EXHIBIT "E"

IDENTEC PROXIMITY READER

PRODUCT MANUAL

FCC ID: JHD-CEN2

1) Installation Guide

2) Product Manual

INSTALLATION MANUAL

IDENTEC LTD

PROXIMITY READER TYPE EC

The EC is a complete Cryptag Census reader in a mullion housing. It has been designed for ease of installation and commissioning.

Mounting the reader
The reader is attached using two countersunk screws (e.g. No 8 woodscrews) through the large holes in the front panel. When installation is complete, the holes can be covered by a self-adhesive label.

Installation
The connections to the EC reader are as follows

OV	Power supply -ve
V+	Power supply +ve. (5V to 28V nominal)
D0	Wiegand format output, data 0 line.
D1	Wiegand format output, data 1 line.
LED	Green LED control, connect to 0V to light LED
Screen	Use screened cable. <u>Do not connect screen at reader</u>, but ground it at the other end. (The 0V line should also be grounded by the equipment at the other end.)

Operation
At power up the red LED will come on. When a tag is within range of the reader, the red LED will flicker. The green LED is controlled by the external input.
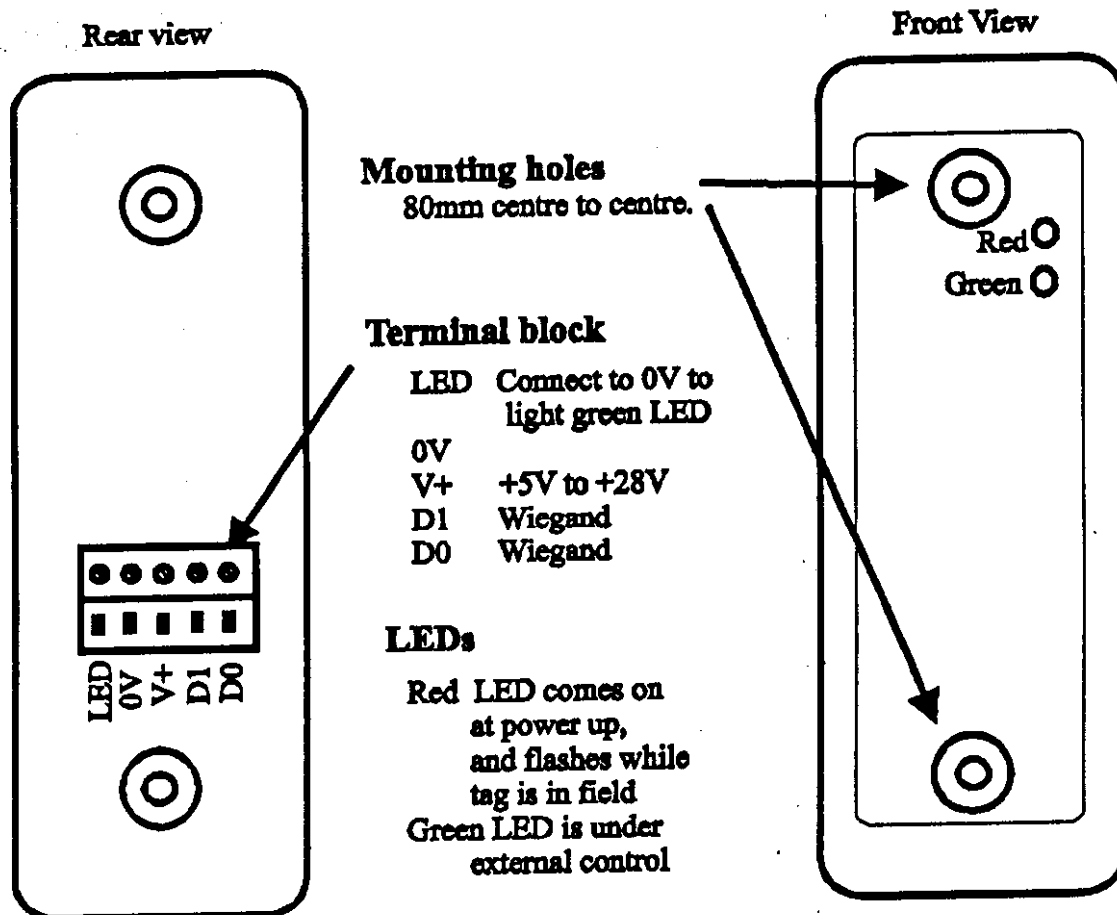
Technical Information

Reading range	15cm (with TC1A tag).
Power requirements	5 to 28V, 15mA max. (The power connections are protected against a reverse voltage of up to 12V. Incorrect connections might damage the data lines.)
Temperature range	0C to +60C (non-condensing)
Approvals	CE, FCC. MPT1337. (Approvals pending)
Dimensions	120mm x 40mm x 17mm

Wiegand output format for type EC1A

Data pulse	From 5V (normal state) to 0V for 100µs.
Time between pulses	1.6ms
Transmission	26 bits
	Bits 1, 26 are parity bits, and ensure that bits 1-13 have even parity, while bits 14-26 have odd parity.
	Bits 2-9 conatin the least significant 8 bits of the HID
	Bits 10-25 contain the PID. (See notes)

Time between transmissions is always at least 250ms.
The equipment to which the EC is connected should contain pull-up resistors on the Wiegand data lines.

Notes:

1:       The tag number can be split into User Number and Site Code as required, with the Site code being the most siginificant block. If the EC is to be mixed with other Cryptag Census readers, consult Identec.

2.   26 bit Wiegand is an open format, which means that the EC reports only part of the tag's identity number. It is possible that more than one tag might give the same reported number. If this is likely to be a problem, consult Identec.

(Where a different tag numbering systems is needed, an EC2A reader will be required instead.)

Rear view   **Front View**

Mounting holes
80mm centre to centre.

Red O
Green O

Terminal block

LED   Connect to 0V to light green LED

0V

V+   +5V to +28V

D1   Wiegand

D0   Wiegand

LED 0V V+ D1 D0

LEDs

Red LED comes on at power up, and flashes while tag is in field

Green LED is under external control

Cables

The EC reader is supplied without a cable. We recommend 5 core screened cable (e.g. with an overall foil screen and drain wire).

Suitable cables include

BICC	H8143
Belden	9535
Brand-Rex	BE57535
Multicomp	OS5C24
RS	361-169

PRODUCT MANUAL

CRYPTAG® CENSUS™ PROXIMITY READERS

IDENTEC TYPE NUMBERS

EC1

EC1A

EC2

EC2A

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Trademark Notice:

Cryptag is a registered trademark of Identec Ltd.

Census is a registered trademark of Identec Ltd.

Patents:

Cryptag is protected by patents in the UK and other countries.

Registered Designs

Various aspects of the reader design are registered.

WARNING NOTICE

This product uses radio frequency signals to identify tags, and is therefore subject to possible interference. Any application should bear this in mind, and in particular it should not be possible for personal safety to be jeopardised by a failure to read.

Cryptag Census neither uses nor generates hazardous voltages. You should not connect any such voltage to the reader.

$C\mathcal{E}$

This product complies with the following European Community directives: [1]
   Low voltage directive (73/23/EEC)
   [2]**EMC Directive** (89/336/EEC)

[1]FCC Regulations

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:
(1) this device must not cause harmful interference, and
(2) this device must accept any interference received, including interference that may cause undesired operation.

FCC Identifier: JHD-CEN2

Note:
Systems that comply with FCC regulations operate at different frequencies, and only such systems are to be installed in USA. These systems have some performance differences (in particular a slight increase in reading speed). Throughout this manual, the effect of the change in frequency is noted, e.g. "131kHz (in USA, 153kHz)". The part numbers of readers and tags for use in USA have an "A" added, so the US version of EC1 is EC1A.

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[1]For more information on approvals, refer to Appendix B.

CONTENTS

1. CRYPTAG CENSUS LOW COST READER

1.1 Introduction

Cryptag Census is a high performance tag identification system, offering fast multiple reading with the CR1 readers. Complementing the top end CR1 readers, the EC1 range of readers provide a cost-effective solution for those locations where only basic tag reading is needed. (Through this manual, the generic product code EC1 will be used to describe all readers in the EC1 range. For details of particular readers in the EC1 range, refer to Section 1.3.)

The EC1 range of readers are simple in construction and very easy to install, using the basic information provided with the reader. Installers should rarely (if ever) need to refer to this manual, which should be treated as a reference document.

This manual complements the Cryptag Census Site Manual, which for instance contains data on the Census tags.

1.2. The reader

A Cryptag Census reader identifies tags (sometimes referred to as tokens or cards) using low frequency radio signals. EC1 transmits to the tag at 131kHz (in USA 153 kHz) and detects the tag's response which is at 98kHz (in USA 115kHz).

1.3 Reader Variants

EC1 Wiegand format output.
    Fixed format, 26 bits.

EC2 As EC1, but different Wiegand formats offered.
    Format to be agreed with Identec.

EC1-RS Fixed format RS232 output.

EC2-RS RS232 output.
    Format of output to be agreed with Identec.

The fixed formats, and format options are described in Appendix A.

The standard versions of the EC1 range are suitable for installation indoors. Versions suitable for outdoor installation are available.

The suffix 'A' is used to denote versions suitable for use in USA.

1.4 Getting started

1. Connect a power supply to the reader

The positive connection goes to V+, while the negative connection goes to 0V. The supply should be at least 5V, and should not exceed 28V.

2. Bring a tag near the reader.

The reading range should be at least 15cm (6 inches) for a TC1 tag, but is usually more.

3. The red LED will flicker when the tag is within range.

The red LED will flicker when the tag is being read.

4. The reader reports the tag only once.

The reader sends the identity of the tag when the tag is first identified. To get another report, take the tag away from the reader for a few seconds, then bring it back in to the reader.

2.   READER LOCATION

The location of EC1 readers is not generally critical, but there are a few points to note.

A   Do not locate an EC1 reader near another reader.
     If tags can pick up signals from two or more readers, they respond to neither.
     This usually means keeping the EC1 at least 1.5 times the reading range plus
     50cm (2 feet) away from a long range reader, or at least 60cm (3 feet) from
     another EC1 reader.

     These figures may apply to readers other than Cryptag readers.

B   EC1 readers may be mounted directly on to a metal surface, but the reading
     range may be affected. The range should not normally fall below 15cm (6
     inches) except on very thick metal.

     There should not be metal above the surface on which the reader is mounted.
     Do not put the reader inside a metal box. Do not mount the reader through a
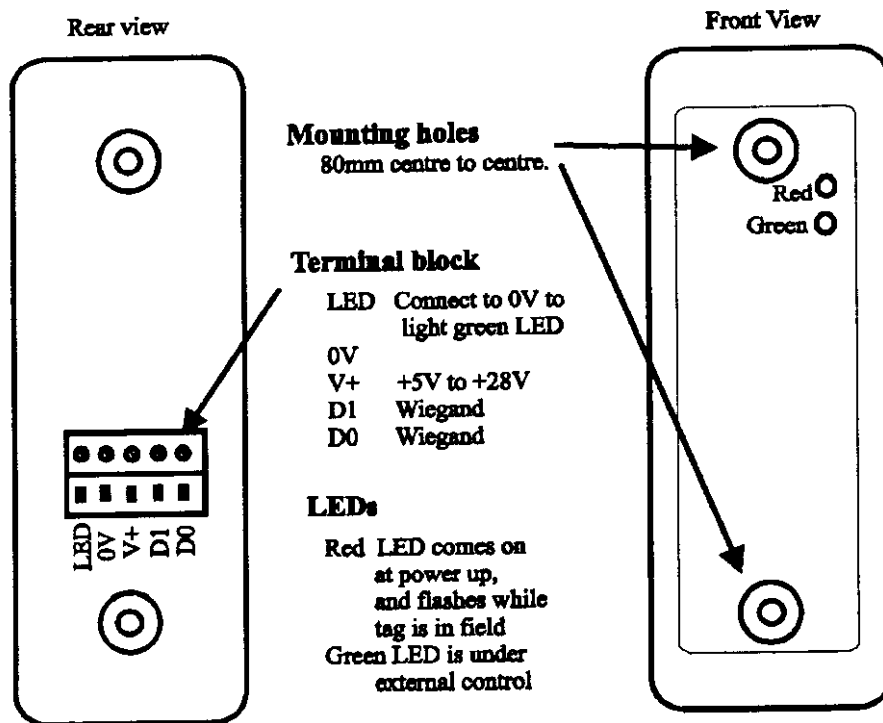   hole in a metal plate.

C   The reading range may be affected if the EC1 is mounted close to a
     computer monitor, or other sources of interference.

The reader should normally be positioned on the wall beside the door. They should be
near to the door handle, on the "insecure" side. Check that no problems will arise from
tags being read behind the reader or to the side. (The reading zone is almost spherical.)

Before positioning the aerials, consider their height from the floor. When tags are being
carried by people, the best height should be selected with regard to both the way in
which tags will be read, and the visibility of the LEDs. The best height is generally
where tags will naturally be presented face on to the reader (except TC3). The reader
should be within reach of people in wheelchairs. If tag holders must be able to see the
LEDs, make sure that they will be visible to all users.

If the reader is to be mounted in an outdoor location, you should use a suitable version
of the reader.

3. INSTALLATION AND COMMISSIONING

Rear view

Front View

Mounting holes
80mm centre to centre.

Red O
Green O

Terminal block

LED   Connect to 0V to
         light green LED
0V
V+   +5V to +28V
D1   Wiegand
D0   Wiegand

LEDs

Red LED comes on
    at power up,
    and flashes while
    tag is in field
Green LED is under
    external control

Cabling

Use screened cable, with the cable screen earthed at the other end from the reader (the controller end). The cable should not be more then 100 metres long for Wiegand interface, or 10 metres for RS232 interface. (EC2-RS readers set for lower than 9600 baud can use proportionately longer cables.)

Suitable cables include

BICC	H8143
Belden	9535
Brand-Rex	BE57535
Multicomp	0S5C24

The cable to the reader can be brought in behind the reader. Alternatively the cable can be surface mounted, and brought into the reader using the cutout area provided.

Connections

The power supply to the reader should be between 5V and 28V d.c.. The current consumption of the reader is below 15mA, so voltage drop in the cable is unlikely to be a problem.

The green LED will light when the LED input is grounded.

The EC1 has some protection against connection faults, but they do not cover all circumstances.

Use of the reader in exposed and outdoor environments

The standard versions of EC1 are not suitable for use in an exposed or outdoor environment, and you are advised to install a protected version.

COMMISSIONING

Commissioning the EC1 is a simple process, consisting of first making sure the reader is working, and then checking that the data from the reader is reaching the controller.

To check that the reader is working, apply power to the reader. The red LED should come on. Bring a tag in towards the reader. The red LED should start to flicker, showing that it is reading the tag. If there are any problems, refer to the Troubleshhoting guide in the next section.

Each time the tag is brought in to the reader, (and the red LED starts to flicker,) the tag should be reported to the controller.

Verify that the green LED (if used) is being driven by the controller.

4. TROUBLESHOOTING

It is rare for the reader to fail, so use this section to check the installation.

Red LED does not come on

This will normally mean that the reader is not receiving power of the correct polarity. Check the voltage on the reader terminals using a meter.

If there is very bright light, it may not be possible to see the LEDs. If this is the case, the reader may need relocating.

If the red LED is still not coming on, replace the reader.

Red LED does not flicker when a tag is brought in.

Make sure that the tag you are using is a working Cryptag Census tag.

Check to see whether the tag reads close to the reader, as there may be loss of range (see below).

Is there another reader (Cryptag or other type) in the vicinity of this reader?

Red LED flashes, but no response by controller (i.e no output message)

Is this tag valid for the reader? An EC2 may be programmed to report some tags and ignore others.

Is the tag being removed from the reading zone for sufficient time? Normally a few seconds will be sufficient, but it is possible for the EC2 to be programmed to wait for longer. (In this case you should have been informed.)

Check the wiring to the controller.

Has the controller been programmed to respond to the tag being used?

NB   If the power supply to the reader has had incorrect polarity, there is a small chance that the output circuit has been damaged.

Tags are read, but range is low

Is there another reader nearby?

Is there a computer monitor nearby?

Is the reader mounted inside a metal box? Mounting on a metal plate will give some range reduction, but the range will still normally be 15cm. There may be more loss of range if there is any other arrangement.

Green LED does not come on

Disconnect any wires to the LED terminal, and connect a wire from the 0V terminal to the LED terminal. The green LED should come on. If it does, check the wiring to the LED terminal.

Does the signal to the LED terminal have the correct polarity? (connect to 0V to turn on.)

Tag numbers reported incorrectly (Wiegand)
The most likely cause is the Wiegand wires are reversed.
Is the controller set up for the format used by the reader? If the system uses Site Codes, are these set up correctly?

Tag numbers reported incorrectly (RS232)
If the data appears to be garbage, check the baud rate etc. The normal for EC1 readers is 9600 baud, 8 data bits, one stop bit, no parity.

Check that the RS232 line is not too long, and check that connections are properly made. This will often give occasional errors.

Repair

The reader is designed to be "Installer-Friendly", and is rarely damaged, so please check the installation thoroughly. In the unlikely event that you find that the reader is faulty, you should replace the entire reader.

Identec encourages its customers to return faulty equipment, as investigation of faults may help us improve the product.

12 month "no-quibble" guarantee
All Identec readers and tags are guaranteed for 12 months from the date of despatch from the factory.

Appendix A   TECHNICAL DATA

For more information on Cryptag Census in general, refer to the Site Manual.

The reading range of EC1 is specified at 15cm minimum with a TC1 tag, but in general better ranges will be achieved. (Tags may be turned on at up to 40cm, so it is best to keep tags well away from the reader even if they don't appear to be read.) This range assumes that the tag is in the optimum orientation.

Reader mechanical details

Dimensions	116mm x 40mm x 18mm
	4.5 x 1.6 x 0.7 inches
Weight	
Colour/Material	White ABS case.
LEDs	Red (internal control)
	Green (external control)

Electrical connections

Screened cables are required to meet EMC requirements, as approvals were obtained with screened cables.

Power input.

> 5-28V d.c. 11mA typical. (current depends on LED status.)
> > 15mA max.
>
> Reverse voltage protected for voltages up to 12V. (But data lines might be damaged if the 0V and V+ lines were also reversed.)

Wiegand output

> Data on D0 and D1.
> Low going pulses 100µs long.
> 1.6ms pulse separation
> Minimum 250ms between transmissions.
> Internal 10k pull-ups. 100 ohm series protection resistors.

RS232 output

> Transmit data only. No receive function.
> 9600 baud, 8 data bits, no parity, one stop bit. (Could be modified on EC2-RS.)

Standard Data formats (EC1)

Wiegand	26 bits	
	Bit 1	Parity. Ensures bits 1-13 have even parity.
	Bits 2-9	8 least significant bits of the HID.
	Bits 10-25	PID
	Bit 26	Parity. Ensures bits 14-26 have odd parity.

The tag number can be split into User Number and Site Code as required, with the Site Code being the most significant block. If the EC1 is to be mixed with other Cryptag Census readers, consult Identec.

26 bit Wiegand is an open format, which imposes certain limitations. In particular the EC1 reports only part of a tag's identity. Although all tags are uniquely

numbered, the reported number may not be unique. If this is likely to be a problem, consult Identec.

If a different numbering system is needed, an EC2 will be needed.

RS232

The reader reports a power up message, identifying itself.
Each tag is reported in ASCII code, e.g.

HID=0014 PID=1234

The numbers are reported in hexadecimal.

Operating Environment
0C to +60C non-condensing. (Standard readers)
Protected readers are available.

Appendix B   APPROVALS

EC1 generally requires some form of approval, as it is an intentional emitter of radio frequency. This section describes the status of the product in various countries at the time of writing. For more up to date information contact Identec.

United Kingdom

EC1 will be approved to MPT1337 and ETS 300 339

Other countries inside European Union

EC1 is to be tested to ETS 300 330, for Radio Frequency emissions. The testing to ETS 300 330 and ETS 300 339 should be acceptable in all European Union countries. However certain national limitations may apply.

United States of America

Approval is awaited.

FCC Identifier: JHD-CEN2
For the purpose of FCC, this range of product is classified as a low frequency intentional radiator. "The user is cautioned that any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment."

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In all countries, this product is approved on the basis that it shouldn't cause interference to others, and that it won't be affected by interference. If you make an unauthorised modification, you may invalidate that approval, and you might be committing an criminal offence (depending on local legislation).

Low Voltage Directive
Cryptag Census readers have been designed and manufactured in accordance with EN60950, following the provisions of the Low Voltage Directive.

ISO 9002
Identec's Quality System conforms to ISO 9002. (Certificate Number - FM36029)

Appendix C   USER INSTRUCTION

C.1   After installing Cryptag Census, it is a good idea to make sure that the customer understands how the system works, and how to get the best out of it. What they are told depends on the type of application. This section provides information that will be useful to the manager responsible for the system, as well as the basis for information to give to all tagholders (if applicable).

If personnel are carrying tags, show them how to present a tag to a reader face on. Explain that tags are much less likely to be read if they are on their side (for instance lying in the bottom of a bag).

Tags do not read as well inside bags with metal frames, or surrounded by keys and coins. **The identity of the tag will not be incorrectly reported, but the range may be affected.**

Once a tag has been reported, most software versions will not report that tag again until it has been taken right out of the reading zone for several seconds, then brought back. If you need the door to unlock again, you must walk well away from the reader before returning to it.

Tags must not be left within range of readers. The battery inside the tag will be used up. If the tag is left next to a reader for several weeks the battery would become totally flat.

C.2   Tag disposal

When a tag reaches the end of its life, it should be disposed of properly. As there may be considerable time before this happens, and environmental policy may have changed in the meantime, we recommend:

Tags contain a small lithium battery, and should be disposed of accordingly.

If you are uncertain about how to dispose of tags, they may be returned to Identec for disposal.

C.3   End User Instructions
This section can be used to generate simple instructions for end users.

You have been provided with a Cryptag Census tag.

Application information to be given here.

To get the best out of your tag, would you please spare a few moments to read this.

The tag operates best when it is in the same plane as the readers, which are usually mounted vertically. You will get good performance if the tag is worn vertically, but not so good if the tag is placed flat in the bottom of a bag.

The performance of the tag will be affected if it is surrounded by metal objects such as coins or keys. (The larger the metal object, the more effect it can have.)

This tag has been designed and built to work under conditions met in normal daily use, but for reliable operation the following precautions should be observed:-

1. Do not bend the tag excessively. It should not be kept in the back pocket of trousers, or other places where it may be subject to bending.

2. Do not immerse in water, or allow it to come in contact with solvents.

3. Do not leave the tag in a hot place (e.g. on a radiator).

4. This tag contains a small battery, which under normal circumstances will last 5 years. Battery life will be reduced if the tag is left for long periods within range of a Cryptag Census reader.