

# A SCANNER FOR THE ICOM IC22S

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Icom 22S owners! When you go mobile through the country side, do you miss the news and activity of the area, or miss the openings due to being engaged in driving? If so, this is the ideal scanner for the vehicle.

This article describes how a scanner can be installed in your IC22S. The scanner is easy to build and easy to operate when operating mobile. It has many facilities which, I think, make the extra circuitry warranted.

Only seven ICs, quite a few diodes, a few transistors, two regulators, some capacitors and a little thought makes life easy.

## FACILITIES

This scanner has a variable scan rate, the speed of which can be varied and adjusted for optimum performance. The author's operates at a rate of 15-20 channels per second. It can be operated faster if desired with a possible deterioration of performance.

If the scan-stop is activated by an incoming signal (by the mute cct) you have two choices. You can listen to the incoming signal and during the inter-over pause break in by simply operating the PTT and replying or you may just listen to the conversation. The break-pause or scan delay time can be adjusted by the pot (RV1) in the circuit to satisfy your desire.

The scan also decides the transmit frequency for which it has to reply and by operating the duplex B (Dp B) switch you can reply on the anti-repeater frequency. The scanner scans 20 channels, i.e. 10 Dp channels and 10 anti-repeater frequencies (Spx). The author's scanner covers anti-repeaters 2, 3, 4, 5, 6, 7, 8, 40, 50, 51, plus 600 kHz above all these frequencies, coming out at repeaters 2, 3, 4, 5, 6, 7, 8, 146.6 (i.e. 40 + 600k), 147.1 (50 + 600k) and 147.15 (51 + 600k).

## CIRCUIT DESCRIPTION

The circuit is very basic but is quite effective. It has a scan-stop and delay circuit consisting of TR1, TR2 and IC1a, IC1b and IC1c which work into the clock

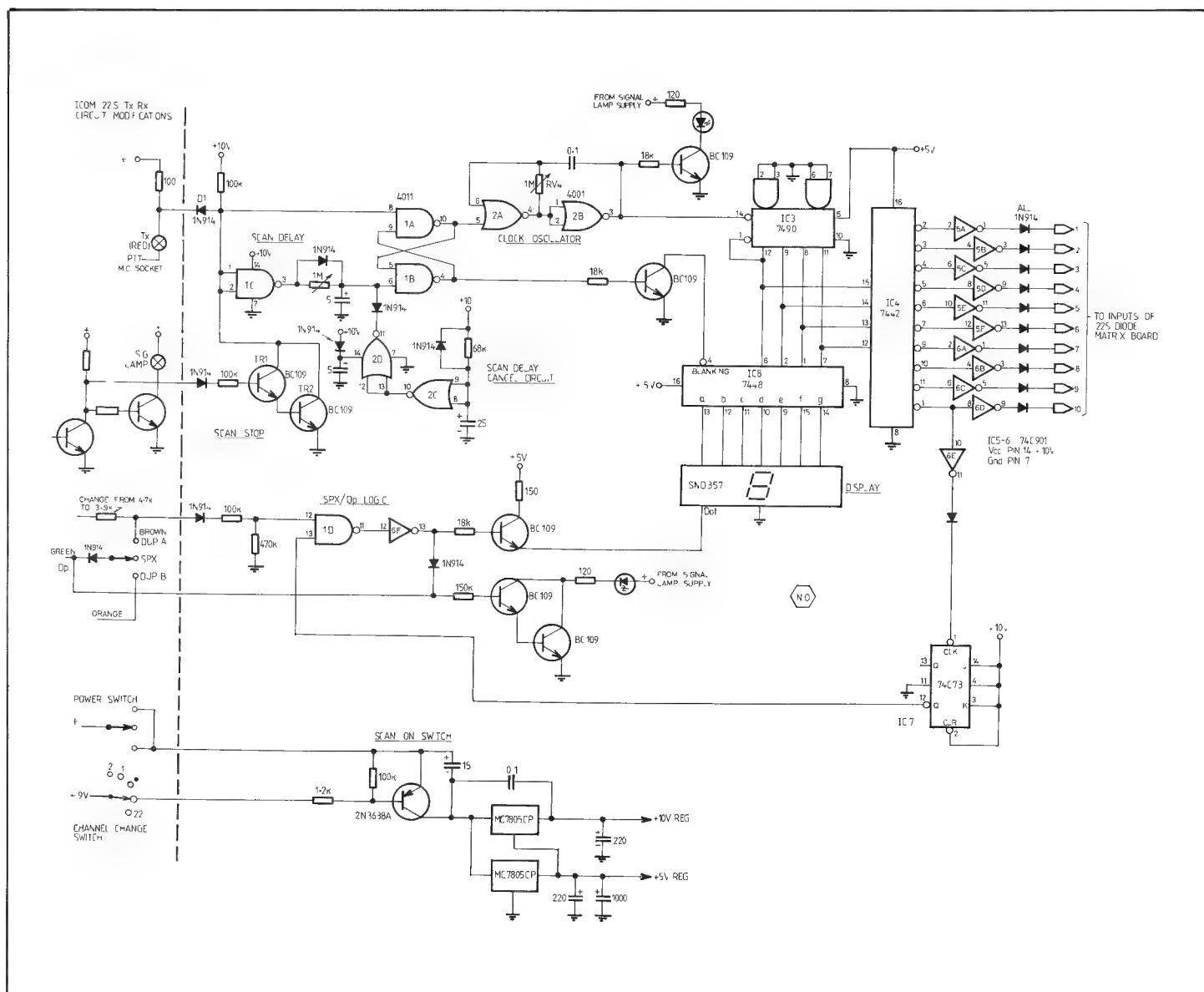


FIGURE 1: Circuit Diagram IC22S Scanner

oscillator (IC2a, IC2b). The clock speed is variable (by RV4) for optimum performance. The scan operates from the HEX inverters IC5, IC6 which switch the diode matrix and at the end of the tenth pulse the JK Flip Flop changes state and switches the receiver into the duplex mode to scan 600 kHz above the ten previous channels scanned.

The second 10 channels are indicated on the seven segment display by the dot. The section in the circuit outlined by the dotted line, containing the display unit was made outboard by the author due to lack of space for circuitry and for the want of a position for mounting the seven segment LED in the IC22S so the second 10 channels (Dp) were indicated by a red LED mounted behind the TX lamp of the 22S.

One could eliminate the display unit and the only indication that the unit is scanning would be the LED operated by the BC109 from the clock and the SPX/Dp LED.

The diode (D1) which has its anode connected to IC1 pins 1 and 2 and 8 allows isolation between the scan circuit and the IC22S circuit. The diode placed in the supply rail of IC1 (4011) was put in circuit before D1 so that when the scan was turned off the positive coming from the IC22S Tx circuit (through the 100 ohm resistor) into the gates of IC1 and out on to the scan rail did not get any further and so would not keep the scan going. Other diodes were added for the same reason.

Sometimes the DPX/SPX logic did not

change over. The addition of a 470k ohm resistor from the pin 12 of IC1 to ground cured the problem.

The main problem encountered during construction was that the scan-stop circuitry could not be taken straight from the receive lamp as the time delay for the globe to increase its resistance was enough for the scan to stop too late or not stop at all. The addition of the BC109s (TR1, TR2) and taking the mute from the previous stage provided a solution.

The other most troublesome problem was apparent voltage sensitivity of the scan even though it had integrated circuit voltage regulators. As the voltage increased the mute could not be opened by either the squelch pot not being adjusted or by an incoming signal. The 2N3638A amplified an unwanted signal on the rail of the synthesizer which got into the scanner. The problem was cured simply by decoupling and filtering of the nine volt regulated rail of the synthesizer unit which turned on the scan unit.

Other filtering capacitors were added so that on the changeover from Rx to Tx the scan did not change channels due to spikes on the rail.

The scan indication LED was mounted in the same position as the signal lamp using the same positive as same and the DPX/SPX LED also. The leads were brought past the TX lamp and through the hole behind the channel change switch.

If the resistor R157 (4.7k) in the Dp A circuit is not lowered to about 2.2k in the IC22S receiver circuit when the scanner unit is on the logic threshold between Dp A and SPX and operation may be affected. If the DPX/SPX LED is eliminated it will work on 3.9k ohms although 2.2k ohms is recommended.

I built the unit on vero board and mounted it on the same side but to the back of the synthesizing board. It was not necessary for any shielding from any other circuitry as was first thought.

This unit was built by VK6JI (Chris), who found a problem which mine did not have. Sometimes when the channel change switch is rotated while the receiver is in the SPX mode, it will go out of sync. (meter lamp extinguishes) and the signal lamp illuminates. He cured these problems by two circuit alterations. They were by placing a 1000 microfarad capacitor across the 5 volt regulated rail of the scan. This also allowed the unit to be turned off momentarily, as may occur when starting the car or switching to accessory, without losing its programming. He also introduced the scan delay cancel circuit as he found that if the delay circuit was too long the scanner started from scratch when he turned off his car ignition and he missed a fair deal of the conversation. With this circuit it will start from scratch but there will be no delay before it starts scanning. ■