

**ANALYSIS AND CALCULATION THE LIGHTNING OUTAGE RATE FOR
THE TENAGA NASIONAL(TNB) TRANSMISSION LINE
USING FLASH SOFTWARE PACKAGE**

**This is presented to fulfil the
requirement of Advanced Diploma in Electrical
Engineering of MARA Institute of Technology**

**AMINUDIN BIN A.GHANI, D.E.E. (UTM)
(91010288)**

**MOHD FADZIL BIN ISMAIL, D.E.E. (ITM)
(91002329)**

NOVEMBER, 1993

**Department of Electrical Engineering
School of Engineering
MARA Institute of Technology
40450 Shah Alam
Selangor
MALAYSIA**

ACKNOWLEDGEMENT

Greatest thanks for the valuable assistance of Project Advisor Dr. Amir Bashah Ismail, Development and Planning Department, Tenaga Nasional Berhad in preparation of this project.

We also would like to express our gratitude to En. Akib, En. Wan Roslan, En. Mohamad and others for their precious guidance and constructive comments without whom this project could not succeed.

Finally we wish to thank our advisor Ir. Puan Shah Rizam Mohd Shah Baki for her great interest in this work and advice, through the completion of this project.

SYNOPSIS

Interruptions from lightning are usually the most frequent cause of transmission line outages. In this study the phenomena of lightning strike are investigated using FLASH Program software package.

Generally the lightning strike that can cause the shielding failure can be divided into two parts :

1. Direct strike
2. Backflash

The objective of this simulation is to determine the transmission line total outage rate due to lightning disturbances taking account both of backflashovers and shielding penetration flashovers.

The FLASH Program software package is used by applying the following parameters :

1. Line parameter
2. Tower structure
3. Thunderday level

CONTENTS	PAGE
DECLARATION.....	i
ACKNOWLEDGEMENT.....	iii
APPROVAL.....	iv
SYNOPSIS.....	v
CHAPTER 1	
1.0 INTRODUCTION.....	1
CHAPTER 2	
2.0 THE ASSESSMENT OF THE LIGHTNING PERFORMANCE FOR TNB TRANSMISSION LINE.....	3
2.1 METHOD OF ANALYSIS.....	3
2.2 LIGHTNING GROUND-BASED OBSERVATIONS.....	5
2.3 ASSUMPTIONS ABOUT THUNDERSTORMS.....	6
2.3.1 Thunderstorm Day.....	6
2.3.2 Thunderstorm Duration.....	7

1.0 INTRODUCTION

Peninsular Malaysia has experienced very high lightning activity and could be countered among the highest in the world. The thunderstorm day in the coastal areas have averaged between 170 to 180 days per year, while inland especially around Kuala Lumpur, the thunder day level has reached 190 to 200. For the country as a whole the average figure was 180 thunder days per annum.

Therefore the interruptions from lightning are usually the most frequent cause of Tenaga Nasional transmission line outages. With the ever increasing demand for more electrical power and increasing difficulties in obtaining right-of-way, it has become necessary in the course of development of Tenaga Nasional transmission line systems to know the lightning performance of the line, in particular, its single, double, triple and quadruple-circuit outage rate during operation.

The computer software program FLASH meets the goals. This project focuses on the simulation of what actually causes the line interruptions during the lightning strike.