

# SECTION 16

## EEC-IV — Quick Test — All Engines

### Contents

#### QUICK TEST

Quick Test Description .....	16-1
Quick Test.....	16-2
Step 1.0 Visual Check Vehicle Preparation .....	16-2
Step 2.0 Equipment Hookup .....	16-3
Step 3.0 Key On Engine Off Self-Test.....	16-5
Step 4.0 Computed Timing Check.....	16-9
Step 5.0 Engine Running Self-Test.....	16-10
Step 6.0 Continuous Self-Test.....	16-14

#### APPENDIX

##### Self-Test

Self-Test Description .....	16-17
Code Output Format .....	16-19
Continuous Self-Test .....	16-20
Self-Test With STAR Tester.....	16-21
Self-Test With Analog Volt Meter.....	16-22
Self-Test With "Check Engine" Light (MIL) .....	16-23
Self-Test With Message Center (Continental Only) .....	16-24

##### Diagnostic Aids

Continuous Monitor Test (Wiggle Test).....	16-25
How To Clear Continuous Memory Codes .....	16-26
Output State Check .....	16-26
Cylinder Balance Test .....	16-27
Failure Mode Effects Management (FME).....	16-28
"Check Engine" Light (Malfunction Indicator Light) .....	16-29
"Check Engine"/"Check DCL" Message (Data Communications Link) .....	16-30
Test Equipment.....	16-31

## QUICK TEST: Test Description

### SPECIAL NOTES:

- This diagnostic procedure is used **ONLY** on vehicles equipped with the fourth generation of Electronic Engine controls (EEC-IV).
- The QUICK TEST procedure should be used **ONLY** when the Diagnostic Routines, Section 2 direct you here.
- If all phases of the Quick Test, including the Diagnostic By Symptom found in the proper Engine Supplement Section, result in a PASS, it is likely that the problem is non-EEC-IV related and will be found elsewhere. You should return to the Diagnostic Routines in Section 2.
- When directed to a Pinpoint Test, look carefully at the Pinpoint Test Schematic and read the Note and Remember.
- Any time service is necessary, Steps 3.0, 5.0, and 6.0 should be repeated to ensure that service was effective.

### QUICK TEST STEPS

1. Visual Check and Vehicle Preparation
2. Equipment Hookup
3. Key On Engine Off Self-Test
4. Computed Timing Check
5. Engine Running Self-Test
6. Continuous Self-Test

The Key On Engine Off and Engine Running Self-Tests detect faults that are present at the time of testing. Intermittent faults that have occurred in the last 40 warm-up cycles are detected during Continuous Self-Test and stored in the EEC-IV memory.

## QUICK TEST: Visual Check Vehicle Preparation

**1.0**

### SPECIAL NOTES:

- Correct results of the QUICK TEST are dependent on the proper operation of related non-EEC-IV components.
- It may be necessary to disconnect or disassemble harness connector assemblies to do some of the inspections. Pin locations should be noted before disassembly.
- If the engine will not start, starts but stalls, idles rough, or runs rough; continue through QUICK TEST STEP 3.0 and follow the instructions in Step 3.0B.

### VISUAL CHECK

1. Inspect the air cleaner and inlet ducting.
2. Check all engine vacuum hoses for damage, leaks, cracks, blockage, proper routing, etc.
3. Check EEC-IV system wiring harness for proper connections, bent or broken pins, corrosion, loose wires, proper routing, etc.
4. Check the processor, sensors and actuators for physical damage.
5. Check the engine coolant for proper level.
6. Make all necessary repairs before continuing with QUICK TEST.

### VEHICLE PREPARATION

1. Perform **ALL** safety steps required to start and run vehicle tests - apply parking brake, place shift lever firmly into PARK position (NEUTRAL on manual transmission), block drive wheels, etc.
2. Turn off **ALL** electrical loads — radios, lights, A/C-heater blower fans, etc.
3. Start engine and run until at operating temperature.
4. Turn engine off and proceed to QUICK TEST STEP 2.0.

## QUICK TEST: Equipment Hookup

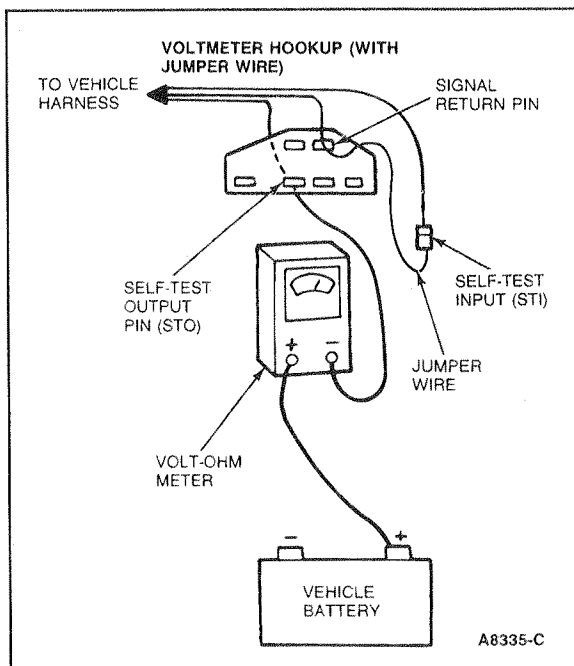
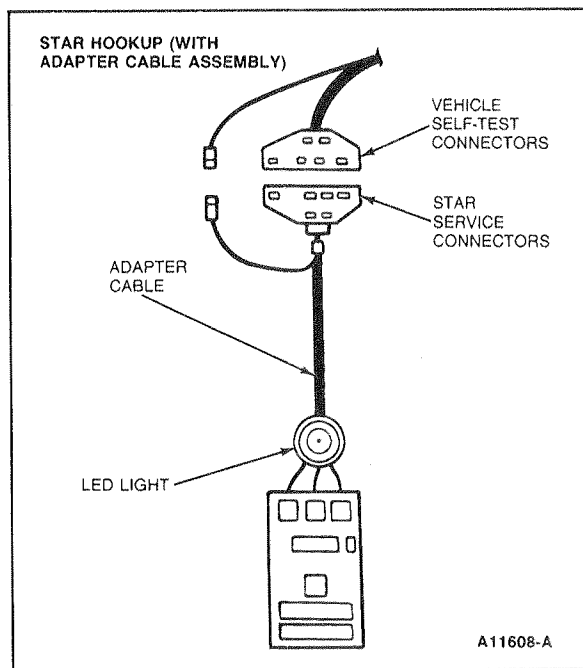
**2.0**

### SPECIAL NOTES:

- Refer to the illustrations for Self-Test connector pin orientation and VOM and STAR hookup.
- After the equipment is properly hooked up, proceed to QUICK TEST STEP 3.0A.

### USING THE STAR TESTER

1. Turn the ignition key off.
2. Connect the color coded adapter cable to the STAR tester.
3. Connect the adapter cable leads to the proper Self-Test connectors.
4. Connect the timing light.



### USING AN ANALOG VOLT/OHM METER (VOM)

1. Turn the ignition key off.
2. Set the VOM on a DC voltage range to read from 0 to 15 volts.
3. Connect the VOM from the Battery + terminal to the Self-Test Output pin of the large Self-Test connector.
4. Connect the timing light.

## QUICK TEST: Equipment Hookup

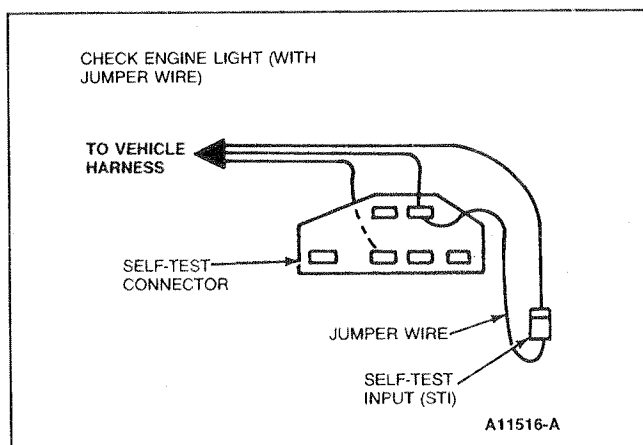
**2.0**

### USING THE "CHECK ENGINE" LIGHT (MIL)

No special equipment hookup is required.

### USING THE MESSAGE CENTER ON CONTINENTAL APPLICATIONS ONLY

No special equipment hookup is required.



## QUICK TEST: Key On Engine Off Self-Test

**3.0**

### A PERFORMING THE KEY ON ENGINE OFF SELF-TEST

#### SPECIAL NOTES:

- It may be necessary to service Non-EEC-IV faults before running Quick Test. Refer to Section 2.
- Continuous Memory Codes recorded in this step will be used for diagnosis in Step 6.0 after a PASS code 11 is received in both the Key On Engine Off and the Engine Running Self-Tests.
- On all vehicles equipped with a **4.9L ENGINE**, the clutch must be depressed during the Key On Engine Off Self-Test.

#### HOW TO RUN THE KEY ON ENGINE OFF SELF-TEST

##### **DO**

- Verify that the vehicle has been properly prepared according to **QUICK TEST STEPS 1.0** and **2.0**.
- Place ignition key in the ON position.
- Activate Self-Test.
  - STAR Tester: Latch the center button in the down position.
  - Analog VOM: Jumper ST1 to SIG RTN at the Self-Test connectors.
  - "Check Engine" Light (MIL): Jumper ST1 to SIG RTN at the Self-Test connectors. Service Codes will be flashed on the "Check Engine" Light.
  - Message Center (Continental Applications Only): Refer to Appendix: Self-Test.

**NOTE:** Refer to Appendix Self-Test for further information on how to read code output.

- Record all service codes displayed.
- Go to **PART B** of Key On Engine Off Self-Test.

##### **DON'T**

- Depress throttle during Key On Engine Off Self-Test.

# **QUICK TEST: Key On Engine Off Self-Test**

**3.0**

B	CODE OUTPUT		
Key On Engine Off	Separator	Continuous Memory	ACTION TO TAKE

11	—	1(0)	—	11
----	---	------	---	----

- Both tests indicate a PASS.
  - If engine idles rough or runs rough, Go to Pinpoint Test Step **S1**. If this symptom is not present, Go to QUICK TEST STEP 4.0.
  - If engine is a no start, Go directly to Pinpoint Test Step **A1**.

ANY CODE(S)	—	1(0)	—	11
----------------	---	------	---	----

- Key On Engine Off Self-Test indicates a FAULT.
  - Go to **PART C** of Key On Engine Off Self-Test.
  - Always start with the first code displayed.

ANY CODE(S)	—	1(0)	—	ANY CODE(S)
----------------	---	------	---	----------------

- Both tests indicate a FAULT.
  - DO NOT SERVICE CONTINUOUS MEMORY CODES AT THIS TIME.
  - Go to **PART C** of Key On Engine Off Self-Test.
  - Always start with the first code displayed.

11	—	1(0)	—	ANY CODE(S) EXCEPT 15, 56 or 66
----	---	------	---	--

- Continuous Memory indicates a FAULT.
  - DO NOT SERVICE CONTINUOUS MEMORY CODES AT THIS TIME.
  - If engine idles rough or runs rough, Go to Pinpoint Test Step **S1**. If this symptom is not present, Go to QUICK TEST STEP 4.0.

11	—	1(0)	—	15
----	---	------	---	----

- Go To Pinpoint Test Step **QB1**.

11	—	1(0)	—	56
11	—	1(0)	—	66

- For 5.0L SEFI MA Mustang only.
  - Service Code 56 Go to Pinpoint Test Step **DC10**.
  - Service Code 66 Go to Pinpoint Test Step **DC6**.

NO CODES OUTPUTTED CODES NOT LISTED				
--	--	--	--	--

- Self-Test did not activate or unlisted codes displayed.
  - Repeat Key On Engine Off Self-Test to verify the above condition.
  - If condition still exists, Go to Pinpoint Test Step **QA1**.

### 3.0

C	PASSENGER CAR SERVICE CODE CHART											
Key On Engine Off Service Code		Pinpoint Test Step Direction										
		1.9L EFI	1.9L CFI	2.3L OHC EFI	2.3L TC EFI	2.3L HSC EFI	2.5L CFI	3.0L EFI	3.8L AXOD EFI	3.8L RWD EFI	5.0L SEFI	5.0L MA SEFI
13 GO to	▶	—	KB1	—	—	—	KB1	—	—	—	—	—
15 GO to	▶	QB3	QB3	QB3	QB3	QB3	QB3	QB3	QB3	QB3	QB3	QB3
19 GO to	▶▶	—	—	QD1	—	QD1	—	QD1	QD1	QD1	QD1	QD1
21 GO to	▶	DE1	DE1	DE1	DE1	DE1	DE1	DE1	DE1	DE1	DE1	DE1
22 GO to	▶▶	DF1	DF1	DF1	DF1	DF1	DF1	DF1	DF1	DF1	DF1	DF1
23 GO to	▶▶▶	DH1	KB12	DH1	DH1	DH1	KB12	DH1	DH1	DH1	DH1	DH1
24 GO to	▶	—	DB1	DB1	DB1	DB1	DB1	DB1	DB1	DB1	DB1	DB1
26 GO to	▶▶	DK1	—	—	DK1	—	—	—	—	—	—	DC1
28 GO to	▶▶▶	DA1	—	—	DA1	—	—	—	—	—	—	—
31 GO to	▶	—	DL1	DD2	—	DL1	DN1	DL1	DL1	DL1	DN1	DN1
32 GO to	▶▶	—	—	—	—	—	DN25	—	—	—	DN25	DN25
34 GO to	▶▶▶	—	DL8	—	—	DL8	DN20	DL8	DL8	DL8	DN20	DN20
35 GO to	▶	—	DL5	—	—	DL5	DN5	DL5	DL5	DL5	DN5	DN5
51 GO to	▶▶	DE10	DE10	DE10	DE10	DE10	DE10	DE10	DE10	DE10	DE10	DE10
52 GO to	▶▶▶	—	—	FF1	—	FF1	FF1	FF1	FF1	—	—	—
53 GO to	▶	DH3	KB15	DH3	DH3	DH3	KB15	DH3	DH3	DH3	DH3	DH3
54 GO to	▶▶	—	DB10	DB10	DB10	DB10	DB10	DB10	DB10	DB10	DB10	DB10
56 GO to	▶▶▶	DK10	—	—	DK10	—	—	—	—	—	—	DC10
58 GO to	▶	DA10	KB5	—	DA10	—	—	—	—	—	—	—
59 GO to	▶▶	—	—	—	—	—	—	T71	—	—	—	—
61 GO to	▶▶▶	DE20	DE20	DE20	DE20	DE20	DE20	DE20	DE20	DE20	DE20	DE20
62 GO to	▶	—	—	—	—	—	—	T61	—	—	—	—
63 GO to	▶▶	DH10	KB18	DH10	DH10	DH10	KB18	DH10	DH10	DH10	DH10	DH10
64 GO to	▶▶▶	—	DB20	DB20	DB20	DB20	DB20	DB20	DB20	DB20	DB20	DB20
66 GO to	▶	DK20	—	—	DK20	—	—	—	—	—	—	DC6
67 GO to	▶▶	FA1	FA1	FA1	FA1	FA1	FA1	T81	T81	FA1	FA1	FA1
68 GO to	▶▶▶	DA20	KB9	—	DA20	—	KB9	—	—	—	—	—
69 GO to	▶	—	—	—	—	—	—	—	T73	—	—	—
73 GO to	▶▶	—	KB22	—	—	—	KB22	—	—	—	—	—
79 GO to	▶▶▶	—	—	—	—	—	—	—	FA9	FA9	FA9	FA9
81 GO to	▶	—	—	—	KN1	—	—	—	—	—	KC8	KC8
82 GO to	▶▶	—	—	—	X80	—	—	—	—	—	KC8	KC8
83 GO to	▶▶▶	—	—	DD17	X30	—	X30	X30	X30	—	—	—
84 GO to	▶	—	DL11	DD17	KA5	DL11	DN10	DL11	DL11	DL11	DN10	DN10
85 GO to	▶▶	—	KD6	—	KR10	KD6	KD6	KD6	KD6	KD6	KD6	KD6
87 GO to	▶▶▶	—	J7	J7	X15	J7	X15	X15	X15	J7	J7	J7
88 GO to	▶	—	—	—	KR1	—	X80	X80	X80	—	—	—
89 GO to	▶▶	—	—	—	—	—	—	T51	T51	—	—	—
93 GO to	▶▶▶	—	KB11	—	—	—	KB11	—	—	—	—	—
95 GO to	▶	J20	J20	—	—	J20	X90	—	X90	J20	J20	J20
96 GO to	▶▶	J6	J30	—	—	J30	X95	—	X95	J30	J30	J30
NO CODES CODES NOT LISTED ▶▶		Go to Pinpoint Test Step QA1										



### 3.0

C		LIGHT TRUCK SERVICE CODE CHART						
Key On Engine Off Service Code		Pinpoint Test Step Direction						
		2.3L EFI	2.9L EFI	3.0L EFI	4.9L EFI	5.0L EFI	5.8L EFI	7.5L EFI
15 GO to	►	QB3	QB3	QB3	QB3	QB3	QB3	QB3
19 GO to	►►	QD1	QD1	QD1	QD1	QD1	QD1	QD1
21 GO to	►►►	DE1	DE1	DE1	DE1	DE1	DE1	DE1
22 GO to	►	DF1	DF1	DF1	DF1	DF1	DF1	DF1
23 GO to	►►	DH1	DH1	DH1	DH1	DH1	DH1	DH1
24 GO to	►►►	DB1	DB1	DB1	DB1	DB1	DB1	DB1
31 GO to	►	DD2	—	—	DN1	DN1	DN1	DN1
32 GO to	►►	—	—	—	DN25	DN25	DN25	DN25
34 GO to	►►►	—	—	—	DN20	DN20	DN20	DN20
35 GO to	►	—	—	—	DN5	DN5	DN5	DN5
51 GO to	►►	DE10	DE10	DE10	DE10	DE10	DE10	DE10
52 GO to	►►►	FF1	—	FF1	FF1	FF1	—	—
53 GO to	►	DH3	DH3	DH3	DH3	DH3	DH3	DH3
54 GO to	►►	DB10	DB10	DB10	DB10	DB10	DB10	DB10
61 GO to	►►►	DE20	DE20	DE20	DE20	DE20	DE20	DE20
63 GO to	►	DH10	DH10	DH10	DH10	DH10	DH10	DH10
64 GO to	►►	DB20	DB20	DB20	DB20	DB20	DB20	DB20
67 GO to	►►►	FA1	FA1	FA1	FA1	FA1	FA1	FA1
81 GO to	►	—	—	—	KC8	KC8	KC8	KC8
82 GO to	►►	—	—	—	KC8	KC8	KC8	KC8
83 GO to	►►►	DD17	—	—	—	—	—	—
84 GO to	►	DD17	—	—	DN10	DN10	DN10	DN10
85 GO to	►►	—	—	KD6	KD6	—	KD6	KD6
86 GO to	►►►	—	KR10	KR10	—	—	—	—
87 GO to	►	J7	J7	J7	J7	J7	J7	J7
89 GO to	►►	KR1	KR1	KR1	—	—	—	—
95 GO to	►►►	—	J20	J20	J20	J20	J20	J20
96 GO to	►	—	J30	J30	J30	J30	J30	J30
NO CODES CODES NOT LISTED		Go To Pinpoint Test Step QA1						

## QUICK TEST: Computed Timing Check

**4.0**

### SPECIAL NOTES:

- If engine is a NO START, go directly to Pinpoint Test Step **A1**.
- If engine starts but stalls, or stalls during timing check Go to Pinpoint Test Step **S1**.
- If the "Check Engine" Light (MIL) is on, do not run Quick Test timing check. Verify Key On Engine Off Self-Test is a PASS.
- Self-Test timing is equal to Base Timing plus 20 degrees BTDC  $\pm$  3 degrees (see VECI decal for correct base timing).

### Example

If base timing is 10 degrees BTDC, Self-Test timing is equal to: 10 degrees + 20 degrees = 30 degrees BTDC  $\pm$  3 degrees or 27 degrees to 33 degrees BTDC.

### HOW TO RUN QUICK TEST TIMING CHECK

1. Turn the key off and wait 10 seconds.
2. Start engine.
3. Activate Engine Running Self-Test.
4. Check timing after the last service code has been displayed. The timing will remain fixed for two minutes, unless Self-Test is deactivated.

Is Self-Test Timing within specification?

**YES** Go To QUICK TEST STEP 5.0.

**NO** Go To Pinpoint Test Step **P1**.

## QUICK TEST: Engine Running Self-Test

**5.0**

### A PERFORMING THE ENGINE RUNNING SELF TEST

#### SPECIAL NOTES:

- If the engine starts but stalls, or stalls during Self-Test, Go to Pinpoint Test Step **S1**.
- On vehicles equipped with the Brake On/Off Switch (BOO), the brake pedal **MUST** be depressed and released **AFTER** the ID code.
- On vehicles equipped with the Power Steering Pressure Switch (PSPS), within 1 to 2 seconds after the ID code, the steering wheel must be turned at least one-half turn and released.

#### HOW TO RUN THE ENGINE RUNNING SELF-TEST

##### **DO**

- Deactivate Self-Test.
- Start and run engine at 2,000 rpm for two minutes. This action warms up the EGO sensor.
- Turn engine off, wait 10 seconds.
- Start engine.
- Activate Self-Test according to Quick Test Step 3.0 A.
- After the ID code, depress and release the brake pedal if appropriate. See Special Note above.
- After the ID code, within 1 to 2 seconds, turn the steering wheel at least one-half turn and then release it, if appropriate. See Special Note above.
- If a dynamic response code occurs, perform a brief wide-open throttle (WOT).
- Record all service codes displayed.
- Go to **Part B** of Engine Running Self-Test.

##### **DON'T**

- Depress the throttle unless a Dynamic Response Code is displayed.

## QUICK TEST: Engine Running Self-Test

# 5.0

B CODE OUTPUT			
Engine ID	Dynamic Response	Engine Running	ACTION TO TAKE

2(0), 3(0) or 4(0)	—	1(0) or no display	—	11
-----------------------	---	--------------------------	---	----

- Engine Running Self-Test indicates a PASS.
  - If Continuous Memory Codes were present, Go to QUICK TEST STEP 6.0.
  - If Continuous Memory is a PASS Code 11 and a symptom is present, Go to DIAGNOSTIC BY SYMPTOM in the proper Engine Supplement Section.

2(0), 3(0) or 4(0)	—	1(0) or no display	—	ANY CODE(S)
-----------------------	---	--------------------------	---	----------------

- Engine Running Self-Test indicates a FAULT.
  - Go to **PART C** of Engine Running Self-Test.
  - Always start with the first code displayed.

98	—	NO DISPLAY	—	ANY CODE(S)
----	---	---------------	---	----------------

- Code 98 in place of the I.D. code indicates that the vehicle DID NOT PASS Key On Engine Off Self-Test. Engine Running Self-Test will not initiate until a PASS Code 11 is obtained in Key On Engine Off Self-Test.
  - Run Key On Engine Off Self-Test and address all codes displayed.

NO CODE DISPLAYED CODES NOT LISTED				
---------------------------------------	--	--	--	--

- Self-Test did not activate.
  - Rerun Engine Running Self-Test to verify the above condition.
  - If condition is still present, Go to Pinpoint Test Step **QA1**.

## 5.0

C PASSENGER CAR SERVICE CODE CHART												
Engine Running Service Code		Pinpoint Test Step Direction										
		1.9L EFI	1.9L CFI	2.3L OHC EFI	2.3L TC EFI	2.3L HSC EFI	2.5L CFI	3.0L EFI	3.8L AXOD EFI	3.8L RWD EFI	5.0L SEFI	5.0L MA SEFI
12 GO to	▶	KE1	KB23	KE1	KE1	KE1	KB23	KE1	KE1	KE1	KE1	KE1
13 GO to	▶▶	KE4	KB26	KE15	KE11	KE11	KB26	KE11	KE11	KE11	KE11	KE11
16 GO to	▶▶▶	KE22	KB31	KE1	—	—	KB31	—	—	—	KE1	KE1
17 GO to	▶	KE13	KB31	—	KE13	KE13	KB31	—	—	—	—	—
18 GO to	▶▶	P1	—	—	—	P1	—	—	P1	P1	P1	P1
19 GO to	▶▶▶	KE12	KB26	—	—	—	—	—	—	—	—	—
21 GO to	▶	DE1	DE1	DE1	DE1	DE1	DE1	DE1	DE1	DE1	DE1	DE1
22 GO to	▶▶	DF1	DF7	DF7	DF1	DF7	DF7	DF7	DF7	DF7	DF7	DF1
23 GO to	▶▶▶	DH1	KB12	DH1	DH1	DH1	KB12	DH1	DH1	DH1	DH1	DH1
24 GO to	▶	—	DB1	DB1	DB1	DB1	DB1	DB1	DB1	DB1	DB1	DB1
25 GO to	▶▶	—	—	DG1	DG1	—	—	DG1	—	—	—	—
26 GO to	▶▶▶	DK1	—	—	DK1	—	—	—	—	—	—	DC4
28 GO to	▶	DA1	—	—	DA1	—	—	—	—	—	—	—
31 GO to	▶▶	—	DL21	DD1	—	DL21	DN1	DL21	DL21	DL21	DN1	DN1
32 GO to	▶▶▶	—	DL20	DD11	—	DL20	DN25	DL20	DL20	DL20	DN25	DN25
33 GO to	▶	—	DL30	DD11	—	DL30	DN40	DL30	DL30	DL30	DN40	DN40
34 GO to	▶▶	—	DL25	DD11	KA1	DL25	DN50	DL25	DL25	DL25	DN50	DN50
35 GO to	▶▶▶	—	DL25	DD30	—	DL25	DN5	DL25	DL25	DL25	DN5	DN5
41 GO to	▶	H11	H11	H11	H11	H11	H11	H11	H11	H11	H11	H1
42 GO to	▶▶	H23	H23	H23	H23	H23	H23	H23	H23	H23	H23	H1
44 GO to	▶▶▶	—	—	—	—	—	—	—	—	—	KC1	KC1
45 GO to	▶	—	—	—	—	—	—	—	—	—	—	—
46 GO to	▶▶	—	—	—	—	—	—	—	—	—	KC1	KC1
47 GO to	▶▶▶	KE20	—	—	—	—	—	—	—	—	—	—
48 GO to	▶	KE21	—	—	—	—	—	—	—	—	—	—
52 GO to	▶▶	—	—	—	—	FF5	FF5	FF5	FF5	—	—	—
55 GO to	▶▶▶	—	QF1	—	—	—	QF1	—	—	—	—	—
56 GO to	▶	—	—	—	—	—	—	—	—	—	—	—
58 GO to	▶▶	—	KB5	—	—	—	KB5	—	—	—	—	DC10
66 GO to	▶▶▶	—	—	—	—	—	—	—	—	—	—	DC6
67 GO to	▶	—	FA1	—	—	—	—	—	—	—	—	—
68 GO to	▶▶	—	KB9	—	—	—	KB9	—	—	—	—	—
72 GO to	▶▶▶	—	—	DF10	—	DF10	—	DF10	—	—	—	—
73 GO to	▶	DH20	—	DH20	DH20	DH20	—	DH20	—	—	—	—
74 GO to	▶▶	—	—	FD1	FD1	—	FD1	FD1	FD1	—	—	—
75 GO to	▶▶▶	—	—	FD5	FD5	—	FD5	FD5	FD5	—	—	—
76 GO to	▶	DK30	—	—	DK30	—	—	—	—	—	—	—
77 GO to	▶▶	M1	—	M1	M1	—	—	M1	—	—	—	—
84 GO to	▶▶▶	—	DL11	—	—	—	—	—	—	—	—	—
85 GO to	▶	—	KD6	—	—	—	—	—	—	—	—	—
87 GO to	▶▶	—	J7	—	—	—	—	—	—	—	—	—
91 GO to	▶▶▶	—	—	—	—	—	—	—	—	—	H11	H1
92 GO to	▶	—	—	—	—	—	—	—	—	—	H23	H1
94 GO to	▶▶	—	—	—	—	—	—	—	—	—	KC1	KC1
98 GO to	▶	GO TO QUICK TEST STEP 5.0B										
99 GO to	▶	—	KB29	—	—	—	KB29	—	—	—	—	—
NO CODES CODES NOT LISTED		Go to Pinpoint Test Step QA1										

## QUICK TEST: Engine Running Self-Test

## 5.0

C		LIGHT TRUCK SERVICE CODE CHART						
Engine Running Service Code		Pinpoint Test Step Direction						
		2.3L EFI	2.9L EFI	3.0L EFI	4.9L EFI	5.0L EFI	5.8L EFI	7.5L EFI
12 GO to	▶	KE1	KE1	KE1	KE1	KE1	KE1	KE1
13 GO to	▶▶	KE15	KE11	KE11	KE11	KE11	KE11	KE11
16 GO to	▶▶▶	KE1	—	—	—	—	—	—
17 GO to	▶	KE13	KE13	KE13	KE13	KE13	KE13	KE13
18 GO to	▶▶	—	—	—	P1	P1	P1	P1
21 GO to	▶▶▶	DE1	DE1	DE1	DE1	DE1	DE1	DE1
22 GO to	▶	DF7	DF7	DF7	DF7	DF7	DF7	DF7
23 GO to	▶▶	DH1	DH1	DH1	DH1	DH1	DH1	DH1
24 GO to	▶▶▶	DB1	DB1	DB1	DB1	DB1	DB1	DB1
25 GO to	▶	DG1	DG1	—	DG1	DG1	DG1	—
31 GO to	▶▶	DD1	—	—	DN1	DN1	DN1	DN1
32 GO to	▶▶▶	DD11	—	—	DN25	DN25	DN25	DN25
33 GO to	▶	DD11	—	—	DN40	DN40	DN40	DN40
34 GO to	▶▶	DD11	—	—	DN50	DN50	DN50	DN50
35 GO to	▶▶▶	DD30	—	—	DN5	DN5	DN5	DN5
38 GO to	▶	—	—	—	—	—	—	—
41 GO to	▶▶	H11	H11	H11	H11	H11	H11	H11
42 GO to	▶▶▶	H23	H23	H23	H23	H23	H23	H23
44 GO to	▶	—	—	—	KC1	KC1	KC1	KC1
45 GO to	▶▶	—	—	—	KC1	KC1	KC1	KC1
46 GO to	▶▶▶	—	—	—	KC1	KC1	KC1	—
52 GO to	▶	FF5	—	FF5	FF5	FF5	—	—
72 GO to	▶▶	DF10	DF10	DF10	DF10	DF10	DF10	DF10
73 GO to	▶▶▶	DH20	DH20	DH20	DH20	DH20	DH20	DH20
74 GO to	▶	FD1	FD1	FD1	—	—	—	—
75 GO to	▶▶	FD5	FD5	FD5	—	—	—	—
77 GO to	▶▶▶	M1	M1	M1	M1	M1	M1	M1
98 GO to	▶	GO TO QUICK TEST STEP 5.0B						
NO CODES CODES NOT LISTED	▶▶	Go to Pinpoint Test Step QA1						

## QUICK TEST: Continuous Self-Test

**6.0**

### A CONTINUOUS MEMORY CODES

#### SPECIAL NOTES:

- Verify that a **Pass Code 11** was received in both Key On Engine Off and Engine Running Self-Tests before continuing with this test.
- Refer to the Appendix for a detailed description of how to use the Continuous Monitor Mode.

#### DETERMINING THE CONTINUOUS MEMORY CODES TO BE SERVICED

- Refer to the Continuous Memory Codes recorded in Quick Test Step 3.0 A.
- The cause of some of the Continuous Memory Codes may have been eliminated during either Key On Engine Off or Engine Running Self-Test service.
- Address only those Continuous Memory Codes for which a similar code has not been previously serviced.
- Go to **Part B** of Continuous Self-Test.

## QUICK TEST: Continuous Self-Test

## 6.0

[illegible]



## 6.0

B		LIGHT TRUCK SERVICE CODE CHART						
Continuous Memory Service Code		Pinpoint Test Step Direction						
		2.3L EFI	2.9L EFI	3.0L EFI	4.9L EFI	5.0L EFI	5.8L EFI	7.5L EFI
14 GO to	►	Y1	Y1	Y1	Y1	Y1	Y1	Y1
15 GO to	►►	QB1	QB1	QB1	QB1	QB1	QB1	QB1
18 GO to	►►►	N1	N1	N1	N1	N1	N1	N1
22 GO to	►	DF90	DF90	DF90	DF90	DF90	DF90	DF90
29 GO to	►►	DP1	DP1	DP1	DP1	DP1	DP1	—
31 GO to	►►►	DD90	—	—	DN92	DN92	DN92	DN92
32 GO to	►	—	—	—	DN90	DN90	DN90	DN90
33 GO to	►►	—	—	—	DN95	DN95	DN95	DN95
34 GO to	►►►	—	—	—	DN98	DN98	DN98	DN98
35 GO to	►	—	—	—	DN92	DN92	DN92	DN92
41 GO to	►►	H29	H29	H29	H29	H29	H29	H29
51 GO to	►►►	DE91	DE91	DE91	DE91	DE91	DE91	DE91
53 GO to	►	DH90	DH90	DH90	DH90	DH90	DH90	DH90
54 GO to	►►	DB90	DB90	DB90	DB90	DB90	DB90	DB90
61 GO to	►►►	DE94	DE94	DE94	DE94	DE94	DE94	DE94
63 GO to	►	DH94	DH94	DH94	DH94	DH94	DH94	DE94
64 GO to	►►	DB93	DB93	DB93	DB93	DB93	DB93	DB93
87 GO to	►►►	J95	J95	J95	J95	J95	J95	J95
95 GO to	►	—	J90	J90	J90	J90	J90	J90
96 GO to	►►	—	J92	J92	J92	J92	J92	J92
NO CODES CODES NOT LISTED		Go to Pinpoint Test Step QA1						

## **APPENDIX: Self-Test Description**

The Self-Test is divided into three specialized tests: Key On Engine Off Self-Test, Engine Running Self-Test, and Continuous Self-Test. The Self-Test is not a conclusive test by itself, but is used as a part of the functional Quick-Test diagnostic procedure. The processor stores the Self-Test program in its permanent memory. When activated, it checks the EEC-IV system by testing its memory integrity and processing capability, and verifies that various sensors and actuators are connected and operating properly.

The Key On Engine Off and Engine Running Self-Tests are functional tests which only detect faults present at the time of the Self-Test. Continuous Self-Test is an ongoing test that stores fault information for retrieval at a later time.

### **KEY ON ENGINE OFF SELF-TEST**

At this time, a test of the EEC-IV system is conducted with power applied and engine at rest.

For Self-Test to detect errors in the Key On Engine Off Self-Test mode, the fault must be present at the time of testing. For intermittents, refer to Continuous Memory Codes.

### **SEPARATOR PULSE**

A single 1/2 second separator pulse is issued 6-9 seconds after the last Key On Engine Off Test code. Then, 6-9 seconds after the single 1/2 second separator pulse, the Continuous Memory Codes will be issued.

**NOTE: The separator code and Continuous Memory Codes follow Key On Engine Testing codes ONLY.**

### **CONTINUOUS MEMORY CODES**

Continuous Memory Codes are issued as a result of information stored during continuous Self-Test, while the vehicle was in normal operation. These codes are displayed only during Key On Engine Off testing and after the separator code. These codes should be used for diagnosis only when Key On Engine Off and Engine Running Self-Tests result in code 11 and all Quick Test Steps 1.0 through 5.0 have been successfully completed.

### **ENGINE RUNNING SELF-TEST**

At this time, a test of the EEC-IV system is conducted with the engine running. The sensors are checked under actual operating conditions and at normal operating temperatures. The actuators are exercised and checked for corresponding results.

### **ENGINE IDENTIFICATION CODES (ID CODES)**

Engine ID codes are issued at the beginning of the Engine Running Self-Test and are one-digit numbers represented by the number of pulses sent out. The engine ID code is equal to one-half the number of engine cylinders (i.e. 2 pulses = 4 cylinders). These codes are used to verify the proper processor is installed and that the Self-Test has been entered.

### **DYNAMIC RESPONSE CHECK**

The dynamic response check verifies the movement of the TP, VAF, and MAP sensors during the brief Wide-Open Throttle (WOT) performed during the Engine Running Self-Test. The signal for the operator to perform the brief WOT is a single pulse or 10 code on the STAR Tester.

## **APPENDIX: Self-Test Description**

### **POWER STEERING PRESSURE SWITCH TEST**

On vehicles equipped with Power Steering Pressure Switch (PSPS), the steering wheel must be turned one-half turn and released AFTER the ID Code. This tests the ability of the EEC-IV system to detect a change of state in the Power Steering Pressure Switch.

### **BRAKE ON/OFF SWITCH TEST**

On vehicles equipped with Brake ON/OFF Switch (BOO), the brake pedal MUST be depressed and released AFTER the ID Code. This tests the ability of the EEC-IV system to detect a change of state in the Brake ON/OFF Switch.

## APPENDIX: Code Output Format

### SERVICE CODES

The EEC-IV system communicates service information through the Self-Test service codes. These service codes are two-digit numbers representing the results of Self-Test.

The service codes are transmitted on the Self-Test output (STO) line found in the vehicle Self-Test connector. They are in the form of timed pulses, and read by the technician on a voltmeter, STAR tester, "Check Engine" Light (MIL) or on the Continental message center.

### SELF-TEST OUTPUT CODE FORMAT

#### KEY ON ENGINE OFF AND CONTINUOUS MEMORY CODES

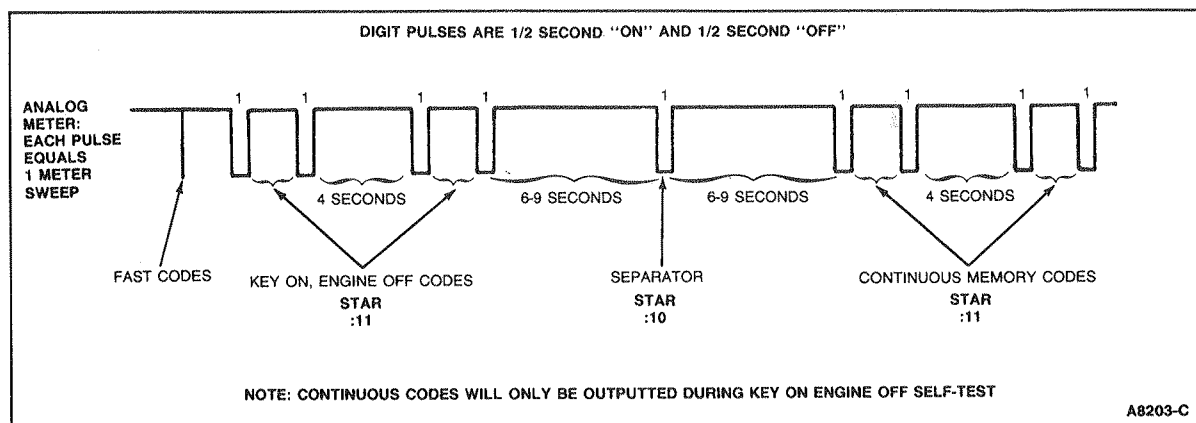


Figure 1 Key On Engine Off and Continuous Memory Code Format

### SELF-TEST OUTPUT CODE FORMAT

#### ENGINE RUNNING CODES

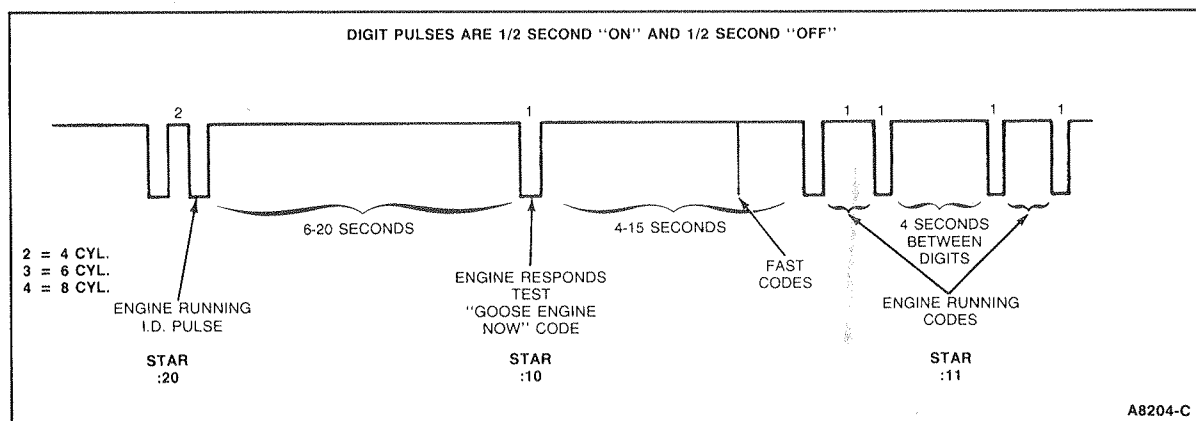


Figure 2 Engine Running Self-Test Code Format

#### Fast Codes

Fast codes are issued prior to regular service codes. These codes contain the identical information as the regular service codes but are transmitted at 100 times the normal rate. These codes are interpreted by special equipment at the end of the assembly line by the Body and Assembly Division.

Some meters in service detect these codes as a short burst of information (slight meter deflection).

## APPENDIX: Continuous Self-Test

The Continuous Memory service codes are separated from the Quick Test Key On Engine Off codes by a single separator pulse, Figure 3.

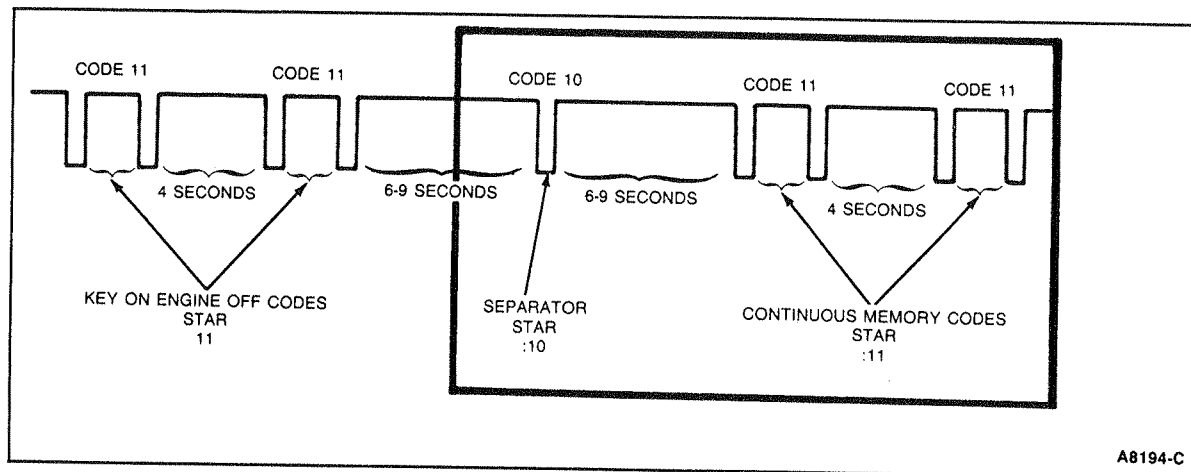


Figure 3 Continuous Memory Code Format

The Continuous Memory codes should never be used for Diagnosis until the Key On Engine Off and Engine Running Self-Tests result in a pass code 11.

During this mode of testing the EEC-IV Processor continuously monitors inputs for opens and shorts. The Continuous Memory Codes must be retrieved within 40 engine temperature warm up cycles. On the 41st Engine Temperature cycle, the service code will be automatically erased. The Continuous Memory Codes can also be erased by deactivating Self-Test while the service codes are being outputted.

## APPENDIX: Self-Test With STAR Tester

### READING CODES — SELF-TEST AUTOMATIC READOUT (STAR) TESTER

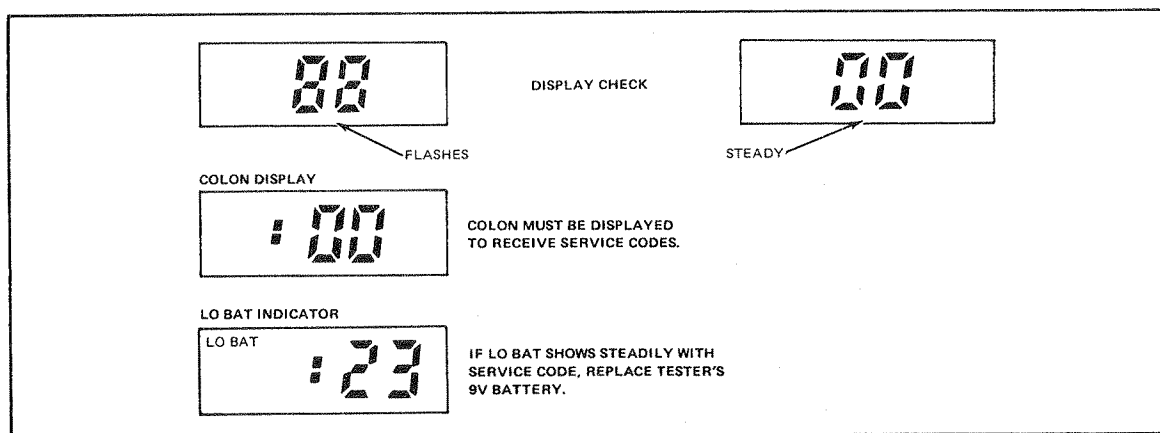
After hooking up the STAR tester and turning on its power switch, the tester will run a display check and the numerals 88 will begin to flash in the display window (Figure 4). A steady 00 will then appear to signify that the STAR tester is ready to start the Self-Test and receive the test's service codes.

To receive the service codes, press the push button at the front of the STAR tester. The button will latch down, and a colon will appear in the display window in front of the 00 numerals. The colon **must** be displayed to receive the service codes.

If, for any reason, the technician wishes to clear the display window during the Self-Test, he must turn off the vehicle's engine, press the tester's push button once to unlatch it (colon will disappear), then press the button again to latch down the button (colon will appear again). Every time the STAR tester is turned off, the low battery indicator (LO BAT) should show briefly at the upper left corner of the tester's display window. If the LO BAT indicator shows steadily at any other time during the operation of the STAR tester with any service code, turn its power switch to Off and replace the 9-volt battery in the tester.

The STAR tester will display the last service code received, even after disconnecting it from the vehicle. It will hold the service code on the display until the power is turned off or the push button is unlatched and relatched.

**WARNING: ANYONE WHO DEPARTS FROM THE INSTRUCTIONS PROVIDED IN THIS PUBLICATION MUST FIRST ESTABLISH THAT HE COMPROMISES NEITHER HIS PERSONAL SAFETY NOR THE VEHICLE INTEGRITY BY HIS CHOICE OF METHODS, TOOLS, OR PARTS.**



A8186-A

Figure 4 Star Tester Output Code Format

## APPENDIX: Self-Test With Analog Voltmeter

### READING CODES — ANALOG VOLTMETER

When a service code is reported on the analog voltmeter for a function test, it will represent itself as a pulsing or sweeping movement of the voltmeter's needle across the dial face of the voltmeter (Figure 5). Therefore, a single-digit number of three will be reported by three needle pulses (sweeps). However, as previously stated, a service code is represented by a two-digit number, such as 2-3. As a result, the Self-Tests service code of 2-3 will appear on the voltmeter as two needle pulses (sweeps), then, after a two-second pause, the needle will pulse (sweep) three times.

The Continuous Memory Codes are separated from the Key On Engine Off codes by a six-second delay, a single half-second sweep, and another six-second delay. They are produced on the voltmeter in the same manner as the Key On Engine Off codes.

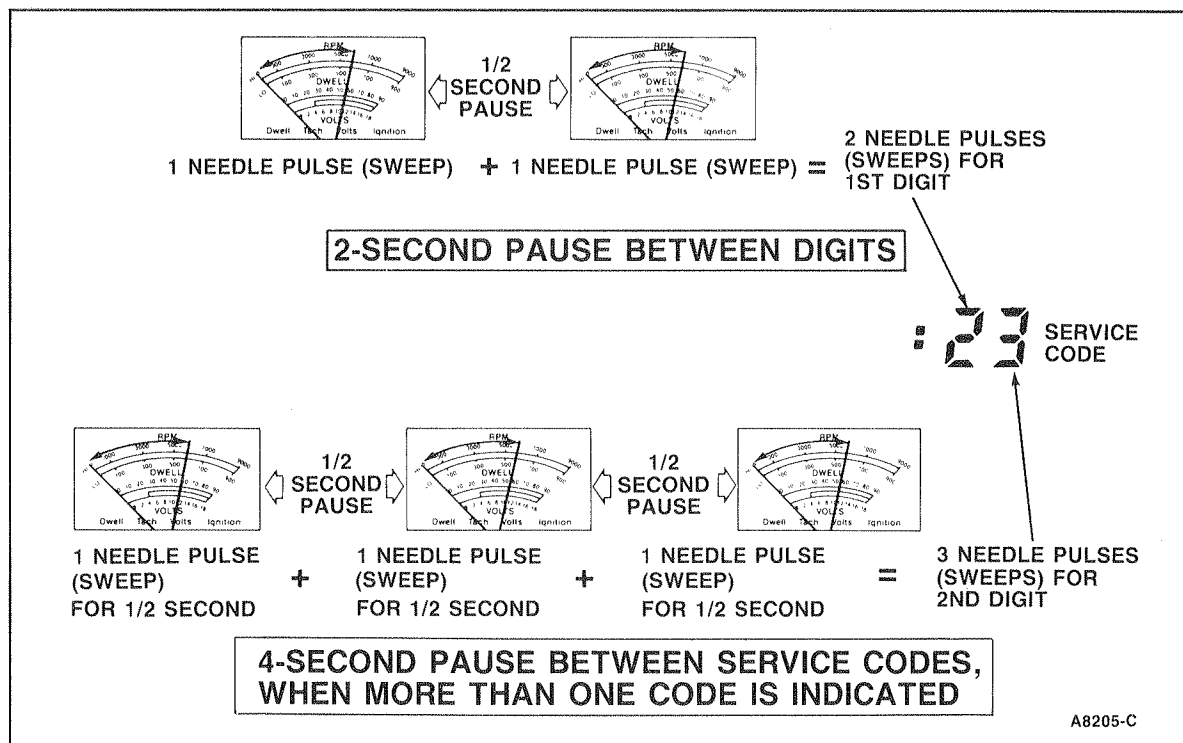


Figure 5 Analog Voltmeter Output Code Format

## APPENDIX: Self-Test With "Check Engine" Light (MIL)

### READING CODES — "CHECK ENGINE" LIGHT (MIL)

The "Check Engine" Light on the front dash panel will remain on when a hard fault (open or short circuit) is present.

During Self-Test a service code is reported by the "Check Engine" Light. It will represent itself as a flash on the "Check Engine" Light display on the dash panel (Figure 6). A single-digit number of three will be reported by three flashes.

However, as previously stated, a service code is represented by a two-digit number, such as 2-3. As a result, the Self-Test service code of 2-3 will appear on the "Check Engine" Light display as two flashes, then, after a two-second pause, the light will flash three times.

The Continuous Memory Codes are separated from the Key On Engine Off codes by a six-second delay, a single half-second flash, and another six-second delay. They are produced on the "Check Engine" Light display in the same manner as the Key On Engine Off codes.

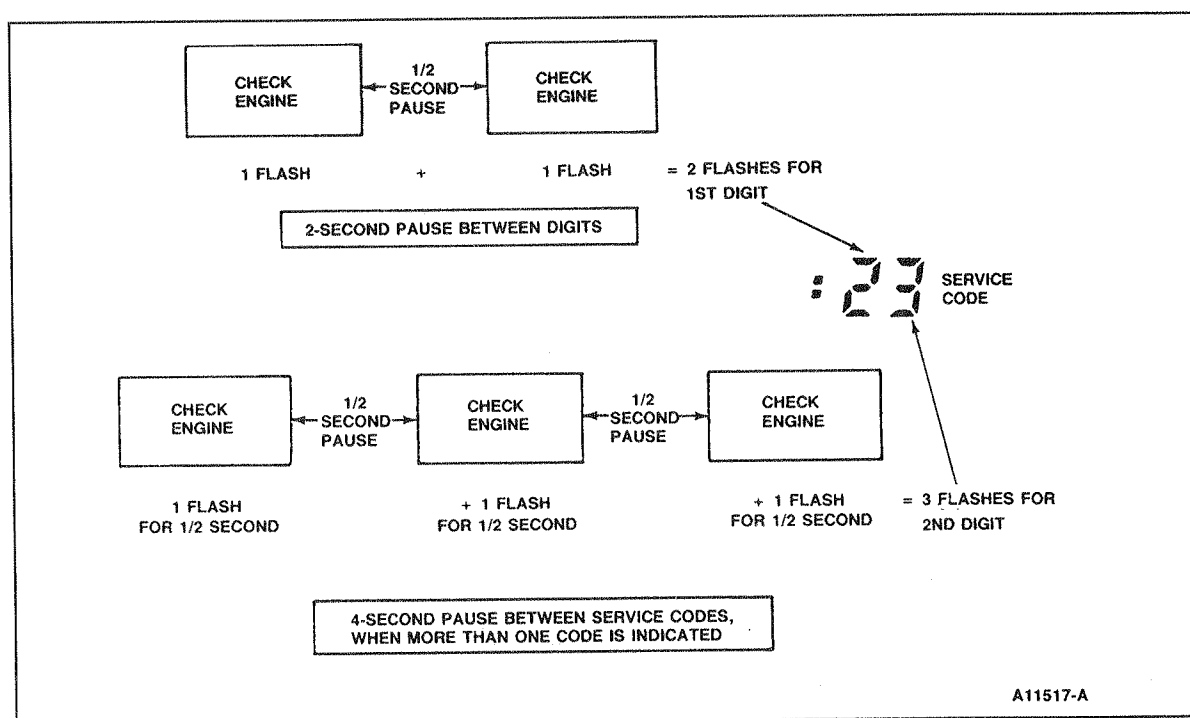


Figure 6 "Check Engine" Light Output Code Format



## APPENDIX: Self-Test With Message Center (Continental Only)

### HOW TO RUN SELF-TEST USING THE CONTINENTAL MESSAGE CENTER

1. Jumper STI to SIG RTN at the Self-Test connectors.
2. On the Electronic Instrument Cluster, hold in all three buttons (SELECT, CHECKOUT and RESET) at the same time.
3. Key On Engine Off Self-Test
  - While holding in all three buttons, place ignition switch in the ON position. Release buttons.
- Key On Engine Running Self-Test
  - While holding in all three buttons, place ignition switch in the RUN position. Release buttons.
4. To initiate Self-Test, press the checkout button twice. A base readout of **2 5 5 4** indicates that Self-Test has been entered successfully.
5. Service code output will be displayed in the left side boxes following the base display.
6. To exit Self-Test, turn ignition switch to OFF.

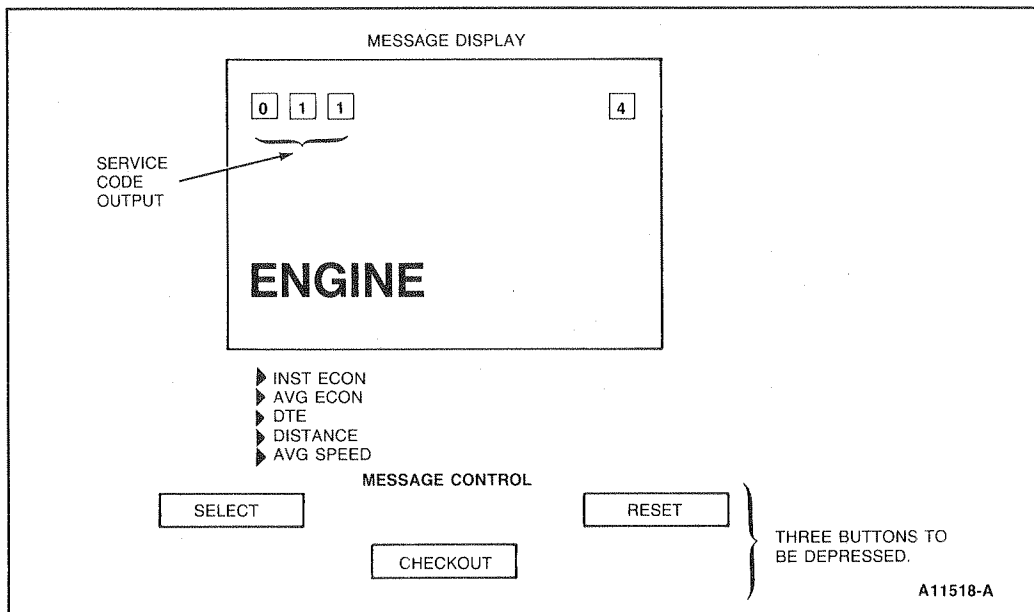


Figure 7 Message Center Output Code Format

PLEASE REFER TO TSB 87-22-15 FOR: REVISED KOEO WIGGLE TEST AND  
STATE EMISSION TEST.

## APPENDIX: Diagnostic Aids

### CONTINUOUS MONITOR MODE (WIGGLE TEST)

#### SPECIAL NOTES:

- The Continuous Monitor Modes allow the technician to **ATTEMPT** to recreate an intermittent fault.
- The STAR Tester and the "Check Engine" Light (MIL) will flash the LED. The STAR Tester may also sound an alert when a fault is recreated.
- The needle of the VOM will sweep across the face of the meter when a fault is recreated.

#### KEY ON ENGINE OFF

1. Hook up a STAR Tester or VOM as shown in Quick Test Step 2.0.
2. Turn the STAR Tester On but **DO NOT** latch the center Button. **DO NOT** ground STI if using a VOM or "Check Engine" Light.
3. Turn the ignition key to the ON position.
4. You are now in the Continuous Monitor Mode.
5. Tap, move, and wiggle the suspect sensor and/or harness. If a fault is detected, a Service Code will be stored in memory and will be indicated as explained above depending on the type of equipment being used.

#### ENGINE RUNNING

1. Hook up a STAR Tester or VOM as shown in Quick Test Step 2.0.
2. Start the engine.
3. Activate Self-Test, wait 10 seconds, deactivate and reactivate Self-Test. **DO NOT** shut the engine off.
4. You are now in the Engine Running Continuous Monitor Mode.
5. Tap, move, and wiggle the suspect sensor and/or harness. If a fault is detected, a Service Code will be stored in memory and will be indicated as explained above depending on the type of equipment being used.

## APPENDIX: Diagnostic Aids

### HOW TO CLEAR THE CONTINUOUS MEMORY CODES

1. Run the Key On Engine Off Self-Test according to Quick Test Step 3.0A.
2. When the Service Codes begin to be displayed, deactivate Self-Test:
  - STAR Tester: Unlatching the center button (up position).
  - Analog VOM: Remove the jumper wire from between Self-Test Input (STI) connector and the Signal Return Pin of the Self-Test connector.
  - "Check Engine" Light (MIL): Remove the jumper wire from between Self-Test Input (STI) connector and the SIGNAL RETURN pin of the Self-Test connector.
  - Message Center (Continental Only): Remove the jumper wire from between Self-Test input (STI) connector and the SIGNAL RETURN pin of the Self-Test connector.
4. The continuous service codes will be erased from the processor's memory.

### OUTPUT STATE CHECK

The output state check aids in servicing output actuators associated with the EEC-IV system. It enables the technician to energize and de-energize most of the system output actuators on command. This mode is entered after all codes have been received from Key On Engine Off and Continuous Testing. At this time, leave Self-Test activated and depress the throttle. Each time the throttle is depressed the output actuators will change state from energized to de-energized or from de-energized to energized.

1. Enter Self-Test.
2. Code Output Ends.
3. Do Brief WOT.
4. EEC-IV Output To Actuators Energized.
5. Do Brief WOT.
6. EEC-IV Output To Actuators De-Energized.

## APPENDIX: Diagnostic Aids

### CYLINDER BALANCE TEST

The Cylinder Balance test on the 5.0L SEFI and 5.0L SEFI MA vehicles is designed to aid in the detection of a non-contributing cylinder.

The Cylinder Balance test first reads engine rpm, with all injectors activated. Next, each injector is turned "off and on," one at a time. The rpm drop that results, if any, is then read. These two rpm's are compared to verify that the rpm drop was greater than a calibrated level.

The Cylinder Balance test has the capability of comparing rpm drop of each cylinder against three different calibrated levels. The first level checks for gross errors (electrical opens, shorts, etc.). The second and third levels check for partially contributing cylinders. If the appropriate rpm drop is not achieved at any of the levels, then a service code corresponding to that cylinder will be sent.

The Cylinder Balance Test service codes are listed in Pinpoint Test Step **H9**.

1. Perform Engine Running Self-Test.
2. After the last repeated service code is received, wait 5-10 seconds.
3. Lightly depress and release throttle (not wide-open throttle) within two minutes of the last repeated service code.
4. Cylinder Balance Test will be performed at the first test level. Test time is approximately three minutes.
5. After the last repeated Cylinder Balance Test pass code 90, re-enter test within two minutes by lightly depressing and releasing the throttle. The second test level of the Cylinder Balance Test will now be performed.
6. After the last repeated Cylinder Balance Test pass code 90, re-enter test within two minutes by lightly depressing and releasing the throttle. Cylinder Balance Test will now be tested at the third test level.
7. Cylinder Balance Test may be repeated as many times as necessary by repeating Step 6. All additional testing will be performed at the third test level.

The Cylinder Balance Test is designed to aid in the detection of a non-contributing or partially contributing cylinder. The Cylinder Balance Pinpoint Test Steps are designed to isolate only EEC related problems.

## **APPENDIX: Diagnostic Aids**

### **FAILURE MODE EFFECTS MANAGEMENT (FMEM)**

FMEM is an alternate system strategy in the ECA designed to allow improved vehicle drive should one or more sensor inputs fail.

When a sensor input is perceived to be out-of-limits by the ECA, an alternative strategy will be initiated.

The ECA will substitute a fixed in-limit sensor value and will continue to monitor the faulty sensor input. If the faulty sensor operates within limits, the ECA will return to the normal engine running strategy.

98 — Code 98 will be displayed when FMEM is in effect.

The "Check Engine" Light (MIL)/Message will remain on when FMEM is in effect in all applications except 49 States Continental.

## APPENDIX: Diagnostic Aids

### "CHECK ENGINE" LIGHT (MALFUNCTION INDICATOR LIGHT) ALL APPLICATIONS EXCEPT CONTINENTAL

The "Check Engine" light is intended to alert the driver of certain malfunctions in the engine control system.

If such a fault occurs, the EEC-IV processor will substitute a value or values and continue operating. This process is called Failure Mode Effects Management (FMEM). In some cases this action may result in a slight change in driveability.

#### HOW THE "CHECK ENGINE" LIGHT OPERATES

##### System OK

The "Check Engine" light will remain on while the ignition key is in RUN position.

Once the vehicle has started the "Check Engine" light will go out.

##### System Not OK

If the "Check Engine" light should remain on after the vehicle has started, run Key On Engine Off Self-Test to completion. If the light continues to remain on, go to EEC-IV Diagnostic By Symptom in the Engine Supplement Section.

If the "Check Engine" light never comes on, go to EEC-IV Diagnostic By Symptom.

If the vehicle is a no start, go to Pinpoint Test Step **A1**.

**NOTE:** When in Self-Test the "Check Engine" light will also flash the service codes.

## APPENDIX: Diagnostic Aids

### "CHECK ENGINE"/"CHECK DCL" MESSAGE (DATA COMMUNICATIONS LINK)

#### Continental Applications Only

The EEC-IV processor transmits the "Check Engine" message to the message center through the Data Communications Link (DCL). The message center is used to display the "Check Engine" and "Check Engine"/"Check DCL" messages.

#### HOW THE "CHECK ENGINE" MESSAGE OPERATES

**Service Codes:** Service codes can be digitally displayed on the message center when running self-test. (See Appendix: Self-Test)

On California applications only, the "Check Engine" message is activated when the EEC-IV processor switches to an alternate strategy of operation. This process is called Failure Mode Effects Management (FMEM). The "Check Engine" message is intended to alert the driver of certain malfunctions in the engine control system.

**FMEM Mode (Calif. only):** The "Check Engine" message is displayed and accompanied by a one second tone every four seconds. The tone is suppressed after one minute.

On all Continental applications the "Check Engine" message will also be activated during an EEC-IV processor Limited Operating Strategy (LOS) mode. (See Section 12)

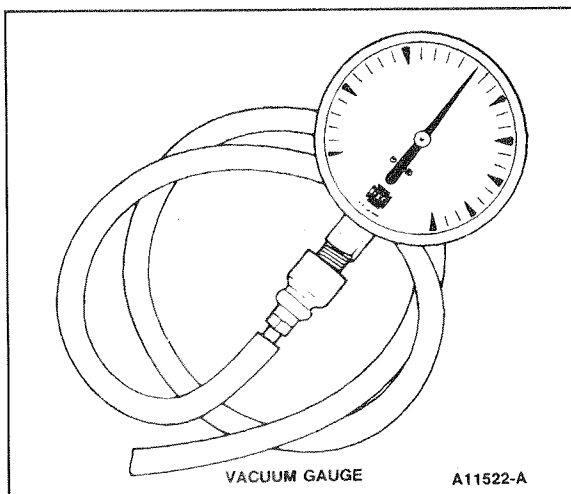
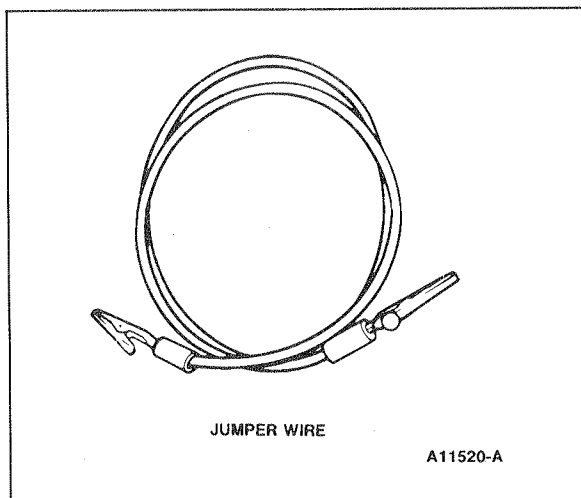
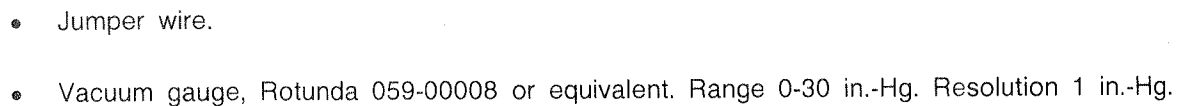
**LOS/DCL Failure:** The "Check Engine" message will be displayed as described in FMEM. In addition, the message "Check DCL" will be displayed alternately with the "Check Engine" message every four seconds.

If the "Check Engine" and/or "Check Engine"/"Check DCL" message should come on after the vehicle has started, Run Key On Engine Off Self-Test to completion. If the message continues to remain on, go to EEC-IV Diagnostic By Symptom in the Engine Supplement Section.

If the vehicle is a no start, go to Pinpoint Test Step **A1**.

**EQUIPMENT REQUIRED:**

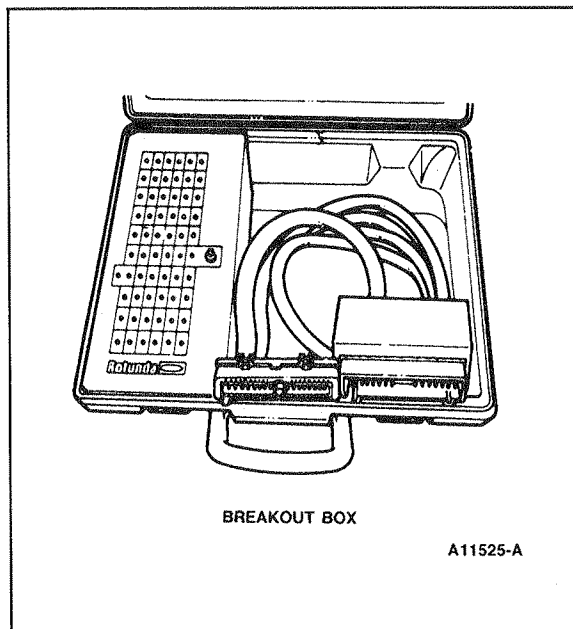
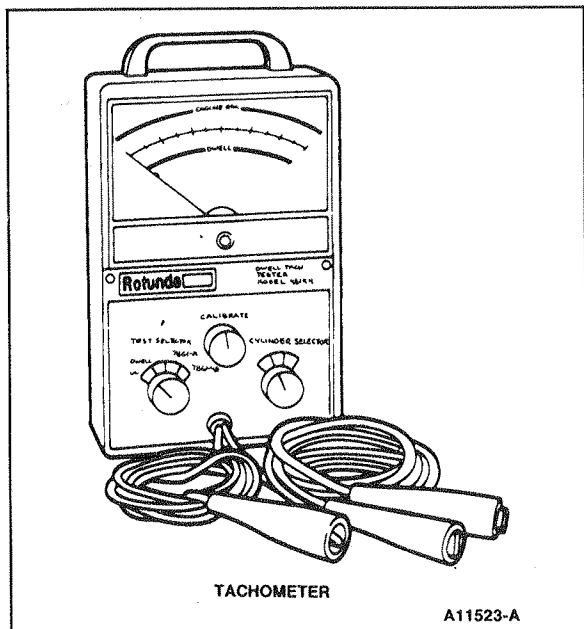
- 
- Diagram of the Rotunda Ford STAR Automatic Readout Tester. The device is a rectangular unit with a display window at the top, a push button below it, and a power switch on the right side. Labels with arrows point to the 'DISPLAY WINDOW', 'PUSH BUTTON', and 'ON-OFF POWER SWITCH'. The top panel features three terminals labeled 'GND', 'OUT', and 'IN'. The front panel displays the 'Rotunda Ford' logo and the 'STAR' model name with the text 'SELF TEST AUTOMATIC READOUT' below it.



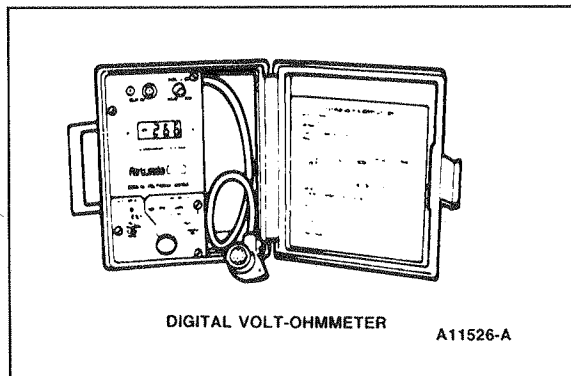
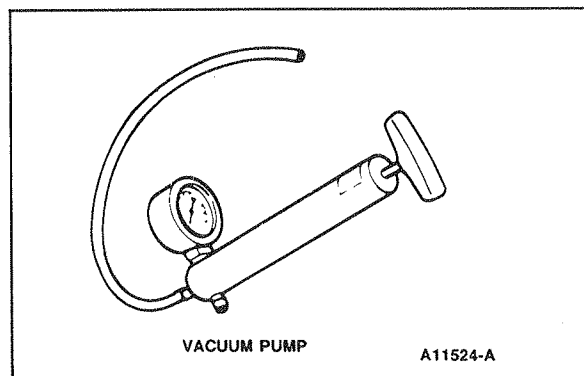


## APPENDIX: Test Equipment (Continued)

- Tachometer, Rotunda No. 059-00010 or equivalent. Range 0-6,000 rpm. Accuracy  $\pm 40$  rpm. Resolution 20 rpm.
- Breakout Box, Rotunda 014-00322, Special Service Tool T83L-50-EEC-IV or equivalent.

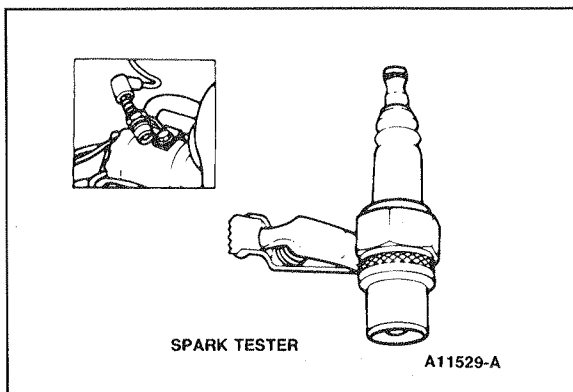
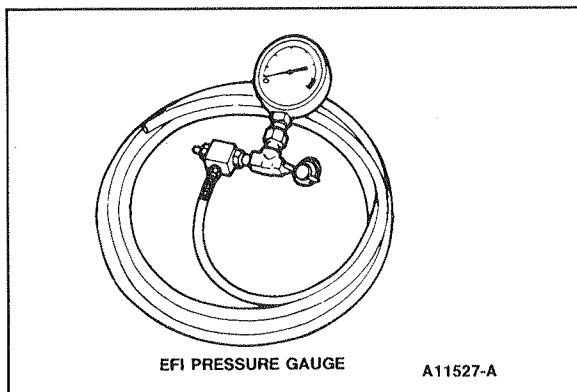


- Vacuum pump, Rotunda No. 021-00014 or equivalent. Range 0-30 in. Hg.
- Digital volt-ohmmeter, Rotunda No. 014-00407 or equivalent. Input impedance 10 Megaohm minimum.



## APPENDIX: Test Equipment (Continued)

- Electronic Fuel Injection Pressure Gauge EFI/CFI only, Tool T80L-9974-A or equivalent. (Use instructions. For specific applications, refer to Shop Manual, Group 24.)
- Spark tester (optional modified spark plug with side electrode removed). Tool D81P-6666-A or equivalent.



- Timing light, Rotunda model 059-00006 or equivalent.
- Non-powered test lamp.

