CHAPTER-VIII
SUMMARY AND CONCLUSIONS

8.1 SUMMARY

The thesis is essentially a technical and economic study undertaken with a view to introducing PCM systems in the junction network in Calcutta. As it was for the first time that such a project was undertaken here, the hurdles faced were many. For arriving at reliable conclusions an elaborate study of the traffic switching matrix and the traffic hierarchy followed in our telecom system was made. The capacity as well as the capability for digitalisation of the different types of cables in use in Calcutta was closely examined. The specific aspects that have been critically studied include:

(i) Different transmission plans.
(ii) Existing cable runs in the junction network.
(iii) Availability of duct routes.
(iv) Availability of different types of cables.
(v) Engineering cable PCM routes.
(vi) Engineering digital microwave routes.
(vii) Impact of damages to underground cables on the revenue-earning capacity of the network.
(viii) Availability and cost of high grade media like cable-PCM systems, digital-microwave systems etc.
(ix) Incremental cost for various types of alternatives.
(x) Capability of our telephone network for data communication.
For the purpose of measurement of cable characteristics and for measurements in the installed systems, sophisticated measuring instruments were procured from abroad. The photographs of some of these measuring instruments, together with those of a few digital transmission systems installed by the author, are shown at the end of this thesis (Photo No. 1 to 9).

8.2 CONCLUSIONS

This study may be considered successful because it helped our administration to a considerable extent in undertaking an extensive programme of digitalisation. The financial benefits to be expected through the introduction of PCM systems, as shown by this study, have been encouraging.

A realistic projection of the junction traffic requirements is done for this study over a time span of next 6 to 7 years. This is shown in the Annexure. For arriving at this projection existing pattern of traffic organisation was taken into consideration and was allocated to various new, existing and proposed exchanges. 20% PCM fill which is arrived at in this study would be a good figure for total digitalisation of the entire junction network in the existing cable. However administration would always like to lay new cables in the city area because of the obvious reason that old cables are prone to frequent outages, and also because our administration is constructing cable ducts on a big scale. However, from the planning point of view it is a good relief to note that from the economic side total digitalisation of junction network is possible in the existing set up without further investment on laying new junction cables.

As a general rule, it is our finding that for a span length less than 10 Km new cable laying is more economical than any other systems for meeting the demand for new junctions; beyond 10 Km but within 20 Km PCM on existing cables is found to be the best solution, and for junction links of more than
20 Km span digital microwave systems are the best choice. But in reality many routes less than 10 Km in span length are selected for PGM working for providing junctions of high transmission standard. Similarly many junction routes less than 20 Km in length but prone to large scale breakdowns have been converted into digital radio links. Revenue and quality of service on account of these changes in junction routes has been found to be much higher compared to what they were before these new systems were added to our junction network.

PGM systems were installed in a very large number of junction routes by the author with almost 100% success of the rules developed. Hence it may be concluded that so far as PGM engineering of our junction network is concerned, this study is exhaustive and reliable. But it is restricted to exploring the capability of our telephone network for data communication upto 2400 bit/s on point to point leased lines. A suggested field for further study in our network is to test the capability of the public switch telephone network for data transmission.

With computers playing an ever-increasing role in the welfare of the nation, data communication will become more wide-spread in the coming years. Present growth rate is of the order of 39% per annum and it is expected to grow at a higher rate in future. With the introduction of PGM systems and its capacity to transmit 64 kbit/s data in each channel, wide-spread study is necessary for digital data network of higher data transmission speed and lower error rate; it should also be economical at the same time.
1. PCM system analyser with Multiplex tester and Pattern generator.
2. Fault Locator, Repeater checker.
4. PCM-30 system under installation.
5. PCM-30 system under working condition.
6. 2nd & 3rd order digital Multiplexer.
7. 13 GHz radio system under installation.
8. 13 GHz radio system with dehydrator unit for wave-guide.
9. Array of Digital Microwave Antennas from the nodal point in the core of the Calcutta city.