EASTERN BEAVER INC.

PC-8R
Install Manual

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INTRODUCTION:

The PC-8R is the 2nd generation fuse box from Eastern Beaver Inc. It is heavily based on the ultra-reliable PC-8 fuse box, which has had over 9,000 installations. The objective for the PC-8R was to make the “overall install package” smaller, and make it easier for customers to do their own wiring, if desired.

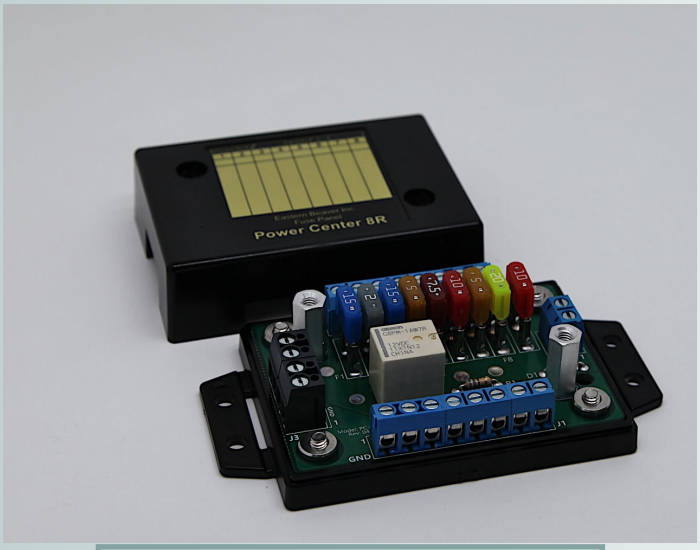


Figure 1: PC-8R

The PC-8R compliments the PC-8. It does not have the configurability in that you cannot make all outputs switched, and also, it is rated for lower total power at 40A maximum. That said, it takes up less space when installed *(important on newer bikes with less under seat space)*, has built in noise suppression for the relay and also has diode protection on the switched input.

Like the PC-8 we will offer standard and bike specific installation kits. We also offer a 2yr warranty on the PC-8R *(terms apply—see warranty section).*

For those travelling the globe we offer a spare kit so the unit can be repaired anywhere access to a soldering iron is available. We also offer fixed price repairs for any issues that might happen, after the 1yr warranty expires. Conditions apply so see our warranty section.

We thank you for purchasing the PC-8R and look forward to supporting all your electrical accessory needs, with new products in the coming years.

DESCRIPTION:

The PC-8R is a 40A, 8 output fuse box/PDM with 2 battery direct fused connections and 6 switched connections. The positive switched outputs are outputs 3 through 8 on connector J2. The battery direct outputs are 1 through 2 on connector J2. Each output can be up to 15A (max), provided the total current does not exceed 40A.

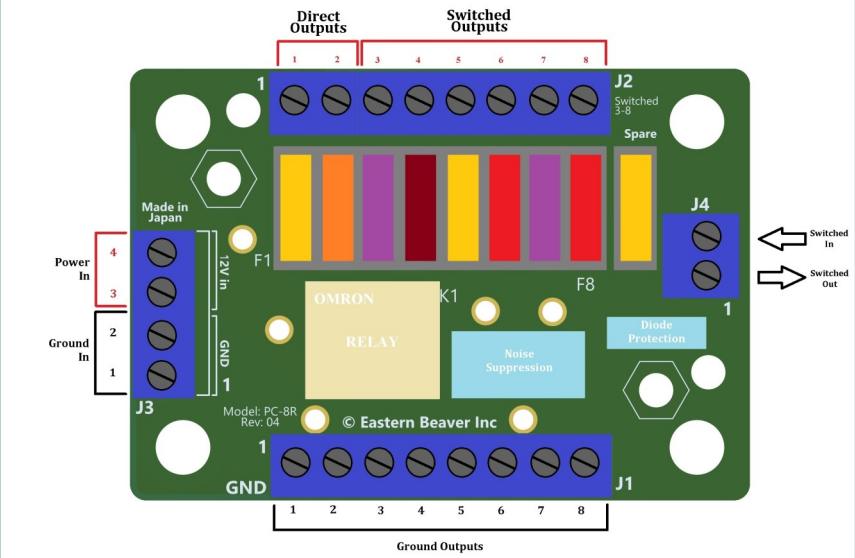


Figure 2: PC-8R Block Diagram

Battery direct outputs can be used for connecting heated gear, chain oilers, or battery chargers, but be careful of devices that can cause parasitic drain. A typical bike ECU will draw less than 1.0mA when the bike is powered off. We found that currents of around 5mA or higher can cause an average battery to be unable to start a bike, after just 4 weeks of storage.

The switched outputs on the PC-8R, of course, switch off when the bike is turned off (provided it has been installed correctly). They are typically used for power devices that are needed during riding such as navigation systems, USB ports, radar detectors, camera systems, communications systems and accessory lights, horns etc.

While the positive outputs on J2 are specified as direct or switched, the ground connections are all common, so you can use any ground connection without any J2 connection.

The switched input should be connected to input 2 on J4. Pin 1 on J4 can be used, if the switched input is to be looped though to another device (should be low current & less than 0.2A) .

DESCRIPTION Continued:

Power is connected to the PC-8R though J3. Pins 1 and 2 are grounds. Pins 3 & 4 are positive. Double check after installing wires to make sure there are no loose strands that could cause a short.

POWER CABLE DESIGN:

We recommend using an inline fuse with any PC-8R power cable, unless the connection to the battery is under 12" (30cm), for extra safety. You should note that the stamped value on a fuse is it's blow rating, not it's continuous use rating. We recommend to use a fuse that is at least 25% higher than the continuous current you intend to protect.

For applications up to 30A the connection is pretty simple.

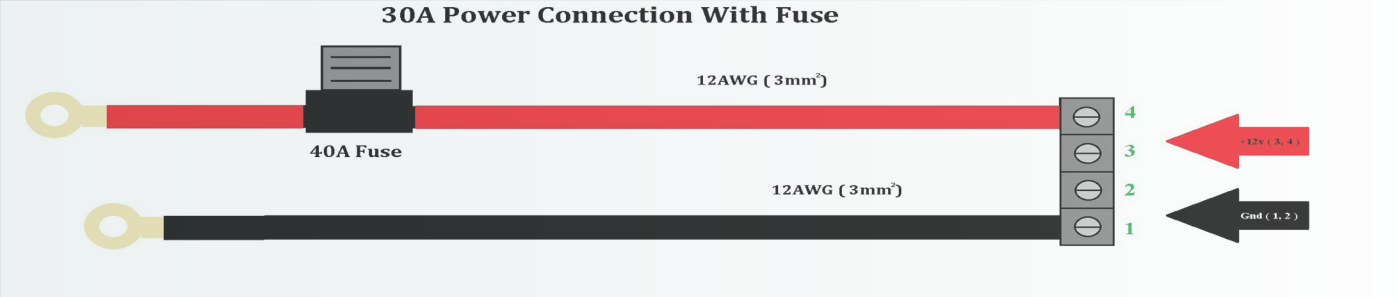


Figure 3: Power Connection < 30A

For connections up to 40A there are a few options:

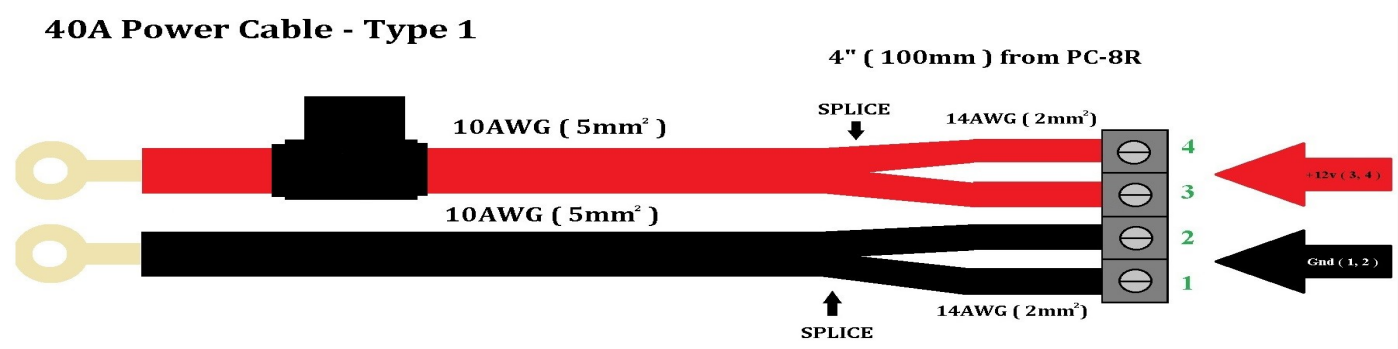


Figure 4: Power Connection 40A (Type 1)

Figure 5: Power Connection 40A (Type 2)

SWITCHING LEAD:

The switching input on the PC-8 requires under 0.070A so there are many sources that can be used for the switching input. We recommend using one of the following sources;

1. Aux power port (preferably in the under seat area).
2. Number plate light using a splice cable or Posi-tap.
3. Tail/driving light using a splice cable or Posi-tap.

Generally it is best to avoid using diagnostic port connectors or any signal, that carries data or that you are not sure of its function. The switched input to the PC-8 is diode protected and the relay circuit has a flyback circuit to eliminate any switching noise.

The switching input is diode protected and the relay has a damping circuit to cancel any switching noise, making the PC-8R safe to use on bikes with canbus systems. We have carried out bench tests using Oscilloscopes & installation tests on various canbus motorcycles.

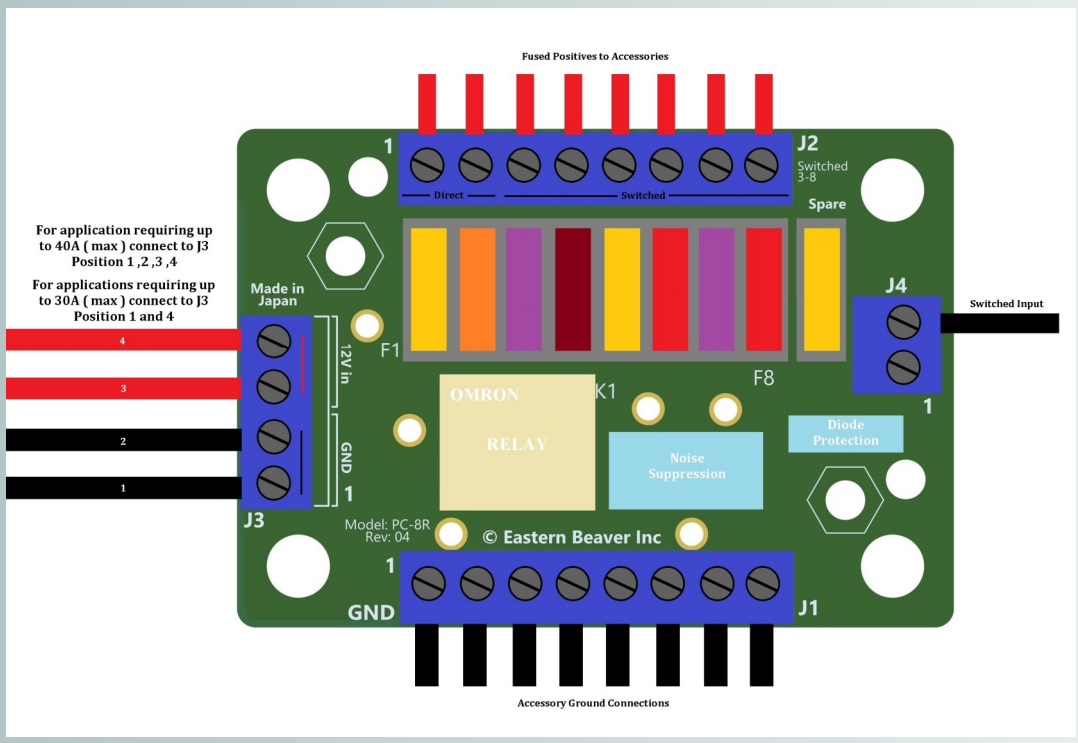
Wire diameter from 0.5mm^2 (20 AWG) to 1.25mm^2 (16 AWG) can be used (smaller wires are fine, but harder to work with).

Installation:

Installation of the PC-8R is quite simple. Decide on the location you want the PC-8R mounted. Most installation positions will be under the rider's or passenger's seat. In some cases the PC-8R can be mounted under a side cowl or seat cowl. Points to note concerning the mount positions are:

- Access for changing fuses
- Access for wiring changes/connections
- Cooling, the PC-8R does not need forced air but it does keep cool via convection so we recommend to avoid stacking items on top that may hinder cooling.
- For reliable operation we recommend mounting the unit out of the direct weather and away from wheel spray/splashing etc.
  (The PC-8R is designed such that should the unit be submerged in water, or mud, simply removing it and washing the unit in fresh clean water asap will ensure it's continued reliable operation. The unit itself generates a small amount of heat and any moisture or water that remains in the case, will evaporate. Usually a good shake after cleaning & before reinstalling is all that is needed.)
- It is always best to mount the PC-8R firmly to a panel or tray. Strong Velcro can be used or self tapping screws or push rivets. Loose mounting or allowing the unit to move around can lead to premature failure of connected wires.

Connections to the PC-8R are straight forward. Depending on application *(power requirement)* there will either be 1 or 2 power and ground connections. The switching input is normally connected to a source of switched power *(very low current is drawn, less than 0.1A).*



CAUTION:
When tightening or loosening J4 and J3 screw terminals, we recommend you support the terminal block against twisting.

Figure 6: Installation Connections

Installation *Tips*:

1. Install the main fuse last. Make sure all connections that you need to make, are made, before installing the main fuse. We also recommend that the PC-8R mini blade fuses be installed with the main fuse removed. When ready to test, install the main fuse.
2. Check carefully that nothing has been dropped into the fuse box before attaching the cover.
3. The fuse box has a spare fuse position. This can be used to store a spare fuse or two fuses, if only one leg of each fuse is used. For offroad riders, we recommend that the only 1 spare be fully inserted into both fuse clips.
4. When using cable ties, avoid tying wires so tight, that it put pressure on connections. The tie is to keep the cable in place and should just be tight enough such that the tie does not move.
5. Avoid storing soft cloths or riding gear on top of the PC-8R. The PC-8R relies on convection for cooling. Soft cloths will block convection and can cause premature failure. Soft rags can be put in small plastic containers and stored.
6. Avoid running cables near seat mechanisms or devices that move, to avoid damage to the cables, or if there is no choice, tie the cable into position, so It cannot be damaged by the mechanism.
7. Ensure that all cables entering the PC-8R screw terminals, do not have frayed wires that could cause a short. If not possible to get the cable in cleanly, any frayed wires can be trimmed off.
8. The bare wire connection to the PC-8R (stripped section), can be 5mm to 6mm (1.4"). Avoid stripping too long a section of wire.
9. If the wire size is large $2mm^2$ (14AWG) or larger, avoid twisting the strands as this increases the wire diameter. To get the wire into the screw terminal, squeeze together & straighten the strands as much as possible, then fit the wire into the terminal at an angle and once the lower stands are in, apply a tiny amount of downward pressure as you insert the wire.
10. Eastern Beaver does all it's testing using Japanese made, copper multistrand wire. Please note that not all wires are created equal, and some of the stated current carrying capacities of cheaper wires, are questionable. CCA (Copper coated Aluminum) for example has about twice the resistance of pure copper wire for a given diameter.

Fuse Selection:

The PC-8R uses mini blade fuses. The fuses come with a number stamped on top of the fuse in white i.e. the fuse value. *Do not use cheap reproduction fuses (usually no white value stamp on the top and not made from a nylon plastic).* The number stamped on each fuse is it's continuous current rating at 25℃, however, running a 10A fuse at 10A causes a heat to be generated at the fuse element. With a 10A ATM fuse in three different (brand name) manufacturer fuse holders, and a current of 10A, we measured temperatures of up to 90℃. When operated at 75% of the rated current, this temperature dropped to a much more acceptable 49℃. Littlefuse *(patent holders)* recommend derating of the fuse value by 25% to avoid heat/reliability issues. A quote from Littelfuse_fuseology.pdf "*For example, a fuse with a current rating of 10A is not usually recommended for operation at more than 7.5A in a 25℃ ambient".*

In short, if you want to fuse 15A circuit, use a fuse that is at least 15A/0.75= 20A

Example 2: Switched output 3 is to protect a navigation systems that requires 4.8A continuously. To select the fuse we divide 4.8/0.75= 6.4A. Since there are no 6.4A fuses we use the next higher value, which is 7.5A (standard value).

Example 3: Switched output 6 is to protect a set of LEDs that draw 10A continuous. Dividing 10A/0.75= 13.3A. Since 13.3A is not a standard value we would use a 15A fuse (the next higher value).

Mini Blade fuses are sold in the following values: 2, 3, 4, 5, 7.5, 10, 15, 25, 30

Ratings

Part Number	Current Rating (A)	Housing Material Color	Test Cable Size (mm²)	Typ. Voltage Drop (mV)	Typ. Cold Resistance (mΩ)
0297002._	2		0.5	171	55.60
0297003._	3		0.5	153	33.75
0297004._	4		0.5	121	23.48
0297005._	5		0.5	129	17.75
029707.5_	7.5		0.75	135	10.85
0297010._	10		1	108	7.42
0297015._	15		1.5	98	4.58
0297020._	20		2.5	96	3.21
0297025._	25		2.5	86	2.36
0297030._	30		4	87	1.85
0297900._	SHUNT		-	-	-

Figure 7: Mini Blade Fuse Standard Values (LittleFuse)

SPECIFICATIONS:

- Maximum Total Current: 40 *A*
- Maximum Switched Outputs: 30 *A*
- Maximum Direct Outputs: 20 *A*
- Maximum Current Per Output: 15 *A*
- Switched Outputs: Position 3 Through Position 8 on J2
- Direct Outputs: Position 1 Through Position 2 on J2
- Main Fuse: 40A or 50A
  40 Amp BUSSMANN (30A or under applications) or
  50 Amp LP JCASE (40 A applications)
- Switched Input Current: 62 *mA*
- Switched Input Loop Through: 1
- Switch Input Protection: 2 Types
  Inline diode and
  Diode + Resistor Flyback Damping
- Power Cable Size: 16 AWG—12 AWG
- Output Cables Size: 22 AWG - 12 AWG
- Operating Temperature: -20c to 70c
- Case Size : 80mm Long (3 1/4")
  58mm Wide (2 1/4")
  30mm Height (1 1/8")
- Fuse Type PC-8R Outputs: Mini Blade Fuses ATM
  (20 Amp Maximum)
- Main Fuse Type: ATO Blade or LP JCASE
  40 Amp ATO Blade for <30A applications or
  50 Amp LP JCASE for <40A applications

CAUTIONS:

I. Avoid twisting the wire strands, if possible as it increases the wire diameter. For smaller diameter wires this is not such an issue.

II. Check that there are no loose or frayed strands once a wire is screwed into a terminal.

III. Install the main fuse last, after installing the PC-8R and making all electrical connections.

IV. Never make PC-8R connections with the main fuse installed.

V. For J3 and J4 we recommend supporting the screw terminal against twisting when tightening the screw to clamp the wire.

VI. 5mm to 6mm (1/4 ") is a perfect length of copper for clamping in the screw terminals.

VII. 40A applications require the use of all power connections on J3. Use a LP JCASE type fuse rated at 50A.

VIII. 30A applications (or under) can use Bussmann 12AWG (3mm) inline fuse holders.

IX. Ensure the fuses are fully inserted into clips and not bent over hitting other fuses.

X. Fuses generate heat when they are incorrectly selected or close to their blow current.

XI. Avoid putting rags or visor cleaning cloths on top of the fuse box. The PC-8R requires convection cooling to dissipate heat.

XII. Always ensure the PC-8R is secured to the bike, to avoid unnecessary problems with connections.

XIII. Do not over tighten the lid. The lid is made in Japan and quite strong, but ham-fistedness could see it damaged.

XIV. Never tie cables in position too tightly. Always allow some slack near connectors or entering looms. Allowing some slack when tying cables in place helps avoid creating stress points and allow a degree of vibration damping to be carried out by the cable slack.

XV. The switched input loop though is not to be used for more than 0.2A

XVI. There is no need to overtighten screw terminal connections. Hold the cable being clamped in place, and lightly tighten the screw. Then give it one small tweak. Never use anywhere near your full strength. For some screw terminal like J3 and J4 it is better to support the terminal when tightening.

REPAIR SERVICE & SPARES:

Eastern Beaver Inc offers fix price repairs for PC-8R unit that are out of warranty and damaged by accident or failure. We also offer 50% discount on replacement units, for units that were damaged in a rider accident, provided we are shown proof of damage to the unit concerned. The repair service and accident damage replacement service are direct though Eastern Beaver and not though dealers. Shipping fees are not included.

Replacement Parts Price List

1. Replacement top cover label…… $2
2. Replacement top cover…… $8
3. Replacement base…… $7
4. Replacement Omron relay…… $6
5. Replacement 2 Position screw terminal…… $2
6. Replacement 4 position screw terminal…… $3
7. Replacement 8 position screw terminal…… $4
8. Replacement diode/resistor set (2 diodes & 1 resistor)…… $2
9. Replacement fuse holder clips (2)…… $5
10. Replacement main board with fuse holders, relay, diodes, resistors, terminals…… $60
11. Accident damage replacement…… $45

Fixed Repair Costs

Fixed prices repairs offers certainty in repair costs, so no big surprises. All work is carried out by qualified technicians. We offer 180day warranty on repairs & replacement parts per our Standard Warranty Policy. Shipping to and from Eastern Beaver Inc is not included and constitutes a separate cost.

1. Relay replacement & testing…… $28
2. Screw Terminal replacement & Full Unit Testing (8 Way)…… $24
3. Screw Terminal replacement & Full Unit Testing (4 way)…… $23
4. Screw Terminal replacement & Full Unit Testing (2 way)…… $22
5. Diodes & Resistor Replacement & Full Unit Testing…… $22
6. Fuse Clips (set) replacement & Full Unit Testing…… $25

PLAIN ENGLISH WARRANTY SUMMARY:

The PC-8R is warranted against defects, per the Standard Eastern Beaver Inc Warranty Policy for a period of 1yr from the date of purchase.

The following exclusions apply:

1. Failure or damage due to improper installation, or proper care during installation.
2. Exceeding specifications on power.
3. Crash or accident damage *(though we will offer a discount on replacement units for PC-8R's damaged in riding accidents)*.
4. Use in corrosive environments.
5. Misuse or lack of care during use that leads to physical damage to the PC-8R.
6. Where a unit is not cleaned properly after being exposed to flooding or submerged in water.
7. Liability is limited to the initial purchase price of the PC-8R, excluding shipping or wiring kit costs.
8. Proof of purchase, from an authorized dealer or Eastern Beaver Inc is required, to make a warranty claim.
9. Shipping costs are not covered by warranty and the customer is responsible for shipping cost to Eastern Beaver Inc and the return to the customer. Eastern Beaver Inc, at its sole discretion may offer to cover some of the shipping costs, depending on the circumstances.
10. The Standard Eastern Beaver Inc Warranty Policy is the determining policy. This section is just a brief summary of that policy.

WARRANTY:

Standard Eastern Beaver Inc. Warranty Policy

This is a return to base warranty. The customer is responsible for all shipping costs.

I. All implied conditions and warranties which may by law be excluded in relation to the supply of products or provision of services by Eastern Beaver Inc are hereby excluded, the exclusion, of which would render the agreement incorporating these Conditions between Eastern Beaver Inc and the Customer void or voidable or Eastern Beaver Inc liable to a penalty or which may not by the terms of relevant State Legislation be excluded or modified, then such conditions or warranties shall apply.

II. In connection with the supply by Eastern Beaver Inc to the Customer of any goods or services, where, any legislation provides for redress in the event of Eastern Beaver Inc breach of a condition or warranty, whether statutory or otherwise, then the Customer's sole remedy for any such breach shall at the option of Eastern Beaver Inc be limited to;

III. the replacement of Eastern Beaver Inc goods; or

IV. the repair of Eastern Beaver Inc goods; or

V. refund of the purchase price of Easter Beaver Inc goods.

VI. Eastern Beaver Inc shall not be liable for the cost of removal and reinstallation or loss or time due to failure of a component or system of its products other than stated in Clause II.

VII. Subject to any provision of relevant State legislation which may not be excluded or modified, Eastern Beaver Inc will not be liable for any costs, claims, damages or demands arising from any personal injury, loss or damage to products whatsoever occurring as a result of either the act or omission of Eastern Beaver Inc, its distributors or agents and in no case will Eastern Beaver Inc be liable for consequential loss or damage.

VIII. Subject to the provisions of this document, if systems or parts fail, supplied as new parts, within a period of 12 months of purchase, due to faults in manufacture, these parts are warranted as per Clause II.

IX. When returning faulty units, the Customer must provide invoice number, proof of purchase, purchase date, product serial number (where applicable) and a description of the product failure.

X. Subject to the provisions of this document, if system parts which have been Upgraded or Modified as part of an OEM Upgrade, fail, within a period of 180 days, these parts are warranted as per Clause II.

XI. This warranty is void if Eastern Beaver Inc determines, in its sole business judgment, the defect to be the result of abuse, neglect, alteration, or attempted repair by unauthorized personnel.

XII. The several clauses which constitute or evidence this warranty shall be taken as mutually explanatory and anything contained in one but not in another shall be equally binding as if contained in all. Any ambiguity, discrepancy or inconsistency shall be explained by Eastern Beaver Inc upon reference thereof in writing to Eastern Beaver Inc by the Customer or on discovery thereof by Eastern Beaver Inc, who shall thereupon direct the Customer as to the interpretation to be followed. If the Customer finds any such ambiguity, discrepancy or inconsistency he shall immediately refer it in writing to Eastern Beaver Inc.

XIII. Eastern Beaver Inc shall not be liable for failure to perform its obligations if the failure arises from circumstances beyond its control, including but not limited to fire, explosion, strikes, lock - outs or any other industrial disputes, failure or refusal of its supplier to supply the goods, inclement weather, acts of God, Governmental action, in no such event shall the Customer be entitled to damages of any kind for late performance or failure to perform.

XIV. Eastern Beaver Inc specifically disclaims any and all implied warranty of merchantability or of fitness for a particular purpose. The buyer acknowledges and agrees that in no event shall the company be liable for any special, indirect, incidental or consequential damages, or for injury, loss or damage sustained by any person or property, that may result from this product failing to operate correctly at any time.