

Multi ISO RFID 1059 User Guide

Technology Solutions UK Ltd
Suite C
Loughborough Technology
Centre
Epinal Way
Loughborough
Leics
LE11 3GE
Tel: +44 (0) 1509 238248
Fax: +44 (0) 1509 220020
Email: enquiries@tsl.uk.com



© 2006 TSL. All rights reserved.

No part of this publication may be reproduced or used in any form, or by any electrical or mechanical means, without permission in writing from Technology Solutions (UK) Ltd. This includes electronic or mechanical means, such as photocopying, recording, or information storage and retrieval systems. The material in this manual is subject to change without notice.

Technology Solutions (UK) Ltd (TSL) reserves the right to make changes to any product to improve reliability, function, or design. TSL does not assume any product liability arising out of, or in connection with, the application or use of any product, circuit, or application described herein. No license is granted, either expressly or by implication, estoppel, or otherwise under any patent right or patent, covering or relating to any combination, system, apparatus, machine, material, method, or process in which TSL products might be used. An implied license exists only for equipment, circuits, and subsystems contained in TSL products. TSL and the TSL logo are registered trademarks of TSL. Other product names mentioned in this manual may be trademarks or registered trademarks of their respective companies and are hereby acknowledged.

All software is provided strictly on an “as is” basis. All software, including firmware, furnished to the user is on a licensed basis. TSL grants to the user a non-transferable and non-exclusive license to use each software or firmware program delivered hereunder (licensed program). Except as noted below, such license may not be assigned, sublicensed, or otherwise transferred by the user without prior written consent of TSL. No right to copy a licensed program in whole or in part is granted, except as permitted under copyright law. The user shall not modify, merge, or incorporate any form or portion of a licensed program with other program material, create a derivative work from a licensed program, or use a licensed program in a network without written permission from TSL. The user agrees to maintain TSL’s copyright notice on the licensed programs delivered hereunder, and to include the same on any authorized copies it makes, in whole or in part. The user agrees not to decompile, disassemble, decode, or reverse engineer any licensed program delivered to the user or any portion thereof.

TSL reserves the right to make changes to any software or product to improve reliability, function, or design.

TSL does not assume any product liability arising out of, or in connection with, the application or use of any product, circuit, or application described herein.

Symbol is a registered trademark of Symbol Technologies, Inc.

Contents

1	Introduction	4
2	Parts of the RFID 1059	4
3	Attaching to an MC70.....	5
4	Detaching from an MC70.....	6
5	Using the RFID 1059.....	7
5.1	Basic operation	7
5.2	Software support for the RFID 1059.....	9
5.2.1	Low level command set	9
5.2.2	API.....	9
5.3	Power management with the RFID 1059.....	9
5.4	Fitting a SAM.....	10
5.5	Compatible peripherals	11
5.6	ActiveSync.....	11
6	Troubleshooting and Maintenance.....	12
6.1	Maintenance.....	12
6.2	Troubleshooting	12
7	Technical specifications	14
7.1	Summary of specifications	14
7.2	Pin-outs	17
7.3	Regulatory Information.....	18
7.4	Statement of compliance.....	19
8	Health and Safety Recommendations	20
9	Waste Electrical and Electronic Equipment (WEEE).....	21
10	Warranty.....	21

History

Version	Date	Modifications
1.0	31/08/06	Document Creation
1.1	1/11/06	Added FCC Compliance to Regulatory section

1 Introduction

Technology Solutions' Multi ISO RFID 1059 provides the Symbol MC70 with Radio Frequency Identification (RFID) functionality. The unit attaches as a snap on to the MC70. The mechanical design of the unit allows it to be quickly and easily removed, alternatively two screws may be used to make the installation semi-permanent. The unit is designed to retain compatibility with standard MC70 accessories such as desktop cradles and chargers.

The RFID 1059 is powered from the MC70. It can be used with the majority of transponders operating at 13.56MHz, including ISO15693 and ISO 14443 compliant types.

2 Parts of the RFID 1059



Figure 1: The parts of the RFID 1059

3 Attaching to an MC70

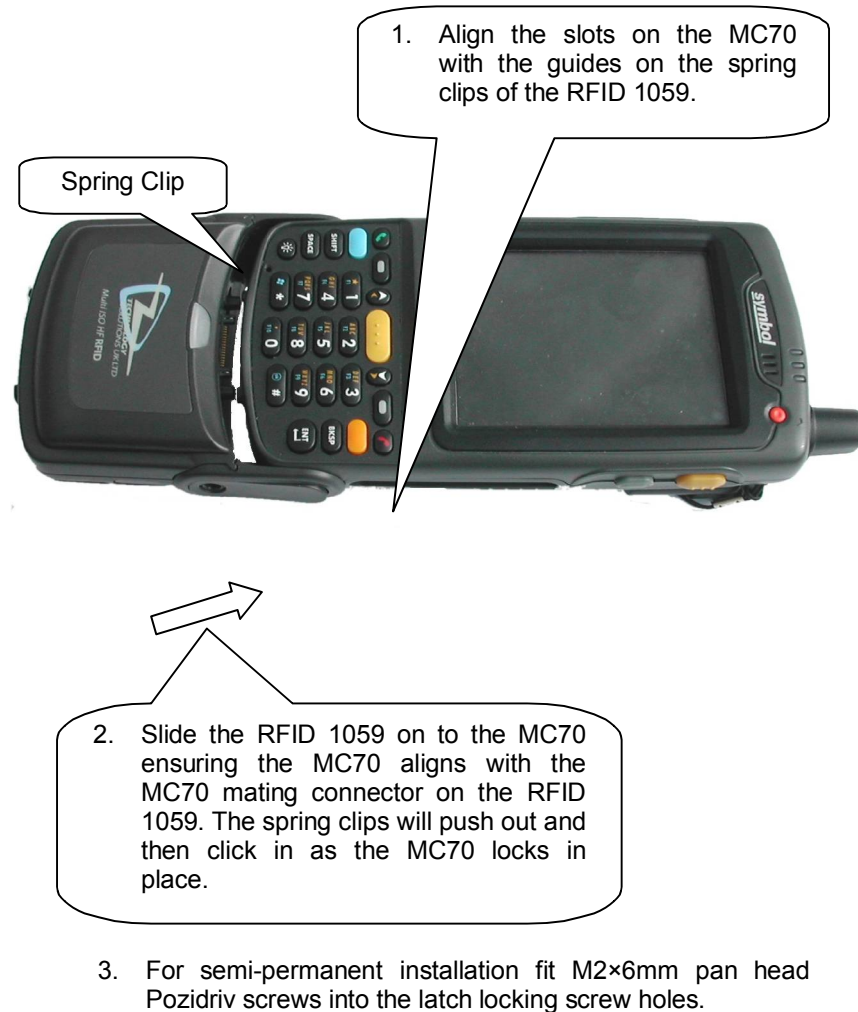


Figure 2: Attaching to an MC70

4 Detaching from an MC70



Figure 3: Detaching from an MC70

5 Using the RFID 1059

5.1 Basic operation

RFID transponders can be read when they are in range of the antenna. The antenna is located behind the label on the front of the RFID 1059. The range at which a transponder can be read depends on the transponder type and size. Larger transponders can be read further away from the antenna. In many cases it will be possible to read transponders behind and to the side of the RFID 1059. For best performance the transponder must be orientated correctly with the antenna. In most cases this means that the transponder should be parallel to the RFID 1059 cover as shown below:



Correct orientation; the transponder is parallel to the reader antenna and read range will be good.



Incorrect orientation; the transponder is perpendicular to the reader antenna and read range will be poor.

Figure 4: Presenting a transponder to the RFID 1059

There are no drivers required for the RFID 1059. The unit is automatically powered up when the serial port on the bottom of the MC70 (COM1) is opened.

The default operating mode of the RFID 1059 as supplied from Technology Solutions is continuous polling for transponders with the unique identification number (UID) of any compatible transponder being sent out to the MC70 in

ASCII format (COM1, 19200 baud). In this default mode an easy way to display the data is to use a Terminal Emulation program, for example mToken from Chung Networks. A trial version is available from <http://www.choung.net/mToken/>

Having installed mToken with ActiveSync connect to the reader as follows:

- Launch mToken.
- Select “Direct Comm Port” from the “session” menu.
- Select the COM1
- Change the baud rate to “19200”. Data bits should be 8, stop bits should be 1, parity should be “None” and flow control should be “None”.
- Click “Connect”

The transponder UIDs are then displayed, prefixed by a letter identifying the transponder type as follows; 'M' for ISO14443A, 'Z' for ISO14443B, 'S' for SR176, 'V' for ISO15693.

The status LEDs on the front of the RFID 1059 provide an indication of the operating status of the RFID 1059.

LED colour	Status
Green flash	The previous command was successfully received and processed by the reader.
Red flash	The previous command was not successfully processed by the reader.

Note that custom configuration of the RFID 1059 may prevent it from operating as described above.

5.2 Software support for the RFID 1059

To make full use of the functionality of the RFID 1059, 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.

5.2.1 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 'Multi ISO RFID 1059 Protocol.pdf' which is available for download from the Technology Solutions website at <http://www.tsl.uk.com/downloads.htm> .

5.2.2 API

An API is provided for use with the RFID 1059. 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.

5.3 Power management with the RFID 1059

All power for the RFID 1059 is drawn from the MC70. Maximum operating time is therefore obtained by managing the operation of the RFID 1059 optimally.

The RFID 1059 has two operating modes; continuous read mode and standby mode. The third mode is fully powered off. The reader is switched between the two operating modes by software commands, documented in the Low level command set. The reader is fully powered off when the COM port on the MC70 is closed.

The recommended power saving method is to close the serial port when the reader is not being used. The current consumption in Standby mode is high enough to reduce the MC70 battery life and the time taken to exit Standby mode is not much shorter than that from the serial port being opened. Any application using the RFID 1059 should therefore only open the COM port when an RFID transaction is to be performed.

5.4 Fitting a SAM

To fit a SAM it is necessary to remove the cover of the RFID 1059. This must only be done in an ESD safe area with appropriate precautions to avoid the possibility of damage to the RFID 1059.

Remove the four Pozidriv screws securing the front cover:

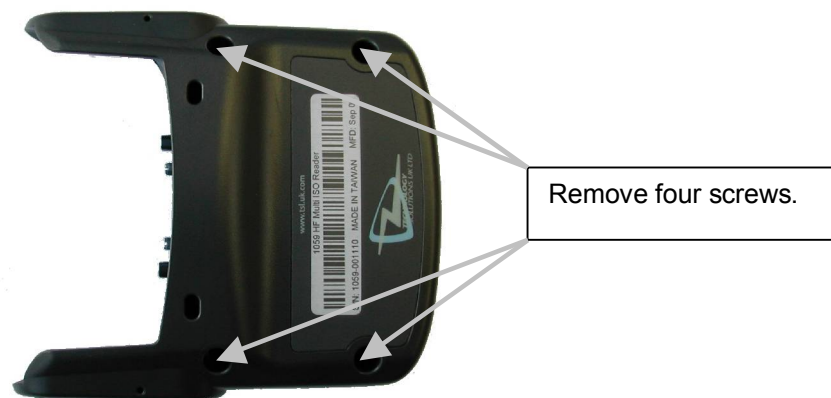


Figure 5: Location of cover fixing screws

Remove the front cover by pulling it away from the body of the RFID 1059, starting at the docking connector end.

The SAM socket is unlocked by sliding the metal cover towards the MC70 mating connector:

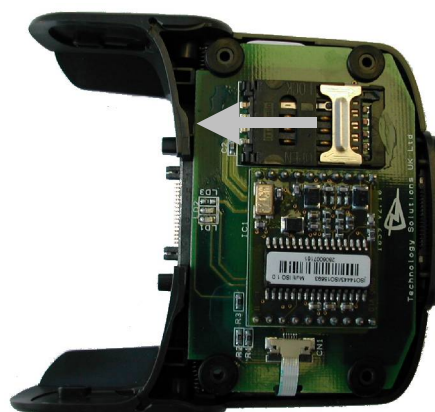


Figure 6: Unlocking the SAM socket

Slide in the SAM, making sure that it is orientated correctly and then relock the SAM socket by sliding the metal cover back away from the MC70 mating connector:

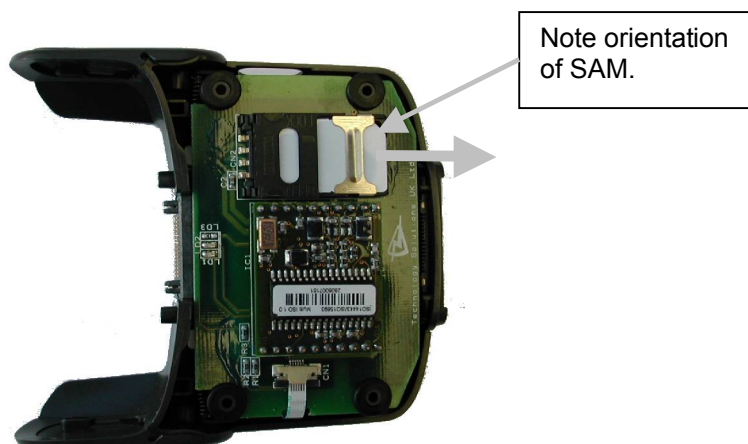


Figure 7: Inserting the SAM

Reassemble the RFID 1059 by refitting the cover and securing it with the four screws.

5.5 Compatible peripherals

The HF RFID 1059 is compatible with any standard Symbol peripheral that does not use the serial port (COM1) because this is used for RFID data. The serial port is not connected to the Docking Connector on the bottom of the HF RFID 1059. A list of compatible peripherals for the HF RFID 1059 is available for download from the Technology Solutions website at <http://www.tsl.uk.com/downloads.htm>.

It is not possible to use the HF RFID 1059 with the vehicle cradle (part number VCD7000-P000R). To charge the MC70 in a vehicle it is necessary to remove the HF RFID 1059 from the MC70 or to use the Auto charge cable (part number 25-70979-01).

5.6 ActiveSync

The MC70 with HF RFID 1059 attached can be used with ActiveSync, but the USB rather than the serial connection must be used.

6 Troubleshooting and Maintenance

6.1 Maintenance

For trouble-free service treat the RFID 1059 in the same way as you would the MC70 and observe the following tips when using the RFID 1059:

- Do not store or use the RFID 1059 in any location that is dusty, damp, or wet.
- Protect the RFID 1059 from temperature extremes. Do not leave it on the dashboard of a car on a hot day, and keep it away from heat sources.

6.2 Troubleshooting

Symptoms	Possible Cause	Action
The Application on the MC70 cannot communicate with the RFID 1059.	The MC70 is not firmly seated into the RFID 1059.	Remove and re-insert the MC70 from the RFID 1059, ensuring it is firmly seated.
	The port has not been opened.	Check that the Application has been configured to use COM1.
	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 RFID 1059 has been reconfigured) .
The RFID 1059 does not read a particular transponder	The RFID 1059 has been configured to exclude some transponder types.	Refer to the command documentation to include the appropriate transponder type.
	The transponder is out of range of the RFID 1059.	Move the transponder closer to the antenna.
MC70 battery does not charge	The battery is faulty.	Verify that other batteries charge properly. If so, replace

Symptoms	Possible Cause	Action
		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 MC70 is not firmly seated into the RFID 1059.	Remove and re-insert the MC70 from the RFID 1059, ensuring it is firmly seated.
ActiveSync cannot connect to the MC70	ActiveSync is not correctly configured on the PC or the MC70.	Detach the RFID 1059 from the MC70 and try to ActiveSync directly to the MC70. If this does not work then consult the MC70 User Guide.
	ActiveSync is using a serial connection.	ActiveSync must use USB with the RFID 1059 connected.
	The MC70 is not firmly seated into the RFID 1059.	Remove and re-insert the MC70 from the RFID 1059, ensuring it is firmly seated.
An accessory connected to the RFID 1059 does not work	The accessory uses a serial connection to the MC70.	The accessory is not compatible with the RFID 1059 because only the USB port is available on the docking connector.
	The MC70 is not firmly seated into the RFID 1059.	Remove and re-insert the MC70 from the RFID 1059, ensuring it is firmly seated.

7 Technical specifications

7.1 Summary of specifications

The following table summarises the RFID 1059's intended operating environment and technical hardware specifications:

Performance Characteristics		
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® DESFIRE	ASK GTML
	MIFARE® SmartMX	ASK GTML2ISO
	SLE 55Rxx	TOSMART P064
	SRF55VxxP +S	Jewel Tag (IRT0302B11 KSW)
	SLE 66CL160S	ISO14443A Tags
	SLE 66CLX320P	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	
SAM support		
SAM clock	3.39MHz	

SAM VCC	5V
SAM type	Form factor compatible with GSM SIM footprint
Current consumption	
Current Consumption	< 150mA during RFID read
	< 30mA in standby mode
	0mA in shutdown mode
User indication	
Red, Green LEDs	Flash indicating activity (function may also be customised).
Connection Interfaces	
Physical interface	USB and power in to charge MC70
Reader power supply	Powered from host terminal
ActiveSync	via USB
Physical Characteristics	
Dimensions	90×82×32mm (3.54"x3.23"x1.26")
Weight	95g (3.35 oz)
Enclosure material	PC/ABS
Colour	Grey
Material finish	Sparked surface
Mechanical attachment	Snap-on action with optional locking screws
Docking	Attachment maintains dockability with Symbol docking cradle for charging and ActiveSync
Environmental	
Operating Temperature	-10°C to +50°C (14°F to 122°F)
Storage Temperature	-40°C to +60°C (-40°F to 140°F)
Humidity	Up to 90% Relative humidity Non Condensing
Drop specification	1.3m (4.26ft) to concrete, 6 drops per 6 sides over operating temperature; 1.5m (5ft) to concrete, 2 drops per 6 sides at ambient temperature 23°C (73°F)
Sealing	Internal components conformal coated
Electrostatic discharge	+/-15kV air discharge, +/-8kV direct

	discharge
Construction	RoHS compliant
Regulatory	
EMI/RFI	EN 300 330, EN 301 489, CE marked
	USA - FCC Part 15
Electrical Safety	Europe - EN60950-1
	USA - UL60950
Notes	
All PCBs are conformally coated	

7.2 Pin-outs



<i>PIN</i>	<i>Docking Connector (Socket)</i>
1	Power Ground
2	Cradle Detect
3	RS232 DCD/Trigger
4	USB_D-
5	USB_D+
6	USB_Gnd
7	USB_Vbus
8	USB_ID
9	Not Connected
10	Not Connected
11	Not Connected
12	Not Connected
13	Not Connected
14	Not Connected
15	Not Connected
16	External DC In 5.4V

7.3 Regulatory Information

All TSL devices are designed to be compliant with appropriate regulations and standards and are CE marked. Any changes or modifications to TSL equipment, not expressly approved by TSL, could void the user's authority to operate the equipment.

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.

7.4 Statement of compliance

Technology Solutions hereby declares that this device is in compliance with the essential requirements and other relevant provisions of Directives 1999/5/EC, 89/336/EEC and 73/23/EEC. Declaration of Conformities may be obtained from Technology Solutions on request.

The RFID 1059 has been tested to and found to comply with the following standards for use within the Economic Union:

EMC Directive 89/336/EEC, R&TTE Directive 99/5/EC:

EN 301 489-3 V1.4.1 (2002-08)

EN 300 330-2 V1.1.1 (2001-06)

Low Voltage Directive 73/23/EEC:

IEC 60950-1 1st Edition 2001 (National and group differences in accordance with CB Bulletin No. 109A December 2005)

The RFID 1059 has also been tested and found to comply with:

Title 47 of the CFR:2004, Part 15, Subpart (c)

FCC emission requirements for Intentional Radiators; Parts 15.207, 15.209 & 15.225

The RFID 1059 complies with:

RoHS Directive 2002/95/EC

8 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 Symbol-approved cradles, chargers and power supplies with the HF RFID 1059. Use of an alternative power supply will invalidate any approval given to this device, void the warranty for the product and may be dangerous.

9 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.

10 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

(i) which has been repaired, tampered with, altered or modified, except by TSL's authorized service personnel; (ii) in which the defects or damage to the Product result from normal wear and tear, misuse, negligence, improper storage, water or other liquids, battery leakage, use of parts or accessories not approved or supplied by TSL, or failure to perform operator handling and scheduled maintenance instructions supplied by TSL;

(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.

EXCEPT FOR THE WARRANTY OF TITLE AND THE EXPRESS WARRANTIES STATED ABOVE, TSL DISCLAIMS ALL WARRANTIES ON PRODUCTS FURNISHED HEREUNDER INCLUDING ALL IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR USE. ANY IMPLIED WARRANTIES THAT MAY BE IMPOSED BY LAW ARE LIMITED IN DURATION TO THE LIMITED WARRANTY PERIOD. SOME STATES OR COUNTRIES DO NOT ALLOW A LIMITATION ON HOW LONG AN IMPLIED WARRANTY LASTS OR THE EXCLUSION OR LIMITATION OF INCIDENTAL OR CONSEQUENTIAL DAMAGES OR CONSUMER PRODUCTS. IN SUCH STATES OR COUNTRIES, FOR SUCH PRODUCTS, SOME EXCLUSIONS OR LIMITATIONS OF THIS LIMITED WARRANTY MAY NOT APPLY.

The stated express warranties are in lieu of all obligations or liabilities on the part of TSL for damages, including but not limited to, special, indirect or consequential damages arising out of or in connection with the use or performance of the Product or service. TSL's liability for damages to Buyer or others resulting from the use of any Product or service furnished hereunder shall in no way exceed the purchase price of said Product or the fair market value of said service, except in instances of injury to persons or property.

TSL is not responsible for any damages incurred during shipment if the approved shipping container is not used. Shipping the units improperly can possibly void the warranty. If the original shipping container was not kept, contact your local distributor or TSL to have another sent to you.

TSL shall not be responsible for any injury, damage or loss of whatever kind caused directly or indirectly by the goods whether as a result of their manufacture, operation, use or otherwise and the customer shall indemnify TSL from any claim arising from any loss suffered by any third party.