RS232 breakout box

Here's a handy little 'Saturday arvo' project for all those computer hobbyists who've ever wrestled with RS232 cabling, 'sexing' and troubleshooting.

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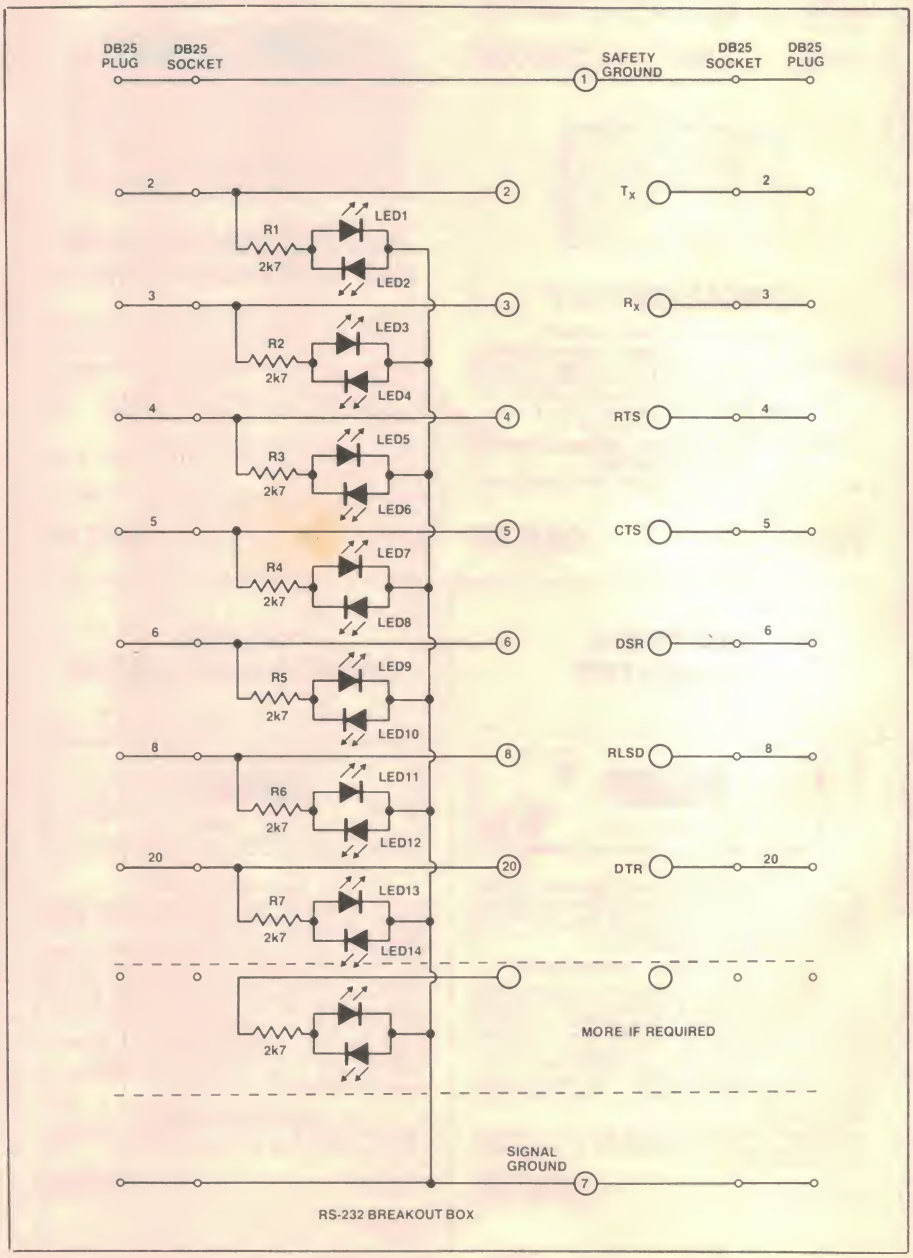
RECENTLY, there have been a number of articles describing monitors and troubleshooting aids for RS232 communication lines, e.g: ETI Sept. 1982 *RS232 Troubleshooter*. There are also commercially available breakout panels/monitors suitable for use with RS232 equipment. These units invariably require some form of external power either via a battery set or plugpack. It is quite probable that, with infrequent use, the battery will be flat when you least expect it, or you cannot get hold of a double adaptor or a long extension cable for your plugpack.

The recent availability of high efficiency LEDs (e.g: Stanley ESBR-5531) has eliminated the power supply problem. These high efficiency LEDs typically emit 160 mcd at 20 mA; as a result, only 2 mA is needed to obtain the same light output as a standard LED driven with 20 mA.

Description

To eliminate the power supply requirement, standard LEDs were not used since they would require at least 80 mA each. However, the high efficiency LEDs operating at 1 mA emit adequate light to indicate activity. For each signal line shown in the circuit, two high efficiency LEDs are wired back-to-back, not only to indicate whether the signal line is mark/space or disconnected but also to provide reverse bias protection to each other. The 2k7 series limiting resistor is high enough not to adversely load the RS232 lines and low enough so that the LED is still visible (albeit dim) with a 3 V signal through a 500 Ohm combined line and line driver resistor. There is no circuit definition as to which end is the input or output. The input could logically be the side associated with the LEDs.

There are always two permanent connections to be made; these are the safety ground (pin 1) and signal ground (pin 7). The other pins usually depend on the usage, e.g: Tx and Rx could be reversed; some peripherals use RTS instead of DTR.



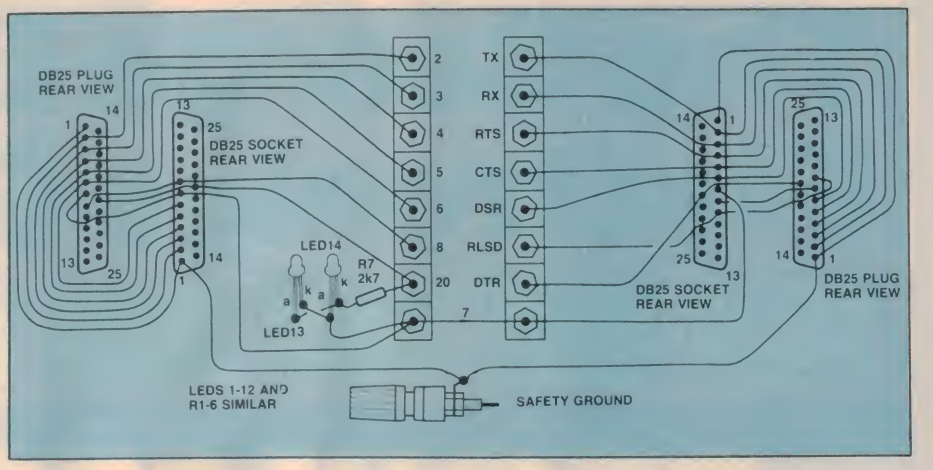
A spare, unlabelled LED could be connected to any of the 4 mm sockets to monitor its status. I found that a set of eight leads consisting of a flexible (Datwyler) wire about 100 mm long terminated at each end with a stackable 4 mm plug is sufficient to link, stack, strap, crossover, pull up and monitor.

A double row of 4 mm sockets allows the connecting of input to output according to the situation in hand.

Construction

As shown int he accompanying photograph, the unit was built in a diecast box. A connector pair consisting of a plug and socket on each side of the box allows for cables with either termination to be connected to the breakout box. A Scotchcal label between the two rows of sockets identifies the pin number and its conventional designation. As it is highly unlikely that all 21 RS232 signals will be monitored, the minimum set of signals shown on the circuit diagram would be adequate for nearly, if not all, situations.

A further improvement to reduce loading would be the use of even higher efficiency LEDs, e.g: the Stanley ESBR-500 which has a light output of 500 mcd at 20 mA. However, the present cost of over $2 each precludes their use for the time being. ●



HOW IT WORKS — ETI-658

Back-to-back high efficiency LED pairs, LEDs 1-14, are connected across the RS232 signal lines with a 2k7 current limiting resistor in series. The plug/socket pairs on the left and right can be linked via the central column of sockets, the LEDs indicating the presence or absence of signal and its polarity on the lines.

PARTS LIST — ETI-658

Resistors.....all ½W, 5%
R1-7 .....2k7

Semiconductors
LED1-14.....Stanley ESBR-5531 or similar

Miscellaneous
Diecast box to suit; 16 x 4 mm 'banana' sockets; 1 x 'banana' socket-terminal; 2 x DB25 chassis-mount plugs; 2 x DB25 chassis-mount sockets; 5 mm LED clips; hookup wire, etc.