ROUGH TERRAIN CRANE

TR-160M

JAPANESE SPECIFICATIONS

<table>
<thead>
<tr>
<th>OUTLINE</th>
<th>SPEC. NO.</th>
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<td>4-section Boom,</td>
<td>TR-160M-2-00101</td>
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<tr>
<td>1-staged Jib</td>
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Control No. JA-01
CRANE SPECIFICATIONS

CRANE CAPACITY
7.4m Boom 16,000kg at 3.0m (6 part-line)
12.3m Boom 11,000kg at 4.0m (4 part-line)
17.2m Boom 7,500kg at 4.5m (4 part-line)
22.1m Boom 5,000kg at 5.5m (4 part-line)
6.3m Jib 2,000kg at 73° (1 part-line)
Single top 2,500kg (1 part-line)

MAX. LIFTING HEIGHT
Boom 22.5m
Jib 28.5m

MAX. WORKING RADIUS
Boom 20.0m
Jib 27.1m

BOOM LENGTH
7.4m – 22.1m

BOOM EXTENSION
14.7m

BOOM EXTENSION SPEED
14.7m / 65s

JIB LENGTH
8.3m

MAIN WINCH SINGLE LINE SPEED
High range: 76m/min (4th layer)
Low range: 36m/min (4th layer)

MAIN WINCH HOOK SPEED
High range: 12.7m/min (6 part-line)
Low range: 6.0m/min (6 part-line)

AUXILIARY WINCH SINGLE LINE SPEED
High range: 77m/min (2nd layer)
Low range: 37m/min (2nd layer)

AUXILIARY WINCH HOOK SPEED
High range: 77m/min (1 part-line)
Low range: 37m/min (1 part-line)

BOOM ELEVATION ANGLE
-2° – 80°

BOOM ELEVATION SPEED
-2° – 80° / 37s

SWING ANGLE
360° continue

SWING SPEED
2.7 rpm

WIRE ROPE
Main Winch
14mm × 125m (Diameter × Length)
7 × 7 + 6 × WS(31) Class B ordinary · Z twist
Spin-resistant wire rope
Breaking strength 15.5t
Auxiliary Winch
14mm × 65m (Diameter × Length)
7 × 7 + 6 × WS(31) Class B ordinary · Z twist
Spin-resistant wire rope
Breaking strength 15.5t

BOOM
4-section hydraulically telescoping boom of box construction.
(stage 2: sequential; stages 3, 4: synchronized)

BOOM EXTENSION
2 double-acting hydraulic cylinder
1 wire rope type telescoping device

JIB
Stored within boom
Dual offset (0°, 30°) type.

SINGLE TOP
Single sheave. Mounted to main boom head for single line work.

HOIST
Hydraulic motor driven planetary gear reducer
With free-fall device.
Automatic brake (with foot brake for free-fall device)
2 single winches

BOOM ELEVATION
1 double-acting hydraulic cylinders

SWING
Hydraulic motor driven planetary gear reducer
Swing bearing
Swing free/lock changeover type
Hand brake

OUTRIGGERS
Fully hydraulic X-type (floats mounted integrally)
Slides and jacks each provided with independent operation device.
Full extended width 5.4m
Middle extended width 4.4m
Minimum extended width 3.3m

MAX. OUTRIGGER LOAD
16.8t

HYDRAULIC PUMPS
Variable piston pump and gear pump

HYDRAULIC OIL TANK CAPACITY
289 liters

SAFETY DEVICES
Automatic moment limiter (AML)
With working range limiting function
Over-winding cutout
Working area control device
Level gauge
Hook safety latch
Winch drum lock
Hydraulic safety valve
Telescopic counterbalance valve
Elevation counterbalance valve
Jack pilot check valve
Swing lock

EQUIPMENTS
Crane cab heater (with defroster)
Hydraulic oil temperature indication lamp
Oil cooler
Winch drum rotation indicator
Operation pedals for elevating/telescoping
Radio
CARRIER SPECIFICATIONS

ENGINE
Model MITSUBISHI 6D31
Type 4-cycle, 6-cylinder, direct-injection, water-cooled diesel engine (with turbo charger)
Piston displacement 4,948cc
Max. output 155PS at 2,800rpm
Max. torque 42.0kg m at 1,800rpm

TORQUE CONVERTER
3-element, 1-stage unit (with automatic lock-up mechanism)

TRANSMISSION
Power shift type (wet multi-plate clutch)
3 forward and 1 reverse speeds

REDUCER
Axle dual-ratio reduction

DRIVE
2-wheel drive (4×2) / 4-wheel drive (4×4) selection

FRONT AXLE
Full floating type

REAR AXLE
Full floating type (with no-spin differential)

SUSPENSION
Front  Parallel leaf spring type
Rear   Parallel leaf spring type

STEERING
Fully hydraulic power steering
With reverse steering correction mechanism

 BRAKE SYSTEM
Service Brake
Hydro-pneumatic brake
Disk brake
Parking Brake
Mechanically operated, internal expanding duo-servo shoe type acting on drum at transmission case rear.
Auxiliary Brake
Electro-pneumatic operated exhaust brake.
Auxiliary braking device for operations

FRAME
Welded box-shaped structure

ELECTRIC SYSTEM
24 V DC. 2 batteries of 12V (120Ah)

FUEL TANK CAPACITY
200 liters

TIRES
Front 12.00R24 (OR)
Rear 12.00R24 (OR)

CAB
One-man type
With sun visor and trim
Rubber mounted type
Fully adjustable seat (with headrest and seat belt)
Adjustable handle (tilt, telescoping)
Roof windshield lock warning

SAFETY DEVICES
Emergency steering device
Spring lock device
Rear wheel steering lock device
Engine over-run alarm
Overshift prevention device
Parking brake alarm

GENERAL DATA

DIMENSIONS
Overall length 9,410mm
Overall width 2,350mm
Overall height 3,320mm
Wheel base 2,900mm
Tread Front 1,980mm
          Rear 1,980mm

WEIGHTS
Gross vehicle weight
  Total 17,795kg
         Front 8,900kg
         Rear 8,895kg

PERFORMANCE
Max. traveling speed 48km/h
Gradeability (tan θ) 0.6
Min. turning radius
  Front 4.3m (4-wheel steering)
  Rear 7.0m (2-wheel steering)
## TOTAL RATED LOADS

(1) With outriggers set (360°)

(i)

### Unit: ton

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<th>B (m)</th>
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<th>12.3m</th>
<th>17.2m</th>
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Unit: ton

A = Boom length
B = Working radius
C = Jib length
D = Jib offset
E = Boom angle

Outriggers middle extended (4.4 m)
Outriggers minimum extended (3.3 m)

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<th>A 7.4 m</th>
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</tr>
<tr>
<td>12.0</td>
<td>1.1</td>
<td></td>
<td>1.15</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>13.0</td>
<td>0.85</td>
<td></td>
<td>0.95</td>
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</tr>
<tr>
<td>14.0</td>
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<td>0.8</td>
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<tr>
<td>15.0</td>
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<td>0.65</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>16.0</td>
<td></td>
<td></td>
<td>0.5</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

A = Boom length  
B = Working radius  
C = Jib length  
D = Jib offset  
E = Boom angle
NOTES:
1. The total rated loads shown are for the case when the outriggers are set horizontally on firm ground. The values above the bold lines are based on the crane strength while those below are based on the crane stability.
2. The weights of slings and hooks (main winch hook: 150kg, auxiliary winch hook: 60kg) are included in the total rated loads shown.
3. The total rated load is based on the actual working radius including the deflection of the boom.
4. The chart below shows the standard number of part lines for each boom length. The load per line should not exceed 2.75t for the main winch and 2.5t for the auxiliary winch.

<table>
<thead>
<tr>
<th>A</th>
<th>7.4m</th>
<th>12.3m</th>
<th>17.2m</th>
<th>22.1m</th>
<th>J</th>
</tr>
</thead>
<tbody>
<tr>
<td>H</td>
<td>6</td>
<td>4</td>
<td>4</td>
<td>4</td>
<td>1</td>
</tr>
</tbody>
</table>

A = Boom length  H = No. of part-line  J = Jib / Single top

5. As a rule, free-fall operation should be performed only when lowering the hook alone. If a hoisted load must be lowered by free-fall operation, the load must be kept below 1/5th of the total rated load and sudden braking operations must be avoided.
6. The total rated load for the single top shall be the value obtained by subtracting 110kg from the total rated load of the boom and must not exceed 2.5t.
(2) Without outriggers

<table>
<thead>
<tr>
<th>B (m)</th>
<th>Stationary</th>
<th>Creep (travelling at 1.6km/h or less)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>7.4m BOOM</td>
<td>12.3m BOOM</td>
</tr>
<tr>
<td></td>
<td>F</td>
<td>G</td>
</tr>
<tr>
<td>3.0</td>
<td>8.0</td>
<td>5.0</td>
</tr>
<tr>
<td>3.5</td>
<td>7.3</td>
<td>4.1</td>
</tr>
<tr>
<td>4.0</td>
<td>6.5</td>
<td>3.5</td>
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<td>2.45</td>
</tr>
<tr>
<td>5.5</td>
<td>4.1</td>
<td>2.0</td>
</tr>
<tr>
<td>6.0</td>
<td>3.5</td>
<td>1.4</td>
</tr>
<tr>
<td>7.0</td>
<td>2.6</td>
<td>0.85</td>
</tr>
<tr>
<td>8.0</td>
<td>1.95</td>
<td>0.5</td>
</tr>
<tr>
<td>9.0</td>
<td>1.45</td>
<td>1.7</td>
</tr>
<tr>
<td>10.0</td>
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<td>1.3</td>
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<tr>
<td>12.0</td>
<td>0.75</td>
<td>0.6</td>
</tr>
<tr>
<td>13.0</td>
<td>0.5</td>
<td>0.4</td>
</tr>
</tbody>
</table>

Unit: ton

B = Working radius  F = Front  G = 360°
NOTES:
1. The total rated loads shown are for the case when the crane is set horizontally on firm ground. The values above the bold lines are based on the crane strength while those below are based on the crane stability. The foundation, working conditions, etc. should be taken into consideration adequately when using the crane for actual work. (Tire air pressure: 9.00kg/cm²).
2. The weights of the slings and hooks (main winch hook: 150kg, auxiliary winch hook: 60kg) are included in the total rated loads shown.
3. The total rated loads are based on the actual working radii into which are included the deflection of the boom and the tires.
4. The chart below shows the standard number of part lines for each boom length. The load per line should not exceed 2.75t (for the main winch).

<table>
<thead>
<tr>
<th>A</th>
<th>7.4 m</th>
<th>12.3m</th>
<th>17.2m</th>
</tr>
</thead>
<tbody>
<tr>
<td>H</td>
<td>6</td>
<td>4</td>
<td>4</td>
</tr>
</tbody>
</table>

A = Boom length   H = No. of part-line
5. The total rated load for the single top shall be the value obtained by subtracting 80kg from the total rated load of the boom and must not exceed 2.5t.
6. Free-fall operations should not be performed without outriggers.
7. Booms over 22.1m in length and jibs should not be used without outriggers.
8. "Over front" crane operations should be performed with the boom being inside a 2° area (1° each to the left and right) over front of the carrier.

Approx. 2°

9. The "Drive, Speed Selection" switch should be set to "4-wheel - Lo" for creeping while hoisting a load.
10. When creeping while hoisting a load, the swing brake should be applied, the load should be kept as close to the ground as possible but not touching the ground and the speed should be kept at 1.6km/h or less. In particular, any abrupt steering, starting or braking must be avoided.
11. Crane operations should not be performed when creeping while hoisting a load.
WORKING RADIUS - LIFTING HEIGHT

NOTES:
1. The deflection of the boom is not incorporated in the figure above.
2. The figure above is for the case when the outriggers are fully extended (360°).