



**POWER SYSTEM RELAYING COMMITTEE**

**OF THE**

**IEEE POWER ENGINEERING SOCIETY**

**MINUTES OF THE MEETING**

**May 14-17th, 2007**

**Nashville, TN**

**FINAL**

**Power System Relaying Committee  
Main Committee Meeting Agenda  
May 17, 2007  
Nashville, TN  
8:00 AM – 11:30 AM**

<b>I. Call to order / Introductions</b>	<b>Charlie Henville</b>
<b>II. Approval of Minutes/Financial Report</b>	<b>Bob Pettigrew</b>
<b>III. Reports of Interest</b>	<b>Charlie Henville</b>
<b>A. Technical Paper Coordinator's Report/Future Meetings</b>	<b>Miriam Sanders</b>
<b>B. PES Report- points of interest</b>	<b>John McDonald</b>
<b>C. CIGRE Report</b>	<b>T. W. Cease</b>
<b>D. UCA Report</b>	<b>John Burger</b>
<b>E. EPRI Report</b>	<b>John Hughes</b>
<b>F. IAS Power System Protection Committee</b>	<b>Chuck Mozina</b>
<b>G. IEC Report</b>	<b>Eric Udren</b>
<b>H. Standard Coordinator's Report</b>	<b>Jeff Gilbert</b>
<b>I. Substation Committee Report</b>	<b>Mike Dood</b>
<b>J. NERC Report</b>	<b>Bob Cummings</b>
<b>K. Other Reports of Interest</b>	
<b>IV. Advisory Committee Reports</b>	
<b>B1. Awards/ Recognition</b>	<b>Mike McDonald</b>
<b>V. Subcommittee Reports</b>	<b>Charlie Henville</b>
<b>I - Relaying Practices</b>	<b>Tarlochan Sidhu</b>
<b>K - Substation Protection</b>	<b>Frank Plumptre</b>
<b>H - Relaying Communications</b>	<b>Alex Apostolof</b>
<b>D - Line Protection</b>	<b>Roger Hedding</b>
<b>J - Rotating Machinery</b>	<b>Wayne Hartman</b>
<b>C- System Protection</b>	<b>Tony Seegers</b>
<b>VI. Presentations</b>	<b>Bob Pettigrew</b>
• <b>Generator Protection Setting Criteria(WG J5)</b>	<b>Chuck Mozina</b>
• <b>Guide for the Protection of Shunt Reactors (WG K7)</b>	<b>Kevin Stephan</b>
• <b>C37.2 Survey Results &amp; IEEE Survey Service</b>	<b>John Tengdin</b>
<b>VII. Adjourn</b>	<b>Charlie Henville</b>

**I. Call to order / Introductions** **Henville**

Chairman Charlie Henville called the meeting to order at 8:05 am.

**II. Approval of Minutes (September Meeting) & Financial Report** **Pettigrew**

The minutes of the Phoenix Jan 2007 meeting were approved.

We had two meeting sponsors, TVA and Nashville Electric Service. We appreciate their support for this PSRC meeting. A brief financial summary was given. The changes in registration cost and the elimination of the cash bar have resulted in a small projected profit for this meeting. This reverses the trend we have seen in the past.

**III Chairman's Report** **Henville**

New attendees from as far away as Brazil and Japan and as from near as Nashville were welcomed. Attendance at this meeting with more than 180 registrants, is close to a record (if not a record) for a May meeting.

We are happy to note the continued participation of associated groups with our meeting. Here in Nashville, the Power Line Carrier Subcommittee of the PSCC and the NERC SPCTF are meeting before and after our PSRC meetings respectively.

The successes of the PSRC continue to be recognized by a wide group of engineers. The Power Engineering Society has awarded two prizes (out of a total of four or five) to PSRC working groups. Congratulations on receipt of PES awards to the following Working Groups

- H6 Application of Substation Ethernet LAN Communication for Protection and Control, (Chair John Burger)
- K2 Breaker Failure Protection Guide (Chair Roger Hedding)

Thanks to all the officers and participants who continue to build the success of this Committee.

**Reports of Interest**

**A. Technical Paper Coordinator's Report – May 2007** **Sanders**

The IEEE PES 2006 Annual meeting in Tampa, FL in June will have good participation by the PSRC. For this meeting, there will be some jointly sponsored sessions (SuperSessions) for high quality papers that span the interest of more than one technical committee. The SuperSession, titled Walking Closer to the Edge will be on Monday, June 25 and will include several authors from the PSRC. There will be also be two presentation sessions and several papers in a poster session. Thanks very much to the Session chairs Solveig Ward and Tarlochan Sidhu for agreeing to chair the two paper sessions and to Phil Winston for agreeing to moderate the super session on Monday.

The call for papers for the IEEE PES 2008 T&D Exposition in Chicago has been posted on the PES website. The manuscript submission site will open about July 9, 2007, and close on September 7, 2007. When the call for reviewers goes out please let Miriam Sanders know of your willingness by return mail. Presently the call for reviewers goes out just to Subcommittee members (through the subcommittee chairs). However we are interested in as broad a number of reviewers as possible. Anyone who did not get a request to review papers in March of this year, and who would like to contribute their expertise, please contact Miriam Sanders directly.

The call for papers for the IEEE PES 2008 General Meeting in Pittsburgh has been posted on the PES website. The manuscript submission site will open about November 5, 2007, and close on December 17, 2007.

**B. PES Report** **John McDonald**

This liaison report will discuss PES activities and accomplishments for the first four months of 2007. Before I joined the PES Governing Board I never realized all the different activities going on in parallel. I would read about bits and pieces in different publications, or hear about some activities from industry friends, but I never found in one place a good overview of the major PES activities going on at one time. This article

covers the major activities that were discussed at the April Executive Committee Meeting. In addition, we have a new PES Executive Director, Pat Ryan, who will start work on April 30!

The PES Governing Board will meet on June 28 during the PES General Meeting in Tampa. There will be a Regions 1-7 Chapter Chairs training session on June 24. The PES Executive Committee will meet in Beijing, China on October 24, followed by the Region 10 Chapter Chairs training session on October 25-26. In addition, there will be a Region 8 Chapter Chairs training session in Lausanne, Switzerland on July 5 in conjunction with the PowerTech Conference.

### **PES Search for New Executive Director (ED)**

The PES Search Committee consisted of John McDonald (Chair), John Estey, Wanda Reder, Mel Olken, Mary Ward-Callan (IEEE Managing Director of Technical Activities), and Bob Dent. The IEEE web site became active for candidates to post their resumes on January 10. The following vehicles were used to get the word out about the job opening: T&D World magazine (January, February, March issues in print, and on line through early April), Power & Energy magazine (March/April issue), posting within IEEE beginning January 10, Boldfish PES distribution (email to all PES members who we have email addresses for) on January 12, posting on PES web site beginning January 11, POWER GLOBE distribution on January 15, PES e-Newsletter monthly beginning with January 15 issue, and email blasts during the week of January 15-19. Bob Dent retrieved all received resumes from the IEEE web site and distributed them to the Search Committee members.

PES received over 80 resumes in January, February and March. The Search Committee held 14 one-hour phone interviews in the three week period February 20 to March 13. On April 3 the Search Committee talked with eight different references for the three finalist candidates. These three candidates were interviewed in person at IEEE in Piscataway, New Jersey on April 4. The four and one-half hour interview time for each candidate included these three 90 minute sessions in this order:

- Interview by Search Committee – Though the Search Committee had interviewed each finalist candidate once or twice by phone, this was the first opportunity for a face-to-face interview with each of them. Each candidate was asked to prepare a 15 minute presentation on how they would address a current PES issue (six were given to them as examples), and their presentation was part of this 90 minute interview session.
- Time with Bob Dent – This gave each candidate time to ask questions of the present Executive Director. In addition, each candidate completed an on-line job application at IEEE HR and Bob spent any remaining time showing them around the IEEE “campus” of offices.
- Interview by Executive Office Staff – The Executive Office Staff had prepared a list of questions for each candidate, and this was their opportunity to interview each one.

After the three interviews on April 4, the Search Committee discussed the pros and cons of each candidate, and reviewed the findings of the reference checks. Bob and John M. then met with the Executive Office Staff that afternoon to discuss their assessment of the three candidates.

The Search Committee had a conference call on April 6, with new reference check information, and decided to move forward with the recommended candidate. The Executive Office Staff was in agreement that this was the best candidate also. That day there were conversations with the recommended candidate regarding compensation and benefits. On April 9 and 10 IEEE HR contacted the recommended candidate several times to discuss the proposed compensation package and benefits and to convey the offer.

The Search Committee’s goal was for the recommended candidate to start in early May so there would be approximately two months of transition time (both office time and meeting time) before Bob Dent retires on June 30. Two weeks in June will be spent at meetings: one week at the IEEE Board Series Meetings in Philadelphia, and one week at the PES General Meeting in Tampa.

### **Bob Dent Retirement**

Speaking on behalf of the PES Governing Board, and I am sure all PES members, we thank Bob Dent for five years of service as our Executive Director. Bob’s extensive experience with both the IEEE and PES has been invaluable to all of us. We will miss Bob’s knowledge and advice and wish him and his wife, Alice, well in their very many retirement years together! The September/October issue of this magazine will have a farewell tribute for Bob.

### **Pat Ryan Welcome**

We all look forward to welcoming our new Executive Director, Pat Ryan, when he begins work with us on April 30. Pat will be at the General Meeting in June in Tampa for everyone to meet. The September/October issue of this magazine will have a welcome announcement for Pat.

### **Transferring Assets of AEI to PES**

In mid-2005 John Estey met with Jack Casazza to discuss areas of cooperation between the American Education Institute (AEI) and IEEE PES. John E. and the PES Governing Board asked John M. to lead further discussions on this matter with Frank Delea, who lives in the Atlanta area and who is on the AEI Board. Frank and John M. began these discussions in mid-2005. Frank has helped PES craft an overall education plan for IEEE PES, emphasizing the education of the non-electric power engineering audience, both domestically and internationally. The success of the Plan Talk courses in January, where AEI and IEEE PES worked together to hold three standalone courses, accelerated the objective of AEI to transfer its assets to IEEE PES. Bob Dent and John M. had a number of discussions with Jack Casazza and Frank Delea to work out the details of transferring the assets of AEI to the IEEE PES.

Arrangements have been completed for AEI to become transferred to the IEEE PES for the delivery of educational programs in the future. A trial of this arrangement in January 2007 (Plain Talk) proved quite successful, generating significant revenue for both the IEEE PES and for AEI. The principle advantage is the coupling of the very significant marketing capability of the IEEE PES to the educational experience of AEI.

The AEI Board of Directors approved an AEI resolution to this effect on Monday, April 9, 2007. PES approved a resolution in concept at the Executive Committee Meeting on April 12, 2007. The approval of these two resolutions concluded the arrangements and AEI will cease to operate as a separate not-for-profit organization, but will come under the IEEE PES umbrella. The necessary changes indicated in the AEI resolution will take some time to complete but should be achieved by the end of June.

Both AEI and IEEE PES believe this arrangement will help in meeting our goals of providing necessary and vital education concerning electric power systems and policies to a wide audience, most of whom will be non-electric power engineers.

Jack expressed his deep appreciation to the members of the AEI Board of Directors that have helped them through the years in delivering their many courses that have been of value to the electric power industry, to the government, and to the general public at large. The IEEE PES expresses our deep appreciation to Jack and Frank and the AEI Board for their confidence in IEEE PES' capability to carry their objectives and goals forward in education to the non-electric power engineering audience.

### **Distinguished Lectures in Central America**

Enrique Tejera (PES VP, Membership/Chapter Activities) and others in Panama have been actively involved in finding new leadership for the Honduras and Nicaragua IEEE PES Chapters. They both have new leadership in place now. To show IEEE PES commitment and support to these Chapters and their new leadership, and to continue to support the Panama Chapter, John M. gave a one-day course in Tegucigalpa, Honduras on March 19 (with 75 attendees); a one-day course in Managua, Nicaragua on March 21 (with 15 attendees), and a two-day course in Panama City, Panama on March 23-24 (with 53 attendees). These were all PES Distinguished Lectures and will help attract new members for IEEE and PES.

### **IEEE Power & Energy Library (IPEL)**

The IEEE Power & Energy Library (IPEL) was launched at the IEEE PES Transmission and Distribution Conference and Exposition in Dallas in May 2006. IPEL is a non-member product consisting of the publications of three IEEE Societies – Power Engineering Society, Industry Applications Society, and Power Electronics Society. The product is aimed at electric utilities, manufacturers of power equipment, and consultants in the power and energy area. It is not intended for use in academic institutions where the IEEE Electronic Library (IEL) is commonly purchased.

New products often take a while to gain acceptance, yet the IEEE Power & Energy Library (IPEL) was very quickly accepted and purchased. Considering that it was only released in May 2006, and IEEE had few

sales of on-line collections until now in the power and energy market, this is a big success. There were 12 sales in 2006 worth a total of approximately \$50K.

### **IEEE Board Series Meetings in February**

The IEEE Board Series Meetings on February 14-18 in Universal City, California had the following items of interest for PES:

- IEEE Technical Activities set a goal to ensure conference content is accessible in IEEE Xplore within 30 to 60 days after the conference. This assumes conference planners submit a CD-ROM containing Xplore-compatible PDF files within seven days of the conference end date.
- IEEE members can now purchase individual courses from the IEEE Expert Now collection directly through the IEEE Xplore digital library.
- The IEEE New Technology Connections Portal provides visitors with an overview of key emerging technologies supported by the New Technologies Directions Committee, and a list of resources to obtain additional information.
- The IEEE Standards Online subscription packages are now accessible through the IEEE Xplore digital library.
- TryEngineering.org has added 13 new countries to its global search tool which enables users to search for accredited engineering and engineering technology programs online.
- The IEEE History Committee and History Center are accepting papers for its next conference series, the 2007 IEEE Conference on the History of Electric Power, which will be held from August 3 through 5 on the campus of the New Jersey Institute of Technology in Newark, New Jersey. The conference is co-sponsored by IEEE and Rutgers, The State University of New Jersey. The deadline for submissions is April 15.

### **IEEE Fellow New Nomination Category**

The Power Engineering Society Fellow Committee invites all members to consider nominations of colleagues for elevation to Fellow grade. Fellow grade is the highest grade of membership in the IEEE. Members cannot apply to become a Fellow, the most prestigious level of membership and a symbol of status in the profession. Candidates are nominated by their peers and recommended by existing Fellows. The process is open but rigorous. It is restricted to 0.1% of the total Membership. If a member has made significant contributions to the industry or the profession, it is time to consider a nomination for Fellow grade. The key qualification for a candidate for Fellow grade is contributions that have advanced the state of the art or the practice of engineering.

There have been some recent developments to encourage more nominations across the entire spectrum of engineering disciplines and across all regions of the IEEE. A new category has been established: Applications Engineer/Practitioner. This category is for practicing engineers who have made an impact through development, advancement or application of technology. Of the 61 nominations evaluated by the PES Fellow Committee in 2006, only 5 were submitted in this new category. The new category opens up the possibility of Fellow nominations to many more PES Senior Members. However, PES has not seen the expected increase in Fellow nominations yet due to this new category.

The preferred approach is to submit forms electronically – see the IEEE website at [www.ieee.org/fellow](http://www.ieee.org/fellow) for nominations forms and instructions. While electronic nominations are preferred, it is still possible to obtain forms and instructions in hard copy. Send a request to [fellows@ieee.org](mailto:fellows@ieee.org). Note that the deadline for the Class of 2008 Fellows nominations, electronic or hard copy, is March 1, 2008. Fellow Reference Forms from 5 to 8 Fellows are required by the same date.

### **e-Newsletter**

Did you know that the PES e-Newsletter is posted on the 15<sup>th</sup> of every month? Input is always welcome about chapters/membership activities and Technical Committee activities.

### **What Can You Do?**

There are many opportunities for you to participate in the PES. We have activities for all interests and desires. Please contact me with any questions or comments. After my last President column in 2007, I received a number of emails from PES members worldwide responding to my plea "We want to hear from

you!" We are in the process of getting each one plugged into PES in areas of their interest. So, please send me an email to get involved in IEEE PES! I can be reached at [j.d.mcdonald@ieee.org](mailto:j.d.mcdonald@ieee.org).

## **C. CIGRE B5 Activities Report**

**Cease**

The 2007 Colloquium will be held in Madrid Spain October 15-20, 2007. The preferential subjects for the colloquium are:

PS-1 New trends in busbar protection

PS-2 Acceptable Functional Integration in Substation P&C of Transmission System Protection

PS-3 Protection of Transmission Lines & Co-ordination of Transmission System Protection

The US has 6 papers in the colloquium. The papers are listed below. These papers address PS 2&3. The US did not have any contributions for PS 1.

The 2008 session will be held in Paris August 24-29, 2008. The US has an allotment of 10 papers for all 16-study committees. Below is listed the 10 papers recommended by the US National Committee. In an effort to have more US papers included in the session several papers were recommended for the International category. That is, if the authors were from more than one country the paper can be considered for inclusion in an International category. There the allotment is different and is dependant on the Study Committee Chairman.

Study Committee B5 has a large number of open working groups and as a result chose not to start any new working groups at this time. There are several working groups waiting to start. They need members. Anyone interested in becoming a member either corresponding or regular please see me. There are a number of opportunities available for anyone wishing to participate.

Attached is the scope and mission statement of SC B5.

Attached is a listing of the Study Committies.

Madrid Colloquium

PS 2

Wide Area Measurement Applications in Functionally Integrated Protection Systems,  
A Phadke, et al

Requirements For Testing of Transmission Line Protection Relays with High Level of Functional Integration,  
A Apostolov, et al

Transmission Line Protection Relays with High Level of Functional Integration,  
A Apostolov, et al

PS 3

Advancements in Transmission Cable Protection, Control and Monitoring,  
D Tziouvaras, S Chano

Improved Transmission Line Protection During Cascading Events, M Kezunovic

Transient Simulation Requirements for Testing of Transmission Line Protection Systems,  
A Apostolov

Corresponding Author	Email	SC	PS	Title
Jim Kirtley	kirtley@MIT.EDU	A1	PS1	Improving Efficiency of Induction Motors Using Die-cast Copper Squirrel Cages
Gary Gauger	ggauger@cooperpower.com	A2	PS2	Mineral Oil with Corrosive Sulfur – Method Evaluation to Identify False Negatives and Its Performance with blends of Natural Ester
Peter Reichmeider	PReichmeider@QuantaServices.com	B2	PS1	Experience with New Methods for Live-Line Conductor Replacement
Krassimir Kutlev	krassimir.kutlev@us.abb.com	B3	PS2	Complete Methodology for Selecting Optimal Substation Solutions
Mark Adamiak	mark.adamiak@ge.com	B5	PS1	Considerations for Process Bus Deployment in Real-World Protection and Control Systems: A Business Analysis
Sundar Venkataraman	sundar.venkataraman@ge.com	C1	PS1	The Linden Variable Frequency Transformer Merchant Transmission Project
Khosrow Moslehi	khosrow.moslehi@us.abb.com	C2	PS1	Smart Infrastructure for a Self-Healing Power Grid — Concepts for Coordinated Intelligent Control
J. Charles Smith	jcharlessmith@comcast.net	C2	PS3	The Role of Wind Forecasting in Utility System Operation
Andy Ott	<a href="mailto:ott@pjm.com">ott@pjm.com</a>	C5	PS1	Implementation of Demand Response in the PJM Synchronized Reserve Market
Angela Chuang	achuang@epri.com	C6	PS1	Demand-side Integration in a Restructured Electric Power Industry

#### CIGRE SC-B5 / Scope:

- Principles, design, application and management of power system protection, substation control, automation, monitoring and recording – including associated internal and external communications, substation metering systems and interfacing for remote control and monitoring

#### CIGRE SC-B5 / Mission:

- Promotion of continued development and exchange of experience for safer and more effective operation of power systems
- To be first international reference for power system protection and substation automation issues, synthesizing state-of-the-art practices and developing recommendations

#### CIGRE Study Committees

A1 Machines électriques tournantes/Rotating Electrical Machines

A2 Transformateurs/Transformers  
 A3 Equipement à haute tension/High Voltage Equipment  
 B1 Câbles isolés/Insulated Cables  
 B2 Lignes aériennes/Overhead Lines  
 B3 Postes/Substations  
 B4 CCHT et électronique de puissance/HVDC and Power Electronics  
 B5 Protection et automatisme/Protections and Automations  
 C1 Développement et économie des réseaux/System Development and Economics  
 C2 Conduite et exploitation des réseaux/System Control and Operation  
 C3 Réseaux et environnement/System Environmental Performance  
 C4 Performances techniques des réseaux/System Technical Performance  
 C5 Marché de l'électricité et régulation/Electricity Markets and Regulation  
 C6 Réseaux de distribution et production décentralisée/Distribution Systems and Dispersed Generation  
 D1 Matériaux et technologies émergentes/Materials and Emerging Technologies  
 D2 Systèmes d'information et télécommunications/Information Systems and Telecommunications

**D. UCA Report**

**Burger**

No written report at this meeting

**E. EPRI Report**

**Hughes**

No written report at this meeting

**F. IAS Power System Protection Committee**

**Mozina**

Since this is the first report on IEEE IAS (Industrial Application Society) activities at the main PSRC meeting I thought I would briefly discuss how the Society is organized.

**1. IAS Organization**

*The organizations mission statement is ...the advancement of the theory and practice of electrical and electronic engineering in the development, design, manufacture and application of electrical systems, apparatus, devices and controls to the processes and equipment of industry and commerce; the promotion of safe, reliable and economical installations; industry leadership in energy conservation and environmental health and safety issues; the creation of voluntary engineering standards and recommended practices; and the professional development of its membership.*

The Society is four departments:

- **Manufacturing Systems Development & Applications Department** – address industrial automation and control
- **Process Industries Department** – Cement, Metals, Mining, Petro- Chem., Pulp&Paper.
- **Industrial & Commercial Power Systems Department (I&CPS)** – Develops codes and standards. Has a subcommittee that addresses protection. Responsible for the Color Book Series. Work in this Department most related to PSRC.
- **Industrial Power Conversion Systems Department** – Electric machines, industrial drives, industrial power conversion, power electronics.

## 2. Items of Interest to PSRC.

- **Color Book Reorganization** – There are currently 13 color book standards that are published. They are similar to our C-37 standards and are recommended practices for the planning, protection, grounding and operation and maintenance of industrial electrical systems. The color books are to be combined to reduce their number and a common or “Base Book” developed which is to have common material that is now in a number of individual color books. This material would include items such as fault current calculation, voltage drop calculations and recommended equipment maintenance practices. Major interest for the PSRC is the Buff Book (Protection and Coordination of Industrial and Commercial Power Systems), which will be combined with the Blue Book (Low Voltage Protection Systems) into a single book. One of the goals to break out the chapters that address protection of individual areas (transformers, generator, cables, est.) so they could be sold separately by the IEEE. Goal is to offer the re-packaged color books by 2010.
- **Generator Grounding and Ground Fault Protection WG** – The failure of a number of large industrial generators in the late 1990's due to stator ground faults that resulted in catastrophic damage caused the formation of a WG to address this problem. These machines were typically low resistance grounded medium voltage generators (13.8KV) that are bus connected at industrial facilities and ground at 400A. The WG reported back to the IAS in a series of four 2002 transaction paper stating that the 400A ground fault level is too high and even with highspeed clearing damage is catastrophic due to the fault energy released during generator coast down after tripping. The papers also suggested a number of possible solutions, which involved system grounding changes. The most cost effective was the suggestion to hybrid ground the generators combining both low and high resistance sources and switch off the low resistance sources during generator shutdown by installing a vacuum switch in series with the typical 400A grounding resistor in the generator neutral and tripping that source when a generator stator ground is detected. The generator remains grounded through the high impedance source (typically less than 10A), which substantially reduces damage during the coast down period that can last several seconds. A second WG was formed in 2003 to develop the specific equipment and protection (including surge protection) necessary for hybrid grounding. This WG ran extensive EMPT studies to address potential switching surges created by switching off the high resistance ground source and will recommend appropriate surge protection. They have completed there EMPT studies and will report the results next year in an I&CPS paper.
- **Arc Flash** – Arc flash study guidelines are addressed by WG 1584 within the Petro-Chemical Committee of the IAS. This WG is currently updating the “ Guide for the Performing Arc Flash Hazard Calculations” This effort relates directly to the efforts of our WG K-9.

## G. IEC Report

Udren

The USNC TAG (WG I4) is commenting on two working drafts for TC 95 functional standards being written by Maintenance Team 3 chaired by Dr. Murty Yalla. PSRC inputs can be considered by MT3, and this is potentially the most effective channel for PSRC and USNC influence of IEC relay standards content. The WG reviewed:

Draft 60255-151 - Functional standard for over/under current protection. This is a new update that absorbs, updates, and supersedes IEC 60255-3 and IEEE C37.112-1996. This draft looks like a good standard for all users.

Draft 60255-127 - Functional standard for over/under voltage protection. This work by TC 95 MT4 is wrapping up soon and needs a particular input on application. For inverse time-voltage relays, the curve shown in the draft has a simple 1/x inverseness, and no one has yet proposed a basis for a more sophisticated curve family based on application requirements. **The WG and MT solicit ideas or information on applications of inverse-time voltage relays where curve shape matters.** Below is a list of applications, but we still need information on defining appropriate curve shape families:

- High speed transfer switch controller for distribution application coordinates with ITIC voltage tolerance curve of supplied technology equipment (Jim Nemiera, S&C).
- Distribution bus source transfer control during bus fault (Raluca Lascu, Detroit Edison).
- EHV long-line applications – document available (Bogdan Kasztenny, GE Multilin).
- EHV transformer protection and alarming for heating from overexcitation, especially with long lines that may be lightly loaded, at thresholds below high speed insulation or arrestor protection trips (Eric Udren, KEMA).
- DG connected through delta-primary transformer, with need to coordinate with feeder protection – document available (Leonard Leech, Nashville Electric).

Draft 60255-121, Functional standard for distance relays. This draft needs a lot of work, and the PSRC review and input is being handled by WG D21 under Alex Apostolov.

Draft 60255 – 1, Measuring Relays. This is functionally like C37.90, but the requirements are completely different. Review leader Mario Ranieri responded with our deep concern regarding how the new IEC draft ignores the existence of C37.90 (no citation) and proceeds to require a completely different set of tests. There is no voting at this early stage, but we hope for a response from the IEC MT on the detailed list of concerns as they continue drafting the standard.

The USNC TAG is also reviewing drafts of the following EMC standards projects:

- 60255-22-2, ESD Tests, CDV, Vote due 9/21
- 60255-22-3, EMI Immunity, FDIS, Vote due 6/15
- 60255-22-4, Fast Transient/burst immunity, CDV, Vote due 9/21
- 60255-26, EMC requirements for relays, CDV, Vote due 8/03

The last of these is a summary of tests and levels, and will eventually refer to a host of IEC base EMC standards (61000-4 series) and supersede the other 60255-22 EMC requirements. We cannot post these drafts on the PSRC web site. Request copies for review from Eric Udren.

## H. Standard Coordinators Report

**Gilbert**

The Standards Coordinator, Jeffrey Gilbert, met with the Chairs of the Working Groups writing and revising standards documents at a session beginning at 8:00 AM on May 14, 2007, in the Hermatage C room of the Sheraton Music City Hotel, Nashville, Tennessee.

The status of selected PARs, Standards and Guides, were reviewed at the meeting. The status of the PARs is summarized below. The actions to be taken for keeping up-to-date the approval of the PARs and for keeping live the Standards and Guides are identified. A summary of the specific approvals received, since the January 2007 meeting of the PSRC, are identified as well.

Information concerning the Standards Association (SA), Board of Governors, Committees of SA, the Development of standards, Recommended Practices and Guides and related issues is available on the following web site.

<http://standards.ieee.org/>

Important Information:

Effective 2 April 2007, employer/affiliation was added to the required information for 'myProject' at the Sponsor, Working Group, and Project levels. This information is required to comply with, changes to the IEEE-SA Standards Board Bylaws and the IEEE-SA Standards Board Operations Manual made in December 2006

Standards Coordination Effort

PARs applied for by all Committees of the Power Engineering Society (PES) are circulated among the Standards Coordinators of the PES Committees. Every PAR approved by the Standards Board is posted on the SA Web site at the following address.

<http://standards.ieee.org/board/nes/approved.html>

The following PAR has been approved by the IEEE-SA Standards Board may be of interest to PSRC attendees.

P1711 - Trial Use Standard for a Cryptographic Protocol for Cyber Security of Substation Serial Links

If you are interested in the development work planned in a PAR, contact the Chair of the Working Group that is developing the document and sign up for participating in the activity of that Working Goup.

Standards Activities Since The January, 2007 Meeting

The status of the standards activities, which have taken place since the May, 2006, meeting of the PSRC, are as follows.

1. Standards Published
  - C37.101 IEEE Guide for Generator Ground Protection
  - C37.102 Guide for AC Generator Protection
  - C37.109 Guide for the Protection of Shunt Reactors
  - C57.13.1 Guide for Field Testing of Relaying Current Transformers
2. Standards waiting to be Published
  - C37.116 Guide for Protective Relay Application to Transmission-Line Series Capacitor Banks
  - C37.117 Guide for the Application of Protective Relays Used for Abnormal Frequency Load Shedding and Restoration
  - C37.231 Recommended Practice for Microprocessor Based Protection Equipment Firmware Control
  - C37.232 Recommended Practice for Naming Time Sequence Data Files
3. Standards Reaffirmed
  - C37.112 IEEE Standard Inverse-Time Characteristic Equations for Overcurrent Relays
4. Standards submitted for reaffirmation
  - None

5. Standards approved
  - C37.117 Guide for the Application of Protective Relays Used for Abnormal Frequency Load Shedding and Restoration
  - C37.232 Recommended Practice for Naming Time Sequence Data Files
6. Standards submitted for approval
  - C37.117 Guide for the Application of Protective Relays Used for Abnormal Frequency Load Shedding and Restoration
  - C37.232 Recommended Practice for Naming Time Sequence Data Files
7. Standards to be submitted for approval
  - None
8. Submitted for Balloting/ Recirculation
  - PC37.101-2006-Cor 1 Guide for Generator Ground Protection - Corrigendum 1: Annex A.2 Phasor Analysis (Informative)
  - PC37.235 Guide for the Application of Rogowski Coils used for Protective Relaying
9. Standards Balloted
  - C37.90.1-2002-Reaff IEEE Standard for Surge Withstand Capability (SWC) Tests for Relays and Relay Systems Associated with Electric Power Apparatus
  - PC37.101-2006-Cor 1 Guide for Generator Ground Protection - Corrigendum 1: Annex A.2 Phasor Analysis (Informative)
10. Standards Re-circulated
  - PC37.230 Guide for Protective Relay Applications to Distribution Lines
  - PC37.235 Guide for the Application of Rogowski Coils used for Protective Relaying
11. Standards to be Re-circulated
  - C37.90.1-2002-Reaff IEEE Standard for Surge Withstand Capability (SWC) Tests for Relays and Relay Systems Associated with Electric Power Apparatus
  - PC37.91 IEEE Guide for Protective Relay Applications to Power Transformers
  - PC37.105 IEEE Standard for Qualifying Class 1E Protective Relays and Auxiliaries for Nuclear Power Generating Stations
  - PC37.110 Guide for the Application of Current Transformers used for Protective Relaying Purpose
  - PC37.235 Guide for the Application of Rogowski Coils used for Protective Relaying
12. Standards due for 5 year review/to be submitted for Re-affirmation
  - C37.90.1 IEEE Standard for Surge Withstand Capability (SWC) Tests for Relays and Relay Systems Associated with Electric Power Apparatus
  - C37.91 IEEE Guide for Protective Relay Applications to Power Transformers
  - C37.95 IEEE Guide for Protective Relaying of Utility-Consumer Interconnections
  - C37.104 IEEE Guide for Automatic Reclosing of Line Circuit Breakers for AC Distribution and Transmission Lines
  - C37.105 IEEE Standard for Qualifying Class 1E Protective Relays and Auxiliaries for Nuclear Power Generating Stations
  - C37.108 IEEE Guide for the Protection of Network Transformers
  - C37.110 IEEE Guide for the Application of Current Transformers Used for Protective Relaying Purposes
13. Standards withdrawn
  - C37.98 Standard for Seismic Testing of Relays
14. New PARs applied for
  - PC37.99 Guide for the Protection of Shunt Capacitor Banks

PC37.101-2006-Cor 1 Guide for Generator Ground Protection - Corrigendum 1: Annex A.2  
Phasor Analysis (Informative)

PC37.237 Recommended Practice for Time Tagging of Power System Protection Events

15. New PARs approved

PC37.99 Guide for the Protection of Shunt Capacitor Banks

PC37.101-2006-Cor 1 Guide for Generator Ground Protection - Corrigendum 1: Annex A.2  
Phasor Analysis (Informative)

PC37.237 Recommended Practice for Time Tagging of Power System Protection Events

16. PAR Extensions applied for

C37.117 Guide for the Application of Protective Relays Used for Abnormal Frequency Load  
Shedding and Restoration

17. PAR Extensions approved

PC37.117 Guide for the Application of Protective Relays Used for Abnormal Frequency Load  
Shedding and Restoration

18. Modified PAR approved

None

19. Modified PAR Submitted

None

20. PARs Wthdrawn

None

21. PARs expiring at the end of 2007

PC37.91 IEEE Guide for Protective Relay Applications to Power Transformers

PC37.105 IEEE Standard for Qualifying Class 1E Protective Relays and Auxiliaries for Nuclear Power  
Generating Stations

PC37.110 IEEE Guide for the Application of Current Transformers Used for Protective Relaying  
Purposes

**SUBMITTAL DEADLINES & STANDARDS BOARD MEETING SCHEDULE**

PAR/Standard Submittal Deadline	Standards Board Meeting
October 15, 2007	November 29, 2007
February 15, 2008	March 25, 2008
May 2, 2008	June 4, 2008

**I. Substation Committee Report**

**Dood**

No Report, did not meet with PSRC.

**J. NERC Report**

**Cummings**

??.

**IV. B. ADVISORY COMMITTEE REPORTS**

**Henville**

**Chair: Charlie Henville**

**Vice Chair: Miriam Sanders**

**B1: Awards and Technical Paper Recognition**

**Chair: Mike McDonald**

**Vice Chair: Bob Beresh**

The group met on Tuesday May 15th with 4 of 6 members present.

The working group discussed how to recognize the past contributions of Main and Sub Committee members who are no longer attending the PSRC meetings. Following verification that members will no longer be attending the meetings, the members will be sent a Certificate of Appreciation for the contributions they made during their tenure.

In addition, work will continue in developing a letter from the SC and WG Chairman that will be sent to all members of working groups in recognition of completion of their assignment.

Awards to be presented at the Main Committee meeting will be as follows:

2006 Distinguished Service Award plaque – Philip Winston

Certificates of Appreciation to past Sub Committee Chairman:

Relaying Practices - James Ingleson

Substation Protection – Charles Sufana.

Certificates of Appreciation for Chairman of Working Groups that have completed their assignments:

B1 Awards & Recognition – Frank Plumptre

C1 Cyber Security Issues for Relaying – Solveig Ward

C2 Power Quality Issues in Protective Devices – T.W. Cease

C5 Deployment and Use of Disturbance Recorders – Bill Strang

D7 Loss of AC Voltage Considerations – Elmo Price

H6 Application of UCA (MMS/Ethernet) in Station LANs for Protection and Control – John Burger

H11 Revision of C37.118 Synchrophasor Standard – Ken Martin

J3 Protection of Generators Interconnected with Distribution System – Everett Fennell

J4 Revision of C37.102 AC Generator Protection Guide – Murty Yalla

J7 Revision of C37.101 Generator Ground Protection – Joe Uchiyama

**B2: Fellows Awards**

**Chair: J.S. Thorp**

The Working Group met in Nashville on May 15, 2007.

The PSRC, PES, and IEEE processes for the Election of Fellows along with the upcoming election cycle were reviewed. The result of the last nomination cycle was also discussed.

**B3: Membership Committee**

**Chair: M.J. Swanson**

Attendance during the PSRC meeting was approximately 180. This is considered very good, even with our joint meeting with the PSCC Power Line Carrier Committee.

14 new attendees were in our Newcomers Orientation meeting on Tuesday, which is considered a normal. I participated in the presentation.

No management support letters were written.

There were at least two NES engineers and two Virginia Tech graduate students attending our meeting.

I created 38 more certificates for attendance longevity.

**B4: O & P Manual and WG Training**

**Chair: R. Hedding**

Nothing new to report. The next training session will be held at the January 2008 meeting in San Antonio.

**B5: Bibliography and Publicity**

**Chair: T.S. Sidhu**

**Vice Chair: M. Nagpal**

The WG met on May 15, 2007 with five members in presence. Minutes from the Jan. 2007 meeting were approved. The Chairman reported on the progress of preparation of the 2006 bibliography paper. First complete draft of the paper should be ready by end of June 2007 and would be sent to WG members for their comments. Mal Swanson will continue to help the PSRC Chairman with the publicity report. Phil Winston will keep the WG updated about the NERC reports. Currently, NERC is not producing any DAWG reports.

**B8: Long Range Planning**

**Chair: Phil Winston**

The Long Range Planning TF continued its discussions in support of activities to make changes to the organization and programs of the PES General Meetings. Rick Taylor gave an update on issues and potential options related to paper presentations (or not) at the General Meeting.

**B9: PSRC Web Site**

**Chair: Jim Ingleson**

Working Group B9 met with 3 members.

1. Use of the PSRC mailing list was brought up. The question arose as to the possibility of having a second list for "not so strict" e-mails to the PSRC membership. Russ Patterson took the action item to investigate with the Listserver host.
2. The question of putting the large PSRC bibliography of papers on the website with search capabilities was brought up. Russ Patterson took the action item to investigate with the website hosting company.
3. Each subcommittee has been asked to make sure they have someone assigned to maintain their web pages.

**V. SUBCOMMITTEE REPORTS**

**C: SYSTEM PROTECTION SUBCOMMITTEE**

**Chair: T. Seegers**

**Vice Chair: R. Hunt**

The C System Protection Subcommittee met on Wednesday, May 16<sup>th</sup> 2007 in Nashville, TN with 17 members and 35 guests in attendance.

6 Working Groups and 1 Task Force met at this meeting. The members of the Subcommittee approved the minutes of the January 2007.

Working Group C3 Processes, Issues, Trends, and Quality Control of Relay Systems completed its assignment, and the Subcommittee voted to dissolve the Working Group. The Working Group report was presented by Solveig Ward at the Georgia Tech Protective Relay Conference in May 2007.

Working Group C5 Deployment and Use of Disturbance Recorders completed its assignment, and the Subcommittee voted to dissolve the Working Group. The Working Group report was presented by Bill Strang at the Georgia Tech Fault and Disturbance Analysis Conference in May 2007.

Working Group C6 Relay Engineering in Power Engineering Curricula completed its assignment, and the Subcommittee voted to dissolve the Working Group. The final report will be published in an upcoming issue of the IEEE PES Transactions on Power Delivery.

NERC liaison report: June 4<sup>th</sup>, 2007, all PRC standards are under review. Make sure your utility is involved in the NERC process.

PSCE liaison report: nothing to report.

PSSC liaison report: Nothing to report. The task force on blackouts is still proceeding.

The Subcommittee voted to create a task force, CTF15 Testing and Design of SIPS, to discuss the design and testing of SIPS schemes. CTF15 will be headed by Yi Hu. Must look at most common schemes, define (and especially limit the scope), and must coordinate with C4 and C11 Working Groups.

The Subcommittee voted to create a task force, CTF16 Relay Scheme Design Using Microprocessor relays, chaired by Ken Birt. This task force will consider the ways that protection and control schemes may be changed when using microprocessor relays, and will include documentation, training, and experience. This Task Force may more properly belong in the K or I Subcommittees.

Mukesh Nagpal and Alla Deronja will report back to the Subcommittee at the September meeting on the possibility of forming a Working Group to discuss issues around connecting IPPs to the transmission system. They will consider whether this information is already covered in C37.95, by Working Group K10, or by any other Standard or Guide.

### **Reports from the WG Chairs**

#### **C3: Processes, Issues, Trends and Quality Control of Relay Settings**

**Chair: S. Kunsman**

**Vice-Chair: G. Kobet**

The Working Group has completed its assignment, and did not meet in Nashville. The WG report was presented at the 2007 Georgia Tech Protective Relay Conference.

#### **C4: Global Industry Experience with System Integrity Protection Schemes**

**Chair: V. Madani**

**Vice-Chair: M. Begovic**

WG C-11 met on May 15 in session with total 11 in attendance (9 M, 2 G).

After review of the patent slides, the members discussed whether they should consider using a database software tool for automatic extraction of responses or perform the task manually. Based on the nature of survey being related to SIPS, different respondents may interpret the questions differently. Therefore, the decision of the members was to have volunteers to review the surveys and extract the information.

Next item discussed was related to extension of the survey deadline for responses. The WG has received request for extension by different countries (CIGRE) and grid systems in North America. The WG members agreed to a 3-month extension. The WG has received approximately 20 responses with some of the responses covering double digit number of schemes and some in excess of 300 schemes.

The C-11 WG members request extension from the "C" Subcommittee for extension to accommodate survey respondents, compilation of results, and to produce a report. The product from this WG is a report to the C Subcommittee.

Sample of several responses received, to date, were reviewed. The WG members suggested to have a brief document that would assist in uniform interpretation of the survey responses.

The plan is for two members to develop the brief criteria, submit to the volunteers that have agreed to participate in data extraction for comments within a month. In parallel, a sample of responses received will be sent to the WG members.

Five members volunteered to assist in extracting responses from the survey.

Vahid mentioned that of all the responses received, no one has mentioned ambiguity in the questions or that the respondent needed further clarification or information.

Other items discussed was to rebroadcast the survey and methods to get the Regional Councils more involved. The WG members discussed best ways to get respondents to fill out the survey, and best ways to f/u. Several WG members have volunteered to send to their contact colleagues in various parts of the world.

**C6: Relay Engineering in Power Engineering Curricula**

**Chair: S.S. Venkata**

**Vice-Chair: J. DeLaRee**

The WG met with 8 members in attendance. The WG discussed the feasibility of developing actual educational modules, and decided to not undertake this effort. The WG was disbanded by the Subcommittee. The paper will published in an upcoming issue of the IEEE Transactions on Power Delivery.

**C9: Appl. of Prot. Relays used for Abnormal Freq. Load Shed. & Restoration**

**Chair: A. Apostolov**

**Vice-Chair: K. Behrendt**

The working group met on Tuesday, May 15th, with 8 members and 4 guests present. Alex announced that the recirculation ballot was successful; there were no negative ballots. The revised guide, C37.117, has been sent to IEEE RevCom for final approval. In the process, an IEEE editor has reviewed the guide again, suggested several editorial changes, and asked questions about terminology, references, and other possible editorial changes. The working group reviewed the comments and questions to form a response. Alex and Ken will respond to the IEEE editor.

Alex will prepare an outline for an IEEE Transaction Paper and draft a Summary Paper paper before the next meeting. Members of the working group will be solicited to write sections of the transaction paper.

**C11: Guide for Protection System Testing**

**Chair: V. Madani**

**Vice-Chair: H. DoCarmo**

WG C-11 met on May 15 in single session with total 44 in attendance (12 M, 20 G). After review of the patent slides, the WG members reviewed a list of pending contributions. The following writing assignments were discussed:

- Sec. 4.4.4: - Synchronous closing CB and associated testing
- Sec. 5.1.2 (Functional Testing of IEC 61850-based applications), Test Mode Functionality
- Sec. 5.1.2 (Functional Testing of IEC 61850-based applications), Additional virtual wiring testing
- Section 6 – SIPS Testing

In discussions with the I8 WG (Application of Optical Sensor Systems) and EG C-13 (Undervoltage load shedding scheme), it is also agreed that system testing will address these two from protection scheme and scheme performance perspectives. The C-11 WG members have the knowledgeable people as WG members that can make the contributions.

For the next meeting, the C-11 WG members will start going over comments assigned to review the entire document. A total of 9 WG members have volunteered (2 from Academics, 2 from Consulting / testing, 3 from utilities, plus Chair and vice Chair).

**C12: Performance of Relaying During Stressed Conditions**

**Chair: D. Novosel**  
**Vice-Chair: G. Bartok**

The working group met on Tuesday, May 14th with 15 members and 18 guests present, chaired by Damir Novosel.

For the benefit of the guests present, the Working Group scope and the current progress in completing the report were reviewed.

Writing contributions received since the last meeting have been incorporated into Draft 7a of the report. This draft was distributed to Working Group members on May 7th for review at this meeting. The draft is over 95% complete.

The report has been completely reviewed by Demetrious Tziouvaras and Alla Deronja for consistency and to remove duplicate material. The general consensus of Working Group members is that the report is too long (99 pages) and contains detailed information that should be removed and noted as references.

Comments and suggestions received from Demetrious and Alla were reviewed:

- Section 2.1 on Voltage Instability is too broad. Alla will condense this section to remove detailed information that will be referenced.
- Section 2.6 on Voltage Excursions will be moved to follow Section 2.1
- Section 2.7 on High System Unbalance will be reduced to remove duplication with Section 3.2.3
- The last paragraph of Section 2.8 (Dependability-Security Balance) will be clarified and moved to Section 3.
- Section 3.2.5 on Automatic Reclosing and Synchro-check is too detailed. It will be reduced to only the key concepts. The last paragraph that describes how stressed system conditions affect reclosing will be retained.
- Section 3.2.6 on Series-Compensated Lines contains material that is instructive, but not related to the central focus of the report. Fernando Calero will rewrite this section to include only the information pertaining to the impact that series line compensation may have on protection performance during stressed system conditions.
- Section 3.2.8 on Multi-Terminal and Tapped Lines is too long and contains material in subsection 3.2.8.1 that is not related to the central focus of the report. This section will be removed or rewritten.
- All of Section 3.4.2 beyond the first two sentences should be moved to Section 5.3.5.
- Section 3.4.7 (Unknown Causes) and 3.4.8 (Gas Turbine Generator Monitoring) should be swapped.
- The events listed in Section 4 (Field Experience and Examples) should be presented in chronological order.
- Section 4.1 (NERC Analysis of August 14, 2003 Blackout) will be reduced to approximately four pages by Tom Wiedman. The remainder of the detailed material in this section will be referenced.

All assignments to edit and rewrite sections of the draft report will be made relative to the draft copy that Demetrious Tziouvaras has already reviewed and edited. These changes will be submitted to the Chair and Vice Chair by July 15th. George Bartok and Vahid Madani will review the entire report for consistency by September 1st. The new draft will be distributed to the members for review prior to the September meeting in Charlotte. It will also be placed on the Working Group web site.

**C13: Undervoltage Load Shedding**

**Chair: A. Buanno**  
**Vice-Chair: S. Imai**

The UVLS Working Group met for the fourth time with 28 in attendance. This included 11 members and 17 guests.

The working group assignment was reviewed with no changes.

**Comments & suggestions from Recent Contributions –**

1. Clause 2.2.1 on Dynamic Reactive Power Source

- a. The terms on percentage increase for price and 'expensive' are to be removed.
- b. Lukach will make a summary of the advantages and disadvantages of various dynamic reactive sources..
2. Clause 2.4 - NERC Position on UVLS,
  - a. No comments
3. Clause 5.1 - Manual/SCADA load shedding,
  - a. Group tripping of load via SCADA will be added by Young.
  - b. Load restoration will be mentioned in clause 5.1 Manual/SCADA load shedding by Young.
4. Clause 7 - Scheme Design,
  - a. In clause 7.9, Performance Criteria, operation under extreme cases will be clarified.
  - b. UVLS as response-based scheme will be added under clause 7.9, Performance criteria.
  - c. Madani will be reviewer for clause 7.9, Performance criteria.
  - d. Possible name change for clause 7 to scheme design and engineering section rather than Scheme Design was mentioned and will be considered later.

#### **Open sections & volunteers for assignments**

1. Madani will contribute for clause 4.1.3. Safety Net and review all of clause 4.
2. Clause 5.2.1 will be written by Burger.
3. Clause 2.3, Coordination between UVLS and UFLS, will be written by Wiedman.
4. Clause 8, Maintenance and testing, will be covered briefly in this report by Madani; details will be covered in the C11 WG guide.

#### **Presentation**

"Understanding Power System Models and Predicting the Next Blackout", Tony Sleva

#### **Timeline of the activities**

- July 15, 2007 – Complete writing assignments
- August 15, 2007 – First review of report
- Sept. 17-20, 2007 – Next working group meeting
- November 15, 2007 – First round of editing
- January 7-10, 2008 – Working group meeting
- February 15, 2008 – Submit for ballot

#### **CTF14: Impact of the Application and Deployment of PMUs on Protective Relaying**

**Chair: J. O'Brien**

**Vice-Chair: A. Deronja**

TF CTF21 met on May 15, 2007, in Nashville, TN, in a single session chaired by Jim O'Brien with 9 members and 9 guests present to define the need and scope of the future working group.

Is there enough in this topic to justify a Working Group? Yes. Meet as a task force next time, define the scope. Discussion focused on:

- Applications on RAS, SPS, adaptive relays and voting scheme input
- Synchrophasors vs. PMU
- Communications, reliability, redundancy
- Power measurements, frequency, rate of change of frequency, phasor angle
- PMU from transient observation, transient response is suitable for application (synchrophasor standard)
- Trend of integration of synchrophasors and relaying functions, security issues
- Stand alone vs. integrated with relaying
- Post-mortem analysis, line impedances, ratios X/R, positive/zero sequence, hardcore protection applications backup, RATS, frequency load shedding. Away from the system
- Impact on the Recorders DFR
- Impact on communications, should be considered

- Dynamic performance different PMU vendors
- Focus on protection, integration SP with relays, commissioning, communications, relay settings, post-mortem, short-circuit analysis, concept of the function, different operation of the different vendor devices, reliability, security
- Conventional protective functions receiving info from PMU, putting conventional protection into SP.
- What to use from PMU to improve

Should the output be a Report, Guide, or Standard?

Thoughts on a title and scope:

- Some possible practical applications (PMU inside the relay):
- Check instrument transformer connections
- Check CT polarities, phasing (within station and remote)
- Analyze faults
- Apply system self-checking schemes
- Monitor voltage/current angles across the system
- Perfectly Time-Align

**Possible scope**

To identify time synchronized measurement data and parameters that are useful for developing relay settings for protective scheme implementation improving protection schemes and analyzing protective relaying performance.

**D: LINE PROTECTION SUBCOMMITTEE**

**Chair: R.A. Hedding**

**Vice Chair: M.J. McDonald**

The Subcommittee met on May 16, 2007 with 22 members and 32 guests. Minutes from the January 2007 meeting were approved.

**ADCOM items of interest**

Working Group Chairman are reminded:

- Please insure that your Working Group website is up to date with the most recent information posted.
- Chairman are responsible for determining the need for coordination
- IEEE Slides are required to be shown at the start of your meetings

**Reports from the WG Chairs**

**D1: Cold Load Pickup Issues and Protection**

**Chair: Dean Miller**

**Vice Chair: Tony Sleva**

**Output: Working group report to PSRC**

**Expected completion date: Early 2008**

Working Group D1 met with 9 members and 9 guests.

The working group met in a single session on Wednesday, May 16, 2007 in Nashville, TN.

Minutes for the January 2007 meeting were accepted as written.

PSRC Working Group D1 is continuing to develop a special report that deals with Cold Load pickup issues and the impact of cold load on protective relay applications. Working Group D1 is projecting that a special report will be submitted to PSRC in early 2008 for PSRC's review, comment, and approval.

**D4: Application of Overreaching Distance Relays**

**Chair: Russell W. Patterson**  
**Vice Chair: Walter P. McCannon**  
**Output: Working group report to PSRC.**  
**Established: May 2004**  
**Expected completion date: September 2007**

Working Group D4 met with 18 members and 9 guests. Total in attendance was 27.

The outstanding writing assignments were discussed and the chairman announced that a final version would be sent to the group shortly for review before the next meeting in September. The expectation is to have a finished paper by the next meeting.

**D5: Guide for Protective Relay Applications to Distribution Lines**

**Chair: Phil Waudby**  
**Vice Chair: Randy Crellin**  
**Output: IEEE Guide PC37.230**  
**Established: January 2002**  
**Expected Completion Date: PAR extended to 2008**

The working group met in a triple session with 26 attendees (16 members and 10 guests).

Comments from the recirculation of the guide were discussed. There were 27 comments received during this recirculation process. We will circulate the document again in June for the final time. Volunteers for writing a summary paper are currently being sought. We expect to submit the guide for approval after the last recirculation

**D8: Justifying Pilot Protection on Transmission Lines**

**Chair: G. Kobet**  
**Vice Chair: B. Kasztenny**  
**Output: Report to the Subcommittee**  
Meeting #8  
Draft: 3.0

The WG met on May 15, 2007 with 21 in attendance: 12 members and 9 guests. The minutes of the January 2007 meeting were approved as printed.

The Chairman set a target to have a draft ready for WG circulation before the September meeting.

Vahid Madani delivered a short presentation on limiting thermal effects of short circuit currents. His presentation feeds into section 3.2 of the document and covers both overhead lines and underground cables. Vahid and Mike McDonald will finalize section 3.2. References from Vahid's presentation will be added to the report.

The group discussed figure in section 3.6 explaining protection of lines terminated with transformers with no high-side breaker. It was decided to leave the figure as-is and mention the issue of redundancy of communication paths – as emphasized by Vahid – in the text. Vahid will review and finalize the paragraph referring to redundancy.

Frank Plumtre will review and finalize definitions for conformity with IEEE100 and other Guides and Standards.

Alla Deronja's comment on section 3.7, referring to line current differential as the only way to protect short lines, has been rejected by the group. Frank Plumtre will review the section and decide if extra comments

are needed. If so, the language will be softened to point to difficulties of the application rather than to single out 87L as the only method.

It was agreed that pilot channels reduce clearance time for high resistive faults, but do not improve sensitivity. Bogdan Kasztenny will rename section 3.8 accordingly and harmonize its content with the general statement on speed vs sensitivity.

Walt Elmore pointed that some figures are too busy. Gary Kobet will work with Al Darlington to simplify and clean up.

Frank Plumtre will take care of the figure missing in section 3.9.2.

General observation was made by Frank regarding avoiding overlaps with other documents and focusing on the WG assignment. This will be taken into account when reviewing the complete document.

Writing assignments are due July 1.

**D9: Revision of C37.113 - Guide for Protective Relay Applications to Transmission Lines**

**Chair: Mohindar Sachdev**

**Vice Chair: Simon Chano**

**Output: Revised IEEE Guide C37.113**

Meeting #8

The Working Group met in Heritage D Room, Sheraton Music City Hotel in Nashville, TN from 04:30 PM to 05:45 PM on May 15, 2007; 22 members and 13 guests were in attendance.

The two slides concerning patent issues provided by the Standards Association were shown and discussed. The minutes of the WG meeting held in January 2007 were approved as distributed by Email. The Chair reported that he could not complete the task of incorporating all the figures in Draft 2 of the Guide because of his personal health problems and, therefore, the draft was not distributed among the members before the meeting. He further reported that more than half of the figures have been completed and incorporated in the draft and he intends to have the draft ready in about four weeks time. The draft will then be distributed among the WG members for review and comments.

Three sections of the guide have been submitted and have been incorporated in Draft 2. A few other sections are outstanding. It was agreed that the outstanding sections should be sent the Chair and Vice Chair before July 1, 2007.

Alex Apostolov made a presentation on the line protection issues addressed in IEC Standard 61850. He will provide a draft suitable for including in the guide on the use of IEC Standard 61850 in line protection. The draft will most likely be incorporated in an Annex of the guide.

Steve Conrad and Neil Saia joined the working Group as members.

**D11: Effect of Distribution Automation on Relaying**

**Chair: F. Friend**

**Vice Chair: J. Johnson**

**Output: Report**

The working group met with 9 members and 10 guests on Tuesday afternoon. The January minutes were reviewed and approved. The outline was reviewed and revised. Writing assignments were given to be completed by August 1, 2007.

A presentation on Distribution Automation was given by Ljubomir Kojovic from Cooper Power Systems.

**D21: Investigate Supporting IEC STd for Distance Relay Characteristics**

**Chair: Alex Apostolov**  
**Vice Chair: Alla Deronja**  
**Output: IEEE/IEC Standard**  
**Established: September 2006**  
**Expected Completion Date: December 2008**

Working Group D21 met on May 16, 2007, in Nashville, TN, in a single session chaired by Alex Apostolov with 15 members and 3 guests present.

The scope of this working group is to 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.

It was mentioned that the existing 1992 standard 255-16 does not have enough information and outdated. The goal is to provide much more information in the new standard relative to the distance relay inputs and outputs, transient and static performance, CT and VT requirements, and testing.

The standard will not address specific applications or schemes for transmission line protection, voltage supervision, switch-onto-fault tripping, pilot-aided schemes, trip conversion logic, and out-of-step blocking/out-of-step tripping operating characteristics. All of these are typically available in the microprocessor distance relay.

The present draft of the IEC60255-121 was presented by Murty Yalla and discussed in detail.

The standard's scope is to specify minimum requirements for distance relays typically used but not limited to line applications. It covers phase-to-phase and/or phase-to-ground impedance and includes specifications of the protection functions, measurement characteristics, phase selection, directionality, and starting and time delay characteristics.

The group believes that load encroachment should also be added to the standard's scope and objective.

Alex presented a valuable diagram on the distance function, which will be utilized by the working group.

An updated draft of the Standard will be circulated to the group before the next PSRC meeting as soon as Murty receives it.

## **D22: Performance Testing of Transmission Line Relays for Frequency Response**

**Chair: Tom Weidman**  
**Vice Chair: Solveig Ward**

This was the first meeting of the D22 Working Group, formerly D22TF. There were 26 people present of which 11 joined the working group including the chairman, Tom Wiedman. Solveig Ward volunteered to become the working group vice-chairman.

The letter from NERC was presented (Charles Rogers/System Protection Control TF to Phil Winston dated 4/28/2006) as was the response from PSRC (Charles Henville to Charles Rogers letter dated 2/27/2007). The Henville letter quoted the proposed WG assignment as agreed to by the Line Protection SC.

The NERC letter requested consideration on two issues:

1. Manufacturers of relays include operating specification on in-specification range for frequency and rate of change of frequency for transmission line relays
2. PSRC establish minimum parameters for relays designed after approval of a subject standard for in-spec frequency and rate of change of frequency.

D22TF recommendations that a working group be formed, approval of D22TF as a working group by the Line Protection SC, and C. Henville/PSRC Response to NERC led to the proposed WG assignment:

**Investigate the feasibility of defining a range of frequency and rate of change of frequency to be using 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.**

On May 16, the WG added "during stressed system conditions." to the assignment with approval by the SC Chairman, Roger Hedding.

Further, the WG agreed to a new name: D22: Performance Testing of Transmission Line Relays for Frequency Response

Several members of NERC's SPCTF relay task force were present, notably the chairman, Charles Rogers. Mr. Rogers agreed with PSRC's response to his letter and encouraged the efforts of the WG.

The following are the first technical papers identified addressing the response of transmission lines to off system frequency during stressed system conditions.

- Final Report on the August 14, 2003 Blackout in the United States and Canada: Causes and Recommendations April 2004
- Adapting Protection to Frequency Changes, Roberto Cimadevilla, Rafael Quintanilla, S. Ward Presented to the 32nd Annual Western Protective Relay Conference Spokane, WA October 25 - 27, 2005
- D. Hou, A. Guzman, and J. Roberts, Innovative Solutions Improve Transmission Line Protection. 24th Western Protective Relay Conference, Spokane, WA, October 21-23, 1997.

(Please forward me any other technical papers on the off frequency response of protective relays that you may know.)

The WG discussed the capabilities of today's test equipment for off frequency and rate of change of frequency. The general consensus was that this form of testing was within their capabilities.

Before adjourning, the chairman requested membership and stated that presentations from a relay test equipment manufacturer and a NERC representative regarding the need for coordination of relay performance with underfrequency load shedding. A draft outline will also be completed.

#### **DTF24: Transmission Line Applications of Directional Ground Overcurrent Relays**

**Chair: Rick Taylor**

**Vice Chair: Don Lukach**

**Output: Report to D Subcommittee**

Meeting # 1 - 5/15/2007

The Task Force met for a single session to determine if the proposed topic required independent investigation and to gauge the interest in participation.

The discussion addressed the increased application of ground distance relaying that could impact the role and application of directional ground oc relays. The primary focus of the WG would be to determine appropriate criteria for determining pickup settings and concepts of coordination for the various applications for which these relays would be used.

It was agreed that the proposed assignment should be to provide a report to the D Subcommittee and to attempt to have all or a portion of this report included in the Line Protection Guide presently under review by Working Group D9.

The TF recommended the formation of a working group, which subsequently was approved by the D Subcommittee. The new WG will begin identifying topics and making assignments during the next month or two and will attempt to have an outline along with several section drafts by the September meeting.

Don Lukach has agreed to serve as Vice Chair and 11 others volunteered to be members.

### **Liaison Reports**

Alex Apostolov gave an update on IEC TC57.

### **Coordination Reports**

None

### **Old Business**

C37.104 Guide for Automatic Reclosing of Line Circuit Breakers for AC Distribution and Transmission Lines is coming up for re-affirmation. Watch for the re-affirmation notice coming soon. We will be looking for someone to Chair a working group to address any changes/modifications that need to be made.

### **New Business**

The SC is looking for ideas for new Working Groups. Please provide any suggestion to the Chairman or Vice Chairman. It was pointed out that suggesting something does not mean you must Chair the topic you suggest.

### **High Impedance Fault Activity**

None reported

## **H: RELAYING COMMUNICATIONS SUBCOMMITTEE**

**Chair: A. Apostolov**

**Vice Chair: V. Skendzic**

The Subcommittee met on 5/16/07 with 16 members and 32 guests. Minutes from the January 2007 meeting were approved.

### **Reports from the WG Chairs**

#### **H1: Guide for Application of Digital Teleprotection**

**Chair: M. Benou**

**Vice Chair: M. Allen**

**Output: Guide**

No report submitted.

#### **H2: Broadband Communications Over Power Line Carrier**

**Chair: M. Simon**

**Vice Chair: TBD**

**Output: Report to the Subcommittee**

Working Group did not meet.

#### **H3: Time Tagging in Protection and Disturbance Recording IEDs**

**Chair: B. Dickerson**

**Vice Chair: J. Ingleson**

**Output: Recommended Practice**

The Working Group met with 22 attendees.

The IEEE Patent Policy slides were shown, and an opportunity was given for attendees to disclose any patent issues. None were identified.

The chair informed the group that the PAR had been approved and the number assigned is C37.237. The chair also reviewed the Scope, Purpose, and Need for the Standard as revised at the request of NesCom, and which were approved as part of the PAR.

The outline was presented and the first contributions were discussed. Additional items were added to the outline under 'Other Considerations' at the suggestion of WG members. Several new volunteers offered to take on writing assignments. These will be requested by end of July so that they can be collated together and distributed to the WG members. The members should come prepared to discuss the contributions at the next meeting.

Copies of these Minutes, the revised Scope and Purpose and Outline documents, and the membership list will be provided to Subcommittee for posting on the web site. The membership list will also be provided to IEEE-SA at their request.

#### **H4: Revision of C37.111 COMTRADE Standard**

**Chair: R. Das**  
**Vice Chair: A. Makki**  
**Established 2006**  
**Output: Standard**

The Working Group met with 16 members and 7 guests.

Minutes of the January 2007 meeting were approved. Discussions were held on Draft 2, primarily on Clause 8.0 and Clause 9.0. Members will submit written comments by June 18, 2007. Mark Adamiak will prepare an xml format single file based on a set of COMTRADE files (with both ASCII and Binary data) provided to him during the meeting. He will submit the file along with xml schema to the chair by June 18, 2007.

Chair will circulate Draft 3 by July 18. Comments on Draft # 3 must be submitted by September 2, 2007. Major comments will be discussed and resolved during the next meeting. Draft #4 will be balloted among WG members and subcommittee members during October 2007.

#### **H5-a: Common Data Format for IED Configuration Data**

**Chair: J. Holbach**  
**Vice Chair: D. P. Bui**  
**Output: Report**  
No report submitted.

#### **H5-b: Common Data Format for IED Event Data**

**Chair: M. Adamiak**  
**Vice Chair: P. Martin**  
**Output: Report**  
No report submitted.

#### **H5-c: Common Data Format for IED Sampled Data**

**Chair: B. Vandiver**  
**Vice Chair: B. McFetridge**  
**Output: Report**

Working group met with 5 members and 9 guests present following sessions with H5-a and H5-b. The meeting minutes from the January meeting in Scottsdale were reviewed and approved by the group. The WG advisory slides were presented and reviewed as prescribed by the PSRC and opportunity provided for membership response.

Draft #6 of the report was reviewed with focus on editorial changes, review of definitions added, and section 4.4 again. IEC-61850 data extensions previously submitted were reviewed for any missing details.

The updated report was distributed to attendees and will be circulated to all members for consideration as a final draft providing members a chance for final comments.

Further edits and comments on the report are due by July 16th for inclusion in the final report that will be distributed and reviewed prior to the September meeting.

**H6**     **Substation Ethernet**

**Chair: J. Burger**  
**Vice Chair: C. Sufana**  
**Output: Report**

Working group met with 30 members and guests. Alex Apostolov gave a presentation about IEC 61850 system testing. Alex also proposed that the term "Intelligent Electronic Device" (IED) be replaced with ISD (Intelligent Substation Device) or IEU (Intelligent Electronic Unit).

**H7:**     **Comparison of IEEE / IEC Teleprotection Standards**

**Chair: M. Simon**  
**Vice Chair: E. Fortin**  
**Output: Report**

H7 met on Tuesday May 15, 2007 with 10 members and guests. The compilation of the standards has been completed. The Compilation will be further parsed into categories and provided to the working group at the next meeting. A introductory document will be created to introduce the document to it's WEB audience.

**H8**     **File Naming Conventions**

**Chair: A. Makki**  
**Vice Chair: E. Gunther**  
**Output: Standard C37.232**

WG met on May 15th, 2007 with 2 members and 1 guest.

Since PC37.232 has been approved, the only work remaining for the group is to write a summary paper. Mark Taylor volunteered to assist in that effort. Other members will be invited to contribute via email.

**H9**     **Understanding Communications Technology for Protection**

**Chair: M. Sachdev**  
**Vice Chair: M. Benou**  
**Output: Report**

The Working Group met with four members and 12 guests.

The minutes of the WG meeting held in January 2007 were approved as distributed by Email. The Chair reported that he had received six assignments that will be incorporated in the first draft of the WG report. He further indicated that he intend to get the first draft prepared and distributed in eight weeks time.

Nine new writing assignments were distributed. All assignments should be completed and provided to the Chair before July 1, 2007.

K. Martin, M. Simon and D. Ware joined the Working Group.

**H11**    **C37.118 Synchrophasor Standard Clarification & Interpretation**

**Chair: K. Martin**  
**Vice Chair: D. Hamai**  
**Output: Paper**

Working Group H11 met with 8 members and 10 guests. The minutes from the January meeting were approved with no corrections.

Ken Martin reported that we do not have an IEEE alias for the WG yet and his e-mail address is being used for questions/clarifications. Permission to submit the IEEE Transactions paper was given by the PSRC officers; Ken will send this week. The IEC dual-logo process has been initiated and is currently being reviewed at IEC.

The North American SynchroPhasor Initiative (NASPI) meeting that took place last week was discussed. Damir Novosel reported that a NASB paper "Interpretation of Testing" will be posted in June 2007 for review.

Arun Phadke's e-mail about the out-of-band frequency performance requirements was discussed by the WG. Bogdan Kasztenny agreed to write a draft response by June 30. This will be reviewed by the WG.

Mark Adamiak agreed to review the two documents "Response to issues raised at Jan 2006 WG meeting" and "C37.118 communication issues". He will format these responses into a resolution document by June 30. This will be reviewed by the WG.

Bill Dickerson discussed the confusion in the FREQ and DFREQ fields in the data frame. By a vote, the WG agreed to the clarification stating that all floating point numbers in the data frame will be unscaled. This resolution will be posted on the WG website.

Bill Dickerson floated the idea of a new PAR and working group to address new material related to implementation. If the issues raised by the questions/clarifications forum are numerous and relate to recommended practices, the WG may need to consider the new PAR approach.

An observation was made about the 16-bit ID code for the PMU in the data frame being too small in the future. The issue will be formulated and sent to Ken for distribution to the WG.

#### **H14 Telecommunications Terms Used By Protection Engineers**

**Chair: R. Ray**

**Vice Chair: R. Young**

**Output: Report**

No report submitted.

#### **HTF1 Device Naming Conventions (subsequently promoted to H10)**

**Chair: A. Makki**

**Vice Chair: J. Hackett**

**Output: Report**

HTF1 met with 8 members and 15 guests. Amir Makki, Chair, was unable to attend. The minutes of the last meeting were reviewed with corrections.

There was a discussion, led by Rick Cornelison, to re-confirm the need to create a Device Naming Convention and to differentiate it from the current work of C37.2. John Tengdin described the related work now under way in the C37.2 activity.

Stan Klein described some of the device naming issues in 61850.

Tom Wiedman and Bob Stuart gave an impromptu presentation based on their experience analyzing data from the 2003 black-out.

A wide range of issues and concerns were reviewed with good participation from those present. There was a consensus that there is a need to uniquely identify the devices that generate time sequenced data.

There was sufficient agreement among the members that a Working Group be formed to pursue this effort. The assignment statement will be drafted at the first meeting. Rick Cornelison volunteered to chair and Jim Hackett volunteered to serve as Vice-Chair.

#### **HTF2 Configuring Ethernet LAN Infrastructure**

**Chair: E. Udren**

**Vice Chair: J. Gould**

**Output: Report**

This was the first taskforce meeting. The Ethernet LAN is becoming as important to protection and control design as the relays themselves – devices from the IT world like Ethernet switches and routers are our new auxiliary relays. They can have as many settings as modern microprocessor relays, and incorrect settings can cause protection and control problems. The new activity aims to inform and guide the community of protection and control engineers.

Veselin Skendzic gave a presentation on experiences and challenges in configuring Ethernet switches and networks to convey high-speed messages for protective relaying over local and wide area communications networks. This was followed with a discussion of the need for a working group, project options, and broad view of the contents of any guidance document to be produced.

## Old Business

C. Huntley asked about the dual logo status of C37.94-2002 which was previously submitted to IEC. E. Udren informed the subcommittee that the TC57 rejected IEEE submission. The Subcommittee members, many of whom are knowledgeable in IEC as well as IEEE standards in this area, stated strongly that they do not understand the response of the TC 57 Secretary and M. Jacquemart who rejected our submission.

The Relaying Communications Subcommittee of PSRC formally requested (through IEEE central office) that the Secretary of TC 57 and M. Jacquemart indicate, specifically what the incompatibility is. E. Udren will report the result at the next PSRC Meeting.

Subcommittee urged M. Jacquemart and the TC 57 management to reconsider the request for Dual Logo publication. We believe that C37.94-2002 fills an important role in unit protective relaying, and is not like any existing or planned IEC Standard. It is widely used, and IEC might benefit from having this in its portfolio

## New Business

Taskforce HTF1 **Device Naming Conventions** has completed the scope / assignment work and asked to be promoted to a full Working Group status. Formation of the new Working Group was approved at the subcommittee. The new WG name will be "H10".

A new taskforce was tasked to investigate creation of the IEEE 1588 profile for precision time synchronization over Ethernet. Taskforce will be named HTF1: **IEEE 1588 Profile for Protection Applications**. G. Antonova accepted to serve as a new taskforce chair, with B. Dickerson taking the vice chair position. Expected output is an IEEE1588 profile.

Five new members were added to the subcommittee. New members are:

B. Dickerson,  
R. Das,  
L. Smith,  
J. Holbach,  
J. Hackett,

## I: **RELAYING PRACTICES SUBCOMMITTEE**

**Chair: T. Sidhu**

**Vice Chair: R. Beresh**

The Subcommittee met on 5/16/07 with 22 members and 16 guests. Minutes from the January 2007 meeting in Scottsdale were approved.

### Reports from the WG Chairs

## I1: **Understanding Microprocessor Based Technology Applied to Relaying**

**Chair: Moh Sachdev**

**Vice Chair: Ratan Das**

**Output: Report to the Main Committee**

The Working Group did not meet in Nashville. The WG report is being balloted in the working group. The ballots are due on June 6, 2007.

## **I2: Terminology Review Working Group**

**Chair: M. Swanson**

**Vice Chair: B. Anderson**

**Output: Definitions for C37.100 and IEEE Std. 100**

Meeting – 5/15/07

The I2 working group met at 11:00 am on Tuesday, May 15, 2007 with eight members and two guests. Mal Swanson chaired the meeting. Minutes from the last meeting were approved.

The working group revised two terms from Group #5 according to comments from two Subcommittee members. Group #5 is now ready for Officer review.

Mal informed the group that Barb Anderson will email Groups #1 through #4 to the Chairman of C37.100, as well as to Bill Lowe who will include them on the website as “approved.” Groups 5 and 6 will also be on the website as “pending.”

So that each working group member can have a concise list of each term that has been approved or is being reviewed by I2, Barb combined Groups 1 through 6 into a document and emailed it to the working group. Barb also mailed this list to Gustavo Brunello so that he can coordinate with IEC.

PC37.233: Fred Friend reviewed this document and had one term that he will discuss with the Chairman of this working group.

Mal presented two terms that were reviewed by the working group and will be added to Group #6.

C37.234: Oscar Bolado presented a revised definitions section of this document. The working group reviewed five of the terms, which will be added to Group #6.

C4 Working Group paper: Roger Whittaker revised definitions from this document, which will be addressed in September.

## **I4: IEC Advisory Working Group**

**Chair: E.A. Udren**

**Vice Chair: M. Ranieri**

**Output: Comments and votes to USNC of IEC on TC 95 (Measuring Relays) Standards projects and drafts. Reports to PSRC on IEC standards development.**

Meetings are continuing

The WG met on May 15, 2007 with 8 members and 6 guests. With many IEC drafts in circulation, the top priority was to discuss two working drafts for TC 95 functional standards being written by Maintenance Team 1 chaired by Dr. Murty Yalla. PSRC inputs can be considered by MT1, and this is potentially the most effective channel for PSRC and USNC influence of IEC relay standards content. The WG reviewed:

- Draft 60255-151 - Functional standard for over/under current protection. This is a new update that absorbs, updates, and supersedes IEC 60255-3 and IEEE C37.112-1996. Review task leader Gabriel Benmouyal declared this to be a fine draft standard with all the latest thinking of the North American and European approaches combined. The group saw no need for modification. Attendees and WG members were invited to comment by May 25, to support Murty's next MT1 meeting work.
- Draft 60255-127 - Functional standard for over/under voltage protection. This work by TC 95 MT4 is wrapping up soon and needs a particular input on application. For inverse time-voltage relays, the curve shown in the draft has a simple 1/x inverseness, and no one has yet proposed a basis for a more sophisticated curve family based on application requirements. The meeting solicited ideas or information on applications of inverse-time voltage relays where curve shape matters, and the request was repeated with the IEC Report at the Main Committee Meeting. Below is a list of applications, but we still need more information on defining appropriate curve shape families.
- Draft 60255-121, Functional standard for distance relays. This draft needs a lot of work, and the PSRC review and input is being handled by WG D21 under Alex Apostolov and Alla Deronja.
- Draft 60255 – 1, Measuring Relays. This is functionally like C37.90, but the requirements are completely different. Review leader Mario Ranieri responded through Murty to the MT4 Convenor our deep concern regarding how the new IEC draft ignores the existence of C37.90 (no citation) and proceeds to require a completely different set of tests. Mario recommended “a vote against this IEC

standard because it does not harmonize with any of our IEEE Relay Standards and it does not provide a standard to avoid the need to test to different standards.” There is no voting yet, but we hope for a response from the IEC MT on the detailed list of concerns as they continue drafting the standard.

The Chair had circulated drafts in various stages of the following EMC standards projects by e-mail to WG members, requesting comments before dates in each of those drafts. The documents are:

- 60255-22-2, ESD Tests, CDV, Vote due 9/21
- 60255-22-3, EMI Immunity, FDIS, Vote due 6/15
- 60255-22-4, Fast Transient/burst immunity, CDV, Vote due 9/21
- 60255-26, EMC requirements for relays, CDV, Vote due 8/03

The last of these is a summary of tests and levels, and will eventually refer to a host of IEC base EMC standards (61000-4 series) and supersede the other 60255-22 EMC requirements. We cannot post these drafts on the PSRC web site. WG/TAG members get them by e-mail. Others can request copies for review from Eric Udren.

## **17: Application of Rogowski Coils Used for Relaying Purposes**

**Chair: Ljubomir Kojovic**

**Vice Chair: Veselin Skendzic**

**Output: Guide**

Meeting – 05/15/07

Group met on Tuesday with 4 members and 5 guests. Draft\_4: PC37.235, “Guide for the Application of Rogowski Coils used for Protective Relaying Purposes” has been approved.

### **RESPONSE RATE**

This ballot has met the 75% returned ballot requirement.

99 eligible people in this ballot group.

83 affirmative votes

0 negative votes with comments

0 negative votes without comments

5 abstention votes

88 votes received = 89% returned, 6% abstention

### **APPROVAL RATE**

The 75% affirmation requirement is being met.

83 affirmative votes

0 negative votes with comments

83 votes = 100% affirmative

WG will work with IEEE to finalize this process. The next activity is writing an IEEE Transactions summary paper. Next meeting: Need room for 20 and a computer projector.

## **18: Guide for Application of Optical Current and Optical Voltage Systems for Protective Relaying**

**Chair: Harley Gilleland**

**Vice Chair: Bruce Pickett**

**Output: Guide**

Meeting - 5/15/2007

The meeting was called to order by the Chair, Harley Gilleland. There were 17 members and 8 guests present.

Introductions were given. An agenda and work assignments discussed as well as current postings on the website.

Harley led the discussions. John Lane discussed section 3. Brian Muligan reviewed Eric's sections posted & discussion for sections 4,5,6,7 were led by Harley and Veslin discussed section 8.

Harley reviewed the list of user companies that we had put together at the last meeting to poll about their experiences with optical sensors. He proposed that he would start the initial contact and then turn it over to the appropriate team. He also entertained ideas on how to get contributions ramped up.

next mtg: room for 25, computer projector requested

**I9: Revision of C37.105 – Standard for Qualifying Class 1E Relays and Auxiliaries for Nuclear Power Plants**

**Chair: S. Usman**

**Vice Chair: Roy Ball**

**Output: Revision of IEEE Standard C37.105**

Meeting - 5/15/2007

The Working group met with 5 members and 3 guests

- The W.G met in three sessions ( May 15 & 16)
- Per Subcommittee's advice, the Notice "Instructions for the WG Chair" (Approved by IEEE-SA Standards Board- December 2002) was circulated among the members and guests.
- Resolution of the most part of the outstanding negative comments/ballots were discussed.
- One of the items required to finalize the draft No and issue for re-balloting is the writing assignment on Harmonization with IEC due from Marie Nemier. Marie has been notified of this.
- It is proposed by the members that the draft D.10/4 incorporating all/most of the negative comments/ballots shall be completed and discussed in the next meeting.
- The members expressed the need for applying for extension of the PAR by one more year.

**I10: C37.98-1987 – Standard Seismic Testing of Relays**

**Chair: M. Nemier**

**Vice Chair: M. Bajpai**

**Output: Revision of IEEE Standard C37.98**

The Working Group did not meet

**I11: Timing Considerations for Event Reconstruction**

**Chair: J. Ingleson**

**Vice Chair: J. Hackett**

**Output: Report to PSRC**

The group had a very successful meeting at the Nashville PSRC in May 2007. A total of 21 members and guests were present.

We reviewed the latest draft of the report, as it has been retitled, and which was posted by the Chair in advance of the meeting, on the I11 web page. A number of fairly minor changes were made at the meeting.

Additional sections for revision or addition were assigned to: Bill Dickerson, Ken Behrendt, and Galina Antonova. Note: These assignments were due by 2 weeks after the meeting, and in all cases they were forwarded to the Chair approximately by the due date. It now remains for the Chair to integrate these assignments into the report and send the result to group Membership for a final check. Unless significant problems develop with the new material, it was agreed that, at that point, the report will be ready to transmit

to the "I" Subcommittee and PSRC officers for review. A general format review is also required and the Chair anticipates that this should all take place approximately one month after this meeting.

Proposed Report Name: Event Reconstruction Using Data from Protection and Disturbance Recording Intelligent Electronic Devices. (This is different from the official name of the I11Working Group.)

Jim Ingleson (Chair) is retiring from NYISO at the end of June. It was agreed that, if Jim does not come to the September meeting, Jeff Pond will act as Chairman, for what is anticipated to be the conclusion of this work.

We request a room for 25 persons and a computer projector for the next meeting.

## **I12 Revision of C57.13.1 - Guide for Field Testing of Relaying Current Transformers**

**Chair: M Meisinger**

**Vice Chair: D. Sevcik**

**Output: Revision of ANSI/IEEE C57.13.1-1981 (R1992)**

The Working Group did not meet, but the work on revising the standard has been completed and approved.

Work continues on writing a summary paper of the revision to coincide with publication of the standard.

## **I14 Revision of C37.2-1996 Device Function Numbers**

**Chair: John Tengdin**

**Vice Chair:**

**Output: Revision of Standard C37.2-1006**

Meeting - 5/16/2007

Attended by ten members and 2 guests

Circulated the two page Patent warning from IEEE SA for all to read.

Reviewed results of Email survey – almost 1900 responses. Survey showed three of the seven “candidates for retirement are still in active use. Reported that at the Substations Committee meeting in April, decided to explore the use of acronyms for the new functions. Objections were raised by some members to the addition of acronyms for new functions (as opposed to going to three digits). Tengdin agreed to review with the Substations WG C5.

Reviewed draft 1.3 and:

- decided to add a generic disclaimer at the beginning of Clause 3 that the word “relay” does not necessarily imply a separate physical device
- decided to use 78T for the function creating synchrophasor data (not PMU)
- for the breaker failure function, show two options:
  - 50BF for current supervised breaker failure
  - 64BF for non-current supervised breaker failure (such as breaker position)
- proposed expanding the list of acronyms to add LOG as the function that provides scheme logic (decided not to use PLC, as that is for a physical device that includes logic)
- proposed expanding the definition of device 26 -now “apparatus thermal device” – (a thermostat) to include the functions in the proposed ENV acronym – now defined as: A device/function that measures and stores variables relating to the environment, such as weather data, ice buildup conditions, geomagnetic disturbances, earthquakes, and other similar phenomena.
- decided not to add acronyms GIL or RIL, or even IL
- revise the example elementary diagrams to include the use of some of the acronyms (in an oval or box with rounded corners (not in a circle, as three letters fit better in those shapes)

On device 16, decided to use standard Visio graphics for switches, routers, firewalls, etc. in the example diagrams showing the use of Device 16. Eric Udren agreed to prepare. He will also prepare a one sentence description of device 16 (now titled “Data Communications Device), similar to the other device descriptions in the draft. Further explanation could be included in the Annex example diagrams.

John Tengdin agreed to explore with IEEE SA why IEEE C37.2-1996 was not an ANSI/IEEE standard, and if the 2007 update will be ANSI/IEEE.

John Tengdin agreed to distribute a new draft after receipt of Eric Udren's input.

For the next meeting, we will need a room for 25 with a computer projector.

**I15: Guide For The Application Of Current Transformers Used For Protective Relaying Purposes**

**Chair: G. P. Moskos**  
**Vice Chair: B. Jackson**  
**Output: IEEE Guide**

Meeting – 05/15/07

The Working Group met with 4 members and 5 guests on May 15, 2007. Draft 10 of IEEE PC37.110 was reported as being opened for recirculation ballot on May 15, 2007. The ballot close date was on May 25, 2007. The ballot has met the 75 % returned ballot requirement. The goal of the recirculation ballot was to resolve the 5 negative votes which had comments.

**I17 Trends in Relay Performance**

**Chair: Mark Carpenter**  
**Vice Chair: Don Wardlow**  
**Output: Special Report**

Meeting – 05/15/07

I-17 met on Wednesday May 16th. with 1 member and 6 guests present.

Rafael Garcia presided over the meeting and presented the system performance results for 2005 and 2006 for which only two companies provided data. Rafael Garcia also presented a detailed review of all the processes TXU Electric Delivery now Oncor Electric Delivery follows in analyzing every disturbance that occurred on Oncor's transmission system and how all mis-operations are handled to arrive at the root cause of the problem and how this information is tracked and reported to ERCOT and internal management.

Due to some interest in revisiting the IEEE methodology of reporting misoperations it was decided that I-17 should meet in September for further discussions and to help increase interest in reporting data.

Next meeting should provide room for 20 and at this time, I do not believe a projector will be necessary.

**ITF1: Relay Services Letter Database**

**Chair: J. Jodice**  
**Vice Chair: None**  
**Output: Database**

The Task Force did not meet.

**ITF2: Anomaly Checks for Relays**

**Chair: Peter McLaren**  
**Vice Chair: None**  
**Output:**

Meeting # 2 – 05/15/07

The Task Force met for a single session with 18 attendees. The chair briefly summarized the minutes of the first meeting for the benefit of the many newcomers.

There are at least two ways relay settings could be wrong; a relay engineer makes a mistake; a "hacker" gains access to a relay and alters settings.

The discussion concerned what techniques, processes etc. could be employed to protect a relay from a “fortuitous” hacker who might gain access to a relay which allowed remote access. (It was felt that there was little or no defence against a determined hacker with power system knowledge). Given that such measures would likely cost money it was felt that the incremental cost was minimal if compared to the cost of the protected element (transmission line, transformer)

The cost benefits of accessing relays remotely was forcing an increase in this mode of operation and a recent CIGRE survey revealed that 60% of utilities had not included the use of wi fi in substations in their risk assessments (nor had plans to do so!)

A survey would be a good way to start as it would make utilities more aware of the risks incurred by the implementation of remote access procedures which saved costs up front.

A show of hands indicated 10 in favor of forming a working group with the chair and 7 others abstaining. There were no votes against forming a WG.

5 volunteered to serve on the WG and the meeting advised the WG to recruit some vendors since only one was represented at this meeting.

### **ITF3: Application of Testing of Relaying Equipment**

**Chair: J. Jodice**

**Vice Chair: Moh Sachdev**

**Output: Report to PSRC**

Meeting – 05/15/07

Sixteen members participated at this, the third session of TF#3.

The original, proposed assignment was reviewed to insure the TF was on track.

Three Transmission presentations were presented to help guide the TF.

\*Bryan Gwyn summarized the conclusions from the 40 Utility NPCC Task Force; these items were suggested for inclusion in an IEEE Guide ,or Standard.

\*Simon Chano presented an extensive Hydro-Quebec Laboratory Application Test methodology, used for qualifying all relays prior to service.

\*Tony Giuliani presented two basic Application Field-Test methods, one to establish relay response to a[modeled] saturated CT; the second to test a Circuit Breaker Failure scheme.

In short, application tests ranged from tests of a single measurement relay function, to end-to-end scheme tests which establish integrated protection & communication system responses to a range of disturbances within and external to the protected zone.

Clearly there is a wide range of opinions and practices employed throughout the PSRC membership, ranging from little –to-extensive application testing; from Lab only, followed by no field testing, to Field Testing, only....and [I believe consensus] that regional protocols are insufficient ;that a nation-wide approach is required.

The Chair will:

1. Distribute Minutes together with all agreed reports to attendees of this meeting, and all past I TF#3 meetings.
2. Poll all attendees to determine their company position on Application Testing, within the scope of today's presentations.
3. Determine which attendees would be willing participants should the TF become a WG.
4. Request specific agreement to the test definitions contained in the CIGRE and IEEE reference documents...to insure compatibility.

This information will form the agenda for the next and final meeting of TF#3...at which time the TF will either establish the WG Task and request I SC approval, or to recommend disbanding the TF, should no consensus of work result.

**ITF5: Protective Relaying and Redundancy**

**Chair: S. Ward**

**Vice Chair: B. Gwyn**

**Output: Recommendation to the Sub Committee**

Meeting #1 (task force)

The Working Group met for a single session with 32 people in attendance on May 14, 2007.

The purpose of the task force was to determine if a working group was to be formed to discuss redundancy issues for relaying. A draft to an outline was reviewed and many items were added to the list, showing that there is interest in the subject. The consensus of the group was to recommend that a working group be formed. 12 people indicated that they wanted to become members.

The assignment was discussed, and preliminary will be "To produce a report addressing redundancy concerns for relaying". No formal assignments were handed out but the utility people were asked to review the redundancy requirements specified by their coordinating councils before the next meeting.

The working group (I19) will meet in September for a single session, 25 people, with computer projector to review and develop an outline for the report.

**ITF6: Reaffirmation of C37.90.1-2002**

**Chair: Jeff Gilbert**

**Vice Chair: None**

**Output: Reaffirmed Standard**

Meeting # 1 - 5/15/2007

The Task Force (TF) met in a single session with 6 members and 1 guest on Tuesday, May 15, 2007.

The scope of the TF is to determine how to respond to comments and a negative ballot received in the reaffirmation ballot for C37.90.1-2002. A total of 80 ballots were returned with 1 negative from a balloting pool of 92 eligible balloters. Seventeen comments were submitted. .

Tom Beckwith stated that the IEEE Standard must not state that exceptions to the Standard are permitted by the Standard. Any mention in the Standard of a method to take exceptions to the Standard gives a false impression and has been misinterpreted worldwide that the manufacturer can still publish that he meets the standard with the noted exceptions.

The TF reviewed the comments submitted by the balloters and those expressed during the meeting. The TF recommends that the Relaying Practices Subcommittee form a working group to revise C37.90.1-2002 and that the individual who submitted the negative ballot be contacted and requested to change his ballot to approve reaffirmation in light of the formation of working group to revise the standard.

**Liaison Reports**

See I4 for IEC Advisory Working Group report.

**Coordination Reports**

None to report

**Old Business**

Minutes from January, 2007 meeting in Scottsdale were approved.

**New Business**

**Three new working groups were created.**

- Based on the report of Task Force ITF2, a new working group I18 was formed and will be chaired by Dr. Peter McLaren.
- Based on the report of Task Force ITF5, a new working group I19 was formed and will be chaired by Selveig Ward.

- Based on the report of Task Force ITF6, a new working group I20 was formed and will be chaired by Tom Beckwith.

**Two new task forces were created.**

- Suggested new ITF Schematic Representation of Power System Relaying will become ITF7, Kevin Donahoe to chair the TF.

Even though evolving technologies have affected all areas of system relaying there are some things that remain. There is still a common expectation that there be a hard-copy graphical representation of the protection and control system. This representation is used in the installation, testing, and maintenance of the system and is more commonly referred to as the schematics. Yet, even though schematics remain, the adoption of these emerging technologies is driving a redefinition of schematics. This has been evidenced by the discussions arising from Working Group I14's efforts to revise C37.2 Device Function Numbers. There seems to be more interest in identifying functions as opposed to identifying devices. In addition, as the physical components of a protection system have reduced, the complexity of that same system has increased. Ten years ago, most power systems had settled on schematics that struck a balance between the physical and the functional. Multifunction devices and data network devices are affecting that balance. With so many different people addressing the same issues in so many different ways it seems like a good time to record the issues addressed and the solutions created.

- Suggested revision to Guide for Grounding of Instrument Transformer will become ITF8, Brian Mugalian to chair the TF

**An item related to 'IED' terminology was discussed.**

- Discussion of "IED" terminology. Points raised for and against changing to "ISU" or "IEU". WG 12 will look into this and report back to the Chair for further action, if needed.

**New member**

- Mukesh Nagpal was nominated as a member of the subcommittee and was accepted.

**J: ROTATING MACHINERY PROTECTION SUBCOMMITTEE**

**Chair: W. G. Hartmann**

**Vice Chair: K.A. Stephan**

The Subcommittee met on 5/16/07 with 21 members and 15 guests. Minutes from the January 2007 meeting in Scottsdale, AZ were approved.

**Reports from the WG Chairs**

**J1: Protection Issues Related to Motors Connected to Variable Speed (Frequency) Drives**

**Chair: J. Gardell**

**Vice Chair: P. Kumar**

**Output: Report to the Main Committee**

- 1) J1 met for a double session with 11 members and 5 Guests. This was the 13<sup>th</sup> meeting for the group.
- 2) Draft 4 was reviewed. Overall editorial changes were made and some writing assignments were made to bring out relevant points such as protection considerations for constant torque applications, ground fault coordination with system relays when there no isolating transformer. Most of the comments were from Adrian Guggisberg of ABB.
- 3) Following are assignments, all due by Jun 15<sup>th</sup>
  - 3a) Dale Finney to include definitions of CSI and VSI in section 2
  - 3b) Adrian to do the following
    - Modify section 4 write-up on categorization by load type,
    - Revise figure in section 4 with ANSI nomenclature
    - Modify section 6A to cover case of ground fault coordination when there is no galvanic isolation.

Modify section 6F to include cases when drives are not operated in constant flux mode.

- 3c) Subash to modify section 6D on reduced frequency operation effects
- 3d) Prem to include in section 7 protection considerations for secondary fault when there are multiple secondary windings, and enhance clarity on Relay/CT harmonics section.
- 4) The plan is to ballot the Working Group and Subcommittee after incorporating the writing assignments before the next meeting.
- 5) The Working Group will review, address and resolve any concerns identified during the ballot.
- 6) The Working Group will meet for a double session in September and require a meeting room for 25 and computer projector.

**J2: Protection Considerations for Combustion Gas Turbine Static Starting**

**Chair: Mike Reichard**

**Vice Chair:**

**Output: Report to the Subcommittee**

- 1) Introductions, 9 members, 4 guests
  - 2) The WG reviewed and approved the January 2007 meeting minutes.
  - 3) The WG reviewed Draft 0 of the paper
    - a) Introduction (authored by Mike Reichard) – no comments
    - b) Categories of machine grounding methods during static start (A & B authored by Pat Kerrigan) - Mike Reichard to confirm 25 amp limit requirement for ground faults
    - c) Short Circuit Calculations (authored by Mike Reichard) - Mike Reichard to clarify that short circuit current in illustration is the initial momentary current at  $t=0$ . Also need to clarify if excitation is manual or automatic during the static start sequence.
    - d) Key Protection Elements and Considerations
      - (1) Low Frequency Response (author Dale Finney/Murty Yalla) – Dale to add comments linking the submitted write-up to response to overcurrent protection.
  - 4) Writing assignments submitted by Wayne Hartman and Jon Gardell to be reviewed at the next meeting.
  - 5) Outline had a Section IV. B (Protection During Normal Operation). WG determined that a separate section was no longer required since a figure provided by Wayne Hartmann already addressed this information
  - 6) Assignments to WG members
    - II C – Ungrounded generators – Zeeky Bukhala
    - IV. A. 2 – Special Protection Applications
      - Phase and Ground Protection – Dale Finney
      - Volts per Hertz – Dale Finney
- Assignments are due August 1<sup>st</sup>, 2007

**J3: Protection of Generators Interconnected with Distribution System**

**Chair: E. Fennell**

**Vice Chair: R. Pettigrew**

**Output: Report to the Main Committee**

The Working Group did not meet this session.

**J4: Revision of C37.102 AC Generator Protection Guide**

**Chair: M. Yalla**

**Vice Chair: K. Stephan**

**Established 2000**

**Output: Guide**

**Expected Completion Date: 2006**

**Status: 19th meeting**

The Working Group did not meet this session. The Guide has been published.

**J5: Generator Protection Setting Criteria**

**Chair: C.J. Mozina**  
**Vice Chair: M. Reichard**  
**Output: Paper**

The WG did not meet. The WG paper was completed and will be presented by the Chair at the main PSRC committee meeting. The paper will also to be presented at a PSRC sponsored session at the upcoming PES General Meeting in Tampa in June. Due to a travel conflict the Chair was unable to present the paper at the PES meeting. Murty Yalla has agreed to present the paper on behalf of the WG

**J7: Revision of C37.101, Generator Ground Protection Guide**

**Chair: J.T. Uchiyama**  
**Vice Chair: R. Das**  
**Co-Vice Chair: Mike Reichard**  
**Output: Revised Guide**

The Working Group did not meet this session. J7-Generator Ground Protection Guide C37.101 is completed. Corrigendum-1 was finished May 13, 2007. There were a few negative comments (typo—comma instead of period). IEEE told chair to recirculate the corrigendum.

**J8: Generator Tutorial Revision**

**Chair: Michael Thompson**  
**Vice Chair: Dave Zinn**  
**Output: Tutorial**

Assignment: Review and Revise 95-TP-102, "IEEE Tutorial on the Protection of Synchronous Generators."

The Working Group met for a single session with 12 members and 8 guests on Tuesday, May 15, 2007

The Chair described tutorial history with additional input from original Tutorial members. It was noted that every feeder document (C37-101, 102, 106) has been revised since the original Tutorial. The conciseness and easy reading ability of the original Tutorial was espoused.

A vote of the attendees was taken to decide the output format:

- a) Create a PPT only; deliver in person at PSRC, PES and other protection conferences
- b) Edit the original Tutorial text to add new information, plus create a PPT deliver in person at PSRC, PES and other protection conferences
- c) Create a PPT with notes, deliver in person at PSRC, PES and other protection conferences

Choice "b" was selected with 18 votes; choice "a" received 0 votes and choice "c" received 1 vote.

A discussion post meeting with PSRC Officers yielded a decision on publication method. The output will be Special Publication and published on the PSRC website. If hard copies are created for tutorial sessions, they can be sold for a nominal fee to cover Kinko's costs and a slight profit for PSRC.

The chair proposed to have assigned authors and assigned peer review teams for the various chapters. Since the document will not go through the full balloting process as would a guide or standard, rigorous internal peer review is important.

The table of contents of the existing tutorial was reviewed chapter by chapter with the following comments:

- Consolidating Voltage Transformer Signal Loss within a misc. section was discussed. It was determined that the material should be expanded and not reduced. The old 60 voltage balance scheme should not be eliminated because many existing schemes exist. Expansion and update of various microprocessor VT fuse loss schemes should be included.
- Add an anti-motoring section (32) for non-sequential tripping purposes.

- Change “Loss of Field” to “Underexcitation/Loss of Excitation” to more accurately reflect abnormal conditions.
- Consider a new chapter, “Operating Modes and Impacts on Protections,” to consider static starting, turning gear, rotor warming and pumped storage operation. The existing inadvertent energization chapter may be rolled into this. It was determined to check with Mike Reichard on status of WG-J2 material.

The existing guide includes Authors attributed to each chapter. It was discussed if we should continue that practice in the updated tutorial and how credit to previous authors should be handled. Previous authors will be credited in the front of the revised Tutorial. The new document will credit the latest chapter owners consistent with the previous version of the document.

In addition to J output C37.101, 102 and 106, other references to use for this effort will include PSRC paper output J5, “Coordination of Generator Protection with Generator capabilities (present J5) ” and “Performance of Generator Protection During Major System Disturbances.”

## **J9: Motor Bus Transfer**

**Chair: Jon Gardell**

**Vice Chair: Dale Fredrickson**

**Output: Transactions paper or report**

Fourth Meeting, 5/16/2007; Double session:

Introductions, 10 members, 11 guests

WG J9 reviewed and approved the January meeting minutes. WG reviewed draft of Outline.

WG continued discussion of 1.33 pu volts per hertz limit from C50.41. Efforts will be made to verify the rationale for this value or use another value if suitable, especially for synchronous motors. Assignments were made to contact people involved in past efforts, especially motor experts.

Assignments were made to investigate relay frequency response as it decays during a bus transfer. Discussed possible damage to transformers and circuit breakers during a motor bus transfer.

Assignments were made to expand on the ten application issues. Chuck Mozina, Tom Beckwith; Mike Reichard, Dale Finney, Bob Pettigrew, Russ Patterson, and Tom Farr volunteered to assist, along with others.

J9 requests a room, with computer projector, for 25 for a double session during the September meeting.

## **J10: Guide for AC Motor Protection**

**Chair: Prem Kumar**

**Vice Chair: Dale Finney**

**Output: Guide Revision**

The meeting was held on 5/17/07 for a single session with 14 members and 5 guests. The task was to revise C37.96.

WG suggested PAR statement:

The revision of C37.96-2000, "Guide for AC Motor Protection" is being performed to ensure inclusion of latest technical information on the protection of AC motors, as well as to provide more clarification and tutorial information. Revised materials to include:

- Information on failure mechanisms of motors
- Motor data sheet interpretation and translation into motor relay settings such as motor cooling time constants and motor running time constants
- Relevant tutorial type material that helps with derivation of relay settings such as explanation of motor speed-torque curves

- Inclusion of setting examples using microprocessor-based relays similar to the annex of C37.102-2006 [?]
- Coordination considerations for fuses over relay such as used with fused contactor applications
- Considerations for settings derivations for reduced voltage starting and placement of power factor correction capacitors relative to motor relay sensing CTs
- ASD protection considerations from Rotating Machinery Subcommittee paper effort (J1 Report)
- Motor bus transfer protection considerations from Rotating Machinery Subcommittee paper effort (J9 Report)
- To include some level of detail on motor surge protection as appropriate

Organizational structure was discussed:

- Clause 8 on microprocessor relay protection does not need to be treated separately. Information on application of microprocessor relays should be merged as needed in the main body of the document.
- The output of the Adjustable Speed Drive Protection Working Group document will be added as an annex.
- A sample calculation annex will be added, similar to what was done in C37.102-2006, that will take a sample motor data sheet and show setting examples.
- On surge protection material written may have to be reviewed by C62 liaison.

Assignments:

- Prem: To review 242 motor protection to ensure for consistency with C37.96 and to review mechanism for taking the sources from MG1.
- Jon: Will follow up to find the newer study of motor failures. (GE and EPRI studies).

### **JTF3: NERC Generator Tripping Response**

**Chair: Joe Uchiyama**

**Vice Chair:**

**Output: Special Report**

TF met on May 15, 2007, with 15 attendees.

Chairman explained the issues, which had occurred during 2003 disturbance in the NPCC area. A total of 71 generators were tripped off unnecessarily during this disturbance by the generator backup relays (24, 27, 40, 51V, 50/27). The chairman explained this issue and expects the output to be a PSRC Special Report to the Rotating Machinery Subcommittee and recommendation to NERC's SPCTF.

TF discussed the following issues:

- Most issues are related to AVR operation, and should coordinate with IEEE Excitation sub-committee.
- Some issues may be able to discuss with J Sub Committee such as 27 in the auxiliary system (station service).

Action Items:

- The chairman will circulate the updated draft memo to all attendees.

#### **Liaison Reports**

##### **Electric Machinery Committee**

**C.J. Mozina**

The EMC will meet at the PES general meeting in Tampa in June of 2007. The last minutes published on their web site is for their 2005 meeting which have already been reported on in PSRC minutes and involved reorganization of EMC into three subcommittees (Generators, Motors and Materials).

##### **IAS I&CP Committee**

**C.J. Mozina**

This report will now also be given at the main PSRC committee meeting. The written report is published under main committee liaison reports.

##### **Nuclear 1E WG**

No activity report

## **NERC**

NERC producing lots of standards. One includes generator backup relaying. Also PRC-001, any connected machine at greater than 100 kV needs to coordinate with neighbors.

## **Coordination Reports**

### **P958-EDPG Guide for Adjustable Speed Drives**

**J. Gardell**

Nothing to report

### **Old Business**

None

### **New Business**

C37.106 Reaffirmation is coming up. Be thinking about possible revision items with this Guide. It needs to be undergoing the revision process by 2008.

## **K: SUBSTATION PROTECTION SUBCOMMITTEE**

**Chair: F. P. Plumptre**

**Vice Chair: P.G. Mysore**

The Subcommittee met on Wednesday, May 16, 2007 in Nashville, TN with 17 members and 19 guests in attendance. After introductions, the scope of the Substation Protection Subcommittee was read by Frank Plumptre, the minutes of the previous meeting held in Scottsdale AZ were approved, and it was discussed that the two IEEE patent slides must be presented at the start of every working group meeting with a PAR. It was requested by Bob Pettigrew that all working group and subcommittee chairmen submit their meeting minutes using the new standard format (see Bob Pettigrew for an example document).

### **ITEMS OF INTEREST FROM THE ADVISORY COMMITTEE MEETING:**

None.

### **REPORTS FROM THE WG CHAIRS:**

## **K1: PROTECTION OF TRANSFORMERS AGAINST FAULTS AND ABNORMAL CONDITIONS**

**Chair: Mohindar Sachdev**

**Vice-Chair: Pratap Mysore**

**Established: 2003**

**Output: Revision of IEEE C37.91-2000**

**Expected Completion Date: 2007**

Meeting #19

The Working Group met for a double session with 8 members and 4 guests on September 20, 2006. The Working Group met in the Heritage D Room, Sheraton Music City Hotel, Nashville, TN at 8:00 AM on Wednesday, May 16, 2007. Ten members and nine guests were present.

The two slides concerning patent issues provided by the Standards Association were shown and discussed. The minutes of the WG meeting held in January 2007 were approved as distributed by Email. The Chair reported that twelve negative ballots were received when Draft 7 of the guide was balloted. Eleven negative ballots have been resolved. He further reported that the WG response to the twelfth negative ballot was sent to the balloter by Email but he has not received any response from him in spite of Email messages and messages left on his telephone answering machine. Another attempt to contact the balloter will be made before the revised draft is recirculated.

The Chair reported that changes were made to Draft 6 in response to the comments received with the ballots received last fault. The revised Draft 6-5 incorporating the track changes feature was distributed

among the WG members for their perusal and comments. Draft 6-6, which is a copy created by accepting all the changes made in Draft 6-5, was also distributed among the members. The members were requested to send in their comments as soon as they can. The Chair plans to submit in June 2007 the revised draft for recirculation.

Roger Hedding agreed to provide a draft of a summary paper before July 1, 2007 for consideration of the WG and then submission for publication.

For the next meeting, the working group requests a single session with a computer projector and a room for 30 people.

**K3: REDUCING OUTAGES THROUGH IMPROVED PROTECTION AND AUTO RESTORATION IN DISTRIBUTION SUBSTATIONS**

**Chair: Bruce Pickett**

**Vice Chair: Tarlochan Sidhu**

**Established, 2002**

**Output: Paper**

**Draft 8.0**

Working Group K3 met 5/16/07 with 6 members and 17 guests.

The Agenda followed was:

1. Call to order and introductions
2. Minutes from previous meeting was reviewed.
3. Draft 9.1 was briefly reviewed.
4. New assignments-
  - a. Charlie Sufana to revise figure 5/appendix C dwg. Once done, appendix C to be deleted. Bruce to supply original drawing and AI's Visio drawing to Charlie. Once completed, full paper to be submitted to subcommittee as working group report to be posted on K website. This is expected to be submitted at September meeting if Charlie's revisions can be posted to the document and emailed out to the WG before the September meeting.
  - b. Bruce reported that Tarlochan to have Transactions paper ready in June. Will be emailed to working group for review to be voted on submission to subcommittee at Sept meeting.

Paper to be a Report to the PSRC Subcommittee and possible summary submission to Transactions.

For the next meeting, the working group requests a single session with a computer projector and a room for 25 people.

**K5: APPLICATION OF COMMON PROTECTIVE FUNCTIONS IN MULTI-FUNCTION RELAYS**

**Chair: Simon Chano**

**Vice Chair: Dean Miller**

**Established, 2005**

**Output: Report to the PSRC**

**Draft 1.0**

The WG met on Tuesday morning, May 15, with 12 members and 4 guests present. Mike Thompson presented the revisions that he and Bogdan Kasztenny made to the 3A clause on Breaker Failure. This revision includes several examples of different application options for multi relays with breaker failure function for different bus arrangements and the benefits and draw backs of implementing these options.

There was a discussion on the possibility of producing several small reports on the parts of the over all subject of the working group or producing one large report. It was agreed to proceed with the single report as the working group scope indicates. The PDF of the completed document will be equipped with hyper links to the various clauses.

Roger Whittaker presented his revisions to the 3C clause on Application on Control Functions. Roger has added sections on the issues on having no redundancy, manual backup, failover redundancy, or parallel redundancy for the different control function discussed in his clause.

Bruce Mackie discussed his writing contribution for clause 4A & B on Human Factor Conditions which he had completed at the January meeting.

Fernando Calero also discussed his writing contribution for clause 4C on Documentation. He had completed this writing assignment at the January meeting.

All of these completed writing assignments will be incorporated into a new draft of the paper that will distribute for the working group for review before the September meeting.

For the next meeting, the working group requests a single session with a computer projector and a room for 20 people.

**K6: SUDDEN PRESSURE RELAYING**

**Chair: Randy Crellin**

**Vice Chair: William Gordon**

**Established:**

**Output:**

**Expected Completion date: 2008**

**Status:**

The working group met on Wednesday morning, May 16, 2007 for the fifth time in a single session with 5 members and 11 guests. Two of the guests requested to join the working group which currently has 17 members.

Randy Crellin welcomed everyone to the meeting and then started the meeting off with a discussion of the agenda. Randy informed the working group that the first draft of the technical paper was complete and distributed copies to those in attendance. Minutes from the previous meeting were then reviewed and approved.

Frank Plumtre presented a WPRC paper titled "Sudden Pressure Revisited" by Young and Barone. This presentation was well received by the working group and instigated several good discussions on sudden pressure verses differential protection.

Randy discussed the feasibility of a survey on sudden pressure relaying practices and operations. Randy also posed numerous questions for the survey and solicited input for additional questions. A discussion was also held on who should be included in the survey.

For the next meeting, the working group requests a single session with a computer projector and a room for 20 people

**K7: GUIDE FOR THE PROTECTION OF SHUNT REACTORS.**

**Chair: Kevin Stephan**

**Vice Chair: Pratap Mysore**

**Established, 1999**

**Output: Revision of ANSI/IEEE C37.109**

**Expected Completion date: 2006**

**Status: Reviewing Draft 15**

The Working Group did not meet this session.

The revised standard, C37.109-2006 has been published as of April 25. A presentation will be made at the PSRC Main Committee meeting on May 17, summarizing the 2006 guide. We will meet during the next session to review and discuss a summary paper.

For the next meeting, the working group requests a single session with no computer projector and a room for 15 people

**K8: GUIDE FOR THE PROTECTION OF SHUNT CAPACITORS**

**Chair: Pratap Mysore**

**Vice Chair: Arvind Chaudhary**

**Established, 2006**

**Output: Revision of IEEE C37.99**

**Expected Completion date: 2011**

**Status: Assignments to review clauses in the existing guide**

The working group met on May 15, 2007, in Nashville, TN, in a single session chaired by Roger Hedding with 10 members and 8 guests present.

The scope of this working group is to revise C37.99, Guide for the Protection of Shunt Capacitors.

Roger Hedding welcomed everyone to the meeting and then started the meeting off with a discussion of the IEEE Standards and Patents requirements. Minutes from the January 2007 meeting were then reviewed and approved. Roger also informed the working group that the PAR was submitted in February 2007.

John Harder then made a presentation titled "Protection of Neutral Relaying for Grounded Wye Capacitor Banks". This paper was very informative and well received by the working group.

A discussion was held on the status of obtaining the guide in Microsoft Word format.

Roger then requested presentation proposals for the next meeting be submitted to Pratap Mysore.

For the next meeting, the working group requests a single session with a computer projector and a room for 30 people

**K9: ARC FLASH**

**Chair: Karl Zimmerman**

**Vice Chair: Roger Hedding**

**Established: 2005**

**Output: Technical report**

**Expected Completion Date: 2008**

Working group K9 met on Tuesday afternoon with 10 members and 12 guests. J.W. Miller joined the Working Group.

Expected completion date: 2008.

After introductions, Draft 2.1 of the document was reviewed.

- Section 1.0 Introduction: Tony Sleva to incorporate his ideas into Introduction including that arc flash increases as voltage, current and time of the arc increase.
- Section 2.0 Definitions: Tony Sleva to add a few more definitions from IEEE1584, NFPA 70E.
- Section 3.0 Summary of Applicable Standards: Modify to include statement that NESC does not address Arc-Flash.
- Section 4.0 Summary of Non-Protective Relaying Approaches to Mitigate Arc Flash Hazard: Change title of section, exchange with section 5. (Make section 4.0 "Section 5.0" and vice versa.) Organize subsections to three items: solutions that reduce current, solutions that reduce time, and solutions that reduce hazard. Add resistance/impedance grounding as a method of reducing fault current levels. (KZ to contact C. Ruckmann)
- Section 5.0 – re-organize as Section 4.0. Add optical sensors to summary table. Add application of core balance cts for ground protection on impedance grounded systems. (KZ to contact D. Tziouvaras)
- B. Dempsey commented on Table in 5.4 – higher cost of high impedance bus diff scheme not as big a disadvantage as Table implies, especially on new installations.
- K. Zimmerman to add light detection row to Table in 5.4.
- P. Kumar to add a medium voltage example to Appendix.
- B. Pickett suggested that the document include more on outdoor applications. J.W. Miller to add a section on current utility practices, including a 46 kV outdoor arc-flash example, and a mention of reclosing block practices.

Writing assignments are due June 15.

For the next meeting, the working group requests a single session with a computer projector and a room for 30 people.

**K10: (Ex KTF1): SCC21 DISTRIBUTED RESOURCES STANDARD COORDINATION**

**Chair: Gerald Johnson**

**Vice Chair: TBA**

**Established, 1999**

**Expected Completion Date: 200x**

**Output: Standard through the SCC 21**

K10--SCC21 Distributed Resources Standard Coordination working group met May 15, 2007 with 3-members and 5-guests. We discussed activities from the Feb 07 joint 1547 meeting held in Atlanta. P1547.2, P1547.4, and P1547.6 working groups met during the week. P1547.2 "Draft Application Guide for IEEE Standard 1547, Interconnecting Distributed Resources with Electric Power Systems", P1547.4 "Draft Guide for Design, Operation and Integration of Distributed Resource Island Systems with Electric Power Systems", and P1547.6 Recommended Practice for Interconnecting Distributed Resources With Electric Power Systems Distribution Secondary Networks". P1547.2 working group also had a teleconference meeting in March to discuss a section that was not finished in Atlanta. A tentative schedule for completion 1547.2 is included in the minutes:

**P1547.2 Completion Schedule (as of April 16, 2007)**

- June 4, 2007 Draft 7 (final draft for review) posted on the IEEE 1547.2 web site
- July 2, 2007 – final comments on Draft 7 due to P1547.2 officials (emails below)
- July 30, 2007 – Draft 8 (ballot draft incorporating final comments on Draft 7) posted
- Aug meeting (week of Aug 7-10; either San Francisco CA area or Las Vegas NV) – final discussion on Draft 8
- August 2007 – Draft 9 that incorporates any edits/changes (ballot-ready draft) submitted to IEEE for pre-ballot feedback
- August/September – Draft 10 incorporates IEEE feedback and start IEEE ballot
- September – IEEE ballot for 30 days (Draft 10)
- Fall 2007 – review and establish changes based on ballot comments (Draft 11)
- Recirculate Draft 11 to IEEE ballot members (reiterate with new draft if necessary)
- Submit to IEEE for approval.

Draft information for P1547.4 and .6 is available at the SCC21 web site. If you have special interest in the progress of a particular working group or would like to provide input, let me know and I will supply the appropriate password to get to the latest draft.

For the next meeting, the working group requests a single session with no computer projector and a room for 20 people

**K13: (PC 37.116): GUIDE FOR PROTECTIVE RELAY APPLICATION OF TRANSMISSION-LINE SERIES CAPACITOR BANKS.**

**Chair: Frank Plumptre**

**Vice Chair: Dan Hamai**

**Established, 1999**

**Output: Guide for the application of protection on transmission series capacitor banks**

**Expected Completion Date: 2006**

**Draft 9.3**

Working Group K13 met at 4:30 pm on Tuesday, May 15. Seven members and one guest were present.

F. Plumptre reported that the Guide had been approved and that we have been contacted by the IEEE Editorial Staff to finalize our Guide. The expected publication date is August 2007.

The WG agreed to write a summary paper to be submitted as an IEEE Transactions paper. F. Plumptre and D. Hamai will create an outline for the paper and send to the WG. Members will review the outline and choose sections to write. The target date for submitting the summary paper is January 2008. The suggested length of the summary paper is six pages.

D. Hamai reported that the T&D Series Capacitors Working Group may appeal the publication of the Guide. If carried out, this process would be initiated at the PES General Meeting in June. Documentation of our correspondence with the Series Capacitor WG will be given to Charlie Henville who is a member of the PES Technical Council. We will be contacted if there is any further action on our part.

For the next meeting, the working group requests a single session with a computer projector and a room for 10 people

#### **K14: (PC 37.234): GUIDE FOR PROTECTIVE RELAY APPLICATION TO POWER SYSTEM BUSES**

**Chair: Bogdan Kasztenny**

**Vice Chair: Steve Conrad**

**Established, 2005**

**Output: Guide for the application of protection on power system buses**

**Expected Completion Date: 20xx**

**Draft 2**

The K14 Working Group met in May 16, 2007, in Nashville, TN, with 13 members and 11 guests in a single session. Chairman Bogdan Kasztenny presided. The minutes of the January (Scottsdale, AZ) 2007 meeting were approved as printed. The IEEE guidelines on intellectual property / patents were discussed.

Bogdan Kasztenny reviewed the status of the guide to date and strongly encouraged those who have writing assignments to be sure to submit them to him quickly; all outstanding and new items are due August 24, 2007.

Draft #4 of the Guide was passed out during the meeting for guests and members of the WG. Bogdan summarized the new submissions to the draft. Mike Thompson discussed the submissions in Clause 7.11. This discussion led to the desire to include some discussion on the thermal rating requirements for the stabilizing resistor. Simon Chano agreed to provide a discussion for the next draft. The use of the shorting contacts was also discussed for shorting the stabilizing impedance and the use of the 50 function in the scheme.

Clause 7.1.4 Linear Couplers was discussed and the WG felt that there are still legacy systems in place using the LC and that some discussion is warranted on their use and applications to legacy systems. Bruce Pickett will work on this.

The chairman reviewed the matrix of clauses yet to be drafted; all of these clauses were assigned, including new material concerning ct requirements for various schemes. These assignments are due by August 24, 2007. The chair will be reminding all to complete their assignments.

All writing assignments are due to the Chair by August 24, 2007.

For the next meeting, the working group requests a single session with a computer projector and a room for 30 people.

#### **Liaison Reports:**

None.

#### **Coordination Reports:**

P824 (PE/T&D) Standard For Series Capacitors In Power Systems – Frank Plumptre

P1036 (PE/T&D) Guide For Application of Shunt Capacitors – Pratap Mysore

#### **Old Business:**

The K7 Working Group (Guide for the Protection of Shunt Reactors, PC37.109) chaired by Kevin Stephan was not formally disbanded. The standard has been submitted to the IEEE for publishing and presented at

the Main PSRC Committee meeting. The request for proceeding with a summary paper was approved and the working group will meet again at the next session to discuss and proceed.

**New Business:**

The K2 Working Group (Guide for Breaker Failure Protection of Power Circuit Breakers, PC37.119) chaired by Roger Hedding will receive an award at the upcoming PES meeting in Tampa for the most outstanding PES Standard.

Charlie Sufana is the webmaster for the “K” Subcommittee website. Please notify him of any changes and/or updates required for the “K” Subcommittee related web pages.

Frank Plumptre requested that present members of the “K” Subcommittee please submit recommendations for new members prior to the next meeting.

**Standards For Reaffirmation:**

C37.95 - Guide for Protective Relaying of Utility Consumer Interconnections, Frank Plumptre champion. This standard needs to be reaffirmed by the end of the year.

C37.108 - Guide for the Protection of Network Transformers, Charlie Sufana champion.

**VII PRESENTATIONS:**

Our main committee meeting is greatly enhanced by presentation by our members of the outputs of the different working groups. We always appreciate their efforts. This time we had three interesting presentations.

- Generator Protection Setting Criteria (WG J5)                      Chuck Mozina
- Guide for the Protection of Shunt Reactors (WG K7)              Kevin Stephan
- C37.2 Survey Results & IEEE Survey Service                      John Tengdin

**Future Meetings:**

<b>September 17-20, 2007</b>	<b>Charlotte, NC</b>
<b>January 7 – 10, 2008</b>	<b>San Antonio, TX</b>
<b>May 12-14, 2008</b>	<b>Kansas City, MO</b>
<b>September 7-11, 2008</b>	<b>Burnaby, B. C., Canada</b>

**VIII.** The meeting was adjourned by Chairman Charlie Henville.