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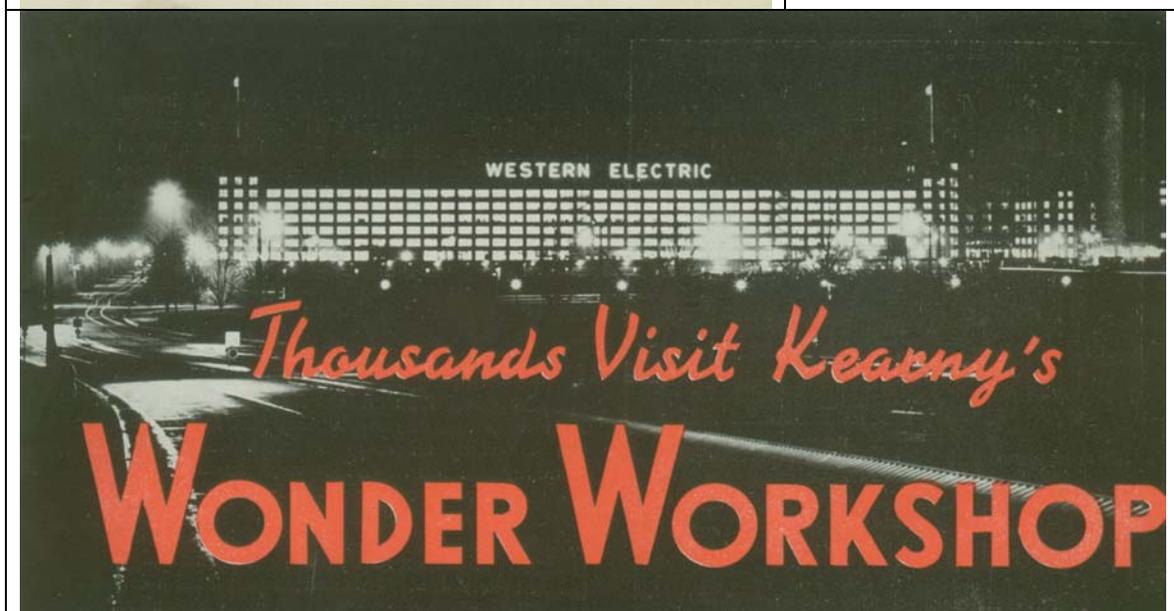
## **Telephone Review**

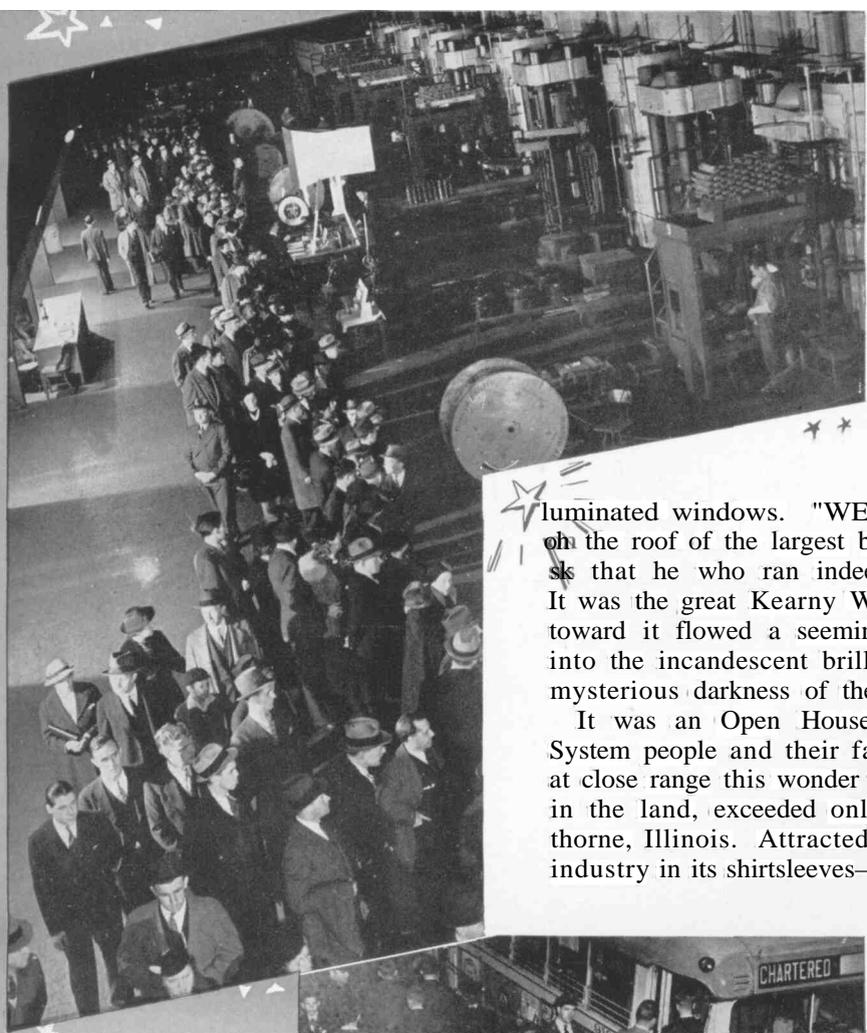
*employee magazine  
of Bell Telephone*

← at left: front cover

On the following pages, you'll  
find an article about the Western  
Electric plant in Kearny, N.J.

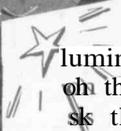
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And see at First Hand How

## Telephone Apparatus and Equipment Are Made



ONE could see it from far away across the Jersey meadows—a patch of light against the blackness, like some great liner passing in the distance. Closer, it resolved itself into a group of immense buildings whose outlines were determined by masses of brilliantly illuminated windows. "WESTERN ELECTRIC"—said the great sign on the roof of the largest building—in words of unmistakable emphasis that he who ran indeed might read, and from a long distance. It was the great Kearny Works of the Western Electric Company and toward it flowed a seemingly endless stream of motor cars, coming into the incandescent brilliance of the factory lights from out of the mysterious darkness of the meadows.

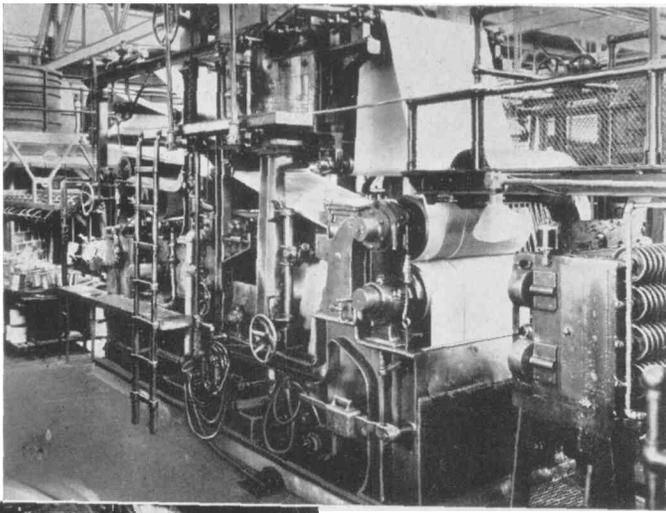
It was an Open House night, one of the ten upon which Bell System people and their families and friends had been invited to see at close range this wonder workshop of telephony—the second greatest in the land, exceeded only by "Western's" vast main plant at Hawthorne, Illinois. Attracted by the opportunity of seeing, at first hand, industry in its shirtsleeves—of seeing with their own eyes how much of the familiar apparatus and supplies used in the telephone business were made—

more than 55,000 persons filed through this remarkable establishment during the two weeks of the Open House.

As swiftly as they arrived, the fortunate visitors to this marvelous center of modern manufacturing were transported by a never-ending succession of buses from the parking area to the point

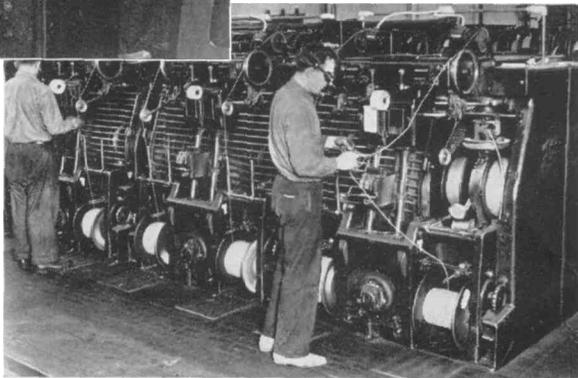
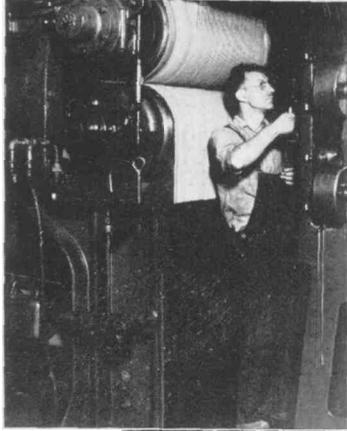


(Above) Some of the 55,000 spectators that viewed the lead presses in operation. (Right) Chartered buses were used to carry the throngs from parking area to the start of the tour and back again.



*With pulp insulating machines, paper is made directly on the wire it insulates. Sixty bare copper wires are passed through tanks of diluted wood pulp and a sheath is formed around them.*

*Emerging from the pulp bath the wires proceed to the polishers and subsequently to the drying oven. Throughout the entire process every foot of wire is under constant electrical test.*

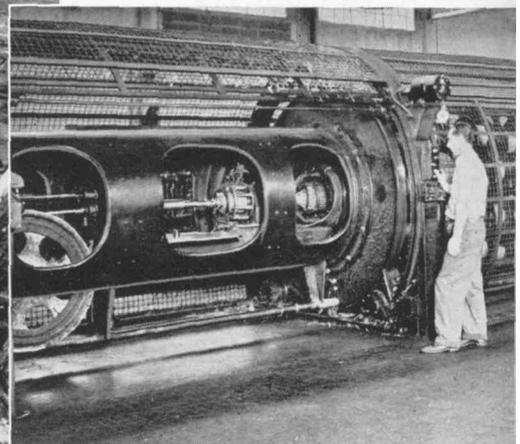


*The insulated wires are twisted into pairs to form telephone circuits.*

some distance away, where the tour of inspection opened. Once within the magic portals of the factory, the visitors entered upon a world of marvels that kept them fascinated from beginning to end. Starting, thanks to the far-sightedness of those who planned the tour—with the familiar finished cable on the reel, the visitors walked along a mile and a half of aisles, absorbed in the diverse techniques and manipulations of Kearny craftsmen, working on a special afternoon and evening shift that this demonstration might be possible. From first to last the tour itself was a splendid example of efficient organization—everything had been anticipated and planned for, even to frequent "rest areas" along the route where the foot-weary might pause for a while before resuming the tour. Guides were unnecessary as the route was so clearly marked that all one had to do was follow the "blazed trail." There were, of course, persons on duty all along the route who gladly explained, on request, any details that might perplex the visitor. This scheme permitted a constant flow of people to pass through the plant, pausing as long as they wished wherever they wished, or going ahead more rapidly as the spirit moved them.

To cover the entire plant would have necessitated a walk of fifteen miles, consequently the route was mapped out through representative manufacturing departments that included a majority of the machines commonly used and many of the most interesting operations. Here and there, at strategic points along the "line of march" were interesting displays, many of them animated, depicting interesting phases of the manufacturing job. Here and there, too, were demonstrations in which the spectators could take actual part, which gave in the most positive way a clear impression of the points at issue. These were eagerly patronized by large groups of visitors.

Beginning with the cable making operation, the spectators saw paper insulation twisted around cop-



*Twisted pairs of wire are combined in a stranding machine to form a cable.*

*Western Electric's Kearny Works, seen here from the air, are situated north of the junction of the Passaic and Hackensack Rivers.*

*"Open House" visitors watch, with interest, the assembling of key equipment.*

per wires with eye-baffling speed. They saw the marvelous new pulp insulating machine—a giant in size—that makes the paper with which it simultaneously insulates copper wires. Here they watched, enthralled, while sixty parallel copper wires, like the strings of a harp, passed through a bath of wood pulp in this monster device, and paper was manufactured literally on them in one operation. This revolution of design and method grew out of an engineer's having one day mixed a solution of wood pulp in a bottle, stirred it with a wire, and found that the pulp stuck to that wire—the birth of another great idea, later brought to practicability by the efforts of Western Electric engineers and scientists, and making possible the carrying of still more wires within the small diameter of a telephone cable sheath.

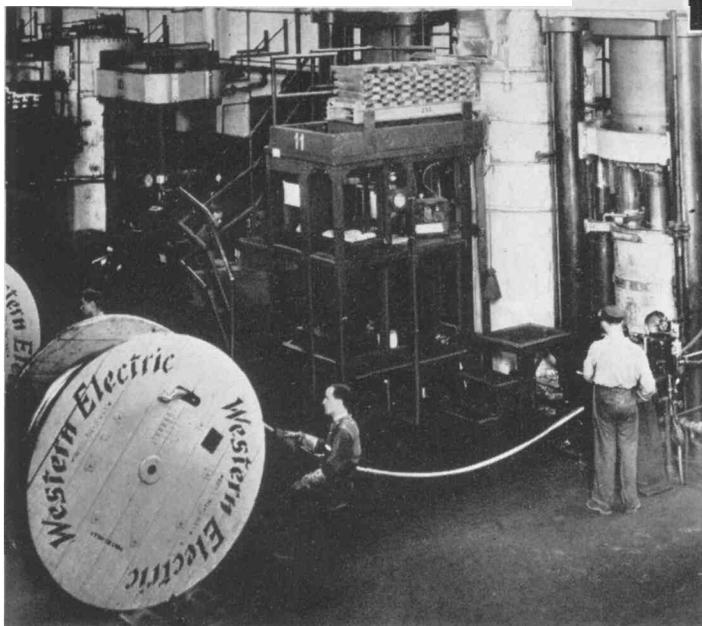
The visitors saw wires twisted into pairs and then stranded into cable cores. Defying description is one's feeling of human insignificance as he stands beside the looming bulk of the stranding machines—whirring monsters of iron and steel. With the drone of metal at work, they whirl, as though angry at being confined within their circumscribing cages. Like giant jugglers made of iron, they toss their many spools of wire in seemingly eccentric gyrations, one about the other in rotary motion, until from the end of the machines, emerge the intricately woven cores of telephone cable.

They saw these cores, in the lofty reaches of the cable shop, passed through drying ovens to remove any moisture and threaded into the giant lead presses, whence they emerged for all the world like *(Continued on page 38)*



*Standardization of switchboard design permits production of quality equipment by conveyORIZED methods.*

*Culminating the many tests given the cable, the final test for continuity is made. Then the end of the cable is sealed.*



*Coils are indispensable in the transmission, control, and protection of telephone currents. These Kearny girls are zyzinding them on machines.*

*From vacuum drying ovens, where, under high vacuum and temperature, about five gallons of water are removed from an average cable, the core is fed to the lead press where the sheath is applied under pressure of 2,500 tons.*

## Thousands Visit Kearny

(Continued from page 9)

endless streams of toothpaste squeezed from some gigantic tube, as finished cable, the core for all time concealed in its protective metal sheath. They looked aloft as the giant crane groaned up and down the great hall picking up quantities of lead bars, transporting them to the lead presses where it dropped them ready to be fed to the always-hungry, melting furnaces. They marvelled, these visitors, at the great pile of lead that towered over them to show in graphic manner, just one day's food for the ravenous appetites of these lead-eating monsters.

They saw young women operatives, with lightning dexterity, test with the tip of an electric device each individual wire of a cable, marking such few imperfect conductors as might be found. It was their first glimpse of a principle which was to leave upon the minds of most of them perhaps the most permanent impression of their evening in this manufacturing wonderland—the relentless quest for perfection. There was testing, everywhere. Tests for accuracy, tests for perfection. Leave nothing to conjecture, nothing to luck, but test, test, test! Of such attention to details, to skill, to perfection is born the kind of telephone service that America enjoys today.

The making of switchboards was another highlight. Here the visitors came upon those manual operations that play so important a part in the manufacture of telephone apparatus—the painstaking, skillful hand-work that can never be matched by machines. They stood with evident interest looking over the shoulders of skilled wiremen who deftly formed intricate mazes of switchboard cable; as the nimble-fingered girl operatives assembled relays, those essential, electrically-operated switches by means of which circuits are opened and closed. Over 6,500 different designs of these relays are made in Kearny Works, vary-

*This Kearny girl is working on a relay, most important piece of apparatus in a telephone circuit. Essentially it is an electrically operated switch by means of which a circuit may be opened or closed.*

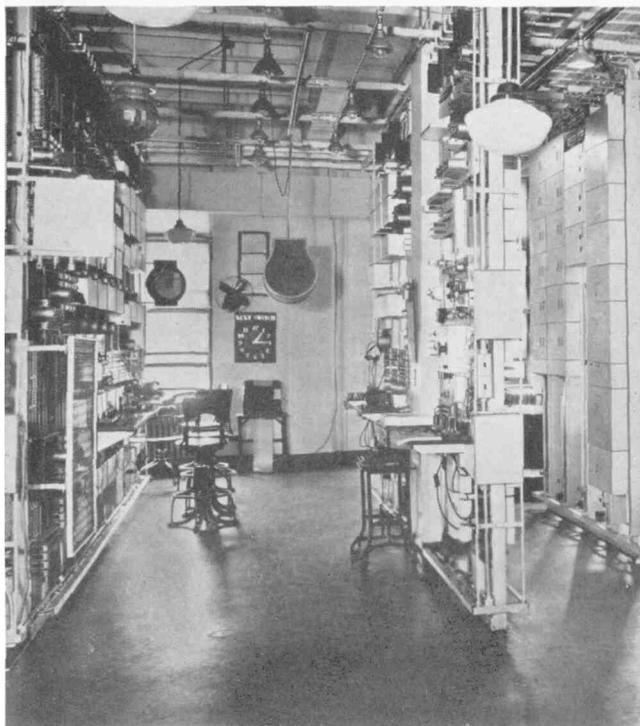


*Forming cable for installation in switchboards is one of the most fascinating Kearny operations.*

*Under the hand of this skilled wireman, a seemingly confused jungle of wires will soon become a neatly ordered set of arteries, channeling the flow of communications through the switchboard.*



*Electrical equipment of extreme accuracy is used to calibrate the quartz plates, so essential in carrier current telephony.*



*Carrier current telephone equipment, manufactured at Kearny, allows as many as 16 different conversations to be carried simultaneously over a single telephone line.*



*Soldering cable to the terminals of the keys. Switchboards of the largest type have more than 2,000,000 tiny soldered parts.*



*Quartz crystals from Brazil are carefully selected for use in telephone filters and radio oscillators.*



*Kearny's cable yard, in which exchange area cable is stored against future orders. The normal stock is about 2,000 cable reels, ranging in weight from 1,600 to 6,500 pounds.*

ing as to character of windings, contact arrangement and combination of springs. The visitors saw coils, transformers, jacks, keys, condensers, vacuum tubes and parts used in long distance, local ship-to-shore marine, and transoceanic telephony. They examined sectional models of the marvelous coaxial cable whose two circuits can carry simultaneously 480 telephone conversations or 5,760 telegraph messages and is capable of transmitting images in motion—the future wire pathway for television. They studied graphic representations of carrier current telephony whereby four telephone conversations, one telegraph message and one teletype message may be sent simultaneously over one pair of wires, and tried out with amusement, the experimental carrier circuit set up across the room, just to see for themselves that it really can be done.

Further along they saw public address systems, commercial broadcasting systems, aviation and police radio systems, audiometers, audiphones, and special displays showing the work done at the other plants of the Western Electric Company and its associated organizations.

At the journey's end, having seen how the WeKearnyeans (as the workers at the plant style themselves) work, the visitors were treated to a fascinating hobby show which indicated how WeKearnyeans play, by displaying some of the products of their leisure hours.

Tired but happy the visitors boarded the waiting buses that whisked them back across the grounds to their starting point. "Well-worth while" was the unanimous verdict as the telephone men and women, back in their own cars once more, set out for home with the friendly glow of the lighted factory speeding them on their way. They went home, these telephone folks and their friends, with a new insight into the size and resourcefulness, the ingenuity and the skill of the great communication system of which Western Electric is so vital a part.



*The stream of humanity closely paralleled the flow of the assembly line. These workers are assembling key cabinets.*