ROUGH TERRAIN CRANE

GR-160N

JAPANESE SPECIFICATIONS

GR

OUTLINE	SPEC. NO.
H-type Outrigger	GR-160N-1-00102

Control No. GR-160N-1-00102 / JA-01

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GR-160N

CRANE SPECIFICATIONS

CRANE CAPACITY

6.5m	Boom	16,000kg	at 3.0m	(6part-line)
10.7m	Boom	12,000kg	at 4.0m	(6part-line)
14.9m	Boom	9,000kg	at 4.5m	(4part-line)
19.1m	Boom	7,000kg	at 5.5m	(4part-line)
23.3m	Boom	5,000kg	at 6.0m	(4part-line)
27.5m	Boom	3,500kg	at 7.0m	(4part-line)
3.8m	Jib	2,000kg	at 70 °	(1part-line)
Single top		3,200kg		(1part-line)

MAX.LIFTING HEIGHT

Boom 28.2m
Jib 32.0m

MAX.WORKING RADIUS

Boom 24.0m
Jib 27.2m

BOOM LENGTH

6.5m – 27.5m

BOOM EXTENSION

21.0m

BOOM EXTENSION SPEED

21.0m/83s

JIB LENGTH

3.8m

MAIN WINCH SINGLE LINE WINDING SPEED

110m/min (5th layer)

MAIN WINCH HOOK SPEED

27.5m/min (4 part-line)

MAIN WINCH SINGLE LINE UNWINDING SPEED

<Reference>

Standard	110m/min	(5th layer)
High speed	150m/min	(5th layer)

AUXILIARY WINCH SINGLE LINE WINDING SPEED

96m/min (3th layer)

AUXILIARY WINCH HOOK SPEED

96m/min (1 part-line)

AUXILIARY WINCH SINGLE LINE UNWINDING SPEED

<Reference>

Standard	96m/min	(3th layer)
High speed	130m/min	(3th layer)

BOOM ELEVATION ANGLE

-9 °– 82.5 °

BOOM ELEVATION SPEED

-9 °– 82.5 °34s

SWING ANGLE

360 °continue

SWING SPEED

2.6min^{-1} (rpm)

WIRE ROPE

Main Winch
14mm x 155m (Diameter x Length)
Spin-resistant wire rope
Auxiliary Winch
14mm x 70m (Diameter x Length)
Spin-resistant wire rope

HOOK

16t hook (6 part-line)
3.2t hook (1 part-line)

BOOM

6-section hydraulically telescoping boom of box construction
(stages 2,3: synchronized; stages 4,5,6: synchronized)

BOOM EXTENSION

2 double-acting hydraulic cylinders
3 wire rope type telescoping devices
With flow regulator valve with pressure compensation

JIB

Single stage which swings from and stores under the boom
Triple offset (5 °, 25 °, 45 °) type

SINGLE TOP

Mounted and fixed on the top boom section.

HOIST

Hydraulic motor driven planetary gear reducer
Automatic brake
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 H-type (floats mounted integrally)
Slides and jacks each provided with independent operation device.

Fully extended width	5.2m
Middle extended width	4.8m, 4.4m, 3.2m
Minimum extended width	1.79m

OPERATION METHOD

Hydraulic pilot valve operation

MAX. VERTICAL LOAD CAPACITY OF OUTRIGGER

18.4t

POWER TAKE-OFF

PTO wet multi-plate clutch

HYDRAULIC PUMPS

2 variable piston pumps
2 gear pumps

HYDRAULIC OIL TANK CAPACITY

295 liters

SAFETY DEVICES

Automatic moment limiter (AML)
With working range limiting function
Outrigger extension width detector (individual detection)
Swing range controller
Swing automatic stop device
Boom elevation slow down and stop device
Over-winding cutout device
Level gauge
Hook safety latch
Swing lock
Hydraulic safety valve
Hydraulic lock (elevation, telescoping, hoist, jack)

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

OPTIONAL EQUIPMENT

AML external warning lamp
Loudspeaker

CARRIER SPECIFICATIONS

MANUFACTURER AND MODEL
TADANO SD-T002

ENGINE
Model Cummins QSB5.9-2A (with turbo charger and air cooler)
Type 4-cycle, 6-cylinder, direct-injection, water-cooled diesel engine
Piston displacement 5.883 liters
Max. output At the time of traveling
160kW(218PS) at 2,300min^{-1} (rpm)
Max. torque 847N·m (86.4kgf·m) at 1,500min^{-1} (rpm)

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 shaft tube type

REAR AXLE
Full floating shaft tube type

SUSPENSION
Front Parallel leaf spring type (with hydraulic lock cylinder)
Rear Parallel leaf spring type (with hydraulic lock cylinder)

STEERING
Fully hydraulic power steering
With reverse steering correction mechanism

BRAKE SYSTEM
Service Brake
Air and hydraulic combined type front and rear disk brakes
Parking Brake
Air-type transmission braking and internal expanding type spring brake
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
250 liters

TIRES
Front 325/95R24 161E ROAD
Rear 325/95R24 161E ROAD

CAB
One-man type
With interior equipment
Rubber mounted type
Fully adjustable suspension seat
(with headrest, armrest 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

EQUIPMENT
Centralized oiling device (Electric type is optional)
Electric mirror (Option)

GENERAL DATA

DIMENSIONS

Overall length		8,230mm
Overall width		2,200mm
Overall height		3,140mm
Wheel base		3,200mm
Tread	Front	1,820mm
	Rear	1,820mm

WEIGHTS

Gross vehicle weight		
Total		19,715kg
	Front	9,770kg
	Rear	9,945kg

PERFORMANCE

Max. traveling speed	49km/h
Gradeability (tan θ)	0.6
Min. turning radius	4.8m (4-wheel steering)
	8.5m (2-wheel steering)

TOTAL RATED LOADS CHART

(1) With outriggers

[BOOM]

Unit:ton

Outriggers fully extended (5.2 m)							–360 °–
Boom length / Working radius	6.5 m	10.7 m	14.9 m	19.1 m	23.3 m	27.5	
2.5m	16.0	12.0	9.0	7.0			
3.0m	16.0	12.0	9.0	7.0			
3.5m	14.0	12.0	9.0	7.0	5.0		
4.0m	12.5	12.0	9.0	7.0	5.0		
4.5m	11.7	11.1	9.0	7.0	5.0		3
5.0m	(4.4m)	10.25	8.9	7.0	5.0		3.
5.5m		9.4	8.2	7.0	5.0		
6.0m		8.8	7.6	6.6	5.0		
7.0m		6.75	6.4	5.8	4.7		3
8.0m		5.3	5.0	5.2	4.15		3
9.0m		4.5	4.0	4.3	3.7		3.1
10.0m		(8.6m)	3.25	3.5	3.3	2.8	
11.0m			2.65	2.95	3.0	2.55	
12.0m			2.15	2.45	2.65	2.35	
13.0m			1.8	2.05	2.25	2.15	
14.0m			(12.8m)	1.75	1.95	2.0	
15.0m				1.45	1.7	1.75	
16.0m				1.25	1.45	1.5	
17.0m				1.05	1.25	1.3	
18.0m					1.05	1.1	
19.0m					0.9	0.95	
20.0m					0.75	0.8	
22.0m					0.6	0.6	
24.0m					(21.2m)	0.45	
A (°)	0 ～ 82.5						

A= Boom angle range (for the unladen condition)

[BOOM]

Unit:ton

Outriggers middle extended (4.8 m) –Over sides–							
Boom length / Working radius	6.5 m	10.7 m	14.9 m	19.1 m	23.3 m	27.5	
2.5m	16.0	12.0	9.0	7.0			
3.0m	16.0	12.0	9.0	7.0			
3.5m	14.0	12.0	9.0	7.0	5.0	3	
4.0m	12.5	12.0	9.0	7.0	5.0	3	
4.5m	11.7	11.1	9.0	7.0	5.0	3.5	
5.0m	(4.4m)	10.25	8.9	7.0	5.0	3.5	
5.5m		9.2	8.2	7.0	5.0	3.5	
6.0m		7.9	7.6	6.6	5.0	3.5	
7.0m		5.85	5.85	5.8	4.7	3.5	
8.0m		4.55	4.5	4.35	4.15	3.4	
9.0m		3.9	3.55	3.9	3.7	3.1	
10.0m		(8.6m)	2.8	3.15	3.3	2.8	
11.0m			2.25	2.6	2.8	2.55	
12.0m			1.8	2.15	2.35	2.35	
13.0m			1.5	1.75	1.95	2.1	
14.0m			(12.8m)	1.45	1.65	1.75	
15.0m				1.2	1.4	1.5	
16.0m				1.0	1.2	1.3	
17.0m				0.85	1.0	1.1	
18.0m					0.85	0.95	
19.0m					0.7	0.8	
20.0m					0.55	0.65	
22.0m						0.45	
A (°)	0 ～ 82.5					24～82.5	

A= Boom angle range (for the unladen condition)

[BOOM]

Unit:ton

Outriggers middle extended (4.4 m) –Over sides–							
Boom length / Working radius	6.5 m	10.7 m	14.9 m	19.1 m	23.3 m	27.5	
2.5m	16.0		12.0	9.0	7.0		
3.0m	16.0		12.0	9.0	7.0		
3.5m	14.0		12.0	9.0	7.0	5.0	
4.0m	12.5		12.0	9.0	7.0	5.0	
4.5m	11.7		11.1	9.0	7.0	5.0	
5.0m	(4.4m)		9.5	8.9	7.0	5.0	
5.5m			8.0	7.9	7.0	5.0	
6.0m			6.8	6.7	6.6	5.0	
7.0m			5.05	5.0	5.35	4.7	
8.0m			3.85	3.85	4.15	4.15	3
9.0m		3.3		3.0	3.3	3.55	
10.0m		(8.6m)	2.35	2.65	2.9	2.8	
11.0m				1.85	2.15	2.4	
12.0m				1.45	1.75	2.0	
13.0m			1.15		1.45	1.65	1.8
14.0m			(12.8m)	1.15	1.4	1.55	
15.0m					0.95	1.15	
16.0m					0.75	0.95	
17.0m					0.6	0.8	
18.0m						0.65	
19.0m						0.5	
20.0m							
A (°)	0 ～ 82.5				32～82.5		

A= Boom angle range (for the unladen condition)

[BOOM]

Unit:ton

Outriggers middle extended (3.2 m) –Over sides–						
Working radius \ Boom length	6.5 m	10.7 m	14.9 m	19.1 m	23.3 m	27.5
2.5m	16.0		12.0	9.0	7.0	
3.0m	14.5		12.0	9.0	7.0	
3.5m	10.5		10.4	9.0	7.0	5.0
4.0m	8.0		8.25	7.9	7.0	5.0
4.5m	6.8		6.6	6.5	7.0	5.0
5.0m	(4.4m)		5.45	5.4	5.8	5.0
5.5m			4.6	4.5	4.9	5.0
6.0m			3.9	3.9	4.2	4.4
7.0m			2.9	2.85	3.15	3.3
8.0m			2.15	2.1	2.4	2.6
9.0m		1.8		1.55	1.85	2.05
10.0m		(8.6m)	1.1	1.45	1.65	1.8
11.0m				0.75	1.1	1.3
12.0m				0.5	0.8	1.0
13.0m					0.55	0.8
14.0m					0.4	0.6
15.0m						0.4
A (°)	0 ～ 82.5			35～82.5	45～82.5	54～82.5

A= Boom angle range (for the unladen condition)

Unit:ton

Outriggers minimum extended (1.79 m) –Over sides–						
Working radius \ Boom length	6.5 m	10.7 m	14.9 m	19.1 m	23.3 m	27.5
2.5m	7.0		7.0	7.0	7.0	
3.0m	5.9		5.6	5.6	5.75	
3.5m	4.5		4.3	4.25	4.6	4.6
4.0m	3.5		3.4	3.3	3.65	3.8
4.5m	2.9		2.7	2.65	3.0	3.15
5.0m	(4.4m)		2.2	2.1	2.45	2.65
5.5m			1.8	1.65	2.0	2.2
6.0m			1.4	1.3	1.65	1.85
7.0m			0.85	0.75	1.1	1.3
A (°)	0～82.5	36～82.5	55～82.5	64～82.5	69～82.5	72～82.5

A= Boom angle range (for the unladen condition)

[JIB]

Outriggers fully extended (5.2 m) –360 °–						
Jib length	27.5 m boom + 3.8 m jib					
Offset	5°		25°		45°	
Boom angle	Working radius (m)	Total rated loads (t)	Working radius (m)	Total rated loads (t)	Working radius (m)	Total rated loads (t)
82.5°	3.6	2.0		4.7	1.5	5.7
75°	8.0	2.0		8.9	1.5	9.6
70°	10.8	2.0		11.6	1.5	12.1
65°	13.2	1.6		14.0	1.35	14.5
60°	15.5	1.35	16.3	1.2		16.7
55°	17.7	1.1		18.4	1.1	18.8
50°	19.7	0.95	20.4	0.9		20.7
45°	21.6	0.75	22.2	0.7		22.4
40°	23.3	0.6		23.8	0.55	
35°	24.8	0.45	25.2	0.4		
30°	26.1	0.35	26.4	0.3		
25°	27.2	0.25				
A(°)	24～82.5		29～82.5		44～82.5	

A= Boom angle range (for the unladen condition)

Outriggers middle extended (4.8 m) –Over sides–						
Jib length	27.5 m boom + 3.8 m jib					
Offset	5°		25°		45°	
Boom angle	Working radius (m)	Total rated loads (t)	Working radius (m)	Total rated loads (t)	Working radius (m)	Total rated loads (t)
1.25	82.5°		3.6	2.0	4.7	1.5
1.25	75°		8.0	2.0	8.9	1.5
1.25	70°	10.8	2.0	11.6	1.5	
1.25	65°	13.2	1.6	14.0	1.35	
1.15	60°	15.5	1.35	16.3	1.2	
1.05	55°	17.7	1.05	18.4	1.0	
0.9	50°	19.7	0.8	20.3	0.75	
0.7	45°	21.5	0.55	22.1	0.5	
	40°	23.2	0.4	23.7	0.4	
	35°	24.7	0.3	25.1	0.3	
A(°)	34～82.5			44～82.5		

A= Boom angle range (for the unladen condition)

Outriggers middle extended (4.4 m) –Over sides–						
Jib length	27.5 m boom + 3.8 m jib					
Offset	5°		25°		45°	
Boom angle	Working radius (m)	Total rated loads (t)	Working radius (m)	Total rated loads (t)	Working radius (m)	Total rated loads (t)
82.5°	3.6	2.0		4.7	1.5	5.7
75°	8.0	2.0		8.9	1.5	9.6
70°	10.8	2.0		11.6	1.5	12.1
65°	13.2	1.6		14.0	1.35	14.5
60°	15.4	1.15	16.3	1.1		16.7
55°	17.6	0.85	18.4	0.85		18.7
50°	19.6	0.6		20.3	0.6	20.5
45°	21.5	0.4		22.1	0.4	22.3
40°	23.1	0.25	23.7	0.25		
A(°)	39～82.5				44～82.5	

A= Boom angle range (for the unladen condition)

Outriggers middle extended (3.2 m) –Over sides–						
Jib length	27.5 m boom + 3.8 m jib					
Offset	5°		25°		45°	
Boom angle	Working radius (m)	Total rated loads (t)	Working radius (m)	Total rated loads (t)	Working radius (m)	Total rated loads (t)
1.25	82.5°		3.6	2.0	4.7	1.5
1.25	75°		8.0	2.0	8.9	1.5
1.25	72°		9.5	1.65	10.5	1.25
1.25	70°	10.5	1.4	11.5	1.1	
1.05	65°	12.9	0.9	13.8	0.85	
0.8	60°	15.2	0.55	16.0	0.45	
0.55	55°	17.3	0.3	18.1	0.25	
0.4	A(°)			54～82.5		

A= Boom angle range (for the unladen condition)

PRECAUTIONS TO BE TAKEN WHEN THE OUTRIGGERS ARE EXTENDED:

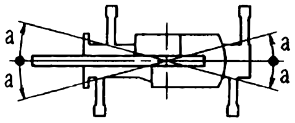
1. The total rated loads shown are for the case where the crane is set horizontally on firm level ground. They include the weights of the slings and hooks (main hook: 140kg, auxiliary hook: 60kg).
   The values above the bold lines are based on the crane strength while those below are based on the crane 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. Jib operations should be performed 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 on a 27.5m boom.
4. The total rated load for the single top shall be the value obtained by subtracting the weight of the hook mounted on the boom from the total rated load of the boom and must not exceed 3.2t.
5. High-speed unwind function should be performed only when lowering the hook alone and sudden braking operations must be avoided.
6. The table below shows the standard number of part lines for each boom length.
   However, when using with other than this number of part lines, the load per line should be 2.67 t or less for the main winch and 3.2 t or less for the auxiliary winch.

Boom length	6.5m	10.7m	14.9m	19.1m	23.3m	27.5m	Jib/Single top
Number of part lines	6	6	4	4	4	4	1

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 (4.8 m)	Middle extended (4.4 m)	Middle extended (3.2 m)	Minimum extended (1.79 m)
Angle a °	45	40	20	5

(Angle a° in the chart shows the minimum value.)



(2) Without outriggers

Unit:ton

Working radius	Stationary							
	6.5 m boom		10.7 m boom		14.9 m boom		19.1 m boom	
	Front	–360 °–	Front	–360 °–	Front	–360 °–	Front	–360 °–
3.0 m	8.0	4.4	7.5		4.5	5.2	4.65	5.0
3.5 m	7.7	3.5	7.5		3.65	5.2	3.7	5.0
4.0 m	7.3	2.8	7.3		3.0	5.2	3.0	5.0
4.5 m	6.6	2.2	6.4	2.4		4.75	2.35	4.55
5.0 m	(4.4m)	(4.4m)	5.45	1.9	4.25	1.8	4.1	2.1
5.5 m				4.6	1.5	3.8	1.4	3.7
6.0 m				3.9	1.15	3.45	1.05	3.4
7.0 m				2.95	0.6	2.6	0.5	2.8
8.0 m				2.25		1.9		2.25
9.0 m						1.4		1.8
10.0 m						1.05		1.4
11.0 m						0.75		1.05
12.0 m						0.5		0.8
13.0 m								0.6
14.0 m								0.4
A (°)	0 ～ 82.5			25～82.5	0～82.5	51～82.5	35～82.5	60～82.5

A= Boom angle range (for the unladen condition)

Unit:ton

Working radius	Travelling at 1.6km/h or less							
	6.5 m boom		10.7 m boom		14.9 m boom		19.1 m boom	
	Front	–360 °–	Front	–360 °–	Front	–360 °–	Front	–360 °–
3.0 m	6.7	3.7	6.3		3.8	4.3	3.8	4.1
3.5 m	6.5	2.95	6.3		3.0	4.3	3.1	4.1
4.0 m	6.1	2.35	6.0		2.45	4.3	2.5	4.1
4.5 m	5.5	1.85	5.4	2.0		3.9	2.0	3.75
5.0 m	(4.4m)	(4.4m)	4.5	1.6	3.5	1.55	3.35	1.7
5.5 m				3.8	1.25	3.2	1.15	3.0
6.0 m				3.25	0.95	2.95	0.85	2.8
7.0 m				2.45	0.45	2.15	0.4	2.45
8.0 m				1.8		1.6		1.9
9.0 m						1.2		1.45
10.0 m						0.85		1.1
11.0 m						0.6		0.85
12.0 m						0.35		0.6
13.0 m								0.4
A (°)	0 ～ 82.5			36～82.5	0～82.5	55～82.5	40～82.5	64～82.5

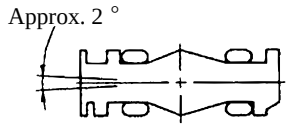
A= Boom angle range (for the unladen condition)

PRECAUTIONS TO BE TAKEN WHEN THE OUTRIGGERS ARE NOT USED:

1. The total rated loads shown are for the case where the tire air pressure on firm level ground is as specified 900kPa (9.00kgf/cm^2) and the crane is completely spring-locked. They include the weights of the slings and hooks (main hook: 140kg, auxiliary hook: 60kg).
   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 for actual work.
2. Since the working radii are based on the actual values including the deflection of the boom and the tires, operations should be performed in accordance with the working radii.
3. The table below shows the standard number of part lines for each boom length.
   However, when using with other than this number of part lines, the load per line should be 2.67 t or less for the main winch and 3.2 t or less for the auxiliary winch.

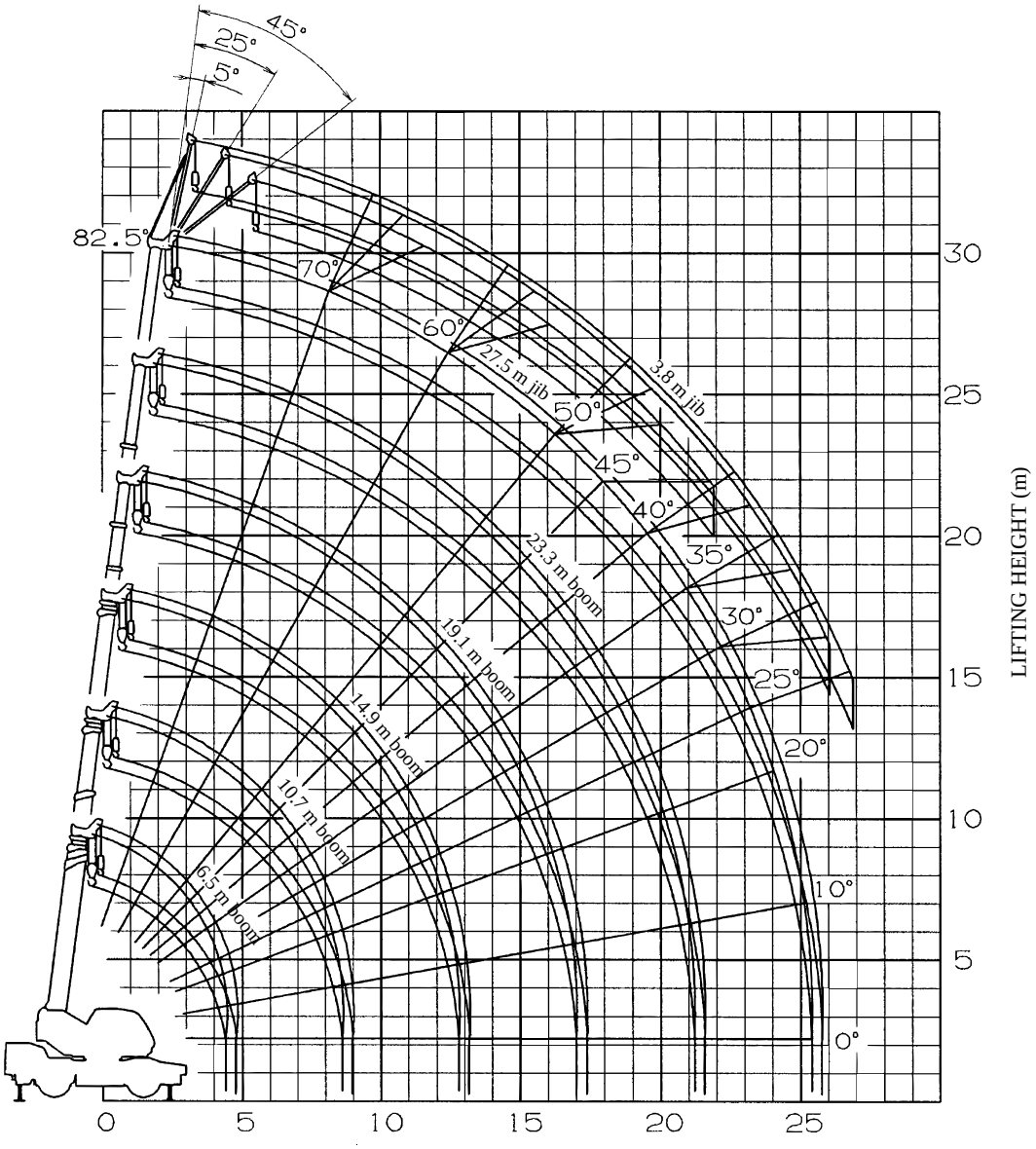
Boom length	6.5 m	10.7 m	14.9 m	19.1 m	Single top
Number of part lines	4	4	4	4	1

4. "Over front" crane operations should be performed only when the AML "over-front area indicator lamp" is lit. The boom must be kept inside a 2 ° area over front of the carrier when performing "Over front" crane operations without the outriggers.



5. The total rated load for the single top shall be the value obtained by subtracting the weight of the hook mounted on the boom from the total rated load of the boom and must not exceed 3.2t.
6. High-speed unwind function should not be performed without outriggers.
   Booms over 19.1 m in length should not be used without outriggers.
7. The "Drive Mode Selection" switch should be set to "4-wheel / Lo" for travelling while hoisting a load and the shift lever should be set to first.
8. When travelling 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.
9. Crane operations should not be performed when travelling while hoisting a load.

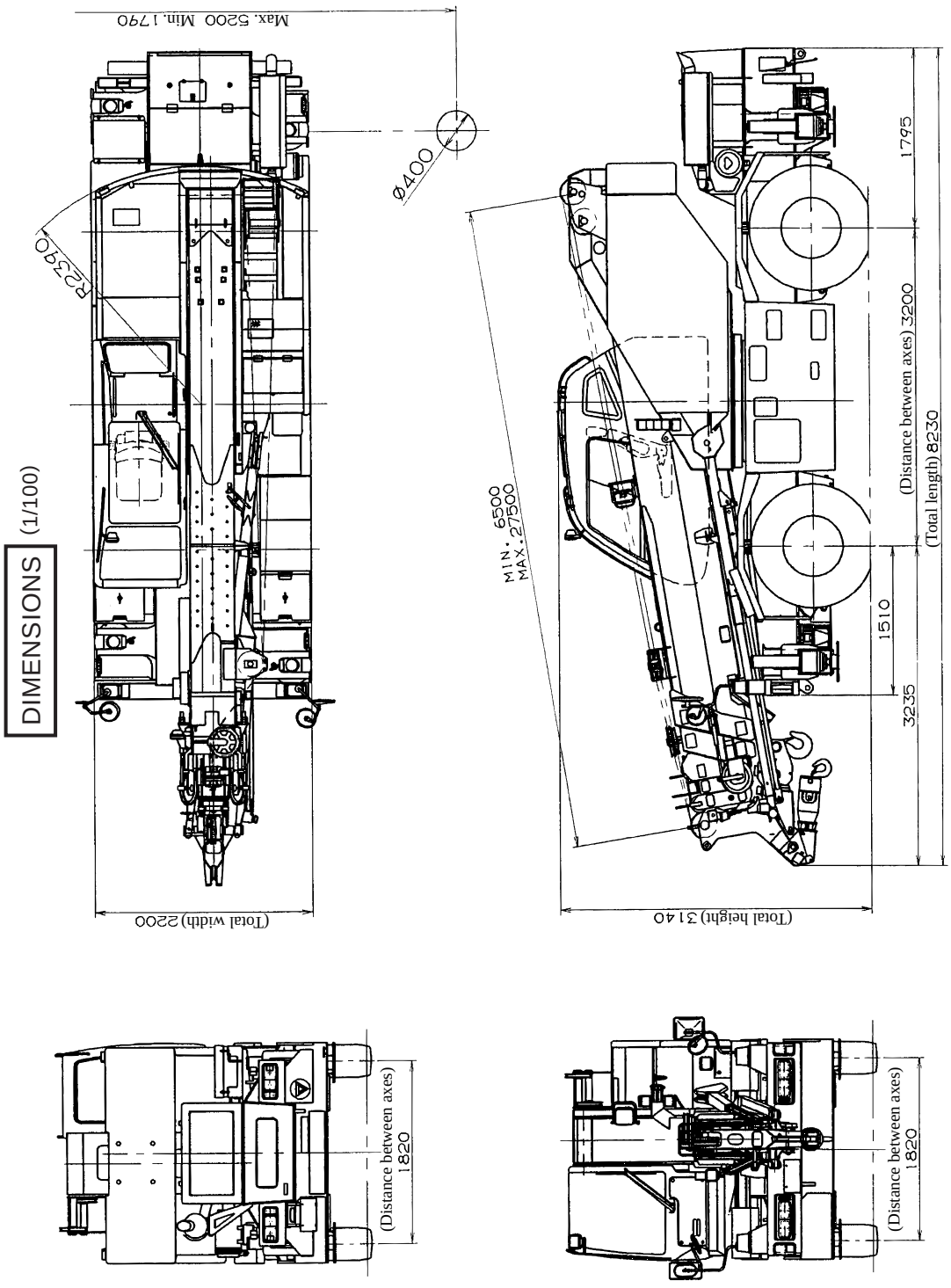
WORKING RADIUS - LIFTING HEIGHT



NOTES:

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

DIMENSIONS (1/100)



◆ MEMO ◆