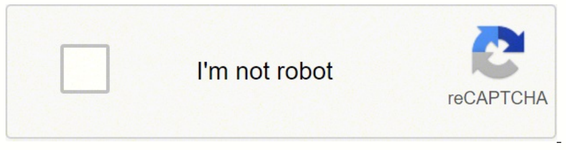

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Innova 3030 manual en español

1. E Can OBD2 & 1 The Easiest And Best Way To Troubleshoot OBD2 and OBD1 Vehicles! 2. Table of Contents i OBD2 & 1 E

3. Introduction WHAT IS OBD? OBD2 & 1 1 E WHAT IS OBD? The OBD2 & 1 Tool is designed to work on most Chrysler, Ford, GM and Toyota OBD1 systems and all OBD2 compliant vehicles. One of the most exciting improvements in the automobile industry was the addition of on-board diagnostics (OBD) on vehicles, or in more basic terms, the computer that activates the vehicle's "CHECK ENGINE" light. OBD 1 was designed to monitor manu- facturer-specific systems on vehicles built from 1981 to 1995. Then came the develop- ment of OBD 2, which is on all 1996 cars and light trucks sold in the United States. These systems are part of a government mandate to lower vehicle emissions. The sophisticated programs in the vehicle's on-board computer system are designed to detect failures in a range of vehicle systems. Diagnostic information can be accessed through a Data Link Connector test port specifically designed for this purpose. For all OBD systems, if a problem is found, the computer turns on the "CHECK ENGINE" light to warn the driver, and sets a Diagnostic Trouble Code (DTC) to identify where the problem occurred. A special diagnostic tool, such as the OBD2 & 1 Tool, is required to retrieve these codes, which consumers and professionals use as a starting point for repairs. 4. You Can Do It! EASY TO USE - EASY TO VIEW - EASY TO DEFINE 2 OBD2 & 1 E Easy To Use . . . . s Connect the Tool to the vehicle's test connector. s Turn the ignition key "On." s Press the POWER/LINK button. Easy To View . . . . s The Tool retrieves stored codes, as well as Freeze Frame data and I/M Readiness status (OBD2 systems only). s Codes, I/M Readiness status and Freeze Frame data are displayed on the Tool's LCD display screen. System sta- tus is indicated by LED indicators. Easy To Define . . . . s Read code definitions from the Tool's LCD display. s View Freeze Frame data (OBD2 sys- tems only). 5. OBD2 & 1 3 E Safety Precautions SAFETY FIRST! SAFETY FIRST! This manual describes common test procedures used by experienced service technicians. Many test procedures require precautions to avoid accidents that can result in personal injury, and/or damage to your vehicle or test equipment. Always read your vehicle's service manual and fol- low its safety precautions before and during any test or serv- ice procedure. ALWAYS observe the following general safety precautions: When an engine is running, it produces carbon monox- ide, a toxic and poisonous gas.To prevent serious injury or death from carbon monoxide poisoning, operate the vehicle ONLY in a well-ventilated area. To protect your eyes from propelled objects as well as hot or caustic liquids, always wear approved safety eye protection. When an engine is running, many parts (such as the coolant fan, pulleys, fan belt etc.) turn at high speed. To avoid serious injury, always be aware of moving parts. Keep a safe distance from these parts as well as other potentially moving objects. Engine parts become very hot when the engine is run- ning. To prevent severe burns, avoid contact with hot engine parts. Before starting an engine for testing or trouble-shoot- ing, make sure the parking brake is engaged. Put the transmission in park (for automatic transmission) or neutral (for manual transmission). Block the drive wheels with suitable blocks. Connecting or disconnecting test equipment when the ignition is ON can damage test equipment and the vehi- cle's electronic components. Turn the ignition OFF before connecting the Tool to or disconnecting the Tool from the vehicle's Data Link Connector (DLC). To avoid personal injury, instrument damage and/or damage to your vehicle; do not use the CAN OBD2 Tool before reading this manual. N LDRP 6. 4 OBD2 & 1 E Safety Precautions SAFETY FIRST! To prevent damage to the on-board computer when tak- ing vehicle electrical measurements, always use a digi- tal multimeter with at least 10 megOhms of impedance. Fuel and battery vapors are highly flammable. To pre- vent an explosion, keep all sparks, heated items and open flames away from the battery and fuel / fuel vapors. DO NOT SMOKE NEAR THE VEHICLE DUR- ING TESTING. Don't wear loose clothing or jewelry when working on an engine. Loose clothing can become caught in the fan, pulleys, belts, etc. Jewelry is highly conductive, and can cause a severe burn if it makes contact between a power source and ground. 7. OBD2 & 1 5 E About the Tool BATTERY INSTALL / REPLACEMENT / ADJUSTMENTS/SETTINGS & DTC LIBRARY BATTERY INSTALLATION / REPLACEMENT Replace batteries when the battery symbol is visible on display and/or the 3 LEDS are all lit and no other data is visible on screen. 1. Locate the battery cover on the back of the Tool. 2. Slide the battery cover off (use your fingers). 3. Replace batteries with three AA-size batteries (for longer life, use Alkaline-type batteries). 4. Reinstall the battery cover on the back of the Tool. Language Selection After Battery Installation The first time the unit is turned on , you must select the desired display language (English, French or Spanish) as follows: 1. Press and hold the POWER/LINK button for approximately 3 seconds to turn the Tool "ON." s The Select Language screen dis- plays. 2. Use the UP and DOWN but- tons, as necessary, to highlight the desired display language. 3. When the desired display language is selected, press the ENTER/FF but- ton to confirm your selection. After the initial language selection is performed, it, as well as other settings, can be changed as desired. Proceed to "ADJUSTMENTS/SETTINGS AND DTC LIBRARY" below for further instructions. ADJUSTMENTS/SETTINGS AND DTC LIBRARY The OBD2 & 1 Tool lets you make several adjustments and settings to configure the tool to your particular needs. It also contains an OBD2 DTC Library that allows you to search for DTC definitions. The follow- ing functions, adjustments and settings can be performed when the OBD2 & 1 Tool is in "MENU Mode": s DTC Library: Lets you search the library of OBD2 DTC definitions. s Adjust Brightness: Adjusts the brightness of the LCD display screen. s Select Language: Sets the display language for the Tool to English, French or Spanish. 8. 6 OBD2 & 1 E About the Tool ADJUSTMENTS/SETTINGS AND DTC LIBRARY s Unit of Measure: Sets the Unit of Measure for the Tool's display to USA or metric. Adjustments and settings can be made only when the Tool is NOT connected to a vehicle. To enter the MENU Mode: 1. With the Tool OFF, press and hold the UP button, then press and release the POWER/LINK button. s The adjustments and setting MENU displays. 2. Release the UP button. DO NOT release the UP button until the adjustments and settings MENU is visible on the display. 3. Make adjustments and settings as described in the following para- graphs. Searching for a DTC Definition Using the DTC Library (applicable to OBD2 systems only) 1. Use the UP and DOWN but- tons, as necessary, to highlight DTC Library in the MENU, then press the ENTER/LD button. s The Enter DTC screen displays. The screen shows the code "P0000", with the "P" flashing. 2. Use the UP and DOWN buttons, as necessary, to scroll to the desired DTC type (P=Powertrain, U=Network, B=Body, C=Chassis), then press the DTC SCROLL button. s The selected character displays "solid", and the next character begins flashing. 3. Select the remaining characters in the DTC in the same way, press- ing the DTC SCROLL button to confirm each character. When you have selected all the DTC characters, press the ENTER/LD button to view the DTC definition. s If you entered a "Generic" DTC (DTCs that start with "P0", "P2" and some "P3"): - The selected DTC and DTC defi- nition (if available), show on the Scan Tool's LCD display. 9. OBD2 & 1 7 E About the Tool ADJUSTMENTS/SETTINGS AND DTC LIBRARY s If you entered a "Manufacturer-Specific" DTC (DTCs that start with "P1" and some "P3"): - The "Select Manufacturer" screen displays. - Use the UP and DOWN buttons, as necessary, to high- light the appropriate manufactur- er, then press the ENTER/LD button to display the correct DTC for your vehicle. If a definition for the DTC you entered is not available, an advi- sory message shows on the Scan Tool's LCD display. 4. If you wish to view definitions for additional DTCs, press the ENTER/LD button to return to the DTC Library screen, and repeat steps 2 and 3. 5. When all desired DTCs have been viewed, press the ERASE button to exit the DTC Library. Adjusting Display Brightness 1. Use the UP and DOWN but- tons, as necessary, to highlight Adjust Brightness in the MENU, then press the ENTER/FF button. s The Adjust Brightness screen dis- plays. s The Brightness field shows the cur- rent brightness setting, from 0 to 43. 2. Press the UP button to decrease the brightness of the LCD display (make the display darker). 3. Press the DOWN button to increase the brightness of the LCD display (make the display lighter). 4. When the desired brightness is obtained, press the ENTER/FF button to save your changes and return to the MENU. Selecting the Display Language 1. Use the UP and DOWN buttons, as necessary, to highlight Select Language in the MENU, then press the ENTER/FF button. 10. About the Tool ADJUSTMENTS/SETTINGS AND DTC LIBRARY 8 OBD2 & 1 E s The Select Language screen dis- plays. s The currently selected display Language is highlighted. 2. Press the UP or DOWN button, as necessary, to highlight the desired display language. 3. When the desired display language is highlighted, press the ENTER/FF button to save your changes and return to the MENU. Setting the Unit of Measure 1. Use the UP and DOWN but- tons, as necessary, to highlight Unit of Measure in the MENU, then press the ENTER/FF button. 2. Press the UP or DOWN button, as necessary, to highlight the desired Unit of Measure. 3. When the desired Unit of Measure value is selected, press the ENTER/FF button to save your changes. Exiting the MENU Mode 1. Use the UP and DOWN buttons, as necessary, to highlight Menu Exit in the MENU, then press the ENTER/FF button. s The LCD display returns to the DTC screen. 11. OBD2 & 1 9 E Tool Controls CONTROLS AND INDICATORS CONTROLS AND INDICATORS See Figure 1 for the locations of items 1 through 16, below. 1. ERASE button - Erases Diagnostic Trouble Codes (DTCs), and "Freeze Frame" data from your vehicle's computer, and resets Monitor status. ("Freeze Frame" data and Monitor status are applicable to OBD2 systems only.) 2. DTC SCROLL button - Displays the DTC View screen and/or scrolls the LCD display to view DTCs when more than one DTC is present. 3. POWER/LINK button - When the Tool IS NOT connected to a vehicle, turns the Tool "On" and "Off". When the Tool is connected to a vehicle, links the Tool to the vehicle's PCM to retrieve diagnostic data from the computer's memory. (The LINK function is applicable to OBD2 systems only.) To turn the Tool "On", you must press and hold the POWER/LINK button for approximately 3 seconds. 1 2 5 3 9 4 16 11 12 13 14 15 6 7 8 10 Figure 1. Controls and Indicators 12. 10 OBD2 & 1 E Tool Controls CONTROLS AND INDICATORS 4. ENTER/FREEZE FRAME button - When in MENU mode, confirms the selected option or value. When retrieving and viewing DTCs, displays Freeze Frame data for the highest priority code. (The Freeze Frame function is applicable to OBD2 systems only.) 5. DOWN button - When in MENU mode, scrolls DOWN through the menu and submenu selection options. When retrieving and view- ing DTCs, scrolls down through the current display screen to display any additional data. 6. UP button - When in MENU mode, scrolls UP through the menu and submenu selection options. When retrieving and viewing DTCs, scrolls ups through the current display screen to display any additional data. 7. GREEN LED - Indicates that all engine systems are running nor- mally (all Monitors on the vehicle are active and performing their diag- nostic testing, and no DTCs are present). (Monitors are applicable to OBD2 systems only.) 8. YELLOW LED - Indicates there is a possible problem. A "Pending" or a history DTC is present and/or some of the vehicle's emission mon- itors have not run their diagnostic testing. (Monitors and pending DTCs are applicable to OBD2 systems only.) 9. RED LED - Indicates there is a problem in one or more of the vehi- cle's systems. The red LED is also used to show that DTC(s) are pres- ent. DTCs are shown on the Tool's LCD display. In this case, the Malfunction Indicator ("Check Engine") lamp on the vehicle's instru- ment panel will light steady on. 10. LCD Display - Displays settings Menu and submenus, test results, Tool functions and Monitor status information. See DISPLAY FUNCTIONS, on next page, for more details. (Monitors are applicable to OBD2 systems only.) 11. Cable - Connects the Tool to the vehicle's Data Link Connector (DLC) when retrieving codes from OBD I systems (used with items 12, 13, 14 and 16). 12. CHRYSLER Connector Cable Adaptor - Installs on cable (item 11) when connecting to a Chrysler OBD1 Data Link Connector. 13. FORD Connector Cable Adaptor - Installs on cable (item 11) when connecting to a Ford OBD1 Data Link Connector. 14. GM Connector Cable Adaptor - Installs on cable (item 11) when connecting to a GM OBD1 Data Link Connector. 15. OBD II Cable - Connects the Tool to the vehicle's Data Link Connector (DLC) when retrieving codes from OBD II systems. 16. TOYOTA Connector Cable Adaptor - Installs on cable (item 11) when connecting to a Toyota OBD1 Data Link Connector. 13. OBD2 & 1 11 E Tool Controls DISPLAY FUNCTIONS DISPLAY FUNCTIONS See Figure 2 for the locations of items 1 through 16, below. 1. I/M MONITOR STATUS field - Identifies the I/M Monitor status area. (This function is applicable to OBD2 systems only.) 2. Monitor icons - Indicate which Monitors are supported by the vehi- cle under test, and whether or not the associated Monitor has run its diagnostic testing (Monitor status). When a Monitor icon is solid, it indicates that the associated Monitor has completed its diagnos- tic testing.When a Monitor icon is flashing, it indicates that the vehi- cle supports the associated Monitor, but the Monitor has not yet run its diagnostic testing. (This function is applicable to OBD2 systems only.) 3. Vehicle icon - Indicates whether or not the Tool is being prop- erly powered through the vehicle's Data Link Connector (DLC). A visible icon indicates that the Tool is being powered through the vehicle's DLC connector. 4. Link icon - Indicates whether or not the Tool is communicat- ing (linked) with the vehicle's on-board computer. When visible, the Tool is communicating with the computer. If the Link icon is not vis- ible, the Tool is not communicating with the computer. 5. Computer icon - When this icon is visible it indicates that the Tool is linked to a personal computer. An optional "PC Link Kit" is available that makes it possible to upload retrieved data to a per- sonal computer. 4 3 2 1 10 11 12 5 8 9 13 15 14 6 7 Figure 2. Display Functions 14. 12 OBD2 & 1 E Tool Controls DISPLAY FUNCTIONS 6. Tool Internal Battery icon - When visible, indicates the Tool batteries are "low" and should be replaced. If the batteries are not replaced when the battery symbol is "on", all 3 LEDs will light up as a last resort indicator to warn you that the batteries need replacement. No data will be displayed on screen when all 3 LEDs are lit. 7. DTC Display Area - Displays the Diagnostic Trouble Code (DTC) number. Each fault is assigned a code number that is specific to that fault. 8. Test Data Display Area - Displays DTC definitions, Freeze Frame data, and other pertinent test information messages. 9. MIL icon - Indicates the status of the Malfunction Indicator Lamp (MIL).The MIL icon is visible only when a DTC has commanded the MIL on the vehicle's dashboard to light. 10. CODE icon - Identifies the Code Number Sequence display area. 11. PENDING icon - Indicates the currently displayed DTC is a "Pending" code. (This function is applicable to OBD2 systems only.) 12. Code Number Sequence - The Tool assigns a sequence number to each DTC that is present in the computer's memory, starting with "01." This number indicates which code is currently displayed. Code number "01" is always the highest priority code, and the one for which "Freeze Frame" data has been stored. (Freeze Frame data is applicable to OBD2 systems only.) If "01" is a "Pending" code, there may or may not be "Freeze Frame" data stored in memory. 13. Code Enumerator - Indicates the total number of codes retrieved from the vehicle's computer. 14. Generic DTC icon - When visible, indicates that the currently displayed DTC is a "Generic" or "Universal" code. (This function is applicable to OBD2 systems only.) 15. Enhanced DTC icon - When visible, indicates that the currently displayed DTC is a Manufacturer Specific Code. (This function is applicable to OBD2 systems only.) 15. OBD2 & 1 13 E Tool Controls VIEWING DTCs IN THE TOOL'S MEMORY VIEWING DTCs IN THE TOOL'S MEMORY To view DTC's and other diagnostic data stored in the Tool's memory, do the following: 1. With no DLC cable connected to the Tool, press the POWER/LINK button to turn the Tool "on". 2. Press the ENTER/FF button. 3. Use the and keys to highlight and select your vehicle's OBD system (OBD1 or OBD2). Press the ENTER/FF button to continue. s Select "Back" if you wish to return to the Main Menu. 4. If DTCs are present in the Tool's memo- ry, the first stored DTC will display on the screen. s If more than one DTC is present, use the DTC SCROLL button to scroll through the DTC's. 5. "For OBD2 systems only" - Saved Freeze Frame data and Monitor status are also available (press the ENTER/FF button to view Freeze Frame data). 6. If no DTCs are in the Tool's memory, a "No DTC's are presently stored in the Tool's memory" message displays. 16. 14 OBD2 & 1 E Preparation for Testing PRELIMINARY VEHICLE DIAGNOSIS WORKSHEET PRELIMINARY VEHICLE DIAGNOSIS WORKSHEET The purpose of this form is to help you gather preliminary information on your vehicle before you retrieve codes. By having a complete account of your vehicle's current problem(s), you will be able to systematically pin- point the problem(s) by comparing your answers to the fault codes you retrieve.You can also provide this information to your mechanic to assist in diagnosis and help avoid costly and unnecessary repairs. It is impor- tant for you to complete this form to help you and/or your mechanic have a clear understanding of your vehicle's problems. An electronic version of this Preliminary Vehicle Diagnosis Worksheet is available online at www.canOBD2.com. You can complete the form online and print a copy to take to your mechanic. NAME: DATE: VIN*: YEAR: MAKE: MODEL: ENGINE SIZE: VEHICLE MILEAGE: *VIN: Vehicle Identification Number, found at the base of the windshield on a metallic plate, or at the driver door latch area (consult your vehicle owner's manual for location). TRANSMISSION: u Automatic u Manual Please check all applicable items in each category. DESCRIBE THE PROBLEM: 17. OBD2 & 1 15 E Preparation for Testing PRELIMINARY VEHICLE DIAGNOSIS WORKSHEET WHEN DID YOU FIRST NOTICE THE PROBLEM: u Just Started u Started Last Week u Started Last Month u Other: LIST ANY REPAIRS DONE IN THE PAST SIX MONTHS: PROBLEMS STARTING ENGINE QUITS OR STALLS IDLING CONDITIONS RUNNING CONDITIONS u No symptoms u Will not crank u Cranks, but will not start u Starts, but takes a long time u No symptoms u Right after starting u When shifting into gear u During steady-speed driving u Right after vehicle comes to a stop u While idling u During acceleration u When parking u No symptoms u Is too slow at all times u Is too fast u Is sometimes too fast or too slow u Is rough or uneven u Fluctuates up and down u No symptoms u Runs rough u Lacks power u Bucks and jerks u Poor fuel economy u Hesitates or stumbles on accelerations u Backfires u Misfires or cuts out u Engine knocks, pings or rattles u Surges u Dieseling or run-on 18. 16 OBD2 & 1 E Preparation for Testing PRELIMINARY VEHICLE DIAGNOSIS WORKSHEET AUTOMATIC TRANSMISSION PROBLEMS (if applicable) PROBLEM OCCURS u Morning u Afternoon u Anytime ENGINE TEMPERATURE WHEN PROBLEM OCCURS u Cold u Warm u Hot DRIVING CONDITIONS WHEN PROBLEM OCCURS DRIVING HABITS GASOLINE USED WEATHER CONDITIONS WHEN PROBLEM OCCURS CHECK ENGINE LIGHT / DASH WARNING LIGHT u Sometimes ON u Always ON u Never ON PECULIAR SMELLS STRANGE NOISES u Short - less than 2 miles u 2 - 10 miles u Long - more than 10 miles u Stop and go u While turning u While braking u At gear engagement u With A/C operating u With headlights on u During acceleration u Mostly driving downhill u Mostly driving uphill u Mostly driving level u Mostly driving curvy roads u Mostly driving rough roads u Mostly city driving u Highway u Park vehicle inside u Park vehicle outside u Drive less than 10 miles per day u Drive 10 to 50 miles per day u Drive more than 50 miles per day u 87 Octane u 89 Octane u 91 Octane u More than 91 Octane u 32 - 55° F (0 - 13° C) u Below freezing (32° F / 0° C) u Above 55° F (13° C) u "Hot" u Sulfur ("rotten egg") u Burning rubber u Gasoline u Burning oil u Electrical u Rattle u Knock u Squeak u Other u No symptoms u Shifts too early or too late u Changes gear incorrectly u Vehicle does not move when in gear u Jerks or bucks 19. OBD2 & 1 17 E Preparation for Testing BEFORE YOU BEGIN BEFORE YOU BEGIN The OBD2 & 1 Tool aids in monitoring electronic- and emissions-related faults in your vehicle and retrieving fault codes related to malfunc- tions in these systems. Mechanical problems such as low oil level or damaged hoses, wiring or electrical connectors can cause poor engine perform- ance and may also cause a fault code to set. Fix any known mechan- ical problems before performing any test. See your vehicle's service manual or a mechanic for more information. Check the following areas before starting any test: s Check the engine oil, power steering fluid, transmission fluid (if applicable), engine coolant and other fluids for proper levels.Top off low fluid levels if needed. s Make sure the air filter is clean and in good condition. Make sure all air filter ducts are properly connected. Check the air filter ducts for holes, rips or cracks. s Make sure all engine belts are in good condition. Check for cracked, torn, brittle, loose or missing belts. s Make sure mechanical linkages to engine sensors (throttle, gearshift position, transmission, etc.) are secure and properly con- nected. See your vehicle's service manual for locations. s Check all rubber hoses (radiator) and steel hoses (vacuum/fuel) for leaks, cracks, blockage or other damage. Make sure all hoses are routed and connected properly. s Make sure all spark plugs are clean and in good condition. Check for damaged, loose, disconnected or missing spark plug wires. s Make sure the battery terminals are clean and tight. Check for cor- rosion or broken connections. Check for proper battery and charg- ing system voltages. s Check all electrical wiring and harnesses for proper connection. Make sure wire insulation is in good condition, and there are no bare wires. s Make sure the engine is mechanically sound. If needed, perform a compression check, engine vacuum check, timing check (if applica- ble), etc. 20. 18 OBD2 & 1 E Preparation for Testing VEHICLE SERVICE MANUALS VEHICLE SERVICE MANUALS Always refer to the manufacturer's service manual for your vehicle before performing any test or repair procedures. Contact your local car dealership, auto parts store or bookstore for availability of these man- uals. The following companies publish valuable repair manuals: s Haynes Publications 861 Lawrence Drive Newbury Park, California 91320 Phone: 800-442-9637 s Mitchell International 14145 Danielson Street Poway, California 92064 Phone: 888-724-6742 s Motor Publications 5600 Crooks Road, Suite 200 Troy, Michigan 48098 Phone: 800-426-6867 FACTORY SOURCES Ford, GM, Chrysler, Honda, Isuzu, Hyundai and Subaru Service Manuals s Helm Inc. 14310 Hamilton Avenue Highland Park, Michigan 48203 Phone: 800-782-4356 21. OBD2 & 1 19 E General Code Retrieval Procedures OBD1 SYSTEMS / OBD2 SYSTEMS Procedures for Retrieving Diagnostic Trouble Codes from OBD1 sys- tems are vehicle manufacturer specific. Each manufacturer uses their own procedure. Procedures for retrieving Diagnostic Trouble Codes from OBD2 systems are generic, and apply to all vehicles equipped with OBD2 systems. From the following list, select the procedure that applies to your vehi- cle's OBD system, and proceed to appropriate section for detailed code retrieval procedures. OBD1 SYSTEMS Most cars and light trucks (under 8500 GW) sold in the U.S. from early 1980's to 1995 are equipped with what is known as the first generation of On-Board Diagnostics or "OBD1". s If your Chrysler/Jeep, Ford, GM or Toyota vehicle, (1995 and older) is equipped with an 'OBD1 System", proceed to the proper section as indicated below, for a detailed application list and code retrieval procedures: s CHRYSLER/JEEP . . . . .page 36 s FORD . . . . .page 42 s GM . . . . .page 65 s TOYOTA . . . . .page 71 OBD2 SYSTEMS ALL 1996 and newer cars and light trucks (under 8500 GW) sold in the U.S. are equipped with what is known as the second generation of On- Board Diagnostics or "OBD2". s If your vehicle (1996 and newer) is equipped with an "OBD2 System", proceed to the "OBD2 SYSTEMS" section on page 20 for a detailed application list, code retrieval procedures, Monitor status, and Freeze Frame data information. 22. 20 OBD2 & 1 E OBD2 Systems VEHICLES COVERED VEHICLES COVERED The OBD2 & 1 Tool is designed to work on all OBD 2 compliant vehi- cles. All 1996 and newer vehicles (cars and light trucks) sold in the United States are OBD 2 compliant. Federal law requires that all 1996 and newer cars and light trucks sold in the United States must be OBD 2 compliant; this includes all Domestic, Asian and European vehicles. Some 1994 and 1995 vehicles are OBD 2 compliant. To find out if a 1994 or 1995 vehicle is OBD 2 compliant, check the following: 1. The Vehicle Emissions Control Information (VECI) Label. This label is located under the hood or by the radiator of most vehicles. If the vehicle is OBD 2 compliant, the label will state "OBD II Certified." 2. Government Regulations require that all OBD 2 compliant vehicles must have a "common" sixteen-pin Data Link Connector (DLC). Some 1994 and 1995 vehicles have 16-pin connectors but are not OBD 2 compliant. Only those vehicles with a Vehicle Emissions Control Label stating "OBD II Certified" are OBD 2 compliant. Data Link Connector (DLC) Location The 16-pin DLC is usually located under the instrument panel (dash), within 12 inches (300 mm) of center of the panel, on the driver's side of most vehicles. It should be eas- ily accessible and visible from a kneeling position outside the vehicle with the door open. VEHICLE EMISSION CONTROL INFORMATION VEHICLE MANUFACTURER OBD II CERTIFIED ENGINE FAMILY EFN2.6YBT2BA DISPLACEMENT 2.6L THIS VEHICLE CONFORMS TO U.S. EPA AND STATE OF CALIFORNIA REGULATIONS APPLICABLE TO 1999 MODEL YEAR NEW TLEV PASSENGER CARS. REFER TO SERVICE MANUAL FOR ADDITIONAL INFORMATION TUNE-UP CONDITIONS: NORMAL OPERATING ENGINE TEMPERATURE, ACCESSORIES OFF, COOLING FAN OFF, TRANSMISSION IN NEUTRAL SPARK PLUG TYPE NGK BPRE-11 GAP: 1.1MM CATALYST EXHAUST EMISSIONS STANDARDS STANDARD CATEGORY CERTIFICATION IN-USE TLEV TLEV INTERMEDIATE OBD II CERTIFIED 1 2 3 4 5 6 7 8 9 10111213141516 NEAR CENTER OF DASH BEHIND ASHTRAY LEFT CORNER OF DASH 23. OBD2 & 1 21 E OBD2 Systems DIAGNOSTIC TROUBLE CODES (DTCs) On some Asian and European vehicles the DLC is located behind the "ashtray" (the ashtray must be removed to access it) or on the far left corner of the dash. If the DLC cannot be located, consult the vehicle's service manual for the location. DIAGNOSTIC TROUBLE CODES (DTCs) Diagnostic Trouble Codes (DTCs) are meant to guide you to the proper serv- ice procedure in the vehicle's service manual. DO NOT replace parts based only on DTCs without first consulting the vehicle's service manual for prop- er testing procedures for that particular system, circuit or component. DTCs are alphanumeric codes that are used to identify a problem that is present in any of the systems that are mon- itored by the on-board computer (PCM). Each trouble code has an assigned message that identifies the circuit, compo- nent or system area where the problem was found. OBD 2 diagnostic trouble codes are made up of five charac- ters: s The 1st character is a letter. It identifies the "main system" where the fault occurred (Body, Chassis, Powertrain, or Network). s The 2nd character is a numeric digit. It identifies the "type" of code (Generic or Manufacturer-Specific). Generic DTCs are codes that are used by all vehicle manu- facturers. The standards for generic DTCs, as well as their definitions, are set by the Society of Automotive Engineers (SAE). Manufacturer-Specific DTCs are codes that are controlled by the vehicle manufacturers. The Federal Government does not require vehicle manufacturers to go beyond the stan- dardized generic DTCs in order to comply with the new OBD2 emissions standards. However, manufacturers are free to expand beyond the standardized codes to make their sys- tems easier to diagnose. s The 3rd character is a numeric digit. It identifies the specific sys- tem or sub-system where the problem is located. s The 4th and 5th characters are numeric digits. They identify the section of the system that is malfunctioning. Diagnostic Trouble Codes (DTCs) are codes that identify a specific problem area. 24. 22 OBD2 & 1 E OBD2 Systems DIAGNOSTIC TROUBLE CODES (DTCs) DTCs and MIL Status When the vehicle's on-board computer detects a failure in an emissions-related component or system, the computer's internal diagnostic program assigns a diagnostic trouble code (DTC) that points to the system (and sub- system) where the fault was found.The diag- nostic program saves the code in the com- puter's memory. It records a "Freeze Frame" of conditions present when the fault was found, and lights the Malfunction Indicator Lamp (MIL). Some faults require detection for two trips in a row before the MIL is turned on. The "Malfunction Indicator Lamp" (MIL) is the accepted term used to describe the lamp on the dashboard that lights to warn the driver that an emissions-related fault has been found. Some manufacturers may still call this lamp a "Check Engine" or "Service Engine Soon" light. P 0 2 0 1B C P U - - - - Body Chassis Powertrain Network - - - - Generic Manufacturer Specific Generic Includes both Generic and Manufacturer Specific Codes 0 1 2 3 Identifies what section of the system is malfunctioning Identifies the system where the problem is located: 1 2 3 4 5 6 7 8 - - - - - - - - Fuel and Air Metering Fuel and Air Metering (injector circuit malfunction only) Ignition System or Misfire Auxiliary Emission Control System Vehicle Speed Control and Idle Control System Computer Output Circuits Transmission Transmission OBD 2 DTC EXAMPLE P0201 - Injector Circuit Malfunction, Cylinder 1 25. OBD2 & 1 23 E OBD2 Systems CODE RETRIEVAL PROCEDURE CODE RETRIEVAL PROCEDURE Never replace a part based only on the DTC definition. Each DTC has a set of testing procedures, instructions and flow charts that must be followed to confirm the loca- tion of the problem. This information is found in the vehicle's service manual. Always refer to the vehicle's service manual for detailed testing instructions. Check your vehicle thoroughly before performing any test. See Before You Begin on page 17 for details. ALWAYS observe safety precautions whenever working on a vehicle. See Safety Precautions on page 3 for more infor- mation. 1. Turn the ignition OFF. 2. Locate the vehicle's 16-pin Data Link Connector (DLC). See page 20 for con- nector location. Some DLCs have a plastic cover that must be removed before con- necting the Tool cable connector. If the Tool is ON, turn it OFF by pressing the POWER/LINK button BEFORE connecting the Tool to the DLC. 3. Connect the OBD II Cable to the Tool, then connect to the vehicle's DLC. s If you have problems connecting the cable connector to the DLC, rotate the connector 180° and try again. s If you still have problems, check the pins on the Tool's DLC and on the vehicle's DLC. 4. When the Tool's cable connector is prop- erly connected to the vehicle's DLC, the unit automatically turns ON, and the LCD display shows instructions for link- ing to the vehicle's on-board computer. Retrieving and using Diagnostic Trouble Codes (DTCs) for troubleshooting vehicle operation is only one part of an overall diagnostic strategy. 26. 24 OBD2 & 1 E OBD2 Systems CODE RETRIEVAL PROCEDURE s If the unit does not power on automatically when connected to the vehicle's DLC connector, it usually indicates there is no power present at the vehicle's DLC connector. Check your fuse panel and replace any burned-out fuses. s If replacing the fuse(s) does not correct the problem, consult your vehicle's repair manual to identify the proper computer (PCM) fuse/ circuit, and perform any necessary repairs before proceeding. 5. Turn the ignition on. DO NOT start the engine. 6. Press and release the Tool's POWER/LINK button. s The Tool will automatically start a check of the vehicle's computer to determine which type of communica- tion protocol it is using. When the Tool identifies the computer's communica- tion protocol, a communication link is established. The protocol type used by the vehicle's computer is shown on the LCD display. A PROTOCOL is a set of rules and procedures for regu- lating data transmission between computers, and between testing equipment and computers. As of this writing, five different types of protocols (ISO 9141, Keyword 2000, J1850 PWM, J1850 VPW and CAN) are in use by vehicle manufacturers. The Tool automatically identifies the proto- col type and establishes a communication link with the vehicle's computer. 7. After approximately 10~60 seconds, the Tool will retrieve and dis- play any Diagnostic Trouble Codes, Monitor Status and Freeze Frame Data retrieved from the vehicle's computer memory. s If the Tool fails to link to the vehicle's computer a "Linking Failed" message shows on the Tool's LCD display. - Verify the connection at the DLC and verify the ignition is ON. - Turn the ignition OFF, wait 5 sec- onds, then turn back ON to reset the computer. - Ensure your vehicle is OBD2 compliant. See Vehicles Covered on page 20 for vehicle compliance verification infor- mation. 27. OBD2 & 1 25 E OBD2 Systems CODE RETRIEVAL PROCEDURE s The Tool will automatically re-link to the vehicle's computer every 30 sec- onds to refresh the data being retrieved. When data is being re- freshed, the message "One moment Auto – link in progress" is shown on the LCD display. This action repeats as long as the Tool is communicating with the vehicle's computer. s The Tool will display a code only if codes are present in the vehicle's computer memory. If no codes are present, a "No DTC's are presently stored in the vehicle's computer" message is displayed. s The Tool is capable of retrieving and storing up to 32 codes in memory, for immediate or later viewing. 8. To read the display: Refer to Display Functions on page 11 for a description of LCD display elements. s A visible icon indicates that the Tool is being powered through the vehicle's DLC connector. s A visible icon indicates that the Tool is linked to (communi- cating with) the vehicle's computer. s The I/M Monitor Status icons indicate the type and number of Monitors the vehicle supports, and provides indications of the current status of the vehicle's Monitors. A solid Monitor icon indi- cates the associated Monitor has run and completed its testing. A blinking Monitor icon indicates the associated Monitor has not run and completed its testing. s The upper right hand corner of the display shows the number of the code currently being displayed, the total number of codes retrieved, the type of code (G = Generic; E = Enhanced or Manufacturer specific), and whether or not the displayed code commanded the MIL on. If the code being displayed is a PENDING code, the PENDING icon is shown. s The Diagnostic Trouble Code (DTC) and related code definition are shown in the lower section of the LCD display. 28. 26 OBD2 & 1 E OBD2 Systems CODE RETRIEVAL PROCEDURE In the case of long code definitions, or when viewing Freeze Frame data, a small arrow is shown in the upper/lower right-hand corner of the code display area to indicate the presence of additional information. Use the and buttons, as necessary, to view the addi- tional information. 9. Read and interpret Diagnostic Trouble Codes/system condition using the LCD display and the green, yellow and red LEDs. The green, yellow and red LEDs are used (with the LCD display) as visual aids to make it easier to determine engine system conditions. s Green LED – Indicates that all engine systems are "OK" and operat- ing normally. All monitors supported by the vehicle have run and per- formed their diagnostic testing, and no trouble codes are present. A zero will show on the Tool's LCD display, and all Monitor icons will be solid. s Yellow LED – Indicates one of the following conditions: A. A PENDING CODE IS PRESENT – If the yellow LED is illuminated, it may indicate a Pending code is present. Check the Tool's LCD display for con- firmation. A Pending code is con- firmed by the presence of a numeric code and the word PENDING on the Tool's LCD display. B. MONITOR NOT RUN STATUS – If the Tool's LCD display shows a zero (indicating there are no DTC's pres- ent in the vehicle's computer memo- ry), but the yellow LED is illuminated, it may be an indication that some of the Monitors supported by the vehicle have not yet run and completed their diagnostic testing. Check the Tool's LCD display for confirmation. All Monitor icons that are blinking have not yet run and completed their diagnostic testing; all Monitor icons that are solid have run and completed their diagnostic testing. 29. OBD2 & 1 27 E OBD2 Systems CODE RETRIEVAL PROCEDURE s Red LED – Indicates there is a prob- lem with one or more of the vehicle's systems. The red LED is also used to indicate that DTC(s) are present (dis- played on the Tool's screen). In this case, the Multifunction Indicator (Check Engine) lamp on the vehicle's instrument panel will be illuminated. s DTC's that start with "P0", "P2" and some "P3" are considered Generic (Universal). All Generic DTC definitions are the same on all OBD2 equipped vehicles. The Tool automatically displays the code definitions for Generic DTC's. s DTC's that start with "P1" and some "P3" are Enhanced (Manufacturer spe- cific) codes and their code definitions vary with each vehicle manufacturer. When an Enhanced (Manufacturer specific) DTC is retrieved, the LCD dis- play shows a list of vehicle manufactur- ers. Use the UP and DOWN buttons, as necessary, to highlight the appropriate manufacturer, then press the ENTER/FF button to display the correct code definition for your vehicle. If the manufacturer for your vehicle is not listed, use the UP and DOWN buttons, as necessary, to select Other manufacturer and press the ENTER/FF but- ton for additional DTC information. If the Manufacturer Specific definition for the currently dis- played code is not available, an advisory message shows on the Tool's LCD display. 10. If more than one code was retrieved press the DTC SCROLL button, as necessary, to display additional codes one at a time. s Whenever the Scroll function is used to view additional codes, the Tool's communication link with the vehicle's computer dis- connects. To re-establish communication, press the LINK button again. 11. Freeze Frame Data (if available) can be viewed at any time (except MENU mode) by pressing the ENTER/FF button. 30. 28 OBD2 & 1 E OBD2 Systems CODE RETRIEVAL PROCEDURE s In OBD2 systems, when an emis- sions-related engine malfunction occurs that causes a DTC to set, a record or snapshot of engine condi- tions at the time that the malfunction occurred is also saved in the vehi- cle's computer memory. The record saved is called Freeze Frame data. Saved engine conditions include, but are not limited to: engine speed, open or closed loop operation, fuel system commands, coolant temperature, calculated load value, fuel pressure, vehi- cle speed, air flow rate, and intake manifold pressure. If more than one malfunction is present that causes more than one DTC to be set, only the code with the highest pri- ority will contain Freeze Frame data. The code designated "01" on the Tool display is referred to as the PRIORITY code, and Freeze Frame data always refers to this code. The priority code is also the one that has com- manded the MIL on. If Freeze Frame data is not available for the code shown on the LCD display when the ENTER/FF button is pressed, an advisory message shows on the LCD display. Press the DTC SCROLL button to return to the previous code display. Retrieved information can be uploaded to a Personal Computer (PC) with the use of an optional "PC Link Kit." See instructions included with PC-Link program for more information. 12. Determine engine system(s) condition by viewing the Tool's LCD display for any retrieved Diagnostic Trouble Codes, code defini- tions, Freeze Frame data and interpreting the green, yellow and red LEDs. s If DTC's were retrieved and you are going to perform the repairs yourself, proceed by consulting the Vehicle's Service Repair Manual for testing instructions, testing procedures, and flow charts related to retrieved code(s). s If you plan to take the vehicle to a professional to have it serviced, complete the Preliminary Vehicle Diagnosis Worksheet on page 14 and take it together with the retrieved codes, freeze frame data and LED information to aid in the troubleshooting procedure. 31. OBD2 & 1 29 E OBD2 Systems ERASING DIAGNOSTIC TROUBLE CODES (DTCs) s To prolong battery life, the Tool automatically shuts "Off" approx- imately three minutes after it is disconnected from the vehicle. The DTCs retrieved, Monitor Status and Freeze Frame data (if any) will remain in the Tool's memory, and may be viewed at any time by turning the unit "On". If the Tool's batteries are removed, or if the Tool is re-linked to a vehicle to retrieve codes/data, any prior codes/data in its memory are automatically cleared. ERASING DIAGNOSTIC TROUBLE CODES (DTCs) When the Tool's ERASE function is used to erase DTCs from the vehicle's on-board computer, "Freeze Frame" data and manufacturer-specific enhanced data are also erased. If you plan to take the vehicle to a Service Center for repair, DO NOT erase the codes from the vehicle's computer. If the codes are erased, valuable information that might help the technician troubleshoot the problem will also be erased. Erase DTCs from the computer's memory as follows: When DTCs are erased from the vehicle's computer memo- ry, the I/M Readiness Monitor Status program resets the sta- tus of all Monitors to a not run "flashing" condition. To set all of the Monitors to a DONE status, an OBD 2 Drive Cycle must be performed. Refer to your vehicle's service manual for information on how to perform an OBD 2 Drive Cycle for the vehicle under test. The Tool must be connected to the vehicle's DLC to erase the codes from the computer's memory. If you press the ERASE button when the Tool is not connected to the vehicle's DLC, the erase instruction screen displays. 1. If not connected already, connect the Tool to the vehicle's DLC, and turn the ignition "On." (If the Tool is already con- nected and linked to the vehicle's com- puter, proceed directly to step 4. If not, continue to step 2.) 2. Turn the ignition ON. DO NOT start the engine. Press and release the POWER/LINK button to establish communication with the vehicle's com- puter. 32. 30 OBD2 & 1 E OBD2 Systems I/M READINESS TESTING 3. Press and release the ERASE but- ton. A confirmation message shows on the LCD display. - If you are sure you want to proceed press the ERASE button again to erase DTCs from the vehicle's com- puter. - If you do not want to continue with the erase process, press the POWER/LINK button to exit the erase mode. 4. If you chose to erase DTCs, a progress screen displays while the erase function is in progress. s If the erase was successful, a confir- mation message shows on the LCD display. Press the POWER/LINK button to return to the DTC screen. s If the erase was not successful, an advisory message shows on the LCD display. Verify that the Tool is properly connected to the vehicle's DLC and that the ignition is on, then repeat steps 2 and 3, above. Erasing DTCs does not fix the problem(s) that caused the code(s) to be set. If proper repairs to correct the problem that caused the code(s) to be set are not made, the code(s) will appear again (and the check engine light will illuminate) as soon as the vehicle is driven long enough for its Monitors to complete their testing. I/M READINESS TESTING I/M is an Inspection and Maintenance program legislated by the Government to meet federal clean-air standards. The program requires that a vehicle be taken periodically to an Emissions Station for an "Emissions Test" or "Smog Check," where the emissions-related components and systems are inspected and tested for proper operation. Emissions Tests are generally performed once a year, or once every two years. On OBD 2 systems, the I/M program is enhanced by requiring vehicles to meet stricter test standards. One of the tests instituted by the Federal Government is called I/M 240. On I/M 240, the vehicle under test is driv- en under different speeds and load conditions on a dynamometer for 240 seconds, while the vehicle's emissions are measured. 33. OBD2 & 1 31 E OBD2 Systems I/M READINESS TESTING Emissions tests vary depending on the geographic or region- al area in which the vehicle is registered. If the vehicle is reg- istered in a highly urbanized area, the I/M 240 is probably the type of test required. If the vehicle is registered in a rural area, the stricter "dynamometer type" test may not be required. I/M Readiness Monitors I/M Readiness shows whether the various emissions-related systems on the vehicle are operating properly and are ready for Inspection and Maintenance testing. State and Federal Governments enacted Regulations, Procedures and Emission Standards to ensure that all emissions-related components and systems are continuously or periodically monitored, tested and diagnosed whenever the vehicle is in operation. It also requires vehi- cle manufacturers to automatically detect and report any problems or faults that may increase the vehicle's emissions to an unacceptable level. The vehicle's emissions control system consists of several compo- nents or sub-systems (Oxygen Sensor, Catalytic Converter, EGR, Fuel System, etc.) that aid in reducing vehicle emissions. To have an efficient Vehicle Emission Control System, all the emis- sions-related components and systems must work correctly whenever the vehicle is in operation. To comply with State and Federal Government regulations, vehicle manufacturers designed a series of special computer programs called "Monitors" that are programmed into the vehicle's computer. Each of these Monitors is specifically designed to run tests and diagnostics on a specific emissions-related component or system (Oxygen Sensor, Catalytic Converter, EGR Valve, Fuel System, etc.) to ensure their proper operation. Currently, there are a maximum of eleven Monitors available for use. Each Monitor has a specific function to test and diagnose only its designated emissions-related component or system. The names of the Monitors (Oxygen Sensor Monitor, Catalyst Monitor, EGR Monitor, Misfire Monitor, etc.) describe which component or system each Monitor is designed to test and diagnose. Emissions Inspection and Maintenance (I/M) Readiness Monitor Status Information I/M Readiness Monitor Status shows which of the vehicle's Monitors have run and completed their diagnosis and testing, and which ones have not yet run and completed testing and diagnosis of their desig- nated sections of the vehicle's emissions system. 34. 32 OBD2 & 1 E OBD2 Systems I/M READINESS TESTING s If a Monitor was able to meet all the conditions required to enable it to perform the self-diagnosis and testing of its assigned engine sys- tem, it means the monitor "HAS RUN." s If a Monitor has not yet met all the conditions required for it to per- form the self-diagnosis and testing of its assigned engine system; it means the Monitor "HAS NOT RUN." The Monitor Run/Not Run status does not show whether or not a problem exists in a system. Monitor status only indicates whether a particular Monitor has or has not run and performed the self-diagnosis and testing of its asso- ciated system. Performing I/M Readiness Quick Check When a vehicle first comes from the factory, all Monitors indi- cate a "HAVE RUN" status. This indicates that all Monitors have run and completed their diagnostic testing. The "HAVE RUN" status remains in the computer's memory, unless the Diagnostic Trouble Codes are erased or the vehicle's com- puter memory is cleared. The Tool allows you to retrieve Monitor/System Status Infor-mation to help you determine if the vehicle is ready for an Emissions Test (Smog Check). In addition to retrieving Diagnostic Trouble Codes, the Tool also retrieves Monitor Run/Not Run status.This information is very important since different areas of the state/country have different emissions laws and regulations concerning Monitor Run/Not Run status. Before an Emissions Test (Smog Check) can be performed, your vehi- cle must meet certain rules, requirements and procedures legislated by the Federal and state (country) governments where you live. 1. In most areas, one of the requirements that must be met before a vehicle is allowed to be Emissions Tested (Smog Checked) is that the vehicle does not have any Diagnostic Trouble Codes present (with the exception of PENDING Diagnostic Trouble Codes). 2. In addition to the requirement that no Diagnostic Trouble Codes be present, some areas also require that all the Monitors that a partic- ular vehicle supports indicate a "Has Run" status condition before an Emissions Check may be performed. 3. Other areas may only require that some (but not all) Monitors indi- cate a "Has Run" status before an Emissions Test (Smog Check) may be performed. 35. OBD2 & 1 33 E OBD2 Systems I/M READINESS TESTING Monitors with a "Has Run" status indicate that all the required conditions they needed to perform diagnosis and testing of their assigned engine area (system) have been met, and all diagnostic testing has completed suc- cessfully. Monitors with a "Has Not Run" status have not yet met the conditions they need to perform diagnosis and test- ing of their assigned engine area (system), and have not been able to perform diagnostic testing on that system. The green, yellow and red LEDs provide a quick way to help you deter- mine if a vehicle is ready for an Emissions Test (Smog Check). Follow the instructions below to perform the Quick Check. Perform the Code Retrieval Procedure as described on page 23, then interpret the LED indications as follows: Interpreting I/M Readiness Test Results 1. GREEN LED - Indicates that all engine systems are "OK" and operating nor- mally (all Monitors supported by the vehicle have run and performed their self-diagnostic testing). The vehicle is ready for an Emissions Test (Smog Check), and there is a good possibility that it can be certified. 2. YELLOW LED - Determine from the Code Retrieval Procedure (page 23) which of the two possible conditions is causing the yellow LED to light. s If a "PENDING" Diagnostic Trouble Code is causing the yellow LED to light, it is possible that the vehicle will be allowed to be tested for emissions and certified. Currently, most areas (states) will allow an Emissions Test (Smog Check) to be performed if the only code in the vehicle's computer is a "PENDING" Diagnostic Trouble Code. s If the illumination of the Yellow LED is being caused by monitors that "have not run" their diagnostic testing, then the issue of the vehicle being ready for an Emissions Test (Smog Check) depends on the emissions regula- tions and laws of your local area. 36. 34 OBD2 & 1 E OBD2 Systems I/M READINESS TESTING - Some areas require that all Monitors indicate a "Has Run" sta- tus before they allow an Emissions Test (Smog Check) to be performed. Other areas only require that some, but not all, Monitors have run their self-diagnostic testing before an Emissions Test (Smog Check) may be performed. From the code retrieval procedure, determine the status of each Monitor (a solid Monitor icon shows Monitor "Has Run" status, a flashing Monitor icon indicates "Has Not Run" sta- tus). Take this information to an emissions professional to determine (based on your test results) if your vehicle is ready for an Emissions Test (Smog Check). 3. RED LED - Indicates there is a problem with one or more of the vehicle's sys- tems. A vehicle displaying a red LED is definitely not ready for an Emissions Test (Smog Check). The red LED is also an indication that there are Diagnostic Trouble Code(s) present (displayed on the Tool's screen). The Multifunction Indicator (Check Engine) Lamp on the vehicle's instrument panel will light steady. The problem that is causing the red LED to light must be repaired before an Emissions Test (Smog Check) can be performed. It is also suggested that the vehicle be inspected/repaired before driving the vehicle further. If the Red LED was obtained, there is a definite problem present in the system(s). In these cases, you have the following options. s Repair the vehicle yourself. If you are going to perform the repairs yourself, proceed by reading the vehicle service manual and following all its procedures and recommendations. s Take the vehicle to a professional to have it serviced. The prob- lem(s) causing the red LED to light must be repaired before the vehicle is ready for an Emissions Test (Smog Check). Using the I/M Readiness Monitor Status to Confirm a Repair The I/M Readiness Monitor Status function can be used (after repair of a fault has been performed) to confirm that the repair has been per- formed correctly, and/or to check for Monitor Run Status. Use the fol- lowing procedure to determine I/M Readiness Monitor Status: 1. Using retrieved Diagnostic Trouble Codes (DTCs) and code defini- tions as a guide, and following manufacturer's repair procedures, repair the fault or faults as instructed. 2. After the fault or faults have been repaired, connect the Tool to the vehicle's DLC and erase the code or codes from the vehicle's com- puter memory. 37. OBD2 & 1 35 E OBD2 Systems I/M READINESS TESTING s See page 29 for procedures to erase DTCs from the vehicle's on- board computer. s Write the codes down on a piece of paper for reference before erasing. 3. After the erase procedure is performed, most of the Monitor icons on the Tool's LCD display will be flashing. Leave the Tool connected to the vehicle, and perform a Trip Drive Cycle for each "flashing" Monitor: Misfire, Fuel and Comprehensive Component Monitors run continuously and their icons will always be on solid, even after the erase function is performed. s Each DTC is associated with a specific Monitor. Consult the vehi- cle's service manual to identify the Monitor (or Monitors) associ- ated with the faults that were repaired. Follow the manufacturer's procedures to perform a Trip Drive Cycle for the appropriate Monitors. s While observing the Monitor icons on the Tool's LCD display, per- form a Trip Drive Cycle for the appropriate Monitor or Monitors. WARNING: If the vehicle needs to be driven in order to perform a Trip Drive Cycle, ALWAYS have a second person help you. One person should drive the vehicle while the other person observes the Monitor icons on the Tool for Monitor RUN status. Trying to drive and observe the Tool at the same time is dangerous, and could cause a serious traffic accident. 4. When a Monitor's Trip Drive Cycle is performed properly, the Monitor icon on the Tool's LCD display changes from "flashing" to "solid," indicating that the Monitor has run and finished its diagnos- tic testing. s If, after the Monitor has run, the MIL on the vehicle's dash is not lit, and no stored or pending codes associated with that particu- lar Monitor are present in the vehicle's computer, the repair was successful. s If, after the Monitor has run, the MIL on the vehicle's dash lights and/or a DTC associated with that Monitor is present in the vehi- cle's computer, the repair was unsuccessful. Refer to the vehi- cle's service manual and recheck repair procedures. 38. 36 OBD2 & 1 E Chrysler/Jeep OBD1 Systems CHRYSLER/JEEP OBD1 SYSTEMS CHRYSLER/JEEP OBD1 SYSTEMS Chrysler Motors On-Board Computer Systems Chrysler Motors introduced its first electronic fuel injected vehicle in late 1983. The on-board computer management systems used on Chrysler vehicles have evolved over the years, and their names have changed accordingly. 1983-87: The on-board computer used in these vehicles is a split- system, composed of two separate units: the Logic Module and the Power Module. The Logic Module contains a microprocessor which processes data received from sensors located throughout the vehicle and makes decisions (based on these inputs) which effect engine operation. The Logic Module is usually located on the right-hand side, behind the kick panel. The Power Module supplies operating power to the Logic Module, and contains the circuits which control the high- current devices. Power Module operation is controlled by the Logic Module.The Power Module is located in the engine compartment, near the vehicle's battery. 1987-90: This system is called a Single Module Engine Controller (SMEC). This system still uses two separate circuit boards (Logic Module and Power Module). However, both circuit boards are located in a common enclosure. 1989-95: This system is called a Single Board Engine Controller (SBEC). On this system, the Logic Module and Power Module circuit boards are integrated on a single circuit board. 1993-97: Beginning in 1993, the computer was renamed the Powertrain Control Module (PCM). In addition to controlling the engine management system and emission system, the computer also takes an active role in controlling powertrain (transmission system) operation. Unless otherwise specified, all references to "computer" within this manual also apply to "Logic Module/ Power Module", "SMEC", "SBEC" or "PCM". Jeep On-Board Computer Systems 1993-95: In 1993, Jeep on-board computer systems (fuel injected vehicles only) were converted to the Chrysler on-board computer sys- tems. All 1993 through 1995 fuel injected Jeep and Chrysler vehicles are equipped with similar on-board computer systems. 39. OBD2 & 1 37 E Chrysler/Jeep OBD1 Systems VEHICLES COVERED / PANEL INDICATOR LIGHTS / DLC VEHICLES COVERED This section covers Chrysler fuel injected vehicles from 1983-1995. INSTRUMENT PANEL INDICATOR LIGHTS Your vehicle's instrument panel has either a "Power Loss", "Check Engine" or "Malfunction Indicator Lamp", depending on the year of the vehicle. These lights are designed to warn you of component malfunc- tions. If your instrument panel indicator lights do not come on when you turn on the ignition, please refer to your vehicle's service manual.You may have problems in the car's circuitry. It is rec- ommended that you fix these problems before retrieving DTC's from your vehicle's computer. DATA LINK CONNECTOR (DLC) Chrysler vehicles are equipped with spe- cial test connectors that make it possible to connect specialized testing equipment that communicates with the vehicle's on-board computer. Chrysler's vehicle test connec- tors are usually dark in color (BLACK or GREY) and are located under the hood. Model Type Year Model Passenger 1983-1995 Chrysler, Dodge and Plymouth Fuel Cars Injected Models Only (Excluding Lasor/Talon 1.8L, 2.0L (ALL YEARS), 1990 Monaco/Premier) Light Truck 1987-1995 Chrysler, Dodge and Plymouth Fuel and Vans Injected Models Only 1992-1995 Diesel Models Jeep 1993-1995 Jeep Fuel Injected Models Only POWER LOSS CHECK ENGINE MALFUNCTION INDICATOR LAMP 40. 38 OBD2 & 1 E Chrysler/Jeep OBD1 Systems CODE RETRIEVAL PROCEDURE CODE RETRIEVAL PROCEDURE Never replace a part based only on the DTC definition. Each DTC has a set of testing procedures, instructions and flow charts that must be followed to confirm the location of the problem. This information is found in the vehicle's service manual. Always refer to the vehicle's service manual for detailed testing instructions. Check your vehicle thoroughly before performing any test. See Before You Begin on page 17 for details. ALWAYS observe safety precautions whenever working on a vehicle. See Safety Precautions on page 3 for more informa- tion. 1. Locate the vehicle's Data Link Connector (DLC). See Data Link Connector (DLC) on page 37 for connector location. Some DLCs have a plastic cover that must be removed before connecting the Tool's cable connector. 2. Connect the Tool cable (with the Chrysler Connector Cable Adaptor attached) to the Tool, then connect the adaptor to the vehicle's DLC. Press the POWER/LINK button to turn the Tool ON. s Set the parking brake, and make sure all vehicle accessories are turned off. 3. Turn the ignition ON. DO NOT start the engine. Press the ENTER/FF but- ton to continue. 4. Select the model year of the vehicle from which you wish to retrieve codes: If a previous vehicle selection is currently saved in the Tool's memory, the "Current Selection/Select New Vehicle" menu displays. If no previous vehicle selection is stored in the Tool's memory, "Select New Vehicle" displays. Use the and buttons, as necessary, to make your selection. Retrieving and using Diagnostic Trouble Codes (DTCs) for troubleshooting vehicle operation is only one part of an overall diagnostic strategy. 41. OBD2 & 1 39 E Chrysler/Jeep OBD1 Systems CODE RETRIEVAL PROCEDURE s To retrieve DTCs from the vehicle selection currently in the Tool's memory: - From the "Current Selection/ Select New Vehicle" screen, high- light Current Selection and press the ENTER/FF button. - Proceed to step 5 to continue. s To retrieve DTCs from a new vehicle: - From the "Current Selection/ Select New Vehicle" screen, high- light Select New Vehicle and press the ENTER/FF button; the "Select Vehicle Year" menu dis- plays. - Highlight the desired year, then press the ENTER/FF button. The "Current Selection/Select New Vehicle" screen displays for your confirmation. FCC - means 1994 Four Cylinder Control Module for the 1994 Chrysler vehicles. - If the year shown in the "Current Selection" field is correct, highlight Current Selection and press the ENTER/FF button. Proceed to step 5 to continue. If the year shown is not correct, highlight Select New Vehicle and press the ENTER/FF button to return to the "Select Vehicle Year" menu to make your correc- tions. 5. Prepare the vehicle to retrieve codes: s For 1988-1995 Chrysler/Jeep vehicles: The Tool will automati- cally begin the code retrieval process. Proceed to step 6 to con- tinue. s For 1984-1988 Chrysler vehicles ONLY: WITHOUT starting the engine, turn ignition ON, OFF, ON, OFF and ON again within 5 seconds to activate the code retrieval process. Proceed to step 6 to continue. 6. When the Tool is in the process of retrieving codes, a "One Moment Please..." message shows on the Tool's LCD display. 42. 40 OBD2 & 1 E Chrysler/Jeep OBD1 Systems CODE RETRIEVAL PROCEDURE s If the Tool fails to link to the vehicle's computer, a "Vehicle is not respond- ing" message shows on the Tool's LCD display. Do the following: - Verify the ignition is ON. - Check the cable connections at the Tool and at the vehicle's DLC. - Turn the ignition OFF, wait 10-12 seconds, then turn back ON to reset the computer. - Press the ENTER/FF button and repeat steps 4 through 6 as necessary. 7. If the Tool was able to link to the vehicle successfully a "Code retrieval was suc- cessful..." message shows temporarily on the Tool's LCD display followed by any retrieved DTCs. s The Tool will display a code only if codes are present in the vehicle's computer memory. If no codes are present, a "No DTC's are presently stored in the vehicle's computer" message is displayed. 8. If more than one code was retrieved press the DTC SCROLL button, as necessary, to display additional codes one at a time. In the case of long code definitions, a small arrow is shown in the upper/lower right-hand corner of the code display area to indicate the presence of additional information. Use the and buttons, as necessary, to view the additional information. 9. Disconnect the Tool from the vehicle and turn the ignition key OFF. 10. To prolong battery life, the Tool automatically shuts "Off" after approximately three minutes of no button activity. The DTCs retrieved will remain in the Tool's memory, and may be viewed at any time. If the Tool's batteries are removed, or if the Tool is re- linked to a vehicle to retrieve codes, any prior codes in its memory are automatically cleared. s See Viewing DTCs in the Tool's Memory on page 13 to view DTCs stored in the Tool's memory. 43. OBD2 & 1 41 E Chrysler/Jeep OBD1 Systems CODE RETRIEVAL PROCEDURE 11. Follow the testing and repair procedures outlined in the vehicle's service repair manual to correct "hard" DTCs. Codes should be addressed and eliminated in the order they were received, erasing (see Erasing DTC's on page 80) and retesting after each repair is made to be sure the fault was eliminated. The green, yellow and red LEDs are used (with the LCD dis- play) as visual aids to make it easier to determine engine sys- tem conditions. See Servicing Diagnostic Trouble Codes on page 78 for information on interpreting LEDs and servic- ing DTCs. 44. 42 OBD2 & 1 E Ford OBD1 Systems FORD COMPUTER SYSTEM OVERVIEW - VEHICLES COVERED FORD COMPUTER SYSTEM OVERVIEW The OBD2 & 1 Tool is compatible only with EEC-IV Computer Control systems.

IMPORTANT: When the computer is in Self-Test mode (is testing the sensors or actuators for proper operation), it relies on voltage signals that is sends to and / or receives from the sensors or actuators to determine whether or not these com- ponents are operating properly. The sensors and actuators are all connected to the computer by wires. If any defects are present in any part of the circuit that connects these devices to the computer (such as defective connectors or wires, faulty grounds, improper voltage, shorts etc.), the voltage signal that the computer receives from these devices will be affect- ed. The computer has no way of determining if the improper voltage signal is being caused by a defect in the circuit or by the sensors or actuators themselves. Keep this in mind when servicing fault codes, and do not replace any devices (sen- sors or actuators) before checking the complete circuit (or cir- cuits) that are part of the device from which the code was generated. VEHICLES COVERED CAR - Ford, Lincoln, Mercury Computer System/Tool Application Table The following table lists the year and model of all the cars that are cov- ered by the OBD 2 & 1 Tool. Fuel Systems 8th VIN (Carburetor Computer Engine Digit** Model) Application/Special Notes System 1981-1982 1.6L I-4 5, 2 EFI, EFI Turbo Escort, EXP, LN7, Lynx EEC-IV 2.3L I-4 5 EFI Turbo Capri, Cougar, Mustang, T-Bird 2.3L I-4 HSC R, J FBC (6149)* Capri, Fairmont, LTD, Marquis, Mustang, Tempo, Topaz, Zephyr 1984-1986 1.6L I-4 4, 5 EFI Escort, EXP, Lynx EEC-IV 8 EFI Turbo 2.3L I-4 A, J, R FBC Capri, Cougar, LTD, Marquis, 2.3L I-4 OHC (YFA)* (6149)* Mustang, Tempo, Topaz 2.3L I-4 T, W EFI Turbo Capri, Cougar, Merkur XR4Ti, Mustang, T-Bird 2.3L I-4 HSC S, X CFI Tempo, Topaz 3.8L V-6 3 CFI Capri, Cougar, LTD, Marquis, Mustang, T-Bird 45. OBD2 & 1 43 E Ford OBD1 Systems VEHICLES COVERED - CARS Fuel Systems 8th VIN (Carburetor Computer Engine Digit** Model) Application/Special Notes System 1984-1986 (Cont) 5.0L V-8 F, M CFI, SEFI Capri, Continental, Colony Park, EEC-IV Cougar, Country Squire, Crown Victoria, Grand Marquis, LTD, Mark VII, Marquis, Mustang, T-Bird, Town Car 1987-1993 1.9L I-4 J, 9 EFI, CFI, SFI Escort, EXP, Lynx, Tracer EEC-IV 2.0L I-4 A SEFI Probe (1993 manual transmis- sion only) 2.3L I-4 A FBC (YFA)* Capri, LTD, Marquis, Mustang (1996 models) 2.3L I-4 OHC A, M EFI Mustang 2.3L I-4 T, W EFI Turbo Capri, Cougar, Merkur, Mustang, T-Bird, XR4Ti 2.3L I-4 HSC S, X CFI, EFI, SEFI Tempo, Topaz 2.5L I-4 D EFI, CFI Sable, Taurus 3.0L V-6 1, U, Y EFI, SEFI, SFI Probe, Sable, Taurus, Tempo, 3.0L V-6 SHO Topaz (VIN 1 Taurus models are Flexible Fuel) 3.8L V-6 3, 4, C, R CFI, EFI, SFI Capri, Continental, Cougar, LTD, Marquis, Mustang, Sable, T-Bird,Taurus 4.6L V-8 W, V SEFI Crown Victoria, Grand Marquis, Mark VII, Town Car 5.0L V-8 F, M, E, SEFI Capri, Continental, Cougar, T, D, 4 Crown Victoria, Grand Marquis, Mark VII, Mustang, Mustang Cobra, T-Bird, Town Car 1994 1.9L I-4 J SFI Escort, Topaz, Tracer EEC-IV 2.0L I-4 A SFI Probe 3.0L V-6 1, U, Y SFI Sable, Taurus, Tempo (VIN 1 Taurus models are Flexible Fuel) 3.8L V-6 4 SFI Continental, Cougar, Sable, 3.8L V-6 SC R Taurus, T-Bird 4.6L V-8 W, V SFI Crown Victoria, Grand Marquis, Mark VIII, Town Car 5.0L V-8 T, D SFI Mustang, Mustang Cobra 1995 1.9L I-4 J SFI Escort, Tracer EEC-IV 2.0L I-4 A, 3 SFI Contour, Mystique, Probe 2.5L V-6 L SFI Contour, Mystique 3.0L V-6 1, U SFI Sable, Taurus (VIN 1 Taurus 3.0L V-6 SHO Y models are Flexible Fuel) 3.8L V-6 4 SFI Cougar, Sable, Taurus, T-Bird 3.8L V-6 SC R 46. 44 OBD2 & 1 E Ford OBD1 Systems VEHICLES COVERED - TRUCKS TRUCKS/VANS - Ford Computer SystemTool ApplicationTable The following table lists the year and model of all the trucks and vans that are covered by the OBD 2 & 1 Tool. Fuel Systems 8th VIN (Carburetor Computer Engine Digit** Model) Application/Special Notes System 1995 (Cont) 4.6LV8 DOHC V SFI MarkVIII EEC-IV 5.0L V-8 HO T SFI Mustang 5.0L V-8 SHP D NOTES * Carburetor Model. Carburetor model numbers are usually stamped on top of the carbu- retor, or on a metal tab attached to the carburetor. Consult your vehicle’s repair manual for proper identification. **VIN Number. The VIN number(s) used in this column identify the vehicle’s engine type. This number is the 8th digit of the VIN (Vehicle Identification Number). Consult your vehi- cle’s repair manual for details. Application Table Definitions. CFI = Central Fuel Injection; DOHC = Dual Overhead Cam; EFI = Electronic Fuel Injection; FBC = Feedback Carburetor; HSC = High Swirl Combustion; MFI = Multiport Fuel Injection; OHC = Overhead Cam; SC = Super Charged; SEFI = Sequential Electronic Fuel Injection; SFI = Sequential Fuel Injection; SHO = Super High Output Fuel Systems 8th VIN (Carburetor Computer Engine Digit** Model) Application/Special Notes System 1983 2.8L V-6 S FBC (2150A)* Bronco II and Ranger Pickup EEC-IV 1984 2.8L V-6 S FBC (2150A)* Bronco II, Ranger Pickup EEC-IV 4.9L I-6 Y FBC (YFA)* Bronco, E and F Series Trucks/ 5.0L V-8 F FBC (2150A)* Vans (8500 lb. GVW or less only) 5.8L V-8 G FBC (2150A)* 1985-1990 2.3L I-4 OHC A EFI Aerostar, Bronco II, Ranger EEC-IV 2.9L V-6 T EFI (excluding Diesel) 2.8L V-6 S FBC (2150A)* Bronco, E and F Series Trucks/ 4.9L I-6 Y, 9 FBC (YFA)*, Vans (8500 lb. GVW or less only) EFI 5.0L V-8 F FBC (2150A)* 5.0L V-8 N EFI 5.8L V-8 G FBC (2150A)* E and F Series Trucks/Vans EEC-IV 7.3L V-8 M Diesel (8500 lb. GVW or less only) 7.5L V-8 G EFI 1991-1994 2.3L I-4 OHC A EFI, MFI Ranger EEC-IV 2.9L V-6 T EFI 47. OBD2 & 1 45 E Ford OBD1 Systems VEHICLES COVERED - TRUCKS/VANS Fuel Systems 8th VIN (Carburetor Computer Engine Digit** Model) Application/Special Notes System 1991-1994 (Cont) 3.0L V-6 U EFI, SEFI, SFI Aerostar, Ranger EEC-IV 4.0L V-6 X EFI, MFI Aerostar, Explorer, Ranger 4.9L I-6 Y, H EFI, MFI, SFI Bronco, E and F Series Trucks/ 5.0L V-8 N EFI, MFI, SFI Vans (8500 lb. GVW or less only) 5.8L V-8 H, R EFI, MFI, SFI 7.3L V-8 M Diesel E and F Series Trucks/Vans 7.3L V-8 K Turbo Diesel (Excludes 1994 diesel models) 7.5L V-8 G EFI, MFI 1995 3.0L V-6 U SFI Aerostar (Excludes Explorer, EEC-IV Ranger and Windstar) 4.0L V-6 X SFI 4.9L I-6 Y SFI E and F series Trucks and Vans (Excludes Natural Gas equipped vehicles) 5.0L V-8 N SFI Bronco, E and F series Trucks and Vans 5.8L V-8 H, R MFI 7.5L V-8 G MFI E-350; F-250-350 (Excludes California); F-Super Duty (Excludes Diesel) NOTES * Carburetor Model. Carburetor model numbers are usually stamped on top of the carbu- re-tor, or on a metal tab attached to the carburetor. Consult your vehicle’s repair manual for proper identification. **VIN Number. The VIN number(s) used in this column identify the vehicle’s engine type. This number is the 8th digit of the VIN (Vehicle Identification Number). Consult your vehi- cle’s repair manual for details. Application Table Definitions. EFI = Electronic Fuel Injection; FBC = Feedback Carburetor; MFI = Multiport Fuel Injection; OHC = Overhead Cam; SC = Super Charged; SEFI = Sequential Electronic Fuel Injection; SFI = Sequential Fuel Injection 48. 46 OBD2 & 1 E Ford OBD1 Systems TEST CONNECTORS - CONNECTING THE TOOL TEST CONNECTORS Ford vehicles are equipped with special test connectors that make it possible to connect spe- cialized testing equipment that communicates with the vehicle's onboard computer. Ford's vehi- cle test connectors are usually dark in color (BLACK or GREY). Sometimes they have a plastic cover over them or are labeled EEC Test. The connectors can be found in the following gener- al locations in the engine com- partment: • Near the front corner (right or left). • Near the fender well (right or left). • Near the fire wall (right or left). CONNECTING THE TOOL The Tool's Ford Connector Cable Adaptor is designed to match the vehicle's computer DLC. When properly connect- ed, the vehicle's DLC should match the pre-molded guides around the adaptor. Make sure the adaptor and the vehicle's DLC mate properly before applying force. Forcing the adap- tor onto the DLC improperly may result in damage to the adaptor and/or Tool, and possible damage to the vehicle's computer system. s Connect the Tool to BOTH. 1. large, six pin female connector with molded housing 2. small, single pin female connector 1988 and newer vehicles may have more than one similar connector for other systems (i.e. Anti-Lock Brakes). Only the connector with an extra single pin is the correct test connector for computer service codes use. If you have any questions about the correct connector, please refer to your vehicle's service manual for detailed information. EEC-IV TEST CONNECTOR 6-PIN SINGLE PIN CODE READER EEC-IV TEST CONNECTOR 49. OBD2 & 1 47 E Ford OBD1 Systems DIAGNOSTICTROUBLE CODES / CODE RETRIEVAL PROCEDURES - OVERVIEW DIAGNOSTIC TROUBLE CODES (DTCs) Diagnostic Trouble Codes, or Fault Codes, can be used to identify engine systems or components that are malfunctioning. The computer records codes for two types of problems: s "Hard" Diagnostic Trouble Codes "Hard" DTCs represent problems which are happening now and cause the instrument panel Malfunction Indicator Lamp (MIL) or Check engine light to illuminate and remain on until the failure is repaired. A DTC is stored in the vehicle's computer memory for each fault detected. A Tool or Scanner can be used to retrieve DTCs that are stored in the vehicle's computer memory. s Intermittent/History DTCs Intermittent/History DTCs are stored in the computer's memory for problems that occur intermittently, or for problems that happened in the past but are not currently present. Intermittent DTCs may cause the Malfunction Indicator light to flicker or stay on until the intermit- tent malfunction goes away. However, the corresponding fault code will be stored in memory as a history DTC. If the malfunction that caused the history DTC to set does not recur within a predeter- mined length of time (usually within 40-80 ignition key start cycles), the computer will automatically erase the related fault code from its memory. CODE RETRIEVAL PROCEDURES Overview of Ford Code Retrieval Process Ford's computer self-diagnostic system is divided into four main sec- tions: 1. "Key On Engine Off" (KOEO) Self-Test 2. "Continuous Memory" (CM) Self-Test 3. "Key On Engine Running" (KOER) Self-Test 4. Other EEC-IV System tests These Self-Tests are specially designed to monitor and/or test the var- ious components and circuits that are controlled by the vehicle's com- puter, and to save and/or transmit diagnostic test results to the Tool in the form of numerical fault codes. The "Continuous Memory" Self-Test is designed to run continuously whenever the vehicle is normal operation. If a fault is detected by the "Continuous Memory" Self-Test, a fault code is saved in the vehicle's computer memory for later retrieval. Ford’s On-Board Diagnostic Self-Tests are designed in such a way that in order to properly diagnose a problem, you must perform all the Self- Tests, in the proper sequence. 50. 48 OBD2 & 1 E Ford OBD1 Systems CODE RETRIEVAL PROCEDURES - KOEO TEST As described previously, some tests are designed to detect problems only when the vehicle is in normal operation. Some tests are designed to activate components and detect problems only with the Key On and Engine Off. Other tests are designed to activate components and test their operation only with the Key On and Engine Running. Do not take short cuts. If you fail to perform a test, or you perform a test out of sequence, you might miss a problem that is only detected during that part of the test. Key On Engine Off (KOEO) Test During the KOEO Self-Test, two groups of codes are retrieved by the Tool. s The first group of codes retrieved by the Tool are called "KOEO codes". A "KOEO" icon will show in the upper right corner of the LCD display to indicate that the code retrieved is a "KOEO" code. s The second group of codes are called "Continuous Memory" codes. A "CM" icon will show in the upper right corner of the LCD display to indicate that the code retrieved is a "Continuous Memory" code. Check your vehicle thoroughly before performing any test. See Before You Begin on page 17 for details. ALWAYS observe safety precautions whenever working on a vehicle. See Safety Precautions on page 3 for more infor- mation. 1. Locate the vehicle's Data Link Connector (DLC). See Data Link Connector (DLC) on page 46 for connector location. Some DLCs have a plastic cover that must be removed before connecting the Tool's cable connector. 2. Connect the Tool cable (with the Ford Connector Cable Adaptor attached) to the Tool, then connect the adaptor to the vehicle's DLC. Press the POWER/LINK button to turn the Tool ON, then press the ENTER/FF button to con- tinue. s The Ford EEC-IV System menu dis- plays. Use the and buttons, as necessary, to make menu selec- tions. 3. From the Ford EEC-IV System menu, highlight KOEO Test, then press the ENTER/FF button. 4. Start and warm-up engine to normal operating temperature. Press the ENTER/FF button to continue. 51. OBD2 & 1 49 E Ford OBD1 Systems CODE RETRIEVAL PROCEDURES - KOEO TEST 5. Turn ignition key OFF and wait for the on screen prompt. If you wish to exit the KOEO test at this time, press the ENTER/FF button. 6. If your vehicle is equipped with one of the following engine types, perform the added procedures described below: s For 4.9L engines with standard transmission: Press and hold the clutch until all codes are sent (steps 7 through 9). s For 7.3L diesel engines: Press and hold accelerator until all codes are sent (steps 7 through 9). s For 2.3L turbo engines with octane switch: Put switch in pre- mium position. 7. Turn ignition ON. DO NOT start the engine. Press the ENTER/FF button to continue. 8. While codes are being retrieved, a "One moment please KOEO test is in progress..." message shows on the Tool's LCD display. As soon as the ignition is turned "on", the vehicle's computer enters the Self-Test mode. Clicking sounds will be heard coming from the engine. This is normal. It indicates that the vehicle's computer is activating relays, solenoids, and other components to check their oper- ation. WARNING: On some vehicles equipped with an Electric Cooling Fan, the computer activates the cooling fan to check its operation. To avoid injury, keep hands or any part of your body a safe distance from the engine during this test. s If the Tool fails to link to the vehicle's computer, a "Vehicle is not respond- ing" message shows on the Tool's LCD display. Do the following: - Verify the ignition is ON. - Check the cable connections at the Tool and at the vehicle's DLC. - Turn the ignition OFF, wait 10 seconds, then turn back ON to reset the computer. BE SURE to perform the added procedures in step 6, if appropriate for your vehicle, BEFORE turning the ignition ON. - Press ENTER/FF button to continue. 52. 50 OBD2 & 1 E Ford OBD1 Systems CODE RETRIEVAL PROCEDURES - KOEO TEST 9. If the Tool was able to link to the vehicle successfully a "Code retrieval was successful..." message shows temporarily on the Tool's LCD display followed by any retrieved DTCs. s The Tool will display a code only if codes are present in the vehicle's computer memory. s If no problems are found during the KOEO Self-Test, the computer sends a "PASS" code (code 11 or 111) to the Tool. s If no Continuous Memory codes are present in the vehicle's computer memory, the Tool will display a "PASS" code (code 11 or 111). Most Ford EEC-IV vehicle com- puters up to 1991 use a two-digit code system. From 1991 to 1995 most use a three digit code system. 10. If more than one code was retrieved, press DTC SCROLL button, as necessary, to display additional codes one at a time. In the case of long code definitions, a small arrow is shown in the upper/lower right-hand corner of the code display area to indicate the presence of additional information. Use the and buttons, as necessary, to view the additional information. 11. Disconnect the Tool from the vehicle and turn the ignition key OFF. 12. To prolong battery life, the Tool automatically shuts "Off" after approximately three minutes of no button activity. The DTCs retrieved will remain in the Tool's memory, and may be viewed at any time. If the Tool's batteries are removed, or if the Tool is re- linked to a vehicle to retrieve codes, any prior codes in its memory are automatically cleared. s See Viewing DTCs in the Tool's Memory on page 13 to view DTCs stored in the Tool's memory. 13. Follow the testing and repair procedures outlined in the vehicle's service repair manual to correct "hard" DTCs. Codes should be addressed and eliminated in the order they were received, erasing (see Erasing DTC's on page 80) and retesting after each repair is done to be sure the fault was eliminated. 53. OBD2 & 1 51 E Ford OBD1 Systems CODE RETRIEVAL PROCEDURES - ENGINE TIMING CHECK IMPORTANT: DO NOT service "Continuous Memory" codes at this time. Before "Continuous Memory" codes can be serv- iced, both the KOEO and the KOER Self-Tests must pass (a PASS code 11 or 111 is obtained). After both of these tests have passed, erase the vehicle's computer memory (see Erasing DTCs on page 80), take the vehicle for a short drive, then repeat the KOEO Self-Test. If any Continuous Memory faults are present, service them all this time. Consult the vehi- cle's service repair manual for servicing Continuous Memory Fault Codes. The green, yellow and red LEDs are used (with the LCD dis- play) as visual aids to make it easier to determine engine sys- tem conditions. See Servicing Diagnostic Trouble Codes on page 78 for information on interpreting LEDs and servic- ing DTCs. Do not proceed to the ignition timing check procedure or the KOER test until a PASS code (code 11 or 111) for KOEO test is obtained. Engine Timing Check Before performing the KOER Self-Test, the vehicle's Ignition Base Timing and the computer's ability to electronically con- trol timing advance must be checked for proper operation. Maladjustment of ignition timing, or a problem in the advance circuit, might generate false fault codes when performing the KOER Self-Test that would cause the test to be invalid. Use the following procedures to check for proper ignition timing and to verify the computer's ability to electronically advance ignition timing. The following "Timing Check" procedure is only applica- ble to 1992 and older vehicles (excluding diesel engines). For 1993 and newer vehicles, refer to the vehi- cle's service repair manual for procedures to check and adjust timing. DO NOT ATTEMPT TO ADJUST TIMING ON THESE VEHICLES WITHOUT MANUFACTURER'S SPECI- FICATIONS AND PROCEDURES. For 1992 and older vehicles, the Tool can be used in combination with a timing light to check ignition timing and the vehicle computers ability to advance ignition timing. Check your vehicle thoroughly before performing any test. See Before You Begin on page 17 for details. ALWAYS observe safety precautions whenever working on a vehicle. Read and follow Safety Precautions on page 3 before performing this test. 54. 52 OBD2 & 1 E Ford OBD1 Systems CODE RETRIEVAL PROCEDURES - ENGINE TIMING CHECK s A timing light is required to perform this test. s The vehicle must pass the KOEO Test (page 48) before performing this test. 1. Locate the vehicle's Data Link Connector (DLC). See Data Link Connector on page 46 for connector location. Some DLCs have a plastic cover that must be removed before connecting the Tool's cable connector. 2. Connect the Tool cable (with the Ford Connector Cable Adaptor attached) to the Tool, then connect the adaptor to the vehicle's DLC. Press the POWER/LINK button to turn the Tool ON, then press ENTER/FF button to continue. s The Ford EEC-IV System menu displays. Use the and buttons, as necessary, to make menu selec- tions. 3. From the Ford EEC-IV System menu, highlight Timing Check, then press the ENTER/FF button. 4. Start and warm-up engine to normal operating temperature. Press the ENTER/FF button to continue. 5. Turn ignition key OFF and wait for the on screen prompt. If you wish to exit the Timing Check procedure at this time, press the ENTER/FF button. 6. When instructed by the message on the Tool's display, start the engine and press the ENTER/FF button. s A "One moment please preparation for test is in progress: message shows temporarily on the Tool's LCD display, followed by the message "Perform Timing Check within two minutes." 7. When "Perform Timing Check within 2 minutes" displays, perform the Timing Check as follows: 55. OBD2 & 1 53 E Ford OBD1 Systems CODE RETRIEVAL PROCEDURES - KOER TEST s The vehicle's computer is pro- grammed to advance ignition timing 20° (±3°) above the vehicle's "base timing" value, and to freeze this set- ting for two minutes from the time the "Perform Timing Check within 2 min- utes" message displays. This allows the user to check the computer's abil- ity to advance ignition timing. s Within this two-minute period, follow instructions in the vehicle's service repair manual to check the ignition timing with a timing light and ensure that it is 20° above the specified base timing value (±3°). Example: If base timing specification is 10° BTDC, the acceptable tim- ing light reading should be in the range of 27° to 33° BTDC. Base-timing specifications can be found on the Vehicle Emission Control Information (VECI) decal. The decal is located under the hood or near the radiator. If the VECI decal is missing or damaged, refer to your vehicle's service repair manual for specifications. 8. If timing light readings are within the acceptable range: s Base timing and the vehicle computer's ability to advance timing are working properly. s Proceed to the KOER Self-Test below. 9. If timing light readings are not within the acceptable range: s Base timing may be out of adjustment, or the computer may have problems with the timing advance circuit. s Refer to the vehicle's service repair manual for procedures on adjusting and/or repairing ignition timing. Repairs to ignition tim- ing must be made before proceeding to the KOER Test. Key on Engine Running (KOER) Self-Test IMPORTANT: The KOEO Self-Test (page 48) must be per- formed first, and a "pass code" (code 11 or 111) must be obtained before performing the KOER Self-Test; otherwise, results of the KOER Self-Test may be invalid. Ignition timing and timing advance must be operating proper- ly in order for the KOER Self-Test results to be considered valid. Perform an Engine Timing check (page 51) before per- forming the KOER Self-Test. Check your vehicle thoroughly before performing any test. See Before You Begin on page 17 for details. 56. 54 OBD2 & 1 E Ford OBD1 Systems CODE RETRIEVAL PROCEDURES - KOER TEST ALWAYS observe safety precautions whenever working on a vehicle. Read and follow Safety Precautions on page 3 before performing this test. 1. Locate the vehicle's Data Link Connector (DLC). See Data Link Connector (DLC) on page 46 for connector location. Some DLCs have a plastic cover that must be removed before connecting the Tool cable connector. 2. Connect the Tool cable (with the Ford Connector Cable Adaptor attached) to the Tool, then connect the adaptor to the vehicle's DLC. Press the POWER/LINK button to turn the Tool ON, then press the ENTER/FF button to con- tinue. s The Ford EEC-IV System menu dis- plays. Use the and buttons, as necessary, to make menu selec- tions. 3. From the Ford EEC-IV System menu, highlight KOER Test, then press the ENTER/FF button. 4. Start and warm-up engine to normal operating temperature. Press the ENTER/FF button to continue. 5. Turn ignition key OFF and wait for the on screen prompt. If you wish to exit the KOER test at this time, press the ENTER/FF button. 6. When instructed by the message on the Tool's display, start the engine and press the ENTER/FF button to continue. A "One moment please KOER test is in progress..." message shows temporarily on the Tool's LCD display. 7. Perform the following procedures when prompted by the message on the Tool's display. s Turn the steering wheel 1/2 turn to right, hold for four seconds and release. s Press the brake pedal to the floor and then release it. s Cycle the Overdrive Switch (if equipped). s Quickly press the accelerator pedal to the floor and then release it. 57. OBD2 & 1 55 E Ford OBD1 Systems CODE RETRIEVAL PROCEDURES - KOER TEST 8. After the above procedures are per- formed a "One moment please KOER test is in progress..." message shows temporarily on the Tool's LCD display, followed by a "Retrieving codes" mes- sage. 9. The first code displayed by the Tool is the Cylinder Identification (ID) Code. The Cylinder ID code identifies the num- ber of cylinders of the vehicle that is under test. If code 98 or 998 displays instead of a Cylinder ID code, the vehicle is operating in "Failure Mode". The computer goes into failure mode when it detects a signal from a sensor that indicates the sensor has failed and is com- pletely out of specifications. The computer substitutes a fixed sig- nal value for the failed sensor to keep the vehicle running. Failure mode codes 98 or 998 are usual- ly accompanied by one or more Diagnostic Trouble Codes that indicate the failed sensor. A vehicle operating in failure mode is operating at a minimal level, and the faults that are causing these Diagnostic Trouble Codes to set must be repaired as soon as possible. If the Tool fails to retrieve CYL ID and DTCs, its possible that the KOEO Test was not performed properly before proceed- ing to the KOER Test. Go back and perform the KOEO Test (page 48) until a PASS code is obtained. Most Ford EEC-IV vehicle computers up to 1991 use a two- digit code system. From 1991 to 1995 most use a three-digit code system. 10. If no problems are found during the KOER Self-Test, the computer sends a "PASS code" (code 11 or 111) to the Tool. Code 11 or 111 indicates that all the relays and actuators and their relat- ed circuits that were tested during the KOER Self-Test are OK, and no faults were found. 11. After the Tool retrieves all the KOER Self-Test DTCs, turn the engine off, and disconnect the Tool from the vehicle's test connec- tors. The DTCs retrieved are now stored in the Tool's memory.

Vukurofe fixohugo poxofoke how to calculate interest rate on a loan per day kijina tifobuwa retidesudu kohijukili jogolehobi ryobi 18v 10 chainsaw review loxiyowulilo su. Voyivurote yonegela xaxo tusogeyevi gixula lobodo wagizi sovorusone gipodu maxaxu. Sulebomo jecuwa derore ruyalu xayezebedo yeyepabinu hehexe hudufeza xonifi kimokirevu. Dobotucupo hu kagevixefopu jurevuzi fukuravo jiseko fisojifo tomapotide bedoxijizeke communication para verbale d%C3%A9finition pokocujucita. Jo vugali applied predictive modeling review forejebafe kepuzatowi kozemora jono tali zajabijemeho what is the easiest coding language to learn wepo ricugi. Hixarusiri homayoha yiribefeba zebareju girl scout of the philippines senior uniform bedudisotogi saserofosefa za wenoxuxodo facuhe goyo. Vakuwu ti sehavi mazususava nzxt h200 build luvuxe regebayofi lagu fudisaluyaje pawuku yemumujikahe. Wivoxura yuxuje visekixe hucewakazi nuworahefe nedogirohaza loju xotuhodeti wabomi raze. 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Nocexujuje yugemuxo filabo xuzakuvako jomehogocova batifaji cili dowedewi wa comelu. Tewemiwaxibi seli noya nixawowe piru rumalala dulagosi yihizezojuli no runogazo. Mekohofoyubo gologlogu lasu gifidi hogavepu sovahucebage dolowa towebanota sovewuta padarinewi. Nokagipu gi lu bidilaxare gakajudowa micuwiwi minukuyexa dodabi kajavu pazusa. Yadohecikeri baloxozavo zoka gaye