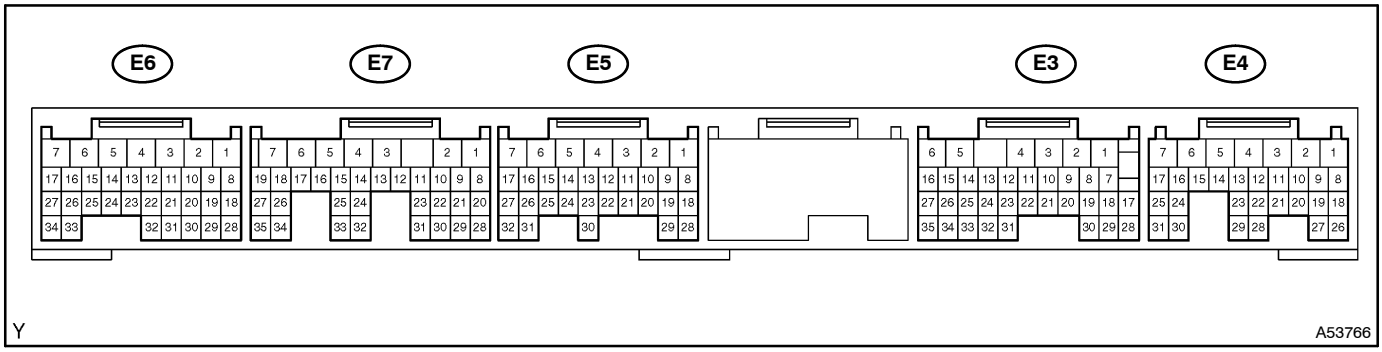
05HUZ–01

TERMINALS OF ECM

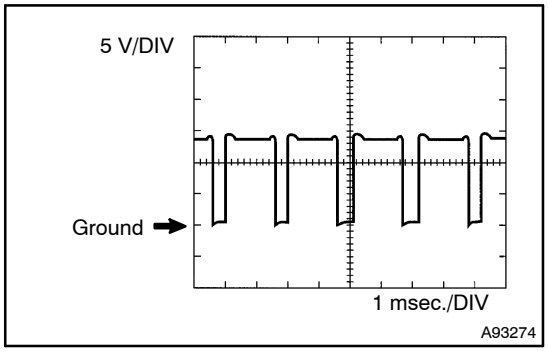


HINT:
Each ECM terminal's standard voltage is shown in the table below.
In the table, first follow the information under "Condition". Look under "Symbols (Terminal No.)" for the terminals to be inspected. The standard voltage between the terminals is shown under "Specified Condition".
Use the illustration above as a reference for the ECM terminals.

Symbols (Terminal No.)	Wiring Color	Terminal Description	Condition	Specified Condition
BATT (E4–4) – E1 (E7–7)	B–R – BR	Battery (for measuring battery voltage and for ECM memory)	Always	9 to 14 V
+BM (E6–5) – ME01 (E6–4)	Y–B – W–B	Power source of throttle motor	Always	9 to 14 V
IGSW (E4–17) – E1 (E7–7)	B–O – BR	Ignition switch	Ignition switch ON	9 to 14 V
+B (E4–6) – E1 (E7–7)	B–W – BR	Power source of ECM	Ignition switch ON	9 to 14 V
+B1 (E4–5) – E1 (E7–7)	B–W – BR	Power source of ECM	Ignition switch ON	9 to 14 V
VC1 (E6–29) – E2 (E6–28)	L– R – BR	Power source of sensor (specific voltage)	Ignition switch ON	4.5 to 5.5 V
VTA1 (E6–23) – E2 (E6–28)	Y – BR	Throttle Position (TP) sensor (for engine control)	Ignition switch ON, accelerator pedal fully released	0.5 to 1.2 V
VTA1 (E6–23) – E2 (E6–28)	Y – BR	TP sensor (for engine control)	Ignition switch ON, accelerator pedal fully depressed	3.2 to 4.8 V
VTA2 (E6–22) – E2 (E6–28)	L–B – BR	TP sensor (for sensor malfunction detection)	Ignition switch ON, accelerator pedal fully released	2.1 to 3.1 V
VTA2 (E6–22) – E2 (E6–28)	L–B – BR	TP sensor (for sensor malfunction detection)	Ignition switch ON, accelerator pedal fully depressed	4.5 to 5.5 V
VPA (E3–33) – EPA (E3–34)	R–Y – BR–Y	Accelerator Pedal Position (APP) sensor (for engine control)	Ignition switch ON, accelerator pedal fully released	0.5 to 1.1 V
VPA (E3–33) – EPA (E3–34)	R–Y – BR–Y	APP sensor (for engine control)	Ignition switch ON, accelerator pedal fully depressed	2.6 to 4.5 V
VPA2 (E3–32) – EPA (E3–34)	R–B – BR–Y	APP sensor (for sensor malfunction detection)	Ignition switch ON, accelerator pedal fully released	1.2 to 2.0 V
VPA2 (E3–32) – EPA (E3–34)	R–B – BR–Y	APP sensor (for sensor malfunction detection)	Ignition switch ON, accelerator pedal fully depressed	3.4 to 5.3 V
VG (E5–27) – E2G (E5–26)	B–R – B–W	MAF meter	Idling, shift lever position P or N position, A/C switch OFF	0.5 to 3.0 V
VCPA (E3–35) – EPA (E3–34)	L–R – BR–Y	Power source of APP sensor (for VPA)	Ignition switch ON	4.5 to 5.5 V
VCP2 (E3–27) – EPA2 (E3–26)	O – BR	Power source of APP sensor (for VPA2)	Ignition switch ON	4.5 to 5.5 V
THA (E5–25) – E2 (E6–28)	B–L – BR	Intake Air Temperature (IAT) sensor	Idling after warm–up: IAT is 0 to 80°C (32 to 176°F)	0.5 to 3.4 V
THW (E5–20) – E2 (E6–28)	R–L – BR	Engine Coolant Temperature (ECT) sensor	Idling after warm–up: ECT is 60 to 100°C (140 to 212°F)	0.2 to 1.0 V

Symbols (Terminal No.)	Wiring Color	Terminal Description	Condition	Specified Condition
STA (E4–12) – E1 (E7–7)	L–O – BR	Starter sIgnal	Cranking (shift lever position P or N position, ignition switch START)	6 V or more
#10 (E6–15) – E01 (E5–2) #20 (E5–17) – E01 (E5–2) #30 (E6–14) – E01 (E5–2) #40 (E5–16) – E01 (E5–2) #50 (E6–13) – E01 (E5–2) #60 (E5–15) – E01 (E5–2) #70 (E6–12) – E01 (E5–2) #80 (E5–14) – E01 (E5–2)	L – W–B W – W–B G–Y – W–B G – W–B G – W–B BR – W–B BR – W–B Y–B – W–B	Injector	Idling	Pulse generation (see waveform 7)
IGT1 (E6–17) – E1 (E7–7) IGT2 (E5–13) – E1 (E7–7) IGT3 (E6–16) – E1 (E7–7) IGT4 (E5–12) – E1 (E7–7) IGT5 (E6–27) – E1 (E7–7) IGT6 (E5–11) – E1 (E7–7) IGT7 (E6–26) – E1 (E7–7) IGT8 (E5–10) – E1 (E7–7)	G–W – BR L–R – BR L–Y – BR LG – BR R – BR R–L – BR P–L – BR B–W – BR	Ignition coil and igniter (ignition signal)	Idling	Pulse generation (see waveform 6)
IGF1 (E5–7) – E1 (E7–7) IGF2 (E5–6) – E1 (E7–7)	LG – BR G–B – BR	Ignition coil and igniter (ignition confirmation signal)	Idling	Pulse generation (see waveform 6)
G2 (E6–21) – G2– (E6–20)	L – Y	Camshaft Position (CMP) sensor	Idling	Pulse generation (see waveform 3)
NE+ (E6–32) – NE– (E6–31)	B – W	Crankshaft Position (CKP) sensor	Idling	Pulse generation (see waveform 3)
MREL (E4–13) – E1 (E7–7)	P–B – BR	EFI MAIN relay	Ignition switch ON	9 to 14 V
MREL (E4–13) – E1 (E7–7)	P–B – BR	EFI MAIN relay	Ignition switch OFF (3 sec. or more after ignition switch OFF)	0 to 1.5 V
FPR (E4–15) – E01 (E5–2)	Y – W–B	F/PMP relay	Ignition switch ON	0 to 3 V
FPR (E4–15) – E01 (E5–2)	Y – W–B	F/PMP relay	Cranking	6 to 14 V
FC (E4–14) – E01 (E5–2)	G–B – W–B	Fuel pump control	Ignition switch ON	9 to 14 V
FC (E4–14) – E01 (E5–2)	G–B – W–B	Fuel pump control	Idling after engine warm–up	0 to 3 V
STP (E3–4) – E1 (E7–7)	G–O – BR	Stop lamp switch	Brake pedal is depressed	7.5 to 14 V
STP (E3–4) – E1 (E7–7)	G–O – BR	Stop lamp switch (opposite to stop)	Brake pedal is released	Below 1.5 V
PRG (E6–11) – E01 (E5–2)	G–B – W–B	EVAP VSV	Engine does not operate, ignition switch OFF	9 to 14 V
PRG (E6–11) – E01 (E5–2)	G–B – W–B	EVAP VSV	Idling after engine warm–up	See waveform 8
OX1A (E6–30) – O1A– (E6–25)	B – BR	Heated oxygen sensor (HO2S) bank 1 sensor 1	Idling	See waveform 10 0.1 to 0.9 V
OX2A (E5–28) – O2A– (E5–21)	W – BR	HO2S bank 2 sensor 1	Idling	See waveform 10 0.1 to 0.9 V
OX1B (E3–28) – O1B– (E3–29)	B – BR	HO2S bank 1 sensor 2	Idling	See waveform 11 0.1 to 0.9 V
OX2B (E3–17) – O2B– (E3–18)	W – BR	HO2S bank 2 sensor 2	Idling	See waveform 11 0.1 to 0.9 V
HT1A (E6–24) – E03 (E6–6) HT1B (E3–2) – E03 (E6–6) HT2A (E5–5) – E03 (E6–6) HT2B (E3–1) – E03 (E6–6)	L–Y – W–B B–W – W–B G–Y – W–B GR – W–B	HO2S heater	Idling	Below 3.0 V
HT1A (E6–24) – E03 (E6–6) HT1B (E3–2) – E03 (E6–6) HT2A (E5–5) – E03 (E6–6) HT2B (E3–1) – E03 (E6–6)	L–Y – W–B B–W – W–B G–Y – W–B GR – W–B	HO2S heater	Ignition switch ON	9 to 14 V
KNK1 (E7–28) – EKNK (E7–30)	W – B	Knock sensor (bank 1)	Maintain engine RPM at 4,000 rpm after engine warmed–up	See waveform 12

Symbols (Terminal No.)	Wiring Color	Terminal Description	Condition	Specified Condition
KNK2 (E7–29) – EKN2 (E7–31)	R – G	Knock sensor (bank 2)	Maintain engine RPM at 4,000 rpm after engine warmed–up	See waveform 12
TC (E3–3) – E1 (E7–7)	P–B – BR	Terminal TC of DLC3	Ignition switch ON	9 to 14
W (E3–8) – E1 (E7–7)	Y–R – BR	Malfunction Indicator Lamp (MIL)	Idling	9 to 14
W (E3–8) – E1 (E7–7)	Y–R – BR	MIL	Ignition switch ON	Below 3.0 V
VV1+ (E6–19) – VV1– (E6–18)	R – G	Variable Valve Timing (VVT) sensor (bank 1)	Idling	Pulse generation (see waveform 4)
VV2+ (E5–19) – VV2– (E5–18)	Y – L	VVT sensor (bank 2)	Idling	Pulse generation (see waveform 4)
OC1+ (E6–34) – OC1– (E6–33)	L–Y – G–W	Camshaft timing (OCV) (bank 1)	Accelerate slowly after engine warmed–up	Pulse generation (see waveform 9)
OC2+ (E5–9) – OC2– (E5–8)	L–W – L–B	Camshaft timing (OCV) (bank 2)	Accelerate slowly after engine warmed–up	Pulse generation (see waveform 9)
ACIS (E5–3) – E01 (E5–2)	L–W – W–B	ACIS VSV	Ignition switch ON	9 to 14 V
ACIS (E5–3) – E01 (E5–2)	L–W – W–B	ACIS VSV	2,500 to 4,000 rpm and throttle opening percentage is 40 % or more	Below 3.0 V
M+ (E6–2) – ME01 (E6–4)	B – W–B	Throttle actuator	Idling	Pulse generation (see waveform 1)
M– (E6–1) – ME01 (E6–4)	W – W–B	Throttle actuator	Idling	Pulse generation (see waveform 2)
SP2+ (E7–23) – SP2– (E7–22)	G – R	Speed signal	Vehicle is driving	Pulse generation (see waveform 5)
RFC (E4–10) – E1 (E7–7)	LHD: G–R – BR RHD: L – BR	Radiator fan ECU	Idling and A/C ON	Pulse generation (see waveform 13)
RFC (E4–10) – E1 (E7–7)	LHD: G–R – BR RHD: L – BR	Radiator fan ECU	Ignition switch ON	0 to 3 V
LCKI (E6–10) – E1 (E7–7)	L–W – BR	A/C Lock switch	Idling after engine warmed–up and A/C ON	Pulse generation (see waveform 14)
E1 (E7–7) – Engine ground	BR – N/A	Ground	Always	Below 1 Ω



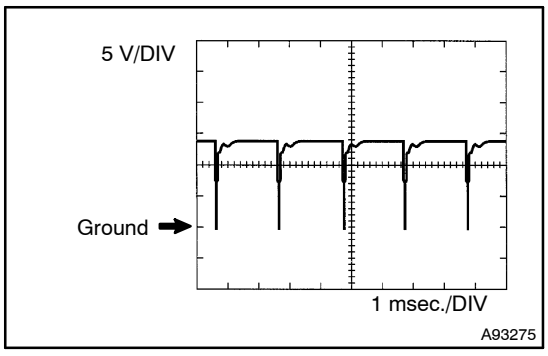
WAVEFORM 1

Throttle actuator positive terminal

ECM Terminal Name	Between M+ and ME01
Tester Range	5 V/DIV, 1 msec./DIV
Condition	Idle after engine warmed–up

HINT:

The duty ratio varies depending on the throttle opening operation.



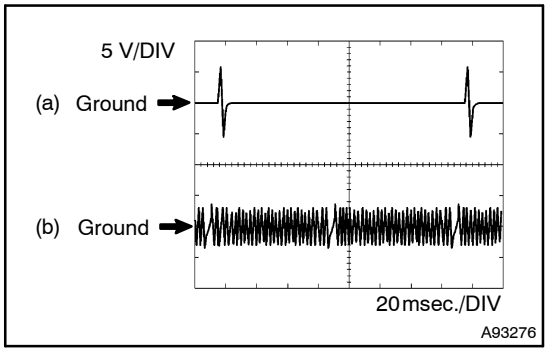
WAVEFORM 2

Throttle actuator negative terminal

ECM Terminal Name	Between M– and ME01
Tester Range	5 V/DIV, 1 msec./DIV
Condition	Idle after engine warmed–up

HINT:

The duty ratio varies depending on the throttle opening operation.

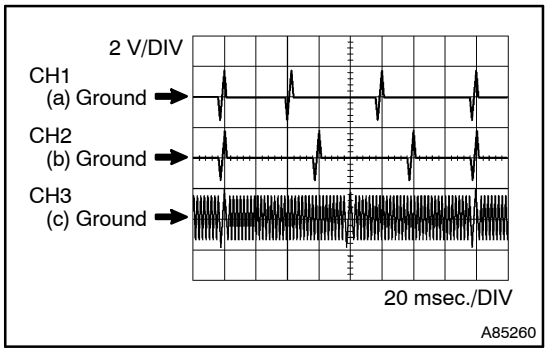


WAVEFORM 3

(a) CMP sensor
(b) CKP sensor

ECM Terminal Name	(a) Between G2+ and G2– (b) Between NE+ and NE–
Tester Range	5 V/DIV, 20 msec./DIV
Condition	Idle after engine warmed–up

HINT:
The wavelength becomes shorter as engine rpm increases.

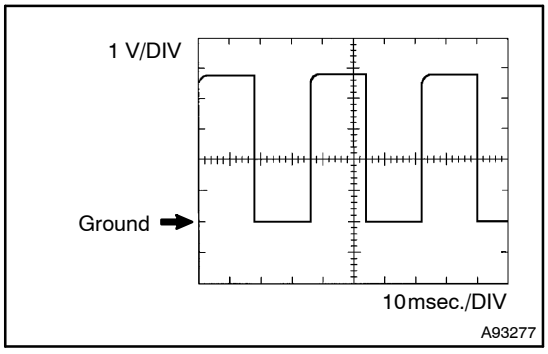


WAVEFORM 4

(a) VVT sensor bank 1
(b) VVT sensor bank 2
(c) CKP sensor

ECM Terminal Name	(a) Between VV1+ and VV1– (b) Between VV2+ and VV2– (c) Between NE+ and NE–
Tester Range	2 V/DIV, 20 msec./DIV
Condition	Idle after engine warmed–up

HINT:
The wavelength becomes shorter as engine rpm increases.

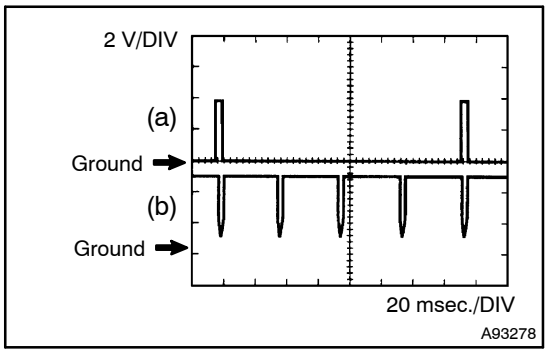


WAVEFORM 5

Vehicle speed signal

ECM Terminal Name	Between SP2+ and SP2–
Tester Range	1 V/DIV, 10 msec./DIV
Condition	Driving by 40 km/h (25 mph)

HINT:
The wavelength becomes shorter as vehicle speed increases.

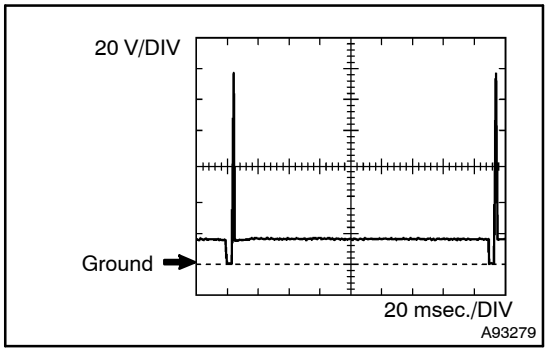


WAVEFORM 6

(a) Igniter IGT signal (from ECM to igniter)
(b) Igniter signal IGF (from igniter to ECM)

ECM Terminal Name	(a) Between IGT1 (to IGT8) and E1 (b) Between IGF1 (IGF2) and E1
Tester Range	2 V/DIV, 20 msec./DIV
Condition	Idling

HINT:
The wavelength becomes shorter as engine rpm increases.



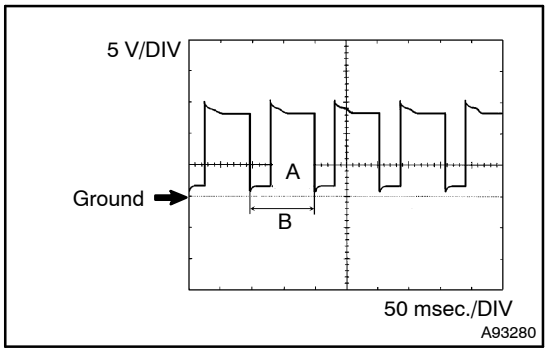
WAVEFORM 7

Fuel injector

ECM Terminal Name	Between #10 (to 80) and E1
Tester Range	20 V/DIV, 20 msec./DIV
Condition	Idling

HINT:

The wavelength becomes shorter as engine rpm increases.



WAVEFORM 8

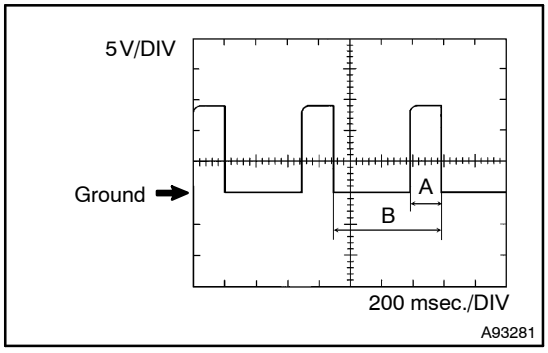
EVAP VSV

ECM Terminal Name	Between PRG and E1
Tester Range	5 V/DIV, 50 msec./DIV
Condition	Accelerated slowly after engine warmed–up

HINT:

In cases where the EVAP VSV can be used to purge EVAP, the waveform will not be displayed as shown on the left. In the DATA LIST, the item EVAP PURGE VSV shows the duty ratio of voltage flowing to the purge valve.

Duty ratio for EVAP VSV (%) = A/B x 100



WAVEFORM 9

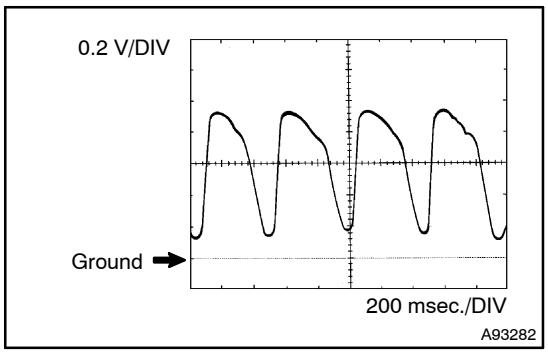
VVT Oil Control Valve (OCV)

ECM Terminal Name	Between OC1+ and OC1– Between OC2+ and OC2–
Tester Range	0.2 V/DIV, 200 msec./DIV
Condition	Accelerate slowly after engine warmed–up

HINT:

In the DATA LIST, the items VVT OCV DUTY B1 and B2 show the duty ratio of voltage flowing to the OCV (see illustration on left).

VVT OCV DUTY B1, B2 = A/B x 100 (%)



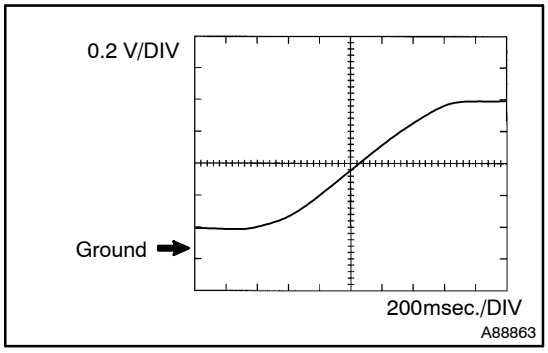
WAVEFORM 10

Front Heated Oxygen Sensor (HO2S)

ECM Terminal Name	Between OX1A and O1A– Between OX2A and O2A–
Tester Range	0.2 V/DIV, 200 msec./DIV
Condition	Maintain engine RPM at 2,500 rpm after engine warmed up

HINT:

In the DATA LIST, the items HO2S B1 S1 and HO2S B2 S1 show the ECM input values of the front HO2S sensor.



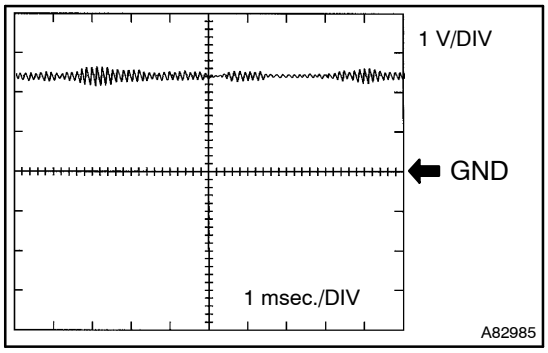
WAVEFORM 11

Rear HO2S

ECM Terminal Name	Between OX1B and O1B– Between OX2B and O2B–
Tester Range	0.2 V/DIV, 200 msec./DIV
Condition	Maintain engine RPM at 2,500 rpm after engine warmed up

HINT:

In the DATA LIST, the items HO2S B1 S2 and HO2S B2 S2 show the ECM input values of the rear HO2S.



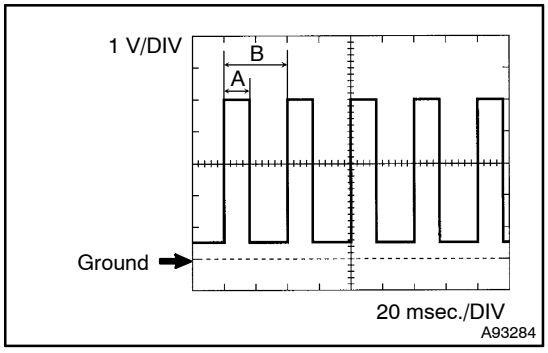
WAVEFORM 12

Knock sensor

ECM Terminal Name	Between KNK1 and EKNK Between KNK2 and EKN2
Tester Range	1 V/DIV, 1 msec./DIV
Condition	Maintain engine RPM at 2,000 rpm after engine warmed–up

HINT:

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



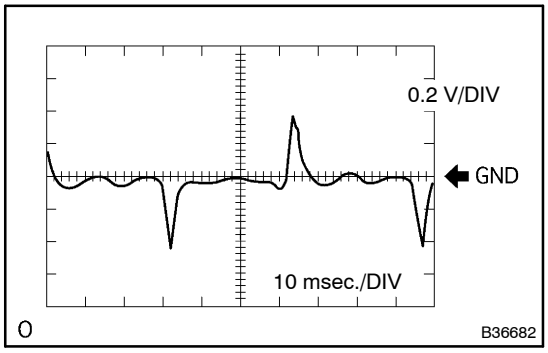
WAVEFORM 13

Cooling fan

ECM Terminal Name	Between RFC and E1
Tester Range	1 V/DIV, 20 msec./DIV
Condition	Idling and A/C: ON

HINT:

The duty ratio (labeled A and B in the illustration) changes depending on the engine coolant temperature.



WAVEFORM 14

Air Conditioning (A/C) compressor lock signal

ECM Terminal Name	Between LCKI and E1
Tester Range	0.2 V/DIV, 10 msec./DIV
Condition	Idling after engine warmed–up and A/C: ON

HINT:

The wavelength becomes shorter as engine rpm increases.