

REPORT

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THE TOUCH-TONE[®] "DIAL"

The TOUCH-TONE[®] telephone made its Bell System commercial debut in November, 1963 and is well on its way to success.

Customer enthusiasm for the new pushbutton service can be seen in some typical comments:

"The whole thing is like magic. You can dial very fast and it's just wonderful."
"Speed, simplicity...the sound is delightful."
"Quite inexpensive for the convenience you get -- Why, I hardly notice the difference in the bill each month."
"It cuts dialing time in half, and to a businessman like myself, this means saving money."

Along with customer interest in TOUCH-TONE[®] service, there has been some natural curiosity about the new telephone. Why does it look the way it does? How did Bell Labs go about picking this particular arrangement of buttons instead of some other?

When the development of the TOUCH-TONE[®] telephone began, Bell Labs human-factors engineers realized that the arrangement of the buttons had to be considered very carefully. The success or failure of this giant step in communications would depend in large part on how our customers felt using the new telephone.

Consequently, a great deal of attention was given to the button array that was to be used and to such other characteristics of the buttons as their size, and shape, the distance between them, how much force must be used to operate them.

Studies participated in by Bell Labs as far back as 1955 indicated that most people expect to find letters of a pushbutton set arranged left-to-right order in horizontal rows, starting with the top row -- the order in which we read, in fact.

As a test of pushbutton arrangements in a form closer to the intended use, telephones were made using 16 different arrays -- rows, circles, triangles, crosses, even one very like the layout of the rotary dial.

Volunteer participants spent weeks testing the different layouts to determine the speed, error rate, and preference index of each one. Final choice for the TOUCH-TONE[®] telephone was an array of three rows of three buttons each, with the letters and numbers arranged in a left-to-right, top-to-bottom order, and the "Zero-Operator" button centered on a fourth row.

Once the arrangement was decided upon, other tests were made to determine the best size and spacing for the buttons.

If they were too close together, one button would be difficult to push without depressing others at the same time. If they were too large, the entire group of buttons couldn't be easily taken in at a glance, and more important, they couldn't fit on the telephone set.

Even the pushbutton action, or "feel" came in for study. Human-factors tests showed that most people preferred a smooth button action -- rather than a "snap" -- with a definite, but slightly cushioned, stop.

The first design concept incorporating the results of laboratory tests was translated into plastic and metal in the Model Shop at Western Electric's Indianapolis Works. Then began a new phase of the Bell System pattern of matching a new design to the customer.

The preliminary TOUCH-TONE® models were installed temporarily in four cities. In all, some 500 homes and offices became laboratories-in-miniature.

The telephone sets used were still considered experimental. While testing under field conditions was going on, more human factors experiments back at Bell Labs continued the search for the best possible combination of pushbutton characteristics.

As the engineers moved closer to their goal, they checked each step of progress against interviews with people using TOUCH-TONE® telephones in their homes and places of business.

By the time the field trials were over and the decision had been made to market test TOUCH-TONE® service before offering it to the general public, a number of design changes had been made.

Button size had been cut 65 per cent. The letter "I" and numeral "1", next to each other vertically, were made more distinct in appearance. The force required to depress the buttons was doubled to overcome accidental pushing of more than one button at the same time.

In line with the modern concept of TOUCH-TONE® calling, the telephone was redesigned, the round dial face given a clean, square look. The buttons themselves, white with black letters in the test models, were made gray with white letters. The surface of the buttons was hollowed gently to fit the fingertips.

The results of the marketing trial proved every effort to have been worthwhile. Ninety-six per cent of the buyers said they thought TOUCH-TONE® service was an improvement.

Since its release to Bell System customers on a gradual basis, the TOUCH-TONE® telephone has been meeting with gratifying success, proving the worth of customer-tested products.