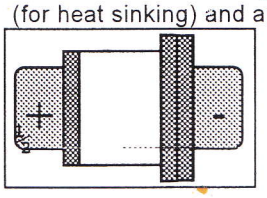
Setting up.
Do not connect the Gunn diode until the supply for it has been tested. Apply power and measure the Gunn diode output voltage. Adjust VR2. which should swing the output over the range of about 5.5 to 9 volts. Set to 7 volts.
If a 6MHz frequency counter is available, monitor the output of FL1 (top of VR3). Alternatively, with a short wave reciever, monitor with a small pickup loop located near the oscillator. Set L3 to obtain 6MHz. (5.5MHz)
If an oscilloscope is available, monitor with AC coupling, the output voltage. Advance the sub carrier control VR3. The 6MHz sub carrier should be observed. Set back to minimum. Apply a 1V PK-PK video signal to the input and set the deviation control VR1 to give approximately 75mV PK-PK of video on the Gunn supply output volts. Some overshoot may be noticed on fast edges of the waveform due to the pre-emphasis. This is normal. Disconnect the video. Turn up the sub carrier level control VR3 to obtain approximately 15mV PK-PK of sub carrier. If a scope is not available set VR3 to just under half rotation and VR1 to one half rotation. Switch off and connect the Gunn oscillator. Apply video and audio and switch on.
At this point you should find some sort of picture on your RX. It very well may be fine in which case turn up the mic gain and away you go. However, if the picture is low in contrast (check RX first) turn up the deviation control VR1. If there is plenty of contrast but the picture is unstable and jumps, turn the deaviation down. If good results are still not attained, alter the diode volts by about 0.5v increments to find the best operating point for your diode. If at no point can a good picture be obtained and assuming all else is OK then unfortunately the Gunn diode will have to be changed for one that modulates better.(supplied oscillators are all tested for output power and good modulation)
If the audio sub-carrier level (VR3) is to high, fine patterning will appear on the screen. If the mic gain (VR4) is to high, the audio will sound distorted. Selecting audio pre-emphasis will cause the high frequency content of the audio to be lifted. All that's left to do now is arrange some QSOs and have fun.

A few points on Gunn diode oscillators.
There are many types of oscillators. By far the most common is the 10.648GHz type with integral mixer diode, intended as motion detectors. Output power is generally in the 4 to 12mW range. This might not sound much, but when coupled to a small 23db antenna (35CMs dish), 0.8 to 2.4 Watts ERP is generated, sufficient (with a good RX.) to work line of sight paths in excess of 100Km. Obviously larger dishes give an even higher ERP.
Presently the most common oscillator is the Solfan type, often seen at rallies it is available as two basic types, with or without a built in mixer. The version without is the best type for a TX. A brass tuning screw and locknut is positioned behind the diode mount. Screw in to lower the frequency. All Solfan oscillator should tune down to 10.250GHz and most will go below 10GHz.
The AEI oscillator is probably the best, cube in shape with a tuning screw behind and a matching screw beside the Gunn diode and a mixer diode at the front. Remove the mixer diode and refit the bottom screw so that it is flush with the inside. The Gunn diode mount is made from copper and conical in shape. 25mW diodes (Farnell components) can be fitted in these units for extra output.
Mullard and similar twin cavity unit are also often to be found (can be purchased new from Farnell and others). Either, side by side or on top mixers are available. These types can be used with great success. However, unless they are only to be used over short distances, a transition to match the oscillator cavity up to WG16 size wave guide needs to be made, Transitions have to be home made from brass or copper sheet and consist of a gentle taper from one size to the other over a length of at least 2".
De coupling components are often found fitted to the Gunn diode connections of surplus units. These must be removed.
The quality of modulation, power output and amount of deviation varies considerably with diode and cavity type.
With a video modulated Gunn oscillator, the diode voltage should be set to a voltage that gives the best quality of modulation. This is usually in the range 6.5 to 8 volts. The Gunn volts should not be used as fine tuning. Best quality modulation is not always consistent with max. output power. Some types of oscillators have the diode reverse mounted (for heat sinking) and are fed with a negative supply. Often the diode can simply be reversed.



Gunn diodes do not last many milli seconds if the incorrect polarity is connected or they if a voltage of less than 5V is applied. The positive end of the diode requires heat sinking, though this only applies to higher power devices. Birkets of Lincoln may be able to supply surplus 10mW diodes which generally I find OK. They generally worked but could be variable in modulation quality and power output. I buy a few at a time and select the best.
A high SWR. caused by strong reflections back down the wave guide can cause some strange effects, such as a sideways wobble or ripple to some or all of the picture. This can be more pronounced if a mixer diode is also fitted within the oscillator. A change of SWR. will also cause a small shift in operating frequency. Supplied oscillators are set up on a dummy load with an SWR. <1.12 to 1.
If, as with the oscillators supplied , a mixer diode is fitted in the cavity, this may be used to establish RF. output. A meter connected from the mixer diode to the case will indicate voltage when the unit is oscillating. Do not leave the meter connected during normal operation as it will absorb power and cause a shift in output frequency.