

Version

1.0

Hardware Manual

Digimotor

VMM
Vehicle Measurement Module



VMM Hardware Manual

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VMM Hardware Manual
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The information, specifications and illustrations in this manual are based on the latest information available at the time of printing. **Ford Motor Company** reserves the right to make changes at any time without notice.

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

Definitions, Acronyms, and Abbreviations

LAN	Local Area Network
LED	Light Emitting Diode
PC	Personal Computer
PCMCIA	Personal Computer Memory Card International Association, Expansion card
POST	Power-On Self Test
SW	Software
TIS	Technical Information Support Hotline
USB	Universal Serial Bus
VCM	Vehicle Communication Module
VMM	Vehicle Measurement Module

VMM Description

The Vehicle Measurement Module (VMM) is a high performance, ruggedized, vehicle instrumentation gateway.

The VMM 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 VMM device contains four LED status indicators to provide the user with a visual mode of operation for the VMM and host device.

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

Safety Warnings

VMM Safety Information

You should read and understand this safety information before installing, assembling and using the equipment.

DO observe the safety warnings and cautions in this document.



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



CAUTION - This indicates the presence of a hazard that can cause damage to , a vehicle or other equipment connected to, or that 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 safety standards; however, like any apparatus, care must be taken in its installation and use.

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



WARNING – This equipment must be earthed (grounded).

DO ensure that a competently trained person checks that all the electrical connections (including any electrical power cable or any extension leads) are properly made in accordance with the instructions.

For continued protection against electric shock certain parts of this equipment, including the PC compatible signal interface connections have been designed such that the voltage is limited to a safe value. In order to maintain this level of protection it is essential that any equipment connected to this equipment shall have interface connections which are similarly protected.

Assurance must be obtained from the manufacturers and suppliers of such equipment that interfaces comply with the requirements for SELV circuits in accordance with IEC 1010 (EN 60101).

DO NOT install this equipment at any location less than 400mm above or 400mm below garage floor level.



CAUTION - This equipment must only be used by trained personnel.



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

DO use this equipment in accordance with the operating procedures.



CAUTION - Use of this equipment in a manner not specified by the manufacturer may impair the protection provided by this equipment.



CAUTION - Do ensure that only those test probes which are required by the diagnostic procedure in use are connected to the VMM while the diagnostic is running and that all test probes are disconnected after the measurement has been taken.

DO ensure that all connections are made prior to applying voltages to the measurement system and that the lower voltage terminal connection (closest to ground) is made first and broken last.

DO NOT use this equipment to measure voltages higher than 450V AC peak < 20% duty cycle or 200Vrms max.



CAUTION - If the VMM system is used to measure hazardous voltages, these voltages can appear on the pins of other connectors in the measurement system.

DO NOT continue to use this equipment if you have ANY doubt that it may not be working properly or it is damaged in any way. Switch off power to the equipment, disconnect the DC power cord from the vehicle and contact your Hotline Call Centre Support.

DO NOT connect any equipment to the PC compatible signal interface connections of the VMM until you are satisfied that the equipment is safe.

DO NOT connect or disconnect any equipment to or from the PC compatible signal interface connections of the VMM unless the VMM is powered off.



CAUTION - Assurance must be obtained from the manufacturers and suppliers of such equipment that interfaces comply with the requirements for SELV circuits in accordance with IEC 1010 (EN 61010).

DO NOT remove any fixed covers unless you are authorized/qualified to do so for the preparation of this equipment.

DO NOT obstruct the ventilation of this equipment. Obstruction can cause overheating, reduce reliability and shorten the life of this equipment.

DO NOT expose this equipment to spilled liquids.



CAUTION - There are no user serviceable parts under the covers unless specifically indicated. Always isolate this equipment from the electrical power source (disconnect the DC power cable from the vehicle) before removing any covers and ensure that all covers are replaced and correctly secured before reconnecting this equipment to the vehicle power.



WARNING - Do not alter this equipment's cabling during lightning activity if there is any cabling connecting from the equipment to the outside of the building in which this equipment is installed ie through a pc connector.

A defective electrical earth 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 electrical wiring is checked at frequent intervals and whenever alterations are made.

If signal cables are added to or removed from this equipment, switch off the electrical power supply to this and other connected equipment.

Pollution Degree 2 – Normally only non-conductive pollution occurs. Occasionally a temporary conductivity caused by condensation must be expected.

Installation Category 2 – Local level, appliances, portable equipment etc. with smaller transient over-voltages than Installation Category 3 (Over-voltage Category).
The measurements section of the VMM is designed for use in Installation Category 1 – Signal level, special equipment or parts of equipment, telecommunication, electronic etc., with smaller transient over-voltages than Installation Category 2.

DO keep the VMM away from devices that generate radio interference.



CAUTION – Do ensure the VMM is not subjected to extreme heat or prolonged exposure to direct sunlight that may cause heating of the VMM.



CAUTION – Do not use this equipment in close proximity to:

- **Operating mobile phones**
- **Operating mobile transceivers, such as amateur radio, taxi cabs, emergency services**
- **Mobile phone cell repeaters**
- **Broadcast radio and television transmitters**
- **Emergency medical equipment**



WARNING – This is a Class II product. In a domestic environment this product may cause radio interference in which case the user may be required to take adequate measures.

IMPORTANT SAFETY INSTRUCTIONS

1. Read all instructions before use of the equipment.
2. Care must be taken as burns can occur from touching hot parts.
3. Do not operate equipment with a damaged cables or if the equipment has been dropped or damaged - until it has been examined by a qualified serviceperson.
4. Do not let cables hang over edge of table, bench or counter or come in contact with hot manifolds or moving fan blades.
5. Care should be taken to arrange the cord so that it will not be tripped over or pulled.
6. Always unplug equipment from electrical outlet when not in use. Never use the cord to pull the plug from the outlet. Grasp plug and pull to disconnect.
7. Let equipment cool completely before putting away. Loop cord loosely around equipment when storing or in the pouch provided.
8. To reduce the risk of fire, do not operate equipment in the vicinity of open containers of flammable liquids (gasoline).
9. Adequate ventilation should be provided when working on operating internal combustion engines.
10. Keep hair, loose clothing, fingers and all parts of body away from moving parts.
11. To reduce the risk of electric shock, do not use on wet surfaces or expose to rain.
12. Use only as described in this manual. Use only manufacturers recommended attachments.

13. ALWAYS WEAR SAFETY GLASSES WHEN USING GARAGE EQUIPMENT. Everyday eyeglasses only have impact resistant lenses, they are NOT safety glasses.

KEEP THESE INSTRUCTIONS IN A SAFE PLACE.

**ENSURE ALL VMM OPERATORS READ AND UNDERSTAND INSTRUCTIONS
BEFORE USING THE EQUIPMENT**

LED Status Indicators

The VMM unit has four LED status indicators that are visible through LED ID Label. The LED status indicators allow the user to visually observe the operation of the VMM. Refer to Fig A for the location of the LED status indicators on the VMM.

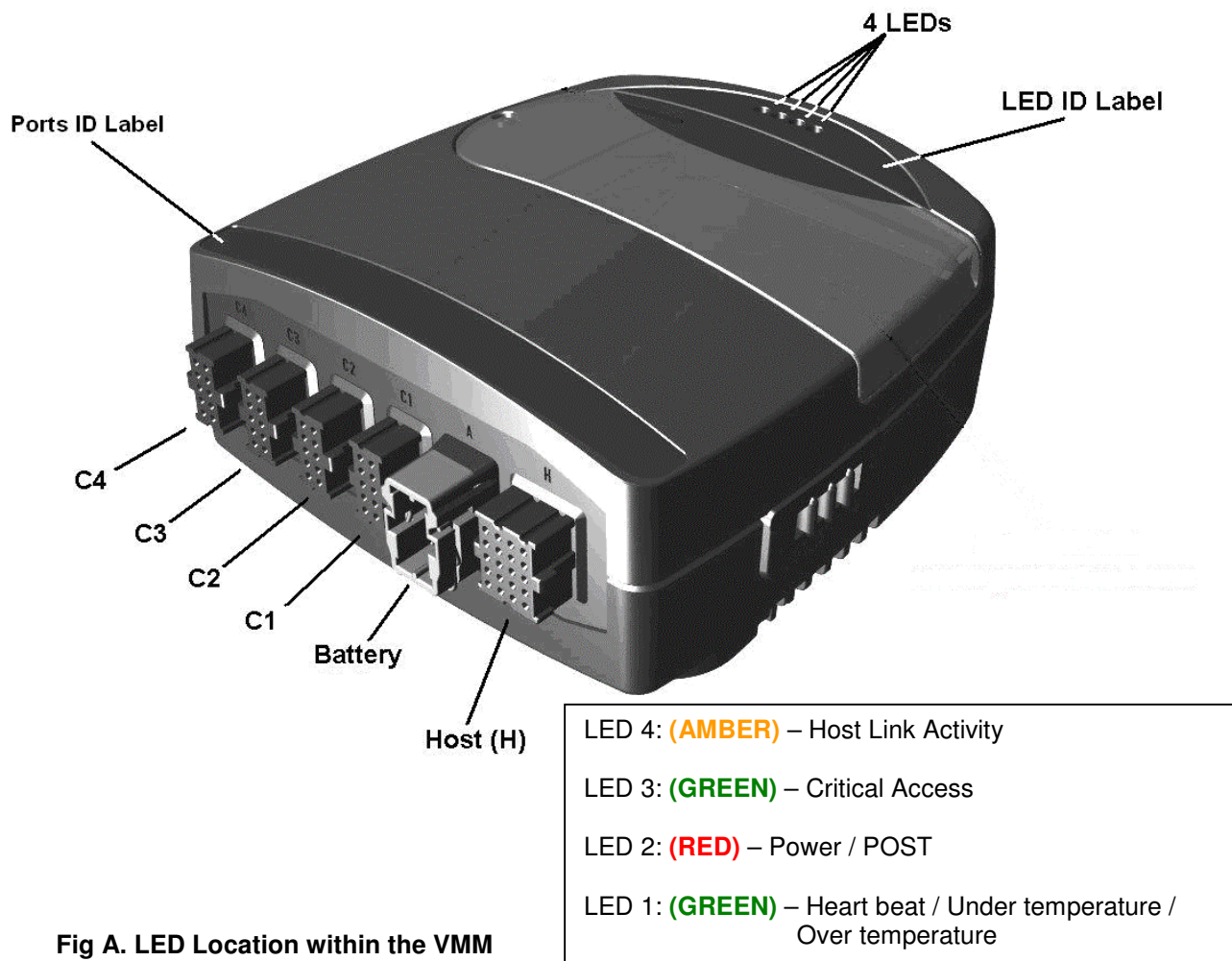


Fig A. LED Location within the VMM

Normal Power-up LED Operation

The VMM Heart Beat / Under temperature / Over temperature Operating LED (LED1) will be flashed regularly, approximately once per second, when the VMM software is running normally.

This LED will flash slowly, approximately once every 2 seconds, (with all other LED's unlit) if the VMM is in 'warm-up' mode following storage at temperatures below 0°C.

This LED will flash rapidly, approximately five per second, (with all other LED's unlit) if the VMM is shut-down due to over temperature.

The Power/ POST Diagnostic LED (LED2) flashes to indicate boot failure code in the event of a VMM boot POST failure. A permanently lit Red LED indicates no failures.

The Critical Access LED (LED3) flashes during critical VMM activity such as Flash Memory access. The VMM power source must not be removed while this LED is flashing.

The Host Link Activity LED (LED4) flashes whenever Host packets are being transferred (similar to the LED 'LAN' indicator used on PC Ethernet port connector) between the VMM and PC.

Note: The LED status indicator operation sequences are based on the latest information available at the time of publication. If differences are observed, refer to the VMM Hardware Manual on the CD/DVD 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 VMM software using the host device when new releases become available.

Troubleshooting

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

Troubleshooting Table

<u>Problem Symptoms</u>	<u>Checks & Possible Causes</u>
VMM 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 VMM and vehicle • Make sure that the cables do not have any bent, broken, missing, or dirty/corroded cable connector pins • Make sure that the VMM unit does not have any bent, broken, missing, or dirty/corroded connector pins • Make sure the VMM is powered from the vehicles battery • Verify battery voltage from the vehicle to the VMM is sufficient (12 V nominal) • If the VMM fails to power On after making all the checks above, contact the Ford Technical Information Support
VMM powers On, but operates abnormally	<ul style="list-style-type: none"> • Cycle (remove/connect) the power to the VMM • Make sure that the VMM's LED 2 is on steady red (passed Power On Self Test) • If the VMM Power On Self Test (POST) fails, contact the Ford Technical Information Support

VMM Technical Specifications

- **Voltage & Current Requirements** 8V – 48V DC (12V nominal) at 3.8 - 0.7 Amps (maximum)
- **Host Protocols**
 - Ethernet 10/100 BaseT
 - USB
- **Host Connection (Typical)** Detachable Cables: PC USB to Ethernet
- **Vehicle Connection** Detachable 7m (23ft) battery cable
- **Enclosure** Magnesium, service bay fluid resistant, 1m freefall impact resistant
- **Dimensions** H:73mm (2.9in) W:160mm (6.3in) L:180mm (7in)
- **Weight** 1400g (3.1lb) without cables
- **Environmental**
 - Operating: -20°C to 50°C (-4°F to 122°F)
at 15% to 95% RH non-condensing
 - Storage: -20°C to 60°C (-4°F to 140°F)
at 15% to 95% RH non-condensing
- **Standards & Regulatory Compliances** The VMM fulfils the requirements of the CE marking scheme and UL201

Care and Maintenance

Cleaning the VMM

Switch OFF the power and disconnect the equipment from the power source before cleaning the equipment. The VMM should only be cleaned using non-abrasive, mild cleaning agent.

Note: Dust and other particles should be lightly brushed from the surface before being cleaned. Cleaner should be applied to a soft lint free cleaning cloth and never directly to the VMM. Do not soak the cleaning cloth and take care not to allow cleaning fluid to enter connectors.

DO switch this equipment off by disconnecting the DC power cord from the vehicle before carrying out maintenance & cleaning operations (see Care & Maintenance section). 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 do not soak the cloth. Take care that cleaning fluid does not enter connector receptacles.

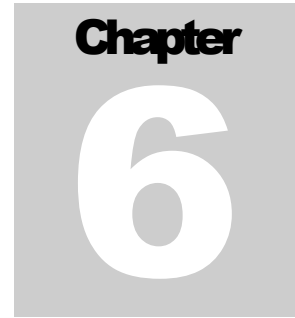
Care of Cables

It is good practice to always return the cables and probes to their appropriate storage place. The cables have been manufactured to high standards but can be damaged by driving vehicles over them or exposing them to excessive temperatures. Avoid stretching the cables.

Vehicle Interface Cables

You **MUST** take care when using these cables as they are capable of passing high current.

Short-circuits are a fire risk.



Support Instructions

If the checks in the Troubleshooting section did not resolve your VMM 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

TERMS AND CONDITIONS FOR VMM HARDWARE

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" shall mean herein the VMM hardware, unless the term is expressly limited on the Order Form to the VMM.
3. 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 is delivered to the location set forth on the Order Form, at which time risk of loss shall transfer to Buyer.
5. Acceptance and Inspection. Buyer shall be deemed to have accepted Equipment upon Seller's delivery. Equipment 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 hardware or software in conjunction with any host platform, or any impact on existing equipment or software.
 - a. Delays. Seller shall not be liable for any failure or delay in delivering, or for any failure to perform any provision hereof, resulting from fire, flood or other casualty, riot, strike or other labor difficulty, governmental regulation 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 (b) any dispute, claim, counterclaim, defense or other right which Buyer may have to assert against Seller or the manufacturer of Equipment.
7. Seller's Limitation of Liability. BUYER'S EXCLUSIVE REMEDY, RECOURSE OR DAMAGE FOR ANY DEFECT IN WORKMANSHIP OR MATERIAL OR ANY FAILURE OF THE EQUIPMENT IS

LIMITED TO THE TERMS AND CONDITIONS OF THE WARRANTIES PROVIDED BY THE HARDWARE MANUFACTURER. SELLER MAKES NO WARRANTIES, REPRESENTATIONS, INDEMNITIES OR GUARANTEES WHATSOEVER WITH RESPECT TO EQUIPMENT EITHER EXPRESS OR IMPLIED, ARISING BY LAW OR CUSTOM, INCLUDING ANY IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. THE LIABILITY OF THE SELLER SHALL BE LIMITED TO THE EXPRESS OBLIGATION TO DELIVER THE EQUIPMENT. UNDER NO CIRCUMSTANCES SHALL SELLER BE LIABLE OR RESPONSIBLE FOR ANY SPECIAL, INDIRECT, INCIDENTAL, CONSEQUENTIAL OR PUNITIVE DAMAGES, WHETHER FORESEEABLE OR UNFORESEEABLE, WHICH BUYER MAY INCUR, EXPERIENCE OR CLAIM, INCLUDING, BUT NOT LIMITED TO, CLAIMS FOR LOSS OF PROFITS, INTERRUPTION IN BUSINESS, LOST OPPORTUNITY, WORK STOPPAGE OR OTHER IMPAIRMENT OF ASSETS, ARISING OUT OF BREACH OF EXPRESS OR IMPLIED WARRANTY, BREACH OF CONTRACT, MISREPRESENTATION, NEGLIGENCE, STRICT LIABILITY, IN TORT OR OTHERWISE, ON ACCOUNT OF ENTERING INTO OR RELYING ON THIS AGREEMENT, EVEN IF SELLER HAS BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGES.

8. 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.
9. Security Interest. Until all amounts due hereunder are paid, Buyer hereby grants to Seller a continuing security interest in (a) the Equipment; (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 until the purchase price has been paid in full. Unless Buyer is in default under the terms and conditions of this Agreement, Buyer may retain possession of the Equipment and use it in any lawful manner not inconsistent with the terms and conditions of this Agreement.
10. Maintenance. Until all amounts due hereunder are paid, Buyer (a) shall use the Equipment carefully and properly, (b) 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, (c) authorizes Seller, or any third party appointed by Seller, to inspect the Equipment when necessary, (d) shall at all times keep the Equipment free and clear of all liens, charges or encumbrances.
11. Authority of Representatives. Hardware Manufacturer's sales and service representatives have no authority to bind Seller or Hardware Manufacturer to any terms, conditions, representations, warranties, agreements or understandings, whether oral or written, not specifically set forth in these Terms and Conditions.
12. Personal Property. Equipment (including the Software, if applicable) shall be kept at Buyer's premises 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.

Insurance and Indemnification. Buyer shall defend, indemnify and hold harmless Seller 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, 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. 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 as herein provided, Seller may, but is not obligated to, place such insurance upon the Equipment 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.

13. 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, 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.
14. Termination for Convenience. If Buyer notifies Seller that it wishes to terminate any order or this Agreement for its convenience and Seller accepts such termination, Seller will stop all work as promptly as reasonably possible, but Buyer shall be responsible for (a) a termination charge equal to 10% of the purchase price of the Equipment prior to shipment of the Equipment (b) a restocking charge of 15% of the purchase price of the Equipment if written notice of termination is received by Seller subsequent to shipment of the Equipment. The parties agree that these charges represent liquidated damages and are not a penalty.

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 the party to be charged. 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 a Michigan agreement and shall be interpreted, construed and enforced in accordance with the laws of the State of Michigan, United States of America. 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 State of Michigan, or in any court of the United States of America sitting in Michigan, and each of the parties hereto submits to and accepts generally and unconditionally the jurisdiction of those 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.

VMM Hardware Manufacturer's Warranty Agreement Terms and Conditions

Warranty and Disclaimer – North America

Hardware Manufacturer 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 Equipment. No warranty is made for loading, use, or application of any software on any host platform used in conjunction with the Equipment. No warranty is made for any connections to a host platform or any resulting damage that may occur to the Equipment, accessories, or host platform used in conjunction with the Equipment. No service support coverage is provided for diagnosing communications issues between the Equipment 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 Hardware Manufacturer'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 Hardware Manufacturer'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 frequency interference; electric power failure; power line voltages beyond those specified for the Equipment; unusual physical, electrical or electro-magnetic stress; and/or any other condition outside of Hardware Manufacturer's environmental specifications; (G) use of the Equipment in combination or connection with other equipment, attachments, supplies or consumables not manufactured or supplied by Hardware Manufacturer; or (H) failure to comply with any applicable federal, state or local regulation, requirement or specification governing emission analyzers and related supplies or consumables (including, without limitation, filters, printer paper, printer ribbons and calibration gases).

NO OTHER WARRANTIES, EXPRESS, IMPLIED OR STATUTORY, INCLUDING WITHOUT LIMITATION ANY IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE, SHALL APPLY, AND ALL SUCH WARRANTIES ARE HEREBY EXPRESSLY EXCLUDED.

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.

Warranty and Disclaimer – Asia Pacific and Africa

Hardware Manufacturer 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 one year 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 one year 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.

No warranty express, implied, or otherwise, is given to any host platform(s) used in conjunction with the Equipment. No warranty is made for loading, use, or application of any software on any host platform used in conjunction with the Equipment. No warranty is made for any connections to a host platform or any resulting damage that may occur to the Equipment unit, accessories, or host platform used in conjunction with the Equipment. No service support coverage is provided for diagnosing communications issues between the Equipment 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 Hardware Manufacturer'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 Hardware Manufacturer'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 frequency interference; electric power failure; power line voltages beyond those specified for the Equipment; unusual physical, electrical or electro-magnetic stress; and/or any other condition outside of Hardware Manufacturer's environmental specifications; (G) use of the Equipment in combination or connection with other equipment, attachments, supplies or consumables not manufactured or supplied by Hardware Manufacturer; or (H) failure to comply with any applicable federal, state or local regulation, requirement or specification governing emission analyzers and related supplies or consumables (including, without limitation, filters, printer paper, printer ribbons and calibration gases).

NO OTHER WARRANTIES, EXPRESS, IMPLIED OR STATUTORY, INCLUDING WITHOUT LIMITATION ANY IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE, SHALL APPLY, AND ALL SUCH WARRANTIES ARE HEREBY EXPRESSLY EXCLUDED.

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.

SELLER WARRANTS THAT THE BOOTSTRAP SOFTWARE WILL PERFORM IN ACCORDANCE WITH ITS SPECIFICATIONS. BUYER ACKNOWLEDGES THAT THIRD PARTIES PROVIDE ADDITIONAL SOFTWARE WITH THE VMM ("THIRD PARTY SOFTWARE"). SELLER MAKES NO WARRANTY, EXPRESSED, IMPLIED OR STATUTORY, INCLUDING WITHOUT LIMITATION ANY IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE, AND ALL SUCH WARRANTIES ARE HEREBY EXPRESSLY EXCLUDED, RELATIVE TO THE THIRD PARTY SOFTWARE. BUYER ASSUMES ALL RISK AS TO THE QUALITY AND PERFORMANCE OF THE THIRD PARTY SOFTWARE. IF THE THIRD PARTY SOFTWARE OR ANY RELATED SOFTWARE DOCUMENTATION IS DEFECTIVE, BUYER (AND NOT SELLER OR ITS AGENTS OR EMPLOYEES) ASSUMES THE ENTIRE RISK AND COST OF SERVICE, REPAIR AND/OR CORRECTION.

Canadian Terms and Conditions For VMM Hardware

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. 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.
3. Risk of Loss. Seller shall be responsible for risk of loss until Equipment is delivered to the location on the Order Form, at which time risk of loss shall transfer to Buyer.
4. Acceptance and Inspection. Buyer shall be deemed to have accepted Equipment upon Seller's delivery. Equipment 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 in conjunction with any host platform or any impact on existing hardware or software.
 - a. Delays. Seller shall not be liable for any failure or delay in delivering Equipment, or for any failure to perform any provision hereof, resulting from fire, flood or other casualty, riot, strike

or other labor difficulty, governmental legislation or other restriction, or any other cause beyond Seller's control.

5. 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 (b) any dispute, claim, counterclaim, defense or other right which Buyer may have to assert against Seller or the manufacturer of Equipment. Buyer has determined Equipment suitability for Buyer's purpose.
6. Seller's Limitation of Liability. BUYER'S EXCLUSIVE REMEDY, RECOURSE OR DAMAGE FOR ANY DEFECT IN WORKMANSHIP OR MATERIAL OR ANY FAILURE OF THE EQUIPMENT OR SOFTWARE IS LIMITED TO THE TERMS AND CONDITIONS OF THE WARRANTIES PROVIDED BY THE HARDWARE MANUFACTURER. SELLER MAKES NO WARRANTIES, REPRESENTATIONS, INDEMNITIES OR GUARANTEES WHATSOEVER WITH RESPECT TO EQUIPMENT EITHER EXPRESS OR IMPLIED, ARISING BY LAW OR CUSTOM, INCLUDING ANY IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. THE LIABILITY OF THE SELLER SHALL BE LIMITED TO THE EXPRESS OBLIGATION TO DELIVER THE EQUIPMENT. UNDER NO CIRCUMSTANCES SHALL SELLER BE LIABLE OR RESPONSIBLE FOR ANY SPECIAL, INDIRECT, INCIDENTAL, CONSEQUENTIAL OR PUNITIVE DAMAGES, WHETHER FORESEEABLE OR UNFORESEEABLE, WHICH BUYER MAY INCUR, EXPERIENCE OR CLAIM, INCLUDING, BUT NOT LIMITED TO, CLAIMS FOR LOSS OF PROFITS, INTERRUPTION IN BUSINESS, LOST OPPORTUNITY, WORK STOPPAGE OR OTHER IMPAIRMENT OF ASSETS, ARISING OUT OF BREACH OF EXPRESS OR IMPLIED WARRANTY, BREACH OF CONTRACT, MISREPRESENTATION, NEGLIGENCE, STRICT LIABILITY, IN TORT OR OTHERWISE, ON ACCOUNT OF ENTERING INTO OR RELYING ON THIS AGREEMENT, EVEN IF SELLER HAS BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGES.
7. 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.
8. Security Interest. Until all amounts due hereunder are paid, Buyer hereby grants to Seller a continuing security interest in (a) the Equipment; (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 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 and use it in any lawful manner not inconsistent with the terms and conditions of this Agreement.
9. Maintenance. Until all amounts due hereunder are paid, Buyer (a) shall use the Equipment carefully and properly, (b) 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, (c) authorizes Seller, or any third party appointed by Seller, to inspect the Equipment when necessary, (d) shall at all times keep the Equipment free and clear of all liens, charges or encumbrances.
10. Authority of Representatives. Hardware Manufacturer's sales and service representatives have no authority to bind Seller or Hardware Manufacturer to any terms, conditions, representations,

warranties, agreements or understandings, whether oral or written, not specifically set forth in these Terms and Conditions.

11. **Personal Property.** Equipment (including the Software, if applicable) shall be kept at Buyer's premises 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.
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, 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. 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 as herein provided, Seller may, but is not obligated to, place such insurance upon the Equipment 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.
12. **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, 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.
15. **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 prior to shipment of the Equipment or (b) a restocking charge of 15% of the purchase price of the Equipment if written notice of termination is received by Seller subsequent to shipment of the Equipment. The parties agree that these charges represent liquidated damages and are not a penalty.
13. **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.

Canadian VMM Hardware Manufacturer's Warranty Agreement Terms and Conditions

Warranty and Disclaimer

Hardware Manufacturer 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 Equipment. No warranty is made for loading, use, or application of any software on any host platform used in conjunction with the Equipment. No warranty is made for any connections to a host platform or any resulting damage that may occur to the Equipment, accessories, or host platform used in conjunction with the Equipment. No service support coverage is provided for diagnosing communications issues between the Equipment 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 Hardware Manufacturer'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 Hardware Manufacturer'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 frequency interference; electric power failure; power line voltages beyond those specified for the Equipment; unusual physical, electrical or electro-magnetic stress; and/or any other condition outside of Hardware Manufacturer's environmental specifications; (G) use of the Equipment in combination or connection with other equipment, attachments, supplies or consumables not manufactured or supplied by Hardware Manufacturer; or (H) failure to comply with any applicable federal, provincial or local regulation, requirement or specification governing emission analyzers and related supplies or consumables (including, without limitation, filters, printer paper, printer ribbons and calibration gases).

NO OTHER WARRANTIES, EXPRESS, IMPLIED OR STATUTORY, INCLUDING WITHOUT LIMITATION ANY IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE, SHALL APPLY, AND ALL SUCH WARRANTIES ARE HEREBY EXPRESSLY EXCLUDED.

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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