



STIRLING COOLER AND CONTROLLER

By

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Abstract

With the exposure of harmful effects of chlorofluorocarbons (CFC) and hydrochlorofluorocarbons (HCFC) on the ozone layer and also more recently even the latest alternative hydrofluorocarbon (HFC) refrigerants have also been found to be formidable global warming agents and are now under scrutiny for potential banning, The immediate need for alternative refrigeration cycles erupted. Free Piston Stirling Cooler (FPSC) is one of the solutions to this problem.

A FPSC was developed along with the electrical driver system and the driver control circuit. The aim of this work is to develop an environment friendly, high efficiency, low weight cooling system suitable for the present day industrial/commercial requirements i.e. cool boxes, and also to develop it further to be utilized in advanced military applications. The working air volume and associated measurements were decided taking into consideration an operational cooler available in a thermal detection system. Further it was also intended to analyze the behaviour of cooler in different working gasses and under different pressures. Since the main objective of the project is the development of the cooler, a commercially available solenoid was used to drive the power piston and a timer was utilized to control the driver system.

Attestation

The work presented in this dissertation has not been submitted
for a fulfilment of any other degree.



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Dedication

To my former supervisor the late Dr. D.A.I.Munindradasa, who was a fine gentleman and a brilliant scholar, for all the guidance and encouragement.

To my Alma Maters St. Sylvester's College Kandy, Kothalawala Defence Academy Ratmalana, Naval and Maritime Academy Trincomalee, INS Valsura India and University of Moratuwa, my teachers, for the fine education I received.

To my mother and late father for providing me the education.

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This is really your achievement.



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List of Abbreviations

FPSC Free Piston Stirling Cooler

CFC Chlorofluorocarbon

HFC Hydrofluorocarbon

HCFC Hydrochlorofluorocarbon

EMF Electro Motive Force

COP Coefficient Of Performance



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