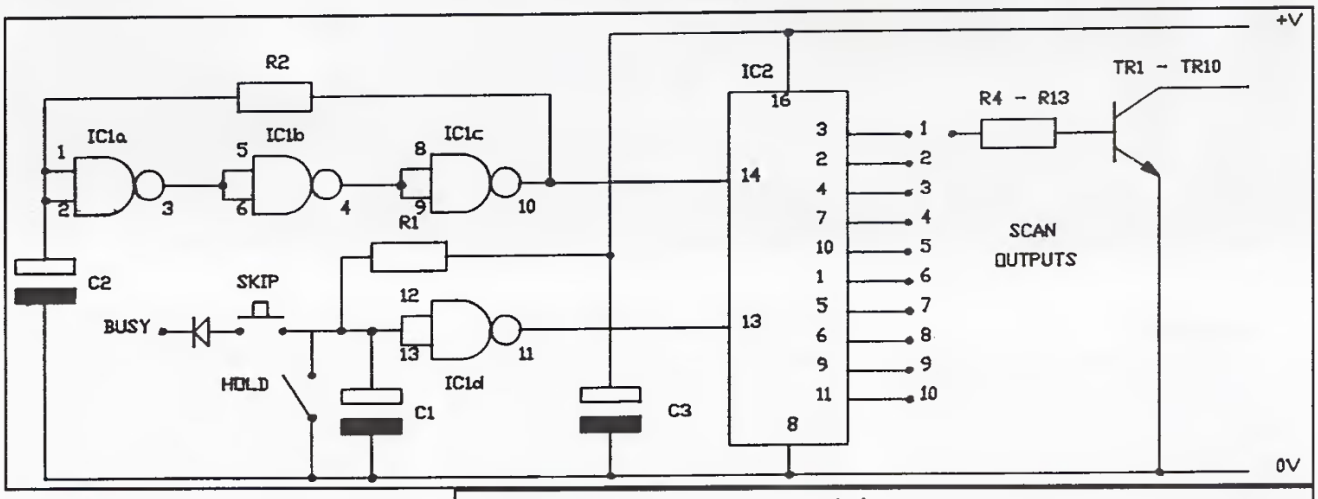
Project — Channel Scanner

Chris Lorek G4HCL describes how to build a simple 10-channel scanner for your transceiver

Many users of ex-PMR rigs, fitted with multiple channels, sometimes wish they could have an automatic channel scanning facility, to allow several channels to be checked for activity without the need for continuous knob-turning operations. 'Manual scanning' does wear your fingers out somewhat! Also, the Editor's postscript to her recent HRT 2m synthesised Ramsey kit transceiver review hinted at a forthcoming channel scanner add-on, so she made me get my IC handbooks and soldering iron out! This scanner is very simple, and should be ideal as a low-cost add-on to increase the versatility of many rigs.

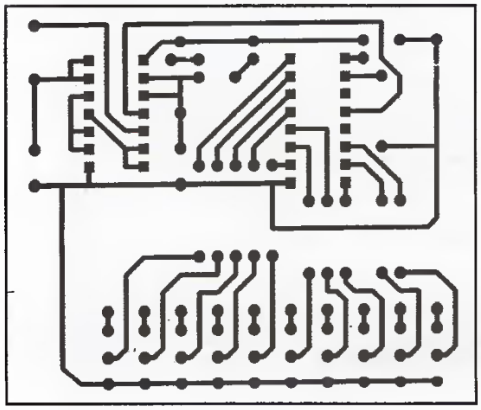
combination of several TTL and CMOS ICs, to 'knock up' a suitable circuit using Veroboard. I'd often thought about documenting that circuit, but in time it became dated with newer ICs becoming available. It was after receiving requests from readers of the HRT ex-PMR conversions, plus the Editor's constant arm-twisting operations, that I decided I'd better design another! The result is the following very simple-to-build circuit. This may either be built up on the PCB described, or more simply, as I did originally, on Veroboard or similar from the given circuit, using a layout to suit your own requirements and available space. The circuit will operate on any supply voltage from 5-15V, drawing very minimal current. If you shop around, you should be able to build the entire circuit for a cost of just a couple of pounds plus the cost of any LED indicators if you need to add these.

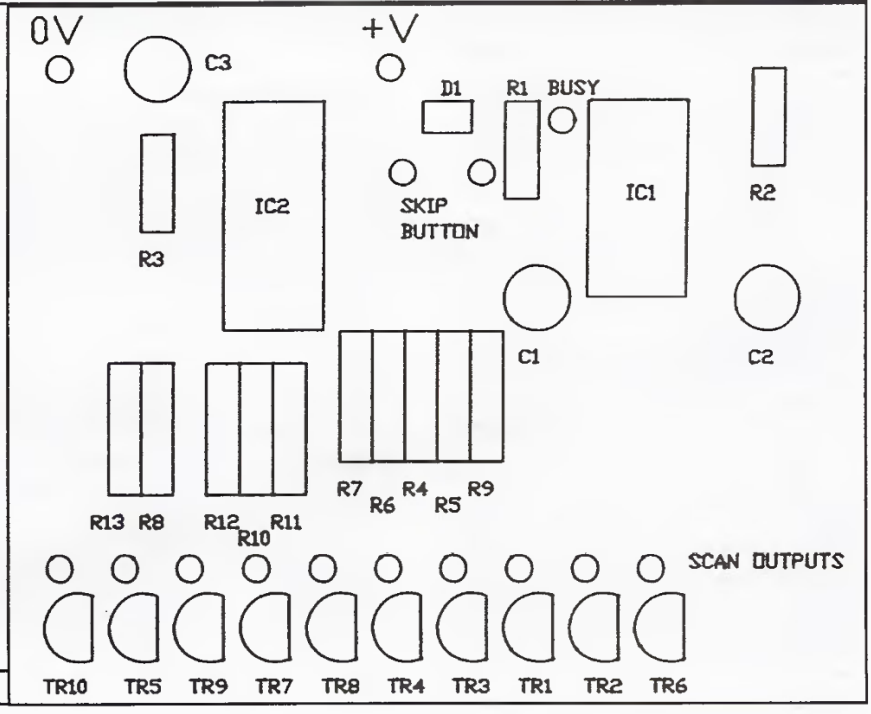


Usage

It was around fifteen years ago, when I ran three remote- mounted Pye Westminsters, that I decided that I could do with some form of automatic channel scanning. It took me some time, and a

Printed circuit board, full size, shown from track side





Circuitry

In use the scanner cycles through up to ten channels, the 4017 providing a CMOS logic '1' output for each channel, cycling through each output step by step. These outputs may be used to directly drive the switching lines of your rig if this accepts CMOS logic levels, alternatively you may add the optional resistors R4 — R13 and switching transistors TR1 — TR10 for each channel. These may be used to drive your rig's diode switches or whatever for channel selection, and/or switch LEDs for channel indication.

By suitably linking pin 15 of the 4017 IC, this being the 'reset' line, the circuit can be preset to scan any number of channels between two and ten. For this you need to add a wire link between pin 15 and the scan output pin 'one higher' than the number of channels you require. For example if you want a five channel scan, connect pin 1 (the channel 6 output) to pin 15.

The scan is initiated simply by applying power to the circuit, and is halted by 0V (or thereabouts — i.e. a CMOS logic '0' minus the diode voltage drop) from your rig's receiver 'busy' line applied to the 'busy' input. Capacitor C1 is present to introduce a delay of around two seconds after the receive signal disappears before the scan resumes. To 'hold' the scan on a particular channel, for example if you want to listen continuously or transmit on that channel also, a toggle switch fitted across C1 is used. Wiring the circuit's 'TX' input to your mic PTT ground-to-transmit line also holds the scan, which prevents you accidentally transmitting on several channels.

Construction

Apart from the ICs, which must of course be the correct types, none of the component values are critical, thus allowing 'junk box' or 'surplus' components to be used if available. R2 and C2 control the scanning speed, thus slight variation of these will similarly slightly affect the speed only, similarly with C1 which controls the 'scan delay'. Increasing the value of these increases the time period correspondingly. Other resistors may be varied by up to 50% in value, depending upon availability, and any types of low-cost silicon diodes and switching transistors may be used.

When building the unit, ensure you use normal CMOS handling precautions for the ICs, if in doubt use IC sockets for these to save a marathon desoldering job if it doesn't work first time. After building the unit, check your soldering for open and short circuits, plug your ICs in if you've used sockets, and happy scanning!

Parts List	
IC1	4093
IC2	4017
D1, D2	General purpose silicon diode, e.g. 1N4148
R1, R2, R3	100k
R4 — R14	10k (optional)
R15 — R24	1k, to suit LEDs used (optional — not shown)
C1	22uF 15V
C2, C3	10uF 15V
TR1 — TR10	General purpose NPN transistor, e.g. BC108 (optional)
Switches	Push-button 'skip' and toggle 'hold' as required
LED 1-10	Any LED type, for channel indication if needed (optional — not shown)