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FINAL REPORT OF DIPLOMA PROJECT

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DESIGN A PURE SINUSOIDAL
SINGLE PHASE INVERTER

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ABSTRACT

DC-to –ac converters are known as inverters. The function of an inverter is to change a dc input voltage to a symmetrical ac output voltage of desired magnitude and frequency. The output voltage could be fixed or variable at a fixed or variable frequency. A variable output voltage can be obtained by varying the gain in the inverter, which is normally accomplished by pulse-width-modulation (PWM) control within the inverter. The inverter gain may be defined as the ratio of the ac output voltage to dc input voltage.

In this thesis, in order to get the pure sinusoidal output we have to choose the most suitable pulse-width-modulation. This PWM will connect at the gate of the transistor (MOSFET) in the inverter circuit. Inverters use controlled turn-on and turn-off devices such as BJTs, MOSFETs, IGBTs, MCTs, SITs, GTOs or forced-commutated thyristors depending on application.

Inverters are widely used in industrial applications such as variable speed ac motor drives, induction heating, standby power supplies, and uninterruptible power supplies. The input may be a battery, fuel cell, solar cell, or other dc source.

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CHAPTER 1

INTRODUCTION

1.1 BACKGROUND

What is an inverter?

An inverter is static circuits (that is they have no moving parts) that changes DC voltage, nearly always from batteries, into standard household AC voltage so that it can be used by common tools and appliances. Essentially, it does the opposite of what a battery charger or “converter” does. DC is useable for some small appliances, lights, and pumps and is usually suitable for small home or cabin system, RV’s and boats. However, nearly all larger home systems should include an inverter. Although some DC appliances are available, with the exception lights there is not a wide selection and many are expensive and or poorly made compared to their AC cousins.

There is also a special line of inverters called a utility intertie or grid tie, which does not usually use batteries, the solar panels or wind generator feed directly into the inverter and the inverter output is tied to the grid power. The power produced is either sold back to the power company or (more commonly) offsets a portion of the power used. These inverters usually require a fairly high input voltage.

The output voltage of an inverter has a periodic waveform that is not sinusoidal but can be made to closely approximate this desired waveform. There are many types of inverters, and there are classified according to number of phases, use of power semiconductor devices, commutation principles, and output waveforms. Inverters are used in many industrial applications, including speed control of induction and synchronous motors, induction heating, aircraft power supplies, and uninterruptible power supplies (UPS) and high voltage DC transmission.

The Basic Inverter

The basic circuit for generating a single phase alternating voltage from a DC power supply is shown in figure below. The circuit is also known as a Half bridge inverter because it uses two semiconductor switches. Switches S1 and S2 connect the DC source to the load (and disconnect) alternately, thus producing an AC rectangular voltage waveform.