

# Power Supply Explained

The Micro Star was designed to have a separate amplifier output stage. It became obvious after working with WFC's, toroidal coil transformers and various PWM designs that the hostile environment created by a working voltage intensifier circuit and a WFC was creating electrical noise in the form of RF, current surges and large reverse voltage spiking that was damaging the signal source. What was required was to isolate the computer from the amplifier stage.

Inside the Micro Star is an optically-coupled power output amplifier board. This unit can be connected to any PWM signal source, e.g. a lap top computer, the Micro Star, etc. without any fear of high voltage spiking causing damage to sensitive digital logic circuits.

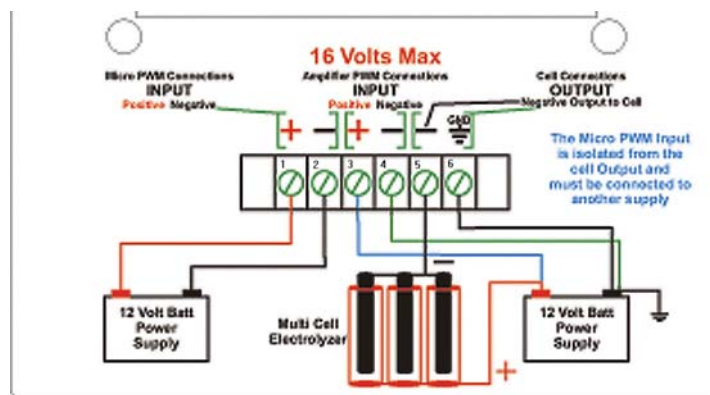
## Micro Star Application

The Micro Star was designed to be flexible and functional to provide the user with a variety of applications. Using multiple power supplies, makes it possible to provide the computer with a noise-free environment, but one is also able to drive the fuel cell on a higher range of voltages above the 12 volt rail. Depending on your choice of MOSFET transistor, the voltage driving the cell could be as high as 300 volts if the user so wishes to incorporate this into their design. The only limitation is the threshold voltage of the gating transistor.

There are three possible power supply applications for the Micro Star:

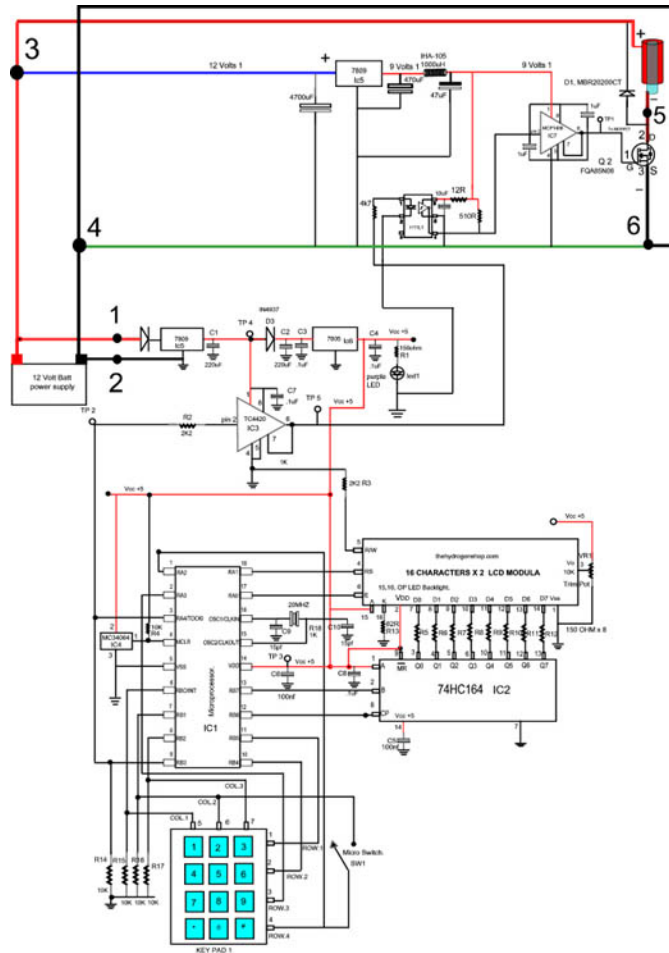
1. using 1 single power supply source;
2. using 2 power supply sources; and
3. using 3 power supply sources.

Note: I have numbered the connection terminals on the schematic to match the numbers on the connection diagram as a helpful guide. Also note that the black dots on the schematic next to each number represent the external connection on the outside of the box.



# 1. Single Supply Rail Application.

This application is possible but not recommended. The user could couple all the supply rail terminals to the one supply rail. This can work satisfactorily as long as large current consumption was not a requirement, e.g. no greater than 500m Amps. The following diagram shows the wiring for this application.



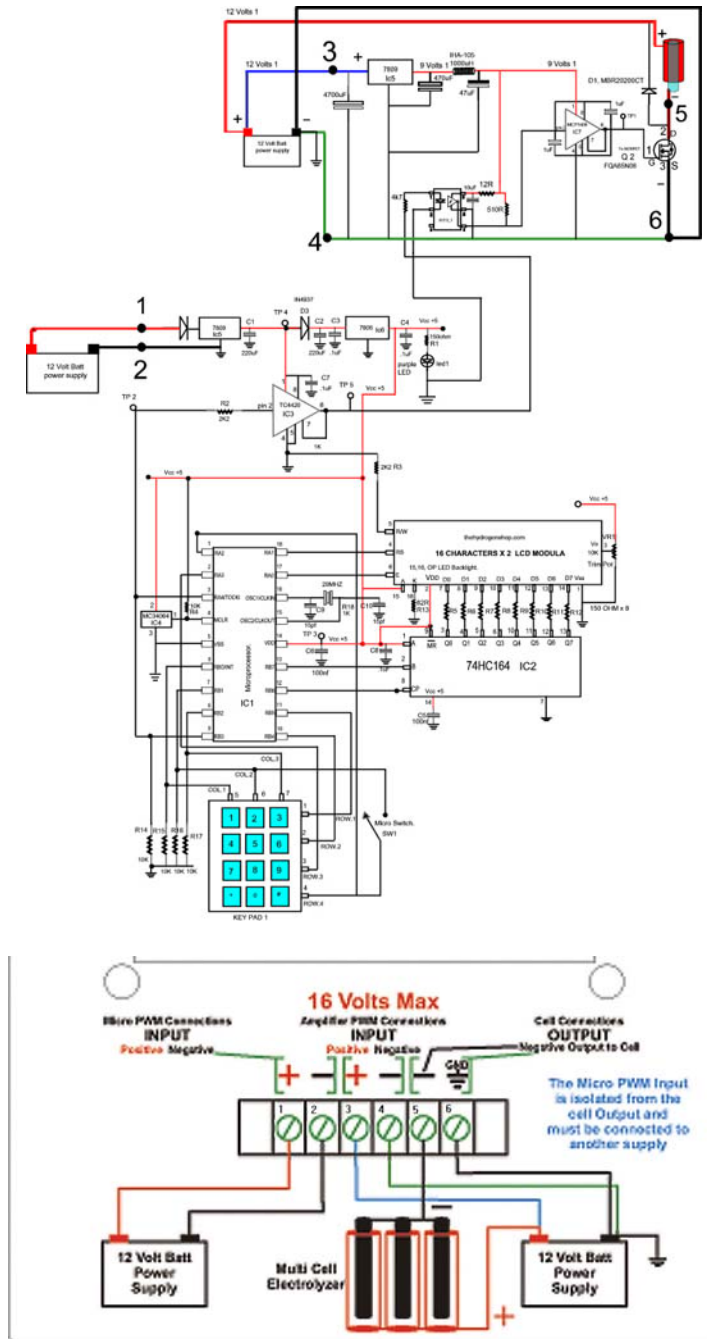
The recommendation for an automotive application is that the positive and negative power rails supplying the fuel cell go straight to the car battery terminals, while the rest of the electrical system could be wired straight to the car's ignition system, or the accessory circuit.

The reason one would wire the cell power supply to the battery is so the cell and the MOSFET could get direct access to all the current it needs on demand and not put excessive load on the car's electrical wiring system.

It should be obvious that the fuel cell may be drawing up to 20 amps of current, where the electronics system of the Micro Star is only drawing 0.1 of an amp.

## 2. Dual Supply Rail Application.

In this application the digital logic circuits of the Micro Star run independently on its own 12 volt source, completely isolating the computer stage from the amplifier stage. The amplifier stage runs completely independently on its own 12 volt supply source and in this configuration current consumption of up to 15 Amps is comfortably possible. Please note that 16 volts should not be exceeded on the supply. The following diagram shows the wiring for this application.

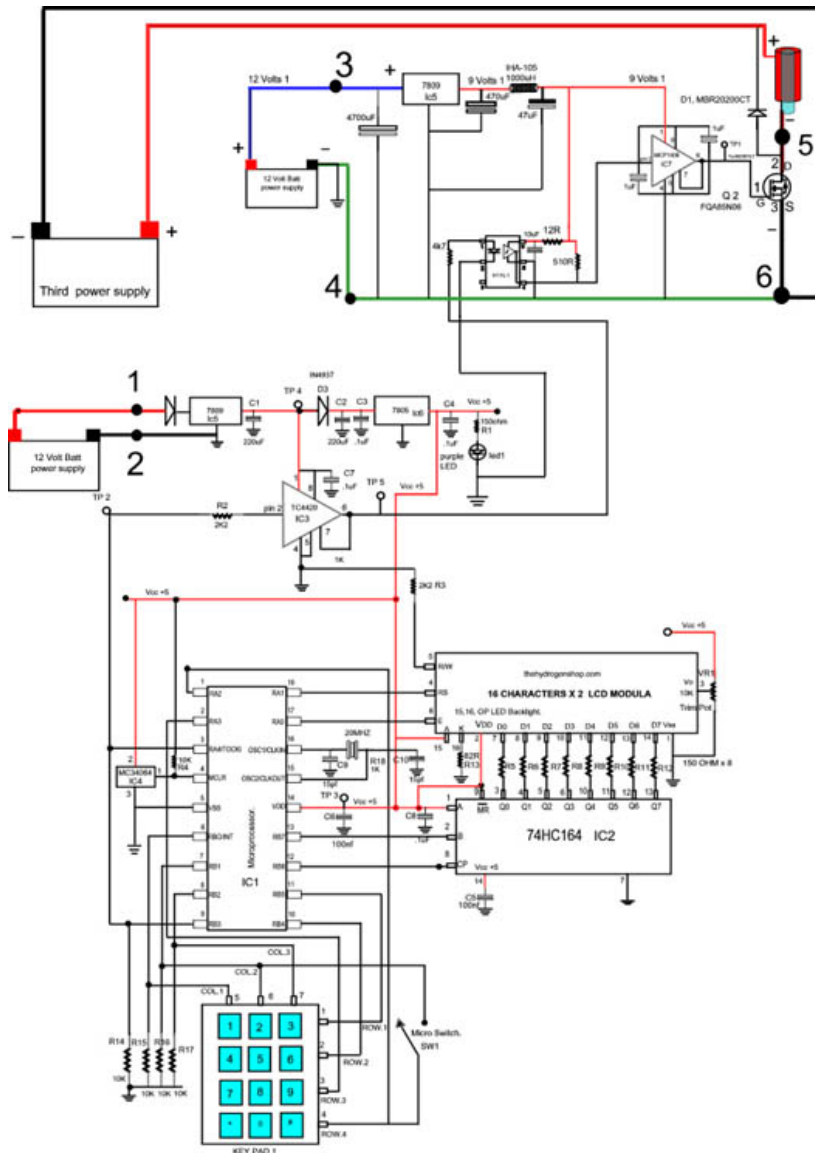


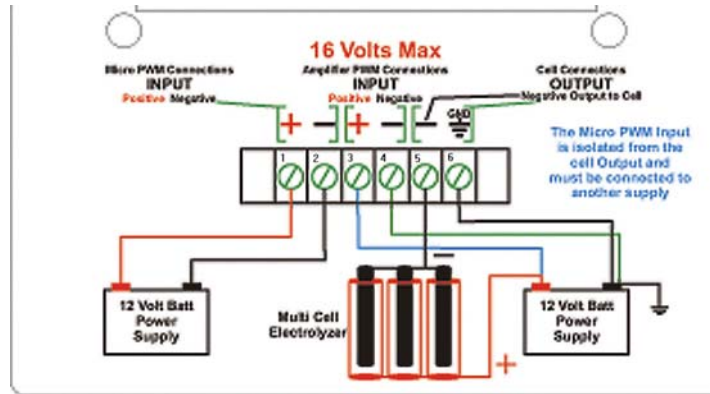
## Dual Supply Rail



### 3. Triple Supply Rail Application.

In this application the computer stage runs on 12 volt supply, the amplifier stage runs on a 12 volt supply and the fuel cell can run a much higher voltage supply. Connecting the Micro Star up in this configuration gives us the opportunity to drive the fuel cell itself on a lot higher voltage range. What we are doing is gating any voltage we choose through the FET, as long as the current and voltage specifications of the transistor are not exceeded. Please see the wiring diagrams below.





## Triple Supply Rail



For demonstration purposes only, I have used a 9 volt transistor battery in the photo above. It should be understood that a small battery like this could not power a cell. It is used to represent an alternative supply rail. The user, however, may be using a bench power supply with variable voltage output or even two 12 volt batteries in series to obtain a 24 volt power supply.

