BIBLIOGRAPHY OF RELAY LITERATURE, 1995
IEEE COMMITTEE REPORT

Members of the Bibliography and Publicity Working Group of the IEEE Power System Relaying Committee are:
T.S. Sidhu, Chairman, M. Bajpai, A. Darlington, D. Finley, A.G. Folkman, M. Kezunovic,

ABSTRACT - The latest of a series of classified lists of power system relaying references, begun in 1927, is presented. This bibliography is in continuation to the bibliographies of relay literature which were published previously and are contained in the following volumes of the IEEE Transactions:

<table>
<thead>
<tr>
<th>Bibliography for</th>
<th>Volume</th>
<th>No.</th>
<th>Year</th>
<th>Page# from</th>
<th>to</th>
</tr>
</thead>
<tbody>
<tr>
<td>1927-1939</td>
<td>60</td>
<td>1941</td>
<td>1435</td>
<td>1447</td>
<td></td>
</tr>
<tr>
<td>1940-1943</td>
<td>63</td>
<td>1944</td>
<td>705</td>
<td>709</td>
<td></td>
</tr>
<tr>
<td>1953-1954</td>
<td>76 pt. III</td>
<td>1957</td>
<td>126</td>
<td>129</td>
<td></td>
</tr>
<tr>
<td>1955-1956</td>
<td>78 pt. III</td>
<td>1959</td>
<td>78</td>
<td>81</td>
<td></td>
</tr>
<tr>
<td>1961-1964</td>
<td>PAS-85</td>
<td>10</td>
<td>1966</td>
<td>1044</td>
<td></td>
</tr>
<tr>
<td>1965-1966</td>
<td>PAS-88</td>
<td>3</td>
<td>1969</td>
<td>244</td>
<td></td>
</tr>
<tr>
<td>1972-1973</td>
<td>PAS-94</td>
<td>6</td>
<td>1975</td>
<td>2033</td>
<td></td>
</tr>
<tr>
<td>1974-1975</td>
<td>PAS-97</td>
<td>3</td>
<td>1978</td>
<td>789</td>
<td></td>
</tr>
<tr>
<td>1978-1979</td>
<td>PAS-100</td>
<td>5</td>
<td>1981</td>
<td>2407</td>
<td></td>
</tr>
<tr>
<td>1982-1983</td>
<td>PAS-104</td>
<td>5</td>
<td>1985</td>
<td>1189</td>
<td></td>
</tr>
<tr>
<td>1984-1985</td>
<td>PWRD-2</td>
<td>2</td>
<td>1987</td>
<td>349</td>
<td></td>
</tr>
<tr>
<td>1986-1987</td>
<td>PWRD-4</td>
<td>3</td>
<td>1989</td>
<td>1649</td>
<td></td>
</tr>
<tr>
<td>1988-1989</td>
<td>PWRD-6</td>
<td>4</td>
<td>1991</td>
<td>1409</td>
<td></td>
</tr>
<tr>
<td>1990</td>
<td>PWRD-7</td>
<td>1</td>
<td>1992</td>
<td>173</td>
<td></td>
</tr>
<tr>
<td>1991</td>
<td>PWRD-8</td>
<td>3</td>
<td>1993</td>
<td>955</td>
<td></td>
</tr>
<tr>
<td>1992</td>
<td>PWRD-10</td>
<td>1</td>
<td>1995</td>
<td>142</td>
<td></td>
</tr>
<tr>
<td>1993</td>
<td>PWRD-10</td>
<td>2</td>
<td>1995</td>
<td>684</td>
<td></td>
</tr>
</tbody>
</table>


The papers listed include references to the subjects of service restoration, testing and methods of calculation, as well as to the field of relaying. Only the more readily available foreign publications are included.

Each reference includes the title, author, publication information, and a very brief summary of the subject matter. The listing of the titles is subdivided into ten sections, depending upon the general substance of each article. The section titles are as follows:

3150 RELAYING ALGORITHMS
3151 DISTRIBUTION AND NETWORK PROTECTION
3151.1 Industrial and Power Station Auxiliaries
3151.2 Primary Distribution Systems
3152 TRANSMISSION LINE PROTECTION
3152.1 Distance and Ground Relaying
3152.2 Relay Communications
3152.3 Relay Systems
3153 RELAY INPUT SOURCES
3154 ROTATING MACHINERY PROTECTION
3155 OTHER PROTECTION
3155.1 Transformer and Reactor Protection
3155.2 Capacitor Bank and Static Var Protection
3155.3 Other Protection
3156 FAULT AND SYSTEM CALCULATIONS
3157 MAINTENANCE, TESTING, ANALYSIS, AND MODELING
3158 STABILITY, OUT OF STEP, RESTORATION
3159 SURGE PHENOMENA

The entries in each section are listed in alphabetical order by the name of the first author. Each title is listed in only one section even if it covers material that belongs to several sections. A list of the periodicals which have been cited and the addresses of their publishers follows the bibliography.

The abstracts of many articles reported in this paper are available in the Science Abstracts - Section B, the Engineering Index, and other digesting and/or indexing periodicals.

ADDITIONAL REFERENCES

Electrical & Electronics Abstracts, are published monthly by the Institution of Electrical Engineers (U.K.) and the Institute of Electrical and Electronics Engineers, Inc. (USA).
Papers and journals published in several countries are covered.

3150 RELAYING ALGORITHMS

Neural Network Approach to Fault Classification for High Speed Protective Relaying. T. Dalstein, B. Kulicke, IEEE Trans. on Power Delivery, Vol. 10, No. 2, Apr 1995, p 1002-11. A selector module consisting of 4 neural networks can classify a fault or no fault load condition within 8 ms. It also classifies fault as arcing or non-arcing in order to allow reclosing only after an arcing fault.


A New Self-Tuning Algorithm for the Frequency Estimation of Distorted Signals. V. Terzija, M. Djuric, B. Kovacevic, IEEE Trans. on Power Delivery, Vol. 10, No. 4, Oct 1995, p 1779-85. This paper describes an algorithm that uses least error square technique along with the updating procedure for estimating the power system frequency. Some test results are also included in the paper.

3151 DISTRIBUTION AND NETWORK PROTECTION

3151.1 Industrial and Power Station Auxiliaries

Critical Considerations for Utility/Cogeneration Inter-Tie Protection Scheme Configuration. R.M. Rifaat, IEEE Trans. on Industry Applications, Vol. 31, No. 5, 1995, p 973-7. This paper discusses special considerations that must be given to inter-tie protection systems. Typical inter-tie configurations and their protection schemes along with advantages and disadvantages are presented. The importance of examining protection scheme requirements during the conceptual design stage is demonstrated.

3151.2 Primary Distribution Systems

Adaptive Applications for Microprocessor Based Distribution and Transformer Protection Systems. D. Aronson, CEA Engineering and Operating Div. Meetings, Mar 26-31, 1995. This paper presents a protection, control, metering, monitoring, and communications system utilizing multiple microprocessors for electric power distribution systems. Radial feeder protection, bus protection, and a multifunction transformer relay are part of the system.

Adaptive Application for Microprocessor Based Distribution and Transformer Protective Systems. D.L. Aronson, G. Payne, 48th Annual Texas A&M Conference for Protective Relay Engineers, April 3-5, 1995. This paper presents a protection, control, metering, monitoring, and communications system utilizing multiple microprocessors for electric power distribution systems. A common platform for multifunction distribution relay that provides feeder and bus protection and a multifunction transformer relay that provides transformer and bus protection is discussed.


Effectiveness of Distribution Backup Ground Protection. J.R. Boyle, 49th Annual Georgia Tech Protective Relaying Conference, May 3-5, 1995. This paper deals with how a varied mix of impedances and loads can greatly influence the magnitude and duration of transients. Also analyzed is the influence that transient harmonics play in the performance of backup ground relays connected in the transformer neutral circuit.

variation of Prony's parameters for different system and fault conditions is also studied.


Distribution Line Protection Practises Industry Survey Results, IEEE Committee Report, IEEE Trans. on Power Delivery, Vol. 10, No. 1, Jan 1995, p 176-86. The results of the recent industry survey are analyzed and discussed. The advantages of indicated changing trends are discussed. Of significance are changes to reduce customer complaints from momentary interruptions and blinking lights.

Protection and Control Design for Distribution Stations, B.W. Jackson, M.K. Boughman, 49th Annual Georgia Tech Protective Relaying Conference, May 3-5, 1995. Discussed in this paper is an effort to take advantage of new technology in order to improve the reliability to the customer by utilizing microprocessor relays and computer controlled equipment in the redesign of distribution stations.

A Novel Approach to Handle the Cold Load Pickup Problem, O.H. Mirza, 22nd Annual Western Protective Relay Conference, Oct 24-26, 1995. This paper presents a theory that is applicable to all microprocessor based overcurrent protective devices used at the distribution level in order to provide a possible method to handle cold load pickup problems at line reclosers installed on the distribution system.

Signatures and Software Find High-Impedance Faults, R. Patterson, IEEE Computer Applications in Power, Vol. 8, No. 3, Jul 1995, p 12-5. This paper describes how the use of modern digital and software technologies have enabled a practical solution for detecting a high percentage of high-impedance faults.

Performance of High-Impedance Fault Detection Algorithms in Long-Term Field Trials, B. D. Russell, Carl L. Benner, Electric Power Systems Research, Vol. 31, 1994, p 71-7. Researchers at Texas A&M University's Power System Automation Laboratory have tested the long-term performance of high-impedance fault detection algorithms at five utilities. This paper summarizes the test results.


Adaptive Relaying for Ground Fault Protection of a Distribution Network, M.S. Sachdev, T.S. Sidhu, B.K. Talukdar, CEA Engineering and Operating Div. Meetings, Mar 26-31, 1995. This paper reports developments in the second phase of a project for designing an adaptive protection system for the City of Saskatoon’s distribution network. Software modules for achieving adaptive capabilities for ground fault protection are described. Results from system studies are also included.


System Considerations in the Application of Reclosers, D.A. Walder, L. Kojovic, 49th Annual Georgia Tech Protective Relaying Conference, May 3-5, 1995. Technology improvements in the design of automatic circuit reclosers allow for coordination flexibility in the application of the devices in series. This paper describes how the use of this technology may improve system performance.

3152 TRANSMISSION LINE PROTECTION

3152.1 Distance and Ground Relaying

Application of Phase and Ground Distance Relays to Three Terminal Lines, G.E. Alexander, J.G. Andrichak, 22nd Annual Western Protective Relay Conference, Oct 24-26, 1995. This paper discusses many of the issues related to the application of distance relays to the protection of three terminal lines. Although such an application is more complex, in certain configurations adequate protection is possible.

Evolution of Distance Relaying Principles, W. Elmore, F. Calero, L. Yang, 48th Annual Texas A&M Conference for Protective Relay Engineers, Apr 3-5, 1995. This paper describes the evolution and principles of one lineage of distance relaying concepts that build up to a new concept for transmission line distance protection. The numerical comparator is discussed along with several advantages over present techniques.

Useful Applications for Negative-Sequence Overcurrent Relaying, A.F. Elnevshii, 22nd Annual Western Protective Relay Conference, Oct 24-26, 1995. This paper presents some practical applications on the B.C. Hydro system where negative-sequence overcurrent elements offer a much better sensitivity than zero-sequence elements in detecting some single-line-to-ground faults.

Consideration for the Design and Application of Ground Distance Relays, A.T. Giulianti, J. E. McConnell, S.P.
Turner, 48th Annual Texas A&M Conference for Protective Relay Engineers, Apr 3-5, 1995. How ground distance relays are designed and applied is discussed. The limitations of the classic R-X diagram introduces an alternative technique using fault record data available in most microprocessor relays.


A New Blocking Principle with Phase and Earth Fault Detection During Fast Power Swings for Distance Protection, A. Mechraoui, D.W.P. Thomas, IEEE Trans. on Power Delivery, Vol. 10, No. 3, Jul 1995, p 1242-8. This paper presents a power swing blocking principle that has ability to immediately clear the block when a fault occurs within the relay trip zone. Simulation results are included.

Limits to the Sensitivity of Ground Directional and Distance Protection, J. Roberts, E.O. Schweitzer, III, R. Arora, E. Poggi, 22nd Annual Western Protective Relay Conference, Oct 24-26, 1995. Relay designers have used analog and digital electronic technology to advance the sensitivity of protective relays while simultaneously decreasing the instrument transformer burden. The fact is that with toady's technology, the sensitivity of the settings is not generally limited by the relays. This paper addresses some of the issues related to this problem.

Real-Time Assessment of a Symmetrical Component and Microcontroller Based Distance Relay, D. L. Waikar, S. Elangovan, A. C. Liew, S.H. Sng, Electric Power Systems Research, Vol. 32, 1995, p 107-12. This paper presents the design, implementation and real-time assessment of a microcontroller based digital distance relay that can be used for the protection of power transmission lines.

Second- and Third-Zone Performance Assessment of a Symmetrical Component Based Improved Fault Impedance Estimation Method, D. L. Waikar, A. C. Liew, S. Elangovan, Electric Power Systems Research, Vol. 32, 1995, p 113-20. A brief review of the symmetrical component based fault impedance estimation method that has previously been proposed by the authors is discussed in this paper.

3152.2 Relay Communications


JEA's Application of Protective Relaying on Digital Communication Systems, V.A. Monfort, V.M. Kamath, L.E. Jones, 49th Annual Georgia Tech Protective Relaying Conference, May 3-5, 1995. This paper addresses the concerns, problems, and solutions JEA implemented to construct a communications network that would serve the critical operational needs of protective relaying, and at the same time provide the large capacity required by corporate communications needs.

3152.3 Relay Systems

Laboratory Investigation of a Digital Protection Technique for Parallel Transmission Lines, M. I. Gilany, O. P. Malik, G. S. Hope, IEEE Trans. on Power Delivery, Vol. 10, No. 1, Jan 1995, p 187-93. The proposed relay uses a fast data acquisition system to obtain data from each terminal of parallel lines. The technique avoids mutual coupling and current/voltage reversal problems. The relay has been studied for all types of faults, reclosing, and line charging on a physical laboratory system model.

High Speed Phase Segregated Line Differential Relay, H. Patterson, CEA Engineering and Operating Div. Meetings, Mar 26-31, 1995. This paper describes a complete line terminal for protecting lines. The performance of the terminal is maximized by evaluation of the whole information in the opposite terminal currents and its reliability is enhanced by an integral distance protection independent of communication.

A New Approach to a Line Protection Terminal With Adaptive Features, K. Wikstrom, K. Kuras, C. Ohlen, J. Zakonjsek, CIGRE, Jun 11-17, 1995, Paper No. 34-208. This paper describes the evolution of microprocessor based line distance protections into "intelligent transmission line terminals" using a modularized standard multiprocessor
hardware platform to custom design a terminal to a certain application.

3153 RELAY INPUT SOURCES

Ferroresonant Oscillations in Capacitor Voltage Transformers, S.K. Chakravarthy, C.V. Nayar, IEE Proceedings-C, Vol. 142, No. 1, 1995, p 30-6. This paper proposes the use of integral form of system equations to determine different types of ferroresonant oscillations. The periodicity of these oscillations can be determined by plotting the temporal evolution of the state variables.

Integrated Optics Pockels Cell High-Voltage Sensor, N.A.F. Jaeger, F. Rahmatian, IEEE Trans. on Power Delivery, Vol. 10, No. 1, Jan 1995, p 127-34. An integrated optics version of the Pockels cell is very small, immune to electromagnetic interference, and does not need earthquake proofing. Samples with a 1 MHz bandwidth have been fabricated, capable of measuring lightning impulses. They show promise in replacing conventional VTs.


Experience with Optical PT's and CT's at 500kV for Relaying and Metering, J. Tillett, J. Pease, J. Hall, D. Bradley, J. Nordstrom, 22nd Annual Western Protective Relay Conference, Oct 24-26, 1995. This paper discusses the evaluation of 500kV optical voltage and current transducers that are part of the Advanced Substation Project. The equipment from two manufacturers were purchased for evaluation.

Bus Differential Protection with a Combination of CT's and Magneto-Optic Current Transducers, E.A. Udren, T.W. Cease, P.M. Johnston, K. Faber, 48th Annual Texas A&M Conference for Protective Relay Engineers, Apr 3-5, 1995. This paper describes the design and testing of a microprocessor-controlled bus-differential relay system which permits using mixed input sources. All of the dependability and security of the original scheme is retained as the ct's are replaced.

3154 ROTATING MACHINERY PROTECTION


A Microprocessor Relay Used for a Cogenerator, J.A. Brogan, 48th Annual Texas A&M Conference for Protective Relay Engineers, Apr 3-5, 1995. This paper presents one utility's solution to a unique cogeneration request by a customer. Also discussed are some of the problems identified during testing and installation. The application solution emphasizes the flexibility of microprocessor relays.


Upgrading Generator Protection Using Digital Technology, C.J. Mozina, CEA Engineering and Operating Div. Meetings, Mar 26-31, 1995. This paper presents the reasons and areas in which utilities as well as non-utility generator owners should consider upgrading the electrical protection of their generators to meet today's standards. The advantages of digital versus conventional technology for such an upgrade program are given.

3155 OTHER PROTECTION

3155.1 Transformer and Reactor Protection


A Multi-Criteria Differential Transformer Relay Based on Fuzzy Logic, A Wiszniowski, B. Kasztenny, IEEE Trans. on Power Delivery, Vol. 10, No. 4, Oct 1995, p 1786-92. This paper presents a digital relay scheme for protecting power transformers. Decision making is done by using a multi-criteria algorithm based on fuzzy sets. Test examples showing performance of the relay are also included in the paper.

Artificial Neural Network Based Protection of Transformers, M.R. Zaman, M.A. Hoque, M.A. Rahman, CEA Engineering and Operating Div. Meetings, Mar 26-31, 1995. This paper describes the use of artificial neural networks to distinguish between magnetizing inrush and internal fault currents of a power transformer. Results from a laboratory prototype are included in the paper.
3155.2 Capacitor Bank and Static Var Protection

Static Var Compensator Protection, IEEE Committee Report, IEEE Trans. on Power Delivery, Vol. 10, No. 3, Jul 1995, p 1224-33. This paper presents Static Var Compensator (SVC) protection practices, describes different protection functions applicable to SVCs and outlines testing of SVC protection systems. Interaction of SVCs with the power system and its impact on protection is discussed.

3155.3 Other Protection

Bus Differential Protection, J.G. Andrichak, J. Cardenas, 22nd Annual Western Protective Relay Conference, Oct 24-26, 1995. A variety of methods have been used to implement bus differential relaying schemes. The introduction of digital technology has led to further improvements in bus differential protection. This paper reviews the various methods that have been used and discusses improvements that can be provided via digital technology.


The DC System: Heart of a Protective Relaying Scheme, C.D. Fate, D.F. Coerber, 22nd Annual Western Protective Relay Conference, Oct 24-26, 1995. The purpose of this paper is to review the design and application of a DC system, including battery and charger sizing, dc distribution system protection and dc design criteria for reliability.

Protection and Control Design for Distribution Stations, B.W. Jackson, M.K. Boughman, 49th Annual Georgia Tech Protective Relaying Conference, May 3-5, 1995. Discussed in this paper is an effort to take advantage of new technology in order to improve the reliability to the customer by utilizing microprocessor relays and computer controlled equipment in the redesign of distribution stations.

Adaptive Relaying – An Application View, G. Koch, CIGRE, Jun 11-17, 1995, Paper No. 34-203. This paper discusses the impact of adaptive relaying on today's relay practice and some practical applications for performance enhancement and simplification of traditional adaptive schemes.

Adaptive Protection and Control, A. G. Phadke, CIGRE, Jun 11-17, 1995, Paper No. 34-212. This paper is a study of adaptive protection and control, and is based on the report of Working Group 34.02 of CIGRE.


Adaptive Protection - Potential and Limitations, W. Winkler, A. Wiszniewski, CIGRE, Jun 11-17, 1995, Paper No. 34-206. This paper discusses the scope of adaptive protection, what are conditions needed to apply adaptivity, and to what extent adaptive relaying is needed in contemporary power systems.

3156 FAULT AND SYSTEM CALCULATIONS

Inter and Intra Substation Communications: Requirements and Solutions, M.G. Adamiak, R.C. Patterson, J. Melcher, 22nd Annual Western Protective Relay Conference, Oct 24-26, 1995. This paper presents an outline of the communication requirements of the myriad of IED's in existence in the substation today as well as the expectations of what the second generation microprocessor based devices might be able to do.

Evaluation of a Phasor-Based Fault Location Algorithm, G.E. Alexander, J.M. Kennedy, 22nd Annual Western Protective Relay Conference, Oct 24-26, 1995. Fault location calculations based on quantities from a single line terminal are subject to errors that can not be completely eliminated by settings in the algorithm. This paper discusses how a much better estimate can be obtained when currents from other lines and/or from other terminals are used.

Removal of DC-Offset in Current Waveforms Using Digital Mimic Filtering, G. Benmouyal, IEEE Trans. on Power Delivery, Vol. 10, No. 2, Apr 1995, p 621-30. Some line relays have a tendency to overreach in the presence of dc offset components in the fault current. This paper shows that by using the exact digital replica of a mimic circuit, the exponentially decaying component of a current can be removed. An analysis of the performance of some popular relaying digital filters is included.

Fuzzy-Set Approach to Fault-Type Identification in Digital Relaying, A. Ferrero, S. Sangiovanni, E. Zappitelli, IEEE Trans. on Power Delivery, Vol. 10, No. 1, Jan 1995, p 169-75. Digital relays may have difficulty in determining whether a ground fault involves one conductor or two. A simple fuzzy procedure involving the ratios of symmetrical component currents is described.

obtained using the proposed algorithms are compared with those obtained from an existing conventional three-phase fault analysis algorithm.

Synchronised Sampling Improves Fault Location, M. Kezunovic, B. Perunicic, IEEE Computer Applications in Power, Vol. 8, No. 2, Apr 1995, p 30-3. This paper describes a fault location technique that uses synchronised voltage and current samples. The technique can be implemented either as a simple add-on to DFRs or as a stand-alone relaying function.

Fault Location Using Digital Relay Data, D. Novosel, D.G. Hart, E. Udren, M.M. Saha, IEEE Computer Applications in Power, Vol. 8, No. 3, Jul 1995, p 45-50. This article discusses one-terminal and two-terminal data algorithms for locating transmission line faults. Some results from evaluation of these algorithms are also included.

Adaptive Features in Line Fault Location Processes, L. Philippot, J. C. Maun, CIGRE, Jun 11-17, 1995, Paper No. 34-201. The paper discusses the different fault locator algorithms, development trends in fault location, and advantages of adaptive features in the automated process leading to fault diagnosis.

Digital Simulation of Fault Location on EHV Lines Using Wideband Spectrum Techniques, V. Taylor, M. Faulkner, A. Kalam, J. Haydon, IEE Proceedings-C, Vol. 142, No. 1, 1995, p 73-80. This paper proposes to transmit a direct sequence signal down a faulted EHV line by using the existing PLC equipment. The fault position may then be estimated by correlation analysis of the reflected waveforms. The proposed fault location process has been simulated on a digital computer and result indicate the fault locations are within 0.5 km.


Three-Phase Circuit Analysis and the Mysterious Ko Factor, S.E. Zocholl, 48th Annual Texas A&M Conference for Protective Relay Engineers, Apr 3-5, 1995. This paper is a tutorial on the three-phase analysis of the transmission line circuit and is of the scale that can be easily implemented on a PC using a readily available math program.

3157 MAINTENANCE, TESTING, ANALYSIS, AND MODELING


Interfacing a Relay Settings Database with an Automated Relay Testing Program, D. Angell, C. Harris, D. Porter, M. Enns, D. Loudermilk, 22nd Annual Western Protective Relay Conference, Oct 24-26, 1995. This paper presents Idaho Power’s automated protective relay testing history, test routine development, data base additions, data handling between the data base and the test program, technician access to the data, and experience with the system.


Substation Relay Data and Communication, K.C. Behrendt, M.J. Dood, 22nd Annual Western Protective Relay Conference, Oct 24-26, 1995. This paper discusses the importance of digital relay data, the evaluation in communication interface development to meet user information needs, and some practical applications for integrated substations relay data using various communication media.


A Team Evaluation of a Digital Feeder Monitor, M.D. Diehl, R.F. Hoad, R.H. Jones, 48th Annual Texas A&M Conference for Protective Relay Engineers, Apr 3-5, 1995. This paper presents a utility perspective as to their involvement in the design and evaluation of the GE Digital Feeder Monitor. Described are the test procedures used, experience gained to
date, and the rationale for requesting some of the unique features.


GPS Satellite Synchronized Test System Simulates Faults on Transmission Lines, S.B. Francis, Jr., N. Farrar, S.I. Thompson, 48th Annual Texas A&M Conference for Protective Relay Engineers, Apr 3-5, 1995. The testing and calibration of protective relaying has historically been performed during cut-in and periodic testing. Using GPS synchronized test systems actual simulated faults can be imposed on the relays to determine functionality.

Distribution and Transmission Fault Analysis Using Digital Fault Recorders and the National Lightning Detection Network, M.M. Gonzalez, D.R. Sevcik, 48th Annual Texas A&M Conference for Protective Relay Engineers, Apr 3-5, 1995. This paper presents one utility’s experience in using the National Lightning Detection System to identify and locate problems on their electric system. A description of the LPS system is included in the paper.

Power System Monitoring and Control Facilities on Protective Relays, S.M. Hadar, 48th Annual Texas A&M Conference for Protective Relay Engineers, Apr 3-5, 1995. As newer protective relays increase in power and therefore their ability to do more than the traditional function of protection, the question arises as to integration of these devices into the control functions of the substation. This paper addresses some of these issues and proposes some advantages of this approach.

Overcurrent Protection Coordination: A Modern Approach for Modern Devices, P.J. Hindle, J.V.H. Sanderson, CEA Engineering and Operating Div. Meetings, Mar 26-31, 1995. An approach to overcurrent relay coordination is proposed which is able to take advantage of improved performance of modern protective devices. The method can deal with mixture of new and old equipment and justifies reduced time margins in many difficult applications.

Capacitive Voltage Transformers: Transient Overreach Concerns and Solutions for Distance Relaying, D. Hou, J. Roberts, 22nd Annual Western Protective Relay Conference, Oct 24-26, 1995. This paper discusses CVT models whose purpose is to identify which major CVT components contribute to the CVT transient which can be a concern with high speed microprocessor relays. The paper also reviews how the Source Impedance Ratio (SIR) affects CVT transient response and discusses improvements in relay logic.


Modern Facilities for Laboratory Testing of Modern Protective Relays, R. J. Marttila, CIGRE, Jun 11-17, 1995, Paper No. 34-103. This paper examines experiences in testing relays to demonstrate new approaches to relay testing, desired capabilities of test equipment, philosophy of testing, importance of testing, and real-time digital simulation.

Relay Database Design, J. McClain, S.M. Chan, D. Choe, IEEE Computer Applications in Power, Vol. 8, No. 3, Jul 1995, p 16-20. This article describes several existing relay database designs and their advantages and disadvantages. A new database model is proposed which is easy to use and can accommodate a wide variety of relays.


A Developmental Package of Interactive Software for Illustrating Power System Protection Principles in Educational and Industry Training Programs, H.A. Smolleck, H. Chen, S. Badruzzaman, R. Bravo, D. Fardave, IEEE Trans. on Power Systems, Vol. 10, No. 1, 1995, p 34-43. This paper describes the philosophy, development and use of a series of microcomputer-based interactive software packages which assist in the analysis and demonstration of some fundamental concepts associated with power system protection and related areas. The modules are applicable to both academic power programs and industry training efforts.


Transformer Modeling as Applied to Differential Protection, S.E. Zocholl, 22nd Annual Western Protective Relay Conference, Oct 24-26, 1995. This paper presents a power transformer model to evaluate differential element performance. The paper analyzes transformer energization, overexitation, external fault, and internal fault conditions with this model.

3158 STABILITY, OUT OF STEP, RESTORATION


Adaptive Load Shedding for Industrial Power Networks, K. P. Brand, D. Weissgerber, CIGRE, Jun 11-17, 1995, Paper No. 34-209. This paper discusses load shedding selectively adapted to the real load and supply situation to preserve maximum availability of the power system.

A New Approach to the Arcing Faults Detection for Fast Autoreclosure in Transmission Systems, M.B. Djuric, V.V. Terzija, IEEE Trans. on Power Delivery, Vol. 10, No. 4, Oct 1995, p 1793-8. Features of a long arc in the air are used as the basis in the algorithm design to avoid automatic reclosing on permanent faults. Simulation studies show that the algorithm can be used for arcing fault detection.


The Role of Adaptive System Protection in Mitigating System Blackouts, S. H. Horowitz, A. G. Phadke, J. S.
This paper reports on research conducted related to hidden failures, and introduces the concepts of regions of vulnerability and vulnerability index to investigate how adaptive relays might be used to eliminate blackouts due to relay failure.


Station Based Semi-Adaptive Auto-Reclose Design and Operating Experience, K. Kuras, CEA Engineering and Operating Div. Meetings, Mar 26-31, 1995. A concept for application of Programmable Logic Controllers (PLCs) and their role in the substation control and automation is discussed. Application of and operating experience from the use of PLCs for substation control and protection within the TransAlta Utilities are presented.

A New Microprocessor Based Islanding Protection Algorithm for Dispersed Storage and Generation Units, M.A. Redfern, J.J. Barrett, O. Usta, IEEE Trans. on Power Delivery, Vol. 10, No. 3, Jul 1995, p 1249-54. The islanding protection algorithm has been developed to be a part of an integrated protection package for dispersed storage and generation units. Results from laboratory and field tests are included to demonstrate the performance of the algorithm.

New Stabilizing Protection Systems With an Adaptive Control Approach, M. Tsukada, I. Kouda, I. Mitani, H. Hayashi, H. Kokai, CIGRE, Jun 11-17, 1995, Paper No. 34-204. This paper discusses two new stabilizing systems that employ an adaptive approach to enable automatic optimum control in cases where power system conditions undergo a drastic change.


3159 SURGE PHENOMENA

Lightning and Surge Protection of Substations, R.B. Carpenter, R.L. Auer, IEEE Trans. on Industry Applications, Vol. 31, No. 1, 1995, p 162-74. This paper discusses the problem of protecting any substation component including the protection system against lightning strikes and to limit incoming transient voltages. A review of conventional protection systems is given. Two new protective systems, dissipation array system and series hybrid surge protection system, are described.

LIST OF PERIODICALS

ABB Review
ABB Marketing Services Ltd., P.O. Box 58, Baden, CH-5401, SWITZERLAND

Canadian Electrical Association (CEA) - Engineering and Operating Div. Meetings
Suite 1600, 1 Westmount Square
Montreal, PQ H3Z 2P9, CANADA

Engineering Institute of Canada
Suite 700, 2050 Mansfield Street
Montreal, PQ H3A 1Z2, CANADA

CIGRE
3-5 rue de Metz, F75010, Paris, France

Electric Light and Power
Technical Publishing Co., 1301 South Grove Ave., Barrington, IL 60010

Electric Construction and Maintenance

Electric Power System Research
Elsevier Sequoia S.A., P.O. Box 564, Lausanne, CH-1001, SWITZERLAND

Electrical Review
Reed Business Publishing, Central House, 27 Park Street, Croyden, CRO 1YD, U.K.

Electrical World
11 West 19th Street, New York, NY 10011

Georgia Tech Protective Relaying Conference
Georgia Institute of Technology, Atlanta, GA 30332

IEEE Proceedings
Institute of Electrical Engineers, Michael Faraday House, Six Hills Way, Stevenage, Herts SG1 2AY, U.K.

IEEE Transactions, Journal and Conference Papers
IEEE Service Center, 445 Hoes Lane, P.O. Box 1331, Piscataway, NJ 08855-1331

Power

Texas A&M Protective Relaying Conference
Texas A&M University, College Station, TX, 77843

Transmission and Distribution
Intertec Publishing Inc., 5072 West Chester Pike, Edgemont, PA, 19028

Western Protective Relaying Conference
Washington State University, Pullman, WA, 99163