# RC-9100

## MULTIBAND P25 AIRBORNE REMOTE CONTROL


# Installation Instructions

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## REVISION HISTORY
**[ 14RE508 ]**

For the most current revision of this document, please check the Technisonic website: www.til.ca

| REV | SECTION - PAGE - | DESCRIPTION | DATE | EDITED BY |
|---|---|---|---|---|
| N/C | | Original Document Release. | Nov. 25, 2014 | H.D. |
| A | iv & 10 | Changes made to DO-160G:<br>- Operational Shock and Crash Safety changed to Category B.<br>- Flammability Condition added. | Sep. 09, 2015 | A.L. |
| | v | Table of Contents was missing Subsections 2.6.1 to 2.6.8 and 2.7.1 to 2.7.5. | | |
| | All | Page Numbers are now sequential. | | |
| | All | Corrected Spelling & Grammar throughout document. | | |
| B | iv | Flammability Category C refers to Mod 6 only. | Nov. 09, 2015 | A.L. |
| | 10 | Added NOTE-3 to Environmental Qualification Form. | | |
| B – 1 | i | Added Website Information to Revision Page. | Nov. 30, 2016 | A.L. |
| | 1 & 4 | Clarified voltage information. | | |

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# NOTES

## ESD CAUTION

This unit contains static sensitive devices. Wear a grounded wrist strap and/or conductive gloves when handling printed circuit boards.

## FCC COMPLIANCE INFORMATION

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference and (2) this device must accept any interference received, including interference that may cause undesired operation.

## WARNING AND DISCLAIMER

Changes or modifications not expressly approved by Technisonic Industries could void the user's authority to operate the equipment.

This manual is designed to provide information about the RC-9100. Every effort has been made to make this manual as complete and accurate as possible.

## WARRANTY INFORMATION

The Model RC-9100 Remote Control Head is under warranty for one year from date of purchase. Failed units caused by defective parts or workmanship should be returned to:

Technisonic Industries Limited
240 Traders Boulevard
Mississauga, Ontario L4Z 1W7

Tel: (905) 890-2113
Fax: (905) 890-5338

## SUMMARY OF DO-160G ENVIRONMENTAL TESTING

Summary of DO-160G Environmental Testing for Technisonic Model RC-9100 Remote Control:

| Conditions | Category |
|---|---|
| Temperature and Altitude | A2, B1, C4, D1 |
| Temperature Variation | B |
| Humidity | A |
| Operational Shock and Crash Safety | B |
| Vibration | S, U |
| Magnetic Effect | Z |
| Power Input | B |
| Voltage Spike | B |
| Audio Frequency Susceptibility | B |
| Induced Signal Susceptibility | AC |
| Radio Frequency Susceptibility | T |
| Radio Frequency Emission | M |
| Electrostatic Discharge | A |
| Flammability | C* |

* *Only applies to units with "MOD 6" marked on the modifications label.*

For more detailed information, see Appendix A.

## INSTALLATION APPROVAL NOTE

Presently, no TSO standard exists for airborne FM transceivers. To make it easier for installation agencies to provide their customers with an approved installation supported by an effective Airworthiness Approval, Technisonic has secured Supplemental Type Certificate (STC) approval. The above referenced DO-160G test data is also on file and available from Technisonic to support approval requirements in airframes for which Technisonic does not possess an STC.

Approved aircraft types are listed in the attachments to the formal STC documents. These STCs are the exclusive property of Technisonic and require the written authority of Technisonic for their use. To assist Factory Authorized Technisonic Dealers in the certification process, we have placed copies of our Canadian and US STCs on our website along with a letter of authorization for their use. These documents may be downloaded and used as support for the technical submission to FAA or Transport Canada. Only authorized factory dealers/installers are permitted to download and make use of these documents on behalf of their customers (end users) in support of regulatory agency approval. Please refer to the Technisonic website www.til.ca for the latest issue of available STCs and letter of authorization for use.

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# SECTION 1: GENERAL DESCRIPTION

## 1.1 INTRODUCTION

This publication provides installation information on the RC-9100 remote control.

## 1.2 DESCRIPTION

The RC-9100 is designed to be a remote control head for the TDFM-9100 series of airborne transceivers. It is a secondary (slave) control point and is not intended to replace the function of the front panel of the radio.

## 1.3 TECHNICAL CHARACTERISTICS

| Specification | Characteristic |
|---|---|
| Model Designation: | RC-9100 |
| Physical Dimensions: | Approx. 5.75" x 3" x 1.3" |
| Weight: | 12 oz (344g) |
| Operating Temperature Range: | -30° C to +60° C |
| Power Requirement: | |
| Voltage: | 28.0 $V_{DC}$, ± 15% |
| Current: | 60 mA minimum |
| | 150 mA maximum |
| Communication Protocol: | RS-232 |
| | 115200,N,8,1 |
| Panel Back Lighting: | 28 $V_{DC/AC}$ or 5 $V_{DC/AC}$ |
| | (Software Configurable) |

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# SECTION 2: INSTALLATION INSTRUCTIONS

## 2.1 GENERAL

This section contains information and instructions for the correct installation of the RC-9100 remote control.

## 2.2 EQUIPMENT PACKING LOG

Unpack the equipment and check for any damage that may have occurred during transit. Save the original shipping container for returns due to damage or warranty claims. Check that each item on the packing slip has been shipped in the container.

## 2.3 INSTALLATION

The RC-9100 Remote Control is designed to be Dzus mounted and should be installed in conjunction with an IN-RC91 installation kit. See Figure 1 for an outline drawing of the unit with dimensions to facilitate the installation.

## 2.4 INSTALLATION KIT - CONTENTS

The IN-RC91 installation kit (P/N 149534-1) consists of:

1. One 9-pin Cannon D mating connector (female) complete with crimp pins and hood.

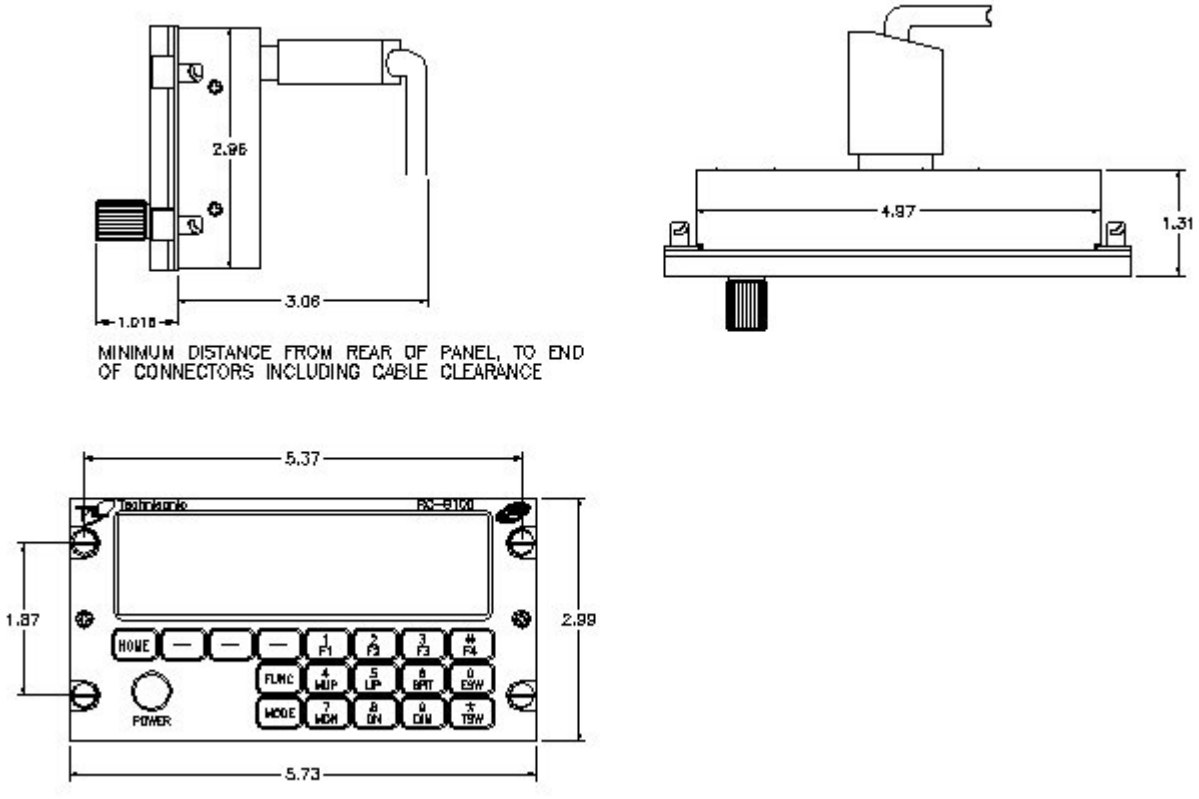



**FIGURE 1** Outline Drawing for Model RC-9100

## 2.5 INSTALLATION - PIN LOCATIONS AND CONNECTIONS

| J1 (9-Pin D-Connections) - Use FEMALE Connector | |
|---|---|
| **Pin #** | **Description** |
| 1 | Ground |
| 2 | Debug |
| 3 | Reset |
| 4 | +28 Volts DC |
| 5 | Vcc (+3.3 $V_{DC}$) |
| 6 | Backlight |
| 7 | RX Data |
| 8 | TX Data |
| 9 | Auto ON |

**TABLE 1** Wire Connections

## 2.6 INSTALLATION - WIRING INSTRUCTIONS

Figure 2 shows all required connections and recommended wire sizes for the RC-9100 Remote Control.

### 2.6.1 MAIN GROUND – PIN 1, J1

Pin 1 should be connected to ground. The pin is internally connected to the chassis.

### 2.6.2 DEBUG - PIN 2, J1

Do not connect. This pin is used for software updates at the factory.

### 2.6.3 RESET - PIN 3, J1

Do not connect. This pin is also used for software updates at the factory.

### 2.6.4 +28 VOLTS DC - PIN 4, J1

Connect to the 28 volt DC avionics bus through a 1 amp breaker.

### 2.6.5 VCC - PIN 5, J1

Do not connect. This is a 3.3 volt output to supply the programmer for software updates at the factory. Output current is rated at 200 mA.

### 2.6.6 BACKLIGHT - PIN 6, J1

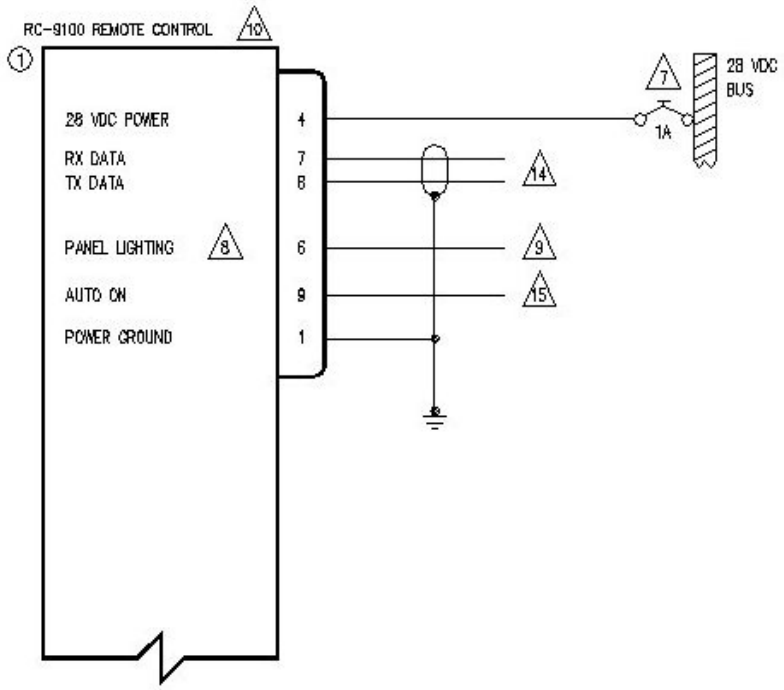
Connect to the aircraft dimmer bus. Backlighting is 28 $V_{DC/AC}$ or 5 $V_{DC/AC}$.

### 2.6.7 TX AND RX DATA - PINS 7 AND 8, J1

These pins are to be connected to the RS-232 pins on the TDFM-9100. TX data connects to RX data on the radio and RX data from the remote goes to TX data on the radio.

### 2.6.8 AUTO ON - PIN 9, J1

Connect this pin to ground if you wish the unit to turn on with the avionics master. Leave unconnected otherwise.




| QTY | ITEM | PART NUMBER | DESCRIPTION | SPEC | MATERIAL |
|---|---|---|---|---|---|
| 1 | 1 | RC-9100 | REMOTE CONTROL HEAD | TECHNISONIC INDUSTRIES LIMITED | |
| 1 | 2 | 7274-11-1 | CIRCUIT BREAKER, 1 AMP | KLIXON | |
| | | | | | |

NOTES:

1) ALL WIRE IAW MIL-W-22759 UNLESS OTHERWISE SPECIFIED.
2) ALL CABLE IAW MIL-C-27500 UNLESS OTHERWISE SPECIFIED.
3) COAXIAL CABLE IAW MIL-C-17 UNLESS OTHERWISE SPECIFIED. DO NOT USE COAX WITH PVC INSULATION.
4) FABRICATION & INSTALLATION OF WIRING HARNESS IAW AC 43.13-1B CHAPTER 11.
5) GROUNDING AND BONDING IAW AC 43.13-1B CHAPTER 11, SECTION 15.
6) ALL WIRE TO BE #22 AWG MINIMUM, UNLESS OTHERWISE SPECIFIED.

7 AN EQUIVALENT CIRCUIT BREAKER OR FUSE MAY BE USED.

8 THE RC-9100 BACK LIGHTING CIRCUIT CAN OPERATE FROM 5VAC OR 24VDC. MAKE SURE THE PROPER VOLTAGE IS SELECTED IN THE CONFIGURATION MENU.

9 CONNECT TO THE APPROPRIATE AIRCRAFT DIMMING BUSS.

10 INSTALLATION OF TRANSCEIVER IAW AC 43.13-1B CHAPTER 4, SECTION 4 AND AC 43.13-2A, CHAPTER 2. PR3 1/2 DZUS RAIL OR EQUIVALENT MAY BE USED.

11) TEST THE SYSTEM IN ACCORDANCE WITH THE POST-INSTALLATION TEST PROCEDURE IN THE INSTALLATION AND OPERATING INSTRUCTIONS MANUAL.

12) REFER TO THE AIRCRAFT STRUCTURAL REPAIR MANUAL AND THE MAINTENANCE MANUAL FOR INSTRUCTIONS AND INFORMATION PERTINENT TO THIS INSTALLATION.

13) THE USE OF RED DISPLAYS SHOULD BE MINIMIZED OR AVOIDED SO AS NOT TO DETRACT FROM THE ATTENTION GETTING CHARACTERISTICS NEEDED IN WARNING AND CAUTION ANNUNCIATORS. RED SHOULD BE USED TO ANNUNCIATE EMERGENCY CONDITIONS REQUIRING IMMEDIATE RESPONSE BY THE FLIGHT CREW. UNITS WITH RED DISPLAYS SHOULD NOT BE LOCATED IN CLOSE PROXIMITY TO WARNING AND CAUTION ANNUNCIATORS. THE INSTALLATION OF UNITS WITH RED DISPLAYS MUST BE EVALUATED ON A CASE BY CASE BASIS TO ENSURE THAT THE EFFECTIVENESS OF THE WARNING AND CAUTION ANNUNCIATORS IS NOT ADVERSELY AFFECTED.

14 TO BE CONNECTED TO THE RS-232 PORT ON THE TDFM-9100 TRANSCEIVER.

15 CONNECT THIS PIN TO GROUND IF YOU WISH THE UNIT TO TURN ON WITH THE AVIONICS MASTER. LEAVE UNCONNECTED OTHERWISE.

**FIGURE 2** Wiring Connections and Notes for the RC-9100

# POST INSTALLATION EMI TEST

## 2.7 APPENDIX TO INSTALLATION INSTRUCTIONS POST INSTALLATION EMI TEST

### 2.7.1 PURPOSE

The purpose of this test is to identify any interference that the RC-9100 remote control head may cause with existing aircraft systems.

### 2.7.2 TEST CONDITIONS

The RC-9100 should be installed and function tested. The TDFM-9100 transceiver should be on throughout this test.

### 2.7.3 METHODOLOGY

Most of the EMI tests can be accomplished on the ground.

The GPS should be operational and navigating with at least the minimum compliment of satellites. The VHF comm should have the squelch open. VOR/DME receivers should be selected for display. If possible, set up a DME/Transponder ramp test set and adjust the output until the flags are out of view. The transponder and encoder should be monitored with ramp test equipment. Set the output of the transponder test set to 3 dB above the output necessary to achieve 90% reply. If possible, set the ADF to a nearby navigation station.

Switch the RC-9100 on and off as often as required.

Observe the GPS for any degradation in satellite status or availability or flags. Listen for any noise or detected audio signals on the VHF comm(s). Listen for any noise or detected audio signals on the VOR/LOC receiver audio; look for any movement of flags or needles on the VOR/LOC/GS navigation display(s).

List the power plant, fuel, and other electric instruments not already in the chart provided and note any anomalies that occur due to operation of the RC-9100. Assess the results.

If the aircraft is equipped with an autopilot or a stability augmentation system, then test fly the aircraft and verify that operation of the RC-9100 does not have adverse effects on these systems. After checking for gross effects at a safe altitude, fly a coupled ILS approach and look for any anomalies.

### 2.7.4 RESULTS

If the installed system passes all of the applicable EMI tests, then no further action is required. If interference is observed, then the interference must be assessed against the appropriate standards of airworthiness for the system in question. A complete discussion of all the standards of airworthiness to be applied in assessing EMI effects is beyond the scope of this document.

### 2.7.5 PROCEDURE

List the power plant, fuel, and other electric instruments not already included in the chart below and note any anomalies that occur due to operation of the RC-9100. Assess the results.

| STEP | SYSTEM | PASS | FAIL | NOTES |
|---|---|---|---|---|
| 1 | Com 1 & 2 | | | |
| 2 | Transponder & Encoder | | | |
| 3 | ADF 1 & 2 | | | |
| 4 | VG | | | |
| 5 | Glideslope 1 & 2 | | | |
| 6 | VOR/LOC 1 & 2 | | | |
| 7 | Compass | | | |
| 8 | Directional Gyro | | | |
| 9 | Fuel Pressure | | | |
| 10 | Oil Temp | | | |
| 11 | Amps | | | |
| 12 | Bus Voltage | | | |

| | | | | |
|---|---|---|---|---|
| 13 | Fuel % | | | |
| 14 | Ng | | | |
| 15 | TOT | | | |
| 16 | Torque % | | | |
| 17 | Enunciators | | | |
| 18 | Digital Clock | | | |
| 19 | Oil Pressure | | | |
| 20 | DME 1 & 2 | | | |
| 21 | GPS | | | |
| 22 | Autopilot | | | |
| 23 | Stability Augmentation Systems | | | |
| 24 | Coupled ILS Approach | | | |
| | | | | |
| | | | | |
| | | | | |

# APPENDIX A

## SUPPORT NOTES

- For the latest Service Bulletin(s), refer to the Publication Index list under the section for this model (*login required*).
- For the latest Technical Information Bulletins, refer to the Publication Index list under the section for this model (*login required*).
- For the latest Software Release(s), refer to the Publication Index list under the section for this model's software/firmware history index (*login required*).

## ENVIRONMENTAL QUALIFICATION FORM

Model No: RC-9100
Part No: 131281-1,-2
Description: Airborne Transceiver Remote Control

Manufacturer: Technisonic Industries Limited
240 Traders Blvd.,
Mississauga, Ontario
Canada
L4Z 1W7

Tel: 905-890-2113
Fax: 905-890-5338

Tested to: RTCA / DO-160G (December 8, 2010)

Date Tested: Feb xx, 2014 – March xx, 2014

Test Report No: 14RExxx

| CONDITIONS | SECTION | CATEGORY | COMMENTS |
|---|---|---|---|
| Temperature and Altitude | 4.0 | A2, B1, C4, D1 | |
| Low Temperature – Survival | 4.5.1 | | - 55 degrees C |
| Low Temperature – Short Time Operating | 4.5.1 | | - 40 degrees C |
| Low Temperature – Operating | 4.5.2 | | - 30 degrees C |
| High Temperature – Survival | 4.5.3 | | + 85 degrees C |
| High Temperature – Short Time Operating | 4.5.3 | | + 70 degrees C |
| High Temperature – Operating | 4.5.4 | | + 70 degrees C |
| In-Flight Loss of Cooling | 4.5.5 | | Not applicable |
| Altitude | 4.6.1 | | 50,000 feet |

| CONDITIONS | SECTION | CATEGORY | COMMENTS |
|---|---|---|---|
| Decompression | 4.6.2 | | 50,000 feet |
| Overpressure | 4.6.3 | | - 15,000 feet |
| Temperature Variation | 5.0 | B | +/- 5 degrees C per minute |
| Humidity | 6.0 | A | Standard Humidity Environment |
| Operational Shock and Crash Safety | 7.0 | B | Standard Operational Shocks |
| Vibration | 8.0 | S | Sinusoidal Vibration – curve M |
| | | S | Random Vibration – curve B |
| | | U | Sine-On-Random Vibration – curve G |
| Explosive Atmosphere | 9.0 | X | Not tested |
| Waterproofness | 10.0 | X | Not tested |
| Fluids Susceptibility | 11.0 | X | Not tested |
| Sand and Dust | 12.0 | X | Not tested |
| Fungus | 13.0 | X | Not tested |
| Salt Fog Test | 14.0 | X | Not tested |
| Magnetic Effect | 15.0 | Z | Distance result was 0.21 meters |
| Power Input | 16.0 | B | See NOTE-2 |
| Voltage Spike | 17.0 | B | |
| Audio Frequency Susceptibility | 18.0 | B | |
| Induced Signal Susceptibility | 19.0 | AC | |
| Radio Frequency Susceptibility | 20.0 | T | See NOTE-1 |
| Radio Frequency Emission | 21.0 | M | See NOTE-1 |
| Lightning Induced Transient Susceptibility | 22.0 | X | Not tested |
| Lightning Direct Effects | 23.0 | X | Not tested |
| Icing | 24.0 | X | Not tested |
| Electrostatic Discharge | 25.0 | A | 10 discharge locations were used |
| Fire, Flammability | 26.0 | C | Flammability – See NOTE-3 |
| Other Tests | | | |

**Remarks:**

All testing was performed at Technisonic Industries unless otherwise indicated.

NOTE-1 Indicated test was performed by ULTRATECH LABS.

NOTE-2 Testing included subparagraph 16.6.1.3b: Requirement for Equipment with Digital Circuits.

NOTE-3 Only applies to units with Mod 6 marked on the modifications label.

## NOTES

**Technisonic Industries Limited**
240 Traders Blvd., Mississauga, ON Canada L4Z 1W7
Tel: (905) 890-2113 Fax: (905) 890-5338

## IMPORTANT
## WARRANTY

All communication equipment manufactured by Technisonic Industries Limited is warranted to be free of defects in Material or Workmanship under normal use for a period of one year from Date of Purchase by the end user.

Warranty will only apply to equipment installed by a factory approved and/or authorized facility in accordance with Technisonic published installation instructions. Equipment falling under the following is not covered by warranty:

- Equipment that has been repaired or altered in any way as to affect performance,
- Equipment that has been subject to improper installation,
- Equipment that has been used for purposes other than intended,
- Equipment that has been involved in any accident, fire, flood, immersion, or subject to any other abuse.

Expressly excluded from this warranty are changes or charges relating to the removal and re-installation of equipment from the aircraft. Technisonic will repair or replace (at Technisonic's discretion) any defective transceiver (or part thereof) found to be faulty during the Warranty Period.

Faulty equipment must be returned to Technisonic (or its authorized Warranty Depot) with transportation charges prepaid. Repaired (or replacement) equipment will be returned to the customer with collect freight charges. If the failure of a transceiver occurs within the first 30 days of service, Technisonic will return the repaired or replacement equipment prepaid.

Technisonic reserves the right to make changes in design, or additions to, or improvements in its products without obligation to install such additions and improvements in equipment previously manufactured. This Warranty is in lieu of any and all other warranties express or implied, including any warranty of merchantability or fitness, and of all other obligations or liabilities on the part of Technisonic.

This Warranty shall not be transferable or assignable to any other persons, firms, or corporations.

**For warranty registration, please complete the online Warranty Registration Form found at www.til.ca.**