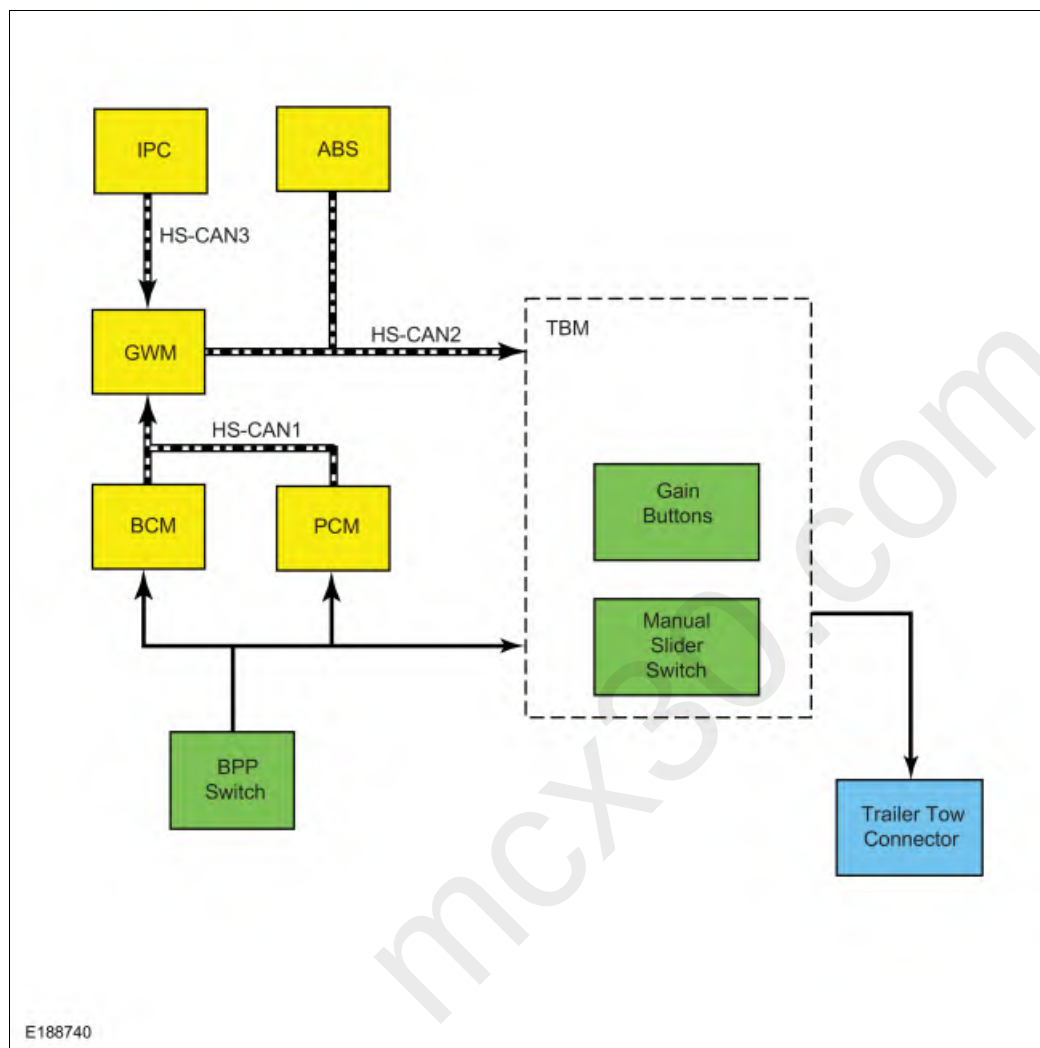


Auxiliary Brake System - Vehicles With: Trailer Brake Control - System Operation and Component Description

System Operation

System Diagram



Item	Description
1	HS-CAN3
2	HS-CAN2
3	HS-CAN1
4	IPC
5	GWM
6	PCM
7	ABS module
8	BCM
9	Trailer tow connector
10	BPP switch
11	TBM
12	Gain buttons

Network Message Chart

TBM Network Input Messages

Broadcast Message	Originating Module	Message Purpose
ABS active	ABS Module	When the TBM receives this message, it adjusts the PWM signal sent to the trailer brakes to aid in the ABS event.
ABS fault	ABS Module	Alerts the TBM of possible system failures in the ABS.
Adaptive cruise control brake torque	ABS Module	This message informs the TBM of the brake torque being requested by the CCM for adaptive cruise control operation.
Collision mitigation by braking precharge	ABS Module	This message is sent to the TBM when the ABS module is precharging the brake hydraulic system in preparation of a collision mitigation deceleration event.
Collision mitigation deceleration	ABS Module	This message is sent to the TBM when the ABS module is decelerating due to a collision mitigation deceleration event.
Driver brake pedal applied	ABS Module	Used to inform the TBM when the driver presses the brake pedal. The TBM uses this message to activate the trailer brakes.
Ignition status	BCM	This message is first sent to the GWM and then to the TBM. This message informs the TBM of the current ignition status; off, accessory, run, start, unknown or invalid.
Backlight LED status	BCM	This message is first sent to the GWM and then to the TBM. The TBM dims or brightens the display based on current driver selected dimming levels.
Powertrain torque status	PCM	This message is first sent to the GWM and then to the TBM. Provides the TBM with the status of the powertrain torque availability for a braking event.
Total requested brake torque	ABS Module	Provides the TBM with the amount of brake torque (in Newton-meters) being requested by the ABS module for a stability control event.
Trailer brake configuration	IPC	This message is first sent to the GWM and then to the TBM. This message informs the TBM of the current IPC configuration for trailer brake messages.
Trailer brake initial output request	BCM	This message is first sent to the GWM and then to the TBM. This message informs the TBM of the driver requested trailer brake output (null, light, medium or heavy) when setting up the trailer braking system.
Trailer braking percent request	ABS Module	This message communicates the trailer brake output request from the ABS module to the TBM during an ABS braking event.
Vehicle configuration data	BCM	This message is first sent to the GWM and then to the TBM. This message informs the TBM of the other vehicle configuration such as tire size, axle size, engine size, etc.
Vehicle longitudinal acceleration	ABS Module	This message provides the TBM with the current vehicle longitudinal acceleration data and notifies the TBM if the data is valid or invalid.
Vehicle speed	PCM	This message is first sent to the GWM and then to the TBM. This message informs the TBM of the current vehicle speed. The TBM adjusts the PWM signal sent to the trailer brakes in proportion to the current amount of vehicle deceleration.

Trailer Brake Control Function

The gain buttons set the TBM for specific towing conditions such as trailer load, vehicle load, road conditions and weather. The gain is normally set to provide maximum trailer braking while maintaining trailer stability. For information on setting the trailer brake gain, refer to the Owner's Literature.

The manual slider switch on the TBM activates the trailer brakes independently from the vehicle brakes. The manual slider is used in conjunction with the gain buttons during initial adjustment and setup of the trailer brakes. When the manual slider switch is activated with a trailer connected to

the vehicle, the trailer stoplamps and the vehicle stoplamps illuminate. Activating the manual slider switch without a trailer connected to the vehicle illuminates the vehicle stoplamps.

Once the driver sets the desired gain, the TBM monitors the CAN messages from the PCM, ABS module, BCM and IPC as well as the manual slider switch input to determine if trailer braking is necessary. If trailer braking is necessary, the TBM sends a PWM signal to the trailer to activate the trailer brakes.

TBM Wake Up

NOTE: *These conditions require a trailer not be connected to the trailer tow connector.*

The following conditions describe the normal operation of the TBM at start up.

When the ignition is set to the ON position and the manual lever is set all the way to the left with a gain of 10, the message center should display TRAILER DISCONNECTED. At the same time, with the vehicle stationary, battery voltage should be present at pin 3 of trailer tow connector [C4099](#).

When **not** braking the TBM sends a voltage pulse every 4 seconds to pin 3 of the trailer tow connector to determine if a trailer is connected to the trailer tow connector.

TBM Message Center Messages

The TBM continually monitors the trailer brake system operation and trailer connectivity. The TBM sends system operation information such as gain setting and relative braking power to other modules over the HS-CAN2. If a system fault or a trailer connectivity issue is detected, the TBM sends a message to the GWM along the HS-CAN2. The GWM sends this message to the IPC along the HS-CAN3. When the IPC receives a trailer brake message from the GWM, one or more of the following messages is displayed in the message center:

- **TRAILER BRAKE GAIN = XX.X NO TRAILER** â€“ Shows the current gain setting for the current ignition cycle and when adjusting the gain. This message also displays if the manual slider switch or gain buttons are used without a trailer connected.
- **TRAILER BRAKE MODULE FAULT** â€“ Displays in response to Diagnostic Trouble Codes (DTCs) reported by the TBM, accompanied by a single audible chime. When this message appears, the system may still function, but performance may be degraded.
- **TRAILER CONNECTED** â€“ Displays when the TBM detects a correct trailer wiring connection (a trailer with electric trailer brakes) during the current ignition cycle.
- **TRAILER DISCONNECTED** â€“ Displays when the TBM detects a trailer connection and then a disconnection, either intentional or unintentional, during the current ignition cycle, the display is accompanied by a single audible chime. This message also displays if a vehicle or trailer-wiring fault occurs causing the trailer to appear disconnected, or if the manual slider switch is activated without a trailer connected.
- **TRAILER WIRING FAULT** â€“ Displays when there is a short circuit on the TBM PWM output signal circuit. If the message is displayed and accompanied by a single audible chime, without a trailer connected, the concern is in the vehicle wiring. If the message only displays with a trailer connected, the concern is in the trailer wiring.

Component Description

TBM

The TBM is the ECU for the trailer brake system. The TBM monitors all sensor inputs and all HS-CAN messages relating to trailer braking and directly controls the trailer brakes using a PWM signal. Vehicle configuration information is sent to a new TBM from the BCM when the ignition is set to ON.
