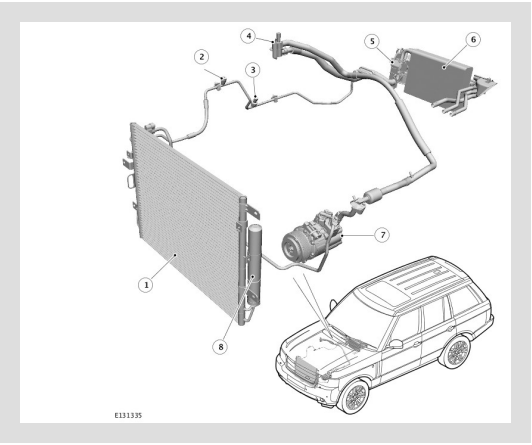
PUBLISHED: 10-JUL-2013
2011.0 RANGE ROVER (LM), 412-03A

AIR CONDITIONING (G1345458)

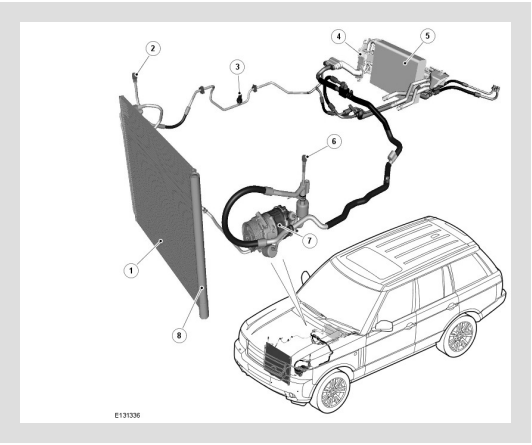
DESCRIPTION AND OPERATION

COMPONENT LOCATION - 3.6L TdV8



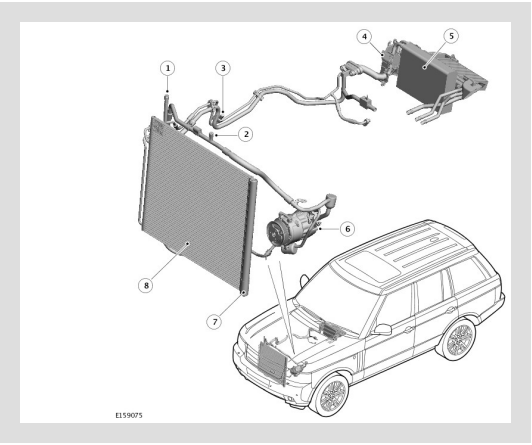
ITEM	DESCRIPTION
1	Condenser
2	High pressure servicing connection
3	Refrigerant pressure sensor
4	Low pressure servicing connection
5	Thermostatic expansion valve
6	Evaporator
7	air conditioning (A/C) compressor
8	Receiver drier module

COMPONENT LOCATION - 5.0L V8



ITEM	DESCRIPTION
1	Condenser
2	Low pressure servicing connection
3	Refrigerant pressure sensor (reference)
4	Thermostatic expansion valve
5	Evaporator
6	High pressure servicing connection
7	air conditioning (A/C) compressor
8	Receiver drier module

COMPONENT LOCATION - 4.4L TdV8



ITEM	DESCRIPTION
1	Low pressure servicing connection
2	High pressure servicing connection
3	Refrigerant pressure sensor (reference)
4	Thermostatic expansion valve
5	Evaporator
6	air conditioning (A/C) compressor
7	Receiver drier module
8	Condenser

OVERVIEW

The A/C system transfers heat from the vehicle interior to the outside atmosphere to provide the heater assembly with dehumidified cool air. The system is a sealed, closed loop, filled with a charge weight of R134a refrigerant as the heat transfer medium. Oil is added to the refrigerant to lubricate the internal components of the A/C compressor.

To accomplish the transfer of heat, the refrigerant is circulated around the system, where it passes through 2 pressure /temperature regimes. In each of the pressure/temperature regimes, the refrigerant changes state, during which process maximum heat absorption or release occurs. The low pressure/temperature regime is from the thermostatic expansion valve, through the evaporator to the A/C compressor; the refrigerant decreases in pressure and

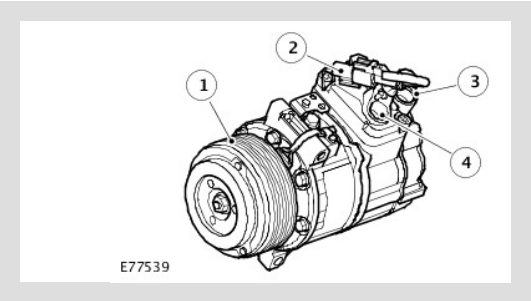
temperature at the thermostatic expansion valve, then changes state from liquid to vapor in the evaporator, to absorb heat. The high pressure/temperature regime is from the A/C compressor, through the condenser and receiver drier to the thermostatic expansion valve; the refrigerant increases in pressure and temperature as it passes through the A/C compressor, then releases heat and changes state from vapor to liquid in the condenser.

Some vehicles may be fitted with a 4 zone climate control system.For additional information, refer to: Auxiliary Heater (412-02B Auxiliary Heating, Description and Operation).

A/C COMPRESSOR

The A/C compressor circulates refrigerant around the system by compressing low pressure, low temperature vapor from the evaporator and discharging the resultant high pressure, high temperature vapor to the condenser. Although similar in appearance, the A/C compressor installed on 3.6L TdV8 vehicles differs slightly to the one installed on 5.0L V8 and 4.4L TdV8 vehicles.

3.6L TdV8 A/C Compressor



ITEM	DESCRIPTION
1	Pulley
2	Electrical connector
3	Inlet port
4	Outlet port

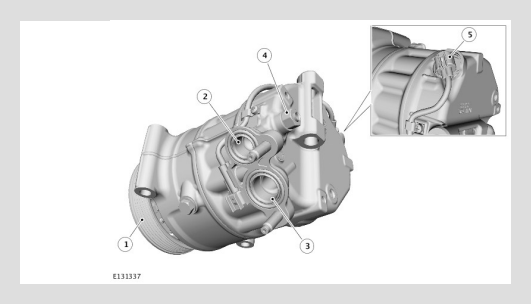
The A/C compressor fitted to 3.6L TdV8 diesel vehicles is a variable displacement unit. The secondary accessory drive belt, driven by the engine crankshaft, drives the A/C compressor via a pulley.

The A/C compressor is a 7 cylinder swash plate unit with a minimum displacement of 5.5 cm^3/rev (0.34 in^3/rev) and maximum displacement of 171 cm^3/rev (10.4 in^3/rev). A control valve in the A/C compressor automatically adjusts the displacement (i.e. flow of refrigerant), between the minimum and maximum values, to match the thermal load of the evaporator. By matching the refrigerant flow to the thermal load of the evaporator, the variable A/C compressor maintains a relatively constant evaporator temperature of approximately 3 to 4 ^oC (37 to 39 ^oF).

To protect the refrigerant system from unacceptably high pressure, a pressure relief valve is installed in the outlet side of the A/C compressor. The pressure relief valve is set to open at 3.5 to 4.1 MPa (508 to 595 lbf/in^2) and vents excess pressure into the engine compartment. The pressure relief valve closes again when the pressure decreases to 3.01 MPa (437 lbf/in^2).

The pulley of the A/C compressor incorporates a mechanical torque limiter, which disconnects the drive plate from the compressor shaft if torque increases to a level that indicates imminent compressor seizure.

5.0L V8 and 4.4L TdV8 A/C Compressor



ITEM	DESCRIPTION
1	Pulley
2	Outlet port
3	Inlet port
4	Pressure relief valve
5	Electronic control valve connector

The A/C compressor fitted to 5.0 V8 petrol and 4.4L TdV8 vehicles is a variable displacement unit. The secondary accessory drive belt, driven by the engine crankshaft, drives the A/C compressor via a pulley. Operation of the compressor is controlled by an electronic control valve working in conjunction with the ATC (automatic temperature control) module.

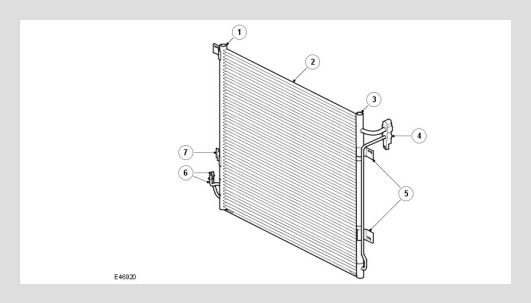
The A/C compressor is a 7 cylinder swash plate unit with a minimum displacement of 1.6 cm^3/rev (0.10 in^3/rev) and maximum displacement of 163 cm^3/rev (9.95 in^3/rev). The ATC automatically adjusts the displacement of the A/C compressor between the minimum and maximum values, to match the thermal load of the evaporator. By matching refrigerant flow and the thermal load of the evaporator, the ATC maintains cabin comfort whilst also considering fuel economy.

To protect the refrigerant system from unacceptably high pressure, a pressure relief valve is installed in the outlet side of the A/C compressor. The pressure relief valve is set to open at 3.5 to 4.1 MPa (508 to 595 lbf/in^2) and vents excess pressure into the engine compartment. The pressure relief valve closes again when the pressure decreases to 3.1 MPa (449 lbf/in^2).

The pulley of the A/C compressor incorporates a mechanical torque limiter, which disconnects the drive plate from the compressor shaft if torque increases to a level that indicates imminent compressor seizure.

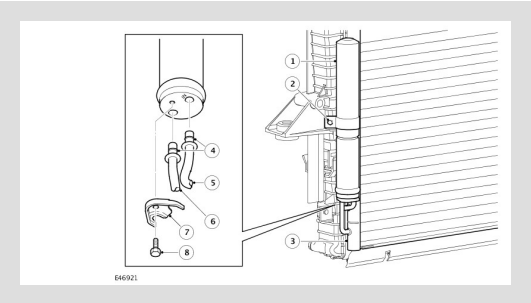
CONDENSER AND RECEIVER DRIER

Condenser - 3.6L TdV8



ITEM	DESCRIPTION
1	right-hand (RH) end tank
2	Condenser core
3	left-hand (LH) end tank
4	High pressure line connector block
5	Condenser attachment brackets
6	Receiver drier pipes
7	Receiver drier attachment bracket

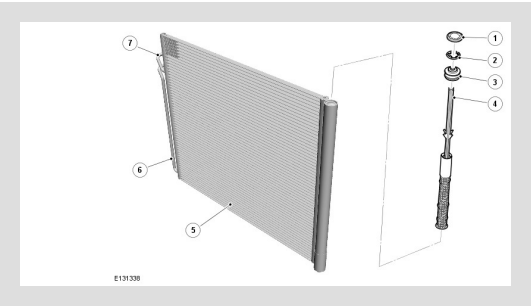
Receiver Drier - 3.6L TdV8



ITEM	DESCRIPTION
1	Receiver Drier
2	Clamp
3	Condenser RH end tank
4	O-ring seals
5	Inlet pipe
6	Outlet pipe
7	Collar

ITEM	DESCRIPTION
8	Bolt

Condenser and Receiver Drier - 5.0L V8 and 4.4L TdV8



ITEM	DESCRIPTION
1	Cap
2	Spring clip
3	Sealing plug
4	Desiccant module
5	Condenser
6	Outlet pipe
7	Inlet pipe

The condenser transfers heat from the refrigerant to the surrounding air to convert the vapor from the A/C compressor into a liquid. A receiver drier module, integrated onto the LH side of the condenser, incorporates a filter and a desiccant to remove solid impurities and moisture from the refrigerant. The receiver drier module also functions as a reservoir for liquid refrigerant, to accommodate changes of heat load at the evaporator.

The condenser is installed immediately in front of the radiator.

The condenser is classified as a multiflow condenser and consists of a fin and tube heat exchanger installed between two end tanks.

3.6L TDV8

Divisions in the end tanks separate the heat exchanger into a four pass upper (condenser) section and a two pass lower (sub-cooler) section. A connector block on the left end tank of the condenser provides connections for the high pressure lines from the A/C (air conditioning) compressor and the evaporator. Two pipes at the bottom of the right end tank of the condenser provide connections for the receiver drier.

5.0L V8 AND 4.4L TDV8

Divisions in the end tanks separate the heat exchanger into a three pass upper (condenser) section and a single pass lower (sub-cooler) section, which are interconnected by the receiver drier module. The desiccant cluster and the filter in the receiver drier module are serviceable items retained in position by a threaded plug.

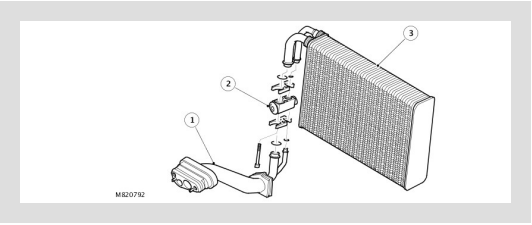
THERMOSTATIC EXPANSION VALVE

The thermostatic expansion valve meters the flow of refrigerant into the evaporator, to match the refrigerant flow with the heat load of the air passing through the evaporator matrix.

The temperature and pressure of the refrigerant leaving the evaporator act on the thermostatic expansion valve to control the volume of refrigerant flowing through the evaporator. The warmer the air flowing through the evaporator matrix, the more heat available to evaporate refrigerant and thus the greater the volume of refrigerant allowed through the metering valve.

EVAPORATOR

Evaporator and Thermostatic Expansion Valve



ITEM	DESCRIPTION
1	Insulated connection pipes
2	Thermostatic expansion valve
3	Evaporator

The evaporator is installed in the heater assembly between the blower and the heater matrix, to absorb heat from the exterior or recirculated air. Low pressure, low temperature refrigerant changes from liquid to vapor in the evaporator, absorbing large quantities of heat as it changes state.

Most of the moisture in the air passing through the evaporator condenses into water, which drains through the floorpan to the underside of the vehicle through two drain tubes.

REFRIGERANT LINES

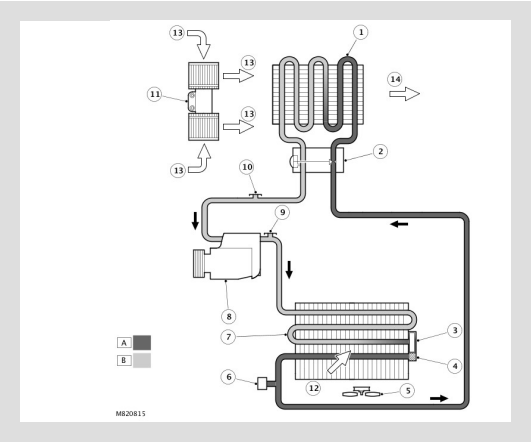
To maintain similar flow velocities around the system, the diameter of the refrigerant lines varies to suit the two pressure/temperature regimes. The larger diameters are installed in the low pressure/temperature regime and the smaller diameters are installed in the high pressure/temperature regime.

Low and high pressure charging connections are incorporated into the refrigerant lines near the front RH corner of the engine compartment.

CONTROL DIAGRAM

NOTE:

NOTE: A = Refrigerant liquid; B = Refrigerant vapor



ITEM	DESCRIPTION
1	Evaporator
2	Thermostatic expansion valve
3	Desiccant (in receiver drier module)
4	Filter (in receiver drier module)
5	Electric cooling fan
6	Refrigerant pressure sensor
7	Condenser
8	A/C compressor
9	High pressure servicing connection
10	Low pressure servicing
11	Blower
12	Air flows: Ambient air flow through condenser
13	Fresh/Recirculated air flow through blower
14	Cooled air flow to vehicle interior