An intruder alarm system is a secondary form of protecting a property. There is little or no point in fitting a system if you have not first considered physical protection. Locks, bolts and on some commercial properties even bars can be a very good form of protection and deterrent. Also remember that a large number of burglaries are carried out with access being gained by the front door. Therefore cut down any high trees or bushes, to ensure that the vulnerable entry points cannot be worked on by the intruder without being noticed by neighbours. If the physical protection and a little pruning is carried out, then backed up with electronic protection this makes a very secure unattractive target.

Before investing in a system it is very worthwhile carrying out a detailed survey of the premises. The best way to start is to draw a sketch plan of the building. Then you should be looking for vulnerable points of entry such as secluded side windows and upper level windows that are accessed by a nearby flat roof.

Once the number of areas for protection have been considered, the type of detectors, warning device, and intruder alarm panel can be selected using the considerations covered in this data sheet.

The Abacus range of panels available from RS is designed to meet the requirements of BS4737 (Intruder alarm systems in buildings, available from HMSO or BSI) when correctly installed and programmed.

Alarm systems explained
First, some basic concepts about alarm installations in general, and how they feature in the Abacus system.

Operational principles
You will need to divide your premises into a number of zones for alarm purposes. Each zone will be protected by an alarm detector. In certain circumstances zones may have been further divided into two alarm detector circuits (Circuit A and Circuit B).

‘Exit Time’ and ‘Entry Time’ is the time allowed to permit the user to leave and enter the premises respectively without causing an alarm condition.

One of the alarm zones must be programmed as a final exit zone. This is the last zone to be closed on exit and the first zone to be opened on entry (normally the front door).

In most alarm installations one or more of the remaining alarm zones will be programmed as an ‘Exit/Entry Route Zone’.

This is the area of your premises that you require to pass through after setting the alarm panel on exit or before unsetting the panel on entry (typically, the entrance hall).

When a zone is programmed as an ‘Exit/Entry Route Zone’ the user has free access within the zone during the ‘Exit and Entry’ time without causing an alarm.

Final exit and entry routes
An important concept in all security alarm installations is the Final Exit and also the Entry/Exit Route.

If the contact (sensors) on the final exit door is triggered when the system is set, the Detectors along the entry/exit route are programmed not to react instantaneously into an Alarm condition. Instead, they have a pre-set delay which gives the user time to turn off the alarm. If you deviate from the Entry/Exit Route, the alarm will Fully activate, triggering the external and internal sounders.

Nite zones and day mode
The alarm system is normally Set to protect the premises whilst they are unoccupied, historically this is usually at night.

Therefore the term Nite has been coined to describe this condition. However, zones set as Fire or Personal Attack give continuous 24 hour protection.

The term Day is used to describe the condition when the panel is unset, with the 24 hours circuits in operation.
**Part setting or going to bed**

In a domestic environment the concept of a Part-set system is very important.

It is highly desirable that, during the night the unoccupied part of the house is fully protected, but free movement is allowed throughout the occupied area, for example, Upstairs.

Under this Part-set condition the Staircase/Hall detector, if fitted, becomes the Final Exit Detector on your route downstairs. It is therefore programmed to delay the alarm by the Exit/Entry time allowing you to go downstairs and turn off the alarm.

**Bells, strobes**

Whatever the alarm condition, it is communicated to the immediate neighbourhood through the local audible ‘Bell’, this could also be a siren or visual Strobe (flashing light).

The primary purpose of the external bell and strobe light is to attract attention in the event of an intruder entering or attempting to enter a protected zone while set. The bell/strobe unit is normally mounted at a high level outside the premises at a point which is easily heard and seen by passers by. The external bell/strobe housing will, in effect, act as a deterrent to burglary, since a potential intruder can see immediately that an intruder alarm system is fitted.

Since the bell/strobe housing is normally located at the front of a premises (in order to attract attention), evidence of an alarm system may not be visible from the back of the premises.

For this reason, it is normal practice to fit one or more ‘Dummy’ bell housings around the premises.

In certain circumstances, several ‘Dummy’ bell housings can be effective (particularly on large premises).

Noise Abatement legislation determines that an alarm bell shall not ring continuously for more than 20 minutes (maximum).

For this reason, all intruder alarm bells are programmed to switch off after a preset period (up to 20 minutes). The strobe light will however, continue to operate until the alarm system is reset by you, the occupier.

**Zones and sensors**

Buildings are divided into Zones which are monitored or guarded by Sensors, also known as detectors or PIRs. These are connected to the ‘Control Panel’ (Abacus) by wired Circuits.

The Abacus system allows for varying amounts of zones, see chart below. (All Abacus panels are supplied with a minimum of six zones.)

<table>
<thead>
<tr>
<th>Model</th>
<th>Maximum number of zones</th>
<th>Maximum number of detection points</th>
<th>RS stock no.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Abacus 6 and 6R</td>
<td>6</td>
<td>12</td>
<td>627-920</td>
</tr>
<tr>
<td>Abacus 8P</td>
<td>8</td>
<td>16</td>
<td>740-477</td>
</tr>
</tbody>
</table>

**System components**

It is important that you are familiar with the various components that go to make up an alarm system, together with their function and the reason for the location selected for each component.

**Abacus control panel**

The basic ‘Abacus’ system comprises a control panel complete with at least one keypad (on board or remote).

The control panel monitors the status of the detectors and tamper loop 24 hours a day. Depending on the mode of operation (i.e. alarm set, chime mode, entry/exit, etc.) it will produce an output condition (i.e., sounder/strobe operating, panel and keypad chime, etc.) either locally at the panel or keypad, or remotely at the sounder unit.

To enable the user to operate the alarm system at convenient locations throughout the premises, up to six additional remote keypads can be fitted to the system, in addition to the main control panel.

The alarm system responds to simple commands which are entered through the numeric keys on the control box or, if fitted, small unobtrusive keypads.

The remote keypad allows the user to perform all user functions, as if at the main control panel.

The responding messages are displayed on a 2 character (LED) screen or a 32 character (2 line) screen (LCD).

These messages are highly informative and personalised, and this makes the system intelligent and user-friendly.

The remote keypads have a ‘Help Button’ feature, comprising two separate push buttons. When pressed simultaneously will perform a pre-selected function.

The remote keypad ‘Help’ buttons can be programmed by the installation engineer as ‘Fire’, ‘Medical’, ‘Panic’ alarms or Set, Part Set or select the chime function.

**Detectors**

A wide range of detectors is available to detect the presence of an intruder in your premises or attempting to gain unauthorised access.

The type of detectors selected will depend on the type of premises, the level of protection required, the general environment surrounding the property.

For normal domestic and commercial environments, these types of detector are in common use.

1. **Door contacts**

A set of magnetic contacts (switches) installed on a protected door (or a window) which will signal to the Abacus alarm panel if the door is opened. (RS stock nos. 335-536, 333-192, 337-396, 333-192).

2. **Vibration detector**

A small security device fitted to a protected door, window or wall to signal to the Abacus alarm panel if a large amount of vibration is detected, such as an intruder forcing a hole through a door. (RS stock no. 740-406).

3. **Movement detectors**

For example, passive infra red or PIR.

A security device normally fitted at head height within a room or corridor to detect the presence of an intruder within the area covered by the detector. (RS stock no. 303-499).

4. **Panic buttons**

Push button devices strategically situated throughout the premises and connected to the Abacus panel which signal a ‘Daresse’ alarm when pressed.

The panic buttons are always armed and will therefore operate regardless of whether the panel is set or unset.

Pressing a panic button will create a full alarm condition (External and Internal sounders).

Once pressed the panic buttons normally require resetting by a special key, provided with the unit, (RS stock no. 156-666).
5. Pressure pad switches
These are usually mounted underneath carpet to detect the presence of a person walking across. The most typical position is mounted under stair carpets, (RS stock nos. 317-140 and 821-942).

6. Passive Infra Red Detectors
These products detect movement in a specified zone. For further information see the PIR detectors data sheet.

System layout
The system layout shown below is a guide to typical positions of the system components. This will obviously vary depending on the premises and level of protection to be afforded. However the general rules given cover all installation layouts.
6. The control panel requires a 230Vac power source. An unswitched fused spur preferably direct from the consumer unit on its own fuse wired in accordance with the current IEE regulations should be provided.

Using the above general rules you should plan your installation on your sketched drawing considering the panel sitting, how the cable runs can be minimised, where different types of detector will be fitted and which zone they will be on. When you have finalised your plan you can begin installation. However lets consider types of wiring first so you may select the correct cable for the installation.

2. PIR detectors are best fitted where an intruder has to pass through an area to gain access (i.e. halls and landings) or to protect specific valuable items (i.e. lounge). Care should be taken in siting to avoid direct sunlight, strong lighting and heat sources (hence the vibration detectors in the kitchen) as these may cause nuisance tripping. They are best sited so the intruder cuts across the field of view, (Figure 1) (some products are specifically designed for long corridors in this instance this rule 3. does not apply), hence a corner position is usually adopted.

3. PIR, vibration detectors, etc. all have complex electronics. These are best given their own zone as in the event of a fault occurring isolating the fault will be quicker and nuisance tripping quickly eliminated. Magnetic door contacts tend to be very reliable if installed well within their magnetic actuation limit. Hence these can be put in series together on a loop if appropriate. They are also easier to test if faulty.

4. Wiring is best concealed where possible to prevent damage and tampering. Try to avoid running alongside mains cables as interference may occur.

5. The sounder/strobe unit should be fitted well above head height to avoid tampering. The wiring should pass directly through the wall behind the bell to make it inaccessible.

232-4336
Wiring

General
The conventional wiring from an alarm panel consists of the detector circuit, the tamper circuit, and where the detector requires it, a 12Vdc supply, (Figure 2).

Figure 2 Tamper circuit

Hence for a magnetic door switch 4 core cable would be required and for a PIR, 6 core cable. The detector usually has 2 sets of integral contacts both normally closed (N/C) as illustrated in Figure 2 by A, B and C. The tamper contacts are usually activated by removal of the cover of the detector. The alarm system will give an alarm irrespective of the system setting when a tamper contact is opened. The detector contacts open when an intruder is detected. A full alarm condition will only be given if the alarm is set.

Note: Chimes may be given if the panel is programmed to do so if the alarm is not set.

Abacus wiring

Detectors
The Abacus range of panels is compatible with conventional 4 and 6 wire devices, (Figure 3). However, to reduce cabling, the Abacus range of panels can be wired in 3 or even 2 wire protocol (Figure 4 and Figure 5) with the simple addition of some resistors on the detectors.

Figure 3 Conventional 4 and 6 wire devices

Zone splitters
As it is good practice to install one detector per zone you can soon find that you have exhausted the zones available. In order to overcome this without the need for a more expensive panel the Abacus zones can be divided into A and B (e.g. zone 1A and 1B etc.). This can be achieved with a Zone splitter:

(RS stock no. 627-958)
The zone splitter enables connection of conventional detectors as illustrated in Figure 6 using 3 wire connection to the splitter.

Figure 6 Zone splitter
Alarm programming
The Abacus range of panels can easily be programmed with entry/exit routes, part setting, chime zones, fire zones, etc. Each panel is supplied with a comprehensive instruction leaflet detailing how to achieve this. As long as you have planned your layout and work carefully you will have no problem in being successful.

Associated security products
It is recommended that the RS alarm control panel is used in conjunction with the products specifically designed for security applications. This data sheet has been written assuming RS security products have been used throughout. A list of suitable security products is given below.

<table>
<thead>
<tr>
<th>Product</th>
<th>RS stock no.</th>
</tr>
</thead>
<tbody>
<tr>
<td>4-core signal cable</td>
<td>365-571</td>
</tr>
<tr>
<td>6-core signal cable</td>
<td>365-587</td>
</tr>
<tr>
<td>Tamper proof 6 way terminal block</td>
<td>424-381</td>
</tr>
<tr>
<td>Flexible jumper loop</td>
<td>424-377</td>
</tr>
<tr>
<td>Pressure pad switch (small)</td>
<td>317-140</td>
</tr>
<tr>
<td>Pressure pad switch (large)</td>
<td>317-156</td>
</tr>
<tr>
<td>Flush mounting reed proximity switch</td>
<td>333-158</td>
</tr>
<tr>
<td>Flush mounting reed proximity switch</td>
<td>337-396</td>
</tr>
<tr>
<td>Surface mounting reed proximity switch</td>
<td>333-192</td>
</tr>
<tr>
<td>Surface mounting reed proximity switch</td>
<td>335-536</td>
</tr>
<tr>
<td>Roller shutter reed proximity switch</td>
<td>625-671</td>
</tr>
<tr>
<td>Personal attack switch</td>
<td>299-4676</td>
</tr>
<tr>
<td>Zone splitter</td>
<td>627-958</td>
</tr>
<tr>
<td>Vibration detector</td>
<td>740-483</td>
</tr>
<tr>
<td>12V 3.0Ah lead acid battery</td>
<td>591-938</td>
</tr>
<tr>
<td>LCD keypad</td>
<td>627-936</td>
</tr>
</tbody>
</table>

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