CHAPTER 1

1.0 INTRODUCTION

1.1 Background information

The direct-drive vibration machine consists of a rotating eccentric or cam driving a positive linkage connection which forces a displacement between the base and table of the machine. Except for the bearing clearances and strain in the load-carrying members, the machine tends to develop a displacement between the base and the table which is independent of the forces exerted by the load against the table. If the base is held in a fixed position, the table tends to generate a vibratory displacement of constant amplitude, independent of the operating RPM. Figure 1.1 shows the direct-drive mechanical machine in its simplest forms. This type of machine is sometimes referred to as a brute force machine since it will develop any force necessary to produce the table motion corresponding to the crank or cam offset, short of breaking the load-carrying members or stalling the driving shaft.
The simplest direct-drive mechanical vibration machine is driven by a constant-speed motor in conjunction with a belt-driven speed changer and a frequency-indicating tachometer. Table displacement is set during shutoff and is assumed to hold during operation. An auxiliary motor driving a cam may be included to provide frequency cycling between adjustable limits. More elaborate systems employ a direct-coupled variable-speed motor with electronic speed control, as well as amplitude adjustment from a control station. Machines have been developed which provide rectilinear, circular, and three-dimensional table movements the latter giving complete, independent adjustment of magnitude and phase in the three directions. Many types of mechanisms are used to adjust the displacement amplitude and frequency of the mounting table. For example, the displacement amplitude can be adjusted by means of eccentric cams and cylinders.
1.2 Problem Statement

To design and build a direct drive shaker that meets a requirement for vibration test machine in lab used, fabrication of direct drive shaker will be done in this project by using Scotch yoke mechanism which is a mechanism for converting the linear motion of a slider into rotational motion or vice-versa and DC motor will be used as a shaker motor. This machine is inexpensive, easy to operate and build in a small-scale size.

1.3 Objectives of the project

Basically these projects are listing three main objectives. The objectives are a guideline in order to complete this project. This project is conducted to achieve the following objectives:

i. To design a direct drive shaker by using Scotch Yoke mechanism.

ii. To fabricate a small-scale direct drive shaker as a vibration testing machine.