Component Procedures: Cruise Control

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Component Procedures: Cruise Control

Parts and Labor (itype_189)

Labor

Operation	Qualifier Path	Skill	Std Hrs	Wty Hrs
Remove & Replace	Cruise Control > Engagement Switch, R&R	B	0.5	0.0
Diagnosis	Cruise Control > System, Diagnosis	B	0.5	0.0

Cruise Control (Article 11062)

Cruise control is a speed control system that maintains a desired vehicle speed under normal driving conditions at speeds above 40 km/h (25 mph). Steep grades may cause variations in the selected vehicle speeds.
The following are the main components of the Cruise Control System:
- The accelerator pedal
- The brake pedal position (BPP) sensor
- The body control module (BCM)
- The cruise on/off switch
- The cruise control cancel switch
- The + RES switch (equivalent to resume/accelerate switch)
- The – SET switch (equivalent to set/coast switch)
- The engine control module (ECM)
- The throttle actuator control (TAC) motor (gasoline engines only)
- The vehicle speed sensor

The body control module (BCM) monitors the signal circuit of the cruise control switch es, which are located on the steering wheel. The BCM relays the cruise control switch status to the engine control module (ECM) via the serial data circuit. The ECM uses the status of the cruise control switch to determine when to capture and maintain the vehicle speed. The ECM monitors the vehicle speed signal circuit in order to determine the desired vehicle speed.
Voltage is supplied to the cruise control switch via the steering wheel control switch reference voltage circuit supplied by the BCM. The cruise control function switches are arranged in a resistive ladder design, with each cruise control function switch having a different resistance value. The BCM detects a specific voltage value that is associated with the cruise control function switch being activated. The BCM sends a serial data message to the ECM indicating that the on/off switch is active. Similarly, when the normally open + RES switch or the normally open – SET switch are pressed, the switch closes and the BCM detects the predetermined voltage signal on the cruise control resume/accel and set/coast switch signal circuit. The BCM sends a serial data message to the ECM indicating that the + RES switch or the – SET switch is active.
Cruise Control Engaged
The Cruise Control System will engage and adjust vehicle speeds, based on the activation of the following cruise control switches, which are located on the steering wheel:
- On/Off
- + RES
- – SET

To engage the Cruise Control System, ensure that the vehicle speed is above 40.2 km/h (25 mph), turn the cruise On/Off switch ON and momentarily press the – SET switch. The ECM will engage the Cruise Control System and record the vehicle speed. The ECM sends a serial data message to the instrument panel cluster (IPC) in order to illuminate the Cruise Engaged indicator in the IPC. Refer to the vehicle owner’s manual for the location and operation of the cruise control On/Off indicators and driver information center (DIC) messages.
Pressing the accelerator pedal while the Cruise Control System is engaged, allows the driver to override the Cruise Control System in order to accelerate the vehicle beyond the current set vehicle speed. When the accelerator pedal is released, the vehicle will decelerate and resume the current set vehicle speed.
The driver can also override the current set vehicle speed via the – SET switch and the + RES switch. When the Cruise Control System is engaged, pressing and holding the – SET switch will allow the vehicle to decelerate from the current set vehicle speed without deactivating the Cruise Control System. When the – SET switch is released, the ECM will record the vehicle speed and maintain the vehicle speed as the new set vehicle speed.
When the Cruise Control System is engaged, momentarily pressing the – SET switch will allow the vehicle to decelerate at a vehicle specific calibratable increment, commonly 1 km/h or 1 mph, each time that the – SET is momentarily pressed, with a minimum vehicle speed of 38 km/h (24 mph). Refer to the vehicle Owner’s Manual for more information.
Pressing and holding the + RES switch, when the Cruise Control System is engaged, will allow the vehicle to

accelerate to a greater vehicle speed than the current set vehicle speed. When the + RES switch is released, the ECM will record the vehicle speed and maintain the vehicle speed as the new set vehicle speed. When the Cruise Control System is engaged, momentarily pressing the + RES switch will allow the vehicle to accelerate at a vehicle specific calibratable increment, commonly 1 km/h or 1 mph, each time that the + RES switch is momentarily pressed. Momentarily activating the + RES switch will recall the previous vehicle speed, after the cruise control system has been disengaged by pressing the brake pedal, or CANCEL switch. Refer to the vehicle Owner's Manual for more information.

Cruise Control Disengaged

The engine control module (ECM) disengages the cruise control operation based on the signals from the following switches:

- The On/Off switch

The Cruise Control System will disengage when the brake pedal is applied. The body control module (BCM) monitors the BPP sensor via the BPP sensor signal circuit as the voltage signal increases while the pedal is further applied. The ECM monitors the BPP signal through a discrete input and a serial data message signal from the BCM indicating the brake status. When either signal indicates the brake pedal is applied, the ECM will disengage the cruise control system.

The Cruise Control System will also disengage when the cruise control on/off switch is switched OFF, or the cruise control cancel switch is activated. The body control module (BCM) determines when the cruise control cancel switch is activated. When the normally open cancel switch is closed, the BCM detects the predetermined voltage signal on the cruise control function switch circuit. The vehicle speed stored in the memory of the engine control module will be erased when the cruise control On/Off switch is turned OFF, or the ignition switch is turned OFF. The BCM sends a serial data message to the ECM in order to disengage the cruise control system. When the Cruise Control System has been disengaged, the ECM sends a serial message to the instrument panel cluster (IPC) in order to turn OFF the Cruise Engaged indicator.

Every time the Cruise Control System is disengaged, the ECM will keep track of the reason for system disengagement. The last 8 disengagement reasons will be recorded within the ECM memory. The scan tool will display the last 8 Cruise Disengage History parameters, in which one out of approximately 50 possible reasons will be displayed in each of these 8 parameters. For the disengagement reason to be displayed within the scan tool parameter the Cruise Control System is active and disengagement is requested.

When engagement of the system is requested but an engagement inhibit is present, the most recent inhibit reason is recorded in the ECM history. The scan tool will display the most recent inhibit reason, in which one out of approximately 50 possible reasons will be displayed.

Cruise Control Inhibited

The engine control module (ECM) inhibits the cruise control operation when any of the following conditions exist:

- The ECM has not detected a brake pedal activation from the body control module (BCM) this ignition cycle.
- A Cruise Control System DTC has been set.
- The vehicle speed is less than 38.6 km/h (24 mph).
- The vehicle speed is too high.
- The vehicle is in PARK, REVERSE, NEUTRAL, or 1st gear.
- The engine RPM is low.
- The engine RPM is high.
- The system voltage is not between 9 volts and 16 volts.
- The Antilock Brake System (ABS)/Traction Control System (TCS) is active for more than a calibratable time (typically 0.3 to 0.7 seconds).

Cruise Control Inhibit Reasons

This is a general list of inhibit reasons. Not every inhibit reason is applicable to all vehicles. Refer to the scan tool inhibit reason list for the last 8 reasons that have been recorded during the current ignition cycle.

Scan Tool Name Description Long Description

Acceleration Rate too High High acceleration The vehicle acceleration rate is too high.

TRAILER BRAKES APPLIED Trailer brakes applied The trailer brake system has been activated.

Acceleration Time Rate limiting fault Cruise torque request rate limiting active too long.

Adaptive Cruise Control Configuration Incorrect Adaptive cruise control option mismatch The cruise control type (adaptive cruise or conventional cruise) is mismatched between the engine control module (ECM) and the body control module (BCM).

Antilock Braking System Active Antilock Braking System Active The antilock braking system was active. Only reported on enhanced cruise control vehicles.

Automatic Braking Engine Torque Request Signal Communication Malfunction Automatic braking engine torque request signal communication malfunction An engine control module to electronic brake control module (EBCM)

serial data fault is active or communication has been lost between the modules.
Automatic Braking Malfunction Brake system malfunction The electronic brake control module has detected a failure that does not allow automatic braking to be performed.
Axle Torque Serial Communication Malfunction Axle Torque Serial Communication Malfunction The adaptive cruise control is being inhibited by the ECM because a serial data signal timeout error has occurred with the hybrid max/min torque signals.
Battery Voltage Too High Voltage above high voltage threshold The ignition voltage is too high at the engine control module (typically 18 volts).
Battery Voltage Too Low Voltage below low voltage threshold The ignition voltage is low at the engine control module (typically 9 volts).
Brake Pedal Applied Brake pedal apply The brake pedal was applied.
Brake Pedal Not Initialized Brake before cruise The brake pedal has not been seen as applied prior to driver request to engage cruise with set switch. A brake pedal apply must be seen before allowing cruise engagement during each key cycle. On a vehicle equipped with a manual transmission, a clutch pedal apply may satisfy the brake pedal apply criteria.
Brake Pedal Position Malfunction Brake pedal position signal invalid A brake pedal apply circuit fault has been detected.
Brake Pedal Position Signal Malfunction DTC P0703 is active or maximum time elapsed without receiving a valid Brake Pedal Position signal. A serial data fault is active or communication has been lost with the module sending the brake pedal apply state.
Brake Pedal Pressure Detected Brake pedal driver applied pressure detected A brake pedal apply has been detected based on brake pedal pressure as measured by the electronic brake control module.
Brake Pedal Released Position Not Learned Brake apply sensor home position not learned The brake pedal position sensor released position is not learned.
Brake System Malfunction Adaptive cruise control automatic braking failed Adaptive cruise control automatic braking inoperative.
Calculated Torque Calculated engine torque The engine torque calculation is incorrect.
Clutch Pedal Applied Clutch switch active The clutch pedal was applied.
Coast Below Minimum Speed Coast below low speed inhibit The Set/Coast switch was depressed and the vehicle slowed below the minimum cruise control operating speed.
Coast Mode Coast disengage Cruise control is in coast mode with the Set/Coast switch depressed and is requesting no throttle.
Control Function Active DLC override A scan tool is plugged into the Data Link Connector (DLC) connector.
Control Module Memory Malfunction Memory failure A control module memory failure has been detected.
Control Module Processor Malfunction Processor integrity fault (random access memory corruption) An engine control module software error has occurred.
Crawl Mode Active Crawl Mode Active Crawl mode is active and inhibiting cruise control.
Cruise Control Cancel Switch Active Cancel switch active The cruise control cancel switch was depressed.
Cruise Control Software Malfunction Sequence of completion checks A cruise control software execution error has occurred.
Cruise Control Switch Inactive On/Off switch in Off state The cruise control On/Off switch is turned off.
Cruise Control Switch Invalid Analog cruise switch input out of range The cruise control switch voltage signal is in an invalid range.
Cruise Control Switch Serial Communication Malfunction Serial data fault (cruise switch serial communication fault) The cruise control switch serial data fault is active or communication has been lost with the module sending cruise control switch states.
Deceleration Rate Too High High deceleration The vehicle deceleration rate is too high.
Diagnostic Trouble Code (DTC) Set Malfunction in PCM/ECM (DTC active) A DTC is active or in history that inhibits cruise control operation.
Distance Sensing Cruise Control Brake Pedal Applied Distance Sensing Cruise Control Brake Pedal Applied Adaptive cruise control is being inhibited by the ECM because a brake pedal apply has occurred.
Distance Sensing Cruise Control Cancel Switch Active Distance Sensing Cruise Control Cancel Switch Active Adaptive cruise control is being inhibited by the ECM because the driver applied the cancel switch.
Distance Sensing Cruise Control Data Serial data fault for adaptive cruise control throttle control and brake control signals sent by the distance sensing cruise control module A distance sensing cruise control module serial data fault is active or communication has been lost between the distance sensing cruise control module and the engine control module.
Distance Sensing Cruise Control Inhibit Distance sensing cruise control inhibited The distance sensing cruise control system is inhibited.
Distance Sensing Cruise Control Invalid Engage Distance Sensing Cruise Control Invalid Engage Adaptive cruise

control is being inhibited by the ECM because an invalid sequence of cruise control applies, brake pedal applies, or an invalid speed range has been detected.
Distance Sensing Cruise Control Off Distance Sensing Cruise Control Off Adaptive cruise control is being inhibited by the ECM because the driver has turned off the cruise on/off switch.
Distance Sensing Cruise Control Reduced Engine Power Distance Sensing Cruise Control Reduced Engine Power Adaptive cruise control is being inhibited by the ECM due to a fault resulting in “Reduced Engine Power”.
Driven Wheel Speed Higher Than Non Driven Wheel Speed Driven wheel speed greater (wheel slip detection) The driven wheel speed is greater than the non driven wheel speed (slip detection).
Engine Control Module PCM/ECM inhibit (RAM corruption) Engine control module internal communication error.
Engine Control Module (ECM) Reset ECM running reset An engine control module running reset has occurred.
Engine Overspeed Protection Active Injectors disabled (engine overspeed fuel cut-off active) Engine RPM limiter active with fuel cut off active.
Engine Overtemperature Protection Active Engine metal overtemp active The engine is over temperature. The engine is overheated.
Engine Run Time Engine run time not elapsed The engine has not been running long enough, typically five seconds.
Engine Speed Engine speed too low or too high The engine RPM is too low (near stall) or too high (near engine RPM fuel shutoff).
Excessive Accelerator Position Override Pedal greater than cruise (override) The driver has overridden cruise control set speed with accelerator pedal for greater than an allowable time.
1st Gear First Gear Transmission is engaged in 1st gear.
Gear Change without Applied Clutch Pedal Manual transmission out of gear with no clutch pedal apply Manual transmission shifted to Neutral without clutch pedal being applied.
Hill Descent Control Active Hill Descent Control System Active The hill descent control system has gone active.
Hill Descent Control Serial Communication Malfunction Hill Descent Control Serial Communication Malfunction An electronic brake control module serial data fault is active or communication has been lost between the EBCM and ECM.
Hybrid/EV System Hybrid Cruise Disengage Cruise control is inhibited on hybrid applications when “Regen on Demand” is requested by the driver via the tap-up/tap-down paddles.
Illegal Mode Illegal cruise mode The cruise control mode is incorrect based on switch states.
Lane Center Control Serial Data Error Lane Center Control Serial Communication Malfunction Adaptive cruise control is being inhibited by the ECM because a serial data error has been detected on a vehicle with Lane Center Control.
Non Driven Wheel Speed Higher Than Drive Wheel Speed Non-driven wheel speed greater The non driven wheel speed is greater than the driven wheel speed.
None None This disengagement reason may be displayed after a dead battery repair or module replacement.
Park Brake Applied Park brake switch signal active The parking brake is applied.
Power Take-Off Active Power Take Off active The Power Take Off (PTO) system is active.
Rear Axle in Low Range Rear axle in low The rear axle is in low range.
Set/Coast and Resume/Accelerate Switches Active Simultaneously SET and RESUME switches simultaneously active The Set/Coast and Resume/Accelerate switches were pressed simultaneously.
Set/Coast Switch Active With Vehicle Speed Higher Than Set Point Over schedule tap-down The Set/Coast switch is selected, vehicle speed is above set speed and does not decrease. May be due to traveling down hill.
Speed Limiting/Warning System On Speed limiter/warning On/Off switch turned on Driver has turned on the Speed Limiter/Warning on/off switch. Cruise is disabled/inhibited and cruise on/off switch will be set to Off.
Throttle Actuator Control System Electronic throttle control prevents cruise operation The electronic throttle control system has detected a failure in the throttle control hardware.
Traction Control Active Traction control active The traction control system was active.
Traction Control System Malfunction Traction Control System Malfunction A fault is present in the traction control system.
Traction Control System Off Traction Control System Off The traction control system has been turned off by the driver.
Transfer Case in 4WD Low Range Transfer case in 4WD Low The transfer case is in low range.
Transmission Gear Ratio Malfunction Transmission gear fault A transmission DTC is active or in history, that inhibits cruise control operation.
Transmission Not in Forward Gear Transmission in neutral, reverse or park The transmission gear selector is not in a forward gear.
Vehicle Overspeed Protection Active MPH limited fuel (vehicle overspeed fuel cut-off active) The vehicle overspeed protection is active with fuel cut off active.

Vehicle Speed Higher Than Set Point Over schedule Vehicle speed has exceeded driver selected set speed by more than an allowable amount. This may occur while driving down a significant grade or driver overriding cruise while performing a passing maneuver.
Vehicle Speed Lower Than Set Point Under schedule The vehicle speed is below cruise control set speed by more than an allowable amount.
Vehicle Speed Too High Vehicle speed exceeds high speed threshold Vehicle speed has exceeded maximum cruise operating speed.
Vehicle Speed Too Low Vehicle speed drops below low speed threshold Vehicle speed dropped below the cruise control minimum operating speed. May be due to hilly terrain and low vehicle speed. Manual transmission gear selection and engine torque may contribute to this disengagement reason.
Vehicle Stability System Active Vehicle stability control active The vehicle stability control system was active.
Vehicle Stability System Malfunction Vehicle Stability System Malfunction A fault has been detected in the vehicle stability control system.
Vehicle Stability System Off Vehicle Stability System Off The vehicle stability control system has been turned off by the driver.

Cruise Control Schematics (Article 11083)

Figure 1: Cruise Control

Cruise Control (Article 11321)

Cruise Control

Symptoms - Cruise Control (Article 11081)

- Before using the symptom diagnostic table, perform the Diagnostic System Check - Vehicle in order to verify the following conditions:
- There are no DTCs set.
- The module can communicate via the serial data.
- Review the system operation in order to understand the system functions. Refer to Cruise Control Description and Operation .

Visual/Physical Inspection
- Inspect for aftermarket devices which can affect the operation of the Cruise Control System. Refer to Checking Aftermarket Accessories .
- Inspect the accessible system components or the visible system components for obvious damage or for obvious conditions which can cause the symptom.

Intermittent
Faulty electrical connections or wiring may be the cause of intermittent conditions. Refer to Testing for Intermittent Conditions and Poor Connections .

Symptom List
Refer to a symptom diagnostic procedure from the following list in order to diagnose the symptom:
- Cruise Control Malfunction - DTC B3794, P0564, P0565, P0567, P0568, P056C, P0580, P0581, P155A-P155C, or P162C
- Cruise Control Indicator Malfunction

Cruise Control Indicator Malfunction (Article 11063)

Diagnostic Instructions
- Perform the Diagnostic System Check - Vehicle prior to using this diagnostic procedure.
- Review Strategy Based Diagnosis for an overview of the diagnostic approach.
- Diagnostic Procedure Instructions provides an overview of each diagnostic category.

Circuit/System Description
The instrument cluster illuminates the cruise control engaged indicator based on serial data messages received from the engine control module (ECM). The indicator is commanded ON when the cruise control system is controlling vehicle speed, and turned OFF with the system disengaged.

Reference Information
Schematic Reference
Cruise Control Schematics
Connector End View Reference
Component Connector End Views

Description and Operation
Cruise Control Description and Operation
Electrical Information Reference
- Circuit Testing
- Connector Repairs
- Testing for Intermittent Conditions and Poor Connections
- Wiring Repairs
Scan Tool Reference
Control Module References for scan tool information

Circuit/System Verification

- Verify the cruise control indicator turns ON and OFF when commanding the All Indicators ON and OFF with a scan tool.
- If the indicator does not turn ON and OFF Replace the P16 Instrument Cluster.
- If the indicator turns ON and OFF
- All OK.

Repair Instructions

Perform the Diagnostic Repair Verification after completing the repair.
Control Module References for instrument cluster replacement, programming and setup.