

Report from AMERICA

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... HAMFEST ... AND VARACTORS ...



A "HAMFEST" in the United States is a get together of radio amateurs to trade equipment and parts, and of course to consume beer. The Cincinnati "Hamfest" is a traditional happening which has been growing successfully for over 30 years, as the 20 year holder of the presidency happily assured me. By mid afternoon of the previous year's gate of just over 2,000 had been comfortably exceeded.

It is organised by the Greater Cincinnati Amateur Radio Association who charge five dollars admission, extracted under a large sign saying "Flea Market!" The admission ticket is a passport to unlimited free beer, two substantial picnic meals and various other snacks, and the ticket number is entered in the hourly prize draws throughout the day.

OPEN MARKET

The wheeling and dealing is conducted by the amateurs round the open boots of their cars packed into a picnic ground taken over for the day, on the outskirts of the city. Here the unwanted junk of the previous year, bearing a hoped for price with occasionally an exhortation to "Fight Poverty, Buy Something" competes with the somewhat more professionally displayed wares of the Government surplus and surplus components dealers, whilst some new equipment manufacturers trade from the grandeur of the bad weather shelter.

The goodies on display defy cataloguing, and ranged in price from thousand dollar brand new transmitter receivers with digit frequency readout to new transistors at two cents each. There were amateur built pieces of equipment. There were old scopes with indignant spiders busily repairing their disturbed webs amongst the tubes. There were early post World War One service radio equipment and even older devices.

There were cameras, lenses, air-compressors, clarinets, trumpets, and all sorts of pickings with knobs and without. Best of all were the boxes of pure junk, fitting accompaniment to another paper carton of free beer.

No matter what one wanted, in the dark corner under the spare wheel of some car, there it would be.

FUN AND GAMES

For the more frivolous there were "hunt the transmitter" games, but to play it was best to have remembered to bring a 440MHz receiver; the lazy alternative was to go and lie in the sun and watch the demonstration radio controlled model planes shave the trees.

The man in the flamingo pink cap just had to be an Englishman. He was. Now after nine years in this country a company vice president and operator of station WA8QXU, which he assured me could be heard in Britain.

The prize draw in the late afternoon was the final adrenalin raiser, after which for many inexperienced salesmen came the awful decision, to dump it or try and sneak it back past the wife's eagle eye to the basement for another year.

VARIABLE CAPACITANCE DIODES

For many applications the mechanical variable capacitor is doomed to extinction. Those splendid rows of shining plates on ball bearing spindles, so much a part of radio, will disappear, to be replaced by the Variable Capacitance Diode or "Varactor".

Plastic encapsulated varactors are now being introduced at consumer prices. High capacitance devices which could be substituted for a couple of hundred puffs tuning capacitor are still relatively more costly. Prices are coming down and this state is unlikely to last.

The capacitance effect in the diode is due to the depletion layer formed at the junction of the p and n type materials forming it. The depletion layer can be looked upon as an electrically neutral area, exhibiting a high resistance because of the lack of conduction carriers.

The diode thus resembles a simple parallel plate capacitor, the p type material being one plate and the n type the other, separated by the dielectric, the depletion layer. The width of the depletion layer, and thus the distance apart of the "plates" can be varied by varying a reverse bias voltage applied across the junction.

Varactors can be obtained with nominal capacitances of up to 250pF and a tuning range of ten-to-one. These are more expensive than lower values with reduced range.

TUNING RATIO

The tuning ratio is the ratio of the capacitance at the lower reverse bias voltage to that at the upper reverse bias voltage.

$$TR \text{ (tuning ratio)} = \frac{C_2}{C_{10}}$$

where C_2 = Capacitance at 2V reverse bias.
and C_{10} = Capacitance at 10V reverse bias.

The reverse voltage cannot be increased indefinitely or the junction will break down at too high a value.

A PRACTICAL EXAMPLE

A typical tuning application is shown in Fig. 1. Note that the inductor L is in parallel with the series combination of C and C_d , where C_d is the varactor capacitance.

C is made very much larger than C_d so that its effect on the resonant frequency of the circuit is negligible and that frequency is given by

$$f = \frac{1}{2\pi\sqrt{LC_d}}$$

C blocks the bias voltage from the coil, which would otherwise provide a low resistance path for bias currents, reducing the voltage across the varactor. VR can be large, about 470 kilohms, so that the bias circuit loading of the tuned circuit is small.

The reverse resistance of the diode is large and virtually the whole of the voltage picked off the potentiometer VR appears across the tuning diode. The circuit is thus tuned by varying the setting of the potentiometer. There is one snag, the maximum signal appearing across the tuned circuit must be much smaller than the minimum bias voltage applied to the diode or serious intermodulation distortion will result.

An obvious use for such a circuit is to permit tuning by remote control, and the ingenious can carry on from there.

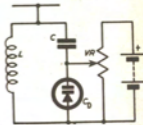


Fig. 1. Note that diode is reverse biased by potentiometer VR