The problem — unless there is something very seriously untoward — tends to lie in the control grid circuitry. At a particular turnover frequency the capacitance of the screen grid structure of a valve will resonate with the lead inductance causing the neutralising properties to be completely lost. The grid circuit of **Fig 3** has two resonant modes. The first one is what the designer wants: ie the control grid structure resonates at a frequency set by the input capacity of the valve, the capacity of the trimmer and the inductance of the input tank circuit. The other one bypasses the inductance of the tank circuit and becomes purely that of the grid lead inductance, the inductance of CI in series with the inductance of VCI. Parallel resonance is then provided purely by this stray inductance together with the input capacity of the valve. This is about 25pF for a 4CX250B.

The result of all this is what old timers know as a TATG oscillator circuit: tuned anode, tuned grid except the 'anode' in this case is the stray resonance of the screen grid. When power tetrodes of the 4CX250B class act as TATG oscillators, the effects on everything including the operator's nerves are pretty dire. This all happens of course at frequencies far removed from VHF and are difficult to detect directly.

This mechanism is not restricted to 250B bottles either. I've seen precisely the same mechanism strip the oxide off the cathode of the ubiquitous QQVO6-40 double beam tetrode in a blaze of uncontrollable anode current. My friend, Keith, G3TLB, will testify to this. It was his linear.

The answer is very simple. Tune the control grid circuitry with halfwave lines or halfwave lumped circuits. This technique is shown in **Fig 4.** The main point about this is that all capacitance is hung on the far end of the tuning element so that all control grid circulating currents have to go through the input inductor. It has the effect of placing all control grid resonances well out of the line of frequency turnover effects in the screen grid.

My own 4CX250B amplifier (which uses halfwave lumped circuits throughout) uses no neutralisation, no input slugging and produces more than 120W of RF with just one watt of drive at the grid. It is completely stable. **G4JST**

Magazine review

Another of our regular features under this heading will be a monthly review of the amateur radio content of other magazines with comments on what to look out for.

October Radio Communication, the RSGB's journal has another of Peter Harts, G3SJX, excellent reviews — this time of the FT-ONE, the all singing/dancing Yaesu box. Overall conclusions are favourable, except for criticism of the close-in dynamic range. Pat Hawker's column has a useful little basic 2M converter design, and an interesting idea on protecting high-power valves from thermal problems using a spring, microswitch and heat sensitive material. All this among a wealth of other useful information in 'Technical Topics'.

The QTC section also attempts to debunk the rumour that the MoD are about to remove 70cm from our use in favour of their own Repeater system. As the MoD have overall control of the band, one would imagine that if they do decide to take it, that will be that, despite WARC etc. Hands up all those who will continue to use it anyway...

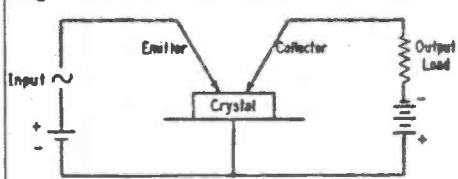
Our Stateside namesake, Ham Radio, starts the October issue off with part one of "An Intelligent Ham Gear Controller', intended as a base for control of such things as a memory keyer, morse board, synthesiser/repeater/transceiver controller etc. The system uses a motherboard based 6502, but you'll have to write to the author for EPROM's and software listings. Other articles are on computer aided UHF preamp design, and a very enlightening (?) piece about ways of working with static and transient sensitive digital circuits. To quote — "a 7-second stroll across a carpet can generate 10,000 volts...".

Members of AMSAT-UK will have their September issue of "OSCAR NEWS", an excellent publication for the satellite user. Edited (and mainly written, due to the usual lack of member effort apparent in most vol-

NOSTALGIA! From QST for October 1948. Note last paragraph!

The "Transistor" — an Amplifying Crystal

There was a time in the early days of radio when the "Oscillating crystal" could be catalogued with sky hooks, left-handed monkey wrenches and striped paint, because no one knew how to amplify a signal with a galena, silicon or other cyrstal. All this is changed by the recent Bell Telephone Laboratories' announcement of the "Transistor", a small germanium-crystal unit that can amplify signals, and hence be made to oscillate.



Housed in a small metal tube less than one inch long and less than a quarter inch in diameter, the Transistor has no filament, no vacuum, and no glass envelope, and is made up only of cold solid substances. Two "catwhisker"-point contacts are made to a surface of the small germanium crystal, spaced approximately 0.002 inch apart.

The Transistor shown is connected as an amplifier in the accompanying sketch. The contact on the input side is called the "emitter" and the output contact is called the "collector" by the Bell Labs. A small positive bias of less than one volt is required on the emitter, and the output circuit consists of a negative bias of 20 to 30 volts and a suitable load. The input impedance is low (100 ohms lor so), and the output impedance runs around 10,000 ohms.

In operation, a small static current flows in both input and output circuit. A small current change in the emitter circuit causes a current change of about the same magnitude in the collector circuit. However, since the collector (output) circuit is a much higher-impedance circuit, a power gain is realised. Measuring this gain shows it to be on the order of 100, or 20 db., up through the video range (5 Mc. or so). The present upper-frequency limit is said to be around 10 Mc., where transit-time effects limit the operation.

The Bell Labs have demonstrated complete broadcast-range superhet receivers using only Transistors for oscillator and amplifier functions (with a 1N34 second detector and selenium power rectifiers). An audio output of 25 milli watts was obtained by using two Transistors in a push-pull connection. However, it seems likely that in the near future Transistors will find their maximum application in telephone amplifiers and large-scale computers, although their small size and zero warm-up time may make them very useful in hearing aids and other compact amplifiers.

It doesn't appear that there will be much use made of Transistors in amateur work, unless it is in portable and/ or compact audio amplifiers. The noise figure is said to be poor, compared to that obtainable with vacuum tubes, and this fact may limit the usefulness in some amateur applications. These clever little devices are well worth keeping an eye on. — B.G.