

# I Introduction

The relevant contents of this chapter should be included in the wheelchair operating guide. Further copies are available from PGDT in either written or disk (Adobe PDF) format. Copies should not be made without the express permission of PG Drives Technology.

The operation of the VR2 varies dependent on programming. This chapter covers all types of operation. It is the responsibility of the wheelchair manufacturer to ensure that only the relevant sections of this chapter are included in the wheelchair's operating manual.

The operation of the VR2 wheelchair control system is simple and easy to understand. The control system incorporates state-of-the-art electronics, the result of many years of research, to provide you with ease of use and a very high level of safety. In common with other electronic equipment, correct handling and operation of the unit will ensure maximum reliability.

Please read this chapter carefully - it will help you to keep your wheelchair reliable and safe.

## 2 General

### 2.1 Handling

Avoid knocking your control system and especially the joystick. Be careful not to strike obstacles with the control system or joystick when you drive. Never drop the control system.

When transporting your wheelchair, make sure that the control system is well protected. Avoid damage to cables.

### 2.2 Operating Conditions

Your control system uses industrial-grade components throughout, ensuring reliable operation in a wide range of conditions. However, you will improve the reliability of the control system if you keep exposure to extreme conditions to a minimum.

Do not expose your control system or its components to damp for prolonged periods. If the control system becomes contaminated with food or drink clean it off as soon as possible.

### 2.3 Cleaning

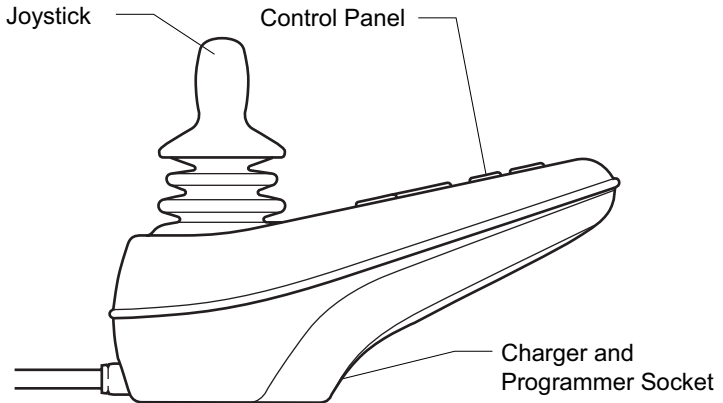
Clean the control system and the joystick with a cloth dampened with diluted detergent. Be careful when cleaning the joystick.

Never use abrasive or spirit-based cleaners.

### 3 Controls

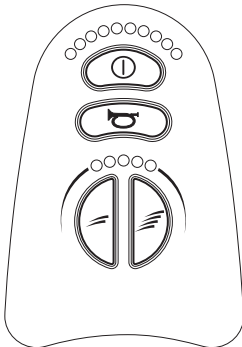
The VR2 control system has four versions of the front control panel – with and without actuator control. Most of the controls are common to all versions, however, the actuator buttons are only included on VR2 control systems with seat actuator control. Each of the controls is explained within this section. For Lighting controls refer to Chapter 4.

#### VR2 USER CONTROLS

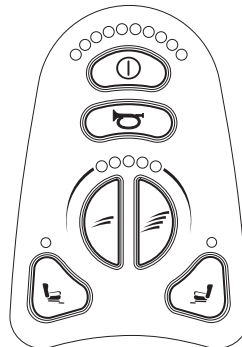


#### Front Control Panel Details

No Actuators



With Actuators



VR2 CONTROLS



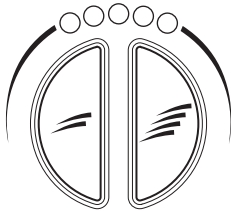
Battery Gauge



On/Off Button



Horn Button



Maximum Speed / Profile Indicator



Speed / Profile Decrease Button



Speed / Profile Increase Button



Actuator Buttons

**3.1 On/Off Button and Battery Gauge**

The on/off button applies power to the control system electronics, which in turn supply power to the wheelchair’s motors. Do not use the on/off button to stop the wheelchair unless there is an emergency. (If you do, you may shorten the life of the wheelchair drive components).

The battery gauge shows you that the wheelchair is switched on. It also indicates the operating status of the wheelchair. Details are given in section 8.0.

## 3.2 Locking / Unlocking the Wheelchair

The VR2 control system can be locked to prevent unauthorized use. The locking method is via a sequence of key presses and joystick movements, as detailed below.

To lock the wheelchair.

- While the control system is switched on, depress and hold the on/off button.
- After 1 second the control system will beep. Now release the on/off button
- Deflect the joystick forwards until the control system beeps.
- Deflect the joystick in reverse until the control system beeps.
- Release the joystick, there will be a long beep.
- The wheelchair is now locked.

To unlock the wheelchair

- Use the on/off button to switch the control system on. The maximum speed / profile indicator will be rippling up and down.
- Deflect the joystick forwards until the control system beeps.
- Deflect the joystick in reverse until the control system beeps.
- Release the joystick, there will be a long beep.
- The wheelchair is now unlocked.

## 3.3 Joystick

The primary function of the joystick is to control the speed and direction of the wheelchair. The further you push the joystick from the center position the faster the wheelchair will move. When you release the joystick the brakes are automatically applied.

If the wheelchair is fitted with actuators, the joystick can also be used to select and move actuators, refer to section 3.8 for more details.

## 3.4 Maximum Speed / Profile Indicator

This is a gauge which shows the maximum speed setting for the wheelchair or, if the control system is programmed for drive profile operation, the selected drive profile. For more information on drive profiles, refer to Chapter 3.

This gauge also indicates if the speed of the wheelchair is being limited or if the control system is locked, refer to sections 8.8 and 8.9.

### 3.4.1 Maximum Speed Indicator

This is a gauge that shows the maximum speed setting of the wheelchair. There are five speed settings – step 1 is the lowest speed and step 5 is the highest speed. For details of how to change the maximum speed setting, see sections 3.6 and 3.7.

### 3.4.2 Profile Indicator

This is an indicator that shows the selected drive profile. There may be up to 5 drive profiles available, this depends on the programming of the control system (refer to Chapter 3). For details of how to select drive profiles, see sections 3.6 and 3.7.

### **3.5 Horn Button**

The horn will sound while this button is depressed.

### **3.6 Speed / Profile Decrease Button**

This button decreases the maximum speed setting or, if the control system is programmed for drive profile operation, selects a lower drive profile.

It is possible to program the control system so this button has no effect while the wheelchair is being driven, refer to Chapter 3.

### **3.7 Speed / Profile Increase Button**

This button increases the maximum speed setting or, if the control system is programmed for drive profile operation, selects a higher drive profile.

It is possible to program the control system so this button has no effect while the wheelchair is being driven, refer to Chapter 3.

## **3.8 Actuator Buttons and LEDs**

Depending on whether the wheelchair is fitted with one or two actuators, the operation of these buttons will differ. Refer to the relevant section below.

### **3.8.1 Wheelchairs with One Actuator**

Depressing either actuator button will enter actuator adjustment mode. This will be indicated by the illumination of both actuator LEDs. Actuator adjustment can then be made by deflecting the joystick. To re-enter drive mode, depress either actuator button.

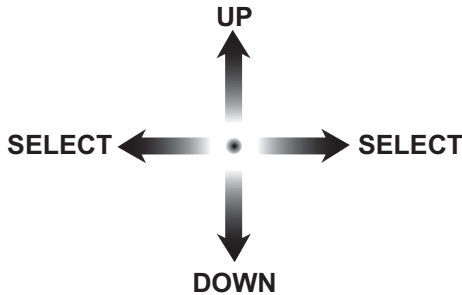
### **3.8.2 Wheelchairs with Two Actuators**

Depressing either actuator button will enter actuator adjustment mode. If the left button was depressed the associated LED will be illuminated, and deflection of the joystick will adjust the actuator motor connected to that channel. If the right button was depressed the associated LED will be illuminated and deflection of the joystick will adjust the actuator connected to the other channel.

To re-enter drive mode depress the selected actuator button, as indicated by the associated LED.

To select the other actuator, depress the opposite actuator button. It is also possible to select the other actuator by left or right movements of the joystick. This alternative

## VR2 JOYSTICK ACTUATOR ADJUSTMENT



selection method is dependent on the programming of the control system, see Chapter 3.

### **3.9 Charger and Programmer Socket**

This socket should only be used for programming and charging the wheelchair. Refer to section 10 for more details.

This socket should not be used as a power supply for any other electrical device. Connection of other electrical devices may damage the control system or affect the E.M.C. performance of the wheelchair.



**The control system's warranty will be voided if any device other than a PG Drives Technology Programmer, or the battery charger supplied with the wheelchair, is connected into this socket.**

## 4 Getting Ready to Drive

- Operate the on/off switch. The battery gauge will blink then remain on after a second.
- Check that the maximum speed control is set to a level which suits you.
- Push the joystick to control the speed and direction of the wheelchair.



**If you push the joystick before or just after you switch the control system on, the battery gauge will ripple up and down and the wheelchair will not be allowed to move. You must release the joystick to resume normal operation. If you do not release the joystick within five seconds the wheelchair will not be able to move, even if you release the joystick and push it again. The battery gauge will then flash rapidly. You can reset this condition by switching the control system off and on again.**

If the battery gauge flashes rapidly, then the VR2 has detected a problem somewhere in the wheelchair's electrical system. Refer to section 8.5 for details.

## 5 Tips for Using Your Control System

### 5.1 Driving - General

Make sure that the control system is mounted securely and that the joystick position is correct. The hand or limb you use to operate the joystick should be supported, for example by the wheelchair arm pad. Do not use the joystick as the sole support for your hand or limb - wheelchair movements and bumps could upset your control.

### 5.2 Driving Technique

The control system interprets your joystick movements and produces appropriate movements of your wheelchair. You will need very little concentration to control the wheelchair, which is especially useful if you are inexperienced. One popular technique is to simply point the joystick in the direction you want to go. The wheelchair will "home-in" on the direction you push the joystick.

The further you push the joystick away from the rest position, the faster the wheelchair will go. Releasing the joystick will stop the wheelchair.

The intelligent speed control system minimizes the effects of slopes and different types of terrain.



**The wheelchair user must be capable of driving a wheelchair safely. PGDT accepts no liability for losses of any kind arising from failure to comply with this condition.**

## 6 Precautions for Use



In the event of the wheelchair moving in an unexpected way **RELEASE THE JOYSTICK**. This action will stop the wheelchair under any circumstances.

### 6.1 Hazards

Do not drive the wheelchair:

- Beyond restrictions indicated in your wheelchair user manual, for example maximum inclines, curb height etc.
- In places or on surfaces where a loss of wheel grip could be hazardous, for example on wet grassy slopes.
- If you know that the control system or other crucial components require repair.



Although the VR2 control system is designed to be extremely reliable and each unit is rigorously tested during manufacture, the possibility of a system malfunction always exists (however small the probability). Under some conditions of system malfunction the control system must (for safety reasons) stop the chair instantaneously. If there is any possibility of the user falling out of the chair as a result of a sudden braking action, it is imperative that a restraining device such as a seat belt is supplied with the wheelchair and that it is in use at all times when the wheelchair is in motion. PGDT accept no liability for losses of any kind arising from the unexpected stopping of the wheelchair, or from the improper use of the wheelchair or control system.



Do not operate the control system if the chair behaves erratically, or shows abnormal signs of heating, sparks or smoke. Turn the control system off at once and consult your service agent. PGDT accepts no liability for losses of any kind arising from failure to comply with this condition.



Electronic equipment can be affected by Electro Magnetic Interference (EMI). Such interference may be generated by radio stations, TV stations, other radio transmitters and cellular phones. If the chair exhibits erratic behavior due to EMI, turn the control system off immediately and consult your service agent. PGDT accepts no liability for losses of any kind arising from failure to comply with this condition.



**It is the responsibility of the chair manufacturer to ensure that the wheelchair complies with appropriate National and International E.M.C legislation. PGDT accepts no liability for losses of any kind arising from failure to comply with this condition.**



**The wheelchair user must comply with all wheelchair safety warnings. PGDT accepts no liability for losses of any kind arising from failure to comply with this condition.**

## 7 Safety Checks

The electronic circuits in your control system have been designed to be extremely safe and reliable. The on-board microcomputer carries out safety checks at up to 100 times per second. To supplement this safety monitoring you should carry out the following periodic checks.

If the control system fails any of these checks, do not use the wheelchair and contact your service agent.

### 7.1 Daily Checks

**Joystick:** With the control system switched off, check that the joystick is not bent or damaged and that it returns to the center when you push and release it. If there is a problem do not continue with the safety checks and contact your service agent.

### 7.2 Weekly Checks

**Solenoid (parking) brake:**

This test should be carried out on a level floor with at least one meter clear space around the wheelchair.

- Switch on the control system.
- Check that the battery gauge remains on, or flashes slowly, after one second.
- Push the joystick slowly forwards until you hear the parking brakes operate. The chair may start to move.
- Immediately release the joystick. You must be able to hear each parking brake operate within a few seconds.
- Repeat the test a further three times, pushing the joystick slowly backwards, left and right.

**Connectors:** Make sure that all connectors are securely mated.

**Cables:** Check the condition of all cables and connectors for damage.

**Joystick gaiter:** Check the thin rubber gaiter or boot, around the base of the joystick shaft, for damage or splitting. Check visually only, do not handle the gaiter.

**Mounting:** Make sure that all the components of the control system are securely mounted. Do not overtighten any securing screws.

### 7.3 Servicing

To ensure continued satisfactory service, we suggest you have your wheelchair and control system inspected by your service agent after a period of 1 year from commencement of service. Contact your service agent for details when the inspection is due.

## 8 Control System Status indication

The battery gauge and maximum speed /profile indicator show the status of the control system.



**A number of supposedly defective control systems returned to us are subsequently found to operate correctly. This indicates that many reported faults are due to wheelchair problems rather than the control system.**

### 8.1 Battery Gauge is Steady

This indicates that all is well.

### 8.2 Battery Gauge Flashes Slowly

The control system is functioning correctly, but you should charge the battery as soon as possible.

### 8.3 Battery Gauge Steps Up

The wheelchair batteries are being charged. You will not be able to drive the wheelchair until the charger is disconnected and you have switched the control system off and on again.

### 8.4 Battery Gauge Flashes Rapidly (even with the joystick released)

The control system safety circuits have operated and the control system has been prevented from moving the wheelchair.

This indicates a system trip, i.e. the VR2 has detected a problem somewhere in the wheelchair's electrical system. Please follow this procedure:

- Switch off the control system.
- Make sure that all connectors on the wheelchair and the control system are mated securely.
- Check the condition of the battery.
- If you can't find the problem, try using the self-help guide given in section 8.5.
- Switch on the control system again and try to drive the wheelchair. If the safety circuits operate again, switch off and do not try to use the wheelchair.

Contact your service agent.












### 8.5 Self-Help Guide

If a system trip occurs, you can find out what has happened by counting the number of bars on the battery gauge that are flashing.

Below is a list of self-help actions. Try to use this list before you contact your service agent. Go to the number in the list which matches the number of flashing bars and follow the instructions.

If the problem persists after you have made the checks described above contact your service agent.

\* If the programmable parameter, Motor Swap has been enabled, then left and right hand references in this table will need transposing.

<p><b>1 Bar</b></p> 	<p>The battery needs charging or there is a bad connection to the battery. Check the connections to the battery. If the connections are good, try charging the battery.</p>
<p><b>2 Bar</b></p> 	<p>The left hand motor* has a bad connection. Check the connections to the left hand motor.</p>
<p><b>3 Bar</b></p> 	<p>The left hand motor* has a short circuit to a battery connection. Contact your service agent.</p>
<p><b>4 Bar</b></p> 	<p>The right hand motor* has a bad connection. Check the connections to the right hand module.</p>
<p><b>5 Bar</b></p> 	<p>The right hand motor* has a short circuit to a battery connection. Contact your service agent.</p>
<p><b>6 Bar</b></p> 	<p>The wheelchair is being prevented from driving by an external signal. The exact cause will depend on the type of wheelchair you have, one possibility is the battery charger is connected.</p>
<p><b>7 Bar</b></p> 	<p>A joystick fault is indicated. Make sure that the joystick is in the center position before switching on the control system.</p>
<p><b>8 Bar</b></p> 	<p>A control system fault is indicated. Make sure that all connections are secure.</p>
<p><b>9 Bar</b></p> 	<p>The parking brakes have a bad connection. Check the parking brake and motor connections. Make sure the control system connections are secure.</p>
<p><b>10 Bar</b></p> 	<p>An excessive voltage has been applied to the control system. This is usually caused by a poor battery connection. Check the battery connections.</p>
<p><b>7 Bar + S</b></p> 	<p>A communication fault is indicated. Make sure that joystick cable is securely connected and not damaged.</p>



An Actuator trip is indicated. If more than one actuator is fitted, check which actuator is not working correctly. Check the actuator wiring.

## 8.6 Slow or sluggish movement

If the wheelchair does not travel at full speed or does not respond quickly enough, and the battery condition is good, check the maximum speed setting. If adjusting the speed setting does not remedy the problem then there may be a non-hazardous fault.

Contact your service agent

## 8.7 Speed / Profile Indicator is Steady

The display will vary slightly depending on whether the control system is programmed to operate with drive profiles. For more information on drive profiles, refer to Chapter 3.

### 8.7.1 Speed Indication

The number of LEDs illuminated shows the maximum speed setting. For example, if the setting is speed level 4, then the four left hand LEDs will be illuminated.

### 8.7.2 Profile Indication

The LED illuminated shows the selected drive profile. For example, if drive profile 4 is selected, then the fourth LED's from the left will be illuminated.

## 8.8 Speed / Profile Indicator Ripples Up and Down

This indicates the control system is locked, refer to section 3.2 for details of how to unlock the control system.

## 8.9 Speed / Profile Indicator Flashes

This indicates the speed of the wheelchair is being limited for safety reasons. The exact reason will depend on the type of wheelchair, however, the most common cause is that the seat is in the elevated position.

## 8.10 Actuator LED Flashes

This indicates that the Actuator(s) may be inhibited in one or both directions. Refer to Chapter 3 for programming details.

## 9 Battery Gauge

The battery gauge is included to let you know how much charge is left in your batteries. The best way for you to use the gauge is to learn how it behaves as you drive the wheelchair. Like the fuel gauge in a car, it is not completely accurate, but it will help you avoid running out of “fuel”.

The battery gauge works in the following way:

When you switch on the control system, the battery gauge shows an estimate of the remaining battery charge.

The battery gauge gives you a more accurate reading about a minute after you start driving the wheelchair.



**When you replace worn out batteries, fit the type recommended by the wheelchair manufacturer. If you use another type the battery gauge may be inaccurate.**

The amount of charge in your batteries depends on a number of factors, including the way you use your wheelchair, the temperature of the batteries, their age and the way they are made. These factors will affect the distance you can travel in your wheelchair. All wheelchair batteries will gradually lose their capacity as they age.

The most important factor that reduces the life of your batteries is the amount of charge you take from the batteries before you recharge them. Battery life is also reduced by the number of times you charge and discharge the batteries.

To make your batteries last longer, do not allow them to become completely flat. Always recharge your batteries promptly after they are discharged.

If your battery gauge reading seems to fall more quickly than usual, your batteries may be worn out.

### 9.1 How to Read a TruCharge Battery Gauge

If the battery gauge shows red, yellow and green, the batteries are charged.

If the battery gauges show just red and yellow, then you should charge the batteries as soon as you can.

If the battery gauge shows just red, either steady or flashing slowly, then you should charge the batteries immediately.

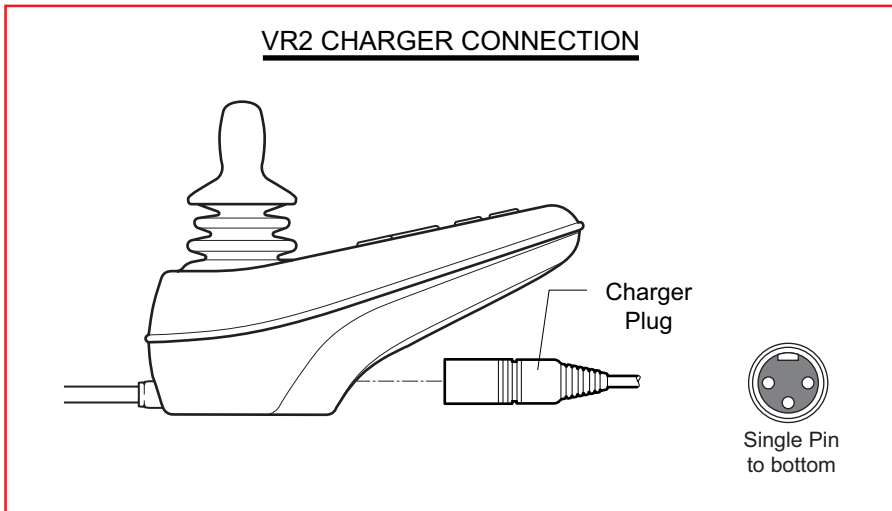


**Do not operate the control system if the battery is nearly discharged. Failure to comply with this condition may leave the user stranded in an unsafe position, such as in the middle of a road. PGDT accepts no liability for losses of any kind arising from failure to comply with this condition.**

## 10 Battery Charging

To charge the wheelchair batteries connect the charger plug into the battery charging socket on the VR2. You will not be able to drive the wheelchair when the charger is connected.

To connect the charger plug, ensure the single pin is at the bottom, as shown in the following illustration, then offer the charger plug to the VR2 in a horizontal orientation. The molded guide on the VR2 will help you to locate the plug. Ensure the plug is pushed fully in position.



**Do not exceed the maximum charging current of 12 Arms. Always use an off-board charger fitted with a Neutrik NC3MX plug. Failure to observe these conditions could result in poor contact resistance in the charger connector resulting in overheating of the charger plugs. This presents a potential burn hazard for the user. PGDT accepts no liability for losses of any kind arising from failure to comply with this condition.**



**Ensure that the charger plug pins are of the correct polarity with that shown on the specific control system's data sheet. Failure to observe this condition could result in a burn hazard or fire hazard. PGDT accepts no liability for losses of any kind arising from failure to comply with this condition.**



**Do not disconnect batteries or open-circuit the circuit breaker while charging is in progress. Failure to observe this condition could result in a burns hazard or fire hazard.**

**PGDT accepts no liability for losses of any kind arising from failure to comply with this condition.**



**Only use the battery charger that has been supplied with your wheelchair. The use of incorrect chargers could damage the batteries, wheelchair, control system or charger itself, or may result in parts overheating creating the potential for burns or even fire. PGDT accepts no liability for losses of any kind if the charger is incompatible with the control system (see Chapter 2, section 8) or any other part of the wheelchair system.**

## **II Programming**

If you cannot find a maximum speed control setting that suits you, the control system can be programmed to meet your needs. Programming can be performed using a PP1a Programmer or specialist PC software and interface cable.

The PP1a is a small hand-held unit which can be plugged into your control system to alter the program. Your wheelchair distributor or service agent or wheelchair manufacturer will be able to program your control system for you.

If you have a PP1a, read the PP1a user guide before you use it.

If you re-program your control system, make sure that you observe any restrictions given in your wheelchair user manual. Note any changes you make for future reference.



**Programming should only be conducted by healthcare professionals with in-depth knowledge of PGDT electronic control systems. Incorrect programming could result in an unsafe set-up of a wheelchair. PGDT accepts no liability for losses of any kind if the programming of the control system is altered from factory pre-set values.**

## 12 Joystick Knobs

The knob fitted to your joystick is suitable for most applications. If you would prefer another type, there is a range of alternatives available. Please contact your wheelchair distributor or manufacturer for advice. Do not replace the joystick knob with any unauthorized item - it may cause hazardous operation.



**Do not replace the joystick knob with any unauthorized item. It may cause hazardous operation. PGDT accepts no liability for losses of any kind arising from failure to comply with this condition.**

## 13 Servicing

All repairs and servicing must be carried out by authorized service personnel. Opening or making any unauthorized adjustments or modifications to the control system or its components will invalidate any warranty and may result in hazards to yourself or other people, and is strictly forbidden. It is possible to replace the cable and the joystick, by following instructions laid down by PG Drives Technology. Refer to Chapter 6 - Servicing.



**PGDT accept no liability for losses of any kind arising from unauthorized opening, adjustment or modifications to the VR2 control system.**



**If the control system is damaged in any way, or if internal damage may have occurred through impact or dropping, have the product checked by qualified personnel before operating. PGDT accepts no liability for losses of any kind arising from failure to comply with this condition.**

## 14 Warranty

The VR2 control system is covered by a warranty period defined by the wheelchair manufacturer. For details of the warranty period, please contact your service agent. The warranty will be void if the VR2 control system has:

- Not been used in accordance with the VR2 control system Technical Manual, SK77898.
- Been subject to misuse or abuse.
- Been modified or repaired by non-authorized persons.



**The warranty will be void if the VR2 has not been used in accordance with VR2 Technical Manual SK77898, the VR2 has been subject to misuse or abuse, or if the VR2 has been modified or repaired by unauthorized persons.**