



LB - 828

REMOTE CONTROL

FOR TELEVISION RECEIVERS

RADIO CORPORATION OF AMERICA
RCA LABORATORIES DIVISION
INDUSTRY SERVICE LABORATORY

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1 OF 6 PAGES

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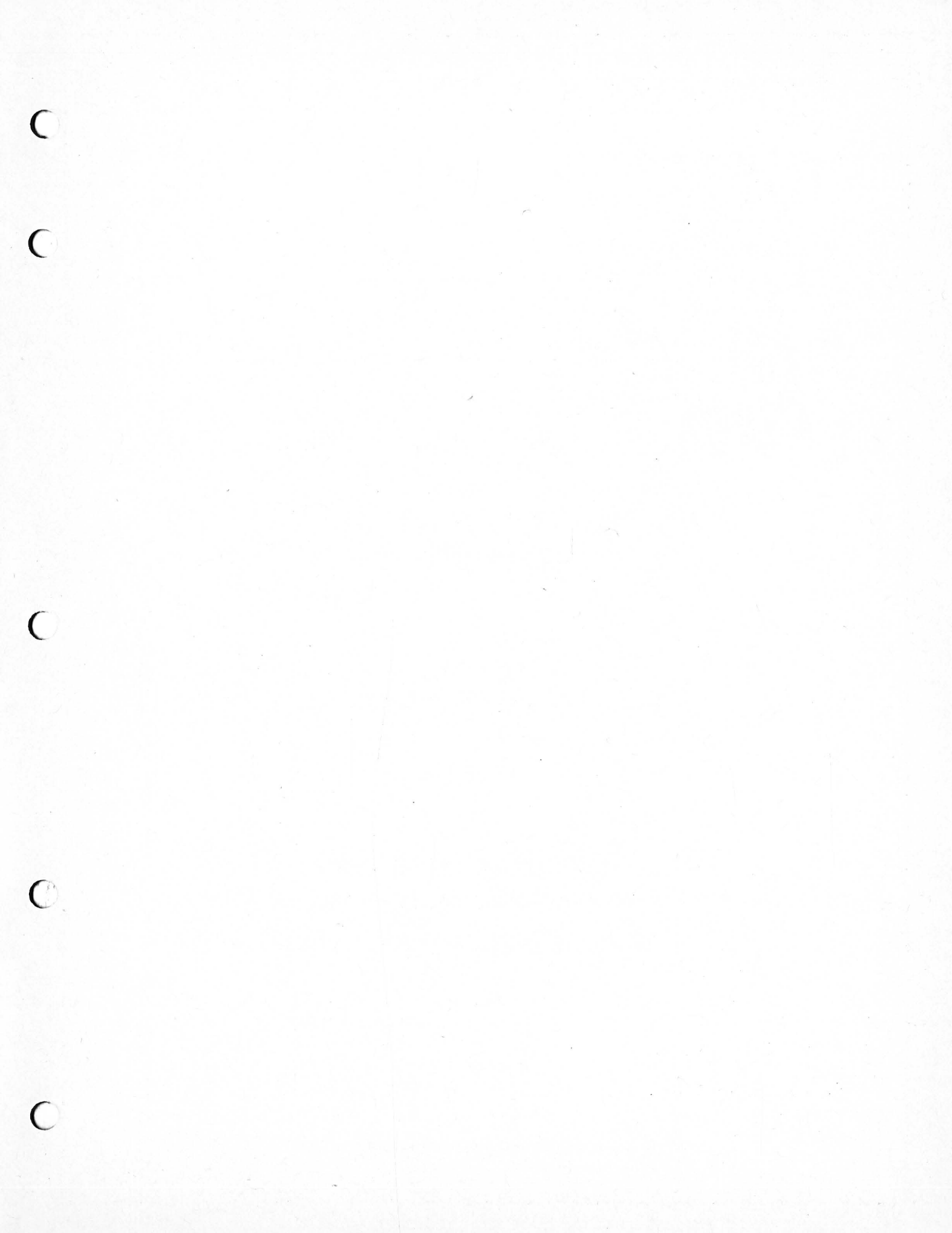
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Remote Control for Television Receivers

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Approved

Stuart W. Lee



Remote Control for Television Receivers

Introduction

With the trend toward larger picture sizes and greater viewing distances, the need for remote control of television receivers is increased. The remote control system should place all the receiver operating controls within easy reach of the viewer. These controls should adjust the receiver with a minimum of time lag and noise. The connecting cable between the receiver and the remote control unit should be small and unobtrusive. The addition of remote control to the receiver should not decrease the ease of operation of the receiver.

This bulletin describes one means of providing remote control to a particular television receiver. Some of the methods may be useful in adapting other television receivers.

The receiver which was modified included AM radio and phonograph. Station-selection, audio-gain, and picture-brightness and contrast controls were provided in the remote control unit.

Station Selection

A receiver of the intercarrier sound type was used to reduce the problem of station tuning. Sufficient oscillator stability in the tuner was obtained so that remote or local control of fine tuning was not used. Station selection is provided by a solenoid which rotates the tuner shaft in 30 degree steps for 12 possible stations. Rotation is always in the same direction. The original detent mechanism on the tuner was removed to reduce the force required from the solenoid. By shock mounting the solenoid and the tuner, the noise of operation was reduced to slightly more than that obtained from tuners with strong detent mechanisms. Fig. 1 shows a photograph of the solenoid, relay and associated parts mounted on the tuner. Fig. 2 shows the solenoid at three points in its cycle of operation. The first part of the solenoid stroke starts the rotation of the shaft by action of the pawl arm. The second and third parts of the solenoid stroke complete the step of rotation and pro-

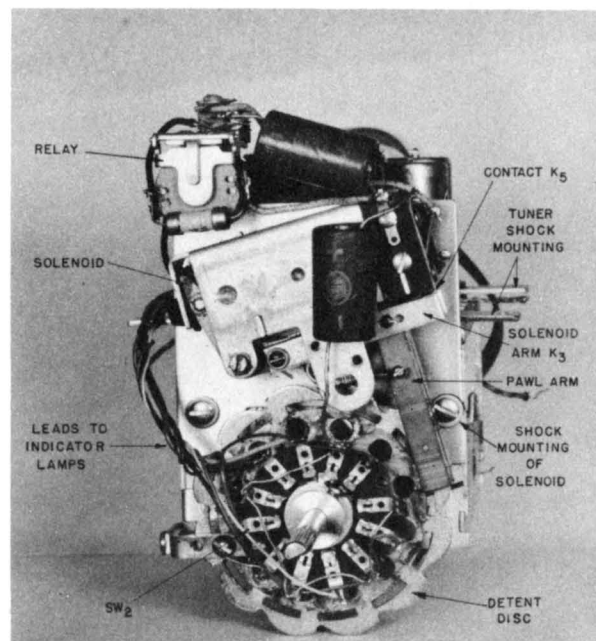
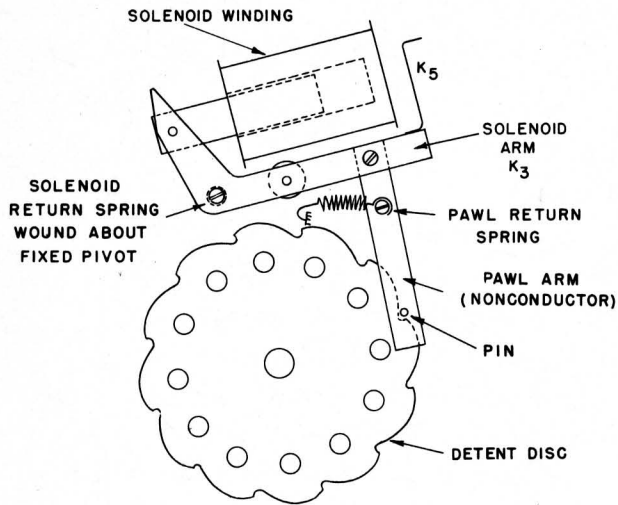
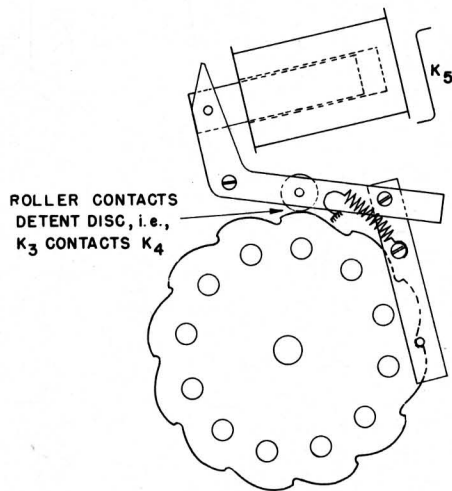


Fig. 1 - Photograph of tuner, solenoid, relay and associated parts.

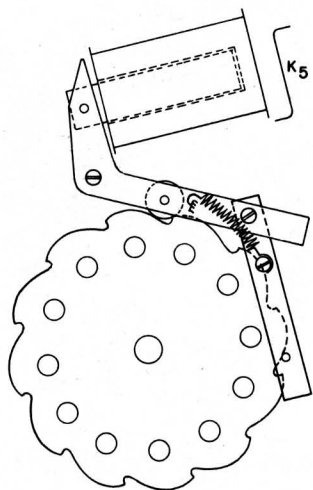
Remote Control for Television Receivers



A - Solenoid de-energized.



B - Solenoid near mid-stroke.



C - End of solenoid stroke.

Fig. 2 - Solenoid action.

vide detent action by pressure of the roller on the detent disc. Since the solenoid pull is greater at the end of its stroke, the force available for detent action is considerable, and positive detent is provided.

With the circuit shown in Fig. 3 a momentary or continuous contact of the remote control push-button will cause the solenoid to advance the station selector one station. In the event of an unused channel the solenoid automatically advances the station selector shaft to the next used channel as determined by connections of the switch SW_2 on the station selector shaft. Thus it is not necessary to press the push-button more than one time to change from one station to the next station.

Operation of the push-button SW_1 in the remote control unit causes a current from condenser C_1 to operate the relay. The relay holds itself closed through contacts K_2 due to the charge on condenser C_1 . At the same time contacts K_1 are closed and the solenoid operates causing the station selector shaft to rotate. The solenoid arm K_3 contacts K_4 near the middle of its stroke as shown in Fig. 2b and thus short-circuits the relay and discharges C_1 . The stroke is completed due to the slow release action of a relay when short-circuited and the inertia of the solenoid. The relay and solenoid thus de-energized, the solenoid arm K_3 returns to contact K_5 . The solenoid is then in position for another step of rotation of the station selector shaft. If the switch SW_2 on the station selector shaft is then grounding one side of C_2 , the charge on C_2 operates the relay and starts the cycle for another step of rotation. Thus the solenoid will continue to advance the station selector shaft until the switch SW_2 does not ground one side of C_2 . The diode across the relay is used to prevent the current through R_1 to C_1 from operating the relay while C_1 is being charged. The diode performs a similar function while C_2 is being charged through R_2 when K_3 contacts K_5 .

The circuit is reliable and simple to operate in that switch SW_1 need not be depressed for the full length of the solenoid stroke but merely long enough for the relay to be closed. Also, continued contact of SW_1 will cause no malfunction since the condenser C_1 is completely discharged through K_3 and K_4 during the solenoid stroke. Continued contact of SW_1 during

Remote Control for Television Receivers

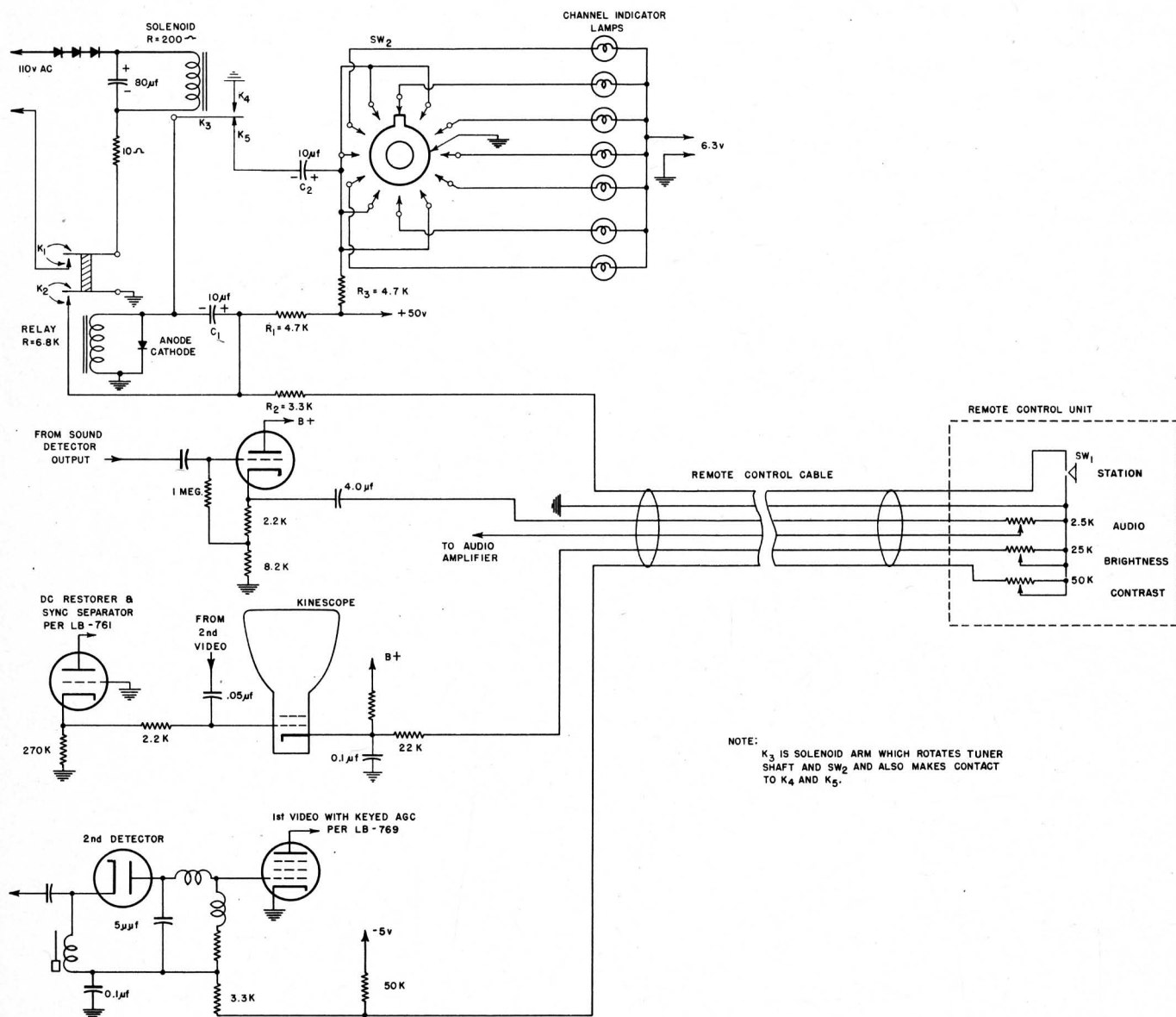


Fig. 3 - Schematic diagram of remote control system.

the second stroke of the solenoid will cause no malfunction even with R_2 short-circuited since C_2 then charges C_1 as well as operates the relay. In the event of mechanical jamming of the solenoid, such that arm K_3 does not contact arm K_4 , the voltage to the solenoid is soon removed due to the discharge of C_1 .

With a remote control system it is advantageous to indicate to which channel the receiver is tuned by indicator lamps. These lamps are operated through the otherwise unused contacts of SW_2 , as shown in the diagram.

Although this remote control system does not provide for instantaneous selection of any

given channel without tuning through other channels, the speed of operation is such that this is not a serious disadvantage. With seven active stations, complete rotation of the selector shaft by depressing the push-button seven times was obtained in approximately six seconds.

Brightness and Contrast Control

The cathode voltage of the kinescope is varied by a rheostat for brightness control. Since the receiver used keyed a.g.c. as des-

Remote Control for Television Receivers

cribed in LB-769, *A Simple Keyed AGC System for Television Receivers*, the grid voltage of the first video stage is varied for contrast control. This method is satisfactory except that the ratio of signal-to-impulse noise at the output of the first video stage becomes less favorable as the contrast is reduced.

Audio Level Control

Since the control leads to the remote control unit are unshielded in the interest of keeping the remote cable small, it is necessary to provide some means of reducing hum pickup on these leads as well as to prevent attenuation of the high audio frequencies due to the capacity between leads. As shown in Fig. 3, a cathode follower is used to reduce the impedance of the audio signal and a low

resistance potentiometer is used in the remote control unit. The resistor R_2 is used to prevent an objectionable "pop" in the loud speaker when the switch SW_1 is operated. This "pop", due to coupling between leads in the remote control cable, was greatly reduced by reduction of the surge current.

Remote Control Unit

The remote control unit consists of three potentiometers and a push-button switch mounted in a case approximately the size of a cigarette case. The control unit is connected to the receiver through a 6-conductor vinylite-insulated flexible cable with an outer braid 1/8 inch in diameter. The voltage on any lead to the remote control unit does not exceed 50 volts.

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