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Availability: ISIS, NotSIR

Major System: ELECTRICAL SYSTEM

Current Language: English

Other Languages: [Español](#)

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Author: Anthony Tondola

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Coding Information

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Title: Starter Diagnostics and Warranty Claim Procedure (Not for: ISB engine w/ Allison trans or PSI engines)

Applies To: All engine, all chassis (Does not apply to ISB engine with Allison transmission or PSI Engines)

Change Log

Please refer to the change log text box below for recent changes to this article:

03/15/2023 - Updated article to exclude PSI engines and added links to PSI diagnostics. Updated author.
03/25/2019 - Updated 'Applies To:' to make it clear this does not apply to ISB with Allison transmission
08/24/2018 - Added graphics to assist in diagnostics. Updated step 7 for clarification on voltage reading.
10/02/2017 - Author updated for feedback purposes.and

Description

The following information details the procedure for proper starter diagnostics and requirements for warranty. Use of this document will increase confidence that the right repair is made with minimal downtime and requires the use of the MidTronics EXP tester and the Starter Diagnostic Worksheet.

Note: This article **does not** cover **CE Bus / DuraStar / WorkStar** equipped with **ISB engines and Allison Transmissions**. See [IK0800503 - ISB Starting System Diagnostics](#)

Note: This article **does not** cover any vehicle powered by a **PSI engine (Gas or Propane.)** Please reference the correct PSI diagnostic manual (See links below)

[7610015 - 2018 PSI 8.8L Gasoline Engine Diagnostic Manual](#)

[7610008 - 2015 PSI 8.8L Propane Engine Diagnostic Manual \(Gen I\)](#)

[7610012 - 2019 PSI 8.8L Propane Engine Diagnostic Manual \(Gen II\)](#)

Symptoms

Diagnostic Trouble Codes:

DTC/Light	Description
N/A	

Customer Observations or Symptoms:

- Click, No-Crank (solenoid clicks, starter does not crank, engine is in a no crank; no start state)
- No-Click; No-Crank (solenoid does not click, starter does not crank, engine is in a no crank no start state)
- Slow Crank (control circuit working, solenoid working, starter cranks the engine, engine is in a slow or no start state from cranking to slow)

Special Tools / Software

Tool Description	Tool Number	Comments
Midtronics EXP	EXP 1000 HD	Dealer essential tool per SFN-07-77

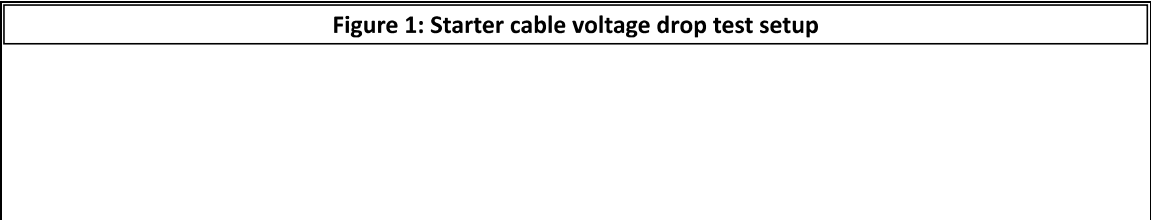
Diagnostic Steps

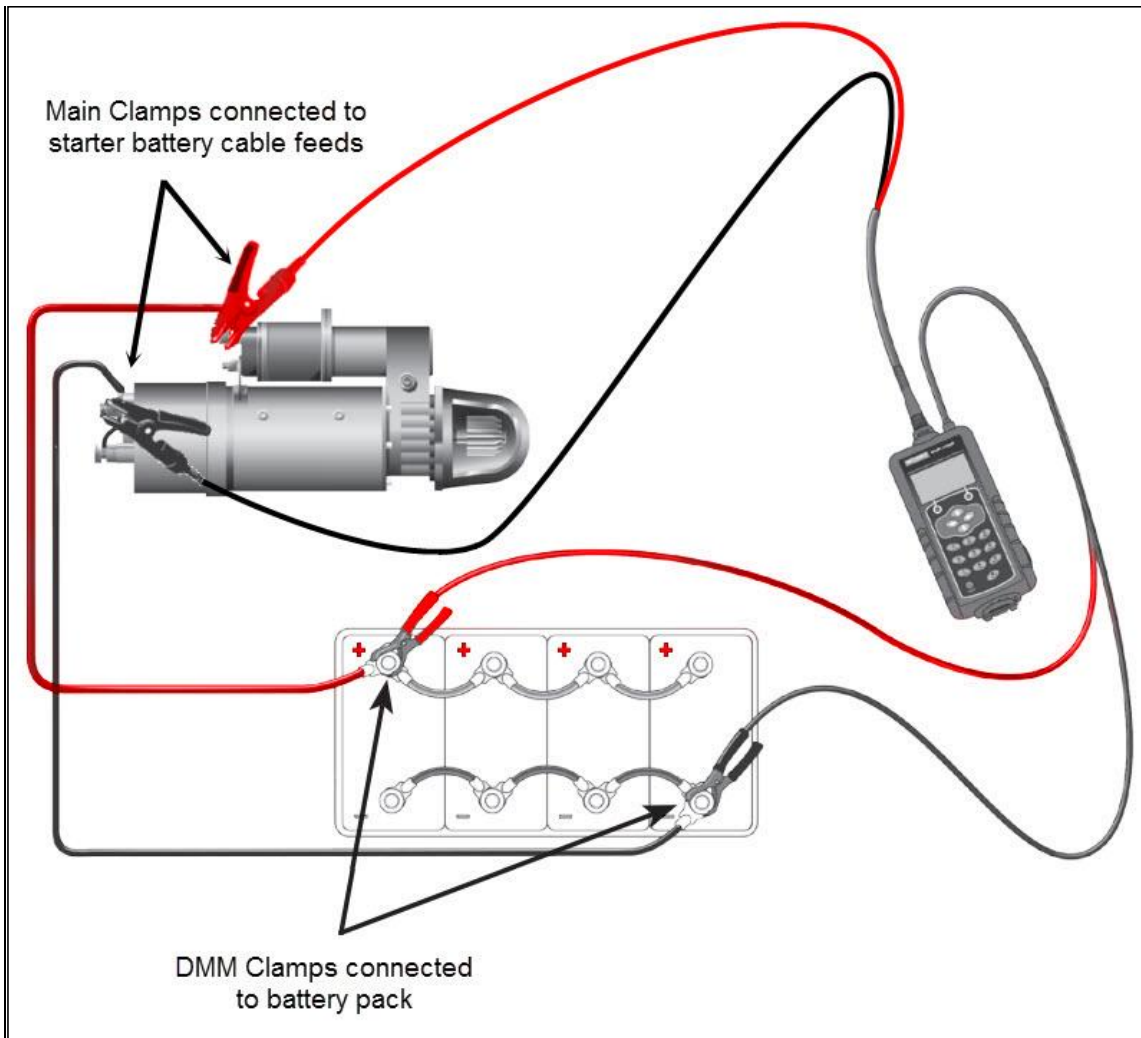
Following the step based procedure below will determine if there is an issue with a starter motor and help prevent warranty denials for No Trouble Found (NTF).

When testing for a Starter related failure, the technician will complete the proper [diagnostic worksheet](#). Critical diagnostic testing values are to be printed and submitted with the claim.

NOTE: Before performing any voltage drop test; inspect each cable end nut torque, insulation, routing, clipping, discoloration, and terminal arching

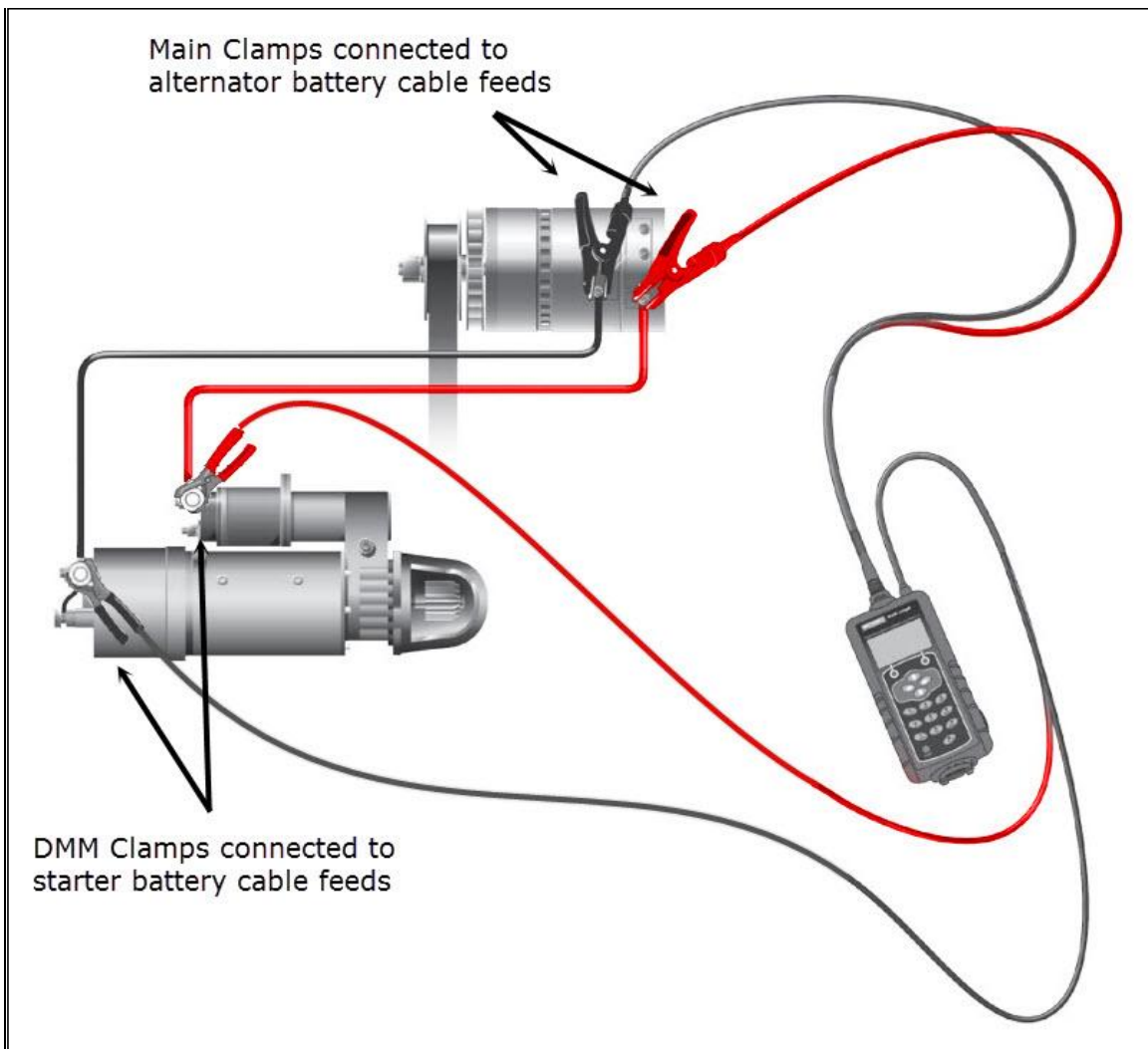
Step	Action	Decision
1	Diagnostic Trouble Code Check: Review current health report for fault codes that may cause an extended crank condition (Crankshaft Position Sensor, Camshaft Sensor, Fuel System, Electrical codes) Are there pending/active/previously active DTC's causing a crank no start?	Yes: Go to appropriate diagnostic manual to diagnose crank no start symptom
		No: Step 2
Step	Action	Decision
2	Manual Engine Barring Test: Have an assistant bar the engine over from the alternator pulley TIP: If an audible noise is heard from the starter area when the engine is rotated by hand, there is most likely flex plate ring gear damage. Does the engine rotate freely?	Yes: Step 3
		No: Diagnose engine lock up condition.
Step	Action	Decision
3	Cranking RPM Test: Monitor Engine RPM while cranking the engine. Does the engine crank?	Yes: Go to appropriate crank no start diagnostic. Do NOT replace starter motor
		No: Step 4
Step	Action	Decision
4	Perform battery test: Follow IK0800482- Battery Testing, Diagnostics & Maintenance Is a warranty approval code (WAC) or failed battery result from any battery generated?	Yes: Replace ONLY failed battery and then recheck for symptom
		No: Step 5





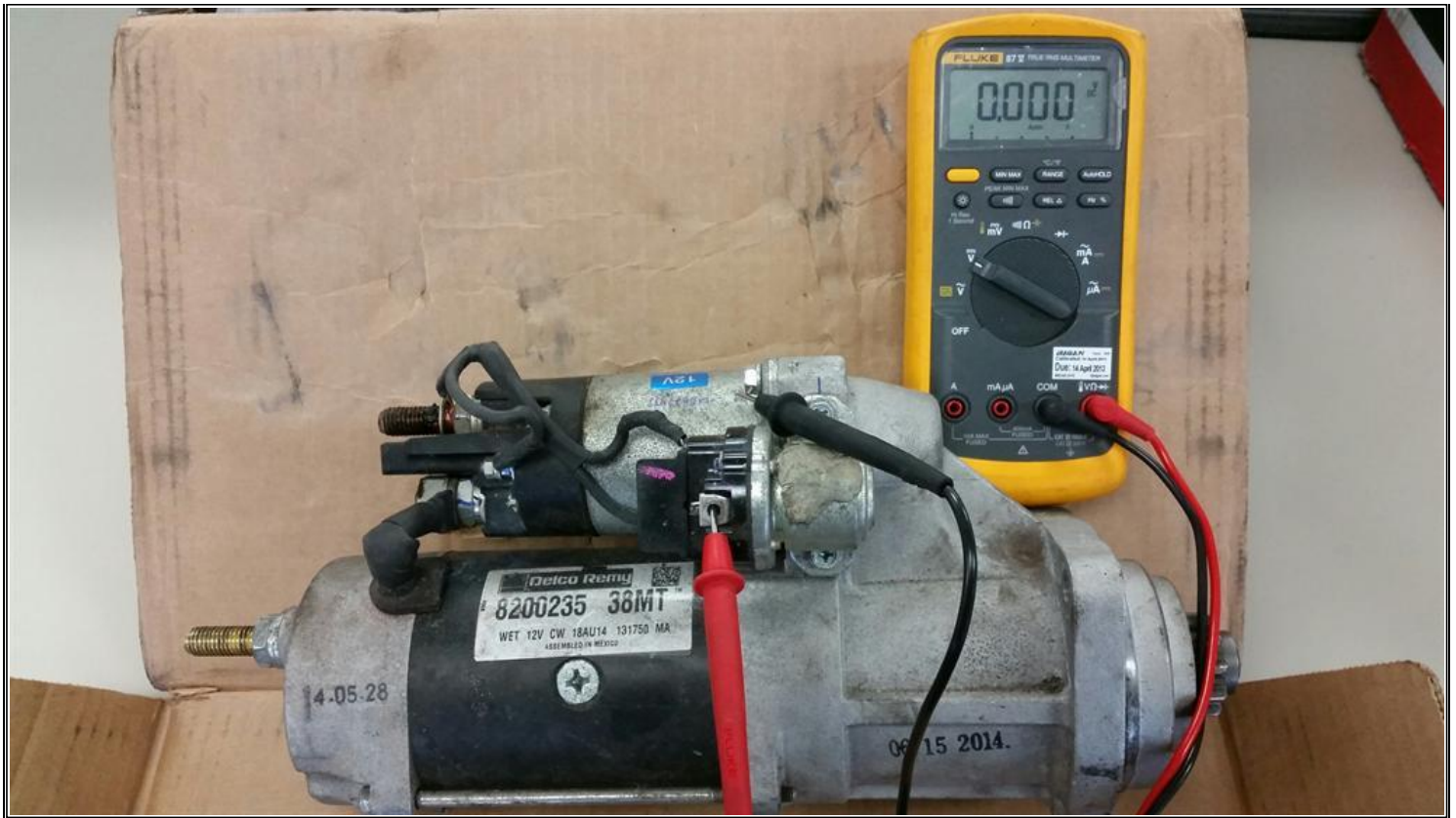
Step	Action	Decision
5	Starter Cable Voltage Drop Test: Follow Midtronics starter cable voltage drop test The test sends a signal through the circuit at the component under test. The tester then simultaneously calculates voltage drop on the positive (+) and negative (–) sides of any circuit as well as the total voltage drop. EXAMPLE <pre> Total circuit voltage drop → STARTER CIRCUIT CIRCUIT DROP: 0.30V Voltage drop across positive side of circuit + DROP: 0.15V - DROP: 0.15V PRINT END Voltage drop across negative side of circuit </pre> Is total circuit voltage drop greater than 1.0v? NOTE: This procedure is outlined in Chapter 6 of the Midtronics Instruction Manual Refer to Image 2 above for connecting the tester	Yes: Make required repair to the cable with the excessive voltage drop
		No: Step 6

Figure 2: Alternator cable voltage drop test setup



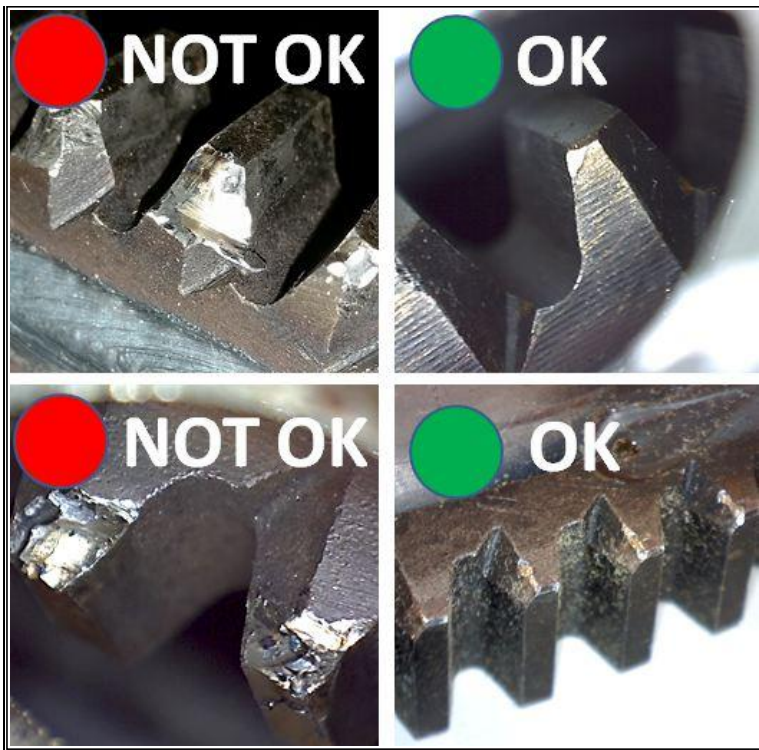
Step	Action	Decision
6	Alternator Cable Voltage Drop Test: Follow Midtronics alternator cable voltage drop test The test sends a signal through the circuit at the component under test. The tester then simultaneously calculates voltage drop on the positive (+) and negative (-) sides of any circuit as well as the total voltage drop. EXAMPLE STARTER CIRCUIT CIRCUIT DROP: 0.30V + DROP: 0.15V - DROP: 0.15V PRINT END Total circuit voltage drop Voltage drop across positive side of circuit Voltage drop across negative side of circuit Is total circuit voltage drop greater than 1.0v? NOTE: This procedure is outlined in Chapter 6 of the Midtronics Instruction Manual Refer to Image 3 above for connecting the tester	Yes: Make required repair to the cable with the excessive voltage drop No: Step 7

Figure 4: Starter IMS S terminal DVOM Hookup Location



Step	Action	Decision
7	Starter Control Circuit Check: Connect DVOM test leads on Starter IMS (Integrated Magnetic Switch) "S terminal" and ground to solenoid case as indicated in Figure 1. Have an assistant hold key switch in start position for 5 seconds. Is measured voltage less than 9v?	Yes: Perform starter control diagnostics for possible causes: 250k Baud Rate Vehicles: Wiring F3A Fuse Start Relay (Neutral Relay) Crank Inhibit Relay Clutch Switch (Manual Trans) TCM (Auto Trans) ECM Key Switch 500k Baud Rate Vehicles: Wiring from BCM 1606-T to Starter IMS Neutral input on BCM 1606-M Clutch Switch (Manual Trans) TCM (Auto Trans) Key Switch (You can make a session in DLB from features 0597064 BC Prog, Electrical Grid Control, 0597065 BC Prog, Crank Inhibit, and 0597066 BC Prog, Key Switch together to assist in diagnostics on 500k baud vehicles) No: Step 8

Figure 2: Flex Plate / Flywheel Ring Gear



Step	Action	Decision
8	Ring Gear Inspection: Remove starter. Mark the flex plate 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 2) TIP: This can be done as a one man operation using a borescope or by looking through the starter mount hole Did all teeth get inspected?	Yes: Step 9
		No: Inspect each tooth

Step	Action	Decision
9	Repair Determination: Does the ring gear require replacement when comparing to Figure 2?	Yes: Replace ring gear & starter
		No: Replace starter

Warranty Information

Warranty Claim Coding:

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

Standard Repair Times:

Description	Chassis	Engine	SRT	Hours

Starter Diagnostics	All Chassis	All Engines	Click Here	0.9
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Special Requirements:

As of November 1, 2012:

When testing for a Starter related failure, the technician will complete the proper [diagnostic worksheet](#). Critical diagnostic testing values are to be printed and submitted with the claim.

A copy of the completed [diagnostic worksheet](#) should be retained with the warranty claim repair order.

All Starters replaced under Warranty (Warranty Codes 01,03,39,55 and 98) will be requested back to be reviewed and tested. Any which are found non-defective or unnecessarily replaced will be charged back to the dealer.

Also now available: [Starter and Alternator Warranty Quick Reference User Guide](#)

Other Resources

[Master Service Information Site](#)

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Feedback Information

Viewed: 21618

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Not Helpful: 46

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