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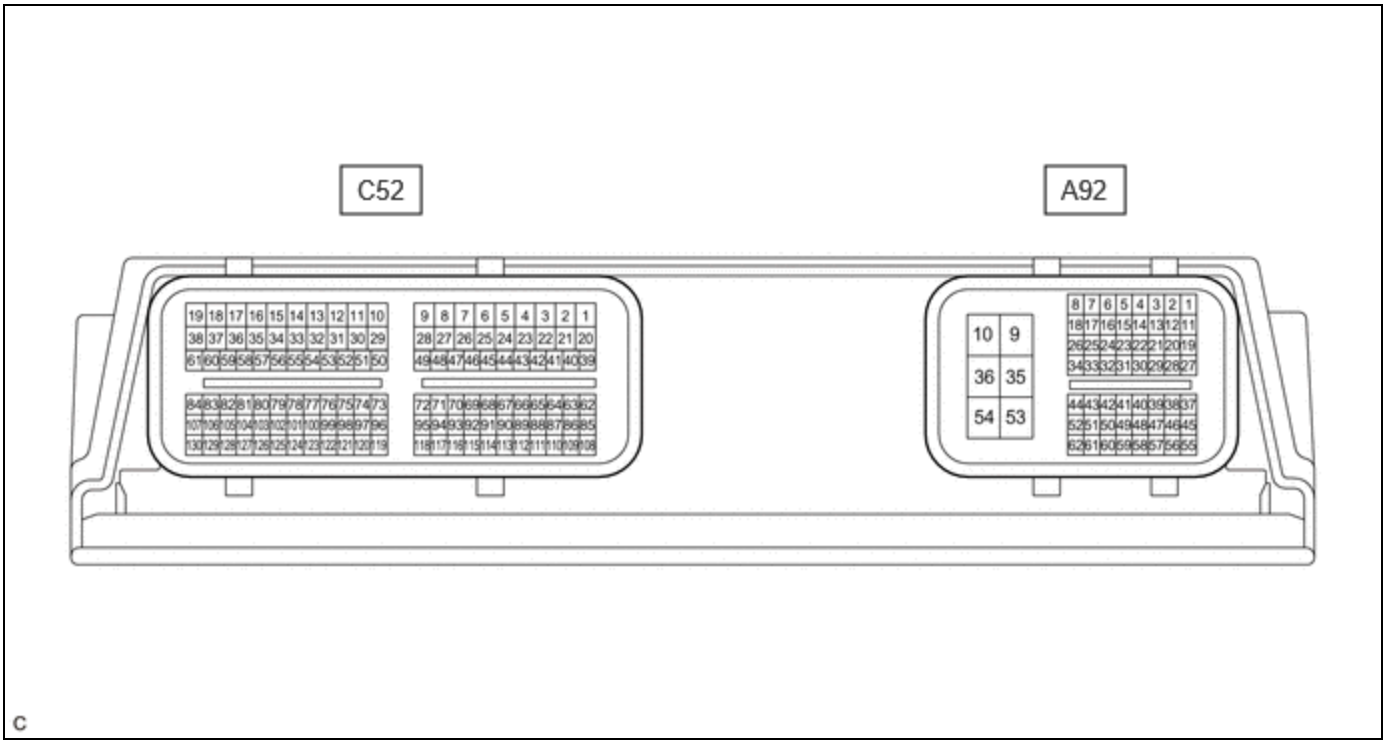
Model Year Start: 2023	**Model:** Prius Prime	**Prod Date Range:** [03/2023 -]
Title: M20A-FXS (ENGINE CONTROL): SFI SYSTEM: TERMINALS OF ECM; 2023 - 2024 MY Prius Prius Prime [03/2023 -]		

TERMINALS OF ECM



HINT:

The standard voltage, resistance and waveform between each pair of the ECM terminals are shown in the table below. The appropriate conditions for checking each pair of the terminals is also indicated. The result of checks should be compared with the standard voltage, resistance and waveform for each pair of the terminals as displayed in the Specified Condition column. The illustration above can be used as a reference to identify the ECM terminal locations.

TERMINAL NO. (SYMBOL)	TERMINAL DESCRIPTION	CONDITION	SPECIFIED CONDITION
A92-1 (BATT) - A92-10 (E1)	Auxiliary battery (for measuring auxiliary battery voltage and ECM memory)	Always	11 to 16 V
A92-2 (IGP) - A92-10 (E1)	Ignition switch signal	Ignition switch ON	11 to 14 V
A92-3 (VPMP) - A92-10 (E1)	Vent valve (built into canister pump module)	Ignition switch ON	11 to 14 V
A92-4 (MPMP) - A92-10 (E1)	Leak detection pump (canister pump module)	Leak detection pump OFF	Below 3 V
		Leak detection pump ON	11 to 14 V

*1: for HEV Model

*2: for PHEV Model

TERMINAL NO. (SYMBOL)	TERMINAL DESCRIPTION	CONDITION	SPECIFIED CONDITION
A92-5 (CFDT) - A92-10 (E1)	CAN communication line	Engine stopped, Ignition switch ON	Pulse generation (See waveform 1)
A92-6 (CFDB) - A92-10 (E1)	CAN communication line	Engine stopped, Ignition switch ON	Pulse generation (See waveform 4)
A92-7 (CFDH) - A92-10 (E1)	CAN communication line	Engine stopped, Ignition switch ON	Pulse generation (See waveform 1)
A92-8 (CFDL) - A92-10 (E1)	CAN communication line	Engine stopped, Ignition switch ON	Pulse generation (See waveform 4)
A92-9 (+B) - A92-10 (E1)	• Power source of ECM • Power source of throttle actuator	Ignition switch ON	11 to 14 V
A92-10 (E1) - Body ground	Ground	Always	Below 1 Ω
A92-11 (CCB+) - A92-10 (E1)	Fuel vapor containment valve signal	Ignition switch ON	Pulse generation (See waveform 2)
A92-12 (CCA+) - A92-10 (E1)	Fuel vapor containment valve signal	Ignition switch ON	Pulse generation (See waveform 2)
A92-14 (IGR) - A92-10 (E1)	Ignition signal	Ignition switch ON	11 to 14 V
A92-15 (MREL) - A92-10 (E1)	EFI-MAIN NO. 1 relay operation signal	Ignition switch ON	Below 1.5 V
A92-16 (FPC) - A92-10 (E1)	Fuel pump control	Ignition switch ON	Below 1.5 V
A92-17 (NEO) - A92-10 (E1)	Crankshaft revolution signal	Idling with warm engine	Pulse generation (See waveform 3)

*1: for HEV Model

*2: for PHEV Model

TERMINAL NO. (SYMBOL)	TERMINAL DESCRIPTION	CONDITION	SPECIFIED CONDITION
A92-19 (CCB-) - A92-10 (E1)	Fuel vapor containment valve signal	Ignition switch ON	Pulse generation (See waveform 2)
A92-20 (CCA-) - A92-10 (E1)	Fuel vapor containment valve signal	Ignition switch ON	Pulse generation (See waveform 2)
A92-24 (G2O) - A92-10 (E1)	Camshaft revolution signal	Idling with warm engine	Pulse generation (See waveform 5)
A92-31 (LIDO) - A92-10 (E1)	Fuel lid courtesy switch signal	Fuel lid closed	11 to 14 V
		Fuel lid open	Below 1.0 V
A92-32 (FANH)*1 - A92-10 (E1)	Cooling fan motor operation signal (high)	Ignition switch ON	11 to 14 V
		Idling, high engine coolant temperature	Below 1.5 V
A92-32 (RFC)*2 - A92-10 (E1)	Cooling fan control signal	Ignition switch ON, A/C switch on (max cool)	Pulse generation (See waveform 29)
A92-33 (FANL)*1 - A92-10 (E1)	Cooling fan motor operation signal (low)	Ignition switch ON	11 to 14 V
		Idling, high engine coolant temperature	Below 1.5 V
A92-34 (IREL) - A92-10 (E1)	D INJ relay operation signal	Ignition switch ON	Below 1.5 V
A92-35 (+B2) - A92-10 (E1)	Power source of ECM	Ignition switch ON	11 to 14 V
A92-36 (E01) - Body ground	Ground	Always	Below 1 Ω
A92-38 (FUEL) - A92-10 (E1)	Fuel lid opener switch signal	Fuel lid opener switch pressed	Below 1.0 V
		Fuel lid opener switch not pressed	4.5 to 5.5 V
A92-41 (LSTM) - A92-10 (E1)	Fuel lid operation signal for combination meter assembly	Multi-information display displaying "Close Fuel Lid"	Pulse generation (See waveform 27)

*1: for HEV Model

*2: for PHEV Model

TERMINAL NO. (SYMBOL)	TERMINAL DESCRIPTION	CONDITION	SPECIFIED CONDITION
		Multi-information display displaying "Ready to Refuel"	Pulse generation (See waveform 28)
		Ignition switch ON	11 to 14 V
A92-44 (FREL) - A92-10 (E1)	Fuel lid lock with motor assembly operation signal	Fuel lid lock with motor assembly operating	Below 1.0 V
		Fuel lid lock with motor assembly not operating	11 to 14 V
A92-45 (EC) - Body ground	Ground	Always	Below 1 Ω
A92-48 (VCPP) - A92-49 (EPPM)	Power source for canister pressure sensor (specific voltage)	Ignition switch ON	4.5 to 5.5 V
A92-50 (PPMP) - A92-49 (EPPM)	Canister pressure sensor (built into canister pump module)	Ignition switch ON	3.0 to 3.6 V
A92-53 (+BD1) - A92-10 (E1)	Power source of ECU (injector driver)	Ignition switch ON	11 to 14 V
A92-54 (E1D1) - Body ground	Ground	Always	Below 1 Ω
A92-55 (PTNK) - A92-56 (EPTK)	Fuel tank pressure sensor signal	Engine stopped, Ignition switch ON	0.4 to 4.5 V
A92-57 (VPTK) - A92-56 (EPTK)	Power source of fuel tank pressure sensor (specific voltage)	Engine stopped, Ignition switch ON	4.75 to 5.25 V
C52-1 (M-) - A92-10 (E1)	Throttle actuator operation signal (negative signal)	Idling with warm engine	Pulse generation (See WAVEFORM 6)
C52-2 (M+) - A92-10 (E1)	Throttle actuator operation signal (positive terminal)	Idling with warm engine	Pulse generation (See WAVEFORM 7)
C52-3 (EGA+) - A92-10 (E1)	EGR valve assembly operation signal	Idling with warm engine	Pulse generation (See WAVEFORM 8)
C52-4 (EGA-) - A92-10 (E1)	EGR valve assembly operation signal	Idling with warm engine	Pulse generation (See WAVEFORM 8)

*1: for HEV Model

*2: for PHEV Model

TERMINAL NO. (SYMBOL)	TERMINAL DESCRIPTION	CONDITION	SPECIFIED CONDITION
C52-5 (EGB-) - A92-10 (E1)	EGR valve assembly operation signal	Idling with warm engine	Pulse generation (See WAVEFORM 8)
C52-6 (EGB+) - A92-10 (E1)	EGR valve assembly operation signal	Idling with warm engine	Pulse generation (See WAVEFORM 8)
C52-8 (HA1B) - A92-10 (E1)	Air fuel ratio sensor (sensor 2) heater operation signal	Ignition switch ON	11 to 14 V
		Idling with cold engine	Pulse generation (See WAVEFORM 9)
C52-9 (HA1A) - A92-10 (E1)	Air fuel ratio sensor (sensor 1) heater operation signal	Ignition switch ON	11 to 14 V
		Idling with cold engine	Pulse generation (See WAVEFORM 10)
C52-10 (#2D-) - A92-10 (E1)	Direct fuel injector assembly signal (No. 2 cylinder)	Idling with warm engine, Data List item "Injection Mode" displaying "Direct"	Pulse generation (See WAVEFORM 11)
C52-11 (#2D+) - A92-10 (E1)	Direct fuel injector assembly signal (No. 2 cylinder)	Idling with warm engine, Data List item "Injection Mode" displaying "Direct"	Pulse generation (See WAVEFORM 11)
C52-12 (#3D+) - A92-10 (E1)	Direct fuel injector assembly signal (No. 3 cylinder)	Idling with warm engine, Data List item "Injection Mode" displaying "Direct"	Pulse generation (See WAVEFORM 11)
C52-13 (#3D-) - A92-10 (E1)	Direct fuel injector assembly signal (No. 3 cylinder)	Idling with warm engine, Data List item "Injection Mode" displaying "Direct"	Pulse generation (See WAVEFORM 11)
C52-14 (#4D-) - A92-10 (E1)	Direct fuel injector assembly signal (No. 4 cylinder)	Idling with warm engine, Data List item "Injection Mode" displaying "Direct"	Pulse generation (See WAVEFORM 11)

*1: for HEV Model

*2: for PHEV Model

TERMINAL NO. (SYMBOL)	TERMINAL DESCRIPTION	CONDITION	SPECIFIED CONDITION
C52-15 (#4D+) - A92-10 (E1)	Direct fuel injector assembly signal (No. 4 cylinder)	Idling with warm engine, Data List item "Injection Mode" displaying "Direct"	Pulse generation (See WAVEFORM 11)
C52-16 (#1D+) - A92-10 (E1)	Direct fuel injector assembly signal (No. 1 cylinder)	Idling with warm engine, Data List item "Injection Mode" displaying "Direct"	Pulse generation (See WAVEFORM 11)
C52-17 (#1D-) - A92-10 (E1)	Direct fuel injector assembly signal (No. 1 cylinder)	Idling with warm engine, Data List item "Injection Mode" displaying "Direct"	Pulse generation (See WAVEFORM 11)
C52-18 (FP1-) - A92-10 (E1)	Fuel (engine room side) pump assembly (for high pressure side) signal	Idling with warm engine, Data List item "Injection Mode" displaying "Direct"	Pulse generation (See WAVEFORM 12)
C52-19 (FP1+) - A92-10 (E1)	Fuel (engine room side) pump assembly (for high pressure side) signal	Idling with warm engine, Data List item "Injection Mode" displaying "Direct"	Pulse generation (See WAVEFORM 12)
C52-20 (VOP-) - A92-10 (E1)	Oil pressure control valve operation signal	Idling with warm engine	Pulse generation (See WAVEFORM 13)
C52-21 (VOP+) - A92-10 (E1)	Oil pressure control valve operation signal	Idling with warm engine	Pulse generation (See WAVEFORM 13)
C52-26 (OE1+) - C52-25 (OE1-)	Cam timing oil control solenoid assembly operation signal	Idling	Pulse generation (See WAVEFORM 14)
C52-28 (EDT1) - A92-10 (E1)	Cam timing control motor with EDU assembly signal	Idling with warm engine	Pulse generation (See WAVEFORM 15)
C52-46 (IGT4) - A92-10 (E1)	No. 4 ignition coil assembly signal (ignition signal)	Idling with warm engine	Pulse generation (See WAVEFORM 16)
C52-47 (IGT3) - A92-10 (E1)	No. 3 ignition coil assembly signal (ignition signal)	Idling with warm engine	Pulse generation

*1: for HEV Model

*2: for PHEV Model

TERMINAL NO. (SYMBOL)	TERMINAL DESCRIPTION	CONDITION	SPECIFIED CONDITION
			(See WAVEFORM 16)
C52-48 (IGT2) - A92-10 (E1)	No. 2 ignition coil assembly signal (ignition signal)	Idling with warm engine	Pulse generation (See WAVEFORM 16)
C52-49 (IGT1) - A92-10 (E1)	No. 1 ignition coil assembly signal (ignition signal)	Idling with warm engine	Pulse generation (See WAVEFORM 16)
C52-50 (WPO) - A92-10 (E1)	Electric water pump assembly signal	Idling with warm engine	Pulse generation (See WAVEFORM 17)
C52-51 (WPI) - A92-10 (E1)	Electric water pump assembly signal	Idling with warm engine	Pulse generation (See WAVEFORM 18)
C52-62 (LIN) - A92-10 (E1)	LIN communication signal	Ignition switch ON	Pulse generation
C52-66 (PRG) - A92-10 (E1)	Purge VSV operation signal	Ignition switch ON	11 to 14 V
		Idling with warm engine, under purge control	Pulse generation (See WAVEFORM 19)
C52-70 (EMR1) - A92-10 (E1)	Cam timing control motor with EDU assembly signal	Idling with warm engine	Pulse generation (See WAVEFORM 20)
C52-71 (EMF1) - A92-10 (E1)	Cam timing control motor with EDU assembly signal	Idling with warm engine	Below 5.0 V
C52-72 (EMD1) - A92-10 (E1)	Cam timing control motor with EDU assembly signal	Idling with warm engine	Pulse generation (See WAVEFORM 21)
C52-73 (#40) - A92-10 (E1)	Port fuel injector assembly signal (No. 4 cylinder)	Idling with warm engine (Data List item "Injection Mode" displaying "Port")	Pulse generation (See WAVEFORM 22)

*1: for HEV Model

*2: for PHEV Model

TERMINAL NO. (SYMBOL)	TERMINAL DESCRIPTION	CONDITION	SPECIFIED CONDITION
C52-74 (#30) - A92-10 (E1)	Port fuel injector assembly signal (No. 3 cylinder)	Idling with warm engine (Data List item "Injection Mode" displaying "Port")	Pulse generation (See WAVEFORM 22)
C52-75 (#20) - A92-10 (E1)	Port fuel injector assembly signal (No. 2 cylinder)	Idling with warm engine (Data List item "Injection Mode" displaying "Port")	Pulse generation (See WAVEFORM 22)
C52-76 (#10) - A92-10 (E1)	Port fuel injector assembly signal (No. 1 cylinder)	Idling with warm engine (Data List item "Injection Mode" displaying "Port")	Pulse generation (See WAVEFORM 22)
C52-78 (VCVG) - A92-10 (E1)	Power source of mass air flow meter sub-assembly (specific voltage)	Ignition switch ON	4.8 to 5.2 V
C52-84 (VCPF) - A92-10 (E1)	Power source of No. 2 fuel pressure sensor (for low pressure side) (specific voltage)	Ignition switch ON	4.75 to 5.25 V
C52-87 (VTA2) - C52-110 (ETA)	Throttle position sensor signal (for sensor malfunction detection)	Engine stopped, Ignition switch ON, accelerator pedal fully released	2.1 to 3.1 V
C52-88 (VCV1) - A92-10 (E1)	Power source of camshaft position sensor (for intake camshaft) (specific voltage)	Ignition switch ON	4.5 to 5.5 V
C52-90 (VV1+) - C52-89 (VV1-)	Camshaft position sensor (for intake camshaft) signal	Idling with warm engine	Pulse generation (See WAVEFORM 23)
C52-91 (EV1+) - C52-114 (EV1-)	Camshaft position sensor (for exhaust camshaft) signal	Idling with warm engine	Pulse generation (See WAVEFORM 23)
C52-93 (NE+) - C52-115 (NE-)	Crankshaft position sensor signal	Idling with warm engine	Pulse generation (See WAVEFORM 24)
C52-94 (A1A-) - A92-10 (E1)	Air fuel ratio sensor (sensor 1) signal	Ignition switch ON	1.24 to 4.22 V
C52-95 (A1A+) - A92-10 (E1)	Air fuel ratio sensor (sensor 1) signal	Ignition switch ON	1.46 to 4.22 V
C52-97 (PR) - C52-96 (EPR)	Fuel pressure sensor (for high pressure side) signal	Idling with warm engine	0.5 to 4.5 V

*1: for HEV Model

*2: for PHEV Model

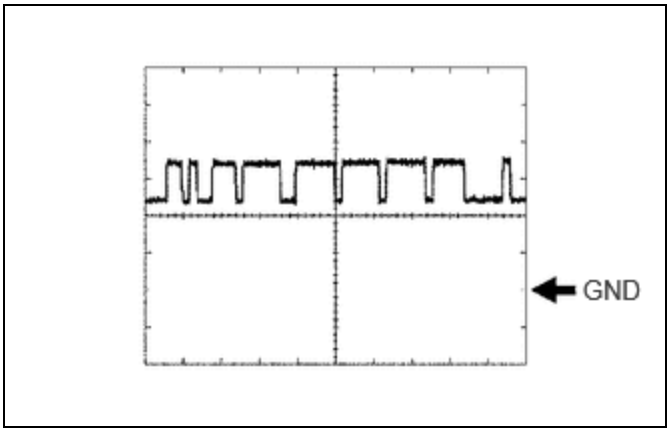
TERMINAL NO. (SYMBOL)	TERMINAL DESCRIPTION	CONDITION	SPECIFIED CONDITION
C52-98 (VCPR) - C52-96 (EPR)	Power source of fuel pressure sensor (for high pressure side) (specific voltage)	Ignition switch ON	4.75 to 5.25 V
C52-99 (VCPE) - C52-100 (EPEO)	Power source of engine oil pressure sensor (specific voltage)	Ignition switch ON	4.5 to 5.5 V
C52-101 (VG) - C52-79 (E2G)	Mass air flow meter sub-assembly signal	Ignition switch ON	Pulse generation (See WAVEFORM 25)
C52-102 (THA) - C52-79 (E2G)	Intake air temperature sensor (mass air flow meter sub-assembly) signal	Idling, intake air temperature 0 to 80°C (32 to 176°F)	0.5 to 3.4 V
C52-107 (PFL) - C52-61 (EPFL)	No. 2 fuel pressure sensor (for low pressure side) signal	Idling with warm engine	0.57 to 4.88 V
C52-108 (VTA1) - C52-110 (ETA)	Throttle position sensor signal (for engine control)	Engine stopped, Ignition switch ON, accelerator pedal fully released	0.6 to 1.1 V
C52-109 (VCTA) - C52-110 (ETA)	Power source of throttle position sensor (specific voltage)	Engine stopped, Ignition switch ON	4.5 to 5.5 V
C52-111 (KNK1) - C52-112 (EKNK)	Knock control sensor signal	Engine speed maintained at 2500 rpm after warming up engine	Pulse generation (See WAVEFORM 26)
C52-113 (VCE1) - A92-10 (E1)	Power source of camshaft position sensor (for exhaust camshaft) (specific voltage)	Ignition switch ON	4.5 to 5.5 V
C52-116 (VCNE) - A92-10 (E1)	Power source of crankshaft position sensor (specific voltage)	Ignition switch ON	4.5 to 5.5 V
C52-117 (A1B-) - A92-10 (E1)	Air fuel ratio sensor (sensor 2) signal	Ignition switch ON	1.17 to 4.49 V
C52-118 (A1B+) - A92-10 (E1)	Air fuel ratio sensor (sensor 2) signal	Ignition switch ON	1.53 to 5.96 V
C52-120 (PIM) - C52-119 (EPIM)	Manifold absolute pressure sensor signal	Ignition switch ON	0.95 to 4.25 V
C52-121 (VCPM) - C52-119 (EPIM)	Power source of manifold absolute pressure sensor (specific voltage)	Ignition switch ON	4.75 to 5.25 V
C52-122 (PEO) - C52-100 (EPEO)	Engine oil pressure sensor signal	Idling with warm engine	0.5 to 4.5 V
C52-123 (THEO) - C52-100 (EPEO)	Engine oil temperature sensor signal	Ignition switch ON	0.54 to 4.86 V
C52-125 (THW) - C52-124 (ETHW)	Engine coolant temperature sensor signal	Idling, engine coolant temperature 75 to 100°C (167 to 212°F)	0.2 to 1.0 V

*1: for HEV Model

*2: for PHEV Model

TERMINAL NO. (SYMBOL)	TERMINAL DESCRIPTION	CONDITION	SPECIFIED CONDITION
A92-129 (THTW) - A92-130 (ETHT)	No. 2 engine coolant temperature sensor signal	Idling, engine coolant temperature 75 to 100°C (167 to 212°F)	0.2 to 1.0 V
*1: for HEV Model *2: for PHEV Model			

WAVEFORM 1



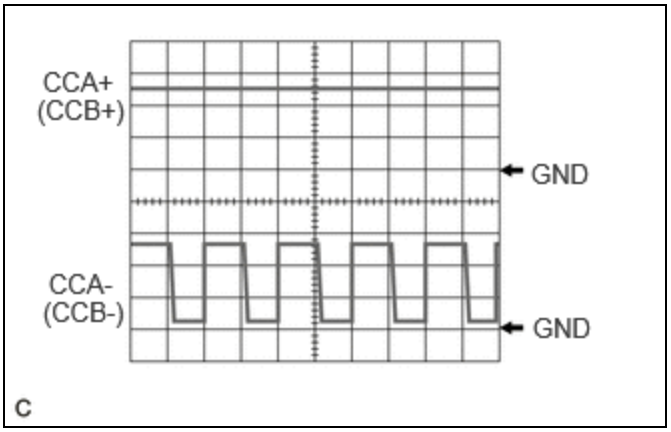
CAN Communication Signal (Reference)

ECM Terminal Name	Between CFDH and E1 Between CFDT and E1
Tester Range	1 V/DIV., 10 µs./DIV.
Condition	Engine stopped, Ignition switch ON

HINT:

The waveform varies depending on the CAN communication signal.

WAVEFORM 2



Fuel Vapor-containment Valve Operation Signal

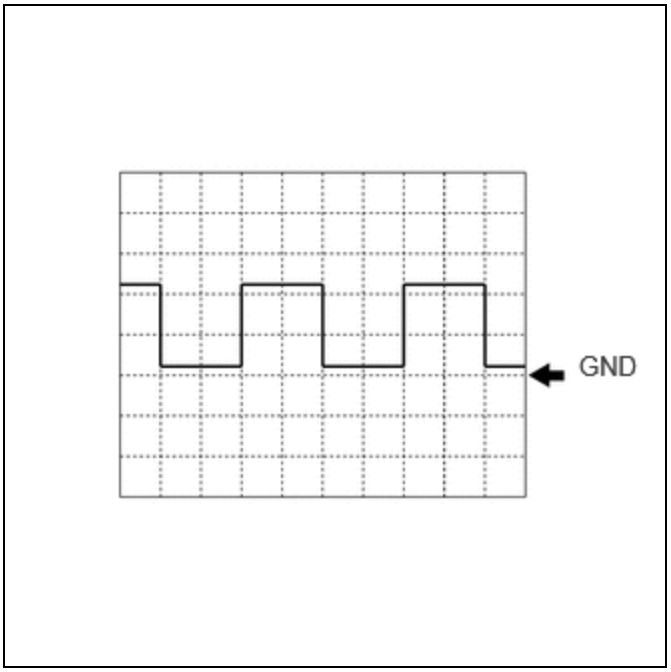
ECM Terminal Name	CH1: Between CCA+ and E1 CH2: Between CCA- and E1

	CH1: Between CCB+ and E1 CH2: Between CCB- and E1
Tester Range	5 V/DIV., 5 µs./DIV.
Condition	Ignition switch ON

HINT:

When the fuel vapor-containment valve is operating, a waveform is produced at each terminal.

WAVEFORM 3



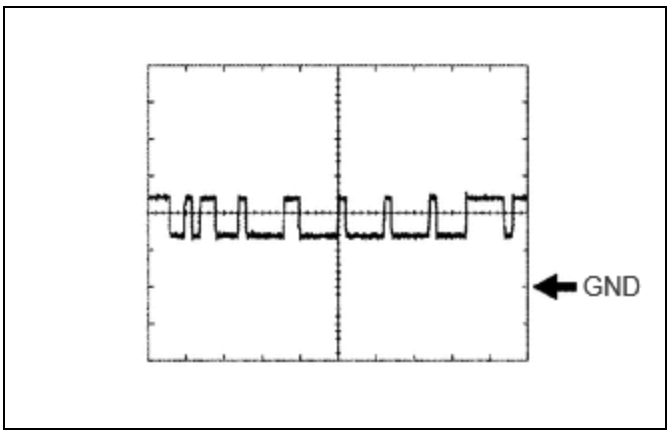
Crankshaft Revolution Signal from ECM to Inverter with Converter Assembly

ECM Terminal Name	Between NEO and E1
Tester Range	5 V/DIV., 20 ms./DIV.
Condition	Idling with warm engine

HINT:

The wavelength becomes shorter as the engine speed increases.

WAVEFORM 4



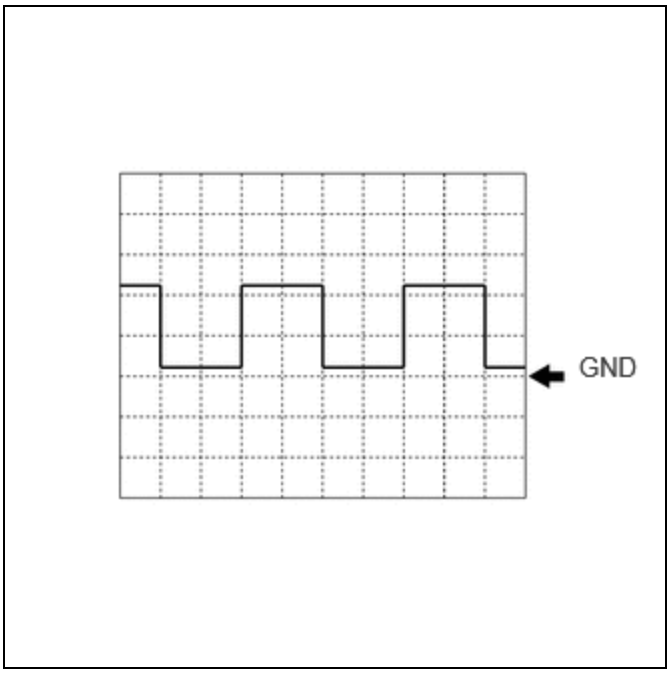
CAN Communication Signal (Reference)

ECM Terminal Name	Between CFDL and E1 Between CFDB and E1
Tester Range	1 V/DIV., 10 µs./DIV.
Condition	Engine stopped, Ignition switch ON

HINT:

The waveform varies depending on the CAN communication signal.

WAVEFORM 5



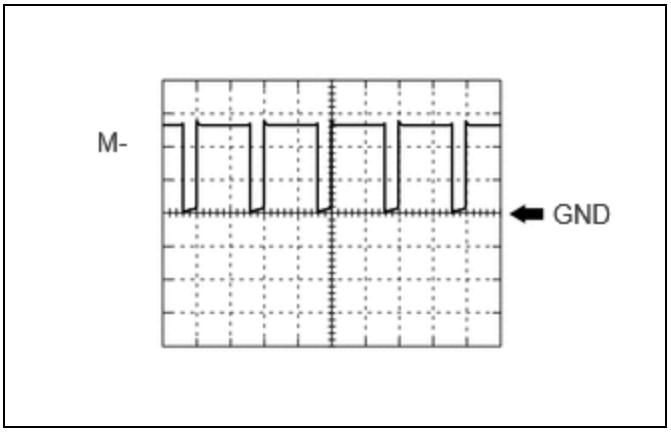
Camshaft Revolution Signal from ECM to Inverter with Converter Assembly

ECM Terminal Name	Between G2O and E1
Tester Range	5 V/DIV., 20 ms./DIV.
Condition	Idling with warm engine

HINT:

The wavelength becomes shorter as the engine speed increases.

WAVEFORM 6



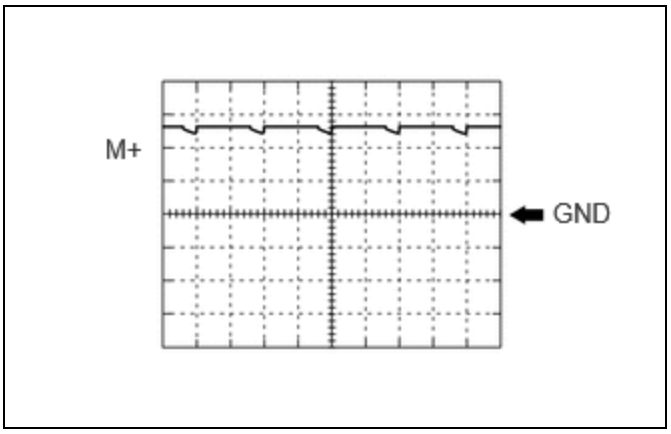
Throttle Actuator Operation Signal (Negative Terminal)

ECM Terminal Name	Between M- and E1
Tester Range	5 V/DIV., 1 ms./DIV.
Condition	Idling with warm engine

HINT:

The duty ratio varies depending on the throttle actuator operation.

WAVEFORM 7



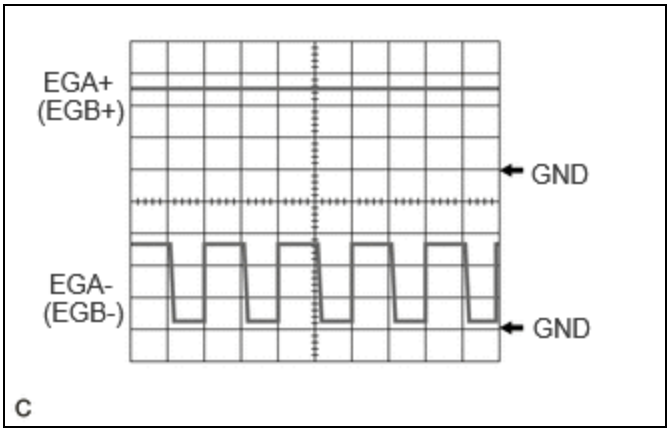
Throttle Actuator Operation Signal (Positive Terminal)

ECM Terminal Name	Between M+ and E1
Tester Range	5 V/DIV., 1 ms./DIV.
Condition	Idling with warm engine

HINT:

The duty ratio varies depending on the throttle actuator operation.

WAVEFORM 8



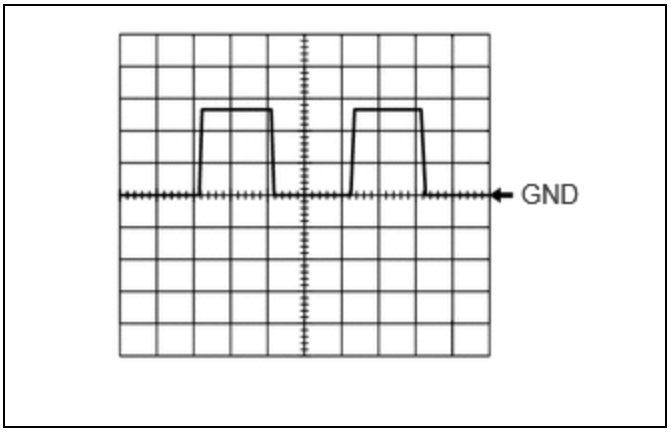
EGR Valve Assembly Operation Signal

ECM Terminal Name	CH1: Between EGA+ and E1 CH2: Between EGA- and E1
	CH1: Between EGB+ and E1 CH2: Between EGB- and E1
Tester Range	5 V/DIV., 5 µs./DIV.
Condition	Idling with warm engine

HINT:

When the EGR valve assembly is operating, a waveform is produced at each terminal.

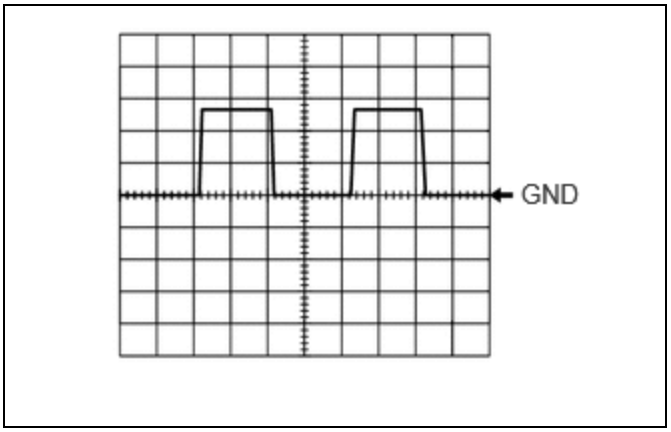
WAVEFORM 9



Air Fuel Ratio Sensor (Sensor 2) Heater Operation Signal

ECM Terminal Name	Between HA1B and E1
Tester Range	5 V/DIV., 10 ms./DIV.
Condition	Idling with cold engine

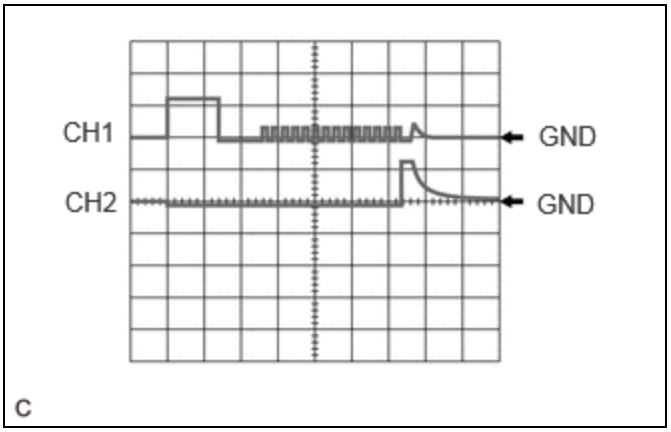
WAVEFORM 10



Air Fuel Ratio Sensor (Sensor 1) Heater Operation Signal

ECM Terminal Name	Between HA1A and E1
Tester Range	5 V/DIV., 10 ms./DIV.
Condition	Idling with cold engine

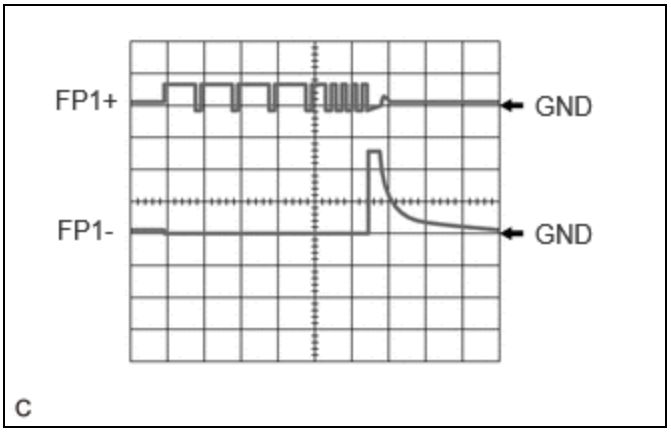
WAVEFORM 11



No. 1 (to No. 4) Direct Fuel Injector Assembly Signal

ECM Terminal Name	CH1: Between #1D+ and E1 CH2: Between #1D- and E1
	CH1: Between #2D+ and E1 CH2: Between #2D- and E1
	CH1: Between #3D+ and E1 CH2: Between #3D- and E1
	CH1: Between #4D+ and E1 CH2: Between #4D- and E1
Tester Range	50 V/DIV., 200 µs./DIV.
Condition	Idling with warm engine, Data List item "Injection Mode" displaying "Direct"

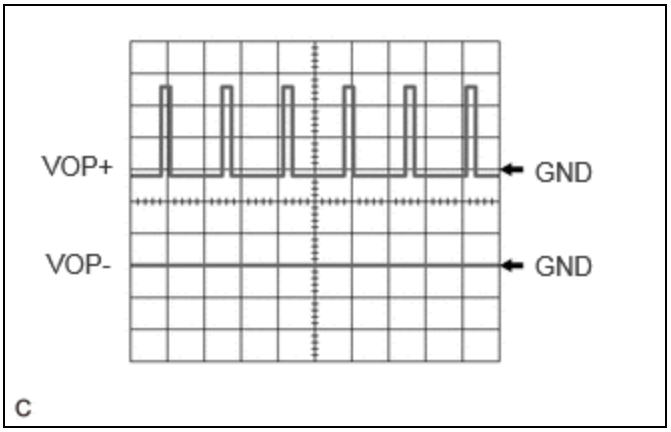
WAVEFORM 12



Fuel (engine room side) pump assembly (for High Pressure Side) Signal

ECM Terminal Name	CH1: Between FP1+ and E1 CH2: Between FP1- and E1
Tester Range	20 V/DIV., 500 µs./DIV.
Condition	Idling with warm engine, Data List item "Injection Mode" displaying "Direct"

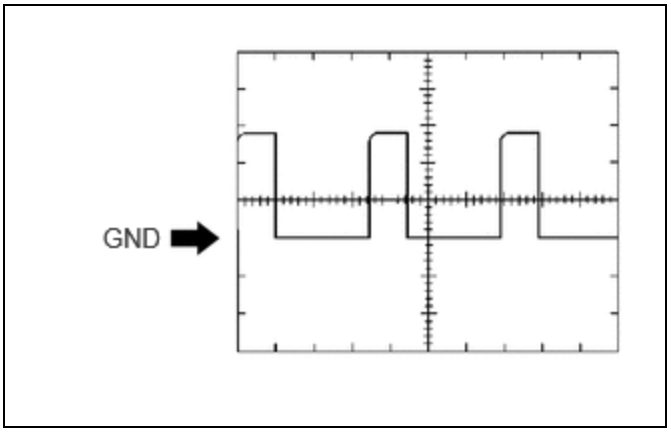
WAVEFORM 13



Oil Pressure Control Valve Operation Signal

ECM Terminal Name	CH1: Between VOP+ and E1 CH2: Between VOP- and E1
Tester Range	5 V/DIV., 20 ms./DIV.
Condition	Idling with warm engine

WAVEFORM 14



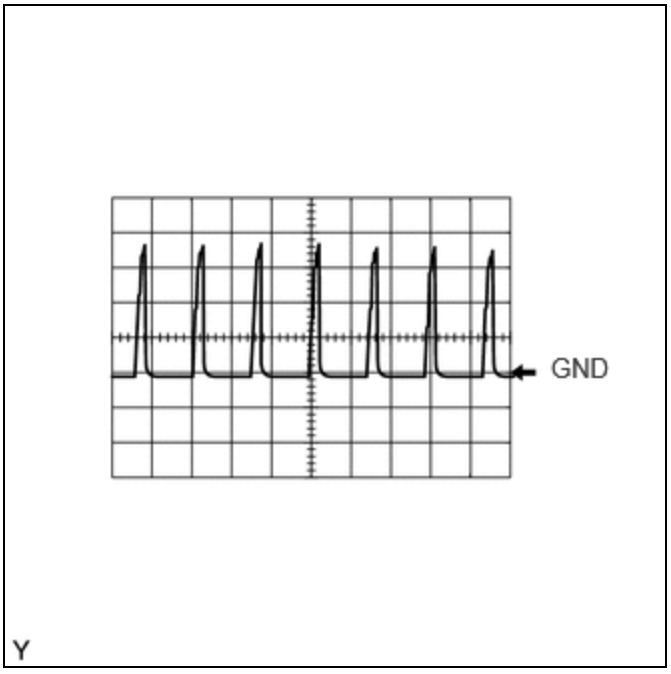
Cam Timing Oil Control Solenoid Assembly Operation Signal

ECM Terminal Name	Between OE1+ and OE1-
Tester Range	5 V/DIV., 1 ms./DIV.
Condition	Idling

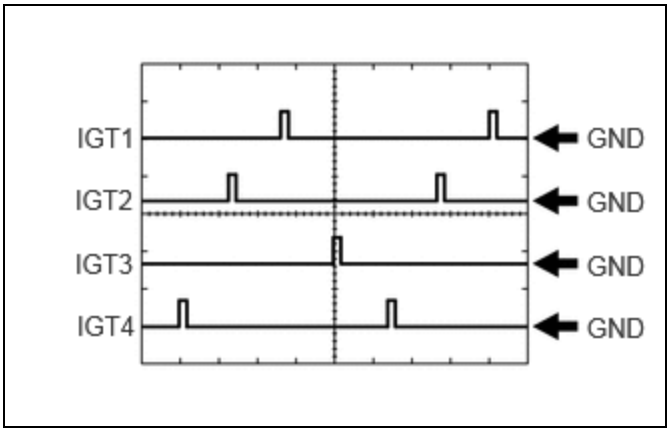
WAVEFORM 15

Cam Timing Control Motor with EDU Assembly Signal (EDT Signal)

ECM Terminal Name	Between EDT1 and E1
Tester Range	1 V/DIV., 5 ms./DIV.
Condition	Idling with warm engine



WAVEFORM 16



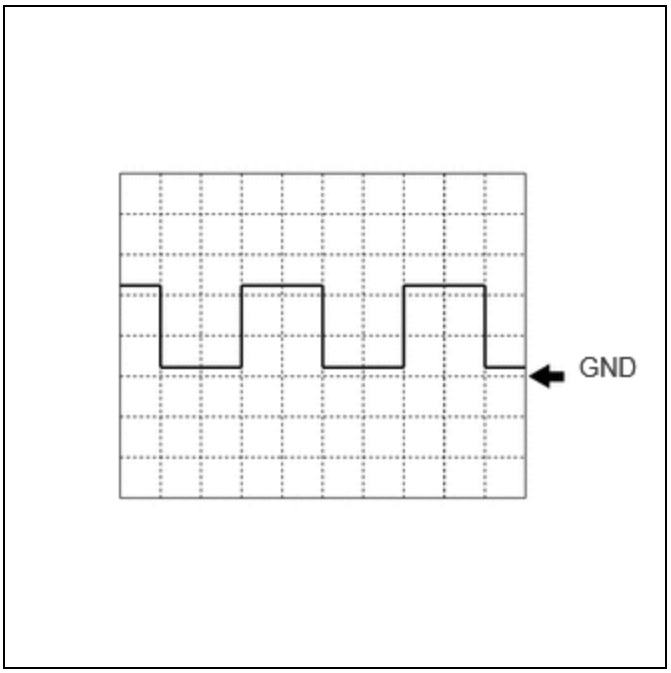
Ignition Coil Assembly Signal (IGT Signal)

ECM Terminal Name	Between IGT (1 to 4) and E1
Tester Range	5 V/DIV., 20 ms./DIV.
Condition	Idling with warm engine

HINT:

The wavelength becomes shorter as the engine speed increases.

WAVEFORM 17



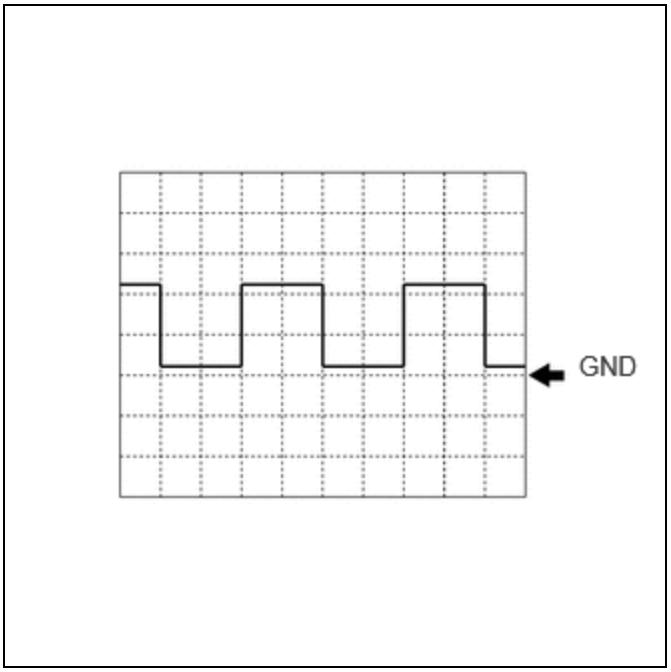
Engine Water Pump Assembly Signal (from ECM to Engine Water Pump Assembly)

ECM Terminal Name	Between WPO and E1
Tester Range	5 V/DIV., 20 ms./DIV.
Condition	Idling with warm engine

HINT:

The duty ratio varies depending on the engine water pump assembly speed.

WAVEFORM 18



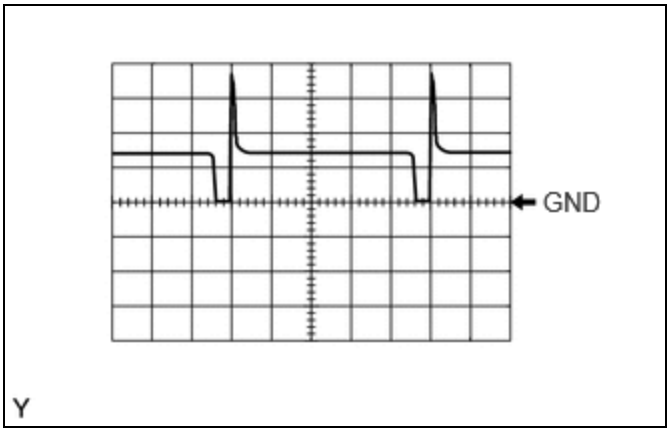
Engine Water Pump Assembly Signal (from Engine Water Pump Assembly to ECM)

ECM Terminal Name	Between WPI and E1
Tester Range	5 V/DIV., 20 ms./DIV.
Condition	Idling with warm engine

HINT:

The wavelength becomes shorter as the engine water pump assembly speed increases.

WAVEFORM 19



Purge VSV Operation Signal

ECM Terminal Name	Between PRG and E1
Tester Range	10 V/DIV., 20 ms./DIV.
Condition	Idling with warm engine, under purge control

HINT:

If the waveform is not similar to the illustration, check the waveform again after idling for 10 minutes or more.

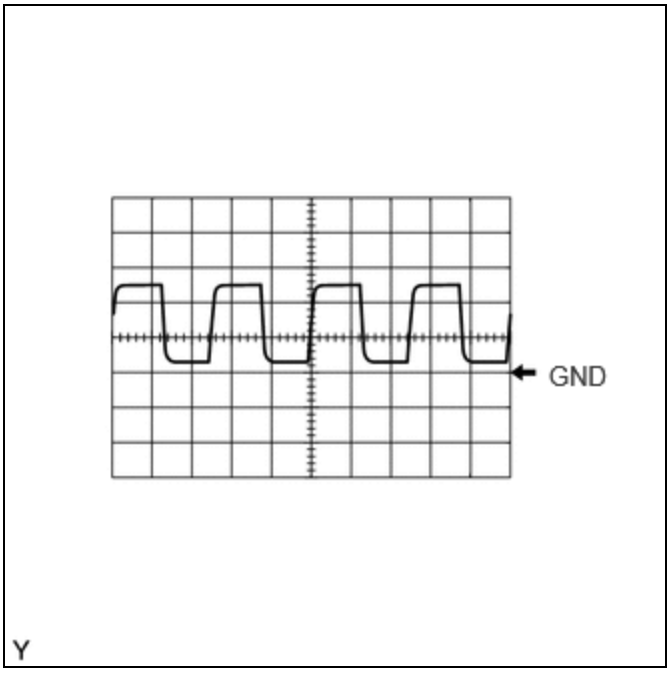
WAVEFORM 20

Cam Timing Control Motor with EDU Assembly Signal (EMR Signal)

ECM Terminal Name	Between EMR1 and E1
Tester Range	2 V/DIV., 5 ms./DIV.
Condition	Idling with warm engine

HINT:

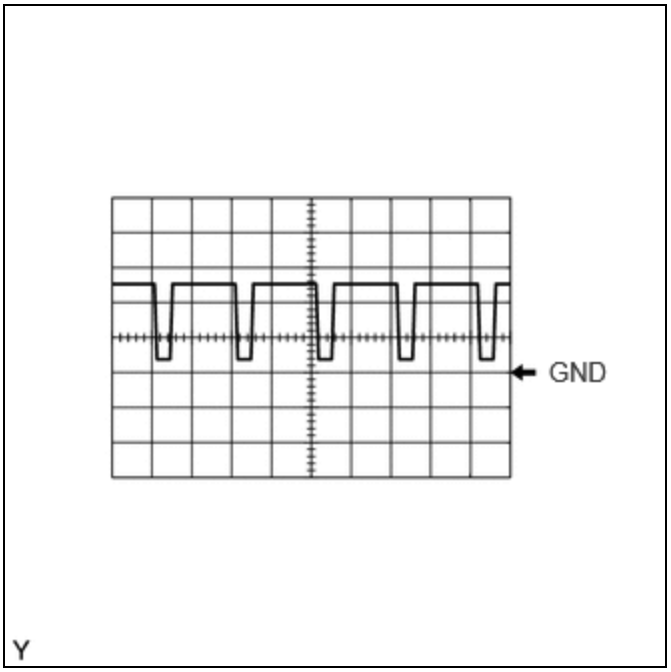
The wavelength becomes shorter as the engine speed increases.



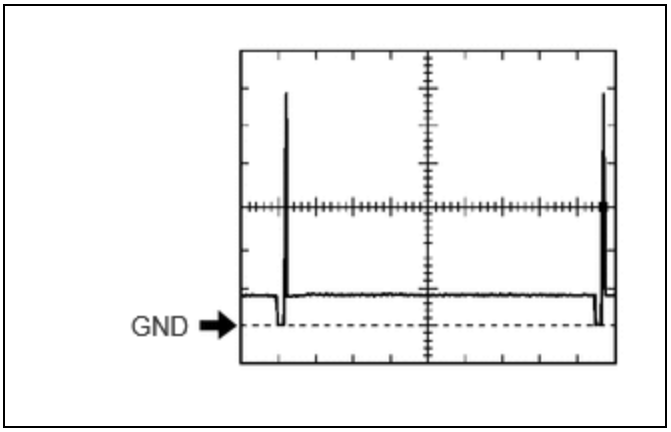
WAVEFORM 21

Cam Timing Control Motor with EDU Assembly Signal (EMD Signal)

ECM Terminal Name	Between EMD1 and E1
Tester Range	2 V/DIV., 100 ms./DIV.
Condition	Idling with warm engine



WAVEFORM 22



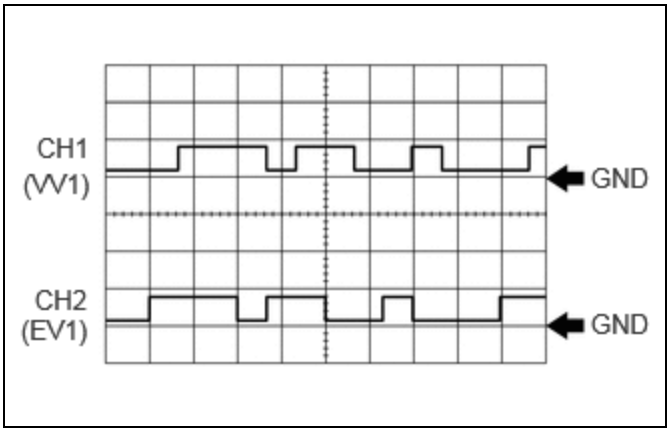
No. 1 (to No. 4) Port Fuel Injector Assembly Signal

ECM Terminal Name	Between #10 (to #40) and E1
Tester Range	20 V/DIV., 20 ms./DIV.
Condition	Idling with warm engine (Data List item "Injection Mode" displaying "Port")

HINT:

- The wavelength becomes shorter as the engine speed increases.
- When the port injection injectors are operating, Port is displayed for Injection Mode of the Data List.

WAVEFORM 23



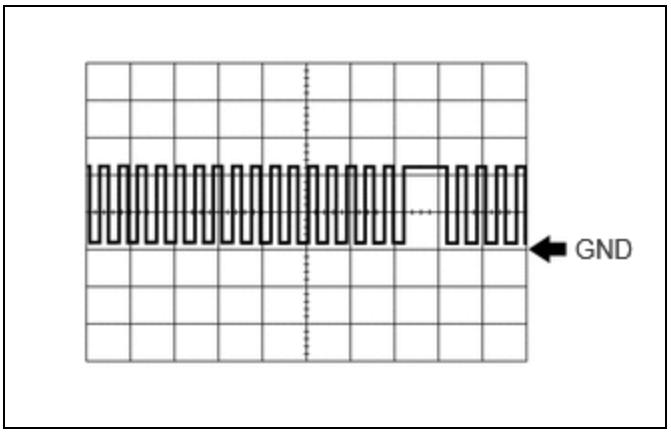
Camshaft Position Sensor Signal

ECM Terminal Name	CH1: Between VV1+ and VV1- CH2: Between EV1+ and EV1-
Tester Range	5 V/DIV., 20 ms./DIV.
Condition	Idling with warm engine

HINT:

The wavelength becomes shorter as the engine speed increases.

WAVEFORM 24



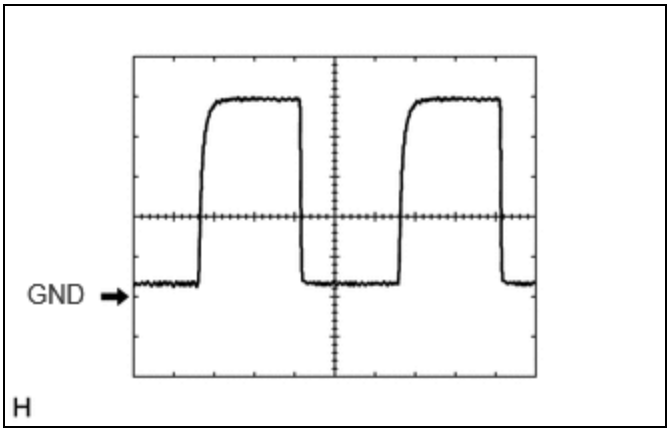
Crankshaft Position Sensor Signal

ECM Terminal Name	Between NE+ and NE-
Tester Range	2 V/DIV., 20 ms./DIV.
Condition	Idling with warm engine

HINT:

The wavelength becomes shorter as the engine speed increases.

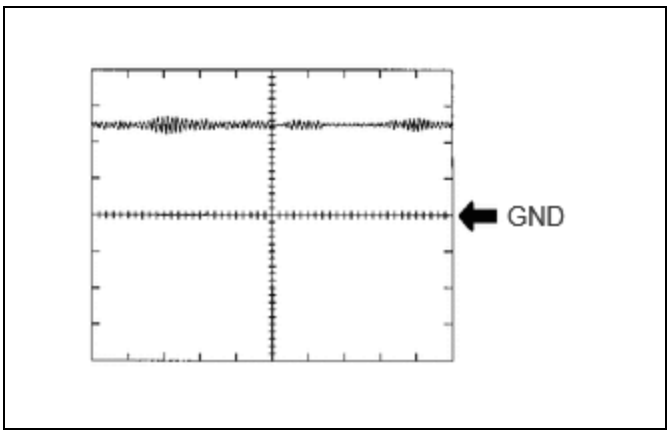
WAVEFORM 25



Mass Air Flow Meter Sub-assembly Signal

ECM Terminal Name	Between VG and E2G
Tester Range	1 V/DIV., 100 µs./DIV.
Condition	Ignition switch ON

WAVEFORM 26



Knock Control Sensor Signal

ECM Terminal Name	Between KNK1 and EKNK
Tester Range	1 V/DIV., 1 ms./DIV.
Condition	Engine speed maintained at 2500 rpm after warming up engine

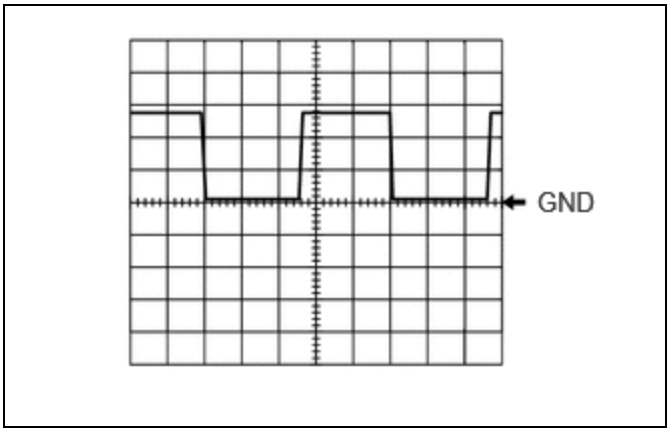
HINT:

- The wavelength becomes shorter as the engine speed increases.
- The waveforms and amplitudes displayed differ slightly depending on the vehicle.

WAVEFORM 27

Fuel Lid Operation Signal for Combination Meter Assembly

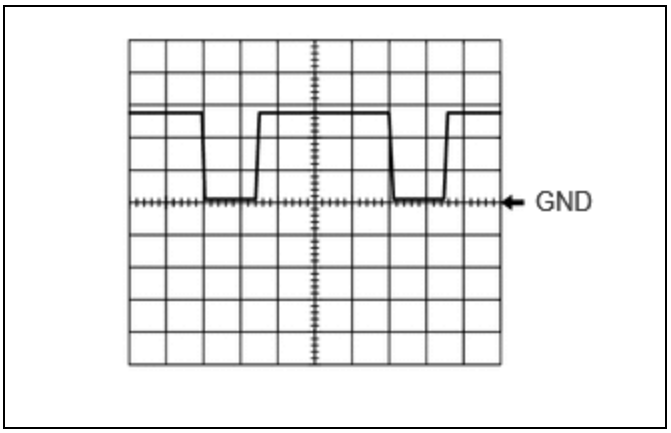
ECM Terminal Name	Between LSTM and E1
Tester Range	5 V/DIV., 20 ms./DIV.
Condition	Multi-information display displaying "Close Fuel Lid"



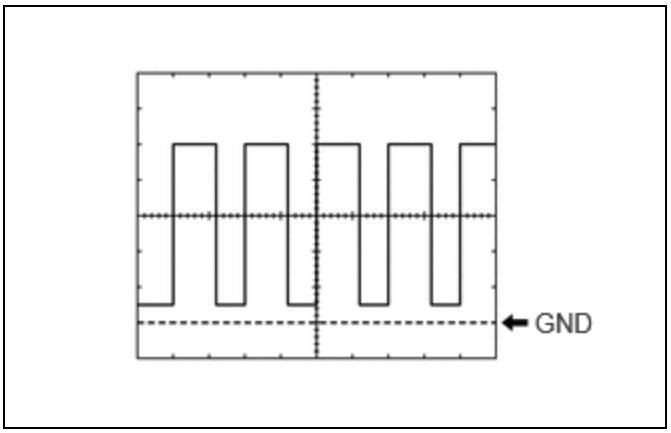
WAVEFORM 28

Fuel Lid Operation Signal for Combination Meter Assembly

ECM Terminal Name	Between LSTM and E1
Tester Range	5 V/DIV., 20 ms./DIV.
Condition	Multi-information display displaying "Ready to Refuel"



WAVEFORM 29



Cooling Fan Control Signal

ECM Terminal Name	Between RFC and E1
Tester Range	1 V/DIV., 20 ms./DIV.

Condition	Ignition switch ON, A/C switch on (max cool)

HINT:

The duty ratio varies depending on the engine coolant temperature.