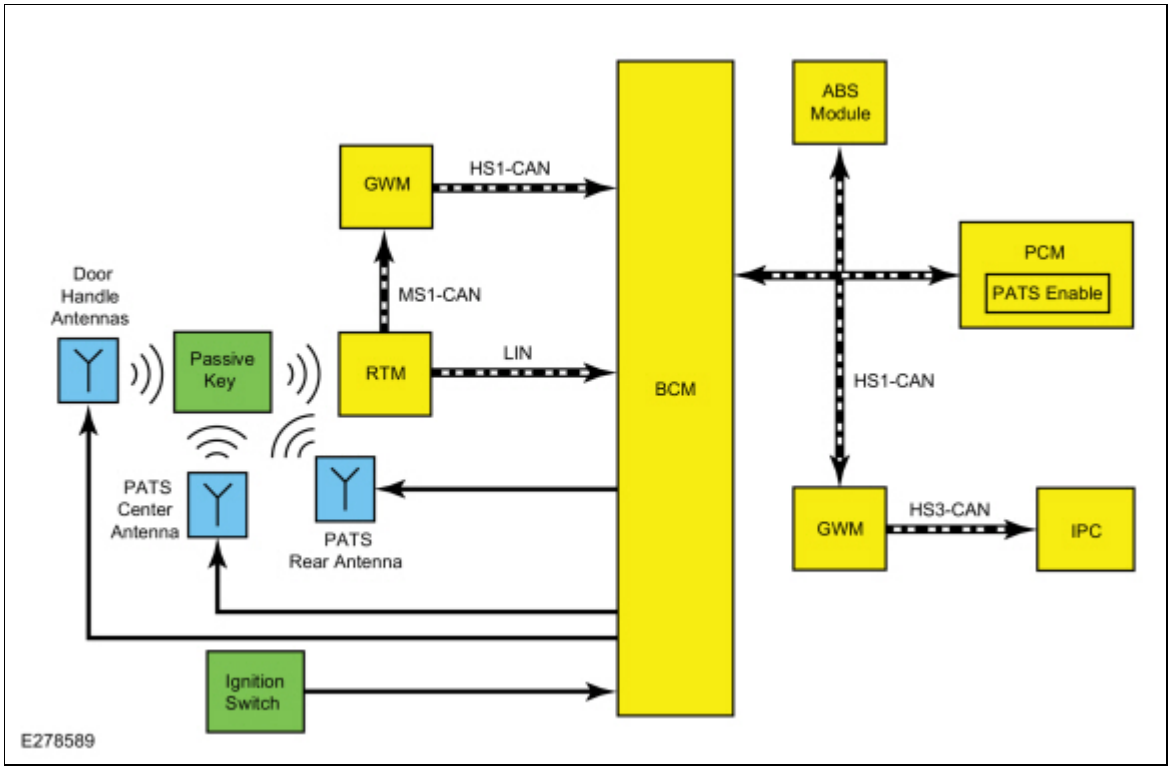
419-01C Passive Anti-Theft System (PATS) - Vehicles With: Keyless Vehicle System *2019 Ranger*

Description and Operation *Procedure revision date: 05/17/2018*

Passive Anti-Theft System (PATS) - System Operation and Component Description

System Operation

System Diagram



Network Message Chart

BCM Network Input Messages

Broadcast Message	Originating Module	Message Purpose
RKE data	RTM	The RTM sends the BCM programmed passive key information.
PATS start request target command	PCM	The PCM sends the BCM a challenge request for a valid ID.

IPC Network Input Messages

Broadcast Message	Originating Module	Message Purpose
Vehicle mode	BCM	Used by the IPC to display No Key Detected when the START/STOP button is pressed and no programmed key is detected within the vehicle.
Ignition status	BCM	Used by the IPC to power up when the START/STOP button is pressed and a programmed key is detected within the vehicle or to power down when the request is to turn the vehicle off.

PCM Network Input Messages

Broadcast Message	Originating Module	Message Purpose
PATS control command	BCM	The response from the BCM supplying the PCM challenge ID. If the BCM ID response is incorrect, then PATS prevents the vehicle from starting.

ABS Module Network Input Messages

Broadcast Message	Originating Module	Message Purpose
Immobilizer target 1 function	PCM	The immobilizer subtarget function sends a response message to the challenge message from the PCM.

PATS

The PATS function is controlled by the BCM, the PCM and the ABS module.

When the START/STOP button is pressed, a signal is sent to the BCM. When the BCM detects the START/STOP button is pressed, it begins the key initialization sequence by activating the PATS center antenna, the PATS rear antenna and both exterior door handle keyless entry antennas. Each antenna transmits a low frequency signal with an approximate range of 1 m (3 ft). The passive key activates if it is within range of the antennas. The BCM is able to determine the passive key location (inside or outside the vehicle) based on the input from the antennas.

When the passive key activates, it sends the PATS identification code to the RTM via a high frequency signal. The RTM interprets the high frequency signal from the passive key and sends the information to the BCM over the LIN-based circuit.

If a valid programmed passive key is detected inside the vehicle, the BCM transitions the ignition out of off.

When the ignition transitions out of off and the modules initialize, the PCM sends a challenge request to the BCM and the ABS module. The BCM and the ABS module replies and if the correct identification is received, the PATS disables and allows the vehicle to start. If the PATS prevents the vehicle from starting, a DTC sets in one of the modules.

The PATS and the RKE system share operation of several components including the passive keys, the BCM and the RTM.

If there is a concern with any of these components, the PATS and the RKE system are both affected.

In the event of a no start, place a programmed passive key in the backup location to allow the vehicle to start. The PATS center antenna activates the passive key when the START/STOP button is pressed in the event the batteries are depleted within the passive key.

NOTE: *If available as a selection on the scan tool, the passive start feature is a programmable parameter and can be enabled/disabled. If the feature is disabled, the features to passively enter and start the vehicle are inoperative. To start the vehicle, the passive key must be placed in the backup starting location.*

The BCM controls the ignition modes and, in conjunction with the PCM, control the PATS.

For information on ignition states,
Refer to: Steering Wheel and Column Electrical Components - Overview (211-05 Steering Wheel and Column Electrical Components, Description and Operation).

PATS Parameter Identifications (PIDs)

In conjunction with Diagnostic Trouble Codes (DTCs), the PATS Parameter Identifications (PIDs) are a useful tool when diagnosing PATS concerns.

BCM PID Chart

Acronym	Name	Description
KEYS_PROGMD	Number of ignition key codes supported	Displays the number of keys currently programmed into the BCM.
MIN_KEYS_RQD	Minimum number of keys required	Minimum number of programmed keys required. This PID always reads 2.

PCM PID Chart

Acronym	Name	Description
PATSENABL	Vehicle enable status	Indicates if PATS allows the vehicle to be driven. Must read enabled for the vehicle to be driven.

Backup Starting

NOTE: *There are certain areas within the vehicle where the passive key may not be detected and the message center displays No Key Detected. If the passive key is in the far outside edges of the interior (such as in a door map pocket or above a sun visor), it may not be detected. Move the passive key to a different location and try to turn the ignition on.*

When the vehicle experiences a PATS condition, the No Key Detected message displays in the message

center when the START/STOP button is pressed.

In the event of one of these failures, place a programmed passive key in the backup location to allow the vehicle to start. When the START/STOP button is pressed, the PATS center antenna activates the passive key and the identification code is sent to the BCM. The passive key must be oriented correctly in the backup starting location.

Refer to the Owner Literature for the backup starting location.

No Key Detected Message

NOTE: *Some brands/types of mobile phone or laptop computer chargers may cause interference that could lead to a PATS concern if the passive key is within close proximity of the charger. If a concern is observed, move the passive key away from the charger and attempt to turn the ignition on.*

There are 2 scenarios in which the No Key Detected message displays in the message center.

The first is when the ignition is off, the START/STOP button is pressed and a programmed passive key is not detected inside the vehicle. If a component failure (such as a depleted passive key batteries) is causing the No Key Detected message to display, the backup starting method can be used.

The second scenario is when the vehicle ignition is on, the driver exits the vehicle with the programmed passive key and closes the door.

The BCM activates the PATS center antenna, the PATS rear antenna and both exterior door handle keyless entry antennas to search the inside of the vehicle for a passive key any time a door is opened and then closed with the ignition on and the first time each drive cycle the vehicle speed exceeds 15 km/h (9 mph). The No Key Detected message displays in the message center and the horn chirps twice when the ignition is on and a passive key is no longer detected inside the vehicle.

This strategy deters the passive key from being separated from an already running vehicle. If a passive key is no longer in the vehicle, the ignition remains on and the vehicle continues to operate. When the START/STOP button is pressed to turn the ignition off, the ignition can be restarted without a passive key present inside the vehicle for approximately 20 seconds. After 20 seconds have elapsed, a passive key must be present to transition the ignition out of off.

Component Description

Passive Key

The passive key incorporates both the PATS and the RKE transmitter functions in a single device. The passive key must be located inside the vehicle for the ignition to transition out of off and outside the vehicle for passive entry features. During key programming procedures, the PATS and the RKE transmitter of the passive key are both programmed into the BCM. Passive keys are programmed into the BCM using the passive key backup starting location. The vehicle accepts programming of up to 4 passive keys.

The passive key receives the low frequency signals from the PATS center antenna and the PATS rear antenna. When the passive key is activated by one of the low frequency signals, it sends out a high frequency signal that is received by the RTM. The passive key also contains a removable key blade that unlocks the driver door in the event of an electrical failure (such as a drained battery).

PATS Center Antenna

NOTE: *Some brands/types of mobile phone or laptop computer chargers may cause interference that could*

lead to a PATS concern if the passive key is within a few inches of the charger and the No Key Detected message displays in the message center. If a concern is observed, move the passive key away from the charger and attempt to transition the ignition on.

The PATS center antenna is wired to the BCM. When activated by the BCM, it transmits a low frequency signal that activates a passive key. This antenna serves a dual purpose in that it can detect a passive key in the backup starting location. The backup starting location is used to program passive keys and to detect a programmed passive key in the event the battery in the programmed passive key has failed.

When activated, the PATS center antenna sends out a low frequency signal with an approximate range of 1 m (3 ft). A valid programmed passive key must be within range for the PATS to recognize the key and allow the ignition to transition out of off.

If a passive key is placed in the far outside edges of the interior, such as above a sun visor or in a door map pocket, the vehicle can experience a PATS concern. If the passive key is located in one of these areas and there is a PATS concern, move the passive key out of the area and attempt to transition the ignition on. If the key is outside the range of the PATS center antenna and the PATS rear antenna when the START/STOP button is pressed, the No Key Detected message displays in the message center.

PATS Rear Antenna

NOTE: *Some brands/types of mobile phone or laptop computer chargers may cause interference that could lead to a PATS concern if the passive key is within a few inches of the charger and the No Key Detected message displays in the message center. If a concern is observed, move the passive key away from the charger and attempt to transition the ignition on.*

The PATS rear antenna is wired to the BCM. When activated by the BCM, it transmits a low frequency signal that activates a passive key.

When activated, the PATS rear antenna sends out a low frequency signal with an approximate range of 1 m (3 ft). A programmed passive key must be within range for the PATS to recognize the key and allow the ignition to transition out of off.

If a passive key is placed in the far outside edges of the interior, such as the far corners of the passenger compartment area, the vehicle can experience a PATS concern. If the passive key is located in one of these areas and there is a PATS concern, move the passive key out of the area and attempt to transition the ignition on. If the key is outside the range of the PATS rear antenna and the PATS center antenna when the START/STOP button is pressed, the No Key Detected message displays in the message center.

Exterior Front Door Handles

Each of the exterior front door handles contain a keyless entry antenna. The antennas are wired to the BCM. When activated by the BCM, the antenna transmits a low frequency signal with an approximate range of 1 m (3 ft) to activate a passive key.

If a passive key is placed in the far outside edges of the interior, such as the far corners of the luggage compartment area, the vehicle can experience a PATS concern. If the passive key is located in one of these areas and there is a PATS concern, move the passive key out of the area and attempt to transition the ignition on. If the key is determined by the BCM to be outside the vehicle or is outside the range of the antennas within the exterior front door handles, the PATS center antenna and the PATS rear antenna when the START/STOP button is pressed, the No Key Detected message displays in the message center.

BCM

If the BCM is replaced, program at least 2 keys and perform the parameter reset procedure.

PMI is required when the BCM is replaced.

PCM

When the PCM is replaced, perform the parameter reset procedure. There is no need to program keys if the PCM is replaced.

PMI is required when the PCM is replaced.

ABS Module

When the ABS module is replaced, perform the parameter reset procedure. There is no need to program keys if the ABS module is replaced.

PMI is required when the ABS module is replaced.