

POWER SYSTEM RELAYING COMMITTEE- 2010

Scope: Treatment of all matters in which the dominant factors are the application, design, construction, and operation of protective, regulating, monitoring, synchronism-check, synchronizing, reclosing, and auxiliary relays, including all matters necessary to the function of such relays and relaying systems employed in the generation, transmission, distribution, and utilization of electrical energy and including the effects of such relays on system operation. Treatment of techniques and requirements for communications within, between, and among protective relays, to the extent that these communications affect protection functions or performance. Maintenance of liaison and collaboration as required with other committees of the Power & Energy Society and associated Groups and Societies of the IEEE. Web Site: <http://www.pes-psrc.org/>

M. P. Sanders, *Chair*
AMETEK Power Instruments
4050 NW 121st Ave.
Coral Springs, FL 33065

R.D. Pettigrew, *Vice-Chair*
TRC Inc.
92 Crestridge Dr.
Asheville, NC 28803

R. Hedding, *Secretary*
ABB Inc.
598 N. Buth
Dousman, WI 53118

J. G. Gilbert, *Standards Coordinator*
PPL Electric Utilities Corp
2 North 9th Street, GENN4
Allentown, PA 18101-1179

Members

Adamiak, M. G.
Anderson, B.B.
Apostolov, A. P.
Appleyard, J. C.
Bartok, G.J.
Basler, M.
Beckwith, T.R.
Begovic, M. M.
Behrendt, K.
Benmouyal, G.
Benou, M.R.
Beresh, R.
Birt, K.
Bolado, O.
Boyle, J. R.
Brunello, G.A.
Brunner, C.
Bui, D-P

Bukhala, Z.
Burger, J. F.
Burnworth, J.
Carpenter, W. M.
Carroll, P.T.
Cease, T.W.
Chadwick, J. W., Jr.
Chano, S. R.
Chaudhary, A.K.S
Conrad, S. P.
Crellin, R.
Darlington, A. N.
Das, R.
Dempsey, R. W.
Deronja, A.
Dickerson, B.
DoCarmo, H.
Elkin, P.
Elmore, W. A.
Fennell, E. C.
Finney, D.
Fodero, K.
Fredrickson, D.
Friend, F. A.
Gardell, J.
Gilleland, H.
Giuliant, A. T.
Hackett, J
Hamai, D.
Hackett, J.
Hartmann, W. G.
Henville, C. F.
Holbach, J.
Horowitz, S. H.
Hunt, R.
Huntley, C.
Ibrahim, M.
Imai, S.
Ingleson, J. W.
Jodice, J.A.
Johnson, G.F.
Kasztenny, B.
Kerrigan, P.
Kezunovic, M.
Kobet, G.
Kojovic, L.
Kumar, P.
Kunsman, S.A.
Lascu, R.
Lukach, D.
Madani, V.
Makki, A.
Martin, K.
Martin, P.
McCannon, W.
McDonald, M. J.
McLaren, P. G.
Meisinger, M.
Miller, D.K.
Moskos, G.
Mozina, C. J.
Mugalian, B.
Mysore, P.G.
Nail, G. R.
Nemeir, M.
Novosel, D.
O'Brien, J.M.
Patterson, R. W.
Phadke, A. G.
Pickett, B.A.
Plumtre, F.
Pond, J.
Price, E.
Ranieri, M. M.
Ray, R.E.
Reichard, M.L.
Sachdev, M. S.
Schroeder, M.S.
Seegers, T.
Sessler, G. A.
Sevcik, D.R.
Sidhu, T.
Simon, M. S.
Skendzic, V.
Smith, L. E.
Stephan, K. A.
Strang, W. M.
Sufana, C. R.
Swanson, M. J.
Sykes, J.A.
Taylor, R. P.
Tengdin, J. T
Thompson, M.
Tziouvaras, D. A.
Uchiyama, J. T.
Udren, E. A.
Usman, S.M.
Vandiver, B.
Venkata, S.S
Ward, S.
Waudby, W. P.
Weers, D.D.
Wiedman, T.
Whittaker, R.L.
Winston, P. B.
Yalla, M.
Young, R.C.
Young, R.
Zimmerman, K.

Honorary Members

Bright, J. A.
Brownlee, W. R.
Colwell, D. H.
Dawson, D. C.
Dietrich, R. E.
Dingler, J. B.
Esztergalyos, J.
Feero, W. E.
Haas, R. W.
Huddleston, J. D., III
Jackson, B
Koepfinger, J
Landoll, L. E.
Lowe, W. G.
Marieni, G. J.
Mathews, C. A.
May, G. E.
Michelson, E. L.
Murphy, J. J.
Niessink, T.
Parr, G.
Pashley, R. W.
Pumphrey, O. F.
Rockefeller, G. D.
Sanford, D. E.
Stephens, J. E.
Thorp, J. S.
Volzka, D. R.
Wagner, C. L.
Zocholl, S. E.
Zulaski, J. A.

B: ADVISORY SUBCOMMITTEE

Scope: Assist the Chair of the PSRC on all matters that he may request in the functioning, direction, and conduct of the work of the Main Committee. (Main Committee Officers, Subcommittee Chairs and past PSRC Chairs)

M. P. Sanders, *Chair*
AMETEK Power Instruments
4050 NW 121st Ave.
Coral Springs, FL 33065

R.D. Pettigrew, *Vice-Chair*
TRC Inc.
92 Crestridge Dr.
Asheville, NC 28803

Appleyard, J.
Beresh, R.
Bolado, O.
Boyle, J.R.
Chadwick, J.W.
Dempsey, R.W.
Elmore, W. A.
Giuliant, A. T.
Gilbert, J.G.
Hedding, R. A.
Henville, C. F.
Horowitz, S.H.
Hunt, R.
McDonald, M. J.
Mysore, P.
Nail, G.R.
Patterson, R. W.
Pettigrew, R.D.
Phadke, A.G.
Sidhu, T.
Skendzic, V.
Stephan, K.
Swanson, M.J.
Taylor, R.P.
Thorp, J.S.
Winston, P.B.

B1: AWARDS AND TECHNICAL PAPER RECOGNITION

Assignment: Nominate PSRC-sponsored papers, standards, and reports for PES Technical Council and IEEE awards. To nominate individual members for award recognition. (Subcommittee Vice Chairs)

Bolado, O., *Chair*
ZIV USA Inc.
2340 River Rd. Ste 210
Chicago, IL 60018

Ward, S., *Vice Chair*.
Patterson, R. W.
Pond, J.
Thompson, M.
Udren, E.

Yalla, M.

B2: FELLOWS AWARDS

Assignment: Assist PSRC sponsors with advice on the Fellow nomination process. To access the background of Fellow nominees and aid the PSRC in preparation of required documents.

C. F. Henville, *Chair*
Henville Consulting Inc.
810 English Bluff Road
Delta, BC, V4M 2N5, Canada

B3: MEMBERSHIP

Assignment: Provide assistance in searching for new participants who have qualifications for eventual membership. Assist in maintaining diversity of expertise among active members and participants. Provide assistance, where appropriate, for those needing help gaining support of the organization where they are employed.

M.J. Swanson, *Chair*
MJ Swanson Associates
20 Grandview Road,
Windham, NH 03087

B4: O&P MANUAL REVISION AND WORKING GROUP CHAIR TRAINING

Assignment: Revise and amend PSRC Organization and Procedure Manual when directed to do so by the PSRC Chair. Conduct working group Chair forums on procedures and training.

J.C. Apleyard, *Chair*
Quanta Technology
8134 Lueth Rd.
Sauk City, WI 53583

Hunt, R., *Vice Chair*
GE Multilin
903 Haddon Hall Drive
Apex, NC

B5: BIBLIOGRAPHY AND PUBLICITY WORKING GROUP

Assignment: Annual publication (as an IEEE paper) of lists of references on published information relating to relaying appearing in American and foreign press. Also, preparation of such articles as may be required for the promotion of more general knowl-edge about the relaying art and the work of the PSRC. Promote the sales of selected IEEE standards, guides, and special publications at technical meetings and conferences.

T. Sidhu, *Chair*
University of Western Ontario,
Dept. of Elec. Engineering
London, Ont. N6A 5B9 Canada

B8: LONG RANGE PLANNING

Assignment: The primary function of the Long Range Task Force is to act in an advisory capacity to the Chair of the PSRC. They will discuss and analyze developments in various fields of Electric Power Engineering as they affect the activity of the Power System Relaying Committee. They are to advise the Officers of PSRC if any changes in the organization and operation of the PSRC are desirable. The membership of the Long Range Task Force is limited to ex-Chairs of PSRC.

C. F. Henville, *Chair*
Henville Consulting Inc.
810 English Bluff Road
Delta, BC, V4M 2N5, Canada

Boyle, J.R., Signal Mountain, TN
Chadwick, J.W., Wilmington, NC
Dempsey, R.W., Washington, DC
Elmore, W. A., Blue Ridge, VA
Giuliant, A.T., Galloway, NJ
Horowitz, S.H., Columbus, OH
Nail, G. R., Albuquerque, NM
Phadke, A.G., Blacksburg, VA
Taylor, R. P., Fletcher, NC
Winston, P. B. Forrest Park, GA

B9: PSRC WEB SITE

Assignment: Provide assistance in set-ting up Web Sites and maintaining the PSRC Web Site.

R. W. Patterson, *Chair*
Relayman Protection Services,
P. O. Box 1022,
Chattanooga, TN, 37401

C: SYSTEMS PROTECTION SUBCOMMITTEE

SCOPE: Evaluate protection system responses to abnormal power system states. Evaluate and report on special protection schemes, remedial actions schemes, monitoring and control systems and their performance during abnormal power system conditions. Recommend corrective strategies and develop appropriate standards, guides, or special publications. Evaluate and report on new technologies which may have a bearing on protection system performance during abnormal power system conditions.

R. Hunt, *Chair*
GE Multilin
903 Haddon Hall Drive
Apex, NC

S. Ward, *Vice Chair*
RFL Electronics, Inc.
353 Powerville Rd.
Boonton Twp., NJ 07005

Apostolov, A. P.
Begovic, M. M.
Behrendt K.
Birt, K.
Buanno, A.
Cease, T.W.
Chadwick, J. W.
De L Ree, J.
Deronja, A.
DoCarmo, H.
Henville, C. F.
Horowitz, S. H.
Imai, S.
Kobet, G.
Kojovic, L.
Kunsman, S.
Madani, V.
McLaren, P. G.
Meisinger, M.
Novosel, D. J.
O'Brien, J.
Pond, J.
Sachdev, M.S.
Seegers, T.
Sidhu, T.
Strang, W. M.
Sykes, J. A.
Thorp, J. S.
Tziouvaras, D. A.
Udren, E. A.
Vandiver, B.
Venkata, M.
Winston, P. B.
Young, R. C.

C4 INDUSTRY EXPERIENCES WITH SYSTEM INTEGRITY PROTECTION SCHEMES (SIPS)

Assignment: Conduct a survey of power systems professionals worldwide to accumulate experiences with the System Integrity Protection Schemes (SIPS). This survey will complement and expand on the previously published IEEE/CIGRE paper "Industry Experience with Special Protection Schemes" by P.M. Anderson and B.K. LeReverend (IEEE Transaction on Power Systems, Vol. II, No. 3, August 1996). The survey will be conducted via an internet-based questionnaire with the assistance of, and be available to, other interested parties; (e.g. IEEE, CIGRE, PES, EPRI, etc.). The survey will be concluded by September 2007 and will be presented in a report to the "C" Subcommittee and a Summary Transactions paper.

V.Madani, *Chair*
Pacific Gas and Electric Co.
1919 Webster St.
Oakland,CA 94612

Begovic, M. M., *Vice Chair*
Atlanta, GA

Adamiak, M
Apostolov,A
Adapa, R
Amantegui, J
Bartok, G
Brunello, G
Bui, D
Cease, TW
Colpron, G
De La Ree, J
dos Santos, A
Elizondo, D
Henville, C
Horowitz, S
Imai, S
Kasztenny, B
Martin, K
Muro, V
Novosel, D
Phadke, A
Sykes, J
Udren, E
Vaccaro, A
Ward, S
Young, R
Zhang, P

CIGRE Contributors (Please note some of the PSRC members above are also CIGRE members and contributors)

Richard J Adams – UK
Javier Amantegui – Spain
Santiago López Barba – Spain
Andre dos Santos - Portugal
John.Fitch - UK
Jean-Marie Gagnon – Canada
Fernando González – Argentina
Stig Holst – Sweden
Daniel Karlsson, Sweden
Dong Kim - Korea
Volker Leitloff – France
Jorge Miguel Ordacgi F. – Brazil
Walter Sattinger – Switzerland
Tevik Sezi – Germany
Vladimir Terzija - UK
Akira Takeuchi – Japan

C9 GUIDE FOR THE APPLICATION OF PROTECTIVE RELAYS USED FOR ABNORMAL FREQUENCY LOAD SHEDDING AND RESTORATION

Assignment: The project will develop a Guide for the application of protective relays used for load shedding and restoration during electric power system abnormal conditions. It will present background information bibliography, and recommendations. It discusses abnormal frequency power system behavior, existing load shedding and restoration practices, the abnormal frequency function of typical protective relays, and possible new methods for improving load shedding and restoration. This project is limited to electric

power system applications and will not include Abnormal Frequency Protection for Power Generating Plants.

A.P. Apostolov, *Chair*
Omicron.
Los Angeles, CA

K. Behrendt, *Vice-Chair*
New Berlin, WI

Beazer, R.
Begovic, M.
Benmouyal, G.
Birt, K.
Broback B.
Chaudhary A.
Darlington A.
DeCesarts, M.
Domin, T.
Emigh D.
Ferraro, J.R.
Feero, B.
Hartmann, W.
Hunt, R.
Ibrahim, M.A.
Johnson, G.
Karlsson, D.
Kazemi, A.R.
Kojovic, L.
Lacroix, M.
Lanigan, T.C.
Leonhardt D.
Madani, V.
Miller, D.H.
Mysore, P.
Nagpal M.
Novosel, D.
Saha, M.
Shuh, Hong Ming
Sidhu, T.S.
Thompson, M.
Tziouvaras, D.A.
Udren, E.A.
Vandiver B.
Ware, D.K.
Young, R.
Young, R.C.

C11 GUIDE FOR PROTECTION SYSTEM TESTING

Assignment: The working group will develop a guide for system application test requirements, scope and level of tests, and benefits for overall protective schemes. This assignment includes SPSs, end-to-end testing, data collection requirements, and the test procedure definitions.

V. Madani, *Chair*
Pacific Gas and Electric Co.,
1919 Webster St.,
Oakland, CA, 94612

H. DoCarmo, *Vice Chair*
Houston, TX

Achterkamp, M.
Adamiak, M.
Agudo, M.

Apostolov, A.
Begovic, M.
Beresh, R.
Brunello, G.
Bui, D.
Chilcote, S.
Colpron, G.
Das, R.
Gardner, K.
Goodrich, D.
Giulianta, A.
Henneberg, G.
Hunt, R.
Kasztenny, B.
Kern, T.
Kezunovic, M.
Kobet, G.
McLaren, P.
Mendik, M.
Mustaphi, K.
Novosel, D.
Rahmatian, F.
Santos, A.
Seegers, T.
Sykes, J.
Udren, E.
Vaccaro, A.
Vandiver, B.
Verzosa, J.
Voloh, I.

C13 UNDERVOLTAGE LOAD SHEDDING

Assignment: This working group produces a report on the implementation of undervoltage load shedding (UVLS) in electric power systems. It presents background information, guidance in implementing UVLS schemes and a bibliography. Voltage instability, voltage and reactive power management, emergency actions to avoid load shedding, UVLS philosophy and methods, voltage collapse detection, existing practices, settings and coordination between UVLS and UFLS are discussed.

M. Begovic, *Chair*
Atlanta, GA

S. Imai, *Vice Chair*
Tokyo, Japan

Apostolov, A.
Birt, K.
Buanno, A.
Burger, J.
Cunico, R.
Harley, K.
Henry, G. P.
Henville, C.
Imai, S.
Kao, M.
Lukach, D.
Madani, V.
Martin, K.
May, S. G.
Mozina, C.
Nail, G.
Novosel, D.

Shin, J.
Sleva, T.
Van Cutsem, T.
Henneberg, G
Vournas, C.
Wiedman, T.
Young, R.

C14 USE OF TIME SYNCHRONIZED MEASUREMENTS IN PROTECTIVE RELAYING APPLICATIONS.

Assignment: Develop a report that identifies synchrophasor data and parameters that are useful for improving protection schemes and analyzing protective relay performance. The report will not include deployment of devices to acquire time synchronized measurements.

J. O'Brien, *Chair*
Duke Energy
P O Box 1006
Charlotte, NC 28201

A. Deronja, *Vice-Chair*
Milwaukee, WI

Girgis, A
Apostolov, A
Vandivar, B
Dickerson, B
Tholomier, D
Hammond, D
Price, E
Benmouyal, G
Kobet, G
Murphy, J
Wang, J
Tan, J
Burger, J
Gers, J
Martin, K
Nakendra, K
Taylor, M
Begovic, M
Sambasivan, S
Imai, S
Saygin, S
Ward, S
Kunsmann, S
Brahma, S
Sezi, T
Skendzic, V
Terzija, V
Hu, Y
Liao, Y

C15 TESTING AND DESIGN OF SYSTEM INTEGRITY SCHEMES.

Assignment: To write a report on industrial practices in design and testing of selected SIPS.

J. Sykes, *Chair*
PGE

Y. Hu, *Vice-Chair*
Quanta Technology

Adamiak, M
Apostolov, A
Dac-Phuoc, B

Deronja, A
Ebrecht, J
Goodrich, D
Henneberg, G
Imai, S
Madani, V
Miller, D
Sezi, T
Vandiver, B
Wittaker, R

C16 RELAY SCHEME DESIGN FOR MODERN RELAYS.

Assignment: Write a supplement to the 1999 report "Relay Trip Circuit Design" as an IEEE report to address microprocessor relays.

T. Seegers, *Chair*

R. Lascu, *Vice-Chair*
Detroit, MI

Bradt, D.
Calero, F.
Donahoe, K.
Frye, R.
Goodrich, D.
Henriksen, L.
Holbach, J.
Lukach, D.
Mackle, B.
Martin, A.
Patel, M.
Platt, J.
Sevcik, D.
Sperl, J.
Stojak, J.
Strang, B.
Wang, J.
Thakur, S.
Warner, J.

C17 FAULT CURRENT CONTRIBUTION FROM WIND PLANTS.

Assignment: To support the activities of the Joint Working Group on Fault Current Contributions from Wind Plants in the production of a report that characterizes and quantifies the short circuit current contributions to faults from wind plants for the purposes of determining protective relay settings and fault interrupting equipment ratings. The report will provide guidelines on the modeling and calculations for that purpose.

D. Miller, *Chair*
PacifiCorp
825 N.E. Multnomah St, 1600
Portland, OR 97232

G. Henneberg, *Vice-Chair*
Reno, NV

Aguilar, R.
Avendano, O.
Barsch, J.
Bartok, G.
Bolado, O.

Bukhala, Z.
 Conrad, S.
 Deronja, A.
 Donahoe, K.
 Henville, C.
 Liao, Y.
 Mozina, C.
 Musunuri, S.
 Schellenberg, E.
 Wiedman, T.

D: LINE PROTECTION SUBCOMMITTEE

Scope: Investigate and report on the relaying techniques and systems used for transmission and distribution (T&D) line protection. Develop statistics and recommend protection practices for improving line relaying performance. Develop and maintain standards for line protection.

M. McDonald, *Chair*
 Ameren
 P.O. Box 66149
 St. Louis, MO 63103

R. W. Patterson, *Vice Chair*
 TVIG, Inc.
 Suite 410
 1200 Mountain Creek Road
 Chattanooga, TN 37405

Apostolov, A.
 Appleyard, J.
 Behrendt, K.
 Birt, K.
 Boyle, J.
 Brunello, G.
 Carpenter, M.
 Conrad, S.
 Carroll, P.
 Crellin, R.
 Darlington, A.
 Deronja, A.
 Friend, F.
 Giuliante, A.
 Hedding, R.
 Kao, M.
 Kasztenny, B.
 Kezunovic, M.
 Kobet, G.
 Lascu, R.
 Lukach, D.
 McCannon, W.
 Miller, D.
 Mooney, J.
 Nail, G.
 Price, E.
 Sachdev, M.
 Sambasivan, S.
 Schroeder, M.
 Seegers, T.
 Sessler, G.
 Sleva, T.
 Strang, W.
 Sufana, C.
 Sykes, J.
 Taylor, R.
 Udren, E.
 Waudby, P.

Wiedman, T.
 Winston, P.
 Zimmerman, K.

D2: AUTOMATIC RECLOSING GUIDE REVISION

Assignment: Revise and up-date the IEEE Guide C37.104 - Guide for Automatic Reclosing of Line Circuit Breakers for AC Distribution and Transmission Lines

G. Kobet, *Chair*
 TVA
 1101 Market Street
 Chattanooga, TN 37402

G. Sessler, *Vice Chair*
 Cottage Grove, WI

Bender, D.
 Best, M.
 Deronja, A.
 Fontana, D.
 Friend, F.
 Frye, R.
 Kao, M.
 Mackie, B.
 McCannon, W.
 Mysore, P.
 Patterson, R. W.
 Perez, J.
 Price, E.
 Sessler, G.
 Strang, B.
 Sufana, C.
 Voloh, I.
 White, J.
 Zinn, D

D3: CONSIDERATIONS IN CHOOSING DIRECTIONAL POLARIZING METHODS FOR GROUND OVERCURRENT ELEMENTS IN LINE PROTECTION APPLICATIONS

Assignment: Prepare a report to the PSRC on identifying different polarizing methods, address issues related to the application of different methods, and make recommendations in choosing the polarizing method.

M. Kao, *Chair*
 TVIG, Inc.
 1200 Mountain Creek Road
 Suite 410
 Chattanooga, TN 37405

E. Price, *Vice Chair*
 Dawsonville, GA.

Aguilar, R.
 Barsch, J.
 Bartok, G.
 Benmouyal, G.
 Calix, C.
 Crellin, R.
 Cunico, R.
 Elkin, P.
 Frye, R.
 Holbach, J.

Lukach, D.
 McCannon, W.
 Mooney, J.
 O'Brien, J.
 Patel, S.
 Patterson, R. W.
 Plumptre, F.
 Revelle, R.
 Rizvi, I.
 Saygin, S.
 Schroeder, M.

D6: TRANSMISSION LINE MODEL PARAMETER VALIDATION

Assignment: The WG will prepare a report to the main committee on the processes, issues, problems and methodology of validating software parameters for AC transmission lines used for relaying. The report will not include details of relay curve models or other similar relay modeling. The report will also not include specific EMTP modeling.

T. Seegers, *Chair*
 Ameren
 1050 West BLVD.
 Belleville, IL 62221

S. Sambasivan, *Vice Chair*
 New York, NY.

Bartok, G.
 Behrendt, K.
 Crellin, R.
 Cornelison, R.
 Fischer, R.
 Girgis, A.
 Kao, M.
 Lukach, D.
 Nagpal, M.
 Patel, M.
 Turner, R.
 Wang, L.
 Wilson, R.

D9: TRANSMISSION LINE PROTECTION GUIDE REVISION

Assignment: Revise and up-date the IEEE Guide C37.113 - Guide for Protective Relay Applications to Transmission Lines reaffirmed in 2004

M. S. Sachdev, *Chair*
 243 Willoughby Cres.
 Saskatoon, SK Canada
 S7H 4W6

S. Chano, *Vice Chair*
 Montreal, Quebec, CA

Apostolov, A.
 Beresh, R.
 Best, M.
 Brahma, S.
 Brunello, G.
 Buanno, A.
 Bui, D-P

Burger, J.
 Carpenter, M.
 Chaudhary, A.
 Cunico, R.
 Darlington, A.
 Deronja, A.
 DoCarmo, H.
 Fital, J.
 Gordon, W.
 Horowitz, S.
 Jensen, M.
 Kasztenny, B.
 Kennedy, W.
 Lopez, F.
 Lukach, D.
 McCannon, W.
 McDonald, M.
 Mysore, P.
 Nagpal, M.
 Norris, K.
 O'Brien, J.
 Ouellette, D.
 Patterson, R. W.
 Price, E.
 Sambasivan, S.
 Saygin, S.
 Sessler, G.
 Taylor, R.
 Thakur, S.
 Tholomier, D.
 Tziouvaras, D.
 Verzosa, Q.
 Ward, S.
 Westerfeld, J.
 Whittaker, R.
 Wiedman, T.
 Zipp, J.

D11: EFFECT OF DISTRIBUTION AUTOMATION ON RELAYING

Assignment: Prepare a special report to the PSRC that describes the effect of Distribution Automation on relaying.

F. Friend, *Chair*
 American Electric Power
 P.O. Box 1986
 Charleston, WV 25327-1986

G. Johnson, *Vice Chair*
 Richmond, VA

Carroll, P.
 Dood, M.
 Gers, J.
 Girgis, A.
 Goodrich, D.
 Heavey, P.
 Hedding, R.
 Hodder, S.
 Kojovic, L.
 Lascu, R.
 Lukach, D.
 Meisinger, M.
 Moskos, G.
 Mugalian, B.
 Ortiz, V.
 Parker, D.
 Siew, C.
 Sufana, C.
 Venkata, M.

Zimmerman, K.
Zinn, D.

WG D21: SUPPORTING IEC STD
FOR DISTANCE RELAY
CHARACTERISTICS

Assignment: Provide an IEEE/PSRC technical input to the ongoing development of IEC Standard 60255-121, dealing with distance relays to standardize impedance relay characteristics, performance, accuracy, and testing aspects.

A. Apostolov, *Chair*
2950 Bentley Ave., Unit 4
Los Angeles, CA 90064

A. Deronja, *Vice Chair*
Waukesha, WI

Ariza, J.
Behrendt, K.
Benmouyal, G.
Brunello, G.
Dac-Phuoc, B.
Hedding, R.
Holbach, J.
Ito, H.
Liao, Y.
Naisani, P.
Ouellette, D.
Saygin, S.
Skendzic, V.
Tziouvaras, D.
Thompson, S.
Udren, E.
Verzosa, J.
Yalla, M.

D22: PERFORMANCE
SPECIFICATION AND TESTING OF
TRANSMISSION LINE RELAYS FOR
FREQUENCY RESPONSE

Assignment: Investigate the feasibility of defining a range of frequency and rate of change of frequency to be used in a performance specification for protective relaying functions. If this proves feasible then the WG will pursue the feasibility of developing a test process for transmission line relays subjected to off frequency disturbance including rate of change of frequency conditions during stressed system conditions.

T. Wiedman, *Chair*
Consultant
4101 S. Pleasant Hill Dr.
Elizabeth, IL 61028

J. Verzosa, *Vice Chair*
Watertown, MA

Benmouyal, G.
Brunello, B.

Buanno, A.
Bui, D.
Chaudhary, A.
Ingelson, J.
Kasztenny, B.
Kim, S.
Martin, A.
Niemira, J.
Oullette, D.
Sambasivan, S.
Schellenburg, E.
Schroeder, L.
Stuart, B.
Sykes, J.
Tan, J.
Turner, S.
Tziouvaras, D.
Verzosa, J.
Ward, S.
Winston, P.
Zipp, J.
Zuhair, M.

D24: TRANSMISSION LINE
APPLICATIONS OF DIRECTIONAL
GROUND OVERCURRENT RELAYS

Assignment: Prepare a report to the Transmission Line Guide revision working group and PSRC on the justifications and application criteria for directional ground overcurrent relays.

D. Lukach, *Chair*
Ameren
370 S. Main
Decatur, IL 62523

R. Taylor, *Vice Chair*
Fletcher, NC

Barsch, J.
Behrendt, K.
Best, M.
Bloder, M.
Bradt, D.
Brahma, S.
Crellin, R.
Cunico, R.
Deronja, A.
Fontana, D.
Garcia, R.
Henneberg, G.
Kao, M.
Mackie, B.
McCannon, W.
Miller, D.
Miller, J.
O'Brien, J.
Patel, M.
Sevcik, D.
Turner, S.

D25: DISTANCE RELAY
RESPONSE TO DISTORTED
WAVEFORMS

Assignment: Write a technical report to the Line Protection Subcommittee on the performance of distance elements with distorted waveforms.

K. Zimmerman, *Chair*
Schweitzer Engineering Labs
122 Lincoln
Place Court, Suite 203
Belleville, IL 62221

A. Martin, *Vice Chair*
Vancouver, WA

Agudo, M.
Ashrafi, H.
Buneo, J.
Deronja, A.
DoCarmo, H.
Fischer, N.
Grimm, J.
Holbach, J.
Lane, J.
Liao, Y.
Mooney, J.
Price, E.
Turner, R.
Uchiyama, J.
Wang, J.
Zhang, Z.

DTF26: REVISION OF C37.114
FAULT LOCATION GUIDE

Assignment: Investigate the need of a working group to update C37.114.

J. Mooney, *Chair*
Power Engineers
1300 16th Avenue, Suite 200
Clarkston, WA 99403

R. Cunico, *Vice Chair*
Forrest Park, GA

DTF27: INVESTIGATE CREATION
OF A LINE DIFFERENTIAL
PROTECTION GUIDE

Assignment: Investigate the need of a working group to create an IEEE guide on Line Differential Protection.

B. Kasztenny, *Chair*
Schweitzer Engineering
Laboratoies
19 Allstate Parkway, Ste 305
Markham, Ontario L3R 5A4

Vice Chair- TBD

**H: RELAYING
COMMUNICATIONS
SUBCOMMITTEE**

Scope: Evaluate and report on the characteristics and performance of protective relaying communications. Recommend communication requirements and operating and test procedures, which assure reliable performance of the overall

protective system. Report on new relaying equipment designs tailored to specific communication requirements.

V. Skendzic, *Chair*
Schweitzer Engineering Labs
2350 NE Hopkins Court
Pullman, WA 99163

E. Udren, *Vice Chair*
Quanta Technology, LLC
1395 Terrace Drive
Pittsburgh, PA 15228

Adamiak, M.
Allen, E.
Antonova, G.
Apostolov, A.
Benou, M.
Brunner, C.
Bui, D.P.
Burger, J.
Cornelison, R.
Dahlin, T.
Das, R.
Dickerson, B.
Fodero, K.
Fortin, E.
Hackett, J.
Holbach, J.
Huddleston, J.
Huntley, C.
Ingleson, J.
Klein, S.
Kunsmann, S.
Makki, A.
Martin, A.
Martin, K.
Martin, P.
Midence, R.
Ray, R.
Sanders, M.
Sachdev, M.
Sciacca, S.
Simon, M.
Smith, L.
Sufana, C.
Swanson, M.
Tengdin, J.
Vandiver, B.
Voloh, I.
Young, R.

H1: A GUIDE FOR APPLICATION OF
DIGITAL TELEPROTECTION

Assignment: Develop a guide for application of digital communications for protective relaying systems and schemes, including transmitting and receiving equipment, digital channels, application principals, performance, installation, troubleshooting, testing and maintenance. Reflected in this guide is the knowledge and experience of equipment manufacturers and power utility users.

M. Benou, Chair
INIVEN
5 Columbia Road
Somerville, NJ 08876

I. Voloh, Vice Chair
GE Multilin
215 Anderson Ave.
Markham, ON L6E 1B3,
Canada

Allen, M.
Bolado, O.
Dahlin, T.
Ebrecht, J.
Finley, J.
Fodero, K.
Huntley, C.
Ince, B.
Miller, J.
O'Brien, J.
Phillippe, T.
Ray, R.
Simon, M.
Swanson, M.
Ward, S.
Young, R.

H2: PROTECTIVE RELAY
APPLICATIONS USING SMART GRID
COMMUNICATIONS
INFRASTRUCTURE

Assignment: Create a working group report to the Relaying Communications Subcommittee that describes example protective relay applications that can make use of the communication infrastructure provided by the "Smart Grid". Protective relay applications will include potential capabilities and the communication requirements necessary to provide suitable communication architectures, services, capabilities, and any other pertinent characteristics.

M. Simon, *Chair*
Exelon Energy
Two Lincoln Centre, 09-NW-28
Oakbrook Terrace, IL 60181

Adamiak, M.
Best, M.
Breault, C.
Byard, A.
Carden, M.
Cobelo, F.
Cornelison, R.
Dahlin, T.
Dickerson, B.
Einarsson, T.
Fodero, K.
Gilbert, J.
Gould, J.
Grier, S.
Gunther, E.
Hassan, S.
Higinbotham, B.
Hughes, R.
Huntley, C.
McDonald, M.
Michel, G.

Mustaphi, K.
Mysore, P.
Noonan, K.
O'Brien, J.
Pickett, B.
Ramaswami, R.
Ray, R.
Salewske, T.
Sanders, M.
Serizawa, Y.
Stephan, K.
Stoupis, J.
Swanson, M.
Ward, S.

H3: TIMETAGGING IN PROTECTION
AND DISTURBANCE RECORDING
IEDS

Assignment: Develop a recommended practice for time tagging of power system protection event, analog, and derived data. This will include methodology for description of measurements and transport delays and for stating the resulting time accuracy.

B. Dickerson, *Chair*
Livingston Consulting
PO Box 1415
Blairmore, AB T0K 0E0
Canada

J. Hackett, *Vice Chair*
Eldridge, Iowa

Adamiak, M.
Allen, E.
Apostolov, A.
Behrendt, K.
Brunner, C.
Bui, D.P.
Fodero, K.
Galanos, J.
Hamilton, R.
Haveron, S.
Hu, Y.
Ingleson, J.
Martin, A.
Martin, K.
Murphy, J.
Narendra, K.
Perez, J.
Sabin, D.
Skendzic, V.
Wang, J.

H4: REVISION OF C37.111-1999
COMTRADE STANDARD

Assignment: Review and revise the existing C37.111 standard describing common format for the data files and medium needed for exchange of fault disturbance, test and simulation data.

R. Das, *Chair*
ABB
252 Brodhead Rd Ste 500
Bethlehem, PA 18017

A. Makki, *Vice Chair*
Softstuf, Inc.
P.O. Box 40245
Philadelphia, PA 19106

Adamiak, M.
Anderson, S.
Apostolov, A.
Bray, G.
Brunner, C.
Bui, D.P.
Dickerson, B.
Giuliantie, T.
Gunther, E.
Hackett, J.
Hamilton, R.
Holbach, J.
Ingleson, J.
Kasztenny, B.
Kezunovic, M.
Madani, V.
Martin, P.
McLaren, P.
Mehta, H.
Nayak, O.
Narendra, K.
Pond, J.
Pickett, B.
Saha, M.
Smith, L.
Tan, J. C.
Thompson, S.
Vandiver, B.
Verzosa, J.
Ward, S.
Wiedman, T.
Zinn, D.

H5: COMMON FORMAT FOR IED
CONFIGURATION DATA

Assignment: Define a common format for IED configuration data. The common format can be used to exchange IED data between various data sources and receivers. Sources and receivers can be IED configuration programs, network study programs, data bases, coordination programs and automated test programs.

J. Holbach, *Chair*
Quanta Technology, LLC
4020 Westchase Blvd.
Suite 300
Raleigh, NC 27607

D.P. Bui, *Vice Chair*
Hydro Quebec
Montreal, PQ
Canada

Apostolov, A.
Brunner, C.
Cornelison, R.
Gunther, E.
Hackett, J.
Hodder, S.
Ito, H.
Kezunovic, M.
Klein, S.
Martin, P.
Musunuri, S.

Narendra, K.
Price, E.
Skendzic, V.
Smith, L.
Taylor, M.
Thompson, S.
Vandiver, B.
Verzosa, J.
Wang, J.

H6: RELAY TO RELAY
COMMUNICATIONS UTILIZING AN
ETHERNET NETWORK

Assignment: This work focuses on user requirements and provides recommendations for relay peer-to-peer communications in substations. The work of H6 will further develop and define practices for the application and testing of IEC 61850 based Ethernet protocol in substation LAN, peer-to-peer applications.

J. Burger, *Chair*
American Electric Power
Columbus, OH

C. R. Sufana, *Vice Chair*
KEMA
Munster, IN

Adamiak, M.G.
Apostolov, A.P.
Beckwith, T.R.
Benmouyal, G.B.
Brunner, C.
Capatina, R.
Clark, D.M.
Cobelo, F.C.
Cooley, K.L.
Dood, L.
Falk, H.
Geline, A.
Gilbert, J.
Gresko, G.
Gunther, E.
Gupta, R.
Hamdon, A.
Higinbotham, W.
Hohn, J.
Holbach, J.
Holstein, D.
Huntley, C.
Janssen, M.
Klein, S.
Krause, R.
Kulshrestha, A.
Kunsmann, S.
Melcher, J.
Michel, G.
Muschlitz, B.
Pavgaoukav, V.
Pozzoli, M.
Reckerd, D.
Simon, M.
Skendzic, V.
Tengdin, J.
Thesing, M.
Tholomier, D.
Toupin, M.
Vandiver, B.
Wallace, C.
Wang, L.

- Ware, D.
Whatley, J.
Yalla, M.
Zipp, J.
- H7: IEEE 1588 PROFILE FOR PROTECTION APPLICATIONS
- Assignment:* Develop "IEEE Standard Profile for Use of IEEE 1588 Precision Time Protocol in Power System Protection" in close coordination with IEC TC57 WG10 and other technical committees with similar interests. Joint WG with Substations Committee C7.
- G. Antonova, *Chair*
Burnaby, BC
Canada
- B. Dickerson, *Vice Chair*
Livingston Consulting
PO Box 1415
Blairmore, AB T0K 0E0
Canada
- T. Tibbals, *Chair for SC C7*
Schweitzer Engineering Labs
2350 NE Hopkins Court
Pullman, WA 99163
- Apostolov, A.
Benmouyal, G.
Brunner, C.
Bui, D.P.
Gould, J.
Hoga, C.
Huntley, C.
Klein, S.
Kunsman, S.
Martin, K.
Michel, G.
Moore, R.
Murphy, J.
Musunuri, S.
Skendzic, V.
Wang, J.
- H8: APPLICATION OF COMTRADE FOR EXCHANGE OF SYNCHROPHASOR DATA
- Assignment:* Develop a paper on issues related to the use of COMTRADE for exchange of Synchrophasor Data. Develop a profile (schema) to use COMTRADE for this purpose. Report on other formats that have been used such as ".dst". Address issues that would arise in converting .dst and other formats to COMTRADE.
- E. Allen, *Chair*
NERC
116-390 Village Blvd.
Princeton, NJ 08540
- J. Ingleson, *Vice Chair*
RLC Engineering
402 Bond Road
- Altamont, NY 12009
- K. Narendra, *Vice Chair*
ERLPhase
74 Scurfield Blvd.
Winnipeg, MB R3Y 1G4
- Adamiak, M.
Anderson, S.
Benmouyal, G.
Bui, D.P.
Dickerson, B.
Hackett, J.
Makki, A.
Martin, K.
Murphy, J.
Tan, J.C.
Taylor, M.
- H9: UNDERSTANDING COMMUNICATIONS TECHNOLOGY FOR PROTECTION SYSTEMS
- Assignment:* Prepare a document that will assist engineers in understanding the communications technology for protective relaying.
- R. Midence, *Chair*
RuggedCom Inc.
300 Applewood Crescent,
Concord, ON L4K 5C7
Canada
- M. S. Sachdev, *Vice Chair*
Saskatoon, SK
Canada
- Antonova, G.
Basler, M.
Benou, M.
Beresh, B.
Bolado, O.
Brahma, S.
Dahlin, T.
Gers, J.M.
Giang, D.
Goodrich, D.
Gould, J.
Hu, Y.
Huerta, C.
Ito, H.
Kim, S.
Mackie, B.
McLaren, P.
Miller, J.
Niemira, J.
Platt, J.
Seegers, T.
Sidhu, T.
Simon, M.
Usman, S.
Ward, S.
Ware, D.
- H10: DEVICE NAMING CONVENTIONS (IEDs)
- Assignment:* Create a PSRC Report that describes a convention to uniquely identify (name) installed Intelligent Electronic Devices (IEDs) for
- sharing data collected by these devices.
- R. Cornelison, *Chair*
Alabama Power
600 North 18th Street
Birmingham, AL 35203-0762
- J. Hackett, *Vice Chair*
Eldridge, Iowa
- A. Makki, *Secretary*
Softstuf, Inc.
Philadelphia, PA
- Apostolov, A.
Brunner, C.
Frisk, L.
Goodrich, D.
Green, V.
Gresko, G.
Ingleson, J.
Klein, S.
Martin, K.
Narendra, K.
Pond, J.
Tan, J.C.
Taylor, M.
Tengdin, J.
Wiedman, T.
- H11: REVISION OF C37.118 SYNCHROPHASOR STANDARD
- Assignment:* Revision of the synchrophasor standard, IEEE IEEE-C37.118. A PAR was approved in 2008 to revise the standard by adding dynamic measurement requirements, communication harmonization with IEC 61850, add PDC & file specifications as needed, and resolve any issues.
- K. Martin, *Chair*
Consultant
2306 NE 46th Ave
Portland, OR 97213
- B. Kasztenny, *Vice Chair*
Schweitzer Engineering Labs
Markham, Ontario L3R 5A4
Canada
- Adamiak, M.
Anderson, S.
Begovic, M.
Benmouyal, G.
Brunello, G.
Burger, J.
Dickerson, B.
Gers, J.
Hu, Y.
Ingleson, J.
Murphy, J.
Narendra, K.
Phadke, A.G.
Sezi, T.
Skendzic, V.
Wang, J.
Willemse, C.
- H12: CONFIGURING ETHERNET COMMUNICATIONS EQUIPMENT
- FOR SUBSTATION PROTECTION AND CONTROL APPLICATIONS
- Assignment:* Develop a report to assist protection engineers in configuring Ethernet LANs and networking equipment when the network traffic includes critical protection messaging such as IEC 61850 GOOSE messaging. Topics include switch and router configuration, VLANs, security, priority queuing, traffic monitoring and control, and topology choices and redundancy.
- E. Udren, *Chair*
Quanta Technology, LLC
1395 Terrace Drive
Pittsburgh, PA 15228
- J. Gould, *Vice Chair*
RuggedCom Inc.
30 Whitmore Road,
Woodbridge, ON L4L 7Z4,
Canada
- Antonova, G.
Benmouyal, G.
Brunner, C.
Burger, J.
Dickerson, B.
Dood, M.
Imai, S.
Kasztenny, B.
Martin, A.
McClure, P.C.
Moore, R.
Preuss, C.
Ray, R.
Simon, M.
Sufana, C.
Tengdin, J.
Tran, T.
Yang, H.
- H13: UNDERSTANDING REQUIREMENTS AND APPLICATIONS OF THE SUBSTATION CYBER SECURITY STANDARDS
- Assignment:* Prepare a standard on "Cyber Security Requirements for Substation Automation, Protection and Control Systems." This document provides technical requirements for substation cyber security. It presents sound engineering practices that can be applied to achieve high levels of cyber security of automation, protection and control systems independent of voltage level or criticality of cyber assets. Cyber security includes trust and assurance of data in motion, data at rest and incident response. Joint WG with Substations Committee C1.
- S. Kunsman, *Chair*
ABB Substation Automation

Allentown, PA

T. Tran, *Vice Chair*
TVA
Chattanooga, TN

Sciacca, S. *Chair for SC C1*
Microsol
Seymour, CT

Antonova, G.
Braendle, M.
Bui, D.P.
Cease, T.W.
Dalyai, S.
Dood, M.
Giarratano, D.
Gould, J.
Gresko, G.
Hammond, D.
Holbach, J.
Johnson, A.
Itism, E.
Klein, S.
Lascu, R.
Martin, K.
Mcclure, P.C.
Midence, R.
Pargaonkar, V.
Popescu, B.
Preuss, C.
Saia, N.
Sambacivan, S.
Simon, M.
Smith, L.
Tengdin, J.
Thanos, D.
Thompson, S.
Toornier, A.
Udren, E.
Ward, S.

H15: COUPLING
REDUNDANCY FOR
PROTECTION SYSTEMS
USING POWER LINE CARRIER

Assignment: To develop a working group report that discusses the various coupling schemes for power-line-carrier systems and the coupling schemes ability to provide for redundancy.

R. E. Ray, *Chair*
Ametek Power Instruments
4050 NW 121 Avenue
Coral Springs, FL 33065

B. Pickett, *Vice Chair*
Florida Power & Light
700 Universe Blvd
Juno Beach, FL 33408

Fella, R.
Finley, J.
Huerta, C.
Ince, B.
Kellner, J.
Miller, J.
Reckerd, D.
Sanders, M.
Sevcik, D.

Simon, M.
Winston, P.
Zipp, J.

H16 COMMON FORMAT FOR IED
EVENT DATA

Assignment: The flexibility provided by digital devices in recording network fault event data in the electric utility industry has generated the need for a standard format for the exchange of data. These data are being used with various devices to enhance and automate the analysis of power systems and related protection schemes during fault and disturbance conditions. The Working Group will define a standard for a common format for the data files needed for the exchange of various types of power network events.

M. Adamiak, *Chair*
GE Multilin – Advanced
Technologies
530 Swedesford Rd.
Wayne, PA 19087

P. Martin, *Vice Chair*
Hydro-Quebec, TransÉnergie
2 Complexe Desjardins,
Montreal, Canada H5B 1H7

Allen, E.
Anderson, S.
Apostolov, A.P.
Brunner, C.
Hackett, J.
Hamilton, R.
Holbach, J.
Kezunovic, M.
Klein, S.
Smith, L.
Thompson, S.
Vandiver, B.

HTF1: IEEE C37.115-2003
STANDARD TEST METHOD FOR
USE IN THE EVALUATION OF
MESSAGE COMMUNICATIONS
BETWEEN INTELLIGENT
ELECTRONIC DEVICES IN AN
INTEGRATED SUBSTATION
PROTECTION, CONTROL, AND
DATA ACQUISITION SYSTEMS

Assignment: Recommend whether to reaffirm, revise or retire.

J. Tengdin, *Chair*
Opus Publishing
San Clemente, CA

HTF2: ESTABLISHING LINKS
BETWEEN COMTRADE, IEC
61850 AND CIM.

Assignment: The TF will explore the possibility to link IEC 61850, CIM and COMTRADE in a way

that the COMTRADE channels can be associated to a node in the power network. If the TF considers the work of relevance, it will propose the scope for a new WG.

C. Brunner, *Chair*
UTInnovation
Chollerstrasse 3
6300 Zug
Switzerland

A. Apostolov, *Vice Chair*
OMICRON
Los Angeles, CA

HTF3: IEC/IEEE JOINT TASK
TEAM FOR SYNCHROPHASOR
STANDARD DEVELOPMENT

Assignment: Coordinate joint development of an IEC/IEEE synchrophasor standard.

K. Martin, *Chair*
Consultant
2306 NE 46th Ave
Portland, OR 97213

Adamiak, M.
Archer, B.
Benmouyal, G.
Brunner, G.
Brunner, C.
Bui, D.P.
Englert, H.
Falk, H.
Fitch, J.
Gers, J.
Haveron, S.
Hu, Y.
Kirby, B.
Mehta, H.
Murphy, J.
Pellizzoni, R.
Rahmatian, F.
Skendzic, V.
Steinauser, F.
Takani, H.
Tate, Z.
Tibbals, T.

HTF4: CYBER SECURITY FOR
PROTECTION RELATED DATA FILES

Assignment: Recommend future SC activities in support of access security for computer file data used for configuration, management, and analysis of protective relaying systems.

A. Makki, *Chair*
Softstuf, Inc.
P.O. Box 40245
Philadelphia, PA 19106

**I: RELAYING PRACTICES
SUBCOMMITTEE**

Scope: Develop, recommend and establish standards on

protective relaying practices which are compatible with the electrical environment, including but, not limited to; relay withstand capabilities to electromagnetic interference, characteristics and performance of instrument transformers, testing procedures, applications, performance criteria, and definitions of relays and relay systems. Evaluate and report on pertinent aspects of protective relaying not addressed by other PSRC Subcommittees. Maintain applicable protective relaying standards.

R. Beresh, *Chair*
P&C Service Line Leader
Kinectrics Inc.
800 Kipling Ave, Unit #2
Toronto, Ontario
Canada M8Z6C4

Jeff Pond, *Vice Chair*
National Grid USA
35 Laurel St.
Auburn, MA 01501

Anderson, B.B.
Apostolov, A.P.
Ball, R.
Beckwith, T.
Bolado, O.
Boyle, J.R.
Burnworth, J.
Carpenter, W.M.
Chadwick Jr., J.W.
Das, R.
Friend, F.
Giilbert, J. G.
Gilleland, H.
Hackett, J.P.
Hasenwinkle, I.O.
Higinbotham, W.
Holbach, J.
Horowitz, S.H.
Ingleson, J.
Jodice, J.
Kojovic, L.
Makki, A.
McLaren, P.G.
Meisinger, M.
Moskos, G.P.
Mugalian, B.
Nagpal, M.
Nemier, M.
Pettigrew, R.D.
Pickett, B.A.
Ranieri, M.M.
Sachdev, M.S.
Sevcik, D.
Simon, M.S.
Skendzic, V.
Smith, L.E.
Swanson, M.J.
Tengdin, J.T.
Thorp, J.S.
Tziouvaras, D.A.
Udren, E.A.
Usman, S.
Ward, S.
Weers, D.
Whittaker, R.

- Young, R. J. McElray
B. Pickett
- Assignment:* Revise and update C37.98
- I1: UNDERSTANDING MICROPROCESSOR-BASED TECHNOLOGY APPLIED TO RELAYING
- Assignment:* To revise the PSRC report, "Understanding the microprocessor-based technology applied to relaying"
- M.S. Sachdev, *Chair*
Dept. of Electrical Engineering
University of Saskatchewan
57 Campus Drive
Saskatoon, SK, Canada, S7N 5A9
- I4: IEC STANDARDS ADVISORY
- Assignment:* Analyze standards development of IEC Technical Committee 95 to foster understanding and rationalization of IEC versus IEEE relaying documents. Develop U.S. position on IEC voting documents. Report on IEC TC 95 and TC 57 standards activities to the subcommittee.
- Eric A. Udren, *Chair*
Quanta Technology, LLC
1395 Terrace Avenue
Pittsburgh, PA 15228
- M. M. Ranieri, *Vice Chair*
- M. Adamiak
G. Brunello
J. Burnworth
J. Chadwick
J. Gilbert
C. Huntley
S. Korslund
M. Sachdev
V. Skendzic
J. Tengdin
B. Vandiver
S. Ward
M. Yalla
- I5: SCHEMATIC REPRESENTATION OF POWER SYSTEM RELAYING
- Assignment:* Report on common practices in the representation of protection and control relaying. The report will identify methodology behind these practices. Present issues raised by the integration of microprocessor relays and the internal logic and external communication configurations. Detail approaches to these issues.
- K. Donahoe, *Chair*
R Young, *Vice Chair*
- K. Birt
M. Carden
D. Goodrich
L. Henriksen
B. Mackie
D. Miller
T. Seegers
J. Uchiyama
R. Whittaker
- I3: RELAY FUNCTIONAL TYPE TESTING
- Assignment:* TBD
- Jerry Jodice, *Chair*
- B. Gwyn, *Vice Chair*
- M. Simon
T. Giuliant
J. Pond
S. Chano
T. Cease
- I6: PRACTICAL ASPECTS OF ROGOWSKI COIL APPLICATIONS TO RELAYING
- Assignment:* Produce a special report describing applications of Rogowski Coils used for protective relaying in electric power systems.
- L. Kojovic, *Chair*
B. Beresh, *Vice Chair*
- I8: REVISION TO THE GUIDE FOR GROUNDING OF INSTRUMENT TRANSFORMERS
- Assignment:* Revision to Guide C57.13.3
- B. Mugalian, *Chair*
B. Magruder, *Vice Chair*
- I9: REVISION OF IEEE STANDARD FOR QUALIFYING CLASS 1E PROTECTIVE RELAYS AND AUXILIARIES FOR NUCLEAR POWER GENERATING STATIONS
- Assignment:* Review the applicability of the standard for all relays used in nuclear power plants, specifically digital relays and seismic qualification of the relays, and update the standard in conformance with the latest IEEE Style Manual, and incorporate field experience and state of the art developments.
- Sahib Usman, *Chair*
Bechtel Power Corporation
7215 Corporate Court
Frederick, MD 21703
- Ray Ball, *Vice Chair*
- M. Bajpai
G. Brunello
J. Burnworth
J. Huddleston
S. Kunsman
M. Nemier
M. M. Ranieri
V. Rebbapragada
N. K. Trehan
P. Waudby
- I10: REVISION TO IEEE C37.98 SEISMIC TESTING OF RELAYS
- Marie Nemier, *Chair*
Trentec Inc.
4600 East Tech Drive
Cincinnati, OH 45245
- M. Bajpai, *Vice Chair*
- R. Ball
T. Crowley
C. Down
S. Mazumdar
M. Ranieri
V. Rebbapragada
S. Sambasian
R. Sullivan
- I11: APPLICATION OF OPTICAL SENSOR SYSTEMS
- Assignment:* Prepare a new IEEE Guide covering the application of optical sensor systems for protective relaying purposes.
- Harley Gilleland, *Chair*
Bruce Pickett, *Vice Chair*
- M. Adamiak
A. Apostolov
C. Brunner
D Bui
J. Burger
T.W. Cease
W. Dickerson
C. Henville
R. Hunt
J. Ingleson
L. Kojovic
J. Lane
V. Madani
P. McLaren
B. Mugalian
V. Skendzic
E. Udren
D. Weers
- I12: REVISION OF C57.13.1, IEEE GUIDE FOR FIELD TESTING OF RELAYING CURRENT TRANSFORMERS
- Assignment:* Revise and update C57.13.1-1981 reaffirmed 1992.
- Mike Meisinger, *Chair*
S&C Electric Co.
6700 North Ridge Blvd.
Chicago, IL 60626-3997
- Don Sevcik, *Vice Chair*
- S.P. Conrad.
P. R. Drum
H. Gilleland
R. Hunt
J. Hrabliuk
R. Meachem
B. Mugalian
B. A. Pickett

M. S. Sachdev.
V. Skendzic
L. E. Smith
S. I. Thompson.
D. K. Ware.
D. D. Weers
S. Weiss

I15: REVISION OF C37.110, IEEE GUIDE FOR THE APPLICATIONS OF CURRENT TRANSFORMERS USED FOR PROTECTIVE RELAYING PURPOSES

Assignment: Revise and update C37.110-1996, IEEE Guide for the Application of Current Transformers. The purpose of the guide is to present a comprehensive treatment of the organization and application of cts to assist relay application engineers in the correct selection and application of cts for protective relay purposes.

G. Moskos, *Chair*
NSTAR
One Nstar Way
Westwood, MA 02090

Barry Jackson, *Vice Chair*

M. Agudo
M. Bajpai
S. R. Chano
R. Das
P. R. Drum
G. Fenner
C. Fink
H. S. Gilleland
N. Kassam
H. King
L. Kojovic
W.C. Kotheimer
P. Kumar
B. Pickett
K. Stephan
J. Stephens
J. Uchiyama,
S. Usman
D. Weers
S. Zocholl

I17: TRENDS IN RELAY PERFORMANCE

Assignment: Apply criteria in working group report "Transmission Protective Relay System Performance Measuring Methodology" to develop a report on performance of in-service relay systems.

Mark Carpenter, *Chair*
TXU Electric Delivery
PO Box 970
Fort Worth, TX 76101

P. Carroll

A. J. Duboise
J. Ferraro
D. Fredrickson
E. Krizauskas
W.G. Lowe
D. Miller
G. P. Moskos
T. Seegers
D. R. Sevcik
L.E. Smith
R. Young

I18: ANOMALY CHECKS FOR RELAYS

P.G. McLaren, *Chair*

P.G. McLaren, *Chair*
Mukesh Nagpal, *Vice Chair*

S. Brahma
S. Chano
D. Goodrich
Y. Liao
V. Ortiz
I. Voloh

I19: PROTECTIVE RELAYING AND REDUNDANCY

Assignment: Produce a special report addressing redundancy considerations for relaying.

S. Ward, *Chair*
B. Gwyn. *Vice Chair*

B. Dac-Phouc
A. Deronja
A. Hanbali
A. Martin
B. Beresh
C. Huntley
C. Mozina
G. Antonova
G. Johnson
G. Henneberg
G. Kobet
J. Long
J. Sykes
J. Soehren
J. Uchiyama
M. Simon
J. McElray
C. McClure
P. Heavey
P. Beaumont
R. Garcia
B. Haas
S. Turner
S. Kim
T. Seegers
E. Udren
D. Ware
T. Wiedman
W. ELMORE

I20: REAFFIRMATION OF C37.90.1: SURGE WITHSTAND CAPABILITY TESTS

Assignment: Revision of IEEE Std C387.90.1-2002

T. Beckwith, *Chair*

J. Burnworth, *Co Chair*

B. Anderson
B. Beresh
J. Chadwick
B. Dac-Phuoc
J. Murphy
M. Ranieri
R. Ray
M. Rochow
M. Simon
J. Tengdin
T. Tenille
S. Turner

ITF1: RELAY SERVICE LETTER DATABASE

Assignment: Maintain a database of relay service letters.

J. Jodice, *Chair*

ITF2: PROMOTION OF C37.2/DUAL LOGO

Assignment: Prepare information for use in describing the 2008 update to local PES chapter meetings and regional conferences.

J.T. Tengdin, *Chair*
E. Udren. *Vice Chair*

A. Apostolov
G. Bartok
K. Donahoe
D. Goodrich
M. Ranieri
M. Yalla

ITF7: Reaffirmation of C37.90.2 Withstand Capability of Relay Systems to Radiated Electromagnetic Interference from transceivers

J. Burnworth, *Chair*

ITF9: Reaffirmation of C37.103 Guide for Differential and Polarizing Relay Circuit testing

M. Sachdev, *Chair*

J: ROTATING MACHINERY PROTECTION SUBCOMMITTEE

SCOPE: Evaluate and report on protective relaying concepts and practices applicable to generators, motors, synchronous condensers, associated auxiliary systems, and performance of

plant protective systems. Develop and maintain related relaying standards.

K. A. Stephan, *Chair*
Westar Energy
P. O. Box 208
Wichita, KS 67201

M. Yalla, *Vice Chair*
Beckwith Electric Co.
Largo, FL 33773

Subcommittee Members:

Bajpai, M.
Basler, M.
Beckwith, T.
Benmouyal, G.
Bukhala, Z. A.
Conrad, S. P.
Crawley, T. L.
Das, R.
Elmore, W. E.
Fennell, E. C.
Finney, D.
Fredrickson, D.
Gardell, J. D.
Hartmann, W. G.
Kerrigan, P.
Kim, S.
Kobet, G.
Kumar, P.
Mozina, C. J.
Nail, G. R.
Patel, S. C.
Patterson, R. W.
Pettigrew, B.
Reichard, M. L.
Thakur, S.
Thompson, M. J.
Uchiyama, J. T.
Waudby, P. W.

J1: PROTECTION ISSUES RELATED TO MOTORS USING VFDS

Assignment: Investigate and report to the Subcommittee motor protection issues related to motors utilizing variable speed (frequency) drives.

J. Gardell, *Chair*
Consultant
1162 Eastern Avenue
Ballston Lake, NY 12019

P. Kumar, *Vice Chair*
Frederick, MD 21703

Bajpai, M.
Basler, M.
Bloder, M.
Conrad, S. P.
Crawley, T. L.
Farr, T.
Fennell, E. C.
Finney, D.
Frederickson, D.
Guggisberg, A.
Hartmann, W. G.
Kerrigan, P.
King, H.

- Lopez, F.
Park, J.
Patel, S. C.
Reichard, M.
Ruckman, C.
Thakur, S.
Uchiyama, J. T.
Usman, S. M.
- J2: PROTECTION
CONSIDERATIONS FOR
COMBUSTION GAS TURBINE
STATIC STARTING
- Assignment: Deliver a paper or report on special protection requirements on generators employing load commutating inverter (LCI) static starting.
- M. L. Reichard, *Chair*
GE Energy
1 River Road, 2-639
Schenectady, NY 12305
- Z. A. Bukhala, *Vice Chair*
Schenectady, NY 12305
- Beckwith, T.
Fennell, E. C.
Finney, D.
Fredrickson, D.
Gardell, J. D.
Hartmann, W. G.
Kerrigan, P.
Kumar, P.
Lukach, D.
Mozina, C. J.
Patel, S. C.
Uchiyama, J. T.
Yalla, M.
- J7: REVISION OF GUIDE FOR
GENERATOR GROUND
PROTECTION C37.101
- Assignment: Review and revise as needed C37.101.
- J. T. Uchiyama, *Chair*
U.S. Bureau of Reclamation
D-8440, PO Box 25007
Denver Federal Center
Denver, CO 80225-0007
- R. Das, *Co-Vice Chair*
Allentown, PA
- M. L. Reichard, *Co-Vice Chair*
Schenectady, NY
- Bajpai, M.
Bukhala, Z. A.
Conrad, S. P.
Darlington, A. N.
Fennell, E. C.
Finney, D.
Gardell, J. D.
Hartmann, W. G.
Martilla, R.
Mozina, C. J.
Pettigrew, B.
Rebbapragada, R. V.
Stringer, T.
- Usman, S. M.
Waudby, P. W.
Wilson, J.
Yalla, M.
- J8 REVISION OF THE IEEE
TUTORIAL ON THE PROTECTION OF
SYNCHRONOUS GENERATORS, 95-
TP-102
- Assignment: Review and Revise
95-TP-102 as needed.
- M. Thompson, *Chair*
Schweitzer Engineering Labs
2350 NE Hopkins Court
Pullman, WA 99163
- C. Ruckman, *Vice Chair*
Kansas City, MO 64114
- Benmouyal, G.
Bukhala, Z. A.
Conrad, S. P.
Finney, D.
Fredrickson, D.
Gardell, J. D.
Gers, J.
Hamilton, R.
Hartmann, W.
Johnson, J.
Kerrigan, P.
Kim, S.
Kumar, P.
McElray, J.
Mozina, C.
Nagpal, M.
Patel, S. C.
Pettigrew, R.
Reichard, M. L.
Sachdev, M.
Stephan, K. A.
Thakur, S.
Uchiyama, J. T.
Verosa, Q. Jr.
Wang, J.
Yalla, M.
Zinn, D.
- J9: MOTOR BUS TRANSFER
APPLICATION AND ISSUES
INVESTIGATION
- Assignment: Investigate
protection and control issues and
phenomena impacting the
effectiveness of safely
transferring buses primarily
consisting of motors from one
power source to another source.
- J. Gardell, *Chair*
Consultant
1162 Eastern Avenue
Ballston Lake, NY 12019
- D. Fredrickson, *Vice Chair*
Milwaukee, WI 53203
- Anderson, B.
Bajpai, M.
Basler, M.
Beckwith, T.
Boyle, J.
- Conrad, S. P.
Farr, T.
Fennell, E. C.
Finney, D.
Hammond, D.
Hartmann, W.
Kerrigan, P.
Kumar, P.
Monterrubio, H.
Mozina, C.
Nail, G. R.
Patel, S. C.
Patterson, R. W.
Pettigrew, B.
Reichard, M. L.
Ruckman, C.
Thakur, S.
Thompson, M.
Uchiyama, J. T.
Usman, S.
Yalla, M.
- J10: Revision of C37.96-2000,
IEEE Guide for AC Motor
Protection
- Assignment: Review and revise
C37.102-1995 as needed.
- P. Kumar, *Vice Chair*
Bechtel Power
Frederick, MD 21703
- D. Finney
Markham, Ontario
- Basler, M.
Conrad, S. P.
Elmore, W. E.
Farr, T.
Gardell, J. D.
Guggisberg, A.
Hartmann, W.
McElray, J.
Patel, S. C.
Patel, S. P.
Reichard, M. L.
Ruckman, C.
Sambasivam, S.
Thakur, S.
Usman, S.
- M.J. Thompson, *Vice Chair*
Schweitzer Engineering
Laboratories,
2350 NE Hopkins Court
Pullman, WA 99163
- Anderson, B.B.
Begovic, M.M.
Benmouyal, G.
Brunello G.A.
Burger, J.F.
Chano, S.R.
Chaudhary, A.K.S.
Conrad, S.P.
Crellin, R.
Elkin P.
Fontana D.
Gordon, W.
Grier, S.E.
Hedding, R. A.
Henville, C.F.
Ibrahim, M.A.
Johnson, G.
Kasztenny, B.
Kennedy, W.
Lukach, D.
Madani, V.
Miller, D.H.
Moskos G.
Nagpal M.
Pickett, B.A.
Plumptre, F.P.
Rebbapragada, R. V.
Sachdev, M.S.
Sessler G. A.
Sidhu, T.
Stephan, K.A.
Sufana, C.R.
Thorp, J.S.
Voloh, I.
Young R. C.
Zimmerman, K.
- K1: C37.91 GUIDE FOR THE
PROTECTION OF TRANSFORMERS
AGAINST FAULTS AND ABNORMAL
CONDITIONS
- Assignment: Revise and up-date
the IEEE Guide C37.113 - Guide
for Protective Relay Applications
to Transmission Lines reaffirmed
in 2004
- M. S. Sachdev, *Chair*
University of Saskatchewan
243 Willoughby Cres.
Saskatoon, Sask. Canada
- P. G. Mysore *Vice Chair*
Minneapolis, MN
- Beresh, R.
Chano, S.
Chaudhary A.K.S.
Darlington, A.N.
Elkin, P.
Elmore, W.
Gohari, J.
Hedding, R.A.
Jensen, M.L.
Jodice, J.
Kennedy, W.
Kim, S.
- K: SUBSTATION PROTECTION
SUBCOMMITTEE**
- Scope: Evaluate and report on
methods used in protective
relaying of substations and the
consumer or independent power
producer, associated equipment
and performance of these
protective systems. Develop and
maintain relaying standards
which re-late to this equipment
and the utility-consumer
interface.
- P.G. Mysore, *Chair*
Xcel Energy,
414 Nicollet Mall, MP-8
Minneapolis, MN-55401

Nagpal, M.
Niemira, J.K.
Pickett, B.A.
Rebbapragada, R.V.
Saha, M.M.
Saygin, S.
Shroeder, M.S.
Thompson, M.J.
Tziouvaras, D.A.
Uchiyama, J.T.
Ware D.K.
Yalla, M.
Yip, T.
Young, R. C.

K3: REDUCING OUTAGES THROUGH IMPROVED PROTECTION AND AUTORESTORATION IN DISTRIBUTION SUBSTATIONS

Assignment: To prepare a paper or a report on protection methods that reduce outage durations in substations with auto-restoration and communication techniques.

B. A. Pickett, *Chair*
Florida Power and Light,
P.O. Box 14000,
700 Universe Blvd. SB-JB
Juno Beach, FL 33408-0420

T. Sidhu *Vice Chair*
London, Ontario, Canada

Anderson, S.
Apostolov, A.P.
Bentert, R.
Boers, K.
Bolado, O.
Carroll, P.
Chano, S.R.
Chaudhary, A.K.S.
Cobelo, F.
Cooley, K.
Cooper, M.
Cornelson, R.
Elkin, P.
Elneweih, A.
Garcia, R.
Gardner, K.
Kern, T.
Kasztenny, B.
Michel, G.
Moskos, G.
Niemira, J.
Nissen, T.
F. P. Plumptre
Sufana, C.
Ware, D.K.

K4: REVISION OF C37.95 – GUIDE FOR PROTECTIVE RELAYING OF UTILITY-CONSUMER INTERCONNECTIONS

Assignment: To revise C37.95-2002 (R2007) –Guide for protective Relaying of utility-consumer Interconnections

M.Nagpal, *Chair*
BC Hydro

6911 Southpoint Dr.
Floor A01
Burnaby, BC V3N 4X8

Mozina, C.

Barsch, J.
Behrendt, K.
Benmouyal, G.
Bloder, M.
Brahma, S.
Bregalda, J.A.
Chano, S.R.
Conrad, S.P.
Crellin, R.
Goodrich, D.
Meisinger, M.
Miller, D.H.
Mulawarman, A.
Patel, S.
Plumptre, F.P.
Selak, M.
Thakur, S.
Wilson, B.A.
Yiu, C.

K5: APPLICATION OF ANCILLARY PROTECTION & CONTROL FUNCTIONS COMMON TO MULTIPLE RELAYS

Assignment: Prepare a report to the PSRC that addresses the considerations in applying protection, control and monitoring functions that can be common in modern micro-processor relays. The report will discuss methods of integration and application of these functions into the overall protective system in order to reduce duplication, improve reliability and enhance simplicity.

S. R. Chano, *Chair*
Hydro Quebec
800 DeMaisonneuve East, 22 FL
Montreal, Quebec Canada

D. H. Miller, *Vice Chair*
Portland, OR

Afonso, J.
Allen, M.
Balasiu, F.
Best, M.
Calero, F.
Crellin, R.
Deronja, A.
Donahoe, K.
Fontana, D.
Gresko, G.
Hedding, R.
Henriksen, L.
Kasztenny, B.
Mackie, B.
McCannon, W.
O'Brien, J.
Plumptre, F.P.
Sachdev, M.
Santerre, G.
Sessler, G. A.
Sleva, T.
Sufana, C.

Tengdin, J.
Tholomier, D.
Thompson, M. J.
Tziouvaras, D.
Whittaker, R.

K6: SUDDEN PRESSURE PROTECTION FOR TRANSFORMERS

Assignment: To complete a technical report to the substation Protection subcommittee on the application of sudden pressure relaying in power transformers

R. Crellin, *Chair*
HDR Engineering, Inc.
2913 Millennium Circle,
Billings, MT 59102

D. Lukach, *Vice Chair*

Carpenter, M.
Conrad S.P.
Dempsey R.W.
Fontana, D.
Garcia, R.
Gordon, W.
Haas, R.W.
Hedding, R.A.
Henneberg, G.
Jackson, B.
Lukach, D.
Nail, G.
Platt, J.
Plumptre, F.P.
Sessler, G.A.
Sleva, G.
Sufana, C.
Winston, P.
Zipp, J.

K8: REVISION OF SHUNT CAPACITOR BANK PROTECTION GUIDE, C37.99-2000

Assignment Revise and update C37.99 "Guide for the protection of Shunt Capacitor Banks"

P.G.Mysore, *Chair*
Xcel Energy
414 Nicollet Mall, MP-8,
Minneapolis, MN 55401

A.K.S. Chaudhary, *Vice Chair*
Ocean Springs, MS

Appleyard, J.C.
Bolado, O.
Brahma, S.M.
Chano, S.R.
Conrad, S.P.
Darlington, A.N.
Deronja, A.
Elkin, P.
Frye, R.
Gordon, W.
Harder, J.E.
Hedding, R.A.
Kasztenny, B.
Nelson, J*
O'Brien, J.M.
Patterson, R. W.
Pickett, B.A.

Sachdev, M.S.
Sambasivan, S.N.
Saygin, S.
Sessler, G.A.
Strang, W.M.
Sufana, C.R.
Tziouvaras, D.A.
Voloh, I.
Wilson, B.

KTF9: Co-ordination with arc flash activities in the industry

K. Zimmerman, *Chair*
Schweitzer Engineering Labs,
122 Lincoln Place Court,
Suite 203,
Belleville, IL 62221

K10: SCC21 DISTRIBUTED RESOURCES STANDARD COORDINATION

Assignment: To interface with SCC21/P1547 in order to reduce unnecessary delays by getting PSRC input into the process without having to wait for after-the-fact coordination.

G. F. Johnson, *Chair*
Basler Electric
11504 Allecingie Pkwy
Richmond, VA 23235

Anderson, B.
Appleyard, J.
Bolado, O.
Beckwith, T.
Begovic, M.
Belkin, P.
Beresh, B.
Berit, Ken
Carroll, P.T.
Chau, J.
Conrad, S.P.
Darlington, A.N.
Fennell, E.C.
Ferraro, J.
Friend, F.
Gers, J.
Hartman, W.
Hedding, R.
Hodder, S.
Lasclu, R.
McCannon, W.
Miller, D.H.
Moskos, G.
Mozina, C.
Pettigrew, B.
Plumptre, F.P.
Reckord, D.
Seegers, T.
Sufana, C.R.
Tang, G.
Tang, S.
Uchiyama, J.
Vaziri, M.
Yalla, M.
Yiu, C.

K13: C37.116 GUIDE FOR PROTECTIVE RELAY APPLICATIONS

OF TRANSMISSION LINE SERIES
CAPACITOR BANKS

Assignment: To prepare a guide for the application of protective relays on transmission-line series capacitor banks.

Thompson, M.J.
Uchiyama, J.T.
Ware, D.K.
Zocholl, S.E.
Zoron, G.

F. P. Plumptre, *Chair*
BC Hydro,
6911 Southpoint Dr.
Burnaby, BC V3N 4X8 Canada

D. Hamai, *Vice Chair*
Lakewood, CO

Batho, J.
Bilodeau, H.
Brunello, G.A.
Chano, S.R.
Chaudhary, A.K.S.
Madani, V.
Miller, D.H.
Mustaphi, K.K.
Nagpal, M.
Rodriguez-Renteria, E.
Saha, M.M.
Skendzic, V.
Weiss, S.
Whittaker, R.L.
Wikstrom, B.

K14: C37.234 GUIDE TO
PROTECTIVE RELAY APPLICATIONS
TO POWER SYSTEM BUSES

Assignment: Write a "Guide for Protective Relay Applications to Power System Buses"

B. Kasztenny, *Chair*
Schweitzer Engineering
Laboratoies
19 Allstate Parkway, Ste 305
Markham, Ontario L3R 5A4

S. P. Conrad, *Vice Chair*
Albuquerque, NM

Beaumont, P.G.
Bolado, O.
Boyle, J.R.
Brunello, G.A.
Burger, J.F.
Calero, F.
Chano, S.R.
Chaudhary, A.K.S
Dalke, G.
Darlington, A.N.
Deronja, A.
Pickett, B.A.
Fontana, D.
Hedding, R.A.
Holbach, J.
Hyder, D
Kojovic, L.
Lopez, F.
Lukach, D.G.
Mysore, P.G.
O'Brien, J.M.
Sambasivan, S.N.
Sessler, G. A.
Tholomier, D.