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**APPENDIX L  
OF  
TEST REPORT T71003\_F**

**USER MANUAL**

**FCC ID:** TVN-MSTRP  
**Manufacturer:** Magellan Technology Pty Limited  
**Test Sample:** PJM Stack Tag Tunnel Reader  
**Model:** MSTRP-5050  
**Serial No:** Production Prototype

**Date:** 25<sup>th</sup> October 2007

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User Manual

**MSTRP-5050 (MLC5/6)**  
StackTag Tunnel Reader/Writer



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## REVISION HISTORY

Version	Date	Person	Reason
Ver.1.0	11.2007	Bodo Ischebeck	

### **To our valued customers**

We constantly strive to improve the quality of all our products and documentation. We have spent time to ensure that this document is correct. However, we realise that we may have missed a few things. If you find any information that is missing or appears in error, please use the contact section at the end of this document to inform us. We appreciate your assistance to constantly improve this document.

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## ABOUT THIS MANUAL

Please read this document before using Magellan's readers.

This manual is designed for use by engineers experienced with Radio Frequency Identification (RFID) devices. Regulatory, safety and warranty notices that must be followed are given in chapter 6.3 and 6.6.

## MEANING OF ALERT SYMBOLS AND SIGNAL WORDS



Notes and Tips. Application Notes.



Requires your attention.



Indicates a potentially hazardous situation which, if not avoided, will result in minor or moderate injury, or may result in serious injury or death. Can cause significant property damage.

## IMPORTANT INFORMATION

### Installation Environment

- For indoor use only unless otherwise specified.
- Install Magellan's readers within the temperature and humidity range according to the product specification. For standard readers the temperature range is from +10°C to +45°C. The humidity range is from 10% to 80% (non-condensing humidity).



The environment must not contain corrosive, flammable or explosive agents or be subject to rapid changes in temperature, to direct vibration or shock.

### Installation

- Magellan's RFID reader-writers communicate with data carriers (RFID inlets, labels and tags) using the 13.56 MHz High Frequency (HF) band. Some industrial machines and electronic devices can generate unwanted noise which may degrade communication. Make sure that other equipment is properly installed, grounded and at a reasonable distance from the reader and/or reader antennas.
- Wireless communication can be degraded by high-voltage and high-current lines and other sources of strong electric and magnetic fields. Installation in such locations should be avoided.



Magellan's RFID reader-writers are to be professionally installed by authorised, qualified and service-trained installation personnel only.

### Maintenance

All Magellan's RFID readers-writers are low maintenance equipment. Except for externally accessible fuses there are no user-serviceable parts in any reader. There is no requirement to remove the cover of the reader.



Removal of the reader cover by unauthorised personnel will void the product warranty.

Do not attempt to clean internally. Periodic cleaning of external case parts with a damp cloth is advisable. Turn off the reader before cleaning. Do not use a solvent of any kind.

### Electrical Safety



In order to avoid electric shock do not remove the reader cover or attempt to repair. The reader must be maintained by authorised, qualified and service-trained personnel only.

### Environmental



For disposal readers should be treated as industrial waste.

This symbol on the product or on its packaging indicates that this product shall not be treated as household waste. Instead it shall be handed over to an appropriate collection point for the recycling of electrical and electronic equipment. By ensuring this product is disposed of correctly, you will help prevent potential negative consequences for the environment and human health, which could otherwise be caused by inappropriate waste handling of this product. The recycling of materials will help to conserve natural resources. For more detailed information about recycling of this product, please contact your local city office, your household waste disposal service or the Magellan Technology regional sales office.

## 1. INTRODUCTION

Thank you for your recent purchase of a Magellan RFID reader-writer.

This User Manual will provide you with information to rapidly adopt Magellan's PJM technology for your needs, to install the reader hardware and ReaderManager software and get the reader running.

Refer to the 66V10 PJM Confidential Data Book (36-10-006-SPC) for the description of the PJM ItemTag® and PJM StackTag® products of Magellan Technology.

Refer to the ReaderManager Guide (40-01-006-DOC) for a description of the various tools and advanced options available in the ReaderManager software.

Programming is covered in the Application Programmer's Guide (40-01-000-DOC).

Refer to Appendix 6.3 of this manual for details of the Regulations and Standards to which this product complies.

For details of Product Warranty refer to Appendix 6.6 of this manual.

For a Glossary of Terms and Abbreviations used in this manual, refer to Appendix 6.4

Magellan reserves the right to change its product design, specifications and product range without notice. This document is subject to change without notice.

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## 2. BEFORE YOU BEGIN

### 2.1 UNPACKING AND INSPECTION

When you receive your system, inspect it for any obvious damage that may have occurred during shipment. If there is damage, notify the shipping carrier and the supplier of the equipment or Magellan if purchased directly from Magellan.



Until you have checked the system, save the shipping carton and packaging materials in the event the unit has to be returned.

The standard MSTRP-5050 package includes the following components:

- Tunnel reader/writer
- Quick Start Guide
- CD-ROM

#### 2.1.1 POWER PACK

The reader is connected to the mains socket via a 3-lead power cable.



A power cable is not included. End-users should purchase a power cable suitable for the country in which the equipment is being used.



Only power cables and adapters that are compliant with the regulations in the country of use may be connected to Magellan's equipment.

Refer to the 4.2.1 Connecting to a Power Supply section of this manual.

## 2.1.2 DATA COMMUNICATION CABLES

The reader can be connected to the network through a normal USB cable, Ethernet cable or cross over Ethernet cable.

As shielded cables are generally required in order to comply with EMC emissions limits, the shielded cables recommended by Magellan Technology must be used. Unshielded cables may be used where explicitly allowed by the User Manual.



Ethernet cable is not included with the supply. Magellan recommends CAT5 STP (shielded twisted pair) Ethernet cable.



USB cable should not be longer than 3m.

## 2.1.3 CD-ROM

The CD-ROM contains the following files:

AdbeRdrxx_enu_full.exe	Self-extracting installation kit for the Adobe Acrobat reader, which is required to read and print PDF files.
40-01-000-DOC Application Programmer Guide.pdf	PDF document describing how to program all of Magellan's Readers.
40-01-006-DOC ReaderManager Guide	PDF document describing various tools and advanced options available in ReaderManager software.
49-70-020-DOC User Manual.pdf	PDF version of this document.
ReaderManager-Install.exe	Self-extracting installation kit for the ReaderManager.

Once you installed the ReaderManager software the User Manuals and Guides can be opened in Windows:  
*Start -> (All) Programs -> Magellan Technology -> User Manuals*

## 2.2 RECOMMENDED SYSTEM REQUIREMENTS

Recommended minimum host computer requirements:

- Operating System: Windows XP SP2
- Memory: 128MB RAM
- Hard Drive: 20 GB
- CPU: Intel Celeron 500
- Interface: USB and Ethernet

Power supply requirements:

- Mains input: 110 - 240 VAC @ 50/60 Hz
- Input rating (MSTRP-5050): 12VDC@4A



### 3. PRODUCT OVERVIEW

Magellan's RFID readers are intended to read and write information to individual Magellan ItemTags and multiple Magellan StackTags.

The communication protocol used by the reader is compliant with ISO/IEC 18000 - 3 Mode 2 (Air Interface at 13.56 MHz).

#### 3.1 MSTRP-5050

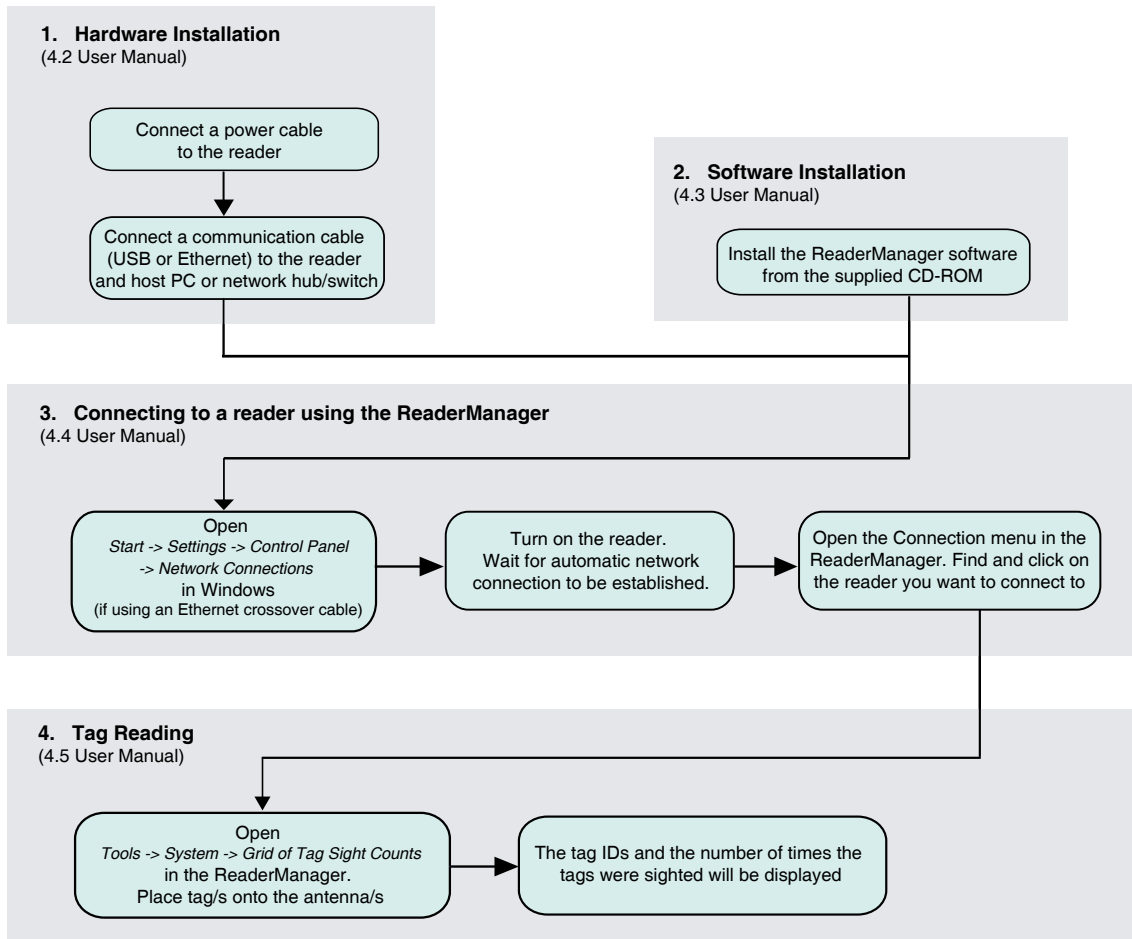
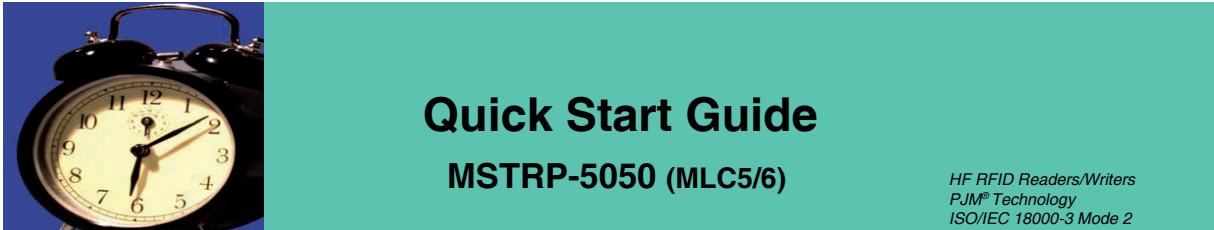
- StackTag Tunnel reader-writer
- Internal aperture: 500 x 500 mm
- Fully shielded
- Three orthogonal internal antennas (guaranteed orientation insensitive operation)
- Rotating field in x, y and z orientation
- 8 PJM reply channels





## 4. INSTALLATION

### 4.1 QUICK START GUIDE





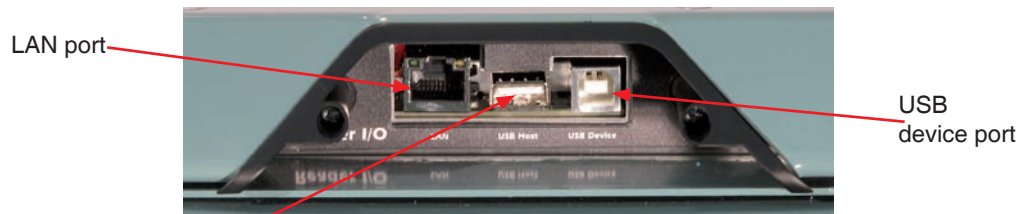
## 4.2 HARDWARE INSTALLATION



Installation overview



Power Installation



MSTRP-5050's LAN and USB Interface

### 4.2.1 CONNECTING THE READER TO A POWER SUPPLY

Connection to the power source is realized via a power cable. The power cable is not supplied with the reader and recommended to be purchased in the country of use. Refer to the Unpacking and Inspection section of this Manual.

- Step 1:** Connect the reader to a host computer or a network hub/switch using an Ethernet cable. Use a crossover cable to connect the reader directly to the network interface port on the PC. Alternatively use a USB cable to connect the tunnel to a PC.
- Step 2:** Turn on the PC or network hub/switch.
- Step 3:** Connect the power cable to the main power socket and use the external power switch to turn on the reader

### 4.2.2 CONNECTING A READER TO A COMPUTER USING USB

Connect the MSTRP-5050 reader to a host computer using the USB data communication cable by plugging the USB cable into the MSTRP-5050 USB device port and the host computer USB port.



Only one Magellan reader can be connected to the PC via USB at a time (limited by Windows).



When the USB connection is used only a screened USB cable should be used.

### 4.2.3 CONNECTING A READER TO A COMPUTER USING ETHERNET

Connect the MSTRP-5050 reader to a host computer using a cross over Ethernet cable. Plug the Ethernet communication cable into the MSTRP-5050 Ethernet port and the network interface port on the PC.



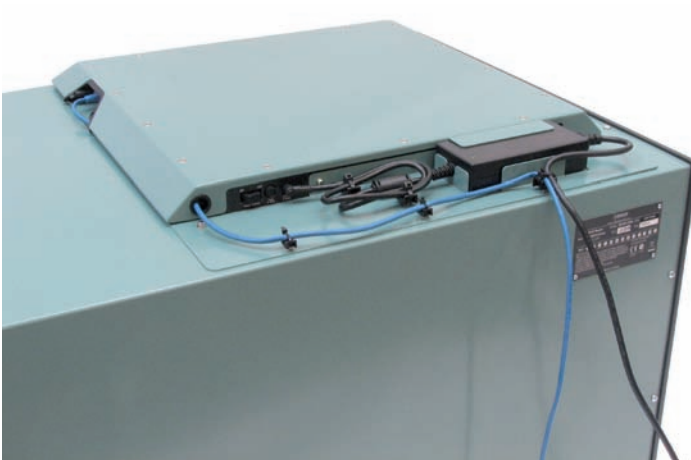
Always connect the Ethernet cable before power is applied to the reader.



Ethernet Installation 1



Ethernet Installation 2



Ethernet Installation 3

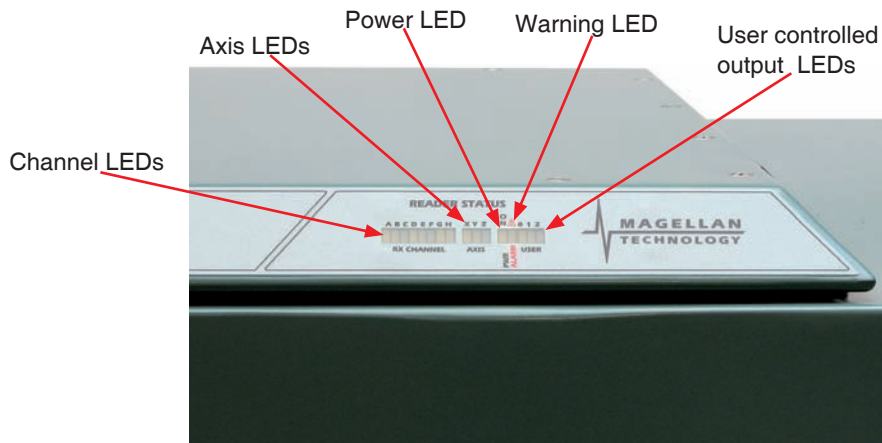
## 4.2.4 CONNECTING MULTIPLE READERS TO A LOCAL NETWORK

Multiple readers can be connected to a local network using an Ethernet hub/switch. Plug the Ethernet communication cable into the MSTRP-5050 Ethernet port and Ethernet hub/switch.



Always connect the Ethernet cable before power is applied to the reader.

## 4.2.5 LEDs



When power is applied to the MSTRP-5050 reader the LEDs should operate as follows:

1. the green Axis, Power and Channel LEDs will come on immediately



2. then they will go off in about 1 minute
3. the green Axis and Power LEDs will come on again in 1-3 seconds and remain permanently lit indicating that the unit is in an operational mode; the green Channel LED will be off

4. once the unit is in an operational mode the green Channel LEDs will flash every time a tag is successfully read



LEDs are controlled by the MSTRP-5050 software

The Warning LED shows a DSB malfunction and is always OFF. If the red light of the Warning LED is ON it means that the reader is faulty



Before power is applied to the reader the Ethernet cable must have been connected to an operating PC or network hub/switch

## 4.3 READERMANAGER SOFTWARE INSTALLATION

The ReaderManager application software allows tag data to be viewed and programmed.

The ReaderManager can only connect to one reader at a time. The Connections menu allows the user to connect to other readers by disconnecting from the currently connected reader and then establishing a connection to a new reader.

It is possible to run many ReaderManagers on the same computer at the same time. Simply double click on the ReaderManager icon to open up multiple instances of the ReaderManager.

Refer to the ReaderManager Guide (40-01-006-DOC) for various tools and advanced options available in the ReaderManager.

### 4.3.1 INSTALLATION AND FUNCTIONALITY TEST

**Step 1:** Insert the CD supplied with the reader into the CD-ROM.

**Step 2:** Open Windows Explorer, double click on *ReaderManager-Install*.

**Step 3:** Ensure all items in the Install dialog are ticked, and then click the *Install* button.

If Python is not installed on your computer, the installation program will prompt you if you would like to install Python. Click the *Yes* button and accept all the default options during installation.

When the ReaderManager and all the required libraries are installed the dialog box will be displayed. Ensure the dialog box shows *Completed* and no problems are reported.

**Step 4:** Click the *Close* button to continue.

If the ReaderManager is already installed, double click *ReaderManager-Upgrade*. Follow steps 3 to 4 above.

If Python and PyQt are already installed, the installation program will not re-install them. To force the installation program to re-install these libraries, click the relevant check boxes.

**Step 5:** To start the ReaderManager double click the *ReaderManager* icon or select *ReaderManager* from the Programs Start menu.



**Step 6:** Functionality test.

Select *Help>About ReaderManager* from menu to see the version of the ReaderManager software and its status.

### 4.3.2 UPGRADING SOFTWARE



Magellan recommends to upgrade the ReaderManager software at least once a month and ReaderServer software on network based readers every 3-4 months.

You are able to download the latest version of the ReaderManager operating software from Magellan's website. Contact Magellan or its representatives to receive a user name and password.

Refer to the ReaderManager Guide (Upgrading Reader Software) for more information about how to upgrade the ReaderServer from the ReaderManager *File* menu.

## 4.4 CONNECTING TO A READER USING READERMANAGER



Magellan's readers are complex and powerful network devices. As most network devices they should be handled by well trained network administrators.

The tunnel provides an Ethernet and USB device interface to allow for user connection.

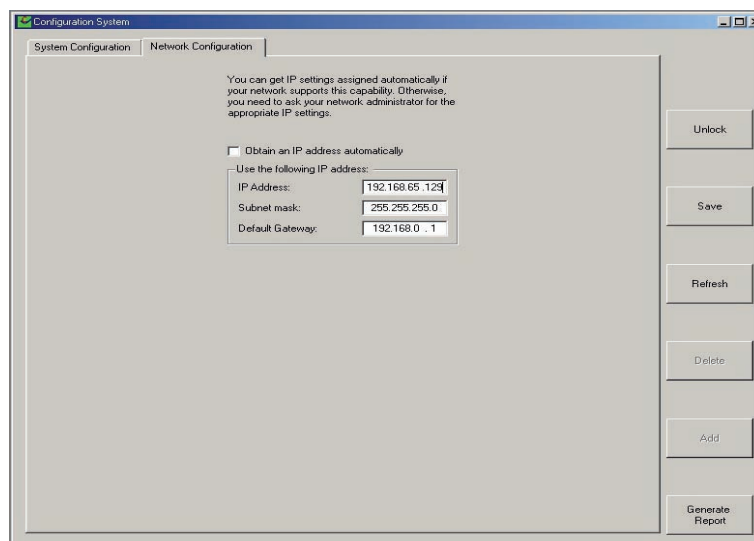
Before you open the ReaderManager and connect to a reader using the ReaderManager you must obtain an Ethernet IP address if you are using a normal Ethernet cable or an Ethernet cross over cable or acquire a USB IP address if you are using the USB cable.

These are the networking rules:

- USB will always choose a subnet different to Ethernet.
- Both interfaces will try to obtain the 169.254.0.0 range, but Ethernet has priority.
- 172.16.0.0/16 is USB's fallover subnet if Ethernet has already taken it by either: DHCP, fixed, or link-local IP acquisition.

#### To change the reader's network settings:

From the Tools menu in the ReaderManager select *System* then *Configuration System*. Click the *Network Configuration* tab.



If the reader is to be assigned an IP address from a DHCP server click the *Obtain an IP address automatically* check box.

To assign a static IP address, uncheck the check box and enter the IP address in the *IP address* text box. The box will turn red if the IP address is not valid.



Care should be taken not to duplicate IP addresses on your network. If you are unsure what IP address to use consult your system administrator.

Enter the network *Subnet mask* and *Default gateway* addresses in the text boxes provided.

Click the *Save* button to save these changes to the reader, or click the *Refresh* button to restore the last saved values.

Restart the reader for these changes to take effect.

#### 4.4.1 GETTING AN IP ADDRESS USING ETHERNET

Here is a general guide to the way Reader network address assignment works:

The Ethernet interface is either served an IP address via DHCP or is assigned a static IP address by the user. If the Reader is set to use a DHCP assigned address and no DHCP server is available it will automatically use a link local address of 169.254.0.0/16.

The Reader must be powered up with the Ethernet connected to get a DHCP assigned IP address.

By default, the Readers are set to *Obtain an IP address automatically*, which means they look for a DHCP server. If one isn't present, for example when a crossover cable is used to connect to a single PC, the Reader will choose a Link Local address.

A link local address (also known as Automatic Private IP Addressing - APIPA) is one chosen at random in the range 169.254.0.1 to 169.254.255.254 with a netmask of 255.255.0.0.

Windows PCs and most other computers by default will use the same system, which allows an ad-hoc network of computers and Readers to automatically pick unique addresses. This can work for a crossover cable between a single Reader and a computer or a more complex setup involving multiple Readers and multiple PCs using a normal Ethernet cable and Ethernet hub/switch.

This system is very good to use because it requires no expertise or intervention from users.

The below process has been discussing automatic address negotiation only.

In order to successfully connect a Reader via a crossover cable follow these steps:

**Step 1:** In Windows, open the *Start -> Settings -> Control Panel -> Network Connections* window

The PC's Ethernet connection should be marked as disconnected

**Step 2:** Plug in the cross over cable. Turn the reader on. The user should instantly see the state of Ethernet change to *Looking For An Address*.

This process may take up to a minute.

**Step 3:** Eventually it should go to the state *Limited Or No Connectivity*. In the desktop icon tray, the Ethernet will be marked with a yellow triangle.

This means that Windows was looking for a DHCP server, but was unable to find one, so it used a Link Local address (169.254.X.X) instead. Even though it looks like an error, this is what we would expect to see.

**Step 4:** Left click on the Ethernet connection and look in the *Details* box on the bottom of the left hand side panel of the *Network Connections* window. You should see the IP address in here.



If the address here is not 169.254 followed by 2 other numbers, then the user needs to check the following:

1. Right click on the Ethernet connection in the *Network Connections* window.
2. Select the *Properties* menu option.
3. In the properties window, look in the list of items for *Internet Protocol (TCP/IP)*.
4. Double click on this item
5. In the *Internet Properties* window, click on the *Alternate Configuration* tab
6. Make sure that the *Automatic private IP address* radio button is the selected one.
7. If it is not, then select it and click *OK*.

In some PCs this setting could be on a manual address, which would prevent Link Local addressing from functioning.



Note that older versions of Reader OS software used a different system. It is important that all Readers are upgraded to 2.03 or above in order to use this functionality.

**Step 5:** Go to the section 4.4.3

## 4.4.2 GETTING AN IP ADDRESS USING USB

The USB interface uses TCP/IP networking over USB as the protocol. This allows you to connect to a reader as if it was a normal network. So all the usual services, such as telnet and FTP are available.

Any device hardware when it's first connected to a PC via USB requires a device driver. The device driver is provided by Microsoft (Windows XP SP2). No USB device drivers are available instantly. They have to be installed and require a certain amount of configuration. The driver must be installed on the PC before Windows can use the connection. The device driver requires a configuration file for the reader which is installed on the PC via the ReaderManager.



When you install a new reader for the first time it can take from 1 to 5 minutes to create a network connection before the ReaderManager is able to recognize a new reader.

Since every reader has a unique serial number, Windows treats it as a new device and you will have to install the device driver again for each new reader that you connect to the same PC. Since the device driver files are already on the reader, Windows can search for the driver automatically.

In order to connect to a reader via USB for the first time follow the steps below:

**Step 1:** Open *Network Connections* in Windows (Windows XP SP2) to view the network connection process.

You can verify that the reader is connected by looking at the *Network Connections* window. You can open this window from several places: *Start -> Settings -> Control Panel -> Network Connections* or *My Computer -> Other Places -> My Network Places -> View Network Connections*.

**Step 2:** Make sure that the USB and power cables are plugged in. Turn on the reader. The *Found New Hardware* dialog box will be displayed.

When a reader is connected to a host computer for the first time using a USB, there are a few steps to go through before the ReaderManager is able to identify the new reader:

1. In *Found New Hardware Wizard* tick *Yes, this time only to search for software* and press *Next*.
2. In *What do you want wizard to do?* tick *Install the software automatically* and press *Next*.
3. Wait while the wizard installs the *Linux USB Ethernet/RNDIS Gadget* device driver. Ignore other message and press *Continue anyway*.
4. Press *Finish*.

**Step 3:** Wait until you see a new entry appears in the Network Connections list called "Linux USB Ethernet/RNDIS Gadget". This is the reader.

If it says *Acquiring IP address* then you must wait until it says *Connected*.

The reader's network connection will say:

1. *Local Area Connection X*
2. *Connected*
3. *Linux USB Ethernet/RNDIS Gadget*

Once it says *Connected* in the *Network Connections* window (Windows XP SP2) you can go to Step 4.

If it says *Disabled* or *Broken*, then click right and select *Repair* or *Enable* to try and fix the connection. If this fails, disconnect the reader, reboot your PC and repeat from Step 1.

The reader can disconnect in situations where it has been repeatedly plugged and unplugged before Windows has had a chance to properly and completely process the network connection. In this situation it is possible for the reader to appear on the network for about a minute before it is disconnected by the Windows networking system.

The solution is:

1. Unplug the reader.
2. Wait for the reader's network connection to be removed from the *Network Connections* window.

Once the network connection has been removed:

1. Plug the reader back in.
2. Wait for the network connection to re-appear and become *Connected*.
3. Connect to the reader via the ReaderManager.

Another solution is to try another USB port as USB ports can fail on PCs. As with the previous case:

1. Unplug the reader.
2. Wait for the network connection to be removed.
3. Plug the reader into another USB port.

Windows networking can take some time (a few minutes) to create the network connection if the reader has been rapidly plugged and unplugged. If the reader network device does not disappear within 5 minutes of being disconnected, reboot your PC as then there is a problem with Windows Networking or the USB port has locked up.



You should NEVER power cycle a reader because you are having problems with your PC or with Windows. Power cycling can cause more problems with Windows and Windows networking.

Most USB problems are usually caused by Windows networking delays and Windows networking problems. Frequent unplugging of the USB cable will create even more problems.

**Step 4:** Go to the section 4.4.3.

### 4.4.3 GETTING A READER CONNECTED USING THE READERMANAGER

**Step 1:** Open the ReaderManager.

ReaderManager will automatically detect all readers on the local network. When a reader is connected for the first time to a network using an Ethernet cable or a host computer using a USB cable, the reader is identified by its Model Name-Serial Number (recommended to keep).

Users can replace or add additional information to the Model Name-Serial Number such as a physical location or customer ID number.

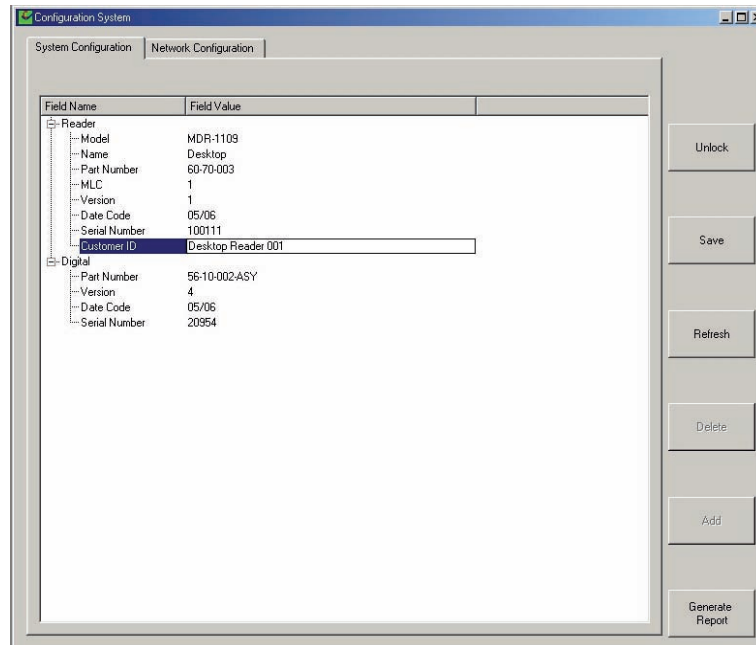
Subsequently when a user starts using the reader the new name will appear on the list of readers in the *Connection* menu.



Tip: If you want to use the new name immediately, simply power cycle the reader to view the new name on the *Connection* menu list.

To change a reader network name:

From the Tools menu, select *System* then *Configuration System*. The window shown below will be displayed.



Click the column on the right of *Customer ID* and enter the name you would like the Reader to be identified as. This is the name that will appear on the *Connection* menu.

Click the *Save* button on the right to save your changes to the reader, or click the *Refresh* button to restore the previously saved name.

**Step 2:** Click the *Connection* menu item to view readers found on the local network.

The ReaderManager will use network broadcasts to look for active readers via USB and Ethernet. If you click on the *Connection* menu, you can see readers defined in there automatically.

A list of readers will be displayed. The IP address and MAC address will be shown on the status bar as you move the mouse over each reader entry.

**Step 3:** To connect to a reader, select the reader you would like to connect to from the *Connection* menu, then click the left mouse button.

The status bar will change from a red to a green background to indicate that the ReaderManager was able to connect to a reader. The tag type and IP address are also shown on the status bar.



To get more information how to setup static connections to readers please refer to the ReaderManager Guide (40-01-006-DOC).

## 4.5 COMMUNICATION TEST

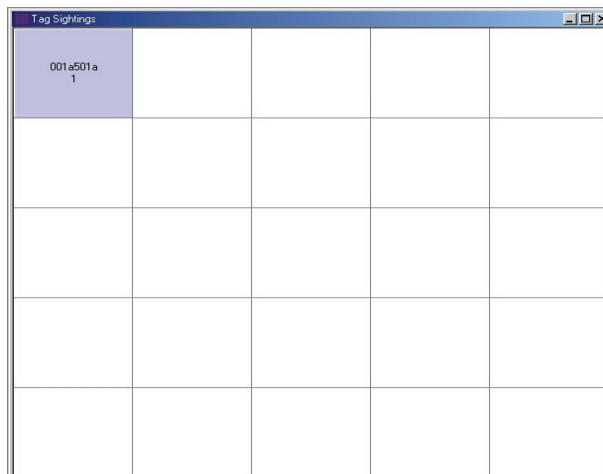
Perform the tag reading test by selecting *Tools -> System -> Grid of tags sight count*.

Check some default settings in *Tools -> System-> Reader Settings*:

- *Tag Type*. Default is *IFX\_STACK*. If you use ItemTags the default should be changed to *IFX\_ITEM*. If you want to read both IT and ST tags the *Tag Type* should be *IFX\_STACK*.
- The *Powering Field* box should be ticked.

Use one of the fully powered tags, place the tag on the reader antenna.

The first square in the grid should turn from white to blue and display the tag's ID number and the number of times the tag was sighted (should be one). An example of this is shown below.



001a501a 1				

## 5. WORKING WITH TAGS

Do not stack Magellan ItemTags on top of each other or allow them to touch or overlap. Only Magellan StackTags can be stacked, overlapped or allowed to touch each other.

Single-axis antennas are tag orientation sensitive. Refer to the Tag-to-Reader/Tag-to-Antenna section of this document.

Reading and writing speeds depend on reader-tag communication speeds, the number of receiver channels, the amount of information to be read and/or written and the number of tags presented at a the same time. The number of tags and the amount of information to be read and especially written, slows down the read-write communication speed. Please consult Magellan regarding these issues for your specific application.



Be aware that tags and readers can be incompatible with each other. Larger tags can work with all types of readers and antennas. Smaller tags require higher field strengths and as a result they may not operate with some reader/antenna combinations or have to be closer to a reader antenna to operate. Refer to the Reader-Tag Compatibility section of this manual.

Magellan StackTags delivered on a roll are always fully powered (ST normal power mode or 6000 mode). Fully or normal powered tags are ON all the time and reply to each reader command providing they are in the field of the reader antenna.

To reduce the risk of tag replies clashing and to increase anti-collision and stackability for some applications the tags can be reconfigured by end-users to a ¼ low power mode (ST ¼ normal power mode or 2000 mode). This means that tags in the ¼ low power mode are muted ¾ of the time and do not reply to the reader commands instantly.

Tags can be reconfigured individually (one by one) or en masse (many at once). **Before reconfiguring tags make sure the ReaderManager software has been installed and upgraded to the latest version, the reader is running and the reader is *Connected* to the ReaderManager software.**

### 5.1 HOW TO RECONFIGURE TAGS INDIVIDUALLY OR EN MASSE

1. In the ReaderManager go to *Tools -> System -> Console*. Click with the right mouse button and tick *Show Tag Replies*.
2. Then go to *Reader Configuration* and choose *Config\_Normal\_Powered\_Tag* or *Config\_Quarter\_Powered\_Tag* (for the ReaderManager version 2.12 or higher).
3. Place a single tag or multiple tags into the reader antenna field.
4. Remove the tag(s) from the field.
5. Follow the step 3 to 4 for a new batch of tags.
6. Once completed go to *Reader Configuration* and click on *Clear All*.

## 5.2 HOW TO CHECK A TAG CONFIGURATION MODE

The tag configuration mode can be checked with the ReaderManager:

- Go to *Tools -> System -> Interrogate Command*.
- In Reply select *Normal* and click *Send*.
- Then go to *Tools -> System -> Table of Tag Messages* to see the tag configuration in the Config column. The messages of all the tags currently in the reader antenna field can be seen. 2000 means that the tag has been reconfigured to ST ¼ normal power mode configuration. 6000 means that a tag is in ST normal power mode.

## 5.3 HOW TO CHECK A TAG CHIP TYPE (IT OR ST)

The tag chip type can be checked with the ReaderManager:

1. Go to *Tools > System > Tag Memory Map*
2. Place a tag on the antenna. The tag ID# will appear below “Current tags”
3. Left mouse click on the ID#
4. The chip type can be seen in the “Value” column of the System Memory in line “0”:

**4000** means ItemTag chip  
**4001** means StackTag chip

## 5.4 TAG-TO-ANTENNA ORIENTATION

The MSTRP-5050 is a three axis tunnel reader which generates a rotating field in x-, y- and z-orientation. Tags will operate in all orientation and positions inside the internal operating volume. With StackTags, multiple closely stacked tags can be presented in all orientations.



The internal operating volume starts 20-cm inside from both ends of the reader tunnel.

The smallest ST tags that can work with the reader are the 35 mm diameter and 26 x 56 mm (Refer to the Reader-Tag Compatibility Appendix of this Manual).



Closely stacked items with high metal content will be identified reliably if the RFID tag is bent around the corner of the item. Thus the tags will not be completely covered by the metal and identification will not be blocked.



RFID tag bent around the corner of the item





## 6. APPENDIX

### 6.1 READER-TAG COMPATIBILITY

Maximum Read-Write Distance* (MRD), mm		READER-WRITERS				
		MARS and round external antenna (124 mm dia.)	MSTRP-5050	MDOCR-505	MDR-1109	MTR-1310
STACKTAGS	76 x 45 mm, 5 turns	235	✓	✓	60	✓
	76 x 45 mm, 2.5 turns	170	✓	✓	30	✓
	73 x 37 mm, 3 turns	165	✓	✓	30	✓
	56 x 26 mm	220	✓	✓	55	✓
	48 x 16 mm	105	✓	✓	10	
	35 mm diameter	170	✓	✓	40	✓
	25 mm diameter	120			15	✓
	20 mm diameter	105			10	
	28 x 16 mm	120			15	✓
	20 x 15 mm	95			10	
ITEMTAGS	76 x 45 mm, 5 turns	385	✓		110	✓
	20 x 15 mm	130		✓	25	✓
	9 mm diameter	135		✓	20	

- \* Measured for a single tag. The RCA cable length is 1.5 m (standard cable).
- ✓ Tags operate inside an internal volume or shrouded area

## 6.2 SPECIFICATIONS

- Read and write operations
- No manual calibration needed
- Automatic tuning
- No user-serviceable parts
- Fully shielded
- ISO/IEC Compliance 18000-3 Mode 2
- Operating Frequency 13.56 MHz
- Number of Axes: 3
- Number of PJM Reply Channels: 8
- Command Data Rate of 424 kbit/s
- Reply Data Rate of 106 kbit/s per channel
- Operation Range: Internal Volume
- Tag Type: PJM StackTag® and PJM ItemTag®
- Conveyor belt speed: Up to 5 m/s
- Internal Aperture: 500 x 500 mm
- External Dimensions (L x W x H): 1010 x 610 x 710 mm
- Net Weight: 120 kg
- Net Volume: 0.44 m<sup>3</sup>
- Shipping Dimensions (L x W x H): 1220 x 1000 x 1030 mm
- Shipping Weight: 200 kg
- Shipping Volume: 1.25 m<sup>3</sup>
- Input rating: 12VDC @ 4A
- Mains Input: 110 - 240 VAC @ 50/60 Hz
- Power Consumption: 125 W
- Operation environment: Indoor use
- Temperature range: +10°C to +45°C
- Humidity: 10% to 80% (non-condensing)
- Recommended Minimum Host Computer Requirement:  
Windows XP SP2/ 500 MHz CPU/ 128MB RAM
- Host Interface: USB and Ethernet

## 6.3 REGULATION AND STANDARDS

RFID equipment is subject to national and international regulations.

### 6.3.1 FCC RADIO FREQUENCY INTERFERENCE STATEMENT (USA)

The FCC regards RFID equipment as low-power transmitting devices and, therefore, does not require users of RFID devices to obtain a license to operate them.

NOTE: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorientation or relocation of receiving antenna
- Increase the separation between the equipment and receiver
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected
- Consult the dealer or an experienced radio/TV technician for help



Any changes or modifications to the equipment that are not expressly approved by the party responsible for compliance could void the user's authority granted under FCC Rules to operate this equipment.

**FCC ID: TVN-MSTRP**

### 6.3.2 INDUSTRY CANADA RADIO FREQUENCY INTERFERENCE DECLARATION OF CONFORMITY

This Class A digital apparatus complies with Canadian ICES-003.  
Cet appareil numérique de la classe A est conforme à la norme NMB-003 du Canada.

**ICES\NMB-003 IC: 6569A-MSTRP**

This apparatus complies with ETSI EN 301 489-1 RF common mode immunity requirements on Ethernet Port with shielded CAT5 Ethernet Cable.

Intended use of the equipment is as a Reader to read and write information to multiple or individual tags.



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

### 6.3.3 ISO/IEC 18000 – 3 MODE 2 (AIR INTERFACE AT 13.56 MHz) COMPLIANCE

Magellan's readers fully comply with the ISO/IEC 18000 Part 3 Mode 2 (Information technology – Radio frequency identification for item management. Part 3: Parameters for air interface communications at 13.56 MHz) published in August, 2004.

### 6.3.4 HUMAN SAFETY



Customers using the MSTRP-5050 readers are responsible for operating their system under implemented power levels against relevant standards for human safety in electronic field.

## 6.4 GLOSSARY OF TERMS AND ABBREVIATIONS

Antenna	A reader antenna that emits radio waves and receives reply signals from tags. The reader antenna can be internal which is integrated into the reader and external which is connected to the reader via a cable.
D/C	Date Code (month/year)
DSB	Digital Support Board
HF	High Frequency (13.56 MHz)
GUI	Graphical Use Interface
IT	ItemTag (chips, inlets and labels)
ItemTag (IT tags)	Magellan's labels and inlets for item tagging (separated items) that work with Magellan's family of reader-writers
LAN	Local Area Network
LED	Light Emitting Diode
MLC	Machine Level Control (System Configuration Control)
<i>Network Connections window</i>	In Windows XP open <i>Start-&gt; Control Panel-&gt; Network Connections</i> or open <i>My Computer-&gt; Other Places-&gt; My Network Places-&gt; View Network Connections</i>
OEM label	Original Equipment Manufacture label is located on the back of the equipment. It includes the Model Number, P/N, D/C, S/N and MLC.
PJM	Phase Jitter Modulation or PJM™ is a registered Trade Mark of Magellan Technology Pty Limited. PJM is a RFID communication technology developed and patented by Magellan Technology Pty Ltd and complies with ISO/IEC 18000-3 Mode 2. PJM technology products include a range of RFID chips, inlets, tags and readers.
PJM ItemTag®	Registered Trade Mark for Magellan's ItemTag tags
PJM StackTag®	Registered Trade Mark for Magellan's StackTag tags

P/N	Part Number
Power cycle the PC	Close Windows, switch the PC off, remove the power plug and wait for 30 seconds before powering the PC back up again. For laptops this means removing the battery and waiting for 30 seconds. This ensures that the USB host controller chips on the motherboard have had a chance to be fully reset.
Power cycle the Reader	Turn off the power or unplug the power cable from the mains socket. Open the <i>Network Connections</i> window in Windows. Wait for the reader network connection to be removed from the <i>Network Connections</i> window. Plug the reader back in and wait for the network connection to re-appear and become <i>Connected</i> in the <i>Network Connections</i> window. Connect to a reader via the ReaderManager's <i>Connection</i> menu.
Reader/s	Magellan's RFID reader-writer/s
ReaderManager	Graphical user application for Windows/Linux which provides a platform for testing, demonstrations and application development
ReaderServer	Embedded application that provides the standard Application Programmer Interface to serve end-user applications. This application runs on the Reader.
RFID	Radio Frequency IDentification
RFID inlet	A RFID device comprising a microchip and an antenna (etched copper or aluminium or possibly conductive inks) on a flexible substrate (PET plastic film)
RFID label	RFID inlet with adhesive backing (sticky label)
RFID tag	<ol style="list-style-type: none"> <li>1. generic name for RFID inlet and label;</li> <li>2. RFID inlet or label inserted into a housing (glass, polycarbonate, polyamid, epoxy, ABS, etc.)</li> </ol>
RFID reader-writer	Device for reading and writing to RFID tags
RMA	Return Authorisation number
S/N	Serial Number
ST	StackTag (chips, inlets and labels)
StackTag (ST tags)	Magellan's labels and inlets for item tagging (stacked, touched or overlapping items) that work with Magellan's family of reader-writers

## 6.5 TROUBLESHOOTING

### 6.5.1 LEDs

Red Warning LED is on	Reader faulty	Send a service report on the Service Form
Power LED is off	Power cable not connected	Ensure the power cable is connected correctly to both the mains power and to the reader
	Power cable faulty	Replace the cable
	Power adaptor faulty	Replace the power adaptor
	Reader faulty	Send a service report on the Service Form
Absence of the flashing green light of the channel LEDs during tag reading	The tags are too close to the entrances of the reader where they can not be read as the reader antennas are located deeper inside.	Move the tags deeper inside of the Reader internal operating volume. The 20-cm zone inside each of the tunnel entrances does not have any antennas to read tags.
	Faulty tag/tags	Replace tag/tags. Do not use tags with a black dot or black square marking (faulty tags).
	The <i>Powering Field</i> is off	Ensure the powering field is on. Go to <i>Tools&gt;System&gt;Reader Setting</i> . Tick the <i>Powering Field</i> box.
Green channel LED flash but I can not see any tag message in the ReaderManager	USB and Ethernet connection is not functioning.	Ensure the communication cable is plugged in or replace if faulty.
	The reader is not <i>Connected</i>	Ensure the reader is turned on and a communication cable is plugged in. In the ReaderManager open the <i>Connection</i> menu. Find the reader you want to connect to on the list. The status bar in bottom right corner of the ReaderManager window has to show an indication <i>Connected</i> , the tag type and the IP address.
	The tag type is incompatible with the reader	Use the appropriate tag type according to the chart in the Reader-Tag Compatibility section.
	A communication tool has not been chosen	Choose <i>Grid of tag sight counts</i> or <i>Table of Tag Messages</i> from <i>Tools-&gt;System</i> menu to view tag replies.



## 6.5.2 CONNECTING A READER

<p>Can not find and connect to the reader - reader is not shown on the <i>Connection menu</i> list</p>	<p>The reader was not in the operational mode when you connected a communication cable and/or opened the <i>Connection menu</i></p>	<p>Plug in the communication and power cables. Wait for about 1 minute after you apply power to the reader. The green Axis LED must be permanently lit and the green Channel LEDs off. Open the <i>Connection menu</i> in the ReaderManager. Find the reader you want to connect to on the list.</p>
<p>PC does not recognise the reader at all</p>	<p>The USB port on the PC is broken</p> <p>USB port has temporarily failed</p> <p>The reader is faulty</p> <p>USB cable faulty</p>	<p>Use another USB port known to be working.</p> <p>Power cycle the PC.</p> <p>Check the reader on two other PCs. If no PC shows any response at all to the USB cable being plugged in then it's faulty. Send a service report using the Service Form.</p> <p>Change the USB cable.</p>
<p>PC recognises the reader, but claims that it is faulty in the Windows' Device Manager and does not create a network connection</p>	<p>Windows has previously marked the reader as faulty and will not try to connect to it or load the reader driver. Usually caused by rapidly unplugging and plugging of the USB cable.</p>	<p>Make sure that the USB cable is unplugged and the reader is turned off. Remove/Uninstall the faulty device from the Device Manager, then plug the USB in, turn the reader on and wait for a network connection again. Alternatively connect a different reader to the PC as it will have a different serial number and Windows will not flag it as faulty.</p>
<p>The reader is connected, and appears to be working correctly but the network connection drops out after a few seconds</p>	<p>The reader was replugged too quickly before Windows finished processing the previous network connection</p> <p>USB hub does not work properly</p>	<p>Wait at least 30 seconds before replugging any reader into the same PC or wait until the network connection disappears</p> <p>Power cycle the PC. Try a rear USB port on the PC to connect the USB cable. Avoid using an external USB hub.</p>
<p>No network connection can be made to the reader but the Network Connections window shows that the reader is connected and all other network status information indicates that networking should be working</p>	<p>The USB port on the PC has stopped working for an unknown reason.</p>	<p>Use another USB port. If this fails, power cycle the PC.</p>

## 6.6 REPORTING A PROBLEM

If after following the checks and procedures outlined in the Troubleshooting section, you are still having a problem with a Magellan reader, you will need to send a report to Magellan.

To make the diagnosis quicker and easier, please supply your problem report on a Service Form along with the following information:

- What kind of tags are you using and how many are you putting inside the Reader at one time?
- Have this Reader and the tags you are using worked at any time in the past?
- Have you tried connecting to the Reader with a different PC?
- Have you successfully installed the ReaderManager application?
- In the ReaderManager, select the Help/About ReaderManager menu item and record on the Service Form what version numbers are shown in the window that appears.
- In the ReaderManager, select the Help>System Report>Get System Information (for the ReaderManager version V2.18 and higher). Zip the file and then email it to us.

The information required in the Service Form about Model Number, S/N, P/N and D/C is located on the OEM label on the back of the equipment.

### 6.6.1 WARRANTY REPAIRS

Before shipping any reader a Return Authorisation number (RMA) must be obtained.



End-users should contact the company from whom they purchased the reader for repair, replacement or refund in accordance with Magellan's terms and conditions of sale.

If you purchased the reader directly from Magellan, contact Magellan for a Return Authorization number (RMA) before shipment.

The copy of the Service Form with RMA must be enclosed in the original or equivalent packing with the RMA number clearly marked on the outside of the box.

### 6.6.2 NON-WARRANTY REPAIRS

If a reader needs repairing after the one year warranty period expires, your support organization or Magellan if you purchased directly from Magellan will first provide an estimate of repair charges. Then upon receiving approval from you the reader can be sent for repair. Refer to above Warranty Repairs information for return procedures.

### **6.6.3 WARRANTY**

Magellan's warranty and liability with respect to products and/or services is for a period of 12 months from date of delivery and is limited to the rectification of faulty workmanship and/or non-compliance by Magellan.

Any liability with respect to components including purchased or free issued items and other materials used in the manufacture of products are covered by, and limited to, any warranty provided by the original manufacturer.

### **6.4.4 LIMITATION OF LIABILITY**

Magellan's warranty excludes products that have been improperly installed or maintained, modified or misused. Notification of claims must occur within the warranty period.

End-users should contact the company from whom they purchase the products for replacement, repair or refund in accordance with Magellan's terms and conditions of sale.

If you purchased the reader directly from Magellan, contact Magellan for a Return Authorization Number (RMA) before shipment.

### 6.6.5 SERVICE FORM (EDITABLE PDF-FILE ON YOUR CD)

## Service Form



Always return a copy of this form along with the product

<b>Contact</b>	Company <input type="text"/> Address <input type="text"/> Country <input type="text"/> Sales Order <input type="text"/> PO Number <input type="text"/> Purchase Date <input type="text"/>	Return Authorisation number (RMA) <input type="text"/> Date <input type="text"/> Technical Contact <input type="text"/> Telephone <input type="text"/> Fax <input type="text"/> Email <input type="text"/>
	From OEM label on the back of the equipment: Model <input type="text"/> P/N <input type="text"/> D/C <input type="text"/> S/N <input type="text"/> MLC <input type="text"/> (first number in order after black dots)	
<b>Product</b>	Describe any hardware modifications made to the unit and modification date: <input style="width: 100%; height: 40px;" type="text"/>	
	Describe problems (see Reporting a Problem): <input style="width: 100%; height: 150px;" type="text"/>	
<b>Reason for</b>		
<b>Return to</b>	If purchased from Magellan: <b>Magellan Technology Pty Limited</b> 65 Johnston St. Annandale NSW 2038 Australia	
	Tel.: +61 2 9562 9800 Fax: +61 2 9518 7620 Email: info@magtech.com.au Website: www.magtech.com.au	

\* End-users should contact the company from whom they purchased the Reader

## 6.7 CONTACT US

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