DESIGN AND DEVELOP AN INVERTER FOR SOLAR PV SYSTEM

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by

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Thank You.
Wassalam

DECLARATION SHEET

I hereby declare that my Final Year Project Thesis is the result of my research work under supervision of En. Tunku Muhammad Nizar Bin Tunku Mansur. All literature sources used for the writing of this thesis have been adequately referenced.

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APPROVAL AND DECLARATION SHEET

This project report titled Design And Develop An Inverter For Solar PV System was prepared and submitted by Mohd Alif Bin Ismail (Matrix Number: 071090426) and has been found satisfactory in terms of scope, quality and presentation as partial fulfillment of the requirement for the Bachelor of Engineering (Electrical System Engineering) in Universiti Malaysia Perlis (UniMAP).

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May 2011

MEREKABENTUK DAN MENGEMBANGKAN LITAR PENUKAR UNTUK SISTEM SOLAR

ABSTRAK

Projek ini adalah merekabentuk satu litar penukar yang akan menghasilkan gelombang persegi 230 V dengan keluaran kuasa 200 Watt dan akan digunakan dalam sistem suria fotovoltaik (PV). Secara konseptual, litar penukar adalah peranti elektrik yang akan menukarkan kuasa dalam bentuk arus terus (DC) kepada arus ulang alik (AC) di mana voltan dan frekuensi yang diperlukan oleh arus ulang alik ini boleh dihasilkan dengan menggunakan alat pengubah yang sesai, litar pensuisan dan litar kawalan. Bateri 12 V arus terus akan digunakan sebagai voltan masukan kepada litar penukar ini dan kemudian akan ditukarkan kepada keluaran gelombang persegi sebanyak 230 V arus ulang alik. Kaedah yang digunakan untuk menukarkan kuasa bateri arus terus kepada kuasa keluaran gelombang persegi arus ulang alik adalah dengan menggunakan teknik pensuisan dan kemudiannya akan melalui alat pengubah menjadi 230 V arus ulang alik. Panel solar akan digunakan untuk mengecas bateri agar litar penukar ini beroperasi secara berterusan.

DESIGN AND DEVELOP AN INVERTER FOR SOLAR PV SYSTEM

ABSTRACT

This project is to design an inverter circuit that will produce a 230 V_{AC} square wave with a power rating of 200 Watt and will be used in solar photovoltaic (PV) system. Conceptually, an inverter is an electrical device that convert direct current (DC) to alternating current (AC) where the resulting AC can be at any required voltage and frequency with the use of appropriate transformer, switching and control circuits. A 12 V_{DC} battery will be used as a voltage source of this project and then will be inverted to a 230 V_{AC} square wave output. The method in which the low voltage DC power is inverted to a desired output is complete by convert the low voltage DC power to AC power with an appropriate switching technique and then a transformer is used to step up the voltage to 230 V_{AC}. For a continuously operation of this inverter circuit, a solar panel will be used to recharge the battery.

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LIST OF SYMBOLS, ABBREVIATIONS OR NOMENCLATURE

THD	Total Harmonic Distortion
PWM	Pulse Width Modulation
RMS	Root Means Square
DC	Direct Current
AC	Alternating Current
ŋ	Efficiency
Φ	Magnetic Flux
V_S	Secondary Voltage
V_P	Primary Voltage
I_S	Secondary Current
I_P	Primary Current
N_S	Secondary Winding
N_P	Primary Winding
Z_S	Secondary Impedance
Z_p	Primary impedance
I	Current
I_L	Photogenerated current
I_D	Diode Current
V	Voltage
V_j	Voltage across both diode and resistor
R	esistance
R_S	Series resistance
R_{SH}	hunt Resistance
q	Elementary Charge
k	Boltzmann's constant
T	Temperature
EMF	Electromotive force