CHAPTER-1
INTRODUCTION

1.1. DEVELOPMENTS IN INTERLOCKING

When railways were introduced on a large scale in the second half of the nineteenth century, the signalling and interlocking functions were carried out through purely mechanical means. The interlocking function involves prevention of signals of the conflicting routes from displaying permissible aspects and is therefore 'vital' in the prevention of accidents. As the railway yards grew bigger and bigger and the number of routes increased, the mechanical interlocking proved cumbersome to install, specially when the yard required changes. At the same time, due to the invention of 'relays' the interlocking function gradually began to envelop relays. Many refinements and improvements were made in the field of relays to increase the levels of safety and performance, with the result the relay interlocking is considered to be absolutely 'safe' by signal engineers all over the world. The existing relay interlocking is also considered to be 'fail-safe' as any break in the circuit, cut in power supply or insufficient current will bring the relays to a 'safe' state preventing a 'permissible' aspect i.e. 'yellow' or 'green' being transmitted.
Now, we have entered into a new generation when the solid state devices like microprocessors are cheaply available and the cost of relays is increasing day by day. The main advantages of using microprocessor instead of relays are claimed to be

- Reduction in capital investment and recurring maintenance costs,
- Flexibility in coping up with yard alterations since only software modifications could be done without affecting hardware.

Taking these into consideration, many foreign railways have tried out experimental installations using microprocessors and some of the railways are installing them on regular traffic routes.

1.2. OUTLINE OF THESIS

A microcomputer was used to simulate the interlocking logic of a small passenger yard based on relay logic. Then a table model to control the signalling at a station of model circular railway was designed. A microprocessor-controlled model with 8085 up was fabricated as a Phase I project with simple interlocking, with approach locking and back locking omitted. The Phase II of the project with approach locking and back-locking was completed later.

This thesis deals with the various studies undertaken into the application of microprocessors to control of
railway signalling. A microcomputer simulation of the control of a small passenger yard is detailed. Software redundancy utilising redundant inputs is suggested to reduce accident probability. A hardware-cum-software system-error checking method is also suggested to improve the reliability as well as accident probability. A combination of this method with other established real time diagnostic methods is suggested for actual implementation.