

ROUGH TERRAIN CRANE

TR-350M

JAPANESE SPECIFICATIONS

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

Control No. JA-03

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
Tread 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°)

Unit : ton

(i)

A B (m)		Outriggers fully extended											
		9.0m	15.25m	21.5m	27.75m	34.0m	7.2m		12.8m				
				E (°)		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	19.0	17.5	13.5	10.0	6.5		65	1.75	1.35	1.2	1.0	0.75	0.65
6.0	17.5	16.4	12.7	10.0	6.5		60	1.45	1.2	1.1	0.85	0.65	0.6
6.5	16.0	15.5	12.0	9.4	6.5		55	1.25	1.05	1.0	0.7	0.55	0.55
7.0		14.6	11.3	8.9	6.5		50	0.95	0.8	0.8	0.6	0.5	0.5
8.0		12.3	10.1	8.0	6.4		45	0.6	0.55	0.55	0.5	0.45	0.4
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								

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	7.2m			12.8m			
						5°	25°	45°	5°	25°	45°	
						C			D			
						E (°)						
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

A B (m)		Outriggers minimum extended																		
		9.0m	15.25m	21.5m	27.75m	34.0m	7.2m			12.8m										
							C		D											
							E (°)		E (°)											
3.0	35.0	22.5					83	5°	25°	45°	5°	25°	45°							
3.5	24.5	22.5	15.5				78	3.0	1.8	1.3	2.0	1.05	0.7							
4.0	18.7	18.6	15.5	10.0			75	3.0	1.8	1.3	2.0	1.05	0.7							
4.5	15.0	14.9	14.8	10.0			72	2.6	1.8	1.3	1.65	1.05	0.7							
5.0	12.4	12.3	12.3	10.0	6.5		70	2.0	1.65	1.3	1.4	0.95	0.7							
5.5	10.4	10.3	10.3	10.0	6.5		65	1.6	1.4	1.15	1.25	0.9	0.7							
6.0	8.9	8.9	8.9	9.0	6.5			0.85	0.7	0.6	0.6									
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															

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 (m)	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	
	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:

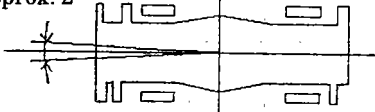
1. The total rated loads shown are for the case when the crane is set horizontally on firm ground. The values above the bold lines are based on the crane strength while those below are based on the crane stability. The foundation, working conditions, etc. should be taken into consideration adequately when using the crane for actual work. (Tire air pressure: 7.75kg/cm²).
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

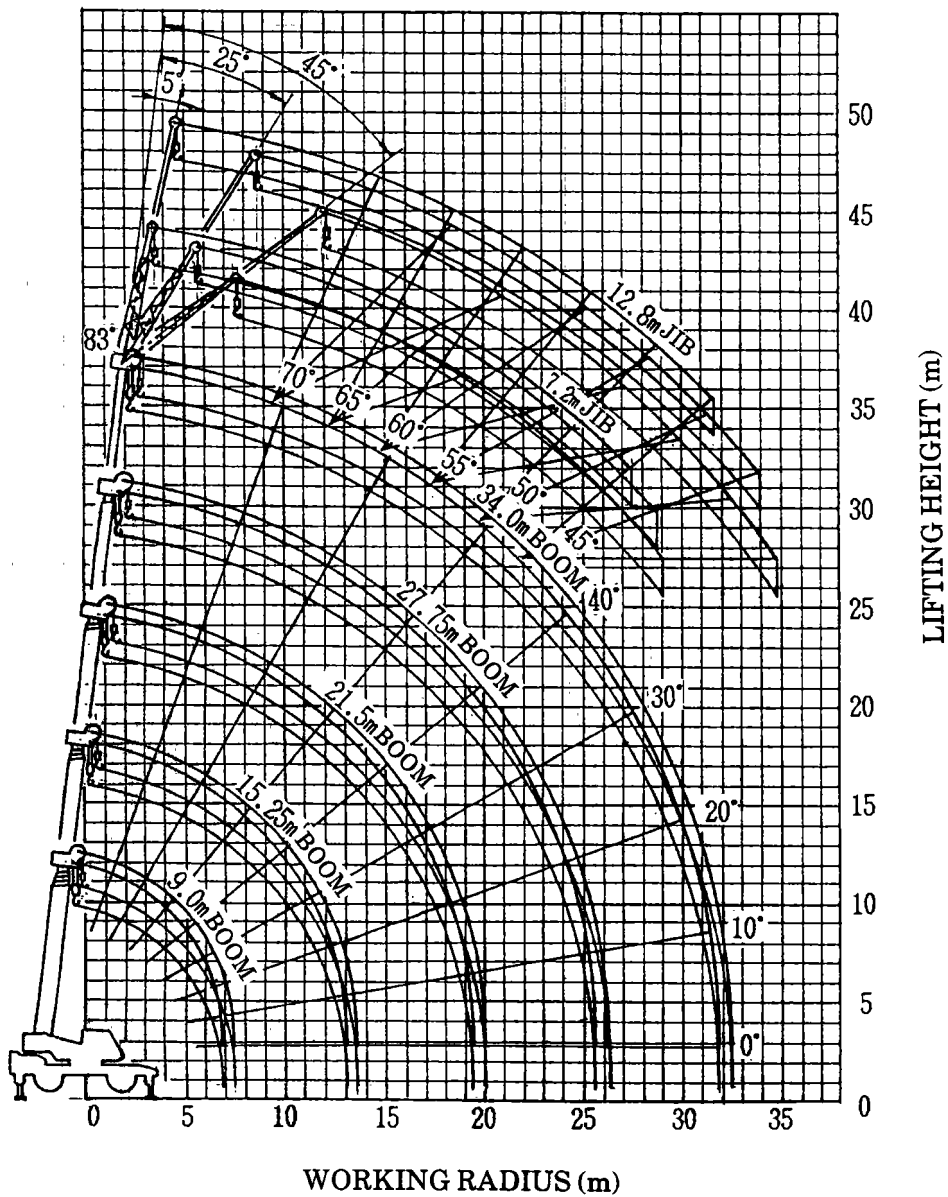
5. The total rated load for the single top shall be the value obtained by subtracting 140kg from the total rated load of the boom and must not exceed 3.0t.
6. Free-fall operations should not be performed without outriggers.
7. The 27.75m boom, the 34.0m boom and the jib should not be used without outriggers.
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.

Approx. 2°



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)

