CRYPTAG® CENSUS®

CR1-DS DEMONSTRATION MANUAL

Last Modified October 2000, Issue 2

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 <u>should not</u> 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.

CE

This product complies with the following European Community directives:

Low voltage directive   (73/23/EEC)
EMC Directive   (89/336/EEC)

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-CEN1

Note:
Systems that comply with FCC regulations operate at different frequencies, and only such systems are to be installed in the 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 the USA have an "A" added, e.g. CR1A, TC1A. Any reference in this manual to CR1 also applies to CR1A.

This manual covers single and dual aerial versions (CR1, CR1-DS, or in USA CR1A, CR1A-DS).
Separate manuals cover other variants of the CR1.

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1. CRYPTAG CENSUS

1.1 Introduction

Cryptag Census has two basic components, the reader and the tags. The reader will identify all Cryptag Census tags within its reading range. (We refer to this as the Reading Zone.) In the simplest form, the reader will report each tag as it is seen, but many other software variants are possible, so that for instance the reader may only report tags belonging to the installation. If you have an application, talk to Identec. It's quite possible that it's already provided for.

Readers can be supplied fitted with an internal aerial, but this can be replaced by an external aerial loop or multi-turn coil, for instance, to customise the reading range. It is possible to fit more than one aerial, to give the best possible performance, or to track tags as they pass the reader.

Tags are programmable, but once they have been programmed they cannot be reprogrammed and become "Read Only". Tags contain a small lithium battery, which should normally last many years. Readers can be configured to indicate when the battery of a tag is going low.

Cryptag Census is an advanced third generation RFID (Radio Frequency Identification) product from Identec Ltd of County Durham, England. It can be used as a standalone product in simple applications (such as opening a single door), or as part of an integrated solution where the output of the Cryptag Census reader is used by other equipment. Cryptag Census combines fast, high integrity, multiple reading of all tags present, good reading range, and ease of installation.

This manual is intended for use by installation and commissioning engineers on site. Most of the information you need to know about installing the reader is available on the Installation Sheet on the inside of the reader's lid. This manual contains some additional background information on Cryptag Census. There is also a more comprehensive Product Reference Manual available, for System Design engineers.

1.2 The reader

A Cryptag Census reader identifies tags (sometimes referred to as tokens or cards) using low frequency radio signals.

Cryptag Census readers use a single aerial coil for transmitting and receiving. The coil is tuned for the transmitter frequency of 131 kHz (in USA 153kHz), using a parallel capacitor. The internal coil is a 2 turn loop around the perimeter of the reader. This can be replaced by an external coil, which will usually be a single loop for anything larger than the reader's internal aerial, although a small mullion aerial can also be fitted.
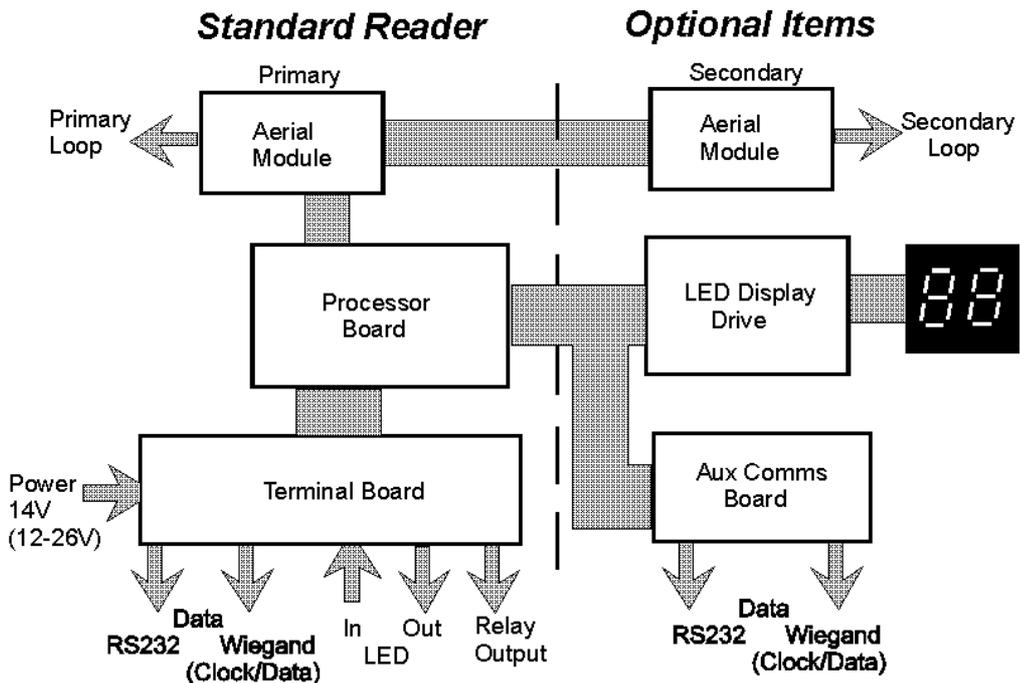
The basic CR1 reader consists of the Processor Board (the heart of the reader), the Terminal Board (which contains the connections to the outside world), and the Aerial Module (which links up with the aerial loop). The same Aerial Module can be used with either the internal aerial, or an external aerial.

The CR1 reader can be fitted with a number of options, some of which involve extra boards to allow for the use of multiple aerials. CR1-DS requires a second Aerial Module and an Auxiliary Communications Board. Any CR1 type reader can be fitted with a tag counter display to show how many tags are present in the reading zone.

1.3 Tags

Cryptag Census tags are designed for long reading range, and are therefore "active" tags containing a small lithium battery. Batteries will normally last many years.

Tags have a 64 bit identity number, although many applications will use fewer bits. The identity is programmable, but once a tag has been programmed it cannot have its identity altered. Tags never reveal their identity number directly, but it is discovered by the reader after an interrogation dialogue.

The tags are robustly constructed, and extremely reliable.

1.4 Getting Started

1.4.1 Unpacking
Check that the package contains
- RS232 interface lead
- CR1-DS demo reader
- CR1-DS manual
- CR1-DS demonstration manual
- 2 External aerials (1/2M square)
- The following tags

PID	HID	Tag Type	Description	Matchmaker
1	57	TC1	Personnel Tag	Personnel Tag
2	57	TC1	Personnel Tag	Personnel Tag
3	57	TC4	Keyfob	Personnel Tag
4	57	TC4	Keyfob	Personnel Tag
10	57	TC2	Article Tag	Article Tag
11	57	TC2	Article Tag	Article Tag
20	57	TC1	Personnel Tag	Pair A (Driver)
21	57	TC2	Article Tag	Pair A (Vehicle)
22	57	TC1	Personnel Tag	Pair B (Driver)
23	57	TC2	Article Tag	Pair B (Vehicle)
30	57	TC6	Personnel Tag (Cliptag)	Supervisor
31	57	TC6	Personnel Tag (Cliptag)	Supervisor

1.4.2 Connecting the Reader (refer to figure 1 on page 7)

1. Connect external aerials as shown in figure 1.

2. Connect a 12-27V dc power supply to the reader (terminal board PSU).

3. Connect the RS232 lead (supplied with reader) between the RS232 terminal on the "Terminal Board", and any serial port (generally labelled COM1, COM2 etc.) on a PC.

4. Ensure both Hex switches are set to position 0

1.4.3 Installing the software

Computer Requirements

Computer	Pentium Based
Memory	32 MB minimum
Hard drive	5 MB of free space

Put the software disk into drive A. Double click on "My Computer" then on "Floppy drive A". Double click on the "**Setup**" icon. Follow the installation instructions then run the program by clicking on

Start → Programs → Census Demo → Census Demo

The following screen with then appear (with the main menu above).
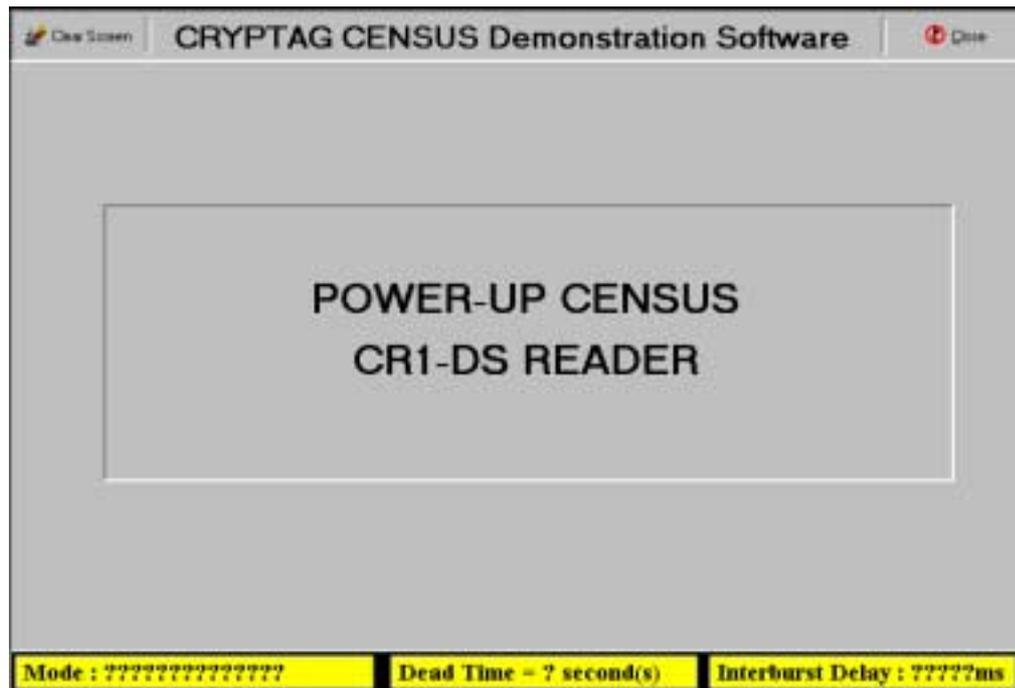
1.4.4 Setting up the software

Select "Setup" from the main menu, then "Preferences". The following screen will then appear.
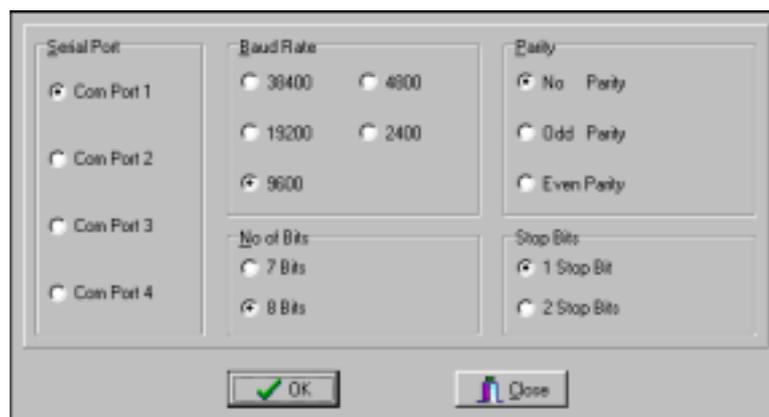
Select the serial port to which the reader is connected. Ensure that the Baud Rate, No Of Bits, Parity and Stop Bits are selected as shown above (unless otherwise stated). Select the "OK" button and power-up the reader. The display should then change to "Inward Reporting" mode.

The display can be cleared at any time by pressing the "F1" key.

1.5 Figure 1 (Demo reader setup)
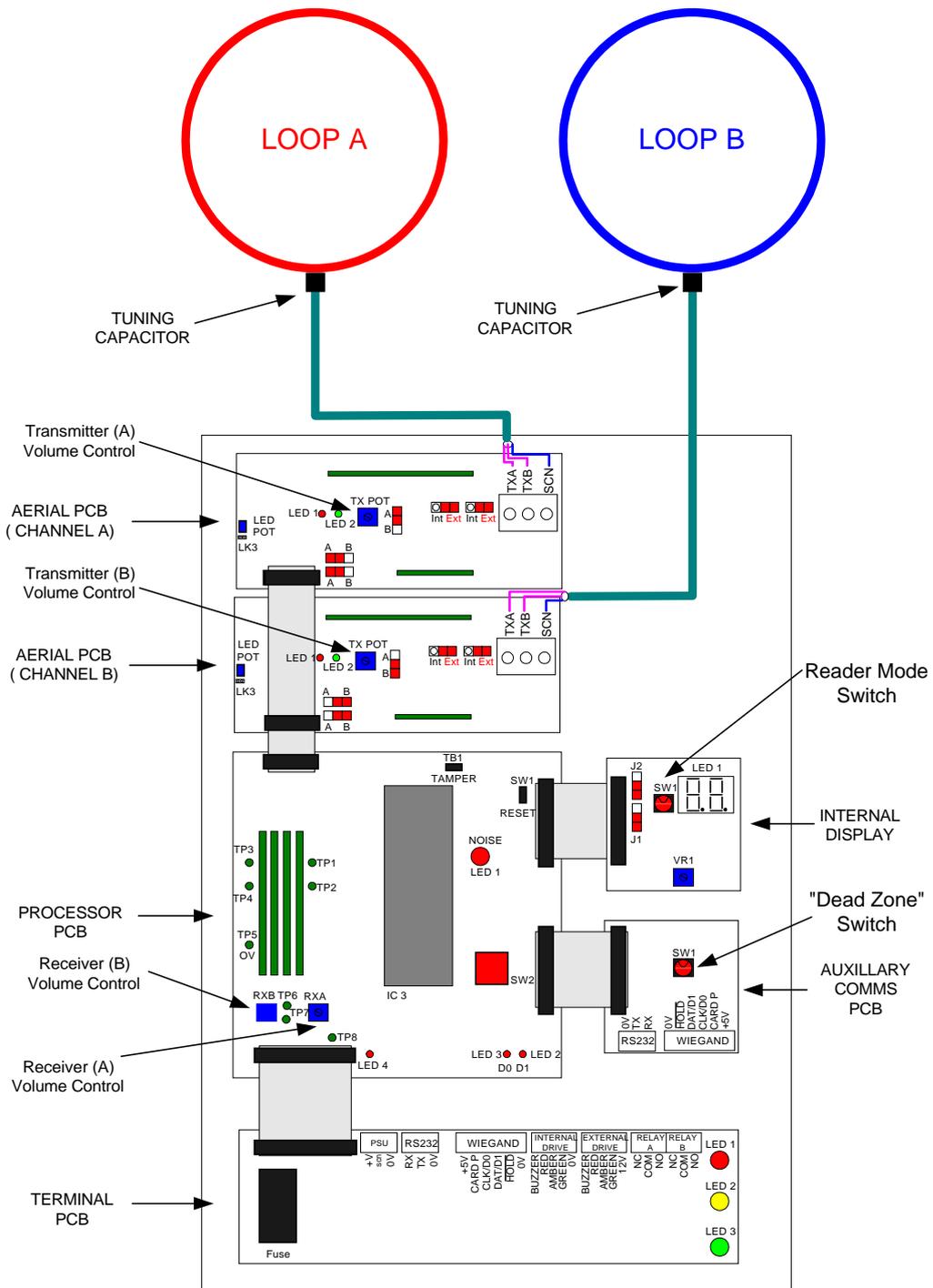
2 Hardware and Software Defaults

2.1 Internal Display

The internal display will indicate the total number of tags being read in both interrogation fields except where stated otherwise (e.g. car parking).

2.2 Auxiliary Communication Board

The Aux Comms Board contains the "EXIT" wiegand output. SW1 is used to determine the length of the "Dead Time" which is used in the Direction Sensing mode.

2.3 LED's and Buzzer

The internal LED's have been configured to operate as follows:-

Device	Default	Operation
RED	ON	Off for 1 second when a new tag is read
AMBER	OFF	Flash at 4Hz while a tag is in the field
GREEN	OFF	ON for 1 second for every new tag read.
BUZZER	OFF	Sound for ¼ second for every new tag read

2.4 Relays

The internal Relays have been configured to operate as follows:-

Device	Default	Operation
RELAY A	OFF	Operates for 5 seconds after a new tag is read on aerial 'A'
RELAY B	OFF	Operates for 5 seconds after a new tag is read on aerial 'B'

3 Software Options

3.1 Inward (Mode switch position 0)

Reader Type

    CR1 - non-directional, single loop, single channel reader.

Typical use

    Hands free access control
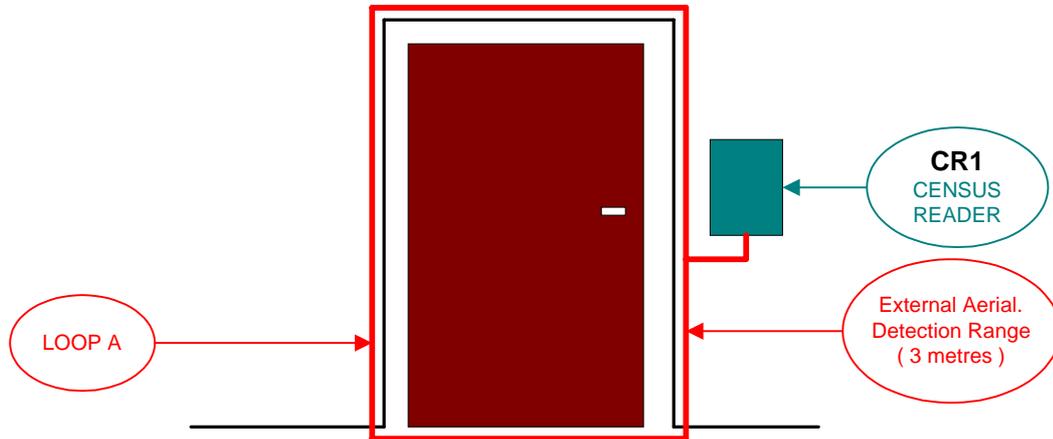
Operation

    Present a tag to aerial 'A' (aerial 'B' is disabled). The tag will be immediately reported upon entering the field. The tag will be continuously scanned but it will never be reported again unless it is first removed from the detection field for the duration of the time-out (typically 2 seconds) before re-entering.

Computer Display

    Only channel "A" is operational. Every time a tag's identity is reported, it will be displayed on channel "A" as follows :-

<div align="center">

Tag Number :- 00001

</div>

Display summary

Tag Transaction	Computer Display (Channel A)	Computer Display (Channel B)
A	The tag's identity will be reported immediately upon the tag entering the reading zone.	Disabled

Application

    This version of the software has numerous applications such as Standard Access Control, Vehicle Tagging, Single Door Monitoring etc.

3.2 Outward (Mode switch position 1)

Reader Type

CR1 - non-directional, single loop, single channel reader.

Typical use

Monitoring high value items in a store. The CR1 is connected to an external aerial. The reader only reports the tag once it has left the interrogation field for the duration of the "Time out" (typically 2 seconds).
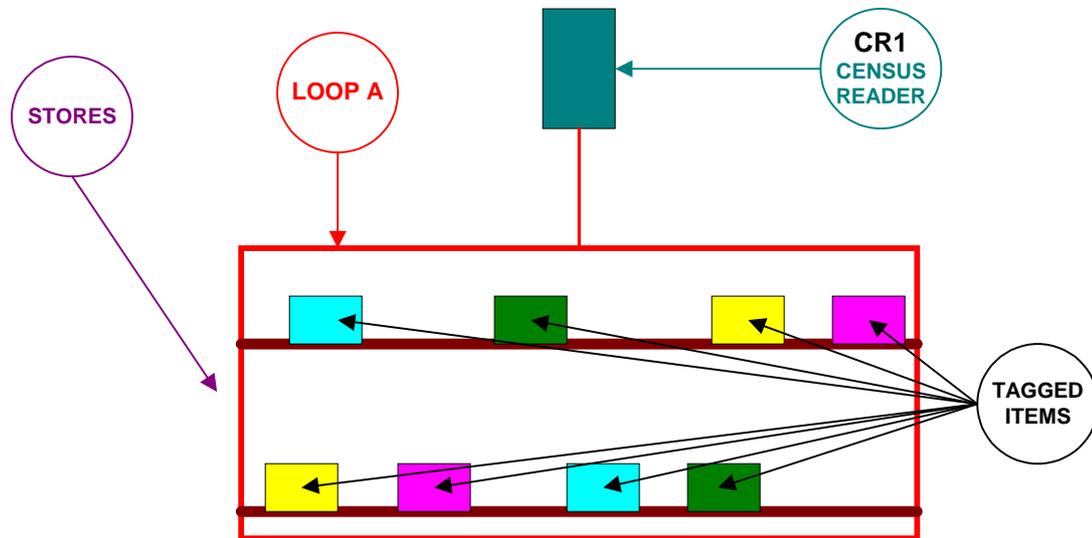
Operation

Present a tag to aerial 'A' (aerial 'B' is disabled). The tag will be not reported upon entering the field. The tag will be continuously scanned but it will not be reported until it is removed from the detection field for the duration of the time-out (typically 2 seconds). After this time the tags identity will be reported.

Computer Display

Only channel "A" is operational. Every time a tag's identity is reported, it will be displayed on channel "A" as follows: -

Tag Number :- 00001

Display summary

Tag transaction	Computer Display (Channel A)	Computer Display (Channel B)
A	The tag's identity will be reported after the tag has left the reading zone for the duration of the "time-out" (typically 2 seconds).	Disabled

Application

One possible use is to continuously monitor tags within the detection field of the reader, for instance in a store. If an item is removed from stock, the control system could automatically book out and re-order replacement items as necessary. The tags are only read at intervals (a few seconds up to a minute) to preserve battery life. The time-out interval must also be increased accordingly.

3.3 Continuous (Mode switch position 2)

Reader Type

CR1 - non-directional, single loop, single channel reader.

Typical use

Computer operator monitoring
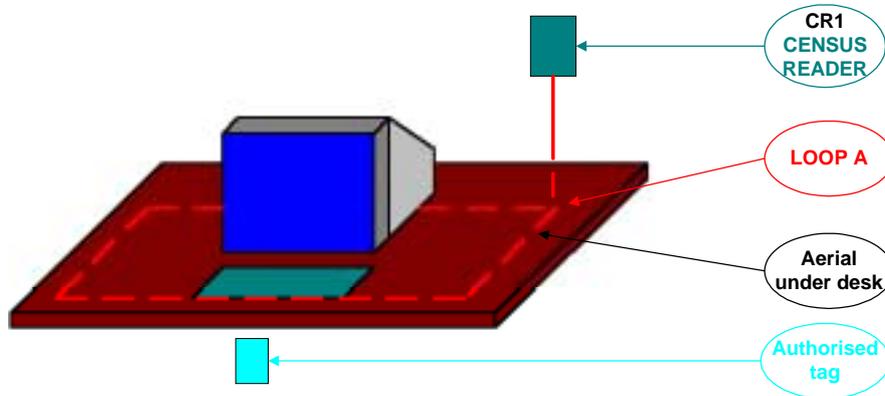
Operation

Present a tag to aerial 'A' (aerial 'B' is disabled). The tag will be reported continuously while in the interrogation field.

Computer Display

Only channel "A" is operational. Every time a tag's identity is output, it will be reported on channel "A" as follows: -

<div align="center">

Tag Number :- 00001

</div>

Display summary

Tag transaction	Computer Display (Channel A)	Computer Display (Channel B)
A	The tag's identity will be continuously reported while left in the reading zone.	Disabled

Application

The reader is installed in a computer desk. When an operator wearing a tag sits down to use the computer, the tag would be identified and continuously reported. The reader would identify the user and could display any new messages, re-route calls to this desk and display the last thing the user was working on. If the user then leaves, the computer would shut down. The display could also be scrambled unless at least one valid tag was present. Care is needed to preserve the battery life of the tag.

Continuous reading is also used (at maximum reporting speed) when the reader is connected to a system which has the ability to use all of this information. One example is a people counting system which correlates information from optical sensors with details of which tags are present. Normally Cryptag Census readers process the tag information and present it in a simplified form. Continuous reading mode makes all of the information available.

3.4 Inward and Outward (Mode switch position 3)

Reader Type

  CR1 - non-directional, single loop, single channel reader.

Typical use - key monitoring
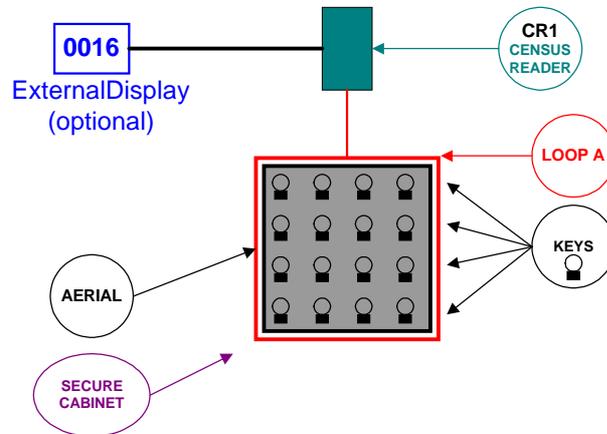
Operation

  Present a tag to aerial 'A' (aerial 'B' is disabled). The tag will be immediately reported upon entering the field. The tag will be continuously scanned but it will never be reported again until it has left the readers interrogation field for longer than the "Time-Out" period (typically 2 seconds).

Computer Display

  Only channel "A" is operational. Every time a tag's identity is reported, it will be displayed on channel "A" as follows: -

<div align="center">

Tag Number :- 00001

</div>

Display summary

Tag transaction	Computer Display (Channel A)	Computer Display (Channel B)
A	The tag's identity will be reported immediately upon entering the reading zone, then again after the tag is removed for longer than the "time-out" period.	Disabled

Applications

  The ability to continuously monitor, or sample, all tags within the detection field of the reader could be used to indicate the total number of keys within the secure cabinet. If keys are added or removed the reader will report the unique identity of the tag and a flag to indicate those keys entering or leaving the field. Battery life considerations again mean that tags will only be monitored at intervals of many seconds, and the time-out has to be extended accordingly.

  As with Continuous Mode (see above), this mode can be used to provide additional information to the Access Control Systems that would benefit from knowing exactly which tags are present. Compared with Continuous Mode there are fewer messages to handle, with the CR1 doing ALL of the processing. The disadvantage of using Inward/Outward reporting is that some information is lost if a tag disappears for less than the time-out, and Outward reports are always delayed.

3.5 Matchmaker (Mode switch position 4)

Reader Type
CR1 - non-directional, single loop, single channel reader.

Typical use
Article monitoring. Can be used stand-alone or as part of an integrated Access Control System.

Operation
There are two different types of tag, for instance personnel and asset. Tags are allocated in pairs of one personnel tag and one asset tag. An asset tag can only be used in conjunction with its partner personnel tag. The personnel tag authorises the asset tag's use.

Personnel tag alone	Valid access
Article tag alone	Alarm
Asset tag with its personnel tag	Valid access
Asset tag and wrong personnel tag	Alarm
Single paired tag	Nothing
Valid Pair (Odd and Even)	Valid access
Invalid Pair	Nothing
Supervisor tags can be created.	They authorise any asset tag.

The alarm is delayed by a short period (typically 2 seconds) to allow time for the authorising tag to be read. This eliminates nuisance warnings.

Display summary

Tag transaction	Computer Display
Personnel tag (PID's 1-9)	Tag Identity reported Door open
Article tag (PID's 10-19)	Tag Identity reported After 2 seconds Alarm ON
Personnel tag (PID's 1-9) + Article tag (PID's 10-19)	Tag Identities reported Door Open
Single paired tag (PID's 20-29)	Tag Identity reported
Valid pair (Vehicle + Driver) (PID's 20 & 21 or 22 & 23 etc.)	Tag Identities reported Door Open
Invalid pair (Vehicle + Invalid Driver) (PID's 20 & 22 etc.)	Tag Identities reported *(Could be changed to have Alarm condition)*
Any vehicle tag + Supervisor tag (PID's 30→)	Tag identities reported Door Open

Application
Matchmaker can be used whenever articles or assets are normally allocated to one person. The matchmaker reader will generally be at the exit. In a car parking application each person is only authorised to remove his or her own vehicle. Employees can only remove their own laptop computer from the premises.

One can see three levels of asset monitoring
1. Matchmaker used standalone, providing a simple solution. The door is controlled by the reader's own relay output.

2. Matchmaker used in conjunction with an Access Control system. Matchmaker provides the asset monitoring, which is an add-on to the Access Control.

3. For more complex asset monitoring and asset tracking, the CR1 (or other Cryptag Census reader) will just report the tags, and not take part in the decision making.

Matchmaker is also available as a twin reader but must only be used in restricted, low throughput applications. For further advice contact Identec.

3.6 Inward Twin (Mode switch position 5)

Reader Type

CR1-DS - non-directional, dual external loops, dual channel reader.

Typical use

Hands free access control. The twin reader is based on a single CR1 but has the ability to drive two external aerials. The reader appears to be two completely separate readers. Each reports any tags in its own separate detection zone and operates its own time-out.
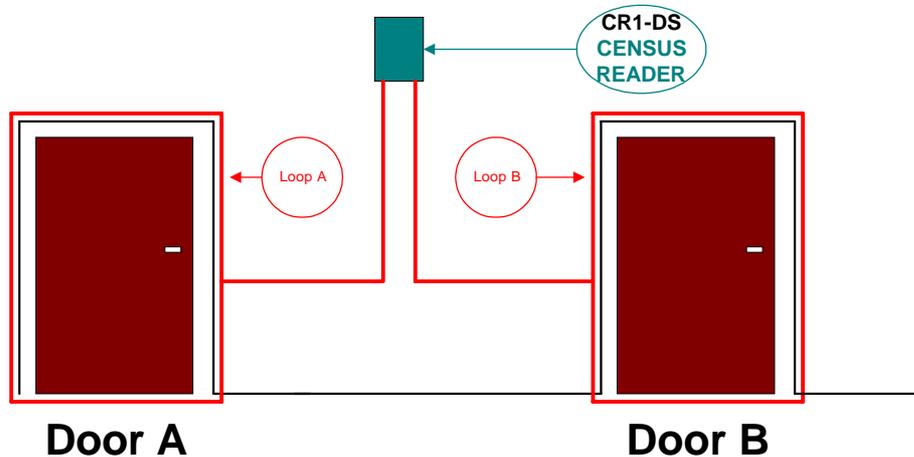
Operation

Present a tag to aerial 'A'. The tag will be immediately reported upon entering the field. The tag will be continuously scanned but it will never be reported again unless it is first removed from the detection field for the duration of the time-out (typically 2 seconds). Now present the tag to aerial 'B'. The tags identity will again be immediately reported upon entering the field but on channel 'B'.

Computer Display

Both channels "A" and 'B' are operational but multiplexed. A tag will be reported on channel 'A' when in the detection zone of loop A as "**Tag Number :- 00001**", and similarly for 'B'.

Display summary

Tag presented to reader aerial	Computer Display (Channel A)	Computer Display (Channel B)
A	The tag's identity will be reported immediately upon entering the interrogation field.	Nothing
B	Nothing	The tag's identity will be reported immediately upon entering the interrogation field

Application

A Twin reader is often a more cost-effective solution when two doors need large aerials loops. It is also the preferred solution when two readers have to be so close that their reading zones will overlap considerably. A Twin reader is slower than a single reader. In the worst case, with several tags present at each reader, the speed is halved.

3.7 Outward Twin (Mode switch position 6)

Reader Type

CR1-DS - non-directional, dual external loops, dual channel reader.

Typical use

Monitoring high value items within a store. The twin reader is based on a single CR1 but has the ability to drive two external aerials. The reader appears to be two completely separate readers. Each reports its tags in its own separate detection zone and operates its own time-out.
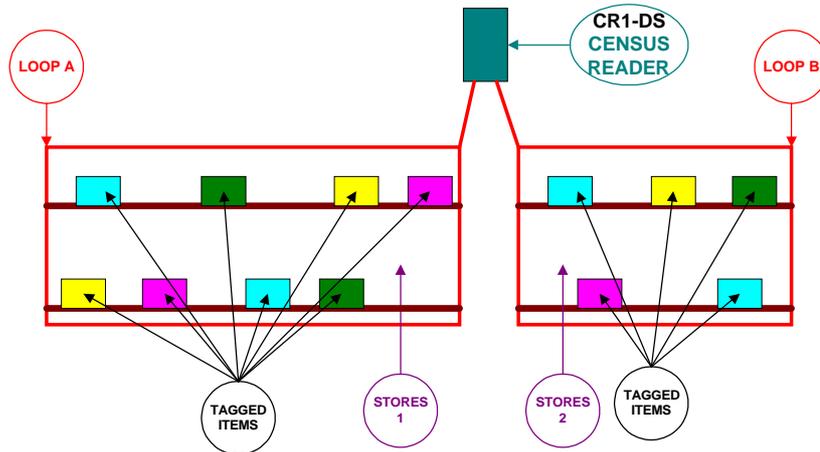
Operation

Present a tag to aerial 'A'. The tag will be not reported upon entering the field. The tag will be continuously scanned but it will not be reported until it is removed from the detection field for the duration of the time-out (typically 2 seconds). After this time the tags identity will be reported. Now present the tag to aerial 'B'. The tags identity will again be reported once it has left the interrogation field for longer than the "time-out".

Computer Display

Both channels "A" and 'B' are operational but multiplexed. Every report associated with aerial A or B will be reported at their respective channel. Thus a tag removed from aerial 'A', would be reported as: -

Tag Number :- 00001

Display summary

Tag transaction	Computer Display (Channel A)	Computer Display (Channel B)
A only	The tag's identity will be reported after it has left the interrogation field for the duration of the "time-out" (typically 2 seconds).	Nothing
B only	Nothing	The tag's identity will be reported after it has left the interrogation field for the duration of the "time-out" (typically 2 seconds).

Application

A Twin reader is often a more cost-effective solution when two doors need large aerial loops. It is also the preferred solution when two readers have to be so close that their reading zones will overlap considerably. A Twin reader is slower than a single reader. In the worst case, with several tags present at each reader, the speed is halved.

## 3.8 Continuous Twin (Mode switch position 7)

Reader Type

CR1-DS - non-directional, dual external loops, dual channel reader.

Typical use

Computer operator monitoring (dual system). The twin reader is based on a single CR1 reader connected to two aerial loops. The reader appears to be two completely separate readers. Each reports its tags in its own separate detection zone and operates its own time-out.
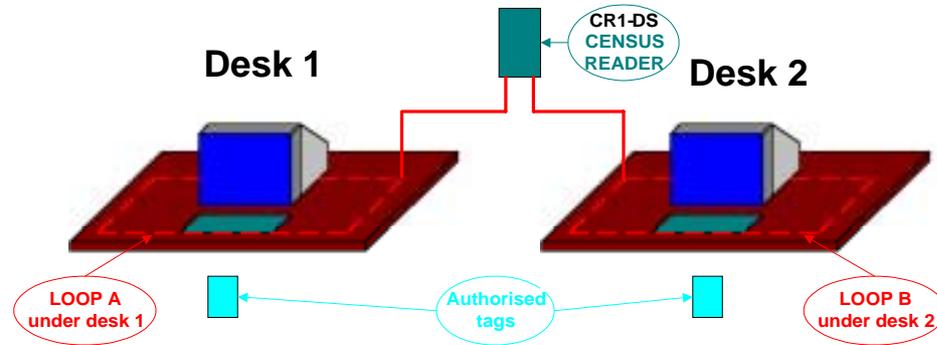
Operation

Present a tag to aerial 'A'. The tag will be reported continuously while in the interrogation field on channel 'A'. Now present the tag to aerial 'B'. The tag will again be continuously reported while in the interrogation field but this time on channel 'B'.

Computer Display

Channels "A" and "B" are both operational. Every time a tag is read on loop "A", the tag number will be displayed on channel "A". A tag read on loop "B", will be displayed on channel "B". The format is as **Tag Number :- 00001**.

Display summary

Tag transaction	Computer Display (Channel A)	Computer Display (Channel B)
A	The tag's identity will be continuously reported while left in the interrogation field.	Nothing
B	Nothing	The tag's identity will be continuously reported while left in the interrogation field.

Application

The reader is installed in a computer desk. When an operator wearing a tag sat down to use the computer, the tag would be identified and continuously reported. The reader would identify the user and could display any new messages, re-route calls to this desk and display the last thing the user was working on. If the user then leaves, the computer would shut down. The display could also be scrambled unless at least one valid tag was present. Care is needed to preserve the battery life of the tag.

Continuous reading is also used (at full speed) when the reader is connected to a system which has the ability to use all of this information. One example is a people counting system which correlates information from optical sensors with details of which tags are present. Normally Cryptag Census readers process the tag information and present it in a simplified form. Continuous reading mode makes all of the information available.

A Twin reader is often a more cost-effective solution when two detection zones are needed. It is also the preferred solution when two readers have to be so close that their reading zones will overlap considerably. A Twin reader is slower than a single reader. In the worst case, with several tags present at each reader, the speed is halved.

3.9 Inward and Outward Twin (Mode switch position 8)

Reader Type

CR1-DS - non-directional, dual external loops, dual channel reader.

Typical use

Key monitoring (dual system). The twin reader is based on a single CR1 reader connected to two aerial loops. The reader appears to be two completely separate readers. Each reports its tags in its own separate detection zone and operates its own time-out.
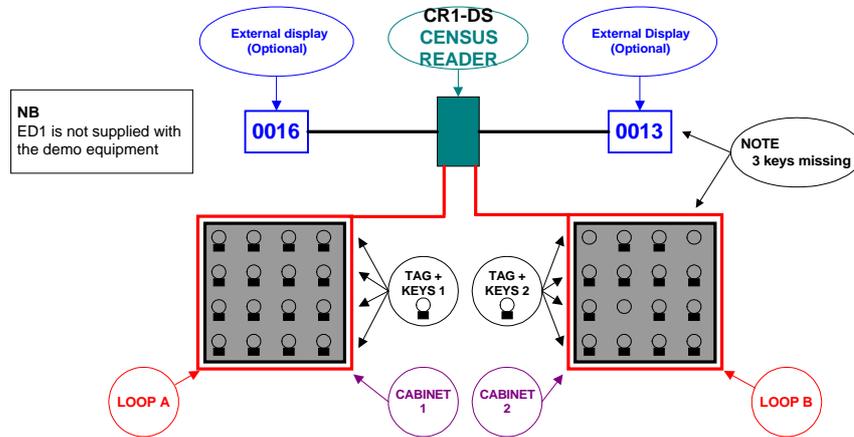
Operation

Present a tag to aerial 'A'. The tag will be immediately reported on channel 'A' upon entering the field. The tag will be continuously scanned but it will never be reported again until it has left the readers interrogation field for longer than the "time-out" period (typically 2 seconds). Now present the tag to aerial 'B' and notice the reader outputs the same data but on channel 'B'.

Computer Display

Channels 'A' and 'B' are both operational. Every time a tag is read on loop "A", the corresponding tag number will be display on channel "A". Thus a tag read on loop "B", will be displayed on channel "B" as follows: -

Tag Number :- 00001

Display summary

Tag transaction	Computer Display (Channel A)	Computer Display (Channel B)
A	The tag's identity will be reported immediately upon entering the interrogation field, then again after it is removed for longer than the "Time-Out" period.	Nothing
B	Nothing	The tag's identity will be reported immediately upon entering the interrogation field, then again after it is removed for longer than the "Time-Out" period.

Applications

The ability to continuously monitor, or sample, all tags within the detection field of the reader could be used to indicate the total number of keys within the secure cabinet. If keys are added or removed the reader will report the unique identity of the tag and a flag to indicate those keys entering or leaving the field. Battery life considerations again mean that tags will only be monitored at intervals of many seconds, and the time-out has to be extended accordingly.

As with Continuous Mode (see above), this mode can be used to provide extra information to systems that would benefit from knowing exactly which tags are present. Compared with Continuous Mode there are fewer messages to handle, with the CR1 doing some of the processing. The disadvantage of using Inward/Outward reporting is that some information is lost if a tag disappears for less than the time-out, and Outward reports are always delayed.

3.10 Control Mode (Mode switch position 9)

Reader Type

 CR1-DS - directional, dual external loops, dual channel reader.

Typical use

 Directional Access Control. Control mode is used when a **locked** door has to be unlocked. The reader reports each tag as soon as it is seen, with the report being on the appropriate channel (entry or exit). If the second aerial sees the tag within the Dead-zone period, the reader will not report the tag again.
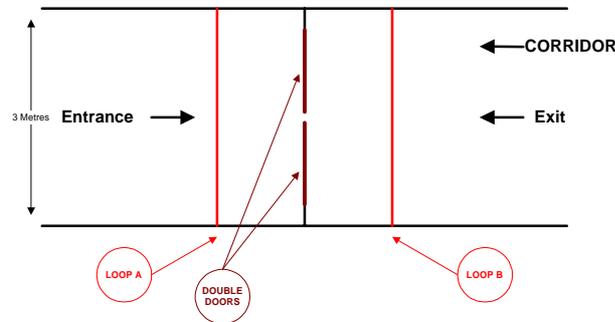
Operation (ensure the "dead time" is set to switch position 2)

 Present a tag to aerial 'A'. The tag will be immediately reported upon entering the field. Now move the tag over aerial 'B' and then out of both interrogation fields. Notice that the reader only reported the tag upon entering the initial loop, and then ignored it on the opposite aerial. Next present the tag to aerial 'A', then hold the tag in the field of aerial 'B'. Notice that after the "dead time" has elapsed (2 seconds + the "dead time") the reader re-reports the tag in the opposite direction (channel 'B').

Computer Screen

 Channels A and B are both operational. All the IN transactions (tag going from loop "A" to "B") will be reported on channel "A" and the OUT transaction (tag going from loop "B" to "A") on channel "B". The format is as follows: -

<p align="center">Tag Number :- 00001</p>

Display summary

Tag transaction	Computer Display (Channel A)	Computer Display (Channel B)
A	The tag is immediately reported when entering the field	Nothing
A→B	The tag is immediately reported when entering the field	The tag is ignored for the duration of the "dead time"
A→B (left in B)	The tag is immediately reported when entering the field	The tag is re-reported after the "dead time" has elapsed"

Advantages / Disadvantages

 Control mode reports a tag that wants access. Consider the case where a tag is reported but the user does not enter. (They may have opened the door then realised they have forgotten something.) The user is reported to be inside when they are actually still outside. This upsets roll calls and Anti-Passback. This would be the case with all identification technologies, but Census readers will actually know that the person hasn't passed through. Other modes of operation (e.g. Enhanced Control, Anti-Passback, Tracking, Safety) should be used if Roll Calls or Anti-Passback are important.

Application

 Used where a lock must control a door, and reports are needed on the direction of travel. Not recommended for use with Anti-Passback or Roll Call. Often used for vehicle access applications.

3.11 Enhanced Control Mode (Mode switch position A)

Reader Type

CR1-DS - directional, dual external loops, dual channel reader.

Typical use

Enhanced Control is used with a **locked** door, particularly in Roll Call applications, where it is important that tags are reported to be in the correct zone. The tag is reported immediately when it is first seen, but for a tag coming in it is initially reported <u>on the Exit Reader.</u> When the user has passed through to the exit reader it is reported again <u>on the Entry reader.</u>
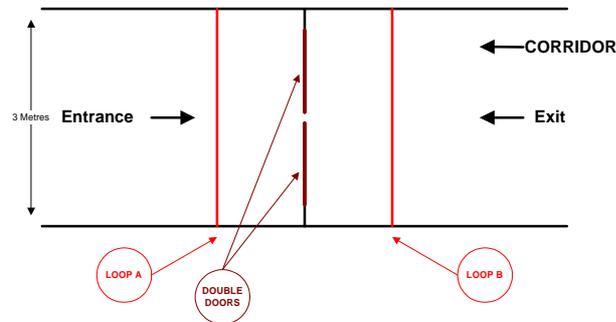
Operation (ensure the "dead time" is set to switch position 2)

Present a tag to aerial 'A'. The tag will be immediately reported upon entering the field. Now move the tag away from the interrogation fields (ensure aerial 'B' does NOT read the tag). Notice that the reader only reported the tag upon entering the initial aerial. Next present the tag to aerial 'A', then to aerial 'B', and then out of the interrogation field. Notice that after the "dead time" has elapsed (2 seconds + the "dead time") the reader re-reports the tag in the opposite zone (channel 'B').

Computer Screen

Channels A and B are both operational. All the IN transactions (tag going from loop 'A' to 'B') will be reported on channel 'A' then 'B' and the OUT transaction (tag going from loop 'B' to 'A') on channel 'B' then 'A'. The format is as follows :-

Tag Number :- 00001

Display summary

Tag transaction	Computer Display (Channel A)	Computer Display (Channel B)
A	The tag is immediately reported when entering the field	Nothing
A→B	The tag is immediately reported when entering the field	The tag is reported after the "dead time" has elapsed"
A→B →A	The tag is immediately reported when entering the field	Nothing

Advantages / Disadvantages

Each tag is always reported at the zone where it was last seen, ensuring that a Roll Call will be correct. Enhanced Control produces an extra report message whenever a user passes normally through the reader. This may cause the door to be re-opened, giving a potential reduction in the level of security. Enhanced Control is not recommended for use with Anti-Passback (APB), where there will be a high level of APB violation reports. (Use Anti-Passback version instead.)

Application

Used where a door must be locked, and it is important to know where users are.

## 3.12 Anti-Passback Control Mode (Mode switch position B)

Reader Type

CR1-DS - directional, dual external loops, dual channel reader.

Typical use

Anti-Passback mode is used with **locked** doors. When a tag is read by the reader, that tag is reported on the appropriate channel. If the user passes through the door and leaves on the other side no further report occurs. If however the user does not pass through the door, the tag is reported again but on the other channel. Normal access creates a single (correct) report, but if the user does not leave on the correct side a second (correcting) report is created. The Access Control system will thus be able to operate an Anti-Passback system.
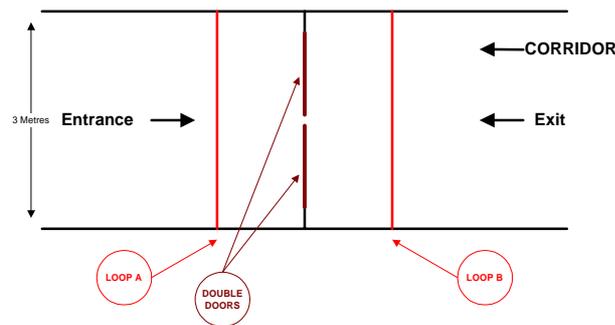
Operation (ensure the "dead time" is set to switch position 2)

Present a tag to aerial 'A'. The tag will be immediately reported upon entering the field. Now move the tag away from the interrogation fields (ensure aerial 'B' does NOT read the tag). Notice that the reader re-reports the tag on the opposite channel (returning the tag to its correct location). Next present the tag to aerial 'A', then to aerial 'B', and then out of the interrogation field. Notice that the tag is only reported once as entering the building.

Computer Screen

Channels A and B are both operational. All the IN transactions (tag going from loop "A" to "B") will be reported on channel "A" and the OUT transaction (tag going from loop "B" to "A") on channel "B". The format is as follows :-

Tag Number :- 00001

Display summary

Tag transaction	Computer Display (Channel A)	Computer Display (Channel B)
A	The tag is immediately reported when entering the field	The tag is re-reported after the "dead time" has elapsed"
A→B	The tag is immediately reported when entering the field	Nothing
A→B →A	The tag is immediately reported when entering the field	The tag is re-reported after the "dead time" has elapsed"

Advantages / Disadvantages

The main advantage of Anti-Passback Mode is the ability to give valid information about a tag's location, with a minimum of extra reports. If the user doesn't pass through the doors an extra report is generated to correct the Anti-Passback state, but this extra report will also cause the door to re-open with a possible loss of security.

Application

Anti-Passback (APB) mode is mostly used where an Access Control system is operating Anti-Passback control, so that once a tag has been used to gain access the same tag cannot be used again in the same direction.

3.13 Tracking (Mode switch position C)

Reader Type

        CR1-DS - directional, dual external loops, dual channel reader.

Typical use

        Tracking Mode is used where there is **no physical barrier**, but the location of tags needs to be recorded. A tag will only be reported if both aerials see it within the "dead time" period. If the tag then comes back so that it leaves in the direction from whence it came, a second (correcting) report is generated.

Operation (ensure the "dead time" is set to switch position 2)

        Present a tag to aerial 'A', and then remove it from the interrogation field. Notice that the reader reports nothing. Now present the tag to aerial 'A', then 'B'. Notice as soon as the second aerial reads the tag the reader reports the tag in the direction travelling. Now traverse between the aerials. The reader will always report the new direction the tag is travelling.

Computer Screen

        Only channel 'A' is visible. All the IN transactions (tag going from loop 'A' to 'B') will be reported on channel 'A' as 'Tag Number :- 00001 >>>>>>>>>>>' and the OUT transaction (tag going from loop 'B' to 'A') as 'Tag Number :- 00001 <<<<<<<<<<<'.

Display summary

Tag transaction	Computer Display (Channel A)
A	Nothing
A→B	The tag is immediately reported once the tag went A→B as ("Tag Number :- 00001 >>>>>>>>>>>")
A→B →A	The tag is immediately reported once the tag went A→B as ("Tag Number :- 00001 >>>>>>>>>>>") then again at B→ A as ("Tag Number :- 00001 <<<<<<<<<<<")
A→B →A→B	The tag is immediately reported once the tag went A→B as ("Tag Number :- 00001 >>>>>>>>>>>"),then again at B→ A as ("Tag Number :- 00001 <<<<<<<<<<<"), then again at A→ B as ("Tag Number :- 00001 >>>>>>>>>>>"),

Advantages / Disadvantages

        Tracking Mode provides a record of whenever a tag passed the reader. It can be used with Anti-Passback systems. If a tag is loitering between the two aerials, there is the danger that it will generate a large number of reports. The last report should be correct. Safety Mode reduces the number of reports. Care should be taken to ensure the reader fields do not overlap as this could lead to hundreds of transactions being reported.

Application

        Used to track the direction of people down a corridor. Users can now change their minds as to which direction they are travelling and the Access Control system will still know in which area they are located.

3.14 Enhanced Tracking (Mode switch position D)

Reader Type

CR1-DS - directional, dual external loops, dual channel reader.

Typical use

Enhanced Tracking Mode is used where there is **no physical barrier**, but the location of tags needs to be recorded. Enhanced tracking is based on Tracking mode but the directional reports are suppressed.

Operation (ensure the "dead time" is set to switch position 2)

Present a tag to aerial 'A', and then remove it from the interrogation field. Notice that the reader reports nothing. Now present the tag to aerial 'A', then 'B'. Notice as soon as the second aerial reads the tag the reader reports the tag in the direction travelling. Now traverse between the aerials. The reader will not report the tag again unless it leaves the interrogation field in the opposite direction to which it was first reported.

Computer Screen

Only channel 'A' is visible. All the IN transactions (tag going from loop 'A' to 'B') will be reported on channel 'A' as '**Tag Number :- 00001 >>>>>>>>>>**' and the OUT transaction (tag going from loop 'B' to 'A') as '**Tag Number :- 00001 <<<<<<<<<<<**'.

Display summary

Tag transaction	Computer Display (Channel A)
A	Nothing
A→B	The tag is immediately reported once the tag went A→B as ("Tag Number :- 00001 >>>>>>>>>>")
A→B →A	The tag is immediately reported once the tag went A→B as ("Tag Number :- 00001 >>>>>>>>>>"), then again after the 'Dead time' had elapsed as last known direction is different to that which was reported e.g. ("Tag Number :- 00001 <<<<<<<<<<")
A→B →A→B→A→B	The tag is immediately reported once the tag went A→B (first time) as ("Tag Number :- 00001 >>>>>>>>>>"), then not again as the last direction is the same as the reported direction.

Advantages / Disadvantages

Tracking Mode provides a record of whenever a tag passed the reader. It can be used with Anti-Passback systems. With this version it is **perfectly acceptable to have overlapping fields** (unlike the standard tracking mode).

Application

Used to track the direction of people down a corridor. Users can now change their minds as to which direction they are travelling and the Access Control system will still know in which area they are located.

3.15 Safety Mode (Mode switch position E)

Reader Type

CR1-DS - directional, dual external loops, dual channel reader.

Typical use

Safety mode is used where there is **no physical barrier** for applications such as Safety roll call. In Safety Mode a tag is only reported when it leaves either aerial. The report is on the channel corresponding to the direction in which the tag left the reader, and takes no account of the direction of arrival. The report actually occurs when the tag has been out of the field for greater than the Dead-zone period.
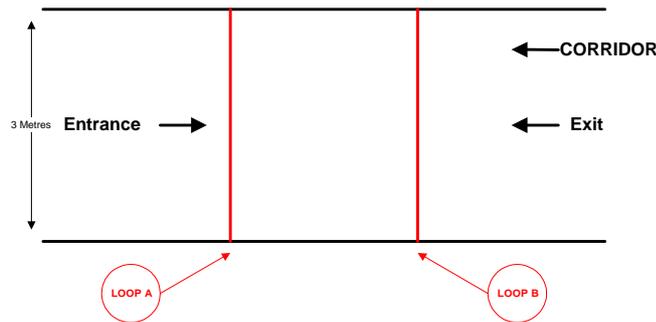
Operation (ensure the "dead time" is set to switch position 2)

Present a tag to aerial 'A', and then remove it from the interrogation field. Notice that the reader reports the tag on channel 'A' after the "dead time" has elapsed. Now present the tag to aerial 'A' and traverse between the aerials. Notice the reader reports nothing until then tag leaves the interrogation field for longer then the "dead time" period. Then the tags identity is reported at the last aerial seen.

Computer Screen

Channels A and B are both operational. All the IN transactions (tag leaving at aerial 'B') will be reported on channel "B" and the OUT transaction (tag leaving at aerial 'A') on channel 'A'. The format is as follows: -

Tag Number :- 00001

Display summary

Tag transaction	Computer Display (Channel A)	Computer Display (Channel B)
A	The tag is re-reported after the "dead time" has elapsed.	Nothing
A→B	Nothing	The tag is re-reported after the "dead time" has elapsed.
A→B →A→B→A	The tag is re-reported after the "dead time" has elapsed.	Nothing

Advantages / Disadvantages

Safety Mode will identify the zone where a tag is, because each tag's last report relates to that zone. This simplifies the tracking version of the software.

Safety Mode provides no information on where a tag came from, and should not be used where such information is important. If a tag is currently within the field of a reader this information is also unavailable.

Application

Used to track the direction of people down a corridor. Users can now change their minds as to which direction they are travelling and the Access Control system will still know in which area they are located.

3.16 Tenant Car Parking Control (Mode switch position F)

Reader Type

CR1-DS - directional, dual external loops, dual channel reader.

Typical use

Different groups of tags can each be allocated, with a maximum number of parking spaces for each group. The reader will allow tags from each group to enter, provided the conditions for that group are met. This can be used for tenanted car parks, or to give priority to certain groups.

In a tenanted car park, each tenant has their own allocation. Cars belonging to that tenant can enter as long as there are spaces for that tenant, but if one tenant's allocation is full their cars will be refused even if there are spaces for the other tenants.
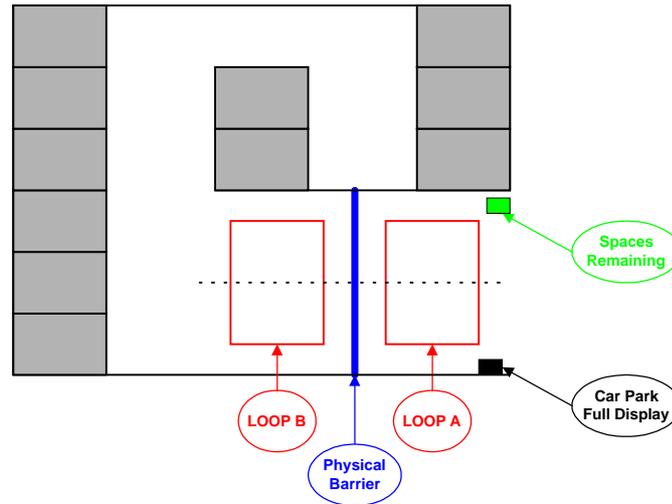
Operation (ensure the "dead time" is set to switch position 2)

NOTE, F1 does not clear the screen in this mode !

The demonstration software has been set up with 3 levels of tenant car parking.

Group A	Maximum of 3 spaces	(tag numbers 1-9)
Group B	Maximum of 3 spaces	(tag numbers 10-19)
Group C	Maximum of 3 spaces	(tag numbers 20- XX)

Present tags 1 and 2 to aerial 'A' then 'B'. The computer screen will indicate that level 1 only has one car parking space left. Present tag number 3 to aerial 'A' then 'B'. Note that level one parking is now full. When an additional card (number 4) is presented to aerial 'A', the reader replies "Car Park Full". Now take tag number 11 to aerial 'A' then aerial 'B'. This tag has been granted access as there are still parking spaces left for that tenant.

Application

This mode is for use in car parks. The reader is programmed with the car park's capacity, and it will not allow more than that number of cars to be inside the car park.