Both-way Uniselector. Patent No. 432,606.

UNISELECTORS employed in telephone circuits may broadly be placed in two classes, homing and non-homing. In the first class, the selector, having performed its function, completes the arc and returns the wipers to the initial position in readiness for further operation. In the second case, the selector remains on the contact to which it was last stepped, commencing its next operation from that point. These two types of uniselectors have sufficed for requirements in automatic telephone practice and for several special applications but it has long been known that in certain instances marked limitations were imposed by the fact that the motion of the selector is unidirectional. With the growth during recent years in the application of automatic telephone apparatus outside the telephone field a considerable demand has been created for a rotary switch capable of stepping in both directions round the arc of the usual bank. A new design was therefore embarked upon, the proved features of the uniselector being adopted as a reliable guide.

An example of the new switch is seen in Fig. 1 It has been designed primarily for remote control circuits of different kinds and thus has a bank capacity dictated by the requirements of these circuits. A standard uniselector bank of four arcs each of 25 contacts is swept by four wipers which may be double-ended at 180°, double-ended at 90° or single-ended. The bank is secured to a frame to which is fitted a pole-piece carrying the cores of two operating coils. To the frame also are fixed knife-edge bearings for each of two armatures as seen in Fig. 1 The ends of the armatures carry small pawls, which, when an armature is attracted, engage with a ratchet on the wiper shaft and rotate the wipers in a direction depending upon the coil energised.

It will be realised that the new switch employs the direct drive principle as distinct from the reverse drive method of operation of the standard uniselector This departure from previous practice gives simplification of the mechanism in the case of the two-way switch and is justified by the extreme accuracy of the switch under severe test conditions, it having proved impossible to cause overstepping. Since a standard four-arc uniselector bank is employed, the new switch mounts on the usual centres of $5\frac{7}{16}'' \times 2''$, the overall dimensions being $5\frac{3}{4}'' \times 5\frac{3}{4}'' \times 1\frac{7}{8}''$

Fig. 1.—Both-way Uniselector, showing coils.

The performance characteristics are best shown by curves obtained from observed readings. Measured impulses at known rates were applied to a coil and the operating times noted. It was found that a constant time was required for operation at all impulsing speeds within the response range of the switch, this time being approximately 20 milliseconds as shown by curve "a" in Fig. 3. At a given rate of impulsing, the cycle of operation and release of an armature must be completed within a certain time and thus there is a maximum period during which operating current may be allowed to flow Ordinates to curve "b" show these maximum permissible periods and provide data for circuit design. It will be seen that at approximately 26 impulses per second there is no margin above the actual operating time and thus this is the maximum speed at which the selector may be stepped by the supply of impulses. The selectors tested were operated from a supply at a nominal 50 volts and the readings plotted are the average of those obtained at maximum and minimum adjustments.

The second curve, Fig. 4, shows the variation in the speed when self-interrupting

Fig. 2.—Both-way Uniselector showing operating pawls and restraining spring.

at different voltages, an applied voltage of 50 giving self-drive speed of 64 steps per second.

Further data for circuit design is afforded by curves given in Figs. 5 and 6, these showing the permissible resistance in series with an operating coil for different supply voltages and for a variety of impulse speeds. Figures of importance, especially in certain instances of remote control circuits, are the breaking capacity and current-carrying capacity of the bank and wipers, these being 12 watts (non-inductive) and 5 amperes respectively

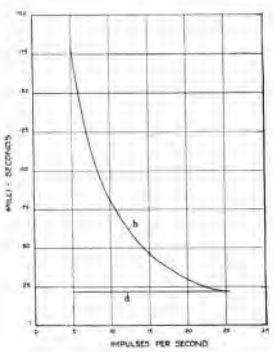

Fig. 3.

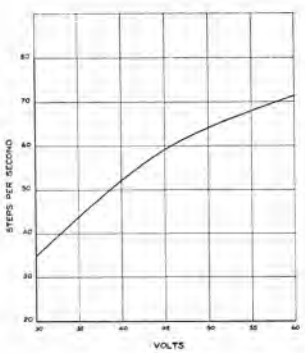

Fig. 4.

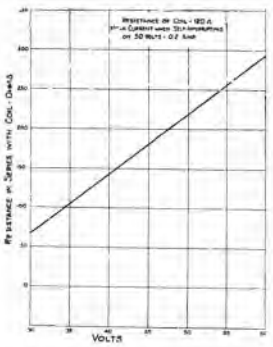

Fig. 5.

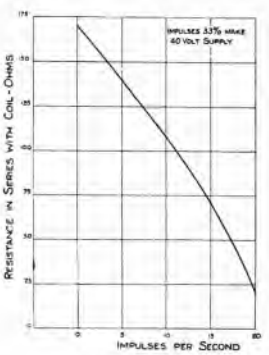

Fig. 6.