Newmark Technology

ParSec Reader

Installation & User Manual

Issue 7 June 2001

CHANGE RECORD			
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Describes the limits of the operating environment such as power consumption and temperature range, and gives dimension and weight details.

FCC Statement

These devices comply with part 15 of the FCC CFR 47 rules. Operation is subject to the following two conditions:

(1) These devices may not cause harmful interference, and

(2) These devices must accept interference received, including interference that may cause undesired operation.

The user is cautioned that modifications or changes to an intentional or unintentional radiator not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

CE Compliance

The reader has been tested and found to comply with the emission limits for access control devices as described in EN 50081-1: 1992, and immunity to EN 50082-1: 1992. These limits are designed to provide protection from harmful interference when the unit is operating in a commercial or residential environment. This equipment generates, uses, and can radiate radio frequency energy. If the unit is not installed and used as instructed in this manual, it may cause interference to radio communications.

Properly grounded and shielded cabling should be used for all incoming and outgoing connections to the reader and peripheral equipment.

UL Listing

The reader and tags are UL listed. UL294-access control unit accessory and UL1037- also suitable as an anti-theft device. To maintain listing, the reader shall be connected to UL Listed equipment.

Text Conventions

This manual uses the following symbols as shown.

Format or Symbol	Meaning
NOTE	A note which may have special importance.
 **TIP**	A technical tip which may help you to perform a certain task or operation with greater efficiency.
	An important note with information essential to proper system operation.
	Indicates a cautionary note. This contains essential information for avoiding damage to your system.

Important Warnings

"CAUTION"

Asset tags contain lithium batteries.

The PAT and SAT tag contain batteries which cannot be replaced or recharged! The WHOLE tag must be disposed of in the correct manor, and not discarded in normal office rubbish/trash. Contact your local authority for advice and information on the correct method for lithium battery disposal. The batteries used in this device may present a risk of fire or chemical burn if mistreated. Keep away from children. Do not recharge, disassemble, heat above 100deg. C (212deg. F), or incinerate. Replace battery in the personnel tag type PET with VARTA type CR2430 or equivalent. Use of another battery may present a risk of fire or explosion.

To maintain UL listing, connect to a UL listed 12Vdc burglar Alarm power supply .

To maintain UL listing, the 5Vdc reader output **should not be used**

Some devices used within the ParSec reader are sensitive to static electricity. Anti-static precautions ***must be taken*** when handling the printed circuit boards. Static discharge may permanently damage the circuit boards. Damage may not be immediate, but may affect the life of the circuit board.

Chapter 1

Overview

The ParSec reader is a long range RF receiver used in conjunction with ParSec active Portable, Static Asset and Personnel Tags (PAT, SAT and PET). The ParSec system works on the basis of detecting and reporting the movement of tags within a protected area. Typical applications for the ParSec tagging system are control and tracking of portable, high value assets such as laptop computers or office equipment. ParSec portable tags can also be used with motor vehicles to provide a solution for car parking and barrier control. Static tags are designed for stationary assets and equipment such as works of art or desk top computers. The personnel tag is designed for hands-free access control and asset management applications.

Portable tag, (PAT) detection range can be adjusted via a hand held range adjustment device called a RAT to suit a particular application. This portable detection range can be adjusted from zero range up to 25m or more depending on the surrounding conditions and the environment. The Static Tag (SAT) range can not be adjusted, and is fixed to the maximum range possible within its environmental surroundings. Both PAT and SAT tags have a built-in tamper switch, which operates when the tag is removed. This tamper transmission is also fixed to the maximum possible range, and is not adjustable.

NOTE: The tags have been evaluated by UL, and operate at a distance of 60' (28m) without environmental disturbances.

The reader is available in two data output options, RS232 and Wiegand. The RS 232 option is designed to be used with a DDE (Data Display and Entry Panel) or a third party asset management software. Typically a chain of up to nine readers can be linked together to protect a large area or number of different areas within a building. See the DDE user manual UM016 for more information.

The Wiegand reader is used with Newmark's or a third party access control panel and system software.

As the reader has an on-board relay output which can be used to trigger an alarm, the reader can also be used in conjunction with a burglar alarm panel as a day-time alarm system.

All ParSec tags transmit at 418MHz using a power level which in the UK is MPT1340 license exempt by the DTI. Asset tags for the USA market meet FCC part 15 rules.

All tags and readers are CE approved and comply with the European EMC directives. They are also UL294 and UL1037 approved (Access control and burglar alarm system accessories).

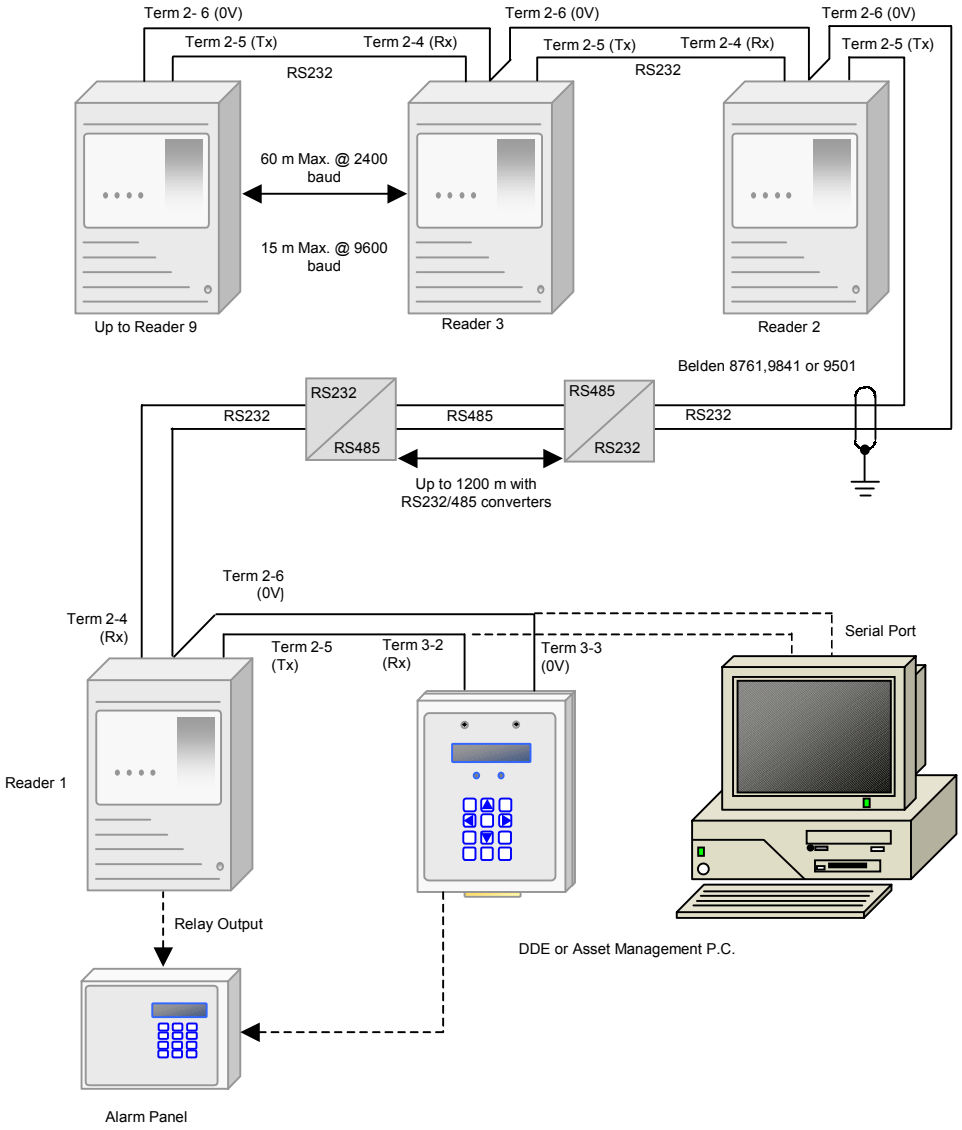


Figure 1.1 RS232 System Diagram (Has not been evaluated by UL).

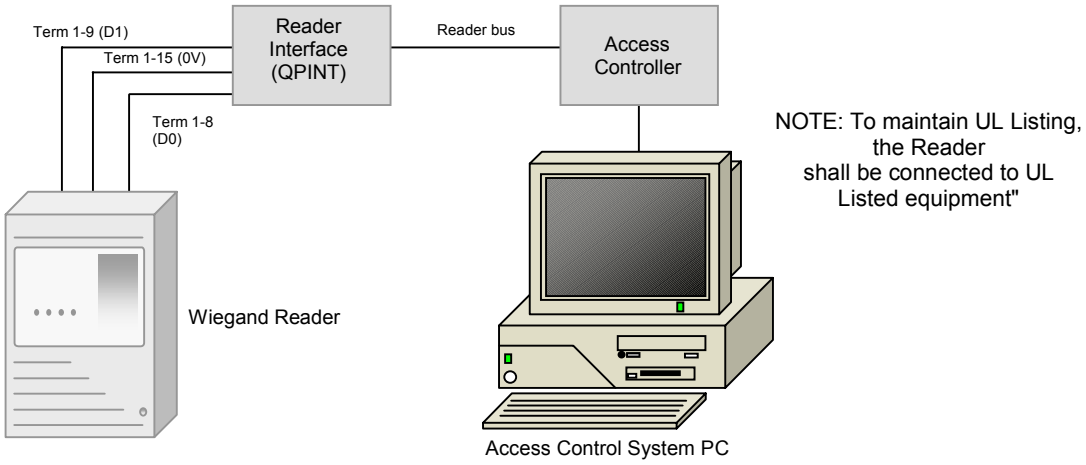


Figure 1.2 Wiegand System Diagram

Chapter 2

Physical Reader Description

Reader Construction

The reader consists of a two part plastic enclosure. The base section provides mounting holes, cable entry point and a knockout, whilst the lid provides protection and security to the internal electronics. The reader contains two main printed circuit boards (PCB's), mounted one above the other. The top LOGIC PCB, which contains the radio receiver, micro-processors and the communication circuitry. The lower BACKPLANE PCB consists of termination connectors, power supply circuitry and input voltage protection diode, fuse. and an alarm relay. On UL approved reader models an additional surge protection PCB is attached to the backplane PCB. This is pre-wired to the backplane PCB and has the user connection terminals located on the top edge. (See figure 2.1).

The LOGIC PCB is electrically connected to the BACKPLANE PCB via two terminal strips and mechanically secured in two locations. All reader set-up adjustments and configuration are performed on this top circuit board.

This method of construction enables quick replacement of the logic PCB for maintenance/repair purposes. It also makes it possible to physically mount and wire the reader prior to system configuration and commissioning (First - Fix).

The reader front cover is normally fixed with a standard M3 x 12mm long cross-head screw, which may be replaced with either a security or “Torx” type screw. Newmark provide alternative screws with every reader. To use these alternative fixings you will need the following tools; “Torx” type TX10 screwdriver or a Newmark security driver (Part no. SS0001).

The front cover is removed by sliding it downwards. You will note removal of the front cover operates an internal anti-tamper switch, which may be used to trigger a local or remote reader tamper alarm.

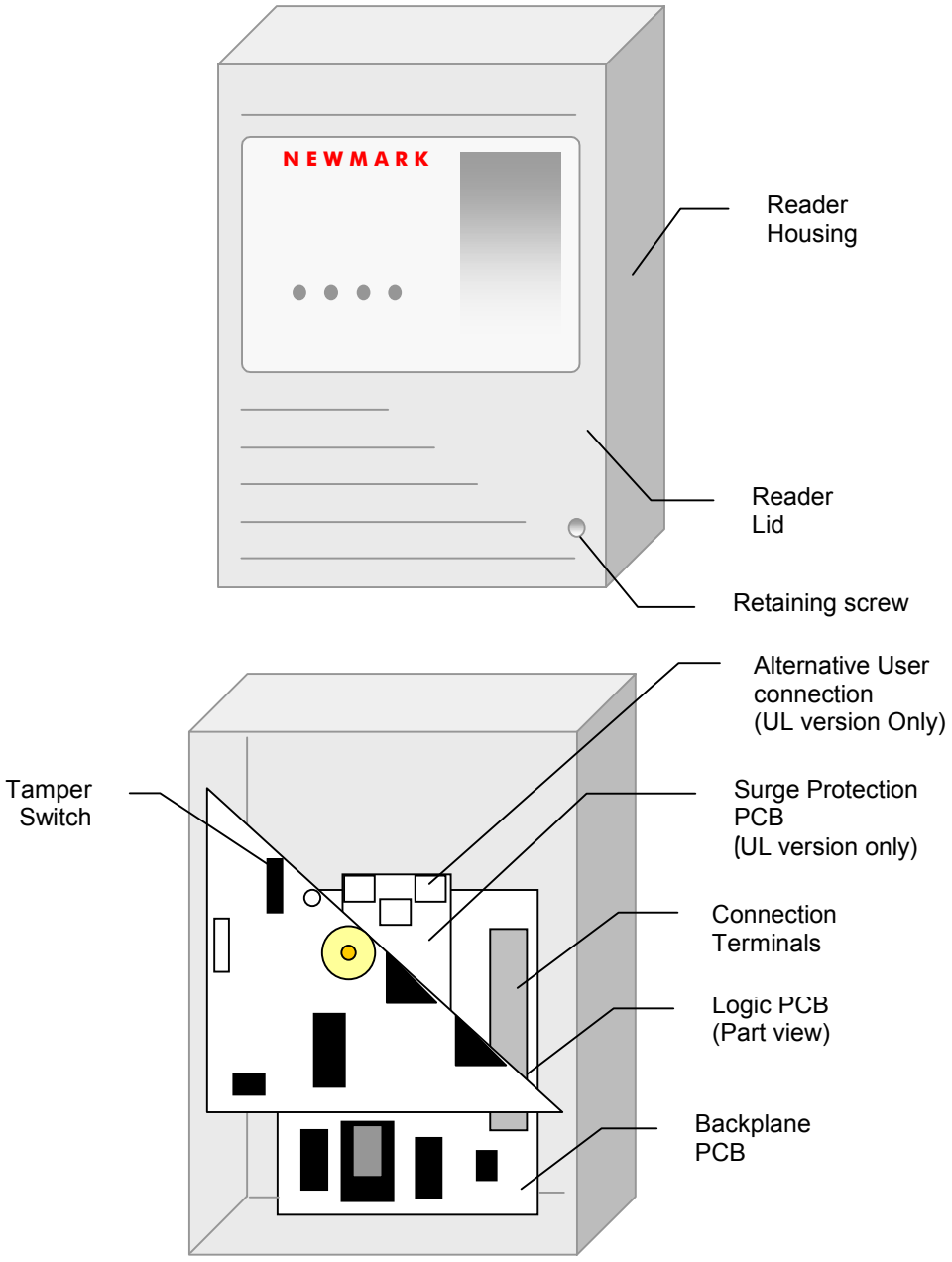


Figure 2.1 Reader Construction

Chapter 3

Typical Reader Siting

In common with all low power radio frequency based systems, ParSec Readers should be sited as far away as practicable from sources of electromagnetic interference.

TIP

It is essential that you test all readers temporarily mounted in their locations first as part of a site survey

The physical location chosen to site each reader will depend principally upon;

(1) The area of coverage required for Static Asset Tags -SAT's.
(2) The exit/entry points to be protected or monitored with Portable Asset Tags -PAT's and Personnel Tags -PET's (The PET has not been evaluated by UL).
(3) Environmental conditions. (See location and restrictions notes)

Most typical installations consist of interior readers used for monitoring tag tamper alarms only and perimeter readers at the entry & exit points, where a range is set to detect portable assets and/or personnel moving in or out of a protected area. For 'portal monitoring' with PAT's and PET's, the reader must be located to one side of the doorway, normally opposite the hinged side, about 1 meter above the floor. Due to the fact that the reader is located in close proximity to a tag whilst passing through the door, means that the reader range can be reduced and therefore made more reliable

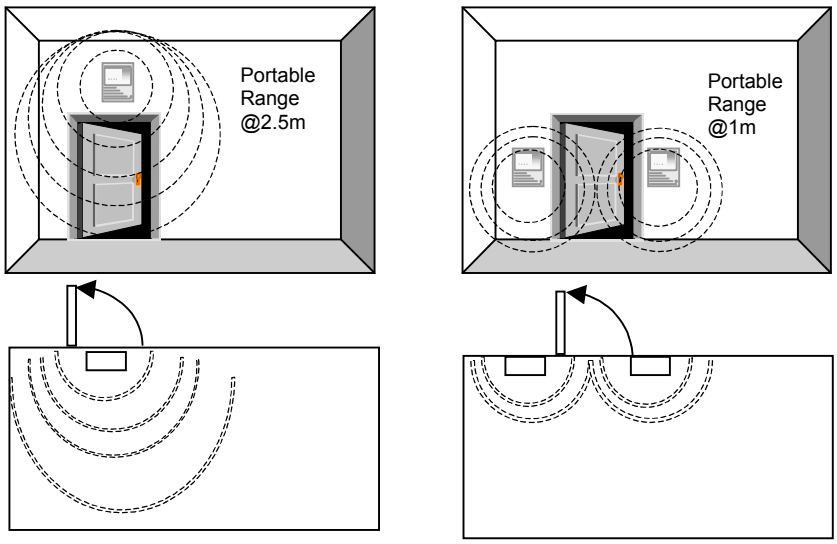


Figure 3.1 Portal Protection with one or two readers.

Although the reader can be located above a door the reader range would have to be increased to cover the extra elevated distance. Locating a reader above a door or suspended ceiling is not an ideal location. Because the reception polar pattern is spherical in shape, a single reader mounted above a door will have to have an increased range to cover the extra height. This increased range will also project forward into the room, and will false alarms as assets move freely about the office.

Where the system is used purely for monitoring unauthorized movement of static items protected by SAT's or for long range tag tamper alarms only, the reader may be mounted approx. 0.5m (1-2') below the ceiling and in the centre of a convenient wall. This will make best use of the polar pattern of the receiving antenna as shown in figure 3.2. In some cases it may be possible to locate the reader above a suspended ceiling. In these cases, it is essential to check that a SAT or PAT in tamper can be read in all the areas, rooms, stairwells, lift shafts etc. requiring protection. In a application where portable and static tags are used, the ParSec system can be split into a combination of portable and static protection readers. The portable range on the static monitoring readers can be reduced down to zero range to prevent false alarms as assets move freely about the protected area. Where large irregular areas need to be protected a number of RS232 readers on a chain or multiple Weigand readers can be used.

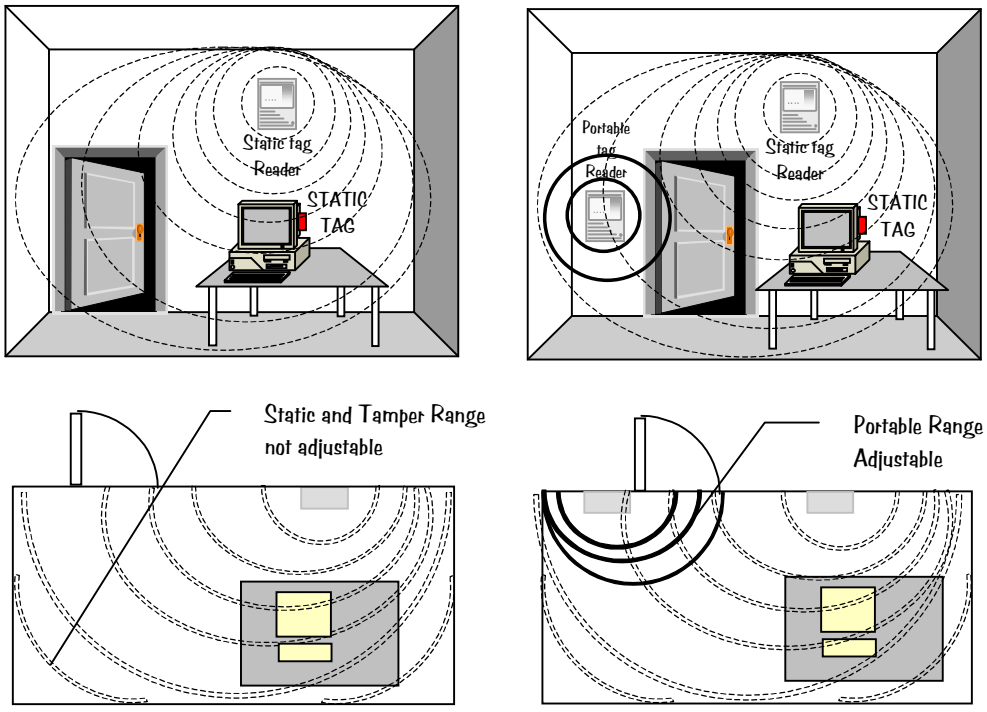


Figure 3.2 a Static Monitoring Figure 3.2 b Combination of Static & Portable Monitoring

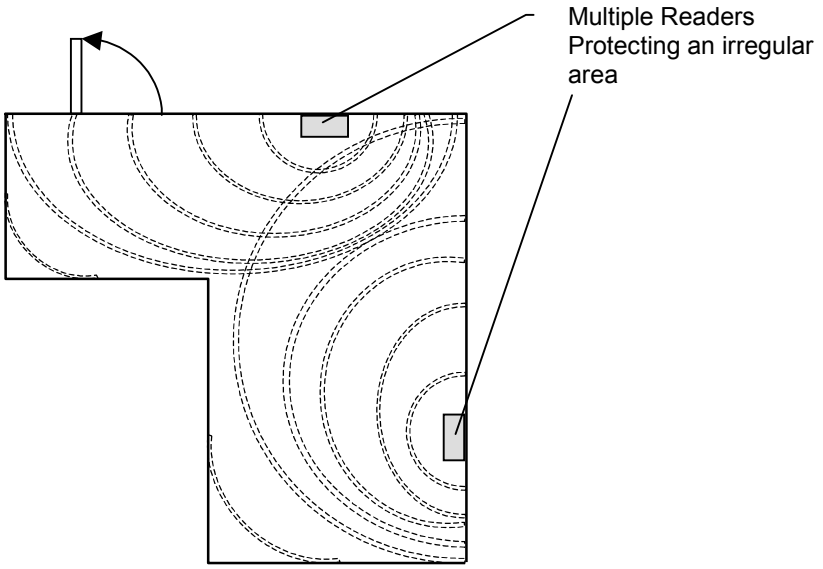


Figure 3.3 Protecting an irregular area using multiple readers

Reader Location & Restrictions

Here follows some helpful notes, diagrams and facts which you need to be taken into consideration when installing a ParSec system.

1) The reader antenna polar pattern (reception area) is strongest in front of the reader. Therefore the reader should be oriented front facing forwards for the best results.

2) Although the reader polar pattern is roughly spherical, the reader will have a reduced tag range from the rear.

3) The presence of steel girders, metal filing cabinets/office furniture, false ceiling supports and aluminum backed plasterboard within the structure of the building will cause RF reflections. This will produce reader blind areas and hot spots (areas of good and bad tag reception). If this occurs, it will be necessary to re-position the reader to an alternative location. This may be in some cases as little as 10cm (4") in one direction or another. Radio signals can often travel along corridors, down lift shafts and may even go round corners. Always test the reader temporarily in its intended location first to check that you obtain the best possible results.

4) The human body naturally absorbs radio transmissions. It is always good practice to mount two reader's either side of a portal to reduce the shielding effect the body will create

5) The reader is designed for indoor use and is not weather-resistant. **To maintain UL listing the ParSec system shall be used for indoor use only.** If a reader is to be mounted outside it must be housed in an all-plastic, suitably rated weather resistant enclosure , ideally IP65. Additional to this it is good practice to place a non-metallic rain shield above the reader as standing water around an enclosure seal can

sometimes be drawn into the enclosure when temperature changes form a vacuum within the box.

6) It is strongly advised that ParSec readers should not be mounted close to VDU screens, TV monitors or other sources of radio frequency emission. The minimum recommended distance is 1.5m (5') from a 15" VDU screen.

7) Never mount readers in metal enclosures.

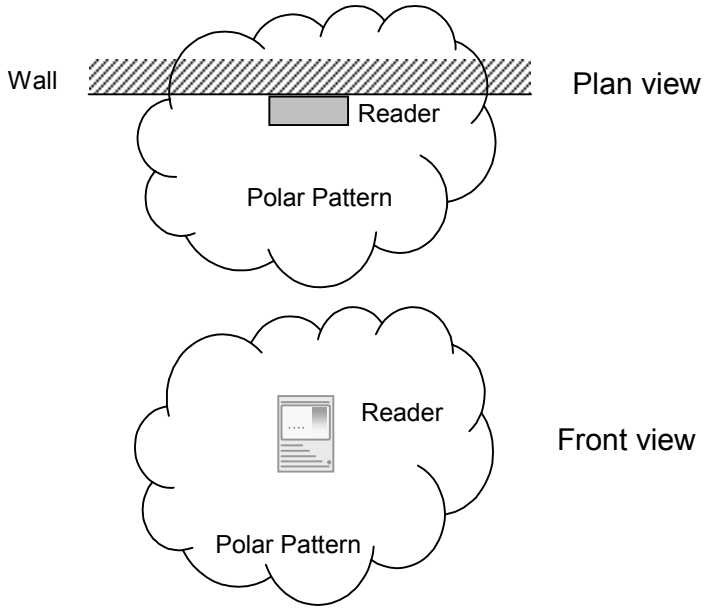


Figure 3.4 Reader Polar Pattern

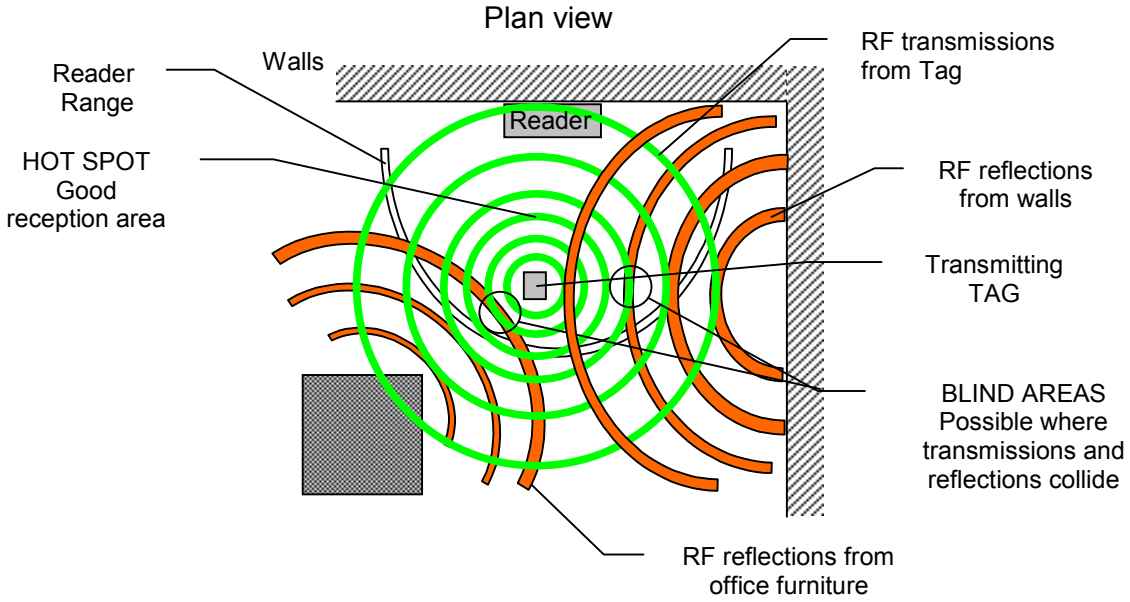


Figure 3.5 RF hot spots and blind areas

Site Survey

This part of the manual is the most important section and should be carefully read and understood before installing a ParSec system. This section will give you an insight into the reader performance and characterists along with information regarding the fine tuning of the reader range. The reader will have a factory pre-set range which has been selected to provide an average PAT/PET read range of 1-2m(6'-9'). It is best practice to mount the reader temporalorly when performing a site survey, as you may need to move the readers to acheive the best results.
NOTE: A tag attached to its asset may produce different range characteristics to that of a tag in free space. Therefore it is also important that you have an example of the exact asset you wish to protect with you whilst performing the site survey. Metallic assets will have an effect on tags and may reduce the PAT range by up to 75%. This includes all computers and laptops.

Tools

Before beginning you will need the following set of tools and equipment.

- An example of the intended asset
- A sample reader. (Pre-wired with flying data and power leads)
- A range adjusting Tag (RAT)
- A selection of sample tags. (PAT, SAT or PET).
- A 3 $^{1/2}$ digit multi-meter (DVM). Set to read up to 5Vdc.)
- A 12Vdc battery or plug top power supply.
- A small cross-head screw driver (Pozi-drive or Supa-drive)
- A small flat blade terminal screw driver.
- A M3 nut spinner or spanner
- A strong adhesive tape or non-metallic clamp (For affixing tags to assets)

Portable Tag Reader Adjustment

Reader range adjustment is achieved by adjusting the received signal strength threshold of the receiver circuit. This is performed by setting the reader into scan mode and by using the +ve an -ve buttons on the RAT to increase or decrease the threshold level. The reader also has four switches which may be used to increase the gain of the receiver and therefore provide greater range.

1) Connect the DVM to the top and bottom pins of the Molex header (PL2) on the left hand side of the Logic PCB.
2) Power up the reader. You will notice that a voltage reading between 0 & 5V will appear on the DVM. Zero volts represents minimum and 5V corresponds to maximum range.
3) Switch on your Tag (Switch 1) and affix it to the intended asset TEMPORARILY, so that the tamper switch is depressed. A suitable tape or non-metallic clamp may be used to affix the tag.
4) Press the Scan Reset button (S6) - the red power LED will flash. The reader is now in range adjustment mode and will respond to any RAT commands.

5) If the pre-set range of the reader is close to the range you require, you can use the + & - buttons to make minor adjustments to the range from that point. If the range needs to be reset then use the FIND button as follows.
6) Move to the position in front of the reader where you would like tags to be read, hold the RAT vertically so that the rear of the case is facing the reader, press and hold down the FIND button on the RAT. You will notice that the left hand side RED LED will also flash repeatedly and within a short time the reader will "find" the RAT and set the range to your location. This will be signified by the tone sounder (single "beep") from the reader. The souder will continue to beep and the left hand LED will flash as long as you hold down the FIND button, but you will notice that the voltage will remain locked. To unlock the voltage, press the + or - button momentarily. You can do a very rough check of the range by pressing and holding down the SEE button on the RAT. When the reader sees the RAT it will again operate the tone sounder.
7) Now check the range is correct by attaching a PAT tag to typical asset. Because the RAT is physically different from an asset tag and the fact that it is not attached to an asset means that it can only be used to set a rough range. You will now need to fine tune the range to the accomodate your tagged asset. Activate the PAT motion sensor by walking **slowly** towards the reader. The amber LED & tone sounder will operate on the reader when the tag is read. This indication will occur every 5 seconds whilst the PAT remains within range (For RS232 readers). For best results you should repeat this test several times as well as approaching the reader from different directions. This will help you to assess the good and bad reception areas. Remember if you set the range too long you will get false alarms from tagged assets or PETs in other adjacent rooms, corridors etc. In all except very large open areas or outdoors, you will find blind spots and hot spots. This is caused by the radio signals from the tag being reflected off walls, ceilings, furniture and people.
8) For a range of about 2m (6') for a PAT on a laptop or a PET worn close to the body, the voltage on the DVM should be about 4.0V. For a range of about 2m for a PAT on a non-metallic surface e.g. a painting, the voltage on the DVM will be about 2.5V. Remember that portable asset tags mounted on or near a metalic surface e.g. laptop PC's, will have a range of only about 1/3rd of that in free space. Personnel tags will also have less range when worn close to the body. These figure are for reference only and may not suit your specific application.
9) If you are not satisfied with the range then make minor adjustments to the range by using the RAT + & - buttons. Press these keys momentarily and check the left hand RED LED on the reader flashes with each RAT command. **Note**: Very brief presses of less than 0.3 seconds will be ignored. It is well worth taking a little extra time and effort to check that the range and reading area are satisfactory at this stage. Note that the voltage on the DVM moves up or down by about 50mV for each press of the RAT + or – button.
10) Once you are satisfied with the reading range, press and release switch S6 on the logic PCB, this will store the range adjustment in the reader memory. The right hand RED LED will now stop flashing, signifying the reader is now out of range adjustment mode. The range setting is stored in non-volatile memory, so it will be retained even if the reader power is removed.

In certain installations it may not be possible to obtain an adequate long range for PET's or PAT's in motion. Typically this may be in areas of high radio interferance. In these situations try increasing the receiver gain by turning ON individual poles of switch S5.

Firstly start with S5-1 ON (this will double the gain). If required use the other poles of S5 to achieve the required range. Repeat the range setting procedure using the RAT.

Note: The gain switch settings are denoted as a multiplication of 2, 4, 8 and 16 times the normal gain. This is only gain amplification and is not directlly related to range. Therefore x 16 may not produce 16 times the reader range. The gain switches also have no effect on the SAT and PAT range in TAMPER.

If at any time you wish to alter the range, you can repeat the above procedure as many times as you like.

If you are in range setting mode and only want to set the reader to its maximum range, then a quick way is to momentarily press the SEE button and then very briefly press the FIND button. The voltage will automatically jump up to 5V (maximum range voltage) and stay there.

Static Tag and Tamper Survey

With the reader/readers positioned around the intended protection area, move around the area setting off a tag in tamper mode. Check to see that the tamper transmissions can be read from every conceivable location. If you do find potential blind spots, readers may need relocating or additional readers may be required to guarantee total SAT/tamper coverage.

NOTE: If you wish to use the reader only for long range tamper of PAT tags and normal SAT monitoring, you can inhibit the reception of PAT's in motion and PET's by setting the reader range voltage to ZERO volts. This will prevent PAT's in motion or PET's from being read.

Chapter 4

ParSec Tags

Asset Tags (PAT & SAT)

There are two main types of asset tag, the PAT (Portable Asset Tag) and the SAT (Static Asset Tag). Physically they appear to be the same and share the same internal electronics. Both tags have a motion sensor, tamper switch and are powered by lithium coin cells, which are non-replaceable.
The tag transmission characteristics depend on the type of tag used. Currently there are 4 types of asset tag.

Type PSPAT1/1	Early UK portable tag, transmits 4 pulses, every 0.75sec. for 3 minutes when activated. Transmits tamper every 0.7sec. continuously until tamper switch is pressed in.
Type PSPAT1/2	Latest UK portable tag, fitted with much more sensitive motion sensor than earlier verson Transmits 7 pulses every activation. Transmits 7 tamper pulses only, until the tamper switch is depressed for 5 sec. then released again. (Ideal for Laptop PC protection)
Type PSPAT 2	As PAT1/2 but with a lower transmission power. FCC approved for the US market. **UL Listed.**
Type PSSAT1/1	UK static tag, transmits 4 pulses at 0.7 sec. intervals at high power every activation. Constant tamper transmission. (Ideal for Desktop PC protection)
Type PSSAT 2	Transmits 7 pulses every 0.7 secs every activation. Transmits 7 tamper transmissions only. Lower transmission power, FCC approved for the US market. **UL Listed.**
Type PSSAT-S	Transmits as PSSAT 2, but has a very sensitive motion sensor. (Ideal for art gallery applications)

Always remember that mounting asset tags on or near a metallic surface will result in up to 75% loss in range. The thickness of the self-adhesive pad supplied with the tags is designed to leave an air gap underneath the tag. Reducing this gap to zero on a metal surface may inhibit the tag transmission. These tags should always be located horizontally or vertically as near to a corner of your asset as possible, with the arrow on the tag pointing towards an outside edge. The arrow printed of the tag's top face points to the tag antenna, which needs to be in as much free space as possible.

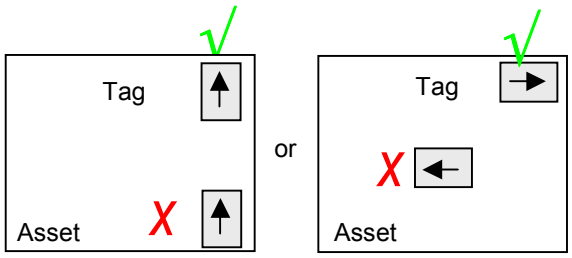


Figure 4.1 Tag location and orientation

Although laptop computers appear to have a plastic outer case, there are always metal screens behind the display. You may have to try several different positions on a laptop before you find one that does not impair the range too much. We recommend that you should always temporarily fit the tag to assets containing metal and check the range is adequate before fixing it permanently. Once you have found the best position, for example, a particular model of laptop, you will then be able to fit subsequent tag in the same position for all similar models. Remember to ensure that the tamper switch spring is pushed in when doing these tests. The tamper alarm always operates at high power at long range.

Static Asset Tag Sensitivity

By adjusting switch S9 on the logic PCB it is possible to adjust the sensitivity of the reader to Static Asset Tag movement. Therefore filtering out small movements, say from an office cleaner, that would cause false alarms, whereas deliberate attempts to move the asset will be detected. The reader processor resets a sensitivity counter every 15 seconds, and the number of pulses detected within this interval determines the global “sensitivity” of all Static Tags. UK type Static Tags (SAT1/1) transmit 4 pulses every time they are moved and FCC type static tags (SAT2 & SAT-S) transmit 7 pulses for each movement. With switch S9 in position 1, the tag's data will be transmitted immediately when it is moved (this is equivalent to 1 pulse count).

Therefore setting switch S9 to position 4 will only delay the alarm for about 4 seconds for an UK type tag. Setting S9 to positions 5 to 7 will prevent alarms from a single movement of an UK tag in any 15second period. Note that if the tag is moved twice within 15 seconds then the alarm will be activated because the tag will have transmitted a total of 8 pulses. Using S9 to positions 1 to 7 for FCC type tags serves no useful purpose at this time. It will only delay the alarm. For example, setting S9 to position 7 will result in a delay of about 5 seconds. However S9 can be used with the pulse count facility on the DDE panel to prevent false alarms for both UK & FCC type tags. Refer to the DDE manual for further details.

NOTE: Positions 8, 9 & 0 of S9 should not be used.

Routine Tag Reporting

If you switch on position 4 on a SAT or PAT tag prior to turning the tag on, then this will activate the tag routine report function. About every hour the tag will automatically transmit its data and status. This occurs even if the tag

motion sensor or tamper alarm is not activated. In some applications this could be used to indicate that an asset has not been subversively moved out of range or that the battery has expired.

If the tag is moved or the tamper alarm is activated then the next routine report will be 1 hour later. If you wish to disable the routine report you will have to remove the tag from the asset, turn off switches 1 & 4 and then turn switch 1 on again. Hourly routine presence reports are only supported on asset tags.

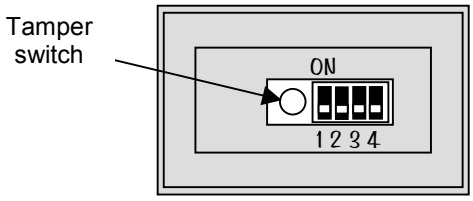


Figure 4.2 Asset Tag switches

Switch 1 Asset Tag power On/Off

Switch 2/3 Reserved for future use, do not use.

Switch 4 Hourly Routine Report On/Off

(Must be powered On prior to switching Tag On)

Affixing Asset Tags

Every asset tag is shipped with a double sided adhesive pad. This pad has been specifically selected to be used for this application. The thickness of the pad and the tamper switch spring length have been designed to provide the best results. Any change to the mounting methods or adhesives must be approved by Newmark Technology .

The critical areas which apply to fitting tags to asset are:

1. Surface preparation.
2. Adhesive bonding time.

Surface Preparation.

To obtain optimum Tag adhesion, the bonding surfaces must be clean, dry and well unified. Typical surface cleaning solvents are isopropyl alcohol/water mixture. Be sure to follow solvent manufacturer's directions for use and precautionary warnings when using solvents.

(Steps A & B).

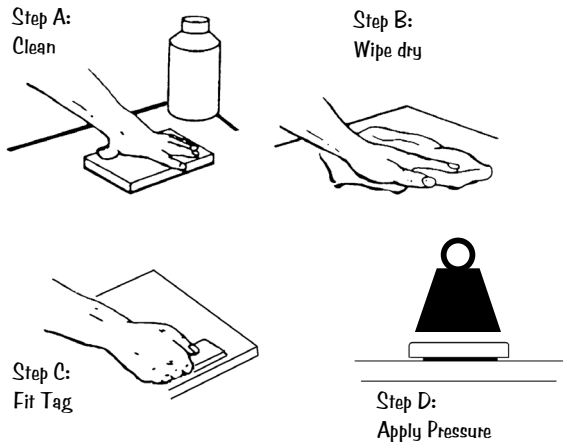


Figure 4.3 Surface Preparation

Tag bonding time

Tag bonding strength is dependent upon the degree of adhesive-to-surface contact developed. Firm application pressure develops better adhesive contact and improves bond strength.
(Steps C & D).

Once the TAG is fitted, the bond strength will increase as the adhesive flows into the asset surface. At room temperature approximately 50% of the ultimate strength will be achieved after 20 minutes, 90% after 24 hours and 100% after 72 hours. Therefore if a heavy weight or clamp can be used to place pressure on the tag, this will prolong its long term adhesion to the asset.

To obtain good initial adhesion between the asset and Tag, it is important to make sure the surfaces are dry and free of condensed moisture.

TIPS

1. It may be necessary to seal or prime some surfaces prior to bonding.

    a) Most porous (e.g. concrete) or fibrous materials (e.g. wood) will require sealing to provide a unified surface (varnish or lacquer).
    b) Some materials (e.g. copper, brass, plasticized vinyl) may require priming or coating to prevent interaction between adhesive and substrate.
    c) Bonding to glass in a high humidity environment requires the use of an appropriate primer to ensure a long-term bond.

2. Never re-use the adhesive pads on tags.
3. If you have to re-locate a tag then remove it with a twisting action as shown in figure 4.4, rather than trying to prize it off.

Asset Tag Removal.

The correct way to remove a tag is to twist the tag, therefore breaking the adhesive pad. **NEVER** lever off a tag, this may cause permanent damage to the tag and the asset (See fig. 4.4).
Removing a tag will normally destroy the adhesive pad, it can not be re-used and will need to be replaced. Always remove any trace of the old adhesive from the bottom of the tag and the asset surface, and never place a new adhesive pad directly on top of an old one.

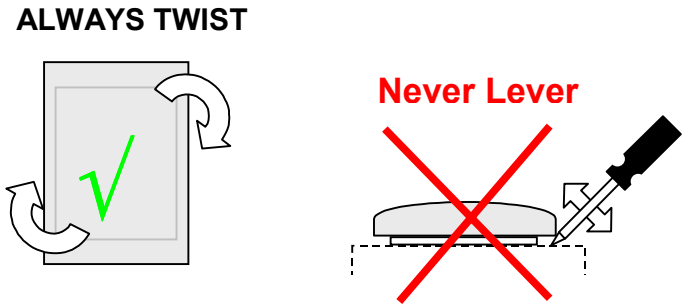


Figure 4.4 Tag Removal

Personnel Tag - PET (Not evaluated by UL)

To use the personnel tag, open the hinged transparent top and fit the 2 lithium coin cells. You may find it easier to open the lid by gently pushing the long sides away from the grey base. Note the tag number is printed on the label on the inside. Now keeping the batteries in position close the hinged lid until it snaps shut. Note that the tag will operate with one battery fitted. This is because they are connected in parallel. If you wish you could replace the plain white card supplied with any standard credit card sized business or photo-ID card. You can also print graphics or text on the plain white card using a suitable die-sublimation type printer. Contact Newmark or your supplier for details of suitable types. Personnel type tags (PS-PET-1) are supplied with their batteries not fitted. This is because they transmit continuously every 0.75 seconds as soon as the batteries are fitted. Fitting them at the factory would result in some loss of battery life.

NOTES:

1. To get the best reader range from the PET when located close to the body i.e. in a shirt pocket turn it round so that the clear plastic side is facing outwards.

2. When replacing the batteries use only the same types e.g. Varta type CR2430 or equivalent.

The PAT and SAT tag contain batteries which cannot be replaced or recharged! The WHOLE tag must be disposed of in the correct manor, and not discarded in normal office rubbish/trash. Contact your local authority for advice and information on the correct method for lithium battery disposal. The batteries used in this device may present a risk of fire or chemical burn if mistreated. Keep away from children. Do not recharge, disassemble, heat above 100deg. C (212deg. F), or incinerate. Replace battery in the personnel tag type PET with VARTA type CR2430 or equivalent. Use of another battery may present a risk of fire or explosion.

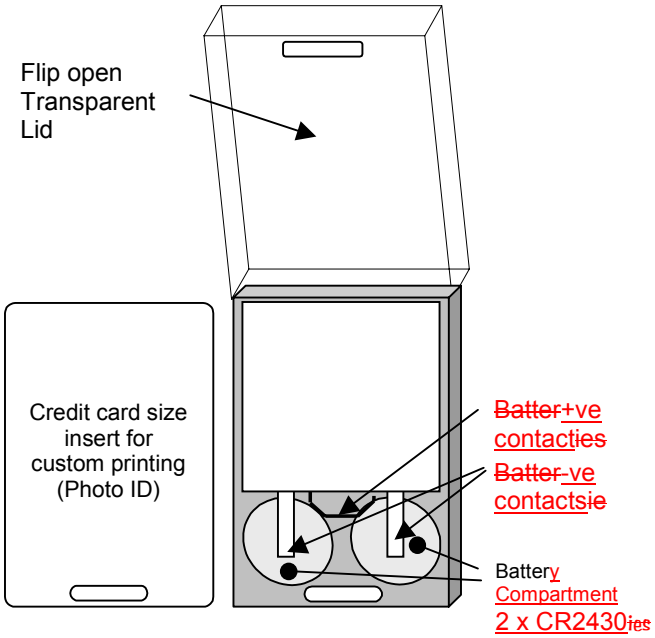


Figure 4.5 Personnel Tag PET battery re-placement

For non-FCC approved tags the transmission times are as follows:

	When moved	*When In Tamper*	*Routine report*
Static Tag PS-SAT1-1	4 times at 1.4sec. intervals at high power	Every 0.7sec. at high power	Every hour at high power. (If switched ON)
PS-SAT-S	7 times at 0.7sec. intervals at high power	7 times at 0.7sec. at high power	Every hour at low power
Portable Tag PS-PAT1-1	For 3 minutes every 0.7sec. at low power	Every 0.7sec. at high power	Every hour at high power. (If switched ON)
PS-PAT1/2	7 times at 0.7sec. intervals at low power	7 times at 0.7sec. at high power	Every hour at low power
Personnel Tag PS-PET1-1	Every 0.7sec. continuously at low power	Not applicable	Not applicable

Table 4.1 Non-FCC type Tag transmissions

For FCC approved tags the transmit times are as follows:

	When moved	*When In Tamper*	*Routine report*
Static Tag PS-SAT2	7 times at 0.7sec. intervals at high power	7 times at 0.7sec. at high power	Every hour at low power
Portable Tag PS-PAT2	7 times every 0.7sec. at low power	7 times at 0.7sec. in high power	Every hour at low power
Personnel Tag PS-PET2	Not FCC Approved. (Available in the near future)		

Table 4.2 FCC type Tag transmissions

Chapter 5

Installing the reader

This section contains similar information to that which appears in a short-form document (A/IM230854) which is shipped with every reader. This section also assumes two things

1 That a site survey as detailed in section 3 of this manual has been carried out and the position of each reader has been mapped.

2. The reader is being installed by an experienced engineer who has had formal ParSec product training.

Installation

1. a) Remove the reader from its protective packaging. Remove the front cover retaining screw and b) slide the cover downward to reveal the internal electronics. Note that a tamper switch is operated when the front cover is removed. You will also note that a bag containing an alternative security screws is located within the reader enclosure.

2. CAUTION! Observe all anti-static precautions when handling the reader electronics.

   Remove the two top PCB fixings, then carefully lift off the circuit board, and store safely.

3. If required remove the four bottom PCB fixings and lift out the circuit board.

   Note: The reader has one cable knockout in the rear of the reader enclosure. If you intend to drill an alternative hole, it is advisable to remove the bottom PCB to avoid any accidental damage.

4. Plan where your cabling route enters the reader housing and remove or create an appropriate knockout.

   It is recommended that power and signal cables be routed via the hole in the centre of the bottom PCB.

5. Position the reader housing in its intended location and mark the four fixing points on the wall, using the diagram or the housing itself as a template.

   Drill the mounting points and affix the reader housing using suitable screws (No.6 or No.8).

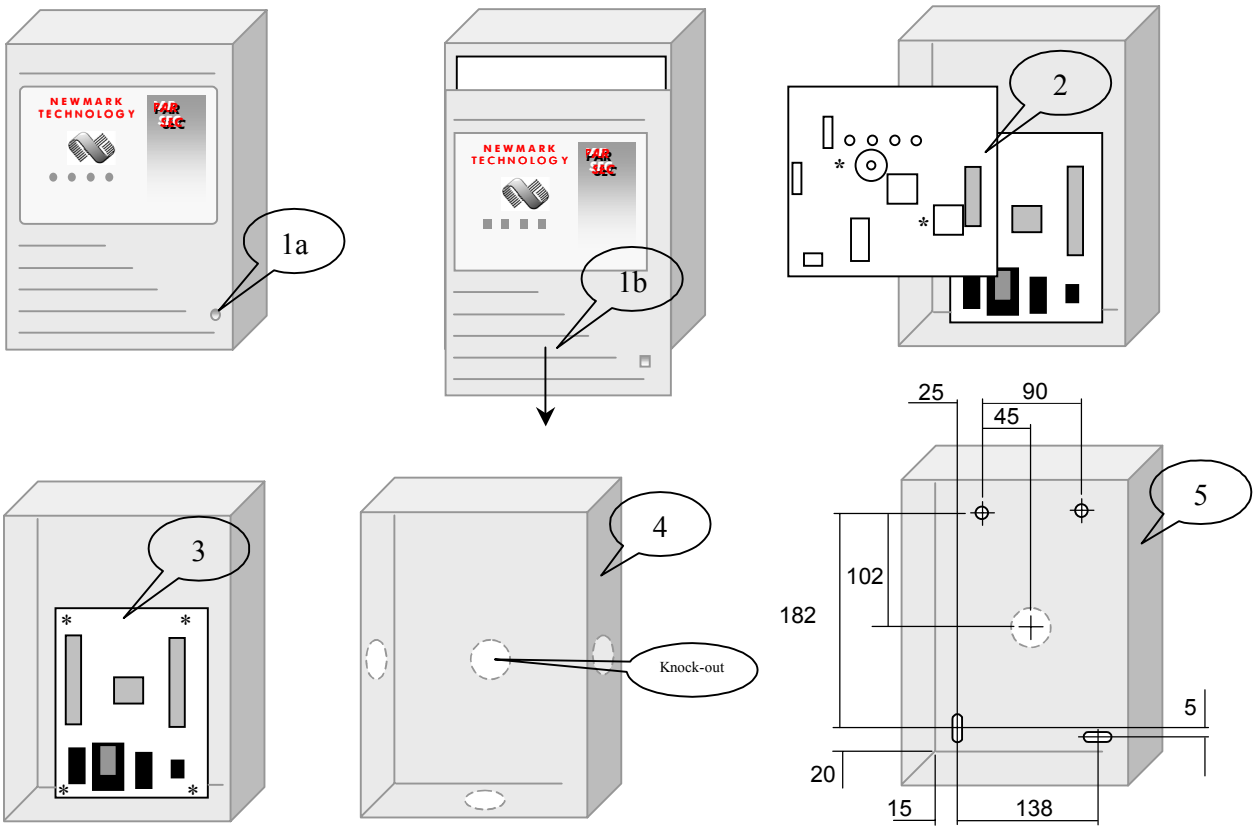


Figure 5.1 Reader installation

Wiring

Please note that dependent on the model of reader the wiring connections may vary. UL listed devices have an additional electrical surge protection circuit mounted directly on top of the lower PCB. This is pre-wired at the factory to the bottom PCB TERM 1 and 2. User connection in this case is via the 3, three-way terminal blocks, located at the top of the protection PCB (TB1, 2 and 3). In absence of the additional PCB and wiring, normal connection is via the 15-way terminals on either side of the lower PCB (TERM1 & 2).

The connection blocks (TERM 1 & 2) may be screw or cage clamp type terminals. The correct way to insert your wires using the cage clamp type connector is as follows;

1. Prepare the wire ends by stripping approx. 5mm of the insulation.
2. Insert a small screwdriver (preferably a 2.5mm wide blade) into the top opening and push home to open the spring clamp.
3. Insert the wire into the lower opening, and then remove the driver to complete the connection.
4. Always double check the wire is securely clamped.

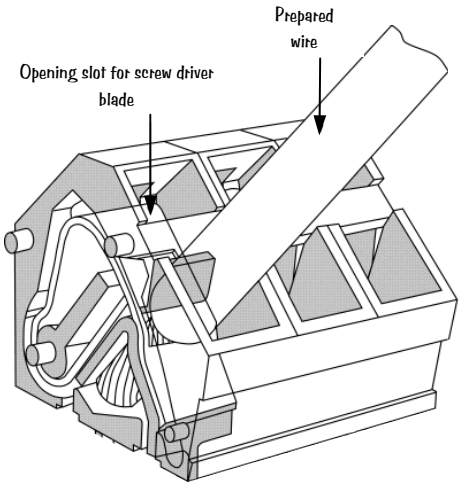


Figure 5.2 Cage clamp Terminal operation

Power Wiring

The reader requires a 12V/100mA, DC power supply, which must be CE (or other local authority equivalent) approved. To maintain UL listing, connect to a listed 12-volt burglar alarm PSU.

The reader's on board voltage regulator allows the input voltage to vary from 9 to 14Vdc The reader is also protected against reverse polarity and voltages greater than 16VDC by a protection diode and fuse (F1-1A). For reader power use screened cables e.g. 2-core Belden 8760 (Min. 22 AWG).

It is highly recommended that cabling to and from the reader should be separated from any 3-phase mains supplies by at least 1m, and from single phase mains supplies and all other types of cable run by at least 0.5m

Always connect the "GND" or 0V terminal to a local earth/ground.

RS-232 Wiring

For RS-232 models use 2-core Belden cable, 8761, 9841 or 9501. (Min. 22 AWG). Always connecting the screens to ground at the remote end.

RS-232Baud Rate

The default RS-232 baud rate is 9600 with LK1 not fitted, at this rate cable lengths are limited to 15m between readers. Fitting LK2 switches the baud rate to 2400; this allows cable lengths of up to 60m between readers or for use with the DDE.

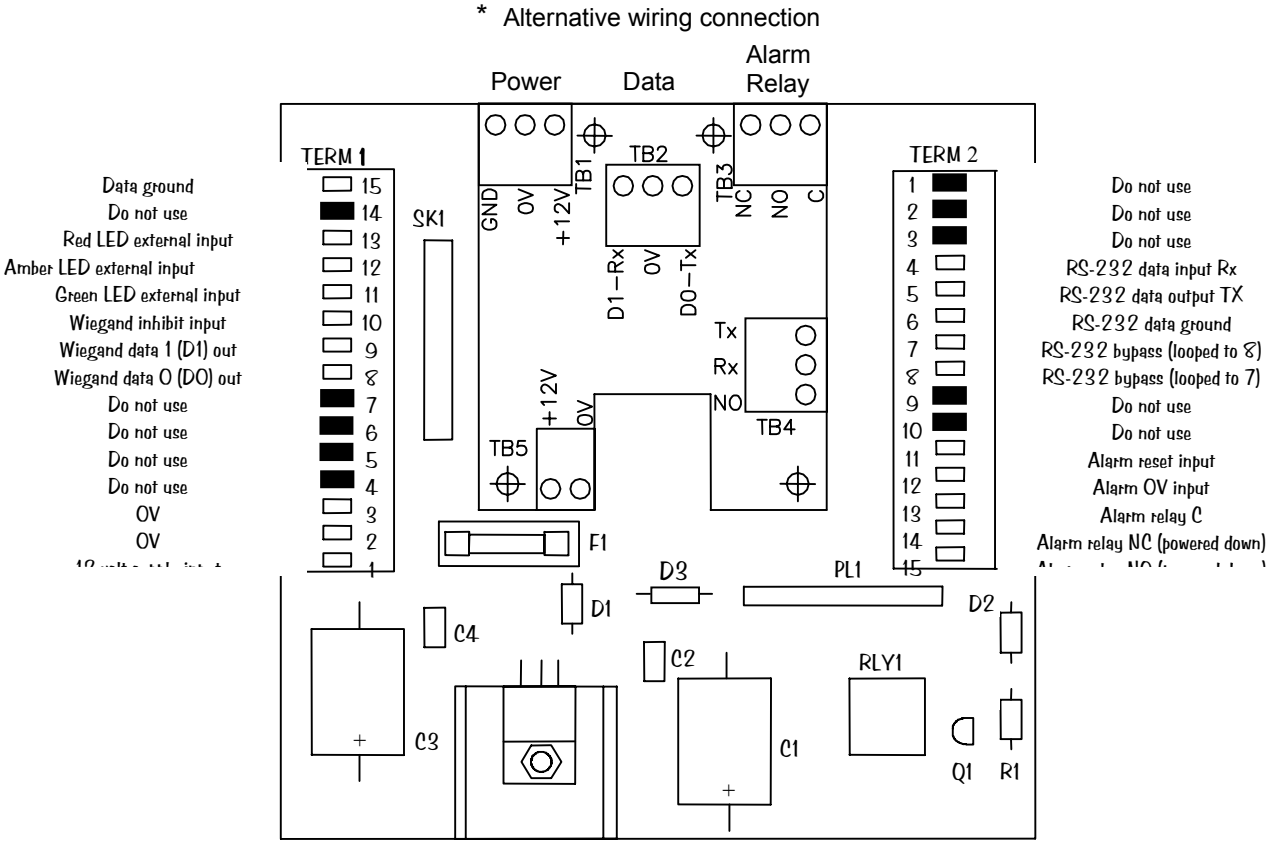


Figure 5.3 Wiring Terminations

Wiegand Wiring

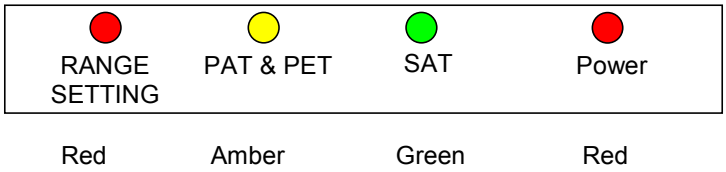
The Wiegand reader allows connection directly to an access control system using a standard 26-bit data format. The 26-bit version uses the industry standard format as follows.

Bit 1	Even parity on bits 1-13
Bits 2 - 9	Batch Code as printed on tags
Bits 10 - 25	Tag no as printed on tags
Bit 26	Odd parity on bits 14-26

For Wiegand data and for LED drive use 6-core screened cable e.g. Belden 9536 (Min. 22 AWG). Always connecting the screens to ground at the remote end.

External LED's

In an access control application you may wish to use the external LED control to indicate if access has been granted, denied or if the door is permanently locked, unlocked or forced. To enable the external LED control, switch S13-2 on the top PCB. The LED drive is then diverted and controlled by an external voltage source. Pulling the LED input to ground will turn on the LED.



External LED wiring via TERM 1

Pin 11	Green LED External input
Pin 12	Amber LED External input
Pin 13	Red LED External input

Connections to a Newmark Technology reader interface (QPINT) are shown below.

ParSec Reader	InterPoint	Function
TB1	TB4	
1	1(12V)	12V
2	3 (0V)	0V
8	4 (R1)	D0
9	6 (R3)	D1
13	7 (RED)	Red LED
11	8 (GRN)	Green LED

Set the InterPoint reader mode DIL switch 5 to 8 all off i.e. as for a Wiegand reader.

Following the enclosure installation and reader wiring, the top processor PCB can be re-installed.

CAUTION

The top, processor PCB must only be installed or removed from the lower PCB with the power supply disconnected.

TIP

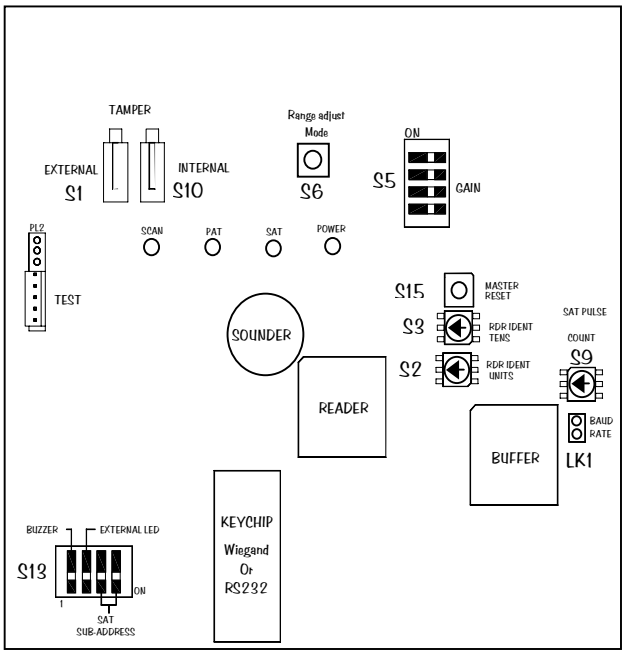
Aligning the two mating connectors requires care; you may find it easier to mate these two connectors by aligning the PCB fixing holes. Misalignment can result in bent or broken pins. Press the connectors firmly home until the top PCB comes to a stop against it's mounting spacers. Once the two PCBs are firmly mated, refit the fixings

Chapter 6

Commissioning the Reader

Switch Settings

The reader switch settings are factory set and should be checked and set by the
installer as part of the initial installation. The diagram below shows the default switch settings of both Wiegand and RS232 readers.



SWITCH OR LINK	POLE	DEFAULT	FUNCTION
S2		0	Reader Address- Units. **PSR-232-1 only (User set)**
S3		0	Reader Address - Tens **PSR-232-1only (User set)**
S5			**Note: Only one section of should be on at a time**
	1	OFF	2 times normal receiver gain
	2	OFF	4 times normal receiver gain
	3	OFF	8 times normal receiver gain
	4	OFF	16 times normal receiver gain
S6		Press	Range adjustment mode (starts scanner - indicated by flashing power LED)
S9		0	Static asset tag pulse count setting 1=1, 7=7 (8,9 & 0 unused - default to 1); determines number of Static tag pulse counts before data output
S10		Depressed	Front panel tamper OFF (ON when cover removed)
S13	1	*ON*	Enable internal sounder
S13	2	*OFF*	Enable external control of LED's
S13	3 & 4	*OFF*	Sub-address codes **NOT SUPPORTED - FOR FUTURE USE ONLY**
S15		Press	Master reset; only used in total data/reader lock-up condition which may be caused by bad power or other data error
LK2		Not fitted	Fitted to old version readers only
LK1		Not fitted (9600)	RS 232 set to 9600 baud. Fit for 2400 baud (Use with DDE Panel). **(RS232 Only)**

Figure 6.1 Switch settings

Functional checks

Portable tag range adjustment (PAT & PET)

The reader's portable reception range for PAT and PET tags is set at the factory. It is represented as a DC voltage of 4.0 volts, which can be read by attaching a multi-meter to the outside pins of PL2 on the top PCB. This voltage adjustment ranges from 0V to 5V, where O volts = zero range and 5V produces the maximum reception range at that given gain setting. The pre-set range should provide a portable tag range of approx. 2-3m (6-10ft) with a tag in free space, which is suitable for a functional test of tags. If a greater or smaller ranges are required, please refer to chapter for details of fine adjustment using the range voltage adjustment device (RAT) If only a

maximum portable range is required, use the receiver gain switch S5 pins 1-4 to amplify the range. Please note that these switches increase the receiver gain, and do not multiply the tag range by the same factors.

The tamper transmission for portable tags is the maximum possible range, and can not be adjusted.

Static tag Range (SAT)

As for portable tags in tamper, the static tag transmission is the maximum possible range in normal operation and in tamper.

Reader Range checks

On powering up the reader you should hear a short **"beep"** from the sounder and the **RED** power LED should come ON. Standing approx. 2 meters (6 ft) from the reader, **switch on a tag with the tamper depressed**. (PAT and SAT only). Present the tag, slight tag movement maybe necessary to activate a tag transmission and depending on the type of tag used. A corresponding LED should light once, the reader will **"beep"** once and you should hear the reader relay trip. Obviously if you have set switch S13-1 off to disable the internal sounder, a **"beep"** will not be heard.

Yellow LED for PAT and PET tag transmissions
Green LED for SAT tag transmissions

To check for tamper transmissions, release the tag tamper, this time the LED will light a number of times and the sounder will "beep" also a number of times depending of the type of tag you are using. (See figures 4.1 and 4.2 for more information on tag transmissions).
If your reader is on-line, check that the reader has transmitted tag data and that the tag number corresponds with the number printed on the side of your tags.

It is worthwhile at this stage to check the portable, static and tamper ranges within you protected area.
It is very important that the range checks are carried out with the tag attached to their intended asset. Being an RF device, a tag held in free space may produce different results to a tag attached to an asset. As stated at the beginning the reader coverage should have already been checked, as part of a site survey.
The portable tag range can be checked by moving away from and towards the reader, with a tagged asset to check the range produced by the reader default setting. The Static Tag range and tamper ranges should also be checked within the protected area to ensure complete protection coverage.

Reader Cover tamper.

Check the internal tamper switch is functioning correctly by depressing S1on the top PCB. The reader will transmit an **"beep"** from the sounder and a trace will appear on your on-line system screen. This function happens automatically when the reader lid is finally replaced.

Reader Address Programming (RS232 only)

Switch S2 programs the 'units value' and S3 programs the 'tens value'. Set the required values before applying power to the reader. You can set as many readers as you wish to the same address; for example when using several readers to cover a large area. Should the reader number need to be changed, select the new number then depress the reset switch (S15); the new number will then be read by the reader software.

Alarm Relay Time

The reader is equipped with a relay, which may be used to trigger external equipment, or, for example, to supply power to an external alarm sounder device.

The relay time is set to operate for 5 seconds if any type of tag is read or if the reader tamper is operated. Note that this relay is normally operated when power is applied to the reader. If power is lost, then the relay will de-operate and activate any external alarm device connected to it. To meet alarm system regulations, once the relay has been operated, it cannot be re-operated until a further 5 seconds have elapsed.

Montag

Montag is a simple DOS utility program that will run on any PC. It can be used with the RS232 reader to report date/time, reader address, reader tamper, reader routine reports, tag batch code, tag number, tag type and status. It is very useful in commissioning systems or when using a DDE or other 3rd party management software. It is a shareware utility, so contact Newmark Technology for a copy.

Chapter 7

Trouble shooting and Maintenance

Trouble shooting

Reader Reset

Switch S15 on the logic PCB provides a reader reset and should be used only if the reader appears to have “hung up”; symptoms may include:

(1) Corrupt or no data output.

(2) No scan response to the RAT.

(3) Irregular LED status.

Press switch S15 and hold down for 1-2 seconds, then release. The tone sounder will momentarily "beep".

No response when Tags are activated

Check that the logic PCB is properly plugged into the baseboard PCB. Check that you have not set the range too short. If a PAT tag is read when in tamper only this would verify this problem.

FAQ’s

Q1. Why do I appear to pass through alternating good and bad bands of tag detection when I walk very slowly towards the reader with my tagged asset?

A1 This will happen if you locate the reader too high off the floor or if you set the range too long. The bands or rings are caused by the radio transmissions from the reader reflecting off the walls, ceiling & furniture as well as by direct line of site. Re-locate the reader no higher than about 1m above the floor and/or reduce the range.

Q2 Why do I only seem to get a single tag read report from a wiegand type reader from a PET or PAT even though I am still in range?

A2 This is normal. The wiegand reader software prevents the same tag being reported again until that tag has been out of range for at least 5 seconds. This prevents multiple reports being given from an access control system if a tag loiters within range of a reader.

Q3 Why does the reader appear to lock up in range setting mode and not respond to the FIND button?

A3 When the reader has found the RAT range, it will then only respond to the RAT +, - or SEE buttons.

Maintenance

IMPORTANT
to maintain UL listing your asset management system must be routinely tested

Reader and system check.

Each individual reader must be regularly checked to see that it operates correctly.

It is recommended that your system should be checked once a week.

Present a valid tag to the reader, in normal operation and in tamper. Check that the correct LED lights and that the reader "beeps", and if connected to a system PC, check that a trace appears on your screen. If you are using the relay output, check that it operates when a tag is read.

Tag check.

If you are utilizing the routine tag reports, this will provide you with some tag status information. It is always best practice to perform a random tag check to confirm that the motion sensor is operating correctly.

Appendix A

Technical Support

If you need any further help or advice, please call Newmark Technology Technical Support line on +44 (0) 1737 788 800 during normal office hours.

If you need to return any equipment for repair, please contact our factory first, on +44 (0)191 5840594, to obtain a return number (RAS No.) and mark this clearly on all packaging and correspondence. When obtaining a RAS number, please have the following information available:

- Reason for equipment return.
- The unit's serial number.
- The Newmark Invoice Number if possible.

All returned items must be shipped in a suitable packaging.

Printed circuit board assemblies are susceptible to damage from static electricity. Make sure that you and your work area are static-safeguarded, and that a static-shielded container is used.

Address all packages to:

Newmark Technology Limited
Unit 6, Mercantile Road
Rainton Bridge Industrial Estate
Houghton Le Spring
County Durham

DH4 5PH

United Kingdom

Tel. +44 (0) 191 584 0594

Fax. +44 (0) 191 512 1570

Appendix B

Equipment Specifications

Reader Range

- Up to 60m* in free space with no in-band external radio interference.

  SAT tag in motion or tamper.

  PAT tag in tamper.

- Up to 25m* in free space for PAT or PET in motion.

  Adjustable from 0.1m to 25m using the Range Adjustment

  Tag (RAT).

* Dependant on location and surrounding environment. The tags have been evaluated by UL, and operate at a distance of 60' (28m) without environmental disturbances.

Product Dimensions

(H x W x D in mm).

Reader (PSR232 and PSRW26) 220 x 170 x 52

Asset Tag (PAT and SAT) 72 x 48 x 10

Personnel Tag (PET) 92 x 75 x 7

Range Adjustment Tag (RAT) 110 x 60 x 25

Weights

Reader	750g
PAT/SAT	30g
PET	40g
RAT	90g

Environmental Temperatures

Operating Temperature: -5^{o}C to +40^{o}C (UL evaluated at 0^{o}C to +49^{o}C)

Storage Temperature: -10^{o}C to +70^{o}C (UL evaluated at 0^{o}C to +49^{o}C)

Electrical

Power Supply

Reader: 12Vdc (+/-3Vdc) at 100mA Max. Nominal 70mA.

SAT: 2 internal non-replaceable, non-rechargeable 3V lithium coin cells.
Typical life of approx. 5 years (dependant on tag usage).

PAT: 2 internal non-replaceable, non-rechargeable 3V lithium coin cells.

Typical life of approx. 3 years if active for around 3 hours per day, 5 days a week.

PET: 2 internal replaceable, non-rechargeable 3V lithium coin cells (CR2032 or equivalent).

Typical life of approx. 14 months.

RAT: 2 internal replaceable, 1.5V alkaline cells (AAA). The factory fitted cells are non-rechargeable, but can be replaced with rechargeable or non-rechargeable size AAA cells.

Reader Data outputs.

PSRS232: Industry standard RS232, 2400 or 9600 baud (selectable). For protocol, contact Newmark Technology.

PSRW26: Industry standard Wiegand 26-bit. Transmission time 1ms per bit- pulse width 50μs.

Radio Transmissions.

UK Tag to Reader: 417.99 MHz at -25dBmV for high power E.g. Tamper, and -30dBmV for low power E.g. PAT Tag in motion or PET Tag.

FCC tag to Reader: 417.99 MHz at 73dBμV/m for high power, and 71.2dBμV/m for low power.

Alarm Relay

- Single pole double throw voltage-free contacts, rated at 24V, 1A Max.
- Output duration 5 seconds.
- Operated by any type of valid tag data received in motion, tamper or power failure.

External LED Inputs.

- Input voltage TTL compatible, active low, internal pull-up +5V.

Certification & Approvals.

- UK, DTI Radio Communications Agency. MPT1340 license exempt type approved.
- Meets or exceeds EN50081:1992 Emissions.

  EN50082-1:1992 Immunity.
- FCC Part 15.231 parts (a) and (b), intentional radiators.
- UL294 and UL1037 listed.

Index

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