Chapter 2
Rigging

Cutting Wire Rope
The wire rope must be tightly seized on both sides of the point where the wire rope will be cut, as shown in Figure 2-1.

Seize the wire rope with either seizing wire or annealed wire. The seizing will prevent the wire rope strands from unraveling and prevent distortion of the rope ends from the pressure applied during cutting.

Anchoring Wire Rope to Drum

**CAUTION** Prevent possibility of wire rope slipping out of drum pocket and dropping the load!

Use only the correct wedge corresponding to the wire size being used. See Parts Manual for exact part number of wedge to be used.

Remove all rough edges and burrs from wedge and drum pocket that may cut wire rope or prevent rope and wedge from seating properly in the pocket.

Dead end of wire rope and seizing must extend past end of wedge, but not out of drum pocket.

If dead end of wire rope is welded, seize the rope near the end and cut weld off before assembling to drum pocket. Weld will not allow strands of wire rope to adjust around the wedge resulting in high strands and wavy rope. This condition can seriously weaken the rope.

Insert the free end of the wire rope through the small opening in the drum pocket as shown in Figure 2-2.

Loop the wire rope and push the free end about three-quarters of the way back into the drum pocket.

Insert small end of the wedge and pull the slack out of the wire to seat the wedge and wire rope in the pocket.

Winding Wire Rope Onto Drum

Carefully inspect the drum and sheaves for defects that might cut the rope or cause excessive wear. If the defects cannot be corrected, replace the faulty part.

Apply tension to the wire rope as it is slowly wound onto drum. The first wrap must be tight against the drum flange for approximately three-fourths of the drum circumference. Tap the adjacent wraps against each other with a soft metal or wooden mallet.

**Important** All wraps of first layer must be tight against drum and against each other.

Voids or spaced wraps in first layer will permit movement and wedging action with subsequent layers. Wedging action will cause crushing and abrasion of wire rope. Never allow wire rope to cross wind.
Anchoring Wire Rope to Wedge Socket

**Prevent possibility of wire rope slipping out of socket and dropping the load!**

**CAUTION**

Use only the correct wedge and socket corresponding to the wire rope size being used. See Parts Manual for exact part number of wedge and socket required.

Remove all rough edges and burrs from wedge and socket that may cut wire rope or prevent rope and wedge from seating properly in the socket.

Do not replace shipping material (bolt, plastic strap or wire) in hole of wedge or socket after assembling. Discard these materials because they can prevent wedge and rope from seating properly in the socket.

Attach wire rope clip to dead end of wire rope after assembling wire rope to wedge and socket. Figure 2-3 shows correct clip attachments.

If dead end of wire rope is welded, seize end of wire rope and cut off weld before assembling to wedge and socket. Weld will not allow strands of wire rope to adjust around bend of wedge, resulting in high strands and wavy rope. This condition can seriously weaken the rope.

Assemble the wire rope and wedge to the socket so the live side of the wire rope is in a straight line with the socket pin hole. Correct and incorrect assemblies are shown in Figure 2-3.

Allow the dead end of the rope to extend past the end of the socket.

Pull on the live side of the wire rope enough to tighten the wedge in the socket.

Correct Methods

- Live side in straight line with socket
- Dead end wrapped around live end
- 7 Times rope diameter (Minimum)
- 3 Times rope diameter (Maximum)
- Short piece of wire rope
- Seizing
- Rope Clip
- Wedge
- Socket

Incorrect Methods

- Dead end
- Rope Clip will transfer load to dead end of wire rope
- Live side
- Live side kinked here because not in straight line with socket

Both are dangerous!

Figure 2-3 Wedge Socket Assembly

Attach a wire rope clip to the dead end of the wire rope using one of the Correct methods shown in Figure 2-3. The rope clip will aid in preventing the wire rope from being pulled out of the socket.

**CAUTION**

Do not attach dead end of wire rope to live side of wire rope with a wire rope clip. Wire rope clip will transfer load from live side of wire rope to dead end, seriously weakening attachment.

After the socket is pinned in place (to dead end on boom head, overhaul ball or loadblock), hoist the load slowly so the wedge and rope will seat firmly in the socket. Do not shock load the socket and wedge.
**Breaking In Wire Rope**

After installing a new wire rope, break in the wire rope by operating it several times under light load and at reduced speed. This practice will allow the wire rope to form its natural lay and the strands to seat properly.

*Note*  Some stretch will occur during the break-in period causing a reduction in the wire rope's diameter as the strands compact around the core.

The dead wraps of wire rope on the winch drum can become slack during operation, even if the utmost care is used during installation of the wire rope. This slackening is caused by the normal stretch that occurs in a new wire rope under tension and periodically throughout the wire rope's life from release of the load.

*Important*  When slackness is noted, the dead wraps of wire rope should be tightly rewound onto the drum. If left incorrect, a wedging action with subsequent layers will occur, and the resultant abrasion will cause broken wires in the dead wraps.
### Three-Sheave Boom Point

1-Part

2-Part

3-Part

4-Part

5-Part

6-Part

7-Part

Figure 2-4 Load Line Reeving — Three-Sheave Boom Point

### Five-Sheave Boom Point

1-Part

2-Part

3-Part

4-Part

5-Part

6-Part

7-Part

8-Part

Figure 2-5 Load Line Reeving — Five-Sheave Boom Point
Chapter 2: Rigging

Reeving
Reeving diagrams for the load line are shown in Figures 2-4 and 2-5. The number of parts of line used depends on the load to be lifted. Refer to the Capacity Chart for your specific crane to determine reeving requirements for the various loads that can be lifted.

Make sure the load line travels through each cable guide on the boom and on the jib, if erected.

Perform the following steps after the load line is reeved to make sure the Anti-Two-Block (ATB) device is operational.

- Check that the cable from the cable reel to the junction box on the boom point is connected.
- If the load is to be handled with the jib, see Erecting Jib later in this chapter for proper installation of cable.
- Check that the ATB counterweight is connected to the limit switch and the counterweight is installed on the correct part of the line. Refer to Figure 2-4 or 2-5.

**Important** Do not shorten length of chain/lanyard on ATB counterweight. If shortened, a two-block condition may occur.
- Test the horn and shutdown for proper operation. Refer to Daily Maintenance Checks in Chapter 6.

Quick-Reeve Load Block

Wire Rope Installation

Step 1 Lower Crane boom to horizontal position and engage crane swing lock.

**CAUTION** Crane swing motion during wire rope installation can cause tipping of the Quick-Reeve block.

Step 2 Ensure ground support is firm and level within 5°.

**CAUTION** Soft or uneven ground may lead to tipping of the Quick-Reeve block.

Step 3 Place Quick-Reeve block in the folded position in line and forward of the boom as illustrated in Figure 2-6.

**CAUTION** Improper placement will produce reeving forces that can cause tipping of the block.

Step 4 Remove Rope Guard Keeper Pins at (A) - Figure 2-6.
Step 5 Remove Rope Guard Pins (B).
Step 6 Remove boom sheave guards.
Step 7 Pull wire rope from the hoist drum and pass wire rope over the first boom and block sheave then over the second boom sheave. Ensure load line pull is always against the boom and never against the block.

**CAUTION** Load line pull applied against block may cause tipping of the block. Avoid injury. Never stand on block.

Step 8 If multiple part reeving, repeat Step 7 for the next boom and block sheave until reeving is complete.
Step 9 Install wedge socket on wire rope if not already installed.
Step 10 Assemble wedge socket to boom or block dead end connection. Ensure connecting pin keeper is properly installed.

Step 11 Replace Rope Guard Pins (B).

Note OSHA invokes ASME B30.5, which requires the sheaves in the lower load block shall be equipped with close-fitting guards that will prevent ropes from becoming fouled when the block is lying on the ground with loose ropes.

Step 12 Replace Rope Guard Keeper Pins (A).

Step 13 Replace boom sheave wire rope guards.

Step 14 Lift block to hanging position by raising boom.

**CAUTION** Stand clear while lifting block off the ground.

Wire Rope Removal

Step 1 Lower crane boom to near horizontal position and engage crane upper swing lock.

**CAUTION** Crane swing motion during wire rope removal may cause tipping of block.

Step 2 Ensure ground support is firm and level within 5°.

**CAUTION** Soft or uneven ground may lead to tipping of the block.

Step 3 Rotate hook into position as shown in Figure 2-7.

Step 4 Lower Quick-Reeve block with hoist drum until hook touches ground - see Figure 2-7.

Step 5 Use a tagline to pull block forward and lower boom simultaneously to start block folding.

Step 6 Continue to pull block forward and lower boom until block rests on ground in folded position.

Step 7 Remove Rope Guard Keeper Pins (A).

Step 8 Remove Rope Guard Keeper Pins (B).

Step 9 Remove boom sheave guards.

Step 10 Disassemble wedge socket from dead end connection.

**CAUTION** Avoid possible injury. Do not allow wedge socket to fall from boom sheave and never stand on block.

Step 11 Pull wire rope and wedge socket around first block and boom sheave.

Step 12 If multiple part reeving, repeat Step 11 for the next boom and block sheave until wire rope removal is complete.

Step 13 Replace Rope Guard Pins (B).

Step 14 Replace Rope Guard Keeper Pins (A).

Step 15 Proceed with next rigging arrangement.

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Figure 2-7 Quick-Reeve Wire Rope Removal
Erecting and Storing Jib

**DANGER**
Exceeding jib ratings or failing to comply with jib operating conditions and restrictions given on Capacity Chart will result in structural damage to crane components, collapse of crane, or tipping.

**Read all instructions on Capacity Chart before handling any load with jib.**

**Do not attempt to erect jib until outriggers and stabilizers are properly set. Do not retract outriggers and stabilizers until jib is stored and boom is lowered onto boom rest.**

Use these formulas to determine the minimum distances required for the side swing-around and rear clearances for the truck when erecting or storing the jib. The lengths are found in the crane’s range diagram.

\[
\text{Retracted boom length} + \text{Fixed jib length or retracted telescopic jib length} + 10 \text{ Feet}
\]

**Minimum side swing-around clearance**

\[
\text{Retracted boom length} + \text{Extended telescopic jib length (or fixed jib length)} + 10 \text{ Feet}
\]

**Minimum rear clearance**
**Erecting Jib**

*Important* Be sure to install hairpin cotters to retain all pins.

- To make lifts with the Jib, the crane must be rigged with a single part of line. Therefore, if the crane is rigged with a load block, break down the rigging to a single part of line and install the Manitowoc Boom Trucks supplied overhaul hook ball.

- Fully retract the boom and lower it until the boom point can be reached from the ground. Remove the four Jib Pins (1) from jib base and boom point, see Figure 2-8.

- Disassemble the ATB weight, separate from the load line and reassemble the weight. Leave the weight attached to the switch on the boom point.

- Remove the load line from the boom point sheaves and lay over the right side of the boom. Be sure to replace the wire rope retaining pins shown in Figure 2-8.

- Install two Jib Pins (1) to fasten the jib to Holes A on the right side of the boom point.

- Raise the boom to horizontal.

  **CAUTION** During the next few steps the jib will swing around uncontrolled if boom is not placed in a horizontal position.

- Fasten a tagline, approximately fifteen feet long, to the bar at the jib point shown in Figure 2-10.

- Remove Pin 2 from Bracket B shown in Figure 2-9.

  **CAUTION** Do not remove Pin 2 until Jib Pins (1) are installed on right side of boom point, otherwise, jib may fall from boom causing serious injury to personnel.

- Extend the boom approximately nine inches so Bracket C, shown in Figure 2-9, is clear of Bracket B.

  **Figure 2-9 Typical Jib Brackets**

- Swing the jib to the extended position with the tagline.

- Lower the boom so the boom point can be reached from the ground.

- Install the two remaining Jib Pins (1) to fasten the jib to Holes A on the left side of the boom point.

**Figure 2-8 Jib Mounting Holes on Typical Boom Point**
If the telescopic jib will be operated in the extended position, proceed as follows:

- Remove Pin 3 from Hole D, refer to Figure 2-10.
- Pull the jib stinger out until it is fully extended. Raise the boom if the jib point touches the ground.
- Re-install Pin 3 in Hole D and secure with hairpin cotter, refer to Figure 2-10.

Note: Pin 3 cannot be installed unless the jib stinger is extended completely.

**CAUTION** Do not proceed unless Pin 3 is installed in Hole D and secured in place with cotter pin. Failure to do so will allow jib stinger to retract suddenly when boom is raised. Do not operate crane unless Stop Pin, Lateral Adjustment Screw and Locknuts are also correctly installed, refer to Figure 2-10.

- Remove the ATB weight from the switch on the boom point and attach to the lanyard on the limit switch at the jib point, refer to Figure 2-10 & 2-11.
- Assemble the ATB weight around the Load Line.
- Relocate the ATB cable, as follows:

  For cranes equipped with HYCAS system:

  - Unplug the ATB cable from the limit switch on the left side of the boom point, shown in Figure 2-11.
  - Disconnect the cable from the last roller guide on the left side of the boom point.
  - Route the cable through the roller guide on the boom point and through each roller guide on the jib.
  - Secure the cable to the tube on the jib point, shown in Figure 2-10, and plug in the cable at the junction box connected to the switch at the jib point.
For cranes equipped with an LMI system:

- Disconnect Plug B from Receptacle C at the foot of the jib base section, refer to Figure 2-13.
- Remove dust cap from Receptacle A at the ATB junction box on the boom point, refer to Figure 2-12.

**Important** Do not disconnect ATB/LMI cable attached from the junction box to the cable reel. Doing so may cause boom length sensor to malfunction.

- Connect ATB extension cable from the foot of the jib base Plug B to Receptacle A on the boom point.

**Note** At this point the ATB circuit (and LMI, if equipped) is enabled for lifting from the jib point.

- Reset the Load Moment Indicator (LMI), if equipped, to the correct operating mode for the jib. Refer to LMI Operating Codes in the Load Chart.
- Test the ATB warning horn and shutdown for proper operation, refer to *Daily Checks* in Chapter 6.

**CAUTION**

Do not handle any load with jib until ATB warning horn and shutdown are operational, otherwise, a two-block condition may occur.

On LMI cranes, do not handle any load with the Jib until the LMI has been set to the proper operating mode. Failure to do so will prevent the LMI system from properly monitoring the load capacity of the crane, possibly resulting in damage to crane or property.
**Storing Jib**

*Important* Be sure to install hairpin cotters to retain pins.

- Fully retract the boom and lower it until the jib point can be reached from the ground.
- Remove the ATB weight from the jib point.
- Relocate the ATB cable, as follows:

For cranes equipped with HYCAS system:

- Unplug the ATB cable from the limit switch on the left side of the jib, shown in Figure 2-10.
- Disconnect the cable from the tube on the left side of the jib.
- Remove the cable from the roller guides on the jib and from the last roller guide on the boom point.
- Secure the cable to the last roller guide mounting bracket on the boom point and plug in the cable at the limit switch on the boom point, refer to Figure 2-11.

For cranes equipped with an LMI system:

*Important* Do not disconnect ATB/LMI cable attached from the junction box to the cable reel. Doing so may cause boom length sensor to malfunction.

- Remove Plug B from Receptacle A and re-install dust cap, refer to Figure 2-12.
- Connect Plug B to Receptacle C for storage, refer to Figures 2-13.

- Attach the ATB weight to the lanyard on the limit switch at the boom point.
- Remove the load line from the end of the jib. Be sure to replace the wire rope retaining pins.
- If the telescopic jib stinger is extended, proceed as follows:
  - Remove Pin 3 from Hole D, shown in Figure 2-10.
  - Push the jib stinger all the way in so the jib point is snug against the jib base.

*Note* Two people may be needed to retract the stinger into the jib base. Insert a pipe through the tube at the jib point to assist in this operation. Ideally, the pipe should be long enough to accommodate a person on each side.

- Replace Pin 3 in Hole D.

**CAUTION** Push jib stinger in until jib point snug against jib base before installing Pin 3. Failing to do so will allow jib stinger to extend suddenly when jib swings around, the boom is raised, or when traveling.

- Fasten a tagline, approximately fifteen feet long, to the bar on the jib point, refer to Figure 2-10.
- Remove the two Jib Pins (1) from Holes A, on the left side of the boom point, refer to Figure 2-8.
- Raise the boom to horizontal.
- Swing the jib to the stored position along side of the boom with the tagline.
- Retract the boom so Bracket C, on the jib engages the stop pin in Bracket B on the boom, refer to Figure 2-9.

**CAUTION** Do not remove Jib Pins 1 on right side of boom point until Pin 2 is installed, otherwise, jib may fall from boom causing serious injury to personnel.

- Install Pin 2 in Bracket B and secure with keeper pin, refer to Figure 2-9.
- Remove remaining two Jib Pins (1) from Holes A, on the right side of the boom point, refer to Figure 2-8.

*Note* Store Jib Pins (1) as shown in Figure 2-8.

*Important* Do not extend boom until Jib Pins (1) are removed when Pin 2 is installed; otherwise, brackets will be damaged.
Assemble the load line to the sheaves on the boom. Be sure to replace the wire rope retaining pins.

If the overhaul ball will be used, assemble the ATB weight to the load line.

If multiple-part reeving will be used, install the load block and, if necessary, the auxiliary sheave. Be sure to pass the dead end of the load line through the ATB weight, refer to Figure 2-4 or 2-5.

Reset the Load Moment Indicator (LMI), if equipped, to the correct operating mode for the boom and crane configuration. Refer to the LMI Operating Codes in Load Chart.

Test the ATB warning horn and shutdown for proper operation, refer to Daily Checks in Chapter 6.

**CAUTION**

Do not handle any load with boom until ATB warning horn and shutdown are operational, otherwise, a two-block condition may occur.

On LMI cranes, do not handle any load until the LMI has been set to the proper operating mode that matches the crane configuration. Failure to do so will prevent the LMI system from properly monitoring the load capacity of the crane, possibly resulting in damage to crane or property.

**Adjusting Jib**

Storing and deploying the Jib may become difficult if misalignment exists between the Jib and Boom point attach holes (Hole A). Adjust Brackets B and F, shown in Figures 2-8 and 2-9, up and down and install shims behind Bracket F so Holes A on the right side of the boom point line up with Holes A on the jib. Perform this adjustment with the boom fully retracted and the jib stored.

It should be necessary to perform this adjustment only when the pins have worn to the point that the jib sags in the stored position.

**Alignment Screws**

*Telescopic Jib Only*

Adjust the alignment screws, shown in Figure 2-10, so the jib stinger (when fully extended) is centered in the jib base. Be sure to tighten the locknuts to retain the adjustment.