

DESIGN OF A CONTROLLABLE RESISTOR LOAD BANK

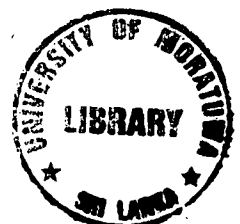
Master of Science Dissertation



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**Department of Electrical Engineering
University of Moratuwa, Sri Lanka**

April 2011



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DESIGN OF A CONTROLLABLE RESISTOR LOAD BANK

A dissertation submitted to the
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In partial fulfilment of the requirements for the
Degree of Master of Science



by
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P. H. K. H. PUHULWELLA

Supervised by: Dr. J. P. Karunadasa

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University of Moratuwa, Sri Lanka

April 2011

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Declaration

The work submitted in this dissertation is the result of my own investigation, except where otherwise stated.

It has not already been accepted for any degree, and is also not being concurrently submitted for any other degree.

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Dr. J. P. Karunadasa

Abbreviations

CDPLC	Colombo Dockyard Public Limited Company
UPS	Uninterrupted Power Supply
NC	New Construction Project / Normally Closed Contact
NO	Normally Open Contact
LR / IRS	Lloyds Register/ Indian Register of shipping
MSB	Main Switch Board



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Abstract

This research is focused on designing a controllable, dry type resistor load bank for load testing purpose and developing a model to simulate the load controlling techniques in modern load banks.

A literature review was carried out on the types of load banks and their applications. The operation and the drawbacks of the liquid type load bank, which is commonly used in industry, are discussed by studying the generator load testing procedure at Colombo Dockyard PLC (CDPLC). This addresses the practical difficulties, operational issues and limitations encountered in the generator load testing procedure.

A study has been done on the main components in a modern dry type load bank, including the selection method of power resistors and their special construction features. The variation of resistance values with the temperature is discussed in detail.

Different load controlling techniques available in modern load banks are discussed and a MATLAB Simulink Model is developed to simulate the automatic load controlling with the variation of temperature in a linearly switched load bank with PWM tailing.

A detail design proposal of a dry type load bank, from the capacity selection to design stage, including ratings, resistor composition, arrangement, resistor selection, cooling design, power circuit design, control safety and indication designs is given considering the requirement of generator load testing at CDPLC. A Bill of Material is given for the major components used in the implementation stage. An economic analysis on the proposed load bank was done in comparison with the present load testing procedure by conducting a case study with actual test data and major cost components obtained from a recently completed ship building project at CDPLC.

The advantages and the economical aspects of the design proposal were discussed presenting the limitations and further improvement opportunities.

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