

Anatomy of a Spring Cord

Tiny, uniquely made wires called "served conductors" help form the link between your telephone and 168 million others, all over the world. The wires are used in your telephone's coiled "spring cord"-because they have no spring at all.

The spring in a spring cord comes entirely from the cord's outer plastic jacket, which is heat treated to set it into a permanent, resilient coil. Everything inside the outer jacket is designed to be as flexible as possible-so it won't fight against the spring set in the plastic, and won't tend to break from constant flexing.

The served conductor is the heart of a tough, extremely flexible voiceway through the spring cord. It gets its name from its construction. To make it, four tiny, flat bronze ribbons must be spirally wound on a slender nylon thread - this process of winding is called "serving." Bronze is used instead of copper because bronze is the stronger and more flexible metal. This year, Western Electric's plant at Buffalo, N. Y., which makes all the standard-length spring cords that are assembled into new Bell System telephones made at WE's Indianapolis plants, will put many tons of bronze into served conductor. The company's plant in Baltimore makes cords of the same design for replacement in reconditioned telephones at WE Distribution Centers.

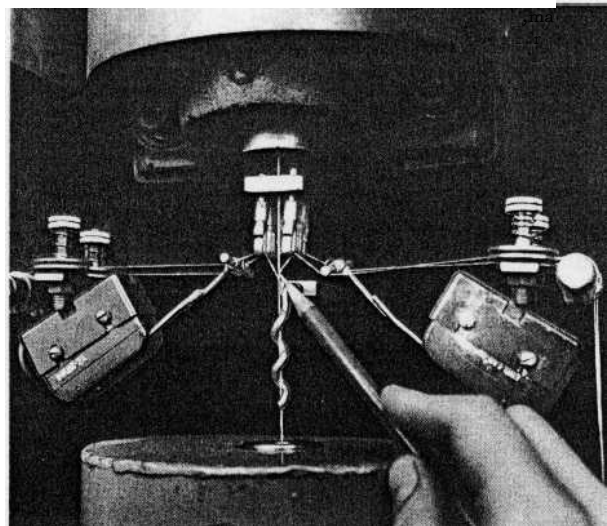
In the manufacturing process at both plants, thick bronze rod is drawn by machine into 37-gauge wire (diameter : 0.00445 inch), then flattened into tiny bronze ribbons, called tinsel, less than 0.020 inch wide and less than 0.001 inch thick. Just one foot of the bronze rod makes more than half a mile of tinsel.

When four pieces of tinsel are wrapped in overlapping fashion on nylon thread, the result is a tough and extremely flexible electrical conductor.

Once the served conductor has been prepared, it's encased in a knit nylon web and coated

with soft plastic insulation, which is color-coded for manufacturing and installation purposes. The coated wires are lubricated with silicon and mica dust to prevent them from sticking together during manufacture.

Four or more of the insulated conductors are then wrapped in paper and covered with a final,



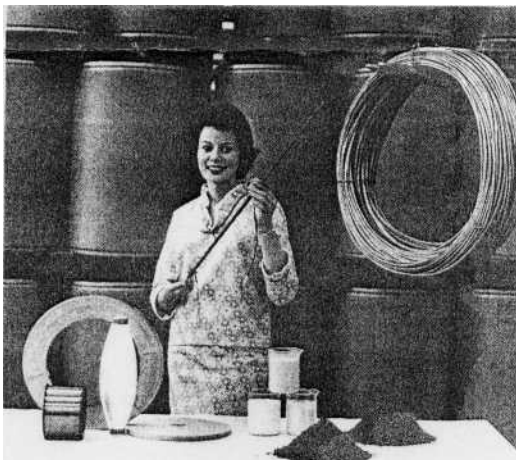
PRECISION - This machine at WE's Buffalo plant automatically winds or "serves" four tiny bronze tapes around nylon thread, forming the extremely flexible core of a telephone's coiled spring cord. E-213

outer plastic jacket. The cords are cut to length and fitted with solderless tips, grommets and bands which connect them physically and electrically to the telephone instrument.

Finally, the cords are tightly wound on a steel rod and baked for 8 minutes in an oven at 268 degrees Fahrenheit to permanently set their coiled shape. Additional spring comes when the coils are re-wound in the opposite direction, causing internal stresses in the plastic jacket which result in a uniform, long lasting spring action.



INSIDE STORY- WE's Carole Davison compares familiar telephone spring cord with an X-ray study of it. The X-ray shows the delicate winding of flexible bronze tinsel that runs beneath the plastic coating. E-212



TELEPHONE CORD RECIPE - Jean Doricko displays the many ingredients that WE's Buffalo plant uses to make 3.5 million coiled telephone cords a year. It takes many tons of bronze shown in rod form on the right and in the spool on the extreme left, intertwined with thousands of pounds of nylon, as in the white spindle, for added strength, and coated with hundreds of barrels of plastic chips like those piled on the table and with silicon and mica dust, shown in the beakers. This mixture is then coated with tons of the paper, lying flat on the table, and recoated with plastic. Finally, several carloads of brass, such as in the circular roll on the left, are used for tinplated tips and millions of plastic grommets are added. Each hatch is baked for eight minutes in a moderate oven and served to telephone users across the country. Jean holds a coiled cord ready for the oven. E-214c