LOAD CHART & RIGGING
PRACTICE EXERCISE

STIFF BOOM TRUCK CRANE
40 Tonnes & Under

Manitex 35100C
National 1400H

CraneSafe Certification
Stiff Boom Truck – 40 Tonnes & Under PRACTICE EXERCISE
LCR.SB40.MX35100C.NA1400H.PEX1 (160310)
30 June 2010

CraneSafe Certification + Fulford Harbour Group
Tel: 604.952.6033 | www.fulford.ca
Introduction

These 12 questions are for you to use to help get ready for the Load Chart & Rigging part of the CraneSafe Certification assessment for Stiff Boom Truck Crane – 40 Tonnes & Under.

The questions on your assessment will be different from these but will be presented in the same format as these questions.

Following the questions are the load charts and rigging tables and then the answers. The answers explain how we arrived at the correct answer and you can use this to help work through any questions you may have gotten incorrect. We have not included all of the charts for this crane—but everything you need to answer the questions is included. You do not need the crane manual or full load chart package to answer the questions.
Load Chart & Rigging Questions

Part I: Questions 1 – 6
Use Load Charts for Manitex 35100C

Specifications

- 5/8” Rotation Resistant Load Line
- Hose reel mounted on heel section
- 7 ton overhaul ball
- 15 ton 1 sheave block
- 35 ton 4 sheave block

1. What is the maximum load the boom truck can lift based on the following configuration?

   - Outriggers and stabilizers fully extended and set
   - 15 ton load block
   - 78 feet of main boom extended
   - Fixed jib stowed
   - Rigging – 60 lbs
   - Radius – 47 feet

Answer: Maximum Load ________________ pounds
2. What is the lowest boom angle the load can be placed and LMI code based on the following boom truck configuration?

- Outriggers and stabilizers intermediate position
- Lift from 7 ton overhaul ball
- Rigging 40 lbs
- Load weight 6,000 lbs
- Main boom fully extended
- Telescopic jib stowed

Answer: _______________ degrees

3. Based on the configuration in #2, what is the LMI code?

Answer: _______________
4. What is the boom truck’s maximum radius and LMI code based on the following configuration?
   - Outriggers and stabilizers fully extended and set
   - Main boom fully extended to 100 feet
   - 55 foot telescopic jib erected
   - 7 ton overhaul ball on jib
   - Load weight – 2,150 lbs
   - Rigging – 120 lbs

   Answer: ________________ feet

5. Based on the configuration in #4, what is the boom truck’s LMI code?

   Answer: ________________

6. If the load in Question #4 is telescoped in to a radius of 50 feet, what is the boom truck’s gross capacity?

   Answer: ________________ pounds
Part 2: Questions 7 – 10
Use Load Charts for National 1400H

7. Determine the minimum size block and parts of line required based on the following configuration?
   - Outriggers fully extended and set
   - Main boom extended to 51 feet
   - Radius 12 feet
   - Load weight 26,700 lbs
   - Rigging 80 lbs

   Answer: Block Size ____________
           Parts of line ____________

8. What is the maximum load that can be lifted based on the following boom truck configuration?
   - Full span outriggers
   - 25 ton 2 sheave block
   - Main boom angle 72 degrees
   - Main boom extended to 108 feet
   - Rigging 80 lbs
   - 30 foot jib not stowed

   Answer: ________________ pounds
9. What is the lowest boom angle the boom truck can boom down based on the following configuration?

- Mid span outriggers
- Main boom fully extended
- 1 sheave block on 30 foot jib
- Rigging 80 lbs
- Load weight 1,500 lbs

Answer: ___________ degrees

10. How many more degrees could the boom truck boom down if the outriggers are at full span in the previous question?

Answer: ___________ degrees
Part 3: Rigging Questions

11. What is the minimum size of wire rope required to lift a load of 15,000 pounds? The two slings are in a double basket hitch configuration at a 60 degree angle.

Answer: ______________ inch

12. What is the minimum size of wire rope sling required to lift a load of 4,525 pounds? The double vertical sling is in a choker hitch configuration.

Answer: ______________ inch
LOAD CHART & RIGGING TABLES (PRACTICE EXERCISE)

STIFF BOOM TRUCK CRANE
40 Tonnes & Under

Manitex 35100C
National 1400H

CraneSafe Certification
Stiff Boom – 40 Tonnes & Under TABLES
LCR.SB40.NA9103A.MX35100.PEX1 (160310)
30 June 2010
Load Charts

Manitex 35100C

RANGE DIAGRAM
- FULL SPREAD CONFIGURATION -

These charts are for assessment purposes only and should not be used to operate a crane. The individual crane’s load chart, operating instructions and other instructional plates must be read and understood prior to operating the crane.

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**Manitex 35100C**

**USE THIS CHART ONLY WHEN OUTRIGGERS AND STABILIZERS ARE FULLY EXTENDED**

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### Load Chart & Rigging PRACTICE EXERCISE  Stiff Boom – 40 Tonnes & Under  Manitex 35100C / National 1400H (1)

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  **CraneSafe Certification + Fulford Harbour Group**  
  **LCR3**

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- **FULL SPREAD CONFIGURATION -**

<table>
<thead>
<tr>
<th>LOAD CHART &amp; RIGGING</th>
<th>MANITEX 35100C / NATIONAL 1400H (1)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>A</strong></td>
<td><strong>B</strong></td>
</tr>
<tr>
<td><strong>C</strong></td>
<td><strong>D</strong></td>
</tr>
<tr>
<td><strong>E</strong></td>
<td><strong>F</strong></td>
</tr>
</tbody>
</table>

**LMI CODE #1**

<table>
<thead>
<tr>
<th>OPERATING FT</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
<th>F</th>
</tr>
</thead>
<tbody>
<tr>
<td>30.5'</td>
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<td></td>
</tr>
<tr>
<td>52'</td>
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<tr>
<td>68'</td>
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</tr>
<tr>
<td>84'</td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>100'</td>
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**LMI CODE #2**

<table>
<thead>
<tr>
<th>OPERATING FT</th>
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<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
<th>F</th>
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</thead>
<tbody>
<tr>
<td>30.5'</td>
<td></td>
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<tr>
<td>30.5'</td>
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<tr>
<td>55'</td>
<td></td>
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<td></td>
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</tr>
</tbody>
</table>

**MAIN BOOM LOAD RATING IN LBS**

**JIB LOAD RATING IN LBS**

**FIXED JIB**

**TELESCOPIC JIB**

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**LCR3**

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**LCR3**
Manitex 35100C

RANGE DIAGRAM
- INTERMEDIATE SPREAD CONFIGURATION -
(MID EXTEND)

NOTE:
Lifting personnel with crane in this outrigger configuration is strictly prohibited.
Use only fully extended outrigger configuration when lifting personnel.

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### Intermediate Spread Configuration (Mid Extend)

#### Manitex 35100C

**Main Boom Load Ratings in LBS**

<table>
<thead>
<tr>
<th>LMI CODE #9</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
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</thead>
<tbody>
<tr>
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<td>30.5FT</td>
<td>52 FT</td>
<td>68FT</td>
<td>84 FT</td>
</tr>
<tr>
<td>6 80 7000</td>
<td>76 53500</td>
<td>10 45670</td>
<td>12 39830 78 31500</td>
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</tr>
<tr>
<td>15 61 24990</td>
<td>75 25720 79 25970</td>
<td>20 49 13840 69 14460</td>
<td>75 14660 79 14780 80 14000</td>
<td>25 33 8760 62 9340 70 9520 75 9630 78 9700</td>
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<tr>
<td>30 35 56 6410 65 6580 71 6680 75 6750 30 79 6940 79 6520</td>
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<td></td>
<td></td>
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<tr>
<td>40 45 48 4520 60 4880 67 4780 72 4840 35 37 5010 77 4590 80 4000</td>
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</tr>
<tr>
<td>45 50 40 3190 55 3350 63 3440 69 3500 40 40 3670 75 3240 78 3850</td>
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<tr>
<td>50 55 29 2210 50 2360 59 2450 66 2510 45 45 73 2680 73 2250 76 2970</td>
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<tr>
<td>55 60 55 1610 55 1690 62 1750 50 71 1910 71 1480 74 2190</td>
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<tr>
<td>60 65 36 1010 51 1090 59 1150 55 68 1310 68 870 72 1570</td>
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<tr>
<td>65 65 27 520 46 600 55 660 60 65 810 70 1070</td>
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</tr>
<tr>
<td>600 LBS. 350 LBS. 270 LBS. 220 LBS. 180 LBS. DEDUCTIONS FOR STOWED FIXED JIB</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>900 LBS. 530 LBS. 400 LBS. 330 LBS. 290 LBS. DEDUCTIONS FOR STOWED TELESCOPIC JIB</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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Manitex 35100C

<table>
<thead>
<tr>
<th>ALLOWABLE LINE PULL</th>
<th>WARNING</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 PART LINE</td>
<td>5/8” ROT RESISTANT (5.0:1 SF) - 45400 LBS MIN BREAKING STRENGTH</td>
</tr>
<tr>
<td>2 PART LINE</td>
<td>$5.0:1$ SF</td>
</tr>
<tr>
<td>3 PART LINE</td>
<td>$5.0:1$ SF</td>
</tr>
<tr>
<td>4 PART LINE</td>
<td>$5.0:1$ SF</td>
</tr>
<tr>
<td>5 PART LINE</td>
<td>$5.0:1$ SF</td>
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<tr>
<td>6 PART LINE</td>
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<td>7 PART LINE</td>
<td>$5.0:1$ SF</td>
</tr>
<tr>
<td>8 PART LINE</td>
<td>$5.0:1$ SF</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>LOAD BLOCK</th>
<th>POUNDS</th>
</tr>
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<tbody>
<tr>
<td>9080 LBS</td>
<td>50</td>
</tr>
<tr>
<td>18160 LBS</td>
<td>175</td>
</tr>
<tr>
<td>27240 LBS</td>
<td>325</td>
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<td>36320 LBS</td>
<td>450</td>
</tr>
<tr>
<td>45400 LBS</td>
<td>63560</td>
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<tr>
<td>54480 LBS</td>
<td>70000</td>
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<tr>
<td>63560 LBS</td>
<td>70000</td>
</tr>
<tr>
<td>70000 LBS</td>
<td>260</td>
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</tbody>
</table>

AREA OF OPERATION

180° FULL CAPACITY WORK AREA

LINE THROUGH CENTERLINE OF ROTATION

DEDUCTIONS FROM RATED LOADS FOR LOAD HANDLING DEVICES SUPPLIED BY MANITEX.

<table>
<thead>
<tr>
<th>DEVICES</th>
<th>DEDUCTIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>AUXILIARY BLOCK</td>
<td>50 LBS</td>
</tr>
<tr>
<td>OVERHAUL BALL</td>
<td>175 LBS</td>
</tr>
<tr>
<td>15 TON LOAD BLOCK</td>
<td>325 LBS</td>
</tr>
<tr>
<td>35 TON LOAD BLOCK</td>
<td>450 LBS</td>
</tr>
<tr>
<td>HOSE REEL</td>
<td>260 LBS</td>
</tr>
<tr>
<td>SWING AROUND JIB (STOWED)</td>
<td>SEE LOAD CHART</td>
</tr>
</tbody>
</table>

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Manitex 35100C

**LMI OPERATING CODES**

<table>
<thead>
<tr>
<th>SETTING</th>
<th>CRANE CONFIGURATION</th>
<th>OUTRIGGER CONFIGURATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>#1</td>
<td>MAIN BOOM</td>
<td>FULLY EXTENDED</td>
</tr>
<tr>
<td>#2</td>
<td>FIXED JIB</td>
<td>FULLY EXTENDED</td>
</tr>
<tr>
<td>#3</td>
<td>TELESCOPIC JIB–RETRACTED</td>
<td>FULLY EXTENDED</td>
</tr>
<tr>
<td>#4</td>
<td>TELESCOPIC JIB–EXTENDED</td>
<td>FULLY EXTENDED</td>
</tr>
<tr>
<td>#5</td>
<td>PERSONNEL LIFTING PLATFORM ON MAIN BOOM</td>
<td>FULLY EXTENDED</td>
</tr>
<tr>
<td>#6</td>
<td>PERSONNEL LIFTING PLATFORM ON FIXED JIB</td>
<td>FULLY EXTENDED</td>
</tr>
<tr>
<td>#7</td>
<td>PERSONNEL LIFTING PLATFORM ON TELESCOPIC JIB–RETRACTED</td>
<td>FULLY EXTENDED</td>
</tr>
<tr>
<td>#8</td>
<td>PERSONNEL LIFTING PLATFORM ON TELESCOPIC JIB–EXTENDED</td>
<td>FULLY EXTENDED</td>
</tr>
<tr>
<td>#9</td>
<td>MAIN BOOM</td>
<td>INTERMEDIATE</td>
</tr>
<tr>
<td>#10</td>
<td>FIXED JIB</td>
<td>INTERMEDIATE</td>
</tr>
<tr>
<td>#11</td>
<td>TELESCOPIC JIB–RETRACTED</td>
<td>INTERMEDIATE</td>
</tr>
<tr>
<td>#12</td>
<td>TELESCOPIC JIB–EXTENDED</td>
<td>INTERMEDIATE</td>
</tr>
</tbody>
</table>

**WARNING**

1. **THE OPERATOR MUST READ AND UNDERSTAND THE OWNER’S MANUAL BEFORE OPERATING THIS CRANE.**

2. **POSITIONING OR OPERATION OF CRANE BEYOND AREAS SHOWN ON THIS CHART IS NOT INTENDED OR APPROVED EXCEPT WHERE SPECIFIED IN OWNER’S MANUAL.**

3. **LOADED BOOM ANGLES AT SPECIFIED BOOM LENGTHS GIVE ONLY AN APPROXIMATION OF THE OPERATING RADIUS. THE BOOM ANGLE BEFORE LOADING SHOULD BE GREATER TO ACCOUNT FOR DEFLECTIONS. DO NOT EXCEED THE OPERATING RADIUS FOR RATED LOADS.**

4. **THE OPERATING RADIUS SHOWN IN THE JIB RATING CHART IS FOR FULLY EXTENDED BOOM ONLY. WHEN BOOM IS NOT FULLY EXTENDED, USE ONLY LOADED BOOM ANGLE TO DETERMINE LOAD RATING OF JIB.**

5. **FOR BOOM ANGLES NOT SHOWN ON JIB LOAD RATING CHART, USE RATING OF NEXT LOWER BOOM ANGLE.**

6. **FOR BOOM LENGTHS NOT SHOWN, USE RATING OF NEXT SHORTER OR LONGER BOOM LENGTH, WHICHEVER IS LESS. FOR RADII NOT SHOWN, USE RATING OF NEXT LONGER RADIUS.**

7. **CRANE LOAD RATINGS ON OUTRIGGERS ARE BASED ON FREELY SUSPENDED LOADS WITH THE MACHINE LEVELLED AND STANDING ON A FIRM UNIFORM SUPPORTING SURFACE. NO ATTEMPT SHALL BE MADE TO MOVE A LOAD HORIZONTALLY ON THE GROUND IN ANY DIRECTION.**

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Manitex 35100C

**WARNING (CONTINUED)**

8. PRACTICAL WORKING LOADS DEPEND ON SUPPORTING SURFACE, WIND, AND OTHER FACTORS AFFECTING STABILITY SUCH AS HAZARDOUS SURROUNDINGS, EXPERIENCE OF PERSONNEL, AND PROPER HANDLING, ALL OF WHICH MUST BE TAKEN INTO ACCOUNT BY THE OPERATOR.

9. THE MAXIMUM LOAD WHICH MAY BE TELESCOPED IS LIMITED BY HYDRAULIC PRESSURE, BOOM ANGLE, AND BOOM LUBRICATION. IT IS SAFE TO ATTEMPT TO TELESCOPE ANY LOAD WITHIN THE LIMITS OF THE LOAD RATING CHART.

10. LIFTING OFF THE MAIN BOOM POINT WHILE THE SWING AROUND JIB IS ERECTED IS NOT INTENDED OR APPROVED.

**INFORMATION**

1. DEDUCTIONS MUST BE MADE FROM RATED LOADS FOR STOWED JIB, OPTIONAL ATTACHMENTS, HOOKS, AND LOADBLOCKS (SEE DEDUCTION CHART). WEIGHTS OF SLINGS AND ALL OTHER LOAD HANDLING DEVICES SHALL BE CONSIDERED A PART OF THE LOAD.

2. LOAD RATINGS ABOVE THE HEAVY LINE ARE STRUCTURALLY LIMITED CAPACITIES. LOAD RATINGS BELOW THE HEAVY LINE ARE STABILITY LIMITED CAPACITIES AND DO NOT EXCEED 85% OF TIPPING.

**DEFINITIONS**

1. OPERATING RADIUS IS THE HORIZONTAL DISTANCE FROM THE AXIS OF ROTATION TO THE CENTER OF THE VERTICAL HOIST LINE OR TACKLE WITH LOAD APPLIED.

2. LOADED BOOM ANGLE AS SHOWN IN THE COLUMN HEADED BY \( \angle \), IS THE INCLUDED ANGLE BETWEEN THE HORIZONTAL AND LONGITUDINAL AXES OF THE BOOM BASE AFTER LIFTING RATED LOAD AT RATED RADIUS.
National 1400H – Specifications

**Boom and Jib Combinations Data**

Model 1469H — Equipped with a 31 ft (9.40-30.49 m) four-section boom. Available in three basic models.

Model 14100H — Equipped with a 30 ft 10 in to 100 ft (9.40-30.49 m) four-section boom. This model can be equipped with a 30 ft (9.15 m) single-section jib or a 30-54 ft (9.15-16.66 m) two-section jib. Maximum tip height w/30-54 ft (9.15-16.66 m) jib is 161 ft (48.98 m).

30'10" - 100' (9.40-30.49 m) four-section boom

**14FJ30M**
30 ft (9.15 m) single-section jib

30'10" - 100' (9.40-30.49 m) four-section boom

**14FJ54M**
30-54 ft (9.15-16.66 m) two-section jib

Model 14127H — Equipped with a 31 ft 7 in to 127 ft (9.63-38.72 m) five-section boom. This model can be equipped with a 30 ft (9.15 m) single-section jib. Maximum tip height w/30 ft (9.15 m) jib is 164 ft (50.00 m).

31'7" - 127' (9.63-38.72 m) five-section boom

**14FJ30M**
30 ft (9.15 m) single-section jib

**Note:** maximum tip height is measured with outriggers/stabilizers fully extended.

### 1400A Winch Data

- **Do not deadhead line block against boom tip when extending boom.**
- **Keep at least 3 wraps of hoistline on drum at all times.**
- **Use only 3/8” diameter rotation-resistant cable with 45,400 pounds breaking strength on this machine.**

#### Maximum Boom Length at Maximum Elevation with Riggings Shown with Load Block on Ground Level

<table>
<thead>
<tr>
<th>Part Line</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
</tr>
</thead>
<tbody>
<tr>
<td>127’ boom w/54’ jib</td>
<td>11’</td>
<td>13’</td>
<td>16’</td>
<td>19’</td>
<td>22’</td>
<td>26’</td>
<td>29’</td>
<td>31’</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Winch</th>
<th>Cable Supplied</th>
<th>Average Breaking Strength</th>
<th>Lift and Speed</th>
<th>Lift and Speed</th>
<th>Lift and Speed</th>
<th>Lift and Speed</th>
<th>Lift and Speed</th>
<th>Lift and Speed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Standard Planetary</td>
<td>1/2” Diameter Rotation Resistant</td>
<td>45,400 lb (20,553 kg)</td>
<td>2,000 lb (907 kg) 77’ (23.5 m)</td>
<td>3,000 lb (1361 kg) 63’ (19.2 m)</td>
<td>4,000 lb (1814 kg) 51’ (15.5 m)</td>
<td>5,000 lb (2268 kg) 41’ (12.5 m)</td>
<td>6,000 lb (2721 kg) 31’ (9.4 m)</td>
<td>7,000 lb (3184 kg) 21’ (6.4 m)</td>
</tr>
<tr>
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<td>1/2” Diameter Rotation Resistant</td>
<td>45,400 lb (20,553 kg)</td>
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<td>7,000 lb (3184 kg) 21’ (6.4 m)</td>
</tr>
</tbody>
</table>

All winch pulls and speeds in this chart are shown on the fourth layer. Winch line pull would increase on the first, second and third layers. Winch line speed would decrease on the first, second and third layers. Winch line pulls may be limited by the winch capacity or the ANG 3’ x 1 cable safety factor. These are shown below:

- **Winch:**
  - Standard planetary: 4,400 lb (1966 kg) (high speed)
  - Full Drum Pull: 9,000 lb (4082 kg) (low speed)

- **Cable Pull:**
  - Allowable Cable Pull: 9,080 lb (4119 kg)

- **Block Type:**
  - Aux. Boom Head: 5 Ton (4530 kg)
  - Downhaul Weight: 100 lb (45 kg)
  - One Sheave Block: 15 Ton (13600 kg)
  - Two Sheave Block: 750 lb (338 kg)
  - Three Sheave Block: 25 Ton (22670 kg)
  - Four Sheave Block: 35 Ton (31760 kg)

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CraneSafe Certification + Fulford Harbour Group

LCR9
The individual crane’s load chart, operating instructions and other instructional plates must be read and understood prior to operating the crane.

CAUTION:

1. Do not operate crane booms, jib extensions, any accessories or loads within 10 ft (3m) of live power lines or other conductors of electricity.

2. Jib and boom capacities shown are maximum for each section.

3. Do not exceed capacities at reduced radii.

4. Load ratings shown on the appropriate charts are maximum allowable loads with the crane mounted on a factory-approved truck and all outriggers at either full span or at mid span range and set on a firm level surface so that the crane is level and all tires are suspended.

5. Always level the crane with the level indicator located on the crane.

6. The operator must reduce load to allow for factors such as wind, ground conditions, operating speeds and their effects on freely suspended loads.

7. Overloading this crane may cause structural collapse or instability.

8. Weights on any accessories attached to the boom or loadline must be deducted from the load chart capacities.

9. Do not exceed jib capacities at any reduced boom lengths.

10. Do not deadhead lineblock against boom tip when extending boom or winching up.

11. Keep at least three wraps of loadline on drum at all times.

12. Use only specified cable with this machine.

13. Always level the crane with the level indicator located on the crane.

14. Do not exceed jib capacities at any reduced boom lengths.

15. Do not deadhead lineblock against boom tip when extending boom or winching up.

16. Keep at least three wraps of loadline on drum at all times.

17. Use only specified cable with this machine.

LOADLINE EQUIPMENT

<table>
<thead>
<tr>
<th>DEDUCT</th>
<th>DEDUCT</th>
<th>DEDUCT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Downhaul weight........... 180 lb (81.6 kg)</td>
<td>One sheave block ........... 375 lb (170 kg)</td>
<td>Two sheave block.......... 640 lb (290 kg)</td>
</tr>
<tr>
<td>Three sheave block........... 870 lb (395 kg)</td>
<td>Four sheave block........... 970 lb (440 kg)</td>
<td></td>
</tr>
</tbody>
</table>

These charts are for assessment purposes only and should not be used to operate a crane.

The individual crane’s load chart, operating instructions and other instructional plates must be read and understood prior to operating the crane.

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CraneSafe Certification + Fulford Harbour Group

LCR10
The individual crane’s load chart, operating instructions and other instructional plates must be read and understood prior to operating the crane.

DO NOT OPERATE CRANE BOOMS, JIB EXTENSIONS, ANY ACCESSORIES OR LOADS WITHIN 10 FT (3M) OF LIVE POWER LINES OR OTHER CONDUCTORS OF ELECTRICITY.

- Jib and boom capacities shown are maximum for each section.
- Do not exceed capacities at reduced radii.
- Load ratings shown on the load rating charts are maximum allowable loads with the outriggers properly extended and the outrigger lock pins engaged on a firm, level surface and the crane leveled and mounted on a factory recommended truck.
- Always level the crane with the level indicator located on the crane.
- The operator must reduce load to allow for factors such as wind, ground conditions, operating speeds and their effects on freely suspended loads.
- Overloading this crane may cause structural collapse or instability.
- Weights on any accessories attached to the boom or loadline must be deducted from the load chart capacities.
- Do not exceed jib capabilities at any reduced boom lengths.
- Do not deadhead lineblock against boom tip when extending boom or winching up.
- Keep at least three wraps of loadline on drum at all times.
- Use only specified cable with this machine.
- Keep at least three wraps of loadline on drum at all times.
- Do not extend jib or other conductors of electricity.
- Overloading this crane may cause structural collapse or instability.
- Keep at least three wraps of loadline on drum at all times.
- Use only specified cable with this machine.

**CAPACITIES**

- The operator must reduce load to allow for factors such as wind, ground conditions, operating speeds and their effects on freely suspended loads.
- Overloading this crane may cause structural collapse or instability.
- Weights on any accessories attached to the boom or loadline must be deducted from the load chart capacities.
- Do not exceed jib capabilities at any reduced boom lengths.
- Do not deadhead lineblock against boom tip when extending boom or winching up.
- Keep at least three wraps of loadline on drum at all times.
- Use only specified cable with this machine.

**LOADLINE EQUIPMENT DEDUCTION**

- Downhaul weight............180 lb (81.6 kg)
- One sheave block.............375 lb (170 kg)
- Two sheave block...............640 lb (290 kg)
- Three sheave block............870 lb (395 kg)
- Four sheave block.............970 lb (440 kg)

**NOTE:**

1. Operate with jib by radius when main boom is fully extended. If necessary increase boom angle to maintain loaded radius.
2. Operate with jib by boom angle when main boom is not fully extended. Do not exceed rated jib capacities at any reduced boom lengths.

**Additional Capacities When No Jib Stowed (lbs):**

- 500
- 300
- 250
- 200
- 150
- 100

*SHADED AREAS ARE STRUCTURALLY LIMITED CAPACITIES*
### Rigging Tables

#### Wire Rope Slings

<table>
<thead>
<tr>
<th>Rope Diameter (Inches)</th>
<th>60°</th>
<th>45°</th>
<th>30°</th>
</tr>
</thead>
<tbody>
<tr>
<td>3/16</td>
<td>650</td>
<td>480</td>
<td>1,300</td>
</tr>
<tr>
<td>1/4</td>
<td>1,150</td>
<td>860</td>
<td>2,300</td>
</tr>
<tr>
<td>5/32</td>
<td>1,750</td>
<td>1,300</td>
<td>3,500</td>
</tr>
<tr>
<td>3/16</td>
<td>2,550</td>
<td>1,900</td>
<td>5,100</td>
</tr>
<tr>
<td>7/32</td>
<td>3,450</td>
<td>2,600</td>
<td>6,900</td>
</tr>
<tr>
<td>1/2</td>
<td>4,700</td>
<td>3,500</td>
<td>9,400</td>
</tr>
<tr>
<td>9/32</td>
<td>5,700</td>
<td>4,200</td>
<td>11,400</td>
</tr>
<tr>
<td>5/16</td>
<td>7,100</td>
<td>5,300</td>
<td>14,200</td>
</tr>
<tr>
<td>3/8</td>
<td>10,200</td>
<td>7,650</td>
<td>20,400</td>
</tr>
<tr>
<td>7/16</td>
<td>13,750</td>
<td>10,300</td>
<td>27,500</td>
</tr>
<tr>
<td>1/4</td>
<td>17,950</td>
<td>13,450</td>
<td>35,900</td>
</tr>
<tr>
<td>1/2</td>
<td>22,750</td>
<td>17,000</td>
<td>45,500</td>
</tr>
<tr>
<td>5/16</td>
<td>28,200</td>
<td>21,200</td>
<td>56,400</td>
</tr>
<tr>
<td>3/8</td>
<td>34,800</td>
<td>26,100</td>
<td>69,600</td>
</tr>
<tr>
<td>1/2</td>
<td>41,300</td>
<td>31,000</td>
<td>82,600</td>
</tr>
</tbody>
</table>

When using a 2-leg bridle in a choker hitch configuration, multiply the above values by 0.75.

When using a double basket hitch configuration, multiply the above values by 2.

Note: For training and assessment use only.

These charts are for assessment purposes only and should not be used to operate a crane. The individual crane’s load chart, operating instructions and other instructional plates must be read and understood prior to operating the crane.

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## Chain Slings

### Grade T (8) Alloy Steel

<table>
<thead>
<tr>
<th>Chain Size (Inches)</th>
<th>Working Load Limit in pounds</th>
<th>2-Leg Bridle Hitch &amp; Single Basket Hitch With Legs Inclined</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Single Vertical Hitch</td>
<td>Single Choker Hitch</td>
</tr>
<tr>
<td>¼ 2,800</td>
<td>2,100</td>
<td>5,600</td>
</tr>
<tr>
<td>⅜ 5,680</td>
<td>4,260</td>
<td>11,360</td>
</tr>
<tr>
<td>½ 9,600</td>
<td>7,200</td>
<td>19,200</td>
</tr>
<tr>
<td>¾ 14,480</td>
<td>10,860</td>
<td>28,960</td>
</tr>
<tr>
<td>1 22,640</td>
<td>16,980</td>
<td>45,280</td>
</tr>
<tr>
<td>1¼ 27,360</td>
<td>20,520</td>
<td>54,720</td>
</tr>
<tr>
<td>1⅛ 38,160</td>
<td>28,620</td>
<td>76,320</td>
</tr>
<tr>
<td>1⅜ 57,840</td>
<td>43,380</td>
<td>115,680</td>
</tr>
</tbody>
</table>

When using a 2-leg bridle in a choker hitch configuration, multiply the above values by 0.75.

When using a double basket hitch configuration, multiply the above values by 2.

Use only alloy steel chain. Links will be stamped with 8 or T.

Discard if more than 10% wear at bearing surfaces.

Note: For training and assessment use only.

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### Nylon Web Slings

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Work</td>
<td>Load Limit</td>
<td>in pounds</td>
<td>60°</td>
</tr>
<tr>
<td>1</td>
<td>1,100</td>
<td>825</td>
<td>2,200</td>
<td>1,905</td>
</tr>
<tr>
<td>2</td>
<td>2,200</td>
<td>1,650</td>
<td>4,400</td>
<td>3,810</td>
</tr>
<tr>
<td>3</td>
<td>3,300</td>
<td>2,475</td>
<td>6,600</td>
<td>5,715</td>
</tr>
<tr>
<td>4</td>
<td>4,400</td>
<td>3,300</td>
<td>8,800</td>
<td>7,620</td>
</tr>
<tr>
<td>5</td>
<td>5,500</td>
<td>4,125</td>
<td>11,000</td>
<td>9,525</td>
</tr>
<tr>
<td>6</td>
<td>6,600</td>
<td>4,950</td>
<td>13,200</td>
<td>11,430</td>
</tr>
</tbody>
</table>

When using a 2-leg bridle in a choker hitch configuration, multiply the above values by \(0.75\).

When using a double basket hitch configuration, multiply the above values by \(2\).

**Note:** Capacities are for flat eye, twisted eye and triangle fittings. For training and assessment use only.
LOAD CHART & RIGGING
ANSWER KEY (PRACTICE EXERCISE)

STIFF BOOM TRUCK CRANE
40 Tonnes & Under

Manitex 35100C
National 1400H

CraneSafe Certification

Stiff Boom – 40 Tonnes & Under ANSWER KEY
LCR.SB40.NA9103A.MX35100.PEX1 (160310)
30 June 2010
Answer Key

Part 1: Manitex 35100C

1. Answer: **5,015 pounds**

   Deductions from Gross Capacity
   
   - **15 ton block**: 325 lbs
   - **Fixed jib**: 270 lbs
   - **Rigging**: 60 lbs
   - **Hose reel**: 260 lbs

   *Note #6 applies.*

   Gross Capacity is 5,930 pounds.
   
   Maximum Load is 5,930 – 915 = 5,015 pounds.

2. Answer: **78 degrees**

   - **Load weight**: 6,000 lbs
   - **7 ton overhaul ball**: 175 lbs
   - **Rigging**: 40 lbs
   - **Telescopic jib stowed**: 290 lbs
   - **Hose reel**: 260 lbs

   Total Gross Load = 6,765 lbs

3. Answer: **LMI Code 9**

4. Answer: **70 feet**

   - **Load weight**: 2,150 lbs
   - **7 ton overhaul ball**: 175 lbs
   - **Rigging**: 120 lbs
   - **Hose reel**: 260 lbs

   Gross Load = 2,705 lbs
5. Answer: LMI Code 4

6. Answer: The gross capacity remains the same as the main boom angle did not change.

See Note #4.

Part 2: National 1400H

7. Answer: Block Size: 2 Sheave Block
   Parts of Line: 4

   Load weight  26,700 lbs
   2 sheave block  640 lbs
   Rigging  80 lbs
   Total Load  27,480 lbs

8. Answer: 7,280 pounds

Deductions from Gross Capacity

   Main block  640 lbs
   Rigging  80 lbs
   Total Gross Load  720 lbs

Gross Capacity is 7,850 lbs + 150 lbs (no jib on crane) = 8,000 lbs.
Maximum Load is 8,000 – 720 = 7,280 lbs.
9. **Answer: 72 degrees**

<table>
<thead>
<tr>
<th>Description</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Load weight</td>
<td>1,500 lbs</td>
</tr>
<tr>
<td>1 sheave block</td>
<td>375 lbs</td>
</tr>
<tr>
<td>Rigging</td>
<td>80 lbs</td>
</tr>
<tr>
<td>Total Gross Load</td>
<td>1,955 lbs</td>
</tr>
</tbody>
</table>

10. **Answer: 7.6 degrees**

### Part 3: Rigging

11. **Answer: 1/2 inch**

   The capacity of one 1/2 inch wire rope sling in a single basket hitch at a 60 degree angle is 8,150 pounds.
   The sling is in a Double Basket Hitch so capacity is doubled:
   \[8,150 \times 2 = 16,300 \text{ pounds}\]

12. **Answer: 7/16 inch**

   The capacity of a 7/16 inch wire rope in a single vertical hitch is 3,450 pounds.
   The sling is in a double vertical configuration: \[3,450 \times 2 = 6,900 \text{ lbs}\]
   The sling is choked so there is a 25% reduction in capacity: \[6,900 \times .75 = 5,175 \text{ lbs}\]  
   - or -
   The capacity of a 7/16 inch wire rope in a choked single vertical hitch is 2,600 pounds.
   The sling is doubled: \[2,600 \times 2 = 5,200 \text{ lbs}\]