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28/31/35 Mini-excavator
7-83260 SERVICE MANUAL

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This section is not applicable to the cab or ROPS.

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This section is not applicable to sheet metal and covers.

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Chapter 0
GENERAL INFORMATION

0.1 SAFETY PRECAUTIONS

- Accidents are caused, they do not just happen!
- Attention to the work, and general common sense will prevent most accidents, remember SAFETY is only a word until it is put into practice. Use safe practices and ensure that people working with you do the same.

CAUTION

Ensure the engine stop control is connected or has been re-connected before attempting to start the engine.

- Only start the machine when seated in the driving position.
- Never get on or off the machine whilst it is in motion.
- It is dangerous to make mechanical adjustments when the engine is running.
- Never repair or tighten hydraulic hoses or fittings while the system is under pressure.
- Never take chances when slinging or handling heavy components, they always cause damage or injury if they slip.
- When working underneath the machine ensure that all hydraulic services are thoroughly depressurised.
- **Never** rely on hydraulic jacks alone, **always** fully support the weight of the machine.
- Ensure there is a ready supply of drain and drip-trays and a convenient point to discard waste oil.
- Always cover oil spillages with sawdust or proprietry oil absorbent materials, and clean-up as soon as possible.
- The workshop must be clean and tidy, always remove scrap to a disposal site or to a store.
- **Fire hazard**:- Scrap parts tend to accumulate oil soaked sawdust, paper and other highly combustible material.
- Ensure fire equipment is readily accessible and know how to use it, especially around welding plant, and when working on electrical and fuel injection systems.

WARNING

Never make drifts and punches from old machine parts as the materials used can splinter and crack when subjected to hammer blows.

- Make sure the First Aid facilities are adequately stocked.
- When testing machines always observe the safety instructions given in the Operator Book.

Remember it is not your own machine you will work on and the fault you have been asked to repair may not be the only malfunction on the machine. It is common for major controls to malfunction or even be disconnected yet not be reported as a problem by the owner or operator - CHECK THE MACHINE THOROUGHLY BEFORE DRIVING IT IN CONFINED SPACES.

0.2 USING THE SERVICE MANUAL

0.2.1 Manual introduction

The purpose of this manual is to assist Dealers and Distributors with the efficient repair and maintenance of the 28, 31 and 35 mini-excavators.

Following the procedures as detailed together with using the special tools where appropriate, will enable the operations to be completed within the time stated in the Repair Time Schedule (RTS).

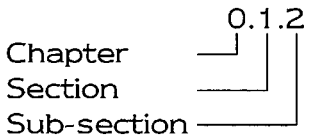
0.2.2 The structure of the manual

This manual has been divided into 15 Chapters using the same numbering system as the Operator's Book and the Parts Catalogue.

Each Chapter is divided into three Sections. The three Sections are Data, Maintenance and Troubleshooting.

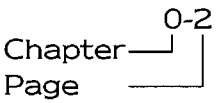
Some Sections are further divided into Sub-sections.

The Contents at the front of this manual lists all Chapters, Sections and Sub-sections with corresponding page numbers using the following numbering system for identification.



0.2.3 Page numbers

The page numbers are shown at the bottom of each page in sequential order. Each Chapter starts at page 1. The Chapter number is also included on each page.



0.2.4 Highlight symbols

Throughout this manual the following symbols are used to draw your attention to areas where special care is required, to prevent accident, injury, damage to equipment or to give you additional information.

WARNING

A warning gives the reader information (or a command) which, if disregarded, could cause injury or death. Because of its importance, any warning preceeds the Instruction(s) which, in the act of being performed, could be dangerous.

CAUTION

A caution provides the reader with advice, which, if disregarded, could cause damage to the equipment.

Note

A note furnishes additional information to assist the reader when reading a particular paragraph.

0.2.5 Special tools

The use of the special tools mentioned in the text contributes to safe, efficient and profitable repair. Some operations are impracticable without their use.

0.2.6 Repairs and replacements

When service parts are required it is essential that only genuine CASE replacements are used.

Attention is particularly drawn to the following points concerning repairs and the fitting of replacement parts and accessories.

Safety features embodied in the machine may be impaired if other than genuine parts are fitted.

In certain territories, legislation prohibits the fitting of parts not to the machine manufacturer's specification. Torque wrench setting figures given in the Service Manual must be strictly used. Locking devices, where specified, must be fitted. If the efficiency of a locking device is impaired during removal it must be renewed.

The machine warranty may be invalidated by the fitting of other than genuine CASE parts. All CASE replacements have the full backing of the manufacturer's warranty. Distributors and Dealers are obliged to supply only genuine service parts.

0.2.7 Repair Time Schedule

The operations listed in the Repair Time Schedule (RTS) will include those described in this manual. The time set against each operation in the schedule is established by performing the actual operations on standard machines using special tools where applicable. The RTS for use with this manual is issued as a separate distribution.

Note

Repair Time Schedules are issued to Distributors and Dealers only and are not for general publication.

0.2.8 Service Information Releases

It is important to maintain the Service Information Releases library up-to-date as servicing procedures or part number changes may modify the instructions given in this manual.

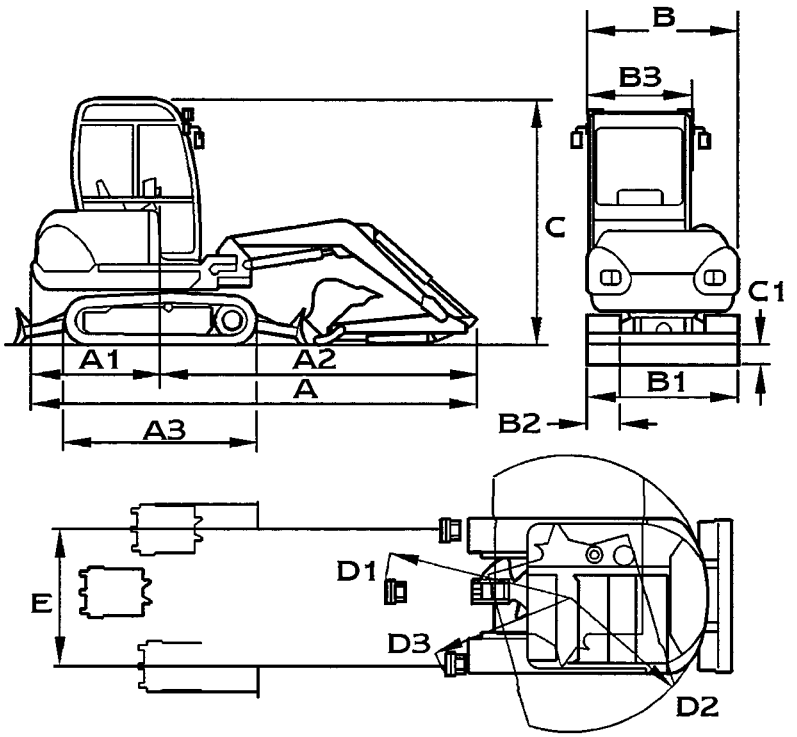
0.3 MACHINE SPECIFICATIONS

0.3.1 Machine dimensions

The machine dimensions are as follows:

General dimensions

		28	31	35
A	Overall length	4510 mm	4700 mm	4970 mm
A1	Slew ring centre to engine cover	1280 mm	1370 mm	1390 mm
A2	Slew ring centre to lowered boom	3230 mm	3330 mm	3580 mm
A3	Length of one track:			
	Rubber	1910 mm	2020 mm	2110 mm
	Metal	1870 mm	1980 mm	2075 mm
B	Overall width of body	1400 mm	1400 mm	1400 mm
B1	Overall width of track	1450 mm	1520 mm	1630 mm
B2	Width of one track	300 mm	300 mm	350 mm
B3	Width of cab	955 mm	955 mm	955 mm
C	Overall height	2530 mm	2530 mm	2530 mm
C1	Minimum ground clearance	290 mm	290 mm	290 mm
D1	Minimum slew radius	1745 mm	1755 mm	1820 mm
D2	Tail swing radius	1285 mm	1370 mm	1390 mm
D3	Minimum off-set slew radius	1370 mm	1375mm	1430mm
E	Bucket off-set:			
	Left	690 mm	710 mm	750 mm
	Right	580 mm	610 mm	620 mm
	Slew offset angle:			
	Cab	L75°, R90°	L80°, R90°	L80°, R90°
	Canopy	L89°, R90°	L90°, R90°	L90°, R90°



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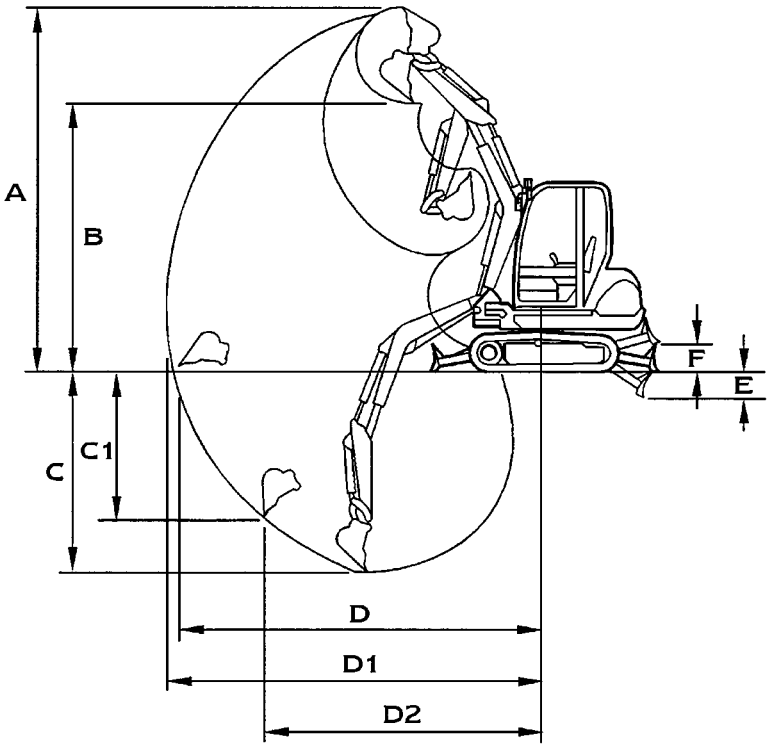
Machine bucket attachment dimensions

		28	31	35
A	Maximum digging height	4485 mm	4805 mm	5070 mm
B	Maximum loading height	3210 mm	3465 mm	3660 mm
C	Maximum digging depth	2600 mm	2850 mm	3105 mm
C1	Maximum depth of flat excavation	1885 mm	2070 mm	2280 mm
D	Maximum reach at ground level	4540 mm	4755 mm	5100 mm
D1	Maximum digging reach	4665 mm	4885 mm	5220 mm
D2	Reach with vertical excavation face	3445 mm	3500 mm	3760 mm
E	Maximum cutting depth	390 mm	405 mm	430 mm
F	Maximum height	370 mm	385 mm	405 mm
	Operating Angle (maximum)			
	Tracks in line with slope:			
	Intermittent	30°	30°	30°
	Continuous	25°	25°	25°
	Tracks across slope	15°	15°	15°



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Dozer blade dimensions

Overall length	1170 mm	1270 mm	1350 mm
Overall height	350 mm	350 mm	350 mm
Overall width	1450 mm	1520 mm	1630 mm
Weight	125 kg	35 kg	151 kg

0.3.2 Weights and capacities

Weights

Weight in transport condition with standard attachment:

	28	**31**	**35**
Base	2810 kg	3110 kg	3430 kg
With cab	2810 kg	3110 kg	3430 kg
With canopy	-79 kg	-79 kg	-79 kg
With metal track	+37 kg	+31 kg	+ 43kg
Ground pressure:			
With rubber track	0,29 kgf/cm^2	0,30 kgf/cm^2	0,31 kgf/cm^2
With metal track	0,30 kgf/cm^2	0,30 kgf/cm^2	0,30 kgf/cm^2

Capacities

Fuel tank	40 ltr	40 ltr	40 ltr
Cooling system (Radiator+cylinder block)	5 ltr	5 ltr	5 ltr
Engine oil (inc filter)	5,7 ltr	5,7 ltr	5,7 ltr
Hydraulic tank	48 ltr	48 ltr	48 ltr
Hydraulic circuit (Tank + pipework)	60 ltr	62 ltr	64 ltr
Upper rollers 2 x	45 cc	45 cc	45 cc
Lower rollers:			
6x (28), 8x (31,35)	70 cc	70 cc	70 cc
Idlers 2x	50 cc	50 cc	50 cc
Track gearbox 2x	0,8 ltr	0,8 ltr	1 lt

Anti-freeze (See table)

Lowest temperature of protection needed	% Volume of anti-freeze	Mixture ratio by volume anti-freeze:water
-12°C	25	1:3
-18°C	33	1:2
-25°C	40	1:1.5
-37°C	50	1:1

0.3.3 General specifications

Engine

	28	31	35
Make	Perkins	Perkins	Perkins
Type	103-13	103-15	103-15
Build list	KH50564	KE50563	KE50563
Number of cylinders	3	3	3
Bore	84 mm	84 mm	84 mm
Stroke	80 mm	90 mm	90 mm
Compression ratio	23:1	22:1	22:1
Firing order	1,2,3	1,2,3	1,2,3
Head bolt torque (oiled)	88-93 Nm - All Models		
Valve Clearance (inlet and exhaust)	0.20 mm (cold)	0.20 mm (cold)	0.20 mm (cold)
Low idle speed (Adjust to avoid vibration)	900-1200 rpm	900-1200 rpm	900-1200 rpm
Maximum governed no load speed	2350 rpm	2460 rpm	2800 rpm
Power	17.0 kW @ 2200 rpm	20.8 kW @ 2300 rpm	22.5 kW @ 2600 rpm
Torque	74 Nm @ 2200 rpm	88 Nm @ 2000 rpm	88 Nm @ 2000 rpm
Oil filter	Canister with bypass valve - All Models		