ParSec READER

INSTALLATION MANUAL

Part No: IM016

DRAFT

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FCC Compliance Statement

For United States Users

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.

The tags are powered are by standard Lithium coin cells and as such the following warning shall be noted:

CAUTION

Danger of explosion if batteries are incorrectly replaced. Replace only with the same or equivalent type recommended by the manufacturer. Dispose of used batteries according to the manufacturers instructions in this manual.

ParSec READER

INSTALLATION MANUAL

CONTENTS

1.   **CAUTION - STATIC PRECAUTIONS**

Some devices used in the ParSec reader are static sensitive.
Anti-static precautions *must be taken* when handling the printed circuit boards.
Static discharge will permanently damage the boards.

2.   **GENERAL INSTALLATION NOTES**

2.1.   **Reader Design**

The reader is mounted in a 2-part enclosure for surface mounting. The rear casing has 2 keyholes and 1 slotted hole for the 3 fixing screws and a 25mm diameter knock-out hole in the rear face for cable entry.

The reader contains two PCB's for ease of installation and maintenance. The rear BACKPLANE PCB comprises two cable termination blocks, the power supply regulator, 1A fuse, alarm relay, and two connectors to the front LOGIC PCB. The Backplane PCB will normally remain permanently mounted after the reader case has been sited and the cables installed.

The LOGIC PCB contains the radio receiver, the microprocessor and communications circuitry, and the KEYPIC personality module. All reader adjustment and configuration is performed via the logic PCB, which is mounted onto the Backplane PCB via two push-fit connectors.

This method of construction enables replacement of the logic PCB for maintenance purposes and also makes it possible for the physical mounting and cabling of the reader enclosure and Backplane to be carried out prior to system configuration and commissioning.

The reader front cover may be fitted with a recessed security screw. It is normally supplied with a standard M3 screw fitted but alternative M3 "Torx" and Newmark type screws are also provided. For these to be used for installation, you will need a "Torx" type TX10 screwdriver (e.g. RS: 662-585) or a Newmark security driver (Part no SS0001 or RS part 541-983). Any attempt to remove the front cover will operate the internal anti-tamper switch which may be set to trigger a local or a remote alarm.

There are 2 types of reader. The model PSR-232-1 has an RS232 port and is normally used with TransAsset or other third party asset management software. The model PSR-W26-1 has a 26-bit industry standard wiegand card type data output and is normally used with access control systems. It is possible to convert from 1 model to another by simply changing the socketed KeyPIC.

All the tags transmit at 418 MHz using a power level which in the UK is MPT 1340 licence exempt by the DTI. Tags for sale in the USA meet FCC part 15 rules. For those countries where 418 MHz is not acceptable, for example mainland Europe tags and readers operating at a different frequency may become available in 1999. All units are CE marked and comply with European EMC directives. However, to maintain this compliance, it is essential that you follow the installation procedures in this manual and in particular use grounded screened cables where specified.

2.2. Siting the reader

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

    (1)   The area of coverage required for Static Asset Tags (PS-SAT1-1's).

    (2)   The exit/entry points to be protected or monitored with Portable Asset Tags (PS-PAT1-1's) and Personnel Tags (PS-PET1-1's).

For 'portal monitoring' with PS-PAT1-1's and PS-PET1-1's, the reader should be sited in line with the centre of the doorway and midway between the top of the door and the ceiling. (This is not critical and, in some cases, it may be appropriate to site the reader in a higher position to deter vandalism.)

Where the system is used solely for monitoring unauthorised movement of items protected by PS-SAT1-1's, the reader should be mounted 0.5m below the ceiling and in the centre of a convenient wall in the location, to optimise the polar pattern of the receiving antenna.

Up to nine of the RS232 type readers can be chained to provide extended coverage of a wide or irregularly shaped area. (For details of reader addressing, see section 4.3.)

Notes
    "DIFFICULT" LOCATIONS

    (1)   The reader antenna has reduced sensitivity to tags from the rear. Where REAR DETECTION is a problem, a new type of uni-directional antenna is being developed.   Contact your supplier or Newmark for more information.

    (2)   The presence of steel girders, metal filing cabinets/office furniture, false ceiling supports and aluminium backed plasterboard in the building structure will cause reflections and will cause blind areas and hot spots. If this occurs, it will be necessary to move the reader to an alternative location, which may be as little as 10 cm away in some cases. Installation survey equipment will be available from Newmark in due course. Radio signals can often travel down corridors, lift shafts and may even go round corners. Always try and test the reader temporarily in the intended location first to check that it will work properly in that location.

    (3)   Peoples bodies absorb the tag transmissions and it is always good practice to mount the reader as high as possible or even facing downwards from the ceiling so that bodies do not shield the reader.   In some cases it may be necessary to mount more than 1 reader to provide adequate coverage.

    (4)   The readers are not weather-resistant and so must only be mounted outside in an all *plastic* suitably rated enclosure.

CAUTION

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

It is strongly advised that they should not be mounted close to VDU screens, TV monitors or other sources of radio frequency emission. The minimum recommended separation is 1.5m from a 15 inch VDU screen.

2.3.   Power Supply Requirements

The reader requires a 12V/100mA, DC power supply, which must be CE approved.

The on board voltage regulator allows the input voltage to vary +/- 3 volts from the nominal 12 volt supply. The reader is protected against reverse polarity but *not* voltages greater than 16V.

It is recommended that power and signal cables to the reader should be separated from 3-phase mains supplies by at least 1m and from single phase mains supplies and all types of cable runs by at least 0.5m.   Use screened cables e.g. 2-core Belden 8760 for reader power, 2-core Belden 8761, 9841 or 9501 for RS-232 and 6-core screened e.g. Belden 9536 for Wiegand data and LED drive. Connect the screen to earth/ground at the remote end.

2.4.   Communications Interfaces
2.4.1. RS-232 Data Port (PSR-232-1 model only)

Serial data input and output connections and switch settings are detailed in Section 4.6.1. Full details of the RS-232 protocol are contained in the separate document "ParSec reader RS-232 Data Specification".

2.4.2. Wiegand Data Port (PSR-W26-1 model only)

Wiegand data format allows ParSec Readers to be connected directly to access control systems using this standard. This 26-bit version uses the industry standard format as follows.

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

Connections for use with an InterPoint are shown below.

ParSec Reader TB1	InterPoint TB4	Function
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 card.

2.5.   External Sensor Operation

With radio tags, it is often difficult to ensure that personnel type tags which transmit every 0.6s are only read in specific areas e.g. only near a door.   By using an external sensor such as an infra-red beam or a passive infra-red detector and connecting this into the reader, PS-PET1-1s will be ignored unless the sensor is activated. See section 4.4.4 for more details. Note current production readers do not support this function. A field upgrade kit will be made available in 1999.

3. INSTALLING THE READER
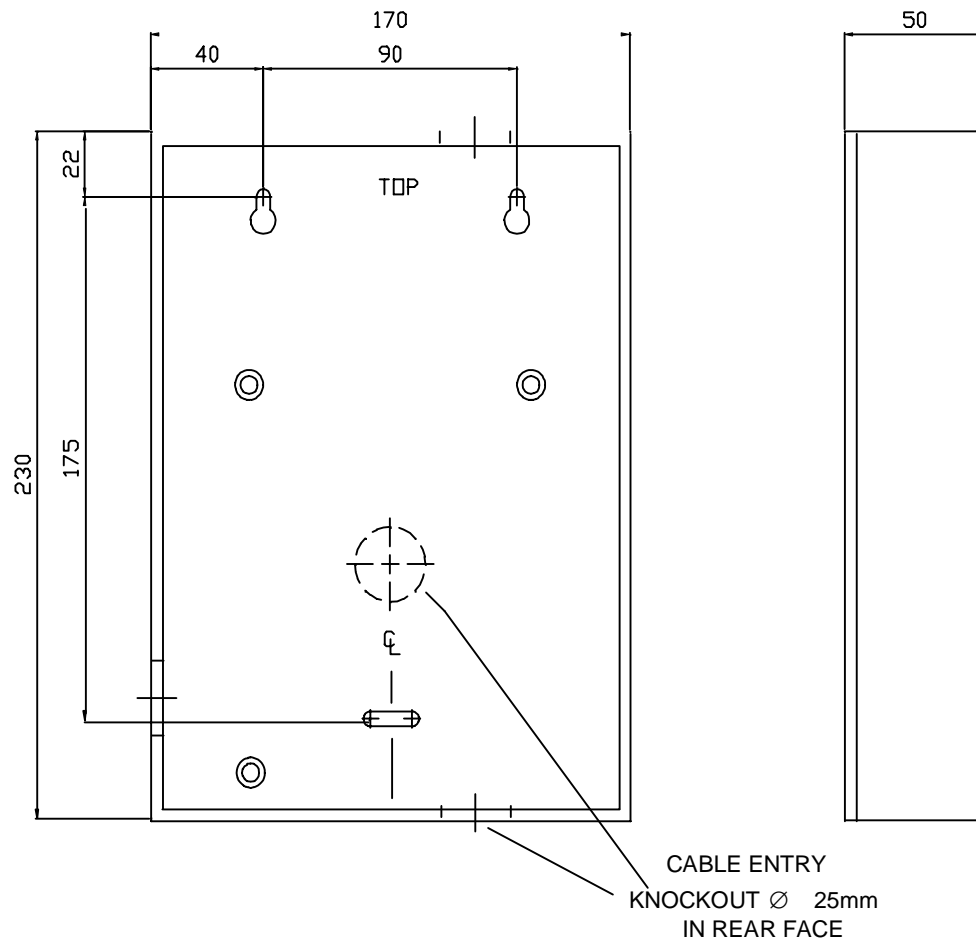## 3.1. Fixing the reader enclosure

FIG. 1 - READER REAR CASE

The rear case should be fixed in position with appropriate. screws in the two upper slotted holes and secured with a third screw in the lower hole.

3.2.   **Installing the Backplane PCB**

It is recommended that power and signal cables are routed via the hole in the centre of the Backplane PCB prior to fixing the PCB and terminating the connectors.

The Backplane PCB is secured to the rear case by the four M3 screws provided.

Cable connections should be made to the two connector blocks shown below. The designations are also shown on a label affixed to the top inside of the reader housing.

FIG. 2 – BACKPLANE PCB LAYOUT
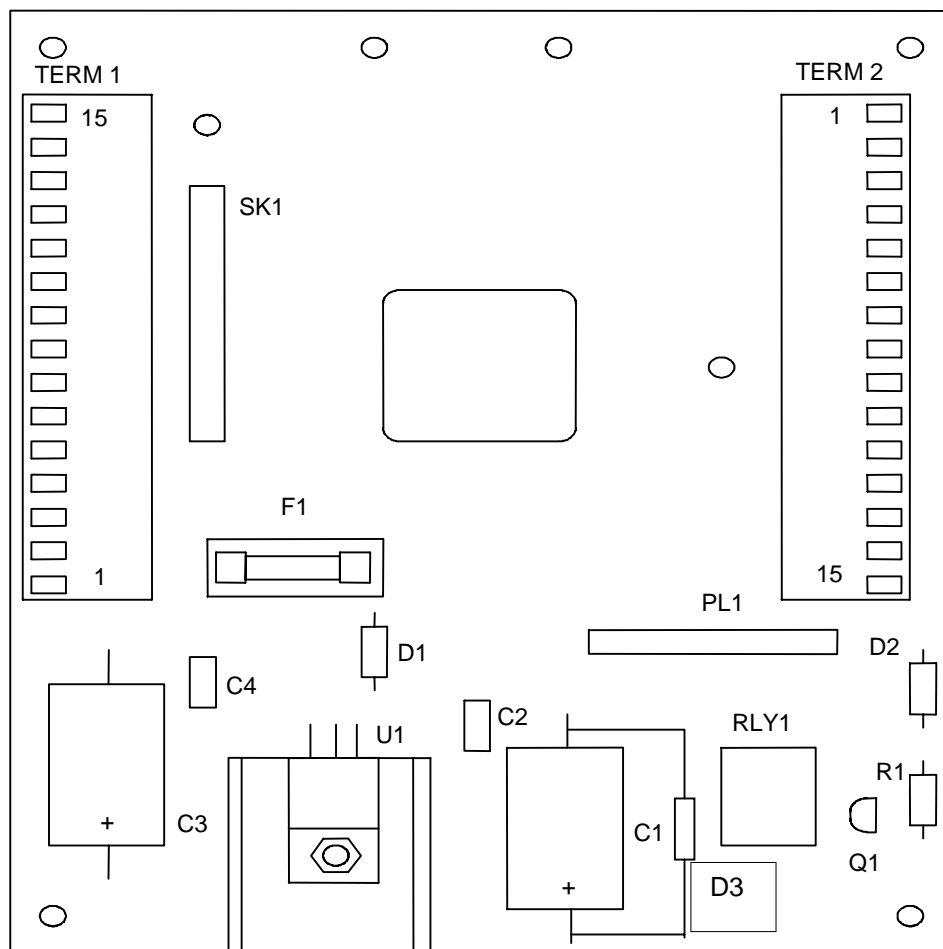
The connector blocks are of the sprung type to ensure ease of installation. Prepare each conductor by stripping back 5 mm insulation then follow the steps below.

1. Insert a 2.5 mm screwdriver in the slot above the required terminal and twist the screwdriver a few degrees in either direction.
2. Insert the conductor.
3. Withdraw the screwdriver to ensure a reliable connection.

TERMINAL BLOCK	TERMINAL NUMBER	DESIGNATION
1	1	+12 volt supply input
	2	0V
	3	0V
	4	+5 volt output
	5	Reserved
	6	Reserved
	7	Not used
	8	Wiegand data 0 (D0) out
	9	Wiegand data 1 (D1) out
	10	Wiegand inhibit input
	11	Green LED external input
	12	Amber LED external input
	13	Red LED external input
	14	Reserved - do not use
	15	Data ground

2	1	External Sensor +12V output
	2	External Sensor 0V output
	3	External Sensor NC contact input
	4	RS-232 data input
	5	RS-232 data output
	6	RS-232 data ground
	7	RS-232 bypass (looped to 8)
	8	RS-232 bypass (looped to 7)
	9	Reserved - do not use
	10	Reserved - do not use
	11	Alarm reset input
	12	Alarm 0V input
	13	Alarm relay C
	14	Alarm relay NC (powered down)
	15	Alarm relay NO (powered down)

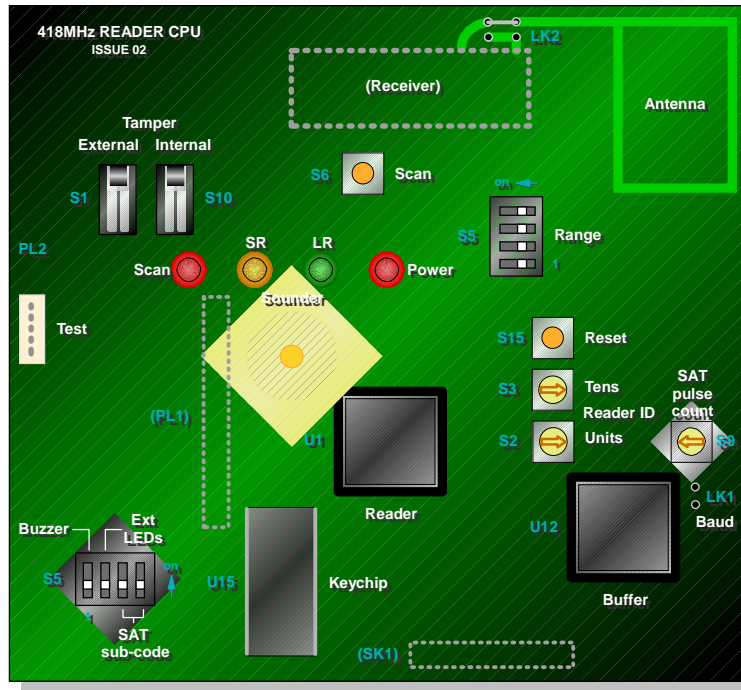TABLE 1 - BACKPLANE PCB CONNECTOR DESIGNATIONS

FIG.3 - LOGIC PCB SWITCH LOCATIONS

3.3. **Installing the Logic PCB**

Following installation and wiring of the Backplane PCB, the Logic PCB is installed by plugging it onto the two Backplane connectors. Aligning these connectors requires care and some practice because you are working blind. Mis-aligning them can result in bent or broken pins. Press the connectors firmly home without exerting undue pressure on the Logic PCB.

CAUTIONS

The Logic PCB must only be installed or removed from the Backplane PCB with the power supply disconnected.

Take great care to ensure that the two connectors between the Backplane and Logic PCBs are correctly located. The L-shaped layout of the connectors is designed to assist with correct location.

Once the two PCBs are firmly mated, refit the 2 M3 screws and washers.

4. COMMISSIONING THE READER

Figure 3 shows the layout of the switches on the reader Logic PCB which are used to configure the reader to its required installation settings. It is important that the commissioning procedure is performed strictly in the sequence which follows.

4.1.   **Default Switch Settings**

Table 2 below lists the functions of all switches on the Logic PCB. When installing a reader for the first time, set the switches to their default conditions shown in *italics* in the table.

SWITCH OR LINK	POLE	SENSE	FUNCTION
S2		0-9 (*0*)	Reader Number - Units (User set) for PSR-232-1 type only
S3		0-9 (*0*)	Reader Number - Tens (User set) for PSR-232-1 type only
S5			Note: Only one section of this switch should be turned at a time
	1	On	2 times normal receiver gain
	2	On	4 times normal receiver gain
	3	On	8 times normal receiver gain
	4	On	16 times normal receiver gain
S6		Press	Scanner master reset (starts scanner - indicated by flashing power LED)
S9		1-7 (*3*)	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	*ON*	Enable external control of LEDs
S13	3 & 4	*OFF*	Position dependent on sub-system code; both must match Static asset tag switch positions;
S15		Press	Master processor and KeyPIC reset; only used in total data/reader lock-up condition which may be caused by bad power or other data error
LK2		Fitted	Connects internal antenna to receiver. Remove when used with external antenna
LK1		Fitted	RS 232 set to 2400 baud. Remove for 9600 baud

TABLE 2 – LOGIC PCB SWITCH & LINK FUNCTIONS

4.2. Adjusting the Read Range

The range at which Portable Asset and Personnel Tags is read by the reader is adjustable from a maximum free space range of about 25m down to a about 10 cm. to suit the requirements of the individual installation.

Notes

(1)   The nominal 75m long range reading of Static Asset Tags is not adjustable.

(2)   Tamper alarms, routine reports and low battery conditions are signalled by Static *and* Portable Tags at high power (i.e. long range); the Personnel Tag always signals at low power (short range).

The range of portable asset and personnel tags is adjusted by using the Range Adjusting Tag (PS-RAT1-1)

4.2.1   Range Adjustment Procedure

1. Power on the reader
2. Press the Scan Reset button (S6) - the red power LED will flash
3. Move to the position where you would like tags to be read and press and hold down the FIND button on the PS-RAT1-1. Within about 10 seconds the reader will then find the RAT and set the range. This will be signified by the tone sounder on the reader operating and the left hand red LED flashing. You can now check the range by pressing and holding down the SEEK button on the RAT. When the reader sees the RAT it will operate the tone sounder.
4. If you would like to make some minor adjustment to the range you can use the + & - buttons.   Press these keys momentarily and check the red LED on the reader flashes each time.   Note that very brief presses of less than 0.3 seconds will be ignored. It is usually very helpful to monitor the reader receiver voltage level with a voltmeter on the top and bottom pins of the Molex header (PL2) on the left hand side of the Logic PCB. As you adjust the range you will see this voltage move up or down.   At 5V it is set to maximum range and at 0V it is set to minimum range.
5. Use the SEEK button and check the range in different locations in the area where you want tags to be read.   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.
6. Now check the range is correct by using 1 or 2 of the actual tag types you are going to use in that location. Remember that portable asset tags mounted on metal e.g. laptop PCs will have less range than in free space.   Personnel tags will also have less range when worn close to the body. Use the PS-RAT-1 + & - buttons to make adjustments. It is well worth taking a little extra time and effort to check that the range and reading area are satisfactory at this stage. Once you are satisfied with the reading range, press and release S6 and this will store the range adjustment in the reader memory. The power LED will now show a solid red.   The range setting is stored in non-volatile memory, so it will be retained even if the reader power is removed.
7. If at any time you wish to alter the range, you can repeat the above procedure as many times as you like.

Notes

(1)   Owing to the nature of RF at the frequencies used in the ParSec system, it may be desirable to carry out the set up procedure a few times to optimise reader performance to the location.

(2)   Mounting Portable asset tags on metal surfaces may result in a severe loss in range unless care is taken to find the best location. Generally these tags should be located as near to a corner as possible with the arrow on the tag pointing to the outside edge. Although laptop computers appear to have a plastic outer case, there is always a metal screen behind the display.   You may have to try several different positions on a laptop before you find one that does not impair the range.   We recommend that you should always temporarily fit the tag on assets containing metal and check the range is adequate before fixing it down permanently.   Once you have found the best position on, for example, a particular model of laptop, you will then be able to fit the 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.   Never re-use the adhesive pads on tags.
If you have to re-locate a tag then remove it with a twisting action rather than trying to prize it off or you could damage the tag housing. ***Always*** replace the adhesive pad and always de-grease the mounting surface using methylated spirits or other de-greasing agent. The adhesive pads will bond much better to surfaces if they are pressed down under under pressure for preferably 24 hours or at least 1 hour. This can be done by using strong adhesive tape or placing a heavy object e.g. large book on the tag.   Smooth cool horizontal surfaces are best for good adhesion.

(3)   The range set using the RAT is designed to compensate for the reduction in range that occurs when asset tags are mounted on metal or when personnel tags are worn close to the body e.g. in a pocket.   You will find that tags mounted on metal or worn close to the body will operate at a lesser range than that set by the RAT.

(4)   The level of ambient background noise will affect range consistency; whilst noise filtering is employed in the reader design it cannot filter transmissions from other devices operating at the same frequency.   Typical amongst these are radio type vehicle locking/unlocking keyfobs and certain types of wireless intruder alarm systems. Please refer to the Important Installation Notes in Section 2.2 'Siting the Reader'.

(5)   If after setting the range, the red power LED continues to flash slowly, then the range setting is invalid. Repeat the range setting process.

### 4.3.   Setting the Reader Address (PS-R232-1 type only)

4.3.1. Reader Address Programming

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.

4.3.2. Sub-system address Programming & Routine Reports

Note – The sub-system address function is not supported on current readers or tags. A field upgrade kit will be made available in 1999. However hourly routine presence reports are supported on current static asset tags. Sub-system addresses are normally only used where more than one static asset tag system is used at the same location; it provides 'isolation' between adjacent systems and typically prevents static asset tags on one floor being read spuriously through the floor or ceiling to an adjacent floor.

Four sub-system address codes are available and they are set via switches S2/3 on the underside of the asset tag.
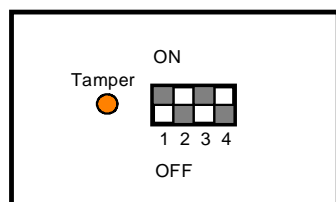
Switch 1   - On/Off
Switch 2/3 - Sub-System Address Code
Switch 4   - Hourly Routine Report On/Off

FIGURE 4 – STATIC TAG SWITCH LOCATIONS

The code setting on the reader (switch S13 poles 3/4) must match the setting chosen for the asset tags belonging to that system. Note that PS-SAT1-1 switch 2 corresponds with reader switch S13/4, and PS-SAT1-1 switch 3 with reader switch S13/3.

Notes
  (1)   Sub-system address code programming applies *only* to Static tags.
  (2)   Portable Asset tags are equipped with the same switch block but switches 2/3 are non functional.
  (3)   Portable Asset tags will also give hourly routine reports if switch 4 is turned ON.   (Not currently supported)
  (4)   If an asset tag is moved or tampered with then the next routine report will be about an hour later.   In other words the internal 1-hour timer inside the tag is reset every time the tag transmits.

4.4. Setting the Indicators & Alarm Functions

4.4.1. Indicator LED Programming

Control of the reader status indicator LEDs is set by switch S13-2. In its default position - OFF - the LEDs are driven by the internal control lines i.e. amber for the personnel and portable asset tags and green for static asset tag.
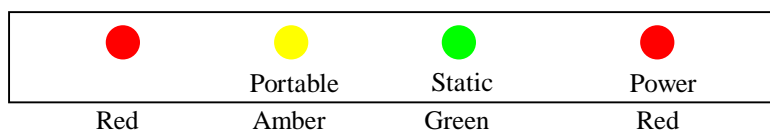

Red	Portable	Static	Power
Red	Amber	Green	Red

FIGURE 5 – INDICATOR LED FUNCTIONS

When switch S13-2 is set to ON, the LED drive is diverted to the main connector panel where they can be controlled by an external voltage source; see Section 3.2, Figure 2 for details of the connections. The external source logic is active low.   In an access control application you may wish to use external LED control to indicate if access has been granted, denied or if the door is permanently unlocked, locked or forced.

4.4.2 Internal Sounder On/Off

The internal sounder may be switched on or off by setting switch S13-1 on or off.

4.4.3. 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 external sounder devices.

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.

4.4.4 External Sensor Operation

Note – this function is not supported on current product. A field upgrade kit will be made available in 1999. This external input is used to prevent any PS-PET-1s and PS-PAT-1 type tags being reported until this input is open-circuited.   It can be connected to any Passive Infra Red, IR beam or any other detection device with a volt-free normally closed contact output.

See Section 3.2 for terminal identification.

4.4.5   Setting the RS 232 baud rate

The default RS-232 baud rate is 9,600 with LK2 not fitted.   Fitting LK2 changes the baud rate to 2,400 which allows cable lengths up to 60m to be used between readers; 9600 baud is limited to 15m.

4.4.6   Static Asset Tag Sensitivity

By adjusting switch S9 it is possible to adjust the sensitivity of the reader to Static Asset Tag movement. So that small movements by say for example the office cleaner will be ignored, but deliberate attempts to move the asset will be detected. The reader processor resets a sensitivity counter every 5 seconds, and the global "sensitivity" of all Static Tags is determined by the number of pulses detected within this interval.
With switch S9 in position 1, the tag's code will be transmitted immediately it is moved (this is equivalent to 1 pulse count). If this is too sensitive try another higher setting. The standard setting for the Static Tag is between 3 and 5 counts. The maximum is 7. Positions 8, 9 & 0 should not be used.

5.   PERSONNEL TAG OPERATION

Personnel type tags (PS-PET-1) are supplied with their batteries not fitted. This is because they transmit every 0.6 seconds continuosly as soon as the batteries are fitted. Fitting them at the factory would result in some loss of battery life.   Typically they will operate for around 14 months before requiring replacement.

To use the personnel tag, open the hinged transparent top and fit the 2 lithium coin cells with the + sign uppermost on to the battery contacts.   You may find it easier to open the lid by gently pushing the long sides away from the grey base. Note the tag number which is printed on the label on the inside. If you wish you can replace the plain white card with any standard credit card sized business card 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.   Now keeping the batteries in position re-close the hinged lid until it snaps shut. Note that the tag will operate with only battery fitted. This is because they are connected in parallel.

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

CAUTION!

Batteries may explode or overheat if incorrectly inserted or short-circuited.   They contain lithium which is *highly* toxic. Dispose of used batteries in a safe and an environmentally friendly way.   DO NOT just throw them in the bin!! Your local authority may be able to advise on safe disposal.   This also applies to used asset tags.

6.   TAG TRANSMISSION TIMING

For non-FCC approved types the transmission times are as follows.

	When moved	*When In Tamper*	*Routine report*
PS-SAT1-1	3 times at 1.2s intervals at high power	Every 0.6s at high power	Every hour at high power
PS-PAT1-1	For 2-3 minutes every 0.6s at low power	Every 0.6s at high power	(Not currently supported)
PS-PET1-1	Every 0.6s continuously at low power	Not applicable	Not applicable

For FCC approved types the transmit times are as follows:

PS-SAT2-1	7/8 times at 0.6s intervals at high power	7/8 times at 0.6s at high power	Every hour at low power
PS-PAT2-1	7/8 timed every 0.6s at low power	7/8 times at 0.6s in high power	Every hour at low power

7   TROUBLESHOOTING

7.1   Reader Reset

Switch S15 provides a reader reset and should be used, by pressing it for 1-2 seconds, 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.

7.2   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 tags operate when in tamper only this would verify this. Note that Demonstration units use the site code 63 and will only read tags with the same site code.

8.   Repair

If for any reason you wish to return the reader for repair or upgrade, before shipping the reader call the Operations Department at Newmark on +44 (0) 1737 788825 and obtain a Repair and Service number (RAS No.).   When calling, please have the following information available:

- Reason for return
- Reader serial number
- Our invoice or sales order number - if known

Mark the package with the RAS number and return it to the address on the front page of this manual.

For readers which are no longer covered by our 12 month warranty, you will need to send us a new purchase order.

The information in this document is subject to change without notice and should not be construed as a commitment by Newmark Technology Limited.   No responsibility is assumed by Newmark Technology Limited for any errors that appear in this document.

9.   Change Record

Change	Date	Description of Change	Affected Sections
ERN 11145	Sept 1997	First release	
ECN 11154	Jan 1998	CaT replaced by RAT	4
ECN 11175	Dec 1998	New PCB switch/links	4 – new section 5
ECN 11176	March 1999	FCC statement added, PET battery fitting	Page 1 new section 7

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