QUASAR KIT No. 1151

SUPER TV PATTERN GENERATOR

General Description

A black and white test pattern generator is a very useful instrument for testing and servicing of the video and scanning circuits of black and white and colour TV sets. The generator which is described below, can produce the following signals:
a. White horizontal lines.
b. White vertical lines.
c. A combination of horizontal and vertical lines. (Cross Hatch).
d. White luminous points on a black raster.
e. A grey level signal. (Grey Scale).
f. Black rasters, which are selectable by a switch.
The generator follows the CCIR standards and produces RF signals in the VHF band

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Technical Specifications - Characteristics

Operating Voltage: 9 VAC
Current drawn: 0.13 A AC
Horizontal scanning frequency: 15625 Hz
Vertical scanning frequency: 50 Hz
Standard test signals: 18 Horizontal & 16 Vertical lines.
RF output frequency: 170-250 MHz (VHF)
Output impedance: 75 ohm

How it Works

The operation of the generator is based upon the use of the integrated circuit IC2 type ZNA234E, which is manufactured by Ferranti and which produces all the signals necessary to compose a composite video signal, which will contain information that will appear on the TV screen together with all the timing signals necessary for the synchronisation of the TV receiver.
The operation of IC2 requires the use of a crystal Y1 for the 2.5 MHz, which controls the crystal oscillator which is built in IC2. The output frequency of the oscillator is divided several times inside IC2 and this finally produces the necessary standard test frequencies as well as the sync pulses. For the creation of the composite video signal there is a mixer stage which consists of T1 and R3, R4, P2 and D5 and the test pattern selector switch. P2 and R3 set the ratio of the video signal against the sync pulses which should be 7/3. R5 together with C9 are used to create vertical lines having the exactly the same width as the horizontal ones.
The composite video signal is then fed through C8 to the RF stage which is amplitude modulated. The RF stage consists of the transistor T2 and the components related to it. It is a Colpitts oscillator, and its output frequency is controlled by the inductance of the transformer

L1 - L2, the capacitor C5 and the stray capacitance of the Collector-Base and the Emitter-Base junctions with the capacitor C6.
The transformer L1-L2 has been etched on the printed circuit board itself and its secondary winding, L2, is the output of the RF stage, which is eventually connected through a coaxial 75 ohm cable with the input of the receiver.
The two resistors R1 and R2 form the biasing circuit of the RF stage, and provide the necessary modulation level of the stage by the video signal. The trimmer P1 adjusts the gain of the stage, ensuring that there will be sufficient contrast on the TV screen. The capacitors C4 and C7 isolate the RF signal from P1, while C2 and C3 block any RF signals from leaking to +5 V supply rail of the circuit.
Finally the generator includes a power supply stage consisting of the diodes D1,2,3 & 4, as rectifiers, C1 for the filtering and IC1 which is a 7805 voltage regulator, which provides the + 5 VDC necessary for the operation of the circuit.

Construction

First of all let us consider a few basics in building electronic circuits on a printed circuit board. The board is made of a thin insulating material clad with a thin layer of conductive copper that is shaped in such a way as to form the necessary conductors between the various components of the circuit. The use of a properly designed printed circuit board is very desirable as it speeds construction up considerably and reduces the possibility of making errors. Quasar Kit boards also come pre-drilled and with the outline of the components and their identification printed on the component side to make construction easier. To protect the board during storage from oxidation and assure it gets to you in perfect condition the copper is tinned during manufacturing and covered with a special varnish that protects it from getting oxidised and also makes soldering easier.
Soldering the components to the board is the only way to build your circuit and from the way you do it depends greatly your success or failure. This work is not very difficult and if you stick to a few rules you should have no problems. The soldering iron that you use must be light and its power should not exceed the 25 Watts. The tip should be fine and must be kept clean at all times. For this purpose come very handy specially made sponges that are kept wet and from time to time you can wipe the hot tip on them to remove all the residues that tend to accumulate on it. DO NOT file or sandpaper a dirty or worn out tip. If the tip cannot be cleaned, replace it. There are many different types of solder in the market and you should choose a good quality one that contains the necessary flux in its core, to assure a perfect joint every time. DO NOT use soldering flux apart from that which is already included in your solder. Too much flux can cause many problems and is one of the main causes of circuit malfunction. If nevertheless you have to use extra flux, as it is the case when you have to tin copper wires, clean it very thoroughly after you finish your work.
In order to solder a component correctly you should do the following:
Clean the component leads with a small piece of emery paper.
Bend them at the correct distance from the component's body and insert the component in its place on the board.
You may find sometimes a component with heavier gauge leads than usual, that are too thick to enter in the holes of the p.c. board. In this case use a mini drill to enlarge the holes slightly. Do not make the holes too large as this is going to make soldering difficult afterwards.
Take the hot iron and place its tip on the component lead while holding the end of the solder

wire at the point where the lead emerges from the board. The iron tip must touch the lead slightly above the p.c. board.
When the solder starts to melt and flow wait till it covers evenly the area around the hole and the flux boils and gets out from underneath the solder. The whole operation should not take more than 5 seconds. Remove the iron and allow the solder to cool naturally without blowing on it or moving the component.
If everything was done properly the surface of the joint must have a bright metallic finish and its edges should be smoothly ended on the component lead and the board track. If the solder looks dull, cracked, or has the shape of a blob then you have made a dry joint and you should remove the solder (with a pump, or a solder wick) and redo it.
Take care not to overheat the tracks as it is very easy to lift them from the board and break them. When you are soldering a sensitive component it is good practice to hold the lead from the component side of the board with a pair of long-nose pliers to divert any heat that could possibly damage the component.
Make sure that you do not use more solder than it is necessary as you are running the risk of short-circuiting adjacent tracks on the board, especially if they are very close together.
When you finish your work cut off the excess of the component leads and clean the board thoroughly with a suitable solvent to remove all flux residues that still remain on it.
Building the circuit should not present any problem apart from the requirements for neat and error-free construction.
Solder in place first of all the IC socket and the pins, and then place one by one all the components following preferably the order of the parts list which will help you avoid any construction errors.
Do not forget to make the jumper connection J, using a piece of wire. When all the components have been placed in their respective places, cut all the leads and solder them carefully. Having done this you can place the IC in its socket making sure that it is aligned properly. Connect a single pole six position rotary switch at points 4, 5, 6, 7, 8, and 9 of the board and connect the moving contact (wiper) of the switch with point 3. If you must use long cables between the board and the switch it is necessary to use shielded cable for these connections.
Use a coaxial cable having an impedance of 75 ohm having a suit able connector fitted on one end to connect points 11 (signal) and 10 (ground) of the generator with a TV set.
Connect the secondary winding of a 220 V/9 V - 0.5 A across points 1 and 2 of the PCB.
Use a TV set of known good quality for the adjustment of your generator.
Connect the output of the generator to the antenna input of the TV.
Adjust P1 and P2 in the middle of their range. Select a free channel on the TV set, in the VHF band, (Band III).
Connect the transformer to the mains and adjust with a plastic tuning screwdriver the capacitor C5 till you get a good quality image on the screen. Select grey Scale with the pattern selector switch and then adjust the trimmer P1 to eliminate any over modulation (excess contrast) on the white side of the scale.
Turn the switch at the Cross Hatch setting and adjust P2 until all the vertical lines become absolutely straight. Finally inspect all the test patterns and if everything is OK you can use your pattern generator for your adjustment and repair jobs.

Adjustments

This kit does not need any adjustments, if you follow the building instructions.

Warning

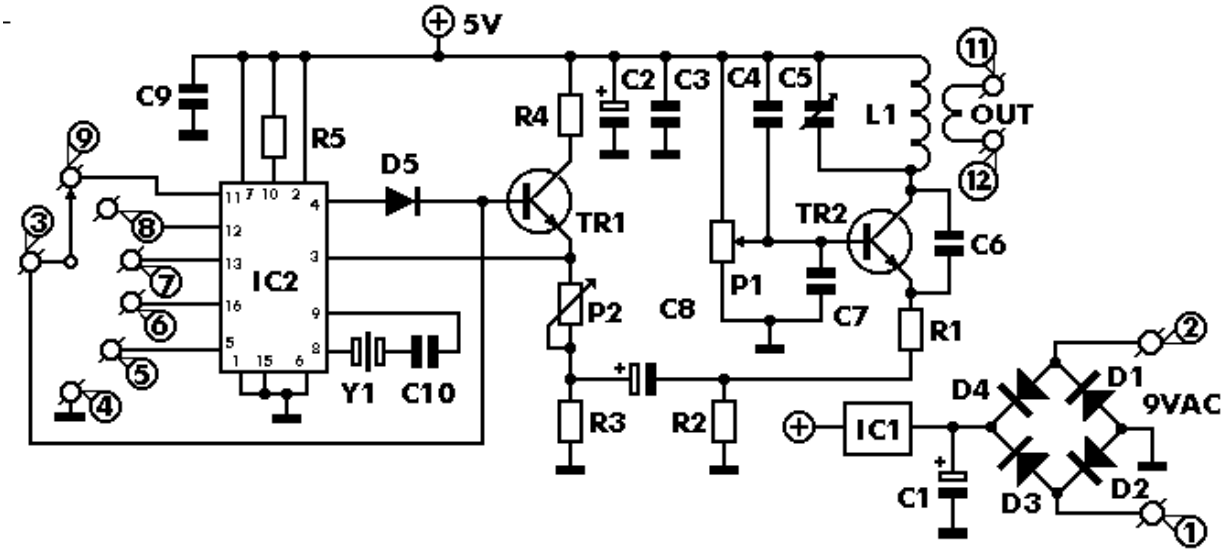
Quasar kits are sold as stand alone training kits.
If they are used as part of a larger assembly and any damage is caused, our company bears no responsibility.

While using electrical parts, handle power supply and equipment with great care, following safety standards as described by international specs and regulations.

If it does not work

Check your work for possible dry joints, bridges across adjacent tracks or soldering flux residues that usually cause problems.
Check again all the external connections to and from the circuit to see if there is a mistake there.
- See that there are no components missing or inserted in the wrong places.
- Make sure that all the polarised components have been soldered the right way round. - Make sure the supply has the correct voltage and is connected the right way round to your circuit.
- Check your project for faulty or damaged components.
If your project still fails to work, please contact us for information about our Get-You-Going service.

Schematic Diagram



Parts List

All components including printed circuit board, assembly instructions including schematics and detailed parts list are supplied when you purchase the kit.

Ordering

For pricing info and online ordering please visit:

http://www.quasarelectronics.com/1151.htm

For further info please contact us by e-mail:

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