

Power-line crossings : methods found most suitable for avoidance of physical contact between power and telegraph and telephone wires, with resulting damage to the latter :

Methods adopted for jointing line-wires, and for ensuring non-deterioration of electrical conductivity in the same :

Methods used for the provision of field testing-points in isolated sections of line :

Class of wire used for lines of varying distances, and experience in connection with the maintenance and life of same :

Insulators : manufacture of same, and methods used in determining relative efficiency and durability :

Installation practice *re* subscribers' telephones, and maintenance of same :

Conditions surrounding erection and regulation of private lines :

Materials used and general practice in connection with the installation of overhead and underground telephone-cable :

Types of cables used in subways and in situations exposed to abnormal risks of power contact, inductive interference, &c. :

Cable-repair methods and desiccation methods :

Practices found most useful in location of faults in overhead, underground, and submarine cables, and the latest testing procedure for the detection of incipient troubles :

Relative merits of different systems of cable-distribution :

Testing and jointing of telephone-cables, and field testing-apparatus generally :

Cable-entrances to telephone exchanges :

Methods adopted for preventing electrolysis in lead-sheathed telephone-cables :

Use of improved devices for the suspension of overhead aerial lead-covered cable :

Loading of cables, and relation to subsequent employment of telephone repeaters and carrier-current methods :

Types of submarine telephone-cables most useful for New Zealand situations such as estuaries, river-crossings, &c. :

Latest practices in connection with the telephone wiring of buildings and groups of buildings :

Different types of ducts for use in connection with underground cables, and relative merits and demerits of same :

Organization of field-work :

Systems devised for checking of engineering output in connection with field-works :

Systems for checking faults in telephone systems and furnishing comparative analyses of same :

Methods adopted by large administrations for recording and planning overhead and underground circuits for reference :

Transport of linemen and materials.

In all the above-mentioned subjects I was given the utmost assistance and information, both oral and printed, by manufacturers, telegraph and telephone administrations and corporations, and in many cases was accompanied on visits of inspection to typical plants illustrating the various features under discussion.

PROTECTION OF TELEGRAPH AND TELEPHONE PLANT FROM ELECTRIC POWER AND LIGHTNING.

A subject of continual concern to telegraph and telephone Engineers is that of the degree of protection which should be provided against damage to plant and equipment caused by the effects of lightning or electrical-power circuits, precautions against which must be taken in the design of telegraph and telephone plant and in its subsequent maintenance. The practice in this respect was known to vary greatly in different parts of the world. I was not surprised to find that it had not yet become standardized, and that differences of opinion were held by telephone Engineers upon various matters connected therewith. In this respect the personal investigations made by me will be of great value, and will enable us to attack the problems arising under this heading with a full knowledge of the motives underlying the varying procedure of different countries.

Protection units are provided in telephone exchanges, in subscribers' premises, and at certain points in the outside plant, notably where open aerial wires junction with overhead or underground cables.

My discussions elicited that New Zealand is regarded by some authorities as overprotected, but it was generally agreed that such a condition is preferable to underprotection, particularly in a country so remotely situated as New Zealand from the world's telephone factories and supplies. Full data were collected as to the practice in England and America. In certain matters such as protection there is a danger of effecting economies at the risk of interruption of service, and danger to life and property. It has to be remembered that in many parts of New Zealand lightning disturbances are experienced in a more or less violent form, and that over practically the whole of this country electric light and power circuits are run both overhead and underground, with corresponding danger of contact and injury to plant, equipment, and person. The view has generally been held by New Zealand Telegraph Engineers that these considerations should weigh even more heavily with a Government Department than possibly with a private company, and that in a country so remote from supplies no unnecessary risks should be taken which would tend to reduce the reliability of the telephone service to the community. The cost of protection is, after all, but a small percentage of the total cost of plant and equipment. We have already experienced the partial annihilation of telephone