CAT® Lift Trucks

Service Manual

MC/FC

Chassis, Mast & Options

GP40K	**ET29C-00011-up**	**DP40K**	**ET19C-00011-up**
GP40KL	**ET29C-50001-up**	**DP40KL**	**ET19C-50001-up**
GP45K	**ET29C-80001-up**	**DP45K**	**ET19C-80001-up**
GP50K	**ET33B-50001-up**	**DP50K**	**ET28B-50001-up**

For use with S6S and TB45 Engine Service Manual. **99739-65120**

FOREWORD

This service manual is a guide for servicing Cat® lift trucks. For your convenience the instructions are grouped by systems as a ready reference.

The long productive life of your lift truck(s) depends on regular and proper servicing—servicing consistent with what you will learn by reading this service manual. Read the respective sections of this manual carefully and familiarize yourself with all of the components before attempting to start a test, repair or rebuild job.

The descriptions, illustrations and specifications contained in this manual are for trucks with serial numbers in effect at the time of printing. Cat Lift Trucks reserves the right to change specifications or design without notice and without incurring obligation.

GP40K, GP40KL, GP45K, and GP50K are powered by TB45 gasoline engine.
DP40K, DP40KL, DP45K, and DP50K are powered by S6S diesel engine.

Safety Related Signs

The following safety related signs are used in this service manual to emphasize important and critical instructions:

⚠ WARNING — Indicates a specific potential hazard resulting in serious bodily injury or death.

⚠ CAUTION — Indicates a specific potential hazard resulting in bodily injury, or damage to, or destruction of, the machine.

NOTE — Indicates a condition that can cause damage to, or shorten service life of, the machine.

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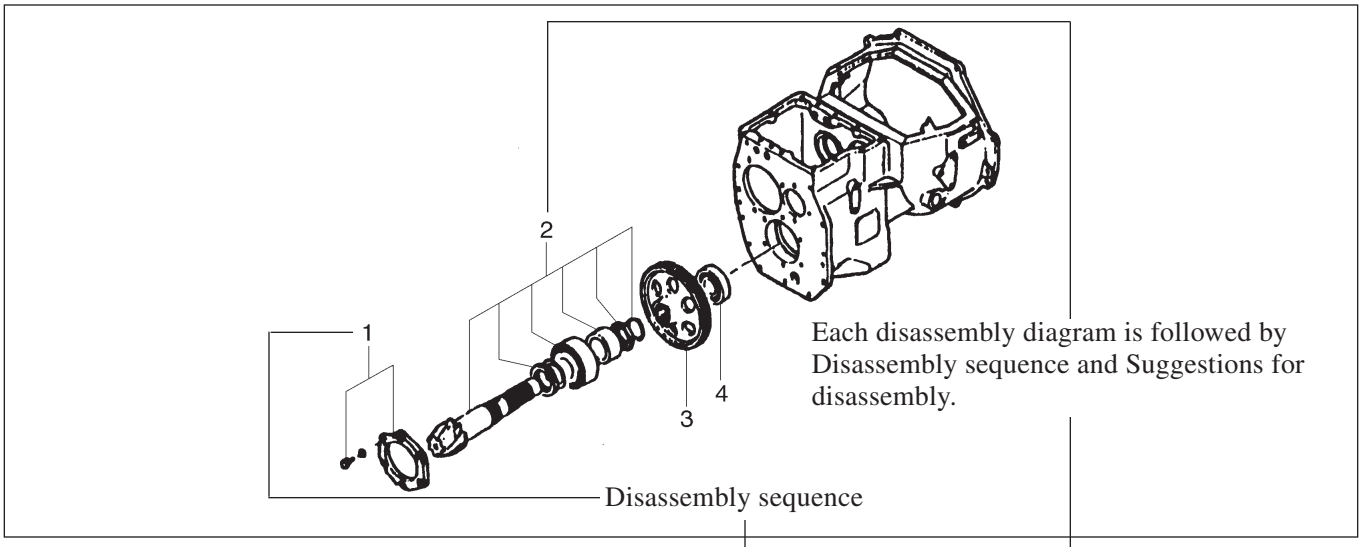
HOW TO READ THIS MANUAL

Disassembly diagram (example)

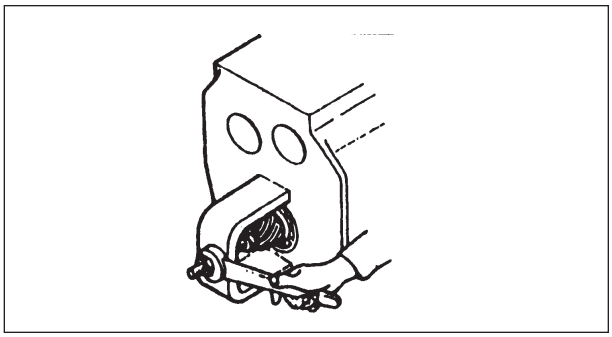


Sequence

1. Cover, Bolt, Washer (part name)
2. Output shaft (part name)

Suggestion for disassembly

(1) Output shaft removal



Unit: mm (in.)

Clearance between cylinder and piston	A	0.020 to 0.105 (0.00079 to 0.00413)
	B	0.15 (0.0059)

A: Standard value B: Repair or service limit

Symbols or abbreviations

OP .....Option

R1/4.....Taper pipe thread (external) 1/4 inch (formerly PT1/4)

Rc1/8.....Taper pipe thread (internal) 1/8 inch (formerly PT1/8)

G1/4A.....Straight pipe thread (external) 1/4 inch (formerly PF1/4-A)

Rp1/8.....Straight pipe thread (internal) 1/8 inch (formerly PS1/8)

SAFETY

⚠ WARNING

The proper and safe lubrication and maintenance for this lift truck, recommended by Cat Lift Trucks, are outlined in the OPERATION & MAINTENANCE MANUAL for these trucks.

Improper performance of lubrication or maintenance procedures is dangerous and could result in injury or death. Read and understand the OPERATION & MAINTENANCE MANUAL before performing any lubrication or maintenance.

The serviceman or mechanic may be unfamiliar with many of the systems on this truck. This makes it important to use caution when performing service work. A knowledge of the system and/or components is important before the removal or disassembly of any component.

Because of the size of some of the truck components, the serviceman or mechanic should check the weights noted in this Manual. Use proper lifting procedures when removing any components.

Following is a list of basic precautions that should always be observed.

1. Read and understand all warning plates and decals on the truck before operating, lubricating or repairing the product.
2. Always wear protective glasses and protective shoes when working around trucks. In particular, wear protective glasses when pounding on any part of the truck or its attachments with a hammer or sledge. Use welders gloves, hood/goggles, apron and other protective clothing appropriate to the welding job being performed. Do not wear loose-fitting or torn clothing. Remove all rings from fingers when working on machinery.
3. Do not work on any truck that is supported only by lift jacks or a hoist. Always use blocks or jack stands to support the truck before performing any disassembly.

⚠ WARNING

Do not operate this truck before you read and understand the instructions in the OPERATION & MAINTENANCE MANUAL. Improper truck operation is dangerous and could result in injury or death.

4. Lower the forks or other implements to the ground before performing any work on the truck. If this cannot be done, make sure the forks or other implements are blocked correctly to prevent them from dropping unexpectedly.
5. Use steps and grab handles (if applicable) when mounting or dismounting a truck. Clean any mud or debris from steps, walkways or work platforms before using. Always face truck when using steps, ladders and walkways. When it is not possible to use the designed access system, provide ladders, scaffolds, or work platforms to perform safe repair operations.
6. To avoid back injury, use a hoist when lifting components which weigh 23 kg (50 lb.) or more. Make sure all chains, hooks, slings, etc., are in good condition and are of the correct capacity. Be sure hooks are positioned correctly. Lifting eyes are not to be side loaded during a lifting operation.
7. To avoid burns, be alert for hot parts on trucks which have just been stopped and hot fluids in lines, tubes and compartments.
8. Be careful when removing cover plates. Gradually back off the last two bolts or nuts located at opposite ends of the cover or device and pry cover loose to relieve any spring or other pressure, before removing the last two bolts or nuts completely.
9. Be careful when removing filler caps, breathers and plugs on the truck. Hold a rag over the cap or plug to prevent being sprayed or splashed by liquids under pressure. The danger is even greater if the truck has just been stopped because fluids can be hot.

10. Always use tools that are in good condition and be sure you understand how to use them before performing any service work.
11. Reinstall all fasteners with same part number. Do not use a lesser quality fastener if replacements are necessary. Do not mix metric fasteners with standard nuts and bolts.
12. If possible, make all repairs with the truck parked on a level, hard surface. Block truck so it does not roll while working on or under truck.
13. Disconnect battery and discharge any capacitors (electric trucks) before starting to work on truck. Hang "Do not Operate" tag in the Operator's Compartment.
14. 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.
15. 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.
16. 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.
17. Always support the mast and carriage to keep carriage or attachments raised when maintenance or repair work is performed, which requires the mast in the raised position.
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. Relieve all pressure in air, oil or water systems before any lines, fittings or related items are disconnected or removed. Always make sure all raised components are blocked correctly and be alert for possible pressure when disconnecting any device from a system that utilizes pressure.
21. Do not operate a truck 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.

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GROUP INDEX	Items
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POWERSHIFT TRANSMISSIONS	1-Speed Transmission (GP40K, GP40KL, GP45K, DP40K, DP40KL, DP45K), Structure and Functions, Removal and Installation, Torque Converter, Transmission, Control Valve, Adjustment, Automatic 2-Speed Transmission (GP50K, DP50K), Transmission, Selector Valve, Adjustment, Troubleshooting, Service Data
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MASTS AND FORKS	Structure, Removal and Installation, Disassembly and Reassembly, Inspection and Adjustment, Troubleshooting, Service Data
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GENERAL INFORMATION

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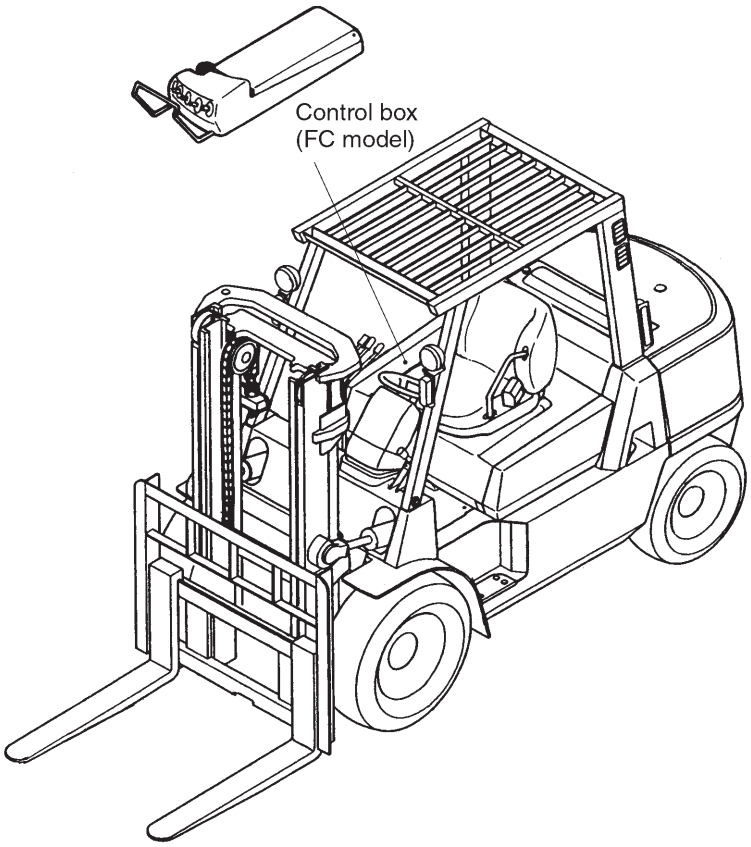
Model View



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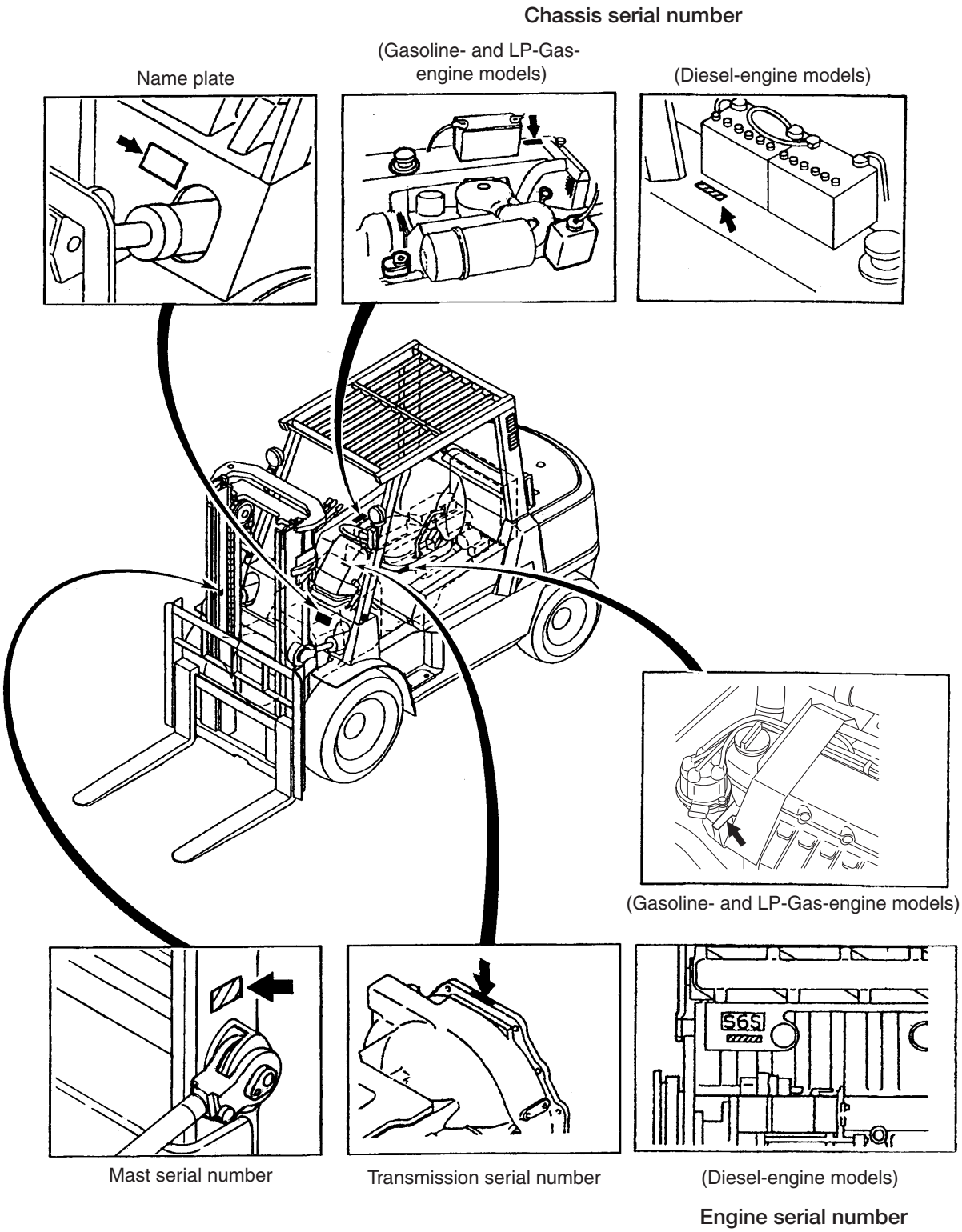
Truck Models Covered

This Service Manual furnishes servicing and maintenance information for the following trucks:

Truck model	Model code – Serial number	Engine mounted
GP40K	ET29C – 00011- up	TB45 gasoline engine
GP40KL	ET29C – 50001- up	TB45 gasoline engine
GP45K	ET29C – 80001- up	TB45 gasoline engine
GP50K	ET33B – 50001- up	TB45 gasoline engine
DP40K	ET19C – 00011- up	S6S diesel engine
DP40KL	ET19C – 50001- up	S6S diesel engine
DP45K	ET19C – 80001- up	S6S diesel engine
DP50K	ET28B – 50001- up	S6S diesel engine

Serial Number Locations



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Chassis and Mast Model Identification

[Chassis]

GP 40 K

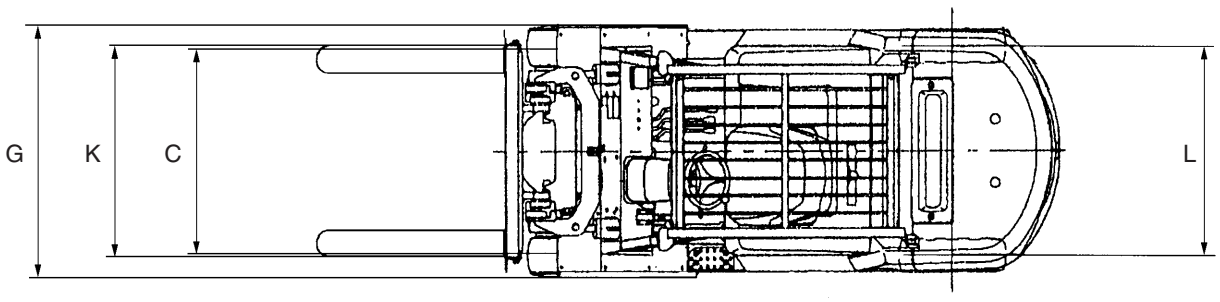
- K: Generation designator
- 40: Maximum capacity/Load center
  - 40: 4000 kg (8000 lb)/500 mm (24 in.)
  - 40L: 4000 kg (8000 lb)/600 mm (24 in.)
  - 45: 4500 kg (10000 lb)/600 mm (24 in.)
  - 50: 5000 kg (11000lb)/600 mm (24 in.)
- GP: Engine type
  - GP: gasoline engine type
  - DP: diesel engine type

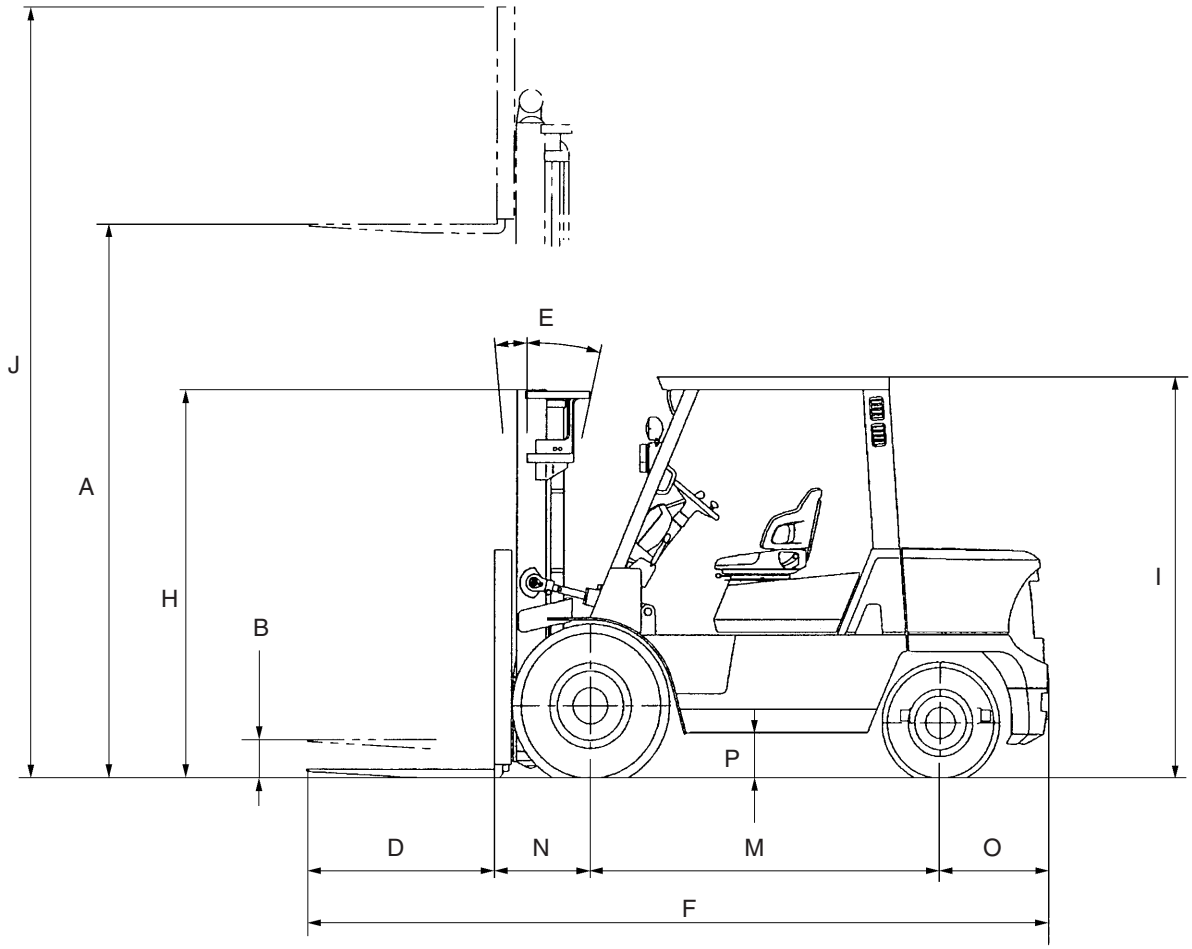
[Mast]

4 V 40 A 33

- 33: Maximum lifting height
  - ["33" stands for 3300 mm (130 in.)]
- A: Order of the minor change
  - ("A" for the original, "B" for the first change, "C" for the second change, and so on)
- 40: Applicable truck model designation
  - 40: 4 ton class
  - 40L: 4 ton class
  - 45: 4.5 ton class
  - 50: 5 ton class
- V: Kind of mast
  - V: simplex mast
  - F: duplex mast
  - M: triplex mast
- 4: Major change
  - ("2" for the original, "3" for the first change, and so on up to "9")

Dimensions





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Unit: mm (in.)

Ref. No.	Item \ Truck Model		GP40K DP40K	GP40KL DP40KL	GP45K DP45K	GP50K DP50K
A	Maximum lift		3300 (130)			
B	Free lift		150 (5.9)			160 (6.5)
C	Fork spread (outside)		300 to 1190 (12 to 47)			
D	Fork length		1220 (48)			
E	Tilt angle (forward – backward)		6° – 10°			
F	Overall length		4290 (168.9)	4340 (170.9)	4395 (173.0)	4525 (178.2)
G	Overall width (outside of tires)	Single tire	1415 (55.7)	1460 (57.5)		
		Dual tire	1780 (70.1)			1965 (77.4)
H	Overall height (to top of mast lowered)		2320 (91.5)		2400 (94.5)	
I	Overall height (to top of overhead guard)		2250 (88.6)			
J	Overall height (mast extended)		4570 (180)			4590 (180.5)
K	Tread (front)	Single tire	1175 (46.5)			
		Dual tire	1445 (56.9)			
L	Tread (rear)		1180 (46.5)			
M	Wheelbase		2000 (78.5)			2150 (84.5)
N	Front overhang		557 (21.9)		562 (22.1)	582 (22.9)
O	Rear overhang		513 (20.6)	563 (22.6)	613 (24.4)	573 (22.6)
P	Underclearance (at frame)		252 (9.9)			

Technical Data

Item \ Truck Model			GP40K DP40K	GP40KL DP40KL	GP45K DP45K	GP50K DP50K
Model code			GP: ET29C DP: ET19C			GP: ET33B DP: ET28B
Type			Standard			
General	Capacity/load center kgf/mm (lbf/in.)		4000/500 (8000/24)	4000/600 (9000/24)	4500/600 (10000/24)	5000/600 (11000/24)
	Maximum lift mm (in.)		3300 (130)			
	Lift speed (rate load) mm/sec (fpm)		GP: 510 (100) DP: 520 (103)		GP: 440 (87) DP: 450 (89)	
	Lowering speed (rate load) mm/sec (fpm)		500 (100)			
	Tilt angle (forward – backward)		6° – 10°			
	Free lift mm (in.)		150 (5.9)			160 (6.5)
Performance	Travel speed of powershift transmission models km/h (mph)	Forward	19.5 (12)			23.5 (14.6)
		Reverse	19.5 (12)			23.5 (14.6)
	Minimum turning radius mm (in.)		2735 (107.5)	2775 (109.5)	2820 (111)	2965 (116.5)
	Steering angle	Inside	83°			
		Outside	56°33’			
	Minimum intersecting aisle mm (in.)	Single tire	2390 (94)	2430 (96)	2450 (96.5)	2510 (99)
		Dual tire	2570 (101)	2590 (102)	2620 (103)	2670 (105)
Tires	Front tires (size and inflation pressure) kPa (kgf/cm^2) [psi]	Single tire	8.25-15-14PR (I) 785 (8.0) [114]			
		Dual tire	7.50-16-12PR (I) 800 (8.2) [116]			8.25-15-12PR (I) 800 (8.2) [116]
	Rear tires (size and inflation pressure) kPa (kgf/cm^2) [psi]		7.00-12-12PR (I) 700 (7.0) [100]		7.00-12-12PR (I) 850 (8.5) [120]	
Truck weight	Single drive tire (unloaded) kg (lb)		GP: 5570 (12300) DP: 5710 (12600)	GP: 5970 (13150) DP: 6120 (13500)	GP: 6530 (14400) DP: 6680 (14750)	GP: 7050 (15500) DP: 7160 (15800)
	Dual drive tire (unloaded) kg (lb)		GP: 5700 (12550) DP: 5900 (13000)	GP: 6050 (13350) DP: 6250 (13750)	GP: 6610 (14550) DP: 6820 (15050)	GP: 7130 (15700) DP: 7320 (16150)

Item \ Truck Model		GP40K	GP40KL	GP45K	GP50K
Engine (gasoline and LP-gas)	Engine model	TB45			
	Type	Gasoline			
	Cooling system	Water cooled			
	No. of cylinders – arrangement	6 – in-line			
	No. of strokes	4			
	Type of combustion chamber	Semi -spherical			
	Valve arrangement	Overhead			
	Type of cylinder liners	Integral			
	Cylinder bore × stroke mm (in.)	99.5 × 96.0 (3.92 × 3.78)			
	Displacement cc (cu in.)	4500 (275)			
	Compression ratio	9.2 : 1			
	Rated output kW/rpm	72/2450			
	Rated torque N·m (kgf·m) [lbf·ft]/rpm	280 (28.5) [207]/1200			
	Minimum engine speed rpm	650 to 700			
	Maximum engine speed rpm	2450			
	Dimensions (L × W × H) mm (in.)	907 × 647.5 × 781 (35.7 × 25.5 × 30.7)			
	Weight kg (lb)	290 (639)			
	Installation position	Rear			
	Ignition	Spark			
	Firing order	1 – 5 – 3 – 6 – 2 – 4			
	Initial ignition timing BTDC deg	10 ± 1			
	Fuel tank capacity liter (U.S. gal.)	115 (30)			

Item \ Truck Model			GP40K	GP40KL	GP45K	GP50K
Ignition system	Ignition coil type		Mold			
	Distributor	Type	Pointless			
		Type of spark advance control	Internal solid state circuit			
	Spark plug	Model	BPR4ES			
		Size mm (in.)	–			
		Gap mm (in.)	0.8 to 0.9 (0.031 to 0.035)			
Fuel system	Fuel pump type		Electromagnetic			
Air cleaner	Type × Number		Cyclone with paper element × 1			
Engine lubrication system	Type		Pressure feed			
	Oil pump		Gear pump			
	Oil filter		Paper element			
	Oil cooler		Oil to water type			
	Refill capacities	Oil pan liter (U.S. gal)	7.3 (1.93)			
		Oil filter & cooler liter (U.S. gal)	0.3 (0.08)			
		Total liter (U.S. gal)	7.6 (2.01)			
Cooling system	Type		Forced circulation			
	Radiator		Corrugated fin with pressure type			
	Refill capacity liter (U.S. gal.)		11.2 (2.96)			
	Water pump		Centrifugal type driven by V-belt			
	Thermostat		Wax type			

Item \ Truck Model		GP40K	GP40KL	GP45K	GP50K
Battery	Type × number	55D26R			
	Voltage V	12			
	Capacity AH (5 Hr)	50			
Alternator	Type	3-phase AC			
	Rated output V – A	12 – 50			
	Regulator	Built-in IC type			
Starter	Type	Electromagnetic			
	Voltage – output V – kW	12 – 0.75			

Item \ Truck Model			DP40K	DP40KL	DP45K	DP50K
Engine (diesel)	Engine model		S6S			
	Type		Water-cooled, 4-stroke cycle			
	No. of cylinders – arrangement		6 – in-line			
	Type of combustion chambers		Swirl			
	Valve arrangement		Overhead			
	Type of cylinder liners		Dry			
	Bore × stroke mm (in.)		94 × 120 (3.70 × 4.72)			
	Displacement cc (cu in.)		4996 (305)			
	Compression ratio		22 : 1			
	Rated output kW/rpm		62.5/2450			
	Maximum torque N·m (kgf·m) [lbf·ft]/rpm		250 (25.5) [184]/1600			
	Dimensions (L × W × H) mm (in.)		907.5 × 639 × 801 (35.7 × 25.2 × 31.5)			
	Weight (service) kg (lb)		350 (771)			
	Installation position		Rear			
	Intake valves	Open BTDC deg	30°			
		Close ABDC deg	50°			
	Exhaust valves	Open BBDC deg	74°			
		Close ATDC deg	30°			
	Valve clearance (at cold)	Intake valves mm (in.)	0.25 (0.0098)			
		Exhaust valves mm (in.)				
	Ignition		Compression			
	Firing order		1 – 5 – 3 – 6 – 2 – 4			
	Ignition or injection timing BTDC deg		19°			

Item \ Truck Model			DP40K	DP40KL	DP45K	DP50K
Engine (diesel)	Fuel tank capacity liter (U.S. gal.)		115 (30)			
	No-load minimum speed rpm		650 to 700			
	No-load maximum speed rpm		2600 to 2650			
Fuel system	Fuel injection pump	Type	Bosch			
		Plunger diam. mm (in.)	6.5 (0.256)			
		Cam lift (one side) mm (in.)	6 (0.24)			
	Fuel injection nozzles	Type	Throttle			
		Spray holes diam. mm (in.)	1.0 (0.04)			
		Injection pressure kPa (kg/cm^2) [psi]	1372 (140) [1992]			
	Glow plugs	Type	Sheathed			
		Voltage – current V – A	22 – 4.4			
	Fuel pump type		Plunger			
	Air cleaner	Type × number	Cyclone with paper element × 1			
Lubrication system	Type		Pressure feed			
	Oil pump		Trochoid type			
	Oil filter		Paper element type			
	Refill capacities liter (U.S. gal.)	Oil pan	11 (2.9)			
		Oil filter	1 (0.3)			
		Total	12 (3.2)			

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