

OCT 18 1982

IEEE TRANSFORMERS COMMITTEE

MINUTES OF MARCH 31, 1982  
LOS ANGELES, CALIFORNIA

IEEE TRANSFORMERS COMMITTEE

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MEMBERS ABSENT

E. J. Adolphson	G. L. Gaibrois	R. I. Lowe
L. C. Aicher	J. H. Galbraith	R. Marek
J. Alacchi	C. M. Gardam	D. E. Massey
L. Ananian	R. F. Goodman	J. W. Matthews
S. J. Antalis	J. W. Grimes	R. J. Mayschak
J. C. Arnold	R. L. Grubb	G. P. Michel
R. Avery	R. L. Grunert	C. K. Miller
A. E. Baker	G. Gunnels	L. D. Miller
R. Bancroft	C. K. Hale	H. E. Mills
L. Baranowski	R. S. Hamilton	W. J. H. moore
J. G. Becket	J. H. Harlow	V. R. Mulhall
J. E. Beehler	D. E. Hazelton	D. Natrass
G. M. Bell	C. Hendrickson	J. J. Nay
W. W. Bendleton	W. Henning	R. A. Nelson
A. Bimbiris	J. J. Herrera	J. R. Newton
J. W. Binus	A. Higby	P. Niemiec
G. H. Bowers	K. R. Highton	S. D. Northrup
H. R. Braunstein	M. C. Hillman	t. H. Orrock
T. Brown	P. J. Hoefler	W. R. Ossman
J. Brunke	R. H. Hollister	R. Pearson
D. Buchanan	E. L. Hook	J. Phillips
J. Burkhart	Dr. M. Hudis	L. L. Preston
R. A. Burns	D. C. Johnson	G. J. Reitter
E. E. Chartier	R. P. Jonston	A. L. Rickley
O. O. Chew	W. D. Jordan	D. A. Roach
G. Coffman	H. M. Kalet	C. A. Robbins
J. Corkran	R. H. Kellogg	J. Rodden
D. Craighead	L. A. Kenoyer	T. O. Rouse
K. W. Doughty	R. F. Kerwin	P. R. Russman, Jr.
D. A. Duckett	A. D. Kline	F. I. Samuelsson
R. L. Ensign	W. A. Kofke	E. W. Schmunk
C. G. Evans	J. Lapp	D. E. Shefka
H. G. Fischer	T. S. Lauber	R. L. Simpson
J. A. Forster	J. Lazzara	R. W. Simpson, Jr.
R. M. Frey	G. Lindland	T. Singh
M. Frydman	T. G. Lipscomb	B. E. Smith

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MEMBERS OR REPRESENTATIVES PRESENT

W. J. McNutt, Chairman	C. Hurty	D. E. Truax
D. A. Yannucci, Secretary	G. W. Iliff	R. E. Uptegraff, Jr.
D. J. Allen	R. G. Jacobsen	R. A. Veitch
B. F. Allen	J. A. Jonnatti	R. J. Whearty
R. Allustiarti	C. P. Kappeler	J. R. Woodall
R. J. Alton	O. Keller	W. E. Wrenn
E. H. Arjeski	J. J. Kelly	A. C. Wurdack
P. L. Bellaschi	L. A. Kilar	
S. Benko	R. E. Liebich	
J. J. Bergeron	H. F. Light	
J. V. Bonucchi	C. Lindsay	
J. D. Borst	K. R. Linsley	
D. F. Buchanan	L. W. Long	
D. J. Cash	M. L. Manning	
E. J. Cham	H. B. Margolis	
E. Chitwood	L. S. McCormick	
O. R. Compton	J. W. McGill	
F. W. Cook, Sr.	C. J. McMillen	
M. G. Daniels	W. J. McNutt	
R. C. Degeneff	G. G. McCrae	
A. E. Dind	S. P. Mehta	
D. H. Douglas	N. J. Melton	
J. D. Douglass	C. Millian	
J. C. Dutton	R. E. Minkwitz, Sr.	
J. K. Easley	C. E. Mitchell	
J. A. Ebert	E. L. Morrison	
E. C. Edwards	H. P. Moser	
P. O. Falkowski	R. J. Musil	
W. R. Farber	W. H. Mutschler	
S. L. Foster	L. Nicholas	
R. H. Frazer	E. T. Norton	
H. E. Gabel	R. A. Olsson	
J. Gerth	J. H. Ottevangers	
D. A. Gillies	H. A. Pearch	
A. W. Goldman	L. J. Savio	
J. C. Gorub	F. R. Stockum	
W. F. Griffard	L. R. Stenslund	
F. Brutt	L. Swenson	
C. H. Griffin	D. Takach	
J. L. Harbell	P. L. Tanton	
T. K. Hawkins	V. Thenappan	
F. W. Heinrichs	R. C. Thomas	
C. C. Honey	T. P. Traub	
E. H. Huber	E. F. Troy	

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MEMBERS ABSENT

R. B. Stetson  
F. W. Thomason  
W. E. Triplett  
G. Vaillancourt  
W. E. Vannah  
S. G. Vargo  
F. Vobel  
J. P. Vora  
L. B. Wagenaar  
R. Wagner  
T. L. Walters  
S. A. Weincek  
R. D. Welsh  
A. Wilks  
C. R. Willmore  
D. Wright

GUESTS

G. Bryant  
G. N. Bull  
D. W. Crofts  
J. A. DeLeon  
D. Fallon  
J. Foldi  
J. Goodavish  
G. Gruehbaum  
E. Koeing  
W. Lampe  
R. E. Lee  
D. D. Perco  
J. L. Puri  
D. M. Shah  
B. Stanleigh

1.0 Chairman's Remarks and Announcements

The chairman convened the meeting at 8:00 a.m. and welcomed members and guest in attendance. A special vote of thanks was given to Mr. Carl Hurty for being host and providing the excellent arrangements. The attendance for the meeting as announced by Mr. Hurty was 152.

The chairman also thanked sam Mehta and his panelists for the seminar on Loss Measurements.

2.0 Approval of Minutes of March 31, 1982

The minutes were accepted and approved as written.

3.0 Report of the Administrative Subcommittee - W. J. McNutt

The Administrative Subcommittee met at 7:00 p.m. on Monday evening, March 29, 1982.

I. Membership

By action of the Administrative Subcommittee, four new members wer invited to join the main Transformer Committee:

James J. Kunes - Westinghouse  
Roger Kieren - Detroit Edison  
James Harlow - Siemens-Allis  
Peter Hoefler - Arkwright Boston

In a related action, Olin Compton suggested computerization of the complete roster of the Transformers Committee, including Subcommittees and Working Groups. His example from the Substations Committee looked excellent, and when Ray Smith indicated that he had access to such a general purpose program it was decided that we should pursue the idea. Ray will get the program to Dean Yannucci for a trial.

II. Liaison Activities

Liaison reports were distributed at Registration and there will be an opportunity to discuss them later on the agenda. There is only one new liaison assignment - Ed Yasuda of BPA will replace Ed Adolphson of Siemens-Allis as our liaison to ANSI C62, Surge Protective Devices. Ed Adolphson has resigned because of a change in his work assignment.

III. Subcommittee Activities

L. S. McCormick reported two new Working Group Chairman assignments.

Harold Moore is the new Chairman of the Working Group on Partial Discharge Tests.

George Iliff is the new Chairman of the Working Group on Revision of Dielectric Tests.

A question was raised regarding what actions could be taken to establish dielectric test standards for two-phase cooled transformers. After discussion it was concluded that the technology is still in a developmental stage and it is too early to attempt to write standards.

IV. Future Transformer Committee Meetings

Our next meeting in the fall will be in Philadelphia, with Bob Whearty as host. Bob proposes to arrange a field trip for Tuesday afternoon, and we will shorten the Subcommittee Meeting time slots to 1 1/2 hours to make the maximum time available.

George McRae has established the hotel and dates for the Spring 1984 meeting.

April 1-3, 1984

Hotel Vancouver  
VanCouver, B.C.  
Host: Mr. G. G. McRae

We have also received an invitation from Bob Vietch to hold the fall 1985 meeting in Toronto, Canada and we are pleased to accept that invitation. Bob could go ahead to firm up the dates and hotel.

Our next opening is in the Spring of 1985 and to maintain an alternating East/West pattern we would like to hold that meeting west of the Mississippi. We would welcome an invitation for that time slot now.

October 24-27, 1982

Holiday Inn - Center City  
Philadelphia, PA  
Host: Mr. R. Whearty

April 10-13, 1983

Peach Tree Plaza  
Atlanta, GA  
Host: Mr. G. Evans

November 7-9, 1983

Hyatt Regency Dearborn  
Detroit, Michigan  
Host: Mr. D. Cash

April 1-3, 1984

Hotel Vancouver  
VanCouver, B.C.  
Host: Mr. G. G. McRae

Fall, 1984

Boston, Massachusetts  
Host: Mr. R. Minkwitz

V. PES Standard Coordinating Committee

Leo Savio's report is included with the lision reports, but you may have noticed mention that "ANSI Committees will cease to exist in approximately two years." I will ask Lloyd Spragins to amplify that comment during the later discussion of liaison reports.

VI. TOD Activities

TOD met on Monday evening, February 1, 1982 at the Winter Power Meeting in New York. Items of note are as follows:

1. The question of an IEEE Accreditation Program for Environmental Qualification Testing Laboratories (Nuclear Plant and Equipment) is a hot issue. Background and status was outlined as follows:
  - o IEEE Board of Directors approved June 8, 1981.
  - o NRC signed agreement October 2, 1981.
  - o NRC to issue proposed rules on requirements for accreditation - 60 day comment period ending in March.
  - o IEEE Staff has held several seminars with Labs on how to apply for accreditation.
  - o Three different IEEE groups have expressed opposition.
  - o January 15, 1981, three IEEE members expressed opposition to the IEEE Executive Committee. They question the need.

- o IEEE Executive Committee has invited NRC to express their position February 26.
  - o IEEE is moving ahead to setup two committees for implementation.
  - o IEEE Staff would begin auditing Labs this summer.
  - o Poll of NPEC says IEEE should do the job if NRC establishes rules requiring accreditation.
2. Diane Drehoff, new Chairman of the Publications Department, reported that PES has a severe problem with publication expenses. The quantities of published Transactions papers continues to increase. Both short range and long range actions are required. The following actions were approved by TOD.
- o (Short Range) Impose a limit of 200 published papers (1400 pages) for the 1982 Summer Meeting. Our allocation was 7 papers or 59% of those submitted.
  - o (Mid-Range) Starting with 1983 Winter Meeting, limit all papers to 7 pages. Charge authors for extra pages at a rate of \$70-\$80 per page.
  - o (Long Range) Investigate re-pricing subscriptions to PA&S Transactions.

Emphasis was placed on stricter review and acceptance of papers for Transactions publication.

3. The Task Force on Coordination of Availability Engineering Activities has completed its work and a final report was presented to T.O.D. by P.F. Albrecht. (Harold Light was our member on the T.F.). The first T.F. recommendation was approved by T.O.D., namely:
- A permanent coordination group should be formed with scope to include:
- o Focal point for discussion of PES availability activities.
  - o Report to PES-TOD on a periodic basis.
  - o Compile and organize availability-related definitions.
  - o Advise PES-TOD on liaison representatives to external organizations.
  - o Exclude activities appropriate to scope of a PES Technical Committee.

The second T.F. recommendation was tabled and referred back to the new coordination group for further study, namely:

PES become a formal sponsor of the annual reliability conference for the Electric Power Industry. Questions concerning the financial implications arose.



4. The Long Range Planning Task Force at its last meeting dealt with Transactions publication practices. Their recommendations were:
  - o Prior publication must be identified when a Declaration of Intent form is submitted. Prior publication means the paper has appeared in a "refereed" or "archival" publication.
  - o Publication in a DOE or EPRI report does not exclude publication if the new paper has significant differences from the report of if it is a concise summary of the report, with perhaps added discussion and conclusions.
  - o Use of "Key Words" after paper title is recommended to assist search and retrieval.
5. The Power Engineering Education Committee is soliciting proposals for new Tutorials from all technical committees.

PES has been experiencing increasing financial problems from the growing number of papers which have been approved for Transactions publication. As a result, TOD took three actions at its meeting in February.

(Short Range) Impose a limit of 200 published papers for the 1982 Summer Power Meeting. Each technical committee received an allocation.

(Mid-Range) Starting with the 1983 Winter Meeting, limit all papers to seven pages. Charge authors for extra pages at a rate of \$70-\$80 per page.

(Long Range) Increase the price for subscriptions to PA&S Transactions.

Emphasis was placed on stricter review and acceptance criteria for Transactions papers.

The second item concerns a request from the Power Engineering Education Committee for technical committees to sponsor an IEEE Tutorial. We last conducted one in 1979-77. We have some suggested ideas and would welcome others for subjects to include. The matter was left in the hands of the Chairman to seek a Coordinator for the project and to jointly attempt to define the make-up for a proposed Tutorial.

One other item reported by the Chairman relates to a proposed revision of the organization of PES. The present governing body is an unwieldy PES Council with 174 members. By the new proposal the governing body would be a much smaller ADCOM made up of 26 members. For your information Dean Yannucci will include with the Minutes the proposed new organization chart. See Attachment I.

### 3.1 Audible Sound & Vibration - R. E. Liebich

We had ten members and five guest attending the meeting. Two of the guests expressed interest in becoming members.

The Chairman read the minutes of the last meeting in which were approved as read. The Chairman read a revised membership list six members were declared inactive and six new members were accepted leaving the total membership unchanged at 14. The Chairman also stated that an invitation list has been prepared with approximately 30 person who will receive a copy of the minutes of this meeting and will be invited to become active in the future.

Mr. Larry Swenson, Chairman of Working Group 2 "Predictive Technology" presented and discussed a new questionnaire to be completed by any organization that has measured transformer reactor noise and vibration data which they are willing to contribute to a common data base. This data base will be used to support the formation of a document titled "Power Transformer Noise Abatement". It is generally concurred by several members that this report will be the outstanding reference on transformer noise control technology for sometime in the future. Mr. Gordon also discussed the need for an air field transformer noise measurement guideline.

Mr. Richard Liebich, Chairman of Working Group 1 "Liaison Standards" discussed the existance of standard projects D523, P673A, and P673B established prior to most present Subcommittee members activity. Mr. Albert Goldman provided a set of file documents defining the objectives and standards of P523 which was assigned to the Working Group 3 Chairman for future resolution. Mr. Liebich distributed sets of copies of previous Subcommittee internal correspondance provided by Mr. Bill McNutt and Ray Smith from their files. Study of this material will provide present Subcommittee members background action for the next Subcommittee meeting concerning official disposition of project P523, 673A, and 673B. Mr. Liebich reported that only one response has been received since the last Subcommittee meeting to the request from IEC TC14, WG20 for the proposed revisions to IEC publication 551.

Consequently, Mr. Liebich has prepared a mailing list intending to be representative of the U.S. transformer industry as a whole, which he will have critiqued by Mr. McNutt, McGill, Swenson and Gordon. The finalized list will be used to distribute to IEC, WG 20, as well as for all other IEC mailing. The IEEE Power Engineering Society, Power Generation Committee Station Design and Subcommittee representative, presented a draft of the guide for power station noise control. He outlined the history of the preparation of this publication and its present status. Mr. Liebich had requested the presentation so that the Subcommittee could review the contents concerning transformer noise while it was still in draft form. The Chairman reported that a liaison has been established with ASME PC36 Committee for development of a standard of measurement for large extended sources. Mr. Alfred Lector of Dupont Company, Chairman of this activity, will forward the current draft to the Subcommittee. The technical problems concerning the acoustical measurement in a manufacturing environment of large mechanical systems such as; steam turbine generator trains are similar to those for the large transformer industry. The U.S. Department of Energy, Argonne National Laboratory has a project in nearing completion of the development sophisticated computer model for a prediction of off site power plant noise. Use of this computer program is likely to be required in the future by Federal and State agencies for preparation of environment impact studies. Large transformers as well as all other equipment categories must be characterized in the computer code input by the sound power. Broad band noise must be separated from total components that is broad band noise that is specified by octave band sound power values and significant tones by the respective sound power values.

In summary, sound power values of individual transformer core noise tones must be available when using this computer program. The Chairman commented on the future significance of measuring sound intensity as opposed to sound pressure using newly available digital instrumentation. He distributed sets of technical papers and data documenting existing industrial experience with this technique. The representative from BC Hydro and Power Authority appealed to the Subcommittee to recognize that total core noise emission varies with transformer loading. He stated that they have extensive data which documents this behavior. Mr. Albert Goldman of Stone and Webster strongly supported this position. The Chairman also noted that he recently had received similar comments from other experienced utility engineers. Mr. Liebich asked the Working Group Chairman to consider this in the future, when preparing for propose test data measurement specifications and performance data basis.

3.2 Bushing Subcommittee - J. K. Easley

The two items which are the most interest to this group were approved by the IEEE Standards Board in December and are now in the capable hands of Fred Huber of the Standards Office. These are the bushing loading guide which is intended to become a keystone of an ANSI bushing application guide. The other is a revision of the C76.2 which will go ANSI where updating of some NEMA input will be incorporated for final publishing.

The Working Group on "Bushing for Use in Gas Insulated Substations" met Monday, with five people present. We made good headway in understanding the special requirements of such applications. Unfortunately, we have a long way to go before we have an acceptable document.

On Tuesday the Bushing Subcommittee met with eight members and nine guests. The entire meeting was given over to a review comments received on the first ballot of a revision of C76.1. After the Transformers committee luncheon at noon, we found an empty room where eight of us reconvened to continue our task. Late in the afternoon we ended up with a marked and remarked draft that will be a real challenge to our editor, Nick Melton with hopes that he can straighten it out so that a second draft will be prepared before a summer vacation period.

3.3 Dielectric Tests Subcommittee - L. S. McCormick

*Added to board membership of SC*

REPORT OF DIELECTRIC TEST SUBCOMMITTEE  
MARCH 30, 1982  
8:00 AM

Attendance: 34 members, 28 guests (reflects additional 4 new members: K. W. Doughty, M. Frydman, W. N. Kennedy and H. R. Moore), total membership is now 66.

Due to a shift in his work assignment, Mr. E. J. Adolphson has resigned as Chairman of the Working Group on Revision to Dielectric Tests and Mr. G. W. Iliff has agreed to take over the chairmanship. The Subcommittee wants to thank Mr. Adolphson for his excellent leadership of this group over the years and for the many hours of hard work that he invested in its work.

The minutes of the Phoenix meeting were approved as published. The Chairman of the Working Groups reported as follows:

*Added to board membership of WG*

WORKING GROUP FOR REVISION OF DIELECTRIC TESTS  
G. W. Iliff, Chairman

Mr. Iliff reported that the Guide for Impulse Testing C57.98 has been approved by the Standards Board for publication.

It was reported that C57.12.14 Dielectric Test Requirements for Power Transformers for Operation at System Voltages from 115 kV through 230 kV has also been approved by the Standards Board for publication as a trial use document.

Work on Revision of Shunt Reactor Testing will be continued by Messrs. Adolphson and Foster.

The 262B Review Task Force met on Sunday and tentatively agreed on several recommendations.

1. NEMA will be requested to expand tables of external clearance in TR1.
2. The one hour, 150% low frequency test should include an enhancement for 7200 cycles of 173.2% at the beginning.
3. Partial discharge will be monitored only during the 150% portion with a 100 microvolt limit and a 30 microvolt limit on any increase with consideration given to its behavior.
4. The ratio of the chopped wave to full wave level should be 1.1.
5. Switching surge levels will remain at 83% of the full wave with the further notation that these are considered maximum levels.

6. Impulse tests will be routine down to 115 kV with the lower end being a QA type test.
7. A draft will be prepared and balloted in the Task Force before the next meeting.

The Working Group discussed tolerances on impulse test levels and the consensus seemed to be that tolerances similar to those in IEEE Standard 4 should be included in C57.12.00 or C57.12.90.

The question of dielectric test of vapor cooled transformers was discussed and referred to ADCOM. The decision was reached there to delay the start of standardizing tests until more experience is gained.

WORKING GROUP ON REVISION OF DIELECTRIC TESTS  
ON DISTRIBUTION TRANSFORMERS  
W. R. Farber, Chairman

Mr. Farber reported that the Working Group's paper on Proposed Revision of Routine Dielectric Tests of Distribution Transformers was presented at the 1982 Winter General Meeting and drew three written discussions. These discussions were reviewed and the closure for the paper has been approved.

A Task Force was formed to prepare a proposal for production line impulse test requirements. This Task Force will consider a number of variables such as the number and magnitude of the impulse waves, their shape tolerances and failure detection methods. Task Force members are W. R. Henning, Chairman, R. E. Lee, C. J. McMillen, Lloyd Miller, D. S. Takach, W. E. Wrenn and A. C. Wurdack.

The Working Group decided to defer indefinitely any further action on reducing low frequency test levels.

Jerry Corkran's Task Force on phase-to-phase test recommended that Table 6 of ANSI C57.12.00 be modified to require a phase-to-phase test at a minimum level of 2 times system voltage.

A new topic is being added to their agenda which concerns the effect on various winding arrangements of current surges entering the low voltage terminals.

WORKING GROUP FOR DIELECTRIC TESTS OF HVDC  
STRESSED TRANSFORMERS AND REACTORS  
C. Hurty, Chairman

Mr. Hurty reported that the Working Group report is ready to be mailed to the subcommittee for comments. Comments are due to be returned on or before May 14, 1982.

A report was made to the group that results of source tests had shown that combined ac and dc testing produces results that differ from separate ac-dc testing.

Dr. Lampe made three suggestions for modifications to their report which were discussed.

1. The polarity reversal test voltage should be 125% of the dc rating rather than 110%.
2. The test should include a double reversal rather than a single negative to positive reversal.
3. Elimination of recommended transient test voltage levels.

WORKING GROUP ON RESONANT OVERVOLTAGES IN EHV TRANSFORMERS  
C. C. Honey, Acting Chairman

This group did not meet because its Chairman, Mr. Degeneff could not be present.

Mr. Honey, as Acting Chairman, reported that the group intends to report its findings in a Working Group paper which will be discussed at its meeting in Philadelphia in the fall.

As reported at the meeting last fall, Mr. Zepic has resigned as Chairman of the Working Group on Partial Discharge Tests. The new chairman of this group is Mr. H. R. Moore.

WORKING GROUP ON PARTIAL DISCHARGE TESTS  
H. R. Moore, Chairman

The Working Group met at 10:15 AM on March 29, 1982 with 16 members and 25 guests present.

The minutes of the October 19, 1981 meeting were approved as written.

G. Vaillancourt, Chairman of the Task Force for Measurement of Apparent Charge presented a report on their work. Simultaneous tests had been made using Biddle, Robinson (ERA), IREQ, and Vogel PD detectors. Similar results were obtained with all detectors except the Vogel detector. Tests made on a 560 MVA, three phase transformer using RIV measurements at 1MHz and PD measurements in the bandwidth of 40 kHz to 200 kHz appear to confirm that the attenuation for RIV at 1 MHz is higher than with the wide band, lower frequency PD measurements.

After a general discussion on various aspects of the Task Force report, it was decided that the following action will be taken:

1. The Task Force will develop a plan for evaluating the various elements of the RIV and PD measurement question including the following:

- RIV at 1 MHz and at lower frequencies
  - PD using Biddle, Robinson, IREQ or other similar PD detectors
  - PD using the Vogel detectors
  - PD using narrow band and wide band detectors
2. Manufacturers and users will be asked to participate in this evaluation process by performing comparative tests on transformers to obtain data on which to make decisions on future changes in partial discharge tests.
  3. A guide for improved measurement of partial discharge in transformers based on the data generated will be prepared and submitted for approval.

Mike Daniels, Chairman of the Task Force for Accoustic Detection was not present, and Ed Norton presented a summary of the activities of this task force to date.

The Working Group decided that its efforts should be devoted to a program for determining an improved PD measurement method and that efforts to make detailed improvements on the RIV method cannot be justified at this time.

The meeting was adjourned at 11:55 AM.

TASK FORCE ON DIELECTRIC TESTS LEVELS FOR 1200 kV  
P. L. Bellaschi, Chairman

Mr. Bellaschi reported his group has reached tentative agreement on the following items.

1. BIL levels of 2050, 2300 and 2550.
2. Chopped wave to full wave ratio of 1.0.
3. One hour phase-to-ground test at 1040 kV rms with a 7200 cycle enhancement of 1200 kV.
4. Corona level of 100 microvolts with maximum increase during test of 30 microvolts.

The group intends to ballot a first draft before the next meeting next fall.



Comments from the floor:

Mr. Goldman commented that when full wave and chopped wave impulses are made that the manufacture should have transparencies of the oscillograms. Mr. McCormick responded that this should be covered by customer specifications.

3.4 Dry Type Transformers Subcommittee - B. E. Allen

The Dry-Type Transformer Subcommittee met at 1 p.m., March 30, 1982 with 12 members and 10 guests. The minutes of the meeting in Phoenix were approved as distributed.

A summary of our W.G. activity is as follows:

W.G. on Standards for Dry Type Transformers Incorporating Solid Resin Encapsulated Coils chaired by Mr. Ed Huber had a task group meeting in New York City at the time of the last Winter Power Society meeting in addition to the full working group meeting held on Monday. At the meeting Monday 15 members and 13 guests were present. The task group reported that they completed the review of C57.12.01 and C57.12.91 and have identified changes that need to be made. Thus the work identified by their project authorization is considered complete. The W.G. discussed the task group report and then recommended to the Subcommittee that a new Project Authorization be requested for developing the specific proposals for the additional and revised requirements in C57.12.01 and C57.12.91. Since the vast majority of the existing documents will still apply, it was recommended that the new and changed material be incorporated as an addendum, supplement, or perhaps by dividing the documents into a Part I and Part II. Guidance on this point will be sought from the Standards Office when the PA is submitted. Four task groups will be formed to develop the specific proposals. Anyone interested in serving on these task groups is requested to contact Mr. Ed Huber.

The Dielectric Problems W.G. chaired by Mr. Jerry Corkran met on 3/29 with 12 members and 9 guests present. The results of the W.G. ballot on Draft II "Guide for Conducting a Transient Voltage Analysis of a Dry Type Transformer Coil" were discussed. Agreement was reached on all comments. The guide will be re-balloted prior to the next meeting. The results of a new confidential survey on partial discharge testing of dry-type transformers was discussed. To date 12 replies have been received from the questionnaire sent to 45 manufacturers. Six make production partial discharge tests, two use the radio noise meter test procedure, and six report using Biddle equipment.

Loading Guide C57.96 Revision W.G. chaired by Mr. Bill Mutschler met on 3/29 with 9 members and 9 guests present. The chairman reported that the W.G. was balloted on a proposal to continue using the same slope for the Arrhenius equation that is in the present loading guide. Six ballots were returned, all agreed with the proposal. Further discussion indicated that the guide should provide for the use of other data for specific insulation systems when such is available. Transient thermal response was discussed and the need for revised equations and additional input recognized.

Thermal Evaluation W.G. chaired by Dr. George Bowers reported that IEEE-65 was approved by the IEEE Standards Board at their December 1981 meeting. It has been forwarded to ANSI and has been assigned the number C57.12.56 by which it will now be known. The title is "Standard Test for Thermal Evaluation of Insulation Systems for Ventilated Dry Type Power and Distribution Transformers." This W.G. will now become inactive but subject to call pending the printing of C57.12.56.

A preliminary discussion of thermal evaluation of solid resin encapsulated coil insulation systems was held on 3/29 under the direction of Dr. George Bowers with 18 people present. The need for such a procedure was discussed at length. There was a nearly unanimous conclusion that an attempt should be made to produce a "Trial Use" document similar in many respects to the just completed C57.12.56. George has agreed to chair this effort and a Project Authorization will be submitted for it. Sixteen people have indicated an interest in this activity and others who may be interested are requested to contact George Bowers.

Mr. Roy Uptegraff and Mr. Jerry Corkran have become members of the Subcommittee since the last meeting.

### 3.5 Instrument Transformers Subcommittee - R. C. Thomas

THE TASK FORCE ON SHORT-TIME CAPABILITY OF CURRENT TRANSFORMERS met on Monday, March 29, at 1:00 P.M. with four of the five members present. This being the first meeting of the Task Force the time was spent outlining the work to be done.

There are at least four areas or applications to be considered. These are:

1. Free standing CT's - oil or solid insulation - in 30° C ambients.
2. Dry Type CT's in enclosure having 55° C ambients
3. CT's inside power transformers
4. CT's inside circuit breakers.

Mr. Basso, Chairman of the Task Force, will prepare a questionnaire to be sent to the users through EEI-AEIC for information regarding their practices of short time overloading of transformers, bushings and breakers.

There has been no report from the Working Group on Current Transformers for use with AC High Voltage Circuit Breakers.

THE INSTRUMENT TRANSFORMER SUB-COMMITTEE met yesterday in an all day session with five members and three guests present.

First item of discussion was the review of the results of the letter ballot on C57.13.2 - Conformance Test Procedures for Instrument Transformers.

Since the report at the Phoenix meeting, additional returns have been received making a total return of 77 out of 103 ballots sent out. We now have 71 approved, 5 not voting and one not approved.

Attempt was made to resolve the one negative vote with no success so far. The reason for the negative vote is the reference to UL 1446 in Par. 8.3 of the proposed standard.

After obtaining a copy of UL 1446 the sub-committee noted that although UL 1446 is for 600V systems there is no conflict with this reference. Par. 8.3 of the proposed standard states "when the hottest spot temperature exceeds the temperature of 105° C it may be advisable to evaluate the insulation in accordance with the principles outlined in UL 1446."

### 3.6 Insulation Life Subcommittee

The Insulation Life Subcommittee met yesterday with 20 members, 1 alternate and 25 guests present, for a total attendance of 46.

All our working groups reported. Following are summaries of their reports:

#### Thermal Tests Working Group - R. A. Veitch, Chairman

The Working Group met at 1:00 P.M. Monday, March 29th. There were 10 members and 16 guests present. Draft 5 of the "Recommended Procedures for Performing Temperature Rise Tests of Oil-Immersed Power Transformers at Loads Beyond Nameplate Ratings", was sent out to the Working Group members and Task Force members prior to the meeting.

As a result, only a few comments were received for discussion at our meeting. A number of editorial suggestions were accepted. However, some of the other proposals of a more technical nature will require further discussion.

Some progress was made in reviewing Draft 5 but time restraints did not permit a complete review. The Task Force and Working Group members were asked to review Draft 5 and send their comments to Bob Guibb no later than the end of April.

*Asked to become member of WG*  
Working Group on Guides for Loading - R. A. Olsson

The Working Group met March 29 with a total attendance of 41, of which 21 were members and 20 were guests. The following new members were added to the Working Group: Mr. David Caverly of Trench Electric Company, Mr. James Harlow of Siemens Allis and Mr. Edward Yasuda of Bonneville Power.

A review of the status of the various guides and Task Force work was as follows:

- a) The Power Transformer Guide for Loading, ANSI C57.92, has been published and is available to the public. A printing error of equation number 1 has been found and IEEE will include a correction page.
- b) Current Reactor Guide Revision. Mr. David Caverly of Trench Electric has volunteered to head the Task Force to revise this guide. He will be submitting a proposed outline. Volunteers are being solicited to work with him in its preparation.
- c) Guide for Transformers Above 100 mVA

Mr. David Douglas reported on the status of this guide. The ballot of the Task Force, Working Group, and Subcommittee achieved a 78% return with 33 approvals, 14 approvals with comments, 2 non-voting and 3 negative ballots. From discussions at their meeting, it appears that resolution of the negative ballots can be satisfied by text changes. Discussion to resolve the negatives will be made after the meeting by Task Force members and negative ballot voters. It is planned to prepare a new draft and revote the Subcommittee by June, and to ballot the Transformers

Committee before the next meeting. Messrs. Dave Douglas and Charlie Mitchell are to be commended for their concentrated efforts that have kept this project moving so well.

d) Task Force on Equations

Mr. Dave Truax presented the work of Mr. Orrean Chew on tested values of  $m$  and  $n$  the exponents on three McGraw Edison Company transformers. Temperature rises were obtained from heat run tests. Comparison with present equation exponents showed differences of  $1.5^{\circ}\text{C}$  maximum with  $.5^{\circ}\text{C}$  average. Calculations for a number of other ways to calculate showed substantial differences. It was requested that other manufacturers provide similar tests. Further work on the equations used in the guides should continue.

e) IEC Guide for Loading

Mr. McNutt provided the chairman with a copy of the recent "in progress" draft revision of the IEC Guide for Loading. Copies were given to Task Force chairmen for use as a reference in their work. Mr. Jacques Aubin gave a summary of the status of the guide preparation and has agreed to the liaison with IEC and our Working Group. Mr. Aubin indicated the guide will be divided into four sections. Section 1 covers equations, 2 covering loading requirements for transformers rated up to 33 kV (distribution transformer), 3 for power transformers up to 100 mVA, and 4 for transformers above 100 mVA. Transformers cannot be loaded to exceed hottest spot temperatures of  $140^{\circ}\text{C}$  and power transformers over 100 mVA cannot have loads exceeding 1.3 times rating and smaller transformers limited to 1.5 times rating. A computer program for calculating loading will be developed to become part of the guide.

f) Regulator Guide

Mr. William Wrenn outlined the status of the Regulators Guide. Computer calculations were made and cross checked to determine values for the various tables. In checking out the guide, it was observed that C57.91 and C57.92 used the following preloading percentages of load 50, 75, 90, 100 and 50, 70, 90, 100 respectively. The 50, 70, 90, 100 loads were agreed upon for this guide. Regulator manufacturers have been requested to assess whether treatment of overload calculations should be based on distribution transformer or power transformer limits. The question of whether to retain or remove the section covering nomograms will be balloted. After resolution of the above the guide will be balloted in the Task Force, Working Group and Subcommittee.

Thermal Evaluation of Power and Distribution Transformers Working Group -  
Al Wurdack, Chairman

Al reported that he mailed 122 ballots to Transformer Committee members about 6 weeks ago. The ballot was on the renewal of IEEE No. 345, ANSI C57.100, The Standard Test Procedure for Thermal Evaluation of Distribution Transformers. Al has been out of the country for the last month, but with his last count, a

4. Project P799

Revisions of all parts of the Guide for Handling and Disposal of Transformer Grade Insulating Liquids Containing PCB's had been prepared by the various authors and were carefully reviewed by the group. Changes were suggested and each author will re-write their respective sections.

The major sections were "agreed to" as follows:

- Part I - Introduction and Scope.
- Part II - Definitions
- Part III - Detection and Measurement
- Part IV - Labeling and Record Keeping
- Part VI - Disposal
- Part VII - Worker Protection

It was agreed that the person responsible for re-writing each section would attempt to have the re-write to the Chairman by May 1, 1982 in order that a draft of the guide might be put together and sent out prior to the next meeting.

As a reminder, those responsible for each part are:

- Part I - Frank Heinrichs
- Part II - Joe Kelly and Mac Thompson
- Part III - Earl Morrison
- Part IV - Joe Kelly and Mac Thompson
- Part V - George Bull
- Part VI - George Bull
- Part VII - Leo Savio

5. Silicone Guide

The Chairman, Louis Gifford, was unable to attend, however, he sent a packet of information which was reviewed briefly by the group.

It was recommended that the task force condense this material and following the format of the Oil Guide prepare a 1st draft of the Silicone Guide. Members of this Task Force are as follows:

Louis Gifford, Chairman  
W. Mutschler  
J. Dind  
M. Frydman  
J. Bryant  
D. Gillies

Please attempt to have this draft to me by September 1, 1982 in order that I might mail it to the Subcommittee members.

couple of weeks ago, he had only 47 returns, all approvals. All members that have not returned their ballots, please do so without delay. Remember, one of the major requirements for maintaining your membership in the Transformer Committee is returning your ballots. If you feel you are not knowledgeable in the subject, chances are, you have someone in your organization that can guide you in responding to the ballot.

Bob Grubb, who is heading a Task Force to determine if gas analysis of transformer undergoing this functional test procedure is desirable. So far he has not been able to find any volunteers.

Dave Douglas, who is heading a Task Force to review the results of the two EPRI Projects on Power Transformer Life, has not been able to accomplish much; because the final reports are not as yet available. It is felt that since we were one of the prime instigators of these projects we should review the projects and draft an opinion as to their results. I know many of the questions that we had at the start have been answered by the projects. However, as with any research project, it raised some new questions. We can help by evaluating these new findings and go on record as to what we feel should be done in the future.

Comments from the Floor:

Al Goldman asked if transformer bushings would be good for 1.3 times nameplate loading. C. McMillen called on J. Easley who stated that no bushing will automatically meet overload requirements, but that you must calculate its capability. Mr. Goldman stated that transformer people must co-ordinate the bushing and the transformer. Bill McNutt stated that the user should identify the specific loading and the manufacturer is responsible for meeting this specification. The loading guide not greater than 100 MVA will provide for co-ordinated loading.

3.7 Insulation Fluids Subcommittee - H. Pearce

The Insulating Fluids Subcommittee met on Monday and Tuesday, March 29 and March 30, 1982 with fifteen members and eighteen guests present.

1. The minutes of the meeting of October 19 and 20, 1981 were approved.

2. Membership changes:

New Members: Robert Vincent - Sun Oil  
Barry Cupples - Gulf Oil  
Kevin McManamon - Sun Ohio

3. The Chairman reported that under Project P637, Guide for Reclamation of Insulating Oil and the Criteria for Its Use, has been approved by the Standards Board.

6. The guide for high temperature hydrocarbon was discussed briefly and Task Force Chairman, Mac Thompson indicated that preliminary work has begun.
7. Maurice Frydman showed a new type of gas sampling can from Japan.
8. The Gas Guide was discussed and it was not clear as to whether a revision was needed. It was decided to ask the members of the Main Transformers Committee if any problems were being encountered with the present guide.
9. Adjournment.
10. Next meeting, October 24-27, 1982, Holiday Inn, Philadelphia, Pa.

3.8 Performance Characteristics Subcommittee - O. Compton

The Subcommittee met on March 30, 1982 at the AMFAC Hotel, Los Angeles, California with 24 members and 27 guests.

After self introductions, the minutes of the fall, 1981 meeting in Phoenix, Arizona were approved.

Four new members were introduced:

Donald Cash - Detroit Edison  
Jerry Grimes - Westinghouse, South Boston  
Richmond Johnston - RTE/ASEA  
Robert Whearty - Philadelphia Electric

It was reported that all the Working Groups of the Subcommittee met with a total of 61 members and 60 guests.

The Working Groups on Qualification of Transformers for Class 1E Application in Nuclear Power Stations, Short Circuit Current Duration, Transformer Reliability, and Loss Tolerance and Measurements reported on ballot activity. Most of these sessions were spent in perfecting their previous ballots. Each of the ballot questions will be issued in a new draft for future balloting. The Working Groups on Harmonic Load Current Heating and on Transformers Connected to Generators are underway and good progress is being made in the development of documents within their scopes.



The meeting adjourned at 3:00 p.m. to allow the members to attend the Seminar on Loss Measurements sponsored by the Working Group on Loss Tolerances and Measurement. The seminar, coordinated by Sam Mehta, was very interesting and provocative. The Subcommittee was most appreciative of the contributions of the panelists.

Reports of the Working Groups are as follows:

3.8.1 Working Group on Loss Tolerance and Measurement

The Working Group on Loss Tolerance and Measurement met at 8:00 A.M., Monday, March 29, 1982, with 13 members and 17 guests attending. Minutes of the Phoenix, Arizona meeting were approved with no comment. The results of four ballots were discussed at the meeting of the Working Group.

Instrument Transformer Phase Angle Error - Transformers Committee Ballot (Proposed addition to C57.12.90 - 1980, Section 9.2.4.2, Draft 2)

The first Ballot reviewed was the proposed addition to C57.12.90 concerning phase angle error correction to load loss measurements balloted at the Transformers Committee level. The ballot results were:

Approved	83
Approved w/comment	0
Not approved	5
Not voting	6
Not returned	26

As a result of the negative votes some changes were made in the wording of the proposal. Potential transformer and current transformer phase angle errors were redefined in terms of standard instrument transformer definitions. The wattmeter phase angle error term was redefined and renamed ('W' was changed to 'Wd'). Several negative votes were not resolved. Members voting negative will be contacted before Draft 3 is issued for ballot.

Voltmeter Connection for Noload Loss - Working Group Ballot (Proposed addition to ANSI C57.12.90 - 1980, Section 8.3.2.1, Draft 2)

The second Ballot considered, was Draft 2 of a Working Group proposal on voltmeter connection for noload loss measurement. The Ballot results were:

Approved	11
Approved w/comment	1
Not approved	2
Not returned	5

One remaining negative vote needs to be resolved, then a third draft will be issued for Working Group Ballot. Mr. Henning will re-write the third draft.

Noload Loss Temperature Correction - Working Group Ballots

(Proposed revision of C57.12.00 - 1980, Section 5.9, Draft 1)  
(Proposed revision of C57.12.90 - 1980, Section 8.1, Draft 1)

The third and fourth Working Group Ballots were discussed together as they both consider noload loss temperature correction.

The results of the Ballot on the proposed revision of C57.12.90 for temperature correction were:

Approved	8
Approved w/comment	0
Not approved	4
Not returned	7

The results of the ballot on the proposed revision of C57.12.00 for temperature correction were:

Approved	8
Approved w/comment	2
Not approved	4
Not returned	7

Reasons for the negative ballots and comments reflected the view that a standard noload loss temperature correction should be developed and be applied to both power and distribution transformers. Most members of the Working Group, it seems, now agree that noload loss for both power and distribution transformers should be corrected to a reference temperature of 85°C, and that a standard correction method be incorporated into standards for this correction. So, one of the main objectives of the Working Group will be to develop a standard noload loss temperature correction. Mr. Yannucci suggested that a correction be developed based on raw material characteristics and induction level. Mr. Compton suggested that an interested neutral party gather data that might be considered proprietary, in confidence, for use by the Working Group.

New Business

The subject of standardizing on a noload loss measurement correction technique for multiple zero applied voltage waveform (minor hysteresis loops) has been asked to be addressed by the Working Group.

Three new members have been added to the Working Group:

Mr. Antal  
Mr. Greb  
Mr. Musil

The meeting adjourned at 9:55 A.M.

3.8.2 Harmonic Load-Current Heating Working Group Meeting

- I. E. F. Troy, chairman, called the meeting to order at 8:00 am.
- II. Attendance list is attached.
- III. Announcements
  - A. Personnel Changes
    - Dick Cunningham, Eastman Kodak Co., resigned.
    - Vis Thenappan, RTE-ASEA and
    - Dave Shefka, Brown Boveri, joined the Working Group as members.
  - B. The Project Authorization Request (PAR) for the Working Group has been approved and assigned number C57.110.
  - C. The Project Authorization Request (PAR) for the Rectifier Transformer Study Group has been approved and assigned number C57.18.10.
  - D. Liaison has been established with the
    - Transmission and Distribution Committee
    - Substation Committee
    - Power Systems Relaying Committee
    - Electric Process Heating Committee
  - E. Liaison is being established with the
    - Power Systems Technology Committee
    - Power Systems Protection Committee
    - Industrial Plants Power Systems Committee
    - Industrial Drives Committee
    - Industrial Control Committee
    - Static Power Converter Committee
- IV. Discussion of 3/4/82 draft of "Recommended Practice for Establishing Transformer Capability When Supplying Nonsinusoidal Load Currents."
  - A. Paragraph 4.2(2) was deleted. It was considered non-essential to the purpose of the standard and the 0.10 factor was controversial.
  - B. Paragraph 5.2(2) will be revised to eliminate the table and to assume that all stray losses are winding eddy losses.

E. J. Cham distributed a document "Load Losses in Power Transformers" to illustrate his position that the concept of the table in par. 5.2(2) was invalid.

- C. Par. 5.2 will establish a recommended procedure for calculating winding losses due to non-sinusoidal load currents based on data from certified test reports. Obviously the procedures established must contain some of Leonard Long's "butcher's thumbs."
- Toward this end manufacturers' representatives on the Working Group were requested to send Ed Troy information as a basis for:
- Establishing winding eddy loss as a function of stray loss.
  - Establishing the division of winding eddy losses between high voltage and low voltage windings.
  - Establishing the maximum winding eddy loss density as a function of average winding eddy loss density.
- Ed Troy will undertake to code the information received to protect the sources prior to distributing the results to the Working Group.
- D. The point that Jim Walton raised in Phoenix concerning the tank heating by zero sequence currents in 3 leg-core transformers was discussed. It was decided to recognize this source of heating - perhaps in the Foreword - but to defer in-depth treatment of the subject until a later revision.
- E. Section 5.2 and 5.2.1 will be revised to include the concept of loss density mentioned in par. 4.2(3).
- F. Section 5.2.2 Example will be completed and Section 5.3 will be rewritten to include Bill McNutt's comments.
- V. Meeting was adjourned at 10:30 am.

3.8.3 Working Group on Qualification of Transformers for Class 1E Applications  
in Nuclear Power Generating Stations

MEMBERS PRESENT:

B. F. Allen  
C. Hurty  
W. H. Mutschler  
T. Singh  
L. R. Stensland

GUESTS PRESENT:

C. Millian  
J. A. Sisson

We met at 10:15 a.m. on March 29, 1982, at the AMFAC Hotel. Minutes of the last meetings in Phoenix, Arizona, were approved as written.

P638/D11 was sent out for balloting on January 22, 1982, with a return date of March 8, 1982. A summary of the results for ballot P638/D11 is as follows:

29 Approved	- 36%
14 Approved with Comments	- 17%
7 Not Approved	- 9%
31 Not Returned	- 38%

Some of the ballots with comments were reviewed. Time did not permit a review of all ballots with comments. Again the majority of comments involved aging methods of qualification. Mr. W. H. Mutschler suggested we review draft 10 of IEEE 323, dated 12/10/81, to see if this draft may alter the way we handle aging and qualification. To facilitate the resolution of those ballots approved with comments or not approved, the chairman will categorize the comments into six groups - one for each member. Because of some travel restrictions, comments from the members will be sent to the chairman, who in turn will distribute their comments to other members to obtain overall agreement. Time will tell whether this agreement is workable.

If the above method gets too cumbersome, it may be necessary to arrange an interim meeting prior to the next Transformers Committee Meeting.

The meeting was adjourned at 12:00 noon.

3.8.4 Working Group on Transformer Reliability

The Working Group on Transformer Reliability met on Monday, March 29, 1982 at the Amfac Hotel in Los Angeles, California. The meeting was conducted from 1 p.m. to 2:45 p.m. and was attended by sixteen members and nine guests. Membership of the Working Group is currently twenty-nine. An agenda previously transmitted to Working Group members was generally followed.

John G. Lackey of Ontario Hydro and Louis M. Nicholas of Maloney Electric were welcomed as new members. After introduction of members and guests, the minutes of the previous Working Group meeting were approved without comment.

The chairman then reported that a task force meeting had been held December 10, 1981 at which time the comments received from Draft #1 of the Reliability Guide had been reviewed. As a result of this meeting, Draft #2 was developed. A breakfast task force meeting was also held on Monday, March 29, 1982 at which time the Subcommittee Chairman, Mr. O. Compton was also in attendance. At this meeting the topic of pursuing a home for collection of data was discussed. It is the desire of the task force to have our Subcommittee Chairman lend us whatever assistance he can in getting this subject rolling. IEEE is not structured to undertake computer work required for the collection of data to analysis transformer failures. The guide this Working Group is writing sets the ground rules for establishing such a data base, but concerns of the task force center around whether or not our labors will be carried to fulfillment with the establishment of a data base. With the assistance of our Subcommittee Chairman, this subject will now be pursued.

Draft #2 of the Reliability Guide resulted in 23 of 29 ballots being returned either approved or approved with comments. No negative ballots resulted. Three general areas of concern were noted. (1) The subject of confidential versus non-confidential information. (2) The desire to raise the range of transformer ratings to 10 MVA in an effort to have more data supplied. (3) And more effort should be made to give a slightly better explanation of some of the work in the mathematical appendix. These comments, along with all comments will be addressed at the next task force meeting now scheduled for some time in June, 1982. With general consensus now reached in the Working Group, the permission of the Subcommittee Chairman was granted to ballot the Subcommittee with ballot of Draft #3. This will be done so that the Subcommittee will have a 45-day ballot of this document. It was noted that generally the guide is well along, but some work needs to be done on Section #7, the reports to be generated from the data base.

Discussion then followed with the Working Group Chairman attempting to explain recent developments regarding the interaction of EEI and IEEE. Since Draft #2 did not generate many comments and since much concern and many questions have been directed as to what will happen with our efforts, this was considered an opportune time to discuss this topic. General discussion then proceeded on the mechanics of data collection and reporting outputs. One point that was noted is that it may be in order for the Working Group to develop a paper on "How To Perform Failure Analysis." It was noted that in many instances, enough homework is not done on failure analysis at the time of failure. This subject will be pursued.

*The chairman then reported ongoing work by other organizations as follows.*

*The Task Force on Coordination of Availability Engineering Activities (CAEA) which was created under TOD to look at all ongoing reliability activities has made a final report back to TOD at the recent Winter Power meeting. The recommendations that have come from their work - (1) A permanent coordinator group should be formed; has been accepted by TOD and a subcommittee will be established in the Availability Committee. (2) PES should become a formal sponsor of the Annual Reliability Conference for the Electric Power Industry; has been tabled for further exploration, since an estimate of cost figures were not available.*

*The CIGRE 13-06 Working Group on Reliability of Power Circuit Breakers has published a recent article in Electra on their findings regarding circuit breaker reliability.*

*The CIGRE 12-05 Working Group on Reliability of Power Transformers now has a document in the working group on a recent transformer failure survey. This work will also appear in a future issue of Electra.*

*The attendees were then questioned for new or old business - with none, the meeting was adjourned.*

### 3.8.5 Working Group on Transformers Connected to Generators

The working group met with seven members and six guests in attendance. The minutes of the October 19, 1981 meeting was approved without comment. One new member was added, John Lackey of Ontario Hydro.

Rewritings of three of the seven sections of the documents were reviewed. Minor changes were incorporated in the sections on transformer connections. The introduction section of the draft was again reworked with primarily editorial changes. This section now introduces the reader to the concept that through faults for the unit transformer are normally not severe in terms of thermal or mechanical duty, however, stresses in the unit auxiliary transformer can be severe under certain conditions; such as, low side faults, paralleling out of phase with station auxiliary transformers, and generator load rejection. Each of these conditions are expanded upon for further information. The insertion of a generator breaker and its effect on the preceding system conditions is also included.

At this point, Jim Walton noted an additional system design condition for sub-synchronous suppression. In this design, a filter inserted in the transformer neutral (see Figure 1) can provide higher through fault current than normally expected.

This filter is a parallel capacitor/inductor circuit that is connected to the neutral high voltage winding terminals of the unit transformer. The high voltage neutral is then closed on the other side of this filter. This filter can have the effect of reducing the transformer impedance perhaps as much or more than 40%. This increases the symmetrical fault current. It was felt that the asymmetrical level of the fault current would not change. If this is true, and since the mechanical design of the transformer is designed to the asymmetrical current level, the increase in the symmetrical fault current may not affect the transformer design. In addition, there most likely would be no thermal problem.

This system design will need further investigation to be sure that all aspects of this design is well understood. Jim Walton will determine what correspondance can be distributed to the working group for study.

Drafts 3 and 4 of the section on the selection of the low voltage rating were reviewed. The two drafts, prepared by different authors in the task force, on this subject differ somewhat in philosophy. The more general approach was accepted by the working group.

Al Goldman agreed to draft the coordinating section on the selection on the high voltage rating of the unit transformer. It was agreed that the nominal tap selection is typically at 102.5 % of nominal system voltage. The section will be written on this basis.

These changes will be incorporated into the guide and circulated for comments by June 1, 1982.

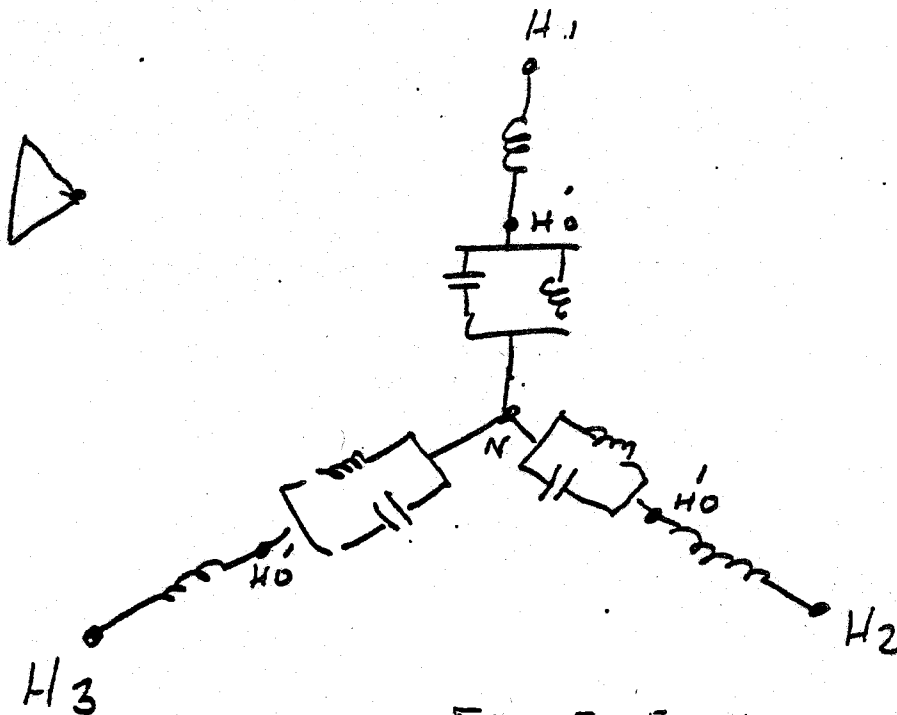


FIGURE 1.



3.8.6 Short Circuit Duration Working Group

The Working Group on Short Circuit Duration met on March 29, 1982 with 9 members and 18 guests in attendance. Minutes of October 19, 1981 meeting were approved without comments.

During our October meeting in Phoenix it was agreed that pending an attempt to resolve 3 negative ballots on L/B P784/D4 a new issue of Transformer Through Fault Current Duration Guide should be balloted within the main Transformers Committee. The Working Group Chairman reported that 2 of the 3 negative ballots were resolved and L/B P784/D5 was subsequently issued together with documentation of a single negative ballot. The following Summary of L/B P784/D5 results were then presented.

	<u>Number</u>	<u>Percent Represented</u> <u>Responding</u> <u>Members</u>	<u>Total</u> <u>Members</u>
Approved	51	65	42
Approved with Comments	13	16	11
Not Approved	9	11	7
Not Voting	6	8	5
LB Not Returned	43	-	35
	<u>122</u>	<u>100</u>	<u>100</u>

A discussion then followed regarding changes that might be employed to effect an acceptable document. Working Group members and guests were advised that most of those expressing dissatisfaction with D5 were opposed to inference of Figures 2 and 3 that both the left hand curve (lowest number of faults) and the right hand curve (frequent fault curve) reflect the same degree of risk of failure.

After a lengthy discussion of what might and what might not constitute an acceptable compromise it was agreed the document should be balloted another time with changes made as follows:

1. Remove phrase "Low Risk Level" from all Figures (1 through 4).
2. Modify Section 4 (1st paragraph) to state that curves represent acceptable risk level.
3. Make reference on each curve to Section 4.

With these changes the Chairman will approach those who voted against D5 to attempt resolution of objections. If objections are resolved in this manner a new L/B will be issued to the Transformers Committee. If these changes do not result in resolution the document will be returned to the Working Group for further consideration.

\* \* \* \* \*

Meeting was adjourned at 4:30 PM.

3.9 Recognition and Awards - J. V. Bonnucchi

Mr. R. J. Musil et.al. were recognized with an award for their outstanding technical paper published in the PAS entitled "Voltage Stresses Produced by A Periodic and Oscillating System Overvoltages in Power Transformers" published in January of 1981.

Mr. C. Honey was given a special outstanding service award for his service to the IEEE and his contribution to Dielectric Standards.

Mr. L. Long was given a special recognition certificate for his service to the performance subcommittee.

It was also noted that Mr. J. Dutton is an IEEE Fellow.

3.10 The Standards Subcommittee - L. R. Smith

All subcommittee chairmen have again been cooperative and reported up-to-date status of their projects.

The following is a summary of the activities and status of the various subcommittee projects.

My records have the chairmen as listed below:

R. E. Liebich	Audible Sound and Vibration
J. K. Easley	Bushing
L. S. McCormick	Dielectric Tests
B. F. Allen	Dry-Type Transformers
O. R. Compton	Performance Characteristics
H. A. Pearce	Insulating Fluids
C. J. McMillen	Insulation Life
R. C. Thomas	Instrument Transformers
R. G. Jacobsen	West Coast
L. R. Smith	Standards

Project Status

PC57.12.00 - General Requirement for Liquid-Immersed Distribution Power and Regulating Transformers

New project. Document being discussed in the Working Group.

PC57.12.01 - General Requirements for Dry-Type Distribution and Power Transformers

Review of required changes related to solid resin-encapsulated coils is continuing.

PC57.18.10 - Semi-conductor Rectifier Transformer

New project. Project number received February 1982. Task force had made work assignments. Three subgroups met in January to commence work.

PC57.12.4.161 - Note: Balloted in Transformer Committee, Negative ballots being resolved.

PC57.21 - American National Standard Requirements, Terminology and Test Code for Shunt Reactors

New task force formed, but no progress to date.

PC57.95 - Loading Guide for Regulators

Draft #2 is out for review and will be discussed in Los Angeles.

PC57.96 - Guide for Loading Dry-Type Distribution and Power Transformers

The Working Group continues to consider various changes.

PC57.110 - Harmonic Load Current Heating of Transformers

New project. Number received February 1982. First draft is being developed.

PC57.111 - Guide for Acceptance and Maintenance of Silicone Liquid in Equipment

New project. Task force is doing preliminary work.

P21 - Revision of ANSI C76.1

First ballot being resolved in subcommittee.

P24 - Revision of ANSI C76.2

Approved by the Standards Board December 1981.

P65 - Thermal Evaluation of Ventilated Dry-Type Power and Distribution Transformers

Submitted to the Standards Board November 9, 1981. It passed the Standards Board December 17, 1981. Assigned a C57.12.56 designation.

- P76 - IEEE Guide for Acceptance and Maintenance of Transformer Askarel in Equipment  
No change reported.
- P93 - Transformer Impulse Tests (C57.98)  
Draft #5 with no unresolved negative votes has been submitted to the Standards Board for approval.
- P238 - Revision of ANSI C57.21, Correction of Loss Measurements on Shunt Reactors  
Complete. Assume to be part of C57.21 now in print.
- P262E - Revision of C57.12.90 Loss Tolerances  
Draft #2 of Working Group ballot on connection of voltmeters for no-load loss being voted.  
P262E/D2 on phase angle errors due to instrumentation being balloted in Transformer Committee.  
Draft #1 on no-lead measurement errors caused by applied excitation voltage distortion being answered by Performance Characteristic Subcommittee.  
Revision of Wording for Ratio Tolerance Section of C57.12.00 balloted in subcommittee. Progressing toward resolution of two negative ballots (was P462D).
- P345 - Review of IEEE Std. 345-1972 Test Procedures for Thermal Evaluation of Oil-Immersed Distribution Transformers (C57.100-1974)  
Ballot P345/D4 out and to be returned by March 31, 1982.
- P462C - Revision of C57.12.00 Loss Tolerance and Measurements  
Drafts being balloted in the Working Group.
- P507 - Revision of C57.92, The Power Transformer Loading Guide  
Printed.
- P513 - Seismic Guide for Power Transformers and Reactors  
Except for one minor problem, which is expected to be cleared up in Los Angeles, the guide is ready.

- P523 - Guide for the Control of Transformer Sound
- Liebich reports that Colin G. Gordon has been appointed chairman of the Working Group to rename "Noise Control Technology" and will determine if existing documentation is valid or will have to start over.
- P545 - Recommended Practice for Partial Discharge (Corona) Tests for Transformers
- Still being discussed in Working Group.
- P546 - Revision of ANSI Requirements for Instrument Transformers C57.13-1978.
- Ready for review of ballots on proposed "Conformance Test Procedures for Instrument Transformers C57.13-1978." Continuing work on revision of C57.13-1978.
- P547 - Revision of ANSI C57.94-1958, Guide for Application, Installation, and Maintenance of Dry-Type Transformers
- Being printed.
- P637 - Proposed, Guide for the Reclamation of Insulating Oil and the Criteria for Its Use
- Being reviewed by the Standards Board.
- P638 - Standard for Type Tests on Class IE Transformers for Nuclear Power Generating Stations
- Draft #11 being balloted in the Working Group, Performance Characteristics Subcommittee and NPEC SC-2.
- P670 - Switchgear and Transformers Working Group on Instrument transformers for High Voltage Circuit Breakers
- No change reported.
- P673A - Shunt Reactor Audible Sound Test Code Addition to ANSI C57.21
- Complete. Assume to be part of C57.21 now in print.
- P673B - Shunt Reactor Vibration Test Code Addition to ANSI C57.21
- Complete. Assume to be part of C57.21 now in print.

- P731 - Revision of Guide for Loading Current Limiting Reactors, ANSI C57.99  
Still looking for a chairman for this task force.
- P732 - Revision of Current Limiting Reactor Standards, ANSI C57.16  
No change reported.
- P733 - Revision of Shunt Reactor Standard, ANSI C57.21  
Printed.
- P740 - Dielectric Test Requirements for Power Transformers for Operating at System Voltage from 69 through 230 kV (C57.XX)  
Document has been approved by the Standards Board.
- P745 - Guide for Conducting a Transient Analysis for Dry-Test Transformers (C57.XX)  
Working Group is making further changes in the document.
- P756 - Guide for Loading Transformers Above 100 MVA  
Draft #5 of this new guide is being balloted now in the Working Group and the Insulation Life Subcommittee.
- P757 - IEEE Guide for Loading Power Apparatus Bushings  
Approved by the Standards Board December 1981.
- P784 - (Transformer Through Fault Current Duration Guide)  
Ballot P784/D4 was voted on with one unresolved negative ballot. Ballot P784/D5 is out to Transformer Committee and is to be returned by March 15, 1982. The committee members were asked to review again after considering the one negative ballot with reasons which accompanied /D5. Results will be discussed in Los Angeles.
- P785 - Transformers Connected to Generators  
P785/D3 on this guide is being balloted in the Working Group.
- P786 - Transformer Failure Reporting and Reliability Analysis  
Balloting P786/D2 in the Working Group.
- P799 - Guide for Handling and Disposing of Askarels  
Preliminary work on first draft being prepared.

- P800 - Bushing Application Guide  
Still being worked on in the Bushing Subcommittee.
- P801 - Recommendations for Revisions to ANSI C57.15 Requirements, Terminology, and Test Code for Step-Voltage and Induction-Voltage Regulators  
Draft #4 out for ballot January 18, 1982. Results to be discussed in Los Angeles.
- P832 - Detection and Measurement of Partial Discharge (Corona) in Instrument Transformers  
No change reported.
- P838 - Guide for Performing Overload Heat Runs  
Task force preparing fourth draft for balloting in task force.
- P842 - Loss Evaluation Guide  
Expect to have a new draft for discussion in Los Angeles.
- P852 - Bushings to Operate in Gas-Insulated Substation  
New project. PAR submitted in October 1981. Now in the Bushing Subcommittee.

In the Insulating Fluids Subcommittee there have been two requests for Project Authorization:

1. Guide for High Temperature Hydrocarbons
2. Gas Guide

In L. S. McCormick's Dielectric Tests Subcommittee a task force has been formed to consider action on the trial use document 262B - Dielectric Tests of Transformers for use on effectively grounded systems, 345 kV and above.

There still seems to be some confusion in the legitimacy of P262E, 462D, and P787. These projects all pertain to Loss Tolerance and/or Loss Measurement. See the Standards Board letter to L. W. Long, June 22, 1981.

There are a few projects which I have been unable to get a handle on. The full title of these is in the preceding accounting:

P670 - Instrument Transformers for High-Voltage Circuit Breakers

Last reported action was mailing of ballot P670/D4 dated September 16, 1980.

P732 - Current Limiting Reactors

Last report was in March 1980, when D. A. Duckett resigned and a new chairman was being sought.

P832 - Partial Discharge in Instrument Transformers

The committee was to investigate to see if this work should be incorporated into C57.13.

If readers of this report note any projects listed that are no longer active or valid and should be removed, or if any active ones are not listed, please let me know so that I can add or delete as necessary. Please furnish P number, title, and relation to IEEE or ANSI Standard.

3.11 West Coast Transformer Committee - R. G. Jacobson

Minutes

The meeting was convened at approximately 1:00 p.m. by Chairman Roger Jacobsen. Members and guests introduced themselves. The minutes of the subcommittee's last meeting of 7/30/81 were approved.

Membership

Jack Shulman of Westinghouse is retiring and Larry Merrifield is taking his place.

The working group membership list was passed around for corrections.

Report - Main Transformers Administrative Committee - Roger Jacobsen

Roger Jacobsen gave a brief report on the meeting held last night. There is a new IEEE Transformer's Committee Operating Manual available now. It lists such things as the way projects are set up, how to report, samples of forms used when voting on projects, forms for project authorization, etc. If you want a copy see Roger. When a project is started the IEEE used to



assign a "P" number which means project and then a 3 digit number. Any project that has to do with revising an existing ANSI standard will be given an ANSI number to start with. The draft number will indicate it is preliminary. We will not be using the "P" number as often in the future. There are new forms for future standards and Roger has samples. The suggestion was made that if we are going to start a project that it would be a good idea to ask for papers on that subject to be presented at the future IEEE meetings. We may obtain a lot of good information that might otherwise be dormant. Roger discussed the requirements to become a full member of the Transformers Committee and circulated an application form.

There is a task force drawing up recommended practices for 1200 kV AC system operation. We'll be hearing more about this, there hasn't been any particular standards or practices drawn up for this high voltage.

Report - Working Group on Consolidation of Guides 283 and EHV 514  
(ANSI C57.12.11 and C57.12.12 - Roger Jacobsen)

Now that C57.12.11 and C57.12.12 are finished we have been asked by John Dutton, Chairman of the IEEE Delegation to ANSI C57, to develop a document to replace C57.93, "Guide for Installation and Maintenance of Oil Immersed Transformers" which has not been kept up to date. When we consolidate C57.12.11 and C57.12.12 we should include information from C57.93. It is possible that the consolidation guide could use C57.93 for a number and include transformers of all sizes and voltages. We have to make an application for authority to work on this project by submitting an IEEE "Standard Project Authorization" form. We have submitted this form before. Del Johnson offered to continue working on this guide.

If members of the subcommittee do not have any objections, we will proceed with this consolidation guide. A discussion was held to determine if the guide should include both installation and maintenance. It was decided that initially the title would include both installation and maintenance, but could be changed later. We may limit the guide to 1000 KVA and above. The subcommittee will decide the size and range of transformers to be included in the guide.

Report - Seismic Guide

Jess Herrera reported earlier that the previous "No Objections," were not considered as an approval and he has to contact the "No objectors" and get "approval."

Report - Transformer Fire Protection Guide

John Galbraith sent out a questionnaire on Fire Detection Practices. A tabulation of the responses is attached. BPA, Portland has had two substation fires in the last two months. Jay Laakso, BC Hydro, has a tape of a fire they had in downtown Vancouver, BC. It can be made available for our next meeting. John Galbraith suggested the "Guide" be changed to a "Recommended Practice" rather than a guide.

This is a very important subject and precipitated a lot of discussion.

Roger will talk to Jay Laakso to chair the working group. We will try to have a written request for this guide and discuss it further at our next meeting.

Report - Informal Working Group Transformer Evaluation Guide - IEEE P842 - Roger Jacobsen

The working group met 10/19/81 and reviewed about half of the draft. Roger will rewrite the draft based on the changes talked about and send it out for people to study. At the next working group meeting we'll go through the remainder of the draft. Roger will send the revised draft to the members.

Shipping Damages

Tom Hawkins sent a letter to the committee members and asked where we thought the shipping problem should be solved, i.e., the railroads, insurance companies, or etc. Tom also is not sure that IEEE should be involved in it. Several years ago this same problem was discussed and was not resolved because of the inability to determine responsibility and IEEE's role in solving the problem. Responsibility was discussed further and the suggestion was made to write a "good shipping" practices guide with pictures and descriptions of the best ways to ship transformers. Tom Hawkins reminded us that in the "Installation" guide we have a section on transformer shipping. Maybe this is the place to add the "good shipping" practices guide. This is probably not what Charlie Honey wanted, but might be the right approach to the problem. Tom pointed out the difficulty as he sees it is not in the railroads not accepting responsibility, but in their accepting responsibility too easily, as if they didn't care. What we're really after is to get the equipment delivered undamaged. Further discussions pointed out the merit of having a rider accompany the transformers and the manufacturers' responsibility to have it shipped properly. Tom doesn't feel that this group can get into shipping routes or switching yards to avoid, etc. He believes that the best vehicle may be the consolidated guide. Other ideas were presented. Tom will continue working on this problem and will contact the railroads

and see if they have any standard practices or procedures. He will send a copy of what he has on the subject to members of the committee for their review.

Including Maintenance in the consolidation guide was discussed and the problem that may be encountered. The "shipping" part of the old guide was reviewed by Roger.

#### New Projects

1. Consolidation guides.
2. Loss evaluation guide - we have been authorized to proceed.
3. Fire protection.
4. Painting.
5. Shipping - see what Tom comes up with.

Keep in mind any new project of interest.

#### Meeting Schedule

July 1982 in San Francisco at the Summer Power Meeting.

At the July meeting in 1982, we will select a new chairman. Roger's two-year term will be over.

FIRE DETECTION PRACTICES

12/13/81

MINUTES OF THE IEEE  
TRANSFORMERS COMMITTEE  
MARCH 31 1982

OCTOBER 13, 1982  
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<u>UTILITY</u>	<u>DETECTORS?</u>	<u>CENTRALLY REPORTED?</u>	<u>SUPPRESSION?</u>	<u>TRANS. RATINGS?</u>	<u>VALID ALARMS?</u>	<u>PROBLEMS?</u>
Washington Water Power	CANCO Model 52 190°F + Rate-of-Rise	YES	YES WATER - FOG	2 - 20 MVA	NO	NONE
Southern Calif. Edison	NO	N/A	N/A	N/A	N/A	N/A
Portland General Electric	Firewall 225°F + Rate-of-Rise	YES	YES Water Deluge Zurn Industries	GSU 115 MVA 170 MVA 555 MVA	--	--
Pacific Gas & Electric	INDOOR STATIONS ONLY	YES	YES WATER - FOG	INDOOR STATIONS	NO	NONE
Nevada Power Co.	NO	N/A	N/A	N/A	N/A	N/A
Puget Sound Power + Light	NO	N/A	N/A	N/A	N/A	N/A
BONNEVILLE POWER ADM.	ADM. YES Firewall 275°F + Rate-of-Rise	YES	NO	Above 30MVA	NO	MOISTURE (Ground Fault)

JMG

4.0 Liaison Reports - W. J. McNutt

A liaison replacement for C62 surge protective devices is needed. A good replacement would be Ed Yuseda who has agreed to this task.

In relation to C68 liaison, L. S. McCormick agreed to act as liaison. Liaison reports are as follows:

1. The Technical Advisory Group for IEC TC 14 has been reorganized to encompass a broader and more diversified technical base which will better represent the viewpoints of the transformer industry.
2. A U.S. member (working by correspondence) has been proposed to join WG 18, which concerns the revision of Publication 354, the IEC Transformer Loading Guide.
3. There have been no meetings of IEC TC 14 or 14B since March 1980. None are expected until late 1982, or 1983.
4. In December 1981 the writer responded to a request from Mr. J. A. Goetz, TA for IEC Publications of Terminology, etc., to comment on proposed "Chapter 421 of the IEC: Power Transformers and Reactors," providing several pages of comments and suggestions. Mr. Goetz expressed appreciation for the comments.
5. The writer attended the "Panel to Promote Better Understanding of International Standards" held 2/3/82 at the IEEE/PES Winter Meeting.

IEC publications pertaining to transformers are listed below:

A. Publications Pertaining Directly to Transformers

1. IEC 76-1 (1976), Power Transformers, General
2. IEC 76-2 (1976), Power Transformers, Temperature Rise
3. IEC 76-3 (1980), Power Transformers, Insulation Levels and Dielectric Tests
4. IEC 76-4 (1976), Power Transformers, Tappings and Connections
5. IEC 76-5 (1976), Power Transformers, Ability to Withstand Short-Circuit
  - a. Amendment No. 1 (1979)
6. IEC 214 (1976), On-Load Tap-Changers
7. IEC 354 (1972), Loading Guide for Oil-Immersed Transformers
8. IEC 542 (1976), Application Guide for On-Load Tap-Changers
9. IEC 551 (1976), Measurement of Transformer and Reactor Sound Levels
10. IEC 606 (1978), Application Guide for Power Transformers
11. IEC 616 (1978), Terminal and Tapping Markings for Power Transformers

B. Publications Related to Transformers

1. IEC 38 (1975), IEC Standard Voltages
  - a. Amendment No. 1 (1977)
2. IEC 137 (1973), Bushings for Alternating Voltages above 1000 V
3. IEC 156 (1963), Method For the Determination of the Electric Strength of Insulating Oils
4. IEC 179 (1973), Precision Sound Level Meters
5. IEC 289 (1968), Reactors
6. IEC 422 (1973), Maintenance and Supervision Guide for Insulating Oils in Service
7. IEC 445 (1973), Identification of Apparatus Terminals and General Rules for a Uniform System of Terminal Marking, Using an Alphanumeric Notation

ANSI C57.12.1 - POWER TRANSFORMERS (J. C. Dutton)

No committee meeting.

ANSI C57.12.2 - TASK FORCE ON DISTRIBUTION TRANSFORMER PRESSURE RELIEF (C.P. Kappalar)

Draft V of C57.12.26 was review at October 8 meeting, and Draft VI modified per discussion will be reviewed at the meeting scheduled for April 22, 1982. All other C57.12 standards are either approved for publication or are current.

The committee addressed a concern expressed by Mr. Frank Trayer regarding the technical adequacy of the penta head bolt dimensions as it relates to cabinet security. The committee instructed the chairman to draft a response letter to Mr. Trayer to the effect that due to variation in socket wrenches generally available, it is not practical to devise a head which cannot be opened with any. Further, it was never represented as being a foolproof system, but an added impediment to unauthorized entry.

ANSI C57.12.5 - DRY TYPE TRANSFORMERS (J. C. Dutton)

No Committee Meeting.

ANSI C57.13 INSTRUMENT TRANSFORMERS (R. C. Thomas)

No report. All work on revision of ANSI C57.13 is being done within the IEEE Instrument Transformer Subcommittee.

ANSI C57.15 - VOLTAGE REGULATORS (A. C. Wurdack)

No Meeting. No report.

ANSI C62 - SURGE PROTECTIVE DEVICES (E. J. Adolphson)

No report available.

ANSI C68 - TECHNIQUES FOR DIELECTRIC TESTS (L.S. McCormick)

No activity. No report.

ANSI C76 - BUSHINGS (N. J. Melton)

No activity. No report.

ANSI C84 - PREFERRED VOLTAGE RATINGS (J. C. Dutton)

1. There have been no meetings of the ANSI C84 Committee since the last Transformers Committee Meeting.
2. The proposed revision of ANSI C84.1 has been balloted. It has received a comment (which appears to be reconcilable), and a negative vote from the Air Conditioning and Refrigeration Institute which is being discussed with the object of achieving resolution.
3. To my knowledge, the next ANSI C84 meeting has not yet been scheduled.

ANSI C89 - SPECIALTY TRANSFORMERS (S. J. Antalis)

1. No ANSI C89 Meetings were held since the last report.
2. ANSI C89.1 (NEMA ST-1) has been reaffirmed.
3. At the NEMA Annual Meeting, November 11, 1981, resolution of a negative comment o reaffirmation of ANSI C89.2-1974 (NEMA ST-20) was accomplished. The Technical Committee of NEMA ST-8 will review, re-edit, and republish (ST-20) C89.2 to inclu only transformers 600V and below, so no conflict will exist with other published Dry Type Standards. This effort is expected to take two years.
4. At their February 18, 1982 meeting, the ANSI Board of Standards Review reaffirmed ANSI - C89.2.

ANSI C92 - INSULATION COORDINATION (J. C. Dutton)

1. There was no annual meeting of the full committee of ANSI C92 in 1981. The administrative subcommittee met on 1/12/82, but this meeting was not attended by your liaison representative.
2. The full ANSI C92 Committee will hold a meeting 12/2/82 in Atlanta.
3. ANSI C92.1 (Insulation Coordination) is almost complete.
4. ANSI C92.2 (Voltage Levels) is now complete and issued.



4. Working Group 11 - Chairman W. R. Goldbach

A HVACC document "Proposed Conformance Tests for Separable Insulated Connectors" was approved by HVACC Subcommittee I and forwarded early this year to ANSI C119 with a recommendation for balloting as publication ANSI C119.2(a) - 198X. It is anticipated that the document will be issued as a supplement to the latest revision of ANSI C119.2.

5. Working Group 14 - Chairman J. H. Keeler (General Electric)

Document is "Proposed Addendum to American National Standard for Instrument Transformers C57.13.2." This document was balloted by ANSI C57 and negative ballots are presently being resolved so that the document may be reballoted.

6. Working Group 16A - Chairman G. M. Bell (General Electric)

Document is "Proposed American National Standard Conformance Guide for Thermal Evaluation of Dry-Type Ventilated Transformer Insulation Systems." The document has been split into two sections, one covering conformance requirements and the other covering test procedures. The first section is being handled as an appendix to C57.12.55-198X which is covered by Item 1 above and has accompanied that document in its submittal to C57. The second section is being coordinated with IEEE-65 and has received approval from the IEEE Standards Board. The document will now be forwarded to C57 for publication. It is anticipated that the document will be published as C57.12.56.

7. Working Group 16B - Chairman R. D. Buckley (Westinghouse)

Document is "Proposed American National Standard Conformance Guide for Insulating Systems and Materials for Liquid-Filled Transformers." The document accompanied Item 2 above as an appendix when sent to HVACC Subcommittee I for balloting as well as when it was sent to ANSI C57 for comments. It is being handled as an appendix to the documents of both W.G.'s 2 and 2A on liquid-filled transformers.

NATIONAL ELECTRIC CODE (E. J. Huber)

In January of 1982, the Code Making Panels met to consider proposals for the 1984 National Electrical Code.

The action taken with regard to Section 450-23 may be of particular interest to those involved with the installation of liquid-filled transformers employing one of the new "High Fire Point Liquids."

The present edition of the National Electrical Code (1981) permitted transformers insulated with Listed less-flammable liquids to be installed without a vault in noncombustible occupancy areas of noncombustible buildings, provided there is a liquid confinement area and the minimum clearances required by the heat release rates of the Listed liquid are maintained. A less-flammable liquid is defined as one having a fire point not less than 300 C.

Subsequent to the printing of the 1981 Code, a Tentative Interim Amendment to Section 450-23 was issued by the National Fire Protection Association. The effect of the TIA was to delete reference to heat release rates of the insulating liquids and to permit transformers insulated with the less-flammable liquids to be installed without vaults in noncombustible occupancy areas of noncombustible buildings provided there are liquid confinement areas and the liquids have a fire point of not less than 300 C.

As a result of a number of proposals for the 1984 NEC, regarding Section 450-23, the Code Making Panel adopted the following wording for this section:

"450-23 Less-Flammable Liquid-Insulated Transformers

Transformers insulated with Listed less-flammable liquids shall be permitted to be installed without a vault in noncombustible occupancy areas of noncombustible buildings, provided there is a liquid confinement area, the liquid has a fire point of not less than 300°C, and the installation complies with all restrictions provided for in the Listing of the liquid.

Such indoor transformer installations not meeting the restrictions of the liquid listing or installed in combustible buildings or combustible occupancy areas, shall (1) be provided with an automatic fire extinguishing system and a liquid confinement area, or (2) be installed in a vault complying with Part C of this article.

Transformers installed indoors and rated over 35,000 volts shall be installed in a vault.

Transformers installed outdoors shall comply with the safeguards of Section 450-27."

This proposal in effect reinstates the requirement for applying the heat release rates of the insulating liquid used since this is one of the restrictions provided for in the listing of all presently "Listed" liquids as published by Factory Mutual Research Corporation.

This proposal will be published for public comment in the Report of the National Electrical Code Committee (Preprint of Proposed Amendments for the 1984 NEC), to be issued in early June, 1982. This document may be obtained from:

National Fire Protection Association  
Batterymarch Park  
Quincy, Massachusetts 02269

It is urged that all who have an interest in the above proposal, or any other aspect of the NEC, obtain a copy of the Preprint and send any comments they may have to NFPA by the indicated deadline, which probably will be a date early in November of 1982.

Mr. L. Spagins of NEMA described the actions occurring in the ANSI Committees. He described the reassessment of ANSI's role in the development of voluntary consensus standards. ANSI has actively sought the input from those organizations mostly likely to be affected by the new procedures. The expressed purpose of this reorganization has been to enhance the due process and approval criteria for the development of ANSI American National Standards, strengthen the planning, coordination, and harmonization functions of ANSI, and to eliminate the perception that ANSI develops standards. The reorganization of ANSI's procedure has lead to confusion, a lot of misunderstanding and speculation on the part of those who have participated in the consensus method of standardization.

I would like to take this opportunity to inform the IEEE Transformer Committee on the latest developments in the proposed new ANSI's procedures and how they will affect the C57 Transformer Committee operations. On March 26, at the ANSI's annual meeting the newest ANSI's procedures dated March 1, 1982 were accepted for approval. This procedures will be those that will be used in the future for the development of American National Standards. There is however, a two year grace period before these standards take effect. During this time the C57 Committee will continue to operate just as it has in the past with the Main Committee and Subcommittees developing American National Standard for approval by ANSI. The executive Standard Committee at ANSI, plans to issue guides and directions to ease the transition from the current operations to accommodate the new requirements. In the final analysis, the only real affects that these new requirements will have on the C57 Committee is to change the name of them. The American National Standards Committee C57 will become the accredited American National Standards Committee C57. This is to facilitate the perception that ANSI is not involved in the actual development of standards rather they are an approving body to insure the consensus method was employed in the development. Their will be concluded to be C57 Main Committee, their will continue to be C57 Subcommittees working together, manufacturers and users developing consensus standards which will then be submitted to C57 Main Committee for approval. They won't be disbanded as there has been some speculation that there would be; there is really only a matter of semantics is all that we are talking about. There will be few changes that affect me, as secretary of that Committee but, as far as the procedures used to develop those standards there really won't be any changes.

Mr. Honey asked if the private sector could write standards. Mr. Huber and Spagins indicated yes if it is submitted to ANSI. It was also noted that NEMA would continue to carry a secretary. The accreditation process will be completed in about two years. Also, IEEE has been accredited and will continue to submit standards to ANSI.

ATTACHMENT I

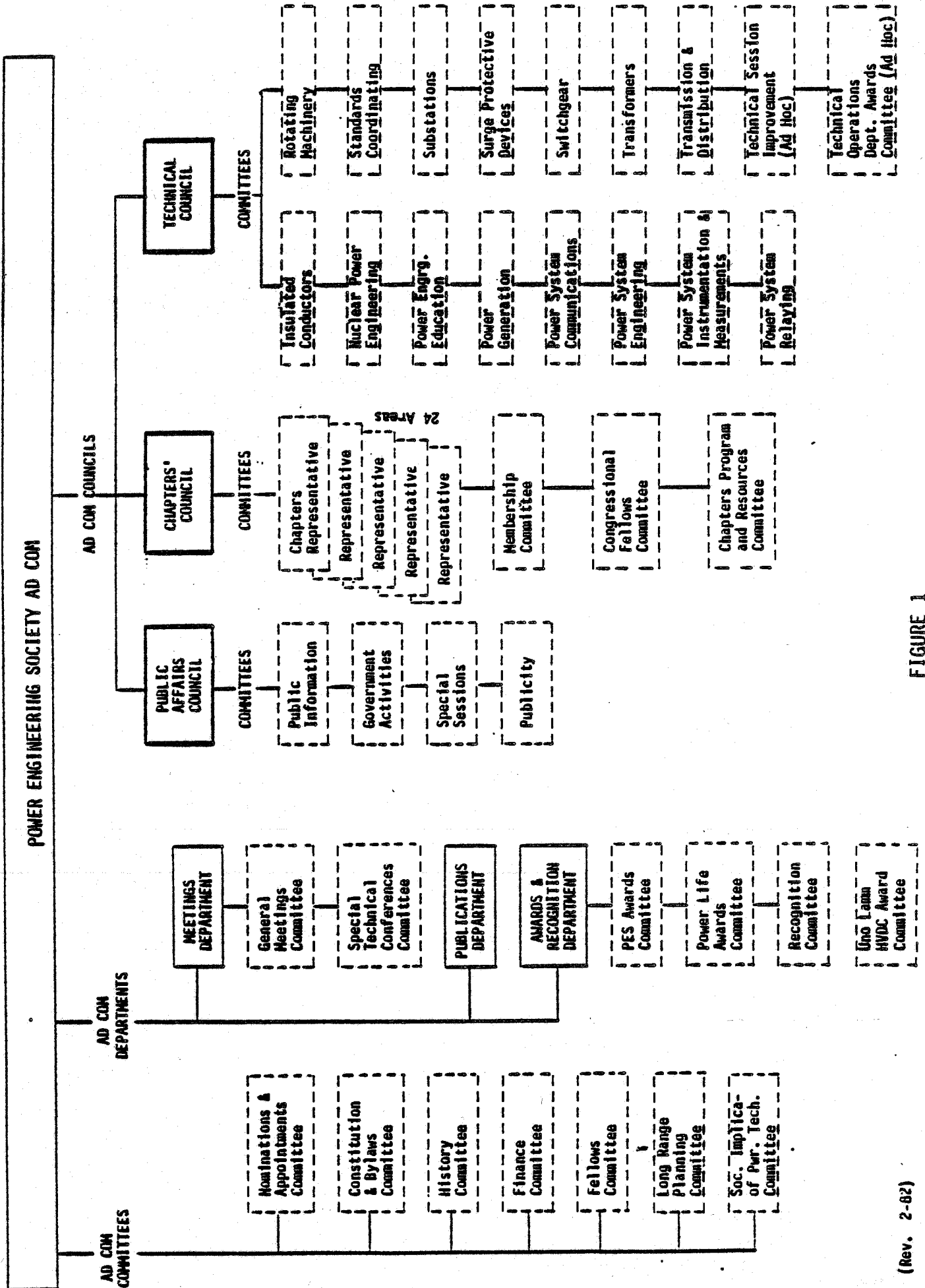


FIGURE 1

5.0 Technical Papers for Future IEEE-PES Meetings - L. Savio

Mr. Savio indicated that he requests four reviews per paper. He requested that the reviewers be cognizant of the quality of the papers. Twenty-three papers were submitted, five were rejected. Some of the papers accepted may have been borderline quality.

Mr. Savio asked; (1)to return the review on time, (2)complete the form, and (3)provide a narrative why the paper was rejected or accepted.

6.0 New Business

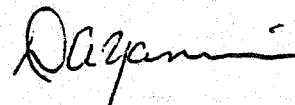
Mr. F. Huber noted the IEEE Headquarters phone number has been changed to 212-705-7960.

Mr. P. Bellaschi provided some interesting and entertaining historical remarks to the Committee about the progress of Dielectric Test Standards over the past 50 years.

Mr. L. Miller discussed warning labels devised by the NEMA Task Force. A display was provided and comments from the Committee were solicited both verbally and in writing.

The meeting was adjourned at 10:47 a.m.

Respectively submitted,



Dean Yannucci, Secretary  
IEEE Transformers Committee

ATTACHMENT I

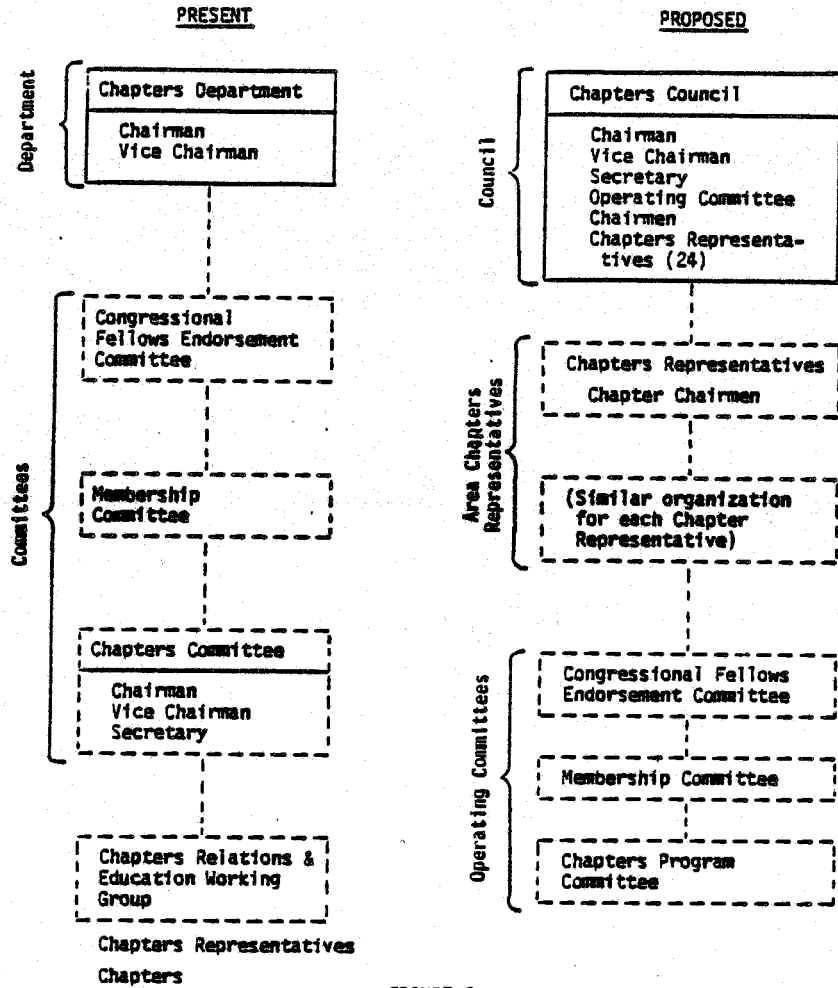


FIGURE 2

Comparison of Present and Proposed Chapters Organization

	1982													
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
1. Recommended by Ad Com	x													
2. Review with and distribute to Council		x												
3. Publication in REVIEW				x										
4. Study by Council and approval in principle (Letter ballot)			—————		x									
5. Prepare Syllab and Constitution changes			—————		x									
6. TAB review and approval					—————	x								
7. Required publication of Constitution changes in REVIEW							—————							
8. Further Council discussion							x							
9. Final Council ballot									—————		x			
10. New organization effective													x	

FIGURE 3

Suggested Timetable for Implementation of Proposed PES Organizational Changes