

2018 BRAKES

Auxiliary Brake System - F150

DESCRIPTION AND OPERATION

AUXILIARY BRAKE SYSTEM - VEHICLES WITH: TRAILER BRAKE CONTROL - OVERVIEW

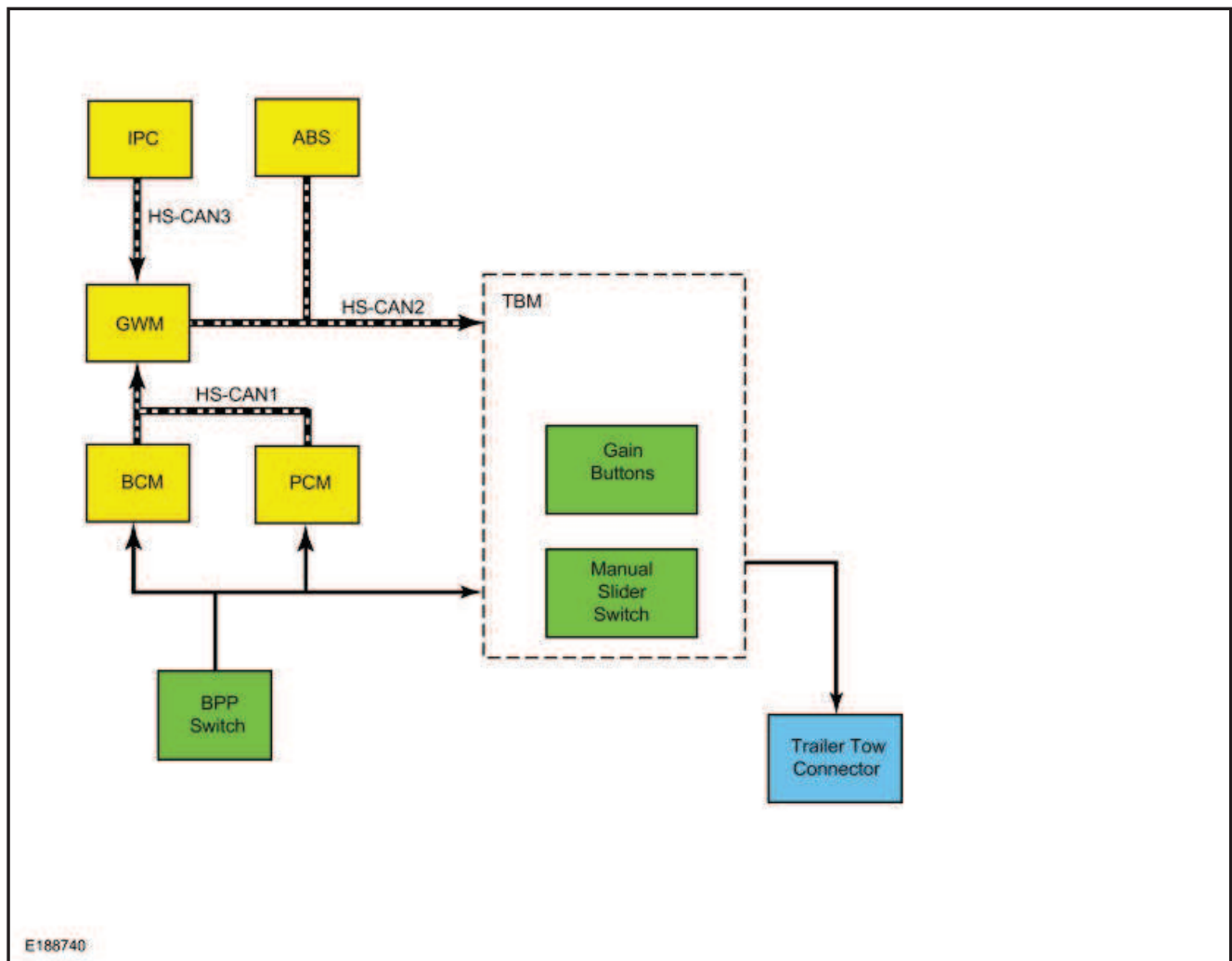
Trailer Brake Control

The trailer brake system uses an Electronic Control Unit (ECU) called the TBM to provide variable braking power to the electric-actuated brakes on a towed trailer (1 to 4 axles only). The braking energy provided to the trailer is modulated with a PWM signal that varies between 0 volt and battery voltage, the higher the duty cycle the more braking power available.

AUXILIARY BRAKE SYSTEM - VEHICLES WITH: TRAILER BRAKE CONTROL - SYSTEM OPERATION AND COMPONENT DESCRIPTION

System Operation

System Diagram



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.

Broadcast Message	Originating Module	Message Purpose
Brake on / off switch	PCM	Used to inform the TBM the driver has pressed the brake pedal. The TBM uses this message to activate the trailer brakes.
Illumination dimming level	BCM	The TBM dims or brightens the display based on current dimming levels.
Trailer brake configuration	IPC	This message informs the TBM of the current IPC configuration for trailer brake messages.
Trailer brake control request	ABS Module	This message communicates the trailer brake output request to the TBM during a trailer sway or other stability control braking event.
Vehicle configuration data	BCM	This message informs the TBM of the other vehicle configuration such as tire size, axle size, engine size, etc.
Vehicle speed	PCM	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 to adjust and set 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 still illuminates the vehicle stoplamps.

Once the driver sets the desired gain, the TBM monitors the HS-CAN messages from the PCM, ABS module and BCM 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 that 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 the IPC along the HS-CAN. 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 CONNECTED** - Displays when the TBM detects a correct trailer wiring connection (a trailer with electric trailer brakes) during the current ignition cycle.
- **TRAILER DISCONNECTED** - 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 BRAKE MODULE FAULT** - 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