

Remote-Control Unit for High-Speed Cameras

PAPER M-4

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DURING the last 20 years, the increasing demands for multiple-camera installations for studies and testing of various events and the extremely hazardous nature of many testing operations, especially those connected with missiles, explosives, etc., have made the use of remote control apparatus an essential concomitant of the filming of many high-speed motion pictures.

Many tests required by Boeing Airplane Co. involve complex problems and are carried out in locations far from cities and in very rugged environments. Under these conditions the usefulness of a remote-control unit would depend upon its portability and simplicity of operation.

A remote control unit, designed by the author with these considerations in mind, is shown in Fig. 1. The basic unit is 17 in. high, 13 in. wide and weighs only 20 lbs. The top bank of "By-Passed Switches" is ordinarily used for circuit checking and operating, completing circuits such as lighting; and connection with other recording equipment which must be in operation ahead of the actual running of the cameras. The bottom bank of "Off-On" switches controls the power of each circuit. Two solenoid relays for completing the circuits are located between the two banks of switches and are controlled by two "Off-On" switches (EE). The power input (B) is at the right of the (EE) switches and the remote-control connection is shown at the left. The solenoids are of the heavy-duty type. Specifications for this unit are 35-amp, 115-v a-c with 26-v d-c breaker point. Other fittings for incoming and outgoing power are 35-amp, 115-v smooth surface receptacles. The solenoid unit is a spring-loaded type and is operated in an "up" position to avoid any danger of arcing and burning of the contact points.

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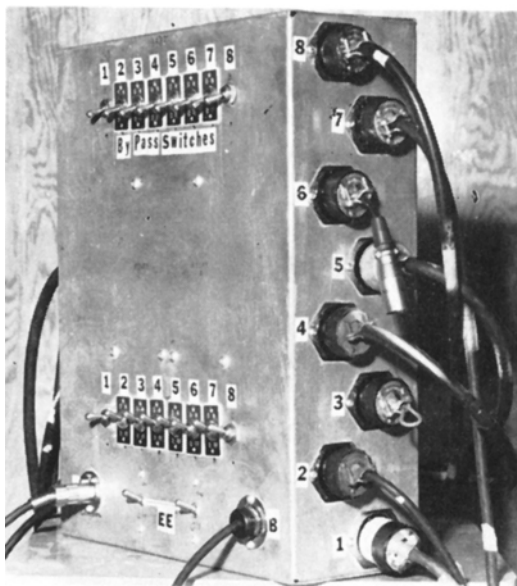


Fig. 1. General view of the unit.

The control system is designed so that each line operates independently (Fig. 2). After one of these units has been connected with the appropriate components, the control line can be operated manually at a camera station or connected with a complicated timing system within a blockhouse where it would be operated within the sequence of that equipment.

In Fig. 1, the shorting plug is in position on line 3 with the power going through the No. 3 switch on one side of the line. This could be an event closing circuit, such as a gun test, ignition of an explosion, a wind tunnel test, bomb-dropping, etc.

An example of the kind of unexpected event that could endanger a cameraman occurred during a test when a 60-mm projectile was fired into the gas tank of an airplane. The gas tank was located inside a firing revetment, and all safety precautions observed. Manual operation of a camera located at a little distance behind and to one side of the projectile's line of flight apparently presented no hazard to the cameraman, but through some unpredictable combination of circumstances, when the missile hit the gas tank, it glanced off some baffles within the tank, came out through the top and landed within three feet of the cameraman. Fortunately, he escaped without injury, but remote control of all the cameras filming this particular test would have eliminated any hazard resulting from an unpredictable event, or "freak" accident.

Note: This paper is condensed from the original presentation which was illustrated by a series of slides showing details of the unit and environments where the equipment had been used. A 16mm color motion picture showed the hazardous condition which prompted the planning of the unit. The film also showed scenes photographed by high-speed cameras.

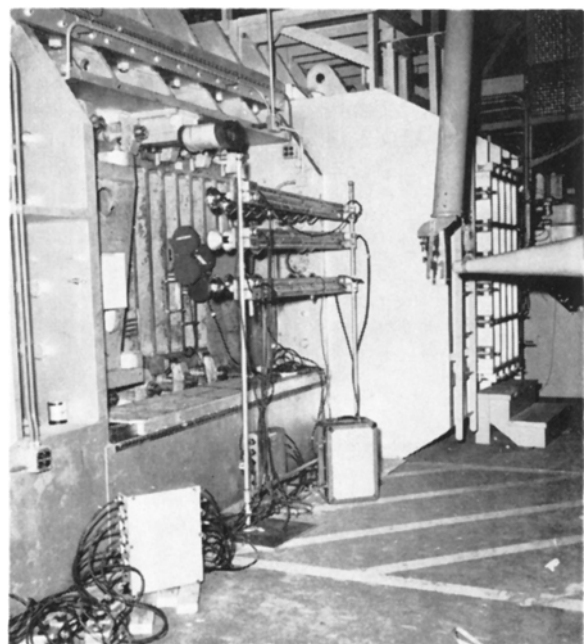


Fig. 2. Typical wind tunnel installation with three high-speed cameras, three banks of lights and other auxiliary equipment.