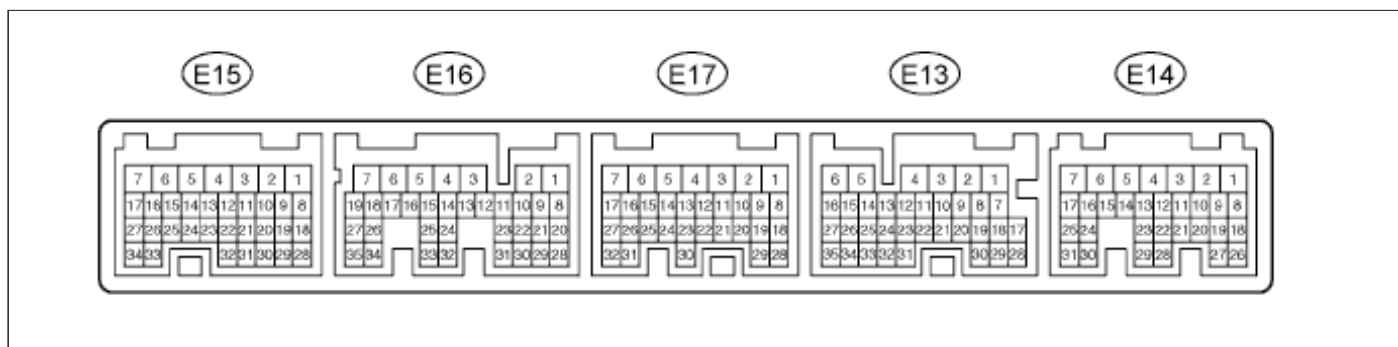


SFI SYSTEM > TERMINALS OF ECM

for Preparation [Click here](#)



HINT:

Each ECM terminal's normal 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 (E14-3) - E1 (E17-1)	L - BR	Battery (for measuring battery voltage and for ECM memory)	Always	9 to 14 V
+BM (E14-7) - E1 (E17-1)	R-W - BR	Power source of throttle motor	Always	9 to 14 V
IGSW (E14-9) - E1 (E17-1)	B-O - BR	Ignition switch	Ignition switch ON	9 to 14 V
+B (E14-1) - E1 (E17-1)	B - BR	Power source of ECM	Ignition switch ON	9 to 14 V
+B2 (E14-2) - E1 (E17-1)	B - BR	Power source of ECM	Ignition switch ON	9 to 14 V
OC1+ (E17-17) - OC1- (E17-16)	L-B - R-B	Camshaft timing oil control valve (OCV)	Ignition switch ON	Pulse generation (see waveform 1)
OC2+ (E17-15) - OC2- (E17-14)	P-L - Y	Camshaft timing oil control valve (OCV)	Ignition switch ON	Pulse generation (see waveform 1)
MREL (E14-8) - E1 (E17-1)	W-G - BR	MAIN relay	Ignition switch ON	9 to 14 V
VC (E15-23) - E2 (E15-28)	LG-B - BR	Power source for sensors (specific voltage)	Ignition switch ON	4.5 to 5.5 V
VG (E15-30) - E2G (E15-29)	L-W - L-R	Mass air flow meter	Idling, Shift lever position P or N, A/C switch OFF	0.5 to 3.0 V

THA (E15-22) - E2 (E15-28)	L-B - BR	Intake air temperature sensor	Idling, Intake air temperature 20°C (68°F)	0.5 to 3.4 V
THW (E15-21) - E2 (E15-28)	B - BR	Engine coolant temperature sensor	Idling, Engine coolant temperature 80°C (176°F)	0.2 to 1.0 V
VTA1 (E15-20) - E2 (E15-28)	B-R - BR	Throttle position sensor (for engine control)	Ignition switch ON, Throttle valve fully closed	0.5 to 1.2 V
VTA1 (E15-20) - E2 (E15-28)	B-R - BR	Throttle position sensor (for engine control)	Ignition switch ON, Throttle valve fully open	3.2 to 4.8 V
VTA2 (E15-19) - E2 (E15-28)	LG - BR	Throttle position sensor (for sensor malfunction detection)	Ignition switch ON, Accelerator pedal released	2.1 to 3.1 V
VTA2 (E15-19) - E2 (E15-28)	LG - BR	Throttle position sensor (for sensor malfunction detection)	Ignition switch ON, Accelerator pedal depressed	4.5 to 5.0 V
VPA (E14-18) - EPA (E14-20)	W-L - BR-W	Accelerator pedal position sensor (for engine control)	Ignition switch ON, Accelerator pedal released	0.5 to 1.1 V
VPA (E14-18) - EPA (E14-20)	W-L - BR-W	Accelerator pedal position sensor (for engine control)	Ignition switch ON, Accelerator pedal depressed	2.6 to 4.5 V
VPA2 (E14-19) - EPA2 (E14-21)	GR-G - BR-Y	Accelerator pedal position sensor (for sensor malfunctioning detection)	Ignition switch ON, Accelerator pedal released	1.2 to 2.0 V
VPA2 (E14-19) - EPA2 (E14-21)	GR-G - BR-Y	Accelerator pedal position sensor (for sensor malfunctioning detection)	Ignition switch ON, Accelerator pedal depressed	3.4 to 5.0 V
VCPA (E14-26) - EPA (E14-20)	LG-R - BR-W	Power source of accelerator pedal position sensor (for VPA)	Ignition switch ON	4.5 to 5.5 V
VCP2 (E14-27) - EPA2 (E14-21)	BR-R - BR-Y	Power source of accelerator pedal position sensor (for VPA2)	Ignition switch ON	4.5 to 5.5 V
HA1A (E16-2) - E04 (E16-7) HA2A (E16-1) - E05 (E16-6)	Y - W-B R-L - W-B	A/F sensor heater	Idling	Pulse generation (see waveform 2)
HA1A (E16-2) - E04 (E16-7) HA2A (E16-1) - E05 (E16-6)	Y - W-B R-L - W-B	A/F sensor heater	Ignition switch ON	9 to 14 V
A1A+ (E16-22) - E1 (E17-1)	B - BR	A/F sensor	Ignition switch ON	3.3 V *1
A2A+ (E16-23) - E1 (E17-1)	G - BR	A/F sensor	Ignition switch ON	3.3 V *1

A1A- (E16-30) - E1 (E17-1)	W - BR	A/F sensor	Ignition switch ON	3.0 V *1
A2A- (E16-31) - E1 (E17-1)	R - BR	A/F sensor	Ignition switch ON	3.0 V *1
HT1B (E15-1) - E1 (E17-1) HT2B (E16-5) - E1 (E17-1)	G - BR L - BR	Heated oxygen sensor heater	Idling	Below 3.0 V
HT1B (E15-1) - E1 (E17-1) HT2B (E16-5) - E1 (E17-1)	G - BR L - BR	Heated oxygen sensor heater	Ignition switch ON	9 to 14 V
OX1B (E15-18) - E2 (E15-28) OX2B (E16-33) - E2 (E15-28)	W - BR B - BR	Heated oxygen sensor	Maintain engine speed at 2,500 rpm for 2 minutes after warming up	Pulse generation (see waveform 3)
#10 (E17-2) - E01 (E15-7) #20 (E17-3) - E01 (E15-7) #30 (E17-4) - E01 (E15-7) #40 (E17-5) - E01 (E15-7) #50 (E17-6) - E01 (E15-7) #60 (E17-7) - E01 (E15-7)	L - W-B G - W-B R - W-B W - W-B L - W-B Y - W-B	Injector	Ignition switch ON	9 to 14 V
#10 (E17-2) - E01 (E15-7) #20 (E17-3) - E01 (E15-7) #30 (E17-4) - E01 (E15-7) #40 (E17-5) - E01 (E15-7) #50 (E17-6) - E01 (E15-7) #60 (E17-7) - E01 (E15-7)	L - W-B G - W-B R - W-B W - W-B L - W-B Y - W-B	Injector	Idling	Pulse generation (see waveform 4)
IGT1 (E15-8) - E1 (E17-1) IGT2 (E15-9) - E1 (E17-1) IGT3 (E15-10) - E1 (E17-1) IGT4 (E15-11) - E1 (E17-1) IGT5 (E15-12) - E1 (E17-1) IGT6 (E15-13) - E1 (E17-1)	R - BR R-L - BR G-B - BR G - BR B-L - BR P-L - BR	Ignition coil (ignition signal)	Idling	Pulse generation (see waveform 7)
KNK1 (E16-29) - EKNK (E16-28)	B - W	Knock sensor	Maintain engine speed at 4,000 after warming up	Pulse generation (see waveform 5)
KNK2 (E16-21) - EKN2 (E16-20)	R - G	Knock sensor	Maintain engine speed at 4,000 after warming up	Pulse generation (see waveform 5)
VV1+ (E17-19) - VV1- (E17-29)	R - G	Variable valve timing (VVT) sensor	Idling	Pulse generation (see waveform 6)

VV2+ (E17-18) - VV2- (E17-28)	Y - L	Variable valve timing (VVT) sensor	Idling	Pulse generation (see waveform 6)
NE+ (E17-21) - NE- (E17-20)	B - W	Crankshaft position sensor	Idling	Pulse generation (see waveform 6)
IGF1 (E15-24) - E1 (E17-1)	G-R - BR	Ignition coil (ignition confirmation signal)	Ignition switch ON	4.5 to 5.5 V
IGF1 (E15-24) - E1 (E17-1)	G-R - BR	Ignition coil (ignition confirmation signal)	Idling	Pulse generation (see waveform 7)
PRG (E15-34) - E1 (E17-1)	L - BR	VSV for EVAP	Ignition switch ON	9 to 14 V
PRG (E15-34) - E1 (E17-1)	L - BR	VSV for EVAP	Idling	Pulse generation (see waveform 8)
SPD (E13-8) - E1 (E17-1)	V-R - BR	Speed signal from combination meter	Ignition switch ON, Rotate driving wheel slowly	Pulse generation (see waveform 9)
STA (E17-11) - E1 (E17-1)	B-Y - BR *2 L-Y - BR *3	Starter signal	Cranking	9 to 14 V
NSW (E16-8) - E1 (E17-1)	L-Y - BR	Park/Neutral position switch signal	Ignition switch ON, Other shift position not in P or N	9 to 14 V
NSW (E16-8) - E1 (E17-1)	L-Y - BR	Park/Neutral position switch signal	Ignition switch ON, Shift position in P or N	0 to 3.0 V
STP (E14-15) - E1 (E17-1)	G-W - BR	Stop light switch	Brake pedal depressed	7.5 to 14 V
STP (E14-15) - E1 (E17-1)	G-W - BR	Stop light switch	Brake pedal released	Below 1.5 V
ST1- (E14-16) - E1 (E17-1)	R-L - BR	Stop light switch (ST1 terminal status is opposite to STP terminal)	Ignition switch ON, Brake pedal depressed	Below 1.5 V
ST1- (E14-16) - E1 (E17-1)	R-L - BR	Stop light switch (ST1 terminal status is opposite and STP terminal)	Ignition switch ON, Brake pedal released	7.5 to 14 V
M+ (E15-5) - ME01 (E16-3)	B - W-B	Throttle actuator	Idling with warm engine	Pulse generation (see waveform 10)
M- (E15-4) - ME01 (E16-3)	W - W-B	Throttle actuator	Idling with warm engine	Pulse generation (see waveform 11)
FC (E14-10) - E1 (E17-1)	LG-B - BR	Fuel pump control	Ignition switch ON	9 to 14 V
FPR (E17-30) - E1 (E17-1)	P-L - BR	Fuel pump control	Ignition switch ON, STA signal OFF	0 to 3.0 V
FPR (E17-30) - E1 (E17-1)	P-L - BR	Fuel pump control	Ignition switch ON, STA signal ON	9 to 14 V
W (E13-30) - E1 (E17-1)	R-B - BR	MIL	Ignition switch ON	Below 3.0 V
W (E13-30) - E1 (E17-1)	R-B - BR	MIL	Idling	9 to 14 V
TC (E14-23) - E1 (E17-1)	P-B - BR	Terminal TC of DLC3	Ignition switch ON	9 to 14 V
SIL (E14-30) - E1	R-Y - BR	Terminal SIL of	Connect intelligent	Pulse generation

(E17-1)		DLC3	tester to DLC3	
TACH (E13-1) - E1 (E17-1)	B-W - BR	Engine speed	Idling	Pulse generation (see waveform 12)
ACIS (E15-33) - E1 (E17-1)	G-B - BR	VSV for ACIS	Ignition switch ON	9 to 14 V
PSW (E17-10) - E1 (E17-1)	G-Y - BR	Power steering pressure switch	Ignition switch ON	9 to 14 V

HINT:

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

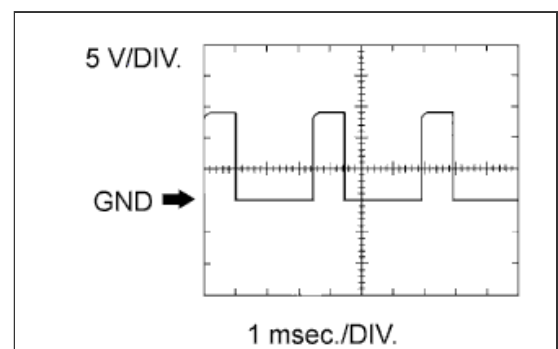
*2: A/T

*3: M/T

WAVEFORM 1

Camshaft timing Oil Control Valve (OCV)

Item	Content
Symbols (Terminal No.)	OC1+ (E17-17) - OC1- (E17-16) OC2+ (E17-15) - OC2- (E17-14)
Tool Setting	5 V/DIV., 1 msec./DIV.
Condition	Idling

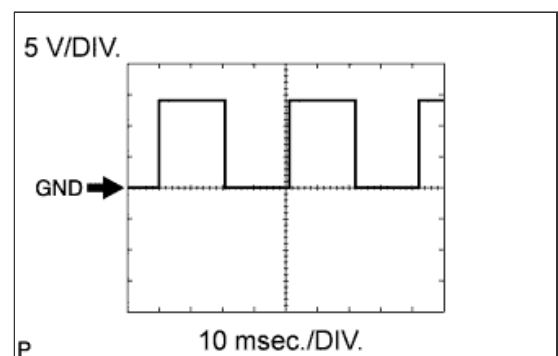
**HINT:**

The wavelength becomes shorter as the engine rpm increases.

WAVEFORM 2

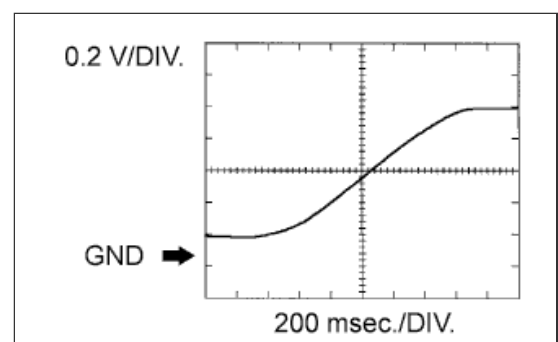
A/F sensor heater

Item	Content
Symbols (Terminal No.)	HA1A (E16-2) - E04 (E16-7) HA2A (E16-1) - E05 (E16-6)
Tool Setting	5 V/DIV., 10 msec./DIV.
Condition	Idling

**WAVEFORM 3**

Heated oxygen sensor

Item	Content
Symbols (Terminal No.)	OX1B (E15-18) - E2 (E15-28) OX2B (E16-33) - E2 (E15-28)
Tool Setting	0.2 V/DIV., 200 msec./DIV.



Condition	Engine speed maintained at 2,500 rpm for 2 minutes after warming up engine
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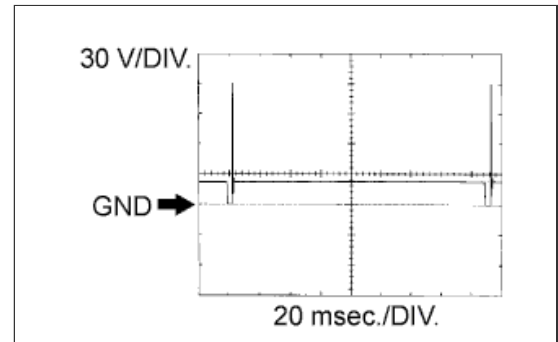
HINT:

In the Data List, item O2S B1S2 shows the ECM input values from the heated oxygen sensor.

WAVEFORM 4

Fuel injector

Item	Content
Symbols (Terminal No.)	#10 (E17-2) - E01 (E15-7) #20 (E17-3) - E01 (E15-7) #30 (E17-4) - E01 (E15-7) #40 (E17-5) - E01 (E15-7) #50 (E17-6) - E01 (E15-7) #60 (E17-7) - E01 (E15-7)
Tool Setting	30 V/DIV., 20 msec./DIV.
Condition	Idling

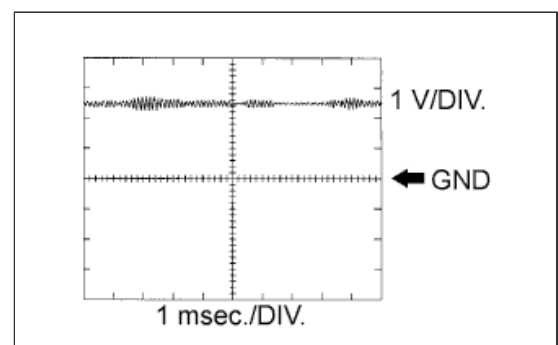
**HINT:**

The wavelength becomes shorter as the engine rpm increases.

WAVEFORM 5

Knock sensor

Item	Content
Symbols (Terminal No.)	KNK1 (E16-29) - EKNK (E16-28) KNK2 (E16-21) - EKN2 (E16-20)
Tool Setting	0.01 to 10 V/DIV., 0.01 to 10 msec./DIV.
Condition	Maintain engine speed at 4,000 rpm after warming up engine

**HINT:**

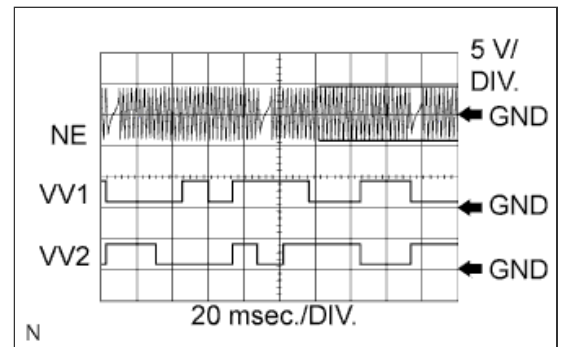
- The wavelength becomes shorter as the engine rpm increases.
- The waveform and amplitude displayed differ slightly depending on the vehicle.

WAVEFORM 6

- Crankshaft position sensor
- VVT sensor bank 1

(c) VVT sensor bank 2

Item	Content
Symbols (Terminal No.)	NE+ (E17-21) - NE- (E17-20) VV1+ (E17-19) - VV1- (E17-29) VV2+ (E17-18) - VV2- (E17-28)
Tool Setting	5 V/DIV., 20 msec./DIV.
Condition	Idling

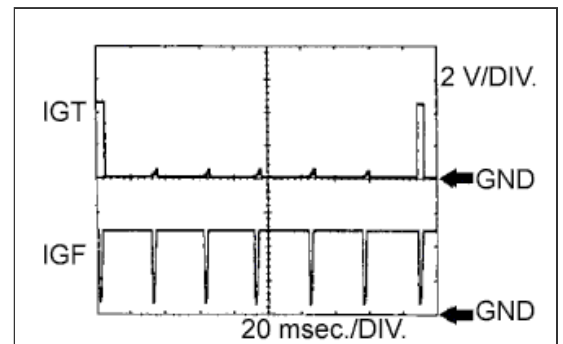
**HINT:**

The wavelength becomes shorter as the engine rpm increases.

WAVEFORM 7

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

Item	Content
Symbols (Terminal No.)	IGT1 (E15-8) - E1 (E17-1) IGT2 (E15-9) - E1 (E17-1) IGT3 (E15-10) - E1 (E17-1) IGT4 (E15-11) - E1 (E17-1) IGT5 (E15-12) - E1 (E17-1) IGT6 (E15-13) - E1 (E17-1) IGF1 (E15-24) - E1 (E17-1)
Tool Setting	2 V/DIV., 20 msec./DIV.
Condition	Idling

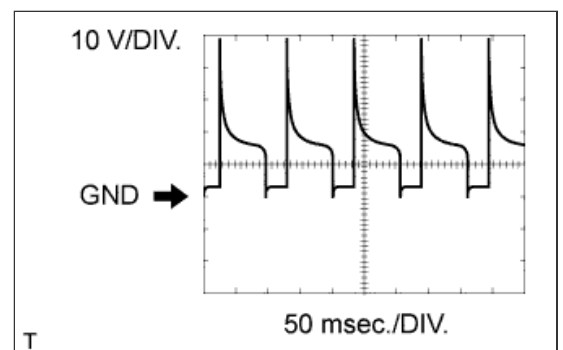
**HINT:**

The wavelength becomes shorter as the engine rpm increases.

WAVEFORM 8

VSV for EVAP

Item	Content
Symbols (Terminal No.)	PRG (E15-34) - E1 (E17-1)
Tool Setting	10 V/DIV., 50 msec./DIV.
Condition	Idling

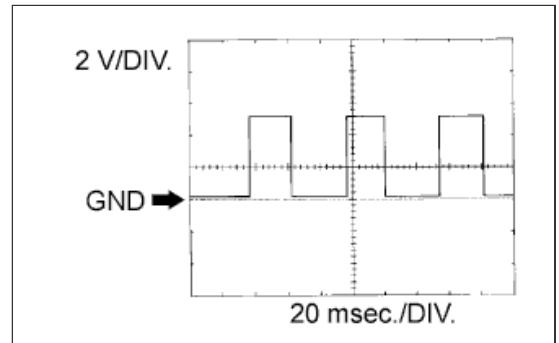
**HINT:**

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

WAVEFORM 9

Vehicle speed signal

Item	Content
Symbols (Terminal No.)	SPD (E13-8) - E1 (E17-1)
Tool Setting	2 V/DIV., 20 msec./DIV.
Condition	Driving at 20 mph (12 km/h)



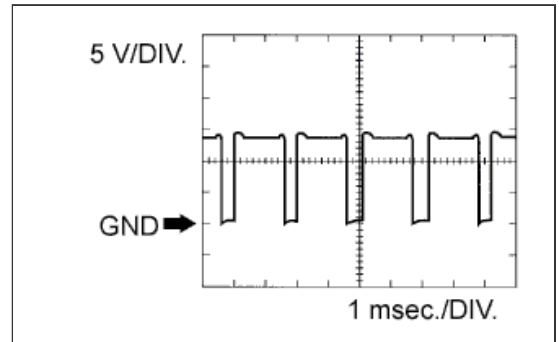
HINT:

The wavelength becomes shorter as the vehicle speed increases.

WAVEFORM 10

Throttle actuator positive terminal

Item	Content
Symbols (Terminal No.)	M+ (E15-5) - ME01 (E16-3)
Tool Setting	5 V/DIV., 1 msec./DIV.
Condition	Idling with warm engine



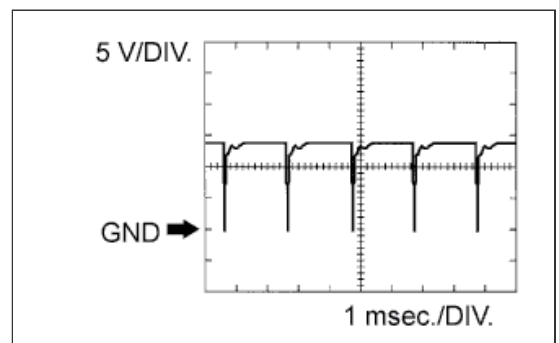
HINT:

The duty ratio varies depending on the throttle actuator operation.

WAVEFORM 11

Throttle actuator negative terminal

Item	Content
Symbols (Terminal No.)	M- (E15-4) - ME01 (E16-3)
Tool Setting	5 V/DIV., 1 msec./DIV.
Condition	Idling with warm engine



HINT:

The duty ratio varies depending on the throttle actuator operation.

WAVEFORM 12

Engine speed signal

Item	Content

Symbols (Terminal No.)	TACH (E13-1) - E1 (E17-1)
Tool Setting	5 V/DIV., 10 msec./DIV.
Condition	Idling

HINT:

The wavelength becomes shorter as the engine rpm increases.

