Cab - Failures - Compressor

A . Diagnosis and failure analysis

Diagnosis

In general, pressure readings are directly related to atmospheric conditions (pressure and temperature). At temperatures between 21°C and 30°C (68°F and 86°F), low pressure readings will vary between 0.1 and 1 bar (1.5 and 15 PSI) and high pressure readings will vary between 10 and 18 bar (145 and 261 PSI). To locate failures, the pressure gauge kit must be connected to the compressor.

Failure analysis

Leaks in the system will lead to inadequate cooling, and low and high pressures will be too low.
If the system is under-charged, bubbles will always be visible in the dehydrator sight glass, in addition to the symptoms already mentioned.
If the evaporator is dirty or an expansion valve is clogged or frozen up, there will be a partial vacuum on the low pressure side and insufficient pressure on the high pressure side.
If the system is over-charged, an expansion valve is stuck in the open position or the condenser is fouled, the pressure will be too high on the low pressure side.
If the condenser is fouled, over-charging will cause excessive pressure on the high pressure side.

Over-charging problems

In a correctly charged system, the R12 refrigerant discharged from the compressor in the form of gas loses its excess heat resulting from compression in the first coil of the condenser and condenses into a liquid in the subsequent coils. The resulting liquid is held in the last condenser coil before flowing to the reservoir. If the system is over-charged, the liquid level rises in the condenser, leaving fewer coils available to condense gas. Both the temperature and pressure then build up causing hoses to burst in some cases.

Causes of failure with engine running

Over-charging
Worn hoses
Chafed hoses
Hoses cut by sharp edges on sheet metal
Bends too tight
Hoses too close to battery (acid)

Causes of failure with engine stopped

These are the same as when the engine is running, plus the following:
- shutdown of engine compartment ventilation,
- «temperature surge» caused by the engine immediately after it has been stopped.

The temperature increase when the engine is stopped causes both the temperature and pressure in the air conditioning system hoses to rise.
If a hose is only just holding, it is more liable to burst due to this effect.
This is particularly prevalent in systems that are over-charged with R12 refrigerant and when hoses are worn or badly positioned (in hot spots).

B . Failure of air conditioning unit

The «by-pass» kit must be connected to the compressor valves.

High pressure reading too high

1. Refrigerant over-charge.
   Purge the system.
   Avoid leaving the system under-charged.
2. Air in system, in spite of correct low pressure reading.
   Purge the system.
   After purging, recharge the system.
3. Space between condenser fins clogged with insects.
   Clean the condenser.
4. Refrigerant remains in liquid state in suction pipe at evaporator outlet. This causes the formation of moisture or frost on the hose or on the compressor inlet valve.
   Check that the expansion valve sensing bulb is properly secured in contact with the suction pipe.
5. Plug left in a pipe during assembly. This is indicated by a difference in temperature upstream and downstream of the point where the plug is located.
6. If high pressure reading is higher than the reading obtained during normal operation with correct low pressure reading and charge but presence of bubbles in the dehydrator, then the dehydrator hose connections have been reversed and fluid is flowing in the wrong direction.
7. If high pressure reading is very high and low pressure reading is normal, with bubbles in the dehydrator and frosting of the dehydrating reservoir, there is a restriction at the dehydrator inlet, causing the dehydrator to act as an expansion valve.

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High pressure reading too low

1. Incorrect charge. A lack of refrigerant is shown by bubbles which appear in the sight glass.
2. Compressor gasket cracked or compressor valves leaking.

Low pressure reading too low, together with insufficient cooling

1. Restriction in a hose or in dehydrator. This problem can be detected by a difference in temperature upstream and downstream of the restriction or by cooling of the dehydrator reservoir when the system is running.
2. Insufficient charge in the expansion valve sensing bulb.
   Warm up the end of the temperature-sensing bulb in the hand. The intake pressure should quickly rise to at least 1.45 bar (21 PSI) with the engine idling. If it does not, the expansion valve must be replaced.
3. Expansion valve capillary tube broken or leaking.
   The expansion valve stays closed causing the system to operate at very low pressure.
4. Formation of frost in expansion valve or jet.
   The expansion valve or jet may be frosted even though the pipes are hardly frosted at all.
5. Expansion valve stuck. Rust residue in system.
   Heating the end of the bulb has no effect on the low pressure reading.
   The expansion valve may open after a period at rest and then stick again after some time in operation.
6. Check that the evaporator air inlet is not obstructed.

Low pressure reading too high

1. Compressor belt too slack.
2. Expansion valve sensing bulb incorrectly installed.
3. Expansion valve needle stuck in the open position.
   Refrigerant flows too freely through the coils and cools or freezes the inlet pipe.
4. Compressor inlet valve filter blocked.
5. Low refrigerant charge.
   Check whether bubbles can be seen in the sight glass when the system is operating with the fans switched on.
6. Leakage from compressor inlet and outlet valves.
7. If the high pressure reading is low, the low pressure reading is high and the charge is correct, there is leakage from the compressor gasket or valves are faulty.

Noisy expansion valve (persistent whistling)

1. Low refrigerant charge, indicated by the presence of bubbles in the sight glass.

Insufficient cooling

1. Incorrect operation of compressor.
2. Incorrect operation of expansion valve.
3. High and low pressure readings are low, tending to cause partial vacuum with correct charge. Temperature too low at evaporator outlet, causing expansion valve to close and poor synchronization between thermostat cycling and opening of expansion valve.

Formation of frost on evaporator fins

1. Check thermostat electrical contacts.
2. Check that the sensing bulb is in contact with the evaporator fins.

Intermittent operation of compressor (irregular cycling)

Check belt tension.
Check clutch drive plate clearance.
Check clutch coil voltage and current.
Check compressor.

Abnormal compressor noise

In engaged position:
Check installation of compressor.
Check clutch and that there is no slipping.
Check Freon R12 refrigerant charge.
Check clutch and compressor bearings.
Check quantity of refrigerant oil (175 cm^3 + 15 cm^3)
Check compressor inlet and outlet valves.

In disengaged position:
Check clutch drive plate clearance.

C. Compressor

Setting the clutch drive plate clearance

Check the clearance with feeler gauges. The clearance should be 0.4 to 0.8 mm (Fig. 1).

If the clearance is not the same all the way round, lift slightly and tap gently where the difference is greatest.

Note: The correct clearance is obtained using shims. When reinstalling the clutch or fitting a new one, try fitting the original shims first.

When fitting a new clutch on a compressor, use the following shim sizes: 1.02 mm (0.04016 in) - 0.05 mm (0.00197 in) - 0.12 mm (0.00472 in). Tighten the nut to a torque of 40 Nm (30 lbf/ft).

Precautions to be taken when removing and refitting the compressor:

Note: 1) Run the air conditioning system for 5 to 10 minutes before removing the compressor in order to return all the refrigerant to the compressor.

2) The head connectors must be facing upwards or in line with the oil filler hole (Fig. 2).

Locate the valve cover plate dowels in the correct holes in the block and then align the plate. Tighten to a torque of 30 to 34 Nm (22 to 25 lbf/ft) in the order shown in Fig. 3.

Filling with oil

Discharge the R12 refrigerant (see part A, section 2 B01).

It is advisable to drain the oil from the compressor and refill with the recommended quantity of clean oil whenever work is carried out on the system and whenever a component has to be replaced (pipes, dehydrator, condenser).

Note: When the system is topped up with oil, gas must be discharged from the installation.

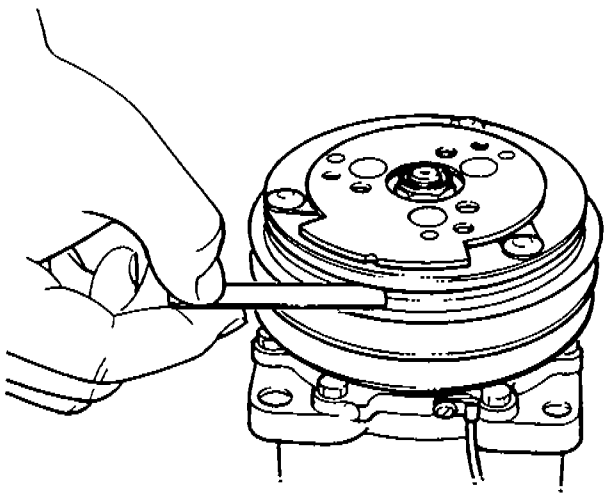


Fig. 1

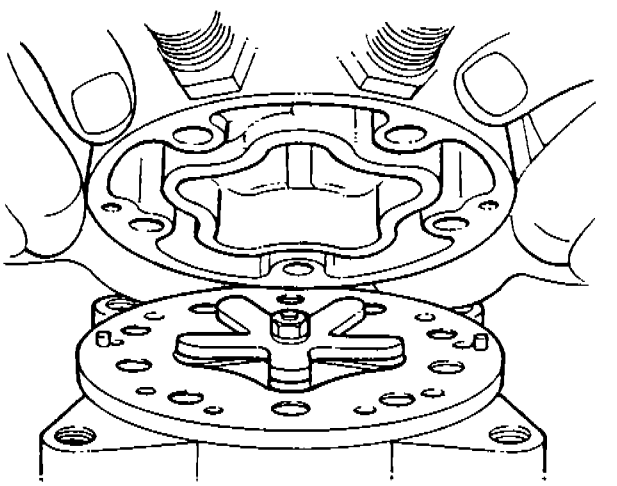


Fig. 2

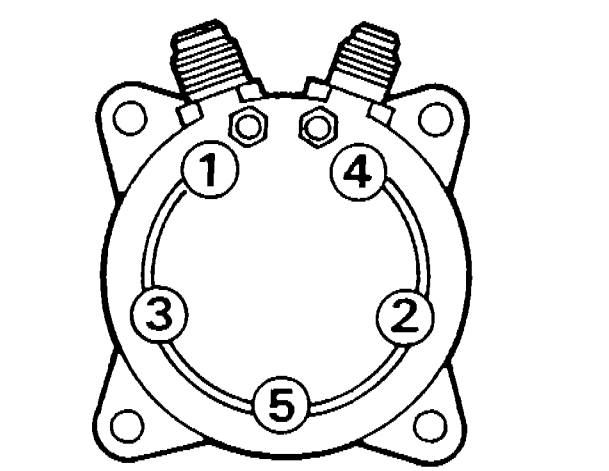


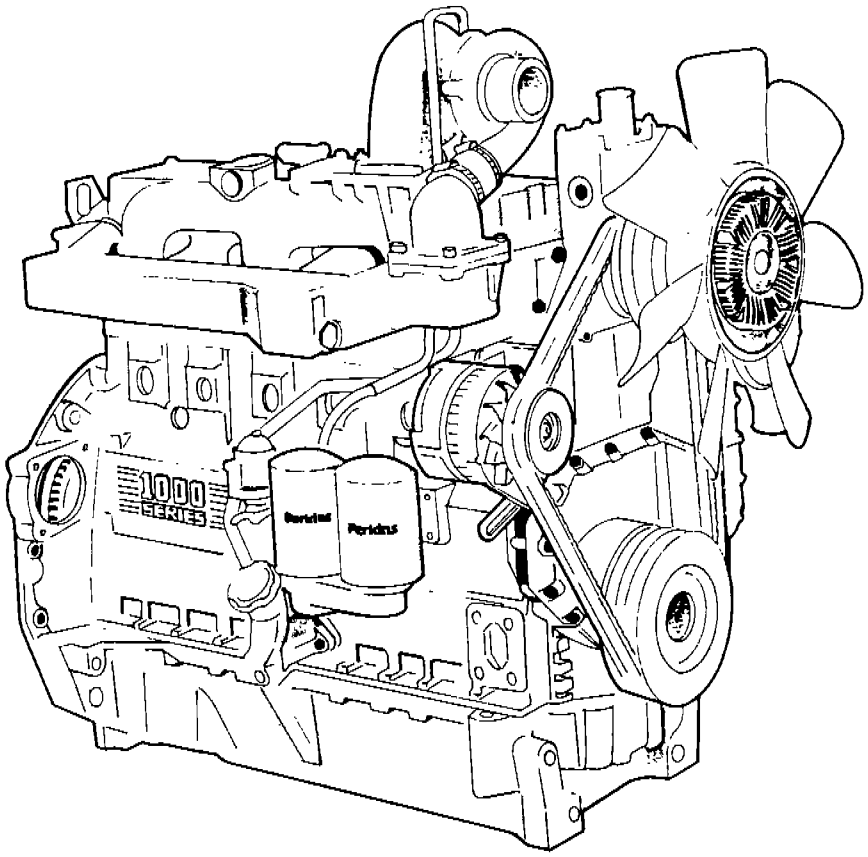
Fig. 3

1. Remove the filler plug.
   Note: Use only refrigerant oil (see the table of the various brands). Close the container after use.
2. Refit the filler plug.
   Check the condition of the O-ring.
   Check that the O-ring and its seat are clean.
3. Tighten the plug to a torque of between 8 and 12 Nm (6 to 9 lbf/ft). If there is any leak, do not tighten the plug any further but remove it and fit a new O-ring).
   Note: Regular checking of the oil level is unnecessary, except when servicing is required.
4. Recharge the installation (see part C, section 2 B01).

Table of recommended oils for filling of compressor SD.510.HD

Capacity 175 cm^3 (+ 100 cm^3 for system)

Make	Name	Grade	Viscosity °E at 50°C
Sun Oil Co.	Suniso Sunbis	4 GS 5 GS 31/41/51	- - -
Caltex	Capella	WF100 WF68	- -
BP	Enagole	LPT 100/150/185	-
Shell	Talpa Oil Bitoria Oil	20/30 33/41	- -
Mobil	Gargoyle Artil	300	-
Castrol	Ice Matic	299/99	-
Texaco	Capella E	-	7.2
Shell	Clavus Oil 41	-	7.5
Esso	Zerice S 58	-	8
Fina	Purfrigol 37	-	5.6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SERIES
Perkins