OPTIONAL EQUIPMENT

Work lights: 2 floodlights on top of boom cradle, 1 floodlight and 1 spotlight on top of upperstructure cab.

Windshield washer and wiper, uppstructure cab.

Heat resistant glass, upperstructure cab.

Engine alarms: lights and buzzer in upperstructure or undercarriage cab to warn of low oil pressure or high water temperature.

Vandalism protection kit: Lexan upperstructure cab windows, metal window covers for undercarriage cab, locking engine covers, locking cover on hydraulic reservoir, locking fuel cap and battery box cover.

Tachometer for upperstructure or undercarriage engine.

Spark arrestor for upperstructure or undercarriage engine.

105 amp alternator, upperstructure.

Revolving beacon.

Cold start package for upperstructure engine: includes ether start kit and 3 SAE #27F batteries.

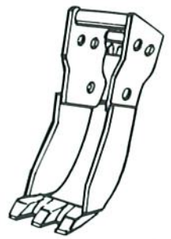
Cold start package for undercarriage engine: includes ether start kit and additional SAE #27F battery.

VHP or fixed flow hydraulic pump disconnect.

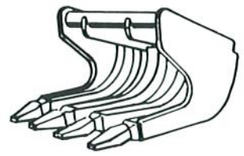
Disc wheels, 6 x 4 undercarriage.

Inside hose trough with additional hosing and piping for pneumatic or hydraulic-powered attachments.

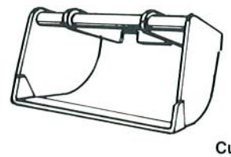
	Cu. yd.	m³
8365-6005 24″ (61cm) Excavating bucket	3/8	.29
8365-6007 30″ (76cm) Excavating bucket	1/2	.38
8365-6054 36″ (91cm) Excavating bucket	5/8	.48
8365-6003 42″ (107cm) Excavating bucket	3/4	.57
8365-6006 48″ (122cm) Excavating bucket	7/8	.67



	Cu. yd.	m³
8365-6012 15″ (38cm) Trenching bucket	1/7	.11
8365-6011 21″ (53cm) Trenching bucket	1/5	.15



8365-6057 40″ (102cm) Pavement removal bucket

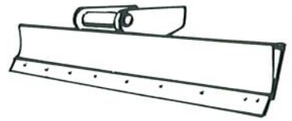


	Cu. yd.	m³
8365-6046 60″ (152cm) Ditching bucket	3/4	.57
8365-6058 66″ (168cm) Ditching bucket	7/8	.67
8365-6041 72″ (183cm) Ditching bucket	1	.76

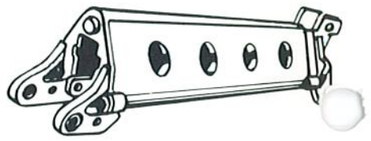
	Cu. yd.	m³
8665-6085 72″ (183cm) Dredging bucket	3/4	.57

8365-6013 Single-tooth ripper

8365-6014 Industrial hook



8365-6010 8′ (2.4m) Grading blade



8665-5003 4′ (1.2m) Boom extension

8665-5010 6′ (1.8m) Boom extension

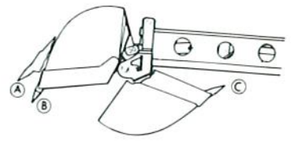
8665-5002 8′ (2.4m) Boom extension

8665-5004 12′ (3.7m) Tubular boom extension

ATTACHMENTS

Buckets fabricated of steel plate, with high strength, low alloy cutting edges and wear strips. Standard attachments available for wide range of applications. Capacities shown are in struck cu. yd.

TWO-POSITION BUCKET



A – Bucket open, lower pin position, for vertical walls or deep excavating. Bucket pivot 165°.

B – Bucket open, upper pin position, for most applications. Bucket pivot 148°

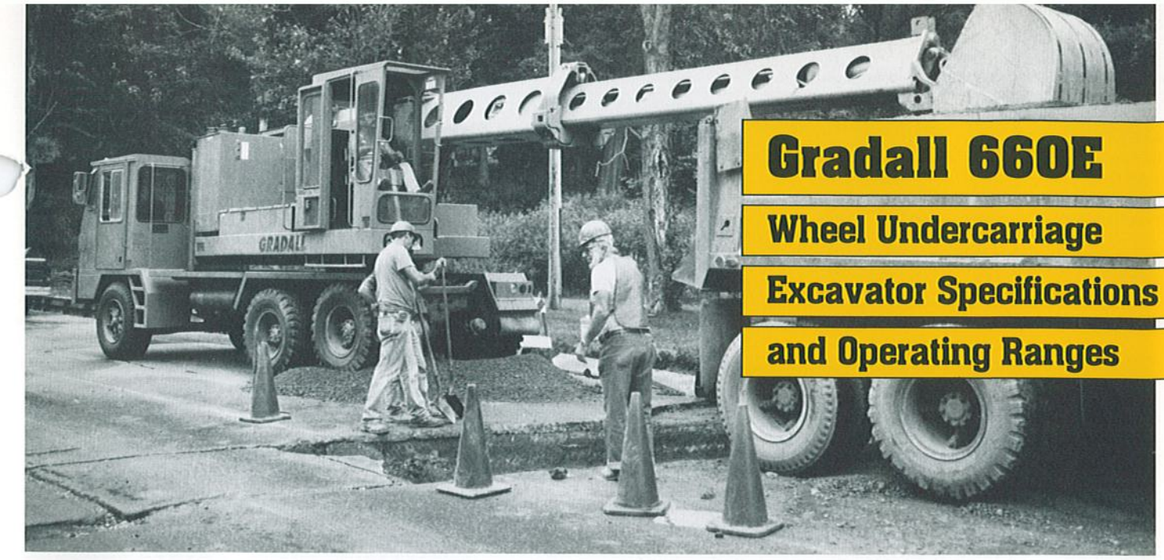
C – Bucket closed, either pin position.

GRADALL

406 Mill Ave. SW, New Philadelphia, Ohio 44663
Phone (216) 339-2211

Form No. 19110
(Replaces 18907)

Printed in U.S.A.



Gradall 660E

Wheel Undercarriage Excavator Specifications and Operating Ranges

UPPERSTRUCTURE ENGINE

Cummins 6BTA5.9 diesel, turbocharged and aftercooled, liquid cooled, 4 cycle, 6 cylinder, 359 cid (5.9L). 4.02″ bore x 4.72″ stroke (102mm x 120mm), 16.5:1 compression ratio.
177 hp (132kW) gross at 2500 rpm, 162 hp (121kW) net at 2500 rpm.
455 ft-lb (617Nm) gross torque at 1500 rpm.
Altitude capability 9850′ (3000m). Derate 4% per 1000′ (300m) above 9850′ (3000m).
Maximum slope: 45°
12 volt starter, 62 amp alternator, two-stage dry-type air cleaner with centrifugal precleaner, ejector valve and service indicator, spin-on oil filter, spin-on fuel filter/water separator.
Fuel tank capacity: 100 gallons (379L).

HYDRAULIC SYSTEMS

VHP HYDRAULIC SYSTEM
Three gear type pumps (2 two section, 1 single section) on 1.1:1 reduction gear box mounted on engine.
Pressure sensing unloading valve built into each two section pump to produce variable flow output: minimum 90 gpm (341L/min), maximum 150 gpm (563L/min) total at 2300 rpm, 120°F (48.9°C).
Auxiliary pump, 10 gpm (38L/min), mounted on engine.

FIXED FLOW HYDRAULIC SYSTEM
Three section tandem gear type pump flange mounted to engine.
136 gpm (515L/min) total at 2500 rpm, 120°F (48.9°C).
Auxiliary pump, 10 gpm (38L/min), mounted on engine.

SYSTEM SPECIFICATIONS
Four double acting cylinders –
- 2 boom hoist: 5″ ID, 2.75″ rod (127mm x 70mm), 45.75″ (1162mm) stroke.
- 1 tool: 5″ ID, 3″ rod (127mm x 76mm), 19.63″ (498mm) stroke.
- 1 telescope: 4.75″ ID, 3″ rod (121mm x 76mm), 12′ (3.7m) stroke.

Two hydraulic motors –
- Swing, 44 hp (33kW); tilt, 48 hp (36kW) with VHP hydraulic system.
- Swing, 38 hp (29kW); tilt, 42 hp (31kW) with fixed flow hydraulic system.

Operating pressures –
- Hoist, 3000 psi (20,685 kPa).
- Tilt, 2750 psi (18,961 kPa).
- Swing, 2500 psi (17,237 kPa).
- Tool, 3100 psi (21,375 kPa).
- Telescope, 1675 psi (11,549 kPa).
- Remote control, 1800 psi (12,411 kPa).
- Pilot system, 450 psi (3,103 kPa).

Oil capacity – reservoir 100 gallons (379L), system 120 gallons (454L). Visual oil level gauges on reservoir.
Filtration system – six filter elements (20 micron) with condition indicators built into reservoir, strainer on by-pass, magnet clusters, air filter on reservoir breather. In-line filter with condition indicator in pilot circuit.
Fin and tube oil cooler with relief valve.
Pump relief valves and circuit relief valves in all circuits.

UPPERSTRUCTURE CAB

All-weather cab with tinted safety glass windows, skylight, acoustical lining, three-way adjustable operator's seat, fire extinguisher, heater and defroster. Front window removable, stored in cab.

CONTROLS
Two hydraulic joysticks (hoist & bucket, telescope & swing), one rocker switch (tilt) control upperstructure. Hydraulic joysticks mounted on movable console, adjustable for individual operator comfort and convenience.
Two rocker pedals for hydraulic remote control of undercarriage steering, travel and digging brakes.
Joysticks and pedals are self-centering; when controls are released power for movement disengages and swing and travel brakes set automatically.
Pump selector valve (VHP hydraulic system only). Emergency/parking brake control.
Engine controls – key operated ignition/starter switch with indicator light, throttle. Oil pressure, water temperature and fuel gauges, volt meter, hourmeter.

SWING

Swing speed: 7.5 rpm, 0 to 90° in 3.3 seconds with VHP hydraulic system; 6.5 rpm, 0 to 90° in 3.5 seconds with fixed flow hydraulic system.
Swing brake: automatic swing parking brake, spring set-hydraulic release. Dynamic braking provided by hydraulic system.

UNDERCARRIAGE

6 x 4 or 6 x 6
Wheelbase: 171″ (4.3m)
Frame width: 42″ (107cm)
Gross vehicle axle weight rating:
- 6 x 4 – 59,200# (26,853 kg)
- 6 x 6 – 62,000# (28,132 kg)

STANDARD ENGINE
Cummins 6CT8.3 diesel, turbocharged, liquid cooled, 4 cycle, 6 cylinder, 504 cid (8.3L), 4.49″ bore x 5.32″ stroke (114mm x 135mm), 17.3:1 compression ratio. EPA certified.
210 hp (157kW) gross at 2200 rpm, 195 hp (145kW) net at 2200 rpm.
605 ft-lb (820 Nm) gross torque at 1500 rpm.
Altitude capability 9850′ (3000m). Derate 4% per 1000′ (300m) above 9850′ (3000m).
Maximum slope: 45°

OPTIONAL ENGINE
Cummins 6CTA8.3 diesel, turbocharged and aftercooled, 16.5:1 compression ratio. EPA certified.
240 hp (179kW) gross at 2200 rpm, 225 hp (168kW) net at 2200 rpm.
645 ft-lb (874 Nm) gross torque at 1500 rpm.

ELECTRICAL SYSTEM
12 volt, 62 amp alternator with integral voltage regulator.
Batteries: 2 SAE #27F, 590 CCA.

COOLING SYSTEM
Fin and tube type radiator, 6 blade 24″ (61cm) fan with shroud.

FUEL SYSTEM
50 Gallon (189L) fuel tank, spin-on fuel filter/water separator.
AIR FILTER
Dry type with service indicator.
OIL FILTER
Full flow spin-on element.
GOVERNOR
Mechanical
TRANSMISSION
6 x 4 with Cummins 6CT8.3 or 6CTA8.3 engine: Fuller RTO-6613 Roadranger, 13 speeds forward, 3 speeds reverse, air controlled countershaft brake.
6 x 6 with Cummins 6CT8.3 or 6CTA8.3 engine: Fuller RTO-6613 Roadranger and Fabco 170 Series transfer case with air controlled front drive declutch.

Travel speed: mph (km/hr)

Gear	1	2	3	4	5	6	7	8
Speed	3(5)	4(6)	5(8)	6(10)	8(13)	10(16)	13(21)	17(27)

Gear	9	10	11	12	13	R1	R2	R3
Speed	21(34)	27(43)	34(55)	44(71)	54(87)	3(5)	6(10)	20(32)

CLUTCH
With Cummins 6CT8.3 engine: 14″ (36cm) single plate.
With Cummins 6CTA8.3 engine: 14″ (36cm) double plate.
DRIVE LINES
Spicer 1710 series with needle bearing universal joints.
AXLES
Front: 6 x 4 – Eaton EFA-12, 13,200# (5,988 kg) rating.
6 x 6 – Rockwell RF-16-145, 16,000# (7,258 kg) rating, 6.14:1 ratio.
Rear: Rockwell RT-46-160, 46,000# (20,886 kg) rating, single reduction, straight line drive, 6.14:1 ratio.
Cab controlled differential lock in forward-rear axle, cab controlled interaxle differential lock.
FRAME
Wide-flange beam, 12″ (31cm), 35 lb/ft (52 kg/m).
SUSPENSION
Front: 14 leaf spring, 42.5″ x 3″ (108cm x 7.6cm) with automatic lockout cylinders.
Rear: Hendrickson equalizer beam, 8″ (20cm) oscillation.
BRAKES
Rockwell "P" Series Cam-Master spring set cam brakes on rear. 6 x 4 – cam brakes on front; 6 x 6 – wedge brakes on front.
Front drums: 6 x 4 – 16.5″ x 5″ (419mm x 127mm),
6 x 6 – 17″ x 6″ (432mm x 152mm).
Rear drums: 16.5″ x 7″ (419mm x 178mm).
Spring brake system incorporates emergency and parking brakes on both rear axles.
Dessicant-type air dryers with automatic purge valve and thermostatically controlled heater. 13.2 cfm (6.2L/sec) air compressor.
WHEELS
6 x 4 – Cast spoke with demountable rim.
6 x 6 – Disc, 10 stud. 11.25″ (29cm) bolt circle.
STEERING
Ross, integral hydraulic power steering.
TIRES
Single front: 6 x 4 – 15:00 x 22.5-14PR, highway tread.
6 x 6 – 15:00 x 22.5-16PR, traction tread.
Dual rear: 6 x 4 – 10:00 x 20-14PR, traction tread.
6 x 6 – 10:00 x 20-14PR, traction tread.
Optional: 9:00 x 20-12PR, traction tread, 6 x 4 rear.
10:00 x 20-14PR, highway tread, 6 x 4 front & rear.
10:00 x 20-14PR, traction tread, 6 x 6 front.
UNDERCARRIAGE CAB
One-man, left-hand-mounted, isolated from frame on rubber mounts. Bostrom T-Bar seat, adjustable front and back. Tinted safety glass windows, sliding windows left and right. Cowl ventilator, acoustical lining, sun visor, fire extinguisher, seat belt, heater and defroster.
STANDARD EQUIPMENT (Undercarriage)
Sealed beam head lights, tail lights, back-up lights, stop lights, identification light clusters front & rear, direction signals, 4-way hazard lights, clearance lights, instrument lights, dome light. Oil pressure, water temperature, dual air tank pressure and fuel gauges; voltmeter, hourmeter, speedometer and odometer. Windshield washer and wiper. Wide angle rear view mirror system with plane and convex mirrors left and right. Wheel and axle wrenches. Full width deck plate.

HYDRAULIC REMOTE CONTROL

Undercarriage powered by upperstructure engine through hydraulic motor and PTO on transmission. Travel and steering pedals in upperstructure cab. Digging brakes and front axle lockout cylinders set automatically with travel pedal in neutral, emergency/parking brakes controlled by toggle. Undercarriage engine off when hydraulic remote control is in use. Electrically operated alarms mounted on undercarriage signal remote control movement in either direction, reverse movement when driven from undercarriage cab. Alarms meet SAE J-994b type B classification.

660E 6X4 & 6X6 LIFT CAPACITY OVER SIDE OR REAR-LB. (KG.)

All loads shown are in compliance with SAE standard J-1097, Oct. 80. They do not exceed 87% of hydraulic lifting capacity or 75% or tipping capacity.

All loads with an asterisk (*) indicate the load is limited by tipping rather than hydraulic capacity.

The rated lift is based on the machine being equipped with 3600 lb. (1633 kg.) counterweight and 8365-6054 36″ (91cm) excavating bucket weighing 695 lb (315 kg.). For other buckets, adjust the listed capacities as follows:

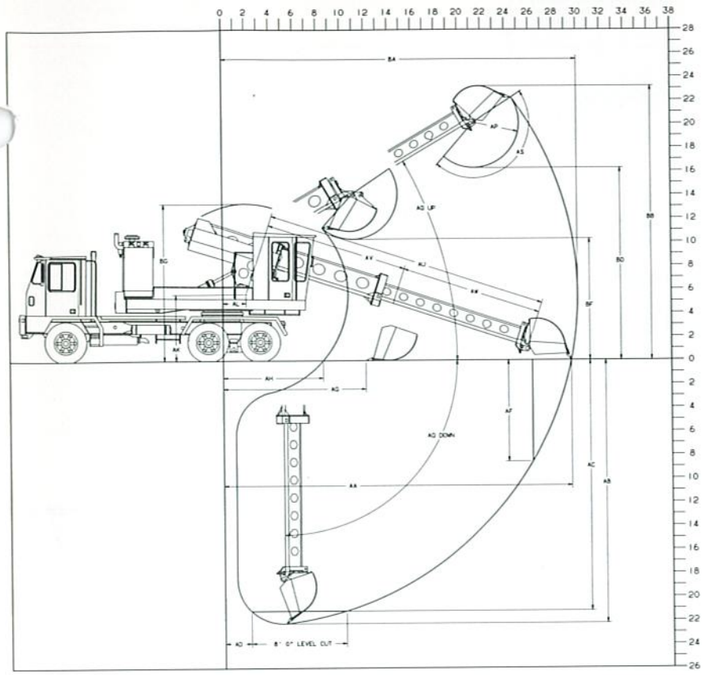
8365-6005 24″ (61cm) Excavating – Add 195 lb. (88 kg.)
8365-6007 30″ (76cm) Excavating – Add 75 lb. (34 kg.)
8365-6003 42″ (107cm) Excavating – Subtract 75 lb. (34 kg.)
8365-6006 48″ (122cm) Excavating – Subtract 135 lb. (61 kg.)
8365-6046 60″ (152cm) Ditching – Add 35 lb. (16 kg.)
8365-6058 66″ (168cm) Ditching – Subtract 35 lb. (16 kg.)
8365-6041 72″ (183cm) Ditching – Subtract 60 lb. (27 kg.)
8365-6057 40″ (102cm) Pavement removal – Subtract 215 lb. (97 kg.)

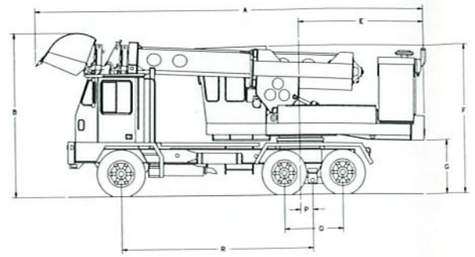
The load point is located on the bucket pivot point, including loads listed for maximum radius. Do not attempt to gain additional radius by wrapping the load line around the back of the bucket.

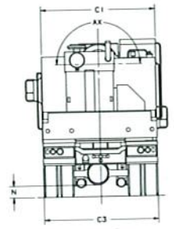
Do not attempt to lift or hold any load greater than these rated values at specified load radii and heights. The weights of slings and any auxiliary devices must be deducted from the rated load to determine the net load that may be lifted.

LOAD POINT HEIGHT		LOAD RADIUS														
		5′ (1.5M)		10′ (3M)		14′ (4.3M)		15′ (4.6M)		20′ (6.1M)		25′ (7.6M)		MAX. RADIUS		
		SIDE	REAR	SIDE	REAR	SIDE	REAR	SIDE	REAR	SIDE	REAR	SIDE	REAR	SIDE	REAR	RAD.
ABOVE GROUND LEVEL	15′ (4.6M)							5160 (2340)	5160 (2340)	3713 (1684)	3713 (1684)					
	10′ (3M)							8099 (3673)	8099 (3673)	5124 (2324)	5124 (2324)	3397 (1541)	3397 (1541)	3186 (1445)	3186 (1445)	25′9″ (7.8M)
	BOOM LEVEL 8′4″ (2.5M)					9443* (4283)	9585 (4347)	8564* (3884)	8706 (3948)	5339* (2421)	5427 (2461)	3556* (1613)	3577 (1622)	3266* (1482)	3274 (1485)	26′1″ (8M)
	5′ (1.5M)							8222* (3729)	9143 (4146)	5167* (2343)	5735 (2601)	3453* (1566)	3794 (1721)	3148* (1428)	3448 (1564)	26′3″ (8M)
GROUND LEVEL								7719* (3501)	8376 (3799)	4901* (2223)	5573 (2527)	3291* (1493)	3799 (1723)	3155* (1431)	3644 (1653)	25′7″ (7.8M)
BELOW GROUND LEVEL	5′ (1.5M)			10266 (4656)	10266 (4656)			7125 (3231)	7125 (3231)	4672* (2119)	5017 (2275)					
	10′ (3M)	17141 (7774)	17141 (7774)	8734 (3961)	8734 (3961)			6063 (2750)	6063 (2750)	4390 (1991)	4390 (1991)					
	15′ (4.6M)	17069 (7741)	17069 (7741)	7804 (3539)	7804 (3539)											

CAUTION: All rated loads are based on the machine being stationary and level on a firm supporting surface for safe working loads. The user is expected to make allowance for his particular job condition, such as soft or uneven ground, out of level condition, side loads, hazardous conditions, experience of personnel, etc. The operator and other personnel should fully acquaint themselves with the operator's manual furnished by the manufacturer before operating this machine, and rules for safe operation of equipment should be adhered to at all times.







Shown with 8365-6054 36″ (91cm) excavating bucket

	6 x 4	6 x 6	
A	28′ 8″ (8.7)	28′ 8″ (8.7)	Overall length (boom in rack) with bucket
B	12′ 1″ (3.6)	12′ 5″ (3.8)	Overall height (boom in rack) with bucket
C1	8′ 0″ (2.4)	8′ 0″ (2.4)	Width of upperstructure
C3	8′ 0″ (2.4)	8′ 0″ (2.4)	Width of undercarriage
E	9′ 4″ (2.8)	9′ 4″ (2.8)	Swing clearance, rear of upperstructure
F	10′ 11″ (3.3)	11′ 4″ (3.4)	Top of cab to groundline
G	46″ (1.1)	53″ (1.3)	Clearance, upperstructure to groundline
N	10″ (0.2)	10″ (0.2)	Ground clearance (per SAE J1234)
P	11″ (0.3)	11″ (0.3)	Center of rear tandem to axis of rotation
Q	52″ (1.3)	52″ (1.3)	Distance between centers of tandem axles
R	14′ 3″ (4.3)	14′ 3″ (4.3)	Wheelbase
AA	29′ 6″ (9.0)	29′ 5″ (9.0)	Maximum radius at groundline (165° pivot)
AB	22′ 3″ (6.8)	21′ 10″ (6.6)	Maximum digging depth (165° pivot) – rear
AC	21′ 2″ (6.4)	20′ 9″ (6.3)	Maximum depth for 8′ level cut – rear
AD	25″ (0.6)	27″ (0.7)	Minimum radius of 8′ level cut at depth "AC" – rear
AF	8′ 7″ (2.6)	8′ 2″ (2.5)	Maximum depth of vertical wall which can be excavated
AG	12′ 1″ (3.6)	12′ 0″ (3.6)	Minimum level cut radius with bucket flat on groundline
AH	8′ 6″ (2.6)	8′ 1″ (2.5)	Minimum radius at groundline
AK	67″ (1.7)	72″ (1.8)	Boom pivot to groundline
AL	24″ (0.6)	24″ (0.6)	Boom pivot to axis of rotation
AP	46″ (1.1)	46″ (1.1)	Bucket tooth radius
AQ	30° Up & 90° Down	30° Up & 90° Down	Boom pivot angle
AS	148° & 165°	148° & 165°	Bucket pivot angle
AU	24′ 0″ (7.3)	24′ 0″ (7.3)	Maximum telescoping boom length (boom pivot to bucket pivot)

	6 x 4	6 x 6	
AV	12′ 0″ (3.6)	12′ 0″ (3.6)	Minimum telescoping boom length (boom pivot to bucket pivot)
AW	12′ 0″ (3.6)	12′ 0″ (3.6)	Telescoping boom travel
AX	180°	180°	Boom tilt angle
BA	30′ 0″ (9.1)	30′ 0″ (9.1)	Maximum radius of working equipment (165° pivot)
BB	23′ 3″ (7.1)	23′ 7″ (7.2)	Maximum height of working equipment
BD	16′ 3″ (4.9)	16′ 8″ (5.0)	Minimum clearance of bucket teeth, with bucket pivot at maximum height
BF	10′ 3″ (3.1)	10′ 8″ (3.2)	Minimum clearance of fully curled bucket at maximum boom height (165° pivot)
BG	13′ 3″ (4.0)	13′ 8″ (4.2)	Maximum height of working equipment with bucket below groundline

Rated bucket tangential force: 13,925 lb (62.7 kN)
Rated telescoping boom crowd force: 17,840 lb (79.4 kN)

TRAVEL POSITION
Boom in rack, without bucket –
Overall length:
27′ 5″ (8.4m)
Overall height:
6 x 4 – 11′ 6″ (3.5m)
6 x 6 – 11′ 11″ (3.6m)
Overall width:
8′ (2.4m)

WEIGHT
Approximate working weight, including 36″ (91cm) bucket, fuel tanks half full –
6 x 4: 43,450 lb (19,709 kg)
6 x 6: 45,200 lb (20,503 kg)

Specifications subject to change without notice.