

PROJECT REPORT

ON

“Automatic Transfer Switch”

SUBMITTED IN PARTIAL FULFILLMENT OF THE REQUIREMENT

FOR

THE REWARD OF THE DEGREE

BACHELOR OF SCIENCE

IN

ELECTRICAL ENGINEERING

Session 2007- 2011

SUBMITTED BY

FAISAL KHURSHEED

071020-054

MUHMAD UMAIR DAR

071020-061

MUHAMMAD SABBAIN MALIK

071020-072

UNDER THE ESTEEMED GUIDANCE OF

Mr. SALEEM ATA

Associate Professor

Department of SST

Date

23rd January, 2012

بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ

In The Name of Allah the Most Beneficent and Merciful

ABSTRACT

An automatic Generator protection system is designed and developed. In this project all parameters of generator protection like over voltage, over current, over load, over temperature are controlled. . If any parameter will change from reference level the controller will observe and sent the instruction to the system keep it at reference level if possible otherwise trip the load and relax the generator. An electrical transfer switch that operates without the need for manual intervention. It is an electrical device that transfers the source of power being used from one power supply to another. Typically this transfer is between the local utility and emergency source of power and back. It maintains constant monitoring of voltage levels on the electrical circuit. It interfaces with a generator and building's electrical system. It monitors the utility power and signals the generator to start if as the utility power drops out entirely. Backup power is now fed to the main utility panel or an emergency panel via ATS.

Dedication

It is our privilege to express our deep gratitude and indebtedness to our **Management** of School of Science and Technology, UMT for their moral support.

We solemnly offer our sincere gratitude to our PROJECT ADVISOR “**SIR SALEEM ATA**” Department of Electrical Engineering, whose constant encouragement and cooperation has made this project successful. We thank **SIR JAWWAD NASAR CHATTHA**, for his valuable suggestions and cooperation in the completion of the project.

It is a great pleasure to complete our project in UMT under the guidance of **SIR JAMEEL AHMAD**, we highly grateful to them for their encouragement and open minded discussion during the project work. We express our heartfelt thanks to those who have directly or indirectly helped us in carrying out this project successful.

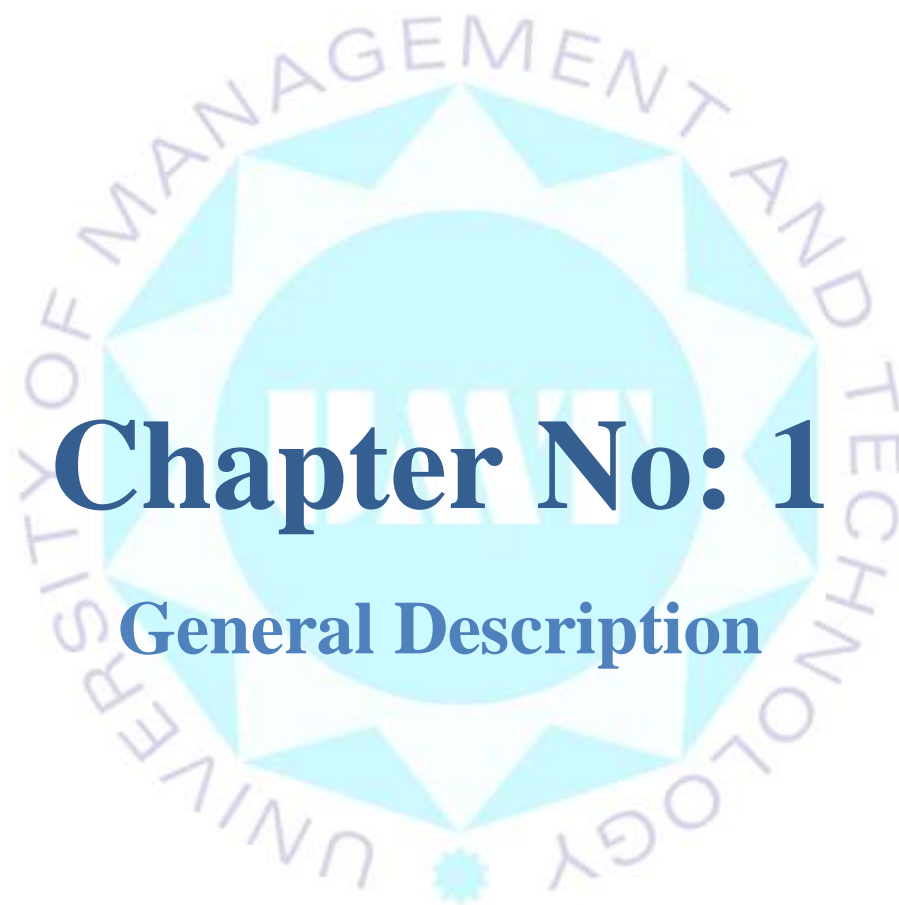
Last but not least we are thankful to our beloved PARENTS, who have stood behind us at all the stages of the project.

Contents

Chapter No: 1	1
General Description.....	1
Automatic Transfer Switch	2
1- General Description about ATS:.....	2
1.1 - DIAGRAM OF ATS WORKING	3
1.2 - What Is A Transfer Switch And How Does It Work?	4
1.3 - STANDARD CONTROL FEATURES:.....	5
1.4 - Equipment Description:	6
1.5 - Transfer Switches Are an Essential Part of All Back-up Generator Systems:	6
1.6 - Transfer Switches Can Be Manual, Automatic, or a Combination of Manual and Automatic.	7
1.7 - How an Automatic Generator and Transfer Switch System Works:	8
1.7.1 - Generator to Generator:	9
1.7.2 - Utility to Generator:.....	10
1.7.3 - Utility to Utility:	10
1.7.4 - Three-Source System:	10
Chapter No: 2	11
Introduction.....	11
2.1 - INTRODUCTION ABOUT OUR PROJECT:.....	12
2.2 - Motivation:.....	12
2.3 - Aim of the Project:	13
2.4 - Function of ATS:.....	13
2.5 - The features to be displayed:.....	13
2.6 - Main Components:	14
Chapter No: 3	15
Hardware Description.....	15
3.1 - Potential Transformers:.....	16
3.1.1 - Principle of Operation:.....	16
3.2 - Potential Transformer Diagram:	18
3.3 - Current transformer (CT):.....	18
3.3.1 - Principle of Operation:.....	19

3.4 - Optocoupler:.....	21
3.4.1 - WHEN & HOW TO USE THEM:	21
3.4.2 - Key Parameters:.....	23
3.4.3 - How They Are Used:	23
3.4.4 - Optocoupler Applications:	24
3.4.5 - Diagram of Optocoupler:	26
3.4.6 - Configurations:	26
3.5 - Why Optocoupler is used?	27
3.6 - Temperature Sensor:.....	28
3.6.1 - Features:.....	29
3.6.2 - Why Use LM35s to Measure Temperature?	29
3.6.3 - What can we expect when we Use an LM35:	29
3.6.4 - Diagram of LM35:.....	30
3.7 - Relay:.....	31
3.7.1 - Relay Purpose:.....	32
3.7.2 - Protection Diodes for Relays:.....	32
3.7.3 - Advantages of Relays:	33
3.8 - ULN2003:.....	33
3.9 - The main features of ULN2003 are as follows:	34
3.10 - Diagram of ULN2003:.....	35
Chapter No: 4	37
Microcontroller.....	37
4.1 - PIC Microcontroller:.....	38
Chapter No: 5	42
Display Section	42
5.1 - LCD20X4:.....	43
5.2 - LCD Display Circuit:.....	44
Chapter No: 6	46
Power Supply Section.....	46
6.1 - 7805 Voltage Regulator:	47
6.1.1 - Measures of Regulator Quality:.....	48
6.1.2 - Other Important Parameters Are:.....	48

6.1.4 - 7805 Voltage Regulator Circuit:.....	50
6.1.5 - Circuit Features:	50
6.1.6 - 7805 Voltage Regulator Pinout:	51
6.1.7 - Operation of ATS Circuit:.....	51
Chapter No: 7	53
Protection System of ATS.....	53
Protection Standards of ATS.....	54
7.1 - What will be happen when voltage is over from reference value?	54
7.2 - What will be happen when current is over from reference value?	54
7.3 - What will be happen when temperature is over from reference value?	55
7.4 - Power Command Microprocessor Control:.....	55
Chapter No: 8	56
Diagram Section	56
8.1 - Block Diagram:	57
8.2 - Current Circuit Diagram:	58
8.3 - Voltage Circuit Diagram:	59
8.4 - Display Circuit Diagram:	60
8.5 - Relay Circuit Diagram:	61
8.6 - Final Circuit Diagram:	62
Chapter No: 9	63
Coding	63
9.1 – Software:	64
9.2 - Coding of Project:.....	64
Diagram of Project	83



Chapter No: 1

General Description

Automatic Transfer Switch

1- General Description about ATS:

(ATS) monitor the power supplies and automatically switch from the normal (utility) supply over to the generator supplied power source in the event of a power outage. ATS equipment can have many different control and alarm features. An ATS, with built in logic, can monitor the utility power, sense any power disruptions, and switch to an alternate power source. Some ATS equipment can even start and stop the generator on a predetermined maintenance schedule to assure the back-up generator works when you need it. In the event of a utility power failure, it is common for an ATS to automatically start our back-up generator and transfer our power source from the utility to the generator. When utility power is reestablished, the ATS will automatically transfer back to the normal supply and shut the generator down. Automatic Transfer Switches are critical components of any emergency or standby power system. Transfer switches are reliable, rugged, versatile and compact assemblies for transferring essential loads and electrical distribution systems from one power source to another. (ATS) monitor the power supplies and automatically switch from the normal (utility) supply over to the generator supplied power source in the event of a power outage.