

Electronic Locking Differential (ELD)

Principles of Operation

The ELD system allows the operator to lock the rear differential side gears. When the ELD is engaged both rear wheels turn at the same speed, providing added traction on slippery and/or off road surfaces. The operator can engage the ELD per the charts below:

ELD Engagement/Disengagement Speeds — 4WD Vehicles

Switch Position	Engage	Disengage	Re-engage
2H/4A/4H	31 km/h (19 mph) ^a	42 km/h (25 mph)	31 km/h (19 mph) ^a
4L	90 km/h (56 mph) ^a	100 km/h (62 mph)	90 km/h (56 mph) ^a

^a The ELD system engages/re-engages at or below the speed noted.

ELD Engagement/Disengagement Speeds — 2WD Vehicles

Switch Position	Engage	Disengage	Re-engage
Off	N/A	N/A	N/A
On	31 km/h (19 mph) ^a	42 km/h (25 mph)	31 km/h (19 mph) ^a

^a The ELD system engages/re-engages at or below the speed noted.

When the operator activates the ELD, the ELD icon displays in the IPC message center. If the vehicle is driven above the disengage speed, the IPC message center no longer displays the ELD icon, alerting the operator that the ELD is disengaged. Once the vehicle speed drops below the re-engage speed, the IPC message center displays the ELD icon again. If there is a malfunction with the ELD system, a CHECK LOCKING DIFFERENTIAL message is displayed in the IPC message center, letting the operator know the ELD is not engaged.

Under certain conditions the ELD system has the ability to modulate powertrain torque output as well as system engagement/disengagement to protect internal ELD hardware.

The ELD feature allows the ABS to override the engage state during special events. When this condition occurs the ELD icon flashes on and off rapidly.

The differential locks when a PWM controlled magnetic field coil located inside the differential energizes. This locks the differential side gears and creates the locked differential.

The ELD system also informs the customer when there is too much wheel slip to safely engage the ELD by displaying TO ENGAGE LOCKING DIFFERENTIAL RELEASE ACCELERATOR PEDAL message in IPC message center. When the ELD is engaged, the TCCM sends PWM voltage to the ELD field coil located in the differential. This voltage is initially 98% duty cycle, and then tapers off after 30 seconds. In order for the TCCM to activate the ELD, certain conditions must be met.

- ELD MSS set to On.
- Wheel speed information via HS-CAN communication from ABS module)
- Operating range (voltage 11.5-16 volts)
- DTC setting range (voltage 10-15 volts)
- Ignition in the ON position
- Throttle Position (TP)

Inspection and Verification

1. Verify the customer concern.
2. Visually inspect for obvious signs of mechanical or electrical damage.
3. If an obvious cause for an observed or reported concern is found, correct the cause (if possible) before proceeding to the next step
4. If the cause is not visually evident, verify the symptom and refer to the Symptom Chart.

Visual Inspection Chart

Mechanical	Electrical
• Rear axle assembly • Matching tire sizes	• BJB Fuses ○ fuse 110 (10A) ○ fuse 72 (25A) ○ fuse 40 (15A) • Wiring, terminals or connectors • MSS • ELD field coil • TCCM

DTC Chart: TCCM

Diagnostics in this manual assume a certain skill level and knowledge of Ford-specific diagnostic practices.

REFER to: [Diagnostic Methods](#) (100-00 General Information, Description and Operation).

DTC	Description	Action
P0562:00	System Voltage Low: No Sub Type Information	REFER to: Four-Wheel Drive Systems - Vehicles With: 2-Speed Torque On Demand Transfer Case (308-07A Four-Wheel Drive Systems, Diagnosis and Testing). REFER to: Four-Wheel Drive Systems - Vehicles With: 2-Speed Torque On Demand Transfer Case (308-07A Four-Wheel Drive Systems, Diagnosis and Testing).

P0563:00	System Voltage High: No Sub Type Information	REFER to: Four-Wheel Drive Systems - Vehicles With: 2-Speed Torque On Demand Transfer Case (308-07A Four-Wheel Drive Systems, Diagnosis and Testing). REFER to: Four-Wheel Drive Systems - Vehicles With: 2-Speed Torque On Demand Transfer Case (308-07A Four-Wheel Drive Systems, Diagnosis and Testing).
P185A:00	Differential Lock-Up Input Switch Circuit High: No Sub Type Information	GO to Pinpoint Test A
P185D:00	Differential Lock-Up Control Circuit Low: No Sub Type Information	GO to Pinpoint Test D
P187C:00	Differential Lock-Up Control Circuit/ Open: No Sub Type Information	GO to Pinpoint Test B
P187D:00	Differential Lock-Up Control Circuit Low: No Sub Type Information	GO to Pinpoint Test B
P187E:00	Differential Lock-Up Control Circuit High: No Sub Type Information	GO to Pinpoint Test C
U0100:00	Lost Communication With ECM/PCM "A": No Sub Type Information	REFER to: Four-Wheel Drive Systems - Vehicles With: 2-Speed Torque On Demand Transfer Case (308-07 Four-Wheel Drive Systems) . REFER to: Four-Wheel Drive Systems - Vehicles With: Electronic Shift Transfer Case (308-07 Four-Wheel Drive Systems) .

U0101:00	Lost Communication With TCM "A": No Sub Type Information	REFER to: Four-Wheel Drive Systems - Vehicles With: 2-Speed Torque On Demand Transfer Case (308-07 Four-Wheel Drive Systems) . REFER to: Four-Wheel Drive Systems - Vehicles With: Electronic Shift Transfer Case (308-07 Four-Wheel Drive Systems) .
U0121:00	Lost Communication With Anti-Lock Brake System (ABS) Control Module: No Sub Type Information	REFER to: Four-Wheel Drive Systems - Vehicles With: 2-Speed Torque On Demand Transfer Case (308-07 Four-Wheel Drive Systems) . REFER to: Four-Wheel Drive Systems - Vehicles With: Electronic Shift Transfer Case (308-07 Four-Wheel Drive Systems) .
U0140:00	Lost Communication With Body Control Module (BCM): No Sub Type Information	REFER to: Four-Wheel Drive Systems - Vehicles With: 2-Speed Torque On Demand Transfer Case (308-07 Four-Wheel Drive Systems) . REFER to: Four-Wheel Drive Systems - Vehicles With: Electronic Shift Transfer Case (308-07 Four-Wheel Drive Systems) .
U0418:00	Invalid Data Received From Brake System Control Module: No Sub Type Information	REFER to: Anti-Lock Brake System (ABS) and Stability Control (206-09 Anti-Lock Brake System (ABS) and Stability Control, Diagnosis and Testing).

U2300:54	Central Configuration: Missing Calibration	This DTC sets if one or more expected configuration data identifications is missing (gearbox type, tire circumference) from the BCM. CARRY OUT a self-test of the BCM. If DTCs are present, REFER to: Body Control Module (BCM) (419-10 Multifunction Electronic Modules, Diagnosis and Testing). If no DTCs are present, CARRY OUT a self-test. If U2300:54 returns, INSTALL a new TCCM. REFER to: Transfer Case Control Module (TCCM) (308-07A Four-Wheel Drive Systems, Removal and Installation).
U2300:55	Central Configuration: Not Configured	This DTC sets upon power up only until all expected configuration data parameters (gearbox type, axle ratio, tire circumference) are received from the BCM. CARRY OUT a self-test of the BCM. If DTCs are present, REFER to: Body Control Module (BCM) (419-10 Multifunction Electronic Modules, Diagnosis and Testing). If no DTCs are present, CLEAR the DTCs. CARRY OUT self-test. If U2300:55 returns, INSTALL a new TCCM. REFER to: Transfer Case Control Module (TCCM) (308-07A Four-Wheel Drive Systems, Removal and Installation).

U2300:56	Central Configuration: Invalid / Incompatible Configuration	This DTC sets if one expected configuration data parameter is out of range (gearbox type, axle ratio, tire circumference) from the BCM. CARRY OUT a self-test of the BCM. If DTCs are present, REFER to: Body Control Module (BCM) (419-10 Multifunction Electronic Modules, Diagnosis and Testing). If no DTCs are present, CARRY OUT a self-test. If U2300:56 returns, INSTALL a new TCCM . REFER to: Transfer Case Control Module (TCCM) (308-07A Four-Wheel Drive Systems, Removal and Installation).
U2300:64	Central Configuration: Signal Plausibility Failure	This DTC sets if the expected axle ratio or tire circumference is out of range from the BCM. CARRY OUT a self-test of the BCM. If DTCs are present, REFER to: Body Control Module (BCM) (419-10 Multifunction Electronic Modules, Diagnosis and Testing). If no DTCs are present, CARRY OUT a self-test. If U2300:64 returns, INSTALL a new TCCM. REFER to: Transfer Case Control Module (TCCM) (308-07A Four-Wheel Drive Systems, Removal and Installation).
U3000:41	Control Module: General Checksum Failure	CLEAR the DTC. REPEAT the self-test. If DTC U3000:49 is retrieved, INSTALL a new TCCM. REFER to: Transfer Case Control Module (TCCM) (308-07A Four-Wheel Drive Systems, Removal and Installation).

U3000:46	Control Module: Calibration / Parameter Memory Failure	CLEAR the DTC. REPEAT the self-test. If DTC U3000:49 is retrieved, INSTALL a new TCCM. REFER to: Transfer Case Control Module (TCCM) (308-07A Four-Wheel Drive Systems, Removal and Installation).
U3000:49	Control Module: Internal Electronic Failure	CLEAR the DTC. REPEAT the self-test. If DTC U3000:49 is retrieved, INSTALL a new TCCM. REFER to: Transfer Case Control Module (TCCM) (308-07A Four-Wheel Drive Systems, Removal and Installation).
U300D:11	Ignition Input On/Start: Circuit Short To Ground	REFER to: Four-Wheel Drive Systems - Vehicles With: 2-Speed Torque On Demand Transfer Case (308-07 Four-Wheel Drive Systems) . REFER to: Four-Wheel Drive Systems - Vehicles With: Electronic Shift Transfer Case (308-07 Four-Wheel Drive Systems) .
All other TCCM DTCs		REFER to: Four-Wheel Drive Systems - Vehicles With: 2-Speed Torque On Demand Transfer Case (308-07 Four-Wheel Drive Systems) . REFER to: Four-Wheel Drive Systems - Vehicles With: Electronic Shift Transfer Case (308-07 Four-Wheel Drive Systems) .

Symptom Chart Electronic Locking Differential (ELD) System

Symptom	Possible Sources	Action

• A module does not respond to the scan tool	• Wiring, terminals or connectors • Scan tool • DLC • TCCM	• CHECK the module communications network, module does not respond to the scan tool. REFER to: Communications Network (418-00 Module Communications Network, Diagnosis and Testing).
• Rear wheels binding when turning corners with the ELD MSS in 2WD or OFF	• Wiring, terminals or connectors • ELD field coil • Rear differential • TCCM	• GO to Pinpoint Test C

Pinpoint Tests

DTC P185A:00

Refer to Wiring Diagrams Cell 34 for schematic and connector information.

Normal Operation

When the ELD MSS is engaged to lock the rear differential, the ELD MSS opens allowing the voltage being monitored by the TCCM to go high. When the TCCM senses the voltage is high it activates the ELD. The TCCM sends a message to the IPC via the HS-CAN requesting the IPC illuminate the ELD message center indicator.

DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions

P185A:00	Differential Lock-Up Input Switch Circuit High: No Sub Type Information	If the ELD is functioning normally, the differential immediately locks when the ELD MSS is activated and the ELD operating conditions are qualified. This DTC only displays during the self-test function.
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Possible Sources

- Wiring, terminals or connectors
- TCCM
- MSS

NOTE: Make sure the battery is fully charged before carrying out this pinpoint test.

PINPOINT TEST A : DTC P185A:00

A1 CHECK FOR TCCM DTCS	
NOTE: Failure to place the ELD MSS in OFF position prior to carrying out a self-test of the TCCM Module results in the false setting of DTC P185A:00. • Ignition ON. • Set the ELD MSS to OFF. • Enter the following diagnostic mode: TCCM Self-Test .	
Are any DTCs present?	
Yes	If only DTC P185A:00 is retrieved, GO to A2 For any other DTCs, REFER to the DTC Chart.
No	IDENTIFY the customer concern and GO to Symptom Chart: ELD.
A2 CHECK THE LOCKER MODE SWITCH CIRCUIT FOR A SHORT TO VOLTAGE	

- Ignition OFF.
- Disconnect TCCM C2371A.

Is any voltage present?

Yes	GO to A3
No	GO to A4

A3 CHECK THE LOCKER MODE SWITCH CIRCUIT FOR A SHORT TO VOLTAGE

- Ignition OFF.
- Disconnect MSS C284.
- Ignition ON.

Is any voltage present?

Yes	REPAIR circuit. CLEAR the DTCs.
No	INSTALL a new MSS

A4 CHECK THE LOCKER MODE SWITCH CIRCUIT FOR AN OPEN

- Ignition OFF.

Is the resistance less than 3 ohms?

Yes	GO to A5
No	REPAIR the circuit.

A5 CHECK THE MSS

- Connect MSS Switch C284.

Is the resistance between 24 - 24.5 ohms with the ELD MSS de-activated and greater than 10,000 ohms with the ELD MSS activated?

Yes	GO to A7
No	INSTALL a new MSS. REFER to: Mode Select Switch (MSS) (308-07A Four-Wheel Drive Systems, Removal and Installation).

A6 CHECK THE LOCKER MODE SWITCH GROUND CIRCUIT FOR AN OPEN

- Ignition OFF.

Is the resistance less than 3 ohms?

Yes	GO to A7
No	REPAIR the circuit.

A7 CHECK FOR CORRECT TCCM OPERATION

- Ignition OFF.
- Disconnect and inspect all TCCM connectors.
- Check for the following:
 - corrosion (install new connector or terminals - clean module pins)
 - damaged or bent pins - install new terminals/pins
 - pushed-out pins - install new pins as necessary
- Connect all TCCM connectors. Make sure they seat and latch correctly.
- Operate the system and verify the concern is still present.

Is the concern still present?

Yes	INSTALL a new TCCM. REFER to: Transfer Case Control Module (TCCM) (308-07A Four-Wheel Drive Systems, Removal and Installation).
No	The system is operating correctly at this time. Concern may have been caused by a loose or corroded connector. ADDRESS the root cause of the connector or pin issues.

DTC P187C:00 AND P187D:00

Refer to Wiring Diagrams Cell 34 for schematic and connector information.

Normal Operation

When the ELD MSS is engaged to lock the rear differential, the TCCM sends a PWM signal to the ELD field coil through the differential lock control circuit. This PWM signal is initially 98% duty cycle to lock the differential and then tapers off to a lower duty cycle once the differential is locked. If the differential lock control circuit is open or shorted to ground, the TCCM senses a signal is not reaching the differential and sets a DTC.

DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
P187C:00	Differential Lock-Up Control Circuit/Open: No Sub Type Information	This DTC sets when the TCCM senses the differential lock control circuit is open. The ELD differential is not engaged.
P187D:00	Differential Lock-Up Control Circuit Low: No Sub Type Information	This DTC sets when the TCCM senses the differential lock control circuit is shorted to ground. The ELD differential is not engaged.

Possible Sources

- Wiring, terminals or connectors

- TCCM

PINPOINT TEST B : DTC P187C:00 AND P187D:00

NOTE: Make sure the battery is fully charged before carrying out this pinpoint test.

B1 CHECK FOR TCCM DTCS

- Ignition ON.
- Set the ELD MSS to OFF.
- Enter the following diagnostic mode: TCCM Self-Test .

Are any DTCs present?

Yes	For DTC P187C:00, GO to B4 For DTC P187D:00, GO to B2 For all other DTCs, REFER to the DTC Chart: TCCM .
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No	VERIFY the customer concern and GO to the Symptom Chart.
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B2 CHECK FOR TCCM DTCS WITH THE ELD FIELD COIL DISCONNECTED

- Ignition OFF.
- Disconnect ELD Field Coil C4359.
- Ignition ON.
- Set the ELD MSS to OFF.
- Enter the following diagnostic mode: TCCM Self-Test .

CLEAR the DTCs. REPEAT the self-test. Does DTC P187D:00 return?

Yes	GO to B3
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No	INSTALL a new ELD field coil. REFER to: Differential Carrier - Vehicles With: Electronic Locking Differential (ELD) (205-02A Rear Drive Axle/Differential - Vehicles With: Ford 8.8 Inch Ring Gear, Disassembly and Assembly). CLEAR the DTCs.
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B3 CHECK THE ELD DIFFERENTIAL LOCK CONTROL CIRCUIT FOR A SHORT TO GROUND

- Ignition OFF.
- Disconnect TCCM C2371B.

Is the resistance greater than 10,000 ohms?

Yes	GO to B4
No	REPAIR the circuit.

B4 CHECK THE ELD DIFFERENTIAL LOCK CONTROL CIRCUIT FOR AN OPEN

- Ignition OFF.
- Disconnect TCCM C2371A.
- Disconnect ELD Field Coil C4359.

Is the resistance less than 3 ohms?

Yes	GO to B5
No	REPAIR the circuit.

B5 CHECK FIELD COIL GROUND CIRCUIT

Is the resistance less than 3 ohms?

Yes	GO to B6
No	REPAIR the circuit.

B6 CHECK FOR CORRECT TCCM OPERATION

- Ignition OFF.
- Disconnect and inspect all TCCM connectors.
- Check for the following:
 - corrosion (install new connector or terminals - clean module pins)
 - damaged or bent pins - install new terminals/pins
 - pushed-out pins - install new pins as necessary
- Connect all TCCM connectors. Make sure they seat and latch correctly.
- Operate the system and verify the concern is still present.

Is the concern still present?

Yes	INSTALL a new TCCM. REFER to: Transfer Case Control Module (TCCM) (308-07A Four-Wheel Drive Systems, Removal and Installation).
No	The system is operating correctly at this time. Concern may have been caused by a loose or corroded connector. ADDRESS the root cause of the connector or pin issues.

Rear Wheels Binding When Turning Corners With The ELD MSS Set To OFF

Refer to Wiring Diagrams Cell 34 for schematic and connector information.

Normal Operation

When the ELD MSS is engaged to lock the rear differential, the TCCM sends a PWM signal to the ELD field coil through the differential lock control circuit. This PWM signal is initially 98% duty cycle to lock the differential and then tapers off to a lower duty cycle once the differential is locked. If the differential does not lock, the TCCM continues to send the signal for a set amount of time. Once the differential is locked, the indicator illuminates steadily.

Possible Sources

- Wiring, terminals or connectors
- ELD field coil
- TCCM (4WD only)

DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
P187E:00	Differential Lock-Up Control Circuit High: No Sub Type Information	This DTC sets when the TCCM senses the differential lock control circuit is shorted to battery voltage. The differential is constantly engaged.

PINPOINT TEST C : REAR WHEELS BINDING WHEN TURNING CORNERS WITH THE ELD MSS SET TO OFF

NOTE: Make sure the battery is fully charged before carrying out this pinpoint test.
C1 • Ignition OFF. • Disconnect ELD Field Coil C4359. • Ignition ON. • Set the ELD MSS to OFF. Is any voltage present?

Yes	GO to C2
No	To repair the rear differential, REFER to: Rear Drive Axle and Differential (205-02A Rear Drive Axle/ Differential - Vehicles With: Ford 8.8 Inch Ring Gear, Diagnosis and Testing). REFER to: Electronic Locking Differential (ELD) (205-02B Rear Drive Axle/ Differential - Vehicles With: Ford 9.75 Inch Ring Gear, Diagnosis and Testing).

C2 CHECK THE ELD FIELD COIL CIRCUIT FOR A SHORT TO VOLTAGE

- Ignition OFF.
- Disconnect TCCM C2371B.
- Ignition ON.

Is any voltage present?

Yes	REPAIR the circuit.
No	GO to C3

C3 CHECK THE TCCM REAR LOCKING DIFFERENTIAL PWM OUTPUT CONTROL (DIFF_PWM_OS) PID

- Ignition OFF.
- Connect PWM Field Coil C4359.
- Connect TCCM C2371B.
- Ignition ON.
- Enter the following diagnostic mode: TCCM DataLogger .
- MSS to OFF monitor the DIFF_PWM_OS PID.

Does the DIFF_PWM_OS PID read OFF?

Yes	GO to C4
No	GO to Pinpoint Test A

C4 CHECK FOR CORRECT TCCM OPERATION

- Ignition OFF.
- Disconnect and inspect all TCCM connectors.
- Check for the following:
 - corrosion (install new connector or terminals - clean module pins)
 - damaged or bent pins - install new terminals/pins
 - pushed-out pins - install new pins as necessary
- Connect all TCCM connectors. Make sure they seat and latch correctly.
- Operate the system and verify the concern is still present.

Is the concern still present?

Yes	INSTALL a new TCCM. REFER to: Transfer Case Control Module (TCCM) (308-07A Four-Wheel Drive Systems, Removal and Installation).
No	The system is operating correctly at this time. Concern may have been caused by a loose or corroded connector. ADDRESS the root cause of the connector or pin issues.

DTC P185D:00

Refer to Wiring Diagrams Cell 34 for schematic and connector information.

Normal Operation

When the ELD is fully locked, the indicator illuminates steadily. When the ELD MSS is engaged to lock

the rear differential, a PWM signal is sent to the ELD field coil by the TCCM through the differential lock control circuit. This PWM signal is initially 98% duty cycle to lock the differential and then tapers off to a lower duty cycle once the differential is locked. If the differential does not lock, the TCCM module continues to send the signal for a set amount of time. Once the ELD is locked, the indicator illuminates steadily.

Possible Sources

- Wiring, terminals or connectors
- ELD field coil

DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
P185D:00	Differential Lock-Up Control Circuit Low: No Sub Type Information	The TCCM sends a signal to the lock up solenoid to lock the differential. After several unsuccessful attempts, the TCCM sets this DTC alerting the driver the ELD is inoperative. Fault may be due to a wheel speed condition or due to a mechanical failure within the driveline/axle subsystem.

PINPOINT TEST D : DTC P185D:00

NOTE: <i>Make sure the battery is fully charged before carrying out this pinpoint test.</i>
D1 CHECK THE ABS MODULE WHEEL SPEED SENSOR PIDS

- Enter the following diagnostic mode: ABS Module Datalogger.
- While driving the vehicle at 30 km/h (18 mph), monitor the following wheel speed sensor PIDs:
 - Left Front Wheel Speed Sensor (LF_WSPD)
 - Left Rear Wheel Speed Sensor (LR_WSPD)
 - Right Front Wheel Speed Sensor (RF_WSPD)
 - Right Rear Wheel Speed Sensor (RR_WSPD)
- Compare the speedometer reading to the wheel speed sensor PIDs.

Do the wheel speed sensor PIDs and speedometer speeds match within 1.5 km/h (1 mph)?

Yes	GO to D2
No	VERIFY that the 4 road wheels are the same size and have similar tread depth. CHECK the ABS for faults.

D2 CHECK RESISTANCE OF THE ELD FIELD COIL

- Ignition OFF.
- Disconnect ELD field coil.
- Measure:

Click to display connectors

Positive Lead	Measurement / Action	Negative Lead
ELD field coil pin 1 component side	Ω	ELD field coil pin 2 component side

Is the resistance between 2-4 ohms?

Yes	GO to D3
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No	INSTALL a new ELD field coil. REFER to: Differential Carrier - Vehicles With: Electronic Locking Differential (ELD) (205-02A Rear Drive Axle/Differential - Vehicles With: Ford 8.8 Inch Ring Gear, Disassembly and Assembly). REFER to: Differential Carrier - Vehicles With: Electronic Locking Differential (ELD) (205-02B Rear Drive Axle/Differential - Vehicles With: Ford 9.75 Inch Ring Gear, Disassembly and Assembly).
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D3 CHECK THE ELD FIELD COIL GROUND

- Measure:

Click to display connectors

Positive Lead	Measurement / Action	Negative Lead
ELD field coil pin 2 component side	Ω	Ground

Is the resistance less than 3 ohms?

Yes	To repair the rear differential REFER to: Differential Carrier - Vehicles With: Electronic Locking Differential (ELD) (205-02A Rear Drive Axle/Differential - Vehicles With: Ford 8.8 Inch Ring Gear, Disassembly and Assembly). REFER to: Differential Carrier - Vehicles With: Electronic Locking Differential (ELD) (205-02B Rear Drive Axle/Differential - Vehicles With: Ford 9.75 Inch Ring Gear, Disassembly and Assembly). . CLEAR the DTCs.
No	REPAIR the circuit.