

# 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

# 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<sup>-1</sup> (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<sup>-1</sup> (rpm)  
 Max. torque 847N·m (86.4kgf·m) at 1,500min<sup>-1</sup> (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 <sup>-1</sup> )	0.6
Min. turning radius	4.8m (4-wheel steering) 8.5m (2-wheel steering)

<b>TOTAL RATED LOADS CHART</b>
--------------------------------

(1) With outriggers  
[BOOM]

Unit: ton

Outriggers fully extended (5.2 m)							-360 °-
Working radius / Boom length	6.5 m	10.7 m	14.9 m	19.1 m	23.3 m	27.5 m	
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-			
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		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-	
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		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	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	1.1	
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			
		2.5m	16.0	12.0	9.0	7.0		27.5	
	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	2.1		
	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			
		2.5m	7.0	7.0	7.0	7.0		27.5	
	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	155	
1.25	75 °	8.0	2.0	8.9	1.5	
1.25	70 °	10.8	2.0	11.6	1255	
1.25	65 °	13.2	1.6	14.0	1235	
1.15	60 °	15.5	1.35	16.3	1.25	
1.05	55 °	17.7	1.05	18.4	196	
0.9	50 °	19.7	0.8	20.3	10.75	
0.7	45 °	21.5	0.55	22.1	0555	
	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	155	
1.25	75 °	8.0	2.0	8.9	1.5	
1.25	72 °	9.5	1.65	10.5	1255	
1.25	70 °	10.5	1.4	11.5	115	
1.05	65 °	12.9	0.9	13.8	0785	
0.8	60 °	15.2	0.55	16.0	0.85	
0.55	55 °	17.3	0.3	18.1	1.053	
0.4	A ( ° )	54 ~ 82.5				

A= Boom angle range (for the unladen condition)



**PRECAUTIONS TO BE TAKEN WHEN THE OUTRIGGERS ARE EXTENDED:**

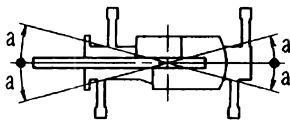
1. The total rated loads shown are for the case where the crane is set horizontally on firm level ground. They include the weights of the slings and hooks (main hook: 140kg, auxiliary hook: 60kg).  
The values above the bold lines are based on the crane strength while those below are based on the crane 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	2.6
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	2.1
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	

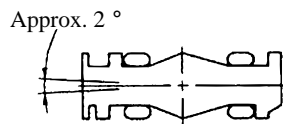
A= Boom angle range (for the unladen condition)

**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<sup>2</sup>) 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.

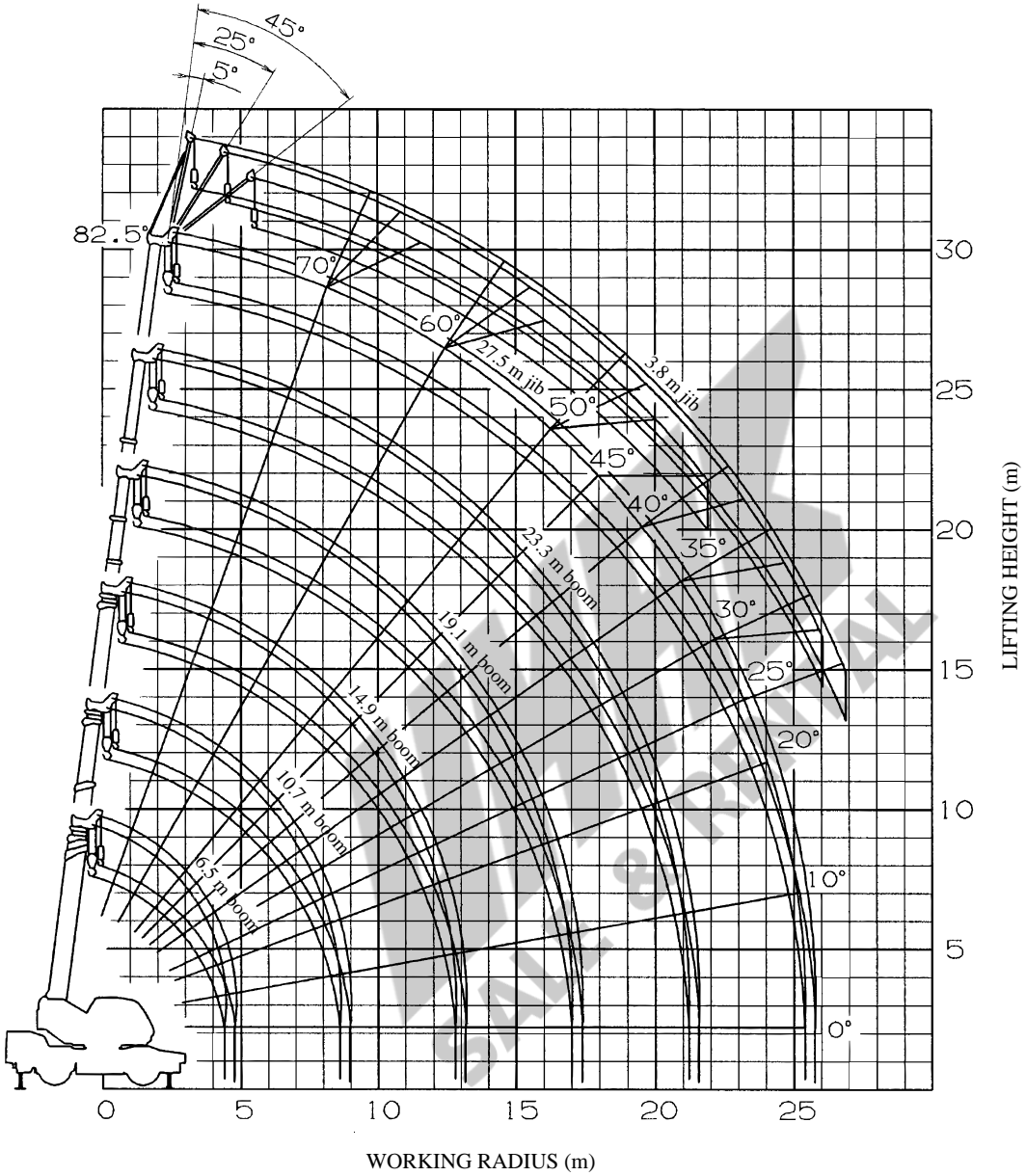
Boom length	6.5 m	10.7 m	14.9 m	19.1 m	Single top
Number of part lines	4	4	4	4	1

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°).

