

## 1117 HF Reader User Guide



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## History

| Version | Date                           | Modifications                           |
|---------|--------------------------------|---|
| 1.0     | 21 <sup>st</sup> June 2011     | Document Creation                       |
| 1.1     | 25 <sup>th</sup> November 2011 | Update to regulatory and specifications |
| 1.2     | 6 <sup>th</sup> December 2011  | Update to regulatory                    |

## 1 Introduction

Technology Solutions' 1117 HF Reader provides the Motorola MC55/65 with HF Radio Frequency Identification (RFID) functionality. The unit attaches as a snap on to the MC55/65. The mechanical design of the unit allows it to be quickly and easily removed.

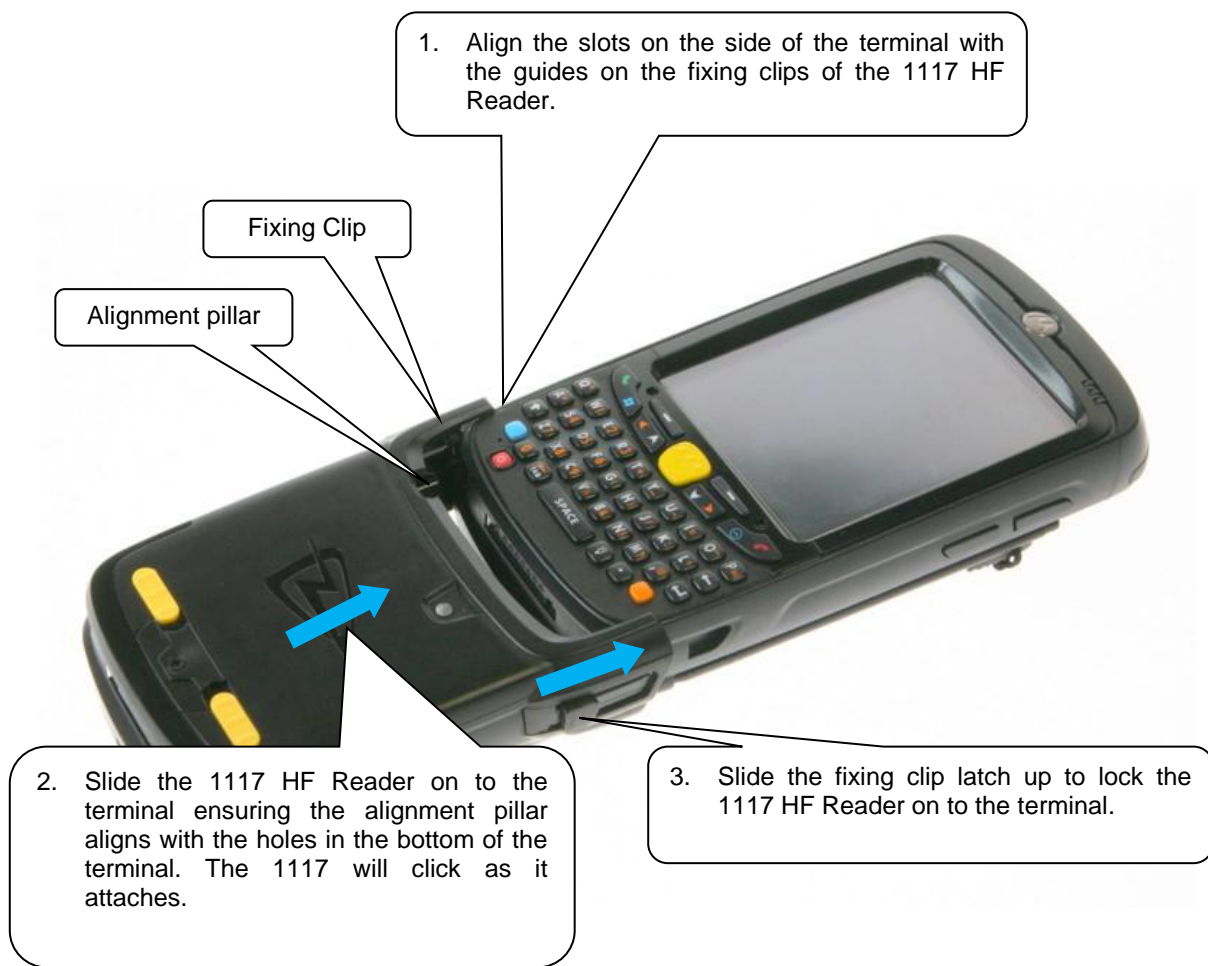
The 1117 HF Reader is powered from the host terminal.

## 2 Parts of the 1117 HF Reader



Figure 1: Parts of the 1117 HF Reader

### 3 Attaching to an MC55/65



**Figure 2: Attaching to an MC55/65**

## 4 Detaching from an MC55/65



**Figure 3: Detaching from an MC55/65**

## 5 SAM Installation or Removal



1. Slide the SAM cover locking clips towards each other



2. Lift the SAM cover away from the reader along the edge by the ActiveSync/Charge connector.

3. Pull the SAM cover away from the reader.

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The SAM holder is located in a recess

4. Slide the metal clip down to release the SAM holder.



5. Lift up the SAM holder and insert the SAM, ensuring it is correctly orientated.

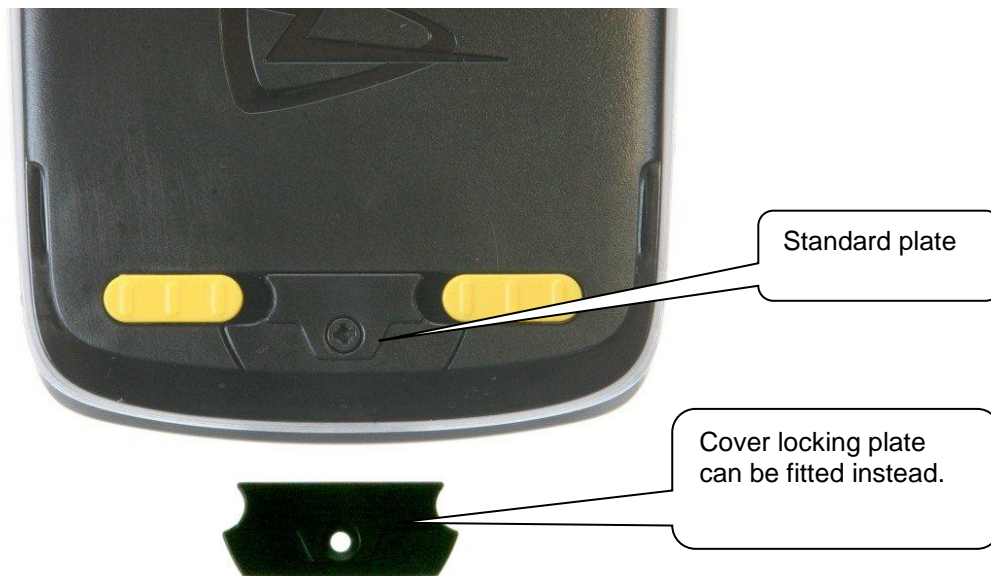
**Figure 4: 1117 HF Reader SAM access**



Refit the cover by reversing the removal procedure:

1. Fold the SAM holder down. Slide the metal clip up to lock the SAM holder.
2. Push the SAM cover in to the reader at a slight angle. There are some small tabs on the cover which align with the slots in the reader.
3. Push the SAM cover flat down on to the reader.
4. Move the SAM cover locking clips apart.
5. Refit the SAM cover locking plate if required.

As an option a locking plate may be fitted to the SAM cover. This is designed to prevent the two cover locking clips from being moved. The cover locking plate is fixed in place with a single screw and should be removed to allow the cover locking clips to be moved and the cover removed.



**Figure 5 : SAM cover locking plate option**

## 6 Charge and ActiveSync Connection

The 1117 HF Reader is designed to fit into a standard MC55/65 desktop charge cradle or cradle cup. When docked into a cradle power is passed through the 1117 so that the host terminal can charge.

When docked and an external USB host is connected, the USB connection from the host terminal is disconnected from the RFID reader and passed straight through to the connector on the bottom of the 1117. This allows an ActiveSync connection to the host terminal but prevents simultaneous ActiveSync and RFID operation. Only ActiveSync connections (external host) are possible. There is no support of USB connection where the terminal is the host (for example USB memory sticks) through the 1117.

If ActiveSync is required for software development and debug purposes it is recommended that ActiveSync over Bluetooth is configured. Instructions for doing this are provided in a separate document 'Bluetooth ActiveSync on Motorola Terminals' included on the Explorer Kit and Software Development Kit CDs and can also be downloaded from <http://www.tsl.uk.com/downloads.htm>.

## 7 Reading Transponders

RFID transponders can be read when they are in range of the antenna. The antenna is located on the back of the 1117 HF Reader. Transponders are read best if they are aligned parallel to the back of the 1117 as shown in Figure 6.



**Figure 6: Antenna location and read direction**

## 8 Status LED

The status LED on the front of the 1117 HF Reader provides an indication of the operating status of the 1117 HF Reader.

| LED colour  | Status  |
|-------------|---|
| Green flash | The previous command was successfully received and processed by the reader.<br><br>OR.<br>A transponder was read. |
| Red flash   | The previous command was not successfully processed by the reader.  |

Note that custom configuration of the 1117 HF RFID reader may prevent it from operating as described above.

## 9 Software

### 9.1 Driver installation

The drivers required for the 1117 HF Reader may be deployed as part of the installation of a custom application. Otherwise they can be deployed by copying 'RFID Reader Driver.CAB' to the host terminal and running it. When prompted, choose 'Device' as the destination to install the drivers to.

RFID Reader Driver.CAB is included on the Explorer Kit and Software Development Kit CDs and can also be downloaded from <http://www.tsl.uk.com/downloads.htm>.

### 9.2 Reader Demonstration

Technology Solutions provide a demonstration application which can be used to explore the functionality of the 1117 HF Reader and test the read range for a particular transponder. This application and full instructions are available for download from the Technology Solutions website at <http://www.tsl.uk.com/downloads.htm>.

An example screenshot of the Demonstration software is shown in Figure 7.

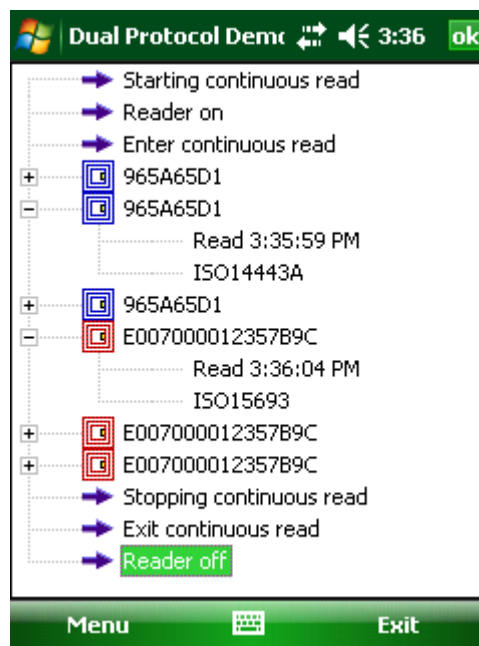


Figure 7 : Demonstration software

### 9.3 SmartWedge RFID application

A Wedge application has been developed for use with the 1117 and other Technology Solutions RFID readers. This activates the RFID reader whilst any of the yellow scan buttons are held down. Any transponder serial numbers that are read are sent out as though they had been typed on the keypad to whichever application has focus.

Instructions for installing and using the Wedge application are provided separately from the Technology Solutions website at <http://www.tsl.uk.com/downloads.htm> .

### 9.4 HF RFID Configuration

A Configuration application has been developed for use with the 1117 and other Technology Solutions RFID readers. This allows common operating parameters to be changed and stored.

Instructions for installing and using the Configuration Application are provided separately from the Technology Solutions website at <http://www.tsl.uk.com/downloads.htm> .

### 9.5 Software support for the 1117 HF RFID reader

To make full use of the functionality of the HF RFID reader, a customised software application will be required. Technology Solutions support two approaches to this; direct communication with the reader using the low level command set or the use of an API to simplify application development.

#### 9.5.1 Low level command set

The Low level command set supports two modes; ASCII and binary. ASCII mode is typically used for simple applications, for example collecting transponder unique identifiers (UIDs). The binary protocol is more suited where complex interaction with transponders is required, for example a Mifare ticketing or vending application.

The command set format and content is described in the document '1117 HF RFID Protocol.pdf' which is available for download from the Technology Solutions website at <http://www.tsl.uk.com/downloads.htm> .

#### 9.5.2 API

An API is provided for use with the HF RFID reader. This can be downloaded from the Technology Solutions website at <http://www.tsl.uk.com/downloads.htm> .

A document is provided as part of the .zip folder which introduces the API. The RFID API is provided with Microsoft style compiled HTML help (.chm) and an intelli-sense file for general reference to the API. A sample application is also provided which demonstrates the use of the API.

### 9.6 Power management with the 1117 HF RFID reader

All power for the HF RFID is drawn from the host terminal. Maximum operating time is therefore obtained by managing the operation of the RFID Reader optimally.

The HF RFID reader has three operating modes; continuous read mode, idle mode and standby mode. The reader is switched between read mode and idle modes by software commands, documented in the Low level command set. The reader is set into standby mode when the virtual COM port is closed. The reader remains in standby mode for as long as the USB is active on the host terminal.

The recommended power saving method is to close the serial port when the reader is not being used. Idle mode does not provide much power saving and the time taken to exit Idle mode is not much shorter than that from the serial port being opened. Any application using the 1117 HF RFID reader should therefore only open the COM port when an RFID transaction

is to be performed. This is the approach taken with the Demonstration application and with SmartWedge RFID.



## 10 Troubleshooting and Maintenance

### 10.1 Maintenance

For trouble-free service treat the 1117 HF Reader in the same way as you would the MC55/65 and observe the following tips when using the 1117 HF Reader:

- + Do not store or use the 1117 HF Reader in any location that is dusty, damp, or wet.
- + Protect the 1117 HF Reader from temperature extremes. Do not leave it on the dashboard of a car on a hot day, and keep it away from heat sources.

### 10.2 Troubleshooting

| Symptoms   | Possible Cause   | Action   |
|--|--|--|
| The Application on the MC55/65 cannot communicate with the 1117 HF Reader. | The MC55/65 is not firmly seated into the 1117 HF Reader.                  | Remove and re-insert the MC55/65 from the 1117 HF Reader, ensuring it is firmly seated.  |
|  | The port has not been opened.  | Check that the Application has been configured to use the correct virtual COM port (COM2 by default).  |
|  | The port is in use by another application.                                 | Close the other application and try again.   |
|  | The baud rate is set incorrectly in the application.                       | Check that the application is set to 19200 baud, 8 data bits, no parity and one stop bit (settings may be different if the 1117 RFID reader has been reconfigured) . |
| The 1117 HF Reader does not read a particular transponder                  | The 1117 HF Reader has been configured to exclude some transponders types. | Refer to the command documentation to include the appropriate transponder type.  |
|  | The transponder is out of range of the 1117 HF Reader.                     | Move the transponder closer to the antenna.  |
|  |  |  |
| MC55/65 battery does not charge  | The battery is faulty.   | Verify that other batteries charge properly. If so, replace the faulty battery.  |
|  | Ambient temperature is too warm.   | Move the unit to an area where the ambient temperature is between 0°C and 35°C.  |
|  | The MC55/65 is not firmly seated into the 1117 HF Reader.                  | Remove and re-insert the MC55/65 from the 1117 HF Reader, ensuring it is firmly seated.  |

| Symptoms                                 | Possible Cause   | Action   |
|--|--|--|
|  | The 1117 HF Reader is not firmly seated into the cradle.   | Remove and re-insert the 1117 HF Reader from the cradle, ensuring it is firmly seated.   |
| ActiveSync cannot connect to the MC55/65 | ActiveSync is not correctly configured on the PC or the MC55/65.   | Detach the 1117 HF Reader from the MC55/65 and try to ActiveSync directly to the MC55/65. If this does not work then consult the MC55/65 User Guide.                           |
|  | The MC55/65 is not firmly seated into the 1117 HF Reader or the 1117 HF Reader is not firmly seated into the cradle. | Remove and re-insert the MC55/65 from the 1117 HF Reader, ensuring it is firmly seated. Remove and re-insert the 1117 HF Reader from the cradle, ensuring it is firmly seated. |

## 12 Regulatory information

### 12.1 Information to the user - FCC

- 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.
- This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. End users must follow the specific operating instructions for satisfying RF exposure compliance. This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.
- Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

### 12.2 Information to the user – Industry Canada

Under Industry Canada regulations, this radio transmitter may only operate using an antenna of a type and maximum (or lesser) gain approved for the transmitter by Industry Canada.

To reduce potential radio interference to other users, the antenna type and its gain should be so chosen that the equivalent isotropically radiated power (e.i.r.p.) is not more than that necessary for successful communication."

This device complies with Industry Canada licence-exempt RSS standard(s). Operation is subject to the following two conditions:

- (1) this device may not cause interference, and
- (2) this device must accept any interference, including interference that may cause undesired operation of the device.

Conformément à la réglementation d'Industrie Canada, le présent émetteur radio peut fonctionner avec une antenne d'un type et d'un gain maximal (ou inférieur) approuvé pour l'émetteur par Industrie Canada.

Dans le but de réduire les risques de brouillage radioélectrique à l'intention des autres utilisateurs, il faut choisir le type d'antenne et son gain de sorte que la puissance isotrope rayonnée équivalente (p.i.r.e.) ne dépasse pas l'intensité nécessaire à l'établissement d'une communication satisfaisante."

Le présent appareil est conforme aux CNR d'Industrie Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes :

- (1) l'appareil ne doit pas produire de brouillage, et

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(2) l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

## 13 Technical specifications

### 13.1 Summary of specifications

The following table summarises the 1117 HF Reader's intended operating environment and technical hardware specifications:

| <b>Performance Characteristics</b> |  |                               |
|------------------------------------|--|-------------------------------|
| RF Transmit Frequency              | 13.56MHz   |                               |
| Supported RFID Standards           | ISO14443A, ISO14443B, ISO 15693, ISO 18000-3, ICODE                |                               |
| Supported Tag-ICs                  | Tag-it HF-I  | SR176                         |
|                                    | Tag-it HF-I Light S  | SRIX4K                        |
|                                    | Philips ICODE SL2  | LRI 12                        |
|                                    | Infineon ISO15693  | LRI 64                        |
|                                    | MIFARE® Standard   | LRI 512                       |
|                                    | MIFARE® 4k   | EM4135                        |
|                                    | MIFARE® Pro  | KSW Temp Sense                |
|                                    | MIFARE® Ultralight   | Sharp S                       |
|                                    | MIFARE® SmartMX  | ASK GTML                      |
|                                    | SLE 55Rxx  | ASK GTML2ISO                  |
|                                    | SRF55VxxP +S   | TOSMART P064                  |
|                                    | SLE 66CL160S   | Jewel Tag<br>(IRT0302B11 KSW) |
|                                    | SLE 66CLX320P  | ISO14443A Tags                |
|                                    | ISO14443B Tags   |                               |
|                                    | ISO15693 Tags  |                               |
| Reading distance                   | Up to 8cm (3") using ISO7810 size credit card format transponders. |                               |
| RF Transmission Speed              | Up to 848 kBit/s   |                               |
| <b>SAM support</b>                 |  |                               |
| SAM clock                          | 3.39MHz  |                               |
| SAM VCC                            | 5V   |                               |
| SAM type                           | Form factor compatible with GSM SIM footprint                      |                               |
| <b>Current consumption</b>         |  |                               |
| Current Consumption                | < 130mA during RFID read   |                               |
|                                    | < 65mA in idle mode  |                               |
|                                    | < 35mA in standby mode   |                               |
| <b>User indication</b>             |  |                               |

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|                                 |   |
|---------------------------------|---|
| Red, Green LEDs                 | Flash indicating activity (function may also be customised).                              |
| <b>Connection Interfaces</b>    |   |
| Physical interface              | USB and power in to charge MC55/65  |
| Reader power supply             | Powered from host terminal  |
| ActiveSync                      | via USB   |
| <b>Physical Characteristics</b> |   |
| Dimensions                      | 85x100x30mm (3.35"x3.93"x1.18")   |
| Weight                          | 100g (3.53 oz)  |
| Enclosure material              | Polycarbonate   |
| Colour                          | Black   |
| Material finish                 | Sparked surface   |
| Mechanical attachment           | Snap-on action with locking tabs  |
| Docking                         | Attachment maintains dockability with Motorola docking cradle for charging and ActiveSync |
| <b>Environmental</b>            |   |
| Operating Temperature           | -10°C to +50°C (14°F to 122°F)  |
| Storage Temperature             | -40°C to +70°C (-40°F to 140°F)   |
| Drop specification              | 1.2m (4ft) to concrete  |
| Tumble                          | 250 0.5m tumbles (500 drops)  |
| Sealing                         | IP54  |
| Electrostatic discharge         | +/-15kV air discharge, +/-8kV direct discharge  |
| Construction                    | RoHS compliant  |
| <b>Regulatory</b>               |   |
| EMI/RFI                         | EN 302 291-2, EN 301 489-3  |
|                                 | USA/Canada - FCC Part 15(c) 15.225 / RSS-210  |
| Electrical Safety               | Europe - EN60950-1 with CB Scheme Group and National Differences                          |
|                                 | USA - UL60950-1   |
| <b>Notes</b>                    |   |
| All PCBs are conformally coated |   |

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## 14 Health and Safety Recommendations

### Ergonomic Recommendations

**Caution: In order to avoid or minimize the potential risk of ergonomic injury, follow the recommendations below. Consult with your local Health & Safety Manager to ensure that you are adhering to your company's safety programs to prevent employee injury.**

- + Reduce or eliminate repetitive motion
- + Maintain a natural position
- + Reduce or eliminate excessive force
- + Keep objects that are used frequently within easy reach
- + Perform tasks at correct heights
- + Reduce or eliminate vibration
- + Reduce or eliminate direct pressure
- + Provide adjustable workstations
- + Provide adequate clearance
- + Provide a suitable working environment
- + Improve work procedures.

### For vehicle installation and use

An air bag inflates with great force. DO NOT place objects, including either installed or portable wireless equipment, in the area over the air bag or in the air bag deployment area. If in-vehicle wireless equipment is improperly installed and the air bag inflates, serious injury could result.

RF signals may affect improperly installed or inadequately shielded electronic systems in motor vehicles (including safety systems). Check with the manufacturer or its representative regarding your vehicle. You should also consult the manufacturer of any equipment that has been added to your vehicle.

### Power Supply

Use only Motorola-approved cradles, chargers and power supplies with the 1117 HF Reader. Use of an alternative power supply will invalidate any approval given to this device, void the warranty for the product and may be dangerous.

### RF Exposure

The reader antenna is designed to direct RF energy away from the user and the reader in the direction shown in Figure 6. To reduce RF exposure and provide best reading performance do not cover the antenna with your hand or other part of your body.

## 15 Waste Electrical and Electronic Equipment (WEEE)

For EU Customers: All products at the end of their life must be returned to TSL for recycling. For information on how to return product please contact TSL.

## 16 Warranty

**(A) Warranty** TSL's hardware Products are warranted against defects in workmanship and materials for a period of twelve (12) months from the date of shipment, unless otherwise provided by TSL in writing, provided the Product remains unmodified and is operated under normal and proper conditions. Warranty provisions and durations on software, integrated installed systems, Product modified or designed to meet specific customer specifications ("Custom Products"), remanufactured products, and reconditioned or upgraded products, shall be as provided in the applicable Product specification in effect at the time of purchase or in the accompanying software license.

**(B) Spare Parts** Spare parts (i.e. parts, components, or subassemblies sold by TSL for use in the service and maintenance of Products) are warranted against defects in workmanship and materials for a period of thirty (30) days from the date of shipment. Spare parts may be new or originate from returned units under the conditions set forth in subsection D below.

**(C) Repair of TSL branded hardware** For repairs on TSL branded hardware Products under this Agreement, including repairs covered by warranty, the repair services provided are warranted against defects in workmanship and materials on the repaired component of the Product for a period of thirty (30) days from the shipment date of the repaired Product, or until the end of the original warranty period, whichever is longer. Any such defects shall be notified to TSL in writing within 7 days of the same becoming apparent.

**(D) Product Service** Products may be serviced or manufactured with parts, components, or subassemblies that originate from returned products and that have been tested as meeting applicable specifications for equivalent new material and Products. The sole obligation of TSL for defective hardware Products is limited to repair or replacement (at TSL's option) on a "return to base (RTB)" basis with prior TSL authorisation.

Customer is responsible for prompt shipment to TSL and assumes all costs and risks associated with this transportation; return shipment to the Customer will be at TSL's expense. Customer shall be responsible for return shipment charges for product returned where TSL determines there is no defect ("No Defect Found"), or for product returned that TSL determines is not eligible for warranty repair. No charge will be made to Buyer for replacement parts for warranty repairs. TSL is not responsible for any damage to or loss of any software programs, data or removable data storage media, or the restoration or reinstallation of any software programs or data other than the software, if any, installed by TSL during manufacture of the Product.

**(E) Original Warranty Period** Except for the warranty applying solely to the repaired component arising from a repair service as provided in Section C above, the aforementioned provisions do not extend the original warranty period of any Product that had either been repaired or replaced by TSL.

**(F) Warranty Provisions** The above warranty provisions shall not apply to any Product

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(iii) which has been subjected to unusual physical or electrical stress, abuse, or accident, or forces or exposure beyond normal use within the specified operational and environmental parameters set forth in the applicable Product specification; nor shall the above warranty provisions apply to any expendable or consumable items, such as batteries, supplied with the Product.

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