



**Avon Barrier Company Ltd**

**THE SABRE RB980 CR.**

**SURFACE MOUNT,**  
**HIGH SECURITY ROAD BLOCKER.**



Example Picture Only.



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## **INTRODUCTION**

This manual provides information on the Avon Barrier Company Sabre RB980 CR, hydraulically operated High Security Road Blocker. It is designed to assist the Specifiers, Installers, Maintainers, Operators, System Integrators and Procurement Staff.

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## **SCOPE OF DOCUMENT**

The RB980 CR Sabre shall hereafter be referred to as the 'Blocker' or 'RB980 CR'.

This document is intended for those who will:

Specify the site / system.

Design the secure entry system

Install / interface the Blocker

Operate the Blocker

Maintain the Blocker

### **IMPORTANT: Note for system/site designers.**

The safe operation of the RB980 CR depends on a careful balancing of the various risk factors which are inevitably associated with operating a large piece of moving equipment in a public area. Site specific risk assessments should be carried out and the mode of operation decided upon *before* the system specifications are made final. Avon Barrier Company will be happy to provide advice and consultation services are available upon request.

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## HEALTH & SAFETY



This symbol indicates a potentially hazardous situation that might result in injury or machine damage. It also indicates strict attention must be given to the instructions following this symbol.

Where associated equipment is supplied or fitted by others, the seller and purchaser of the equipment are responsible for ensuring that:

- The equipment complies with all Safety Requirements,
- The associated equipment does not adversely affect the operation or safety of equipment supplied by Avon Barrier Company Limited.
- It is the sole responsibility of the owner / user of the equipment to establish which legislation is applicable to the country in which the equipment is installed, and to ensure subsequent compliance with all national and local regulations.

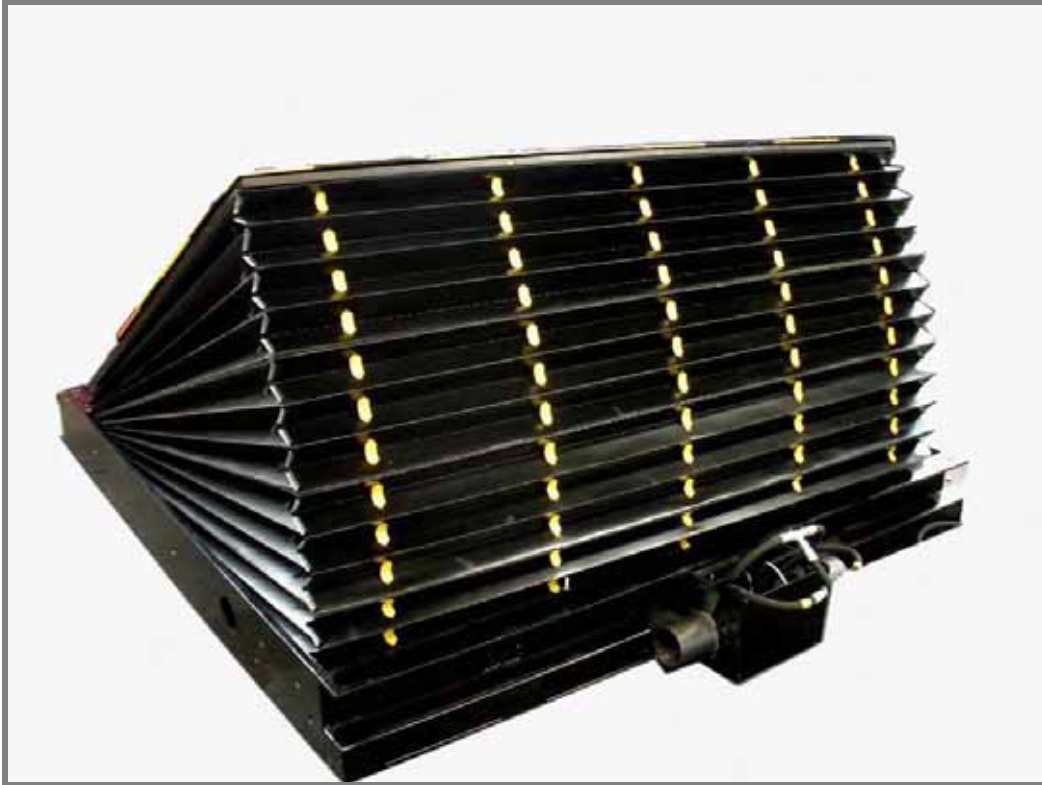
It is also important that the owner/user of the equipment has assessed all equipment and operational hazards which might arise from the presence of electrical power, powered machinery and exposed moving parts, both pre and post-installation of the equipment. It is recommended that this assessment be reviewed before the equipment is set to work.

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## PRODUCT DESCRIPTION.

The Avon RB980 CR Sabre has been designed to operate in a security environment where effective perimeter protection and a high level of security against aggressive vehicle attack are required. The Sabre is designed to withstand substantial direct impact forces whilst avoiding the need for foundations and can therefore offer protection at sites where shallow underground services preclude the use of equipment with foundations.

The Sabre is also ideally suited to sites where temporary protection is required, it can be quickly deployed at any site and requires only a relatively flat area of roadway and a power supply to operate effectively. It can be rapidly dismantled and transported to another location and is designed to be used with temporary sectional defence walls. The electrical and hydraulic components can be contained within a specially constructed section of the steel defence wall, or can be contained within a normal roadside cabinet mounted up to eight meters from the Blocker.



*RB980 CR Sabre Rising Blocker.*

The RB980 CR has been fully crash tested in excess of U.S. DoS Standard K12/L3 with zero penetration of the load bearing structure. It absorbed an impact in excess of 7500kg at 80 K.p.h. and remained fully operational.

It conforms to the B.S.I Specification PAS 68 – 1 for Security Barriers Part 1:  
Impact Absorption – 7500 Kg at 80Kph (Exceeds DoS Specification K12/L3)

Constructed of heavy welded steel sections and fully crash tested in accordance with PAS68 and in excess of U.S. DoS. Standard K12/L3, this unit is ideal for High Security installations.

Designed and manufactured by engineers with a wealth of experience in the fields of High Security and Access Control, the RB980 CR is a highly dependable security product that will easily interface with a wide range of control equipment.

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## **FURTHER DESCRIPTION.**

The RB980 CR is an Electro-Hydraulically operated blocking system with a standard segment width of two meters. The unit has a full one meter height when fully raised and is comprised of: a one piece 'off' ramp, a three piece 'on' ramp, two side sections, a rising blocker wedge and a separate roadside HPU cabinet.

The hydraulic power unit (HPU) is controlled by a programmable logic controller (PLC) enabling connection of virtually any access control to the blocker. In addition, the PLC can be configured to enable the blocker to be raised quickly (under 1 second) in an emergency by utilising an hydraulic accumulator (optional).

The HPU cabinet and Blocker assembly are shot blasted, zinc primed and finished in a high quality RAL colour coded paint.

The blocker may be operated by attendant from a local or remote control station (via intercom or C.C.T.V ), or from a vehicle using a variety of Avon Access control options.



*HPU Cabinet. (Standard type)*



*HPU contained within defence wall section.*

The Blocker rising wedge has removable steel side panels fastened by six M16 dome-head bolts to allow maintenance access to the limit switches and bearing blocks.

The surrounding ramp framework is constructed from fully welded, heavy gauge steel angle and box section designed to provide a quickly deployable ramp on either side of the blocker wedge.

The impact Wedge is mounted on the Frame via an 80mm bright steel shaft in heavy duty bearing blocks.

The rising impact wedge is enclosed by a concertina type skirt manufactured from a heavy duty woven polypropylene fabric. The skirt is designed to prevent entrapment beneath the moving wedge of persons or animals, it also acts to limit the ingress of sand and debris.

Units are assembled in our UK fabrication facility using heavy gauge materials to give maximum strength and durability, this makes the RB980 CR the ideal product to protect high security establishments.

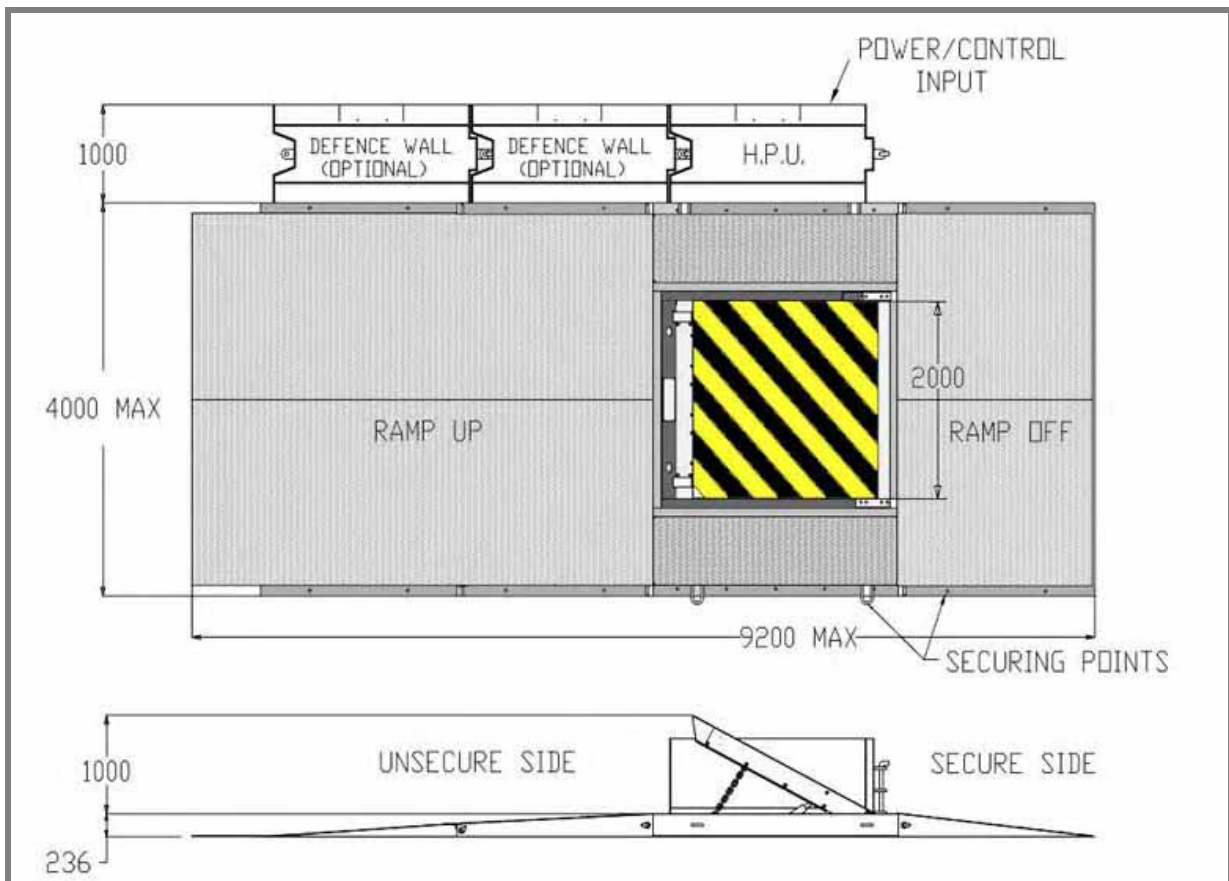
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## GENERAL SPECIFICATION.

### Physical dimensions:

<b>Blocker segment width:</b>	<b>2000 mm</b>
<b>Blocker frame width:</b>	<b>2386</b>
<b>Blocker frame length:</b>	<b>2500</b>
<b>Width of ramps:</b>	<b>4000</b>
<b>Width of optional defence wall:</b>	<b>1000</b>
<b>Overall length:</b>	<b>9200</b>
<b>Dimensions are approximate.</b>	

Standard HPU cabinet dimensions: W: 635mm x D 660mm x H 1300mm  
 Fast Raise HPU cabinet dimensions W: 935mm x D 660mm x H 1300mm  
 HPU cabinet concrete foundation support: W: 1100mm x D: 800mm x H 300mm.



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**Electrical requirements:**

Electrical Supply	Value	Tolerance	Comments
Supply Voltage (V ac)	415	+10%, -15%	240v single or 3 phase is available as a special order
Supply Voltage Frequency (Hz)	50		60 available as a special order.
Current Rating (A) (Current dependant on Equipment supplied and may vary)	20A		The Blocker should be protected by a type 'D' MCB
Maximum power cable size (mm2)	6		
Maximum signal cable size (mm2)	4		

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el construction, sections bolt together for ease of installation.  
 Pivot shaft: 80mm bright steel rotating in high impact nylon bearings.  
 HPU Cabinet - 2.5mm Steel housing and door.  
 Locking : 6 x M16 Dome head steel bolts securing each of 2 inspection plates.  
 2 cam barrel locks on each HPU cabinet door.

**Performance:**

Axle weight limit : 30 Tonnes  
 Impact Absorption : 7610Kg at 80Kph Fully crash tested with no operational damage.  
 (Exceeds DoS Specification K12/L3)  
 Standard Speed of operation : 6 to 8 Seconds  
 Emergency Fast Raise (if specified) : < 1 Second

**HPU Cabinet:**

Constructed from 2.5mm steel plate, it houses the Hydraulic Power Unit (HPU), the operating mechanisms, manual hand pump and electrical enclosures. Access is via two lockable removable doors.  
 The Electrical controls, relays and programmable logic controller ( PLC ) are housed in their own IP65 rated individual panel within the HPU cabinet.  
 A rotary mains disconnect switch to electrically isolate the equipment for maintenance purposes, is fitted within the cabinet.  
 The HPU cabinet may also be contained inside a specially constructed housing that can form part of a temporary sectional defence wall.

**Hydraulics:**

The Hydraulic Power pack uses an electric motor driven pump to actuate the two hydraulic rams, these in turn raise and lower the blocker wedge.  
 A hand pump for manual raise and lower facilities is provided and is incorporated in the HPU cabinet.  
 The hydraulic power pack oil tank is mounted at the base of the HPU enclosure and is fitted with an oil level \ temperature indicator.  
 The positive displacement pump draws fluid from the reservoir, through a suction filter, and delivers it through double steel braided hoses (to EN853-2SN 10), at high pressure to the cylinders in the blocker. Raise / Lower directional control is provided by the use of a solenoid control valve.  
 Lift speed is derived directly from the pump capacity.  
 A relief valve prevents excess pressure being generated in the system and a flow control valve is fitted to allow adjustment of the lowering speed.  
 Where emergency Fast Raise or power fail backup is installed, the hydraulic rams may be powered from a pressurized nitrogen accumulator which can be sized to give single or multiple raise operations.

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## HYDRAULIC CYLINDERS.

The two hydraulic rams are of steel construction with stainless steel pistons. They are attached between the blocker base and the blocker wedge with solid steel pins and locking devices.



*Illustration front inside view.*

### **Electrical:**

Standard supply requirements: 415v AC three phase 50/60 hertz, max 20 amps.

Supplies should be protected by a type "D" magnetic circuit breaker.

Cable entry is via conduit through the base of the HPU cabinet.

System control utilises a programmable logic controller which allows for a wide variety of configurations and control /monitor interfaces.

The hydraulic pump is driven by a 415v 3 phase motor. (other options available).

Hall effect type proximity switches are fitted at the side of the Blocker wedge and provide raised / lowered input signals to the PLC.

### **Options:**

The installation will normally comprise a single Blocker across each entrance.

The PLC programmable controller allows many different modes of operation to be incorporated.

The Blocker comes with a simple raise and lower push-button control as standard, however it can be customised to interface with a wide range of access control equipment to suit specific customer requirements and any configuration including card readers and remote control systems, communication equipment and manned guard panic systems can be accommodated.

Safety systems can include; photo cells.

Large head (200mm Diameter) red / green traffic lights can be provided with status signalling received from the PLC controller and back indication inputs.

Emergency fast raise, using hydraulic accumulators, can be provided to give a sub- 1 second raise time.

Power fail back up with UPS battery and hydraulic accumulators can be provided to allow the blocker to be raised and lowered in a power failure situation.

*Where the control point is to be remote from the Blocker position, we strongly recommend the fitting of a recordable CCTV system, traffic lights, signage and safety photo cells.*

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## INSTALLATION

### Health and Safety.



It is the sole responsibility of the owner/user of the equipment to establish which legislation is applicable to the country in which the equipment is installed, and to ensure subsequent compliance with all national and local regulations.

It is also important that the owner/user of the equipment has assessed all equipment and operational hazards, which might arise from the presence of electrical power, powered machinery and exposed moving parts, both pre and post-installation of the equipment. It is recommended that this assessment be reviewed before the equipment is set to work.

Where associated equipment is supplied or fitted by others, the seller and purchaser of the equipment are responsible for ensuring that the equipment complies with all Safety Requirements and any associated equipment does not adversely affect the operation or safety of equipment supplied by Avon Barrier Company Limited.

### Personnel.



The vendor should train one or more authorised persons, nominated by the employer, to be responsible for the installation of the equipment.

Training should include instruction on Safe Practices and known hazards.

All installation works must be carried out only by suitably qualified and experienced personnel, who are familiar with the risks and dangers inherent to their particular discipline, and the precautions necessary to minimise them.

Only carry out installation works;

- When suitable warning signs are posted and area is cordoned off from traffic.
- If no hazard exists (e.g. crushing hazard, slipping hazard, etc.)
- With correct tools and equipment.
- After carrying out the appropriate Risk Assessments.



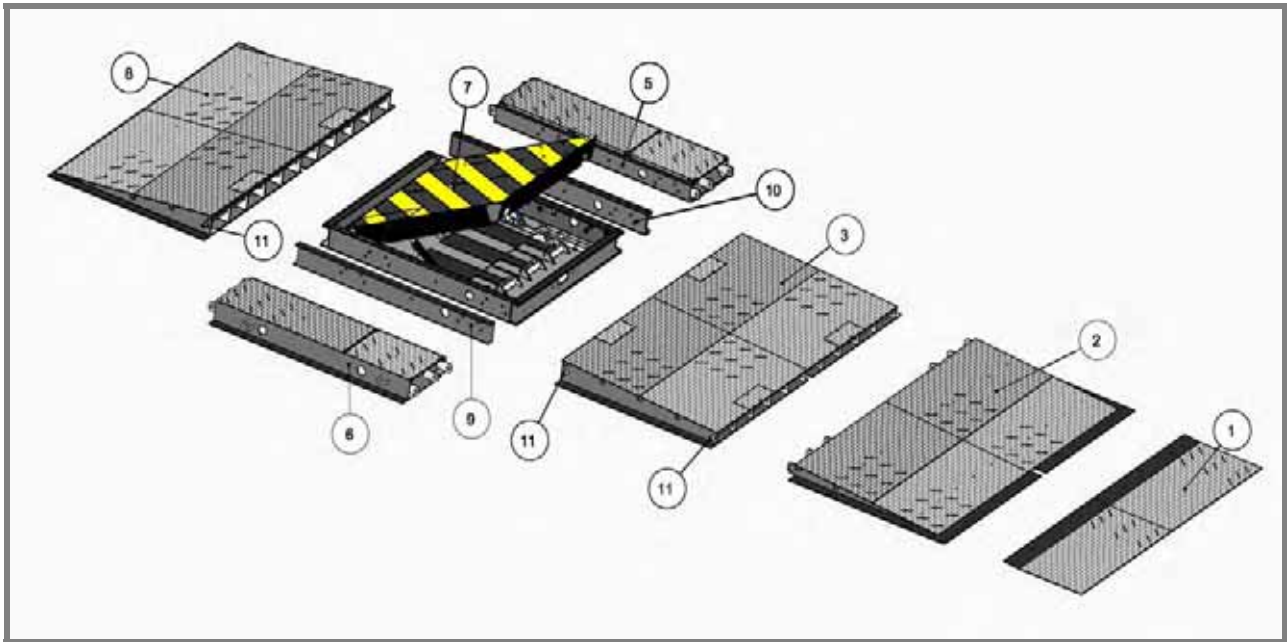
**Risk Assessments for the installation process are included in this document, it is strongly recommended that they are consulted prior to commencement of the installation.**

**They may be found in the Document section of this publication under the title:  
Risk assess RB980CR-inst.**

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## **INSTALLATION GUIDELINES.**

The installation drawings supplied with this manual provide full details of the installation procedure.  
*RB980CR-100-surface assembly.* Soft copies may be obtained from Avon Barrier Company.



*Detail from installation drawing:RB980CR-100-surface assembly.*

### **Key to installation drawing:**

5. First section of front ramp
6. Second section of front ramp.
7. Third section of front ramp.
8. Side section. (Right).
9. Side section. (Left).
10. Rising blocker section.
11. Rear ramp section.
12. Side beam. (Left).
13. Side beam. (Right).
14. Entry points for linking bars..

### **Installation Detail.**

To be installed across the roadway with the opening end of the rising wedge fitted on the insecure side.

The short ramp (rear ramp) is to be positioned on the secure side of the site.

The blocker may be sited on a rising or falling road surface and allowed to follow the line of the slope, however, the blocker must be mounted level across the camber of the road.

The RB980 CR is made up of 9 sections including the Road blocker wedge.

The HPU control cabinet may be a standard roadside cabinet or a section of a defence wall.

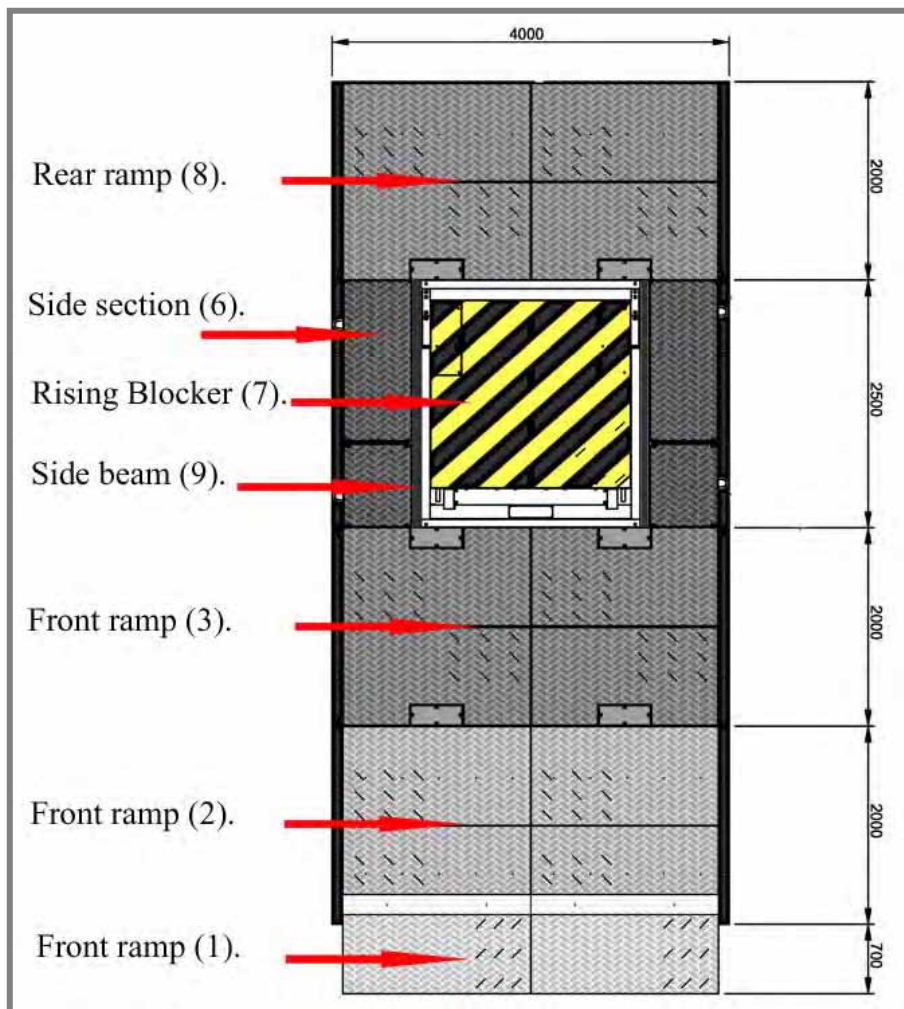
Please follow the instructions referring to drawing: *RB980CR – 100-surface assembly.*

1. Ensure that the area where the blocker will be installed is level across the camber of the road.
2. Place the blocker ( Part 7 ) in position with the opening side of the wedge to insecure side of the site.
3. Position the blocker side beams ( 9 & 10 ) Please note that the beams are handed.

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## **INSTALLATION DETAIL CONTINUED**

4. Remove the top cover plates from both ramp side sections ( 6 & 5 ) and position the sections to line up with the side beams ( 9 & 10 )
5. Bolt both the side sections ( 6 & 5 ) through the side beams ( 9 & 10 ) onto the blocker wedge ( Part 7 ) using 18 off 24mm x 70mm bolts with flat and spring washers (grease bolts before fixing).
6. Pull the hydraulic hoses and limit switch cable through the appropriate side of the blocker wedge
7. Attach rear ramp ( 8 ) securing it to blocker wedge using 2 x 1 metre link bars either side.
8. Attach front ramp inner (3) securing to blocker wedge using 2 x 1 metre link bars either side
9. Attach front ramp (2) to front ramp inner (3) using 2 x 1.7 metre link bars either side.
10. Install the durbar extension piece (1) to the front ramp and secure to roadway.
11. Attach HPU defence wall ( if supplied) to the required side using chain links supplied.
12. Attach hydraulic hoses and terminate electrical connections in control panel. Use the labels on the hoses and HPU to connect the hoses, follow connection diagram for terminating in control panel.
13. When assembly is complete and adjustments for level and final positioning have been made, the assembly should be secured to the roadway using the 30 securing points around the blocker using M16 chemical anchors.



*Detail from installation drawing:RB980CR-100-surface assembly*

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## HPU cabinet.

Containing hydraulic power pack, drive unit and electrical control equipment, it should ideally be fitted within 8 meters of the centre of the Blocker unit.

Where the distance between the HPU and the Blocker exceeds 8M, steel piping may be required in place of the standard hoses. (Please contact Avon Barrier Company Ltd. for further details.)

Should a pair of Blockers be controlled by a single HPU, the cabinet can be mounted either at the roadside or on a central traffic island.

The cabinet should be positioned in such a way as to allow access to both doors and should be sited in an area free from flooding.

It should be mounted on a concrete platform as per the drawing.

( If the site already has a 300mm deep hard standing and is in an area not liable to flooding, then the concrete base may be omitted).

The HPU Cabinet should be fixed on the prepared base with M12 chemical anchor bolts or equivalent.

The HPU cabinet may also be contained inside a specially constructed housing that can form part of a temporary sectional defence wall. If this type of cabinet is used, it should be attached to the blocker assembly using the chain links and attachment points provided. Details can be found in drawing: *RB980CR-100-surface assembly*.

## Ducting.

From beneath the rear of the HPU cabinet, separate ducting must be provided for the following cables:

Access control point (guard room or card reader post etc).

Power distribution point.

100mm duct to the Blocker (for the two hydraulic hoses and the signal cable).

Traffic lights. (if fitted).

Induction road loops, (if fitted).

Avoid 90° sharp bends and sharp edges.

The size of conduits will depend on the number of Blockers operated from the HPU.

All conduits should be fitted with draw wires.

## Installation: Hydraulic.

All hydraulic pipes are of double braided construction to EN853-2SN 10 rated at 330 Bar.

*A specification sheet may be found in the reference section of this manual.*

Hoses should be run between the HPU and the Blocker in 100mm PVC ducting.

All joints in the conduit should be smooth and free from sharp edges and burrs to prevent scoring the hose outer sheath during installation and Blocker operation.

Hose length should be sufficient to allow for some slack in the HPU cabinet for expansion or shrinkage.

When fitting the hoses care should be taken to not allow contamination from dirt, water, swarf etc.

This is done by flushing new hoses prior to fitting and capping off any open ends/connectors.

The blanking caps should be removed from the hose fittings and the hoses connected to the appropriate fitting points and tightened.

The other end of the hoses should be attached to the numbered fittings in the HPU cabinet and tightened.

(The hoses and associated fitting points in the blocker and HPU are marked.)



**Electrical installation must be in accordance with current local regulations .**



## INSTALLATION: ELECTRICAL.

All cable sizes must conform to Blocker electrical specification and current local regulations.

Power cables must be routed in separate conduit from signal cables.

The electrical equipment is located inside an IP65 rated enclosure mounted inside the HPU cabinet above the hydraulic power pack.

A 415v 3 phase mains supply cable should be connected to the isolator switch mounted below the electrical enclosure, and the cabinet frame should be earthed.

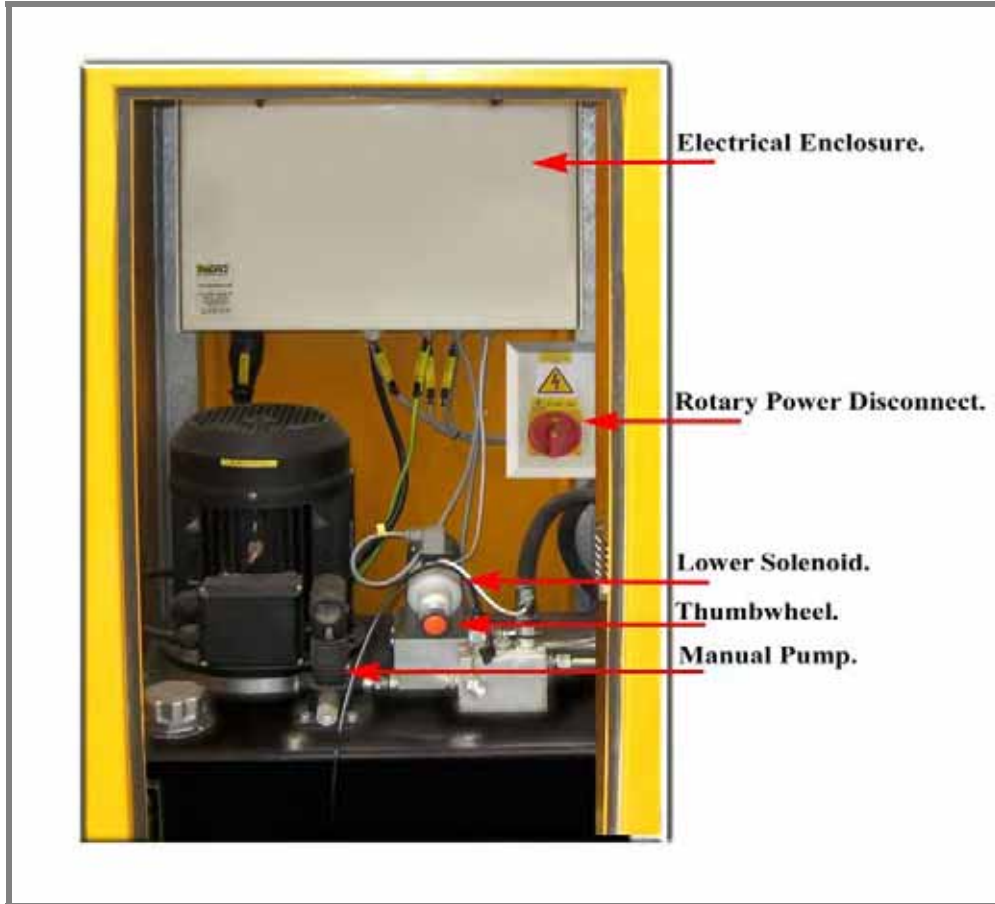
The signal and control cables should be brought into the electrical enclosure through the glands and connected to the appropriate DIN rail mounted terminals.

*A generic wiring diagram is included in the document section of this manual, it should only be used for reference purposes as the site specific drawing will be different.*

Copies of site specific wiring diagrams will be shipped with the equipment and will be found stored in the electrical enclosure.

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## COMMISSIONING



*Illustration HPU-001. Cabinet.*

### MANUAL RAISE AND LOWER:

Refer to: Illustration HPU-001. Cabinet.

The Blocker should initially be raised and lowered using the manual pump in the following manner:

Insert the pump handle (stored behind the vertical frame strut), into the manual pump socket and pump up and down until the blocker raises.

It may require several strokes to build up the initial pressure.

If the Blocker appears to be lowering, then it is possible the hoses have been connected the wrong way round and this should be checked and rectified.

The Blocker may then be lowered by using the manual pump in conjunction with the Lower solenoid: Turn the solenoid thumbwheel clockwise until finger tight

( **do not over tighten** ) pump the handle up and down until the Blocker lowers.

- Check for oil leaks at both ends of the hoses and tighten where necessary.
- Check all fastenings and mounting bolts are secure.
- Check Blocker is centrally located within the frame and that the limit switch pick-up lugs are in line with limit switches.
- Check hydraulic fluid level is above the minimum level on sight glass.
- Top up oil if necessary.

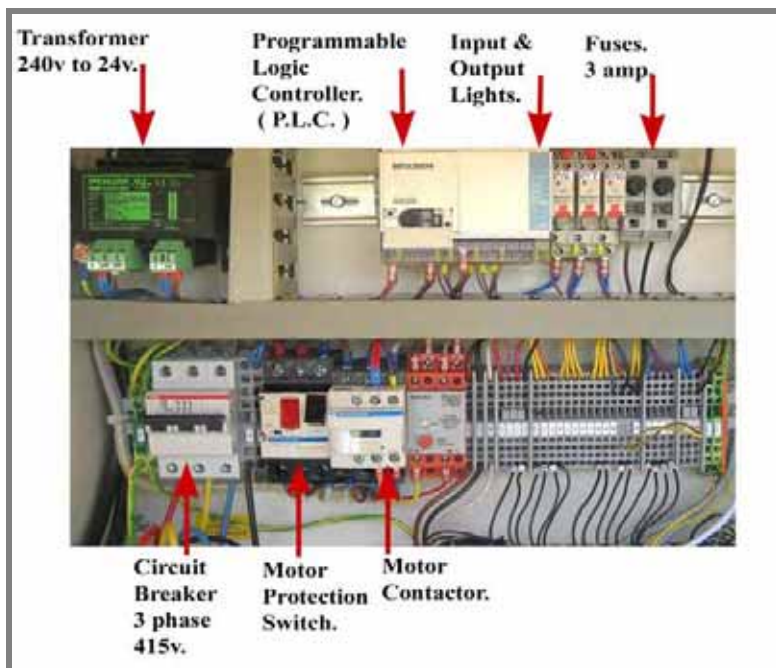
See C.O.S.H.H sheets included in the documents section of this manual for handling precautions.

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## POWER ON TESTS:



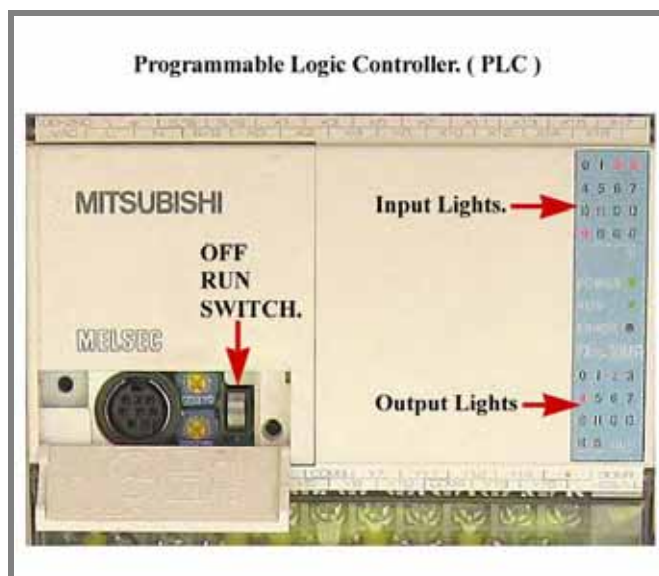
The authorised site electrician should now switch the mains power ON and make the appropriate tests in compliance with local safety regulations.



*Illustration elec-001.Control Panel.*

## MOTOR DIRECTION CHECK:

Set the PLC to 'Off' by using the micro-switch located under the front cover on the PLC Refer to: Illustration elec-002. PLC. and then switch the Mains power on at the MCB circuit breaker and at the Rotary Disconnect switch. Refer to: Illustration elec-001.Control Panel.



*Illustration elec-002. PLC.*

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## **MOTOR DIRECTION CHECK: CONTINUED**

The PLC Input and Output designation is site specific and a designation sheet will be found with the electrical schematics stored in the electrical enclosure.  
This sheet should be to hand when carrying out the following procedures.



**Equipment will now be live, observe all safety precautions for working near live equipment.**



Locate the Motor contactor; refer to: Illustration elec-001.Control Panel.  
Using an insulated screwdriver, firmly depress the central segment.  
The motor should turn whilst the contactor is depressed.  
Check the direction that the motor is spinning by observing the fan blades .  
The correct motor direction is indicated by the arrow on the fan cowl.  
If the motor spins in the wrong direction then swap two of the incoming phases until it spins correctly.



**Power off the Electrical panel at the MCB switch and at the rotary disconnect switch before swapping the cores.**



## **RAISE AND LOWER TESTS.**

Using the motor contactor, fully raise the blocker and check the limit switch indication on the PLC.  
The Raised limit Input Light should be OFF and the Lowered limit Input light should be ON.

**Note:** The Blocker limit switches are fitted at the left side of the Blocker frame and can be accessed by removing the six 16mm dome head screws and lifting the side inspection plate off.



**Disconnect power and isolate accumulator before removing inspection plates.**



*Blocker side inspection plates.*

The limit switches are Normally Closed contacts and therefore the indicator light will go OFF when the detector is triggered.

*When the Blocker is in the Raised position the LED on the Raised limit switch and the input indicator lamp on the PLC will be OFF. When the Blocker is NOT in the Raised position they will be ON.*

Turn in the thumb-wheel on the lower solenoid and then, using the motor contactor, lower the blocker as far as it will go and check the limit switch indication on the PLC.

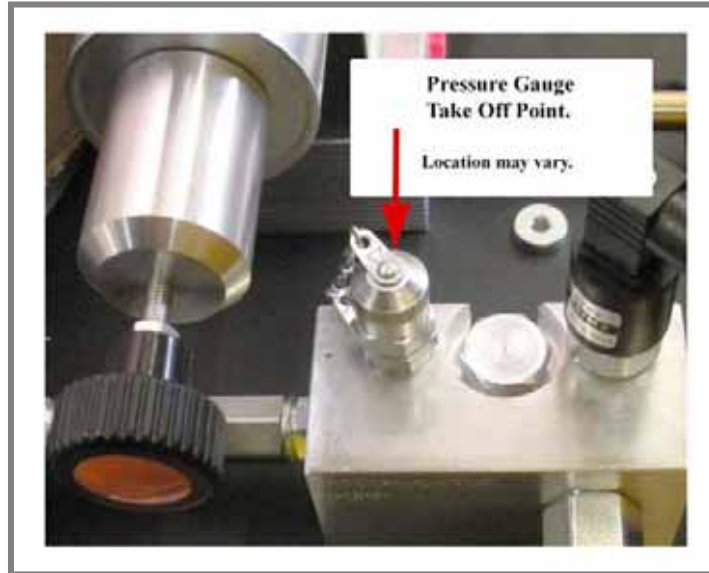
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The Raised limit Input Light should be ON and the Lowered limit Input light should be OFF.  
Turn the thumb-wheel on the solenoid several turns out to its normal position.

When the Blocker is in the Lowered position the LED on the limit switch and the input indicator lamp on the PLC will be **OFF**.  
When the Blocker is NOT in the Lowered position they will be **ON**.

### **PRESSURE TESTS.**

Attach a suitable pressure test gauge to the test point located on the hydraulic manifold block.  
Refer to illustration hyd-001.



*Illustration hyd-001. Pressure take off.*

Raise the Blocker using the motor contactor and note the pressure reading during raise.  
When the Blocker has reached its maximum raise height continue to hold the motor contactor and allow pressure gauge to stabilise, observe and note the maximum pressure reading.  
Lower the Blocker using the lower solenoid and note the pressure reading during lowering.  
Stop the motor. Make sure lower solenoid thumb-wheel is released.

Test condition.	Reading in bar.
Forced fully raised. (Relief Pressure)	
Maximum during raise.	
Maximum during lower.	

Remove the 2 Blocker side inspection plates and check the ram and hose connections for oil leaks.  
Check ram pivot pins and locking devices for tightness. Replace and refasten the inspection plates.

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If access is required to the space behind the protective skirt, the following procedure must be adopted.



### ACCESS TO THE INSIDE OF THE BLOCKER WEDGE.

With the blocker in the raised position:

- 1: Switch off the main power switch, (also switch off UPS battery back up switch if fitted).
- 2: If an accumulator is fitted; Isolate the accumulator and dump the stored pressure back to tank.
- 3: With one person at each corner of the skirt, lift the skirt from the bottom edge until it is fully raised.

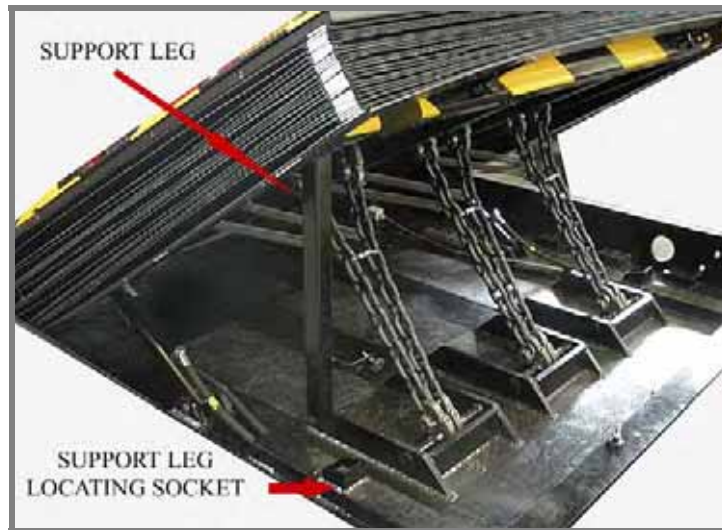


- 4: A third person should undo the thumb-wheel retaining bolts and swing the two support straps under the compressed skirt.
- 5: The weight of the skirt should now be allowed to rest on the support straps.



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6: By undoing the thumb-wheels, both of the support legs may now be released from their storage location and allowed to swing vertically downwards.



7: Using the manual hand pump, the blocker wedge should be carefully lowered until both support legs are located in the sockets provided and the weight of the wedge is fully supported by the legs.



**No person should be allowed under the blocker wedge until the above steps have been completed.**



### OPERATIONAL TESTS.

Set the PLC to 'ON' by using the micro-switch located under the front cover on the PLC.  
*Refer to: Illustration elec-002. PLC.*

Using the push button controller or other access control system, raise and lower the blocker several times.

*The access control system can be simulated by using a short jumper wire to momentarily connect between the Common terminal and the Raise or Lower terminals on the terminal strip located at the bottom right of the electrical panel.*

Check that the following systems, ( if fitted ) function correctly:

Access control equipment ( pushbuttons / card reader etc ).

Traffic lights.

Safety Photocells.

Fast Raise \ battery back up.

Interfacing with any other equipment.

Carry out test sequences to prove that the system functions in accordance with the required mode of operation.

Leave the Blocker in the fully raised position for several hours and check for Blocker 'creeping' down.

It is recommended that the blocker is operated as many times as is practicable, preferably with vehicles crossing it, and then the limit switch operation and oil levels are double checked before handing over the system to the client

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## HANDOVER PROCEDURE

Demonstrate power isolation using MCB and Rotary switch.	
With mains power OFF ; Demonstrate the use of the Manual pump to raise and lower the Blocker.	
Mains power ON ; PLC to 'Run'. Raise & Lower the Blocker using jumper wire between Common and Raise / Lower terminals.	
Demonstrate use of access control system to operate the Blocker. ( Including safety-closing and free exit loops if fitted.)	
Demonstrate that the traffic sequencing functions according to the required mode of operation; traffic lights / interlock etc.	
Demonstrate Fast Raise operation and accumulator isolation procedure.	
Confirm the raise and lower speeds.	
Demonstrate power fail back up system (if applicable).	
Demonstrate functioning of all safety systems.	
Inspect condition of installation ; paintwork, cabling, etc.	
Demonstrate oil top up / change procedure.	
Demonstrate relay change procedure.	
Demonstrate pressure adjustment procedure.	
Demonstrate limit switch adjustment procedure.	
Demonstrate periodic inspection procedures.	
Complete and hand over relevant paperwork, manual, keys etc.	
Complete and sign the Blocker commissioning checklist included with this manual.	

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## OPERATION AND MAINTENANCE



### HEALTH & SAFETY.



Appropriate risk assessments should be carried out and operational methodologies should be agreed and established before the equipment is operated.  
The owner should ensure that one or more competent persons are responsible for controlling the access system and advising vehicle users of the correct entry and exit procedures. Training should include instruction on safe practices and known hazards, including normal and emergency use.  
Operators and attendants should be directed NOT to operate the blocker unless the area is clear and all covers / guards are in place.

The 'Site Details' section of the final commissioning / handover document will give site specific details of the equipment fitted and its mode of operation. This should be studied in conjunction with the rest of this manual.  
*Training and certification of Operations and Maintenance personnel can also be provided upon request by Avon Barrier Company Ltd.*

### Manual Raise / Lower.

Manual operation of the Blocker in the event of power failure:



**Before attempting manual operation, ensure that the electrical power is switched off**  
**Do not attempt to operate if there is evidence of failure of any hydraulic components call**  
**Maintenance Engineer for assistance.**  
**Make sure the area around blocker is free from obstruction and is isolated from pedestrian and**  
**vehicular traffic.**



Refer to: *Illustration hpu-001.Cabinet.*

Insert the pump handle (stored behind the vertical frame strut), into the manual pump socket and pump up and down until the blocker raises.

The Blocker can be lowered by using the manual pump in conjunction with the Lower solenoid:  
Turn the solenoid thumbwheel clockwise until finger tight (do not over tighten).  
Pump the handle up and down until the Blocker lowers.  
Turn the solenoid thumbwheel anti-clockwise several turns.

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## Access Control.

Opening and closing is usually achieved by a standard Avon Barrier push button controller, however other access control equipment may be used.

To operate the Blocker a signal is required going from normally open to closed, for a pulse length of not more than 1 second. The 'Site Secure' push button (if fitted) will lock in the down position and can be released by twisting the button or using the key, (depends on type supplied).

Depending on the customer requirements, the 'Site Secure' facility may over-ride the safety systems and this should be taken into account when establishing operational procedures.

A wide variety of access control methods, safety systems and security requirements may be applied to the RB980 CR, these reflect the specific needs of individual sites and may include:

Site Secure facility which over-rides safety devices.

Site Secure which does not over-ride safety devices.

Blocker / Barrier interlock system.

## Hydraulic:

The RB980 CR Blocker, as standard, uses a three phase electric motor to drive a submersed high pressure positive displacement oil pump. The high pressure (max 220 bar) hydraulic fluid is applied, via two hydraulic hoses, to 2 hydraulic rams located inside the Blocker, thus lifting or lowering the blocking wedge segment.

Applying hydraulic pressure to the bottom of the rams will raise the blocker.

Applying hydraulic pressure to the top of the rams will lower the blocker.

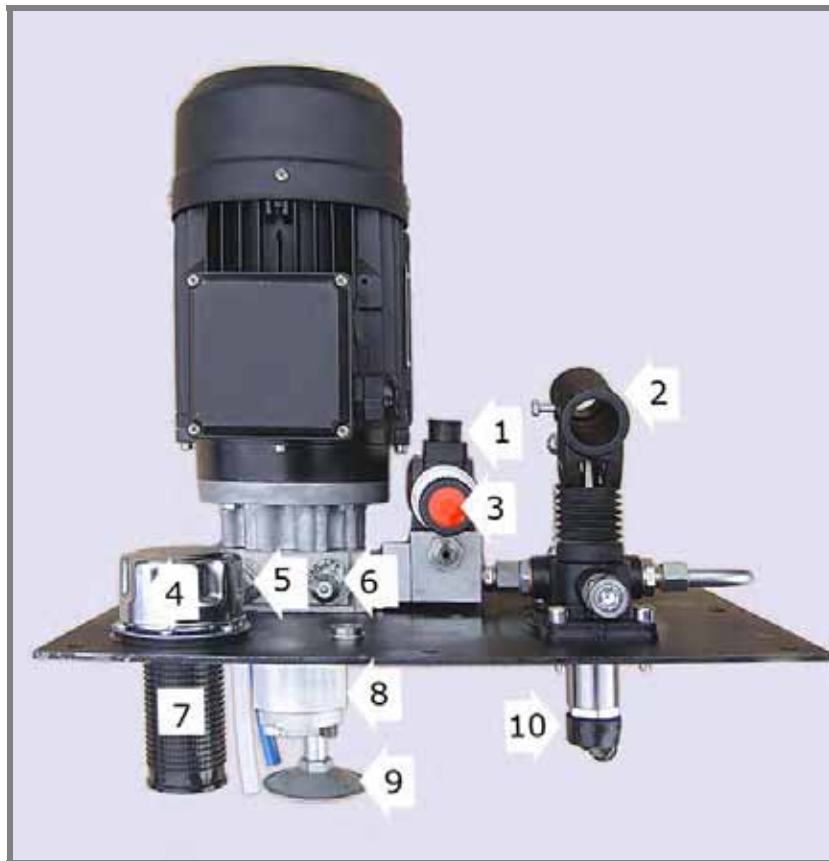
An electrically operated solenoid valve changes the direction of flow of the hydraulic fluid;

When the solenoid is OFF and the motor is running, the blocker will raise.

When the solenoid is ON and the motor is running, the blocker will lower.

*The following illustration is intended as a guide only.*

*Site specific details may vary with twin blocker or emergency fast raise systems.*



*Illustration hyd-002. Components; Generic HPU.*

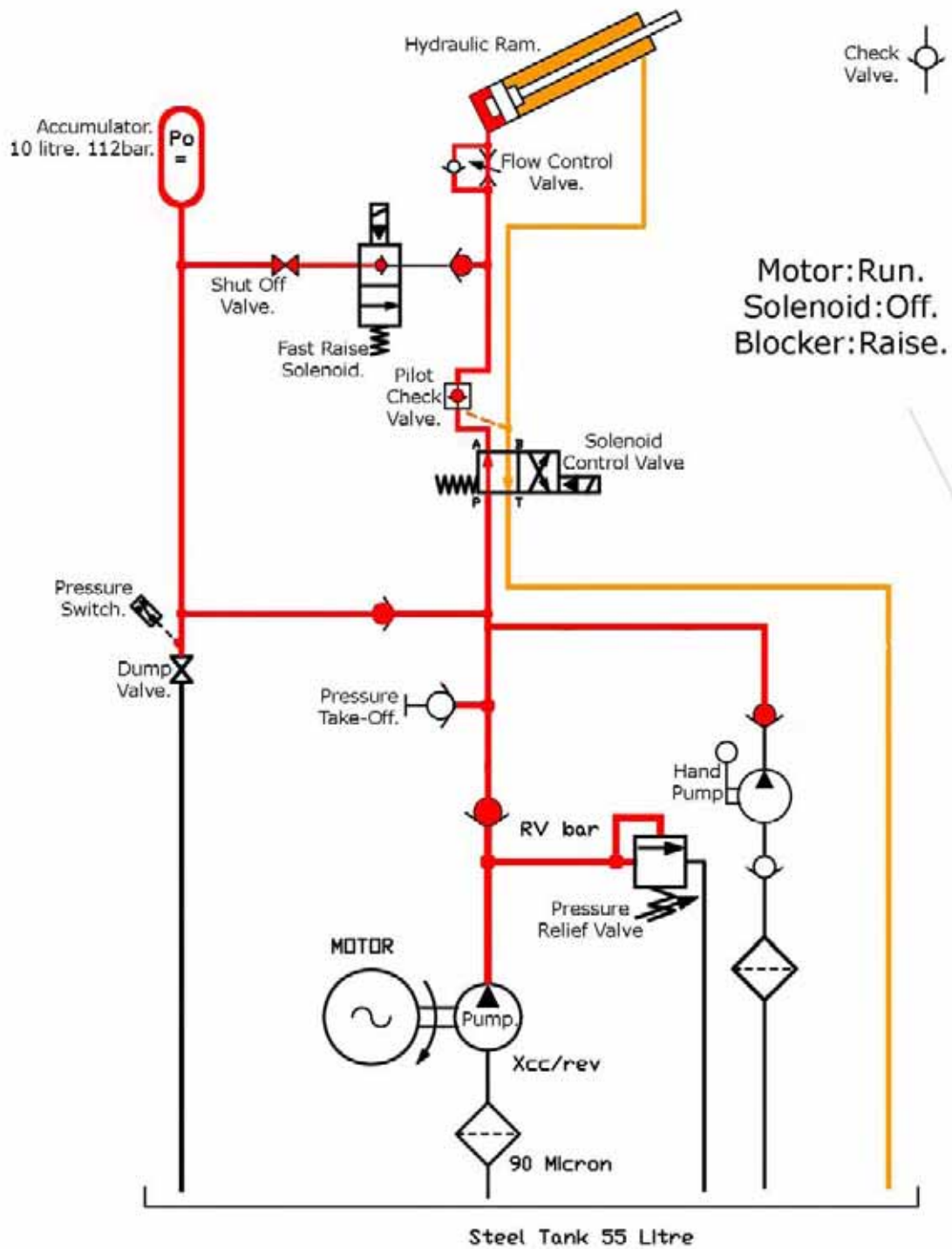
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## **EXPLANATION OF ILLUSTRATION HYD-002.**

- 1: The solenoid acts to change the direction of flow of the hydraulic oil.  
When OFF, the pressurised fluid is directed to the bottom of the rams with the fluid returning to tank from the top of the rams, this will raise the blocker.  
With the solenoid ON, the fluid is directed to the top of the rams with return to tank being from the bottom, this will lower the blocker.
- 2: A manually operated pump allows the blocker to be operated in case of power failure.
- 3: In the event of a power failure, the thumbwheel is used to manually operate the Lower solenoid to allow the hand operated pump to lower the blocker.
- 4: The oil filler cap is removed to top-up if required.
- 5: The pressure relief valve acts as a safety valve and will dump hydraulic fluid back to the tank if pressure exceeds the maximum setting. This valve is factory set and should not require any adjustment.
- 6: The pressure take-off point is used to connect a suitable pressure test gauge.  
It is fitted with a spring loaded self-closing valve and a removable dust cap.
- 7: The Oil strainer will act to filter any oil being added to the reservoir and prevents ingress of foreign objects when the filler cap is open.
- 8: Main high pressure oil pump is of the submersible type and draws fluid from the reservoir via the filter.
- 9: Intake to the high pressure pump. Filter screen acts to protect the pump from particles larger than 90 microns and is washable.
- 10: The manual pump draws its oil from this submerged intake.

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**HYDRAULIC SCHEMATIC**  
**RB980 CR HPU with Fast Raise**

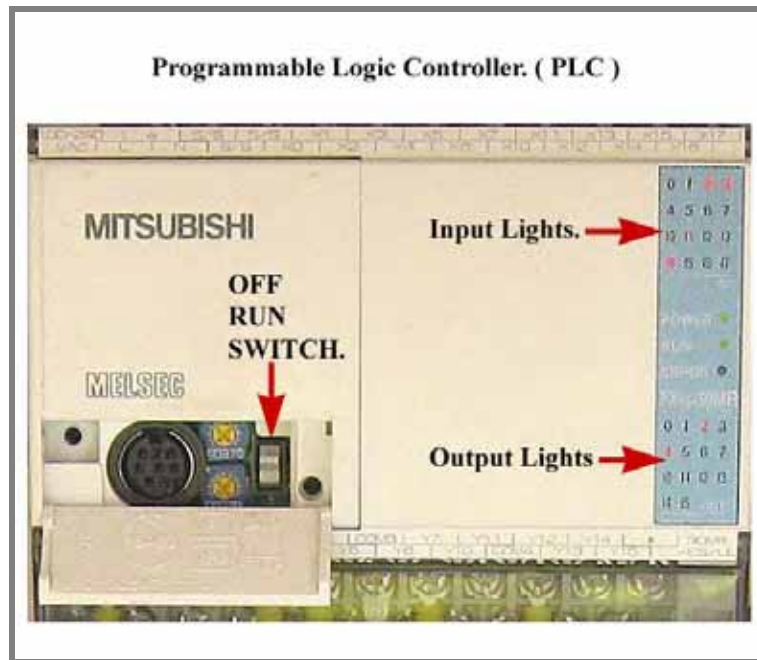


ustration hyd-003.Schematic.

The above schematic illustrates an Hydraulic Power Unit supplied with optional fastraise circuit.  
 Site specific HPU's may vary slightly but will operate on the same principles.

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## PROGRAMMABLE CONTROLLER



A Mitsubishi programmable logic controller ( PLC ) is used to operate the system and monitors the inputs and controls the outputs: It is located inside the electrical control panel and is invaluable in fault finding. A range of indicator lights at the top of the unit give information about the Inputs with a similar group at the bottom of the unit giving information about the Outputs. These inputs and outputs are listed, along with their functions and contact type (normally open or normally closed) in the PLC Input / Output sheet supplied with the equipment ( shipped in the electrical enclosure ).

*Making a note of which I / O indicators are lit and the position of the blocker at the time can be of great benefit in determining the fault.*

On the front lower left of the PLC is a small drop down flap which gives access to a micro toggle switch. This switch has two positions; Run and Off and can be used to reset the PLC by toggling OFF and then back to ON, or to switch the programming off while leaving the rest of the circuitry live for testing and fault finding.

Inputs come from:

- Access control equipment ( open / close push button etc ),
- Proximity switches. ( actual position of blocker )
- Safety equipment ( road loops, photo cells etc ).

Outputs go to:

- Motor contactor; starts and stops motor.
- Solenoid.; raises the Blocker when ON .
- Traffic lights; lights show green when output is ON.( if fitted ).
- Back indication.; provides clean contact indicating blocker position .

### **Limit Switches:**

The raised and lowered positions of the Blocker are monitored using two proximity detectors fitted to the Blocker at the left side of the frame.

They can be accessed by removing the steel cover plate at the left edge of the Blocker.

Proximity detectors ( limit switches ) are 'Normally Closed', therefore:

- When the blocker is raised, the Raised limit switch will be OFF.
- When the blocker is lowered, the Lowered limit switch will be OFF.

Each limit switch has an L.E.D. indicator light on the back of the switch, this will be ON when the switch is NOT detecting and will go OFF when the switch is in the proximity of the pick-up point which is fixed to the side of the rising wedge.

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### **Raise operation:**

Blocker is lowered . Lowered limit switch is OFF. Raised limit switch is ON.

Operator presses the Close Lane button:

The PLC detects 'Close Lane' closed circuit and checks the safety device input;

If the input is closed circuit then the PLC closes the motor contactor circuit and the motor runs :

Blocker Raises: The lowered limit switch is now ON. The raised limit switch remains ON.

As the Blocker reaches the raised position the raised limit switch turns OFF.

The PLC detects the raised limit open circuit and opens the motor contactor circuit, this switches OFF the motor.

Blocker is now raised. Raised limit switch: OFF. Lowered limit switch is ON.

### **Lower operation:**

Blocker is raised. Lowered limit switch is ON. Raised limit switch is OFF.

Operator presses Open Lane button:

The PLC controller detects 'Open Lane' closed circuit and closes the 'lower' solenoid circuit, the solenoid energises, the PLC closes the motor contactor circuit and the motor runs. Blocker lowers.

As the Blocker lowers, the raised limit switch turns ON. Lowered limit switch remains ON.

Blocker reaches the lowered position and the lowered limit switch turns OFF.

The PLC controller detects 'lowered limit' open circuit and opens the motor contactor circuit which stops the motor, PLC then opens the 'lower' solenoid circuit which switches OFF the solenoid.

Blocker is Lowered. Lowered limit switch is OFF. Raised limit switch is ON.

### **Motor Timeout:**

If the motor runs continuously for more than one minute, the controller will enter a 'Timeout' mode and the output '0' will illuminate. This can be reset by switching the mains power off and on again or by switching the PLC to 'OFF' and then back to 'RUN'.

### **Safety devices:**

Depending on site specifications, various safety devices may be fitted e.g.

Induction loops to detect vehicle presence, photocells to detect vehicles or persons.

### **Site Secure facility:**

Some sites may have a Site Secure mode whereby if the blocker is lowered or lowering and the site secure button is pressed, then the blocker will stop lowering and will raise.

This may over-ride the safety device circuit, depending on the system specification.

### **Emergency Fast Raise:**

Equipment may be fitted with hydraulic accumulators to provide an emergency fast raise facility which will raise the Blocker in less than one second. It may also be used, in conjunction with a battery back-up, to provide the ability to raise the Blocker in the event of a power failure.



**Emergency fast raise systems will normally over-ride the safety systems therefore extra care should be taken when operating or working on them.**

**An isolation valve is provided to allow isolation of the accumulator from the hydraulic rams.**

## **FAULT FINDING.**

If a fault condition should occur the following steps should be taken:

Try to determine the exact nature of the fault, i.e.

- Blocker will not raise,
- Blocker will not lower,
- Blocker raises slowly,
- Blocker does not lower fully etc.

Check that the power supply is ON.

Carry out a visual inspection of the equipment, look for any signs of damage.

Check inside the cabinet for signs of oil leaks and check the oil level.

Switch the power supply off, using the rotary disconnect switch in the HPU cabinet, wait a few seconds and then switch back on. This will reset the programmable controller and the Induction loop detectors (if fitted).

Check if fault has cleared.

If the fault has not cleared, or if it re-occurs after operating the system, then use the following guidelines.

The input and output lights on the programmable controller ( PLC ) should be read and a note made of which lights are on.

*Refer to illustration elec-002.*

Check that the input and output indications on the PLC match the current status of the Blocker.

Use the site-specific PLC input/output information sheet.

Use the following list of fault finding guidelines in conjunction with the PLC input/ output display.

### **Lower Input.**

Use the access control system to open the lane (lower blocker) and observe the input indicator on the PLC which should show on and off condition if the open lane button is repeatedly pressed.

Alternatively a jumper wire can be used between the 'common' and 'open' terminals on the main terminal block.

### **Raise Input.**

Use the access control system to close the lane (raise blocker) and observe the input indicator on the PLC which should show on and off condition if the close lane button is repeatedly pressed.

Alternatively a jumper wire can be used between the 'common' and 'close' terminals on the main terminal block.

If a Site Secure facility is provided, the blocker will raise and over-ride safety devices, therefore if the blocker will not raise using the normal raise (lane close) circuit, but will raise using the Site Secure circuit, then this can be used as an indication that the problem may be in the safety device circuit.

### **Safety devices Input.**

Check that the PLC display is showing a closed indication for the safety device input.

If an open circuit is indicated then check the safety devices.

i.e. check photocells, safety edges and induction loop indicators.

Refer to the site specific wiring schematic stored in the electrical panel enclosure.

Safety devices can be jumpered across at the terminal block, one at a time, to narrow down the active device.

Note; an open circuit condition in any of the safety devices will prevent the blocker from raising but should not prevent it from lowering.

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## **FAULT FINDING CONTINUED**

### **Site secure Input.**

Check that the PLC display is showing a closed indication for the site secure input.  
If an open circuit is indicated then check the site secure push buttons are not locked in the ON position.  
An open circuit condition will raise the blocker and will also prevent it from lowering.

### **Limit switch.**

Limit switches that are out of adjustment can cause a variety of faults;  
Blocker not raising, Blocker not lowering, Blocker stopping halfway, Blocker cycling up and down.  
If two Blockers are interlocked to work together in a 'trap' formation then a limit switch problem on one Blocker may prevent the other Blocker from working.  
The limit switch is equipped with an LED indicator next to the cable entry point.  
Check that this lamp is lit when not near to the metal pick-up point, then check the lamp goes out when near to the pick-up point.  
*A spanner or other metal object may be used to check for activation of the limit switch.*  
Whilst activating the limit switch, check for correct input indication at the PLC .  
Observe the PLC input lights and check with the PLC Input/output information sheets to make sure that the correct limit switch is operating at the correct time.

### **Motor Timeout.**

If the motor runs for more than one minute, a timer in the PLC will cause the system to enter the 'Timeout' mode. The output '0' will be lit.  
This can be cleared by using the micro switch on the PLC and switching it to OFF and then back to RUN.  
The PLC can be 'reset' by switching off the mains power for a few seconds and then switching back on.

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## PERIODIC MAINTENANCE



**Risk Assessments for the maintenance process are included in this document, it is strongly recommended that they are consulted prior to commencement of any maintenance tasks.**

**Only carry out maintenance works;**

- **When suitable warning signs are posted and area is cordoned off to traffic.**
- **If no hazard exists (e.g. crushing hazard, slipping hazard, etc.)**
- **With correct tools and equipment.**
- **After carrying out the appropriate Risk Assessments.**

### **Weekly maintenance:**

Observe Blocker in operation and check for:  
Erratic operation. Unusual noises. Damage to safety devices.  
Operation of traffic lights and induction loop systems (if fitted).  
Open cabinet door and check for signs of damage and oil leaks.

### **Monthly maintenance:**

Same as weekly checks but additionally:  
Use sight glass on front of oil tank and check oil level; top up if required.  
Remove the Blocker inspection plates and check the hoses and hydraulic ram for signs of damage and oil leaks  
First 100 operational hours:  
The oil should be changed.  
One operational hour is equal to approx 200 raise & lower cycles.

### **Six monthly maintenance:**

Same as weekly and monthly checks but additionally;  
Remove Blocker side plates and check main shaft bearings for signs of wear.  
Check that the Blocker wedge assembly is moving centrally in the frame.  
Check hydraulic hoses for signs of damage or abrasion.  
Check the tightness of dome headed bolts on blocker road plate and the main shaft bearing-block bolts.  
Remove the Blocker inspection plates and check the hoses and hydraulic ram for signs of damage and oil leaks

### **Annual maintenance:**

After 3000 operational hours or every 12 months:  
Same as 6 monthly maintenance but additionally:  
The oil should be changed and the filter screen should be cleaned.  
The nylon pivot shaft bearings should be changed.



**COSSH Data sheets and handling precautions are contained in the information section**



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## **Topping up the oil:**

Use a DIN 51519 Hydraulic Mineral Oil.

A list of suitable oils, can be found in the information section at the end of this manual.

Attention should be paid to the temperature ranges of the oil listed in the information section.

Care should be taken to prevent any contamination of the oil or the oil reservoir.

Oil should be added through the filler hole on top of the HPU.

Filling should be done slowly as the filler hole is fitted with a strainer which restricts the flow of oil into the reservoir.

Attention should be paid if frequent topping up is required, as this will be a sign of leakage.

## **Changing the oil:**

Remove the oil filler cap and the screws holding the cap housing in place.

Remove the cap housing and strainer basket. The oil should be pumped out of the reservoir using a suitable hose and extractor pump.

The reservoir should be refilled with the correct grade of oil to the full mark on the sight glass.

Use a DIN 51519 Hydraulic Mineral Oil.

*A list of suitable oils and COSSH data sheets and handling precautions are contained in the document section of this manual.*

Check the oil level again after several operational cycles of the blocker.

## **Cleaning the oil filter:**

Refer to *illustration hyd-002*.

Drain the oil as described previously.

Remove the 8mm hex head bolts that secure the HPU base plate to the reservoir tank.

Lift the HPU, complete with motor and base plate, high enough to be able to access the filter / strainer unit, and prop it in place. (Replace the cork gasket if necessary).

Do not use wooden props as this risks wood particles falling into the reservoir.

Undo the filter locknut and remove the filter from the intake pipe.

Thoroughly clean the filter in paraffin / kerosene or other suitable cleaner.

Refit the cleaned and dried filter and tighten the locknut.

Lower the HPU into place, taking care not to allow any dirt to fall into the reservoir.

Refit and tighten the HPU retaining bolts. Refill with oil as described previously.

## **Adjusting the limit switches.**

Moving the limit switch closer to, or further away from the pick-up point will adjust its sensitivity while the vertical adjustment will change the point in the cycle at which it is triggered, a combination of these two adjustments may be required.

Earlier or later triggering is achieved by moving the pick up lug, bolted to the side of the blocker wedge, up or down.

More or less sensitivity is achieved by loosening the locknuts around the body of the switch and moving it closer to or further away from the pick-up point.

Normally only very fine adjustments are required and care should be taken not to move the switch too far from its original position.

## **Bleeding air from the hydraulic system.**

Using a 19 or 22 mm open ended spanner, crack open the hose connection at the point where the flexible hose joins the bottom of the hydraulic ram manifold.

Position an absorbent material to soak up any oil, pressurise the line by using the hand pump and observe for air / oil exiting the connection. Continue slowly pumping until the oil runs clear with no sign of air bubbles. Retighten the connection.

Repeat the procedure with the hose connection at the top of the ram manifold after manually engaging the raise solenoid.

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**Avon Barrier Company Ltd**

## **WARRANTY AND LIMITATION OF LIABILITY**

Avon Barrier Company Ltd. warrants that during the first 12 months following delivery, the products will be free from defect in material and workmanship.

Avon Barrier Company Ltd's sole obligation under the terms of this warranty shall be to repair (or at Avon Barrier Company Ltd's. option, to replace) any defective product/part, without extra charge to the Buyer, provided that,

- (a) Buyer gives Avon Barrier Co. written notice of any such claimed defect within such period of 12 months,
- (b) The products, if installed, were installed by an Avon Barrier Company Ltd authorised installer, and
- (c) The products have not been altered, subjected to misuse, improper maintenance, negligence or accident, or used with parts not authorised by Avon Barrier Company Ltd.

**NO OTHER WARRANTY IS EXPRESSED AND NONE SHALL BE IMPLIED, INCLUDING WITHOUT THE WARRANTY OF MERCHANTABILITY OR WARRANTY OF FITNESS FOR USE.**

**THE FOREGOING STATES THE ENTIRE LIABILITY OF AVON BARRIER CO. LTD. WITH RESPECT TO THE PRODUCTS.**

**IN NO EVENT SHALL AVON BARRIER CO. LTD. BE LIABLE FOR ANY SPECIAL, INCIDENTAL OR CONSEQUENTIAL DAMAGES WHICH RESULT FROM USE BY BUYER OR ANY OTHER PARTY, OF THE PRODUCTS, AND IN NO EVENT SHALL AVON BARRIER BLOCKER CO. LTD'S LIABILITY EXCEED THE AMOUNTS PAID BY THE BUYER FOR THE PRODUCTS THEREUNDER**

### **DISCLAIMER**

Careful consideration must be given to the selection, placement and design of a Barrier installation, and care must be taken to ensure that approaching vehicles as well as pedestrians are fully aware of the Barrier system and its operation.

Proper illumination, clearly worded signage and auxiliary safety devices, should be considered.

Avon Barrier Company Ltd. has information available on many such pieces of safety equipment not specifically listed here.

Avon Barrier Company Ltd Nova House 191-195 South Liberty Lane Ashton Vale Trading Estate Bristol England BS3 2TN

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**Avon Barrier Company Ltd**

## DECLARATION OF CONFORMITY

E C MACHINERY DIRECTIVE 2006/42/EC

E C LOW VOLTAGE DIRECTIVE EN60204-1:1998

E C ELECTROMAGNETIC COMPATIBILITY

DIRECTIVE EN 50081-1 & EN 50082-2

U.K. PAS68 7500-80

We hereby certify that the RB980 CR Security Road Blocker complies with the relevant provisions of the E C Directives detailed above.

Manufactured by:

Avon Barrier Company Ltd  
Nova House  
195 South Liberty Lane  
Ashton Vale Trading Estate  
Bristol  
BS21 2TN

Date: 1<sup>st</sup> December 2009

Name: P A Jeffrey

Position: Managing Director, Avon Barrier Company Ltd

**ToC**

Avon Barrier Company Ltd Nova House 191-195 South Liberty Lane Ashton Vale Trading Estate Bristol England BS3 2TN

## DOCUMENTS.

### RB980CR-100-surface assembly.

Drawings showing assembly procedure

### Risk Assess RB980 -inst.

Risk assessment document covering installation process.

### HPU found-large.

Drawing providing dimensions for HPU cabinet foundation.

### Hyd hose spec.

Information sheet giving hydraulic hose specifications.

### Risk Assess RB980 -maint.

Risk assessment document covering maintenance process.

### Commissioning Checklist.

Checklist for commissioning tests.

### Maintenance Checklist.

Checklist for maintenance purposes.

### Oil Data sheet. Hyspin.

Data sheet providing COSHH information on hydraulic oil.

### List of Suitable hydraulic oils.

List of suitable oil types and brands.

### Warranty Statement.

Statement of warranty terms.

### Generic Wiring Schematic.

Wiring diagram for general reference only.

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