Service Bulletin

Bulletin No.: 19-NA-247
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INFORMATION

Subject: 2020 Cadillac CT5 New Model Features

Brand:	Model:	Model Year:		VIN:		Engine:	Transmission:
		From:	To:	From:	To:		
Cadillac	CT5	2020		—		Gasoline, 2.0L, 4 Cylinder, L4, Turbocharged, SIDI, DOHC, VVT, Aluminum, VAR 3 — RPO LSY	Automatic, 10L80, 10-Speed, GRX, GEN 1, ATSS, ETRS, VAR 1 — RPO MHS

Involved Countries and Regions	North America, Middle East, Israel, Palestine and South Korea

Overview

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2020 Cadillac CT5

Bulletin Purpose

The purpose of this bulletin is to introduce the 2020 Cadillac CT5 luxury sedan. The bulletin will provide an overview to help the Service Department Personnel become familiar with the engine, transmission, brake system and some of the other vehicle systems.

Overview

Tip: On the rear decklid is an emblem designating 350T. This emblem does not indicate engine displacement, it indicates engine “torque” in Newton metres.

The CT5 is designed, developed and positioned as an all-new Cadillac vehicle built on the global Alpha vehicle architecture, it has been upgraded in key areas and highlighted by a fastback profile. Equipped with a responsive, fuel-efficient 2.0L twin-scroll turbocharged 4-cylinder engine with the Stop/Start system and is paired with an advanced 10-speed automatic transmission. Rear wheel drive (RWD) is standard with available all wheel drive (AWD).

Driver Mode Control allows personalization of the CT5 driving experience by selecting a pre-optimized vehicle mode or by creating one from a menu of vehicle performance attribute choices.

CT5 features standard Adaptive Remote Start and an available hands-free power-release decklid to enhance convenience and comfort. Adaptive Remote Start automatically activates features such as the available adaptive heated/ventilated front seats, heated steering wheel and other climate systems, depending on the temperature. The hands-free decklid uses a motion sensor with a Cadillac crest target projection that allows customers to activate the trunk release with their foot, providing easy access.

CT5 is equipped with an all-new vehicle electronic system capable of managing up to 4.5 terabytes of data processing power per hour. It provides more rapid communications within the vehicle itself and to outside sources due to Ethernet connections of 100Mbps, 1Gbps and 10Gbps.

Sound quality is enhanced using Cadillac’s four-step sound optimization strategy which consists of:

– Eliminate/minimize noise generation at the source.
– Block/reduce/absorb unwanted noise before it enters the cabin.
– Cancel unwanted cabin noise.
– Enhance pleasing sounds.

The standard wheel on the Luxury model is an 18-inch alloy, while Premium Luxury and Sport models are equipped with 19-inch wheels.

Brakes

ABS Description and Operation

This vehicle is equipped with an Integrated Brake Control (IBC), also known as the Brake System Control Module.

The IBC is an electromechanical device that interprets and converts driver brake pedal input and provides a corresponding hydraulic pressure output to activate a standard brake system according to the driver’s demand. The electro-hydraulic boost system replaces the conventional vacuum-based power assist brake system, which provides an advantage in efficiency. The electro-hydraulic brake system supplies "on-demand" power when the driver presses the brake pedal. In an event of a loss of electrical energy the driver’s input is mechanically converted to a hydraulic pressure output.

Depending on options, the following vehicle performance enhancement systems are provided:

– ABS
– Adaptive Cruise Control
– Bi-directional WSS
– Brake Drying/Cleaning
– Collision Imminent Braking
– Dynamic Rear Proportioning
– Electronic Stability Control
– Engine Drag Control
– Extended Hill Hold Start Assist
– Panic Brake Assist
– Teen Mode Support
– Traction Control
– Trailer Sway Control

Brake System Components

The following components are involved in the operation of the listed enhancement systems:

- The body control module (BCM) monitors the brake pedal position sensor signal when the brake pedal is applied and sends a high speed serial data message to the Brake System Control Module indicating the brake pedal position.
- The instrument cluster displays the vehicle speed based on the information from the engine control module (ECM). The ECM sends the vehicle speed information via a high speed serial data to the BCM. The BCM then sends the vehicle speed information via a low speed serial data to the instrument cluster in order to display the vehicle speed, either in miles or kilometers, based on the vehicle requirements.
- The yaw rate, lateral acceleration and longitudinal acceleration sensors are combined into one multi-axis acceleration sensor, internal to the Restraints Control Module (formerly identified as the inflatable restraint sensing and diagnostic module). The Brake System Control Module receives serial data message inputs from the yaw rate, lateral acceleration and longitudinal acceleration sensor and activates stability control and hill hold start assist function depending on multi-axis acceleration sensor input.
- The traction control switch is a multifunction momentary switch. The BCM monitors the signal circuit from the traction control switch and sends a high speed serial data message to the Brake System Control Module indicating the switch

position. The traction control and stability control are manually disabled or enabled by pressing the traction control switch.

- The Brake System Control Module receives serial data message inputs from the steering wheel angle sensor. The steering wheel angle sensor signal is used to calculate the intended driving direction. The steering wheel angle sensor is installed as an internal part of the power steering gear.
- The Brake System Control Module receives high speed serial data message inputs from the transmission control module (TCM) indicating the gear position of the transmission for hill start assist or hill hold functions.
- This vehicle is equipped with unique directional wheel speed sensors (WSS) that can detect wheel direction as well as zero wheel speed. The WSS are Active sensors that receive a 12 V power supply voltage from the Brake System Control Module and provides an output signal to the module. As the wheel spins, the WSS sends the Brake System Control Module a DC square wave signal. The Brake System Control Module uses the frequency of the square wave signal to calculate the wheel speed.

Brake Assist

Brake Assist provides additional brake pressure over the pressure provided by the conventional brake apply system.

- Panic Brake Assist will apply the brakes more quickly when a panic brake situation is determined. Panic Brake Assist detects that the driver intent is to stop the vehicle as quickly as possible, but does not apply sufficient brake pressure to do so. The feature will detect the driver intent then actively apply brake pressure to maximum pressure, activating the ABS system and stopping the vehicle as quickly as possible.
- Rear Brake Boost provides rear hydraulic brake assist to ensure that all four corners are achieving maximum braking during an ABS event. When vehicle loading is heavily rear axle biased, the rear brakes may not utilize all of the available road adhesion. Rear Brake Boost is designed to provide additional pressure to the rear brakes when the front brakes ABS are activated and the rear wheels have low slip.
- Electronic Pre-Fill is used to reduce the brake response time when the driver quickly releases the accelerator pedal. It is also used to support low drag calipers.

Electronic Stability Control (ESC)

ESC provides the following benefits:

- Roll Over Mitigation/Preemptive ESC will detect driving situations that could cause a vehicle rollover. After detection, ESC brake control will be modified to reduce the chance of vehicle rollover.
- Torque Vectoring by Brakes enhances vehicle agility by using active brake applies and engine torque requests to maximize traction on the drive wheels. While cornering, brakes are applied to the inside drive wheels, allowing more torque to the outside wheels without slipping the inside wheels. Increasing the engine torque, above driver request, gives more torque to outer wheels.
- If a flat tire is detected, the ESC system will not be allowed to be disabled by the driver. ESC will be re-enabled if the driver has already disabled it. The traction control system can be disabled by the driver.

Traction Control System (TCS)

The traction control system will recognize a vehicle “stuck” condition by monitoring for excessive wheel slip for greater than 5 seconds with a vehicle reference velocity of less than 1.86 mph (3 km/h). Once detected, TCS will allow additional wheel slip of 5% to “dig” the vehicle out. This feature does not guarantee the vehicle will get unstuck, its function is to assist the driver.

- Engine Drag Control is designed to mitigate drop-throttle-oversteer/understeer. It will slowly reduce the engine torque in order to maintain vehicle stability.

Brake System Control Module

The Brake System Control Module controls the following:

- Brake Drying/Cleaning autonomously applies a small amount of brake pressure during long driving on wet roads in order to remove water from the rotor surface. The brake application is unperceivable to the driver, but should result in improved brake feel and performance. The Conditions to enable Brake Drying/Cleaning are:
  - Wipers need to be ON.
  - If Cruise is Active, Brake Drying/Cleaning will not function as minimum pedal position is required.
  - If the driver applies the brakes, the distance counter will be reset.
  - Brake pressure needs to build up to 3 bar (300 kPa/43.5 PSI) at all 4-wheels.
- Hill Start Assist will temporarily hold the vehicle while on a grade. This feature will hold the vehicle for 2-5 seconds after the driver has removed their foot from the brake pedal and the vehicle is on a grade exceeding 5%. The intent is to prevent the vehicle from rolling down the hill before the driver has an opportunity to apply the accelerator pedal.
- Driveline Damping is required on vehicles with ESC, Stop/Start functionality and an automatic transmission. This feature maintains brake pressure to dampen driveline acceleration disturbance as the engine is restarted and holds brake pressure to retard or prevent the vehicle from rolling. It is used for driver comfort and has also been used to extend vehicle hold on a steep grade.
- Extended Hold Hill Start Assist will function the same as Hill Start Assist except there will be an indefinite vehicle hold instead of a temporary vehicle hold. The vehicle will be held by the Brake System Control Module, and then will transfer the hold to the Electronic Park Brake when necessary.

All of the driver exit strategies of Hill Start Assist with Electronic Park Brake will also apply to this feature.

Electronic Parking Brake Description

Vehicles with the electric parking brake have a switch in the center console or on the dash, which takes the place of the manual parking brake system including the foot pedal and release handle. In the event of insufficient electrical power, the electric parking brake cannot be applied or released. The parking brake function is integrated into the Electronic Brake Control Module/Brake System Control Module. The module contains the logic for applying and releasing the parking brake when commanded by the Park Brake Switch.

Engine — Air Filter Life

Overview

If equipped, this feature provides the engine air filter's remaining life information as a percentage and the best timing for a change. The timing to change an engine air filter depends on driving and environmental conditions. The Air Filter Life is a software feature that uses sensors to read the pressure drop across the engine air filter. The higher the pressure drop, the more debris that has accumulated in the air filter. A computer-based algorithm utilizes the pressure drop value and the age of the air filter and calculates a precise determination of the remaining air filter life. The information can be accessed in the Driver Information Center (DIC). The feature can also detect if the air filter is clogged due to a more sudden change in driving conditions, such as a sudden dust storm, snow or slush, or if the air filter is missing altogether.

Engine — Components

Overview

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Typical View of the Gasoline, 2.0L, 4 Cylinder, L4, Turbocharged, SIDI, DOHC, VVT, Aluminum, VAR 3 — RPO LSY

The turbocharged 2.0L, 4-cylinder engine utilizes a twin-scroll turbocharger to help reduce turbo lag, with Active Fuel Management (AFM), Direct Injection and Stop/Start technology helping to improve fuel economy.

Engine Components and Specifications

- **Bore/Stroke:** 3.27 in (83 mm) / 3.634 in (92.3 mm).
- **Camshaft:**

  Two camshafts are used, one for all intake valves, the other for all exhaust valves. The camshafts are assembled with steel lobes. The camshafts consist of several segments that are displaceable. As a result, two cylinders can be deactivated. The movement of the segments of the camshaft is controlled by the camshaft position actuators in the camshaft carrier.
- **Camshaft Carrier:** The two camshafts are in the camshaft carrier. The camshaft carrier has mounting locations for the ignition system and the camshaft position actuators for cylinder deactivation.
- **Camshaft Drive:** A roller chain is used for camshaft drive. There is a tensioner and active guide used on the slack side of the chain to control chain motion and noise. The chain drive promotes long valve train life and low maintenance.
- **Camshaft Position Actuator:** The camshaft position actuator solenoid valve – Intake and camshaft position actuator solenoid valve – exhaust system enables the ECM to change camshaft timing while the engine is running. The camshaft position actuator assembly varies camshaft position in response to directional changes in oil pressure. The camshaft position actuator solenoid valve – Intake and camshaft position actuator solenoid valve – exhaust controls the oil pressure that is applied to advance or retard the camshaft. Modifying camshaft timing under changing engine demand provides a balance between power output, fuel economy and reduced emissions.
- **Camshaft Position Sensors:** The intake and exhaust camshaft position sensors are each triggered by a notched reluctor wheel built onto the camshaft sprockets. The four signal pulses occur every camshaft revolution. Each notch is a different size which is used to identify the compression stroke of each cylinder and to enable the correct timing of the fuel injection pulse.
- **Compression Ratio:** 10.0:1
- **Connecting Rod:** The connecting rods are powdered metal. The connecting rods are fractured at the connecting rod journal and then machined for the proper clearance.

- **Cooling System:** One valve that contains two coolant control valves, called the engine coolant flow control valve and the block control valve that eliminate the need for the conventional cooling system thermostat.
- **Crankshaft:** The crankshaft is forged micro alloy steel. It is supported in 5 main journals with main bearings which have oil clearance for lubricating. The thrust bearing is located in the 4th position which controls proper crankshaft axial end play. The crankshaft is comprised of 4 counterweights that have been scalloped for mass reduction and precision engine balance. A harmonic balancer is used to control torsional vibration.
- **Crankshaft Position Sensor:** The crankshaft position sensor is an external, magnetically biased, digital output integrated circuit sensing device. The sensor provides a pulse for each magnetic pole of the encoder wheel on the crankshaft. The sensor produces an ON/OFF DC voltage of varying frequency, with 58 output pulses per crankshaft revolution. The frequency of the sensor output depends on the velocity of the crankshaft.
- **Cylinder Block:** The cylinder block is constructed of aluminum alloy by high-pressure die casting with 4 cast-in-place iron cylinder liners arranged in-line. The block has 5 crankshaft bearings with the thrust bearing located on the second bearing from the rear of the engine. The cylinder block incorporates a bedplate design that forms an upper and lower crankcase. This type of design promotes cylinder block rigidity and reduced noise and vibration.
- **Cylinder Deactivation:** Active Fuel Management (AFM) temporarily deactivates two cylinders under light load conditions and seamlessly reactivates them when the driver demands full power.
- **Cylinder Head:** This cylinder head is dual over head camshaft (DOHC) design. The cylinder head is made of cast aluminum alloy for better strength, hardness and less weight. The combustion chamber of the cylinder head is designed for increasing the squish and swirl efficiency and this maximizes combustion efficiency. The injectors are each seated into their individual bores in the cylinder head with two combustion seals to provide sealing. The exhaust manifold is integrated into the cylinder head.
- **Engine Control Module:** The ECM controls all ignition system functions and constantly adjusts the spark timing. The ECM monitors information from various sensor inputs.
- **Engine Block Lower Structural Extension:** Within the engine block structural extension is the oil pump and the balance shafts. The balance shafts are driven by the balance chain. The chain is tensioned by a hydraulic tensioner that is supplied pressure by the engine oil pump. This design promotes the maximum effectiveness of the balance shaft system and reduces noise and vibration. The oil pump assembly is driven by the balancer shaft assembly. The oil pump has variable flow capability using a circular vane arrangement and the actuation of an oil control valve assembly commanded by the ECM. The variable flow capability of the pump optimizes oil flow to the engine components as needed. During high acceleration the oil pump operates in a steady high pressure state. During steady low load speeds the oil pump will operate in a steady low pressure state.

  Lower Oil Pan: The lower oil pan is made of synthetic material and is attached to the engine block lower structural extension.
- **Exhaust Manifold:** The exhaust manifold is integrated into the cylinder head.
- **High Pressure Fuel Pump:** The high pressure fuel pump mounts to the rear of the cylinder head and is driven by the intake camshaft. Motion is transmitted to the pump from a quad-lobe on the rear of the intake camshaft through a hydraulic roller lifter.
- **Horsepower:** 237 hp (177 kW) @ 5000 rpm. (GM estimate).

  Torque: 258 lb-ft (350 Nm) @ 1500–4000 rpm. (GM estimate).
- **Idle Speed:** 650 rpm.
- **Intake Manifold:** The intake manifold is made of a polymer composite.
- **Ignition Coil Module:** The ignition coil module integrates the 4 coils and the ignition control module within a single sealed component.
- **Knock Sensor:** The knock sensor system is used by the ECM to control the ignition timing for the best performance while protecting the engine from potentially damaging levels of detonation, known as spark knock.
- **Pistons:** The pistons are cast aluminum. The pistons use 2 compression rings and 1 oil control ring assembly. The piston is a low friction, lightweight design with a recessed top and barrel shaped graphite coated skirt. The piston pins are a chromium steel full-floating design. The piston and pin must be serviced as an assembly.
- **Spark Ignited Direct Injection:** The spark ignited direct injection (SIDI), fuel injection system is a high pressure, returnless on-demand design. The fuel injectors are mounted in the cylinder head beneath the intake ports and spray fuel directly into the combustion chamber. DI requires high fuel pressure due to the location of the injector in the combustion chamber. Fuel pressure must be higher than compression pressure requiring a high pressure fuel pump. The fuel injectors also require more electrical power due to the high fuel pressure. The ECM supplies a high voltage supply circuit and a high voltage control circuit for each fuel injector. The injector high voltage supply circuit and the high voltage control circuit are both controlled by the ECM. The ECM energizes each fuel injector by grounding the control circuit. The ECM controls each fuel injector with 65 V. This is controlled by a boost capacitor in the ECM. During the 65 V boost phase, the capacitor is discharged through an injector, allowing for initial injector opening. The injector is then held open with 12 V.

The fuel injector assembly is an inside opening electrical magnetic injector. The injector has six precision machined holes that generate a cone shaped oval spray pattern. The fuel injector has a slim extended tip in order to allow a sufficient cooling jacket in the cylinder head.

- **Turbocharger:** The turbocharger is a compressor that is used to increase the power output of an engine by forcing more air and proportionately more fuel into the combustion chambers.
- **Valves:** 2 intake and 2 exhaust valves per cylinder.
- **Valve Lash Adjusters:** The valve train uses a roller finger follower actuated by a hydraulic lash adjuster. The roller finger follower reduces friction and noise.
- **Variable Valve Timing:** Variable Valve Timing (VVT) works with AFM to enhance fuel economy and maximize engine performance.

Engine — Fuel System

Overview

The fuel system is an electronic returnless on-demand design. The returnless fuel system reduces the internal temperature of the fuel tank by not returning hot fuel from the engine to the fuel tank. Reducing the internal temperature of the fuel tank results in lower evaporative emissions.

An electric turbine style fuel pump attaches to the fuel tank fuel pump module inside the fuel tank. The fuel pump supplies fuel through the fuel filter and the fuel feed pipe to the high pressure fuel pump. The high pressure fuel pump supplies fuel to a variable-pressure fuel rail. Fuel enters the combustion chamber through precision multi-hole fuel injectors. The high pressure fuel pump, fuel rail pressure, fuel injection timing, and injection duration are controlled by the ECM.

The fuel system is comprised of the following components:

– **Fuel Fill Pipe:** The fuel fill pipe has a built-in restrictor to prevent refueling with leaded fuel.
– **Fuel Filter:** The fuel filter is located on the fuel feed pipe, between the low pressure fuel pump and the high pressure fuel pump. The paper filter element traps particles in the fuel that may damage the fuel injection system. The filter housing is made to withstand maximum fuel system pressure, exposure to fuel additives, and changes in temperature.
– **Fuel Pump:** The fuel pump is mounted in the fuel tank fuel pump module reservoir. The fuel pump is a 3 phase electric pump. Fuel is pumped to the high pressure fuel pump at a pressure that is based on feedback from the fuel pressure sensor. The fuel pump delivers a constant flow of fuel even during low fuel conditions and aggressive vehicle maneuvers. The fuel pump flex pipe acts to dampen the fuel pulses and noise generated by the fuel pump.
– **Fuel Pump Driver Control Module:** The fuel pump driver control module receives the desired fuel pressure message from the ECM and controls the fuel pump located within the fuel tank to achieve the required fuel pressure.
– **Fuel Pressure Sensor:** The sensor is located on the fuel feed pipe forward of the fuel tank, and receives its power and ground from the ECM. The sensor provides a fuel pressure signal to the ECM, which it uses to provide Closed Loop fuel pressure control.
– **Fuel Level Sensor:** The fuel level sensor consists of a float, a wire float arm, and a ceramic resistor card. The position of the float arm indicates the fuel level. The fuel level sensor contains a variable resistor which changes resistance when the position of the float arm changes.
– **Fuel Strainer:** The fuel strainer attaches to the lower end of the fuel tank fuel pump module. The fuel strainer is made of woven plastic. The functions of the fuel strainer are to filter contaminants and to wick fuel. The fuel strainer normally requires no maintenance. Fuel stoppage at this point indicates that the fuel tank contains an abnormal amount of sediment or contamination.
– **Fuel Tank:** The fuel tank stores the fuel supply and is located in the rear of the vehicle. It is held in place by 2 metal straps that attach to the underbody of the vehicle. The fuel tank is molded from high-density polyethylene.
– **Fuel Tank Fuel Pump Module:** The electric turbine style fuel pump attaches to the fuel tank fuel pump module inside the fuel tank and supplies fuel through the fuel feed pipe to the high pressure fuel pump. The fuel tank fuel pump module contains a reverse flow check valve. The check valve maintains fuel pressure in the fuel feed pipe in order to prevent long cranking times.
– **High Pressure Fuel Pump:** The high fuel pressure necessary for direct injection is supplied by the high pressure fuel pump. The pump is mounted on the rear of the engine and is driven by a four-lobe cam on the camshaft. This pump also regulates the fuel pressure using an actuator in the form of an internal solenoid-controlled valve. In order to keep the engine running efficiently under all operating conditions, the ECM requests pressure ranging from 290 to 5,076 psi (2 to 35 MPa), depending on engine speed and load.
– **Quick-Connect Fittings:** Quick-connect fittings provide a simplified means of installing and connecting fuel system components. The fittings consist of a unique female connector and a compatible male pipe end. O-rings, located inside the female connector, provide the fuel seal. Integral locking tabs inside the female connector hold the fittings together.
– **Pressure Relief Regulator Valve:** The pressure relief regulator valve replaces the typical fuel pressure regulator used on a mechanical returnless fuel system and is used to vent pressure during hot soaks and also functions as a fuel pressure regulator in the event of the fuel pump driver control module defaulting to 100 percent PWM of the fuel pump.

– **Fuel Injectors:** The fuel injectors are mounted in the cylinder head beneath the intake ports and spray fuel directly into the combustion chamber. Fuel pressure must be higher than compression pressure which requires a high pressure fuel pump. The fuel injectors also require more electrical power due to the high fuel pressure. The ECM supplies a high voltage supply circuit and a high voltage control circuit for each fuel injector. The ECM energizes each fuel injector by grounding the control circuit. The ECM controls each fuel injector with 65 V. This is controlled by a boost capacitor in the ECM. During the 65 V boost phase, the capacitor is discharged through an injector, allowing for initial injector opening. The injector is then held open with 12 V.
– **Fuel Rail Assembly:** The fuel rail assembly attaches to the cylinder head and distributes the high pressure fuel to the fuel injectors. The fuel rail assembly consists of the direct fuel injectors, fuel rail pressure sensor and a jumper harness with in-line connector.

Fuel System Electric Purge Pump

An electric purge pump is mounted on the engine which is designed to help comply with the most stringent emissions regulations, including North America Ultra-Low Emissions Vehicle (ULEV) 50 and China 6.

The electric purge pump manages the purge of vapors from the fuel tank. Compared with a traditional solenoid valve to purge emissions, the electric purge pump provides greater control over the timing and amount of purge.

Engine — Sliding Cam System

Overview

The Sliding Cam System (SCS) enables the ECM to change the camshaft lift profile of the intake and exhaust camshafts while the engine is running. The SCS utilizes 4 intake camshaft profile actuators and 2 exhaust camshaft profile actuators that vary the Camshaft Lift Profile Sleeve position axially on the camshaft in response to electrical commands from the ECM. Each camshaft has 2 profile sleeves with different height cam lobes and each camshaft has a detent ball and spring under each sleeve that helps hold the profile sleeve into position. The SCS profile actuator solenoids push out an actuator guide pin into the shifting groove machined into the Camshaft Lift Profile Sleeve. When the guide pin engages the sleeve, it causes it to shift axially on the camshaft causing unique sized cam lobes to be placed over the intake and exhaust valves and modify valve lift and duration.

The crankshaft position sensor and the camshaft position sensors are used to monitor the camshaft positions and provide input for the SCS system. 2 Intake and 2 Exhaust Profile sleeve position sensors are used to monitor the camshaft Lift Profile Sleeve positions axially on the camshaft.

Operation

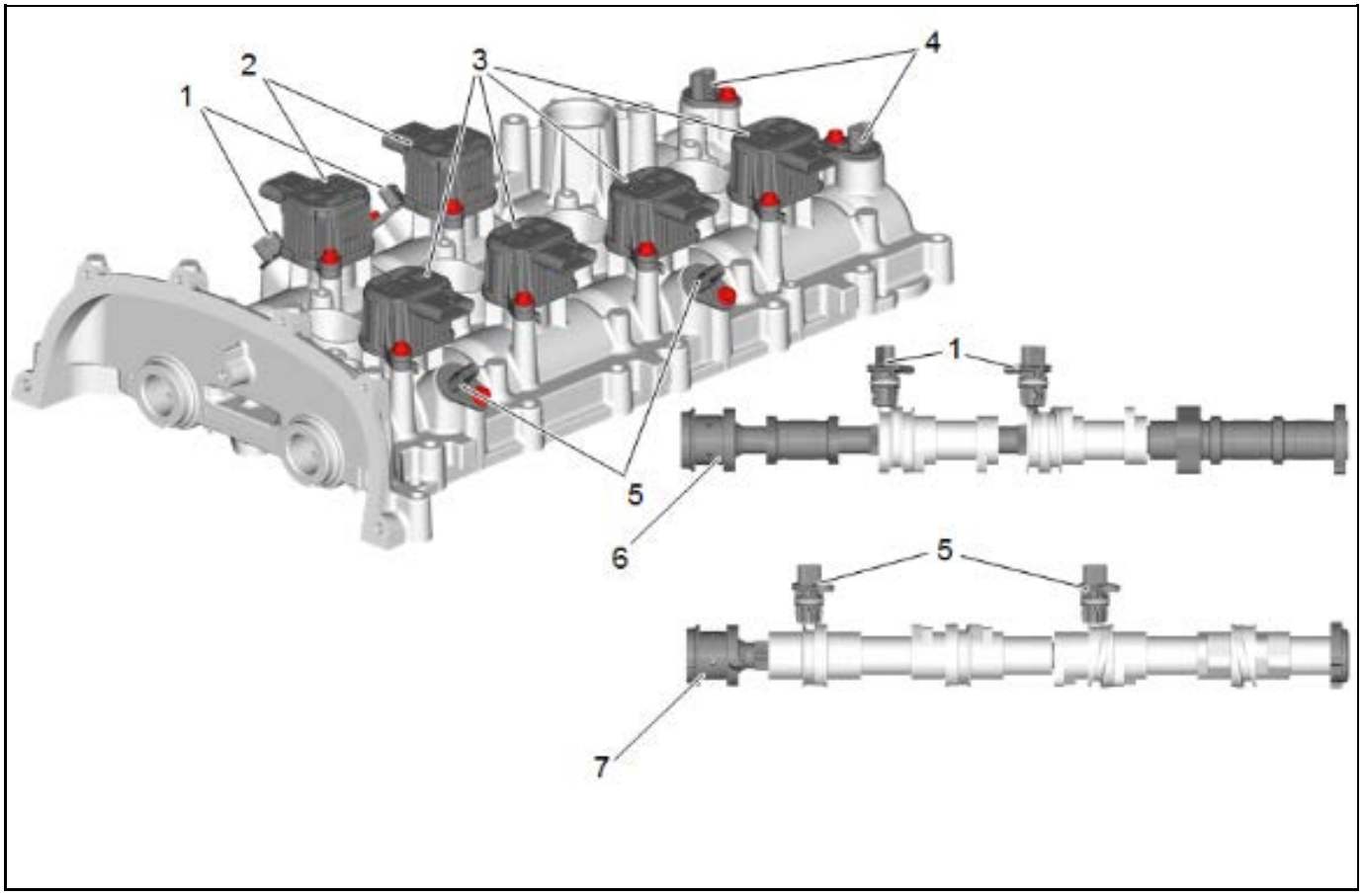
The SCS profile actuators have the ability to individually push out each of the actuator's 2 shifting pins. The SCS actuators are single direction actuators (OUT only) and require a physical response to push back or retract the pins back into the actuator. Each of the actuators have 2 shifting pins with 2 completely independent shifting coils. Based on a PWM signal the shifting pins push out and engage the "shifting" groove of the sliding cam profile sleeve to the position requested. The first pin will be pushed out causing the camshaft profile sleeve to shift from High Lift (Power Profile) to Low Lift (Economizer Profile). The shifting groove is now aligned under the second pin and the position sensor confirms that the sleeve is in the requested position. The actuator profile position sensors operate the same as cam sensors and provide a high signal when there is metal below them and a low signal when there is air below them. Each position, High Lift, Low Lift and AFM have a unique square wave profile allowing the position sensors to identify which mode it is in. When requested the second actuator pin will be pushed out to cause the profile sleeve to shift from Low Lift to AFM mode. When the ECM requests moving back to a higher cam profile mode then the actuator on the neighboring cylinder is used to move the sliding cam profile sleeve in the opposite direction because the shift groove is pointing in the opposite direction. For the intake camshaft there are 2 profile sleeves covering 2 cylinders each (1&2 - 3&4). On the exhaust camshaft there are 2 profile sleeves however they are smaller and only on cylinders 2 & 3.

SCS Profiles

The SCS has 3 unique sized cam lobes on each camshaft profile slider as follows:

- **Economizer Profile:** Low Lift — Reduced capacity, as little as 0.118-inches (3 mm) lift changes the duration of the valve opening and closes the valve early. Under medium load conditions where the driver does not need the full capabilities of the engine power, like highway driving, the SCS system slides into Low Lift to start saving fuel. All 4 cylinders are still active with all intake valves now opening to a lower lift height.
- **Power Profile:** High Lift — Full capacity, conventional lift and duration. When the driver needs the full capability of the engine then all 4 cylinders are active and all valves open to their maximum lift.
- **Ultimate Fuel Economy:** AFM — Cylinder deactivation is used for increased fuel economy. For light load conditions, such as highway cruising, when the driver does not need the full capability of the engine the SCS system slides into AFM mode and cylinders 2 & 3 are deactivated. The system first turns OFF the fuel injectors of cylinder 2 & 3, then the exhaust valves and last the intake valves. This effectively traps a cylinder's worth of air with no fuel in the cylinder. This trapped air becomes an air spring helping the piston return in what would be the expansion stroke. Cylinders 1 & 4 are still active with their intake valves now opening to a lower lift height. The intake cam profile for the firing cylinders is the same Low Lift used on the Economizer Profile. The engine still produces the same power from the 2 cylinders but is now operating at half of the Economizer Profile.

Sliding Cam System Components



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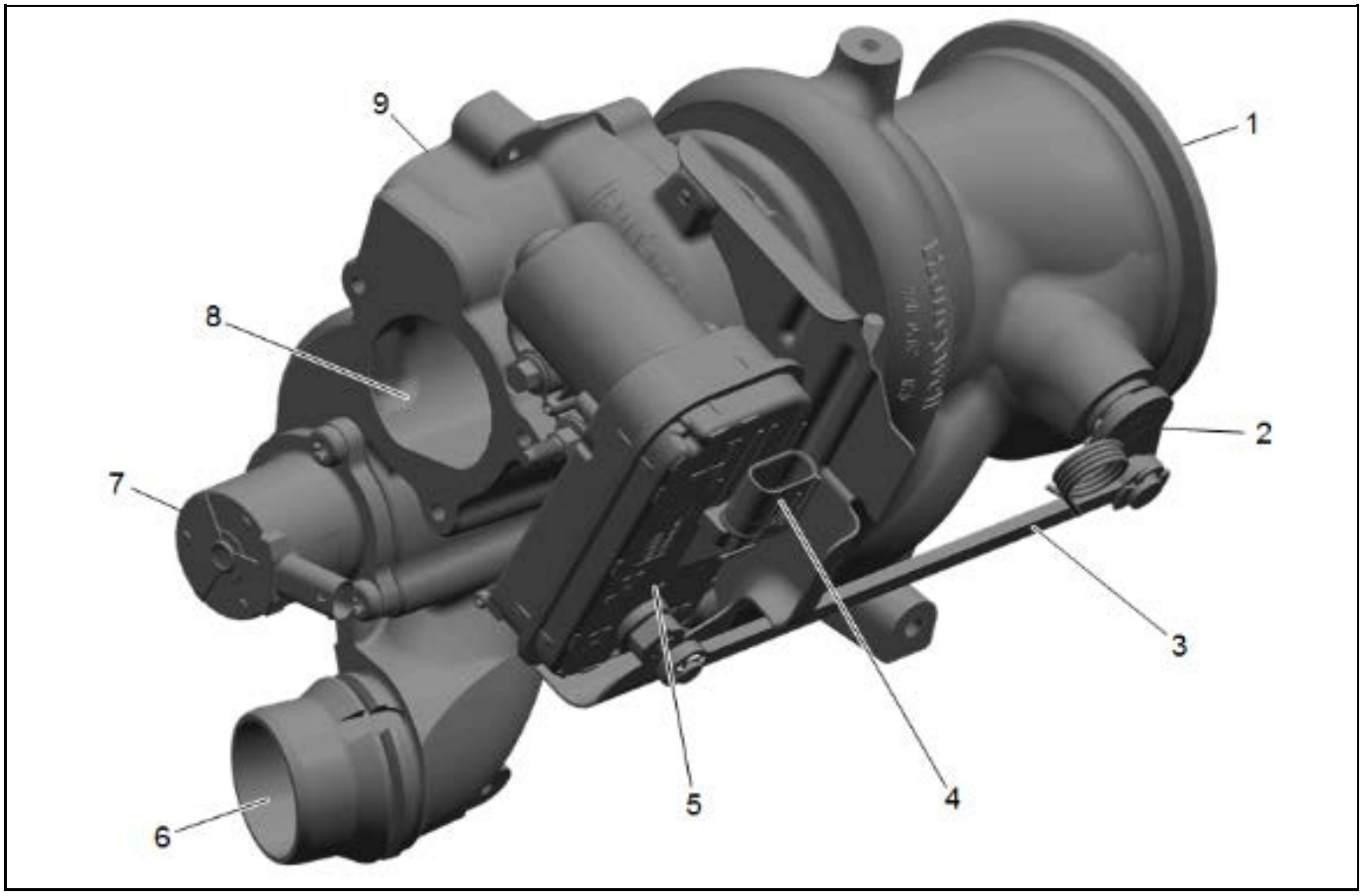
1. B339 Exhaust Camshaft Profile Sleeve Position Sensor (Qty 2)
2. M130 Exhaust Camshaft Profile Actuators (Qty 2)
3. M129 Intake Camshaft Profile Actuators (Qty 4)
4. B23 Exhaust & Intake Camshaft Position Sensors (Qty 2)
5. B338 Intake Camshaft Profile Sleeve Position Sensor (Qty 2)
6. Exhaust Camshaft (Qty 1)
7. Intake Camshaft (Qty 1)

Sliding Cam System — Video

For a video of how the SCS operates, refer to ***Camshaft Actuator System Description*** in SI.

Engine — Turbocharger

Turbocharger Assembly



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1. Turbocharger Turbine Exhaust Outlet
2. Turbocharger Wastegate Valve and Lever
3. Turbocharger Wastegate Valve Actuator Rod
4. M128 Turbocharger Wastegate Actuator Harness Connector
5. M128 Turbocharger Wastegate Actuator
6. Turbocharger Compressor Air Outlet
7. Q40 Turbocharger Bypass Solenoid Valve
8. Turbocharger Compressor Air Inlet
9. Positive Crankcase Ventilation (PCV) Foul Air Inlet

Overview

The turbocharger (TC) is a compressor that is used to increase the power output of an engine by forcing more air and proportionately more fuel into the combustion chambers. The dual-scroll TC is mounted either to the exhaust manifold or directly to the head. The turbine is driven by the energy generated by the flow of the exhaust gases. The turbine is connected by a shaft to the compressor which is mounted in the induction system of the engine. The centrifugal compressor blades compress the intake air above atmospheric pressure, increasing the density of the air entering the engine.

Turbocharger Operation

The TC incorporates a wastegate that is controlled by the ECM, using an electronic motor driven actuator, to control boost pressure. A turbocharger bypass valve (compressor recirculation valve), controlled by the ECM, is used to prevent compressor surging and damage by opening during abrupt closed throttle conditions. The bypass valve opens during closed throttle deceleration conditions, which allows the air to recirculate to the turbocharger compressor inlet. During a wide open throttle command, the bypass valve closes to optimize turbo response.

The TC is connected to the engine oiling system by a supply and drain pipe. The oil is used to lubricate the bearing system and also will remove some heat from the TC. There is a cooling system circuit in the turbocharger that further reduces operating temperatures, and passively dissipates bearing housing heat away from the TC, to prevent oil coking in the bearings on engine shut down.

Turbocharger Wastegate Actuator

The wastegate valve opens and closes a passage beside the turbine wheel within the TC housing which allows excess exhaust pressure to bypass the turbine into the downstream exhaust. The ECM controls a

bi-directional DC motor and actuator that is connected to the wastegate valve via simple rod and linkage. The ECM supplies a PWM signal on the motor control circuits to control the direction and maintain the position of the wastegate valve. The ECM converts a serial data signal into a value equal to the relative position of the wastegate valve, which can be observed on a scan tool as a percentage and as a voltage.

The electronic wastegate actuator addresses the disadvantages inherent with a pressure/ vacuum-actuated systems such as position pulsations and leakage. The electric actuator operates the wastegate much faster than a pneumatically actuated system allowing for more precise control of the wastegate in all operating conditions, since valve positioning isn't inhibited by the weight of the actuator spring and transient pressures within the system. The default position of the wastegate is fully open at a learned value represented at 0%. When the engine is idling the wastegate remains opened near the learned minimum closed position (0%). On acceleration the ECM commands the wastegate closed to a value learned value represented as 100%, or fully closed, until the desired boost pressure is achieved. During partial load and cruising speeds the ECM modulates the position of the wastegate to maintain boost as desired.

Bypass Solenoid Valve (Compressor Recirculation Valve)

The turbocharger bypass solenoid valve prevents the turbo from exceeding the surge limit of the compressor at low flow and high pressure. This occurs when the engine is running with a load and the throttle suddenly closes. When that happens, flow is almost null and pressure is very high. This condition is damaging to the TC, and also generates noise and decelerates turbine speed. The ECM supplies a voltage signal to the solenoid valve output driver, which regulates the open or closed valve position.

Accelerator Pedal Depressed The bypass valve is closed. The force in the return spring integrated in the valve presses the valve cone against its seat in the TC housing. The valve is turned OFF.

Accelerator Pedal Released In order to avoid pressure spikes in the intake manifold and unloading or overrunning the turbo, the ECM sends a voltage signal to the bypass valve, which will then open. The compressed air on the pressure side of the turbo is led to the intake via the open valve. When the pressure drops, the turbine speed can be kept relatively high and the turbocharger is prevented from exceeding the surge limit of the compressor.

Turbcharger Charge Air Cooler

The TC air intake system is supported by an air-to-air charge air cooler (CAC) system, which uses fresh air drawn through a heat exchanger to reduce the temperature of the hot compressed air exiting the turbo compressor, prior to delivery to the engine combustion system. Inlet air temperature can be reduced by up to 180°F (100°C), which enhances performance due to the higher density of oxygen in the cooled air, promoting optimal combustion. The CAC is connected to the turbocharger and to the throttle body by flexible ductwork that requires the use of special high torque fastening clamps. In order to prevent any type of air leak when servicing the ductwork, the tightening specifications, cleanliness and proper positioning of the clamps is critical, and must be strictly adhered to.

Turbocharger Charge Air Cooler Icing Prevention and Detection

Moisture is a natural by-product of the combustion process in an internal combustion engine. The root cause of CAC icing is evaporating moisture stored in the engine oil that is fed into induction system before the turbocharger compressor via the positive crankcase ventilation (PCV) secondary (breather) path. Generally, the secondary PCV path is used at highway speeds, or during transient maneuvers that cause the manifold absolute pressure (MAP) to be greater than 13.1 psi (90 kPa). High moisture content in the oil may lead to rapid CAC icing during these engine operating conditions when the secondary PCV path is used instead of the primary path. Short distance driving in cold weather conditions can contribute to CAC icing since the moisture in the engine oil increases rapidly, if the oil temperature stays low, such as colder than 176°F (80°C) over several drive cycles.

Charge Air Cooler Icing Detection will enable whenever conditions exist that contribute to CAC icing while driving.

Charge Air Cooler Icing Prevention will enable whenever ambient air temperatures exist that are known to contribute to increased moisture content in the engine oil.

Engine Oil — dexos1®

Specification

5108021

Use full synthetic engine oil that meets the dexos1® specification. Full synthetic engine oils that have been approved by GM as meeting the dexos1® specification are marked with the dexos1® APPROVED - GEN 2 logo.

Viscosity Grade

In the 2.0L turbocharged engine use dexos1® APPROVED - GEN 2 full synthetic SAE 0W-20 viscosity grade engine oil. Do not add anything to the oil.

HVAC

Heating and A/C Overview

The heating and A/C system provides heated and cooled air to the interior of the vehicle. The A/C system will also remove humidity from the interior and reduce windshield fogging. The air streams into the passenger compartment through the heater core and the evaporator core. The air temperature actuator drives the mixed air door to direct the requested airflow. If the interior temperature needs to be increased, the mixed air door is put into the position in which more air streams through the heater core. If the interior temperature needs to be decreased, the mixed air door is put into the position in which more air streams through the evaporator core.

Regardless of the temperature setting, the following can affect the rate that the HVAC system can achieve the desired temperature:

- Recirculation actuator setting
- Difference between inside and desired temperature
- Blower motor speed setting
- Mode setting

Vehicles equipped with R-1234yf may utilize an Internal Heat Exchanger (IHX) in the A/C line set. An IHX transfers heat between the liquid line from the condenser and the gas line from the evaporator. It uses the cold vapor from the evaporator to cool the warm liquid refrigerant before it enters the expansion device, resulting in increased cooling and higher efficiency.

Air Ionizer

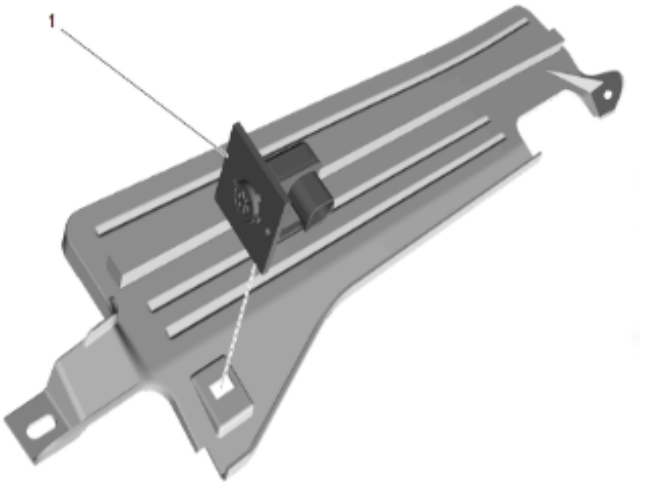
The air ionizer is a LIN device. The air ionizer electrodes produce positive and negative ions to reduce certain pollutants and odors, electronically cleaning the air to improve the air quality in the vehicle cabin. The air ionizer uses a battery voltage circuit, ground circuit, and a serial data signal from the BCM to operate. When the air ionizer is enabled, the BCM will send a serial data message for the ionizer to operate when the HVAC system is ON.

The air ionizer assists the air filtration system in reducing certain airborne contaminants by generating negatively charged hydroxi (O2-H) and emitting them into the air through the HVAC ducts. The hydroxi particles interact with airborne contaminants, breaking their structure and changing their charge so that they attract/clump together. The airborne contaminants then fall freely to interior surfaces, cleaning and sterilizing the air. The recirculation climate control setting can still be used when outdoor pollution is high in order to supplement the ionizer's operation. The air ionizer requires no maintenance or filter replacement.

The air ionizer will help reduce the following airborne contaminants:

– Dust
– Pollen
– Bacteria
– Odor
– PM 2.5 class particles (airborne particulate matter, often the result of burning fuel).

Ambient Air Quality Sensor



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Tip:

The B108 Air Quality Sensor is a LIN device on LIN 5. Diagnostics are comprehended by DTC U1100 - Lost Communication with Air Quality Sensor - Exterior.

The BCM uses a remotely mounted "exterior" Ambient Air Quality Sensor (1), located near the windshield wipers before the inlet to the HVAC system to detect certain pollutants. The sensor is mounted ahead of the recirculation door, typically near the outside air inlet to the HVAC system.

The sensor sends a signal to the BCM via serial data indicating the level of pollutants that are detected. The information is used to adjust the recirculation door when the HVAC system is ON in all modes except defrost/defog. When the concentration of pollutants exceeds a calibrated value, the recirculation actuator is commanded from outside air to recirculation so that polluted air does not enter the cabin.

Infotainment

Audio Systems

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Typical View of the CT5 Premium Luxury 10-inch (254 mm) Infotainment Screen.

The CT5 will have a Standard and an Available audio system:

– **Standard:** Premium Audio System.

– **Available:** Bose® Performance Series System.

Premium Audio System

The Premium Audio System consists of:

- 9 speakers located in these positions: 1 in the center of the instrument panel, 2 in each front door, 1 in each rear door and 2 in the rear package shelf.
- Premium Amplifier.
- Active Noise Cancellation (ANC). ANC is designed to reduce the perception of certain undesirable sounds generated by the engine into the vehicle cabin. The systems uses microphone and engine speed signals, software integrated into the Amplifier/Active Noise Cancellation Module, and the vehicle speakers to determine and generate the correct frequencies needed to achieve the desired noise reduction.
- Engine Sound Enhancement (ESE) (if equipped).

Bose® Performance Series System

The Bose® Performance Series System consists of:

- 15 premium speakers located in these positions: 1 in the center of the instrument panel, 1 in each A-pillar, 2 in each front door, 2 in each rear door and 4 in the rear package shelf.
- Bose® Centerpoint™ and AudioPilot™ functionality.
- Digital Signal Processor (DSP) Position Modes.
- Premium Amplifier.
- Active Noise Cancellation (ANC). ANC is designed to reduce the perception of certain undesirable sounds generated by the engine into the vehicle cabin. The systems uses microphone and engine speed signals, software integrated into the Amplifier/Active Noise Cancellation Module, and the vehicle speakers to determine and generate the correct frequencies needed to achieve the desired noise reduction.
- Engine Sound Enhancement (ESE) (if equipped).

Engine Sound Enhancement — Overview

ESE accentuates the most pleasing, natural powertrain and exhaust system sounds and delivers them to the cabin at the right levels during the correct times, such as during engine start or a spirited acceleration. It uses the infotainment system microphones, tachometer input, software integrated into the Amplifier/Active Noise Cancellation Module, and the vehicle speakers to determine and generate the correct frequencies needed to modify the sound and play it back through the speakers. ESE is thoroughly integrated and automatic, with no action required by the driver. The engineering and science behind ESE are rooted in orders, or sound frequencies that are generated by the engine. Based on the desired sound character, ESE amplifies or adds in more of certain orders to achieve the desired sounds. Adding more orders produces a richer, more complex and pleasing sound.

Sound levels are based on engine speed as ESE activates at approximately 3,000 rpm when the engine is moving into its optimal power band and on accelerator pedal position. The software is calibrated to use the tachometer signal to ensure the frequencies of the enhanced sound correspond to engine speed. This is processed in milliseconds.

In addition to the distinct engine sound character tuning, sound character is also tuned to enhance Driver Mode Control options:

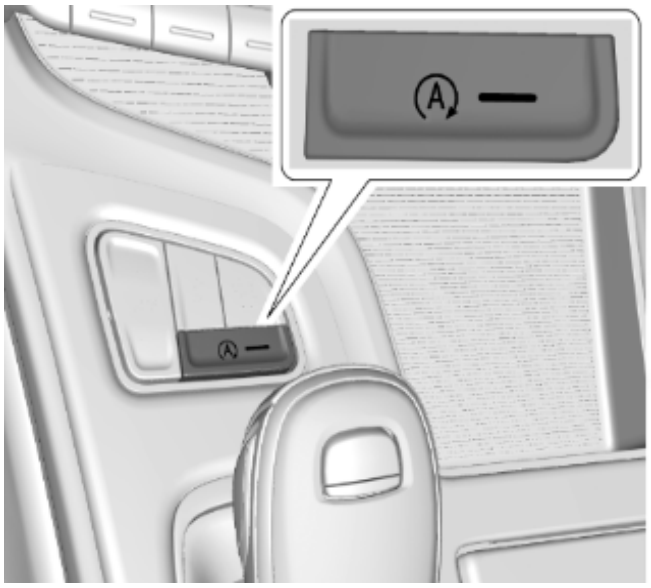
- Tour and Snow/Ice modes purr with refinement.
- Sport mode growls with power.
- Track mode roars with aggression (if equipped).
- My Mode/V-Mode allows driver selection from available sound characters.

Stop/Start

Overview

Stop/Start is a technology that improves fuel economy. The vehicle has a Stop/Start system to shut OFF the engine. It has components designed for the increased number of starts that will occur. Stop/Start works by automatically shutting down the engine when the vehicle comes to a stop under certain conditions, such as at a stoplight, a railroad crossing or when stuck in traffic. When this happens, the needle on the tachometer will move to the "Auto Stop" position. The engine seamlessly restarts when the brake pedal is released.

Enable/Disable Switch



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A driver that prefers to operate without Stop/Start enabled, a disable button is located in the center console. The automatic engine Stop/Start feature can be disabled and enabled by pressing the switch with the A symbol surrounded by a circular arrow. When the A symbol surrounded by a circular arrow is illuminated, the system is enabled. Auto Stop/Start is enabled each time the vehicle is started.

Transfer Case

Overview

The Borg Warner™ Model BW-4475, transfer case is a 1-speed active design. The transfer case allows vehicle speed dependent flexible clutch preload torque levels for enhanced system performance. An on-demand torque biasing friction clutch is tuned through software calibrations. When a driver enters a turn, clutch torque is decreased based on the various CAN inputs, such as steering angle, to prevent crowhop or driveline binding from occurring at low speeds. If the driver were to accelerate hard enough in a turn to induce rear wheel slip the transfer case would immediately correct it and then reduce torque to prevent crowhop or binding.

The system is fully automatic, requires no driver intervention, and has its own control module integrated with the vehicle chassis control system via the vehicle's CAN bus. The torque split between the front and rear axle is not fixed as in an open center differential transfer case meaning the active transfer case has the ability to transfer up to 100% of available torque to the front axle as needed.

Transmission 10-Speed Automatic

Overview

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Typical view of the 10L80 10-Speed Automatic Transmission

The Hydra-Matic® 10L80 10-Speed — RPO MHS is a fully automatic, rear-wheel drive, electronic-controlled transmission. The ten speed ratios are generated using four simple planetary gearsets, two brake clutches, and four rotating clutches. The resultant on-axis transmission architecture utilizes a squashed torque converter, an off-axis pump and four close coupled gearsets. The four rotating clutches have been located forward of the gearsets to minimize the length of oil feeds which provides for enhanced shift response. There are different variants of the transmission, all based on torque capacity. Architecture is common between the variants, and component differences are primarily related to size.

The transmission architecture features a case with an integral bell housing for enhanced powertrain stiffness. A unique pump drive design allows for off-axis packaging very low in the transmission. The pump is a variable vane type which effectively allows for two pumps in the packaging size of one. This design and packaging strategy not only enables low parasitic losses and optimum priming capability but also provides for ideal oil routing to the controls system, with the pump located in the valve body itself. The transmission control module (TCM) is externally mounted, enabling packaging and powertrain integration flexibility. The controller makes use of three speed sensors which provide for enhanced shift response and accuracy.

The 4-element torque converter contains a pump, a turbine, a pressure plate splined to the turbine, and a stator assembly. The torque converter acts as a fluid coupling to smoothly transmit power from the engine to the transmission. It also hydraulically provides additional torque multiplication when required. The pressure plate, when applied, provides a mechanical direct drive coupling of the engine to the transmission.

The hydraulic system consists of an off-axis gear-driven variable vane-type pump next to the valve body, and 2 control valve body assemblies. The pump maintains the working pressures needed to stroke the clutch pistons that apply or release the friction components. These friction components, when applied or released, support the automatic shifting qualities of the transmission.

The friction components used in this transmission consist of 6 multiple disc clutches. The multiple disc clutches deliver 11 different gear ratios, 10 forward and one reverse, through the gear sets. The gear sets then transfer torque through the output shaft.

Driver Mode Control

Overview

Driver Mode Control allows the driver to personalize their driving experience by selecting a vehicle mode with a simple push of the center console mode button. The CT5 has three pre-optimized selectable Drive Modes which are Tour, Sport, Snow/Ice and one driver personalizable My Mode.

Press the Drive Mode button on the center console to select a mode. When pressed, the mode menu will display in the instrument cluster and activate the next available mode.

- **Tour Mode:** Use for normal city and highway driving to provide a smooth, soft ride. This setting provides a balance between comfort and handling. This is the standard mode. When Tour Mode is selected, an indicator will not display. Tour mode is the default mode.
- **Sport Mode:** In this mode, the vehicle monitors driver behaviors and automatically enables Performance Shift Features when spirited driving is detected. These features maintain lower transmission gears to increase available engine braking and improve acceleration response. The vehicle will exit this feature and return to normal operation after a short period when no spirited driving is detected. The steering will change to provide more precise control. If the vehicle has Magnetic Ride Control, the suspension will change to provide better cornering performance. When Sport Mode is selected, an indicator will display.
- **Snow/Ice:** Snow/Ice Mode is used for slippery surfaces to help control wheel speed. This can compromise the acceleration on dry asphalt. Snow/Ice Mode uses a different accelerator pedal map (calibration) to optimize traction on a slippery surface. The accelerator pedal will reduce engine torque at small pedal inputs. When Snow/Ice Mode is selected an indicator will display.
- **My Mode:** My Mode is used to personalize everyday driving. This mode is designed to allow the driver to configure vehicle sub-systems to their own preference for city or normal driving. Using the center display, the following vehicle sub-systems ***may*** be available for customization in this mode:
  - **Engine Sound:** Stealth, Tour, Sport, Track.
  - **Steering:** Tour, Sport, Track.
  - **Suspension:** Tour, Sport, Track.
  - **Brake Response:** Tour, Sport.

Safety, Driver Awareness and Driver Assistance Technologies

Overview

Depending on equipment, the CT5 offers an array of Standard and Available Safety, Driver Awareness and Driver Assistance technologies.

Driver Awareness Technologies

Driver awareness technologies include standard Safety Alert Seat (SAS) and Cadillac's latest generation available Rear Camera Mirror with zoom and tilt adjustment.

Driver Assistance Technologies

Some of the following driver assistance technologies are standard and others are available:

Adaptive Cruise Control, Automatic Emergency Braking (AEB), Forward Collision Alert (FCA), Front Pedestrian Braking (FPB), Lane Change Alert (LCA), Lane Departure Warning (LDW), Lane Keep Assist (LKA) and Side Blind Zone Alert (SBZA).

Parking or Backing Assistance Technologies

Some of the following parking or backing assistance technologies are standard and others are available:

Automatic Parking Assist with Braking, Backing Warning System, Front Park Assist (FPA), Rear Cross Traffic Alert (RCTA), Rear Park Assist (RPA), Rear Vision Camera (RVC), Reverse Automatic Braking (RAB) and Surround Vision, may help the driver park and/or avoid objects.

Head-Up Display

HUD includes four different information display page options that can be selected to project onto the windshield.

- **Audio/Phone View:** Displays speed information, current radio station, media type and incoming calls.
- **Navigation View:** Displays speed information, Turn-by-Turn Navigation information (if equipped) and when navigation routing is not active it displays compass heading.
- **Performance View:** Displays speedometer reading, rpm reading, transmission position and gear shift indicator.
- **Speed View:** Displays speedometer reading, speed limit and if equipped, Adaptive Cruise Control set speed, Lane Departure Warning Alert and Vehicle Ahead/Tailgating Alert Indicator.

Rear Camera Mirror

If equipped, the rear camera mirror provides a wider and less obstructed field of view to assist when driving, changing lanes and checking traffic conditions.

Surround Vision Recorder

If equipped, this system records the 360° camera views to an SD card. Only images are recorded, without sound. A dedicated SD card will be needed for this system. The recommended SD card is a 32GB SDHC card with FAT32 file system, Class 10 and over. Do not store other files on the same SD card as the surround vision recorder files. Storing other files on the same card may increase recording start up and playback time or result in a loss of data.

Supplemental Inflatable Restraint

SIR System Overview

The supplemental inflatable restraint system, comprised of the Restraints Control Module (RCM), impact sensors, Airbags, Restraint Occupant Classification System Module, and seat belt Pretensioners, supplements the protection offered by the seat belts. The RCM determines the severity of a collision using data collected from impact sensors located at strategic points on the vehicle. The RCM processes the information provided by the sensors to provide the safest combination of Airbag and pretensioner deployment. The RCM will deploy the Airbags and Pretensioners if it detects a collision of sufficient force. If the force of the impact is not sufficient to warrant Airbag deployment, the RCM may still deploy the seat belt Pretensioners. The RCM contains a sensing device that translates vehicle acceleration to an electrical signal. The RCM compares these signals to the threshold values stored in memory. If the signals exceed the stored threshold value, the RCM will determine the severity of the event and may deploy restraints. The RCM continuously monitors the deployment loops and electrical components for malfunctions. Upon detection of a circuit malfunction, the RCM will set a DTC and illuminate the SIR system Airbag indicator.

AIRBAGS

The CT5 is equipped with eight airbags to help protect occupants.

– 2 dual-stage frontal airbags for driver and front passenger.
– 2 knee airbags for driver and front passenger.
– 2 seat mounted side impact airbags for driver and front passenger.
– 2 head curtain side impact airbags with first and second row coverage. The airbags also help to protect occupants in the event of a vehicle rollover.

Sensing System

The CT5 utilizes advanced sensing technology to help detect the type and severity of the collision that has occurred in order to ensure that the airbags inflate as quickly as needed. The sensing system includes the following:

- 2 acceleration based sensors (G-force sensors) located on the front tie bar to detect frontal impacts (Front EFS).
- 2 pressure based sensors inside the front doors to detect rapid changes in the air pressure in side impact crashes (PSIS).
- 2 acceleration based sensors (G-force sensors) on the rocker inner, between the B and C pillars, to detect side-impact crashes at the rear of the vehicle (SIS).
- K36 Restraints Control Module (RCM). The RCM contains internal sensors in addition to the external impact sensors.

Seat Belt Pretensioners

The seat belt pretensioners consist of a housing, seat belt retractor, seat belt anchor, seat belt webbing, initiator, and a canister of gas generating materials. The initiator is part of the seat belt pretensioner deployment loop. When the vehicle is involved in a collision of sufficient force, the RCM causes current to flow through the seat belt deployment loops to the initiator. Current passing through the initiator ignites the material in the canister producing a rapid generation of gas. The gas produced from this reaction deploys the seat belt pretensioners which removes the slack in the seat belts. Depending on the severity of the collision, the seat belt pretensioners may deploy without the frontal inflator modules deploying, or they will deploy immediately before the frontal inflator modules deploy. Each seat belt pretensioner connector is equipped with a shorting bar, which shorts the seat belt pretensioner circuitry to prevent unwanted deployment of the seat belt pretensioner when the connector is disconnected.

Towing the Vehicle

Flatbed Car Carrier

GM recommends a flatbed car carrier to transport a disabled vehicle. Use ramps to help reduce approach angles, if necessary. The transmission ***must*** be in (N) Neutral when moving the vehicle. The vehicle was neither designed nor intended to be towed with any of its wheels on the ground. If the vehicle is equipped with a tow eye, only use the tow eye to ***pull the vehicle onto a flatbed car carrier from a flat road surface***. ***DO NOT*** use the tow eye to pull the vehicle from snow, mud, or sand. Contact Roadside Assistance or a professional towing service if the disabled vehicle must be towed.

Wireless Charging

Overview

If equipped, the vehicle should have a wireless charging pad below the climate controls. The system operates at 145 kHz and wirelessly charges one Qi compatible smartphone. The power output of the system is capable of charging at a rate up to 3 amp (15 W), as requested by the compatible smartphone. To charge, the vehicle must be ON, in ACC/ACCESSORY, or Retained Accessory Power (RAP) must be active. The wireless charging feature may not correctly indicate charging when the vehicle is in RAP. The operating temperature range for the charging system is −4°F (−20°C) to 140°F (60°C) and for the smartphone 32°F (0°C) to 95°F (35°C).

Training Courses

Training Courses — Description and Number

Description	Course Name and Number
2020 Cadillac CT5 New Model Launch	#10320.63W: 2020 Cadillac CT5 New Model Launch
Engines	#16026.07D: CSS Engines – Features, Diagnosis and Servicing (Canada) #16440.23D: Engines – New and Updates for RPOs L3B, LSY, L82, L84, L87 (United States) #16440.23D-V: Engines – New and Updates for RPOs L3B, LSY, L82, L84, L88 (Video) (United States)
Transmission	#17440.17D: Transmissions – New and Updates for 9T50, 10L90 and ETRS Select (United States) #17041.74W: ETRS Operation and Service (United States)

Version Information

Version	1
Modified	Released October 30, 2019

Trademark Footnotes

Borg Warner™ is a trademark of BORG WARNER INC

Bose® is a Registered Trademark of the BOSE Corporation

Bose® AudioPilot™ is a Trademark of the BOSE Corporation

Bose® Centerpoint™ is a Trademark of the BOSE Corporation

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