

Version

1.2

Hardware Manual

VCM
Vehicle Communication Module



VCM Hardware Manual

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Note: An electronic version of this manual is available on the CD or at the Internet location in which software is obtained.

Definitions, Acronyms, and Abbreviations

- Caddy Detachable interface assembly used with NGS+
- CAN Controller Area Network
- CARB California Air Resources Board (State Agency)
- DCL Data Communications Link; 7-Pin VIP connector (EEC IV vehicles)
- DDL Diagnostic Data Link (Villager)
- DLC Data Link Connector - vehicle diagnostic connector, SAE J1962 (OBDII vehicles)
- ISO International Standards Organization
- ISO-9141 Serial communication protocol implemented in Ford and CARB versions
- LAN Local Area Network
- LED Light Emitting Diode
- NGS New Generation Star Tester (NGS Classic)
- NGS+ Product name for the VCM when combined with the Caddy and used with the NGS T-handle
- P-PC Pocket-PC
- PC Personal Computer
- PCMCIA Personal Computer Memory Card International Association, Expansion card form factor
- PDS Portable Diagnostic Software
- SCP Standard Corporate Protocol
- SW Software
- T-Handle NGS Hand-Held Control Unit with Display and Controls
- TIS Technical Information Support Hotline
- UART Universal Asynchronous Receiver Transmitter
- UBP UART Based Protocol
- USB Universal Serial Bus
- VCM Vehicle Communication Module

VCM Description

The Vehicle Communication Module (VCM) is a high performance, ruggedized, vehicle serial communications gateway. This device provides multiple vehicle serial communication interfaces to meet the requirements of all Ford Motor Company vehicles.

The VCM unit is housed in a magnesium enclosure with a tough, protective, plastic cover for the PCMCIA expansion slot which can, for example, be used for wireless LAN cards or memory expansion.

The VCM device contains five LED status indicators to provide the user with a visual mode of internal VCM, vehicle, and host device (e.g. NGS Classic's T-Handle, PC, Pocket PC/PDS, Laptop) operation.

The VCM also has detachable cables for connection to industry standard high-speed host interfaces as well as to the vehicle under test.

LED Status Indicators

The VCM unit has five LED status indicators that are visible through the plastic cover of the PCMCIA expansion slot. The LED status indicators allow the user to visually observe the operation of the VCM. Refer to Fig A for the location of the LED status indicators on the VCM.

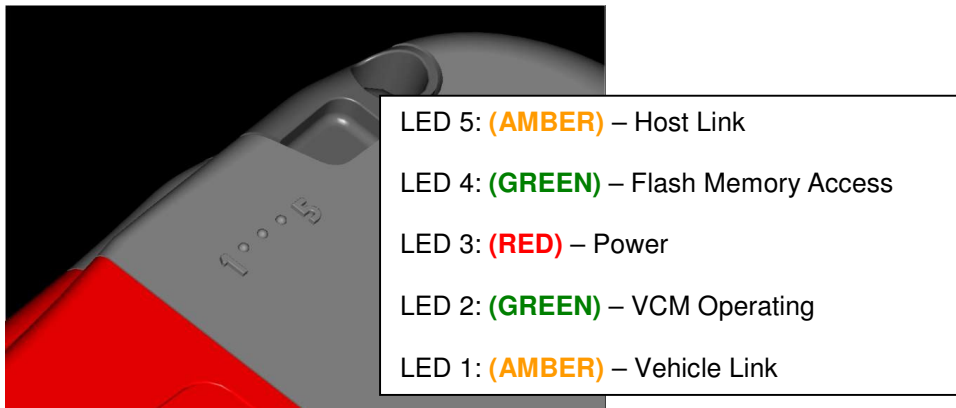


Fig A. LED Location Under Plastic Cover

Normal Power-up LED Operation

When power is applied to a VCM loaded with software all five LED's will briefly turn On, single LED sweep from 5 through 1 twice, and 1 through 5 twice, then become ready for use with LED 2 (VCM Operating) blinking and LED 3 (Power) On steady. This LED sequence is considered a normal VCM power-up/boot-up operation. Following a normal power-up operation, LED 1 (Vehicle Link) comes On/Active when connected to a vehicle, and LED 5 (Host Link) comes On/Active when connected to a host device. Refer to the Troubleshooting section for examples of abnormal LED operation.

Note: The LED status indicator operation sequences are based on the latest information available at the time. If differences are observed, refer to the VCM Hardware Manual on the CD or at the Internet location in which software is obtained for up-to-date information.

Software Updates

Periodically, the user will be able to update the VCM software using the base station/host device when new releases become available.

Troubleshooting

Users should perform the following checks to determine if they can resolve any problems with the VCM unit. If the VCM is still inoperable after performing the checks, contact the Ford Technical Information Support for assistance (see Support Instructions chapter).

Troubleshooting Table

<u>Problem Symptoms</u>	<u>Checks & Possible Causes</u>
VCM will not power On (No LED's turn On)	<ul style="list-style-type: none"> • Make sure that secure cable connections are made between the VCM and vehicle • Make sure that the cables do not have any bent, broken, missing, or dirty/corroded cable connector pins • Make sure that the VCM unit does not have any bent, broken, missing, or dirty/corroded connector pins • Make sure the VCM is powered from the vehicle DLC or the power supply unit • Verify battery voltage from the vehicle DLC going to the VCM is sufficient (12 V nominal) • If the VCM fails to power On after making all the checks above, contact the Ford Technical Information Support
VCM powers On, but operates abnormally	<ul style="list-style-type: none"> • Cycle (remove/connect) the power to the VCM • Make sure that the VCM performs the power On boot-up successfully. Refer to the Normal Power-up LED Operation section • If the VCM power On boot-up fails, contact the Ford Technical Information Support
VCM operates abnormally. LED's 1, 3 & 5 are Off, and LED's 2 & 4 are On steady	<ul style="list-style-type: none"> • Reload the software on the VCM • If the VCM is reloaded with software and the problem persists, contact the Ford Technical Information Support
After a successful VCM boot-up, <u>ALL</u> 5 LED's blink together for 5 seconds, and then the unit operates normally	<ul style="list-style-type: none"> • This is an indication that the VCM software license has expired. VCM operation will not be affected.

VCM Technical Specifications

Voltage & Current Requirements	8V – 18V DC (12V nominal) at 4 Amps (maximum)
Vehicle Protocols	<ul style="list-style-type: none"> - SCP - CAN (Hi & Med Speed) - ISO-9141 - UBP - DDL (No software support) - DCL (No software support)
Host Protocols	<ul style="list-style-type: none"> - Ethernet 10/100 BaseT - RS-232 - USB & USB On-The-Go (Presently no software support)
Host Connection (Typical)	Detachable Cables: Ethernet, USB
Vehicle Connection	Detachable 0.91m (3ft) & 2.44m (8ft) cables with molded DLC
NGS Classic's T-Handle Connection	Detachable VCM Caddy
Enclosure	Magnesium, service bay fluid resistant, 1m freefall impact resistant
Dimensions	H:37mm (1.46in) W:80mm (3.15in) L:155mm (6.1in)
Weight	268g (9.4oz) without cables or the VCM Caddy
Environmental	<p>Operating: 0°C to 50°C (32°F to 122°F) at 15% to 85% RH non-condensing</p> <p>Storage: -20°C to 70°C (-4°F to 158°F) at 15% to 85% RH non-condensing</p>
Standards & Regulatory Compliances	The VCM fulfils the requirements of the CE marking scheme and UL201

Care and Maintenance

Periodically the VCM and its cables should be inspected and cleaned after usage. Make sure that the VCM is not connected to any power source (vehicle or power supply) during cleaning. Follow the cleaning tips outlined below:

- Always use water or a mild detergent applied to a soft cloth to clean the VCM unit and dry thoroughly
- Never use petroleum base solvents which can damage the VCM finish, labels and plastic components
- Inspect all cables for any possible damage (cuts, abrasions, excessive wear)
- Inspect all VCM 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
- Store the VCM and its cables in a dry area away from solvents and other liquids

Support Instructions

If the checks in the Troubleshooting section did not resolve your VCM concern, contact the Ford Technical Information Support for assistance.

For U.S. Ford Dealership support information see www.fmcdealer.com

For Canadian Ford Dealership support information see www.inford.com

For non-Ford Dealerships support information is available at www.motorcraftservice.com

Please have the following information available:

- Vehicle Make, Model, Year, and Engine Size
- PCM part number or Tear Tag number
- NGS+ Software Level found under New Generation Setup/Software Version
- Thincard software level, displayed on the screen after the card is inserted

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Warranty and Disclaimer

Seller warrants only to the original Buyer that under normal use, care and service, the Equipment (except as otherwise provided herein) shall be free from defects in material and workmanship for Two Years from the date of original invoice. Leads, probes, cables, pick-ups, adapters and all other attachments, supplies and consumables (except as otherwise provided herein) are also warranted for Two Years from the date of original invoice to be free from defects in material and workmanship under normal use. Warranty does not apply to equipment, leads, probes, cables, pick-ups, adapters, supplies and consumables, and all other attachments that fail due to negligence, abuse, or uses other than those applications for which the product is intended. This Warranty does not cover software, which is separately warranted.

No warranty express, implied, or otherwise, is given to any host platform(s) used in conjunction with the VCM. No warranty is made for loading, use, or application of any software on any host platform used in conjunction with the VCM. No warranty is made for any connections to a host platform or any resulting damage that may occur to the VCM unit, accessories, or host platform used in conjunction with a VCM. No service support coverage is provided for diagnosing communications issues between the VCM and any host platform.

This Warranty does not cover (and separate charges for parts, labor and related expenses shall apply to) any damage to, malfunctioning, inoperability or improper operation of the Equipment caused by, resulting from or attributable to (A) abuse, misuse or tampering; (B) alteration, modification or adjustment of the Equipment by other than Seller's authorized representatives; (C) installation, repair or maintenance (other than specified operator maintenance) of the Equipment or related equipment, attachments, peripherals or optional features by other than Seller's authorized representatives; (D) improper or negligent use, application, operation, care, cleaning, storage or handling; (E) fire, water, wind, lightning or other natural causes; (F) adverse environmental conditions, including, without limitation, excessive heat, moisture, corrosive elements, or dust or other air contaminants; radio

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 - a. If Buyer has requested and Ford Motor Company ("Seller") agrees to sell under the Dealer Open Account payment plan, then Buyer shall pay the Total Cash Price shown on the Order Form.
 - b. If Buyer has requested the Installment Plan in Part II of the Order Form and Seller agrees to sell pursuant to such Plan, then Buyer shall pay the Total Cash Price and any interest thereon in accordance with the Loan and Security Agreement to be executed by Buyer and Seller.
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16. Maintenance. Buyer shall use the Equipment carefully and properly. Buyer, at Buyer's own expense, shall maintain and repair all items of the Equipment in order to keep them in good order and condition and, in particular, shall comply fully with the maintenance, operating, usage or other instructions provided by the Hardware Manufacturer. Buyer authorizes Seller, or any third party appointed by Seller, to inspect the Equipment when necessary. Buyer shall at all times keep the Equipment free and clear of all liens, charges or encumbrances.
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18. Personal Property. Equipment (including the Software, if applicable) shall be kept at Buyer's premises as listed on the reverse side and shall remain personal property regardless of how and to what degree it may be affixed or attached to any building or structure or what may be the consequence of its removal from such building or structure. Buyer shall not encumber the Equipment (including Software, if applicable) until all amounts owing to Seller hereunder are paid. In addition, Seller grants to Buyer, and Buyer accepts, a nonexclusive license to use the Equipment (including the Software, if applicable) in accordance with the terms and conditions set forth herein. The license (and Equipment) shall not be leased, sold, assigned or otherwise transferred, in whole or in part. In the event, Buyer proposes to lease, sell, assign or otherwise transfer the Equipment (and/or its Software, if applicable), in whole or in part, to any person or entity, Ford Motor Company shall have a Right of First Refusal to purchase the Equipment (including all software, if applicable) for Ten and 00/100 Dollars (\$10.00) in U.S. currency.
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20. Seller's Remedies. In the event Buyer breaches this Agreement, Seller has all the remedies available to a seller under the Uniform Commercial Code and may pursue any other remedy available at law or in equity. Should legal proceedings be instituted by Seller to recover any amounts due hereunder or to take possession of the Equipment and Software, Buyer shall pay all collection and legal expenses (including court costs and reasonable attorneys' fees). Seller's rights

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Canadian VCM Hardware Manufacturer's Warranty & Bootstrap Software License Agreement Terms and Conditions

Warranty and Disclaimer

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Hardware Manufacturer's obligations under this warranty are limited solely to the repair or, at Hardware Manufacturer's option, replacement of Equipment or parts which to Hardware Manufacturer's satisfaction are determined to be defective and which are necessary, in Hardware Manufacturer's judgment, to return the equipment to good operating condition. Repairs or replacements qualifying under this Warranty will be performed or made on regular business days during Hardware Manufacturer's normal working hours within a reasonable time following Buyer's request. All requests for warranty service must be made during the stated warranty period.

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CANADIAN VCM LIMITED SOFTWARE WARRANTY

Ford Motor Company of Canada Ltd. ("Ford") warrants that the unmodified VCM software ("VCM Software"), when used as directed will conform to its specifications on date of shipment and for a period of twelve (12) months from that time ("warranty period"). Other than such limited warranty, and to the extent permitted by applicable law, VCM Software is provided **"AS IS."**

If Buyer determines nonconformity exists within the warranty period, which nonconformity is a substantial deviation from its specifications, Buyer shall provide written notification to Ford, within the warranty period, explaining the alleged nonconformity. Buyer's sole and exclusive remedy shall be for Ford to provide, at no cost to Buyer, information that Ford determines, in its sole discretion, to rectify the nonconformity.

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CANADIAN TERMS AND CONDITIONS FOR VCM HARDWARE AND SOFTWARE

1. Payment and Terms of Payment.
 - a. If Buyer has requested and Ford Motor Company ("Seller") agrees to sell under the Dealer Open Account payment plan, then Buyer shall pay the Total Cash Price shown on the Order Form.
 - b. If Buyer has requested the Installment Plan in Part II of the Order Form and Seller agrees to sell pursuant to such Plan, then Buyer shall pay the Total Cash Price and any interest thereon in accordance with the Loan and Security Agreement to be executed by Buyer and Seller.
 2. Equipment and Software: "Equipment" shall mean the VCM hardware. Unless the term is expressly limited to the VCM, WDS or Bootstrap software, "Software" shall collectively mean the VCM (including Bootstrap) and WDS software.
 3. Title. Title to Equipment purchased by Buyer from Seller shall pass to Buyer upon Seller's receipt of all amounts owing by Buyer to Seller hereunder.
 4. Risk of Loss. Seller shall be responsible for risk of loss until Equipment and Software are delivered to the location set forth herein, at which time risk of loss shall transfer to Buyer.
 5. Acceptance and Inspection. Buyer shall be deemed to have accepted Equipment and Software upon Seller's delivery. Equipment and Software shall be deemed to have been delivered in good condition unless Buyer gives Seller notice to the contrary within 10 days after Seller's delivery. Seller is not responsible for performance of Equipment or Software in conjunction with any host platform or any impact on existing hardware or software.
 - 5A. Delays. Seller shall not be liable for any failure or delay in delivering Equipment or Software, or for any failure to perform any provision hereof, resulting from fire, flood or other casualty, riot, strike or other labour difficulty, governmental legislation or other restriction, or any other cause beyond Seller's control.
 6. Unconditional Obligation. Buyer's obligation to make payments to Seller or its assignee shall be absolute and unconditional and shall continue unmodified despite: (a) any loss, damage or other interruption in the use of Equipment or Software; or (b) any dispute, claim, counterclaim, defense or other right which Buyer may have to assert against Seller or the manufacturer of Equipment and/or Software. Buyer has determined Equipment and Software's suitability for Buyer's purpose.
 7. VCM Hardware Manufacturer's Warranty and Disclaimer. Snap-On Tools Company, LLC is the VCM hardware equipment manufacturer represented by its division "Equipment Solutions Canada a division of Snap-on Tools of Canada Ltd."("Hardware Manufacturer"). The VCM hardware and associated bootstrap software ("Bootstrap Software) are warranted by the Hardware Manufacturer. See the VCM Hardware Manufacturer's Warranty and Disclaimer included with The Future of Vehicle Diagnostics Enrollment Brochure for details.
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8. VCM Software Warranty and Disclaimer: Seller warrants the VCM software ("VCM Software Manufacturer"), except the Bootstrap Software mentioned above. See VCM Limited Software Warranty included with The future of Vehicle Diagnostics Enrollment Brochure for details.
9. WDS Software Warranty and Disclaimer: Teradyne Diagnostics Solutions Ltd. warrants the WDS software ("WDS Software Manufacturer"). See Teradyne Diagnostic Solutions Limited WDS Software Warranty and Disclaimer included with The Future of Vehicle Diagnostics Enrollment Brochure for details. This warranty is administered by a designated agent in Canada.
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14. Freight and Taxes. Freight costs and applicable taxes will be added to the final invoice and will be borne by Buyer. Import and export duties, VATS, and taxes are the responsibility of the Buyer. When billed to Buyer, all duties, VATS and taxes will be included in the invoice.
15. Security Interest. Until all amounts due hereunder are paid, Buyer hereby grants to Seller a continuing security interest in (a) the Equipment and Software; (b) any substitutions, replacements

and additions thereto; and (c) the products and proceeds thereof. This Order Form shall be deemed a security agreement and a copy thereof may be filed as a financing statement in order to perfect Seller's security interest. Buyer hereby authorizes Seller to execute and file all documents deemed necessary by Seller to protect Seller's security interest in the Equipment & Software until the purchase price has been paid in full and pay any filing fees thereof. Unless Buyer is in default under the terms and conditions of this Agreement, Buyer may retain possession of the Equipment & Software and use it in any lawful manner not inconsistent with the terms and conditions of this Agreement.

16. Maintenance. Buyer shall use the Equipment and Software carefully and properly. Buyer, at Buyer's own expense, shall maintain and repair all items of the Equipment in order to keep them in good order and condition and, in particular, shall comply fully with the maintenance, operating, usage or other instructions provided by the Hardware Manufacturer. Buyer authorizes Seller, or any third party appointed by Seller, to inspect the Equipment and Software when necessary. Buyer shall at all times keep the Equipment and Software free and clear of all liens, charges or encumbrances.
17. Authority of Representatives. Hardware Manufacturer's sales and service representatives have no authority to bind Hardware Manufacturer to any terms, conditions, representations, warranties, agreements or understandings, whether oral or written, not specifically set forth in these Terms and Conditions.
18. Personal Property. Equipment (including the Software, if applicable) shall be kept at Buyer's premises as listed on the reverse side and shall remain personal property regardless of how and to what degree it may be affixed or attached to any building or structure or what may be the consequence of its removal from such building or structure. Buyer shall not encumber the Equipment (including Software, if applicable) until all amounts owing to Seller hereunder are paid. In addition, Seller grants to Buyer, and Buyer accepts, a nonexclusive license to use the Equipment (including the Software, if applicable) in accordance with the terms and conditions set forth herein. The license (and Equipment) shall not be leased, sold, assigned or otherwise transferred, in whole or in part. In the event, Buyer proposes to lease, sell, assign or otherwise transfer the Equipment (and/or its Software, if applicable), in whole or in part, to any person or entity, Seller shall have a Right of First Refusal to purchase the Equipment (including all software, if applicable) for Thirteen and 00/100 Dollars (\$13.00) in Cdn. currency.
19. Insurance and Indemnification. Buyer shall defend, indemnify and hold harmless Seller, its subsidiaries, affiliates and agents from and against, and at Buyer's own expense provide insurance satisfactory to Seller covering any and all losses, damages, claims, expenses and other liabilities (including attorneys' fees) relating to or arising out of: (i) damage, loss, theft or destruction of the Equipment and/or Software, or (ii) death, injury or property damage connected with the use, operation or condition (including without limitation, defects whether or not discoverable by any party) of the Equipment and/or Software. Buyer shall promptly notify Seller of any such claim. Seller shall have the right to participate, at its own expense, in any proceeding for which Buyer has undertaken the defense of Seller, and in no event shall Buyer settle any claim against Seller without Seller's prior written consent. Buyer shall provide evidence of such insurance to Seller upon demand. Seller is under no obligation to examine any insurance certificate or advise Buyer that its insurance does not comply with the requirements set forth herein. The losses covered by insurance shall in all cases be payable to Seller and Buyer as their interests may appear. If Buyer fails to insure the Equipment and/or Software as herein provided, Seller may, but is not obligated to, place such insurance upon the Equipment and/or Software and the Buyer agrees to pay to Seller on demand the premiums for such insurance placed by Seller. In no event shall any

insurance coverage be deemed to limit or replace Buyer's obligation to indemnify Seller as provided herein.

20. Seller's Remedies. In the event Buyer breaches this Agreement, Seller has all the remedies available to a seller under this contract and may pursue any other remedy available at law or in equity. Should legal proceedings be instituted by Seller to recover any amounts due hereunder or to take possession of the Equipment and Software, Buyer shall pay all collection and legal expenses (including court costs and reasonable attorneys' fees). Seller's rights shall be cumulative and action on one right shall not be deemed to constitute an election or waiver of the other rights to which Seller may be entitled.
21. Termination for Convenience. If Buyer notifies Seller that it wishes to terminate any order or this contract for its convenience and Seller accepts such termination, Seller will stop all work as promptly as practical, but Buyer shall be responsible for (a) a termination charge equal to 10% of the purchase price of the Equipment & Software prior to shipment of the Equipment and Software or (b) a restocking charge of 15% of the purchase price of the Equipment and Software if written notice of termination is received by Seller subsequent to shipment of the Equipment and Software
22. General. The waiver by either party of, or failure to claim, a breach of any provision of this contract shall not be deemed to be a waiver of any provision of this contract, shall not be deemed to be a waiver of any subsequent breach or to affect in any way the effectiveness of such provision. This contract constitutes the entire agreement between the parties and may not be changed except by an instrument in writing signed by parties. This contract may not be assigned by Buyer without the Seller's prior written consent. Seller may assign this contract at any time but shall not thereby be relieved from any liability hereunder. In the event that one or more clauses of this contract are found to be unenforceable, illegal or contrary to public policy by court of competent jurisdiction, the remainder of this contract shall remain in full force and effect except for the unenforceable, illegal or other provisions. This agreement is an Ontario agreement and shall be interpreted, construed and enforced in accordance with the laws of the Province of Ontario and Federal laws applicable therein. Teradyne license agreement will be governed by the laws of the commonwealth of Massachusetts. Each of the parties hereto agrees that any legal or equitable action or proceeding with respect to this agreement shall be brought only in any court of the Province of Ontario , and each of the parties hereto submits to and accepts generally and unconditionally the jurisdiction of these courts with respect to such party's person and property. Each party hereby irrevocably waives any objection to the laying of venue of any such action or proceeding in the above described courts.