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Coding Information

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Title: Air Conditioning Electrical Diagnostics

Applies To: All Models All Engines

CHANGE LOG

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8/05/2014 - Initial Article Release

DESCRIPTION

This document is supplemental to [IK1900228](#) and addresses sensor and electronic issues.

SYMPTOM:

Compressor clutch does not engage

SENSOR AND ELECTRONIC ISSUES

Possible Causes:

Active DTC

Failed compressor clutch coil

No ignition and accessory voltage at body controller

No A/C request from HVAC control head to body controller (B/C)

No engine running signal at B/C

Engine speed signal to B/C

Low pressure switch input

Freeze probe

A/C high side pressure

A/C CLUTCH ENGAGEMENT DIAGNOSTICS

Note-Body controller will not engage the clutch when A/C related DTCs are active. The following procedures are ONLY VALID if the A/C system is fully charged and the A/C system checks in IK1900000 were performed.

Note- When a failed circuit or component is detected, repair as needed and retest for original problem.

1	Clutch Engagement Requirements	Decision
A. Start engine B. Turn the A/C Control to NORM, Fan On, and Temp control to coldest setting. C. Start Diamond Logic Builder (DLB). D. Watch the following DLB signals: • <i>Ignition</i> • <i>Accessory_Signal_Input</i> • <i>HVAC_Low_Pressure_Switch</i> • <i>A/C_Request</i> • <i>Engine_Running</i> • <i>HVAC_Freeze_Protect</i> • <i>HVAC_High_Side_Pressure</i> Note: The signals must be check marked or have the correct value for the Body Controller to engage the A/C clutch. Is <i>Ignition</i> check marked? Is <i>Accessory_Signal_Input</i> check marked? Is <i>HVAC_Low_Pressure_Switch</i> check-marked? Is <i>A/C_Request</i> check marked? Is <i>Engine_Running</i> check marked? Is <i>HVAC_Freeze_Protect</i> value less than 507?		Yes, all signals are correct: Go to step-2.
		No, <i>Ignition</i> is not check marked: Go to IK0800092
		No, <i>Accessory_Signal_Input</i> is not check marked: Go to IK0800092
		No, <i>HVAC_Low_Pressure_Switch</i> is not check marked: Go to step-4.
		No, <i>A/C_Request</i> is not check marked: Go to A/C Control head diagnostics (IK1900226)
		No, <i>Engine_Running</i> is not check marked: Go to IK0800080
		No, <i>HVAC_Freeze_Protect</i> is less than 507: Go to step-6.

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2	HVAC_High_Side_Pressure	Decision
A. Start engine		Yes: Go to step 3.

B. Turn the A/C Control to NORM, Fan On, and Temp control to coldest setting.	No: Go to step 7.
C. Use DLB to monitor <i>A/C_High_Side_Pressure</i> signal.	
D. Use the A/C charging station gauges to monitor high-side pressure.	
E. When the gauge pressure is stable, record the gauge value and the DLB signal value.	
F. Use the Pressure Transducer Voltage Table to convert the DLB voltage signal to PSI.	
G. Compare the DLB value in PSI to the high-side gauge reading.	

Does the HVAC_High_Side_Pressure value converted to PSI match the gauge within +/- 10 psi?

Pressure Transducer Voltage Table

1	PSI	0	20	25	40	50	75	100	150	185	Continues in Row 3
2	V	0.25	0.42	0.48	0.62	0.71	0.92	1.15	1.59	1.90	Continues in Row 4
3	PSI	200	250	285	300	350	400	420	450	475	500
4	V	2.03	2.48	2.80	2.92	3.38	3.81	3.99	4.26	4.48	4.71

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3	A/C Clutch Output	Decision
A. Start engine B. Turn the A/C Control to NORM, Fan On, and Temp control to coldest setting. C. Locate A/C Clutch on the DLB signal column.		<i>A/C_Clutch</i> is check-marked in DLB and A/C clutch is engaged: Verify A/C system operates correctly.
Is there a check mark for A/C_Clutch in the value column?		<i>A/C_Clutch</i> is check-marked in DLB but A/C clutch does not engage: Go to step 9.
Is the clutch engaged?		<i>A/C_Clutch</i> is not check-marked: Repeat step 1 and step 2. Are all the values correct and the check marks there?

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Step 4-5: Low Pressure Switch Diagnostics

4	Low Pressure Switch Diagnostics: Step 1.	Decision
A. Shut engine off. B. Disconnect the harness from the low pressure switch. C. Use a DMM to check for continuity across the switch terminals.		Yes: Go to step 5.
Is there continuity across the switch?		No: Switch has failed. Repair as needed, verify clutch engages,

Note: Switch should have continuity with a fully charged system. The system must have the correct charge for this test to be valid.	and A/C system operates correctly.
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5	Low Pressure Switch Diagnostics: Step 2.	Decision
A. Use a DMM to measure voltage between each terminal of the low pressure switch harness connector and a good ground. One terminal should have voltage; the other terminal should have near 0V. Are the correct voltages present?		Yes: Circuits are good. Verify steps 3-4 were performed correctly and the correct decisions were made. Recheck <i>HVAC_Low_Pressure_Switch</i> signal on DLB.
		No, there is no voltage on either terminal: Check HVAC Unit connector (1210) for pushed back or damaged pins -K and J. Check Body Controller connector J3 (1600) for pushed back or damaged Pin-B5. Check voltage at B5 with low pressure switch disconnected and J3 connected. Pin-B5 should have 10v +/- 1.0

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Step 6: Freeze Probe Diagnostics

6	Freeze Probe Diagnostics:	Decision
A. Turn ignition Key-Off. B. Disconnect the freeze probe from the HVAC Unit harness. C. Measure resistance between freeze probe connector Pin-A and Pin-B. D. Reconnect freeze probe. E. Disconnect Body Controller connector J3 (1600). F. Check connector J3 (1600) for pushed back or damaged Pin-B13. G. Measure resistance from Pin-B13 to HVAC Unit connector (1210) Pin-H. H. Compare measured resistance in step C and current temperature to Thermistor Cross Reference Table. I. Compare step C measurement to step G measurement. Is step C measurement correct for the temperature and step C and step G measurements the same +/- .01 Kohm?		Yes: Check the following circuit for open or high resistance: Circuit A9AB (connector 1210 Pin-H to connector 1600 Pin-E5)
		No, Freeze probe measurement (step C) out of spec: Replace freeze probe. Verify clutch engages and A/C system operates correctly.
		No, step C measurement is correct but different than step G by more .01 Kohm: Check circuit A77D for open or high resistance.

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Thermistor (freeze Probe) Cross Reference Table

TEMP (C°)	TEMP (F°)	MIN Ω (kohms)	NOMINAL Ω (kohms)	MAX Ω (kohms)
-15	5	35.03	35.67	36.32
-10	14	26.65	27.06	27.48
-5	23	20.46	20.72	20.98
0	32	15.84	16.00	16.16
5	41	12.30	12.46	12.61
10	50	9.626	9.771	9.918
15	59	7.589	7.722	7.856
20	68	6.025	6.144	6.265
25	78	4.816	4.922	5.030

30	86	3.874	3.968	4.064
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Step 7-8: Pressure Transducer Diagnostics

7	Pressure Transducer Diagnostics: Step 1	Decision
A. Turn ignition Key-On. B. Disconnect the A/C pressure transducer connector (6201) from the sensor. C. Measure voltage between harness connector Pin- 2 and a good ground. There should be 5 volts at terminal 2. D. Measure the voltage between harness connector Pin-2 and Pin-1. There should be 5 volts. Are both step 3 and step 4 measurements 5V?		Yes: Go to step 8.
		No, step C measures less than 5V: Check IP/Engine connector (1702) for damaged, corroded, or pushed back Pin-3. Check voltage at Pin-E6 of Body Controller connector-J5. If 5V exist at Pin-E6, check the following circuits for open or high resistance. Circuit A6DB (connector 1602 Pin-E6 to connector 1702 Pin-3) Circuit K6DB (connector 1702 Pin-3 to connector 1601 Pin-2)
		No, step C has 5V, but step D has <5V: 1. Check the following circuits for open circuit or high resistance: Circuit A9AA (connector 1602 Pin-E5 to connector 1702 Pin-2) Circuit K9AA (connector 1702 Pin-2 to connector 6201 Pin-1)

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8	Pressure Transducer Diagnostics: Step 2	Decision
A. Turn the ignition Key-OFF. B. Disconnect the Body Controller J3 connector (1600). C. Disconnect the A/C pressure transducer connector (6201) from the sensor. D. Measure resistance between Pin-B12 of connector 1600 and Pin-3 of connector 6201. Is Resistance is <1 Ohm.		Yes: Replace pressure transducer.
		No: Check IP/Engine connector (1702) for damaged, corroded, or pushed back Pin-4. Check the following circuits for circuit opens or high resistance: Circuit A77B (connector 1600 Pin-B12 to connector 1702 Pin-4) Circuit K77B (connector 1702 Pin-4 to connector 6201 Pin-3)

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Step 9-10: Compressor Clutch Diagnostics

9	Clutch Voltage	Decision
A. Disconnect the chassis harness from the clutch. B. Request A/C Clutch engaged using DLB. C. Measure voltage between Pin-B of chassis connector (6200) and a good ground.		Yes: Go to step-10.

Is voltage greater than 11.5V?	No: Check IP/Engine connector (1702) for damaged, corroded, or pushed-back Pin-10. Check Pin-C of body controller connector-J1 for voltage. Check the following circuits for open or high resistance: Circuit A77 (Body controller connector J1 Pin-C to IP/Engine connector (1702) Pin-10) Circuit K77 (IP/Engine connector 1702 Pin-10 to connector 6200 Pin-B)
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10	Clutch Resistance	Decision
A. Disconnect the chassis harness connector (6200) from compressor clutch. B. Measure resistance terminal A to terminal B on the clutch coil.	Is resistance 2.8 to 4.4 ohms at room temperature?	Yes: Check Pin-A of chassis harness connector (6200) continuity to ground through crankcase connection.
		No: Replace Compressor.

WARRANTY INFORMATION

Warranty Claim Coding:

Standard Repair Time(s):

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