ROUGH TERRAIN CRANE

TR-350M

JAPANESE SPECIFICATIONS

<table>
<thead>
<tr>
<th>OUTLINE</th>
<th>SPEC. NO.</th>
</tr>
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<tbody>
<tr>
<td>5-section Boom, 2-staged Power Tilt Jib</td>
<td>TR-350M-2-00101</td>
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</table>
**TR-350M**

**CRANE SPECIFICATIONS**

**CRANE CAPACITY**
- 9.5m Boom: 35,000kg at 3.0m
- 16.15m Boom: 22,500kg at 4.0m
- 22.8m Boom: 14,000kg at 5.5m
- 29.45m Boom: 10,000kg at 7.0m
- 36.1m Boom: 7,000kg at 8.0m
- 8.0m Jib: 3,400kg at 78°
- 13.0m Jib: 2,200kg at 77°
- Single top: 3,400kg

**MAX. LIFTING HEIGHT**
- Boom: 37.0m
- Jib: 49.7m

**MAX. WORKING RADIUS**
- Boom: 33.0m
- Jib: 37.4m

**BOOM LENGTH**
- 9.5m – 36.1m

**BOOM EXTENSION**
- 26.6m

**BOOM EXTENSION SPEED**
- 26.6m / 112s

**JIB LENGTH**
- 8.0m, 13.0m

**MAIN WINCH SINGLE LINE SPEED**
- 126m/min (4th layer)

**MAIN WINCH HOOK SPEED**
- 12.6 m/min (10 part-line)

**AUXILIARY WINCH SINGLE LINE SPEED**
- 126m/min (4th layer)

**AUXILIARY WINCH HOOK SPEED**
- 126m/min (1 part-line)

**BOOM ELEVATION ANGLE**
- 0° – 83°

**BOOM ELEVATION SPEED**
- 0° – 83° / 53s

**SWING ANGLE**
- 360° continue

**SWING SPEED**
- 2.6 rpm

**WIRE ROPE**
- Main Winch: 16mm x 200m (Diameter x Length)
- Spin-resistant wire rope
- Auxiliary Winch: 16mm x 110m (Diameter x Length)
- Spin-resistant wire rope

**BOOM**
- 5-section hydraulically telescoping boom of hexagonal box construction
- (stages 2: sequential; stages 3, 4, 5: synchronized)

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

**JIB**
- Quick-turn type (2-staged type which stores alongside below the base boom section and extendible from under the boom (with 2nd stage being a pull-out type))
- Hydraulic non-stage offset (5°-45°) type

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

**HOIST**
- Driven by hydraulic motor and via spur gear speed reducer.
- With free-fall device.
- (with operation lever lock device for prevention of misuse/operation)
- Automatic brake (with foot brake for free-fall device)
- 2 single winches
- With flow regulator valve with pressure compensation

**BOOM ELEVATION**
- 1 double-acting hydraulic cylinders
- With flow regulator valve with pressure compensation

**SWING**
- Hydraulic motor driven planetary gear reducer
- Swing bearing
- Swing free/lock changeover type
- Negative brake

**OUTRIGGERS**
- Fully hydraulic X-type (floats mounted integrally)
- Slides and jacks each provided with independent operation device.
- Full extended width 6.7m
- Middle extended width 5.2m
- Minimum extended width 3.8m

**OPERATION METHOD**
- Hydraulic pilot valve operation

**MAX. OUTRIGGER LOAD**
- 35.1t

**HYDRAULIC PUMPS**
- 2 variable piston pumps
- 2 gear pumps

**HYDRAULIC OIL TANK CAPACITY**
- 450 liters

**SAFETY DEVICES**
- Automatic moment limiter (AML)
- Multi-display indication
- Over-winding cutoff
- Working area control device
- Outrigger extension width detector
- Winch drum lock
- Level gauge
- Hook safety latch
- Hydraulic safety valve
- Telescopic counterbalance valve
- Elevator counterbalance valve
- Power tilt counterbalance valve
- Jack pilot check valve
- Swing lock

**EQUIPMENTS**
- Heat pump type air-conditioner
- Hydraulic oil temperature indication lamp
- Radio
- Oil cooler
- Tactile-type winch drum rotation indicator
- Operation pedal for elevating operation
- Centralized oiling device (carrier)
- Television (option)
- Electrically housed side-mirror
CARRIER SPECIFICATIONS

ENGINE
Model MITSUBISHI 6D22 (with turbo charger)
Type 4-cylinder, 6-cylinder, direct-injection, water-cooled
diesel engine
Piston displacement 11,149cc
Max. output 270PS at 2,200rpm
Max. torque 107.0kg·m at 1,200rpm

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

TRANSMISSION
Automatic and manual transmission
Power shift type (wet multi-plate clutch)
3 forward and 1 reverse speeds (with Hi/Low settings)

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
Hydrodynamic retarder
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
300 liters

TIRES
Front 16.00R25☆☆☆☆(OR)
Rear 16.00R25☆☆☆☆(OR)

CAB
Two-man type
With sun visor and trim
Rubber mounted type
Fully adjustable foldable seat
(with headrest, armrest, seat belt)
Adjustable handle (tilt, telescoping)
Roof windshield lock warning
Intermittent type roof wiper (with washer)

SAFETY DEVICES
Emergency steering device
Spring lock device
Rear wheel steering lock device
Engine over-run alarm
Overshift prevention device
Parking brake alarm
Powered mirror for right side of boom
Monitor TV for left side of boom

GENERAL DATA

DIMENSIONS
Overall length 11,400mm
Overall width 2,750mm
Overall height 3,590mm
Wheel base 3,800mm
Tread Front 2,265mm
Rear 2,265mm

WEIGHTS
Gross vehicle weight
Total 31,800kg
Front 15,900kg
Rear 15,900kg

PERFORMANCE
Max. traveling speed 49km/h
Gradeability (tan 8) 5.2m (4-wheel steering)
Min. turning radius 8.6m (2-wheel steering)
## TOTAL RATED LOADS

(1) With outriggers set

### (i)

<table>
<thead>
<tr>
<th>A</th>
<th>B</th>
<th>9.5m</th>
<th>16.15m</th>
<th>22.8m</th>
<th>29.45m</th>
<th>36.1m</th>
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A = Boom length
B = Working radius
C = Jib length
D = Jib offset
E = Boom angle
a = Boom angle range (for the unladen condition)
## Outriggers middle extended (Over sides)

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<th>A (m)</th>
<th>9.5m</th>
<th>16.15m</th>
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<th>D</th>
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</table>

- **A** = Boom length
- **B** = Working radius
- **C** = Jib length
- **D** = Jib offset
- **E** = Boom angle
- **a** = Boom angle range (for the unladen condition)
### Outriggers minimum extended (Over sides)

<table>
<thead>
<tr>
<th>A</th>
<th>9.5m</th>
<th>16.15m</th>
<th>22.8m</th>
<th>29.45m</th>
<th>36.1m</th>
<th>C</th>
<th>D</th>
<th>8.0m</th>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>20.0m</td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></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  
a = Boom angle range (for the unladen condition)
PRECAUTIONS TO BE TAKEN WHEN THE OUTRIGGERS ARE EXTENDED:

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 (330kg for a 35 ton capacity hook, 210kg for a 20 ton capacity hook and 70kg for a 3.4 ton capacity hook) 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 3.5t for the main winch and 3.4t for the auxiliary winch.

<table>
<thead>
<tr>
<th>A</th>
<th>9.5m</th>
<th>16.15m</th>
<th>22.8m</th>
<th>29.45m</th>
<th>36.1m</th>
<th>J</th>
</tr>
</thead>
<tbody>
<tr>
<td>H</td>
<td>10</td>
<td>7</td>
<td>5(6)</td>
<td>4</td>
<td>4</td>
<td>1</td>
</tr>
</tbody>
</table>

The value in ( ) is for a 20t hook.

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 250kg from the total rated load of the boom and must not exceed 3.4t.
7. The hoisting performance for the "Over sides" range will differ according to the extended width of the outriggers. Operations should be performed in accordance with the performance corresponding to the extended width. Also, although the hoisting performances for the "Over front" and "Over rear" ranges are equivalent to those of the "outriggers fully extended" condition, the front and rear ranges (angle a) will differ according to the width to which the outriggers are extended in the left and right directions.

<table>
<thead>
<tr>
<th>Extended width</th>
<th>Middle extended</th>
<th>Minimum extended</th>
</tr>
</thead>
<tbody>
<tr>
<td>Angle a°</td>
<td>25</td>
<td>15</td>
</tr>
</tbody>
</table>

![Diagram](image-url)
(2) Without outriggers

Unit: ton

<table>
<thead>
<tr>
<th>B (m)</th>
<th>9.5 m BOOM</th>
<th>16.15m BOOM</th>
<th>22.8m BOOM</th>
<th>9.5m BOOM</th>
<th>16.15m BOOM</th>
<th>22.8m BOOM</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>F</td>
<td>G</td>
<td>F</td>
<td>G</td>
<td>F</td>
<td>G</td>
</tr>
<tr>
<td>3.0</td>
<td>16.0</td>
<td>9.0</td>
<td>13.0</td>
<td>8.0</td>
<td>12.0</td>
<td>6.8</td>
</tr>
<tr>
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<td>16.0</td>
<td>9.0</td>
<td>13.0</td>
<td>8.0</td>
<td>12.0</td>
<td>6.8</td>
</tr>
<tr>
<td>4.0</td>
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<td>7.6</td>
<td>13.0</td>
<td>6.75</td>
<td>10.8</td>
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</tr>
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<td>9.9</td>
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<td>4.6</td>
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<td>3.9</td>
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<tr>
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<td>8.4</td>
<td>2.5</td>
<td>8.3</td>
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<tr>
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<td>2.8</td>
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<tr>
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<td>3.3</td>
<td>0.5</td>
</tr>
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<td>3.15</td>
<td>0.75</td>
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<tr>
<td>11.0</td>
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<td>1.3</td>
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<tr>
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</tr>
<tr>
<td>18.0</td>
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<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>a (°)</th>
<th>0 ~ 76</th>
<th>47~76</th>
<th>18~76</th>
<th>56~76</th>
<th>0 ~ 76</th>
<th>47~76</th>
<th>22~76</th>
<th>59~76</th>
</tr>
</thead>
</table>

B = Working radius  F = Front  G = 360°
a = Boom angle range (for the unladen condition)
PRECAUTIONS TO BE TAKEN WHEN THE OUTRIGGERS ARE NOT MOUNTED:

1. The total rated loads shown are for the case when the crane is set horizontally on firm ground, with the air pressure of the tires being at the prescribed pressure and with the spring lock being applied completely. The values above the bold lines are based on the tire 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 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 3.5t for the main winch and 3.4t for the auxiliary winch.

<table>
<thead>
<tr>
<th>A</th>
<th>9.5 m</th>
<th>16.15m</th>
<th>22.8 m</th>
<th>Single top</th>
</tr>
</thead>
<tbody>
<tr>
<td>H</td>
<td>10</td>
<td>7</td>
<td>5</td>
<td>1</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 250kg from the total rated load of the boom and must not exceed 3.4t.
6. Free-fall operations should not be performed without outriggers.
7. Booms over 22.8m 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.

![Diagram](#)

9. 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.
10. Crane operations should not be performed when creeping while hoisting a load.
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°).