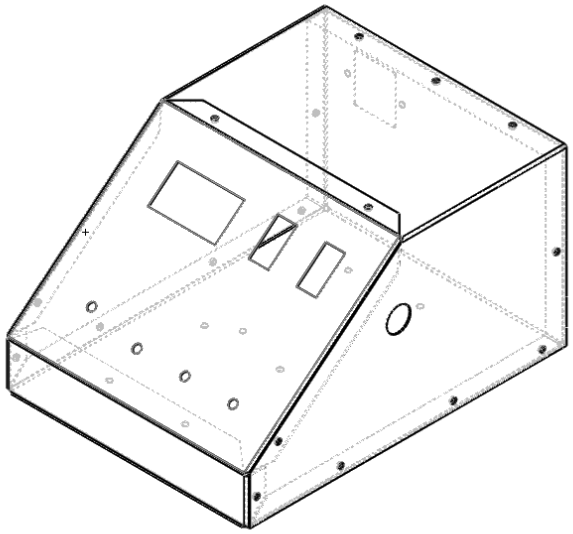
M.R. INC.

VARIABLE POWER SUPPLY

User manual



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INTRODUCTION

First and foremost, we'd like to thank you for choosing M.R.INC. The following documents will detail the proper use and safety of our Variable Power Supply, warranty policy, troubleshooting, amongst other technical information. This document should be read attentively before the device's first use and safety instructions need to be followed consistently.

This device is shipped with the following:

- 1 x Variable Power Supply (M.R.INC)
- 1 x AC Power Cable (Type-B)
- 3 x Fuse
- 1 x Manual

Thank for your purchase!

SAFETY

The safety guidelines details bellow must be followed at all times to avoid injury or damage of property. Read thoroughly before usage. Failure to follow the safety guidelines will void the warranty.

Safety Standards

This product conforms to the IEC 61010 Safety Standards. It operates under CAT 2, with an input of 120V RMS 60Hz.

This instrument should NOT be used in an electrical environment with a higher category rating than the one mentioned above.

Precautions

The power supply should be placed in a fixed spot. Do not move or handle while its connected.

Do NOT apply voltage outside the specified range to power the device.

THIS IS NOT A TOY. THE POWER SUPPLY MUST BE KEPT AWAY FROM CHILDREN OR UNTRAINED PERSONNEL.

This is a tool designed for professional use. It is not a toy. It can cause real damage, injuries or even death to someone if handled incorrectly.

UNDER NORMAL AND OPERATING CIRCUMSTANCES THE GROUNDED NUT AND BOLT CONNECTION IS **NOT** TO BE LOOSENED FOR ANY REASON.

For safety, the case has been mechanically grounded through the ground conductor of the cable. To loosen this connection puts the user at great risk of electrical shocks or even death in the event that the case was to come in contact with live wire.

FUSE PROTECTION IS NOT TO BE BIPASSED BY SHORTING THE FUSE HOLDER AT THE AC POWER SOCKET.

At the power socket, there is a fuse holder designed for a 2A Slow-blow fuse. This is to prevent sudden power surges to damage the inner circuitry. This fuse should only be replaced when unplugged and by qualified personnel.

UNDER NO CIRCUMSTANCES SHOULD THE CASE BE OPENED WHILE THE POWER SUPPLY IS CONNECTER NOR SHORTLY AFTER.

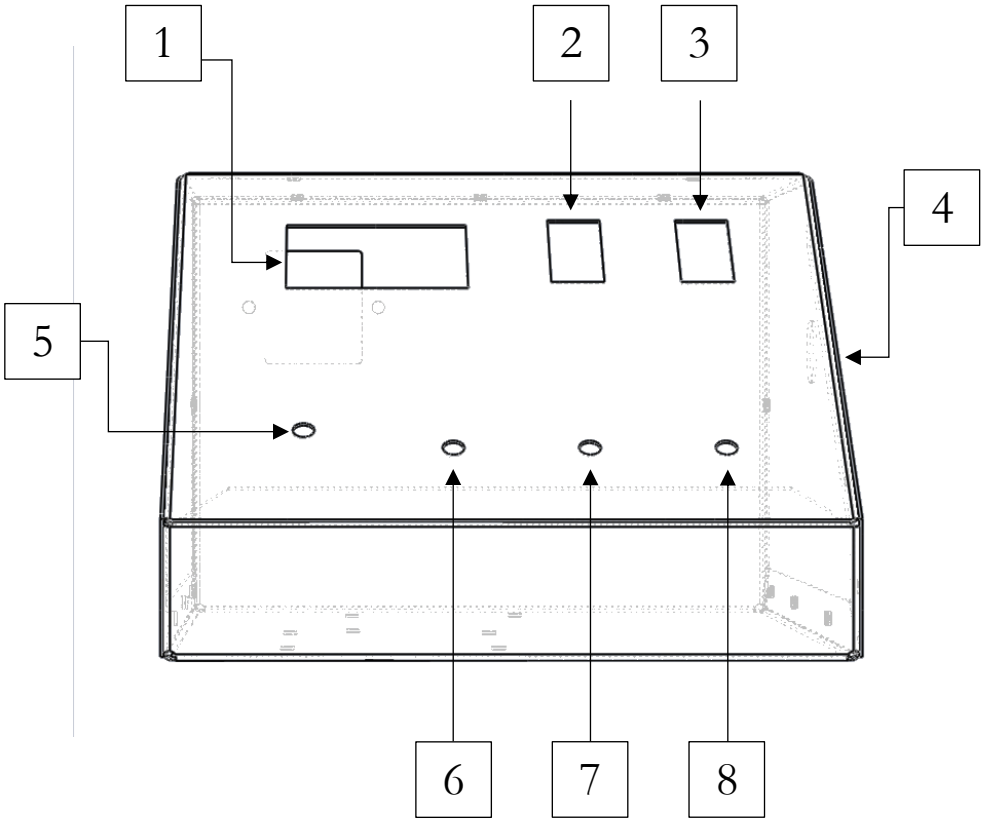
Touching the board, exposed wires or the components may cause electrical shocks even after the device has been disconnected (this is because of the nature of capacitors). Components may also heat up to dangerous temperatures so direct contact is to be avoided. Beyond, touching the board or exposed wires may cause a short that, if not outright fatal or at least harmful to the user, may damage the components and cause it to stop working all together.

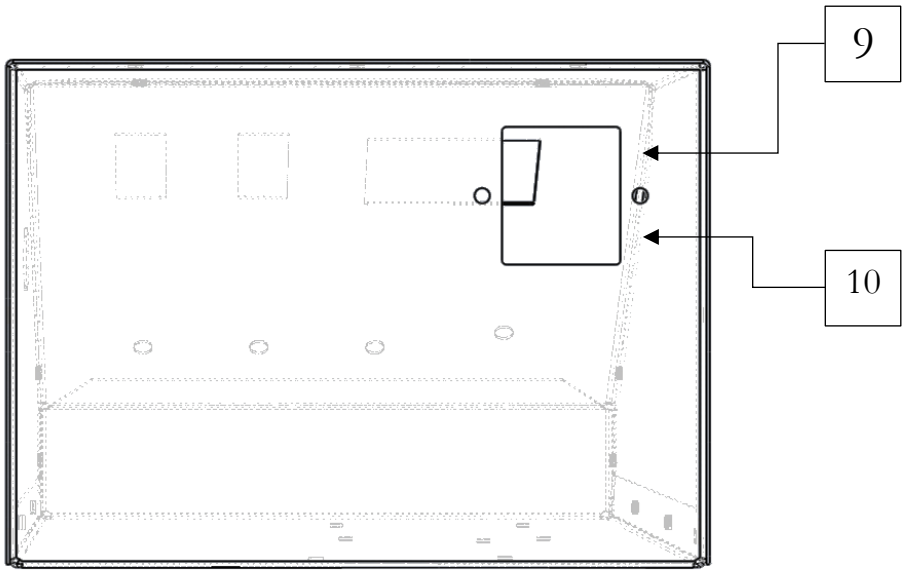
UNDER NO CIRCUMSTANCES SHOULD THE POWER SUPPLY BE OPERATED WITH AN OPEN CASE.

Exposed live wire and circuitry is always the hazard. If damaged or suspects damaged, the device is to not be operated until after inspection and clearance authorized personnel.

OPERATION

Layout and Functions





1	**V&A Display** Displays the voltage(red) and current(blue) at the variable output.	**6**	**Variable Output** Red binding post. Controlled by the variable output switch and the Potentiometer, it allows for a voltage output with a range of 1.4V up to 30V.
2	**Variable Output Switch** Opens and closes the circuit at the variable output. It allows you to cut off power without having to disconnect from output or turn off the power supply Upper side: Pushing the upper side inwards will close the circuit and allow current to flow out of the variable output. Lower side: Pushing the lower side inwards will open the circuit and cut power to the variable output.	**7**	**Ground** Black binding post. Connects to the ground of circuit.
3	**3.3&5V Switch** Allows you to alternate between 3.3V and 5V at the 3.3&5V Output. Upper side: Pushing the upper side inwards will set the voltage output at 3.3V Lower side: Pushing the lower side inwards will set the voltage output at 5V.	**8**	**3.3&5V Output** Green binding post. It provides a fixed output of 3.3V or 5V Controlled by the 3.3&5V Switch.
4	**Power Switch** Allows you to feed or cut power to the entire circuit. Upper side: Pushing the upper side inwards will power up to the entire power supply (the display will light up) Lower side: Pushing the lower side inwards will cut power to the entire power supply. (the display will take a few seconds to power down)	**9**	**AC Input Socket** With the cable provided connected, it allows for energy to flow into the power supply from whichever AC source it's connected to.
5	**Potentiometer** Allows to raise or lower the voltage at the variable output. CW: Turning the knob clockwise will increase the voltage at the variable output up to 30V. CCW: Turning the knob counterclockwise will decrease the voltage at the variable output do down to 1.4V.	**10**	**Fuse socket** Holds fuse that protects the power supply from any power surges, electrical malfunctions or issues created by incorrect flow of energy.

Before you start

Before anything, make sure that the power switch is off, and the variable output is closed. Make sure that that a Fuse has properly been inserted and connect to the cable to the Variable Power Supply and then to your AC input of 120Vrms@60Hz.

After this, you can turn on the power supply with the switch on the right side of the case. If everything goes right, you should see the V&A Display light up and Variable Power Supply is ready for use.

When you're done

When you're done, disconnect anything that you may have connected the Variable Output and 3.3&5V Output and close the Variable output with the switch.

Make sure to turn off the Power Supply BEFORE disconnecting the cable from the AC Source or from the AC socket.

After turning it off and disconnecting, it might take a few seconds before the V&A Display starts powering down before turning off (the display will dim slowly before going out completely)

After this, store and maintain the Variable Power Supply as detailed bellow.

MAINTENANCE & TROUBLESHOOTING

Storage

The power supply is to be placed in a fixed spot away from any flammable, explosive, corrosive or noxious gases and substances of such nature as to avoid any unwanted reactions.

Water or other fluids are to be kept away from the power supply. Nor should the power supply be placed in a damp or humid environment.

The power supply is not to be operated in a place with restricted airflow or at a temperature outside the bounds of 0° to 40° degrees Celsius.

Cleaning

UNDER NO CIRCUMSTANCES SHOULD THE CLEANING BE DONE WHILE THE POWER SUPPLY IS CONNECTED NOR SHORTLY AFTER.

Do not attempt to clean with water or any type of liquid/chemical as this may compromise the electric circuitry.

The power supply is to be dusted a minimum of once a year, although this may vary depending on the storage environment and frequency of usage.

Cleaning the is to be done carefully ONLY with a dry lint-free cloth.

Cleaning is to be done ONLY by qualified personnel and following the safety guidelines.

Troubleshooting

Troubleshooting is to be done EXCLUSIVELY by qualified personnel.

If you fear that your product may be malfunctioning, please check the following before taking any further steps:

- Check that the device is properly connected to both the Variable Power Supply and its AC source.
- Check the FUSE has properly been inserted in its corresponding socket and that the FUSE is not blown.
- Check that the Variable Output Switch is in the desired positions with its corresponding out.
- Check that the 3.3&5V Switch is in the desired positions with its corresponding output
- Check that the potentiometer is at the desired position with its corresponding voltage and behaves as described in the Layout and Functions section.

If these basic troubleshooting steps don't help, the following troubleshooting steps are EXCLUSEVILY to be preformed by a TRAINED TECHNICIAN always following the safety guidelines detailed above.

TO OPEN THE CASE, ONE HAS TO UNDO THE GROUNDED NUT AND BOLT. THIS IS TO BE DONE WITH EXTREME CAUTION WITH THE POWER SUPPLY DISCONNECTED AND THE CONNECTION NEEDS TO BE REDONE AND SECURED BEBORE THE POWER SUPPLY IS RETURNED TO REGULAR USE.

- First and foremost, all switches should be checked to make sure that they're functional and behave as detailed in the Layout and Functions section.
- Does the display light up when connected? And is there power at the variable output display?
    - If the display lights up but there is no power at the Variable Output or it doesn't match, there might be a problem with the

LM317. Please check the data sheet for it and make sure it's working properly. If this doesn't solve it there might be a connection problem between the Variable Output and the Display input. Please make sure these are connected as shown in the schematics.

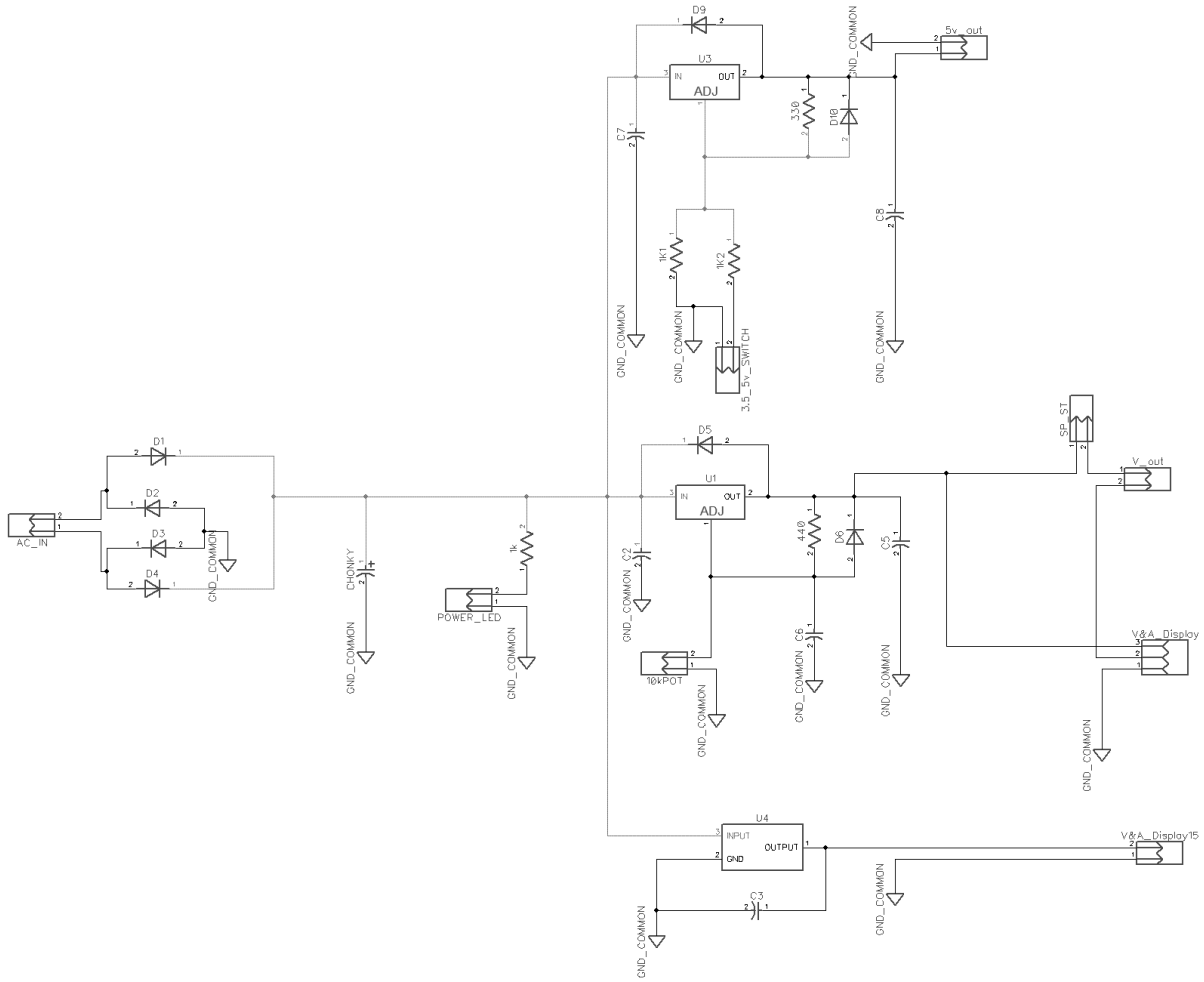
  - If the display does NOT light up, but there is power at the Variable Output, measure the voltage at the V&A Display15. If the voltage is 15V, the problem is the display and needs to be replaced. If the voltage is anything else, the problem might be the LM78L15. Please consult its datasheet and make sure it's working properly.
  - If the display does NOT light up AND there's no power at the Variable Output, check the 3.3&5V Output. If it has an output, this might be two separate issues, please refer to the two previous steps and troubleshoot accordingly. If there's no output, there might no power flowing into the power supply, check that the rectifier bridge and the transformer are both working properly.

- Does the 3.3&5V output have a voltage? Is it anything else outside of 3.3V or 5V?
  - If there's no output, there might be a problem with the LM317. Please check the data sheet for it and make sure it's working properly.
  - If there IS an output, but it's not the output desired, it might be the resistances at the ADJ pin of the LM317. Measure their resistances and make sure it's 1kΩ each and 500Ω when in parallel.
- Does the potentiometer not control the voltage at the output?
  - Check the resistance at the potentiometer. Make sure it isn't burned and replace if needed.

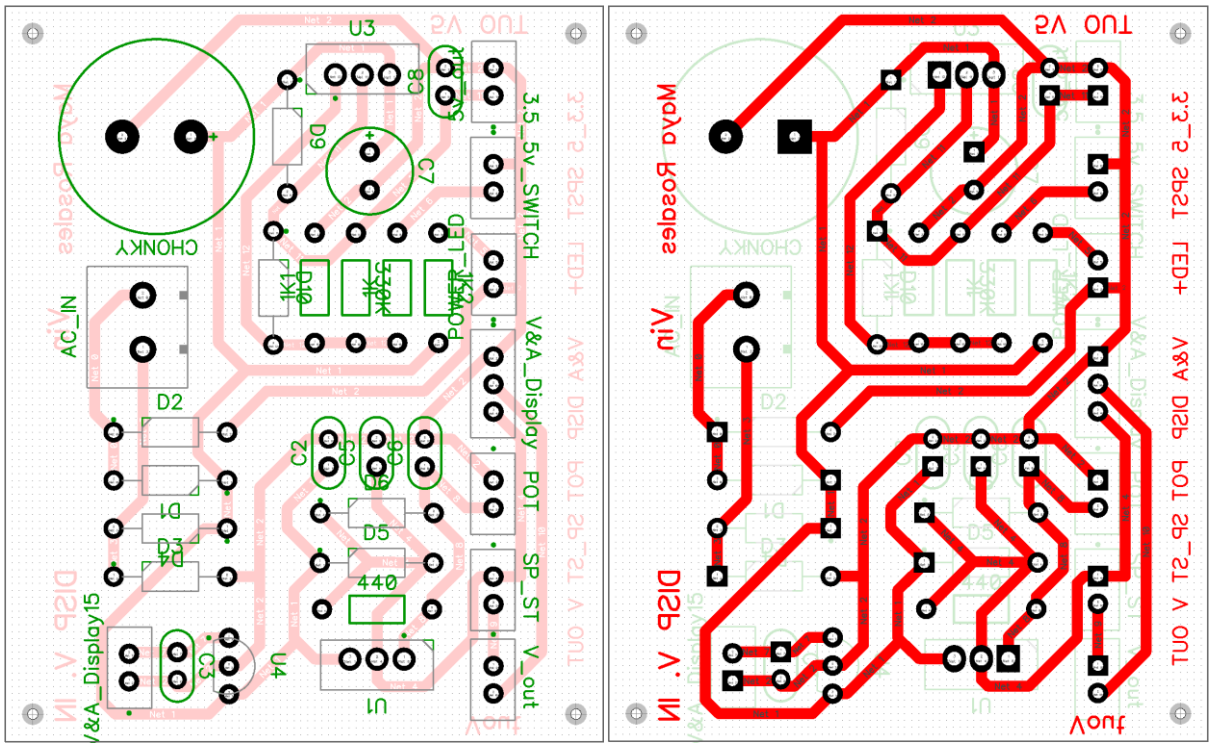
If after following these steps, the issue persists the next step is to contact us with the issue at hand and to check if the product is still covered under warranty.

If any parts need to be replaced, please contact us and we'll provide you replacements (or sell if out of warranty).

SCHEMATICS



5.1 Wiring Diagram



5.2 Board diagram (front)

5.3 board diagram (back)

5V_out 3.3&5V Output	**POT** Potentiometer
3.3_5V_SWITCH 3.3&5V Switch	**SP_ST** Variable Output Switch
V&A_Display V&A Display measuring input	**V_out** Variable Output
V&A_Display15 V&A Display 15V Power output	**AC_IN** Power Input from transformer.

NOTE: It is important to mention that in the schematics and board, there is an output labeled as POWER_LED. This was a light indicator for the power supply in one of our earlier versions, which has since been replaced by the digital V&A display. This output is simply to be ignored and will not affect the performance of the Power Supply at hand.

WARRANTY

If a costumer is not satisfied with their purchase within 30 days, they may demand a refund for any reason at any authorized retailer. The request *must* be accompanied with a proof of purchase and, if authorized, the product must be returned along with all the accessories included (if the reason for the return *is* that the product is missing accessories, please contact our costumer service team)

All our products are covered by legal warranty and any customer protection laws that may apply to the time and region where the product is sold.

M.R.INC. assures that the product will be free of defects for a period of 2 years from the date of purchase. In case of failure due to malfunction within this period, the company offers, at its own discretion, the replacement or repairment of the product. The request *must* be accompanied with a proof of purchase, details about the malfunction and its nature and the request must be sent our costumer service team. The client may be requested to send photographic evidence of the defect and/or its nature before any action takes place.

Evidence of tampering, or failure to following the usage/safety guidelines will nullify the warranty.

The warranty does NOT cover any damages caused by improper usage or maintenance of the product.

The company is not liable nor responsible for injury, death or damage to property caused by incurring on the previously mentioned actions.

Out of warranty repair services are offered depending on the nature of the issue. These services are limited and come at a variable rate. Please contact our costumer service team for further details.

EMAIL: costumerservice@mrinc.com

M.R. INC.