ELECTRICAL AUTOMATION SYSTEMS TOWARDS INTELLIGENT AND ENERGY EFFICIENCY APPLICATIONS

Musse Mohamud Ahmed

IIUM PRESS

INTERNATIONAL ISLAMIC UNIVERSITY MALAYSIA

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APPLICATIONS

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IIUM Press

Published by:
IIUM Press
International Islamic University Malaysia

First Edition, 2011

Perpustakaan Negara Malaysia Cataloguing-in-Publication Data

ISBN: 978-967-418-170-3

Member of Majlis Penerbitan Ilmiah Malaysia – MAPIM
(Malaysian Scholarly Publishing Council)

Printed by :
IIUM PRINTING SDN.BHD.
No. 1, Jalan Industri Batu Caves 1/3
Taman Perindustrian Batu Caves
Batu Caves Centre Point
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CHAPTER 3

FAULTS FROM TRADITIONAL TO AUTOMATION TECHNIQUES

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Chapter 3 discusses about faults from traditional to automation and consists on brief introduction to Malaysia distribution scenario, short circuit faults, over-current faults, open loop distribution fault configuration when implementing automation systems.

3.1 Malaysia Distribution Scenario

Based on the survey carried out by the Energy Commission, 90.4% of the 27,598 interruptions recorded in the year 2002 on the supply system of the TNB in Peninsular Malaysia with a total duration of 57,217 hours were unscheduled interruptions [3]. A wide range of faults or breakdowns including cable fault, flashover, equipment failure, transient and overload cause customer interruptions.

In order to prevent these interruptions, it is important to choose the correct protective devices and it should be placed at the correct settings. Firstly, it is important to know the values of the currents which flow through the protective devices. Secondly, it is important to ascertain the fault level throughout the network that can be determined and to check that it does not exceed the fault rating of any of the equipment. In practice, the equipment shall be rated to withstand the rated fault current for duration of 3 seconds. Maximum fault tolerance levels allowed in the distribution system are shown in Table 3.1.

Table 3.1: Equipment Fault Rating

Nominal Voltage (kV)	Rated Voltage (kV)	Difference (kV)	Fault Current (kA)
33	36	3	25
22	24	2	20
11	12	1	10
6.6	7.2	0.6	5
0.415	0.415	0	0.6

The fundamental issue regarding fault level is that under maximum fault, the system components must be rated such that the resultant heat can be dissipated and mechanical forces with stood. The fault level must not exceed the short circuit rating of the circuit rating of the circuit breaker, which is interrupting the fault.

Fault calculation is the analysis of power system's electrical behavior under fault conditions. Under fault conditions, particular reference such as current and voltage values is