

- 1 NETWORKS AND SHORT CIRCUIT CALCULATION
 - 1.1 MEDIUM VOLTAGE GRIDS
 - 1.2 HIGH VOLTAGE GRIDS
 - 1.3 CALCULATION OF 3-PHASE SHORT CIRCUITS
 - 1.4 CALCULATION OF 1-PHASE SHORT CIRCUITS
- 2 FAULT DETECTION / STARTER FUNCTION
 - 2.1 PICKUP SAFETY / MAXIMUM OPERATING AREA
 - 2.2 OVERCURRENT STARTER
 - 2.3 $U_{<}$, VOLTAGE CONTROLLED OVERCURRENT STARTER
 - 2.4 IMPEDANZ STARTER
 - 2.5 EARTH FAULT DETECTION
 - 2.6 EARTHING FACTORS
- 3 IMPEDANCE GRADING
 - 3.1 ZONE CHARACTERISTICS AND PARAMETERS
 - 3.2 GENERATING THE GRADING DIAGRAM
 - 3.3 GRADING IN RADIAL NETWORKS
 - 3.4 GRADING IN MESHED NETWORKS
 - 3.5 APPROACH WITH SHORT TRIP TIMES, APPROACH WITH ABSOLUT SELECTIVITY
 - 3.6 DETECTION OF MULTIPLE EARTH FAULTS
 - 3.7 FAULT RESISTANCE AND SINGLE ENDED INFEEEDING
 - 3.8 FAULT RESISTANCE AND DOUBLE ENDED INFEEEDING
 - 3.9 INFLUENCE OF THE EARTHING FACTORS
 - 3.10 ARC RESISTANCE
 - 3.11 DIFFERENCES BETWEEN CABLE AND OVERHEADLINES
- 4 ADDITIONAL FUNCTIONS
 - 4.1 SENSIBLE EARTH FAULT PROTECTION IN SOLIDLY GROUNDED NETWORKS
 - 4.2 SENSIBLE EARTH FAULT PROTECTION IN ISOLATED OR COMPENSATED NETWORKS
 - 4.3 AUTO RECLOSING IN SOLIDLY GROUNDED NETWORKS
 - 4.4 AUTO RECLOSING IN ISOLATED OR COMPENSATED NETWORKS
 - 4.5 PERMISSIVE OVERREACHING / PERMISSIVE UNDERREACHING SCHEMES
 - 4.6 BACK UP OVER CURRENT PROTECTION
- 5 OBJECT RELATED SETTINGS
 - 5.1 CABLE DATA
 - 5.2 LINE DATA
 - 5.3 TRANSFORMER DATA
 - 5.3 GENERAL PARAMETERS AND THEIR MEANING
 - 5.4 SETTING AND CONFIGURATION OF THE STARTER FUNCTION
 - 5.5 CALCULATING THE ZONE REACHES FOR LINES AND CABLES
 - 5.6 BCALCULATING THE ZONE REACHES FOR TRANSFORMERS
 - 5.7 SETTING THE ADDITIONAL FUNCTIONS
 - 5.8 PICKUP LIMITATION FOR BACK UP PROTECTION
 - 5.9 BUS COUPLER PROTECTION

6 CT REQUIREMENTS

- 6.1 CT DATA
- 6.2 PRIMARY SHORT CIRCUIT AND INDUCTION
- 6.3 STATIONARY TRANSMISSION BEHAVIOUR
- 6.4 TRANSIENT TRANSMISSION BEHAVIOUR
- 6.5 CALCULATION ACCORDING IEC 60044
- 6.6 CALCULATION ACCORDING BS 3938
- 6.7 DIMENSIONING CHECK

7 TESTING

- 7.1 FIRST ELECTRICAL TEST / TESTING THE FAULT LOCATOR
- 7.2 TESTING THE BACK UP PROTECTION PICKUP/DROPOFF BEHAVIOUR
- 7.3 TESTING BACK UP PROTECTION TRIP TIMES
- 7.4 TESTING THE DISTANCE STARTER FUNCTION FOR LE AND LL FAULTS
- 7.5 TESTING THE ZONE REACHES AT DIFFERENT ANGLES
- 7.6 TESTING THE TRIP TIMES
- 7.7 TESTING THE OVERREACHING ZONES
- 7.8 TESTING THE DIRECTIONAL FUNCTION
- 7.9 TESTING SWITCH ONTO FAULT
- 7.10 TESTING THE SENSITIVE EARTH FAULT PROTECTION
- 7.11 TESTING TELEPROTECTION SCHEMES
- 7.12 TESTING AUTO RECLOSING
- 7.13 TESTING CIRCUIT BREAKER
- 7.14 TESTING MEASUREMENT SUPERVISION

The theoretical considerations and explanations are underlined by practical demonstrations and tests at the relays.