8454 SERVICE MANUAL

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GENERAL INFORMATION

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2. TIGHTENING TORQUE FOR STANDARD BOLTS AND NUTS

2.1 TIGHTENING TORQUE

Screws, bolts and nuts whose tightening torques are not specified in this workshop manual should be tightened according to the table below.

A. TIGHTENING TORQUE FOR STANDARD BOLTS AND NUTS

Grade / Unit / Nominal Diameter	No grade 4T			7T			9T		
	N·m	Kgf·m	lbf·ft	N·m	Kgf·m	lbf·ft	N·m	Kgf·m	lbf·ft
M6 (6 mm, 0.24 in.)	7.85 ~ 9.30	0.80 ~ 0.95	5.79 ~ 6.87	9.80 ~ 11.2	1.00 ~ 1.15	7.24 ~ 8.32	12.3 ~ 14.2	1.25 ~ 1.45	9.1 ~ 10.5
M8 (8 mm, 0.31 in.)	17.7 ~ 20.5	1.8 ~ 2.1	13.0 ~ 15.2	23.6 ~ 27.4	2.4 ~ 2.8	17.4 ~ 20.2	29.4 ~ 34.3	3.0 ~ 3.5	21.7 ~ 25.3
M10 (10 mm, 0.39 in.)	39.2 ~ 45.0	4.0 ~ 4.6	29.0 ~ 33.2	48.1 ~ 55.8	4.9 ~ 5.7	35.5 ~ 41.2	60.8 ~ 70.5	6.2 ~ 7.2	44.9 ~ 52.1
M12 (12 mm, 0.47 in.)	62.8 ~ 72.5	6.4 ~ 7.4	46.3 ~ 53.5	77.5 ~ 90.1	7.9 ~ 9.2	57.2 ~ 66.5	103 ~ 117	10.5 ~ 12.0	76.0 ~ 86.8
M14 (14 mm, 0.55 in.)	108 ~ 125	11.0 ~ 12.8	79.6 ~ 92.5	124 ~ 147	12.6 ~ 15.0	91.2 ~ 108	167 ~ 196	17.0 ~ 20.2	123 ~ 144
M16 (16 mm, 0.63 in.)	167 ~ 191	17.0 ~ 19.5	123 ~ 141	196 ~ 225	20.0 ~ 23.0	145 ~ 166	260 ~ 303	26.5 ~ 31.0	192 ~ 224
M18 (18 mm, 0.71 in.)	245 ~ 284	25.0 ~ 29.0	181 ~ 210	275 ~ 318	28.0 ~ 32.5	203 ~ 235	343 ~ 401	35.0 ~ 41.0	254 ~ 297
M20 (20 mm, 0.79 in.)	334 ~ 392	34.0 ~ 40.0	246 ~ 289	368 ~ 431	37.5 ~ 44.0	272 ~ 318	490 ~ 568	50.0 ~ 58.0	362 ~ 420

* The figures on the table above are indicated the top of screw of bolt.

B. TIGHTENING TORQUE FOR STUDS

M8	11.7 to 15.7 N·m	1.2 to 1.6 kgf·m	8.6 to 11.5 lbf·ft
M10	24.5 to 31.4 N·m	2.5 to 3.2 kgf·m	18.0 to 23.1 lbf·ft
M12	34.3 to 49.0 N·m	3.4 to 5.0 kgf·m	25.3 to 36.1 lbf·ft

C. TIGHTENING TORQUE FOR HIGH PRESSURE HOSE UNION NUTS

Hose Size (Inside Diameter: Inches)		1/8″	3/16″	1/4″	5/16″	3/8″	1/2″	5/8″, 3/4″	1″
Screw Size (PF)		1/8″	1/4″	1/4″	3/8″	3/8″	1/2″	3/4″	1″
Tightening Torque	(N·m)	9.8	24.5	24.5	49.0	49.0	58.8	117.7	137.3
	(kgf·m)	1	2.5	2.5	5	5	6	12	14
	(lbf·ft)	7.2	18.0	18.0	36.1	36.1	43.3	86.8	101.2

3. SPECIFICATION

MODEL	8454	
Maximum PTO power	38 HP	
Engine GROSS power	45 HP	
Engine	Model	4A220
	Type	Indirect injection, vertical, water-cooled, 4cycle diesel
	Number of cylinders	4
	Bore and stroke	87 x 92.4 (3.425 x 3.638in.)
	Total displacement	2,197
	Rated revolution	2,600 RPM
	Injection timing	18 before T.D.C.
	Injection order	1-3-4-2
	Compression ratio	22:01
	Lubricating system	Forced lubrication by trochoida pump
	Cooling system	Pressurized radiator, Forced circulation with water pump
	Alternator	12V, 50 AMPS
	Weight (Dry)	207 kg (456lb)
Capacities	Fuel tank	40 L (10.6 gal.)
	Engine crankcase	7.0 L (1.9 gal.)
	Engine coolant	8.9 L (2.4 gal.)
	Transmission case	34.0 L (9.0 gal.)
	Front axle case	8.2 L (2.2 gal.)
Dimensions (with std.tires)	Overall length (without 3p)	3,073mm (120.9 in.)
	Overall length (with 3p)	3,323mm (130.8 in.)
	Overall Length (minimum tread)	1,550mm (61.0 in.)
	Overall height (Top of ROPS)	2,235 mm (88.0 in.)
	Overall height (Top of CABIN)	2,337 mm (92.0 in.)
	Overall height (Top of steering wheel)	1,610 mm (63.3 in.)
	Wheelbase	1,820 mm (71.6 in.)
	Ground clearance	370 mm (14.5 in.)
Track width	Front	1,265 mm (49.8 in)
	Rear	1,180 - 1,490mm (46.4 - 58.6 in.)

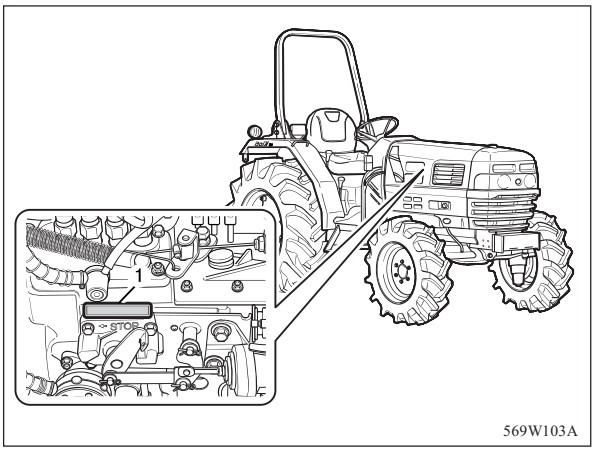
3. SPECIFICATION CON'T

Drive system	Tire size (Std. Tires)	Front	9.5 - 16.6
		Rear	14.9 - 24.8
	Clutch		Dry single disc
	Steering		Hydrostatic steering system
	Transmission		Synchronized shuttle 12 forward and 12 reverse speeds
	Brake	Travel	Wet disc type
		Parking	Connected with the traveling brake
	Differential		Bevel gear
Hydraulic system	Hydraulic lift control system		Position, Draft and Mix control
	Pump Capacity	Main Pump	31.2 L/min (8.2 gal.)
		Power steering pump	18.7 L/min (5.0 gal.)
	Three point hitch		SAE Category 1 & 2
	Maximum lifting capacity		1,800 kg (3,968 lb)
	No. of remote control valve ports (option)		2-4
PTO	PTO shaft		SEA 1 3/8, 6 splines
	Revolution (independent PTO)		560 rpm
Min. turning radius (without Brake)			2,865 mm (112.7 in.)
Traction system			Fixed drawer (or swing drawer Option)
Weight (with ROPS)			1,720 kg (3,792 lb)
Traveling speed (at rated engine speed with Std tires)			0.37 - 24.6 km/h (0.23 - 15.29 mph)

4. IDENTIFICATION

4.1 ENGINE NUMBER

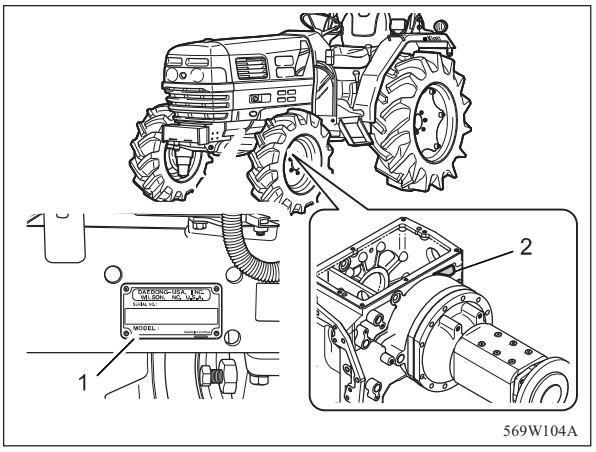
Engine number is engraved in the left side of the cylinder block as shown in the figure.Engine number fills the important role of providing it's record.



(1) Engine Serial Number

4.2 SERIAL NUMBER OF THE TRACTOR

Serial number of the tractor is stamped on the left side of the front axle frame as shown in the figure.



(1) Tractor Serial Number

(2) Transmission Serial Number

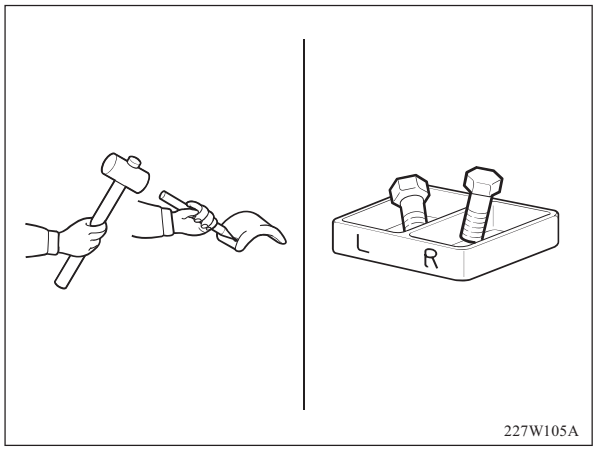
5. CAUTION BEFORE REPAIR

5.1 BEFORE REPAIR OR INSPECTION

1. In case of repair or inspection, locate the tractor on the flat ground and pull the parking brake on.
2. Except for the items to be checked while the engine is running, be sure to stop the engine prior to the work.
3. When washing parts, use parts washing solvent for industrial use (avoid using gasoline so to prevent environmental pollution). For the hydraulic parts, apply designated hydraulic oil in washing.
4. When disassembling and assembling of the hydraulic apparatus, pay special attention not to allow dust or foreign substance to be attached or intermixed.

5.2 ASSEMBLY AND DISASSEMBLY

To check a failure, try to find out its underlying cause. If assembly or disassembly is needed, perform the work in regular sequence as specified in this repair manual.



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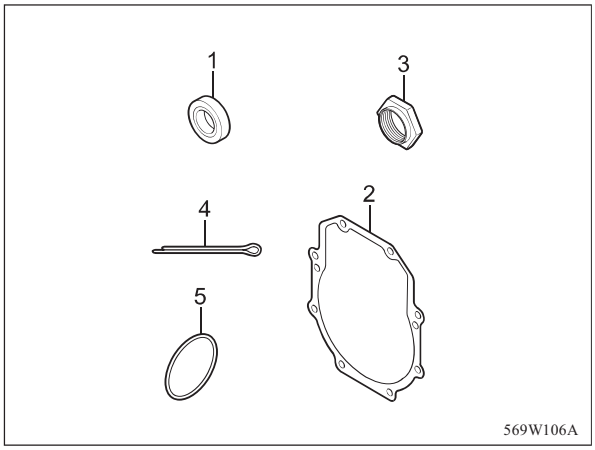
1. Disassembled parts shall be arranged orderly.
2. Sort out the parts to be replaced from the ones to be reused.
3. Be sure to use standard bolts and nuts that are designated.
4. When assembling snap rings or spring pin types, take care of assembling direction.
5. Split pin shall be spread surely not to escape when installed.
6. When using sealant (such as gasket bond) on the assembled surfaces, apply it evenly and consistently in a height of 3 ~ 5 mm (0.12 ~ 0.2 in.) on the contact surface after removing the old bond and cleaning the sealing surface with solvent. Apply sealant on the center of the contact surface for the space between the bolt holes of the contact surface, and on the more inner side than the bolt hole for the bolt area.
7. Finish assembly within 20 minutes after applying sealant, after that, wait approx. 30 minutes later before filling with oil.

5.3 PARTS TO BE REPLACED



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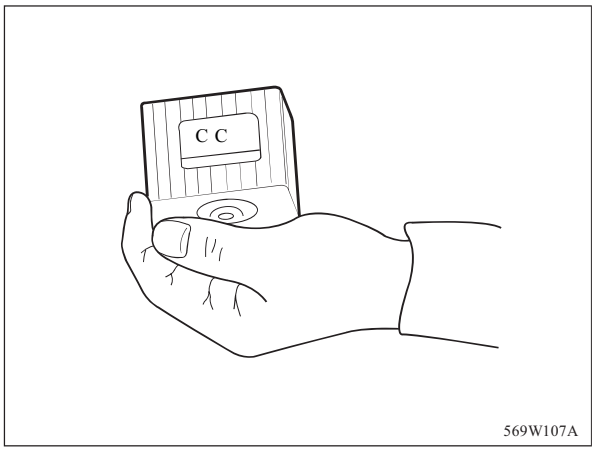
The following parts should be replaced with new ones when removed.

(1) Oil Seal
(2) Gasket
(3) Lock Nut
(4) Split Pin
(5) O-Ring

5.4 PARTS



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When replacing part only genuine Cub Cadet parts.

5.5 ASBESTOS PARTS

Since dust out of asbestos fibrous parts is extremely dangerous to your health, be sure to clean such parts carefully, do not use compressed air.

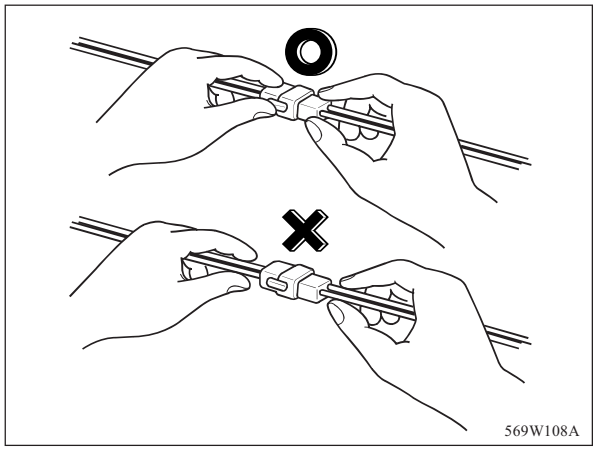
5.6 ELECTRICAL SYSTEM

1. Check electrical wiring every year for any damage or short circuit at the connections. In addition, have your dealer inspection the electric system regularly.
2. Do not modify or reorganize the wiring of the electric field parts.
3. When disconnecting the battery cable, disconnect negative cable first, reinstall the positive cable first when reinstalling.

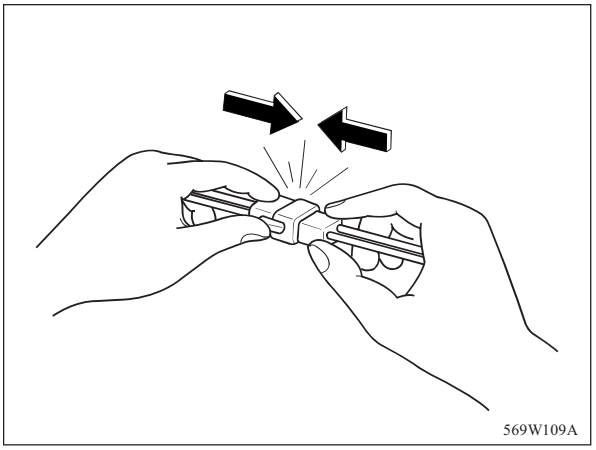
Disconnect battery negative terminal

CAUTION

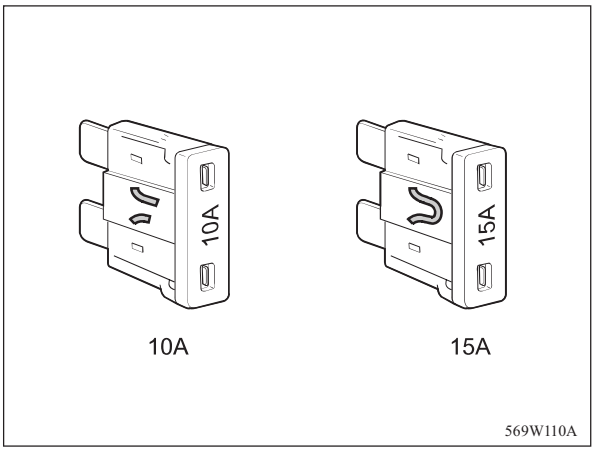
- Be sure to turn the starting key OFF when connecting or disconnecting the cable.



4. Remove the connector by pulling the plastic section, not the wiring.

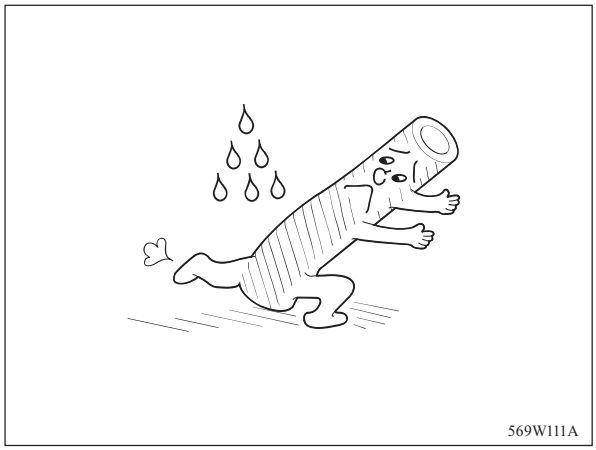


5. When connecting the connector, insert it until it snaps.



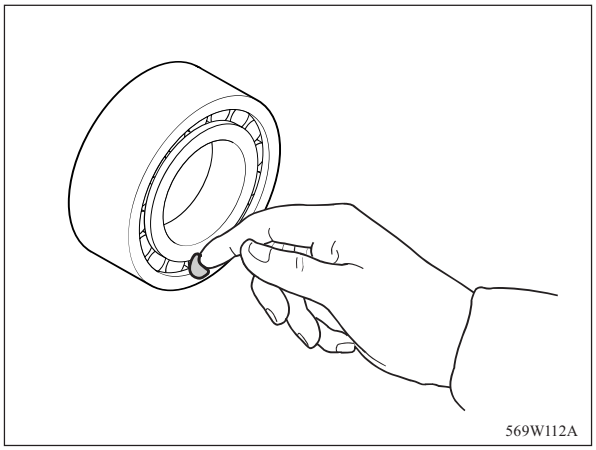
6. Be sure not to drop sensors and relays which are fragile.
7. When replacing a broken fuse with a new one, be sure to use the fuse of capacity as specified.

5.7 TUBES AND RUBBERS



Be cautious of oil or other petroleum products on the hoses and rubber parts, this may cause damage.

5.8 LUBRICANT



When assembling and fixing, apply designated lubricant where specified in accordance with this repair manual.

6. REGULAR CHECK LIST

◎ the first
○ periodically

Check Items	Indicated Hours By Hour Meter														Since Purchased	
	50	100	150	200	250	300	350	400	450	500	600	700	800	1500hr	1yr	2yr
Engine oil change	◎	○		○		○		○		○	○	○	○			
Engine oil filter cartridge change	◎			○				○			○		○			
Transmission oil change	◎					○					○					
Hydraulic oil filter change	◎			○				○			○		○			
Front axle oil change	◎					○					○					
Applying grease	○	○	○	○	○	○	○	○	○	○	○	○	○			
Clutch pedal deflection	◎		○			○			○		○		○			
Brake pedal deflection			○			○			○		○		○			
Fan belt tension				○				○			○		○			
Fuel filter element change								○					○			
Air cleaner element change		○		○		○		○		○	○	○	○			
Battery electrolyte			○			○			○		○		○			
Oil pressure fuel pipe's inlet screw if loosened	○	○	○	○	○	○	○	○	○	○	○	○	○			
Radiator hose's inlet bands if loosened			○			○			○		○		○			
Fuel pipe change																○
Radiator hose change																○
Hydraulic pipe joint change																○
Steering hose change																○
Toe-in			○			○			○		○		○			
Deflection adjustment in front and rear of the front axle											○					
Direction control section													○			
Bolt, nuts and pins of each part															○	
Battery positive code adjustment & change	○	○	○	○	○	○	○	○	○	○	○	○	○			
Bleeding water in clutch housing	○	○	○	○	○	○	○	○	○	○	○	○	○			
Check injection nozzle*														○		

* Maintenance intervals in basis on the EPA instructions.

7. OIL & WATER SUPPLY LIST

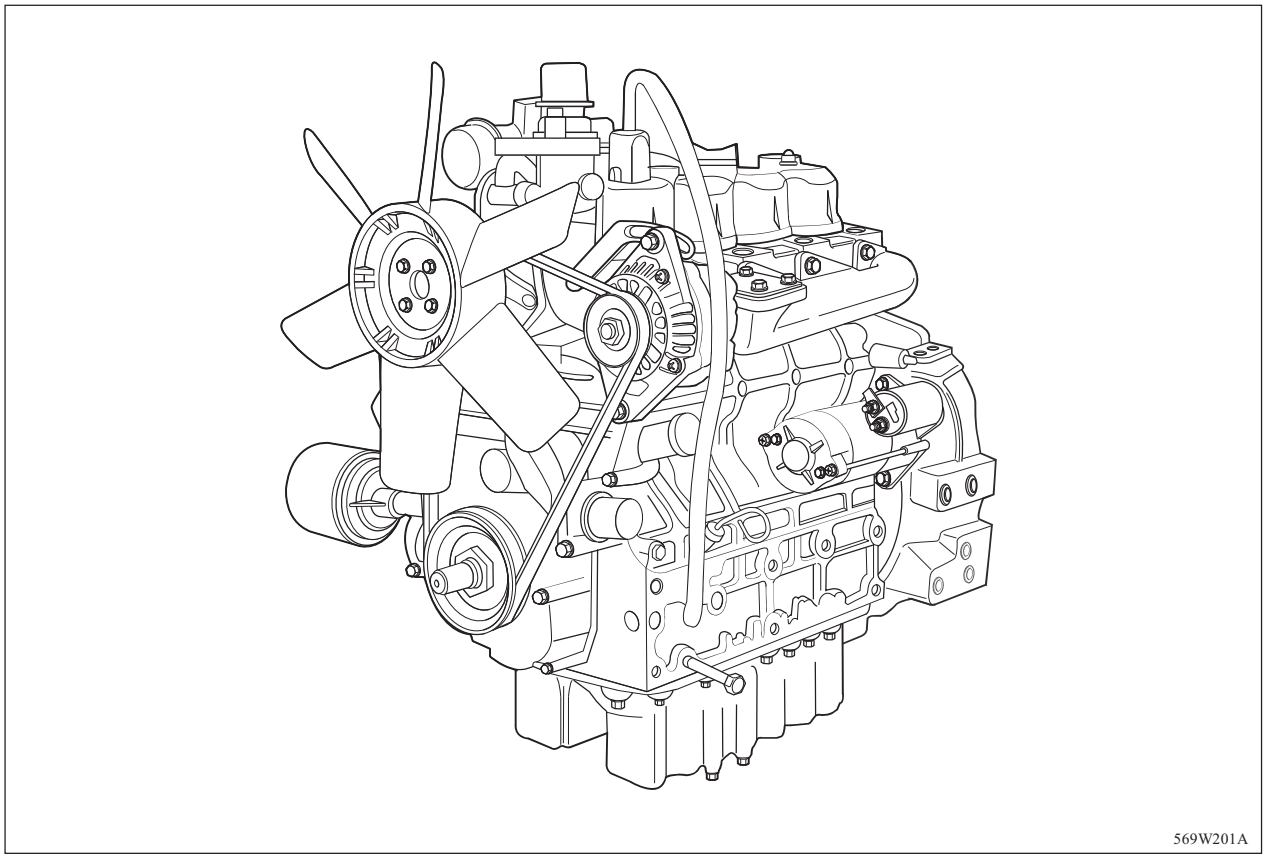
Supply Items		Capacity	Recommended Spec.
Fuel		40 ℓ (42.3 U.S.gal.)	No. 2 - D diesel fuel No. 1 - D diesel fuel if temperature is below - 10 °C (14 °F)
Coolant		8.9 ℓ (2.4 U.S.gal.)	Fresh clean water with antifreeze
Engine oil		7.0 ℓ (1.8 U.S.gal.)	SAE 15 W - 40
Transmission oil		34 ℓ (9.0 U.S.gal.)	Universal tractor/transmission hydraulic oil
Front axle section		8.2 ℓ (2.2 U.S.gal.)	
Applying grease	Hydraulic control lever shaft section	Small quantity	SAE multi-purpose type grease
	3 point link section	Until grease exits	
	Brake pedal link section		
	Bracket section in front and rear of the front axle		
	Clutch release hub	Supply when removed	

CHAPTER 2

ENGINE

1. GENERAL

1.1 APPEARANCE



The DAEDONG A series engines are vertical, water-cooled, 4-cycle, three or four cylinders diesel engines, they concentrate DAEDONG's foremost technologies.

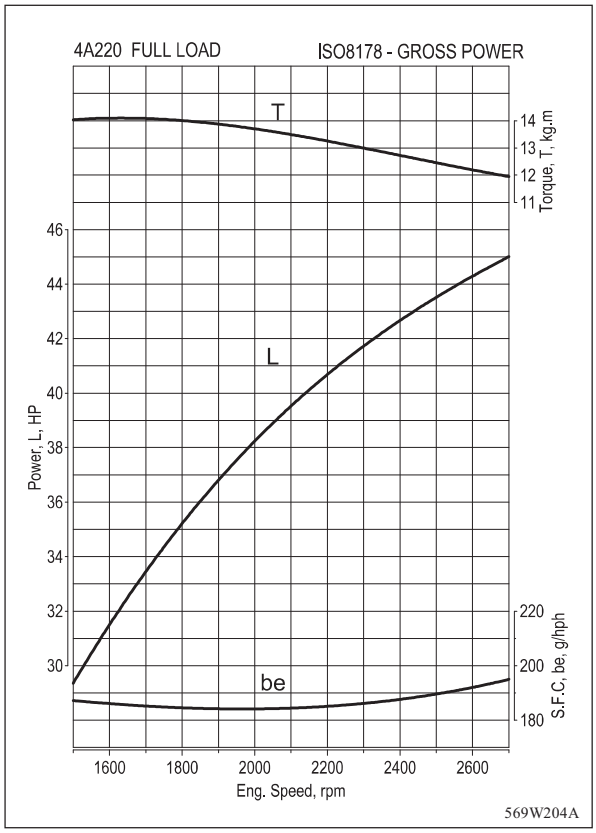
With swirl combustion chamber, bosch K type fuel injection pump, well-balanced designs, they feature greater power, low fuel consumption, less vibration and noise, and low emission.

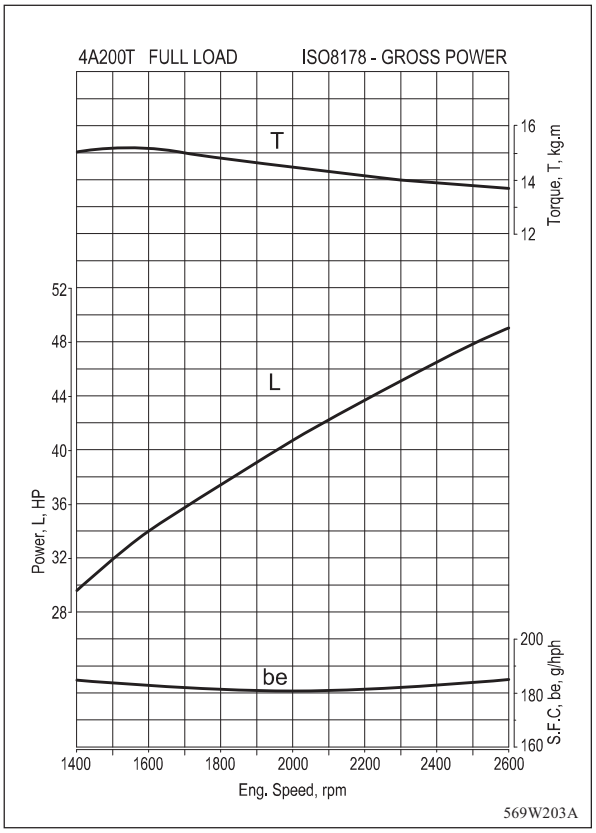
1.2 SPECIFICATIONS

MODEL	4A220	4A200T
Type	Vertical, water-cooled, 4-cycle diesel engine	Vertical, water-cooled, 4-cycle diesel engine (Turbo)
Number of cylinder	4	4
Bore and stroke mm (in.)	87.0 x 92.4 (3.43 x 3.64)	83.0 x 92.4 (3.27 x 3.64)
Total displacement cc (in^3.)	2,197(134.1)	1,999(122.0)
Combustion chamber	vortex chamber	vortex chamber
POWER (NET) PS/rpm (kW. rpm)	43/2,700 (30.9/2,700)	47/2,600 (34.6/2,600)
Maximum idling speed rpm	2,900	2,800
Minimum idling speed rpm	850 ~ 900	850 ~ 900
Order of firing	1-3-4-2	1-3-4-2
Direction of rotation	Counterclockwise (viewed from flywheel side)	Counterclockwise (viewed from flywheel side)
Injection pump	Bosch K TYPE mini pump	Bosch K TYPE mini pump
Injection pressure	140 ~ 150 kgf/cm^2 (13.73 ~ 14.71 MPa, 1991 ~ 2133 psi)	140 ~ 150 kgf/cm^2 (13.73 ~ 14.71 MPa, 1991 ~ 2134 psi)
Injection timing (Before T.D.C)	18°	12°
Compression ratio	22 : 1	22 : 1
Fuel	Diesel fuel	Diesel fuel
Lubricant	Engine oil SAE 15W-40	Engine oil SAE 15W-40
Dimensions mm (length x width x height) (in.)	817.3 x 488.1 x 735.8 (32.2 x 19.2 x 29.0)	817.3 x 542.0 x 735.8 (32.2 x 19.2 x 29.0)
Dry weight kg (kg, lbs.)	207 (456)	211 (465)

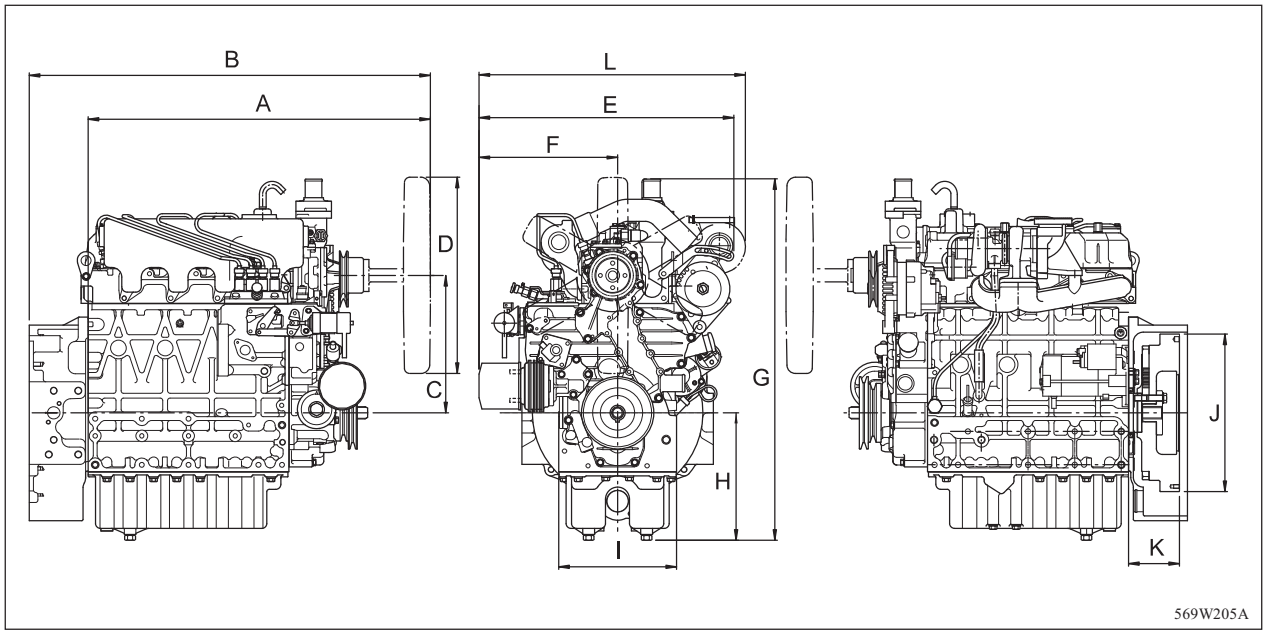
* NOTE: Change of parts are not subject to advance notice.

1.3 PERFORMANCE CURVE





1.4 DIMENSIONS



Sample/td Spec.

mm (in.)

	A	B	C	D	E	F
4A220	697.3 (27.45)	817.3 (32.18)	280 (11.02)	ϕ400 (15.75)	502.6 (19.79)	262.5 (10.33)
4A200T	697.3 (27.45)	817.3 (32.18)	280 (11.02)	ϕ400 (15.75)	519 (20.43)	282.4 (11.12)
	G	H	I	J	K	L
4A220	736 (28.98)	260 (10.24)	240 (9.45)	ϕ321 (12.64)	104.5 (4.11)	-
4A200T	736 (28.98)	260 (10.24)	240 (9.45)	ϕ321 (12.64)	104 (4.09)	542 (21.34)

1.5 GENERAL WARNING

- When disassembling, arrange each part on a clean place. Do not mix them up. Replace bolts and nuts where they were.
- When connecting instruments to electrical equipment, first disconnect battery negative terminal.
- Replace gaskets or O-rings with new ones when reassembling, and apply grease on a O-rings and the oil seals when reassembling.
- When exchanging parts, use genuine DAEDONG parts to maintain engine performance and safety.
- To prevent oil and water leakage, apply non-drying adhesive to the gaskets according to this manual before reassembling.
- When hoisting up the engine, use the hook provided on the cylinder head.
- When installing the engine, use the hook provided on the cylinder head.
- When installing external cir-clips or internal cir-clips, direct corner end to the non- loosening direction.

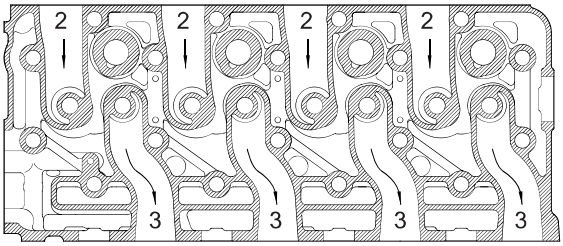
2. STRUCTURE AND FUNCTION

2.1 BODY

A. CYLINDER HEAD

The cylinder head is made of special alloy cast iron which can resist high temperature and pressure caused by combustion. The intake and exhaust ports are arranged cross-flow type to get high combustion efficiency by protecting the suction air from being heated and expanded by heated exhaust air.

The Daedong vortex type combustion chamber is designed for high efficiency combustion and reducing fuel consumption. The glow plugs assures easy engine starts even at (-) 15 °C (5 °F).



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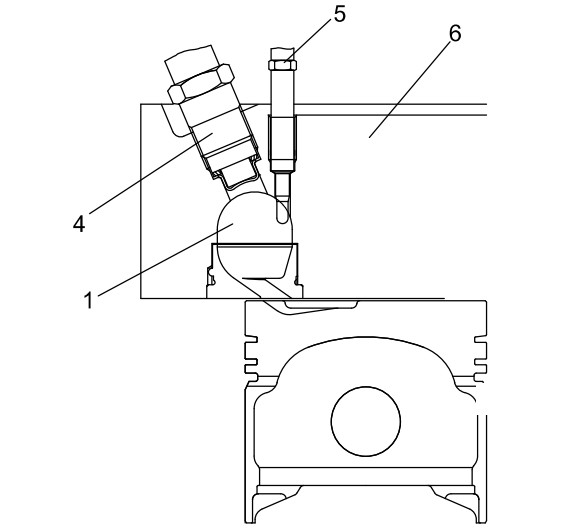
(1) Combustion Chamber
(2) Inlet Port
(3) Exhaust Port
(4) Injection Nozzle
(5) Glow Plug
(6) Cylinder Head



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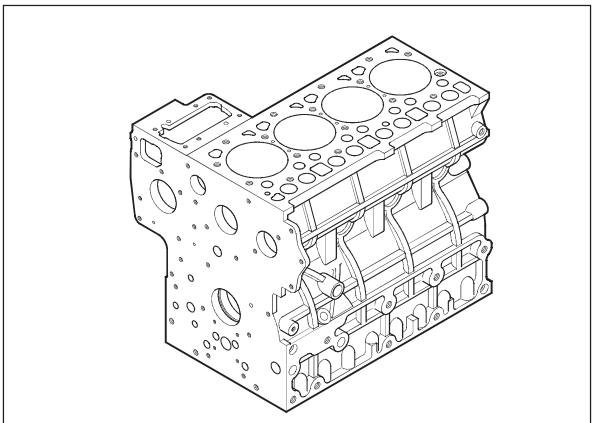
B. CYLINDER BLOCK

The engine has a high durability tunnel-type cylinder block. Furthermore, liner less type, allows effective cooling, less distortion, and greater wear-resistance using special material. The noise is reduced to a minimum because each cylinder had its chamber.



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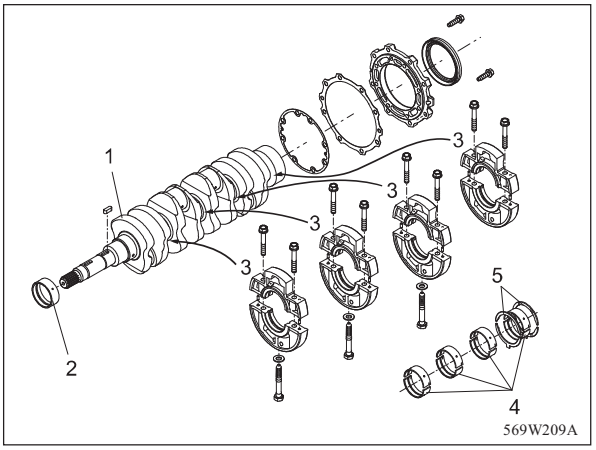
C. CRANKSHAFT

The crankshaft is made of forged steel and the journals, the crankpins and the bearing surface for the oil seal are induction-hardened to increase wear resistance. Each crankshaft journal is supported by the main bearing case (3) having a bearing inside.

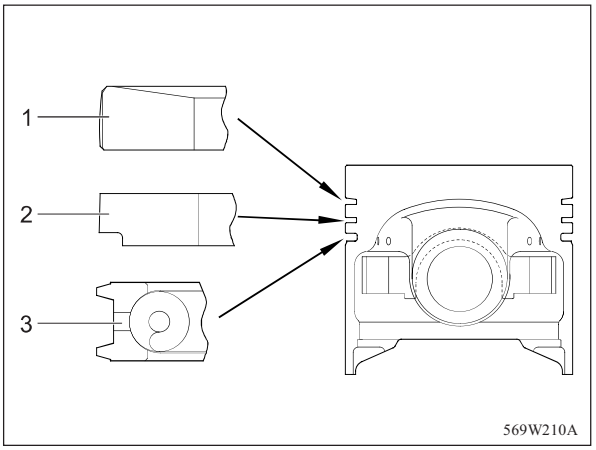
The front crankshaft bearing (2) is a solid type bushing and rear and intermediate bearings are a split type. The crankshaft's bearings have oil holes for lubricant flow.



(1) Crankshaft
(2) Crankshaft Bearing
(3) Main Bearing Case
(4) Crankshaft Bearing 2
(5) Thrust Bearing

D. PISTON AND PISTON RINGS

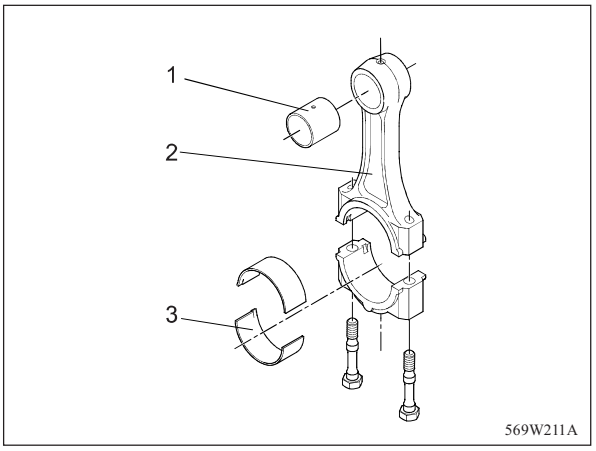
The piston are made of an aluminum alloy which is temperature and pressure resistant. Three rings installed in grooves of the piston. The top ring (1) is a keystone type, which can withstand heavy loads, and the barrel face on the ring fits well to the cylinder wall. The second ring (2) is an undercut type, which prevents the oil from being carried up. The oil ring (3) has chambered contact faces and an expander ring, which increase the pressure of the oil ring against the cylinder wall to scrape the oil. The top ring is plated with hard chrome to increase wear resistance (The ring of 4A200T engine is mode of a special steel).



(1) Top Ring
(2) Second Ring
(3) Oil Ring

E. CONNECTING ROD

The connecting rod (2), which converts the reciprocating motion of the pistons caused by the fuel combustion into the rotating motion of the crankshaft, is made of harden forged steel. The connecting rod has bearings at both ends. The small end has a solid type bearing (small end bushing (2)) and the big end has a split type bearing (crankpin bearing (3)).



(1) Small End Bushing
(2) Connecting Rod
(3) Crankpin Bearing