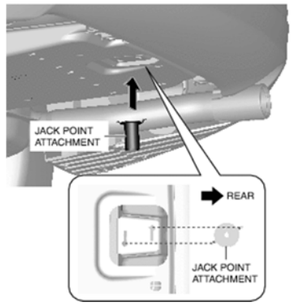
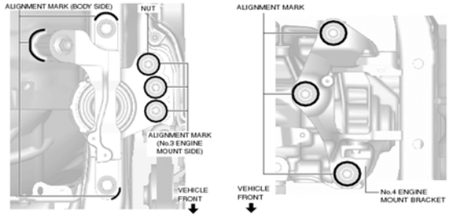
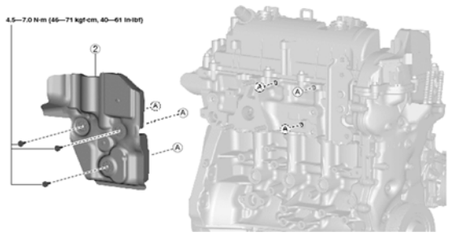
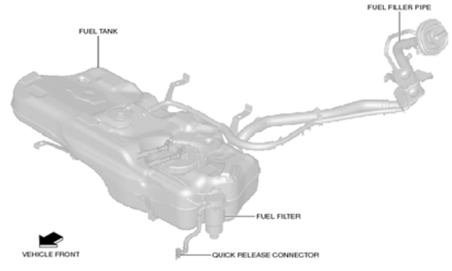
Technical Quick Guide

Section	Title	Purpose of Adoption	Service Point	Common Inquiry	Other
GENERAL INFORMATION	JACKING POSITIONS	・A removable jack point attachment has been adopted to the 4SD.	・When jacking up the rear of the vehicle, remove the jack point attachment from the trunk compartment and jack up the vehicle after installing as shown in the illustration. 	・Not applicable	・Not applicable
ENGINE SKYACTIV-G 1.3 SKYACTIV-G 1.5 (WITH 4-1 EXHAUST SYSTEM) AT ONLY	VARIABLE VALVE TIMING MECHANISM (WITH 4-1 EXHAUST SYSTEM)	・To improve engine re-startability, the ignition switch OFF (IG-ON to IG-OFF) is delayed (within approx. 0.5 s) until the variable valve timing mechanism switches to the fixed mode[*1] when the ignition is switched OFF (LOCK) under the following conditions. -During or right after fast idle increase (during control of catalytic converter earlier activation) -Right after shifting to D/R/M position while the vehicle is parked at high-altitude, or shifting from D/R/M position to P/N position [*1]: Fixed mode (lock-pin in hydraulic variable valve timing actuator engaged with rotor depression)	・Not applicable	・Not applicable	・Not applicable
ENGINE SKYACTIV-G 1.3 SKYACTIV-G 1.5 (WITH 4-1 EXHAUST SYSTEM) ONLY AT	DRIVE SELECTION SYSTEM	・A drive selection system has been adopted which achieves driving performance corresponding to the driver's intentions. ・With the sport mode, the following 3 points are changed from the normal mode to minimize the delayed acceleration response when a fast-response situation is required. 1. Lower gear selected 2. Improved shifting speed between gears 3. Engine torque increases corresponding to accelerator opening angle	・Not applicable	・When switching to "SPORT" mode, the vehicle automatically shifts to a lower gear speed. This function enhances the response to the accelerator operation by assuring manageable drive force in advance. ・The "SPORT" mode controls the output characteristics, shift timing and also shift-speed changes, which enable a greater than normal powerful acceleration response to the accelerator operation. As a result, smooth driving when passing or merging onto highways is achieved.	・Not applicable
ENGINE SKYACTIV-G 1.3 SKYACTIV-D 1.5	ENGINE MOUNT	・The engine and transaxle are secured to the vehicle body by the engine mounts to reduce vibration and noise. ・A liquid sealant has been adopted to the No. 3 engine mount to reduce engine vibration.	・When installing the No.3 and No.4 engine mounts, the brackets may deviate from their original position and engine noise or vibration could increase. ・When installing the No.3 and No.4 engine mount brackets, align them to the alignment marks placed during removal and install them to their original positions. No.3 ENGINE No.4 ENGINE 	・Not applicable	・By placing the No.1 engine mount in a level position, the rotation behavior of the engine and transaxle is reduced. Modifications and tuning have been implemented to control engine and emission behavior which cause occupants to feel discomfort. ・The mounts are installed with the engine and transaxle weight center position above the rotational movement center axis, which reduces the energy to the body frame because the rotation radius is smaller.
ENGINE SKYACTIV-G 1.3 SKYACTIV-G 1.5 SKYACTIV-D 1.5	BATTERY	・On vehicles with i-stop and i-ELOOP where the frequency of repeated charge/discharge is high, an i-stop exclusive battery is used to prevent battery discharge and battery life deterioration because the internal resistance is lower than that of a normal battery.	・If a normal battery is installed on a vehicle with i-stop and i-ELOOP, i-stop may be inhibited early due to a false detection of battery depletion. Always use the specified i-stop exclusive battery.	・Not applicable	・When battery deterioration advances, the internal resistance increases. The PCM detects this battery depletion condition from the internal resistance. Due to this, i-stop may be inhibited if the PCM determines there is a normal battery with high internal resistance installed and early battery deterioration.

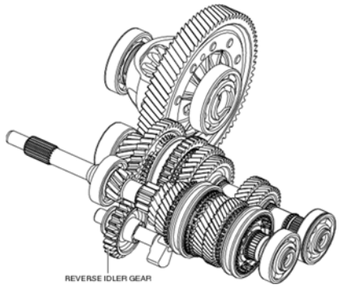
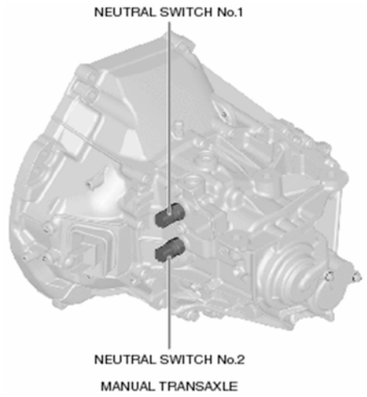
Technical Quick Guide

Section	Title	Purpose of Adoption	Service Point	Common Inquiry	Other
ENGINE SKYACTIV-D 1.5	ENGINE DISASSEMBLY/ASSEMBLY	・As shown in the following illustration, insulator No.1 (blue-colored 2 part) has been adopted to the cylinder head for engine noise absorption. 	・Not applicable	・Not applicable	・The No.1 installation area acts as a floating structure to control the noise transmission from the engine.
ENGINE SKYACTIV-D 1.5	WATER-COOLED CHARGE AIR COOLER	・For improved accelerator pedal response, the intake air passage capacity to the separate type water-cooled charge air cooler of the SKYACTIV-D 2.2 has been reduced by half from 8 L {8 US qt, 7 Imp qt} to 4 L {4 US qt, 4 Imp qt}. ・In addition, a water-cooled type charge air cooler has been adopted with an exclusive engine coolant circuit and an electronically controlled water pump to supply a constant, optimum amount of intake air temperature.	・The charge air cooler is built into the intake manifold, and it differs from the SKYACTIV-D 2.2. ・Two radiator caps with differing valve opening pressures, one for the engine cooling and the other for the charge cooler, are in the engine compartment.	・Not applicable	・Not applicable
ENGINE SKYACTIV-D 1.5	COOLANT CONTROL VALVE	・A coolant control valve has been adopted to promote engine warming by determining the driving conditions such as the engine speed, fuel injection amount, water temperature and oil temperature while the vehicle is being driven, and by controlling the engine coolant supply circuit and amount so that the engine coolant is supplied in the required amount to the required circuits, at the required time. ・A spacer is installed in the water jacket liner of the cylinder block to promote further warming and to reduce the flow speed of the engine coolant near the liner.	・Not applicable	・Not applicable	・A coolant control valve and a water jacket spacer have been newly adopted to the SKYACTIV-D 1.5.
ENGINE SKYACTIV-D 1.5	TURBOCHARGER WITH VARIABLE TURBINE GEOMETRY	・A turbocharger with variable turbine geometry has been adopted to produce a broad, sufficient amount of air charging pressure of a small engine or single type from the low to the high speed range.	・Not applicable	・Not applicable	・Not applicable
ENGINE SKYACTIV-D 1.5	FUEL INJECTOR	・Solenoid injectors have been adopted which achieve high precision, multistage injection in various patterns.	・When replacing an injector always perform the fuel injection amount learning.	・Not applicable	・Not applicable
ENGINE SKYACTIV-D 1.5	FUEL FILTER	・Not applicable	・For fuel flow prevention when removing the filter, remove the rear seat and disconnect the quick connector connected to the fuel filter from the fuel tank. ・When a new fuel filter is installed, air flows into the fuel system so that the filter paper inside the filter can absorb fuel, which will cause the engine to stall immediately after starting it. However, you can start the engine by performing cranking (approx. 10 s) 2 or 3 times which removes the air. ・If the engine still does not start, perform the "Fuel Line Air Bleed" of the "After Service Precaution" in the Workshop Manual.	・Not applicable	**Warning** • Before servicing the fuel system always follow the procedure “Before Service Precaution” in the Workshop Manual before performing the “Fuel Line Safety Procedure”. ・Be careful when using the SST to install the filter so that the filter coating is not damaged. ・If water does not flow during draining (remaining fuel in fuel tank is low) disconnect the quick release connector as shown in the figure below and inject air into the filter so draining can be done. 

Technical Quick Guide

Section	Title	Purpose of Adoption	Service Point	Common Inquiry	Other
ENGINE SKYACTIV-D 1.5	FUEL INJECTION AMOUNT LEARNING	・To reduce engine speed fluctuations, the fuel injection amount learning verifies the fuel injection amount of each cylinder by calculating fluctuations in engine speed during idling and corrects the fuel injection amount of each cylinder.	・While fuel injection amount learning is being performed, the engine revs several times to verify the changes in the engine speed fluctuation. ・The fuel injection amount learning can be performed when the following conditions are met. -Engine coolant temperature: 70 °C {158 °F} to 95 °C {203 °F} -Intake air temperature: 0 °C {32 °F} to 65 °C {149 °F} -Fuel temperature: 20 °C {68 °F} to 80 °C {176 °F} ・If fuel injection amount learning is not completed, the malfunction indicator light, glow indicator light and master warning light turn on. In addition, the PCM detects DTCs P1200:00 and P167B:00. (cleared by completing fuel injection amount learning) ・If only DTC P167B:00 is detected, the glow indicator light flashes.	・Not applicable	・When the following are replaced, fuel injection amount learning must be performed. -Injector -PCM -CKP sensor -CKP sensor signal detection plate -Lower cylinder block -Crankshaft -Mechanical
ENGINE SKYACTIV-D 1.5	ENGINE TECHNICAL DATA	・For improved fuel economy, a new engine oil with low viscosity (OW-20) is used with the SKYACTIV-D 1.5 engines.	・The new oil (OW-20) cannot be used in SKYACTIV-D 2.2.	・Not applicable	・A high viscosity index oil that ensures kinetic viscosity temperature at high temperatures and lowers the kinetic viscosity temperature at low temperatures is used.
SUSPENSION	WHEEL AND TIRE	・Not applicable	・Not applicable	・ Wheel size up or down is not applicable due to the following reasons. -If the wheel is changed to 16 inch wheels and tire chains are installed to the vehicle originally equipped with the 15 inch wheels, the tire chains may contact the tire houses and body frames because the tire steering angles are different. To prevent this, equip wheels of the specified size. <Steering angle> Vehicles equipped with 15 inch tires -Inside: 43° 00' ±3° -Outside: 35° 00' ±3° Vehicles equipped with 16 inch tires -Inside: 41° 00' ±3° -Outside: 34° 00' ±3° ・ 14 inch wheels cannot be installed to vehicles equipped with 15 or 16 inch wheels because the wheel contacts the tie rod when the steering wheel is operated.	・Not applicable
TRANSMISSION/TRANSAXLE CW6A-EL	CONTROL VALVE BODY DISASSEMBLY	・Not applicable	・Snap fit tie wraps have been adopted to secure the wiring harnesses inside the transaxle. The snap fit tie wrap cannot be reused. Use a Mazda genuine part when replacing.	・Not applicable	・Not applicable
TRANSMISSION/TRANSAXLE CW6A-EL EW6A-EL	SHIFT POINT CONTROL (AUTO SHIFT CONTROL)	・Performs control automatically to maintain the optimum shift point according to the road conditions and the driver operation.	・Not applicable	・Not applicable	・When driving on a winding road (acceleration and deceleration is required repeatedly), the lower gears are maintained by the AAS control to allow the driver to control the vehicle as intended and to assure excellent acceleration. ・If it is assumed that the friction resistance of the road is low (such as compacted snow-road, gravel road, and wet road), the shift point is lowered so that the vehicle posture can be maintained safely.
TRANSMISSION/TRANSAXLE CW6A-EL	INITIAL LEARNING	・Perform the initial learning if any of the following parts is replaced. Otherwise, engine racing may occur or shift shock may increase. -Control valve body -Oil pressure switch -Automatic transaxle -Clutch (low clutch, high clutch, R-3-5 brake, 2-6 brake)	・If the initial learning is not performed, DTC P06B8:00 is stored. ・While in the initial learning, because the gears are forcibly changed with the engine running and the shift lever in a drive range, the vehicle may move which could lead to an accident. When performing the initial learning, apply the parking brake securely and block the front and rear wheels using wheel blocks.	・Not applicable	・Shift shock will occur during the initial learning because the gears are changed forcibly.

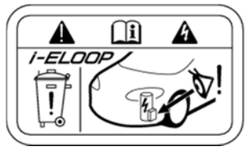
Technical Quick Guide

Section	Title	Purpose of Adoption	Service Point	Common Inquiry	Other
TRANSMISSION/TRANSAXLE F65M-R F66M-R	MANUAL TRANSAXLE	・For rotational resistance reduction (improved fuel economy), a selective sliding type reverse idler gear has been adopted with which the reverse idler gear does not rotate constantly. ・For sliding resistance reduction, the synchronizer mechanism of the reverse idler gear has been eliminated. A rev pre-balk mechanism (stops rotation using 5th synchronizer mechanism) has been adopted to stop primary shaft rotation.  	・Neutral switches No.1 and No.2 are the same shape. Be careful not to assemble them mistakenly.  	・If shifting to the reverse gear is difficult, release the clutch pedal once and depress it again and return the shift lever to the neutral position once to make shifting to the reverse gear smooth.	・Not applicable
STEERING	STEERING GEAR AND LINKAGE	・A steering column with a tilt/telescoping mechanism has been adopted to enable precise adjustment for an optimum driving posture.	・Not applicable	・After releasing the tilt/telescoping lever and adjusting the steering wheel position, the tilt cam may not engage with the teeth on the opposite side and the lever cannot be locked. ・If they do not engage, move the steering wheel slightly and return the lever slowly to lock the lever.	・The steering wheel can be moved in the up/down and forward/backward direction by pressing the adjusting lever towards the front of the vehicle and releasing the lock of the tilt/telescoping system. ・The tilt/telescoping mechanism allows adjustment for 45 mm {1.8 in} in the vertical direction and 50 mm {2.0 in} in the longitudinal direction. ・Generally, the telescoping operation may feel heavy if it is operated by one hand or holding the lower part (6-o'clock position) or upper part (12-o'clock position) of the steering wheel. It can be operated smoothly by holding the steering wheel in the 3-o'clock and 9-o'clock positions.
HEATER, VENTILATION & AIR CONDITIONING (HVAC)	REFRIGERANT SYSTEM SERVICE CAUTIONS	・New refrigerant HFO-1234yf (R-1234yf) has been newly adopted.	・Always use the following specified compressor oil (PAG oil). If compressor oil other than the specified type is used, the refrigerant performance may be lowered or the refrigerant cycle parts may be damaged. <SKYACTIV-G 1.3, SKYACTIV-G 1.5> Specified compressor oil ・HFC-134a (R-134a) => ZXL200PG ・HFO-1234yf (R-1234yf) => VC200YF Compressor oil sealed volume (approx. quantity) ・HFC-134a (R-134a) => 110 ml {110 cc, 3.72 fl oz} ・HFO-1234yf (R-1234yf) => 110 ml {110 cc, 3.72 fl oz} <SKYACTIV-D 1.5> Specified compressor oil ・HFC-134a (R-134a) => DH-PR ・HFO-1234yf (R-1234yf) => YR20 Compressor oil sealed volume (approx. quantity) ・HFC-134a (R-134a) => 140 ml {140 cc, 4.73 fl oz} ・HFO-1234yf (R-1234yf) => 130 ml {130 cc, 4.40 fl oz}	・Not applicable	・Shape of the charging valve for HFC-134a (R-134a) and HFO-1234yf (R-1234yf) is different.
RESTRAINTS	SIDE AIR BAG	・If a side collision occurs, the side air bag stored inside the front seat reduces the impact to the occupant and protects the chest, abdominal, and lumbar areas of the occupant. In addition the side air bag sensor inside the B-pillar detects a side collision accurately to deploy the air bag quickly.	・Not applicable	・Not applicable	・Not applicable
RESTRAINTS	SEAT BELT	・Pre-tensioners have been adopted for the rear seat belts.	・Not applicable	・Not applicable	・Not applicable

Technical Quick Guide

Section	Title	Purpose of Adoption	Service Point	Common Inquiry	Other
BODY & ACCESSORIES	THEFT-DETERRENT SYSTEM	・The theft-deterrent system triggers an alarm to the surrounding area by operating the horn and flashing the hazard lights if a door, liftgate/trunk or the hood is forcibly opened.	・For servicing, basically use the M-MDS with the theft-deterrent system turned off.	・Not applicable	・For security reasons, even a forcible IG-ON using the M-MDS, such as when servicing a keyless entry system malfunction or loss of the key, is regarded as an unauthorized IG-ON which is one of the conditions that triggers the theft-deterrent system. ・Therefore, if the ignition is switched ON forcibly using the M-MDS without the theft-deterrent system turned off while servicing, the theft-deterrent system activates the warning.
BODY & ACCESSORIES	COMING HOME LIGHT SYSTEM	・To assist the driver in a dark place after driving, the headlights LO can be turned on for a certain period of time by operating the light switch for a flash-to-pass with the ignition switched OFF or in ACC.	・Not applicable	・Coming home light illumination time can be changed using the personalization feature. Time can be selected from OFF/30 s/60 s/90 s/120 s. (Initial setting is 30 s)	・The coming home light system turns on the headlights LO in the following two modes: ・Turns on the headlights from when the driver performs a flash-to-pass operation in stand-by mode (illumination time is not counted) to when the driver leaves the vehicle. If the driver does not leave the vehicle after performing a flash-to-pass operation, the headlights turn off after 3 min. ・Operates when the user leaves the vehicle while in stand-by mode after off-timer mode (illumination time is counted) and all the doors are closed.
BODY & ACCESSORIES	LEAVING HOME LIGHT SYSTEM	・To assist the driver in a dark place before driving, the headlights LO and TNS can be turned on for a certain period of time by unlocking the doors using the remote transmitter with the ignition switched OFF or in ACC and the light switch in TNS or HEAD position.	・Not applicable	・The leaving home light system can be enabled using the personalization feature. Illumination time is 30 s.(Initial setting is off)	・After the headlights are turned on by the leaving home light system, if the doors are locked or no operation is made for 30 s, the lights turn off automatically.
BODY & ACCESSORIES	ROOM LIGHT CONTROL SYSTEM	・To reduce electricity consumption, the interior lights/map lights turn off if no operation is made for approx. 30 s with the ignition switched OFF (LOCK).	・Not applicable	・Not applicable	・Not applicable

Technical Quick Guide

Section	Title	Purpose of Adoption	Service Point	Common Inquiry	Other
i-ELOOP	i-ELOOP	・For improved fuel economy, a large amount of electrical power is instantaneously generated using kinetic energy during deceleration and it is retrieved as electrical energy and reused, which reduces the power generation load on the engine.	・ are systems which differ from power voltage. For the removal/installation or replacement of 13-25 V parts (capacitor, DC-DC converter, generator) in particular, always disconnect the negative battery terminal and pull out the capacitor safety plug. ・If the DC-DC converter is replaced (capacitor replaced at same time) with the capacitor voltage decreased, the mode switches to the pre-charge mode for charging the capacitor after connecting the battery or starting the engine. ・After starting the engine when replacing the DC-DC converter, verify that there is no DTC record. If a DTC is stored, always clear the DTC using the M-MDS. ・When the engine is started the first time after replacing the DC-DC converter, the capacitor is changed by generating power at the generator. In addition, if the capacitor voltage is low and the battery voltage is low, it takes several seconds to complete the capacitor charge. ・During this time, the battery voltage may further decrease and each electrical component may store a DTC because electrical load is supported by only the battery. ・Because examination for the capacitor using the tester or i-ELOOP system is not possible, the examination is performed based on the external appearance (capacitor damage, capacitor connector damage or corrosion). ・Store the capacitor in an upright position. However, the part can be tilted for a short period during installation. ・If there is external appearance damage or deformation because the capacitor was dropped, replace it with a new one (no external appearance damage and deformation). ・The service parts are delivered with the short wire installed to prevent static discharge. Remove the short wire before installing to the vehicle. ・The following label is attached on the upper part of the bumper. For vehicles with the capacitor, discharge operation is performed using a capacitor discharge resistance box when the capacitor is discarded. Discard the same way as other parts after discharge. 	・Not applicable	・Size reduction of battery -A DC-DC converter and capacitor with improved performance have been adopted, reducing the size of the lead battery. ・Placement of DC-DC converter in engine compartment -The size reduction of the wiring harness connected to the i-ELOOP related-parts has been realized by reducing the size of the lead battery and placing the DC-DC converter in the available space. ・Changing pre-charge method -If the engine is started with the capacitor voltage decreased after vehicle is left for long periods, the capacitor is shut off and the mode is switched to bypass mode. Due to this, even if the capacitor voltage is low, the power supply can be assured immediately. -The pre-charge operation is performed via the charge circuit in the DC-DC converter with the capacitor and generator shut off electronically.

Technical Quick Guide

Section	Title	Purpose of Adoption	Service Point	Common Inquiry	Other
SAFETY EQUIPMENT	BLIND SPOT MONITORING (BSM) SYSTEM	・A blind spot monitoring (BSM) system has been adopted for assisting the driver in confirming the area behind the vehicle when changing lanes. ・This system detects a vehicle approaching from the rear of the vehicle in an adjacent lane while the vehicle is traveling, or an approaching vehicle, motorcycle, or pedestrian when backing up the vehicle from a garage or parking lot while the vehicle is stopped to warn the driver. ・The vehicle rear detection uses the 24 GHz quasi-millimeter radar sensors equipped to the right and left rear end panels. A vehicle, motorcycle, or pedestrian is detected by this quasi-millimeter radar.	・Blind spot monitoring (BSM) radar aiming -The blind spot monitoring control module is required to correctly determine the position of an object at the rear, and the radar aiming operation using the SST is required to adjust a deviation in the radar emission angle when replacing the control module. -The aiming procedure is the same as the RVM radar aiming equipped to the CX-5. Always verify the workshop manual before performing the procedure. ・Blind spot monitoring (BSM) configuration ・If the control module is replaced with a new one, the configuration operation using the M-MDS is not required because vehicle specification information is read automatically (auto configuration) via CAN communication from the instrument cluster when the ignition is switched ON.	・Not applicable	・The blind spot monitoring (BSM) system has the following two functions. Blind spot monitoring (BSM) function ・The detection of an approaching vehicle starts at a vehicle speed of 15 km/h {9.3 mph} or more, and if any of the following vehicles is detected, the function alerts the driver of the approaching vehicle by turning the BSM warning indicator light (outer mirror) on the vehicle approaching side on. -The detected approaching vehicle enters the alert area. -An approaching vehicle is detected which will reach the alert area front end within 5.5 s. ・In addition, when the BSM warning indicator light is turned on and the turn light switch is turned on to the side in which the BSM warning indicator light is turned on, the BSM warning indicator light is flashed and a warning sound is activated to alert the driver. ・Rear cross traffic alert (RCTA) function ・An approaching vehicle or a pedestrian when backing up the vehicle from a garage or parking lot is detected to warn the driver. ・When the selector lever is in the R position (ATX)/shift lever is in the R position (MTX), the detection of an approaching vehicle or a pedestrian starts. When an approaching vehicle or a pedestrian entering the alert area within 3 s is detected, the BSM warning indicator lights on both sides are flashed and a warning sound is activated to alert the driver.