

# SECTION 8B

## Ignition Systems

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# SECTION 8B

## Ignition Systems

### Contents (continued)

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## Description and Operation

### Ignition and Timing Systems

The ignition system provides spark control to the engine during all modes of operation. The ignition system consists of three sub-systems: primary ignition, secondary ignition, and timing advance. The 1.8L and 2.0L engines use an Ignition Control Module (ICM) with the coil mounted separately from the distributor. The 1.6L engines use an integrated distributor mounted ignition system with vacuum advance. The 1.3L and 2.5L engines use a distributor with an integrated coil and ICM.

### Primary Ignition Components

The primary ignition components include the coil primary circuit, the Ignition Control Module (ICM), and ignition switch. When the ignition switch is turned ON, the PCM signals the ICM. In 1.3L, 1.6L, 1.8L, and 2.5L, the ICM controls current flow through the ignition coil and produces a high voltage spark. In the 2.0L, the ICM sends the signal to the ignition coil, where the high voltage spark is produced. It is the spark which is passed onto the secondary ignition system.

### Secondary Ignition Components

The secondary ignition components include the spark plugs, the spark plug wires, the distributor cap, the rotor, the coil wire (if equipped), and the coil secondary circuit. The high voltage spark produced in the primary ignition system is passed from the ignition coil to the distributor. The rotor and distributor cap are used to send the spark to each spark plug.

### Timing Advance Components

#### 1.3L, 1.8L, 2.0L, and 2.5L

The spark advance and retard functions are controlled by the Powertrain Control Module (PCM). The PCM receives signals from various switches and sensors and then sends the spark timing signal to the distributor.

#### 1.6L

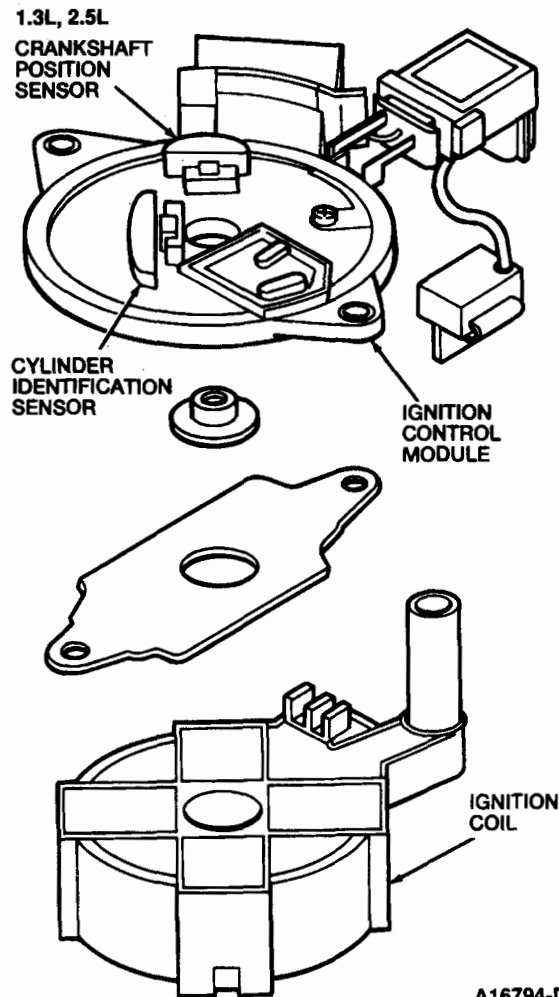
The 1.6L Turbo uses governor weights, a knock control module, and a vacuum advance / boost retard diaphragm. The 1.6L Non-Turbo uses governor weights and a dual vacuum advance diaphragm.

## Description and Operation

### Ignition Control Module (ICM)

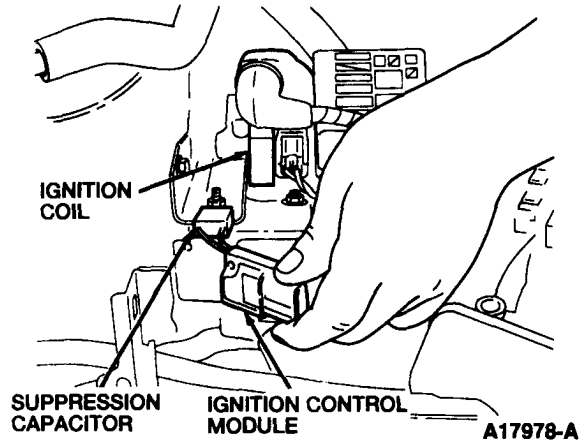
The 1.3L, 1.6L, 1.8L, and 2.5L engine's Ignition Control Module (ICM) is an output device controlled by the Powertrain Control Module (PCM). The PCM sends a signal to the ICM. The ICM controls current flow through the ignition coil where a high voltage spark is generated. The high voltage spark is then sent to the spark plugs in the ignition system.

The PCM sends a Spark Out (SPOUT) signal for the 2.0L engines to the ICM. The ICM sends this signal to the ignition coil, where it is converted into a high voltage spark that is sent to the spark plugs.

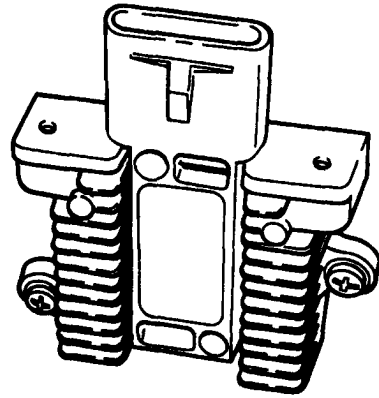


## Description and Operation

1.8L



2.0L



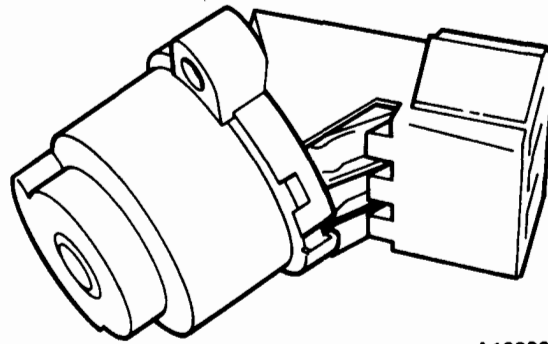
### IGNITION COIL

Engine	Location
1.8L	Mounted near ignition coil, forward of the LH strut.
1.3L, 1.6L, 2.5L	Mounted in the distributor.
2.0L	Mounted to LH strut, next to fuel filter (MTX). LF corner of engine compartment, left of cooling fan (CD4E).

## Description and Operation

### Ignition (IGN) Switch

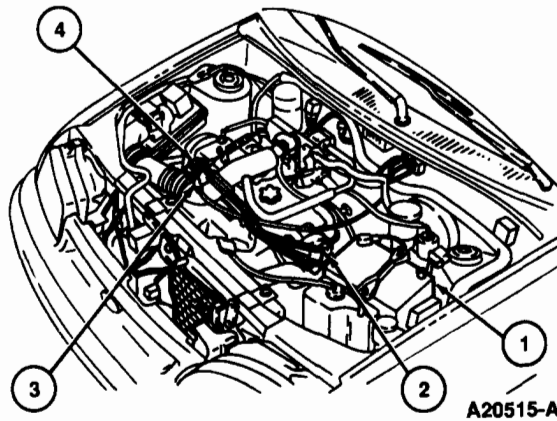
The Ignition (IGN) switch directs current to the vehicle's systems according to its position. The Powertrain Control Module (PCM) detects the ignition switch position by a series of inputs, and controls the vehicle's operation based on this information.



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Engine	Location
1.3L, 1.6L, 1.8L, 2.0L, 2.5L	Mounted to steering column.

### 1.3L Component Location



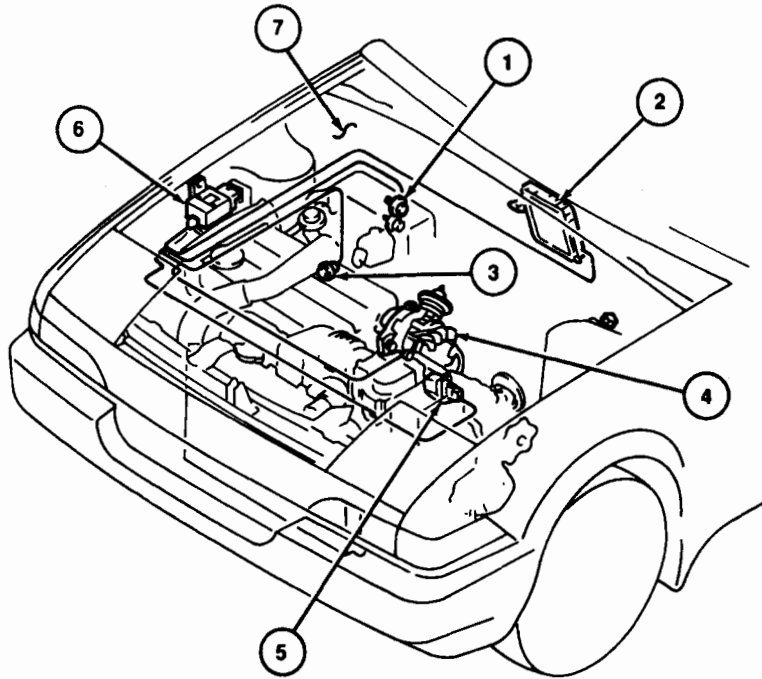
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Figure 1.

Item	Description
1	Battery
2	Distributor (Integrated Ignition Control Module and Ignition Coil)
3	Spark Plug Wire
4	Spark Plug

## Description and Operation

### 1.6L Component Location



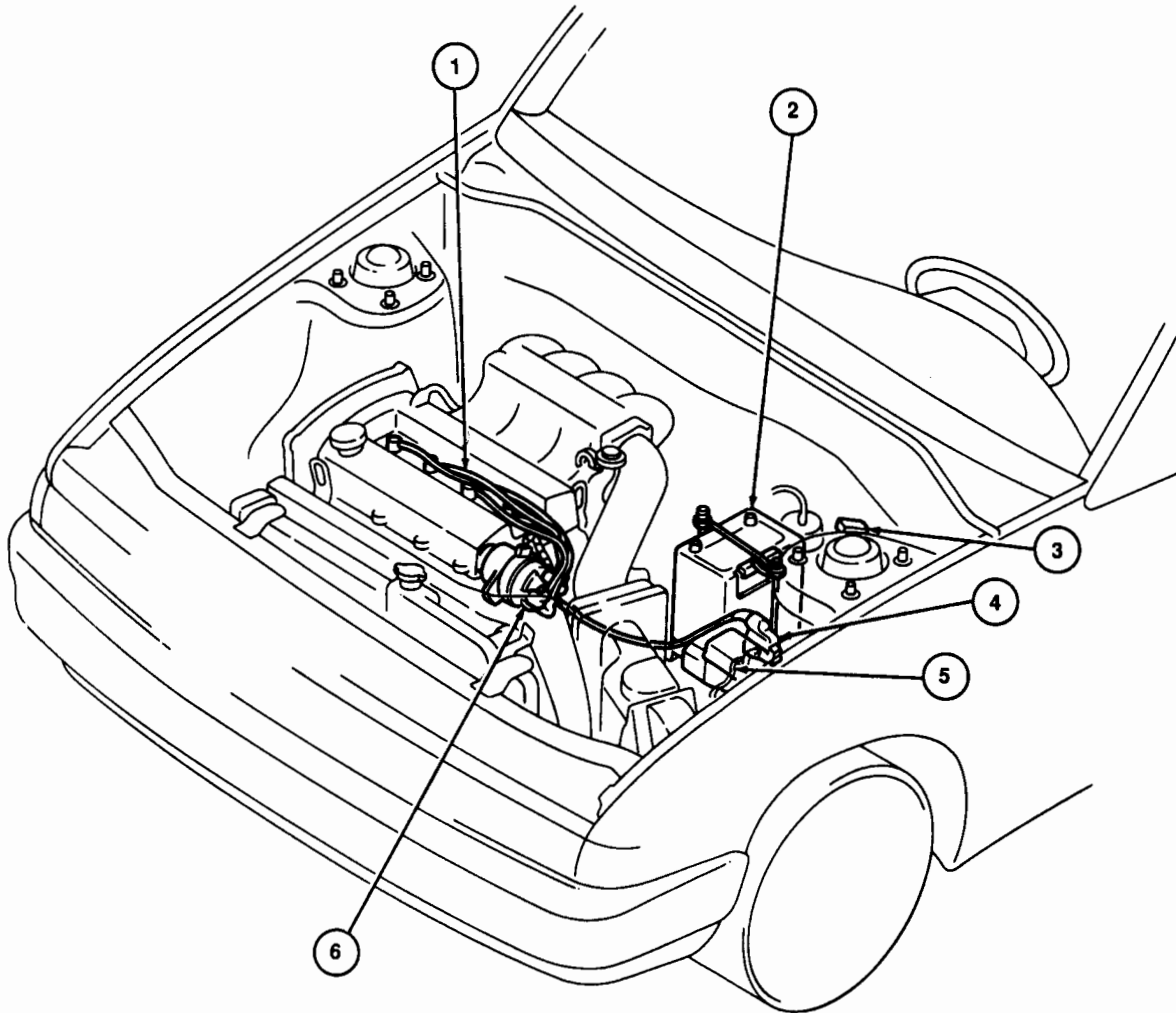
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Figure 2.

Item	Description
1	Boost Pressure Switch (Turbo Only)
2	Powertrain Control Module (PCM)
3	Knock Sensor (Turbo Only)
4	Distributor (Integrated Distributor Mounted Ignition With Vacuum Advance [DMIVA] Module)
5	Ignition Coil
6	Knock Control Module (Turbo Only)
7	Self-Test Input (STI) Connector

## Description and Operation

### 1.8L Component Location



B5411-C

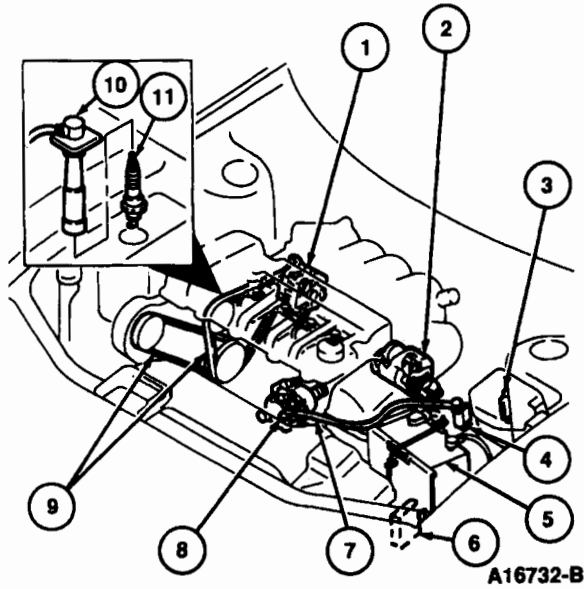
Figure 3.

Item	Description
1	Spark Plug Wires (4)
2	Battery
3	Data Link Connector (DLC)
4	Ignition Coil
5	Ignition Control Module (TI3)
6	Distributor



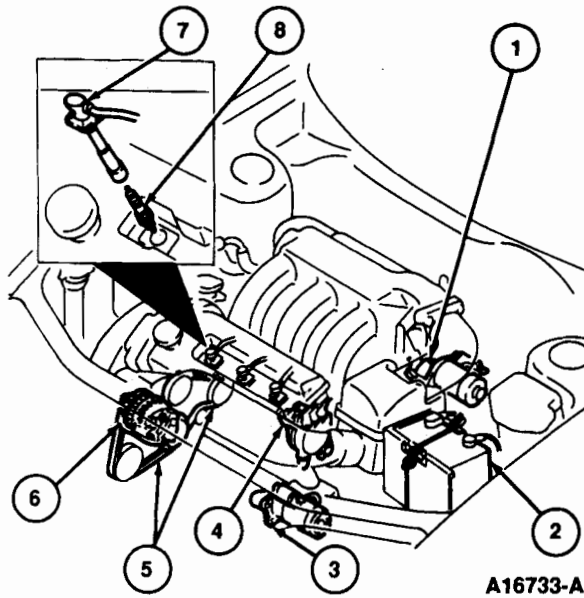
## Description and Operation

### 2.0L Component Location



Item	Description
1	Generator
2	Starter
3	Ignition Control Module (TFI-IV) (MTX)
4	Ignition Coil
5	Battery
6	Ignition Control Module (TFI-IV) (CD4E)
7	Primary Coil Wire
8	Distributor
9	Drive Belts
10	Spark Plug Boot
11	Spark Plug

### 2.5L Component Location



Item	Description
1	Starter (4EAT)
2	Battery
3	Starter (MTX)
4	Distributor (Integrated Ignition Control Module and Ignition Coil)
5	Drive Belts
6	Generator
7	Spark Plug Boot
8	Spark Plug

## Diagnosis and Testing

### System Inspection

1. Visually inspect the components of the ignition system.

#### VISUAL INSPECTION CHART

Mechanical	Electrical
<ul style="list-style-type: none"> <li>● Damaged or worn distributor cap and rotor</li> <li>● Damaged spark plugs</li> <li>● Improperly seated spark plug, distributor cap, or rotor</li> <li>● Corroded, contaminated, or carbon fouled distributor cap</li> </ul>	<ul style="list-style-type: none"> <li>● Discharged battery</li> <li>● Damaged or loose connectors</li> <li>● Damaged insulation</li> <li>● Poor coil, distributor and spark plug connections</li> <li>● Blown fuses</li> </ul>

2. Check the vehicle's maintenance schedule to ensure that the spark plugs and the wires have been properly maintained.
3. Check the spark plug wires and boots for signs of poor insulation that could cause cross firing.
4. A damaged or worn timing belt can cause symptoms that appear to be timing related. Refer to the service manual basic engine section if necessary.
5. Make sure the engine idle speed and base timing are within specification.

**NOTE:** For ignition system diagnostics on all engines except the 2.0L, go to IGN1. For 2.0L, see Symptom Chart below.

#### 2.0L SYMPTOM CHART

Symptom	Action To Take
Engine no start and no codes	GO to IGNA1.
Engine no start and code 211 - PIP circuit failure	GO to IGNA1.
Code 212 - IDM missing	GO to IGNB1.
Timing off, code 213 - Spark Output (SPOUT) open, lack of power, poor fuel economy	GO to IGNC1.
Clear codes or code 211 - intermittent miss or stall	GO to IGND1.
Clear codes and misfire under load - secondary short to ground	GO to IGN3.
Car continues to run after key is turned to OFF	CHECK ICM PWR for short to battery power.

<b>Diagnosis and Testing</b>	<b>1.3L, 1.6L, 1.8L, 2.5L</b>	<b>IGN</b>
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TEST STEP		RESULT	ACTION TO TAKE
<b>IGN1</b>	<b>CHECK FIRING ORDER</b>		
	<ul style="list-style-type: none"> <li>● Inspect the routing of the spark plug wires.</li> <li>● Make sure the wires follow the firing order 1-3-4-2 on all engines except 2.5L (1-2-3-4-5-6 on 2.5L).</li> <li>● <b>Is firing order OK?</b></li> </ul>	Yes No	<ul style="list-style-type: none"> <li>▶ GO to <b>IGN2</b>.</li> <li>▶ SERVICE as required.</li> </ul>
<b>IGN2</b>	<b>TEST SPARK AT PLUG(S)</b>		
	<ul style="list-style-type: none"> <li>● Connect an Air Gap Spark Tester D81P-6666-A, or equivalent between the spark plug wire (plug end) and ground. Crank the engine, repeat on all spark plug wires.</li> <li>● <b>Does spark jump at each wire?</b></li> </ul>	Yes (Engine Runs) Yes (Engine Does Not Run) No (1.6L and 1.8L) No (1.3L and 2.5L)	<ul style="list-style-type: none"> <li>▶ INSPECT the spark plugs, GO to <b>IGN3</b>.</li> <li>▶ GO to Section 9B, Fuel Delivery / Turbocharger System.</li> <li>▶ GO to <b>IGN9</b>.</li> <li>▶ GO to <b>IGN10</b>.</li> </ul>

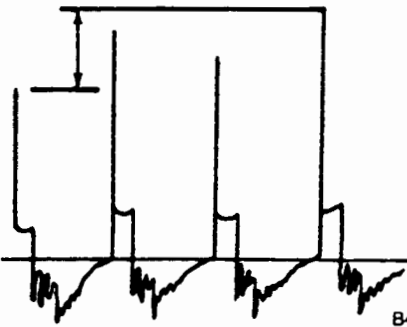
<b>Diagnosis and Testing</b>	<b>All Engines</b>	<b>IGN</b>
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TEST STEP		RESULT	ACTION TO TAKE
<b>IGN3</b>	<p><b>CHECK SECONDARY DISPLAY</b></p> <p><b>NOTE:</b> If this portion of the diagnostic procedure is to provide accurate results, it is essential that the calibration of your engine analyzer be maintained. Refer to your equipment manual. If this is not available, an estimate of the calibration can be made by connecting the spark tester to a properly operating ignition system and measuring the firing voltage of the spark tester only. Do not include the firing voltage to the cap-to-rotor gap. The spark tester firing voltage should be approximately 28KV (± 10%).</p> <ul style="list-style-type: none"> <li>● Connect a Rotunda Engine Analyzer 010-00575, or equivalent to view parade display of ignition secondary system.</li> <li>● Slowly increase the engine rpm from idle to 2000 rpm, and compare the engine analyzer display to the illustrations in the next six test steps.</li> <li>● <b>Is the evenness of spark plug firing voltage and the average value of spark plug firing voltage normal and stable?</b></li> </ul>	<p>Yes (2.0L)</p> <p>Yes (1.3L, 1.8L, and 2.5L)</p> <p>Yes (1.6L)</p> <p>No</p>	<p>▶ Ignition system operating properly. RETURN to Section 2B, Diagnostic Routines.</p> <p>▶ GO to <b>IST1</b>.</p> <p>▶ GO to <b>ADV1</b>.</p> <p>▶ GO to <b>IGN4</b>.</p>
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<b>Diagnosis and Testing</b>	<b>All Engines</b>	<b>IGN</b>
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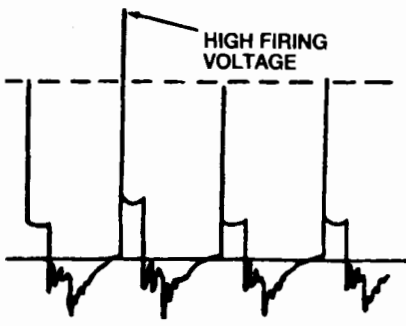
TEST STEP		RESULT	ACTION TO TAKE
IGN4	CHECK SECONDARY DISPLAY (CONTINUED)		
<ul style="list-style-type: none"> <li>Are both the evenness of the spark plug firing voltage too wide and the average value of spark plug firing voltage greater than the normal value of 28KV?</li> </ul>		Yes	<ul style="list-style-type: none"> <li>Problems affecting all cylinders:                             <ul style="list-style-type: none"> <li>- CHECK coil wire for proper installation in coil and distributor cap.</li> <li>- CHECK for wide spark plug gaps at all cylinders, (usually from worn electrodes due to high mileage).</li> <li>- INSPECT cap and rotor for problems causing excessive cap-to-rotor gap.</li> <li>- GO to <b>IGN11</b>.</li> </ul> </li> </ul>
		No	<ul style="list-style-type: none"> <li>GO to <b>IGN5</b>.</li> </ul>

<b>Diagnosis and Testing</b>	<b>All Engines</b>	<b>IGN</b>
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TEST STEP		RESULT	ACTION TO TAKE
IGN5	CHECK SECONDARY DISPLAY (CONTINUED)		
<ul style="list-style-type: none"> <li>Is the evenness of the spark plug firing voltage greater than normal voltage of 28KV?</li> </ul>		Yes	<ul style="list-style-type: none"> <li>CHECK for ignition problems affecting some cylinders:                             <ul style="list-style-type: none"> <li>- Wide spark plug gap(s) or worn electrode(s)</li> <li>- Improperly installed cap or rotor</li> </ul> </li> <li>CHECK for mechanical problems affecting some cylinders:                             <ul style="list-style-type: none"> <li>- Valves</li> <li>- Fuel injectors</li> <li>- Compression</li> <li>- Vacuum leaks</li> </ul> </li> </ul>
		No	<ul style="list-style-type: none"> <li>GO to <b>IGN6</b>.</li> </ul>
			
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<b>Diagnosis and Testing</b>	<b>All Engines</b>	<b>IGN</b>
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TEST STEP		RESULT	ACTION TO TAKE
<b>IGN6</b>	<b>CHECK SECONDARY DISPLAY (CONTINUED)</b>		
<ul style="list-style-type: none"> <li>Is there consistently high spark plug firing voltage in one or more cylinders?</li> </ul>		Yes	<ul style="list-style-type: none"> <li>CHECK for ignition problems affecting some cylinders:                             <ul style="list-style-type: none"> <li>- Spark plug wire(s) are firmly connected to distributor cap or spark plug.</li> <li>- Wide spark plug gap(s).</li> <li>- Open plug wire(s).</li> </ul> </li> <li>CHECK for mechanical problems affecting some cylinders:                             <ul style="list-style-type: none"> <li>- Valves</li> <li>- Fuel injectors</li> <li>- Compression</li> <li>- Vacuum leaks</li> </ul> </li> <li>GO to <b>IGN11</b>.</li> </ul>
		No	<ul style="list-style-type: none"> <li>GO to <b>IGN7</b>.</li> </ul>

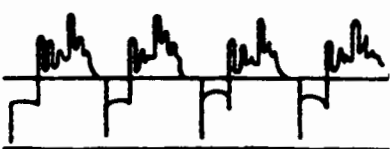


<b>Diagnosis and Testing</b>	<b>All Engines</b>	<b>IGN</b>
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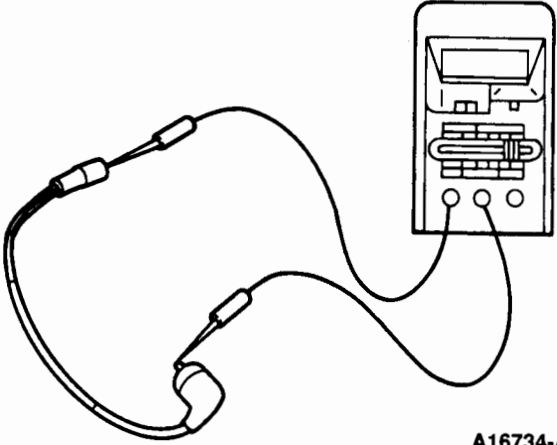
TEST STEP		RESULT	ACTION TO TAKE
IGN7	CHECK SECONDARY DISPLAY (CONTINUED)		
<ul style="list-style-type: none"> <li>● Is there consistently low spark plug firing voltage or sloping spark line in one or more cylinders?</li> </ul>		Yes	<ul style="list-style-type: none"> <li>▶ CHECK for ignition problems affecting some cylinders:                             <ul style="list-style-type: none"> <li>- Fouled spark plug(s)</li> <li>- Narrow spark plug gap(s)</li> <li>- Spark plug wire(s) grounding on engine.</li> </ul> </li> <li>▶ INSPECT for damage.                             <ul style="list-style-type: none"> <li>- Carbon tracking in cap</li> </ul> </li> <li>▶ CHECK for mechanical problems affecting some cylinders:                             <ul style="list-style-type: none"> <li>- Valves</li> <li>- Fuel injectors</li> <li>- Compression</li> <li>- Vacuum leaks</li> </ul> </li> </ul>
		No	<ul style="list-style-type: none"> <li>▶ GO to <b>IGN8</b>.</li> </ul>
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<b>Diagnosis and Testing</b>	<b>All Engines</b>	<b>IGN</b>
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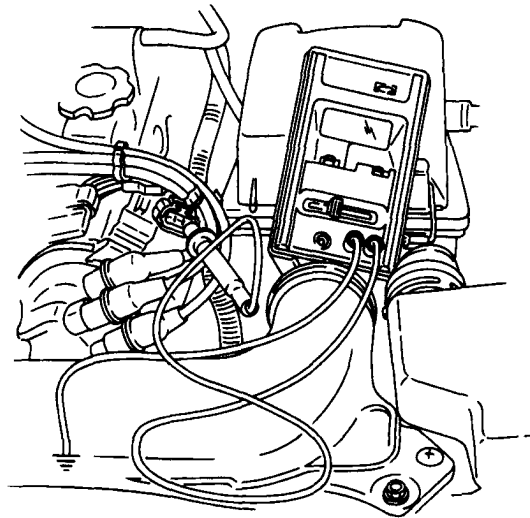
TEST STEP		RESULT	ACTION TO TAKE
<b>IGN8</b>	<b>CHECK SECONDARY DISPLAY (CONTINUED)</b>		
	<ul style="list-style-type: none"> <li>● Is spark plug firing voltage reversed?</li> </ul>	Yes          No (all except 2.0L)  No (2.0L)	<ul style="list-style-type: none"> <li>▶ - CHECK to see if ignition coil primary circuit is reversed. If necessary make proper connections.</li> <li>- CHECK wiring harness for ignition coil primary circuit. If OK, REPLACE ignition coil (1.6L, 1.8L, and 2.0L) or distributor (1.3L and 2.5L).</li> <li>▶ GO to <b>IGN11</b>.</li> <li>▶ REEVALUATE symptom and RETURN to symptom chart at beginning of this section.</li> </ul>
 <p style="text-align: center;">B4721-A</p>			
<b>IGN9</b>	<b>CHECK SPARK FROM COIL</b>		
	<ul style="list-style-type: none"> <li>● Connect a spark tester between coil secondary output terminal and ground.</li> <li>● Crank the engine.</li> <li>● Does spark jump?</li> </ul>	Yes  No	<ul style="list-style-type: none"> <li>▶ GO to <b>IGN10</b>.</li> <li>▶ GO to <b>IGN12</b>.</li> </ul>
<b>IGN10</b>	<b>CHECK DISTRIBUTOR ASSEMBLY</b>		
	<ul style="list-style-type: none"> <li>● Check rotor, distributor cap, and module for wear, breakage, cracks, carbon buildup (black buildup), and oxidation (white buildup).</li> <li>● Crank the engine and verify the rotor turns steadily.</li> <li>● Is the distributor assembly OK and does the rotor turn freely?</li> </ul>	Yes  No	<ul style="list-style-type: none"> <li>▶ GO to <b>IGN11</b>.</li> <li>▶ SERVICE as required.</li> </ul>

<b>Diagnosis and Testing</b>	<b>All Engines</b>	<b>IGN</b>
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TEST STEP		RESULT	ACTION TO TAKE
IGN11	CHECK SPARK PLUG WIRE RESISTANCE		
<ul style="list-style-type: none"> <li>● Remove spark plug wire.</li> </ul> <p><b>CAUTION: Do not under any circumstances puncture a spark plug wire when measuring resistance. Measure only as instructed.</b></p> <ul style="list-style-type: none"> <li>● Measure the resistance of each spark plug wire.</li> <li>● Is the resistance between 4,000-7,000 ohms per foot?</li> </ul>		Yes (1.8L) Yes (1.6L) Yes (2.0L)  Yes (1.3L and 2.5L) No	<ul style="list-style-type: none"> <li>▶ GO to <b>IST1</b>.</li> <li>▶ GO to <b>ADV1</b>.</li> <li>▶ REEVALUATE symptom and RETURN to symptom chart at the beginning of this section.</li> <li>▶ GO to <b>IGN12</b>.</li> <li>▶ REPLACE the spark plug wire(s).</li> </ul>
 <p style="text-align: right;">A16734-A</p>			

<b>Diagnosis and Testing</b>	<b>1.3L, 1.6L, 1.8L, 2.5L</b>	<b>IGN</b>
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TEST STEP		RESULT	ACTION TO TAKE										
IGN12	<b>CHECK VOLTAGE AT IGNITION COIL</b>												
<ul style="list-style-type: none"> <li>● Disconnect the ignition coil connector (on distributor).</li> <li>● Key ON.</li> <li>● Measure the voltage on the following wire at the ignition coil connector (on distributor for 1.3L and 2.5L).</li> </ul>		Yes  No	<ul style="list-style-type: none"> <li>▶ GO to <b>IGN13</b>.</li> <li>▶ <b>SERVICE</b> the wire between the ignition switch and the ignition coil connector.</li> </ul>										
<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: center;">Engine</th> <th style="text-align: center;">Wire Color</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">1.3L</td> <td style="text-align: center;">BL</td> </tr> <tr> <td style="text-align: center;">1.6L</td> <td style="text-align: center;">BK/W</td> </tr> <tr> <td style="text-align: center;">1.8L</td> <td style="text-align: center;">BL</td> </tr> <tr> <td style="text-align: center;">2.5L</td> <td style="text-align: center;">BK/PK</td> </tr> </tbody> </table>		Engine	Wire Color	1.3L	BL	1.6L	BK/W	1.8L	BL	2.5L	BK/PK		
Engine	Wire Color												
1.3L	BL												
1.6L	BK/W												
1.8L	BL												
2.5L	BK/PK												
<ul style="list-style-type: none"> <li>● Is the voltage greater than 10 volts?</li> </ul>													

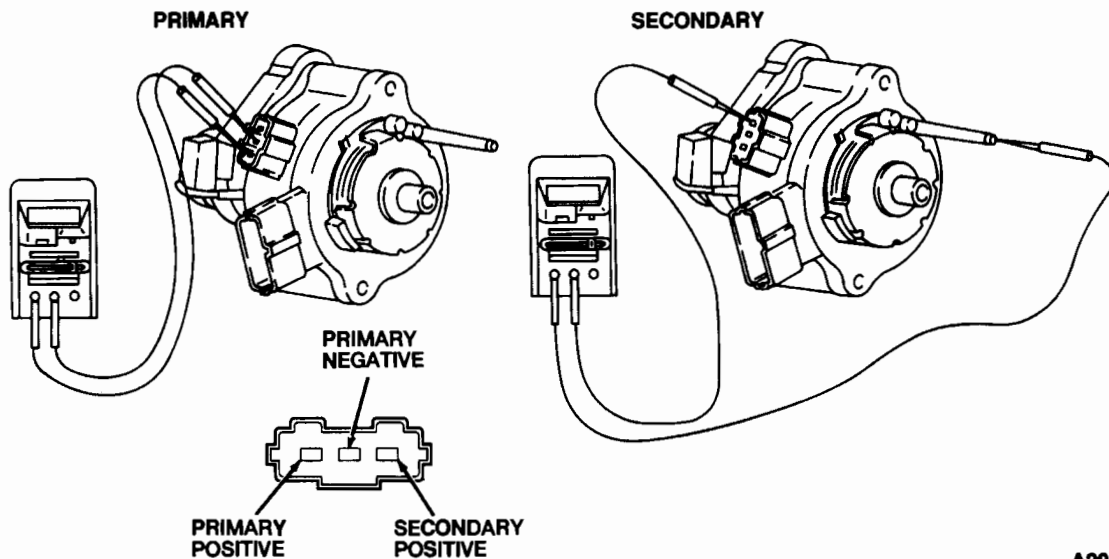


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<b>Diagnosis and Testing</b>	<b>1.3L, 1.6L, 1.8L, 2.5L</b>	<b>IGN</b>
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TEST STEP				RESULT	ACTION TO TAKE
IGN13	CHECK IGNITION COIL RESISTANCE				
<ul style="list-style-type: none"> <li>Disconnect the wire(s) from the ignition coil.</li> <li>Measure:</li> </ul>				Yes (1.6L and 1.8L)	▶ GO to EEC Pinpoint Test <b>IDM</b> .
				Yes (1.3L and 2.5L)	▶ GO to EEC Pinpoint Test <b>ICM</b> .
				No	▶ REPLACE the ignition coil (1.6L and 1.8L) or distributor (1.3L and 2.5L).
Engine	Coil	Terminals	Resistance		
1.3L	Primary	Positive to negative	0.5-0.7 ohms		
	Secondary	Positive to high voltage	20-31 k-ohms		
1.6L, 1.8L	Primary	Positive to negative	0.8 to 1.6 ohms		
	Secondary	Positive to high voltage	6 to 30 k-ohms		
2.5L	Primary	Positive to negative	0.58 to 0.86 ohms		
	Secondary	Positive to high voltage	1.15 to 18.5 k-ohms		
<p>NOTE: Refer to illustrations after Test Steps.</p> <ul style="list-style-type: none"> <li>Are the resistance readings within specifications?</li> </ul>					

**1.3L**



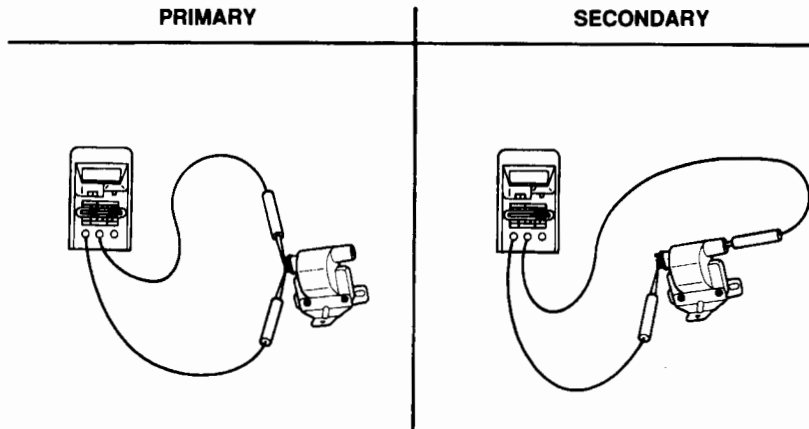
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**Diagnosis and Testing**

**1.3L, 1.6L,  
1.8L, 2.5L**

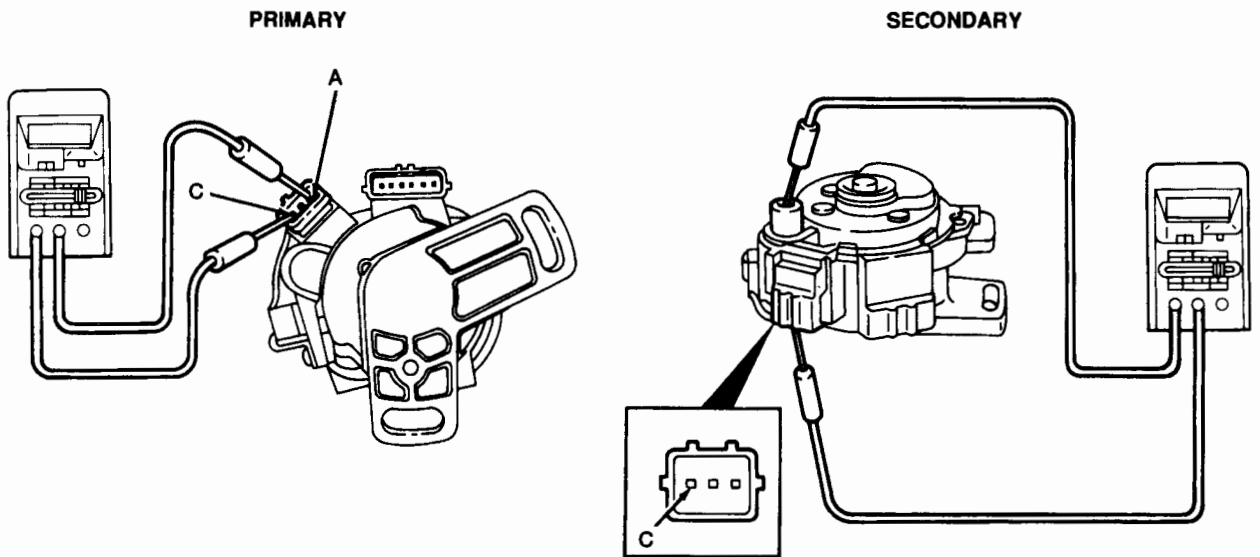
**IGN**

**1.6L and 1.8L**



A14064-B

**2.5L**



A16735-C

<b>Diagnosis and Testing</b>	<b>1.3L, 1.8L, 2.5L</b>	<b>IST</b>
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**Idle Speed and Timing Adjustments (IST) (1.3L, 1.8L, 2.5L)**

TEST STEP		RESULT	ACTION TO TAKE									
<b>IST1</b>	<b>CHECK IDLE SPEED</b>											
	<ul style="list-style-type: none"> <li>Start the engine and run until at normal operating temperature.</li> <li>Engine at idle.</li> <li>All electrical loads off.</li> <li>Connect Rotunda 88 Digital Multimeter 105-00053, or equivalent as a tachometer.</li> <li>Ground STI connector. Refer to illustrations after Pinpoint Test Steps.</li> <li>Compare idle speed with chart:</li> </ul> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 50%;">Engine</th> <th style="width: 50%;">Idle Speed</th> </tr> </thead> <tbody> <tr> <td>1.3L MTX</td> <td>700 ± 50 rpm</td> </tr> <tr> <td>1.3L ATX</td> <td>750 ± 50 rpm</td> </tr> <tr> <td>1.8L</td> <td>750 ± 50 rpm</td> </tr> <tr> <td>2.5L</td> <td>650 ± 100 rpm</td> </tr> </tbody> </table> <ul style="list-style-type: none"> <li>Is idle speed within specifications?</li> </ul>	Engine	Idle Speed	1.3L MTX	700 ± 50 rpm	1.3L ATX	750 ± 50 rpm	1.8L	750 ± 50 rpm	2.5L	650 ± 100 rpm	Yes No
Engine	Idle Speed											
1.3L MTX	700 ± 50 rpm											
1.3L ATX	750 ± 50 rpm											
1.8L	750 ± 50 rpm											
2.5L	650 ± 100 rpm											
<b>IST2</b>	<b>CHECK BASE TIMING</b>											
	<ul style="list-style-type: none"> <li>Start the engine and run until at normal operating temperature.</li> <li>Engine at idle.</li> <li>All electrical loads off.</li> <li>Connect a Rotunda Timing Analyzer 059-00014, or equivalent.</li> <li>Ground STI connector (refer to STI Connector Locations illustration on the next page).</li> <li>Compare timing with chart:</li> </ul> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 50%;">Engine</th> <th style="width: 50%;">Base Timing</th> </tr> </thead> <tbody> <tr> <td>1.3L, 1.8L, 2.5L</td> <td>10 degrees ± 1 degree BTDC</td> </tr> </tbody> </table> <ul style="list-style-type: none"> <li>Is timing within specifications?</li> </ul>	Engine	Base Timing	1.3L, 1.8L, 2.5L	10 degrees ± 1 degree BTDC	Yes No	<ul style="list-style-type: none"> <li>RETURN to Section 2B, Diagnostic Routines.</li> <li>ADJUST the timing. REFER to Section 12B, Air Intake Systems and Throttle Body.</li> </ul>					
Engine	Base Timing											
1.3L, 1.8L, 2.5L	10 degrees ± 1 degree BTDC											

<b>Diagnosis and Testing</b>	<b>1.3L, 1.8L, 2.5L</b>	<b>IST</b>
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**STI Connector Locations**

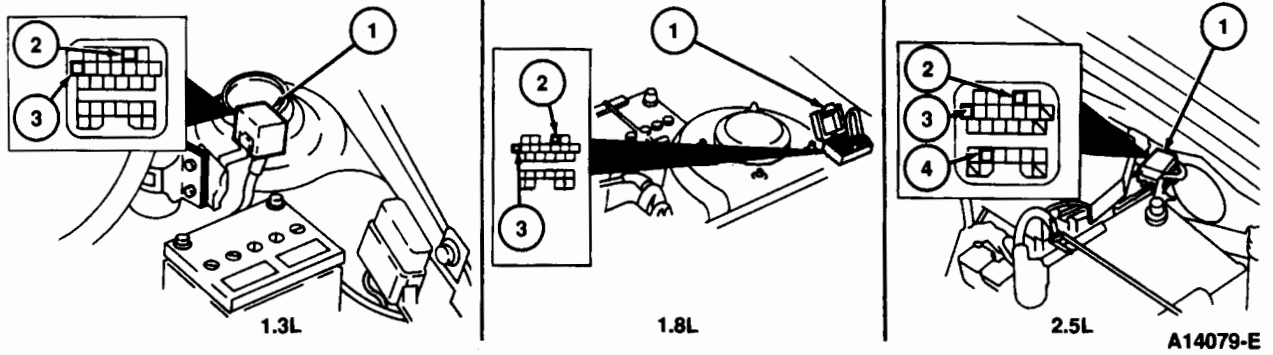


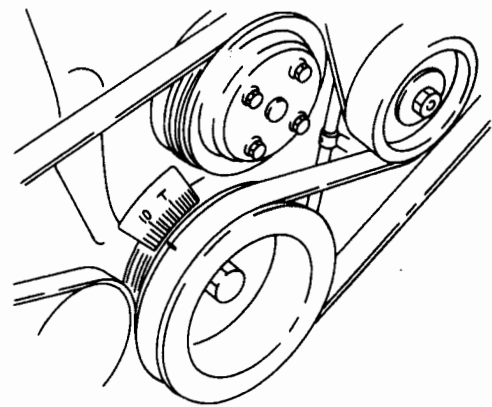
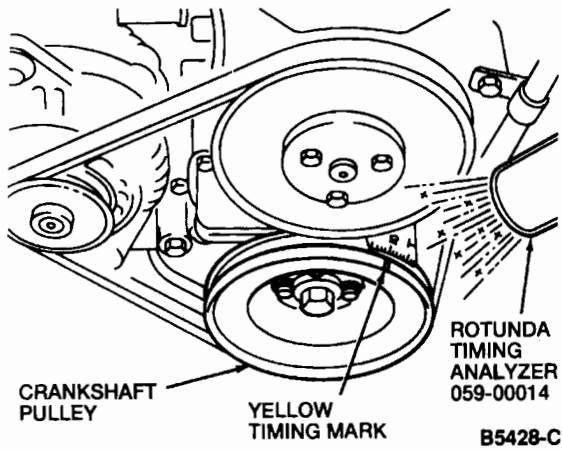
Figure 4.

Item	Description
1	Data Link Connector
2	STI
3	GND
4	IGN (-)

**Base Timing Check**

1.3L and 1.8L

2.5L

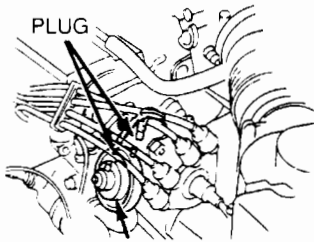


A16737-C

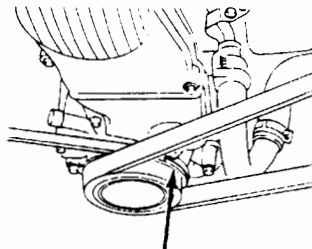
<h2 style="text-align: center;">Diagnosis and Testing</h2>	<h2 style="text-align: center;">1.6L Non-Turbo 1.6L Turbo</h2>	<h2 style="text-align: center;">ADV</h2>
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**Vacuum Advance (ADV) (1.6L)**

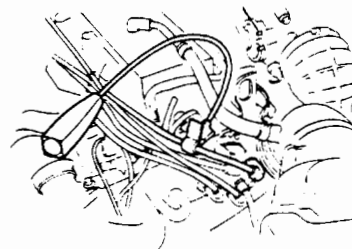
	TEST STEP	RESULT	ACTION TO TAKE
<b>ADV1</b>	<b>CHECK VACUUM SUPPLY</b> <ul style="list-style-type: none"> <li>● Check the vacuum hoses to the distributor diaphragm for cracks or poor connections.</li> <li>● Remove the vacuum delay valve.</li> <li>● Using a Rotunda Vacuum Tester 021-00014, or equivalent apply 635 mm-Hg (25 in-Hg) of vacuum to the green side of the valve.</li> <li>● <b>Does the vacuum delay valve hold vacuum for 10-20 seconds?</b></li> </ul>	Yes  No	<ul style="list-style-type: none"> <li>▶ GO to <b>ADV2</b>.</li> <li>▶ <b>SERVICE</b> hose as required or <b>REPLACE</b> the vacuum delay valve.</li> </ul>
<b>ADV2</b>	<b>INSPECT TIMING</b> <ul style="list-style-type: none"> <li>● Disconnect and plug the vacuum hoses from the vacuum diaphragm.</li> <li>● Ground the Self Test Input (STI) connector.</li> <li>● Engine at operating temperature.</li> <li>● All electrical loads off.</li> <li>● At idle:                             <ul style="list-style-type: none"> <li>— 1.6L Non-Turbo: 850 ± 50 rpm</li> <li>— 1.6L Turbo: 850 ± 50 rpm</li> </ul> </li> <li>● Connect a Rotunda Timing Analyzer 059-00014 or equivalent.</li> <li>● Check timing:                             <ul style="list-style-type: none"> <li>— 1.6L Non-Turbo: 2 ± 1 degrees BTDC</li> <li>— 1.6L Turbo: 12 ± 1 degrees BTDC</li> </ul> </li> <li>● <b>Is the ignition base timing correct?</b></li> </ul>	Yes  No	<ul style="list-style-type: none"> <li>▶ GO to <b>ADV3</b>.</li> <li>▶ <b>ADJUST</b> the timing.</li> </ul>



VACUUM DIAPHRAGM



TIMING MARKS

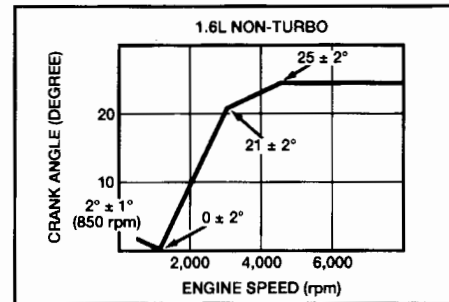
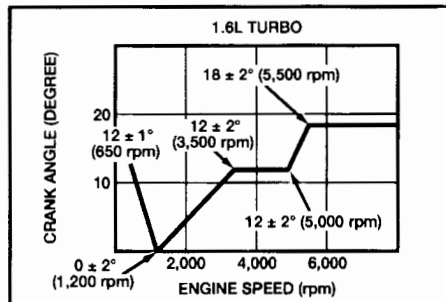


A14067-A



<b>Diagnosis and Testing</b>	<b>1.6L Non-Turbo 1.6L Turbo</b>	<b>ADV</b>
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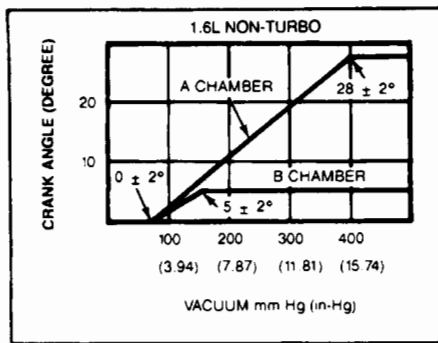
TEST STEP	RESULT	ACTION TO TAKE
<b>ADV3</b> CHECK CENTRIFUGAL ADVANCE <ul style="list-style-type: none"> <li>● Warm the engine.</li> <li>● Disconnect and plug the vacuum hose(s) from the vacuum control.</li> <li>● Connect a Rotunda Timing Analyzer 059-00014 or equivalent.</li> <li>● Gradually increase the engine speed.</li> <li>● Monitor the ignition timing advance and compare to the chart.</li> <li>● <b>Does the centrifugal advance operate properly?</b></li> </ul>	Yes (1.6L Non-Turbo)  Yes (1.6L Turbo)  No	► GO to <b>ADV4</b> .  ► GO to <b>ADV5</b> .  ► <b>SERVICE</b> the centrifugal advance assembly.



A15146-B

<b>Diagnosis and Testing</b>	<b>1.6L Non-Turbo</b>	<b>ADV</b>
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TEST STEP		RESULT	ACTION TO TAKE
<b>ADV4</b>	<b>CHECK VACUUM DIAPHRAGM</b>		
<ul style="list-style-type: none"> <li>● Disconnect and plug the vacuum hose(s) from the vacuum diaphragm.</li> <li>● Connect a Rotunda Vacuum Tester 021-00014 or equivalent to the vacuum diaphragm.</li> <li>● Connect a Rotunda Timing Analyzer 059-00014 or equivalent.</li> <li>● Engine at idle.</li> <li>● Apply vacuum to chamber A (outer chamber) and then to chamber B (inner chamber).</li> <li>● Monitor the ignition timing and compare to the chart. Increased vacuum should advance (increase) the crank angle.</li> <li>● <b>Is the vacuum advance operating properly?</b></li> </ul>		Yes	<ul style="list-style-type: none"> <li>▶ CHECK the vacuum hoses for leaks, cracks, and breakage. REPAIR as required. RETURN to Section 2B, Diagnostic Routines.</li> </ul>
		No	<ul style="list-style-type: none"> <li>▶ REPLACE the vacuum diaphragm.</li> </ul>



A15147-A

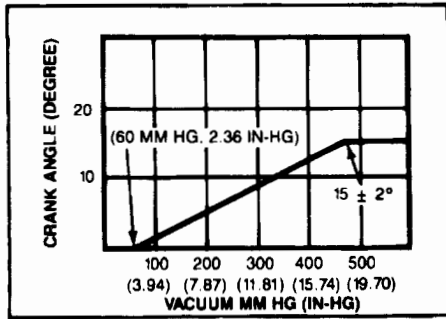
# Diagnosis and Testing

**1.6L Turbo**

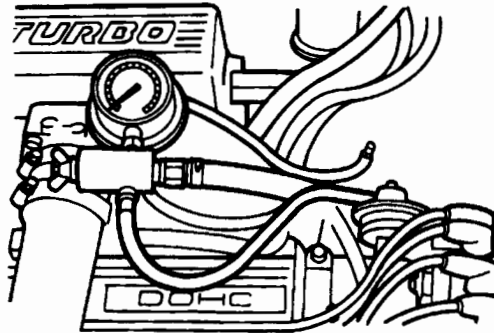
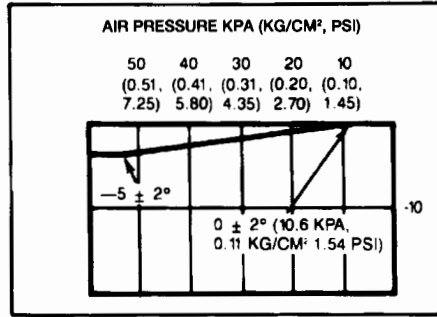
**ADV**

TEST STEP		RESULT	ACTION TO TAKE
ADV5	CHECK VACUUM ADVANCE		
<ul style="list-style-type: none"> <li>● Disconnect and plug the vacuum hose.</li> <li>● Apply vacuum to the advance diaphragm and monitor the ignition timing. See chart below.</li> <li>● Remove vacuum and apply air pressure to the advance diaphragm 68.9 kPa (10 psi MAX). Monitor the ignition timing.</li> <li>● Compare the readings to the chart below.</li> <li>● <b>Does the vacuum advance operate properly?</b></li> </ul>		Yes	<ul style="list-style-type: none"> <li>▶ CHECK the vacuum hoses for leaks, cracks, breakage, and proper routing. SERVICE as required. RETURN to Section 2B, Diagnostic Routines.</li> </ul>
		No	<ul style="list-style-type: none"> <li>▶ REPLACE the advance diaphragm.</li> </ul>

**Vacuum Chart**



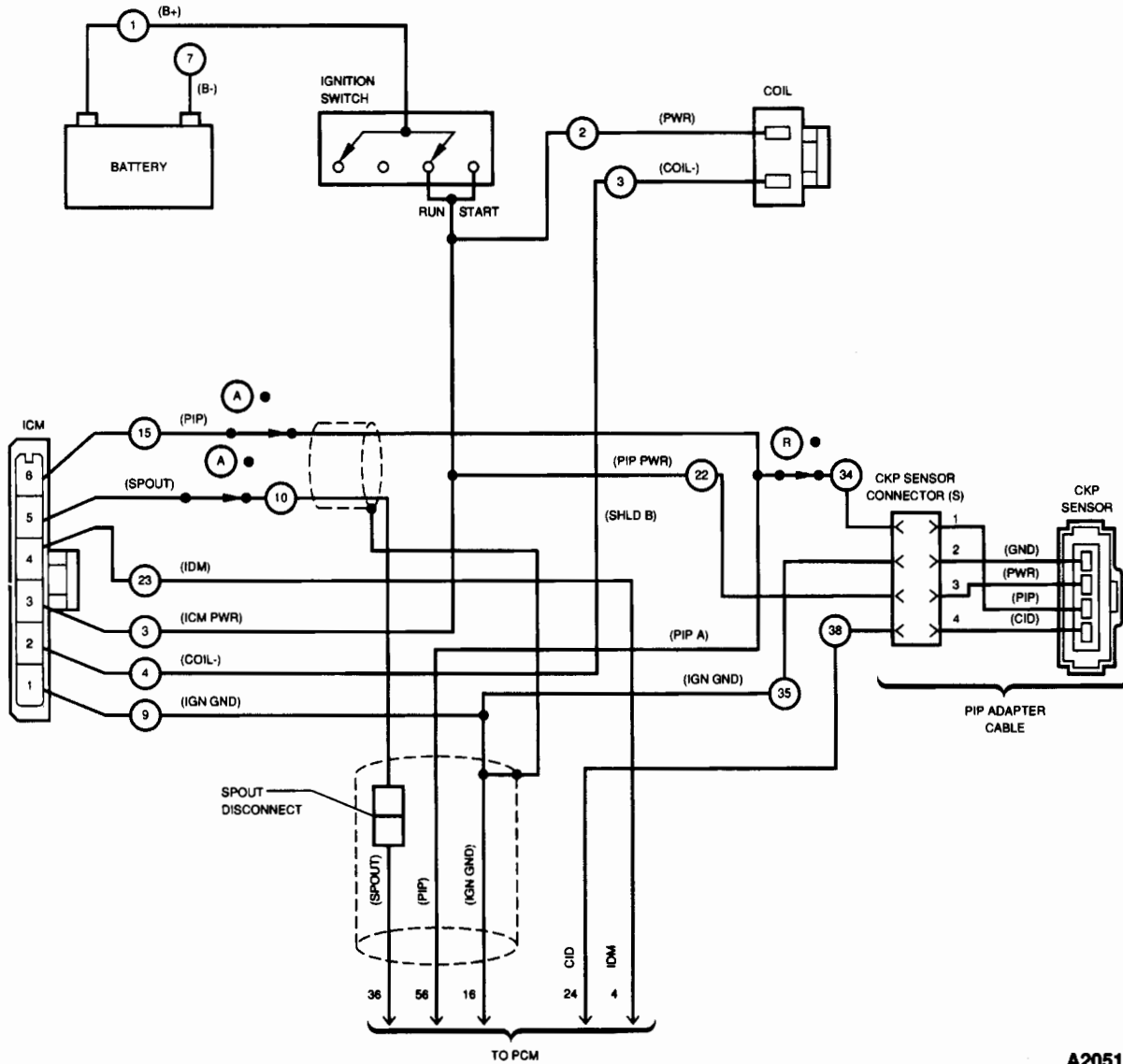
**Air Pressure Chart**



A14306-B

<b>Diagnosis and Testing</b>	<b>2.0L</b>	<b>IGNA</b>
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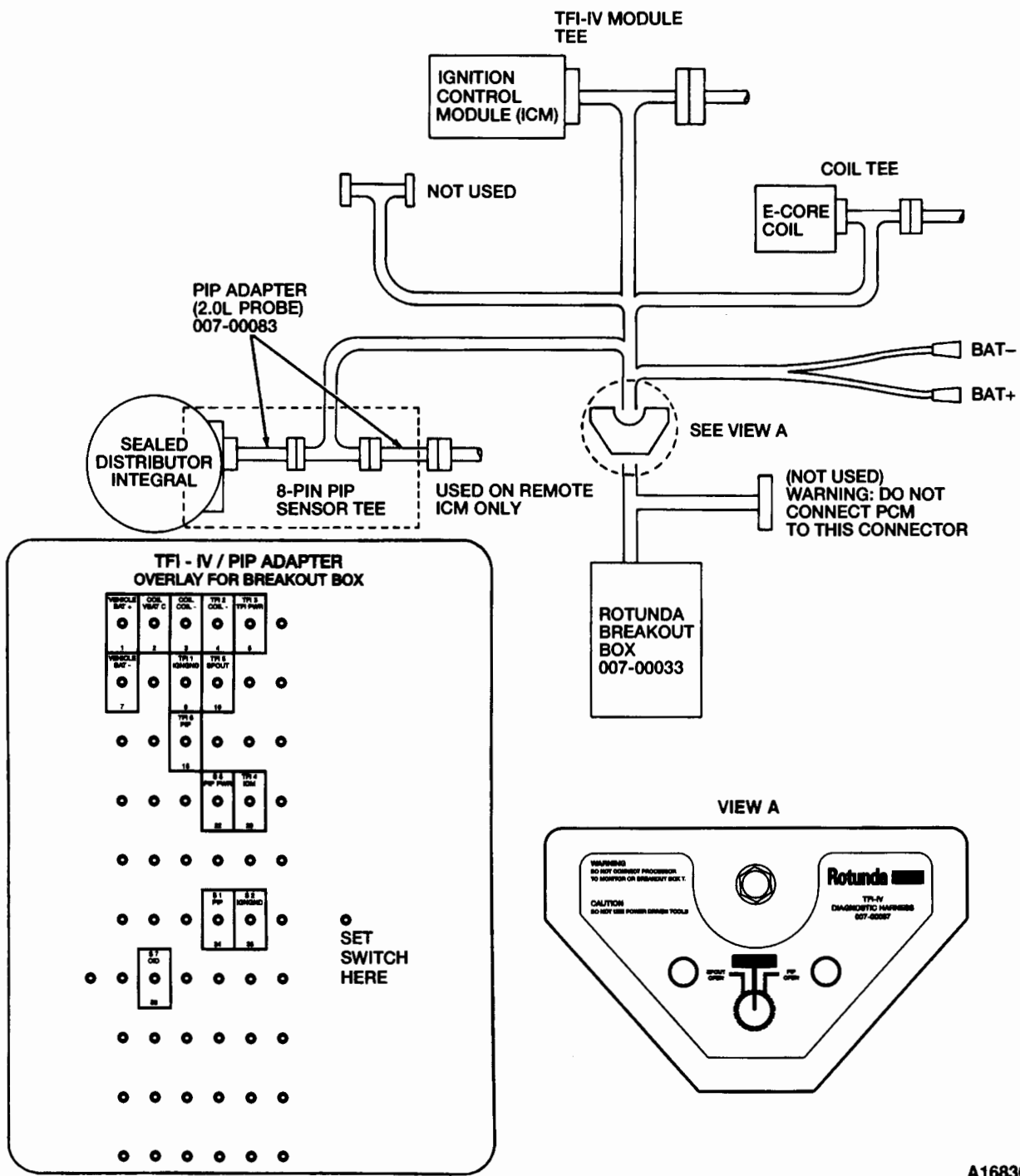
**ICM Ignition System (2.0L CD4E and MTX Only)**



**NOTE:** Circled numbers refer to Breakout Box pins.

<b>Diagnosis and Testing</b>	<b>2.0L</b>	<b>IGNA</b>
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Rotunda TFI-IV Diagnostic Cable 007-00097



A16836-D

<b>Diagnosis and Testing</b>	<b>2.0L</b>	<b>IGNA</b>
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**Engine No Start (IGNA) (2.0L)**

TEST STEP		RESULT	ACTION TO TAKE
IGNA1	CHECK FOR EEC IV QUICK TEST COMPLETION		
	<ul style="list-style-type: none"> <li>Were all tests accomplished according to EEC IV Quick Test procedures?</li> </ul>	Yes No	<ul style="list-style-type: none"> <li>GO to <b>IGNA2</b>.</li> <li>REFER to Section 2A, Diagnostic Routines.</li> </ul>
IGNA2	CHECK FOR GOOD BATTERY		
	<ul style="list-style-type: none"> <li>Is battery voltage greater than 10 volts DC with the key ON?</li> </ul>	Yes No	<ul style="list-style-type: none"> <li>GO to <b>IGNA3</b>.</li> <li>SERVICE battery.</li> </ul>
IGNA3	CHECK FOR SPARK AT COIL DURING CRANK		
	<ul style="list-style-type: none"> <li>Use an Air Gap Spark Tester (D81P-6666-A) or equivalent to check for spark during crank at coil wire.</li> <li>Was spark present during crank?</li> </ul>	Yes No	<ul style="list-style-type: none"> <li>GO to <b>IGNA9</b>.</li> <li>GO to <b>IGNA4</b>.</li> </ul>
IGNA4	CHECK FOR TFI POWER		
	<ul style="list-style-type: none"> <li>Key OFF.</li> <li>Connect Rotunda TFI Diagnostic Cable 007-00097, or equivalent and PIP Adapter 007-00083 to Rotunda Breakout Box 007-00033, or equivalent connect BAT- lead to negative post of battery, and connect TFI module tee to Ignition Control Module and vehicle harness.</li> <li>Do not connect BAT+ lead of TFI Diagnostic Cable to battery.</li> </ul> <p><b>CAUTION: Do not connect PCM to Breakout Box when it is used with TFI Diagnostic Cable.</b></p> <ul style="list-style-type: none"> <li>Make sure PIP OPEN / NORMAL / SPOUT OPEN switch on TFI Diagnostic Cable is in the NORMAL position.</li> <li>Use TFI overlay on Breakout Box.</li> <li>DVOM on DC volt scale.</li> <li>Key ON.</li> <li>Measure voltage between Pin 5 (TFI PWR) and Pin 7 (VEHICLE BAT-) at Breakout Box.</li> <li>Is voltage greater than 10 volts DC?</li> </ul>	Yes No	<ul style="list-style-type: none"> <li>GO to <b>IGNA5</b>.</li> <li>SERVICE power open to Ignition Control Module in harness or connector. REMOVE all test equipment. RECONNECT all components. CLEAR Continuous Memory. RERUN Quick Test.</li> </ul>
IGNA5	CHECK FOR PIP SIGNAL		
	<ul style="list-style-type: none"> <li>DVOM on AC volt scale.</li> <li>Crank engine and measure voltage between Pin 15 (PIP) and Pin 7 (VEHICLE BAT-).</li> <li>Is voltage between 3.0 and 8.5 volts AC?</li> </ul>	Yes No	<ul style="list-style-type: none"> <li>GO to <b>IGNA6</b>.</li> <li>GO to <b>IGNA11</b>.</li> </ul>

<b>Diagnosis and Testing</b>	<b>2.0L</b>	<b>IGNA</b>
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TEST STEP		RESULT	ACTION TO TAKE
IGNA6	CHECK FOR SPOUT SIGNAL		
	<ul style="list-style-type: none"> <li>● DVOM on AC volt scale.</li> <li>● Crank engine and measure voltage between Pin 10 (SPOUT) and Pin 7 (VEHICLE BAT-).</li> <li>● <b>Is voltage between 3.0 and 8.5 volts AC?</b></li> </ul>	Yes No	<ul style="list-style-type: none"> <li>▶ GO to <b>IGNA7</b>.</li> <li>▶ GO to <b>IGNA15</b>.</li> </ul>
IGNA7	CHECK VBAT AT COIL		
	<ul style="list-style-type: none"> <li>● Key OFF.</li> <li>● Connect diagnostic cable coil tee to vehicle harness; do not connect diagnostic cable to coil.</li> <li>● Key ON.</li> <li>● DVOM on DC volt scale.</li> <li>● Measure voltage between Pin 2 (VBAT C) and Pin 7 (VEHICLE BAT-).</li> <li>● <b>Is voltage greater than 10 volts DC?</b></li> </ul>	Yes No	<ul style="list-style-type: none"> <li>▶ GO to <b>IGNA8</b>.</li> <li>▶ SERVICE power open to coil in harness or connector. REMOVE all test equipment. RECONNECT all components. CLEAR Continuous Memory. RERUN Quick Test.</li> </ul>
IGNA8	CHECK FOR COIL (-) SIGNAL		
	<ul style="list-style-type: none"> <li>● Key OFF.</li> <li>● Connect BAT+ lead of TFI diagnostic cable to positive post of battery.</li> <li>● Connect 12 volt incandescent test lamp between Pin 1 (VEHICLE BAT+) and Pin 3 (COIL-).</li> <li>● Key ON.</li> <li>● Crank engine.</li> <li>● <b>Did test lamp flash brightly?</b></li> </ul>	Yes No	<ul style="list-style-type: none"> <li>▶ REPLACE coil. REMOVE all test equipment. RECONNECT all components. CLEAR Continuous Memory. RERUN Quick Test.</li> <li>▶ GO to <b>IGNA23</b>.</li> </ul>
IGNA9	CHECK FOR SPARK AT ALL WIRES		
	<ul style="list-style-type: none"> <li>● Use an Air Gap Spark Tester (D81P-6666-A) or equivalent to check for spark at all wires.</li> <li>● <b>Was spark present at all plugs during crank?</b></li> </ul>	Yes No	<ul style="list-style-type: none"> <li>▶ GO to <b>IGNA10</b>.</li> <li>▶ SERVICE distributor cap, rotor, plugs, or plug wires. REMOVE all test equipment. RECONNECT all components. CLEAR Continuous Memory. RERUN Quick Test.</li> </ul>
IGNA10	CHECK PLUGS		
	<ul style="list-style-type: none"> <li>● Remove and check plugs for damage, wear, carbon deposits, and proper plug gap.</li> <li>● <b>Are plugs OK?</b></li> </ul>	Yes No	<ul style="list-style-type: none"> <li>▶ Not an ignition problem, REFER to Section 2A, Diagnostic Routines.</li> <li>▶ SERVICE plugs. REMOVE all test equipment. RECONNECT all components. CLEAR Continuous Memory. RERUN Quick Test.</li> </ul>

<b>Diagnosis and Testing</b>	<b>2.0L</b>	<b>IGNA</b>
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TEST STEP		RESULT	ACTION TO TAKE
IGNA11	CHECK FOR PIP POWER AT PIP SENSOR (DISTRIBUTOR)		
	<ul style="list-style-type: none"> <li>● Connect diagnostic cable PIP sensor tee to PIP sensor (distributor) and vehicle harness.</li> <li>● DVOM on DC volt scale.</li> <li>● Key ON.</li> <li>● Measure voltage between Pin 22 (PIP PWR) and Pin 7 (VEHICLE BAT-).</li> <li>● <b>Is voltage greater than 10 volts DC?</b></li> </ul>	Yes No	► GO to <b>IGNA12</b> . ► SERVICE power to PIP sensor (distributor) in harness or connector. REMOVE all test equipment. RECONNECT all components. CLEAR Continuous Memory. RERUN Quick Test.
IGNA12	CHECK PIP SENSOR		
	<ul style="list-style-type: none"> <li>● Key OFF.</li> <li>● Disconnect diagnostic harness PIP sensor tee from PIP sensor (distributor) only; leave PIP sensor tee connected to vehicle harness.</li> <li>● DVOM on DC volt scale.</li> <li>● Key ON.</li> <li>● Measure the voltage between Pin 34 (PIP) and Pin 7 (VEHICLE BAT-).</li> <li>● <b>Is the voltage greater than 9 volts DC?</b></li> </ul>	Yes No	► CHECK PIP sensor (distributor) wiring, if OK REPLACE distributor. REMOVE all test equipment. RECONNECT all components. CLEAR Continuous Memory. RERUN Quick Test. ► GO to <b>IGNA13</b> .
IGNA13	CHECK PIP SIGNAL WITH TFI DISCONNECTED		
	<ul style="list-style-type: none"> <li>● Key OFF.</li> <li>● Reconnect diagnostic harness PIP sensor tee to PIP sensor (distributor).</li> <li>● Turn switch on diagnostic cable to NORMAL.</li> <li>● Disconnect diagnostic harness TFI module tee from Ignition Control Module only; leave TFI module tee connected to vehicle harness.</li> <li>● DVOM on AC range.</li> <li>● Crank engine and measure voltage between Pin 34 (PIP) and Pin 7 (VEHICLE BAT-).</li> <li>● <b>Is voltage between 3.0 and 8.5 volts AC?</b></li> </ul>	Yes No	► REPLACE Ignition Control Module. REMOVE all test equipment. RECONNECT all components. CLEAR Continuous Memory. RERUN Quick Test. ► GO to <b>IGNA14</b> .



<b>Diagnosis and Testing</b>	<b>2.0L</b>	<b>IGNA</b>
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TEST STEP		RESULT	ACTION TO TAKE
<b>IGNA14</b>	<b>CHECK PCM PIP SIGNAL</b>		
<ul style="list-style-type: none"> <li>● Key OFF.</li> <li>● Disconnect diagnostic cable PIP sensor tee from PIP sensor (distributor) only; leave PIP sensor tee connected to vehicle harness.</li> <li>● Disconnect PCM.</li> <li>● Measure the resistance between Pin 34 (PIP) and ground.</li> <li>● <b>Is the resistance greater than 10,000 ohms?</b></li> </ul>		Yes	▶ REPLACE the PCM. REMOVE all test equipment. RECONNECT all components. CLEAR Continuous Memory. RERUN Quick Test.
		No	▶ SERVICE PIP between PIP sensor (distributor) and PCM or Ignition Control Module in harness for short. REMOVE all test equipment. RECONNECT all components. CLEAR Continuous Memory. RERUN Quick Test.
<b>IGNA15</b>	<b>CHECK FOR SPOUT SIGNAL IN HARNESS</b>		
<ul style="list-style-type: none"> <li>● Turn switch to SPOUT OPEN position on diagnostic cable.</li> <li>● DVOM on AC range.</li> <li>● Crank engine and measure voltage between Pin 10 (SPOUT) and Pin 7 (VEHICLE BAT-).</li> <li>● <b>Is voltage between 3.0 and 8.5 volts AC?</b></li> </ul> <p>NOTE: Engine may start, continue diagnostics.</p>		Yes	▶ REPLACE Ignition Control Module. REMOVE all test equipment. RECONNECT all components. CLEAR Continuous Memory. RERUN Quick Test.
		No	▶ GO to <b>IGNA16</b> .
<b>IGNA16</b>	<b>CHECK SPOUT SIGNAL VOLTAGE</b>		
<ul style="list-style-type: none"> <li>● Key OFF.</li> <li>● Disconnect diagnostic cable TFI module tee from Ignition Control Module only; leave TFI module tee connected to vehicle harness.</li> <li>● Turn switch to NORMAL on diagnostic cable.</li> <li>● DVOM on DC volt scale.</li> <li>● Measure voltage between Pin 10 (SPOUT) and Pin 7 (VEHICLE BAT-), with key ON.</li> <li>● <b>Is voltage less than 0.5 volt DC?</b></li> </ul>		Yes	▶ GO to <b>IGNA18</b> .
		No	▶ GO to <b>IGNA17</b> .

<b>Diagnosis and Testing</b>	<b>2.0L</b>	<b>IGNA</b>
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TEST STEP		RESULT	ACTION TO TAKE
IGNA17	<b>CHECK FOR SPOUT CIRCUIT SHORT TO POWER</b>		
	<ul style="list-style-type: none"> <li>● Key OFF.</li> <li>● Disconnect PCM.</li> <li>● DVOM on DC volt scale.</li> <li>● Measure voltage between Pin 10 (SPOUT) and Pin 7 (VEHICLE BAT-) with key ON.</li> <li>● <b>Is voltage less than 0.5 volt DC?</b></li> </ul>	Yes No	► GO to <b>IGNA19</b> . ► <b>SERVICE SPOUT</b> between PCM and Ignition Control Module in harness for short to power. <b>REMOVE</b> all test equipment. <b>RECONNECT</b> all components. <b>CLEAR</b> Continuous Memory. <b>RERUN</b> Quick Test.
IGNA18	<b>CHECK FOR SPOUT CIRCUIT SHORT TO GROUND</b>		
	<ul style="list-style-type: none"> <li>● Disconnect PCM.</li> <li>● Measure resistance between Pin 10 (SPOUT) and Pin 7 (VEHICLE BAT-).</li> <li>● <b>Is resistance greater than 10K ohms?</b></li> </ul>	Yes No	► GO to <b>IGNA19</b> . ► <b>SERVICE SPOUT</b> circuit between PCM and Ignition Control Module in harness for short to ground. <b>REMOVE</b> all test equipment. <b>RECONNECT</b> all components. <b>CLEAR</b> Continuous Memory. <b>RERUN</b> Quick Test.
IGNA19	<b>CHECK FOR PIP CIRCUIT OPEN</b>		
	<ul style="list-style-type: none"> <li>● Key OFF.</li> <li>● DVOM on AC volt scale.</li> <li>● Install Breakout Box.</li> <li>● Crank engine and measure voltage between BOB Pin 56 (PIP) and BOB Pin 60 (GND).</li> <li>● <b>Is voltage between 3.0 and 8.5 volts AC?</b></li> </ul>	Yes No	► GO to <b>IGNA20</b> . ► GO to <b>IGNA22</b> .
IGNA20	<b>CHECK IGN GND AT PCM</b>		
	<ul style="list-style-type: none"> <li>● Key OFF.</li> <li>● Reconnect diagnostic cable TFI module tee to Ignition Control Module.</li> <li>● DVOM on ohm scale.</li> <li>● Disconnect PCM.</li> <li>● Measure resistance between Pin 16 (IGN GND) of PCM harness connector and Pin 7 (VEHICLE BAT-) at the breakout box.</li> <li>● <b>Is resistance less than 5.0 ohms?</b></li> </ul>	Yes No	► <b>REPLACE PCM</b> . <b>REMOVE</b> all test equipment. <b>RECONNECT</b> all components. <b>CLEAR</b> Continuous Memory. <b>RERUN</b> Quick Test. ► GO to <b>IGNA21</b> .

<b>Diagnosis and Testing</b>	<b>2.0L</b>	<b>IGNA</b>
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TEST STEP		RESULT	ACTION TO TAKE
<b>IGNA21</b>	<b>CHECK FOR IGN GND AT PIP SENSOR</b> <ul style="list-style-type: none"> <li>● Connect diagnostic cable PIP sensor tee to PIP sensor (distributor) and vehicle harness.</li> <li>● Measure resistance between Pin 35 (IGN GND) and Pin 7 (VEHICLE BAT-).</li> <li>● <b>Is resistance less than 5.0 ohms?</b></li> </ul>	Yes        No	<ul style="list-style-type: none"> <li>▶ SERVICE IGN GND between PCM and PIP sensor (distributor) in harness for open. REMOVE all test equipment. RECONNECT all components. CLEAR Continuous Memory. RERUN Quick Test.</li> <li>▶ SERVICE IGN GND wire or REPLACE distributor. IGN GND open in PIP sensor. REMOVE all test equipment. RECONNECT all components. CLEAR Continuous Memory. RERUN Quick Test.</li> </ul>
<b>IGNA22</b>	<b>CHECK PIP SIGNAL AT PIP SENSOR</b> <ul style="list-style-type: none"> <li>● Key OFF.</li> <li>● Connect diagnostic cable PIP sensor tee to vehicle harness.</li> <li>● DVOM on DC volt scale.</li> <li>● Key ON.</li> <li>● Measure the voltage between Pin 34 (PIP) and Pin 7 (VEHICLE BAT-).</li> <li>● <b>Is the voltage greater than 9 volts DC?</b></li> </ul>	Yes        No	<ul style="list-style-type: none"> <li>▶ REPLACE distributor. PIP open in PIP sensor (distributor). REMOVE all test equipment. RECONNECT all components. CLEAR Continuous Memory. RERUN Quick Test.</li> <li>▶ SERVICE PIP open in harness between PCM and PIP sensor (distributor). REMOVE all test equipment. RECONNECT all components. CLEAR Continuous Memory. RERUN Quick Test.</li> </ul>



<b>Diagnosis and Testing</b>	<b>2.0L</b>	<b>IGNA</b>
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TEST STEP		RESULT	ACTION TO TAKE
IGNA27	CHECK GND AT PIP SENSOR		
<ul style="list-style-type: none"><li>● Connect diagnostic cable PIP sensor tee to the PIP sensor (distributor) and vehicle harness.</li><li>● Measure resistance between Pin 35 (GND) and Pin 7 (VEHICLE BAT-).</li><li>● Is resistance less than 5.0 ohms?</li></ul>		Yes	▶ SERVICE open GND in harness between PIP sensor (distributor) and Ignition Control Module. REMOVE all test equipment. RECONNECT all components. CLEAR Continuous Memory. RERUN Quick Test.
		No	▶ SERVICE GND wire or REPLACE distributor. GND open in PIP sensor (distributor) or connector. REMOVE all test equipment. RECONNECT all components. CLEAR Continuous Memory. RERUN Quick Test.

<b>Diagnosis and Testing</b>	<b>2.0L</b>	<b>IGNB</b>
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**Code 212-IDM Missing (IGNB) (2.0L)**

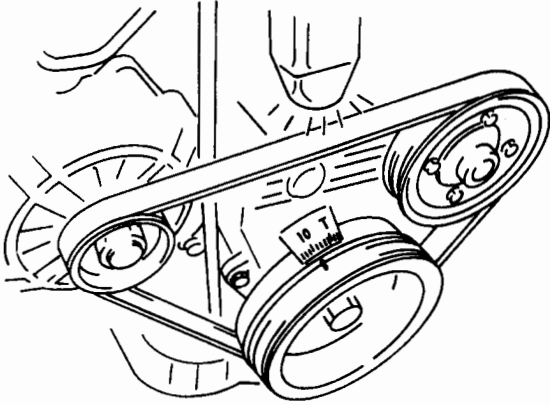
TEST STEP		RESULT	ACTION TO TAKE
<b>IGNB1</b>	<b>CHECK IDM SIGNAL AT PCM CONNECTOR</b>		
	<ul style="list-style-type: none"> <li>● Key OFF.</li> <li>● Install Rotunda Breakout Box 007-00033, or equivalent.</li> <li>● DVOM on AC volt scale.</li> <li>● Crank engine and measure voltage between BOB Pin 4 (IDM) and ground.</li> <li>● <b>Is voltage greater than 1.0 volt AC?</b></li> </ul>	<p>Yes</p> <p>No</p>	<p>▶ REPLACE PCM. REMOVE all test equipment. RECONNECT all components. CLEAR Continuous Memory. RERUN Quick Test.</p> <p>▶ GO to <b>IGNB2</b>.</p>
<b>IGNB2</b>	<b>CHECK FOR IDM SHORT TO POWER</b>		
	<ul style="list-style-type: none"> <li>● Key OFF.</li> <li>● Connect TFI Diagnostic Cable 007-00097, or equivalent to PCM breakout box, connect BAT- lead to negative post of battery, and connect TFI module tee to vehicle harness.</li> <li>● DVOM on DC volt scale.</li> <li>● Key ON.</li> <li>● Measure voltage between Pin 23 (IDM) and Pin 7 (VEHICLE BAT-).</li> <li>● <b>Is voltage less than 0.5 volt DC?</b></li> </ul>	<p>Yes</p> <p>No</p>	<p>▶ GO to <b>IGNB3</b>.</p> <p>▶ SERVICE IDM short to power in harness between PCM connector and Ignition Control Module connector. REMOVE all test equipment. RECONNECT all components. CLEAR Continuous Memory. RERUN Quick Test.</p>
<b>IGNB3</b>	<b>CHECK FOR IDM SHORT TO GROUND</b>		
	<ul style="list-style-type: none"> <li>● Key OFF.</li> <li>● Disconnect PCM.</li> <li>● DVOM on ohm scale.</li> <li>● Measure resistance between Pin 23 (IDM) and Pin 7 (VEHICLE BAT-).</li> <li>● <b>Is resistance greater than 10K ohms?</b></li> </ul>	<p>Yes</p> <p>No</p>	<p>▶ GO to <b>IGNB4</b>.</p> <p>▶ SERVICE IDM short to ground in harness between PCM connector and Ignition Control Module connector. REMOVE all test equipment. RECONNECT all components. CLEAR Continuous Memory. RERUN Quick Test.</p>

<b>Diagnosis and Testing</b>	<b>2.0L</b>	<b>IGNB</b>
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TEST STEP		RESULT	ACTION TO TAKE
IGNB4	CHECK FOR IDM OPEN IN HARNESS		
<ul style="list-style-type: none"> <li>● Disconnect PCM.</li> <li>● Measure resistance between Pin 23 (IDM) diagnostic cable and Pin 4 of the PCM connector.</li> <li>● <b>Is resistance less than 5.0 ohms?</b></li> </ul>		Yes	<ul style="list-style-type: none"> <li>▶ REPLACE Ignition Control Module.</li> <li>REMOVE all test equipment.</li> <li>RECONNECT all components. CLEAR Continuous Memory.</li> <li>RERUN Quick Test.</li> </ul>
		No	<ul style="list-style-type: none"> <li>▶ SERVICE IDM open in harness between Ignition Control Module and PCM connector.</li> <li>REMOVE all test equipment.</li> <li>RECONNECT all components. CLEAR Continuous Memory.</li> <li>RERUN Quick Test.</li> </ul>

<b>Diagnosis and Testing</b>	<b>2.0L</b>	<b>IGNC</b>
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**Code 213 - Timing Off (IGNC) (2.0L)**

TEST STEP		RESULT	ACTION TO TAKE
<b>IGNC1</b>	<p><b>CHECK BASE TIMING</b></p> <p><b>CAUTION: Do not use a remote starter while doing timing check.</b></p> <ul style="list-style-type: none"> <li>● Key OFF.</li> <li>● Install timing light.</li> <li>● Remove SPOUT in line connector.</li> <li>● Run engine at normal operating condition.</li> </ul>  <p style="text-align: right;">A17098-B</p> <ul style="list-style-type: none"> <li>● Is base timing within <math>\pm 3</math> degrees of specified base timing (see Specifications Chart at the end of this section)?</li> </ul>	<p>Yes</p> <p>No</p>	<ul style="list-style-type: none"> <li>▶ GO to <b>IGNC2</b>.</li> <li>▶ REFER to Initial Timing Set Procedure.</li> </ul>
<b>IGNC2</b>	<p><b>CHECK FOR SPARK ADVANCE</b></p> <ul style="list-style-type: none"> <li>● Key OFF.</li> <li>● Reconnect SPOUT in line connector.</li> <li>● Idle engine at normal operating condition.</li> <li>● Is timing between 6 degrees and 18 degrees, and does spark advance from base timing position?</li> </ul>	<p>Yes</p> <p>No</p>	<ul style="list-style-type: none"> <li>▶ Not an ignition problem. REFER to Section 2A, Diagnostic Routines.</li> <li>▶ GO to <b>IGNC3</b>.</li> </ul>



<b>Diagnosis and Testing</b>	<b>2.0L</b>	<b>IGNC</b>
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TEST STEP		RESULT	ACTION TO TAKE
<b>IGNC3</b>	<b>CHECK FOR GOOD SPOUT TO IGNITION CONTROL MODULE</b>		
	<ul style="list-style-type: none"> <li>● Connect Rotunda TFI Diagnostic Cable 007-00097, or equivalent, to Rotunda Breakout Box 007-00033, or equivalent, connect BAT- lead to negative post of battery, and connect Ignition Control Module and vehicle harness.</li> <li>● Turn switch on diagnostic cable to SPOUT OPEN.</li> <li>● Use TFI overlay on Breakout Box.</li> <li>● DVOM on AC volt scale.</li> <li>● Run engine and measure voltage between Pin 10 (SPOUT) and Pin 7 (VEHICLE BAT-).</li> <li>● <b>Is voltage between 3.0 and 8.5 volts AC?</b></li> </ul>	<p>Yes</p> <p>No</p>	<p>▶ REPLACE Ignition Control Module. REMOVE all test equipment. RECONNECT all components. CLEAR Continuous Memory. RERUN Quick Test.</p> <p>▶ GO to <b>IGNC4</b>.</p>
<b>IGNC4</b>	<b>CHECK FOR SPOUT OPEN IN HARNESS</b>		
	<ul style="list-style-type: none"> <li>● Key OFF.</li> <li>● Disconnect PCM.</li> <li>● Disconnect diagnostic cable TFI module tee from Ignition Control Module only; leave TFI module tee connected to vehicle harness.</li> <li>● DVOM on ohm scale.</li> <li>● Measure resistance between Pin 36 (SPOUT) of the PCM vehicle harness connector and Pin 10 (SPOUT) at the breakout box.</li> <li>● <b>Is resistance less than 5.0 ohms?</b></li> </ul>	<p>Yes</p> <p>No</p>	<p>▶ REPLACE PCM. REMOVE all test equipment. RECONNECT all components. CLEAR Continuous Memory. RERUN Quick Test.</p> <p>▶ SERVICE SPOUT open in harness between PCM and Ignition Control Module. REMOVE all test equipment. RECONNECT all components. CLEAR Continuous Memory. RERUN Quick Test.</p>

# Diagnosis and Testing

## 2.0L

## IGND

### Intermittent Miss or Stall (IGND) (2.0L)

Before conducting this test, talk to the customer to get the symptoms. Then review the vehicle history to get the number of previous repairs and what components have been replaced.

TEST STEP		RESULT	ACTION TO TAKE
IGND1	TEST EQUIPMENT		
	<ul style="list-style-type: none"> <li>Is a Rotunda TFI/EEC-IV Intermittent Ignition Analyzer 007-00078 or equivalent available?</li> </ul> <p>NOTE: The TFI-IV intermittent analyzer cannot be used with TFI-IV modules with Computer Controlled Dwell (CCD) unless a CCD update is added to the analyzer.</p>	<p>Yes</p> <p>No</p>	<p>FOLLOW test procedure instructions supplied with tester.</p> <p>GO to <b>IGND2</b>.</p>
IGND2	BEGIN DIAGNOSIS		
	<ul style="list-style-type: none"> <li>Will engine start?</li> </ul>	<p>Yes</p> <p>No</p>	<p>GO to <b>IGND3</b>.</p> <p>GO to <b>IGNA1</b>.</p>
IGND3	COLD WIGGLE TEST		
	<ul style="list-style-type: none"> <li>Engine at idle, raise hood, shake wiring harness and pull wires at connectors for ignition components.</li> <li>Does engine quit?</li> </ul>	<p>Yes</p> <p>No</p>	<p>SERVICE wiring harness or connector.</p> <p>GO to <b>IGND4</b>.</p>
IGND4	ENGINE WARM-UP		
	<ul style="list-style-type: none"> <li>Engine at idle, close hood, A/C ON, blower on medium speed: allow engine to run for 15 minutes.</li> <li>Does engine quit?</li> </ul>	<p>Yes</p> <p>No</p>	<p>GO to <b>IGND8</b>.</p> <p>GO to <b>IGND5</b>.</p>
IGND5	HOT RESTART TEST		
	<ul style="list-style-type: none"> <li>Engine off, hood closed, hot soak for 10 minutes.</li> <li>Will engine restart?</li> </ul>	<p>Yes</p> <p>No</p>	<p>GO to <b>IGND6</b>.</p> <p>GO to <b>IGNA1</b>.</p>
IGND6	HOT WIGGLE TEST		
	<ul style="list-style-type: none"> <li>Engine at idle, raise hood, shake wiring harness and pull wires at connectors for ignition components.</li> <li>Does engine quit?</li> </ul>	<p>Yes</p> <p>No</p>	<p>SERVICE wiring harness or connector.</p> <p>GO to <b>IGND7</b>.</p>
IGND7	ROAD TEST		
	<ul style="list-style-type: none"> <li>Road test.</li> <li>Does engine quit?</li> </ul>	<p>Yes</p> <p>No</p>	<p>GO to <b>IGND8</b>.</p> <p>Test complete (Problem not duplicated).</p>
IGND8	FINAL TEST		
	<ul style="list-style-type: none"> <li>Raise hood, shake wiring harness, pull wires at connectors, separate and reconnect connectors for ignition components.</li> <li>Does engine start?</li> </ul>	<p>Yes</p> <p>No</p>	<p>SERVICE wiring harness or connector.</p> <p>GO to <b>IGNA1</b>.</p>

## Specifications/Special Service Tools

### Specifications

#### GENERAL SPECIFICATIONS

Description	Specification
Base Timing:	
1.3L	10 ± 1 degrees BTDC
1.6L Non-Turbo	2 ± 1 degrees BTDC
1.6L Turbo	12 ± 1 degrees BTDC
1.8L	10 ± 1 degrees BTDC
2.0L	10 ± 1 degrees BTDC
2.5L	10 ± 1 degrees BTDC
Spark Plug Gap:	
All Engines	1.0 - 1.09mm (0.039 - 0.043 inch)
Firing Order:	
1.3L	1-3-4-2
1.6L	1-3-4-2
1.8L	1-3-4-2
2.0L	1-3-4-2
2.5L	1-2-3-4-5-6
Idle Speed:	
1.3L ATX	750 ± 50 rpm
1.3L MTX	700 ± 50 rpm
1.6L	850 ± 50 rpm
1.8L	750 ± 50 rpm
2.0L	700 ± 50 rpm
2.5L	650 ± 100 rpm

### Special Service Tools/Equipment

#### SPECIAL SERVICE TOOLS

Tool Number	Description
D81P-6666-A	Air Gap Spark Tester

#### ROTUNDA EQUIPMENT

Model	Description
059-00014	Timing Analyzer
105-00053	88 Digital Multimeter
010-00575	Engine Analyzer
105-00051	73 Digital Multimeter
007-00078	TFI/EEC-IV Intermittent Ignition Analyzer
007-00097	TFI-IV Diagnostic Cable
007-00033	Breakout Box
021-00014	Vacuum Tester
007-00083	PIP Adapter