



SED-901 Blackwater Series Hand Held Wiegand or Cardax System Oct 2019

**WARNING: PLEASE READ
INSTALLATION INSTRUCTIONS
FIRST**

PRODUCT WARRANTY

This product is covered by a 12 month, **back to base warranty** from date of purchase, and proof of purchase should be supplied. The warranty does not cover damage that has resulted from the improper installation or improper use of this product. The warranty does not cover lightning damage, product misuse, electrical surges or acts of God.

LIMITATION OF LIABILITY

Sec Eng Systems Pty Ltd does not accept any liability for the loss or damage to property or persons in relation to goods supplied. This disclaimer is only limited to the warranty **of the goods supplied and the intended use.**

NOTE: THIS MANUAL IS SUBJECT TO COPYRIGHT

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PLEASE READ FIRST

Do's and Don'ts of installing the SED-901 System

- 1. Always install the supplied SED-901 antennas outside.**
- 2. The antennas must be installed at least 3 metres away from any other antenna or transmitting device.**
- 3. If installing multiple SED-901 systems in one location, call Sec.Eng Systems for assistance on how to best configure.**
- 4. The SED-901 system supplied is ready to use out of the box - No programming required.**

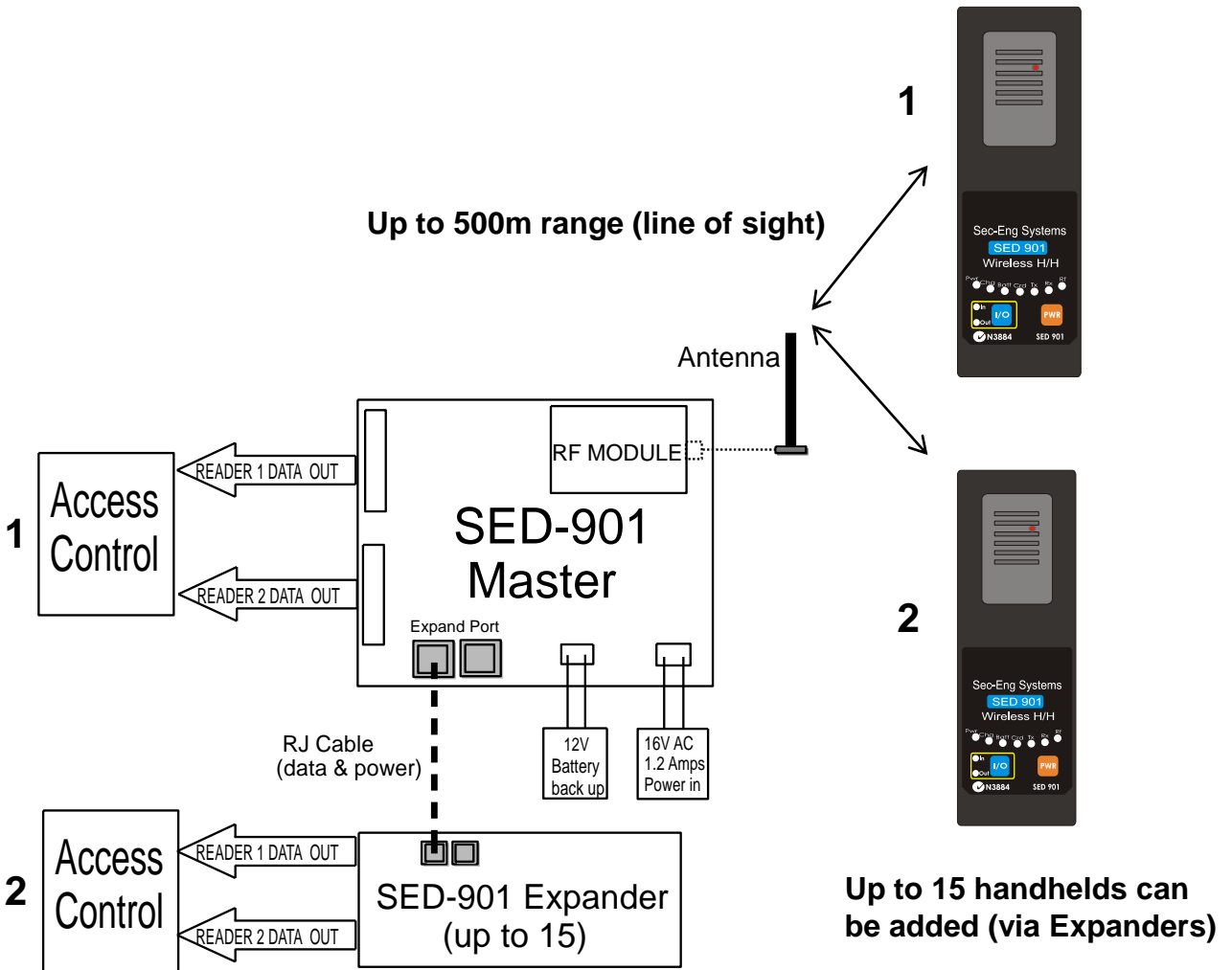
Failing to follow the installation instruction may void the warranty of the system.

SYSTEM OVERVIEW

The SED-901 is designed to allow a wireless reader to operate back to a Master control station, and provide Wiegand or Cardax data signal via 900MHz radio link.

The SED-901 Master can provide 2 outputs that are selectable from the handheld. This allows the presented card to be directed to the Reader 1 (IN) or Reader 2 (OUT) ports on the Master control unit.

The system can be expanded to allow for additional handhelds to operate on the same radio link.



QUICK INSTALLATION GUIDE

The SED-901 Handheld and Master/Expander have been factory programmed and tested.

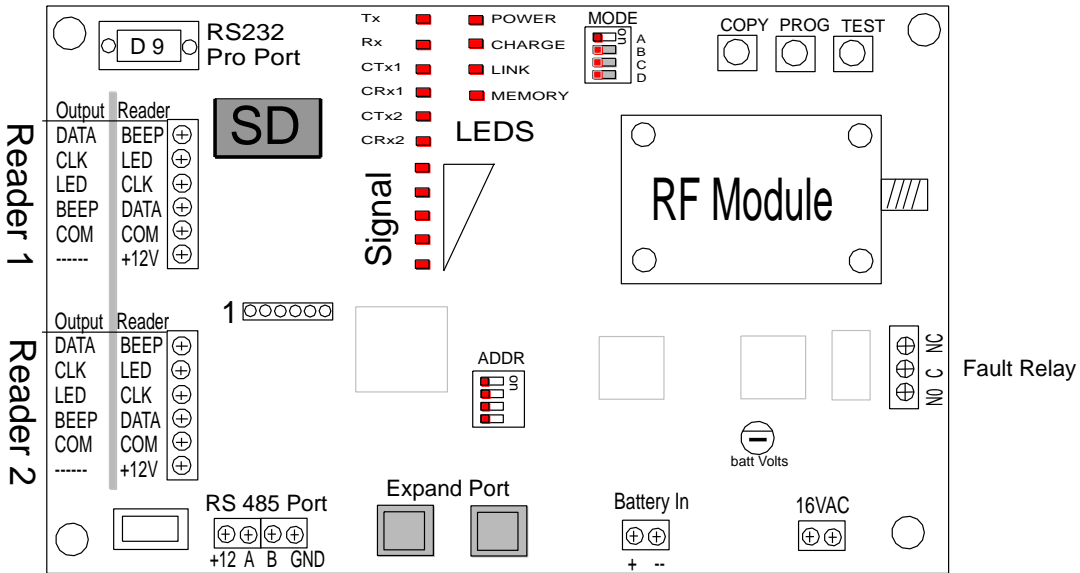
Installation is a simple **PLUG & PLAY** - there is no programming required.

1. Wire the Reader ports on the Master to the access control system (use the **OUTPUT** legend on the Master board, see page 9-10)
2. Fit the supplied antenna and connect power to the SED-901 Master (16V AC plug pack supplied or external 12V DC source, see page 6).
3. Power up the SED-901 Handheld by pressing and holding the PWR button for 3 seconds.
4. Check that a link has established between the Handheld and Master:
 - Rf** LED on Handheld should be green.
 - Link** LED on Master should be on.
5. Test the card reader with a working access card.

SEE FOLLOWING PAGES FOR DETAILED INSTALLATION INSTRUCTIONS

SED-901 MASTER BOARD

BOARD TERMINAL CONNECTIONS



AC Power in

16VAC = 16V AC 1.5Amps

Battery in

+BAT- = 12V 7AH gel cell / SLA backup battery

RS 485 Port

+12 = for input or output devices or 12V DC power input.

A = data (not used)

B = data (not used)

COM = Common

Fault Relay

Used for RF signal status. The relay is active if a Handheld is within RF range and is linked to the Master unit.

DB 9 Serial

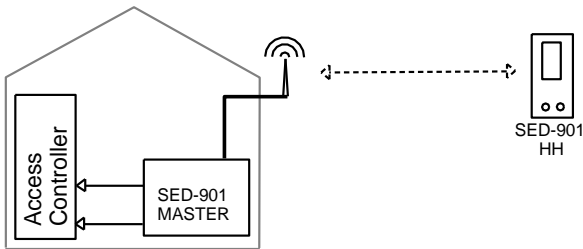
for PC configuration (See page 14)

EXP PORT (RJ12)

Used to link the SED-901 Expander units (See page 8)

ANTENNA INSTALLATION

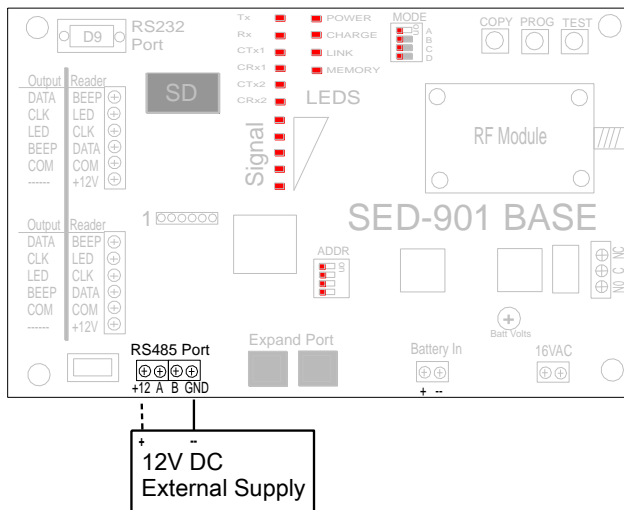
It is recommended that the antenna is mounted on the outside of the building and in clear line of sight of the SED-901 Handheld. The antenna should be mounted as high as possible and free of any obstruction. Doing this will ensure best possible operational range. The system is supplied with a mounting bracket and a 5m antenna extension lead.



EXTERNAL DC POWER SUPPLY - 12V DC

The SED-901 Master unit can be powered from a 12V DC external source. Please note: once the board is powered this way, the battery backup charging will be no longer operate.

- Connect a filtered 12V DC source to the power rail on the RS485 port.
- Do not fit the backup battery and AC to the standard inputs.



EXTERNAL DC POWER SUPPLY - 24V DC

The SED-901 Master unit can also be powered from a 24V DC external source. The filtered 24V supply is connected to the same 16V AC terminal. Please note: Battery back up charging will still operate when the system is powered this way.

MASTER LED INDICATORS

POWER= Power on

CHARGE = Indicates battery charging (if fitted)

LINK = Indicates if RF link is established

MEMORY = Indicated SD card fitted (not used)

TX = Packet being transmitted

RX = Packets being received

CTX1= Reader 1 (IN) transmitting data

CRX1= Reader 1 (IN) receiving data

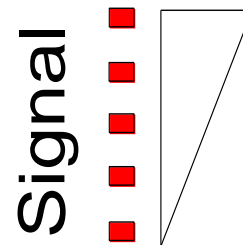
CTX2= Reader 2 (OUT) transmitting data

CRX2= Reader 2 (OUT) receiving data

Signal LEDs = 1-5 signal level (low to high)

TX	■	■	POWER
RX	■	■	CHARGING
CTX1	■	■	LINK
CRX1	■	■	MEMORY
CTX2	■		
CRX2	■		

LEDS



MODE DIP SWITCH (TOP OF BOARD)

Switch 1: ON = Master OFF = Remote

Switch 2: ON = Cardax systems OFF = Wiegand systems

Switch 3: Not used

Switch 4: ON = Program mode via serial port(115.2k 8-N-1)

 OFF = GPS port data mode where fitted output (9600 8-N-1)

ADDRESS DIP SWITCH (MIDDLE OF BOARD)

Used for Expanders addressing, see page 8

PUSH BUTTON SWITCHES

COPY = Not used

PROG = Used to enroll a Handheld (see page 19)

TEST = Used to enroll a Handheld, as well as test the Handheld

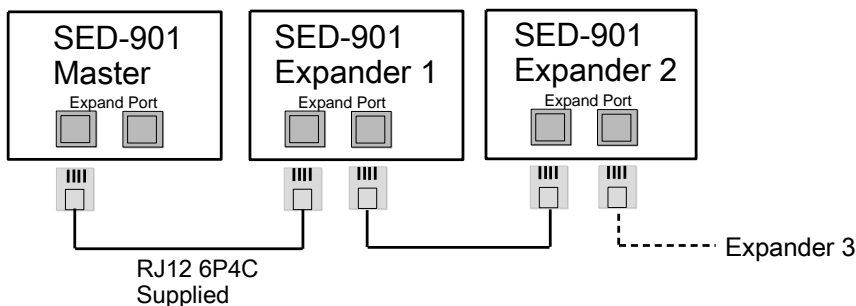
SED-901 EXPANDER SET UP

The Expander units allow for additional handhelds to be added to the system and operate on the same radio link as the Master. A Master unit can support up to 15 Expanders.

To set up an Expander, follow the steps below:

1. Power down the SED-901 system down while installing the Expander
2. On the Expander Mode DIP switch, ensure Switch1 = ON
3. Set the Address DIP switch according to the number of Expanders connected off the Master unit. See below.
4. The Expander gets both power and communications through the RJ12 cable. Only use the cable supplied by Sec.Eng System.
5. If a Handheld isn't already linked to the Expander, It can be re-enrolled by following the instructions on page 19.

NOTE: When any of the DIP switches are changed the entire SED-901 system must be power cycled for it to take effect.



Expander dip switch Address settings									
ADDR switch	1	2	3	4		1	2	3	4
Expander 1	ON				Expander 11	ON	ON		ON
Expander 2		ON			Expander 12			ON	ON
Expander 3	ON	ON			Expander 13	ON		ON	ON
Expander 4			ON		Expander 14		ON	ON	ON
Expander 5	ON		ON		Expander 15	ON	ON	ON	ON
Expander 6		ON	ON						
Expander 7	ON	ON	ON						
Expander 8				ON					
Expander 9	ON			ON					
Expander 10		ON		ON					

ACCESS CONTROL CONNECTIONS

Note: The SED-901 Base board has dual markings for Master and Remote systems applications. Use the **OUTPUT** markings for connection to the access control system.

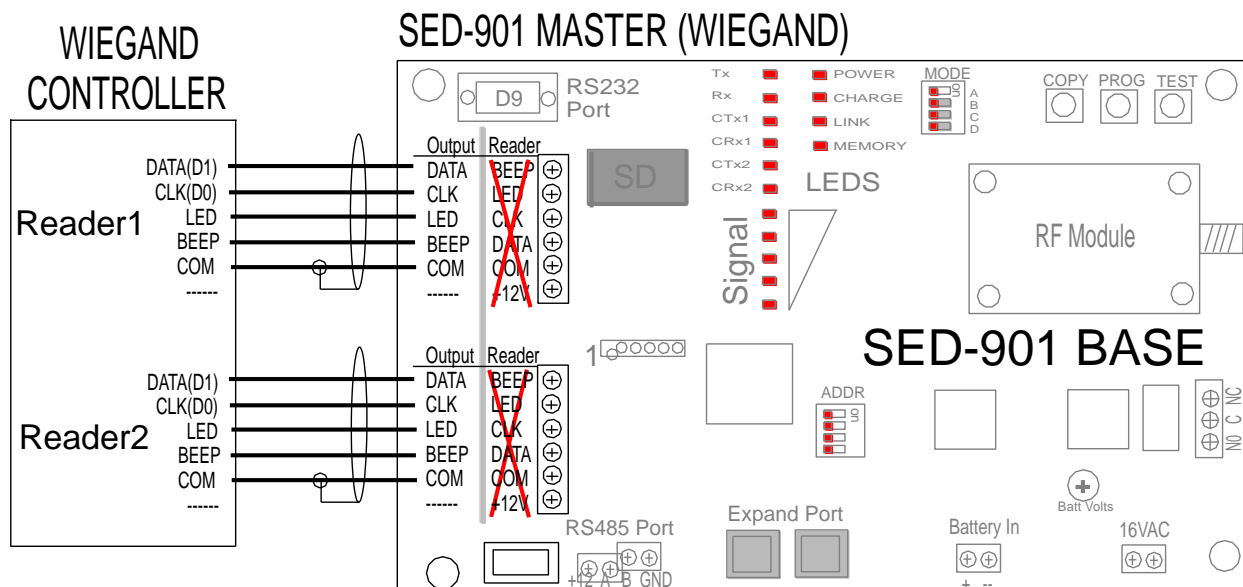
FOR WIEGAND SYSTEMS:

MODE DIP SWITCH (top of board): **Switch 2 =OFF**

SED-901 Output

Connections to access control system

- DATA -----To Wiegand controller DATA / D0 (GREEN)
- CLK -----To Wiegand controller CLOCK / D1 (WHITE)
- LED -----To Wiegand controller LED (BROWN/ORANGE)
- BEEP -----To Wiegand controller BUZZER (YELLOW)
- COM -----To Wiegand controller GND or COMMON (BLACK)
- +12V -----Do not connect

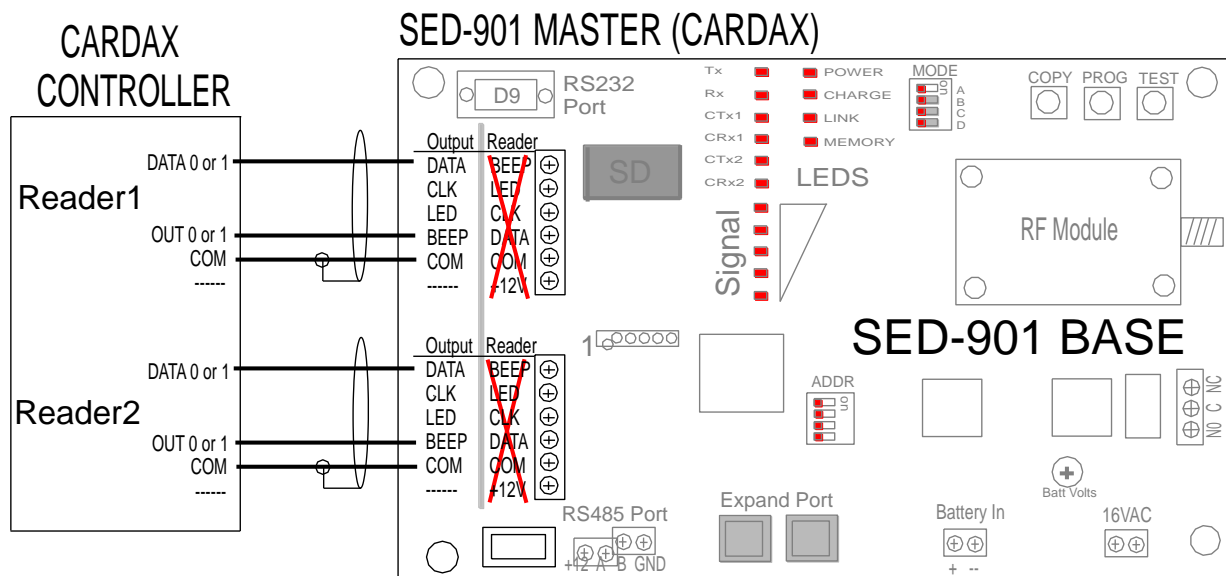


IMPORTANT: If using the SED-901 system on a Gallagher controller with a Wiegand reader adaptor, or a Wiegand system which does not use the standard logic levels of 0-5V, then 2.2kΩ pull up resistors must be fitted on the Master/Expander between the Clock and 12V terminals, as well as Data and 12V terminals.

FOR GALLAGHER / CARDAX SYSTEMS:
 MODE DIP SWITCH (top of board): **Switch 2 =ON**

IMPORTANT: The SED-901 Master/Expander must be connected to the G BUS of the Gallagher controller. (H BUS is not supported)

- | | |
|-----------------------|--|
| SED-901 Output | Connections to access control system |
| DATA ----- | To Cardax Controller DATA 0 or 1(WHITE) |
| CLK ----- | Not used |
| LED ----- | Can be used to trigger internal buzzer on Handheld |
| BEEP ----- | To Cardax Controller OUT 1 or 2(BLUE) |
| COM ----- | To Cardax controller GND or COMMON (BLACK) |
| +12V | Do not connect |



SED-901 HANDHELD SET UP

HANDHELD OVERVIEW

The SED-901 Handheld features a number of LEDs on the front that provide the user with information on the current status of the system.

This includes the RF LED which indicates the radio link status back to the base Master/Expander.

HANDHELD LEDES

- RF LED** **GREEN (constant)** = Full signal
GREEN (fast flashing) = Medium signal
GREEN (slow flashing) = Poor signal
RED (flashing) = No signal
 OFF= Handheld Radio system is off
- RX LED** **GREEN** = indication that the unit is receiving data
- TX LED** **GREEN** = indication that the unit is transmitting data
- CRD LED** **GREEN (constant)** = indicates when the Handheld is sending card data to Master/Expander
GREEN (double flash) = GPS is enabled and has a GPS lock (optional feature).
- BATT LED** **when unit is running on battery**
GREEN (flash every 10 seconds) = Battery OK
RED (flashing) = Battery low
- CHG LED** **GREEN (fast flashing)** = Charging
GREEN (flash every 5 seconds) = Battery fully charged
RED (flashing) = Battery fail or removed
- PWR LED** **when charger is connected**
GREEN (constant) = Voltage from charger is OK (24V DC)
GREEN (flashing) = Voltage from charger is low (less than 24V DC)
- In/Out LED** Show the reader port on the Master/Expander currently selected for sending out the card data.



POWERING ON

Press and hold the **PWR** button for 3 seconds until the **Tx**, **Rx** and **Rf** LEDs come on with a single beep. Once this has occurred release the button and the Handheld will stay on.

POWERING OFF

Press and hold the **PWR** button for 3 seconds. When the beeper sounds release button and the Handheld will power off.

Note: If the Handheld is not in use, it will automatically power off after 1 hour (default setting).



SELECTING IN/OUT PORT

Press the **I/O** button to toggle between the IN or OUT position. When the IN position is selected the card data will be directed to the Reader1 port on the Master and when OUT is selected it will be directed to the Reader2 port.

Note: Upon powering up the Handheld, the I/O button will be on the port last selected.

LOCKING THE IN/OUT PORT

The I/O button can be locked in a particular position by the user to avoid accidental changes. This can be done in 2 ways:

- Connecting to the Master to a PC via the serial port and setting this (see page 14 - 16)
- On system version 2.17 or newer this can be set by pressing PWR and I/O buttons in a set combination:
 1. With the Handheld powered on, press the power buttons 10 times. The I/O LED will start to alternate between the two positions to indicate it is in the setup mode.
 2. Press the I/O button so that the LED is in the desired I/O position. After a few seconds the handheld will timeout from the setup mode and lock the button in the last set position.

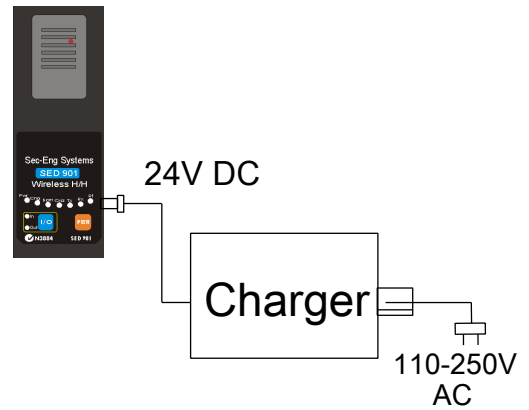
Note: To unlock the I/O button (normal operation) do not press the I/O button during step 2 or default the handheld (see page 18)

HANDHELD BATTERY CHARGING

To charge the Handheld connect the supplied 24V DC charger to the barrel plug on the right hand side of the handheld.

Only the Sec-Eng System supplied charger must be used.

The handheld battery will take about 3 hours to charge from a flat battery.



The system does feature a charging circuit that will monitor for any issues while attempting to charge, as well as disconnecting the charger when the battery is full.

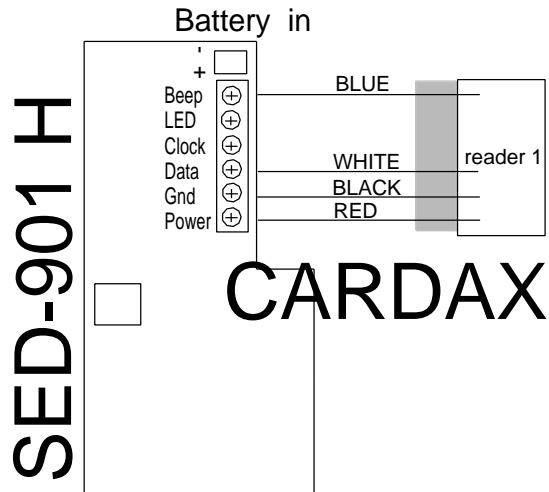
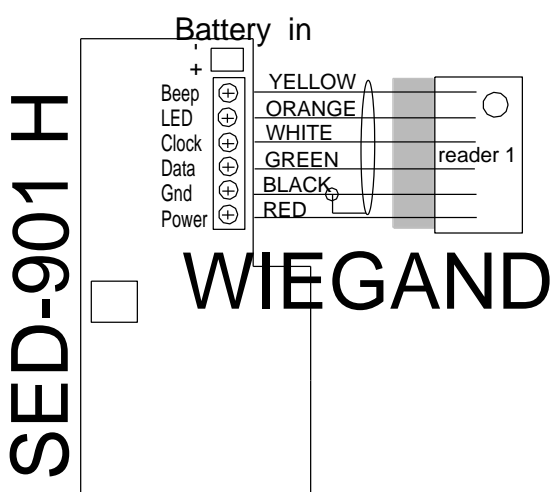
To best maintain the battery pack life, leave the handheld and connect to the charger when not in use.

Note: For firmware version 2.17 and onwards, when the charger is connected the radio link will be disabled (Rf LED will be off) to allow the handheld to charge at a faster rate.

To turn on the radio link while charging, press and hold the **PWR** button for 3 seconds. The Rf should return to a green linked status.

Use the **Chg** LED to check the charging stats of the handheld.(see page 11)

HANDHELD CARD READER WIRING DIAGRAM



CHANNEL = * [0 to 9] Default = 4

This sets the operation radio channel. You would only change this if you have more than one Handheld and base operating in the same area.

To change type **channel=1-9**.

If you do this, you must power cycle both the Handheld and Master. You will need to re-enroll the Handheld - see page 19

SCAN START = * [0 to 9] Not used, DO NOT CHANGE

SCAN END = * [0 to 9] Not used, DO NOT CHANGE

SLEEP TIME = * [0 to 600] Default =0**

This allows the Handheld to conserve power by going into sleep mode after a period of time in seconds. This would be used in conjunction with the move wake feature.

To change type **sleep time=1-9**

MOVE WAKE = * [0 to 9] Default =0

This feature will reset the shutdown and sleep timer by the measuring movement in any direction . 1 being least sensitive and 9 being the most sensitive. We suggest you use 5.

To change type **move wake=1-9**

OFF TIME = ** [0 to 3600] Default = 3600 seconds (1Hr)**

This sets the Handheld to power off if it is not in use after a period of time.

To change type **off time=0-3600**

GPS RATE = ** [0 to 3600] seconds**

This is used if the Handheld has a GPS chipset fitted (optional). This sets the update rate in seconds to be fed to the serial port on the Master at 9600 baud (Mode Dip switch 4 must be off).

To change type **gps rate=0-3600**

GPS ID = *** [0 to 999999]**

This is used if the Handheld has a GPS chipset fitted (optional). This will send the following message in a comma.

To change type **gps id=0-999999**

E.G. Delimited format GPS,223344,3401.8617,S,15107.2323,E,1,04 out the serial port of the Master at 9600 baud.(Mode Dip switch 4 must be off)

Type **GPS UPDATE**

This will indicate the most update GPS location.

BATTERY = * [0 or 1]

This feature enables battery diagnostic mode and is only available in this configuration mode.

To change type

battery=0 for diagnostics off

battery=1 for diagnostics on

IN/OUT mode = * [0 or 1 or 2] Default =0

This feature is used to Lock the in/out button on the hand held some clients require a handheld to be dedicated to in or out

To do this type

In Out mode=0 for normal button operation

In Out mode=1 for locked on IN

In Out mode=2 for locked on OUT

LED MODE = * [0 or 1]

This allows for the output of the LED terminal on the Handheld to be inverted as some card readers only having one LED mode.

To change type **led mode=1 or 0**

FAULT FINDING GUIDE

COMMUNICATION ISSUES

No data received at access control system

- Test the access control system by wiring a card reader directly.
- Check the wiring between access system and Master/Expander (must be wired to the correct legend – OUTPUT).
- Check the Com terminal on Master Reader1/Reader2 is wired to access system.
- Check D1(Clock) and D0(Data) are wired in the correct orientation.
- Check the handheld is in the correct I/O button position:
IN= >Reader 1 OUT=>Reader 1
- For a Weigand system, check that it operates on the standard 0-5V logic (measure the voltage between Data (D0) and common).

If it lower than 5V then pull up resistors will need to be fitted on the Master/Expander Output terminals. Fit a 2.2k Ω resistor between the CLK and 12V terminals and a 2.2k Ω resistor between DATA and 12V terminals.

Data went through but no LED or Beeps by the reader

- Check wiring for Buzzer/Beep and LED outputs between the Master/Expander and access system.

Data duplicating 4 times at the access system

- Check wiring for Buzzer/Beep between the Master/Expander and access system.

HANDHELD ISSUES

In/Out port not changing when pressing I/O button on Handheld.

- The system has the ability to lock the I/O button in a fixed position. See page 12 on how this is done.

Handheld not holding charge

- The battery pack does have a life of about 1000 full charge cycles. Allow the handheld to charge for 4 hours on the Sec.Eng Systems supplied charger and check the status of the Chg LED. See page 11.

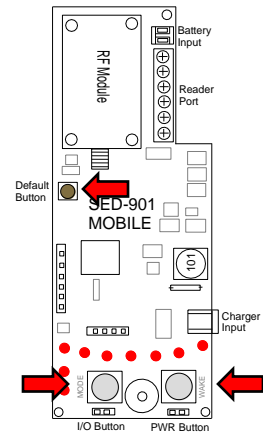
DEFAULTING THE HANDHELD

By defaulting the handheld all settings will be reset and the handheld will need to be re-enrolled with its Master/Expander base unit.

To default:

1. Open the handheld front cover by removing the 4 x Philips screws on the back. This is to allow access to the internal Default button on the PCB.
1. Connect the Handheld to the charger. (Handheld must be on charge to default)
2. Press and hold all 3 buttons on the handheld PCB (I/O, PWR and Default buttons) for 3 seconds.
3. Once the handheld resets, release the buttons and it will now be defaulted.

Note: see page 19 on re-enrolling the handheld with its Master/Expander.



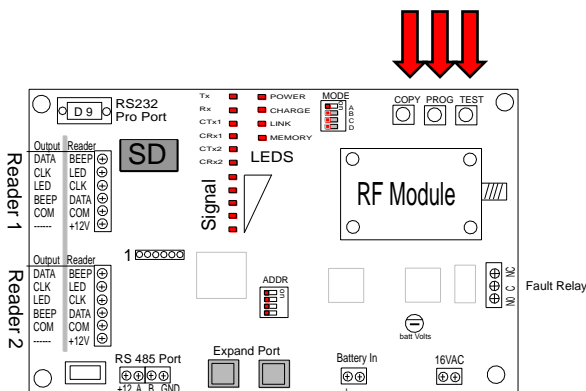
DEFAULTING THE MASTER/EXPANDER

By defaulting the handheld the I/O buttons setting will be reset and the handheld will need to be re-enrolled with its Master/Expander base unit.

To default:

1. Open the handheld front cover by removing the 4 x Philips screws on the back. This is to allow access to the internal Default button on the PCB.
2. Connect the Handheld to the charger. (must be on charge to default)
3. Press and hold all 3 buttons on the handheld PCB (I/O, PWR and Default buttons) for 3 seconds.
4. Once the handheld resets, release the buttons and it will now be defaulted.

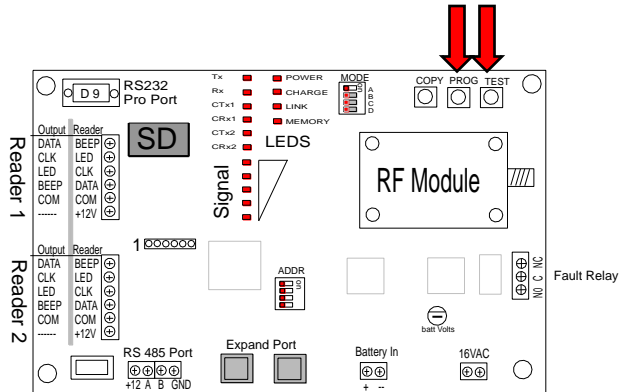
Note: Do not default two Master units that are within RF rang as the defaulted System ID will cause interference between the two transmitting units. See page 14 to change the System ID.



RE-ENROLLING HANDHELD AND MASTER UNIT

To Enroll Master or Expander:

1. Press and hold the PROG and TEST buttons on the Master/Expander unit. Once the signal LED starts scanning up and down, the buttons can be released - the unit will now be in learn mode.



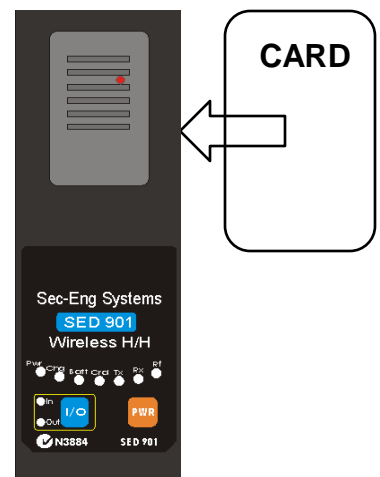
To Enroll 901 handheld:

2. With the Handheld powered on, press and hold the IN/OUT button and then press the power button 5 times rapidly. All the LEDs on the front will scan and the unit will auto enroll to the Master/Expander within 30 seconds
3. Power cycle the handheld and test with a card.



TESTING

1. Ensure the SED-901 Master/Expander is wired into the access control system, and is powered up with the Link LED on.
2. Ensure the SED-901 Handheld is powered on and the RF LED is green.
3. Present a valid card to the reader on the Handheld. The reader will beep and transmit card data across to the Master/Expander, which will then present this data to the access control system. LED and buzzer information will be send back to the Handheld just like a wired reader.



TECHNICAL SPECIFICATIONS

- Radio Frequency operational: 915-928 MHz
- Radio Transmit power: 1-1000mW
- Radio Security encryption: 128 AES key coded (key design classified)
- Operation Rang: 500 metres (line of sight)
- Handheld Battery: NICKEL METAL HYDRIDE (Ni-MH)
12V 2000mA with inline thermal protection
- Handheld Charge Time: 3 Hours
- Handheld Standby Time: 10-15 Hours (card reader dependent)
- Handheld Charger: Input =110V-240V AC Output=24V DC 2.5A
- Handheld IP rating: IP54
- Handheld dimensions: 197 x 66 x 40mm (Housing)
- Master power pack: Input =230V-240V AC Output=16V AC 1.5A
- Master/Expander dimensions: 100 x 80 x 20mm (Housing)
- Australian Compliance: RCM Certified.



RADIO MODULE DECLARATION OF CONFORMITY

MANUFACTURER'S NAME: Max Stream Inc. (DIGI INTERNATIONAL)

ADDRESS: 355 South 520 West Suite 180 Lindon, UT 84058. USA.

LABORATORIES: UltraTech EMC Labs Inc. {ITI (UK) accredited test facilities}

3000 Bristol Circle Oakville, Ontario, Canada L6H 6G4

EQUIPMENT TYPE / ENVIRONMENT: Radio Communications Equipment

TRADE NAME / MODEL NO.: 9XTEND, Model XT09 (XTP9B-DPS-721-revE)

GRANTEE'S NAME: Max Stream, Inc

RF OUTPUT POWER: 29.83 dBm e.i.r.p peak maximum

Tx FREQUENCY RANGE: 915 – 928 MHz

Rx FREQUENCY RANGE: 915 – 928 MHz

Emission Designation: 221K1F1D Duty Cycle: 100%

YEAR OF MANUFACTURE: 2005 COUNTRY OF MANUFACTURE: USA

STANDARD(S) TO WHICH CONFORMITY IS DECLARED: Australian/New Zealand Standard AS/NZS 4771:2000 – Technical characteristics and test conditions for data transmission equipment operating in the 900 MHz, 2.4 GHz and 5.8 GHz bands and using spread spectrum modulation techniques.