



Countries: CANADA, UNITED STATES **Document ID:** IK0800503
Availability: ISIS, Bus ISIS, Fleet ISIS **Revision:** 5
Major System: ELECTRICAL SYSTEM **Created:** 10/22/2014
Current Language: English **Last Modified:** 5/11/2015
Other Languages: NONE **Author:** David Horner
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Coding Information

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Title: ISB Starting System Diagnostics

Applies To: ISB Engine

CHANGE LOG

04/27/2015- Updated SRT's, repaired hyperlinks within diagnostic steps
 04/02/2015- Removed flexplate face to face measurement and updated diagnostic steps. Added ring gear damage acceptance chart and image for voltage check
 01/22/2015- Changed flexplate face to face depth measurement replacement guideline to measurement with no action required
 12/05/2014- Inserted flexplate face to face depth measurement replacement guideline10/23/2014- Initial Article Release

DESCRIPTION

This document will guide the user through Cummins ISB starter and ring gear diagnostics. It is important to review all the material to prevent repeat failures, especially in instances of ring gear damage by the starter.

SYMPTOMS

Diagnostic Trouble Codes

DTC/Light	Description
N/A	

Customer Observations or Concerns:

Operator may hear one of the following from the starter:

- Click
- Clunk
- Grind
- Squeal
- Starter spins, doesn't rotate engine
- Slow Engine Crank
- Click No-Crank
- No-Click No-Crank
- Crank No-Start

SPECIAL TOOLS / SOFTWARE

Tool Description	Tool Number	Comments	Instructions
Cummins Insite		Cummins Tool	
Midtronics ESP			
DVOM		Obtain Locally	

[Tools Resource Center](#)

SERVICE PARTS INFORMATION

Kit Description	Part Number	Quantity	Notes
MOTOR,STARTING 12V , 38MT DELCO	8201039	1	Order Critical Truck Down Next Day Air
Flexplate (Automatic Transmission)	3968672	1	Order from Cummins

DIAGNOSTIC STEPS

Step	Action	Decision
1	Diagnostic Trouble Code Check: Review current health report for Cummins or Body Controller fault codes that may cause an extended crank condition (Crankshaft Position Sensor, Camshaft Sensor, Fuel System, Electrical codes)	Yes. Go to appropriate diagnostic manual to diagnose crank no start symptom
		No. Step 2
	Are there pending/active/previously active DTC's causing a crank no start?	

Step	Action	Decision
2	Cranking RPM Test: Monitor Engine RPM using Cummins Insite while cranking the engine	Yes. Go to appropriate Cummins crank no start diagnostic
		No. Step 3
	Does the engine crank at ~150RPM or more during the check?	

Step	Action	Decision
3	Manual Engine Barring Test: Have an assistant bar the engine over from the alternator pulley	Yes. Step 4
		No. Diagnose engine lock up condition.
	Does the engine rotate freely?	

Step	Action	Decision
4	Perform battery test: Before testing batteries, inspect each cable end nut torque, insulation, routing, clipping, discoloration, and terminal arching Follow IK0800482- Battery Testing, Diagnostics & Maintenance Save screenshot of results (IK2700003- Midtronics Screen Print)	Yes. Replace ONLY failed battery and then recheck for symptom
		No. Step 5
	Is a warranty approval code (WAC) or failed battery result from any battery generated?	

Step	Action	Decision
5	Starter Cable Voltage Drop Test:	Yes. Make required repair

Before performing any voltage drop test; inspect each cable end nut torque, insulation, routing, clipping, discoloration, and terminal arching Follow Midtronics starter cable voltage drop test (Chapter 7 Page 33) Save screenshot of results (IK2700003- Midtronics Screen Print) Does the Starter Cable Voltage Drop Test fail?	No. Step 6
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Step	Action	Decision
6	Alternator Cable Voltage Drop Test: Before performing any voltage drop test; inspect each cable end nut torque, insulation, routing, clipping, discoloration, and terminal arching Follow Midtronics alternator cable voltage drop test (Chapter 7 Page 34) Save screenshot of results (IK2700003- Midtronics Screen Print) Does the Alternator Voltage Drop Test fail?	Yes. Make required repair No. Step 7



Figure 1: Starter IMS S terminal DVOM Hookup Location

Step	Action	Decision
7	Starter Control Circuit Check: Before performing Starter Control Circuit Check; inspect each wire end nut torque, insulation, routing, clipping, discoloration, and terminal arching. Connect DVOM test leads on IMS (Mag switch) "S terminal" and ground to solenoid case as indicated in Figure 1 while having an assistant hold keyswitch in start position for 5 seconds. Compare DVOM to B+ at batteries	Yes. Perform starter control diagnostics for possible causes: <i>Wiring</i> <i>F3A Fuse</i> <i>Start Relay (Neutral Relay)</i> <i>Crank Inhibit Relay</i> <i>Clutch Switch (Manual Trans)</i> <i>Trans Control Module (Auto Trans)</i> <i>Key Switch</i>

	No. Step 8
Does the DVOM not read battery voltage +/-0.5 volts?	

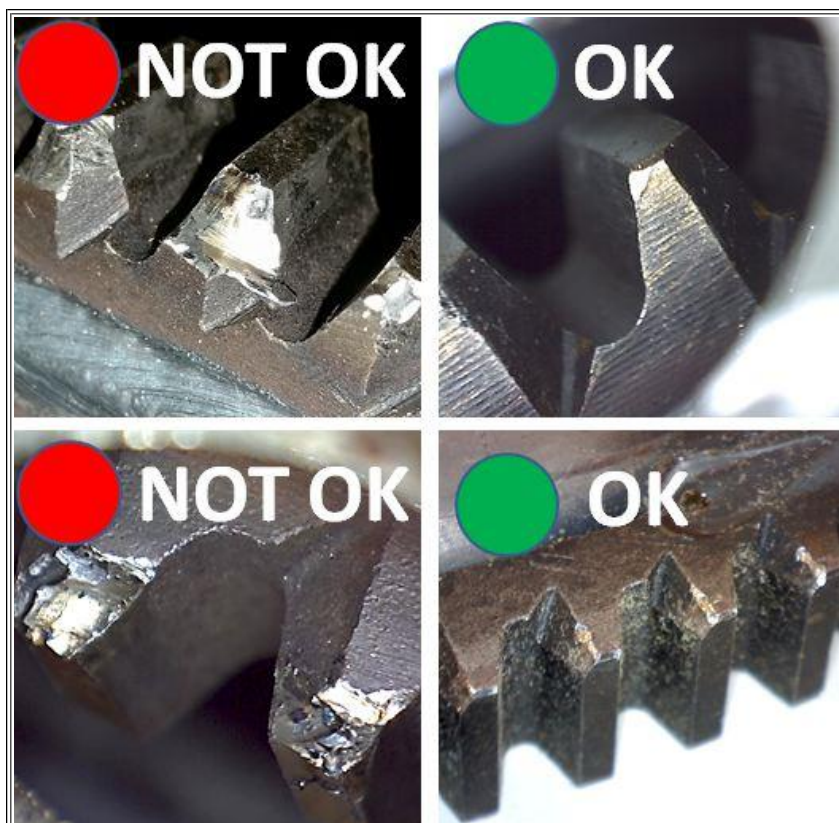


Figure 3: Flexplate/Flywheel Ring Gear Acceptance

Step	Action	Decision
8	Flexplate/Flywheel Ring Gear Inspection: Remove starter Mark the flexplate ring gear with a paint pen Have an assistant bar the engine over while you inspect each tooth for damage: burrs, milling, chips, etc. (Figure 3) Tip: This can be done as a one man operation using a borescope or by looking through the starter mount hole Did all 127 teeth get inspected?	Yes. Step 9
		No. Inspect each tooth

Step	Action	Decision
9	Repair: Does the flexplate need to be replaced?	Yes Replace flexplate & starter
		No Replace starter

WARRANTY INFORMATION

Any of the following symptoms should be documented in notes on the warranty claim

Click
Clunk
Grind
Squeal
Slow engine crank
Click no-crank
No-click no-crank
Crank no-start

Warranty Claim Coding:

Group:	08540- Cranking System
Noun:	202- Motor, Starter

Standard Repair Times:

Description	Chassis	Engine	SRT	Hours
Starter Diagnostics	CE Bus	Cummins ISB	GY08-2202A	0.9
Starter Diagnostics	4300	Cummins ISB	KL08-2202A	0.9
Starter Motor Replacement	CE Bus	Cummins ISB	GY08-4202SB	0.8
Starter Motor Replacement	4300	Cummins ISB	KL08-4202SB	1.1
Automatic Transmission (Removal & Reinstall)	CE Bus	Cummins ISB	GY13-9114SB	3.2
Automatic Transmission (Removal & Reinstall)	4300	Cummins ISB	KL13-9114SB	3.2
Flexplate Replacement	CE Bus	Cummins ISB	GY13-9114SB-1	0.3
Flexplate Replacement	4300	Cummins ISB	KL13-9114SB-1	0.3

OTHER RESOURCES

[Master Service Information Site](#)

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