

2012 - Mazda6 - Transmission/ Transaxle

TCM INSPECTION [FS5A-EL]

CAUTION:

- Water or foreign objects entering the connector can cause a poor connection or corrosion. Be sure not to drop water or foreign objects on the connector when disconnecting it.

NOTE:

- The TCM terminal voltage can vary with conditions when measuring and changes due to age deterioration on the vehicle, causing false diagnosis. Therefore a comprehensive inspection of the input and output systems, and the TCM is necessary to determine where the malfunction occurs.

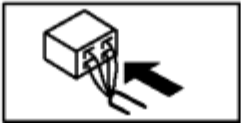
1. Disconnect the negative battery cable.
2. Remove the TCM. (See [TCM REMOVAL/ INSTALLATION \[FS5A-EL\]](#) .)
3. Connect the TCM connector.
4. Connect the negative battery cable.
5. Connect the voltmeter (-) lead to body GND.
6. Measure the voltage at each terminal.
 - If any incorrect voltage is detected, inspect the related system(s), wiring harnesses and connector(s) referring to the "Inspection Item" column in the "TCM Terminal Voltage".

TCM Terminal Voltage (Reference)

TCM
HARNESS SIDE CONNECTOR

1O	1M	1K	1I	1G	1E	1C	1A
1P	1N	1L	1J	1H	1F	1D	1B

2W	2U	2S	2Q	2O	2M	2K	2I	2G	2E	2C	2A
2X	2V	2T	2R	2P	2N	2L	2J	2H	2F	2D	2B



Terminal	Connected to	Test Condition		Voltage (V)	Inspection Item	
1A	Shift solenoid A	(See Shift solenoid A.)			- Shift solenoid A (See SOLENOID VALVE INSPECTION [FS5A-EL] .) - Related harness	
1B	Shift solenoid B	(See Shift solenoid B.)			- Shift solenoid B (See SOLENOID VALVE INSPECTION [FS5A-EL] .) - Related harness	
1C	Shift solenoid C	(See Shift solenoid C.)			- Shift solenoid C (See SOLENOID VALVE INSPECTION [FS5A-EL] .) - Related harness	
1D	Pressure control solenoid B	(See Pressure control solenoid B.)			- Pressure control solenoid B (See SOLENOID VALVE INSPECTION [FS5A-EL] .) - Related harness	
1E	Pressure control solenoid A (+)	(See Pressure control solenoid A (+).)			- Pressure control solenoid A (See SOLENOID VALVE INSPECTION [FS5A-EL] .) - Related harness	
1F	Shift solenoid D	D position 1GR	Below 1.0		- Shift solenoid D (See SOLENOID VALVE INSPECTION [FS5A-EL] .) - Related harness	
		D position 2GR	Below 1.0			
		D position 3GR	Below 1.0			
		D position 4GR	B+			
		D position 5GR	B+			
1G	Pressure control solenoid A (-)	(See Pressure control solenoid A (-).)			Pressure control solenoid A (See SOLENOID VALVE INSPECTION [FS5A-EL] .)	

				Related harness
1H	Shift solenoid E	TCC released	Below 1.0	- Shift solenoid E (See SOLENOID VALVE INSPECTION [FS5A-EL] .) - Related harness
		TCC engaged	B+	
1I	AT main relay	Ignition switch off	Below 1.0	- AT main relay (See RELAY INSPECTION .) - Related harness
		Ignition switch ON	B+	
1J	Shift solenoid F	D position 1GR	B+	- Shift solenoid F (See SOLENOID VALVE INSPECTION [FS5A-EL] .) - Related harness
		D position 2GR	B+	
		D position 3GR	B+	
		D position 4GR	B+	
		D position 5GR	Below 1.0	
1K	Battery	Under any condition	B+	- Battery (See BATTERY INSPECTION [MZR 2.5] .) - Related harness
1L	—	—	—	—
1M	AT main relay	Ignition switch off	Below 1.0	- AT main relay (See RELAY INSPECTION .) - Related harness
		Ignition switch ON	B+	
1N	—	—	—	—
1O	GND	Under any condition	Below 1.0	Related harness
1P	GND	Under any condition	Below 1.0	Related harness
2A	—	—	—	—
		M position	Below 1.0	M position switch

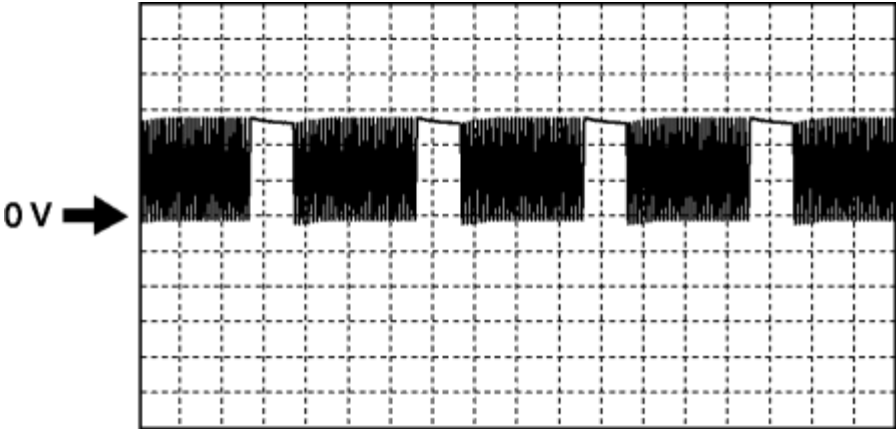
2B	M position switch	Except M position	B+	(See M POSITION SWITCH INSPECTION [FS5A-EL] .) • Related harness
2C	—	—	—	—
2D	Up switch	Selector lever up-shift position	Below 1.0	• Up switch (See UP SWITCH INSPECTION [FS5A-EL] .) • Related harness
		Except selector lever up-shift position	B+	
2E	—	—	—	—
2F	Down switch	Selector lever down-shift position	Below 1.0	• Down switch (See DOWN SWITCH INSPECTION [FS5A-EL] .) • Related harness
		Except selector lever down-shift position	B+	
2G	—	—	—	—
2H	TR switch	P position	4.3—4.8	• TR switch (See TRANSAXLE RANGE (TR) SWITCH INSPECTION [FS5A-EL] .) • Related harness
		R position	3.8—4.2	
		N position	3.0—3.5	
		D position	2.2—2.7	
		M position	2.2—2.7	
2I	Input/turbine speed sensor (+)	(See Input/ turbine speed sensor.)		• Input/turbine speed sensor (See INPUT/ TURBINE SPEED SENSOR INSPECTION [FS5A-EL] .) • Related harness
2J	Oil pressure switch	1GR	Below 1.0	• Oil pressure switch (See OIL PRESSURE SWITCH INSPECTION [FS5A-EL] .) • Related harness
		2GR	Below 1.0	
		3GR	Below 1.0	

		4GR	B+	
		5GR	B+	
2K	Input/turbine speed sensor (-)	(See Input/ turbine speed sensor.)		- Input/turbine speed sensor (See INPUT/ TURBINE SPEED SENSOR INSPECTION [FS5A-EL].) - Related harness
2L	Intermediate sensor	(See Intermediate sensor.)		- Intermediate sensor (See INTERMEDIATE SENSOR INSPECTION [FS5A-EL].) - Related harness
2M	TFT sensor	ATF temperature 20 °C {68 °F}	Approx.3.3	- TFT sensor (See TRANSAXLE FLUID TEMPERATURE (TFT) SENSOR INSPECTION [FS5A-EL].) - Related harness
		ATF temperature 65 °C {149 °F}	Approx.1.3	
2N	—	—	—	—
2O	TR switch, TFT sensor	Under any condition	Below 1.0	Related harness
2P	VSS	(See VSS.)		- VSS (See VEHICLE SPEED SENSOR (VSS) INSPECTION [FS5A-EL].) - Related harness
2Q	—	—	—	—
2R	AT main relay	Ignition switch off	Below 1.0	- AT main relay (See RELAY INSPECTION.) - Related harness
		Ignition switch ON	B+	
2S	—	—	—	—
2T	—	—	—	—
2U	—	—	—	—

2V	—	—	—	—
2W	CAN module	Because this terminal is for CAN, no valid determination of terminal voltage is possible.		
2X	CAN module	Because this terminal is for CAN, no valid determination of terminal voltage is possible.		

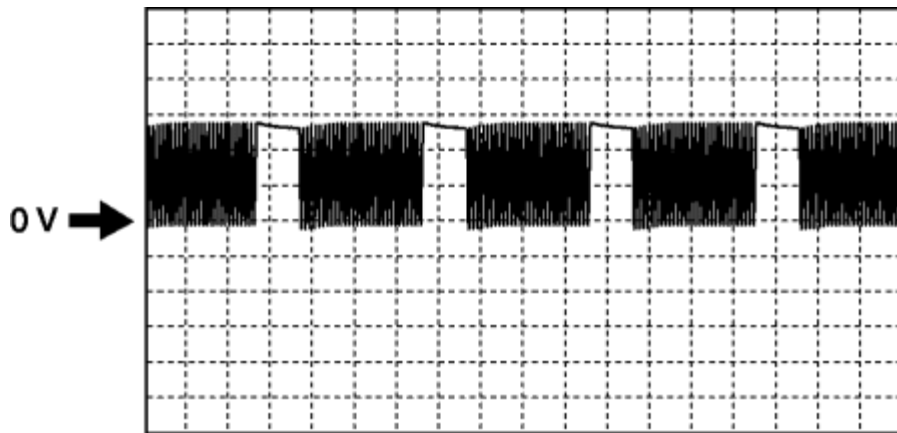
Input/ Output Wave From (Reference)

Shift solenoid A



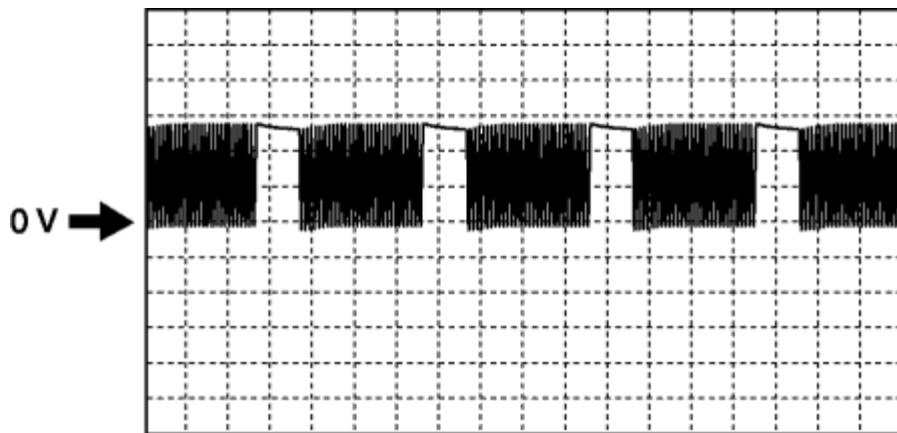
- TCM terminals
1A (+)—body GND (-)
- Oscilloscope setting
5 V/DIV (Y), 5 ms/DIV (X), DC range
- Test Condition
D position 4GR

Shift solenoid B



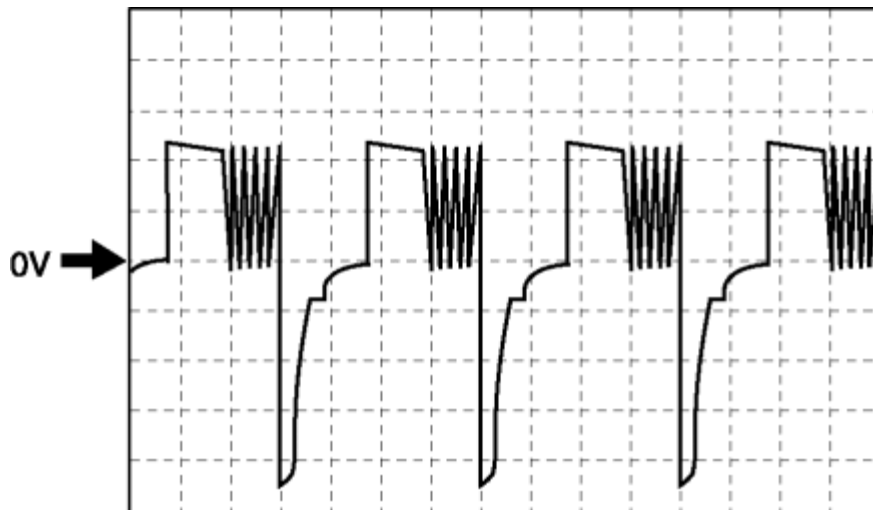
- TCM terminals
1B (+)—body GND (-)
- Oscilloscope setting
5 V/DIV (Y), 5 ms/DIV (X), DC range
- Test Condition
D position 1GR

Shift solenoid C



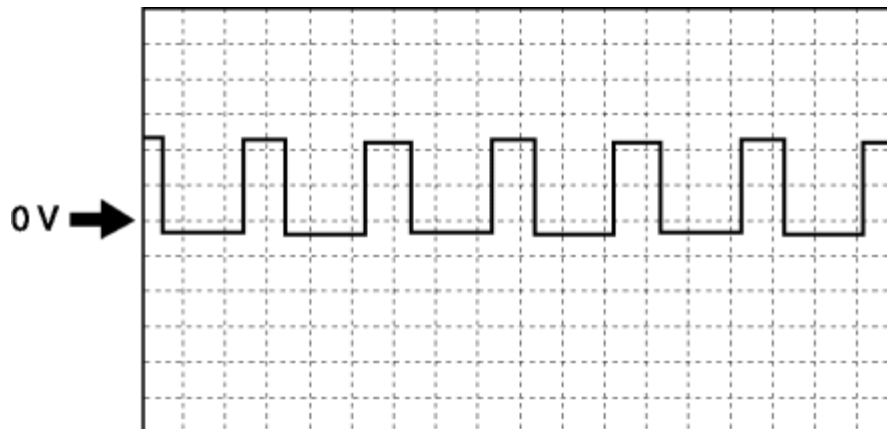
- TCM terminals
1C (+)—body GND (-)
- Oscilloscope setting
5 V/DIV (Y), 5 ms/DIV (X), DC range
- Test Condition
D position 1GR

Pressure control solenoid B



- TCM terminals
1D (+)—body GND (-)
- Oscilloscope setting
5 V/DIV (Y), 5 ms/DIV (X), DC range
- Test Condition
Shifting from 4GR to 5GR or from 5GR to 4GR

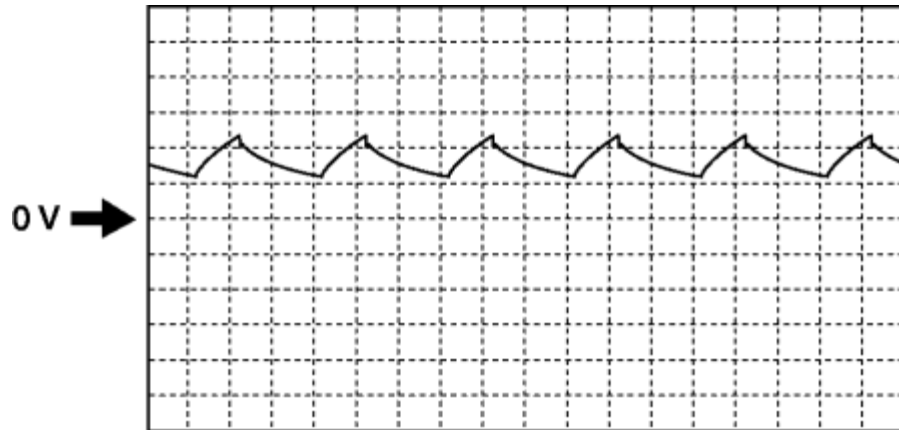
Pressure control solenoid A (+)



- TCM terminals
1E (+)—body GND (-)
- Oscilloscope setting
5 V/DIV (Y), 1 ms/DIV (X), DC range
- Test Condition
The following conditions are met:
 - Ignition switch ON (engine off)
 - P position

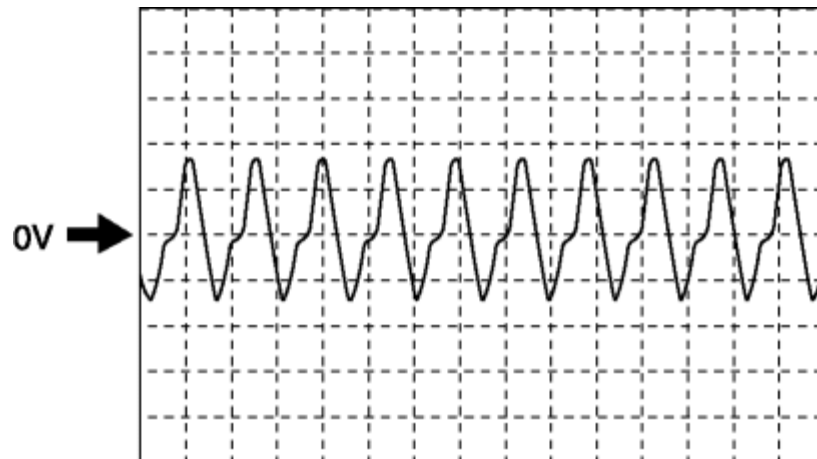
- Accelerator pedal fully depressed

Pressure control solenoid A (-)



- TCM terminals
1G (+)—body GND (-)
- Oscilloscope setting
200 mV/DIV (Y), 1 ms/DIV (X), DC range
- Test Condition
The following conditions are met:
 - Ignition switch ON (engine off)
 - P position
 - Accelerator pedal fully depressed

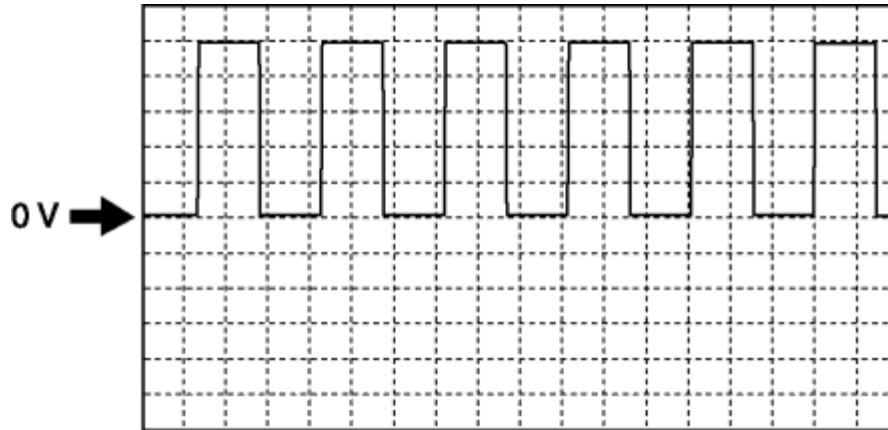
Input/ turbine speed sensor



- TCM terminals
2I (+)—2K (-)

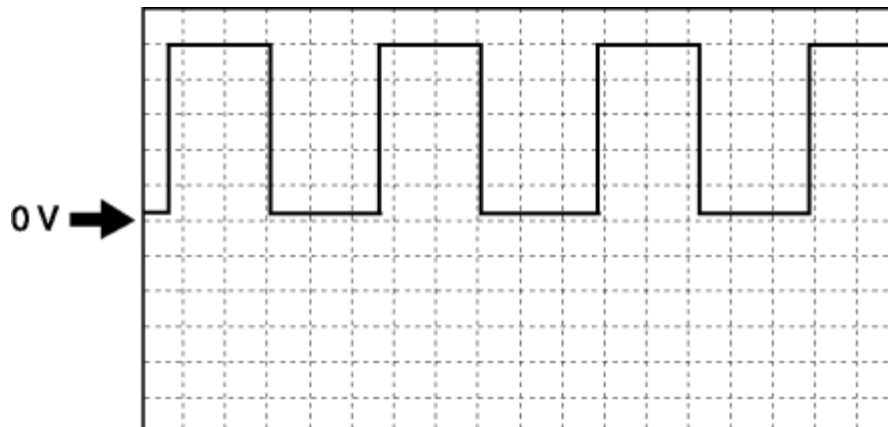
- Oscilloscope setting
1 V/DIV (Y), 2 ms/DIV (X), DC range
- Test Condition
Idle at P position after warm-up

Intermediate sensor



- TCM terminals
2L (+)—body GND (–)
- Oscilloscope setting
1 V/DIV (Y), 200 μ s/DIV (X), DC range
- Test Condition
The following conditions are met:
 - Vehicle speed: **30 km/h { 19 mph }**
 - Gear position: 3GR

VSS



- TCM terminals

2P (+)—body GND (–)

- Oscilloscope setting
1 V/DIV (Y), 2 ms/DIV (X), DC range
- Test Condition

The following conditions are met:

- Vehicle speed: **30 km/h { 19 mph }**
- Gear position: 3GR

[< Previous](#) [Next >](#)

[Back to Top](#)

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TCM INSPECTION [FS5A-EL]

CAUTION:

- Water or foreign objects entering the connector can cause a poor connection or corrosion. Be sure not to drop water or foreign objects on the connector when disconnecting it.

NOTE:

- The TCM terminal voltage can vary with conditions when measuring and changes due to age deterioration on the vehicle, causing false diagnosis. Therefore a comprehensive inspection of the input and output systems, and the TCM is necessary to determine where the malfunction occurs.

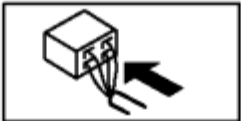
1. Disconnect the negative battery cable.
2. Remove the TCM. (See [TCM REMOVAL/ INSTALLATION \[FS5A-EL\]](#) .)
3. Connect the TCM connector.
4. Connect the negative battery cable.
5. Connect the voltmeter (-) lead to body GND.
6. Measure the voltage at each terminal.
 - If any incorrect voltage is detected, inspect the related system(s), wiring harnesses and connector(s) referring to the "Inspection Item" column in the "TCM Terminal Voltage".

TCM Terminal Voltage (Reference)

TCM
HARNESS SIDE CONNECTOR

1O	1M	1K	1I	1G	1E	1C	1A
1P	1N	1L	1J	1H	1F	1D	1B

2W	2U	2S	2Q	2O	2M	2K	2I	2G	2E	2C	2A
2X	2V	2T	2R	2P	2N	2L	2J	2H	2F	2D	2B



Terminal	Connected to	Test Condition		Voltage (V)	Inspection Item	
1A	Shift solenoid A	(See Shift solenoid A.)			- Shift solenoid A (See SOLENOID VALVE INSPECTION [FS5A-EL] .) - Related harness	
1B	Shift solenoid B	(See Shift solenoid B.)			- Shift solenoid B (See SOLENOID VALVE INSPECTION [FS5A-EL] .) - Related harness	
1C	Shift solenoid C	(See Shift solenoid C.)			- Shift solenoid C (See SOLENOID VALVE INSPECTION [FS5A-EL] .) - Related harness	
1D	Pressure control solenoid B	(See Pressure control solenoid B.)			- Pressure control solenoid B (See SOLENOID VALVE INSPECTION [FS5A-EL] .) - Related harness	
1E	Pressure control solenoid A (+)	(See Pressure control solenoid A (+).)			- Pressure control solenoid A (See SOLENOID VALVE INSPECTION [FS5A-EL] .) - Related harness	
1F	Shift solenoid D	D position 1GR	Below 1.0		- Shift solenoid D (See SOLENOID VALVE INSPECTION [FS5A-EL] .) - Related harness	
		D position 2GR	Below 1.0			
		D position 3GR	Below 1.0			
		D position 4GR	B+			
		D position 5GR	B+			
1G	Pressure control solenoid A (-)	(See Pressure control solenoid A (-).)			Pressure control solenoid A (See SOLENOID VALVE INSPECTION [FS5A-EL] .)	

				Related harness
1H	Shift solenoid E	TCC released	Below 1.0	- Shift solenoid E (See SOLENOID VALVE INSPECTION [FS5A-EL] .) - Related harness
		TCC engaged	B+	
1I	AT main relay	Ignition switch off	Below 1.0	- AT main relay (See RELAY INSPECTION .) - Related harness
		Ignition switch ON	B+	
1J	Shift solenoid F	D position 1GR	B+	- Shift solenoid F (See SOLENOID VALVE INSPECTION [FS5A-EL] .) - Related harness
		D position 2GR	B+	
		D position 3GR	B+	
		D position 4GR	B+	
		D position 5GR	Below 1.0	
1K	Battery	Under any condition	B+	- Battery (See BATTERY INSPECTION [MZR 2.5] .) - Related harness
1L	—	—	—	—
1M	AT main relay	Ignition switch off	Below 1.0	- AT main relay (See RELAY INSPECTION .) - Related harness
		Ignition switch ON	B+	
1N	—	—	—	—
1O	GND	Under any condition	Below 1.0	Related harness
1P	GND	Under any condition	Below 1.0	Related harness
2A	—	—	—	—
		M position	Below 1.0	M position switch

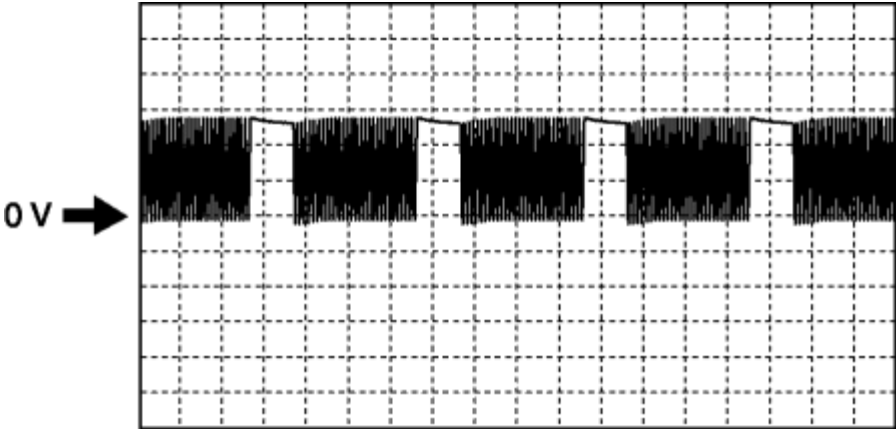
2B	M position switch	Except M position	B+	(See M POSITION SWITCH INSPECTION [FS5A-EL] .) • Related harness
2C	—	—	—	—
2D	Up switch	Selector lever up-shift position	Below 1.0	• Up switch (See UP SWITCH INSPECTION [FS5A-EL] .) • Related harness
		Except selector lever up-shift position	B+	
2E	—	—	—	—
2F	Down switch	Selector lever down-shift position	Below 1.0	• Down switch (See DOWN SWITCH INSPECTION [FS5A-EL] .) • Related harness
		Except selector lever down-shift position	B+	
2G	—	—	—	—
2H	TR switch	P position	4.3—4.8	• TR switch (See TRANSAXLE RANGE (TR) SWITCH INSPECTION [FS5A-EL] .) • Related harness
		R position	3.8—4.2	
		N position	3.0—3.5	
		D position	2.2—2.7	
		M position	2.2—2.7	
2I	Input/turbine speed sensor (+)	(See Input/ turbine speed sensor.)		• Input/turbine speed sensor (See INPUT/ TURBINE SPEED SENSOR INSPECTION [FS5A-EL] .) • Related harness
2J	Oil pressure switch	1GR	Below 1.0	• Oil pressure switch (See OIL PRESSURE SWITCH INSPECTION [FS5A-EL] .) • Related harness
		2GR	Below 1.0	
		3GR	Below 1.0	

		4GR	B+	
		5GR	B+	
2K	Input/turbine speed sensor (-)	(See Input/ turbine speed sensor.)		- Input/turbine speed sensor (See INPUT/ TURBINE SPEED SENSOR INSPECTION [FS5A-EL].) - Related harness
2L	Intermediate sensor	(See Intermediate sensor.)		- Intermediate sensor (See INTERMEDIATE SENSOR INSPECTION [FS5A-EL].) - Related harness
2M	TFT sensor	ATF temperature 20 °C {68 °F}	Approx.3.3	- TFT sensor (See TRANSAXLE FLUID TEMPERATURE (TFT) SENSOR INSPECTION [FS5A-EL].) - Related harness
		ATF temperature 65 °C {149 °F}	Approx.1.3	
2N	—	—	—	—
2O	TR switch, TFT sensor	Under any condition	Below 1.0	Related harness
2P	VSS	(See VSS.)		- VSS (See VEHICLE SPEED SENSOR (VSS) INSPECTION [FS5A-EL].) - Related harness
2Q	—	—	—	—
2R	AT main relay	Ignition switch off	Below 1.0	- AT main relay (See RELAY INSPECTION.) - Related harness
		Ignition switch ON	B+	
2S	—	—	—	—
2T	—	—	—	—
2U	—	—	—	—

2V	—	—	—	—
2W	CAN module	Because this terminal is for CAN, no valid determination of terminal voltage is possible.		
2X	CAN module	Because this terminal is for CAN, no valid determination of terminal voltage is possible.		

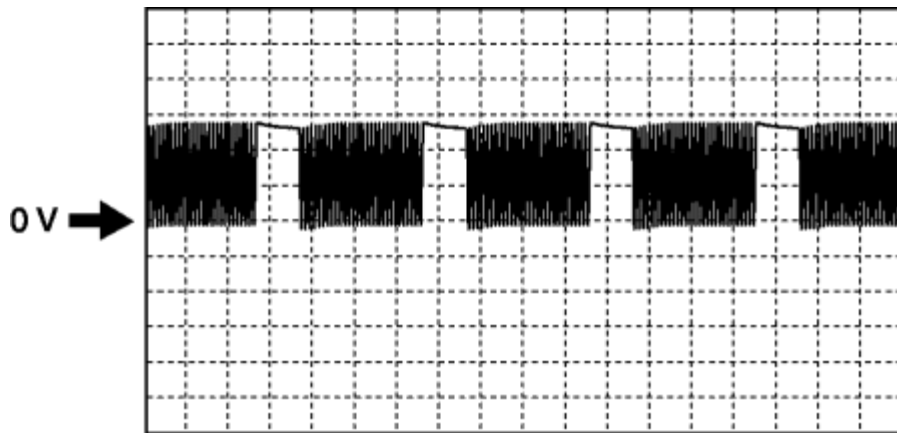
Input/ Output Wave From (Reference)

Shift solenoid A



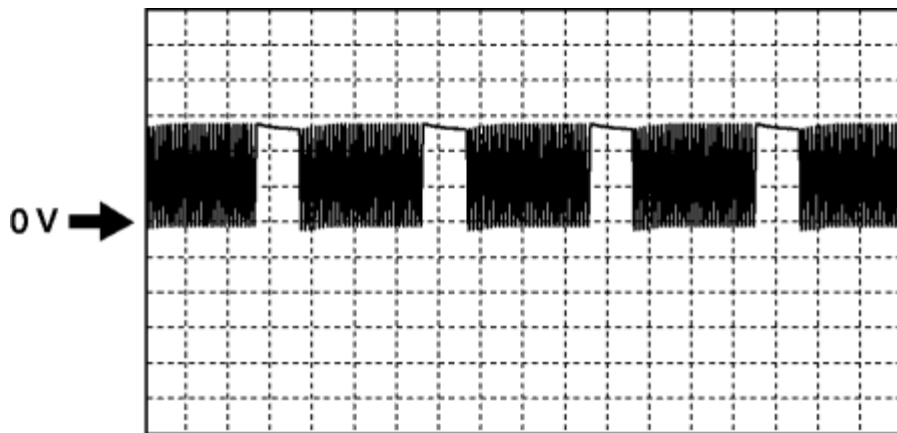
- TCM terminals
1A (+)—body GND (-)
- Oscilloscope setting
5 V/DIV (Y), 5 ms/DIV (X), DC range
- Test Condition
D position 4GR

Shift solenoid B



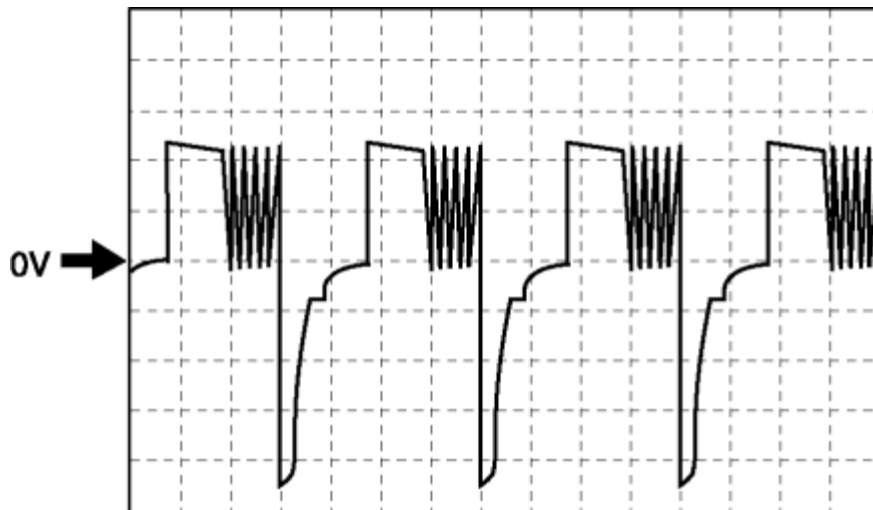
- TCM terminals
1B (+)—body GND (-)
- Oscilloscope setting
5 V/DIV (Y), 5 ms/DIV (X), DC range
- Test Condition
D position 1GR

Shift solenoid C



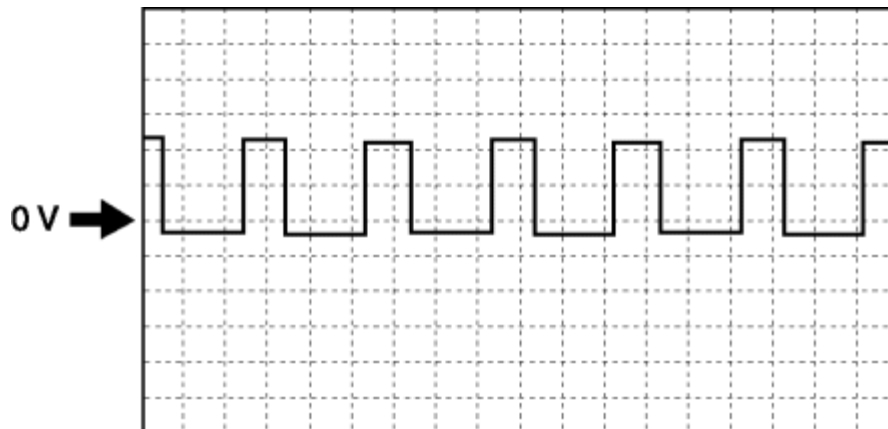
- TCM terminals
1C (+)—body GND (-)
- Oscilloscope setting
5 V/DIV (Y), 5 ms/DIV (X), DC range
- Test Condition
D position 1GR

Pressure control solenoid B



- TCM terminals
1D (+)—body GND (-)
- Oscilloscope setting
5 V/DIV (Y), 5 ms/DIV (X), DC range
- Test Condition
Shifting from 4GR to 5GR or from 5GR to 4GR

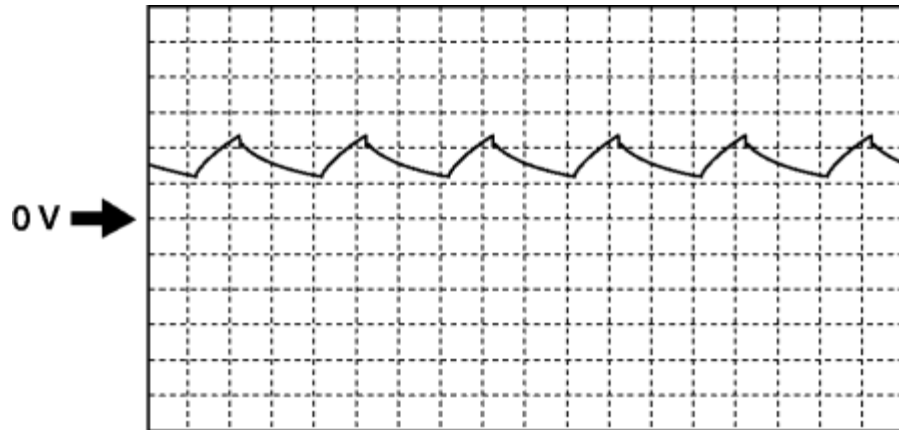
Pressure control solenoid A (+)



- TCM terminals
1E (+)—body GND (-)
- Oscilloscope setting
5 V/DIV (Y), 1 ms/DIV (X), DC range
- Test Condition
The following conditions are met:
 - Ignition switch ON (engine off)
 - P position

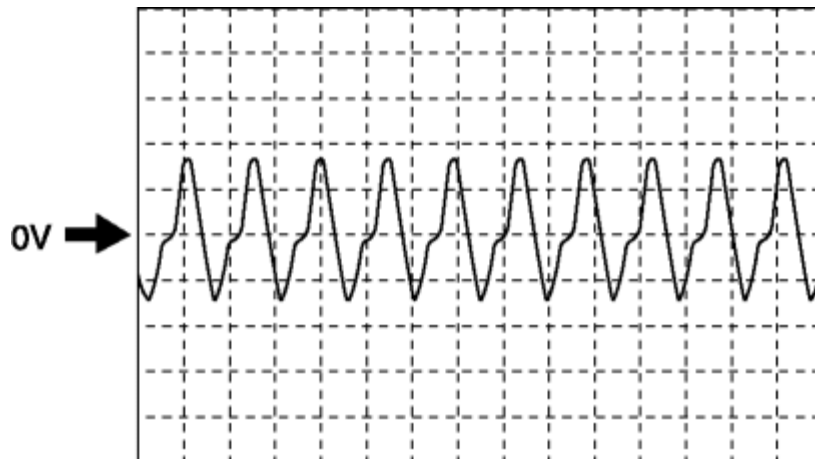
- Accelerator pedal fully depressed

Pressure control solenoid A (-)



- TCM terminals
1G (+)—body GND (-)
- Oscilloscope setting
200 mV/DIV (Y), 1 ms/DIV (X), DC range
- Test Condition
The following conditions are met:
 - Ignition switch ON (engine off)
 - P position
 - Accelerator pedal fully depressed

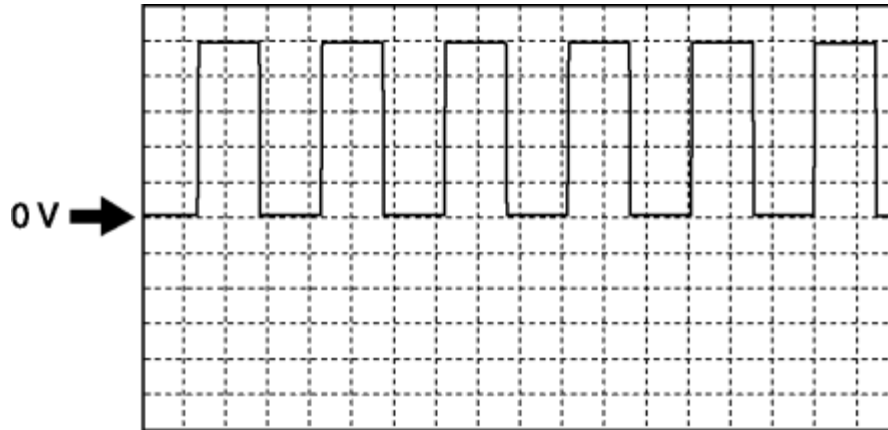
Input/ turbine speed sensor



- TCM terminals
2I (+)—2K (-)

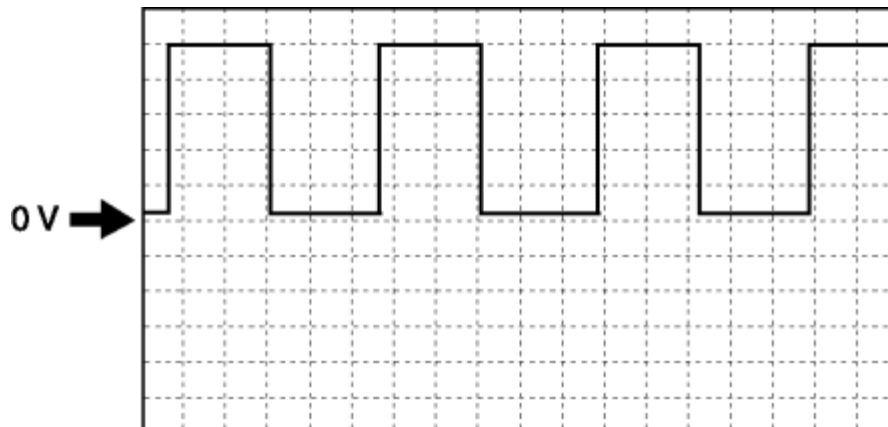
- Oscilloscope setting
1 V/DIV (Y), 2 ms/DIV (X), DC range
- Test Condition
Idle at P position after warm-up

Intermediate sensor



- TCM terminals
2L (+)—body GND (—)
- Oscilloscope setting
1 V/DIV (Y), 200 μ s/DIV (X), DC range
- Test Condition
The following conditions are met:
 - Vehicle speed: **30 km/h { 19 mph }**
 - Gear position: 3GR

VSS



- TCM terminals

2P (+)—body GND (–)

- Oscilloscope setting
1 V/DIV (Y), 2 ms/DIV (X), DC range
- Test Condition

The following conditions are met:

- Vehicle speed: **30 km/h { 19 mph }**
- Gear position: 3GR

[< Previous](#) [Next >](#)

[Back to Top](#)

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