ANOTHER APPLICATION NOTE DESCRIBING A LOW-POWER RS232-LIKE INTERFACE

Paul Newland, ad7i
Post Office Box 205
Holmdel, New Jersey 07733

Abstract

A new and improved low power RS232-like interface is discussed. It features half the power consumption of the interface presented in a previous paper and uses fewer parts.

Introduction

In a previous paper[1] I showed a method of providing a low power RS232-like interface. That interface met all the stated requirements. However, for those applications that do not need full control of the receiver slicing point and the hysteresis, the interface described here may provide an alternative solution with reduced parts count that is acceptable for most applications. As an additional bonus, the power supply current drain is even less than that of the original interface.

Implementation

The output buffers (drivers), shown in Figure 1, remain functionally the same as those of the original. The current-limiting resistors in series with the output are not absolutely necessary but they are shown here for completeness. The reference point for the drivers is no longer buffered by an op-amp; the reference is set by 2 resistors instead of the previous one resistor and two diodes. A suitable op-amp would be the LM358 (dual) or LM324 (quad) for speeds up to 1200 bps. At speeds above 1200 bps, the slew rate of either type of op-amp exceeds the RS232 recommended values. For better performance at higher speeds, use a LM349 which has a slew rate five times faster than either the LM358 or LM324.

The input buffers (receivers), as shown in Figure 2, are either 74C14s or 74HC14s with the choice left to the user. The 74C14 requires less supply current and provides a larger hysteresis loop while the 74HC14 consumes more supply current (but less than 100 uA) and has a smaller hysteresis loop.

Because both the 74C14 and 74HC14 include clamping diodes at the input of each inverter section, a 100K series current-limiting resistor is all that is needed to protect against over-voltage input conditions. Additionally, to provide a default state when no signal is present at the receiver's input, either a 10K pull up (to +5) or pull down (to ground) may also be included.

Useful Additions

For those who are using a system that does not have a negative supply, a voltage inverter capable of supplying the necessary current for the output buffers is shown in Figure 3. It is capable of supplying up to 50mA without significant ripple.

For those who also need a regulated negative 5 volt supply, a spare section of an op-amp and a transistor can be used to provide good regulation. The resistor from the non-inverting input of the op-amp to ground is included so that the closed loop gain is greater than 5 (the LM349 is potentially unstable with closed loop gains of less than 5).

Notes

[1] Paul Newland, "A Low-power RS232-like Interface", Proceedings of the Third ARRL Amateur Radio Computer Networking Conference, April 15, 1984, pp 83-84.

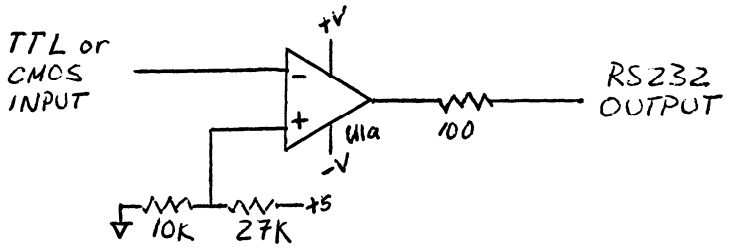

FIGURE 1: OUTPUT BUFFERS

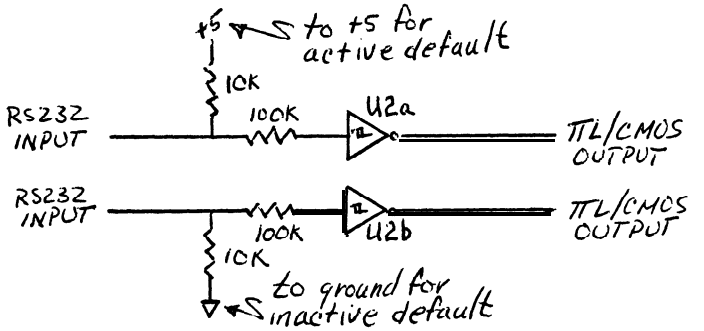

FIGURE 2: INPUT BUFFERS

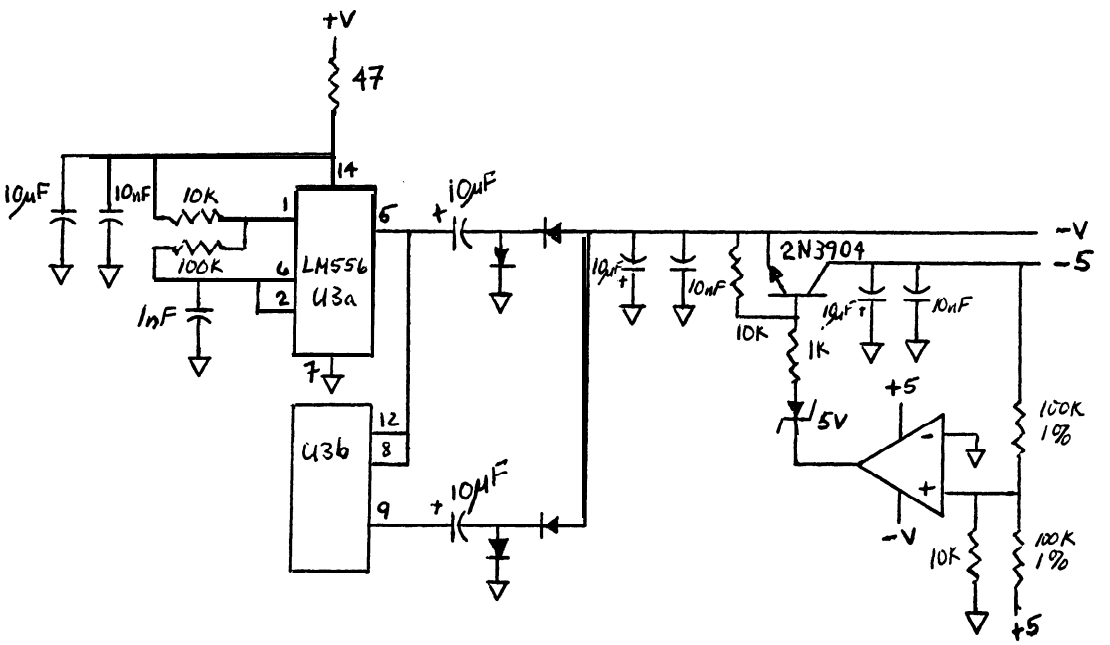

FIGURE 3: VOLTAGE INVERTER AND REGULATOR