

2022 Tundra New Technology



TECHNICAL
TRAINING

Overview

- Unit 1- Engine
- Unit 2- Body Systems
- Unit 3- Drivetrain
- Unit 4- Brakes and Suspension
- Unit 5- Multimedia System
- Unit 6- Advanced Driver Support System
- Unit 7- Hybrid Electric Vehicle System



Unit 1: V35A-FTS Engine

- Turbocharger System
- Engine Design
- Cooling Systems
- EVAP System



V35A-FTS

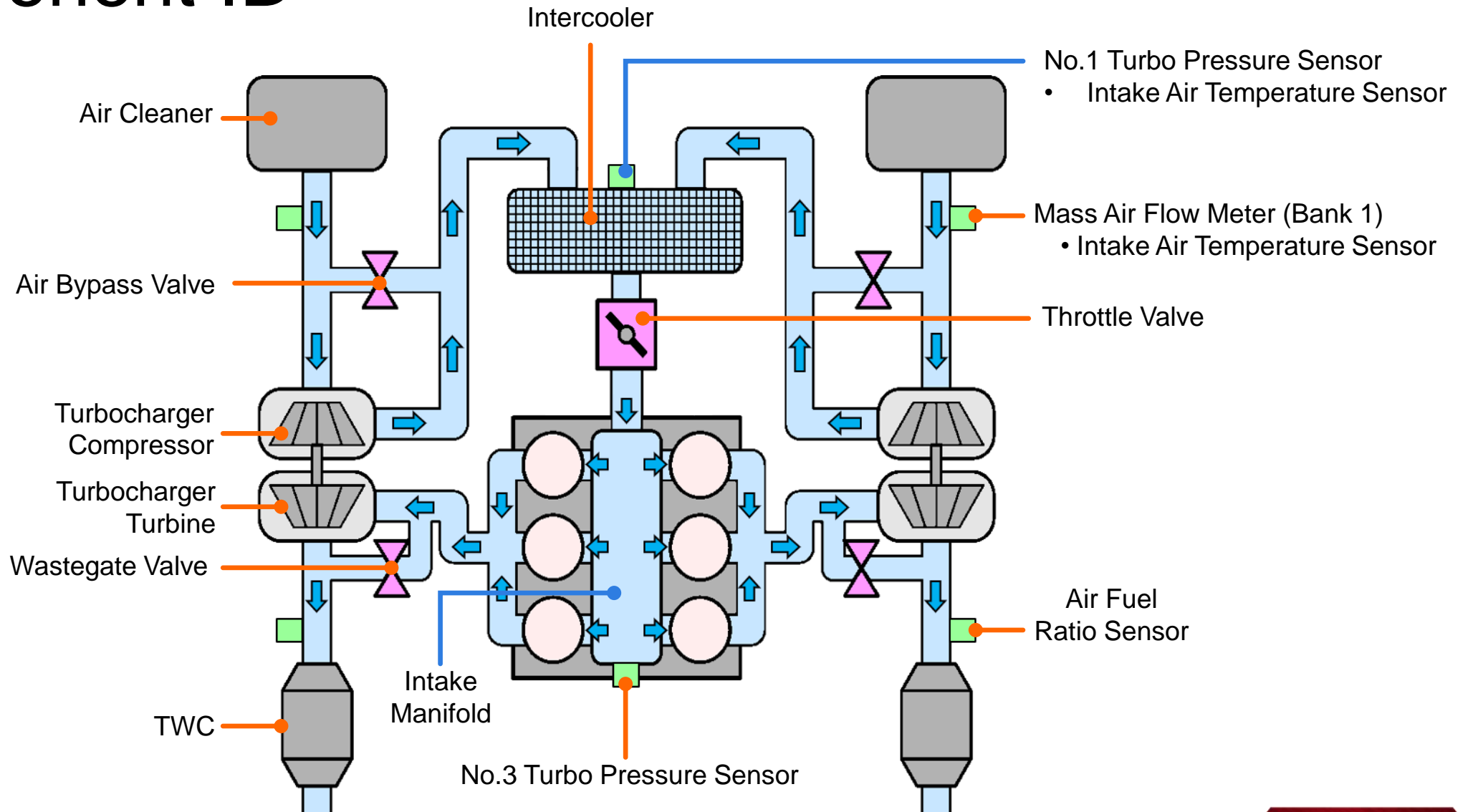


KEY NEW FEATURES:

- Twin Turbochargers
- Electronic Wastegate Control
- Liquid to Air Intercooler
- Dual air intakes
- Electronic Control Fan Coupling



Component ID

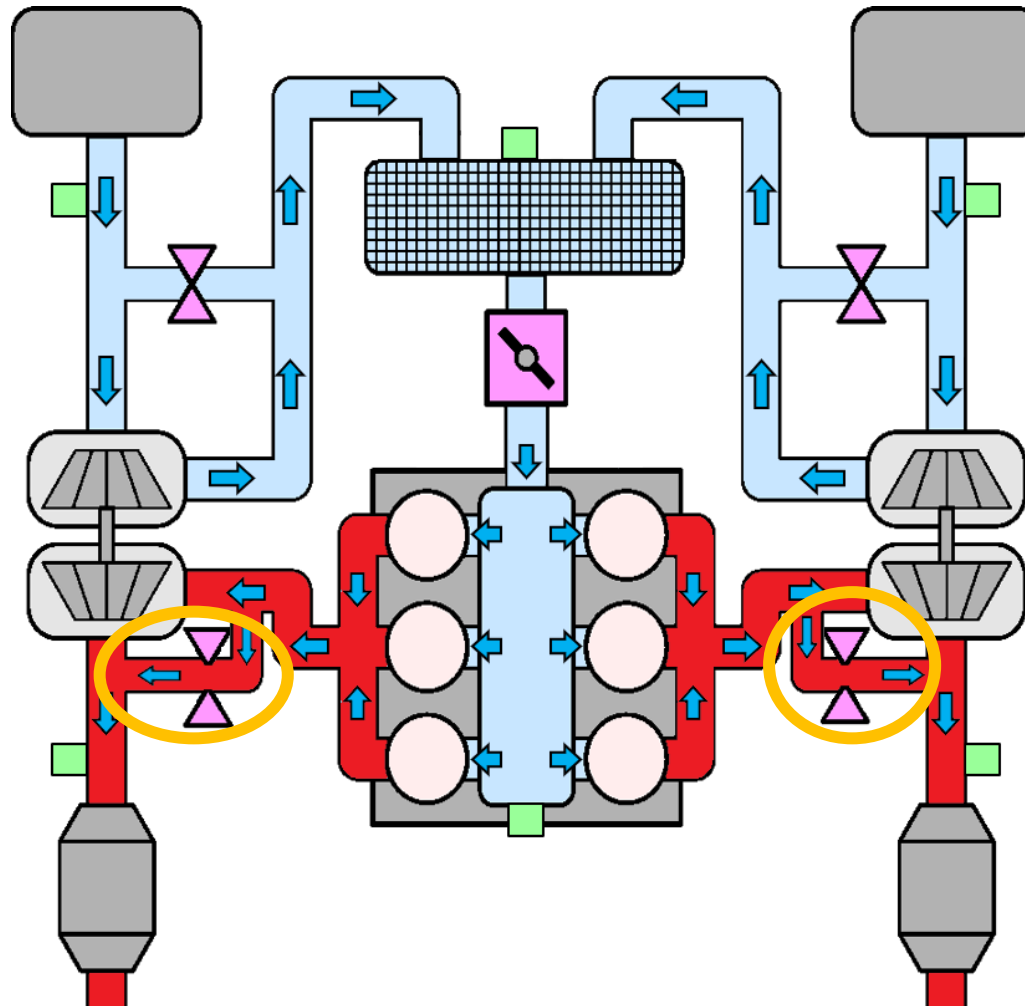


Turbocharging Operation - Non-Boosted

Operation: Non-boosted

Air Bypass: Closed

Wastegate: Open



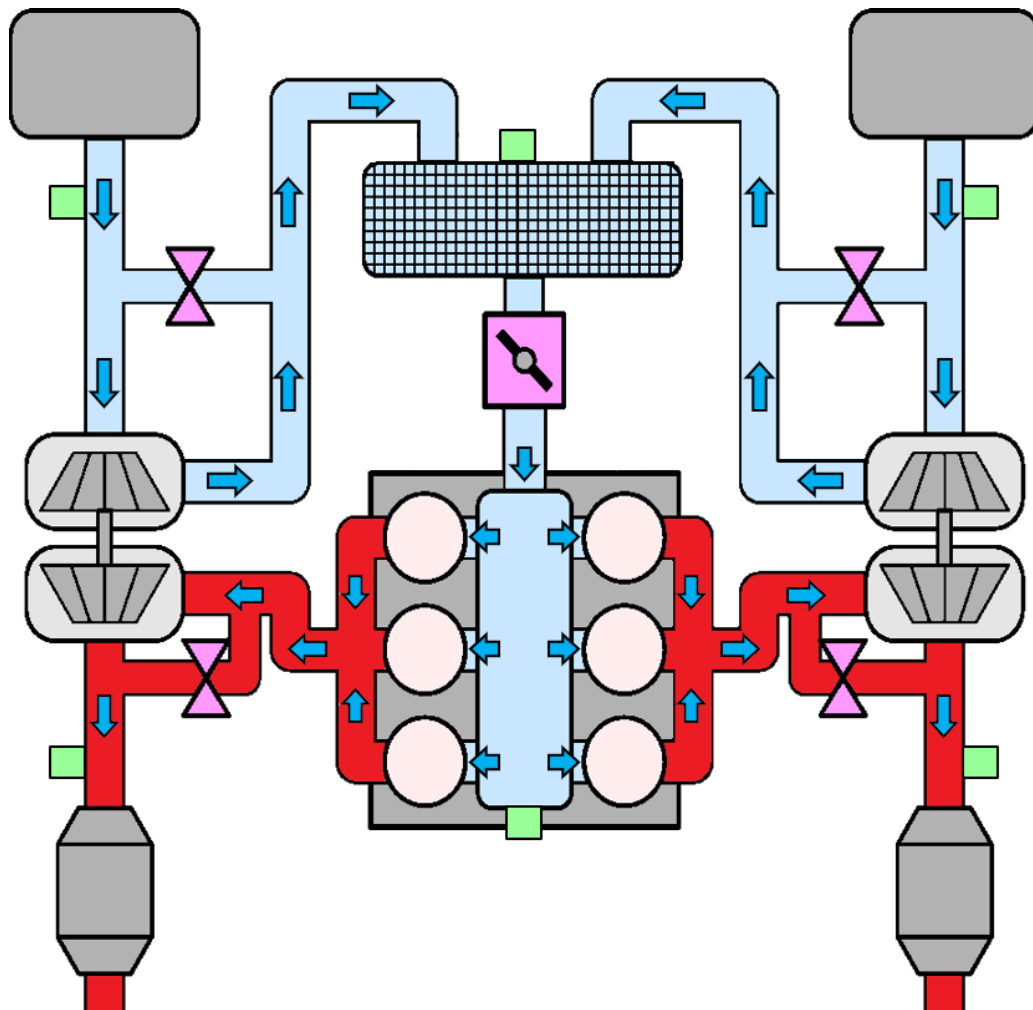
Use arrow keys to animate.

Turbocharging Operation - Boosted

Operation: **Boosted**

Air Bypass: **Closed**

Wastegate: **Closed**



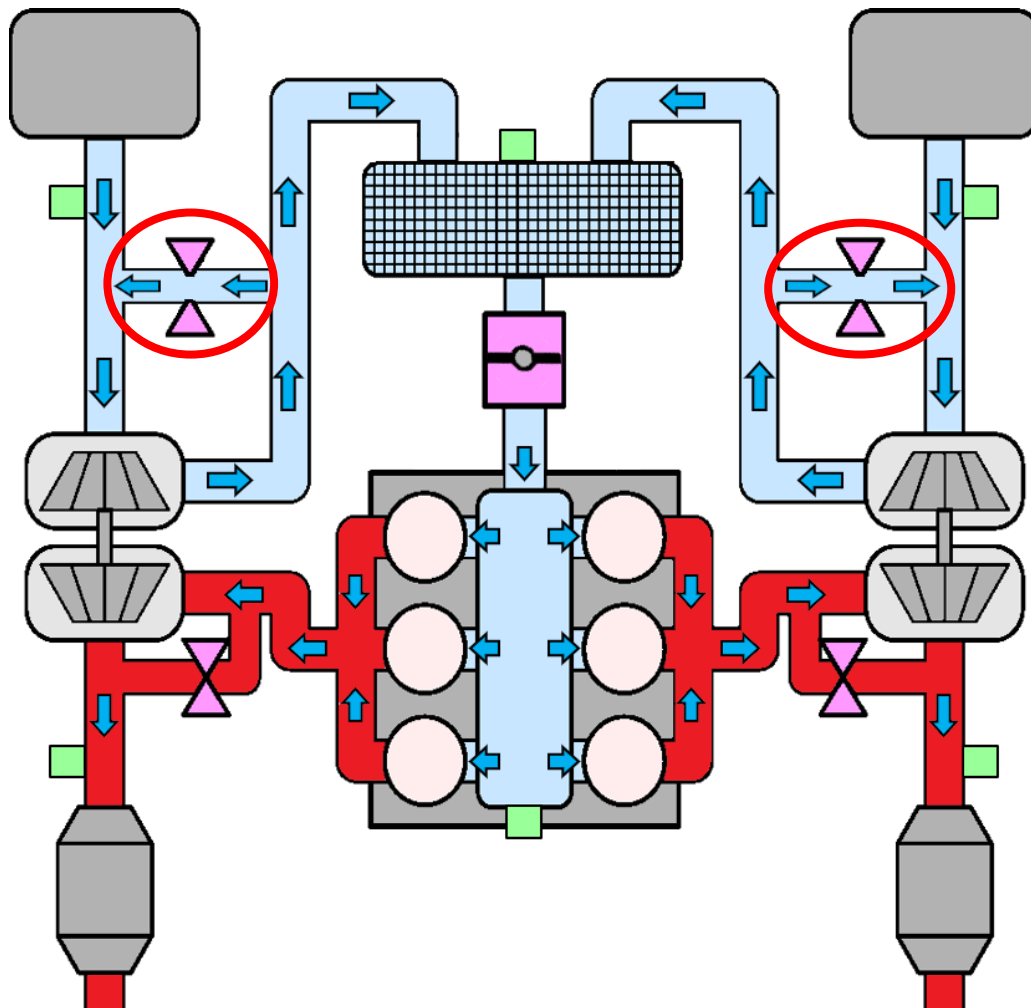
Use arrow keys to animate.

Turbocharging Operation - Bypass

Operation: **Bypass**

Air Bypass: **Open**

Wastegate: **Closed**

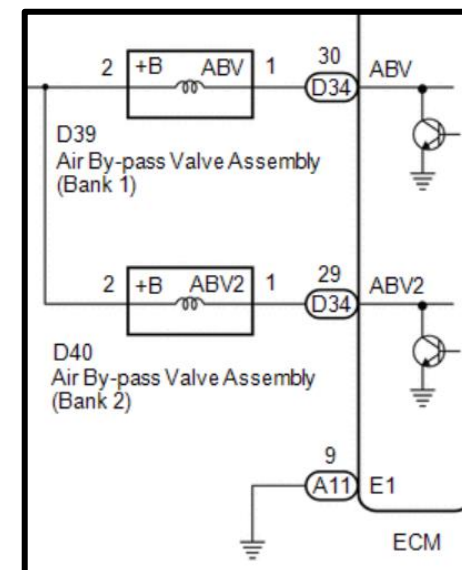
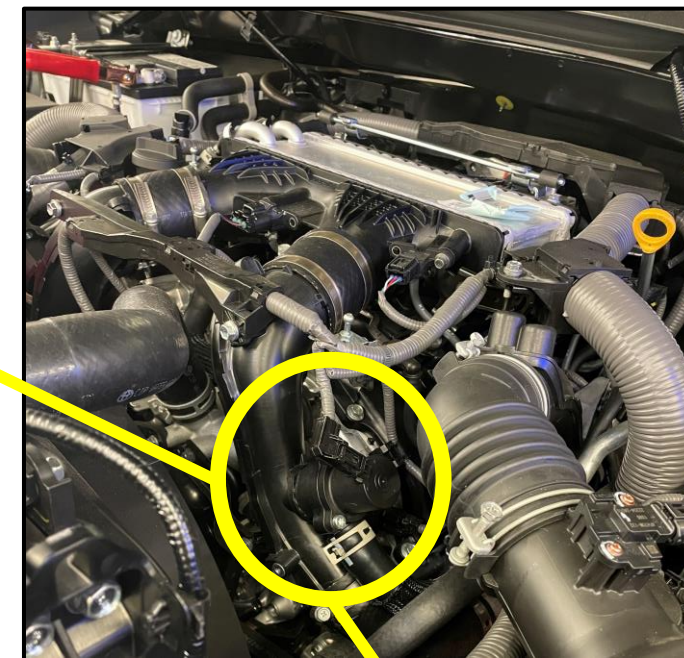
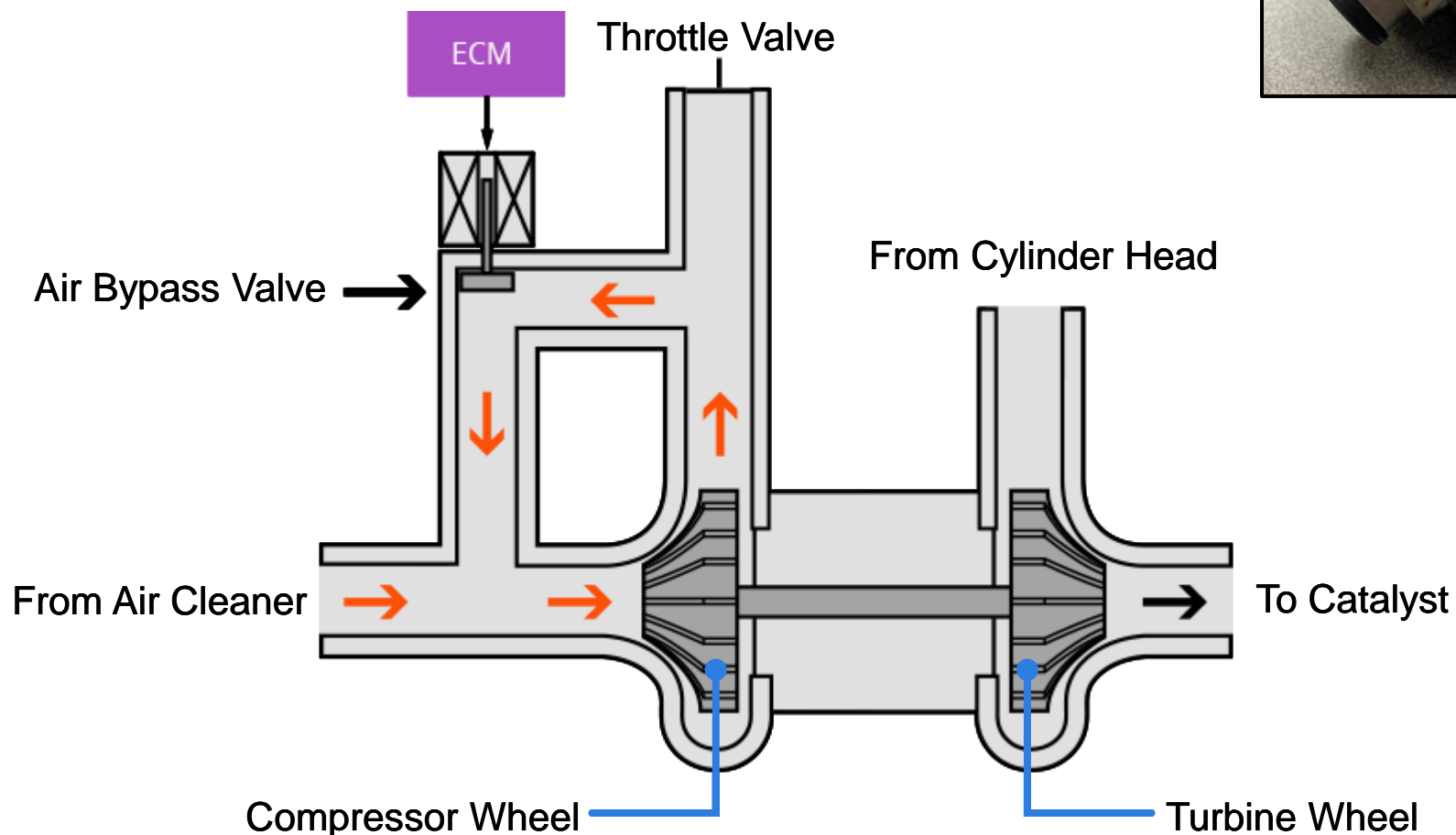


Use arrow keys to animate.

Bypass Valve Operation

During deceleration:

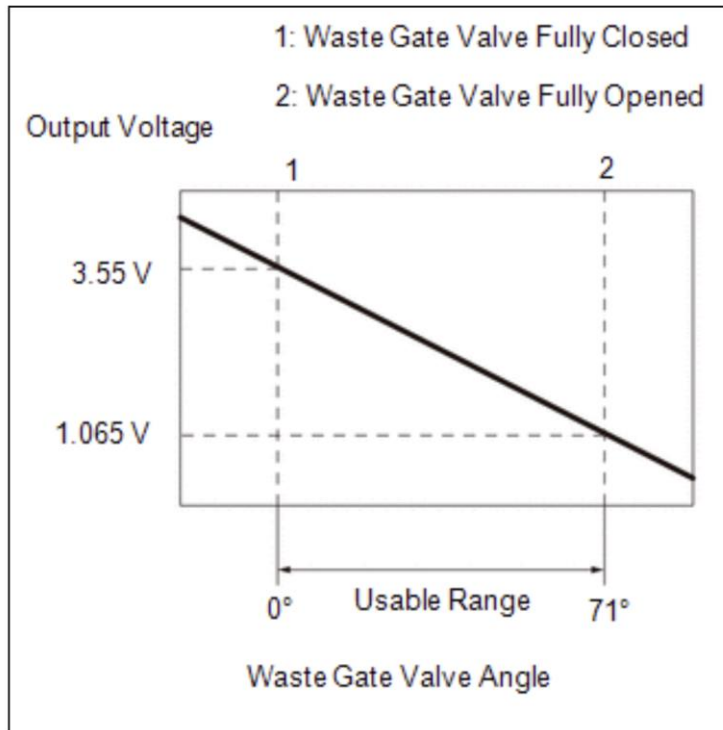
- Bypass valve open



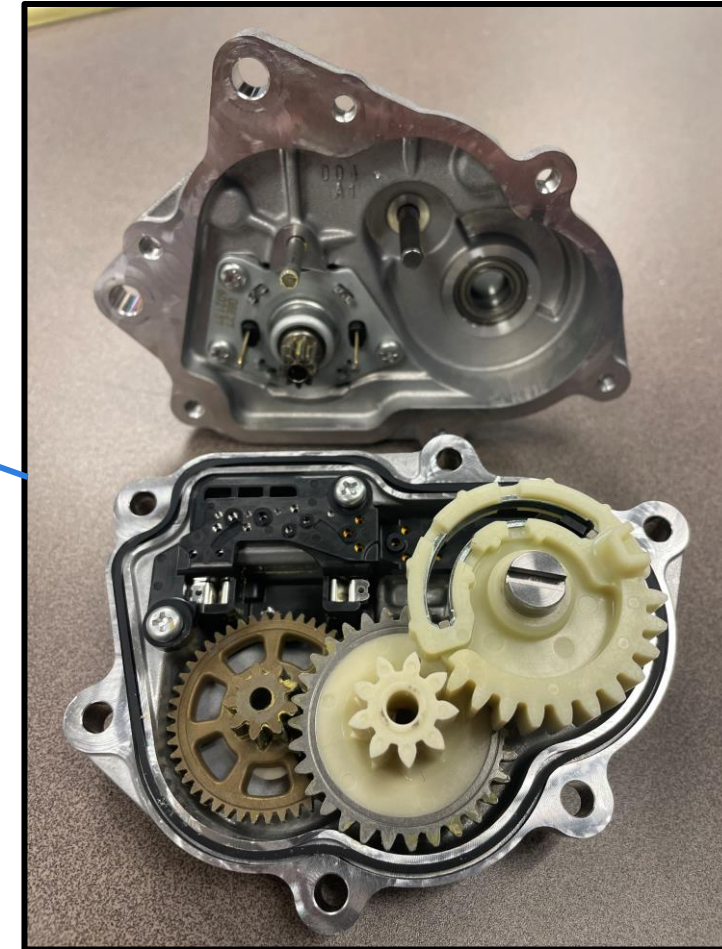
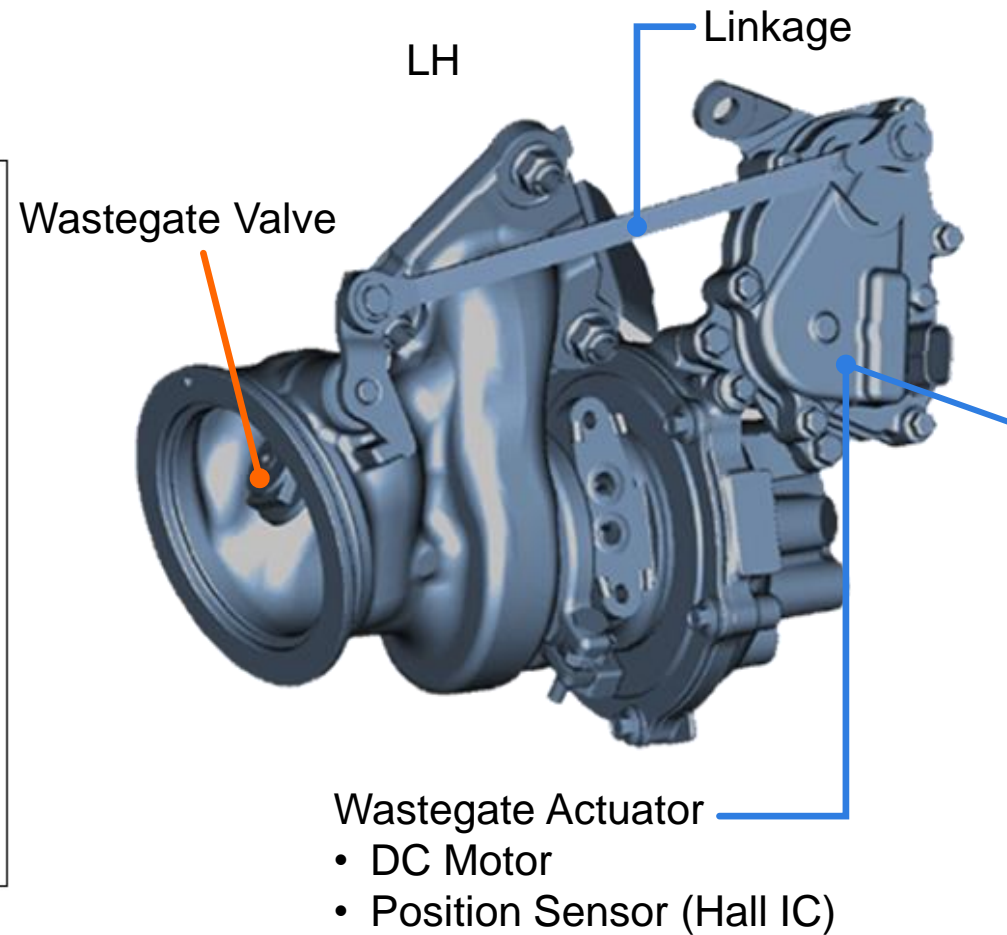
Use arrow keys to animate.

Wastegate Actuator Operation

- Duty Cycled Actuator
- Hall Effect Position Sensor



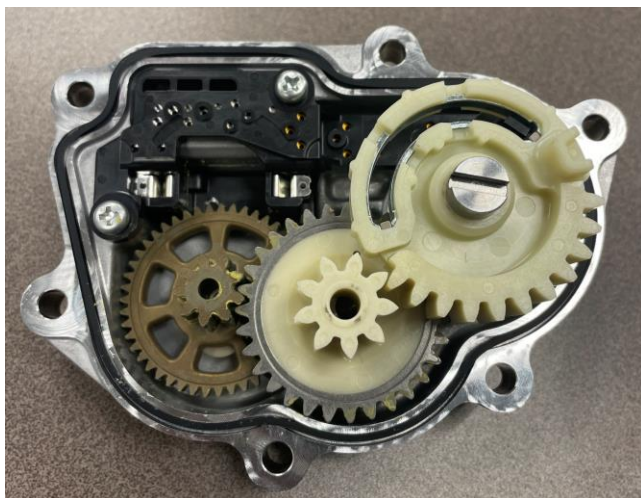
Position Sensor Signal



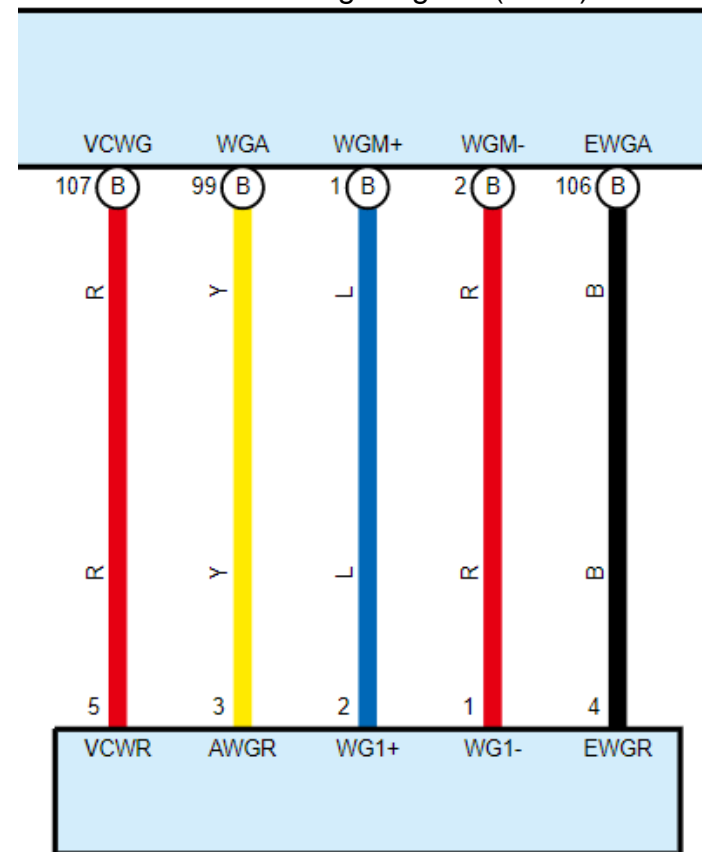
2022 Tundra Wastegate (Repair Manual)

Terminals of ECM:

D34-107 (VCWG) - D34-106 (EWGA)	Power source of waste gate valve position sensor (bank 1) (specific voltage)	Ignition switch ON	4.5 to 5.5 V
D34-99 (WGA) - D34-106 (EWGA)	Waste gate valve position sensor (bank 1) signal	Waste gate valve fully open (Engine stopped, ignition switch ON)	0.7 to 1.4 V
		Waste gate valve fully closed (During boost)	3.3 to 4.4 V
D34-1 (WGM+) - A11-9 (E1)	Waste gate valve actuator assembly (bank 1) operation signal	Waste gate valve actuator assembly (bank 1) operating	Pulse generation
D34-2 (WGM-) - A11-9 (E1)	Waste gate valve actuator assembly (bank 1) operation signal	Waste gate valve actuator assembly (bank 1) operating	Pulse generation



Electrical Wiring Diagram (EWD)



D43
No. 2 Turbocharger Sub-Assembly

Turbocharger Cooling

- Allow engine to idle in park
- Cools engine oil and turbocharger

■ Idling time before engine stop

To prevent damage to the turbocharger, allow the engine to idle immediately after high-speed driving or hill climbing.

To allow the engine to idle when the vehicle is stopped, disable the Stop & Start cancel switch. (→P.274)
(With the Stop & Start system enabled, the engine will be stopped by the Stop & Start system when the vehicle is stopped.)

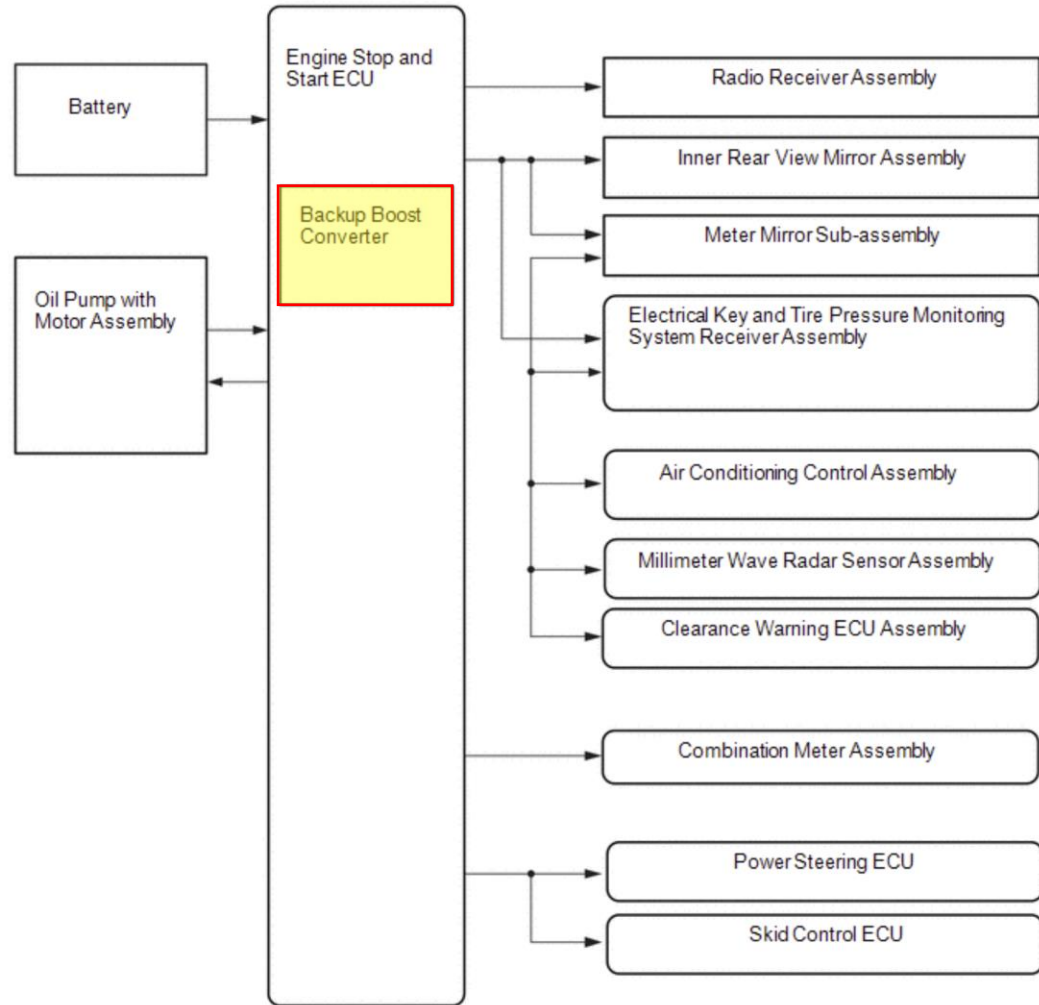
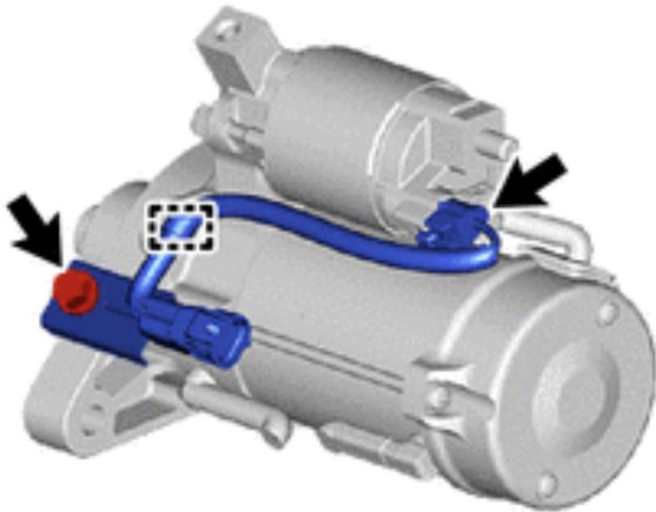
Driving condition	Idling time
Normal city driving	Not necessary
High-speed driving (Constant speed of approx. 50 mph [80 km/h])	Not necessary
Steep hill driving or continuous driving at 62 mph (100 km/h) or more (race track driving, etc.)	Approximately 1 minute

Owner's Manual Page 174

Stop/Start System – Non-Hybrid

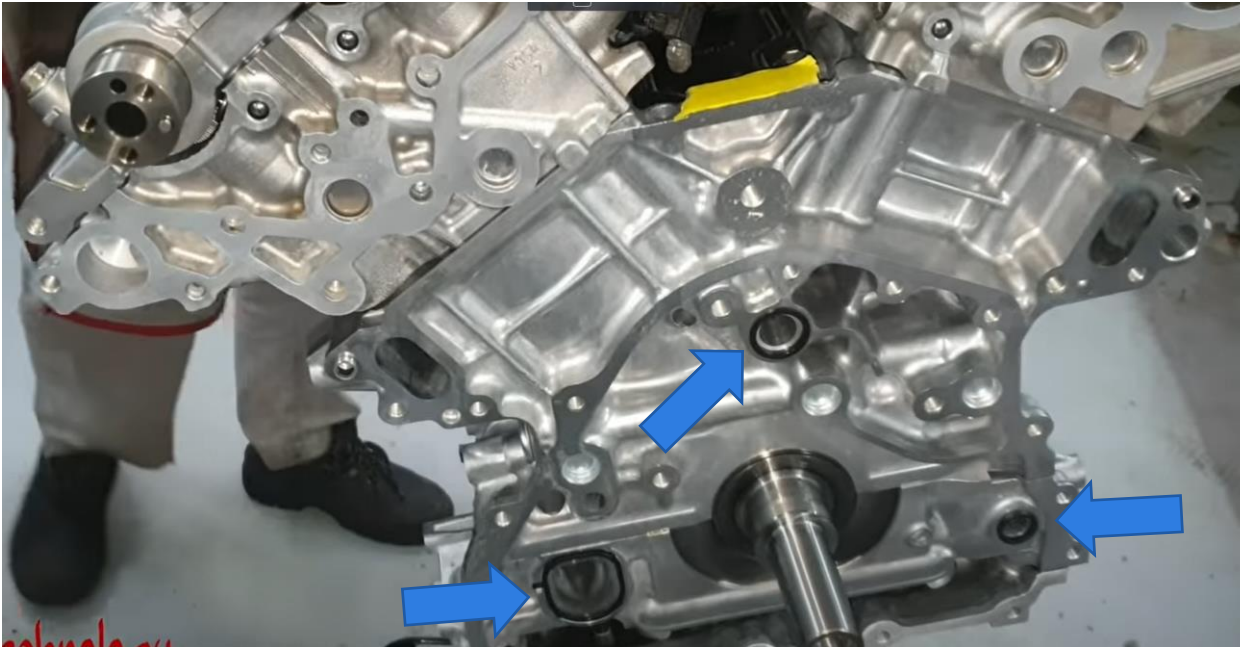
Planetary reduction type starter is used.

- Replace Starter if the data list parameter "Starter Operation" # is 384,000 or more
- Replace Engine Stop and Start ECU if "Starter Operation #" displays 1,000,000 or more

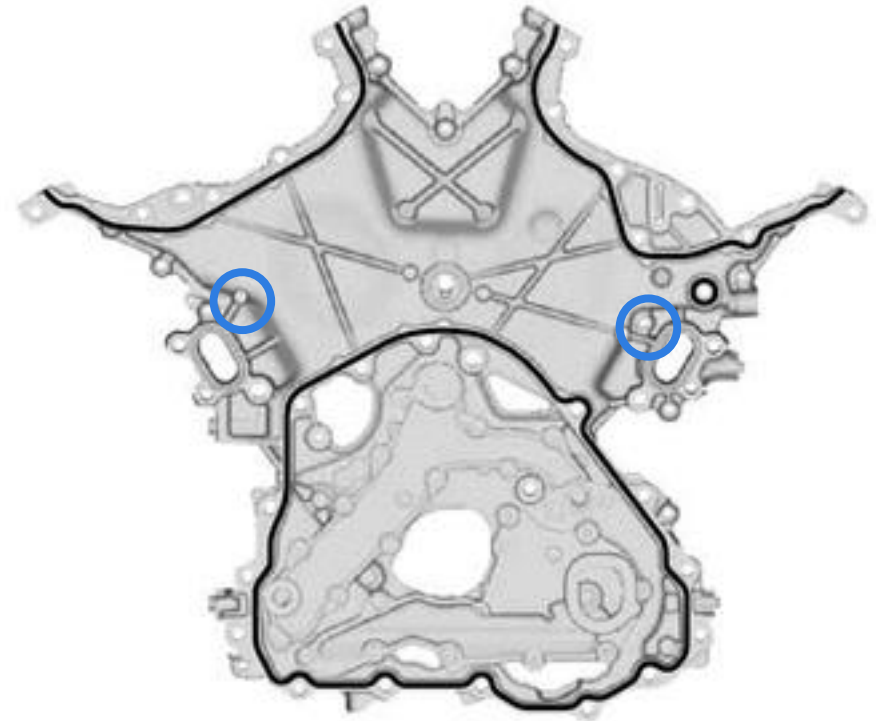


Timing Cover Sealing to Block

A 3.0mm to 3.5mm bead is used in all areas that require FIPG.

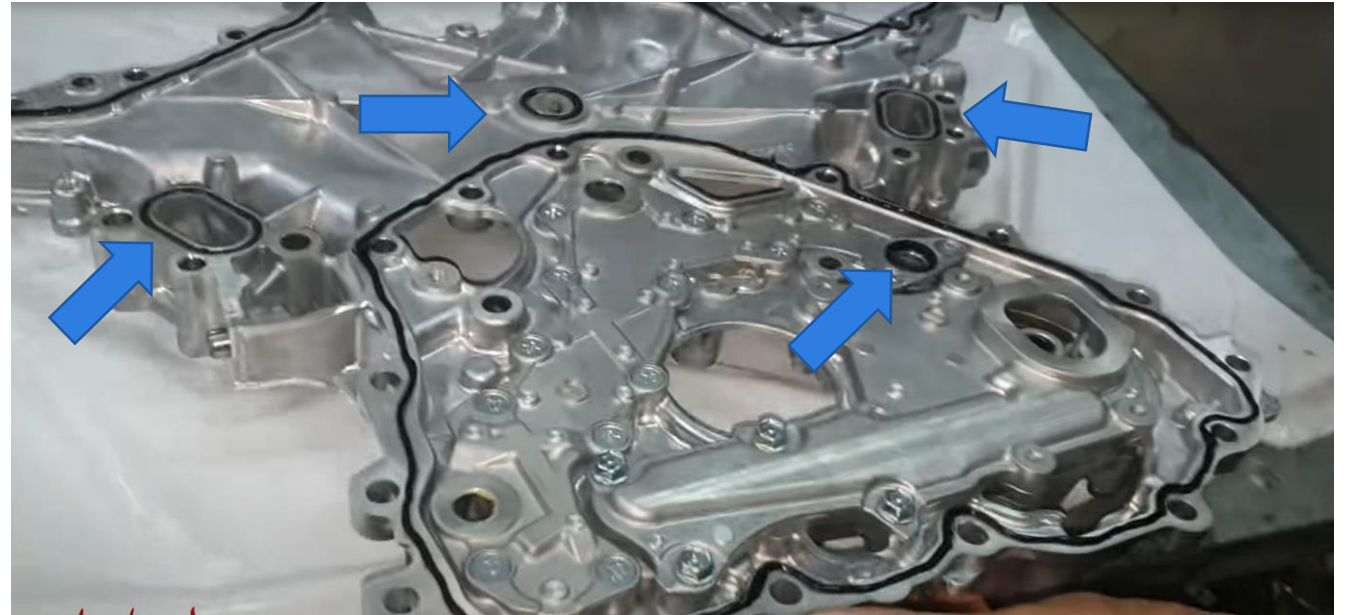
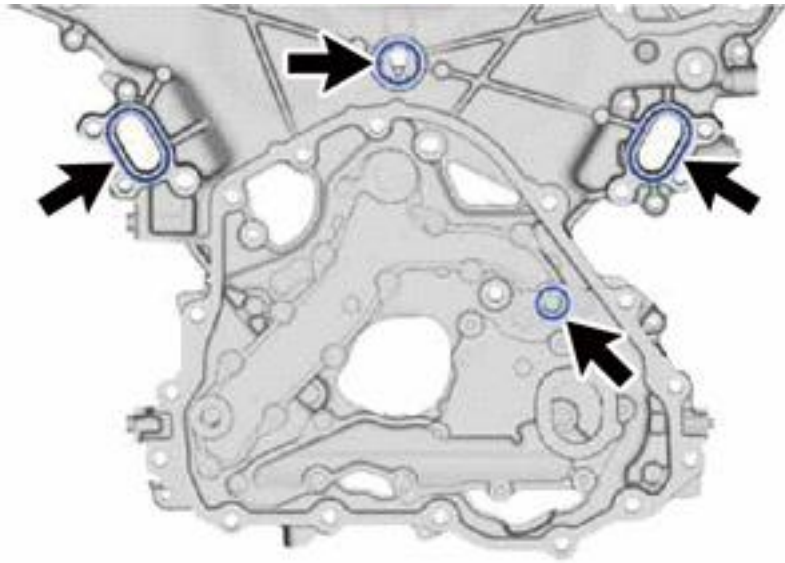


Rubber Seal Positions



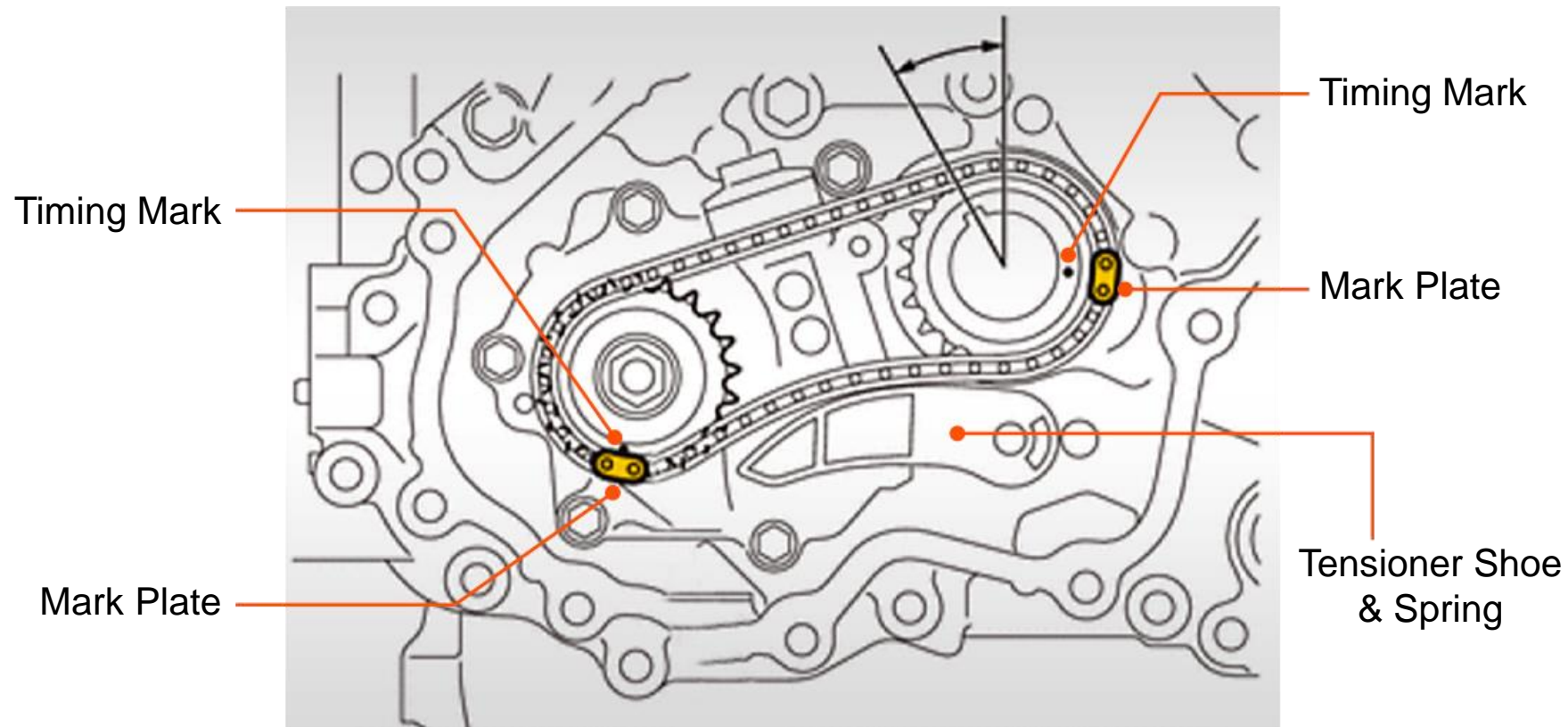
○ = Block/ Head/ Cover Meeting Area

Timing Cover Rubber Seal Positions



Rubber Seal Positions

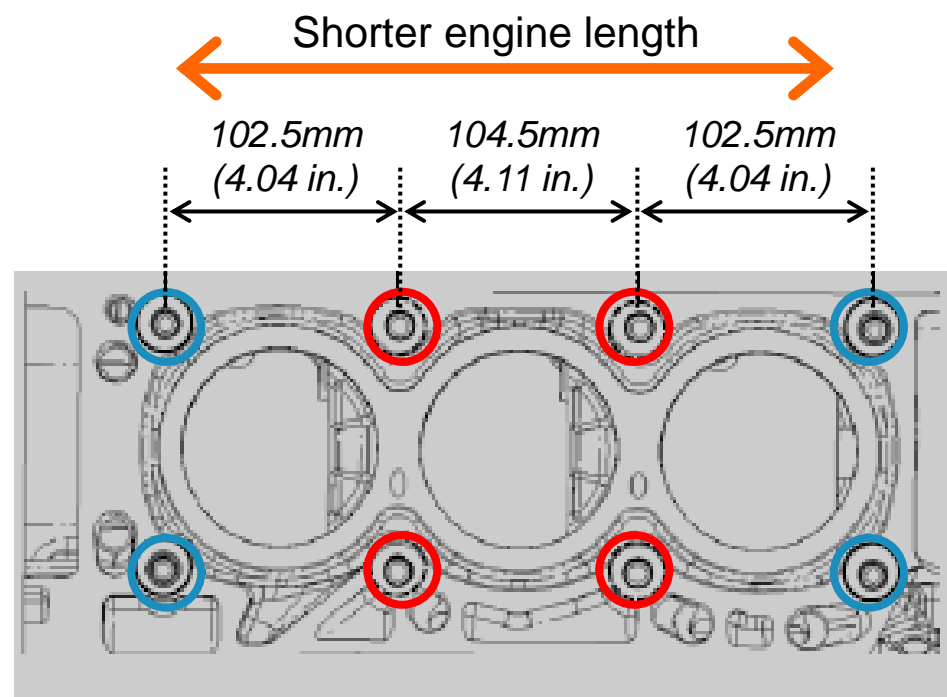
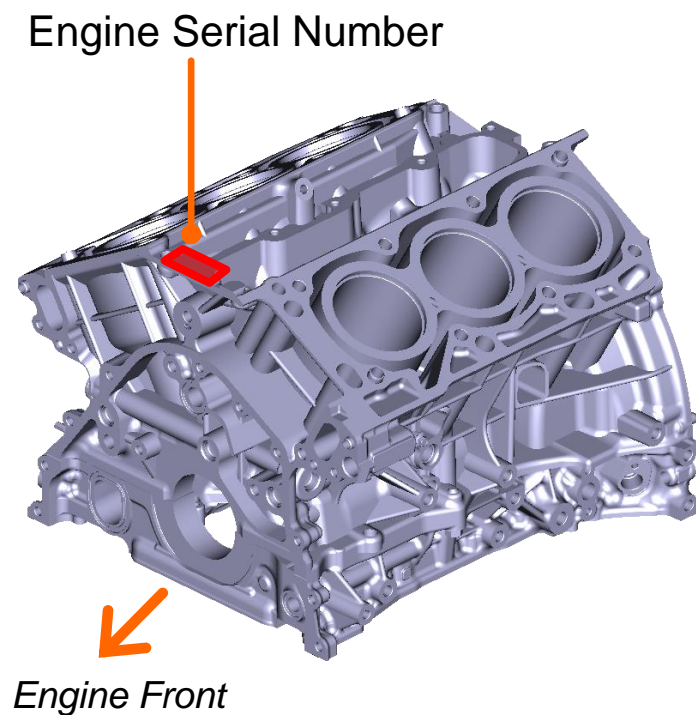
Chain Driven Oil Pump



Block Design

The distance between head bolts has been reduced, resulting in a shorter engine length and compact design.

- Cylinder head bolt sizes differ depending on location.



○ : M11, Bolt Length: 140mm [5.51 in.]

○ : M12, Bolt Length: 150mm [5.90 in.]

V35A-FTS Cam/Crank Timing Marks



Bank 1 (LH) Intake Cam
Timing Mark



Bank 2 (RH) Intake Cam
Timing Mark



Crank Sprocket Timing Mark

V35A-FTS Bank 1 (RH) Cam Timing Marks



Bank 1 (RH) Exhaust Cam
USES SINGLE LINE MARK



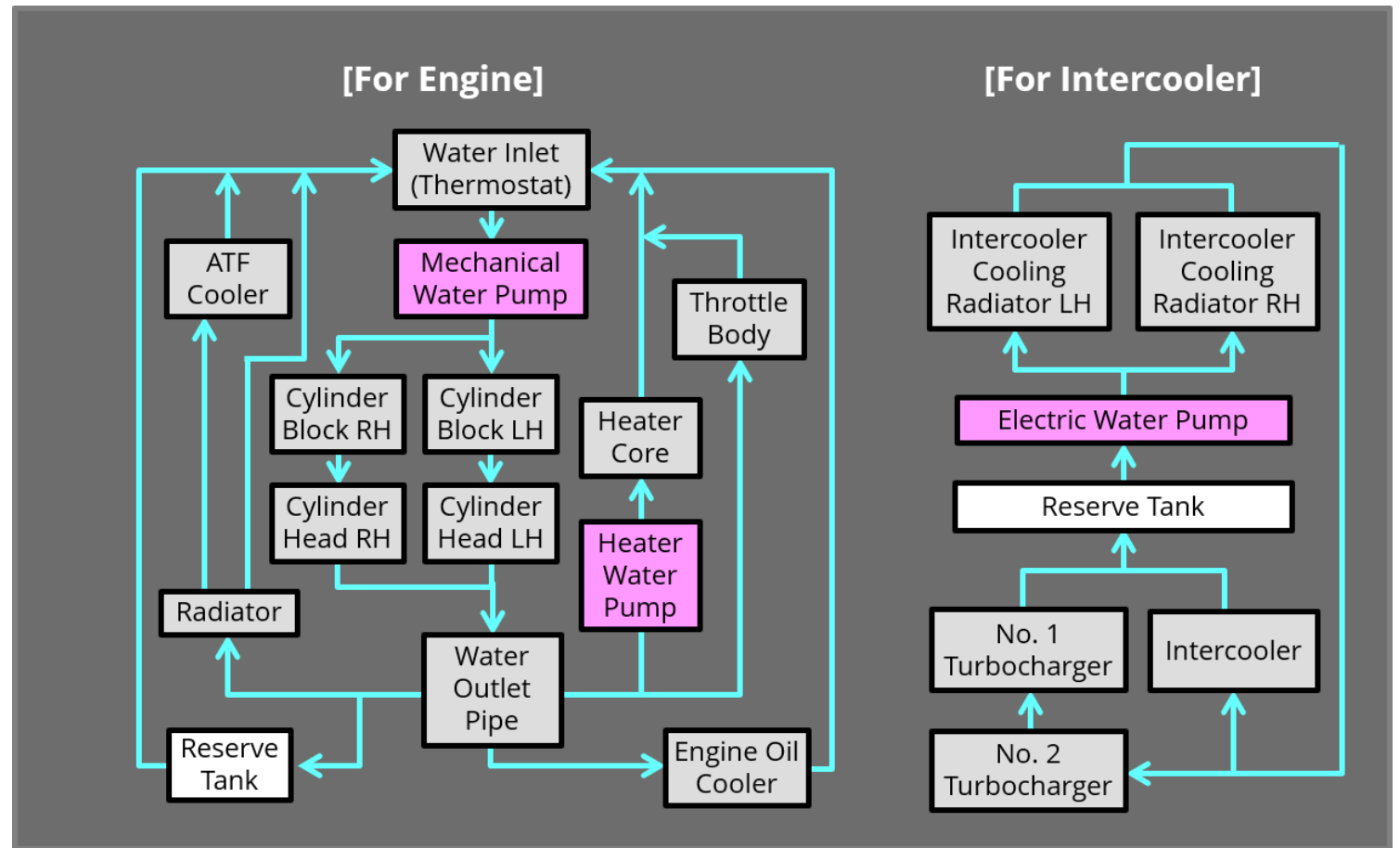
V35A-FTS Bank 2 (LH) Cam Timing Marks



Bank 2 (LH) Exhaust Cam
USES DOUBLE LINE MARK

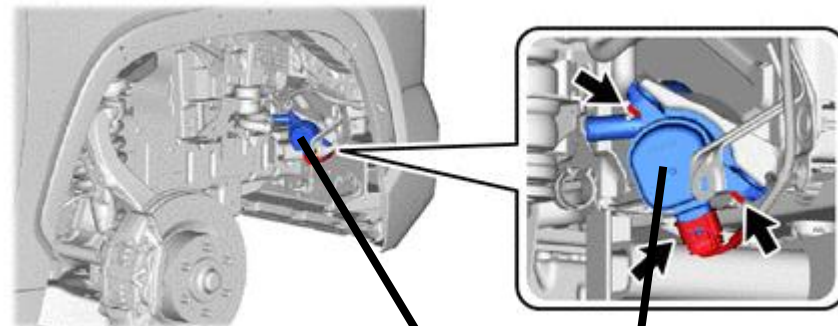
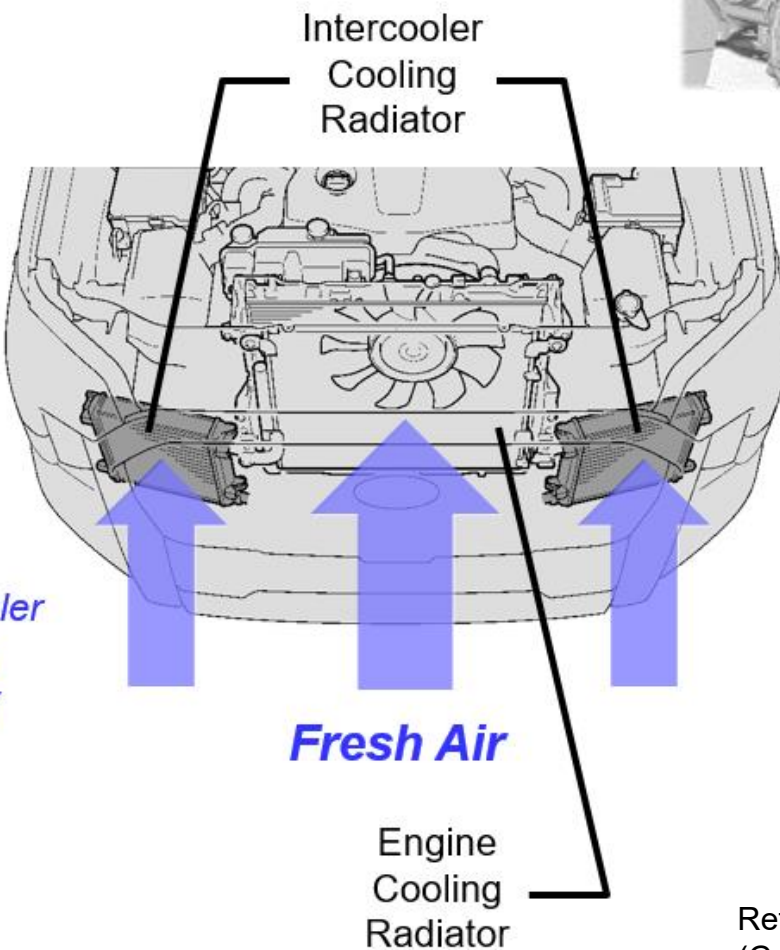
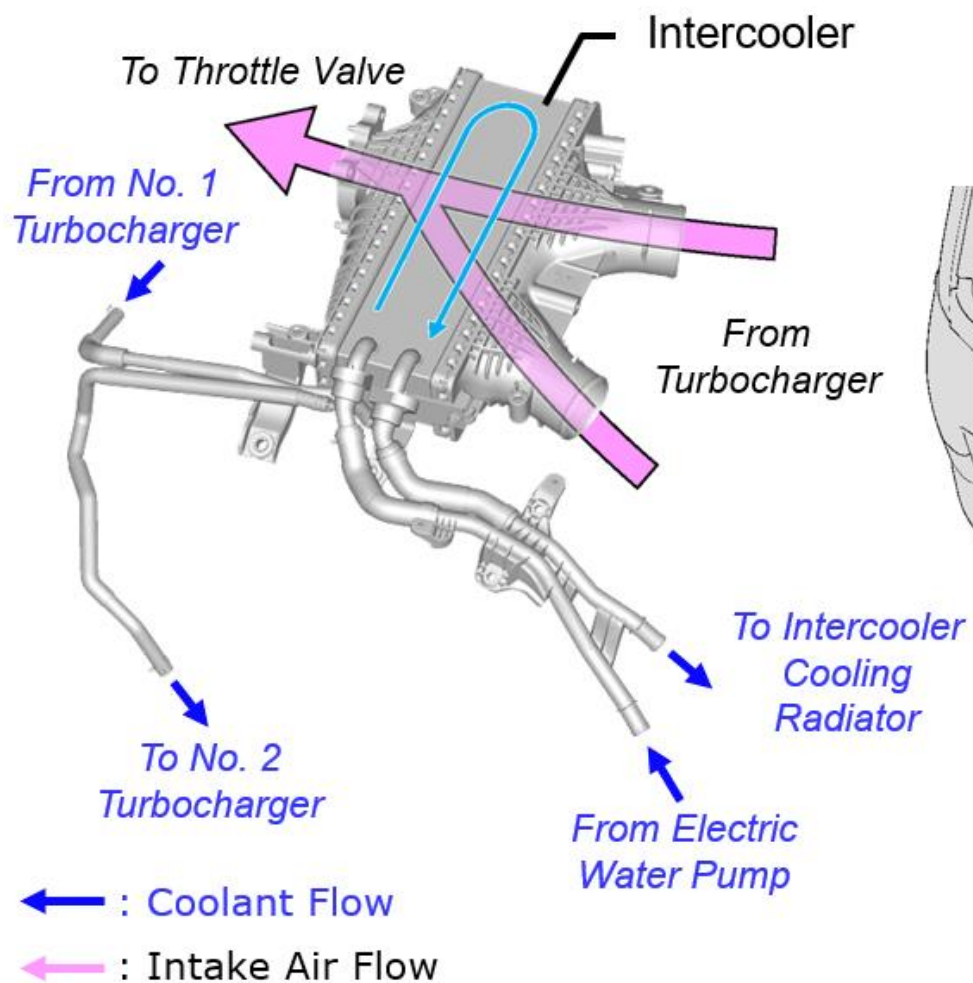
Cooling System Diagram

Intercooler Coolant	
Type	Toyota Super Long Life Coolant (SLLC)
Capacity	4.6 quarts
Service Interval	100,000 mi., then every 50,000 mi.



Hint! Tundra HEV has additional cooling circuit (not shown) for hybrid system.

Intercooler Cooling



Intercooler Water Pump

Refer to RM for Intercooler Coolant "Bleeding" Procedures (General>Maintenance>V35A-FTS Coolant>Replacement)

Coolant Fill Locations

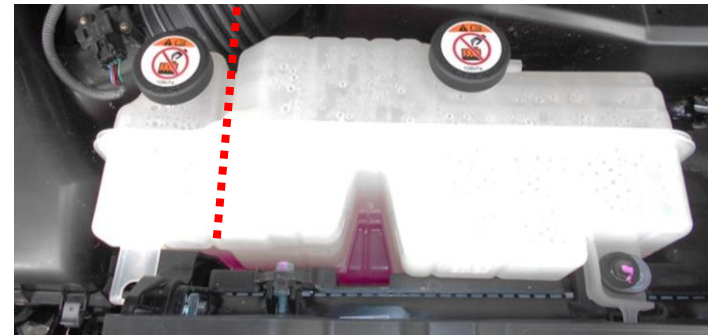
Hybrid system coolant

Engine oil

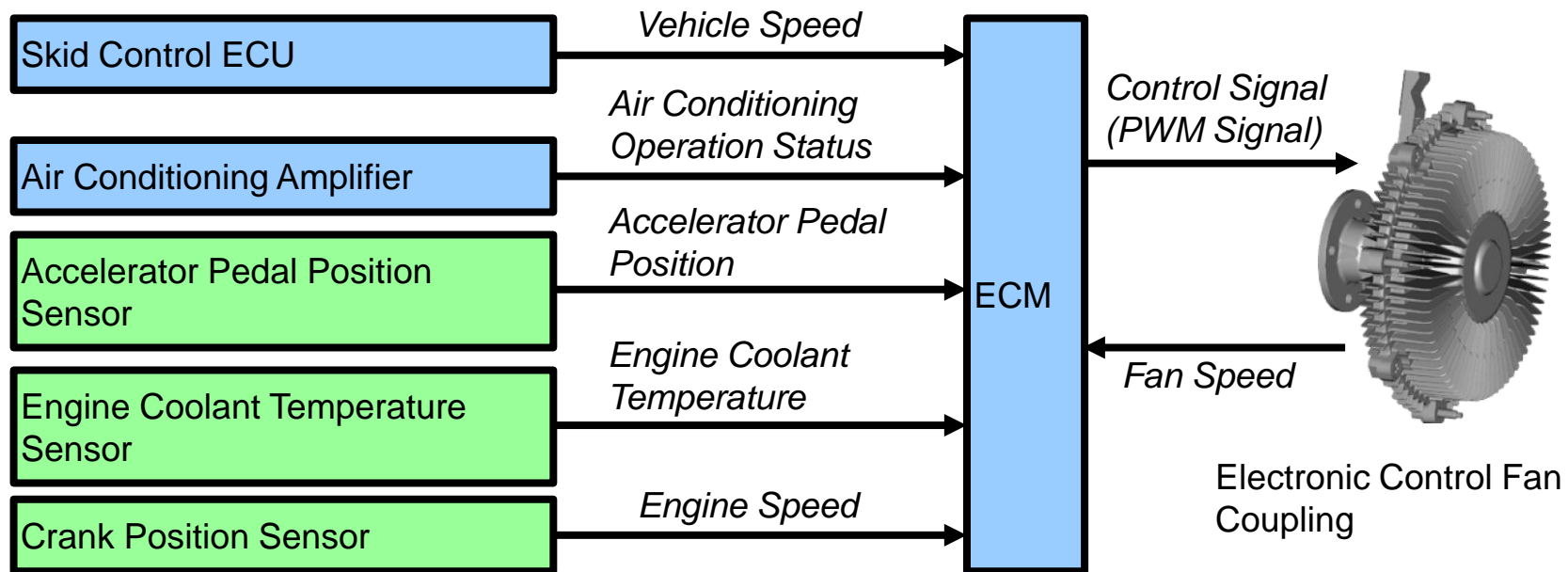


For Intercooler

For Engine



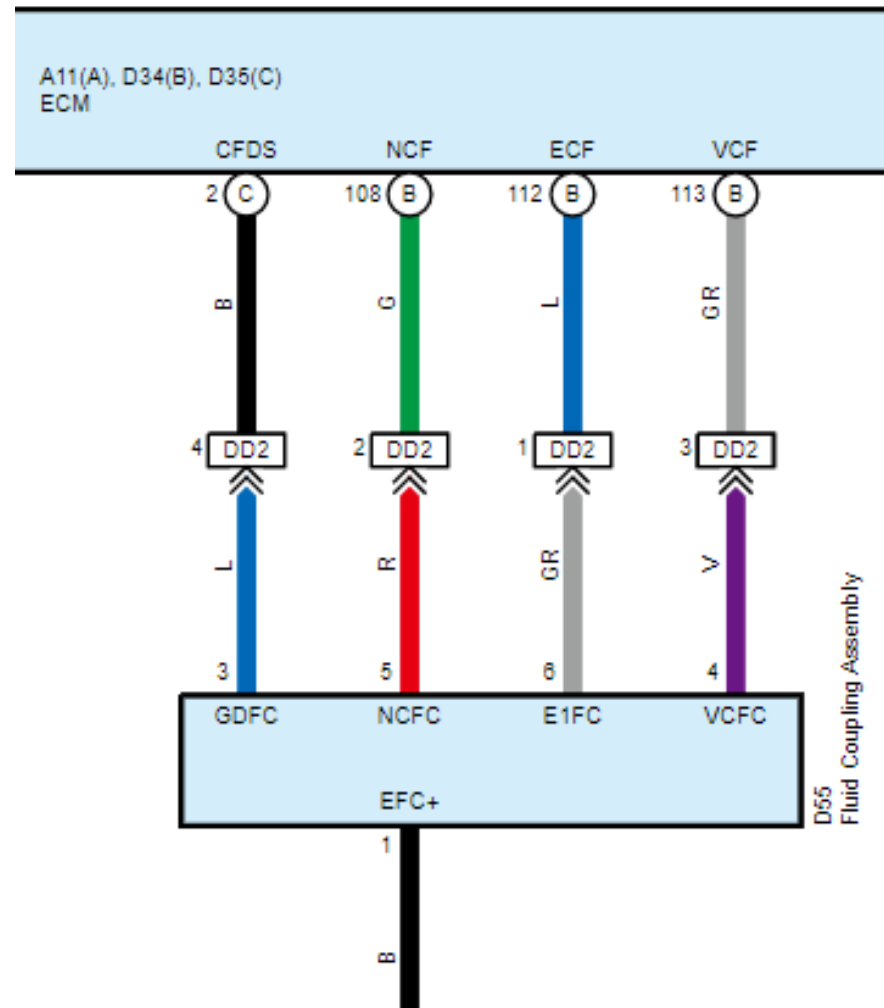
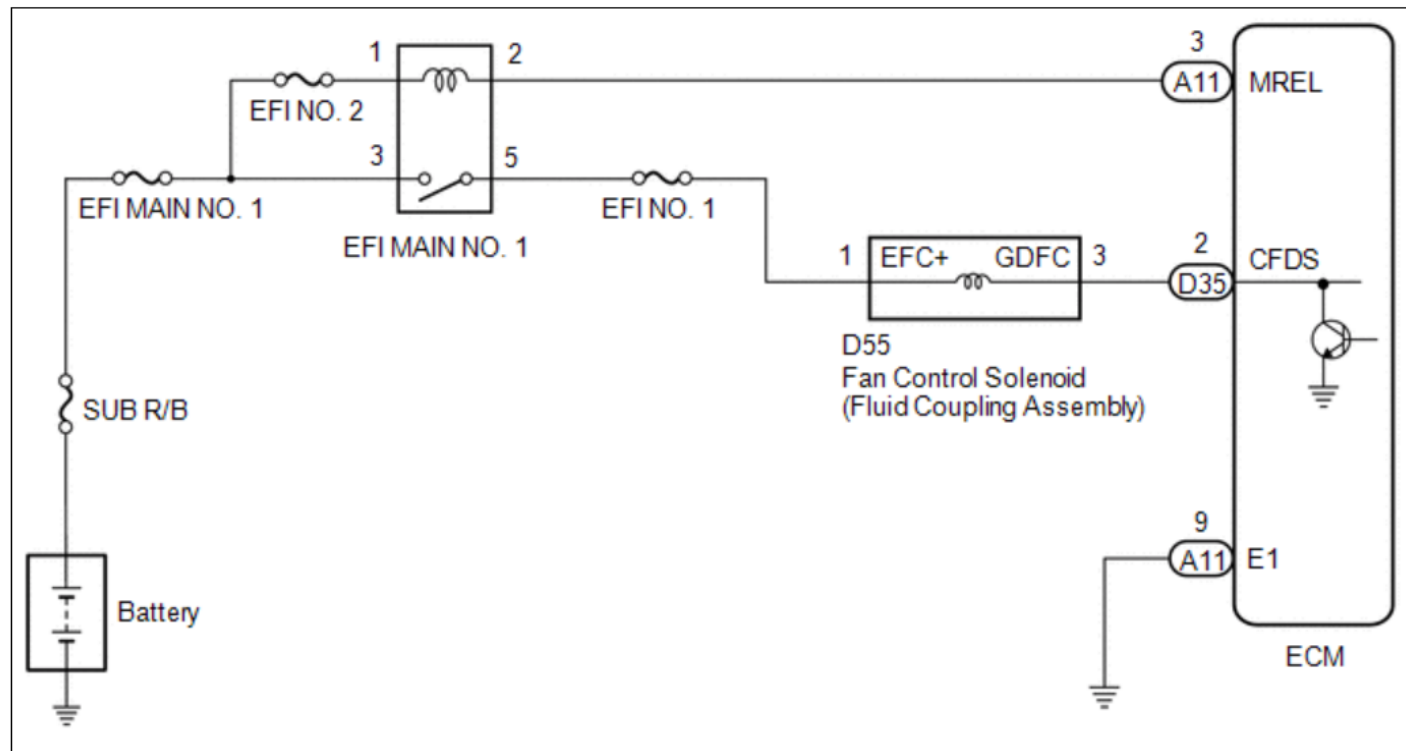
Fan Coupling



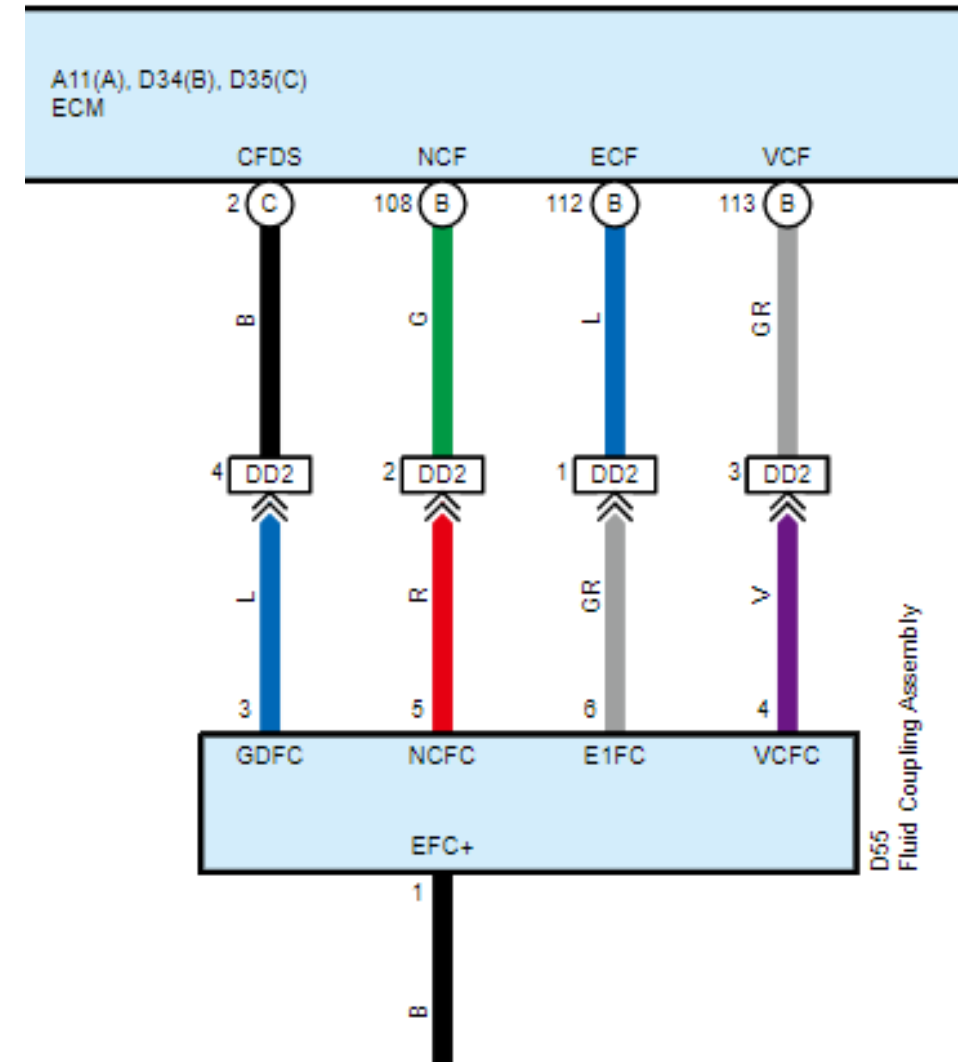
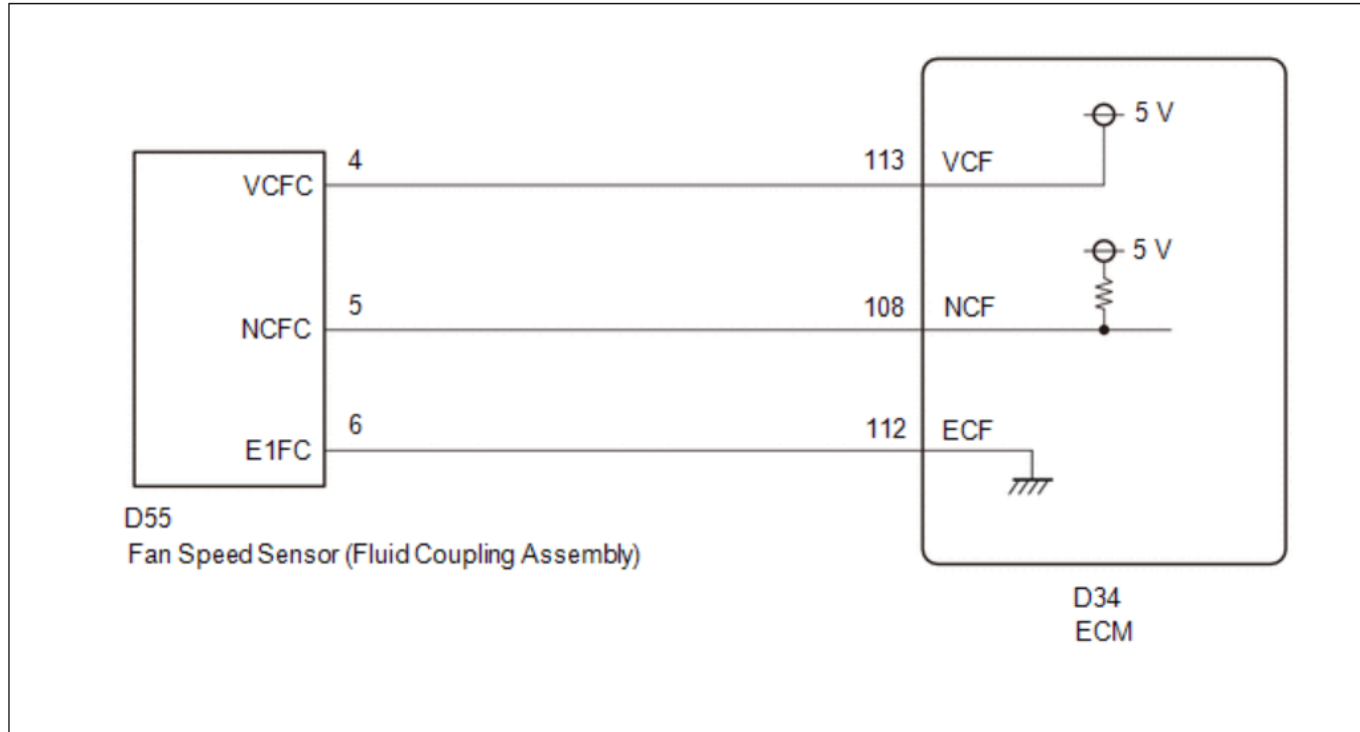
[Operation Image of Electronic Control Fan Coupling (A/C OFF)]

Engine Condition	Engine Warm-up	Low to Middle Load	High Load
Engagement Ratio	Reduced to 0		Increased
Purpose	Suppress fan co-rotation and improve quietness		Secure engine cooling performance

Cooling Fan Coupling Control



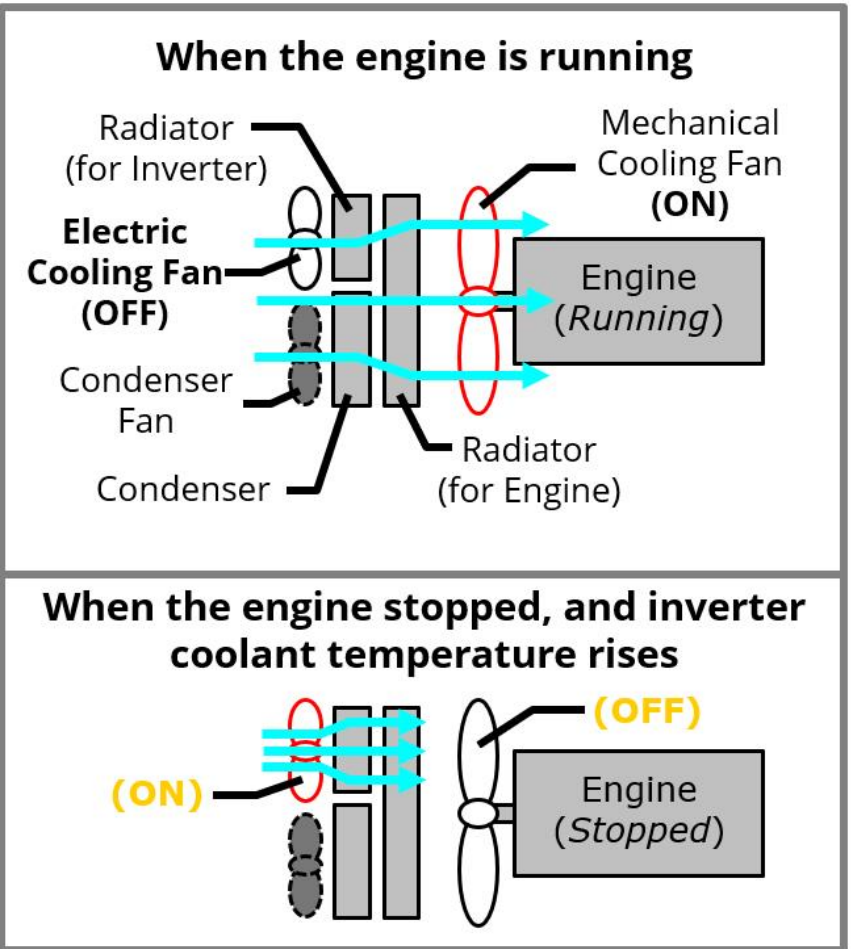
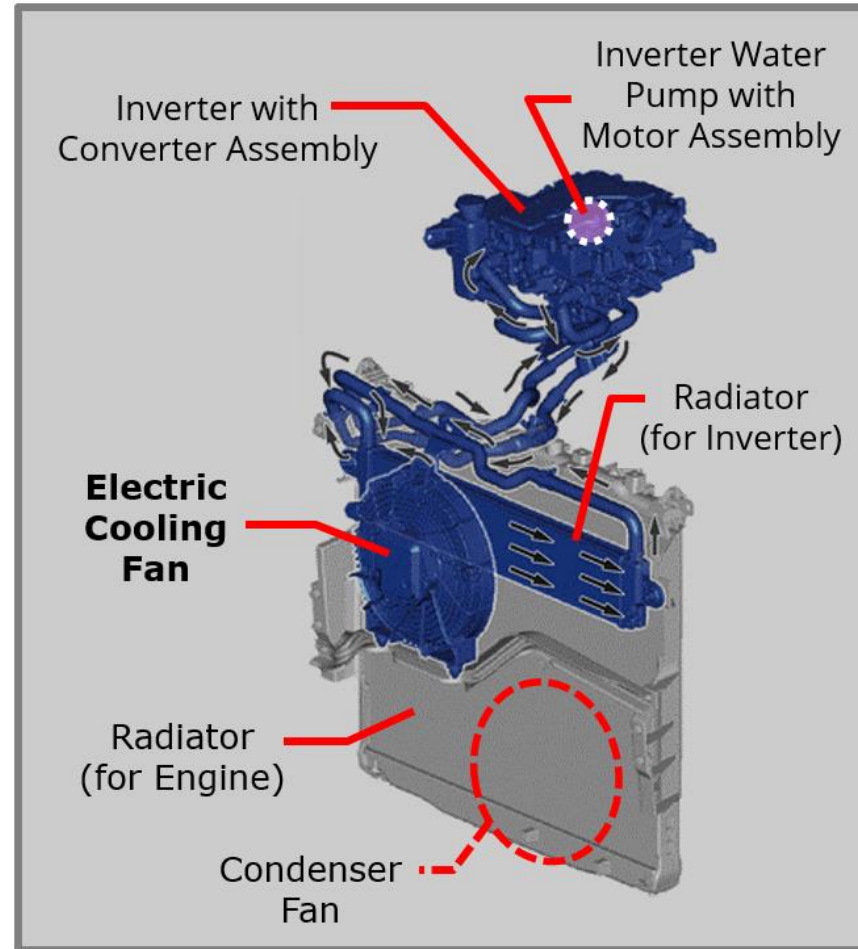
Cooling Fan Coupling Control



Additional Cooling Fans - HEV

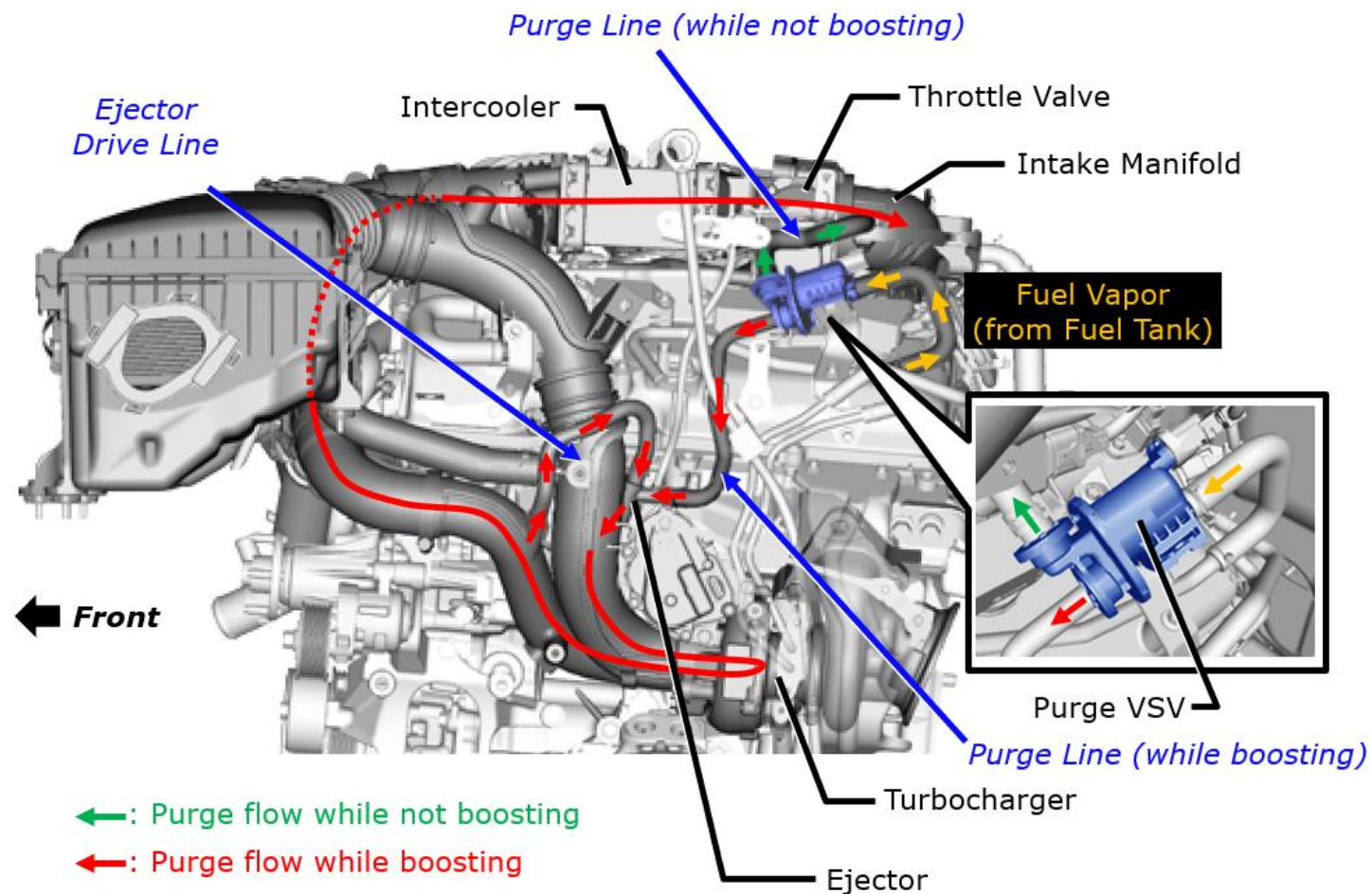
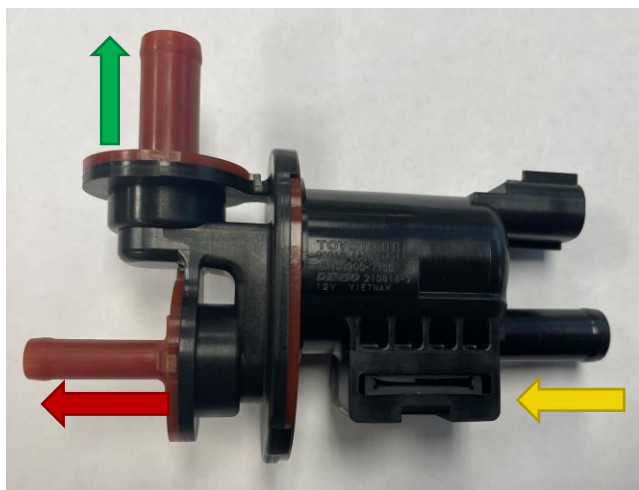
Electric Cooling Fans

- Inverter Cooling
- Condenser Fan (HVAC)

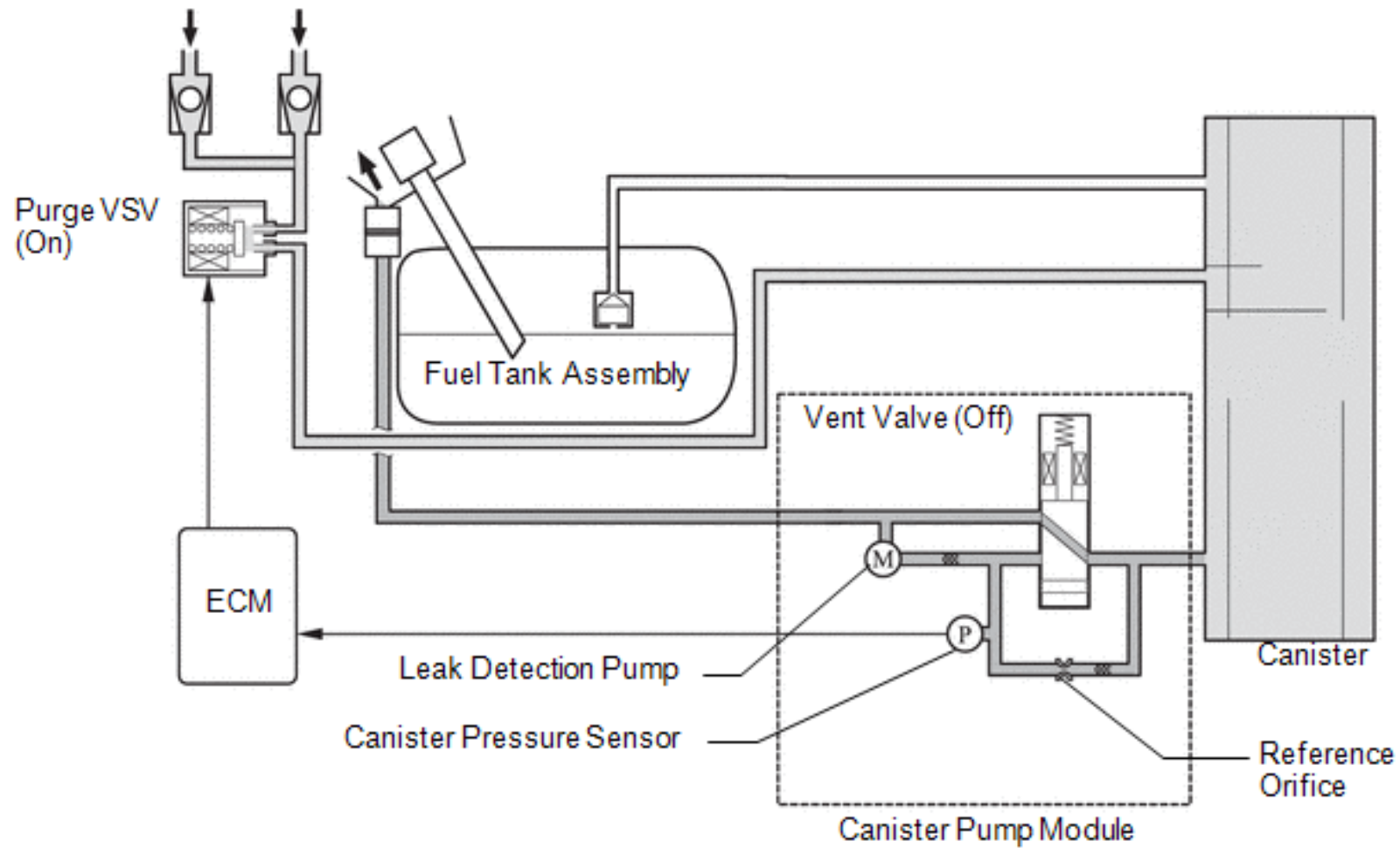


EVAP System Operation

- Purge flow while boosting
 - Flow through VSV to ejector via purge line into duct upstream of turbocharger
- Purge flow while not boosting
 - Flow through VSV into intake manifold behind throttle valve

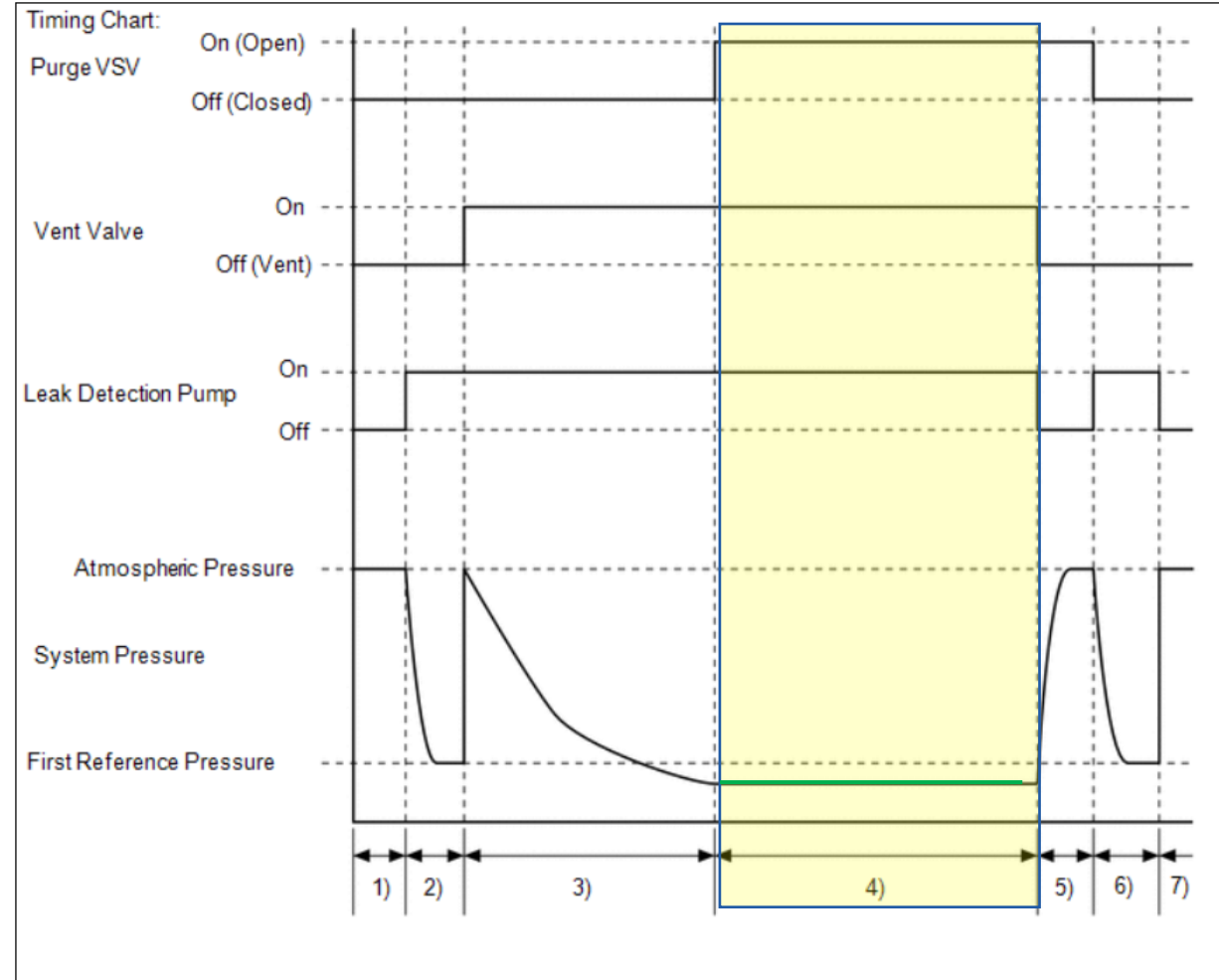


Evaporative System Schematic

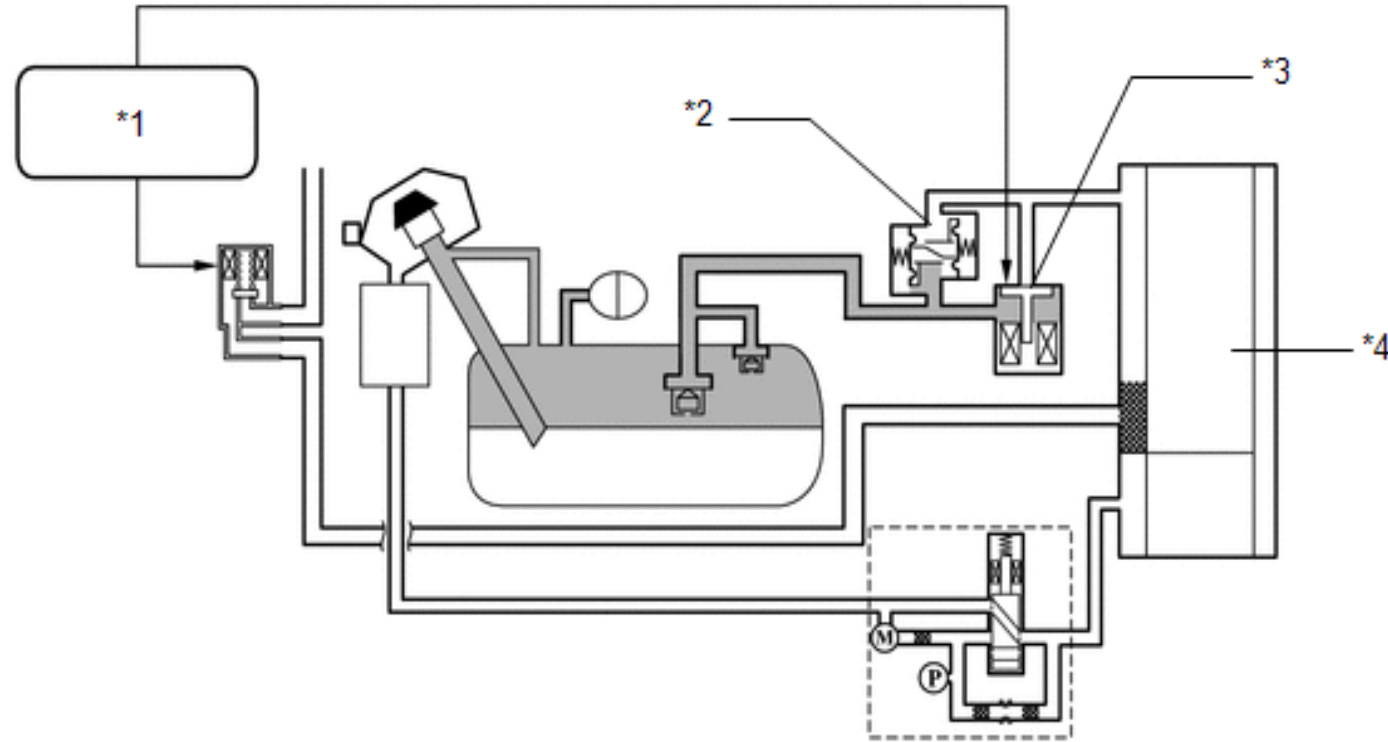


EVAP Monitor Operation

1. Atmospheric Pressure Measurement
2. First Reference Pressure Measurement
3. EVAP Leak Check
4. Check Valve Monitoring
5. Purge VSV Monitor
6. Second Reference Pressure Measurement
7. Final check

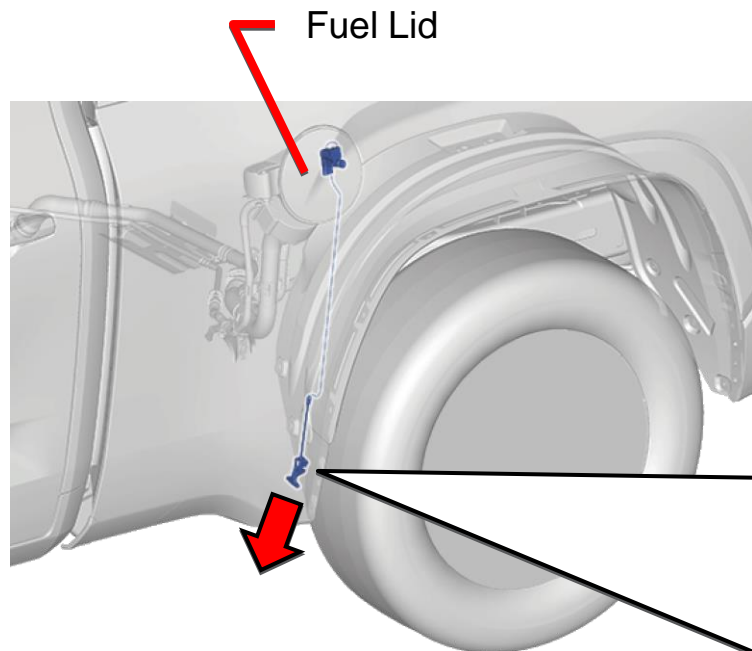


Fuel Vapor Containment Valve for HV Tundra



*1	ECM	*2	Fuel Outlet Valve (Closed)
*3	Fuel Vapor Containment Valve (Closed)	*4	Canister

Fuel Lid



- [Fuel Lid Manual Opening Operation]
1. Remove the emergency opener from the clip.
 2. Pull the emergency opener down.



Unit 2: Body Systems

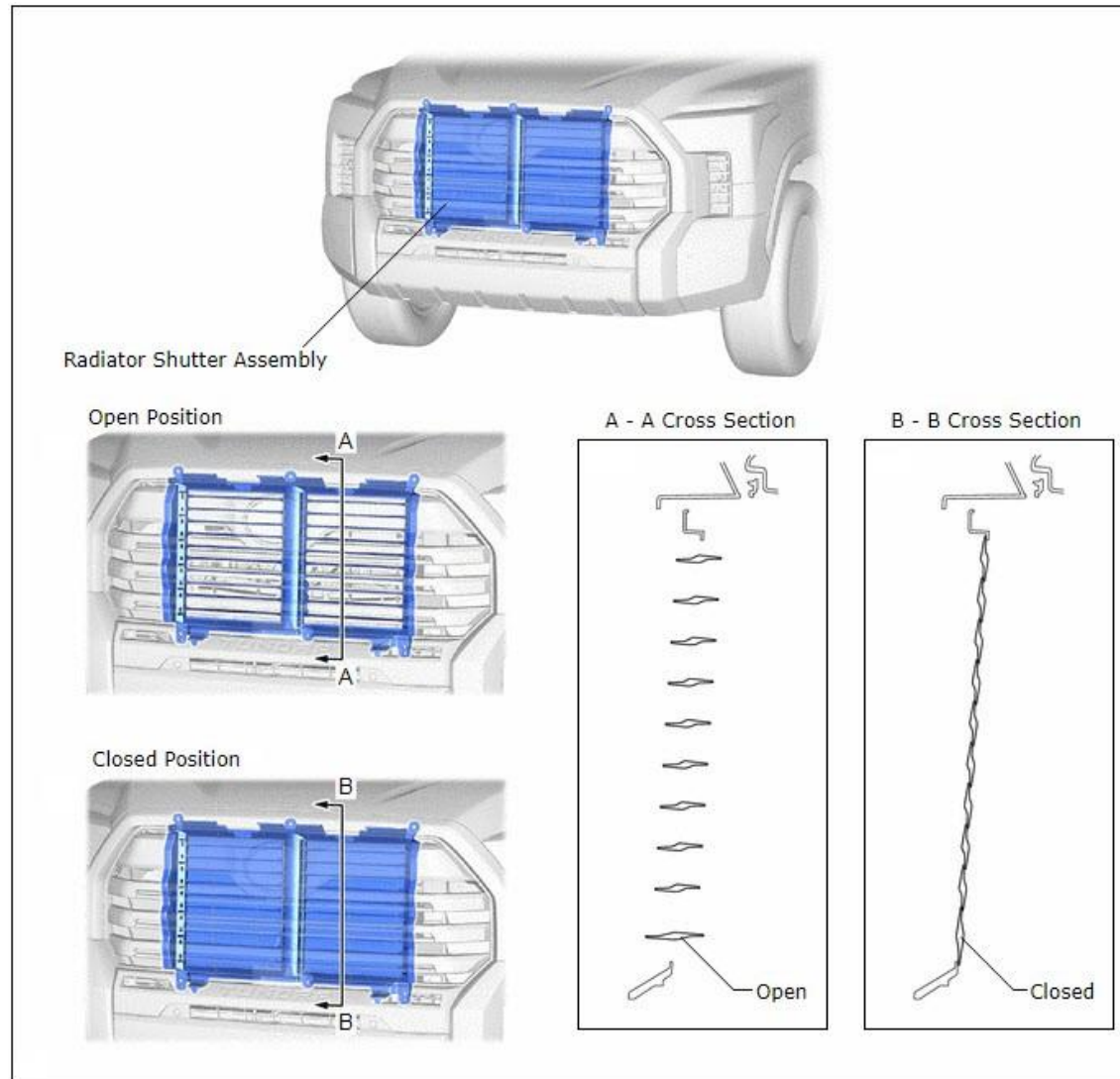
- Grille Shutter system
- Front Active Spoiler
- Automatic Running Board System
- Scene Based Power Distribution



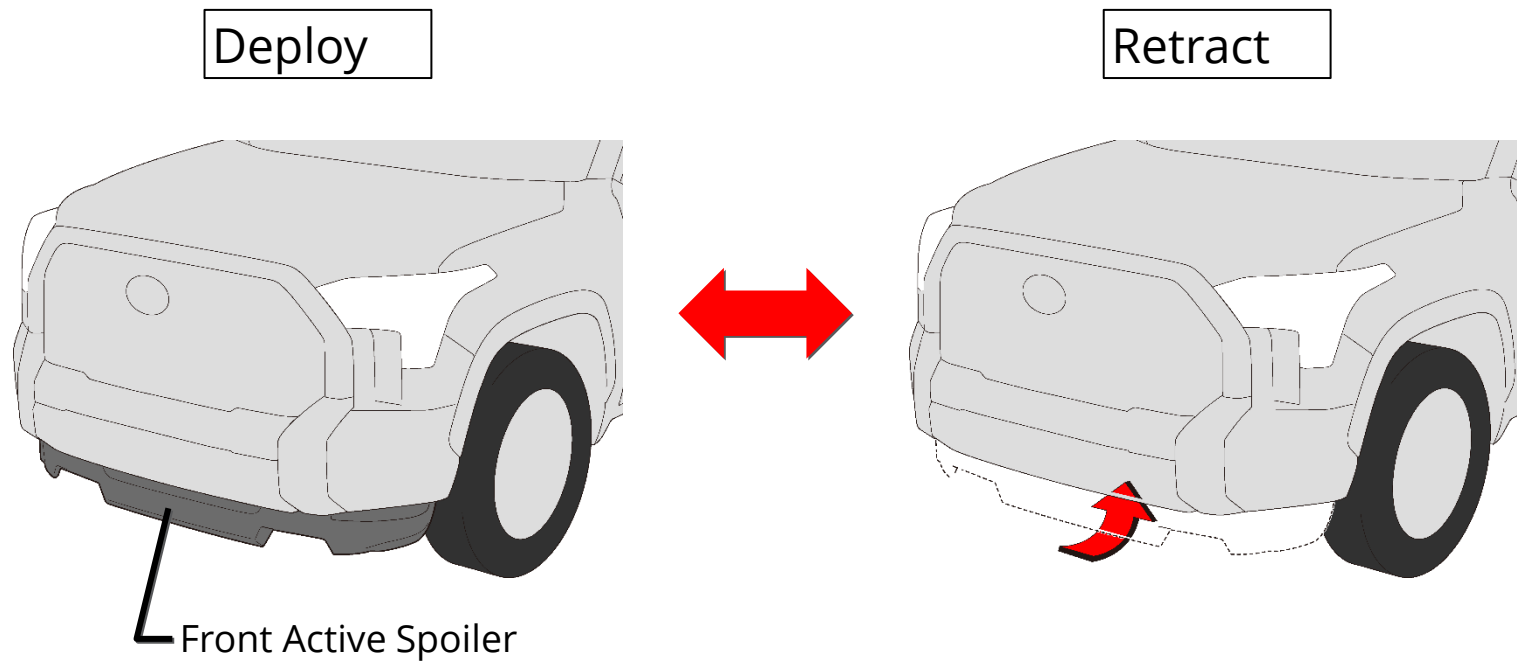
Grille Shutter

The Grille Shutter controls cooling airflow for the engine by opening and closing the shutter, reducing drag.

- System must be put into maintenance mode before servicing.



| Front Active Spoiler System



Front Active Spoiler – Service Position

Move to the service position

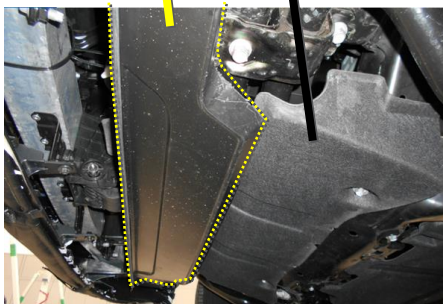
1. Turn the ignition switch to off.
2. Turn and hold the windshield wiper switch to “MIST” for 2 seconds within 45 seconds of turning the ignition switch off.
3. The front active spoiler is deployed. (service position)
4. Remove the No.1 engine under cover.

MIST



Front Active Spoiler

No.1 Engine Under Cover

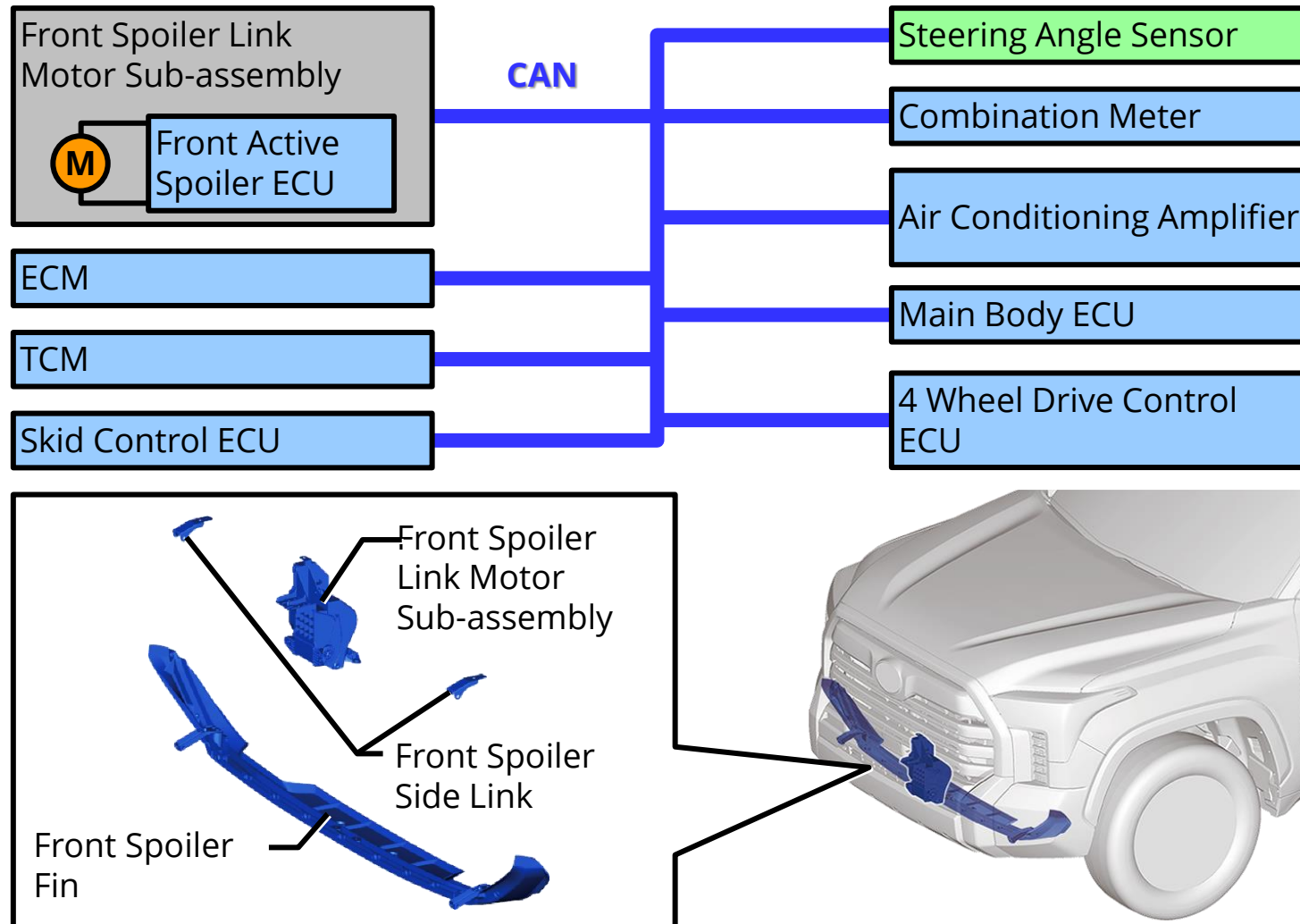


No.1 Engine Under Cover

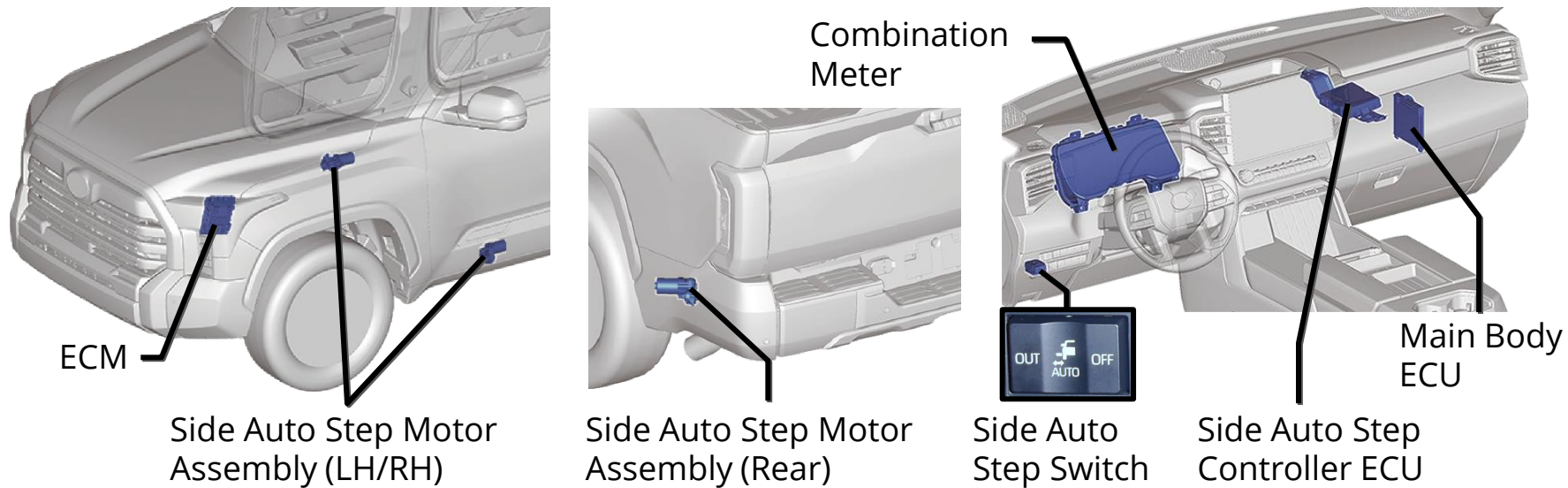
Return to the retracted position

1. Turn the ignition switch to ON.
2. Set the shift position to D or R.
3. The front active spoiler is retracted.



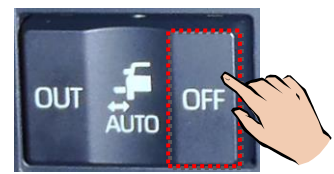
Front Active Spoiler System - Diagram






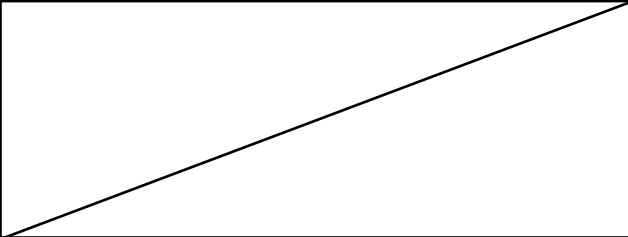
Automatic Running Board System



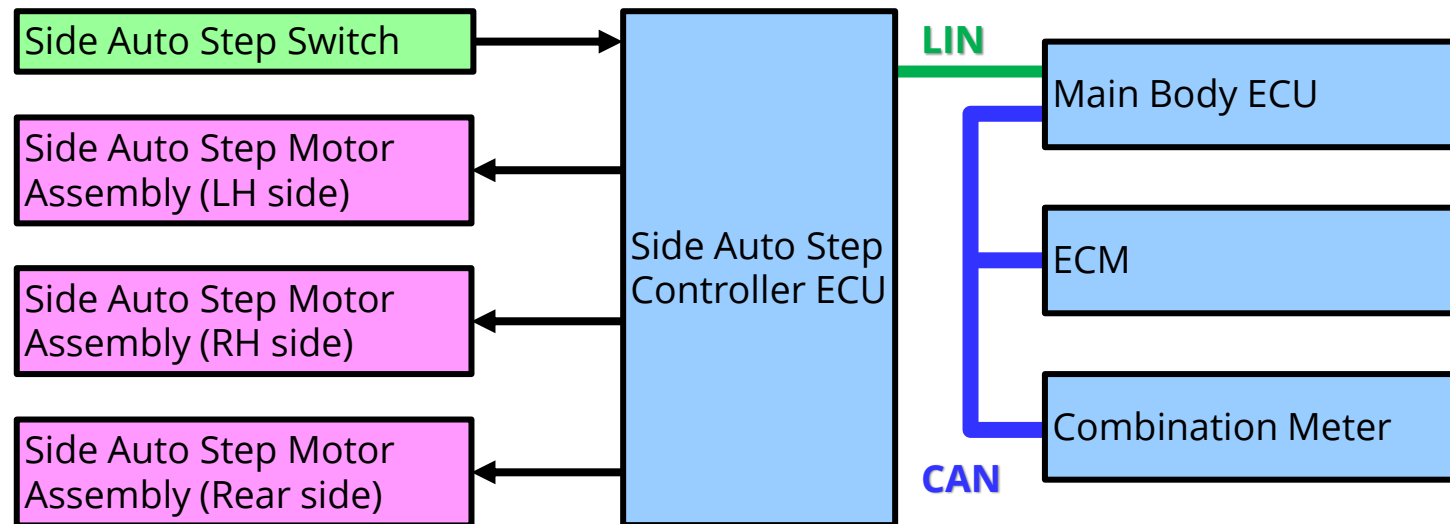
| Operating Conditions [Automatic Running Board]

Side Auto Step Switch	Automatic Running Board	
	Deployment	Retract
"OUT" 	If the vehicle speed is less than 5 km/h (3 mph), automatic running boards on both sides are deployed when "OUT" is selected.	Automatic running boards are retracted if the vehicle speed becomes 5 km/h (3 mph) or more.
"AUTO" 	Automatic running board is deployed when the following conditions are met. <ul style="list-style-type: none"> • The vehicle speed is less than 5 km/h (3 mph). • Front or rear door is opened. 	Automatic running board is retracted when the following conditions are met. <ul style="list-style-type: none"> • The vehicle speed is more than 5 km/h (3 mph). • Front or rear door is closed.
"OFF" 		Automatic running boards are retracted when "OFF" is selected.

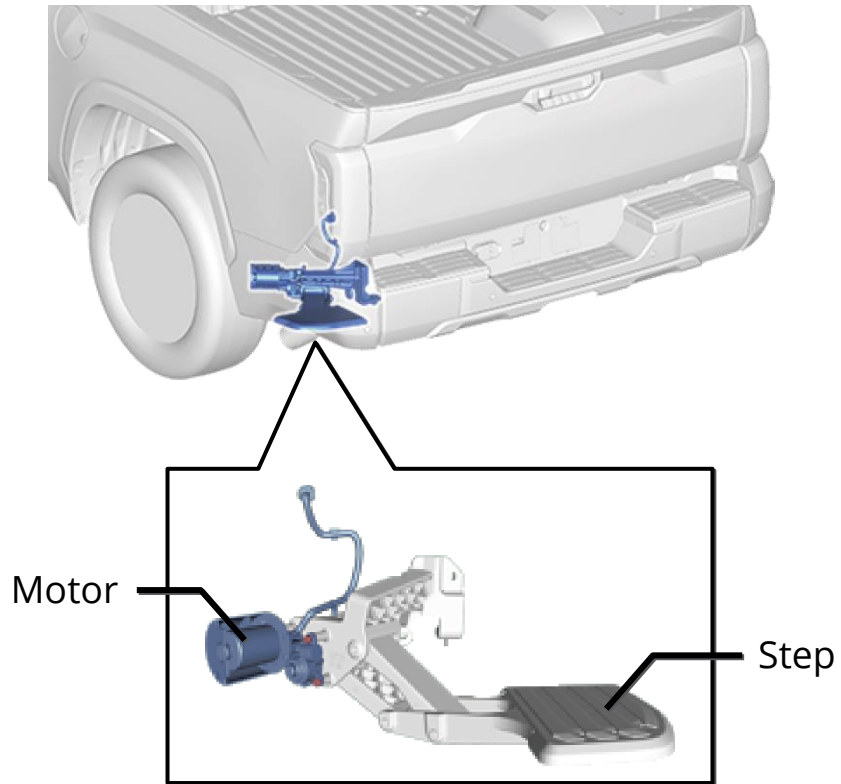
| Operating Conditions [Power Bed Step]

Side Auto Step Switch	Power Bed Step	
	Deployment	Retract
"OUT" 	<p>If the vehicle speed is less than 5 km/h (3 mph), power bed step is deployed when "OUT" is selected.</p>	<p>Power bed step is retracted if the vehicle speed becomes 5 km/h (3 mph) or more.</p>
"AUTO" 	<p>Power bed step is deployed when the following conditions are met.</p> <ul style="list-style-type: none"> • The vehicle speed is less than 5 km/h (3 mph). • Tailgate is opened. 	<p>Power bed step is retracted when the following conditions are met.</p> <ul style="list-style-type: none"> • The vehicle speed is more than 5 km/h (3 mph). • Tailgate is closed.
"OFF" 		

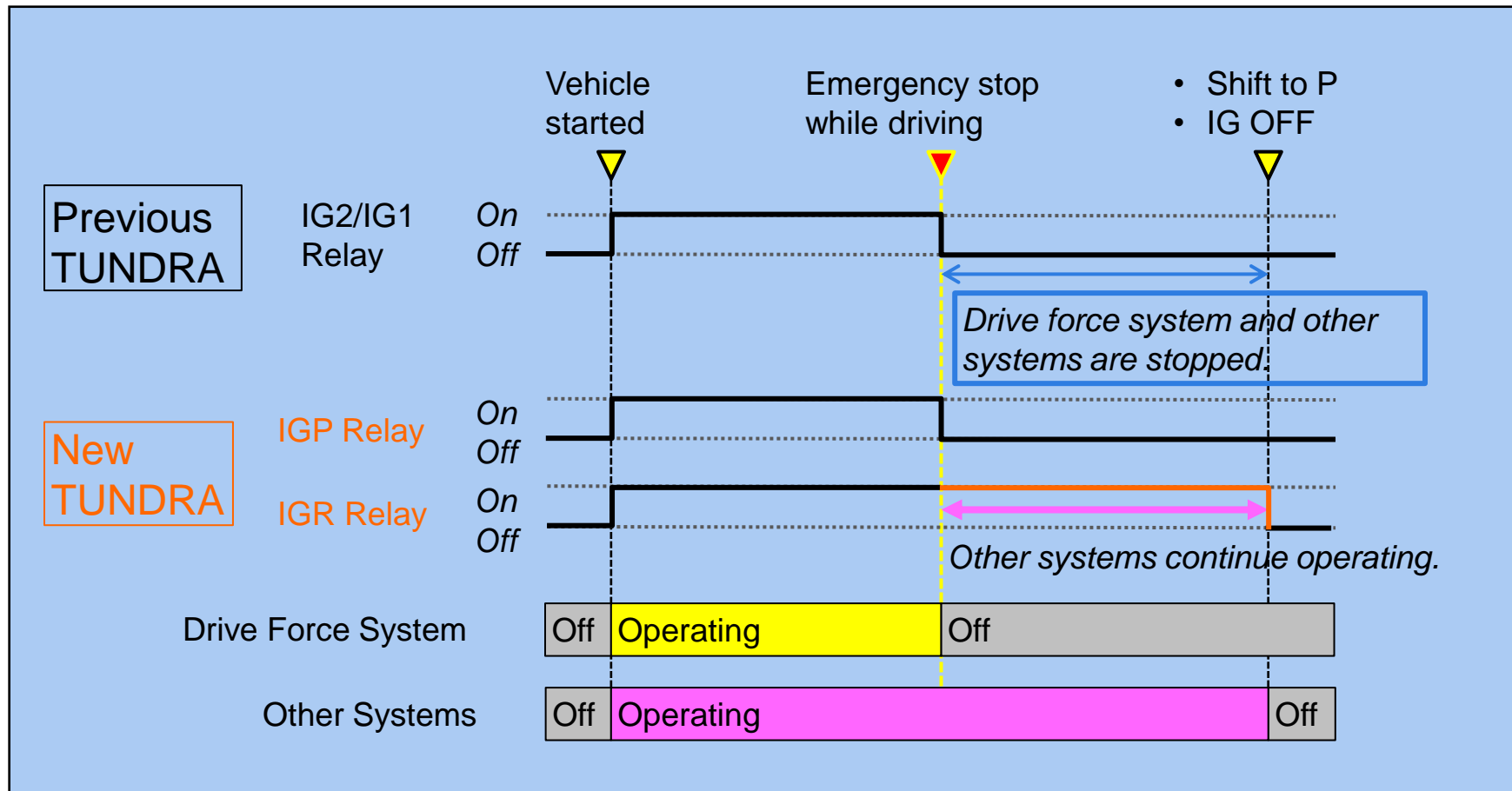
Automatic Running Board System - Diagram



| Power Bed Step Operation



Scene-based power supply system

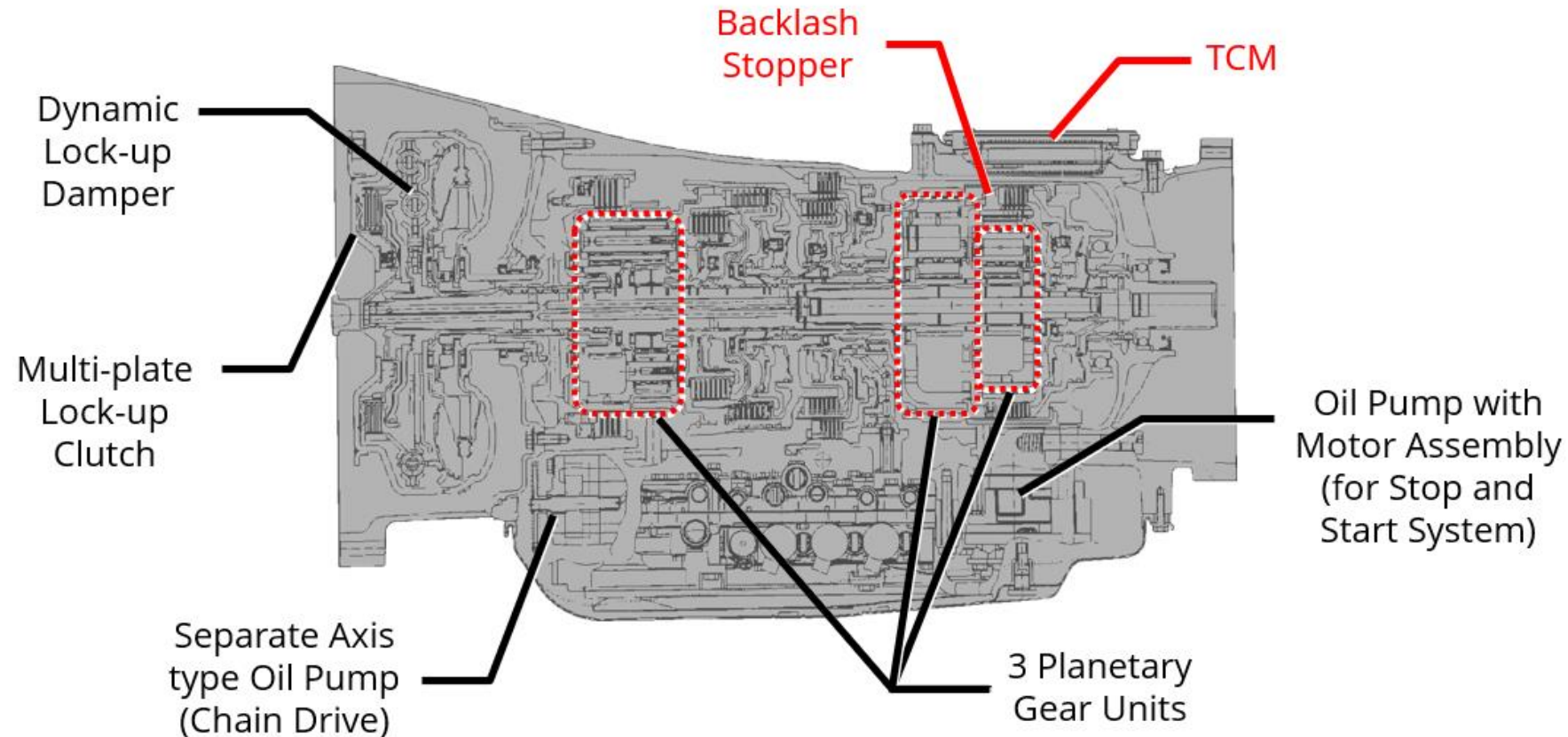


Unit 3: Drivetrain

- Features of New Transmissions
- Describe ATF filling procedure
- Describe Differential Lock operation



AJA0E/F Transmission



L4A0E/F Transmissions

Parts added for parallel hybrid system

Parts of conventional automatic transmission changed for parallel hybrid system

Motor/Generator

Good fuel economy,
High power performance

Torque Converter

Smooth start

Pinion gear

For high torque

HV damper

Suppressing NVH

Intermediate shaft

For high torque

K0 hydraulic clutch

Connecting
engine and M/G

Electric Oil Pump

Idle stop operation and Increase
in ATF flow for motor cooling

Valve body (Front module-exclusive)

Higher K0 clutch response

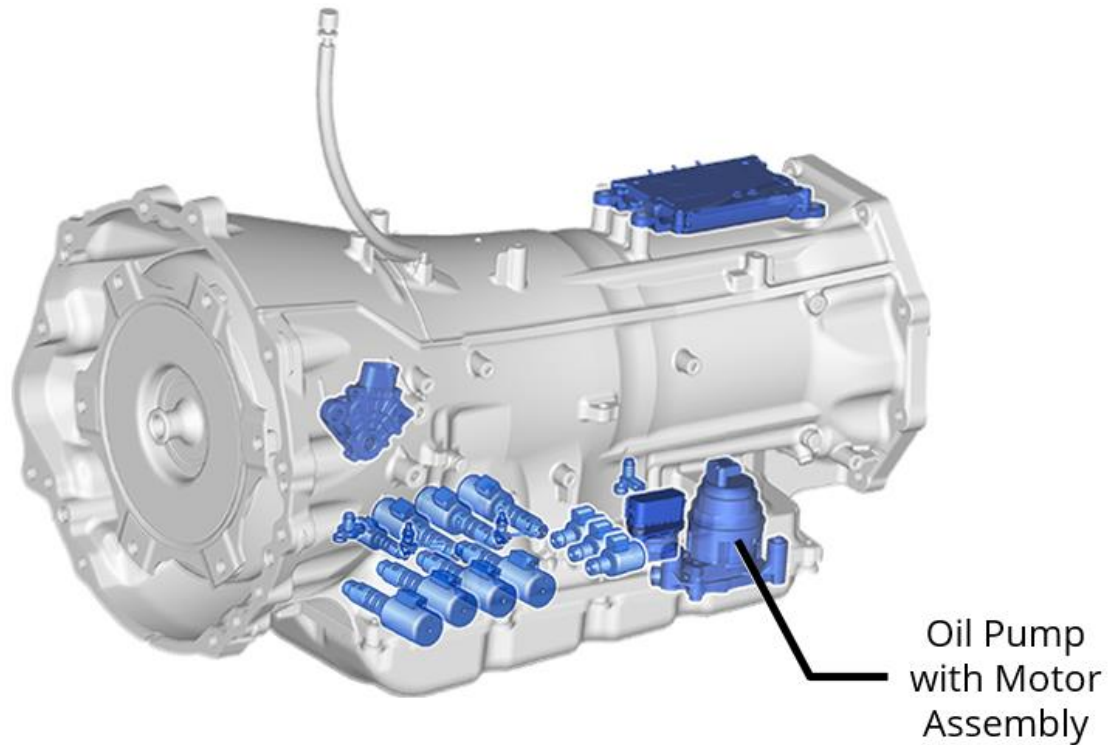
Mechanical Oil Pump

Increase in ATF flow for motor
cooling

Shaft

For high torque

ATF Filling Procedure Update



1. Perform Initial Filling
 - Fill trans until fluid flows from overflow
2. Add Specified Amount of ATF
 - Start Engine – Run through gears
3. Air Bleed Oil Pump with Motor
4. Adjust ATF Temperature
5. Adjust ATF Level at Temp
6. ATF Thermal Degradation Estimate Reset

ATF Filling Procedure RM

The Repair Manual now includes Workflow diagrams.

ATF THERMAL DEGRADATION ESTIMATE RESET

NOTICE:

If either of the following conditions is met, perform ATF Thermal Degradation Estimate Reset.

- The ATF has been replaced.

HINT:

If 50000 or more is displayed for the Data List item "ATF Thermal Degradation Estimate", thermal degradation of the ATF is suspected. Perform ATF Thermal Degradation Estimate Reset after replacing the ATF.

- Approximately 50% or more of the ATF has been replaced during a repair of the transmission or a similar operation.

(a) Connect the GTS to the DLC3.

(b) Turn the ignition switch to ON.

NOTICE:

Do not start the engine.

(c) Turn the GTS on.

(d) Enter the following menus: Powertrain / Transmission / Utility / ATF Thermal Degradation Estimate Reset.

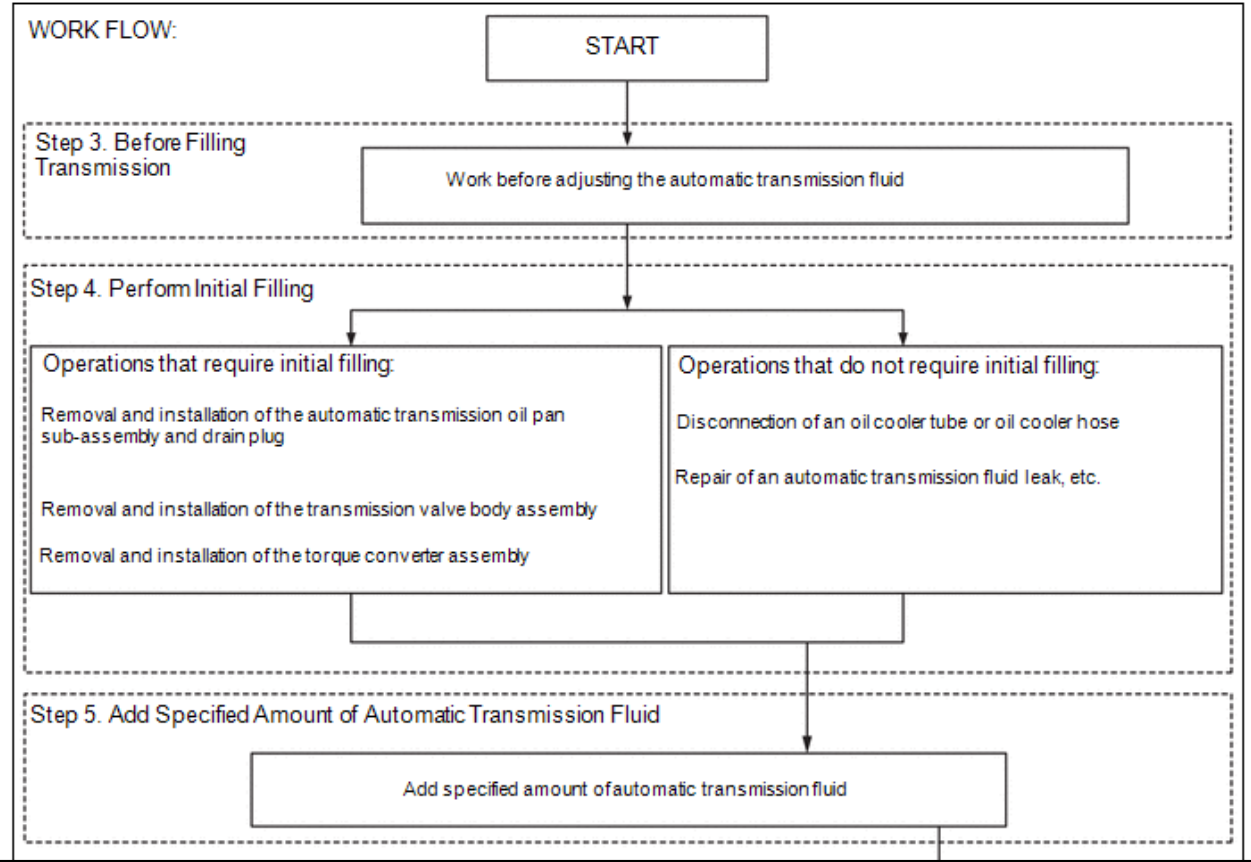
Powertrain > Transmission > Utility

TESTER DISPLAY

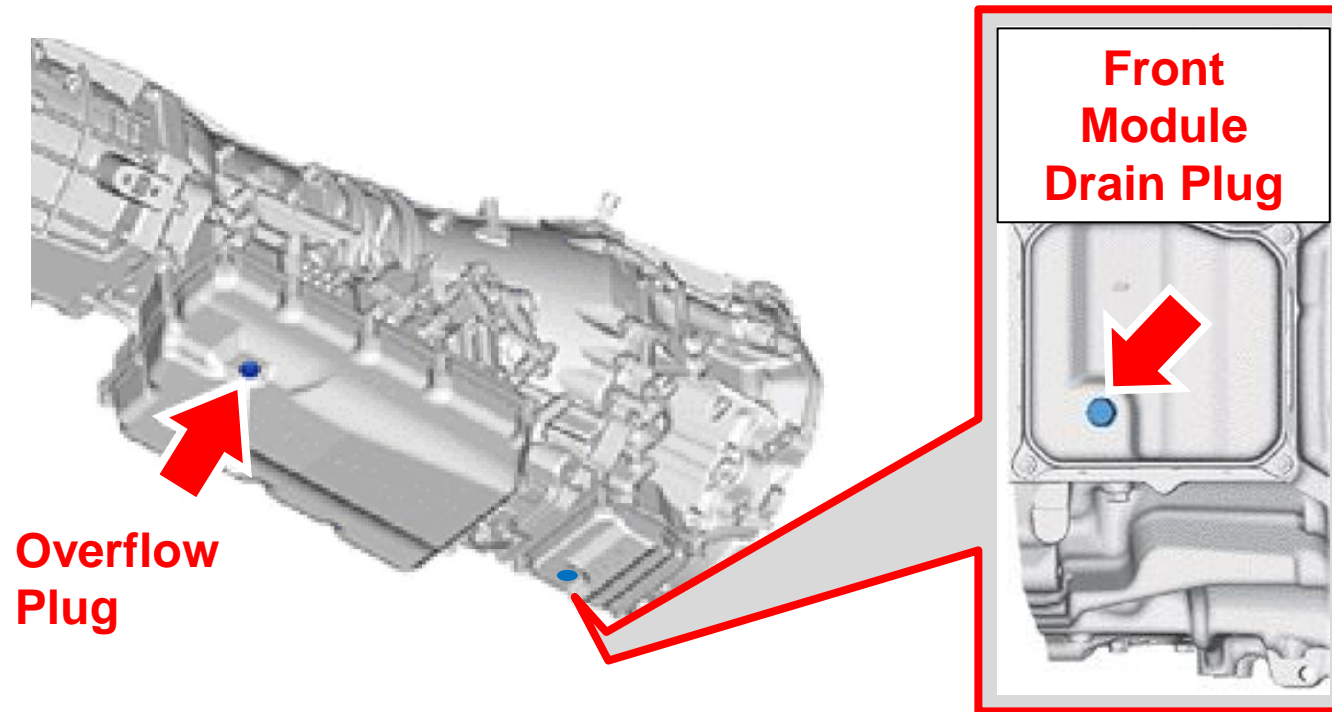
ATF Thermal Degradation Estimate Reset

2. WORK FLOW

(a) The adjustment should be performed according to the procedure referenced in the work flow below.



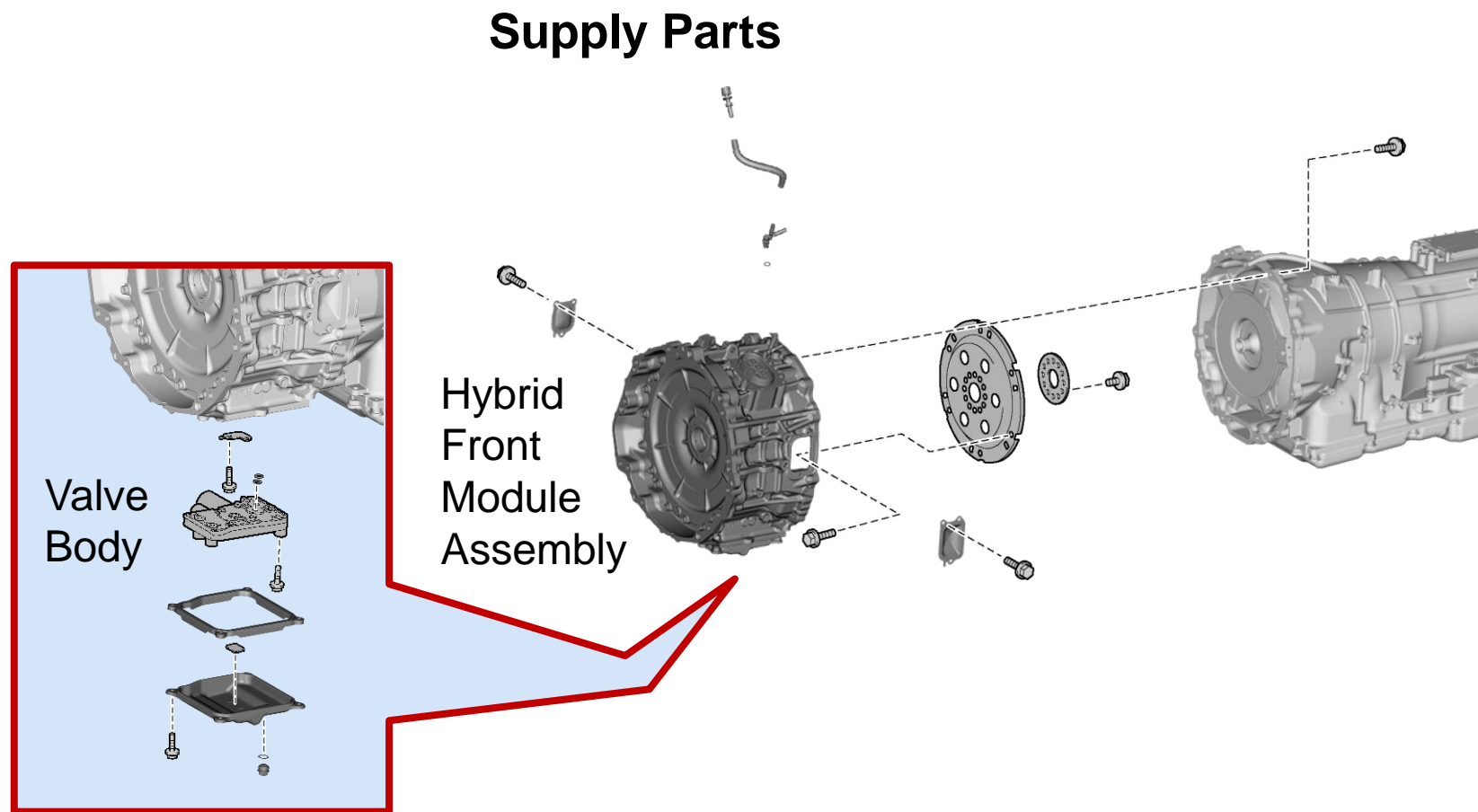
L4A0 Plugs



L4A0E(F) Initialization and Calibration

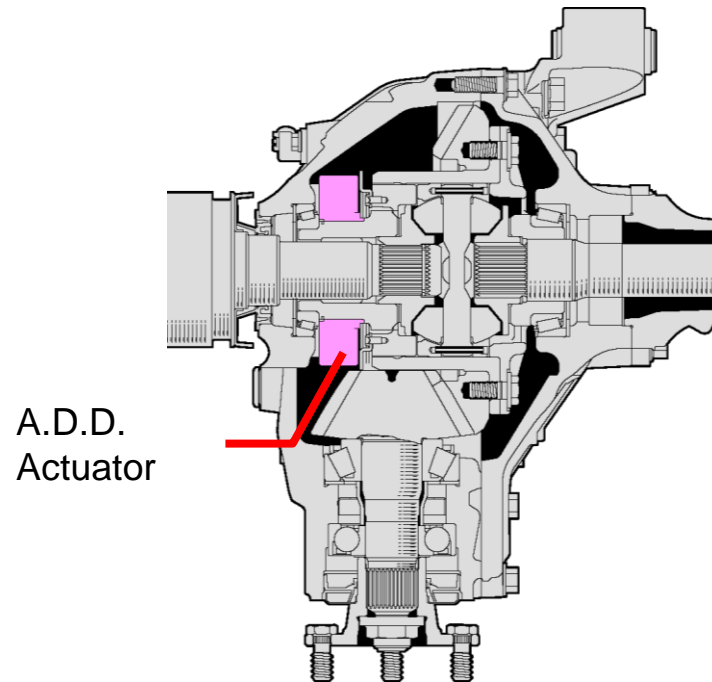
Replaced Part	Necessary Procedures
Hybrid vehicle transmission assembly	<ol style="list-style-type: none"> 1. Learning by Driving 2. K0 Learning Promotion
<ul style="list-style-type: none"> • Automatic transmission assembly • Automatic transmission assembly and torque converter assembly 	<ol style="list-style-type: none"> 1. K0 Compensation Code Registration 2. Learning by Driving 3. K0 Learning Promotion
Torque converter assembly	<ol style="list-style-type: none"> 1. A/T Code Registration (Fixed Code) 2. ATF Thermal Degradation Estimate Reset 3. Learning by Driving
<ul style="list-style-type: none"> • Solenoid Valves (SL1, SL2, SL3, SL4, SL5, SL6, SL, SR, SLT, SLU and SC1) • Transmission valve body assembly (for transmission side) 	<ol style="list-style-type: none"> 1. ATF Thermal Degradation Estimate Reset 2. Learning by Driving
Hybrid module assembly	<ol style="list-style-type: none"> 1. K0 Compensation Code Registration (Arbitrary Code) 2. Reset Memory 3. ATF Thermal Degradation Estimate Reset 4. K0 Thermal Estimate Reset 5. Learning by Driving 6. K0 Learning Promotion

Hybrid Component Service

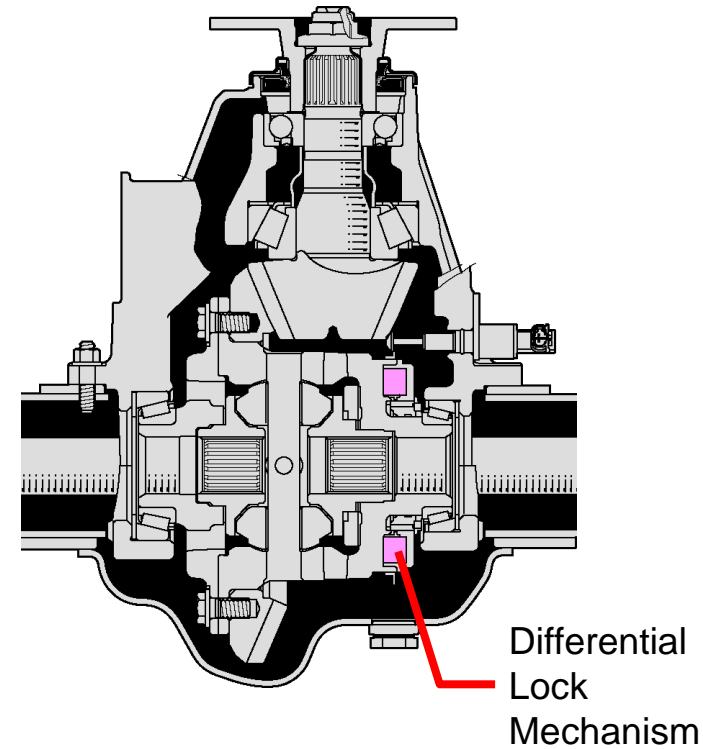


Differential Lock and A.D.D.

**SD22BD Type
Front Differential**

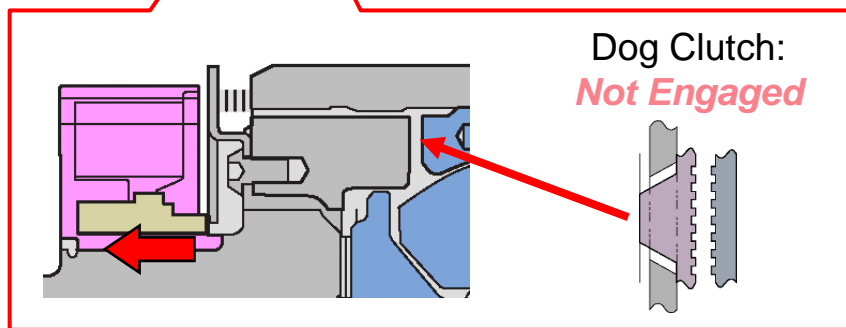
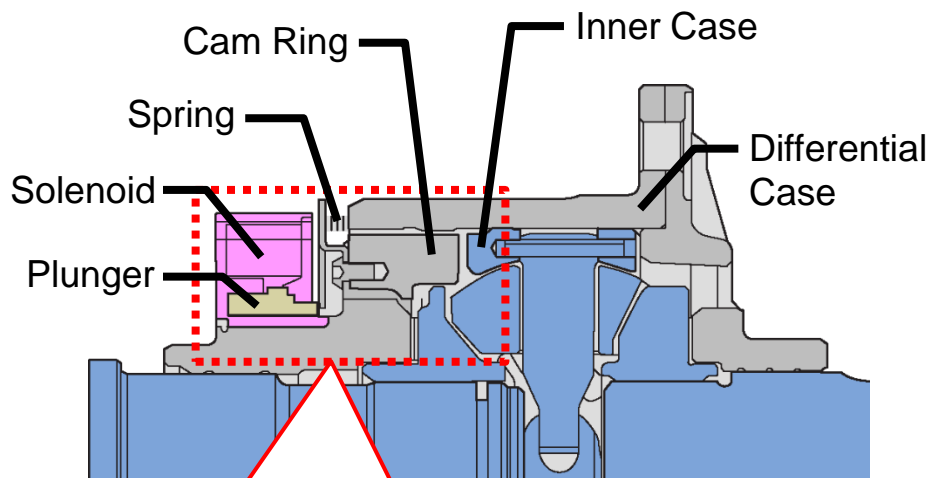


**BD24DN Type Rear
Differential**

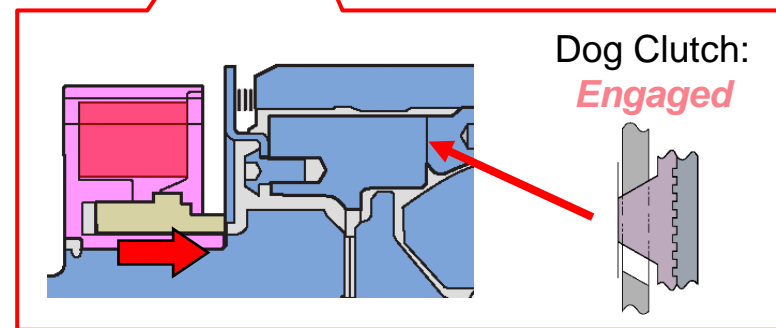
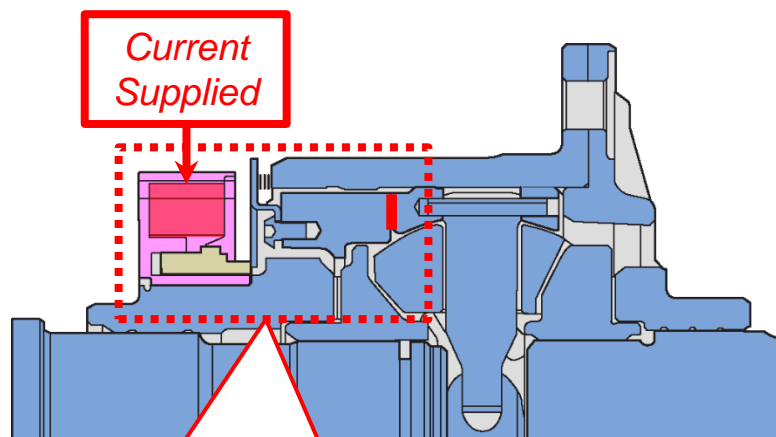


Front Differential A.D.D.

Disconnect

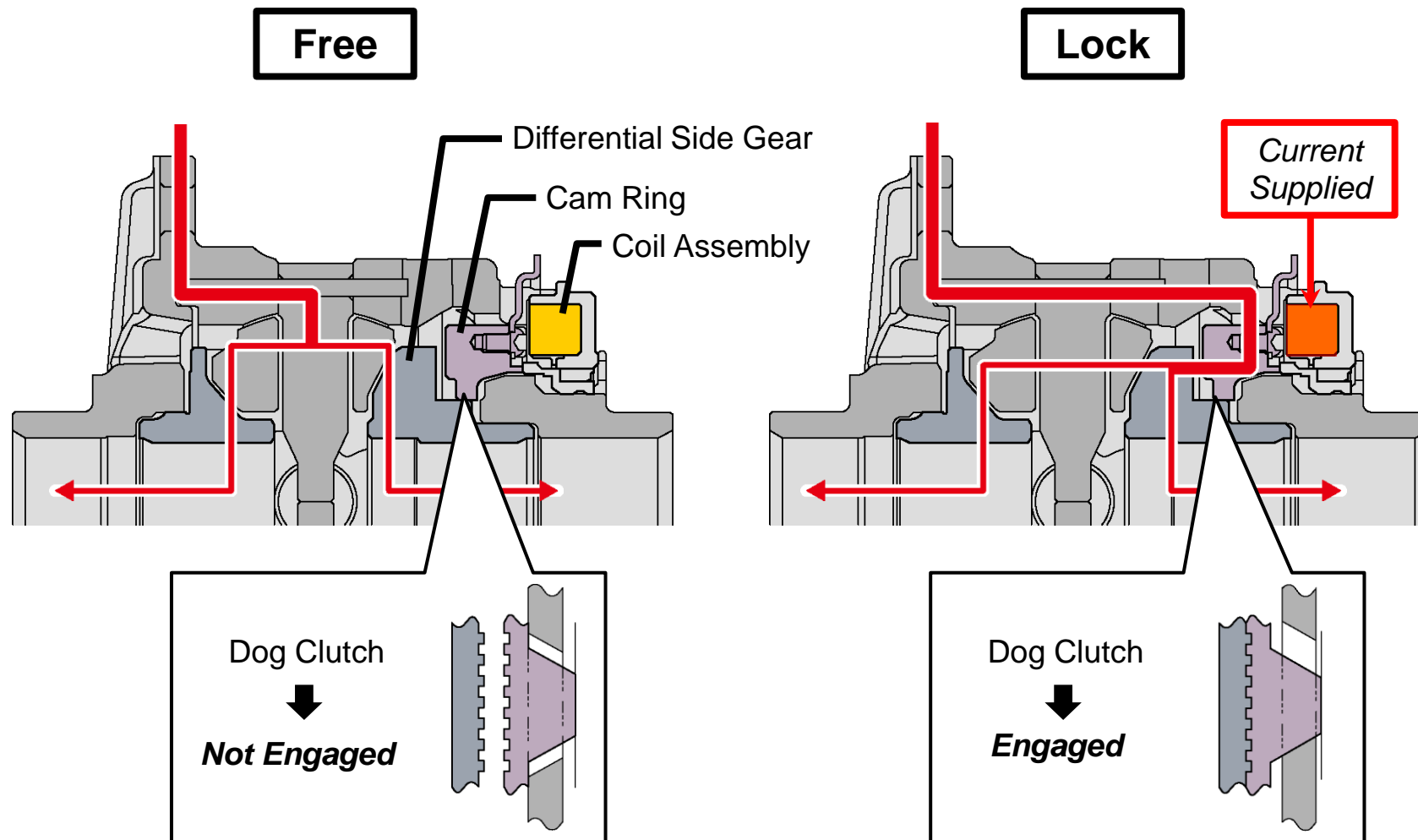


Connect



■ : Static Parts
■ : Rotating Parts

Rear Differential Lock



Unit 4: Brakes and Suspension

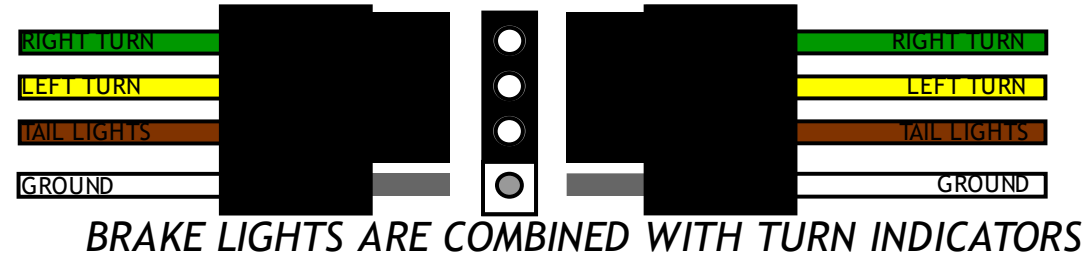
- Describe trailer connection types
- Describe Trailer Brake Controller (TBC) operation
- Electric Parking Brake



Trailer Electrical Connection Types

4-pin flat connector

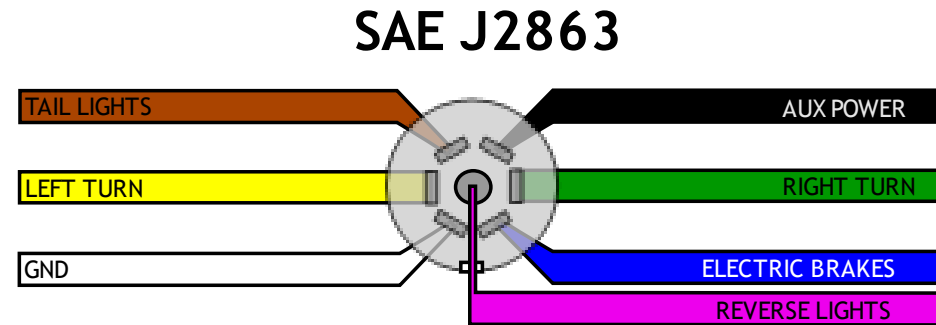
- Class 1-2
- Often used for simpler trailers



4-pin flat connector

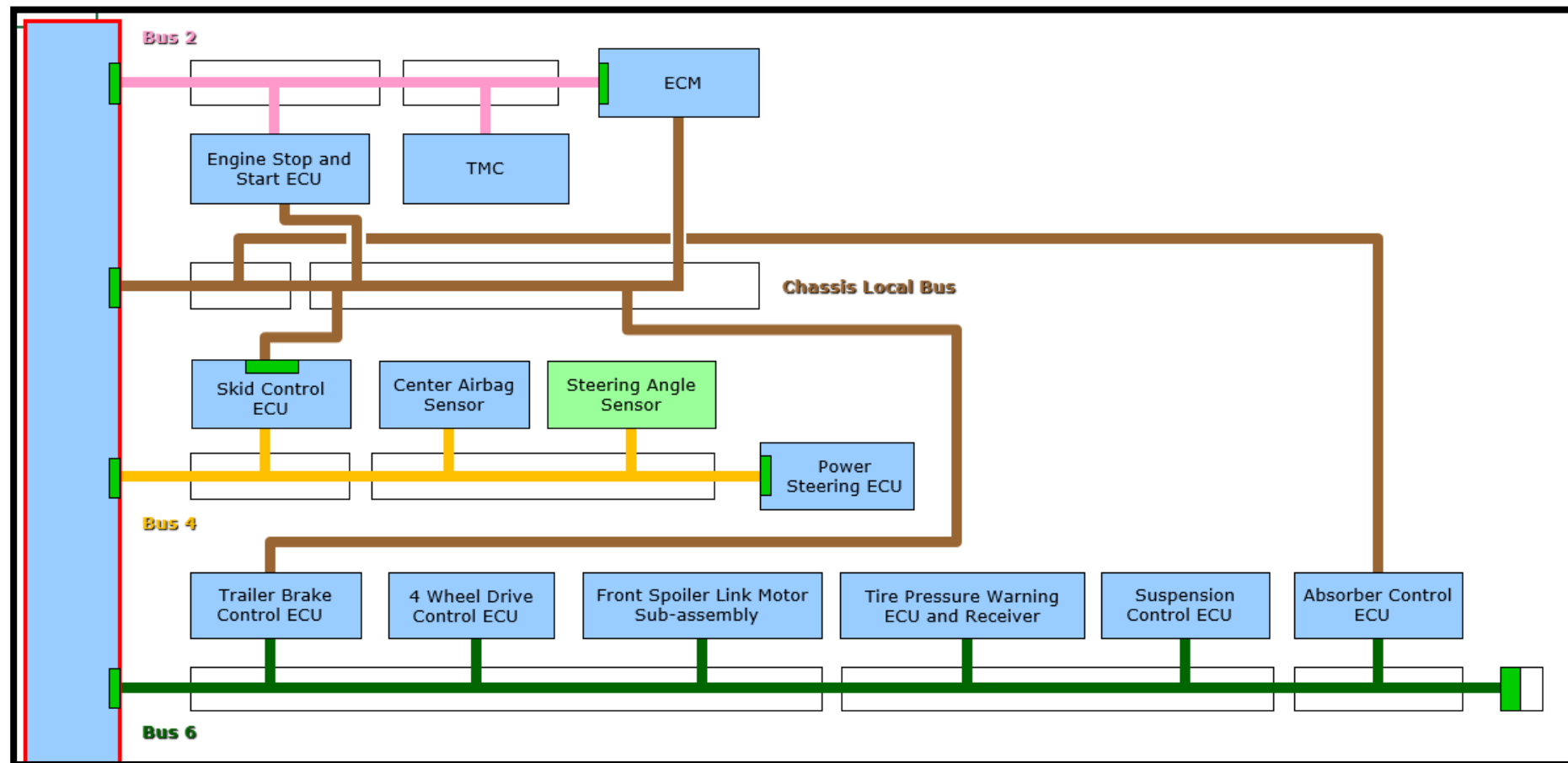
7-pin round blade connector

- Class 3-5
- Often used for large trucks, travel trailers, RVs, etc.



7-pin round blade connector

TBC Integration

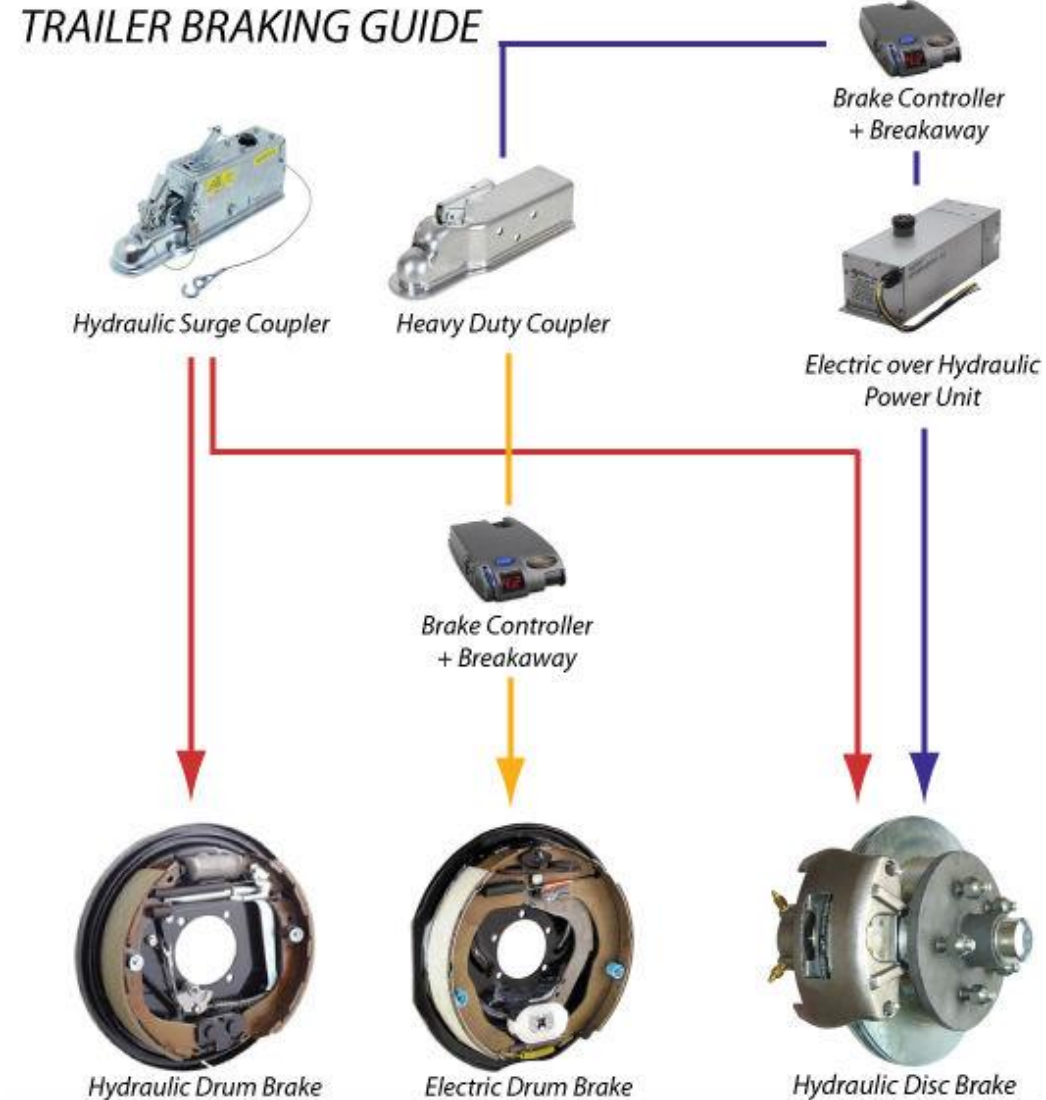


SYSTEMS INTEGRATED WITH TBC:

- VSC, TSC, ACC, PCS, HAC, BA, Dynamic EPB

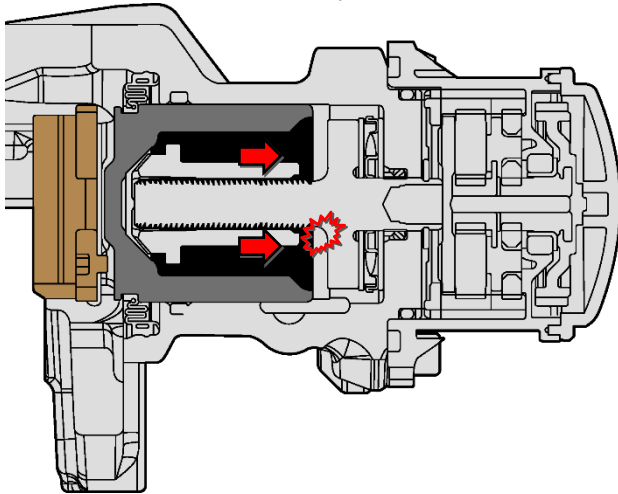
Trailer Brakes

- Inertia
- Electric
- Electric Over Hydraulic (EOH)
- Brake Controller
- Breakaway



Electric Parking Brake

Large torque motor is used to the parking brake actuator.

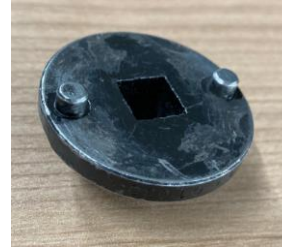
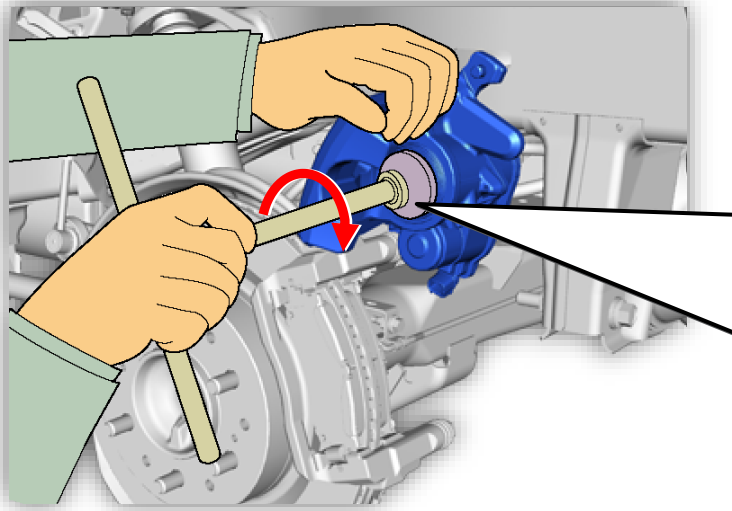


New TUNDRA

For rear brake pad replacement, it is necessary to push back the disc brake piston manually.

Rear Brake Pad Replacement

It is necessary to push back the disc brake piston manually.



or



SST:
09719-12010
(09719-01030)

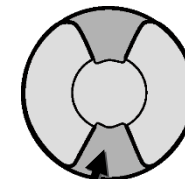
Tool
(Included with the rear
disc brake pad kit)

Notice!

Turn the piston to the position where the protrusion on the pad lines up properly with the piston groove.



Protrusion

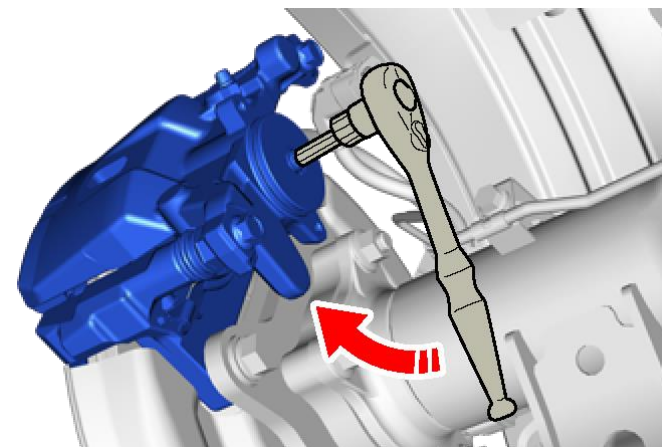
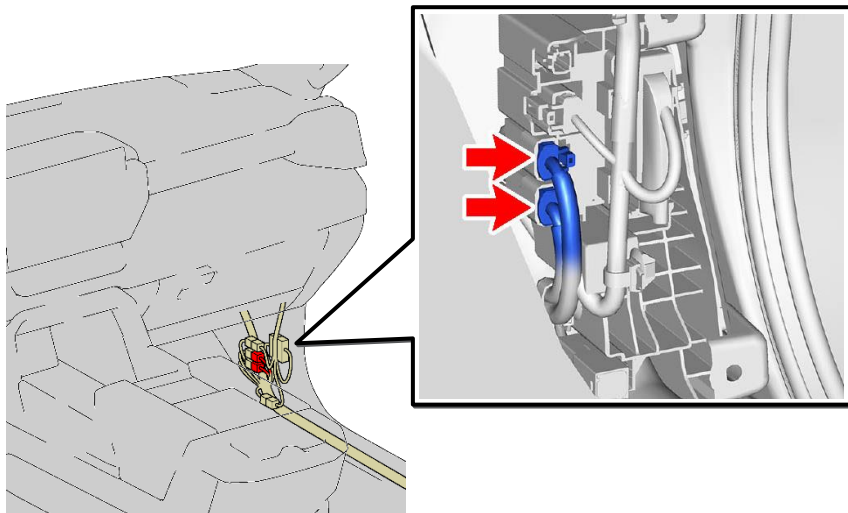


Piston Groove

Parking Brake Forced Release

[Overall Procedure]

1. Park the vehicle on a level surface and check that the shift lever is in P.
2. Turn the ignition switch off and use wheel chocks to secure the vehicle.
3. Disconnect the 2 connectors.
4. Remove the parking brake actuator assembly.
5. Using T50 "TORX" socket wrench, turn it 2 full rotations clockwise to release the parking brake lock.



Vehicle Lifting Precautions



Vehicle Height Control:
Manual Mode

Auto leveling
function is cancelled.



Jacking up the vehicle



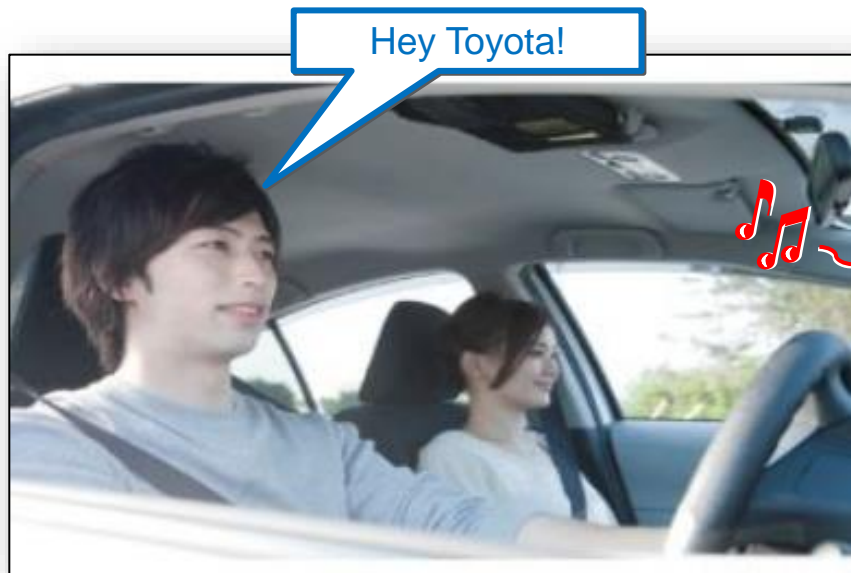
A trailer etc. is attached to
the vehicle.

Unit 5: Multimedia System

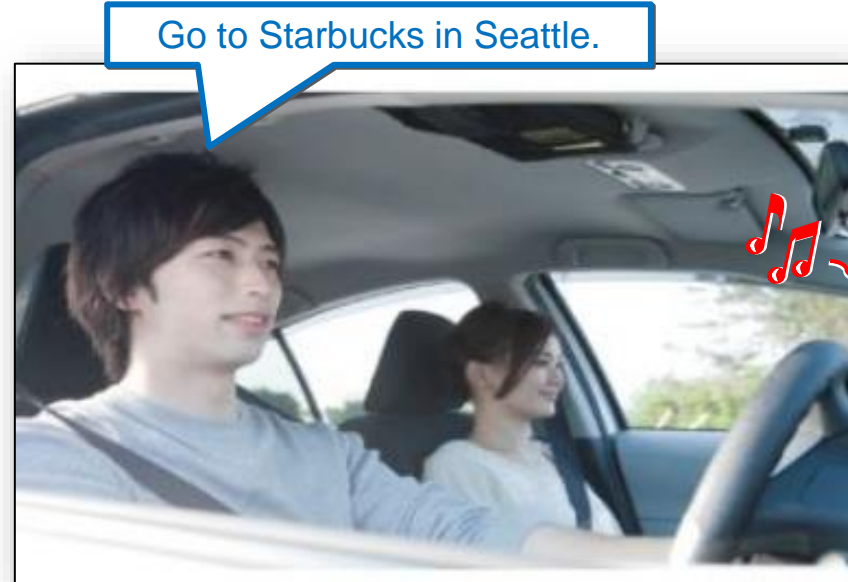
- Cloud Based System
- Connected Services Support
- Connected Technology Portal
- Able to recognize driver and link profile



Voice Recognition Function

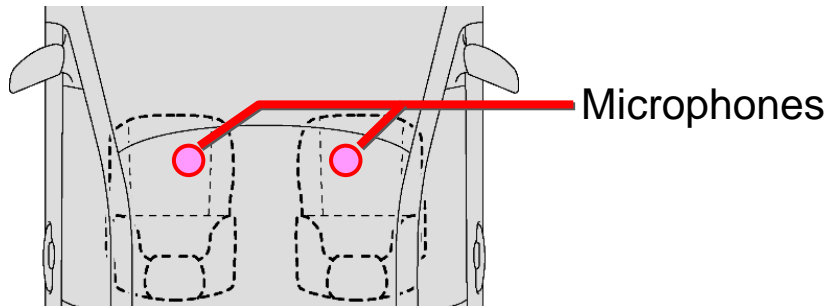


Speak "Wake up Phrase".

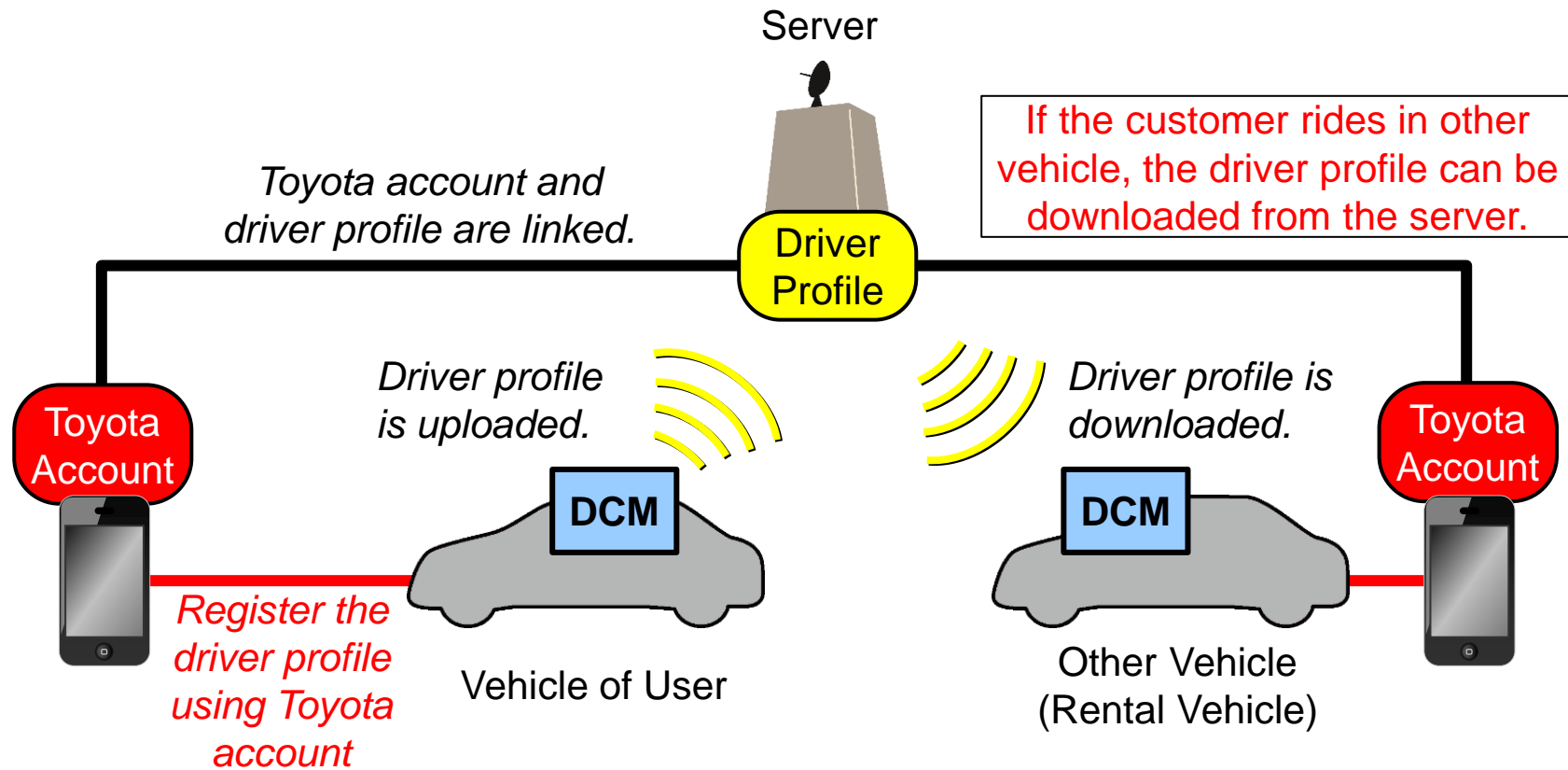


Speak instructions.

The audio source does not stop while this function is activated.



Driver Profile Control



New Support Information

Located in SLP – Knowledge Center
Customer Interview Forms
Links to CTS and CTP sites

Customer Interview Forms

1. [Customer Interview Form: HV Transaxle Abnormal Noise / Vibration](#)
2. [Customer Interview Form: Vehicle Drivability \(Surge/Hesitation\)](#)
3. [Toyota CTP Setup Guide](#)
4. [Toyota Alexa Worksheet](#)
5. [Toyota Cloud Navigation Worksheet](#)
6. [Toyota Destination Assist Worksheet](#)
7. [Toyota Remote Connect App Worksheet](#)
8. [Toyota RES by Key Fob Worksheet](#)
9. [Toyota Safety Connect Worksheet](#)
10. [Toyota Service Connect Worksheet](#)
11. [Toyota Service Drive Flow Chart](#)
12. [Toyota Wi-Fi Worksheet](#)

Quick Links

- [Frequently Asked Questions for all things Toyota](#)
- [Toyota Financial Services Homepage](#)
- [Toyota Financial Services Insurance Products](#)
- [Telematics – CTS \(Features by VIN/set up guidance\)](#)
- [Telematics – CTP \(Accounts by VIN/Network/Op History\)](#)

Unit 6: ADAS System

- Forward Recognition Camera calibration procedures
- Millimeter Wave Radar sensor calibration procedures



ADAS Systems

- Toyota Safety Sense 2.5
 - Towing PCS
 - Towing LTA
 - Towing ACC
- Panoramic View Monitor
 - Bed View Camera
- Multi-Terrain Monitor
- Trailer Backup Guide
- Blind Spot Monitor
 - Trailer Blind Spot Monitor

Model		Previous TUNDRA	New TUNDRA
Type		Toyota Safety Sense P	Toyota Safety Sense 2.5
PCS (Pre-Collision System)	Warning/Brake Assist/ Brake	●	●
	Intersection Support	—	●
	Emergency Steering Assist	—	●
	Operation during towing	—	●
LTA (Lane Tracing Assist) System	LDA Function	●	●
	Steering Assist Function	—	●
	Lane Centering Function	—	●
	Operation during towing	—	●
Dynamic Radar Cruiser Control System	Vehicle-to-vehicle Distance Control Mode	●	●
	Turn Signal-linked Control	—	●
	Operation during towing	—	●
AHB (Automatic High Beam) System		●	●
RSA (Road Sign Assist) System		—	●

●: Available

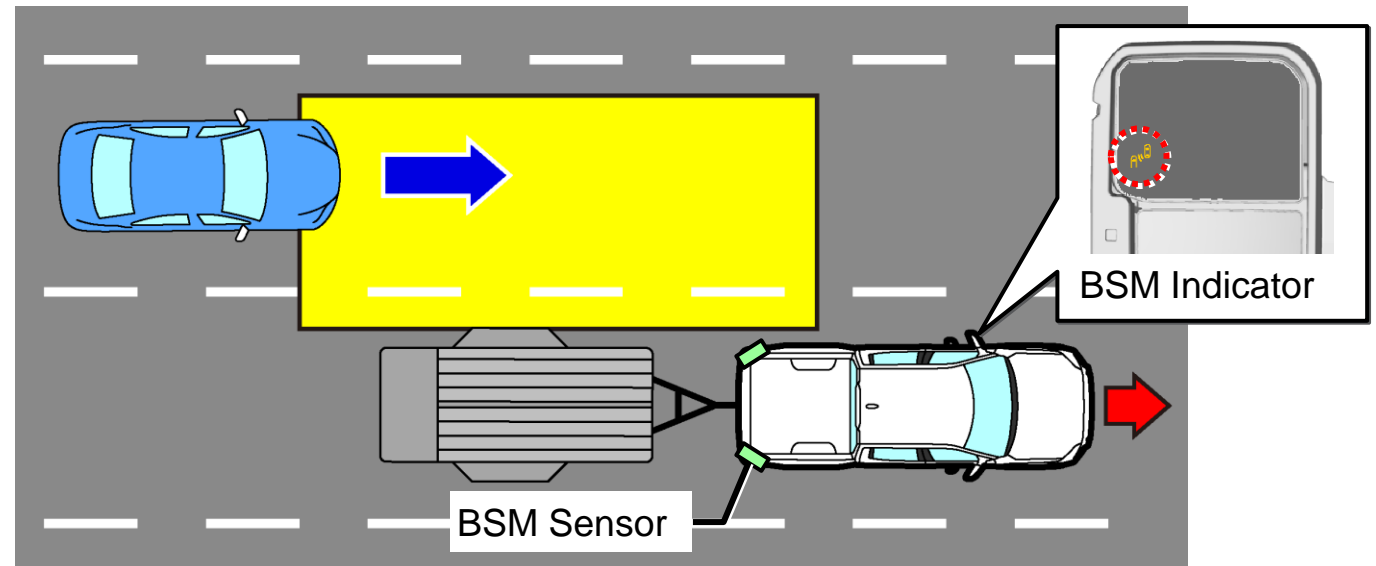
—: Not available

Trailer Blind Spot Monitor (TBSM) Function

TBSM function is newly adopted to operate the BSM system when towing a trailer.

TBSM function has 3 functions:


- ATD (Auto Trailer Detection) function
- TLD (Trailer Length Detection) function
- TMW (Trailer Merge Warning) function



Like BSM system, TBSM function uses BSM sensors to detect vehicles that are in blind spot and helps the driver to confirm safety when changing lanes.

Trailer Backup Guide

In order to use the Trailer Backup Guide (TBG) system, it is necessary to register the trailer information on the Multi-Information Display in advance.

1. Select  > Trailer Settings on the multi-information display.
2. Select “Select or Add Trailer” and enter the trailer information.

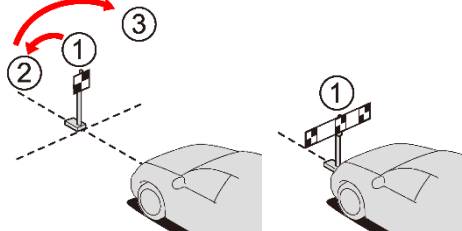
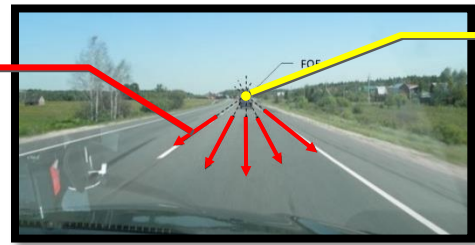
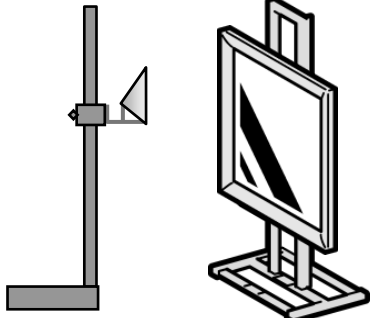
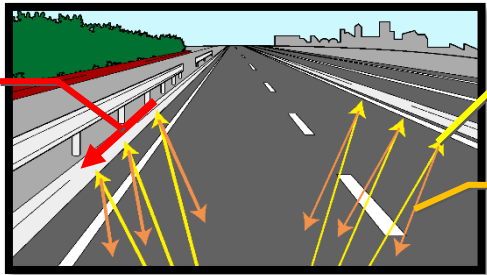
NOTE: If the trailer information already is registered, select the trailer the customer want to use.



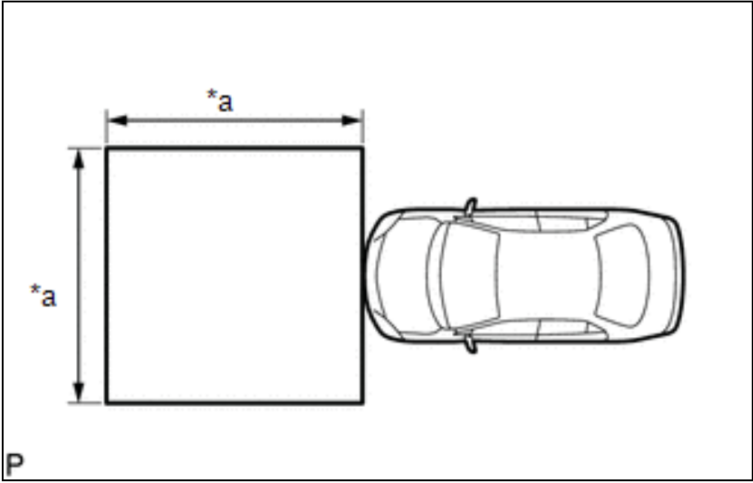
When all the following conditions are met, the trailer backup guide system operates.

- Ignition switch is turned on.
- The trailer backup guide switch is turned on.
- The trailer is connected to the vehicle.
- The shift position is R.

Calibration

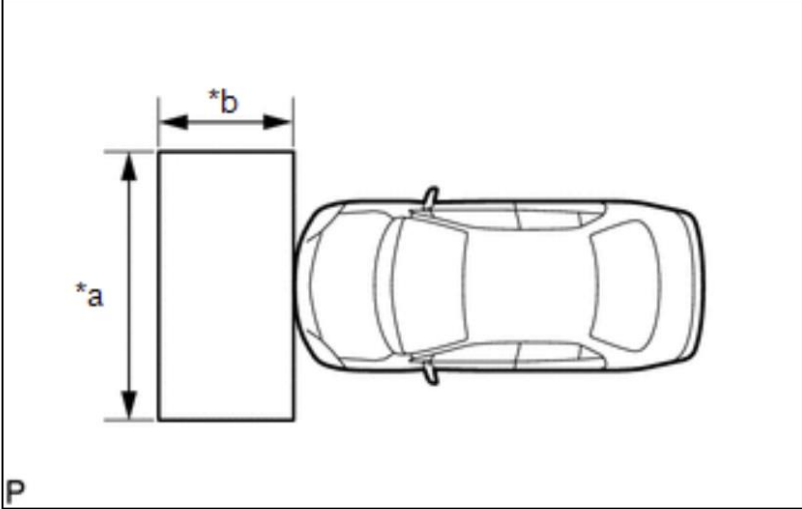
Parts	Method of Optical Axis / Beam Axis Adjustments	
	Target Adjustment	Driving Adjustment
Forward Recognition Camera	<ul style="list-style-type: none"> Sequential Recognition One Time Recognition 	<p>While driving the vehicle, camera recognizes the movement of external data (white lines, etc.) and calculates the vehicle driving direction.</p> 
Millimeter Wave Radar Sensor	<ul style="list-style-type: none"> Triangle Target Flat Surface Target 	<p>While driving the vehicle, sensor detects the movement of external data (stationary metallic objects, etc.) and calculates the vehicle driving direction.</p> 

| One Time Recognition Target



$*a$	3 m (9.84 ft.)
------	----------------

Sequential Recognition Space Requirement

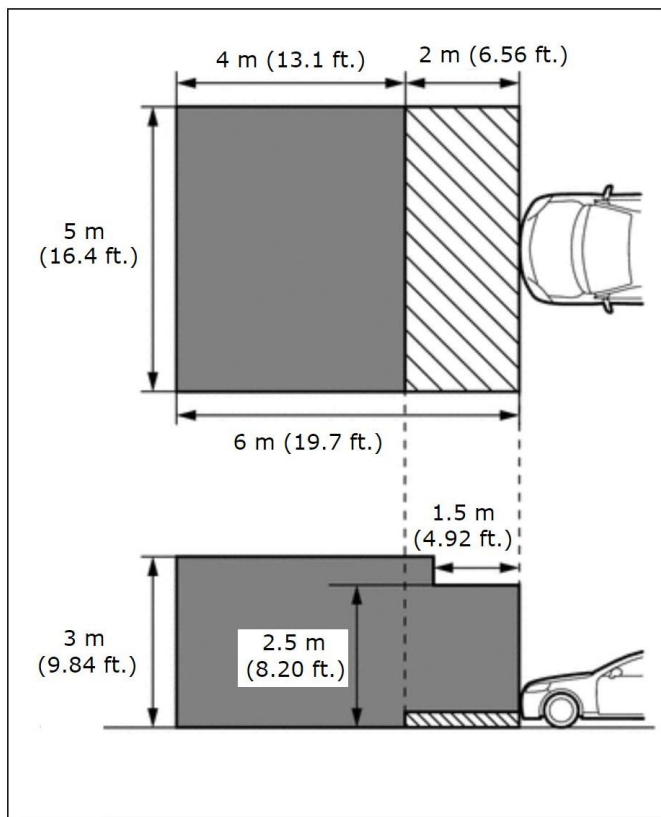


$*a$	2 m (6.56 ft.)
$*b$	1 m (3.28 ft.)

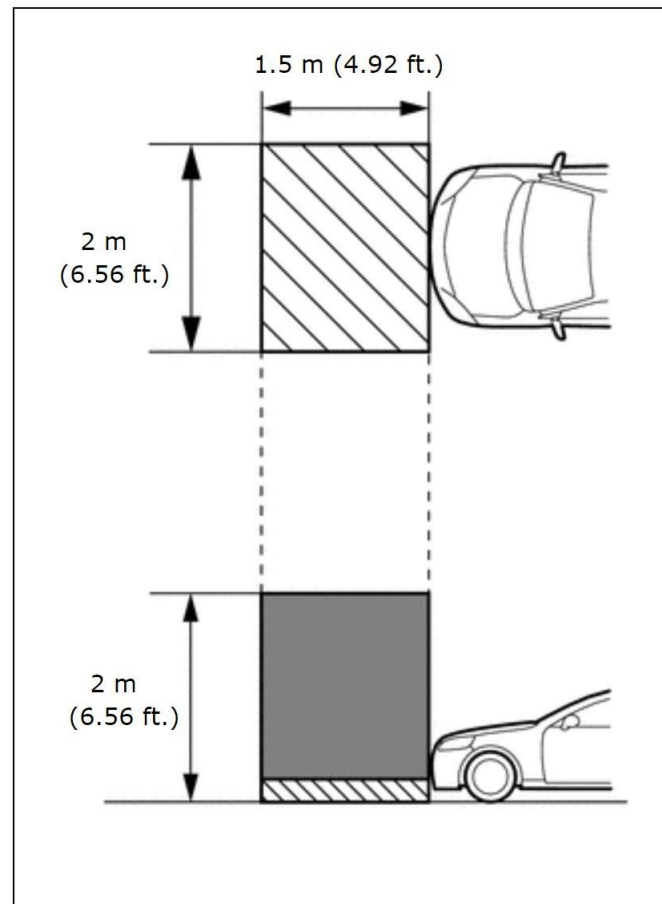
One Time Recognition Space Requirement



Flat Surface Target



Triangle Target Space Requirement



Flat Surface Target Space Requirement

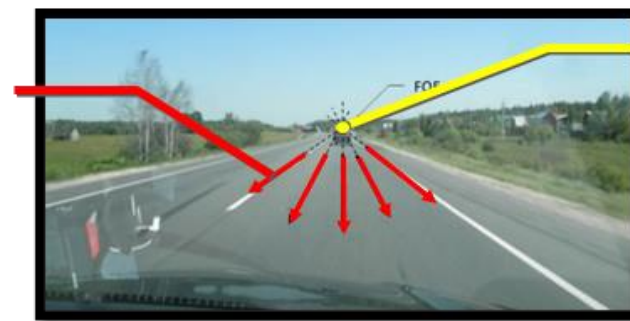


Driving Calibration - Camera

Desired driving conditions:

- Drive at a vehicle speed of 40 km/h (25 mph) or more.
- Steer the vehicle straight and avoid sudden acceleration or deceleration.
- Perform the adjustment mainly on a straight road without incline or decline, with a dry and smooth road surface.
- Use roads with continuous white lines and objects such as buildings or utility poles
- Perform the adjustment outside during daytime, on a sunny or cloudy day (without precipitation).
- Keep preceding vehicles at a distance of at least 20 m (66 ft.)

*Movement
of external
data*



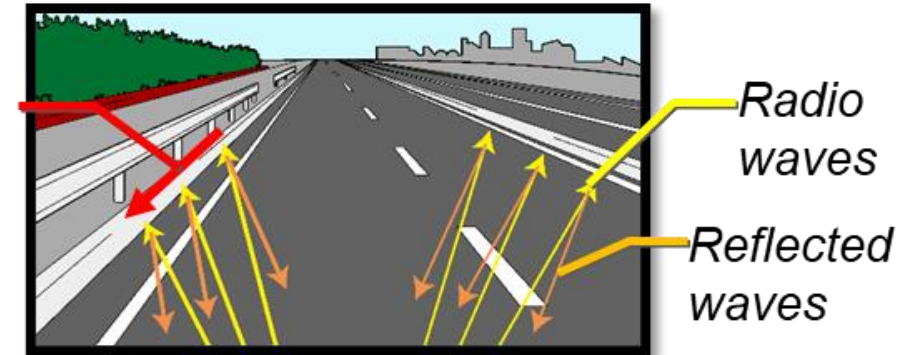
*Vehicle
Driving
Direction*

Driving Calibration - Radar

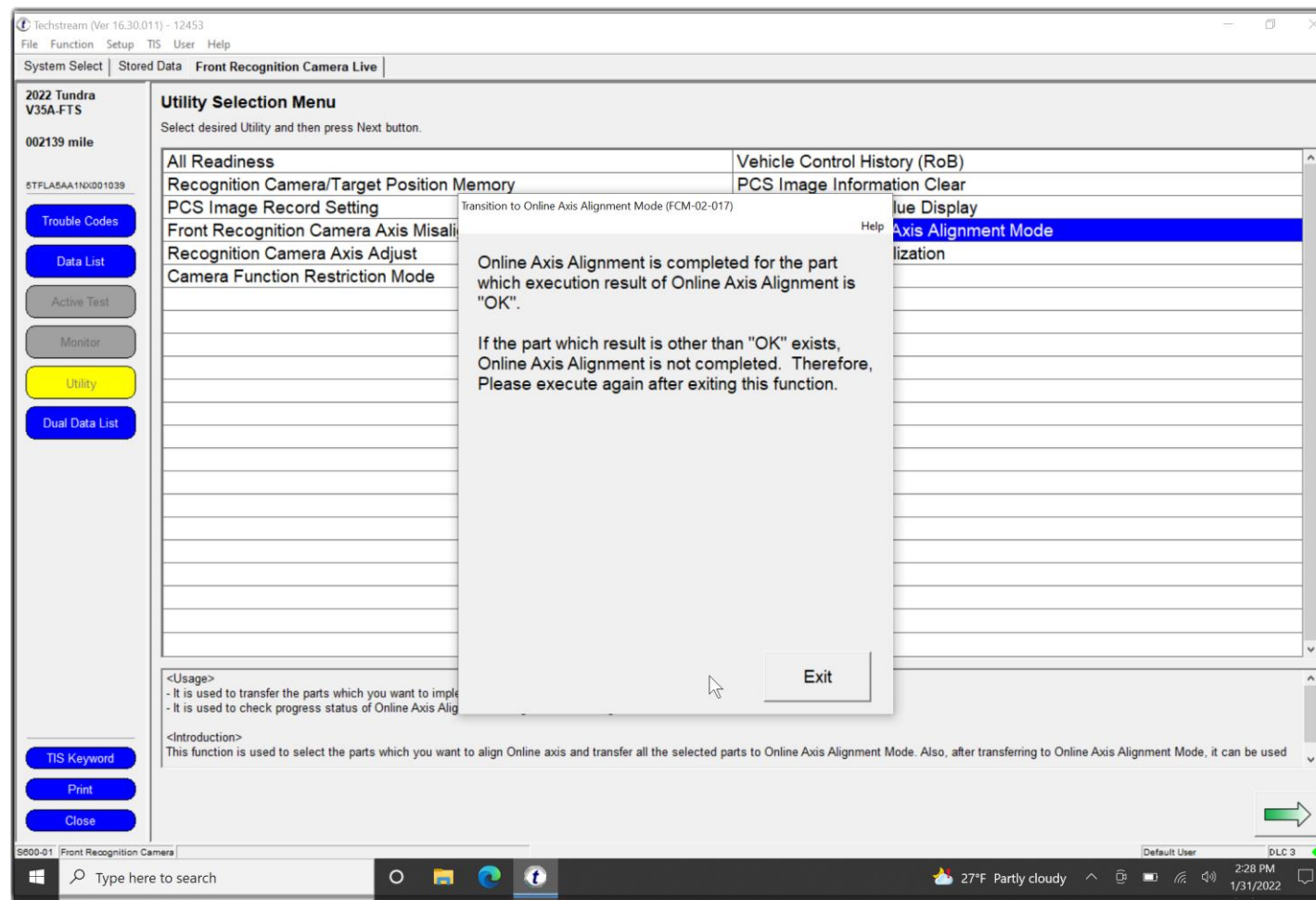
Desired driving conditions:

- Drive the vehicle straight ahead at a speed of 40 km/h (25 mph) or more.
- Use roads with stationary metallic objects such as guard rails
- Perform the adjustment outside during daytime, on a sunny or cloudy day (without precipitation).
- If preceding vehicles are present, they should be kept at a distance of at least 20 m (66 ft.)
- Ensure that there is no snow, ice, or foreign matter on the front or rear of the radar sensor cover or on the front surface of the sensor.
- Make sure that no covers other than the genuine radar sensor cover are installed.
- Drive on a road that does not have heavy snow accumulation around it.

*Movement
of external
data*



Online Axis Alignment Mode



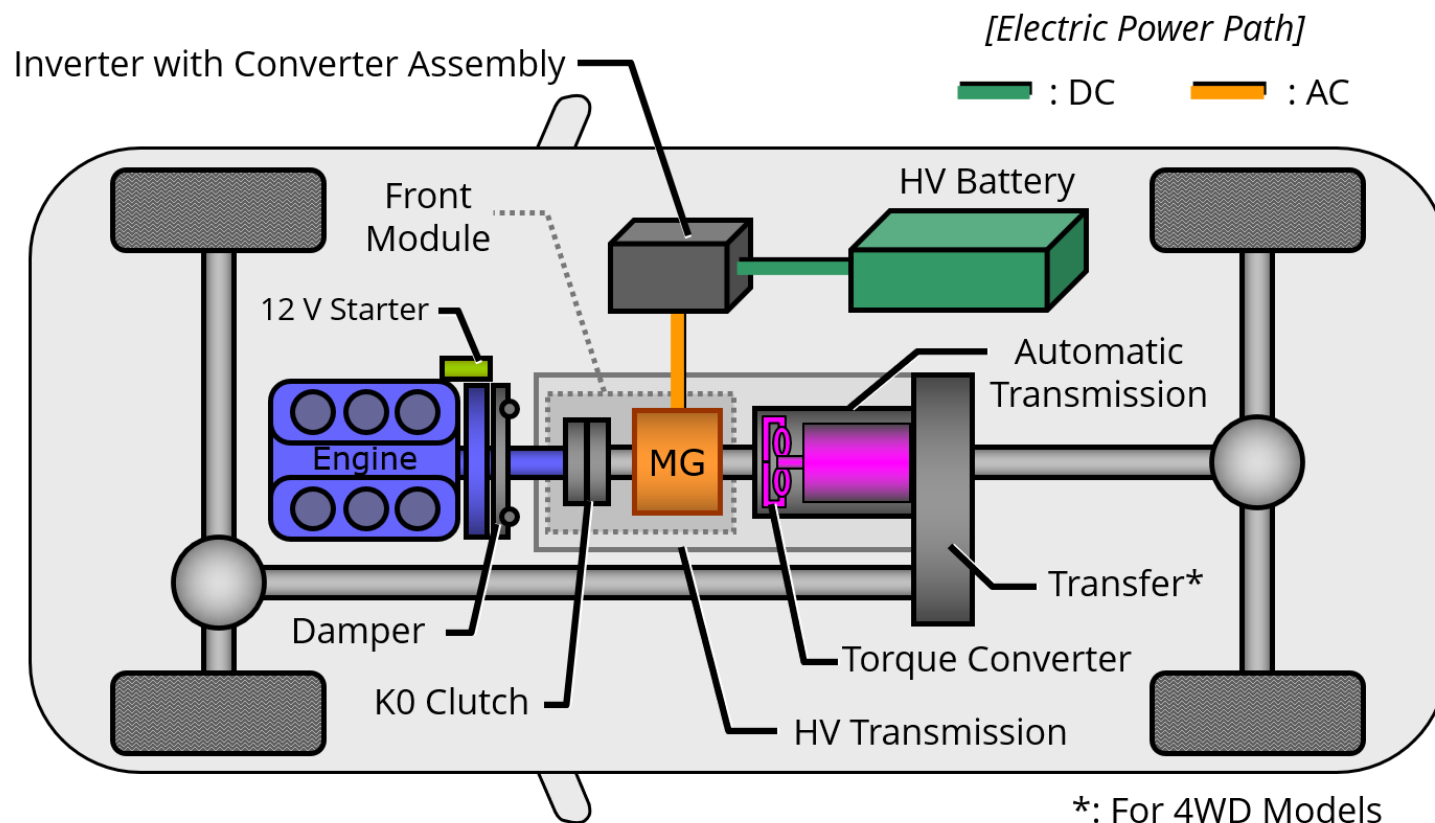
Unit 7: HEV System

- Hybrid System Design
- High Voltage system power down process

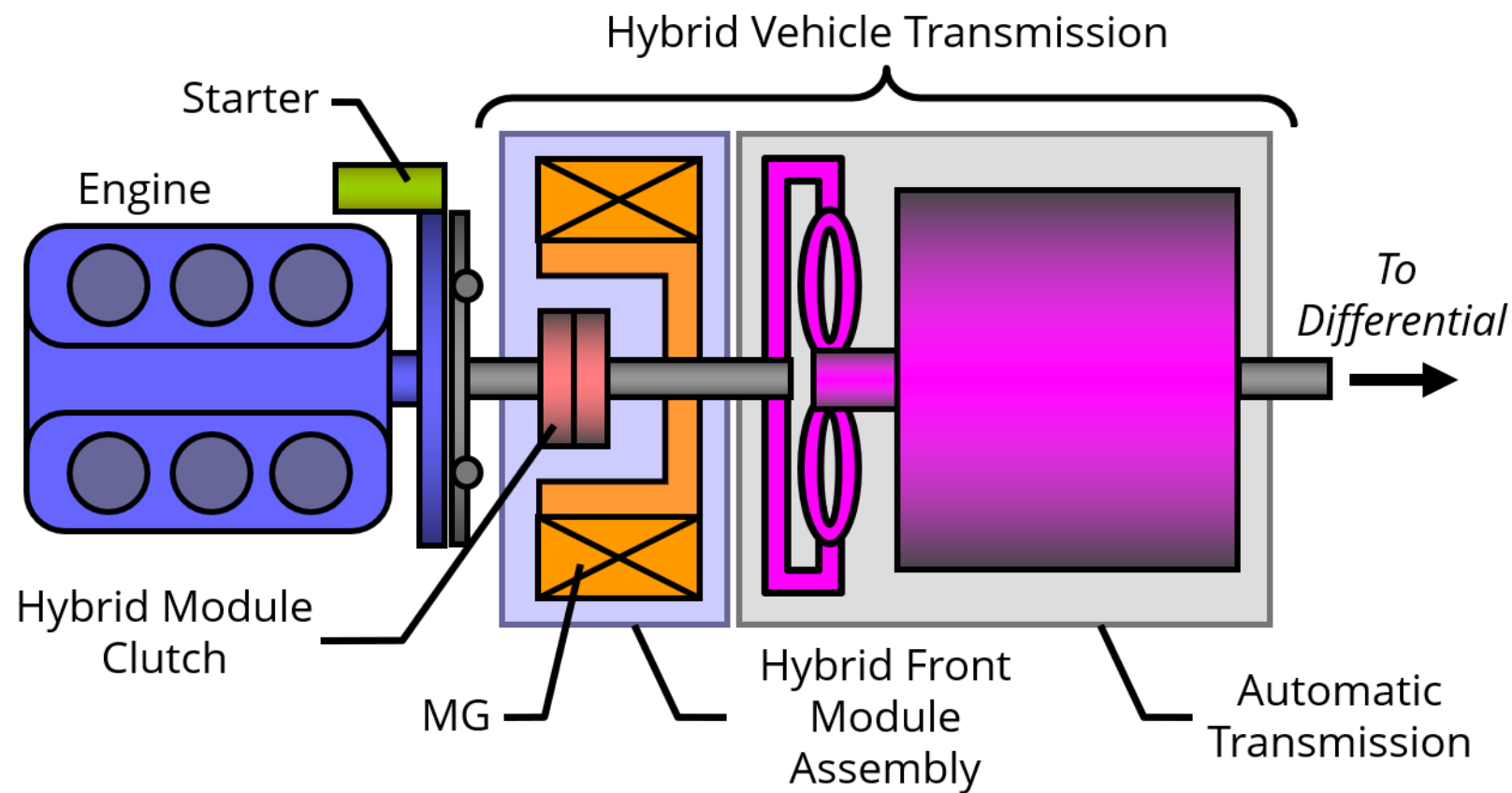


HEV Components

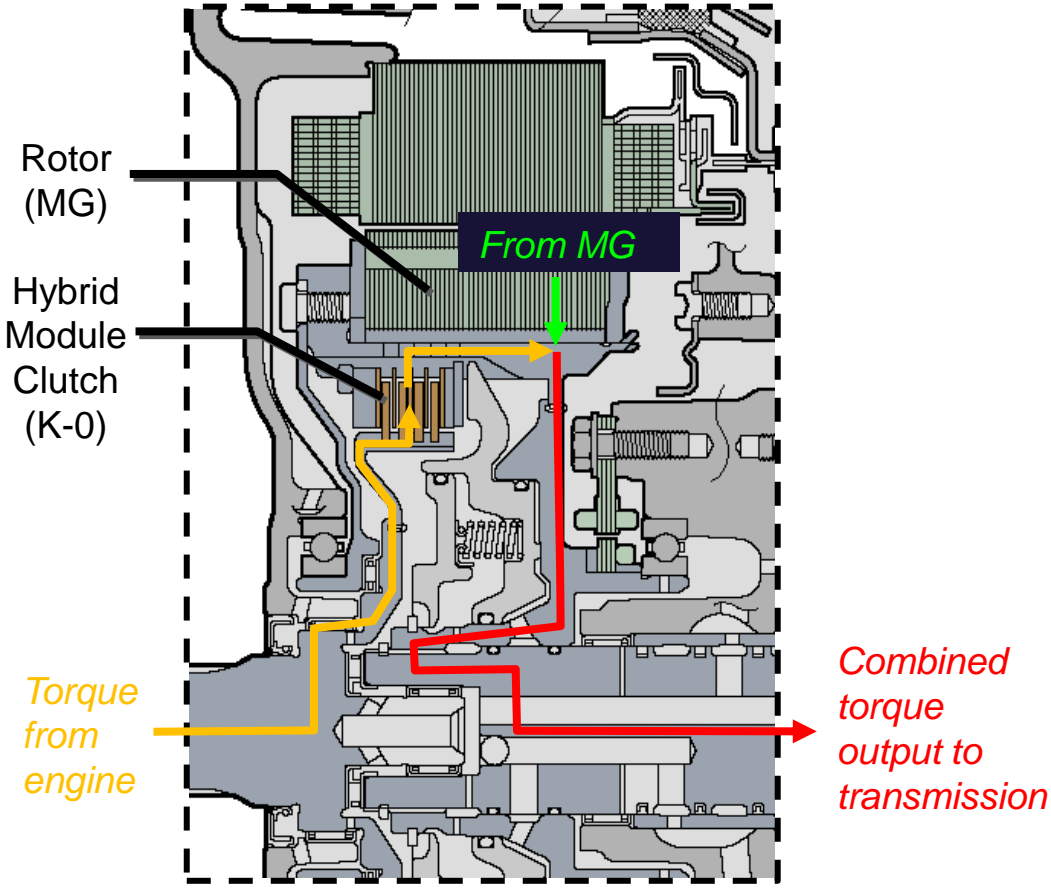
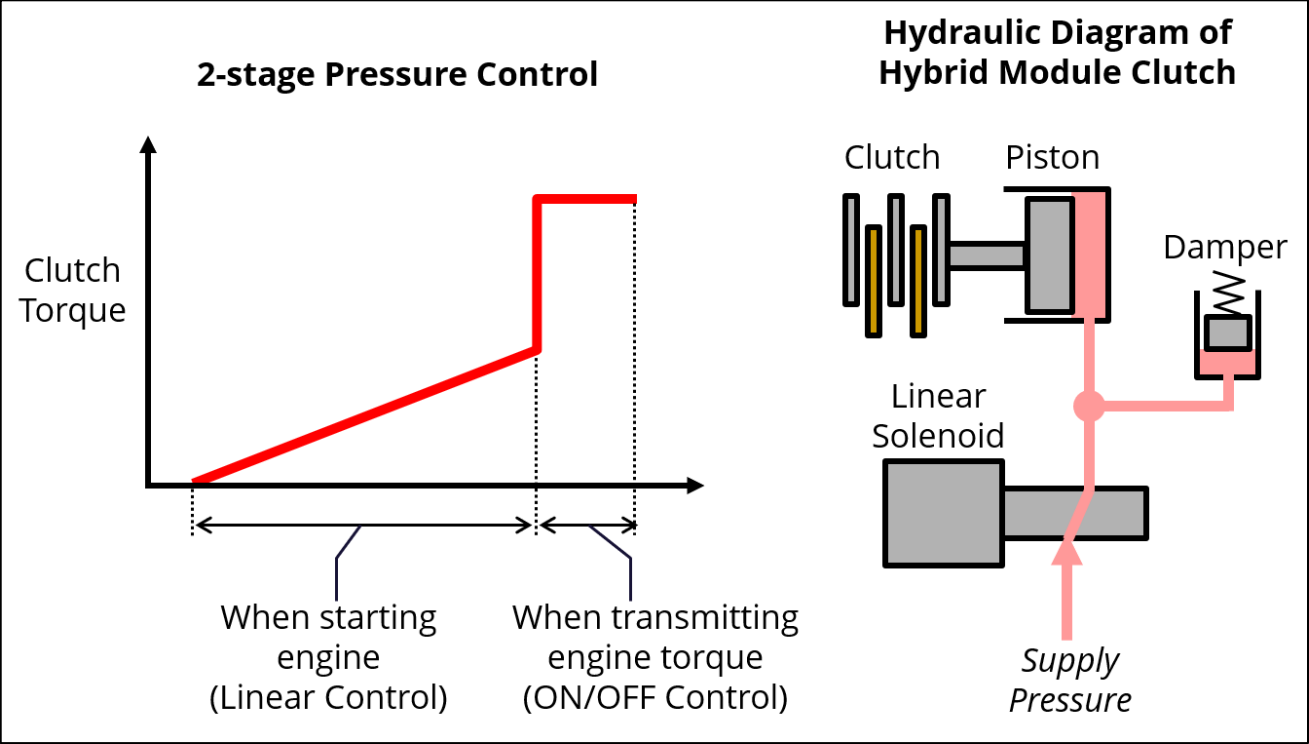
- Inverter with Converter Assembly
 - DC/DC Converter
 - IPM for Driving
 - Not Boosted
- Front Module
 - KO Clutch
 - Valve body
 - Motor Generator (MG)
- Traditional 12 V starter
- HV battery
 - NiMh construction
 - 288 Vdc



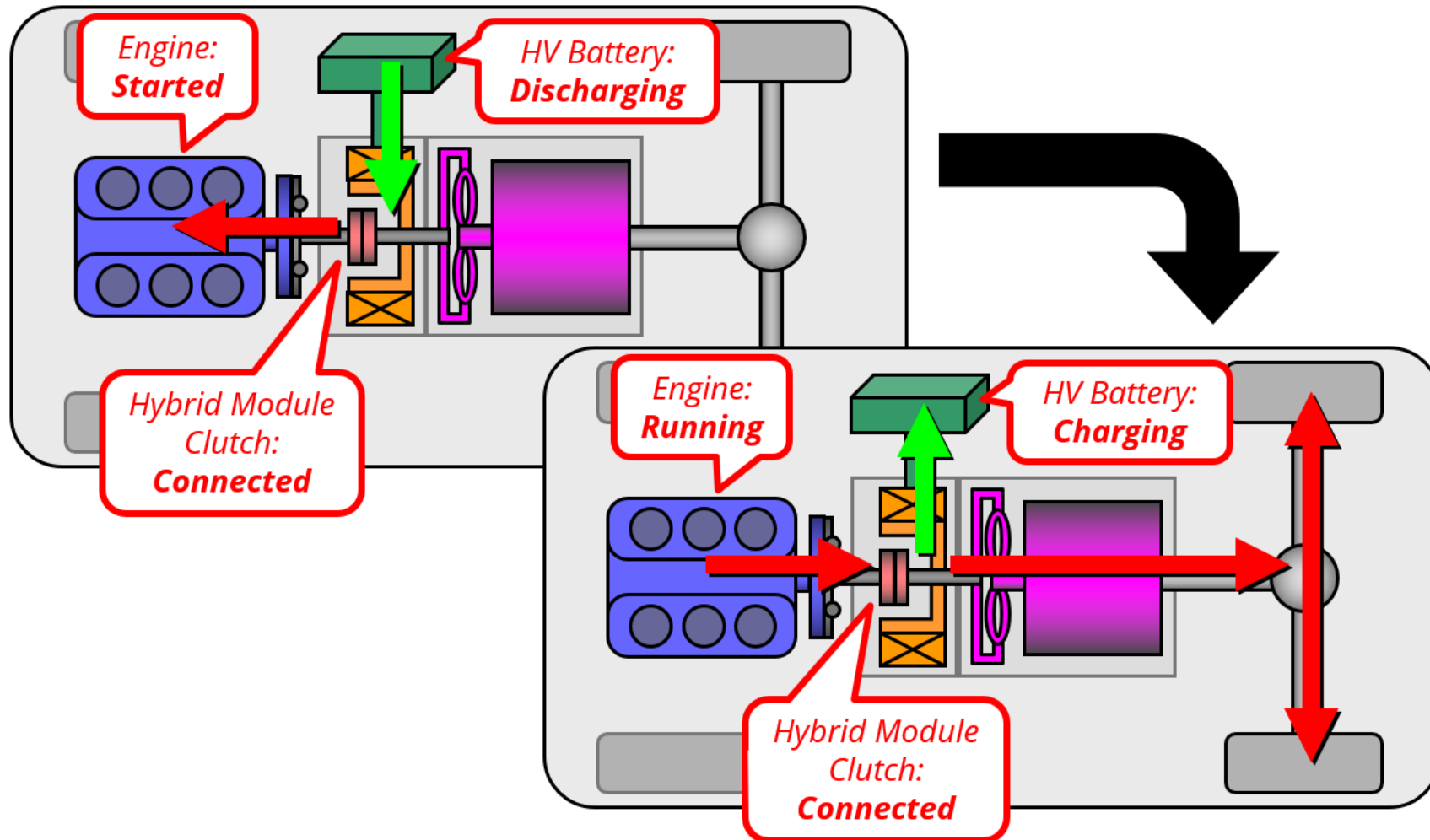
HEV Driveline Components



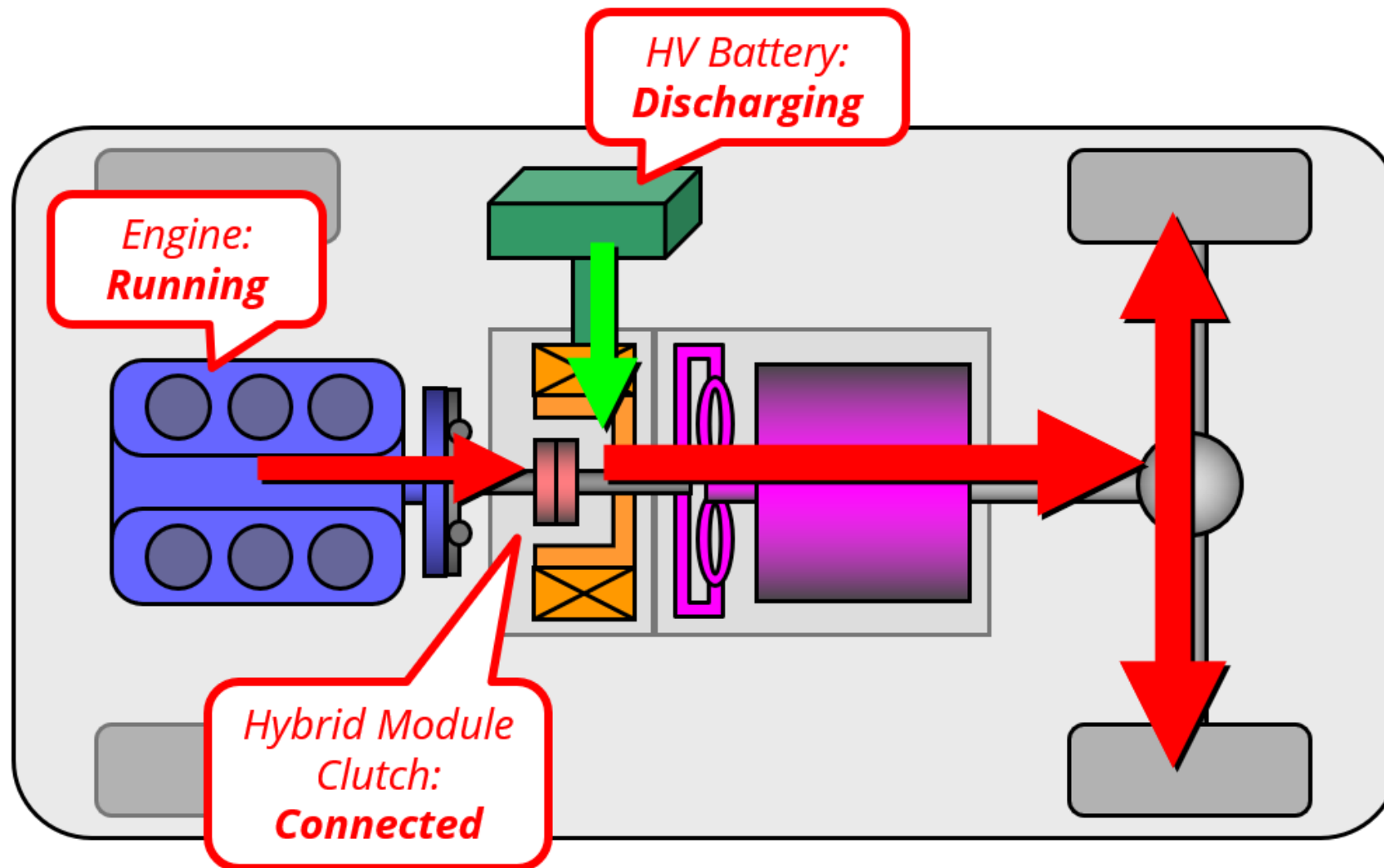
K0 Clutch Operation



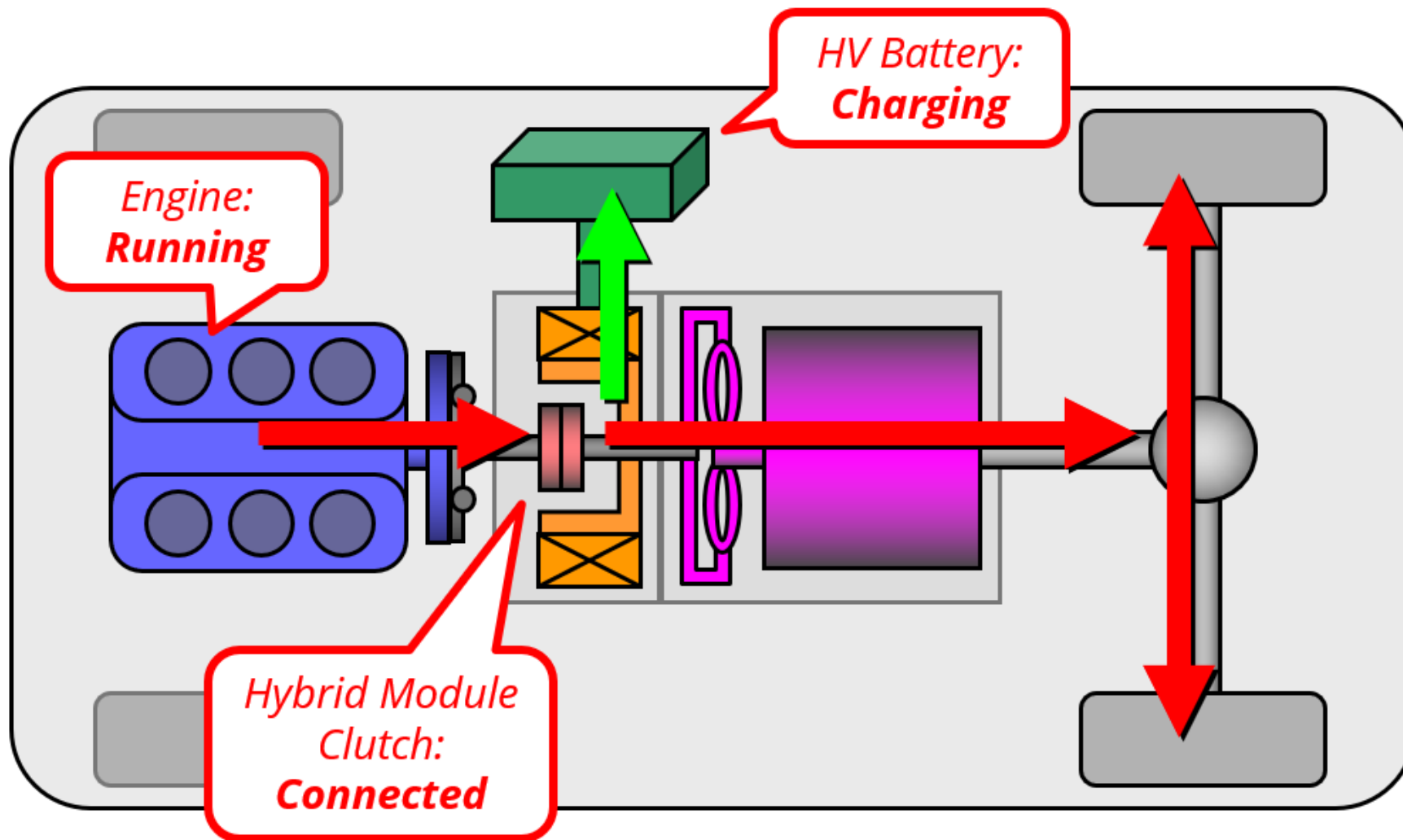
Engine Starting



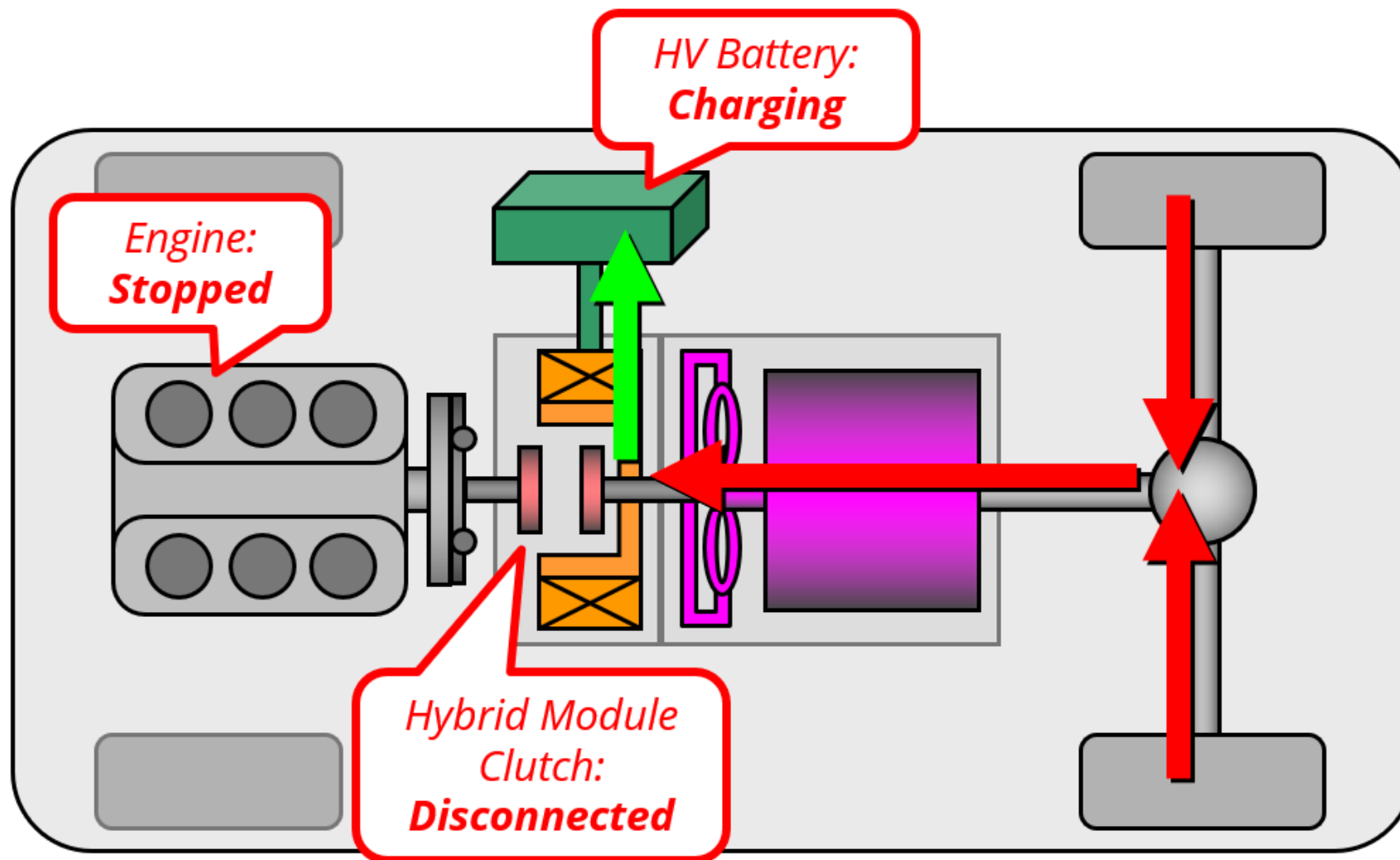
Heavy Acceleration



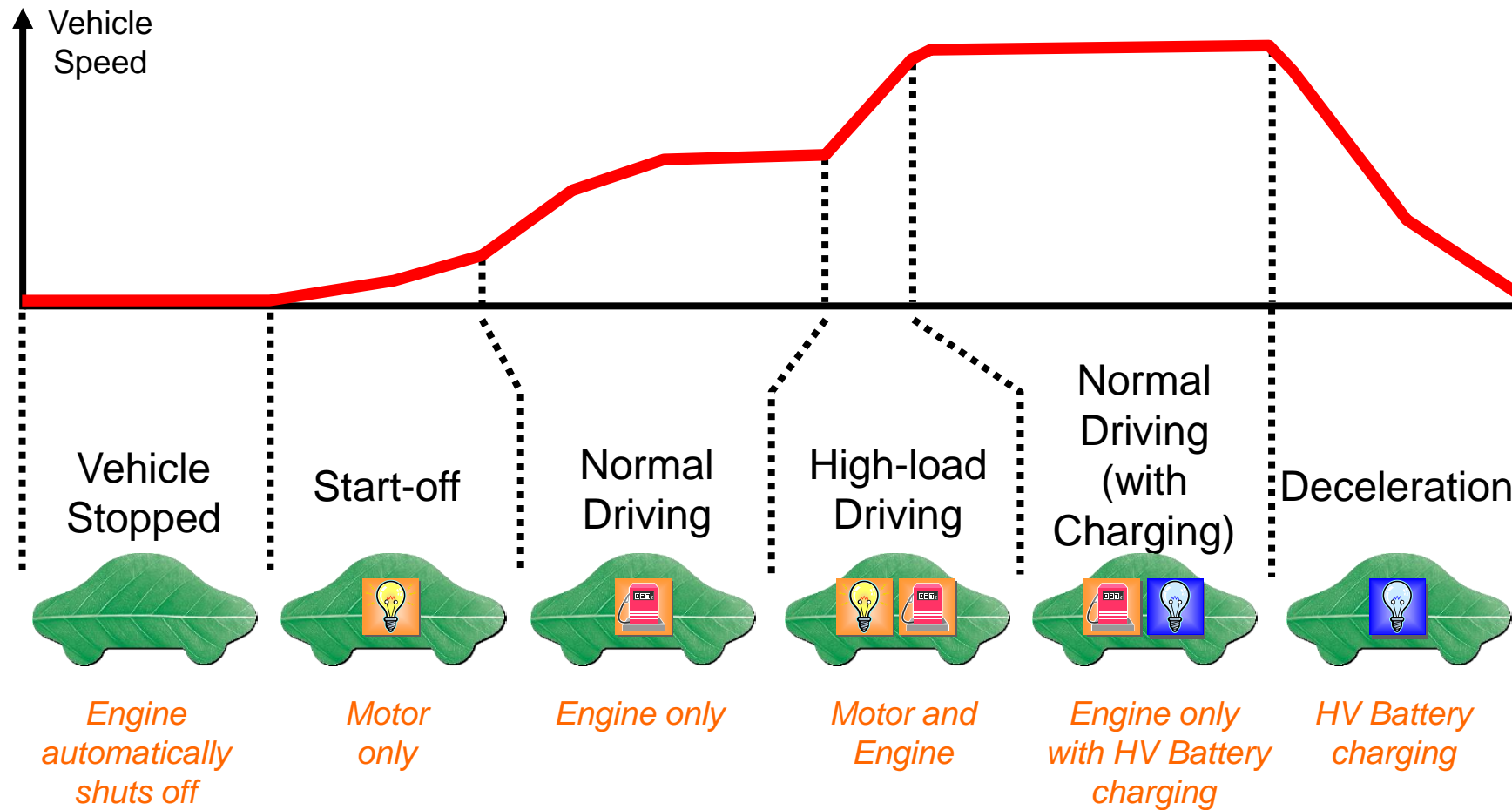
| Constant Speed



Deceleration – Regenerative Braking



HEV System Operation

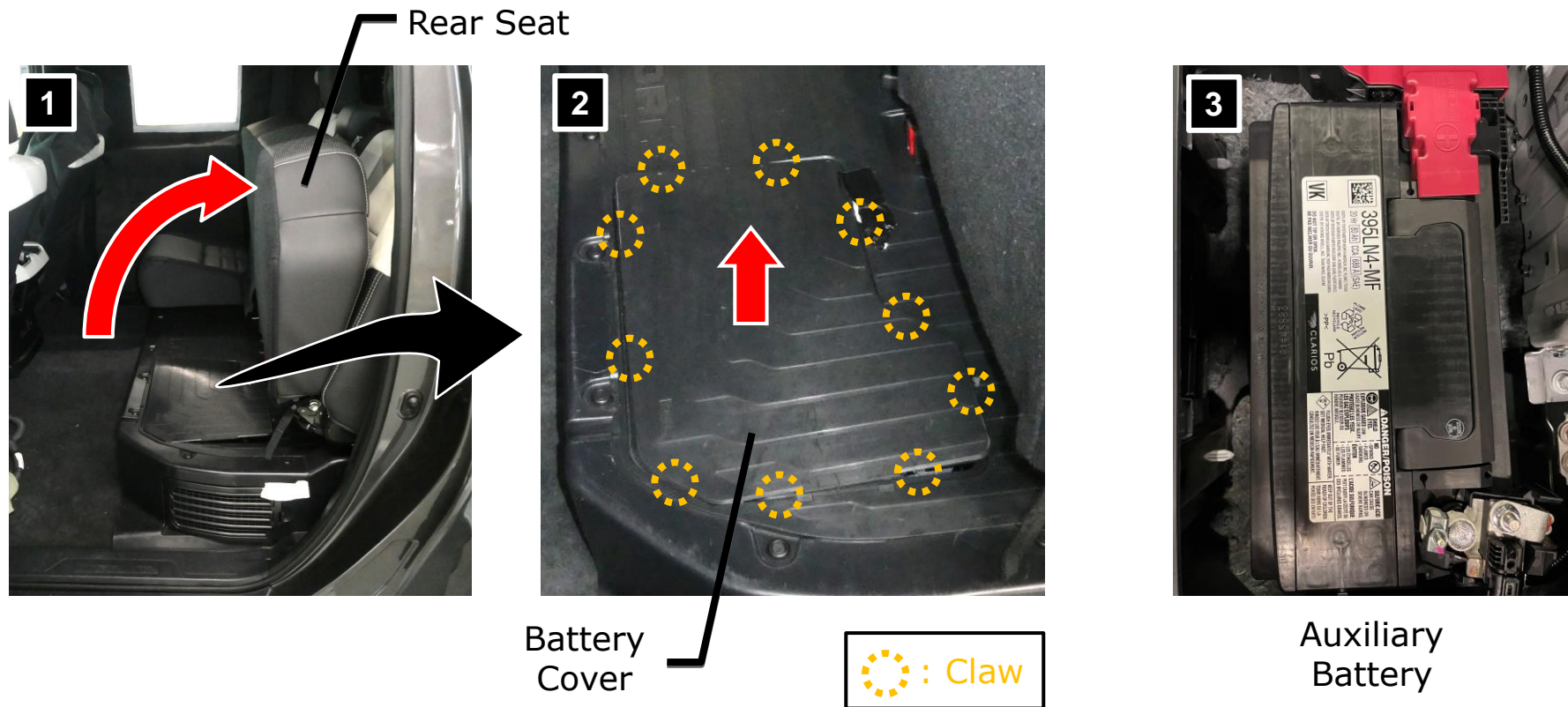


High Voltage Disable Procedure Overview

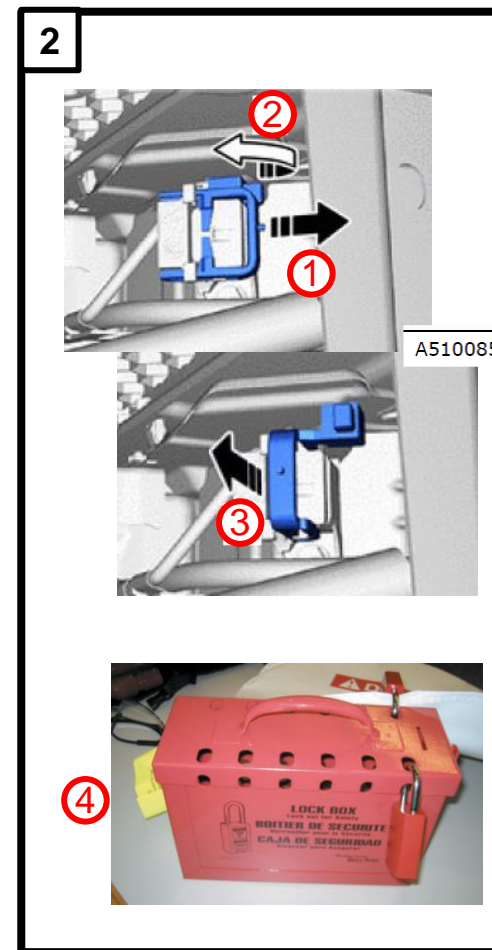
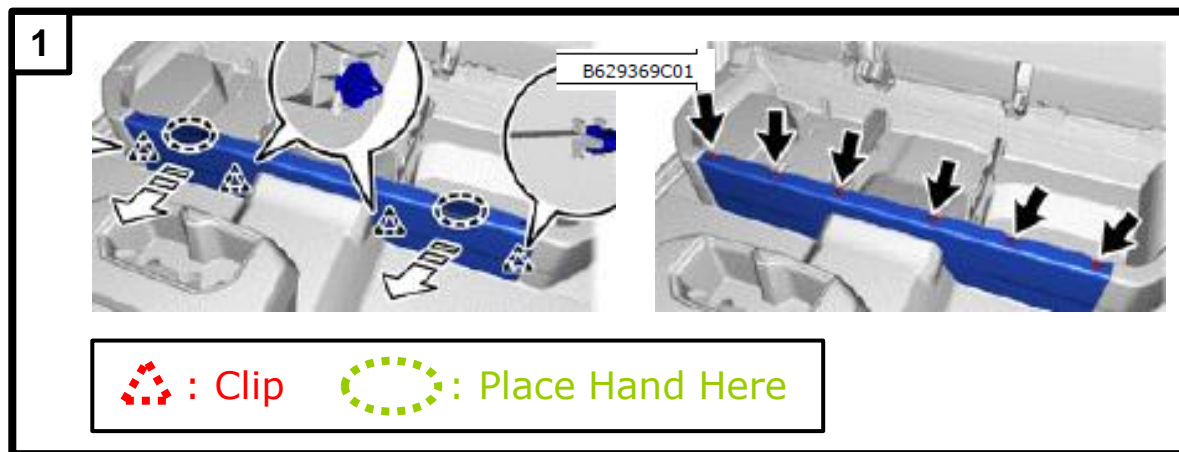
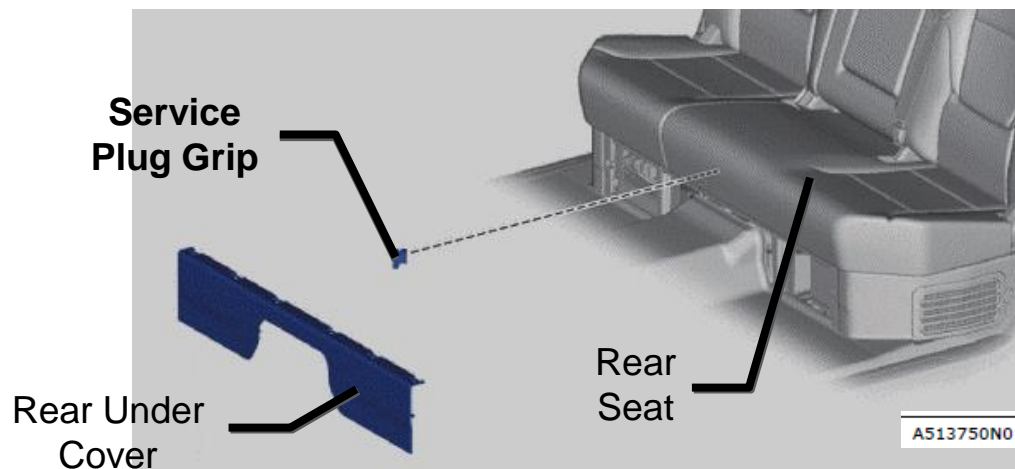
CAUTION

1. Turn the power switch off and remove the key from interior detection area for entry and start system.
2. Disconnect the cable from auxiliary battery negative (-) terminal.
3. Check the insulated gloves.
4. Remove the service plug grip.
5. Wait for at least 10 minutes to discharge the high-voltage capacitor inside the inverter with converter assembly.
6. Measure the high-voltage capacitor terminal voltage (0 V Check).
7. Insulate the disconnected high-voltage connector with insulated vinyl tape.

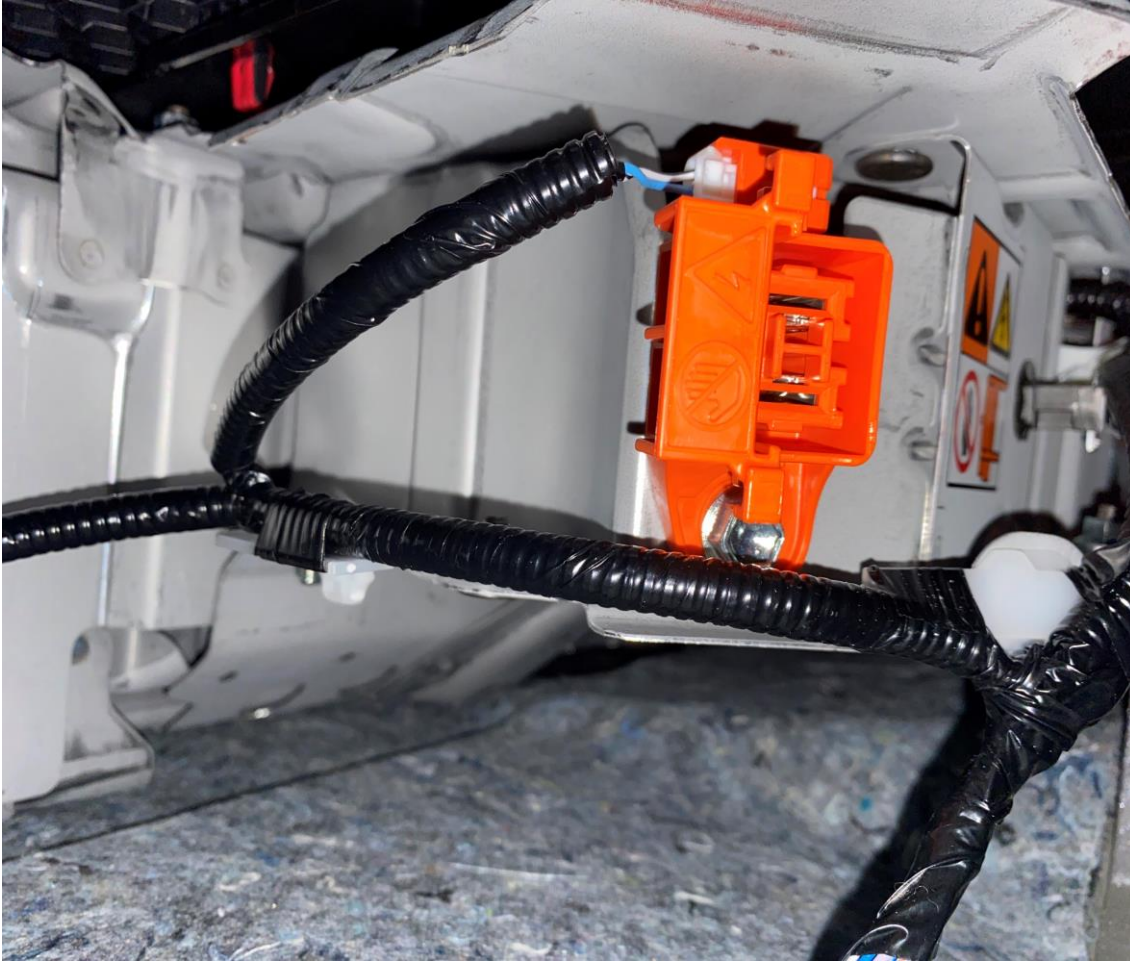
Auxiliary Battery Disconnect



Remove the Service Plug Grip

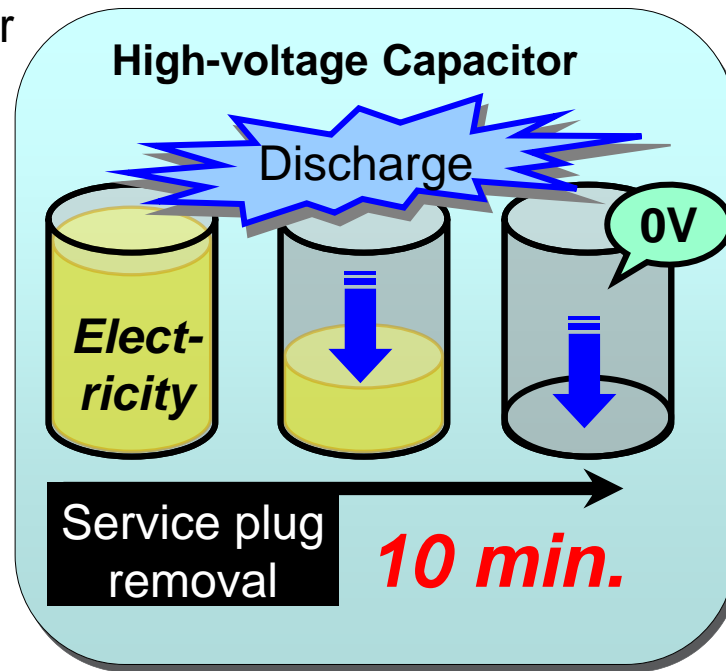


Service Plug Grip



Capacitor Discharge

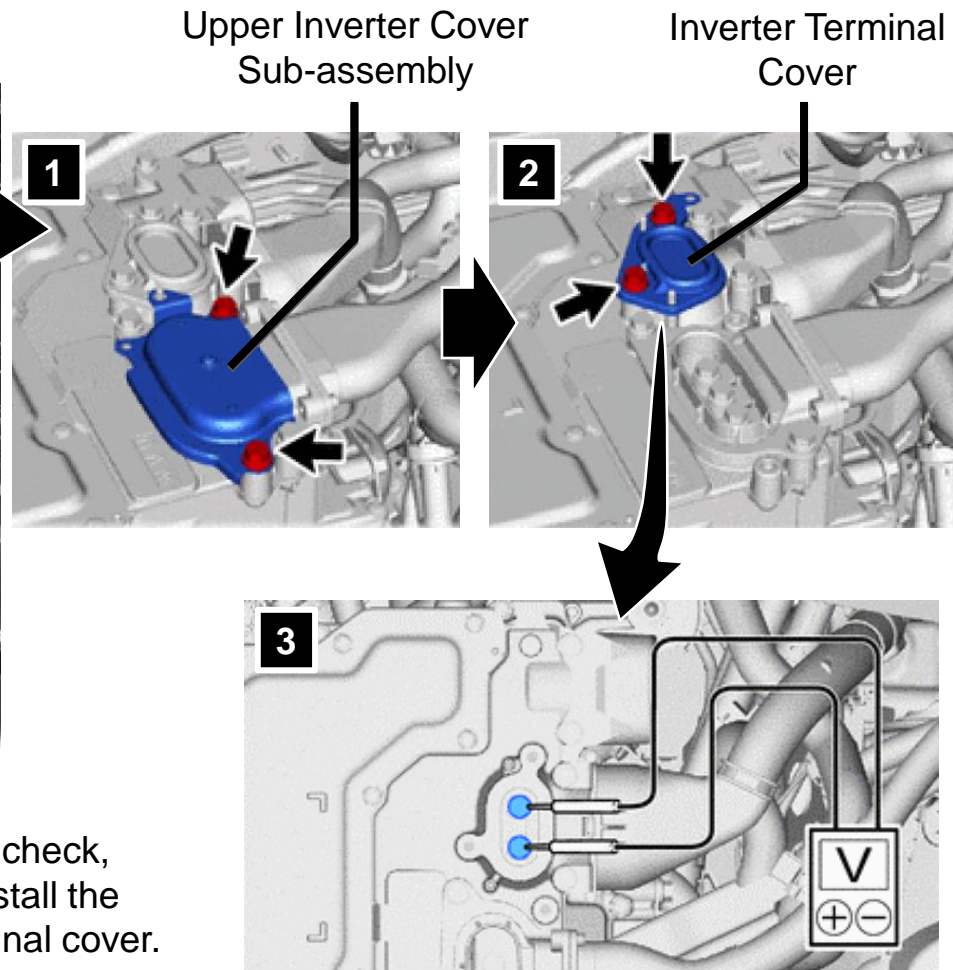
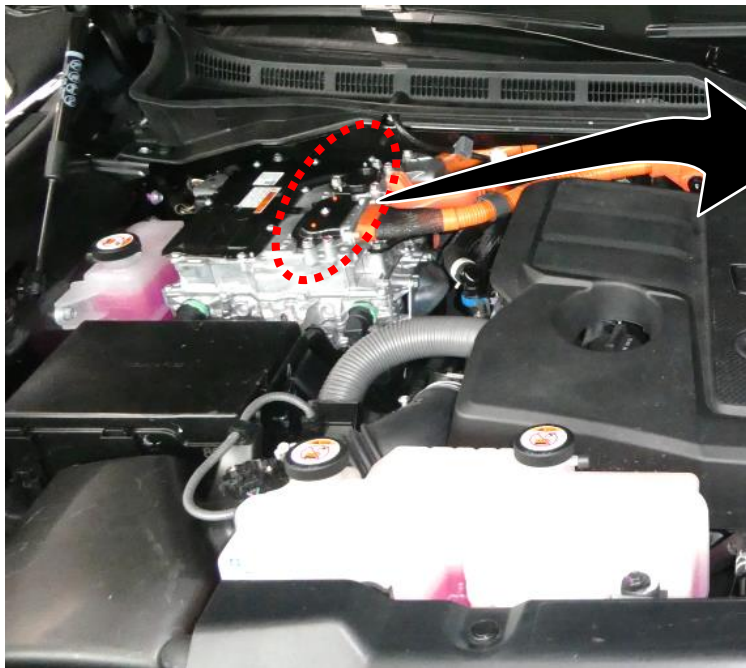
After removing the service plug grip, wait for at least 10 minutes to discharge high-voltage capacitor inside the inverter with converter assembly.



Inverter with Converter Assembly



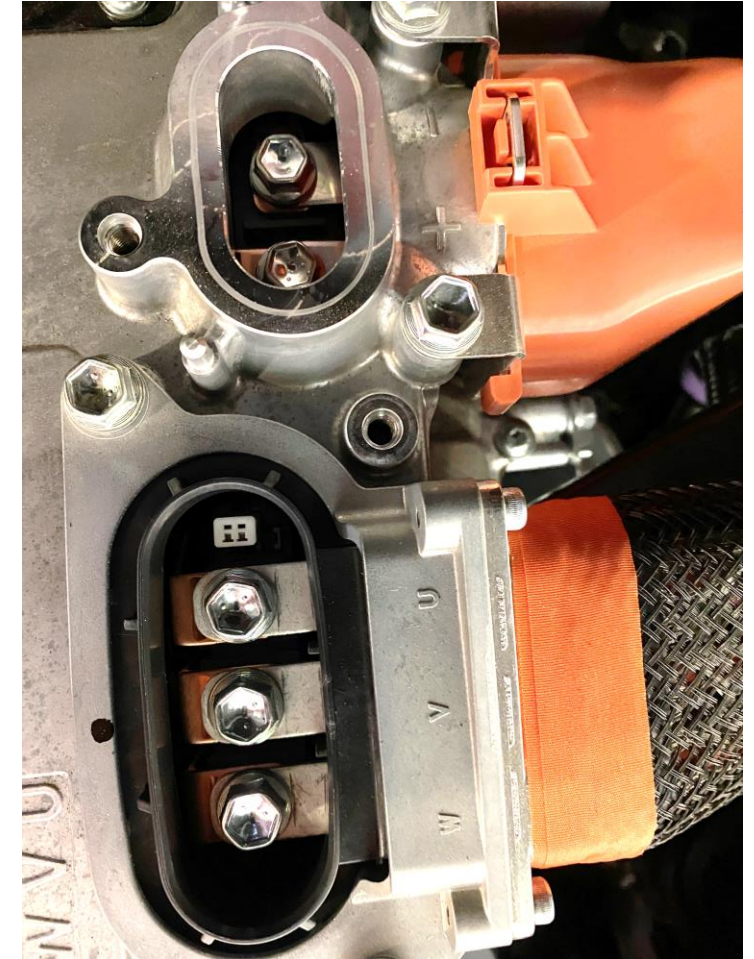
Check Terminal Voltage



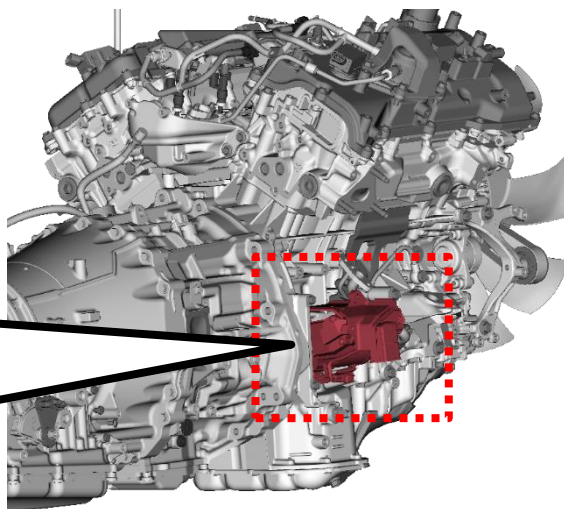
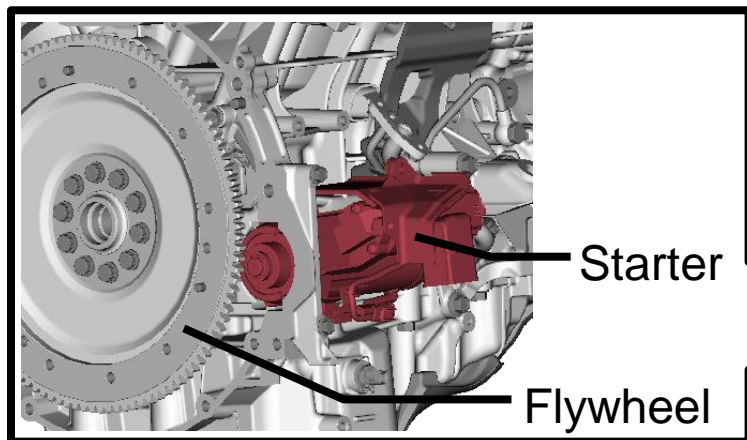
NOTE:
After the 0 V check,
temporary install the
inverter terminal cover.

Inverter Covers

- Motor terminal cover contains an interlock connector
- A tab covers the inverter terminal cover (not shown)
- To check for zero volts, the motor terminal cover needs to be removed



12V Starter - HEV



Starter Operating Conditions	Purpose
The ambient temperature is -15°C (5°F) or lower	Ensuring startability in cold condition.
After the fuel lid is opened and closed, the initial engine start with an engine coolant temperature of 70°C (158°F) or higher	Operates the starter at regular intervals prevents the starter from sticking, etc.

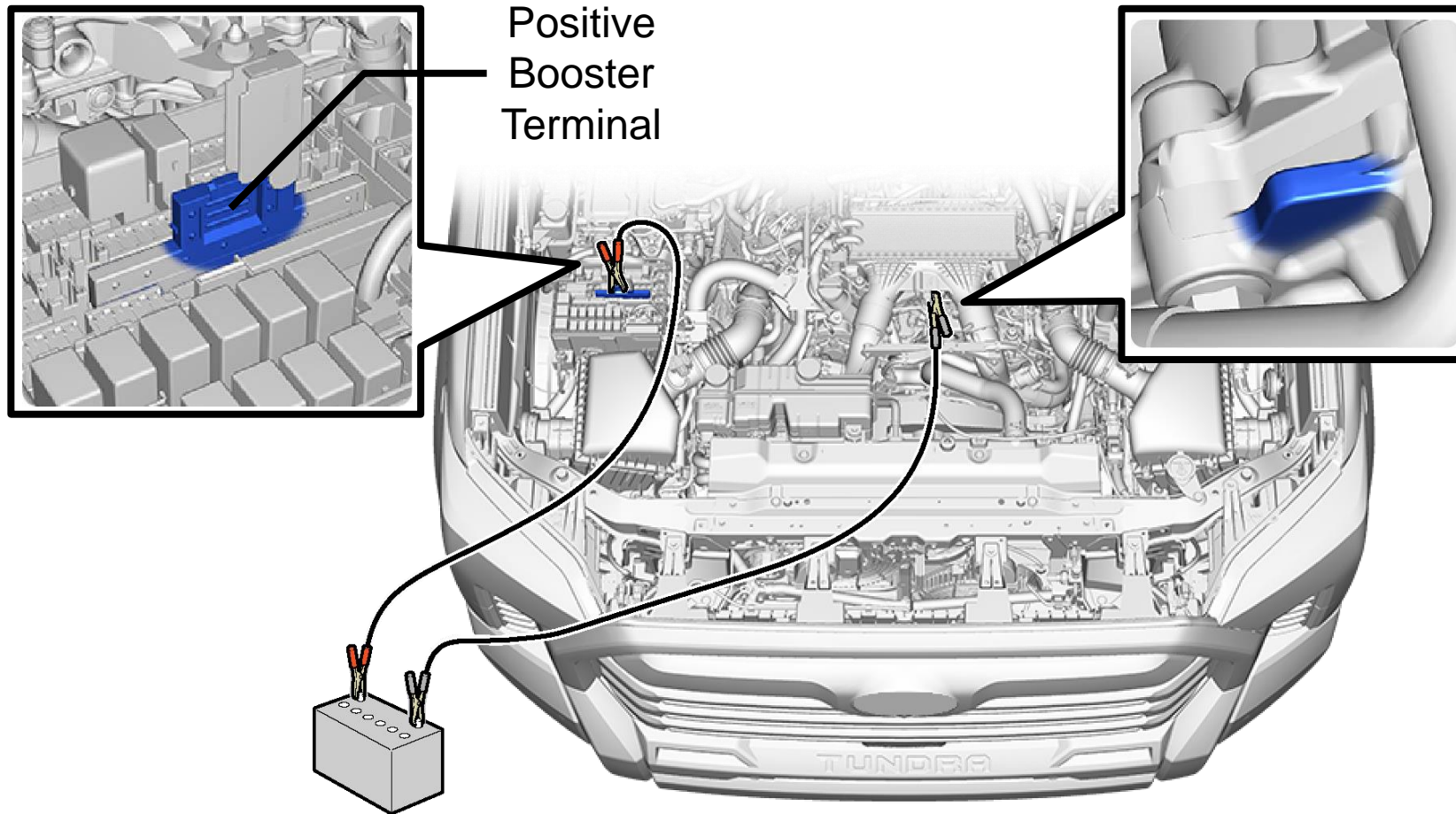
Active Test	Measurement Item	Control Range	Test Condition
Starter Start Mode	Transfers to Starter Start Mode	Start / Stop	<ul style="list-style-type: none"> Ignition switch is ON. READY off.

HEV Start/Stop

Conditions in which the engine may not stop

- During engine warm-up
- During HV battery charging
- When the temperature of the HV battery is high or low
- When the heater is switched on
- When the TOW/HAUL or TOW+ is selected
- When the multi-terrain select is on
- When the transfer drive mode is in 4H or 4L
- When the shift lever is shifted to S
- When the engine hood is opened during READY-on state

| Positive Booster Terminal



For More Information

- Use your TIS credentials to explore in more detail what is new with each new model release.
 - In the Library Tab, select the Model and Year
 - In the Results, open the New Car Features book and explore!
-
- One.TIS.Toyota.com with your credentials
 - tten_support@toyota.com
for TECS Program Information

