

# Recovery and Repair of Telephone Apparatus

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Every working day of the year, a large amount of apparatus is removed from the Bell System telephone plant for a variety of reasons. Much of this apparatus is repaired and re-installed. It is the responsibility of the Repair Groups of the Laboratories to recommend the requirements for the repair of this apparatus before it is again placed in service.

Actually the term "repair" does not adequately describe the objectives desired and the work done. The word "repair" seems to imply the restoration to normal of apparatus that has failed or become damaged in service. Some apparatus is, of course, removed on this account, but the bulk is removed for other reasons; in the case of station apparatus, the discontinuance of service or change of residence; or, for central office apparatus, equipment rearrangement or change from manual to dial operation. Like a new car, a telephone set becomes a "used" set, and a possible candidate for the repair routine if, for any reason, it is taken out of service after any use, however brief. In the returned apparatus, all vintages of manufacture and all degrees of the effects of service are found. The condition of the apparatus, however, is usually such that a large percentage can be made suitable for further service with a reasonable repair or conversion expense.

Reconditioning of the apparatus is done most often by the Western Electric Distributing House Repair Shops, although some of the apparatus may be repaired by the Telephone Companies in their own storerooms. Whether the repair should be made in the Distributing House Shop or at the point of use is primarily a question of economics.

As a part of their Telephone Division, Western Electric has twenty-nine Distributing Houses, each comprising a warehouse and repair shop, situated at strategic locations throughout the country, employing a large organization that deals with many items. At least one of these distributing houses is in the area of each Bell Telephone Company. Its function is to serve the needs of the Telephone Company in whose area it operates, by maintaining stocks of new and used apparatus and equipment, by handling the Telephone Company's orders for such material, and by receiving and repairing or disposing of used apparatus returned to it by the Telephone Company.

Besides repairing apparatus returned by the Telephone Companies, the repair shops also do other special jobs ordered by the Companies, such as assembling and wiring special switchboards. Although the personnel and management of these shops report to the Distributing House Manager, there is a central organization in New York under the Engineer of Shops which not only supplies the needed technical information, but outlines work and inspection methods and makes recommendations with regard to all shop equipment.

Apparatus received for repair by the Distributing House is first examined and classified. Repairable apparatus that can be used by the Telephone Company is known as the Company's Class "C" stock. The objective of Class "C" repairs is to secure the full measure of satisfactory service life expected when the apparatus was purchased, and the repair requirements must be consistent with both those for new apparatus and for field maintenance.

From time to time the occasion arises



Fig. 1—Portion of a distributing house repair shop—assembly line for hand telephone and telephone set repairs.

for a widespread conversion of old style apparatus — to introduce an improvement or to keep abreast of the changing times. These changes, while sometimes made in the field, are usually made in the Distributing House Repair Shops and such apparatus returned to the Distributing House also is identified as Class "C". When the change to ten cents for local calls from a pay station was made in 1951 in New York City, for example, many of the modifications in the coin collectors were made right at the customers' premises, although a great number were made in Western Electric's New York and Brooklyn Distributing House Repair Shops.

Another class is composed of apparatus for which there is no demand on the part of the Company removing it. If a demand exists for it in some other area of the Bell System, or from a non-associated telephone company, it is purchased by the Western Electric Company, and either resold to another Bell Company "as is" for reuse, or returned to the Manufacturing Department to be repaired, and offered for resale. If the apparatus is returned to the factory for

repair, it becomes known as Class "AH" material after repair. Apparatus that is not repairable, or for which no demand exists, is junked and the junk value less a charge for handling, is credited to the Telephone Company.

Formulation of requirements for Class "AH" (factory resale apparatus) differs in several respects from Class "C". Class "AH" apparatus has been disposed of by an Associated Company before completion of its useful life; when repaired and resold, it must give as good performance in service as equivalent new apparatus. It is sold with, or in lieu of, new apparatus, at a price of 75 to 85 per cent of that for corresponding new apparatus. Although Class "C" apparatus requirements may be less stringent than the requirements for new apparatus, Class "AH" may differ from new only in appearance, residual life, or in other ways that will not affect maintenance or service.

Some apparatus is in sufficiently good condition to be repaired by the Telephone Companies in their own storerooms. This class of reconditioning is performed under a "Recovery" specification which applies

only to completely equipped station apparatus. Although some reconditioning is done by the Telephone Companies, most of the recovery and repair work is done by the Distributing House Shops.

Requirements that apply to recovered and repaired apparatus are prepared by the Laboratories. These include repair expedients that may be employed which would result in the apparatus differing from the accepted construction for new apparatus, modifications considered desirable to bring the old apparatus into agreement with more recently manufactured devices, and the operating values that the repaired apparatus should be capable of meeting. Although operating requirements may not be so severe as the corresponding ones for new apparatus, they must not be less severe than the rejection values used for field maintenance.

Requirement specifications for Class "C" repair are distributed both to the Western Electric Company, and, through the A T and T, to the Telephone Companies, so that both Western Electric and the Telephone Companies will have a statement as to the requirements that the repaired apparatus may be expected to meet. The intent is, of course, that each Telephone Company shall adopt, for use in its relations with the local Distributing House, the System's recommended requirements. If these

were not available, each Telephone Company would have to prepare its own instructions to the local Distributing House. This is done to some extent now, but the necessity for it is greatly minimized by the existence of the standard practices giving System recommendations. These requirements are not mandatory, and may be deviated from if the local companies do not concur, but they summarize the experiences of many organizations and areas of the System so that, as may be expected, they are very generally followed except when peculiar local conditions necessitate departure.

Recovery and repair necessitates consideration of many financial, technical, and administrative aspects of the Bell System's business. The large amount of apparatus removed and its very great value makes this Laboratories activity of considerable importance; first, as an effort toward achieving the System's aim of economical service of high quality and second, as a source of information and experience to be used as an aid in deciding upon features to be included in future new designs.

The value of the apparatus and equipment reclaimed is relatively large. Reused apparatus constitutes about 10 per cent of the material used in the Bell System for plant additions and maintenance.



**THE AUTHOR:** A. B. REYNOLDS has been in charge of the repaired station apparatus group since 1942. After he was graduated in 1919 from Massachusetts Institute of Technology, he worked for General Electric Company for about a year and a half. In 1921 Mr. Reynolds came to Bell Laboratories, spending several years preparing manufacturing specifications for telephone apparatus and instruction bulletins for care and operation of such apparatus. He went into design work in 1925, particularly the design of telephone apparatus, such as rheostats, panels, and mounting plates. Since 1928 he has been a member of the repaired apparatus and specifications engineering groups, where requirements for the recovery and repair of telephone apparatus as well as for station maintenance are developed.