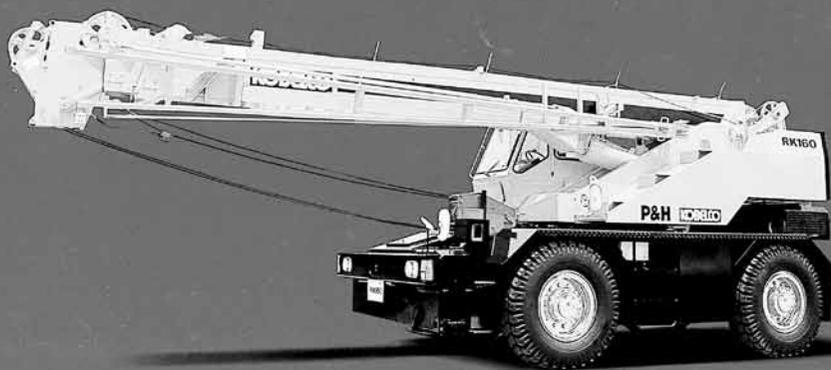


# ROUGH TERRAIN CRANE

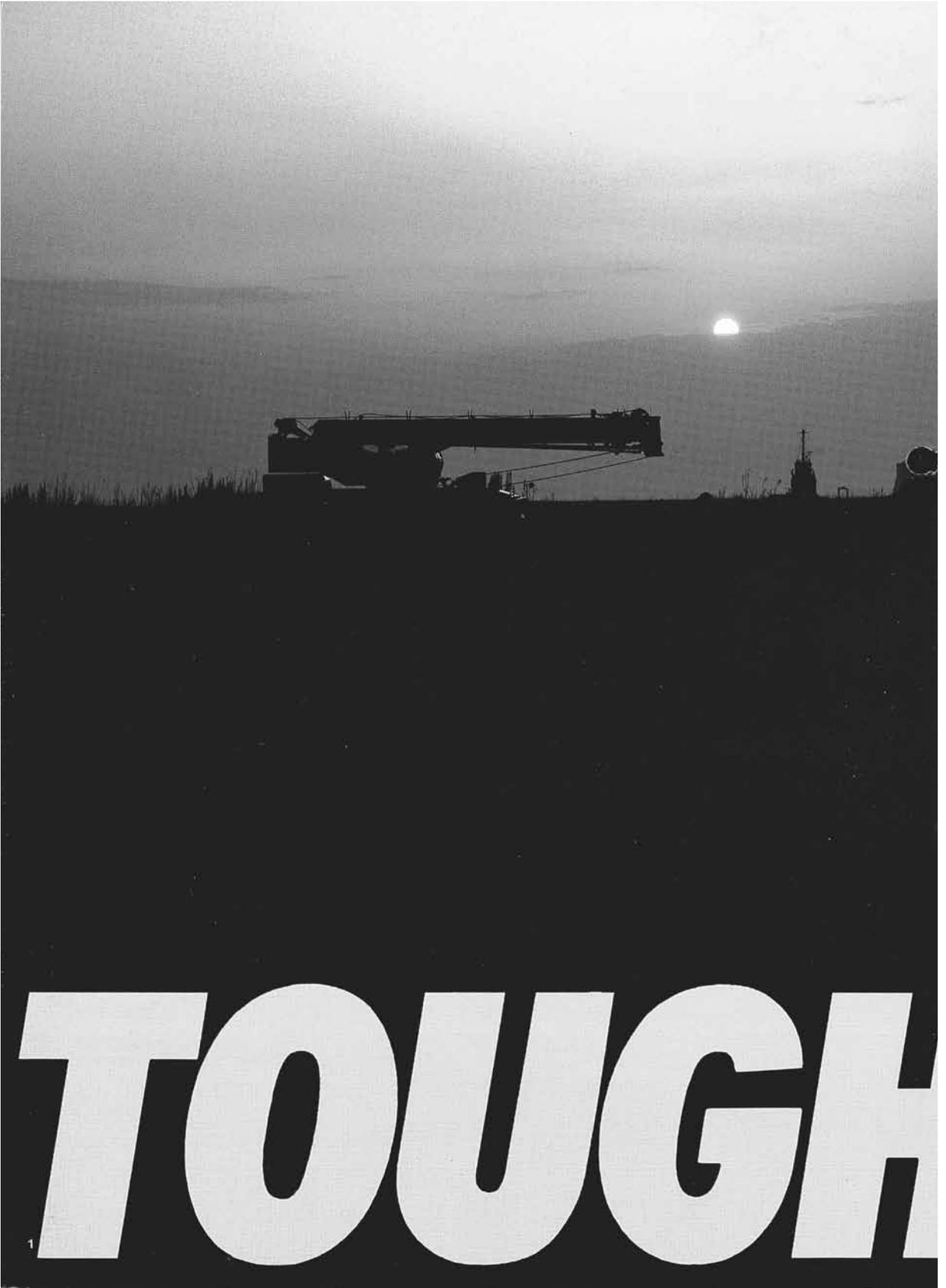


*16 metric ton maximum crane load • 20m maximum boom and 6.8m jib*

## RK160

**P&H**  **KOBELCO**

Bulletin No. RK160-4





## Rugged power is here now!

Why should you buy a rough terrain crane? Because you want a one man traveling crane that can get into tight places to make lifts that a truck mounted crane cannot. This means speedy travel on improved surfaces, maneuverability in confined, cluttered, unsurfaced job sites, and most importantly, a variety of ratings so that one machine can cover as wide a range of duties as possible.

Why should you buy a P & H KOBELCO RK160 rough terrain crane? Because the RK160 travels at speeds up to 50km/h, offers 3 steering modes, sports innovative features like M-type hydraulic outriggers and a "twist" jib, and enables you to choose just the right on-outrigger or on-rubber rating chart to maximize the RK160's productivity. You'll do more jobs in less time in more places with this new 16 tonner!

*Max. lifting capacity: 16,000kg x 3.5m ● Max. boom & jib length: 20m + 6.8m*

# **& WILLY**



# Gets around, gets into, get

## Power Package

A rear mounted, direct injection diesel engine is at the heart of this crane. A unique "lockup" torque converter allows engine output to bypass the torque converter when traveling at higher speeds, but on site, it combines with a 12 speed transmission to deliver a wide variety of speed and driving power. During crane operations, a PTO clutch-activated governor restricts the engine to a maximum of 2,450 rpm. This reduces fuel consumption, noise emissions and wear on the engine. From site-to-site transit to precise pick-and-carry lifts, RK160 offers the optimum power control combination for both safety and efficiency.

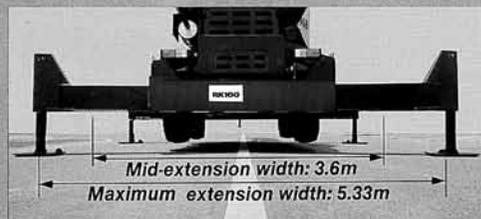
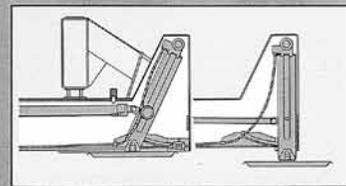


## Attachment

The 3-section box boom allows single lever control over its entire length. A rope crowd system for extending the top boom section keeps the boom light but strong with minimum deflection. The single boom hoist cylinder, mounted further back on the revolving frame, allows better operator visibility to the boom side of the cab. The twist jib (stowed on the base boom) and the auxiliary sheave (stowed on the boom tip) are ideal for single line operations that may require high speed duty cycle lifting of loads up to three tons. The jib's truss structure and the fold-up auxiliary sheave keep the boom point shorter and narrower to allow a minimized turning radius. Compared to a swing around jib, the twist jib sets up more easily in confined spaces, but offers better visibility when stowed for travel than an underhung jib.

## M Outriggers

These exclusive KOBELCO outriggers permit maximum span while still allowing self-storing floats that have the largest surface area in the 16 ton class. Yet they retract to within the machine's traveling width. Besides offering two settings, these outriggers use inverted jack cylinders which keep the easily damaged rods encased in the beam structure. These features plus their low profile when extended make RK160's M outriggers the rigid base necessary for both heavy, close-in lifts and for long radius lifts where stability is the limiting factor.

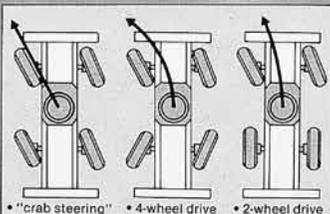




# s it done.

## Steering

Three steering modes are available to get the machine into the work spot: 2-wheel (front), 4-wheel (cramp) and 4-wheel (crab). The steering system also has about-face steering compensation and emergency steering power supply features. About-face steering compensation is both a safety and simplicity feature which means that, when the upper has been rotated 180 degrees on the carrier, the steering hydraulic system reverses so that machine movement will correspond to the direction of steering wheel rotation. The emergency steering power supply system consists of a battery powered hydraulic pump that will automatically come on line to supply hydraulic pressure to the steering system should engine power ever be lost. Both of these features are sure to make the RK160 a favorite with the operators.



**Minimum turning radius = 4.7m**

## Suspension

On the road, RK160's fully sprung suspension treats the operator like a distinguished passenger, like he is the boss! Riding is smooth, but in the event of hard braking, an anti-nose dive mechanism counteracts the tendency of the crane to pitch forward. On site, the suspension can be hydraulically locked out for stability to maximize on-rubber ratings, both stationary and pick-and-carry.

## Disk Brakes

As any operator will tell you, getting the machine to go is only half the job, getting it to stop is equally important. RK160 is fitted with "air-over-hydraulic" independent disk brakes all around. Our long experience as a wheel loader maker proved to us the heat and wear resistance qualities of disk brakes over drum brakes. They provide surer braking on long downgrades and in wet conditions, and generally make fewer maintenance demands. The front two disks are double-caliper as another extra safety feature.

## Now watch it lift!

Whether you are looking for lift height or reach, we invite you to run RK160's load rating chart against any other comparable machine. RK160 will speak for itself. But in addition to what the ratings tell you, note some extra features.

## On Rubber Lifting

Lifting while on the tires is the ultimate test for a rough terrain crane. Whether standing still or doing a "pick-and-carry" job, RK160 offers full main boom 360 degree on rubber ratings, plus upgraded ratings for over front lifts. Suspension lockout hydraulic cylinders are included as standard for use during all on rubber lifts.

## Positive/Negative Winch Brakes

Most cranes offer their operators only positive or negative winch brake systems. RK160 is one of the few machines to offer both at the shift of a lever. An operator asked to do precision placings can choose the fatigue reducing negative system — the winch brake automatically engages to hold the drum when the winch control lever returns to neutral. When faced with repetitious liftings of perhaps lighter loads, an operator may choose to engage the productivity improving positive brake system — so that at control lever neutral the winch drum goes into freefall for control by footbrake pedal pressure. You can get the best of both from RK160.

## "Hydrotorque" Swing Control

An original Kobe Steel development, "hydrotorque" is another way that RK160 lets the operator choose how he will most effectively operate. This swing system comes with two brake modes: "Free" (no brake applies at control lever neutral) for doing less precise cycle work like concrete pourings. The operator can establish a productivity enhancing "swing flow" pattern where both swing start and stop operations are done via the single swing control lever. "Braked" mode (a swing brake automatically engages at control lever neutral) is better for precision work like structural component and machinery placings. Hydrotorque's smooth motion with these two braking modes, plus the inching and line speed attributes of RK160's winch system make this machine a winner — whether its speed or accuracy you want, have them both!

# Instrument panel design revolutionized through the latest electronic technology!



## AT KOBE STEEL

We build performance into our cranes. We then must depend on the operator to get this performance out into the field where it can contribute to the profitability of the crane user—and also to our good reputation as a machinery maker. Therefore it is to everyone's benefit that the operator have as much information as possible so that he can safely extract the machine's full work potential.

## Electronic Assistance

Take a seat in the operator's cab and you will see how the machine communicates with its operator. Collected into three panels directly in front of the operator are electronic indicators of how the machine is currently operating. This removes much of the guess work that operators previously had to include in their decisions on how to proceed with a job. With this electronic assistance, there is less operator tension for longer hours of safer, more productive work.

## Easy Indicators

Operators new to electronic devices need not worry about getting themselves tuned into these indicators. For example, look at the center panel and you will see where speedometer and tachometer readings are given digitally (upper left corner) and graphically (along the center range line by green signal lamps). The operator can choose to operate by speedometer or tachometer readout by engaging one or the other via the selector switch (upper left on the right side panel). Water and torque converter oil temperatures as well as fuel level and many other operating factors are indicated by signal lamps. Nothing could be easier!

## Check and Safety Monitor

• When the operator starts to use the crane, he must set some switches on the left side panel to inform the on-board computer (overload warning device) of how he intends to operate. Corresponding lamps light up (see the panel's lower and right sides) to allow the operator to confirm that he has programmed the computer correctly for the outrigger and boom/jib/auxiliary sheave combination he will actually use.

- Besides acting as an overload warning device, the computer monitors and collects vital crane operation factors into a single location for the operator's easy reference. By noting such factors as boom angle and length, load moment (ratio), operating radius, lift height, actual load being lifted and allowable maximum load, the operator can choose to operate in such a way as to maximize the crane's lifting potential without gambling that he is asking too much and compromising safety. All these items are digitally indicated except for the "load moment" which uses a series of lamps to indicate the percentage of the maximum rated load being lifted.
- If the operator fails to respect the crane's load limits, the computer is equipped to hydraulically discontinue operation except for corrective measures (operation to the safe side). It also has an automatic stop to prevent overhoisting (two-blocking).

NEW ELECTRONIC DISPLAY

# EAR INFORMATION

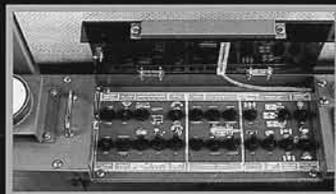


Shown only for illustration, not as a representation of working mode.



### Safety and Comfort

The cab is a command post which greatly influences how effective the operator and machine will be. By working closely with the Check and Safety Monitor as just described, the operator can see to his own and the machine's safety, but the operator must also be truly comfortable if he is to spend long hours in the cab at peak efficiency. Therefore we have arranged the switch panel conveniently to the side of the high-back reclining seat, used short stroke crane control levers which require minimum control pressure, and placed a large steering wheel at the control end of a full power-steering system. These features plus the ventilation and eye-pleasing trim features built into the two-seater cab make it a pleasant place to spend a working day.



### Efficiency to Productivity

With the wide cab, the operator has a wider view of the work area so that he can get on with his jobs. Because engine rpm is kept low during crane operations, the cab is quieter and voice communications easier with ground crews. The operator is able to carry out all his duties from inside the cab; driving to the site, maneuvering into work position, setting the outriggers, and then doing the lift. The man and the machine are a team working to make every hour a paying proposition.



# Specifications

## UPPER



### SWING UNIT

Hydraulic radial piston motor drives swing pinion through deck mounted planetary and spur gear reducer, 360° continuous rotation. By employing four check valves, "Hydrotorque" circuit controls hydraulic pressure in the motor. Brake valve allows operator to select free or automatic brake when swing control lever is in neutral position.

### SWING BRAKE

Hand operated disc brake.

### SWING GEAR

Internal spur gear.

### SLEWING RING

Single row ball bearing integral with swing gear.



### WINCHES

Mounted side-by-side, power raising and lowering; free fall; hydraulic motor drive and spur gear reduction.

**Clutches:** Hydraulically boosted shoe type.

**Brakes:** Band type; both positive and negative brake modes provided.

**Drums:** 352mm P.C.D., 528mm dia. flanges; Width: 357mm (Main) 204mm (Auxiliary).

**Hoist wire rope:** Non-twist, U4 x SeS(39), c/o H class, 16mm dia. Length: 110m (Main), 60m (Auxiliary, optional).

### BOOM HOIST

Double acting hydraulic cylinder with holding valve, boom angle indicator mounted on base boom section.



### BOOM TELESCOPE

Full power telescoping by one hydraulic cylinder (with holding valve) and wire ropes.

### CONTROLS

Four adjustable hand control levers for swing, telescope, winch, and boom hoist (boom hoist lever with foot-operated pedal on right hand drive only); two short hand levers for main and auxiliary winch clutches and negative brake ON-OFF. One short hand lever for swing parking brake, one lever for transmission gear selection (with high/low switch), swing lock pin (two holes), winch drum lock knobs, two pedals for main and auxiliary winch drum brakes (during free fall), foot-operated pedal for engine throttle control, and travel brake pedal.



### OPERATOR'S CAB

All weather, full vision with safety glass, sliding door and roll down window, and roof window with wiper. Auxiliary seat provided behind driver's seat (optional).

### SAFETY ENHANCING DEVICES

Overhoist alarm buzzer, relief valves in hydraulic circuits, holding valves for boom hoist and telescope cylinders, counter balance valve for winch motor, Check and Safety Monitor on dash, Overload Warning Device (automatic stopping), winch drum locks, swing brake lock pin, lock valve for outrigger vertical cylinder, emergency steering system, anti-nose-dive valve, about-face steering compensator valve, outrigger single pilot check valve, axle lockout valve, lower limit mechanism (optional), and backup warning alarm.



## HYDRAULIC SYSTEM

### PUMPS

Power for all motions of upper structure and outriggers is delivered from carrier engine power take-off to the motors and cylinders through 3 in-line gear pumps and a single gear pump.

First pump actuates boom hoist cylinder, telescope cylinder, and winch motor assist for high speed.

Second pump actuates winch motor.

Third pump actuates pilot circuits for clutches, negative brake cylinders, and 4 check valves in swing circuit.

Fourth pump actuates swing motor or steering via outrigger hydraulic system, priority valve, and suspension axle lockout.

### MOTORS

One, hydraulic radial piston motor for swing.

One, hydraulic plunger motor for hoist.

### CONTROL VALVES

One set of 3 stack, 4-way valves; one set of 2 stack, 4-way valves, and one remote control valve.

### OIL RESERVOIR

Capacity ..... 365 liters

## EQUIPMENT



Cab heater/defroster (optional), radio, windshield wiper/washer, cigarette lighter, ashtray, sun visor, vinyl floor mat, tachograph (optional), engine tachometer, engine hourmeter, engine trouble alarm, air supply valve, paper element type air cleaner, fuel/water separator, three working lights, horn, outrigger sight level bubble, load centering button on winch lever (braked swing mode only), air conditioner for cooling purpose only (optional), towing hooks (one front, two rear), fenders and ladder for jib mounting (optional).

## CARRIER

### MAKE AND MODEL

KOBELCO R-160

### TYPE

4 wheel drive (4 × 4), 2 wheel drive select.

### FRAME

High tensile steel welded box structure.



### OUTRIGGERS

KOBELCO hydraulic M-type with self-storing floats, eight double-acting hydraulic cylinders for independent horizontal and vertical motion of each outrigger. Outriggers can be set from inside cab or at side of carrier.



### POWER PLANT

Mitsubishi 6D15 Diesel Engine, 4 cycles, direct injection, water cooled, 6 cylinders.

Max. output (JIS) ..... 160PS at 2,800 rpm  
Max. torque (JIS) ..... 46kg-m at 1,600 rpm

### ELECTRICAL SYSTEM

24 volt DC, Battery: 12 volt, 120 A.H. × 2.

### FUEL TANK

Capacity ..... 200 liters

### CLUTCH

Multi-disc, electric shift.

### TRANSMISSION

12-speed, power shift with high-low range; lockup torque converter. Gear ratio (forward and reverse)

Low gear: 1st—5.812, 2nd—3.210, 3rd—1.942  
High gear: 1st—2.512, 2nd—1.387, 3rd—0.839

### BRAKES

**Service:** Air-over hydraulic disc on all 4 wheels, dual caliper on front wheels and single caliper on rear wheels.

**Parking:** Spring applied, air released shoe type on output shaft of transmission.



### STEERING

"Orbitrol" hydraulic power steering with emergency system.

**About-Face Steering Compensator:** Travel in reverse with the same handling characteristics of forward travel (except steer) is possible with the about-face steering compensator. This handling is possible only when the upper frame is rotated 180°.

### SUSPENSION

**Front/Rear:** Leaf springs with axle lockout and shock absorber-like cylinder.

Anti-nose-dive mechanism prevents tendency of crane to pitch forward during hard braking.

### FRONT/REAR AXLE

Fully floating drive-steer type; non-spin differential on rear axle (optional).

### FINAL REDUCTION

2-stage reduction type, ratio 15.39

### TIRES

**Front/Rear:** 14.00-24-24PR(OR)

### LAMPS

European marked lamps except head lamps, license plate lamp, clearance lamp, directional lamp, and parking lamp.

## ATTACHMENTS

### BOOM

Three sections, consisting of a boom base and two power telescoping sections, all welded high tensile steel box construction.

Fully retracted length ..... 8.10m

Fully extended length ..... 20.0m

### JIB (OPTIONAL)

High tensile steel square tube, truss construction, twist type.

Length ..... 6.8m

Side stored, twisted under raised boom, pulled up from under by auxiliary rope. Adjustable tension members for 5° and 30° offsets.

### AUXILIARY SHEAVE (OPTIONAL)

Can be stored without resetting auxiliary wire rope. Folded up to store so does not obstruct operator's view during travel; pinned for extension to provide one part line operation. Must be mounted if jib is ordered.



### HOOK BLOCKS

16 metric ton three sheaves with swivel and safety latch.  
3 metric ton weighted hook with swivel and safety latch (optional).

## AXLE LOADINGS

	Front	Rear	GVW
With jib	9,865kg	9,725kg	19,590kg
Without jib	9,485kg	9,855kg	19,340kg

## PERFORMANCE

Max. rated lifting capacity	16 metric ton × 3.5m	
Boom length	8.10~20.0m	
Twist jib length	6.8m	
Boom derricking angle	0°~78°	
Boom derricking time	38 sec. (0°~78°)	
Boom telescoping time	50 sec./11.90m	
Main hoist line speed (6 part line)	High	86.6 m/min (3rd layer)
	Low	43.4 m/min (3rd layer)
Aux. hoist hook speed (Single part line)	High	86.6 m/min (3rd layer)
	Low	43.4 m/min (3rd layer)
Swing speed	3.4 rpm	
Max. travel speed	50 km/h	
Gradeability	tan θ	0.6

# Lifting Capacities

## RATED LOADS IN KGS

With outriggers fully extended to 5.33m centers—360° work areas							
Operating radius in Meters	Main Boom			Auxiliary Sheave	Boom Angle	20.00m Boom + 6.8m Jib	
	8.10m Boom	14.05m Boom	20.00m Boom	8.10 – 20.00m Boom		Offset 5°	Offset 30°
	3.0	16,000	11,000	8,000		3,000	78°
3.5	16,000	11,000	8,000	3,000	75°	3,000	1,500
4.0	14,000	11,000	8,000	3,000	72°	3,000	1,400
4.5	12,600	11,000	8,000	3,000	70°	2,800	1,350
5.0	11,500	10,500	8,000	3,000	65°	2,400	1,250
5.5	10,400	9,800	7,400	3,000	60°	2,100	1,200
6.0	9,300	9,000	7,000	3,000	55°	1,900	1,150
7.0		7,600	6,150	3,000	50°	1,700	1,100
8.0		6,100	5,400	3,000	45°	1,550	1,050
9.0		5,050	5,000	3,000	40°	1,450	1,050
10.0		4,300	4,400	3,000	35°	1,250	1,000
11.0		3,650	3,750	3,000	30°	1,100	
12.0		3,200	3,300	3,000	25°	1,000	
13.0			2,900	2,700	20°	900	
14.0			2,500	2,350	15°	850	
15.0			2,200	2,000	10°	800	
16.0			2,000	1,800	5°	800	
17.0			1,800	1,600			
18.0			1,550	1,400			

With outriggers mid-extended to 3.6m centers—360° work areas					
Operating radius in Meters	Main Boom			Auxiliary Sheave	
	8.10m Boom	14.05m Boom	20.00m Boom	8.10 – 14.05m Boom	20.00m Boom
	3.0	16,000	11,000	8,000	3,000
3.5	14,500	11,000	8,000	3,000	3,000
4.0	11,450	11,000	8,000	3,000	3,000
4.5	9,550	9,550	8,000	3,000	3,000
5.0	7,800	7,900	7,800	3,000	3,000
5.5	6,650	6,750	6,650	3,000	3,000
6.0	5,700	5,900	5,900	3,000	3,000
7.0		4,650	4,650	3,000	3,000
8.0		3,700	3,700	3,000	3,000
9.0		3,050	3,050	3,000	3,000
10.0		2,500	2,550	2,300	2,400
11.0		2,100	2,200	1,900	2,000
12.0			1,850		1,650
13.0			1,550		1,400
14.0			1,350		1,150
15.0			1,200		1,000
16.0			1,050		850
17.0			900		700
18.0					

Without outriggers												
Operating Radius in Meters	Main Boom											
	8.10m Boom				14.05m Boom				20.00m Boom			
	Over Front (w/2° of center)		360°		Over Front (w/2° of center)		360°		Over Front (w/2° of center)		360°	
	Stationary	Pick & Carry (under 5km/h)	Stationary	Pick & Carry (under 5km/h)	Stationary	Pick & Carry (under 5km/h)	Stationary	Pick & Carry (under 5km/h)	Stationary	Pick & Carry (under 5km/h)	Stationary	Pick & Carry (under 5km/h)
3.0	11,450	8,000	7,600	5,350	7,600	5,350	6,650	4,650				
3.5	10,000	7,000	6,300	4,400	7,600	5,350	5,800	4,050	4,950	3,450	3,450	2,400
4.0	8,950	6,250	5,250	3,650	7,600	5,350	5,000	3,450	4,950	3,450	3,450	2,400
4.5	7,350	5,100	4,300	3,000	6,750	4,700	4,200	2,900	4,950	3,450	3,450	2,400
5.0	6,300	4,400	3,500	2,450	5,900	4,100	3,600	2,500	4,950	3,450	3,450	2,400
5.5	5,350	3,700	2,950	2,050	5,250	3,650	3,150	2,200	4,550	3,200	3,200	2,200
6.0	4,550	3,200	2,550	1,750	4,550	3,200	2,850	1,850	4,300	3,000	2,750	1,900
7.0					3,500	2,450	2,050	1,450	3,600	2,500	2,200	1,500
8.0					2,850	2,000	1,500	1,050	3,050	2,100	1,700	1,200
9.0					2,350	1,600	1,150		2,500	1,750	1,350	900
10.0					1,900	1,350	850		2,100	1,450	1,050	
11.0					1,550	1,100	600		1,700	1,200	800	
12.0									1,450	1,000	650	
13.0									1,250	850		
14.0									1,100			
15.0									900			
16.0									750			
17.0									650			
Minimum Angle (Oper. Rad.)	—	—	—	—	—	—	—	40° (9.08m)	—	35° (14.69m)	40° (13.64m)	55° (9.84m)

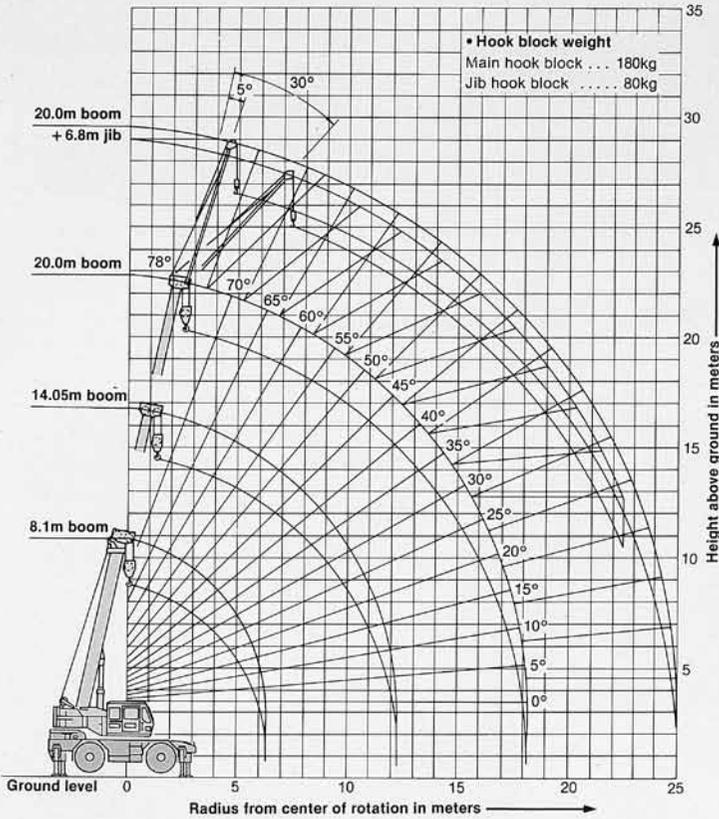
### OPERATION OF THIS EQUIPMENT IN EXCESS OF RATED LOADS OR DISREGARD OF INSTRUCTIONS VOIDS THE WARRANTY.

#### NOTE:

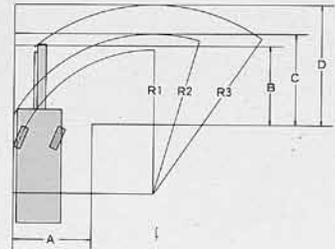
- Operating radius is the horizontal distance from centerline of rotation to a vertical line through the center of gravity of the load.
- Load ratings do not exceed 75% of tipping loads.
- Load ratings are the approved maximum lifting capacities on a firm and level surface, and include hook block(s) slings and all other load handling accessories. Main hook block weight: 180kg. Auxiliary hook block weight: 80kg.
- Deduct 500kg from main boom ratings when jib boom is extended.
- Ratings in the shaded area are based on the machine's hydraulic or structural limitations and not on machine stability.
- Load ratings with outriggers fully extended are over rear, over side and over front lifting capacities with the machine leveled. Load ratings with outriggers mid-extended are based on the condition of 3.6m distance of outriggers and over rear, over side and over front lifting capacities with machine leveled.
- The working radii given in the above charts include allowances for laden boom deflection. The main boom must always be operated on the basis of those figures. However, jib operation limits must be based on main boom angle only.
- To determine load ratings in-between those shown on chart, proceed as follows:
  - For boom lengths not shown, use rating for next longer boom length shown.
  - For load radii not shown, use rating for next longer radius shown.
- Standard hoist reeving are shown below. Single line load must not exceed 3,340kg.
 

Boom length	8.10m	14.05m	20.00m	Aux. sheave
No. of parts of line	6	4	4	1
- Load ratings for free fall operation are one fifth of rated loads shown above. In this case, each permissible load for single line is 700kg for main hoist line and 500kg for auxiliary hoist line.
- The following items must be observed when operating "without outriggers":
  - Axle lockouts must be engaged.
  - Jib lifts are prohibited.
  - Free fall operation is prohibited.
  - Tire inflation pressure must be 3.0 kg/cm<sup>2</sup>.
  - Parking brake must be applied during load lifting.
  - Over side load ratings are less than those of front and rear. When swinging from over front or rear to over side, be sure the suspended load will not exceed the over side rating.
  - When transporting a load (Pick and Carry), the machine must be on firm, level surface. Do not exceed 5 km/h travel speed.
  - When transporting a load, wind and swing brakes must be locked.
- When minimum angles are indicated at the bottom of load rating table, tipping may result if the boom is lowered beyond that stated angle.

# Working Ranges

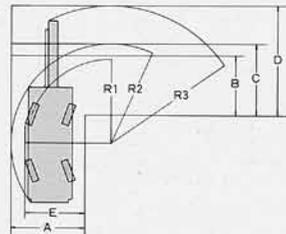


## Minimum 90° road width



### • 2-wheel steering

R1 = Wheel turning radius	8.10m
R2 = Vehicle turning radius	9.00m
R3 = Boom turning radius	10.64m
A = Road width at entrance	4.45m
B = Road width at exit for wheels	4.45m
C = Road width at exit for vehicle	5.13m
D = Road width at exit for boom	6.77m

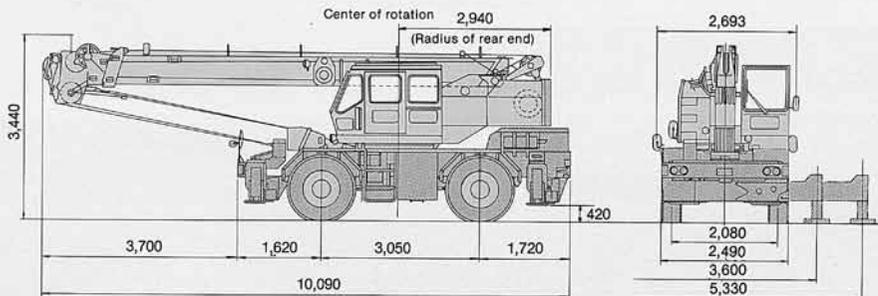


### • 4-wheel steering

R1 = Wheel steering radius	4.70m
R2 = Vehicle turning radius	5.60m
R3 = Boom turning radius	7.69m
A = Road width at entrance	3.96m
B = Road width at exit for wheels	3.38m
C = Road width at exit for vehicle	4.03m
D = Road width at exit for boom	6.12m
E = Road width at entrance allowing for rear swing	3.38m

# General Dimensions

Unit: mm



# RK160

**NOTE:** Due to our policy of continual product improvement, all designs and specifications are subject to change without advance notice. Data herein is informational in nature and shall not be construed to warrant suitability of the machine for any particular purpose as performance may vary with the conditions encountered. These statements are correct at time of going to press.



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