SECTION 412-03: Air Conditioning

VEHICLE APPLICATION : 2008.0 Falcon

CONTENTS PAGE

(Continued)

SPECIFICATIONS

General Specifications

Description	Specification
A/C compressor 10S17C	
Displacement	188 cc
Cylinder bore	32.0 mm (1.26 in)
Cylinder stroke	23.38 mm (0.92 in)
Rotation	Clockwise
Magnetic clutch	
Air gap between pulley and hub	0.35 mm - 0.60 mm (0.014 in - 0.024 in)
Evaporator temperature thermistor switching-Automatic Climate Control	
Evaporator air outlet temperature cycling (Measured at Evaporator Themistor) in all modes except Demist mode	Compressor clutch cut out - 4.7-6.3°C
Centre vent air outlet temperature cycling (measured at Face centre vent) in all modes except Demist mode	At MAX cold (face vent, full cold set temperature, max fan speed), centre vent air outlet temperature is within 2°C of evaporator thermistor temperature
A/C pressure relief valve (in compressor)	
Open	3,430 - 4,100kPa (497 - 595psi)
A/C pressure cut-off switch (pressure transducer)	
low pressure cut-out	200kPa
high pressure cut-out	3,100kPa
Engine cooling fan switching pressures	
high speed fan on	2100kPa
High speed to low speed fan	1800kPa at idle
Thermal Expansion (TX) Valve	
Type	Box type valve
Size/Setting	BG19849A 1.5 Ton Low side pressure setting, 108kPa @ 0°C and 225kPa at 10°C
Lubricants	
PAG Compressor Oil ND-Oil 8 (250 cc can - AY19L000A)	120cc (supplied in new compressor)
Refrigerant R-134a (YN-19)	470 ± 30g

Torque Specifications

Description	Nm
A/C compressor to comp bracket bolt (black colour) - upper front mount	23
A/C compressor to comp bracket bolts (silver grey colour) - lower front and both rear mounts	23
A/C compressor bracket to engine bolts - I6	48
A/C compressor bracket to engine bolts - V8	28
A/C liquid line to front LH apron body clamp bolt	7
A/C liquid line (service part only) union joint nuts	13
A/C compressor to suction & discharge hose bolts	10
A/C tubes through TX Valve to Evaporator E-clamp bolts	3.5
Suction tube (V8) clamp to side rail screw	6
Suction hose/tube clamp to spring tower nut	35
A/C condenser core to discharge hose bolt	5
A/C condenser core to liquid line bolt	10
A/C condenser mounting bracket to radiator bolts	7
A/C condenser mounting bracket to condenser core bolts	5.5
A/C condenser receiver/modulator cap/plug (to access filter/drier)	3
Discharge hose to radiator side tank bolt	7
Discharge hose clamp (V8) to cross member bolt (including radiator hose guide)	15
Power steering cooler to condenser bracket nut	4
Pressure transducer into discharge hose fitting	11

O-Ring Specifications

Description	Part No
Refrigerant O-Ring, black liquid line (small)	V890158S
Refrigerant O-Ring, black discharge hose & evap inlet (medium)	BG19E889A
Refrigerant O-Ring, black suction hose/tube & evap outlet and suction sub tube (large)	V890157S

DESCRIPTION AND OPERATION

Air Conditioning Safety Precautions

WARNING: To avoid injury, disconnect the positive lead from the vehicle battery before servicing the Climate Control system

WARNING: To avoid accidental deployment and possible injury, the air bag system backup power supply must be depleted before repairing any HVAC (Heating, Ventilation and Air Conditioning unit) components. To deplete the backup power supply, disconnect the battery positive cable and wait one minute. Failure to follow these instructions may result in personal injury.

WARNING:

Use only R-134a refrigerant

WARNING:
R-134a is classified as a safe refrigerant, but misuse can make it dangerous. The following precautions must be observed. Failure to follow these instructions may result in personal injury.

- **Always wear safety goggles when repairing an air conditioning system.**
- **Avoid contact with liquid refrigerant R-134a. R-134a vaporizes at approximately -25°C (-13°F) under atmospheric pressure and it will freeze skin tissue.**
- **R-134a refrigerant cylinders must be stored in a cool dry place away from the risk of fire or sources of heat, and must be maintained in ambient temperatures below 52°C**
- **Never allow refrigerant R-134a gas to escape in quantity in an occupied space. R-134a is non-toxic, but it will displace the oxygen needed to support life.**
- **Allow the engine to cool sufficiently prior to carrying out maintenance or serious burns and injury can occur.**

WARNING: Take care when using R134a Refrigerant Oil (PAG Compressor ND Oil-8), as follows:

- **When handling the HFCR134a refrigerant oil, please wear gloves.**
- **HFC134a refrigerant oil is very hygroscopic (absorbs moisture). Keep the oil container sealed at all times.**
- **HFC134a refrigerant oil reacts with some plastics. Keep it stored in metal container. (Plastic bottle should only be used for o-ring lubrication.)**
- **Care should be taken not to spill the HFC134a refrigerant oil on paint work, and plastic. If this is accidentally done, wipe immediately.**
- **Clearly identify the refrigerant oil when transferred to a different container.**

CAUTION: To avoid damaging the vehicle or A/C components, the following precautions must be observed:

- **Do not add R-12 refrigerant to an A/C system that requires the use of R-134a refrigerant. These two types of refrigerant must never be mixed. Doing so can damage the A/C system.**
- **A number of manufacturers are producing refrigerant products that are described as direct substitutes for refrigerant R-134a. The use of any unauthorized substitute refrigerant can severely damage the A/C components. If repair is necessary, use only new or recycled refrigerant R-134a.**
- **Do not remove the sealing caps from a new component until ready to install, as moisture absorption from the air can deteriorate the A/C system performance and/or result in A/C component corrosion.**
- **Refrigerant oil will absorb moisture from the atmosphere if the oil container is left uncapped. Do not open an oil container until ready to use, and install the cap immediately after using. Store the oil in a clean, moisture-free container.**
- **Air conditioning O-rings are made from a material compatible with refrigerant and refrigerant oil. Always use the correct replacement air conditioning O-ring, or A/C system leakage may occur.**
- **If an A/C O-ring is not supplied with A/C hose assembly, coat the refrigerant O-ring with refrigerant oil before assembling.**
- **When installing a refrigerant line, avoid sharp bends. Position the line away from the exhaust or any sharp edges that can chafe the line.**
- **The aluminum fittings used in the refrigerant system will not tolerate over-tightening.**
- **Do not open a refrigerant system or uncap a new component unless it is as close as possible to room temperature. This will prevent condensation from forming inside a component that is cooler than the surrounding air.**

CAUTION: To avoid contamination of the A/C system:

- **Keep service tools and the work area clean.**
- **Never open or loosen a connection before discharging the system.**
- **When loosening a connection, if any residual pressure is evident, allow it to leak out before opening the fitting.**

DESCRIPTION AND OPERATION (Continued)

Before charging an A/C system where a new component has been installed or a system has been serviced after discharging through leakage, evacuate the system to remove all air/moisture.

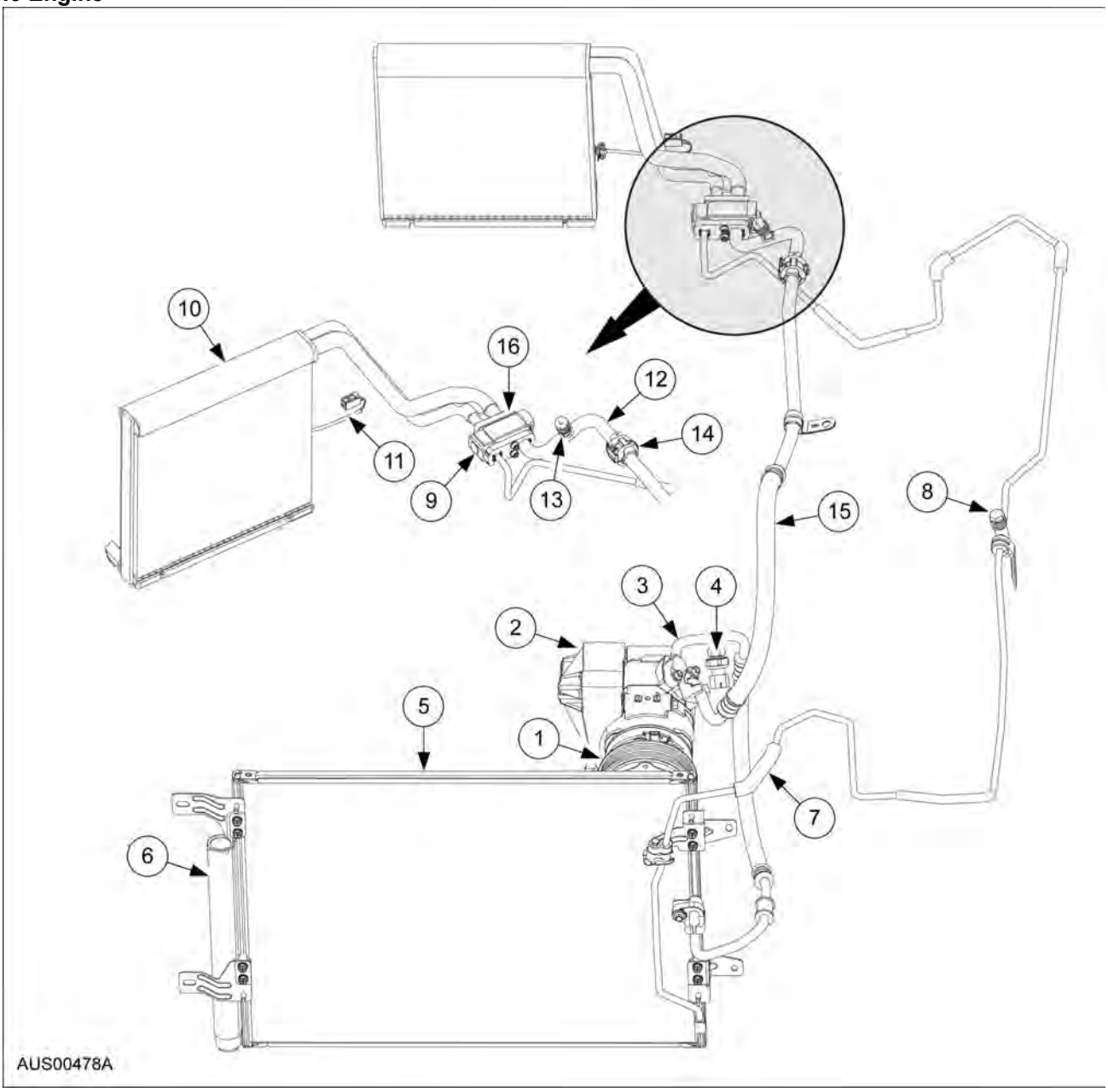
Seal open fittings with a cap or plug immediately after disconnecting a component from the system.

Clean the outside of the fittings thoroughly before disconnecting a component from the system.

Climate Control System

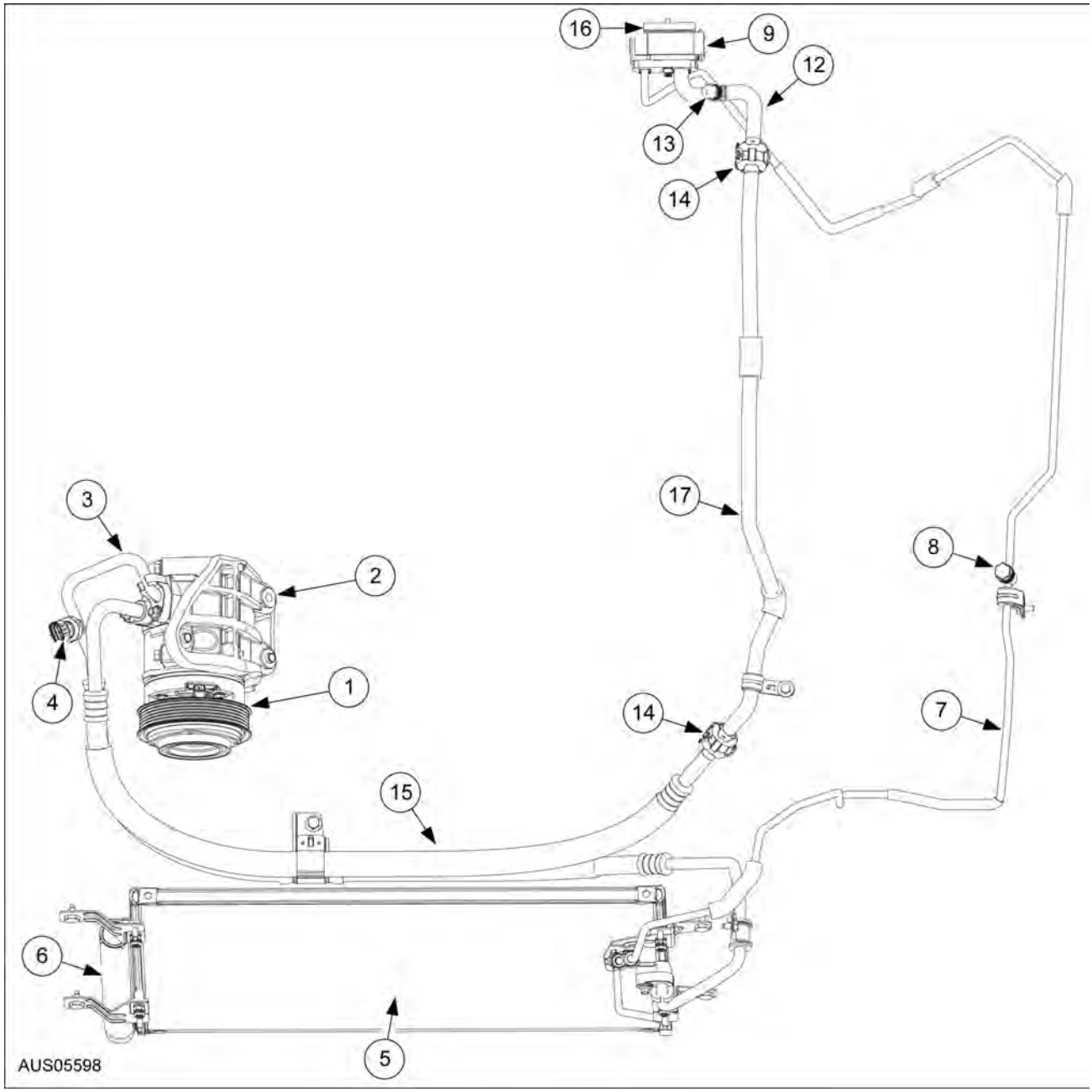
Clutch Cycling Refrigerant System Components ("The refrigerant cycle")

I6 Engine



DESCRIPTION AND OPERATION (Continued)

V8 Engine



Item	Description
1	Compressor + Clutch assembly
2	Compressor bracket
3	Discharge hose (compressor outlet/condenser inlet)
4	A/C Pressure Transducer
5	Condenser core
6	Condenser receiver/modulator (includes A/C system filter/drier)
7	A/C Liquid Line (condenser to evaporator)
8	A/C Charge Port (high pressure side)

Item	Description
9	Thermal Expansion Valve (TXV)
10	Evaporator core
11	Evaporator temperature thermistor
12	Suction sub-tube
13	A/C charge port (low pressure side)
14	Quick connect assembly
15	Suction hose (compressor inlet)
16	Evaporator E-clamp (between evaporator tubes and TXV)
17	V8 suction tube (between suction sub-tube and suction hose)

DESCRIPTION AND OPERATION (Continued)

The A/C refrigerant system is a clutch cycling, thermal expansion valve system. The system consists of the following major components:

- A/C compressor/clutch assembly
- A/C condenser core with modulator (receiver with serviceable filter /dryer)
- A/C evaporator core
- connecting refrigerant lines
- Thermal expansion valve (TXV)

The refrigerant system operation is controlled by the following:

- Thermal Expansion Valve (TXV)
- Evaporator temperature thermistor (A/C cycling switch)
- A/C compressor pressure relief valve
- A/C pressure transducer (pressure cut-off switch)

The refrigerant system incorporates an A/C compressor controlled by an Evaporator temperature thermistor.

The Evaporator thermistor senses A/C evaporator core temperature to control A/C compressor operation.

An A/C compressor pressure relief valve is installed in the compressor to protect the refrigerant system against excessively high refrigerant pressures, and a pressure transducer in fitted to the A/C discharge hose assembly to control the system temperature and pressure by switching the engine cooling fan.

The Thermal Expansion Valve, mounted on the evaporator inlet/outlet tubes, controls the flow of liquid refrigerant into the A/C evaporator core by monitoring the state of refrigerant exiting the evaporator.

Differences between the 2008 Falcon and 2006 BA Falcon Air Conditioning Systems

The 2008 Falcon Air Conditioning system is a completely new system featuring an upgrade in technology, and the major components in the 2008 Falcon A/C system are NOT compatible with the BF Falcon. The system is now a Clutch Cycling Thermal Expansion Valve (TXV) Refrigerant System with a sub cooled condenser.

The 2008 Falcon A/C system requires significantly less refrigerant charge than the BF Falcon. Note that incorrect refrigerant charge can cause excessively high discharge pressures resulting in compressor damage, compressor cut-out, excessive operating noise or poor A/C performance.

The TXV modulates the refrigerant flow in the circuit via a variable orifice opening and, combined with the sub cooled condenser, eliminates the need for a suction accumulator. This TXV replaces the fixed opening Orifice Tube used in the BF Falcon.

The compressor contains a new oil quantity, hence a different part number and is NOT compatible with the BF A/C system.

The 2008 Falcon I6 A/C compressor bracket is different to the BF in that it has added bosses at the top to locate an engine lifting eye.

The 2008 A/C condenser assembly is different in construction, size, mounting points, inlet/outlet fittings and operating characteristics to the BA/BF condenser assembly, and uses new mounting bolts. The new sub-cooled condenser features an integral receiver/modulator with a serviceable filter/drier assembly. The condenser receiver/modulator replaces the suction accumulator used in the BF Falcon.

In the 2008 Falcon, some of the tube pad fitting joints are different to the BF Falcon, in that the tube extends right through the pad fitting and is no longer brazed to the fitting, thus reducing the potential for leakage. These new tube fittings require new mounting bolts.

The Condenser Inlet (Discharge) hose has a revised routing, new pad fittings requiring different joint bolts and a support on the radiator side tank using a saddle clamp.

A new Compressor Inlet (Suction) hose now mounts to the suction sub-tube on the liquid line manifold with a quick joint and clamp. The hose routing is different to BF and the compressor end of the hose assembly has a new pad fitting requiring a different joint bolt. The quick joint assembly is unchanged from BF Falcon.

The 2008 Falcon features a new Condenser to Evaporator tube (A/C liquid line). The tube is now 8.0mm in outer diameter and without any hose section, and requires two new smaller diameter refrigerant O-rings. The liquid line now includes a manifold that interfaces to the TXV. It includes two service charge points, a high pressure discharge port on the body apron adjacent to the fender/mudguard (same as the BF location) and a low pressure suction port located on the suction sub-tube outlet on the manifold. The Liquid line is also now clipped to the body in two locations using plastic clips, and has a new pad fitting requiring a different joint bolt at the condenser end of the tube.

If the 2008 Falcon A/C liquid line is to be replaced, there is a new service replacement liquid line with two extra joints compared with the original equipment (OE) liquid line. The new service liquid line is required because the OE liquid line must be cut to remove the line, and the added joints allow for liquid line assembly without removal of major adjacent components.

The TXV mounts between a new evaporator E-Clamp and the liquid line manifold, with bolts that pass through the liquid line manifold and TXV and thread into the E-clamp.

The 2008 Falcon evaporator assembly is different to the BF, with an all new 38mm thick core that has a revised refrigerant flow path, a new dash panel pass-through seal and revised tube end fittings on the inlet/outlet tubes to suit the TXV. The evaporator inlet/outlet tubes have a different pitch to BF and use

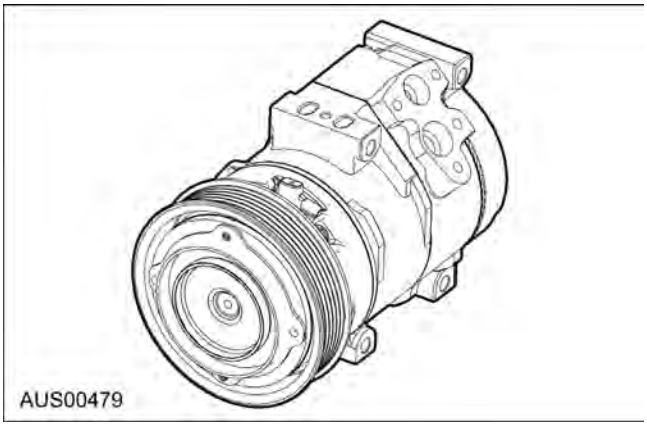
DESCRIPTION AND OPERATION (Continued)

different refrigerant O-rings. The evaporator temperature thermistor is also new, using a different type of sensor in a new location and a revised mounting in the HVAC case, along with the software in the HIM that controls the thermistor switching points.

The 2008 Falcon features the BF Falcon single engine cooling fan with new 16mm radiator on all I6 vehicles, except for the Turbo variants and 1 tonne Ute. The BF twin cooling fans and new 27mm radiator are placed on all I6 Turbo and one tonne Utes, and on all V8 vehicles.

All new radiators have been fitted with foam seals on the front face, along the top rail and down the two side tanks. The lower air deflector also has a foam seal that sits on its upper surface directly underneath the condenser core. These seals have been fitted to prevent hot air recirculating from the engine bay around to the front of the radiator and condenser.

A/C Compressor and Clutch Assembly



NOTE: The 2008 AC compressor contains a different quantity of oil and hence is NOT compatible with the BA/BF Falcon compressor.

NOTE: Internal A/C compressor & compressor clutch components are not repaired separately. Install a new A/C compressor only as an assembly.

NOTE: Installation of a new filter/dryer is required when repairing the air conditioning system when there is physical evidence of system contamination from a failed A/C compressor, evidence of the A/C system being open to the atmosphere/leaking or evidence of moisture absorption. The serviceable filter/dryer is located in the condenser receiver/modulator.

The 10S17C A/C compressor has the following characteristics:

- a 10-cylinder swashplate design
- displacement of 188cc
- A two-piece lip-type seal is used to seal the shaft opening in the assembly.
- Five double-acting pistons operate within the cylinder assembly. The pistons are actuated by a swashplate that changes the rotating action of the shaft to a reciprocating force.
- Reed-type discharge valves are located between the cylinder assembly and the head at each end of the A/C compressor.
- The A/C compressor uses PAG Compressor Oil ND-Oil 8 or equivalent (meeting Ford specification WSH-M1C231-B). This oil contains special additives necessary for the A/C compressor.

The magnetic A/C clutch has the following characteristics:

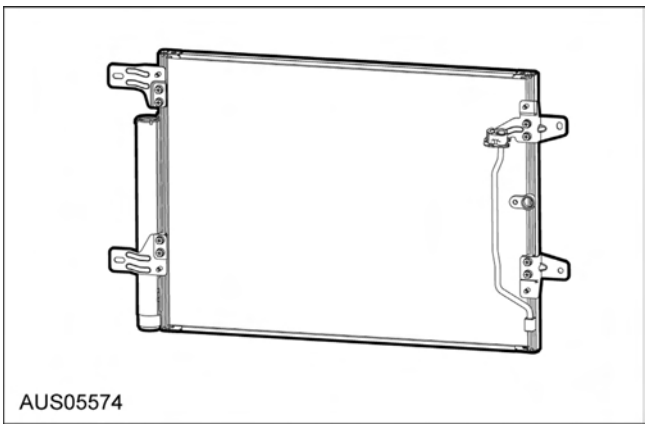
- It drives the compressor shaft.
- When battery positive voltage (B+) is applied to the A/C clutch field coil, the clutch disc and hub assembly is drawn toward the A/C clutch pulley.
- The magnetic force locks the clutch disc and hub assembly and the A/C clutch pulley together as one unit, causing the compressor shaft to rotate.
- When B+ is removed from the A/C clutch field coil, springs in the clutch disc and hub assembly move the clutch disc away from the A/C clutch pulley.

A/C Compressor Pressure Relief Valve

An A/C compressor pressure relief valve is incorporated in the compressor A/C body to:

- relieve unusually high refrigerant system discharge pressure build-ups of 3.43MPa [497 psi] and above.
- prevent damage to the A/C compressor and other system components.
- avoid total refrigerant loss by closing after the excessive pressure has been relieved.

A/C Condenser Assembly



The 2008 A/C condenser assembly is different in construction, size, mounting points, inlet/outlet fittings and operating characteristics to the BA/BF condenser assembly:

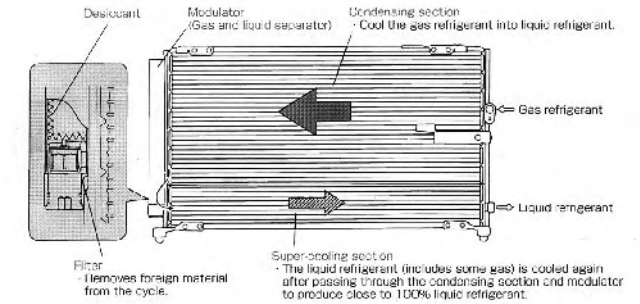
The 2008 condenser is a sub-cooled design with an integral receiver/modulator containing a filter/ dryer that is a serviceable item. This condenser filter/drier replaces the BA/BF filter/drier located in the accumulator assembly.

DESCRIPTION AND OPERATION (Continued)

The condenser uses an aluminium plate-and-fin design heat exchanger located in front of the vehicle radiator, in which the compressed refrigerant gas is cooled by allowing air to pass over the fins and tubes-inside-the-plates to extract heat and by condensing gas to liquid refrigerant as it is cooled.

Compared to the BA/BF Falcon, the cooling performance has been improved. The refrigerant path is divided into two sections, the initial upper section of the core where the refrigerant gas is condensed to liquid, and after the modulator/receiver, there is a sub-cooled section of the core where the liquid is super-cooled to improve efficiency.

Gas and liquid refrigerant are drawn into the top of receiver/modulator, and after the modulator separates the gas from liquid, the liquid flows out into the lower sub-cooled rows of the condenser core. The separation ensures predominantly liquid is sent to the subsequent super-cooling section of the condenser core.



The following is an explanation of how the gas and liquid refrigerants are separated.

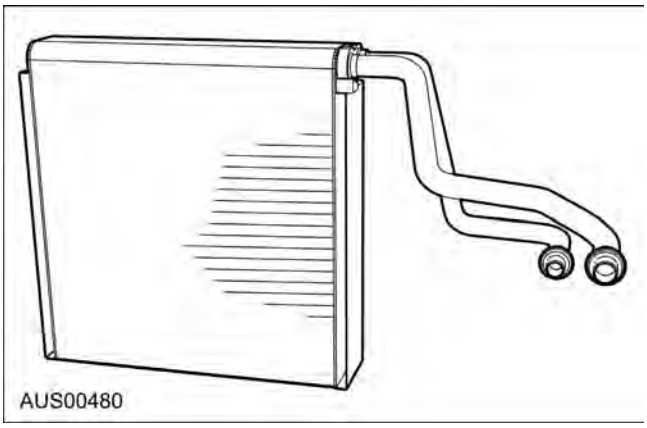
1. Some portion of gas will enter the gas area inside the receiver/modulator tank (upper section of the receiver) depending on the buoyancy, and be cooled and condensed by the outside air. The liquid level is then maintained at a balance point between gas and liquid refrigerant.
2. If the amount of incoming gas to the receiver/modulator tank increases, the liquid level will be pushed down. As a result, an additional amount of liquid refrigerant is supplied to the refrigeration circuit.
3. Alternatively, if the amount of incoming gas to the receiver/modulator tank decreases, the gas in the top section of the tank will be condensed and the liquid level will rise. Surplus refrigerant for the A/C circuit will then be stored in the modulator.

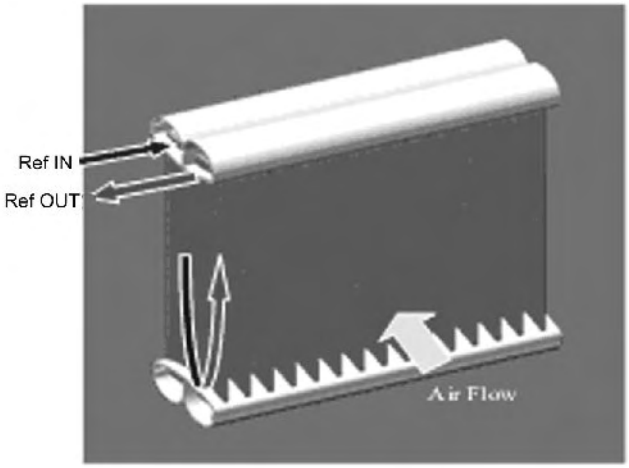
Refrigerant Dye

An R-134a fluorescent tracer dye has been added to the A/C system of this vehicle, supplied in the condenser filter/drier. The refrigerant dye has a limited life of ~500 hours of air conditioning operation.

Leak checking can be performed with an ultra-violet lamp and viewed through ultra-violet glasses.

A/C Evaporator Core





The HVAC assembly contains the A/C evaporator core. The A/C evaporator core is the plate/fin type with a unique refrigerant flow path. A mixture of low pressure refrigerant vapour/ liquid enters the inlet (smaller diameter) tube of the evaporator core from the TXV and is routed so it flows downwards then upwards through the core tubes. The refrigerant exits the evaporator core (larger diameter tube) as a low pressure vapour and flows to the inlet port of the compressor.

Refrigerant flow to the evaporator must be controlled to obtain maximum cooling, while ensuring that complete evaporation of the liquid refrigerant takes place. This is accomplished by the Thermal Expansion Valve (TXV)

The amount of refrigerant that flows to the evaporator inlet is adjusted via the metering orifice at the TXV inlet. The orifice opening is governed by the evaporator outlet temperature reacting on the refrigerant filled diaphragm sensing bulb, which is located at the TXV outlet.

DESCRIPTION AND OPERATION (Continued)

Evaporator temperature thermistor

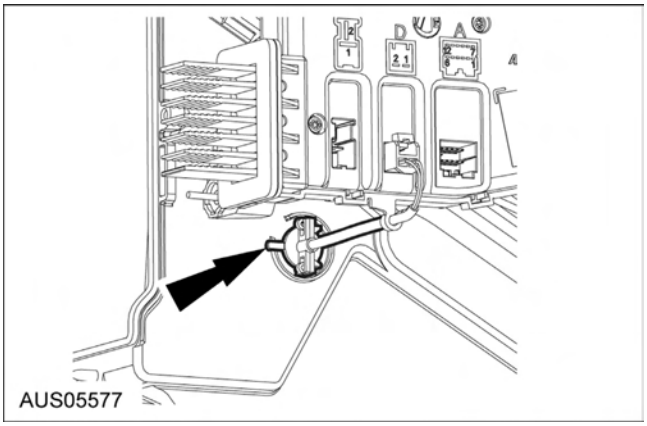
The evaporator temperature thermistor is located on the driver's side of the evaporator core towards the lower face of the core. The tip of the thermistor is an NTC (temperature sensing) resistor which is connected via a harness to the HIM (HVAC Integrated Module). The thermistor is located in an optimised position on the core face and controls compressor "ON"/"OFF" set points as the evaporator air-off temperature changes.

The HIM Module changes the compressor switching set points depending on blower fan speed, and thus prevents evaporator core ice up. Varying the fan speed also varies the set point for cycling the compressor clutch. It is not necessary to remove the evaporator core when replacing the thermistor.

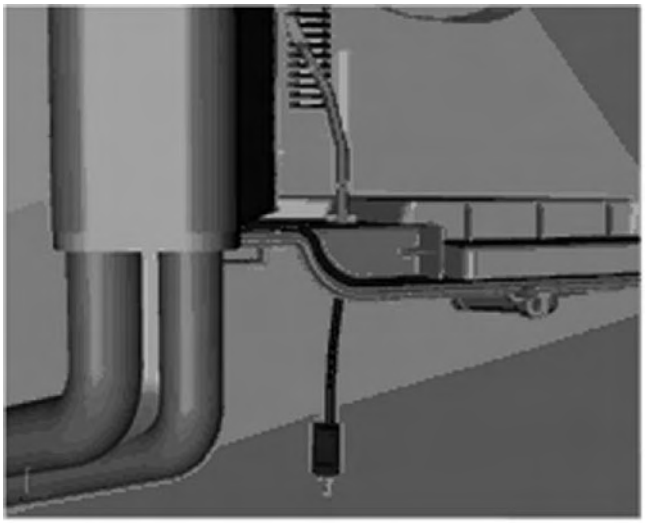
The position of the thermistor in relation to the evaporator air-off airflow is set to the specified location by means of the angled plastic housing of the thermistor and the bayonet type fitting into the passenger side of the HVAC sump.

The position of the thermistor in relation to the evaporator air-off airflow is critical for efficient operation of the refrigeration system. It is therefore vital that the correct removal and replacement procedure is followed as incorrect positioning of the thermistor will adversely affect efficiency, and could also result in evaporator core ice up.

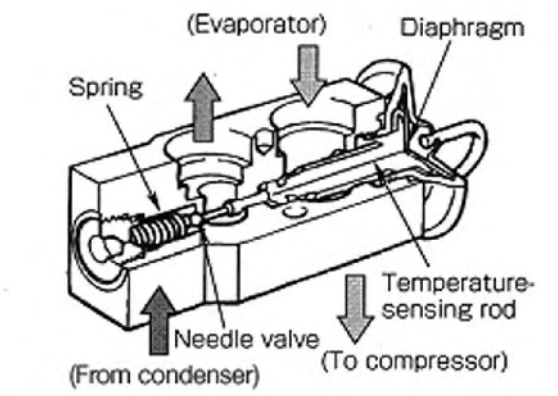
Thermistor



Thermistor Location



Thermal Expansion Valve (TXV) Assembly

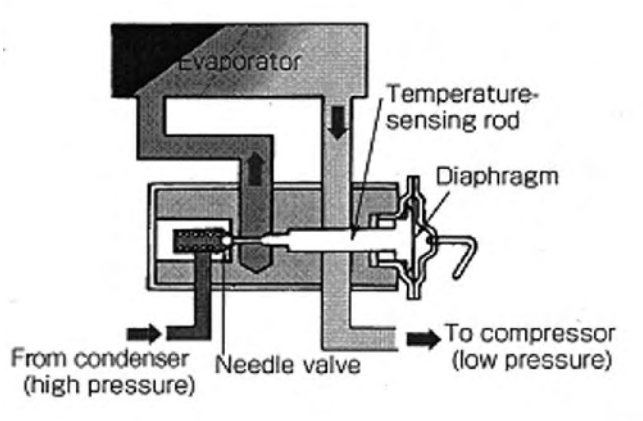


The Thermal Expansion Valve (TXV) is basically a variable orifice opening, consisting of a valve that has both the evaporator inlet and outlet tubes passing through it. The TXV incorporates an orifice opening adjustable via needle valve and spring, diaphragm, temperature-sensing rod and exterior noise insulation.

The TXV has two functions.

1. It converts high temperature, high pressure liquid refrigerant to low temperature, low pressure refrigerant vapour, via the orifice opening
2. It controls the refrigerant flow rate so that the evaporator refrigerant has an adequate superheat at the evaporator outlet, by adjusting the opening (orifice size) of the needle valve

DESCRIPTION AND OPERATION (Continued)



Refrigerant gas is sealed in a chamber above the diaphragm. The evaporator refrigerant outlet pressure is applied to the bottom of the diaphragm.

The temperature-sensing rod senses the refrigerant temperature after it has passed through the evaporator. This temperature is transmitted to the diaphragm chamber top section through the temperature-sensing rod. As the refrigerant gas pressure varies with the temperature, the diaphragm position is moved up or down as the evaporator outlet temperature/pressure changes. The temperature-sensing rod is linked directly to the diaphragm and therefore adjusts the degree of opening of the needle valve/orifice opening.

When the evaporator outlet temperature is low (when the thermal load is low)

The pressure of the gas in the diaphragm chamber drops, the volume is reduced, the temperature-sensing rod moves to the right (see sectional view above), and the needle valve moves toward closed.

When the evaporator outlet temperature is high (when the thermal load is high)

The pressure of the gas in the diaphragm chamber rises, the volume is increased, the temperature-sensing rod moves to the left (see sectional view above), and the needle valve moves toward open.

Refrigerant Lines

NOTE: Installation of a new filter/dryer is required when repairing the air conditioning system when there is physical evidence of system contamination from a failed A/C compressor, evidence of the A/C system being open to the atmosphere, evidence of A/C system leaking or evidence of moisture absorption.

In the 2008 Falcon, some of the tube pad fitting joints are different to the BF Falcon, in that the tube extends right through the pad fitting and is no longer brazed to the fitting, thus reducing the potential for leakage.

The 2008 Falcon features a new condenser to evaporator tube (A/C liquid line). The tube is now 8.0mm in outer diameter and without any hose section. It also has a new routing. The liquid line now includes a manifold that interfaces to the TXV. It includes two service charge points, a high pressure discharge port adjacent to the fender/mudguard (same as the BF location) that is used in the assembly plant and a low pressure suction port, for service, located on the suction sub-tube on the Liquid line manifold. The Liquid line is also now clipped to the body in two locations using plastic clips.

If the 2008 Falcon A/C liquid line is to be replaced, the new service replacement liquid line has two extra joints compared with the original equipment (OE) liquid line. The new service liquid line is required because the OE liquid line must be cut to remove the line, and the added joints allow for liquid line assembly without removal of major adjacent components. The extra joints in the service replacement liquid line are located forward of the TXV mounting manifold and near the high pressure service charge port .

The condenser inlet hose (discharge hose) contains high temperature high pressure refrigerant vapour. This discharge hose incorporates an A/C pressure cut-off switch (pressure transducer) which disables the compressor in the event of excessively high or low system pressures, and is used to select low or high condenser fan speeds. The discharge hose is now mounted to the Radiator side tank with a clamp.

The compressor inlet hose (suction hose) contains low temperature low pressure refrigerant vapour. For all models, the suction hose/tube is attached to the suction sub-tube on the liquid line manifold via a quick-connect clamp. In the V8 vehicle, the suction hose and additional suction tube join via a second quick-connect clamp at the front of the engine. The suction hose incorporates a low pressure charge port valve which is used for all A/C system servicing.

All hose/tube assemblies contain refrigerant O-rings which are retained in a recessed groove. These O-rings seal against leakage using radial compression once the joint is fully assembled and further tightening of the fitting bolt or tube nut will not improve the sealing performance. These O-rings are black in colour and made of a special material compatible with refrigerant and refrigerant oil. Use only black genuine Ford refrigerant O-rings for replacement (refer to Specifications table at the start of this section).

Air Conditioning Joint Design

In the A/C system, there are 2 types of joints:

- Radial seal pad fitting
- Radial seal quick joint and clamp
- Compression seal with nut and union - service liquid line only

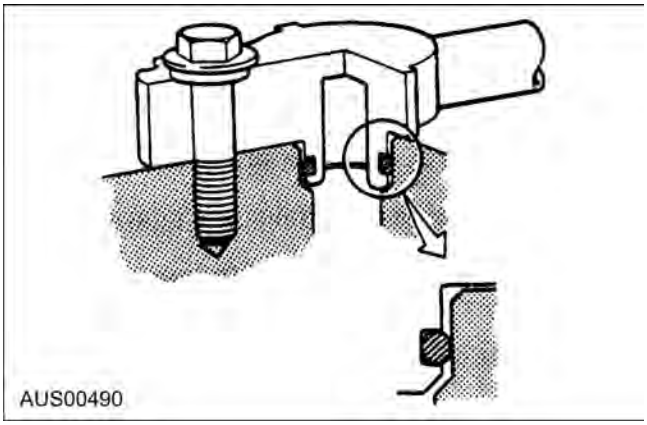
For all radial seal joints, the O-ring is retained in a recessed groove. The O-ring seals against leakage using radial compression. Once the joint is fully assembled, further tightening of the fitting bolt or tube nut will not improve the sealing performance. Full insertion of the tube joint is critical to prevent O-ring

DESCRIPTION AND OPERATION (Continued)

damage. All retained O-rings are black refrigerant O-rings made from a special material compatible with refrigerant and refrigerant oil. All quick joints use two black retained refrigerant O-rings for sealing (refer to Specifications table at the start of this section).

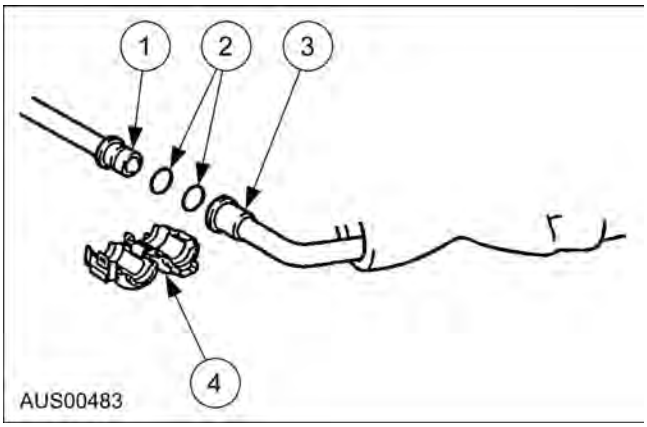
Prior to making any hose/tube connections, lubricate the O-ring with refrigerant oil to avoid refrigerant leakage.

Fine fibre and dust can affect seal performance. When disassembling joints, keep fittings capped to prevent O-ring damage, contamination and moisture ingression.



For all compression seal joints such as in the service liquid line nut-union joint, the tightening torque is critical for ensuring that the joint does not leak. The specified torque ensures that the O-ring is compressed sufficiently for full contact sealing without O-ring damage.

Quick Joint Connection



Item	Description
1	Male fitting
2	O-ring, suction
3	Female fitting
4	Quick joint clamp

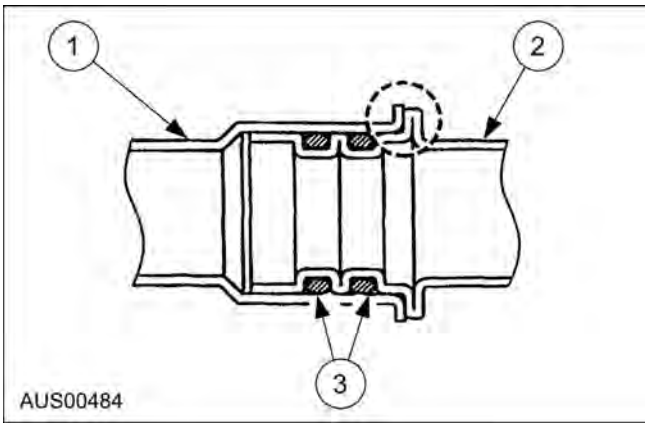
The quick joint connection is a refrigerant line coupling held together with a plastic clamp. The plastic clamp has locking tabs that grip the tube shape and hold tubes together.

The o-ring seals are black in colour and made of a special material compatible with refrigerant & refrigerant oil. Use only black genuine Ford refrigerant O-Rings in this location (refer to Specifications table at the start of this section).

A special service tool is required to remove the quick joint connector. The use of the special tool is important for proper removal of the quick joint.

Male fitting (suction hose) must be fully inserted into female fitting.

Lubricate o-rings with refrigerant oil to ensure smooth insertion and O-ring sealing.

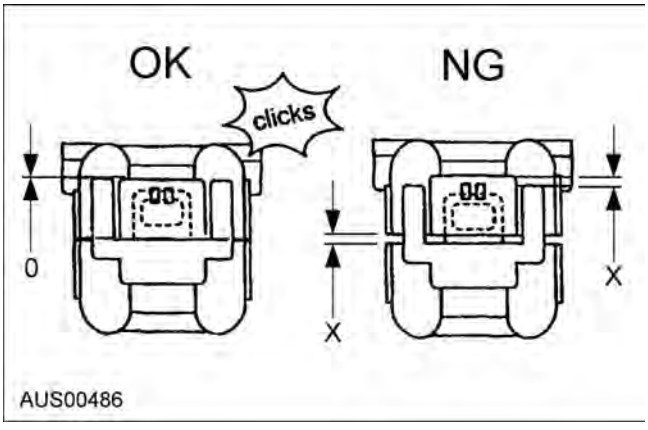


Item	Description
1	Female fitting
2	Male fitting
3	O-Ring seals

Quick joint clamp wraps around the tube connection.

Interlocking tabs on clamp hold quick-connect in place.

Quick joint clamp clicks shut.

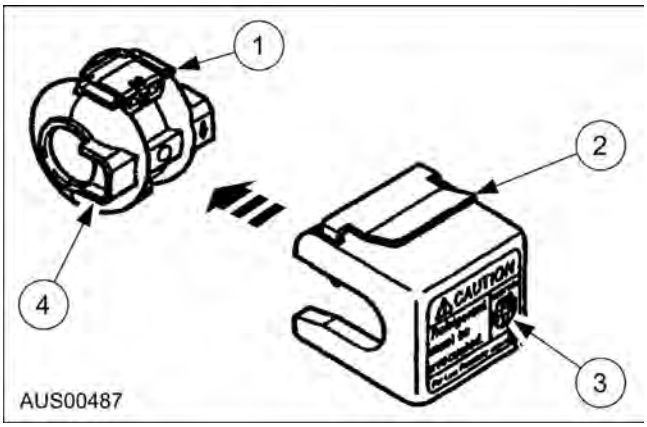


If gap exists, clamp cannot be closed.

Clamp can rotate freely on tube joint until A/C system is charged with refrigerant.

DESCRIPTION AND OPERATION (Continued)

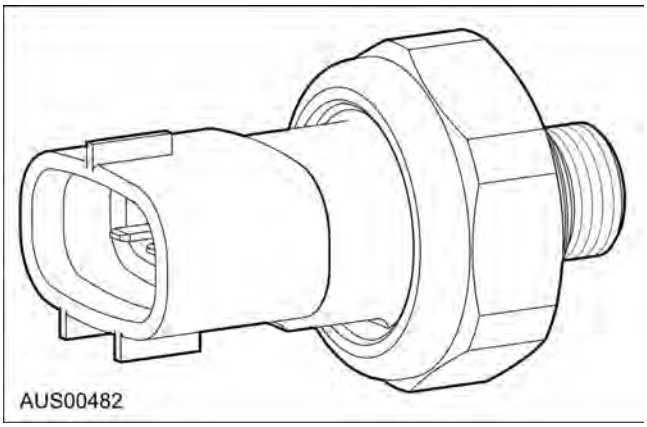
Alignment of clamp guide to quick joint clamp removal tool is required for clamp removal.



WARNING: It is extremely important that the quick joint be assembled correctly prior to charging the A/C system with refrigerant. If the connection is not fully closed, the joint may separate and leak high pressure refrigerant during or after charging.

Item	Description
1	Clamp interlocking tabs
2	Stopper lever
3	Quick joint clamp removal tool
4	Clamp guide

A/C Pressure Transducer (Pressure Cut-Off Switch)



The A/C pressure transducer is mounted on the high pressure discharge hose assembly.

CAUTION: It is necessary to discharge the refrigerant system before removing the A/C pressure transducer.

The A/C pressure transducer is used to interrupt A/C compressor operation in the event of high or low system discharge pressures, as described below

If the compressor discharge pressure drops below 200kPa, the pressure transducer sends a signal to the PCM/EEC which disengages the A/C compressor.

If the compressor discharge pressure rises to approximately 3100kPa, the pressure transducer sends a signal to the PCM which disengages the A/C compressor.

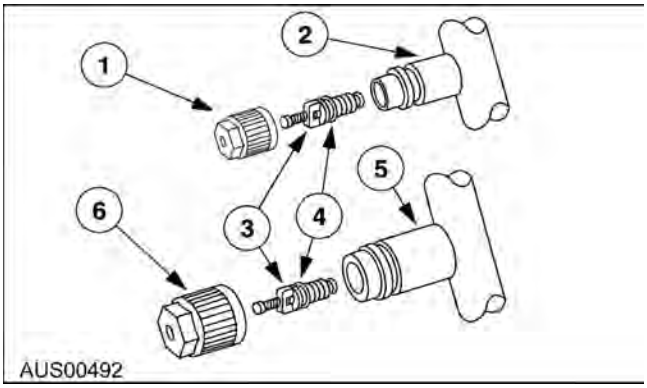
When the pressure drops to approximately 2500kPa, the pressure transducer signal via the PCM allows the A/C compressor to re-engage.

The A/C pressure transducer output is also monitored on compressor clutch engagement, to determine if the pressure rise is normal, where an insufficient pressure rise may be caused by a faulty compressor or loose belt drive.

The pressure transducer is also used for engine cooling (condenser) fan control. The A/C requirements are monitored via the compressor discharge pressure output from the pressure transducer. This pressure data is transmitted to the Powertrain Control Module, which then controls the fan(s) via relays, and when required, operates the fans at low speed or high speed. The fan speed settings will depend upon the powertrain cooling and A/C cooling demands, and will also use engine rpm, throttle position, vehicle speed and fan timers in the A/C fan switching strategies, which are detailed under Engine Cooling Fan(s) in this section.

Charge Port Valves

The high-pressure charge port valve is located on the A/C condenser to evaporator line (liquid line). The low-pressure charge port valve is now located on the suction sub-tube on the liquid line manifold. The low pressure charge port is used for all service charging.



Item	Description
1	A/C assembly plant charging valve cap (high pressure)
2	A/C liquid line
3	Charge port valve
4	O-ring seal
5	A/C suction sub-tube on liquid line manifold
6	A/C service charging valve cap (low pressure)

DESCRIPTION AND OPERATION (Continued)

The fitting is an integral part of the refrigeration line or component.

Special couplings are required for both the high-side and low-side charge ports.

The Schraeder-type valve core can be replaced if the seal leaks.

Always install the appropriate A/C charging valve cap on the charge port valves after repairing the refrigerant system.

The high pressure charge port cap located on the liquid line charge port is smaller than the low pressure charge port cap located on the suction sub-tube on the liquid line manifold.

Engine Cooling Fans (Condenser Fans)

The 2008 Falcon features the BF Falcon single engine cooling fan with new 16mm radiator on all I6 vehicles, except for the Turbo variants and 1 tonne Ute. The BF twin cooling fans and new 27mm radiator are placed on all I6 Turbo and one tonne Utes, and on all V8 vehicles.

All radiators have been fitted with foam top and side seals to prevent hot air recirculating around the radiator and condenser from the engine bay, and the lower air deflector also has a foam seal that sits under the condenser core.

The electric engine cooling fan(s) mount directly behind the radiator assembly in a fan shroud assembly.

For the single cooling fan, low fan speed is 1120rpm and high fan speed is 1760rpm. For the dual fans, low fan speed is 1400rpm and high fan speed is 2300rpm. For the dual fans, both engine cooling fans operate together in both low and high fan speeds.

The fan(s) are used for both engine cooling and air conditioning condenser cooling. The fan(s) are controlled by relays via the Powertrain Control Module, and when required, operate at low speed or high speed depending on the engine and A/C cooling demands. The A/C requirements are controlled via the pressure transducer, as described below

When the A/C switch is engaged below a set vehicle speed, the engine cooling fan is engaged automatically onto low fan speed. The fan is also disengaged above a set vehicle speed, if the compressor discharge pressure is acceptable.

If the compressor discharge pressure exceeds a set pressure for a given engine rpm, then low speed fan is engaged

If the vehicle is subjected to wide open throttle, the fan will be temporarily disengaged.

If the low speed fan switches off, it will remain for a minimum time period before it can be re-engaged, to prevent excessive fan cycling.

When the compressor discharge pressure reaches approximately 2100kPa, the pressure transducer signal via the PCM engages the high-speed fan control. Once engaged, the high speed fan will remain on for a minimum period of time to prevent excessive fan cycling.

Once high speed fan is engaged, the fan speed will drop down to low speed after the set time delay, if the 2100kPa pressure is not maintained (to cater for pressure spikes) or if the pressure drops below 1800 kPa.

The fan is also engaged automatically if there are engine/transmission cooling requirements, even if the A/C switch is off.

For the dual engine cooling fans, both fans operate together at both low and high fan speeds.

Refer to Wiring diagrams 303-03A- 00 -1 & -2 and Engine Cooling section 303-03 for further details.

⚠ CAUTION: When the ignition is ON, the fan(s) may start without warning.

⚠ CAUTION: During service operations, ensure that the fan is not rotated in a direction opposing normal operation (designated by an arrow on the fan blade), or this may damage the fan motor. For more information refer to Engine Cooling section 303-03.

Air Conditioning Relay

When the A/C switch is selected on the Front Display Module (FDM), an A/C Demand signal is sent to the Powertrain Control Module (PCM) via the CAN. When the PCM receives the A/C Demand signal, the PCM energises the Air Conditioning Relay (WAC relay, ACR). The air conditioning relay then energises the A/C compressor clutch.

NOTE: The A/C relay signal may be de-energised to disable the A/C compressor if conditions are unsuitable for A/C operation. (For example, engine overheat, faulty A/C components, etc. Refer to A/C Disable Chart in this section)

DIAGNOSIS AND TESTING

Air Conditioning

Inspection and Verification

In order to correctly diagnose the root cause of the fault, it is advisable that the technician follow the Air Conditioning System Fault Test process listed below.

System fault	System test A	System test B	System test C	System test D
A/C Cooling fault	A/C System Functional Inspection test, then	A/C Fault Symptom Chart, then	A/C System Performance test or A/C system leak test or A/C system noise test, then	Portable/Integrated Diagnostic System (PDS/IDS) or Pinpoint tests

A/C Functional Inspection Chart

A/C component	Result for Inspection Pass	System Fault for Inspection Fail
A/C system	Good cooling performance from system	Refer to A/C Fault Symptom Chart
A/C compressor	Engages with A/C on (comp clutch centre turns)	Wiring fault, refer pinpoint test A ICC fault, refer section 413-08.A/C cooling fault, refer A/C Fault Symptom Chart.
Compressor drive belt	Does not slip or whip when A/C is engaged	Accessory drive fault, refer section 303-05
A/C discharge hose	Hot to touch with A/C on	A/C cooling fault, conduct A/C Performance test
A/C liquid line at entry to TX valve	Warm/hot to touch with A/C on	A/C cooling fault, conduct A/C Performance test
A/C suction sub-tube at exit from TX valve	Cool to touch with A/C on NOTE: When tested in lower ambient environments, the suction tube temperature may not be significantly colder than the ambient temperature	A/C cooling fault, conduct A/C Performance test
Condenser fan	Air flow across condenser	A/C cooling fault, conduct A/C Performance test. Wiring fault, refer pinpoint test F
System blower fan speed & temperature selection	Air flow and cooling as selected, Blower operates at all fan speeds	Blower fault, refer section 412-04 Air distribution fault, refer section 412-02 A/C cooling fault, refer A/C Fault Symptom Chart

A/C Fault Symptom Chart

Symptom	Possible Cause Area	Possible Root Cause	Confirmation Test	Possible Fix
No A/C cooling	If Comp clutch engages	If Comp clutch engages		
	Refrigerant fault	Low A/C system charge	Conduct A/C Performance test, KOER test & A/C leak test at all joints	Repair any leaks, replace A/C system filter/drier & recharge A/C system to specification
		A/C system refrigerant blockage	Conduct A/C Performance test & KOER test	Replace blocked component & A/C system filter/drier

DIAGNOSIS AND TESTING (Continued)

Symptom	Possible Cause Area	Possible Root Cause	Confirmation Test	Possible Fix
	Poor compressor performance	Inefficient compressor pumping	Conduct A/C Performance test & KOER test	Replace Compressor assembly & A/C system filter/drier
		Loose comp drive belt	Visual Inspection of drive belt (Refer to section 303-05), Conduct A/C Performance test & KOER test	Replace drive belt or faulty tensioner
		Slipping comp. clutch	Visual inspection of comp clutch, Conduct A/C Performance test & KOER test	Replace Compressor assembly & A/C system filter/drier
	If Comp clutch is not engaging	If Comp clutch is not engaging		
	Electrical fault	Fuse or disconnected wire	Wiring fault, refer to Pinpoint test A	Repair circuit
		Comp clutch field coil open circuit	Refer to Pinpoint test A for clutch	Replace Compressor assembly & A/C system filter/drier
		WAC relay open circuit	Refer to Pinpoint test B for Relay	Replace relay
		ICC screen or control fault	ICC fault, refer to section 413-08	Refer to section 413-08
		HIM / CAN / BEM / PCM / EEC fault	Pinpoint test for each Part Refer to section 412-04, 413-08 or 303-14	Refer to section 412-04, 413-08 or 303-14
		Blower fan not operating	Pinpoint test for Blower fan, refer to section 412-04	Refer to section 412-04
		Insufficient battery voltage	Refer to section 412-04	Refer to section 412-04
	Compressor or clutch fault	Comp clutch slipping	Visual inspection for clutch slip, Conduct A/C Performance test & KOER test	Replace Compressor assembly & A/C system filter/drier
		Excessive clutch air gap	Visual inspection for clutch engagement and measurement of clutch air gap	Replace Compressor assembly & A/C system filter/drier
		Compressor seized	Hand turn compressor hub (at centre front of pulley)	Replace Compressor assembly & A/C system filter/drier
	Refrigerant fault	Low A/C system charge	Conduct A/C Performance test, KOER test & A/C leak test at all joints	Repair any leaks, replace A/C system filter/drier & recharge A/C system to specification

DIAGNOSIS AND TESTING (Continued)

Symptom	Possible Cause Area	Possible Root Cause	Confirmation Test	Possible Fix
	Refrigerant flow fault	TX valve jammed closed	Check temperatures of TXV entry and exit temperatures, Conduct A/C performance test & KOER test, conduct pinpoint test H on TXV	Replace TX valve
Insufficient A/C cooling	Refrigerant fault	Low A/C system charge due to improper initial charge	Conduct A/C Performance test, KOER test and A/C Leak test at all joints	Recharge A/C system to specification
		Air in A/C system due to poor evacuation	Conduct A/C Performance test & KOER test	Replace A/C system filter/drier & recharge A/C system to specification
		Moisture in A/C system	Conduct A/C Performance test & KOER test	Replace A/C system filter/drier & recharge A/C system to specification
		Contaminant in A/C system due to poor quality refrigerant	Conduct A/C Performance test & KOER test	Replace A/C system filter/drier & recharge A/C system to specification
		Excessive A/C system charge	Conduct A/C Performance test & KOER test	Recharge A/C system to specification
		Excessive refrigerant oil	Check repair history, conduct A/C Performance test & KOER test	Drain compressor, replace A/C system filter/drier, recharge refrigerant oil to specifications
	Refrigerant flow fault	TX valve partially blocked/restricted	Conduct A/C Performance test & KOER, conduct pinpoint test H on TXV	Replace TX valve
		TX Valve jammed open	Conduct A/C performance test & KOER test, conduct pinpoint test H on TXV	Replace TX Valve.
		A/C hose/tube flow restriction	Inspect for hose & tubing restrictions, kinks, delamination. Conduct A/C Performance test & KOER test	Replace faulty part & A/C system filter/drier

DIAGNOSIS AND TESTING (Continued)

Symptom	Possible Cause Area	Possible Root Cause	Confirmation Test	Possible Fix
	Air flow heat pick-up fault	Air duct heat pick-up fault after evaporator	Air distribution fault, refer to section 412-02	Refer to section 412-02
		Air inlet heat pick-up fault before evaporator	Air distribution fault, refer to section 412-02	Refer to section 412-02
		Air mix door position fault	Air distribution fault, refer to section 412-02	Refer to section 412-02
		Air mix door leak	Air distribution fault, refer to section 412-02	Refer to section 412-02
		Fresh/recirc door position fault	Air distribution fault, refer to section 412-02	Refer to section 412-02
		Fresh/recirc door leak	Air distribution fault, refer to section 412-02	Refer to section 412-02
	Poor evaporator performance	Restricted air flow through evaporator (clogged or damaged fins)	Conduct A/C Performance test & KOER test, inspect evaporator core	Replace Evaporator & A/C system filter/drier
		Restricted air flow to evaporator (filter or duct)	Air Distribution fault, refer to section 412-02	Refer to section 412-02
		Blower fan not operating correctly	Blower fault, refer to section 412-04, Pinpoint test L	Refer to section 412-04
		Evaporator refrigerant flow blocked/restricted	Conduct Pinpoint test D, Conduct A/C Performance test & KOER test	Replace Evaporator & A/C system filter/drier
	Poor compressor performance	Inefficient compressor pumping	Conduct A/C Performance test & KOER test	Replace Compressor assembly & A/C system filter/drier
		Slipping comp drive belt	Visual Inspection of Belt for drive belt wear. Refer to section 303-05, Conduct A/C Performance test & KOER test	Replace drive belt or faulty tensioner
		Slipping comp. clutch	Visual Inspection of clutch operation, Conduct A/C Performance test & KOER test	Replace Compressor assembly & A/C system filter/drier

DIAGNOSIS AND TESTING (Continued)

Symptom	Possible Cause Area	Possible Root Cause	Confirmation Test	Possible Fix
		Insufficient refrigerant oil quantity causing comp seizure	Assess oil amount in system, using A/C Noise test and hand turn compressor hub (at centre front of pulley). Conduct A/C Performance test & KOER test	Replace A/C system filter/drier, add oil as specified or replace compressor if damaged
		Insufficient refrigerant oil transfer from blocked TX valve	Check temperatures of TXV entry and exit temperatures, Conduct A/C performance test & KOER test, conduct pinpoint test H on TXV	Replace TX valve
	Poor condenser performance	Condenser refrigerant flow blocked/restricted	Conduct A/C performance test & KOER test	Replace condenser & A/C system filter/drier
		Restricted air flow to condenser	Assess air flow across condenser and compare against equivalent vehicle, Conduct A/C Performance test & KOER test	Remove restriction
		Restricted air flow through condenser (clogged or damaged fins)	Assess air flow through condenser and inspect fins, Conduct A/C Performance test & KOER test	Clean / Repair fin damage or replace condenser, including A/C system filter/drier
		Engine overheating	Engine cooling fault, refer to section 303-03	Refer to section 303-03
		Radiator overheating	Engine cooling fault, refer to section 303-03	Refer to section 303-03
		Hot air re-circulating through condenser	Check radiator side seals for damage/distortion. Prevent hot air re-circulating and compare A/C performance before and after modification	Replace radiator top & side seals and/or air deflector seal under condenser
	Cooling fan fault	Incorrect cooling fan operation for condenser pressure conditions	Test fan operation refer to Pinpoint test F	Repair fault or replace part
		Cooling fan(s) open-circuited/not operating	Test fan operation refer to Pinpoint test F	Replace cooling fans

DIAGNOSIS AND TESTING (Continued)

Symptom	Possible Cause Area	Possible Root Cause	Confirmation Test	Possible Fix
Incorrect operation of A/C cooling	Excessive A/C high pressure compressor cut-out	Incorrect cooling fan operation for condenser pressure conditions	Engine Cooling fault, refer to section 303-03	Refer to section 303-03
		Excessive A/C system charge	Conduct A/C performance test & KOER test	Recharge A/C system to specification
		Condenser refrigerant flow blocked/restricted	Conduct A/C performance test & KOER test	Replace condenser, including A/C system filter/drier
		Pressure transducer fault	Go to Pinpoint test C	Repair fault, replace part
		Air mix door fault	Air mix door fault, refer to section 412-02	Refer to section 412-02
	A/C compressor cycles too frequently	Evaporator thermistor incorrectly located	Conduct A/C performance test & KOER test, inspect thermistor location.	Reassemble thermistor in correct location
	A/C compressor excessive cycle-on time	Restricted air flow through evaporator	Conduct A/C performance test & KOER test, Inspect evaporator surface	Clean or replace evaporator and replace A/C system filter/drier
		Restricted air flow to Evaporator	Air Distribution fault refer to section 412-02	Improve air flow to evaporator
		Air/Moisture in A/C system	Conduct A/C Performance test & KOER test	Replace A/C system filter/drier and recharge A/C system to specification
		A/C system refrigerant blockage	Conduct A/C Performance test & KOER test	Replace blocked part & A/C system filter/drier
	A/C will not switch off-electrical fault	HIM / CAN / BEM / PCM / EEC fault	Electrical fault, refer to section 412-04, 413-08 or 303-14	Refer to section 412-04, 413-08 or 303-14
		ICC display or control fault	ICC fault, refer to section 413-08	Refer to section 413-08
		Comp. clutch relay	Conduct Pinpoint test B	Replace relay
		Evaporator thermistor short circuit/calibration fault	Conduct Pinpoint test G and Refer to Section 412-04.	Repair fault, replace part
		Evaporator thermistor incorrectly located	Conduct A/C performance test & KOER test , Inspect thermistor location	Reassemble thermistor in correct location
Abnormal Noise	A/C will not switch off-comp clutch fault	Insufficient clutch air gap	Visual inspection for clutch engagement and measurement of Air gap	Replace Compressor assembly & A/C system filter/drier

DIAGNOSIS AND TESTING (Continued)

Symptom	Possible Cause Area	Possible Root Cause	Confirmation Test	Possible Fix
	Noisy with A/C not operating	Drive belt loose/worn	Visual inspection of Belt, Conduct A/C Performance test & KOER test	Replace belt
		Comp. clutch bearing fault	Conduct A/C noise test, Hand turn clutch rotor (pulley outer diameter which belt wraps around)	Replace Compressor assembly & A/C system filter/drier
	Noisy with A/C off, blower fan on	Blower motor fault	Blower fault, refer to section 412-02	Replace part
		Blower fan out of balance	Blower fault, refer to section 412-02	Replace part
	Noisy with A/C operating	Worn/damaged compressor	Conduct A/C noise test	Replace Compressor assembly & A/C system filter/drier
		Comp. clutch engagement or disengagement fault	Visual Inspection of magnetic clutch and measurement of air gap, test engagement with A/C switch	Replace Compressor assembly & A/C system filter/drier
		Slipping drive belt	Visual Inspection of belt, Conduct A/C Performance test & KOER test	Tighten drive belt
		A/C component resonance/rattling	Conduct A/C noise test and detect noise source	Isolate noise source
		Comp. discharge pulsation noise transfer to body	Conduct A/C noise test	Isolate noise condition
		Excessive compressor noise due to overcharged system	Conduct A/C Performance test & KOER test, looking for symptoms of overcharge	Recharge A/C system to specifications
		Excessive refrigerant flow hiss/gurgle due to overcharged system	Conduct A/C Performance test & KOER test, looking for symptoms of overcharge	Recharge A/C system to specification,
		Excessive refrigerant flow hiss/gurgle due to A/C liquid line noise transmission	Conduct A/C noise test and detect noise source	Isolate/replace A/C liquid line
Control component fault	Intermittent A/C operation	Intermittent power to clutch	Compressor wiring fault, refer to Pinpoint test A	Repair circuit
	Pressure transducer fault	Open-circuit	Go to Pinpoint test C	Repair fault, replace part
		Short circuit	Go to Pinpoint test C	Repair fault, replace part

DIAGNOSIS AND TESTING (Continued)

Symptom	Possible Cause Area	Possible Root Cause	Confirmation Test	Possible Fix
		Calibration fault	Go to Pinpoint test C	Replace sensor
	Cabin temperature sensor fault	Open-circuit	Go to section 412-04	Repair fault, replace part
		Short circuit	Go to section 412-04	Repair fault, replace part
		Calibration fault	Go to section 412-04	Replace sensor
	Ambient temperature sensor fault	Open-circuit	Go to section 412-04	Repair fault, replace part
		Short circuit	Go to section 412-04	Repair fault, replace part
		Calibration fault	Go to section 412-04	Replace sensor
	Sun Load sensor fault	Open-circuit	Go to section 417-01	Repair fault, replace part
		Short circuit	Go to section 417-01	Repair fault, replace part
		Calibration fault	Go to section 417-01	Replace sensor
	Evaporator Thermistor fault	Open Circuit	Go to Pinpoint test G	Repair fault, replace part
		Calibration fault	Go to Pinpoint test G	Replace sensor
	ICC screen or button fault	Not working, Incorrect operation	Refer to section 413-08	Refer to section 413-08

For additional information, refer to Section 412-00.

Air Conditioning System Performance Test

NOTE: This test is used to determine the maximum cooling capability of the air conditioning system, using pressure and temperature measurements.

Vehicle preparation:

NOTE: Check the following items before carrying out the test - adjust as necessary.

1. No heat pickup when the A/C controls are in the full cold position.
2. The engine cooling fan(s) for correct operation and providing adequate condenser airflow.
3. Condenser and Radiator core fin condition (obstruction by insects, grass, accessory items, etc.).
4. Full Recirculation air mode is achieved.
5. Compressor drive belt tension.
6. Face level air outlet mode achieved.
7. Temperature door is achieving full cold position.
8. Correct operation of Automatic Climate Control system (Perform HVAC On-Demand Self Test).
9. Engine coolant level in radiator supply tank.

Test Conditions:

NOTE: This test is to be conducted in an ambient temperature of 10 C to 40 C

1. Engine Idling at operating temperature with the transmission in Park and the handbrake applied.
2. All vehicle DOORS and WINDOWS FULLY CLOSED with bonnet raised.
3. An R134a Manifold Gauge set connected to the high and low side service port connections.
4. The vehicle positioned in the shade at least 1.5 metres from any wall with the rear of the vehicle protected from any tail wind.
5. Air conditioning operating on Semi-AUTO with RECIRC inlet air, FACE vent outlet air, MAX COLD temperature (Low - L), MAX BLOWER FAN SPEED for 10 minutes until A/C system temperatures are stable.

Test Procedure:

1. Run with the engine idling and A/C set as per test conditions for 10 minutes until the A/C system temperatures are stable.
2. Confirm that the Compressor is engaged.
3. Insert a thermometer (or temperature measuring device) into one of the Centre Face Level Registers. Monitor the Register air outlet temperature and record only when it is stable. (ie: When the temperature has stopped falling). Allow a minimum of 5 minutes for the Register air temperature to stabilise before taking readings.

DIAGNOSIS AND TESTING (Continued)

4. Monitor the pressure gauge readings and record stabilised pressures (MAXIMUM discharge and MINIMUM suction pressures).

NOTE: Pressure modulations even when the system has stabilised is normal.

5. Record the maximum and minimum vent temperatures (both temperatures if the system cycles), maximum discharge pressure, minimum suction pressure and compressor on-time and off-time.

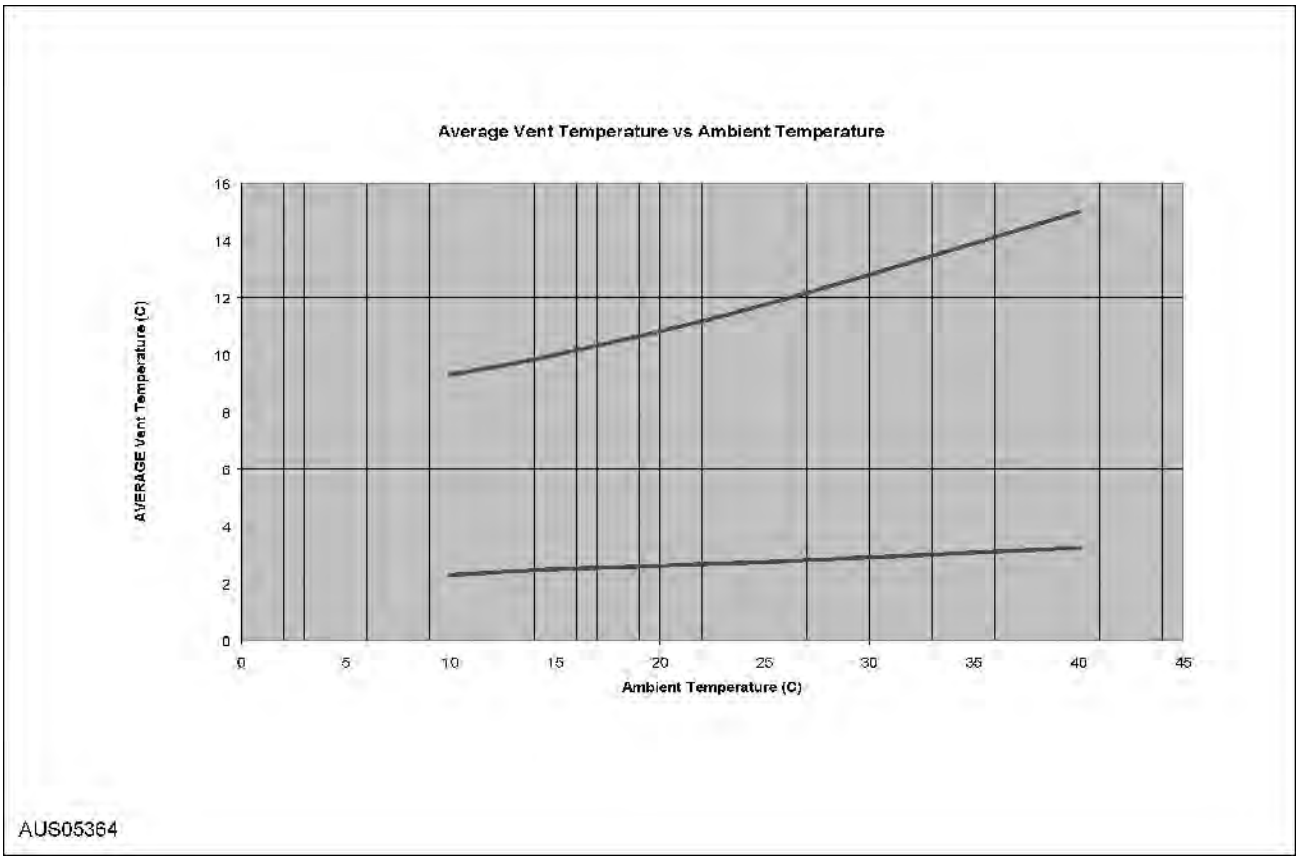
NOTE: Cycling should only occur at lower ambient temperatures. (Refer to Recommended Compressor Cycle Times over page.) It is more accurate to measure compressor on-time several times, followed by compressor off-time several times (preferably with a stop watch), rather than measure each cycle on-off consecutively.

6. Record the Ambient air temperature of the day away from direct sunload using the air temperature measuring device.
7. For the air register vent temperatures, if the system was cycling, calculate the average of the maximum and minimum temperatures. Use the AVERAGE register temperature for comparison against the normal values on the graph. If the system was not cycling, compare the measured vent temperature against the normal values on the graph.
8. Next, compare these temperature and pressure readings with Normal values between the upper and lower limits shown in the graphs below. Using this information and the Diagnostics table, the likely cause of capacity loss can be diagnosed. For more information on A/C system diagnosis, refer to the A/C fault symptom chart in this section.

⚠ CAUTION: Never top-up with R134a. If low R134a charge is suspected, evacuate the remaining charge and recharge with the recommended R134a quantity.

NOTE: The A/C System Performance graphs below are unique to the 2008 Falcon range of vehicles, and are different for the 2008 Territory range of vehicles

DIAGNOSIS AND TESTING (Continued)



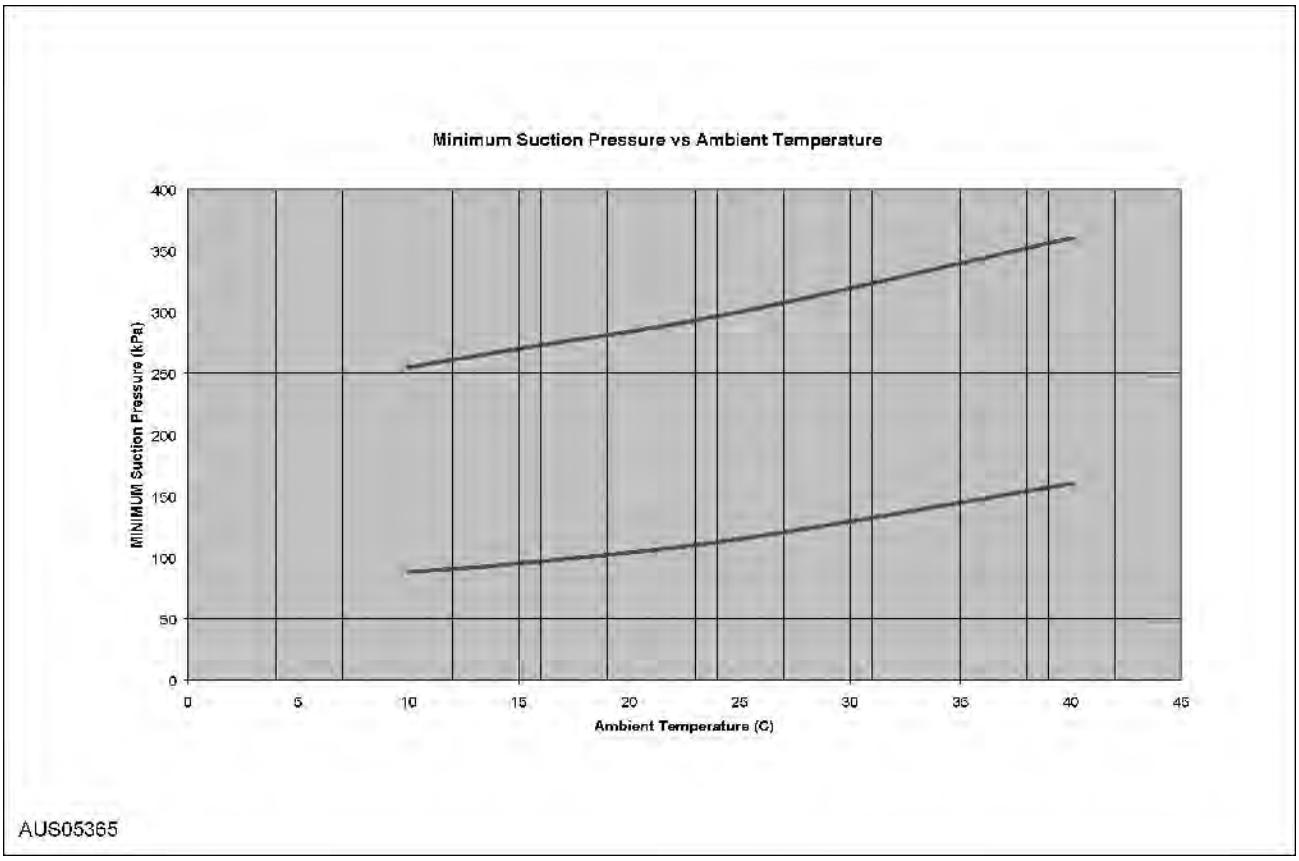
NORMAL COMPRESSOR CYCLE TIMES:

The compressor should cycle ON for approximately 2 to 20 seconds.

The compressor should cycle OFF for approximately 2 to 20 seconds.

In ambient temperatures below about 25°C, the A/C compressor cycle time will vary, with lower cycle-on times at lower ambient temperatures. At higher ambients, above about 25°C, the compressor may not cycle off at all.

DIAGNOSIS AND TESTING (Continued)



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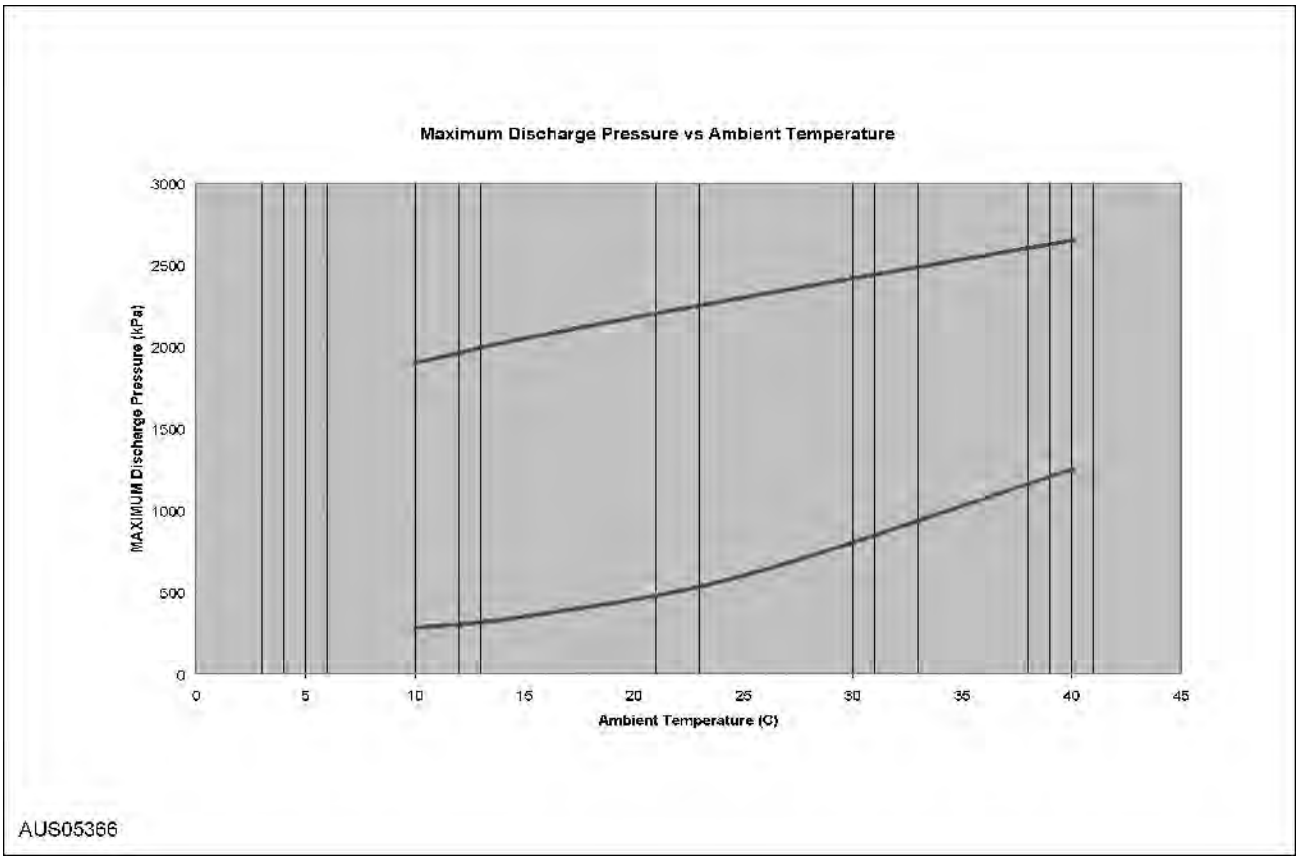

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DIAGNOSIS AND TESTING (Continued)

Air Conditioning System Performance Test Diagnostics

Vent temp	Discharge press	Suction press	Clutch on time	Fault	Likely cause
High	High	High	Long to continuous	Low condenser air flow.	Blocked condenser or radiator core.Cooling fan(s) not working. Non approved accessories blocking air flow.
				Hot air recirculating through the condenser	Cooling fan(s) not operating effectively. Radiator side shields missing.
High	High	Normal to high	Long to continuous	Air in the system.	Poor refrigerant evacuation
High	Normal to high	Normal to low	Long to continuous	Low refrigerant to the evaporator.	TX Valve blocked or jammed closed. Refer to pinpoint test H
High	Normal to high	Normal	Long to continuous	Low refrigerant charge.	Leaking j+oint, pipe, or component.
Normal to high	Normal to low	Normal	Long to continuous	Partial blockage of the evaporator refrigerant circuit.	Contamination in refrigerant circuit.Damaged, crimped or dented evaporator tubes.
High	Normal	Normal	Long to continuous	Heat pick up in air inlet system.	Fresh/recirc door leaking or not fully closing in recirc position.Hot engine compartment air drawn into the inlet.
				Excessive oil in system.	Failure to flush before changing compressor.
High	Normal	Normal	Normal	Heat pick up in the air delivery system. (after the evaporator core)	Temp control not achieving full cold.
High	Low	Normal	Long to continuous	Condenser refrigerant flow low.	Damaged or crimped condenser tube.Contaminants blocking refrigerant circuit.
High	Low	High	Long to continuous	Poor compressor performance.	Worn or damaged compressor.Compressor drive belt or clutch slipping.
				Restricted suction line.	Delaminated, crimped or block suction line.
Normal to high	Normal to low	High	Long to continuous	Insufficient restriction at orifice.	TXV jammed open. Wrong TX valve fitted. Refer to pinpoint test H
Normal to high	Normal to low	Intermitt -ently below zero	Long to continuous	Moisture in the A/C system.	Leaking joint, hose/tube, moisture in component or poor evacuation.
Normal	High	Normal to high	Normal	Refrigerant over charge.	Topping up instead of full evacuation and recharge.
Normal	Normal to low	Normal to low	short	Low evaporator airflow.	Partially blocked evaporator fins.Restriction in recirc duct.
Low	Normal to low	Normal to low	continuous	Clutch not disengaging.	Evaporator air off thermistor faulty or not clipped into the correct core location

DIAGNOSIS AND TESTING (Continued)

Key On Engine Running (KOER) test with A/C check

NOTE: The A/C check run during the KOER test is used to determine if the cooling capability of the air conditioning system is below a minimum acceptable limit, known as a Low Charge Protection (LCP) limit, using the IDS/PDS service tool.

Special Tool(s)	
	Integrated Diagnostic System/Portable Diagnostic System (IDS/PDS)—

Test Procedure:

NOTE: This test is to be conducted in an ambient temperature of **10°C to 40°C**.

1. Connect the IDS/PDS diagnostic tool to the vehicle via the diagnostic connector. Record and then clear all existing DTCs, then re-enable the A/C system before conducting the KOER test. The ignition must be keyed off for 2 seconds minimum prior to clearing all DTCs.
2. Prior to starting the KOER test, run the vehicle at idle for 2 minutes (minimum) with the A/C switched OFF at the ICC controls, and with FRESH inlet air, FACE vent outlet air, MAX COLD temperature (Low - L) and MAX BLOWER FAN speed selected. Ensure all doors and windows are fully closed, and the rear of the vehicle is protected from any tail winds.

NOTE: If the above test conditions are not selected and maintained, the KOER test could result in a false fail and set DTC P0534.

3. Start the KOER test via the IDS/PDS service tool.
4. Within 10 seconds of starting the KOER test, switch on the A/C button at the FDM controls. (Note that the A/C will be switched off and on automatically by the IDS/PDS during the KOER test).
5. Review and record any new DTCs resulting from the KOER test.

The DTCs applicable to an HVAC issue are shown in section 412-04. The DTCs applicable to an air conditioning performance issue are shown in the following table.

NOTE: Once the fault has been rectified, conduct a Continuous Mode DTC test (CMDTC) using the IDS/PDS diagnostic tool to clear all DTCs and retest for faults. The ignition must be keyed off for 2 seconds minimum prior to clearing all DTCs. For more information, refer to section 412-04.

DIAGNOSIS AND TESTING (Continued)

DTC	Test Mode when DTC set	A/C Pressure when DTC set	Condition
P0534	KOER	All pressures	Poor A/C System performance, most likely cause is low A/C refrigerant charge. Other possible causes are A/C System blockage, faulty evaporator thermistor, faulty HVAC blower, faulty compressor. A/C is not disabled when this DTC is set
P0532	KOER and continuous	Less than 50kPa	A/C system performance test failed, because A/C disabled with system pressure less than 50kPa . Most likely causes are no A/C refrigerant charge at all, or faulty pressure transducer (sensor out of calibration, open circuit).
P0533	KOER and continuous	All pressures	A/C system performance test failed, because A/C disabled with system pressure outside of range. Most likely cause is faulty pressure transducer (sensor out of calibration, short circuit).
P145A	KOER	Less than 200kPa	A/C system performance test failed, because A/C disabled with system pressure less than 200kPa. Most likely cause is very low A/C refrigerant charge.
P145B	KOER	Greater than 200kPa	A/C System performance test failed, because A/C not switched on at ICC controls when KOER test run. A/C is not disabled when this DTC is set

P0534 is the DTC applicable to an A/C Low Charge Protection failure due to poor A/C system performance. This test is only valid if the A/C system is operating with a refrigerant pressure above 200kPa. However, if the A/C is disabled for other reasons, P0534 will be set and other DTCs such as P0532, P145A or P145B will also be set. Once set, DTC P0534 will remain on for 40 engine warm-up cycles only, but will not disable the A/C compressor.

P0532 is the DTC applicable to an A/C zero pressure failure, and occurs if the refrigerant pressure reading is below 50kPa. Once set, this DTC will disable the A/C compressor until the fault is repaired.

P0533 is the DTC applicable to an A/C over-pressure failure, and occurs if the refrigerant pressure reading is out of range. Once set, this DTC will disable the A/C compressor until the fault is repaired.

P145A is the DTC applicable to an A/C low pressure failure in the KOER test only, and occurs if the refrigerant pressure reading is below 200kPa. Once set, this DTC will disable the A/C compressor until the fault is rectified or at the next ignition key-on after an A/C system pressure greater than 200kPa is achieved.

P145B is the DTC applicable to an incorrectly run KOER test, where the A/C was not switched on at ICC controls when the KOER test was run. This DTC will not disable the A/C compressor.

A/C System Noise Test

All compressor driven air conditioning systems will emit noise. Careful system tuning has been undertaken to suppress most noise emissions. However, with improvements to cabin quietness, customer complaints for noise, vibration and harshness may need to be addressed. The following charts and test procedures may help with these issues.

DIAGNOSIS AND TESTING (Continued)

Action	Conditions
Inquire about customer complaint	* What kind of noise (tone/loudness).
	* When noise occurs (first time etc.).
	* Where is it heard from
	* What conditions it occurs in
Validate the customer claim	* Reproduce conditions that noise occurs in
	* Detail what, when, where noise occurs
Check air conditioning system	* Check system layout.
	* Check gas pressures
	* Check belt tension and alignment
Make judgement on type of noise	* Use A/C Noise Symptom Chart to judge noise
	* Detail what and where noise occurs
	* Find noise source and transmission path
	* Isolate source to verify
Make repair and judge affect	* Remove source (replace, unbolt) if faulty component
	* Mask noise source if possible
	* Mask transmission path (insulate)
Explain your findings to customer	* Detail your activities
	* If required, request owner to document when noise complaint occurs to help investigation

Test Procedure

NOTE: This test is used to identify customer complaints.

NOTE: Vehicle Conditions

Ensure the system is not over charged with refrigerant by conducting an A/C System Performance Test.

Inspect to confirm that system is assembled correctly. That is, compressor is fastened to bracket, drive belt is tight, condenser is rubber mounted, A/C pipework is not touching body, retaining clamps are in correct positions, etc.

1. Reproduce the customer complaint noise. (complaint needs to be clearly identified).
2. Judge if noise is abnormal (it is important to understand the characteristics of the vehicle in its normal state, to judge what is abnormal). Seek additional advice if necessary.
3. Detail what and how noise occurs.
4. Find the noise source and verify its transmission path by isolating suspect part from the vehicle. That is, float condenser or A/C piping in space to cut the transmission path, etc. If the noise disappears, this validates the noise source or transmission path.
5. Identify the best method to remove the source. If not possible, mask the source output or isolate the transmission path.
6. Explain you investigations to the owner, as they are attuned to a noise, as it may be difficult for them to accept that the total removal of the noise may not be possible. With noise issues, improvement can often be made but complete removal cannot always be achieved (eg. if the noise complaint is a characteristic of the actual car or a normal A/C system operating characteristic). Detailing your findings will make your explanation easier.

DIAGNOSIS AND TESTING (Continued)

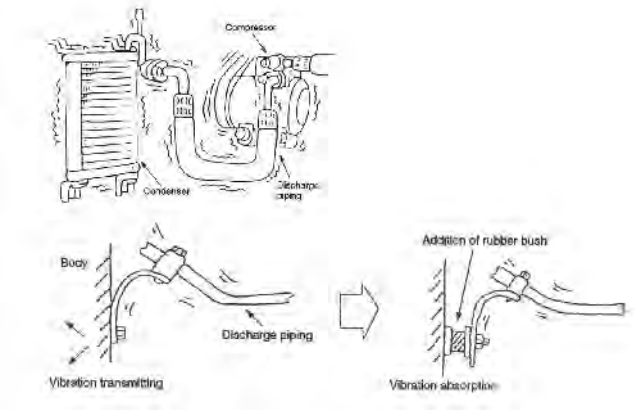
A/C Noise Symptom Chart

Condition	Possible Sources	Action
Internal wear of compressor - Mechanical 'rattling' noise occurs with compressor engagement	*Lack of lubricating oil. In a system with a gas leak, the oil has escaped with the refrigerant. *Lack of lubricating oil has caused wear to the compressor internal surfaces.	*Check rattling noise from compressor, using a screwdriver to hear compressor internals. Replace compressor and also fix the system leak to prevent recurrence. Likewise, if you detect a leak in the system, estimate and add refrigerant oil to A/C system to ensure future compressor reliability (refer to Refrigerant Oil Replacement Quantity later in this section)
Resonant noise with accessory drive - With A/C on, a 'cooing' or 'woo' noise can be heard inside the car. Vibration of steering wheel can also occur. Because resonant noise is similar to compressor pulsation noise, you must distinguish by a different checking method.	*Cause is due to drive accessory (eg, alternator, power steering pump, etc) loose/out of balance/resonating at specific engine speed. The vibrations are transmitted to the vehicle body causing the noise.	*To check: *Check the drive belt accessories. If accessory can be isolated (press down with a screwdriver), the noise level will be lowered. *To repair: Repair accessory or accessory mounting to stop vibrations or modify transmission route to the vehicle body.
Compressor discharge pulsation noise - With A/C on, a rumbling noise is heard inside the vehicle. Vibration of steering can also occur. The noise level rises if the outside temperature is high. (refer to illustration below)	*Cause is excessive pressure fluctuation of refrigerant discharged from compressor, vibrating the high pressure piping, and abnormal noise occurs by resonating with the car. Possible causes of excessive pressure fluctuation are (i) excessive refrigerant charge (ii) poor mounting of high pressure components, particularly discharge hose, condenser and liquid line	*To check: - Remove the discharge hose mounting clamp (where fitted) and recheck for noise/vibration. - Float the condenser from the radiator and recheck. *To repair: - Evacuate and recharge the A/C system to the specified refrigerant quantity. - Put rubber isolators between tube mounting clamps and body sheet metal, to reduce noise/vibration transmission to the body.
Refrigerant Flow Noise (Hissing/Gurgling) With all air conditioning systems, a hissing or gurgling noise can be heard at start up, in the cabin from the passenger side, and at the TXV (refer to illustration below)	* Cause is due to the uneven flow of refrigerant at start up. As shown in illustration following this chart, gas and liquid refrigerant will begin to flow through the liquid line to the TXV. This can cause a hissing/gurgling sound in the cabin. This noise disappears as the refrigerant flow stabilises into a fully liquid flow. If this refrigerant flow noise is excessive on every compressor cycle, this is considered abnormal	* To repair. 1. Refrigerant quantity. Noise occurs more frequently if charge is low. To correct, evacuate and recharge the A/C system to the specified refrigerant quantity. 2. Sound deadening (lagging). To reduce noise, add lagging to liquid line and suction sub-tube (at bends) and extra lagging to TXV.

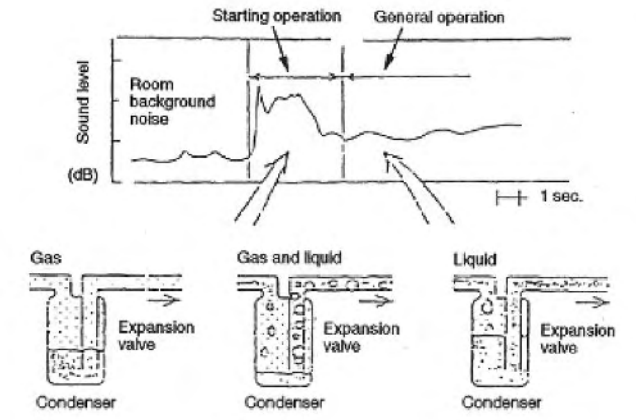
DIAGNOSIS AND TESTING (Continued)

Condition	Possible Sources	Action
Hose and tube rattles (refer to illustration below)	*Most common cause is tubing fouling on body panels (tube bent or foam/plastic tubing protectors damaged/slid out of location so touching on body sheet metal or adjacent components occurs).	*To check: - Follow the A/C tube circuit around the engine bay and check for clearances and signs of tubes contacting body or adjacent components, tubes bent or damaged, tubing isolator/protectors damaged or out of location * To repair. - Add isolators or protectors to tubes/hoses wherever clearances are insufficent or contact with body is occurring

Discharge pulsation noise / Hose and tube rattles



Refrigerant Flow Noise (Hissing/Gurgling)



A/C System Leak Test

Two options are available for detection of joint leaks.

1. **Refrigerant R-134a Leakage detection**

NOTE: For more information, refer to Electronic leak detection in the General Procedures section.

Refrigerant leakage can be determined by a leak detector. Be sure to remove all oil from the test area before using the leak detector, because the oil may contain refrigerant which would give erroneous readings.

The A/C system pressure must be above 300kPa (with engine off) prior to conducting this test, as this indicates sufficient refrigerant to allow the compressor to run and pressurise the system for leak detection. If the system pressure is below 300kPa with engine off, a small amount of refrigerant may be added to the system for leak detection purposes.

Check for leakage at the compressor shaft, the HVAC vent outlet and condensate drain tube, and at all system joints and lines as detailed in Joint Locations in the General Procedures section.

2. **Alternative R134a Leak detection (leak tracer dye)**

NOTE: For more information, refer to **Fluorescent Dye leak detection** in the General Procedures section.

R-134a fluorescent tracer dye has been added to the A/C system of this vehicle, supplied in the condenser receiver/modulator. The refrigerant dye has a limited life of ~500 hours of air conditioning operation.

Leak checking can be performed with an ultra-violet lamp and viewed through U.V. glasses.

The A/C system must have run for ~15 minutes prior to leak testing, to allow the dye to mix thoroughly.

Check for leakage with the ultra-violet lamp at the compressor shaft, the HVAC vent outlet and condensate drain tube, and at all system joints and lines as detailed in Joint Locations in the General Procedures section.

Leaks can be pin-pointed by bright yellow-green glow of the tracer dye.

After the leak is repaired, the traces of dye can be removed from previously leaking areas by using any general purpose oil solvent.

DIAGNOSIS AND TESTING (Continued)

Module Configuration

Special Tool(s)	
	Integrated Diagnostic System/Portable Diagnostic System (IDS/PDS)

The air conditioning refrigerant system does not itself contain any programmable modules, but the operation of the climate control system and the output of some A/C Sensors rely on a number of programmable modules. These modules are accessed via the IDS/PDS service tool, and the modules may require re-configuring as part of the repair procedure. The IDS/PDS is used to select appropriate data for the vehicle, and each module configuration must be relevant for the specific Climate Control system (eg. ACC, single zone, dual zone, etc.) and for the circumstance where the module has been modified or replaced. If this procedure is not followed, the module may not function correctly and may set a number of Diagnostic Trouble Codes.

For module configurations that effect the air conditioning refrigerant system, refer to the following sections:

EEC/PCM.....303-14

HIM.....412-04

ICC.....413-08

BEM.....419-10

IDS/PDS Parameter Identifier (PID) chart

Special Tool(s)	
	Integrated Diagnostic System/Portable Diagnostic System (IDS/PDS)

The following chart lists all PID's used by the IDS/PDS service tool to access data relevant to the system.

Acronym	Description
from EEC/PCM	
ACPRES	A/C Discharge Pressure (kPa) (1 PSI = 6.89 kPa)
HPCOMP_CUT	Number of high pressure compressor cut-outs
HFC	Engine Cooling Fan On/Off status (Low or high speed)
FAN_F	Engine Cooling Fan, fan circuit or relay fault status
RPM	Engine Speed (RPM)
VSS	Vehicle Speed (KPH)
CHT	Cylinder Head Temperature
ECT	Engine Coolant Temperature
from HIM	
ACCS#	A/C Compressor Cycling Request
A/CT#	Evaporator Temperature
ETSFD#	External Temperature Sensor Filtered Data (Ambient Temperature)
EXT_TEMP	External Temperature From Sensor (unfiltered) (Ambient Temperature)
BLOWVOL#	HVAC Blower Voltage
BLOWAP	Blower Motor Speed - Actual Position
BLOWTP#	Blower Motor Speed - Target Position
LEFTOT#	Passenger's Display Set Temperature
RIGHTOT#	Driver's Display Set Temperature
MC_VREF	Vehicle Battery Voltage
RECIRDS	Recirculation Door Actual Position
RECIRDTP#	Recirculation Door Target Position
CCMODE	Climate Control Mode
from FDM	
CC_AUTO	AUTO (ACC)
CC_OFF	OFF (ACC)
BLWR_FAN	Blower Fan Speed
CC_RECIRC	Recirculation Status
from BEM	
AC_SUNLD	A/C Sunload Sensor Status
INT_TEMP	Interior Temperature Sensor
from Instrument Cluster	
VEH_SPD	Vehicle Speed
VBATT_VAL	System Battery Voltage Value

DIAGNOSIS AND TESTING (Continued)

IDS/PDS Diagnostic Trouble Code (DTC) chart

Special Tool(s)	
	Integrated Diagnostic System/Portable Diagnostic System (IDS/PDS)

The following chart lists all DTCs relevant to the A/C system that may be set due to operation failures. The codes may be set due to either intermittent or permanent failures.

Faults are either tested for continuously, or can be tested for in the Key On Engine Off test (KOEO test) or in the Key On Engine Running test (KOER test). The KOEO and KOER tests are run via the IDS/PDS service tool.

Record and then clear all existing DTCs, then re-enable the A/C system before conducting any diagnostic tests. Once a fault has been rectified, conduct a Continuous Mode DTC test (CMDTC) using the IDS/PDS diagnostic tool to clear all DTCs and retest for faults. The ignition must be keyed off for 2 seconds minimum prior to clearing all DTCs. For more information, refer to section 412-04

IDS/PDS Display	Fault Description	Possible Cause
from EEC/PCM		
B2979	High Pressure A/C Compressor Cut-Out	Excessive number of high pressure compressor cut-outs, due to
		* A/C system severely overcharged
		* A/C system refrigerant blockage
		* Engine cooling fan fault
P145A	A/C Pressure Insufficient – A/C Clutch Disabled	DTC set only during KOER test
		* Very low A/C refrigerant charge
P145B	A/C Demand Not Activated during Self Test	DTC set only during KOER test
		* A/C not switched on during KOER test
P0532	A/C Refrigerant Pressure Sensor A Circuit Low Input	* No A/C refrigerant charge
		* Pressure sensor out of calibration, open-circuit
		* Refer to A/C disable strategy list in this section.
P0533	A/C Refrigerant Pressure Sensor A Circuit High Input	* Pressure sensor out of calibration, short-circuit
		* Refer to A/C disable strategy list in this section.
P0534	A/C Refrigerant Charge Loss or System Blockage	* Most likely - Low A/C refrigerant charge.
		* Less likely - A/C System blockage, faulty pressure transducer, faulty HVAC blower, faulty compressor.
P1270	Engine RPM or Vehicle Speed limiter reached	Refer to A/C disable strategy list in this section.

DIAGNOSIS AND TESTING (Continued)

IDS/PDS Display	Fault Description	Possible Cause
P1285	Cylinder Head over-temperature condition, protection active	* Engine overheating fault
P1299		* Refer to A/C disable strategy list in this section.
P1463	A/C Pressure Sensor insufficient pressure change	This DTC is only active for engine speeds above idle, so will not be displayed at KOER test. * Slipping compressor clutch or belt * Poor compressor performance or compressor not operating * Low A/C refrigerant charge * Sudden loss of pressure while A/C operating, from a major refrigerant leak such as a burst hose or pierced condenser * Refer to A/C disable strategy list in this section.
P1465	A/C relay circuit	* WAC Relay fault * Relay wiring circuit fault
P1474	Fan Control primary circuit	* Fault in circuit from PCM to cooling fan(s) * Fault in Cooling fan(s)
P1479	High Fan Control primary circuit	* Fault in PCM signal to engine cooling fan relay(s) * Fault in circuit from PCM to fan relay(s) * Fault in fan relay(s)
U1900	CAN communication bus fault	* HIM/CAN/BEM/circuit to EEC/PCM fault * Refer to A/C disable strategy list in this section.
from HIM		
B2014	Climate Control A/C Post-Evaporator Sensor (Evap Temp Thermistor) open circuit	* Sensor leads disconnected from HIM * Sensor failure * HIM failure
B1947	Climate Control A/C Post-Evaporator Sensor (Evap Temp Thermistor) short to ground	* Sensor leads shorted together * Sensor failure * HIM failure
B2513	Blower (Fan) circuit failure	* HVAC air flow restriction * HIM failure
B2006	Blower Motor Switch out of range	Invalid data code sent by vehicle sub-system
B2005	Climate Control Temperature Switch out of range	Invalid data code sent by vehicle sub-system
B1255	Air temperature external sensor circuit open	* Sensor lead disconnected from HIM * Sensor failure * Internal module failure (HIM)

DIAGNOSIS AND TESTING (Continued)

IDS/PDS Display	Fault Description	Possible Cause
B1257	Air temperature external sensor circuit short to ground	* Sensor leads shorted together * Sensor leads shorted to vehicle body * Sensor failure * Internal module failure (HIM)
U2196	Invalid 'Engine RPM' data	Invalid data code sent by vehicle sub-system
U2197	Invalid 'Vehicle Speed' data	Invalid data code sent by vehicle sub-system
U2199	Invalid 'Engine Coolant Temperature' data	Invalid data code sent by vehicle sub-system
B2007	(Driver/Passenger) Solar radiation	Sun load sensor faulty, out of calibration
B2890	Sensor out of range	
B2141	NVM Configuration Failure.	* Failure to successfully complete HIM calibration file download. * Power interruption to HIM module during file download. * Power interruption to WDS scan tool during file download.
from ICC		
B1318	Battery voltage low	* Low system voltage detected. * Battery or alternator fault.
B2923	Climate control button stuck	Climate control button jammed
U2201	Ambient temperature data invalid	HIM did not have valid ambient temperature data output
from BEM		
B1250	Air temperature internal (cabin) sensor circuit failure	Cabin temperature sensor failure
B1251	Air temperature internal (cabin) sensor circuit open	Cabin temperature sensor/wiring fault, open circuit
B1253	Air temperature internal (cabin) sensor circuit short to ground	Cabin temperature sensor/wiring fault, short-circuit
B1259	Solar radiation sensor circuit open	Sun load sensor wiring fault, open circuit
B1261	Solar radiation sensor circuit short to ground	Sun load sensor wiring fault, short-circuit

DIAGNOSIS AND TESTING (Continued)

A/C disable strategy chart

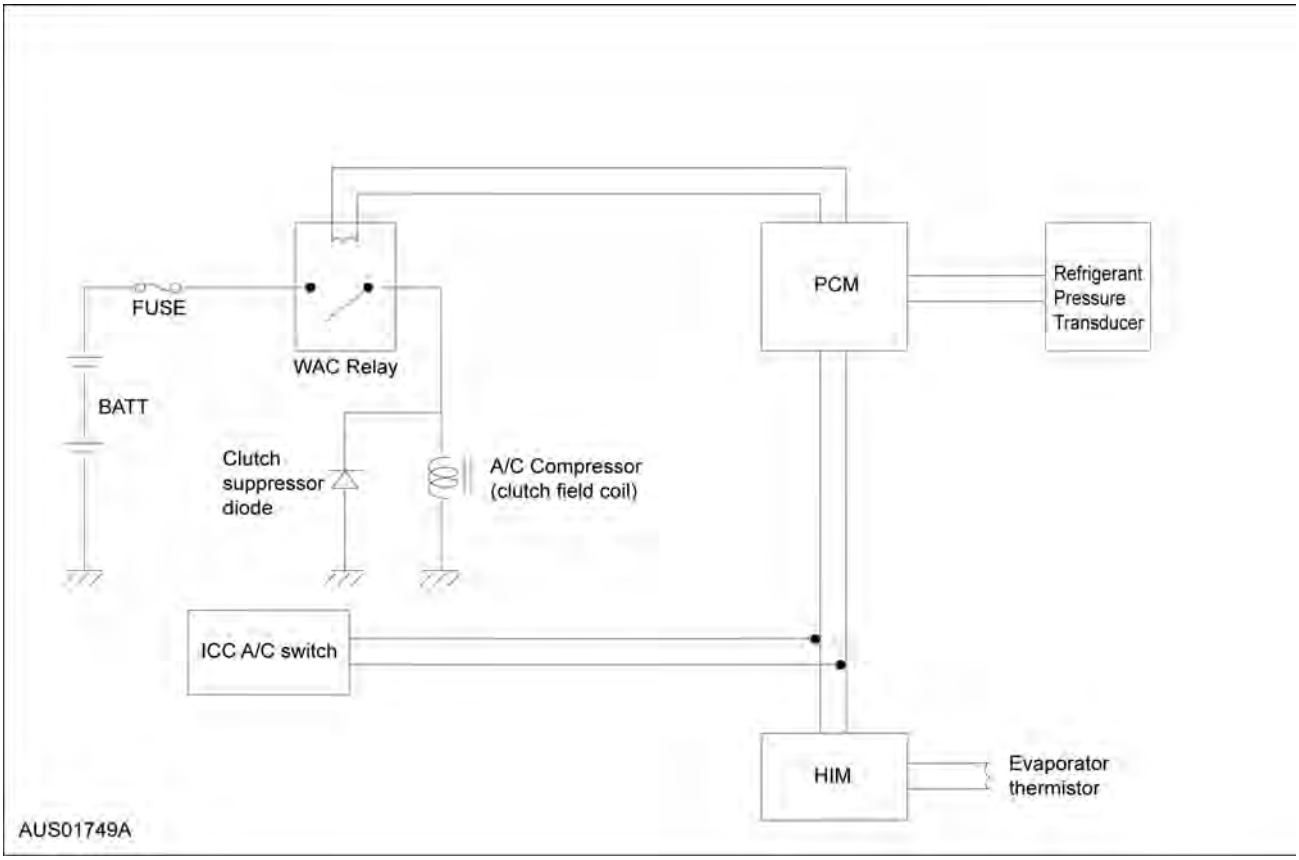
The following chart lists the conditions under which the A/C System is disabled to prevent compressor operation, either temporarily or permanently. The A/C System may be disabled temporarily to protect the compressor until conditions are suitable for operation, on permanently until a fault is rectified.

NOTE: Record and then clear all existing DTCs, then re-enable the A/C system before conducting any diagnostic tests. Once a fault has been rectified, conduct a Continuous Mode DTC test (CMDTC) using the IDS/PDS diagnostic tool to clear all DTCs and retest for faults. The ignition must be keyed off for 2 seconds minimum prior to clearing all DTCs. For more information, refer to section 412-04.

DTC Code	A/C is Disabled under the following conditions
N/A - (temporary A/C disengagement only)	A/C is disabled when the A/C pressure transducer output (ACPT) exceeds the maximum allowed pressure, and is re-engaged when the ACPT output drops back down to an acceptable pressure (eg. may occur in extremely high ambient, high vehicle speed conditions)
N/A - (temporary A/C disengagement only)	A/C is disabled when the A/C pressure transducer output (ACPT) drops below the minimum allowed pressure, and is re-engaged when the ACPT output rises up to an acceptable pressure (eg. may occur in extremely low ambient temperatures)
P0532,P0533	A/C is disabled when the ACPT output is out of range (no A/C charge, transducer circuit or calibration fault)
P1463	A/C is disabled if the A/C pressure transducer output (ACPT) does not rise sufficiently when the A/C clutch is engaged, or if the A/C gas charge level drops during A/C operation, and is re-engaged if the A/C gas charge level is increased to an acceptable pressure after recharging.
	(This may indicate low A/C charge, a slipping compressor clutch or belt, compressor not functioning or an A/C system leak during operation, This DTC is only active for engine speeds above idle, so will not be displayed at KOER test)
P145A	A/C is disabled during the KOER test when the A/C pressure transducer output (ACPT) does not reach the minimum allowed pressure, and is re-engaged at the next ignition key-on after the ACPT output rises up to an acceptable pressure
N/A - (temporary A/C disengagement only)	A/C is disabled when the engine speed is greater than the maximum allowed for a given vehicle speed, and continues to be disabled when the engine speed is greater than the maximum allowed for A/C re-engagement
N/A - (temporary A/C disengagement only)	A/C is disabled when the engine speed is more than the maximum allowed for A/C operation (close to red-line rpm), and continues to be disabled when the engine speed is greater than the maximum allowed for A/C re-engagement
N/A - (temporary A/C disengagement only)	A/C is disabled for a set time period when the throttle is close to wide open
N/A - (temporary A/C disengagement only)	A/C is disabled when the engine speed is more than the maximum allowed for A/C compressor run-in, and is re-engaged when the engine speed drops back down to a specified lower rpm, for the first 1 minute of new compressor operation or first 1 minute after battery has been connected. Once the new compressor has been run-in, this strategy is deactivated.
N/A - (temporary A/C disengagement only)	A/C is disabled when the engine speed is less than the minimum allowed for A/C operation (below idle rpm)
U1900	A/C is disabled when the HIM CAN link is missing
N/A - (temporary A/C disengagement only)	A/C is disabled at the first A/C engagement after a new or reflashed PCM, if the A/C is engaged at too high an engine speed, and is re-engaged when the engine speed drops back to a specified lower rpm
P1299	A/C is disabled just before the engine cylinder head temperature exceeds a maximum allowable temperature and fail safe cooling is activated, and is re-engaged when the engine cylinder head temperature drops back to an acceptable temperature
N/A - (temporary A/C disengagement only)	A/C is disabled for a set time period on Turbo models only when the manual clutch pedal is released if the PCM is in Idle rpm control mode

DIAGNOSIS AND TESTING (Continued)

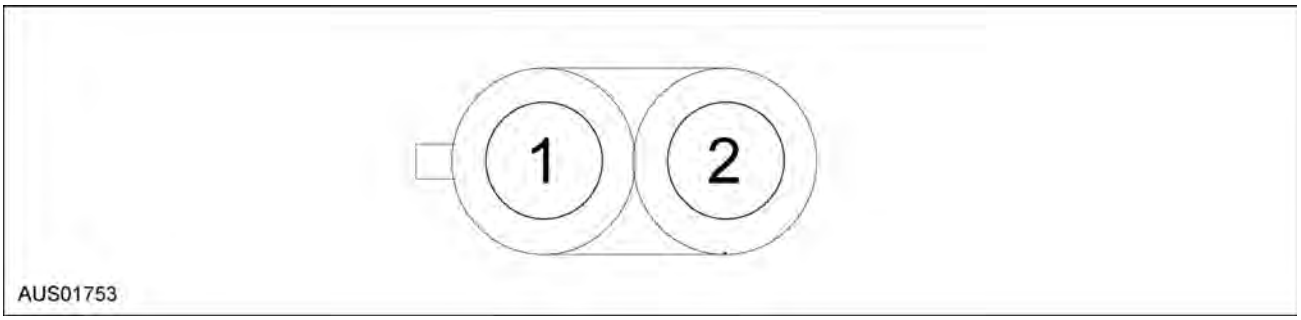
Simplified Air Conditioning Electrical Circuit



NOTE: For more information, refer to complete Climate Control Circuit in Wiring Diagram section.

Connector Circuit Reference

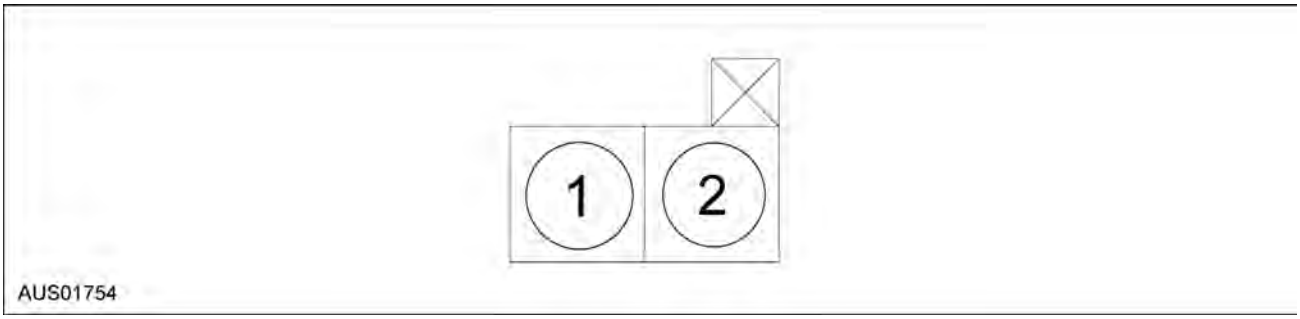
C-121 (A/C Compressor)



Pin Number(s)	Circuit Designation / Description	Normal Condition / Measurement
1	Circuit 347A (B-Y) Power	12V when A/C on
2	Circuit 57A (B) Ground	Earth (less then 5 Ohms to chassis ground)

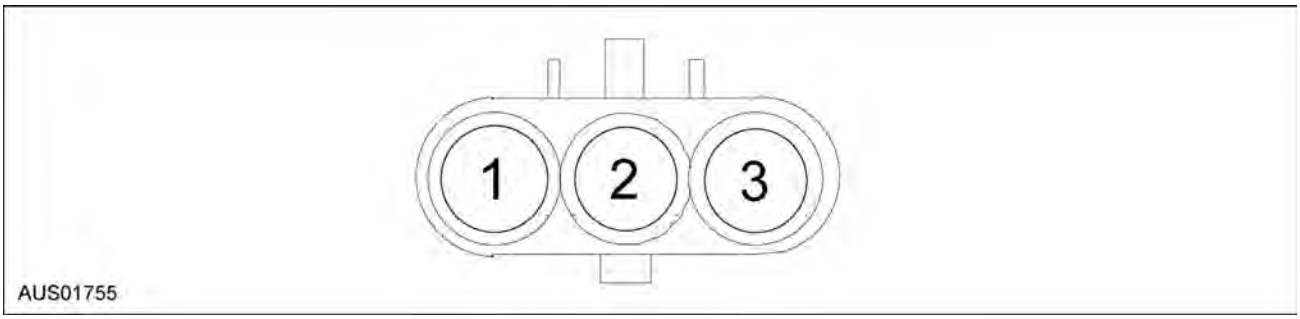
DIAGNOSIS AND TESTING (Continued)

C-127 (A/C Clutch Diode)



Pin Number(s)	Circuit Designation / Description	Normal Condition / Measurement
1	Circuit 57S (B) Ground	Earth (less then 5 Ohms to chassis ground)
2	Circuit 347B (B-Y) Power	12V when A/C on

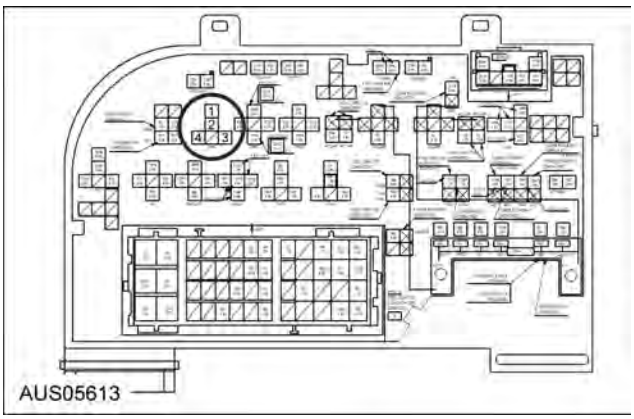
C-122(A/C Pressure Transducer)



Pin Number(s)	Circuit Designation / Description	Normal Condition / Measurement
1	Circuit 359C (GR)	Earth (less then 5 Ohms to chassis ground)
2	Circuit 440 (BR)	Feedback Voltage 0V to 5.0V
3	Circuit 351E (BR-W)	Reference Voltage 5.0V±0.25V

DIAGNOSIS AND TESTING (Continued)

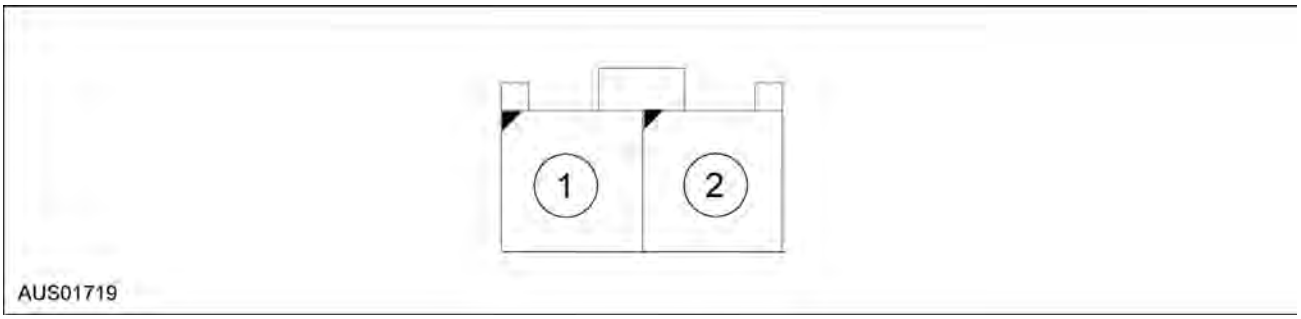
C163 (Power Distribution Board) - WAC Relay



Pin Number(s)	Circuit Designation / Description	Normal Condition / Measurement
1	Circuit 347 (B-Y) Power	12V supplied when Relay engaged
2	Circuit 175E (B-Y)	12V supplied with IG ON condition
3	Circuit 321 (GR-W)	Earth from PCM/EEC for A/C operation
4	Circuit 361W (R)	12V supplied with A/C Relay engaged

C-376 Evaporator Temperature Thermistor

NOTE: View from wire entry side (rear).



Pin Number(s)	Circuit Designation / Description	Normal Condition / Measurement
1	Sensor ground	Voltage (V) between HIM terminal connection D pin 1 and C376 pin 13 0V (ground)
2	Sensor supply	Voltage (V) between HIM terminal connection D pin 2 and C376 pin 13 **NOTE:** With ignition ON and thermistor disconnected, refer to thermistor voltage from thermistor output table, Pinpoint test G.

DIAGNOSIS AND TESTING (Continued)

Air Conditioning & HVAC Relay and Fuses

The air conditioning compressor cut-out relay (WAC relay, R2-black) is located in the Engine Compartment Fuse Box.

The A/C compressor clutch is protected with a 15 amp fuse (F1-blue) located in the Engine Compartment Fuse Box.

For the single A/C condenser fan (single engine cooling fan), this fan is controlled with two relays (R4 & R3-both white) located in the Engine Compartment Fuse Box. The single cooling fan circuit is protected with a 50 amp fuse (F7-red) also located in this fuse box.

For the dual A/C condenser fans (dual engine cooling fans), these fans are controlled with three relays (R4-white, R11-green, R3-white) located in the Engine Compartment Fuse Box. The dual cooling fan circuit is protected with two fuses, 50 amp (F7-red) and 40 amp (F24-green), both located in this fuse box.

The condenser fan relay coils are protected by a single 20A fuse (F21-yellow, combined with the ignition switch fuse) located in the instrument panel fuse box.

The HIM electrical circuits are protected with two fuses, one 5 amp (F6-tan) and one 10 amp, (F27-red), both located in the Instrument Panel Fuse Box.

The HVAC blower fan circuit is protected with a 40 amp fuse (F26-green) located in the Engine Compartment Fuse Box.

Pinpoint Tests

Special Tool(s)	
 SST105-R0057	Electrical Multimeter

DIAGNOSIS AND TESTING (Continued)

PINPOINT TEST A : COMPRESSOR OPERATION

Test Step		Result / Action to Take
A1	**CHECK COMPRESSOR OPERATION**	
	Turn blower motor fan to max speed. Turn A/C switch on. Set temperature to full cold (driver and passenger). Inspect magnetic clutch operation. **Does rotor and hub engage and drive the compressor?**	**Yes** Operation is normal. **No** Go to **A2**
A2	**CHECK THE A/C COMPRESSOR CIRCUIT 347 (B-Y) FOR POWER**	
	Measure the voltage between the A/C compressor clutch C-121, circuit 347A, harness side and ground. **Is the voltage greater than 10 volts?**	**Yes** Go to **A3** **No** Go to **A4**
A3	**CHECK THE A/C COMPRESSOR CIRCUIT 57 (B) FOR OPEN CIRCUIT**	
	Measure the resistance between the A/C compressor clutch, circuit 57A (B) harness side and ground. **Is the resistance less than 5 ohms?**	**Yes** INSTALL a new compressor. Refer to Removal & Assembly in this section. **No** REPAIR the circuit. TEST the system for normal operation.
A4	**CHECK CIRCUIT 347 (B-Y) FOR POWER**	
	Measure the voltage between the A/C clutch relay circuit 347, harness side and ground. **Is the voltage greater than 10 volts?**	**Yes** Repair circuit, Test for normal operation from relay to compressor. **No** Go to **A5**
A5	**CHECK THE A/C CLUTCH RELAY CIRCUIT 175 (B-Y) FOR POWER**	
	Measure the voltage between A/C clutch relay C163, circuit 175A (B-Y), harness side and ground. **Is the voltage greater than 10 volts?**	**Yes** Go to **B1** . Check relay operation. **No** Go to **A6**
A6	**CHECK THE 30A FUSE C163 CIRCUIT 50 (R) FOR POWER**	
	Measure the voltage between fuse pin and ground. **Is the voltage greater than 10 volts?**	**Yes** Test the system for normal operation. **No** Inspect battery and wiring circuit. Repair the circuit, and test the system for normal operation.

DIAGNOSIS AND TESTING (Continued)

PINPOINT TEST B : WAC RELAY OPERATION

NOTE: Also refer to PCM section 303-14, Air Conditioner Inputs.

Test Step		Result / Action to Take
B1	**CHECK RELAY OPERATION**	
	Turn blower motor fan to max speed. Turn A/C switch on at normal idle condition. **Does WAC relay engage?**	**Yes** Relay operation is normal. **No** Go to **B2**
B2	**CHECK RELAY OPERATION**	
	Check circuit as follows: Relay should close to give continuity between circuits 175 (Pin No.2) and 347 (Pin No.1). **Is the resistance less than 5 Ohms across terminals 1 & 2 ?**	**Yes** Relay operation is normal. Go to **B3** **No** Replace relay.
B3	**CHECK RELAY FOR POWER CIRCUIT 361C**	
	Operate the A/C system at maximum cooling (max blower fan, full cold temperature, face vent, recirculated inlet air). Check voltage between ground and 361C (R) wire on wiring harness. **Is voltage greater than 10 Volts?**	**Yes** Go to **B4** **No** Repair circuit from EEC to relay and test for normal operation. Go to **B6**.
B4	**CHECK EEC OUTPUT 321 GRW**	
	Check for resistance between ground and 321 GRW on wiring harness. **Is resistance less than 5 Ohms?**	**Yes** EEC output is normal. Go to **B5** **No** Check A/C disable strategy chart. Confirm correct EEC operation. Repair circuit and test for normal operation.
B5	**CHECK WIRING CIRCUIT 347 TO CLUTCH**	
	Check for resistance between circuit 347 at wiring harness and 347 at compressor. **Is resistance less than 5 Ohms?**	**Yes** Circuit 347 is normal. Go to **B6** **No** Repair circuit and test for normal operation.
B6	**CHECK WIRING CIRCUIT 175A FOR POWER**	
	Check voltage between ground and 175A **Is voltage greater than 10 Volts?**	**Yes** Operation is normal. **No** Repair circuit. Test for normal operation.

DIAGNOSIS AND TESTING (Continued)

PINPOINT TEST C : PRESSURE TRANSDUCER (PRESSURE SWITCH) OPERATION

NOTE: Also refer to PCM section 303-14, Air Conditioner Inputs.

Test Step		Result / Action to Take
C1	**CHECK THE PRESSURE TRANSDUCER REFERENCE VOLTAGE**	
	Check voltage between ground and circuit 351 BR-W on wiring harness. **Is reference voltage correct to spec: V=5±0.25V?**	**Yes** Go to **C2** **No** Repair circuit. Test for normal operation.
C2	**CHECK EARTH AT TRANSDUCER**	
	Check resistance between ground and circuit 359 on wiring harness. **Is transducer earth present?**	**Yes** Go to **C3** **No** Repair circuit. Test for normal operation.
C3	**CHECK TRANSDUCER OUTPUT SIGNAL**	
	Apply 5 V to circuit 351 at transducer. Apply earth to circuit 359 at transducer. Ensure A/C refrigerant pressure is within 200kPa and 3170 kPa. Check voltage between ground and circuit 440 at transducer. **Is voltage within range 0.0 V to 5.25 V ?**	**Yes** Pressure transducer operation is normal. **No** REPLACE pressure transducer.

PINPOINT TEST D : EVAPORATOR CORE ICE UP

⚠ CAUTION: Follow all Climate Control system safety precautions when dealing with A/C system refrigerant.

⚠ CAUTION: The position of the thermistor in relation to the evaporator air-off airflow is critical for efficient operation of the refrigeration system. It is therefore vital that the evaporator thermistor is correctly located in the HVAC case, as incorrect positioning of the thermistor will adversely affect efficiency, and could also result in evaporator core ice up

Test Step		Result / Action to Take
D1	**COMPRESSOR CYCLING**	
	NOTE: Test can not be conducted in high ambient temperatures, as the compressor may not cycle off, if the ambient temperature is high. Turn blower motor fan to low speed (fan speed 1). Switch A/C ON. Set to re-circulated air. Set temperature to full cold (driver and passenger). Ensure all vehicle doors and windows are closed. **Does the Compressor Cycle OFF and ON?**	**Yes** Go to **D2** **No** GO to Pinpoint Test G. to check evaporator thermistor.

DIAGNOSIS AND TESTING (Continued)

Test Step		Result / Action to Take
D2	**PRESSURE GAUGE EVALUATION**	
	NOTE: Test can not be conducted in high ambient temperatures, as the compressor may not cycle off, if the ambient temperature is high. **Is the suction pressure constantly at or below approx 150 kPa with the A/C On and Engine speed held at approx 2000 RPM ?**	**Yes** Conduct A/C Performance test to diagnose the cause of the Low suction pressure. (Refer to this section). **No** Go to **D3**
D3	**SUCTION TUBE INSPECTION**	
	NOTE: Test can not be conducted in high ambient temperatures, as the compressor may not cycle off, if the ambient temperature is high. **Does the Evaporator outlet tube at the TX Valve frost or ice-up with the A/C ON, Blower fan speed 1 (low) and the Engine speed held at 2000 RPM for 3 - 5 Minutes?**	**Yes** Replace TX Valve and recharge A/C system to correct gas charge. Refer to Air Conditioning System Evacuation and Charging in this section. **No** Operation is normal. ⚠ **CAUTION: The Electronic Leak Detector probe MUST NOT come in contact with any water, as this can damage the leak detector. So electronic leak detection at the HVAC condensate drain tube is NOT recommended.**

DIAGNOSIS AND TESTING (Continued)

PINPOINT TEST E : EVAPORATOR CORE REFRIGERANT LEAKAGE

CAUTION: Follow all Climate Control system safety precautions when dealing with A/C system refrigerant.

NOTE: An Evaporator Core Refrigerant leakage will also cause “Smell”. This is due to the PAG Refrigerant Oil being released with the Refrigerant.

NOTE: Removal of the Evaporator core should not be undertaken unless all other potential leak sources have been eliminated.

Test Step		Result / Action to Take
E1	**EVAPORATOR LEAK TEST – FLUORESCENT DYE LEAK DETECTION**	
	NOTE: Test can not be conducted in high ambient temperatures, as the compressor may not cycle off, if the ambient temperature is high. Conduct an A/C leak test. Follow the procedure described in the General Procedures section under Fluorescent Dye Leak Detection (if the A/C system has operated for only a small number of hours) or Electronic Leak Detection. Fluorescent Dye Leak Detection: This test procedure is applicable only if the A/C system has operated for a small number of hours, as the accumulator dye only has a limited life of ~500 hours of Air conditioning operation. Note that for an Automatic Climate Control (ACC) system, the Air Conditioning may be operating almost continuously to maintain cabin comfort levels. For Fluorescent Dye Leak Detection, the A/C system must have run for ~15 minutes prior to leak testing, to allow the dye to mix thoroughly and give valid leak test results. Operate the A/C system with A/C on, low blower fan (fan speed 1), full cold temperature (driver and passenger), recirculated inlet air and air outlet face centre vents open but outboard vents closed. Place the leak detector probe at the outlet of the face centre vents. Leaks can be pinpointed by the bright yellow-green glow of the tracer dye, using a 120-watt Ultra Violet lamp, and viewed through U.V. glasses **Is there evidence of fluorescent dye leaking onto the air outlet face centre vent grilles?**	**Yes** Replace the Evaporator core. Refer to this section. **No** Go to step 6.
E2		
	Operate the A/C system at maximum cooling (max blower fan, full cold temperature (driver and passenger), recirculated inlet air) but close off all air outlet vents (this will force air out the HVAC condensate drain tube). Place the leak detector probe at the outlet of the HVAC condensate drain tube, underneath the centre of the car above the transmission. Leaks can be pinpointed by the bright yellow-green glow of the tracer dye, using a 120-watt Ultra Violet lamp, and viewed through U.V. glasses **Is there evidence of fluorescent dye leaking from the HVAC condensate drain tube or around the top of the transmission?**	**Yes** Replace the Evaporator core. Refer to this section. **No** Go to step 9.

DIAGNOSIS AND TESTING (Continued)

Test Step		Result / Action to Take
E3		
	Set the ACC to full cold temperature (driver and passenger). Switch off the A/C. Remove the ICC (Refer to section 413-08) to observe dye traces inside the HVAC case assembly. Leaks can be pinpointed by the bright yellow-green glow of the tracer dye, using a 120-watt Ultra Violet lamp, and viewed through U.V. glasses **Is there evidence of fluorescent dye leaking from the evaporator core?**	**Yes** Replace the Evaporator core. Refer to this section. **No** If the fluorescent dye leak test was completed with no leaks on an A/C system with only a small number of hours in operation, the evaporator core is not the root cause of refrigerant leakage.
E4	**EVAPORATOR LEAK TEST _ ELECTRONIC LEAK DETECTION**	
	Electronic Leak Detection: The A/C system pressure must be above 300kPa (with engine off) prior to conducting an Electronic Leak test, as this indicates sufficient refrigerant to allow the compressor to run and pressurise the system for leak detection. If the system pressure is below 300kPa with engine off, a small amount of refrigerant may be added to the system for diagnostic purposes. **Operate the A/C system with A/C on, low blower fan (fan speed 1), full cold temperature (driver and passenger), recirculated inlet air and air outlet face centre vents open but outboard vents closed.** Insert the leak detector probe as far as possible down the face air outlet centre vent **Does the leak detector indicate a leak from the evaporator core?**	**Yes** Replace the Evaporator core. Refer to this section. **No** The evaporator core is not the root cause of refrigerant leakage. ⚠ **CAUTION: The Electronic Leak Detector probe MUST NOT come in contact with any water, as this can damage the leak detector. So electronic leak detection at the HVAC condensate drain tube is NOT recommended.**

PINPOINT TEST F : CONDENSER FAN OPERATION/PERFORMANCE

NOTE: Also refer to PCM section 303-14, Electro Drive Fans.

Test Step		Result / Action to Take
F1	**CHECK FOR AIRFLOW OBSTRUCTION**	
	Visually inspect A/C condenser core and radiator core for air flow obstructions such as leaves or bugs. **Is there any obstruction ?**	**Yes** Remove obstruction and clean A/C condenser core and radiator. Retest system. **No** Go to **F2** The evaporator core is not the root cause of refrigerant leakage. ⚠ **CAUTION: The Electronic Leak Detector probe MUST NOT come in contact with any water, as this can damage the leak detector. So electronic leak detection at the HVAC condensate drain tube is NOT recommended.**
F2	**FAN SELF-TEST**	
	The cooling fan motor(s) and circuits are tested during a PCM Key On Engine Off Self-Test, using the PDS/IDS (Refer to section Section 303-14). Faults detected by the PCM will be recorded as DTCs. **NOTE:** Prior to executing the self-test, any other DTCs which have been set should be recorded and cleared. **Did the self-test set any DTCs ?**	**Yes** Refer to DTC chart in Section 412-03 and Section 303-14. Repair circuit, replace faulty parts, test for normal operation. **No** The condenser fan(s) are not at fault.

DIAGNOSIS AND TESTING (Continued)

PINPOINT TEST G : EVAPORATOR TEMPERATURE THERMISTOR

⚠ CAUTION: The position of the thermistor in relation to the evaporator air-off airflow is critical for efficient operation of the refrigeration system. It is therefore vital that the correct removal and replacement procedure is followed as incorrect positioning of the thermistor will adversely affect efficiency, and could also result in evaporator core ice up

Test Step		Result / Action to Take
G1	**SYSTEM ON DEMAND SELF TEST**	
	Start and run engine until normal operating temperature is reached. Ensure vehicle battery voltage is within normal operating range (12~14volts) before proceeding with test. Using PDS/IDS service tool, record all DTCs set in the HIM memory. Using PDS/IDS service tool, clear all DTCs set in the HIM memory. Using PDS/IDS service tool, perform HVAC On Demand Self Test (refer section 412-04). **Are any DTC codes set?**	**Yes** Go to **G2** if code B2014 is set. Go to **G3** if code B1947 is set. **No** System is OK.
G2	**EVAP TEMP THERMISTOR WIRING INSPECTION**	
	Disconnect the 2 way Evaporator thermistor (temperature sensor) connector D from the HIM and inspect terminals on the thermistor lead assembly for damage or corrosion. **Do the terminals appear damaged?**	**Yes** Replace Evaporator thermistor **No** Go to **G3**
G3	**EVAP THERMISTOR INSPECTION - RESISTANCE CHARACTERISTIC**	
	Turn off the Air Conditioner, select face vent air outlet, full cold temperature, ('L' or 'Low') and operate HVAC blower at max fan speed to stabilise the Evaporator thermistor temperature. Disconnect the 2 way Evaporator thermistor connector D from the HIM. Carefully insert the test probes of a resistance meter in to the REAR of the Evaporator thermistor connector (wire side). Inserting probes in to front of terminals will damage the thermistor and cause intermittent A/C operation. Compare the thermistor resistance value over page with a temperature thermometer located in the face outlet. **Is the resistance reading within specification (+/- 5°C) as per thermistor output table?**	**Yes** Go to **G4** **No** Replace Evaporator thermistor.
G4	**MODULE FUNCTION CHECK - EVAPORATOR THERMISTOR TEMPERATURE READING**	
	Reconnect the thermistor 2 way connector D to the HIM. Connect PDS/IDS service Tool. Read the A_CT value (Evaporator thermistor temperature) from the HIM. **Does the value closely match the temperature probe located in the face outlet (+/- 5°C) as per thermistor output table overpage?**	**Yes** System OK. **No** Go to **G5**

DIAGNOSIS AND TESTING (Continued)

Test Step		Result / Action to Take
G5	**MODULE FUNCTION CHECK – EVAP THERMISTOR SUPPLY VOLTAGE**	
	Check the Evaporator thermistor supply voltage with a voltmeter. With the Evaporator thermistor 2 way connector D inserted in to the HIM, attach the positive probe to pin 2 (LHS) and the negative probe to pin 1 (RHS) of the rear of the Evaporator thermistor connector. Refer to Evaporator thermistor connector diagram for correct pin designations. Using evap thermistor output table, compare the voltage reading against a temperature probe located in the face outlet with the HVAC Blower fan operating at high speed. **Does the voltage value closely match the temperature probe located in the face outlet (+/- 5°C)?**	**Yes** Go to **G6** **No** Replace HIM
G6	**MODULE OUTPUT CHECK – EVAP THERMISTOR SUPPLY VOLTAGE**	
	Remove evaporator thermistor plug from HIM. Using a voltmeter, attach the probes to the HIM output terminals for the evaporator thermistor. Ensure ignition key is ON. **Is the voltage reading within 4.5-5.5 Volts?**	**Yes** System OK. Clear DTC. **No** Replace HIM.

Evaporator Thermistor (Temperature Sensor) Output

Temperature Degrees (Celsius)	Sensor Resistance (Ohms)	Sensor Voltage (Volts)
-30	25.37k	4.16
-25	18.90k	3.94
-20	14.19k	3.68
-15	10.73k	3.39
-10	8.17k	3.08
-5	6.27k	2.76
0	4.85k	2.44
5	3.78k	2.13
10	2.97k	1.84
15	2.35k	1.56
20	1.87k	1.34
25	1.50k	1.14
30	1.21k	0.96
35	0.98k	0.81
40	0.75k	0.68
45	0.66k	0.57
50	0.55k	0.48
55	0.45k	0.41

NOTE: Use this table as a guide only. Minor variations between actual readings are acceptable.

DIAGNOSIS AND TESTING (Continued)

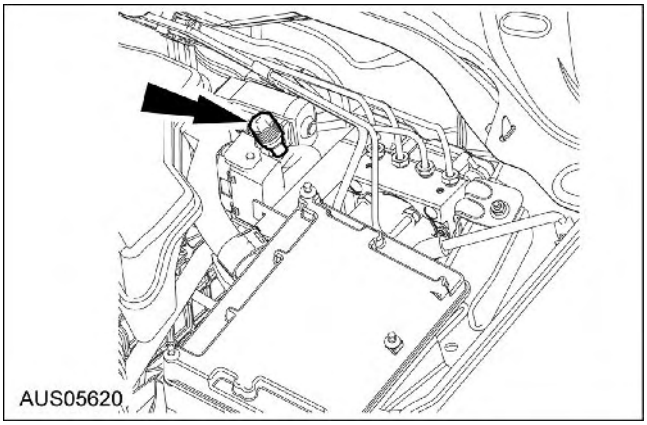
PINPOINT TEST H : TXV OPERATION

Test Step		Result / Action to Take
H1	**Establish normal operating conditions**	
	NOTE: This test should be conducted only after conducting the Air Conditioning system performance test and/or KOER test. If the A/C system performance is still not acceptable, use the following test to confirm TXV operation Turn blower motor fan to max fan speed. Switch A/C ON. Set to re-circulated air. Set temperature to full cold (driver and passenger) Ensure all vehicle doors and windows are opened.	
H2	**TXV inlet tube temperature measurement**	
	Does the TXV inlet tube (liquid line entering TXV) feel warm/hot to touch?	**Yes** Go to **H3** **No** Review A/C performance test and KOER test, and repair fault as per Performance Test Diagnostics chart or KOER Test DTC chart.
H3	**TXV outlet tube temperature measurement**	
	Is the TXV outlet tube (suction sub-tube exiting TXV) cold to touch? **NOTE:** When tested in lower ambient environments, the suction tube temperature may not be significantly colder than the ambient temperature	**Yes** Operation is normal **No** Go to **H4**
H4	**TXV needle movement (Clogged with Moisture)**	
	Connect A/C system manifold gauges as per General Procedures-Manifold Gauge Set Connection. Does the suction manifold gauge reading fluctuate significantly and indicate a vacuum when viewed for up to 5 minutes? **NOTE:** Normal operation is within limits set by A/C system performance test charts in this section **NOTE:** Suction side vacuum may be caused by freezing of the TXV from presence of moisture	**Yes** Evacuate to remove moisture and recharge A/C system for correct gas charge. (Refer to this section). **No** Go to **H5**
H5	**TXV needle movement (Blocked / stuck)**	
	NOTE: This test will only be valid if the ambient temperature is above 30°C. Observe manifold gauge pressures as you cool the bulb (heat sensing portion) of the TXV. (Add ice to the bulb or cool with compressed air/nitrogen) Suction side pressure should increase as needle is closed from the cooling of the TXV bulb. **Has the suction pressure increased?**	**Yes** TXV is not the cause of the problem. Repeat A/C system performance test. **No** Replace the TX Valve. ⚠ **CAUTION: Recover refrigerant before TXV removal. Refer to A/C Discharging and Recovery in this section. Recharge A/C system for correct gas charge. Refer to Air Conditioning System Evacuation and Charging in this section**

GENERAL PROCEDURES

Manifold Gauge Set Connection

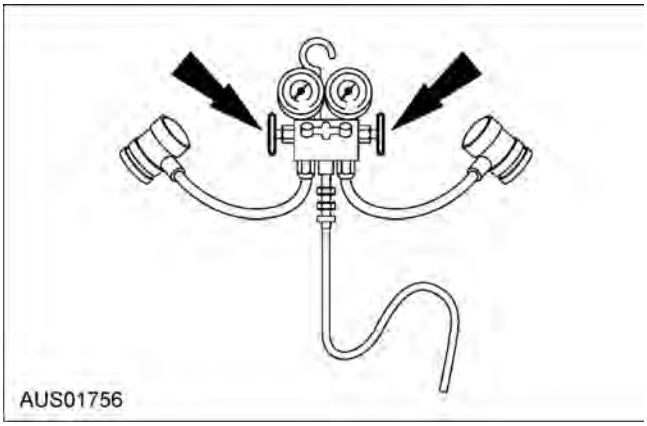
Special Tool(s)	
	R-134a Manifold Gauge Set with isolating valves on each hose or equivalent



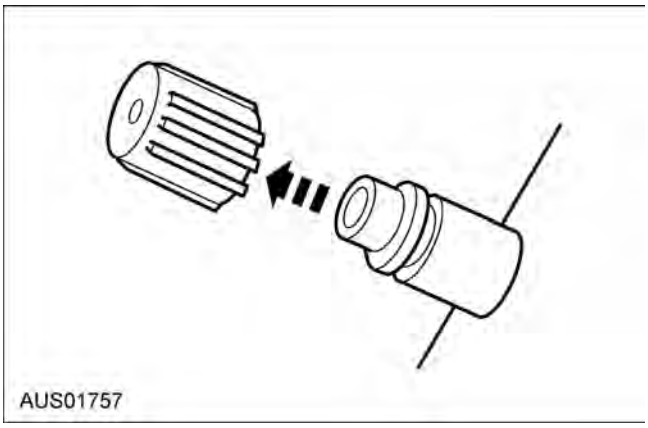
To access the low pressure charge port on the suction sub-tube, it may be necessary to remove the air cleaner outlet duct by loosening the hose clamp at the intake manifold and the air box outlet. However, once the manifold gauge quick connect fitting has been assembled to the charge port, the air cleaner outlet duct should be reconnected before the vehicle is started. For additional information, refer to Sections 303-12.

1. Turn both gauge valves on the R-134a Manifold Gauge Set all the way clockwise to close the low-pressure and high-pressure hoses to the centre manifold and centre hose.

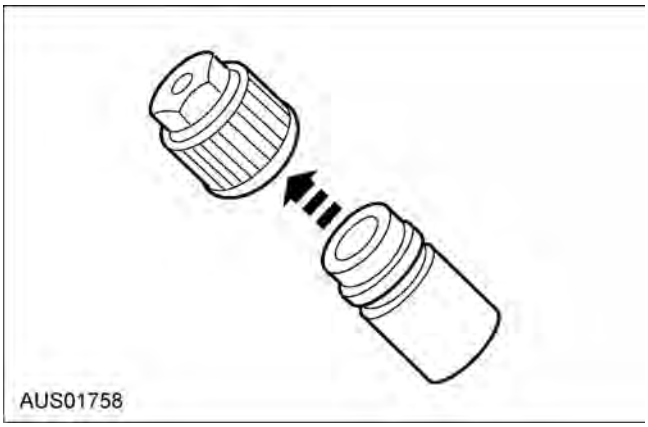
NOTE: The valves on the quick-connect fittings are clockwise to open, while the valves at the manifold gauges are clockwise to close.



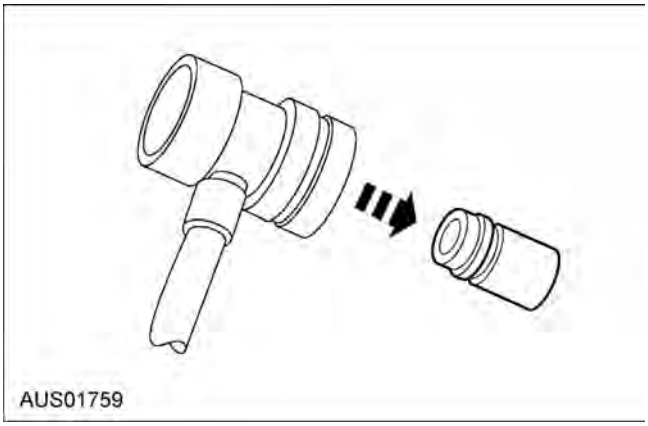
2. Remove the A/C charging valve cap from the low-pressure service charge port located on the suction sub-tube.



3. Remove the A/C charging valve cap from the high-pressure service charge port located on the liquid line.

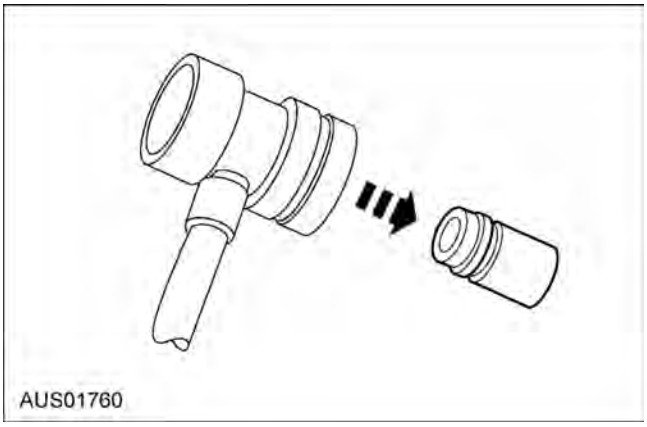


4. Connect the R-134a manifold gauge set low-pressure hose (BLUE) with the R-134a low side quick-connect fitting to the low-pressure service charge port on the suction sub-tube.



GENERAL PROCEDURES (Continued)

5. Connect the R-134a manifold gauge set high-pressure hose (RED) with the R-134a high side quick-connect fitting to the high-pressure service charge port on the liquid line.



Fluorescent Dye Leak Detection

Special Tool(s)	
	120 Watt UV Spot Lamp or equivalent
	R-134a Manifold Gauge Set with isolating valves on each hose or equivalent

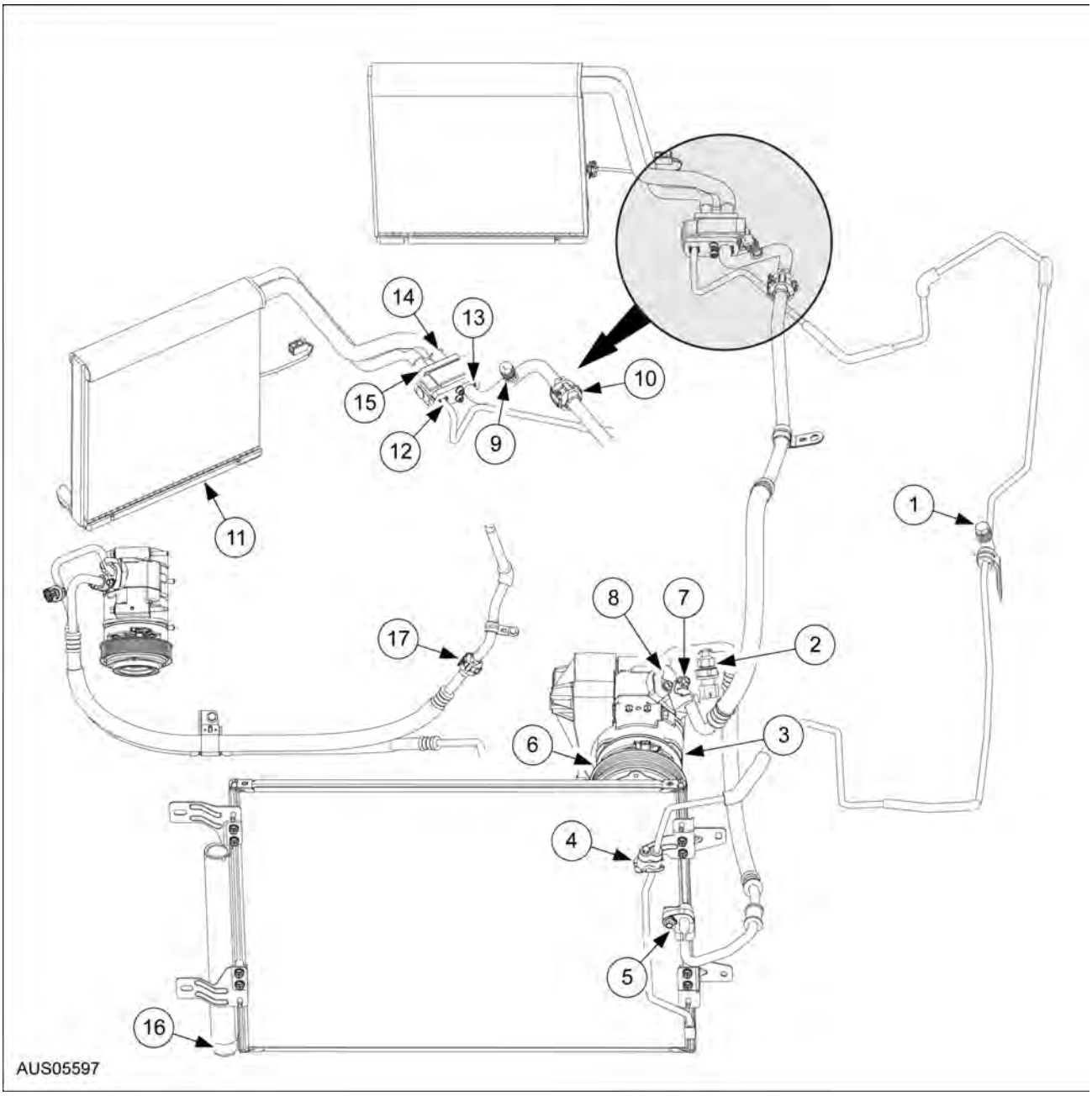
NOTE: Ford Motor Company vehicles are produced with R-134a Leak Tracer Dye added to the condenser receiver/modulator drier bag, with the fluorescent dye having a limited life of ~500 hours of air conditioning operation. The location of leaks can be pinpointed by the bright yellow-green glow of the tracer dye when viewed under Ultra Violet light. Since more than one leak can exist, always inspect each component.

If A/C system filter/drier is replaced, the new drier bag is supplied with new dye, which has a limited life of ~500 hours of air conditioning operation after drier bag replacement.

NOTE: For Fluorescent Dye Leak Detection, the A/C system must have run for ~15 minutes prior to leak testing, to allow the dye to mix thoroughly and give valid leak test results.

1. Run the A/C system for ~15 minutes prior to leak testing, to allow the dye to mix thoroughly.
2. Check for leaks using a 120-watt UV spot lamp, and viewed through U.V. glasses.
3. Check for leakage at the compressor shaft seal, and at all system fittings, lines and components as per Joint Locations illustration in this section.

GENERAL PROCEDURES (Continued)



4. To check for leaks from the evaporator core, look for dye traces with the A/C operating, as follows
5. (i) at the air outlet face centre vent. Refer to pinpoint test E.
6. (ii) around the HVAC condensate drain tube above the transmission, viewing from the left side of the transmission. Refer to pinpoint test E.
7. Alternatively, to check for leaks from the evaporator core, it may be necessary to remove the Interior Command Centre (Refer to section 413-08) to look for dye traces inside the HVAC case assembly. Refer to Pinpoint test E.
8. If a leak is found, recover the refrigerant and repair the leak. For additional information refer to A/C system discharging and recovery in this section.

After the leak is repaired, remove any traces of leaked dye with a general purpose oil solvent.

Electronic Leak Detection

Special Tool(s)	
	Refrigerant Electronic Leak Detector or equivalent

⚠ CAUTION: Good ventilation is necessary in the area where electronic A/C leak testing is to be carried out. If the surrounding air is contaminated with refrigerant gas, the leak detector will indicate this gas as a leak. Odours from other chemicals such as antifreeze, diesel fuel, disc brake cleaner,

GENERAL PROCEDURES (Continued)

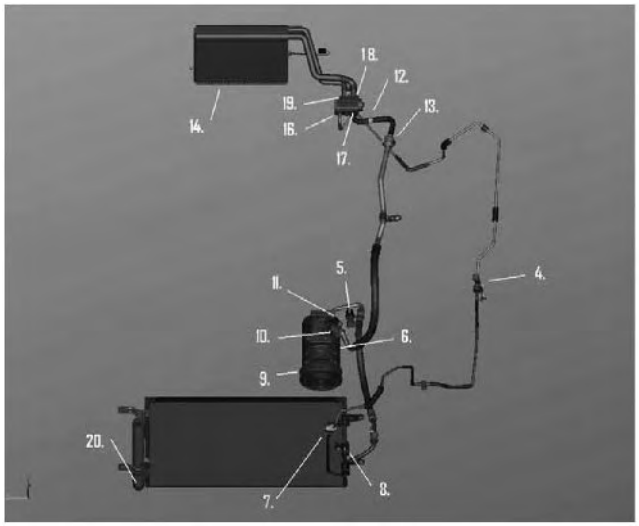
or other cleaning solvents can cause the same problem. A fan, even in a well-ventilated area, is very helpful in removing small traces of contamination from the air that might affect the leak detector.

NOTE: The A/C system pressure must be above 300kPa (with engine off) prior to conducting an Electronic Leak test, as this indicates sufficient refrigerant to allow the compressor to run and pressurise the system for leak detection. If the system pressure is below 300kPa with engine off, a small amount of refrigerant may be added to the system for diagnostic purposes. A Refrigerant Recovery Station must be connected during this procedure to ensure the immediate recovery of added refrigerant once a leak is detected.

CAUTION: The Electronic Leak Detector probe MUST NOT come in contact with any water, as this can damage the leak detector. So electronic leak detection at the HVAC condensate drain tube is NOT recommended.

1. Be sure to remove all oil from the test area before using the electronic leak detector, because the oil may contain refrigerant which would give incorrect readings. Do NOT touch the tip of the leak detector in any moist, oily or dirty surfaces, as this may result in faulty readings.
2. Check for leakage at the compressor shaft seal, and at all system fittings, lines and components as per Joint Locations illustration in this section.The leak detector tip should be moved around the system at a distance of 5-10mm from all surfaces at a rate of 25-50mm per second. Particular attention should be paid to the underside of all joints and A/C components. Follow instructions included with leak detector for handling and operation techniques.
3. To check for leaks from the evaporator core (inside the HVAC case), insert the electronic leak detector probe as far as possible down the air outlet face centre vent with the A/C operating. Refer to Pinpoint test E.
4. If a leak is found, recover the refrigerant and repair the system. For additional information refer to A/C system discharging and recovery in this section.

Joint Locations



ITEM	DESCRIPTION
1	High pressure service gauge charge port
2	A/C pressure transducer
3	Compressor pressure relief valve
4	Condenser - AC Liquid line joint
5	Condenser – Discharge hose joint
6	Compressor front seal
7	Suction hose – Compressor joint
8	Discharge hose – Compressor joint
9	Low pressure service gauge charge port
10	Liquid line to suction hose quick joint
11	Evaporator – Check HVAC condensate drain hose and HVAC air outlet vents
12	Liquid line – TXV joint
13	Suction hose – TXV joint
14	Evaporator outlet – TXV joint
15	Evaporator inlet - TXV joint
16	Condenser filter/receiver cap
17	V8 only – Extra quick joint between suction hose and suction tube at front of LH side rail
18	AC liquid line joint near TXV (this joint only exists if service replacement line has been fitted)
19	AC liquid line joint near high pressure charge port (this joint only exists if service replacement line has been fitted)

GENERAL PROCEDURES (Continued)

A/C Refrigerant Discharging and Recovery

NOTE: Refrigerantion Service Technicians must be licenced by the Australian Refrigeration Council Ltd prior to conducting this procedure

Special Tool(s)	
	R-134a Refrigerant Recovery Station or equivalent
	R-134a Manifold Gauge Set with isolating valves on each hose or equivalent

1. Connect the R-134a Manifold Gauge Set to the low and high pressure service gauge charge ports.
   The low-pressure hose (BLUE) is to be connected via the low side quick connect to the low-pressure service charge port on the suction sub-tube. The high-pressure hose (RED) is to be connected via the high side quick connect to the high-pressure service charge port on the liquid line.
2. Connect the Manifold Gauge Set centre hose (YELLOW) to the RECOVERY port on the Refrigerant Recovery Station.
3. Ensure the Refrigerant Recovery Station internal oil drain tank and external oil drain measuring cylinder is empty, so that an accurate measurement can be made of the amount of refrigerant oil removed from the A/C system in the Discharging & Recovery process.
4. Recover the refrigerant from the system following the operating instructions provided by the equipment manufacturer. The Refrigerant Recovery Station will withdraw and filter the refrigerant for reuse.

NOTE: The following process is an alternative to reduce the quantity of oil removed from the A/C system. Discharge the majority of the refrigerant through the high pressure hose first (with low pressure quick connect valve closed), BUT then open the low pressure quick connect valve before the evacuation process is completed, to ensure the low pressure side is also fully evacuated.

5. Once the Refrigerant Recovery Station has recovered the vehicle A/C system refrigerant and shut off, close the Recovery Station inlet and outlet valves, but keep all manifold gauge and quick connect valves open.
6. Allow the vehicle A/C system to remain closed for about 5 minutes. Observe the system vacuum level as shown on the gauge. If the vacuum does not change, disconnect the Recovery Station hose(s).
7. If the system pressure rises (due to small pockets of trapped refrigerant boiling off), repeat Steps 2 through 5 until the vacuum level remains stable for 5 minutes.
8. Record the amount of refrigerant oil collected in the Refrigerant Recovery Station by draining the collected oil into the measuring cylinder, as this amount of oil MUST be replaced before recharging the system.

NOTE: For replacement oil, use PAG Compressor ND Oil-8 (250cc can - AY19L000A) or equivalent meeting Ford specification WSH-M1C231-B..

9. Carry out the required repairs, then evacuate and recharge the A/C system, referring to the A/C System Evacuation and Charging procedure following.

Replenishment of Refrigerant Oil

NOTE: Refrigerant oil should be added to the A/C system through the low pressure charge port PRIOR to Evacuation and Charging whenever the following situation has occurred:

there is evidence of a refrigerant leak,

when the A/C system has been evacuated,

if the A/C system filter/drier has been replaced

if any A/C component has been replaced.

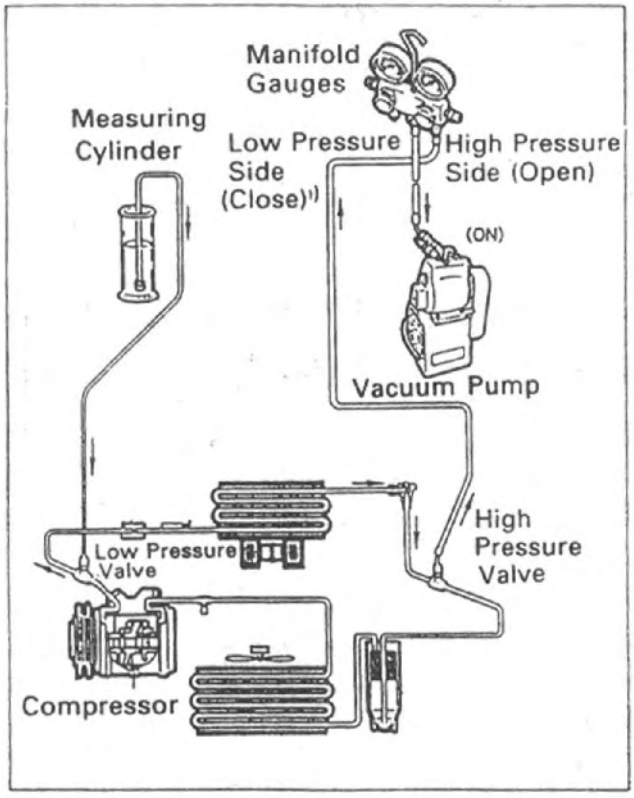
NOTE: The correct oil quantity depends upon which A/C part has been repaired or replaced. For correct oil quantities, refer to Refrigerant Oil Replacement Quantity next in this section.

NOTE: For replacement oil, use PAG Compressor ND Oil-8 (250cc can - AY19L000A) or equivalent meeting Ford specification WSH-M1C231-B.

	R-134a Refrigerant Recovery Station or equivalent
	R-134a Manifold Gauge Set with isolating valves on each hose or equivalent

GENERAL PROCEDURES (Continued)

1. Pour the specified amount of refrigerant oil in to a measuring cylinder (refer to Refrigerant Oil Replacement Quantity next in this section).



2. Connect manifold gauge hoses as shown in illustration in Manifold Gauge Set Connection

   Manifold gauge (high pressure side RED) to air conditioner high pressure charge port on liquid line.

   Manifold gauge (centre YELLOW) to vacuum pump (in Refrigerant Recovery Station).

   Remove hose from manifold gauge (low pressure side BLUE) and connect this end to measuring cylinder with oil. Other end is connected to air conditioner low pressure charge port on suction sub-tube.
3. When vacuum pump is run, oil is drawn into air conditioning system from low pressure side.
4. Switch off vacuum pump after specified amount of oil has been drawn into the system.

⚠ CAUTION: When handling the HFCR134a refrigerant oil, please wear gloves.

⚠ CAUTION: HFC134a refrigerant oil is very hygroscopic (absorbs moisture). Keep the oil container sealed at all times.

⚠ CAUTION: HFC134a refrigerant oil reacts with some plastics. Keep it stored in metal container. (Plastic bottle should only be used for o-ring lubrication.)

⚠ CAUTION: Care should be taken not to spill the HFC134a refrigerant oil on paint work, and plastic. If this is accidentally done, wipe immediately.

⚠ CAUTION: Clearly identify the refrigerant oil when transferred to a different container.

Refrigerant Oil Replacement Quantity

NOTE: During normal A/C operation, oil is circulated through the system with the refrigerant, and a small amount is retained in each component. When evacuating or if certain components of the system are removed for replacement, some of the refrigerant oil will be lost with the component. To maintain the original total system oil charge, it is necessary to compensate for the oil lost by adding refrigerant oil to the system with the new part.

NOTE: As well as replacing the refrigerant oil lost with the removed A/C component, refrigerant oil is carried in the recovered gas and collected in the Refrigerant Recovery Equipment. This collected oil must be measured and replaced, in addition to those quantities listed for each new component below.

NOTE: For replacement oil, use PAG Compressor ND Oil-8 (250cc can - AY19L000A) or equivalent meeting Ford specification WSH-M1C231-B.

NOTE: 2008 Falcon service A/C compressors are shipped with compressor oil (120cc). The 2008 compressor contains a different oil quantity to the BF Falcon, hence it has a different part number and is not compatible with the BF A/C system.

NOTE:

1. Refrigerant recovery

Amount of oil to be ADDED to system =

Amount of oil collected in Refrigerant Recovery Machine

Each time a system charge is recovered, an amount of oil will also be recovered with the refrigerant.

The amount will differ with type of Recovery Machine used and time taken to recover refrigerant.

The oil balance of the system must be maintained for compressor durability and A/C system performance.

Measure the amount of oil recovered with refrigerant (refer to Recovery Machine instructions and A/C system Discharging and Recovery).

This amount of refrigerant oil must be added to the system before recharging with refrigerant.

As the A/C system is being serviced, the filter/drier should be also replaced as described in step 3 (including replacement of additional oil removed with the old drier bag).

GENERAL PROCEDURES (Continued)

2. Compressor Replacement

Amount of oil to be REMOVED from new compressor = 120ml Amount of oil drained from old compressor

NOTE: The 2008 A/C compressor contains a different oil quantity to the BF Falcon, hence it has a different part number and is not compatible with the BF A/C system.

- Rotate the old A/C compressor shaft six to eight revolutions while collecting the oil in a clean measuring device. This amount of old oil collected is all that is required to be in the replacement service compressor
- Drain the oil from the new service compressor (approx. 120ml supplied in new compressor) and remove a quantity of this new oil, so that the amount of oil to be added back into the A/C system equals the amount of oil collected from the old compressor.
- If 80ml was drained from the old compressor then remove 40ml from replacement compressor. (i.e.120 supplied in new comp - 40 to be removed = 80 returned to system).
- Pour this revised quantity of new oil back into the service compressor.
- If an A/C hose has been flushed prior to a new compressor installation, follow step 6 for refrigerant oil replacement quantity.
- As system has been opened to the atmosphere, the filter/drier must be also replaced as described in step 3

3. Filter and Drier replacement

Amount of oil to be ADDED to system = 40ml

- The filter/drier is located in the condenser receiver/modulator, and can be accessed through a flip-down door on the underside of the lower air deflector. The modulator/receiver lower cap must be removed, and then the filter and drier bag can be replaced.
- After fitting the new drier bag, add 40ml of refrigerant oil to the system before recharging with refrigerant. This 40ml is to replace the oil removed with the old drier bag
- The 40ml of refrigerant oil needs to be added each time a filter/drier is replaced, even if refrigerant oil is also added to compensate for other A/C components that are replaced.

4. Condenser, Evaporator replacement

Amount of oil to be ADDED to system = 40ml for each component

- Add 40ml of compressor oil for each component replaced, before recharging with refrigerant.
- As system has been opened to the atmosphere, the filter/drier must be also replaced as described in step 3 (including replacement of additional oil removed with the old drier bag).

5. Leak Repair (Hose or tube, O-ring, pressure switch, charge port repair / replacement, etc)

Amount of oil to be ADDED to system = 20ml

- Additional oil is required unless you can determine no evidence of oil loss (No oil stain around joints). Add 20 ml for oil loss for the refrigerant leak.
- The replacement refrigerant oil must be added to the system before recharging with refrigerant.
- As system has been opened to the atmosphere, the filter/drier must be also replaced as described in step 3 (including replacement of additional oil removed with the old drier bag).

6. Flushing Effect on Oil Quantity

Flushing components will remove any refrigerant oil from these parts.

Amount of oil to be ADDED to system = 20ml for each hose flushed

- If a hose is flushed prior to a new compressor installation, then this oil must be replaced (refer to step 5) to maintain an oil capacity of 120 ml in the total A/C system
- The replacement refrigerant oil must be added to the system before recharging with refrigerant.

A/C Component Flushing

⚠ **CAUTION: A/C component flushing should be only be performed on hose and tube assemblies, and only using compressed nitrogen. Compressed air must NOT be used for flushing A/C components due to its high moisture content. When conducting flushing, ensure that personal protection equipment is worn and safety procedures are strictly observed.**

The inner tube diameters of the condenser and evaporator cannot be flushed effectively. These parts should be inspected for any debris. If doubt exists, it is recommended that the complete condenser or evaporator assembly is replaced.

Vehicles that have an inoperative A/C compressor, due to an internal compressor fault, should be inspected and, as appropriate, components should be cleaned by flushing or replaced to remove any debris or contaminants that may cause damage to the replacement A/C compressor or other A/C system components:

- flush the condenser inlet hose (Discharge hose)
- inspect the compressor inlet hose (Suction hose) and if there is any sign of debris, flush the suction hose
- inspect the condenser, and if there is any sign of debris at the inlet fitting, the condenser assembly should be replaced. If the condenser is not replaced, the filter/drier must be replaced (as debris may have accumulated in the filter).

GENERAL PROCEDURES (Continued)

. Inspect the suction hose at the upper quick connect joint, and if there is any sign of debris that may have been drawn into the TXV, then the TXV should be replaced.

A/C System Evacuation and Charging

CAUTION: The 2008 Falcon A/C system requires significantly less refrigerant charge than the BF Falcon. For refrigerant charge quantity, refer to General Specifications at the beginning of this section. Incorrect refrigerant charge can cause excessively high discharge pressures resulting in compressor damage, compressor cut-out, excessive operating noise or poor A/C performance.

Special Tool(s)	
	R-134a Refrigerant Recovery Station or equivalent
	R-134a Manifold Gauge Set with isolating valves on each hose or equivalent
	1.2 or 4.0 CFM Vacuum Pump or equivalent
	Digital weighing platform (+/-10gram accuracy), or Calibrated Charging Cylinder or equivalent

1. Connect the R-134a Manifold Gauge Set to the low and high pressure service gauge charge ports.

The low-pressure hose (BLUE) is to be connected via the low side quick connect to the low-pressure service charge port on the suction sub-tube. The high-pressure hose (RED) is to be connected via the high side quick connect to the high-pressure service charge port on the liquid line.

2. Connect the Manifold Gauge Set centre hose (YELLOW) to the VACUUM port on the Refrigerant Centre.
3. Open the quick connect valves and manifold gauge valves. Evacuate the system with the low-pressure gauge reading at least 94kPa (25 in-Hg) (vacuum) and as close to 101kPa (30 in-Hg) as possible. Continue to operate the vacuum pump in the Refrigerant Recovery Station for a minimum of 30 minutes.
4. Close the Recovery Station inlet and outlet valves and turn off the vacuum pump. Observe the low-pressure gauge for five minutes to make sure that the system vacuum is held. If vacuum is not held for five minutes (more than 2kPa rise indicates a leak), then leak test the system (for additional information, refer to Electronic or Fluorescent Dye Leak Detection procedures in this section), service the leaks, and evacuate the system again.
5. To maintain the original total system oil charge, it is necessary to compensate for the oil lost when discharging the refrigerant or after replacement of a system component. For additional information on quantity of oil to be added to the system, refer to the Replenishment of Refrigerant Oil and Refrigerant Oil Replacement Quantity in this section.

NOTE: For replacement oil, use PAG Compressor ND Oil-8 (250cc can - AY19L000A) or equivalent meeting Ford specification WSH-M1C231-B..

6. Charge the system with the specified weight of refrigerant and with the correct amount of refrigerant oil, referring to the General Specifications at the start of this section for the refrigerant charge and using the Replenishment of Refrigerant Oil procedure in this section.

MANUAL CHARGING ONLY - If manual charging scales are used, ensure the quick connect valves are closed and the manifold gauge valves and refrigerant bottle valves are open. This will ensure the hoses are filled with refrigerant before zeroing the scales prior to beginning the charging process.

If the full charge of refrigerant has not been drawn into the system, shut-off the high pressure quick connect valve or disconnect the high pressure quick connect. Start the engine and select MAX A/C operation. Adjust the blower motor fan speed to maximum and open the low pressure quick connect valve, to allow the last of the refrigerant to be drawn in through the suction charge port only. Continue to add refrigerant into the system until the specified weight of R-134a has been added. Close the quick connect valves and disconnect the manifold gauge hoses from the vehicle.

AUTOMATIC CHARGING ONLY - Follow the refrigerant charging instructions provided by the manufacturer of the R134a Refrigerant Recovery Station.

REMOVAL AND INSTALLATION

A/C System Filter/Drier Servicing

⚠ CAUTION: All refrigerant must be recovered from the A/C system.

NOTE: Installation of a new A/C system filter/drier is required under the following conditions

when repairing the air conditioning system,

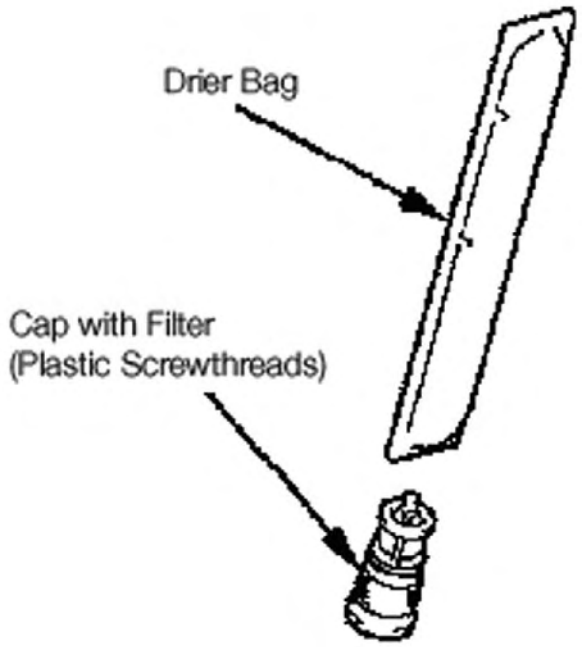
when there is physical evidence of system contamination from a failed A/C compressor,

when there is evidence of the A/C system being open to the atmosphere/leaking

when there is evidence of moisture absorption.

NOTE: The condenser is a sub-cooled condenser. This is a condenser that has a receiver/modulator, which is basically an integral receiver drier, as a part of the condenser assembly. The receiver/modulator has the filter/drier installed into it, and the filter and drier bag are serviceable items. Each time the system is opened to atmosphere for service or component replacement, the filter/drier must be replaced.

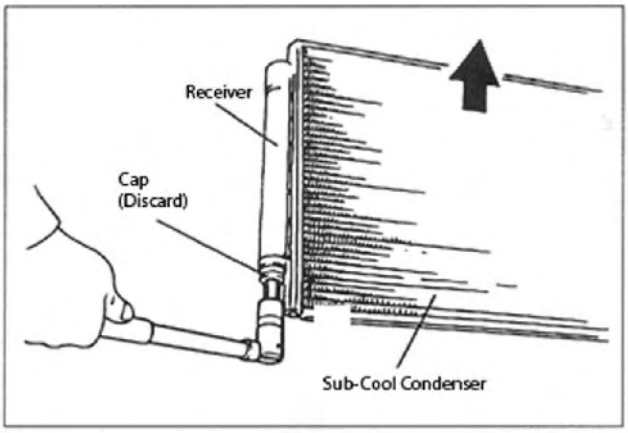
Filter/drier service kit



Removal

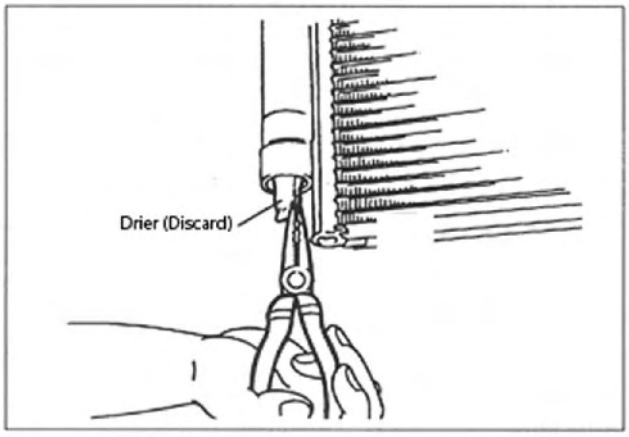
1. Recover the refrigerant. Refer to A/C Discharging and Recovery in this section.
2. Flip open the access door in the underside of the lower air deflector directly below the condenser receiver/modulator on the RHS of the condenser
3. Remove the receiver/modulator cap and filter using a 14mm Allen key.

NOTE: Ensure condenser is free of dust or dirt around the cap area before disassembling.



4. Remove the drier bag.

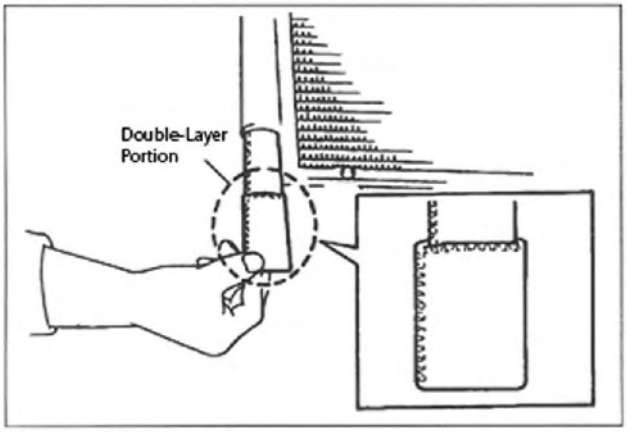
Discard the cap, filter and drier bag, as all will be supplied in the filter/drier service kit



Installation

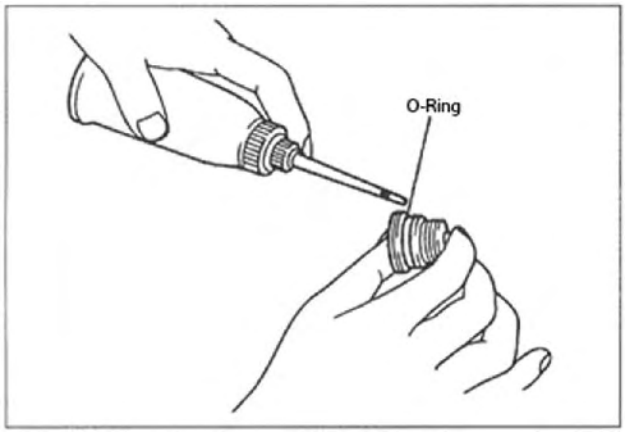
1. Insert the drier bag into the receiver/modulator, with its double-layer portion at the bottom of the receiver/drier closest to the filter and cap

⚠ CAUTION: It is extremely important that the drier is not removed from the packaging until immediately before inserting it into the receiver/modulator, so it does not absorb moisture from the surrounding air.



REMOVAL AND INSTALLATION (Continued)

2. Apply PAG Compressor Oil ND-Oil 8 to 0-ring and thread of the new cap.



3. Install the cap to the recommended tightening torque.
4. Add 40cc of PAG Compressor Oil ND-Oil 8 to the A/C system (Refer to Replenishment of Refrigerant Oil and Refrigerant Oil Replacement Quantity in this section prior to recharging the A/C system, as any oil removed with the filter/drier must be replaced)
5. Evacuate and recharge the A/C system. For more information, refer to the A/C System Evacuation and Charging procedure in this section.

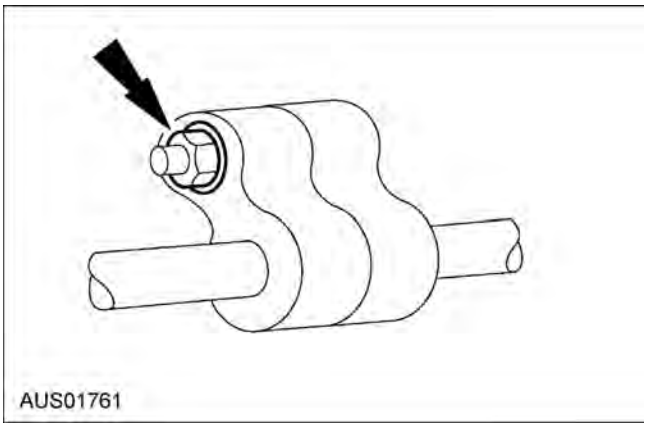
A/C Hose/Tube Pad Fitting

⚠ CAUTION: All refrigerant must be recovered from the A/C system.

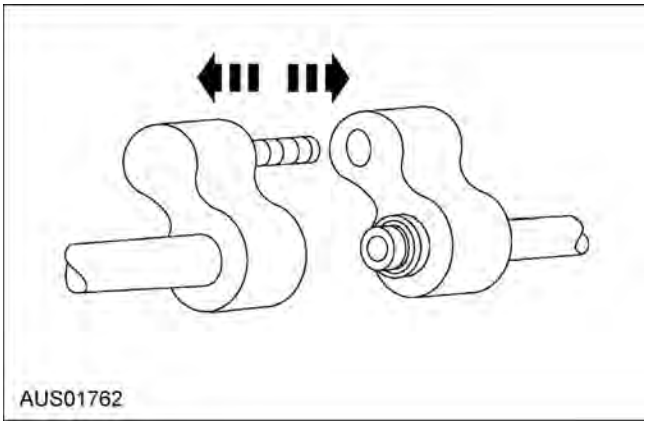
Removal

1. Recover the refrigerant. Refer to A/C Discharging and Recovery in this section.
2. Remove the bolt from the air conditioning line (pad) fitting.

⚠ CAUTION: Support the female fitting with a wrench to prevent the tubes from twisting.

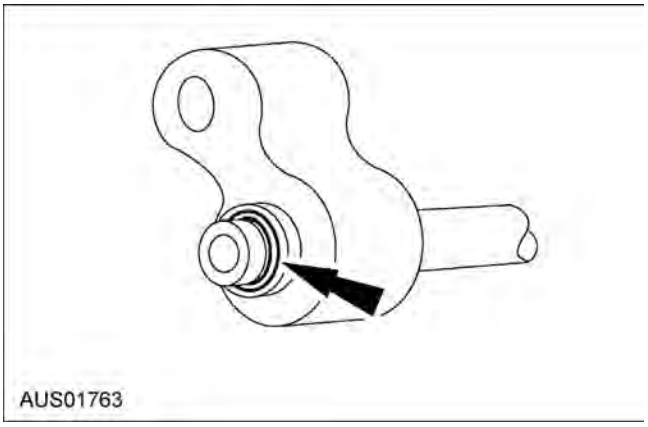


3. Pull the air conditioning line (pad) fitting apart.



4. If damaged remove the O-ring seal with a non-metallic tool.

⚠ CAUTION: Do not use metal tools to remove the O-ring seal. They can cause axial scratches across the O-ring seal groove resulting in refrigerant leaks.

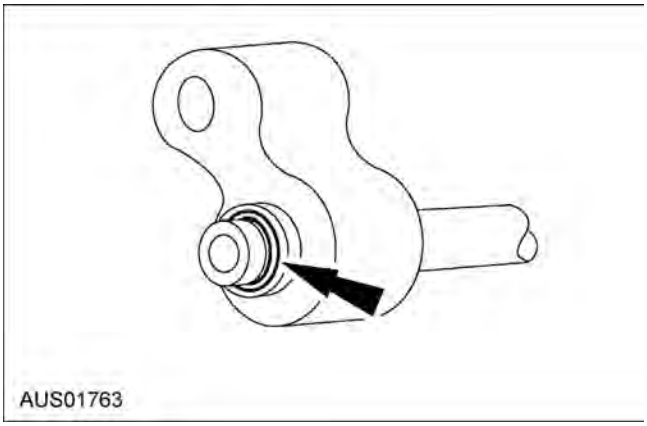


REMOVAL AND INSTALLATION (Continued)

Installation

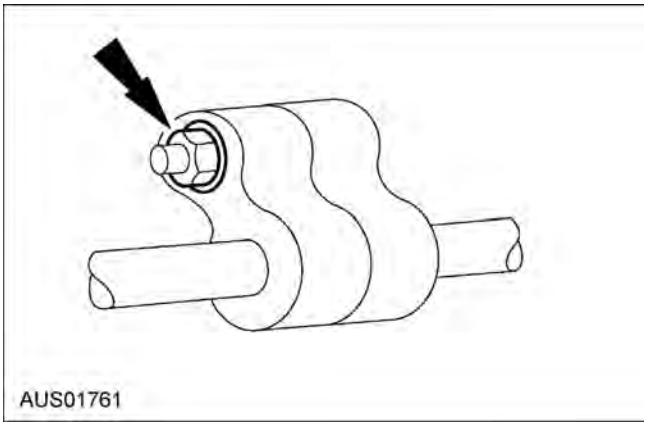
1. Clean all dirt or foreign material from the fittings.
2. If removed, install a new O-ring seal.

⚠ CAUTION: Use only new genuine Ford black refrigerant O-ring seals which are compatible with refrigerant R-134a and refrigerant oil ND-Oil The use of any O-ring seals other than specified may result in intermittent leakage during vehicle operation.


AUS01763

3. Lubricate the A/C O-ring seals with PAG Compressor Oil ND-Oil 8 prior to assembly.
4. Assemble the male and female pad fittings together.

NOTE: When correctly assembled, the male and female pad fittings should be flush before installing the connecting bolt.


AUS01761

5. Tighten the pad fitting bolt to the specified torque.

NOTE: Once tightened to the specified torque, further tightening of the pad fitting bolt will not improve the sealing performance.

6. Install a new filter and drier. For additional information, refer to Filter and drier Replacement in this section prior to recharging the A/C system.

NOTE: Installation of a new A/C system filter/drier is required when repairing the air conditioning system, when there is physical evidence of system contamination from a failed A/C compressor, evidence of the A/C system being open to the atmosphere/leaking or evidence of moisture absorption.

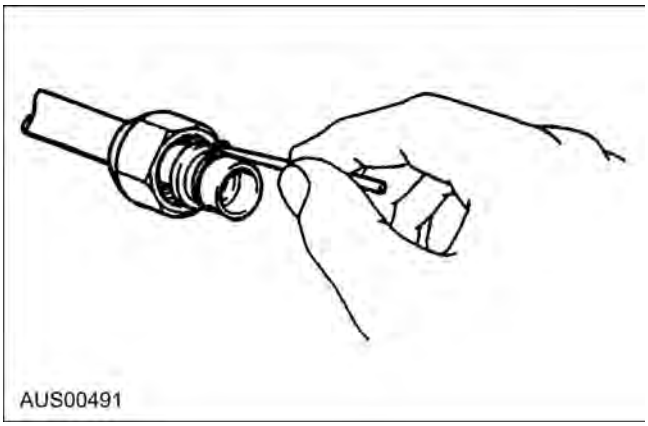
7. Refer to Replenishment of Refrigerant Oil and Refrigerant Oil Replacement Quantity in this section prior to recharging the A/C system, as any oil removed with the serviced parts must be replaced.
8. Evacuate and recharge the A/C system. Refer to Air Conditioning System Evacuation and Charging in this section.

O-Ring Removal and Lubrication

Removal

1. When removing an o-ring from a tube, use a wooden or nylon tool to prevent damaging the tube.

NOTE: Always replace the existing o-rings with new genuine Ford O-rings specified for refrigerant HFC-134a, as air conditioning O-rings are made of a material compatible with refrigerant and refrigerant oil.


AUS00491

2. Before making any hose and tube connections, apply a few drops of compressor oil to the seat of o-ring to avoid refrigerant leakage.

NOTE: Lubricate the A/C O-ring seals with PAG Compressor Oil ND-Oil 8 prior to assembly.

Air Conditioning (A/C) Compressor I6 Engine

⚠ CAUTION: All refrigerant must be recovered from the A/C system.

⚠ CAUTION: If you are installing a new A/C compressor because the A/C compressor has failed internally, you must use the following procedures to prevent refrigerant system contamination.

Vehicles that have an inoperative A/C compressor, due to an internal compressor fault, should be inspected and, as appropriate, components should be cleaned by flushing or replaced to remove any debris or contaminants that may cause damage to the

REMOVAL AND INSTALLATION (Continued)

replacement A/C compressor or other A/C system components:

flush the condenser inlet hose (Discharge hose)

inspect the compressor inlet hose (Suction hose) and if there is any sign of debris, flush the suction hose

inspect the condenser, and if there is any sign of debris at the inlet fitting, the condenser assembly should be replaced. If the condenser is not replaced, the filter/drier must be replaced (as debris may have accumulated in the filter).

Inspect the suction hose at the upper quick connect joint, and if there is any sign of debris that may have been drawn into the TXV, then the TXV should be replaced.

NOTE: Installation of a new A/C system filter/drier is required under the following conditions

when repairing the air conditioning system,

when there is physical evidence of system contamination from a failed A/C compressor,

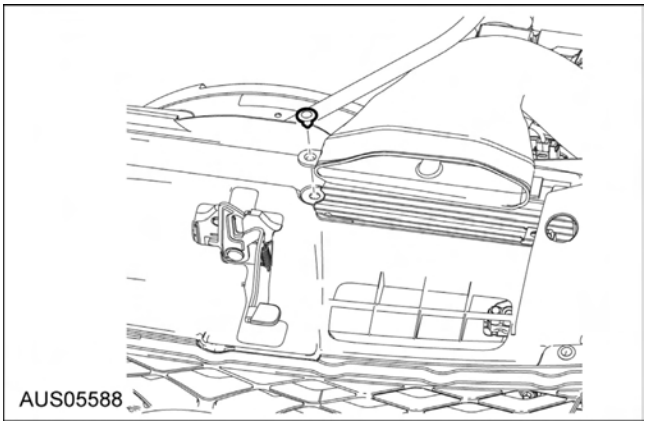
when there is evidence of the A/C system being open to the atmosphere/leaking

when there is evidence of moisture absorption.

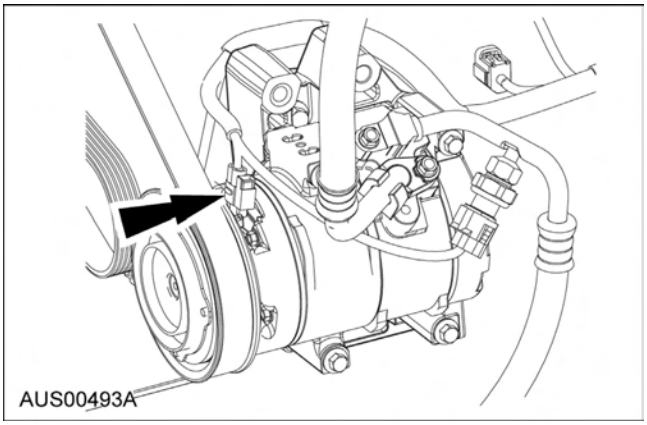
NOTE: The 2008 A/C compressor contains a different oil quantity to the BF Falcon, hence it has a different part number and is not compatible with the BF A/C system.

Removal

1. Disconnect the vehicle battery. This will ensure that the compressor run-in strategy will be activated once the new compressor has been fitted and the battery reconnected.
2. Recover the refrigerant. For additional information refer to A/C system discharging and recovery in this section.
3. Remove the air cleaner intake duct by removing the scrivet onto the radiator grille sight cover. Also remove the air cleaner box secured with 2 bolts. For additional information, refer to Section 303-1



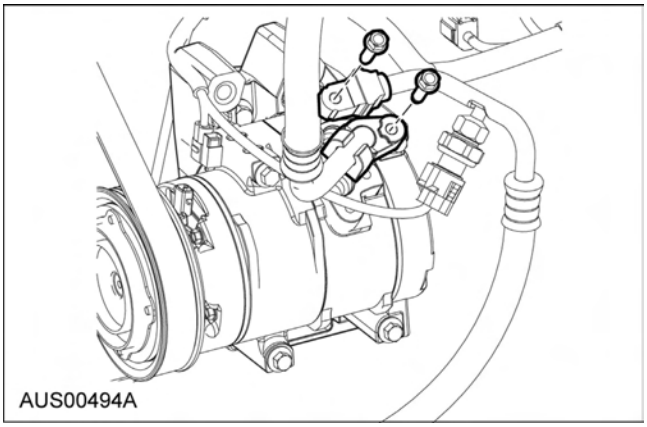
4. Remove the drive belt. For additional information, refer to Section 303-05
5. Disconnect the A/C clutch electrical connector.



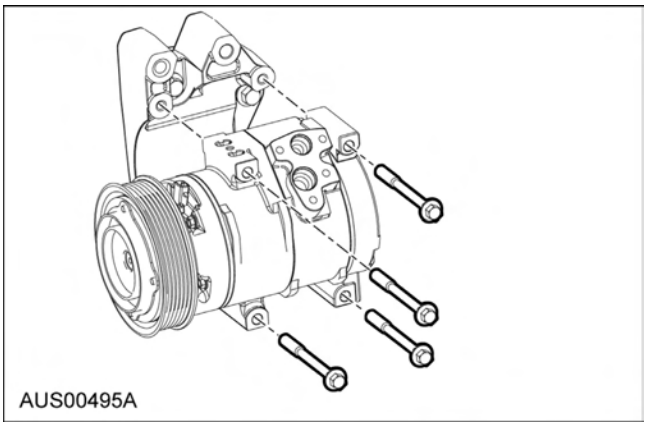
6. Remove the A/C discharge hose assembly bolt and the suction hose assembly bolt from the pad fittings on the side of the A/C compressor, and disconnect the A/C hose assemblies.

NOTE: Do not insert screwdriver between pad fittings, as damage can easily occur.

⚠ CAUTION: Plug all A/C ports and hoses to prevent contamination from dirt or moisture.



7. Remove the 4 compressor mounting bolts and the A/C compressor from the compressor bracket.



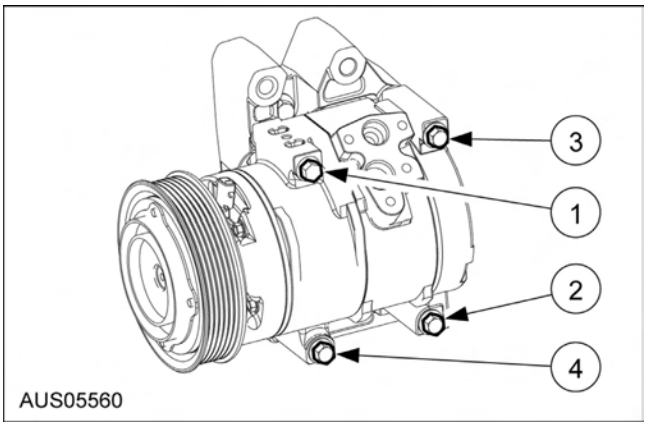
REMOVAL AND INSTALLATION (Continued)

Installation

1. Each new compressor is supplied with 120cc of ND-Oil8 for the A/C system lubrication. Refer to Refrigerant Oil Replacement Quantity in this section prior to fitting a new compressor, as the new compressor must have some oil removed to ensure that the A/C system maintains 120cc of oil.
2. To install, reverse the removal procedure.The tightening sequence is upper front, lower rear, upper rear, lower front.

NOTE: For installation, the black compressor mounting bolt must be fitted to the upper front location (both I6 & V8) in the bracket first. The remaining 3 silver grey compressor mounting bolts are to be fitted to the other 3 locations, as per the mounting bolt tightening sequence as shown opposite.

NOTE: Lubricate the A/C O-ring seals with PAG Compressor Oil ND-Oil 8 prior to assembly.



3. For vehicles that have had a failed A/C compressor due to an internal fault, carry out the air conditioning (A/C) component flushing procedure in this section, and/or replace contaminated A/C components, in order to prevent damage to the replacement compressor or other A/C system components
4. Install a new filter and drier. For additional information, refer to Filter and drier Replacement in this section prior to recharging the A/C system.

NOTE: Installation of a new A/C system filter/drier is required when repairing the air conditioning system, when there is physical evidence of system contamination from a failed A/C compressor, evidence of the A/C system being open to the atmosphere/leaking or evidence of moisture absorption.

5. Evacuate and recharge the A/C system. For additional information, refer to A/C system evacuation and charging in this section.

Air Conditioning (A/C) Compressor - V8 Engine

⚠ CAUTION: All refrigerant must be recovered from the A/C system.

⚠ CAUTION: If you are installing a new A/C compressor because the A/C compressor has failed internally, you must use the following procedures to prevent refrigerant system contamination.

Vehicles that have an inoperative A/C compressor, due to an internal compressor fault, should be inspected and, as appropriate, components should be cleaned by flushing or replaced to remove any debris or contaminants that may cause damage to the replacement A/C compressor or other A/C system components:

flush the condenser inlet hose (Discharge hose)

inspect the compressor inlet hose (Suction hose) and if there is any sign of debris, flush the suction hose

inspect the condenser, and if there is any sign of debris at the inlet fitting, the condenser assembly should be replaced. If the condenser is not replaced, the filter/drier must be replaced (as debris may have accumulated in the filter).

Inspect the suction hose at the upper quick connect joint, and if there is any sign of debris that may have been drawn into the TXV, then the TXV should be replaced

NOTE: Installation of a new A/C system filter and drier is required under the following conditions

when repairing the air conditioning system,

when there is physical evidence of system contamination from a failed A/C compressor,

when there is evidence of the A/C system being open to the atmosphere/leaking

when there is evidence of moisture absorption.

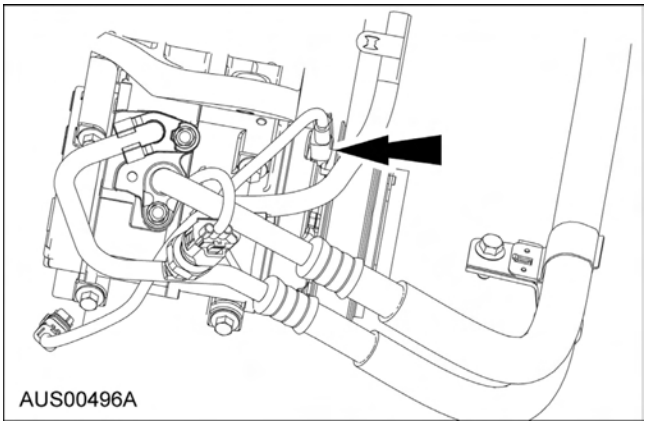
NOTE: The 2008 A/C compressor contains a different oil quantity to the BF Falcon, hence it has a different part number and is not compatible with the BF A/C system.

Removal

1. Disconnect the vehicle battery. This will ensure that the compressor run-in strategy will be activated once the new compressor has been fitted and the battery reconnected.
2. Recover the refrigerant. For additional information refer to A/C System Discharging and Recovery in this section.
3. Remove the drive belt. For additional information, refer to Section 303-05

REMOVAL AND INSTALLATION (Continued)

4. Disconnect the A/C clutch electrical connector.

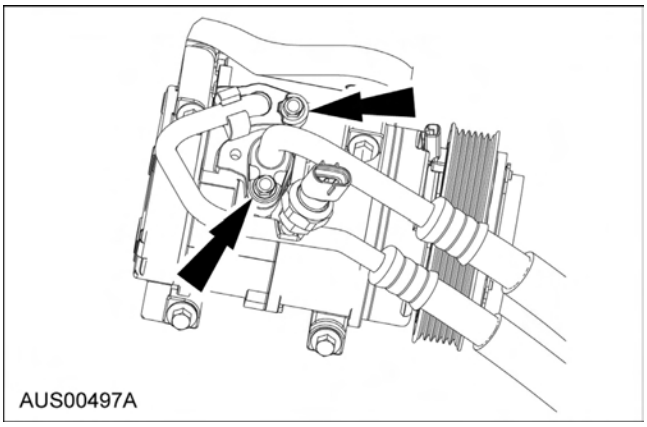


5. Remove the A/C discharge hose assembly bolt and the suction hose assembly bolt from from the pad fittings on the the side of the A/C compressor and disconnect the A/C hose assemblies.

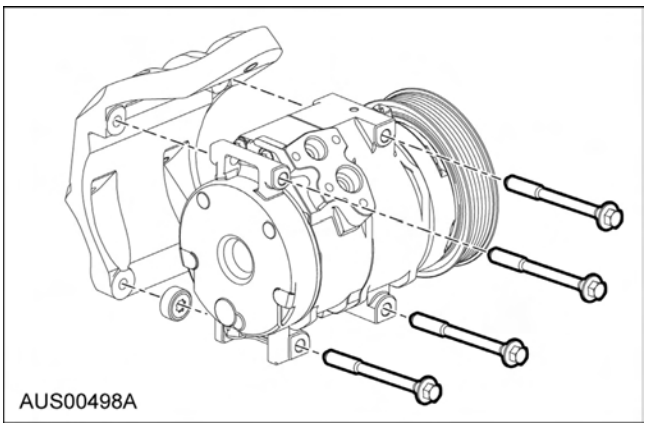
NOTE: Access to the V8 compressor is easier from underneath the vehicle

NOTE: Do not insert screwdriver between pad fittings, as damage can easily occur.

⚠ **CAUTION: Plug all A/C ports and hoses to prevent contamination from dirt or moisture.**



6. Remove the 4 compressor mounting bolts and the two lower compressor mounting spacers and the A/C compressor from the compressor bracket.



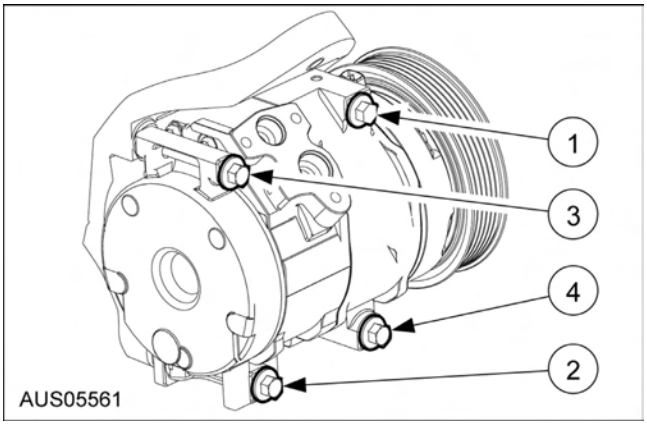
Installation

1. Each new compressor is supplied with 120cc of ND-Oil8 for the A/C system lubrication. Refer to Refrigerant Oil Replacement Quantity in this section prior to fitting a new compressor, as the new compressor must have some oil removed to ensure that the A/C system maintains 120cc of oil.
2. To install, reverse the removal procedure.The tightening sequence is upper front, lower rear, upper rear, lower front.

NOTE: For installation, the black compressor mounting bolt must be fitted to the upper front location (both I6 & V8) in the bracket first. The remaining 3 silver grey compressor mounting bolts are to be fitted to the other 3 locations, as per the mounting bolt tightening sequence as shown opposite.

NOTE: For V8 only, spacers must be fitted between comp & bracket on two lower comp mounting bolts.

NOTE: Lubricate the A/C O-ring seals with PAG Compressor Oil ND-Oil 8 prior to assembly.



3. For vehicles that have had a failed A/C compressor due to an internal fault, carry out the air conditioning (A/C) component flushing procedure in this section, and/or replace contaminated A/C components, in order to prevent damage to the replacement compressor or other A/C system
4. Install a new Filter and drier. For additional information, refer to Filter and drier Replacement in this section.

NOTE: Installation of a new A/C system filter and drier is required when repairing the air conditioning system, when there is physical evidence of system contamination from a failed A/C compressor, evidence of the A/C system being open to the atmosphere/leaking or evidence of moisture absorption.

5. Evacuate and recharge the A/C system. For additional information, refer to A/C system evacuation and charging in this section.

REMOVAL AND INSTALLATION (Continued)

Compressor Clutch, Compressor Pressure Relief Valve and Compressor Shaft Seal

The compressor clutch, compressor pressure relief valve and compressor shaft seal are not serviceable.

If any compressor clutch, pressure relief valve or compressor leakage faults occur, replace the complete compressor and clutch assembly.

NOTE: The 2008 Compressor contains a different oil quantity to the BF Falcon, hence it has a different part number and is not compatible with the BF A/C system.

Air Conditioning (A/C) Compressor Bracket - I6 / V8

CAUTION: All refrigerant must be recovered from the A/C system.

NOTE: Installation of a new A/C system filter and drier is required when repairing the air conditioning system, when there is physical evidence of system contamination from a failed A/C compressor, evidence of the A/C system being open to the atmosphere/leaking or evidence of moisture absorption.

NOTE: The 2008 Falcon I6 A/C compressor bracket is different to the BF in that it has added bosses at the top to locate an engine lifting eye

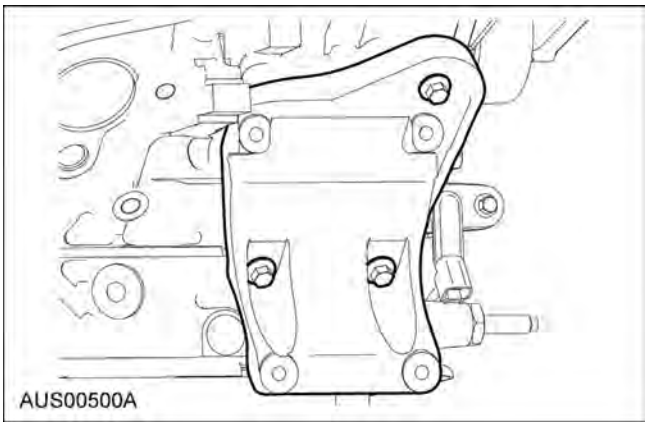
Removal

1. Recover the refrigerant. For additional information refer to A/C System Discharging and Recovery in this section.
2. Remove the compressor assembly, as detailed earlier in this section

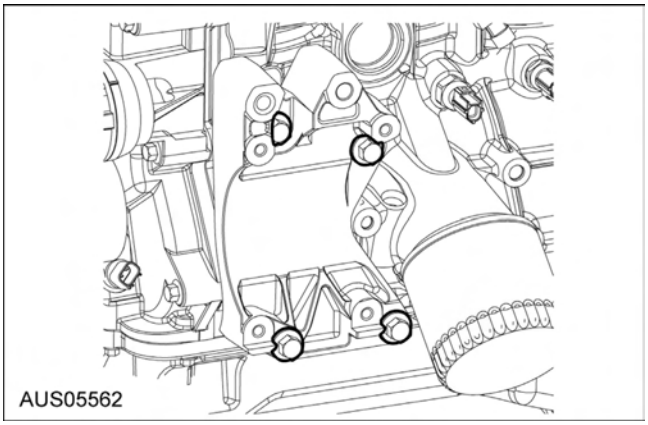
NOTE: Access to the V8 compressor is easier from underneath the vehicle

3. Remove the bracket mounting bolts, and the A/C compressor bracket.

V8 Bracket



I6 Bracket



Installation

1. To install, reverse the removal procedure following the mounting bolt tightening sequence as shown opposite.

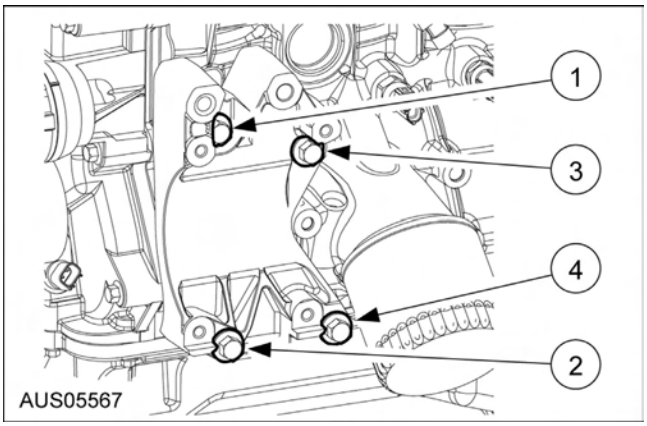
NOTE: For installation, the black compressor mounting bolt must be fitted to the upper front location (both I6 & V8) into the bracket. The remaining 3 silver grey compressor mounting bolts to be fitted to the other 3 locations. The tightening sequence for the compressor mounting bolts is upper front, lower rear, upper rear, lower front.

NOTE: For V8 only, spacers must be fitted between comp & bracket on two lower comp mounting bolts.

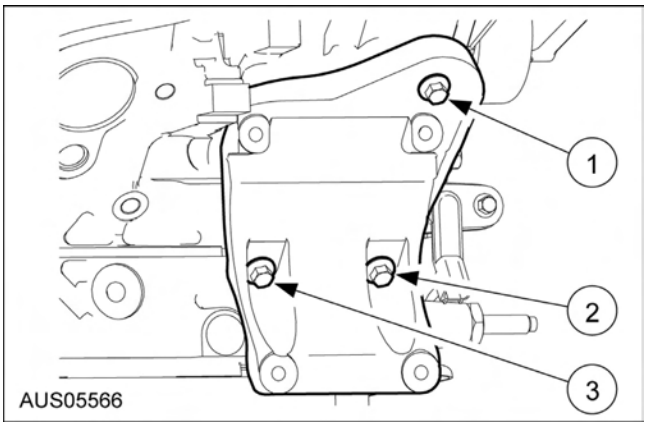
NOTE: Lubricate the A/C O-ring seals with PAG Compressor Oil ND-Oil 8 prior to assembly.

REMOVAL AND INSTALLATION (Continued)

I6 - upper front, lower front, upper rear, lower rear



V8 - upper, lower front, lower rear.



2. Install a new Filter and drier. For additional information, refer to Filter and drier Replacement in this section.

NOTE: Installation of a new A/C system filter and drier is required when repairing the air conditioning system, when there is physical evidence of system contamination from a failed A/C compressor, evidence of the A/C system being open to the atmosphere/leaking or evidence of moisture absorption.

3. Refer to Replenishment of Refrigerant Oil and Refrigerant Oil Replacement Quantity in this section prior to recharging the A/C system, as any oil removed with the serviced parts must be replaced.
4. Evacuate and recharge the A/C system. For additional information, refer to A/C system evacuation and charging in this section.

Pressure Transducer (Pressure Cut-off Switch)

CAUTION: All refrigerant must be recovered from the A/C system.

Removal

1. Recover the refrigerant. For additional information, refer to A/C system discharging and recovery in this section.
2. Disconnect the A/C pressure transducer electrical connector.
3. Remove the A/C pressure transducer from the A/C discharge hose assembly.

CAUTION: Plug all A/C ports to prevent contamination from dirt or moisture

Installation

1. To install, reverse the removal procedure.

NOTE: Lubricate the A/C O-ring seals with PAG Compressor Oil ND-Oil 8 prior to assembly.

2. Install a new Filter and drier. For additional information, refer to Filter and drier Replacement in this section.

NOTE: Installation of a new A/C system filter and drier is required when repairing the air conditioning system, when there is physical evidence of system contamination from a failed A/C compressor, evidence of the A/C system being open to the atmosphere/leaking or evidence of moisture absorption.

3. Refer to Replenishment of Refrigerant Oil and Refrigerant Oil Replacement Quantity in this section prior to recharging the A/C system, as any oil removed with the serviced part must be replaced.
4. Evacuate and recharge the A/C system. For additional information, refer to A/C system evacuation and charging in this section.

Quick Joint Clamp

Special Tool(s)	
 SST95048-10270	Quick joint clamp removal tool

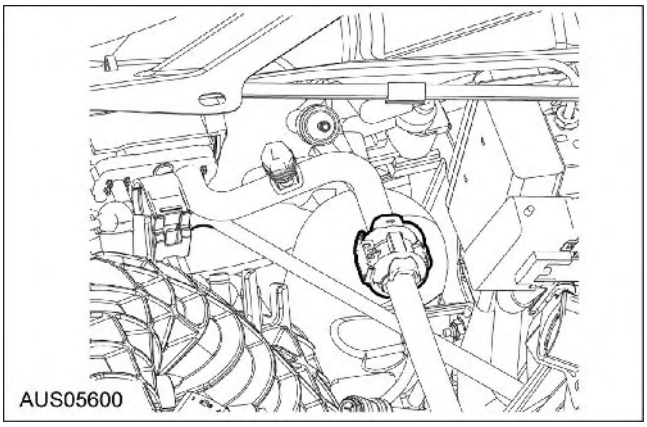
CAUTION: All refrigerant must be recovered from A/C system.

WARNING: It is extremely important that the quick joint be assembled correctly prior to charging the A/C system with refrigerant. If the connection is not fully closed, the joint may separate and leak high pressure refrigerant during or after charging.

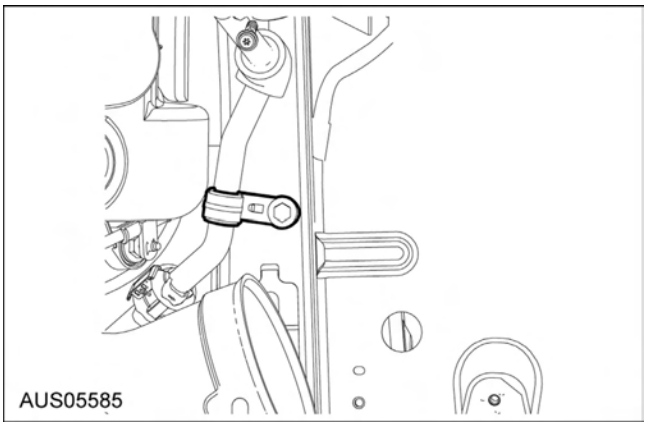
REMOVAL AND INSTALLATION (Continued)

Removal

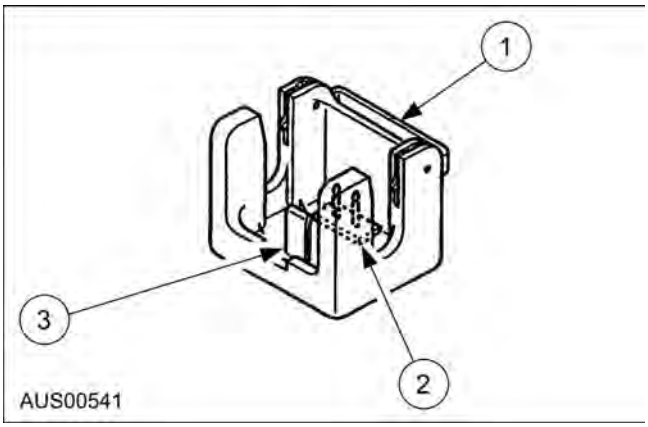
The upper quick joint clamp is fitted between the A/C suction sub-tube and the I6 A/C compressor inlet hose (I6 suction hose) or the V8 A/C evaporator to compressor tube (V8 suction tube).



On the V8 vehicle, there is an additional lower quick joint clamp fitted between the V8 A/C evaporator to compressor tube (V8 suction tube) and the V8 A/C compressor inlet hose (V8 suction hose).



1. Recover the refrigerant. For additional information, refer to A/C System Discharging and Recovery in this section.
2. When the quick joint clamp removal tool is fitted, a plate will hold the quick joint clamp into the removal tool and the removal tool stopper lever will locate the removal tool on the tube joint. Needles in the tool will then release the quick joint clamp locking tabs.

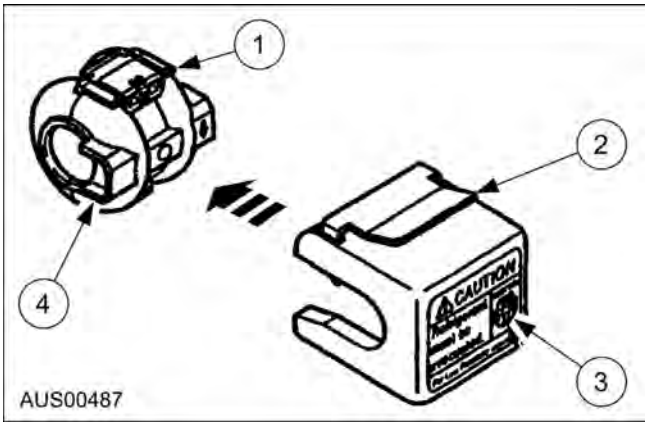


Quick Joint Clamp Removal Tool

Item	Description
1	Stopper Lever
2	Needles
3	Plate

3. Align the plastic quick joint clamp to fit into the quick joint clamp removal tool.

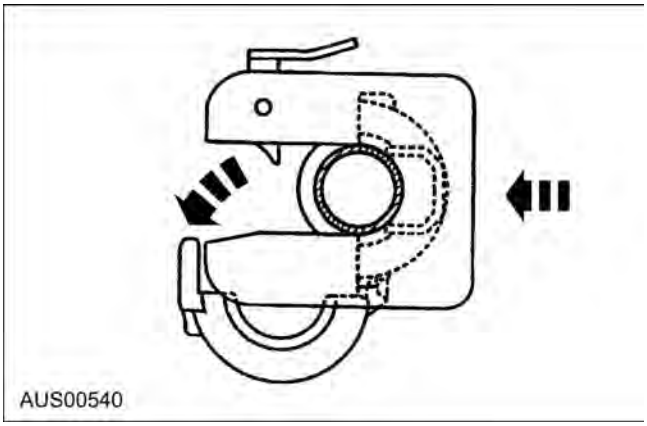
NOTE: Guide on quick joint clamp must fit into slot on tool.



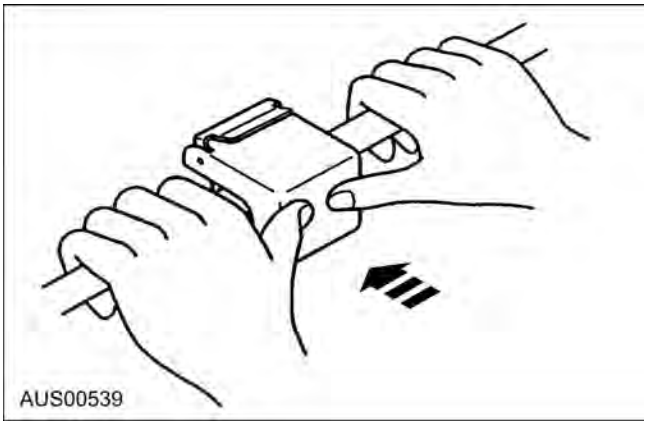
Item	Description
1	Quick Joint Clamp
2	Stopper Lever
3	Clamp Removal tool
4	Clamp Guide

REMOVAL AND INSTALLATION (Continued)

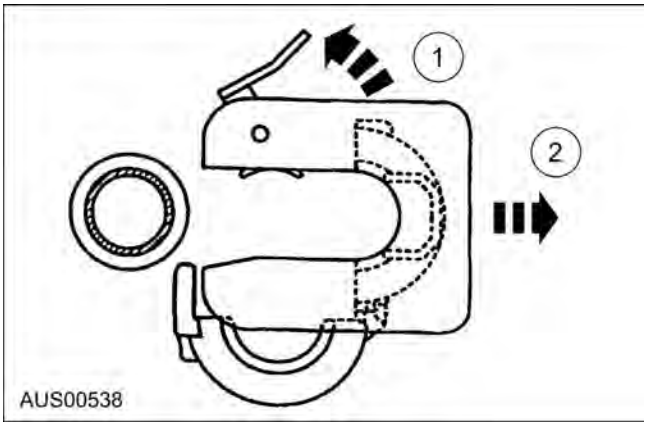
4. Push removal tool onto quick joint clamp.
   NOTE: Do not bend the needles inside the tool when inserting.



5. Push the removal tool against a spring resistance.



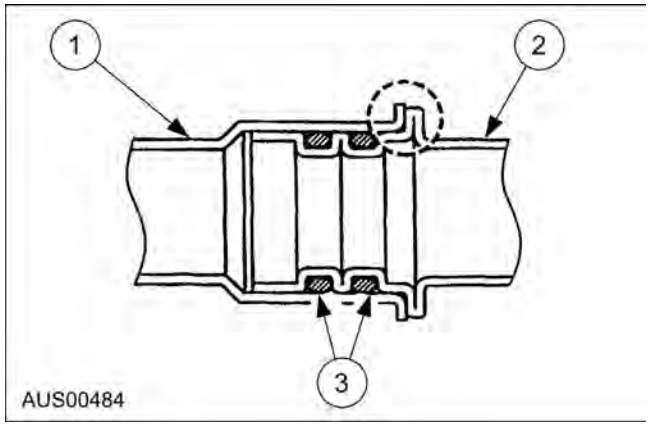
6. Quick joint clamp will release (spring open). Remove quick joint clamp removal tool by lifting the stopper lever to remove from A/C tube.



Item	Description
1	Lift Stopper Lever
2	Slide off removal tool and clamp

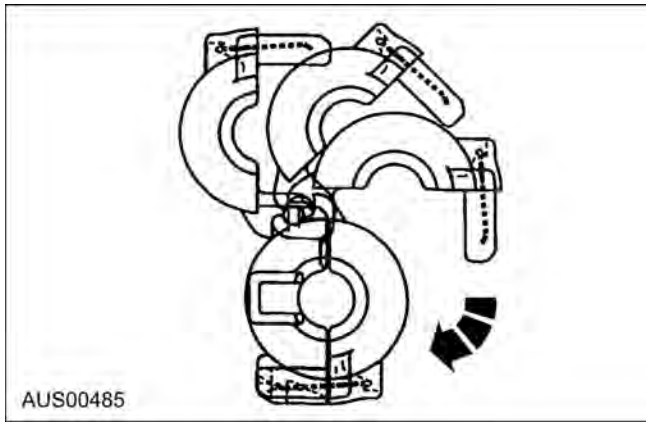
Installation

1. Fully insert the male tube into the female joint, such that no gap exists.Lubricate A/C O-Ring seals with PAG Compressor oil ND-Oil 8 prior to assembly.

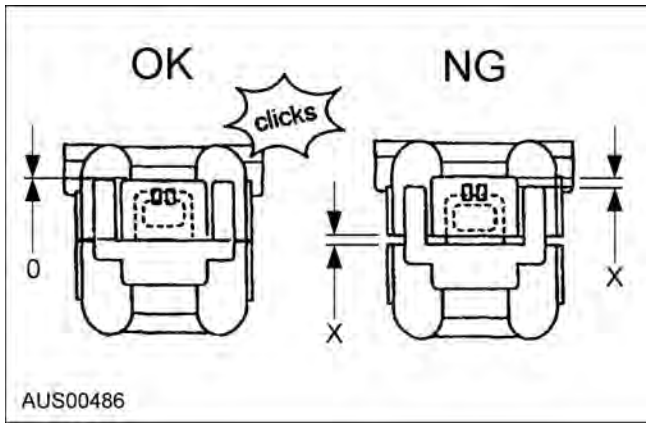


Item	Description
1	Female fitting
2	Male fitting
3	O-Ring seals

2. Wrap quick joint clamp around tube joint, and squeeze to close quick joint clamp.



3. Clamp must click with no gap at (X) joint between both halves of clamp



REMOVAL AND INSTALLATION (Continued)

4. Install a new filter and drier. For additional information, refer to Filter and drier Replacement in this section prior to recharging the A/C system.

NOTE: Installation of a new A/C system filter/drier is required when repairing the air conditioning system, when there is physical evidence of system contamination from a failed A/C compressor, evidence of the A/C system being open to the atmosphere/leaking or evidence of moisture absorption.

5. Refer to Replenishment of Refrigerant Oil and Refrigerant Oil Replacement Quantity in this section prior to recharging the A/C system, as any oil removed with the serviced parts must be replaced.
6. Evacuate and recharge the A/C system. For additional information, refer to A/C system evacuation and charging.

Thermal Expansion Valve (TXV) Assembly and Evaporator E-Clamp

Special Tool(s)	
 SST95048-10270	Quick joint clamp removal tool

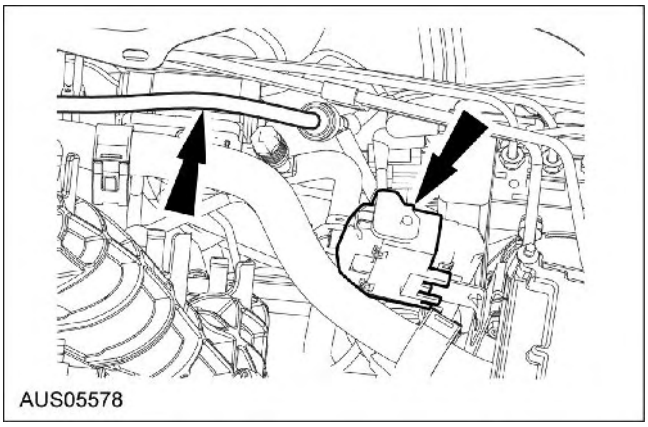
CAUTION: All refrigerant must be recovered from the A/C system.

CAUTION: Ensure the genuine Ford A/C O-rings are present and undamaged on the evaporator inlet and outlet tubes and on the liquid line manifold prior to assembly of the E-clamp, TXV and liquid line. Note that there are 3 different sized A/C O-rings used in the evaporator-TXV-liquid line joints

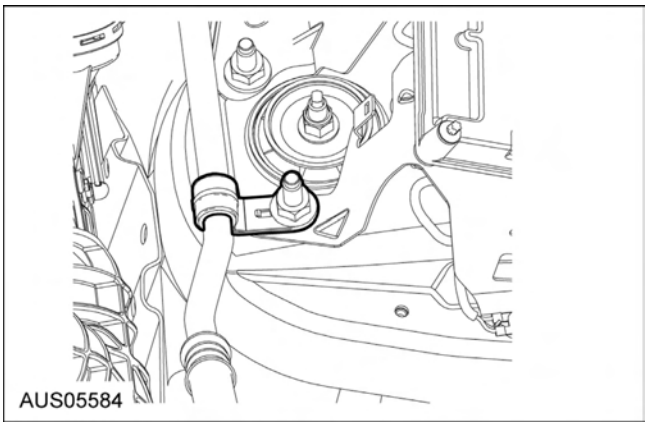
NOTE: The 2008 Falcon evaporator clamp is different to the BF in order to mate to

Removal

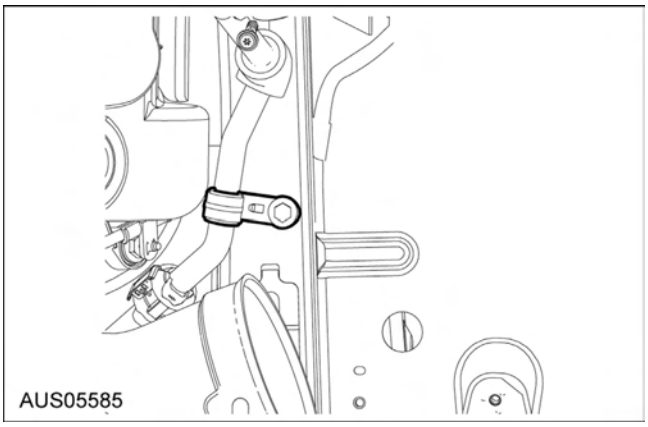
1. Recover the refrigerant. For additional information refer to A/C system Discharging and Recovery in this section.
2. Disconnect the PCM-engine wiring loom from the connector on the PCM, and slide the connector off the PCM bracket.


AUS05578

3. Disconnect the vacuum hose that runs from the vacuum reservoir to the inlet manifold
4. **I6 ONLY** - Remove the air cleaner outlet duct by loosening the hose clamp at the intake manifold and the air box outlet. For additional information, refer to Sections 303-1 Remove the nut from the suction hose bracket to shock absorber stud. Lift the suction hose bracket off the stud by rotating the A/C hose.


AUS05584

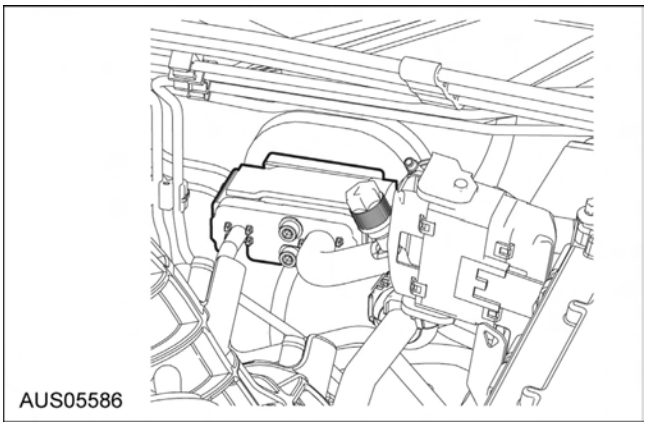
5. **V8 ONLY** - Remove the screw attaching the suction tube bracket to the LH side rail.


AUS05585

REMOVAL AND INSTALLATION (Continued)

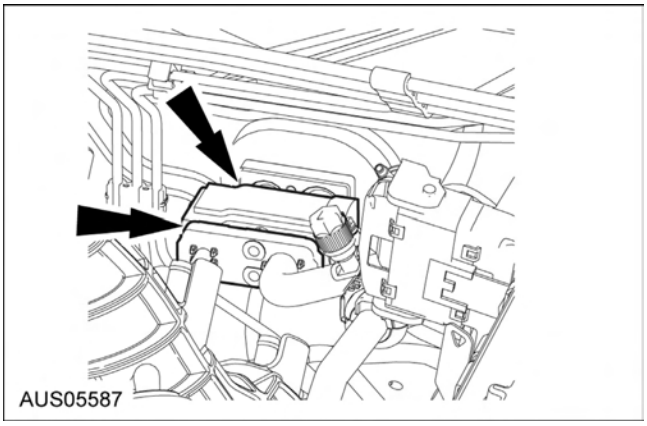
6. While holding the evaporator E-clamp forward, undo the bolts holding the liquid line manifold and TXV to the E-clamp

NOTE: These bolts do not need to be removed from the liquid line completely at this stage, only disconnected from the E-clamp and TXV

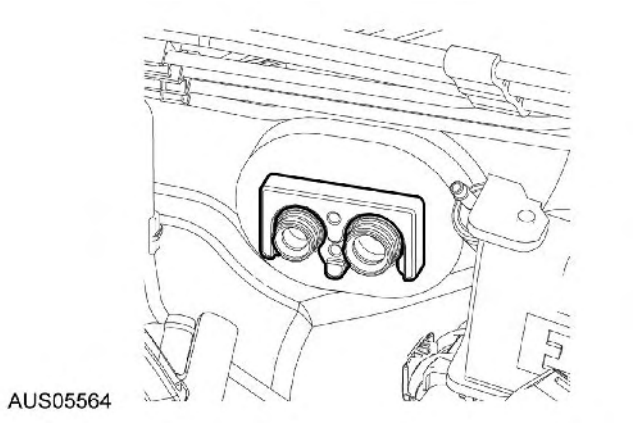


7. Pull the liquid line manifold forward away from the face of the TXV, and allow the manifold to drop down below the TXV, taking care not to damage the A/C O-rings on the manifold tubes

⚠ CAUTION: Plug all A/C ports to prevent contamination from dirt or moisture.



8. Slide the TXV off the evaporator tubes, taking care not to damage the A/C O-rings on the evaporator tubes
9. Lift the evaporator E-clamp up off the evaporator tubes (if required).



Installation

1. To install, reverse the removal procedure.

NOTE: The TXV needs to be slid evenly onto both evaporator inlet and outlet tubes simultaneously to prevent it jamming. Also, the E-clamp should be held forward when tightening the TXV bolts, and the lower bolt should be hand started first.

NOTE: Prior to installing the TXV or liquid line, ensure that the genuine Ford A/C O-rings are present and undamaged on the evaporator inlet and outlet tubes and on the liquid line manifold.

NOTE: There are 3 different sized A/C O-rings used in the evaporator-TXV-liquid line joints

Lubricate A/C O-Ring seals with PAG Compressor oil ND-Oil 8 prior to assembly.

2. Install a new Filter and drier. For additional information, refer to Filter and drier Replacement in this section.

NOTE: Installation of a new A/C system filter and drier is required when repairing the air conditioning system, when there is physical evidence of system contamination from a failed A/C compressor, evidence of the A/C system being open to the atmosphere/leaking or evidence of moisture absorption.

3. Refer to Replenishment of Refrigerant Oil and Refrigerant Oil Replacement Quantity in this section prior to recharging the A/C system, as any oil removed with the serviced parts must be replaced.
4. Evacuate and recharge the A/C system. For additional information, refer to A/C system evacuation and charging.

REMOVAL AND INSTALLATION (Continued)

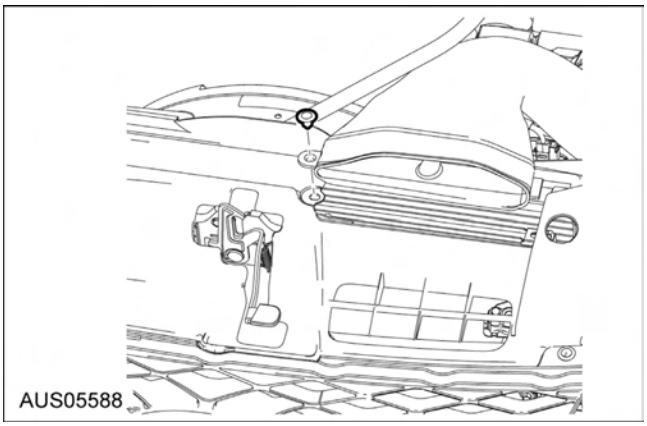
Condenser Inlet Hose Assembly (Discharge Hose)

CAUTION: All refrigerant must be recovered from A/C system.

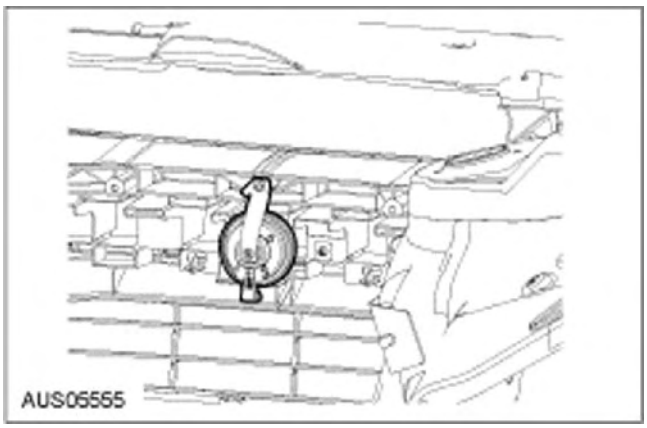
NOTE: The 2008 Falcon condenser Inlet (Discharge) hose is different to the BF discharge hose, with a revised routing, new pad fittings requiring different joint bolts and a support on the radiator side tank using a saddle clamp.

Removal

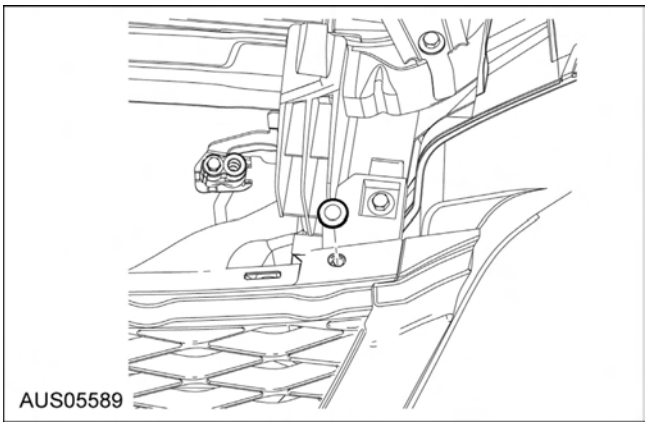
1. Recover the refrigerant. For additional information, refer to A/C Discharging and Recovery in this section.
2. Disconnect the A/C pressure transducer (pressure cut-off switch) electrical connector.
3. Remove the air cleaner intake duct by removing the scrivet onto the radiator grille sight cover. For additional information, refer to Section 303-12



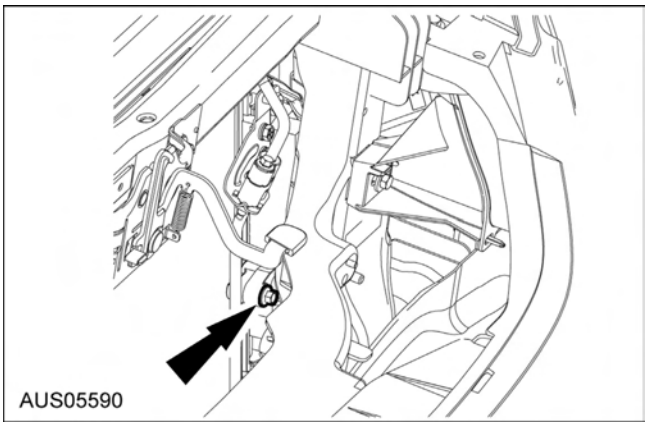
4. Remove the radiator grille sight cover by removing the remaining 3 scrivets. For additional information, refer to Section 501-02



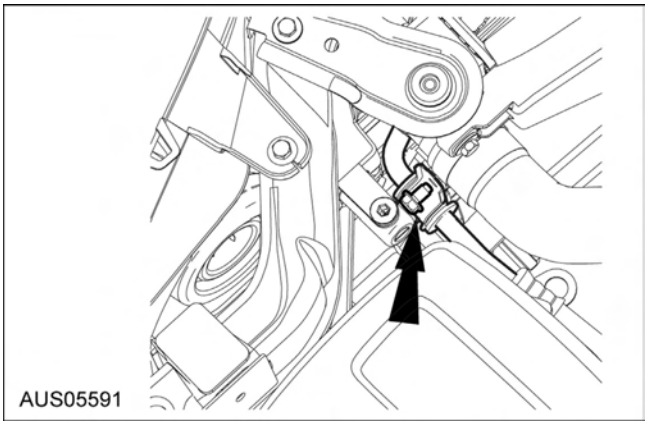
5. Remove the radiator grille by removing the 2 scrivets, to access the front of the condenser. For additional information, refer to Section 501-02



6. Remove the bolt from the A/C discharge hose to A/C condenser core inlet tube fitting.



7. Where fitted, remove the bolt and saddle clamp from the radiator LH side tank, where the rubber bush on the A/C discharge hose is secured to the radiator.



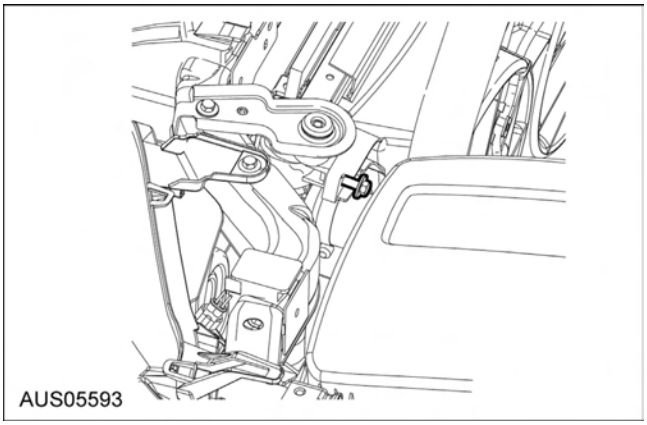
8. Disconnect the discharge hose assembly from the condenser pad fitting.

CAUTION: Plug all A/C ports to prevent contamination from dirt or moisture.

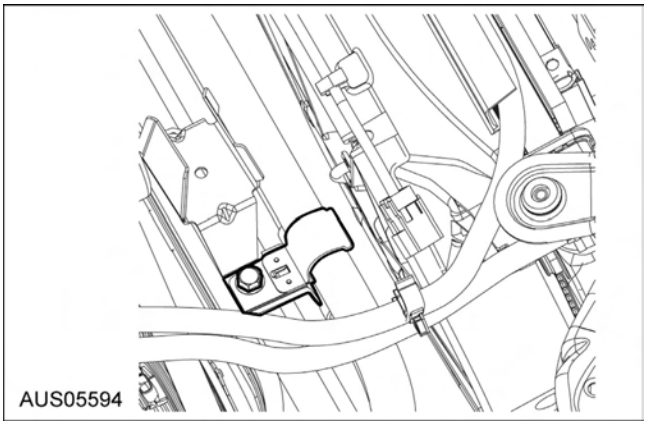
NOTE: Do not insert screwdriver between fittings, as damage can easily occur.

REMOVAL AND INSTALLATION (Continued)

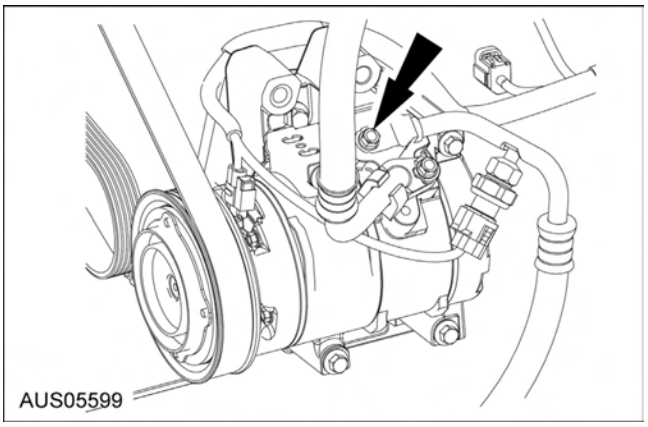
9. **V8 ONLY - Option 1** -Remove the engine cooling fan and shroud assembly by removing the two upper shroud-radiator bolts and lifting the fan and shroud assembly up out of the lower mounting tangs (refer to Section 303-03A). Also remove the power steering reservoir that clips onto the fan shroud (refer to Section 211-02), to access the hose bracket on the front sub-frame.
- Option 2 -Remove the lower air deflector (refer to section 501-02) from below the vehicle to access the hose bracket on the front sub-frame.



10. **V8 ONLY** - Remove the bolt that attaches the discharge hose double bracket to the lower radiator hose support on the front sub-frame.



11. **V8 ONLY** Slide out the suction hose assembly from the discharge hose assembly double bracket.



12. Remove the bolt from the discharge hose pad fitting on the side of the compressor, and disconnect the discharge hose assembly.

NOTE: Access to the V8 compressor is easier from underneath the vehicle

NOTE: Do not insert screwdriver between fittings, as damage can easily occur.

⚠ CAUTION: Plug all ports to prevent contamination from dirt or moisture.

Installation

1. To install, reverse the removal procedure.

NOTE: To assemble the discharge hose to the condenser, insert the discharge hose fitting partially into the condenser inlet fitting and rotate the discharge hose fitting to align the rubber grommet to the radiator side tank boss while pushing the two pad fittings together.

NOTE: Lubricate the A/C O-ring seals with PAG Compressor Oil ND Oil 8 prior to assembly.

2. Install a new filter and drier. For additional information, refer to Filter and drier Replacement in this section prior to recharging the A/C system.

NOTE: Installation of a new A/C system filter/drier is required when repairing the air conditioning system, when there is physical evidence of system contamination from a failed A/C compressor, evidence of the A/C system being open to the atmosphere/leaking or evidence of moisture absorption.

3. Refer to Replenishment of Refrigerant Oil and Refrigerant Oil Replacement Quantity in this section prior to recharging the A/C system, as any oil removed with the serviced parts must be replaced.
4. Evacuate and recharge the A/C system. For additional information, refer to A/C system evacuation and charging in this section.

REMOVAL AND INSTALLATION (Continued)

Compressor Inlet Hose Assembly (I6 & V8 Suction Hose) and Evaporator to Compressor Tube Assembly (V8 Suction Tube)

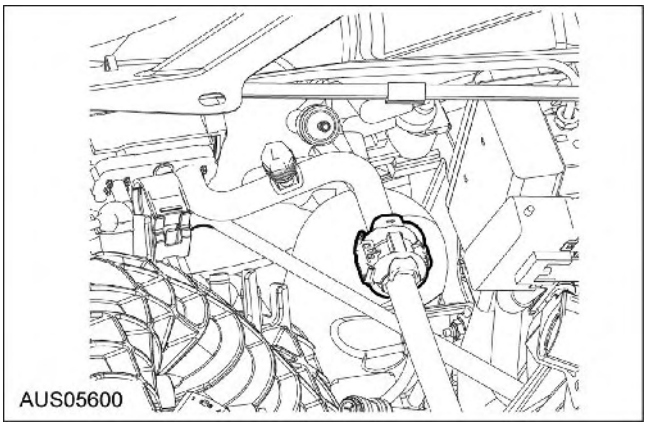
Special Tool(s)	
 SST95048-10270	Quick joint clamp removal tool

⚠ CAUTION: All refrigerant must be recovered from the A/C system.

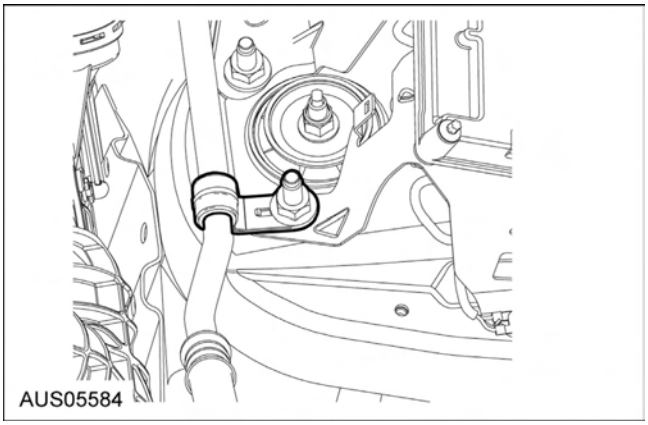
NOTE: The 2008 Falcon Compressor Inlet (Suction) I6 hose/V8 tube now mounts to the suction sub-tube on the liquid line manifold with a quick joint and clamp. The hose/tube routing is different to BF and the compressor end of the hose assembly has a new pad fitting requiring a different joint bolt.

Removal

1. Recover the refrigerant. For additional information, refer to A/C System Discharging and Recovery in this section.
2. Remove the upper quick joint clamp holding the I6 compressor inlet hose assembly (I6 suction hose) or V8 evaporator to compressor tube assembly (V8 suction tube) to the suction sub-tube, using the quick joint clamp removal tool. (Refer to section on Quick Joint Clamp removal/installation.)



3. **I6 ONLY** For access to the I6 hose mounting bolts, it may be preferable, but not compulsory, to remove the air cleaner intake duct, radiator grille sight cover, air cleaner outlet duct and lid of the air cleaner box. For additional information, refer to sections 501-02 and 303-12
4. **I6 ONLY** - Remove the nut from the suction hose bracket to shock absorber stud. Lift the suction hose bracket off the stud by rotating the A/C hose.

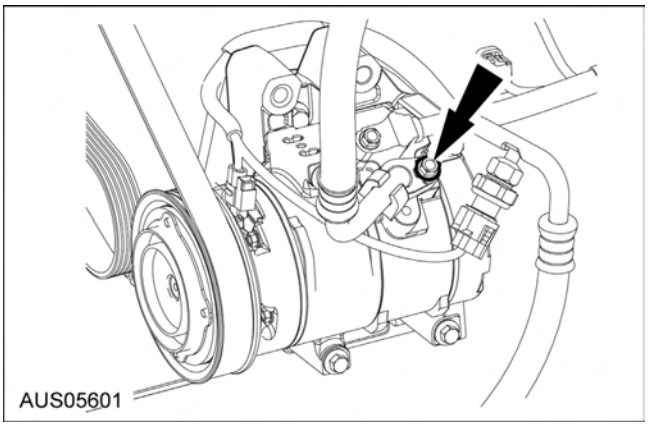


5. **I6 ONLY** - Disconnect the I6 suction hose from the sub-tube assembly (using hands only).

⚠ CAUTION: Plug all A/C ports to prevent contamination from dirt or moisture.

6. **I6 ONLY** - Remove the bolt from the suction hose pad fitting on the side of the compressor, and disconnect the suction hose assembly from the compressor.

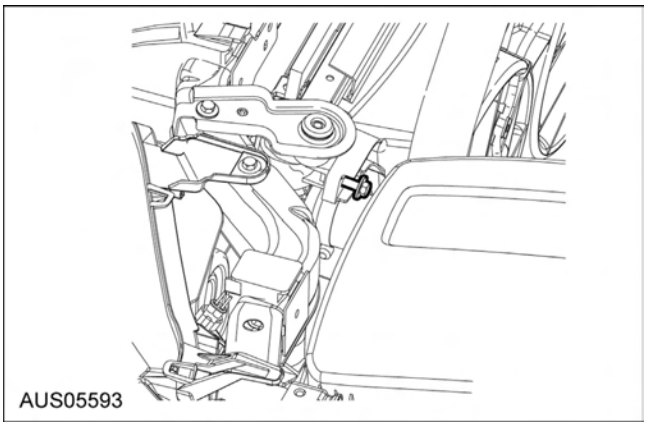
⚠ CAUTION: Plug all A/C ports to prevent contamination from dirt or moisture.



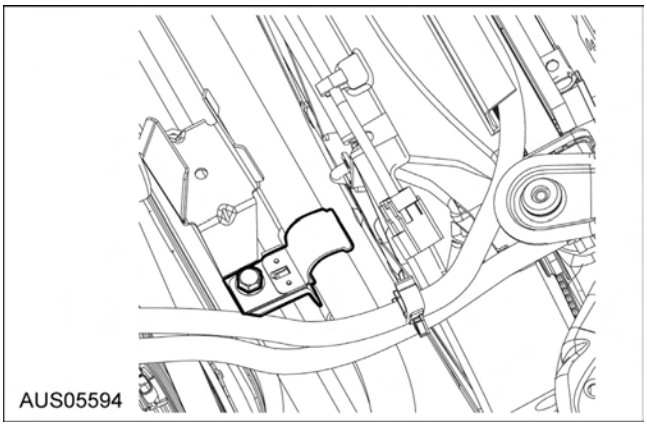
7. **V8 ONLY** - Remove the air cleaner intake duct by removing the scrivet onto the radiator grille sight cover. Remove the air cleaner box secured with 2 bolts. Also remove the air cleaner outlet duct by loosening the hose clamp at the intake manifold. For additional information, refer to Sections 501-02 and 303-12.

REMOVAL AND INSTALLATION (Continued)

8. **V8 ONLY** - Remove the engine cooling fan and shroud assembly by removing the two upper shroud-radiator bolts and lifting the fan and shroud assembly up out of the lower mounting tangs (refer to Section 303-03A)

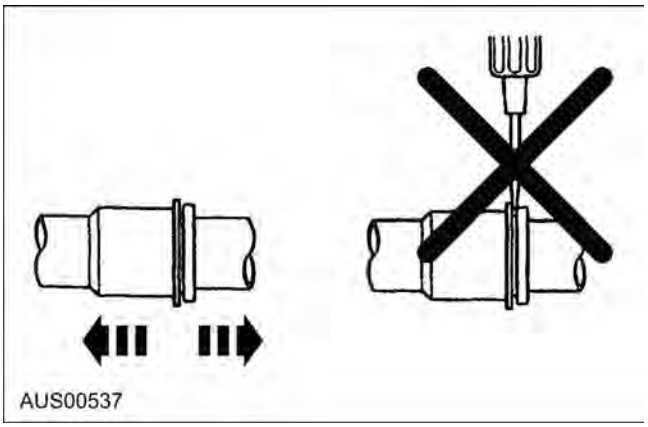


9. **V8 ONLY** Slide out the suction hose assembly from the double bracket on the discharge hose assembly where it attaches to the radiator hose guide on the front sub-frame.

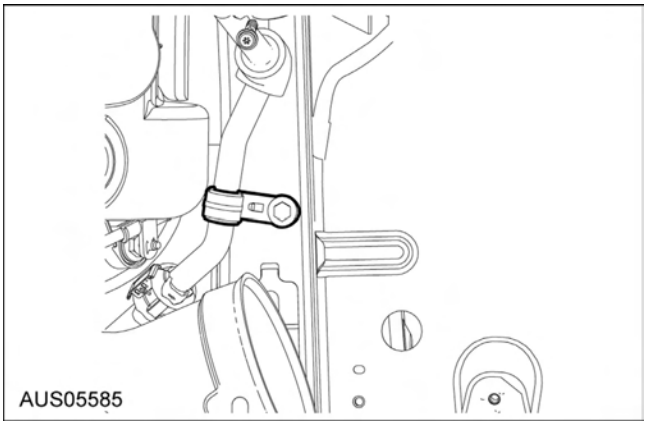


10. **V8 ONLY** - Remove the lower quick joint clamp holding the V8 suction tube to the suction hose near the LH side rail, using the quick joint clamp removal tool. (Refer to section on Quick Joint Clamp removal/installation)
    Disconnect the V8 suction hose assembly from the suction tube (using hands only).

⚠ **CAUTION: Plug all A/C ports to prevent contamination from dirt or moisture.**

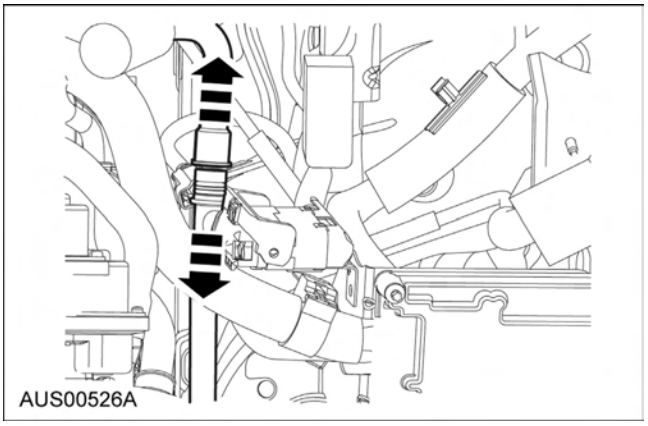


11. **V8 ONLY** - Remove the screw attaching the suction tube bracket to the LH side rail.



12. **V8 ONLY** - Disconnect the V8 suction tube from the sub-tube assembly (using hands only), and remove the V8 suction tube.

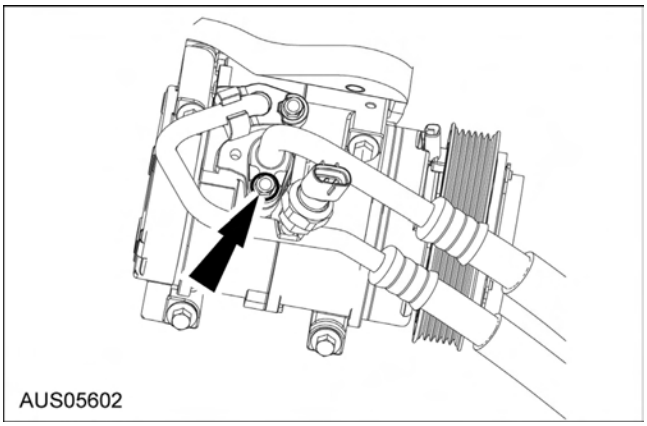
⚠ **CAUTION: Plug all A/C ports to prevent contamination from dirt or moisture.**



REMOVAL AND INSTALLATION (Continued)

13. **V8 ONLY** - Remove the bolt from the suction hose pad fitting on the side of the compressor, and disconnect the suction hose assembly from the compressor.

⚠ CAUTION: Plug all A/C ports to prevent contamination from dirt or moisture.



Installation

1. To install, reverse the removal procedure.

NOTE: Lubricate the A/C O-ring seals with PAG Compressor Oil ND Oil 8 prior to assembly.

2. Install a new filter and drier. For additional information, refer to Filter and drier Replacement in this section prior to recharging the A/C system.

NOTE: Installation of a new A/C system filter/drier is required when repairing the air conditioning system, when there is physical evidence of system contamination from a failed A/C compressor, evidence of the A/C system being open to the atmosphere/leaking or evidence of moisture absorption.

3. Refer to Replenishment of Refrigerant Oil and Refrigerant Oil Replacement Quantity in this section prior to recharging the A/C system, as any oil removed with the serviced parts must be replaced.
4. Evacuate and recharge the A/C system. For additional information, refer to A/C system evacuation and charging.

Condenser to Evaporator tube assembly (A/C liquid line)

⚠ CAUTION: All refrigerant must be recovered from the A/C system.

⚠ CAUTION: Ensure the genuine Ford O-rings (refer to Specifications in this section for O-ring details) are present and undamaged on the liquid line manifold and at the condenser outlet prior to assembly of the A/C liquid line.

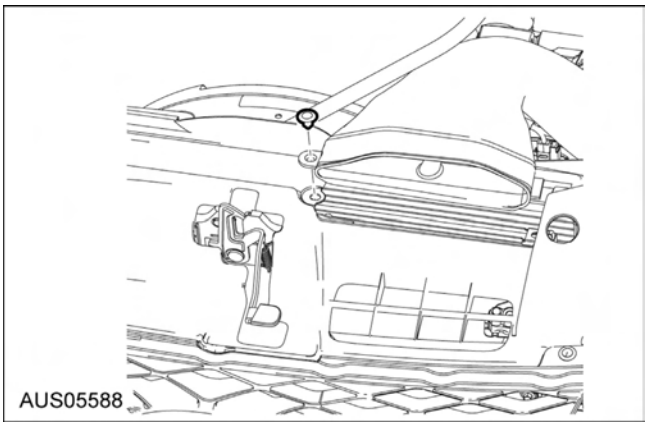
NOTE: There are 3 different sized A/C O-rings used in the evaporator-TXV-liquid line joints

The 2008 Falcon condenser to evaporator tube (A/C liquid line) has a different routing to the BA Falcon liquid line, and is made of thinner diameter tube without any hose section. The liquid line now includes a manifold that interfaces to the TXV and has a new refrigerant O-ring to suit the small tube diameter. The liquid line includes two service charge points, a high pressure discharge port on the body apron adjacent to the fender/mudguard (same as the BF location) and a low pressure suction port located on the suction sub-tube outlet on the manifold. The liquid line is also now clipped to the body in two locations using plastic clips, and has a new pad fitting requiring a different joint bolt at the condenser end of the tube.

If the 2008 Falcon A/C liquid line is to be replaced, there is a new service replacement liquid line with two extra joints compared with the original equipment (OE) liquid line. The new service liquid line is required because the OE liquid line must be cut to remove the line, and the added joints allow for liquid line assembly without removal of major adjacent components.

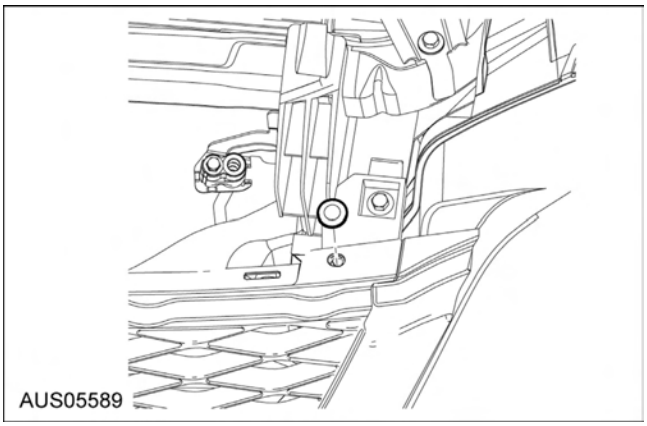
Removal

1. Recover the refrigerant. For additional information, refer to A/C System Discharging and Recovery in this section.
2. Remove the air cleaner intake duct by removing the scrivet onto the radiator grille sight cover. Also remove the air cleaner box secured with 2 bolts. Remove the air cleaner outlet duct by loosening the hose clamp at the intake manifold and the air box outlet. For additional information, refer to Section 303-12

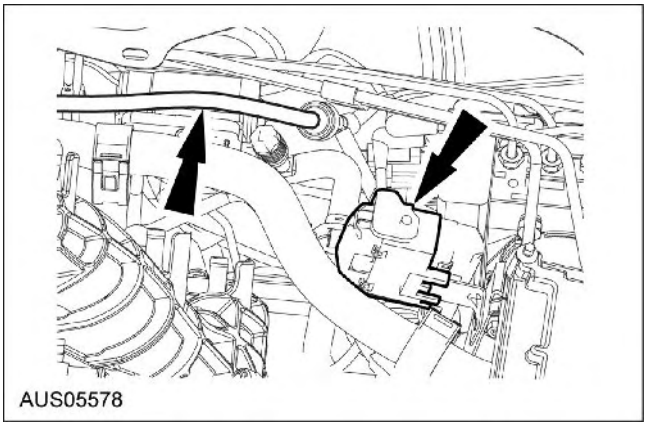


REMOVAL AND INSTALLATION (Continued)

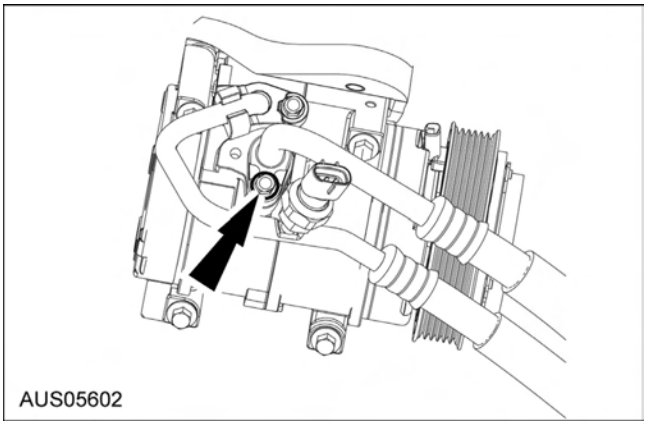
3. Remove the radiator grille sight cover by removing the remaining 3 scrivets. For additional information, refer to Section 501-02



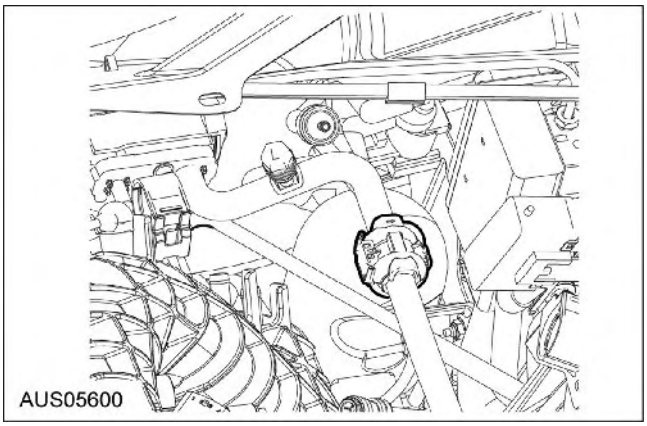
4. Disconnect the PCM-engine wiring loom from the connector on the PCM, and slide the connector off the PCM bracket.



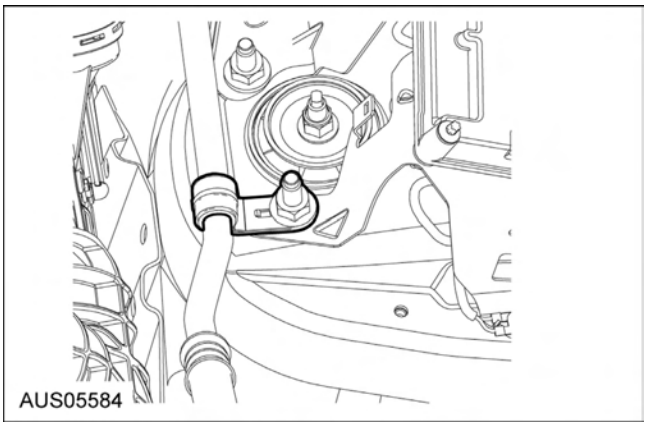
5. Disconnect the vacuum hose that runs from the vacuum reservoir to the inlet manifold
6. Remove the two nuts that attach the ABS/TCM/VDC brake module lower mounting bracket to the body sheet metal and vacuum reservoir mounting bracket, so that the brake module can be moved rearwards to disassemble and assemble the A/C liquid line. For additional information, refer to Section 206-09



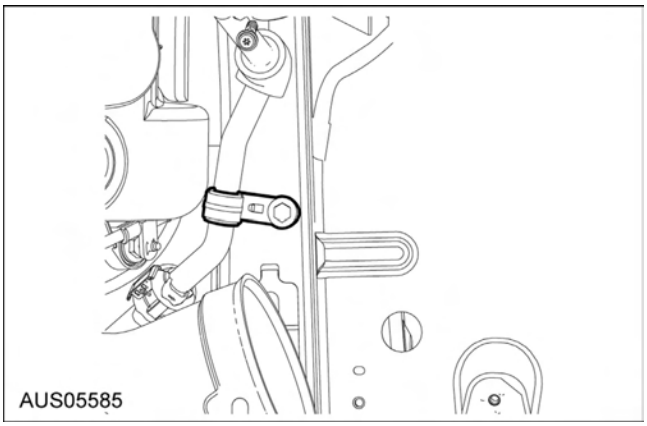
7. Remove the upper quick joint clamp holding the I6 compressor inlet hose assembly (I6 suction hose) or V8 evaporator to compressor tube assembly (V8 suction tube) to the suction sub-tube, using the quick joint clamp removal tool. (Refer to section on Quick Joint Clamp removal/installation.)



8. **I6 ONLY** - Remove the nut from the suction hose bracket to shock absorber stud. Lift the suction hose bracket off the stud by rotating the A/C hose.



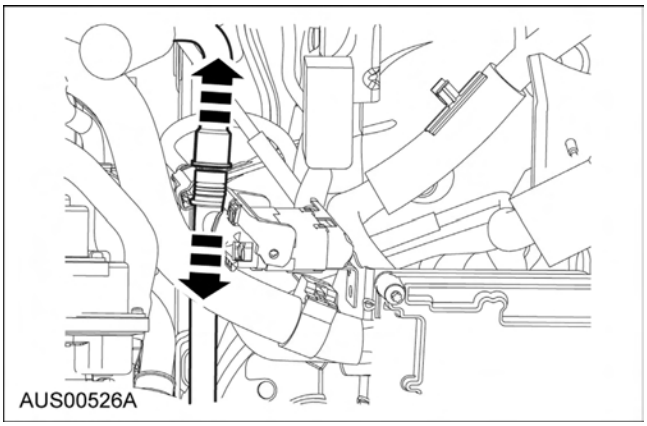
9. **V8 ONLY** - Remove the screw attaching the suction tube bracket to the LH side rail.



REMOVAL AND INSTALLATION (Continued)

10. Disconnect the I6 suction hose/V8 suction tube from the sub-tube assembly (using hands only).

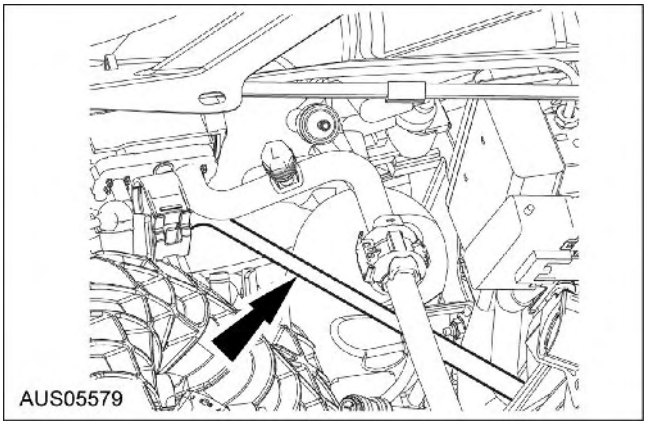
⚠ CAUTION: Plug all A/C ports to prevent contamination from dirt or moisture.



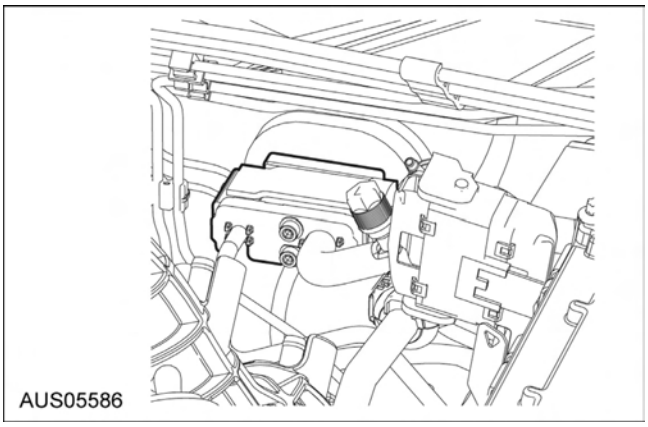
11. The original equipment (OE) liquid line must be cut to remove the line without having to remove adjacent components. The first cut in the liquid line is to be made forward of the TX Valve at the point marked in the illustration opposite

A tube cutter is the recommended tool, as it does not result in aluminium filings which may contaminate the A/C system.

⚠ CAUTION: Care must be taken when cutting the OE liquid line to prevent any foreign material (eg. aluminium filings) from entering the A/C system.



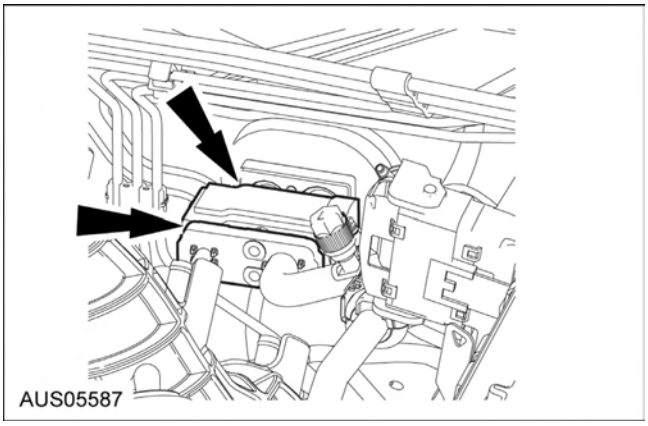
12. Remove the bolts holding the liquid line manifold and TXV to the E-clamp



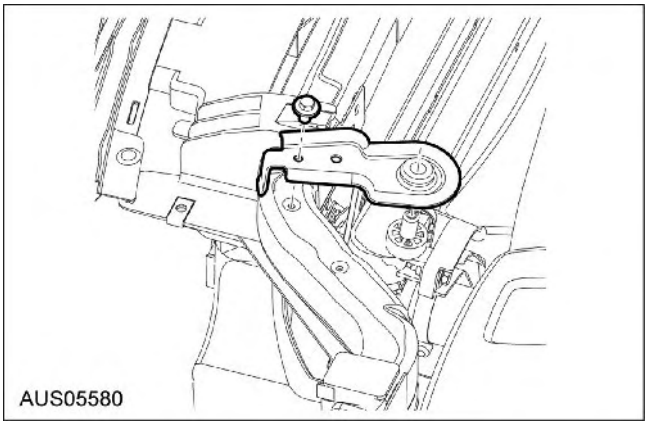
13. Pull the liquid line manifold forward away from the face of the TXV, and discard this section of tube assembly.

⚠ CAUTION: Plug all A/C ports to prevent contamination from dirt or moisture.

NOTE: Do not insert screwdriver between pad fittings, as damage can easily occur.



14. Remove the two upper radiator support brackets, secured with two bolts. For additional information, refer to section 303-03A. This will allow the cooling module to be tilted rearwards at the top to give better access to the front section of the liquid line.

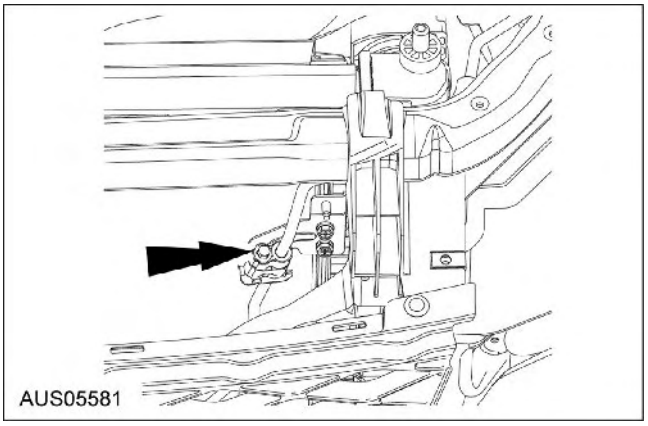


REMOVAL AND INSTALLATION (Continued)

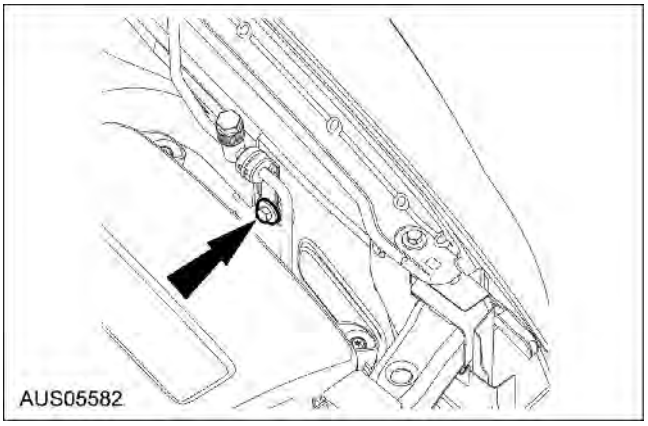
15. Remove the bolt from the liquid line condenser outlet tube joint and disconnect the liquid line from the condenser.

⚠ CAUTION: Plug all A/C ports to prevent contamination from dirt or moisture.

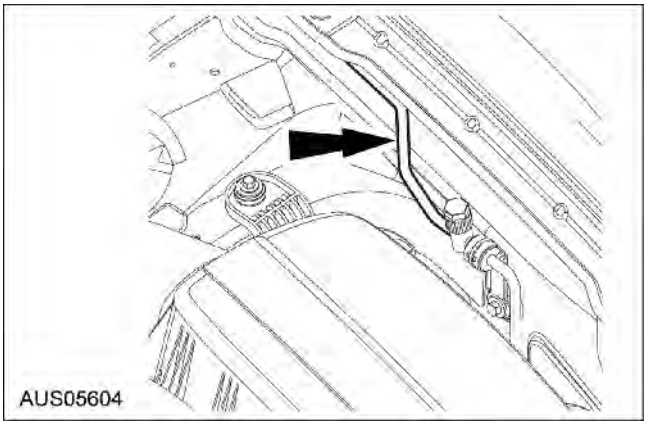
NOTE: Do not insert screwdriver between pad fittings, as damage can easily occur.



16. Remove the screw attaching the liquid line bracket to body adjacent to the charge port



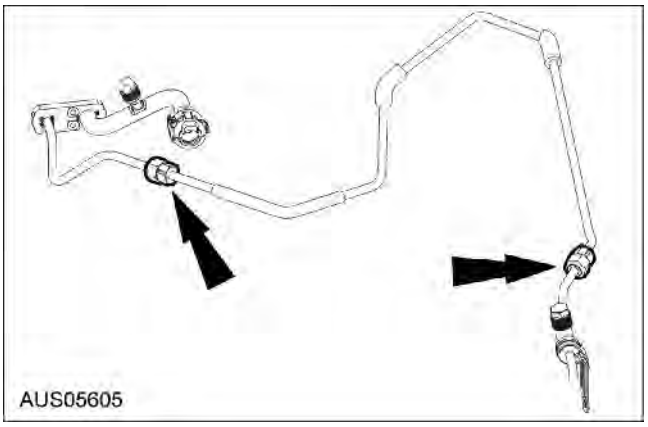
17. The original equipment (OE) liquid line must be cut to remove the line without having to remove adjacent components. The second cut in the liquid line is to be made just rearward of the high pressure service charge port at the point marked in the illustration opposite.



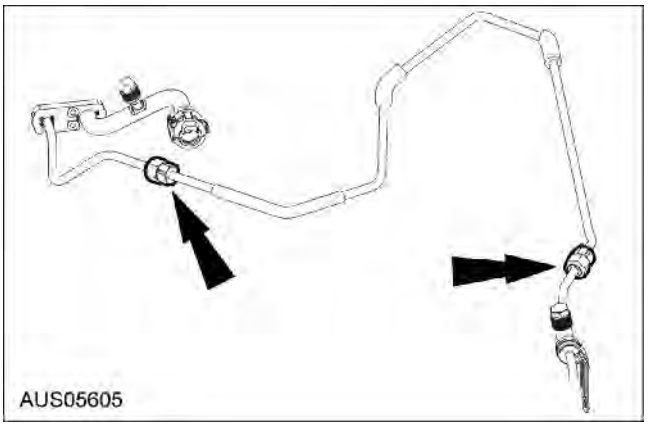
18. Remove all remaining sections of the liquid line, and discard.

Installation

1. Select the service replacement liquid line which has two extra nut-union joints in the tube assembly.



2. Disconnect the nut and union at the two extra joints, and route each tube section as per the OE liquid line routing, pushing the ABS/TCM/VDC brake module rearward and tilting the cooling module rearward to fit the tubes.



3. Mate the extra nut and union joints together and tighten each joint nut to the recommended torque.

NOTE: Lubricate the A/C O-ring seals with PAG Compressor Oil ND Oil 8 prior to assembly.

4. Repeat Removal steps 2-9 and 11-15 in reverse order.

NOTE: Lubricate A/C O-ring seals with PAG compressor oil ND-Oil8 prior to assembly.

NOTE: There are 3 different sized A/C O-rings used in the evaporator-TXV-liquid line joints

REMOVAL AND INSTALLATION (Continued)

5. Install a new filter and drier. For additional information, refer to Filter and drier Replacement in this section prior to recharging the A/C system.

NOTE: Installation of a new A/C system filter/drier is required when repairing the air conditioning system, when there is physical evidence of system contamination from a failed A/C compressor, evidence of the A/C system being open to the atmosphere/leaking or evidence of moisture absorption.

6. Refer to Replenishment of Refrigerant Oil and Refrigerant Oil Replacement Quantity in this section prior to recharging the A/C system, as any oil removed with the serviced parts must be replaced.
7. Evacuate and recharge the A/C system. For additional information, refer to A/C System Evacuation and Charging.

Evaporator Core

⚠ CAUTION: All refrigerant must be recovered from the A/C system.

⚠ CAUTION: Ensure the genuine Ford A/C O-rings are present and undamaged on the evaporator inlet and outlet tubes and on the liquid line manifold prior to assembly of the E-clamp, TXV and liquid line. Note that there are 3 different sized A/C O-rings used in the evaporator-TXV-liquid line joints

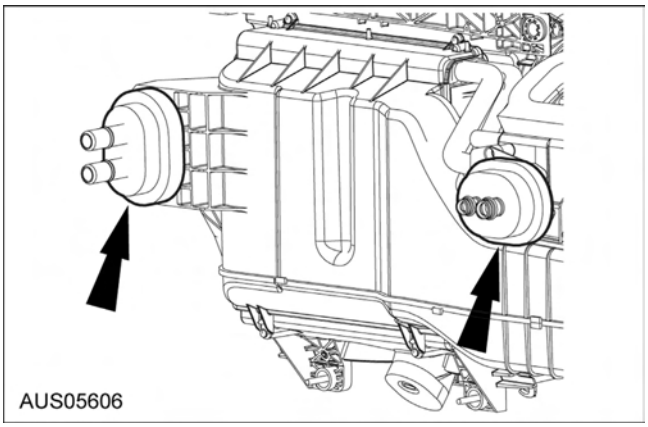
NOTE: The 2008 Falcon evaporator assembly is different to the BF, with an all new 38mm thick core that has a revised refrigerant flow path, a new dash panel pass-through seal and revised tube end fittings on the inlet/outlet tubes to suit the TXV. The evaporator inlet/outlet tubes have a different pitch to BF and use new refrigerant O-rings.

Removal

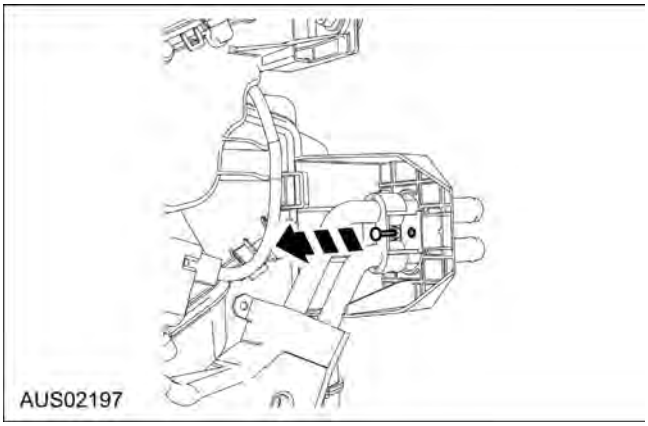
1. Recover the refrigerant. For additional information, refer to A/C system Discharging and Recovery in this section.
2. Remove the radiator cap to depressurise the coolant system. Disconnect heater hoses from heater core inlet/outlet tubes and immediately cap both hoses and tubes to minimise coolant loss, taking care not to allow any coolant to spill through the dash panel into the cabin. If it is necessary to drain engine coolant, refer to Section 303-03A.
3. Remove the evaporator E-clamp, TX Valve and A/C liquid line (refer to details in this section).

⚠ CAUTION: Evaporator tube and liquid line manifold O-rings and tube ends should be capped to prevent damage and contamination.

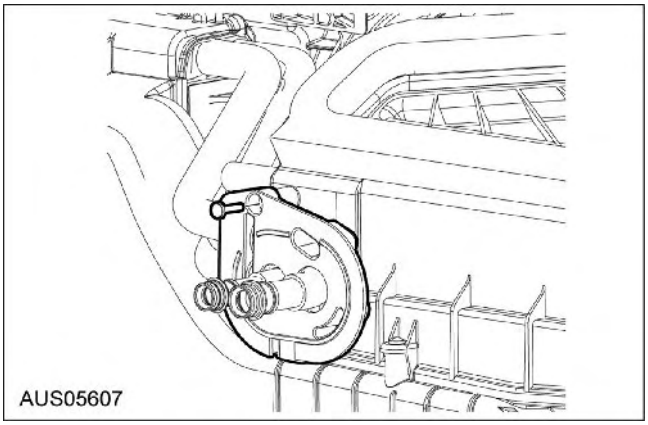
4. Remove the Instrument Panel, refer to Section 501-12
5. Remove HVAC Assembly. Refer to Section 412-02
6. Detach the Foam Insulators from the Heater and Evaporator Tubes.



7. Remove One Screw retaining the Heater Core mounting clamp to the HVAC.

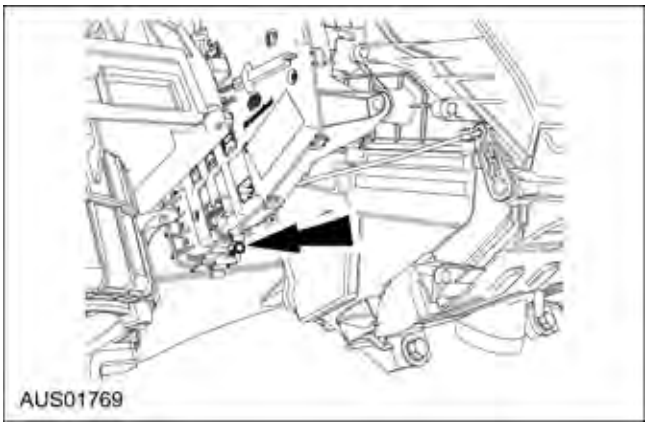


8. Undo one screw retaining the A/C evaporator tube retaining plate, and remove the plate.

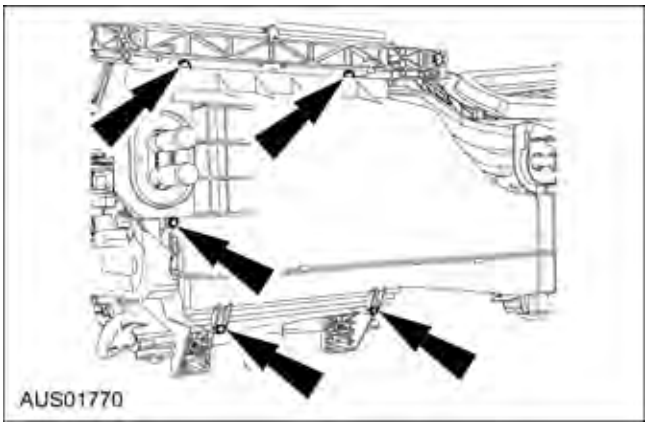


REMOVAL AND INSTALLATION (Continued)

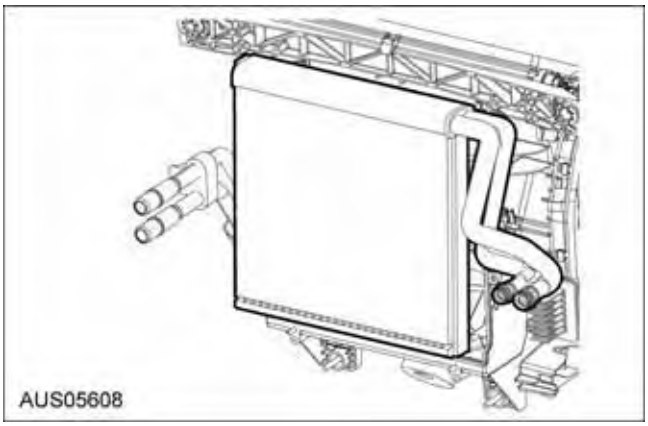
9. Remove the one screw retaining the HIM Heat sink to the HVAC.



10. Undo the five screws used to retain the Case scroll housing to the HVAC.



11. Gently remove the Case scroll clear of the Evaporator Tubes from the HVAC Main Case.
12. Lift the Evaporator Core clear of the HVAC Main Case.



Installation

1. Ensure the HVAC case sump is clean and the HVAC case drain is not blocked
    1. Fit the evaporator core into the HVAC Case opening, ensuring that the lower side of the core rests correctly on the White foam insulator and the core face is parallel to the HVAC opening surface

⚠ CAUTION: Care must be taken when installing the Evaporator core as the Aluminium Fins could become damaged and affect air flow over the Evaporator Core.

⚠ CAUTION: Ensure evaporator seal adequately fits around core to prevent air by pass.

2. Refit all previously removed Components in reverse order to removal.

NOTE: Prior to installing the TXV or liquid line, ensure that the genuine Ford A/C O-rings are present and undamaged on the evaporator inlet and outlet tubes and on the liquid line manifold.

NOTE: There are 3 different sized A/C O-rings used in the evaporator-TXV-liquid line joints

Lubricate A/C O-Ring seals with PAG Compressor oil ND-Oil 8 prior to assembly.

3. Install a new Filter and drier. For additional information, refer to Filter and drier Replacement in this section.

NOTE: Installation of a new A/C system filter and drier is required when repairing the air conditioning system, when there is physical evidence of system contamination from a failed A/C compressor, evidence of the A/C system being open to the atmosphere/leaking or evidence of moisture absorption.

Refer to Replenishment of Refrigerant Oil and Refrigerant Oil Replacement Quantity in this section prior to recharging the A/C system, as any oil removed with the serviced parts must be replaced.

4. Evacuate and recharge the A/C system. For additional information, refer to A/C system evacuation and charging in this section.
5. Refill the engine cooling system (refer to section 303-03A).

A/C Evaporator Temperature Thermistor

⚠ CAUTION: The position of the thermistor in relation to the evaporator air-off airflow is critical for efficient operation of the refrigeration system. It is therefore vital that the correct removal and replacement procedure is followed as incorrect positioning of the thermistor will adversely affect efficiency, and could also result in evaporator core ice up.

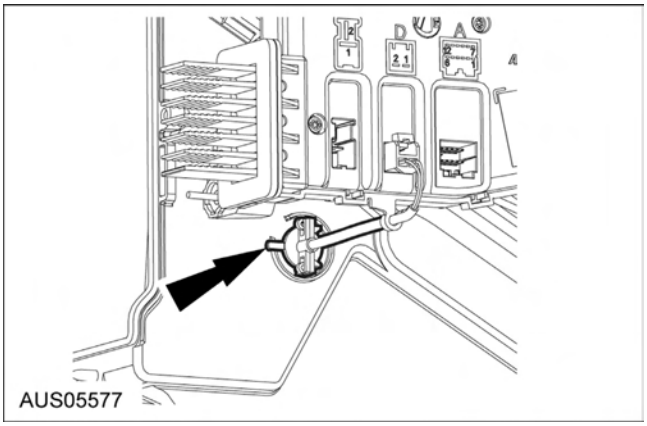
NOTE: The 2008 Falcon evaporator temperature thermistor is all new, using a different type of sensor in a new location and a revised mounting in the HVAC case, along with new software that controls the thermistor switching points.

REMOVAL AND INSTALLATION (Continued)

NOTE: It is NOT necessary to remove the evaporator core when replacing the evaporator thermistor.

Removal

1. Disconnect the evaporator thermistor (temperature sensor) electrical 2 pin connector at the HIM.
2. Locate the evaporator thermistor on the Passenger side of the HVAC lower sump area. Grasp the end of the evaporator thermistor housing and turn it clockwise until it rotates past the detent pin on the HVAC case into the unlocked position where it can be removed from the case.



3. Withdraw the evaporator thermistor, TAKING CARE not to damage the wiring. As the evaporator thermistor has an angled tube you will have to remove it on a slight angle

Installation

1. Insert the evaporator thermistor into the HVAC case bayonet hole and turn the thermistor housing anti-clockwise until the housing rotates past the detent pin on the HVAC case into the locked position resting against the case stop.

⚠ CAUTION: The position of the thermistor in relation to the evaporator air-off airflow is critical for efficient operation of the refrigeration system.

The thermistor position is set by means of the angled plastic housing of the thermistor and the bayonet type fitting into the passenger side of the HVAC sump.

Condenser Assembly

⚠ CAUTION: All refrigerant must be recovered from the A/C system.

NOTE: Installation of a new A/C system filter and drier is required when repairing the air conditioning system, when there is physical evidence of system contamination from a failed A/C compressor, evidence of the A/C system being open to the atmosphere/leaking or evidence of moisture absorption.

NOTE: If an A/C condenser core leak is suspected, the A/C condenser core should be leak tested before it is removed from the vehicle. For additional information, refer to Electronic Leak Detection and Fluorescent Dye Leak Detection in this section.

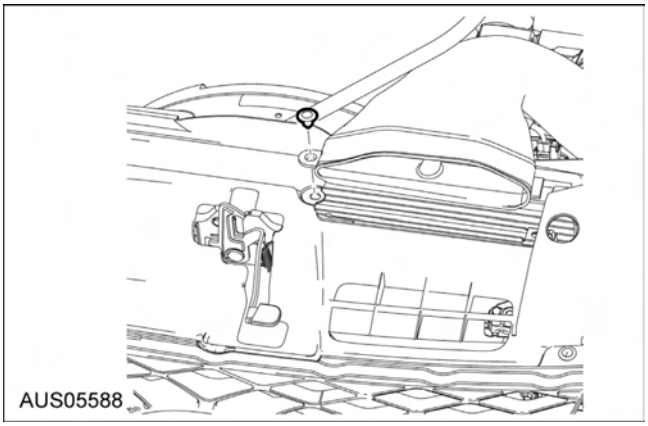
NOTE: The 2008 A/C condenser assembly is different in construction, size, mounting points, inlet/outlet fittings and operating characteristics to the BA/BF condenser assembly. The new condenser is a sub-cooled design with an integral modulator/receiver containing a filter/ dryer that is a serviceable item. New mounting bolts are required to suit the new condenser.

Removal

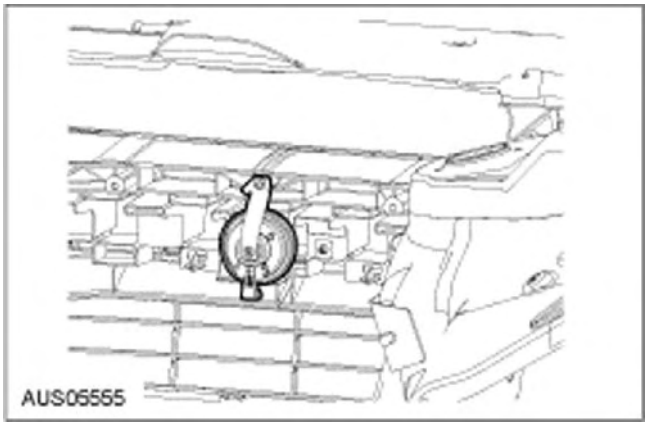
1. Recover the refrigerant. For additional information, refer to A/C System Discharging and Recovery in this section.

NOTE: The condenser assembly is most easily removed from the top of the vehicle.

2. Remove the air cleaner intake duct by removing the scrivet onto the radiator grille sight cover. For additional information, refer to section 303-12).

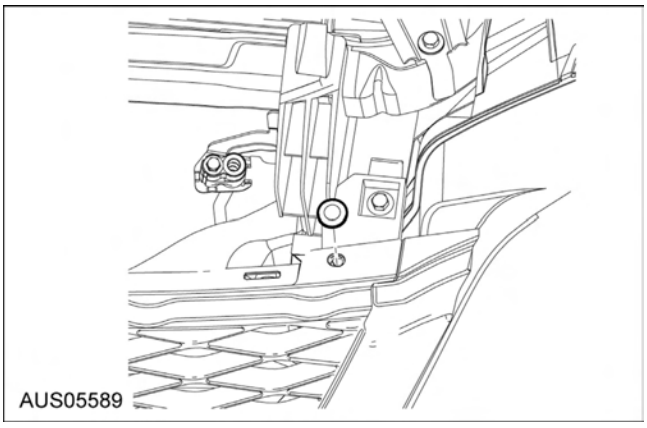


3. Remove the radiator grille sight cover by removing the remaining 3 scrivets, to access the front of the condenser from above. For additional information, refer to section 501-02



REMOVAL AND INSTALLATION (Continued)

4. Remove radiator grille by removing the 2 scrivets, to access the front of the condenser. For additional information, refer to section 501-02



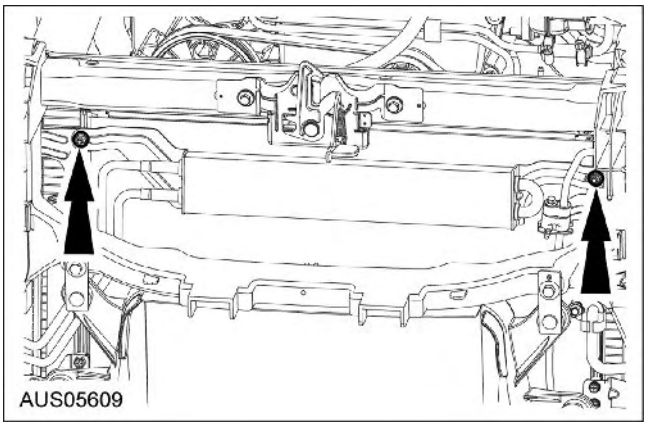
5. To give better access to the front of the condenser, the radiator/cooling module will need to be tilted rearwards at the top or lifted out of the lower mounts and moved rearwards with the radiator hoses still intact. The extent of disassembly will depend on access for different vehicle models

Option 1 - Remove the two upper radiator support brackets, secured with two bolts, to allow the radiator and fan assembly to tilt rearwards at the top. For additional information, refer to section 303-03A.

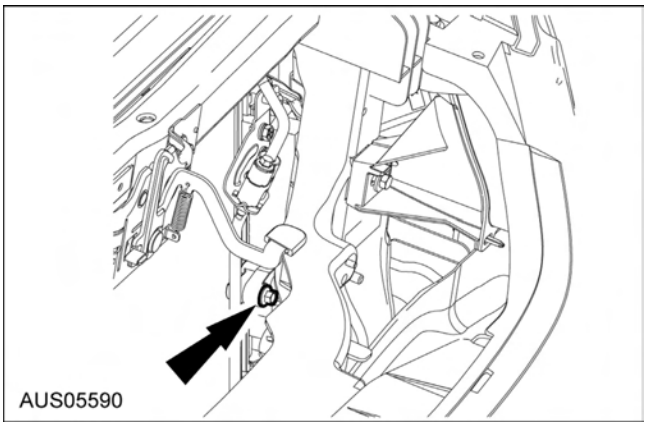
Option 2 - Remove the two upper radiator support brackets, secured with two bolts. Lift the radiator and fan assembly out of the lower rubber radiator supports, to allow the entire cooling module to be moved rearwards with the radiator hoses still intact. For additional information, refer to section 303-03A.

Option 3 - Remove the two upper radiator support brackets, secured with two bolts. Also remove the engine cooling fan and shroud assembly from the radiator. This is done by removing the two upper shroud-radiator bolts and upper brackets, and lifting the fan and shroud assembly up out of the lower mounting tangs. This will allow the radiator assembly to be tilted rearwards at the top, or if the radiator is lifted out of the lower supports, it can be moved rearwards with the radiator hoses still intact. For additional information, refer to section 303-03A. Care must be taken to ensure the rear of the radiator is not damaged when moved rearwards towards the engine without the fan shroud protecting the radiator fins

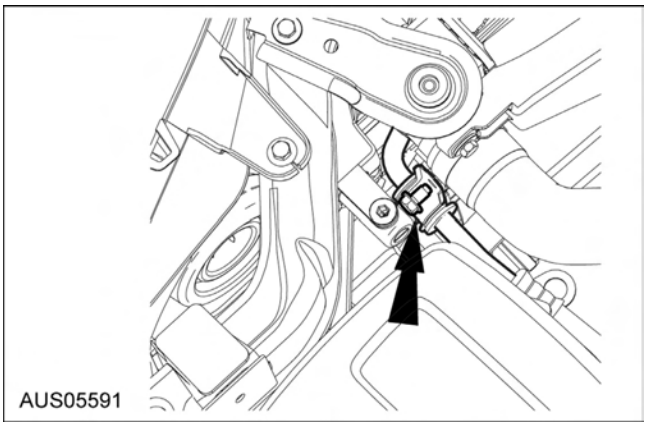
6. **XR6 TURBO & F6 TURBO ONLY** Remove the two nuts holding the power steering cooler to the upper condenser brackets. Tie the cooler forward with mechanic's wire, to prevent the cooler from dropping down and to allow room for the condenser to slide past the rear of the cooler. Then slide the power steering cooler forward off the two studs.



7. Remove the bolt from the A/C discharge hose to A/C condenser core inlet tube fitting.



8. Where fitted, remove the bolt and saddle clamp from the radiator LH side tank, where the rubber bush on the A/C discharge hose is secured to the radiator.

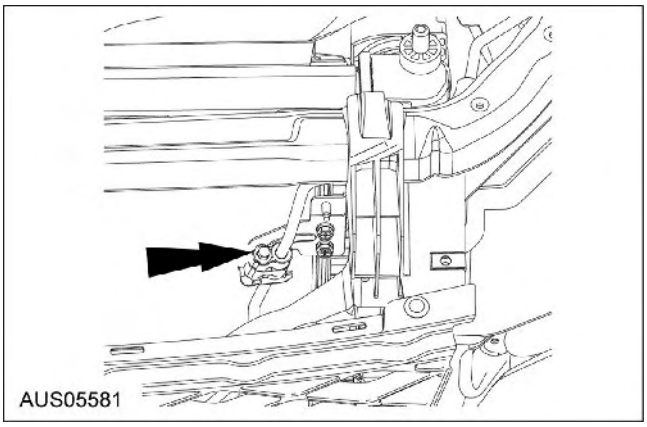


REMOVAL AND INSTALLATION (Continued)

9. Disconnect the discharge hose assembly from the condenser pad fitting.

⚠ CAUTION: Plug all A/C ports to prevent contamination from dirt or moisture.

NOTE: Do not insert screwdriver between fittings, as damage can easily occur.

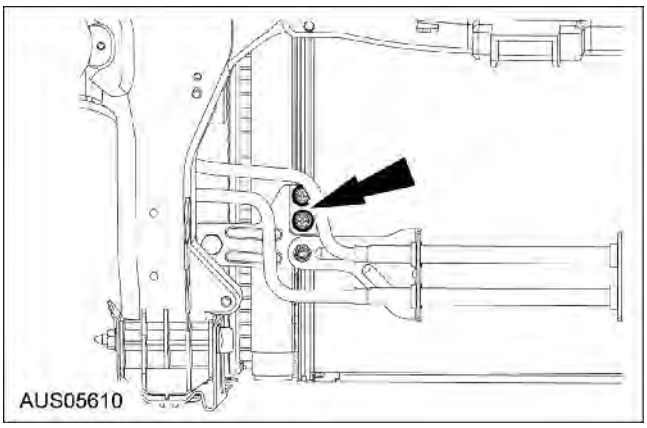


10. Remove the bolt from the liquid line condenser outlet tube joint and disconnect the liquid line from the condenser.

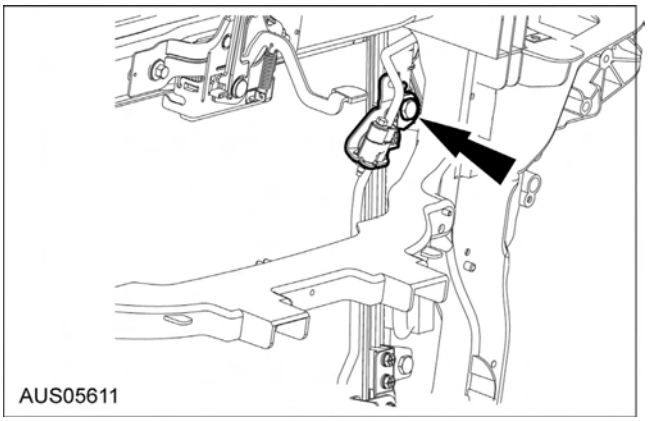
⚠ CAUTION: Plug all A/C ports to prevent contamination from dirt or moisture.

NOTE: Do not insert screwdriver between fittings, as damage can easily occur.

11. For both lower condenser brackets, remove the two mounting bolts that hold each condenser bracket to the condenser core, leaving the two lower condenser brackets attached to the radiator.



12. Remove the bolts that hold the two upper condenser brackets to the radiator, so that these two upper brackets can be removed with the condenser



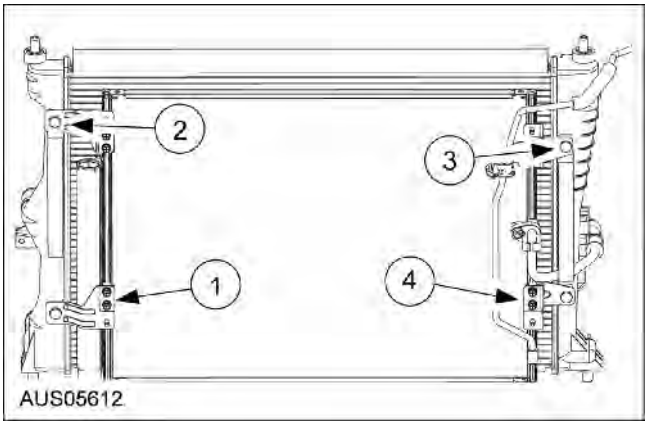
13. Tilt or move the radiator rearwards and slide the condenser core up and out.

⚠ CAUTION: Prior to removing the condenser assembly, insert a sheet of cardboard either side of the cores to protect the tubes and fins.

Installation

1. If the two upper condenser mounting brackets still attached to the condenser core are damaged, these brackets will need to be replaced with new brackets from the new condenser assembly.

However, if the two lower condenser mounting brackets still attached to the radiator are undamaged, remove the two lower brackets from the new condenser core, as these two new brackets will not be required



2. To install, reverse the removal procedure.

NOTE: The discharge hose assembly must be attached to the condenser inlet pad fitting BEFORE the condenser mounting bolts are tightened as per the tightening sequence shown opposite. To assemble the discharge hose to the condenser, insert the discharge hose fitting partially into the condenser inlet fitting and rotate the discharge hose fitting to align the rubber grommet to the radiator side tank boss while pushing the two pad fittings together.

⚠ CAUTION: Ensure that the foam seals are intact and undamaged on the radiator (on the front face along the top rail and down the two side

REMOVAL AND INSTALLATION (Continued)

tanks) and on the lower air deflector (on the upper surface directly below the condenser core). These seals are to prevent hot air recirculating from the engine bay around to the front of the radiator and condenser.

3. Lubricate the A/C hose O-ring seals with PAG Compressor Oil ND-Oil 8 prior to assembly.
4. Install a new filter and drier. For additional information, refer to Filter and drier Replacement in this section prior to recharging the A/C system.

NOTE: Installation of a new A/C system filter/drier is required when repairing the air conditioning system, when there is physical evidence of system contamination from a failed A/C compressor, evidence of the A/C system being open to the atmosphere/leaking or evidence of moisture absorption.

5. Refer to Replenishment of Refrigerant Oil and Refrigerant Oil Replacement Quantity in this section prior to recharging the A/C system, as any oil removed with the serviced parts must be replaced.
6. Evacuate and recharge the A/C system. For additional information, refer to A/C system evacuation and charging in this section.

Engine Cooling Fan(s) (Condenser Fans) and Fan Shroud Assembly

The 2008 Falcon features the BF Falcon single engine cooling fan with new 16mm radiator on all I6 vehicles, except for the Turbo variants and 1 tonne Ute. The BF twin cooling fans and new 27mm radiator are placed on all I6 Turbo and one tonne Utes, and on all V8 vehicles.

All new radiators have been fitted with foam seals on the front face along the top rail and down the two side tanks, to prevent hot air recirculating around the sides of the radiator and condenser from the engine bay. The lower air deflector also has a foam seal that sits on its upper surface directly underneath the condenser core.

For removal and installation of engine/condenser cooling fan(s), refer to section 303-03A.