

*2500 sketches, measurements of 2000 faces, breadboard models, and lacquered sculptures were some of the steps which contributed to the present instrument*

## DESIGNING THE TELEPHONE

*"We bear in mind that the object being worked on is going to be ridden in, sat upon, looked at, talked into, activated, operated, or in some other way used by people individually or en masse.*

*"When the point of contact between the product and the people becomes a point of friction, then the industrial designer has failed.*

*"On the other hand, if people are made safer, more comfortable, more eager to purchase, more efficient—or just plain happier—by contact with the product, then the designer has succeeded."*

*So writes industrial designer Henry Dreyfuss at the beginning of his new book "Designing for People."° And when he speaks of the object being "talked into," he knows whereof he speaks—for he is the designer of the "500 set," so called (and what a pity his design couldn't have included a better name!). His account of how the telephone got its new look forms Chapter 7 of the book, and we are permitted to reprint it here—with some necessary deletions because of space limitations—through the courtesy of Mr. Dreyfuss and of his publisher, Simon and Schuster. EDITOR.*

OF ALL THE MAGIC of modern civilization, the telephone seems to me the most wondrous achievement. How easily we take for granted that the simple, commonplace spinning of a dial will enable us to talk privately and intimately with a particular person across a city or a continent or an ocean or on a speeding train or a ship at sea or in an auto or a plane several miles in the sky. We assume that the telephone will be there, within reach, in time of stress, to reassure one's family and friends or to transact business.

This assumption is not necessarily an expression of smugness or a feeling that our society is especially endowed, but rather a testimonial to the wonderful democracy of the telephone. It is available alike to

millionaire and reliefer. It can be found in stock exchange and boudoir, in saloon and hospital. It has permeated our daily activity and become a personal thing, like reading a letter, and a habit, like brushing the teeth. A child uses it before he learns to read. People unhesitatingly call Washington, New York, Paris, or London.

Other scientific and engineering feats may be more spectacular—the Golden Gate bridge, the Mt. Palomar telescope, this country's fantastic radar screen, the supersonic jet bomber—but they are things apart. People do not live by them as they do by the ubiquitous telephone.

---

° *Designing for People*. Copyright 1955 by Henry Dreyfuss. Simon and Schuster, Inc., New York.

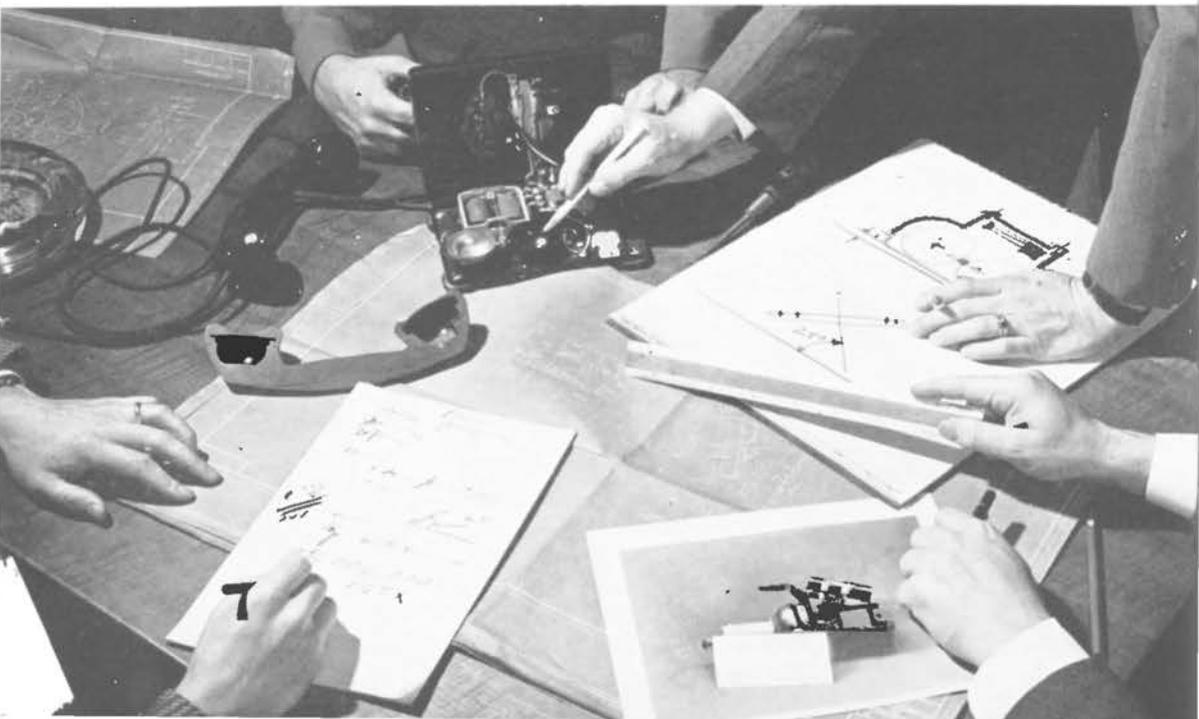
RECENTLY my plane was delayed for several hours by bad weather on a transcontinental trip, and as soon as it landed I rushed to a phone to relieve any anxiety my wife might have had. She calmly told me she knew the plane was going to be late. She had been on the telephone constantly, and the airline people had kept her informed of weather conditions and the progress of the plane. The incident recalled the "widow's walk" of New England. These were flat areas, with a railing, perched on the gabled roofs of old houses in fishing villages such as Nantucket. During storms, worried seafarers' wives paced these walks, looking out to sea for a glimpse of their husbands' ships returning to port. In a sense, the telephone is a kind of modern "widow's walk." A recent check disclosed that an average of 71,000 telephone inquiries about the weather are made daily in New York City. When storms threatened, the calls sometimes reached 270,000.

There are now more than 50,000,000 telephones in operation in the United States. Of this number, the Bell System provides

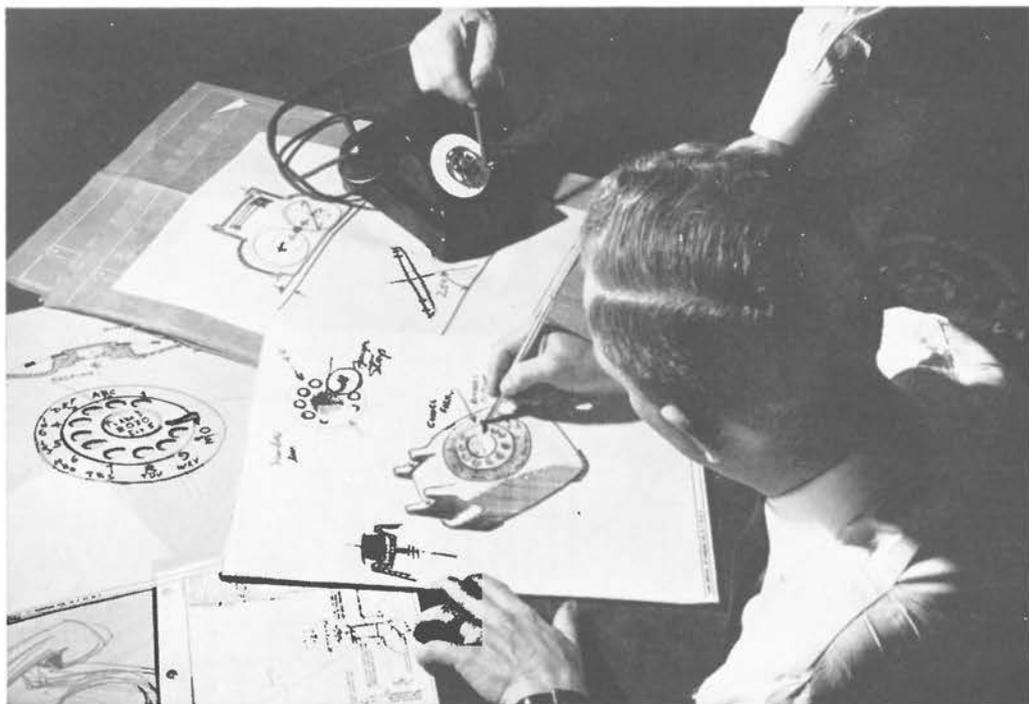
service on 41,350,000. The rest are served by Independent operating companies substantially all of which have interconnecting facilities with the Bell System. The average subscriber makes 5.5 calls daily—a total of 275,000,000 calls every twenty-four hours. The average length of each conversation is 5.35 minutes, which means that Americans spend 1,471,000,000 minutes or 24,500,000 hours on the telephone every day. For a busy people, this certainly seems excessive. It is difficult to imagine that there can be that much of importance to talk about. Certainly, here is proof that Americans like to talk about little things as well as big things. Here also is an indication of the responsibility the telephone company feels in giving its subscribers an efficient telephone.

Before industrial design as we know it today was appreciated in most businesses, the telephone people had recognized that utility alone was not enough. In 1930, shortly after I opened my office, a representative of the Bell Telephone Laboratories called on me. He graciously dis-

*This is what it's all about.*



## *Designing the Telephone*



*There has to be a basic design.*

played no uneasiness over my office furniture—a borrowed card table and folding chairs—all I could afford at the time. His mission was to inform me that the Bell Laboratories were offering thousand-dollar awards to each of ten artists and craftsmen for their conceptions of the future appearance of the telephone.

It was flattering to be included in such a group, and the prospect of a thousand dollars was attractive. But I suggested that a telephone's appearance should be developed from the inside out, not merely created as a mold into which the engineers would eventually squeeze the mechanism, and this would require collaboration with Bell technicians. My visitor disagreed, saying such collaboration would only limit a designer's artistic scope.

Several months later he returned with a changed point of view. He admitted

frankly that the telephones of the future submitted by the ten commissioned artists had been unsatisfactory. Some of them were quite original, he said, but all of them were impractical. Now he wanted to hear my ideas about design from the inside out. Our conversation led to an association that has proved eminently satisfying. No one could have been more co-operative than the Bell engineers have been through the years, or so patient and understanding.

TODAY THE CONVENIENCE of telephones is established, and they occupy the most accessible place in the home or office or store. Twenty-five years ago some people weren't quite sure where to put them. They were sometimes kept inside plaster globes of the world or cabinets or dolls with fluffy skirts. Because placement had a bearing on design, we had to determine what people

did with phones, and that is why the telephone company permitted me to act as a repairman's helper when he went on his rounds. My research ended abruptly when I went up in the service elevator of an apartment house and was ushered through the kitchen into the living quarters of a family I knew. There my hostess of a previous evening greeted me in some confusion and seemed surprised that a man who had represented himself as an industrial designer should be repairing telephones.

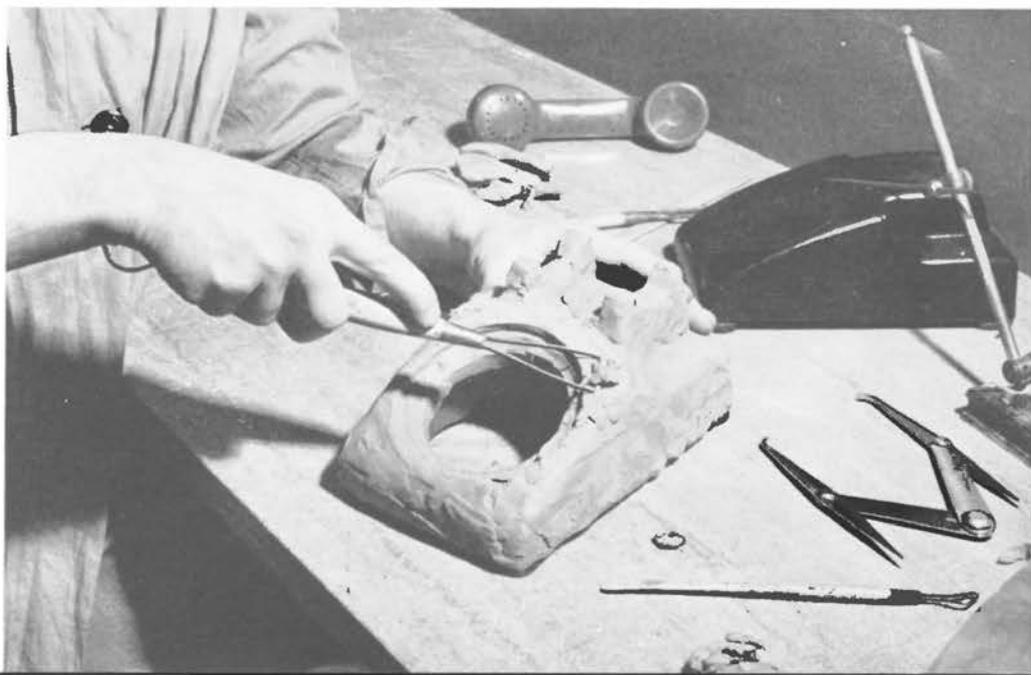
The telephone for which the Bell people were seeking a new appearance combined several features. After long development, the most serious operating faults of the so-called "French" phone or handset had been overcome. The resulting combination of a handset with parts of the old stand-up phone had produced the early cradle-type instrument. The proposed design, with smaller components housed within the instrument, would eliminate the box on the wall that held the ringing apparatus. In the final design, plastic was substituted for the metal housing. This is the type of phone in general use today.

Eight years ago the Bell people again began to discuss with us their ideas for another new telephone instrument. They wanted improved sound, volume, comfort, dial mechanism, new materials—in short, a new design. This was the beginning of what became the 500-Type Telephone Set—the instrument now being installed all over the country—and the start of another long collaboration between the Bell engineering staff and our office, involving a mountainous file of data and incalculable testing.

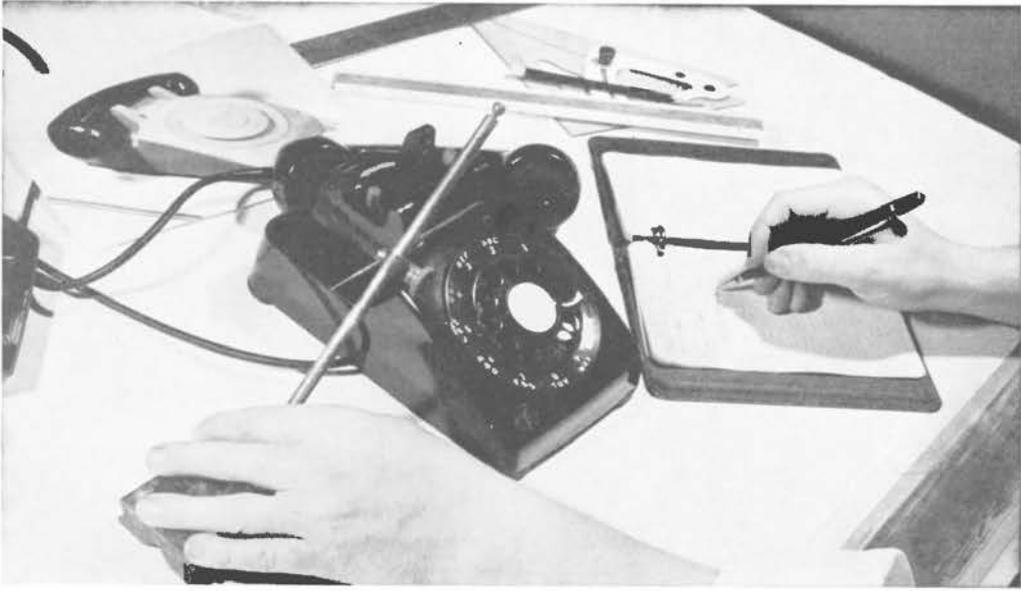
In seeking a new telephone appearance, the Bell people were confronted with a consideration in which the user was not primarily involved. The form had to be classic so that it would not be out of place with shorter-lived objects in homes and offices either at the time of introduction or twenty years later, the estimated life span of the instrument.

THIS IS A GOOD PLACE to point out that designing a telephone is not quite the same as designing a clock or a vacuum cleaner or a radio. In the accepted sense, there is no

*A third dimension gives some idea of how it should look.*



## *Designing the Telephone*



*A model is checked for size.*

consumer sales problem. Telephone subscribers do not buy their telephones; they use the instruments the Bell System makes available to them because telephones are part of the integrated over-all service that they purchase from the telephone company. Yet salesmanship of the highest order is still involved. The Bell System owes much of its growth to its acute awareness of public relations and its alertness to the subtleties in the relationship of men and machines. The telephone people want each piece of equipment to be an ambassador of good will. They know the subscriber will be pleased, perhaps subconsciously, when he finds the handset grip is more comfortable than the old model and that the voices of his friends are transmitted more clearly.

Toward this goal, we proceed slowly, discarding more innovations than we accept. We have to consider that phones are used not only on desks and tables while people are sitting, but also on counters and shelves for stand-up use. We have to give

critical consideration to room lighting and to arm, wrist, and finger angles and motion in the dial operation.

Maintenance, always a factor in a new design, did not present too great a problem in the 500-Type set, as the maintenance record of the old instrument had been excellent. Nevertheless, to permit a greater degree of accessibility for repair, etc., Bell engineers fastened all components to the base plate. Previously, some of the components had been fastened inside the cover and others on the base plate.

The handset was re-engineered by the Bell people for better performance. Data in Bell files on the measurement of two thousand faces, to determine the average spacing between mouth and ear, were re-examined and interpreted in terms of a new instrument. Every conceivable kind of handgrip was considered—triangular in cross section like its predecessor, square, a thin rectangle, a thick rectangle, and many mongrel forms. The final selection

was the thick rectangle, slimmed down. In comparison with its predecessor, it was smaller, lighter, more comfortable, resisted turning in the hand, and looked better.

Drawing on years of experience with the dial number plate used on coin collectors in public telephone booths, Bell engineers expanded the existing three-inch dial of the desk telephone set to four and one quarter inches, the letters and numbers were placed outside the finger wheel, and the white characters were molded in black. (In the old dial, black letters and red numbers were printed on white under the wheel.) With the new placement, dragging fingers and pencils could no longer deface the characters, the flickering effect of the spinning wheel was eliminated, the characters could be made larger, the dial was easier to clean. Laboratory and field tests by typical telephone users under typical dialing conditions have pointed up these advantages.

Once Bell engineers established the basic position for the handset and dial, the phone began to fall into shape. This is an easy way of stating that something like 2500 rough sketches were scrutinized and narrowed down to half a dozen. Curiously enough, the first form conceived for the new combined set was generically the same as the form finally accepted.

IT WOULD SERVE no purpose to confound the reader with the infinite mass of statistical detail that had to be carefully studied, the suggested changes that were agreed upon, rejected, or modified, and the compromises effected between engineers and industrial designer. Inherent limitations dictated much of the design. The bell, for instance, had to be placed at the rear because, as the largest component, this was the only area available.

Our office was in turmoil for weeks over what was called the "ROH Battle"—receiver off hook. The telephone company has a pronounced distaste for hang-up errors—the subscriber should properly replace the handset on the cradle, so that the plunger buttons do not remain up, thus keeping the line closed and unavailable for subsequent calls—and lengthy discussions were held over whether two or four prongs on the cradle lessened this possibility.

Early designs of the new housing were unsatisfactory on two counts. They were too high, appearing taller than the old model, and the cradle prongs took away the sleek appearance that was desired. After renewed analysis, Bell engineers found that the housing could be lowered an important one eighth of an inch. Our contribution was optical. By making small changes in the shape of the housing, the position of the light reflection was changed, thus making the instrument *look* even lower.

Sketches were made of all these variations, then accurate layout drawings. These were followed by full-size "bread-board models" of the components. When several designs appeared likely, they were modeled in clay, which can easily be modified as ideas develop. Later they were cast in plaster, sculptured and lacquered. This high polish was important so that the model could be analyzed for light reflection that might prove annoying or tiring. Some were equipped with mock components such as handset dials, cords, and number plates to simulate the finished product. When all decisions were made, a bronze master was made of the final design. From this, the finished housing evolved, made of cellulose acetate butyrate.

The task has not ended there. The telephone family is a large one. Commercially,

## *Designing the Telephone*



*Designer to clients—"How do you like it?"*

not only telephone sets are involved, but also switchboard facilities and related installations. The new design also made allowance for special types of telephones—hard-of-hearing sets, four- and six-button sets, and two-line single-button sets, to permit interoffice communication and extended service. Some of these functions can be incorporated into the standard housing design, but special variations will require modifications.

In recognition of the increasing use of color in the decorative schemes of homes and offices, the 500 Set has been made available in a range of colors, although the familiar black will long be with us.

THE NEW TELEPHONE is already in many homes and offices, and the Bell people and our staff are very proud of it. It represents eight years of heartening and rewarding cooperation between Bell administrative, engineering, research, and sales personnel

and our office. It is a tangible monument to integration. The lesson we all learned in contributing to a new and better telephone instrument was that not all parts of an old design need be changed for the sake of change, that some parts have proved themselves through years of use but that better devices, techniques, and materials may justify a change. One of these is the bell, which has a four-position volume-control wheel under the base plate, permitting users to select the bell volume they prefer.

It is inescapable that a sense of urgency be attached to a ringing telephone. It may be merely someone calling to accept an invitation to a birthday party, but it may also be an emergency that could affect lives. Perhaps it is wise to consider a telephone call in its proper perspective. It is relatively meaningless when a sixth-grade student calls a chum, and they do their homework jointly over the phone. But it may affect the future of the world when a president calls a prime minister.