

# TUNE-UP - 6-CYL

1988 Jeep Cherokee

1987-88 TUNE-UP  
Jeep 6 Cylinder Tune-Up

Cherokee, Comanche, Wagoneer, Wrangler

## IDENTIFICATION

### ENGINE IDENTIFICATION

Engine can be identified by the fourth character of engine Build Date Code number, located on a tag attached to right side of block between No. 2 and 3 cylinders.

The same code letter is also the fourth character in the Vehicle Identification Number (VIN), located at top left corner of dashboard.

#### ENGINE CODE TABLE

Engine	Code
4.0L (242") MPFI .....	M
4.2L (258") 2-Bbl. ....	C

## TUNE-UP NOTES

NOTE: When performing tune-up procedures described in this article, these notes and precautions must be followed.

Due to late changes and corrections, always refer to Emission Control Label in engine compartment before attempting tune-up. If manual and label specifications differ, use label specifications.

When performing tune-up on vehicles equipped with a catalytic converter, do not allow or create an engine misfire in one or more cylinders for an extended period of time. Damage to converter from overheating may occur due to loading with unburned fuel.

## TESTING

### ENGINE COMPRESSION

Check compression pressure with engine at normal operating temperature, all spark plugs removed, throttle and choke valves wide open and engine at cranking speed.

#### COMPRESSION SPECIFICATIONS TABLE

Application	Specification
Compression Ratio .....	9.2:1
Compression Pressure .....	120-150 psi (8.4-10.5 kg/cm <sup>2</sup> )
Maximum Variation Between Cylinders ..	30 psi (2.1 kg/cm <sup>2</sup> )

### HIGH TENSION WIRE RESISTANCE

Do not puncture spark plug wires with any type of probe. Remove spark plug wire and check resistance using an ohmmeter.

## SPARK PLUGS

### SPARK PLUG TYPE TABLE

Application	Champion No.
All Models .....	RFN14LY

### SPARK PLUG SPECIFICATIONS TABLE

Gap: In. (mm)	Torque: Ft. Lbs. (N.m)
0.035 (0.89) .....	7-15 (10-20)

## FUEL PUMP

4.0L

1) Remove the cap from the pressure test port located in the fuel rail. See Fig. 1. Connect Fuel Pressure Gauge (J-34730-1) to the pressure fitting.

2) Start vehicle. Pressure should be approximately 31 psi (2.1 kg/cm<sup>2</sup>) with the vacuum hose connected to the pressure regulator and 39 psi (2.6 kg/cm<sup>2</sup>) with the vacuum hose removed from the pressure regulator. See FUEL PUMP SPECIFICATIONS TABLE.

3) Check the fuel pump flow rate. A good fuel pump will deliver at least one liter of fuel per minute with the fuel return line pinched off. If the fuel pump does not pump adequately, inspect the fuel system for a plugged fuel filter or filter sock.

4) Fuel pump flow rate can be checked by connecting one end of an old A/C gauge hose to the fuel test port on the fuel rail and inserting the other end of the hose into a container of at least one liter or more capacity.

5) Run the fuel pump by installing a jumper wire into diagnostic connector terminals D1-5 and D1-6. Be sure to pinch off the fuel return line or most of the fuel will be returned to the fuel tank.

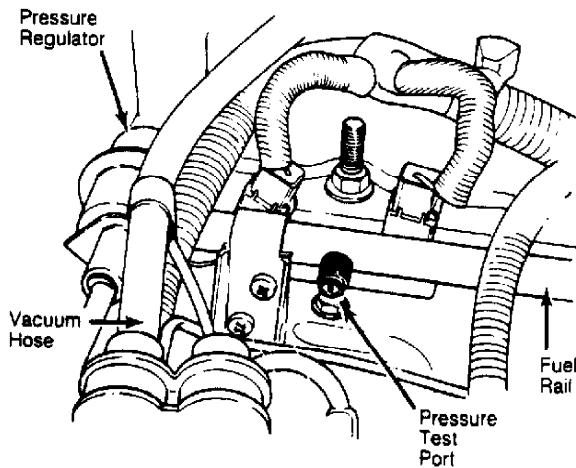


Fig. 1: Fuel System Pressure Test Components  
Courtesy of American Motors/Jeep Corp.

4.2L

Perform fuel pump test with air cleaner removed and fuel

inlet line or filter disconnected at carburetor. Disconnect fuel return line at fuel filter and plug nipple on filter. Make all tests at idle speed. See FUEL PUMP SPECIFICATIONS TABLE.

FUEL PUMP SPECIFICATIONS TABLE

Application **	Pressure psi (kg/cm <sup>2</sup> )	Volume (1) Pts. (L)
4.0L .....	(2) 31 (2.1) .....	1.0 (.47)
4.0L .....	(3) 39 (2.6) .....	1.0 (.47)
4.2L .....	4.0-5.0 (.28-.35) .....	1.0 (.47)

- (1) - Volume per 30 seconds.
- (2) - With the vacuum hose connected to the pressure regulator.
- (3) - With the vacuum hose removed from the pressure regulator.

**ADJUSTMENTS**

**VALVE ARRANGEMENT**

\* E-I-I-E-I-E-E-I-E-I-I-E (Front-to-rear).

**VALVE CLEARANCE**

All engines are equipped with hydraulic lifters. Valve clearance is not adjustable.

**IGNITION COIL WIRE**

Remove ignition coil wire from coil and distributor cap. Check terminals for corrosion and clean (if necessary). Check coil wire resistance. Replace wire if resistance is excessive.

HIGH TENSION WIRE RESISTANCE (OHMS) TABLE

Wire Length	Minimum	Maximum
0-15" .....	3000 .....	10,000
15-25" .....	4000 .....	15,000
25-35" .....	6000 .....	20,000
Over 35" .....	8000 .....	25,000

**DISTRIBUTOR**

4.0L  
Information not available from manufacturer.

4.2L  
All models are equipped with Motorcraft Solid State Ignition (SSI) systems. No adjustments are required.

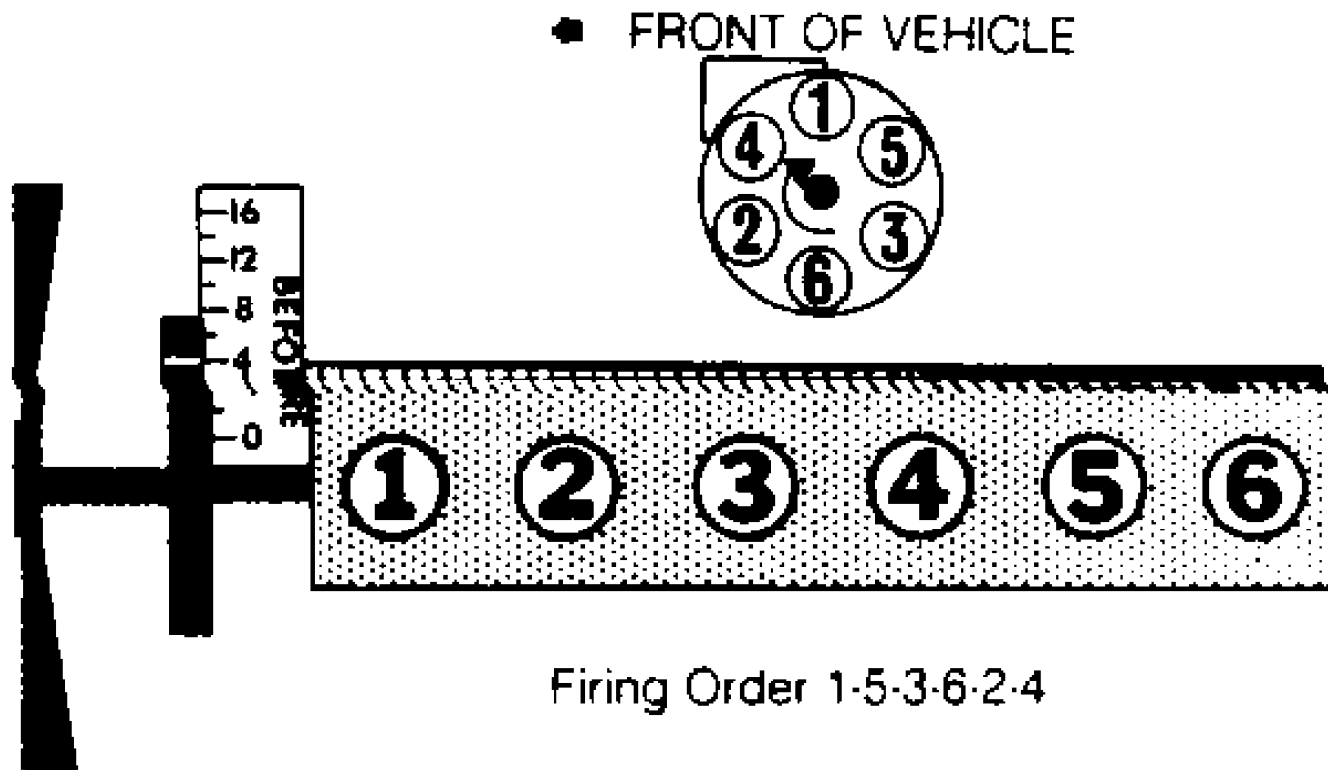


Fig. 2: 4.0L & 4.2L Timing Marks & Firing Order  
Magnetic probe located at 9.5 degrees ATDC on 4.2L.

#### IGNITION TIMING (4.0L)

Information not available from manufacturer.

#### IGNITION TIMING (4.2L)

NOTE: Engines are equipped with a receptacle for a magnetic probe timing light, located 9.5 degrees ATDC. Do not use this location to check timing with a conventional light, use a magnetic probe timing light.

##### Standard Timing Procedure

1) Apply parking brake, and place transmission in Neutral (Park for automatic transmissions). Operate engine to normal operating temperature. Turn ignition off. Install timing light.

2) Connect tachometer. Disconnect and plug vacuum hose at distributor. Disconnect vacuum switch assembly wire connector, located on top of valve cover. Start engine and increase engine speed to 1600 RPM.

3) Compare timing to specification. See IGNITION TIMING SPECIFICATIONS table. To adjust timing, loosen distributor clamp bolt and turn distributor. Recheck timing after clamp bolt is tightened.

##### Alternate Timing Procedure

1) Apply parking brake and place transmission in Neutral (Drive for automatic transmissions). Operate engine to obtain normal operating temperature. Turn ignition off. Install timing light.

2) Disconnect and plug vacuum switch hose (Red and Black

wires connected to switch). Disconnect distributor vacuum advance hose and connect hose to vacuum switch. Disconnect wire connector from knock sensor, located in cylinder head.

3) Using a jumper wire, ground knock sensor wire connector to engine block. Start engine. With engine at idle speed (solenoid energized), check timing. Adjust timing to one degree more than specification (if required). See Emission Control Label.

IGNITION TIMING SPECIFICATIONS (DEGREES BTDC@RPM) - 4.2L

Application	Man. Trans.	Auto. Trans.
50 State .....	9 @ 1600 .....	9 @ 1600
High Altitude .....	16 @ 1600 .....	16 @ 1600

HOT (SLOW) IDLE RPM

4.0L

1) Apply parking brake and place transmission in Neutral (Drive for automatic transmissions). Operate engine to normal operating temperature. Turn ignition off.

2) Ensure all accessories are off. Connect positive tachometer lead to terminal "D1-1" and negative lead to "D2-7" of diagnostic connectors. See Fig. 3. Disconnect air stepper motor connector and TPS wiring connector. See Fig. 4.

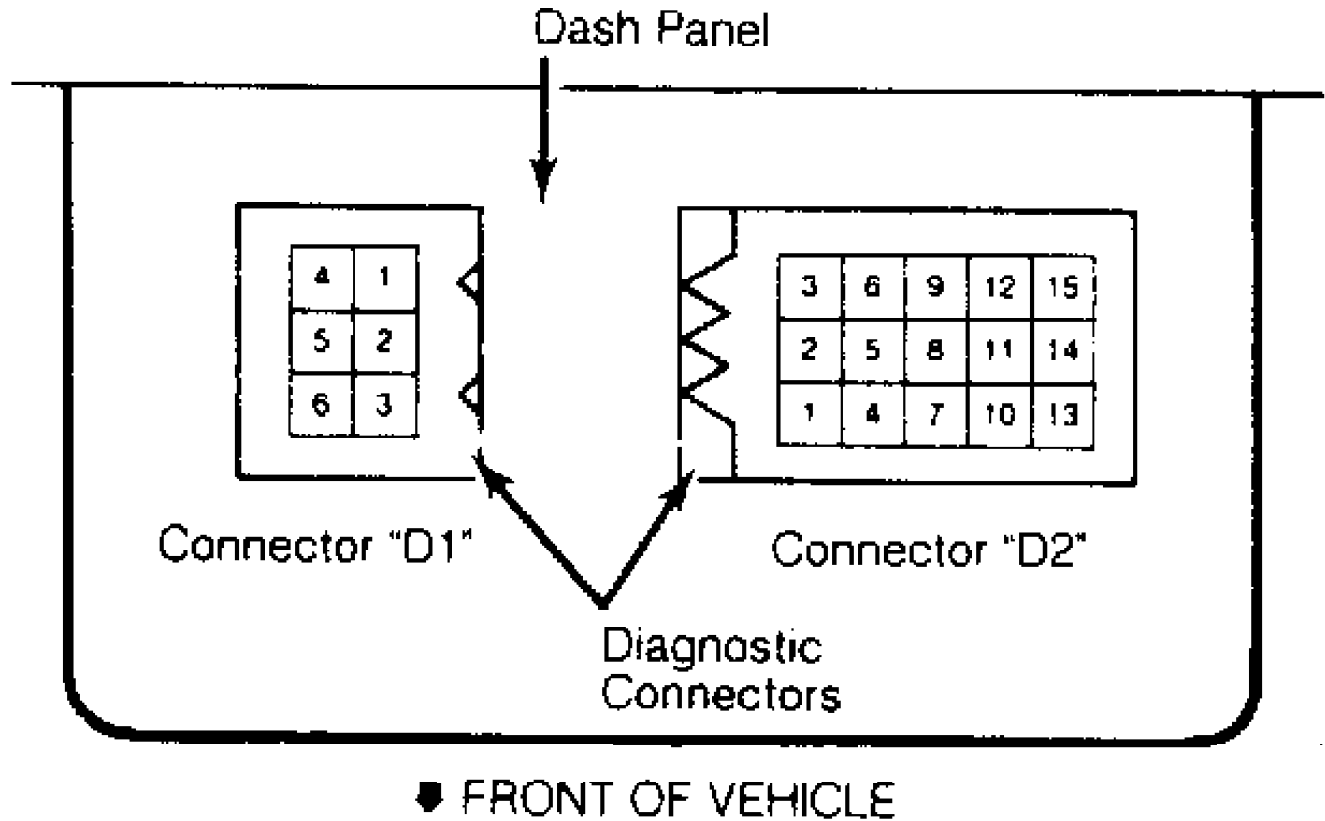


Fig. 3: Diagnostic Connector Terminal Identification  
 Courtesy of Chrysler Motors.

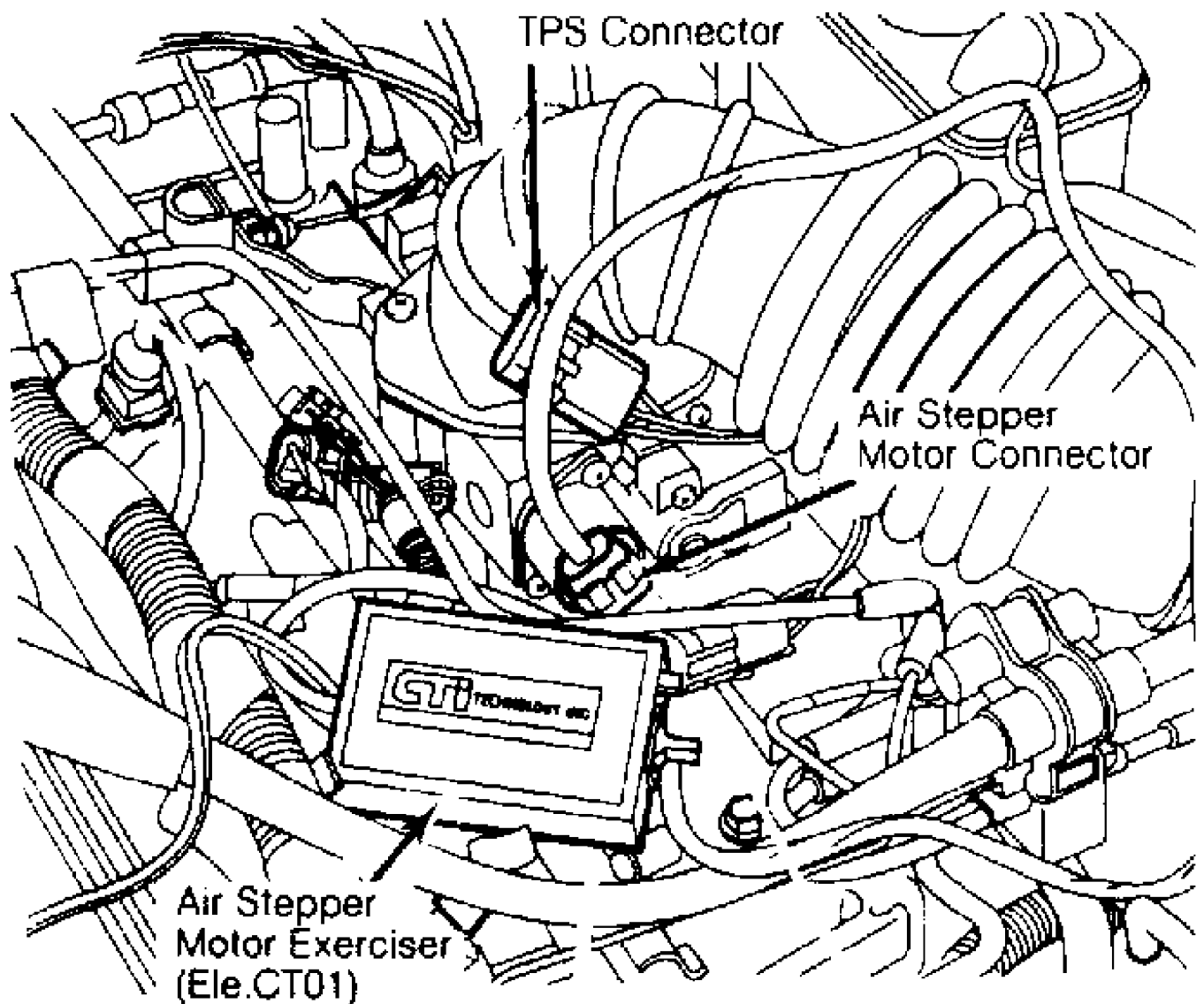
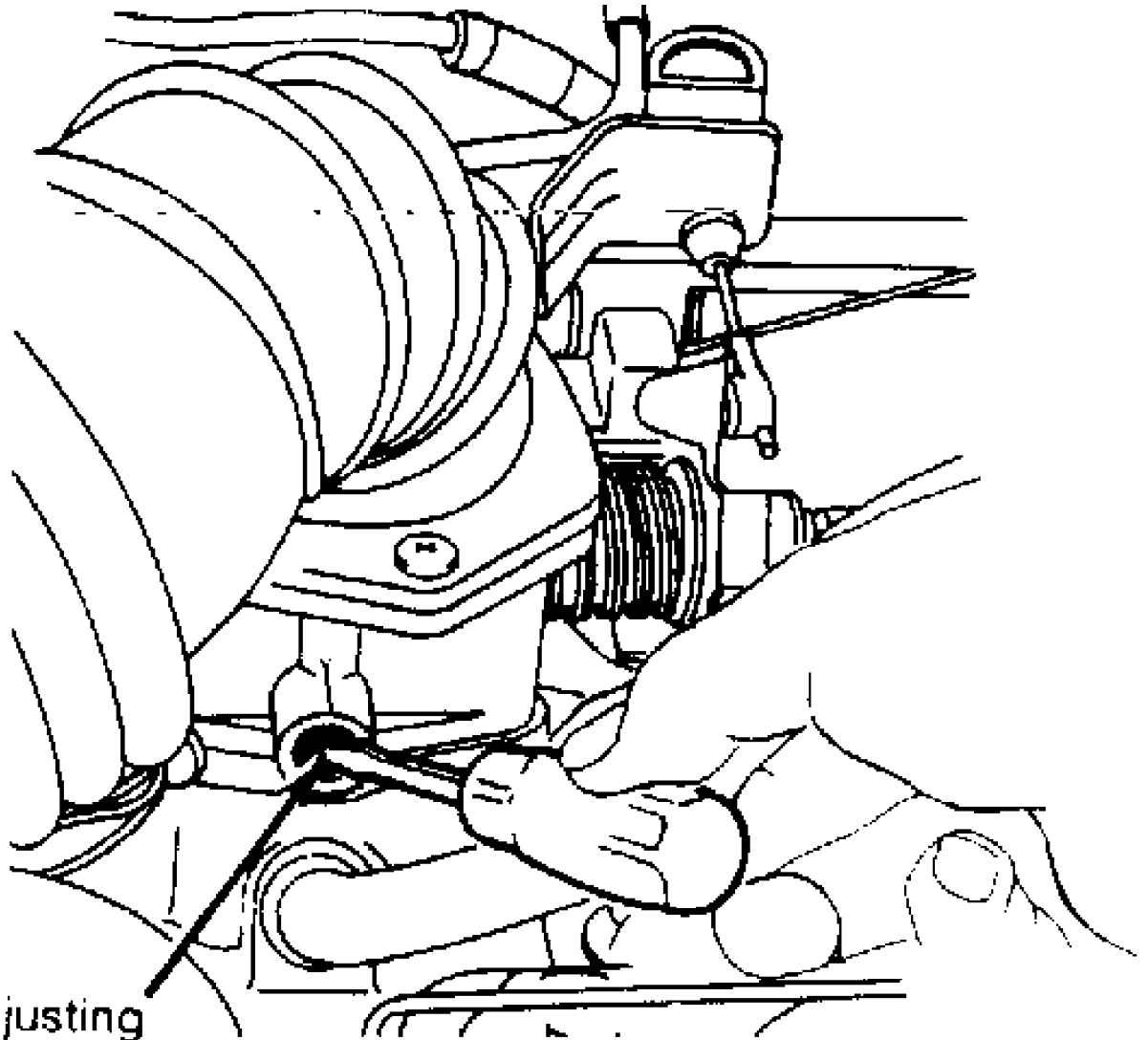


Fig. 4: Installing Air Stepper Motor Exerciser  
Courtesy of Chrysler Motors.

3) Install Air Stepper Motor Exerciser (Ele.CT01) on the air stepper motor connector. See Fig. 4. Install the Red terminal of the air stepper exerciser on the positive battery post and the Black terminal on the negative battery terminal.

4) Start engine and place stepper motor exerciser switch on the "LOW" position and note engine RPM. Idle speed should be 750F50 RPM. Disconnect and remove air stepper motor exerciser.

5) If adjustment is required, turn ignition off. Remove the welch plug from the RPM adjusting screw cavity. See Fig. 5. Turn RPM adjusting screw inward 2 turns. Start the engine and note engine RPM.



## Idle Adjusting Screw

Fig. 5: Adjusting Idle RPM  
Courtesy of Chrysler Motors.

6) Adjust idle RPM screw to obtain idle speed of 750F50 RPM. Once correct idle RPM is obtained, seal the welch plug cavity with RTV sealant. Reconnect air stepper motor and TPS.

### 4.2L

1) Warm engine to normal operating temperature. Apply parking brake. Place automatic transmission in Drive (Neutral on manual transmission). Disconnect and plug vacuum hose from vacuum actuator. Disconnect solenoid wire connector.

2) Adjust curb idle screw to obtain correct curb idle. See CURB IDLE SPEED (RPM) table. Apply 10-15 in. Hg vacuum to vacuum actuator. With throttle positioner fully extended, adjust screw on throttle lever, to set vacuum actuator RPM to specification. See VACUUM ACTUATOR & SOLENOID IDLE (RPM) table. Disconnect vacuum pump.

3) Apply battery voltage to solenoid with a jumper wire. Turn A/C on (if equipped). Open throttle, allowing solenoid to fully extend. Adjust solenoid adjusting screw to obtain solenoid idle RPM.

See VACUUM ACTUATOR & SOLENOID IDLE (RPM) table. Reconnect solenoid connector and vacuum hose.

CURB IDLE SPEED (RPM) TABLE - 4.2L

Application	Man. Trans.	Auto. Trans.
50 State .....	680 .....	600
High Altitude .....	700 .....	650

VACUUM ACTUATOR & SOLENOID IDLE (RPM) TABLE - 4.2L

Application	Vacuum Actuator	Solenoid Energized
Man. Trans. ....	1100 .....	900
Auto. Trans. ....	900 .....	800

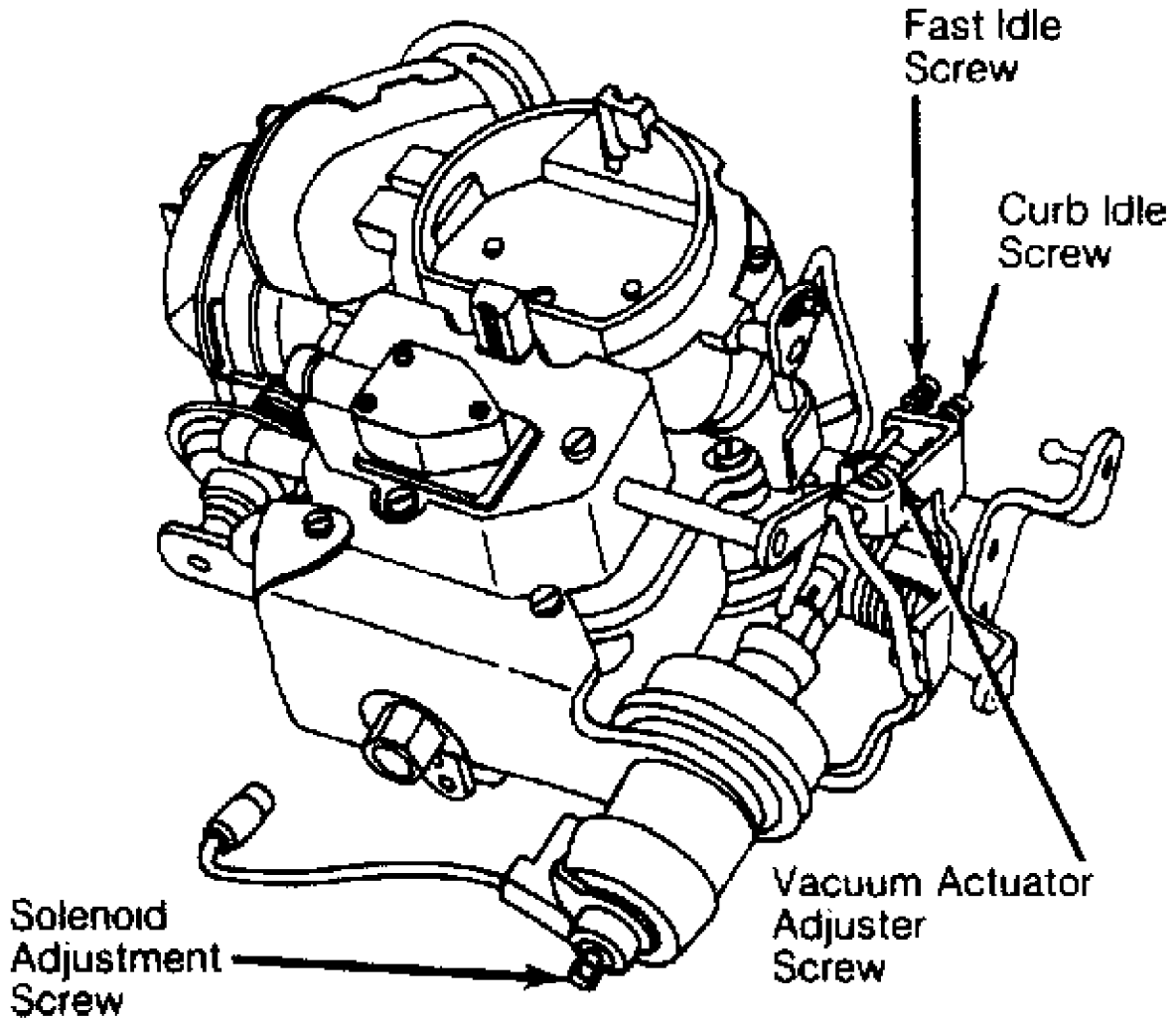


Fig. 6: Adjusting 4.2L Idle RPM  
 Courtesy of Chrysler Motors.

NOTE: Idle mixture adjustment is not part of a normal tune-up. DO NOT adjust mixture unless carburetor has been disassembled



or vehicle fails emissions testing.

### **IDLE MIXTURE (TACHOMETER (LEAN DROP) PROCEDURE)**

**NOTE:** On 4.2L engines, ensure idle speed and timing are set prior to adjusting the idle mixture. If mixture adjustment time exceeds 3 minutes, run engine at 2000 RPM in Neutral for one minute, and resume adjustment. On 4.0L engines, idle mixture adjustment is not possible.

#### **4.2L**

1) Remove carburetor and locate roll pins blocking idle mixture screws. Drill through throttle body on closed end of roll pin hole. Drive pins out with punch. Reinstall carburetor. Install tachometer.

2) Operate engine to normal operating temperature, and adjust curb idle speed. Place automatic transmission selector in Drive (Neutral for manual transmissions). Turn mixture screws inward until RPM drops. Turn screws outward until highest RPM is reached.

3) Turn mixture screws inward to obtain the correct decrease in RPM. See LEAN DROP (RPM) table. Adjust both screws equally. When mixture is correctly adjusted, replace roll pin to block adjustment screws.

**NOTE:** If final RPM differs more than 30 RPM from specified curb idle speed, reset curb idle, and repeat mixture adjustment.

#### **LEAN DROP (RPM) TABLE**

Application	Man. Trans.	Auto. Trans.
4.2L .....	50 .....	50

### **THROTTLE POSITION SENSOR (TPS)**

**NOTE:** Adjustment of TPS only applies to the 4.0L models. It may be necessary to remove throttle body from intake manifold, to access sensor wiring harness.

#### **Checking & Adjusting - 4.0L (Automatic Transmission)**

1) Locate the square TPS connector. Note connector terminal identification stamped on the back of the connector. Turn ignition on.

2) Connect voltmeter through back of wiring harness connector. Connect negative voltmeter lead to terminal "D" and positive voltmeter lead to terminal "A" to check input voltage. DO NOT disconnect TPS connector.

3) Hold throttle plate closed against idle stop and note voltage. Input voltage should be approximately 5 volts. Disconnect voltmeter positive lead and connect to terminal "B" to measure output voltage.

4) With throttle plate closed, measure the output voltage. The output voltage should be approximately 4.2 volts. If output voltage is not within specification, loosen TPS retaining screws.

5) Partially tighten one retaining screw. Rotate TPS to obtain correct output voltage. Tighten retaining screws once correct voltage is obtained.

#### **Checking & Adjusting - 4.0L (Manual Transmission)**

1) Turn ignition on. Connect voltmeter through back of wiring harness connector. Connect negative voltmeter lead to terminal "B" and positive voltmeter lead to terminal "A". DO NOT disconnect TPS connector.

2) Hold throttle plate in the closed throttle position against idle stop and note input voltage reading. Input voltage should be approximately 5.0 volts.

3) Disconnect positive lead from terminal "A" and connect to terminal "C" to check output voltage. Output voltage should be checked with throttle plates fully closed.

4) Output voltage should be approximately 0.8 volts. If output voltage is not within specification, loosen TPS bottom retaining screw and pivot sensor for a large adjustment or top retaining screw for a fine adjustment.

5) Adjust sensor to obtain correct output voltage. Tighten retaining screws. Remove voltmeter.

## COLD (FAST) IDLE RPM

4.2L

Disconnect and plug EGR valve vacuum hose. With engine running at normal operating temperature, place fast idle screw on second step of fast idle cam and against shoulder of high step. Turn screw to adjust fast idle speed.

FAST IDLE SPEED (RPM) TABLE

Application	Man. Trans.	Auto. Trans.
4.2L .....	1700 .....	1700

## AUTOMATIC CHOKE SETTING

Choke coil cover is riveted in place and no adjustment is necessary or possible.

## SERVICING

### EMISSION CONTROL

See EMISSIONS section.

## SPECIFICATIONS

### IGNITION

Distributor

All vehicles use a Motorcraft breakerless solid state distributor.

PICK-UP COIL RESISTANCE TABLE - OHMS @ 75°F (24°C)

Application	Specification
All Models .....	400-800

TOTAL SPARK ADVANCE TABLE @ 2000 RPM

Application	W/ Vac. Advance	W/O Vac. Advance
4.0L .....	N/A .....	N/A
4.2L .....	30.5° .....	7.5-12.5°

(1) - Information not available from manufacturer.

## IGNITION COIL

### IGNITION COIL OUTPUT TABLE @ 1000 RPM

Application	Output
All Models .....	24KV Minimum

### IGNITION COIL RESISTANCE TABLE

Temperature	Primary Ohms	Secondary Ohms
75°F (24°C) .....	1.13-1.23 .....	7700-9300
200°F (93°C) .....	1.5 .....	12,000

## FUEL SYSTEM

### CARBURETORS & FUEL INJECTION TABLE

Application	Model
4.0L .....	MPFI
4.2L .....	Carter BBD 2-Bbl.

## BATTERY

### BATTERY SPECIFICATIONS TABLE

Application **	Cold Cranking (1) Amps	Reserve Capacity Minutes
Standard .....	421 .....	75
Optional .....	452 .....	81

(1) - At 0°F (-18°C).

## STARTER

All models equipped with Mitsubishi starters.

### STARTER SPECIFICATIONS TABLE

Application	Volts	Amps	Test RPM
All Models .....	11.22 .....	80 .....	2500

## ALTERNATOR

All models use Delco-Remy solid state alternators with internal voltage regulator.

### ALTERNATOR SPECIFICATIONS TABLE

Application	Field Current	Rated
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**	Draw @ 12 Volts	Amp Output
Standard	(1) 4.0-5.0 Amps	56
Optional	(1) 4.0-5.0 Amps	66
Optional	(1) 4.0-5.0 Amps	78

(1) - At 80°F (27°C).

## ALTERNATOR REGULATORS

All models use Delco-Remy solid state regulators, integral with alternator. Regulator is nonadjustable.

## BELT ADJUSTMENT

BELT ADJUSTMENT TABLE TENSION IN LBS. (KG) USING STRAND TENSION GAUGE

Application	New Belts	Used Belts
"V"-Belts	125-155 (57-70)	90-115 (41-52)
Serpentine	180-200 (82-91)	140-160 (63-72)

## REPLACEMENT INTERVALS

REPLACEMENT INTERVALS TABLE

Component	Interval (Miles)
Air Filter	30,000
Fuel Filter	30,000
Oil & Filter	7500
PCV Valve	30,000
Spark Plugs	30,000

## CAPACITIES

FLUID CAPACITIES TABLE

Application	Quantity
Auto. Trans. (Dexron II)	
Wrangler	8.0 qts. (7.6L)
All Others	8.5 qts. (8.0L)
Cooling System	
Wrangler	10.5 qts. (9.9L)
All Others	12.0 qts. (11.4L)
Crankcase (Includes Filter)	
Wrangler	5.0 qts. (4.7L)
All Others	6.0 qts. (5.7L)
Drive Axle	
Front	2.5 pts. (1.2L)
Rear	
Comanche	
Standard Capacity	2.5 pts. (1.2L)
Metric Ton Axle	4.8 pts. (2.3L)
All Others	2.5 pts. (1.2L)
Fuel Tank	
Cherokee & Wagoneer	
Standard	13.5 gals. (51L)

Optional	.....	20 gals.	(76L)
Comanche			
Standard	.....	16 gals.	(60L)
Optional	.....	23.5 gals.	(89L)
Wrangler			
Standard	.....	15 gals.	(57L)
Optional	.....	20 gals.	(75L)
Manual Transmission			
AX4	.....	7.8 pts.	(3.7L)
AX5	.....	7.4 pts.	(3.5L)
BA 10/5	.....	3.5 pts.	(1.6L)
Transfer Case (Dexron II)			
Wrangler	.....	3.25 pts.	(1.5L)
All Others			
Command Trac	.....	2.2 pts.	(1.0L)
Select Trac	.....	3.0 pts.	(1.4L)

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SYSTEM REFRIGERANT CAPACITIES TABLE

Application		Ozs.
All Models	.....	36

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