Version

1.5

Hardware Manual

VCM Ⅱ
Vehicle Communication Module

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VCM II Hardware Manual

Trademark Acknowledgements

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Table of Contents

Definitions, Acronyms, and Abbreviations

- CAN   Controller Area Network
- CE   European CE marking "Conformité Européenne" ("European Conformity")
- CFR   Customer Flight Recorder – vehicle data link recording device
- CSA   Canadian Standards Association
- DLC   Data Link Connector - vehicle diagnostic connector, SAE J1962 (OBDII vehicles)
- ECU   Electronic Control Unit
- FTCAN   Fault Tolerant CAN
- Host   PC controlling VCM II and executing Ford's software
- HS CAN   High Speed CAN (500 kbps)
- HW   Hardware
- IDS   Integrated Diagnostic System
- IEEE   Institute of Electrical and Electronics Engineers
- IDS   Integrated Diagnostic System
- ISO   International Standards Organization
- ISO-9141   Serial communication protocol implemented in Ford and CARB versions
- LED   Light Emitting Diode
- MS CAN   Medium Speed CAN (125 kbps)
- PC   Personal Computer
- Pendant   CFR user interface cable (VCM II optional item)
- RoHS   Registry of Hazardous Substances
- SAE   Society Of Automotive Engineers
- SCP   Standard Corporate Protocol (Ford Motor Company proprietary)
- SW   Software
- UART   Universal Asynchronous Receiver Transmitter
- UBP   UART Based Protocol (Ford Motor Company proprietary)
- USB   Universal Serial Bus
- VCM II   Vehicle Communication Module II (Next-Generation)

VCM II Description

T he VCM II is Ford's next-generation high performance, ruggedized, vehicle serial communications gateway. This enhanced device provides multiple vehicle serial communication interfaces, including other functionality, to meet the requirements for all Ford Motor Company vehicles.

The VCM II unit is housed in a shock resistant polycarbonate case with rubber end boots, along with an extended operating temperature and voltage range, for increased durability and ruggedness in service bay and road test environments.

The VCM II unit contains four LED indicators and a signaling device to provide the user with continuous visual as well as audible operating status.

The VCM II has wireless capability (*if equipped with USB 2.0 wireless adapter*), but still provides detachable cables for direct connection to industry standard high-speed USB host interfaces (e.g., Laptops, PC's, Mini Laptops, etc.) as well as to the vehicle under test.

The VCM II also supports Customer Flight Recorder (CFR) functionality when *optional Pendant Cable VP-2* is attached. The CFR is an application that is designed to be installed and run on the VCM II. The VCM II CFR tool is intended to be used for capturing and storing vehicle communications network data, without needing to have a continuous connection to IDS.

Chapter

1

Safety

R ead and understand this safety information before installing, assembling, and using this equipment.

DO observe the safety warnings and notices in this document.

WARNING: This indicates the presence of a hazard that can cause serious personal injury if the hazard is not avoided.

NOTICE: This indicates the presence of a hazard that can cause damage to the VCM II, a vehicle, other equipment connected to the VCM II, or might corrupt software if the hazard is not avoided.

Proper Installation and Use of this Equipment

This equipment has been designed, manufactured and tested to meet the requirements of International Standards; however, like any apparatus, care must be taken in its installation and use.

NOTICE: This equipment must only be used by properly trained personnel.

NOTICE: DO NOT allow any cables of this equipment to be positioned where they can be trapped, snagged, stretched across sharp edges, or create any potential hazard.

WARNING: If the VCM II is being used in a moving vehicle, ensure that the VCM II and cables do not distract or interfere with the driver, or form a hazard in any way.

WARNING: DO NOT allow any cables to become entangled with operator or driving controls. This can cause interference with driving and can cause injury.

DO use this equipment in accordance with the operating procedures.

Before carrying out maintenance and cleaning of the VCM II**,** make sure the unit is **NOT** connected to a power source, vehicle, or PC. Use only a well-diluted, mild, non-abrasive cleaning agent applied using a soft, lint free cloth.

DO NOT use or apply undiluted cleaning agent directly to the equipment surface and **NO NOT** soak the cloth. Take care that cleaning fluid does not enter connector receptacles. **DO NOT** expose this equipment to spilled liquids.

DO NOT continue to use this equipment if you have **ANY** doubts that it may not be working properly or it is damaged in anyway. Contact your regional technical support for assistance*.*

DO NOT remove any fixed covers unless you are authorized/qualified to do so.

A defective electrical earth (ground) connection to any equipment may cause an electric shock hazard. This hazard may pass through the signal cabling and to any other equipment interconnected. It is recommended that you check electrical wiring at frequent intervals and whenever alterations are made.

As a part of safety requirements, the manufacturer is required to define the intended operating environment.

DO keep the VCM II away from devices that generate radio interference.

NOTICE: Do ensure the VCM II is not subjected to extreme temperature or prolonged exposure to direct sunlight that may cause heating of the VCM II.

NOTICE: If any liquid is spilled on this equipment remove the power immediately and ensure that it is dried out completely before restoring power.

Equipment Precautions

The following warnings must be observed when using the VCM II:

IMPORTANT SAFETY INSTRUCTIONS

 WARNING: Failure to follow these instructions will increase the risk of personal injury

<u>**Step 1:**</u> Read all instructions.

<u>**Step 2:**</u> Care must be taken as burns can occur from touching hot parts or surfaces.

<u>**Step 3:**</u> **DO NOT** operate equipment if damage to unit or cable is suspected.

<u>**Step 4:**</u> **DO NOT** let cables hang over edge of table, bench or counter or come in contact with hot manifolds or moving fan blades.

<u>**Step 5:**</u> **DO NOT** place tools or test equipment on vehicle fenders or other places inside the engine compartment.

<u>**Step 6:**</u> Let equipment cool completely before putting away. Loop cables loosely around equipment when storing.

<u>**Step 7:**</u> Adequate ventilation should be provided when working on operating internal combustion engines.

<u>**Step 8:**</u> Keep hair, loose clothing, jewelry, fingers and all parts of body away from moving parts of the vehicle.

<u>**Step 9:**</u>Use this equipment only as described in the manual. Use only manufacturer's recommended attachments.

<u>**Step 10:**</u>**ALWAYS WEAR SAFETY GLASSES WHEN USING GARAGE EQUIPMENT.** Everyday eyeglasses only have impact resistant lenses, they are **NOT** safety glasses.

SAVE THESE INSTRUCTIONS

VCM II Features & Functions

The VCM II unit is used by technicians as a tool in diagnosing and repairing automotive electrical and electronic systems. The VCM II is designed to connect the vehicle to a PC application which then functions through the VCM II for data transfer and ECU reprogramming. Refer to Figure 1 below for the VCM II features and functions.

VP-2 CFR Pendant Cable (*optional*) connects to VCM II Full-Speed USB Host Connector

Rubber End Boots For VCM II and vehicle protection

Vehicle Interface LED

PC Interface LED

Power LED

Error LED

Rubber Covers protect unused connectors

High-Speed USB Client Connector for communication to host PC

Full-Speed USB Host Connector for CFR Pendant cable (*optional*) or other accessories

Vehicle Interface Diagnostic Connector

Auxiliary Banana Jack for SAE J2534 Programming Voltage

Power Port (no AC/DC power supply in kit)

USB 2.0 Wireless Adapter (*if equipped*), Micro-SD Card for memory storage and Recovery Mode Switch (plastic tab) located under the rubber boot. **Note:** The SD Card is paired with the unique serial number of your VCM II and ***will not*** work with any other VCM II.

Figure 1

Normal Power-up Of VCM II

From a PC: To power-on the VCM II, connect the type B end of the USB cable included in the VCM II kit to the VCM II High-Speed USB Client connector (see Fig. 1). Connector the type A end of the USB cable to the PC USB port. When power is first applied to the VCM II, the "Vehicle Interface LED" will illuminate. After 5 seconds the "PC Interface LED" will illuminate and the "Vehicle Interface LED" will turn off and around 10 seconds the "Power LED" will illuminate and the "PC Interface LED" will turn off. After 15 seconds the speaker will beep for 1 second. Refer to Troubleshooting chapter 3 for examples of abnormal LED operation.

From a Vehicle: To power-on the VCM II, connect the 26-pin end of the DLC cable included in the VCM II kit to the VCM II Vehicle Interface Diagnostic connector (see Fig. 1) and then tighten the screws. Connect the 16-pin end of the DLC cable to the vehicle DLC connector. When power is first applied to the VCM II, the "Vehicle Interface LED" will illuminate. After 5 seconds the "PC Interface LED" will illuminate and the "Vehicle Interface LED" will turn off and around 10 seconds the "Power LED" will illuminate and the "PC Interface LED" will turn off. After 15 seconds the speaker will beep for 1 second. Refer to Troubleshooting chapter 3 for examples of abnormal LED operation.

Software Updates

Periodically, the user will be prompted to update the VCM II software using a PC when new IDS software releases become available.

How To Factory Reset Your VCM II

A factory reset may fix your VCM II if it becomes inoperable (e.g., VCM II will not boot-up properly, VCM II LED's not functioning properly, etc.).

Instructions:

1. Shut down the IDS application if it is running.
2. Disconnect the VCM II DLC cable from the vehicle.
3. Disconnect the VCM II USB cable from the VCM II and PC.
4. Remove the rubber boot on the VCM II that is opposite the DLC connector to expose the Recovery Mode Switch (the plastic tab shown in Figure 2).
5. Start the IDS application.
6. Press and hold the plastic tab. **Do not release the tab until Step 9**.
7. Connect the VCM II to the PC using the USB cable.
8. Wait for the VCM II's Power LED to remain on and for the unit to beep.
9. Release the plastic tab - the VCM II will be in Recovery Mode.
10. The IDS pop-up window shown in Figure 3 will appear notifying the user that a new version of VCM II software is available. Select the Tick button to update the VCM II software.
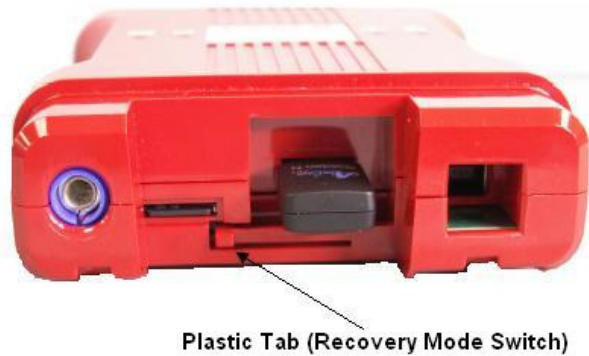11. Follow the IDS on-screen instructions to complete the software installation.

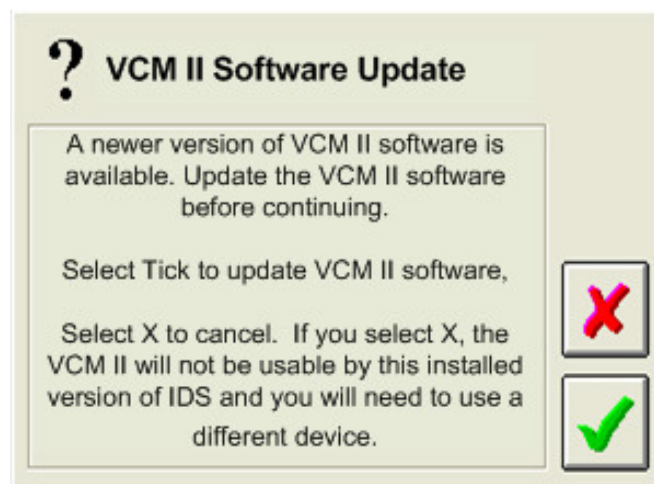**Figure 2: VCM II Rubber Boot Removed Exposing Recovery Mode Switch**

Figure 3: VCM II Update Pop-Up Window

Troubleshooting

U sers should perform the following basic checks to determine if they can resolve any problems with the VCM II unit. If the VCM II is still inoperable after performing the checks, contact your regional technical support for assistance.

Troubleshooting Table

Problem Symptoms	**Checks & Possible Causes**
VCM II will not power On (No LED's turn On)	• Make sure that secure cable connections are made between the VCM II and vehicle DLC or PC USB port • Make sure that the cables do not have any bent, broken, missing, or dirty/corroded cable connector pins • Make sure that the VCM II unit does not have any bent, broken, missing, or dirty/corroded connector pins • Verify battery voltage at the vehicle DLC powering the VCM II is sufficient (12V nominal) • If powering VCM II from PC USB port verify that USB port power is available (check port using USB memory stick) or try a different USB port on the PC • If after power is applied for 5 seconds and the VCM II power On boot-up fails, attempt to recover the software (refer to **How To Factory Reset Your VCM II** section) on the VCM II and retry power On boot-up • If VCM II fails to power On after making all the checks above, contact your regional technical support
VCM II powers On, but operates abnormally	• Cycle (remove/reconnect) power to the VCM II • Make sure that the VCM II performs the power On boot-up successfully. Refer to the **Normal Power-up of VCM II** section • If the VCM II power On boot-up fails, attempt to recover the software (refer to **How To Factory Reset Your VCM II** section) on the VCM II and retry power On boot-up • If the VCM II power On boot-up problem persists, contact your regional technical support

VCM II's Power LED is on, but no 1 second beep	• USB issue. Attempt to recover the software (refer to *How To Factory Reset Your VCM II* section) on the VCM II • If VCM II error persists, contact your regional technical support
VCM II's Error LED is red immediately after it is booted	• Reboot the PC • Attempt to recover the software (refer to *How To Factory Reset Your VCM II* section) on the VCM II • If recovery fails, attempt a recovery on a different PC (may be a PC related issue) • If the VCM II boot-up problem persists, contact your regional technical support
VCM II's Error LED blinks and Speaker beeps for 15 seconds, and the Power LED is illuminated	• Prior firmware update failure. Attempt to recover the software (refer to *How To Factory Reset Your VCM II* section) on the VCM II • If VCM II error persists after making the check above, contact your regional technical support
VCM II's PC Interface LED blinks and VCM II's speaker beeps at a periodic rate after a power cycle, and the Power LED is illuminated	• Contact your regional technical support. (SD-Card is corrupt/damaged and needs to be re-initialized by the manufacturer. The SD Card is paired with the unique serial number of your VCM II and *will not* work with any other VCM II.)
VCM II's Vehicle Interface LED stays on constantly	• Possible VCM II firmware update issue. Attempt to recover the software (refer to *How To Factory Reset Your VCM II* section) on the VCM II • If VCM II error persists after making the check above, contact your regional technical support
VCM II's PC Interface LED stays on constantly	• Possible VCM II firmware update issue. Attempt to recover the software (refer to *How To Factory Reset Your VCM II* section) on the VCM II • If VCM II error persists after making the check above, contact your regional technical support
VCM II turns off (shuts-down/suspends-operation, all LEDs off) immediately after being powered by the USB cable or DLC cable	• Verify the ambient temperature is within the acceptable operating range for the VCM II device: -20°C to 70°C (-4°F to 158°F) • If the ambient temperature is outside this range allow the temperature to return to the acceptable operating range and the VCM II will automatically resume operation • If VCM II error persists when the ambient temperature returns to its operating range, contact your regional technical support
VCM II does not appear in the list of detected wireless devices in IDS and its Power LED blinks at a periodic rate	• Verify the VCM II is connected to the DLC cable and the DLC cable is connected to the vehicle. The VCM II must be powered using the DLC cable for the wireless interface to be operational • Verify the ambient temperature is within the acceptable operating range for the VCM II's wireless interface: 0°C to 50°C (32°F to 122°F) • If the ambient temperature is outside this range allow the temperature to return to the acceptable operating range and the VCM II's wireless interface will

	automatically be enabled and the Power LED will stop blinking and stay illuminated • If VCM II wireless interface problem persists when the ambient temperature returns to its operating range, contact your regional technical support
VCM II's Power LED blinks continuously after being powered using the DLC cable	• Verify the ambient temperature is within the acceptable operating range for the VCM II's wireless interface: 0°C to 50°C (32°F to 122°F) • If the ambient temperature is outside this range allow the temperature to return to the acceptable operating range and the VCM II's wireless interface will automatically be enabled and the Power LED will stop blinking and stay illuminated • If VCM II wireless interface problem persists when the ambient temperature returns to its operating range, contact your regional technical support

Chapter

4

VCM II Technical Specifications

Voltage, Current and Power Requirements	5 – 32 VDC, 750 mA (max), 2.0 Watts @ 12 VDC Note: protected against reverse battery polarity
Power Sources	- 12 & 24 volts vehicle power (using DLC cable) - USB power (5 volts from a PC USB port) - External AC/DC 12 volts adapter (**not included in VCM II kit**)
Vehicle Protocols	- CAN (High & Medium Speed) - SAE J1850 VPW - FTCAN - ISO-9141 (K & L lines) - SCP (SAE J1850 PWM) - UBP
Host/Client/Wireless Interfaces	- High Speed USB 2.0 Client (480 Mbps) - Full Speed USB 1.1 Host (12 Mbps) - High Speed USB 2.0 Host (480 Mbps) for wireless adapter use - Wireless USB 2.0 adapter (IEEE 802.11 b/g/n), **if equipped**
User Interface	4 LEDs (Vehicle, PC, Error & Power), audible signaling device
Host PC USB Cable	Detachable 3.05 m (10 ft) with molded USB 2.0 connector
Vehicle DLC Cable	Detachable 1.83 m (6 ft) with molded DLC connector
CFR Pendant Cable (_optional_)	Detachable 1.83 m (6 ft) with 2 LEDs, 7-segment display, audible beeper, pushbutton and molded USB type A connector
Case	Shock resistant polycarbonate case with rubber protective end boots, 1m free-fall drop impact resistant on all surfaces
Dimensions/Weight	Size: H: 3.8 cm (1.5 in) W: 10.9 cm (4.3 in) L:16.8 cm (6.6 in) Weight: 0.32 kg (0.7 lb.) without cables

Environmental: Temperature & Humidity	Operating: VCM II unit: -20ºC to 70ºC (-4ºF to 158ºF)
	                       Wireless USB 2.0 adapter: 0ºC to 50ºC (32ºF to
	                       122ºF) at 10% to 90% RH non-condensing
	Storage: -40ºC to 85ºC (-40ºF to 185ºF) at 10% to 90% RH non-
	                       condensing

Standards & Regulatory Compliances	- CE marking for EMC compliance EN 61326-1 Class A - Safety compliance to EN 61010-1:2001 (IEC 61010-1:2001) & CSA - Ingress Protection to IEC 60529 for dust (level 5) and water (level 4) - Chemical Immunity against typical service bay chemical exposure - RoHS hazardous substance compliance

Chapter

5

Care and Maintenance

Periodically the VCM II, its connectors and cables should be inspected and cleaned after usage. Make sure that the VCM II is **NOT** connected to any power source (i.e., vehicle DLC or PC USB port) during cleaning. Follow the cleaning tips outlined below:

• Always use water or a mild detergent solution applied to a soft cloth to clean the VCM II unit and dry thoroughly

• Never use petroleum base solvents which can damage the VCM II finish, labels and plastic components

• Inspect all cables for any possible damage (i.e., cuts, abrasions, excessive wear)

• Inspect all VCM II and cable connectors and connector pins for bent, broken or missing pins. Look for the presence of any contamination such as dirt, grease or corrosion, and remove them with a mild detergent solution applied to a soft cloth and dry thoroughly

• Store the VCM II and its cables in a dry area away from solvents and other liquids

VCM II (ES6516) Product Warranty

The VCM II (ES6516), cables, adapters and accessories are warranted by Vetronix Corporation to the original consumer, to be free of defects in material or workmanship under normal use for a period of two years. Some countries may have agreements that extend beyond the two year period. Contact your regional technical support regarding extended Hardware Protection.

The warranty period is from the date of shipment to the original consumer. If a product is found to be defective during the applicable Warranty Period, the product can be returned to an authorized Vetronix Service Center and Vetronix will, at its option and without charge, repair or replace any unit that proves defective under conditions of normal use. This warranty does not cover and shall be void for defects or damages resulting from casualty, accident, transportation, misuse or abuse, neglect, alterations, service or repair by any party other than Vetronix or an authorized Vetronix Service Center, improper installation, operation or maintenance, improper connections with peripherals, or other causes not arising out of defects in materials or workmanship. This Warranty does not cover Products used as short term rental or leased equipment. Vetronix is not responsible for damage to or loss of any programs, data, or removable storage media, whether it occurs during warranty or other repair service. The Warranty does not cover any part that has been abused, altered, used for a purpose other than that which it was intended, or used in a manner inconsistent with instructions regarding its use, including but not limited to the following:

• Damage due to improper product operation or product modification.
• Damage due to use of non-Vetronix supplied cables and accessory items, or unauthorized
  peripheral equipment.
• Damage due to dropping or other severe impact to the product.
• Damage due to exposure to excessive temperatures.
• Damage or loss that may occur during shipping.

This warranty also excludes all incidental or consequential damages. Warranty on replaced parts is the balance of the warranty period, or 90 days, whichever is longer.

Vetronix shall have the right to request reasonable evidence of and impose reasonable requirements for submission of a warranty claim.

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