



**POWER SYSTEM RELAYING COMMITTEE
OF THE IEEE POWER and ENERGY SOCIETY
MINUTES OF THE MEETING
September 14-17, 2015
La Jolla, CA
Final**

I. Call to order/ Introductions Mike McDonald

Chairman Mike McDonald called the meeting to order at 8:00 am

After introductions, a quorum was verified and met. Main Committee Attendance sheet was routed.

† After introductions and a verification of quorum, the Chair explained the need to finalize the PSRC scope for submittal by October 31st to meet the PES schedule. The proposed scope, which had been finalized by ADCOM and others, was presented with the reasons for changes explained by former Chair Roger Hedding. At that point, the floor was opened for membership to comment and suggest changes. The Scope was edited with minor changes for over an hour when a motion was made by Michael Reichard to accept the Scope as edited. The motion was seconded and the motion passed. The Chair stated the Main Committee would be balloted for acceptance within 2 weeks. (A survey monkey ballot was completed with the Main Committee members with 93% approval of the quorum that took part which - the proposed Scope passed)

† After the Scope discussion, the Chair presented two possible names that ADCOM had suggested based on the proposed broadened scope: "Protection and Control" and "Power System Relaying and Control". While no formal vote was required, the vast majority preferred "Power System Relaying and Control" (PSRC) Committee.

II. Approval of Minutes & Financial Report Russ Patterson

Motion to approve Minutes of the May 2015 meeting in San Antonio, TX was moved by Bob Pettigrew and seconded by Miriam Sanders and was approved unanimously.

The financial status of PSRC is in good standing.

III. Chairman's Report Mike McDonald

"Congratulations are in order! At the PES General Meeting in Denver, the **IEEE PES Working Group Recognition Award -Technical Report** was presented to Jim O'Brien for his Working Group efforts creating "Use of Synchrophasor Measurements in Protective Relaying Applications". Congratulations to Jim (Chair), Alla Deronja (Vice-Chair) and all the working group members – well done!

Also at the GM, the PSRC was awarded the **PES Outstanding Technical Committee** award. This is well deserved recognition of the great work we do. Our thanks to Mal Swanson for putting together a comprehensive summary of our work completed in 2014. Well done everyone!

With the PES Re-organization Town Hall meetings at the GM in Denver in late July, the efforts make this happen have really picked up steam. The scope of the proposed new Technical Committee was effectively

† - amendments made to satisfy motion at January 2016 meeting approving these minutes.

finalized based on comments received. With only a month to try to modify the PSRC scope to align with the new Technical Committee, PSRC and C0 leaders crafted a proposal for the MC to ballot. This scope was presented at the MC and was discussed with some edits made. Following the meeting, the Main Committee was successfully balloted. This is a major milestone that had to be completed by October 31 to meet the PES schedule. Thanks to all who participated.

We have also asked all WG chairs – via their SC Chairs – to provide guidance as to where their work should reside. This was done to allow each WG a chance to express their views. Decisions on what groups will remain in the PSRC and which will be aligned with the new Communications and Cybersecurity Committee need to be determined before year end.

Regardless of the outcome, I am optimistic that we will maintain a very close relationship with the new Technical Committee to the benefit of both of our Committees and the PES. This is the end that I am committed to work to.

Also, based on input at the Main Committee meeting, we have recommended calling ourselves the Power System Relaying and Control (PSRC) Committee.

Finally, the name and scope change is tied to the re-organization being completed. Thanks to all of you who have been part of the sometimes challenging process.”

Mike

IV. Reports of Interest

A. Report from the Vice- Chair – Pratap Mysore

a. Technical Paper Coordinator’s Report.

The PSRC received 18 conference papers for review and is now in the process of getting assigned to reviewers.

b. Future Meetings

The PSRC Website is updated with the latest information. Please visit <http://www.pes-psrc.org>

B. CIGRE B5 Activities Report – Rich Hunt

The next B5 Colloquium will be held in Nanjing, China September 20-26, 2015. The B5 Colloquium will be held in conjunction with the APAP Conference (6th International Conference on Advanced Power System Automation and Protection). Conference details:

<http://www.apap2015.com>

<http://www.cigre-scb5-Nanjing2015.com>

Rich Hunt is not able to attend, so TW Cease has graciously agreed to represent the U.S. at this meeting.
Working Groups

WG B5.45 Coordination of Protection and Automation for Future Networks, Mark Adamiak, Convener, has finished its assignment, and been disbanded. The Technical Brochure has been approved for publication by SC B5. It will be published as TB 629, on www.e-cigre.org on September, 9th, 2015, with a summary on the December, 2015, edition on Electra Magazine.

Any CIGRE member interested in joining either of these Working Groups, please contact Rich Hunt.

CIGRE Grid of the Future Symposium

The fourth Grid of the Future Symposium, sponsored by the CIGRE US National Committee (USNC) and the Electric Power Research Institute (EPRI), and with the theme Technology for the 21st Century Electric Utility, will be held October 11-13, 2015 in Chicago, Illinois, at the Westin Michigan Avenue. Symposium details can be found at <http://cigre.wpengine.com/grid-of-the-future/>. The symposium also includes tutorials, and will be followed by a North American Synchrophasor Initiative Work Group meeting.

CIGRE 2016 General Session

The 2016 CIGRE General Session is in Paris (August 21-2, 2016). Details can be found at <http://www.cigre.org/Events/Session/Session-2016>.

Other CIGRE items of interest:

- CIGRE members have free access to electronic versions of all documents in the CIGRE technical library.
- Free access granted to non-members to the CIGRE technical library for most documents three years after their publication, in order to improve the awareness of CIGRE production for a wider audience outside of CIGRE.

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CIGRE B5 webpage: <http://b5.cigre.org>

C. IAS Power System Protection Committee - Suparat Pavavicharn

No information available.

D. IEC Report - Eric Udren

TC 95, Measuring relays

TC 95 drives IEC protection system standards – electrical and physical environment type testing, design, safety, and functional behavior. Technical work is carried out by Maintenance Teams (MTs) and by Working Groups led by Convenors. Dr. Murty Yalla is now the new Chair of TC 95 (internationally).

There are no drafts or voting documents out for review at this time. The functional standards maintenance team MT4 is working on the following projects. A new strategic feature is that we are establishing PSRC working groups in relevant subcommittees to collaborate with and support the IEC WG, so the resulting standard is more complete and accurate, meets the requirements of PSRC as well as IEC participant users, and can achieve voting approval as quickly as possible. We announced this joint IEC-IEEE strategy in our May report.

- IEC 60255-121 – *Functional Standard for Distance Relays* - publication is coming soon!
- IEC 60255-187-1 - *Functional requirements for restrained and unrestrained differential protection of motors, generators and transformers* – Now supported by PSRC WG K19 under Gustavo Brunello. The WG will supply COMTRADE dynamic test cases with the functional standard – a first that will likely be used in with other functional standards in the future.
- IEC 60255-187-3 - *Functional requirements for biased (percentage) differential relays for transmission lines* – only outlined so far, and supported by PSRC WG D34 under Norman Fischer.
- IEC 60255-181 Functional requirements for frequency protection – just underway, and considering functionality for applications in distribution with DG and microgrids as well as for large grid or machine protection. A PSRC WG has not yet been established.

The next MT4 meeting is in Biarritz, France, October 27th-30th.

TC 95 is revisiting several base requirements and type-testing standards to add requirements for smart grid protection or control devices (equipment on distribution circuits with distributed generation and inverters, or microgrids) that are scaled to appropriate levels for low-cost high-volume equipment.

- 95/330/DC – Update to IEC 60255-1 Ed. 1: *Measuring relays and protection equipment – Part 1: Common requirements*.
- 95/331/DC – Update to IEC 60255-26 Ed. 3: *Measuring relays and protection equipment – Part 26: Electromagnetic compatibility requirements*. Do we test adequately for influences from Smart Grid devices (electronic power converters/ inverters/conditioners/controls)?
- 95/332/DC – Update to IEC 60255-27 Ed. 2: *Measuring relays and protection equipment – Part 27: Product safety requirements*. Adapt the standard to meet the new requirements of the European Low Voltage Directive covering protection of people and animals from all risks; and internal production conformity control. In addition, revised base standard IEC 61010 now includes risk assessments and considers other aspects of safety not covered by IEC 60255-27 Ed.2.

TC 57, Power systems management and associated information exchange

TC 57 WG 10 continues development of parts of IEC 61850. For an update on the status of TC 57 WG 10 developments for IEC 61850, provided by Christoph Brunner, see SC H Liaison Reports. The next meeting of WG 10 is in Brussels, Belgium, October 5-9. Documents of interest now being circulated for comments or votes include:

- 61850-80-3 DTR – Specific Communications Services Mapping (SCSM) that maps application objects to a web-based protocol for contemporary Smart Grid applications. Uses new 61850-8-2 using cyber-secure Extensible Messaging and Presence Protocol (XMPP) which transports XML, as alternative to serial MMS in 61850-8-1 that transports binary data. Layer 3 GOOSE and Sampled Values are also mapped.
- 61850-80-4 – interface to COSEM metering data protocol.
- 61850-90-2 – using 61850 for substation to control center communications.
- 61850-90-8 – models for electric mobility (vehicles).
- 61850-90-12 – WAN engineering guidelines (beyond 90-4 LAN).
- 62351-11 – security for XML files – sent to interested PSRC WGs.

E. Standard Coordinators Report – Adi Mulawarman

The status of standards activities that have taken place since the May 2015 meeting of the PSRC are as follows:

RevCom Activity: (revision)

Standards/PAR Approved

C37.103 Guide for Differential and Polarizing Relay Circuit Testing

Standards/PAR submitted for approval

PC37.242 Guide for Synchronization, Calibration, Testing, and Installation of Phasor Measurement Units (PMUs) for Power System Protection and Control

Standards due for 10 year review

None

Ballot Activity:

Standards/Projects currently in Balloting (Sponsor Ballot, Comment Resolution, Recirculation)

PC37.113 (will file extension) Guide for Protective Relay Applications to Transmission Lines
PC37.238 (recirculation review) Standard Profile for Use of IEEE 1588 Precision Time Protocol in Power System Applications

NesCom Activity: (new Standard)

Standards/PAR approved;

C37.243 Guide for Application of Digital Line Current Differential Relays Using Digital Communication

Standard/PARs submitted for approval

New or Modified PAR submitted; PAR Extensions (applied for); PARs Requested for Withdrawal; or PARs Administratively Withdrawn

P61850-9-3 (Comment Resolution) Communication Networks and Systems for Power Utility Automation -Part 9-3: Precision Time Protocol Profile for Power Utility Automation

Ballot Activity

Standards/Projects currently in Balloting (Sponsor Ballot, Comment Resolution, Recirculation)

None

PARS expiring at the end of 2015

PC37.113 Guide for Protective Relay Applications to Transmission Lines

PARS expiring at the end of 2016

PC37.119 (Ballot) Guide for Breaker Failure Protection of Power Circuit Breakers
PC37.237 Standard Requirements for Time Tags Created by Intelligent Electronic Devices - COMTAG(TM)
PC37.241 Guide for Application of Optical Instrument Transformers for Protective Relaying
PC37.245 Guide for the Application of Protective Relaying for Phase Shifting Transformers

PARS expiring at the end of 2017

P60255-118-1 Measuring relays and protection equipment - Part 118-1: Synchrophasor for power system - Measurements
PC37.116 Guide for Protective Relay Application to Transmission-Line Series Capacitor Banks
PC37.238 (Recirculation Review) Standard Profile for Use of IEEE 1588 Precision Time Protocol in Power System Applications
PC37.246 Guide for Protection Systems of Transmission to Generation Interconnections
PC37.247 Standard for Phasor Data Concentrators for Power Systems
PC37.248 (was NESCOM Sep 2 2015) Guide for Common Format for Naming Intelligent Electronic Devices (COMDEV)
PC57.13.1 Guide for Field Testing of Relaying Current Transformers

PARS expiring at the end of 2018

PC37.230 Guide for Protective Relay Applications to Distribution Lines
PC37.249 Guide for Categorizing Security Needs for Protection and Automation Related Data Files
PC37.250 Guide for Engineering, Implementation, and Management of System Integrity Protection Schemes
PC37.91 Guide for Protecting Power Transformers
PC37.94 (Ballot) Standard for N Times 64 Kilobit Per Second Optical Fiber Interfaces Between Teleprotection and Multiplexer Equipment

PAR/Standard Submittal Deadlines & Standards Board Meeting Schedule:

Submittal Deadline	Meeting Date
October 16th, 2015	October 16th, 2015
December 9 th 2015	January 19th, 2016
March 22 nd , 2016	May 2 nd , 2016
August 5 th 2016	September 16 th , 2016

F. C0: DATA ACQUISITION, PROCESSING, AND CONTROL SYSTEMS SUBCOMMITTEE

Chair: C. Preuss
Vice Chair: Vacant
Secretary: Vacant

A brief report of the work in Substations Committee was presented at the PSRC A0 Subcommittee meeting on 9/17/2015

- A. WG C3, working on IEEE PC37.1.1, standard requirements for inputs and outputs (such as digital inputs/output and ac/dc analog inputs/outputs), has determined that edition 2 of IEC 61850-3 is no longer just an environmental standard. This means that PC37.1.1's scope overlaps part 3 edition 2, which is not a good because part 3 edition 2 and IEEE 1613 already overlap in scope relating to environmental requirements. C0, WG C3, and WG C2 will all be considering incorporating the WG C3 work into the scope of WG C2, essentially expanding the scope of IEEE 1613 to align with part 3 edition 2. Note that SUBS C0 WG C2 is a joint working group with a working group in the PSRC I subcommittee as well as with the T&D Committee.
- B. C0 has been subject to the IEEE PES technical committee reorganization. This work has been well-coordinated with the PES Technical Council, Substations Committee, the PSCC, and the PSRC. C0 will be participating in critical work regarding technical committee names and scopes that will take place through the end of the year.

G. NERC Report - Eric Allen

1. System Protection and Control Subcommittee (SPCS) Activities
 - a. Considerations for Power Plant and Transmission System Protection Coordination
 - Version 2 presented to NERC Planning Committee in June and was approved
 - b. Single Point of Failure (FERC Order 754)
 - NERC SPCS & SAMS reviewed the protection system single point of failure data for facilities 100 kV and above
 - Report on survey results was presented to NERC Planning Committee in June and reviewers were assigned to provide comments and suggest changes
 - Report on survey results to be presented to NERC Planning Committee in September for approval
 - c. UAT Transformer Overcurrent Relay Loadability During a Transmission Depressed Voltage Event
 - SPCS to review the report in their next face-to-face meeting
 - The report is planned to be presented and approved by the Planning Committee early 2016
2. Protection-Related Standards Activities
 - a. Standards Applicability for Dispersed Power Producing Resources
 - Distributed Generation (resources) – Generally connected at distribution level (covered by IEEE PSRC Standard 1547)
 - Dispersed Power Producing Resources – aggregated small-scale resource technologies such as: wind, solar, fuel cells, flywheels, geothermal, energy storage, & micro-turbines
 - Standards modifications underway
 - PRC-005-5
 - PRC-001-1.1ii
 - PRC-019-2
 - PRC-024-2
 - VAR-002-4
 - b. Protection System Maintenance

- PRC-005-3 – FERC approved under Order No. 803
 - Requirements 1, 2, and 5 become enforceable April 1, 2016
 - Reference document: SPCS report, Sudden Pressure Relays and Other Devices that Respond to Non-Electrical Quantities: SPCS Input for Standard Development in Response to FERC Order No. 758
 - NERC working with the IEEE PSRC I25 working group to develop guidance on protection system commissioning
- PRC-005-4 – Version filed with FERC, NOPR pending
 - NOPR issued April 16, 2015 with directive to include to include supervisory devices for auto-reclosing
 - NOPR proposes to approve PRC-005-4 posted for a 60-day comment period

c. Protection System Misoperations

- PRC-004-3 – Protection System Misoperation Identification and Correction
 - Superseded by PRC-004-4 (dispersed generation resources). Approved by FERC and will become effective July 1, 2016
- PRC-004-5 – Protection System Misoperation Identification and Correction
 - Addresses the inclusion of UVLS in the applicability
 - Aligning revisions were made to PRC-010-1 to address Misoperation of UVLS
 - Filed with regulatory authorities on June 8, 2015

d. System Protection Coordination (Phase 1)

- PRC-027-1 – Coordination of Protection Systems for Performance During Faults
 - Posted for a 45-day formal comment and ballot from July 29 through September 11, 2015
- Replaces R3 and R4 from PRC-001-1.1(ii) concerning coordination of Protection Systems
- Other PRC-001-1.1(ii) – System Protection Coordination work
 - Requirements R1, R2, R5, and R6

e. System Protection Coordination (Phase 2)

- TOP-009-1 – Knowledge of Composite Protection Systems and Remedial Action Schemes and Their Effects
 - Posted for formal comment and ballot July 29 through September 11, 2015
- Requirement R1 of PRC-001-1.1(ii) is being revised and moved to TOP-009-1
 - Performance is operations based; therefore, the Requirement is being moved to the transmission operations (i.e., TOP) family of standards
 - The standard separates the applicable entities (BA, GOP, and TOP) into their own Requirements
- Requirements R2, R5, and R6 of PRC-001-1.1(ii) are addressed by the yet to be approved TOP/IRO standards as explained in the project Mapping Document

f. Coordination of Generator Voltage Regulator Controls with Unit Capabilities and Protection

- PRC-019-1 – Coordination of Generating Unit or Plant Capabilities, Voltage Regulating Controls, and Protection
 - Added applicability to exempt on Dispersed Generation Resources

g. Generator Performance During Frequency and Voltage Excursions

- PRC-024-1 – Generator Frequency and Voltage Protective Relay Settings
 - Added applicability to exempt on Dispersed Generation Resources

h. Disturbance Monitoring

- PRC-002-2 – Disturbance Monitoring and Reporting Requirements
- Filed with FERC December 15, 2014 – pending regulatory approval

i. Stable Power Swings

- PRC-026-1 – Relay Performance During Stable Power Swings
 - Filed with regulatory authorities December 31, 2014
- FERC directive in Order No. 733 – NERC establish a standard addressing protection system response to stable power swings

j. Special Protection Systems

- PRC-012-2 – Remedial Action Schemes
 - Posted for a formal 45-day comment and ballot from August 20 through October 5, 2015
- Affects Reliability Standards PRC-012-1, PRC-013-1, PRC-014-1, PRC-015-1, PRC-016-1, and PRC-017-1
- Corrects the applicability of fill-in-the-blank standards PRC-012-1, PRC-013-1, and PRC-014-1
- Revises the RAS/SPS-related standards above that address:
 - planning, coordination, and design of RAS/SPS,
 - review, assessment, and documentation of RAS/SPS,
 - analysis of RAS/SPS operation(s) and/or failure(s) to operate and corrective actions,
 - testing of RAS/SPS, and maintenance of any non-protection system components used

k. Undervoltage Load Shedding

- PRC-010-2 – Under Voltage Load Shedding
 - Addresses perceived gap concerning Misoperation of UVLS
 - Revision made concurrently with PRC-004-5
- Filed with regulatory authorities on June 8, 2015

3. Synchronized Measurement Subcommittee (SMS) Activities

a. Newly formed (authorized by Planning Committee Dec 2012)

- Initial meeting September 2-3

b. Purpose: to provide input for the creation, management, and utilization of robust, adequate, widely available and secure synchronized data measurement exchange structures (typically via Phasor Measurement Units (PMUs)) across North America

- Goal is to advance synchrophasor technology in those areas where the technology is ready for deployment/utilization

c. Initial tasks

- PMU placement guidelines
- Angular separation
- Using PMUs for NERC standards
- Model verification
- Technical workshop
- Cascading outages
- Monitoring IEEE C37.118 certification process
- Monitor operator training practices

V. ADVISORY COMMITTEE REPORTS

Chair: Mike McDonald

Vice Chair: Pratap Mysore

B1: Awards and Technical Paper Recognition

B1 WG Awards and Technical Paper Recognition Working Group Meeting Minutes for September 2015

Chair: Hugo Monterrubio

Vice Chair: Mal Swanson

The B1 Working Group met on Monday September 14 at 3:00PM with 7 members. The group approved the May meeting minutes. The following items were discussed during this meeting:

1. Awards & Recognition Tracking - The WG reviewed and finalized the list of completed (disbanded) WG's between December 2013 and September 2015. This list will allow the WG to remain organized moving forward and get current in delivering all the pending WG recognition certificates by the January 2016 meeting.
2. PSRC WG Awards – The WG discussed, nominated and selected the 2015 WG Awards for the period ending in September 2015. The following awards will be announced and delivered in the January meeting:
 - a. 2015 PSRC WG Recognition Award.
 - b. 2015 PSRC Prize Paper Award.
3. PES WG Award Nominations – The WG discussed and selected the WG's that will be nominated for the following PES level awards:
 - a. 2015 PES WG Recognition Award for Outstanding Technical Report
 - b. 2015 PES WG Recognition Award for Outstanding Standard or Guide.
 - c. 2015 PES Prize Paper Award.
4. The WG will be discussing Individual Awards and Recognition in the January 2016 meeting. The WG will seek guidance and definition from PSRC officers to define the criteria to nominate and select the following PSRC Individual Awards
 - a. 2015 PSRC Distinguished Service Award
 - b. 2015 PSRC Career Service Award
 - c. 2015 PSRC Honorary Membership
5. IEEE PES Technical Council Technical Committee of the Year (TCOY) Award– The WG will improve the format of our yearend report to the PES

Respectfully Submitted

Hugo Monterrubio

B1 Chair

The following awards were presented or announced at the Main Committee meeting on September 17, 2015:

Special Awards

- **2015 IEEE PES Technical Council Technical Committee of the Year (TCOY) Award: Power Systems Relaying Committee**
 - This award was announced on Tuesday July 30, 2015 at the IEEE PES General Meeting during the Awards dinner Roger Hedding accepted the award on behalf of the PSRC.
 - This award recognizes a technical committee that has had an active, impactful year in promoting and advancing the technical influence and value of the PES.

Individual Awards and Recognitions

Date	Award/Recognition	For	First Name	Last Name
6/11/2015	IEEE-SA Working Group Chair Award	C37.243 Guide for application of digital line current differential relays using digital communications (Chair)	Solveig	Ward
6/11/2015	IEEE-SA Working Group Chair Award	C37.243 Guide for application of digital line current differential relays using digital communications (Vice Chair)	Bruce	Mackie
9/17/2015	IEEE PES Technical Committee Recognition Award	Outgoing Subcommittee Chair (H)	Eric	Udren
9/17/2015	IEEE PES Technical Committee Recognition Award	Outgoing Subcommittee Chair (D)	Russ	Patterson
9/17/2015	PSRC Bronze Service Award	For 15 years of service and contributions to the PSRC	Gary	Kobet
9/17/2015	PSRC Bronze Service Award	For 15 years of service and contributions to the PSRC	Russ	Patterson
9/17/2015	PSRC Bronze Service Award	For 15 years of service and contributions to the PSRC	Solveig	Ward
9/17/2015	PSRC Silver Service Award	For 25 years of service and contributions to the PSRC	Peter	McLaren

Working Group Awards and Recognitions

- 2014 IEEE PES Working Group Recognition Award -Technical Report - Jim O'Brien (Chair) and Alla Deronja (Vice-Chair) Power System Relaying Committee "Use of Synchrophasor Measurements in Protective Relaying Applications"
 - Award was announced and delivered on Tuesday, July 28th at the IEEE PES General Meeting in Denver, Colorado.

Completed WG	Title	Chair	VC
C1	IEEE 1686 Standard for Substation IED Cyber Security	Sam Sciacca	Mark LaCroix
C4	C37.244 Guide for Functional Requirements for Phasor Data Concentrators for Power System Monitoring, Protection and Control	Galina Antonova (announced at the May 2015 meeting)	Vasudev Gharpure
C5	IEEE PC37.242 Guide for Synchronization, Calibration, Testing and Installation of Phasor Measurement Units (PMU) for Power System Protection and Control	Farnoosh Rahmatian	Paul Myrda
C10/H13	IEEE PC37.240 Standard for Cyber Security Requirements for Substation, Automation, Protection and Control Systems	Tim Tibbals	
C16	Relay Scheme Design Using Microprocessor Relays	Raluca Lascu	Tony Seegers

D3	Considerations in Choosing Directional Polarizing Methods for Ground Overcurrent Elements in Line Protection Applications	Meyer Kao	Elmo Price
D6	Transmission Line Model Parameter Validation	Tony Seegers (announced at the May 2015 meeting)	Sam Sambasivan
D24	Transmission Line Applications of Directional Ground Overcurrent Relays	Don Lukach (announced at the May 2015 meeting)	Rick Taylor
D25	Distance Element Response to Distorted Waveforms	Karl Zimmerman (announced at the May 2015 meeting)	Aaron Martin
D26	Revision of C37.114 Fault Location Guide	Joe Mooney (announced at the May 2015 meeting)	Randall Cunico
H2	Protective Relaying Applications Using Smart Grid Communications Infrastructure	Mark Simon	Galina Antonova
H4	Revision of C37.111 COMTRADE Standard	Ratan Das	Amir Makki
H5	Common Format for IED Configuration Data	Jurgen Holback	Dac-Phuoc Bui
H7	IEEE 1588 Profile for Protection Applications	Galina Antonova	Bill Dickerson
H13/C10	IEEE PC37.240 Standard for Cyber Security Requirements for Substation, Automation, Protection and Control Systems	Sam Sciacca	
H19	Synchrophasor Data Transfer for Power Systems	Ken Martin	Gustavo Brunello
I5	Schematic Representation of Power System Relaying	Kevin Donahue	Rich Young
I8	Grounding of Instrument Transformers C57.13.3	Brian Mugalian	Bruce Magruder
I12	Quality Assurance for Protection and Control Design	Andre Uribe	Mal Swanson
I21	Analysis of System Waveforms and Event Data	Jerry Jodice	George Moskos
I22	End of Life Assessment for Protection and Control Devices	Bob Beresh	Bruce Mackie
K3	Reducing Outages Through Improved Protection, Monitoring, Diagnostics and Autorestitution In Transmission Substations	Bruce Pickett	Paul Elkin
K4	C37.95 Guide Protective Relaying of Utility - Consumer Interconnections	Mukesh Nagpal	Chuck Mozina
K6	Sudden Pressure Protection for Transformers	Randy Crellin	Don Lukach
J2	Protection Considerations for Combustion Gas Turbine Static Starting	Michael Reichard	Zeeky Bukhala

B3, Membership Activity Report
Chair: M. Swanson

Assignment: Assist in searching for new attendees.

Attendance during the La Jolla meeting was 226, which is considered a healthy number for us.

6 new attendees were in our Newcomers Orientation meeting on Tuesday. We will take some promotional steps for our next meetings.

No management support letters were written. As a further note, if any attendee needs stronger management support for PSRC participation, we encourage them to let us know.

5 Service Awards were presented.

B4: O & P Manual and WG Training

Chair: Phil Winston: O&P Manual:

Did not meet.

Chair: R Hunt: WG Training:

No information available.

B5: Bibliography and Publicity

Chair: T.S. Sidhu

Vice Chair: M. Nagpal

No information available.

B8: Long Range Planning

Chair: Bob Pettigrew

No information available.

B9: PSRC Web Site

Chair: Russ Patterson

No report.

VI. Items from the Main Committee meeting:

- A. There were no new Main Committee members announced
- B. There were no new Fellows announced
- C. There were no Motions from SC chairs to the Main Committee

VII. SUBCOMMITTEE REPORTS

C. SYSTEM PROTECTION SUBCOMMITTEE

Chair: J. O'Brien

Vice-Chair: G. Henneberg

System Protection Subcommittee Scope

Evaluate protection systems responses to abnormal power system states. Evaluate and report on special protection schemes, remedial actions schemes, monitoring and control systems and their performance during abnormal power system conditions. Recommend corrective strategies and develop

appropriate standards, guides, or special publications. Evaluate and report on new technologies which may have a bearing on protection system performance during abnormal power system conditions.

Meeting Minutes

The System Protection Subcommittee of the PSRC met September 16 in La Jolla, CA in conjunction with the PSRC. The participants introduced themselves. A quorum was achieved and the May 2015 minutes were approved.

Advisory Committee Items of Interest

Timely submittal of WG minutes is important to be able to assemble both the subcommittee and main committee meeting minutes. Most WG chairs already deliver the reports from their computers during these subcommittee meetings. Jim requested that WG chairs submit their minutes by Friday, September 18 to both himself and Gene Henneberg.

Working Group Reports

The minutes of the Working Groups are attached.

The C2 Working group has completed its work, did not meet in La Jolla, and does not expect to meet in Memphis in January. The expectation is to officially disband at the January meeting.

CTF26 was approved to become an official Working Group (C26). The complete PAR to revise C37.233 is expected to be filed in October to meet the schedule for IEEE SA review at the December meeting. Only relatively minor changes are anticipated to the existing C37.233 purpose and scope. The proposed Scope and Purpose are part of the attached meeting minutes.

CTF28 was approved to become an official Working Group (C28). The complete PAR to revise C37.242 is expected to be filed in October to meet the schedule for IEEE SA review at the December meeting. The proposed Scope and Purpose are part of the attached meeting minutes.

New Business

Working Group chairs are reminded to provide meeting minutes and updated Working Group membership lists to Gene Henneberg by this Friday, September 18.

C-2: Role of Protective Relays in the Smart Grid

Detailed Minutes 5/13/15

Chair: Alex Apostolov

Vice Chair: Roy Moxley

Assignment: Identify the functions and data available in Protective Relaying Devices that are used at different functional levels and different applications and can be used within a Smart Grid. Describe the use of interoperable data formats for protection, control, monitoring, recording, and analysis.

As noted above, this Working Group has now completed its work, did not meet in La Jolla, and anticipates disbanding at the January 2016 meeting

C18: Transmission to Generation Interconnection Protection Considerations

Chair: Alla Deronja (aderonja@atcllc.com)

Vice Chair: Keith Houser (keith.houser@dom.com)

Output: IEEE Guide PC37.246

Established: September 2011

Expected Completion Date: December 2017

Write an IEEE Guide for Protection Systems of Transmission to Generation Interconnections.

Scope:

This Guide documents accepted protection practices for transmission to generation interconnections. It is intended to cover the protection system applications at the interconnections between transmission systems and generation facilities greater than 10 MVA. This Guide does not cover distributed energy resources.

Purpose:

This Guide provides guidance to those who are responsible for the protection of electrical interconnections between transmission systems and generation facilities greater than 10 MVA. It is not intended to supplant specific transmission or generator owner practices, procedures, requirements, or any contractual agreement between the transmission and generation owners.

Requirements for the next meeting: Wednesday 9:30 – 10:45 am single session, meeting room for 35 people with a computer projector.

C19: Standard for Phasor Data Concentrators for Power Systems

La Jolla – PSRC September 16th, 2015

Chair: Vasudev Gharpure

Vice-chair: Mital Kanabar

Assignment:

Develop a standard for Phasor Data Concentrators for power systems.

14 Attendees: 6 members, 4 corresponding members & 4 guests attended. The meeting roster is attached.

- Patent/IP related IEEE slides were shown
- We had a quorum. However, previous meeting minutes had already been approved electronically.
- WG C19 PAR, Assignment, Purpose, and Scope were presented
- The WG's task status was presented.
 - The project duration and the web meeting / teleconference frequency and schedule.
 - The functions to be included in the standard were described briefly. These are
 - Time Alignment of Data
 - Data Forwarding
 - Communication
 - Data Format and Coordinate Conversion
 - Reporting Rate Conversion
 - Phase Adjustment
 - System Monitoring
 - The functional description section is expected to be completed in another month or so.
 - Functional description will be circulated to the corresponding members for comments after the WG review is complete, approximately by the end of this year.
- Performance requirements were discussed.
 - Processing delay, robustness and processing accuracy have been included
 - Reliability and availability were not planned to be included, but the group opined that these should be included. Specifying explicit numbers would be arbitrary, and a challenge, but this need should be addressed in some form, as a minimum requirement. Users / manufacturers can specify better as needed.
 - Harold Kirkham volunteered to take a look at these needs.
 - Processing Delays
 - The conditions for processing delay tests should be specified. These should be at the device capacity (Nameplate data) in terms of number of streams, number of phasors, data transfer rates etc., based on manufacturer claims. WG to consider requiring manufacturers to provide such data, as part of the standard.
 - The introduction to this section should clarify the distinction between the device hosting the PDC and the PDC functions, in terms of how the performance is measured and testing performed. As an example - processing delay may refer to data entry / exit at the device level, or the application function level; the difference between these being the

- time period consumed in the low level communication functions such as Ethernet stacks. C37.118.x-2 2011 standards do specify the definition of data entry / exit.
 - Such a clarification would also be useful to distinguish the testing for hardware PDCs and
 - software PDCs running on a server.
 - This requirement may be applicable to PDC as a system (including software/firmware/hardware), since processing delay depends on Hardware platform as well, and there may exist software PDCs
- Robustness
 - Several layers of robustness were described. The group consensus was to use the kind of robustness implied during hardware tests such as IEEE 1613. The device / function is permitted to misbehave during actual disturbance, but then must recover at the cessation of the disturbance.
 - An automatic reboot / restart and a need to remote login was acceptable. A requirement for physical access is not acceptable, as it could require someone to drive out to a remote device.
 - It would also be unacceptable for the device to go into reboot cycles continuously, which effectively rules out a remote login, and requires a physical access / power cycle for a fix.
 - It was to be acknowledged that it may be impossible to achieve the desired robustness under all conditions (such as hardware failure). The intent of the WG is to include specific tests, and that the device should not need physical access under those test conditions.
- Processing accuracy
 - The only mathematical operations required by the PDC are phase adjustment and format conversion. These use standard mathematical library functions. These are expected to be accurate enough. However, it was pointed out that the standard should include some requirements, else an error prone PDC might still pass the standard. A requirement selected was 1% of 1%. This is considered achievable, and adequate for the purpose. It was pointed out that the requirement on phasor measurement is 1% TVE as per C37.118.1-2011, and that the requirement for the PDC was based on this.
- WG work schedule
 - The PAR is valid to the end of December 2017. This gives the group just about two and a third of a year to wrap everything up.
 - Vasudev to work on an estimated timeline for the WG to consider, if they are to complete the work within time.

C20: Impact of VSC HVdc Transmission on AC Protective Relaying

WG Chair: Joe Mooney

Vice Chair: Ian Tualla

Output: PSRC Report

Expected Completion Date: May 2016

Working Group Scope: Develop a report to the PSRC describing Voltage Source Converter (VSC) HVdc systems and the impact on local AC system protection.

The Working Group met with 26 attendees; 10 members and 16 guests.

WG chair discussed briefly background of WG group. WG Chair discussed outline and requested writing contributions from WG. WG member discussed writing contribution specifically field experience with a PLC application. The Carrier Equipment burned a card inside the Carrier Set and that it was suggested to put filters at the line tuner as a mitigation. WG decided to move writing contribution to section dealing with field experience instead of section called "communications related to line protection." WG member went over writing contribution section called "Communication between HVDC and AC systems." After WG member went over writing contribution, discussions began about the DC breakers and the quick response of those equipment. WG member, discussed his study to incorporate fault models on Wind Farms was complete and his findings. After WG member discussed his findings, discussions began about different fault types and contributions from the VSC. WG member discussed *revised* writing

contribution specifically on Reasons for having HVDC and AC System Protection. WG discussed that power flow doesn't play a key role with VSC systems but does play a role with LCC systems.

Next meeting: one session, 30 attendees, computer projector.

C-21: Guide for Engineering, Implementation and Management of System Integrity Protection Schemes (PC37.250)

Chair: Yi Hu
Vice Chair: Gene Henneberg
Established: September 2013
Completion: December 2018
Assignment: Develop an IEEE Guide for Engineering, Implementation, and Management of System Integrity Protection Schemes

Working group C21 met on Tuesday, September 15, 2015 in La Jolla, CA in a double session chaired by Yi Hu and Gene Henneberg with 12 members, including 1 new corresponding member and 6 guests attending. The meeting was started by introductions and display IEEE Patent Policy slides to inform all attendees and the WG of any known potential patent issues (none were identified).

The May 2015 meeting minutes from San Antonio were previously reviewed electronically and approved

The most recent draft 0.09 was distributed via email to WG members last week, along with another submission from Phil Beaumont that has not yet been incorporated. Some editing has been done by Gene.

Yi reviewed the present draft for sections which still need authors, resulting in the following volunteers for several sections, which completes the sign-up of remaining sections that were not assigned:

- 5.1.3 – Tony Johnson
- 5.2.3 – Manish Patel, Phil Beaumont
- 5.2.8 – Tony Johnson
- 5.2.10 - Alex Wang
- 5.2.11 – volunteer needed
- 6.2.4 – Heather Malson
- 7.3 – Bonian Shi

It was noted that the section authors have tended to use different terms for the same functions. For example, Engineering, Design, and Implementation do not seem to be used consistently. It was suggested that the intended usage be included in the Definition section. Other sections will then be edited accordingly.

It was also suggested that it may be both easier and increase member's "ownership" of the Guide to have one or two WG members review and edit individual sections other than their primary contributions.

Yi led a discussion on the Scope of what the guide will cover. The present list of scheme types not to be covered was not universally applauded. It was observed that the specific list did seem to appropriately exclude "small" schemes based on local measurements that take local action. The content of section 4.3 also provides overlap with this section 1.1. It was suggested that we focus (per the Guide title) on Engineering, Implementation, and Management of SIPS, rather than on individual application types.

WG Chairs will revise the current section 1.1 "Scope" based on the above discussion.

Alfredo De La Quintana provided a "flow chart" style diagram that the WG had not had the opportunity to discuss at the May meeting. Though Alfredo was not able to attend this meeting, the flow chart seemed to have good potential as an overall view of the complete SIPS process, but in its present form seems to be too detailed (and too large) as a single figure. We will revise with a more clear organization along the lines of Engineering, Design, and Implementation of SIPS

Gene provided an informational review of the present status of the NERC effort to rewrite the NERC standards related to RAS. The NERC slides from the September 10 webinar were the basis of the discussion.

WG Chairs will send the September 2015 meeting minutes to WG members for electronic approval.

Requirements for January JCTM meeting in Memphis, TN – Room for 20 people, double session, projector.

C23: Coordination of Synchrophasor Related Activities

La Jolla, CA
Sept. 15, 2015

Chair: Anthony Johnson (anthony.johnson@sce.com)
Vice Chair: Allen Goldstein

Assignment:

The ongoing task force will provide three main functions:

- Liason with NASPI (North American Synchrophasor Initiative) (specifically the PRSVTT (Performance Requirements, Standards and Verification Task Team)) to keep the PSRC in sync with the changes and needs in the industry with respect to the development and usage of PMU devices. Formalize transfer process of PRSVTT developed documents to PES PSRC including making recommendations which PRSVTT activities should be transferred to IEEE reports, guides and standards.
- Make recommendations to PSRC for assignments that would require the creation of working groups in PSRC and also recommend what the output of those working groups might be (Guides, reports, etc.) based on the needs of the industry.
- Coordinate related activities with other IEEE PES committees.

Meeting Agenda

1. Introductions (17/5)
2. Approved of the May 2015 meeting minutes Deferred to email due to lack of Quorum
3. NASPI Update
 - a. NASPI Meeting in Chicago Oct. 13-15
 - b. Workgroup to examine: Impact of PMU Measurement Errors on Operational Applications
 - c. Workgroup to identify: Synchrophasor security best practices TRC meeting
 - d. Tutorial at Cigre meeting Oct 11 on the NASPI Synchrophasor Starter Kit
4. IEEE Workgroup Activity

	Title	Status
PSRC C19	Standard for Phasor Data Concentrators (PDC) for Power Systems	In Progress
PSRC CTF28	Guide for Synchronization, Calibration, Testing and Installation for PMUs	In Progress
PSRC H11	Revision of C37.118 Synchrophasor Standard Joint with IEC	In Progress
PSRC H21	Development of standard Mapping between C37.118 and IEC61850-90-5	In Progress
Substation C20	Recommended Practice for Databases used in SAS	In Progress

IEEE SCASC	Synchrophasor Measurement Conformity Assessment Steering Committee	Standing
IEEE SDCASC	Synchrophasor Data Conformity Assessment Steering Committee	In Progress

5. Discussion on C37.118.2 update. Asked NASPI to help identify Chair and Co-Chair for workgroup. Potential new task for in January to address.
6. Adjourn

Requirements for next meeting: Single Session, Meeting room for 25 people with a computer projector.

C24: Modification of Commercial Fault Calculation Programs for Wind Turbine Generators

Chair: Sukumar Brahma (New Mexico State University)
Vice Chair: Evangelos Farantatos (EPRI)
Established: 2014
Completion: TBD

Scope:

- 1) To survey WTG manufacturers to determine what parameters they could provide that could be used by steady state short circuit program developers in various time frames.
- 2) Use the result of this survey to prepare a report that can be used by steady state program developers to refine their models.

Venue: San Diego Marriott La Jolla, Room Los Angeles, La Jolla, CA.
Tuesday, September 15, 2015, 3:00 – 4:15 pm.

1. Introductions
2. Approval of minutes of the May 2015 meeting.
3. Announcements:
 - Sukumar Brahma made a WebEx presentation about the purpose and progress of this WG at the June 15 meeting of the WECC Renewable Energy Modeling Task Force (REMTF). The scope was well received. Some members showed interest in attending our meetings.
 - Bob Nelson of Siemens showed willingness to work with us on what information can be provided for Type IV WTGs in order to create accurate phasor domain models.
4. Based on the presentations¹ made at the January 2015 meeting, continue the drafting of the survey to be sent to WTG manufacturers with questions to be asked and data requests to the WTG manufacturers. The draft survey has been sent to the group.
5. Update on any contacts with manufacturers of WTGs. Some members had offered to provide such contact details in the May meeting. A list of manufacturers provided by Dean Miller is provided at the end of the survey.
6. Adjourn

C25: Protection of Wind Electric Plants

Chair: Martin Best
Vice Chair: Keith Houser
Established: 2014
Completion: TBD

Assignment:

¹ Presentations slides can be found at:
<https://www.dropbox.com/s/a6ff25p4j3ano00/Presentations.zip?dl=0>

Write a report to provide guidance on relay protection and coordination at wind electric plants. This report will cover protection of generator step up transformers, collector system feeders, grounding transformers, collector buses, reactors, capacitors, main station transformers, tie lines and points of interconnection and associated arc flash issues. Although the report will address coordination with wind turbine generator protective devices and static var sources, the protection of the wind turbine generators and static var sources will not be included.

Working Group C25 met in La Jolla, CA on September 16, 2015 with 9 members and 8 guests. A quorum was achieved; though not necessarily required.

After introductions, the May 13, 2015 meeting minutes were discussed. Jim Niemira motioned to approve the minutes as is. Raluca Lascu provided a second to that motion. WG approved the C25 Meeting Minutes from the May 13, 2015 meeting in San Antonio, TX.

The WG reviewed the outline in more detail and it was noted that most of the previously assigned section writing assignments had been received.

Jacob Lien mentioned the use of a grounding switch on the collector feeder system to ground the feeder during fault conditions. Jacob volunteered to a writing assignment that will be integrated into section 2.4 – System Grounding [working with Keith Houser].

Dean Miller talked about his section; typically the low voltage side of the GSU is solidly grounded, although several WG members noted that they have seen numbers of installations with ungrounded (wye or delta) utilized.

In general there were several good discussions about the primary and secondary GSU connections seen in a wind farm design.

The WG moved on to discuss Arc Flash and its importance at both the GSU and feeder breaker locations of the collector system.

The WG discussion then moved to the discussion of actual protection schemes. There are a number of relay packages customized for wind plant design application.

The next step for the C25 WG is to begin writing assignments. To that end, the following assignments of Outline sections have been made [New Assignments: **BOLDED**]:

1. Introduction
 - a. Scope
 - b. Purpose [Jim Niemira]
2. Differences Between Wind Electric Plant Substations and Conventional Distribution Substations and Generating Stations
 - a. Wind Electric Plant Substation arrangements and voltage levels [Rene' Midence]
 - b. Collector Feeder design and characteristics [Rene' Midence]
 - c. Fault Currents (equipment ratings) [Sukumar Brahma]
 - d. System grounding [Keith Houser]
 - e. Wind Electric Generator characteristics [Yuan Liao; Rene' Midence]
 - f. Transformer connections and characteristics
 - i. Wind turbine generator (WTG) transformers [Dean Miller]
 - ii. Main Substation transformers [Dean Miller]
 - g. Harmonics and Sub-harmonics [Yuan Liao; Rene' Midence]
 - h. Voltage and Frequency Control Requirements (LVRT) [Yuan Liao; Rene' Midence]
3. Typical Protective Relay Schemes at Wind Electric Power Plant Substations
 - a. Collector Feeder Protection [**Jim Niemira, Martin Best, and Jacob Lien to collaborate on this section; Jim to share a previously written paper with this collaborative group**].
 - i. Overcurrent Protection and Coordination with WTG transformer protective device.
 - ii. Voltage and Frequency Protection and Coordination
 - iii. Arc Flash protection
 - iv. Removal of WTGs and Static VAR Devices from collector feeders under fault

- b. Grounding Transformer Protection [**Keith Houser**]
- c. Bus Protection [**Dean Miller**]
- d. Main Transformer Protection [**Dean Miller**]
 - i. Transformer differential protection
 - ii. Overcurrent Protection and Coordination with Collector Feeders
- e. Capacitor, Reactor, and Harmonic Filter Protection [**Jim Niemira, Martin Best**]
 - i. Voltage protection
 - ii. Overcurrent protection
 - iii. Harmonic current and voltage considerations for protection scheme operation [**Juan Gers**]
- f. Transmission Tie Line Protection
 - i. Typical pilot protection schemes [Charlie Henville]
 - ii. Back-up protection schemes [Charlie Henville]
 - iii. Voltage and frequency protection requirements [Charlie Henville]
 - iv. Supervision requirements for transmission line breaker closing [Charlie Henville]
- 4. Conclusion
- 5. Bibliography

We now have writing assignments for the remainder of the unassigned outline sections of the report excluding the Conclusion/Bibliography. The updated draft outline (with writing assignments) will be circulated among WG members to assist with the completion and submission of writing assignments by December 1, 2015.

The group requests a single session, meeting room for 25-30 at the January 2016 meeting, and a computer projector. **It is requested that the meeting time for C25 avoid conflicts with the meeting times for the C18 and C24 working groups, if possible.**

Meeting adjourned @ 09:15.
 Respectively Submitted 9-16-2015,
 Keith Houser

C26: C37.233, Power System Protection Testing Guide

Chair: D. Ware

Vice Chair: M. Black

Output: PAR to form WG C26

Assignment: Elect Chair and Vice Chair for WG C26. Write and discuss scope and purpose for revision to C37.233

The C26 task force, chaired by Don Ware, met on Tuesday, Sept 15, 2015 with 12 members and 5 guests.

Don Ware was nominated and accepted the position of Chair for the working group C26 (presently for the Task Force). Matt Black accepted nomination of Vice Chair for the working group.

The Original scope and Purpose of the PAR from 2005 was reviewed. The content and structure of the paper is largely acceptable and only minor changes are needed, so the same verbiage was used as the 2005 PAR request.

Scope: This guide covers suggested test requirements for Power System Protection Scheme Testing, System Application Tests, the scope and level of tests based on the application, and benefits of the overall protective schemes testing. This guide encompasses overall system testing procedures (generators, line, line reactors, transformer, capacitors, Special protection schemes, end-to-end testing, distributed application within substation, etc.), data collection requirements, as well as the test procedure definitions. The Guide describes the methods, extent, and types of system tests for protection applications, at various voltage levels. Control functions which are inherent to the protective systems are

included. Importance of line testing, indirect trip applications, and open / closed loop tests (dynamic / non-linear tests) are also covered.

Purpose: This guide is intended for power system protection professionals. It includes a reference list of type tests for protective devices as well as overall protection scheme performance tests for various types of protection schemes. The Guide describes the methods, extent, and types of protection scheme tests. Interlocking and control functions inherent to the protective schemes are included.

The Need for the project was also discussed which led to the unchanged scope and purpose.

Need: The need for this revision is to intercept this guide prior to its expiration in 2019. The intent of this revision is to make minor revisions to highlight the technological changes that have occurred since its last publication in 2009 (e.g. Power Line Carrier medium versus Fiber).

The PAR request must be filled out completely and submitted to NESCOM by Mid-October. Don and Matt will collaborate to complete the PAR request by Friday 10/2/15 for submission to Jim O'Brien for feedback before submission to NESCOM.

It was noted that the target will be to put the guide out for ballot no later than June 2018 to allow 18 months before submission to RevCom. If the guide were to expire before it is revised it will become "inactive" until it is successfully re-balloted.

Notes from the previous meeting with the guide will be dispersed to the members of the new working group after it is approved in the C-subcommittee meeting.

A meeting room sized for 30 people is requested for the January 2016 meeting and a projector is requested to be available as well.

C28 C37.242 Guide to the Synchronization, Calibration, Installation and Testing of PMUs

Chair: Allen Goldstein
Vice Chair: Harold Kirkham
Established: September 2015
Completion: TBD

SCOPE:

Revision of the IEEE guide which provides guidance for synchronization, calibration, testing, and installation of phasor measurement units (PMUs) applied in power system protection and control. The following are addressed in this guide:

- a) Test and calibration procedures for PMUs for laboratory and field applications. These procedures have been superseded by another IEEE document and will be revised or deleted as appropriate.
- b) Considerations for the installation of PMU devices based on application requirements and typical bus configurations. New lessons learned since the publication of this guide may be accounted for in a revision to the guide.
- b) Techniques focusing on the overall accuracy and availability of the time synchronization system. New technologies and further information about synchronization may be accounted for in a revision to the guide
- d) Communications testing for connecting PMUs to other devices including Phasor Data Concentrators (PDCs). Lessons learned from the field may be included in a revision of the guide.

PURPOSE:

This guide is intended to be used by power system protection professionals for PMU installation and covers the requirements for synchronization of field devices and connection to other devices including PDCs.

CTF29 -- Testing Out of Step Protection

Tuesday, 9:30 AM September 15 2015 Attendance 34 people
TF Chair: Heather Malson
Established: September 2015
Completion: TBD
Assignment: TBD

Summary:

Significant interest based on attendance. Discussion surrounded both static and dynamic tests for OOS testing. The feeling was that though the idea of having the group available in the future for other WG projects may be of interest, focusing on OOS was big enough for now.

Presentations were given by Gene Henneberg (NV Energy) and Kevin Jones (Xcel Energy) on ways to generate test information.

The group seemed ready to move forward forming a WG, however, we ran out of time to finalize details. We plan to continue the TF at the next meeting in order to take care of the details (tweak assignment, affirm motions, choose WG leaders, etc.).

Respectfully,
Heather Malson

Details:

Still haven't finalized a title. The intent may be more than just J5 (Generators) and D29 (Out of step) testing. The original proposal was mentioning the two working groups as relevant right now, but may encompass more than those two.

The way this Task Force got started was from the D29 working group. Essentially, the working group showed how to do the settings and said go test it, but didn't say how to test it.

Discussion on what type of testing is this? If this is truly commissioning testing or is this just verifying that the settings issued match what is in the relay and that it trips/blocks/alarms at that threshold.

Suggestion on what the testing paper should talk about it. One person suggested that the way they test out of step is they only test certain points inside/outside the blinders and assume the rest will work (static testing). Additionally, this was suggested using not electro-mechanical, but should be fine with microprocessor.

Discussion continued that the only way to test Out Of Step properly is to use RTDS. This is more of a dynamic testing.

Do we do Static Testing or Dynamic Testing? Suggestion that there is some holes to simply doing static testing.

Presenter 1) Reno Nevada

Gene created a spreadsheet that he can adjust things in his spreadsheet to account for configuration changes.

Test Cases

(Presenter Excel Spreadsheet) Relay engineer comes up with settings and test values.

1. Assume you have unstable condition (out of step blocking application) right to left. Flow maximum expected swing rate.
2. Again unstable swing. Once the locus swing into the middle it turns into a fault. Besides blocking with this case treat it as a fault because it stayed in middle to long.
3. Stable swing. Stable case comes in one side and leaves same side.
4. Fast swing. More quickly moving event. A little faster than allowed swing event. Interrupt the event as a fault rather than a swing.

Presenter 2) Xcel Energy

Misoperation from a negative sequence above a certain threshold it will actually unblock and allow tripping. What they did was change the negative sequence pickup. He showed his out of step Comtrade calculator. Specify inputs including starting angle, ending angle, slip rate, local/remote source impedance. He uses Gene's spreadsheet to graph it and to come up with his blinders.

If you don't have a test set that is capable of doing dynamic. Wont the static testing using just points in and outside work as well?

Suggestion for assignment: Changing the name to actually be "Testing of out of Step Trip/Block".

Meet another time with another Task Force Meeting. This was seconded (Jonathon Sykes)

CTF30 Microgrid Protection Systems

Chair: Michael Higginson

Vice Chair: N/A

Established: September 2015

Completion: TBD

Assignment: TBD

September 15, 2015

La Jolla, CA

The task force had our first meeting with 26 attendees, 6 of which were interested in membership. The attendance list is below.

Michael presented on the definition of a microgrid, protection challenges related to this type of system, and some methods of addressing the challenges.

The task force expressed interested in producing a report on the challenges of microgrid protection and means of addressing the challenges.

The task force discussed our experiences with microgrid protection, and produced the following ideas regarding potential scope of the report:

- Define scope as protection of system, and refer to other documents for protection of specific equipment
- Some challenges of microgrid system (i.e. fault current scenarios to evaluate) may be noted, but not necessarily addressed within the report
- Discussion of sensors and sensor accuracy for microgrid applications

We would like to request another meeting at the Joint Technical Committee Meeting in January. The following items would be covered in this meeting:

- Presentations on real-world experiences with microgrids and individuals' perceptions of microgrids
 - We would request that anyone willing and able to present a brief presentation on the aforementioned please contact the chair.
- Discussion of proposed scope of report

The following are action items before the next meeting:

- Reach out to other groups that may have interest, i.e. the T&D Smart Distribution working group and IEEE 1547.4
- Members will research related standards that may have impact on desired scope
- Michael will prepare a suggested scope based on the group feedback for discussion

Next Meeting: Single session, 40 attendees, computer projector

D: LINE PROTECTION SUBCOMMITTEE

Chair: G.L. Kobet

Vice Chair: K.V. Zimmerman

The Subcommittee meeting was called to order on Wednesday, September 16, 2015 at 1:30 p.m. with 22 members and 22 guests present.

Following introductions, a count of SC membership was made, and it was determined a quorum was present (22 out of 42 members present).

Minutes from the May 2015 meeting in San Antonio were approved.

The Chair reviewed items of interest from the Advisory Committee.

Working groups gave reports on their activity.

Reports from the WG Chairs:

D19: PC37.113, DRAFT Guide for Protective Relay Applications to Transmission Lines

Chair: Don Lukach

Vice Chair: Jeff Barsch

Chair Emeritus: Rick Taylor

Chair Emeritus: Mohindar Sachdev

Established: September, 2011

Expected Completion Date: September 2015

PAR Expiration Date: December 2015

Scope: Concepts of transmission line protection are discussed in this guide. Applications of these concepts to various system configurations and line termination arrangements are presented. Many important issues, such as coordination of settings, operating times, characteristics of relays, impact of mutual coupling of lines on the protection systems, automatic reclosing and use of communication channels are examined. Special protection systems, multi-terminal lines and single phase tripping and reclosing are also included. The impact that system parameters and system performance have on the selection of relays and relay schemes is discussed as well.

WG Draft Guide (Draft 8.1)

The D19 working group met in a single session on Wednesday, September 15, with 12 of 20 (60%) balloting members present. Also in attendance were 1 corresponding member and 20 guests.

A motion was made by Joe Mooney to approve the May 2015 meeting minutes from San Antonio and the WebEx meeting minutes from May 27, June 24, July 8, July 22, and August 5, 2015. Claire Patti seconded the motion. The minutes were approved by the working group.

The IEEE SA patent slides were reviewed.

The WG discussed the ballot recirculation comments.

- During SA editorial review, the WG plans to replace the approximately 20 original fuzzy figures with crisper Visio figures. John Miller will work on these.
- References in the text to figures 28 through figures 33 did not appear in the .pdf version of the document. These need to be fixed.
- Clause 6.10.2.1: The figures and text in this clause are ok. The technical comment was reviewed and accepted by the WG.

- Annex A.1.1: There was a technical comment on the first sentence. The WG changed “60 Hz” to “the nominal frequency”.
- An editorial change was made to Figure 15.
- Figures 52, 57(j), and 74 need editorial corrections per the ballot comments.
- A few other editorial changes were made, including one in clause 6.8.7.

The WG voted to submit Draft 8.1 for recirculation ballot to address the one technical comment revision.

The WG chair will submit for a PAR extension.

D28: (PC37.230): Guide for Protective Relay Applications to Distribution Lines

Chairman: Brian Boysen

Vice Chair: Claire Patti

Established: 2013

Output: C37.230 – Guide for Breaker Protective Relay Applications to Distribution Lines

Draft :1.6

Expected Completion Date: 2018

Assignment: To review and revise C37.230-2007, “Guide for Protective Relay Applications to Distribution Lines” to correct errors and address additional distribution line protection related topics.

The working group in La Jolla, CA on Tuesday, September 15th 2015, 1:30 pm PDT.

There were 19 members and 10 guests. The attendance list is attached.

The patent slides were presented.

The working group minutes from the May and July meetings were presented and approved (Mike motioned, Fred seconded).

The working group reviewed Brian’s contribution to section 7.1.1.

The working group reviewed the comments submitted by the teams for sections 7.2 and 7.3

Karl Zimmerman will provide a write up on Coordination Time Interval for section 7.2.

Brian suggested rewriting the discussion of Figure 7-6 to relate to the range of expected fault current not coordination time. He will add this to section 7.2.

Working group identified that coordination figures and text referring them need to be reviewed to make sure that they show/explain coordination in a manner consistent with current industry practices. Karl Zimmerman and Soudi Farajollah will review and revise 7.2.

Brian will revise 7.2.1 to address methods of restoration from intentional miscoordination.

Discussion on 7.4 will begin at the next meeting after the working group members have had a chance to review the changes.

Assignments:

The following new assignments were made:

Karl Zimmerman will provide a write up on Coordination Time Interval for section 7.2.

- Karl Zimmerman and Farajolla Soudi will review and revise 7.2. Working group identified that coordination figures and text referring them need to be reviewed to make sure that they show/explain coordination in a manner consistent with current industry practices.
- Brian suggested rewriting the discussion of Figure 7-6 to relate to the range of expected fault current not coordination time. He will add this to section 7.2.
- Brian will revise 7.2.1 to address methods of restoration from intentional miscoordination.
- The following assignments are outstanding:
- Don Lukach is going to look for a standard on transformer magnetizing inrush that can be referenced in 7.1.3.
- Ratan Das will provide a section on sensors, focusing on RVDs.
- Joe Mooney will revise section 6.3.3 to address his comments and the need for the resistor.
- Juan Gers and Joe Xavier will review and revise 7.6 and 7.7.
- Joe Mooney will review and determine need for 7.8. May combine with fuse saving discussion in section 6.
- Brian to add reference to 7.1.3 to 7.1.1.

All assignments are due November 15th. Word format is preferred.

We will hold two WebEx meetings this Fall. Meeting invitations will be sent to members in the next few weeks.

Old Business:

It was decided that we will add a reference to PSRC report [Cold Load Pickup Issues](#) somewhere in section 7.

It has been noted that the existing guide is inconsistent in the use of terminology. It was pointed out that it uses both sense and detect. We will maintain a list these terminology issues and address them as we work through the guide.

A reference to 7.1.3 will be added to 7.1.1.

- Sense vs. detect
- Line vs. phase , such as double-line and two-phase
- High side vs. high voltage
- Load capability vs line rating

We will address the use of pulseclosing and pulsefinding throughout the document per the guidance provided by Mike Meisinger.

We will need to confirm that all references are to valid/active standards and that the correct version is reference. This should be done before sponsor ballot.

D29: Tutorial on Setting Impedance-Based Power Swing Blocking and Out-Of-Step Tripping Functions on Transmission Lines

Chair: Normann Fischer

Vice chair: Kevin W. Jones

Assignment:

The tutorial will focus on methods of setting impedance-based power swing blocking and out-of-step tripping functions. Specific relay setting examples will be provided. Other methods of detecting an out-of-step condition do exist but will not be discussed.

ATTENDANCE

18 Total with 9 Members and 9 Guests.

GENERAL ITEMS

Normann mentioned that testing of power swing settings will be removed from D29 and will be moved to a new working group that is presently CTF29.

Settings-less methods will be described in the D29 tutorial.

REVIEW OF OUTLINE AND ASSIGNMENTS

Writing assignments have been received from Kevin Jones, Chris Mertz and Jorg Blumschein.

DISCUSSION

A brief discussion about the model ensued. Normann Fischer, Joe Mooney, Kevin Jones and Demetrios Tziouvaras will get together before the January 2016 meeting to iron out the modeling discrepancies.

Normann will send out the completed writing assignments to date for the work group to review before the next meeting.

TASKS:

Kevin

Give an update on the status of PRC-026-1.

Normann

Send the completed assignments to date to the rest of the work group.

Set up meeting for Normann, Demetrios, Joe and Kevin to discuss modeling discrepancies.

D30: Tutorial on Application and Setting of Ground Distance Elements on Transmission Lines

Chair: Karl Zimmerman

Vice-Chair: Ted Warren

Established: Jan 2014

Working Group Assignment: Write a tutorial on factors affecting the application and setting of ground mho and quadrilateral distance elements on transmission lines

The working group met in La Jolla on September 15, 2015 with 14 members and 18 guests. Brandon Armstrong, Wes Brown, and Meyer Kao joined the working group.

After introductions, the WG Chair reviewed the minutes, and restated the working group assignment.

The WG reviewed the tutorial outline, and after discussion, we added a section on high-resistance grounded systems.

Leading up to the meeting, we received several writing assignments. None were presented at this meeting, but starting at the January 2016 meeting, authors will present their sections to the Working Group. The format will be to schedule two to three presentations of 10-15 minutes each and time for Q&A.

The Chair gave a short presentation on a process for comparing sensitivity (defined by fault resistance coverage) for a long transmission line. The idea is to define line and source impedances, relay elements (21 quad, 21 mho, etc.), reach settings, and using a system and relay model, place faults along the line and compare the RF detected for faults on the protected line.

The Chair will distribute an IEEE template for tutorials to the WG members, along with the minutes.

D31: Summary presentation for C37.114 Fault Locating Guide

WG Chair: Joe Mooney

Vice Chair: NA

Assignment: Create summary presentation for the latest revision of the C37.114 Fault Locating Guide for presentation at the Main Committee meeting.

Expected Completion Date: January 2016

The working group met with 13 attendees and 7 members. One member was added at the meeting.

After introductions, the WG Chair reviewed the significant changes in the C37.114 Fault Locating guide that were introduced in the latest revision. The previous presentation from the original issue of the guide was also reviewed. The WG decided that using the previous presentation as a starting point would be good. Some material will be removed and replaced with new material from the revised guide. The presentation will consist of approximately 20 slides. The presentation will be developed using the IEEE PES Power Point template.

WG assignments with estimate number of slides are as follows:

Joe Mooney – Section 3.3 - Error Methods (3 slides)

Brian Boysen – Section 5.5 - Distribution Examples (4 slides)

Norman Fischer – Section 6 - Travelling Wave and Nonhomogeneous lines (3 slides)

Jeff Barsch – Section 4.4.2 & 4.4.3 - Synchrophasor & Synchronized sampling (2 slides)

WG assignments are to be completed by December 4, 2015 and sent to the WG Chair. The WG Chair will assemble the material for review at the next WG meeting in January 2016. The WG chair volunteered to deliver the presentation at the May 2016 meeting.

The D SC motioned and voted, with quorum to initiate WG D32.

D32: Summary Paper and Presentation for C37.243 Guide for the Application of Digital Line Current Differential Protective Relays Using Digital Communications

Chair: Bruce Mackie

Vice Chair: Craig Palmer

Established: September 2015

Output: Report and Presentation

Assignment: To develop a summary paper and presentation describing C37.243 Guide for the Application of Digital Line Current Differential Protective Relays Using Digital Communications to be used at protective relaying conferences.

Expected Completion date: Dec 31, 2016

Draft: 0

TF DTF32 met on Tuesday, September 15, 2015 at 3:00pm PDT in a single session with 7 members and 2 guests.

After introductions, the proposed assignment of the working group was reviewed and approved. The schedule for completing the report and presentation was discussed and the goal is to finalize the paper and presentation in time for the 2016 Western Protective Relay Conference in the fall of 2016.

The Guide for the Application of Digital Line Current Differential Protective Relays Using Digital Communications was reviewed. Each of the sections of the report was assigned an author to compose a draft of this section for the report. The writing assignments are due December 15, 2015. The following were assigned to the appropriate section of the guide.

Craig Palmer Section 4 Current differential line protection applications

Jim van de Ligt Section 5 Current differential operating methods

Bob Ince Section 6 Communication Scheme Design

Kent Ryan Section 7 Application Considerations

Don Ware Section 8 Testing and Troubleshooting

(Don did not attend meeting but agreed to this before meeting)

Additional discussion included questions about obtaining the Word document of the Guide, rules on plagiarizing the Guide and format for the paper. The chair will respond with answers for each of these before the end of next week.

Craig Palmer has volunteered to be the Vice-Chair.

The D SC motioned and voted, with quorum to initiate WG D32.

DTF33: Coordination with CIGRE Working Group TOR-JWG C4_B5.41 Challenges with series compensated applications in power system when overcompensating lines

TF Chair: Luis Polanco

Vice Chair: NA

Assignment:

Expected Completion Date:

DTF33 met on Tuesday, September 15th, 2015 with 5 attendees. Chair and attendees proceed with introductions, and attendance sheet sign in.

DTF33 Chair discussed the Agenda, and provided details on CIGRE Working Group TOR-JWG C4_B5.41 first meeting / discussions that took place earlier this year in May, 2015.

Chair presented the CIGRE Working Group TOR-JWG C4_B5.41 Draft content of the Technical Brochure that was discussed on the CIGRE WG first meeting.

Chair suggested to explore the possibility of IEEE PSRC working in collaboration (parallel) with the CIGRE WG members on the development of the Technical Brochure, and will follow up with IEEE SA and CIGRE WG chair to understand if this is possible.

Significant interest by the attendees on learning more about the key items that triggered the series over compensation project on one known actual case from Sweden where no relay mis-operations or other problems have been reported during its 15 years in operation.

Chair also noted from attendees special Interest not only from a system technical performance point of view, but also on protection issues related to fault detection and assessment on local and remote

near-by terminals protection systems operation, including distance protection, etc., when overcompensating lines.

Chair indicated that on existing IEEE Standards related to series compensation it was not found discussions in reference to overcompensation applications in power systems.

Chair proposed to have a 2nd Task force meeting in January 2016 to discuss Interest by IEEE PSRC DTF33 attendees to propose an IEEE WG with the intent to work in parallel with CIGRE WG on the Technical Brochure, or explore the option to develop an IEEE WG Report.

D34: Coordinate with IEC 60255-187-3 Functional Specification for Line Current Differential

CHAIRMAN: Normann Fischer

VICE CHAIR: Joe Mooney

ASSIGNMENT:

Coordinate with IEC 60255-187-3 (functional specification on line current differential requirements) and provide feedback

MINUTES:

The working group meet for the first time on Tuesday with 13 people present, 4 of these signed up to be members for the working group.

Dr. Murty Yalla gave everyone and overview of the expectation of the Working group and how we will interface with the IEC TC95 MT 4.

Hopefully by the next meeting we will have a table of contents, on which we can comment.

Coordination Reports

T&D Committee / Distribution Subcommittee

The next T&D Committee / Distribution Subcommittee meeting will occur during the JTC Meeting in Memphis, TN, 11-14 Jan 2016.

The Distribution Subcommittee is comprised of working groups focused on Distribution Reliability, Switching and Overcurrent Protection, Smart Distribution, Distributed Resource Integration, and Voltages at Publicly and Privately Accessible Locations. Additional information can be found at the following link: <http://grouper.ieee.org/groups/td/dist/>

The following are items of interest to the Line Protection Subcommittee:

Working Group on Smart Distribution

Larry Clark, Chair

Bob Uluski, Vice-Chair

<http://grouper.ieee.org/groups/td/dist/da/>

Fred Friend, Secretary

Continued discussion on developing the Smart Distribution Application Guide, P1854

Scope: This guide categorizes important smart distribution applications, develops descriptions of the critical functions involved, defines important components of these systems, and provides examples of the systems that can be considered as part of distribution management systems or other smart distribution systems. Gaps were identified and request assistance with development of a section on Advanced Protection, specifically impact of distributed generation. The WG is seeking assistance with writing a section on Advanced Protection. Contact Fred Friend fafriend@aep.com if you are interested.

The Smart Distribution Working group is considering a co-sponsored (with the Switching & Overcurrent Protection Working Group) invited panel session for the 2016 GM in Boston, MA on the topic of Protection Design for Micro Grids.

Volt-VAR Control Task Force

Work continues on P1885 'Guide for Assessing, Measuring and Verifying Volt-Var Control Optimization (VVO) on Distribution Systems'. Balloting is expected to begin in 2016.

A tutorial on Distribution Volt-Var Control and Optimization is planned for the 2015 GM in Denver. The tutorial will cover basic principles, approaches, challenges, results as well as case studies from GA Power, BC Hydro, and Duke Energy.

Distribution Management System (DMS) Task Force

Continued discussion regarding DMS issues and the results from the DMS TF survey. The PES reorganization may move DMS TF from the T&D committee to the PSPO committee.

Working Group on Switching & Overcurrent Protection

<http://grouper.ieee.org/groups/td/dist/sop/>

Fred Friend, Chair Casey Thompson, Vice Chair

Joe Viglietta, Secretary

The PAR for P1806 “Guide for Reliability Based Placement of Overhead and Underground Switching and Overcurrent Protection Equipment” was approved.

Scope: This guide provides analytical techniques to assist in the placement of switching and overcurrent protection devices on medium voltage distribution circuits for reliability purposes.

Purpose: This guide provides means and methodologies for proper placement of switches and protective devices to achieve the desired performance characteristics and reliability for medium voltage distribution circuits, including feeder and branch line equipment, with operating voltages up to and including 38 kV. Drivers for device placement, such as reliability and operational considerations are identified. Various types of switching and overcurrent equipment are covered such as: manual switches, automated switches, reclosers, sectionalizers, and fuses. Impacts on reliability and device placement are addressed for factors such as fault rate, interruption duration, exposure miles, customers affected and distribution automation.

Working Group on Voltages at Publicly and Privately Accessible Locations

<http://grouper.ieee.org/groups/td/dist/stray/>

Chuck DeNardo, Chair

Jim Bouford, Vice Chair

Scott Kruse, Secretary

P1695, “Guide to Understanding, Diagnosing and Mitigating Stray and Contact Voltage” is being balloting. The guide was balloted and the working group is now resolving the balloting comments.

Instrument Transformer Subcommittee:

The Instrument Transformer Sub Committee spring meeting was in Savannah, GA. The fall meeting will be in Tyson’s Corner, VA, 20 – 23 October. (There was an additional session held in Charlotte, NC on June 3rd)

There are three active working groups. All three PARs expire at the end of the year.

A new standard for CTs, C57.13.7, with a 250 millamp maximum output is being developed. It is nearly ready for vote.

The second new project C 57.13.8 is a Station Service Voltage Transformer Standard.

The third working group is reviewing a number of important proposed changes for C57.13. The integration into C57.13 of C 57.13.5 is the major discussion. Standard C57.13.5 requires extra testing for high voltage instrument transformers. The appendix will include a large section with new information on bushing and generator CTs.

Old Business

No old business to discuss.

New Business

The Subcommittee discussed and agreed to create Task Force DTF35, to investigate the need to form a working group to evaluate and compare line protection schemes with respect to security,

dependability, sensitivity, speed, simplicity and selectivity. Some objectors voiced concern that objectivity could be difficult for such a group and regulators could misinterpret such a paper without proper context. No chair has been selected as September 30, and SC chair and VC will determine when to commence the task force.

Bruce Mackie and Luis Polanco have been added to the SC membership roster. Four previous members (retirement or non-attendance) had been removed prior to the meeting.

General Discussion

None

Line Protection operations of interest

None

The meeting was adjourned at 2:40 p.m.

H: RELAYING COMMUNICATIONS SUBCOMMITTEE

Chair: Eric Allen

Vice Chair: Marc Benou

The Subcommittee met on September 16, 2015 with 26 members of 39 total, comprising a quorum. 27 guests were also present. Minutes of the May 2015 meeting were approved without objection.

Deepak Maragal is now a member of the H subcommittee.

The Chair presented several announcements:

- WGs should use the IEEE websites for posting their documents and not their personal email addresses. For non-standard activity, WGs are encouraged to use the IEEE PSRC website by sending documents to webmaintenance@pes-psrc.org to get them added to a WG page. For groups working on standards activities, they may use Central Desktop.
- Volunteers wanted for 17 technical paper reviews. Reviews needed by September 28.
- A full set of PSRC standards available at a discounted price of \$495 through the end of October.
- No breakfast will be provided Thursday morning at the main committee meeting.
- WG chairs are encouraged to take no more than one week to submit their WG minutes to the H vice chair, Marc Benou, and not more than two weeks to the attendees and members.
- WG chairs were warned to check the PAR completion date and avoid extensions as they are becoming difficult to come by, so every attempt should be made to finish their work on time.
- Double sessions are discouraged due to scheduling difficulties.
- Members are reminded to use the standard format for SC H vote mailings (Subject line):

PSRC VOTE REQUIRED SC H [WG HXX] (2014-1) by May 31, 2014.

- IEEE PES Reorganization – formation of Power System Communications and Cybersecurity Committee and transferal of some H working groups to this committee.
- A vote will take place on Thursday at the main committee meeting on both the name and the scope of the PSRC.
- WG chairs were told that it is time to update the PSRC directory. They are required to submit names of members to the vice chair, Marc Benou by the end of September

WG business:

None; see WG reports.

Old business:

None

New business:

H13 requested to be disbanded and the SC voted to approve.

Reports from the WG Chairs

H1: PC37.236 Guide for Power System Protective Relay Applications over Digital Communication Channels

Chair: Marc Benou

Vice Chair: Ilia Voloh

Output: Guide

Established: 2006

Expected completion date: December 2013

Assignment: Develop a summary paper of C37.236.

The H1 working group did not meet.

The goal remains to add a real world case involving problems using audio FSK over digital lines. If progress is not made before the September 2015 PSRC meeting, the working group will ask to be disbanded.

No requirements for the next meeting.

Status: Draft 1

H3: Time Tagging for Intelligent Electronic Devices (COMTAG)

Chair: W. Dickerson

Vice Chair: J. Hackett

Substations C4 Co-Chair: M. Lacroix

Output: Standard

Established: 2006

Expected completion date: December 2016

Assignment: Develop an IEEE Standard for time tagging for power system IEDs. This will include common requirements for time tags, and show how to apply them to various classes of time sequence data. Requirements and methods for stating the resulting time accuracy will be included.

The WG met on Tuesday, with 9 members and 3 guests in attendance, with a quorum. After calling attendance and verifying a quorum, the meeting was called to order by Chair Bill Dickerson.

The patent policy slides were shown, and no issues were identified. Minutes from the preceding meeting in San Antonio were approved – Benton Vandiver moved approval; Chris Huntley seconded; approved unanimously.

Old Business: The working group accepted changes in the current draft, now version 0.6. Craig Preuss moved approval, Eric Allen seconded; approved unanimously.

New Business: Two annexes remain to be added to the standard. The first is an extension of the IRIG-B time code, being moved from C37.118.1 to this standard. This annex also includes new extensions needed for high-reliability applications. We are working in coordination with the IRIG

Range Commanders' Council on these changes. The group indicated their preference to include this annex in its present form, with possible future changes as the liaison with RCC continues. The second annex shows examples of applying time tags to various classes of data, in accordance with COMFEDE. Both will be incorporated into the next draft. Once these changes are made, we will circulate the draft to the working group for an email vote to proceed to sponsor ballot. We expect to ask the subcommittee and main committee for approval to go to ballot in January at the Memphis meeting. Once business was complete, Chris Huntley moved to adjourn. For the next meeting: a single session jointly with SubC4, for 30 attendees and computer projector. The existing slot (4:30 on Tuesday) worked out well with manageable conflicts. For the next meeting: a single session jointly with SubC4, for 30 attendees and computer projector. The existing slot (4:30 on Tuesday) worked out well with manageable conflicts.

H6: IEC 61850 Application Testing

Chair: C. Sufana

Vice Chair: B. Vandiver

Output: Report

Established: 1999

Expected completion date: December 2014

Assignment: Write a report to the H Subcommittee on application testing of IEC-61850 based protection and control systems. Emphasis will be on the GOOSE functions.

No report

H11: C37.118.1 Standard for Synchrophasors for Power Systems

Chair: K. Martin

Vice Chair: A. Goldstein

Output: Standard

Established: 2006

Expected completion date: December 2017

Assignment: Develop a joint IEC/IEEE standard for synchrophasor measurements based on the IEEE Stds. C37.118.1-2011 and C37.118.1a-2014 according to the PAR issued June 2013.

The meeting was initiated and called to order by the chair, Ken Martin. Attendees introduced themselves. The governing body patent and copyright involvement rules were reviewed. There were 9 members and 12 guests present (in total).

The chair summarized the current state:

- The draft standard has been reviewed and some changes proposed at each of the Jan 2014 and 2015 meetings. Several proposed changes were completed and incorporated in Feb. 2015.
- Several recommended proposals have not been submitted and will be not considered further for this standard revision.
- Additional reporting rates were added last year and some minor wording changes were made in the current draft to accommodate them in testing.
- Validation of changing the P-class reference model from 15/cycle to 16/cycle sampling has been completed. The performance changes are extremely small, so the change is acceptable for the standard. (this change simplifies testing for reporting rates $>f_0$). This change requires some small changes in the reference model annex.
- Changes in the ramp test description are needed to reflect the issue that was resolved in May.
- 3 annex proposals have been submitted for consideration: PMUs with digital inputs, extended current range tests, enhanced accuracy tests. These are to be considered at the meeting.
- The list of proposed changes will be complete when the present issues are resolved, marking the start of the approval processes.

The draft development and timing was reviewed. We are still on track to submit the first CD for IEC circulation in February 2016. However we will have to really push things along to make that schedule.

A separate class for sample value input was suggested, but it was previously decided to make an annex that discusses sample value input with the expectation that normative requirements will be specified in the next standard revision.

Extended Current Range Qualification Annex. This annex specifies testing and qualification of a PMU under operation with high current levels so they will provide a useful measurement under conditions like faults. Due to potentially damaging current levels, testing may be limited to very short durations. The WG questioned the usefulness of this and who (users) are asking for it. High currents are typically of very short duration and typically not constant. How useful would such a measurement be? The WG did not reach a consensus on including or rejecting the proposal. H. Kirkham, V. Gharpure, M. LaCroix, and B. Dickerson volunteered to draft a response to the questions that were raised. This response will be due 1 October. (The chair will provide a list of these questions and a few other comments about the proposal. Any others who have reviewed this proposed annex and have comments are requested to send these to the chair by September 24).

Enhanced Accuracy Qualification Annex. This annex specifies testing and qualification of a PMU to higher levels of steady-state accuracy than is required under the present standard. It allows the specification for TVE, magnitude, and phase accuracy separately. This proposal was generally acceptable though there was some objection specifying high accuracy when the underlying sensing (PT, CT, etc.) is really not that good. The WG is requested to review and provide any comments and proposed edits to the chair by October 1.

Digital Input (Sample Value) input for PMUs Annex. This annex proposes performance specifications for testing and qualification of a PMU that has digital rather than analog inputs. In this case an electronic transducer/merging unit changes the analog signal to a digital format so the PMU function is reduced to the algorithm that estimates phasors from digitally represented waveforms. The inaccuracy and noise generated by analog components and A/D conversion is removed from the testing. The annex describes how these factors affect the performance and recommends changes in the present requirements to account for the differences. The WG questioned where the proposed numbers came from. The accuracy of the SV used for testing was also questioned. There were no specific editing suggestions. The draft will be circulated to the WG for comments which will be due by October 1.

Restatement of synchrophasor, frequency & ROCOF definitions. Over the past months 4 proposals (from Allen, Dan, Harold, and Ken) have been made for restatement of the definitions of synchrophasor, frequency, and rate of change of frequency (ROCOF). Three proposals (Allen, Dan, and Ken) are very similar but emphasize different aspects of the derivations. During the Email discussion, there was a consensus to keep the definition introduction in the body of the standard to a minimum and move all examples and discussion to an informative annex. This reduces the possibility of normative inconsistency and misinterpretation that requires amending the standard. The proposals were presented and discussed in the meeting. There was no consensus or clear preference for any of the proposals. Ken proposed to combine his and Dan's proposals since they are the most similar and circulate for comments. All WG participants are invited to express their preference so a decision can be made and the standard draft can progress.

Meeting adjourned 12:25

The WG requests space for 25 attendees and a double session at the next meeting in January 2016

H12: Configuring Ethernet Communications Equipment for Substation Protection and Control Applications

Chair: E.A. Udren

Vice Chair: B. Vandiver

Output: Report

Established: 2008

Expected completion date: December 2014

Assignment: Develop a report to assist protection engineers in configuring Ethernet LANs and networking equipment when the network traffic includes critical protection messaging such as IEC 61850 GOOSE messaging. Topics include switch and router configuration, VLANs, security, priority queuing, traffic monitoring and control, and topology choices and redundancy.

Introductions were completed after a welcome by Chair Eric Udren. There were 7 members and 9 guests present for the Sept 15, 2015 meeting.

The Chair explained how the report is considered finished after he made some final edits and harmonized some of the figures. A few detail updates and one small section are to be addressed, as marked in Draft 0.82 just circulated to members and all recent attendees for last comments preceding a vote. The Chair focused on the new Annex B which gives an example Product Implementation Conformance Statement (PICS) for an Ethernet switch used in an IEC 61850

GOOSE or Sampled Value application. The intent is to guide users purchasing and configuring substation switches carrying protection traffic.

Alex inquired if anything is included from IEC 61850 Part 6 Edition 2 on system configuration which defines object modeling or logical nodes for networking equipment. This modeling has been developed since H12 report structuring and is not there. Alex volunteered to provide a short writeup on this in the time frame of intended report voting and publication.

This report is being coordinated with Substation C8 – IEEE 1615. The next step is to re-circulate the report to the WG for approval.

The attendees discussed an IEC 61850 substation design project at Entergy, leading to an exchange on process bus (sampled value) network architecture choices and trends.

For the next meeting a single session for 30 attendees is requested.

H17: Establishing links between COMTRADE, IEC 61850 and CIM

Chair: C. Brunner

Vice Chair: A. Apostolov

Output: Report

Established: 2010

Expected completion date: December 2013

Assignment: Develop a standards approach to link IEC 61850, CIM and COMTRADE so that the COMTRADE channels can be associated to a node in the power network.

No report

H21: Information Mapping between IEEE C37.118.2 and IEC 61850-90-5 systems

Chair: Yi Hu

Vice Chair: A. Goldstein

Output: Report

Established: September 2012

Expected completion date: December 2016

Assignment: Create an IEEE report documenting the mapping between IEEE C37.118 and IEC 61850-90-5 standards.

No report

H22: PC 37.249 Guide for Categorizing Security Needs for Protection Related Data Files (Joint Working Group Substations Committee C19 & PSRC H22)

Chair: Caitlin Martin

Chair C19: Denis Holstein

Vice Chair: Dylan Jenkins

Output: Guide

Established: September 2012

Expected completion date: January 2019

Assignment: Develop an IEEE Guide on security for data files used for configuration, management, and analysis of protective relaying systems.

The Working Group met on time with 17 members and guests in attendance. Discussions were held on the role of the Group under the new reorganization. The project scope was also reviewed. Consensus was present that the Group should remain with the PSRC as the project scope identifies security needs and does not address communications or cyber security.

Discussions were then focused on the effort needed to complete the draft Guide. The draft Guide is near completion, ten (10) members volunteered to help complete it (each member to address one of the identified categories). Assignments were made accordingly and consensus was present that the work can be fast tracked to completion within the next couple of meetings.

H23: Guide for Naming Intelligent Electronic Devices (COMDEV)

Chair: R. Cornelison

Vice Chair: Eric Allen

Secretary: Amir Makki

Output: Guide

Established: January, 2013

Estimated Completion Date: January, 2017

Assignment: Develop an IEEE Guide for naming Intelligent Electronic Devices (IEDs) based on the report of Working Group 10.

The Working Group met on Wednesday September 16, 2015 with 13 members and 6 guests.

Draft 2.2 was distributed prior to the meeting.

The May 2015 minutes were approved.

Amir Makki led a discussion on line groups and the working group decided to include a section on line groups in the document.

Other discussions included:

- COMDEV could be used to help name list points
- fully identified names lead to a world unique identification
- name needs to be readable by operators and others
- length of device name will not be restricted by the Guide

A room for 20 people is requested for the January meeting.

H24: Investigate Need to Update C37.238 (Joint Working Group Substations Committee C7 & PSRC H24)

Chair: G. Antonova

Chair SubC7: Tim Tibbals

Vice Chair: Bill Dickerson

Output: Standard

Established: January, 2013

Estimated Completion Date: May, 2014

Assignment: Develop a revision of the IEEE Standard C37.238-2011 "IEEE Standard Profile for Use of IEEE 1588 Precision Time Protocol in Power System Applications" based on the list of issues brought forth in close coordination with IEC TC57 WG10 and other technical committees with similar interests. The goal is to bring it to the IEEE Sponsor Ballot by January 2014.

No report

H25: Review of C37.94

Chair: M. Benou

PSCC Co-Chair: Roger Ray

Vice Chair: D. Jenkins

Output: Standard

Established: September 2013

Estimated Completion Date: December 2015

Assignment: Revise IEEE Standard C37.94-2008, *IEEE Standard for N Times 64 Kilobit Per Second Optical Fiber Interfaces Between Teleprotection and Multiplexer Equipment*.

H25 did not meet. The standard is in ballot and will meet in January to review the comments. A quorum was achieved outside of the meeting and the minutes from the May meeting were approved.

Requirements for the next meeting: 1 session, meeting room for 20 people.

H27: Standard File Format for IED Configuration Data (COMSET)

Chair: C. Chelmecki

Vice Chair: Dylan Jenkins

Output: Standard

Established: September 2013

Estimated Completion Date: September 2017

Assignment: Develop a standard XML based file format for exchange of protection and control configuration data between engineering tools and asset management tools. The modeling and naming conventions should be based on the definitions and extension rules defined in IEC 61850.

Introductions were completed after a welcome by Chair Chris Chelmecki. There were 7 members and 3 guests present for the Sept 15, 2015 meeting.

Chris outlined the PAR development which was the first agenda item and then related the scope of the standard to be developed. For the PAR Chris commented on the recent changes, removal of the joint sponsor since the pending merger of the Sub C group would negate this. Then he reviewed the PAR scope and current status for submission of the PAR.

A review of Section 5 began and discussion ensued between Chris, Craig, and Eric on other WG activities that might conflict or support this standard development. The Scope definition was edited by the group as discussed as well as the Need for the Project. Edits were made and agreed. Then sections 6, 7 and 8 were reviewed and confirmed as accurate.

Chris will send the revised PAR request out for vote. Then Chris outlined what he had for topics of inclusion in COMSET and asked for volunteers to begin working on examples. One item was suggested to include in the scope a statement regarding the structure of the COMSET file for ease of use.

Chris asked for any additional activities or comments, with none provided the meeting was adjourned.

For the next meeting a single session for 30 attendees is requested.

H30: IEC 61850 User Feedback

Chair: D. Maragal

Vice Chair:

Output: Recommendation on formation of a Working Group

Established: September, 2014

Estimated Completion Date: September, 2015

Assignment: Collect user feedback from utilities and consultants for designing and implementing IEC-61850 based substation automation system. Prepare a report outlining the experienced issues and suggest enhancements to IEC-61850 standard and manufacturer implementations.

No report

HTF31: Common Protection & Control parameters for COMSET

Chair: D. Maragal

Vice Chair: A. Apostolov

Output: Standard

Established: September, 2014

Estimated Completion Date: September, 2015

No report

H32: Report on Teleprotection over Ethernet

Chair: K. Fodero

Vice Chair: W. McCannon

Output: Recommendation on Formation of a Working Group

Established: September, 2014

Estimated Completion Date: September, 2015

The group met on Tuesday 9/15/2015 with 17 people in attendance. 12 of which are existing or new members.

Scope: The working group will prepare a report on the use of Ethernet transport for teleprotection services and line current differential protection. The report will cover:

Channel Performance requirements / expectations

Considerations and differences for Ethernet vs current TDM transport

Defining the performance requirements for Teleprotection and line current differential protection. To include but not be limited to propagation delay, channel asymmetry, jitter, restoration, equipment initialization times and performance monitoring techniques.

General discussion and explanation of various technologies in use today and the pros / cons of each.

The goal is to create a document that will enable a protection engineer to use with their IT / Telecom counterparts to ensure that protective relay circuits applied over these systems will perform as expected. Additionally provide a document that clearly states the performance requirements for various teleprotection applications for the IT / Telecom departments. This report will discuss the various requirements and explain why they are important to the application. A range of acceptable performance specifications will be documented in the report. A Channel Performance Requirements for the Transport of Protective Relay Communications document will be included as an annex to the report. This document will be used by the protection engineer to communicate and document the technical performance requirements.

This meeting:

Assignment from the last meeting was to research and collect existing relevant reports and standards and share them with the group. Several IEC and Cigre documents were distributed to the WG members prior to this meeting.

Writing tasks have been agreed upon and owners assigned.

The relay vendor members will submit channel performance requirements for their current differential relays. As these devices have the most stringent requirements the group agreed this would be a good starting point for documenting existing channel performance requirements.

Assignments will be collected, compiled and distributed before the next meeting.

Next meeting will require a room for at least 25 and an overhead projector.

H33: Designing / modifying substation automation system utilizing 61850 technology

Chair: Wang

Vice Chair:

Output: Report

Established: May, 2015

Estimated Completion Date:

No report

H34: Development of architectures of protection schemes utilizing IEC-61850:

Chair: K. Martin

Vice Chair:

Output: Report

Established: May, 2015

Estimated Completion Date:

No Report

H35: XML Translation for COMTRADE

Chair: M. Adamiak

Vice Chair:

Output: Report

Established: May, 2015

Estimated Completion Date:

No Report

Liaison Reports

PES Substations Committee

C. Preuss

C0: DATA ACQUISITION, PROCESSING, AND CONTROL SYSTEMS SUBCOMMITTEE

Chair: C. Preuss

Vice Chair: Vacant

Secretary: Vacant

A. WG C3, working on IEEE PC37.1.1, standard requirements for inputs and outputs (such as digital inputs/output and ac/dc analog inputs/outputs), has determined that edition 2 of IEC 61850-3 is no longer just an environmental standard. This means that PC37.1.1's scope overlaps part 3 edition 2, which is not a good because part 3 edition 2 and IEEE 1613 already overlap in scope relating to environmental requirements. C0, WG C3, and WG C2 will all be considering incorporating the WG C3 work into the scope of WG C2, essentially expanding the scope of IEEE 1613 to align with part 3 edition 2. Note that SUBS C0 WG C2 is a joint working group with a working group in the PSRC I subcommittee as well as with the T&D Committee.

B. C0 has been subject to the IEEE PES technical committee reorganization. This work has been well-coordinated with the PES Technical Council, Substations Committee, the PSCC, and the PSRC. C0 will be participating in critical work regarding technical committee names and scopes that will take place through the end of the year.

PES Communications Committee

D. Nordell

No report

IEC TC 57 WG 10, 17, 18, and 19 and related WGs

C. Brunner

No report

I. RELAYING PRACTICES SUBCOMMITTEE

Chair: J. Pond

Vice-Chair: B. Mugalian

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

The I Subcommittee met on September 16, 2015 with 25 members in attendance – a quorum was achieved.

- Minutes of the I Subcommittee meeting held in San Antonio TX in May 2015 were approved
- Coordination & Advisory Committee Meeting Items of Interest:
 - Working Group Chairs should provide their pertinent information to Jeff Pond and Brian Mugalian. Russ Patterson and Rick Gamble will post information for your working group. Email your content to: webmaintenance@pes-psrc.org
 - Future PSRC Meetings
 - January 2016 – JTCM Memphis TN
 - May 2016 – Denver CO
 - September 2016 – Cincinnati OH
 - May 2017 – Puerto Rico being considered
 - PSRC is looking for presentations for the January 2016 meeting
 - PES Technical Committee Restructuring

- Subcommittee scopes will be updated. The I Subcommittee will update their scope to include groups from Substations Committee
- PSRC Website – Working Group pages updated
- Administrative items:
 - Working Group roster updates will be needed for the September 2015 PSRC Directory. After the September meeting, send rosters to Brian Mugalian
 - For working group agendas and minutes, please use the format attached to the meeting agenda
 - IEEE Patent Slides are available on the PSRC web site for presentation at the beginning of each meeting – new version issued March 15, 2015 and located at: <https://development.standards.ieee.org/myproject/Public/mytools/mob/slideset.pdf>
 - Review scope with Working Group members and achieve approval before submitting a PAR to the IEEE-SA
 - Review Policy & Procedures Manual at <http://www.pes-psrc.org/Manuals.html>
 - Working Group Chairs developing or revising IEEE guides need to attend the Standards Coordinator meeting on Tuesday morning
 - Email items to post on the I web pages to Jeff Pond and Brian Mugalian which will be reviewed and forwarded to: webmaintenance@pes-psrc.org

Reports from the WG Chairs

I2: Terminology Review Working Group

Chair: M. Swanson

Vice Chair: F. Friend

Output: Definitions for IEEE Definition Database (formerly IEEE Std. 100)

Assignment: Review drafts of PSRC publications for proper terminology, abbreviations and symbols; and to recommend additions and changes to the IEEE database as appropriate.

The I2 working group, chaired by Mal Swanson, met on Wednesday, May 13, 2015 with 6 members and 2 guests.

Minutes from the May meeting in San Antonio, TX were reviewed and approved and quorum was achieved.

Liaisons have been assigned for all working groups with a PAR to facilitate the development of new terms during the working group process.

Updates were given on the status of each of the standards giving attention that acronyms also have a definition.

Words from approved Standards and Guides with a Section 3 (Definitions) have been incorporated into the IEEE database. An alphabetical listing of the words not in the database, but useful to the PSRC is posted on the web site under “TERMS” link.

All working group chair are reminded the database is available to them for use during their document development. The IEEE staff reviewed the new process for accessing the database. All IEEE members have access to the dictionary database through their MyProject account (click on “Dictionary Database” from the dropdown menu).

Output from a working group in the form of a report does not need review of terms; however, any Standards work with a PAR must be submitted for review and approval from I2.

I4: IEC Advisory Working Group

Chair: E.A. Udren

Vice Chair: M. Yalla

Output: IEC TC 95 USNC standards votes and PSRC status reports

Established: 1990

Expected completion date: Meetings are continuing

Assignment: Develop comments and votes for USNC of IEC on TC 95 (Measuring Relays) Standards projects and drafts. Report to PSRC on IEC Standards development.

The WG met on September 15, 2015 in a lively session with 7 members & 5 guests to review TC 95 standards activities. There are no standards documents requiring review or comments at this time, but the WG reviewed the status of active projects.

Dr. Murty Yalla is now the new Chair of TC 95 (internationally). He updated the attendees on status of MT4 projects, and other issues under discussion:

Murty Yalla gave an update from the maintenance team MT4 meeting held in Chengdu, China on April 20-23:

- IEC 60255-121 – Functional Standard for Distance Relays – Approved standard whose publication slowed by correction of some errors that were detected during Chinese translation. The MT has discussed creating validation models, as is being done for 187-1 – see next.
- IEC 60255-187-1 - Functional requirements for restrained and unrestrained differential protection of motors, generators and transformers – Draft that will include appended dynamic models for normalized test cases is to be issued by January 2016. Models are under development by 2 vendors. PSRC WG K19 led by Gustavo Brunello will coordinate PSRC contribution.
- IEC 60255-187-3 - Functional requirements for biased (percentage) differential relays for transmission lines - a draft outline or early draft is expected by January 2016. PSRC WG D34 led by Normann Fischer will coordinate PSRC contribution.
- IEC 60255-181 Functional requirements for frequency protection – Not yet developed, and there are pressing technical drivers from the DER world. The functionality of frequency relaying must coordinate with DER having ride-through and with microgrid applications. ROCOF requirements and phase shift islanding protection are under discussion. PSRC does not yet have a support WG – the PSRC SC venue must be determined. 60255-127, already published, may need to be revisited due to the same DER and microgrid application needs.
- IEEE PSRC COMSET standard development - a request from IEEE PSRC H27 Standard for Protection and Control Configuration Data Format for joint development is impacted by the H27 decision to split the work into TC57 (modeling) and TC95 (protection modeling) parts. Latter needs a new PSRC WG before IEC TC95 coordination can occur.
- Next meeting is in Biarritz, France from October 27th-30th, 2015.

The Chair presented TC 95 new project announcements for which the USNC seeks participants (contact Eric Udren for details):

- 95/330/DC – Update to IEC 60255-1 Ed. 1: *Measuring relays and protection equipment – Part 1: Common requirements*. Should it include requirements for Smart Grid devices and controls associated with electronic power converters/inverters/conditioners/ controls? Apply this standard to any device which is not a protection relay in these applications. Maybe create compliance classes. Convenor Allan Millard will start up WG soon.
- 95/331/DC – Update to IEC 60255-26 Ed. 3: *Measuring relays and protection equipment – Part 26: Electromagnetic compatibility requirements*. Do we test adequately for influences from Smart Grid devices (electronic power converters/ inverters/conditioners/controls)? Report with action plan expected soon.
- 95/332/DC – Update to IEC 60255-27 Ed. 2: *Measuring relays and protection equipment – Part 27: Product safety requirements*. TC 95 needs to adapt the standard to meet the new requirements of the European Low Voltage Directive covering protection of people and animals from all risks including mechanical, vibration, etc.; and internal production conformity control. Base standard IEC 61010 now includes risk assessments and considers safety aspects not covered by IEC 60255-27 Ed.1. Maybe have classes of conformance. Report with plan to be issued soon.
- 95/329/DC - Review of IEC 60050-447 Ed. 1: International Electrotechnical Vocabulary – Part 447: Measuring relays – MT1 to fix or add terms that appear in standards and were not previously defined. Convenor is Zhao Xi-Chai of China.

The WG turned to discussion of interesting current projects in TC 57. IEC 61850 drafts just seen at IEC web site:

- 80-3 DTR – Specific Communications Services Mapping (SCSM) maps objects to web protocols. Calls for new 61850-8-3 using cyber-secure Extensible Messaging and Presence Protocol (XMPP) that transports XML as alternative to MMS in 61850-8-1 that transports

binary data. Layer 3 GOOSE and Sampled Values are also mapped. The publication includes with companion document on rejected solutions.

- 80-4 – interface to COSEM metering data protocol.
- 90-2 – using 61850 for substation to control center communications.
- 90-8 – models for electric mobility (vehicles)
- 90-12 – WAN engineering guidelines (beyond 90-4 LAN)
- IEC 62351-11 – security for XML files – a complete solution that has been forwarded to PSRC H22 leaders for consideration.

I7: Revision of C37.103 Guide for Differential and Polarizing Circuit Testing

Chair: Gary Kobet

Vice Chair: Alex Lee

Output: IEEE Guide

Established: May 2012

Expected completion date: December 2016

Assignment: Revise and update the IEEE Guide C37.103 – Guide for Differential and Polarizing Circuit Testing

Working Group I7 held its meeting in a single session on Tuesday, Sep 15, 2015. This was the eleventh meeting for this working group.

There were 2 members present and a quorum was not reached. 1 guest attended the meeting. Membership stands at 10 members and 5 corresponding members.

The IEEE patent requirement slides were presented, and attendees were given the opportunity to identify any known patent claims.

May 2015 meeting minutes were reviewed and not enough members present to approve the minutes.

Presented C37.103 2015 Approval Notification.pdf and Publication Schedule for IEEE Std C37.103.pdf to members.

Jay Anderson, Negative Balloter
Robert Beresh, Negative Balloter
Stephen Conrad, Negative Balloter
Rhonda Netzel, Negative Balloter
M Sachdev, Negative Balloter

Negative balloters were not present at this meeting to submit their appeal on this Guide.

I11: PC37.241 – Guide for Application of Optical Current Transformers for Protective Relaying

Chair: Farnoosh Rahmatian

Vice-Chair: Bruce Pickett

Established: 2010

Output: Guide PAR PC37.241

Expected Completion Date: 2016

Assignment: Develop Guide for “Application of Optical Instrument Transformers for Protective Relaying”

The Working Group met on Sept 16, 2015 in a single session. The session was chaired by Bruce Pickett. There were participation from **6 members and 4 guests**. We did not have quorum.

All participants introduced themselves.

The IEEE-SA Patent and Copyright slides were presented – there were no comments from the participants.

The minutes of the January 2015 meeting were put on the computer overhead.

Chair led review of actions from the previous meeting:

Reviewed WG ballot emails sent out 8-28-15 by Farnoosh, received approvals, comment document and then opened the floor for comments.

Draft-5 of the Guide was briefly reviewed with attendees comments from Charlie, Vahid, and Brian.

Discussion on removing or **making inactive members into corresponding members (CM)**

Vahid to send his comments to Farnoosh and discuss it with him.

Roger Hedding became a member.

Actions:

Bruce to send "hybrid x" info in three instances of usage to Claire Patti for IEEE Terms & Dictionary

I12: Quality Assurance for Protection and Control (P&C)

Chair: Andre Uribe

Vice Chair: Mal Swanson

Established: 2011

Expected Completion Date: 2014

Assignment: "To develop a special report outlining the best practices of quality control for protection and control design drawing packages from conception to final "as-built".

The Working Group I-12 did not meet. The output (paper) is on the PSRC web site. A presentation will occur at the January 2016 meeting. The Chair entered a motion to disband the working group, Vice-Chair seconded, motion approved.

I21: Analysis of System Waveforms and Event Data

Chair: Jerry Jodice

Vice Chair: George Moskos

Output: Report

Established: 2012

Expected Completion Date:

Assignment: Prepare a report that will define a process for identifying and analyzing a fault incident. The process will include data collection, analyzing techniques, and methods of reporting.

The report from the working group will be sent out after September meeting for SC review and approval. A motion to disband will be requested at the January 2016 meeting.

I23: Revision of C57.13.1 – Guide for Field Testing of Relaying Current Transformers

Chair: Bruce Magruder

Vice-Chair: Will Knapek

Output: Revision of Guide for Field Testing of Relaying Current Transformers

Established: May 2013

Expected Completion Date: 2018

Assignment: Review of IEEE C57.13.1 to determine whether a revision is needed

Working Group I23, Revision of C57.13.1 - Guide for Field Testing of Relaying Current Transformers, was held in the Pacific Beach Room of the Marriott La Jolla, CA, September 16, 2015 at 8:00 am. 5 members and 2 guests were present and a quorum was not met.

Patent Conflict slides were shown.

1. Minutes from May 2015 meeting will be sent out by email for acceptance.
2. Review of Webex meeting Will Knapek
3. Discussion of addition to Chapter 12 Will Knapek

4. Follow up with Don Sevcik on Modern Test equipment WG Members
5. Added clarification on 16.1 on why we short the windings during testing
6. Bruce will get draft on IEEE Central Desktop, it will be draft 5.

I24: Use of Hall Effect Sensors for Protection and Monitoring Applications

Chair: Jim Niemira

Vice-Chair: Jeff Long

Output: Develop a Report on the Use of Hall Effect Sensors for Protection and Monitoring Applications. The report will discuss the technology and compare with other sensing technologies.

Established: January 2013

Expected Completion Date: September 2014

The Working Group I-24 met on Tuesday, Sept 15th, 2015, at San Diego in single session chaired by Jim Niemira with a total of **13 attendees** (8 members and 5 guests). Quorum was met.

Meeting was brought to order at 3pm. The IEEE patent slides were presented and reviewed.

The minutes from the January and May 2015 meetings were approved.

It was noted that several writing assignments are still missing from Joe Perez, Jeff Long, George Semati and Vessalin Skedsnik. It was voted by the WG to remove the writing assignments for Joe Perez (Electronics) and Vessalin Skedsnik (Limitations) as their assignments are already covered in other sections of the report.

Open Action Items are:

- 1) John Buffington will work with Jim Niemira to tailor the presentation given by Vincent Mosser into practical applications for the protection and control audience.
- 2) Jeff Long to incorporate additional theory information into the report using the presentation from Vincent Mosser as a reference document.
- 3) Jeff Long to include a refresher on Lenz's Law and Ampere's Law when expanding the Theory section of the report.
- 4) Mark Taylor will add DME applications to the report.
- 5) Amir Makki to amend his contribution to reword a few transducer sensitivity ranges.
- 6) Amir Makki to confirm the source of the strength of the induced magnetic field with respect to distance of the sensor to the cable.
- 7) Amir Makki to reach out to Krish Narendra from ERL Phase in order to peer review Amir Makki's technical contribution.
- 8) Jim Niemira agreed to peer review John Buffington's technical contribution.
- 9) When reviewing the document, we (as a group) need to agree on common terms throughout the report. Suggestion to check IEEE and IEC for commonly used terms/definitions.

John Wang was removed from membership of the WG due to not being able to attend PSRC anymore due to career change. He was changed to guest.

George Semati changed from member to a corresponding member of the WG.

Jason Strebe was removed from membership of the WG and changed to guest.

New Action Items:

- 1) Jeff Long to include changes made by John Buffington in his writing contribution.
- 2) Jim Niemira to discuss copyright issues with Erin Spiewak.
- 3) Jeff Long to add section in the report titled Definitions, Acronyms & Abbreviations.
- 4) Jim Niemira to add a Summary Section
- 5) All WG members to review the report before October 15th and provide comments to Jim Niemira and Jeff Long to incorporate into the report.
- 6) Jeff Long to send out a Comment Form to the WG members.

I25: Commissioning of Substation Protection and Control Devices

Chair: Rafael Garcia

Vice Chair: Kevin Donahoe

Output: Report: Provide guidance in the commissioning of power system protection systems

Established: January 2014

Expected Completion Date:

Working Group I-25 met Tuesday day, September 15, 2015, in San Diego, CA with 12 members and 16 guests. There were two teleconferences held between meetings.

Minutes of the May meeting were handed out during the meeting and were briefly discussed. We continue to focus writing assignments to commissioning testing only since there are many aspects of commissioning that although very important are beyond the intent of this report. Some of the current contributions were discussed as were outstanding writing assignments. In order to make greater progress on the document, additional teleconferences between meetings will be held. Next teleconference will be on October 15th.

I26: Review and Expand Transaction Paper on Mathematical Models of Current, Voltage, and Coupling Capacitive Voltage Transformers

Chair: Mike Meisinger

Vice Chair: Alex Lee

Output: Report: Revise Transactions Paper

Established: January 2014

Expected Completion Date: December 2018

Assignment: Recommendation to update or expand Mathematical models of instrument transformers [1] and transducers, including interface electronics such as merging units, for use in both off-line and real time EMTP studies. In addition to improved models for conventional CT's, PT's and CVT's there are now new transducer types such as optical, Hall effect, Rogowski coils.

1. "Mathematical Models for Current, Voltage, and Coupling Capacitor Voltage Transformers." , Working Group C5 of the IEEE PSRC, Chairman D. Tziouvaras, Vice-chairman **P.G. McLaren**, et al., IEEE Transactions on Power Delivery, January 2000, Vol. 15, No. 1, p62.

Working Group I26 held its meeting in a single session on Tuesday, September 15, 2015. This was the sixth meeting for this working group.

There were 8 members present and a quorum was reached. 6 guests attended the meeting. Reviewed Yuan Liao and Jack Wilson's submitted comments.

Working group discussed design CT parameters availability from manufacturer to be used in the Jiles-Asherton CT Modeling.

Action Items:

Peter McLaren will contact RTDs to obtain CT specific parameters used to model CT.

Demetrios Tziouvaras will review CT transaction paper, add comments and verify formulas accuracies.

Ljubomir Kojovic will be researching on Rogowski CT model.

Harold Kirkham's suggested to include Optical Current Transformer in this report as reference and acknowledge existence.

Working group suggested focusing on CT modeling and practical applications.

I27: Investigation of Protective Relay Self-Monitoring Capabilities

Chair: Bob Beresh

Vice Chair: Cathy Dalton

Established: 2014

Output: Report

Assignment: Prepare a technical report to the PSRC main committee on the enumeration, performance and efficacy of self-monitoring capabilities within protective relays in order to determine the extent and degree of self-monitoring.

Expected Completion Date: 2015

Met with 7 members and 9 guests.

Cathy Dalton (Vice Chair) substituted for Roy Moxley (Chair) as facilitator of this meeting. We discussed the background of the working group, transition of committee chair from Bob Beresh to Roy Moxley, and reviewed the scope of the working group.

Relay block diagrams were provided by Ilio Voloh (GE) prior to the meeting. Ilio also shared GE's format and approach to describing relay self-monitoring functionality within its relays. What does NERC think self-monitoring means? Dennis Tierney mentioned that a gentlemen from NERC had been at previous meetings (Phil Tatro, who is no longer with NERC). Cathy checked with Phil Winston regarding NERC PRC language after the meeting and obtained the following information:

"I believe the information that you have requested is included in table 1.1 of PRC-005-x (link included below). Please let me know if any additional information is needed, Phil"

http://www.nerc.com/pa/stand/project%20200717%20protection%20system%20maintenance%20and%20t/prc-005-2_clean.pdf

Need to structure and create a writing assignment for giving the information based on the bullet points below so that users can understand what questions to ask or investigate for different IEDs. For example in the meeting it was mentioned by the relay vendors that not all self monitoring functions were checked at the same intervals (some every scan and other maybe several minutes, etc.) and some of the users in the room were not aware of that fact so the report should bring such information to light.

- What is started during the boot sequence?
- What is monitored thereafter?
- What is the frequency (every scan, every minute?)

It was suggested the report include sections on problems (especially with monitoring) and on things users would like to see in a monitoring system. Also, it was suggested to organize the document around components that should be monitored such as power supply, CPU, memory, A/D converter, etc. and their failure modes of each, consequences of failures, means to monitor, and lessons learned.

A request was made to have the report draft sent out so that it can be reviewed by the members of the working group.

Writing Assignments

Robert Frye: He will write up some information on failures at TVA where trip outputs were asserted as a result of relay failure. To what extent should we monitor without driving MTBF down? He has volunteered to do a write up on TVA testing practices to (e.g. partial testing between required intervals to determine if something is not caught by self-monitoring).

Dennis Tierney: He discussed power supply on edge of operation. Something may pull the power supply voltage down and the relay reboots, so it appears to be operational, but is not (e.g. trip output asserts and drags down power supply voltage below operating voltages). Another situation he discussed is that the screen freezes; the relay appears to be working but it is actually frozen. He went on to mention that some hardware failures cannot be monitored, such as failed, on-board CTs, partial solder bridges, and solder whiskers. (This info needs to be added to the "things that cannot be monitored" section). These situations have caused generator differential trips which create problems that cause the generator to be checked, and cause long outage times due to these mis-operations.

Jean-Philippe (Gentec): He will provide block diagram. He is going to discuss with Hydro Quebec and provide a write up on what Hydro-Quebec gives as a self-monitoring definition.

Joe Xavier (ABB): He will provide block diagram.

*Tony S. and Aaron M. were not at the meeting, we need to ask for an update on their writing assignment.

Nilesh Bilimora gave an example of getting a loss of potential alarm on an assumed A/D failure (needs to be concluded) he will send the example once the analysis is complete.

A new request was made for Relay manufacturers to provide block diagrams (Ilio (GE), Joe (ABB), Ben (Basler), Jose Miguel ZIV(CG Global).

I29: Revision of C37.110 Guide for Application of Current Transformers for Protective Relaying Purposes

Chair: Joseph Valenzuela

Vice Chair: Jeff Long

Output: Revision of the Guide

Established: September 2014

Expected Completion Date: January 2018

The Working Group I-29 met on Tuesday, Sept 15th, 2015, at La Jolla, CA in single session chaired by Joseph Valenzuela with a total of **22 attendees** (7 members, 1 corresponding member and 14 guests). Quorum was met.

Meeting was brought to order at 1:31 pm.

The minutes from the last meeting were reviewed and approved.

It was noted the PAR for I-29 had been reviewed and approved by NESCOM on June 11, 2015.

Iliia Voloh gave short presentation on CT saturation equations and introduced new method for calculating time to saturate.

New Action Items (due by Dec 1, 2015):

- 1) Joseph Valenzuela to add Patent Slides to the next meeting agenda.
- 2) Joseph Valenzuela to contact Erin Spiewak to get the native word document of the standard.
- 3) Jeff Long to contact Erin Spiewak to obtain Central Desktop workspace.
- 4) Jeff Long to post comment log to Central Desktop and notify working group of the hyperlink.
- 5) Working Group Members to review/update the comment log via Central Desktop.
- 6) Joseph Valenzuela to research PAR options for 2017 when the Standard is supposed to lapse.
- 7) Iliia Voloh to provide CT saturation method paper to the Working Group (Joseph Valenzuela to distribute to the WG).
- 8) Joseph Valenzuela to contact George Moskos to locate origin of the Time to Saturate equation.
- 9) Mike Higginson to start a new Annex to the Standard of examples/applications/equations related to CT applications that are useful to engineers utilizing CT's for relay applications.
- 10) Jack Wilson to review C37.109 *Guide* (Joseph – I'm not sure I heard this correctly. Please confirm).
- 11) Will Knapek to provide Working Group with paper to support the table shown in Annex C.
- 12) Claudine Pascal to provide review of Ground Induced Currents verbiage (found in Section 6.5).
- 13) Jim Niemira to review/revise verbiage found in Section 7.2.4.1 (Figure 26 as a reference).
- 14) Jim Niemira to review/revise verbiage found in Section on High Impedance Differential Relays
- 15) Joseph Valenzuela to organize webex meeting to review the remaining open comments in the comment log.

It was noted that Tapan Manna changed companies and no longer attending PSRC meetings. He will be dropped from WG involvement.

Mal Swanson informed the WG that he will represent the I2 Terminology working group, and volunteered to be a new member of this WG.

Jim Niemira asked to join the WG as a new member.

I30: Revision of C37.235 Guide for the Application of Rogowski Coils Used for Protective Relaying Purposes

Chair: Ljubomir Kojovic

Vice Chair: TBD

Output: Revision of the Guide

Established: September 2014

Expected Completion Date: December 2018

Working Group I30 held its meeting in a single session on Tuesday, Sept 15, 2015. This was the fourth meeting for this working group.

There were 13 participants attended the meeting.

Main aspect of the Guide revision is harmonization with the IEC 61869 standards.

Because the Rogowski coil-based solutions are changing paradigm how relay protection can operate, on the request of participants, Chair presented different aspects of relay protection designs and principles of operations.

It was concluded that this Guide may include examples of implemented solutions to help relay engineers better understand this technology.

All participants confirmed that the Rogowski coil-based solutions are an evolving technology with promising opportunities to provide improved power relaying operation.

I31/Subs C2: Environmental and Testing Requirements for Communications Networking Devices; IEEE 1613/1613.1

Chair: John Tengdin

Vice Chair: Brian Mugalian

Output: Revision

Established: September 2014

Expected Completion Date: TBD

I31 met on September 16, 2015 with ten attendees. The group discussed the change in the scope of the Standard and the submission of a new PAR to revise the Standard. A brief review of the document occurred and an updated draft will be prepared in parallel with the submission of a new PAR. Conference calls will be held before the January 2016 meeting.

Task Force reports

ITF32: Review Survey of Relaying Test Practices (2001 report)

Chair: Andre Uribe

Vice Chair: Joe Uchiyama

Output: Review

Established: January 2015

Expected Completion Date:

The Task Force met for the second time on Tuesday, Sep 15, 2015, San Diego in a single session chaired by Andre Uribe with a total of 12 attendees.

Introductions were held followed by a discussion on scope assignment.

1. May meeting minutes were approved
2. Reviewed the content of the original survey to remove what would be insignificant and added what we felt would be appropriate for a 2015 survey. This effort was performed to give the working group for January's meeting a good place to start.

3. The task force recommends that a working group be developed and also recommends that Andre Uribe as chair and Joe Uchiyama as vice chair.
4. The newly formed working group would need a copy of the original survey questionnaire and seeks the wisdom of the sub-committee to locate it prior to January's meeting.
5. Adjourned at 9:20 am

A recommended scope for this working group would be:

To review report prepared by working group I11 in 2001 called "A Survey of Relaying Test Practices" and update the survey accordingly to today's industry environment.

The Task Force will become Working Group I32 in January 2016

ITF33: Review of Relay Testing Terms

Chair: Submitted for approval – Jay Gosalia

Vice Chair: Amir Makki

Output: Report

Established: May 2015

Expected Completion Date: May 2017

The Task Force met on time with 12 members and guests in attendance. Discussions were held on whether or not the Task Force should meet and work to define relay testing terms as a standalone activity (without being part of a standard development activity). After detailed discussions, agreement was reached by unanimous vote that the work should be done by the Task Force and that the output should be a report to the Subcommittee.

Jay Gosalia volunteered to serve as Chair of the Task Force and Amir Makki volunteered to serve as Vice Chair.

Liaison Reports

Instrument Transformer Subcommittee:

The fall meeting of the Instrument Transformer Sub Committee will be in Memphis, TN, 1 – 5, November 2015 at the Peabody Hotel in Memphis TN.

There are three active working groups.

PC57.13 Standard Requirements for Instrument Transformers is being revised – Draft 5.

PC57.13.7 Standard for Instrument Transformer with max output of 250ma is being developed – Draft 2.

PC57.13.8 Standard for Station Service Voltage Transformers is being developed – Draft 1.

Coordination Reports

None

Old Business

None

New Business

1. New Business
 - a. New Task Force Recommendations, WG group training session suggested. Setting up a Powerpoint to be on the web site.
 - b. Working Group Recommendations, put them in writing and we can discuss at the January 2016 Subcommittee meeting.
 - c. Leadership change, Brian Mugalian Chair, Jeff Long Vice-Chair
 - d. Rich Young retiring at end of this year

J: ROTATING MACHINERY PROTECTION SUBCOMMITTEE

Chair: M. Reichard

Vice Chair: D. Finney

Scope: Evaluate and report on protective relaying concepts and practices applicable to generators, motors, synchronous condensers, associated auxiliary systems, and performance of plant protective systems. Develop and maintain related relaying standards.

The J Subcommittee met on Wednesday, Sep 15, 2015 with 16 members (achieving quorum 16/30) and 17 guests. There was a call for the approval of the minutes of the May 2015 meeting. These minutes were approved by the subcommittee members.

Reports from the WG Chairs:

J5: Application of Out-of-Step Protection Schemes for Generators

Chair: Sudhir Thakur

Vice Chair: Manish Das

Output: Report to the Subcommittee

Established: 2011

Expected Completion Date: December 2015

Status: 8th Meeting

Working Group Scope: Produce a summary and full report to the "J" Subcommittee explaining the various schemes and setting guidelines in use for Out-of-Step protection for AC generators. The report should be in the format that could be used as feeder material into the next revision of C37.102-IEEE Guide for AC Generator Protection

The Working Group met for a double session with 17 members and 9 guests present.

The minutes of the San Antonio meeting were approved.

Bulk of the report is complete. WG reviewed and addressed comments received from the completed assignments.

Working Group, in concurrence with WG D29, decided to move the Testing section to CTF29.

Several brief review assignments were made to close the remaining open items. Phil Tatro/Juan Gers will review and revise items in Section V. Stability Studies (by 10/30/2015).

Dale Finney will review and revise Simple Mho Scheme in Appendix A (by 10/30/2015).

Manish Das will add a note or regroup Section IV to identify schemes that are considered legacy (by 10/30/2015).

Pragnesh Shah will review the recently added Equal Area Criterion Method in Appendix A (by 10/30/2015).

Normann Fischer will review the responses to Frequency Deviation of Voltage in Appendix B in Appendix A (by 10/30/2015).

Rama Gokaraju will renumber all Figures and verify References are correctly identified (by 11/30/2015).

In addition, four volunteers (Dale Finney, Everett Fennell, Lifeng Yang, Juan Gers) have signed up to final review the report prior to the January 2016 meeting, which is when the WG expects to start the process to ballot, pending no additional comments.

Draft 8 will be uploaded to J5 section of the J SC website folder.

It is requested that future J5 sessions be scheduled to avoid conflicts with D29 and other J WGs.

A single session with space for 50 people and a computer projector is requested for the January 2016 meeting.

J6: Protection Issues Related to Pumped Storage Generation

Chair: Joe Uchiyama

Vice Chair: Dale Finney

The J6 WG met on Tuesday, September 15, 2015 at 4:30 p.m., in San Diego, CA with seven (7) members and four (4) guests.

Chairman welcomed WG attendees, and the attendees introduced themselves. Following the introduction, chairman explained briefly the status of the document.

As the May J-subcommittee, WG was told that the output of this WG is for a Subcommittee report, and the assignment was completed accordingly.

WG discussed the next steps, attendees brought up many comments as the following:

Dale proposes that we could write a transactions paper that's focused just on microprocessors
Mike Reichard said instead of being a transactions paper it could be a conference paper.

After the discussion of "What is the next step?" WG got the following options:

Option-1 (Acknowledgement) – Since majority of the document is 1975 report, we should change new words (μ -processor relays, digital relays, group settings, no-switching CTs and VTs, etc.)

Option-2 (Main committee report) - Bob P pointed out that it will be easier to make it as a Main committee report and put it in the PSRC web-site.

Option-3 (Conference presentation) – WG brought other option to present to the Regional Conferences. Item-4 (Synch-check Relay) - Wesley Gross questioned including device 25 in this document. We will add the 25 synch-check relay/device to this paper.

The majority of WG members desired to the option-2.

Also, Dale Finney indicated that he would like to see the latest version of this document for any possibility to submit to IEEE for a transaction paper. He would like to whether the existing document could be newer information for Transaction paper or not.

Mike Jensen presented his experiences for the recent PG unit protection rehabilitation. It was valuable information for other utilities. His design was just retrofitted for three (3) units-15kV-390MW-Pony Motor Starting method, duration: 2009-2013. (1) He tried not to use external switching but couldn't do it due to various reasons. (2) However, he provided thermal protection on the starting motor using overcurrent elements. (3) His previous Breaker Failure scheme allowed a reclosing during the pump mode, it was awful experience and corrected after all.

Will English told us that he experienced on the recent PG unit protection rehabilitation. His units were a synchronous start method. His digital relay had a problem which the Differential element was too sensitive CT miss-match during motor start up at low frequency and consequently caused miss-operation. The solution was to de-sensitize the differential element.

Next meeting will be 15 people and one session with a computer projector.

J7 Avoiding Unwanted Reclosing on Rotating Apparatus

Chair: Mike Reichard

Vice Chair: Steve Conrad

Output: Report to the Rotating Machinery Protection Subcommittee of the PSRC

Established: 2011

Ninth Meeting Expected Completion 2015

Status Draft 3.0

Assignment: To review and provide comment on the protection and control vulnerability known as "Aurora" and report to the Subcommittee.

The working group met with 6 members and 10 Guests on September 15, 2015 at the Marriott, La Jolla, CA. Membership of the WG stands at 23.

The meeting minutes from the May meeting were not approved, vice chair will call for email approval. The chair discussed the changes incorporated into Draft 3.0, which included the removal of vendor product names.

Dale Finney discussed his edits to the ROCOF clause of the paper.

The equations for stiffness ration were discussed and edited to show the variations of the calculation.

Recommendations to modify the conclusion to include some discussion on application of microprocessor based synch-check relays and the need to isolated external communications to such.

Draft 4.0 of the paper will be sent to WG members for final review in preparation for submittal to the J-SC. This report to SC is planned to be presented the the ain committee in January 2015.

Next meeting requirements: Single meeting, room for 30, computer projector.

Avoid conflicts with K16 and J7 – Steve is VC of both WG

J12: Improved Generator Ground Fault Protection Schemes

Chair: Dale Finney
Vice Chair: Manish Das
Established: Jan 2013
Output: Report to subcommittee
Status: 7th Meeting

Assignment: To review new methods related to generator ground fault protection

The group met on 9/16/2015 in La Jolla, CA with 13 members and 19 guests in attendance. The minutes from May 2015 meeting was approved.

The Chair presented the agenda and reviewed each section in the report draft R1.0, including the completed assignments received to date.

It was asked whether the report should include other kind of generators such as Diesel Generators into the scope of this report. It was agreed that the Introduction section would be updated to limit the scope to GSU connected high impedance grounded generators.

There was a discussion on the need for hybrid grounded generator in this report. The WG felt that it was not necessary to be included.

A new scheme for detecting turn-to-turn faults that would also detect ground faults was mentioned. Further details on this scheme will be discussed in the next meeting and a WG decision made on whether it should be included in this scope.

The WG agreed to include a section on adaptive third harmonic protection be added.

Assignments were made or reaffirmed to write the different sections of the paper.

The working group will have its 8th meeting in January 2016, with the need for a single session, computer projector and seating for 35 people.

J13 : Modeling of Generator Controls for Coordinating Generator Relays

Chair: Juan Gers
Vice Chair: Phil Tatro

Assignment: Work jointly with the Excitation Systems and Controls Subcommittee (ESCS) of the Energy Development and Power Generation Committee (EDPG) and the Power Systems Dynamic Performance Committee (PSDP) to improve cross discipline understanding. Create guidelines that can be used by planning and protection engineers to perform coordination checks of the timing and sensitivity of protective elements with generator control characteristics and settings while maintaining adequate protection of the generating system equipment. Improve the modeling of the dynamic response of generators and the characteristics of generator excitation control systems to disturbances and stressed system conditions. Improve the modeling of protective relays in power dynamic stability modeling software. Define cases and parameters that may be used for the purpose of ensuring coordination of controls with generator protective relays especially under dynamic conditions. Write a report to the J-Subcommittee summarizing guidelines.

WG Report

The working group met with 14 members and 12 guests present. A quorum was achieved (14 members present, 27 total).

The working group approved the minutes of the May 12, 2015 meeting. The working group reviewed the roster. The vice chair will contact members who have not attended recent meetings to ask if they would prefer to be corresponding members rather than voting members.

Charlie Henville gave liaison report from Excitation Systems and Controls Subcommittee (ESCS) of the Energy Development and Power Generation Committee (EDPG) and the Power Systems Dynamic Performance Committee (PSDP). James Feltes of PSDP states they are interested in our outline. ESCS had no comment but is supportive of our work.

Review of Revision 0 was conducted.

Chapter 1 - Visitor Kurt Sullivan volunteered to contact James Feltes of PSDP to discuss simulation of 78 relay response to OOS conditions.

Chapter 2 Eric Allen volunteers to contribute.

Chapter 3 Deepak Maragal volunteers to contribute.

Chapter 7 Mohammed Zadeh volunteers to contribute.

The layout proposed by Michael Basler for the two chapters he is going to develop, was discussed. It was agreed to keep both layouts provided that the chapters do not get too long. An estimate of 20 pages each at the most was deemed reasonable.

Murty Yalla informed that received a questionnaire from Professor Chul-Hwan Kim from Sungkyunkwan University, of the Republic of Korea. Their work is closely related to the activities of our working group. The questionnaire will be circulated among the group members who were invited to review it and compile any responses to be sent to Professor Chul-Hwan Kim.

Charlie Henville made a summarized presentation on Modeling tripping of the generator and delaying tripping of the excitation system

The requirements for the next meeting are a single session, a meeting room for 40 people, and a computer projector.

J14: Plant Protection Issues Associated with Black Starting of Generators

Chair: Chris Ruckman
V Chair: Zeeky Bukhala
Established: May 2014
Output: Report to Subcommittee
Expected Completion: May 2016
Status: 4th Meeting

The working group held its fourth meeting on Tuesday, September 15th, 2015 with 11 members and 7 guests in attendance

Assignment: Investigate and report to the J Subcommittee on black start generating facilities and protection elements within the plant that could be affected during black start.

Chair kicked off the meeting with introductions and a brief review of the assignment and background of the working group.

There was no meeting held during the May PSRC (San Antonio, TX) meeting. Minutes from the January 2015 (Garden Grove, CA) had been previously circulated and were not reviewed at the meeting.

Assignments from Garden Grove meeting were reviewed

- a. Combustion turbines (Chris Ruckman) – Chris has completed his assignment.
- b. Hydro turbines – Joe Uchiyama volunteered to prepare a short write-up for the hydro turbine applications. Deepak Maragal will provide a write-up on pump-storage hydro facilities.
- c. Other plant issues – Still pending
- d. Protection element write ups
 - i. 27, 59 (Dale Fredrickson) – Assignment has been completed and ready for review.
 - ii. 46 (Derrick Haas) – Derrick did not attend, Chair will follow up with him.
 - iii. 50, 51 (station service), 87SP (Sungsoo Kim) – Will provide his write up by the next meeting.
 - iv. 87 (Dale Finney) – Assignment has been completed and ready for review.
 - v. Inadvertent Energization (Nick Hoch) - Nick did not attend, Chair will follow up with him.
 - vi. Other functions (Chris Ruckman/Zeeky Bukhala) – Chris completed the assignment.
- e. Excitation systems - There was some discussion on the importance of addressing excitation system operation under black start. Chair confirmed that the paper already has a section on the subject. Deepak Maragal suggested including a discussion on Power System Stabilizers.

IV. Next Steps and Assignments

- a. The following assignments were made for reviewing sections of the paper.
 - i. Protection elements
 - 24 – Mike Reichard
 - 27/59 – Dale Finney
 - 40 – Sungsoo Kim/Trevor
 - 47 (Negative sequence voltage) – Dale Finney
 - 78 – Bob Pettigrew
 - 81 – Hasnain Ashrafi
 - 87 – Deepak Maragal
 - ii. Excitation systems – Deepak Maragal / Kurt Sullivan
- b. Discussion
 - i. Zeeky Bukhala asked if the working group has any experience with Steam Turbine black start units. Members were not aware of any.

- ii. Deepak discussed specific pump-storage hydro station stability challenges when the main generator is islanded and providing power to a synchronous motor. This scenario may require modifications to excitation and governor parameters.
- iii. Manish Das asked if there was any discussion on specific breakers used for closing on a dead bus, i.e., low-side breaker, versus, high-side breaker. Chair will review and find a place to include a discussion in the paper.
- iv. Kurt Sullivan suggested adding a discussion on frequency protection

The requirements for the next meeting are a single session, a meeting room for 40 people, and a computer projector.

J15: Investigation of the Criteria for the Transfer of Motor Buses

Chair: Wayne Hartmann

Vice Chair: Joseph Valenzuela

Established: 2015 (1/15)

Output: Report

Status: 3rd Meeting

Assignment:

1. Review, compare and contrast NEMA MG-1 with ANSI C50.41 regarding transfer criteria.
2. Examine published reports and papers on motor bus transfer criteria to compare the conclusions with NEMA MG-1 with ANSI C50.41 regarding fast transfer criteria.
3. Investigate existing open-transition motor bus transfer (MBT) actual data from multiple events at the medium voltage level. Examine for current and torque ratio versus Volts/Hz at transfer periods to see if there is a correlation.
4. Examine published reports, papers, C50.41 and NEMA MG-1 on motor fast bus transfer criteria to reconcile the conclusions with the field-measured results.
5. Study existing motor protection oscillography voltage and current to identify which motors are generating and which are motoring. Examine v/Hz of composite bus and individual motors, and individual motor reacceleration current versus total bus reacceleration current (if available).
6. Produce a Report to Subcommittee with findings of the above

Activity:

1. The WG met September 15, 2015 with 13 members and 15 guests.
2. Chair alerted WG that we will use an IEEE PSRC web location for parking documents. Chair will send link and password WG members and guests to date.
3. The WG reviewed assignments of key industry motor bus transfer papers with regard to C50.41, NEMA MG-1 and field results presented to the WG.

Assignments:

1. Chair to distribute oscillographic triggering suggestions to the WG for review and comment.
2. Chris Ruckman will compare C50.41 to NEMA MG-1 regarding transfer criteria of 1.33 V/Hz and prescriptive fast transfer time limitations.
3. Tom Beckwith to provide Chris Ruckman reference for his use in the review of C50.41 to NEMA MG-1.
4. Paper Reviews: Reviewers are to examine for comparing and contrasting recommendations for v/Hz, transfer time limits, maximum current limits and other limits, including mentions of torque ratio (or lack thereof).
 - a. Mital Kanabar volunteered to review Higgins paper, Induction Motor Models for Bus Transfer, 1990
 - b. Tom Beckwith and Murty Yalla to review IEEE Std. 666 clauses 4.6 and 11.10.3 regarding transfer criteria.
5. Chair to contact Dennis Tierney about monitoring one of his powerplants for the WG's analysis synchronous transfers
 - Assignments 1-7 are to be reported to the Chair by December 15, 2015, for exploration at the January 2016 Meeting.

Next Meeting:

- Single session; projector, 30 people

New Business:

Added 5 new J SC members: Phil Tatro, Gene Henneberg, Hasnain Ashrafi, Pregnesh Shah, Mukesh Nagpal, and Norman Fisher

New Task Force:

JTF1-Penetration of renewable energy resources and their impact on synchronous generator protection. Normal Fisher Chair

JTF2 – Accessing generator voltage protection in order to comply with NERC Standard PRC-024-1 Manish Das Chair

K: SUBSTATION PROTECTION SUBCOMMITTEE

Chair: M. J. Thompson
Vice Chair: D. G Lukach

The K-Subcommittee met on September 16 in LaJolla, CA, with 24 of 31 members and 54 guests in attendance. A quorum was achieved. Roger Hedding motioned to approve the May, 2015 subcommittee meeting minutes. Charlie Henville seconded. Vote was unanimous to approve.

Jerry Johnson and John Wang have resigned from the subcommittee due to changes in employment. They were thanked for their service.

Reports from the WG Chairs

K1: PC 37.245 GUIDE FOR THE APPLICATION OF PROTECTIVE RELAYING FOR PHASE SHIFTING TRANSFORMERS.

Chair: Lubomir Sevov

Vice Chair: Brandon Davies

Established: Jan. 2012

Output: PC37.245 Guide for the Application of Protective Relaying for Phase Shifting Transformers Draft 5.3a

Expected Completion Date: Dec.2016

Assignment: To write a guide for the application of Protective Relaying for Phase Shifting Transformers (PSTs). The protection methods for different types of PST and operating conditions of PSTs will be reviewed. Representation of PST models to determine short circuit currents for relaying considerations will be considered. Protection CT sizing and location issues will be considered. Relay application and setting examples will be provided.

The K1 working group met in a single session. Nine members and four guests were present. After the introduction, a call for quorum was made, but quorum was not achieved. A ballot for approval of the minutes from the May 2015 meeting will be conducted by email.

The IEEE Patent disclosure slides were presented. One letter of assurance has previously been received from a patent holder. This letter has been transmitted to IEEE.

Current draft of the document is 5.2a, The draft for the next meeting will be 5.3a (clean draft).

The group discussed whether there was any need to add specific information discussing the PST tap changer, and sudden pressure relay especially with respect to any special precautions. It was agreed that a special section is not required.

Authors are requested to provide contributions for the following assignments by 30th October 2015.

- Randy Crellin will add text to Section 12.1.3 Thermal Overload Protection regarding application of hot spot temperature. With help from Paul Elkin and Abu Bapary, he will also write paragraphs on the application of sudden pressure relays and Buchholz protection. Paul Elkins and Abu Bapary will

investigate the application of sudden pressure and Buchholz relays on PSTs. It was noted that the dependence on sudden pressure in PSTs might be different than the one applied in conventional transformers.

- Charlie Henville and Mike Thompson will add information on PST control to automatically reduce loading when the load through the PST is excessive.
- Charlie Henville will modify Section 5 to explicitly state that when the load side of the PST leads the source side, the PST is in the advance position and the phase shift across the transformer is positive. Charlie will work with Zoran Gajic and Eli to consolidate the Short Circuit study, and bring to a common format.
- Mike Thompson agreed to draft a small section (7) regarding PST inrush current as it might affect the overcurrent protection and not affect the 87S functions.
- Demetrious Tziouvaras agreed to send his contribution regarding distance protection by the new deadline
- Steve Conrad approached the chair before the meeting volunteering to work on all diagrams and graph from the guide and bring them to a common format.

A vote for approving the meeting minutes of the K1 WG meeting from May 15th, 2015 in San Antonio was conducted by the K1 WG chair by e-mail, and the minutes were approved with 12- out of 16 members.

K5: (PC 37.119.2005): IEEE Guide for Breaker Failure Protection of Power Circuit Breakers

Chairman: Roger Whittaker

Vice Chair: Adi Mulawarman

Established: 2011

Output: Revised C37.119-2005 – IEEE Guide for Breaker Failure Protection of Power Circuit Breakers

Draft : 2

Expected Completion Date: Dec. 2016

Assignment: To revise and update C37.119-2005 – IEEE Guide for Breaker Failure Protection of Power Circuit Breakers.

1. Introductions/ Sign up sheet/Patent slides/ Quorum?

2. Approve San Antonio minutes

Voting Member attended : 15 (out of 26 registered) Quorum met : Yes (need 13)

Motion : Brian Boysen

Second : Rich Young

6 non-voting member attended

Total attendees : 37

4. SA Ballot, Draft 2 (MER result) (legalese: shall, should, prevent, ensure)

5. Comment resolution methodology: per section volunteers? Web meetings?

6. Breaker failure events?Adjourn

Introductions and affiliations were presented, patent slides shown, sign-up sheet circulated, and the above mentioned quorum and votes were tallied.

Roger then described that the guide has passed SA editorial review, the ballot group has been formed, and it is currently in the ballot process which will close Oct 10th 2015.

Roger described that words such as must and should and shall were reworded due to SA editorial process. Some words referring to absolut-ism like prevent, maximize, minimize, etc. also got reworded, however several instances of these words were left as-is because it was felt that these words were the best possible way to describe the schemes and no alternative was conceived of.

There will be final SA editorial after the guide is submitted to RevCom. 115 people signed up for ballot. Ten percent of balloters have voted thus far.

The question is being asked on how we want to process the comments, keeping in mind that we have just 1 more year left (3 more meetings). Roger suggested more online meetings to cover the comments.

Whichever method we use will depend upon how many comments we receive.

Mike T. likes/prefers to have someone/a few people go over the comments first and keep track of the resolution and let the members just review the comment resolution whether they agree or do not agree to it. If anything needs to be discussed at the WG meeting, we can go ahead and bring it up there. A couple

attendees liked this idea also. Bruce suggested downloading whatever comments we received so far so we can be ahead in our schedule.

K10: SCC21 DISTRIBUTED RESOURCES STANDARD COORDINATION

Chair: Ben Kazimier

Vice Chair: TBA

Established, 1999

Output: Standard through the SCC 21

Expected Completion Date: 20xx

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

Working group K10 met on Tuesday September 15, 2015 in La Jolla, CA with 8 members and 6 guests in attendance.

Keith Houser of Dominion shared with the group an NREL report which discusses inverter based DER and the effect on neutral shift upon the loss of the utility source. The document is available at:

<http://www.nrel.gov/docs/fy15osti/64173.pdf> . This sparked a lively discussion on TOV and effective grounding within the group. The working group chair will advise the group of any discussions surrounding this document that might take place at the next meeting since it pertains to protection.

Working group attendees from utility companies shared information on interconnection requests and protection requirements including TELCO, DTT, and alternatives such as –proprietary new grid edge networks communication which operates on the line and removes common mode, line and wireless/radio (spread spectrum), IEC61850.

Mark Siira, though he was not in attendance at the meeting because of a conflict, provided the group with a PowerPoint detailing the current state of the 1547 family of documents, this presentation was reviewed by the group. A request was made by the attendees to receive a copy of the PowerPoint and the chair has requested permission from Mr. Siira prior to sending it to the attendees.

All minutes for working group meetings are posted on the SCC21 web site under “logistics” for the particular document. All revisions to P1547 must be completed by 2018. If you are interested in participating in the revision of P1547, please check the SCC21 web site for meeting information. The next meeting will be at the in Tempe, AZ hosted by the Salt River Project Pera Club Oct 27th – 29th, 2015.

K11: Open Phase Detection for Nuclear Generating Stations

Chair: Charlie Sufana

Vice Chair: M. Urbina

Output: Report

Draft 2.0

Assignment: Write a report to the K Subcommittee entitled Methods for Analyzing and Detecting an Open Phase Condition of a Power Circuit to a Nuclear Plant Station Service or Startup Transformer.

Introductions were done after a welcome by Chairman Charlie Sufana. There were 9 members and 11 guests in attendance for the September 15, 2015 meeting.

The minutes from the May 13, 2015 K11 meeting were read and approved.

Mike Urbina had nothing new to report from the NEI.

Wayne Johnson provided an update on NEI and the NRC. The NRC did issue the final branch technical position.

Charlie then quickly reviewed updates to the report (now draft 3.0) that have been added since the last meeting. He indicated that there are now hyperlinks for the sections, tables, and figures.

Alex Apostolov gave a CIGRE report on B5.53. They will be meeting at Georgia Tech from October 26 to 28, 2015. He indicated that there a lot of effort being put forward by RTE in France involving remote testing. Sampled value files will be used to perform the remote testing. Alex also mentioned that a proposal will be coming forward to have logical nodes for the input and output ports.

There was a pretty lively discussion on the present content in the report.

Discussion of comments on the report from Wayne Johnson, primarily on section 4.11 by Dale Finney.

Charlie indicated that had talked with Dale about rewriting the sentence regarding wye-delta transformers

and active current injection (Dale was not present for the meeting) to clarify that this was for a very specific type of active current inject scheme.

It was also decided that the title for 4.11 be changed to "Feasibility of Anti-Islanding Technology".

Ahmed Abd-Elkador from SEL submitted a new section. Charlie suggested compressing the section to a 1 page summary, and then putting the rest of it in an appendix. Mike Thompson and Ahmed agreed.

Tentatively, the section will be added as section 4.12.

Charlie suggested forming an editorial committee. It was later decided that everyone should review the present draft and provide suggestions by October 1.

Suggestions for changes include:

1. Figures need to be reviewed for clarity.
 2. Figure 26 was not clear. Remove it?
 3. Matlab plot was also not clear (Figures 19 and 21).
 4. A number of items in section 4 appear to belong in a different section (CTs for example).
 5. It was suggested that there are too many sections with detection schemes that don't work.
 6. There was a lot of discussion on how to reorganize section 4.
 7. Don Lukach is looking for the document to be more usable for a plant operator looking for a solution. Don also indicated that the document does not match the latest style guide.
 8. Wayne suggested moving table 5 to the front of the document.
 9. It was suggested that the section on symmetrical components should be moved to an appendix.
- Suggestions for reordering the clauses and other changes are to be returned to the chair by October 1, 2015. This will include the new section 4.12 from SEL.

Charlie suggested finishing this at the January 2016 meeting and publishing the initial version on web by the May meeting.

K12: P1032 Guide for Protecting Transmission Static Var Compensators.

Chair: John Wang

Vice Chair: Martin Best

Established: May 2013

Output: Guide for Protecting Transmission Static Var Compensators

Expected Completion Date: December 2016

Draft 10

Assignment: To work jointly with Substations WG I9 to write a guide for protecting transmission static var compensators. PSRC WG K12 will provide guidance and review on topics that are already covered in other IEEE guides to prevent overlap and identify areas where interpretation of existing guides is necessary to meet the specific application challenges unique to transmissions static var compensators.

Workgroup K12 met at 11:00 am September 15, 2015 at the San Diego Marriott La Jolla with 2 members and 5 guests. Two of the guest attendees, Paul Elkin and Mike Stajak later joined the group as members. Vice chair, Martin Best, lead the meeting. Martin announced that Satish Samineni will become the new chair of K12 because John Wang, who changed jobs, is stepping down as Chair. John will remain as a corresponding member.

The San Antonio meeting minutes were displayed, and these will be approved by Email ballot. Patent slides were shown and patent issues solicited. Draft 10 of the guide has been received back from workgroup I9 which included I9 comments to definitions and to the CT saturation description in Section 6.1.1.1. Martin will attempt to resolve I9's CT comments.

The workgroup reviewed document Section 7.2 on HV (High Voltage) Bus Protection, Section 7.3 on Transformer Protection, and Section 7.4 on MV (Medium Voltage) Bus Protection. Several bullets describing methods and zones of protection for the HV bus, the step down transformer, and the middle voltage bus up to the TCR (Thyristor Controlled Reactor) and TSC (Thyristor Switched Capacitor) equipment were reviewed. Several possible CT locations were described and overlapping protection of possibly redundant bus protection, both high impedance and low impedance bus protection, percentage differential, phase overcurrent protection, ground fault protection and under and over voltage protection were discussed. It was verified that basic protection standards of PSRC such as the bus protection guide and the transformer protection guide would be referenced with emphasis on the differences and or peculiarities of having the protection applied to SVC equipment. Harmonics present with SVC were discussed and how the presence of these might affect settings.

It was mentioned while discussing the overlapping protection that if single phase transformers are used, then it is possible that the CT location might be inside the low-side delta connection, and this might create setting concerns. Paul Elkin agreed to add a few statements to explain how to mitigate this situation.

Lockout relay and automatic isolation using motor-disconnects of the SVC were described. Whether or not to include the step down transformer with the HV bus protection zone was discussed. If done, it was mentioned that a transformer protection relay with harmonic restraint should be used.

There was also some discussion on the application of zero-sequence over voltage protection for phase to ground faults on the MV Bus, as the MV Bus and the SVC equipment connected to it can be designed to operate ungrounded or grounded through a high impedance grounding transformer.

At the next meeting the workgroup begin review of section 7.5, which is a description of TCR protection provided by the I9 workgroup.

In January 2016, K12 will meet jointly with Substation I9, and this is usually an all-day session.

K13 PC37.116 IEEE Guide for Protective Relay Application to Transmission-Line Series Capacitor Banks

Chair: Ilia Voloh

Vice Chair: Joshua Park

Assignment: Revise IEEE C37.116 “Guide for Protective Relay Application to Transmission-Line Series Capacitor Banks”.

Draft 1.5

1. WG met on Tuesday, September May 15th, 2015 with 4 members and 5 guests.

2. WG Vice-Chair Joshua Park was not able to attend this meeting.

3. IEEE Patent slides were introduced.

4. There was no quorum to approve January 2015 Meeting Minutes. Therefore, Meeting Minutes approval will be done by chair via emails.

5. Review of Prior Assignments:

- o Group reviewed Mohammad’s significant revision of the Annex A about SSR. This section used and referred to the Goldworthy and corrected equations in the previous revision. Mohammad will improve some figures.

- o Sakis, Deepak and Luis agreed to review this section.

- o Alex Wang agreed to provide real life waveforms of SSR to replace existing low quality figure.

- o Satish Samineni informed just before the meeting that he was not able to complete review of section 5.3 and he’ll do it for the next meeting.

- o Group reviewed Galina’s proposal for section 5.1 to copy bank protection functions description into 116 guide. Don commented that it’s better to make a reference to 824 rather than copying.

- o Luis proposed to elaborate on the section about impact of the SCB to the line protection-group agreed with this proposal.

6. New Assignments

- o Satish Samineni to complete review of section 5.3 Capacitor Protection.

- o Galina Antonova will take another look at section 5.1 Protection and Control Philosophy.

- o Add new section on capacitor bank modeling and lab testing. Joshua Park will write this based on his experiences with RTDS testing on series compensated line protection.

- o SSR section Annex A to be improved and reviewed as stated above.

- o Luis to provide write-up on impact of the SCB to the line protection (21, 87, 67 etc). Will write this section with a possibility that similar section from 113 guide will be removed and 116 will be the reference for SCB.

7. Current draft is 1.5.

K15: Centralized Substation Protection and Control

Chair: Ratan Das

Vice-Chair: Mital Kanabar

Assignment: Write a PSRC report describing and analyzing existing and emerging technologies for centralized protection and control within a substation

Draft 5.0

The working group met on Sep 16, 2015 with 24 participants (8 members and 16 guests).

Minutes of the May meeting approved by email stands final without any correction.

WG discussed editorial comments received on the final draft report and decided to incorporate them in the final report and forward the final report to subcommittee for approval by Sep 27, 2015.

WG discussed comments received from members on responses to reviewers' comments for the paper submitted for the IEEE PWRD Special publication and agreed on revised responses which will be submitted to IEEE PWRD by Sep 27, 2015.

WG also discussed submission of an abstract for 2016 Georgia Tech Protective Relaying Conference and the same (except IEEE PES GM which will be same as PWRD paper) abstract/paper for other future conferences based on the working group report. Some members volunteered to present the paper at the following conferences, if accepted:

2016 Georgia Tech: Mital Kanabar and A.P. (Sakis) Meliopoulos
2016 PAC World (International): Paul Myrda and Alex Apostolov
2016 IEEE PES GM: Ratan Das and Mital Kanabar
2016 PAC World (Americas): Rich Hunt and Alex Apostolov
2016 WPRC: Vahid Madani and Mohammad DadashZadeh
2016 CIGRE Grid of the Future: Qun Qiu and Rich Hunt
2017 DistribuTECH: Mital Kanabar and Rich Hunt
2017 Texas A&M: Mohammad DadashZadeh and TBD

K16 PC37.91 Revision of IEEE Guide for Protecting Power Transformers

Chair: Will English

Vice Chair: Steve Conrad

Output: Revised IEEE C37.91 Standard -Guide for Protecting Power Transformers

Established: May 2014

PAR Expires: December 2018

Draft: 3

Assignment: To revise and update C37.91, IEEE Guide for Protecting Power Transformers to correct errors and address additional protection related topics.

The working group met with 27 members and 17 Guests on 16 Sept., 2015, at the Marriott, La Jolla, California. Elmo Price and Gerald Johnson have retired and will be removed from the WG. Guillermo Weyer has joined the WG as a member and Adi Mulawarman as a corresponding member. Membership in the WG stands at 38.

The chair displayed and reviewed the required patent information slides related to PAR activity of the WG, and provided opportunity for participants to identify patent claims. The assignment of the WG was also reviewed / discussed. As a requirement of standards development work all participants are required to indicate both their Company and Affiliation on the attendance sheet. The attendance sheet was circulated to collect the required information of each participant.

The chairman led discussions on submitted assignments. Discussion focused on submitted revisions/comment incorporated in Draft 3.

Clause 10 – 10.1.4 Question was raised as to whether the equations remain under scrutiny as indicated in the clause. Pat Carroll may be able to clarify and report to the WG.

Discussion about keeping the specific date of C37.102-**2006** to the cited clause resulted in maintaining the specificity if the data is pertinent, otherwise cite the standard number.

Clause 13 Gas analysis table should be referenced since the material is from another standard (C57.104) and will be removed Motion passed. Pat Carroll volunteered to revise Clause 13.

Clause 14 – Overall Generator Clauses 14.1 / 14.2 discussed the need for such a scheme to remain in the documents, since the modern μ P relays filter out harmonics and may be prone to mis-operate. The scheme is designed for older E-M relays schemes. Thompson moved to remove second, motion carried. The revision of clause 14 will be edited by Mark Schroeder.

Clause 15 Other Considerations- GIC discussion is ongoing work the clause will be edited to include referenced K17 report.

Annex D Thermal Overloads minor edit

Annex B Verify ability to reference CSA document. Guillermo Weyer volunteered to provide a literature search for similar IEEE document references.

SPR tripping scheme via μP relaying. Mike Thompson led discussion on modified scheme use. Alla Deronja, Adi Mulawarman, Chris Walker and Jeff Barsch to review the concepts and provide write up for discussion.

All writing assignments are due to chair/vice chair by October 20, 2015

The chair will upload Draft 3 to K16 Central Desktop.

Avoid WG conflicts with J7

K17 Geomagnetic Disturbances (GMD)

Chair: Qun Qiu

Vice-Chair: Luis Polanco

Assignment: To submit a WG report to the PSRC K Substation Subcommittee evaluating the performance of protection systems during Geomagnetic Disturbances

Draft: 0

- 1.K17 met on Tuesday September 15th with 17 participants (11 guests and 6 signed members).
 - 2.Chair presented the agenda for the meeting of the K17 WG to all participants.
 - 3.Meeting minutes of the K17 last meeting from May 2015 in San Antonio, TX, was previously approved via email.
 - 4.Chair led the discussion on the review of 1996 IEEE Transaction Paper “The Effects of GIC on Protective Relaying”. It was recommended that the K17 WG report provide a summary of research and operating experience related to the effects of GIC on protective relaying since 1995, including historical observations on relay misoperations if available
 - 5.The WG report outline was discussed. One input is that this report should focus on the GMD impacts on protection and control with only a high level overview on transformer configurations that are susceptible to GIC
 - 6.It was suggested that the report should also look into potential GIC impacts on the protection of other device such as shunt reactors and surge arresters. One guest volunteered to provide a review on relay trip circuit.
 - 7.Chair will continue promoting open discussions to define a report outline with more inputs and involvement from members/future members and guests.
 - 8.For next meeting chair requests a single-session and a meeting room for 30 persons, with AV capabilities.
- The WG report draft # is 0.

K18 PC37.108, Guide for Protection of Network Transformers

Chair: Adi Mulawarman

Vice Chair: Surarat Pavavicharn

Established: May 2014

Assignment: To revise and update C37.108-2002 – IEEE Guide for the Protection of Network Transformers.

Draft: 0

1. Introductions/ Sign up sheet/Patent slides/ 50% Quorum?
16 attendees
9 out of 14 members attended 3 new members added
2. Approve San Antonio meeting minutes
Don Lukach – motioned Ed Bertolini - seconded
3. Brief on PAR process/submittal/schedule
Don Lukach – motioned to accept the written PAR Kevin Donahoe – second
9 votes to submit the PAR as it’s written
4. Work on Scope and Purpose wording (reference PAR preparation blank form; probably go over the complete form of this in September meeting, plan to just discuss scope and purpose on this).
5. Presentations if any if not we will have open discussions from folks that have reviewed the guide or related guide.

The standard we will be working from was approved March 21st 2002, went through reaffirmation December 5th 2007 and was approved. We received some reaffirmation comment at the time.
Existing scope/purpose.

Unlike newer standards/guides the existing overview section does not have a subsection called out separately as scope and purpose. The scope/purpose seems to be the 4th paragraph in the Overview section as shown below.

This guide is intended to aid those engineers who have reevaluated problems associated with faults within network vaults, particularly for those network vaults located within or near high-rise buildings. It will also identify currently available devices that are being used in network transformer protection schemes. These devices should act to sense the fault and initiate fault interruption locally or remotely, thereby minimizing damage and restoration time. These devices will be described as to their fault detecting capabilities.

Proposed scope See PAR form

Proposed purpose (per IEEE SA, this is encourage but not mandatory) See PAR form

6. Adjourn

Ed Bertolini suggested that Vic Mohl, the head of ETI, is reviewing C37.108 and that we get in contact with him to see if he has any comments/inputs.

K19 Advisory to IEC 60255 -187-1 Functional requirement for restrained and unrestrained differential protection of motors, generators and transformers.

Chair: Gustavo Brunello

Vice Chair: Abu Bapary

Established: May 2015

Assignment: To provide an advisory function to the IEC working group

The Working Group met for the first time yesterday, Tuesday, Sept 16. Five people signed as members and 2 as guests.

The chair made a brief presentation of Std IEC 60255-187-1 and its status. Then, a quick overview of the present draft was made.

Murty Yalla explained that in a few weeks a new draft of the Standard will be ready which we will circulate between those who attended the meeting for their comments.

The WG agreed on the assignment: Review IEC60255-187-1 Draft and provide comments to the IEC TC95 through the IEC US National Committee

Liaison Reports:

No reports were given for T&D, Capacitor Subcommittee or IAS Arc Flash.

A report from the Transformer Committee was given by Fred Friend and included discussion about two standards discussed in *New Business*.

Old Business:

No Old Business was discussed.

New Business:

The Transformer PCS (Performance Characteristics Subcommittee), requested the PSRC to review and provide comments to C57.21, IEEE Standard Requirements, Terminology, and Test Code for Shunt Reactors Rated Over 500 kVA. The Transformer PWR (Power Transformers Subcommittee), requested the PSRC to review and provide comments to C57.109, IEEE Guide for Transformer Through-Fault-Current Duration. KTF20, chaired by Jim Niemira, was formed to perform a review of both standards. The reorganization of the PSRC led to discussion about possible scope changes for K subcommittee. After some discussion Rich Young motioned to keep the K subcommittee scope as-is. Pat Carrol seconded, and the vote was unanimous.

General Discussion:

No general discussion. Motion to adjourn made by Roger Hedding and seconded by Rich Young. Motion passed unanimous.

VIII. Presentations: There were two presentations.

WG I22 – End of Life Assessment of P&C Devices – Bruce Mackie

How to write an effective Fellow nomination – Charlie Henville

IX. Adjourn: Meeting was adjourned by the chair at 11:30 AM.