

# The VERB interface

## 1. What is the VERB interface ?

The VERB interface ( Versatile Easy Relay Box ) is a cheap, simple and easy to build interface between your pc and a motorized telescope mount. It is especially designed to work with AstroArt 3.0 ( or higher ).

The interface is connected to the COM port of the pc and uses the DTR (Data Terminal Ready), RTS (Ready To Send) and TX ( transmit) lines of the port.

The VERB can be used in two ways :

- a. If you intend to control your telescope mount by means of digital signals only, it is enough to build only the left part of the interface ( see schematic diagram ) and use the digital RA+, RA- , DEC+ and DEC- signals to drive the mount directly. In this case, a 5 wire cable can be used to connect the mount ( 4 signals + ground ).  
There is no external power supply needed : the power for the integrated circuits comes from the COM port itself.
- b. If you want to connect your mount by means of relays, you can also build the right part of the interface, containing 4 individual relay contact pairs. These outputs can be put in parallel to the buttons of the control of the mount. In this case, you have to check if the pushbuttons of your mount need separate connections. On some mounts ( like for instance the DD1 dual control of the Vixen GP and GPDx mounts ), there is a 'common' for the 4 buttons, so only 5 wires are needed to connect them. For the 12V power, needed for the relays, the power supply of the mount is also used. This means that you will need a cable with 7 wires in case of a common ground for the buttons ( 5 wires for the buttons, 12V and GND ), or 10 wires in case of separated lines ( 4x2 wires for the buttons, 12V and GND ).

## 2. How does it work?

Quite simple. All the work is done by two CMOS integrated circuits : a counter and a circuit with 4 AND gates. The DTR signal is used to power both circuits.

In order to send a signal to one or more relays, the following happens:

- first, DTR goes high ( about +9V to +12V ). This powers up the IC's. At this moment, RTS is still low, so that no signals are seen at the output of the gates.
- TX is now sending a number of pulses, depending on the relays you want to activate.
- Now, the RTS goes high. The result is that the signals appear at the output, so that the relays are activated.
- Finally, after a certain period, the RTS goes low. This will release the relays. DTR will also go low. This will reset the counter.

### 3. Remarks

- For the relays, a small reed relay is used: the coil is 12V, 1000 ohm. They fit in a 14 pin dil IC socket.
- Transistors are BC549C. Any other small npn transistor could be used as well. If the relay is not activated, the HFE of the transistor could be too low. In that case, lower the value of the 220K resistor to 150K or 100K.
- The LED's are small 3mm types. Use 4 different colors.
- Diodes : 1N914, 1N646 or any other Si diode.
- All resistors: 1/4 Watt

# **VERB ( Versatile Easy Relay Box )**

