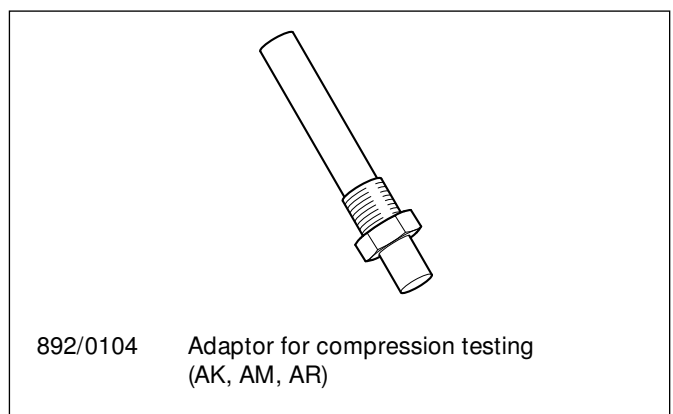
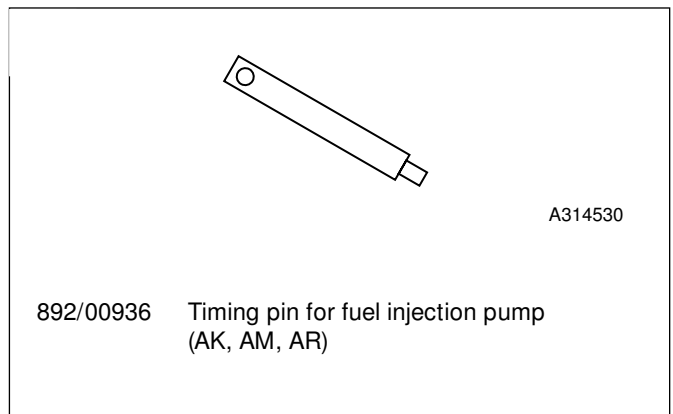
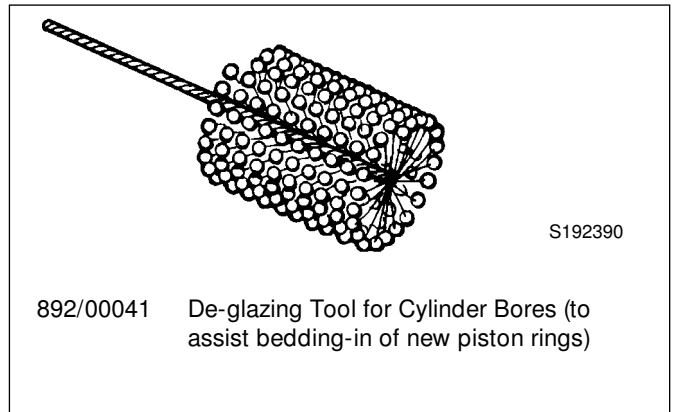
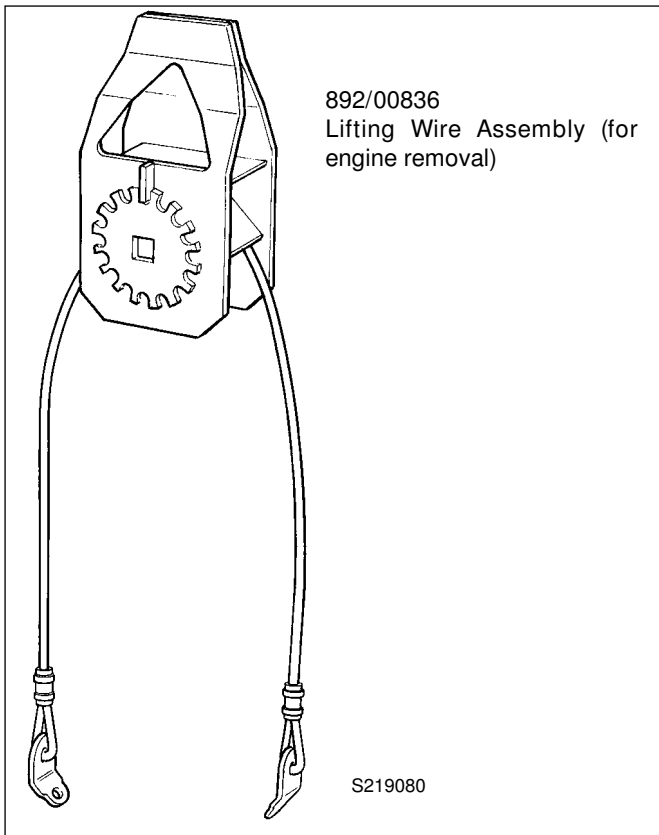


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For details of other engine service tools refer to Engine Service Manual, Publication No. 9806/0100 or 9806/2140 for low emission engines.

Type	1000 Series 4 cylinder Engines AB - Turbocharged AA - Naturally Aspirated AK - Turbocharged AM - Turbocharged and Intercooled AR - Naturally Aspirated		
Engine Build List Number	AA50608 - AR50656, AR50654, AR50678 - 56kw (75bhp), AK50745 60kw (80bhp) AA50606 - 56kw (75bhp) AB50607 - 67.5 kw (90.5bhp), AK50628 - 68.5 kw (92bhp) AB50609 - 71.5kw (96bhp), AK50640 - 74.6 kw (100bhp) AM50647 85.5 kw (115bhp)		
Bore			
AA, AB, AK, AM	100mm (3.937 in)		
AR	103mm (4.055 in)		
Stroke	127mm (5.000 in)		
Swept Volume	AB, AA, AK, AM	4 litres (243 in³)	
	AR	4.23 litres (258 in³)	
Compression Ratio	AB	16.0:1	
	AA	16.5:1	
	AK, AM	17.25:1	
	AR	18.5:1	
Compression Pressure	28 bar (400 lbf/in²) [maximum variation between cylinders 3.5 bar (50 lbf/in²)]		
Injection Sequence	1,3,4,2		
Valve Clearance - Cold	- Inlet	0.20mm (0.008 in)	
	- Exhaust	0.45mm (0.018 in)	
Oil Pressure (hot) at maximum speed	- AA	2.1 bar (30 lbf/in²)	
	- AB, AK, AM	2.6 bar (40 lbf/in²)	
	- AR	2.0 bar (30 lbf/in²)	
Maximum Air Cleaner Restriction	559mm (22 in H²O)		
Injection System Details - Refer to appropriate Engine Service Manual.			
Idling Speed	- All builds	880 - 930 rev/min	
Maximum Governed Speed	- All builds	2200 rev/min	
Maximum No-load Speed (High Idle)	- All builds	2400 - 2440 rev/min	
Cooling System			
Coolant Pressure	0.48 bar (7 lbf/in²)		
Coolant Temperature (Normal)	80-85 °C (176-185 °F)		
Temperature Warning Light operates at:	98 °C (208 °F)		

Note: For further details of the engines refer to the following Engine Service Manuals:

Publication No. 9806/0100 (AA, AB)

Publication No. 9806/2140 (AK, AM, AR)

Fuel Lift Pump - Cleaning the Strainer

To remove and fit pump, see Engine Service Manual.

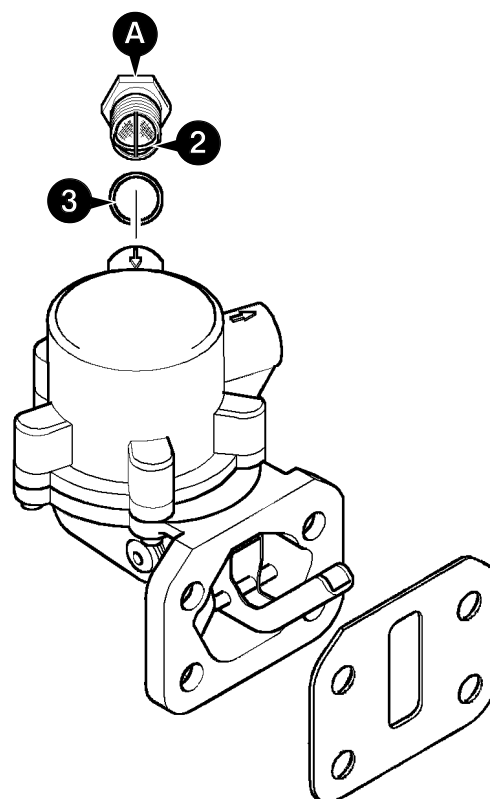
Remove and clean fuel inlet strainer **2** if blockage is suspected ie. low engine power, difficult to start, fuel tank contamination.

- 1 Allow the engine to cool. Remove the fuel filler cap to vent the system and reduce loss of fuel. Disconnect the fuel inlet pipe to the lift pump.
- 2 Unscrew the fuel filter **A**. Remove strainer **2** and O-ring **3**.
- 3 Clean the strainer in clean diesel fluid and dry with low pressure compressed air. Renew the strainer and O-ring if damaged.
- 4 Fit the strainer into the fuel inlet connection. Fit the inlet connector **A** and tighten to 20Nm (15 lbf ft). Fit the fuel inlet pipe carefully to prevent damage to the strainer, and tighten the union nut.

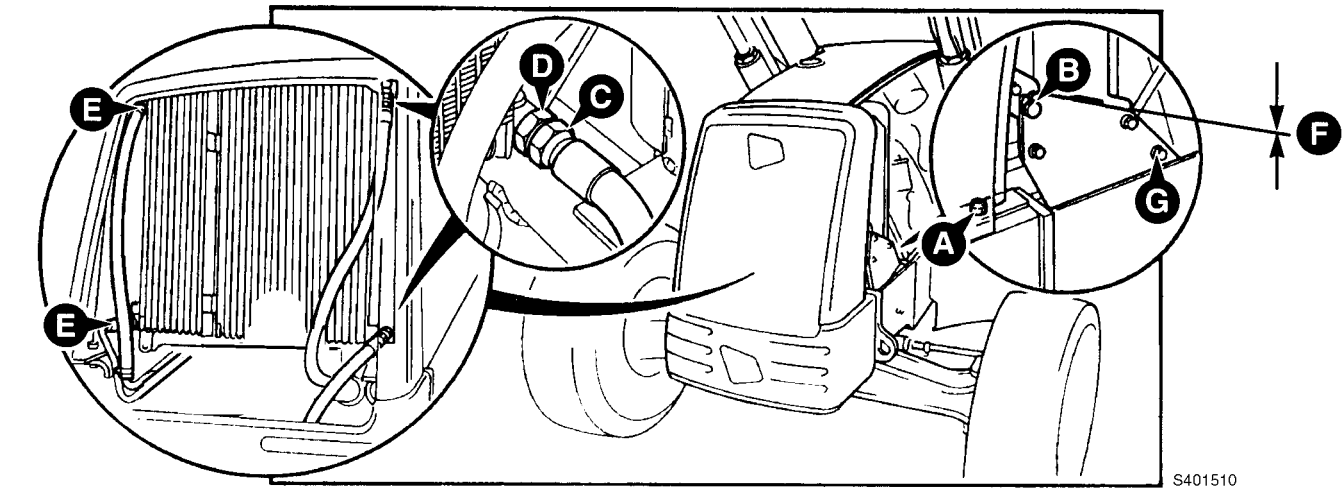
IMPORTANT: The fuel strainer can be damaged and fuel flow can be restricted if the fuel pipe is inserted too far into the inlet connection. This should be checked if a fuel restriction is suspected.

Make sure the olive on the fuel inlet pipe is in good condition and forms an effective seal. Renew the olive or pipe if necessary to prevent air entering the fuel system.

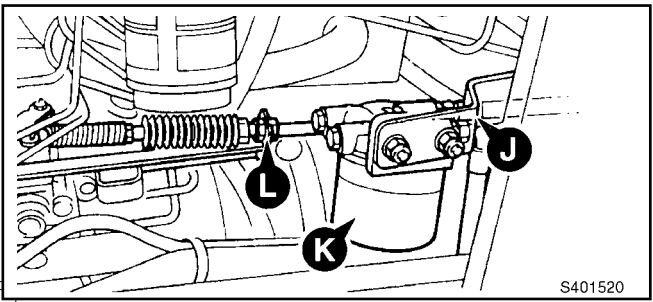
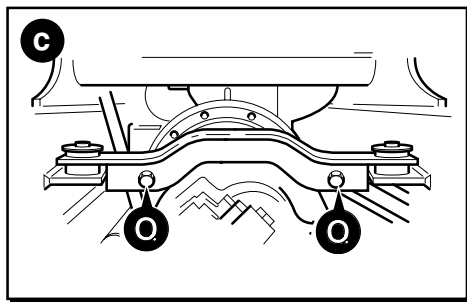
- 5 Fit the tank cap and prime the fuel system. Start the engine and check for fuel leakage.



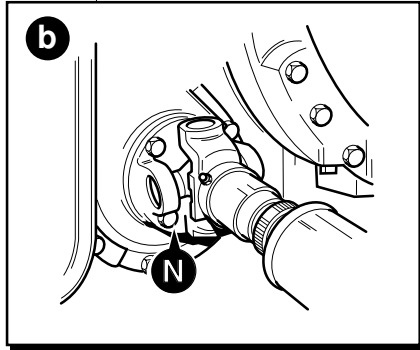
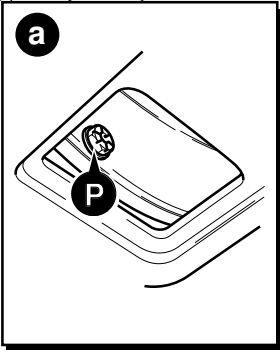
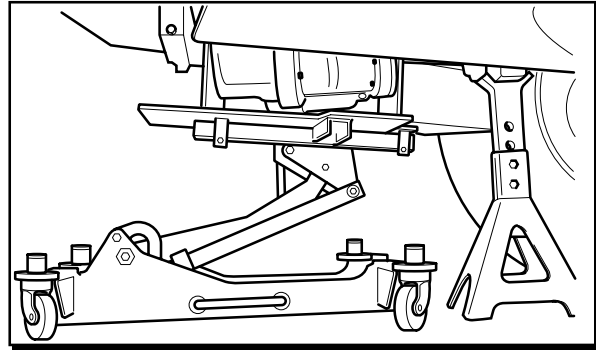
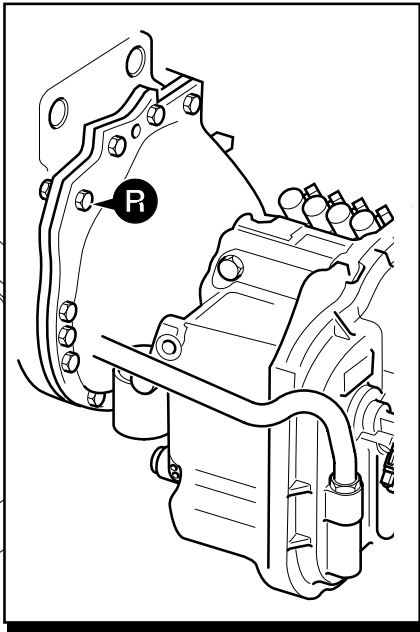
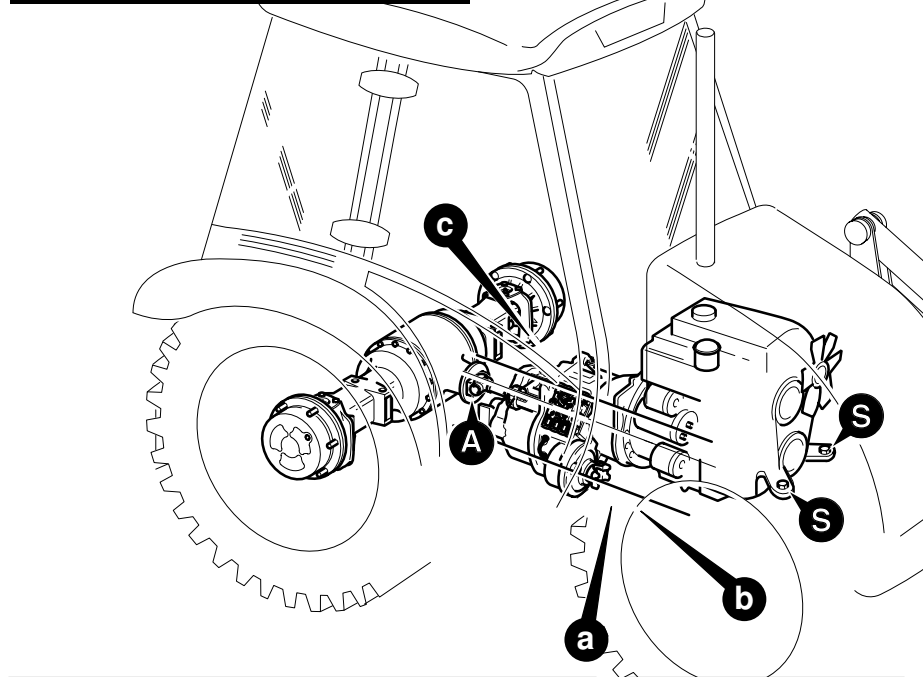
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Removal and Replacement

Removal

1 Park the machine on firm level ground, engage the parking brake and set the transmission to neutral. Chock the road wheels.

2 Raise the loader arms and fit the loader arm safety strut.

Note: In the event of engine failure, the loader arms will have to be raised using suitable lifting equipment. Make sure that the loader control lever is in the 'raise arms' position before manually lifting the loader arms.

3 Remove the engine side panels

4 Remove the engine cover (including the exhaust stack).

5 Disconnect the battery. When disconnecting the battery, take off the earth (black) lead first.

6 Remove retaining bolts and then lift off the front grille.

7 Remove retaining bolts **A** and **B** (both sides) and lift off the front nose guard.

8 Disconnect the hydraulic oil cooler hoses **C** from the hydraulic oil cooler. Plug and cap open ports to prevent ingress of dirt.

Note: When installing and removing hoses from the cooler, it is essential to note that adaptor **D** must be held with a spanner whilst installing or removing the hose. It may be easier to remove the top hose connection once the cooler has been removed from the machine.

9 Drain the cooling system.

10 Remove the transmission oil cooler hoses **E**.

11 Remove the radiator top hose and bottom hose.

12 Remove the coolant bottle pipe.

13 Make a suitable alignment mark to allow correct repositioning of the radiator shroud, as shown at **F**.

14 If an engine fan guard is fitted, remove retaining bolts and lift off the guard.

15 Remove retaining bolts **G** (both sides) and lift off the radiator sub-assembly including radiator, hydraulic and transmission coolers, and shroud. Take care not to damage the engine fan, note also that the sub-assembly is heavy, use suitable lifting equipment.

Note: If required, the shroud, radiator and coolers can be removed as individual items.

16 Loosen and remove the exhaust silencer retaining bolts, remove the silencer.

17 Loosen and remove the retaining clamp for the heater hose. Remove the hose.

18 Loosen and remove the retaining clamp for the air filter intake hose.

19 Remove the air intake filter. Use tape to close the opening in the air intake manifold, this will prevent ingress of dirt.

20 Loosen and remove the brake master cylinder reservoir retaining bolts. Do not remove the pipes attached to the master cylinder reservoir but put the reservoir out of the way. Make sure that the fluid level does not drain down.

21 Label and remove all electrical connections, the number of connectors will vary depending on the ancillary equipment fitted to the engine. Typical electrical connectors are:

- i) starter motor
- ii) alternator
- iii) coolant pressure switch
- iv) coolant temperature sender
- v) engine oil pressure switch
- vi) engine temperature sender
- vii) engine shut off solenoid
- viii) ether cold start (if fitted)
- ix) air conditioning compressor (if fitted)

22 If air conditioning is fitted:

Note: The air conditioning is a pressurised closed loop system, do not disconnect the hoses to the compressor. Leave the hoses to the compressor intact.

- a** Remove the belt from the clutch of the air conditioning compressor.
- b** Disconnect the electrical connectors at the compressor.
- c** Loosen and remove the air conditioning compressor retaining bolts.
- d** Put the air conditioning compressor out of the way (do not allow the compressor to 'hang' on its hoses).

23 Loosen and disconnect the fuel lines **J** from the fuel sedimenter. Plug and cap open orifices to prevent ingress of dirt and loss of fuel.

24 Loosen and remove the retaining bolts for the fuel sedimenter, remove the sedimenter **K**.

.....cont'd

Removal and Replacement

Removal (continued)

- 25 If fitted, loosen and disconnect the ether cold start fuel line from the engine. Plug and cap open orifices to prevent ingress of dirt and loss of fluid.
- 26 If fitted, loosen and remove the ether cold start canister retaining bolts, lift off the canister and retaining bracket assembly.
- 27 Disconnect the throttle linkage **L** from the arm on the fuel injection pump. Leave at least one of the locking nuts in position, this will ensure that the engine revs are set correctly when reassembling.
- 28 Loosen and remove the rear propshaft to gearbox retaining bolts **M**.
- 29 On 4WD machines, loosen and remove the front propshaft to gearbox retaining bolts **N**.
- 30 Remove the access bung located at the base of the gearbox. Through the access hole, loosen and remove the torque converter to engine flywheel retaining bolts **P** (turn the flywheel to align bolts with access hole).
- 31 If manual gearbox fitted, disconnect the gearshift lever from the top of the gearbox.
- 32 Use a suitable trolley jack and support the weight of the gearbox.

Note: Attach a 'cradle' to the trolley jack that will evenly support the weight of the gearbox. Refer to **Service Tools**.

- 33 Use a suitable stand and support the weight of the engine.
- 34 Loosen and remove the gearbox mounting bolts **Q**.
- 35 Remove the gearbox to engine retaining bolts **R**, pull the transmission and converter clear of the engine, make sure that the converter stays mounted on the gearbox shaft.
- 36 Attach suitable lifting chains to the engine (see Lifting Wire Assembly, service tool 892/00836 in **Service Tools**). Take the weight of the engine on the hoist.
- 37 Loosen and remove the engine mounting bolts **S** (both sides).
- 38 Lift the engine clear of the machine.
- 39 Put the engine on a suitable stand, the correct dismantling and assembly procedures are detailed in the Engine Service Manual, publication number 9806/0100.

Replacement

Replacement is a reversal of the removal procedure.

- 1 When mating the gearbox/torque converter to engine, ensure that the drive tangs are correctly located in the gearbox pump. See Section F **Gearbox Replacement** for a detailed procedure.

Note: It is vitally important that the torque converter is fitted at the gearbox and engine flywheel correctly. Failure to locate the converter correctly will result in damage to the gearbox oil pump on engine start up.

- 2 When you are satisfied that the torque converter is located correctly, use the access hole in the bottom of the gearbox to fit and tighten the flexi-plate to engine flywheel retaining bolts. Rotate the flywheel to align the next bolt hole, fit and tighten all retaining bolts.
- 3 When fitting the radiator sub-assembly, including radiator, cooler and shroud take care not to damage the engine fan, align the shroud using alignment mark made at step 13 in **Removal**.
- 4 Make sure that the front nose guard and the engine cover are correctly aligned.
- 5 Refill cooling system using correct mixture of water/anti-freeze.
- 6 Check engine, coolant and brake oil levels.
- 7 When connecting the battery, connect the earth (black) lead last.

Make sure that the engine idle speed is correct, adjust as required, refer to **Technical Data**.

Torque Figures

Item	Nm	Kgf m	lbf ft	Description
M	118	12	87	Rear propshaft bolts
N	79	8	58	Front propshaft bolts
P	44	4.5	32	Flexi-plate to flywheel bolts
Q	237	24	175	Gearbox mounting bolts
R	98	10	72	Gearbox to engine bolts
S	85	8.7	63	Engine mounting bolts

Note: The engine oil pressure switch, water temperature switch and water temperature sensor torque figure varies depending on the material it is screwed into.

	Nm	Kgf m	lbf ft
Plastic	4	0.4	3.0
Aluminium	30	3.0	22