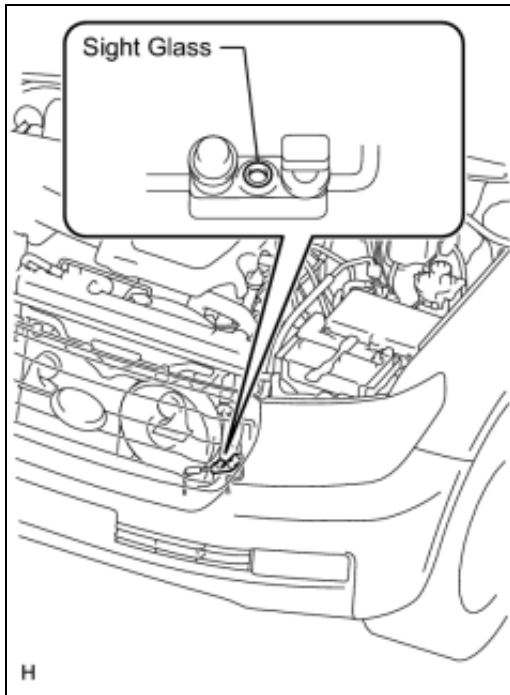


Last Modified: 9-4-2007		1.6 G
Service Category: Vehicle Interior	Section: Heating/Air Conditioning	
Model Year: 2008	Model: Land Cruiser	Doc ID: RM000001R8Z00KX
Title: HEATING / AIR CONDITIONING: REFRIGERANT: ON-VEHICLE INSPECTION (2008 Land Cruiser)		

ON-VEHICLE INSPECTION

1. INSPECT REFRIGERANT VOLUME



(a) Check the sight glass on the liquid pipe A.

Test conditions:

- Temperature at the air inlet is 30 to 35°C (86 to 95°F).
- Engine is running at 1500 rpm.
- Blower speed control switch is at HI.
- A/C switch is on.
- Temperature control switch is at the MAX. COOL position.
- Doors are fully open.

ITEM	SYMPTOM	AMOUNT OF REFRIGERANT	CORRECTIVE PROCEDURES
1	Bubbles visible	Insufficient*	(1) Check for gas leakage and repair if necessary (2) Add refrigerant until bubbles disappear
2	No bubbles visible	Empty, insufficient or too much	Refer to items 3 and 4
3	No temperature difference between compressor inlet and outlet	Empty or nearly empty	(1) Check for gas leakage with halogen leak detector and repair if necessary

			(2) Add refrigerant until bubbles disappear
4	Considerable temperature difference between compressor inlet and outlet	Correct or too much	Refer to items 5 and 6
5	Immediately after A/C is off, refrigerant becomes clear	Too much	(1) Drain or discharge refrigerant (2) Bleed air and supply proper amount of purified refrigerant
6	Immediately after A/C is off, refrigerant foams and then becomes clear	Correct	-

HINT:

***: If the ambient temperature is higher than usual but cooling is sufficient, bubbles in the sight glass are permissible.**

2. INSPECT REFRIGERANT PRESSURE WITH MANIFOLD GAUGE SET

(a) This method uses a manifold gauge set to locate problem areas. Read the manifold gauge pressure when these conditions are established.

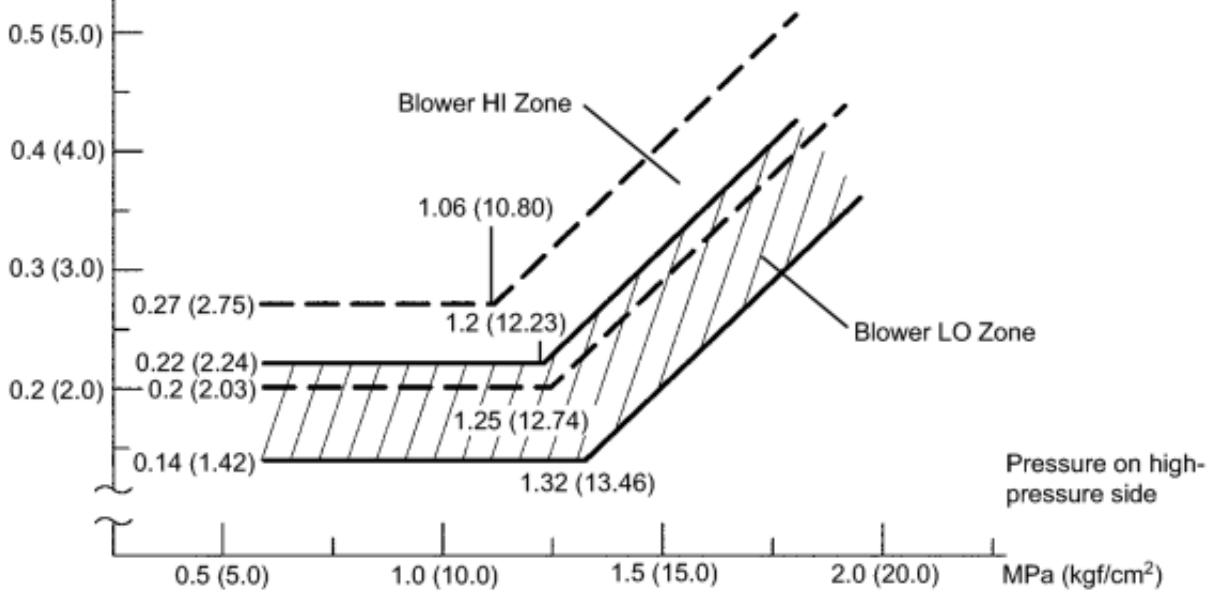
Test conditions:

- Temperature at the air inlet is 30 to 35°C (86 to 95°F).
- Engine is running at 1500 rpm.
- All doors are fully open.
- Blower speed control switch is at HI.
- Air inlet control set at "RECIRC".
- A/C switch is on.

Gauge readings (Reference)

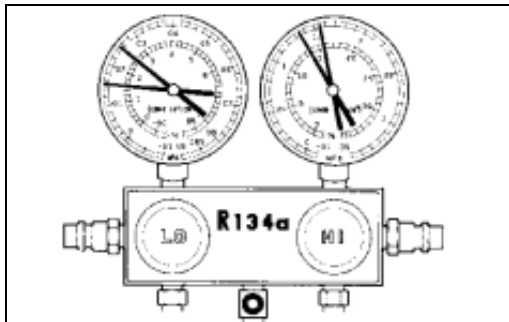
Pressure on low-pressure side

MPa (kgf/cm²)



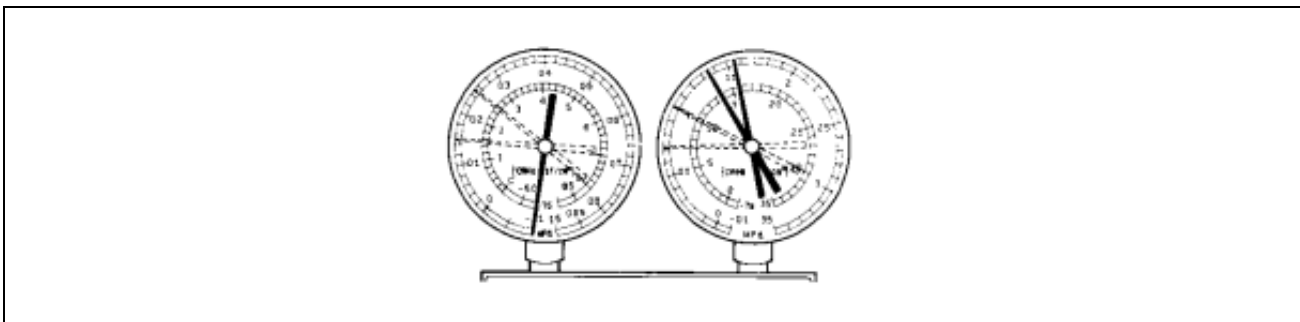
(1) Normally functioning refrigeration system

Gauge Reading:



PRESSURE SIDE	REFRIGERANT VOLUME
Low	0.15 to 0.25 MPa (1.5 to 2.5 kgf/cm ²)
High	1.37 to 1.57 MPa (14 to 16 kgf/cm ²)

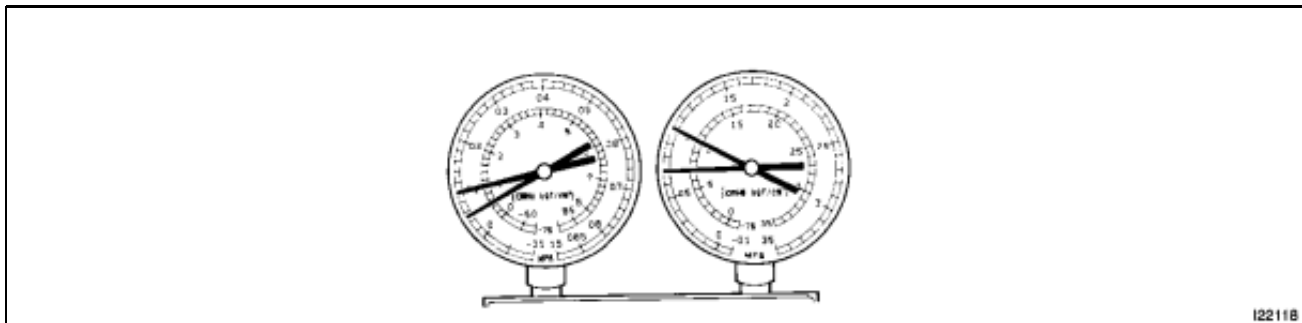
(2) The A/C system periodically changes between normal and improper function due to moisture in the refrigerant system.



SYMPTOMS	PROBABLE CAUSE	DIAGNOSIS	CORRECTIVE ACTIONS
			1. Replace cooler dryer

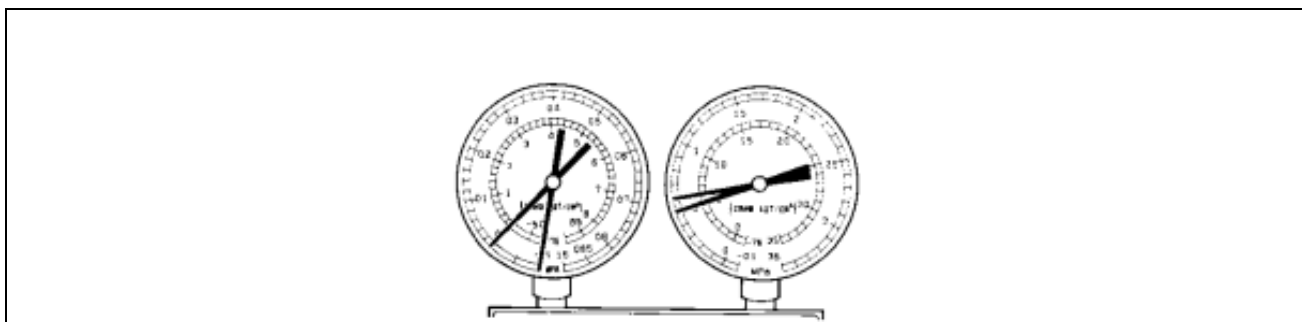
During operation, pressure on low pressure side cycles between normal and vacuum	Moisture in refrigeration system freezes at expansion valve orifice, causing temporary stop of cycle. However, when melted, normal state is restored.	<ul style="list-style-type: none"> - Dryer is overly saturated - Moisture in refrigeration system freezes at expansion valve orifice and blocks refrigerant circulation 	<ol style="list-style-type: none"> 2. Remove moisture from cycle by repeatedly evacuating air 3. Supply appropriate volume of new refrigerant
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(3) The A/C system does not function effectively due to insufficient refrigerant.



SYMPTOMS	PROBABLE CAUSE	DIAGNOSIS	CORRECTIVE ACTIONS
<ul style="list-style-type: none"> - Pressure low on both low and high pressure sides - Cooling performance insufficient 	Gas leakage from refrigeration system	<ul style="list-style-type: none"> - Insufficient refrigerant - Refrigerant leakage 	<ol style="list-style-type: none"> 1. Check for gas leakage and repair if necessary 2. Supply appropriate volume of new refrigerant 3. If indicated pressure value close to 0 when connected to gauge, create vacuum after inspecting and repairing the location of leakage

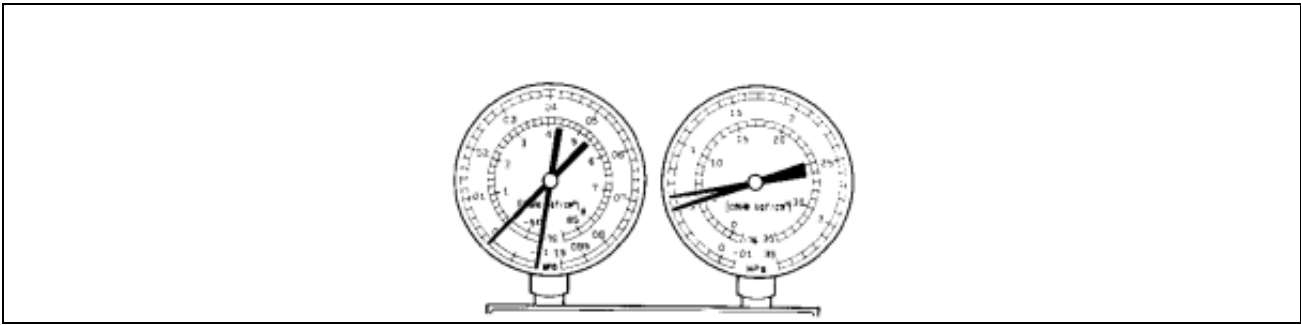
(4) The A/C system does not function effectively due to poor circulation of the refrigerant.



SYMPTOMS	PROBABLE CAUSE	DIAGNOSIS	CORRECTIVE ACTIONS
<ul style="list-style-type: none"> - Pressure low on both low and high pressure sides - Frost exists on piping from condenser to A/C unit 	Refrigerant flow obstructed by dirt in condenser	Condenser clogged	Replace condenser

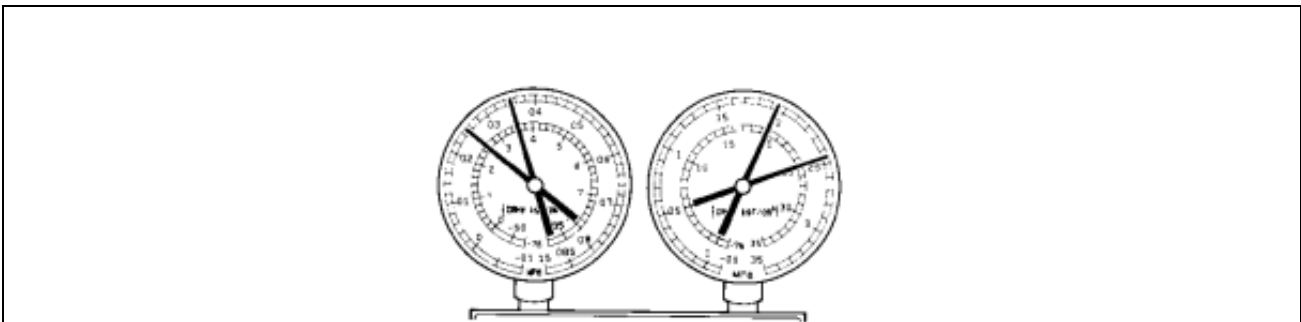
(5) The A/C system does not function or functions intermittently because the refrigerant does not

circulate.



SYMPTOMS	PROBABLE CAUSE	DIAGNOSIS	CORRECTIVE ACTIONS
<ul style="list-style-type: none"> - Vacuum indicated on low pressure side, and extremely low pressure indicated on high pressure side - Frost or condensation seen on piping on both sides of condenser or expansion valve 	<ul style="list-style-type: none"> - Refrigerant flow obstructed by moisture or dirt in refrigeration system - Refrigerant flow obstructed by gas leakage from expansion valve 	Refrigerant does not circulate	<ol style="list-style-type: none"> 1. Check expansion valve refrigerant 2. Clean expansion valve by blowing air 3. Replace condenser 4. Evacuate air and charge appropriate volume of new refrigerant 5. For gas leakage from expansion valve, replace expansion valve

(6) The A/C system does not function effectively due to overcharged refrigerant or insufficient cooling of the condenser.

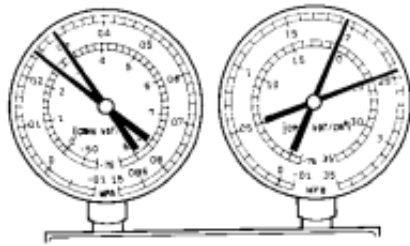


SYMPTOMS	PROBABLE CAUSE	DIAGNOSIS	CORRECTIVE ACTIONS
Pressure extremely high on both low and high-pressure sides	<ul style="list-style-type: none"> - Excessive refrigerant - Cooling performance of condenser insufficient 	<ul style="list-style-type: none"> - Condenser is dirty - Condenser fan motor is malfunctioning - Excessive refrigerant 	<ol style="list-style-type: none"> 1. Clean condenser 2. Check condenser fan motor operation 3. If 1 and 2 normal, check the amount of refrigerant and supply appropriate volume of refrigerant

(7) The A/C system does not function due to air in the refrigeration system.

CAUTION:

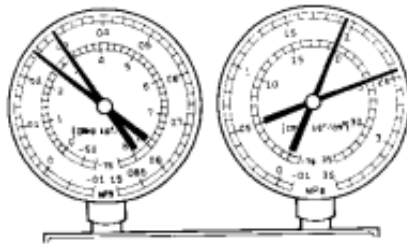
The low-pressure piping may be very hot and cause serious burns.



HINT: These gauge indications occur when the refrigeration system opens and the refrigerant is charged without vacuum purging

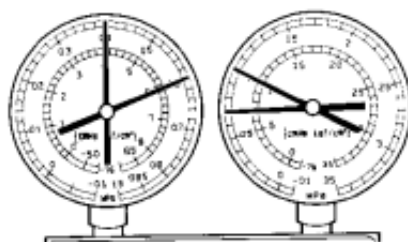
SYMPTOMS	PROBABLE CAUSE	DIAGNOSIS	CORRECTIVE ACTIONS
<ul style="list-style-type: none"> - Pressure extremely high on both low and high-pressure sides - Low-pressure piping is too hot to touch 	Air in refrigeration system	<ul style="list-style-type: none"> - Air in refrigeration system - Vacuum purging insufficient 	<ol style="list-style-type: none"> 1. Check if compressor oil is dirty or insufficient 2. Evacuate air and charge new refrigerant

(8) The A/C system does not function effectively due to an expansion valve malfunction.



SYMPTOMS	PROBABLE CAUSE	DIAGNOSIS	CORRECTIVE ACTIONS
<ul style="list-style-type: none"> - Pressure extremely high on both low and high-pressure sides - Frost or condensation on piping on low-pressure side 	Problem with expansion valve	<ul style="list-style-type: none"> - Excessive refrigerant in low pressure piping - Expansion valve open too wide 	Replace expansion valve

(9) The A/C system does not function due to a defective compressor.



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SYMPTOMS	PROBABLE CAUSE	DIAGNOSIS	CORRECTIVE ACTIONS
<ul style="list-style-type: none"> - Pressure extremely high on both low and high-pressure sides - Pressure extremely low on high pressure side 	Internal leakage in compressor	<ul style="list-style-type: none"> - Compression failure - Leakage from damaged valve or sliding parts broken 	Repair or replace compressor

