

Rocket-Target Coincidence Circuit

Theory of Operation:

The MULTIVIBRATOR circuit comprised of tubes V_1 and V_2 is used to generate a Blanking pulse which is utilized in Blanking out the radar "main-bang" which normally appears in the video arriving at the grid of tube V_3 . It has been found that it is necessary to blank the main-bang as it is normally of greater amplitude than the received targets and therefore would trigger the Coincidence circuit rendering the circuit useless. The 2 megohm variable resistor which is connected to the grid of V_2 was made variable to adjust the generated Blanking pulse in length so it may be adjusted for the differences in main-bang lengths (time-wise) encountered in different radar sets. The two crystals used at the input of the master trigger are to clip off the negative portion of the master-trigger so that the MULTIVIBRATOR will not be stopped at the end of the pulse. All of the value of components used in this circuit are not necessarily from as the only model constructed to date was of breadboard configuration and may have slight changes in the final configuration.

The coincidence circuit is comprised of tubes V_3 and V_4 and its input circuitry consisting of the 0.137 micro-second delay line, 2 each .01 capacitors, and 2 each, 10K resistors. The 2 meg pot at the grid of V_3 is used to adjust the level of the grid at a point where it cannot be triggered by the amplitude of a normal locked-on target. An attempt to limit all video to the same level is made by the placement of the 2 input crystals which are biased by the voltage divider comprised of a 1 meg resistor and a 50K pot. The delay line serves the purpose of shifting the video in order that the video may be added at the junction of the 2 10K resistors and give combined video as pictured in the accompanying diagram. When the circuit has been adjusted so that V_3 cannot be triggered with normal video it is ready to operate. Normally V_4 is conducting ^{holding} V_3 cut-off by the 7.5 K cathode resistor. This also means that the millisecond relay K_1 is normally energized. When the video is of the proper spacing (rocket and target video 0.137 micro-seconds apart) V_3 is triggered cutting-off V_4 and deenergizing K_1 , which marks the strike camera film.

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Present plans are to use the over-run marker in the normal gun camera to mark the film but work along these lines have not been completed. Two sources of 28 volts will be supplied to the relays. One source is from the trigger or firing voltage circuits which is the normal supply. This was chosen so that the pilot can render the circuit inoperative until the targets range is less than that of the ground line so the circuit will not mark the film on the passing of the target through the ground line. Being relay K_2 is wired for self locking it is ^{only} necessary for the pilot to release the trigger to stop the camera marking which would make the circuit ready for another firing pass. The other source of voltage is to be used for test purposes on the ground while adjusting the circuits. The 28 volt lamp is placed in the circuit as an indicator also for adjusting the circuits. The spring loaded switch is used to release relay K_2 by removing the interlock voltage when adjusting the circuits. The normal in-flight position for the switches is such that the 28 volt source is from the trigger and the spring loaded switch is closed.

Progress to Date:

The bread-board model has been constructed according to the enclosed schematic and successful operation has been obtained on the mock-up. Construction has started on building this in a chassis for installation in an aircraft. Some difficulty has been experienced on the bread-board model due to stray pick-up, but this is should be overcome by proper shielding in the first prototype model.