# Specifications

Hydraulic Lattice Boom Crawler Crane

## LS-228H

150-Ton (136 metric ton)

<table>
<thead>
<tr>
<th>General dimensions</th>
<th>feet</th>
<th>meters</th>
</tr>
</thead>
<tbody>
<tr>
<td>Basic boom length</td>
<td>50</td>
<td>15.24</td>
</tr>
<tr>
<td>Overall width of machine with</td>
<td></td>
<td></td>
</tr>
<tr>
<td>38&quot; (.96 m) track shoes</td>
<td>18.66</td>
<td>5.68</td>
</tr>
<tr>
<td>Overall width of cab w/catwalks both sides</td>
<td>13.79</td>
<td>4.20</td>
</tr>
<tr>
<td>Overall width of cab less catwalks</td>
<td>10.95</td>
<td>3.34</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>General dimensions</th>
<th>feet</th>
<th>meters</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tailswing of counterweight &quot;A&quot;</td>
<td>14.95</td>
<td>4.50</td>
</tr>
<tr>
<td>Tailswing of counterweight &quot;AB&quot;</td>
<td>15.94</td>
<td>4.85</td>
</tr>
<tr>
<td>Tailswing of counterweight &quot;ABC&quot;</td>
<td>15.94</td>
<td>4.85</td>
</tr>
<tr>
<td>Overall height for transport w/boom base</td>
<td>13.31</td>
<td>4.05</td>
</tr>
<tr>
<td>Overall height for transport w/live mast only</td>
<td>13.31</td>
<td>4.05</td>
</tr>
<tr>
<td>Maximum tailswing of live mast</td>
<td>19.71</td>
<td>5.01</td>
</tr>
</tbody>
</table>
Bohoist limiting device - Restricts hoisting boom beyond recommended minimum radius.

**Electrical system**
24 volt negative ground system with two 12-volt batteries. Standard lighting system includes: two 70 watt headlamps mounted on machine front and one interior cab light.

**Operator’s cab**
Full vision, modular compartment with safety glass panels. The completely independent cab is insulated against noise and vibration. Sliding operator’s door, swing up roof window. Standard equipment includes: heater, defroster, windshield wiper, dry chemical fire extinguisher, sun visor, bubble-type level, fuel gauge, tachometer, hydraulic temperature gauge, engine oil pressure gauge, coolant temperature gauge, and service monitor system.

**Machinery cab**
Hinged doors (one on right side, two on left side) for machinery access. Equipped with rooftop access ladder, electric warning horn and skid resistant finish on roof.

**Catwalks**
Guard on right and left sides. Catwalks remove for reduced travel width.

**Bail**
Pinned to revolving frame. Five sheaves are provided for 16 part hoist wire rope reeving. Sheaves mounted on “sealed” anti-friction bearings.

**Counterweights**
*A* upper ctwt. - 23,000 lbs. (10,433 kg)
*AB* upper ctwt. - 42,330 lbs. (19,201 kg)
*ABC* upper ctwt. - 69,000 lb. (31,298 kg)

**Boo and Jib**

**Tubular boom**
Two-piece basic boom 50’ (15.24 m) long with open throat top section. Boom 70” (1.78 m) wide, 62” (1.57 m) deep at connections. Alloy steel round tubular cords 4” (101.6 mm) outside diameter. Maximum boom length is 240” (73.15 m).

**Base section**
20’ (6.10 m) long; boomfoot lugs on 55” (1.40 m) centers.

**Boom extensions**
Available in 10’, 20’, 30’, 40’ and 50’ (3.05, 6.10, 9.14, 12.19 and 15.24 m) lengths with appropriate length pendants.

**Optional** - Special 10’ (3.05 m) boom extension with necessary sheaves for handling crawler side frames and counterweight. Can be used as an extension in normal boom makeup. Includes appropriate pendants.

**Boom connections**
In-line pin connections.

**Boom top section**
Open throat; 30’ (9.14 m) long.

**Boompoint machinery**
Six 20-1/2” (.52 m) root diameter sheaves mounted on “sealed” anti-friction bearings.

**Hydraulic boomfoot pin removal**
Standard; Speed-o-Matic controlled; located between mounting lugs on boom base section.

**Boom live mast**
26’ (7.92 m) long; supports hoist boom bridge and boom pendants. Required for all boom lengths. May be used as short boom for assembling and disassembly of side frames and boom, but is not intended for general crane service. Refer to operator's manual for boom live mast lifting capacities.

**Jib**
Tubular; two-piece basic jib 30’ (9.14 m) long; 36” (.91 m) wide, 30’ (7.5 m) deep at centerline of connections. Alloy steel tubular chords 2-1/2” (63 mm) outside diameter.

**Base section** - 15’ 0” (4.57 m) long.

**Jib extensions** - Available in 10’ (3.05 m), 20’ (6.10 m), and 30’ (9.14 m) lengths with appropriate length pendants.

**Jib connections** - In-line, tapered pins.

**Tip section** - 15’ (4.57 m) long; equipped with single peak sheave 21” (.53 m) root diameter, heat treated and mounted on anti-friction bearings. Anchor provided at peak of jib tip section for two-part load hoist wire rope (whipline) connection.

**Maximum jib length permitted** - 70’ (21.34 m). All jib lengths may be mounted at 0°, 15°, or 30° offset to boom.

**Jib mast**
12’ 7.62” (3.85 m) long, mounted on jib base section. Deflector sheave mounted within mast to guide whipline; mounted on anti-friction bearings.

**Jib staylines** - Front and back staylines. Back staylines vary in length depending on degree of jib offset from boom centerline; back staylines attached at bottom end of boom top section.

**Jib stops** - Telescoping type; pinned from jib mast to boom top section and from jib mast to jib base section.

**Auxiliary Equipment**

**Boom angle indicator**
Pendulum type; mounted on boom base section. Electronic type readout on load indicator.

**Hook blocks**
Blocks, or weighted ball with swivel hook, optional - refer to price list.

**Rated capacity limiter**
Standard; electronic load indicator for load hoist line.

**Swing alarm**
Standard; audio/visual warning device signals when upper is swinging.

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Crawler Mounting

- **Lower frame**
  All welded high strength steel (100,000 psi yield), box construction; precision machined surfaces for turntable bearing and axle plate.

- **Turntable bearing**
  Outer race bolted to upper frame; inner race with internal swing gears bolted to lower.

- **Crawler side frames**
  All welded, precision machined and removable. Positioned on cross axles by dowels and held in place with adjustable wedgepacks.

- **Track drive sprockets**
  Cast steel, heat treated, self-cleaning. Powered by hydraulic motors through double reduction gear drive.

- **Track carrier slide rails**
  Slide rails on top of each side frame.

- **Track rollers**
  Heat treated, mounted on oil filled "lifetime sealed" anti-friction bearings; 10 per side crawler side frame.

- **Tracks**
  Heat treated, self-cleaning, multiple hinged track shoes joined by one piece full floating pins; 42 shoes per side frame - 38" (.96 m) wide.

- **Track tension adjustment**
  Idler wheel adjusted by means of hydraulic cylinder and hand pump. Idler wheel shaft held in position with shims after adjustment is made.

- **Take up idlers**
  Cast steel, heat treated, self-cleaning, mounted on aluminum/bronze bushings. Lubricated through idler shaft.

- **Independent hydraulic travel/steering**
  Power transmitted by axial piston hydraulic motors through double reduction unit to track drive sprocket.

Steering - Axial piston motor with reduction gear is located at inner drive end of each crawler side frame. Each track is driven simultaneously or individually for straight-line, gradual turn, or pivot turn. The tracks can be counterrotated for spin turns.

Brakes - Spring applied, hydraulically released multiple disc brakes are applied automatically when the control lever is in the neutral position.

Travel speed - 0.61 mph (0.97 km/hr).
Gradeability - 30%

- **Jacking system**
  Optional; four ground controlled, power hydraulic jacks, pinned to the lower carbody frame, used to raise the machine to facilitate removal or installation of the crawler side frames.

Ground contact area and ground bearing pressure

Based on standard machine equipped with "ABC" counterweight and 50' (15.24 m) tubular boom.

<table>
<thead>
<tr>
<th>Track shoes</th>
<th>Ground contact area</th>
<th>Ground bearing pressure</th>
</tr>
</thead>
<tbody>
<tr>
<td>inches</td>
<td>meters</td>
<td>sq. in.</td>
</tr>
<tr>
<td>38</td>
<td>0.96</td>
<td>17,700</td>
</tr>
</tbody>
</table>

Revolving Upperstructure

- **Frame**
  All welded and precision machined.

- **Turntable bearing**
  With integral swing (ring) gear. Inner race with internal swing gear is bolted to lower frame.

- **Engine**
  Full pressure lubrication, oil filter, air cleaner, hour meter and throttle, electric control shutdown.

- **Fuel tank**
  77 gallon (291 liter) capacity; equipped with fuel sight level gauge, flame arrester, and self-closing cap with locking eye for padlock.

### Engine Specifications

<table>
<thead>
<tr>
<th>Engine Specifications</th>
<th>Isuzu 6SA1TPA-07</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of cylinders</td>
<td>6</td>
</tr>
<tr>
<td>Bore and stroke: inch</td>
<td>4.53 x 5.31</td>
</tr>
<tr>
<td>- (mm)</td>
<td>(115 x 135)</td>
</tr>
<tr>
<td>Piston displacement</td>
<td>513</td>
</tr>
<tr>
<td>- cu. in.</td>
<td>(8 413)</td>
</tr>
<tr>
<td>- (cm³)</td>
<td></td>
</tr>
<tr>
<td>High idle speed</td>
<td>2,350</td>
</tr>
<tr>
<td>- rpm</td>
<td>2,100</td>
</tr>
<tr>
<td>Engine rpm at full load speed</td>
<td>195</td>
</tr>
<tr>
<td>Net engine hp at full load speed</td>
<td>513</td>
</tr>
<tr>
<td>Peak torque - foot pounds</td>
<td>(696)</td>
</tr>
<tr>
<td>- joules</td>
<td></td>
</tr>
<tr>
<td>Peak torque - rpm</td>
<td>1,400</td>
</tr>
<tr>
<td>Electrical system</td>
<td>24-volt</td>
</tr>
<tr>
<td>Batteries</td>
<td>2 - 12 volt</td>
</tr>
</tbody>
</table>
**LS-228H Load Hoisting Performance**

Available line speed and line pull
Line pulls are not based on wire rope strength. See wire rope chart below for maximum permissible single part of line working loads.

### Line Speeds and Pulls

<table>
<thead>
<tr>
<th>Rope layer</th>
<th>Maximum line pull</th>
<th>No load line speed</th>
<th>Full load line speed</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>lbs.</td>
<td>kg</td>
<td>ft./min</td>
</tr>
<tr>
<td>1</td>
<td>35,913</td>
<td>16,290</td>
<td>227</td>
</tr>
<tr>
<td>2</td>
<td>33,081</td>
<td>15,006</td>
<td>246</td>
</tr>
<tr>
<td>3</td>
<td>30,849</td>
<td>13,922</td>
<td>266</td>
</tr>
<tr>
<td>4</td>
<td>28,562</td>
<td>12,956</td>
<td>285</td>
</tr>
<tr>
<td>5</td>
<td>26,730</td>
<td>12,125</td>
<td>305</td>
</tr>
<tr>
<td>6</td>
<td>25,125</td>
<td>11,399</td>
<td>324</td>
</tr>
<tr>
<td>7</td>
<td>23,670</td>
<td>10,770</td>
<td>344</td>
</tr>
</tbody>
</table>

### Wire Rope Drum Capacities

<table>
<thead>
<tr>
<th>Rope layer</th>
<th>Boomhoist Drum Capacity - 7/8&quot; (22 mm) wire rope</th>
<th>Third Drum - 3/4&quot; (19 mm) wire rope</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Pitch Diameter</td>
<td>Lay</td>
</tr>
<tr>
<td></td>
<td>in.</td>
<td>mm</td>
</tr>
<tr>
<td>1</td>
<td>15.88</td>
<td>403</td>
</tr>
<tr>
<td>2</td>
<td>17.63</td>
<td>448</td>
</tr>
<tr>
<td>3</td>
<td>19.38</td>
<td>492</td>
</tr>
<tr>
<td>4</td>
<td>21.13</td>
<td>537</td>
</tr>
<tr>
<td>5</td>
<td>22.88</td>
<td>581</td>
</tr>
<tr>
<td>6</td>
<td>24.63</td>
<td>626</td>
</tr>
<tr>
<td>7</td>
<td>26.38</td>
<td>670</td>
</tr>
</tbody>
</table>

### Wire Rope: size, type and working strength

<table>
<thead>
<tr>
<th>Wire rope application</th>
<th>Size: diameter</th>
<th>Type</th>
<th>Max. permissible load</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>inches</td>
<td>mm</td>
<td>lbs.</td>
</tr>
<tr>
<td>Boomhoist</td>
<td>7/8</td>
<td>22</td>
<td>LB</td>
</tr>
<tr>
<td>Main load hoist</td>
<td>7/8</td>
<td>22</td>
<td>N</td>
</tr>
<tr>
<td>Jib load hoist</td>
<td>7/8</td>
<td>22</td>
<td>RB</td>
</tr>
<tr>
<td>Boom pendants (dual)</td>
<td>1-3/8</td>
<td>35</td>
<td>N</td>
</tr>
<tr>
<td>Jib staylines</td>
<td>7/8</td>
<td>22</td>
<td>N</td>
</tr>
<tr>
<td>Third drum</td>
<td>3/4</td>
<td>19</td>
<td>RB</td>
</tr>
</tbody>
</table>

### Wire Rope: types available
- Type "N" - 6 x 25 (6 x 19 class) filler wire, extra improved plow steel, preformed, independent wire rope center, right lay, regular lay.
- Type "LB" - 6 x 25 (6 x 19 class), extra improved plow steel, preformed, independent wire rope center, right lay, alternate lay.
- Type "RB" - 18 x 19 non-rotating, extra, extra improved plow steel, preformed, right regular lay, swaged.
Hydraulic System

- **Hydraulic pumps**
  Two variable displacement piston pumps operating at 4,000 psi (281.24 kg/cm²) power travel, main drum, auxiliary drum, third drum, and boomhoist functions. One fixed displacement gear pump operating at 3,000 psi (211 kg/cm²) power swing, counterweight lowering, and machine jack functions. One fixed displacement gear pump operating at 1,210 psi (85 kg/cm²) powers pilot control system, clutches, brakes, and pump controls.

- **Pump control ("fine inching") mode**
  Special fine metering pump setting selectable from the operator's cab allows very slow movements for precision work. Main hoist, auxiliary hoist, boomhoist, third drum, and travel are all supplied with this standard feature.

- **Hydraulic reservoir**
  42 gal. (159 L), equipped with sight level gauge.

- **Relief valves**
  Each function is equipped with relief valves to protect the circuit from overload or shock.

- **Hydraulic filtration**
  Ten micron, full flow line filter furnished in control circuit. All oil is filtered prior to return to sump tank.

- **Hydraulic motors**
  Main hoist drum, auxiliary hoist drum, boomhoist, swing, and travel are powered by axial piston motors.

- **Counterbalance valves**
  **Upper** - Hoist motors are equipped with counterbalance valves to provide positive load lowering and prevent accidental load drop when hydraulic power is suddenly reduced.
  **Lower** - Travel motors are equipped with counterbalance valves to provide positive travel lock and prevent overspeeding of travel motors.

Principal Operating Functions

- **Control system**
  Remote controlled hydraulic servo for main drum, auxiliary drum, travel, boomhoist, and third drum. Mechanical linkage controls swing. Function speed is proportional to lever movement. Levers are adjustable for operator comfort.

- **Load hoisting and lowering**
  Main and auxiliary hoist drums are driven by individual axial piston motors and reduction gearing. Load hoisting or lowering is provided by actuating a hydraulic motor. The control lever provides two speeds for hoisting and lowering. Hoisting or lowering speeds are proportional to lever movement.

- **Freefall** - The incorporation of power hydraulic controlled, two-shoe clutches allow freefall operation of the main and auxiliary hoist drums for special crane cycle application. Mode selection switch on control panel allows operator to select the most productive operating mode.

- **Load hoist drums**
  Main (front) and auxiliary (rear) hoist drums are 16-3/4" (43 cm) root diameter grooved for 7/8" (22 mm) wire rope. Mounted on anti-friction bearings.

- **Third operating drum - Optional**
  18-3/4" (49 cm) grooved drum lagging, mounted in boom base section. 3/4" (19 mm) wire rope.

- **Drum clutches**
  Speed-o-Matic® power hydraulic two-shoe clutches; internal expanding, lined shoes. Clutch spiders are splined to shafts; clutch drums are integral with hoist drums.

- **Load hoist clutches** - Front and rear main drums - clutch drums 20" (51 cm) diameter, 5" (13 cm) width.

- **Drum brakes**
  External contracting band type; operated by foot pedal equipped with a locking latch. Operator may select automatic brake mode* (spring applied, hydraulically released), which will apply brakes when the hoist control lever is in the neutral position.

- **Drum rotation indicators**
  Standard for front and rear drums. Audible-type indicators.

- **Drum locking pawl**
  Standard for front and rear drums; electrically actuated and prevents drum rotation in a lowering direction.

- **Anti two-block system**
  Standard - A switch mounted on the boom peak activates a buzzer to warn the operator of a two-block condition and simultaneously disengages hoist function while applying the hoist brakes.

- **Swing system**
  Independent, hydraulic swing is driven by two gear motors through a gear reduction system; free swing when lever is in neutral position.

- **Swing brake** - Spring applied, hydraulically released; controlled by button on swing control lever.

- **Swing lock** - Mechanically controlled, three-position locking mechanism.

- **Swing speed** - Variable from 0 to 2.2 rpm.

- **Boomhoist/lowering system**
  Independent, hydraulic boomhoist is driven by an axial piston motor through a gear reduction system. Boom hoisting or lowering is performed by actuating or reversing the motor. Boomhoist speed is infinitely variable. Boomhoist speed from 0° to 70° boom angle is 90 seconds.

- **Boomhoist drum**
  Single grooved lagging 10.68" (.27 m) root diameter.

- **Boomhoist drum locking pawl**
  Electrically operated.

- **Boomhoist brake**
  Spring applied, hydraulically released, multiple disc type brake. Brake is automatically applied when control lever is in neutral position.
Boomhoist limiting device - Restricts rig boom beyond recommended maximum radius.

Electrical system
24 volt negative ground system with two 12-volt batteries. Standard lighting system includes: two 70 watt headlights mounted on machine front and one interior cab light.

Operator's cab
Full vision, modular compartment with safety glass panels. The completely independent cab is insulated against noise and vibration. Sliding operator's door, swing up roof window. Standard equipment includes: heater, defroster, windshield wiper, dry chemical fire extinguisher, sun visor, bubble-type level, fuel gauge, tachometer, hydraulic temperature gauge, engine oil pressure gauge, coolant temperature gauge, and service monitor system.

Machinery cab
Hinged doors (one on right side, two on left side) for machinery access. Equipped with roof top access ladder, electric warning horn and skid resistant finish on roof.

Catwalks
Standard on right and left sides. Catwalks receive for reduced travel width.

Bail
Pinned to revolving frame. Five sheaves are provided for 16 part boomhoist wire rope reeling. Sheaves mounted on "sealed" anti-friction bearings.

Counterweights
"A" upper ctwt. - 23,000 lbs. (10 433 kg)
"AB" upper ctwt. - 42,330 lbs. (19 201 kg)
"ABC" upper ctwt. - 69,000 lb. (31 298 kg)

Boom and Jib

Tubular boom
Two-piece basic boom 50' (15.24 m) long with open throat top section. Boom 70" (1.78 m) wide, 62" (1.57 m) deep at connections. Alloy steel round tubular cords 4" (101.6 mm) outside diameter. Maximum boom length is 240' (73.15 m).

Base section
20' (6.10 m) long; boomfoot lugs on 55" (1.40 m) centers.

Boom extensions
Available in 10', 20', 30', 40' and 50' (3.05, 6.10, 9.14, 12.19 and 15.24 m) lengths with appropriate length pendants.

Optional - Special 10' (3.05 m) boom extension with necessary sheaves for handling crawler side frames and counterweight. Can be used as an extension in normal boom makeup. Includes appropriate pendants.

Boom connections
In-line pin connections.

Boom top section
Open throat; 30' (9.14 m) long.

Boompoint machinery
Six 20-1/2" (.52 m) root diameter sheaves mounted on "sealed" anti-friction bearings.

Hydraulic boomfoot pin removal
Standard; Speed-o-Matic controlled: located between mounting lugs on boom base section.

Boom live mast
26' (7.92 m) long; supports boomhoist bridle and boom pendants. Required for all boom lengths. May be used as short boom for assembling and disassembly of side frames and boom, but is not intended for general crane service. Refer to operator's manual for boom live mast lifting capacities.

Jib
Tubular: two-piece basic jib 30' (9.14 m) long; 35" (.89 m) wide, 30" (.75 m) deep at centerline of connections. Alloy steel tubular chords 2-1/2" (63 mm) outside diameter.

Base section - 15' 0" (4.57 m) long.

Jib extensions - Available in 10' (3.05 m), 20' (6.10 m), and 30' (9.14 m) lengths with appropriate length pendants.

Jib connections - In-line, tapered pins.

Tip section - 15' (4.57 m) long; equipped with single peak sheave 21" (.53 m) root diameter, heat treated and mounted on anti-friction bearings. Anchor provided at peak of jib tip section for two-part load hoist wire rope (whipline) connection.

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Jib stops - Telescoping type; pinned from jib mast to boom top section and from jib mast to jib base section.

Auxiliary Equipment

Boom angle indicator
Pendulum type; mounted on boom base section. Electronic type readout on load indicator.

Hook blocks
Blocks, or weighted ball with swivel hook, optional - refer to price list.

Rated capacity limiter
Standard; electronic load indicator for load hoist line.

Swing alarm
Standard; audio/visual warning device signals when upper is swinging.