

# **SPRscan Manual**

## **Hardware**

Ref: SPR0002  
Issue: 001  
26 May 1998







## **Copyright information page**

- © Copyright 1998  
No part of this document may be photocopied or otherwise reproduced without the prior permission in writing of ERA Technology Ltd. Such written permission must also be obtained before any part of this document is stored in an electronic system of whatever nature.

## Using this handbook

This handbook has been written to provide the SPRscan user with clear, concise instructions in the assembly and care of the radar. In order to avoid repeating sets of instructions, icons have been used to inform the user which assembled components are required for a particular section. If an icon appears in the requirements section, turn to the pages describing the assembly of that component and follow them carefully.

### Key

	Controller
	Antenna with radar head installed
	Pull handle system
	1 GHz antenna system with radar head installed
	Harness system
	Warning

## **Contents**

<b>Copyright information page</b>	<b>2</b>
<b>Using this handbook</b>	<b>3</b>
<b>Contents</b>	<b>4</b>
<b>Parts Lists</b>	<b>7</b>
SPRscan3D System	7
Option : Trolley System	8
Option : Trolley Rough Ground Option	9
Option : 1 GHz Antenna System	10
Option : 2 GHz Antenna System	11
Option : 250 MHz Antenna	12
<b>Modes of Operation</b>	<b>13</b>
<b>Description of Parts</b>	<b>16</b>
Controller	16
Head Electronics Unit	17
General Antenna	18
1 GHz antenna	19
Function Handle	20
Trolley	21
<b>General Assembly of parts</b>	<b>22</b>
Controller	22
Installing the Head Electronics unit into an antenna or antenna belt case	23
The pull handle system	25
Assembly of pull handle	25
Attaching the handle to the antenna	26
Setting up for field use	27
Connecting the antenna/Head Electronics unit combination to the controller	27
One-Man Harness Operation	27
Using the harness – 500/250 MHz	27

Using the harness – 1 GHz backpack	29
The Standard Trolley Option	30
Adding the antenna	30
Adding the controller	31
The Rough Ground Option	31
<b>Pictorial Guide To Assembling the System</b>	<b>32</b>
<b>Proximity Sensor Calibration</b>	<b>36</b>
Calibration Procedure	36
<b>Dead Man's Handle</b>	<b>36</b>
Using Optional Peripherals	38
<b>Standard System : Technical Specifications</b>	<b>39</b>
Controller	39
Control	39
Display	39
I/O provision	39
Software	39
System Scan Modes	40
Head Electronics Unit (Tx-Rx)	40
500 MHz Antenna (P – 0500)	40
Environmental & build specifications	40
SPRscan Standard Parts List as supplied (+ shipping weight in kg)	41
Antennas : Technical Specifications	42
Model P-0250 250 MHz	42
Model P-0500 500 MHz	42
Model P-1000 1000 MHz	42
Model P-2000 2000 MHz	42
Optional extras	43
<b>Limitations on using the SPRscan</b>	<b>44</b>
<b>Maintaining the SPRscan System</b>	<b>45</b>
Cleaning the System	45

<b>Distributor and Technical Support Contact Information</b>	<b>46</b>
Manufacturer	46
Distributors	46
United Kingdom – Home Counties and London	46
Belgium	47
Czech Republic	47
Germany and Austria, Luxembourg, Netherlands, Switzerland	47
Italy	47
South Korea	48
United States of America	48
<b>SPRscan Electromagnetic Compatibility (EMC)</b>	<b>52</b>

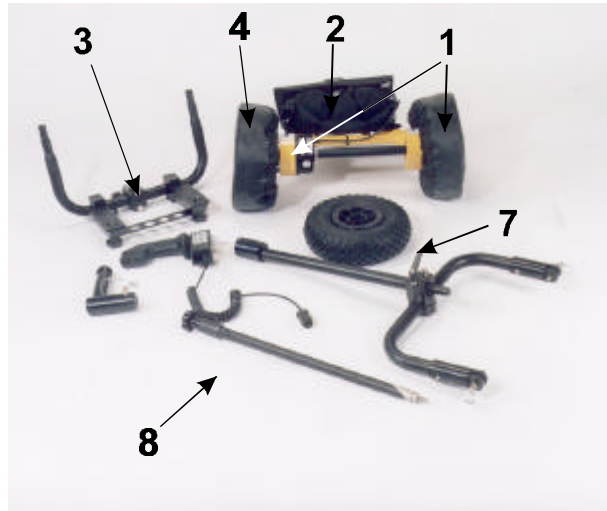
## Parts Lists

The following section illustrates the component parts supplied with each SPRscan option

### ***SPRscan3D System***



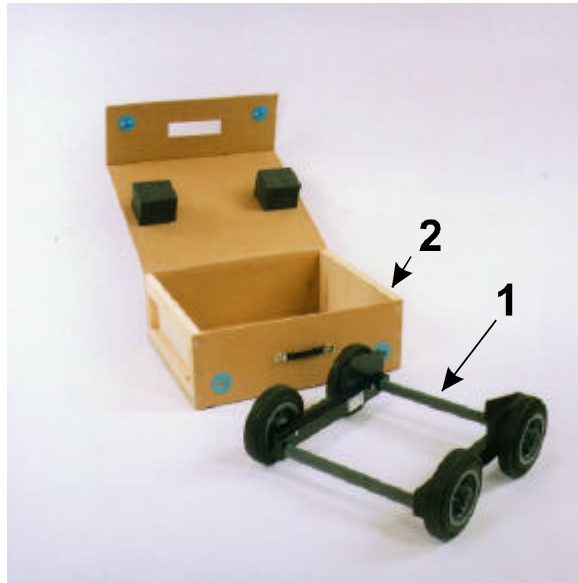
- |   |                          |    |                            |
|---|--------------------------|----|----------------------------|
| 1 | 500 MHz antenna          | 10 | Display visor              |
| 2 | Head electronics unit    | 11 | Manuals                    |
| 3 | Controller unit          | 12 | Document and software pack |
| 4 | Battery packs – 2 off    | 13 | Carry cases – 2 off        |
| 5 | Battery chargers – 2 off | 14 | Keyboard                   |
| 6 | 2 m data cable           | 15 | Mouse                      |
| 7 | Power cable              | 16 | Carry harness              |
| 8 | Mains adapter            | 17 | Function handle            |
| 9 | Handle system            |    |                            |

***Option : Trolley System***

- |   |                                    |   |                                |
|---|------------------------------------|---|--------------------------------|
| 1 | Wheels with integral shaft encoder | 5 | Transit case (not illustrated) |
| 2 | Battery bag                        | 6 | Tool roll (not illustrated)    |
| 3 | Computer handle assembly           | 7 | Spare wheel                    |
| 4 | Wheel covers, on wheels            | 8 | Handles                        |

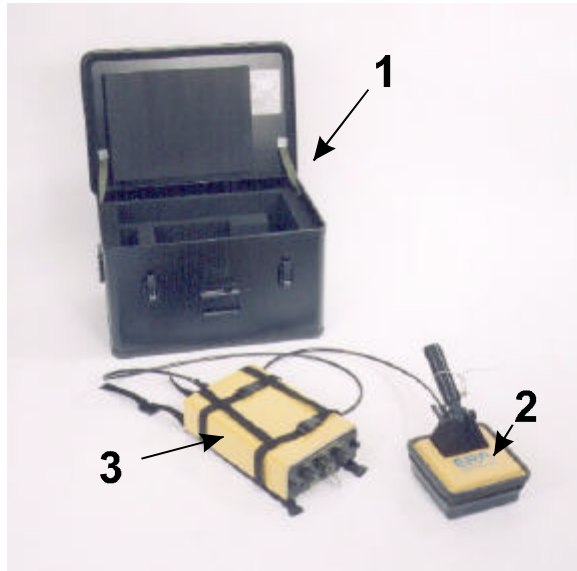


***Option : Trolley Rough Ground Option***



1 Rough Ground Option

2 Transit case

**Option : 1 GHz Antenna System**

- 1 Transit case
- 2 1 GHz antenna with sacrificial skid tray
- 3 Head electronics unit with backpack

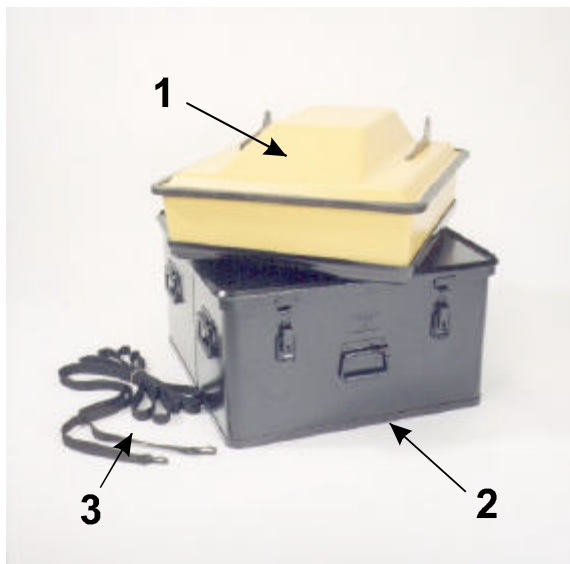
*Note: The system illustrated shows a head electronics unit installed. This is NOT part of the 1 GHz option.*

**Option : 2 GHz Antenna System**

- 1 Transit case
- 2 2 GHz antenna

3 Head electronics unit with backpack

*Note: The system illustrated shows a Head Electronics unit installed. This is NOT part of the 2 GHz option.*

***Option : 250 MHz Antenna***

- |   |                 |   |              |
|---|-----------------|---|--------------|
| 1 | 250 MHz antenna | 2 | Transit case |
| 3 | Pull cable      |   |              |

## Modes of Operation

The following section illustrates some of the ways in which the SPRscan can be deployed in the field. The selection is not exhaustive but is intended to show the operator how flexible the system can be.



Trolley Mode – with 500 MHz antenna



Trolley Mode – with 250 MHz antenna



Two-man operation



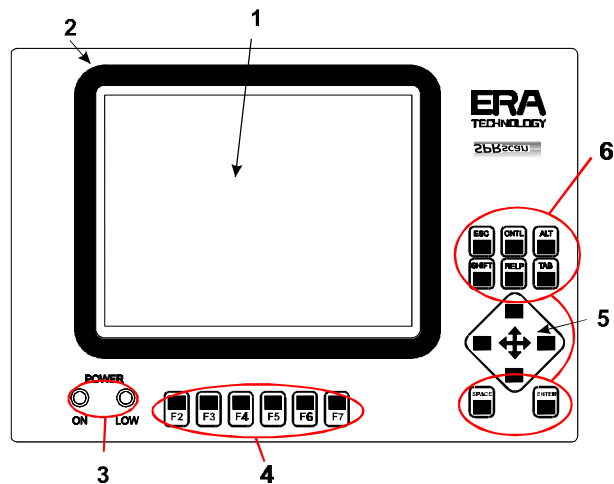
One-man mode – with 1 GHz antenna.  
The 500 MHz antenna can also be used in this configuration



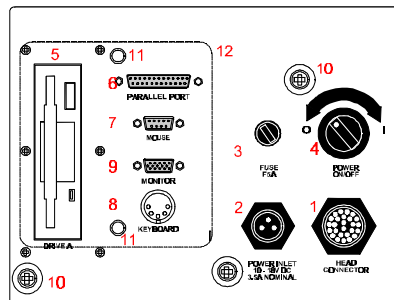
Office mode

## Description of Parts

### Controller



- |   |                     |   |               |
|---|---------------------|---|---------------|
| 1 | Screen              | 4 | Function keys |
| 2 | Bezel               | 5 | Cursor keys   |
| 3 | Power status lights | 6 | Command keys  |

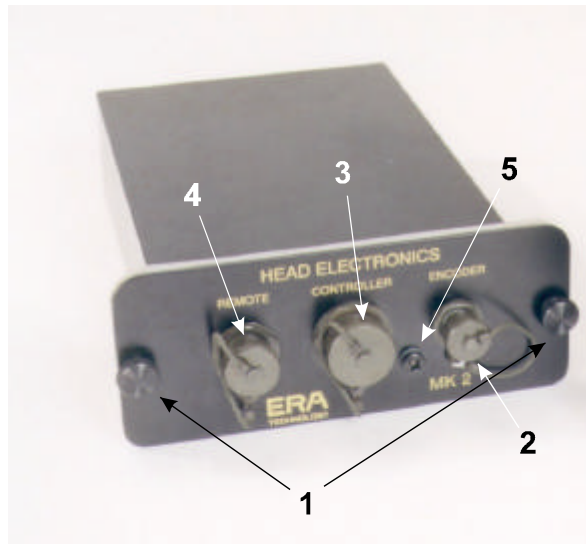


- |   |                        |    |                                     |
|---|------------------------|----|-------------------------------------|
| 1 | Data Connector         | 7  | Mouse/serial port                   |
| 2 | Power Supply Connector | 8  | Keyboard socket                     |
| 3 | Fuse                   | 9  | External monitor socket             |
| 4 | Power on/off switch    | 10 | Carry harness connecting posts      |
| 5 | Floppy disk drive      | 11 | Protective cover fastening holes    |
| 6 | Parallel/printer port  | 12 | Protective cover (outline) for IP65 |



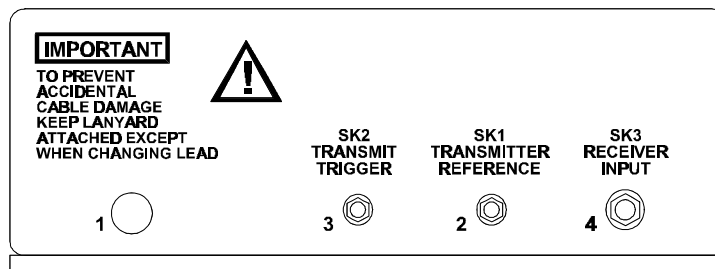
## Head Electronics Unit

### Front



- |   |                      |   |                                     |
|---|----------------------|---|-------------------------------------|
| 1 | Locking screws       | 4 | Remote control/function grip socket |
| 2 | Shaft encoder socket | 5 | Purge screw                         |
| 3 | Data cable socket    |   |                                     |

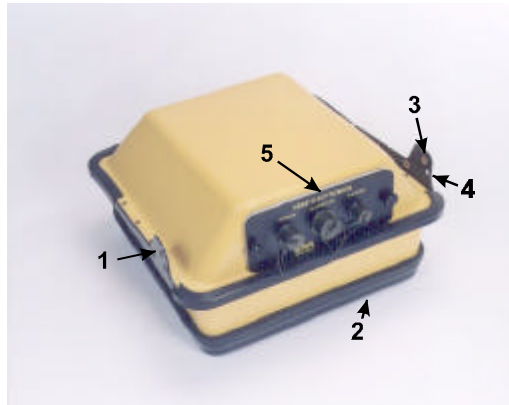
### Back



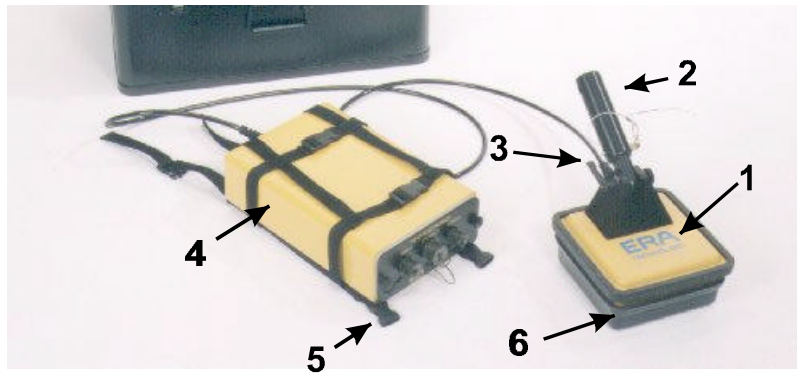
- |   |                              |   |                            |
|---|------------------------------|---|----------------------------|
| 1 | Strain relief lanyard socket | 3 | Transmit trigger (Tx trig) |
| 2 | Transmit reference (Tx ref.) | 4 | Receiver                   |

**General Antenna**

The illustration below covers both the 500 and 250 MHz antennas. The numbered features are essentially common to both units.



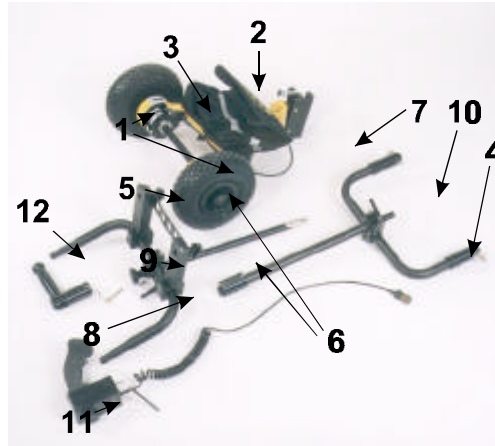
- |   |                       |   |                          |
|---|-----------------------|---|--------------------------|
| 1 | Side cheek            | 4 | Pull cable locating hole |
| 2 | Sacrificial skid tray | 5 | Head Electronics unit    |
| 3 | Handle locating hole  |   |                          |

**1 GHz antenna**

- |   |                      |   |                       |
|---|----------------------|---|-----------------------|
| 1 | 1 GHz Antenna        | 4 | Belt box              |
| 2 | Handle               | 5 | Harness straps        |
| 3 | Handle locking lever | 6 | Sacrificial skid tray |

***Function Handle***

- |   |                                 |   |                                     |
|---|---------------------------------|---|-------------------------------------|
| 1 | Stub handle socket              | 5 | Locating pin to lock handle on stub |
| 2 | Head Electronics unit connector | 6 | Stop button                         |
| 3 | Pause button                    | 7 | Marker trigger switch               |
| 4 | Next button                     | 8 | Dead Man's Handle                   |

***Trolley***

- |   |                          |    |                            |
|---|--------------------------|----|----------------------------|
| 1 | Pneumatic tyres          | 7  | Head Electronics connector |
| 2 | Battery bag              | 8  | Bracket locking levers     |
| 3 | Shaft encoder            | 9  | Main shaft adjusting knob  |
| 4 | Clevis                   | 10 | Clevis adjusting lever     |
| 5 | Computer handles         | 11 | Function handle            |
| 6 | Controller locking bolts | 12 | Dummy handle               |

## General Assembly of parts

### ***Controller***

1. Remove the controller from the carry case and place on a level and stable surface.
2. Remove the protective covers from the two circular connectors.
3. Connect the 1 m black curly power cable to the controller power socket, ensuring that the connector is securely fastened and the collar has locked.

Note on circular connectors: The circular connector is a robust, positively locking, keyed connector. When making the connection the plug will only fit one way, so rotate the plug until it drops into the socket. The collar is then twisted clockwise until it 'locks'. To undo the connector, simply twist the collar in a counter-clockwise direction until the connector becomes loose.




4. The battery pack is now connected to the power cable by pushing the silver connector onto the battery plug. Ensure the connector has locked.
5. Remove the flexible visor from the carry bag. If it appears crushed, the following procedure should enable it to regain some shape.
  - Place both hands inside the visor, one from each end. Rotate your hands whilst applying an outward stretching pull.
6. Fasten the visor to the front of the controller.
  - Place the visor onto the screen with the wider end downwards.
  - With one hand outside the visor and the other inside the visor, carefully stretch it so that it fits around the bezel.
  - If necessary, twist the visor so that it fits snugly and neatly on the bezel.
7. Do not turn on the power until the rest of the system has been assembled.

### ***Installing the Head Electronics unit into an antenna***

The following describes how the Head Electronics unit is installed into an antenna. However, the same procedure is followed for installing the Head Electronics unit into the 1 GHz and 2 GHz belt box.

These first steps describe the installation of the Head Electronics unit into the antenna. Generally it will not be necessary to follow these steps, as the radar head will already be installed in the antenna.

1. Remove the cover plate from the antenna and store it safely in the carry bag.
2. Attach the lanyard (antenna only) to the back plate of the Head Electronics unit. This is a push and twist fit.
3. Carefully attach the three gold plated connectors in the following order. Care should be taken to ensure these connectors screw up smoothly. They should never be forced or over tightened and under no circumstances should a non-torque spanner be used. Care should be taken to avoid twisting these cables and connecting them in the following sequence should ensure this does not occur. The numbered and coloured sleeves should be used to identify the connectors.

Rx Cable	3	
Tx Reference	1	
Tx Trigger	2	



4. Without twisting or trapping the cables, insert the Head Electronics unit into the antenna. The Head Electronics unit should now be pushed firmly, but not forced, until the front plate reaches the antenna housing.

*Note: The cables are designed to lay across the width of the case to give smooth cable flexing and are moulded to achieve this.*



Ensure that the writing on the faceplate is the correct way up, as the front plate is made at a slight angle and should correspond to the angle of the front face of the antenna.

5. Tighten the two plastic headed retaining screws until finger tight. Do not over-tighten or the protective plastic heads may be damaged.

The procedure for removing the Head Electronics unit is the exact reverse of installing.



## ***The pull handle system***

The pull handle system is in four parts:

1. The grip - dummy or function handle.
2. The adjustable top shaft.
3. The central tube.
4. The clevis, which is used for antennas of frequencies 500 MHz and lower.

### **Assembly of pull handle**

#### **Fitting the clevis**

1. Point the two feet of the clevis away from you with the lever upwards.
2. Loosen the lever and insert the closed end of the central tube into the bracket so that the wide portion just below the weld sits inside.
3. Rest the two feet of the clevis on the floor and turn the tube until one of the flat surfaces is pointing upwards and the round attachment at the top of the central tube bulges downwards.
4. Tighten the lever securely.

#### **Fitting the adjustable shaft**

1. Loosen the plastic adjusting knob so that the knurled wedge is free to move.
2. Insert into the top of the central tube, being careful to align the machined groove with the internal anti-twist locating flange. Push it in.
3. Set it to the desired length and tighten the adjusting knob.

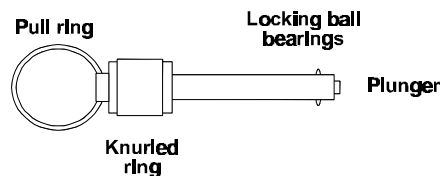


### Fitting a grip

Two grips are available; a plastic dummy grip or a function handle with integral push buttons. Both are attached to the pull handle in an identical fashion.

1. Remove the PIP pin from the grip.
2. Push the grip onto the small stub fixing.
3. Insert the PIP pin and push in as far as it will go. It will almost certainly be necessary to move the grip to ensure that the holes line up.

### Note on using the PIP pins



The PIP pins have a positive locking device that prevents them from accidentally falling out of their holes. In order to free them or enable them to be inserted into a hole, they must be operated in the following manner.

*To insert:* Push the pin into the hole by pressing the very top of the pin. The small button will depress, releasing the locking ball bearings, allowing the pin to be pushed into the hole.

*To remove:* Pull the pin by means of the attached ring. The ring is attached to the central plunger, which operates the locking ball bearings. Pulling the ring (and plunger) releases the lock, allowing the pin to be removed.

NOTE: Simply pulling or pushing the knurled part of the PIP pin will have no effect.

### Attaching the handle to the antenna

Requirements:

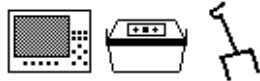


1. Place the antenna on the ground with the Head Electronics unit connectors towards you.
2. Pull the PIP pins from the clevis.
3. Insert the two antenna side cheeks into the two grooves on the ends of the clevis.
4. Align the two uppermost holes in the side cheeks with the holes on the clevis.
5. Insert the PIP pins as far as they will go.
6. If the function handle option is fitted, connect the curly cable to the Tx-Rx unit socket marked "REMOTE".

## Setting up for field use

Connecting the antenna/Head Electronics unit combination to the controller

Requirements:



1. Place the antenna on the floor with the handle pushed forward.
2. Select either the 2 metre long or 25 metre long, grey data cable.
3. Attach the *female* connector to the central circular socket on the Head Electronics unit. This socket is marked “CONTROLLER”.
4. Attach the *male* data cable connector to the large circular connector on the controller unit. This socket is marked “HEAD CONNECTOR”.
5. The radar is now ready for proximity sensor calibration and use.

Note:

Each end of the data cable is marked with the name of the unit to which it connects.

## One-Man Harness Operation

The radar can be operated in “one-man” mode, whereby the operator wears the controller attached to a body harness.

### Using the harness – 500/250 MHz

Requirements:



Before following these instructions the antenna should be fully assembled, with the handle and data cable attached.

1. Remove the carry harness from the bag and remove any twists from the straps.



2. Put your arms through the arm loops. The large pads should sit on your shoulders. The two silver rings should be positioned on either side of your waist and the large, black, push fit waist connector at the front.
3. Fasten the push fit belt and chest connectors.
4. Make sure the two thin webbing waist straps are free and at about two-thirds extension.
5. Make sure the similar shoulder connectors are free and also at two-thirds extension.
6. Using the two adjusting buckles, lengthen or shorten the vertical straps until the harness is comfortable.



1. Now take a belt battery pack from the carry bag and put it on, ensuring it is comfortable and not too loose. Also, ensure the two harness waist straps are free.
2. Pick up the controller and carefully attach the two waist fasteners to the connecting posts on the lower edges of the controller side panels.
3. Now attach the two shoulder fasteners to the remaining two connecting posts.
4. Adjust the four straps until the controller is sitting comfortably.
5. Remove the curly power cable from the bag and connect it to the controller power socket.

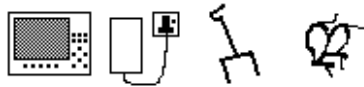
6. Fasten the other end to the battery pack.
7. Now attach the visor to the controller.



8. Readjust the harness straps to ensure that you can comfortably view the controller screen, without any unnecessary straining or craning of the neck.
9. Now connect the antenna to the controller by means of the grey data cable.
10. The radar is now ready for proximity sensor calibration and use.

### Using the harness – 1 GHz backpack

Requirements:



Before following these instructions the 1 GHz antenna should be fully assembled, with the Head Electronics unit installed in the belt box and a handle, if required, attached. The data cable should be attached and the belt box fastened into the supplied black, cordura holder.

1. Remove the carry harness from the bag and remove any twists from the straps.
2. Fasten the 1 GHz belt case to the back of the harness using the four push-fit connectors. The cables should be pointing upwards.
3. Now follow steps 2 onwards from the section entitled: *Using the harness – 500/250 MHz*

## ***The Standard Trolley Option***

The standard trolley is assembled in the following sequence:

1. Hold the yellow wheel unit so that the battery bag is pointing towards you and the arrow marked on the frame is pointing away from you.
2. Lift and lower the two metal catches to open the large, black bracket.
3. Take the central handle tube with clevis attached and slot into the bracket. The flat faces point up and down. In addition, the clevis lever should also point upwards and the clevis away from you.
4. Move the central tube so that the bracket is positioned at the lowest extreme of the flats.
5. Fasten the two metal catches, ensuring that they are firmly closed.  
Note: These catches can be adjusted by rotating the central nut and shaft.
6. Loosen the clevis lever and rest the assembly so that both wheels and both clevis feet are on the floor.
7. Tighten the lever.
8. Take the computer handle\* assembly and by means of the plastic adjusting knob, loosen the central shaft so that the knurled wedge is free to move.
9. Insert the computer handle into the top of the central shaft and push it down. It is necessary to align the machined groove with the anti-twist flange in the central tube. Adjust for height and lock tight using the adjusting knob. The red ring on the computer handle is to indicate the balance limit of the system.  
Note: For safe operation the red ring should not be visible.
10. Take the dummy grip and the function handle and remove the PIP pins.
11. Attach one to the left hand stub fixing and the remaining handle to the other stub fixing. Lock on using the PIP pins.

## **Adding the antenna**

Requirements:



12. Place the antenna on the ground with the Head Electronics unit connectors towards the trolley.
13. Pull the PIP pins from the clevis.
14. Insert the two antenna side cheeks into the two grooves on the ends of the clevis.
15. Align the two uppermost holes in the side cheeks with the holes on the clevis.
16. Insert the PIP pins as far as they will go.
17. Connect the function handle, curly cable to the radar head socket marked "REMOTE".

---

\* This is assembled in the factory and should not be dismantled.

18. Connect the straight black cable from the shaft encoder to the socket marked “ENCODER”. It might be necessary to organise this cable to prevent it dragging along the floor.

### Adding the controller

19. Hold the controller and align the computer handle runners with the machined brackets on the back plate of the controller.
20. Slide the controller down the runners.
21. Fasten the controller in place by means of the two plastic headed bolts on the computer handle mount.
22. Place the two battery packs in the black battery bag attached to the trolley. It is assumed that these have been charged.
23. Take the black, curly power cable and connect it to one of the batteries.
24. Connect the other end of the power cable to the smaller of the two circular sockets on the side panel of the controller.
25. Take the grey data cable and connect the female end to the central circular socket on the Tx-Rx unit in the antenna. Make sure the cable is threaded under the clevis and not over the top, as this will place unnecessary strain on the connector.
26. Wrap the data cable loosely around the central shaft of the trolley and plug the male end into the HEAD CONNECTOR socket on the controller.
27. If necessary, fix the visor onto the display bezel.
28. The radar is now ready for proximity sensor calibration and use.

### The Rough Ground Option

The following instructions describe the additional steps required to assemble the trolley with the Rough Ground Option.

1. Follow the above instructions as far as step 11, in the *Standard Trolley Option*.
2. Place the four-wheel Rough Ground Option on the ground with the two brackets pointing away from you.
3. Place the 500 MHz antenna inside the frame with the connectors towards you.
4. Take the assembled trolley and line it up with the Rough Ground Option antenna assembly. The clevis should be aligned with the Rough Ground Option brackets.
5. Remove the PIP pins from the clevis and slot the Rough Ground Option brackets into the grooves in the clevis feet.
6. Insert the PIP pins to lock on the Rough Ground Option.
7. Connect the function handle curly cable to the radar head socket marked “REMOTE”.
8. Connect the straight black cable from the shaft encoder to the socket marked “ENCODER”. It might be necessary to organise this cable to prevent it dragging along the floor.
9. Now follow steps 19 onwards, of the *Standard Trolley Option*, to complete assembly.

## Pictorial Guide To Assembling the System

This brief guide should help in the assembly of the trolley. Please refer to the text for clarification.



Position the trolley wheels so that the arrows point forward



Fix the clevis and handle shaft to the wheels



Insert the computer handles and lock in place



Remove the PIP pins and position the 500 MHz antenna between the clevis





Secure with the PIP pins



Loosen the locking clamp and straighten antenna so that it lies flat. Tighten up the clamp



Locate and fix the function handle to the stub. Lock it in place with the PIP pin supplied



Slide the controller on to the handle rails



Fix the controller in place with the two screws



Connect the grey data cable to the controller - **MALE** end



Connect the three cables to the Head Electronics unit in the antenna



Place the batteries in the battery bag



Connect the battery to the controller using the black curly cable



Fix the visor on the controller



Turn on the radar!!

## **Proximity Sensor Calibration**

All ERA Technology antennas, except the 2 GHz unit, are fitted with a proximity sensor. This is to prevent the system from transmitting radio frequency energy into the air (a requirement of many national certification agencies). It must be calibrated on every occasion that the Head Electronics unit is powered up. Failure to do so will mean that the radar will not transmit. In addition, a secondary safety device is built into the grip of the function handle. This switch must also be kept depressed for the radar to operate. If the antenna is lifted from the ground it will continue to transmit for approximately 10 seconds. This feature prevents erratic operation when surveying uneven surfaces etc.

### ***Calibration Procedure***

1. Assemble the radar system so that it is ready to be powered up.
2. Invert the antenna so that it is pointing upwards into air or, alternatively, lift it so that there is a gap of 20 cm (8 inches) between the antenna and the ground.
3. Switch on the radar.
4. The sensor will now automatically calibrate itself.

Note: The radar will not be transmitting during this procedure.

5. Turn over the antenna so that it is resting on, and pointing into the ground. If the antenna was lifted, lower it so that it rests on the ground.
6. The system is now ready to operate.

## **Dead Man's Handle**

The function handle is fitted with a Dead Man's Handle. This is the switch located in the grip of the handle. This switch must be depressed for the system to operate. If it is released, there will be a delay of approximately 10 seconds before the transmitter is turned off.

### **Office Mode**



In office mode, the radar operator has the ability to carry out tasks which are not suitable in the field, such as data backup, data processing and printing out radar data or report writing. As the SPRscan controller is running the Windows for Workgroups 3.11 environment, it is easy to install and run favourite or necessary software such as a word processor, drawing package etc.

Setting up the controller in office mode:

1. Place the controller on a level surface and, using a support, tilt it slightly to afford a clear view of the screen.
2. Remove the mains power adapter from the carry bag and connect it to the circular power socket.
3. Plug the adapter into the mains supply.
4. Remove the black side panel by unscrewing the two plastic headed screws. Allow it to swing free on the lanyard.
5. Remove the keyboard from its protective pouch in the carry bag.
6. Plug the keyboard into the controller side panel connector marked "KEYBOARD".
7. Remove the mouse from its protective pouch in the carry bag.
8. Plug the mouse into the controller side panel connector marked "MOUSE".

### ***Using Optional Peripherals***

#### **Printer:**

If you have a printer, plug the printer data cable into the socket marked “PARALLEL”.

#### **External Monitor:**

The controller is capable of driving an external VGA monitor. If you have one, this is connected to the socket marked “MONITOR”.

Note: When an external monitor is connected, the built-in screen will not be powered.

## **Standard System : Technical Specifications**

### ***Controller***

Processor	AMD 586-133 MHz
Radar Interface card	Proprietary
Memory	16 Mbytes
Hard disk (program and storage)	800 Mbytes
Floppy disk	3.5"
Dimensions	335 mm x 235 mm x 180 mm
Weight	6.0 kg
Power requirement	9-18 V @ 45 W

### ***Control***

Windows based full screen menu system using local subset keyboard and soft keys.  
Optional use of full AT keyboard and mouse.

### ***Display***

9.5" 640 by 480 pixel colour TFT LCD display

### ***I/O provision***

PC-AT Keyboard port  
PC-AT RS232 port for mouse  
PC-AT Parallel port (hard copy/data archiving)  
Radar interface port  
DC Power port

### ***Software***

DOS 6.22 and Windows for Workgroups V3.11  
ERA SPRscan Control Software

### ***System Scan Modes***

Free run 120 scans per sec typical  
 Timed interval 100, 50, 20, 10 scans per sec  
 Shaft encoder 10, 25, 50, 100, 250, 500, 1000 mm

### ***Head Electronics Unit (Tx-Rx)***

Dimensions	300 mm x 220 mm x 90 mm
Weight	2 kg
Total system dynamic range	>130 dB
Receiver dynamic range	>90 dB
Time range minimum	6.4 ns
Time range maximum	820 ns
Pulse repetition time	1 $\mu$ s
Effective bandwidth (typical)	2 GHz

### ***500 MHz Antenna (P – 0500)***

Dimensions	400 mm x 400 mm x 250 mm
Weight	4.0 kg
Pulse duration (typical)	0.9 ns

### ***Environmental & build specifications***

Temperature	+1° to +40°C
Humidity	10% to 90% non condensing
Sealing	IP55
EMC Directive	89/336/EEC
Low Voltage Directive	72/23/EEC
CE Marked according to	93/68/EEC



***SPRscan Standard Parts List as supplied (+ shipping weight in kg)***

1 off 500 MHz antenna	4.0
1 off Head Electronics unit	2.0
1 off controller + software	6.0
2 off 13.2 V 7AH Nickel-Cadmium battery belt + overnight charger	3.9
1 off 1 m battery power lead	0.2
1 off 2 m Head Electronics unit data/control cable	0.5
1 off display visor	0.5
1 off 240 V - 15 V power supply	1.0
1 off 102 key UK keyboard	1.2
1 off radar controller body harness	0.5
2 off padded carry cases	5.5
1 off mouse	0.3
1 off aluminium transit case for 500 MHz system	12.5
1 off operating manual set/documentation	1.5
1 off standard pull handle	
1 off ruggedised function handle	
1 off trolley system	12.5
1 off aluminium transit case for trolley system	12.5

***Antennas : Technical Specifications*****Model P-0250                      250 MHz**

Dimensions	500 mm x 560 mm x 300 mm
Weight	6 kg*
Pulse duration (typical)	2 ns

**Model P-0500                      500 MHz**

Dimensions	400 mm x 400 mm x 250 mm
Weight	4.0 kg*
Pulse duration (typical)	0.9 ns

**Model P-1000                      1 GHz**

Dimensions	200 mm x 200 mm x 160 mm
Weight	2.5 kg*
Pulse duration (typical)	0.4 ns

**Model P-2000                      2 GHz**

Dimensions	110 mm x 110 mm x 130 mm
Weight	1.0 kg*
Pulse duration (typical)	0.4 ns

---

\* All weights are approximate

***Optional extras***

These include:-

Additional battery packs and chargers  
100 minute intelligent fast charger  
12 V-240 V inverter with cigar lighter plug  
10 M & 25 M data/control cables

## Limitations on using the SPRscan

The SPRscan surface penetrating radar has been designed to be a field rugged surveying system. It is perfectly suited for use in a wide variety of environments and conditions. However, there are some conditions to which it is not suited and therefore use of the SPRscan should be avoided where these prevail. These fall into two categories:

1. Environments which the SPRscan has not been designed to operate in and therefore correct operation cannot be guaranteed if the operator chooses to use the radar in such a place.
  - The system is not designed to be used in temperatures greater than +40 ° C or less than +1 ° C. [Note: damage to the hard disk may result if the system is switched on from cold in temperatures less than 0 ° C.]
  - The system is sealed to IP55; therefore it is not proofed against immersion in liquid.
2. Environments where certain legal requirements or design criteria need to be met before operation is permitted.
  - The SPRscan is not an intrinsically safe device. Therefore its use in confined spaces, particularly where there is a potential of explosive gases, is not generally allowed. For example, in the United Kingdom this means that the system is not BASEEFA approved.
  - The user should ensure that all licensing requirements applicable to the country of operation are met.

## Maintaining the SPRscan System

The ERA Technology SPRscan radar system has been designed to be a rugged piece of surveying instrumentation. It should require a minimum of maintenance to keep it serviceable. However, a few simple, common-sense procedures and rules should be followed to ensure that this is the case. Please bear in mind that whilst it is rugged and field useable, it is not indestructible!

- Avoid knocking, banging or dropping the controller. If the controller is inadvertently dropped, the hard disk should be examined using the DOS SCANDISK facility to check all is well.
- Never immerse the radar in water.
- Avoid *changing* antennas in the rain or in dusty environments as this can allow moisture and dirt to get into the antenna through the Head Electronics aperture.
- Avoid removing the controller side panel in dusty or wet environments.
- Always ensure circular connector dust covers are replaced when not in use.
- Check that all the connectors are free from dirt and moisture.
- Store cables in as clean and dirt free state as circumstances allow.
- Make sure that the 25 metre data cable is stored in an untwisted state.
- Do not put any unnecessary strain on any connector.
- Avoid storing the radar wet. If the system has to be packed in a wet or damp state, remove it and dry it at the very first opportunity.
- Always virus check any disks which you intend putting in the controller.
- If the power inlet fuse fails, always replace with the same type: 5 A 20 mm quick blow.

## Cleaning the System

The controller and antennas can simply be cleaned using a damp cloth to wipe away the inevitable build-up of dirt. Cleaning solvents should be avoided as these can adversely affect the system finish. The computer screen should be cleaned using a soft cloth to prevent scratching.



**Note:** Under no circumstances should the system be immersed in water or cleaned with a pressurised water hose.

Occasionally, empty and thoroughly clean the carry bags.

## **Distributor and Technical Support Contact Information**

All queries should be addressed to your nearest distributor. Usually this will be the company from which you purchased your system. The following list gives the names and addresses of the current SPRscan distributors and their regions of coverage.

For an up-to-date list, please refer directly to the manufacturer.

### ***Manufacturer***

ERA Technology Limited  
Cleeve Road  
Leatherhead  
Surrey KT22 7SA  
UK

Tel: +44 (0) 1372 367000  
Fax: +44 (0) 1372 367081  
E-mail: [info@era.co.uk](mailto:info@era.co.uk)

### ***Distributors***

#### ***United Kingdom***

Pipewise Ltd  
Access House  
Imperial Way  
London E3 3EA

Tel: +44 (0) 181 981 4743  
Fax: +44 (0) 181 981 4740

## ***Belgium***

Forintec International NV  
Laabekestraat 15  
B-2060 Merksem  
Antwerp  
Belgium

Tel: +32 3 646 0880  
Fax: +32 3 646 1016

## ***Czech Republic***

Associated Consultants  
Dobrovskeho 22B  
77100 Olomovc  
Czech Republic

Tel/Fax: +42 0 68 5226360

## ***Germany and Austria, Luxembourg, Netherlands, Switzerland***

Trotec von der Lieck  
Grebbeener Str 7  
D52525 Heinsberg  
Germany

Tel: +49 2452 962100  
Fax: +49 2452 962200

## ***Italy***

PASI Srl  
Via Goito 8  
10125 Torino  
Italy

Tel: +39 11 6507033  
Fax: +39 11 658646

### ***South Korea***

Shinwoo Tech Corp  
Room 320, 4 Dong  
Sihung Industrial Centre  
984 Sihung, 3-Dong  
Kumchon-Ku  
Seoul  
Korea

Tel: +822 896 8428  
Fax: +822 896 8429

### ***United States of America***

US Radar  
PO Box 319  
121 Amboy Road  
Matawan  
New Jersey

Tel: +1 732 566 2035  
Fax: +1 732 566 8522



*Space for European Declaration of Conformity*

*Space for European Declaration of Conformity*

*This page is intentionally left blank*

## **SPRscan Electromagnetic Compatibility (EMC)**

### **1 Design Aims**

SPRscan is designed for electromagnetic compatibility with other electrical and electronic equipment sharing its intended working environment. Under some circumstances identified below, certain procedures may need to be adopted in order to ensure that compatibility is maintained.

### **2 Intended Electromagnetic Environment**

The SPRscan surface penetrating radar system has two basic modes of operation:-

- a) As a portable radar data acquisition system for use in light industrial or open areas. Any combination of CE marked peripherals and antennas is permitted. Use within domestic or office environments is not an intended environment for this mode of operation.
- b) As a desktop data review and processing system in the office or domestic environment. The essential feature of this mode of operation is that the radar head and antenna are not connected to the controller unit. Use with any combination of CE marked peripherals is permitted.

### **3 Assembly and Use**

For SPRscan to comply with the essential EMC protection requirements, it must be assembled and operated as specified in the User Manual and only within the intended environment for each mode of operation.

### **4 Protection of Other Equipment from Interference**

SPRscan is an intentional radiator of radio frequency energy. When operated in accordance with the instructions for use in the intended electromagnetic environment, SPRscan is unlikely to cause interference to other radio spectrum users and electrical or electronic equipment.

To minimise the possibility of interference, SPRscan should be operated at a minimum distance of 15 m from other electrical or electronic equipment. Closer operating distances may be possible depending on the design of that equipment and must be determined by careful practical testing at the user's risk.

SPRscan should not be operated in areas such as hospitals where interference to sensitive electronic equipment may endanger life.

## **5 Limitations**

### **5.1 Intense Radio Frequency Fields**

Due to the presence of a wideband radio receiver as part of the systems intrinsic function, SPRscan may not provide reliable data in the presence of high level radio frequency energy. Under some conditions this energy can be detected by the system's radio receiver and cannot be distinguished from the reflected energy of the built-in transmitter, thereby masking the wanted signals.

Very high levels of radio frequency energy will overload the receiver. However, the system is not damaged by levels within those specified by BS EN 50082-1 and normal operation will resume when the high level fields are removed.

The most common sources of high level radio energy are cellular telephones or mobile radio systems. If these are used near to SPRscan, interference may result. A minimum protection distance of 15 m should therefore be observed. However, this figure is only a guide. Other sources are fixed radio and television broadcast transmitters and industrial machinery. When operating in the vicinity of broadcasting transmitters, appropriate minimum distances must be maintained, typically not less than 200 m. Generally this is not a problem, since most fixed transmitters are located on the tops of hills or on tall towers with limited access to the immediate vicinity.

The ability of SPRscan to operate near to any of these sources must be determined by practical testing on a case by case basis, since wide variations in interference levels can occur in practice.

Typical symptoms of interference are intense continuous vertical bands of colour or random dots of changing size across the screen. When a survey is being carried out it is important to ensure that the displayed data is not corrupted by radio interference to avoid survey errors.

### **5.2 Electrostatic Potentials**

Whilst extensive protection measures against electrostatic discharges are incorporated in the design there is a potential vulnerability, as with all electronic devices, when cable connections are being made to the units. To prevent damage, always touch the equipment case to discharge static from the body prior to handling its connectors. Care should also be taken not to touch the pins of connectors if at all possible. The connectors at the rear of the radar head electronics case are the most vulnerable. Do not touch the centre pins of these connectors or their mating halves at any time.

## **6 Operation of SPRscan with User Supplied Peripherals**

SPRscan has been EMC tested with a representative selection of typical commercially available peripherals such as monitors, tape backup units and printers. Users may source peripherals from reputable manufacturers subject to some simple precautions. To ensure that the EMC protection requirements are met with a particular selection of user supplied peripherals, users must do the following:

- \* Only use new or well-maintained CE marked equipment
- \* Always use shielded interface cables
- \* Always fully mate cable connectors and tighten locking screws
- \* Always operate the equipment in accordance with the manufacturers' instructions

## **7 Maintenance**

To ensure continued conformity with the applicable EEC directives, it is important that repairs to sealed cases are only carried out by authorised maintenance personnel. There are no user serviceable parts inside any of the sealed cases.

Users should inspect SPRscan and its cables on a regular basis to check for damage to the integrity of the enclosures and cable screens and connector screen terminations. If any damage is found, users should contact their nearest service agent to arrange repairs and not use the equipment until these have been carried out.

## **8 Upgrades**

ERA continually strives to improve the performance, reliability and quality of its products. Any system upgrades, in the form of changes to sub-assemblies or components, must be performed by an authorised service agent.

*This page is intentionally left blank*

*This page is intentionally left blank*