Convert voltage from RS232 RTS pin to PWM signal current to drive Victor or Jaguar PWM input

General Notes for RS232

According to the specifications, the open-circuit output voltage for the RTS pin of RS232 may vary from +/- 5v to +/- 25v

The open-circuit voltage from the RTS pin that I measured on ten different computers was approximately 11 volts.

The short-circuit current from the RTS pin that I measured on ten different computers varied approximately from 7 to 10 milliamps. **Note: according to the spec, it is OK to short-circuit the RS232 RTS output.**

For *these computers only*, a simple series 1N914 diode (50 pack $3 at Radio Shack) circuit as shown in Figure 1 is all that was required to convert the RTS pin output to a usable signal for the motor controller PWM input. See notes below:

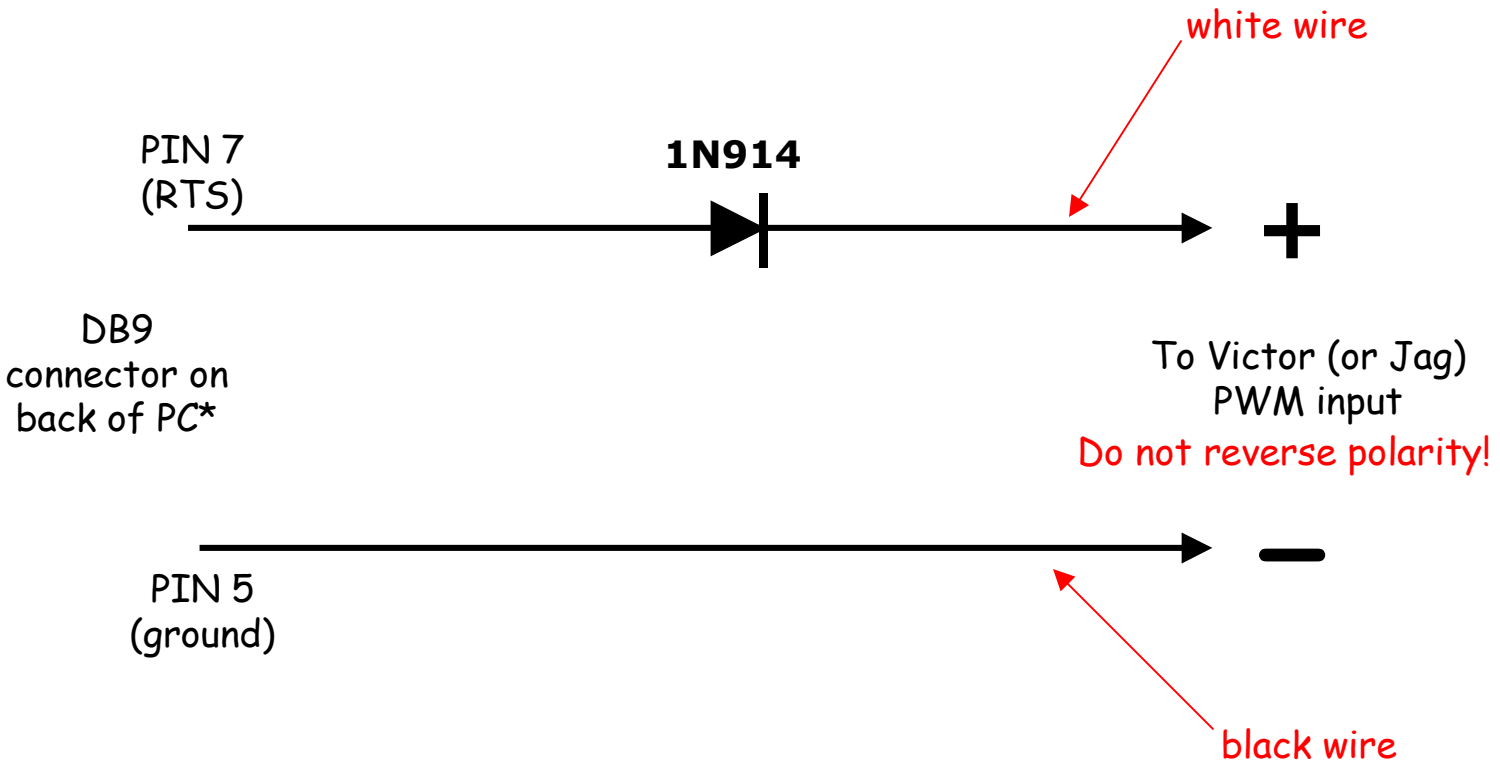
Figure1 1N914 diode circuit NOTES

1) **Your mileage may vary!** Measure the open-circuit voltage and short-circuit current of your RS232 RTS pin before designing and building your cable.

2) **Do Not Reverse the polarity of the connection to the Vic or Jag!** Full RS232 reverse voltage at the PWM input may damage the LED in the photocoupler

Figure 1

Use this circuit ONLY for RS232 ports whose RTS open-circuit voltage and short-circuit current meet the requirements stated on previous pages.
See explanation on following pages



*for a DB25 connector, the pinout is different. Be careful! Always measure the output for polarity before connecting to the motor controller.

See explanation on following pages

Notes for Figure 1

The following comments apply when using this circuit to supply the PWM input signal to a Victor or Jaguar:

Use Figure1 circuit ONLY if short-circuit current of RTS pin of RS232 port is 12 milliamps or less.

Use a diode such as 1N914 whose reverse current is far less than the photocoupler LED rated reverse current.

Do NOT reverse the polarity of the connection to the Vic (or Jag) PWM inputs! Reverse polarity may damage the LED in the photocoupler.

Notes for Figure 1

Advantages:

This is probably the “simplest” and least expensive circuit to use

No separate power supply is required.

Can work with +/-25v RS232 as long as the short-circuit current is limited to 12 milliamps or less.

Disadvantages:

The photocoupler LED in the motor controller may suffer damage if the polarity of the connection is accidentally reversed. (The Jag’s – and Victor’s? - LED is spec’d at only 6v reverse polarity).

If you use this on a different PC, you must first check the RS232’s short circuit current before doing so.

The diode must have a reverse leakage current much smaller than the LED in the motor controller’s photocoupler, in order to limit reverse voltage.

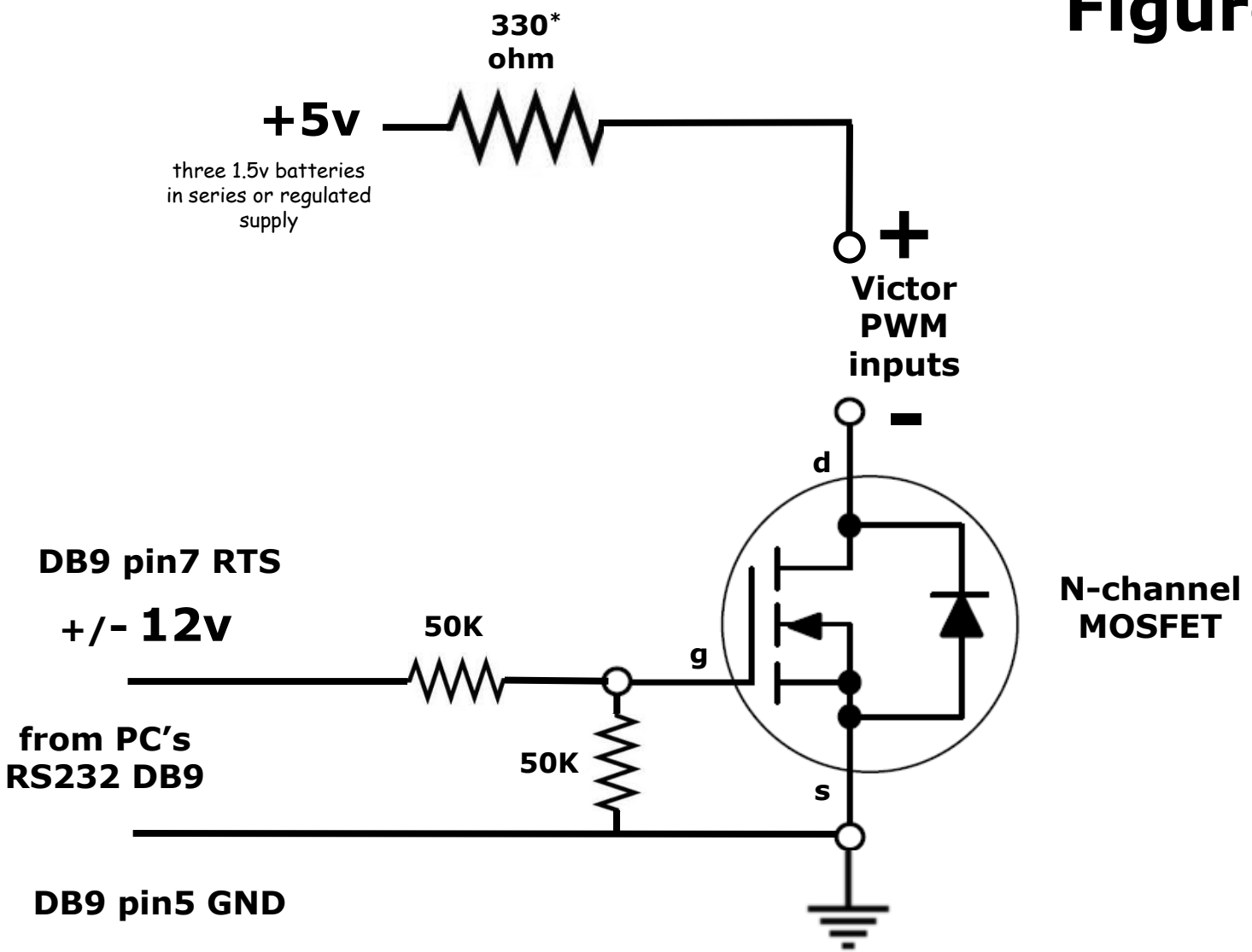
Notes for Figure 1

All the RS232 ports I have measured have a short-circuit current of approximately 7 to 12 milliamps and an open-circuit voltage of approximately +/-11 volts from the RTS pin, so Figure1 circuit was OK to use, but **YMMV!**

Figure 2 circuit on the following page illustrates a circuit which provides some protection from reverse polarity connection to the Victor or Jaguar PWM input.

It also should work on a wider range of RS232 hardware without modification.

Figure 2



*330 ohm was selected because that is what the DSC uses for PWM

Notes for Figure 2

Advantages:

This is probably the “safest” circuit to use:

The photocoupler LED in the motor controller can probably tolerate -5v if the polarity of the connection is accidentally reversed.

The output is unaffected by the impedance of the RS232 driver, so the circuit will work with a wide range of RS232 outputs without the need to change components

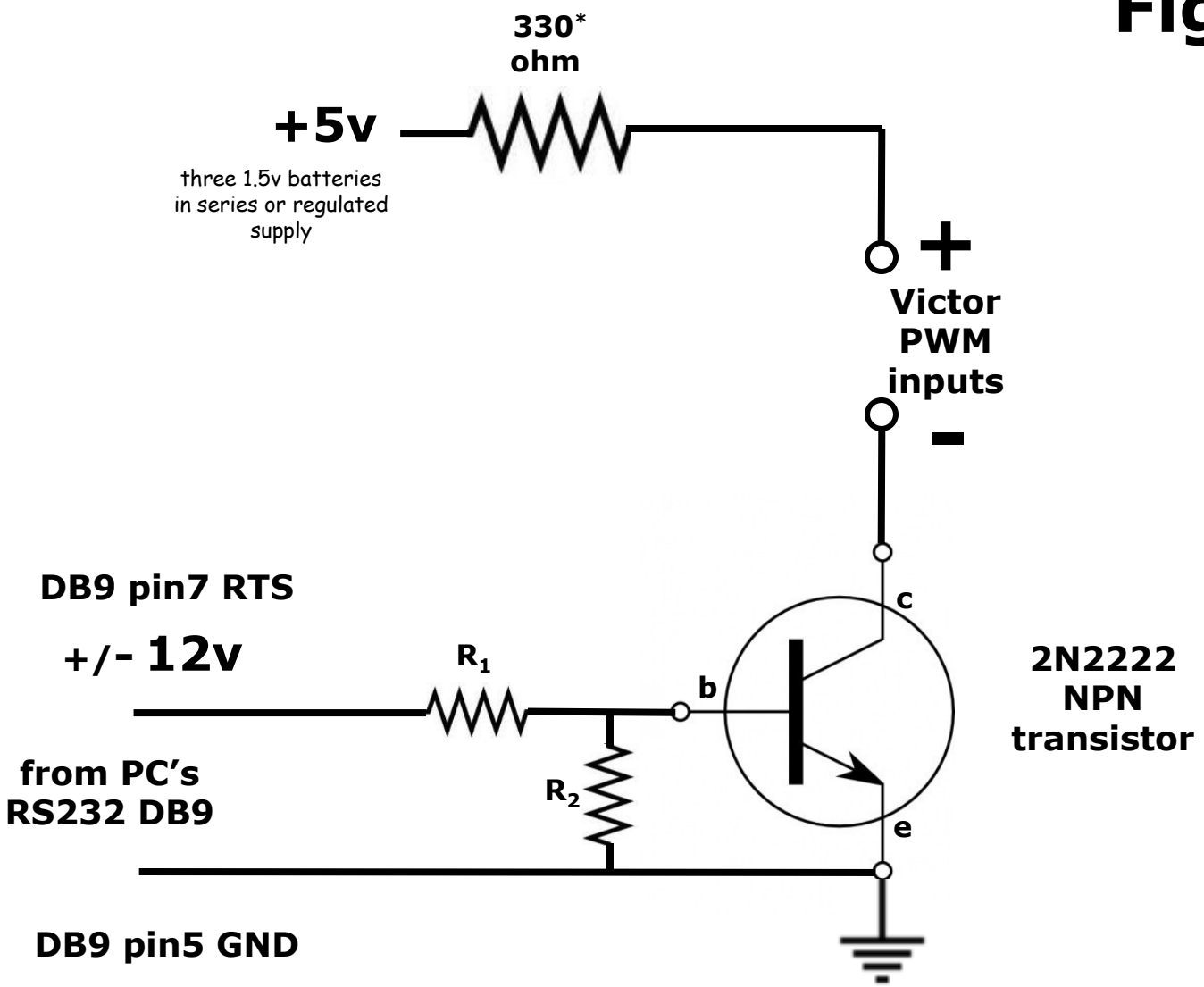
Disadvantages:

It requires a separate regulated 5v power supply (or three 1.5v batteries in series)

It’s slightly more complex than Figure 1

If your RS232 outputs +/-25v, you may have to select a FET with a higher V_{gs} rating (or reduce the resistance from gate to ground to divide-down the signal voltage reaching the gate)

Figure 3



*330 ohm was selected because that is what the DSC uses for PWM

Notes for Figure 3

Advantages:

Similar to Figure 2, except uses a less expensive part.

Disadvantages

Size R_1 & R_2 for your RS-232 voltage to provide adequate turn-on base-emitter current in the forward direction while limiting reverse base-emitter voltage in the negative direction.

Thanks to all the helpful folks on CD who provided constructive criticism and suggestions