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APPENDIX L
OF
TEST REPORT T61218_F

USER MANUAL AND READER MANAGER GUIDE

FCC ID: TVN-MARS-24
Manufacturer: Magellan Technology
Test Sample: RFID Terminal
Model: MARS24
Serial Number: Production Prototype

Date: 15th January 2007

HF RFID System

User Manual

MARS-24

Multiple Antenna Reader-Writer System - 24

Document Number : 63-70-006-DOC ver.1
Last Changed : 16 January 2007

Content

📖 Please read before proceeding

Please read and understand this document before using Magellan's Readers.

If you have any questions, comments or suggestions about the User Manual please contact Magellan Technology.

① 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.

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 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).

1.1Regulation and Standards

RFID equipment is subject to national and international regulations.

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:

- Reorient or relocate 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-MARS-24

Industry Canada Radio Frequency Interference Declaration of Conformity (Canada)

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: 6596A-MARS24

EU	ETSI EN 300 330-1 v.1.3.1 (2001-06) ETSI EN 300 330-2 v.1.2.1 (2004-11) ETSI EN 489-1 v.1.5.1 (2004-11) ETSI EN 489-3 v.1.4.1 (2002-08) EN 61000-3.2: 2002 EN 61000-3.3: 1995 Safety: IEC/EN 60950	Pending
AS/NZS	CISPR 22: 2004 4268: 2003	Pending

ISO/IEC 18000 – 3 Mode 2 (Air Interface at 13.56 MHz) Compliance

Magellan's Readers fully complies 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.

1.2 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.

1.3 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.

If purchases the Reader directly from Magellan, contact Magellan for a Return Authorization Number (RAN) before shipment.

1.4 Changes in Product Family, Specifications and User Manuals/Guides

This document is subject to change without notice in future editions.

Magellan reserves the rights to change its product design, specifications and product range.

1.5 Copyrights and Copy Permission

This document shall not be copied, reproduced or transmitted in any form or by any means without written permission from Magellan Technology Pty Limited. This document is protected by copyrights and is intended solely for use in conjunctions with Magellan's products only.

1.6 Meaning of Alert Symbols and Signal Words

	Notes and Tips. Application Notes.

!	This part of the Manual requires your attention.
! CAUTION	Indicates a potentially hazardous situation which, if not avoided, will result in minor or moderate injury. Can cause property damage.
! WARNING	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.
⚠	**Warning!** In order to avoid electric shock follow the instructions provided.

1.7 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.
Antenna axis	The antenna port on the Reader antenna interface the antenna is plugged into.
Antenna tuning	Trimming a reader antenna to its highest possible field strength which corresponds to the highest operating voltage.
Create axis group	Create an antenna group. It means to combine antennas or antenna ports in one group that serve the same purposes or applications.
Configure axis group	Configure group antenna behaviour. It means to set up all antennas in the group to the same behavioural parameters which will be default parameters for this group.
D/C	Date Code (month/year)
DSB	Digital Support Board
HDF	High Density Fiberboard (for MARS only)
HF	High Frequency
GUI	Graphical Use Interface
IT	ItemTag (chips, inlets and labels)
ItemTag tags (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
MDF	Medium Density Fiberboard (for MARS only)
MLC	Machine Level Control (System Configuration Control)
MRD	Maximum Read-Write Distance
Network Connections window	In Windows XP open *Start-> Control Panel-> Network Connections* or open *My Computer-> Other Places-> My Network Places-> View Network Connections*
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	Shut up Windows and switch the PC off at the wall 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 (the power port on the Reader user interface). Open the *Network Connections* window in Windows. Wait for the Reader' network connection to be removed from the *Network Connections* window. Plug the Reader back and wait for the network connection to re-appear and become *Connected* in the *Network Connections* window. Connect to a Reader via the ReaderManager's *Connection* 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 a printed antenna (copper/aluminium/conductive inks) on a flexible substrate (PET plastic film)
RFID label	RFID inlet with adhesive backing (sticky label)
RFID tag	1. generic name for RFID inlet and label; 2. RFID inlet or label inserted into a housing (glass, polycarbonate, polyamid, epoxy, ABS, etc.)
RFID reader-writer	Device for reading and writing to RFID tags
RMA	Return Authorisation number
Setup axis	Setup antenna. To setup an antenna means to match the antenna with its corresponding antenna port by choosing the antenna type from list in the ReaderManager.
S/N	Serial Number
ST	StackTag (chips, inlets and labels)
StackTag tags (ST tags)	Magellan's labels and inlets for item tagging (stacked, touched or overlapping items) that work with Magellan's family of reader-writers

2.Product Overview

Intended use of Magellan's RFID Reader is 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).

2.1MARS-24

Multiple Antenna Reader System – 24

Multiple antenna system (up to 24 antennas)

8 reply channels

3. Before you begin

3.1 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 purchase 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 MARS-24 package includes the following components:

- Reader-writer
- External antennas (up to 24) and connection cables (up to 24)
- Power adaptor
- USB data communication cable
- Quick Start Guide
- CD-ROM
- Test tags (required for Hardware Functionality Test and Communication Test)
- Magellan Antenna Tuning Kit (optional)

Power Pack

The Reader connection to the power source is realized via a low voltage power pack (12VDC output).

! A power cable is not included. End-users should purchase a power cable suitable for the country of use.

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

Data Communication Cables

Magellan supplies USB shielded cable (USB 2.0, 2 m long)

! USB cable should not be longer than 3m

!

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 cabled may be used where explicitly allowed in the Installation Requirements section of this User Manual.

Ethernet cable is not included with the supply.

Magellan recommends CAT5 Ethernet cable.

CD-ROM

The CD-ROM should contain 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.
63-70-006-DOC User Manual.pdf	PDF version of this document.
ReaderManager-Install.exe	Self-extracting installation kit for the ReaderManager.

Once you install the ReaderManager software the User Manuals and Guides can be open in Windows:
Start -> (All) Programs -> Magellan Technology -> User Manuals.

3.2 Installation Environment

Magellan's Readers are designed to operate in indoor environments where temperature and humidity are controlled unless other conditions are specified for customised Readers.

For standard Readers the temperature range is from +10°C to +45°C. The humidity range is from 10% to 80% (non-condensing humidity).

Install the Readers within the temperature and humidity ranges according to the product specification.

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

! WARNING Do not operate this Reader in an environment which contains flammable or explosives gases or fumes.

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 are 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.

In order to avoid electric shock do not remove the Reader cover or attempt to repair. Magellan's reader-writers are to be maintained by authorised, qualified and service-trained personnel only.

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

3.3 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 or Ethernet

3.4 Installation Requirements

Power supply requirements:

Mains input:	110 - 240 VAC @ 50/60 Hz
Low voltage input (MARS-24):	12 VDC @ 2 A

MARS-24 requires special installation and tuning of external antennas. Refer to the ReaderManager User Guide (40-01-006-DOC) for the antenna matching, tuning and testing instructions using the *Reader Setup Wizard* tool.

MARS' external antennas are suitable for applications where many reading points are required. MARS-24 is capable of operating up to 24 external antennas that can be embedded into desk tops or shelves.

Once antennas are placed in the position they are to be used, it is essential that they are fixed in place and tuned. The tuning is to be done only once at installation. All antennas (except the small round antenna 30 mm radius) have an adjustable capacitor that allows for tuning.

Materials

The affect of materials and antenna position on antenna operation may be determined as follows:

Place an antenna on a Styrofoam block and tune for maximum voltage at the antenna center using an Antenna Tuning Probe, digital voltmeter and a trimming tool. Then place the antenna on/into the installation position and measure the maximum voltage again. Compare the voltage values.

A difference of 10% or less is acceptable. If the voltage reduces more than 10%, this indicates the material is adversely affecting the antenna. The user should determine if the reduction in operation is acceptable by measuring read range and stacking operation. If the reduction is not acceptable the antenna may be relocated.

Alternatively use of a plastic spacer of 5 mm between the mounting material and the antenna is recommended where the mounting material is adversely affecting the antenna.

Reader antenna performance may be affected by conductive and metallic materials in the immediate vicinity of the antenna.

Metal, metallic or metallized objects placed next to the Reader antenna may change the characteristics of the antenna affecting the tuning operation and reducing the read range.

It's recommended that the antenna not to be placed closer than 35 cm to any metallic object that is of a similar or larger size to the antenna.

Small metallic objects such as jewelry or coins put on the antenna will have almost no affect on the antenna performance.

If metallic conveyor rollers are a part of an application it's advised to replace them with plastic parts if possible or apply shielding techniques as required.

The materials that antennas are mounted on/into should not be metallic or conductive.

Materials such as wood, laminated MDF, HDF or plywood have a limited conductivity. If an antenna is mounted into these materials some drop in the read range is expected in comparison with the equipment specification.

Plastics are the best materials to embed antenna into provided they are graphite/carbon free.

Try to avoid using black plastics as they may be conductive due to carbon/graphite based colouring agents.

Clear glass is generally not conductive and can be used as a desk top material. Smoked and tinted glass may be conductive and any affect on antenna operation should be determined by measurement.

Distance

Antennas mounted in a close proximity to each other may interfere with each other's operation.

For antennas connected to the same MARS Reader the safe distance between the antenna edges is antenna size dependent and varies from 5 cm (radius 30 mm round antenna) to 15 cm (202x352 mm antenna).

For antennas connected to two different MARS Readers the safe distance between the antenna edges is also antenna size dependent and varies from 30 cm (radius 30 mm round antenna) to 60 cm (202x352 mm antenna).

Do not mount an antenna on a desktop surface if there is a MARS reader immediately below and under the antenna. The distance between the antenna and the MARS reader should be no less than 20 cm. Use extended brackets to increase the distance if required. Alternatively the MARS can be screened from the antenna by a purpose built ferrite shield.

! In general no electronic devices and power adaptors are to be placed within 20 cm of the antenna in any direction.

Before such installations are attempted Magellan must be consulted.

Cables

Do not run any cables under or near antenna. Maintain a minimum distance of 15 cm.

! The cables that connect external antennas with the reader are provided by Magellan. The MARS Readers should only operate with antenna cables supplied by Magellan.

! Any changes or modifications to the equipment that are not expressly approved by the party responsible for compliance will void the product warranty.

How to shield antennas

Antennas may be shielded by a purpose built ferrite sheet only. In special circumstances devices such as keyboards and computers may be placed under antennas where a purpose built ferrite antenna shield (64-50-001) is provide to protect the antenna.

A ferrite shield consists of a sheet of aluminium with ferrite tiles, minimum thickness 5 mm.

Contact Magellan for further information on shielding antennas for you specific application and the specification of the Ferrite Antenna Shield (64-50-001) when planning your installation.

3.5 Antenna Maintenance (Tuning)

Antennas may require periodic re-tuning and testing. Detuning of an antenna may occur if physical environment around the antenna is changed. For example when large metal objects are located near the antenna or electronic devices or cables are placed in close proximity with the antenna. The severity of detuning is dependent upon the size of the metal object and can only be determined by measurement.

Before tuning make sure that metal objects, electronic devices and cables are not closer that the recommended distances in any direction from the antenna.

The purpose of the tuning procedure is to maintain an antenna at its correct operating point. Tuning the antenna means to trim it to its highest possible field strength which corresponds to the highest voltage as measured by a voltmeter with an Antenna Tuning Probe.

Contact Magellan for further instructions for your specific application.

Equipment and Software Required for Antenna Tuning and Testing

- 1 x Antenna Tuning Probe with cable (Magellan Antenna Tuning Kit)
- 1 x RF Trimming Tool (Magellan Antenna Tuning Kit)

Antenna Tuning Kit: Antenna Tuning Probe with a cable and RF Trimming Tool

- 1 x Universal Digital Voltmeter (to measure DC voltages between 1 and 15 volts)
- ReaderManager software– V2.05 or better
- 1 x Tag (fully powered tag)

Tuning Instructions

1. Connect the Antenna Tuning Probe terminals to the voltage and input terminals of the digital voltmeter.
2. Set the voltmeter to measure a DC voltage range greater than 10 volts.
3. Place the Antenna Tuning Probe in the center of the antenna.
4. Using an RF trimming tool adjust the tuning capacitor on the antenna for maximum voltage as measured by the tuning probe.

Quality Assurance/ Quality Control

If the maximum read distance is important for your application then the antennas have to be protected/shielded from the interference with a mounting material firstly and then tuned at maximum voltage.

In case the maximum read distance is not an issue the antennas can work properly even at lower voltage but at a reduced read range.

Method 1

To confirm optimum antenna operation measure the maximum read-write distance.

1. Take a single tag and position it over the Reader antenna center. Do not hold the tag antenna coil or tag inner area with you fingers. Preferably hold the tag edges or use a non metallic carrier to hold the tag.

2. Measure the maximum read distance in mm and compare with the value for the same antenna-tag type in the Maximum Read-Write Distance chart. Refer to this User Manual, Appendix.

3. If the maximum read-write distance is less than the chart value re-tuning may be necessary. If the antenna is correctly tuned then the user should determine if the reduction in read-write distance is acceptable.

Method 2

During an initial tuning procedure measure the maximum voltage using an Antenna Tuning Probe. Record the voltage value for every antenna. To confirm tuning at any time measure the maximum voltage using the Antenna Tuning Probe and compare with the recorded results. The voltage values should be identical otherwise the antenna has to be tuned.

3.6 Working with Tags

Do not stack ItemTags on top of each other. Only StackTags can be stacked, overlapped or touch each other.

Single-axis Readers 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, amount of information to be read and/or written and the number of tags presented at a time. The additional number of tags and information to be read and especially written slows down the read-write communication speed. Please consult Magellan or your support organisation 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. Smaller tags require higher field strengths and as a result they may not operate with some Readers or have to be closer to a Reader antenna to operate. Refer to the Reader-Tag Compatibility section of this document.

StackTag tags 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 decrease tag clashing and 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 to reply to the Reader commands instantly.

Tags can be reconfigured individually (one by one) or on mass (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.

How to reconfigure tags individually or on mass

1. In the ReaderManager go to *Tools -> System -> Console. C*lick 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. Take the tag/tags off the reader.

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*.

How to check a tag configuration mode

1. In the ReaderManager go to *Tools -> System -> Interrogate Command*.

2. In *Reply* select *Normal* and click *Send*.

3. 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*.
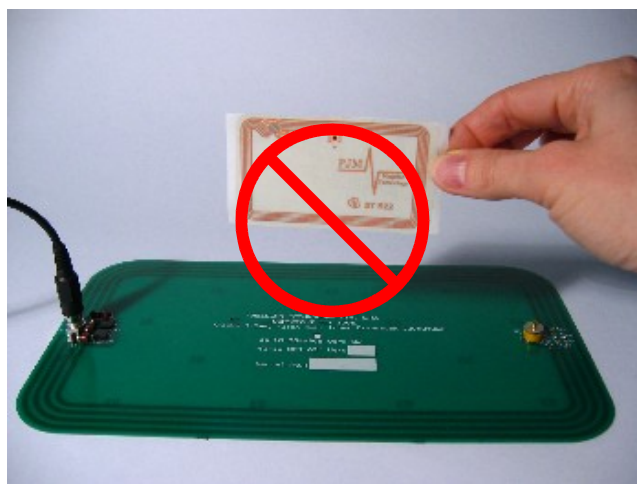
3.7 Tag-to-Antenna Orientation

Tags should always be presented face on to the external antenna surface. They may still work at some angle depending upon the distance between the tag and the external antenna.

Correct orientation
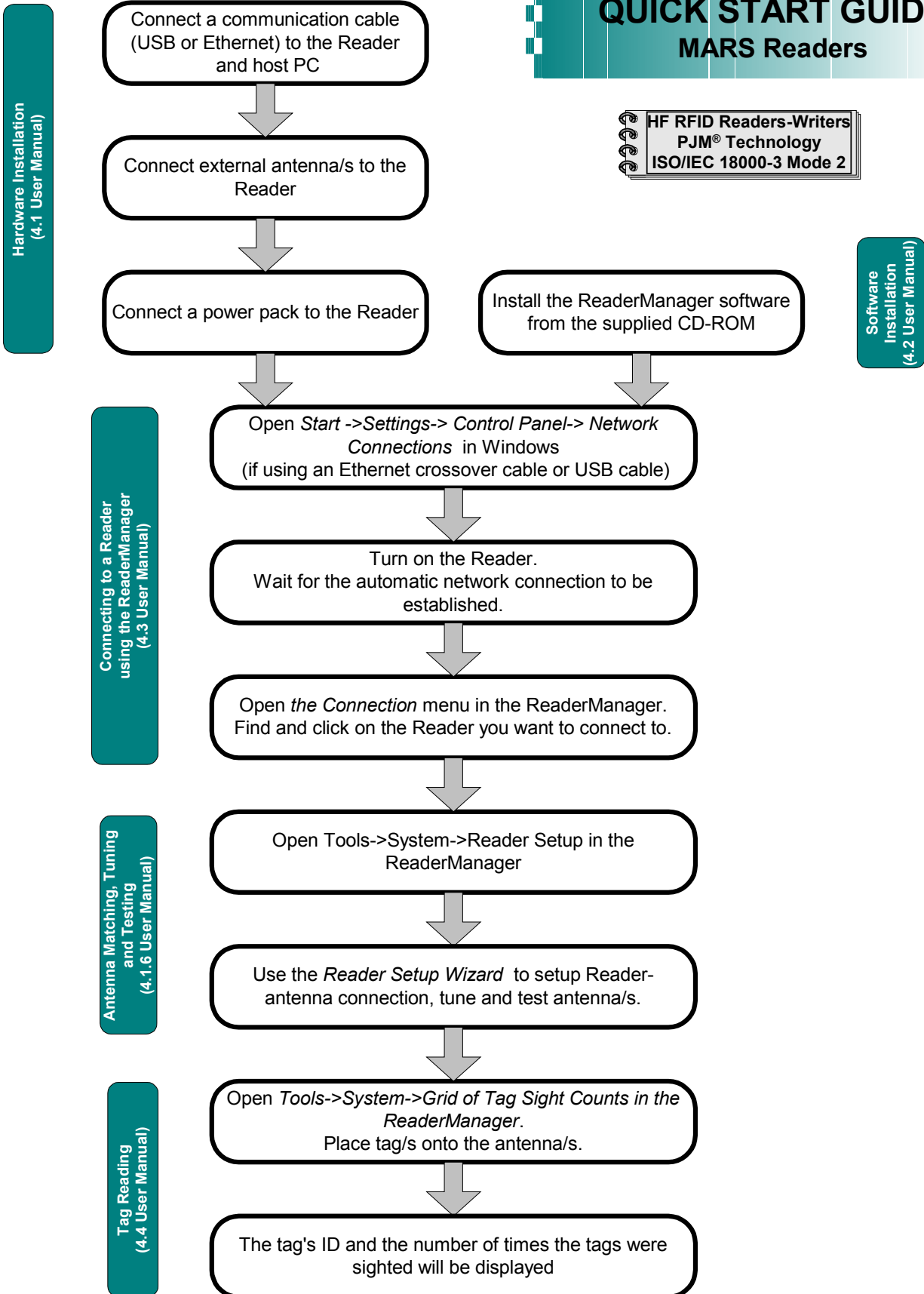

Correct orientation
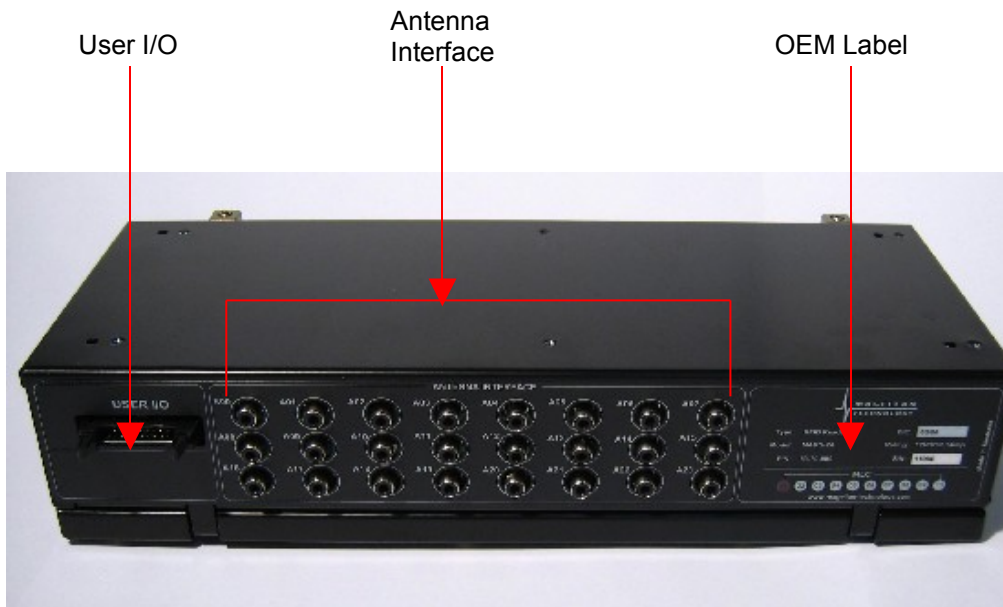

Incorrect orientation (90° angle)

4.Installation

QUICK START GUIDE
MARS Readers

HF RFID Readers-Writers
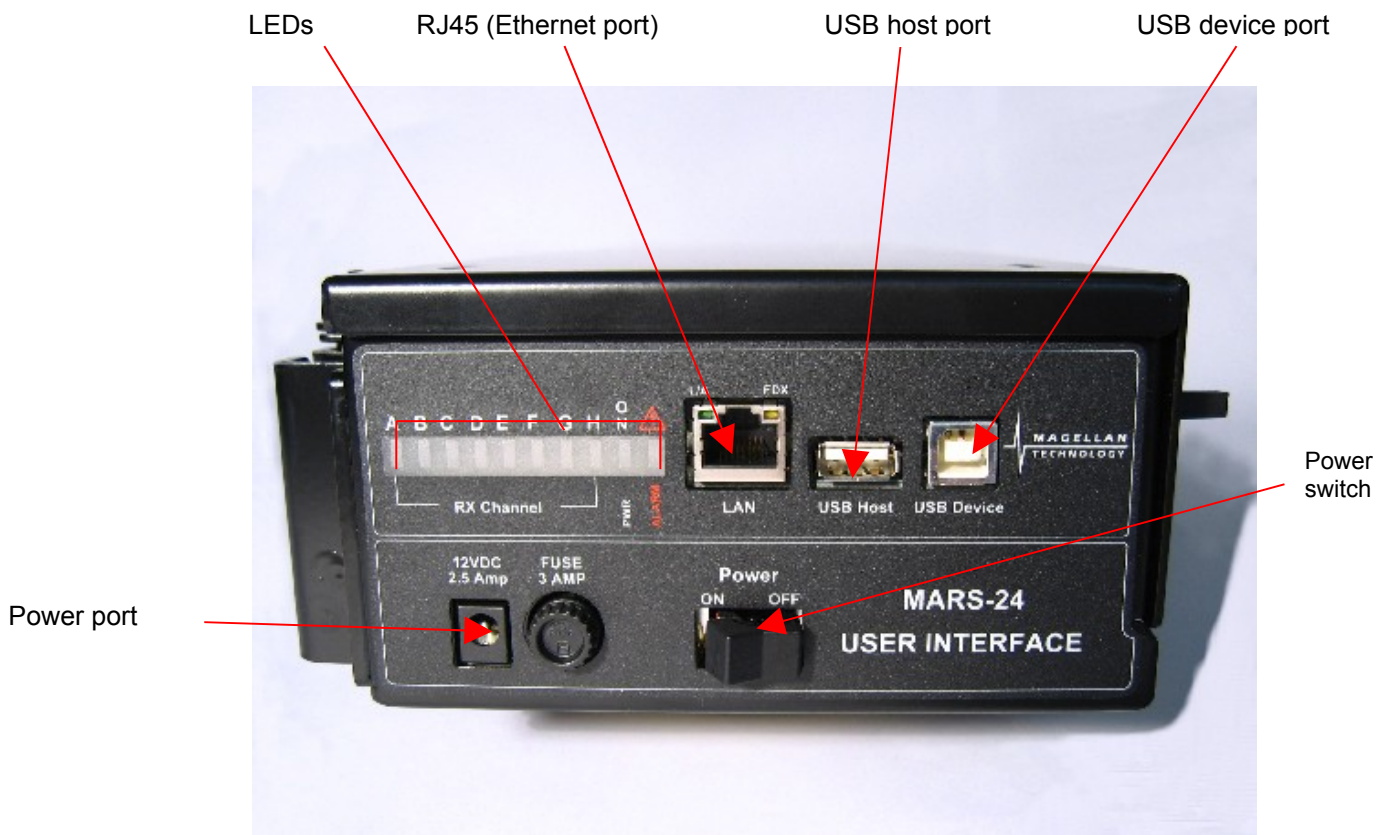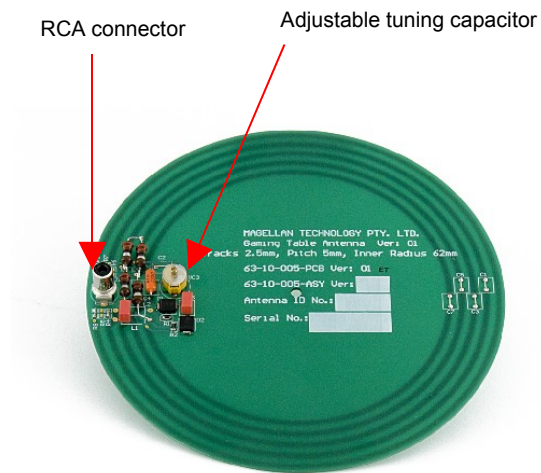PJM® Technology
ISO/IEC 18000-3 Mode 2

Hardware Installation (4.1 User Manual)

Connect a communication cable (USB or Ethernet) to the Reader and host PC

↓

Connect external antenna/s to the Reader

↓

Connect a power pack to the Reader

Software Installation (4.2 User Manual)

Install the ReaderManager software from the supplied CD-ROM

Connecting to a Reader using the ReaderManager (4.3 User Manual)

Open *Start ->Settings-> Control Panel-> Network Connections* in Windows
(if using an Ethernet crossover cable or USB cable)

↓

Turn on the Reader.
Wait for the automatic network connection to be established.

↓

Open *the Connection* menu in the ReaderManager.
Find and click on the Reader you want to connect to.

Antenna Matching, Tuning and Testing (4.1.6 User Manual)

Open Tools->System->Reader Setup in the ReaderManager

↓

Use the *Reader Setup Wizard* to setup Reader-antenna connection, tune and test antenna/s.

Tag Reading (4.4 User Manual)

Open *Tools->System->Grid of Tag Sight Counts in the ReaderManager*.
Place tag/s onto the antenna/s.

↓

The tag's ID and the number of times the tags were sighted will be displayed

4.1 Hardware Installation

MARS-24 User I/O, Antenna Interface and OEM label panel

MARS-24 User Interface panel

RCA connector   Adjustable tuning capacitor

MAGELLAN TECHNOLOGY PTY. LTD.
Gaming Table Antenna Ver: 01
racks 2.5mm, Pitch 5mm, Inner Radius 62mm
63-10-005-PCB Ver: 01
63-10-005-ASY Ver:
Antenna ID No.:
Serial No.:

Round 124 mm diam. antenna (63-10-005)

4.1.1 Connecting to a power supply

Step 1. Connect a low voltage power pack to the unit.

The connection to the power source is realized via a low voltage power pack.

The power cable is not supplied with the Reader and recommended to be purchased in the country of use.

Step 2. Plug the power supply into AC power mains.

When power is applied to a MARS-24 Reader the LEDs on the Reader should operate as follows:

- the blue LED and green LEDs will immediately come on; both LEDs will go off in about 1 minute

MARS-24 with the blue and green LEDs on

- the blue LED will come on again in 1-3 seconds indicating that the unit is in an operational mode; the green LEDs will be off

MARS-24 with the blue LED. The Reader is in an operational mode

- once the unit is in an operational mode the blue LED will remain lit the green LEDs will flash every time a tag/tags is/are successfully read

The MARS-24 has an external interface connector called the USER I/O. This provides a number of digital input and outputs points. These can be used under application control to connect to external devices, such as buttons and lights.

The connector is an IDC 20 pin male.
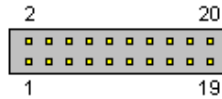
The pins are used as follows:

Pin Number	Direction	Function
1	-	5V at up to 200mA
2	Out	Fault alarm signal
3	Out	Debug serial port transmit
4	Out	SPI port output
5	Out	SPI port clock
6	Out	External output line 0
7	Out	External output line 1
8	Out	External output line 2
9	Out	External output line 3
10	Out	External output line 4
11	In	Debug serial port receive
12	In	External input line 0
13	In	External input line 1
14	In	External input line 2
15	In	External input line 3
16	In	External input line 4
17	In	External input line 5
18	In	External input line 6
19	-	Ground
20	-	Ground

All the External output line pins can be controlled using the ExternalOutputState() and ExternalOutputPulse() API commands using the number specified in the table. For example, ExternalOutputState(3,1) would turn on the output on pin 9. Note that the outputs are intended to drive a simple LED indicator or provide a control signal to a more powerful external buffer. All outputs are 3V.

All the External input line pins will generate log messages when the state of a pin changes, for example Info,External:Input 4 changed state to 0. The ExternalInput() API function can also be called to read the state of all inputs as a number. The inputs allow connection to either switches or any external sensor which provides a contact closure or TTL compatible signal.

When designing external hardware, we strongly advise checking the design with Magellan beforehand to verify that it will be electrically compatible.

This connector also includes the debug serial port of the CPU, which is used as the system console. These pins are 3V levels only, so a proper RS-232 driver must be used externally if this connection is required.

Refer to Application Programmer's Guide (40-01-000-DOC) for more information.

4.1.2 Connecting a Reader to a Computer using USB

Connect the MARS-24 Reader to a host computer using the USB data communication cable by plugging the USB cable into the MARS-24 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.

MARS-24 with the USB communication cable and power cable

4.1.3 Connecting a Reader to a Computer using Ethernet

Connect the MARS-24 Reader to a host computer using a cross over Ethernet cable. Plug the Ethernet cross over cable into the MARS RJ45 socket (Ethernet port) and the network interface port on the PC.

! Always connect Ethernet cable before power is applied to the Reader.

4.1.4 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 MARS's RJ45 socket (Ethernet port) and Ethernet Hub.

! Always connect Ethernet cable before power is applied to the Reader.

MARS-24 with the Ethernet communication cable and power cable

4.1.5 Connecting External Antennas

Connect each external antenna to a Reader's Antenna Axis/port via a supplied connection cable.

MARS-24 with the external 124 mm diam. antenna connected

4.1.6Antenna Matching, Tuning and Testing

Before you start tuning and testing the antennas it's required to install the ReaderManager software and connect to a Reader in the ReaderManager's *Connection* menu.

Refer to the ReaderManager Guide (40-01-006-DOC) for the antenna matching, tuning and testing instructions using the *Wizard* tool in *Reader Setup*.

Follow the procedure, making sure that the Magellan Antenna Tuning Probe and voltmeter are used to measure when the tuning is correct.

The design of the antenna and the selection of the correct cable length are critical factors in the reliability of a Reader. Each antenna has unique set up values associated with it that are used by the software to ensure the Reader and antenna are matched to each other.

The most critical part of the setup of MARS-24 is telling the Reader what type of antenna is connected to each antenna axis (*Setup Axis*).

This is done using the *Reader Setup* tool in the Reader Manager. It provides a fixed list of antennas with known set up values for that particular Reader.

If an antenna is not listed in this table it cannot be used with that Reader. Unless correct set up values are measured by Magellan and recorded in the list of known antennas, the antenna will not operate properly.

If you can not find your antenna on the list you have to upgrade the ReaderManger software to the latest version assuming that you purchased a new antenna type recently to be used with the Reader purchased some time before. You will also need to upgrade the ReaderServer on your Reader.

Update the ReaderManager from our website first. Then you can upgrade the ReaderServer using new version of the ReaderManager installed.

Note that different release versions (MLC number) of the same Reader may well have very different set up values, because of circuit changes. The Reader selection system accounts for this and automatically manages loading the correct values for a given version of the Reader.

4.2 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.

4.2.1 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 the items in *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.

There is an option to install only an Ethernet-over-USB driver. Tick only the *PJM Reader USB driver (RNDIS Ethernet)* box in *Install* dialog and press *Install*.

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 in re-install these libraries, click the relevant check boxes.

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

Step 6. Functionality test.

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

4.2.2 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 can 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.

4.3 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.

A Reader provides Ethernet and USB device interfaces 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 systems 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.

4.3.1 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 crossover 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.

What this means is 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 pane 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 4. Go to the section 4.3.3

4.3.2 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. 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 one 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, these are a few steps to go through before the ReaderManager is able to identify a 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 the Step 4.

If it says *Disabled* or *Broken*, then right click 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 the Reader 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 because it is a problem with Windows Networking or the USB port has locked up.

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

It is important to understand that USB problems are usually caused by Windows networking delays and Windows networking problems which cause people to rapidly unplug and plug the USB cable and create even more problems.

Step 4. Go to the section 4.3.3.

4.3.3 Getting a Reader connected using the ReaderManager

Step 1. Open the Reader Manager.

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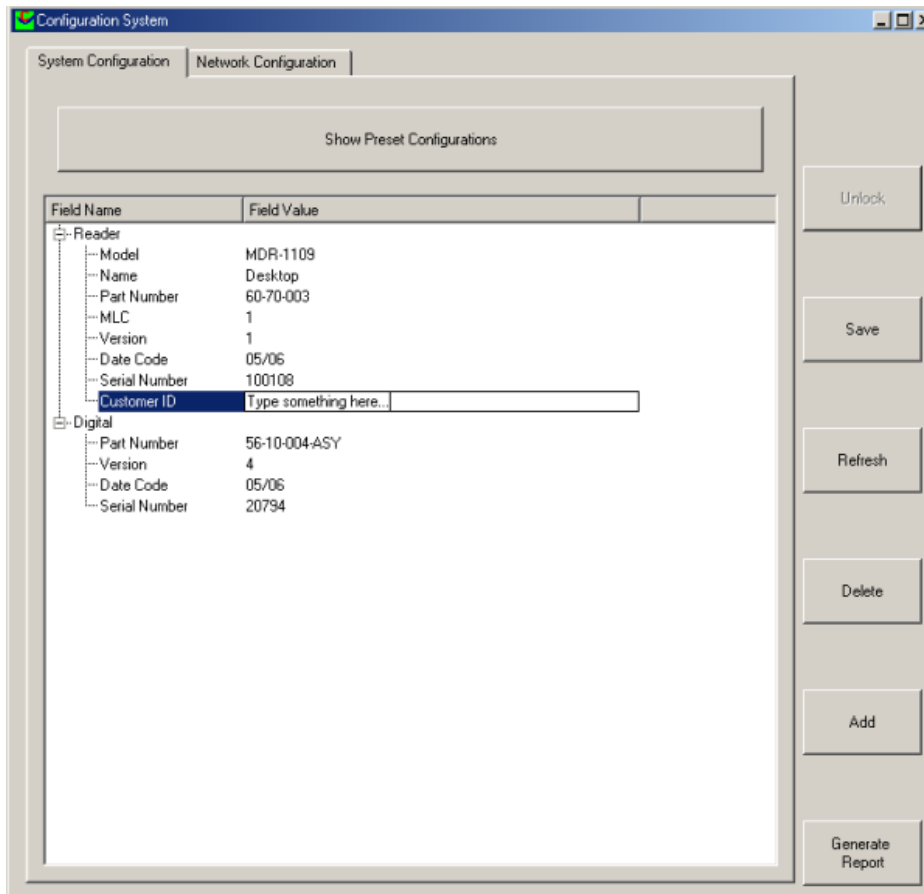
Click the column on the right of *Customer ID* and enter the name you would like the Reader to be identified as. This is the name that will appear on the *Connection* menu.

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 refer to the ReaderManager Guide (40-01-006-DOC).

4.4 Communication Test

Perform the tag reading test.

From the *Tools* menu, select *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.

- *Tag Reply Mode*:

For 8 channel Readers, the default is:
CommandReplyChannelHoppin7_8muted
CommandReplyChannelHoppingUnmuted

Using one of the test tag supplied with the Reader, 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.
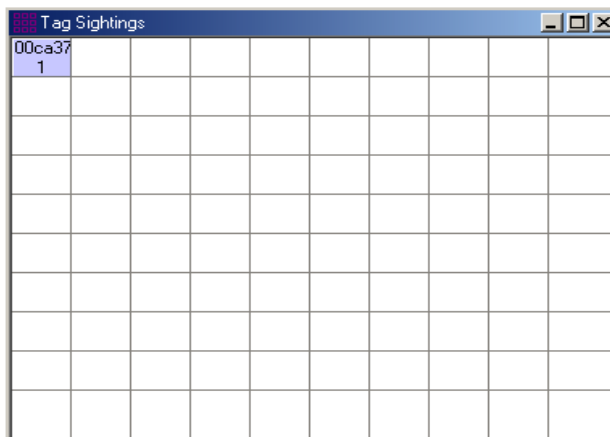
5. Reporting a Problem

If you are having a problem with a Magellan Reader, you will need to send a report to your support organisation. 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.

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

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.

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.

Non-Warranty Repairs

If a Reader needs repairing after 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.

5.1 Troubleshooting

Problem	Reason	Solution
LEDs		
Red 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 LED during tag reading	Incorrectly oriented tag/tags	Ensure tag/tags are oriented correctly to the Reader Antenna (see Tag-to-Reader/Tag-to-Antenna Orientation).
	Faulty tag/tags	Replace tag/tags. Do not use tags with a black dot or black square marking (faulty tags).
	The *Powering Field* is off	Ensure the powering field is on. Go to *Tools>System>Reader Setting.* Tick the *Powering Field* box.
	Reader faulty	Send a service report on the Service Form.
Green LED flashes but I can not see any tag message in the ReaderManager	USB or Ethernet connection is not functioning	Ensure the communication cable is connected correctly.
	The reader is not *Connected*	Ensure the Reader is turned on and a communication cable is plugged in. The status bar in bottom right corner of the ReaderManager window has to show an indication *Connected,* 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 *Grid of tag sight counts* or *Table of Tag Messages* from *Tools->System* menu to view tag replies.
Antenna installation and maintenance		
Antenna test failed	Wrong tag. The tag used for the test is in a low power mode.	Make sure you use a normal/fully powered tag for testing (refer to the Working with Tags section in the Reader User Manual). Perform the test again.
	Faulty tag	Replace tag. Do not use a tag with a black dot or black square marking (faulty tag).
Antenna is not on the list of available antenna types	You have purchased new antenna type which is not in your version of the ReaderManager	Download the latest version of the ReaderManager available from Magellan's website. Then upgrade the ReaderServer on your Reader using the ReaderManager.
Antenna does not work as good as before (reduced read range, etc.)	The Antenna has been moved recently and was not tuned	Once you change the antenna position, moved the antenna or replaced the mounting material you should understand first whether the antenna is affected by the mounting material, put a plastic spacer if affected and tuned the antenna again.
	Metallic object/s, electronic devices or cables are in the close vicinity of the antenna and affect the antenna performance	Move all metallic objects, electronic devices and cables away from the antenna or shield the antenna by a purpose built ferrite shield. Once you do so the antenna should perform as before. Measure the maximum voltage, compare with the voltage previously recorded and tuned the antenna if it's required.
Connecting a Reader		
Can not find and connect to the Reader as the Reader is not shown on the *Connection* menu list	The Reader was not in the operational mode when you connected a communication cable and/or opened the *Connection* menu	Plug in the communication and power cables. Wait for about 1 minute after you apply the power to the Reader. The blue LED must to be permanently lit and the green LEDs off. In the ReaderManager open the *Connection* menu. Find the Reader you want to connect to on the list.

The PC does not recognise the Reader at all	The USB port on the PC is broken	Use another USB port known to be working.
	USB port has temporarily failed	Power cycle the PC.
	The Reader is faulty	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 on the Service Form.
	USB cable faulty	Change the USB cable.
The PC recognises the Reader, but claims that it is faulty in the Windows' *Device Manager* and does not create a network connection	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.	Make sure that the USB cable is unplugged and the Reader is turned off. Remove/Unistall the faulty device from the *Device Manager*, then plug the USB in, turn the Reader on and wait for a network connection again. Alternatively you can connect a different Reader to the PC as it will have a different serial number and Windows will not flag it as faulty.
The Reader is connected, and appears to be working correctly but the network connection drops out after a few seconds	A Reader was replugged too quickly before Windows finished processing the previous network connection	Wait at least 30 seconds before replugging any Reader into the same PC or wait until the network connection disappears.
	USB hub does not work properly	Power cycle the PC. Try a rear USB port on PC to plug a USB cable. Avoid using an external USB hub.
No network connection can be made to a Reader but the *Network Connections* window shows that the Reader is connected and all other network status information indicates that networking should be working	The USB port on the PC has stopped working for an unknown reason.	Use another USB port. If this fails, power cycle the PC.

5.2 Service Form

<table>
<tr><td>CONTACT</td><td>Company _____

Address _____

Country _____

Sales Order _____

PO Number _____

Purchase Date _____</td><td>Return Authorisation number (RMA) _____

Date _____

Technical Contact _____

Telephone _____

Fax _____

Email _____</td></tr>
<tr><td>PRODUCT</td><td colspan="2">From OEM label on the back of the equipment:

Model _____

P/N _____

D/C _____

S/N _____

MLC _____
    (first number in order after black dots)

Describe any hardware modifications made to the unit and modification date:

_____
_____
_____
_____
_____</td></tr>
<tr><td>REASON FOR RETURN</td><td colspan="2">Describe problems (see Reporting a Problem):

_____
_____
_____
_____
_____
_____
_____
_____
_____
_____
_____
_____
_____
_____
_____
_____</td></tr>
<tr><td>RETURN TO*</td><td>If purchased from Magellan:

Magellan Technology Pty Limited

65 Johnston St.
Annandale
NSW 2038
Australia</td><td>Tel.: +61 2 9562 9800
Fax: +61 2 9518 7620
Email: info@magtech.com.au
Website: www.magtech.com.au</td></tr>
</table>

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

6.Contact Us

Magellan Technology pty limited

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

7.Revision History

Version	Date	Person	Reason
Ver.1	09.2006	Olga Kolesnik	Initial User's Guide (40-01-005-DOC) has been split into separate User Manuals for each reader. New user-friendly document layout/design, new logo, new sections added (Alert Symbols, Glossary, Product Overview, Service Form, Specifications, Revision History)

8.Appendix

8.1Specification

MARS-24 Multiple Antenna Reader System – 24

Read and write operations	
No user-serviceable parts	
ISO/IEC Compliance	18000-3 Mode 2
Operating Frequency	13.56 MHz
Number of Reply Channels	8
Command Data Rate	424 kbit/s
Reply Data Rate	106 kbit/s per channel
Tag Type	PJM StackTag® and PJM ItemTag®
External Dimensions (L x W x H): without mounting brackets with mounting brackets	 380 x 170 x 80 mm 380 x 205 x 120 mm
Net Weight	3 kg (without external antennas)
Low Voltage Input	12 VDC @ 2 A
Operation environment	Indoor use
Temperature range	+10ºC to +45ºC
Humidity	10% to 80% (non-condensing)
Recommended Minimum Host Computer Requirement	Windows XP SP2/ 500 MHz CPU/ 128MB RAM
Host Interface	USB and Ethernet
Number of External Antennas	up to 24
External Antennas (custom design is available on request)	Single-axis antennas with inner coil dimensions: Round 60 mm diam. x 0.8 mm and 124 mm diam. x 0.8 mm Rectangular 60 x 420 x 0.8 mm, 120 x 240 x 0.8 mm, 202 x 352 x 0.8 mm and 202 x 353 x 3.2 mm
Antenna Connection Cable Length	1.5 m

8.2External Antenna Types

Magellan's MARS Readers have been designed to operate with the antennas listed below. Each antenna is connected to a Reader via a supplied RCA cable. Each supplied RCA cable has a fixed length of 1.5 m. The antenna must be connected using the cable supplied by Magellan. The antenna operating volume is inside the antenna turns.

All antennas have a maximum gain of 3.5 dB. Antennas that are not included in this list or having a gain greater than 3.5 dB are strictly prohibited for use with the MARS Readers. The required antenna impedance is 4 ohms.

Part Number	Description	Photo
61-10-002	Single axis, Round, 60 mm inner antenna coil diameter, 85 mm overall diameter, thickness 0.8 mm	
63-10-005	Single axis, Round, 124 mm inner antenna coil diameter, 160 mm overall diameter, thickness 0.8 mm	
63-10-004	Single axis, Rectangular, 120x240 mm inner antenna coil, 158x277 mm overall dimensions, thickness 0.8 mm	
63-10-003	Single axis, Rectangular, 60x420 mm inner antenna coil, 88x448 mm overall dimensions, thickness 0.8 mm	
64-10-002	Single axis, Rectangular, 202x352 mm inner antenna coil, 250x400 mm overall dimensions, thickness 3.2 mm	

64-10-004	Single axis, Rectangular, 202x352 mm inner antenna coil, 250x400 mm overall dimensions, thickness 0.8 mm	

8.3 Reader-Tag Compatibility

Maximum Read-Write Distance* (MRD), mm		READER-WRITERS					
		MPR-5050	MARS and round external antenna (124 mm diam)	MSTRP-5050	MDOCR-2505	MDR-1109	MTR-1310
S T A C K T A G S	Rectangular, 76 x 45 mm, 5 turns	315	235	✔	✔	60	✔
	Rectangular, 76 x 45 mm, 2.5 turns	160	170	✔	✔	30	✔
	Rectangular, 73 x 37 mm, 3 turns		160	✔	✔	30	✔
	Rectangular, 56 x 26 mm	280	220	✔	✔	55	✔
	Round, 35 mm diameter	145	170	✔	✔	40	✔
	Round, 25 mm diameter		115			15	✔
	Round, 20 mm diameter		100			10	
	Rectangular, 28 x 16 mm		120			15	✔
	Rectangular, 20 x 15 mm		95			10	
I T E M T A G S	Rectangular, 76 x 45 mm, 5 turns	540	370	✔		110	✔
	Rectangular, 20 x 15 mm		135		✔	25	✔

* - Measured for a single tag

✔ - Tags operate inside an internal volume or shrouded area

8.4 Maximum Read-Write Distance

Maximum Read-Write Distance: MARS with External Antennas

Maximum Read-Write Distance* (MRD), mm	External antenna type			
	62 mm radius	120x240 mm	60x420 mm	202x352 mm
StackTag tags				
20x15 mm	95	95	60	65
28x16 mm	120	125	75	110
20 mm diameter	100	100	60	70
25 mm diameter	115	120	75	110
35 mm diameter	170	195	130	205
56x26 mm	220	250	185	280
73x37 mm, 3 turns	160**	185	125	200
76x45 mm, 2.5 turns	170**	195	130	205
76x45 mm, 5 turns	235**	270	200	300
ItemTag tags				
20x15 mm	135	140	95	155
76x45 mm, 5 turns	370**	440	350	505

* - Measured with a single tag

** - Tags may work unreliably at a distance of less than 50 mm due to the microchip overheating. It is recommended not to use the tags with 62 mm (63-10-005) or 30 mm (61-10-002) round MARS antennas.

MRD ± 5 mm
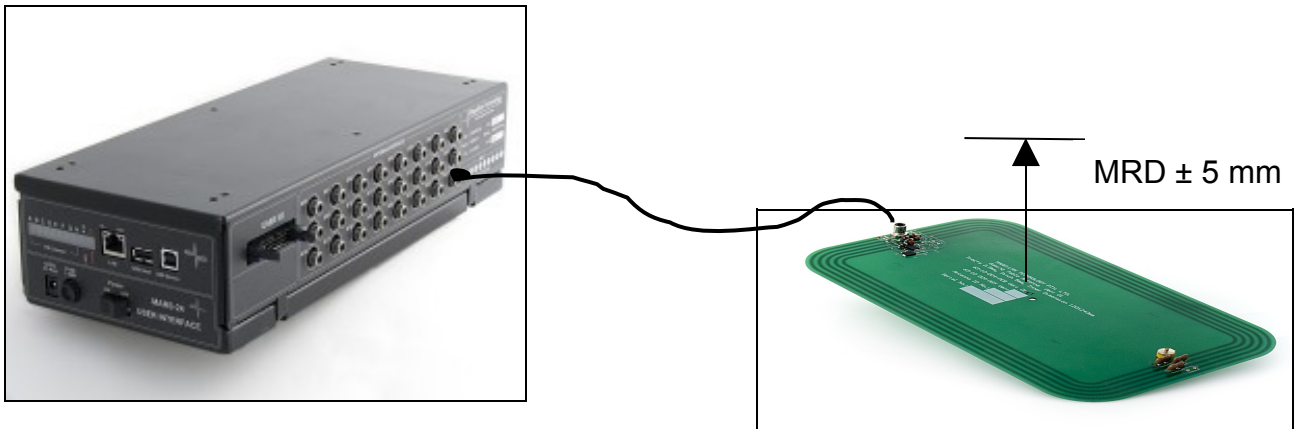
Magellan
Reader Manager
Guide

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Reference Documents

Document Number	Description	Date	Version
40-01-000-DOC	Applications Programmer's Guide For Version 3 Reader Server	27 June 2006	
45-00-001-SPC	BT and ST Chip Logical Specification	30 June 2003	Ver 2

Document History

Date	Version	Change Description	Author
14 Dec 2005	1	Jeff Gray original document	Jeff Gray
6 Sep. 06	2.00	Changed formatting, updated to show new tools.	Daryl Dusheiko
14 Sep. 06	2.01	Added more instructions to the axis test section.	Daryl Dusheiko

Table of Contents

1   Introduction

The ReaderManager is a graphical application for Windows and Unix. It provides a platform for reader setup, configuration, demonstrations, testing and application development.

When it is run, the ReaderManager can connect to a single reader at one time. It can switch between multiple readers.

Multiple copies of ReaderManager can be run, each of which can be connected to different readers.

The program provides a set of *tools*, each of which is a particular demonstration, test or diagnostic window.

All windows can be resized. This will be saved, so the next time you run the ReaderManager, all windows will retain the size you set the last time. The position of the application on the Windows desktop is also retained.

2 Frequently asked Questions

This section provides a list of commonly asked questions.

2.1 How do I install or upgrade ReaderManager?

1. Run the install program *ReaderManager-Install*.exe. This can be downloaded from the Magellan website www.magtech.com.au, or run from the CD supplied with your reader.

2. If you already have ReaderManager installed run the program *ReaderManager-Upgrade.exe.*

3. Follow the installation instructions given in section **3 Installation**.

2.2 How to connect ReaderManager to a reader?

1. Connect an Ethernet cable or USB cable to the reader as described in reader manual. Apply power to the reader.

2. Wait about 40 seconds for the reader to start up.

3. Either select the reader from the *Dynamic Reader* list on the *Connection* menu as described in **5.1.2 Opening a Dynamic Connections**, or create a static connection as described in section **5 Managing Connections**.

2.3 I have a new reader, what do I do now?

1. You will need the following equipment to setup a reader.

   - DC Voltmeter
   - Antenna tuning block and trim tool.
   - Normal powered tag.

2. Open the *Reader Setup* tool as described in section **6.8 Reader Setup.**

3. Follow instructions provided by the wizard selecting and configuring the number of axis Groups, selecting, tuning and testing the antennas used with the reader. Save the configuration to the reader.

2.4 How do I change the network settings on a reader?

1. Open the *Configuration System* tool as descried in section **6.1 Configuration System**.

2. Changing the *Customer ID* field will change the name of the reader as displayed on the dynamic connections menu.

3. Click the *Network Settings* tab to set a fixed IP address or to obtain an IP address from a DHCP server.

2.5 How do I set a tag to Normal Powered mode?

1. Open the *Console*. Right click in the *Message log* area and ensure that *Show Tag Replies* is ticked.

2. Place a tag on the reader, you should see a response from the tag.

3. From the *Reader Configuration* menu select *Config_Normal_Powered_Tag.*

4. You should get a response from the reader with the **data value equal to 6000**. A typical response looks as follows:

Info,Reply:Timestamp 7fff, LockPointer 0004, Manufacturing e005, SpecificID 000f8ff5, GroupID 2000, ConditionalID ffff, Configuration 6000, ReadAddress 0006, **Data: 6000**

5. Remove the tag from the antenna.

6. From the *Reader Configuration* menu select *ClearAll.*

2.6   How do I restore the reader to its default settings?

1. Open the *Reader Settings* tool.

2. Click the *Clear Saved Settings* button.

3. Power the reader off then on.

2.7   How do I get the ReaderServer version of my Network based reader?

- Open the Console tool.

- Type *Version()* in the Command Entry area.

- The ReaderServer and operating system will be shown in the Message Log area.

3   Installation

This section describes how to install, upgrade and start ReaderManager and how to get ReaderManager updates.

Installation instructions are only given for installation on a computer running Microsoft Windows, for installation on computers running Linux please contact Magellan Technology.

3.1   New Installation

All that needs to be done is to run *ReaderManager-Install.exe*. This contains the Python interpreter, the PyQt and Twisted libraries and the application itself. When it is run, the window shown as Figure 1 appears.
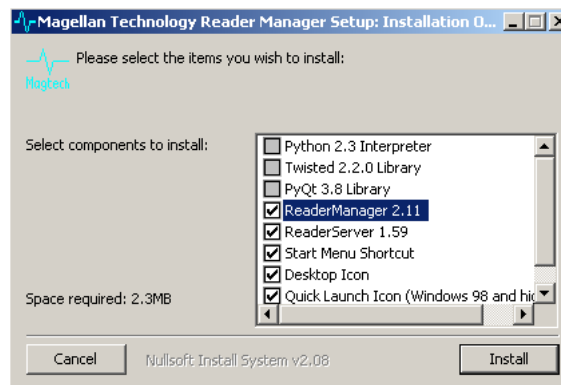

Figure 1

The installer looks on the system to determine which components are already present. Ticks will appear next to the items that are not currently installed. The Python, PyQt and Twisted libraries will automatically install if required.

The version numbers of the components are shown next to their names.

If the installer finds that ReaderManager has already been installed with the current version, the user can force a reinstall by manually ticking the checkbox next to the application.

The only directory selection that you are ever offered is when you install Python (which is part of *ReaderManager-Install.exe*). It offers a default directory of *C:\Python23*. This can be changed to *C:\Program Files\Python23*, for example, but you can put it anywhere you like.

When the ReaderManager application is installed, it is placed inside the Python directory. This is determined automatically by the installer.

3.2   Upgrading ReaderManager software

Most of the time, software upgrades will not involve a change in the version of Python, PyQt and Twisted libraries. In this case, all that needs to be done is to get the new version of *ReaderManager-Upgrade.exe* and run this file. This file is much smaller than the full installation. The upgrade window is shown in Figure 2.
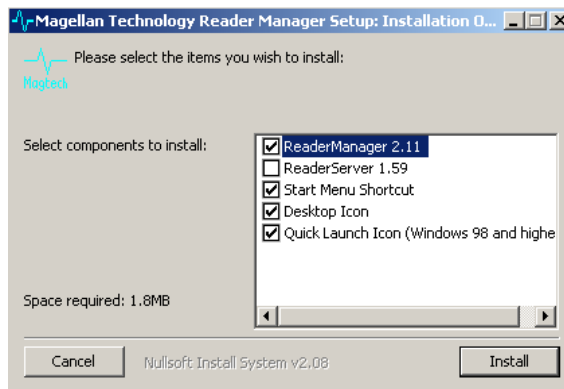
Figure 2

Like the *-Install* version, this installer will check the currently installed application versions and un-tick already installed components accordingly. The user can manually tick an application to force reinstallation.

If the version of the Python, PyQt libraries or Twisted libraries is not present, is damaged or has changed, the installer will indicate that a full install is required. In this case it will be necessary to follow these steps:

1. Run the *Control Panel* and select the *Add Or Remove Programs* item.

2. Uninstall *Magellan ReaderManager* if it is present.

3. Uninstall *Python, PyQt and Twisted* if it is present.

4. Close the *Control Panel*.

5. Using a file manager, such as *My Computer*, delete the Python directory if it remains.

6. Follow section **3.1 New Installation** to install the full version.

3.3 Starting ReaderManager

The installer will put an icon on the Windows desktop and add an application folder to the programs start bar.

- To start ReaderManager from the desktop icon, double click the icon .

- To start Reader Manage from the Windows start menu; click *Start* then *All Programs*, then *Magellan Technology*, then click *Reader Manager*.

3.4 Getting Software Upgrades

Magellan Technology releases periodic software updates via their Web site.

Users can use our Web site to get software update files. You will need to be running a browser such as Mozilla or Internet Explorer, then follow these steps:
1. The updates are stored on our Web site at the address http://www.magtech.com.au/downloads/
   A username and password is required to access the downloads page. Please contact Magellan or the supplier of the equipment to arrange for an account to be setup. Once connected, click the link, *Click here to continue to the page from which you came.* You will see a list of files. Follow these steps for each file to download it.
2. Point the mouse at the file you want. This is shown as a disk icon .
3. Press the right mouse button, so the context menu pops up.
4. Select the *Save Target As...* menu item.
5. A file save dialog box will then appear. Change directories to where you want to save the file. It does

not matter where you save it. Just note which directory it is in. Click the *Save* button to complete this action.

Installation files can be run from any directory, even directly off a CD-ROM.

4 The ReaderManager Desktop

This section gives a brief overview of the main ReaderManager elements, such as the menu bar, desktop and status bar.

The ReaderManager desktop is shown in Figure 3 and consists of several items:

1. The menu bar, providing the primary user interface to ReaderManager.

2. The main window, which can contain one or more tool windows open at any given time.

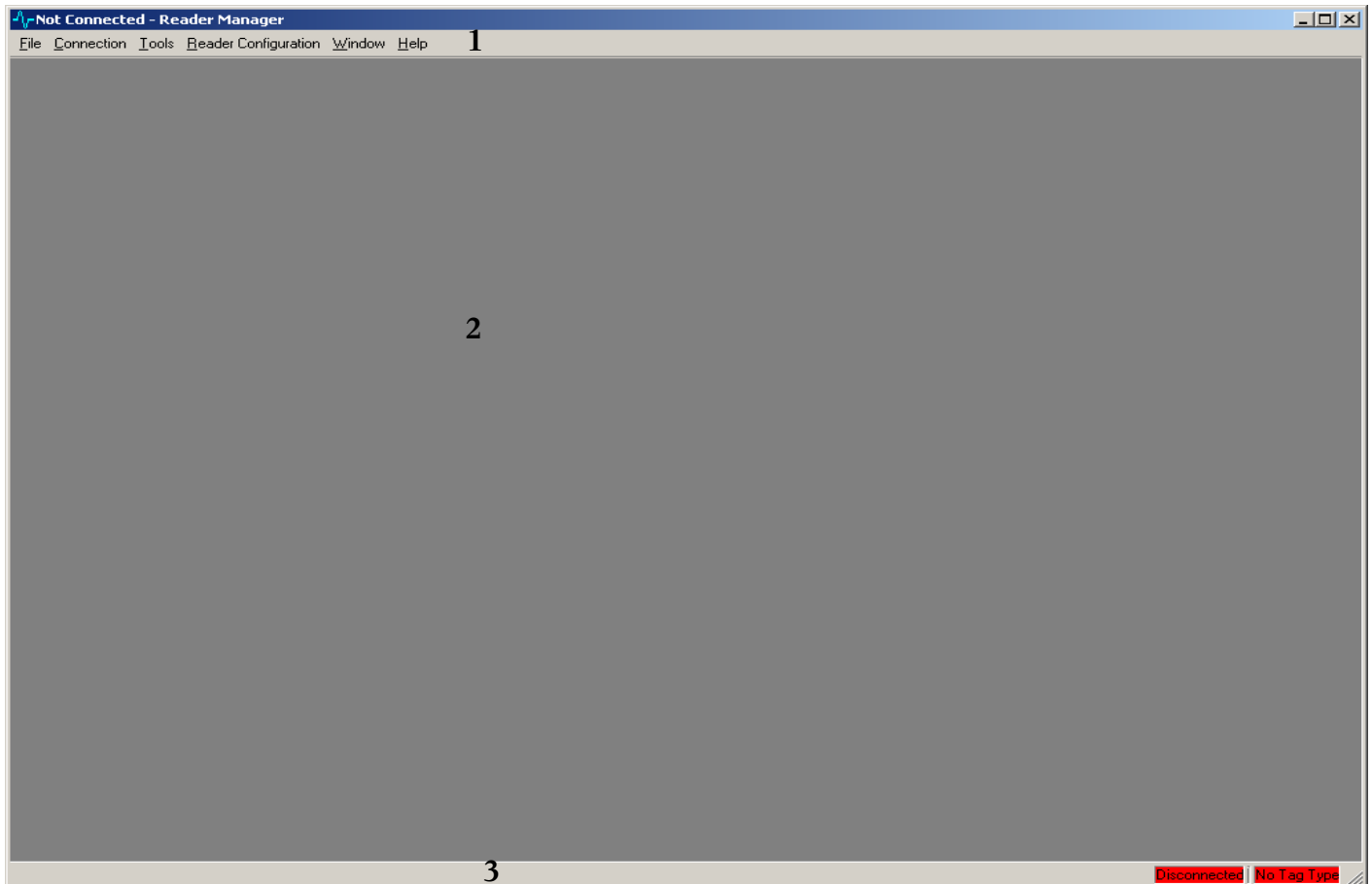3. A status line at the bottom used to show connection information between ReaderManager and the reader.

Figure 3

4.1 ReaderManager Menu Bar

The ReaderManager menu bar consists of the following main menus items; *File*, *Connection*, *Tools*, *Reader Configuration*, *Window* and *Help*. These menu items are explained in more detail below.

4.1.1 File Menu

To show the file menu click *File* on the main ReaderManager menu.

The File menu items are described in Table 1.

Sub Menu	Description
Preferences	Opens a dialog box which allows the user to change the font, user level, language and upgrade directory.
Print	For tools which support this function, allows the user to print a text representation of the active tool.
Print Preview	For tools which support this function, allows the user to preview a text representation of the active tool which can be printed.
Upgrade	There are two options available: Upgrade AVR readers – opens a dialog window which allows the user to upgrade the firmware or FPGA on an AVR type reader. Upgrade DSB or x86 readers – opens a dialog window which allows the user to upgrade network based readers.
Quit	Exit the application.

Table 1

4.1.2   Connection Menu

To show the connection menu click *Connection* from the main ReaderManager menu.

The connection menu shows all readers which can be connected to using ReaderManager. The menu also provides options to edit static connections and close the connection to the reader.

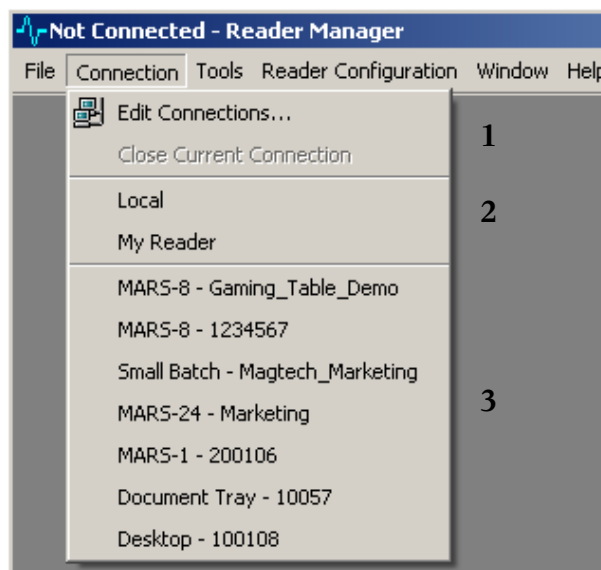The Connection menu options are shown in Figure 4, the menu items are described in Table 2.

Figure 4

Index	Description
1	*Edit Connections* - Allows the user to create and edit static connections to reader.
	Close current connection - Disconnect ReaderManager from the currently connected reader.
2	Static connections area - This section shows static connections created using the *Edit Connections* menu option. Static menu options are saved when ReaderManager is closed.
3	Dynamic connection area - ReaderManager automatically detects readers connected on a network. These readers are shown in the dynamic connection area. This menu may look different on your installation.

Table 2

4.1.3   Tools Menu

From the main ReaderManager menu click *Tools*.

If ReaderManager is not connected to a reader only the *Console* tool is shown in this menu. When ReaderManager is connected to a reader there will be two sub menu items, *Demonstrations* and *System*. This document will only describe the *System* menu options. A detailed description of all System tools is given in section **6 Tools**. The System tools menu is shown in Figure 5.
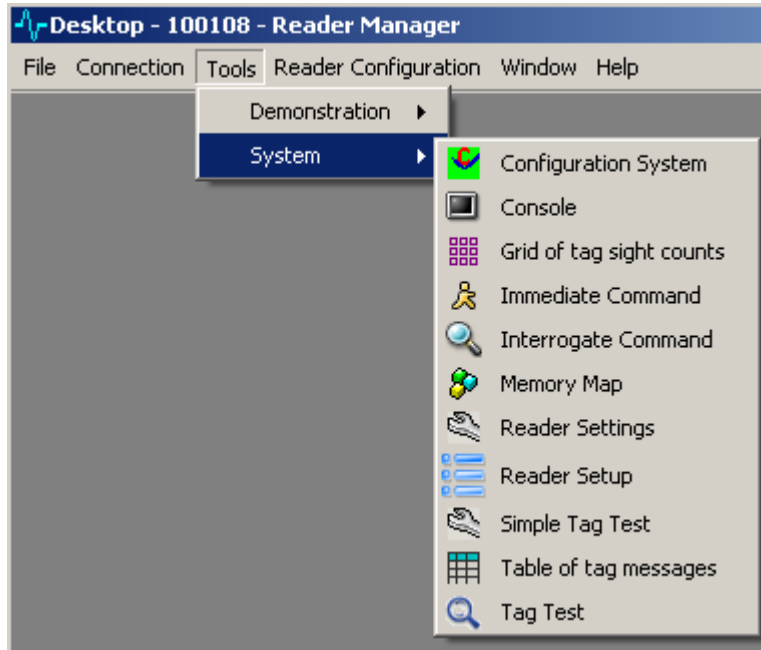
Figure 5

Sub Menu	Description
Configuration System	Allows the user to view reader module part numbers, versions and serial numbers. Also provides an interface to change the readers networks setup.
Console	Use this tool to send commands to the reader and view all reader messages.
Grid of tag sight counts	Use this tool to graphically view all tags sighted by the reader.
Immediate Command	Use this tool to construct an Immediate command.
Interrogate Command	Use this tool to construct an Interrogate command.
Memory Map	Use this tool to show and change tag memory.
Reader Settings	Use this tool to view and change various reader operating parameters.
Reader Setup	Use this tool to configure the reader to work with various antennas and to tune and test each antenna.
Simple Tag Test	Provides a tool used to read and write to various memory locations and verifies the data is written correctly.
Table of Tag messages	This tool displays a table of tag related messages received from the reader sorted by a timestamp.
Tag Test	More advanced tags test. Used mainly by tag and chip manufactures.

Table 3

4.1.4　Reader Configuration

From the main ReaderManager menu click *Reader Configuration*. This menu item provides access to all user defined scripts and commands. The menu also provides an item to open a form which is used to create and edit scripts. The default menu is shown in Figure 6:
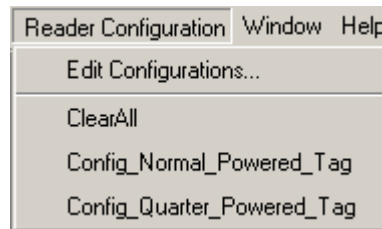
Figure 6

Sub Menu	Description
Edit Configurations	Provides an interface to create and edit custom scripts and tag commands.
Clear All	Clears Interrogate and Immediate commands.
Config_Normal_Powered_Tag	This script sets an Action command to write 2000 to the configuration word. Use this script to set all the tags placed on a reader to Normal Powered Mode.
Config_Quarter_Powered_Tag	This script sets an Action command to write 4000 to the configuration word. Use this script to set all the tags placed on a reader to Quarter Powered Mode.

Table 4

4.1.5　Window

This menu option allows the user to arrange various tools on the desktop.

4.1.6　Help

This menu allows the user to get the version number of Reader Manager and Qt.

To get the Reader Manager version click Help then click About ReaderManager .

To get the Qt library version click About Qt .

4.2　Reader Manager Status Bar

The status bar indicates various reader connection states and displays the active tag type. It is divided into four areas, these are shown in Figure 7 and described in Table 5.

Figure 7

Index	Description
1	This area shows the following information:

Index	Description
	The MAC address and IP address when the mouse is moved over a reader name in the dynamic connection menu.
	Shows connection status – Connecting -> Getting Settings -> Connected -> Disconnected.
2	Indicates reader manager is connected / disconnected to / from the Reader Server.
3	On AVR reader indicates if the reader server is connected to the reader. On all other readers shows the tag type.
4	On AVR readers shows the tag type. On all other readers shows the IP address of the connected reader

Table 5

5   Managing Connections

This section details how to create static connection profiles, how to connect or disconnect ReaderManager from a reader.

The ReaderManager is capable of connecting to a variety of readers. Each reader is distinguished by a number of parameters which give it a unique address. The set of all these parameters is referred to as a *connection profile*.

This includes connections to all kinds of readers across the network or AVR Series readers that are running on the same PC as the ReaderManager.

There are two ways to connect to a reader:

1. Defining a static connection or,

2. Using the dynamic reader discovery feature in ReaderManager.

5.1   Defining a Static Connection

To access the *Edit Connections* dialog, select *Connections->Edit Connections.*

When you first start ReaderManager, you only have the *Local* connection configured, which is a default AVR Series reader connection. You may want to connect to a ReaderServer somewhere else on the network, or another local reader.

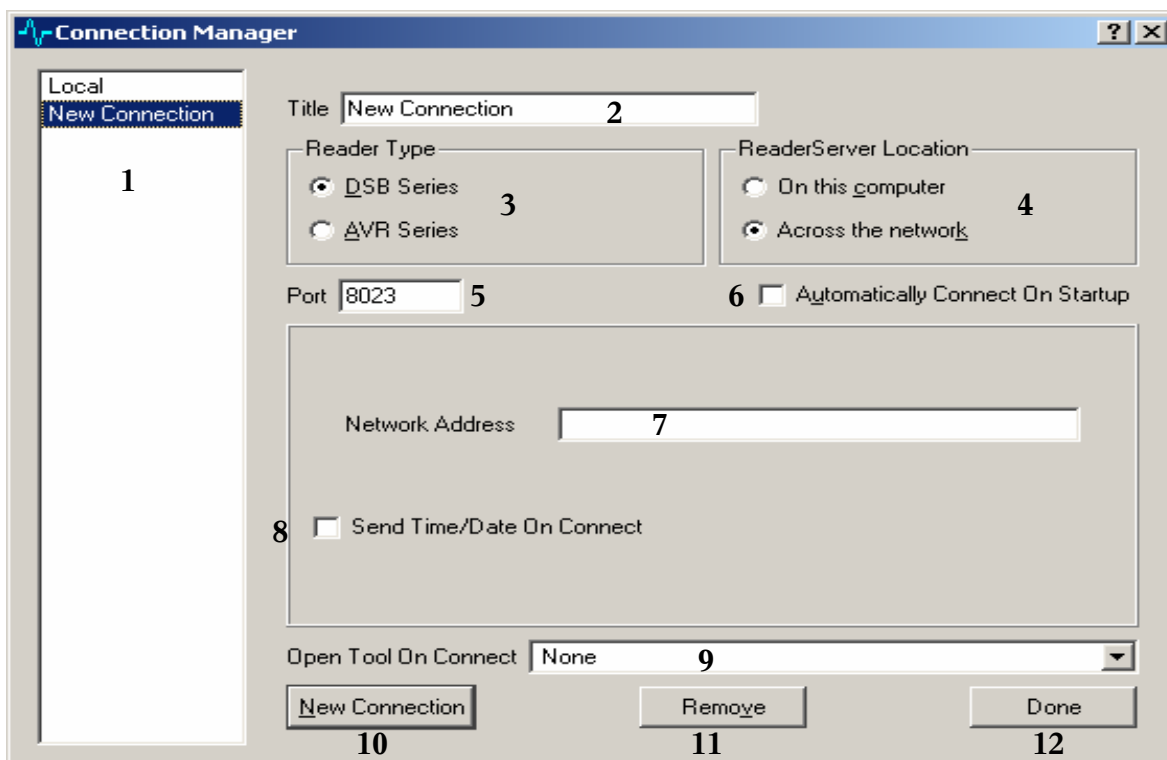The connection dialog is shown in Figure 8, its elements are described in Table 6.

Figure 8

Index	Description
1	Shows the names of already defined static connections. To edit an already defined connection, click on the name and change the required fields on the right hand side of the dialog.
2	*Title* is the text that will appear in the *Connection* menu and in the list of connections in this dialog. This can be any name that can act as a brief summary of the reader being connected to. For example, the reader type, network address shortcut or location can be used.
3	For network based readers select *DSB Series*. For AVR type readers select *AVR series*.
4	For network based readers select *Across the network*. For AVR type readers select *On this computer*. The selection for this item will adjust the options that appear in the middle portion of this window.
5	This field defines the TCP port used to connect to the reader server. It should be left as 8023.
6	*Automatically Connect On Startup* can only be ticked for a single connection in the list. It defines which connection will be opened automatically when the ReaderManager is run. This can be convenient if only a single reader is ever used with this application.
7	When across a network is selected, *Network Address* is the address of the ReaderServer, either as a domain name or an IP address. e.g. 192.168.0.25.
8	*Send Time/Date On Connect* if ticked will generate a command to set a remote reader to the current time and date of the computer that ReaderManager is being run on. This is useful for readers that do not retain time and date information when powered off.
9	*Open Tool On Connect* will automatically open the specified item from the *Tool* menu that is selected when this program connects to this reader. Different connections may open different tools. This is convenient if a particular tool is commonly used with a given reader.
10	Click this button to create a new connection profile
11	Click this button to remove a connection profile.
12	Click this button to complete the connection editing or creation process. Connection as saved when you exit the ReaderManager application.

On AVR readers the following items are displayed in the middle portion of the form:

	When on this computer is selected, *Location of ReaderServer* shows where the ReaderServer application can be found. It should automatically load the correct directory in most cases. If not, click on the *Find ReaderServer...* button and go to the *<PythonPath>\Lib\ReaderServer\DTRHF* directory. You do not need to select a file, just this directory.
	The *Serial Port* drop down list allows the name of the serial port that the reader is connected to be selected. It is also possible to edit this line to enter a custom name.

Table 6

5.1.1   Opening a Static Connection

Select *Connection* from the main ReaderManager menu. The connection menu is shown in Figure 9.
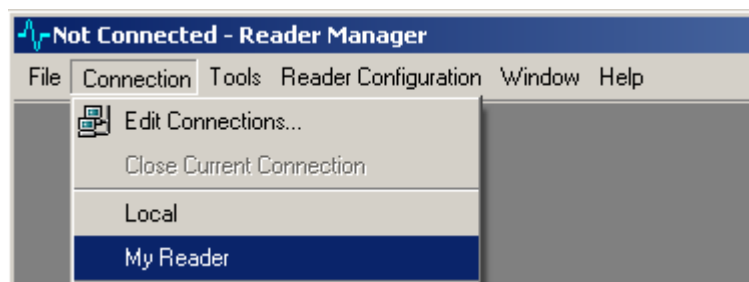
Figure 9

Select the connection profile you would like to connect to. Statically defined connection profiles are shown below the *Close Current Connection* item.

The message on the right of the status bar will change to *Connected* in green if the ReaderManager successfully connected to the reader.

For connections to a ReaderServer on the same computer, a status message will indicate that the server is being started automatically. This takes a little longer than a network connection because of this activity.

5.1.2   Opening a Dynamic Connections

ReaderManager uses multicast addressing to discover readers on a network. Figure 10 shows a typical connection menu showing various readers detected on a network. It is not necessary to define a profile for readers to be discovered on a network.
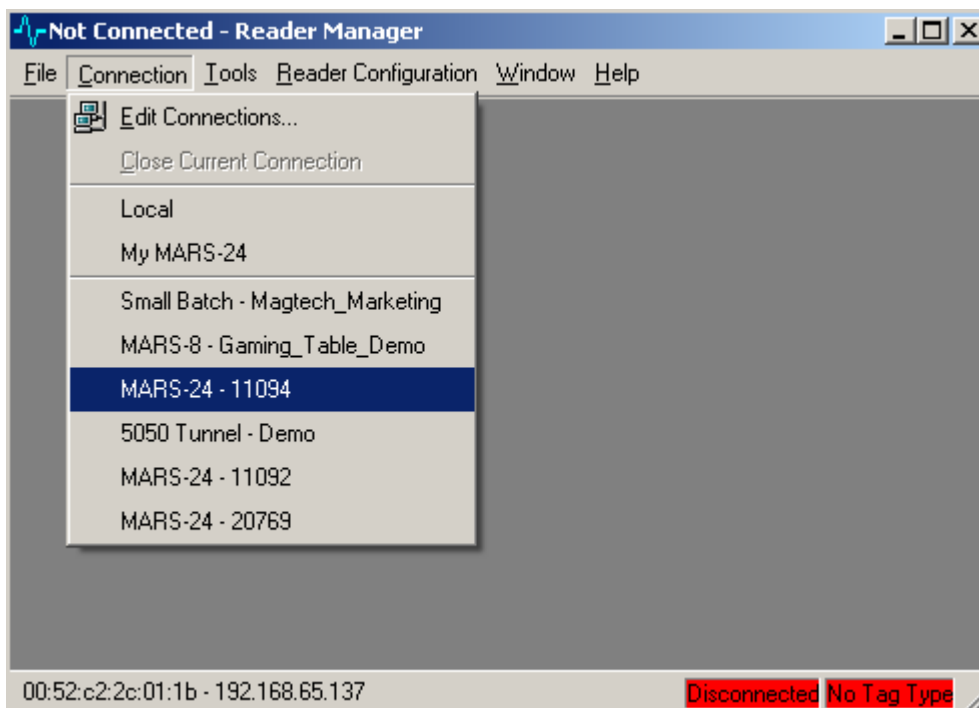
Figure 10

Readers are labelled as either:

<Reader Type> - <Serial Number> or as,

<Reader Type> - <User defined name> or as,

<Mac Address> - <IP address>.

When the menu item is highlighted the MAC and IP address is shown on the status bar.

5.2   Closing a Connection

When connected to a reader, the menu item *Close Current Connection* can be selected in the *Connection* menu. If a local ReaderServer has been automatically started when the connection was established, it will be automatically shutdown as well.

6 Tools

This section gives a more detailed explanation of the *System* tools available in the *Tools* menu.

It is possible to open more than one tool at the same time. They are shown overlapped in the main window area.

The *Window* menu contains options which allow the open windows to be cascaded or tiled. Also, any open tool can be selected, so it can be seen in the foreground.

Some tools will issue commands to the reader to change its operating state. Because of this, some tools cannot be used at the same time because they operate by expecting a particular mode of operation.

In this case, closing the window or ReaderManager will not solve the problem, because the reader is still operating in whatever mode it was told to. If you think the reader has become confused in a case like this, the best way to resolve it is to shut down the ReaderManager and the reader, then start from scratch.

Fortunately, most windows are passive and do not cause problems like this.

6.1 Configuration System

This tool is used to view the reader's hardware module part numbers and version numbers. The tool is also used to set the networks settings and to change the name of the reader as seen on the network.

To access this tool, select *Tools->System->Configuration System.*

The configuration system tool consists of two tab items:

1. System configuration – shows part and version numbers of various components which make up a reader.

2. Network configuration – shows the current reader network settings.

6.1.1 System Configuration Tab

The configuration system tool is shown in Figure 11. Your section names, part and version numbers may be different to what is shown in this document, depending on what type of reader, ReaderManager is connected to.

Most fields in the configuration system require a password to change the field value. The *CustomerID* field does not require a password and is provided for the user to assign a descriptive name to the reader. This name will appear in the multicast messages from the reader and will be shown in the dynamic connection area on the *Connection* menu. Table 7 describes the various elements of the tool.
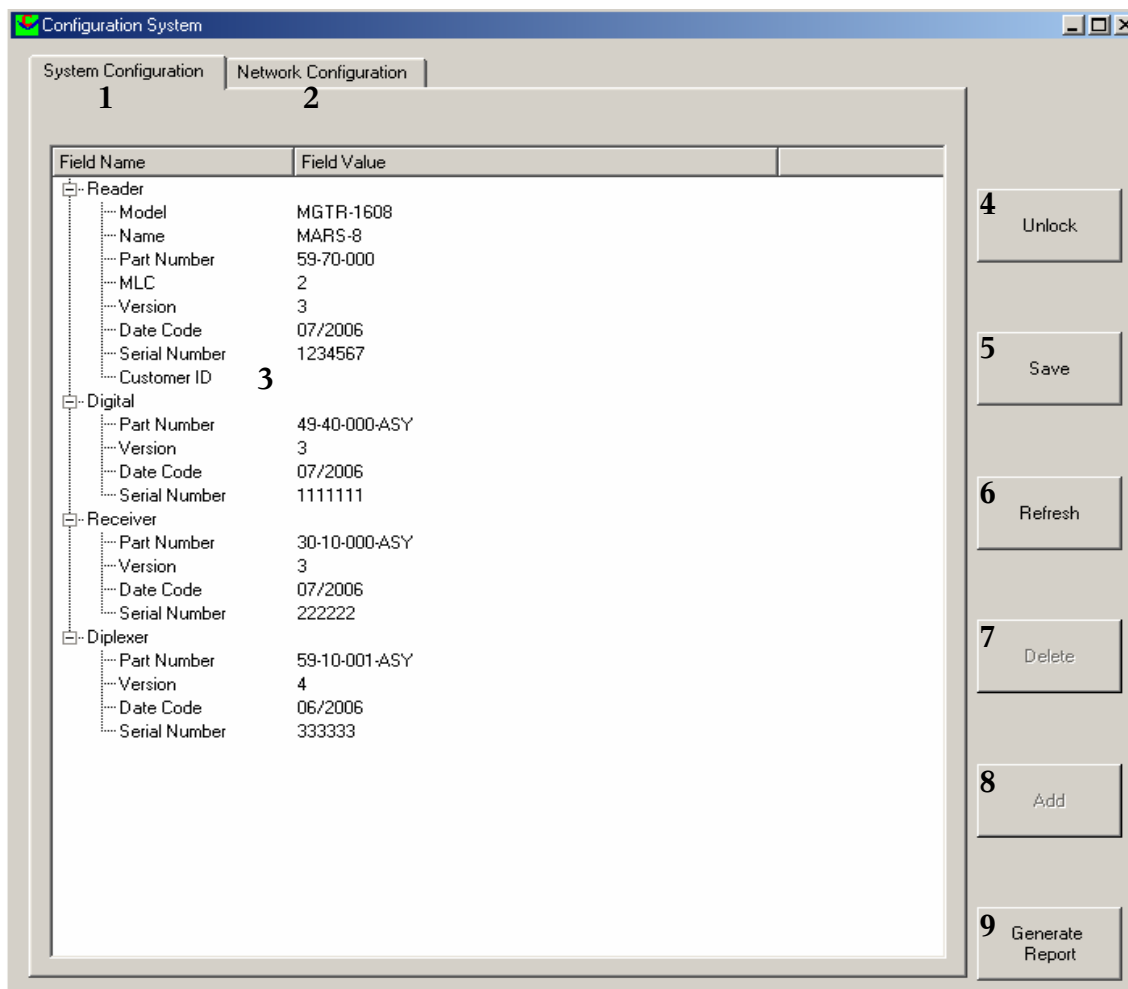
Figure 11

Index	Description
1	Click this tab to show the part numbers and version numbers of various components which make up a reader.
2	Click this tab to show the reader's network settings.
3	This field allows the user to give the reader a descriptive name. This name will appear on the dynamic connection list and will be the hostname of the reader on the network. 1. Click the field column opposite *Customer ID*. 2. Enter the name you would like assigned to the reader. 3. Press *Enter*.
4	Click this button to unlock the password protected fields. The user will be prompted to enter a password.
5	Click this button to save any changes to the reader.
6	Click this button to refresh the list from the last saved values.
7	Click this button to delete a custom field. Only custom fields can be deleted.
8	Click this button to add a custom field name and value to any reader section.
9	Click this button to create a packing report prior to shipping a reader.

Table 7

6.1.2   Network Configuration Tab

The *Network Configuration* tab provides fields for the user to setup the reader to get an IP address from a DHCP server to use a static IP address. The network configuration tab is shown in Figure 12.
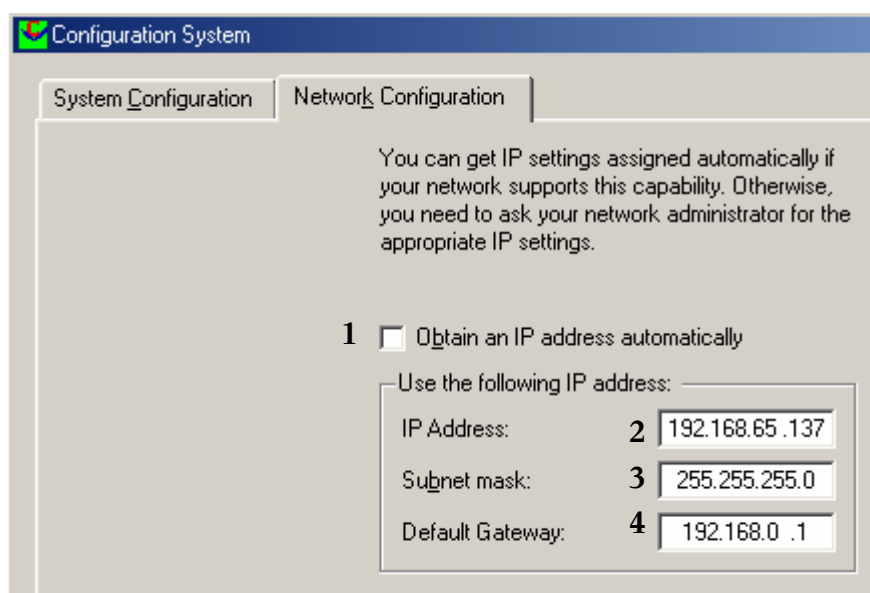
Figure 12

Index	Description
1	Tick this to set the reader to get an IP address from a DHCP server.
2	If (1) is not ticked enter the IP address used by the reader.
3	Enter the subnet mask based on the IP address entered in (2)
4	Enter the default gateway IP address. (Optional)

Table 8

6.2 Console

The console dialog provides a command line interface to a reader. Reader commands are described in the Application Programmers Guide (40-01-000-DOC). The *Command Entry* area also accepts Python code. The console tool is shown in Figure 14. Table 8 describes the various elements of the Console tool.

To access this tool select, *Tools->System->Console.*
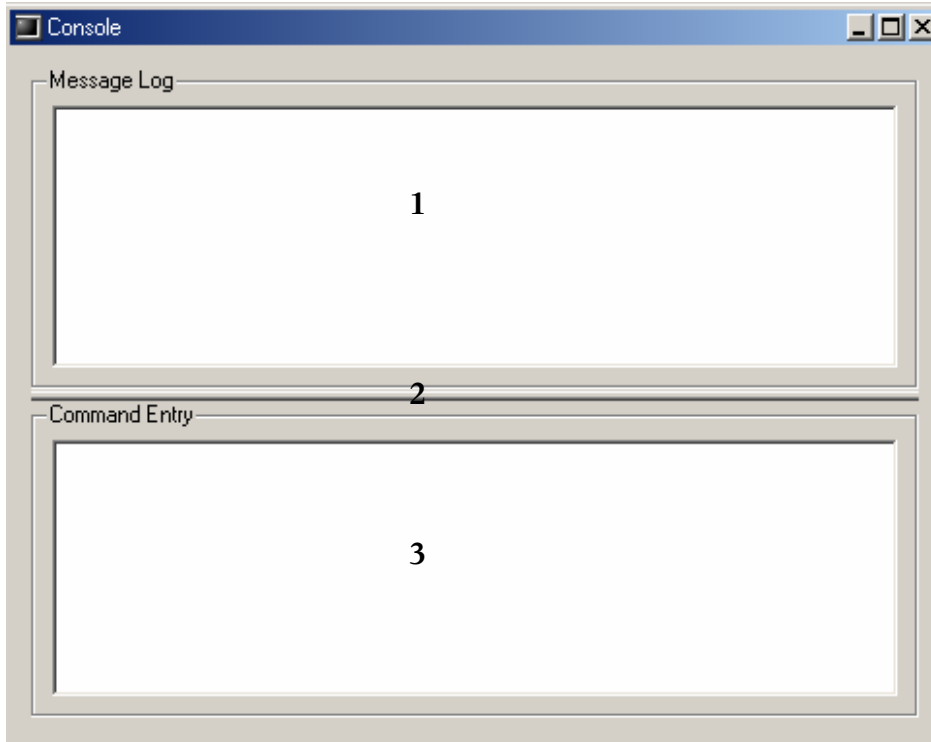
Figure 13

Index	Description
1	*Message Log* window shows all message received from the reader.
2	Window size adjustment bar. Use this to change the size of the *Message Log* and *Command Entry* windows.
3	*Command Entry* window provides an area to enter command to send to the reader.

Figure 14

Clicking the right mouse button in the *Message Log* brings up a menu. This is the means of controlling the behaviour of the console.

- If text has been selected in the *Message Log* window, it can be copied into the clipboard for pasting elsewhere.

- *Clear* will remove all the text in this window.

- *Show Tag Replies* enables the display of tag messages and tag expired message. By default, this is turned off, because in applications where large numbers of tags are being processed, it will bring the application to a halt updating this window with tag messages. Each time this option is selected, it will turn this option on or off.

- *Show Commands Sent* if ticked will enable the display of all commands sent from this application in any window to the reader. This is an excellent diagnostic tool if you are seeing error messages from the reader in response to a command or you just want to see how the various tools work by looking at what they send.

- *Show Messages* enables the display of all other messages that the reader sends. This includes error messages, so normally it is advisable to never turn this option off.

- *Open Log File...* controls the facility to record all the text that appears in this window into a file. When this option is selected, a file open dialog will appear, allowing you to select the directory and filename to use.

If the log filename you have selected already exists, you will be prompted to either *Replace* (overwrite) or *Keep* (append to the end of the file) the log file. This message also shows how large the file currently is in bytes.

While the log file is open, this menu item will change to *Close Log File(xxxx)* with the name of the log file shown within the parenthesis. Selecting this option will close the log file. When running this application under Windows, the log file contents will not appear complete if viewed with an outside application until the file is closed or the application exited. This is the behaviour of Windows itself with open files. This does not occur when run under Unix systems.

Note that if a log file is open when the ReaderManager is exited, it will be reopened when it is started the next time.

6.3   Grid of Tag Sight Counts

This tool shows a graphical representation of tag sighted by the reader.

To access this tool select, *Tools->System->Grid of tag sight counts.*

This tool is shown in Figure 15.

When a tag is placed on the reader the cells turn light blue and shows the specific ID. The tool can also be setup to show the number of times the tag has been sighted and show data read from the tag. Expired tags are shown as a grey cell.

Right click on the grid to bring up a menu which provides several options to configure the grid, these are:
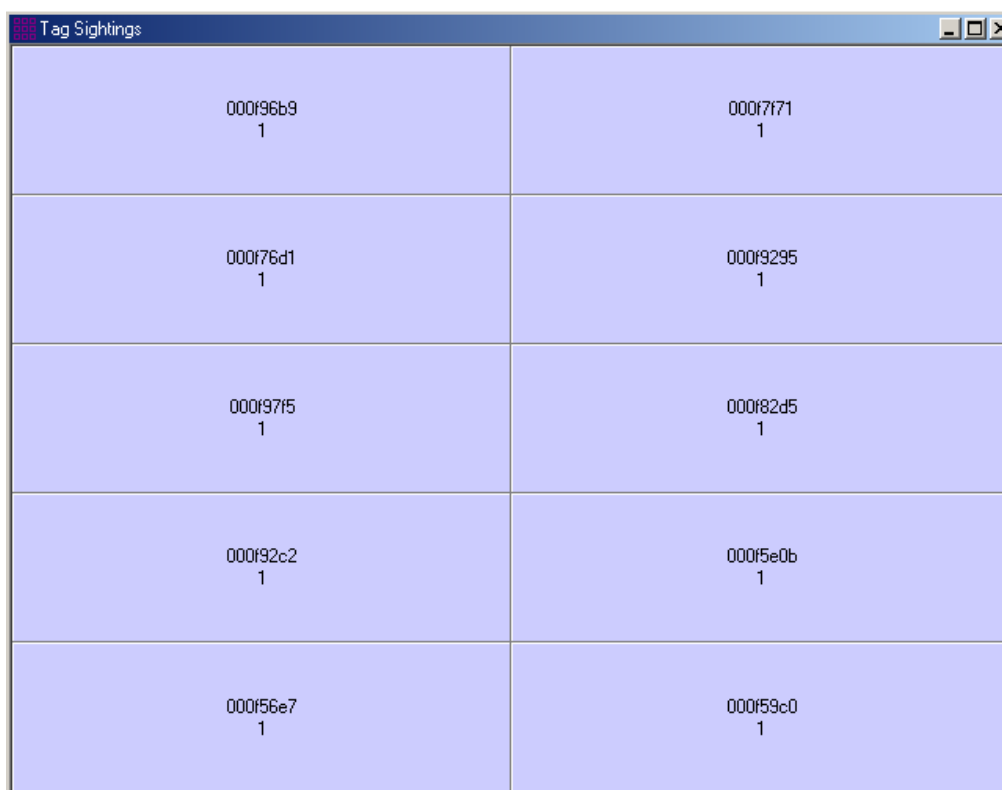
Clear: - Allows the user to clear the table and select preferences. Note that *Del* can be used as a shortcut to clear the table.

Show Counter: - When ticked shows the number of times a tag has been sighted.

Show Data: - When ticked shows the data reader from the last command the tag responded to.

Rows and Columns: - Provides a dialog to set up the number or rows and column in the grid.

Font: - Shows a dialog which can be used to change the font.

Figure 15

6.4 Immediate Command

This tool is useful to construct an Immediate command.

To access this tool, select *Tools->System->Immediate Command.*

Immediate commands are sent to tags after the initial interrogate cycle. These commands can be sent to specific tags or to groups of tags. A more detailed of description of immediate commands is given in the Application Programmer's Guide (40-01-000-DOC).

The tool is shown in Figure 16, the elements are described in Table 9.

Figure 16

Index	Description	Index	Description
1	The *Command* group box is used to select if the command is a read command or a read and write command.	10	Click to preview the complete Immediate Command. No command is sent to the reader.
2	Not used	11	Click this to send the command to the reader.
3	The *Reply* group box is used to select if the reply is a *Short* reply or a *Normal* reply. Normal replies contain more detailed information about the tag being read.	12	Select the channel on which the reply will be received.
4	Enter the start address being read from the tag. This field accepts a single word decimal value.	13	Enter the command number sent with the Immediate command. This value is returned in the Timestamp field of the reply. This field accepts a single word hexadecimal value.
5	Enter the number of words to read. This field accepts a single word decimal value	14	Enter the Specific ID of the tag being read from or written to. Leaving this field blank means all tags will respond to the command. This field accepts a two word hexadecimal value. This is useful to read or write to a single tag in a stack of tags.

Index	Description	Index	Description
6	Enter the start write address or used the scroll arrows to set the start write address.	15	Enter the Group ID of tags you would like to be affected by the command. Only tags with a matching Group ID will respond to the command. Leaving this field blank means all tags will respond to the command. This field accepts a single word hexadecimal value.
7	Enter the data to write to the tag. The number of data fields depends on the start address. Write data should be entered from left to write. It is not necessary to enter data into all the fields. Entering no data will set the lock pointer.	16	Enter the Conditional ID used in the command. Only tags with a Conditional ID equal to or less than the value in this field will respond. Leaving this field blank means all tags will respond. This field accepts a single word hexadecimal value.
8	Select this option to write ASCII text.	17	This field is used to enter a password for tags which are password protected. This field should be left blank for tags which are not password protected. This field accepts a three word hexadecimal value.
9	Select this option to write hexadecimal data.		

Table 9

Typical usage of this tool is as follows:

To read two words from address 10 do the following:

1. Select *Read* in the *Command* group box.

2. Select *Short reply* in the *Reply* group box.

3. Enter *10* in the *Address* field in the *Read* group box.

4. Enter *2* in the *Length* field in the *Read* group box.

5. Click *Send*.

To write two hexadecimal words 1234 and 5678 to address 12 and 13 and read the response do the following:

1. Select *Read/Write* in the *Command* group box.

2. Select *Short reply* in the *Reply* group box.

3. Enter *12* in the *Address* field in the *Read* group box.

4. Enter *2* in the *Length* field in the *Read* group box.

5. Enter *12* in the *Address* field in the *Write* group box.

6. Select the *Hex* option button in the *Write* group box.

7. Enter *1234* in the *Data* field under the *12 label*, enter *5678* in the data field under the *13 label*. Leave all other value as ####.

8. Click *Send*.

6.5   Interrogate Command

This tool used to set the Interrogation command.

To access this tool, select *Tools->System->Interrogate Command*

This tool is shown in Figure 17.

This is the command that is sent continuously in an effort to identify new tags entering the reader. If you do not want to specify a read address and length, then put an address of 10 (for example) and a length of 0 (zero).

Once the settings are made, press *Send* to transmit the command to the reader.

The fields operate in the same way as the fields on the *Immediate command* tool. There are two additional fields, namely *Pre Script* and *Post Script*. These fields are used to define Python scripts which are run before the command (*Pre Script*) and after the command (*Post Script*).

Figure 17

6.6   Memory Map

This tool allows the entire memory of tags to be examined and changed. It also supports creation of tag configurations that define a series of writes that can be applied to any tag.

To access this tool, select *Tools->System->Memory Map*

Whenever a tag is clicked once, the memory panes will be updated to reflect that tag.

This tool is shown in Figure 18, its elements are described in Table 10.
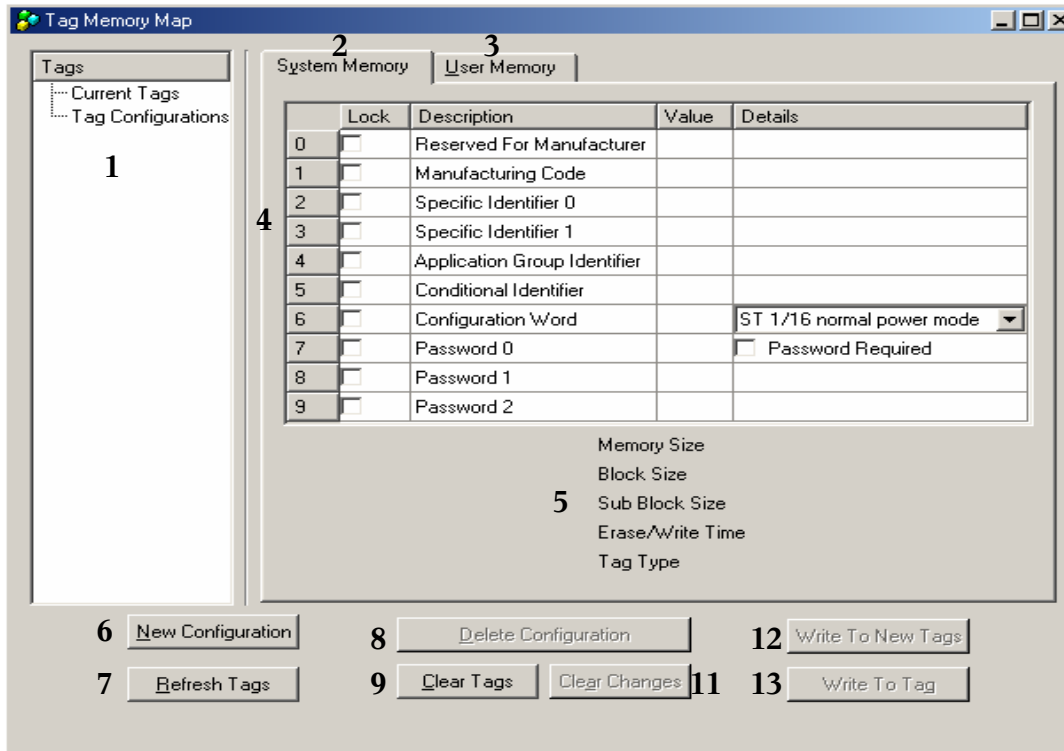
Figure 18

Index	Description
1	List of all current tags and tag configurations. Whenever a new tag is placed on the reader, it will appear in this list. Each tag is identified by its specific ID. The colour of this ID changes according to context: • *Green* for a new tag. It will remain in this colour until all the tag's memory has been read. • *Blue* for a tag that has been completely read. This is an active tag that is ready to be written to. • *Grey* when a tag has expired. This indicates the tag has left the field or has been muted indefinitely. • R*ed* when writes to the tag are being attempted. Usually, a tag will remain in this state for a short time while the writes are being performed.
2	Select this tab to view / change tag system memory.
3	Select this tab to view / change tag user memory.

Index	Description
4	Shows system tag memory: • The *Lock* column shows the position of the lock pointer. If the check box is ticked the address is locked. **Once changed the *Lock* pointer can't be undone.** • To change the data at a system memory address, edit the number in the *Value* column. • To change the *Configuration* word, select the configuration from drop down list in the details column at address 6. • To set the *Configuration* word to set the tag to password protected, check the *Password Required* checkbox.
5	Shows various information about the selected tag.
6	If there is a need to write the same data to multiple tags, then configurations make this easy. Click *New Configuration* to enter the name to remember this configuration by. Then click on the configuration. All the memory is shown as *FFFF*. Simply change the memory locations required. To apply these changes to a real tag, click on the configuration name, keeping the mouse button held down, move the mouse and drag it over the tag you wish to apply the changes to. When the mouse button is released, the changes will be applied to the tag. They will not be writen to the tag, but changes the tag representation so that the changes are represented in red as if the user had manually entered them. Click buttongs (13) or (14) to write to the tag.
7	Click this to refresh the tag list – all tags will be re-sighted.
8	Click this button to delete the selected configuration.
9	Click this to clear the tag list.
10	Click this to revert to the selected tags current state.
11	Click this to write to all tags in the tag list.
12	Click this to write only to the selected tag.

Table 10

To change the value of a memory location, click once on any cell in *User Memory* or the *Value* column of *System Memory* and edit the hexadecimal value. Any changed value from what is on the tag will be shown in red.

It is also possible to enter text in the *As Text* column of *User Memory*, though this should be used with caution. Only plain text can be entered in this way and care must be taken to move to the correct address.

When changes to a tag are complete, make sure the tag is in the reader field, then click *Write To Tag*. After a brief period in red while the writes are occurring, the tag memory should change to black for all the changed values indicating success. If the user decides not to write to the tag, *Clear Changes* will revert to the tag's current state. *Clear Tags* will remove all current tags from the list.

6.7   Reader Settings

This tool provides controls for the user to change operating parameters on the reader.

To access this tool, select *Tools->System->Reader Settings*

The tool has two tabs *User Settings* and *System Settings*.

The user settings form is shown in Figure 20 and the various controls described in Table 10. The system settings form is shown in Figure 21 and the various controls described in Table 11.

The parameter values are reader dependent the forms shown in this document may be different to what is shown on your reader.

Changing reader settings incorrectly could cause the reader to malfunction or operate below normal efficiency. If you are unsure what you are doing contact Magellan Technology for advice.

To restore the reader is its default settings click the *Clear Saved Settings* button, and then power cycle the reader.

The reader commands which are affected by the controls on the settings tool are shown in **bold**, the reader commands are described in the Programmers API document (40-10-000-DOC).

When changing a text field, enter the value in the text box then press *Enter* to send the command to the reader.

6.7.1 User Settings

Figure 19

Index	Description / Command	Index	Description / Command
1	When multiple groups have been defined this drop down list can be used to display the settings for a specific group.	20	**ShowExpired()** Tick this to enable tag expired message to be sent from the reader.
2	**GroupPriority()** Drop down list provides options for the user to change the *Group Priority* for the current group. Selecting disabled indicates that this group will only be polled manually.	21	**AgeTags()** Tick this to enable tag aging on the reader.
3	Shows the axis ports which are part of the group selected in (1). This field is read only. Use the *Reader Setup* tool to edit axis groups.	22	**AutoMute()** Tick this to enable mute commands to be sent to tags after all the action commands have been completed by the reader.
4	Click this tab to select the *User Settings* form.	23	**TagType()** Use this drop down list to select the tag type being used on the reader.
5	Click this tab to select the *System Settings* form.	24	**Power()** Tick this to enable the powering field on the reader.

Index	Description / Command	Index	Description / Command
6	**ToggleReaderID()** Tick this enable the reader to change the *Reader ID* periodically.	25	**AxisPeriod()**[1] Sets the number of milliseconds to spend on an axis.
7	**TimeStamp()** Change the *TimeStamp* sent to the reader.	26	**AxisOffPeriod()** Sets the minimum number of milliseconds to switch the power off between axes.
8	**InterrogateBreak()**[1] Set the number of small power breaks to send to the reader when operating in stack mode.	27	**AxisCount()** Use this drop down list to select the number of axes used by the reader.
9	**UnmuteCount()** Set the number *Interrogate Commands* per break to unmute tags during the unmute phase of an ID cycle.	28	**IDCycleExpiryCount()** Sets the number of axis ID cycles to wait before expiring a tag.
10	**ReaderID()** Change the *ReaderID* sent to the reader in an interrogate command. Only valid when *Toggle Reader ID* is disabled.	29	**TagTimeout()**[1] Set the number of milliseconds to wait before timing out the tag.
11	**TimeStampScalingFactor()** Set the rate at which the timestamp field of the command number in the interrogation command changes.	30	**CurrentAxis() and AxisLabels()** To change the current axis: 1. Uncheck the Switching checkbox (35) 2. Select the axis you would like to power using the drop down list. To change the axis name: 1. Select the axis you would like to rename from the dropdown list 2. Delete the current name and enter the new axis name. 3. Press enter when done.
12	**InterrogateCount()** Sets the number of interrogate commands sent per break. The sliding check box should be left ticked.	31	**AxisMinPeriod()** Set the minimum number of milliseconds to spend on an antenna. Settings this parameter to zero means operate at the fastest possible speed.
13	**BreakCount()** Sets how many small power breaks are sent when the reader is operating in stack tag mode.	32	**AxisMaxPeriod()** Set the maximum number of milliseconds to spend on an antenna. Settings this parameter to zero means operate with no maximum.
14	**DefaultReplyActions()** If ticked sets default actions for post scripts.	33	**NoReplyAxisCount()**[1] Sets the number of axis periods with no replies before performing the necessary actions.
15	**FullReplyFormat()** If ticked the reply includes extra information related to the tags configuration and reply channel.	34	**AxisColdPowerUp()** Not used
16	**ShowHardCode()** If ticked tag replies will include the tags *HardCode* value.	35	**Switching()** If ticked will enable axis switching.

Index	Description / Command	Index	Description / Command
17	**WithTime()** If ticked the time and date will be added to the tags reply.	36	Refresh the displayed settings
18	**FastReplyDecode()** If ticked the reader will decode all tag replies as soon as they are received. In most cases this should be left un-ticked.	37	Clear the settings on the reader which are loaded when the reader is powered. When the reader is next powered up it will load the factory default settings.
19	**TagReplyMode()** To add a reply mode: 1. Click the mode you would like to add from the left list. 2. Click the right pointing arrow. To remove a reply mode: 1. Click the mode you would like to remove from the right list. 2. Click the left pointing arrow. To change the order of the active reply mode parameters: 1. Click the mode you would like to re-order from the right list. 2. Click the up arrow to move the mode to the top of the list. 3. Click the down arrow to move the mode to the end of the list.	38	Save the current settings to the reader. These settings will be loaded when the reader is powered on.

Figure 20

Notes:

1. For AVR readers only.

6.7.2　System Settings

Figure 21

These settings should be left at their default values.

Index	Description / Command	Index	Description / Command
1	**IndependentAxis()** Tick this to make all axes in a group behave as separate antennas. If not ticked, antennas in the same group are treated as one antenna – tags will not expire when moved between them.	8	**PostBreakDelay()** Sets the delay between a small power break in the command sent to a tag.
2	**AxisCycleEnabled()** When ticked the reader will power off periodically and switch axes. This setting should always be ticked.	9	**IdleModulation()** On readers which support this command it changes what bits are sent to the reader when no command is sent.
3	**BreakCycleEnabled()** When ticked the reader will send small power breaks to stack tags. In *Item Tag* mode this is disabled otherwise it should always be ticked.	10	**SpecificRetryMax()** Sets how many times to send a tag specific command when no reply is received.

Index	Description / Command	Index	Description / Command
4	**CommandCycleEnabled()** When ticked the reader will send tag commands. This should always be ticked.	11	**SpecificPhaseMax()** Sets how many tag specific commands are sent per interrogate / break phase.
5	**AxisBreak()**[1] When ticked the reader will power off periodically and switch axes. The setting should always be ticked.	12	**TuneAxisEvery()**[2] Controls how frequently the reader runs the auto tune sequence.
6	**PreCommandDelay()** This is the fixed delay after an axis start before the command is sent.	13	**DiplexerPowerMode()**[1] Sets the power field level.
7	**PreCommandDelayRandom()** This behaves like the *PreCommandDelay* function except that the time before the first command is variable and causes the tag to randomly hop to a different channel.	14	**Time()** Sets the reader system time.

Table 11

Notes:

1. For AVR readers only.
2. For readers which have a diplexer with an auto tune circuit.

6.8 Reader Setup

This tool provides a wizard which is used to:

- Create, edit and delete axis groups
- Configure axis groups
- Select the antennas which are connected to each axis port.
- Configure each axis.
- Tune each antenna.
- Test each antenna.
- Report the antenna configuration.

Readers can not be used reliably without correct antenna setup. It is vital for correct operation that this tool is used to setup a reader and the setup is saved to the reader.

Equipment required:	
Quantity	**Description**
1	Antenna tuning block.
1	Voltmeter - Must be able to measure DC volts between 100mV and 12V.
1	Trim tool.
1	Stack tag configured in Normal Powered mode. See section 2.5 How do I set a tag to Normal Powered mode? for details on how to configure this tag.

To access this tool, select *Tools->System->Reader Setup*

The flow chart shown in Figure 22 describes the typical setup steps which must be followed when using this tool.

This setup flow chart makes the following assumptions:
1. The settings in the reader are set to the factory default.
2. Only one axis group is required.
3. ReaderManager is connected to the reader.

Before starting the setup procedure ensure you have the following:
1. DC voltmeter able to measure 100mV to 12V.
2. Tuning block.
3. Trim tool.
4. A stack tag set to Normal Powered Mode

Select
Tools->System->Reader setup

Tick *Use Wizard*
Click *Go*

Select
Load settings from the Reader.
Click
Load Settings

Acknowledge setting have been loaded
Click *OK*

Click
Edit groups

Ensure only one group is shown.

Click
Configure groups

Ensure
• Independent Axes is ticked.
• Toggle Reader ID is ticked.
• Group Priority is 1.
• Tag Reply Mode is set to the readers default setting.

Click
Configure axis

From the *Antenna Type* list select the antenna which is connected to the *Axis* port shown at the top of the form.

Is this the last axis?

N → Click *Next* to setup the next Axis.

Y

Click
Save Configuration

Click
Save to Reader

Save the settings to the reader by clicking *Yes*

Acknowledge setting have been saved
Click *OK*

Click
Tune Axis

Follow the tuning instructions displayed on the form

Is this the last axis?

N → Move the tuning block to the next antenna.
Click *Next* to setup the next Axis.

Y

Click
Test axis

Place a Normal powered stack tag on the antenna.
Click *Start*

Does the test PASS

N → Consult the trouble shooting section in the your Reader's user guide and in the antenna tuning guide.

Y

Is this the last axis?

N → Move the tag to the next antenna
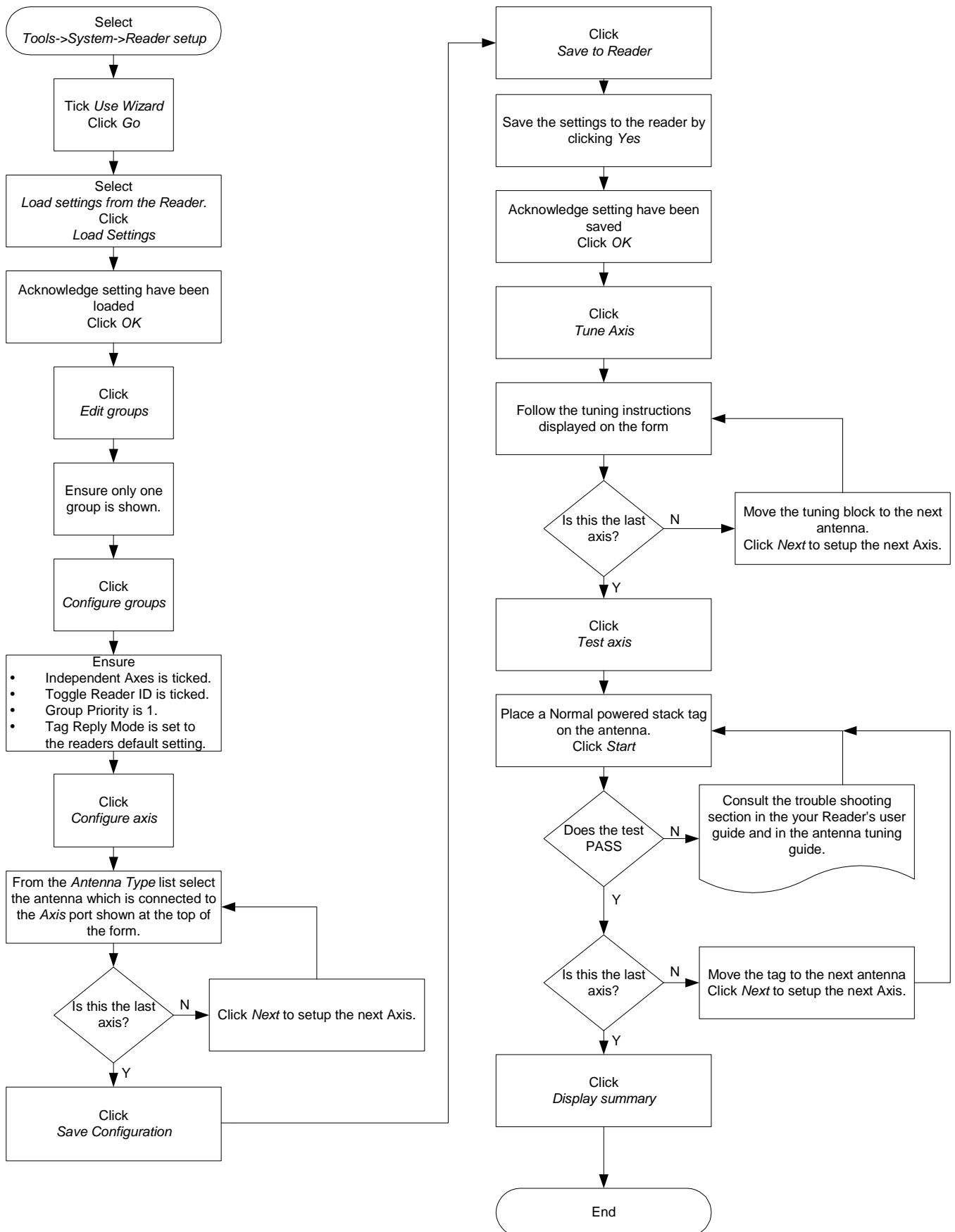Click *Next* to setup the next Axis.

Y

Click
Display summary

End

Figure 22

The reader setup tool is designed to take the user through a sequence of steps to setup a reader. Each step must be completed for all axes / antennas before the next step is started. When a setup stage is complete a green tick is shown next to the setup stage description in the Reader setup progress frame. Ensure the *Use Wizard* check box is ticked, then click *Go*.

6.8.1   Load Configuration

This form is used to initialise the tool by loading the current reader configuration from the reader or by loading a previously saved configuration from a file saved on disk.

The configuration must be loaded each time this tool is opened.

The *Load a configuration* form is shown in Figure 23 and the various elements are described in Table 12.
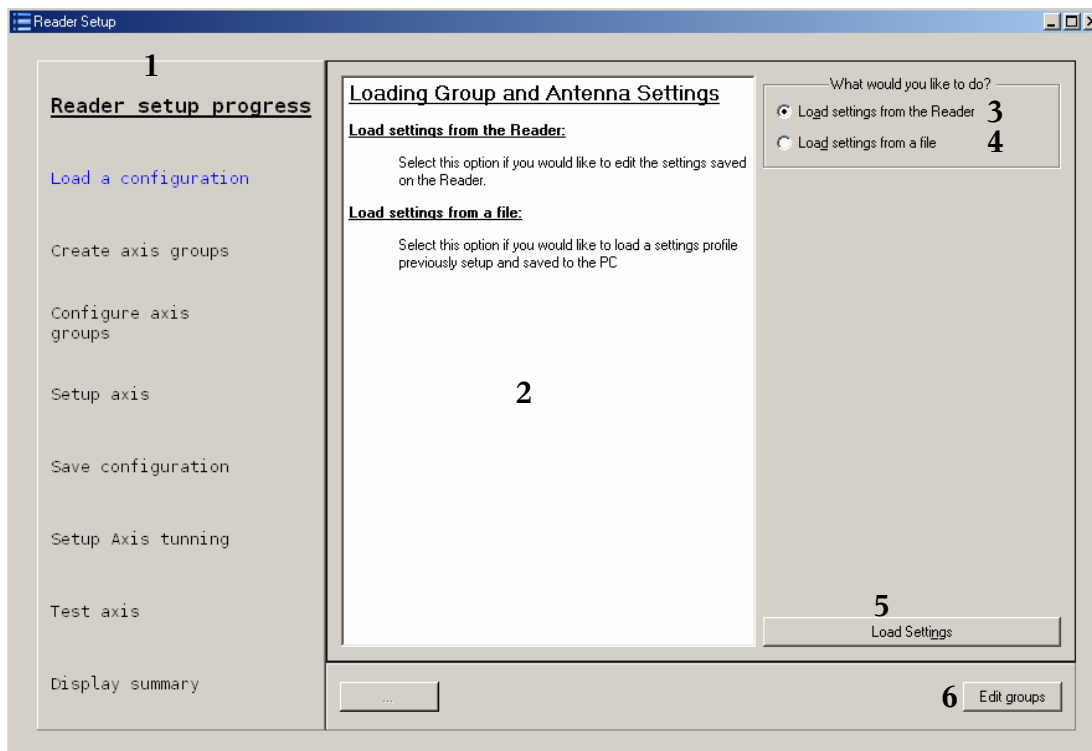
Figure 23

Index	Description
1	Setup progress
2	Form instructions
3	Select this to initialise the tool from the current reader configuration.
4	Select this to initialise the tool from a file saved on the disk
5	Click this to load the selected configuration.
6	Once the configuration is loaded click this to go to the next form.

Table 12

Typically the sequence of events when using this form is:

1. Select the configuration you want to load.

2. Click *Load settings*.

3. Acknowledge the configuration has been loaded when the message box is shown.

4. Click *Edit groups*.

6.8.2   Create axis groups

This form provides an interface for users to create or delete axis groups and to move antennas between groups. Groups are used to define different behaviours for groups of antennas. The concept of grouping antennas is described in more detail in the Programmers Guide (40-00-000-DOC). In most cases one group containing all antennas is sufficient.

The *Create axis group* form is shown in Figure 24 and the elements are detailed in Table 13.
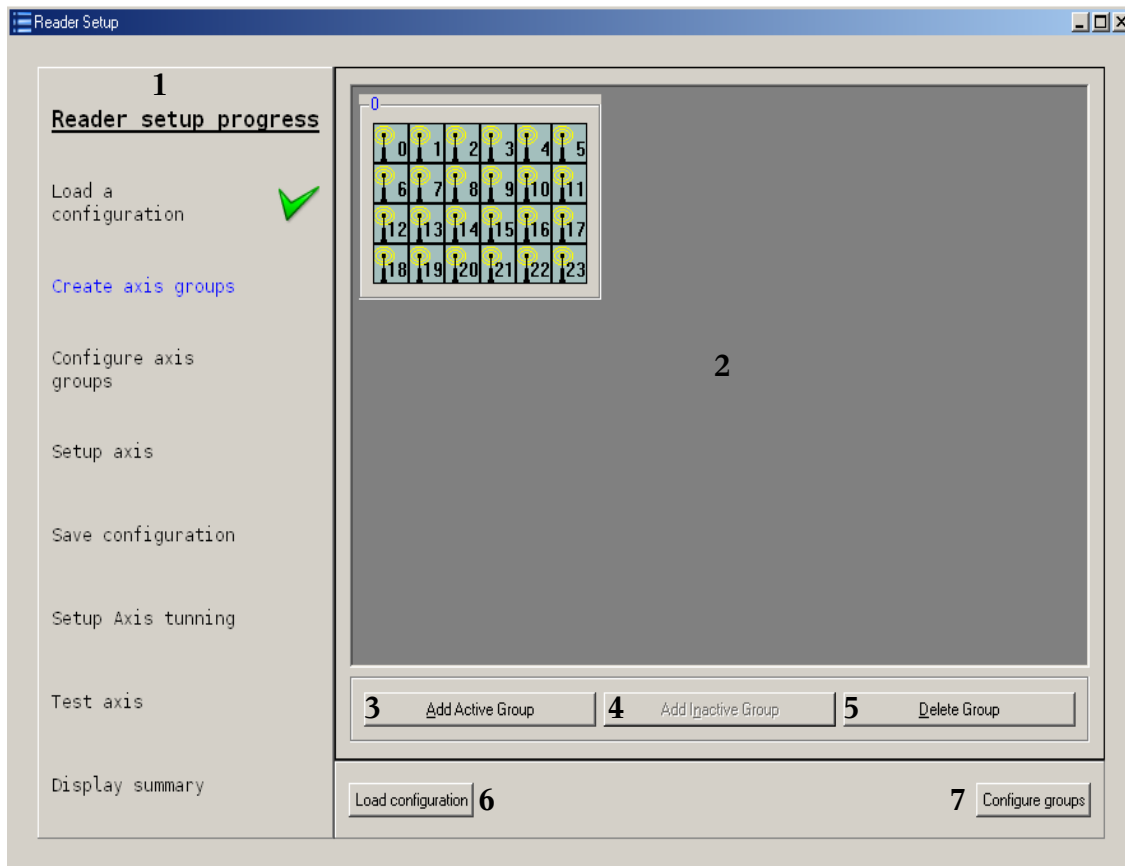
Figure 24

Index	Description
1	Setup progress – should show *Load a configuration* as being complete.
2	Axis group workspace. When more than one group is defined, click on an antenna icon then drag and drop it onto the group box.
3	Create a new empty group.
4	Not used.
5	Delete an empty group
6	Go back to the *Load a configuration* form. The tool configuration will be cleared and a new configuration will need to be loaded.
7	Go to the *Configure axis* group form.

Table 13

Typical the sequence of events when using this form is (when more than one group is needed):

1. Click *Add Active Group.*

2. Move antennas from group 0 into the new group.

3. Click *Configure groups.*

6.8.3   Configure axis groups

This form is used to configure reader settings for the groups created in the previous step.

The following group parameters are setup using this form.

- *Independent axis* – ticked if the antennas in the group do not operate as one axis.
- *Toggle reader ID* – Ticked if the reader ID is toggled when the reader polls the axes in this group.
- *Group Priority* – Set the group priority for all axes in this group. The group priority determines how often the antennas in this group are polled. Setting the group to disabled will result in none of the antennas in this group being polled during the normal axis switching cycle. The Programmers Guide (40-01-000-DOC) describes how to manually poll axes in a disabled group.
- *Tag Reply Mode* – Set the reply mode for all axes in this group.

The Configure axis groups form is shown in Figure 25, its elements are described in Table 14.
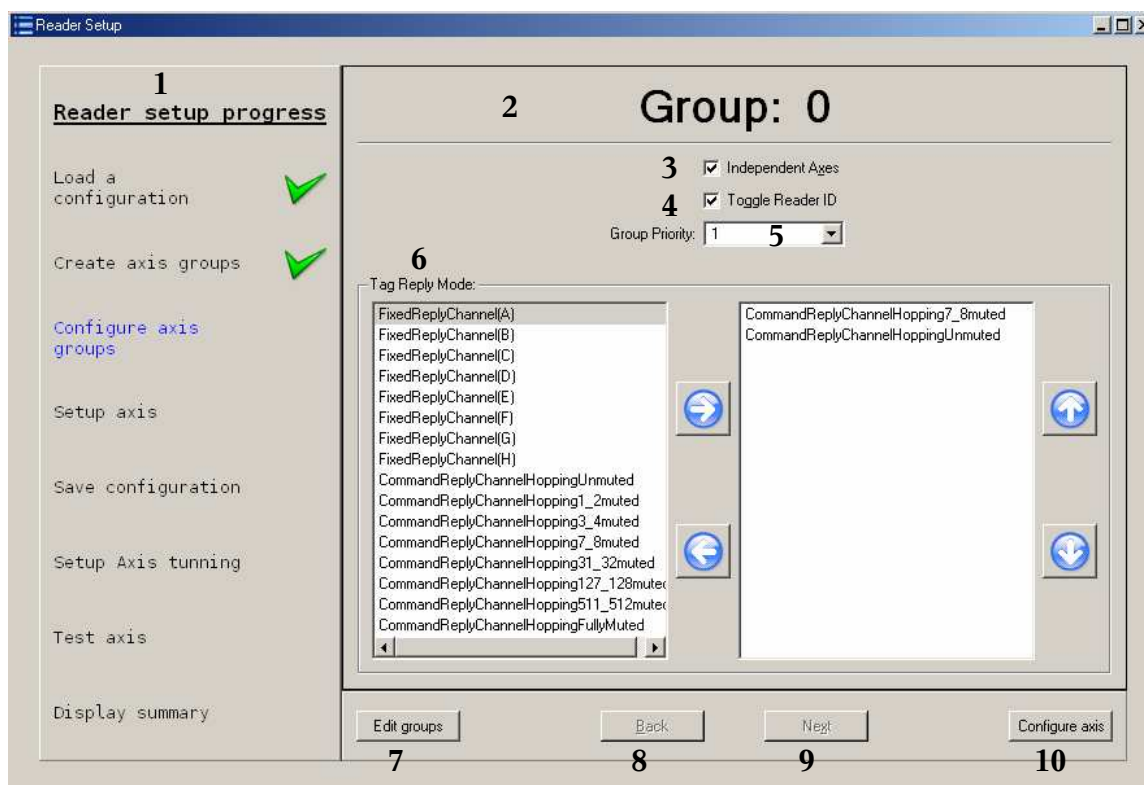
Figure 25

Index	Description
1	Setup progress – should show *Create axis groups* as being complete.
2	Current group indicator.
3	Tick this to enable *Independent axis* setting for this group
4	Tick this to enable *Toggle Reader ID* for this group.

Index	Description
5	Select the *Group priority* or disable all axis selections for axes in this group.
6	Set the reply mode for all axes in this group. To add a reply mode: 1. Click the mode you would like to add from the left list. 2. Click the right pointing arrow. To remove a reply mode: 1. Click the mode you would like to remove from the right list. 2. Click the left pointing arrow. To change the order of the active reply mode parameters: 1. Click the mode you would like to re-order from the right list. 2. Click the up arrow to move the mode to the top of the list. 3. Click the down arrow to move the mode to the end of the list.
7	Click *Edit groups* to go back to the previous form and edit the groups.
8	Click this to configure the previous group's settings.
9	Click this to go to the next group and edit its group's settings.
10	Click this to go to the *Setup axis* form.

Table 14

The typical usage of this form is as follows:

1. Set *Independent axis*, *Toggle Reader ID*, *Group Priority* and *Tag Reply Mode* to the required settings, the default settings are normally sufficient.

2. Click *Next* to edit the next group's settings.

3. Click *Configure axis*.

6.8.4   Setup axis

This form provides an interface for the user to select what type of antenna is connected to each reader axis port.

> This step in the setup is crucial for correct reader operation. If the correct antenna is not selected reader performance can be significantly degraded.

The Setup axis form is shown in Figure 26, its elements are detailed in Table 15.
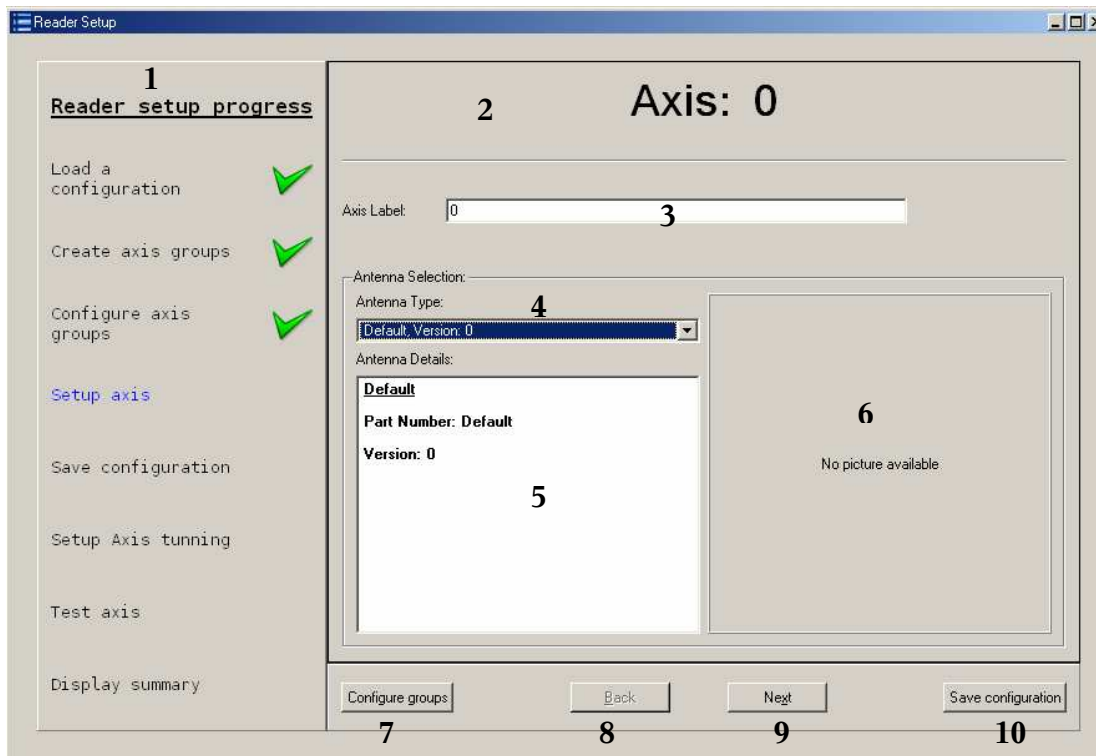
Figure 26

Index	Description
1	Setup progress – should show *Configure axis groups* as being complete.
2	Current axis indicator.
3	Enter the label for this axis.
4	Drop down list showing antennas which are compatible for the reader being configured. The version number indicated the minimum version which is compatible.
5	Selected antenna details shows: the part number, description and version.
6	Go back to the *Configure axis group* form.
7	Click this to setup the previous axis.
8	Click this to setup the next axis.
9	Click this to go to the *Save configuration* form.

Table 15

The typical usage of this form is as follows:

1. Select the antenna connected to the current port from the *Antenna type* drop down list.

2. Click *Next* to setup the next axis.

3. Repeat until all axis ports are configured with an antenna.

If less than the available axis ports are used setting the antenna to default is a safe configuration to use. It is still necessary to iterate through all antennas.

6.8.5   Save configuration

This form is used to write the configuration to the reader and also to save the configuration to disk. Saving the configuration to disk provides a way to setup other readers to use the same antenna configuration.

No configuration is written to the reader until this point.

If you click *Save Configuration* to save the configuration as a file on the hard disk, you must also click *Save to Reader* to write the configuration to the reader.

If you do not click *Save to Reader* the reader will remain in an un-configured state.

This form is shown in Figure 28 and the elements are described in Table 15.
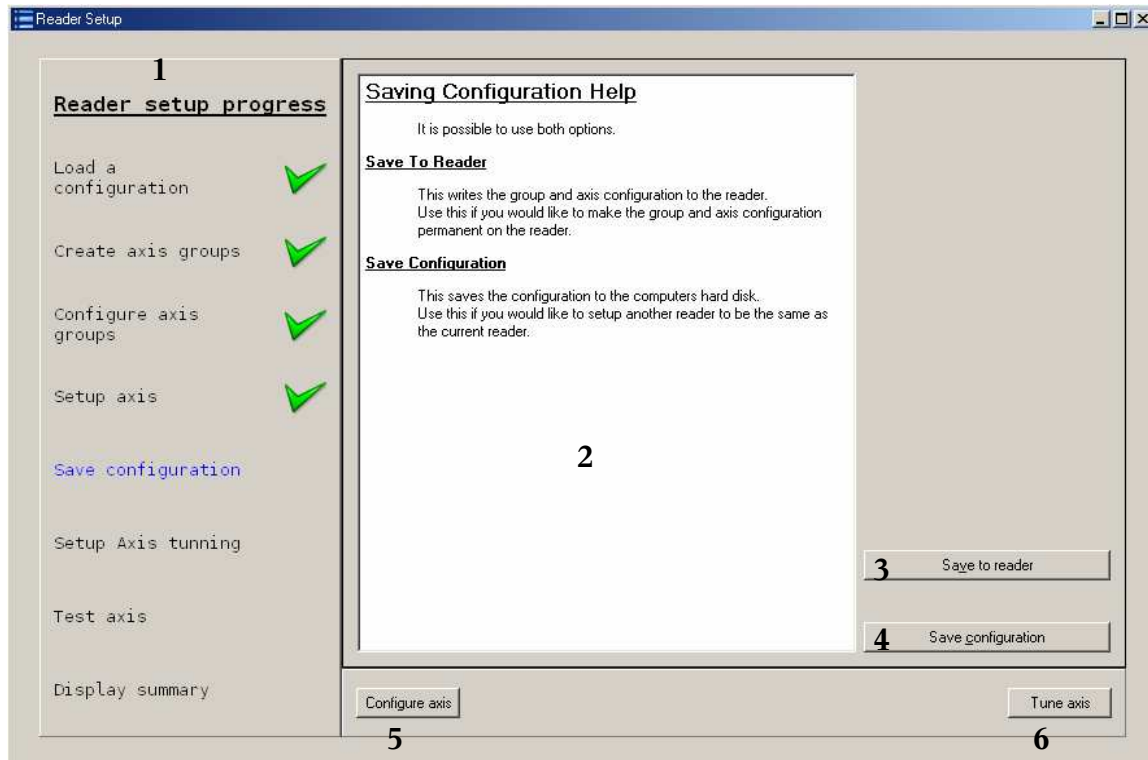
Figure 27

Index	Description
1	Setup progress – should show *Setup axis* as being complete.
2	Form instructions.
3	Click this to write the configuration to the reader.
4	Click this to save the configuration to a file which is saved on the hard disk.
5	Click this to go back to the *Setup axis* form.
6	Click this to go to the *Setup tuning* form.

Figure 28

The typical usage of this form is as follows:

1. Click *Save to Reader*.

2. Click *Yes* when asked to save to the reader.

3. Acknowledge the configuration has been saved when the message box is shown.

4. Click *Tune Axis*.

6.8.6 Setup axis tuning

This form provides instructions for tuning the antenna connected to each axis port.

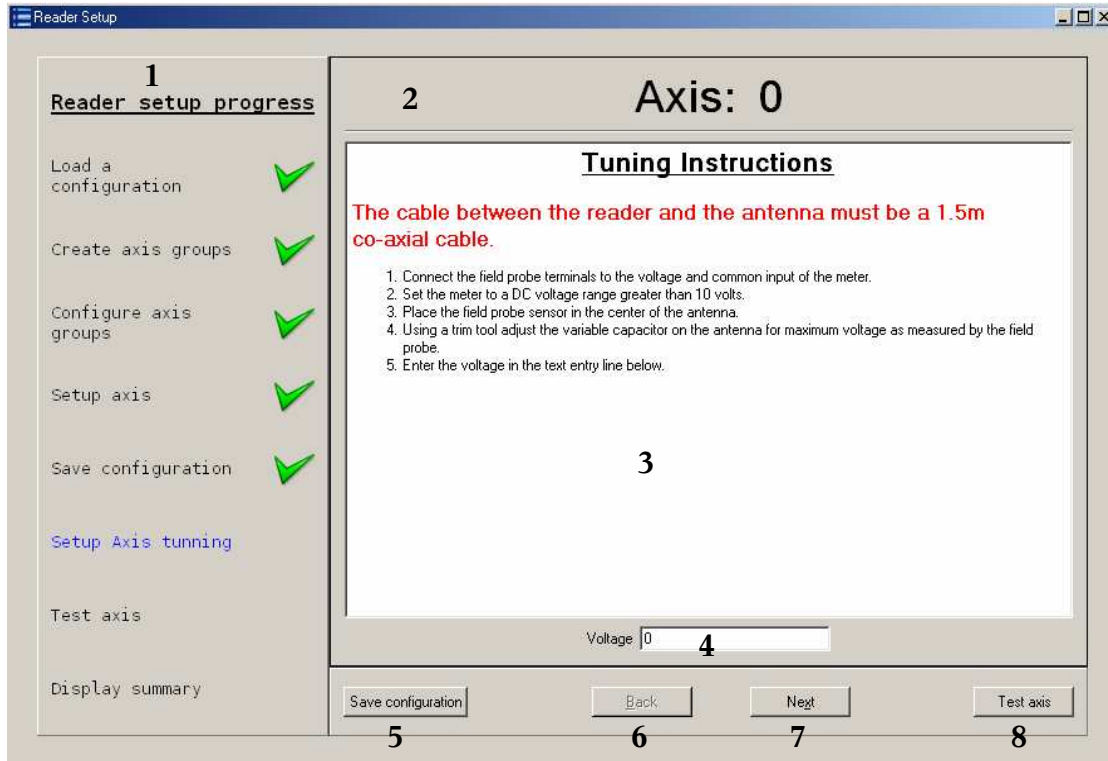The Setup axis tuning form is shown in Figure 29 and its elements are detailed in Table 16.

Figure 29

Index	Description
1	Setup progress – should show *Save configuration* as being complete.
2	Current axis indicator.
3	Tuning instructions for the current axis / antenna.
4	Enter the voltage measured on the tuning block. This is not saved to the reader or to disk it is included only as information which is shown on the final summary form.
5	Click this to go back to the *Save configuration* form.
6	Click this to setup the previous axis.
7	Click this to setup the next axis.
8	Click this to go to the *Test axis* form.

Table 16

Typical usage of this form is:

1. Follow the tuning instructions.

2. Enter the maximum voltage measured when tuning the antenna.

3. Click *Next* to tune the next switch to the next antenna.

4. Repeat until all antennas have been tuned.

5. Click *Test Axis*.

6.8.7   Test axis

This form shows how well each axis / antenna pair is working. The test sends 10 tag commands and expects all commands to be received on each receiver stream.

Readers such as the Mars-24 and Mars-8 have eight receiver streams; the axis test expects to receive replies on all eight streams. The form shown in Figure 30 shows the results of a successful antenna test for an eight stream reader.

Readers such as the Mars-1, Mars-2, Mars-4, Mars-6 and MDR-1109 have two receiver steams, for these types of readers' only receiver streams *G* and *H* should show replies. Channel *G* should show 10 replies and channel *H* should show more than 7 replies the other channels can be ignored. The form shown in Figure 31 shows the results of a successful test for a two steam reader.

The form elements are described in Table 17.

- This test must be done using a single tag placed on the antenna under test.

- The tag must be configured as a Normal powered tag.

- For all antenna types except the panel antenna we recommend using a 25mm round tag or one of equivalent size. For panel antennas we recommend using a credit card sized antenna.

If your reader does not pass this test it will not read and write to tags reliably. Check there are no metal other sources of interference near the antenna.

It is important that the test is stopped before this window is closed as this test configures the reader to operate in a different mode to what it would be set to when just reading and writing to tags. If the form is closed by accident disconnect ReaderManager from the reader and power cycle the reader.
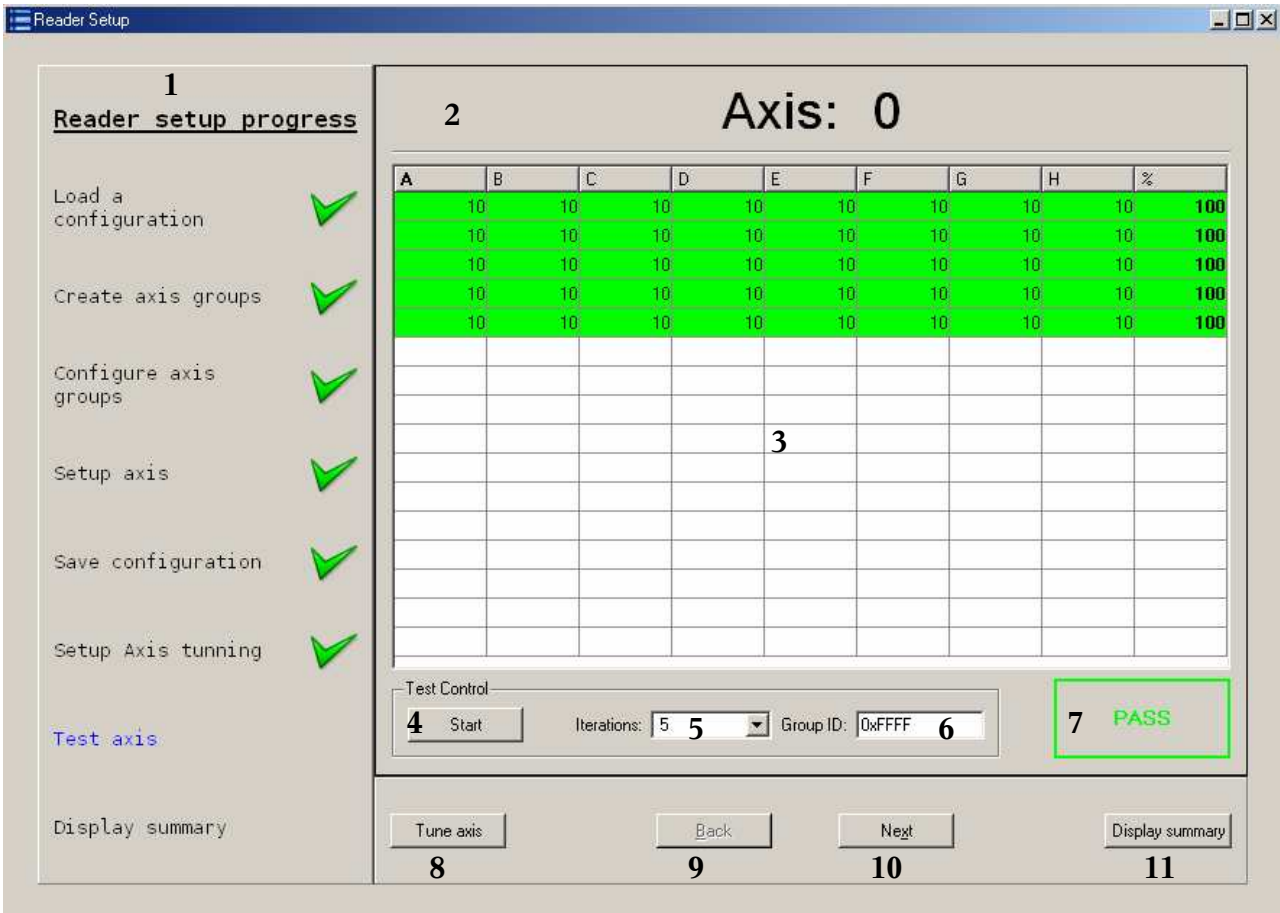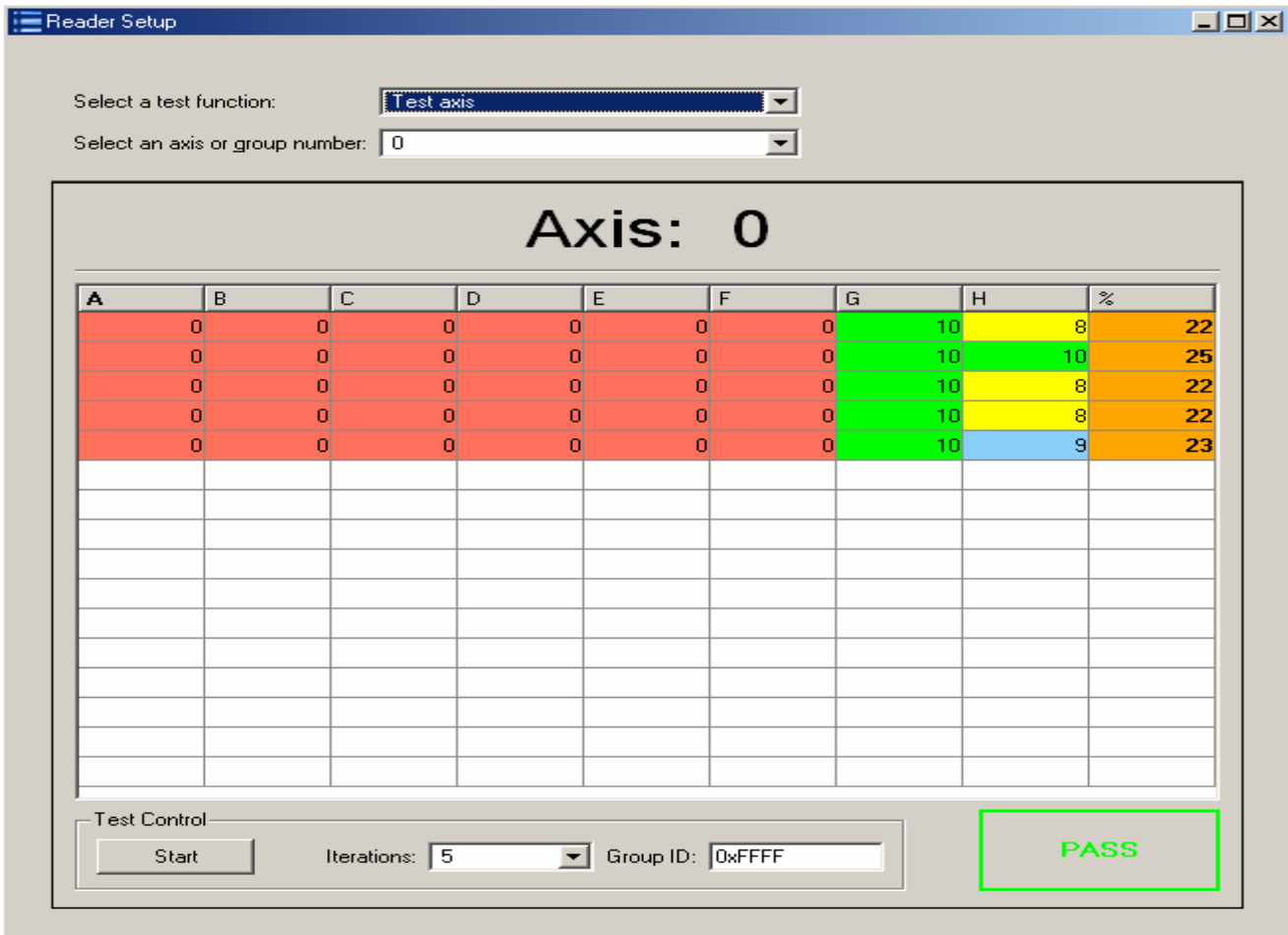
Figure 30

Figure 31

Index	Description
1	Setup progress – should show *Setup axis tuning* as being complete.
2	Current axis indicator.
3	The table shows the number of replies received per channel. Each cell shows how commands have been received on that channel. All cells should be green and should show 10 replies received. The column on the right shows the total percent received for all channels.
4	Click this button to start or stop a test.
5	Select the number of test iterations. Select continuous to run the test until the stop button is clicked.
6	Enter the group ID of the tag used to preform the test. Leaving the group ID set to 0xFFFF will allow any tag to respond to test commands. This option is used when there is more than one tag on the antenna and the test tag has been configured with a group ID which is different to the other tags group IDs.
7	Test result indicator. This will display PASS at the end of the test if all replies are received.
8	Click this to go back to the *Tune axis* form
9	Click this to test the previous axis.
10	Click this to test the next axis.
11	Click this button to go to the Display summary form.

Table 17

The typical usage of this form is:

1. Place the test tag on the antenna under test.

2. Click the *Start* button.

3. Wait for the test to complete and indicate a pass.

4. Move the tag to the next antenna, click the *Next* button.

5. Repeat until all antennas have been tested.

6.8.8   Display summary

This form displays the reader setup, tuning and test results for each axis / antenna. The left column shows the group configuration, the right column displays all the axes in the group, antenna details, tune voltage and test results. This form is shown in Figure 32, the form elements are shown in Table 18.
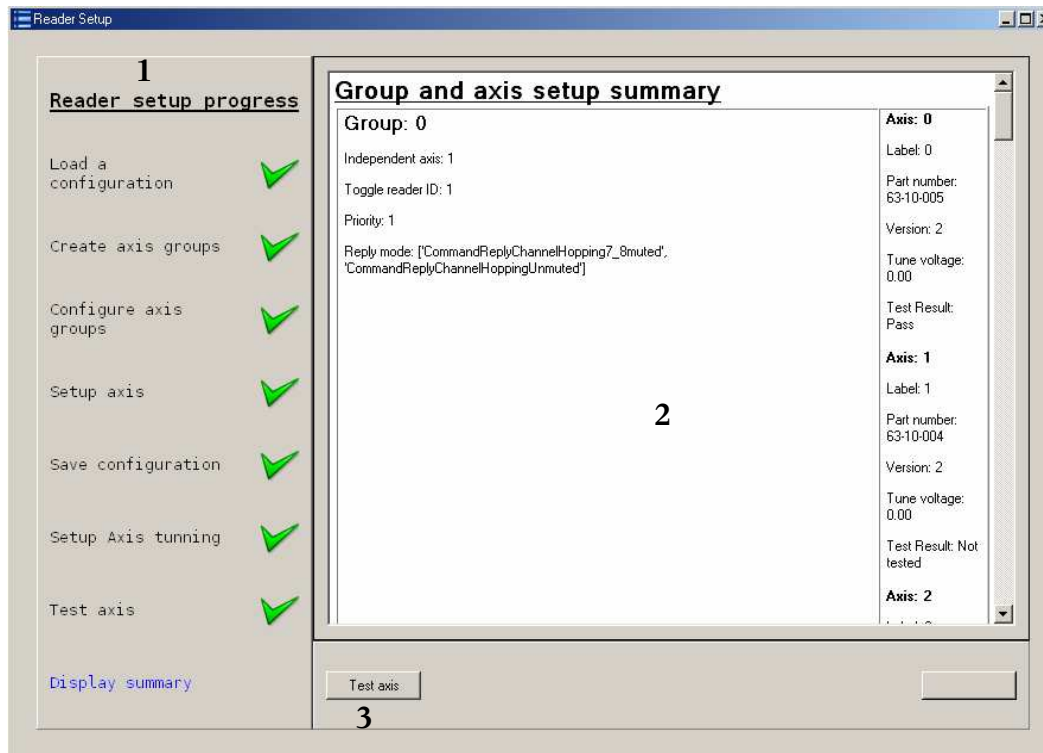
Figure 32

Index	Description
1	Setup progress – should show *Test axis* as being complete.
2	Show group and axis setup details.
3	Click this to go back to *Test axis*.

Table 18

This form can be printed by selecting print from the file menu on the main reader manager menu.

6.9   Simple Tag Test

This tool is provided to test a number of tags.

To access this tool, select *Tools->System->Simple Tag Test*

The test writes a checker board pattern from address 10 to 31 to each tag sighted by the reader. All data is read and verified. All tests must be read and written to and verified within 20 seconds for the test to pass.

This tool is shown in Figure 33, the tool elements are described in Table 19

Figure 33

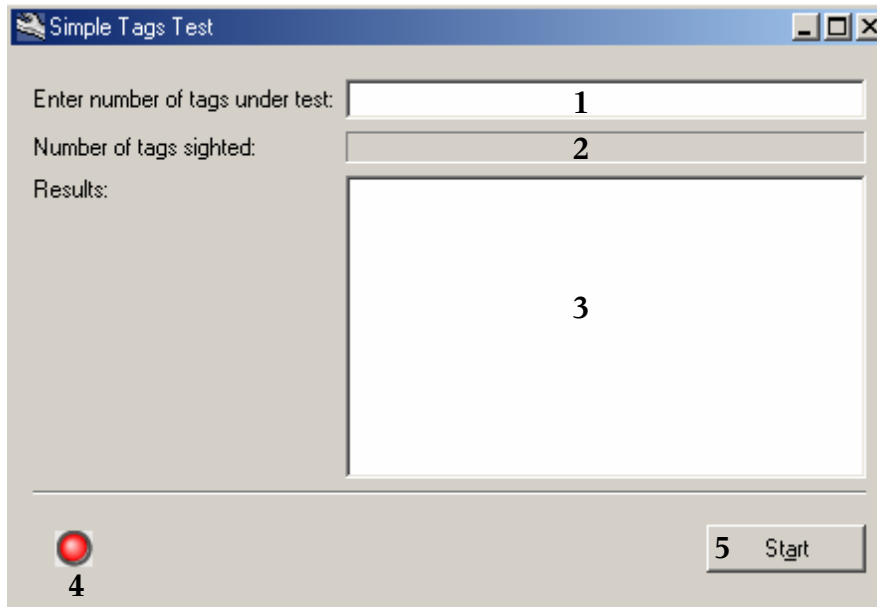| Index	Description
1	Enter the total number of tags placed on all antennas.
2	Shows the number of tags sighed on all antennas.
3	Shows any fail messages at the end of the test
4	Test result indicator. *Green* – Test pass *Yellow* – Test in progress *Red* – Test failed.
5	Click this to start or stop the test.

Table 19

6.10 Table of Tag Messages
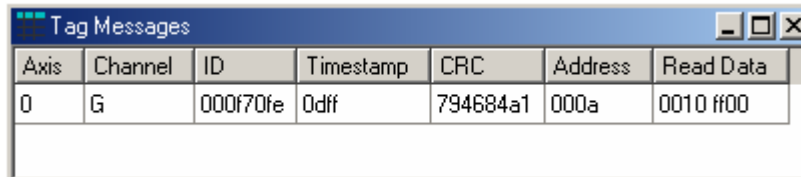
Shows the tag messages that come from the reader in a table.

To access this tool, select *Tools->System->Table of tag messages*

The columns in the table depend on the message received by the reader. Figure 34 shows a typical response to an InterrogateAction command which reads two words from address.

InterrogateAction(readAddress=10, readLength=2)

A tag reply field will be placed under the corresponding table label and a column number. Only the columns that receive data will be displayed, thus creating an auto-adjusting table.

Figure 34

6.11 Tag Test

The tag test tool can be used to test the reliability of tags.

To access this tool, select *Tools->System->Tag Test*

This is of use to tag manufacturers only. All tags in the field will have already been through this process. Each tag is sent 10 read commands and the number of replies is counted. If the tag passes a threshold, then a write command is sent. There are also optional additional write commands to configure the tag's behaviour. This tool is shown in Figure 35 and its controls described in Table 20.
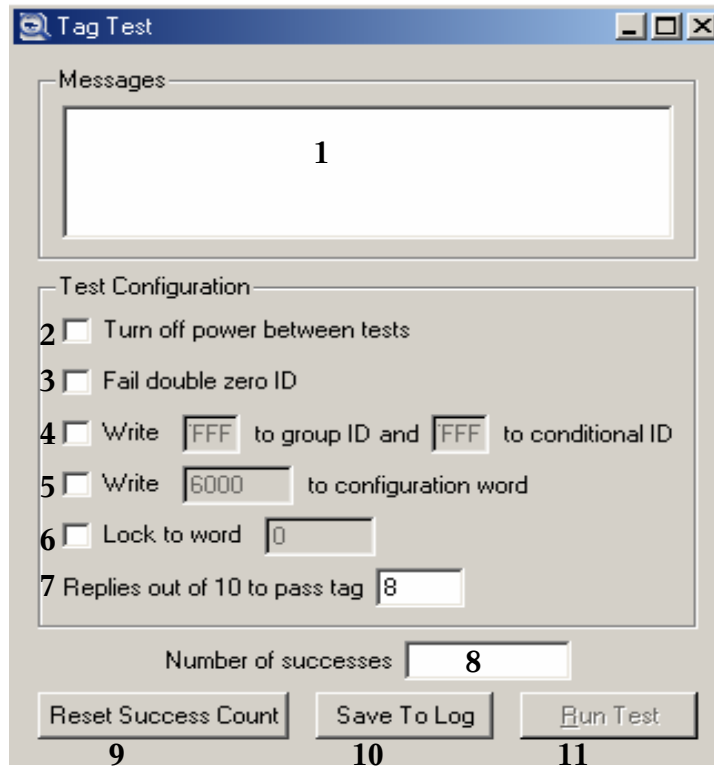

Figure 35

Index	Description
1	Shows tag messages as they are being tested. It is advisable to resize the window so that a complete test of a single tag can be seen at once.
2	Turn off power between tests will keep reader power off, except when a tag is being tested. This is useful for cases where the tag must be positioned before the test is performed. In this case, the Run Test button is enabled. This must be clicked each time a test is to be run.
3	*Fail double zero ID* if ticked will reject tags with 00 for the lower byte of the specific ID. This was needed to handle a batch of tags that accidentally included 2 tags with the same ID of 00 in every batch of 256 tags. This is not needed for all tags other than those with this problem.
4	Write to group ID and conditional ID writes values to 2 common tag configuration areas. The values are in hexadecimal.
5	*Write to configuration word* writes to the tag configuration. See 3.7 of *Chip Logical Specification* document for details.
6	*Lock to word* sets the tags lock pointer.
7	*Replies out of 10 to pass tag* controls the pass/fail criteria. In most cases, the default 8/10 is a good value to use.
8	The *Number of successes* field shows how many tags have been tested and passed successfully. This count can be reset by the *Reset Success Count* button.

Index	Description
9	Resets the test success counter.
10	The *Save To Log* button opens a dialog to save the messages displayed to a log file
11	When *Turn off power between tests* is ticked, click this to start the test.

Table 20

7 Reader Configurations

This section describes ReaderManager's script building tool. It is provided for users to create custom scripts and commands which are accessed from the main ReaderManager menu.

A *reader configuration* is a collection of a combination of the following items:

- A script which is run immediately. This is a number of any valid API commands and Python syntax.

- A number of tag commands, which may be applied to interrogation, specific or immediate actions.

- A number of action scripts, which may be applied to interrogation, specific or immediate actions.

A given configuration may consist of just a single instance of one of these 3 things, or it may be a complex application involving multiple scripts and commands.

This menu is used to create, edit and run reader configurations. It is intended to act as an aid for programmers who are building applications, by making the development process much easier. Building up complex scripts, in particular, can be a tricky process.

It can also be used by anyone working with a reader to build up a set of custom commands and scripts which can be sent to the reader to put it into a particular operating mode.

As reader configurations are defined, they are added to this menu, in a similar fashion to the way the *Connection* menu works.

7.1 Edit Configurations Dialog

The first item in the *Reader Configuration* menu is *Edit Configurations...*, which opens up a dialog window where reader configurations can be created and edited.

It shows a list of titles of reader configurations that have currently been defined. Pressing the right mouse button makes a local menu appear. Some of the items in this menu are specific to the configuration that was clicked on, while others apply generally.

- *New Configuration* creates a new reader configuration. You will be prompted which tag type this configuration applies to. You will then be taken to an empty Reader Configuration window.

- *New Folder* creates a new subdirectory into which configurations may be created. This allows them to be grouped into sub categories that make management easier if there are a lot of scripts.

- *Edit* opens the Reader Configuration window for the currently selected item.

- *Cut, Copy & Paste* allows you to make copies of existing configurations under a new name. This is very useful is there are a number of configurations that are very similar.

- *Rename* opens up a small dialog that allows you to rename the currently selected configuration.

- *Delete* deletes the currently selected configuration.

7.2 Reader Configuration Dialog

The Reader Configuration dialog has 4 tabs that can be selected along the top. *Reader Configuration* is the overview, *Scripts* and *Tag Commands* defines the pieces that go to make up the configuration, and *Assembly* ties the pieces together into the order desired.

The *Reader Configuration* tab shows the title, tag and reader types for this configuration. Note that the tag type cannot be changed because this affects other parts of the configuration in ways that are difficult to automate.

The *Preview* button opens a window showing the complete configuration as it would be sent to the reader. Lines wraparound so long commands don't get hard to read.

The *Scripts* tab shows a list of titles of all of the Python scripts that have been defined for this configuration. Click on a title to view it. Right click and *Edit...* to change the script contents.

The scripts used may contain optional markers of the form `%(Parameter)s` indicating the location of a parameter to be substituted. The user will be asked to provide parameter values when running the script. This is done through a dialog which has a list of parameter name and value pairs. The values entered are substituted into the scripts before it is sent to the reader.

The *Tag Commands* tab shows a list of titles of commands that have been defined for this configuration.

The *Assembly* tab allows all the scripts and tag commands that have been defined to be tied together in the desired way.

The Title field of these items is used in combo boxes to identify the item in question. With the *Immediate Configuration Change* the script is sent to the reader in raw format with real newline characters. The *Interrogation command* sets the action tuple for the interrogation command.

The Tag Specific Actions table shows 3 columns headed Pre Script, Tag Command & Post Script. This declares the action list to take with new tag. This list will be compiled and placed in an *Actions()* construct.

The *Add* and *Delete* buttons allows the user to add and remove configurations, scripts and tag commands.

The *Save* button starts disabled and is only enabled when a change is made. When it is clicked, the configuration details are saved in the configuration file.

8   Upgrading Reader software

Upgrading AVR type readers is described in section **13.1 Upgrading An AVR Series Reader**.

8.1   Upgrading ARM and x86 Readers

This form is used to update the reader server or operating system on network based readers.

The Upgrade form is accessed from the File menu item on the main reader manager menu. From the main reader manager menu, select *File->Upgrade->Upgrade AReaderManager or x86 Readers*. The upgrade form is shown in Figure 36. The form elements are shown in Table 21.

The upgrade is applied to the reader when the reader is power cycled or the reader is reset. When a reader is applying the upgrade the start up time will be longer than normal, it could take up to two minutes for the reader to restart.

> **DO NOT REMOVE THE POWER TO THE READER WHILE AN UPDATE IS IN PROGRESS.**

> If both an operating system and reader server upgrade is required it is recommended to upgrade the operating first, reset the reader and then do the reader server upgrade.

The upgrade form uses package files saved in the *Upgrade* directory. The default path for the *Upgrade* directory is a sub-directory under the Reader Manager install directory. To change the default Upgrade path use the Preferences menu item in the file menu (See section **4.1.1 File Menu**).

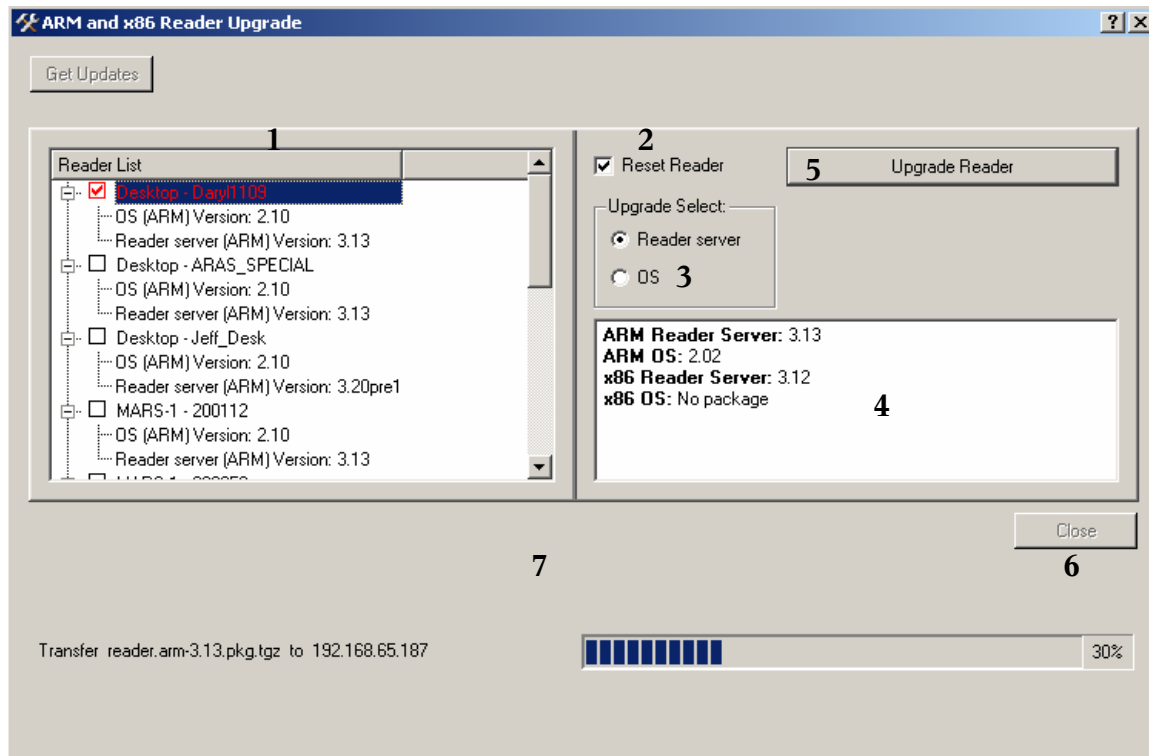| There should only be one package file per upgrade component. When an upgrade is released delete the older package file in the upgrade directory and replace with the new package file.	
Typical package names are:	
Filename	**Description**
os.magtiny.arm-2.02.pkg.tgz	Arm reader operating system version 2.02 upgrade package file.
os.x86-2.03.pkg.tgz	X86 reader operating system version 2.03 upgrade package file.
reader.arm-3.13.pkg.tgz	Arm reader server version 3.13 upgrade package file.
reader.x86-3.12.pkg.tgz	X86 reader server version 3.13 upgrade package file.

Figure 36

Index	Description
1	This frame shows all x86 and ARM based readers detected on the network. If ReaderManager is connected to a reader, this reader will be shown as the first item in the list and will be highlighted in red. ReaderManager does not need to be connected to a reader to use this dialog, multiple readers can be upgraded at the same time.
2	Tick this to reset the reader after the upgrade package is copied to the reader. If this is ticked when the package is transferred to the reader, ReaderManager will be disconnected from the reader.
3	Select the package to transfer to the reader. Select *Reader server* to upgrade the reader server application, select *OS* to upgrade the operation system.
4	This text box shows the available upgrades to apply to the reader. If the package shows *None* as the version number there is no package available. Check the package filenames in the *Upgrade* directory.
5	Click this to start the upgrade
6	Once the upgrade is complete, click this to close the form and return to ReaderManager.
7	Status area shows upgrade states and transfer progress. Error message are also displayed in this area.

Table 21

9   Troubleshooting

9.1   Can't see my reader on the dynamic connection list

- The computer IP address on the computer running ReaderManager must be in the same subnet as the reader.
- The reader must be running ReaderServer 3.xx or better.
- AVR readers can not be discovered on the network.

9.2   My reader is behaving strangely or tags are timing out.

- Have you setup the reader to use the antenna you are using? Use the *Reader Setup* tool.
- Is the antenna tuned correctly and has the antenna passed the antenna test in the *Reader Setup* tool?
- Restore the reader to its default settings using the *Reader Settings* tool.

9.3   My antenna is not in the Reader Setup tool antenna list.

- Log onto the Magellan Technology website, get and install the latest versions of ReaderManager and ReaderServer. If your antenna is still not in the list then the antenna is not meant to be used with the type of reader you are using.

10   Reporting a Problem

If you are having a problem with the ReaderManager, you will need to send a report describing your problem. To make diagnosis easier, please try and supply this information with any problem report.

- 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 what version numbers are shown in the window that appears.

- What type of reader are you using?

- Has the reader worked in the past and has just stopped working?

- Please be a descriptive as possible:

    - Saying, "I've placed a stack of 10 gaming chip tags on antenna XX four tags timeout every 3 seconds." is better than saying, "My tags timeout."

- Send as much information about the reader as possible, please do the following:

    - Connect to the reader.

    - Open the *Console.*

    - Type *Settings()* then press enter.

    - Type *Settings()* then press enter.

    - Type *config.data* then press enter.

    - Type *AntennaSettings()* then press enter.

    - Right click in the *Message Log* area of the *Console* and click *Select All.*

    - Right click in the *Message Log* area of the *Console* and click *Copy.*

    - Paste all the information into an email and send it to Magellan Technology.

11 Minimum System Requirements

This section defines the minimum computer system recommended to run ReaderManager.

Computer / Processor	133 MHz or higher Pentium-compatible CPU.
Memory	At least 64 megabytes (MB) of RAM
Hard Disk	50 MB.
Optical Drive	Required for installation only.
Display	1024 x 768 resolution or better.
Keyboard	Required
Mouse	Required
Ethernet	10/100 Mbps
USB	1.10
Operating System	Windows 2000 SP4, or Windows XP professional with SP2.

12   Getting more information

If you require any further information about a reader or associated software, please contact Magellan, or the supplier of the equipment.

Magellan's contact details are:

Magellan Technology Pty Limited
65 Johnston Street
Annandale
Sydney NSW 2038
AUSTRALIA

Phone: ....+61 2 9562 9800
Fax: ....+61 2 9518 7620
Email: ....info@magtech.com.au
Website: ....www.magtech.com.au

13 Appendix A – AVR Options

13.1 Upgrading An AVR Series Reader

To upgrade the firmware in the reader, follow this sequence of steps:

- Make sure that the ReaderServer is NOT running. In most environments, just disconnect and the server will be shut down. If you have selected *Start server when computer boots* in the Connection settings or manually started it, closing the connection will not close the ReaderServer. In this case, connect and type *Exit()* into the console window and press Enter to terminate the server and close the connection.

- Select the *File* menu then select the *Upgrade AVR Readers...* menu option. The upgrade window appears.

- The previous serial port used in this window is automatically reselected. If this is the first time this application has been run, the first available port detected will be used. Make sure the correct serial port for the reader is selected from the drop down list of serial port names. If you do not know which serial port number to use, see SS. Ports detected by Windows are shown with a + next to them. Note that Windows sometimes reports ports that are not actually there.

- Unplug the power from any AVR Series Reader, which is most simply done by removing the power jack plug from its socket in the cover plate on the underside of the unit.

- Plug the power in and the software should indicate the connection has been made When the connection has been established, the icon changes and the text changes in the middle of the window and on the status line. If this does not happen, check the port number being used and make sure the serial cable is correctly plugged in.

- Click on the *Firmware Upgrade* tab. Follow step 1 and select the file to upload. For current AVR Series readers, it is *40-70-016-SFW_Firmware.hex*. To get this file, see SS. The file can be located anywhere on the system.

- Click on *Program* under step 2. The loading process will begin, with progress being continuously displayed in a progress bar on the screen, and indicated by rapid flickering of the green LED on the reader.

- When the upload has finished, close the upgrade window. Remove power from the reader and reapply to reset it. The ReaderServer can now be started and connection with the upgraded reader established.

The *Altera Upgrade* tab follows a similar procedure to upgrade the programmable logic device on the board. There are a number of data files that can be used depending on the type of reader being used. Check with technical support that the correct RBF file has been supplied for the reader.

There are a number of other controls on this window, but they are primarily for testing and manufacturing purposes.

13.2 Opening A Connection Using The Command Line

The *Automatically Connect On Startup* option works well if only a single copy of ReaderManager needs to run at the same on a single computer. But if there is a need to run multiple copies, then the software doesn't know which connection to make automatically with each copy that is started.

To resolve this dilemma, ReaderManager can accept the connection name as a command line parameter. For example, this could be put in a batch/script file:

```
python ReaderManager.py "New 1310"
```

This application will not return to the command prompt until the ReaderManager has exited. To run multiple copies, it is necessary to run each from separate command windows (or batch files).

In this example, python is given without a path, but in many cases, it will be necessary to supply the path to the Python interpreter, for example, *C:\Program Files\Python23\Python*.

This command line execution must always be run in the directory where the ReaderManager.py file resides, which on Windows is *<Python>\Lib\ReaderManager*.

The connection names given in this example must exactly match the name that appears in the *Connection* menu, including case. If the connection name contains spaces, it must be surrounded by quotes as shown.

13.3   Trouble shooting AVR problems

When reporting problems with a Reader, it is important to be able to say what the version of software is used for the ReaderManager, the ReaderServer, and if using an AVR series reader, the firmware.

To find out, select the *Help/About Reader Manager* menu item. It should open a window that contains multiple application version numbers, depending on the kind of reader being used.

In this example, the top two lines show the version numbers of the currently installed ReaderManager and ReaderServer applications. The next line shows the version of the reader that is currently connected. If it is a local ReaderServer, as in this example, the version number will be the same as the installed ReaderServer. Finally, the embedded reader firmware version is shown if it is an AVR Series reader.

If the numbers do not appear as expected, shutdown the ReaderManager, turn the reader off, then on and restart the application. Then try this procedure again. Starting A Local ReaderServer Problem When the ReaderServer is started, a log file is generated. It is called reader.log and is saved in the *<PythonPath>\Lib\ReaderServer\DTRHF* directory.

If there is no problem, the log file is not shown, but if there is a problem, it is automatically shown to the user after timing out.

For example, a typical log file for a successful connection would look like this:

```
Magellan Monitor Server started on port 8023
Incoming monitor connection from 127.0.0.1:1296 on channel 1900
```

While an unsuccessful start could generate an error message like this:

```
An error has occurred. Please copy this message and submit with a problem
report
Traceback (most recent call last):
  File "DTRHF.py", line 17, in ?
    ApplicationEntry(tagName) # run the main application entry point
  File "../DTR\DTRApplication.py", line 223, in ApplicationEntry
    application._Initialise()
  File "../DTR\DTRApplication.py", line 78, in _Initialise
    Globals.serial.Enable()
IOError: Unable to open serial port : Access is denied.
```

Sometimes the final line of this error report can give a clue as to the nature of the problem. In the above example, another application had opened the serial port, so the ReaderServer was unable to gain access to it.

In an error message is received and you believe it indicates a bug or some problem whose nature is not clear, send the error message in an email to your technical support contact.

Notes: