

HYDRAULIC EXCAVATOR

SHOP MANUAL

model

SK 220 v SK 220lc v

This is the shop manual for KOBELCO hydraulic excavator. Contained is the necessary technical data concerning the maintenance and repair of this model. The manual is divided into the following four major sections; GENERAL, SYSTEMS, COMPONENTS and PROCEDURE.

*GENERAL

- LQ01. SPECIFICATION
- OPERATION AND CONTROLS
(Refer to Operators Manual)
- LQ03. LOCATION AND
WEIGHT OF COMPONENTS

- LQ04. MAINTENANCE STANDARD AND
TEST PROCEDURE
- PREVENTIVE MAINTENANCE
(Refer to Operators Manual)
- LQ07. WORKING STANDARD
- LQ08. STANDARD MAN-HOUR TABLE

*SYSTEMS

- LQ12. HYDRAULIC SYSTEM
- LQ15. SWING FRAME
- LQ18. TRAVEL SYSTEM
- LQ21. ATTACHMENTS
- LQ22. CONTROL SYSTEM

- LQ25. ELECTRICAL SYSTEM
- LQ26. AIR-CONDITIONER OR COOLER
SYSTEM
- LQ29. TROUBLE SHOOTING

*COMPONENTS

- 12. HYDRAULIC PUMP
- 13. CONTROL VALVE
- 14. OTHER VALVES
- 15. HYDRAULIC MOTOR

- 16. SWIVEL JOINT
- 17. HYDRAULIC CYLINDER
- 21. REDUCTION UNIT
- 50. ENGINE

*PROCEDURE

When checking or repairing the machine we suggest that you refer to this manual carefully. We hope that reference to this manual will help to maintain a high level of working efficiency and reliability. For further details on maintenance and checks refer to the "OPERATORS MANUAL" which has been supplied with the machine.

Although all data was correct at the time of printing, due to continual design changes and improvements, some contents may not conform to the actual machine. Take special care to order parts only after confirming the validity of the part number in the "PARTS MANUAL".

If you notice any explanatory discrepancies, after consulting one of our representatives, please update your manual according to the latest data. However, in the event of any specification changes, we will issue revised edition.

INDEX

KOBELCO

Book code No. S5LQ0008E③

▲ WARNING

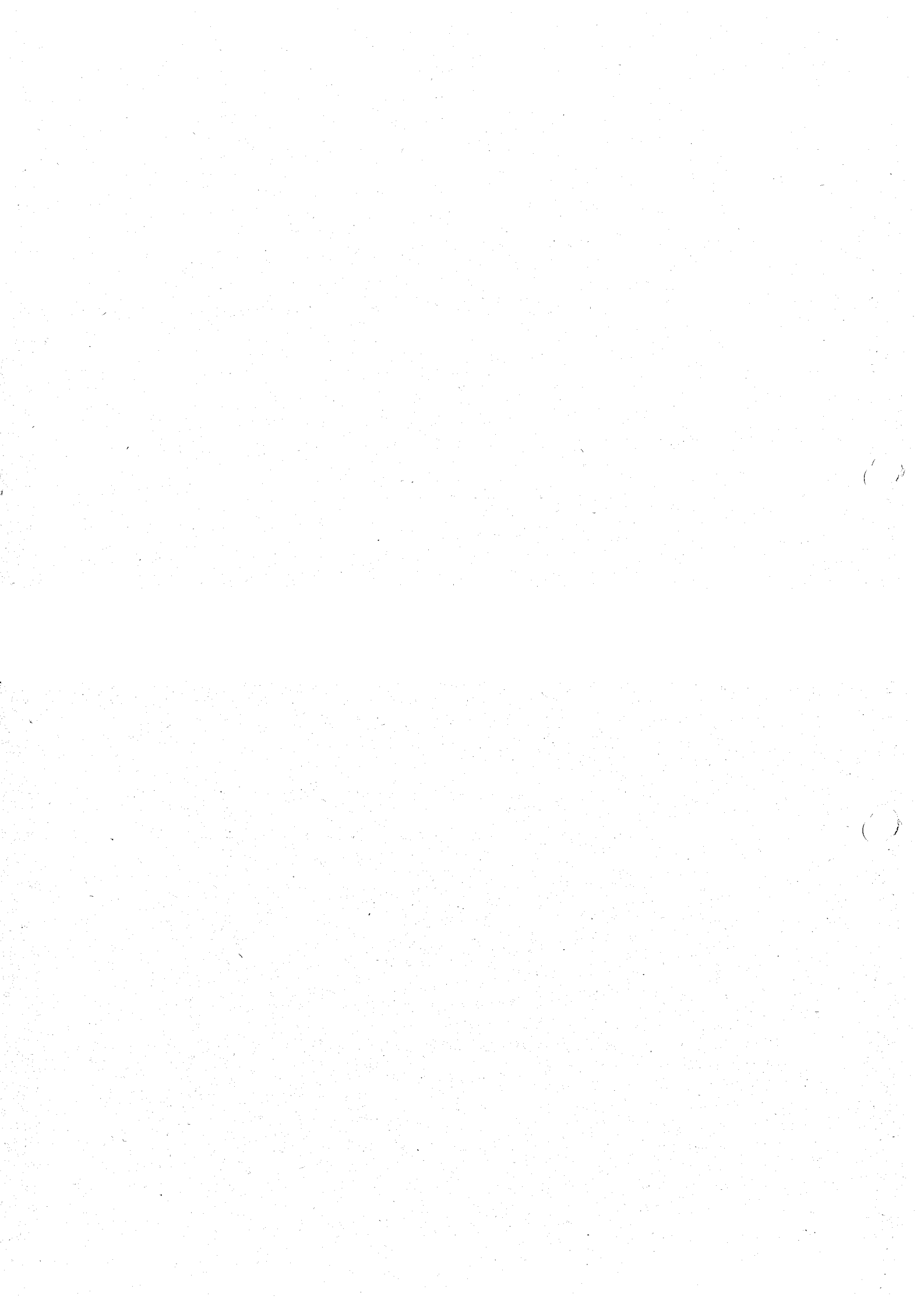
13. Always use tools that are in good condition and be sure you understand how to use them before performing any service work.
14. Reinstall all fasteners with same part number. Do not use a lesser quality fastener if replacements are necessary.
15. Repairs which require welding should be performed only with the benefit of the appropriate reference information and by personnel adequately trained and knowledgeable in welding procedures. Determine type of metal being welded and select correct welding procedure and electrodes, rods or wire to provide a weld metal strength equivalent at least to that of parent metal. Always disconnect battery during welding operations to protect sensitive electric equipment.
16. Do not damage wiring during removal operations. Reinstall the wiring so it is not damaged nor will it be damaged in operation by contacting sharp corners, or by rubbing against some object or hot surface. Do not connect wiring to a line containing fluid.
17. Be sure all protective devices including guards and shields are properly installed and functioning correctly before starting a repair. If a guard or shield must be removed to perform the repair work, use extra caution.
18. Loose or damaged fuel, lubricant and hydraulic lines, tubes and hoses can cause fires. Do not bend or strike high pressure lines or install ones which have been bent or damaged. Inspect lines, tubes and hoses carefully. Do not check for leaks with your hands. Pin hole (very small) leaks can result in a high velocity oil stream that will be invisible close to the hose. This oil can penetrate the skin and cause personal injury. Use cardboard or paper to locate pin hole leaks.
19. Tighten connections to the correct torque. Make sure that all heat shields, clamps and guards are installed correctly to avoid excessive heat, vibration or rubbing against other parts during operation. Shields that protect against oil spray onto hot exhaust components in event of a line, tube or seal failure must be installed correctly.
20. Do not operate a machine if any rotating part is damaged or contacts any other part during operation. Any high speed rotating component that has been damaged or altered should be checked for balance before reusing.
21. On track-type machines, be careful when servicing or separating tracks. Chips can fly when removing or installing a track pin. Wear safety glasses and long sleeve shirts. Track can unroll very quickly when separated. Keep away from front and rear of machine. The machine can move unexpectedly when both tracks are disengaged from the sprockets. Block the machine to prevent it from moving.
22. Caution should be used to avoid breathing dust that may be generated when handling components containing asbestos fibers. If this dust is inhaled, it can be hazardous to your health. Components in KOBELCO products that may contain asbestos fibers are brake pads, brake band and lining assemblies, clutch plates and some gaskets. The asbestos used in these components is usually bound in a resin or sealed in some way. Normal handling is not hazardous as long as airborne dust which contains asbestos is not generated.

If dust which may contain asbestos is present, there are several common sense guidelines that should be followed.

- a. Never use compressed air for cleaning.
- b. Avoid brushing or grinding of asbestos containing materials.
- c. For clean up, use wet methods or a vacuum equipped with a high efficiency particulate air (HEPA) filter.
- d. Use exhaust ventilation on permanent machining jobs.
- e. Wear an approved respirator if there is no other way to control the dust.
- f. Comply with applicable rules and regulations for the work place.
- g. Follow environmental rules and regulations for disposal of asbestos.
- h. Avoid areas where asbestos particles may be in the air.

 **WARNING**

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SHOP MANUAL

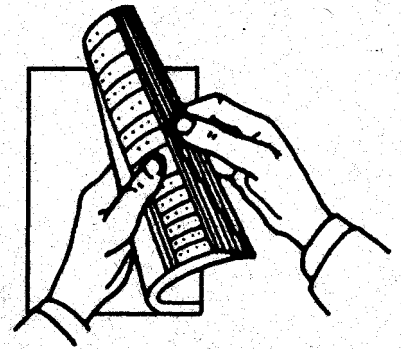
model

SK 220 v SK 220LC v

TABLE OF CONTENTS

1. SPECIFICATION	LQ01
2. OPERATION AND CONTROLS (Refer to Operators Manual Chapter 2 or) (Refer to this Manual Control System)	
3. LOCATION AND WEIGHT OF COMPONENTS	LQ03
4. MAINTENANCE STANDARDS AND TEST PROCEDURES	LQ04
5.	
6. PREVENTIVE MAINTENANCE (Refer to Operators Manual Chapter 4)	
7. WORKING STANDARDS	LQ07
8. STANDARD MAN-HOUR TABLE	LQ08

○How to Index each Shop Manual Section
The GENERAL of this shop manual consists of 8 headings as shown above. Each section can be easily referred to by indexes appended to the margin of the page as indicated on the right. Please use the indexes for speedy reference.



KOBELCO

GENERAL

SK220^v List of Shop Manual GENERAL Section
 SK220^{LCV}

Index No.	Title	Book Code No.		
		Distribution Year - Month		
LQ01	SPECIFICATION	S5LQ0107E 1996-01		
—	OPERATION	S2YN1011E Refer to Operators manual		
LQ03	LOCATION AND WEIGHT OF COMPONENTS	S5LQ0307E 1996-01		
LQ04	MAINTENANCE STANDARDS AND TEST PROCEDURES	S5LQ0409E① 1996-02		
—	PREVENTIVE MAINTENANCE	S2YN1011E Refer to Operators manual		
LQ07	WORKING STANDARDS	S5LQ0706E 1996-01		
LQ08	STANDARD MAN-HOUR TABLE	S5LQ0806E 1996-01		
	Applicable Machines	LQ03701~ LL02501~		

Book code No. S5LQ0107E

KOBELCO

SHOP MANUAL

SK 220 v SK 220LC v

LQ01

SPECIFICATION

TABLE OF CONTENTS

1. NAME OF COMPONENTS	1
2. GENERAL DIMENSIONS	2
3. SPECIFICATIONS AND PERFORMANCE	3
4. TYPE OF SHOES	4
5. TYPE OF BUCKETS	5
6. COMBINATION OF ATTACHMENTS	6
7. WORKING RANGES OF ATTACHMENTS	7
8. LIFTING-UP ABILITY DIAGRAM	9
9. ENGINE SPECIFICATIONS	14

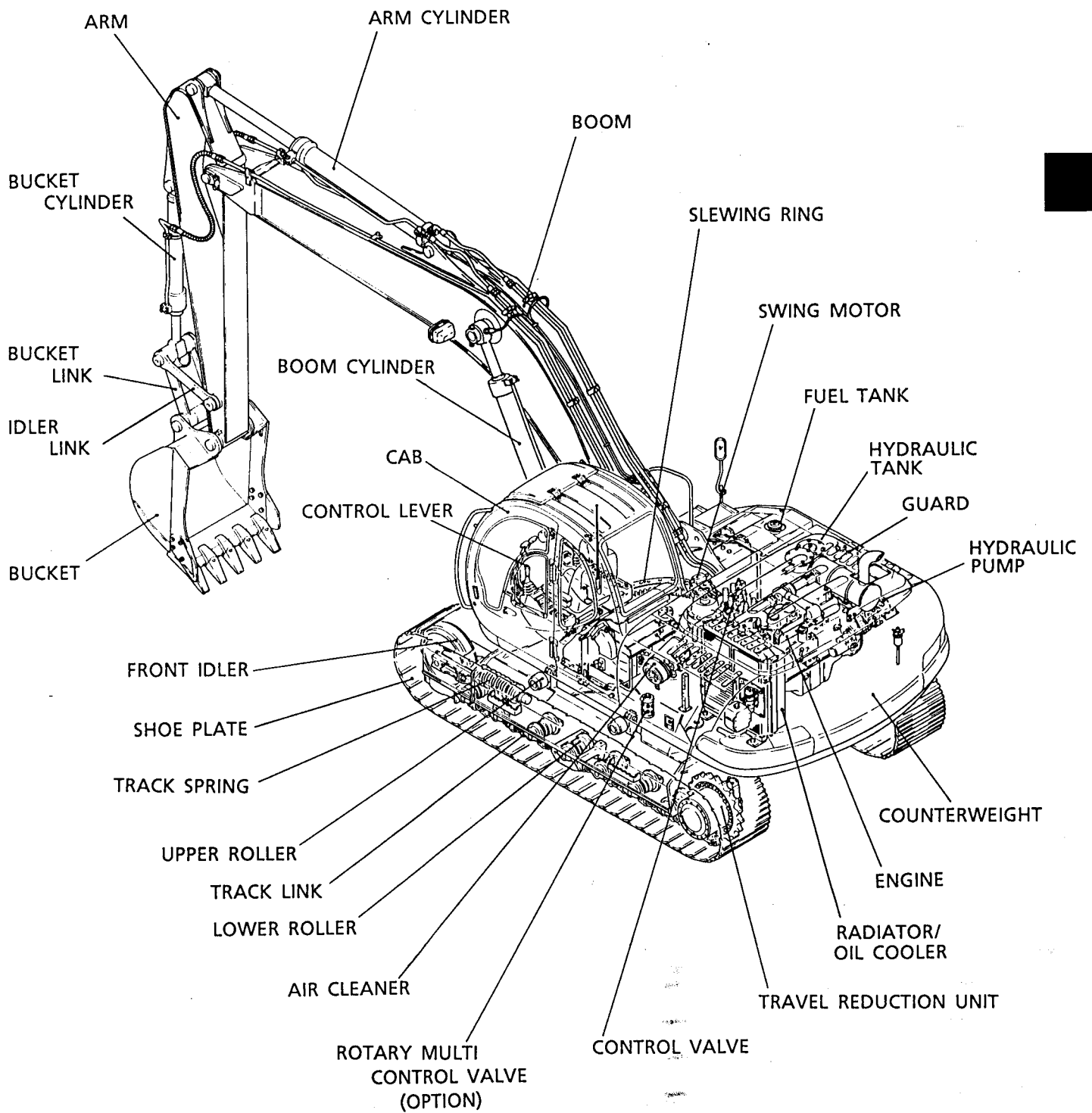
Applicable Machines

LQ03701~

LL02501~

Revision	Date of Issue	Remarks
First edition	January, 1996	S5LQ0107E K

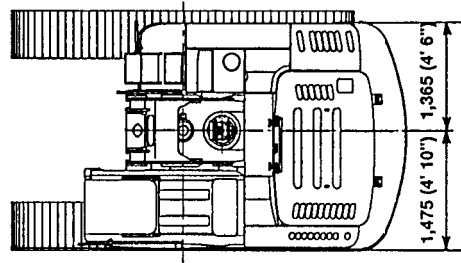
1. NAME OF COMPONENTS



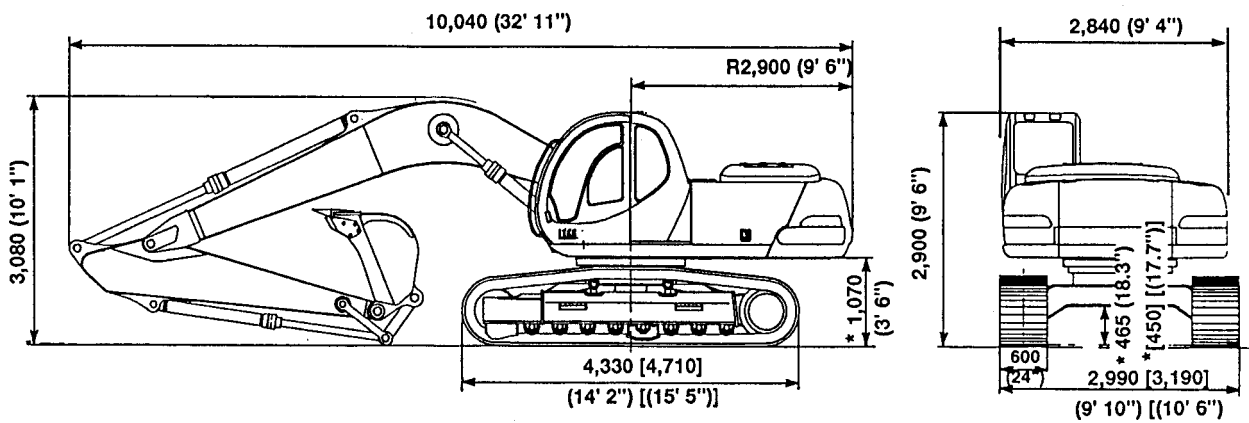
2. GENERAL DIMENSIONS

- SK220v AND SK220Lcv (with 6.02m (19ft-9in) boom and 2.98m (9ft-9in) standard arm)

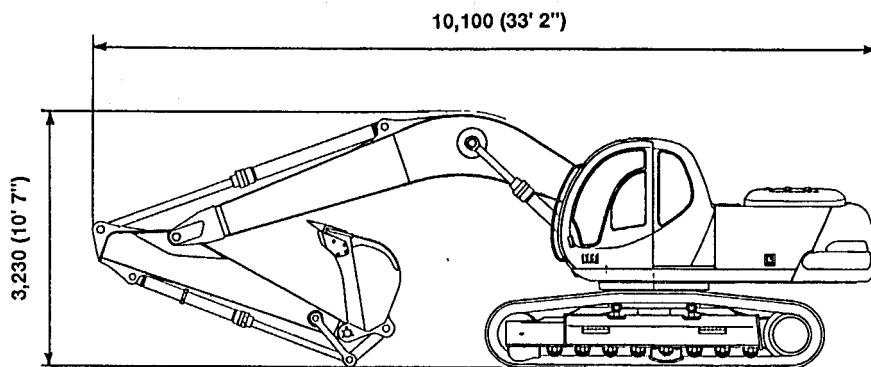
Unit : mm (ft-in)



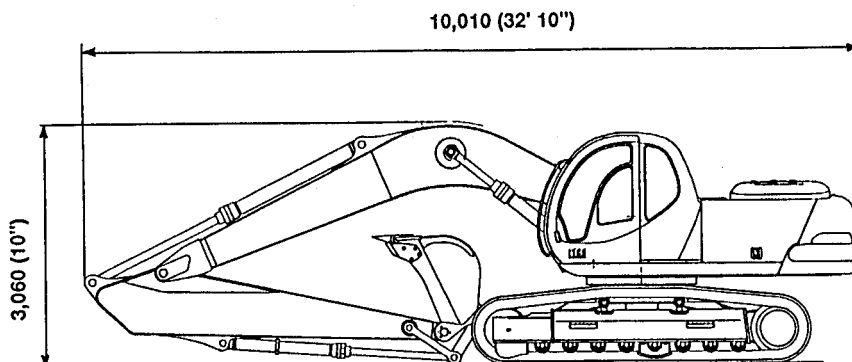
Note : Numerical values marked * do not include the height of the shoe lug. Numerical value enclosed in parentheses [] indicate LC specifications.



- SK220v AND SK220Lcv (with 6.02m (19ft-9in) boom and 2.5m (8ft-2in) short arm)



- SK220v AND SK220Lcv (with 6.02m (19ft-9in) boom and 3.66m (12ft) long arm)



3. SPECIFICATIONS AND PERFORMANCE

● SPEED AND CLIMBING CAPABILITY

Item	Model	SK220 v, SK220Lc v
Swing speed		11rpm
Travel Speed (high/low)		7 / 4km/h (4.3 / 2.5mph)
Gradeability		70% (35°)

● ENGINE

Item	Model	SK220 v, SK220Lc v
Engine model		Mitsubishi 6D16-TE1
Type		Water-cooled 4-cycle direct injection type engine with an exhaust turbocharger
Number of Cylinders Bore×Stroke		6-118mm×115mm (4.65in. × 4.53in.)
Total Displacement		7,545 c.c (460cu-in)
Rated Output / Rotation Speed		165 / 2,000rpm
Maximum Torque / Rotation Speed		63kgf·m / 1,600rpm

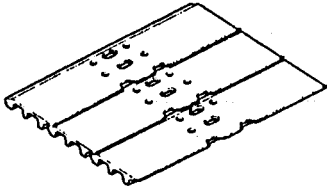
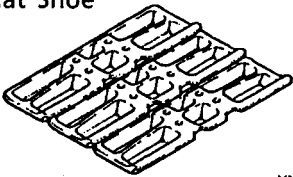
● HYDRAULIC COMPONENTS

Item	Model	SK220 v, SK220Lc v
Hydraulic Pump		Double-pump variable displacement axial piston + gear pump
Hydraulic Motor (swing)		Axial piston motor
Hydraulic Motor (travel)		Axial piston motor
Control Valve		6-function multiple control valve
Cylinder (boom, arm, and bucket)		Double action cylinder
Oil Cooler		Air-cooled type

● WEIGHT

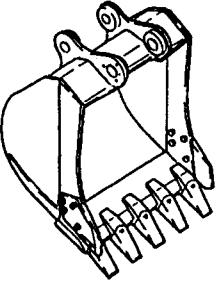
Item	Model	Unit ; kg (lbs)	
		SK220 v	SK220Lc v
Fully equipped Weight		22,700 (50,000)	23,200 (51,000)
Upper Frame machinery		10,100 (22,200)	←
Lower Frame machinery (with 600mm (24in) grouser shoe)		8,600 (19,000)	9,100 (20,000)
Attachment ; 6.02m (19ft9in) boom + 2.98m (9ft-9in) arm + 1.0m ³ (1.30cuyd) bucket		4,000 (8,800)	←

4. TYPE OF SHOES

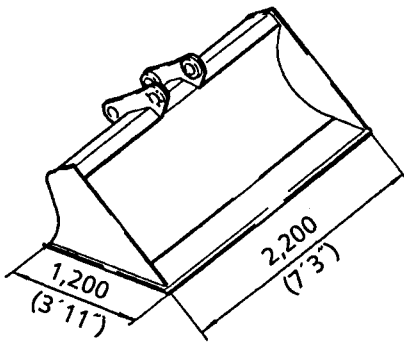
Shape	Model	Shoe Width mm (in.)	Total Width of Crawler mm (ft-in.)	Ground Pressure kg /cm ² (psi)
Grouser Shoe  <small>YN-6-7</small>	SK220V 48 links	600 (24)	2,990 (9'10")	0.50 (7.11)
		700 (28)	3,090 (10'2")	0.44 (6.25)
		800 (32)	3,190 (10'6")	0.39 (5.54)
	SK220LCV 52 links	600 (24)	3,190 (10'6")	0.47 (6.68)
		700 (28)	3,290 (10'10")	0.41 (5.83)
		800 (32)	3,390 (11'1")	0.36 (5.11)
Flat Shoe  <small>YN-6-8</small>	SK220V 48 links	600 (24)	2,990 (9'10")	0.51 (7.25)
	SK220LCV 52 links	600 (24)	3,190 (10'6")	0.48 (6.82)
		—	—	—
		—	—	—

Note : Use grouser shoes 600mm (24in) on rough ground (areas covered with rocks and gravel). If you drive or excavate with other shoes, this may cause shoe bending, shoe bolt looseness, and track assembly (link, roller, etc.) damage.

5. TYPES OF BUCKETS

Hoe Bucket	Heaped Capacity m ³ (cu-yd)	Outside Width of Bucket mm (ft-in)		Number of teeth	Equipped with Side Cutters	Can be Turned over	Weight kg (lbs)
		With side cutters	Without side cutters				
 <p style="text-align: center;">YN-6-10</p> <p>The numerical value marked* is for heavy digging.</p>	0.81 (1.06)	1,060 (3'6")	960 (3'2")	4	Yes	Yes	730 (1,610)
	STD 1.00 (1.30)	1,280 (4'2")	1,180 (3'10")	4	Yes	Yes	790 (1,740)
	*1.04 (1.36)	1,210 (4')	1,170 (3'10")	5	Yes	Yes	920 (2,030)
	1.10 (1.44)	1,390 (4'7")	1,290 (4'3")	5	Yes	Yes	850 (1,870)
	1.40 (1.83)	—	1,510 (4'11")	6	No	Yes	900 (1,980)

Slope Finishing Bucket Weight: 1,050kg (2,310lbs)
Can not be turned over



6. COMBINATIONS OF ATTACHMENTS

Bucket		Applicable Arm			
Type	SAE heaped capacity m ³ (cu-yd)	JIS, SAE struck capacity m ³ (cu-yd)	2.5m (8ft-2in) Arm (short)	2.98m (9ft-9in) Arm (STD)	3.66m (12ft) Arm (long)
Hoe Bucket	0.81 (1.06)	0.59 (0.77)	○	○	◎
	STD 1.00 (1.31)	0.76 (0.99)	○	◎	△
	*1.04 (1.36)	0.76 (0.99)	○	○	×
	1.10 (1.44)	0.84 (1.09)	◎	△	×
	The numerical value marked *is for heavy digging.	1.40 (1.83)	1.00 (1.31)	△	×
Slope Finishing Bucket	Width×Depth 2.2m×1.2m (7'3"×3'11")	—	△	△	×
Breaker	—	—	○	○	×

Note :

- ◎ Standard combination
- General operation : Excavation or loading of sand, gravel, and clay
- △ Light operation : Mainly loading or loose gravel (e.g., cultivation or loading of sand or gravel)
- × Prohibited combination : KOBELCO'S warranty does not cover any damages resulting from these combinations. Do not use these combinations.

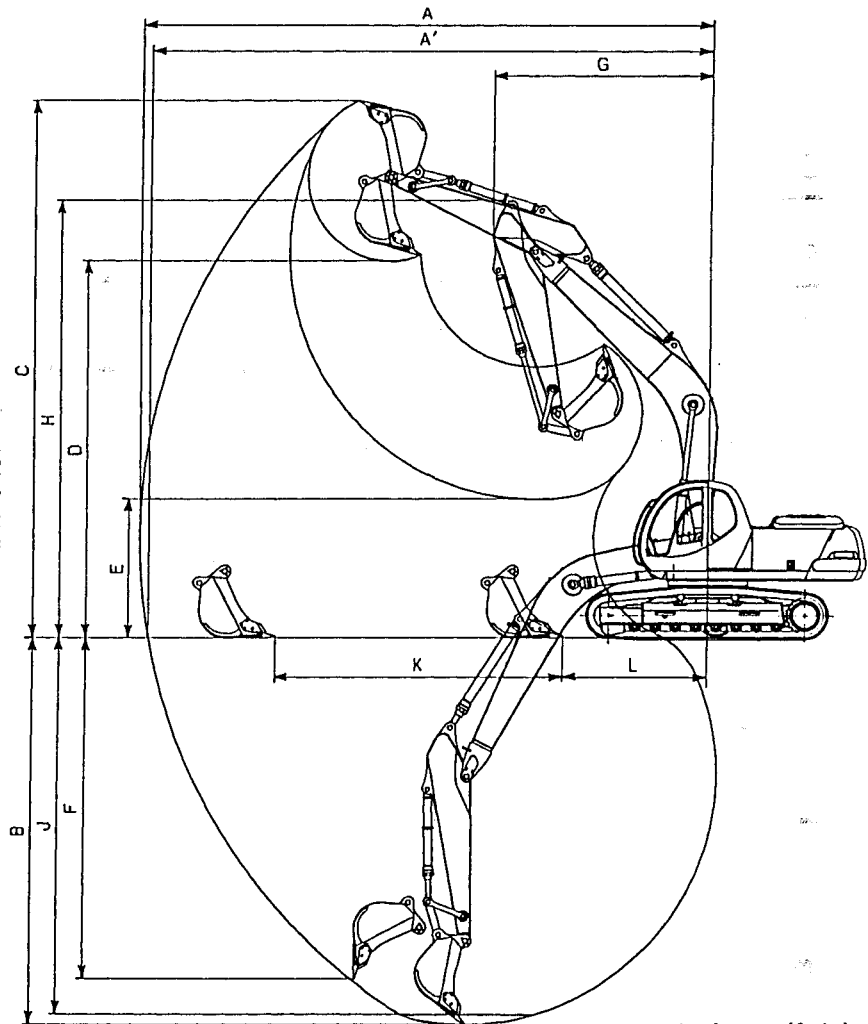
Install only genuine attachment recommended by KOBELCO on the machine. KOBELCO is not liable for any damages to the machine or attachment arising from the installment of attachment other than the specified attachments.

CAUTION

- If any other bucket, except for the backhoe bucket, is turned over and used for excavation, damage to the arm and bucket may occur.
- Do not operate the power boost switch when the long arm or extension arm is installed.

7. WORKING RANGES OF ATTACHMENTS

● BACKHOE ATTACHMENT

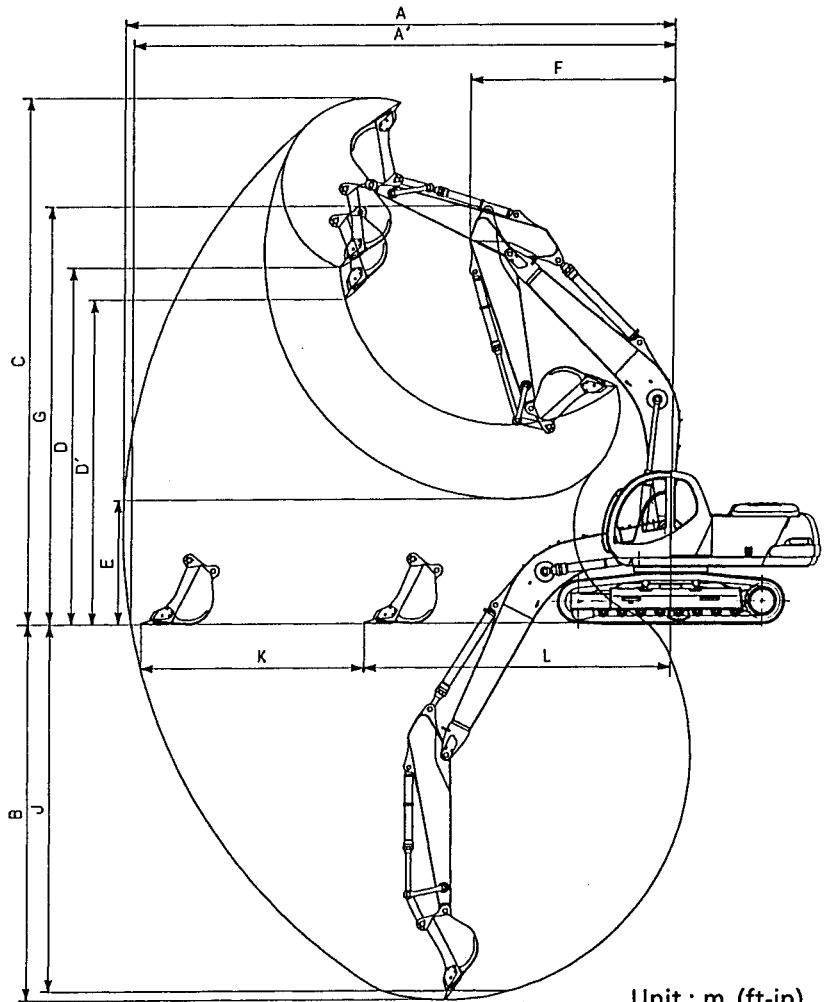


Unit ; m (ft-in)

Attachment Type		2.5m (8ft2in) arm with 1.10m ³ (1.44cuyd) bucket	2.98m (9ft9in) arm with 1.0m ³ (1.31cuyd) bucket	3.66m (12ft) arm with 0.81m ³ (1.06cuyd) bucket	
Item					
A	Maximum digging reach	9.89 (32'5")	10.31 (33'10")	10.97 (36')	
A'	Maximum reach at ground level	9.72 (31'11")	10.14 (33'3")	10.81 (35'6")	
*B	Maximum digging depth	6.53 (21'5")	7.01 (23')	7.69 (25'3")	
*C	Maximum digging height	9.63 (31'7")	9.77 (32'1")	10.17 (33'4")	
*D	Minimum dumping height	6.71 (22')	6.87 (22'6")	7.25 (23'9")	
*E	Minimum dumping height	3.02 (9'11")	2.54 (8'4")	1.86 (6'1")	
*F	Vertical digging depth	5.83 (19'2")	6.18 (20'3")	6.79 (22'3")	
G	Minimum swing radius	3.94 (12'11")	3.90 (12'9")	4.00 (13'1")	
*H	Height at minimum swing	8.03 (26'4")	7.96 (26'1")	7.92 (26')	
*J	Digging depth for 8-feet flat bottom	6.33 (20'9")	6.83 (22'5")	7.54 (24'9")	
K	Horizontal digging	Stroke	4.20 (13'9")	5.26 (17'3")	6.58 (21'7")
L	stroke at ground level	Minimum	3.23 (10'7")	2.58 (8'6")	1.93 (6'4")

NOTE : Dimensions marked * do not include the height of the shoe lug.

● FACE SHOVEL
ATTACHMENT



Unit ; m (ft-in)

Attachment Type		2.5m (8ft2in) arm with 1.10m ³ (1.44cuyd) bucket	2.98m (9ft9in) arm with 1.0m ³ (1.31cuyd) bucket	3.66m (12ft) arm with 0.81m ³ (1.06cuyd) bucket
Item				
A	Maximum digging reach	10.07 (33')	10.49 (34'5")	11.15 (36'7")
A'	Maximum reach at ground level	9.90 (32'6")	10.33 (33'11")	11.00 (36'1")
*B	Maximum digging depth	6.71 (20')	7.19 (23'7")	7.87 (25'10")
*C	Maximum digging height	9.92 (32'7")	10.08 (33'1")	10.46 (34'4")
*D	Maximum dumping height	6.65 (21'10")	6.79 (22'3")	7.19 (23'7")
*D'	Maximum dumping height (45°)	6.05 (19'10")	6.18 (20'3")	6.37 (20'11")
*E	Minimum dumping height	2.84 (9'4")	2.36 (7'9")	1.68 (5'6")
F	Minimum swing radius	3.94 (12'11")	3.90 (12'10")	4.00 (13'1")
*G	Height at minimum swing	8.03 (26'4")	7.96 (26'1")	7.92 (26')
*J	Digging depth for 8-foot flat bottom	6.52 (21'5")	7.02 (23')	7.73 (25'4")
K	Horizontal digging stroke at ground level	Stroke	3.51 (11'6")	4.26 (14')
L		Minimum	6.21 (20'4")	5.87 (19'3")
			5.47 (17'11")	5.33 (17'6")

NOTE : Dimensions marked * do not include the height of the shoe lug.

8. LIFTING-UP ABILITY DIAGRAM

(1) Calculation condition

The lifting-up ability of this drawing is indicated by metric standard. The indicated figures fall within 87% of a set pressure of the main relief valve used in the arm and the boom cylinder and 75% of static tilting load.

- 1) The load point is the fulcrum of the bucket and the bucket position is an embraced posture.
- 2) The figures on the upper stage indicate the lifting-up ability of a machine facing sideways, while the figures at the bottom stage represent a machine facing longitudinally.
- 3) Unit : ton Shoe width : 600mm (24~) shoe

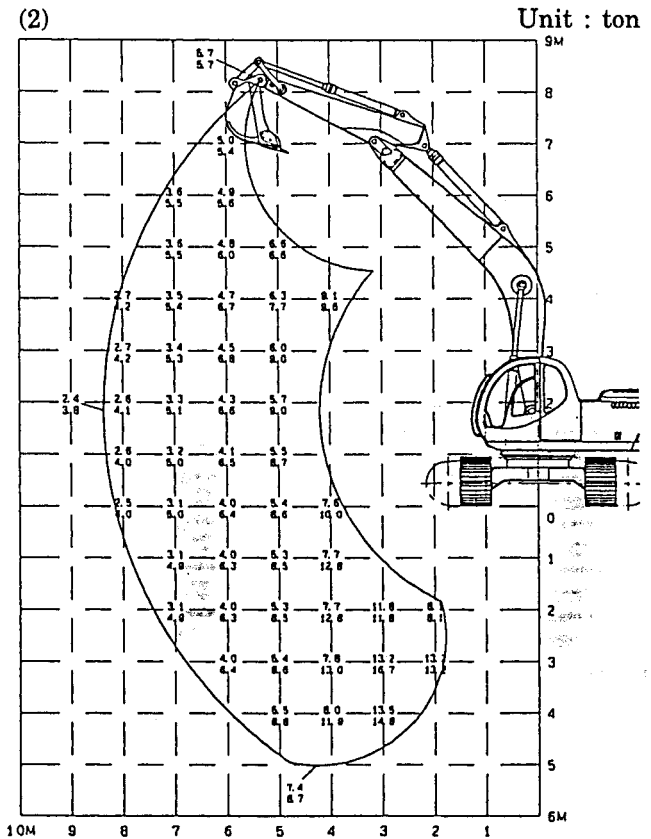
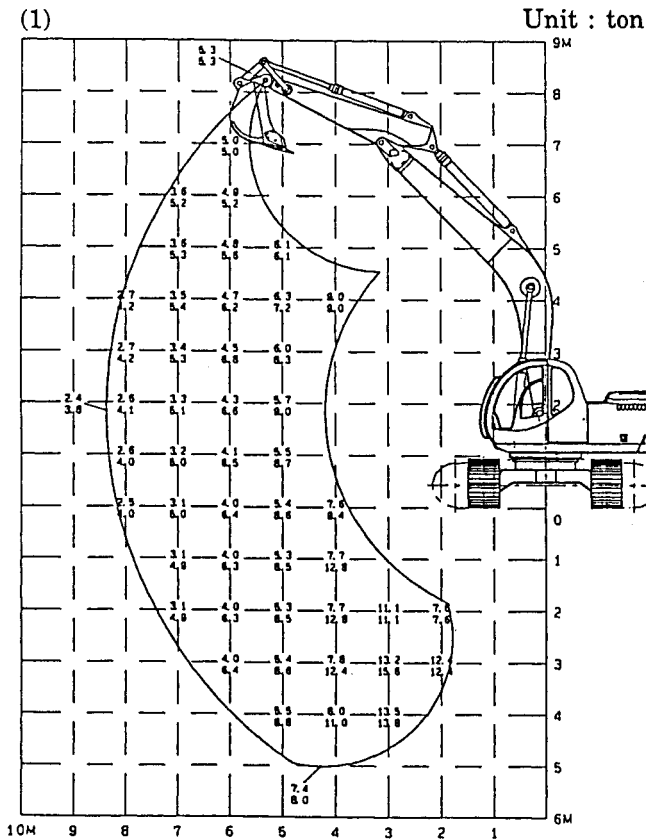
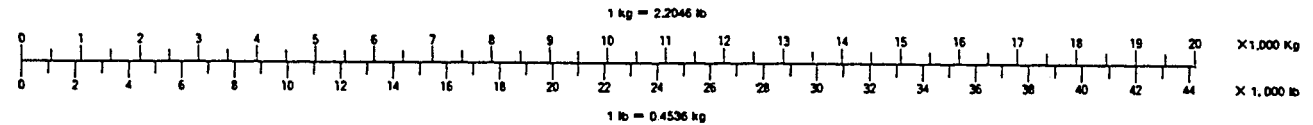
(2) Lifting-up ability diagram Item No. table

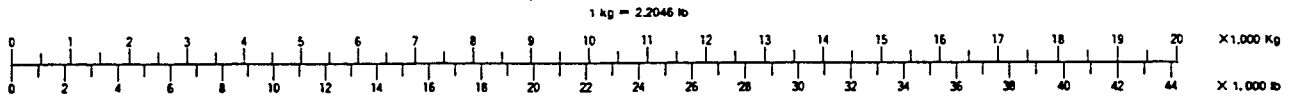
Model	Pressure kgf/cm ² (psi)	Shoe mm (in)	Arm	2.5M (8'2") Arm +1.10M ³ (1.44 cuyd) Bucket	2.98M (9'9") Arm +1.0M ³ (1.31 cuyd) Bucket	3.66M (12'0") Arm +0.81M ³ (1.06 cuyd) Bucket
			600 mm shoe (24 in)	600 mm shoe (24 in)	600 mm shoe (24 in)	600 mm shoe (24 in)
SK220 v	350 (4980)			1	3	5
	370 (5260)			2	4	—
SK220LC v	350 (4980)			6	8	10
	370 (5260)			7	9	—

(3) Long Range Spec. (800mm (32in) Shoe)

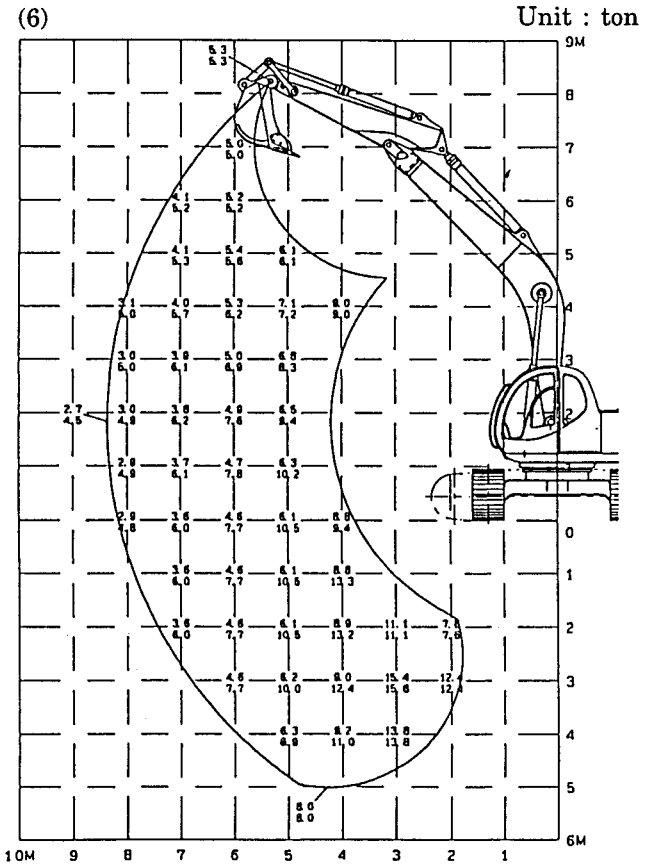
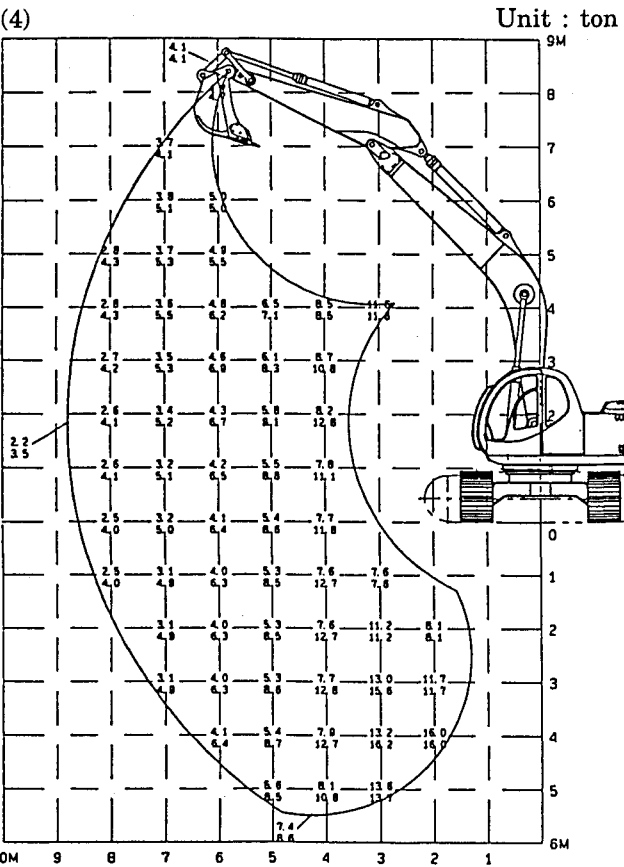
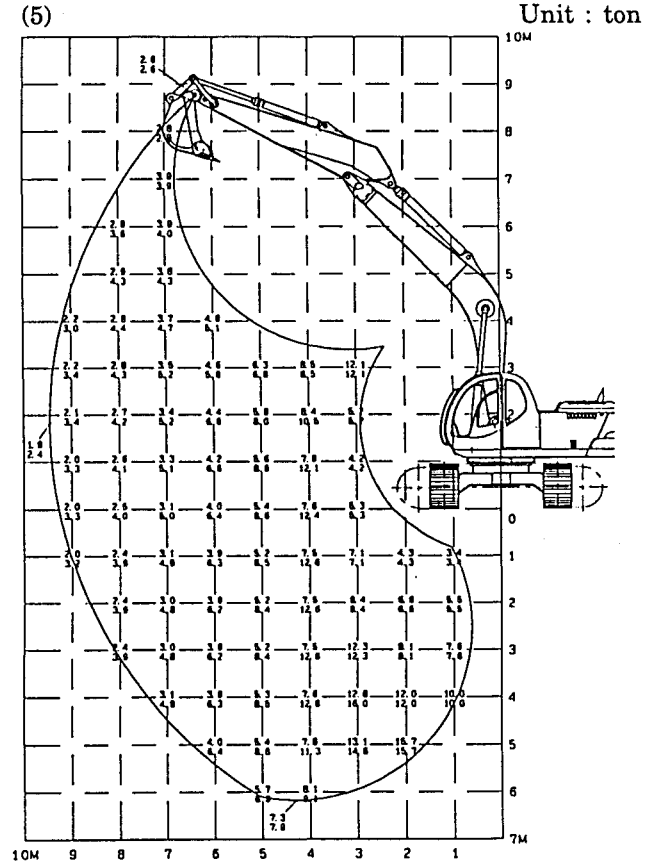
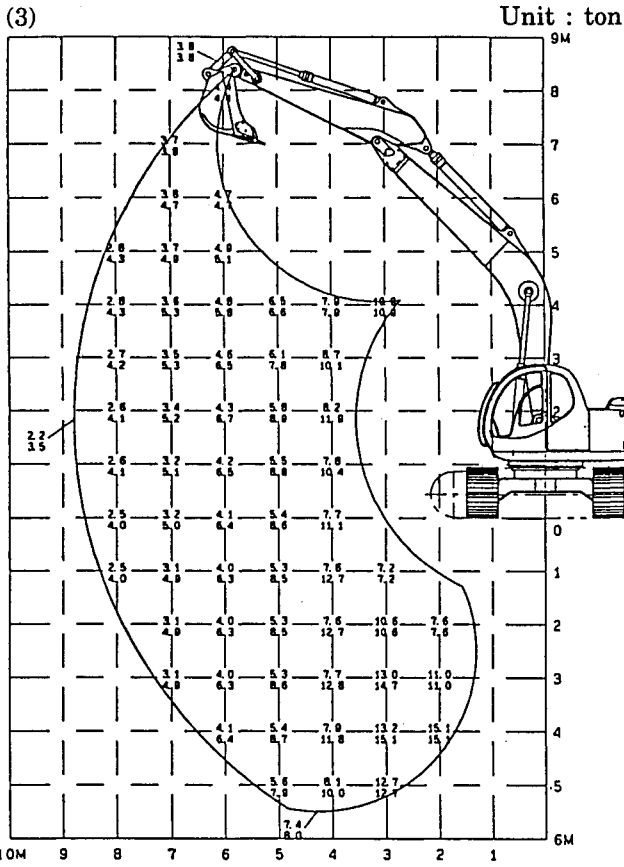
Model	Spec.	50Ft		60Ft	
		8.5M (27ft-11in) Boom + 6.6M (21ft-8in) Arm	0.76M ³ (0.99 cuyd)	0.64M ³ (0.84 cuyd)	10.1M (33ft-2in) Boom + 8.25M (27ft-1in) Arm
SK220 v		11	—	12	—
SK220LC v		—	13	—	14

Do not operate the power boost switch when the long range attachment is installed.

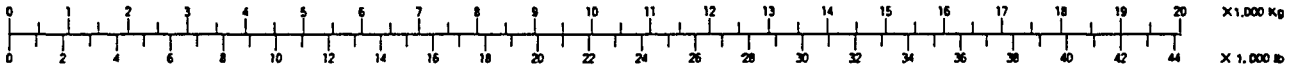




1 lb = 0.4536 kg



1 kg = 2.2046 lb



1 lb = 0.4536 kg

