

GROUP 42C

WIRELESS CONTROL MODULE (WCM)

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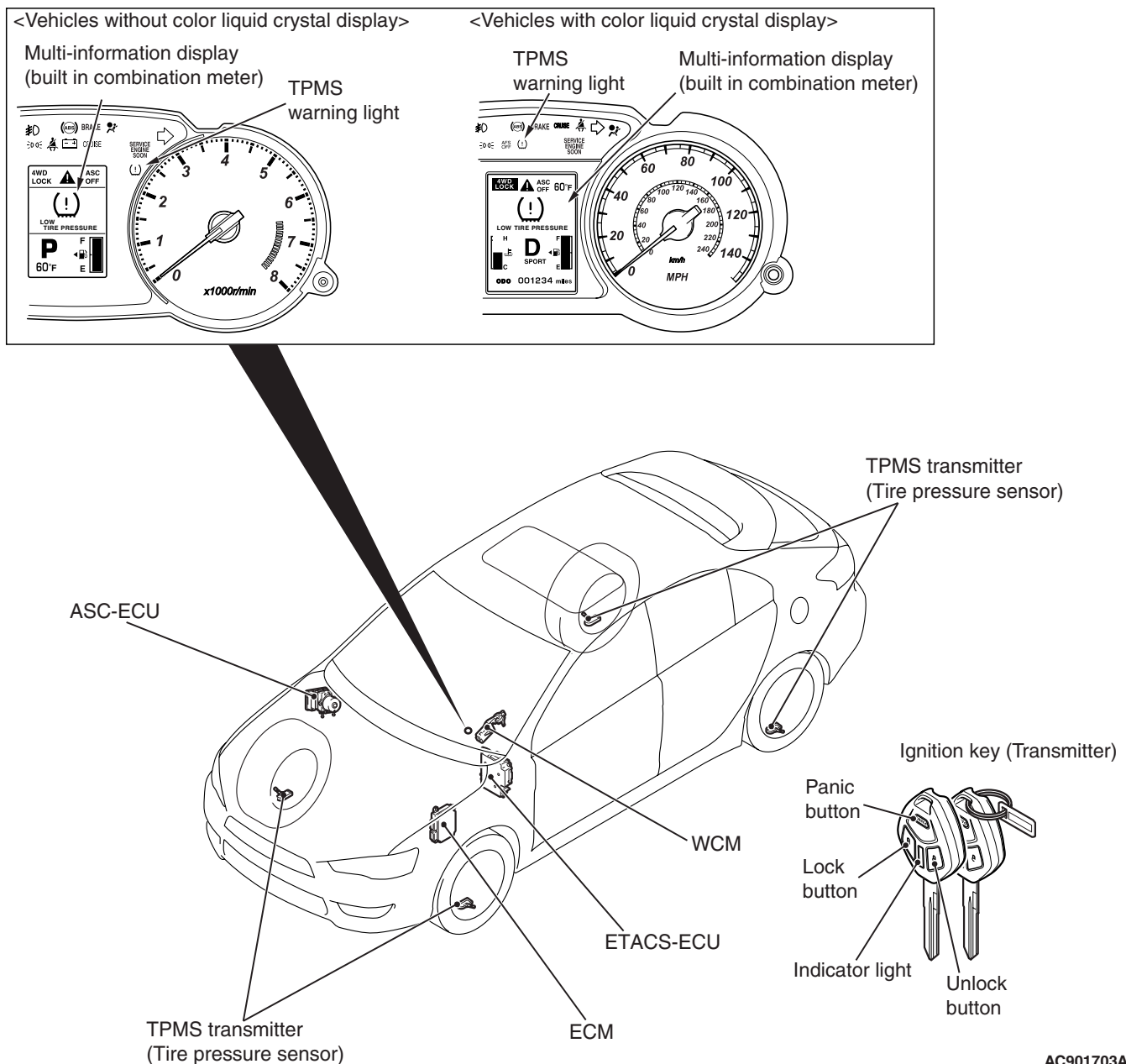
GENERAL INFORMATION

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The wireless control module (WCM) is a system that integrates the keyless entry function, immobilizer function, and the TPMS function, and it has the following features:

- The ignition key (transmitter) incorporates a lock/unlock button and a panic button. The ignition key also incorporates an indicator light that enables the driver to check if the signal is transmitted correctly or if the battery in the key is discharged. (Refer to P.42C-5.)
- The ignition key incorporates the immobilizer function that inhibits starting the engine by using an unauthorized key.
- The incorporated TPMS function monitors the air pressure of all the tires (except spare tire).
- Each vehicle is provided with two ignition keys (transmitter), and up to eight ignition keys can be registered.
- Settings of the keyless entry function can be adjusted using a customization function (Refer to P.42C-15).

CONSTRUCTION DIAGRAM



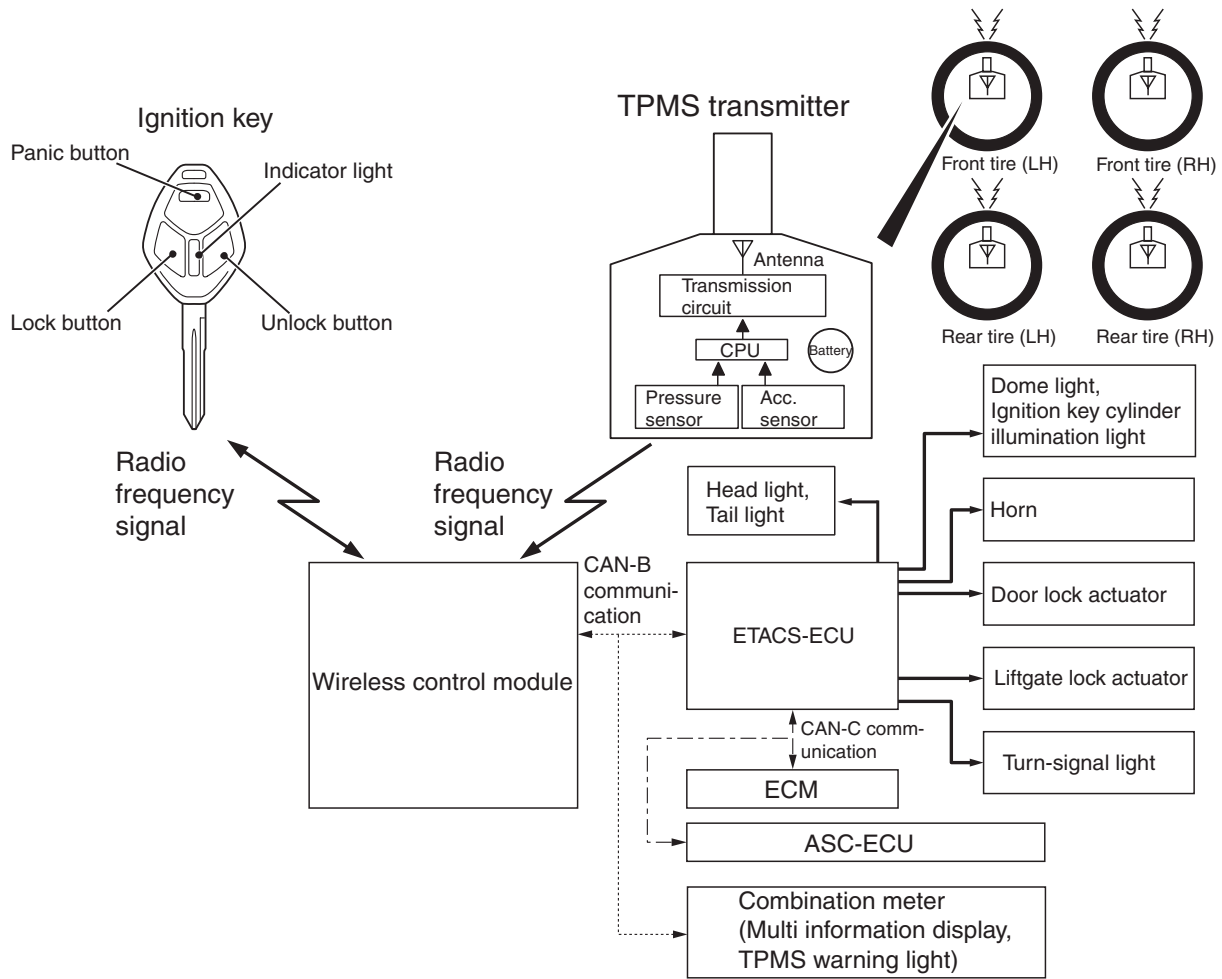
Main components and functions

Parts name	Functional description
WCM	Controls the keyless entry functions, TPMS functions and starting of the engine by using the following communications. <ul style="list-style-type: none"> • Communications with ETACS-ECU, ECM, ASC-ECU and combination meter via CAN • Wireless communication with the ignition key (transmitter) • Wireless communication with the TPMS transmitter
Ignition key (transmitter)	The ignition key (transmitter) also sends signals to WCM when the lock/unlock button and the panic button on it are operated.
Combination meter (Multi information display, TPMS warning light)	Communicates with WCM via CAN. Send ignition switch status. Receives the warning request or warning information about TPMS from WCM, activates * the TPMS warning light. Warning symbol and message is additionally displayed on the multi information display.
ETACS-ECU	Communicates with WCM via CAN send ignition switch status. Receives the door lock/unlock request from WCM, outputs the lock/unlock signal and flashes the turn signal light, dome light and horn to inform the driver that the doors are locked/unlocked.
ASC-ECU	Communicates with WCM via CAN. Sends the vehicle speed data.
TPMS transmitter	Measure tire pressure directly, then send radio frequency signal to WCM.

NOTE:

- *: *Illuminates for tire pressure warning.*
- *: *Flashes for about 1 minute and then continuously illuminated for TPMS malfunction warning.*

System configuration

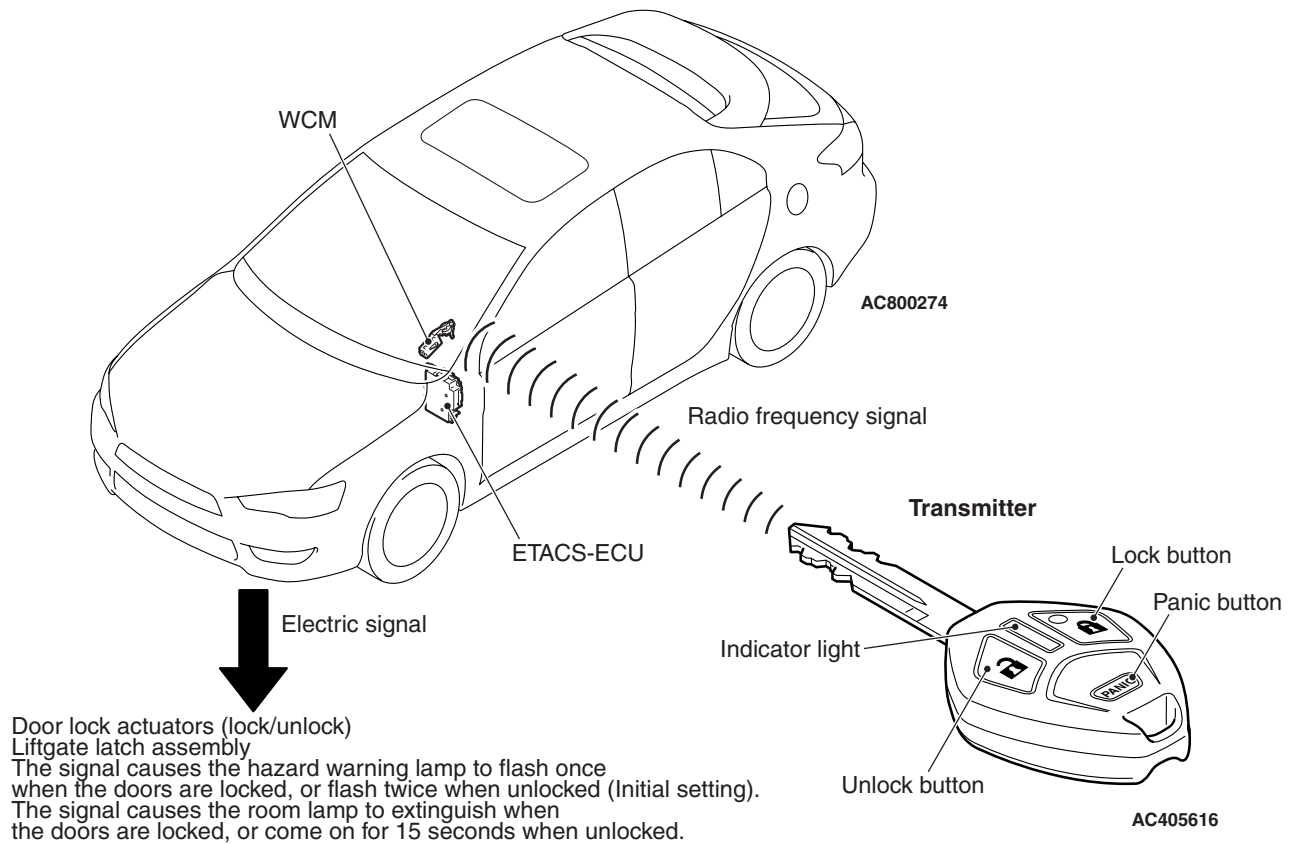


NOTE: In case of replacement of WCM, all keyless ID, key ID and tire pressure sensor ID should be re-registered using scan tool MB991958 (M.U.T.-III sub-assembly).

SYSTEM OPERATION

KEYLESS ENTRY FUNCTION

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This keyless entry function has the following features: A keyless entry system enables locking and unlocking of all doors, the liftgate from 12 m (39.4 feet) away from the vehicle. The following features are also available.

- A three-knob type transmitter with lock, unlock and panic buttons.
- The WCM incorporates a receiver and a receiving antenna.
- Up to eight encrypted codes can be registered using scan tool MB991958 (M.U.T.-III sub-assembly).
- Answerback functions

NOTE: The answerback function can be changed using a customization function (Refer to [P.42C-15](#)).

- Keyless entry timer lock

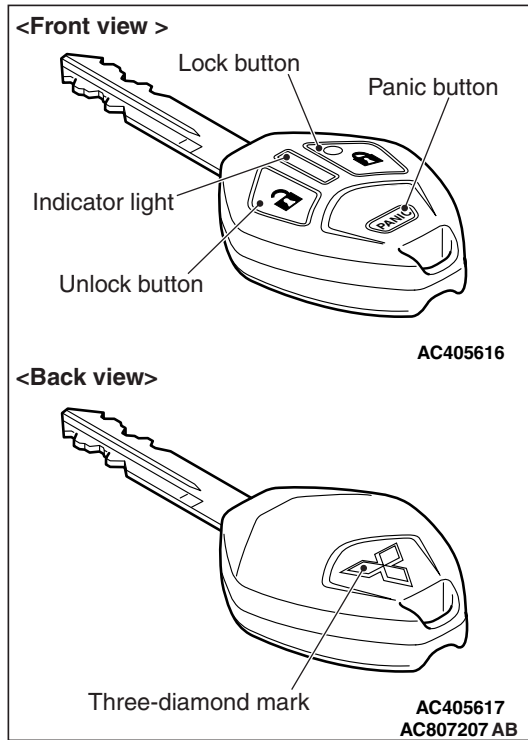
NOTE: Timer of the keyless entry timer lock can be changed using a customization function (Refer to [P.42C-15](#)).

- Due to adoption of the power door locks with selective unlocking to keyless entry system, the anti-theft feature is improved.

NOTE: Using a customization function, the operation of power door locks with selective unlocking can be enabled or disabled. (Refer to [P.42C-15](#).)

DESCRIPTION OF CONSTRUCTION AND OPERATION

TRANSMITTER

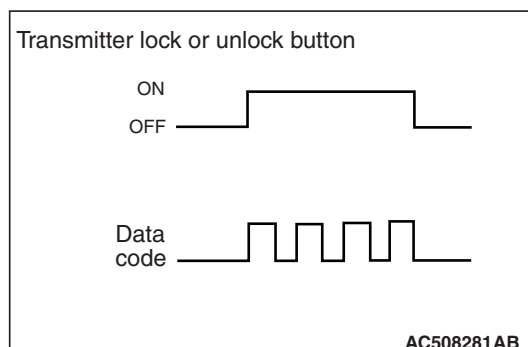


- The transmitter is integrated into the master key. The three-knob button is adopted, and the specific encrypted code is transmitted as radio wave signal.
- An indicator light, which illuminates when signals are sent, is added on the key grip. This indicator light informs you of the signal transmission status and warns you of flat battery.
- A signal transmission circuit (printed circuit) and a battery are housed in one case. The case is housed in the key grip, thus improving resistance to water ingress.
- A coin type battery, CR1620 is used in the transmitter.
- The functions of the immobilizer system are integrated (Refer to P.42C-8).
- Using a customization feature, the transmitter button operation can be changed (Refer to P.42C-15).
- The transmitter button operation allows the system to operate as follows:

KEYLESS ENTRY SYSTEM OPERATION TABLE (DEFAULT)

OPERATION OF TRANSMITTER			OPERATION OF KEYLESS ENTRY SYSTEM
Lock button		Press once	Lock all doors (including the liftgate)
power door locks with selective unlocking. <i>NOTE: Using a customization function, the power door locks with selective unlocking can be enabled or disabled.</i>			Press the unlock button once to unlock the driver's door, and within 2 seconds, press the unlock button again to unlock the front passenger's door, rear doors and liftgate.
Panic alarm system	Panic button	Press once (press and hold for 1 second).	Starts the panic alarm (headlights flash and horn honks for three minutes)
	Lock button, unlock button or panic button	Press again	Stops the panic alarm in progress

ENCRYPTED CODE



Four data codes are transmitted when a switch is operated once. The encrypted code for user identification is a combination of 0 and 1, and more than 1 million different combinations are available. To prevent theft by copying signal codes, the data code includes a rolling code with the encrypted code. The rolling code changes each time a signal is sent.

RECEIVER

The receiver is incorporated into WCM together with the receiving antenna. The receiver compares the signal the antenna received from the transmitter with the encrypted code registered in it, and when they coincide, outputs a signal from WCM. By connecting scan tool MB991958 (M.U.T.-III sub-assembly) to the data link connector, encrypted codes of up to eight transmitters can be registered.

NOTE: IA transmitter can be added without using the scan tool. <USA only>

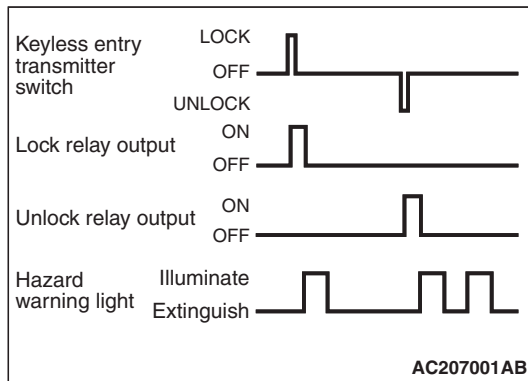
FUNCTION FOR CONFIRMING WCM (RECEIVER) OUTPUT AND OPERATION

When the ETACS-ECU receives a command from WCM, the ETACS-ECU outputs LOCK/UNLOCK signal and informs the driver of the keyless entry system operation by flashing the light and blowing horn (Answerback). The initial setting at factory for the answerback function is as following table. Using a customization feature, the answerback function can be changed (Refer to P.42C-15).

FUNCTION TABLE FOR CONFIRMING KEYLESS ENTRY OPERATION (DEFAULT)

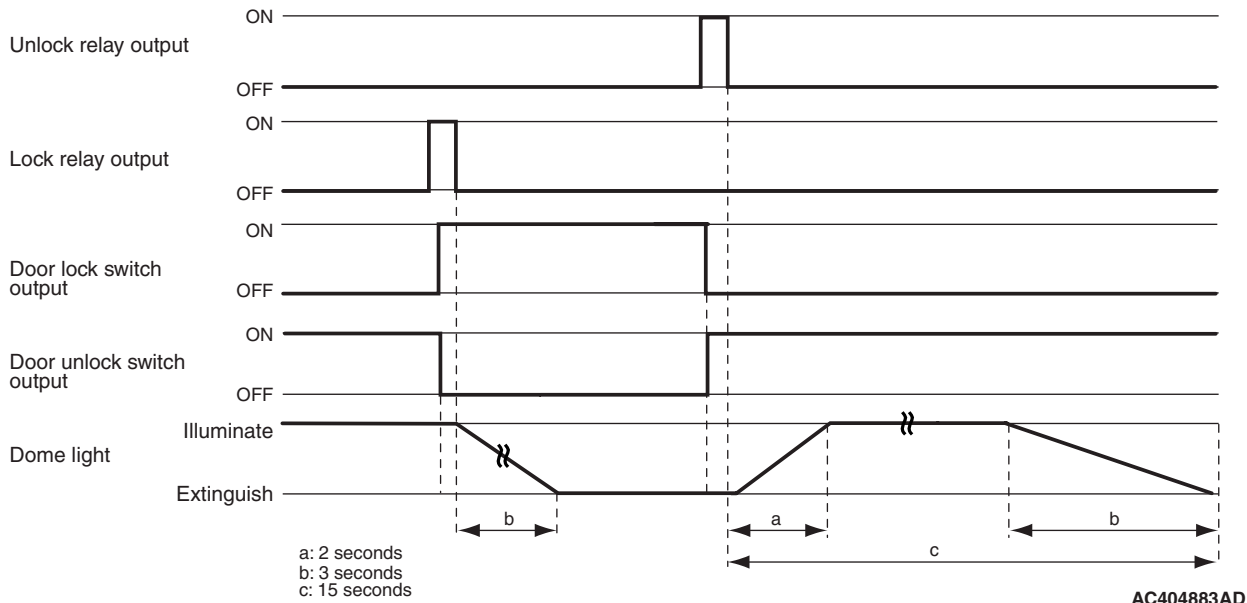
ITEM	OPERATION	
	DOORS AND LIFTGATE LOCKED	DOORS AND LIFTGATE UNLOCKED
ETACS-ECU (WCM)	Sends lock signal	Sends unlock signal
Dome light	Flashes once	Illuminates for 15 seconds
Turn-signal lights (RH and LH)	Flashes once	Flashes twice
Horn	Sounds once if doors are already locked	–

KEYLESS ENTRY HAZARD LIGHT ANSWERBACK FUNCTION



The hazard answerback function that allows checking the lock/unlock state of the door easily even in the daytime is installed. When the LOCK signal from the transmitter is input to ETACS-ECU, all doors (including the liftgate) are locked and the hazard warning light flashes once. When UNLOCK signal is input, all doors (including the liftgate) are unlocked and the hazard warning light flashes twice.

KEYLESS ENTRY DOME LIGHT ANSWERBACK FUNCTION



When LOCK signal from the transmitter is input to the ETACS-ECU via WCM, all doors (including the liftgate) are locked and the dome light will extinguish*. When UNLOCK signal is input, all doors (including the liftgate) are unlocked and the dome light illuminates for 15 seconds. The dome light fades in, keeps on, and fades out in 15 seconds after the door unlock relay is operated.

*NOTE: *: If doors (including the liftgate) are locked with the transmitter when the dome light is ON while doors (including the liftgate) are opened, the dome light is switched off in 1.2 seconds. In addition, if doors (including the liftgate) are locked with the transmitter when the dome light is OFF, the dome light does not work.*

KEYLESS ENTRY HORN ANSWERBACK FUNCTION

When WCM receives the LOCK signal from the transmitter and send LOCK signal to ETACS-ECU, all doors (including the liftgate) are locked and the horn sounds. If the driver's door cannot be locked even when the keyless entry transmitter is operated, the horn does not sound.

IMMOBILIZER FUNCTION

The immobilizer function prevents the engine from starting and immobilizes the vehicle if a key other than the key registered for that vehicle is used in an attempt to start the engine after forced entry.

WELCOME LIGHT FUNCTION <VEHICLES WITH COLOR LIQUID CRYSTAL METER>

Refer to GROUP 54A, Lighting [P.54A-9](#).

KEYLESS ENTRY TIMER LOCK TIME

When none of the doors (including the liftgate) is opened within 30 seconds after the doors (including the liftgate) are unlocked by the keyless entry system, ETACS-ECU automatically outputs the door lock signal to lock the doors (including the liftgate). This function prevents the doors from being unlocked unexpectedly by operation errors. Using a customization function, the timer lock time can be changed (Refer to [P.42C-15](#)).

OPERATION INHIBITION CONDITIONS

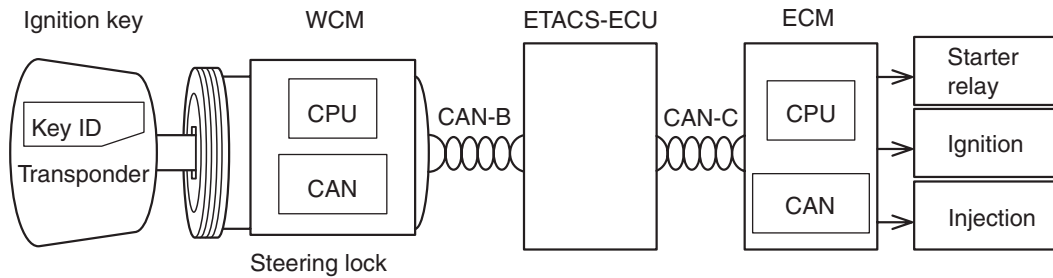
The operation of the system is inhibited when:

- The ignition key is in the ignition switch.
- Any door or the liftgate is open (door switch is ON). (including door ajar)

THEFT-ALARM SYSTEM

Refer to GROUP 54A, Theft-alarm system [P.54A-47](#).

CONSTRUCTION DIAGRAM



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OPERATION

1. With the ignition key turned ON, the transponder (a small transmitter) integrated in the ignition key transmits its own ID code (key ID) to WCM via radio wave.
2. According to the sent key ID, WCM controls the ECM only when the sent ID code agrees with the pre-registered one.
3. Since the power to the transponder incorporated in the ignition key is supplied from the WCM, the ignition key can be used even when its battery is discharged. Two ignition keys are provided, and up to eight ignition keys can be registered to one vehicle as needed. More than one trillion of ID code combinations can be registered. This feature prevents code copying, resulting in higher security of the system.

NOTE: In case of replacement of WCM, or loss or addition of the ignition key, all key ID codes should be re-registered using scan tool. (A key can be added without using the scan tool. <USA only>)

TIRE PRESSURE MONITORING SYSTEM (TPMS) FUNCTION

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When the tire pressure becomes under the specified value, the TPMS function warns the driver of that state by illuminating the TPMS warning light.

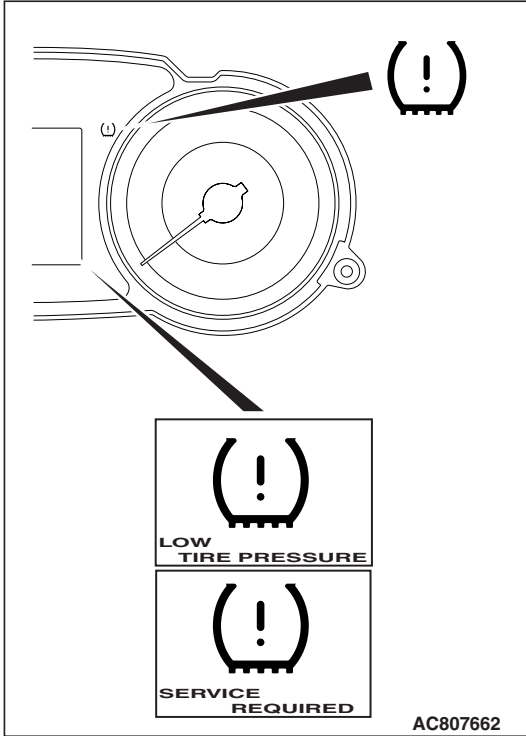
OPERATION

- The signals from the TPMS transmitter are received by the WCM.
 - WCM processes input signals from each TPMS transmitter as well as vehicle speed signals from the ASC-ECU if equipped. It receives the atmospheric pressure signal from ECM, and when the atmospheric pressure is low (such as at high altitude), it calibrates the tire pressure received from TPMS transmitter and makes a judgment of warning. When the road tire pressure is low, it sends a warning signal causing the TPMS warning light to be illuminated. When the TPMS has problems, it sends a warning signal causing the TPMS warning light to be flashed*.
- NOTE: *: Change to continuous illumination after flashing for about 1 minute.*
- For 3 seconds after the ignition switch is turned to the "ON" position, WCM illuminates the TPMS warning light to check any breaks in the TPMS warning light circuit.
 - By connecting the scan tool to the data link connector, data stored in WCM (data of tire pressure and TPMS transmitter ID, the alarm status and warning history, etc.) can be displayed and TPMS transmitter ID can be registered.
- NOTE: If the TPMS transmitter is replaced, register the ID codes of all the TPMS transmitters again using the scan tool.*

TPMS WARNING LIGHT AND DISPLAY

The TPMS warning light on the combination meter illuminates or flashes* to alert the driver by request from WCM. When the tire pressure warning or the fault warning is activated, a warning symbol and a message are displayed on the multi information display.

WARNING DISPLAY PATTERN OF TPMS WARNING LIGHT AND MULTI INFORMATION DISPLAY



Circumstance	Warning light	Multi information display
For 3 seconds after the ignition switch is turned to the "ON" position (warning light circuit self-check)	Illuminates	No indication
TPMS problems	Flashes*	Symbol and "SERVICE REQUIRED" is displayed
Low tire pressure	Illuminates	Symbol and "LOW TIRE PRESSURE" is displayed

*NOTE: *: Change to continuous illumination after flashing for about 1 minute.*

TIRE PRESSURE THRESHOLD VALUES

Item	Tire pressure kPa (psi)
Standard pressure at cold (reference)	220 (32)
Alarm ON pressure	174 (25.2) or less
Alarm OFF pressure	189 (27.4) or more

TPMS TRANSMITTER (TIRE PRESSURE SENSOR)

The TPMS transmitter combines the valve and tire pressure sensor in a single unit. The TPMS transmitters are mounted inside the tires. The TPMS transmitter measures tire pressure directly with its tire pressure sensor and sends radio frequency signals to WCM. The TPMS transmitter includes acceleration sensor that senses tire rotation, and change tire pressure sampling and data transmission timing when vehicle is running.

NOTE: Use only genuine wheels. The use of non-genuine wheels may cause the improper installation of the TPMS transmitters, possibly resulting in air leakage and damage to the TPMS transmitter.

TIRE PRESSURE SAMPLING TIMING

Vehicle status	Sampling timing
At vehicle moving	once every 5 seconds
At vehicle stationary	once every 1 minute

NOTE: Vehicle moving = vehicle speed: approximately 25 km/h (15 mph) or more

DATA TRANSMISSION TIMING

Vehicle status	Transmission timing
At vehicle moving	once every 1 minute*
At vehicle stationary	once every 13 hours


If a sampled pressure varies by ± 10 kPa (1.5psi) from the last transmitted pressure value, an additional transmission will occur.


*NOTE: *: Once every 15 seconds for first 30 transmission after vehicle starts moving.*

WARNINGS/ALARMS <VEHICLES WITHOUT COLOR LIQUID CRYSTAL DISPLAY>

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If the TPMS fails or the tire pressure is low, the WCM warns the driver of that state by the TPMS warning light and the multi information display in the combination meter.

Display contents	Message	Item	State	Warning operations		Warning cancellation conditions (Cancels warning operations when one of the conditions met)
				TPMS warning light	Multi information display	
Not displayed	–	TPMS warning light bulb open circuit check	The ignition switch is turned from "LOCK" (OFF) to "ON."	Illuminates for 3 seconds.	–	3 seconds have passed after the TPMS warning light is lit.
 <small>AC809643</small>	LOW TIRE PRESSURE	Tire pressure alarm	The received tire pressure value is under the alarm ON threshold value.	Illuminates.		The received tire pressure value is over the alarm OFF threshold value.


Display contents	Message	Item		State	Warning operations		Warning cancellation conditions (Cancels warning operations when one of the conditions met)
					TPMS warning light	Multi information display	
 <small>AC809643</small>	SERVICE REQUIRED	TPMS failure warning	ID not stored	The TPMS transmitter ID is not registered in the WCM.	Flashes *		ID is registered normally.
			Defective EEPROM	Abnormality of data in the EEPROM of the WCM is detected.			Data in the EEPROM of the WCM is checked to be normal.
			Problem in signal reception	The signals from TPMS transmitters cannot be received while driving for about 20 minutes.			The signal from the TPMS transmitter that was warned is received.
			Defective sensor	The sensor failure signal is received from the TPMS transmitter.			A normal signal is received from the TPMS transmitter that was warned.
			The battery voltage of the TPMS transmitter is low.	The reception problem warning is activated because of the low battery voltage of the TPMS transmitter.			The signal of normal battery voltage is received from the TPMS transmitter that was warned.
			Vehicle speed input problem	The vehicle speed is not input.			The vehicle speed is input.
			Abnormal vehicle speed value	The vehicle speed value is abnormal.			The normal vehicle speed value is received.


NOTE: *: Change to continuous illumination after flashing for about 1 minute.

WARNINGS/ALARMS <VEHICLES WITH COLOR LIQUID CRYSTAL DISPLAY>

If the TPMS fails or the tire pressure is low, the WCM warns the driver of that state by the TPMS warning

light and the multi information display in the combination meter.

Display contents	Message	Item	State	Warning operations		Warning cancellation conditions (Cancels warning operations when one of the conditions met)
				TPMS warning light	Multi information display	
Not displayed	–	TPMS warning light bulb open circuit check	The ignition switch is turned from "LOCK" (OFF) to "ON."	Illuminates for 3 seconds.	–	3 seconds have passed after the TPMS warning light is lit.
 <small>AC809643</small>	LOW TIRE PRESSURE	Tire pressure alarm	The received tire pressure value is under the alarm ON threshold value.	Illuminates.		The received tire pressure value is over the alarm OFF threshold value.

Display contents	Message	Item		State	Warning operations		Warning cancellation conditions (Cancels warning operations when one of the conditions met)
					TPMS warning light	Multi information display	
 <small>AC809643</small>	TPMS SERVICE REQUIRED	TPMS failure warning	ID not stored	The TPMS transmitter ID is not registered in the WCM.	Flashes *		ID is registered normally.
			Defective EEPROM	Abnormality of data in the EEPROM of the WCM is detected.			Data in the EEPROM of the WCM is checked to be normal.
			Problem in signal reception	The signals from TPMS transmitters cannot be received while driving for about 20 minutes.			The signal from the TPMS transmitter that was warned is received.
			Defective sensor	The sensor failure signal is received from the TPMS transmitter.			A normal signal is received from the TPMS transmitter that was warned.
			The battery voltage of the TPMS transmitter is low.	The reception problem warning is activated because of the low battery voltage of the TPMS transmitter.			The signal of normal battery voltage is received from the TPMS transmitter that was warned.
			Vehicle speed input problem	The vehicle speed is not input.			The vehicle speed is input.
			Abnormal vehicle speed value	The vehicle speed value is abnormal.			The normal vehicle speed value is received.

NOTE: *: Change to continuous illumination after flashing for about 1 minute.

CUSTOMIZATION FUNCTION

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By operating the ETACS system or MMCS of scan tool MB991958, the following functions can be programmed. The programmed information is held even when the battery is disconnected.

Adjustment item (scan tool display)	Adjustment item	Adjusting contents (scan tool display)	Adjusting contents
Hazard answer back	Adjustment of the number of keyless hazard warning light answer back flashes	Lock:1, Unlock:2	LOCK: Flashes once, UNLOCK: Flashes twice (initial condition)
		Lock:1, Unlock:0	LOCK: Flashes once, UNLOCK: No flash
		Lock:0, Unlock:2	LOCK: No flash, UNLOCK: Flash twice
		Lock:2, Unlock:1	LOCK: Flash twice, UNLOCK: Flash once
		Lock:2, Unlock:0	LOCK: Flash twice, UNLOCK: No flash
		Lock:0, Unlock:1	LOCK: No flash, UNLOCK: Flash once
		Lock:0, Unlock:0	No function
Dome light delay timer with door	Adjustment of interior light delay shutdown time	0sec	0 second
		7.5sec	7.5 seconds
		15sec	15 seconds
		30sec	30 seconds (initial condition)
		60sec	60 seconds
		120sec	120 seconds
		180sec	180 seconds
Door unlock mode	Adjustment of power door locks with selective unlocking	All doors unlock	Without function: The first operation of keyless entry system or unlock operation by KOS unlocks all doors.
		Dr door unlock	With function: The first operation of keyless entry system or unlock operation by KOS unlocks the driver's door only, and the second unlock operation within 2 seconds after that unlocks all doors. (initial condition)

Adjustment item (scan tool display)	Adjustment item	Adjusting contents (scan tool display)	Adjusting contents
Auto door unlock	Adjustment of the auto door unlock function	Disabled	Without function (initial condition) <M/T, CVT, TC-SST>
		Always (P pos)	With function: Operates when the shift lever or the selector lever is moved to the P position. <CVT, TC-SST>
		P/W unlock (P)	With function: Operates when the shift lever or the selector lever is moved to the P position with the power window lock switch in the OFF position. <CVT, TC-SST>
		Always(Lock pos)	With function: Operates when the ignition switch is moved to the LOCK (OFF) position. <M/T, CVT, TC-SST>
		P/W unlock(Lock)	With function: Operates when the ignition switch is turned to the LOCK (OFF) position with the power window lock switch in the OFF position. <M/T, CVT, TC-SST>
Duration of horn chirp	Horn sounding time during horn answer back	Short	0.01 second (initial condition)
		Long	0.02 second
Horn chirp by keyless	Horn chirp by keyless entry system <vehicles without auto light>	Not sound horn	No horn answerback function
		Lock any time	The horn sounds when the lock button of keyless entry transmitter is pressed once.
		W lock any time	The horn sounds when the lock button of keyless entry transmitter is pressed twice. (initial condition)
	Horn chirp by keyless entry system <vehicles with auto light>	Not sound horn	No horn answerback function
		Lock any time	The horn sounds when the lock button of keyless entry transmitter is pressed once.
		Lock/auto ON	During daytime, while the lighting switch is in the AUTO position, the horn sounds once when the lock is pressed once.
		W lock any time	The horn sounds when the lock button of keyless entry transmitter is pressed twice. (initial condition)
Timer lock timer	Timer lock period adjustment	30sec	30 seconds (initial condition)
		60sec	60 seconds
		120sec	120 seconds
		180sec	180 seconds
Panic alarm switch	With/without panic alarm function	Disable	No function
		Enable	With function (initial condition)