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# An Improved Trigger-Type Dial—the Dial, Automatic, No. 21

J. L. BELK, Assoc.I.E.E.†

U.D.C. 621.395.636.1

A new telephone dial is being introduced in matching colours for use with 700-type telephones. The basic trigger mechanism of the earlier type of dial has been retained but the use of a different form of construction and different materials has enabled an improved appearance and performance to be obtained at reduced cost.

## INTRODUCTION

THE development of the 700-type telephone\* necessitated some redesign of the dial so that its appearance would be in keeping with the new telephone. The opportunity was also taken to reduce the cost of the dial whilst improving its reliability. Development of the dial followed that of the telephone, and the existing type of stainless-steel dial with a figured number-ring has therefore been used on the first issues of the new telephones. The general appearance of the new dial is shown in Fig. 1.



FIG. 1—GENERAL APPEARANCE OF THE NEW DIAL

## FEATURES OF THE NEW DESIGN

### Interchangeability

When large numbers of an item of apparatus are in use it is essential that the normal economic life of the item shall not be curtailed by the introduction of new components which are not interchangeable. Thus, with seven million telephones already in service, the new dial had to be suitable for use both on existing telephones and the new telephone. This meant that the three fixing lugs used on the earlier dial had to be retained on

†Subscribers' Apparatus and Miscellaneous Services Branch, E.-in-C.'s Office.

\* SPENCER, H. J. C., and WILSON, F. A. The New 700-Type Table Telephone—Telephone No. 706. *P.O.E.E.J.*, Vol. 52, p. 1, April 1959.

the new dial, although a new method of fixing, by means of a clamp around the body of the dial, was to be used on the new telephone.



FIG. 2—BASE PLATE AND MECHANISM

### Reliability

The reliability of a dial mechanism can be proved only by prolonged field trial. Accelerated life tests may show possible faults but a satisfactory life test on a mechanical component which is affected by ageing is only a preliminary step to a field trial if performance is to be proved conclusively before introduction. Thus, although new designs of mechanism were considered for the dial, they were rejected in favour of the trigger mechanism which has been used by the Post Office since 1948.

### Mechanical Details

The most expensive component of the earlier dial was the metal case that housed the mechanism. Economy has been obtained with the new dial by mounting the mechanism on a flat steel base plate (Fig. 2) and completing the body by means of a moulding (Fig. 3). The flat plate has provided improved accessibility and the use of steel has provided greater support for the centre bearing of the older dial could be distorted, due to the brass case buckling, if excessive pressure was put on the edge of the finger plate, e.g., when the dial was dropped or forced into a telephone case or dial mounting.



FIG. 3—BACK VIEW OF NEW DIAL

The material for the bush of the centre bearing has also been changed and it is now made of steel, although trials of different materials have not established any particular superiority. This provides the more conventional combination of brass and steel for this type of bearing. In addition, the centre spindle and the governor gear pinion and its shaft have been provided with a coating of dry graphite to assist in preventing dial failure due to deterioration of the lubrication at these points. Dry lubrication, which will not be affected by ageing, has been investigated for use in other parts of the dial mechanism, but a fully satisfactory and cheap method of providing dry lubrication for all bearing surfaces has not yet been found.

### Spring-set Design

Palladium has been used in preference to silver for the pulsing contacts. Silver contacts used in the existing types of dial have occasionally developed a high contact resistance which can affect pulsing, and cause noise in the line. Although not widespread, these troubles have occurred on the earlier slipping cam type of dial, the contacts of which had a wiping action, and also on the trigger-type dial the contacts of which have very little wiping action. The use of palladium may prevent or reduce these faults at little extra cost.

### Appearance

It was originally hoped that a single type of dial would be acceptable for use on all the different coloured telephones. Early consultation with the Council of Industrial Design indicated that polished stainless steel was not favoured and, as the Post Office did not favour a satin finish for the heavily used finger plate, alternative materials were investigated.

P.V.C. appeared to be ideal material in that it was cheap and could be made with a variety of colours and finishes. The appearance of the complete telephone was much improved by having a dial coloured to match the telephone and, notwithstanding the increased overhead costs of having more than one dial, a full range of seven colours was introduced. The colours are listed in Table 1. Also, because of its resilience, a finger plate made of this material was pleasant to handle and risk of damage to

the centre bearing, by excessive pressure applied off-centre on the front of the dial, was reduced.

The formed p.v.c. construction enabled the front of the dial to have an unbroken contour because the dial centre label and its protective window have been sunk into the finger plate. The resilience of the finger plate has been used to retain the label protector by gripping three pins on the periphery of the protector and so providing a snap fit. The protector has to be released by using a rubber suction disk (Extractor No. 29), or by inserting a small screwdriver (Screwdriver No. 1) under an ejector plate beneath the protector.

To match the appearance of the dial, the finger stop and the dial centre label have also been redesigned as shown in Fig. 1. The centre label is grey with white printing on the top half, and white with black printing on the bottom half and is suitable for all colours of dial. The appearance of the dial, in its association with the Telephone No. 706, has been approved by the Council of Industrial Design.

### Dust Exclusion

The dial "number-ring" was designed to prevent it collecting dust and providing a point of entry for dust into the mechanism. Thus, instead of fitting the number-ring into a recess as on earlier dials, it now overlaps the body of the dial. Part of the body has been left exposed so that when the dial is gripped with the hand, as for instance when it is fitted in a switchboard dial mounting, pressure can be taken directly on to the dial body. When the dial is fitted in the new telephone the body is not seen because the dial is sunk so that the top surface of the dial number-ring is coincident with that of the outer number-ring.

A thin polythene seal has also been provided between the dial number-ring and the boss of the centre spindle. This seal is a floating fit in the number-ring, to enable it to be self adjusting for eccentricity between the number-ring and the centre spindle. A dust cover has been included in the Telephone No. 706 to protect the back of the dial.

### FURTHER WORK

The modifications necessary to provide a new range of dials for other purposes are now being investigated. For use on 200-type and 300-type telephones, as a maintenance replacement item, the only change that will be required in the new dial will be replacement of the plain number-ring by one carrying letters and figures. It is hoped that the new dial with letters and figures will also be suitable as a switchboard dial, and a field trial is being arranged. Trials of an earlier design of p.v.c. finger plate, which was based on the shape of the stainless-steel finger plate, failed due to breakage across the thin bridge between the finger holes. The finger plates of the latest design are of greater depth and should prove to have sufficient strength to withstand the hard use encountered on switchboards. On the other hand, trials leave little doubt that a stainless-steel finger plate will still be necessary in call offices if excessive damage is to be avoided.

### ACKNOWLEDGEMENT

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TABLE 1  
Colours Used for the Finger Plate and Number-Ring of the New Dial

Abbreviated Colour Description (used in titles of telephone, dial, finger plate and number-ring)	Actual Colour of Finger Plate	Actual Colour of Blank "Number-Ring"
Black	Black	Black
Blue	Concord blue	Concord blue
Green	Aircraft grey-green	Forest green
Grey	French grey	Elephant grey
Ivory	Light ivory	Light ivory
Red	Lacquer red	Lacquer red
Yellow	Topaz yellow	Topaz yellow

Note: The green and grey number-rings, which are darker than the green and grey finger plates match the colour of the telephone handsets. The finger plates match the colour of the telephone covers.