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Major System: ELECTRICAL SYSTEM **Created:** 10/22/2014
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Coding Information

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Title: ISB Starting System Diagnostics

Applies To: ISB Engine

CHANGE LOG

10/23/2014 - 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
- 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: Connect to truck using EST to check DTC's List DTC's _____ _____ _____ Are there pending/active or high counts of previously active DTC's?	Yes. Go to appropriate diagnostic manual No. Step 2

Step	Action	Decision
2	Engine Crank Check: Crank the engine Cranking RPM= _____ Does the engine crank at normal speed and not start?	Yes. Go to appropriate Cummins crank no start diagnostic No. Step 3

Step	Action	Decision
3	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) Is a warranty approval code (WAC) or failed battery result from any battery generated?	Yes. Replace ONLY failed battery No. Step 4

Step	Action	Decision
4	Alternator Cable Voltage Drop Test: Before performing any voltage drop test; inspect each cable end nut torque, insulation, routing, clipping, discoloration, and terminal arching	Yes. Make required repair No. Step 5

Is the ring gear teeth damaged requiring ring gear replacement?	
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Figure 2: Starter Mount Face to Ring Gear Face Measurement

Step	Action	Decision
8	<p>Housing to Ring Gear (Face to Face) Measurement:</p> <p>Measure face to face depth using a depth micrometer or digital caliper every 90 degrees on the ring gear (See Figure 2)</p> <p>Spec- 1.94" - 2.06"</p> <p>Measurement 1= _____</p> <p>Measurement 2= _____</p> <p>Measurement 3= _____</p> <p>Measurement 4= _____</p> <p>Does the Face to Face depth measure out of spec?</p>	<p>Yes. Immediately order starter, flexplate/flywheel, and then continue to step 9</p> <hr/> <p>No. Step 9</p>

Step	Action	Decision
9	<p>Starter Inspection:</p> <p>Inspect both sides of pinion gear teeth for wear, chipping, or damaged teeth</p> <p><i>Note Inspection Results:</i> _____</p> <p>_____</p> <p>_____</p> <p>Inspect the pinion gear face for milling (indicating the pinion may have engaged to a moving ring gear)</p> <p><i>Note Inspection Results:</i> _____</p> <p>_____</p> <p>_____</p> <p>Inspect wires from the IMS to the solenoid and from the solenoid to the starter for; terminal damage, thread damaged, wires damaged by heat (puckering), or overheating of the cable from the solenoid to the starter</p> <p><i>Note Inspection Results:</i> _____</p> <p>_____</p> <p>_____</p>	<p>Yes. Open case file and attach specific results from each step before part installation</p> <hr/> <p>No. Replace ring gear (if required from previous steps) & starter by following 38MT Starter Installation Instructions and Torque Specs provided in new starter box</p>

Is there Grafo Dielectric Grease on the starter terminals?	
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WARRANTY INFORMATION

Warranty Claim Coding:

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

Standard Repair Times:

Description	Chassis	Engine	SRT	Hours
Starter Diagnostics	CE	Cummins ISB	GY08-2202A	0.9
Starter Diagnostics	4300, Durastar	Cummins ISB	KL08-2202A	0.9
Starter Motor Replacement	CE	Cummins ISB	GY08-4202SB	0.8
Starter Motor Replacement	4300, Durastar	Cummins ISB	KL08-4202SB	1.1
Automatic Transmission (Removal & Reinstall)	CE, 4300, Durastar	Cummins ISB	A13-3101	5.0
Flexplate Replacement	CE, 4300, Durastar	Cummins ISB	A13-101-3	0.4

OTHER RESOURCES

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