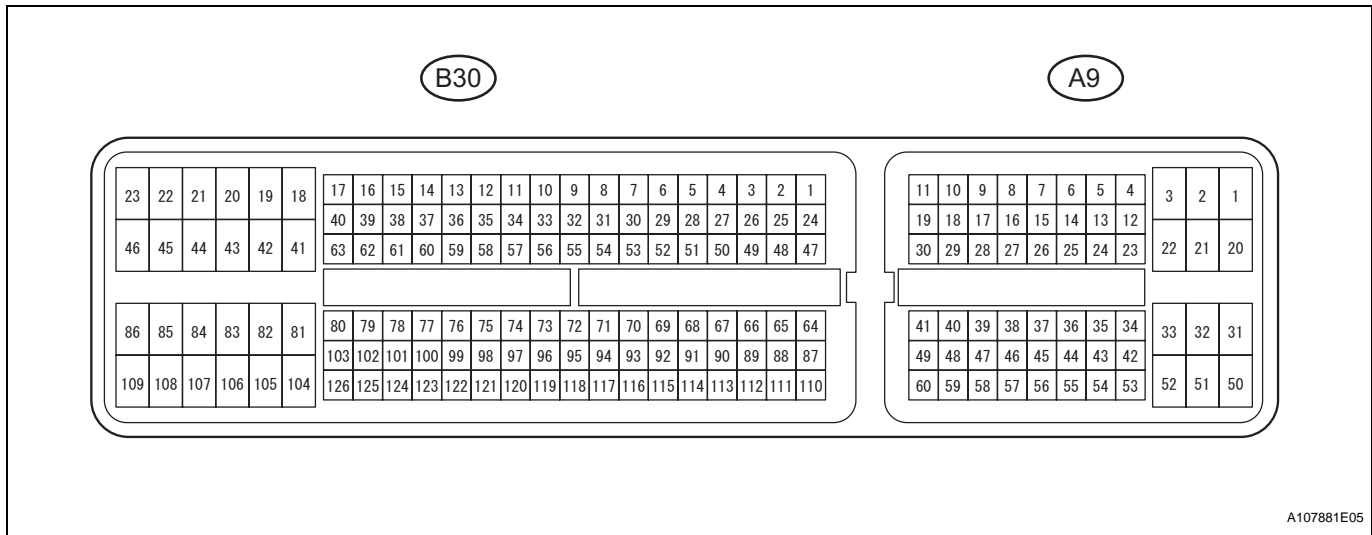


TERMINALS OF ECM

1. CHECK ECM



(a) Measure the voltage of the ECM connector.

HINT:

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

Symbol (Terminal No.)	Wiring Color	Terminal Description	Condition	Specified Condition
BATT (A9-20) - E1 (B30-81)	W - BR	Battery (for measuring battery voltage and for ECM memory)	Always	9 to 14 V
+BM (A9-3) - E1 (B30-81)	LG - BR	Power source of throttle actuator	Always	9 to 14 V
IGSW (A9-28) - E1 (B30-81)	B - BR	Ignition switch	Ignition switch ON	9 to 14 V
+B (A9-2) - E1 (B30-81)	B - BR	Power source of ECM	Ignition switch ON	9 to 14 V
+B2 (A9-1) - E1 (B30-81)	B - BR	Power source of ECM	Ignition switch ON	9 to 14 V
OC1+ (B30-58) - OC1- (B30-57)	W - B	Camshaft timing oil control valve (OCV)	Ignition switch ON	Pulse generation (see waveform 1)
OC2+ (B30-52) - OC2- (B30-51)	BR - B	Camshaft timing oil control valve (OCV) (Intake side (bank 2))	Ignition switch ON	Pulse generation (see waveform 1)
OE1+ (B30-56) - OE1- (B30-55)	R - LG	Camshaft timing oil control valve (OCV) (Exhaust side (bank 1))	Ignition switch ON	Pulse generation (see waveform 1)
OE2+ (B30-50) - OE2- (B30-49)	W - B	Camshaft timing oil control valve (OCV) (Exhaust side (bank 2))	Ignition switch ON	Pulse generation (see waveform 1)
MREL (A9-44) - E1 (B30-81)	O - BR	EFI relay	Ignition switch ON	9 to 14 V
VG (B30-72) - E2G (B30-73)	GR - L-G	Mass air flow meter	Idling, Shift lever position P or N, A/C switch OFF	0.5 to 3.0 V
THA (B30-71) - ETHA (B30-74)	P - G-R	Intake air temperature sensor	Idling, Intake air temperature 20°C (68°F)	0.5 to 3.4 V

Symbol (Terminal No.)	Wiring Color	Terminal Description	Condition	Specified Condition
THW (B30-79) - ETHW (B30-78)	L - BR	Engine coolant temperature sensor	Idling, Engine coolant temperature 80°C (176°F)	0.2 to 1.0 V
VCTA (B30-96) - ETA (B30-97)	B - W	Power source of throttle position sensor (specific voltage)	Ignition switch ON	4.5 to 5.5 V
VTA1 (B30-98) - ETA (B30-97)	Y - W	Throttle position sensor (for engine control)	Ignition switch ON, Throttle valve fully closed	0.5 to 1.1 V
			Ignition switch ON, Throttle valve fully open	3.3 to 4.9 V
VTA2 (B30-99) - ETA (B30-97)	GR - W	Throttle position sensor (for sensor malfunction detection)	Ignition switch ON, Throttle valve fully closed	2.1 to 3.1 V
			Ignition switch ON, Throttle valve fully open	4.6 to 5.0 V
VPA (A9-55) - EPA (A9-59)	W - Y	Accelerator pedal position sensor (for engine control)	Ignition switch ON, Accelerator pedal released	0.5 to 1.1 V
			Ignition switch ON, Accelerator pedal fully depressed	2.6 to 4.5 V
VPA2 (A9-56) - EPA2 (A9-60)	R - O	Accelerator pedal position sensor (for sensor malfunctioning detection)	Ignition switch ON, Accelerator pedal released	1.2 to 2.0 V
			Ignition switch ON, Accelerator pedal fully depressed	3.4 to 5.0 V
VCPA (A9-57) - EPA (A9-59)	B - Y	Power source of accelerator pedal position sensor (for VPA)	Ignition switch ON	4.5 to 5.5 V
VCP2 (A9-58) - EPA2 (A9-60)	L - O	Power source of accelerator pedal position sensor (for VPA2)	Ignition switch ON	4.5 to 5.5 V
HA1A (B30-86) - E04 (B30-23) HA2A (B30-109) - E04 (B30-23)	G - BR B - BR	A/F sensor heater	Idling	Below 3.0 V
			Ignition switch ON	9 to 14 V
A1A+ (B30-93) - E1 (B30-81)	W - BR	A/F sensor	Ignition switch ON	3.3 V*
A1A- (B30-116) - E1 (B30-81)	BR - BR	A/F sensor	Ignition switch ON	3.0 V*
A2A+ (B30-120) - E1 (B30-81)	L - BR	A/F sensor	Ignition switch ON	3.3 V*
A2A- (B30-119) - E1 (B30-81)	Y - BR	A/F sensor	Ignition switch ON	3.0 V*
HT1B (B30-48) - E03 (B30-104) HT2B (B30-47) - E03 (B30-104)	LG - BR Y - BR	Heated oxygen sensor heater	Idling	Below 3.0 V
			Ignition switch ON	9 to 14 V
OX1B (B30-88) - EX1B (B30-65) OX2B (B30-87) - EX2B- (B30-64)	W - GR B - B-W	Heated oxygen sensor	Engine speed maintained at 2,500 rpm for 2 minutes after warming up sensor	Pulse generation (see waveform 2)
#10 (B30-45) - E01 (B30-22) #20 (B30-85) - E01 (B30-22) #30 (B30-44) - E01 (B30-22) #40 (B30-84) - E01 (B30-22) #50 (B30-43) - E01 (B30-22) #60 (B30-83) - E01 (B30-22)	Y - BR W - BR B - BR BR - BR L - BR G - BR	Injector	Ignition switch ON	9 to 14 V
			Idling	Pulse generation (see waveform 3)
			Engine speed maintained at 4,000 rpm after warming up engine	Pulse generation (see waveform 4)
			Ignition switch ON	4.5 to 5.0 V
			Ignition switch ON	4.5 to 5.0 V
			Ignition switch ON	4.5 to 5.0 V
VCE1 (B30-114) - E1 (B30-81)	GR - BR	Power source for VVT sensor (specific voltage)	Ignition switch ON	4.5 to 5.0 V
VCE2 (B30-112) - E1 (B30-81)	Y - BR	Power source for VVT sensor (specific voltage)	Ignition switch ON	4.5 to 5.0 V
VV1+ (B30-69) - VV1- (B30-92)	P - L-B	Variable valve timing (VVT) sensor (Intake side (bank 1))	Idling	Pulse generation (see waveform 5)

Symbol (Terminal No.)	Wiring Color	Terminal Description	Condition	Specified Condition
VV2+ (B30-67) - VV2- (B30-90)	W - B	Variable valve timing (VVT) sensor (Intake side (bank 2))	Idling	Pulse generation (see waveform 5)
EV1+ (B30-68) - EV1- (B30-91)	Y - G	Variable valve timing (VVT) sensor (Exhaust side (bank 1))	Idling	Pulse generation (see waveform 5)
EV2+ (B30-66) - EV2- (B30-89)	R - L	Variable valve timing (VVT) sensor (Exhaust side (bank 2))	Idling	Pulse generation (see waveform 5)
NE+ (B30-110) - NE- (B30-111)	G - R	Crankshaft position sensor	Idling	Pulse generation (see waveform 5)
IGT1 (B30-40) - E1 (B30-81) IGT2 (B30-39) - E1 (B30-81) IGT3 (B30-38) - E1 (B30-81) IGT4 (B30-37) - E1 (B30-81) IGT5 (B30-36) - E1 (B30-81) IGT6 (B30-35) - E1 (B30-81)	W - BR G-R - BR G - BR LG - BR P - BR V - BR	Ignition coil (ignition signal)	Idling	Pulse generation (see waveform 6)
IGF1 (B30-106) - E1 (B30-81)	Y - BR	Ignition coil (ignition confirmation signal)	Ignition switch ON	4.5 to 5.5 V
			Idling	Pulse generation (see waveform 6)
PRG (B30-108) - E1 (B30-81)	LG - BR	Purge VSV	Ignition switch ON	9 to 14 V
			Idling	Pulse generation (see waveform 7)
SPD (A9-8) - E1 (B30-81)	V - BR	Speed signal from combination meter	Driving at 20 km/h (12 mph)	Pulse generation (see waveform 8)
STA (A9-48) - E1 (B30-81)	LG - BR	Starter signal	Cranking	5.5 V or more
NSW (B30-62) - E1 (B30-81)	G-R - BR	Starter relay control	Ignition switch ON	Below 1.5 V
			Cranking	6.0 V or more
STP (A9-36) - E1 (B30-81)	L - BR	Stop light switch	Brake pedal depressed	7.5 to 14 V
			Brake pedal released	Below 1.5 V
ST1- (A9-35) - E1 (B30-81)	GR - BR	Stop light switch (opposite to STP terminal)	Ignition switch ON, Brake pedal depressed	Below 1.5 V
			Ignition switch ON, Brake pedal released	7.5 to 14 V
M+ (B30-19) - ME01 (B30-20)	G - BR	Throttle actuator	Idling with warm engine	Pulse generation (see waveform 9)
M- (B30-18) - ME01 (B30-20)	R - BR	Throttle actuator	Idling with warm engine	Pulse generation (see waveform 10)
FC (A9-7) - E1 (B30-81)	W - BR	Fuel pump control	Ignition switch ON	9 to 14 V
			Idling	Below 1.5 V
FPR (B30-59) - E1 (B30-81)	W - BR	Fuel pump control	Cranking	9 to 14 V
FPR (B30-59) - E1 (B30-81)	W - BR	Fuel pump control	Idling	9 to 14 V
W (A9-24) - E1 (B30-81)	R - BR	MIL	Ignition switch ON	Below 1.5 V
			Idling	9 to 14 V
TC (A9-27) - E1 (B30-81)	G - BR	Terminal TC of DLC3	Ignition switch ON	9 to 14 V
TACH (A9-15) - E1 (B30-81)	GR - BR	Engine speed	Idling	Pulse generation (see waveform 11)
VPMP (A9-42) - E1 (B30-81)	W - BR	Vent valve (built into canister pump module)	Ignition switch ON	9 to 14 V
MPMP (A9-34) - E1 (B30-81)	B - BR	Leak detection pump (built into canister pump module)	Leak detection pump OFF	Below 3 V
			Leak detection pump ON	9 to 14 V
VCPP (B30-75) - EPPM (B30-76)	V - BR	Power source for canister pressure sensor (specific voltage)	Ignition switch ON	4.5 to 5.5 V

Symbol (Terminal No.)	Wiring Color	Terminal Description	Condition	Specified Condition
PPMP (B30-77) - EPPM (B30-76)	L - BR	Canister pressure sensor (built into canister pump module)	Ignition switch ON	3 to 3.6 V
ELS (A9-31) - E1 (B30-81)	O - BR	Electric load	Taillight switch ON	7.5 to 14 V
			Taillight switch OFF	Below 1.5 V
ELS2 (A9-33) - E1 (B30-81)	G - BR	Electric load	Defogger switch ON	7.5 to 14 V
			Defogger switch OFF	Below 1.5 V
ALT (B30-32) - E1 (B30-81)	P - BR	Generator	Ignition switch ON	9 to 14 V
CANH (A9-41) - E1 (B30-81)	Y - BR	CAN communication line	Ignition switch ON	Pulse generation (see waveform 12)
CANL (A9-49) - E1 (B30-81)	W - BR	CAN communication line	Ignition switch ON	Pulse generation (see waveform 13)
VCIB (B30-80) - EIB (B30-101)	LG - P	Battery current sensor	Ignition switch ON	4.5 to 5.5 V
IB (B30-100) - EIB (B30-101)	R - P	Battery current sensor	Ignition switch ON	0.5 to 2.5 V
THB (B30-103) - EIB (B30-101)	G-R - P	Battery temperature sensor	Ignition switch ON, battery temperature -30 to 80°C (-22 to 176°F)	0.5 to 4.5 V
RLO (B30-31) - E1 (B30-81)	Y - BR	Generator	After engine warmed up, during charging control, vehicle driven at constant speed	Pulse generation (see waveform 14)
RLO (B30-31) - E1 (B30-81)	Y - BR	Generator	After engine warmed up, during charging control, vehicle accelerated	Pulse generation (see waveform 15)
RLO (B30-31) - E1 (B30-81)	Y - BR	Generator	After engine warmed up, during charging control, vehicle decelerated	Pulse generation (see waveform 16)
AICV (A9-4) - E1 (B30-81)	L - BR	VSV for air intake control system operation signal	Ignition switch ON	9 to 14 V
ACIS (B30-107) - E1 (B30-81)	R - BR	VSV for ACIS (Acoustic Control Induction System) operation signal	Ignition switch ON	9 to 14 V

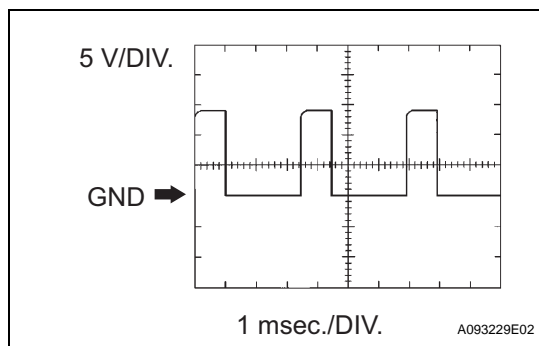
ES

HINT:

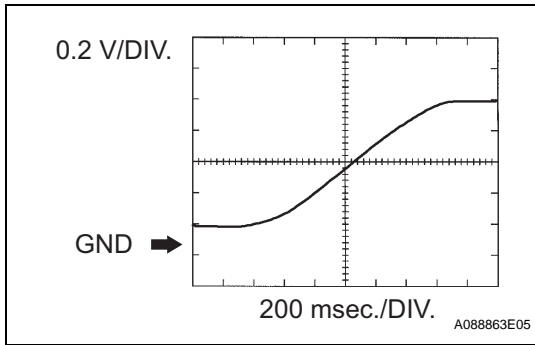
*: The ECM terminal voltage is constant regardless of the output voltage from the sensor.

(b) WAVEFORM 1

Camshaft timing oil control valve (OCV)



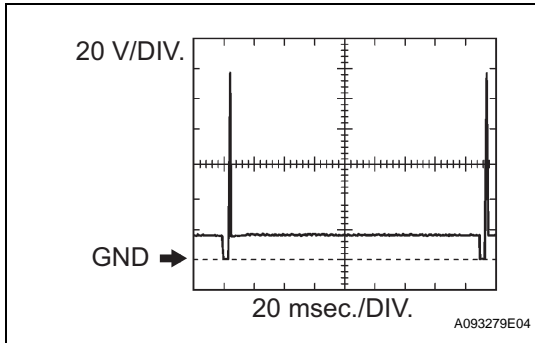
Symbol (Terminal No.)	Between OC1+ and OC1- Between OC2+ and OC2- Between OE1+ and OE1- Between OE2+ and OE2-
Tester Range	5 V/DIV., 1 msec./DIV.
Condition	Idling



(c) WAVEFORM 2
Heated oxygen sensor

Symbol (Terminal No.)	Between OX1B and EX1B Between OX2B and EX2B
Tester Range	0.2 V/DIV., 200 msec./DIV.
Condition	Engine speed maintained at 2,500 rpm for 2 minutes after warming up sensor

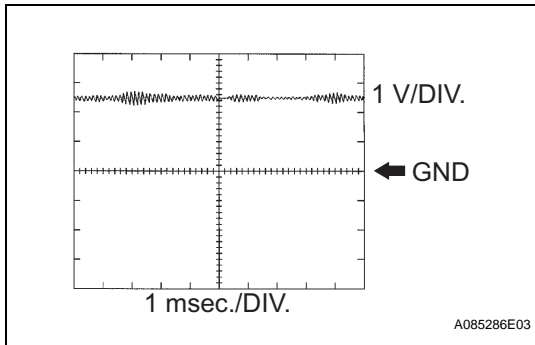
HINT:
In DATA LIST, item O2S B1 S2 shows the ECM input values from the heated oxygen sensor.



(d) WAVEFORM 3
Injector No. 1 (to No. 4) injection signal

Symbol (Terminal No.)	Between #10 (to #60) and E01
Tester Range	20 V/DIV., 20 msec./DIV.
Condition	Idling

HINT:
The wavelength becomes shorter as the engine rpm increases.

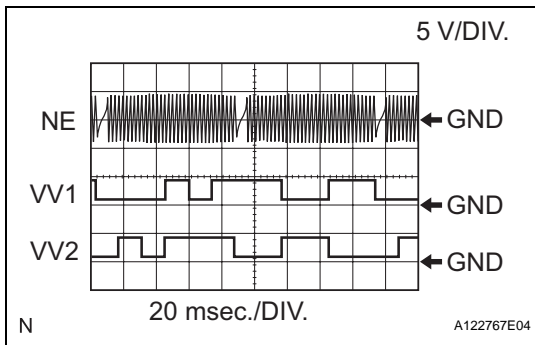


(e) WAVEFORM 4
Knock sensor

Symbol (Terminal No.)	Between KNK1 and EKNK Between KNK2 and EKN2
Tester Range	1 V/DIV., 1 msec./DIV.
Condition	Engine speed maintained at 4,000 rpm after warming up engine

HINT:

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

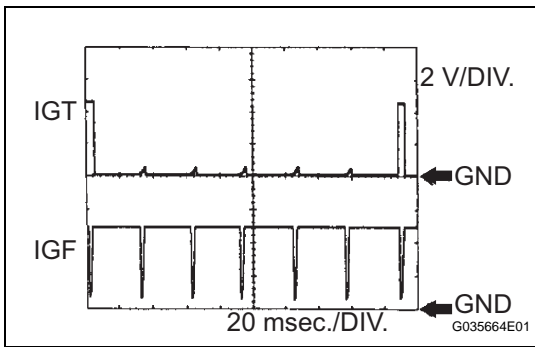


(f) WAVEFORM 5
Crankshaft position sensor and Camshaft position sensor

Symbol (Terminal No.)	Between NE+ and NE- Between VV1+ and VV1- Between EV1+ and EV1- Between VV2+ and VV2- Between EV2+ and EV2-
Tester Range	5 V/DIV., 20 msec./DIV.
Condition	Idling

HINT:
The wavelength becomes shorter as the engine rpm increases.

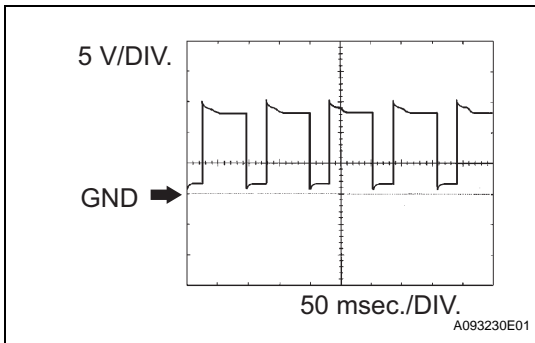
ES



(g) WAVEFORM 6
Igniter IGT signal (from ECM to igniter) and Igniter IGF signal (from igniter to ECM)

Symbol (Terminal No.)	Between IGT (1 to 6) and E1 Between IGF1 and E1
Tester Range	2 V/DIV., 20 msec./DIV.
Condition	Idling

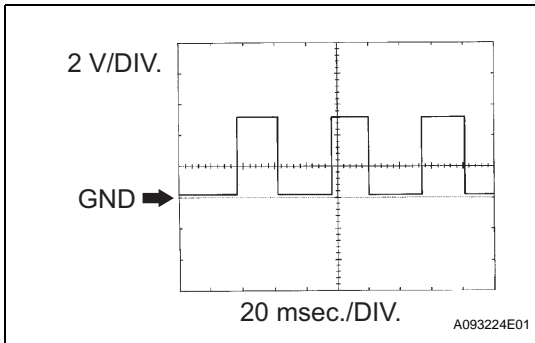
HINT:
 The wavelength becomes shorter as the engine rpm increases.



(h) WAVEFORM 7
Purge VSV

Symbol (Terminal No.)	Between PRG and E1
Tester Range	5 V/DIV., 50 msec./DIV.
Condition	Idling

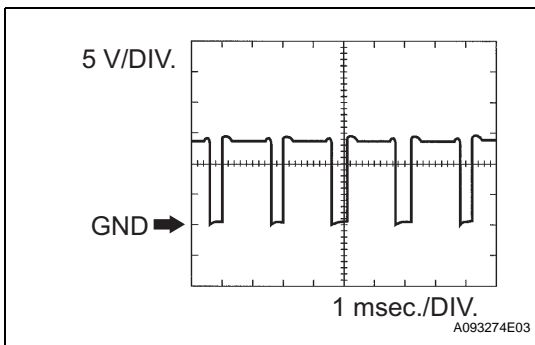
HINT:
 If the waveform is not similar to the illustration, check the waveform again after idling for 10 minutes or more.



(i) WAVEFORM 8
Vehicle speed signal

Symbol (Terminal No.)	Between SPD and E1
Tester Range	2 V/DIV., 20 msec./DIV.
Condition	Driving at 20 km/h (12 mph)

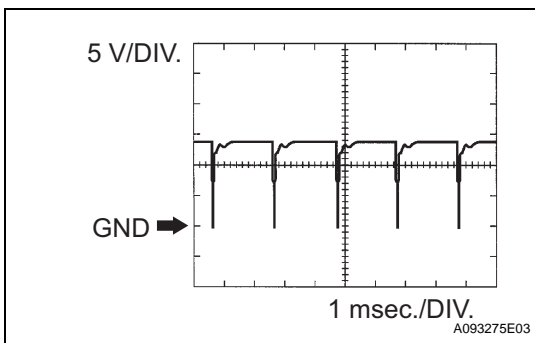
HINT:
 The wavelength becomes shorter as the vehicle speed increases.



(j) WAVEFORM 9
Throttle actuator positive terminal

Symbol (Terminal No.)	Between M+ and ME01
Tester Range	5 V/DIV., 1 msec./DIV.
Condition	Idling with warm engine

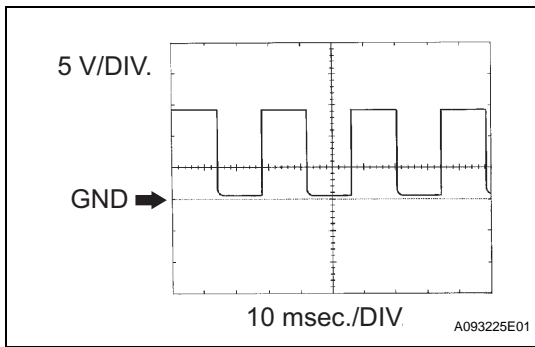
HINT:
 The duty ratio varies depending on the throttle actuator operation.



(k) WAVEFORM 10
Throttle actuator negative terminal

Symbol (Terminal No.)	Between M- and ME01
Tester Range	5 V/DIV., 1 msec./DIV.
Condition	Idling with warm engine

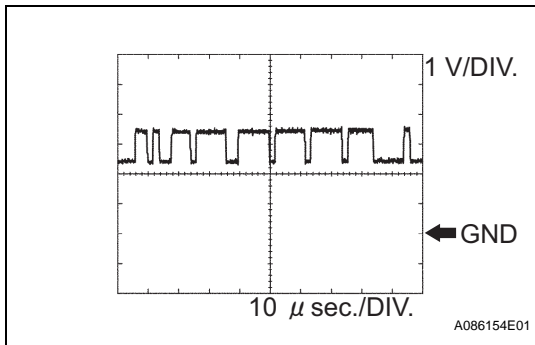
HINT:
 The duty ratio varies depending on the throttle actuator operation.



(l) WAVEFORM 11
Engine speed signal

Symbol (Terminal No.)	Between TACH and E1
Tester Range	5 V/DIV., 10 msec./DIV.
Condition	Idling

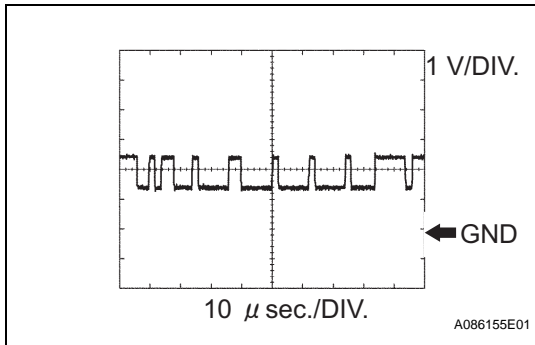
HINT:
The wavelength becomes shorter as the engine rpm increases.



(m) WAVEFORM 12
CAN communication signal

Symbol (Terminal No.)	Between CANH and E1
Tester Range	1 V/DIV., 10 μsec./DIV.
Condition	Engine stops and ignition switch ON

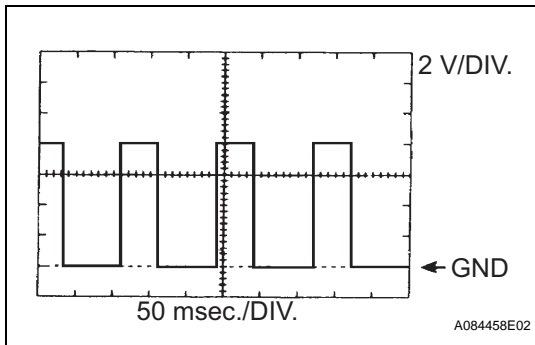
HINT:
The waveform varies depending on the CAN communication signal.



(n) WAVEFORM 13
CAN communication signal

Symbol (Terminal No.)	Between CANL and E1
Tester Range	1 V/DIV., 10 μsec./DIV.
Condition	Engine stops and ignition switch ON

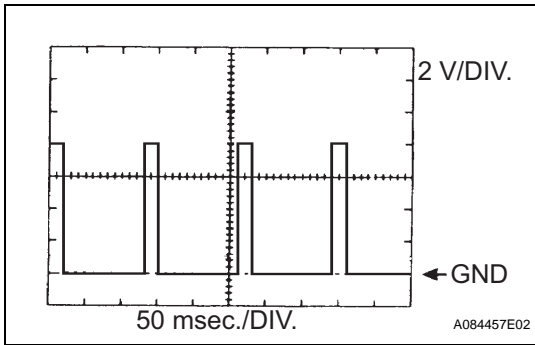
HINT:
The waveform varies depending on the CAN communication signal.



(o) WAVEFORM 14
Generator

Symbol (Terminal No.)	Between RLO and E1
Tester Range	2 V/DIV., 50 msec./DIV.
Condition	After engine warmed up, during charging control, vehicle driven at constant speed

HINT:
A constant value is not output, as the duty ratio varies depending on the electrical load and battery condition.

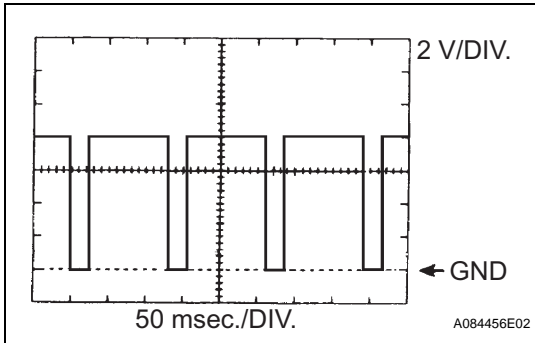


(p) WAVEFORM 15
Generator

Symbol (Terminal No.)	Between RLO and E1
Tester Range	2 V/DIV., 50 msec./DIV.
Condition	After engine warmed up, during charging control, vehicle accelerated

HINT:

A constant value is not output, as the duty ratio varies depending on the electrical load and battery condition.



(q) WAVEFORM 16
Generator

Symbol (Terminal No.)	Between RLO and E1
Tester Range	2 V/DIV., 50 msec./DIV.
Condition	After engine warmed up, during charging control, vehicle decelerated

HINT:

A constant value is not output, as the duty ratio varies depending on the electrical load and battery condition.