



## ADJUSTABLE POWER SUPPLY (Code: POWADJ)

### DESCRIPTION

The *ADJUSTABLE POWER SUPPLY* is designed to supply between 1.2 volt and approx. 15 volts with a current up to a 1 ampere. It can be used for testing, powering circuits, motors, solenoids and other equipment.

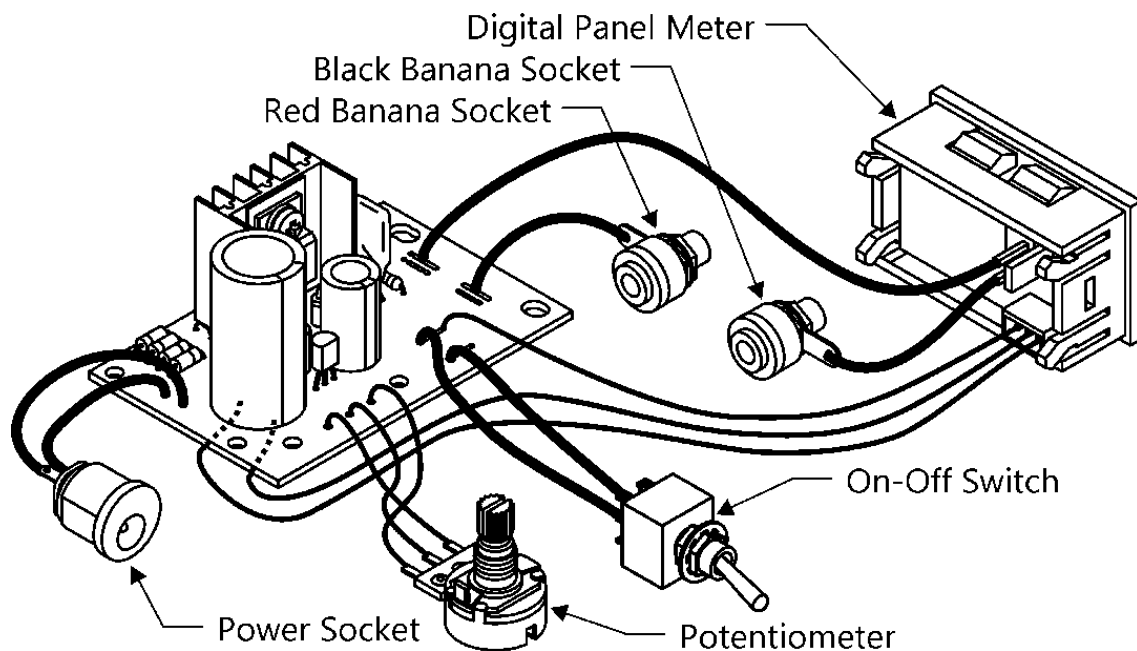
It can operate from either an AC or DC plug pack transformer with a voltage range between 12 to 18 volts.

The *ADJUSTABLE POWER SUPPLY* input can be either AC or DC, but it will only output DC



\*case CASEM150 shown –purchased separately

<b>LEVEL:</b>	Intermediate
<b>HOURS TO CONSTRUCT:</b>	10 -12 hours Add 2-3 hours if designing and making the case
<b>SKILL DEVELOPMENT:</b>	<ul style="list-style-type: none"><li>• Planning and Design</li><li>• Manufacturing</li><li>• Soldering</li><li>• Electrical</li><li>• Testing</li></ul>





## WHAT'S IN THE KIT?

- ☐ All the electrical and electronic components required to make the *ADJUSTABLE POWER SUPPLY* except for the plug pack transformer
- ☐ A detailed teaching unit with a complete parts list, design suggestions for the case layout, design considerations if you are making your own case, step by step instructions for soldering components onto the PCB, and general construction guidelines.



## WHAT ELSE IS NEEDED?

The following items are required and are available from Scorpio Technology, but need to be ordered separately:

- ☐ Suitable 1 Amp 12-to-18 Volt Plug Pack Transformer - either AC or DC type.
  - 12V DC Plug pack (Order code: POWPK2)
  - 16V AC Plug Pack and plug (Order code: POWPK16AC + PLUGDC2.1)
- ☐ You will require a case to suit this project. Either design your own or buy a suitable case.
  - Metal case with ventilation slots 150x102x61mm (Order code: CASEM150)



The following material is to be supplied by the student / teacher:

- ☐ Material for the case if you are making your own
- ☐ Block of wood at least 18mm thick to support the case at the assembly stage.  
Holes will be drilled into the block.

## TOOLS REQUIRED

The following tools are required:

REQUIRED TOOLS	ORDERING CODE
Assorted hand tools (depending on materials chosen)	-
Small Phillips screwdriver and spanner	-
Ruler and pen, Scribing implement or centre punch	-
Drill (either powered or a hand drill)	-
Drill Bits – sizes 1.5, 3, 6, 7, 8.5, 9.5 & 12.5mm	-
Small needle files	-
Soldering Iron and Soldering iron stand: – a good quality soldering iron, with a fine tip <b>Or</b>	SOLDIRN SOLDIRNSTD
Soldering station	SOLDSTN
Solder: – 0.71mm 60/40 solder is recommended	SOLD250/SOLD500

*Tool requirement continued on following page*



REQUIRED TOOLS (continued)	ORDERING CODE
Wire strippers	WIRESTR
Side cutters	SIDECUT or SIDECUTM
Nibbling tool	NIBBLER
Crimping tool or long nose pliers	CRIMPTM or PLIERLN

In addition, the following tools are useful to have and are available from Scorpio Technology, but need to be ordered separately if required:

- ☐ Component lead forming tool (for resistors, diodes etc.) (COMPLFT)
- ☐ PCB Holder (PCBHOLD)
- ☐ IC Inserter (ICINSERT) / IC remover (ICEXTRACT) / IC straightener (ICSTRAIT)

## ABOUT THE PROJECT

The major features of this project are the planning, design, construction, assembly and evaluation stages of an *ADJUSTABLE POWER SUPPLY*

### PLANNING PHASE

Projects such as the *ADJUSTABLE POWER SUPPLY* require good time management from the student because of the number of components involved as well as the complexity of the project. Before commencing work the student should spend some time planning their project, drawing up a plan describing:

- ☐ The sequence of work that will be necessary to complete it.
- ☐ A timeline showing the anticipated completion dates of each section of work.
- ☐ The student can then use the timeline to properly manage their classroom time.

These plans should also take into account what items should be recorded throughout the life of the project. This may include maintaining a logbook, recording daily or weekly progress, problems encountered, and observations made.

Before commencing the project, the teacher and student need to:

- o discuss what the student is trying to achieve
- o come up with solutions to things that need to be solved to make the project.

These should then be evaluated by the student after the project is completed.

### DESIGN PHASE

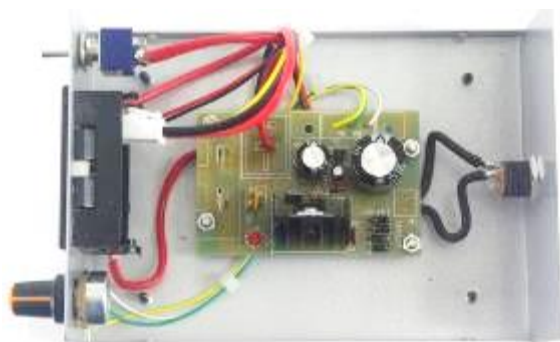
- ☐ Purchase or design a case to house your *ADJUSTABLE POWER SUPPLY*. Suitable cases are available in different sizes, shapes and materials.
- ☐ The student will need to evaluate/consider:
  - o Is the interior large enough to fit the PCB and all the other parts?
  - o How to lay out the PCB and other components inside the case
  - o Is there enough ventilation to dissipate heat from the circuit/components?
  - o Is the front panel large enough to fit the Digital Panel Meter, Banana Sockets, On/Off Switch and Voltage Control (potentiometer with knob)?
  - o Front panel layout.
  - o Consider the practical aspects of construction and assembly.



## MAKING / CONSTRUCTION

Once the Design process has been completed, the students will be able to start **building their design**. They will:

- ☐ Make the case if they have not used a purchased one, or modify the purchased case to be able to mount all the electronics (PCB and other components)
- ☐ Assemble and solder the PCB
- ☐ Mount the Digital Panel Meter, switch, potentiometer, banana sockets and power socket to the case
- ☐ Wire up and solder the Digital Panel Meter, switch, potentiometer, banana sockets and power socket to the PCB.
- ☐ Mount the PCB in the case
- ☐ Test the *ADJUSTABLE POWER SUPPLY*
- ☐ Troubleshoot any problems!
- ☐ After completing and assembling the *ADJUSTABLE POWER SUPPLY*, the student will make up the two test leads with banana plugs and alligator clips



## **DOES THE TEACHING UNIT INCLUDE ANY THEORY?**

The Teaching unit has a THEORY section that covers:

- ☐ An overview of the major sub-systems
- ☐ AC Voltage
- ☐ DC Voltage
- ☐ Half Wave Rectification
- ☐ Transformers
- ☐ Filter Capacitors
- ☐ Full Wave Rectification
- ☐ AC Waveform measurements: Peak, Peak to Peak, Average, RMS
- ☐ Voltage Regulators
- ☐ Power Calculations and Efficiency

