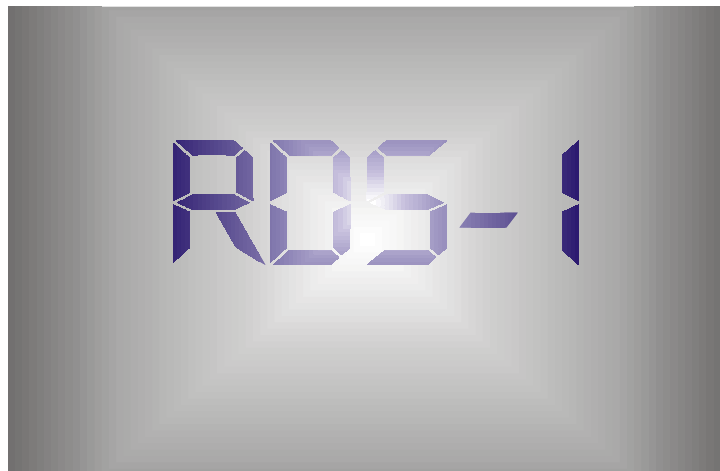# ThermoCryotechnics

RDS-1

REMOTE DATA/ALARM SYSTEM

SYSTEM ADMINISTRATORS
MANUAL

ABRIDGED FOR FCC
APPLICATION
FULL VERSION AVALIABLE IF
REQUIRED (85 Pages)

REMOTE DATA SYSTEM

FCC REGULATONS

NOTE: This equipment has been tested and found to comply with the limits for a class A digital device, persuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses and can radiate radio frequency energy and if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user wil be required to correct the interference at his own expense.

IMPORTANT INFORMATION !

READ BEFORE USE

CAUTION   Modifications to this equipment which are not expressly approved By Thermo Life Sciences development department could void the Users authority to operate this equipment.

WARNING   Do NOT short circuit the battery as this may cause a risk of explosion**.**

ELECTRIC SHOCK RISK. Isolate the power supply before removing any cover.

BURN HAZARD. Installation and maintenance of temperature probes should only be carried out by users who are qualified and are familiar with the required safety procedures applicable to the equipment to which the probe is being fitted.

Ensure each part of the system is installed securely and in such a way that it does not obstruct normal access to surrounding areas and is kept away from excessive heat and moisture.

Read the user manual before installing or making changes to the system.

Version 1.00
2001-03-05

CONTENTS

INTRODUCTION

The RDS system has been designed as an integrated data acquisition and equipment monitoring system. Installation and maintenance of the system is simplified as
All data and alarm signals are sent using a wireless protocol specially developed to ensure complete data integrity and reliability.
There are no wires or cables to run which eliminates the need for physical connections between each part of the system, thus removing one of the main difficulties in the installation of any new system in an existing environment.
The transmission protocol incorporates many advanced data protection features to ensure that all transmitted data is received without error.
All elements of the RDS system have undergone stringent RF emissions and Susceptibility testing by a recognised independent testing facility, See the section *RF EMISSIONS TEST* for details.
The RDS system is self monitoring[1] and is able to detect failure of any of the remote Sensors thus avoiding the need for the user to manually test each unit.
All Data received by the system, including any alarms, can be logged onto a computer using the RDS system software for easy equipment monitoring and retrospective analysis of equipment performance. The software also provides you with a permanent record of all the received data and any alarms.
Most aspects of the system can be automated allowing equipment to be monitored and Data to be logged with a minimal of time and effort from the end user.
When connected to a suitable telephone line the system can automatically call for assistance should any equipment develop a fault.
The RDS system itself can be linked to and existing alarm system to provide an additional level of security.
The system is supplied with full technical support from the manufacturer to provide you with any installation and configuration needs that you may have.

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[1] Subject to any local legislation

CHAPTER ONE

SYSTEM PLANNING

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IMPORTANT

Please read this manual carefully before attempting to install or modify an RDS system. Maximum system performance and reliability can only be obtained by proper installation and setting up of this system.

</div>

A complete RDS system consists of four main parts.

       Receiver
       Transmitter(s)[1]
       Transponder(s)[2]
       Computer[3]

The receiver is the hub of the RDS system as all data and alarms are sent to and processed by it. Each transmitter is configured and programmed into the system using the receiver and once entered into the system they are constantly monitored.
When connected to a suitable phone line the system can be configured to selectively call for assistance should an alarm be detected.
The RDS system can discriminate between different types of alarms allowing different actions to be taken depending on the type of alarm encountered. All alarm settings are under the control of the end user so the system can be tailored to suit any environment.
If required then a computer[4] can be connected to the system allowing all data and alarm codes to be saved as a permanent record. The computer software also allows The user to view specific information about any or all remote transmitters including All data received, any alarms received and the location of each piece of equipment being monitored.
The system can be expanded[5] as and when required by simply adding a new transmitter.
The use of one or more transponders allows the system to be extended beyond the normal range of the transmitters or can be used to provide multiple signal paths for *difficult* environments thus maintaining system reliability.
Each RDS receiver can be programmed with a unique GROUP code which allows more than one RDS system to operate in the same location. This enables the system to

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[1] One transmitter is required for each piece of equipment to be monitored.
[2] Transponders are used to extend the range of the system and may not always be required.
[3] A computer is not essential to system operation unless data logging is required.
[4] The computer must have the RDS system software installed.
[5] Each unit can monitor a maximum of 255 units (unlimited if unique identification is not required).

be extended still further and also enables the system to be set so as not to interfere with any existing installations.

Once installed the RDS system will maintain a constant watch over any equipment Connected to the system so giving the user complete peace of mind and maximum Response speed should any problems arise.

The RDS system itself can be wired to a fail safe alarm so that if the system itself Fails then the user is made aware of the problem.
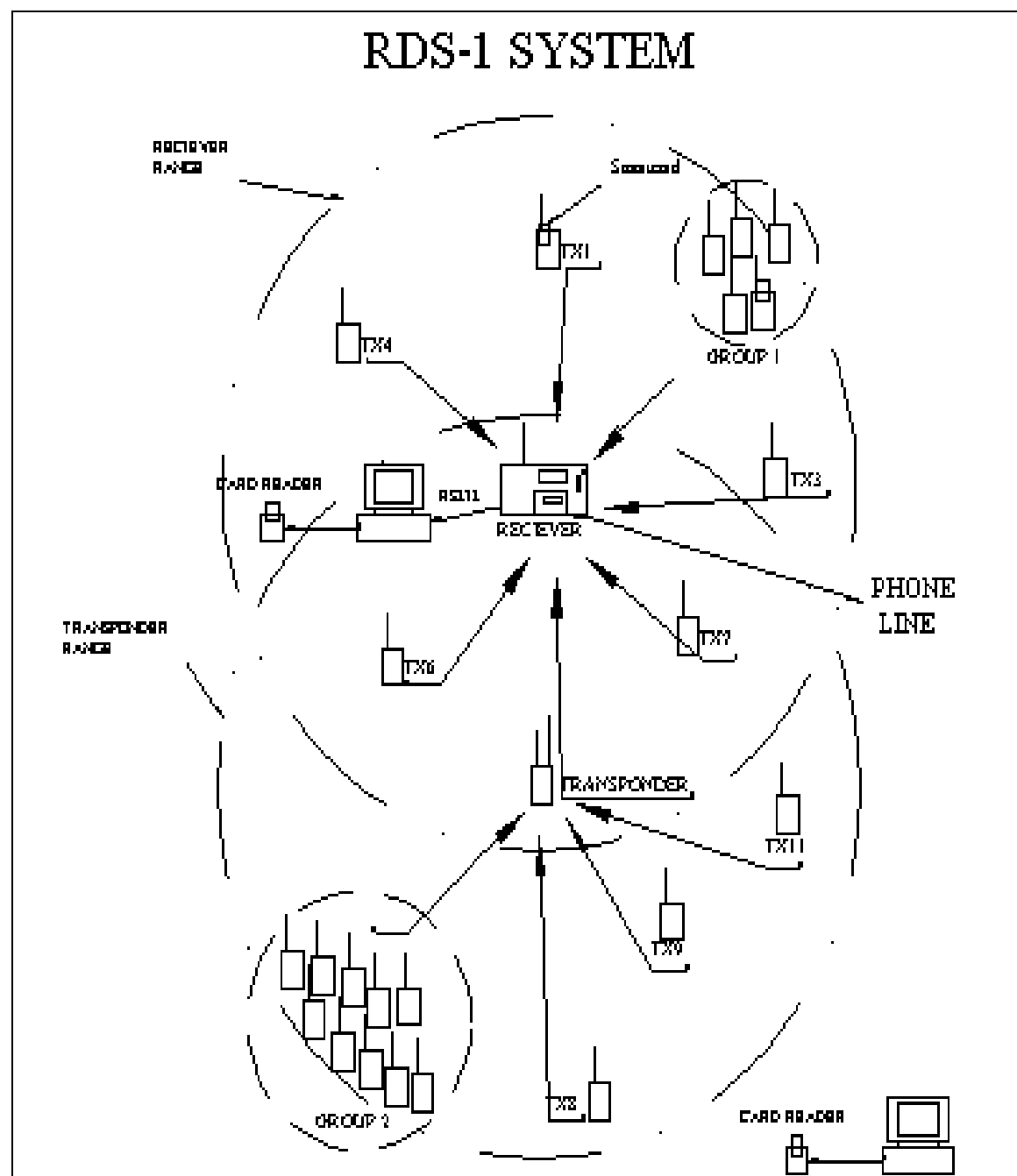
Figure 1 shows a *typical* RDS system set-up

Figure 1

The rest of this manual explains how to install and get the best from the RDS system.

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<u>IMPORTANT</u>

Please read this manual carefully before attempting to install or modify an
RDS system. Maximum system performance and reliability can only be
obtained by proper installation and setting up of this system.

</div>

The RDS system comprises several separate components which must all be
Correctly installed in order for the system to operate properly.
The following sections explain how to install the equipment.
Later sections detail how to configure and program the system along with
Suggestions and guidelines as to how to get the most out of this equipment.

The steps involved for installing an RDS system are.

      SITE SURVEY[1]
      RECEIVER INSTALLATION
      TRANSPONDER INSTALLATION[2]
      COMPUTER INSTALLATION[3]
      PROGRAMMING THE RECEIVER
      PROGRAMMING THE TRANSMITTERS
      INSTALLING THE TRANSMITTERS
      TESTING THE TRANSMITTERS
      COMPUTER SOFTWARE INSTALLATION[4]
      SD1 PROGRAMMING
      SYSTEM TESTING

SITE SURVEY

A site survey is desirable to determine the best location for the receiver and any
transponders that may be required. All installed transmitters will need to be able to
communicate with the receiver either directly or via one or more transponders.
Unfortunately it is not possible to specify an absolute range for a transmitter as this
will be largely influenced by environmental conditions such as power conduits,
heating ducts, other equipment etc. It is therefore necessary to first decide on a
location for the receiver and then to check any locations in which transmitters are to

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[1] A separate site survey form should be filled out for each receiver installed.
[2] Transponders are only required to extend the range of the system or provide multiple signal paths.
See the section *SITE SURVEY* for details
[3] A computer is not essential for system operation unless data logging is required.
[4] This step only applies if a computer is added to the system.

be used to determine if a transponder is required in order to give reliable communications.

Should it be found that a transponder is required then the best location for this should Be determined in order that the maximum area be covered and to avoid installing more transponders than are required.

If possible the site survey should be carried out by an installation engineer and the person (or persons) who will be responsible for the day to day running of the system. This will ensure that the system is set up exactly the way the customer requires.

Although the system can be set up using trial and error the best solution will be found By using a ground plan of the site in which the system is to be installed and marking on it any known sources of interference. See appendix A for a list of possible sources Of interference.

Once this is complete the location for the receiver should be determined bearing in mind the following requirements.

1	A source of electrical power will be required. See Appendix B
2	Choose a central location if possible.
3	The receiver must be accessible.
4	Try not to locate it too close to Sources of interference. See Appendix A
5	Locate as high as possible.
6	If automatic calling is required then access to an outside phone line is required.
7	To use the fail safe alarm or local 'switchboard' alarm a hardwired local alarm connection will be required.
8	If connection to a computer is used then provision for this must be considered.
9	Avoid excessive Heat, Cold, Humidity and vibration.
10	The receiver does NOT need to be in a place where it can be constantly monitored.

During this phase of the survey a *GROUP* code should be agreed upon.

A group code is a unique code range used by the transmission protocol so that multiple receivers can be used in the same location. If this is the only Receiver in use Then the code may be left at the default setting[1] otherwise it will need to be set to a code that is NOT used by any other receiver on the same site[2].

Make a note of the *GROUP* code agreed upon and enter it into site survey form.

Once the receiver location has been determined each location where a transmitter is to be used Will require checking to ensure that reliable communications with the receiver is Possible. Take into account any equipment on the site which may cause interference intermittently when carrying out this testing.

During this testing include any areas where transmitters may be added in the future otherwise any transponders that may be Required may not be Installed in the best location. This could result in you having to relocate transponders when new transmitters are added to the system or even installing more transponders than would otherwise be necessary.

During this testing it may become evident that one or more transponders are required.

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[1] The default GROUP code is 00

[2] Unless the other systems are well out of range including any transponders.

When locating transponders please observe the following recommendations.
1   A source of electrical power will be required. See Appendix B
2   Choose a location that will serve as many transmitters as possible.
3   Try not to locate it too close to Sources of interference. See Appendix A
     Locate as high as possible.
4   Avoid excessive Heat, Cold, Humidity and vibration.
5   Try not to locate it too close to Sources of interference. See Appendix A
6   Locate as high as possible.

Transponders may sometimes be required due to adverse environmental problems
Such as high levels of interference from other equipment or large conductive
obstacles such as metal clad walls. In all cases try to follow the recommendations
given above.

Once all locations have been tested and positions for any transponders determined
then a completed site survey form should be completed and included with the
equipment order.

When the equipment is to be installed please refer to the chapter
INSTALLING THE SYSTEM.

After installing the system please refer to the chapter
PROGRAMMING THE SYSTEM
For details on how to set-up the system

If a computer is to be used please refer to the chapter
WINDOWS SOFTWARE

CHAPTER TWO

INSTALLING THE SYSTEM

RECEIVER INSTALLATION

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CAUTION
INSTALLATION OF THE RECEIVER INVOLVES CONNECTION TO
THE MAINS SUPPLY AND SHOULD ONLY BE UNDERTAKEN BY
A QUALIFIED ENGINEER.

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After removing the receiver unit from all packing the two screws securing the front
panel of the receiver should be removed.
The front panel cannot be completely removed from the unit due to connections to the
Autodialer and care should be taken not to damage any internal parts of the receiver.
The receiver should now be secured into its final location, as identified in the site
survey, using suitable fastenings for the wall type.
If required connect the supplied external alarm to the connector on the receiver PCB
Marked *EXT*. Connect the other end of the external alarm cable to the external alarm
system. See the section *EXTERNAL ALARM CONNECTION* for details.
Connect the Phone line from the receiver unit into a suitable approved external phone
line socket[1].
Remove the Battery[2] from its packing and place in the lower right section of the
receiver enclosure with the battery terminals towards the right side of the enclosure.
Connect the Black connector marked *BATT –VE* to the battery negative terminal and
the Red connector marked *BATT +VE* to the battery positive terminal

NOTE
Connecting the battery activates the receiver.

Carefully refit the front panel to the receiver and replace the two screws taking care
not to overtighten them.
If a computer is to be connected to the system then connect the supplied serial cable to
a spare serial connector on the computer.
Connect the Mains inlet cable to a suitable power source. See appendix B for
Details on power requirements.
Switch on the mains power.

The receiver is now installed and should be programmed. Please refer to the chapter
PROGRAMMING THE SYSTEM for details.

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[1] For details regarding the type of phone connection to use Please refer to the Autodialer user manual
supplied with this product
[2] Use of a non approved battery type could result in system malfunction or permanent system damage.

TRANSPONDER INSTALLATION

If your system does not require any transponders, as determined during the site Survey then please skip this section.
Should it have become necessary to install one or more transponder due to system expansion then please refer to the guide lines in the section **SITE SURVEY** in Chapter one for a suitable location.

Remove the access panel on the rear of the transponder unit.

Using JP1 & JP2 inside the unit select the required *GROUP* code as agreed upon during the site survey by referring to the following table.

GROUP code	JP1	JP2
00	ON	ON
01	ON	OFF
02	OFF	ON
03	OFF	OFF

Connect the mains adapter to the transponder.

Fit the shorting link to JP3. This will apply power to the unit.
The LED will show a steady Green for approximately 1 minute after which
A flashing Green is shown.

Replace the access panel.

Connect the transponder power adapter to a suitable supply. See Appendix B for details on power requirements.

Fit the transponder unit into the required location.

Installation is now complete and the unit should be tested as described in the next section.

Repeat the installation procedure for all transponders that are to be installed into the system.

TESTING THE TRANSPONDER

Press the **TEST** key for approximately 10 seconds. The LED should flash red briefly once every 2 seconds. This indicates that the unit is working.
The test signal should be picked up by the RDS-1 Receiver.

NOTES
1   Occasionally the LED will briefly flash Red. This is normal.
2   Should the mains supply fail the unit has internal battery backup which will
         Maintain normal operation for approximately 12 hours.
3   If the unit is to be disconnected from the mains supply for any length of time
         then JP3 should be removed to preserve internal battery charge.
         Note that Removing JP3 disables the unit.

TRANSMITTER INSTALLATION

Before a transmitter can be used it must be programmed into the system. See the section *PROGRAMMING THE TRANSMITTERS* in the chapter *PROGRAMMING THE SYSTEM* for details.

Position the probe or sensor in the location which is to be monitored or connect the alarm input lead to the equipment alarm connector. For more details on probe types and alarm inputs. See Appendix D
Fit a new battery to the transmitter unit.
The unit will emit a series of short beeps and the LED will briefly flash Green/Red
Indicating that the unit is active.
Attach the Transmitter unit securely to the side panel of the equipment which is to be monitored. The unit should be mounted as high as possible and if practical the aerial should extend beyond the top of the equipment.

Installation is now complete and the unit should be tested as described in the next section.

Repeat the installation procedure for all transmitters that are to be installed into the system.

TESTING THE TRANSMITTER

Press the TEST key for approximately 10 seconds. The LED should flash red briefly once every 2 seconds. This indicates that the unit is working.

The test signal should be picked up by the RDS-1 Receiver.

Two modes of operation are available for the transmitters and are described in the next two sections.

TRANSMITTER BATTERY OPERATION

When powered by the internal battery the LED will not be illuminated and the
Unit will switch to low power mode.
Should an alarm condition be detected then the LED will begin to flash Red.
After the pre-set delay an audible alarm will be sounded and the alarm code
Will be sent to the Receiver.
Press the MUTE key to silence the alarm. The LED will continue to flash Red.
To clear the alarm the fault condition must be corrected.
If the fault condition is not corrected[1] then the unit will repeat the transmission
Of the alarm code every *pre-set delay period*[2] until the fault condition is cleared.
During battery operation the period timings are approximate.

TRANSMITTER MAINS OPERATION

When a suitable mains adapter[3] is used to power the Transmitter then the unit
Automatically switches into Precision operation mode.
The LED is illuminated steady Green.
In this mode all timings are very precise.
Should the mains fail then the unit will automatically switch to internal battery
Operation.

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[1] If a transmitter is left in an alarm mode for any length of time then the battery life will be reduced.
[2] See the section PROGRAMMING THE TRANSMITTERS in the Chapter PROGRAMMING THE SYSTEM for an explanation of this feature.
[3] See Appendix B for details on power requirements.

NOTES
        Occasionally the LED will briefly flash Red. This is normal.
        If a transmitter is left in an alarm mode for any length of time then the
        Battery life will be reduced.

Refer to the SD1 Operators manual for details on how to program the SD1 and record
The appropriate voice messages.
Refer to Appendix C for a guide to setting up the SD1 for best results.

If a computer is to be connected to the system then Please refer to the Chapter
WINDOWS SOFTWARE for details on how to install and operate the RDS system
software.

Installation of the RDS system is now complete. All remote units should be given a
final test and the system should be monitored for the first 6 hours of operation.
Should any faults arise then Please refer to the Chapter **RDS SYSTEM FAULTS**.

CHAPTER THREE

PROGRAMMING THE RECEIVER

Most of the features in the RDS system are configured using the software set-up menu giving the user total control over the way the system operates.
All system settings can be reprogrammed at any time although for maximum system Integrity it is advisable to adopt a common approach when programming different parts of the system.
Please take time to read and understand all the settings described in this section before Changing any system settings. If in doubt the contact the system supplier for advise. Many of the features should already have been discussed during the site survey so simplifying the set-up process.

There are two main programming tasks.
Receiver set-up
Transmitter programming

For instructions on programming the transmitters Please refer to the next Chapter
PROGRAMMING THE TRANSMITTERS

CHAPTER FOUR

PROGRAMMING THE TRANSMITTERS

Before a transmitter can be used it must be programmed with the required system settings[1]. It is also necessary to program the transmitter into the system before the system can properly monitor it[2]. Both operations are carried out at the same time. The RDS receiver unit is used to program the transmitters as outlined in the Following sections.

For maximum system reliability the programming of transmitter units should be carried out by whoever is responsible for the day to day operation of the system. This will enable the operator to maintain a consistent system set-up which will become more important as the system grows.

Programming of the transmitters is performed using an infra red beam after first selecting the required transmitter settings via a menu system on the RDS receiver As explained in the following section.

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[1] For an explanation of the meaning of each setting Refer to the section
TRANSMITTER OPTIONS
[2] It is possible to operate the RDS system without the transmitters programmed into it but the system will be unable to detect failure of the transmitters under these conditions.

CHAPTER FIVE

OPERATING THE RECEIVER

For information on installing the receiver Please Refer to Chapter 2

MAIN DISPLAY MODE

The receiver will usually be in *MAIN DISPLAY MODE* unless any specific action is being performed by the user or an uncancelled alarm is being displayed.
If new data has not been displayed and no alarm condition is being displayed then the display backlight will switch off after 15 seconds.
In this mode the top line of the display shows *REMOTE DATA SYSTEM* and line 2 displays **ACTIVE**.
The bottom line displays the current Time and Date.
Any new data is displayed on line 3 and indicates
RECEIVED iii ddd
Where iii is the *ID CODE* of the sending unit and ddd is the data sent.
Should an alarm be transmitted the display changes to *ALARM DISPLAY MODE.* See the next section for details.

NOTE
       Any incoming data will cause the Alarm led to flash Green briefly.

CHAPTER SIX

ALARMS

This chapter explains the different alarm types that the RDS system can detect and the way in which the system can deal with them.

Possible alarm types are.

ALARM
LOST CONTACT ALARM
LOW BATTERY ALARM
NO MAINS ALARM
CARD ERROR ALARM
UNKNOWN ALARM

TO SILENCE A TRANSMITTER ALARM PRESS THE RED MUTE BUTTON

CHAPTER SEVEN

SYSTEM MANAGEMENT

This chapter explains how to manage and expand a current RDS installation.

A single RDS receiver can communicate with up to 255 transmitter units or many more if unique identification of the units is not required.
During a typical system installation only a few transmitters are installed leaving a great scope for future system expansion.
It is also possible to use more than one receiver at one location which increases the scope for expansion even further.
As new equipment is installed it can be equipped with a transmitter and added to the RDS system. In this way it will be possible to monitor ALL your site equipment from One central location.
The sections in this chapter outline the day to day running of the system and describe the steps required to add more transmitter units as they are required.

DAY TO DAY SYSTEM OPERATION

The RDS system does not require any regular user maintenance except replacing any Transmitter batteries as required.

The location of any transmitters in the system along with their settings should be recorded in the *REMOTE UNIT LOCATION TABLE* at the back of this manual.
This will save time when trying to locate individual units and greatly help in system Maintenance should it become a requirement.

CHAPTER EIGHT

PROGRAMMING THE SD1+ AUTODIALLER

CHAPTER NINE

DATA LOGGING

NOT YET AVALIABLE

CHAPTER TEN

SYSTEM FAULT FINDING

Should a fault develop in the system then this chapter explains how to find and correct the cause.

CHAPTER TEN

RF EMMISIONS TESTS

This RDS system has be subjected to very stringent emissions and susceptibility tests by a specialist independent test facility. These tests are to ensure that this system performs correctly in all environments and does not interfere with other equipment. The actual tests that this system has been subjected to are well beyond those that are required by current legislation. This was done to ensure maximum system performance and reliability whatever the working environment.

A copy of all RF emission and susceptibility test results can be obtained from your equipment supplier.

CHAPTER ELEVEN

RDS WINDOWS SOFTWARE

This chapter gives you a quick guide to installing the RDS system WINDOWS
software.
For a more complete guide on how to use this software please refer to the program
HELP files.

APPENDIX A

SOURCES OF INTERFERENCE

The RDS system operates using a specially developed radio transmission protocol and Has been tested and found to be very stable and resistant to external interference. However for maximum system performance and reliability certain types of interference should be avoided as far as possible.

APPENDIX B

POWER REQUIREMENTS

RECEIVER POWER

110V 60Hz 25W   +   12v 1.2Ah internal battery

TRANSMITTER POWER

Internal battery   9v   6LR61 (PP3 Alkaline)
            Or
Internal battery   9v   15F8K (PP3 NiCd)

TRANSPONDER POWER

Mains adapter   12v   DC   40mA

APPENDIX C

SETTING UP THE SD1 AUTODIALLER

Refer to the SD1 User manual for details on programming the autodialer.

APPENDIX D

TYPES OF PROBES AND INPUTS

INDEX