



**IEEE**

## Task Force on Revising Std 519

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**Co-Chair (IAS)**

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### Minutes of Meeting, 1999 IEEE I&CPS Meeting

Sparks, NV  
May 2, 1999

Mark Halpin led this inaugural meeting of the Task Force on Revising Std 519. Four were in attendance, including the co-chair and secretary. The low attendance is attributed to the program announcing the meeting as "319 Revision". With the meeting being held on Sunday evening, there was no time to get the word out.

Mark discussed the structure of the committee and proposed content changes to Std 519. He used the slides beginning on page 2 of these minutes to facilitate the discussion.

Points of emphasis included:

- Functioning as a single group offering participation by attending meetings and/or email in lieu of the concept of two separate committees.
- Std 519 will remain a Recommended Practice.
- Measurement requirements will be removed from 519 assuming 1159.1 Task Force preparing a "Guide for Recorder and Data Acquisition Requirements..." will address measurement of harmonics. [See related *Email 1*, page 7]
- Meetings will initially include presentations by volunteers who wish to present perceived deficiencies in Std 519. (Those desiring to present should notify Mark Halpin before the meeting and prepare a couple of slides to illustrate and support the argument.)

Several sections of proposed new content and the persons leading these efforts include:

- 1) Probabilistic Aspects of Harmonics – Yahia Baghzouz or Paulo Ribero (existing PES Task Force chaired by Yahia)
- 2) Interharmonics – Erich Gunther (existing PES Task Force chaired by Erich)
- 3) Even-order harmonics – Alex Emanuel



## 519 Revision Effort

- IAS co-Chair: Allan Ludbrook
  - a.ludbrook@ieee.org
- PES co-Chair: Mark Halpin
  - halpin@ece.msstate.edu
- Secretary: Blane Leuschner
  - leuschnb@squared.com

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1

## Sponsorship

- Joint PAR
  - IAS Industrial Power Converter Committee
  - PES Transmission & Distribution Committee
- Co-Chairmen
  - Allan Ludbrook, IAS (ludbrook@netaccess.on.ca)
  - Mark Halpin, PES (halpin@ece.msstate.edu)
  - [www.nas.net/~ludbrook/ieee519.html](http://www.nas.net/~ludbrook/ieee519.html)
  - P519WG (username) Y2000 (psswd)

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2



## Ways to Participate

- “Virtual” Committee
  - chaired by Allan Ludbrook
- “Physical” Committee
  - chaired by Mark Halpin
    - PES summer and winter meetings (New York, Edmonton, ...)
    - IAS annual meeting (Phoenix, ...)
    - I&CPS annual meeting (Sparks, ...)

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3

## General Information

- The revision will be a Recommended Practice
- The revision will concentrate on “limit issues” and leave “application issues” to 519A
- The completion date is May 2002
- Final version balloted by IAS and PES

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4



## Scope: Definitions

- Definitions
  - Analytical
    - theoretical expressions and formulas
  - Signal Processing
    - measurement & instrument considerations
  - Letter Symbols

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5

## Scope: Limits

- Establish current harmonic limits including:
  - Current drawn by the user as a whole
  - Recommendations of how the limits might be applied to individual internal points on the user's system
- Establish voltage harmonic limits at user and utility busses

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6



## Scope: Specific Issues

- Specific consideration will be given to:
  - Short duration harmonics (PES TF)
  - Background harmonics
  - Interharmonics (PES TF)
  - Even order harmonics
  - Voltage notching and ringing
  - TIF

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7

## Proposed Outline

- The following topics will be considered
  - Telephone Interference
  - Line Notching & Ringing
  - Voltage Harmonics
  - Current Harmonics
  - Voltage Interharmonics
  - Current Interharmonics
  - Background Distortion

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8



## Proposed Outline

- Work is broken along these lines
  - Definitions
  - Measurement method(s)
  - Steady-state limits: <1, <69, <161, >161 kV
  - Statistical limits: <1, <69, <161, >161 kV
  - Inverse-time limits: <1, <69, <161, >161 kV

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9

## So Who Will Do What???

- 519A group becomes 519 revision group
  - transitioning @ SPM (Edmonton)
- The role of other PES and/or IAS TFs
  - are new TFs needed?
- Physical and virtual contributions
  - some overlap is inevitable
  - cooperation is the key

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10



## Email Submitted to Working Group

### Email 1

>-----Original Message-----

>From: NARANG A Mr -TS+NP DVLPMPT [<mailto:Arun.Narang@oht.hydro.on.ca>]

>Sent: Tuesday, June 22, 1999 4:21 PM

>To: 'stds-519@majordomo.ieee.org'

>Cc: NARANG A Mr -TS+NP DVLPMPT; BELL Mike -TS+NP DVLPMPT

>Subject: Harmonic Measurement Issues

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>Dear friends:

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>I would like to seek your comments, suggestions and guidance on the  
>following. The issue concerns measurement of harmonics, and in  
>particular their accuracy. IEEE Std 519 provides limits for current and  
>voltage harmonics, which are understandably low relative to the  
>fundamental; for example, as low as 4% for low-order odd current  
>harmonics and 0.3% for higher-ones in case of generating equipment, and  
>even lower percentage values for HV & EHV systems. Section 9.3 proposes  
>accuracy requirements which seem reasonable (<5% measurement  
>uncertainty), until one ponders the practical constraints, as follows:

>

>\* For generating equipment, the injected current harmonics must be  
>under 0.3% for harmonics beyond the 35th. To measure this with 5%  
>accuracy on a 480 V system means having a resolution of 0.04 V rms. A  
>conventional time-domain PQ monitor would need to be using 14 bit  
>digitizer or better to allow for capturing overvoltages. This does not  
>yet consider uncertainties involving transducer (CT) and signal  
>conditioning gains, drift, frequency response and finally calculation  
>errors in case of FFT based instruments, so the required accuracy seems  
>rather onerous when one considers that these may need to be maintained  
>for hundreds/thousands of sites when regulatory compliance monitoring  
>takes hold.

>

>\* It seems that few commercial PQ monitors can meet this stringent  
>requirement. One of the more popular brands uses only 12 bit  
>digitizers, but in fact its accuracy spec for harmonics is 1% of  
>full-scale (ie. 1% of the fundamental) - inexplicably, much worse than  
>expected given the digitizer resolution, and way out of line relative to  
>519 requirements!!!! I have the impression that many utilities are  
>deploying this brand of monitors for network benchmarking, and perhaps  
>ultimately for demonstrating compliance with future standards. However  
>I'm wondering how they plan to reconcile the obvious discrepancy with



>IEEE 519 (or whatever relevant std exists in the future). Another  
>popular make of PQ monitor I checked does not even provide a spec for  
>harmonics, though its 60 Hz spec is 1% of full-scale plus 0.7% of  
>reading. Based on this alone, the unit evidently does not provide the  
>necessary accuracy for harmonics. So what am I missing?

>  
>\* Some monitors require external PTs and CTs for signal  
>conditioning, even in end-use applications (ie. 480 V). In this case,  
>proper calibration of PTs and CTs is necessary, though not  
>straightforward? Proper calibration requires that harmonic signals be  
>injected superimposed on the nominal power-frequency signal? A range  
>of harmonic signal levels should be covered, in addition to varying  
>their phase relationship relative to the fundamental? Is there a  
>simpler alternative which might be considered adequate? What happens in  
>the future when utilities/customers may be required to demonstrate  
>compliance with regulations, particularly at T&D voltage levels? Would  
>utilities/customers need to go to the trouble of installing calibrated  
>transducers in contentious circumstances, or would utilities perform  
>wholesale calibrations of existing PTs and CTs for continuous compliance  
>monitoring?

>

>

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