

BISTAR

RFID SYSTEM



**PROVISIONAL
USER MANUAL**

INFORMATION TO THE USER

TYPE APPROVAL COMPLIANCE

This equipment has been tested and found to comply with the FCC rules PART 15 for Frequency Hopping Spread Spectrum intentional radiators. This equipment generates, uses and radiates radio frequency energy, and if not installed and used in accordance with the instructions may cause harmful interference to radio communications

NOTICE 1

Changes or modifications to this equipment not expressly approved by the party responsible for compliance could void the users authority to operate the equipment

NOTICE 2

This equipment is intended for use in conjunction with computing devices which must themselves comply with the limits for a class B digital device persuant to PART 15 of the FCC rules. A shielded cable must be used to inter connect the equipment

Type approval:

FCC – model MR101 **FCCID XXXMR-101**

CEPT – model MR102



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USER MANUAL

Before commencing installation and operation of your BiStar RFID system, in the interests of safety and protection, please read the provided documentation thoroughly.

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1. INSTALLATION

1.1 COMPONENTS:

The box containing your basic system will contain the following:

- Master Reader
- Power cable
- Mounting bracket complete with mounting hardware
- User manual

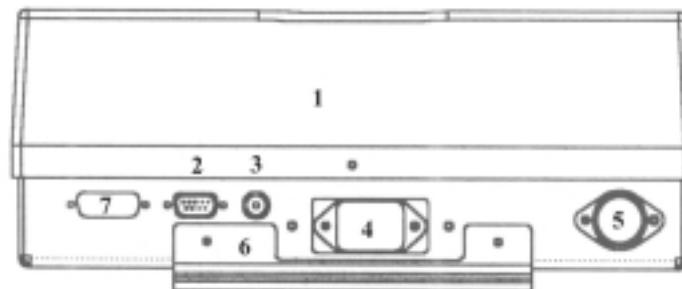
1.2 LOCATING YOUR SYSTEM:

To obtain maximum benefit from your system, the following guidelines should be followed when selecting the location for the installation of the readers. Your accredited Bistar agent or representative will gladly assist in identifying the best location.

- Ideally the reader should be installed away from potential sources of EM interference. Typical examples of are motors, generators, inverters, UPS's, Induction heaters, light dimmers and switching relays.
- Installation in areas of direct sunlight should be avoided
- The Bistar reader is not waterproof. It therefore should not be installed in areas with high moisture levels unless encapsulated in a suitable, non-metallic enclosure. All leads should egress through the bottom of the enclosure. (Note: Due to many dyes utilizing a high carbon content, the use of **black** enclosures should be avoided.)

1.3 READER CONNECTIONS:

With exception of the auxiliary antenna connector, all connection points are on the bottom of the reader.



- 1: Radome
- 2: RS232 "D" Connector
- 3: Pilot Light
- 4: AC Input connector (CEE-22)
- 5: Voltage Regulator
- 6: Mounting Bracket

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1.4 POWER:

The mains power cord (lead) of this apparatus is wired as follows:

Live-Brown
Neutral-Blue
Ground-Green/Yellow

The power requirements for the reader are as follows:

Europe, RSA

230 V - 50 Hz Alternating Current – Nominal (Range 210-250 VAC)

United States and Canada

115 V - 60Hz Alternating Current – Nominal (Range 105-125 VAC)

IMPORTANT NOTE: If there is any doubt regarding your supply voltage, please consult your accredited Bistar agent or representative or registered electrician.

1.5 CONFIGURATION:

There are a number of products and configuration options available to optimize system performance. Each of these is discussed briefly in typical configurations.

Single Reader:

A single reader will give satisfactory results when mounted to either side of the measurement area. Typically this would be 1 meter above the ground. In high speed or large volume measurement requirements, the system can be expanded to an auxiliary antenna or master/slave configuration

Aux. Antenna:

The auxiliary antenna contains no electronics and is powered from the main reader. The auxiliary antenna can be mounted either opposite or at 90 degrees to the main reader. In the latter case, a typical installation would have the antenna mounted in a “look down” configuration. In practice, the two antennae are alternated giving different views of the measurement area.

Networked:

With the optional network interface, it is possible to operate a maximum of 256 Bistar readers on a network connected to 1 P.C.



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1.6 MAINTENANCE:

The Bistar reader does not contain any user serviceable components and all maintenance, repair or alignment should be referred to a Bistar accredited agent or representative.

The Bistar system requires little maintenance. However the following checks should be carried out routinely:

- ◆ Check that the RF connectors are secure
- ◆ Check power and antenna cables for damage
- ◆ Check for rust on mounting hardware
- ◆ Periodic cleaning of the housings with a damp cloth will suffice. ***Do not use abrasive materials or chemical solvents***

2. SAFETY CONSIDERATIONS

The apparatus is double insulated and does not require connection to the mains supply earth, however normal precautions for the connection and use of mains powered apparatus should be observed.

As is the case with most RF systems, prime consideration is given to the safety aspects of using EM devices. Compliance with recognized standards for UHF, microwave and 13.56 MHz systems has been verified by leading manufacturers.

Given that it has been demonstrated that current safety regulations have no negative impact on system performance, RFID systems of all frequencies can be used without any fears or reservation. However, as with all RF devices, the following basic safety precautions should be followed

- ◆ Prolonged continuous exposure to the EM field should be avoided.
- ◆ Avoid staring at the antenna for prolonged periods
- ◆ Do not disconnect antenna with system operational

HUMAN EXPOSURE

The safe limits of human exposure are a function of conducted power, antenna gain, exposure time and body mass. For most recommendations, the exposure is averaged over a 6-minute period at pulse duration times not exceeding 30µS.



Organisation	Power Density	Averaging time	Peak Power
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	W/m²	In minutes	Energy Density
ICNIRP	10	6	20mJ/m ² <<30μs pulse
CENELEC ENV 50166-2	10	6	20mJ/m ² <<30μs pulse
NRBP/UK	100	6	10mJ/m ² <<30μs pulse

Calculation of protection distance.

Power density is a function of the conducted power into the antenna and the exposure area at a distance from the antenna.

As an example it can be calculated that for a worst case scenario with:

1. A conducted power of 1.25 W,
2. An effective duty cycle of 10%,
3. An antenna gain of 6 dB, and
4. An exposure limits of 10 W/m², or for a radiated power of 6 watts, that the protection distance would be 6.2 cm.

This distance would only be of relevance if a persons head or trunk was 6.2 cm away from the antenna for a continuous 6 minute period, RF interrogations are made during the full 6 minutes and the duty cycle is averaged over 6 minutes. In the event that the exposure time, or the duty cycle is less, the resultant required protection distance would be less.

However, the interrogation rate is dependent of the number of tags in the read area. A person present in this area would absorb RF energy in tissue. This, due to the reader not seeing the tags, will result in a reduced interrogation rate. A lower interrogation rate will reduce the duty cycle with a major reduction in the required protection distance. Conversely, for a higher duty cycle rate, the required protection distance would be increased.

It can therefore be seen that the required protection factor varies with radiated power and the duty cycle, which in turn is a function of the number of tags being interrogated.

3. TAGS

3.1 CHARACTERISTICS:

The RF tag consists of a single Integrated Chip attached to a flexible antenna. The chip is protected from radiation, chemical and mechanical damage by a protective coating. All RF tags have an antenna thickness of 125 micron and a chip height of 450-micron allowing packaging in a card format conforming to ISO standards. There are 3 standard antenna footprints available at present.



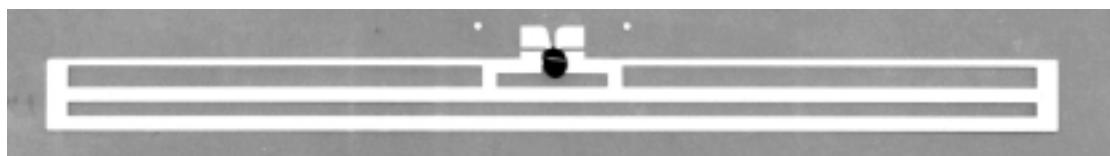
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BiStar tags are battery-less devices deriving their power requirements from the RF field generated by the reader. This improves tag life far beyond the life span of similar powered devices

3.2 DIPOLE:

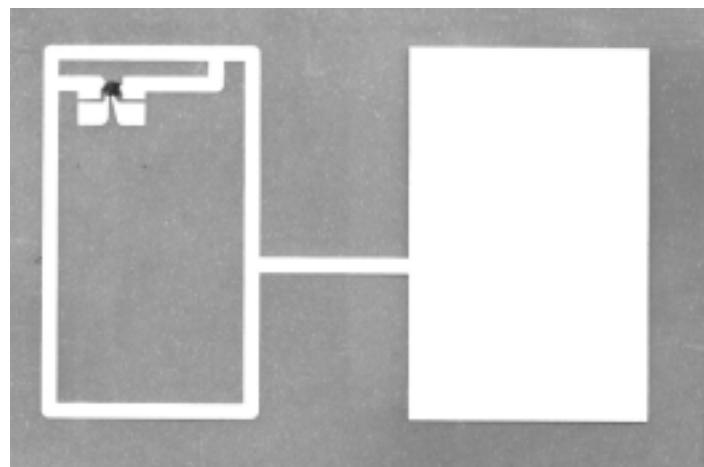


Size: 140x20mm

This is the most versatile of the tags. The tag is flexible and can be twisted and rolled to fit into small areas. This tag is ideal for bulk storage applications

3.3 ISO TAG

This is a credit card sized tag and is ideally suited for personnel identification and movement control. The size and construction allow it to form part of a standard laminated ID card. The following illustration shows the tag with the chip mounted but not folded or laminated.



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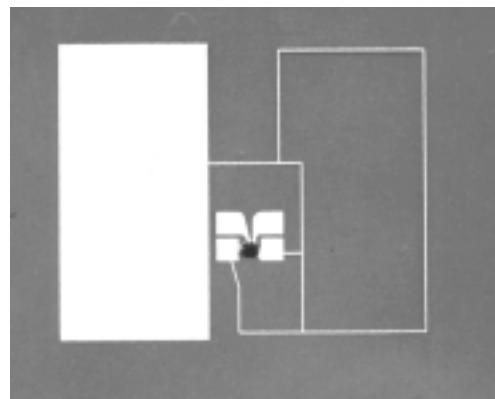
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Size: 75x45mm

3.4 MINI TAG.

The mini tag was developed for applications where the Dipole or ISO tag are too large. The mini tag, when folded is approximately half the size of a standard ISO tag.



Size: 50x35mm

3.5 INSTALLATION OF TAGS:

Tags can be affixed on the surface of the items to be read or even concealed within items. The method of affixing the tags will vary, depending on the surface type and the material of the product.

Ideally the orientation of the tag should be at right angles to the reader. However due to the circular polarization of the reader antenna, tags can be read in most orientations. The addition of an auxiliary antenna placed at either 90 or 180 degrees to the master reader will ensure maximum results particularly when large numbers of tags have to be read.



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4. DEMONSTRATION SOFTWARE



Bistar software is supplied on a standard CD-ROM. The minimum requirement for a P.C. to install and run the software is as follows:

- 486-MHz or better
- CD-ROM Drive
- 100MHz Hard Drive
- 16 Mb RAM
- Mouse

4.1 INSTALLING THE BISTAR DEMONSTRATION SOFTWARE:

Insert CD-ROM into drive and select “Start” then “Run”
The computer will prompt you for the drive and application.
Type D:\ setup and enter.
Follow the on-screen instructions.



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Your software is now ready to run.

The screen will be displaying the main menu screen as shown in figure 1.

The display has two main components:

The large window displays the “read” data and the smaller window to the left displays the setup options.

4.2 SOFTWARE OPERATION

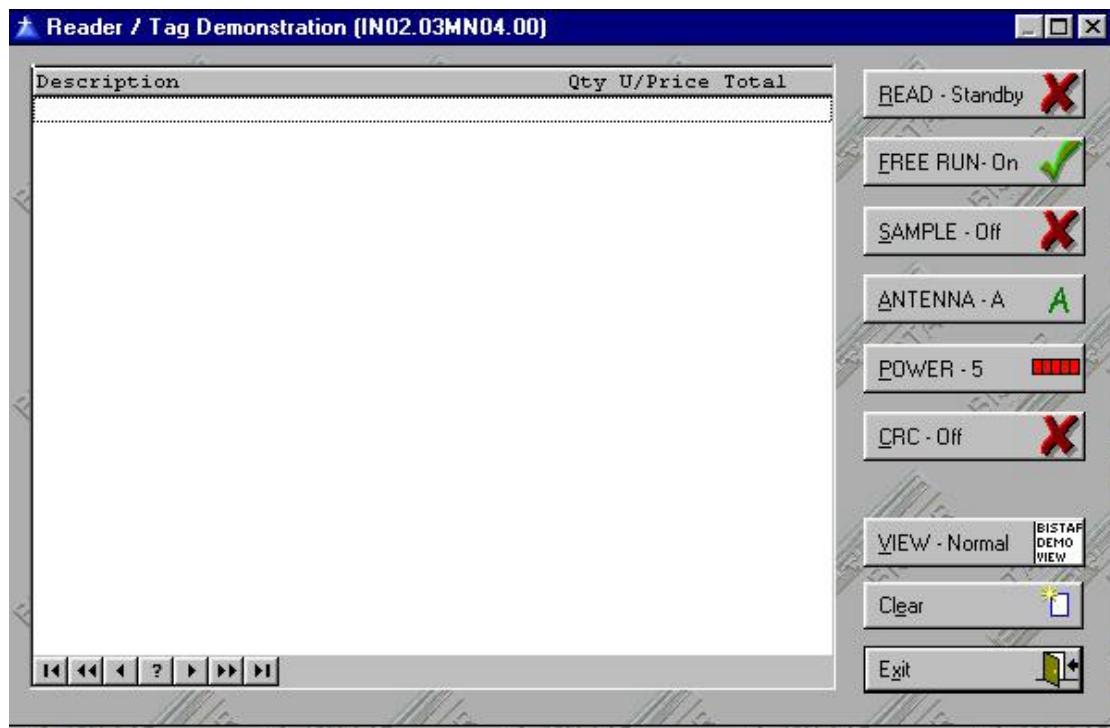
Main Screen:

After selecting the Demonstration Icon on the desktop, the following options will be presented.



To access the main demonstration software, click on the “Go” option.

Select MAIN DEMO. The following screen will be launched.



Click Boxes: The click boxes provide the MMI to set up the reader parameters. The options required are selected by clicking the box with the mouse cursor until the

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desired setting is achieved. Highlighted, underlined letters are the equivalent keyboard command keys.

READ-Standby

This changes the reader from a standby state to operational. The “ON” state is indicated by a green tick “”, “Standby” by a red cross “”.

FREERUN-On

In this state, the reader will count each individual tag as often as it transmits its ID. In the “OFF” state, the reader will instruct the tag to switch off once it has been successfully read. The “ON” state is indicated by a green tick “”, “OFF” by a red cross “”.

SAMPLE-Off

The reader can be programmed into “sample mode” where as opposed to a continuous RF field being generated, the reader periodically checks the measurement area for the presence of tags. The TX/RX ratio can be software programmed in 100mS steps to a maximum of 5 ratios, which are screen selectable. The “ON” state is indicated by a “green tick “”, “OFF” by a red cross “”.

ANTENNA-“A”.

In a stand-alone configuration, this setting defaults to “A” and relates to the antenna enclosed in the reader housing. It is possible to connect an auxiliary antenna “B”. The options then are:

- Antenna A only
- Antenna B only
- Antennae A and B where the reader alternates between antennae.

The selection will be indicated as “**A**”, “**B**” or “**A/B**”

POWER-5

The maximum power setting of the reader is factory set according to the regulations of the country of destination. However, the RF output, dependent on application and system requirements can be regulated in 5 fixed steps. Level one being the lowest, 5 being the highest. The reader automatically defaults to level 5. These levels are factory programmable.

The required level is selected by clicking the box until the required level is achieved.

CRC-Off

The CRC check checks the validity of the tag coding. Should this be invalid, the information will not be forwarded to the PC. The “ON” state is indicated by a green tick “”, “OFF” by a red cross “”.

VIEW-Normal

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In this view, the screen displays the tag information as read.

CLEAR

Clicking the CLEAR box deletes the displayed list of read tags.

EXIT

This is self-explanatory. Selection of the exit box will close the window.

4.3 EDITING THE TAG FILE

From time to time there will be a requirement to edit or add tag information. This is done in the “Tag Edit” screen. This is found and selected on the main screen, select “EDIT”

Select “Tag File” by left clicking the mouse and the following “Browse Tag File” screen will be launched:

Tag No.	Tag Info	Unit Price	Response
000000000000A054F8F60000	*** UNASSIGNED TAG ***	1.00	
000000000000A096C9420000	*** UNASSIGNED TAG ***	1.00	
12340000000000128690000	*** UNASSIGNED TAG ***	1.00	
9907260000004008579F0000	*** UNASSIGNED TAG ***	1.00	
9907260000003009809F0000	*** UNASSIGNED TAG ***	1.00	
9907260FF3320E4C00000000	*** UNASSIGNED TAG ***	1.00	
9FC3C2C1C6C3F8C0C3FC0000	*** UNASSIGNED TAG ***	1.00	
9907260000003017FFFE0000	*** UNASSIGNED TAG ***	1.00	
990726000000001FCFC0000	*** UNASSIGNED TAG ***	1.00	
9907260000003016C0E00000	*** UNASSIGNED TAG ***	1.00	
9907260000003003EF580000	*** UNASSIGNED TAG ***	1.00	
990726000000300200AF0000	*** UNASSIGNED TAG ***	1.00	
9907260000003010A0C00000	*** UNASSIGNED TAG ***	1.00	
9907260000003016C1FF0000	*** UNASSIGNED TAG ***	1.00	
9907260000003016C0FF0000	*** UNASSIGNED TAG ***	1.00	
990726000000300200A30000	*** UNASSIGNED TAG ***	1.00	
990726000000000130680000	*** UNASSIGNED TAG ***	1.00	
9907260000003006408F0000	*** UNASSIGNED TAG ***	1.00	
9907260000003010A0CF0000	*** UNASSIGNED TAG ***	1.00	

Two screens are available. The “Sort Tag” screen gives a list of tags in numerical order according to tag number , whilst the “Sort Customer” screen arranges the information in alphabetical order according to tag info.

A particular record can be selected with the mouse. A selected record will be highlighted and can then be edited or deleted.

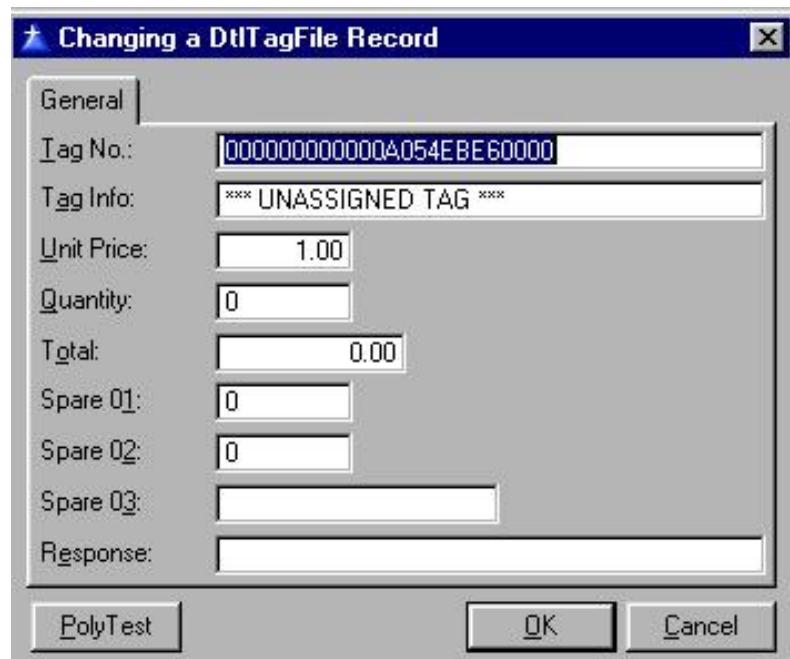


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Selecting the “CHANGE” box will launch the following screen:



Highlighting the required field will allow for editing of the field.



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5. TROUBLESHOOTING:

The Bistar website contains information that will provide the means to identify and troubleshoot most commonly experienced problems. In addition Bistar offer a comprehensive backup service through a network of accredited dealers. Experience has shown that most solutions can be found without the need for a service callout.

Before calling for service, please ensure that:

- The power to the reader is present
- The system is enabled
- Correct antenna selection has been made
- All connecting cables are undamaged and correctly plugged in.
- Test system with a known valid tag
- The tags have been programmed.
- Remove all unnecessary metallic/conductive materials from the measurement area to avoid unwanted reflections
- If a Wattmeter or R.F. field strength meter is available, check that the required measurement area is illuminated

Additional first-line maintenance information is available on the Bistar web site:
www.bistartech.com.

For further assistance or placing of a service call, please contact your nearest accredited Bistar agent or representative.

6. GUARANTEES AND WARRANTIES:

BiStar warrants the reader equipment to be free from defect in workmanship and material, for a period of 12 months from the date of purchase or shipping from BiStar to the purchaser. Should the equipment fail during this 12 month period, BiStar may at it's discretion, either repair or replace the equipment at no cost to the purchaser if delivered to BiStar. The purchaser will be responsible for all shipping and insurance costs. This warranty expressly excludes damage or failure due to mishandling, unauthorized tampering or repair, natural and man-made disasters or due to use under conditions for which it was not intended to be used. A return authorization must be obtained from BiStar customer support before returning any equipment. This warranty does not exclude any statutory rights of the purchaser. This warranty supercedes any other warranties whether implied or expressed

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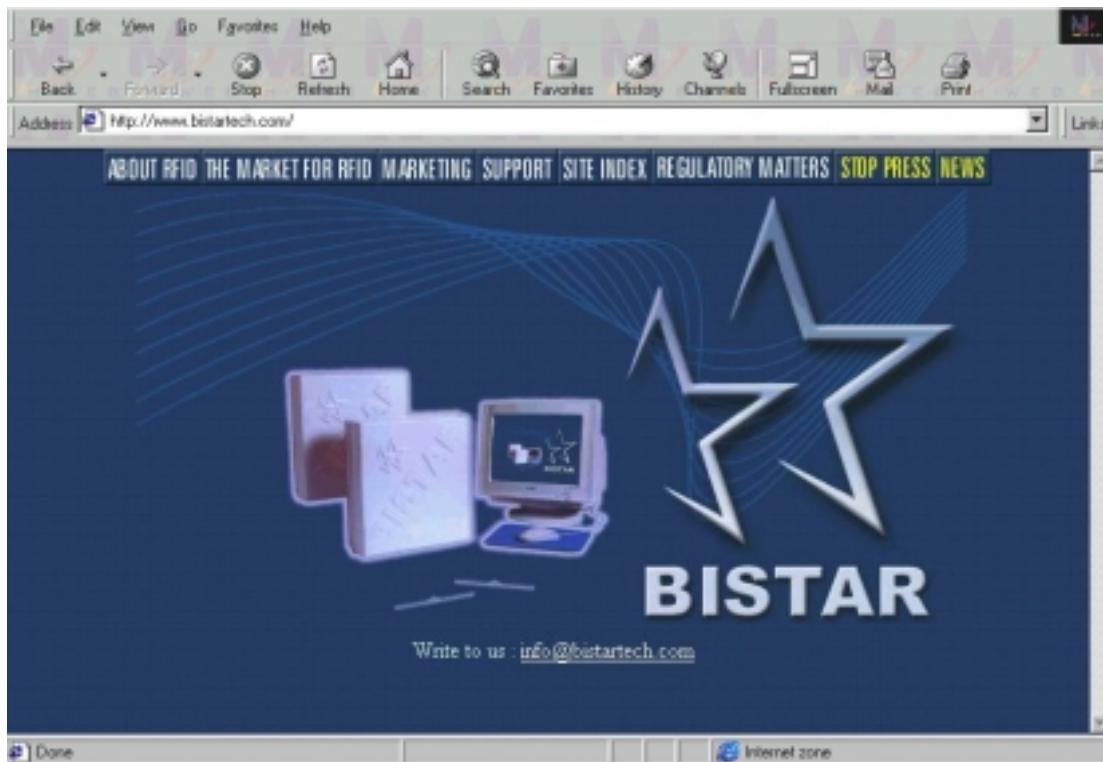
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7. CONTACT INFORMATION:

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8. TECHNICAL SPECIFICATIONS

Primary Power	100 – 125 or 200 – 250 Volts AC 50/60 Hz
Power Consumption	50 Watts maximum
Dimensions	31 x 34 x 12 cm
Temperature range	-10 to 60 deg C
Weight	4.5 kg (9.9 lbs)
Operating frequency	
Europe	868 to 876 MHz single frequency or frequency hopping in 25 kHz steps.
New Zealand	864 – 868 MHz Frequency Hopping Spread Spectrum in 25 kHz steps
USA/Canada	902 – 928 MHz Frequency Hopping Spread Spectrum or single- frequency in steps of 100 kHz.
Other countries	Programmable for single frequency or multi-frequency operation within the ranges of 860 – 876 MHz or 902 – 928 MHz.
Frequency stability	TCXO controlled to within ± 2 parts per million
Transmitter RF output	
Europe	500 mW eirp circularly polarised
USA/Canada	4 watts eirp (FCC part 15 FHSS)
Other countries	12 watts eirp (FCC part 90 non-multi-lateration) Factory programmable between 0.1 and 3 Watts conducted which equates to 0.4 to 12 Watts eirp.
Antenna Gain	5.8 dBi pseudo-circularly polarised with a conical beam-width of 60 degrees of arc.
Occupied bandwidth	<500 Hz unmodulated Fits within a 25 kHz channel when acknowledging tags at the maximum rate.

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Modulation	Negative going Amplitude modulation with a depth of ~50%.
Host Computer Interface	RS232c or Ethernet 10BaseT

9. REGULATORY COMPLIANCE

Europe	ETS 300 220 Short range devices
	ETS 300 683 EMC requirement for Short Rangedevices
USA	Part 15 Frequency Hopping Spread Spectrum intentional radiators
	Part 90 LMS single frequency multilateration systems
	Part J EMC
Safety	IEC 65 electrical safety
CISPR	EMC
FCCID	xxxMR - 101

10. NOTES



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