

# 1600 AUTOMOTIVE COMPUTER PRINTER

GENERAL MOTORS  
/ FORD /  
CHRYSLER

OWNER'S MANUAL

To the Customer:

Congratulations on your purchase of the latest in diagnostic test equipment. The PRINTER "talks" to the engine computers on GM, FORD and CHRYSLER vehicles and prints out whatever may be troubling - - in plain English.

For example many GM car computers check once each second to see if anyone wants to engage in a "conversation". The car computer will not talk to just anyone; you have to send it a special coded message or it will not answer! If the proper message is retrieved the computer spews out more than 100 pieces of information such as rich or lean fuel, water temperature, exhaust oxygen, all in less than 1/10th second.

The PRINTER is lightning fast and catches everything in its large memory; without pausing it translates the computer data to English words and prints a complete engine analysis out on paper.

For the first time the PRINTER is able to "talk" to all GM, FORD, and CHRYSLER vehicles without any optional add-ons. We pack all of the information in one time saving cartridge, eliminating the need to change cartridges every time you check a different type of car.

The PRINTER employs a new computer technology which utilizes both master and slave PROM's (Programmable Read Only Memory chips). This innovative process not only provides enhanced memory and speed but it frees the microprocessor for communication of messages to and from the engine. In addition, the master-slave technique allows for the possibility of future computer modifications to be made simply by any user.

Other Diagnostic devices employ a keyboard on which the user must type in commands, codes, signals, and various miscellaneous numbers. The PRINTER has cleverly eliminated the keyboard; no need to punch in anything. Instead a plastic ID card is furnished for EACH model car or truck; the user simply inserts the card which is then optically read by the PRINTER. The optical ID system is resistant to erasing by magnets which auto-mechanics often use as tools.

## WARNINGS

**When operating automobiles remember the following:**

Have adequate ventilation in the service area when the engine is operating. The carbon monoxide produced while the engine is running is odorless, and may lead to serious injury.

Set the parking brake and block the wheels for safe testing.

Take care when connecting the tester to the battery, explosive gases are produced when the battery is being charged.

Be sure the battery has an adequate charge (10.5 volts minimum) to ensure accurate testing.

### NOTE:

All information contained in this manual and produced by the PRINTER is based on the latest technical information available from the factory at the time of printing. We reserve the right to make changes at any time without notice.

## OPERATING INSTRUCTIONS

Your PRINTER is designed to test and print out engine analysis data for GM, FORD, and CHRYSLER vehicles. Throughout this manual there are references to repair manuals published by the manufacturer of the automobile. These are an excellent source of information, and their repair procedures should be followed whenever possible.

## GENERAL INFORMATION MESSAGES

- INSERT CARD** This message is printed when the PRINTER is ready to accept a card. Do not insert the card until the PRINTER has finished printing this message.
- NO ENG DATA** This message is printed when the PRINTER is not receiving data from the car. Check the ALDL connector plug.
- TEST COMPLETE** This message is printed when the PRINTER has finished testing.

## GENERAL MOTORS SECTION

*This section is written for personnel who are knowledgeable and schooled in the technical areas of General Motors Computer Command Control Systems. Proper training is needed to take advantage of all the information printed by this tester.*

## General Motors Information Messages

**DIAGNOSTIC MODE** (Diagnostic Mode) Printed when the Diagnostic\Normal switch is in the Diagnostic Mode.

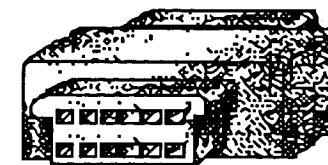
### WARNING

#### MAX RUN 2 MIN

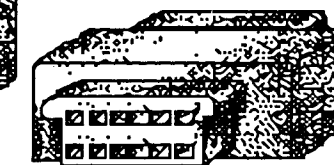
This message is printed whenever the Diagnostic\Normal switch is in the Diagnostic mode. Do not run the engine in this mode for more than 2 minutes to avoid overheating exhaust system.

## General Motors Operating Procedure

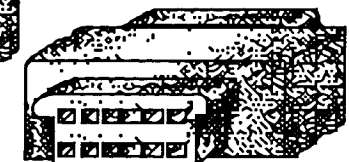
1. Plug in the tester leads. **NOTE:** The ALDL adapter link is keyed, and will go in only one way!!!



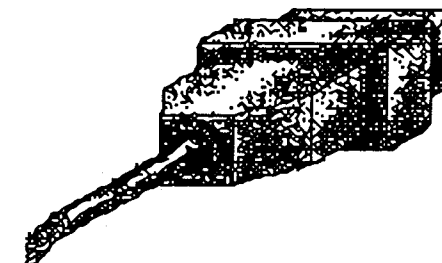
1981 ADAPTOR



MIN-T ADAPTOR



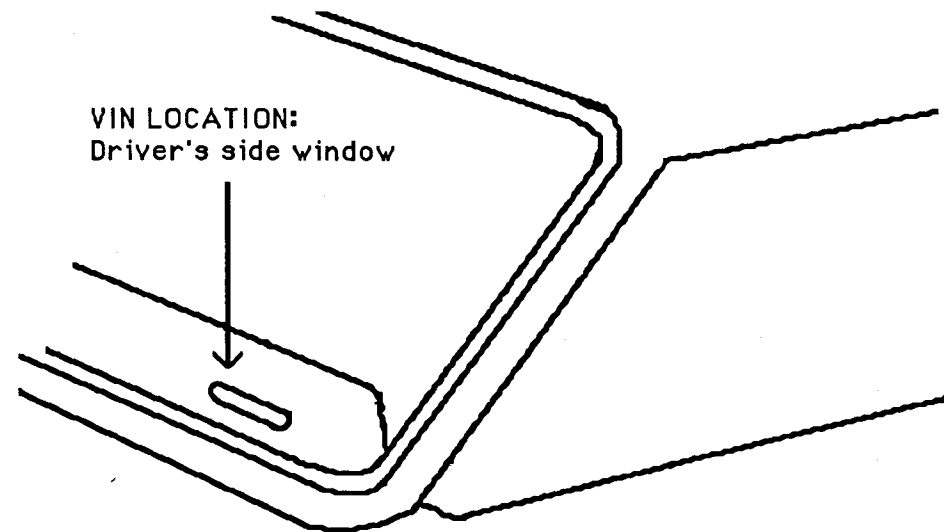
CORVETTE ADAPTOR  
86 AND UP



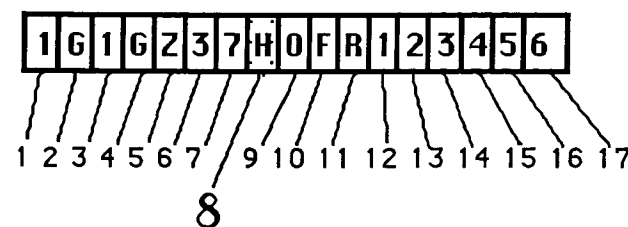
2. Set the two data switches (Normal/Diagnostic) test scan and (Long/Short) list. The short list is useful if not all the data is needed. The short list only provides data on the following:

1. Throttle Position
2. Mixture Dwell or Integrator
3. RPM (Revolutions per minute)
4. Oxygen Millivolts

3. Choose the card needed by using the VIN number of the engine and the year of the car. The VIN number is best seen by standing outside of the car and looking through the bottom of the windshield on the driver's side.



The Engine Code is in VIN position 8.

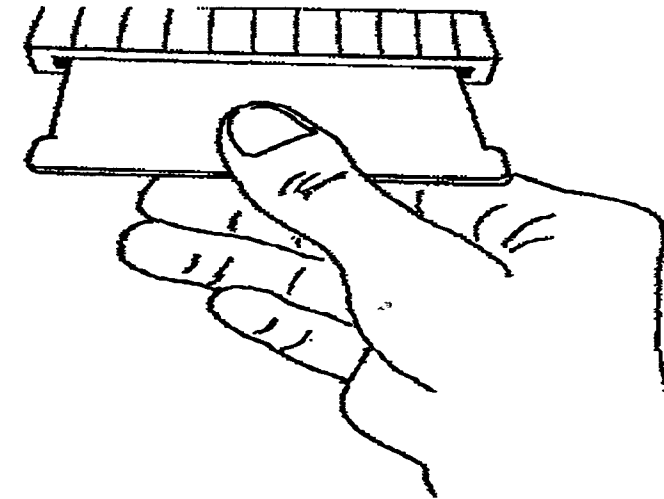


TYPICAL VIN NUMBER.  
ENGINE CODE IS IN POSITION 8

4. Turn on the ignition switch or start the car.
5. Turn on the tester. If the power light is not illuminated, make sure the tester is getting a good connection through the cigarette lighter socket. Check the two data switches: Long/Short and Normal/Diagnostic. (usually "Long" and "Normal"). If there is any difficulty getting reliable power from the lighter socket, use an adaptor to power the printer directly from the battery. (See "Replacement Parts")

6. The PRINTER will print out "INSERT CARD".

7. Insert the card into the card reader with the index label up. **NOTE:** Each card is for two different cars; one car on each side. **Make sure the card number you want is facing up when inserting it into the card reader.**



8. If card remains inserted the list will be repeated with updated data. When the card is removed the list will be completed and will then stop.

## PRINTED WORDS AND THEIR MEANINGS FOR GM

### COOLANT (°C)

The coolant temperature is displayed in degrees celsius. The normal operating range of an Engine is approximately 95°-115°. The coolant sensor is one of the most important sensors on the car. If it is not working, **or the coolant level is low**, the computer will sense the engine is too cold (or too hot) and incorrectly set operating conditions.

### MPH

Vehicle speed as received from the vehicle speed sensor (VSS), and is in miles per hour. This sensor reading is critical for operation of the lockup torque converter clutch.

### PROM ID

The identification number of the PROM is printed out. If the ECM or the PROM has to be replaced, the PROM numbers must be the same. The PROM is the fixed memory of the computer, and tailors the computer to the car.

**MAN PRES V/10**

(Manifold Pressure) Divide the printed number by 10 to obtain volts. Manifold vacuum and pressure are opposites. When the manifold vacuum is high the manifold pressure is low. This is a condition of the engine at idle. Manifold vacuum-low, and manifold pressure-high is a condition encountered when the engine is under a load, such as climbing a hill or rapid acceleration. The computer uses these readings to determine what type of load is being put on the engine. See the table below to convert volts to pressure or vacuum.

MANIFOLD ABSOLUTE PRESSURE											
KPA	100	90	80	70	60	50	40	30	20	10	0
HG	29.6	26.6	23.7	20.7	17.7	14.8	11.8	8.9	5.9	2.9	0
VOLTS	4.9	4.4	3.8	3.3	2.7	2.2	1.7	1.1	0.6	0.3	0.3

VACUUM											
KPA	0	10	20	30	40	50	60	70	80	90	100
HG	0	2.9	5.9	8.9	11.8	14.8	17.7	20.7	23.7	26.6	29.6
V	0.3	0.3	0.6	1.1	1.7	2.2	2.7	3.3	3.8	4.4	4.9

**KNOCK RTD (°)**

(Knock Retard ) Sensor sends a signal to the electronic spark control when engine knock is detected. The PRINTER prints the amount of spark retard in degrees.

**THROTTLE V/10**

(Throttle Position) Divide the printed number by 10 to obtain volts. This sensor sends the information to the ECM. The throttle position sensor usually is less than 1 volt when the throttle is closed, and up to 5 volts if the throttle is wide open. The computer uses this information to determine engine demand. If the driver suddenly depresses the accelerator, the computer will have to adjust the mixture, timing, and possibly disengage the torque converter clutch, in order to provide the driver with the power needed. If the throttle position sensor is out of specification, it can cause driveability problems, rough idle, and poor fuel economy.

**OXYGEN (X10MV)**

(Oxygen Sensor Voltage). Multiply the printed number by 10 to obtain millivolts. A read out of 055 is equal to 550 millivolts. The oxygen sensor monitors the gases in the exhaust and sends a lean signal (500MV or less) or a rich signal (500MV or higher) to the ECM. This is one of the main sensors for emission control and fuel economy.

**MIXTURE DWELL**

(Mixture Control Dwell) . The printed number is degrees. During closed loop (normal) operation, the mixture dwell should be fluctuating between 5 and 55 degrees.

**RPM (X10)**

(Engine Revolutions per Minute).The printed number 062 equals 620 RPM.

**BARO (V/10)**

(Barometric Pressure Sensor). Divide the printed number by 10 to obtain volts. Using the chart below 4.9 volts equals 100KP which is normal atmospheric pressure at sea level. This sensor is used to determine the altitude of the engine. When an engine is located near sea level, the air is thicker, and the computer has to adjust the mixture to allow more fuel to mix with the air. If an engine is located in a high altitude area such as Denver, Colorado, the air is thinner, and the mixture has to be cut down in order to maintain the 14.7 to 1 fuel ratio.

BAROMETRIC PRESSURE											
KPA	100	90	80	70	60	50	40	30	20	10	0
HG	29.6	26.6	23.7	20.7	17.7	14.8	11.8	8.9	5.9	2.9	0
V	4.9	4.4	3.8	3.3	2.7	2.2	1.7	1.1	0.6	0.3	0.3

**ALDL COUNT**

The printed number keeps track of the commands the computer sends to the MC solenoid or fuel injection unit. The range is 0-256 counts. This is used to determine the activity level of the oxygen sensor.

**BATTERY (V/10)**

(Battery voltage). Divide the printed number by 10 to obtain volts; a reading of 141 equal 14.1 volts.

**EGR DUTY CYCL**

Printed number is in percent. The number indicates the position of the E.G.R. valve. This is not used on systems which use an "ON/OFF" switch to determine the position of the E.G.R. On Oldsmobile and Chevrolet cars 0% means the EGR is fully cosed and 100% means the EGR is fully open. On Buick cars, 0% means the EGR valve is fully open, and 100% means the EGR valve is fully closed.

**LEAN MIXTURE**

Message printed when the mixture is greater than 14.7 parts of air to 1 part of fuel.

**RICH MIXTURE**

Message printed when the mixture is less than 14.7 parts of air to 1 part of fuel.

**CLOSED LOOP**

Message printed when the computer is in full control of all variable settings.Closed loop is a condition of the engine when the engine is fully warmed up and the ECM has finished its "time-out" sequence (i.e. the computer is ready to operate, normally about 15 to 20 seconds after the engine is running), and the temperature of the oxygen sensor is above 600°F.

**OPEN LOOP**

Message printed when the computer is not in full control (e.g. when the engine is cold). During open loop, some of the settings are no longer adjustable but are fixed at certain specified values.

**AIR DIV ON**

Message printed when the air cleaner divert solenoid is sending air from the air pump to the air switch solenoid. The divert solenoid diverts air to either the atmosphere or down to the air switch.

**AIR DIV OFF**

Message printed when the air cleaner divert solenoid is venting air from the air pump into the atmosphere.

**AIR SW ON**

Message printed when the air from the air divert is routed into the exhaust ports, instead of into the catalytic converter.

**AIR SW OFF**

Message printed when the air from the air divert is routed into the catalytic converter instead of into the exhaust ports.

**E.G.R ON**

Message printed when the exhaust gas recirculation is disabled. This is done by energizing a solenoid in the vacuum line going to the EGR valve and blocking the vacuum, thus keeping the EGR from working.

**E.G.R. OFF**

Message printed when the E.G.R. valve is allowed to operate. The solenoid in the EGR vacuum line is de-energized and vacuum is allowed to control the EGR valve.

**PARK/NEUTRAL**

Message printed when the transmission is in park or neutral. It is not displayed when the transmission is in any other gear.

**A. C. CLUTCH ON**

Message printed only when the air conditioning clutch is engaged.

**XM CLUTCH ON**

Message printed when the lockup torque converter is engaged. Engagement of the torque converter depends on temperature, throttle position, and manifold vacuum/pressure, and how fast the car is moving.

**XM CLUTCH OFF**

Message printed when the lockup torque converter is disengaged.

**OPEN THROTTLE**

Message printed when the throttle is in a wide open condition. A wide open signal tells the computer that the driver is demanding maximum performance out of the engine. The computer will then adjust the fuel ratio, and timing to meet the demands of the driver.

**IDLE CONTROL**

Message printed when the idle speed control motor is controlling the idle. The idle control insures an adequate engine speed at idle when the air conditioning is turned on, power steering is operating, or the alternator is under a load.

**IAC MOTOR POS**

Message printed when the engine is equipped with idle air control. The reading is in counts. A reading of 255 indicates full retraction of the solenoid and maximum air bypass. A reading approaching 0 indicates the solenoid is in the fully extended position allowing zero bypass air. When the IAC motor is fully retracted (around 200 counts) the mixture is being leaned. When the IAC motor is fully extended (counts are approaching zero) the mixture is being enriched.

**LOAD VARIABLE**

Printed number is in counts. This is the reading of the filtered load variable in the computer. The reading is proportional to the amount of air being displaced per cylinder. This sensor calculates the amount of air being displaced per cylinder. Based on this information, the computer adjusts the pulse width of the fuel injectors, thus keeping the mixture at 14.7 to 1.

**AIRFLOW (G/S)**

This is a reading of the amount of air flowing through the airflow meter in grams per second. The load variable calculates the amount of air being displaced by the engine, the airflow meter calculates the amount of air flowing into the engine. By using these two sensors, the computer adjusts the pulse of the fuel injectors.

**BLK LRN MULTY**

(Block Learn Multiplier) This reading is in counts 0 - 256. Block learn is a measurement of long term adjustments made to the fuel mixture.

**INTEGRATOR**

Printed number is in counts 0 - 256. Integrator is a measurement of short term adjustments made to the fuel mixture.

**HIGH VOLTAGE**

Message printed when the battery voltage is 16.9 volts or higher. This could cause the ISC motor to be made inoperative.

**LOW BATTERY**

Message printed when the battery voltage is 9.0 volts or less. This could cause the ISC motor to be made inoperative.

**BASPULS MS/10**

(Base pulse) Divide printed number by 10 to obtain the "ON" time of the fuel injectors in milliseconds.

**3RD GR/OVR DR**

Message printed when the transmission is in third gear or overdrive.

**4TH GEAR**

Message printed when the transmission is in fourth gear.

**ERLY FUL EVAP**

(Early Fuel Evaporation) Message printed when the computer has energized the EFE relay or solenoid. The computer de-energizes the EFE when the engine coolant temperature has reached approximately 85°C.

**ISC SWCH CLOS**

Message printed when the idle speed control motor is maintaining the idle speed.

**CAN /ILC ON**

Message printed when the canister purge solenoid is engaged.

**T B BACKUP**

Message printed when the back up fuel mode is in operation. The back-up fuel mode supplies fuel to the engine at a fixed rate if the ECM should fail. This allows the car to "limp-in" for service.

**CLR FLOD FLG**

(Clear flood flag) Message is printed when the clear flood mode is activated. The clear flood mode is activated when the vehicle gas pedal is held to the floor board to clear a flooded engine.

**WASTEGATE DC**

Message printed when the wastegate is reducing the amount of boost.

**FREON OK**

Message printed when the car is equipped with a Freon level sensor. Message printed when the Freon level is acceptable.

**FREON LOW**

Same as above.

**OVERDRIVE**

Message printed when the overdrive on the transmission is engaged.

**LOW COOLANT**

Message printed when the engine coolant is low.

**AIR COND REQ**

Message printed when the automobile's computer has requested the air conditioning be turned on.

**HI P STR PRES**

Message printed when there is excessive power steering pressure. The idle speed control motor will increase the idle to compensate for the additional load.

**LO P STR PRES**

Message printed when there is not enough power steering pressure. The idle speed control motor will increase the idle to compensate.

**SPARK-BASE (°)**

Printed number is the spark advance in degrees determined by the ECM. This number can be added to the base timing reading for the total advance.

**TOTAL SPK (°)**

Printed number is the total spark advance determined by the ECM.

**CATLYTC °CX10**

Multiply printed number by 10 to obtain the temperature of the catalyst in degrees Celsius.

## General Motors Trouble Codes

CODE	PRINT-OUT	YEAR	AREA IN QUESTION
12	RPM	ALL	NO DISTRIBUTOR REFERENCE PULSE
12	RPM	85	ENGINE SPEED ACTIVE
13	OXYGEN	ALL	O2 SENSOR
14	COOLANT	ALL	COOLANT SENSOR
14	COOLANT	86-87	COOLANT SENSOR HIGH TEMP
15	COOLANT	ALL	COOLANT SENSOR
15	COOLANT	86-87	COOLANT SENSOR LOW TEMP
15	COOLANT	86-87	COOLANT SWITCH
21	THROTTLE POS	ALL	THROTTLE POSITION HIGH
21	THROTTLE POS	85	IDLE AND WOT SWITCH ERROR
21	THROTTLE POS	86	THROTTLE POSITION SENSOR
22	THROTTLE POS	82 and up	THROTTLE POSITION LOW
22	THROTTLE POS	84	FUEL CUTOFF SOLENOID LOW
23	MC DWELL	ALL	M/C CIRCUIT SOLENOID LOW
23	MC DWELL	84 and up	MAT SENSOR LOW
23	MC DWELL	85 and up	AIR FUEL SOLENOID
24	MPH	ALL	VEHICLE SPEED SENSOR
25	MANIFOLD TEMP	84 and up	MAT SENSOR HIGH
25	MANIFOLD TEMP	84	AIR SWITCH SOLENOID LOW
31	MISCELLANEOUS	84 and up	WSTEGTE ELECTRONIC SIGNAL OPEN
31	MISCELLANEOUS	85 and up	WASTEGATE HIGH MAP OVERBOOST
31	MISCELLANEOUS	85 -86	MAP LOW
32	EGR/BARO	ALL	BARO SENSOR
32	EGR/BARO	86-87	EGR DIAGNOSTICS
32	EGR/BARO	84 and up	EGR CIRCUIT MALFUNCTION
32	EGR/BARO	85 and up	EVRV/EGR
33	MISCELLANEOUS	84 and up	MASS FLOW SENSOR HIGH
33	MISCELLANEOUS	82 and up	MAP SENSOR HIGH
34	MANIFOLD PRES	85 and up	MAP SENSOR LOW
34	MANIFOLD PRES	ALL	DIFFERENTIAL PRESSURE VACUUM
34	MANIFOLD PRES	81-84	MAP SENSOR
34	MANIFOLD PRES	84 and up	MAF SNSR LOW, NO SGNL
34	MANIFOLD PRES	85 and up	MASS AIR FLOW SENSOR LOW
35	IDLE CONTROL	81-84	ISC CIRCUIT
35	IDLE CONTROL	85 and up	IDLE AIR CONTROL (IAC) ERROR
35	IDLE CONTROL	85 and up	ISC NOSE SWITCH SHORTED
35	IDLE CONTROL	86	IAC DIAGNOSTICS
35	IDLE CONTROL	87	IAC ERROR
36	MISCELLANEOUS	86	BURN OFF DIAGNOSTICS
41	RPM	82 and up	NO DIST. REFERENCE SIGNAL
41	RPM	84 and up	CAM SENSOR FAILED
41	RPM	85 and up	CYLINDER SELECT ERROR
42	IGNITION	ALL	ELECTRONIC SPARK CONTROL
42	IGNITION	84	ERROR IN DIST. OR 3C SYSTEM
42	IGNITION	85 and up	BYPASS LINE ERROR
42	IGNITION	84	FUEL CUTOFF HIGH
42	IGNITION	85 and up	EST MONITOR ERROR
43	KNOCK RTD	82 and up	ELECTRONIC SPARK CONTROL

44	OXYGEN LEAN	ALL	LEAN EXHAUST
45	OXYGEN RICH	ALL	RICH EXHAUST
46	MISCELLANEOUS	87	VATS ERROR
51	PROM	ALL	BAD PROM
51	PROM	85	CHECKSUM
51	PROM	85	CAL. PROM
52	COMPUTER	84 and up	CALPACK MISSING
52	COMPUTER	85 and up	BAD ECM
53	MISCELLANEOUS	84	EGR VACUUM CONTROL
53	MISCELLANEOUS	86	EGR FAILURE ON V8
53	MISCELLANEOUS	85 and up	OVER VOLTAGE
53	MISCELLANEOUS	85 and up	WATER INJECTION FAILURE
53	MISCELLANEOUS	85 and up	AIR SWITCH SOLENOID HIGH
53	MISCELLANEOUS	86	HIGH BATTERY VOLT DIAGNOSTICS
54	MIXTURE DWELL	81-84	SHORTED MC SOLENOID OR BAD ECM
54	MIXTURE DWELL	85 and up	MC SOLENOID HIGH
54	MIXTURE DWELL	85 and up	FUEL PUMP VOLTAGE
54	MIXTURE DWELL	85 and up	FUEL PUMP RELAY MALFUNCTION
55	MISCELLANEOUS	ALL	FAULTY O2 SENSOR
55	MISCELLANEOUS	87	ECM FAILURE
56	MISCELLANEOUS	87	CORROSIVE COOLANT
61	MISCELLANEOUS	87	OXYGEN SENSOR DEGRADED
63	MISCELLANEOUS	87	MAP SENSOR HIGH
64	MISCELLANEOUS	87	MAP SENSOR LOW

Additional numbers may be printed out. For further information on correcting the trouble codes, you should follow the GM diagnostic procedure outlined in any General Motors or professional repair manual for computer controlled cars.

## FORD MOTOR COMPANY SECTION

The following is intended to be a supplement to the Ford factory computer diagnosis manual. Printed messages are in **BOLD FACE TYPE**. The adjacent numbers are the actual trouble codes generated by the Ford on-board computer. This tester is designed to follow the Ford test procedures as recommended by Ford in their repair manual (Volume H).

The PRINTER comes equipped with several cards for the Ford test options. They are: Key on-Engine Off, Engine Running, Clear Memory, Engine Running SEFI, Wiggle test, and Timing Test. These cards can be used on both Ford cars and trucks. Please consult the appendix at the end of this manual or a Ford repair manual for a further explanation of each test. Important : All tests involving engine running require the engine to be warm and in closed loop mode. Ford suggests warming for 2 minutes at 2000 RPM.

### FORD MOTOR COMPANY DEFINITION OF TERMS

EEC-IV Refers to electronic engine control series4. First used in Ford vehicles in 1983.

EEC-IV SEFI Refers to electronic engine control series 4 sequential electronic fuel injection. Was used first in 1986.

MCU Refers to the microprocessor control unit. First used in 1981.

### Printed Information Messages for Ford

<b>ENG. OFF TEST</b>	Printed when the self-test is triggered and the engine is not running.
<b>TEST COMPLETE</b>	Indicates the end of the self test procedure.
<b>TROUBLES..... PRESENT NOW</b>	The Ford system prints two types of codes. One is the codes which are present at the time of the test. The other type are the codes which are stored in the car's internal computer memory.

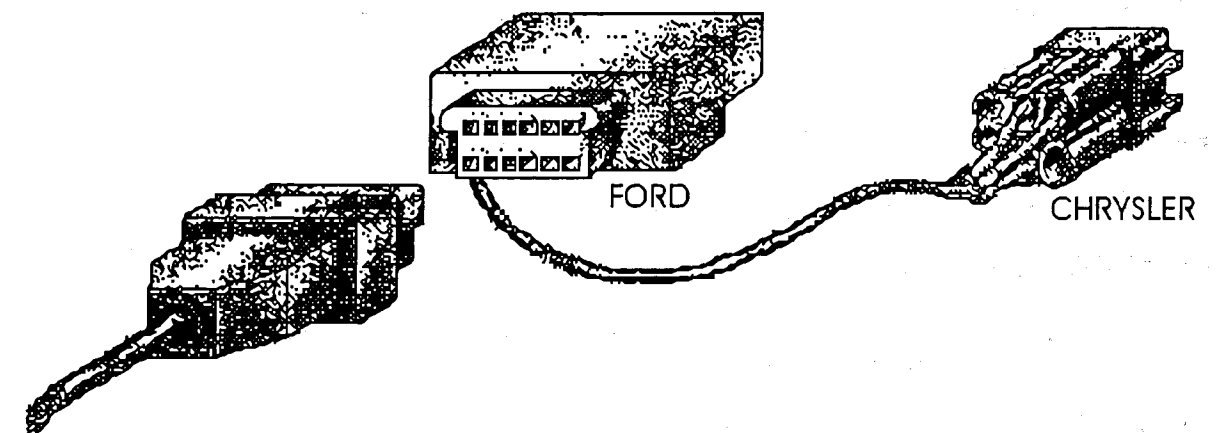


<b>TROUBLES..... PAST (STORED)</b>	The heading printed before the computer prints the codes stored in the car's internal computer memory. (They may also include troubles present now). These troubles may be intermittent or they may even be no longer present.
<b>10 SEP</b>	Printed during the "engine on" test when the user is asked by the computer to tap on the engine in the vicinity of the engine knock sensor; one should also snap accelerate the engine, (not necessarily in that order).
<b>TESTING.. WAIT</b>	Printed when the tester is reading or waiting on codes from the computer. This may take 10 to 15 seconds.
<b>ENG. RUN TEST</b>	This is printed as a heading when the "engine on" test is performed. This allows the user to run the test and know when the codes were received.
<b>CYL BALANCE</b>	This is printed on SEFI engines when the cylinder balance test is being performed.
<b>FORDTEST WAIT</b>	The PRINTER is performing the Ford test.
<b>SNAP ACCEL.</b>	This message is printed before the cylinder balance test on SEFI engines. The RPM must be raised approximately 600 RPM for 2 seconds then released.
<b>KEYOFF 10 SEC</b>	When this message is displayed, turn the ignition key off for 10 seconds, the PRINTER will wait 10 seconds then ask you to turn the key on or start the engine depending on the test you are performing.
<b>RPM NOT 2500</b>	The test must be run at 2500 RPM, on certain MCU cars, if you are testing one of these cars, and you are not running the engine at 2500 RPM, the tester will tell you to redo the test after printing out this message.
<b>WHEN FINISHED PUSH ACTUATOR</b>	Signals the PRINTER when you are finished with the test.
<b>TURN KEY ON</b>	Self explanatory.
<b>START ENGINE</b>	Self explanatory.
<b>TIMING TEST</b>	This is the heading which is printed out when you are doing the timing test. This test requires the use of a timing light.
<b>CLEAR MEMORY</b>	This is a heading which is printed out when you are performing the clear memory procedure.
<b>MEM CLEARED</b>	Confirms the memory was cleared.
<b>SEFI EEC IV</b>	This is a heading which is printed out for the EEC-IV SEFI test.

<b>ENGINE ID</b>	This is printed out near the beginning of the engine running tests. After this code is printed out you may have to depress the brake pedal to ensure an accurate test. Consult the Ford repair manual for specifics.
<b>BEGIN TEST</b>	Self explanatory.
<b>WIGGLE TEST</b>	The Wiggle Test comes up automatically following Engine Run Test, after the message "FOR WIGGL TST". The wiggle test is also a stand alone test, but with the engine not running; use card marked "WIGGLE TEST".

## Ford Motor Company Operating Procedure

1. Plug tester into Ford adapter.



2. Turn tester on.
3. Tester will display "INSERT CARD"
4. Choose which test you want to perform, and insert the appropriate card.
5. Follow the instructions printed out by the PRINTER.

## Ford Trouble Codes

For further information on correcting the trouble codes, you should follow the Ford diagnostic procedure outlined in any professional repair manual for computer controlled cars. It is possible that a single code number may have different meanings depending on the type of car you are working on. Consult the Ford factory repair manual for the proper meaning. If the car is capable of generating a code not contained on this list, the PRINTER will display the code number only. This code number can be interpreted by referring to a Ford factory repair manual.

<b>11 NONE (ALL OK)</b>	The computer and the sensors have passed the test.
<b>12 RPM OUT SPEC</b>	RPM out of specification (extended idle).
<b>13 RPM OUT SPEC</b>	RPM out of specification (normal idle).
<b>14 PIP ERRATIC</b>	The profile ignition pickup is erratic.
<b>15 ROM FAILURE</b>	Read only memory integrated circuit failed.
<b>16 RPM TOO LOW</b>	RPM was too low during the fuel lean test.
<b>17 RPM TOO LOW</b>	RPM was too low during the fuel lean test with the air bypassed upstream.
<b>18 NO TACH</b>	No tach signal was received.
<b>21 ECT OUT SPEC</b>	Engine coolant temperature sensor is out of range.
<b>22 MAN PRESS BAD</b>	Manifold absolute pressure sensor is out of range.
<b>23 ACT BAD</b>	The air charge temperature sensor is out of range.
<b>24 TPS BAD</b>	The throttle position sensor is out of range.
<b>25 NO RAPPING</b>	The service technician did not tap on engine to check the knock sensor.
<b>26 MAF/VAF BAD</b>	The manifold air flow/vane air flow is out of range.
<b>31 EGR OUT SPEC</b>	EGR valve fails to open.
<b>32 EGR BAD</b>	The EGR is not controlling.
<b>33 EGR NOT CLOSED</b>	EGR valve not closing properly.
<b>34 NO EGR</b>	There is no EGR flow.
<b>35 EGR /RPM LOW</b>	The RPM is too low during the EGR test.
<b>36 FUEL LEAN</b>	Fuel always lean at Idle.

<b>37 FUEL RICH</b>	Fuel always rich at idle.
<b>41 SYSTEM LEAN</b>	The system is always lean.
<b>42 SYSTEM RICH</b>	The system is always rich.
<b>43 EGO COOLDOWN</b>	The exhaust gas oxygen sensor has cooled below normal operating temperature.
<b>44 AIR SYSTEM</b>	AIR management system is inoperative.
<b>45 AIR UPSTREAM</b>	AIR is always upstream during testing.
<b>46 AIR BYPASSED</b>	AIR should be bypassed during testing, but is not.
<b>47 AIR/LEAN RICH</b>	Up air/lean test always rich.
<b>48 INJECTORS</b>	Fuel Injectors unbalanced or faulty.
<b>51 ECT HIGH</b>	Engine coolant temperature sensor input is too high. Possible open or shorted wire.
<b>53 TPS TOO HIGH</b>	Throttle position sensor input is too high. Possible open or shorted wire.
<b>54 ACT TOO HIGH</b>	Air charge temperature/vane air temperature sensor input is too high. Possible open or shorted wire.
<b>55 UNDER VOLTAGE</b>	Electrical charging system is under voltage
<b>56 MAF/VAF HIGH</b>	Manifold air flow/vane air flow sensor input is too high. Possible open or shorted wire.
<b>58 ITS BAD</b>	Idle tracking switch input too high (engine running test).
<b>61 ECT LOW</b>	Engine coolant temperature sensor input is too low. Possible open or shorted wire.
<b>63 TPS TOO LOW</b>	Throttle position sensor input is too low. Possible open or shorted wire.
<b>64 ACT/VAT LOW</b>	Air charge temperature/vane air temperature sensor input is too low. Possible open or shorted wire.
<b>65 OVER VOLTAGE</b>	Electrical charging system over voltage
<b>66 MAF/VAF LOW</b>	Manifold air flow/vane air flow sensor input is too low. Possible open or shorted wire.
<b>67 NDS/ACC</b>	Neutral drive switch - drive or accelerator on (engine off).
<b>68 ITS BAD</b>	Idle tracking switch open or AC on (engine-off test).
<b>72 NO MAP CHANGE</b>	No MAP change in "snap accel test".
<b>73 NO TPS CHANGE</b>	No TPS change in "snap accel test".
<b>76 NO MAF CHANGE</b>	No MAF/VAF change in "snap accel test".

- 77 **NO SNAP ACCEL** Operator did not do the "snap accel test".
- 81 **TAB** Thermactor air bypass circuit fault.
- 82 **TAD** Thermactor air divert circuit fault.
- 83 **EGR CONTROL** Exhaust gas recirculation control circuit fault.
- 84 **EGR VENT** Exhaust gas recirculation vent circuit fault.
- 85 **CANISTER** Canister purge circuit fault.
- 86 **WOT AC CUTOFF** Wide Open Throttle A/C cut-off circuit fault (all 3.8L and 5.0L Continental).
- 87 **FUEL PUMP** Fuel pump circuit fault.
- 88 **THROTT KICKER** Throttle kicker circuit fault.
- 89 **EX HEAT CNTRL** Exhaust heat control valve circuit fault.
- 91 **RT EGO LEAN** Right exhaust gas oxygen sensor always lean.
- 92 **RT EGO RICH** Right exhaust gas oxygen sensor always rich.
- 93 **R EGO COOLDWN** Right exhaust gas oxygen sensor cooldown has occurred.
- 94 **RT SEC AIR** Right secondary air inoperative.
- 95 **RT AIR UPSTRMN** Right air always upstream.
- 96 **R NO BYPASSED** Right air is not bypassed, but should be.
- 97 **RPM/R OX RICH** RPM drop (with fuel lean) but right EGO rich.
- 98 **RPM/R OX LEAN** RPM drop (with fuel rich) but right EGO lean.

## CHRYSLER CORPORATION SECTION

*This section is written for personnel who are knowledgeable and schooled in the technical areas of Chrysler's Computerized Engine Control systems. Proper training is needed to take advantage of all the information printed by this tester.*

Chrysler tests are classified into two modes: the first is the "display" mode and the second is the "interrogator" mode.

The Chrysler display mode performs the tests as prescribed in the Chrysler repair manuals. This mode of operation is equivalent to using the Miller Tool Diagnostic Readout Box. The display mode will print trouble codes, perform switch tests, actuator tests, and sensor tests, and works on Chrysler cars from 1983 and up providing they have a computer and an access plug. For a list of tests which can be performed on each engine type, consult the appendix at the end of this manual, or any Chrysler factory repair manual.

The interrogator mode gives you actual sensor readings on the engine. You must use the selector chart for Chrysler vehicles to get the correct card for each engine. **NOTE: Chrysler does not provide interrogator mode on carbureted cars**

## MEANINGS of TERMS and INSTRUCTIONS FOR CHRYSLER

**Trouble Codes** A code generated by the computer when a fault has been detected. A code 88 means it is OK to test, and a code 55 means the trouble code portion of the test is complete.

**Switch Tests** The switch tests determine whether the car's computer can see a circuit turn on and off.

**Actuator Tests** Actuator tests check the working condition of components that are controlled by the computer. The computer will cycle power to the component selected by the test number.

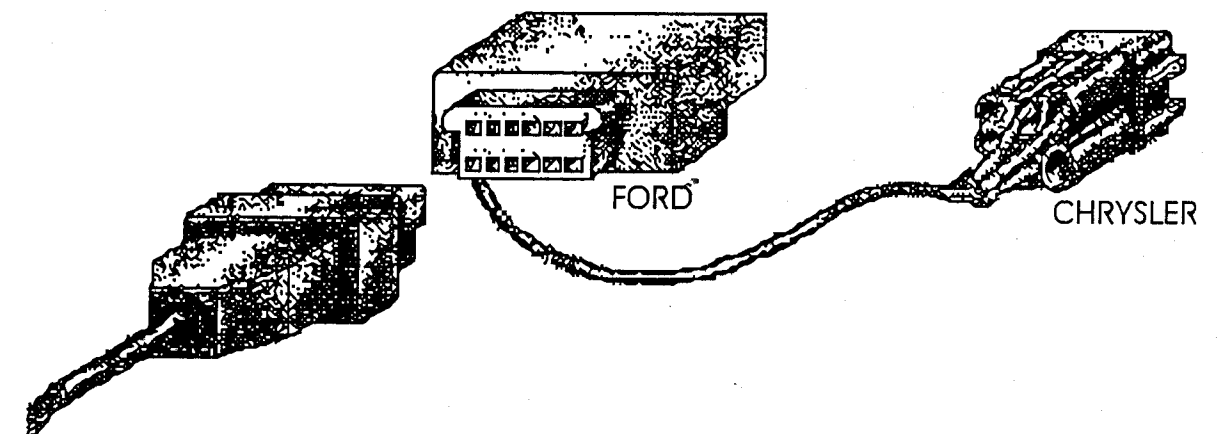
**Sensor Tests** The sensor tests are actual readings of certain sensors while in the actuator test mode. By moving the read/hold switch to the hold position, you will get a sensor reading. Not all tests will give you a reading.

## Chrysler Printed Information Messages

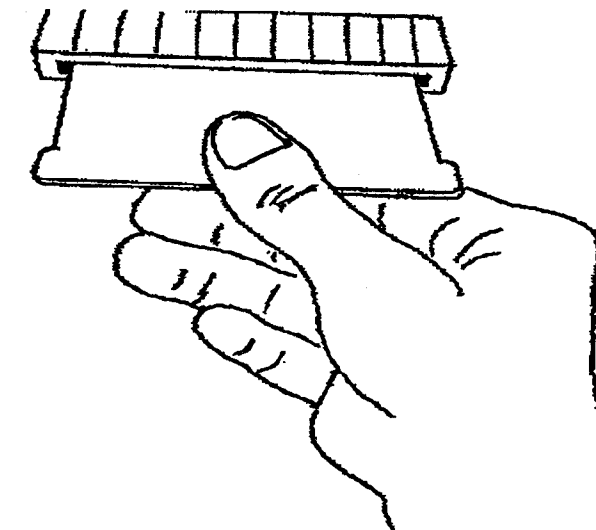
<b>ATM/STM READY</b>	Message printed when the tester has finished printing trouble codes, and it is ready to proceed to the Switch, Actuator or Sensor test Modes
<b>ATM TEST</b>	Message printed as a header before the PRINTER begins actuator tests.
<b>SENSOR TEST</b>	Message printed as a header before the PRINTER begins to print test number and sensor output.
<b>DISPLAY MODE</b>	Message printed as a header when the PRINTER is performing the display mode test
<b>INTERROGATOR</b>	Message printed as a header when the PRINTER is in interrogator mode.
<b>SWITCHED</b>	Switched test message to indicate that a switch has been turned on or off. The switch tests are available after the trouble codes are printed and before the actuator test series begins.

## Chrysler Operating Procedure - Display Mode

1. Make sure the car is **fully warmed up**.
2. Turn the engine off.
3. Connect the tester to the car.



4. Turn the tester on. Set the Read/Hold switch to Hold.
5. Message from the PRINTER. **"INSERT CARD"**.



6. Use card 49 A or B. The A side is for engine off, and the B side is for engine running. The engine running test will only give rich/lean indication. For trouble codes and actuator tests use card 49A.

7. Message from the PRINTER "CHRYSLER TEST, TESTING WAIT, 88 OK TO TEST".
8. For EFI and TURBO systems, set read/hold switch to read position. For FBC systems, set switch to hold position.
9. Trigger the Chrysler computer by turning the ignition switch on-off-on-off-on. DO NOT START ENGINE. Note: For FBC engines with carburetor Switch; Switch must be in open position.
10. The PRINTER will print any trouble codes stored in the car's computer. Code 55 indicates end of trouble codes.
11. After the trouble codes are printed the switch tests can be performed. After switch is depressed, a message will be printed. Most cars have a brake switch or A/C switch. Consult the Appendix for switch application.
12. When you are through with the switch tests, slide the actuator switch in sequence to perform the actuator tests. The PRINTER will print different test numbers as long as the actuator switch is held. When you wish to perform a test, release the actuator switch, and that test number will be performed.
13. If you wish to perform sensor test, slide the actuator switch until the test number you want is printed. Release the actuator switch. Then move the Read/Hold switch to Hold. The reading you get will be the sensor reading.

## Chrysler Trouble Codes

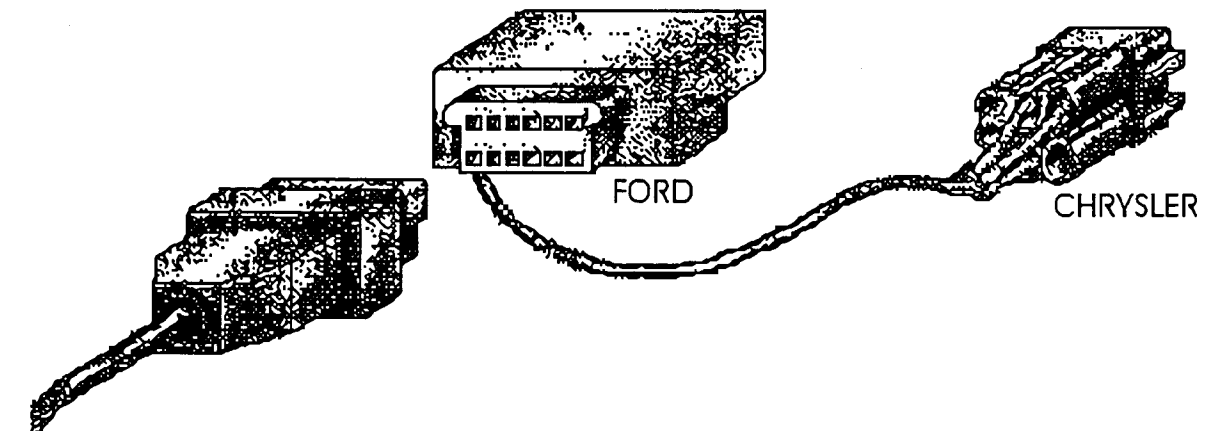
For further information on correcting the trouble codes, you should follow the Chrysler diagnostic procedure outlined in any professional repair manual for computer controlled cars.

- |                         |  |
|-------------------------|--|
| <b>11 ENG NOT CRANK</b> | No distributor signal present possibly the battery is disconnected.  |
| <b>12 MEM POWR LOST</b> | Battery feed to the logic module has been disconnected within the last 20 to 40 engine starts.                                   |
| <b>13 MAN PRESS BAD</b> | M.A.P. sensor vacuum level does not change between cranking and when the engine starts.  |
| <b>14 MAN PRESS BAD</b> | M.A.P. sensor signal is below .02 or above 4.9 volts.  |
| <b>15 MPH SENSOR</b>    | Speed sensor indicates less than 2 mph when vehicle is moving.   |
| <b>16 UNDER VOLTAGE</b> | Battery sensing voltage drops below 4 or stays between 7.5 and 8.5 volts for more than 20 seconds.                               |
| <b>17 KNOCK SENSOR</b>  | (Turbo) No knock signal above 5000 engine rpm for 3 seconds.<br>(EFI) Engine does not reach operating temperature.               |
| <b>21 OXYGEN SENSOR</b> | No oxygen sensor signal for more than 20 seconds when in closed loop.  |
| <b>22 COOLNT SENSOR</b> | Coolant sensor voltage is above 4.96 volts when the engine is cold, or below .51 volts when the engine is warm.                  |
| <b>23 CHRG TEMP SEN</b> | Charge temperature sensor voltage is above 4.98 or below .06 volts.  |
| <b>24 TPS BAD</b>       | Throttle position sensor signal is below .16 or above 4.7 volts.   |
| <b>25 AIS MOTOR DRV</b> | Proper voltage in the AIS system is not present.   |
| <b>26 INJECTORS</b>     | (Turbo) Injectors 1 and 2 do not fire correctly.<br>(EFI) Fuel (Peak injector current not reached).<br>(FBC) Engine temp sensor. |
| <b>27 INJECTORS</b>     | (Turbo) Injectors 3 and 4 do not fire correctly.<br>(EFI) Fuel (No current to logic module).                                     |
| <b>31 PURGE SOL CIR</b> | Canister purge solenoid does not turn on and off when it should.   |
| <b>32 PWR LOSS LAMP</b> | Power Loss/Power Limit Lamp does not turn on and off when it should.   |

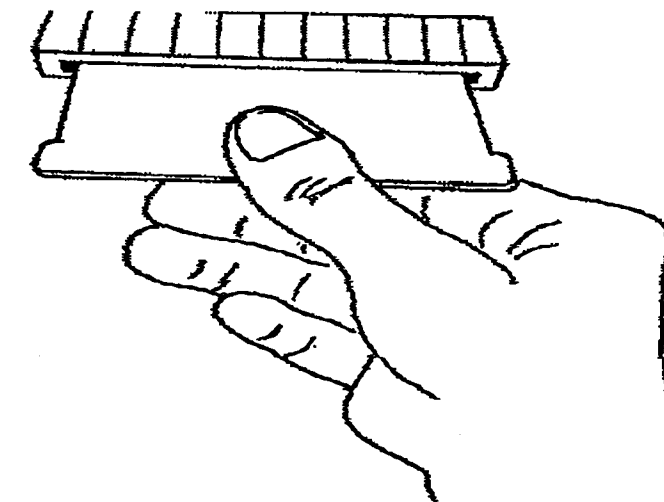
33 A/C RELAY CIR	A/C cut off relay does not turn on and off when it should.
34 EGR BAD	Exhaust Gas Recirculation solenoid does not turn on and off when it should. (1987) Speed control problem.
35 FAN RELAY CIR	Radiator Fan Relay Circuit does not turn on and off when it should.
36 WASTEGATE SOL	Wastegate control solenoid does not turn on and off when it should.
37 BARO READ SOL	(Turbo) The Baro read solenoid does not turn on and off when it should. (EFI) PTV circuit (auto) or shift lamp (man).
41 CHARGING SYST	Alternator Field Control fails to switch properly.
42 AUTO SHUTDOWN	Control voltage of the relay pull in coil (located in the Power Module) is not correct.
43 PWR MODULE	Spark Control Interface fails to switch properly.
44 MIS	<u>Years 84 and lower.</u> Wrong PROM is installed. <u>Years 1985 and higher.</u> Battery Temperature Sensor is below 0.04 or above 4.9 volts.
45 OVERBOOST	MAP sensor signal indicated excessive boost.
46 OVER VOLTAGE	Battery voltage is more than 1 volt above the desired control voltage for more than 20 seconds
47 UNDER VOLTAGE	Battery voltage is less than 1 volt below the desired control voltage for more than 20 seconds
51 CLOSED LOOP	System is lean for more than 2 minutes.
52 MIS	<u>Years 1984 and Lower.</u> RAM Failure. <u>Years 1985 and Higher.</u> System stays rich for more than 2 minutes.
53 ROM FAILURE	Logic module failure.
54 LOGIC MODULE	No distributor sync. pickup signal.
55 TEST COMPLETE	Indicates the end of the test procedure.

## Chrysler Corporation Operating Procedure Interrogator Mode

1. Make sure the car is **fully warmed up**.
2. Turn the engine off.
3. Connect the tester to the car.



4. Turn the tester on.
5. Message from the PRINTER "INSERT CARD".



6. The engine must be turned over one revolution before performing the engine off mode.
7. Insert the correct card by using the card selector chart for Chrysler.
8. A print out of the engine data will follow. Do not expect all of the data listed below to be furnished by every Chrysler model.

9. Print will repeat until card is removed.

## Chrysler Corporation Interrogator Mode Test Definitions

The Chrysler Interrogator mode will give you a list of data readings which apply to that car.

<b>BATTERY (V/10)</b>	Divide printed number by 10 to get the voltage of the battery.
<b>RPM (X10)</b>	Multiply printed number by 10 to get the engine speed in revolutions per minute.
<b>COOLANT (°C)</b>	The temperature of the engine coolant in degrees Celsius.
<b>CHARGE TEMP</b>	(°F) This is the inlet air charge temperature. This sensor is used to vary the injector pulse width to compensate for a warm or cold engine.
<b>THROTTLE (V/10)</b>	Divide the printed number by 10 to obtain the throttle position. A low voltage indicates a closed throttle condition. A high voltage (approx 5 volts max) indicates a wide open throttle condition.
<b>MIN THROTTLE</b>	This is the minimum voltage of the throttle position sensor when the throttle is closed.
<b>MANIFOLD PRES</b>	(Pascals) Indicates the reading coming from the manifold pressure sensor. The computer uses this reading to determine what type of load is being put on the engine.
<b>KNOCK RTO (°)</b>	The knock retard sensor sends a signal to the electronic spark control when Engine Knock is detected. The PRINTER gives the amount of spark retard in degrees.
<b>T/BODY TEMP</b>	Temperature of the fuel in the throttle body.
<b>BAT TEMP (°C)</b>	This is the temperature of the battery; a cold battery will be charged at a higher voltage than a warm battery.

## REPAIR AND REPLACEMENT

This instrument is designed and produced to provide unlimited service. Should the unit be inoperative after the user has performed the recommended maintenance a no-charge repair or replacement will be made to the original purchaser. This applies to all repairable instruments which have not been tampered with or damaged. This claim must be made within one year from the date of purchase. For repair of your instrument have your mobile tool dealer or jobber send the instrument to the factory. An additional 90-day warranty will cover the repaired or replaced instrument.

## TROUBLE SHOOTING TIPS

PROBLEM	SOLUTION
Printer head moves and paper advances but nothing is printed out.	Check and make sure the thermal paper is loaded properly. Thermal paper is heat treated on one side only. If you attempt to print on the wrong side, nothing will be printed out.
Nothing happens when the printer is plugged in to the cigarette lighter or battery.	Check and see if the power light is on. Check the Connection at the cigarette lighter. If you are using a battery cable adapter, make sure the positive lead is hooked to the positive post of the battery.

## REPLACEMENT PARTS

ITEM	PART NUMBER
Ford/Chrysler Adaptor plug	A15051
Thermal Printer paper	PRINTER1
Paper Spool	16009
Cigarette Lighter to Battery Adaptor	A15090
1981 ADAPTER	A15081
Minimum - T Adaptor (Chevette)	A150MN
Corvette Adaptor	

NOTE: If there is a need to order a single card the part number for that card will be the card number preceded by the number 16026. For example: to order card 4, the part number would be 1602604.

APPENDIX

GLOSSARY OF VEHICLE SYSTEMS

General Motors

1981 System	1A
EFI/TBI	3A
FULL	1B,4A,7B
OLDS LC	2A,3B
MIN-T	2B
CFI 2BL TBI	3A,9B,16A,17B
PONTIAC 4 PFI	5A,8B
BUICK 6 PFI	9A,11A
ISUZU SYSTEM	5B
CHEV. TRUCK	6A
PONTIAC L4 EFI	4B,7A
OLDS FULL	8A,10A
CHEV PFI	6B,10B,15B
PONTIAC 6 PFI	9A,15A
BUICK PFI	11B,16B
TPI V8	12B
TRUCK TBII	17A
P4 PONTIAC	13B
P4 TURBO	14B
P4 CHEV	14A
P4 PFI V6	13A
P4 TPI V8	12B
P4 TRUCK	18A

GENERAL MOTORS

YEAR	SIZE	VIN	TYPE	SYSTEM	APPLICATION
1981	3.8T	3	V6	1981	CHEV, BUICK
1981	4.1	4	V6	1981	OLDS, BUICK, CADILLAC
1981	2.5	5	L4	1981	CHEV, PONT, OLDS, BUICK
1981	6.0	6	V8	1981	CADILLAC
1981	5.7	6	V8	1981	CHEV
1981	1.6	9	L4	1981	CHEV, GM OF CANADA
1981	3.8	A	V6	1981	CHEV, PONT, OLDS, BUICK, CANADA
1981	5.7	B	V8	1981	BUICK
1981	4.3	F	V8	1981	OLDS
1981	5.0	H	V8	1981	CHEV, PONT, OLDS, BUICK, CANADA
1981	4.4	J	V8	1981	CHEV, PONT, OLDS, BUICK, CANADA
1981	3.8	K	V6	1981	CHEV, PONT
1981	3.8	K	V6	1981	CHEV, PONT
1981	5.7	L	V8	1981	CHEV
1981	4.3	S	V8	1981	PONT, BUICK, GM OF CANADA
1981	4.9T	T	V8	1981	PONT
1981	4.9	W	V8	1981	PONT, GM OF CANADA
1981	2.8	X	V6	1981	CHEV, PONT, OLDS, BUICK
1981	5.0	Y	V8	1981	PONT, OLDS, BUICK
1981	2.8	Z	V6	1981	CHEV
1982	1.8	0	L4	EFI	PONT, BUICK
1982	2.8	1	V6	FULL	CHEV, PONT
1982	2.5	2	L4	EFI	CHEV, BUICK
1982	3.8T	3	V6	FULL	BUICK
1982	4.1	4	V6	FULL	PONT, OLDS, BUICK, CADILLAC
1982	2.5	5	L4	FULL	CHEV, PONT, OLDS, BUICK
1982	5.0	7	V8	CFI	CHEV, PONT
1982	5.7	8	V8	CFI	CHEV
1982	4.3	8	V8	LC	OLDS
1982	3.8	A	V6	FULL	CHEV, PONT, OLDS, BUICK
1982	1.6	C	L4	MIN-T	CHEV, PONT, GM OF CANADA
1982	3.0	E	V6	FULL	OLDS, BUICK
1982	2.5	F	L4	FULL	CHEV, PONT
1982	1.8	G	L4	FULL	CHEV, PONT, OLDS, BUICK, CADILLAC
1982	5.0	H	V8	FULL	CHEV, PONT, OLDS, BUICK, CANADA
1982	4.4	J	V8	FULL	CHEV, PONT, OLDS, BUICK, CANADA
1982	3.8	K	V6	FULL	CHEV
1982	5.7	L	V8	FULL	CHEV
1982	2.0	N	L4	FULL	CHEV, OLDS, BUICK
1982	2.5	R	L4	EFI	CHEV, PONT, OLDS, BUICK
1982	2.8	X	V6	FULL	CHEV, PONT, OLDS, BUICK
1982	5.0	Y	V8	LC	OLDS, BUICK
1982	2.8	Z	V6	FULL	CHEV, PONT, OLDS, BUICK
1983	2.8	1	V6	FULL	CHEV, PONT
1983	2.5	2	L4	EFI	CHEV, PONT
1983	4.1	4	V6	FULL	OLDS, BUICK, CADILLAC
1983	2.5	5	L4	FULL	CHEV, PONT, OLDS, BUICK
1983	5.7	6	V8	FULL	CHEV
1983	6.0	6	V8	FULL	CADILLAC
1983	5.7	8	V8	CFI	CHEV



1983	3.8T	8	V6	FULL	BUICK
1983	5.0	9*	V8	LC	OLDS
1983	3.8	9*	V6	FULL	CHEV
1983	3.8	A	V6	FULL	CHEV,BUICK,OLDS,PONT,CANADA
1983	1.9	A	L4	ISUZU	CHEV,GMC
1983	2.0	B	L4	FULL	CHEV,PONT,OLDS,BUICK,CADILLAC
1983	2.8	B	V6	FULL	CHEV,GMC
1983	1.6	C	L4	MIN-T	CHEV,PONT,GM OF CANADA
1983	4.1	D	L6	CHEV TR	CHEV,GMC
1983	3.0	E	V6	FULL	OLDS,BUICK
1983	5.0	F	V8	LC	CHEV,GMC
1983	2.5	F	L4	FULL	CHEV,PONT
1983	5.0	H	V8	FULL	CHEV,PONT,OLDS,BUICK,CANADA
1983	5.0	H	V8	LC	CHEV,GMC
1983	5.7	L	V8	LC	CHEV,GMC
1983	2.8	L	V6	FULL	PONT
1983	1.8	O	L4	EFI	PONT,OLDS,BUICK
1983	2.0	P	L4	EFI	CHEV,PONT,OLDS,BUICK,CADILLAC
1983	2.5	R	L4	EFI	CHEV,PONT,OLDS,BUICK
1983	5.0	S	V8	CFI	CHEV,PONT
1983	2.8	X	V6	FULL	CHEV,PONT,OLDS,BUICK
1983	5.0	Y	V8	LC	OLDS,BUICK
1983	2.8	Z	V6	FULL	CHEV,PONT,OLDS,BUICK
1984	2.8	1	V6	FULL	CHEV,PONT
1984	2.5	2	L4	PON.EFI	CHEV,PONT
1984	3.8	3	V6	PFI-6CLY	BUICK,OLDS
1984	4.1	4	V6	FULL	BUICK,OLDS
1984	5.7	6	V8	FULL	CHEV
1984	5.7	8	V8	CFI	CHEV
1984	3.8	9*	V6	PFI-6CLY	BUICK
1984	3.8	9*	V6	FULL	CHEV
1984	5.0	9*	V8	OLDS FULL	OLDS
1984	1.9	A	L4	ISUZU	S-10
1984	3.8	A	V6	FULL	CHEV,PONT,OLDS,BUICK,CANADA
1984	2.0	B	L4	FULL	CHEV,PONT,OLDS,BUICK,CADILLAC
1984	2.8	B	V6	FULL	S-10
1984	1.6	C	L4	MIN-T	CHEV,PONT,GM OF CANADA
1984	4.1	D	L6	CHEV TR	CHEV,GMC
1984	3.0	E	V6	FULL	BUICK,OLDS
1984	5.7	E	V8	FULL	CHEV,GMC
1984	5.0	F	V8	FULL	CHEV,GMC
1984	5.0	G	V8	FULL	CHEV,PONT
1984	5.0	H	V8	FULL	CHEV,PONT,OLDS,BUICK,CANADA
1984	5.0	H	V8	FULL	CHEV,GMC
1984	1.8	J	L4	PFI-4CLY	PONT,BUICK
1984	2.8	L	V6	FULL	PONT
1984	5.7	L	V8	FULL	CHEV,GMC
1984	5.7	M	V8	FULL	CHEV,GMC
1984	1.8	O	L4	PON.EFI	PONT,OLDS,BUICK
1984	2.0	P	L4	EFI	All divisions
1984	2.5	R	L4	PON.EFI	CHEV,PONT,OLDS,BUICK
1984	2.8	X	V6	FULL	CHEV,PONT,OLDS,BUICK,CADILLAC
1984	5.0	Y	V8	OLDS FULL	OLDS,BUICK
1984	2.8	Z	V6	FULL	CHEV,PONT,OLDS,BUICK
1985	2.5	2	L4	PONTL4PFI	CHEV,PONT

1985	3.8	3	V6	BUICK6PFI	OLDS,BUICK
1985	5.7	6	V8	FULL	CHEV,PONT
1985	4.3	7	V6	CFI2BLTBI	CHEV,GMC
1985	5.7	8	V8	CHEV PFI	CHEV
1985	3.8	9	V6	BUICK6PFI	BUICK
1985	2.8	9	V6	PONT6PFI	PONTIAC
1985	5.0	9	V8	OLDS FULL	OLDS
1985	1.9	A	L4	ISUZU	S-10
1985	3.8	A	V6	FULL	CHEV,PONT,OLDS,BUICK
1985	2.8	B	V6	FULL	S-10
1985	1.6	C	L4	MIN-T	CHEV,PONT,GM OF CANADA
1985	2.5	E	L4	PONTL4PFI	S-10
1985	3.0	E	V6	FULL	OLDS,BUICK
1985	5.0	F	V8	FULL	CHEV,GMC
1985	5.0	F	V8	CHEV PFI	CHEV,PONT
1985	5.0	G	V8	FULL	CHEV,PONT
1985	5.0	H	V8	FULL	CHEV,GMC
1985	6.0	H	V8	FULL	CHEV,PONT,OLDS,BUICK
1985	1.8	J	L4	PONTL4PFI	PONT,BUICK
1985	5.7	L	V8	FULL	CHEV,GMC
1985	3.0	L	V6	BUICK6PFI	PONT,OLDS,BUICK
1985	4.3	N	V6	FULL	CHEV,GMC
1985	1.8	O	L4	PONTL4PFI	PONT,OLDS,BUICK
1985	2.0	P	L4	EFI	CHEV,PONT,OLDS,BUICK,CAD
1985	2.5	R	L4	PONTL4PFI	CHEV,PONT,OLDS,BUICK
1985	2.8	S	V6	CHEV PFI	CHEV,PONT
1985	2.5	U	L4	PONTL4PFI	PONT,OLDS,BUICK
1985	2.8	W	V6	CHEV PFI	CHEV,PONT,OLDS,BUICK,CADILLAC
1985	2.8	X	V6	FULL	CHEV,PONT,OLDS,BUICK
1985	5.0	Y	V8	OLDS FULL	OLDS,BUICK
1985	4.3	Z	V6	CFI2BLTBI	CHEV,PONT
1986	2.5	2	L4	PONTL4 EFI	CHEV,PONT
1986	3.8	3	V6	86 BUI PFI	OLDS,BUICK
1986	5.7	6	V8	FULL	CHEV
1986	3.8	7	V6	86 BUI PFI	BUICK
1986	4.3	7	V6	CFI2BLTBI	CHEV,GMC,M-VAN
1986	5.7	8	V8	86 PFI V8	CHEV
1986	3.8	9	V6	BUICK 6PFI	BUICK
1986	2.8	9	V6	PONT6PFI	PONT
1986	5.0	9	V8	FULL	OLDS
1986	3.8	A	V6	86 BUI PFI	CHEV,PONT,OLDS,BUICK
1986	3.8	B	V6	86 BUI PFI	OLDS,BUICK
1986	2.8	B	V6	FULL	S-10
1986	1.6	C	L4	MIN-T	CHEV,PONT
1986	2.5	E	L4	PONT L4 EFI	S-10
1986	5.0	F	V8	FULL	CHEV,GMC,M-VAN
1986	5.0	F	V8	86 PFI V8	CHEV,PONT
1986	5.0	G	V8	FULL	CHEV,PONT
1986	5.0	H	V8	FULL	CHEV,PONT,OLDS
1986	5.0	H	V8	FULL	CHEV,GMC,M-VAN
1986	2.0	I	L4	EFI	CHEV
1986	6.2	J	V8	6.2L DSL	CHEV,GMC,M-VAN

1986	1.8	J	L4	PONTL4 EFI	CHEV,PONT,OLDS,BUICK,CADILLAC
1986	5.7	L	V8	FULL	CHEV,GMC,M-VAN
1986	3.0	L	V6	86 BUI PFI	PONT,OLDS,BUICK
1986	4.3	N	V6	FULL	CHEV,GMC
1986	1.8	O	L4	PONTL4 EFI	PONT,OLDS,BUICK
1986	2.0	P	L4	EFI	
1986	2.8	R	V6	CFI2BLTBI	S-10
1986	2.5	R	L4	PONTL4 EFI	CHEV,PONT,OLDS,BUICK
1986	2.8	S	V6	CHEV PFI	CHEV,PONT
1986	2.5	U	L4	PONT L4 EFI	PONT,OLDS,BUICK
1986	2.8	W	V6	CHEV PFI	CHEV,PONT,OLDS,BUICK,CADILLAC
1986	2.8	X	V6	FULL	CHEV,PONT,OLDS,BUICK
1986	5.0	Y	V8	FULL	PONT,OLDS,BUICK,CADILLAC
1986	4.3	Z	V6	CFI2BLTBI	CHEV,PONT

## FORD TEST MATRIX

	MCU	EEC-IV	EEC-IV-SEFI
ENGINE OFF TEST	X	X	X
ENGINE RUNNING TEST	X	X	
CLEAR MEMORY TEST		X	X
ENGINE RUNNING SEFI TEST			X
WIGGLE TEST		X	X
TIMING TEST		X	X

## FORD System Identification

YEAR	ENG	VIN	TYPE	SYSTEM	APPLICATION
1981	1.3	1	L4	NONE	PASSENGER CARS
1981	1.6	2	L4	NONE	PASSENGER CARS
1981	2.3	A	L4	MCU	PASSENGER CARS
1981	3.3	B	L6	MCU	PASSENGER CARS
1981	4.2	D	L6	NONE	LIGHT TRUCKS
1981	4.2	D	L6	NONE	PASSENGER CARS
1981	4.9	E	V8	NONE	LIGHT TRUCKS
1981	5.0	F	V8	MCU	LIGHT TRUCKS
1981	5.0	F	V8	EEC-III	PASSENGER CARS
1981	5.0	F	V8	EEC-III	CALIFORNIA VEHICLES
1981	5.0	F	V8	MCU	PASSENGER CARS
1981	5.0	F	V8	ECC-III	CALIFORNIA VEHICLES
1981	5.8	G	V8	MCU	PASSENGER CARS
1981	5.8	G	V8	NONE	LIGHT TRUCKS
1981	7.5	L	V8	NONE	LIGHT TRUCKS
1981	5.8	W	V8	ECC-III	CALIFORNIA VEHICLES
1981	5.8	W	V8	MCU	LIGHT TRUCKS
1981	6.6	Z	V8	NONE	LIGHT TRUCKS
1982	1.6	2	L4	NONE	PASSENGER CARS
1982	3.8	3	V6	NONE	LIGHT TRUCKS
1982	3.8	3	V6	MCU	PASSENGER CARS
1982	2.3	A	L4	MCU	PASSENGER CARS
1982	3.3	B	L6	NONE	PASSENGER CARS
1982	4.2	D	V8	MCU	PASSENGER CARS
1982	4.2	D	V8	NONE	LIGHT TRUCKS
1982	4.9	E	V8	MCU	LIGHT TRUCKS
1982	5.0	F	V8	EEC-III	PASSENGER CARS
1982	5.0	F	V8	EEC-III	LIGHT TRUCKS
1982	5.0	F	V8	MCU	PASSENGER CARS
1982	7.5	L	V8	NONE	LIGHT TRUCKS
1982	5.8	W	V8	EEC-III	LIGHT TRUCKS
1982	6.6	Z	V8	NONE	LIGHT TRUCKS

1983	1.6	2	L4	NONE	PASSENGER CARS
1983	1.6	2	L4	EEC-IV	PASSENGER CARS
1983	3.8	3	V6	NONE	LIGHT TRUCKS
1983	3.8	3	V6	NONE	PASSENGER CARS
1983	2.3	A	L4	MCU	LIGHT TRUCKS
1983	2.3	A	L4	MCU	PASSENGER CARS
1983	3.3	B	L6	NONE	PASSENGER CARS
1983	2.0	C	L4	MCU	LIGHT TRUCKS
1983	4.9	E	V8	MCU	LIGHT TRUCKS
1983	5.0	F	V8	EEC-IV	PASSENGER CARS
1983	5.0	F	V8	NONE	PASSENGER CARS
1983	5.0	F	V8	EEC-III	LIGHT TRUCKS
1983	5.8	G	V8	EEC-IV	LIGHT TRUCKS
1983	5.8	G	V8	MCU	PASSENGER CARS
1983	7.5	L	V8	NONE	LIGHT TRUCKS
1983	2.8	S	V6	EEC-IV	LIGHT TRUCKS
1984	1.6	2	L4	NONE	PASSENGER CARS
1984	3.8	3	V6	EEC-IV	PASSENGER CARS
1984	1.6	4	L4	EEC-IV	PASSENGER CARS
1984	1.6	5	L4	EEC-IV	PASSENGER CARS
1984	2.3	5	L4	EEC-IV	PASSENGER CARS
1984	2.3	A	L4	MCU	LIGHT TRUCKS
1984	2.3	A	L4	EEC-IV	PASSENGER CARS
1984	2.0	C	L4	MCU	LIGHT TRUCKS
1984	5.0	F	V8	NONE	PASSENGER CARS
1984	5.0	F	V8	EEC-IV	PASSENGER CARS
1984	5.0	F	V8	NONE	LIGHT TRUCKS
1984	5.8	G	V8	MCU	LIGHT TRUCKS
1984	5.8	G	V8	EEC-IV	LIGHT TRUCKS
1984	7.5	L	V8	NONE	LIGHT TRUCKS
1984	5.0	M	V8	EEC-IV	PASSENGER CARS
1984	2.3	R	L4	EEC-IV	PASSENGER CARS
1984	2.8	S	V6	EEC-IV	LIGHT TRUCKS
1984	4.9	Y	V8	EEC-IV	LIGHT TRUCKS
1985	1.6	2	L4	NONE	PASSENGER CARS
1985	3.8	3	V6	EEC-IV	PASSENGER CARS
1985	1.6	4	L4	NONE	PASSENGER CARS
1985	1.6	5	L4	EEC-IV	PASSENGER CARS
1985	1.6	6	L4	EEC-IV	PASSENGER CARS
1985	1.9	9	L4	NONE	PASSENGER CARS
1985	2.3	A	L4	EEC-IV	LIGHT TRUCKS
1985	2.3	A	L4	EEC-IV	PASSENGER CARS
1985	3.8	C	V6	EEC-IV	PASSENGER CARS
1985	2.0	C	L4	NONE	LIGHT TRUCKS
1985	5.0	F	V8	NONE	PASSENGER CARS
1985	5.0	F	V8	EEC-IV	LIGHT TRUCKS
1985	5.0	F	V8	EEC-IV	PASSENGER CARS
1985	5.8	G	V8	EEC-IV	LIGHT TRUCKS
1985	5.8	H	V8	NONE	LIGHT TRUCKS
1985	5.0	M	V8	EEC-IV	PASSENGER CARS
1985	5.0	N	V8	EEC-IV	LIGHT TRUCKS
1985	5.8	O	V8	MCU	PASSENGER CARS
1985	2.3	S	L4	EEC-IV	PASSENGER CARS
1985	2.8	S	V6	EEC-IV	LIGHT TRUCKS
1985	2.3	T	L4	EEC-IV	PASSENGER CARS

1985	2.3	W	L4	EEC-IV	PASSENGER CARS
1985	2.3	X	L4	EEC-IV	PASSENGER CARS
1985	4.9	Y	V8	EEC-IV	LIGHT TRUCKS
1986	6.9	1	V8	NONE	LIGHT TRUCKS
1986	3.8	3	V6	EEC-IV	PASSENGER CARS
1986	4.9	9	V8	EEC-IV	LIGHT TRUCKS
1986	1.9	9	L4	NONE	PASSENGER CARS
1986	2.3	A	L4	EEC-IV	LIGHT TRUCKS
1986	2.3	A	L4	EEC-IV	PASSENGER CARS
1986	2.0	C	L4	NONE	LIGHT TRUCKS
1986	2.5	D	L4	EEC-IV	PASSENGER CARS
1986	2.3	E	L4	NONE	LIGHT TRUCKS
1986	5.0	F	V8	EEC-IV	PASSENGER CARS
1986	5.8	G	V8	MCU	PASSENGER CARS
1986	2.0	H	L4	NONE	PASSENGER CARS
1986	5.8	H	V8	NONE	LIGHT TRUCKS
1986	1.9	J	L4	EEC-IV	PASSENGER CARS
1986	7.5	L	V8	NONE	LIGHT TRUCKS
1986	5.0	M	V8	EEC-IV-SFI	PASSENGER CARS
1986	5.0	N	V8	EEC-IV	LIGHT TRUCKS
1986	2.3	R	L4	NONE	PASSENGER CARS
1986	2.8	S	V6	EEC-IV	LIGHT TRUCKS
1986	2.3	S	L4	EEC-IV	PASSENGER CARS
1986	2.9	T	V6	EEC-IV	LIGHT TRUCKS
1986	2.3	T	L4	EEC-IV	PASSENGER CARS
1986	3.0	U	V6	EEC-IV	LIGHT TRUCKS
1986	3.0	U	V6	EEC-IV	PASSENGER CARS
1986	2.3	W	L4	EEC-IV	PASSENGER CARS
1986	2.3	X	L4	EEC-IV	PASSENGER CARS
1986	4.9	Y	V8	EEC-IV	LIGHT TRUCKS

CHRYSLER TESTS

1983-1984 THROTTLE BODY INJECTION

Switch Tests Brake Pedal, Gear shift Selector, A/C Switch, and rear window defroster.

- Actuator Tests
- 01 Spark Trigger
  - 02 Idle Speed Movement
  - 03 Fuel Pulse
  - 04 Repeat 01, 02, 03

1984 2.2 TURBO

Switch Tests Brake Pedal, Gear shift Selector, A/C Switch, and rear window defroster.

- Actuator Tests
- 01 Spark Trigger
  - 02 Idle Speed Movement
  - 03 Fuel Pulse
  - 04 Repeat 01, 02, 03

1984 2.2 MEXICAN TURBO

Switch Tests Brake Pedal, Gear shift Selector, A/C Switch, and rear window defroster.

- Actuator Tests
- 01 Spark Trigger
  - 02 Idle Speed Movement
  - 03 Fuel Pulse
  - 04 Repeat 01, 02, 03

1985 - 86 FEEDBACK CARBURETOR SYSTEMS 1.6 ENGINE

- Actuator Tests
- 91 Oxygen Sensor Clicking
  - 92 Blinking Shift Light if equipped
  - 96 Fan cycling on and off

1985 FEEDBACK CARBURETOR SYSTEMS 2.2 ENGINE and 1986 2.2 L BODY ONLY

Switch Tests A/C Switch

- Actuator Tests
- 91 Oxygen Sensor Clicking
  - 92 Blinking Shift Light if equipped
  - 93 Canister Purge Solenoid
  - 96 Fan cycling on and off
  - 97 Throttle control solenoid
  - 98 Vacuum operated secondary solenoid

1985 FEEDBACK CARBURETOR SYSTEMS 3.7 FEDERAL AND 5.2 CAL. ENGINE

Switch Tests A/C Switch

- Actuator Tests
- 91 Oxygen Sensor Clicking
  - 92 Blinking Shift Light if equipped
  - 93 Air Switching Solenoid
  - 97 Throttle control solenoid
  - 98 EGR solenoid

1985 2.2 EFI

Switch Tests Brake Pedal,Neutral backup switch, A/C Switch, vehicle speed sensor

- Actuator Tests
- 01 Spark Trigger
  - 02 Injector Fire
  - 03 Idle Speed Motor
  - 04 Radiator Fan
  - 05 A/C cutout
  - 06 Auto shutdown
  - 07 Canister purge solenoid

1985 2.2 TURBO

Switch Tests Brake Pedal,Neutral backup switch, A/C Switch, vehicle speed sensor

- Actuator Tests
- 01 Spark Trigger
  - 02 Injector Fire
  - 03 Idle Speed Motor
  - 04 Radiator Fan
  - 05 A/C cutout
  - 06 Auto shutdown
  - 07 Canister purge solenoid
  - 08 EGR Solenoid
  - 09 Wastegate solenoid
  - 10 Baro solenoid

1985 2.2 MEXICAN TURBO

Switch Tests Brake Pedal,Neutral backup switch, A/C Switch, vehicle speed sensor

- Actuator Tests
- 01 Spark Trigger
  - 02 Injector Fire
  - 03 Idle Speed Motor
  - 04 Radiator Fan
  - 05 A/C cutout
  - 06 Auto shutdown
  - 07 Canister purge solenoid
  - 08 Baro Solenoid
  - 09 Wastegate solenoid

## 1986 FEEDBACK CARBURETOR SYSTEMS 2.2 ENGINE EXCEPT L BODY

### Switch Tests A/C Switch

Actuator Tests	91	Oxygen Solenoid
	93	Vacuum operated secondary solenoid
	96	Radiator Fan
	97	Throttle control solenoid
	98	Canister Purge solenoid

Sensor Tests	91	Vacuum Transducer
	92	Engine Temp Sensor
	93	Radiator Fan Sensor
	96	Speed Sensor

## 1986 FEEDBACK CARBURETOR SYSTEMS 3.7 AND 5.2 ENGINE

### Switch Tests A/C Switch, Rear Window Defroster

Actuator Tests	91	Oxygen Solenoid
	92	Shift Indicator light or Transmission unlock relay
	93	Air switching solenoid
	97	Throttle control solenoid
	98	EGR solenoid, Canister Purge solenoid

Sensor Tests	91	Vacuum Transducer
	92	Engine Temp Sensor (3.7) Charge Temp (5.2)
	93	Charge Temp Sensor (3.7)
	96	Speed Sensor

## 1986 EFI 2.2 AND 2.5 ENGINE

### Switch Tests Brake Pedal, Neutral backup switch, A/C Switch, vehicle speed sensor

Actuator Tests	01	Spark Trigger
	02	Injector Fire
	03	Idle Speed Motor
	04	Radiator Fan
	05	A/C cutout
	06	Auto shutdown
	07	Canister purge solenoid
	08	Shift Indicator
	09	Alternator Field

Sensor Tests	01	Battery temperature
	02	Oxygen Sensor
	03	Throttle Body Temperature
	04	Coolant Sensor
	05	Throttle position
	07	Battery voltage
	08	MAP Sensor

## 1986 2.2 TURBO

### Switch Tests Brake Pedal, Neutral backup switch, A/C Switch, vehicle speed sensor

Actuator Tests	01	Spark Trigger
	02	Injector Fire
	03	Idle Speed Motor
	04	Radiator Fan
	05	A/C cutout
	06	Auto shutdown
	07	Canister purge solenoid
	08	EGR Solenoid
	09	Wastegate Solenoid
	10	Baro Solenoid
	11	Alternator Field

Sensor Tests	01	Battery temperature
	02	Oxygen Sensor
	03	Charge Temperature
	04	Coolant Sensor
	05	Throttle position
	06	Peak Knock voltage
	07	Battery Voltage
	08	MAP Sensor

## 1986 2.2 MEXICAN TURBO

### Switch Tests Brake Pedal, Neutral backup switch, A/C Switch, vehicle speed sensor

Actuator Tests	01	Spark Trigger
	02	Injector Fire
	03	Idle Speed Motor
	04	Radiator Fan
	05	A/C cutout
	06	Auto shutdown
	07	Canister purge solenoid
	08	Baro Solenoid
	09	Wastegate Solenoid

## 1987 EFI

### Switch Tests Brake pedal, Park/Neutral switch, A/C switch

Actuator Tests	01	Ignition coil
	02	Fuel injector
	03	AIS motor
	04	Radiator fan relay
	05	A/C cutout relay
	06	Auto shutdown relay
	07	Purge solenoid
	08	Speed control
	09	Voltage Regulator
	10	SIL lamp (man. only)

Sensor Tests	01	Battery temperature sensor
	02	Oxygen sensor
	03	T/body temperature sensor
	04	Engine coolant temp. sensor
	05	Throttle position sensor
	06	Not Used
	07	Battery voltage sense
	08	MAP sensor
	09	Speed control switches

1987 FEDERAL TURBO I / TURBO II

Switch Tests	Brake switch, Park/Neutral switch, A/C compressor switch	
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Actuator Tests	01	Ignition coil
	02	Fuel injector
	03	AIS motor
	04	Radiator fan relay
	05	A/C cutout relay
	06	Auto shutdown relay
	07	EGR/Purge solenoid
	08	Speed control
	09	Wastegate solenoid
	10	Baro read solenoid
	11	Voltage regulator

Sensor Tests	01	Battery temperature sensor
	02	Oxygen sensor
	03	Charge temperature sensor
	04	Engine coolant temp. sensor
	05	Throttle position sensor
	06	Knock sensor
	07	Battery volatge sense
	08	MAP sensor
	09	Speed control switches

CHRYSLER System Identification

YEAR	SIZE	VIN	TYPE	SYSTEM
1983	2.2	C	L4	MEXICAN
1983	2.2	D	L4	EFI
1983	2.2	E	L4	TURBO
1984	2.2	C	L4	.MEXICAN
1984	2.2	D	L4	EFI
1984	2.2	E	L4	TURBO
1985	1.6	A	L4	FBC
1985	2.2	C	L4	MEXICAN
1985	2.2	C	L4	FBC
1985	2.2	D	L4	EFI
1985	2.2	E	L4	TURBO
1985	3.7	H	V6	FBC
1985	5.2	T	V8	FBC
1986	1.6	A	L4	FBC
1986	2.2	C	L4	MEXICAN
1986	2.2	C	L4	FBC
1986	2.2	D	L4	EFI
1986	2.2	E	L4	TURBO
1986	3.7	H	V6	FBC
1986	2.5	K	L4	EFI
1986	5.2	T	V8	FBC