

ROUGH TERRAIN CRANE

TR-350M

JAPANESE SPECIFICATIONS

TR

OUTLINE	SPEC. NO.
5-section Boom, 2-staged Jib X-type Outrigger	TR-350M-3-00102

Control No. JA-01

TR-350M

CRANE SPECIFICATIONS

CRANE CAPACITY

9.5m Boom	35,000kg	at 3.0m	(10part-line)
16.2m Boom	22,500kg	at 4.0m	(7part-line)
22.9m Boom	14,000kg	at 5.5m	(5part-line)
29.6m Boom	10,000kg	at 7.0m	(4part-line)
36.3m Boom	7,000kg	at 8.0m	(4part-line)
8.0m Jib	3,400kg	at 78°	(1part-line)
13.0m Jib	2,200kg	at 77°	(1part-line)
Single top	3,500kg		(1part-line)

MAX.LIFTING HEIGHT

Boom	37.1m
Jib	50.1m

MAX.WORKING RADIUS

Boom	33.0m
Jib	37.6m

BOOM LENGTH

9.5m - 36.3m

BOOM EXTENSION

26.8m

BOOM EXTENSION SPEED

26.8m/113s

JIB LENGTH

8.0m, 13.0m

MAIN WINCH SINGLE LINE WINDING SPEED

126m/min (4th layer)

MAIN WINCH HOOK SPEED

12.6m/min (10 part-line)

AUXILIARY WINCH SINGLE LINE WINDING 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

2.3rpm

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
(stage 2: sequential; stages 3,4,5: synchronized)

BOOM EXTENSION

2 double-acting hydraulic cylinders
2 wire rope type telescoping devices

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))
Triple offset (5°, 25°, 45°) type

SINGLE TOP

Single sheave. Mounted on main boom head for single line work.

HOIST

Driven by hydraulic motor and via spur gear reducer. With free-fall device.

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 cylinder

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.

Fully extended width 6.7m

Middle extended width 6.3m, 5.2m

Minimum extended width 3.8m

OPERATION METHOD

Hydraulic pilot valve operation

MAX. VERTICAL LOAD CAPACITY OF OUTRIGGER

35.0t

POWER TAKE-OFF

PTO wet multi-plate clutch

HYDRAULIC PUMPS

2 variable piston pumps

2 gear pumps

HYDRAULIC OIL TANK CAPACITY

450 liters

SAFETY DEVICES

Automatic moment limiter (AML)

Swing automatic stop device

Over-winding cutout device

Working area control device

Free-fall interlock device

Outrigger extension width detector

Winch drum lock

Level gauge

Hook safety latch

Hydraulic safety valve

Telescopic counterbalance valve

Elevation counterbalance valve

Jack pilot check valve

Swing lock

EQUIPMENT

Air-conditioner with dehumidifier

Hydraulic oil temperature indication lamp

Radio

Oil cooler

Visual-type winch drum rotation indicator

Operation pedals

ISO arrangement: for telescoping/auxiliary hoisting

TADANO arrangement: for elevating/telescoping

Television (option)

CARRIER SPECIFICATIONS**ENGINE**

Model MITSUBISHI 6D24 (with turbo charger)
 Type 4-cycle, 6-cylinder, direct-injection, water-cooled diesel engine
 Piston displacement 11,945cc
 Max. output 290PS at 2,200rpm
 Max. torque 110kg·m at 1,400rpm

TORQUE CONVERTER

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

TRANSMISSION

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

REDUCER

Axle dual-ratio reduction

DRIVE

2-wheel drive (4X2) / 4-wheel drive (4X4) selection

FRONT AXLE

Full floating type

REAR AXLE

Full floating type

SUSPENSION

Front

Hydro-pneumatic suspension (with hydraulic lock cylinder)

Rear

Hydro-pneumatic suspension (with hydraulic lock cylinder)

STEERING

Fully hydraulic power steering
 With reverse steering correction mechanism

BRAKE SYSTEM

Service Brake

Hydro-pneumatic 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

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

FUEL TANK CAPACITY

300 liters

TIRES

Front 16.00R25☆☆(OR)

Rear 16.00R25☆☆(OR)

CAB

One-man type

With interior equipment

Liquid filled rubber mounted type

Fully adjustable foldable seat

(with headrest and seat belt)

Adjustable handle (tilt, telescoping)

Intermittent type windshield/roof wiper (with washer)

Power window

Side visor

SAFETY DEVICES

Emergency steering device

Suspension 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 (option)

EQUIPMENT

Centralized oiling device

Electric mirror

GENERAL DATA**DIMENSIONS**

Overall length	11,425mm
Overall width	2,750mm
Overall height	3,595mm
Wheel base	3,800mm
Tread Front	2,260mm
Tread Rear	2,260mm

WEIGHTS

Gross vehicle weight	
Total	31,795kg
Front	15,900kg
Rear	15,895kg

PERFORMANCE

Max. travelling speed	49km/h
Gradeability (tan θ)	0.57
Min. turning radius	5.2m (4-wheel steering) 8.6m (2-wheel steering)

Note:

This crane is covered by Class D Conditions under the Basic Running Conditions of the Road Traffic Act.

TOTAL RATED LOADS

(1) With outriggers set
[BOOM]

Unit:ton						Unit:ton						
Outriggers fully extended (6.7m) -360°-						Outriggers middle extended (6.3m) -Over sides-						
A B	9.5m	16.2m	22.9m	29.6m	36.3m	A B	9.5m	16.2m	22.9m	29.6m	36.3m	
3.0m	35.0	22.5	14.0			3.0m	35.0	22.5	14.0			
3.5m	30.6	22.5	14.0	10.0		3.5m	30.6	22.5	14.0	10.0		
4.0m	27.5	22.5	14.0	10.0		4.0m	27.5	22.5	14.0	10.0		
4.5m	24.7	20.7	14.0	10.0	7.0	4.5m	24.7	20.7	14.0	10.0	7.0	
5.0m	22.3	19.3	14.0	10.0	7.0	5.0m	22.3	19.3	14.0	10.0	7.0	
5.5m	20.3	17.9	14.0	10.0	7.0	5.5m	20.3	17.9	14.0	10.0	7.0	
6.0m	18.6	16.8	13.4	10.0	7.0	6.0m	18.6	16.8	13.4	10.0	7.0	
6.5m	16.4	15.8	12.5	10.0	7.0	6.5m	16.4	15.8	12.5	10.0	7.0	
7.0m	14.5	14.9	11.8	10.0	7.0	7.0m	14.5	14.9	11.8	10.0	7.0	
8.0m		13.1	10.6	8.9	7.0	8.0m		12.6	10.6	8.9	7.0	
9.0m		10.7	9.6	8.0	6.3	9.0m		10.0	9.6	8.0	6.3	
10.0m		9.0	8.6	7.2	5.8	10.0m		8.0	8.6	7.2	5.8	
11.0m		7.4	7.7	6.55	5.3	11.0m		6.6	7.4	6.55	5.3	
12.0m		6.1	6.7	6.0	4.9	12.0m		5.4	6.25	6.0	4.9	
13.0m		5.1	5.85	5.55	4.5	13.0m		4.5	5.3	5.55	4.5	
14.0m			5.1	5.1	4.15	14.0m			4.6	4.8	4.15	
15.0m			4.4	4.6	3.85	15.0m			3.95	4.3	3.85	
16.0m			3.8	4.15	3.6	16.0m			3.4	3.8	3.6	
17.0m			3.3	3.75	3.35	17.0m			2.9	3.35	3.35	
18.0m			2.9	3.3	3.15	18.0m			2.55	2.95	3.1	
19.0m			2.5	2.95	2.95	19.0m			2.15	2.55	2.75	
20.0m			2.2	2.6	2.7	20.0m			1.85	2.25	2.45	
22.0m				2.0	2.2	22.0m				1.7	1.95	
24.0m				1.5	1.75	24.0m				1.3	1.5	
26.0m				1.1	1.35	26.0m				0.9	1.15	
28.0m					1.0	28.0m					0.8	
30.0m					0.75	30.0m					0.55	
32.0m					0.55							
33.0m					0.45							
a (°)	0~83					a (°)	0~83					20~83

A= Boom length B= Working radius
a= Boom angle range (for the unladen condition)

[BOOM]

Unit: ton

Outriggers middle extended (5.2m) -Over sides-						
A \ B	9.5m	16.2m	22.9m	29.6m	36.3m	
3.0m	35.0	22.5	14.0			
3.5m	30.6	22.5	14.0	10.0		
4.0m	27.5	22.5	14.0	10.0		
4.5m	24.7	20.7	14.0	10.0	7.0	
5.0m	22.3	19.3	14.0	10.0	7.0	
5.5m	19.8	17.9	14.0	10.0	7.0	
6.0m	16.9	15.8	13.4	10.0	7.0	
6.5m	14.3	13.6	12.5	10.0	7.0	
7.0m	12.3	11.7	11.8	10.0	7.0	
8.0m		8.9	9.5	8.9	7.0	
9.0m		7.0	7.7	8.0	6.3	
10.0m		5.6	6.3	6.8	5.8	
11.0m		4.5	5.3	5.75	5.3	
12.0m		3.7	4.4	4.9	4.9	
13.0m		3.0	3.7	4.2	4.3	
14.0m			3.2	3.6	3.8	
15.0m			2.7	3.1	3.35	
16.0m			2.3	2.65	2.9	
17.0m			1.9	2.25	2.55	
18.0m			1.5	1.9	2.2	
19.0m			1.2	1.65	1.9	
20.0m			1.0	1.4	1.65	
22.0m				1.0	1.2	
24.0m				0.6	0.8	
26.0m					0.5	
a (°)	0~83		19~83	36~83		

Unit: ton

Outriggers minimum extended (3.8m) -Over sides-						
A \ B	9.5m	16.2m	22.9m	29.6m	36.3m	
3.0m	35.0	22.5	14.0			
3.5m	28.5	22.5	14.0	10.0		
4.0m	21.3	20.2	14.0	10.0		
4.5m	16.85	16.1	14.0	10.0	7.0	
5.0m	13.8	13.0	13.8	10.0	7.0	
5.5m	11.6	10.8	11.55	10.0	7.0	
6.0m	9.95	9.15	9.8	10.0	7.0	
6.5m	8.5	7.8	8.45	9.0	7.0	
7.0m	7.4	6.8	7.4	7.95	7.0	
8.0m		5.15	5.8	6.3	6.4	
9.0m		4.0	4.65	5.1	5.25	
10.0m		3.05	3.75	4.2	4.4	
11.0m		2.3	3.05	3.45	3.65	
12.0m		1.7	2.5	2.85	3.05	
13.0m		1.2	2.0	2.35	2.6	
14.0m			1.6	1.95	2.15	
15.0m			1.2	1.6	1.85	
16.0m			0.9	1.3	1.5	
17.0m			0.6	1.0	1.25	
18.0m				0.75	1.0	
19.0m				0.5	0.75	
20.0m					0.55	
a (°)	0~83		28~83	43~83	54~83	

A= Boom length B= Working radius
a= Boom angle range (for the unladen condition)

[JIB]

Unit:ton

Outriggers fully extended (6.7m)													-360°-	
C	36.3m Boom + 8.0m Jib						36.3m Boom + 13.0m Jib							
	5°		25°		45°		5°		25°		45°			
D	B(m)	M	B(m)	M	B(m)	M	B(m)	M	B(m)	M	B(m)	M		
E (°)	83	5.0	3.4	7.8	2.1	9.8	1.6	6.4	2.2	10.6	1.25	14.0	1.0	
	78	9.2	3.4	11.9	2.1	13.6	1.6	11.2	2.2	15.1	1.25	18.1	1.0	
	77	10.0	3.25	12.6	2.1	14.4	1.6	12.1	2.2	16.0	1.25	18.9	0.95	
	75	11.5	2.9	14.2	1.95	15.8	1.5	13.8	1.95	17.7	1.2	20.4	0.85	
	70	15.3	2.3	17.8	1.65	19.2	1.3	18.0	1.55	21.7	1.0	24.0	0.75	
	65	18.8	1.9	21.3	1.45	22.5	1.2	22.0	1.25	25.5	0.9	27.5	0.7	
	63	20.3	1.8	22.6	1.35	23.7	1.15	23.6	1.15	26.9	0.85	28.8	0.65	
	60	22.2	1.6	24.5	1.25	25.5	1.1	25.8	1.05	29.0	0.8	30.6	0.63	
	56	24.8	1.4	27.0	1.15	27.8	1.05	28.6	0.9	31.5	0.7	32.9	0.6	
	54	26.0	1.25	28.1	1.1	28.8	1.0	30.0	0.85	32.8	0.65	34.0	0.57	
	50	28.3	0.9	30.2	0.8	30.7	0.75	32.5	0.7	35.1	0.6	36.0	0.55	
	47	30.0	0.7	31.7	0.6	32.1	0.6	34.3	0.5	36.6	0.47	37.3	0.45	
	45	30.9	0.55	32.6	0.5			35.4	0.4	37.6	0.35			
	43	31.9	0.45	33.5	0.4									
a (°)	42 ~ 83				46 ~ 83				44 ~ 83				46 ~ 83	

Unit:ton

Outriggers middle extended (6.3m)													-Over sides-	
C	36.3m Boom + 8.0m Jib						36.3m Boom + 13.0m Jib							
	5°		25°		45°		5°		25°		45°			
D	B(m)	M	B(m)	M	B(m)	M	B(m)	M	B(m)	M	B(m)	M		
E (°)	83	5.0	3.4	7.8	2.1	9.8	1.6	6.4	2.2	10.6	1.25	14.0	1.0	
	78	9.2	3.4	11.9	2.1	13.6	1.6	11.2	2.2	15.1	1.25	18.1	1.0	
	77	10.0	3.25	12.6	2.1	14.4	1.6	12.1	2.2	16.0	1.25	18.9	0.95	
	75	11.5	2.9	14.2	1.95	15.8	1.5	13.8	1.95	17.7	1.2	20.4	0.85	
	70	15.3	2.3	17.8	1.65	19.2	1.3	18.0	1.55	21.7	1.0	24.0	0.75	
	65	18.8	1.9	21.3	1.45	22.5	1.2	22.0	1.25	25.5	0.9	27.5	0.7	
	63	20.3	1.8	22.6	1.35	23.7	1.15	23.6	1.15	26.9	0.85	28.8	0.65	
	60	22.2	1.6	24.5	1.25	25.5	1.1	25.8	1.05	29.0	0.8	30.6	0.63	
	56	24.7	1.3	26.9	1.15	27.8	1.05	28.6	0.9	31.5	0.7	32.9	0.6	
	54	25.9	1.05	28.0	0.95	28.7	0.9	29.9	0.85	32.8	0.65	34.0	0.57	
	50	28.2	0.7	30.1	0.65	30.6	0.6	32.4	0.55	35.0	0.45	35.9	0.45	
	47	29.9	0.5	31.6	0.45	32.0	0.45							
a (°)	46 ~ 83						49 ~ 83							

B= Working radius C= Jib length D= Jib offset
 E= Boom angle M= Total rated loads
 a= Boom angle range (for the unladen condition)

[JIB]

Unit:ton

Outriggers middle extended (5.2m) -Over sides-												
C	36.3m Boom + 8.0m Jib						36.3m Boom + 13.0m Jib					
	5°		25°		45°		5°		25°		45°	
D	B(m)	M	B(m)	M	B(m)	M	B(m)	M	B(m)	M	B(m)	M
E (°)												
83	5.0	3.4	7.8	2.1	9.8	1.6	6.4	2.2	10.6	1.25	14.0	1.0
78	9.2	3.4	11.9	2.1	13.6	1.6	11.2	2.2	15.1	1.25	18.1	1.0
77	10.0	3.25	12.6	2.1	14.4	1.6	12.1	2.2	16.0	1.25	18.9	0.95
75	11.5	2.9	14.2	1.95	15.8	1.5	13.8	1.95	17.7	1.2	20.4	0.85
70	15.3	2.3	17.8	1.65	19.2	1.3	18.0	1.55	21.7	1.0	24.0	0.75
65	18.8	1.8	21.3	1.45	22.5	1.2	22.0	1.25	25.5	0.9	27.5	0.7
63	20.2	1.45	22.6	1.3	23.7	1.15	23.6	1.15	26.9	0.85	28.8	0.65
60	22.1	1.05	24.4	0.95	25.4	0.85	25.7	0.85	28.9	0.7	30.6	0.63
56	24.6	0.65	26.7	0.55	27.5	0.5	28.4	0.5	31.3	0.4	32.8	0.4
54	25.8	0.45	27.8	0.4	28.6	0.35						
a (°)	53 ~ 83						55 ~ 83					

Unit:ton

Outriggers minimum extended (3.8m) -Over sides-												
C	36.3m Boom + 8.0m Jib						36.3m Boom + 13.0m Jib					
	5°		25°		45°		5°		25°		45°	
D	B(m)	M	B(m)	M	B(m)	M	B(m)	M	B(m)	M	B(m)	M
E (°)												
83	5.0	3.4	7.8	2.1	9.8	1.6	6.4	2.2	10.6	1.25	14.0	1.0
78	9.2	3.4	11.9	2.1	13.6	1.6	11.2	2.2	15.1	1.25	18.1	1.0
77	10.0	3.25	12.6	2.1	14.4	1.6	12.1	2.2	16.0	1.25	18.9	0.95
75	11.5	2.9	14.2	1.95	15.8	1.5	13.8	1.95	17.7	1.2	20.4	0.85
70	15.2	1.7	17.7	1.4	19.2	1.2	18.0	1.35	21.7	1.0	24.0	0.75
66	17.8	0.8	20.3	0.7	21.6	0.6	20.9	0.65	24.4	0.5	26.6	0.4
a (°)	65 ~ 83											

B- Working radius C- Jib length D- Jib offset
 E- Boom angle M- Total rated loads
 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 where the crane is set horizontally on firm level ground. They include the weights of the slings and hooks (main hook: 330kg, 20t hook: 210kg, auxiliary hook: 70kg).
The values above the bold lines are based on the crane strength while those below are based on the crane stability.
2. Since the working radii are based on the actual values including the deflection of the boom, operations should be performed in accordance with the working radii.
3. Perform jib operations in accordance with the boom angle, irrespective of the boom length. The working radii are reference values for the case where the jib is mounted to a 36.3m boom.
4. The total rated load for the single top shall be the value obtained by subtracting the weight of the hook mounted to the boom from the total rated load of the boom and must not exceed 3.5t.
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 table below shows the standard number of part lines for each boom length. The load per line should not exceed 3.5t for both the main winch and auxiliary winch.

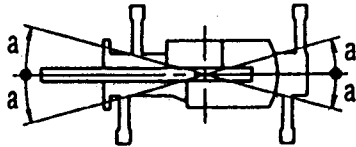
A	9.5m	16.2m	22.9m	29.6m	36.3m	J
H	10	7	5(6)	4	4	1

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

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

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.

Extended width	Middle extended (6.3m)	Middle extended (5.2m)	Minimum extended (3.8m)
Angle a°	35	25	15



(2) Without outriggers

Unit:ton

B (m)	Stationary						Creep (travelling at 1.6km/h or less)					
	9.5m Boom		16.2m Boom		22.9m Boom		9.5m Boom		16.2m Boom		22.9m Boom	
	K	G	K	G	K	G	K	G	K	G	K	G
3.0	16.0	9.0	13.0	8.0			12.0	6.8	10.0	6.0		
3.5	16.0	9.0	13.0	8.0			12.0	6.8	10.0	6.0		
4.0	14.4	7.6	13.0	6.75			10.8	5.7	10.0	5.05		
4.5	13.05	6.4	11.8	5.7	10.0	5.5	9.75	4.8	9.15	4.2	7.5	4.0
5.0	11.85	5.2	10.8	4.6	10.0	5.5	8.9	4.05	8.35	3.45	7.5	4.0
5.5	10.8	4.3	9.9	3.7	9.5	4.6	8.15	3.35	7.6	2.8	7.2	3.4
6.0	10.0	3.6	9.1	3.05	9.0	3.9	7.5	2.8	6.95	2.3	6.8	2.85
6.5	8.7	3.0	8.4	2.5	8.3	3.3	6.9	2.35	6.2	1.9	6.2	2.4
7.0	7.5	2.5	7.3	2.0	7.8	2.8	5.9	1.9	5.5	1.55	5.85	2.05
8.0			5.6	1.2	6.25	2.05			4.25	1.0	4.85	1.5
9.0			4.4	0.6	5.05	1.4			3.3	0.5	3.9	1.05
10.0			3.5		4.15	0.9			2.65		3.15	0.75
11.0			2.75		3.4	0.5			2.05		2.6	
12.0			2.1		2.8				1.65		2.15	
13.0			1.6		2.35				1.3		1.8	
14.0					1.9						1.5	
15.0					1.5						1.25	
16.0					1.2						1.0	
17.0					0.9						0.75	
18.0					0.65						0.5	
19.0					0.5							
a (°)	0~76		47~ 76	18~ 76	56~ 76	0~76			47~ 76	22~ 76	59~ 76	

B= Working radius K= Front G= 360°
a= Boom angle range (for the unladen condition)