duty rims on rear axles 4

Main boom, on tires with ABC+no bumper ctwt. 1024MD standard rims on rear axles 5

Main boom pick with jib erected, but not used; on outriggers ABC+0 ctwt. for 50' thru 200' boom
 ABC+AB ctwt. for 210' thru 210' boom Jib 30' or 40' 6

Main boom pick with jib erected, but not used; on outriggers ABC+0 ctwt. for 50' thru 200' boom
 ABC+AB ctwt. for 210' thru 210' boom Jib 50' or 60' 7

Main boom pick with jib erected, but not used; on outriggers ABC+0 ctwt. for 50' thru 200' boom
 ABC+AB ctwt. for 210' thru 210' boom Jib 70' or 80' 8

Main boom pick with jib erected, but not used; on outriggers ABC+0 ctwt. for 50' thru 200' boom
 ABC+AB ctwt. for 210' thru 210' boom Jib 90' or 100'..... 9

On outriggers ABC+0 ctwt. for 50' thru 200' boom ABC+AB ctwt. for 210' thru 210' boom
 Jib mode Jib 30', Offset 5° 10

On outriggers ABC+0 ctwt. for 50' thru 200' boom ABC+AB ctwt. for 210' thru 210' boom
 Jib mode Jib 30', Offset 15° 11

On outriggers ABC+0 ctwt. for 50' thru 200' boom ABC+AB ctwt. for 210' thru 210' boom
 Jib mode Jib 30', Offset 25° 12

On outriggers ABC+0 ctwt. for 50' thru 200' boom ABC+AB ctwt. for 210' thru 210' boom
 Jib mode Jib 40', Offset 5° 13

On outriggers ABC+0 ctwt. for 50' thru 200' boom ABC+AB ctwt. for 210' thru 210' boom
 Jib mode Jib 40', Offset 15° 14

On outriggers ABC+0 ctwt. for 50' thru 200' boom ABC+AB ctwt. for 210' thru 210' boom
 Jib mode Jib 40', Offset 25° 15

On outriggers ABC+0 ctwt. for 50' thru 200' boom ABC+AB ctwt. for 210' thru 210' boom
 Jib mode Jib 50', Offset 5° 16

On outriggers ABC+0 ctwt. for 50' thru 200' boom ABC+AB ctwt. for 210' thru 210' boom
 Jib mode Jib 50', Offset 15° 17

On outriggers ABC+0 ctwt. for 50' thru 200' boom ABC+AB ctwt. for 210' thru 210' boom
 Jib mode Jib 50', Offset 25° 18

Read and understand all warning, operating instructions, the chart values on the lifting capacity plate(s), and in the crane rating manual provided with this machine before operating crane. Operation which does not follow these instructions may result in an accident.

TABLE OF CONTENTS

On outriggers ABC+0 cwt. for 50' thru 200' boom ABC+AB cwt. for 210' thru 210' boom
 Jib mode Jib 60', Offset 5°19

On outriggers ABC+0 cwt. for 50' thru 200' boom ABC+AB cwt. for 210' thru 210' boom
 Jib mode Jib 60', Offset 15°20

On outriggers ABC+0 cwt. for 50' thru 200' boom ABC+AB cwt. for 210' thru 210' boom
 Jib mode Jib 60', Offset 25°21

On outriggers ABC+0 cwt. for 50' thru 200' boom ABC+AB cwt. for 210' thru 210' boom
 Jib mode Jib 70', Offset 5°22

On outriggers ABC+0 cwt. for 50' thru 200' boom ABC+AB cwt. for 210' thru 210' boom
 Jib mode Jib 70', Offset 15°23

On outriggers ABC+0 cwt. for 50' thru 200' boom ABC+AB cwt. for 210' thru 210' boom
 Jib mode Jib 70', Offset 25°24

On outriggers ABC+0 cwt. for 50' thru 200' boom ABC+AB cwt. for 210' thru 210' boom
 Jib mode Jib 80', Offset 5°25

On outriggers ABC+0 cwt. for 50' thru 200' boom ABC+AB cwt. for 210' thru 210' boom
 Jib mode Jib 80', Offset 15°26

On outriggers ABC+0 cwt. for 50' thru 200' boom ABC+AB cwt. for 210' thru 210' boom
 Jib mode Jib 80', Offset 25°27

On outriggers ABC+0 cwt. for 50' thru 200' boom ABC+AB cwt. for 210' thru 210' boom
 Jib mode Jib 90', Offset 5°28

On outriggers ABC+0 cwt. for 50' thru 200' boom ABC+AB cwt. for 210' thru 210' boom
 Jib mode Jib 90', Offset 15°29

On outriggers ABC+0 cwt. for 50' thru 200' boom ABC+AB cwt. for 210' thru 210' boom
 Jib mode Jib 90', Offset 25°30

On outriggers ABC+0 cwt. for 50' thru 200' boom ABC+AB cwt. for 210' thru 210' boom
 Jib mode Jib 100', Offset 5°31

On outriggers ABC+0 cwt. for 50' thru 200' boom ABC+AB cwt. for 210' thru 210' boom
 Jib mode Jib 100', Offset 15°.....32

On outriggers ABC+0 cwt. for 50' thru 200' boom ABC+AB cwt. for 210' thru 210' boom
 Jib mode Jib 100', Offset 25°.....33

Main Boom on outriggers with ABC + no bumper cwt.34

Main Boom on outriggers with ABC + A bumper cwt.35

Main boom, on intermediate outrigger position with ABC + no bumper cwt.36

Main boom, on intermediate outrigger position with ABC + A bumper cwt.37

Main Boom with Tip Extension.....38

Read and understand all warning, operating instructions, the chart values on the lifting capacity plate(s), and in the crane rating manual provided with this machine before operating crane. Operation which does not follow these instructions may result in an accident.

LINK-BELT HC-248H ELCAS
OPERATING CODE SWITCH POSITIONS

**Main boom, on outriggers,
with ABC + no bumper ctwt.**

MAIN BOOM LENGTH (ft)	CODE
50	0001
60	0002
70	0003
80	0004
90	0005
100	0006
110	0007
120	0008
130	0009
140	0010
150	0011
160	0012
170	0013
180	0014
190	0015
200	0016
210	0017
220	0018
230	0019
240	0020

Read and understand all warning, operating instructions, the chart values on the lifting capacity plate(s), and in the crane rating manual provided with this machine before operating crane. Operation which does not follow these instructions may result in an accident.

LINK-BELT HC-248H ELCAS
OPERATING CODE SWITCH POSITIONS

**Main boom, on outriggers,
with ABC + A bumper ctwt.**

MAIN BOOM LENGTH (ft)	CODE
100	0101
110	0102
120	0103
130	0104
140	0105
150	0106
160	0107
170	0108
180	0109
190	0110
200	0111
210	0112
220	0113
230	0114
240	0115
250	0116
260	0117

Read and understand all warning, operating instructions, the chart values on the lifting capacity plate(s), and in the crane rating manual provided with this machine before operating crane. Operation which does not follow these instructions may result in an accident.

LINK-BELT HC-248H ELCAS
OPERATING CODE SWITCH POSITIONS

**Main boom, on outriggers,
with ABC+AB bumper ctwt.**

MAIN BOOM LENGTH (ft.)	CODE
180	0149
190	0150
200	0151
210	0152
220	0153
230	0154
240	0155
250	0156
260	0157
270	0158
280	0159

Read and understand all warning, operating instructions, the chart values on the lifting capacity plate(s), and in the crane rating manual provided with this machine before operating crane. Operation which does not follow these instructions may result in an accident.

LINK-BELT HC-248H ELCAS
OPERATING CODE SWITCH POSITIONS

**Main boom on tires with ABC+no bumper cwt.
1024AG heavy duty rims on rear axles**

MAINBOOM LENGTH (ft)	CODE
50	0181
60	0182
70	0183
80	0184
90	0185
100	0186
110	0187
120	0188
130	0189
140	0190
150	0191

Read and understand all warning, operating instructions, the chart values on the lifting capacity plate(s), and in the crane rating manual provided with this machine before operating crane. Operation which does not follow these instructions may result in an accident.

LINK-BELT HC-248H ELCAS
OPERATING CODE SWITCH POSITIONS

**Main boom, on tires with ABC+no bumper ctwt.
1024MD standard rims on rear axles**

MAIN BOOM LENGTH (ft)	CODE
50	0181
60	0182
70	0183
80	0184
90	0185
100	0186
110	0187
120	0188
130	0189
140	0190
150	0191

Read and understand all warning, operating instructions, the chart values on the lifting capacity plate(s), and in the crane rating manual provided with this machine before operating crane. Operation which does not follow these instructions may result in an accident.

LINK-BELT HC-248H ELCAS
OPERATING CODE SWITCH POSITIONS

Main boom pick with jib erected, but not used; on outriggers
ABC+0 cwt. for 50' thru 200' boom
ABC+AB cwt. for 210' thru 240' boom
Jib 30' or 40'

MAINBOOM LENGTH (ft)	CODE
50	4201
60	4202
70	4203
80	4204
90	4205
100	4206
110	4207
120	4208
130	4209
140	4210
150	4211
160	4212
170	4213
180	4214
190	4215
200	4216
210	4401
220	4402
230	4403
240	4404

Read and understand all warning, operating instructions, the chart values on the lifting capacity plate(s), and in the crane rating manual provided with this machine before operating crane. Operation which does not follow these instructions may result in an accident.

LINK-BELT HC-248H ELCAS
OPERATING CODE SWITCH POSITIONS

Main boom pick with jib erected, but not used; on outriggers
ABC+0 ctwt. for 50' thru 200' boom
ABC+AB ctwt. for 210' thru 240' boom
Jib 50' or 60'

MAIN BOOM LENGTH (ft)	CODE
50	4241
60	4242
70	4243
80	4244
90	4245
100	4246
110	4247
120	4248
130	4249
140	4250
150	4251
160	4252
170	4253
180	4254
190	4255
200	4256
210	4411
220	4412
230	4413
240	4414

Read and understand all warning, operating instructions, the chart values on the lifting capacity plate(s), and in the crane rating manual provided with this machine before operating crane. Operation which does not follow these instructions may result in an accident.

LINK-BELT HC-248H ELCAS
OPERATING CODE SWITCH POSITIONS

Main boom pick with jib erected, but not used; on outriggers
ABC+0 cwt. for 50' thru 200' boom
ABC+AB cwt. for 210' thru 240' boom
Jib 70' or 80'

MAIN BOOM LENGTH (ft)	CODE
50	4301
60	4302
70	4303
80	4304
90	4305
100	4306
110	4307
120	4308
130	4309
140	4310
150	4311
160	4312
170	4313
180	4314
190	4315
200	4316
210	4421
220	4422
230	4423
240	4424

Read and understand all warning, operating instructions, the chart values on the lifting capacity plate(s), and in the crane rating manual provided with this machine before operating crane. Operation which does not follow these instructions may result in an accident.

LINK-BELT HC-248H ELCAS
OPERATING CODE SWITCH POSITIONS

Main boom pick with jib erected, but not used; on outriggers
ABC+0 cwt. for 50' thru 200' boom
ABC+AB cwt. for 210' thru 240' boom
Jib 90' or 100'

MAIN BOOM LENGTH (ft)	CODE
50	4341
60	4342
70	4343
80	4344
90	4345
100	4346
110	4347
120	4348
130	4349
140	4350
150	4351
160	4352
170	4353
180	4354
190	4355
200	4356
210	4431
220	4432
230	4433
240	4434

Read and understand all warning, operating instructions, the chart values on the lifting capacity plate(s), and in the crane rating manual provided with this machine before operating crane. Operation which does not follow these instructions may result in an accident.

LINK-BELT HC-248H ELCAS
OPERATING CODE SWITCH POSITIONS

On outriggers
ABC+0 cwt. for 50' thru 200' boom
ABC+AB cwt. for 210' thru 240' boom
Jib mode
Jib 30', Offset 5°

MAIN BOOM LENGTH (ft)	CODE
50	0201
60	0202
70	0203
80	0204
90	0205
100	0206
110	0207
120	0208
130	0209
140	0210
150	0211
160	0212
170	0213
180	0214
190	0215
200	0216
210	0217
220	0218
230	0219
240	0220

Read and understand all warning, operating instructions, the chart values on the lifting capacity plate(s), and in the crane rating manual provided with this machine before operating crane. Operation which does not follow these instructions may result in an accident.

LINK-BELT HC-248H ELCAS
OPERATING CODE SWITCH POSITIONS

On outriggers
ABC+0ctwt. for 50' thru 200' boom
ABC+AB ctwt. for 210' thru 240' boom
Jib mode
Jib 30', Offset 15°

MAIN BOOM LENGTH (ft)	CODE
50	0241
60	0242
70	0243
<hr/>	
80	0244
90	0245
100	0246
<hr/>	
110	0247
120	0248
130	0249
<hr/>	
140	0250
150	0251
160	0252
<hr/>	
170	0253
180	0254
190	0255
<hr/>	
200	0256
210	0257
220	0258
<hr/>	
230	0259
240	0260

Read and understand all warning, operating instructions, the chart values on the lifting capacity plate(s), and in the crane rating manual provided with this machine before operating crane. Operation which does not follow these instructions may result in an accident.

LINK-BELT HC-248H ELCAS
OPERATING CODE SWITCH POSITIONS

On outriggers
ABC+0ctwt. for 50' thru 200' boom
ABC+AB ctwt. for 210' thru 240' boom
Jib mode
Jib 30', Offset 25°

MAIN BOOM LENGTH (ft)	CODE
50	0301
60	0302
70	0303
80	0304
90	0305
100	0306
110	0307
120	0308
130	0309
140	0310
150	0311
160	0312
170	0313
180	0314
190	0315
200	0316
210	0317
220	0318
230	0319
240	0320

Read and understand all warning, operating instructions, the chart values on the lifting capacity plate(s), and in the crane rating manual provided with this machine before operating crane. Operation which does not follow these instructions may result in an accident.

LINK-BELT HC-248H ELCAS
OPERATING CODE SWITCH POSITIONS

Onoutriggers

ABC+0 ct wt. for 50' thru 200' boom

ABC+AB ctwt. for 210' thru 240' boom

Jib mode

Jib 40', Offset 5°

MAIN BOOM LENGTH (ft)	CODE
50	1001
60	1002
70	1003
80	1004
90	1005
100	1006
110	1007
120	1008
130	1009
140	1010
150	1011
160	1012
170	1013
180	1014
190	1015
200	1016
210	1017
220	1018
230	1019
240	1020

Read and understand all warning, operating instructions, the chart values on the lifting capacity plate(s), and in the crane rating manual provided with this machine before operating crane. Operation which does not follow these instructions may result in an accident.

LINK-BELT HC-248H ELCAS
OPERATING CODE SWITCH POSITIONS

On outriggers
ABC+0 ct wt. for 50' thru 200' boom
ABC+AB ctwt. for 210' thru 240' boom
Jib mode
Jib 40', Offset 15°

MAIN BOOM LENGTH (ft)	CODE
50	1041
60	1042
70	1043
80	1044
90	1045
100	1046
110	1047
120	1048
130	1049
140	1050
150	1051
160	1052
170	1053
180	1054
190	1055
200	1056
210	1057
220	1058
230	1059
240	1060

Read and understand all warning, operating instructions, the chart values on the lifting capacity plate(s), and in the crane rating manual provided with this machine before operating crane. Operation which does not follow these instructions may result in an accident.

LINK-BELT HC-248H ELCAS
OPERATING CODE SWITCH POSITIONS

On outriggers
ABC+0 ct wt. for 50' thru 200' boom
ABC+AB ctwt. for 210' thru 240' boom
Jib mode
Jib 40', Offset 25°

MAIN BOOM LENGTH (ft)	CODE
50	1101
60	1102
70	1103
80	1104
90	1105
100	1106
110	1107
120	1108
130	1109
140	1110
150	1111
160	1112
170	1113
180	1114
190	1115
200	1116
210	1117
220	1118
230	1119
240	1120

Read and understand all warning, operating instructions, the chart values on the lifting capacity plate(s), and in the crane rating manual provided with this machine before operating crane. Operation which does not follow these instructions may result in an accident.

LINK-BELT HC-248H ELCAS
OPERATING CODE SWITCH POSITIONS

On outriggers
ABC+0 ct wt. for 50' thru 200' boom
ABC+AB ctwt. for 210' thru 240' boom
Jib mode
Jib 50', Offset 5°

MAIN BOOM LENGTH (ft)	CODE
50	1141
60	1142
70	1143
<hr/>	
80	1144
90	1145
100	1146
<hr/>	
110	1147
120	1148
130	1149
<hr/>	
140	1150
150	1151
160	1152
<hr/>	
170	1153
180	1154
190	1155
<hr/>	
200	1156
210	1157
220	1158
<hr/>	
230	1159
240	1160

Read and understand all warning, operating instructions, the chart values on the lifting capacity plate(s), and in the crane rating manual provided with this machine before operating crane. Operation which does not follow these instructions may result in an accident.

LINK-BELT HC-248H ELCAS
OPERATING CODE SWITCH POSITIONS

On outriggers
ABC+0 ct wt. for 50' thru 200' boom
ABC+AB ctwt. for 210' thru 240' boom
Jib mode
Jib 50', Offset 15°

MAIN BOOM LENGTH (ft)	CODE
50	1201
60	1202
70	1203
80	1204
90	1205
100	1206
110	1207
120	1208
130	1209
140	1210
150	1211
160	1212
170	1213
180	1214
190	1215
200	1216
210	1217
220	1218
230	1219
240	1220

Read and understand all warning, operating instructions, the chart values on the lifting capacity plate(s), and in the crane rating manual provided with this machine before operating crane. Operation which does not follow these instructions may result in an accident.

LINK-BELT HC-248H ELCAS
OPERATING CODE SWITCH POSITIONS

On outriggers
ABC+0 ct wt. for 50' thru 200' boom
ABC+AB ctwt. for 210' thru 240' boom
Jib mode
Jib 50', Offset 25°

MAIN BOOM LENGTH (ft)	CODE
50	1241
60	1242
70	1243
80	1244
90	1245
100	1246
110	1247
120	1248
130	1249
140	1250
150	1251
160	1252
170	1253
180	1254
190	1255
200	1256
210	1257
220	1258
230	1259
240	1260

Read and understand all warning, operating instructions, the chart values on the lifting capacity plate(s), and in the crane rating manual provided with this machine before operating crane. Operation which does not follow these instructions may result in an accident.

LINK-BELT HC-248H ELCAS
OPERATING CODE SWITCH POSITIONS

On outriggers
ABC+0 ct wt. for 50' thru 200' boom
ABC+AB ctwt. for 210' thru 240' boom
Jib mode
Jib 60', Offset 5°

MAIN BOOM LENGTH (ft)	CODE
50	2001
60	2002
70	2003
80	2004
90	2005
100	2006
110	2007
120	2008
130	2009
140	2010
150	2011
160	2012
170	2013
180	2014
190	2015
200	2016
210	2017
220	2018
230	2019
240	2020

Read and understand all warning, operating instructions, the chart values on the lifting capacity plate(s), and in the crane rating manual provided with this machine before operating crane. Operation which does not follow these instructions may result in an accident.

LINK-BELT HC-248H ELCAS
OPERATING CODE SWITCH POSITIONS

On outriggers
ABC+0 ct wt. for 50' thru 200' boom
ABC+AB ctwt. for 210' thru 240' boom
Jib mode
Jib 60', Offset 15°

MAIN BOOM LENGTH (ft)	CODE
50	2041
60	2042
70	2043
80	2044
90	2045
100	2046
110	2047
120	2048
130	2049
140	2050
150	2051
160	2052
170	2053
180	2054
190	2055
200	2056
210	2057
220	2058
230	2059
240	2060

Read and understand all warning, operating instructions, the chart values on the lifting capacity plate(s), and in the crane rating manual provided with this machine before operating crane. Operation which does not follow these instructions may result in an accident.

LINK-BELT HC-248H ELCAS
OPERATING CODE SWITCH POSITIONS

On outriggers
ABC+0 ct wt. for 50' thru 200' boom
ABC+AB ctwt. for 210' thru 240' boom
Jib mode
Jib 60', Offset 25°

MAIN BOOM LENGTH (ft)	CODE
50	2101
60	2102
70	2103
80	2104
90	2105
100	2106
110	2107
120	2108
130	2109
140	2110
150	2111
160	2112
170	2113
180	2114
190	2115
200	2116
210	2117
220	2118
230	2119
240	2120

Read and understand all warning, operating instructions, the chart values on the lifting capacity plate(s), and in the crane rating manual provided with this machine before operating crane. Operation which does not follow these instructions may result in an accident.

LINK-BELT HC-248H ELCAS
OPERATING CODE SWITCH POSITIONS

On outriggers
ABC+0 ct wt. for 50' thru 200' boom
ABC+AB ctwt. for 210' thru 240' boom
Jib mode
Jib 70', Offset 5°

MAIN BOOM LENGTH (ft)	CODE
50	2141
60	2142
70	2143
80	2144
90	2145
100	2146
110	2147
120	2148
130	2149
140	2150
150	2151
160	2152
170	2153
180	2154
190	2155
200	2156
210	2157
220	2158
230	2159
240	2160

Read and understand all warning, operating instructions, the chart values on the lifting capacity plate(s), and in the crane rating manual provided with this machine before operating crane. Operation which does not follow these instructions may result in an accident.

LINK-BELT HC-248H ELCAS
OPERATING CODE SWITCH POSITIONS

On outriggers
ABC+0 ct wt. for 50' thru 200' boom
ABC+AB ctwt. for 210' thru 240' boom
Jib mode
Jib 70', Offset 15°

MAIN BOOM LENGTH (ft)	CODE
50	2201
60	2202
70	2203
80	2204
90	2205
100	2206
110	2207
120	2208
130	2209
140	2210
150	2211
160	2212
170	2213
180	2214
190	2215
200	2216
210	2217
220	2218
230	2219
240	2220

Read and understand all warning, operating instructions, the chart values on the lifting capacity plate(s), and in the crane rating manual provided with this machine before operating crane. Operation which does not follow these instructions may result in an accident.

LINK-BELT HC-248H ELCAS
OPERATING CODE SWITCH POSITIONS

On outriggers
ABC+0 ct wt. for 50' thru 200' boom
ABC+AB ctwt. for 210' thru 240' boom
Jib mode
Jib 70', Offset 25°

MAIN BOOM LENGTH (ft)	CODE
50	2241
60	2242
70	2243
80	2244
90	2245
100	2246
110	2247
120	2248
130	2249
140	2250
150	2251
160	2252
170	2253
180	2254
190	2255
200	2256
210	2257
220	2258
230	2259
240	2260

Read and understand all warning, operating instructions, the chart values on the lifting capacity plate(s), and in the crane rating manual provided with this machine before operating crane. Operation which does not follow these instructions may result in an accident.

LINK-BELT HC-248H ELCAS
OPERATING CODE SWITCH POSITIONS

On outriggers
ABC+0 ct wt. for 50' thru 200' boom
ABC+AB ctwt. for 210' thru 240' boom
Jib mode
Jib 80', Offset 5°

MAIN BOOM LENGTH (ft)	CODE
50	3001
60	3002
70	3003
80	3004
90	3005
100	3006
110	3007
120	3008
130	3009
140	3010
150	3011
160	3012
170	3013
180	3014
190	3015
200	3016
210	3017
220	3018
230	3019
240	3020

Read and understand all warning, operating instructions, the chart values on the lifting capacity plate(s), and in the crane rating manual provided with this machine before operating crane. Operation which does not follow these instructions may result in an accident.

LINK-BELT HC-248H ELCAS
OPERATING CODE SWITCH POSITIONS

On outriggers
ABC+0 ct wt. for 50' thru 200' boom
ABC+AB ctwt. for 210' thru 240' boom
Jib mode
Jib 80', Offset 15°

MAIN BOOM LENGTH (ft)	CODE
50	3041
60	3042
70	3043
80	3044
90	3045
100	3046
110	3047
120	3048
130	3049
140	3050
150	3051
160	3052
170	3053
180	3054
190	3055
200	3056
210	3057
220	3058
230	3059
240	3060

Read and understand all warning, operating instructions, the chart values on the lifting capacity plate(s), and in the crane rating manual provided with this machine before operating crane. Operation which does not follow these instructions may result in an accident.

LINK-BELT HC-248H ELCAS
OPERATING CODE SWITCH POSITIONS

On outriggers
ABC+0 ct wt. for 50' thru 200' boom
ABC+AB ctwt. for 210' thru 240' boom
Jib mode
Jib 80', Offset 25°

MAIN BOOM LENGTH (ft)	CODE
50	3101
60	3102
70	3103
80	3104
90	3105
100	3106
110	3107
120	3108
130	3109
140	3110
150	3111
160	3112
170	3113
180	3114
190	3115
200	3116
210	3117
220	3118
230	3119
240	3120

Read and understand all warning, operating instructions, the chart values on the lifting capacity plate(s), and in the crane rating manual provided with this machine before operating crane. Operation which does not follow these instructions may result in an accident.

LINK-BELT HC-248H ELCAS
OPERATING CODE SWITCH POSITIONS

On outriggers
ABC+0 ct wt. for 50' thru 200' boom
ABC+AB ctwt. for 210' thru 240' boom
Jib mode
Jib 90', Offset 5°

MAIN BOOM LENGTH (ft)	CODE
50	3141
60	3142
70	3143
80	3144
90	3145
100	3146
110	3147
120	3148
130	3149
140	3150
150	3151
160	3152
170	3153
180	3154
190	3155
200	3156
210	3157
220	3158
230	3159
240	3160

Read and understand all warning, operating instructions, the chart values on the lifting capacity plate(s), and in the crane rating manual provided with this machine before operating crane. Operation which does not follow these instructions may result in an accident.

LINK-BELT HC-248H ELCAS
OPERATING CODE SWITCH POSITIONS

On outriggers
ABC+0 ct wt. for 50' thru 200' boom
ABC+AB ctwt. for 210' thru 240' boom
Jib mode
Jib 90', Offset 15°

MAIN BOOM LENGTH (ft)	CODE
50	3201
60	3202
70	3203
80	3204
90	3205
100	3206
110	3207
120	3208
130	3209
140	3210
150	3211
160	3212
170	3213
180	3214
190	3215
200	3216
210	3217
220	3218
230	3219
240	3220

Read and understand all warning, operating instructions, the chart values on the lifting capacity plate(s), and in the crane rating manual provided with this machine before operating crane. Operation which does not follow these instructions may result in an accident.

LINK-BELT HC-248H ELCAS
OPERATING CODE SWITCH POSITIONS

On outriggers
ABC+0 ct wt. for 50' thru 200' boom
ABC+AB ctwt. for 210' thru 240' boom
Jib mode
Jib 90', Offset 25°

MAIN BOOM LENGTH (ft)	CODE
50	3241
60	3242
70	3243
80	3244
90	3245
100	3246
110	3247
120	3248
130	3249
140	3250
150	3251
160	3252
170	3253
180	3254
190	3255
200	3256
210	3257
220	3258
230	3259
240	3260

Read and understand all warning, operating instructions, the chart values on the lifting capacity plate(s), and in the crane rating manual provided with this machine before operating crane. Operation which does not follow these instructions may result in an accident.

LINK-BELT HC-248H ELCAS
OPERATING CODE SWITCH POSITIONS

On outriggers
ABC+0 ct wt. for 50' thru 200' boom
ABC+AB ctwt. for 210' thru 240' boom
Jib mode
Jib 100', Offset 5°

MAIN BOOM LENGTH (ft)	CODE
50	4001
60	4002
70	4003
80	4004
90	4005
100	4006
110	4007
120	4008
130	4009
140	4010
150	4011
160	4012
170	4013
180	4014
190	4015
200	4016
210	4017
220	4018
230	4019
240	4020

Read and understand all warning, operating instructions, the chart values on the lifting capacity plate(s), and in the crane rating manual provided with this machine before operating crane. Operation which does not follow these instructions may result in an accident.

LINK-BELT HC-248H ELCAS
OPERATING CODE SWITCH POSITIONS

On outriggers
ABC+0 ct wt. for 50' thru 200' boom
ABC+AB ctwt. for 210' thru 240' boom
Jib mode
Jib 100', Offset 15°

MAIN BOOM LENGTH (ft)	CODE
50	4041
60	4042
70	4043
80	4044
90	4045
100	4046
110	4047
120	4048
130	4049
140	4050
150	4051
160	4052
170	4053
180	4054
190	4055
200	4056
210	4057
220	4058
230	4059
240	4060

Read and understand all warning, operating instructions, the chart values on the lifting capacity plate(s), and in the crane rating manual provided with this machine before operating crane. Operation which does not follow these instructions may result in an accident.

LINK-BELT HC-248H ELCAS
OPERATING CODE SWITCH POSITIONS

On outriggers
ABC+0 ct wt. for 50' thru 200' boom
ABC+AB ctwt. for 210' thru 240' boom
Jib mode
Jib 100', Offset 25°

MAIN BOOM LENGTH (ft)	CODE
50	4101
60	4102
70	4103
80	4104
90	4105
100	4106
110	4107
120	4108
130	4109
140	4110
150	4111
160	4112
170	4113
180	4114
190	4115
200	4116
210	4117
220	4118
230	4119
240	4120

Read and understand all warning, operating instructions, the chart values on the lifting capacity plate(s), and in the crane rating manual provided with this machine before operating crane. Operation which does not follow these instructions may result in an accident.

LINK-BELT HC-248H ELCAS
OPERATING CODE SWITCH POSITIONS

**Main Boom on outriggers
with ABC + no bumper ctwt.**

MAIN BOOM (ft)	Land Base	OPERATING CODE		
		Beaufort Wind Force		
		3	4	5
50	5001	5011	5021	5031
60	5002	5012	5022	5032
70	5003	5013	5023	5033
80	5004	5014	5024	5034
90	5005	5015	5025	5035
100	5006	5016	5026	5036
110	5007	5017	5027	5037

Read and understand all warning, operating instructions, the chart values on the lifting capacity plate(s), and in the crane rating manual provided with this machine before operating crane. Operation which does not follow these instructions may result in an accident.

LINK-BELT HC-248H ELCAS
OPERATING CODE SWITCH POSITIONS

**Main Boom on outriggers
with ABC + A bumper ctwt.**

MAIN BOOM (ft)	OPERATING CODE			
	Land Base	Beaufort Wind Force		
		3	4	5
100	5046	5056	5066	5076
110	5047	5057	5067	5077

Read and understand all warning, operating instructions, the chart values on the lifting capacity plate(s), and in the crane rating manual provided with this machine before operating crane. Operation which does not follow these instructions may result in an accident.

LINK-BELT HC-248H ELCAS
OPERATING CODE SWITCH POSITIONS

**Main boom, on intermediate outrigger position
with ABC + no bumper ctwt.**

MAIN BOOM LENGTH (ft)	CODE
50	5301
60	5302
70	5303
80	5304
90	5305
100	5306
110	5307
120	5308
130	5309
140	5310
150	5311
160	5312
170	5313
180	5314
190	5315
200	5316
210	5317
220	5318
230	5319

Read and understand all warning, operating instructions, the chart values on the lifting capacity plate(s), and in the crane rating manual provided with this machine before operating crane. Operation which does not follow these instructions may result in an accident.

LINK-BELT HC-248H ELCAS
OPERATING CODE SWITCH POSITIONS

**Main boom, on intermediate outrigger position,
with ABC + A bumper ctwt.**

MAIN BOOM LENGTH (ft)	CODE
100	5406
110	5407
120	5408
130	5409
140	5410
150	5411
160	5412
170	5413
180	5414
190	5415
200	5416
210	5417
220	5418
230	5419
240	5420

Read and understand all warning, operating instructions, the chart values on the lifting capacity plate(s), and in the crane rating manual provided with this machine before operating crane. Operation which does not follow these instructions may result in an accident.

LINK-BELT HC-248H ELCAS
OPERATING CODE SWITCH POSITIONS

Main Boom with Tip Extension

MAIN BOOM (ft)	OPERATING CODE			
	Land Base	Beaufort Wind Force		
		3	4	5
50	5201	5211	5221	5231
60	5202	5212	5222	5232
70	5203	5213	5223	5233
80	5204	5214	5224	5234
90	5205	5215	5225	5235
100	5206	5216	5226	5236
110	5207	5217	5227	5237

NOTE: When using main hook while tip extension is attached, reduce capacities by 1,100 lbs.

Read and understand all warning, operating instructions, the chart values on the lifting capacity plate(s), and in the crane rating manual provided with this machine before operating crane. Operation which does not follow these instructions may result in an accident.

HANDBOOK REVISIONS

REV	DATE	NAME	DESCRIPTION
-	06/20/94		General operating handbook created for use with specific operating codes handbook.
A	08/20/98	CSH	Pg 36 - Chg codes 50 - 110 ft and Add 120 - 230 codes Pg 37 - Chg codes 100 - 110 ft and Add 120 - 240 codes

Read and understand all warning, operating instructions, the chart values on the lifting capacity plate(s), and in the crane rating manual provided with this machine before operating crane. Operation which does not follow these instructions may result in an accident.