

# Circuit & Design Ideas

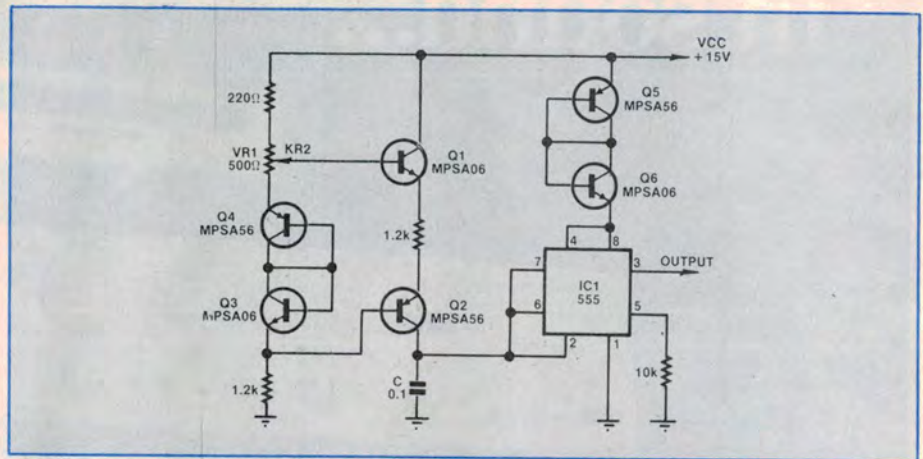
Interesting circuit ideas from readers and technical literature. While this material has been checked as far as possible for feasibility, the circuits have not been built and tested by us. As a consequence, we cannot accept responsibility, enter into correspondence or provide constructional details.

## Linear frequency control for the 555 timer

The 555 timer is a convenient device for use as a variable frequency oscillator, requiring a variable resistor to feed a timing capacitor in a simple configuration. The main weakness of this arrangement is that the frequency variation is not linear with respect to pot rotation, but tends to be logarithmic.

The accompanying circuit is designed to overcome this problem. It will operate linearly over the range from a few Hz to 5kHz and is also unaffected by supply voltage variations.

Heart of the circuit is a constant current network to charge the timing capacitor, C (0.1 $\mu$ F), so that charging is linear. This feature is augmented by arranging that the capacitor charges from only one quarter to one half of the supply voltage, rather than from one third to two thirds, as is more usual.



Q1, Q2, Q3 and Q4 together provide a temperature-compensated constant current source for C. Potentiometer VR1 sets the current through Q1 and Q2 and thus sets the frequency of oscillation. The 10k resistor from pin 5 of IC1 to 0V restricts the charging cycle to between one quarter and one half of the supply

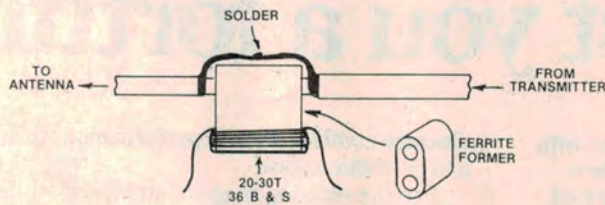
For best linearity, particularly at low frequencies, it is necessary to use matched  $V_{be}$  transistors in the constant current network. Transistors Q1 and Q4 should be matched.

From "Electronics", August, 1982.

## Simple SWR Meter

This simple SWR meter is suitable for both 27MHz CB and 28MHz amateur

work. The pick-up loop uses a ferrite balun former, with 20-30 turns of 36 B&S enamelled copper wire for the secondary winding (see diagram).



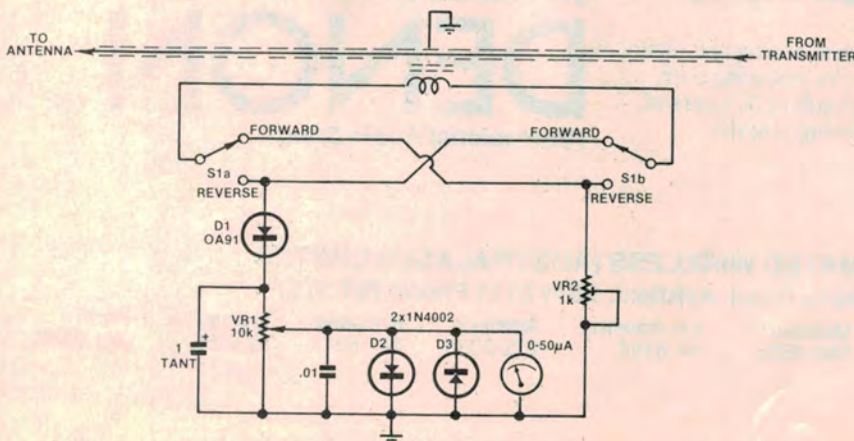
The signal from the pick-up loop is fed to switch S1 (which switches between forward and reverse readings) and then applied to the meter circuit via D1, VR1 and VR2. Diodes D2 and D3 are included to protect the meter against overload. Note that a multimeter switched to a low current range could be substituted for the meter.

Ideally, VR2 should be a multiturn pot. The procedure is to first adjust VR1 for a full-scale forward reading, then adjust VR2 for a minimum reverse reading. The SWR is then read off the accompanying table.

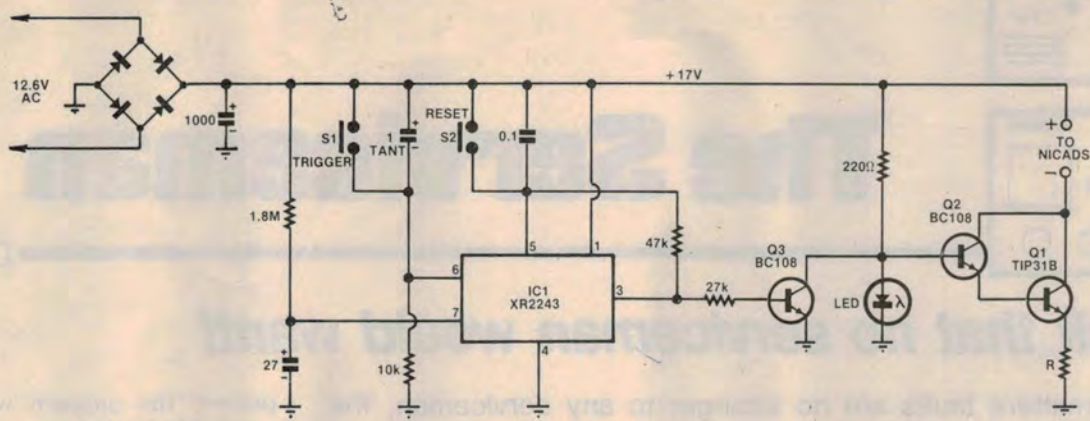
Construction of the pick-up loop is as follows:

- remove 45mm of outer insulation from one end of a 450mm length of RG58 coaxial cable;
- carefully cut braid 35mm from end of cable and slide off;
- slip insulated inner cable through one hole in ferrite former;
- replace braid. Solder braid over top of former where previously cut;
- wind 20-30 turns of 36 B&S enamelled copper wire on second section of ferrite former.

The circuitry should all be contained in a metal case. The antenna end of the pick-up cable is terminated in a panel-







## NiCd charger with automatic shutoff

It is necessary to exercise a degree of caution when charging NiCd cells, as overcharging can lead to cell damage and reduced service life. The circuit shown here guards against this by turning off the charging current at the end of a 15 hour period.

An XR-2243 timer IC is wired as a 15 hour monostable and controls a constant current sink consisting of transistors Q1 and Q2. The LED is used

as a 2V reference which means that about 800mV is maintained across resistor R. Various values for R are given in Table 1 to suit different NiCds and these could be made switch-selectable.

Switch S1 initiates the timing cycle, while switch S2 resets the XR-2243 ready for the next cycle. Both these switches should be momentary contact pushbutton types. Note that up to 10 identical cells may be charged at the same time, simply by placing them in series.

Note also that some older style LEDs only have a forward voltage of about

BATTERY	N	AA	SUB-C	C	D
CURRENT (mA)	15	45	120	180	400
R(Ω)	56	18	6.8	4.7	2.2/ 1/2W

1.7V, leaving about 500mV across R. In this case, it will be necessary to recalculate the values for R to get the correct charging current.

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**\$15**

Reverse Current (µA)	SWR	Comments
2.4	1.1:1	Excellent
5.0	1.2:1	
6.6	1.3:1	Satisfactory
10.0	1.5:1	
14.4	1.8:1	Marginal
16.8	2.0:1	
21.5	2.5:1	Unsatisfactory
25.0	3.0:1	

mounting SO-239 socket while the other end passes through a hole in the case (where it is clamped) and is fitted with a plug for connection to the transmitter.

Finally, the accompanying table assumes a 50µA meter. If other meters are used, the SWR can be found by multiplying the figures in the first column by two to obtain a percentage of full scale deflection — eg, 20% of FSD indicates an SWR of 1.5:1.

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**\$20**

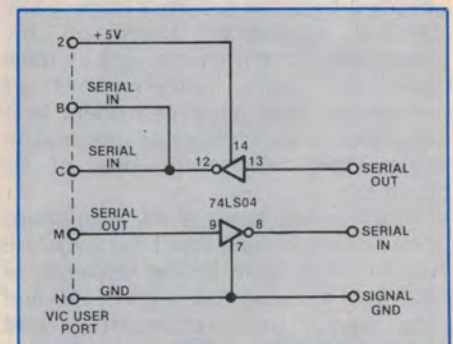
## VIC-20 video terminal

A useful role for the VIC-20 is to use it as a video terminal. It can then be used as a means of communicating with other systems, through their serial input and output lines.

The program shown uses the RS-232 software already present as part of the VIC operating system. Line 10 configures the VIC to operate as a "dumb" terminal, the configuration being for 600 baud, 7-bit ASCII, no parity and full duplex. Line 20 is used to check for a VIC key depression. If a key has been depressed then line 30 sends the ASCII character to the other system, while line 40 checks for a response. If there is a response, line 50 prints the character on the screen.

The hardware consists of inverters which are used to achieve the correct signal polarity and to buffer the VIC lines.

To use the above, the program is run on the VIC followed by the application of power to the other system. This sequence is necessary as some systems only check for the presence of a video



terminal during a warm start.

The approach shown here is extremely simple, and as such has some limitations. These are: (1) the serial lines of the other system must operate at TTL levels and not at RS-232 levels; (2) the full ASCII character set is not used; (3) the maximum communication rate is 600 baud; and (4) signal path length should be less than 500mm. However, in a lot of cases these limitations can be accommodated.

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**\$12**

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10 OPEN2,2,3,CHR$(167)+CHR$(0)
20 GETA$:IF A$="" THEN 40
30 A=ASC(A$):PRINT#2,CHR$(A);
40 GET#2,B$:IF B$="" THEN 20
50 B=ASC(B$):PRINT CHR$(B);:GOTO 20

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