

iX6

HID-EM 80cm Read Range Dual System Reader



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1. Overview

The **iX6** is a state of the art DUAL system HID/EM long range card reader intended for production, process, logistics and access control. The **iX6** reads both EM and HID clamshell cards up to 80cm giving it significantly more range than HID's own long range Indala readers. Dual system readers offer integration possibilities and also allow for seamless phasing in or out readers either EM or HID reader systems.

The **iX6** is now trialling hosting using polled commands. The polling can address several thousand readers although in practice one hundred readers would be reasonable. Each reader has two remotely controlled power drivers for two independent 12volt strikes and a door open/closed sensing facility.

2. Features

- ✓ **Dual System, HID - EM**
- ✓ **World's Best HID Read Range – 80cm**
- ✓ **Easy integration into office systems.**
- ✓ **Polling system for multiple readers.***
- ✓ **2 Remotely Controlled Strike Drivers**
- ✓ **Remote Door Sensing**
- ✓ **Seamless Phasing in new reader system**

3. iX6 Technical Overview

The **iX6** is a dual system reader for HID (using Frequency Shift Keying) and EM (using Manchester Encoding). Read range has not been sacrificed indeed the HID range performance is the best in class, offering ranges up to 82 cm using an enclosure just 28cm square. To achieve this HID performance, intensive use of DSP signal recovery programming has been used. Due in part to its intrinsic nature and the full-on DSP detection, the HID system resists heavy interference. To put this in context, in terms of physical size, HID's own long range reader, the Indala 620 is a little larger than the **iX6**, yet its maximum read range is just 60cm.

The EM detection system too has built in algorithms to reduce noise and has natural long range. The reader also features a powerful polling system, with optional CRC checking and can support up to 100 readers.

4. iX6 Advantages

The **iX6** is a dual system reader. It reads both EM and HID cards, which are completely different systems. The EM system uses Manchester Encoding whereas the HID system uses Frequency Encoding. The systems are normally incompatible. Far from being disadvantaged by incorporating two systems, the **iX6** has the longest read range for any HID reader of its size, and this includes Indala readers direct from HID. The user has the unique means to combine both systems in a single reader. The long read range for both systems allows thru wall use of the reader where the reader is placed safely inside a building.

Optional polling means that many readers may be connected to a single communication cable.. A full range of polled commands are available.

5. Cards/Tags

The reader uses standard EM and HID cards. The HID card effectively has 44 user bits of user data. The **iX6** outputs these 44 bits of data as 11 ASCII characters of 4 bits data each. The EM card effectively has 40bits of user data. The **iX6** outputs these as 10 ASCII characters of 4 bits data each.

HID actually have many ways to arranging the bits internally in the card, with configurations based on 26, 34 and 42 bit Wiegand along with 'Site' codes. The **iX5** sends the same data as is on the card, nothing is lost, so the user is free to use the bits as required.

6. Installation

Position the **iX6** away from sources of interference such as mains wiring. Do not fix the reader antenna on solid steel objects or range loss may occur and the auto-tuning may run out of range. Moderate metal fixtures are acceptable.

Do not mount the reader on an uneven surface as the reader will become mechanically stressed by the fixing screws. Do not place in an area with vibration because this can cause loss of range. Do not place within 2m of another **iX6** or 15m of any other 125 KHz reader or loss of range may occur.

Use a 1 amp regulated Power Supply. Switching regulators may be used but the devices should preferably be separated from the reader to prevent interference.

7. Device Operational and Physical Characteristics

Parameter	Conditions
Power Requirements	11-13 VDC at 0.36 - 0.85 Amperes nominal depending on PWR setting.
Read Range for EM Card	70cm - 90cm (Innovations Long Range Clamshell Card)
Read Range for HID Card	60cm - 75cm (HID Clamshell Card)
EM Transponder	64 Bit EM4001 compatible, Manchester encoded
HID Transponder	48 Bit HID Card
Auto-tune	Internal upon switch-on
Interfaces	RS232 (9,600, n, 8, 1)
Read Indication	LED and Beeper
Dimensions and Weight	22cm x 22cm, 2Kg
Temperature range	-10c to +50c. (Enquire for extended range -20c - +60c)

7.1 Absolute Maximum Limits

Supply Power Voltage (Red Lead)	+18volts. Short term only.
Voltage on Door Sensor (Brown lead)	+/- 200volts for 1mS
Strike Drive (Yellow and White leads)	Max Volts +30volts, -1volt : Max Current 2amps (1 second intermittent only)
Temperature	-20c + 60c

8. LED Indications

The iX6 has three LEDs labelled PWR, READ and AUX.

The PWR LED. This is the power LED and it is controlled by the firmware and activates after switch on. It is dual function. Its primary function is to indicate that the reader is running. All the while the reader is receiving valid commands it will blink every second to indicate it the reader is on-line.

The READ LED. This LED has a dual function. In normal read mode it indicates that a tag has been read and is being sent. In Polled-Only mode it indicates that the reader is sending a transmission.

The AUX LED. This LED is driven on by strikes1&2 powering on and it is dual colour. When Strike1 is activated it lights up red, When Strike2 activated it lights up green and when both strikes activated it lights up yellow. Due to production spreads the hue of yellow cannot be guaranteed.

9. Data Formats in Normal Mode

The iX6 transmits using standard RS232 9600:N,8,1 :
(Baud rate 9600 : No parity : 8 data bits : 1 Stop bit)

The normal (non-polled) RS232 data string is preceded by an STX (start of transmission) control character followed by the data and a final CR, LF and ETX. In normal mode (Non-Polled), the data is sent as the card is read. If the card is EM there



will be 40 bits of Data included and if the card is HID then 44 bits of data will be included.

STX (02h)	DATA (10 ASCII)	CR	LF	ETX (03h)
-----------	-----------------	----	----	-----------

EM Card Transmission

STX (02h)	DATA (11 ASCII)	CR	LF	ETX (03h)
-----------	-----------------	----	----	-----------

HID Card Transmission.

Where STX = Start of Transmission Character (\$02)
 CR = Carriage return Character (\$0D)
 LF = Line Feed Character (\$0A)
 ETX = End Of Transmission Character (\$03)

10. Report Format

Upon switch-on the reader sends a report via the RS232 line. The report indicates the Software Revision and data for fault diagnosis. A typical switch on report is shown below.

iX6 Ver 1.1 08082014 HW Ver AD24, Reader ID 001111, Poll Address 0000, P3F ,TU 16

1	iX6 Ver 1.1	Firmware version
3	08082014	Date of software version
4	HW Ver AD24	Hardware Version
5	Reader ID 001111	The unique reader ID
6	Polling Address 0000	The reading polling address.
7	P3F	The internal voltage setting code
8	Tuning Variable	0004 = The tuning variable.

Note: The fields of the report in future versions may be added to or modified. Developers are advised to future proof their host software by allowing for changes switch on report.

11. The Polling System

The **iX6** incorporates a set of polling commands that will reasonably support up to 100 readers. The communications are full duplex however while a reader is servicing one command, subsequent commands will be ignored until the current command has completed. The commands employ a CRC checksum. In systems with multiple readers it is important that the command data is thoroughly checked. For commissioning, a 'FFFF' checksum may be used, however for operational use a full checksum is recommended. Reader responses do not contain a checksum for speed. If a response is deemed to be corrupted then it is a simple matter to request another response because the reader address is known. See 'Cyclic Redundancy Check (CRC)'. See also Appendix4 - Worked examples of polled commands.



11.1 Polling Commands Table

CMD	Explanation	Form	Reader TX Response
CMD10	Login/Logout	[STX][Address][10][Parameter][Password][CRC][ETX]	[ACK]/[NAK]
CMD11	Send all cards	[STX][Address][11][CRC][ETX]	[STX][Card1][Cardn][CRLF][ETX]
CMD12	Strike Period	[STX][Address][12][Parameter][CRC][ETX]	[ACK]/[NAK]
CMD13	Perform Strike	[STX][Address][13][Parameter][CRC][ETX]	[ACK]/[NAK]
CMD14	Send Status	[STX][Address][14][CRC][ETX]	[STX][Settings][CRLF][ETX]
CMD15	New Address	[STX][Address][15][New Password][CRC][ETX]	[ACK]/[NAK]
CMD16	System Settings	[STX][Address][16][Parameter][CRC][ETX]	[ACK]/[NAK]
CMD17	New Password	[STX][Address][17][New Password][CRC][ETX]	[ACK]/[NAK]
CMD18	Power Setting	[STX][Address][18][Parameter][CRC][ETX]	[ACK]/[NAK]
CMD19	Tune Cycle	[STX][Address][19][CRC][ETX]	[ACK]/[NAK]

11.2 10-Series Polled Command General Form

The RS232 polled commands take the general form:-

[STX][Address][Command][Parameter][CRC][ETX]

Where:-

STX	=	Start of Transmission control code 02h
Address	=	Reader 4 character address
Command	=	Command number
Parameter1&2	=	The data passed from the host to the reader
CRC	=	Cyclic Redundancy Check
ETX	=	End of Transmission control character 03h
ACK	=	Command OK
NAK	=	Command not OK

12. 10-Series Polled Commands

CMD10 (Login) [STX][Address][10][Parameter][Password][CRC][ETX]

The Parameter: 01 = login
 00 = logout.

Login is required before commands that change the system settings are permitted. Commands requiring login are CMD12, CMD15, CMD16 and CMD17.

Reader Reply ACK/NAK



CMD11 (Send All cards) [STX][Address][11][CRC][ETX]

Once the system settings have been set to poll-only operation the reader will not automatically send card data and must be polled to send the latest cards. This command instructs the reader to send all the cards read since the last CMD11 command was performed. The reader can store up to 50 cards and any cards in excess of this will be lost. Before using this command set up the system to polled-only by logging in with CMD10, and then selecting Poll-only using CMD15.

Reader Reply [STX][Card1] – [Cardn] – [Last Card][CR][LF][ETX]

CMD12 (Strike Period) [STX][Address][12][Parameter][CRC][ETX]

Where the Parameter	0	Strike1 = 3sec,	Strike2 = 3sec
	1	Strike1 = 3sec	Strike2 = 6sec
	2	Strike1 = 3sec,	Strike2 = 10sec
	3	Strike1 = 3sec,	Strike2 = 250mS
	4	Strike1 = 6sec,	Strike2 = 3sec
	5	Strike1 = 6sec,	Strike2 = 6sec
	6	Strike1 = 6sec,	Strike2 = 10sec
	7	Strike1 = 6sec,	Strike2 = 250mS
	8	Strike1 = 10sec,	Strike2 = 3sec
	9	Strike1 = 10sec,	Strike2 = 6sec
	A	Strike1 = 10sec,	Strike2 = 10sec
	B	Strike1 = 10sec,	Strike2 = 250mS
	C	Strike1 = 250mS,	Strike2 = 3sec
	D	Strike1 = 250mS,	Strike2 = 6sec
	E	Strike1 = 250mS,	Strike2 = 10sec
	F	Strike1 = 250mS,	Strike2 = 250mS

Note - Requires logon.

There are two main types of door strike. One type is normally energised and the other is normally not energised. The iX6 only supports normally off strikes. There are two strike drivers are both can be activated independently. The timing period for each can also be set independently.

Reader Reply ACK/NAK

CMD13 (Perform Strike/s) [STX][Address][13][Parameter][CRC][ETX]

The Parameter: 01 = Strike1 cycle
02 = Strike2 cycle
03 = Strike1 & 2 cycle

Reader Reply ACK/NAK



CMD14 (Send Status) [STX][Address][14][CRC][ETX]

The reader will send a status byte showing the door sensor status open/closed.

Reader Reply [STX][Status Byte][CR][LF][ETX]

Where 00 = Door Closed, 01 = Door Open : Leave bits 1 thru 7 blank for future.

CMD15 (New Address) [STX][Address][15][New Address][CRC][ETX]

The Parameter: New Address = 4 Hex Characters

Note - Requires logon.

The new address must consist of 4 hexadecimal characters. These must be chosen from the normal range of hexadecimal characters, namely 0,1,2,3,4,5,6,7,8,9,A,B,C,D,E,F. Other characters are not allowed as they may contain ASCII control codes. There are 64,000 different addresses available.

Reader Reply [ACK][NAK]

CMD16 (System) [STX][Address][16][Parameter][CRC][ETX]

Parameter: Consists of 8 bits where

Bit0 Poll Mode on/off

Bit1 Mute Beeper

Bit1-7 Not committed

To operate the reader in Poll mode this command should be sent with a parameter of 01. To return to normal mode the command should be sent with a parameter of 00. After this command it is advisable to log out.

Reader Reply [ACK][NAK]

CMD17 (New Password) [STX][Address][17][New Password][CRC][ETX]

New Password: Consists of 4 hexadecimal characters

Note - Requires logon.

The new password must consist of 4 hexadecimal characters. These must be chosen from the normal range of hexadecimal characters, namely 0,1,2,3,4,5,6,7,8,9,A,B,C,D,E,F. Other characters are not allowed as they may contain ASCII control codes. There are 64,000 different addresses available. After this command it is advisable to log out.

Reader Reply [ACK][NAK]



CMD18 (Power setting) [STX][Address][18][CRC][ETX]

The Parameter: Consists of a two byte hexadecimal value from 0-3F where 00 represents the lowest power and 3F represents the highest power.

Note - Requires logon.

Note that your reader will normally be pre-set to suit your geographical area. The range of input values is from \$00 to \$3F

Reader Reply [ACK][NAK]

CMD19 (Tune Cycle) [STX][Address][19][CRC][ETX]

The reader will perform an auto tune cycle. This is useful for testing..

Reader Reply [ACK][NAK]

13. The Cyclic Redundancy Check (CRC)

A cyclic redundancy check helps detect corrupted data due to electrical interference. In multiple reader systems it is very important to be able to detect the presence of data errors. A corrupted command to change a password or an address can have serious consequences. The reader uses a standard (Modem) 16 bit CCITT CRC. For checking purposes several of CRC calculators can be found on line. To assist in testing, examples of implementations of this CRC in the popular PIC assembler code can be found in Appendix1, and for ARM thumb assembler code in appendix2 and ATmega series assembly code in appendix3. Worked out examples of Commands with appropriate CRCs can be found in appendix4.

The general form of the polled command is as,

[STX][Address][Command][Parameter2][Parameter2][CRC][ETX].

The CRC is calculated by taking each byte of the command starting at the address field thru to the end of the parameter field. Say the reader address is 1234 and command 12 is sent, with a 00 parameter, then the address field + the command field + the parameter field will be 12341200. This is divided into bytes as follows \$12, \$34, \$12 and \$00. The CRC methods described in the appendix select the \$12 and run it through the CRC update, then the \$34, the \$12 and finally the \$00. For these test values the CRC is \$8ABB. The CRC implementations given in the appendix are continually cycling.

Users may use their own implementations CCITT CRC16 code, however it should be noted that the examples given are byte-based and the CRC is calculated much quicker than bit-based CRC checkers.

The command transmission will be received in ASCII from the RS232 network, however, these ASCII values are not used to calculate the CRC, the original hexadecimal values are. For example the byte \$12 will be sent as an ASCII 31 followed by ASCII 32 but the iX6 uses the value \$12 to calculate the CRC, without involvement in the ASCII transmission characters. Note for test purposes \$FFFF may be used.

14. Cable Definitions

Wire colour	Signal	Description
Red	PWR	+12V DC input
Black	GND	Ground
Blue	RS232	Serial RS232 Output (19,200:N,8,1)
Violet	RS232	Serial RS232 Input (19,200:N,8,1)
White	-	Do not connect
Green	-	Do not connect
Brown	Door Status	Sends the output of the door sensor. (Open/closed)
Orange	Strike 1	Remotely controlled door strike driver
Grey	Strike 2	Remotely controlled door strike driver.
Yellow	-	Do not connect
Screen	GND	Earth Screen

15. Emergency Reset

Passwords and addresses may get lost or mislaid. In these circumstances the user can perform an emergency reset back to the factory condition for password and address. To do this the user must isolate the reader from the other readers on line, switch off and on, and then use a terminal to type in the word 'RESET' within 4 seconds of switch on. The settings for the terminal must be 9600: N, 8, 1 (9,600 baud, no parity, 8 data bits and 1 stop bit). The reader will reset and return to the original factory values.

For different values see Appendix4 for worked example of command. The examples shown in the appendix use a popular free terminal program. Note that \$FFFF will be accepted for the CRC and the address and this is useful for testing, however for system integrity a calculated CRC checksum should always be used when there are multiple readers.

16. Factory Settings

Polling Address	0000
Polling Password	0000
Strike Time (sec)	3
Polling Mode	Off
Power Setting (0-3F)	38

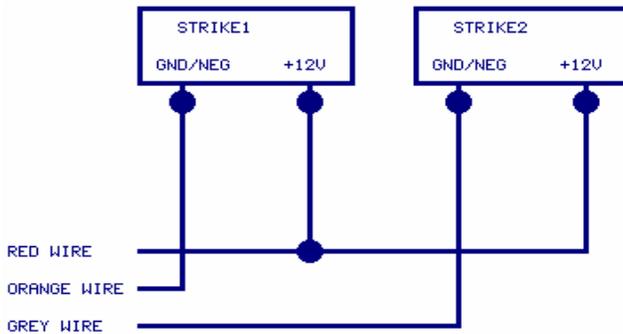
17. The Door Strike Drivers.

The Strike drivers are independent and may be operated singly and also set up for different strike periods. The strike power should be preferably taken from the 12volt DC reader supply. A maximum voltage of 25v is allowed for the strike and the maximum current should not exceed 0.5amp each or 1A in total, due to cable restrictions. The nominal resistance of each strike should be greater than 25 ohms. If the strike is set to normally-on then the maximum permissible current is 250mA for each strike, and the strike resistance should be greater than 50 ohms. The strike drivers are rugged intelligent FETs with

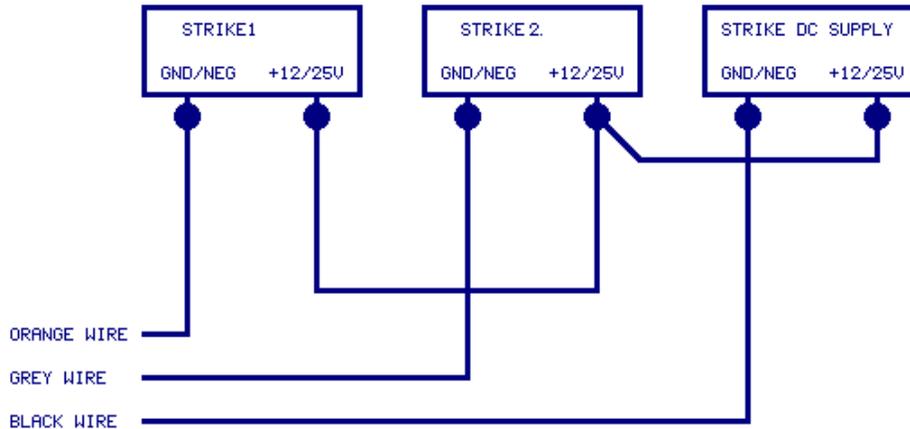


inbuilt protection. The driver circuit has an additional reverse voltage diode for inductive spikes. If an external DC power source is used for the strike then care must be taken to avoid reverse polarity, the FET driver is protected but reverse current through the safety diode can cause damage to the copper track, the cables and the diode itself.

The strike is controlled by polled commands but it should be noted that these commands may still be used in normal mode. The appropriate polled command `[$02][0000][13][01][FFFF][$03]` will operate strike1, `[$02][0000][13][02][FFFF][$03]` will operate strike2, while `[$02][0000][13][03][FFFF][$03]` will operate strike1&2. Note that for single reader applications the CRC test value of FFFF can safely be used. The period and the type of strike, may also be set using polled commands. See polled commands and also appendix4.



Above - Wiring Diagram for using Reader 12v Supply



Above – Wiring Diagram Using Separate DC power Supply

18. The Door Sensor

In many applications it is important to know if the door has been closed properly. The iX6 door sensing circuitry is connected to the brown wire. When the reader is polled with command 14, the reader will send `[$02][00][0A][0D][$03]` if the voltage on the brown wire is under 2volt and `[$02][01][0A][0D][$03]` if the voltage is greater than 2volt. A contact closure taken from the brown wire to 12volt will be suitable.

19. Connections to a computer RS232 Port using a DB9 Socket.



Pin1	NC	
Pin2	(Computer RS232 out) (Reader RS232 in)	Purple Wire
Pin3	(Computer RS232 in) (Reader RS232 out)	Blue Wire
Pin4	NC	
Pin5	(Ground, 0volt)	Black Wire
Pin6-9	NC	

20. Useful Information

For general testing we recommend the Bray terminal free from the net. It is the best software we have seen. It is available at <http://braypp.googlepages.com/terminal> truly excellent. The examples described will be detailed using this program, although others may be used including hyper terminal.

For all technical help contact ID-Innovations at help@id-innovations.com

For users wishing to send commands manually, STX (\$02) can be sent using CNTR/A and ETX (\$03) can be sent using CNTR/C.

21. Contact Information

Sales: wendy@id-innovations.com

Technical support help@id-innovations.com

22. Disclaimer

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This product contains polled command software that is still undergoing testing and has been described as such in the data sheet. The user should understand that he uses these commands at his own risk. In particular the user should understand that the commands may contain errors, may cause malfunction and that the commands themselves may change in future versions.



Appendix1 - CRC calculation in PIC assembly language.

```

;-----
; Beginning of test program
;-----
PERF_CRC
    CALL    CRC_Init
    movlw  12
    CALL    CRC_Update
    movlw  34
    call   CRC_Update
    movlw  12
    call   CRC_Update
    movlw  00
    call   CRC_Update    ;CRC 8ABB
    jmp    PERF_CRC      ;Loop indefinitely for test.

CRC_Init
    movlw  0x00          ; Preload the CRC Registers with 0x00
    movwf  CRC16_HIGH
    movwf  CRC16_LOW
    retlw  0

CRC_Update
    xorwf  CRC16_HIGH,w
    movwf  INDEX
    andlw  0xf0
    swapf  INDEX,F
    xorwf  INDEX,F

; High byte
    movf   INDEX,W
    andlw  0xf0
    xorwf  CRC16_LOW,W
    movwf  CRC16_HIGH
    rlf   INDEX,W
    rlf   INDEX,W
    xorwf  CRC16_HIGH,F
    andlw  0xe0
    xorwf  CRC16_HIGH,F
    swapf  INDEX,F
    xorwf  INDEX,W
    movwf  CRC16_LOW
    retlw  0

```

Appendix2- CRC calculation in ARM Thumb assembly language.

```

;-----
; Beginning of test program
;-----
Perf_crc

```



```

bl      crc16_INIT
Ldr     r1,=0x12
bl      CRC_update
Ldr     r1,=0x34
bl      CRC_update
Ldr     r1,=0x12
bl      CRC_update
Ldr     r1,=0x00
bl      CRC_update           ;CRC = 8ABB
b       Perf_crc           ;Loop indefinitely for test.

crc16_INIT
push    {lr,r1}
ldr     r1,=0x00           ; Preload the CRC Registers with 0x00
strb   r1,[r11,#CRC16_hi_b]
strb   r1,[r11,#CRC16_lo_b]
pop     {r1,pc}

CRC_update
push    {lr,r0,r2,r3,r4}
ldrb   r3,[r11,#CRC16_hi_b]
ldrb   r4,[r11,#CRC16_lo_b]
eor    r1,r3,r1
mov    r2,r1
and    r1,#0xf0
lsl    r2,#4
ubfx   r0,r2,#8,#4
add    r2,r0
and    r2,#0xff
eor    r2,r1
and    r1,r2,#0xf0
eor    r3,r4,r1
lsl    r1,r2,#1
tst    r1,#0x100
orrne  r1,#0x01
and    r1,#0xff
eor    r3,r1
and    r1,#0xe0
eor    r3,r1
lsl    r2,#4
ubfx   r0,r2,#8,#4
add    r2,r0
and    r2,#0xff
eor    r1,r2,r1
mov    r4,r1
strb   r3,[r11,#CRC16_hi_b]
strb   r4,[r11,#CRC16_lo_b]
pop     {r4,r3,r2,r0,pc}

```

Appendix3- CRC calculation in Atmel ATmega assembly language.

```

-----
; Beginning of test program
-----
Test:   call    inits
        ldi    r16,#0x12
        CALL   CRC_Update3 ;
        ldi    r16,#0x34
        CALL   CRC_Update3 ;
        ldi    r16,#0x12
        CALL   CRC_Update3 ;
        ldi    r16,#0x00
        CALL   CRC_Update3 ;           ;CRC = 8ABB
        jmp    Test                   ;Loop indefinitely for test

Inits:  ldi    r16,0x00                 ; Preload the CRC Registers with 0x00
        sts    CRC16_HIGH, r16
        sts    CRC16_LOW, r16
        ret

CRC_Update3:
        lds    r17, CRC16_HIGH
        eor    r16, r17
        sts    INDEX, r16
        andi   r16, 0xf0
        lds    r17,index
        swap   r17
        eor    r16, r17
        sts    index, r16
; High byte
        andi   r16, 0xf0
        lds    r17, CRC16_LOW
        eor    r16, r17
        sts    CRC16_HIGH, r16
        lds    r17, index
        rol    r17
        lds    r17, index
        rol    r17
        lds    r16, CRC16_HIGH
        eor    r16, r17
        sts    crc16_high, r16
        andi   r17, 0xe0
        lds    r16, crc16_high
        eor    r16, r17
        sts    crc16_high, r16
        lds    r16, index
        swap   r16
        sts    index, r16
        eor    r17, r16
        sts    crc16_low, r17
        ret

```




5) Command 14 Read Door Status As appears in Bray Macro	\$0200001452B5\$03	or	\$02000014FFFF\$03
6) Command 15 Change Reader Address As appears in Bray Macro	\$020000151234BB55\$03	or	\$020000151234FFFF\$03
7) Command 16 Set System Response Example – Set to Normal As appears in Bray Macro	\$0200001600A9D5\$03	or	\$0200001600FFFF\$03
Example – Set to Poll only As appears in Bray Macro	\$0200001601B9F4\$03	or	\$0200001601FFFF\$03
8) Command 17 Change Password Example 1, change from 0000 to 3333 As appears in Bray Macro	\$0200001733339005\$03	or	\$020000173333FFFF\$03
Example 2, Change from 3333 to 0000 As appears in Bray Macro (Still logged in!)	\$020000170000C6F3\$03	or	\$020000170000FFFF\$03

Appendix6 - Error Messages

Err1	External Beeper Connection Problem Detected If the Reader Model has an External Beeper connection the beeper has been disabled due to a possible external short. The reader will continue without beeping.
Err2	Current Overload Detected The reader has detected a high current and will close down and restart.
Err3	RF High Voltage Detected The reader has detected an RF high voltage. This may be due to the proximity of metal works or another nearby reader. The reader will close down and start again.
Err4	RF High Current Detected The RF circuits are drawing high current. The reader will incrementally reduce RF power over a period of time until RF current is acceptable.
Err5	Memory Problem Detected The system has detected a CRC error on its firmware. This can be caused by a reader failure, X rays, neutrino bombardment, lightning, laser cannon or tampering. If the message is repeated contact the vendor.
Err6	Amplifier High Volt Condition Detected One of the internal amplifiers has a fault condition
Err7	Amplifier Low Volt Condition Detected One of the internal amplifiers has a fault condition.
Err8	Tuning at High Limit Warning The reader is probably too near substantial metal fixtures.
Err9	Tuning at Low Limit Warning The reader is probably too near substantial metal fixtures.

Appendix6 - Information Messages

Poll Address and Poll Password reset to 0000 - (Restarting reader now).

The message received after a user 'RESET' command is used. The address and password have been reset to '0000'