TR

ROUGH TERRAIN CRANE

TR-350M

JAPANESE SPECIFICATIONS

OUTLINE	SPEC. NO.
5-section Boom, 2-stage Jib	TR-350M-1-00101

Control No. JA-03

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TR-350M

CRANE SPECIFICATIONS

CRANE CAPACITY

9.0m	Boom	35,000kg	at 3.0m	(10 part-line)
15.25m	Boom	22,500kg	at 3.5m	(7 part-line)
21.5m	Boom	15,500kg	at 4.5m	(5 part-line)
27.75m	Boom	10,000kg	at 6.0m	(4 part-line)
34.0m	Boom	6,500kg	at 7.0m	(4 part-line)
7.2m	Jib	3,000kg	at 78°	(1 part-line)
12.8m	Jib	2,000kg	at 78°	(1 part-line)
Single top		3,000kg		(1 part-line)

MAX. LIFTING HEIGHT
Boom 34.7m
Jib 47.6m

MAX. WORKING RADIUS
Boom 31.5m
Jib 36.5m

BOOM LENGTH
9.0m – 34.0m

BOOM EXTENSION
25.0m

BOOM EXTENSION SPEED
25.0m / 119s

JIB LENGTH
7.2m, 12.8m

MAIN WINCH SINGLE LINE SPEED
High range: 125m/min (4th layer)
Low range: 62m/min (4th layer)

MAIN WINCH HOOK SPEED
High range: 12.5m/min (10 part-line)
Low range: 6.2m/min (10 part-line)

AUXILIARY WINCH SINGLE LINE SPEED
High range: 125m/min (4th layer)
Low range: 62m/min (4th layer)

AUXILIARY WINCH HOOK SPEED
High range: 125m/min (1 part-line)
Low range: 62m/min (1 part-line)

BOOM ELEVATION ANGLE
0° – 83°

BOOM ELEVATION SPEED
0° – 83° / 50s

SWING ANGLE
360° continue

SWING SPEED
3.0rpm

WIRE ROPE
Main Winch
16mm × 190m (Diameter×Length)
6×WS(36) Designated type ordinary · Z twist
Spin-resistant wire rope
Breaking strength 21.4t
Auxiliary Winch
16mm × 105m (Diameter×Length)
7×7+6×Fi(29) Class B ordinary · Z twist
Spin-resistant wire rope
Breaking strength 17.6t

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

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

JIB
2-staged swingaround boom extension which stores alongside boom base section
(with 2nd stage being a pull-out type).
Triple offset (5°, 25°, 45°) type

SINGLE TOP
Single sheave. Mounted to main boom head.

HOIST
Driven by hydraulic motor and via spur gear speed reducer.
With free-fall device.
Automatic brake (with foot brake for free-fall device)
2 single winches

BOOM ELEVATION
2 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 6.6m
Middle extended width 5.2m
Minimum extended width 3.8m

MAX. OUTRIGGER LOAD
31.8t

HYDRAULIC PUMPS
2 variable piston pumps
2 gear pumps

HYDRAULIC OIL TANK CAPACITY
465 liters

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

EQUIPMENTS
Cab heater (with front and side defrosters)
Hydraulic oil temperature indication lamp
Radio
Fan
Oil cooler
Winch drum rotation indicator
Operation pedals for elevating/telescoping
Jib extending device

CARRIER SPECIFICATIONS

ENGINE
Model MITSUBISHI 6D16 (with turbo charger)
Type 4-cycle, 6-cylinder, direct-injection, water-cooled diesel engine
Piston displacement 7,545cc
Max. output 215PS at 2,800rpm
Max. torque 65.0kg·m at 1,800rpm

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
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 16.00-25-28PR (OR)
Rear 16.00-25-28PR (OR)

CAB
Two-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	10,985mm
Overall width	2,750mm
Overall height	3,580mm
Wheel base	3,800mm
Tread Front	2,270mm
Rear	2,270mm

WEIGHTS
Gross vehicle weight
Total	29,450kg
Front	14,725kg
Rear	14,725kg

PERFORMANCE
Max. traveling speed	45km/h
Gradeability (tan θ)	0.6
Min. turning radius	5.2m (4-wheel steering)
	8.6m (2-wheel steering))

TOTAL RATED LOADS

(1) With outriggers set (360°)

(i)

Unit : ton

Outriggers fully extended

A / B (m)	9.0m	15.25m	21.5m	27.75m	34.0m
3.0	35.0	22.5			
3.5	30.0	22.5	15.5		
4.0	26.2	21.5	15.5	10.0	
4.5	23.3	20.0	15.5	10.0	
5.0	21.0	18.6	14.4	10.0	6.5
5.5	19.0	17.5	13.5	10.0	6.5
6.0	17.5	16.4	12.7	10.0	6.5
6.5	16.0	15.5	12.0	9.4	6.5
7.0		14.6	11.3	8.9	6.5
8.0		12.3	10.1	8.0	6.4
9.0		10.0	9.0	7.3	5.8
10.0		8.2	8.0	6.7	5.3
11.0		6.75	6.7	6.2	4.8
12.0		5.7	5.7	5.7	4.4
13.0		4.85	4.85	5.2	4.1
14.0			4.15	4.6	3.8
15.0			3.55	4.05	3.5
16.0			3.05	3.6	3.3
17.0			2.6	3.2	3.1
18.0			2.2	2.8	2.9
19.0			1.9	2.45	2.65
20.0				2.15	2.4
22.0				1.65	2.0
24.0				1.25	1.6
26.0					1.25
28.0					0.95
30.0					0.7
31.5					0.5

C / D / E (°)	7.2m			12.8m		
	5°	25°	45°	5°	25°	45°
83	3.0	1.8	1.3	2.0	1.05	0.7
78	3.0	1.8	1.3	2.0	1.05	0.7
75	2.6	1.8	1.3	1.65	1.05	0.7
72	2.3	1.65	1.3	1.4	0.95	0.7
70	2.1	1.55	1.3	1.25	0.9	0.7
65	1.75	1.35	1.2	1.0	0.75	0.65
60	1.45	1.2	1.1	0.85	0.65	0.6
55	1.25	1.05	1.0	0.7	0.55	0.55
50	0.95	0.8	0.8	0.6	0.5	0.5
45	0.6	0.55	0.55	0.5	0.45	0.4

A = Boom length

B = Working radius

C = Jib length

D = Jib offset

E = Boom angle

(ii)

Unit : ton

Outriggers middle extended												
A / B (m)	9.0m	15.25m	21.5m	27.75m	34.0m	C / D / E (°)	7.2m			12.8m		
							5°	25°	45°	5°	25°	45°
3.0	35.0	22.5				83	3.0	1.8	1.3	2.0	1.05	0.7
3.5	30.0	22.5	15.5			78	3.0	1.8	1.3	2.0	1.05	0.7
4.0	26.2	21.5	15.5	10.0		75	2.6	1.8	1.3	1.65	1.05	0.7
4.5	23.3	20.0	15.5	10.0		72	2.3	1.65	1.3	1.4	0.95	0.7
5.0	21.0	18.6	14.4	10.0	6.5	70	2.1	1.55	1.3	1.25	0.9	0.7
5.5	18.0	17.5	13.5	10.0	6.5	65	1.75	1.35	1.2	1.0	0.75	0.65
6.0	15.2	14.7	12.7	10.0	6.5	60	1.2	1.05	1.05	0.85	0.65	0.6
6.5	12.9	12.7	12.0	9.4	6.5	55	0.7	0.6	0.6	0.5	0.4	0.4
7.0		11.0	11.0	8.9	6.5							
8.0		8.5	8.5	8.0	6.4							
9.0		6.8	6.8	7.3	5.8							
10.0		5.5	5.5	6.3	5.3							
11.0		4.55	4.55	5.3	4.8							
12.0		3.85	3.85	4.5	4.4							
13.0		3.15	3.15	3.8	4.05							
14.0			2.6	3.2	3.5							
15.0			2.1	2.7	3.05							
16.0			1.7	2.3	2.7							
17.0			1.35	1.95	2.35							
18.0			1.1	1.65	2.05							
19.0			0.8	1.4	1.75							
20.0				1.15	1.5							
22.0				0.7	1.05							
24.0					0.7							

A = Boom length

B = Working radius

C = Jib length

D = Jib offset

E = Boom angle

(iii)

Unit : ton

Outriggers minimum extended

A / B (m)	9.0m	15.25m	21.5m	27.75m	34.0m
3.0	35.0	22.5			
3.5	24.5	22.5	15.5		
4.0	18.7	18.6	15.5	10.0	
4.5	15.0	14.9	14.8	10.0	
5.0	12.4	12.3	12.3	10.0	6.5
5.5	10.4	10.3	10.3	10.0	6.5
6.0	8.9	8.9	8.9	9.0	6.5
6.5	7.7	7.7	7.7	8.0	6.5
7.0		6.6	6.6	7.2	6.5
8.0		5.1	5.1	5.7	6.0
9.0		4.0	4.0	4.6	5.0
10.0		3.2	3.2	3.7	4.1
11.0		2.5	2.5	3.05	3.4
12.0		1.95	1.95	2.5	2.85
13.0		1.5	1.45	2.05	2.4
14.0			1.05	1.65	2.0
15.0			0.7	1.3	1.65
16.0				1.0	1.35
17.0				0.75	1.1
18.0					0.9

C / D / E (°)	7.2m			12.8m		
	5°	25°	45°	5°	25°	45°
83	3.0	1.8	1.3	2.0	1.05	0.7
78	3.0	1.8	1.3	2.0	1.05	0.7
75	2.6	1.8	1.3	1.65	1.05	0.7
72	2.0	1.65	1.3	1.4	0.95	0.7
70	1.6	1.4	1.15	1.25	0.9	0.7
65	0.85	0.7	0.6	0.6		

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 the slings and hooks (main winch hook: 330kg, 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 3.5t for the main winch and 3.0t for the auxiliary winch.

A	9.0m	15.25m	21.5m	27.75m	34.0m	J
H	10	7	5	4	4	1

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 3.0t.

(2) Without outriggers

Unit : ton

B	Stationary						Creep (travelling at 1.6km/h or less)					
	9.0m BOOM		15.25m BOOM		21.5m BOOM		9.0m BOOM		15.25m BOOM		21.5m BOOM	
(m)	F	G	F	G	F	G	F	G	F	G	F	G
3.0	15.0	9.0	12.0	7.2			11.0	6.7	9.0	5.0		
3.5	15.0	7.6	12.0	7.2	8.0		11.0	5.8	9.0	5.0	6.0	3.3
4.0	13.5	6.3	12.0	6.1	8.0	4.5	10.0	5.0	9.0	4.5	6.0	3.3
4.5	12.1	5.3	11.1	5.25	8.0	4.5	9.0	4.3	8.3	4.0	6.0	3.3
5.0	10.9	4.55	10.15	4.55	8.0	4.5	8.0	3.8	7.65	3.65	6.0	3.3
5.5	9.8	3.9	9.35	3.9	7.5	3.85	7.3	3.3	7.0	3.3	5.75	3.25
6.0	8.9	3.4	8.6	3.4	7.0	3.3	6.6	2.85	6.4	2.85	5.5	2.75
6.5	8.0	2.9	7.8	2.9	6.5	2.8	6.0	2.45	5.9	2.45	5.25	2.35
7.0			7.1	2.45	6.0	2.35			5.5	2.05	5.0	1.95
8.0			5.7	1.7	5.1	1.6			4.8	1.4	4.3	1.35
9.0			4.55	1.1	4.3	1.05			3.85	0.9	3.6	0.85
10.0			3.65		3.5				3.1		2.95	
11.0			2.9		2.9				2.45		2.45	
12.0			2.35		2.3				2.0		1.95	
13.0			1.95		1.85				1.65		1.55	
14.0					1.4						1.15	
15.0					1.05						0.85	
16.0					0.8						0.65	
17.0					0.55							

B = Working radius F = Front G = 360°

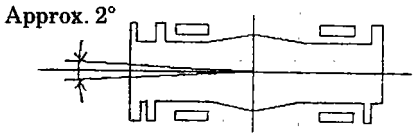
NOTES:

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: 7.75kg/cm^2).
2. The weights of the slings and hooks (main winch hook: 330kg) 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 deflections 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 (main winch hook).

A	9.0m	15.25m	21.5m
H	10	7	5

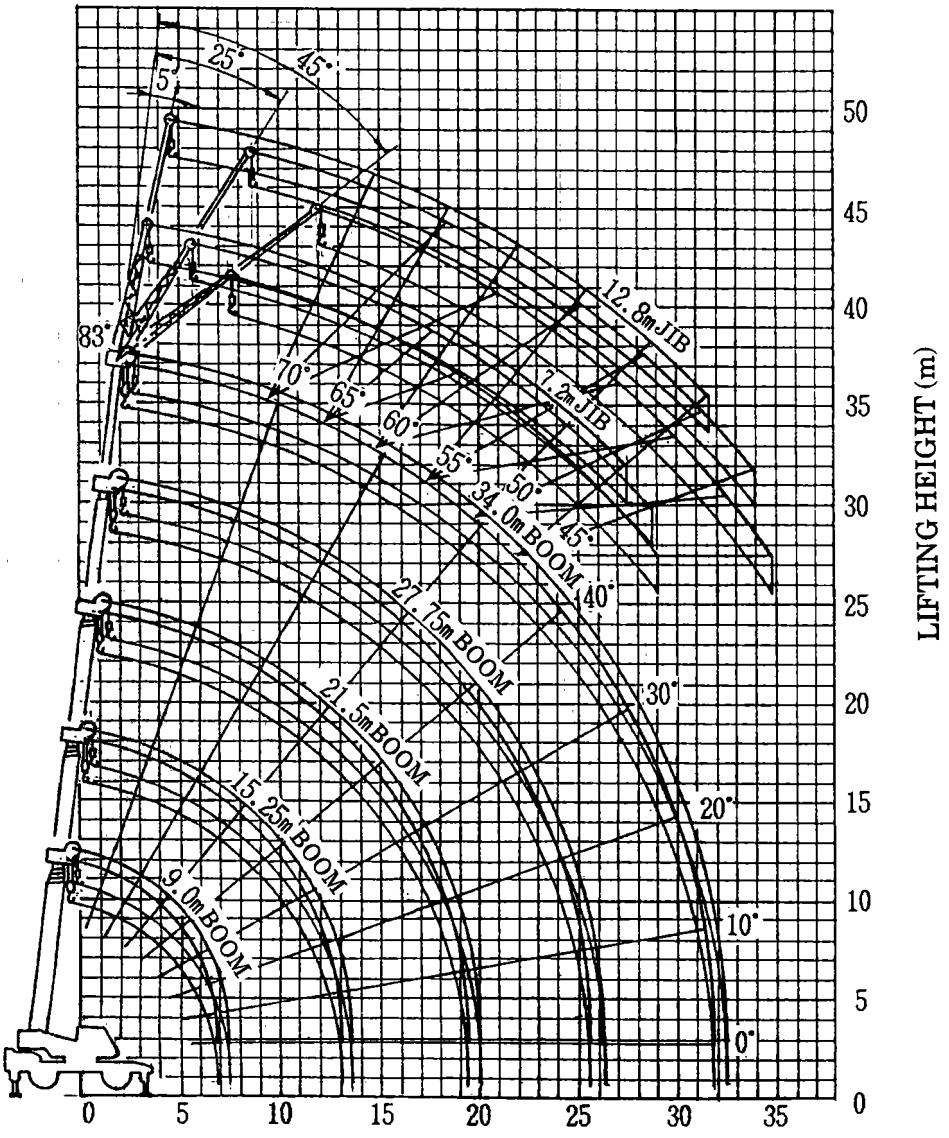
A = Boom length
H = No. of part-line

5. The total rated load for the single top shall be the value obtained by subtracting 140kg from the total rated load of the boom and must not exceed 3.0t.
6. Free-fall operations should not be performed without outriggers.
7. The 27.75m boom, the 34.0m boom and the jib should not be used without outriggers.
8. The boom must be kept inside a 2° area (1° each to the left and right) over front of the carrier when performing "Over front" crane operations without the outriggers.



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.

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°).

DIMENSIONS (1/100)