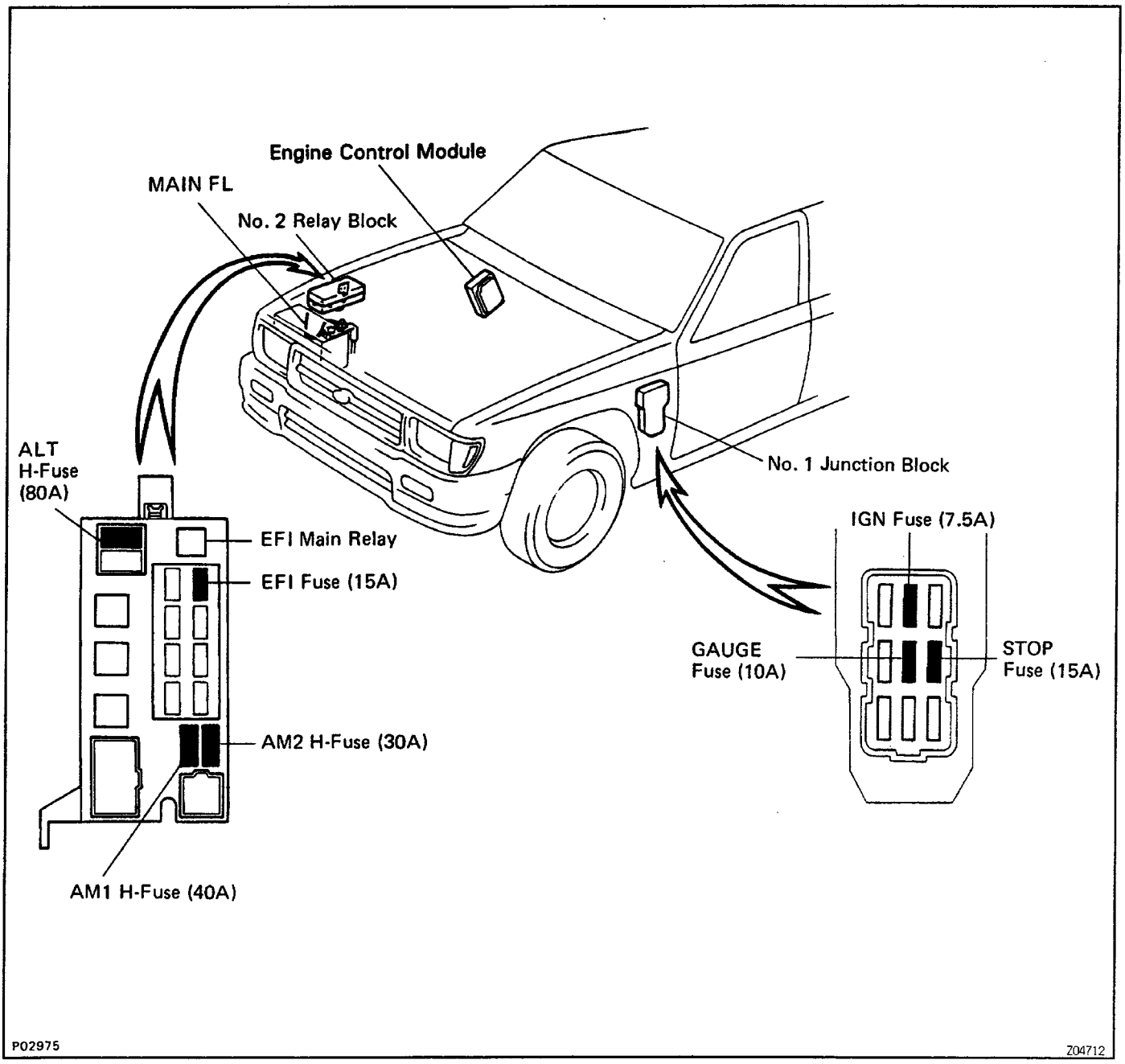
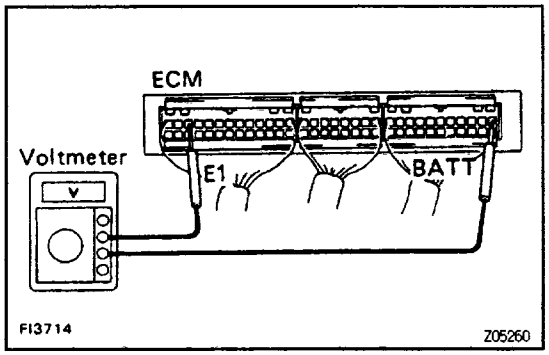
TROUBLESHOOTING WITH VOLT OHMMETER

HINT: Because the following troubleshooting procedures are designed for inspection of each separate system, the actual troubleshooting procedure may vary somewhat.
However, please refer to these procedures and perform actual troubleshooting, conforming to the inspection methods described.
For example, it is better to first make a simple check of the fuses, fusible links and connecting condition of the connectors before making your inspection according to the procedures listed.
The following troubleshooting procedures are based on the supposition that the trouble lies in either a short or open circuit in a component outside the –computer or a short circuit within the computer. If engine trouble occurs even though proper operating voltage is detected in the computer connector, then the engine control module is faulty and should be replaced.

FUSES AND FUSIBLE LINK LOCATION

EG1GH–02





MFI SYSTEM CHECK PROCEDURE

EG1GJ–02

HINT:

- Perform all voltage measurements with the con–nectors connected.
- Verify that the battery voltage is 11 V or more when the ignition switch is in ”ON” position. Using a voltmeter with high impedance (110 kΩ/V minimum), measure the voltage at each terminal of the wiring connectors.

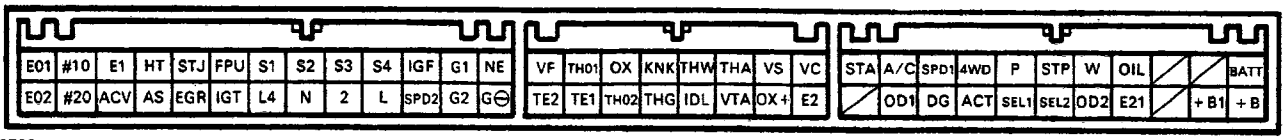
EG1GK–03

Engine Control Module (ECM) Terminals

Symbol	Terminal Name	Symbol	Terminal Name	Symbol	Terminal Name
NE	DISTRIBUTOR	VC	VOLUME AIR FLOW METER	BATT	BATTERY B+
G⊖	DISTRIBUTOR	E2	SENSOR GROUND	+B	EFI MAIN RELAY
G1	DISTRIBUTOR	VS	VOLUME AIR FLOW METER		–
G2	DISTRIBUTOR	*5 OX+	HEATED OXYGEN SENSOR	+B1	EFI MAIN RELAY
IGF	IGNITER	THA	INTAKE AIR TEMP. SENSOR		
*1 SPD2	VEHICLE SPEED SENSOR	VTA	THROTTLE POSITION SENSOR		–
*2 S4	TCM SOLENOID	THW	ENGINE COOLANT TEMP. SENSOR	*1 OIL	A/T OIL TEMP. WARNING LIGHT
*1 L	PARK/NEUTRAL POSITION SWITCH	IDL	THROTTLE POSITION SENSOR	E21	SENSOR GROUND
*1 S3	TCM SOLENOID	KNK	KNOCK SENSOR	W	MALFUNCTION INDICATOR LAMP
*1 2	PARK/NEUTRAL POSITION SWITCH	*3 THG	EGR GAS TEMP. SENSOR	*1 OD2	O/D MAIN SWITCH
*1 S2	TCM SOLENOID	OX	HEATED OXYGEN SENSOR	STP	STOP LIGHT SWITCH
*1 N	PARK/NEUTRAL POSITION SWITCH	*2 TH02	T/F FLUID TEMP. SENSOR	SEL2	–
*1 S1	TCM SOLENOID	*2 TH01	4WD OIL TEMP. SENSOR	*1 P	PATTERN SELECT SWITCH
*2 L4	TRANSFER POSITION SWITCH	TE1	D LC1	SEL1	–
FPU	VSV (for EG R)	VF	D LC 1	*4 4WD	4WD SWITCH
IGT	IGNtTER	TE2	DLC1	ACT	A/C AMPLIFIER
STJ	COLD START INJECTOR		–	SPD1	VEHICLE SPEED SENSOR
EGR	VSV (for EG R)		–	*1 DG	DLC1
HT	HEATED OXYGEN SENSOR			A/C	A/C MAGNET SWITCH
AS	VSV (for PAIR)		–	*1 OD1	CRUISE CONTROL ECU
E1	ENGINE GROUND		–	STA	STARTER SWITCH
ACV	VSV (for A/C)		–		–
#10	INJECTOR		–		–
#20	INJECTOR		–		–
E01	ENGINE GROUND		–		–
E02	ENGINE GROUND		–		–

*1: A/T only *2: 4WD A/T only *3: California only *3: California and C & C *4: 4WD only *5: California 2WD only

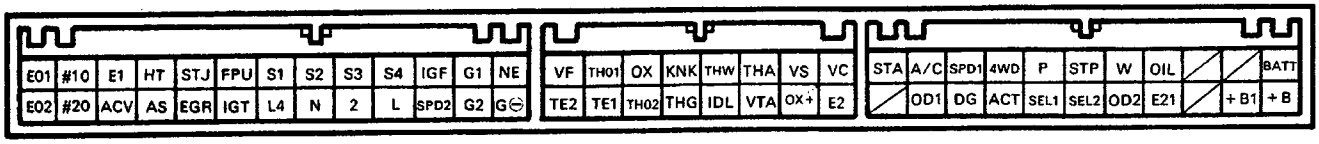
Engine Control Module (ECM) Terminals



Engine Control Module (ECM) Wiring Connectors Voltage

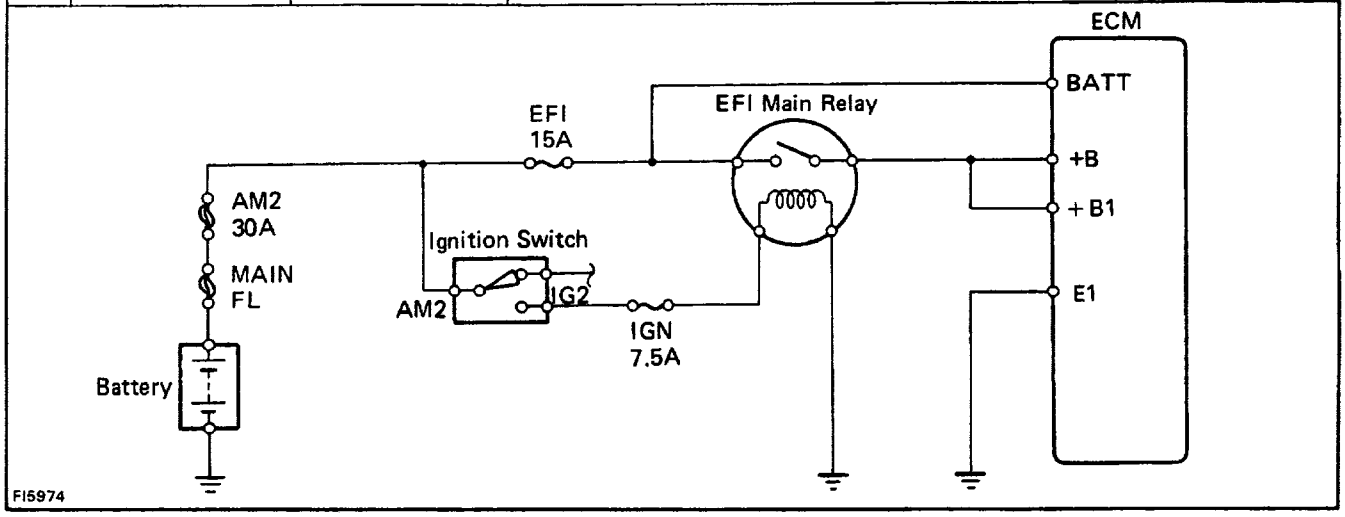
No.	Terminals	Condition		STD voltage	See page
1	BATT – E1	–		9 – 14	EG2–186
	+B – E1	Ignition SW ON			
	+B1 – E2				
2	IDL – E2 (E21)	Ignition SW ON	Throttle valve open	9 – 14	EG2–188
	VC – E2 (E21)		–	4.5 – 5.5	
	VTA – E2 (E21)		Throttle valve fully closed (Throttle opener must be cancelled first)	0.3 – 0.8	
			Throttle valve fully open	3.2 – 4.9	
3	VC – E2 (E21)	Ignition SW ON	–	4.5 – 5.5	EG2–190
	VS – E2 (E21)		Measuring plate fully closed	4.0 – 5.5	
			Measuring plate fully open	0.2 – 0.5	
		Idling		2.3 – 2.8	
		3,000 rpm		0.3 – 1.0	
	THA – E2 (E21)	Ignition SW ON	Intake air temperature 20°C (68°F)	0.5 – 3.4	
4	THW – E2 (E21)	Ignition SW O N	Engine coolant temperature 80°C (176°F)	0.2 – 1.0	EG2–192
5	STA – E1	Cranking		6 V or more	EG2–193
6	#10 – E01 #20 – E02	Ignition SW ON		9 – 14	EG2–194
7	IGT – E1	Idling		Pulse generation	EG2–195
8	W – E1	No trouble (malfunction indicator lamp off) and engine running		9 – 14	EG2–196
9	STJ – E1	Cranking	Engine coolant temperature 80°C (176°F)	6 V or more	EG2–197
10	STP – E1	Stop light switch ON		7.5 – 14	EG2–198

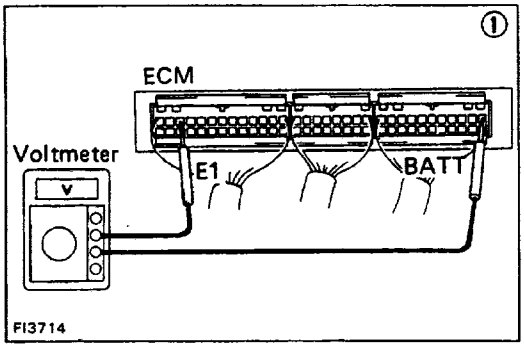
Engine Control Module (ECM) Terminals

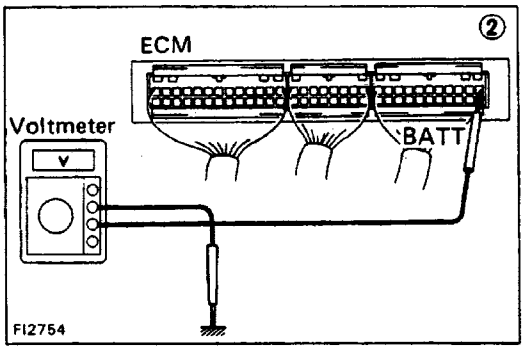


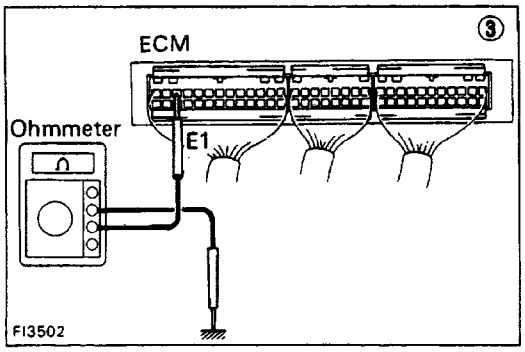
FI2796

No.	Terminals	Trouble	Condition	STD Voltage
1	BATT – E1	No voltage	–	9 – 14 V
	+B – E1		Ignition switch 4N	
	+B1 – E1			









- **BATT– EI**

(1) There is no voltage between ECM terminals BATT and E1.

(2) Check that there is voltage between ECM terminal BATT and body ground.

NO → OK

(3) Check wiring between ECM terminal E1 and body ground.

OK → Try another ECM.

BAD → Repair or replace.

Check fuse and fusible link.

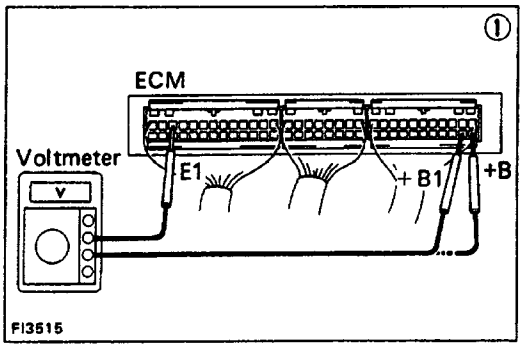
BAD → Replace.

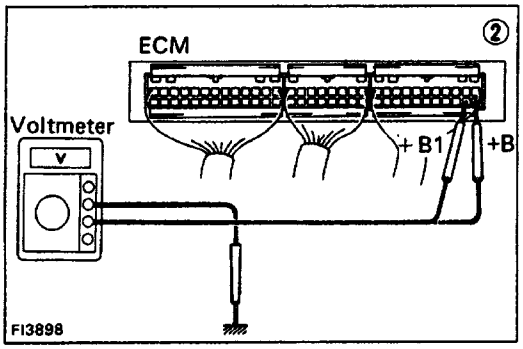
OK

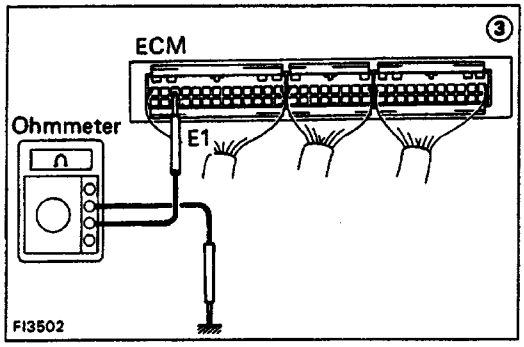
Check wiring between fuse and ECM.

BAD → Repair or replace.

V02191







- **+B (+B1) –E1**

(1) There is no voltage between ECM terminals + B (+ B1) and E1. **(IG SW ON) .**

(2) Check that there is voltage between ECM terminal + B (+ B1) and body ground. (**IG SW ON)**

NO

OK

(3) Check wiring between ECM terminal El and body ground.

OK → Try another ECM.

SAD → Repair or replace.

Check fuse, fusible link and ignition switch. — BAD → Repair or replace.

OK

Check EF 1 main relay. — BAD → Replace.

OK

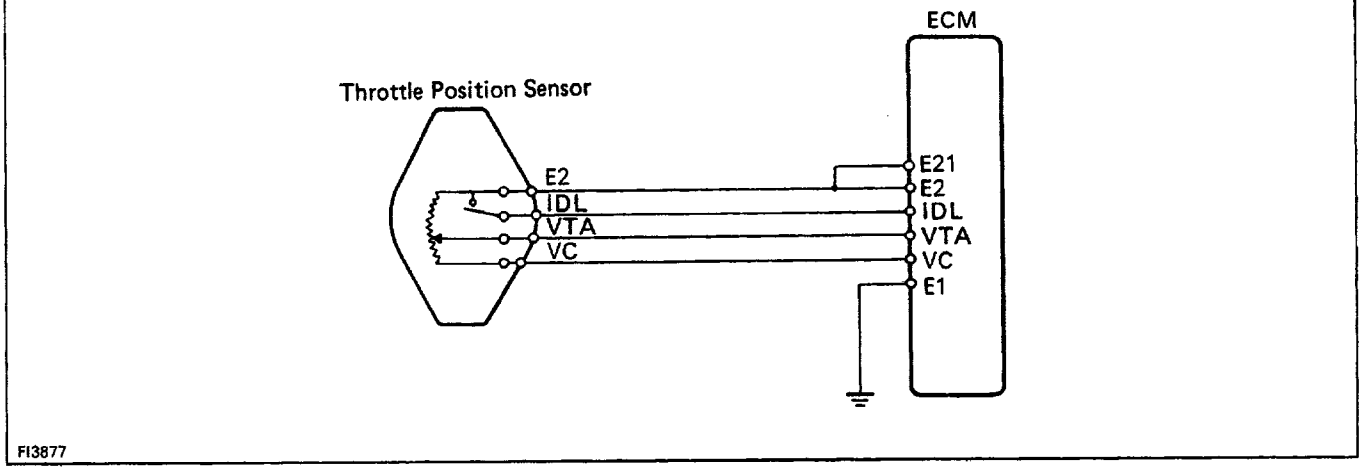
Check wiring between E F I main relay and battery. — BAD → Repair or replace.

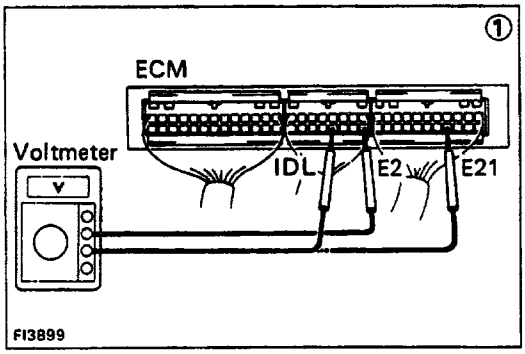
OK

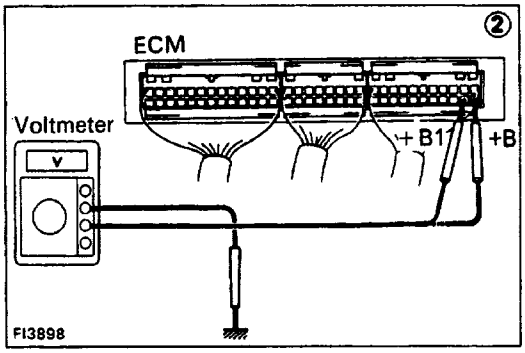
Check wiring between EFI main relay and ECM terminal + B (+B1). — BAD → Repair or replace.

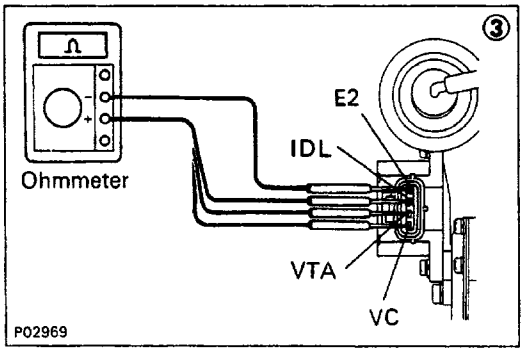
V02192

No.	Terminals	Trouble	Condition	STD Voltage
2	IDL – E2 (E21)	No voltage	Ignition switch O N	Throttle valve open	9 – 14 V
	VC – E2 (E21)			–	4.5 – 5.5 V
	VTA – E2 (E21)			Throttle valve fully closed (Throttle opener must be cancelled first)	0.3 – 0.8 V
				Throttle valve fully open	3.2 – 4.9 V









- **IDL – E2 (E21)**

(1) There is no voltage between ECM terminals IDl. and E2 (E21). **(IG SW ON) (Throttle valve open)**

↓

(2) Check that there is voltage between ECM terminal + 131 (+ B) and body ground. **(IG SW ON)**

NO → Refer to No. 1. → BAD → Replace or repair.

OK → Check wiring between ECM terminal E1 and body ground.

OK → **(3)** Check throttle position sensor.

BAD → Replace or repair throttle position sensor.

OK → Check wiring between ECM and throttle position sensor.

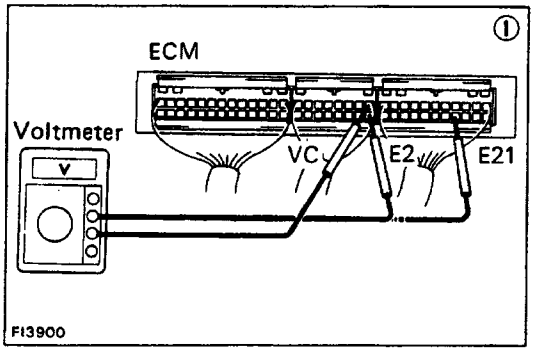
OK → Try another ECM.

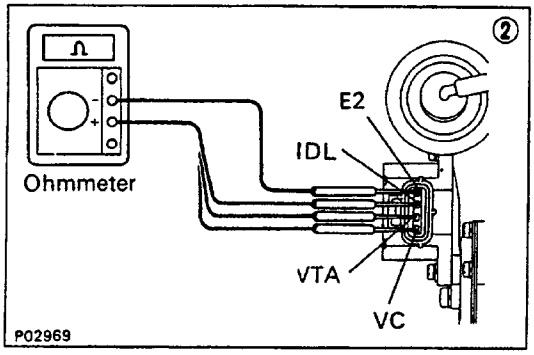
BAD → Replace or repair.

BAD → Replace or repair.

OK → Check wiring between ECM and throttle position sensor.

V02193





- **VC – E2 (E21)**

(1) There is no voltage between ECM terminals VC and E2 (E21).
(IG SW ON)

↓

Check that there is voltage between ECM terminals + B1(+ B) and E1.
(IG SW ON)

OK → ↓ | **NO** → Refer to No. 1.

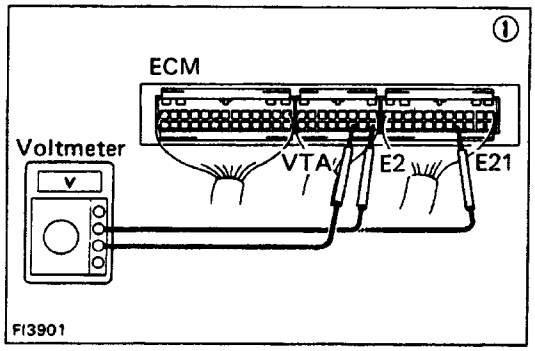
(2) Check throttle position sensor.

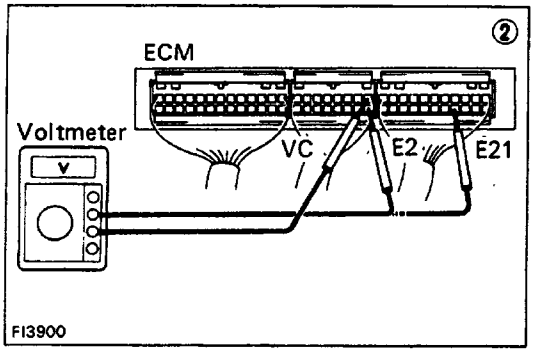
BAD → Repair or replace.

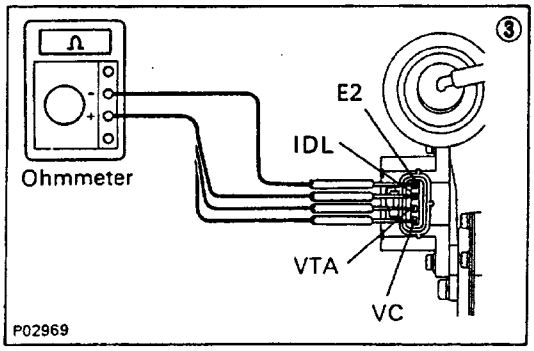
OK → Check wiring between ECM and throttle position

OK → Try another ECM.

BAD → Repair or replace wiring.







- **VTA – E2 (E21)**

(1) There is no voltage between ECM terminals VTA and E2 (E21).
(IG SW ON)

↓

(2) Check that there is voltage between ECM terminals VC and E2 (E21).
(IG SW ON)

OK → ↓ | **NO** → Perform inspection of VC – E2 (E21).

(3) Check throttle position sensor.

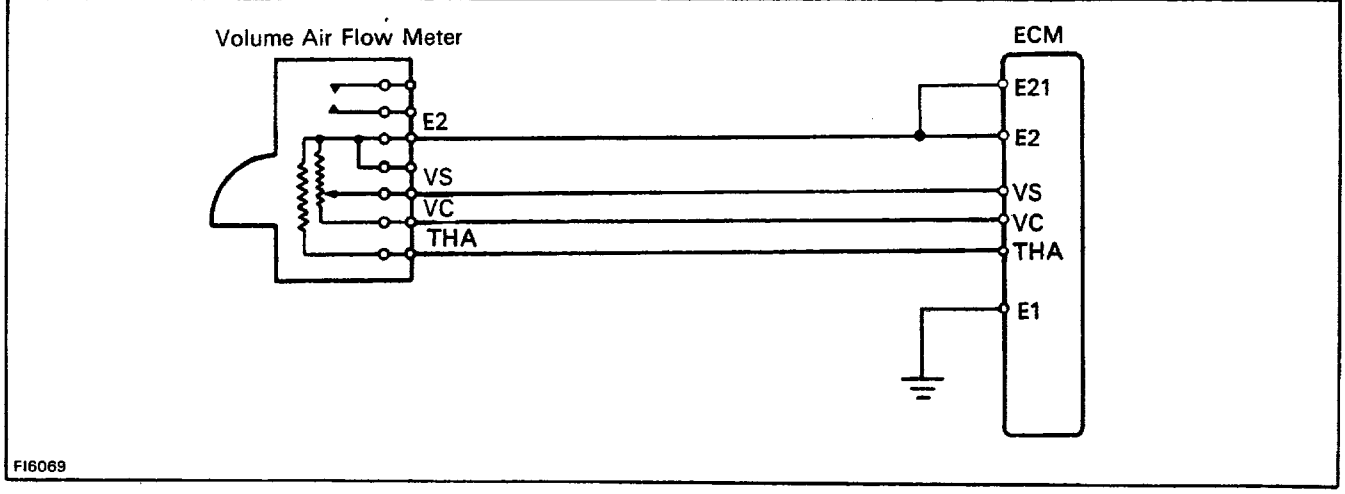
BAD → Repair or replace.

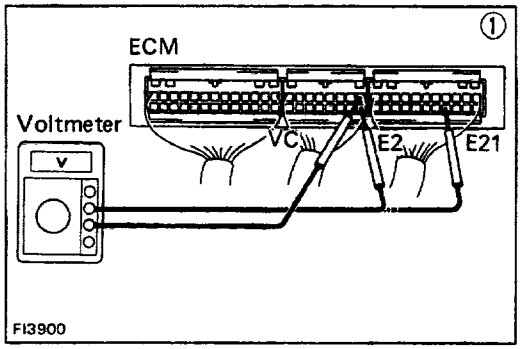
OK → Check wiring between ECM and throttle position sensor.

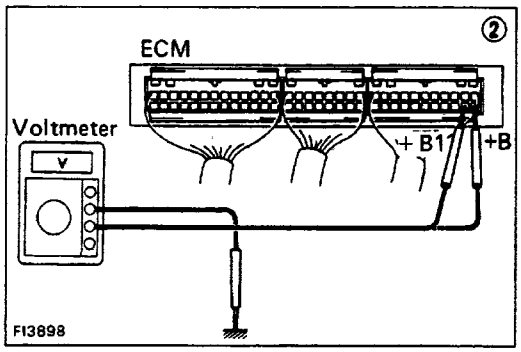
BAD → Repair or replace.

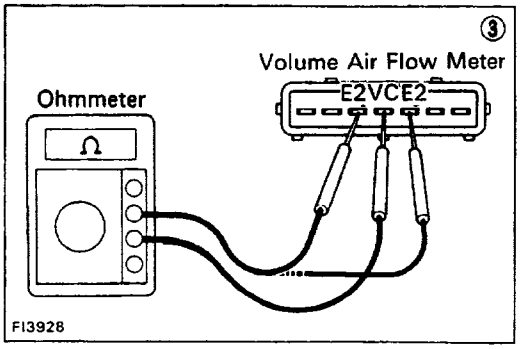
OK → Try another ECM.

No.	Terminals	Trouble	Condition		STD Voltage
3	VC – E2 (E21)	No voltage	Ignition SW ON	–	4.5 – 5.5 V
	VS – E2 (E21)			Measuring plate fully dosed	4.0 – 5.5 V
				Measuring plate fully open	0.2 – 0.5 V
			Idling		2.3 – 2.8 V
	THA – E2 (E21)		IG SW ON	Intake air temperature 20°C (68°F	0.5 – 3.4 V









- **VC – E2 (E21)**

(1) There is no voltage between ECM terminals VC and E2 (E21). **(I G SW ON)**

↓

(2) Check that there is voltage between ECM terminal + B (+ 131) and body ground. **(IG SW ON)**

OK → ↓

NO → Refer to No. 1.

(3) Check volume air flow meter.

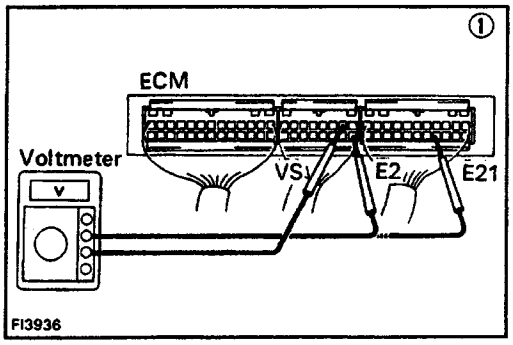
BAD → Replace or repair volume air flow meter.

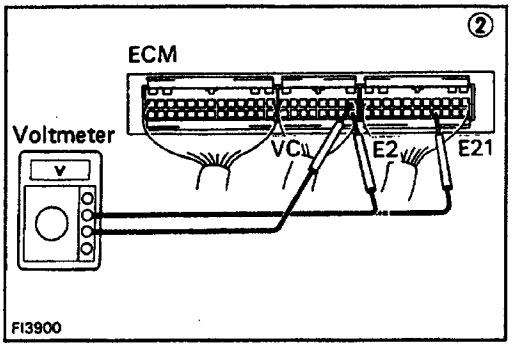
OK → Check wiring between ECM and volume air flow meter.

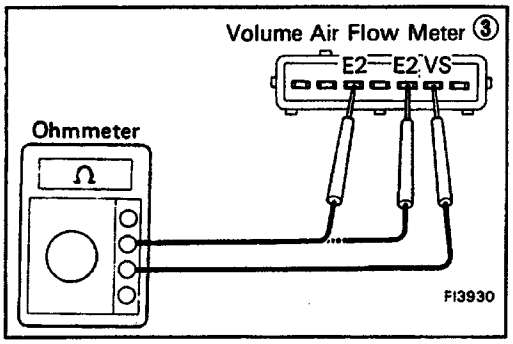
OK → Try another ECM.

BAD → Replace or repair wiring.

V02195







- **VS – E2 (E21)**

(1) There is no voltage between ECM terminals VS and E2 (E21). **(IG SW ON)**

↓

(2) Check that there is voltage between ECM terminals VC and E2 (E21). **(IG SW ON)**

↓ OK / NO → Refer to VC – E2 (E21). → BAD → Repair or replace.

↓ OK

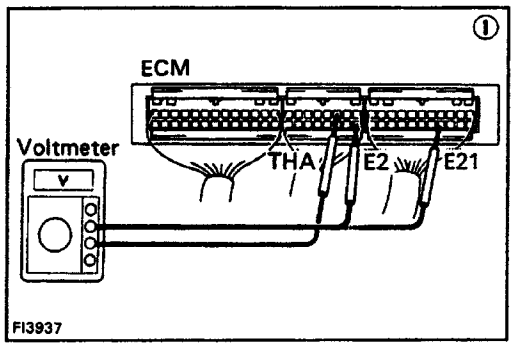
b Check volume air flow meter. → BAD → Repair or replace.

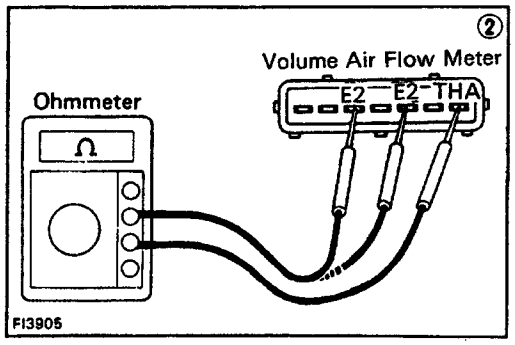
↓ OK

Check wiring between ECM and volume air flow meter. → BAD → Repair or replace.

↓ OK

Try another ECM.





- **THA – E2 (E21)**

(1) There is no voltage between ECM terminals THA and E2 (E21). **(IG SW ON)**

↓

Check that there is voltage between ECM terminal + B (+ B1) and body ground. **(IG SW ON)**

↓ OK / NO → Refer to No. 1.

↓ OK

(2) Check intake air temp. sensor.

↓ BAD → Replace volume air flow meter.

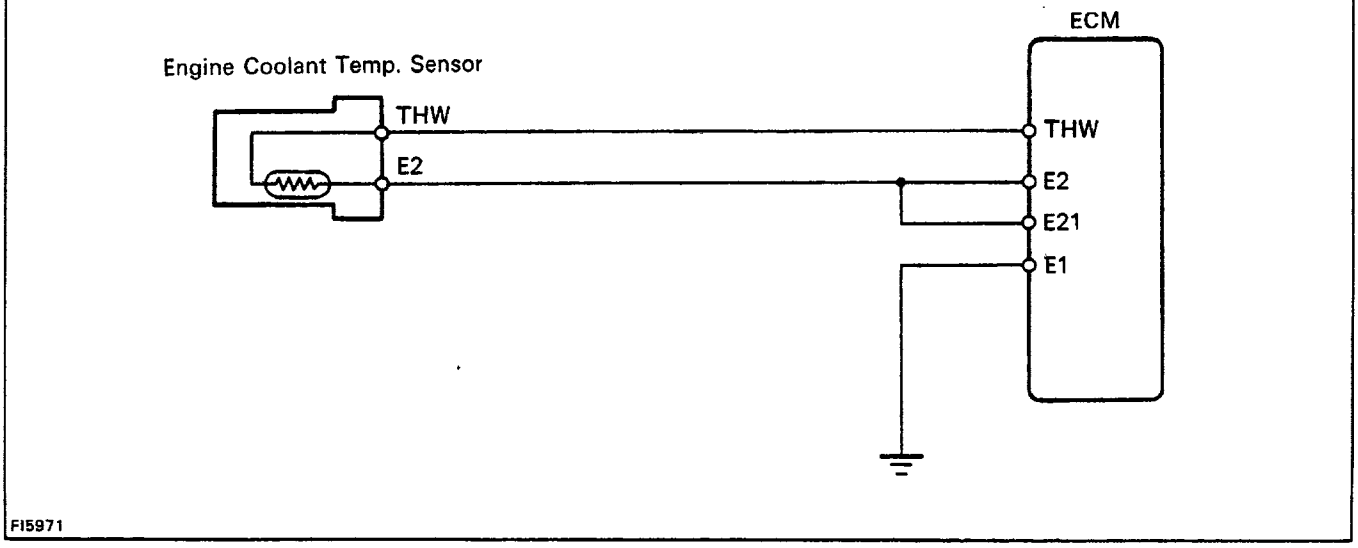
↓ OK

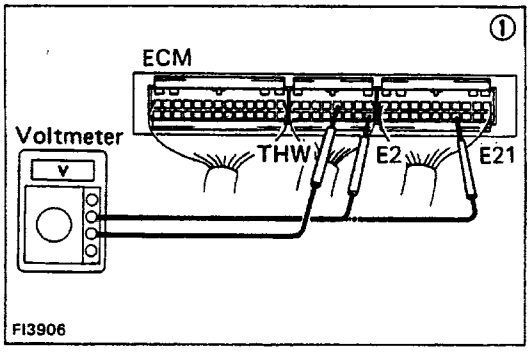
Check wiring between ECM and volume air flow meter.

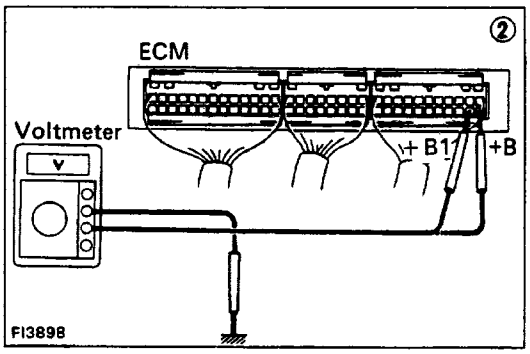
↓ OK → Try another ECM.

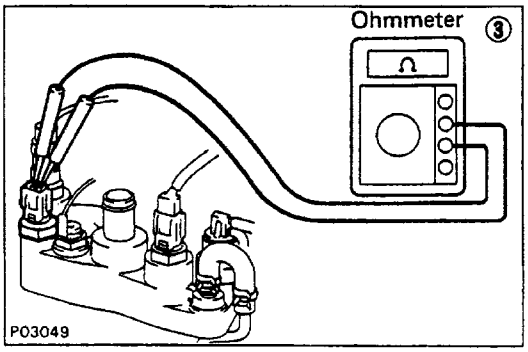
↓ BAD → Repair or replace wiring.

No.	Terminals	Trouble	Condition		STD Voltage
4	THW – E2 (E21)	No voltage	Ignition switch ON	Engine coolant temperature 80°C (176°F)	0.2 – 1.0 V









(1) There is no voltage between ECM terminals THW and E2 (E21). (IG SW ON)

↓

(2) Check that there is voltage between ECM terminal +B (+ B1) and body ground. **(IG SW ON)**

OK → ↓

NO → Refer to No. 1.

↓

Check wiring between ECM terminal E1 and body ground.

OK → ↓

BAD → Repair or replace.

(3) Check engine coolant temp. sensor.

BAD → Replace engine coolant temp. sensor.

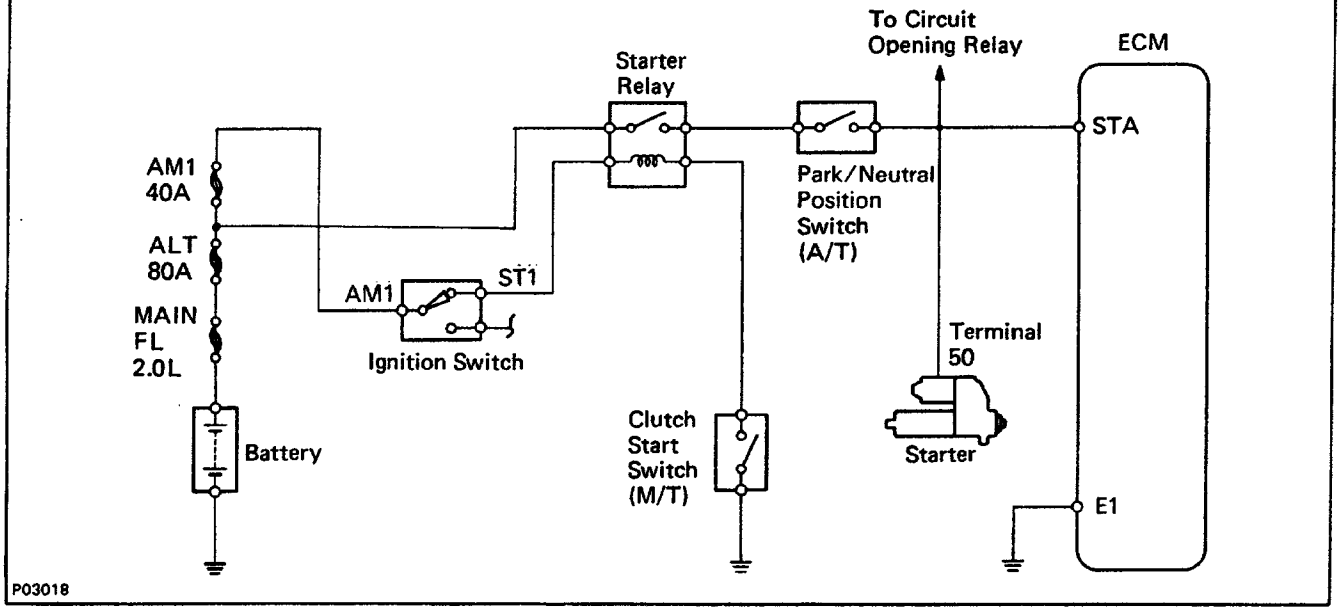
OK → Check wiring between ECM and engine coolant temp. sensor.

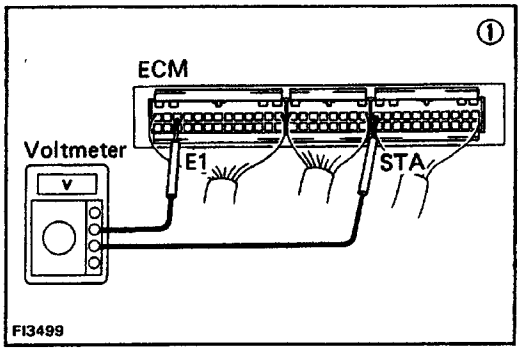
OK → Try another ECM.

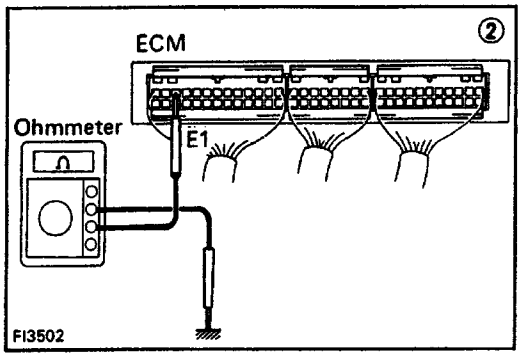
BAD → Repair or replace.

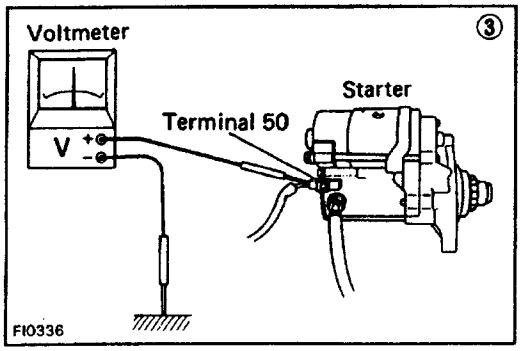
V02197

No.	Terminals	Trouble	Condition	STD Voltage
5	STA – E1	No voltage	Cranking	6 V or more









(1) There is no voltage between ECM terminals STA and E1. **(IG SW START)**

Check starter operation. — OK → Check wiring between . ECM terminal STA and starter terminal 50.

BAD

OK

BAD → Repair or replace.

(2) Check wiring between ECM terminal E1 and body ground..

BAD → Repair or replace.

Check fusible link, battery, wiring and ignition switch. — BAD → Repair or replace.

OK

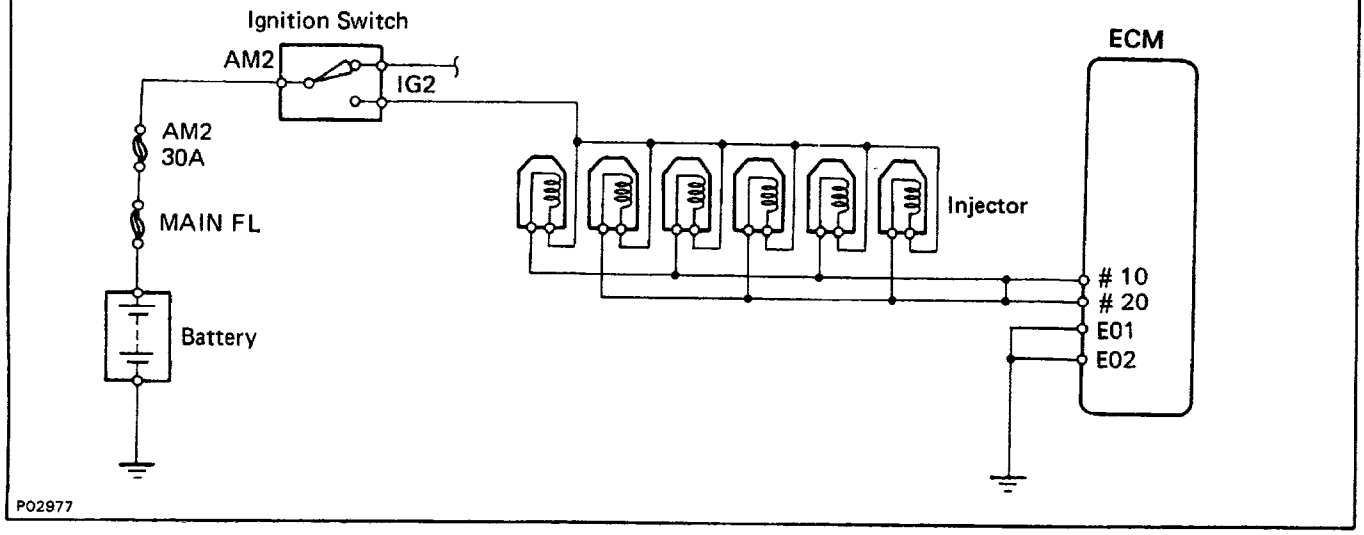
(3) Check that there is voltage at terminal 50 of starter. **(IG SW START) STD voltage: 6 V or more**

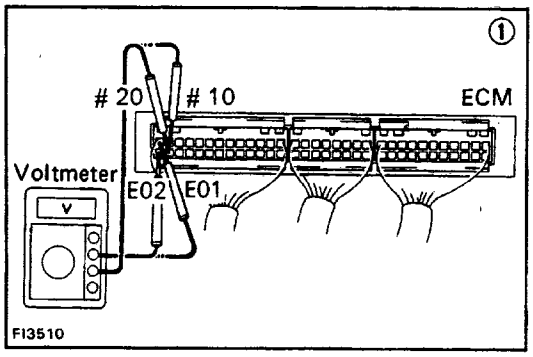
OK → Check starter.

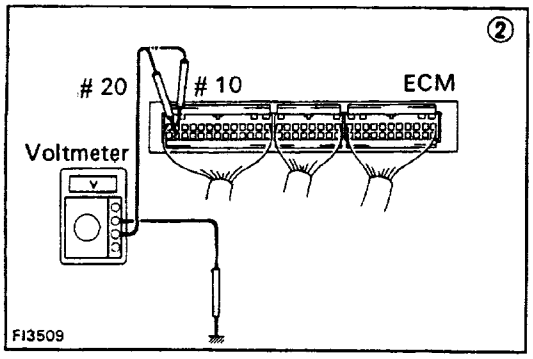
NO → Check wiring between ignition switch ST1 terminal and starter terminal 50.

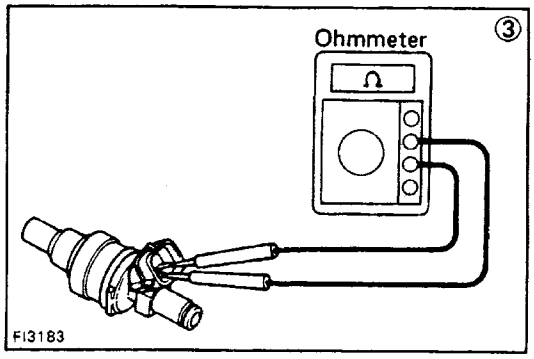
V02198

No.	Terminals	Trouble	Condition	STD Voltage
6	# 10 _ E01 # 20 _ E02	No voltage	Ignition switch ON	9 – 14 V









(1) There is no voltage between ECM terminals # 10 and/or # 20 and E01 and/or E02. **(IG SW ON)**

↓

(2) Check that there is voltage between ECM terminal # 10 and/or # 20 and body ground,

NO → OK

OK → Check wiring between ECM terminal E01 and/or E02 and body ground.

OK → Try another ECM.

BAD → Repair or replace.

NO → Check fusible link and ignition switch.

BAD → Repair or replace.

OK → Check resistance of magnetic coil in each injector.
STD resistance: 13.4 – 14.2 Ω

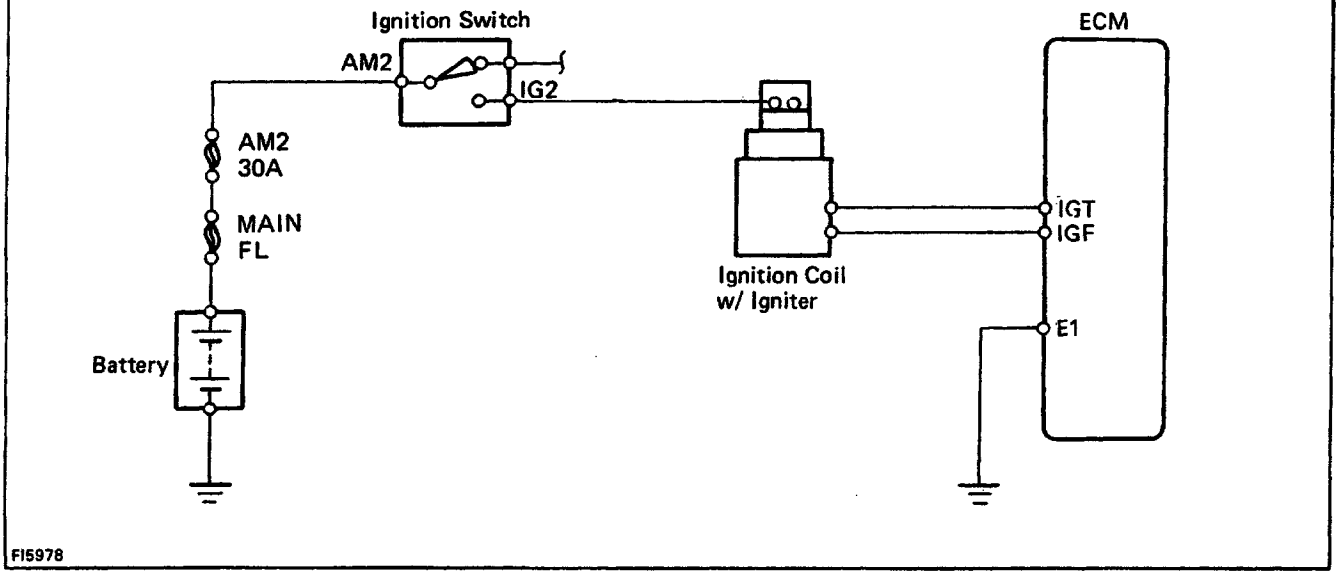
OK → Check wiring between ECM terminal # 10 and/or # 20 and battery.

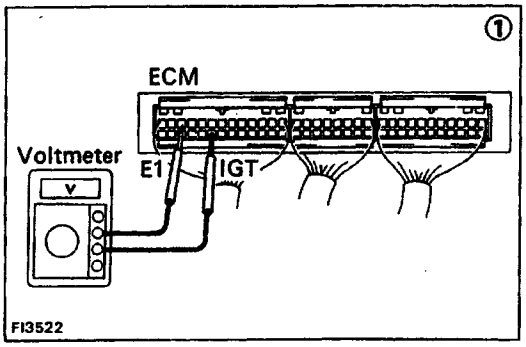
BAD → Repair or replace.

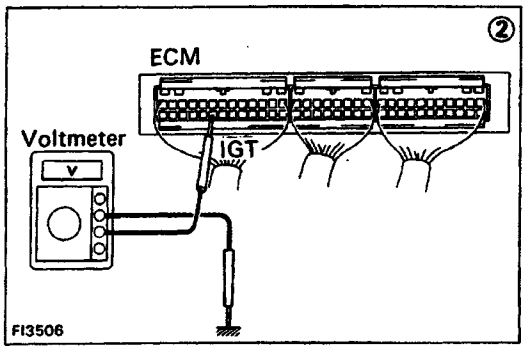
NO → Replace injector.

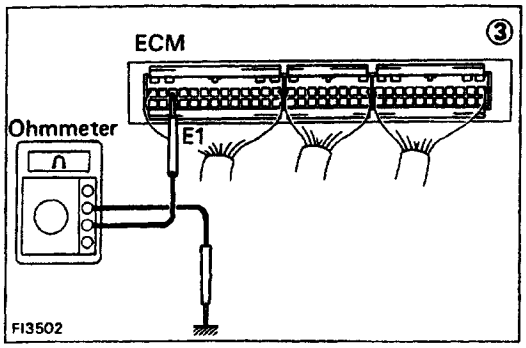
V02199

No.	Terminals	Trouble	Condition	STD Voltage
7	IGT – E1	No voltage	Idling	Pulse generation









(1) There is no voltage between ECM terminals IGT and El. **(idling)**

(2) Check that there is voltage between ECM terminal IGT and body ground. (idling)

OK

(3) Check wiring between ECM terminal E1 and body ground.

BAD

Refer to No. 1. — BAD → Repair or replace.

OK

Check wiring between igniter and distributor. — BAD → Repair or replace.

OK

Check distributor. — BAD → Replace.

OK

Check wiring between ECM and igniter. — BAD → Repair or replace.

OK

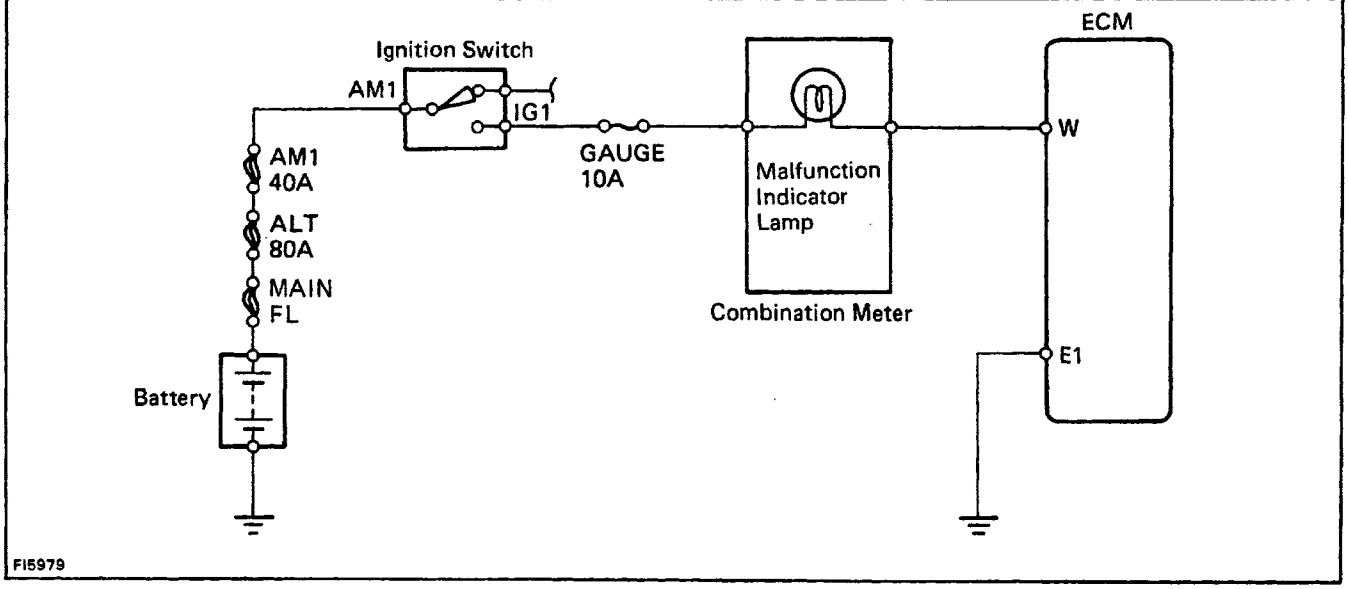
Check igniter. — BAD → Repair or replace.

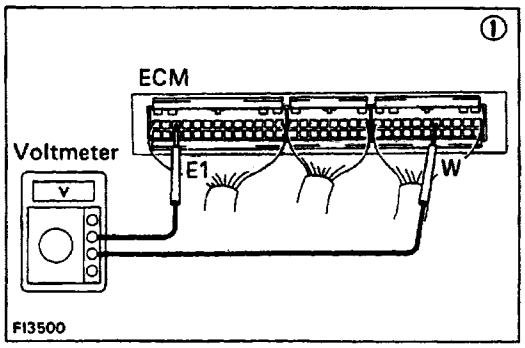
OK

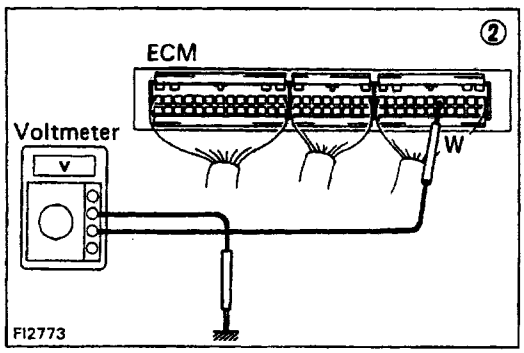
Try another ECM.

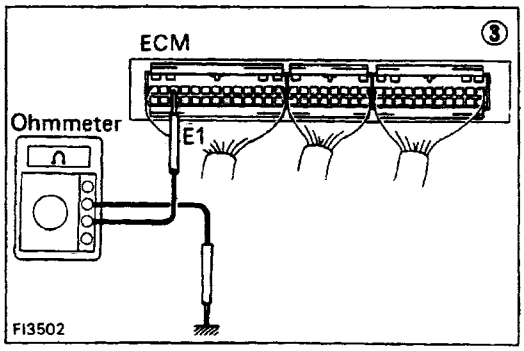
V02200

No.	Terminals	Trouble	Condition	STD Voltage
8	W – E1	No voltage	No trouble (malfunction indicator lamp off) and engine running	9 – 14 V









(1) There is no voltage between ECM terminals W and El. **(idling)**

↓

(2) Check that there is voltage between ECM terminal W and body ground.

NO → ↓

OK → **(3)** Check wiring between ECM terminal E1 and body ground.

OK → Try another ECM.

BAD → Repair or replace.

↓

Check GAUGE fuse (10A) and malfunction indicator lamp.

OK → ↓

BAD → Repair or replace.

Fuse blows again

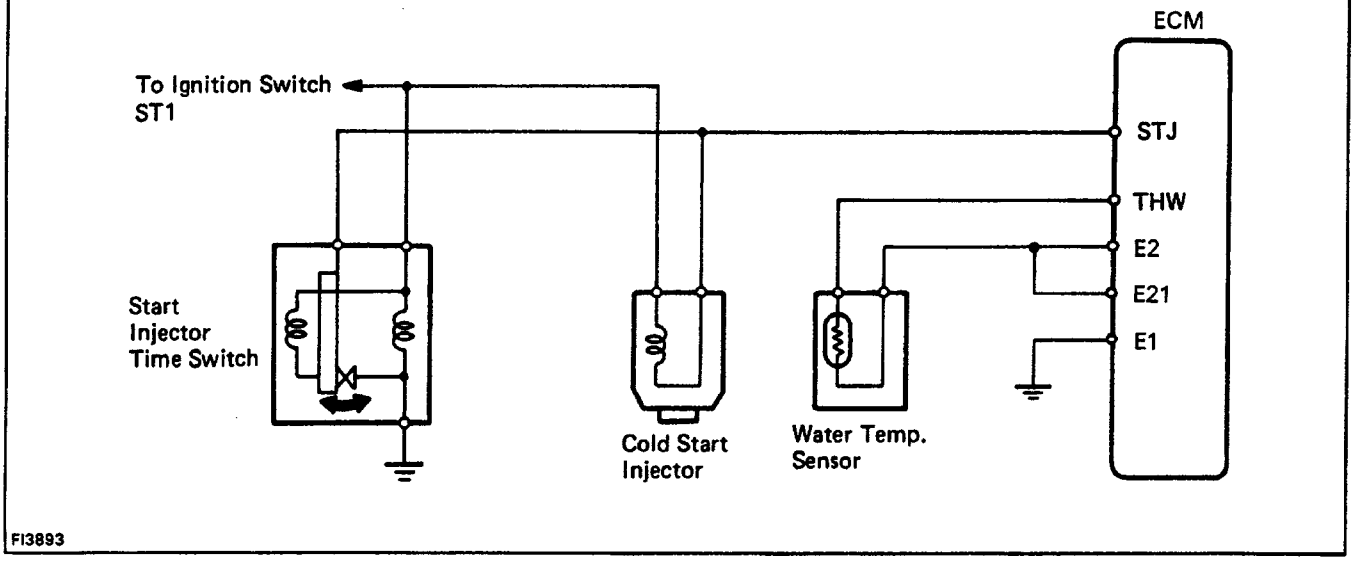
↓

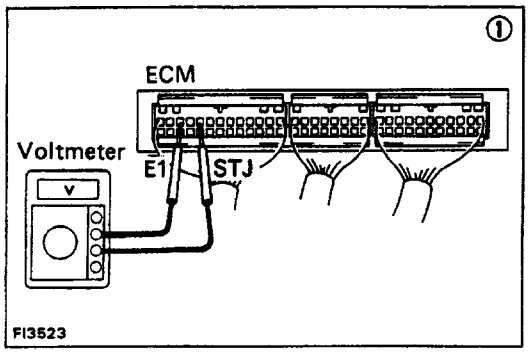
Check wiring between ECM terminal W and fuse.

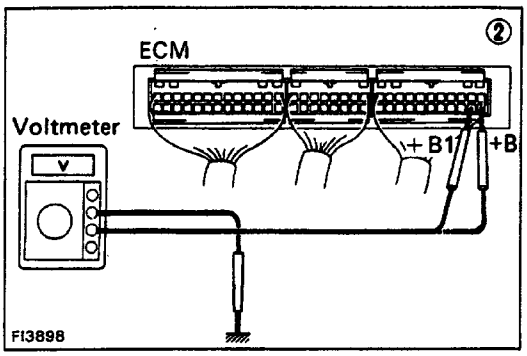
BAD → Repair or replace.

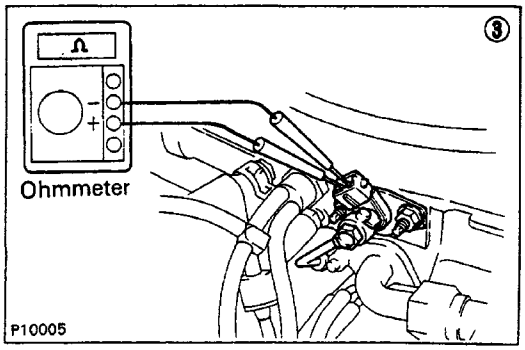
V02201

No.	Terminals	Trouble	Condition		STD Voltage
9	STJ – E1	No voltage	Cranking	Engine coolant temperature 80° (176° F)	6 V or more









(1) There is no voltage between ECM terminals STJ and E1. **(IG SW START)**

↓

(2) Check that there is voltage between ECM terminal + B (+ B1) and body ground. (IG SW ON)

OK → **(3)** Check cold start injector.

NO → Refer to No. 1.

BAD → Replace cold start injector.

OK → Check wiring between ECM and cold start injector.

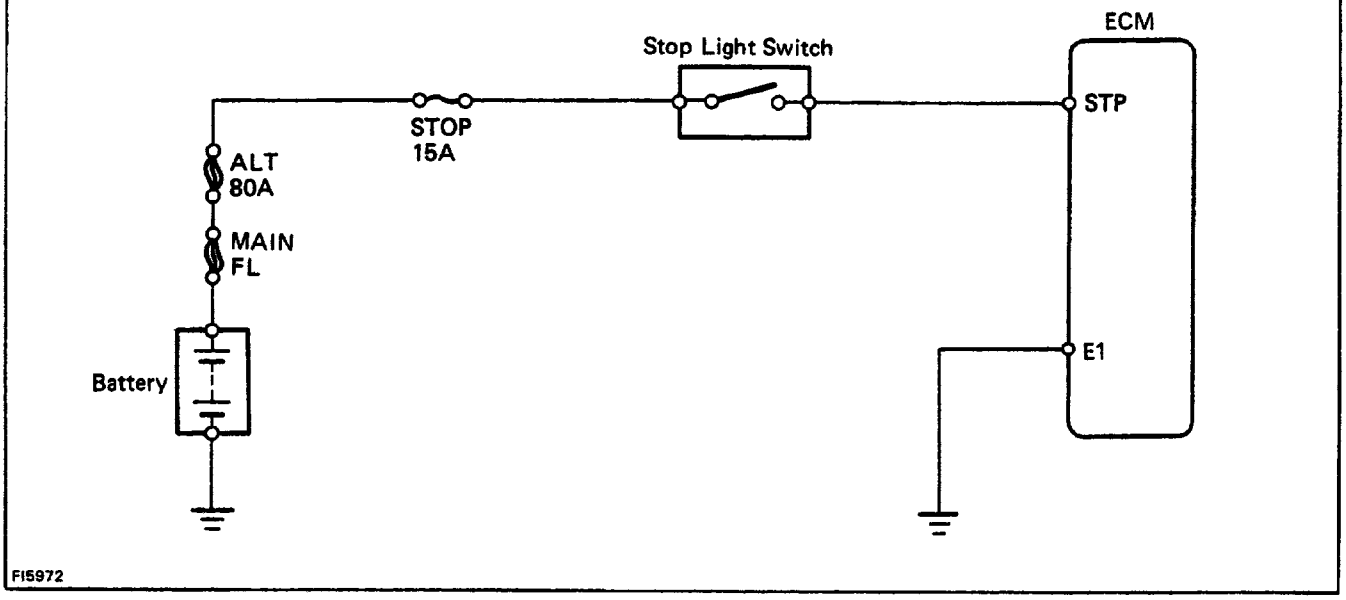
OK → Check wiring between ECM terminal E1 and body ground.

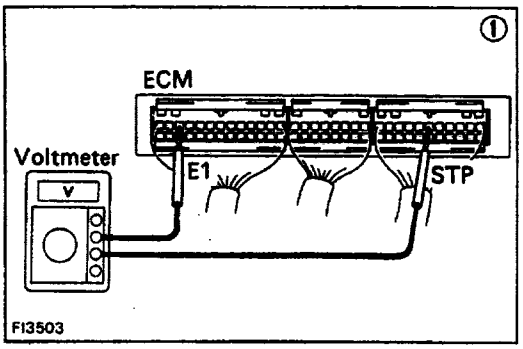
OK → Try another ECM.

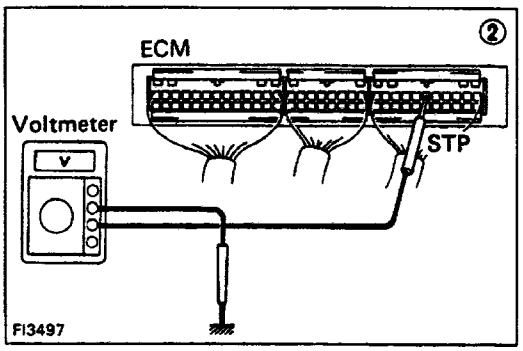
BAD → Repair or replace wiring.

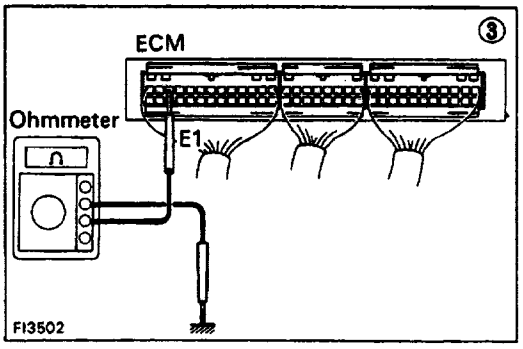
V02202

No.	Terminals	Trouble	Condition	STD Voltage
10	STP – E1	No voltage	Stop light switch ON	7.5 – 14 V









(1) There is no voltage between ECM terminals STP and E1.

(2) Check that there is voltage between ECM terminal STP and body ground when the brake pedal is depressed.

NO

OK

(3) Check wiring between ECM terminal E1 and body ground,

OK

BAD

Try another ECM.

Repair or replace.

Check STOP fuse 15A) and stop light switch.

BAD

Repair or replace.

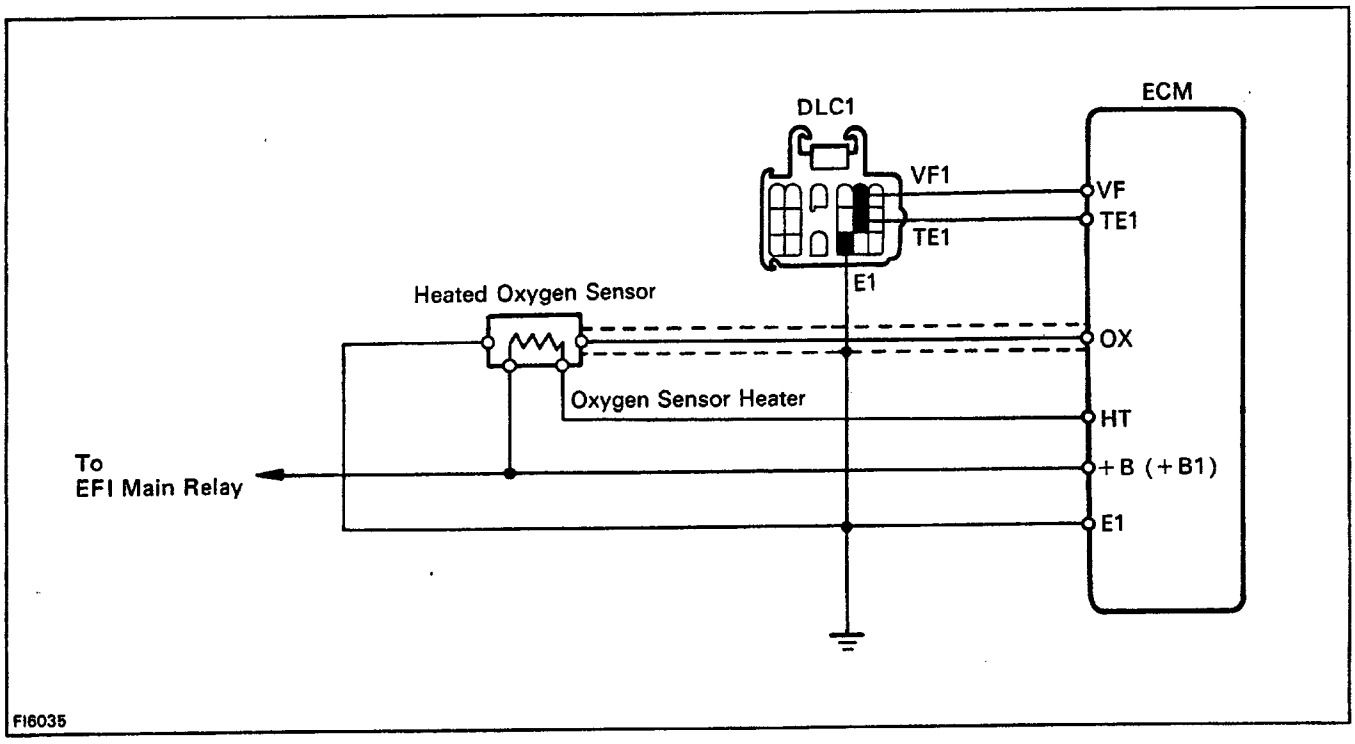
OK

Check wiring between ECM terminal STP and battery.

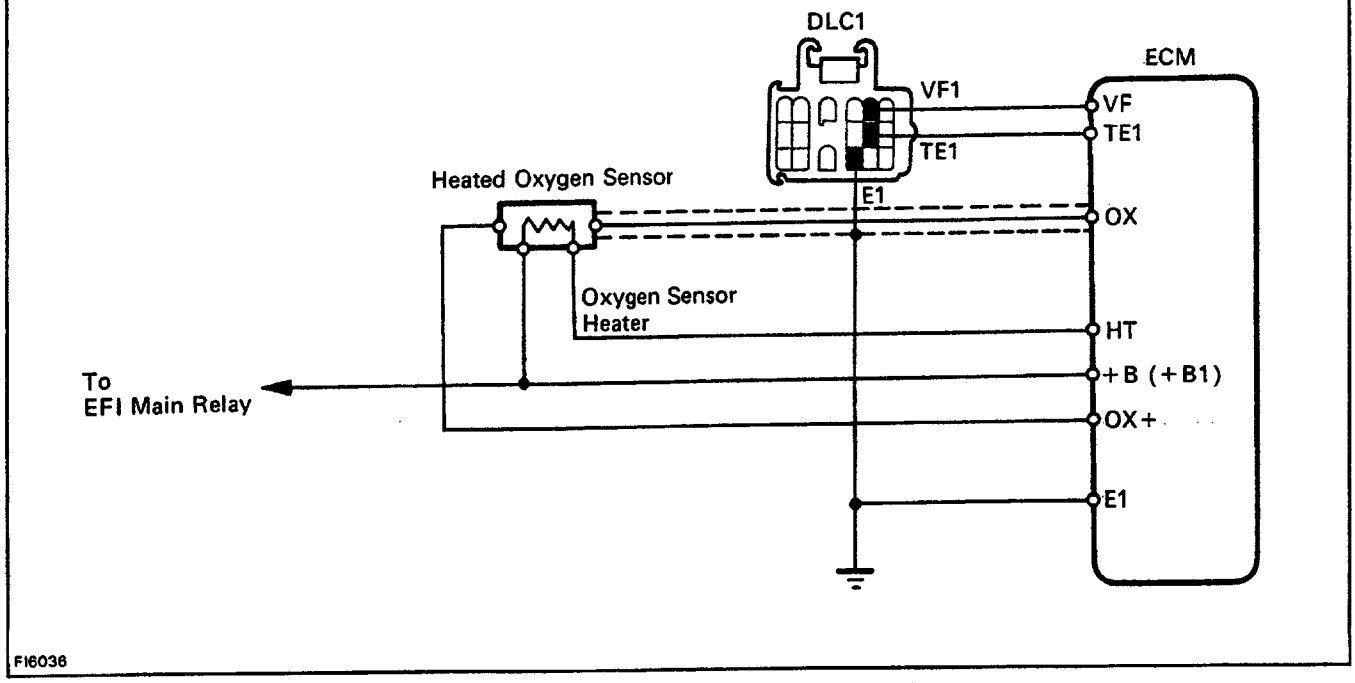
BAD

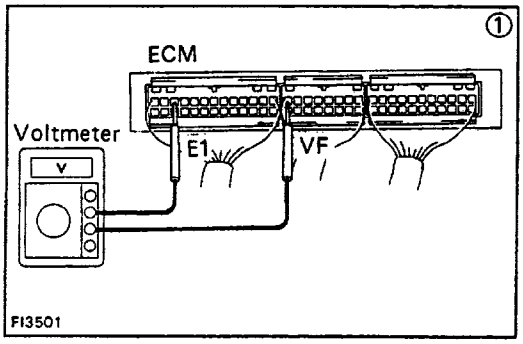
Repair or replace.

V02203



(California 2WD only)





(1) There is no voltage between ECM terminals 11F and E1.

Check that there is voltage between ECM terminal VF and body ground.

NO

OK

Check wiring between ECM terminal E1 and body ground.

OK

BAD

Try another ECM.

Repair or replace.

Is air leaking into air induction system? YES → Repair air leak.

NO

Check spark plugs. BAD → Repair or replace.

OK

Check distributor and ignition system. BAD → Repair or replace.

OK

Check fuel pressure. BAD → Repair or replace.

OK

Check injector. BAD → Repair or replace.

OK

Check cold start injector.* BAD → Repair or replace.

OK

Check volume air flow meter. BAD → Repair or replace.

OK

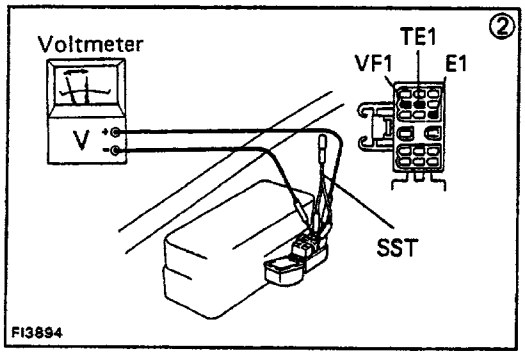
Check operation of heated oxygen sensor. OK → System normal.

BAD

Check wiring between heated oxygen sensor and ECM connector. BAD → Repair wiring.

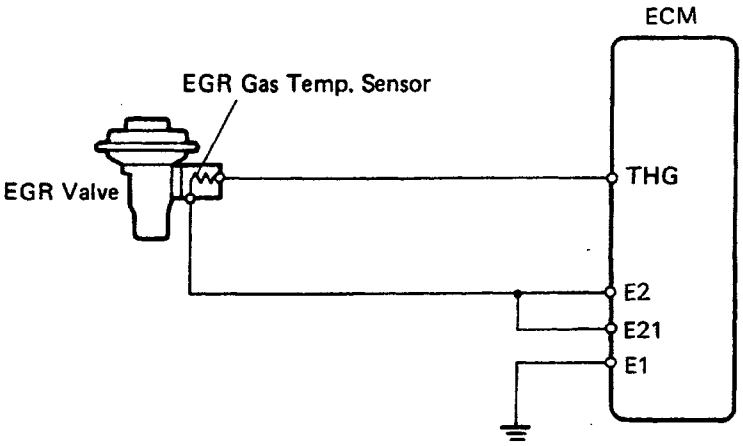
OK

Replace heated oxygen sensor.

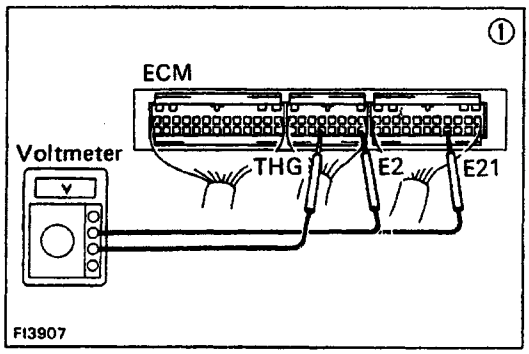


*Rich malfunction only

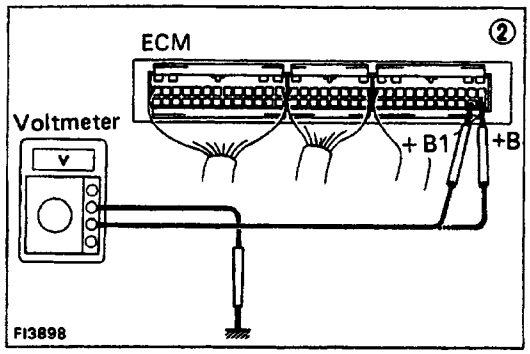
(California Vehicles and C & C)



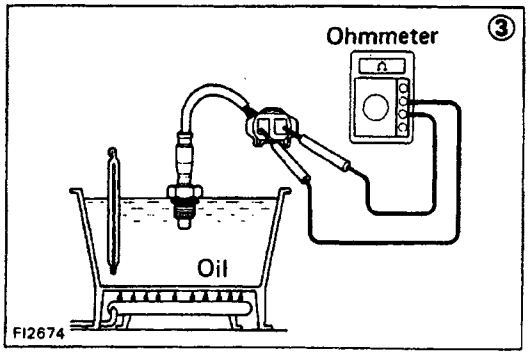
FI3895



FI3907



FI3898



FI2674

(1) There is no voltage between ECM terminals THG and E2 (E21). **(Engine running at 2,000 rpm)**

↓

(2) Check that there is voltage between ECM terminal + B (+ B1) and body ground. **(IG SW ON)**

OK ↓ / NO → Refer to No. 1.

↓

Check wiring between ECM terminal E1 and body ground.

OK ↓ / BAD → Repair or replace.

↓

Check EGR system. — BAD → Repair or replace.

OK ↓

Check EGR gas temp. sensor.

BAD ↓ / OK →

Replace EGR gas temp. sensor.

Check wiring between ECM and EG R gas temp. sensor.

OK ↓ / BAD →

Try another ECM.

Repair or replace.

V02206