IMPROVED RADAR INFORMATION RECORDER

Present day radar scope records available for fighter type aircraft are capable of recording only attack presentation. In training aircrews in the evaluation of over-all radar system effectiveness, this is a severe limitation since search and acquisition data are of primary importance. One method of overcoming this shortcoming is described here. The salient features of this device are a small remote scope capable of displaying exactly the same presentation as that displayed by the pilot and/or radar observers scope, plus a camera which is capable of recording both search, acquisition and attack presentations. It will be possible to do this over an extended period of time by recording only a fraction of the total sweeps during search and running at a low continuous frame rate during acquisition and attack. A unique feature of this device is a camera whose shutter opening is capable of being controlled directly by the sweep information. This is achieved through electronic circuitry which senses from the display voltage itself the beginning and end of complete sweeps, opens the camera shutter for a complete sweep, closes it and then only reopens the shutter for another sweep after a given number of sweeps have been made. In addition, this device senses operation of the action which occurs during acquisition attack phases and then operates the camera as a standard low frame rate motion picture recording camera during these periods of time.

This device is an improved circuit for determining time coincidents of two pulses. Its present application is more or less specific to determining this coincidence between pulses from a fire control system radar. It is specifically intended for use with a radar optic scoring device in which it is necessary to determine time coincidents of the radar return from rockets and target. There are a number of possible schemes of doing this, the most common being a fixed time delay in series with the signal sense and a comparison circuit for this signal voltage before and after time delay. This circuit has inherent inacouracies which are largely eliminated with the circuit described here. Without exception, in present day practice signals from rockets and target differ greatly in amplitude, those on rockets being a small fraction of the amplitude of the target pulse. This fact is utilized to make possible an accurate time discrimination of their coincidents. In Figure 1 is shown a typical voltage wave from the radar as it might appear after amplification. "A" being the rocket return, "B" being the target return. It is now possible, by using the circuit of Figure 2, which is commonly known as a signal slicer, to pick up signal components (the area shown in the shaded lines) to provide two discreet signals as time discrimination. However, a more practical scheme is shown in Figure 2, where a comparison diode (D1) picks up the signal component above a certain level (E1) and passes it on to an amplifier. The signal at point "B" effectively contains only the target pulse "B". After amplification, the rocket pulse is driven to limiting and a diode tube will now pick up two components first in time. Both the signal component from diode 1 and diode 2 are passed on through amplifiers and pulsed shaping circuits and into a suitable coincident circuit which mibht consist of either a twin triode or dual grid control pentode such as the 6AS6. Trigger pulse will now occur when the leading edges of A and B are in coincidence and will continue after that point. This trigger may be used to actuate either a relay tube or a multivibrator, lighting the neon bulb to give a photographic indication of time coincidents.