

A/T SYSTEM DESCRIPTION - ELEC...

2011 CR-V - - A/T System Description - Electronic Control System

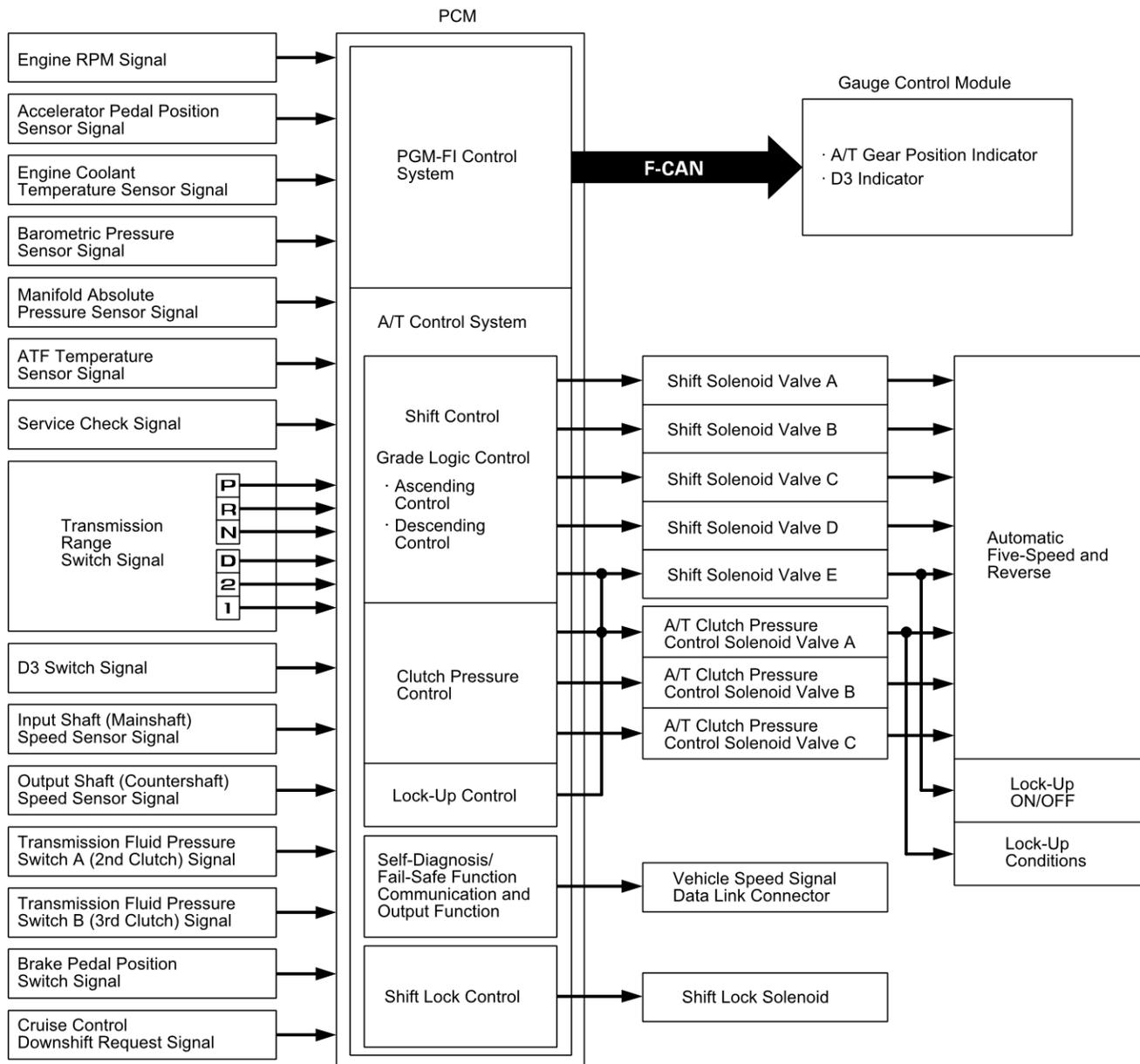
Electronic Control System

Electronic Control

The electronic control system consists of the PCM, the sensors, and the solenoid valves. Shifting and lock-up are electronically controlled for comfortable driving under all conditions.

Functional Diagram

The PCM receives input signals from the sensors, switches, and other control units, processes data, and outputs signals for the engine control system and the A/T control system. The A/T control system includes shift control, clutch pressure control, lock-up control, and A/T system hydraulic control. The PCM switches the shift solenoid valves and the A/T clutch pressure control solenoid valves on and off in a specific sequence to control gear selection and torque converter clutch lock-up. It also controls the appropriate operating hydraulic pressure to the automatic transmission.



Shift Control

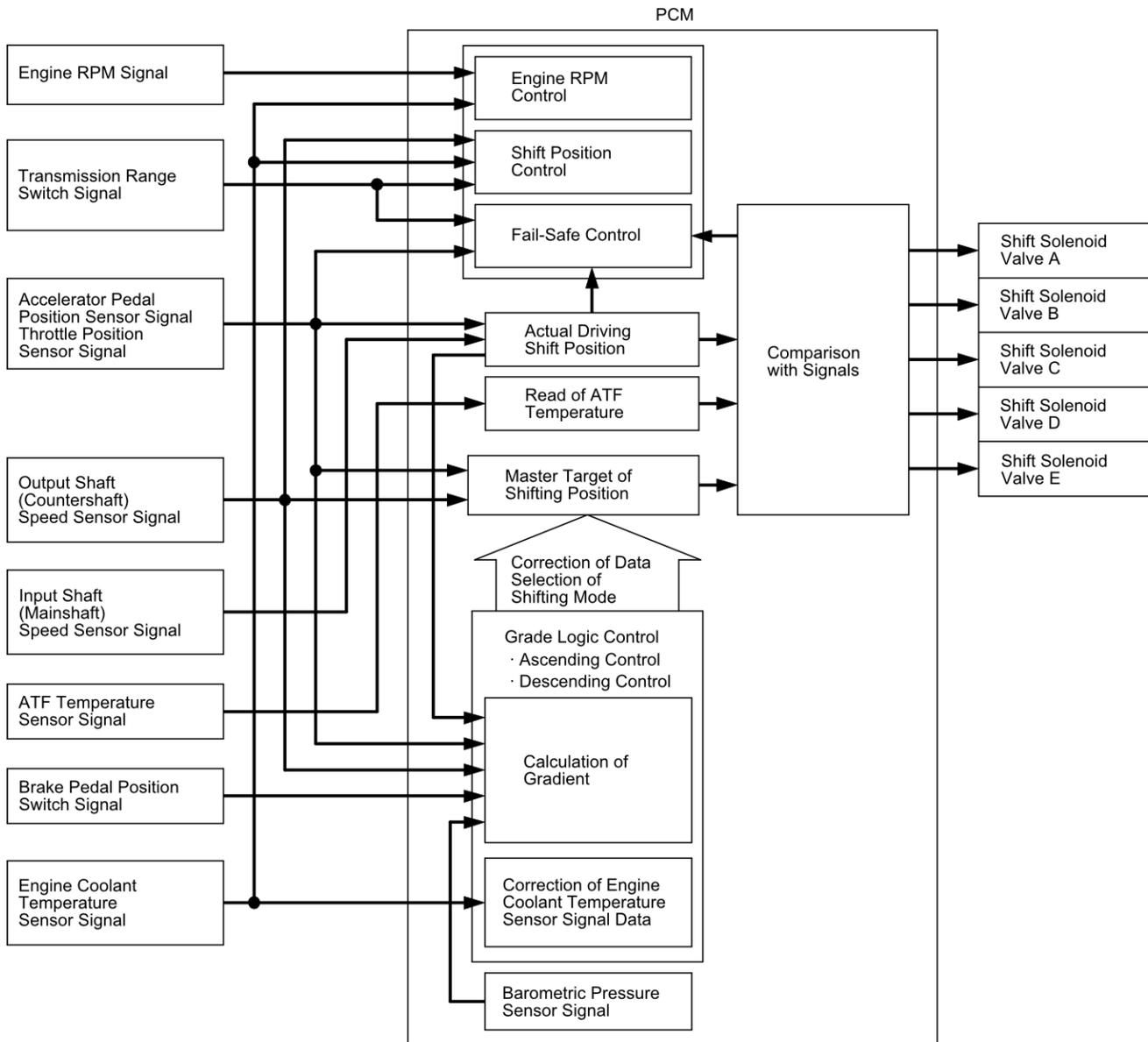
The PCM instantly determines which gear should be selected by various signals sent from sensors and switches, and it actuates shift solenoid valves A, B, C, D, and E to control gear selection. The PCM turns shift solenoid valves A, B, C, D, and E ON and OFF to control gear selection. All shift solenoid valves are normally closed (ON-OPEN/OFF-CLOSED). The shift solenoid valve port opens to allow ATF to pass through when the PCM turns it ON, and the port closes, blocking fluid flow when turned off. The combination of driving signals to shift solenoid valves A, B, C, D, and E for each gear are in the following table.

Position	Gear position	Shift solenoid valves				
		A	B	C	D	E
D	Shifting from N	OFF	ON	ON	OFF	OFF
	Stays in 1st	ON	ON	ON	OFF	OFF
	Shifting gears between 1st and 2nd	OFF	ON	ON	OFF	OFF
	Stays in 2nd	OFF	ON	OFF	ON	OFF or ON
	Shifting gears between 2nd and 3rd	OFF	ON	ON	ON	OFF or ON
	Stays in 3rd	OFF	OFF	ON	OFF	OFF or ON
	Shifting gears between 3rd and 4th	OFF	OFF	OFF	OFF	OFF or ON
	Stays in 4th	ON	OFF	OFF	OFF	OFF or ON
	Shifting gears between 4th and 5th	ON	OFF	OFF	ON	OFF or ON
	Stays in 5th	ON	OFF	ON	ON	OFF or ON
2	2nd gear	OFF	ON	OFF	ON	OFF
1	1st gear	ON	ON	ON	OFF	OFF
R	Shifting from P and N	OFF	ON	OFF	OFF	ON
	Stays in reverse	ON	ON	OFF	OFF	ON

Position	Gear position	Shift solenoid valves				
		A	B	C	D	E
	Reverse inhibit	OFF	OFF	ON	OFF	OFF
P	Park	OFF	ON	OFF	OFF	ON
N	Neutral	OFF	ON	ON	OFF	OFF

Shift Control - Grade Logic Control

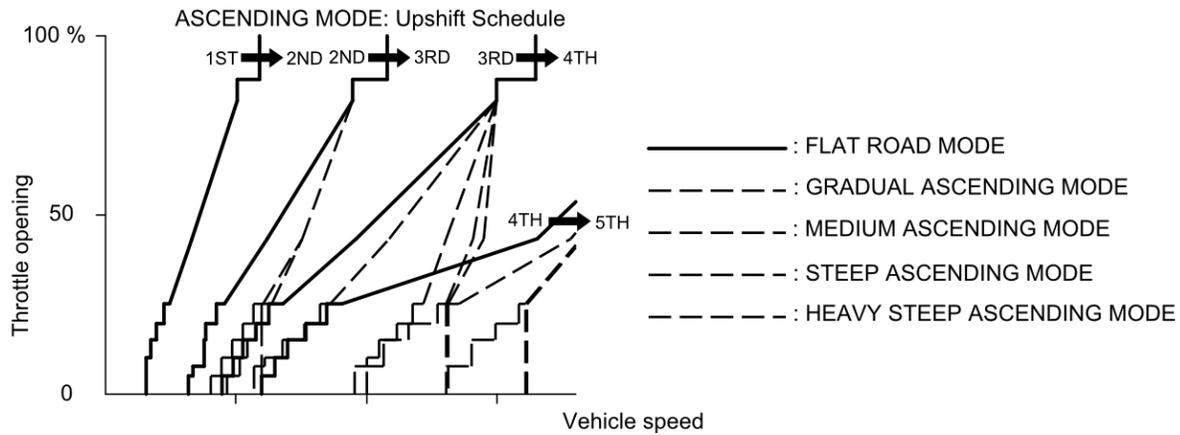
A grade logic control system is used to control shifting in D. The PCM compares actual driving conditions with programmed driving conditions, based on input from the accelerator pedal position sensor, the throttle position sensor, the engine coolant temperature sensor, the barometric pressure sensor, the brake pedal position switch signal, the output shaft (countershaft) speed sensor signal, and the shift lever position signal, to improve shifting control while the vehicle is ascending or descending a slope.



Grade Logic Control: Ascending Control

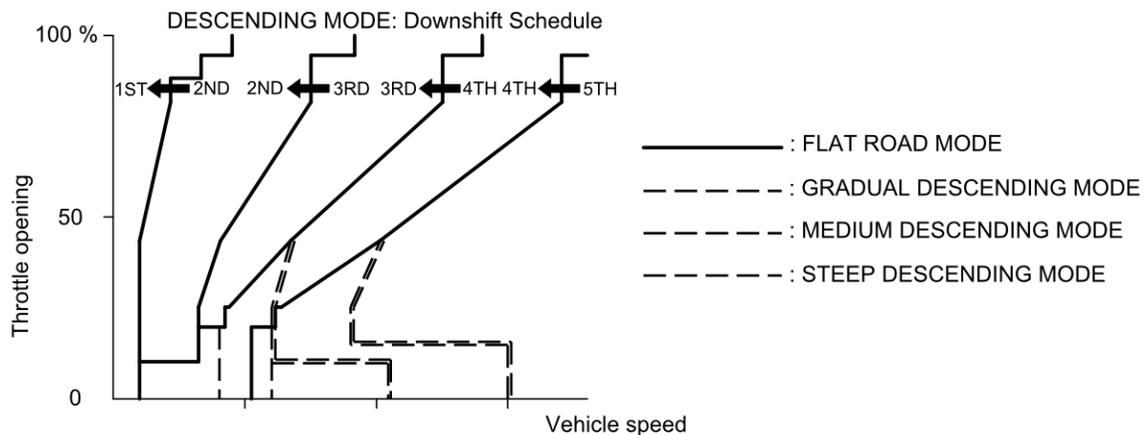
When the PCM determines that the vehicle is climbing a hill in D, the system extends the engagement area of 2nd, 3rd, and 4th gears to prevent the transmission from frequently shifting between 2nd and 3rd gears, between 3rd and 4th gears, and between 4th and 5th gears, so the vehicle can run smoothly, and have more power when needed.

NOTE: Shift commands stored in the PCM between 2nd and 3rd gears, between 3rd and 4th gears, and between 4th and 5th gears, enable the PCM to automatically select the most suitable gear based on the steepness of the grade.



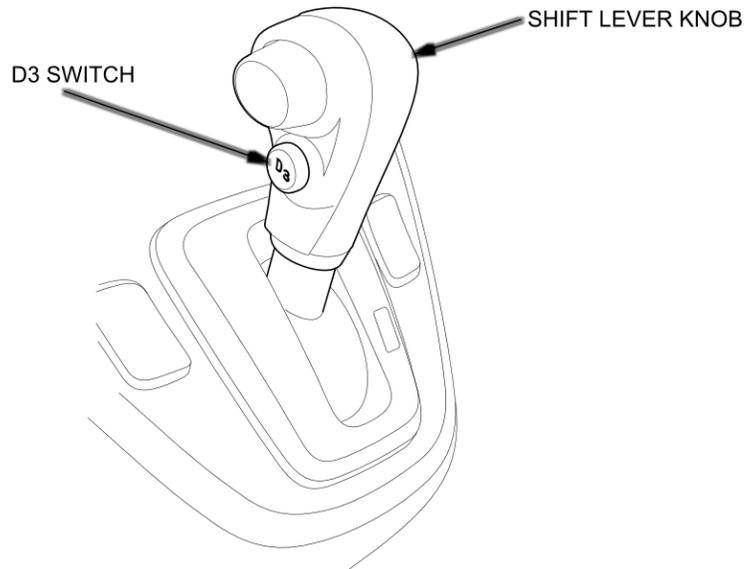
Grade Logic Control: Descending Control

When the PCM determines that the vehicle is going down a hill in D, the upshift speed from 4th to 5th gear, from 3rd to 4th gear, and from 2nd to 3rd gear (when the throttle is closed) becomes higher than the set speed for flat road driving to extend 4th gear, 3rd gear, and 2nd gear driving area. This, in combination with engine braking from the deceleration lock-up, achieves smooth driving when the vehicle is descending. There are three descending modes stored in the PCM with different 4th gear driving areas, 3rd gear driving areas, and 2nd gear driving areas based on the steepness of the grade. When the vehicle is in 5th gear or 4th gear, and the vehicle is decelerating while applying the brakes on a steep hill, the transmission downshifts to a lower gear. When you accelerate, the transmission then returns to a higher gear.

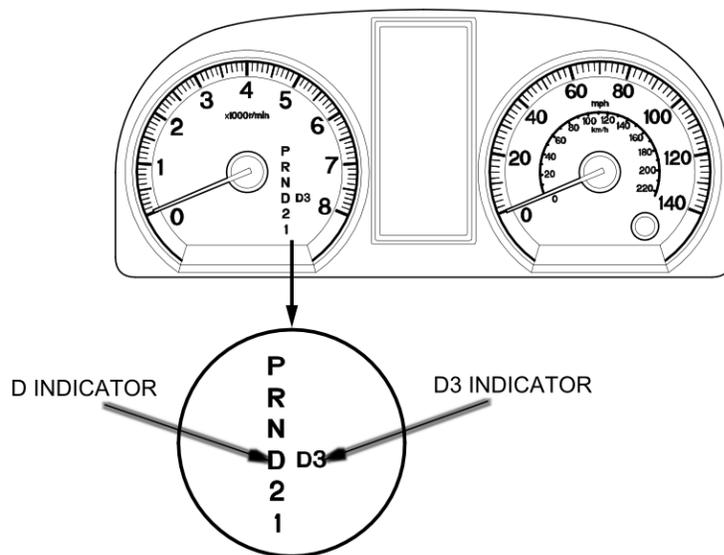


Shift Control - D Position D3 Driving Mode Control

The automatic transmission is provided with the D3 driving mode in D. D has two modes; general driving mode (shifts gears automatically 1st through 5th), and the D3 driving mode (shifts gears automatically 1st through 3rd). The transmission mode switches by pressing the D3 button on the shift lever knob in D.



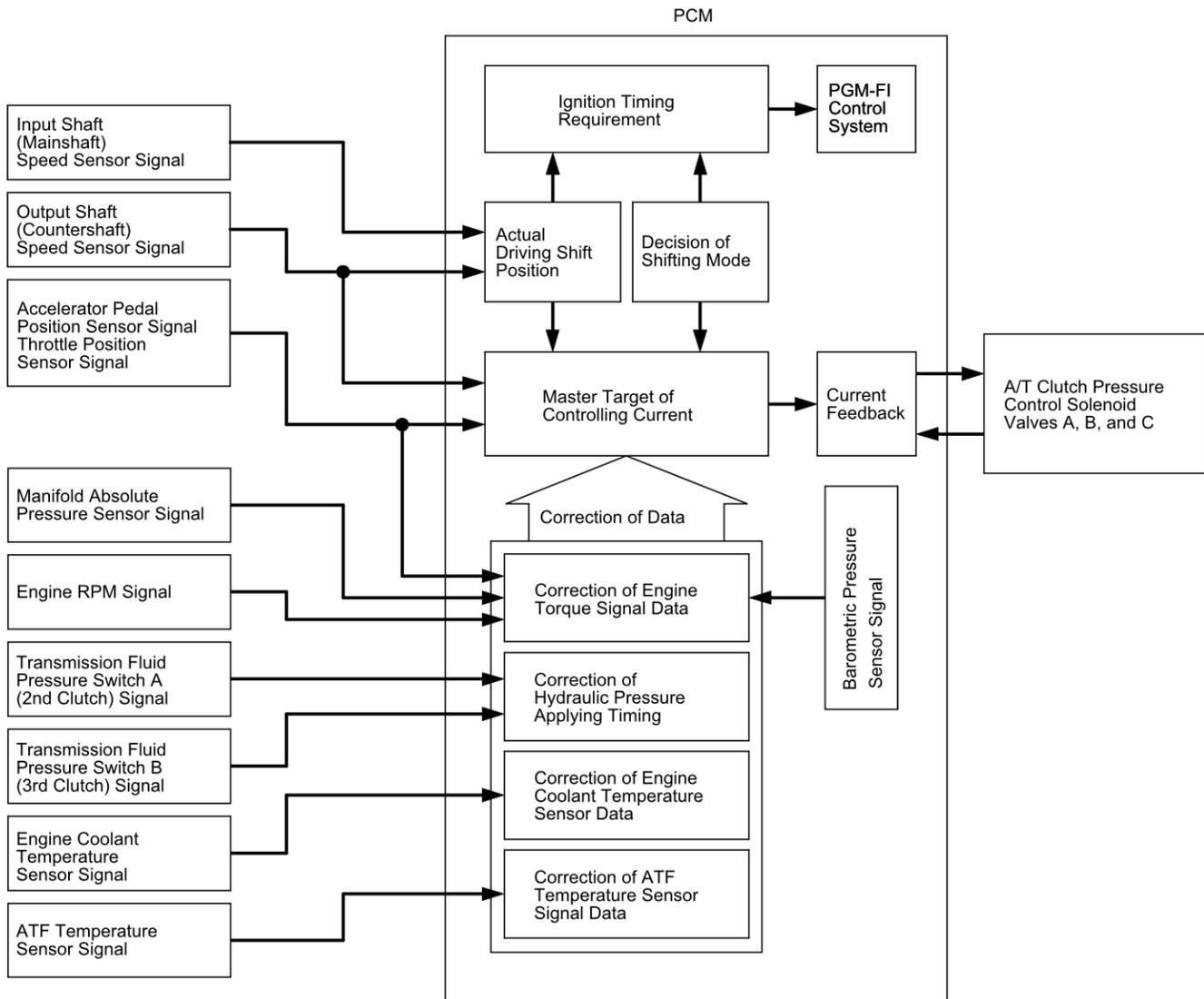
In D3 driving mode, the D3 indicator next to the D indicator in the gauge control module comes on. The D3 driving mode is cancelled by pressing the D3 button, and the D3 indicator goes off. Also, the D3 driving mode is cancelled when the ignition switch is turned to LOCK (0). When the shift lever is moved out of D in the D3 driving mode, the D3 indicator goes off, but the transmission returns into the D3 driving mode when returning the shift lever into D, and the D3 indicator comes on.



Clutch Pressure Control

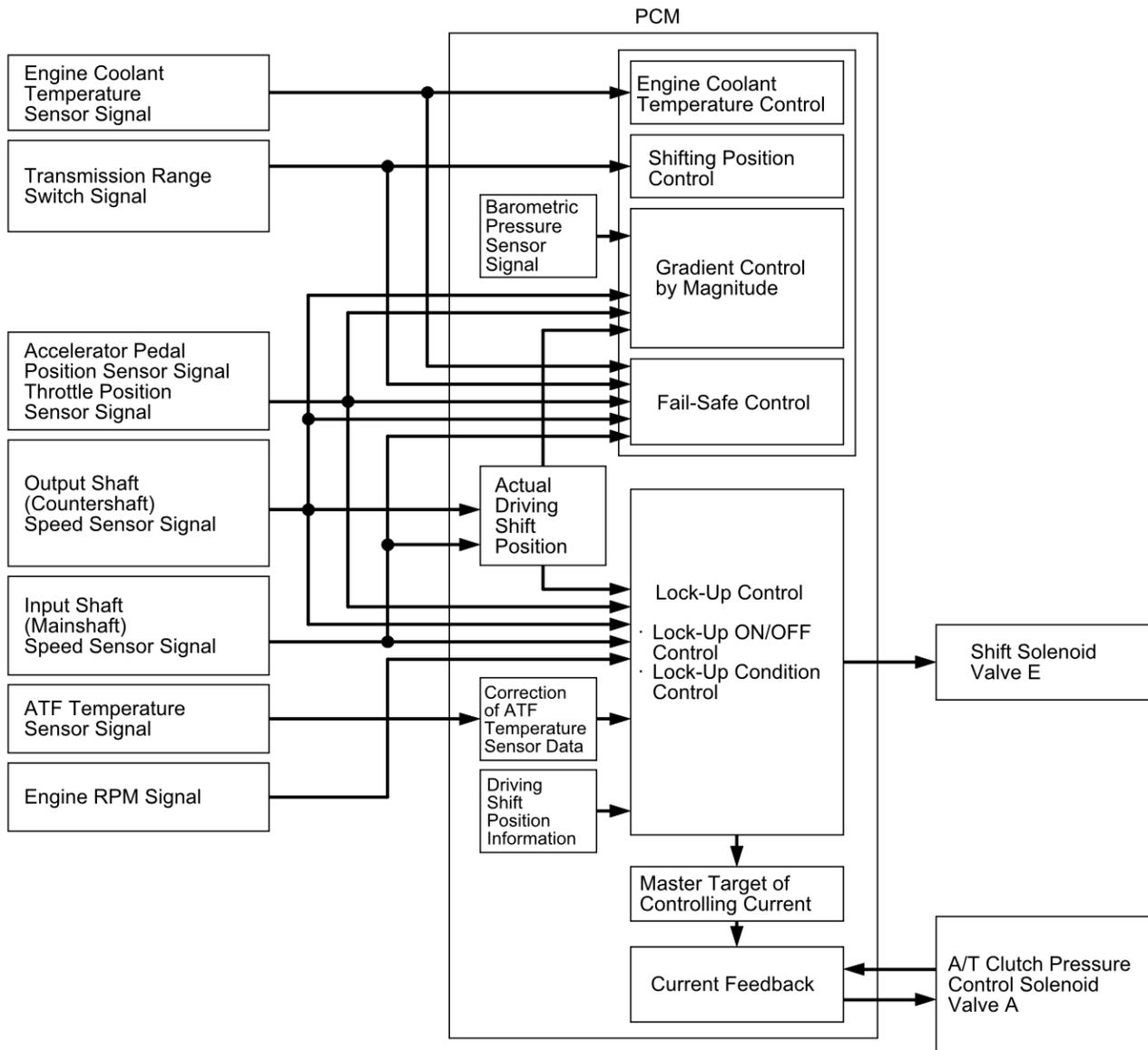
The PCM actuates A/T clutch pressure control solenoid valves A, B, and C to control the clutch pressure. When shifting between gears, the clutch pressure regulated by A/T clutch pressure control solenoid valves A, B, and C engages and disengages the clutch smoothly.

The PCM receives input signals from the various sensors and switches, processes the data, and outputs current to A/T clutch pressure control solenoid valves A, B, and C.



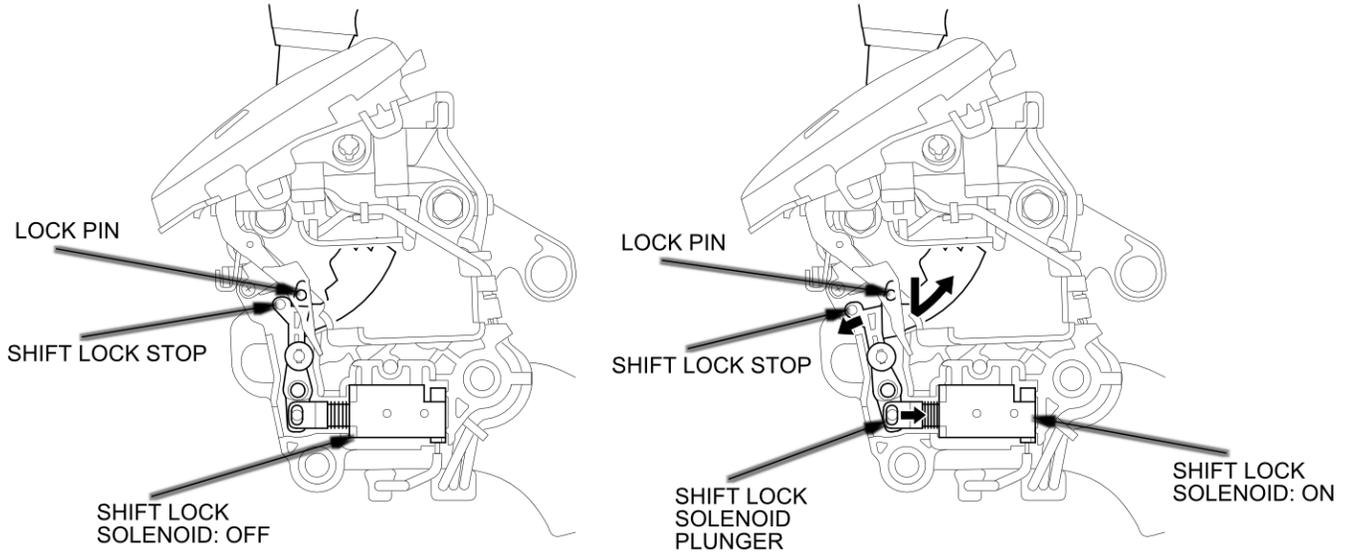
Lock-Up Control

Shift solenoid valve E controls the hydraulic pressure to switch the lock-up shift valve and lock-up ON and OFF. The PCM actuates shift solenoid valve E and A/T clutch pressure control solenoid valve A ON, and lock-up starts. A/T clutch pressure control solenoid valve A regulates and applies hydraulic pressure to the lock-up control valve to control the amount of lock-up. The lock-up mechanism operates in D (2nd, 3rd, 4th, and 5th gears), and in D with D3 driving mode (2nd and 3rd gears).

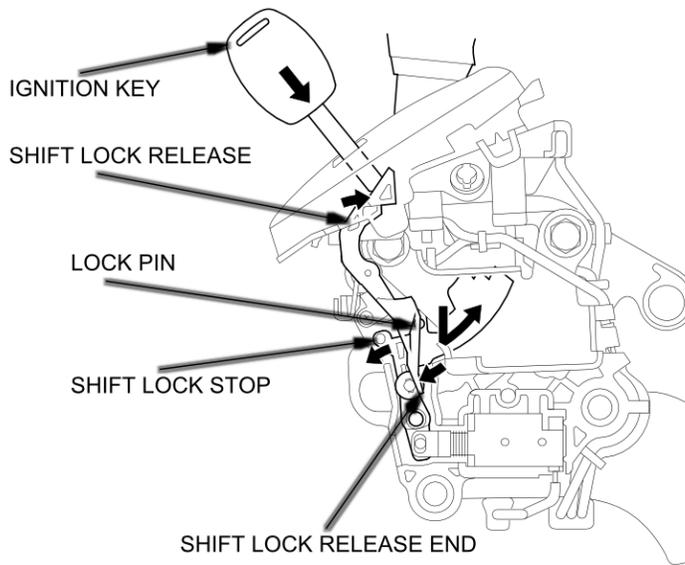


Shift Lock Control

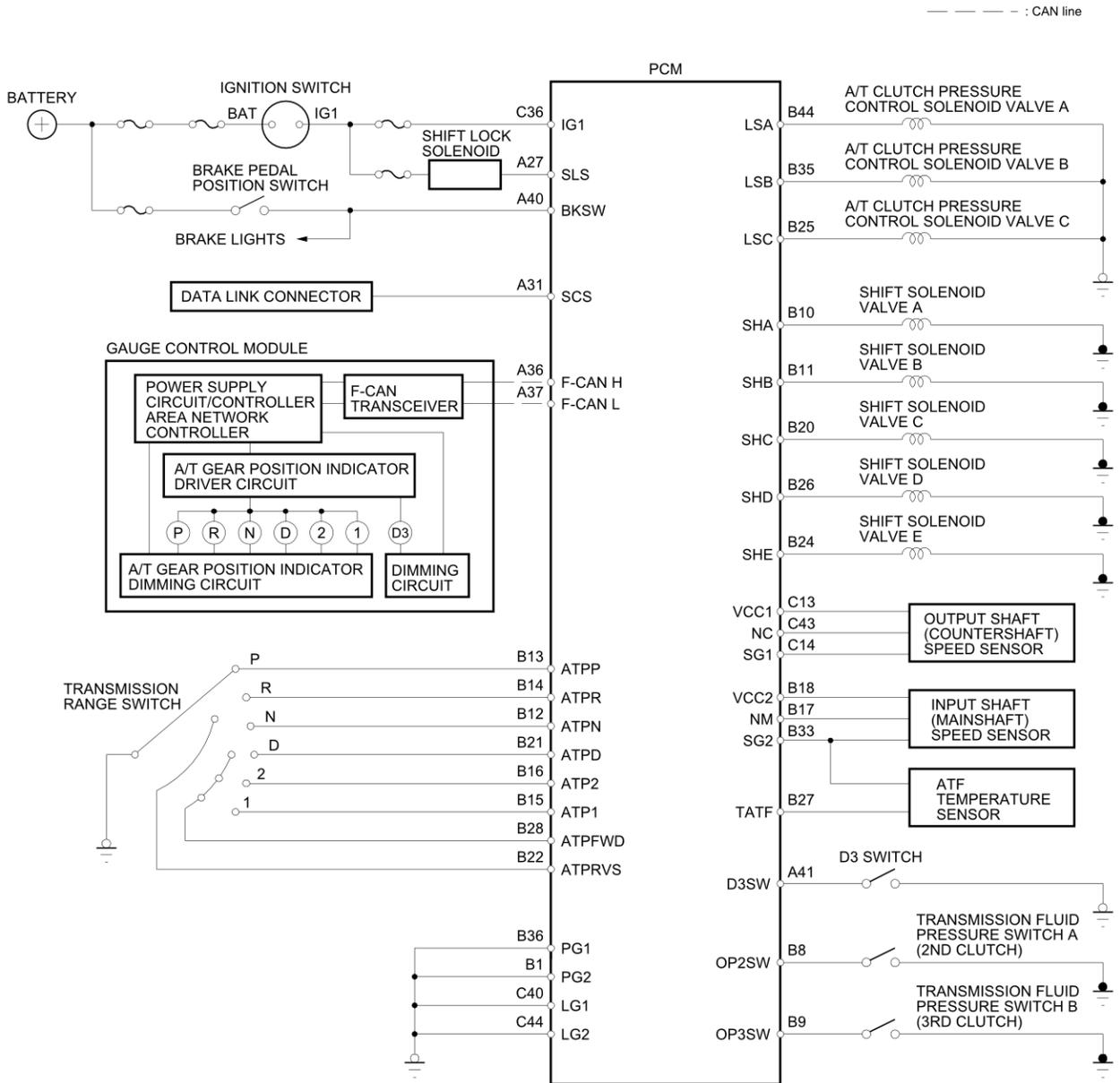
The shift lock system prevents the shift lever from moving unless certain conditions are met. The shift lock solenoid is normally OFF. After starting the engine in P, the shift lever cannot move to any other position from P because the shift lock stop stops the lock pin. When the brake pedal is pressed and the accelerator pedal is not pressed, the PCM commands the shift lock solenoid is ON; the shift lock solenoid plunger in the shift lock solenoid pulls the shift lock stop to release the lock pin. Pressing the shift lever button allows the shift lever to move to any other position. When the brake pedal and the accelerator pedal are pressed at the same time, the PCM commands the solenoid OFF and the shift lock system is locked.



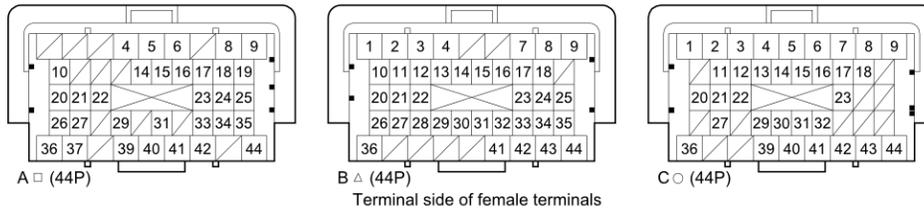
When the shift lock system does not operate due to mechanical or electrical problem, you can unlock the shift lock temporarily by inserting the ignition key into the shift lock release hole and pressing the shift lock release. When the shift lock release end is pressed, the shift lock stop releases the lock pin, and the shift lever can move to any other position.



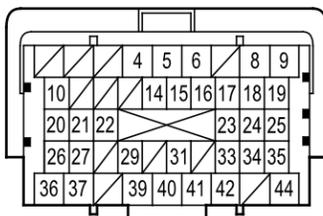
PCMA/T Control System Electrical Connections - K24Z1 Engine



PCM Harness Connector Terminal Locations



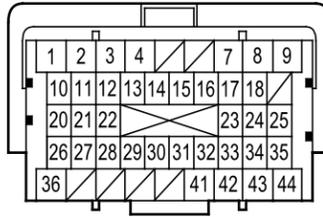
PCMA/T Control System Inputs and Outputs at PCM Connector A □ (44P) (K24Z1 Engine)



Terminal side of female terminals

Terminal number	Wire color	Terminal name	Description	Signal
A27	RED	SLS (SHIFT LOCK SOLENOID)	Drives shift lock solenoid	With ignition switch ON (II), in P, brake pedal pressed, and accelerator released: about 0 V
A31	BRN	SCS (SERVICE CHECK SIGNAL)	Detects service check signal	With service check signal shorted using the HDS: about 0 V With service check signal opened: about 5.0 V
A36	WHT	F-CAN H (CAN COMMUNICATION SIGNAL HIGH)	Sends and receives communication signal	With ignition switch ON (II): pulses (about 2.5 V)
A37	RED	F-CAN L (CAN COMMUNICATION SIGNAL LOW)	Sends and receives communication signal	With ignition switch ON (II): pulses (about 2.5 V)
A40	LT GRN	BKSW (BRAKE PEDAL POSITION SWITCH)	Detects brake pedal position switch signal	With brake pedal released: about 0 V With brake pedal pressed: battery voltage
A41	BLU	D3SW (D3 SWITCH)	Detects D3 switch signal	With ignition switch ON (II): <ul style="list-style-type: none"> With D3 switch ON (pressed): about 0 V With D3 switch OFF (released): battery voltage

PCMA/T Control System Inputs and Outputs at PCM Connector B □ (44P) (K24Z1 Engine)

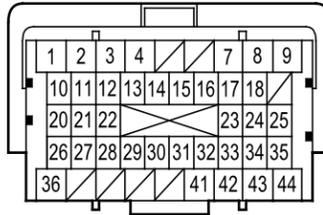


Terminal side of female terminals

Terminal number	Wire color	Terminal name	Description	Signal
B1	BLK	PG2 (PCM GROUND)	Ground circuit for PCM	Less than 0.2 V at all times
B8	BLU/RED	OP2SW (TRANSMISSION FLUID PRESSURE SWITCH A (2ND CLUTCH))	Detects transmission fluid pressure switch A (2nd clutch) signal	With engine running: <ul style="list-style-type: none"> Without 2nd clutch pressure: about 5.0 V With 2nd clutch pressure: about 0 V
B9	BLU/WHT	OP3SW (TRANSMISSION FLUID PRESSURE SWITCH B (3RD CLUTCH))	Detects transmission fluid pressure switch B (3rd clutch) signal	With engine running: <ul style="list-style-type: none"> Without 3rd clutch pressure: about 5.0 V With 3rd clutch pressure: about 0 V
B10	BLU/BLK	SHA (SHIFT SOLENOID VALVE A)	Drives shift solenoid valve A	In R, and in 1st, 4th, and 5th gears in D: battery voltage In P and N, and in 2nd and 3rd gears in D: about 0 V
B11	GRN/WHT	SHB (SHIFT SOLENOID VALVE B)	Drives shift solenoid valve B	In P, R, and N, and in 1st and 2nd gears in D: battery voltage In 3rd, 4th, and 5th gears in D: about 0 V
B12	RED/BLK	ATPN (TRANSMISSION RANGE SWITCH N POSITION)	Detects transmission range switch N position signal input	With ignition switch ON (II), in N: about 0 V With ignition switch ON (II), in any position other than N: about 5.0 V

Terminal number	Wire color	Terminal name	Description	Signal
B13	BLU/BLK	ATPP (TRANSMISSION RANGE SWITCH P POSITION)	Detects transmission range switch P position signal input	With ignition switch ON (II), in P: about 0 V With ignition switch ON (II), in any position other than P: more than 5.0 V
B14	WHT	ATPR (TRANSMISSION RANGE SWITCH R POSITION)	Detects transmission range switch R position signal input	With ignition switch ON (II), in R: about 0 V With ignition switch ON (II), in any position other than R: more than 5.0 V
B15	RED	ATP1 (TRANSMISSION RANGE SWITCH 1 POSITION)	Detects transmission range switch 1 position signal input	With ignition switch ON (II), in 1: about 0 V With ignition switch ON (II), in any position other than 1: battery voltage
B16	GRN/RED	ATP2 (TRANSMISSION RANGE SWITCH 2 POSITION)	Detects transmission range switch 2 position signal input	With ignition switch ON (II), in 2: about 0 V With ignition switch ON (II), in any position other than 2: battery voltage
B17	WHT/RED	NM (INPUT SHAFT (MAINSHAFT) SPEED SENSOR)	Detects input shaft (mainshaft) speed sensor signal	With ignition switch ON (II): about 0 V or about 5.0 V With engine running in N: about 2.5 V
B18	YEL/BLU	VCC2 (SENSOR VOLTAGE)	Provides sensor voltage	With ignition switch ON (II): about 5.0 V With ignition switch in LOCK (0): about 0 V

PCMA/T Control System Inputs and Outputs at PCM Connector B □ (44P) (K24Z1 Engine)

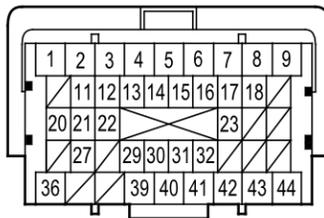


Terminal side of female terminals

Terminal number	Wire color	Terminal name	Description	Signal
B20	GRN	SHC (SHIFT SOLENOID VALVE C)	Drives shift solenoid valve C	In N, and in 1st, 3rd, and 5th gears in D: battery voltage In P and R, and in 2nd and 4th gears in D: about 0 V
B21	YEL/GRN	ATPD (TRANSMISSION RANGE SWITCH D POSITION)	Detects transmission range switch D position signal input	With ignition switch ON (II), in D: about 0 V With ignition switch ON (II), in any position other than D: battery voltage
B22	RED/WHT	ATPRVS (TRANSMISSION RANGE SWITCH RVS)	Detects transmission range switch R position signal input	With ignition switch ON (II), in R: about 0 V With ignition switch ON (II), in any position other than R: battery voltage
B24	YEL	SHE (SHIFT SOLENOID VALVE E)	Drives shift solenoid valve E	In P and R: battery voltage In N, and in 1st gear in D: about 0 V
B25	BLU/YEL	LSC (A/T CLUTCH PRESSURE CONTROL SOLENOID VALVE C)	Drives A/T clutch pressure control solenoid valve C	With ignition switch ON (II): current controlled
B26	GRN/RED	SHD (SHIFT SOLENOID VALVE D)	Drives shift solenoid valve D	In 2nd and 5th gears in D: battery voltage In P, R, and N, and in 1st, 3rd, and 4th gears in D: about 0 V

Terminal number	Wire color	Terminal name	Description	Signal
B27	RED/YEL	TATF (ATF TEMPERATURE SENSOR)	Detects ATF temperature sensor signal	With ignition switch ON (II): about 0.2–4.0 V (about 1.8 V at operating temperature, depending on ATF temperature)
B28	BLU/YEL	ATPFWD (TRANSMISSION RANGE SWITCH FWD)	Detects transmission range switch D, 2, and 1 signal input	With ignition switch ON (II), in D, 2, and 1: about 0 V With ignition switch ON (II), in any position other than D, 2, and 1: battery voltage
B33	GRN/BLK	SG2 (SENSOR GROUND)	Sensor ground	Less than 0.2 V at all times
B35	BRN	LSB (A/T CLUTCH PRESSURE CONTROL SOLENOID VALVE B)	Drives A/T clutch pressure control solenoid valve B	With ignition switch ON (II): current controlled
B36	BLK	PG1 (PCM GROUND)	Ground circuit for PCM	Less than 0.2 V at all times
B44	RED/BLK	LSA (A/T CLUTCH PRESSURE CONTROL SOLENOID VALVE A)	Drives A/T clutch pressure control solenoid valve A	With ignition switch ON (II): current controlled

PCMA/T Control System Inputs and Outputs at PCM Connector C □ (44P) (K24Z1 Engine)

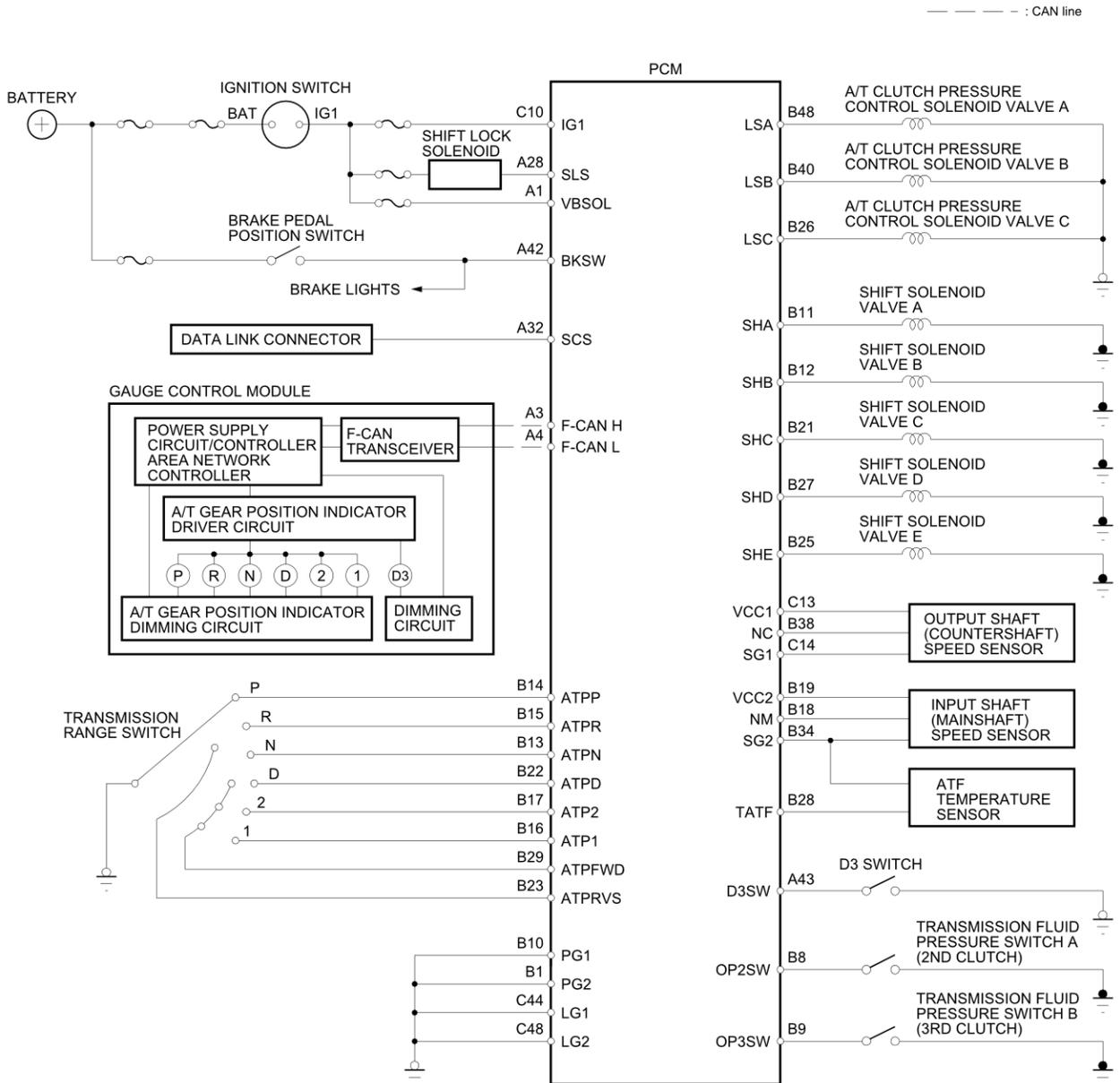


Terminal side of female terminals

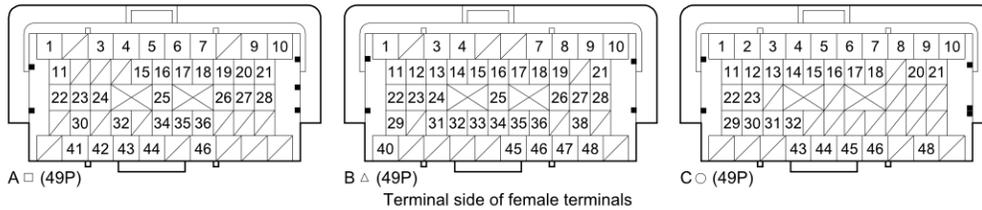
Terminal number	Wire color	Terminal name	Description	Signal
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Terminal number	Wire color	Terminal name	Description	Signal
C13	YEL/RED	VCC1 (SENSOR VOLTAGE)	Provides sensor voltage	With ignition switch ON (II): about 5.0 V With ignition switch in LOCK (0): about 0 V
C14	GRN/WHT	SG1 (SENSOR GROUND)	Sensor ground	Less than 0.2 V at all times
C36	BLK/RED	IG1 (IGNITION SIGNAL)	Detects ignition signal	With ignition switch ON (II): battery voltage With ignition switch in LOCK (0): about 0 V
C40	BRN/YEL	LG1 (LOGIC GROUND)	Ground circuit for PCM	Less than 0.2 V at all times
C43	BLK/WHT	NC (OUTPUT SHAFT (COUNTERSHAFT) SPEED SENSOR)	Detects output shaft (countershaft) speed sensor signal	With ignition switch ON (II): about 0 V or about 5.0 V With driving: pulses
C44	BRN/YEL	LG2 (LOGIC GROUND)	Ground circuit for PCM	Less than 0.2 V at all times

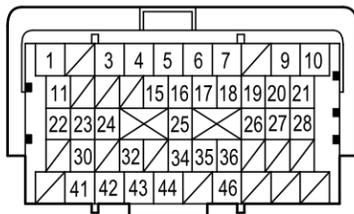
PCMA/T Control System Electrical Connections - K24Z6 Engine



PCM Harness Connector Terminal Locations

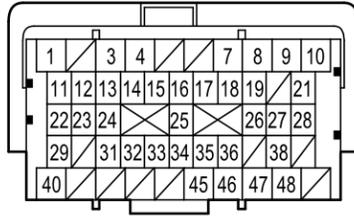


PCMA/T Control System Inputs and Outputs at PCM Connector A □ (49P) (K24Z6 Engine)



Terminal side of female terminals

Terminal number	Wire color	Terminal name	Description	Signal
A1	YEL	VBSOL (POWER SOURCE FOR SOLENOID VALVES)	Power source for solenoid valves	With ignition switch ON (II): battery voltage With ignition switch LOCK (0): about 0 V
A3	WHT	F-CAN H (CAN COMMUNICATION SIGNAL HIGH)	Sends and receives communication signal	With ignition switch ON (II): pulses (about 2.5 V)
A4	RED	F-CAN L (CAN COMMUNICATION SIGNAL LOW)	Sends and receives communication signal	With ignition switch ON (II): pulses (about 2.5 V)
A28	RED	SLS (SHIFT LOCK SOLENOID)	Drives shift lock solenoid	With ignition switch ON (II), in P, brake pedal pressed, and accelerator released: about 0 V
A32	BRN	SCS (SERVICE CHECK SIGNAL)	Detects service check signal	With service check signal shorted using the HDS: about 0 V With service check signal opened: about 5.0 V
A42	LT GRN	BKSW (BRAKE PEDAL POSITION SWITCH)	Detects brake pedal position switch signal	With brake pedal released: about 0 V With brake pedal pressed: battery voltage
A43	BLU	D3SW (D3 SWITCH)	Detects D3 switch signal	With ignition switch ON (II): <ul style="list-style-type: none"> With D3 switch ON (pressed): about 0 V With D3 switch OFF (released): battery voltage

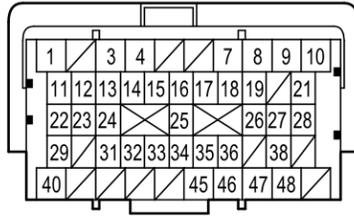
PCMA/T Control System Inputs and Outputs at PCM Connector B □ (49P) (K24Z6 Engine)

Terminal side of female terminals

Terminal number	Wire color	Terminal name	Description	Signal
B1	BLK	PG2 (PCM GROUND)	Ground circuit for PCM	Less than 0.2 V at all times
B8	BLU/RED	OP2SW (TRANSMISSION FLUID PRESSURE SWITCH A (2ND CLUTCH))	Detects transmission fluid pressure switch A (2nd clutch) signal	With engine running: <ul style="list-style-type: none"> Without 2nd clutch pressure: about 5.0 V With 2nd clutch pressure: about 0 V
B9	BLU/WHT	OP3SW (TRANSMISSION FLUID PRESSURE SWITCH B (3RD CLUTCH))	Detects transmission fluid pressure switch B (3rd clutch) signal	With engine running: <ul style="list-style-type: none"> Without 3rd clutch pressure: about 5.0 V With 3rd clutch pressure: about 0 V
B10	BLK	PG1 (PCM GROUND)	Ground circuit for PCM	Less than 0.2 V at all time
B11	BLU/BLK	SHA (SHIFT SOLENOID VALVE A)	Drives shift solenoid valve A	In R, and in 1st, 4th, and 5th gears in D: battery voltage In P and N, and in 2nd and 3rd gears in D: about 0 V
B12	GRN/WHT	SHB (SHIFT SOLENOID VALVE B)	Drives shift solenoid valve B	In P, R, and N, and in 1st and 2nd gears in D: battery voltage In 3rd, 4th, and 5th gears in D: about 0 V

Terminal number	Wire color	Terminal name	Description	Signal
B13	RED/BLK	ATPN (TRANSMISSION RANGE SWITCH N POSITION)	Detects transmission range switch N position signal input	With ignition switch ON (II), in N: about 0 V With ignition switch ON (II), in any position other than N: about 5.0 V
B14	BLU/BLK	ATPP (TRANSMISSION RANGE SWITCH P POSITION)	Detects transmission range switch P position signal input	With ignition switch ON (II), in P: about 0 V With ignition switch ON (II), in any position other than P: more than 5.0 V
B15	WHT	ATPR (TRANSMISSION RANGE SWITCH R POSITION)	Detects transmission range switch R position signal input	With ignition switch ON (II), in R: about 0 V With ignition switch ON (II), in any position other than R: more than 5.0 V
B16	BRN	ATP1 (TRANSMISSION RANGE SWITCH 1 POSITION)	Detects transmission range switch 1 position signal input	With ignition switch ON (II), in 1: about 0 V With ignition switch ON (II), in any position other than 1: battery voltage
B17	BLU	ATP2 (TRANSMISSION RANGE SWITCH 2 POSITION)	Detects transmission range switch 2 position signal input	With ignition switch ON (II), in 2: about 0 V With ignition switch ON (II), in any position other than 2: battery voltage
B18	WHT/RED	NM (INPUT SHAFT (MAINSHAFT) SPEED SENSOR)	Detects input shaft (mainshaft) speed sensor signal	With ignition switch ON (II): about 0 V or about 5.0 V With engine running in N: about 2.5 V

PCMA/T Control System Inputs and Outputs at PCM Connector B □ (49P) (K24Z6 Engine)

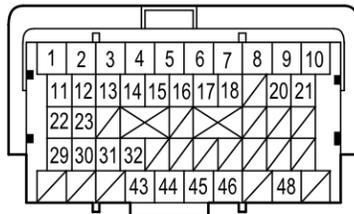


Terminal side of female terminals

Terminal number	Wire color	Terminal name	Description	Signal
B19	YEL/BLU	VCC2 (SENSOR VOLTAGE)	Provides sensor voltage	With ignition switch ON (II): about 5.0 V With ignition switch in LOCK (0): about 0 V
B21	GRN	SHC (SHIFT SOLENOID VALVE C)	Drives shift solenoid valve C	In N, and in 1st, 3rd, and 5th gears in D: battery voltage In P and R, and in 2nd and 4th gears in D: about 0 V
B22	YEL/GRN	ATPD (TRANSMISSION RANGE SWITCH D POSITION)	Detects transmission range switch D position signal input	With ignition switch ON (II), in D: about 0 V With ignition switch ON (II), in any position other than D: battery voltage
B23	RED/WHT	ATPRVS (TRANSMISSION RANGE SWITCH RVS)	Detects transmission range switch R position signal input	With ignition switch ON (II), in R: about 0 V With ignition switch ON (II), in any position other than R: battery voltage
B25	YEL	SHE (SHIFT SOLENOID VALVE E)	Drives shift solenoid valve E	In P and R: battery voltage In N, and in 1st gear in D: about 0 V
B26	BLU/YEL	LSC (A/T CLUTCH PRESSURE CONTROL SOLENOID VALVE C)	Drives A/T clutch pressure control solenoid valve C	With ignition switch ON (II): current controlled

Terminal number	Wire color	Terminal name	Description	Signal
B27	GRN/RED	SHD (SHIFT SOLENOID VALVE D)	Drives shift solenoid valve D	In 2nd and 5th gears in D: battery voltage In P, R, and N, and in 1st, 3rd, and 4th gears in D: about 0 V
B28	RED/YEL	TATF (ATF TEMPERATURE SENSOR)	Detects ATF temperature sensor signal	With ignition switch ON (II): about 0.2–4.0 V (about 1.8 V at operating temperature, depending on ATF temperature)
B29	BLU/YEL	ATPFWD (TRANSMISSION RANGE SWITCH FWD)	Detects transmission range switch D, 2, and 1 signal input	With ignition switch ON (II), in D, 2, and 1: about 0 V With ignition switch ON (II), in any position other than D, 2, and 1: battery voltage
B34	GRN/BLK	SG2 (SENSOR GROUND)	Sensor ground	Less than 0.2 V at all times
B38	BLK/WHT	NC (OUTPUT SHAFT (COUNTERSHAFT) SPEED SENSOR))	Detects output shaft (countershaft) speed sensor signal	With ignition switch ON (II): about 0 V or about 5.0 V With driving: pulses
B40	BRN	LSB (A/T CLUTCH PRESSURE CONTROL SOLENOID VALVE B)	Drives A/T clutch pressure control solenoid valve B	With ignition switch ON (II): current controlled
B48	RED/BLK	LSA (A/T CLUTCH PRESSURE CONTROL SOLENOID VALVE A)	Drives A/T clutch pressure control solenoid valve A	With ignition switch ON (II): current controlled

PCMA/T Control System Inputs and Outputs at PCM Connector C □ (49P) (K24Z6 Engine)



Terminal side of female terminals

Terminal number	Wire color	Terminal name	Description	Signal
C10	BLK/RED	IG1 (IGNITION SIGNAL)	Detects ignition signal	With ignition switch ON (II): battery voltage With ignition switch in LOCK (0): about 0 V
C13	YEL/RED	VCC1 (SENSOR VOLTAGE)	Provides sensor voltage	With ignition switch ON (II): about 5.0 V With ignition switch in LOCK (0): about 0 V
C14	GRN/WHT	SG1 (SENSOR GROUND)	Sensor ground	Less than 0.2 V at all times
C44	BRN/YEL	LG1 (LOGIC GROUND)	Ground circuit for PCM	Less than 0.2 V at all times
C48	BRN/YEL	LG2 (LOGIC GROUND)	Ground circuit for PCM	Less than 0.2 V at all times

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