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## **OWNERS MANUAL**



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## **SCAN TO LEARN MORE** ABOUT TOW ASSIST



#### Introduction

The Dexter Tow Assist™ system brings automotive intelligence and technology to the trailer industry by providing Anti-Lock Braking (ABS), Sway Mitigation, and a towable odometer. The product will make trailer driving safer for both novice and professional drivers while also helping to reduce the costs associated with trailer downtime.

#### Anti-Lock Braking System (ABS)

Anti-lock Braking System (ABS) will operate when one or more wheels are determined to be slipping to a level to require ABS intervention. The main goal of the trailer ABS feature is to maintain lateral stability of the trailer on a surface where the trailer wheels become locked (typically lower friction surfaces, wet asphalt, gravel, snow, ice).

ABS ensures the braking system can achieve maximum braking power without the associated risk of locked wheel trailer instability. ABS is the foundation of a safe braking system.

#### **Trailer Sway Mitigation (TSM)**

Trailer sway is increasing oscillations of a trailer swaying due to incorrectly loaded trailers or external forces such as high winds, road conditions or extreme driver steering. TSM function will only activate at speeds 40 MPH and above.

TSM improves safety by using advanced monitoring and braking algorithms to ensure the trailer stops with the most effective level for the sway rate, road surface, brake efficiency and trailer weight. Paired with ABS, trailer sway mitigation is extremely effective in adapting to all trailers irrespective of the weight, loading, braking efficiency or wheel & tire choice.

#### Lane Change Control (LCC)

Lane change instability differs from trailer sway. LCC is caused by a sudden change in the tow vehicle's direction rather than an increasing the sway of the trailer while the vehicle is traveling straight. The Tow Assist Lane Change Control (LCC) monitors for sudden vehicle swerving and extreme trailer movement to stabilize the trailer early.

#### **Trailer Brake Monitoring**

Drivers know they can rely on Tow Assist; it is a safety system that continually monitors components and provides up to date notification through the indicator light. For this reason, the customer benefits from a monitoring system. Monitoring of trailer components includes electrical brake mechanisms, wheel speed sensors, power source monitoring and trailer braking issues (see 2.4 Tow Assist External Components Monitoring).

#### **Trailer Odometer Feature**

Tow Assist offers the feature of recording trailer mileage. Trailer mileage tracking plays an important role in ensuring trailers are serviced at correct intervals, improving safety. Additionally, it can improve the resale value of trailers by offering the buyer the trailer mileage and service history.

#### **Configuration**

The installer of your Tow Assist system configured it to your specific trailer with the number of axles and tire size from original delivery. Significant changes in the size may slightly affect odometer accuracy.



## **Operation**

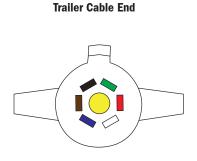
The Tow Assist system works in collaboration with an in-vehicle Electric Trailer Brake Controller to improve the safety and stability of trailer braking.

The primary trailer braking control remains the responsibility of the Electric Brake Controller and the vehicle driver. Tow Assist will intervene when it determines the safety of braking is compromised and the system can improve the situation.

The goal of the Tow Assist system is to improve the safety of the trailer braking and stability, while also ensuring trailer braking efficiency or reliability is not reduced.

The Tow Assist system requires a 7-way (or similar) tow vehicle connector. This connector must have Auxiliary +12V Power wired at position 4, which is typically a black wire. This connection is how the Tow Assist system is powered. The system will not work without power from this connection. Your tow vehicle may have the 7-way connector without the +12v terminal activated. Please consult your vehicle's owner's manual or a qualified service center to verify that your connector has the proper power connection.

Figure 1: Most Common Factory Installed Wiring **Arrangement (Front Face of Connectors)** 





Position	Color	Description
0	Yellow	Auxiliary Lights
1	Green	Tail Lights
2	Red	Left Turn/Brakes
3	eiliw	Ground
4	Black	+12 V
5	Brown	Right Turn/Brakes
6	Blue	Trailer Brakes

#### **Initialization**

The Tow Assist will startup when power is first applied through the 7-way plug connection. During Tow Assist startup, audible clicking may be heard from the Tow Assist ECU performing a self-check. The light will flash briefly as part of the self-check.

After startup, the Tow Assist light will remain off until a valid brake signal is detected. A brake signal is generated by the driver pressing the brake pedal or pressing the brake override lever of the electric trailer brake control. By waiting for this signal, Tow Assist ensures it has detected a valid trailer braking signal and that the driver has correctly connected the tow vehicle to the trailer.

Brake controllers will vary somewhat on the exact signal produced while at a standstill. Tow Assist requires a strong brake controller signal to wake-up the unit. Available brake controllers vary on actual output created from each controller setting. It is recommended to set the controller gain setting of "2" or higher to ensure there is enough signal created to wakeup the Tow Assist. The Tow Assist indicator light will illuminate, indicating the system is on. If Tow Assist does not go into normal operation do the following until the system indicator light is green:

- Press and hold the brake pedal for at least 2 seconds.
- Press and hold the brake override switch for at least 2 seconds.
- Increase the gain setting slightly.
- If Tow Assist does not become active, check trailer plug connections, wire and power supply to the Tow Assist and repeat the steps above.

Tow Assist will wake-up from a sleep state when power and a valid signal is detected from the brake input.

Normal operation will commence when a brake signal is detected by the system. The system status will also be displayed on the light module.

- Green operational light display only indicates the system is good and completely operational.
- Amber warning light display only indicates the system has a fault and is shutdown. It will not operate in this state. Note that regular braking is still available. Use your Tow Assist app or contact Dexter to have this corrected.
- Operational and warning light displays on together (green and amber) indicates the system is operating in a reduced state due to a detected fault. Some level of ABS and Sway Mitigation is available. Use your Tow Assist app or contact Dexter to have this corrected.

A detailed list of light states is listed in the reference section under light Module Operations.

#### Shutdown/Sleep

Tow Assist will turn off the light module illumination after 20 minutes of trailer standstill without a braking signal detected. Tow Assist will go into low power sleep mode after 120 minutes of trailer standstill without a braking signal detected. Tow Assist will shut down if there is no power by removing the 7-way plug, unless an on-board battery powers system. Note: Anytime the light module is not illuminated, the driver must assume the Tow Assist is off and not operational.

## **Fault Monitoring**

Tow Assist will perform periodic system status checks. On start-up, the system will perform a detailed review of the system and the connected braking components.

While operating, Tow Assist is constantly monitoring and reviewing the failure status of the ECU and supporting components.

If the Tow Assist has an active fault, the system will continue to perform fault checks once at a standstill. Periodic checks are a sequence of 5 minutes after standstill, then at 15 minutes after standstill and then every 30 minutes until such time the fault is corrected and no longer detected.



## **Brake System Monitoring**

#### **Brake Magnets**

Brake Magnets are monitored for a range of faults including open circuit on magnet connection, shorts to Ground Level, shorts to Positive Battery Level, and incorrect wiring detected on the brake magnets. These checks are performed at Tow Assist start-up and during active Tow Assist operation (ABS, TSM, LCC).

#### **Wheel Speed Sensors**

Wheel Speed Sensors are checked for a range of faults including wheel speed signal and supply faults, tone wheel damage and a range of plausibility checks between different wheels.

#### **Power Supply**

Tow Assist Power Supply is checked for conditions in standby and active operation including:

- Under voltage when Tow Assist not actively braking
- Under voltage levels when actively braking
- Over voltage level

#### **External Simulated Load**

If the electric brake controller is not satisfied with the Tow Assist internal load simulator, warnings will display on your tow vehicle dash display. These warnings are dependent on specific conditions on certain tow vehicles and should not happen in most configurations. If needed, an external simulated load can be added to the harness and enabled. This feature must be activated through proprietary software. Please contact towassistsupport@dexteraxle.com for more information.

## **Tow Assist Compatibility Guidelines**

## **CAUTION**

It is the responsibility of the end user to ensure that their electric brake controller is compatible with the Dexter Tow Assist System. Dexter attempts to provide compatibility with most controllers available but is unable to anticipate design changes that might be introduced by the various controller manufacturers.

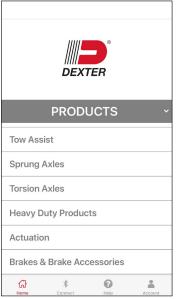
Information on Tow Assist Compatibility Guideline are available in instruction sheet 059-A23-00 available at www.dexteraxle.com.

## **Dexter Phone App**

The Dexter app has many features, including access to product information, manuals, instructions, and a dedicated section for the Tow Assist system. The app is available in both Google Play™ store or the Apple App Store®.

The Tow Assist interface portion of the app allows users to

- Create and manage account
- Manage multiple trailers
- Read trailer odometer
- Diagnose and learn about system faults
- Save information about readings and faults
- Reset the Tow Assist Controller (ECU)





The Tow Assist portion of the phone app requires the supplied Bluetooth communication adapter (Dexter Part Number 058-037-00) to communicate with the Tow Assist System. Plug the Bluetooth adapter into the OBD2 harness connector located near the front of your trailer. Contact your trailer manufacturer if the OBD2 connector if it is not easily visible. See the images below for reference. Remove the adapter when not in use to protect from environmental extremes.

Please note that the app is meant to read information from the Tow Assist ECU only. Only the trailer manufacturer can write to the ECU with specialized software.

#### **OBD2** Harness Connection and Bluetooth Adapter







## **Troubleshooting**

A correctly installed and fully operational Tow Assist will display an operation light (green) on and warning light (amber) off.

If the system detects a fault, the warning light will be on. Perform the following steps:

- 1. Wait for more than 5 minutes at standstill or power cycle the Tow Assist ECU. The Tow Assist ECU will perform a self-check.
- 2. If the warning light remains on after 5 minutes at a standstill or power cycle, carefully drive off and stop again (generating a brake signal by pressing the brake pedal or pressing the brake override lever of the electric trailer brake control).
- If the warning light remains on, perform fault diagnosis in one of the next two sections.

#### **Fault Diagnosis: Diagnostic Interface Method**

The Tow Assist App contains a diagnostic code log that provides the cause and repair for each fault. The full description of the possible diagnostic codes is listed in the reference section in this manual. To extract the diagnostic fault codes from the Tow Assist, the user can use an OBD2 Bluetooth® adapter and the Tow Assist App.

#### **Fault Diagnosis: Light Flash Method**

An alternative basic troubleshooting method is available, however, it will not offer the same high level of troubleshooting detail that a connection to the diagnostic interface will. Diagnostic fault codes are mapped to Light Flash Codes which can be accessed by the installer, service representative and the user.

To activate the light Fault Display Mode the following actions must be performed:

- The trailer must be stationary, electric brake controller connected and the Tow Assist powered on.
- The electric brake controller gain should be greater than 50% of its scale.
- 3. The driver must not press the brake pedal.
- 4. The driver must Apply (short press) the manual override switch on the electric brake controller with 10 short pulses within a 15 second period to commence the Fault Display Mode.

If these requirements are met then the Tow Assist will flash the fault codes as per the table in the reference section under light Module Diagnostics.

Fault code flashing sequence will operate in the following manner:

- 1. Fault Code (First Fault) (e.g. fault number 25)
- Flash Warning light (amber) number of times as the 1st digit. (e.g. 2 flashes)
- 3. Flash Operation light (green) number of times as the 2nd digit. (e.g. 5 flashes)
- All light off for 1 second (signifies 1st fault finished and will start 2nd fault)
- 5. Fault Code (Second Fault) (e.g. fault number 45)

- 6. Flash Warning light (amber) number of times as the 1st digit. (e.g. 4 flashes)
- Flash Operation light (green) number of times as the 2nd digit. (e.g. 5 flashes)
- 8. All light off for 1 second (signifies 2nd fault finished and will start next fault)
- 9. Fault Code (maximum 10 available)

Both lights off for 3 seconds (signifies all faults finished and will start the sequence again).

The entire flashing sequence will repeat for 10 cycles before returning to normal light operation.

The light Fault Display Mode will cancel and return to standard light operation if the trailer is towed at any time or if power is removed from the Tow Assist controller.



## **Service Instructions**

	<ol> <li>Check/Inspect</li> <li>Inspect condition of brake magnet for damage or incorrect installation.</li> </ol>						
	Inspect condition of brake magnet cable shielding and wire.						
	Check the brake Magnet is correctly connected/plugged into wiring harness.						
Brake Magnet Service	4. Inspect condition of wiring from magnet connection to ECU for damage.						
Instructions	Check ground connection of brake magnet return wire. (Must have a common ground with ECU).						
	Repair/Resolve Actions						
	<ol> <li>Damaged wiring harness should be replaced or repaired correctly. Contact Dexter for questions about Tow Assist parts or service.</li> </ol>						
	2. Brake magnet should be replaced or installation corrected if fault persists.						
	<ol><li>If fault persists once brake magnet replaced and harness is confirmed, contact Dexter for assistance.</li></ol>						
	Check/Inspect						
	1. Inspect condition of wheel speed sensor for damage or incorrect installation.						
	2. Check the wheel speed sensor is mounted securely.						
	3. Inspect condition of tone wheel for damage or missing teeth.						
Speed Sensor Service	4. Check tolerance between tone wheel and wheel speed sensor.						
	5. Check if wheel speed sensor is correctly plugged into wiring harness.						
Instructions	6. Inspect condition of wiring from wheel speed sensor to ECU for damage.						
	Repair/Resolve Actions						
	Damaged wiring harness should be replaced or repaired correctly. Contact Dexter for questions about Tow Assist parts or service.						
	2. Wheel speed sensor should be replaced or installation corrected.						
	3. Hub Drum should be replaced or repaired if damage is found.						
	<ol> <li>If fault persists once wheel speed sensor replaced and harness is confirmed, contact Dexter for assistance.</li> </ol>						
	Check/Inspect						
	1. Check power supply voltage while charging.						
	2. Check power supply voltage when not being charged.						
	3. Check wiring and connection between the power supply and the ECU						
Power Supply Service	Repair/Resolve Actions						
Instructions	<ol> <li>Charge power supply to a good service level and check power supply response under heavy braking (100% Manual Override).</li> </ol>						
	<ol><li>Ensure power supply is charged from tow vehicle and all power connections are of sufficient power capacity.</li></ol>						
	3. Ensure power supply is rated sufficiently to support all power load on trailer.						
	4. Replace power supply with new batteries if unable to maintain suitable power supply level.						



# **Reference**Light Module Operations

	Light State	System Status	Possible Causes	Driver Action
DEXTER	All light Off	ECU Powered Off/ Sleep/ No Brake Signal	System has no power or has gone into sleep mode.	Connect power to system, press brake pedal, press brake controller manual override.
DEXTER (a) (b) (c) (c) (c) (c) (c) (c) (c) (c) (c) (c	Operations light On Low Intensity Warning light Off	Full System Available (Pass-through Braking)	System is in full operation and brake signal has been detected.	No action necessary by driver.
OEXTER (b)	Operations light On High Intensity Warning light Off	Full System Available	System is in full operation and ABS, TSM, or LCC control is operating.	No action necessary by driver. The high intensity light will return to low intensity about 3 seconds after a ABS or sway event concludes
DEXTER	Operations light On Low Intensity Warning light On	Reduced System Available (Pass-through Braking)	System fault has occurred and the system can only offer reduced ABS, TSM, LCC control	Expect reduced operation from the system and adjust their driving/braking accordingly. Stop for 5 minutes, then carefully drive off and stop again. The system will then preform a self-check. If the warning light remains on, see troubleshooting.
OEXTER ODEXTER	Operations light On High Intensity Warning light On	Reduced System Available (ABS / TSM / LCC active)	System is in reduced operation and ABS, TSM, or LCC control is operating	Expect reduced operation from the system and adjust their driving/braking accordingly. Stop for 5 minutes, then carefully drive off and stop again. The system will then preform a self-check. If the warning light remains on, see troubleshooting.
DEXTER DEXTER	Operations light Off Warning light On	System NOT Available (Pass-through Braking)	System fault has occurred and the system cannot offer any control (ABS, TSM, LCC).	Expect no operation from the system and adjust their driving/braking accordingly. Stop for 5 minutes, then carefully drive off and stop again. The system will then preform a self-check. If the warning light remains on, see troubleshooting.
DEXTER G	Operation light Intermittent Warning light On	Operation light Failed (System Available)	System is in full operation, however the green light has detected as faulty	System status can't be reliably reported to driver. Driver should expect no operation from the system and adjust their driving/braking accordingly. Stop for 5 minutes, allowing the system to preform a self-check. Read fault codes through the App. Repair or replace light module.
DEXTER DEXTER	Operations light Off Warning light Intermittent	Warning light Failed (System Available)	System is in full operation, however the amber light has been detected faulty	System status can't be reliably reported to driver. Driver should expect no operation from the system and adjust their driving/braking accordingly. Stop for 5 minutes, allowing the system to preform a self-check. Read fault codes through the App. Repair or replace light module.



## **Service Diagnostic Action**

DT Code	Fault Service Description	# Amber Flashes	# Green Flashes	Fault Service Detail
0561	Battery condition warning	2	1	
0562	Battery under voltage fault	2	1	Refer to the Power Supply Service Instructions on page 6.
0563	Battery over voltage	2	1	
				· Internal brake voltage reference plausibility fault
0564	ECU voltage reference plausibility fault	2	8	· Refer to the Brake Magnet Service Instructions and Power Supply Service Instructions on page 6.
4031	Front Axle, Left Wheel Speed Sensor Fault	1	2	· Locate the wheel speed sensor on front axle, left or right
4032	Front Axle, Left Wheel Tone Wheel or WSS Mount	5	2	wheel brake assembly backing plate.
4034	Front Axle, Right Wheel Speed Sensor Fault	1	3	· Refer to the Wheel Speed Sensor Service Instructions on
4035	Front Axle, Right Wheel Tone Wheel or WSS Mount	5	3	page 6.
4037	Rear Axle, Left Wheel Speed Sensor Fault	1	4	· Locate the wheel speed sensor on rear axle, left or right wheel
4038	Rear Axle, Left Wheel Tone Wheel or WSS Mount	5	4	brake assembly backing plate.
403A	Rear Axle, Right Wheel Speed Sensor Fault	1	5	· Refer to the Wheel Speed Sensor Service Instructions on
403B	Rear Axle, Right Wheel Tone Wheel or WSS Mount	5	5	page 6.
				Check/Inspect
4063	4063 Yaw Rate Measurement Fault	5	1	Check ECU mounting surface is rigid to ensure the ECU cannot be easily vibrated
4005			1	Check ECU mounting hardware to ensure ECU is securely mounted and is in the correct orientation
				Check ECU is protected from oncoming projectiles by the trailer frame or fitted shield
				Resolve/Repair
				Correct all ECU mounting issues and clear the faults
406A	ECU Inertia Sensor Fault	5	1	Preform a test drive to evaluate if problem has been resolved
				If fault persists, ECU should be returned to dealer for investigation
4091	Center Axle, Left Wheel Speed Sensor Fault	1	6	· Locate the wheel speed sensor on center axle, left or right
4092	Center Axle, Left Wheel Tone Wheel or WSS Mount	5	6	wheel brake assembly backing plate.
4094	Center Axle, Right Wheel Speed Sensor Fault	1	7	· Refer to the Wheel Speed Sensor Service Instructions on
4095	Center Axle, Right Wheel Tone Wheel or WSS Mount	5	7	page 6.
40B0	Front Axle, Left Wheel Brake Magnet Fault	2	2	· Locate the brake magnet within front axle, left wheel brake assembly.
				· Refer to the Brake Magnet Service Instructions on page 6.
40B1	Front Axle, Right Wheel Brake Magnet Fault	2	3	· Locate the brake magnet within front axle, right wheel brake assembly.
		<b></b>		· Refer to the Brake Magnet Service Instructions on page 6.
40B2	Rear Axle, Left Wheel Brake Magnet Fault	2	4	· Locate the brake magnet within rear axle, left or right wheel brake assembly.
40B3	Rear Axle, Right Wheel Brake Magnet Fault	2	5	· Refer to the Brake Magnet Service Instructions on page 6.



DT	Fault Service Description	# Amber	# Green	Fault Service Detail
Code	Table Golffide Bosonphon	Flashes	Flashes	Tault Gol vioo Botaii
40B4	Center Axle, Left Wheel Brake Magnet Fault	2	6	<ul> <li>Locate the brake magnet within center axle, left or right wheel brake assembly.</li> </ul>
40B5	Center Axle, Right Wheel Brake Magnet Fault	2	7	· Refer to the Brake Magnet Service Instructions on page 6.
				External simulated load function is enabled, but physical load not detected, possibly open circuit.  Check/Inspect
				Check if external simulation load is fitted to ECU.
40F1	External Simulated Load Fault	2	9	Check connections and wiring between the simulated load and ECU.
				Resolve/Repair
				<ol> <li>Repair any connection or wiring between ECU and external simulation load.</li> </ol>
				Light module failure, system has detected a fault with the operational light.
				Check/Inspect
	Operational light Fault			1. Check any connection of the ECU light module.
4218		No Lamp	No Lamp	<ol><li>Check connection and wiring between light module and the ECU.</li></ol>
				Resolve/Repair
				<ol> <li>Repair any connections or wiring between light module and ECU.</li> </ol>
				2. If fault persists, replace light module.
				Light module failure, system has detected a fault with the warning light
				Check/Inspect
				1. Check any connection of the ECU light module.
4226	Warning light Fault	No Lamp	No Lamp	<ol><li>Check connection and wiring between light module and the ECU.</li></ol>
				Resolve/Repair
				<ol> <li>Repair any connections or wiring between light module and ECU.</li> </ol>
	Trailer Factory Settings Not Programmed	3	1	Dealer programmable trailer variant settings are not entered correctly.
5000				Resolve/Repair
				<ol> <li>If fault persists, ECU should be returned for investigation.</li> </ol>
5050	Factory Mode Enabled	No Lamp	No Lamp	Non-Serviceable fault. Contact Dexter for investigation.

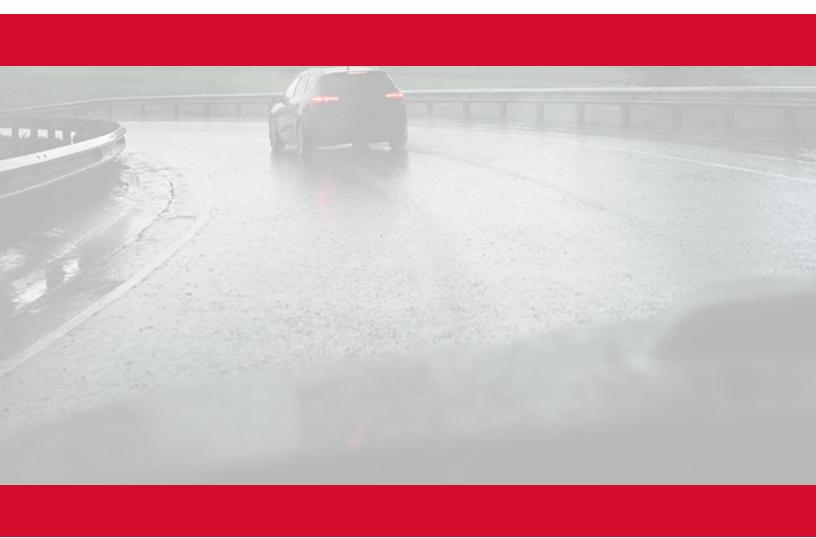


DT Code	Fault Service Description	# Amber Flashes	# Green Flashes	Fault Service Detail		
			8	ABS, TSM, or LCC system activation has detected as activating for an implausible amount of time.		
				Check/Inspect		
5091 General Wheel Speed Fault				Check ECU mounting for rigidity correct orientation and protection from oncoming projectiles.		
				<ol><li>Check wheel brakes and bearings for high friction components causing wheel rotation drag.</li></ol>		
	General Wheel Speed Fault	1		Resolve/Repair		
3031	deneral wheel Speed Fault	1		Correct all ECU mounting issues and clear faults.		
				Ensure all wheel bearings are running with minimal rolling resistance. Ensure all brake components are not causing rolling resistance when not actively Applied.		
				<ol> <li>Preform a test drive to evaluate if problem has been resolved.</li> </ol>		
			8	Fault detected with the wiring harness connection on the ECU.		
		3		Check/Inspect		
5200	Wiring Harness Feedback Fault			8	Check any new wiring connections made on the trailer to the brake assemblies.	
				Resolve/Repair		
				Review trailer electrical circuit for correctness and remove any incorrect wiring to brake magnet.		
		3	9	ECU internal brake service monitoring failure.		
				Check/Inspect		
	Service Brake Signal Plausibility Fault			Check electrical brake controller operations and wiring.		
5300				Check wiring and connection between electrical brake controller and ECU.		
				Resolve/Repair		
				<ol> <li>If fault persists, ECU should be returned for investigation.</li> </ol>		
	ECU Internal hardware Fault		8	Check/Inspect		
				<ol> <li>Check condition of ECU, it's mounting and wiring.</li> </ol>		
5137		5		Resolve/Repair		
				<ol> <li>If fault persists, ECU should be returned for investigation.</li> </ol>		

Note: All flash codes above represent active faults in the ECU system. If a fault has been set previously and has since healed, a history flash code will be available the same fault code as listed below with an additional 5 flash counts added to the Warning Flashes (e.g. Front Left Brake Magnet active fault flash code = 2 & 2, Front Left Brake Magnet history fault code = 7 & 2).

## **Notes**











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