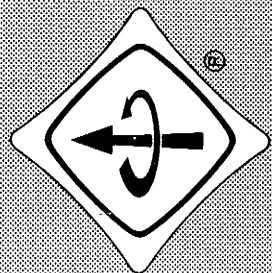


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I E E E



Professional Communication Society

N E W S L E T T E R

# IPCC 91: The Engineered Communication

by D. L. Plung, Conference Chairman

Like every IPCC conference chairman, I have spent the first months of my tenure feeling very anxious about the response our program would receive: Would the themes maintain the high standards set at previous conferences? Would our call for papers elicit a quality of response suitable to ensure an interesting and edifying program? Would the conference environment be attractive enough to our professional colleagues in this era of increased opportunities for professional development and decreased corporate and university budgets?

Well, as we approach the cutoff date of the submission of abstracts, I feel these anxieties rapidly dispersing. Owing to the devoted efforts of the IPCC 91 Steering Committee, the

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*... Over 80 abstracts have been received ... an exciting array of papers, panels, and even a new conference series has been proposed.*

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initial response to IPCC 91 has been tremendous. Chris Forbes, Program Chair, has received over 80 abstracts from all corners of our profession, and an exciting array of papers, panels, and even a new conference series has been proposed. These abstracts are setting a spirited agenda for the Steering Committee's next meeting, at which the conference program will be established. Further, Bill Kehoe (Registration and Finance Chair) and I have received dozens of inquiries from prospective new PCS members.

Yet the papers represent only one facet of the conference preparations. John Strack (Exhibits Chair) is

targeting exhibitors whose products or services complement our program themes. Exhibitors being targeted range from university research centers to computer software/hardware vendors, all dealing with products and services that contribute to successful "engineering" of professional communications. One notable feature being developed is a panel discussion of products and technologies that will influence the development and delivery of technical documentation in the next decade.

Barbara Strack, Publications Chair, is developing specifications for accepted papers. This year authors will be requested to provide electronic copy of their text. This will allow the Publications Committee an opportunity to complete a level of manuscript editing that will provide a consistent, high-quality conference record.

While I don't want to delve into all the ongoing initiatives, I would be remiss if I didn't highlight just three other key efforts. Susan Glasstetter, here in Aiken, has been working with the University of Central Florida (among others) to arrange for music for our registration

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## FROM THE EDITOR

by *Deborah Flaherty Kizer*

Spring is finally in the air, which means IPCC 91 is not far behind! Two articles in this brief but information-packed issue focus on conference planning activities to-date. Hats off to the committee—from all fronts, it looks like IPCC 91 will be a great conference.

As businesses "go-global," we have many opportunities to meet and do business with colleagues from other countries and cultures. Two articles in this issue focus on some aspect of doing business internationally. Walt Fulcher's article focuses on coping with the language barrier when doing business overseas. His tips will certainly help improve our international communications skills. Cheryl Reimold's continuing series in "Tools of the Trade" focuses on negotiation, clearly a critical aspect in doing business internationally. Common business practices and styles in the U.S. do not necessarily play in other business circles.

Special thanks to Tom Rhyne and Ronnie Rawls for their contributions!

Again, all contributions to the *Newsletter* are welcome! ◀

## Division VI Director's Report

by *Tom Rhyne*

My first two months of service as your Division Director have been busy ones. Serving on both the IEEE Board of Directors and on the Technical Activities Board have certainly increased my travel schedule. For example, I attended meetings of both groups in New York in late January, plus a meet-

ing of the TAB Administration Council.

Given my previous experience with IEEE finances as a member of the Budget Development Committee for the past two years, I have been assigned to the TAB Finance Committee and will likely be active in the Institute's financial planning at the Board level as well.

Frankly, those responsibilities are likely to be difficult ones. At the TAB level we are trying to negotiate a stable cost model for our publications. Since IEEE Publications, like so many other IEEE activities, has been subject to significant changes in expenses, this is not a simple issue. Our technical and informative publications are the cornerstone of the IEEE, of course, but the costs of producing them have risen even with the introduction of new technology. My view is that the TAB entities should pay their fair share of the actual costs of the parts of the publication process they utilize, but no more. I expect this issue to be settled in the next several months.

At the Board level, overruns in recent IEEE budgets have become the central issue. Those overruns have resulted from three conditions: (1) Planned expenditures of reserves for "one-time" projects, (2) Unplanned increases in operational expenses in several areas, and (3) Unachieved income projections. For 1991, however, I introduced a motion that requires each part of the IEEE to control its expenses in relation to both its income estimates and its budgetary authorization, adjusting downward whenever either gets out of range. Even so, you should keep in mind that the 1991 budget has a planned deficit of \$500,000.

Given this situation, TAB has taken a significant step, offering to rebate a sizeable portion of its 1991, 1992, and 1993 General Fund income as a means of stopping the Institute's red ink. Hopefully, other parts of the IEEE will follow this lead. By combining tight ex-

pense control, careful income monitoring, and voluntary reductions in budgets, I believe that the IEEE can regain financial stability, but it won't be easy given the operating style of the immediate past.

I will be working with the presidents of the five societies within Division VI on these and other matters during the rest of this year. If any of you have questions or comments that I can help with, please feel free to contact me. Your best approach is to use electronic mail where I'm available as [t.rhyne@ieee.org](mailto:t.rhyne@ieee.org) or [rhyne@mcc.com](mailto:rhyne@mcc.com). ◀

## IEEE PROFESSIONAL COMMUNICATION SOCIETY

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AT&T-International Communications Services, 412 Mt. Kemble Avenue, Room N410-E24, Morristown, NJ 07960. Articles, letters, and reviews from readers are welcome.

# Meeting With Success

by Jim Watson

Engineers spend 25% to 75% of their time in meetings. Meetings are a basic operating procedure and an important management tool. Unfortunately, meetings have a bad reputation. Poor planning and weak execution contribute to the bad name of meetings.

Meetings are usually unpopular because they can waste time. This often is caused by following past practices without understanding or using proven techniques for successful meetings.

## The First Rule

When a meeting is considered, the first question should be, "Do we need this meeting?" Meetings are expensive because they use participants' time which is one of the most costly resources of an organization. They also may require special facilities. Methods of communication other than a meeting may be more cost effective and just as efficient in exchanging information. Therefore, make sure it is really necessary to hold the meeting to accomplish the desired results. The decision to hold the meeting can be determined early if the purpose has been clearly defined. This can be done by developing objectives and outlining major points to be covered. A review of these should help determine whether or not you need a meeting.

If the decision is to proceed with a meeting, the outline will help establish the meeting's agenda and format. A good rule of thumb is, "Don't hold a meeting without a well planned agenda."

## Planning

The next step is to plan. This starts with consideration of who will attend, when the attendees will be available, what facilities will be needed, and which type of meeting will be used. Answers to

these initial questions will provide directions in establishing the length, format and structure of the meeting.

If the meeting is to be small and informal, planning is still important, but may be less involved than a major conference. Many times, all planning and implementation is done by one person. In this case, it is important that this person be well prepared to conduct the meeting.

If a committee is involved in the planning stage, good communication within the committee is critical to the meeting's success. The chairperson should give specific tasks to each member. Committee members in turn should provide feedback to the chairperson indicating they understand the assigned tasks and the time schedules. It is important that all members of the committee become involved.

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## *Big or small, meetings require focus and planning to be effective.*

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Planning includes a check list of tasks as they are completed. Unexpected situations may be experienced. When this occurs, additional communication within the group may be needed. Planners need to be flexible and adapt to changes if needed.

Some free time should be scheduled to break up long meetings. This can provide time for refreshments for the audience and allow time for meeting coordinators to make last minute revisions if necessary. Breaks also provide an excellent opportunity for an informal inter-change of information among speakers and the audience.

The planning stage should also identify those who have major assignments during the meeting. Larger meetings are more effective when several share responsibilities. Assignments will depend on the

complexity, size and length of the meeting. Allowances should be made for last minute changes and backup plans if a speaker is unable to participate or if equipment fails to operate as planned.

## Participants

One mistake in planning meetings is not knowing who should attend. Effective meetings occur when those attending have a high interest in the subject being discussed, or when they will be significantly affected by the consequences.

The quality of the participants is usually more important than the quantity. Also, participants appreciate knowing in advance how much time they should plan for the meeting. The attention and quality of the participation by the audience is improved when planners communicate the anticipated length.

In small meetings, the personalities of the attendees should be considered. Strong-willed participants may overshadow discussions and prevent other viewpoints. Several levels of power may also keep some participants from sharing their ideas. This often creates roadblocks in bringing the subject to a conclusion or in obtaining effective results. The leader needs to recognize that individual personalities are an important factor in small meetings.

For conferences, invitations should be given to those with the most to gain from the formal presentations. Speakers should be selected to match the audience's needs. The best or more entertaining speakers should be scheduled to start and end the meeting.

Panel discussions and breakout sessions may add a more personal or informal atmosphere to meetings. These encourage greater inter-change of ideas, more audience participation and usually maintain a higher level of audience interest.

If meals are to be provided, the menus should be appropriate for the group. Light but filling lunches will help in maintaining audience

attention for meeting sessions which follow. For large groups, it is not a good idea to select unusual or exotic meals. Assistance in planning this portion of the meeting can be obtained from those providing the food.

### Publicity

The most important aspect of publicizing a meeting is timelines. Otherwise, attendance will be poor.

Small, informal meetings of peers or co-workers may only require a discussion of the time and location of the meeting and the agenda. This can be effectively publicized with one or two weeks notice.

If the meeting will involve audience participation, those attending need sufficient information to effectively participate in the discussion. Assignments or information should be provided in writing before the meeting to assure clear understanding of what is expected.

Large conferences and workshops should be publicized with more formal invitations, stating procedures for registration and arrangements for lodging when necessary. These also require a well planned system of registration; and written confirmation to the attendees after they respond to the invitations. Follow-up letters or telephone calls just prior to the meeting will increase attendance.

Because major conferences should be planned well in advance, several notices should be provided to prospective attendees at least six months or more prior to the meeting. Any meeting requiring travel from various locations should be formally discussed at least one month or more prior to the meeting. This should include a copy of the program, and directions, maps and information about the meeting facilities and location.

### Preparing

Many well planned meetings still result in disaster due to the lack of followup and proper preparation of the facilities and arrangements. (See "Who Invited Murphy" on

page 6 of this *Newsletter*.) Nothing should be taken for granted. Without follow-up, things that can go wrong will definitely go wrong. Promises from those who provide meeting rooms, equipment, food and other arrangements are often misunderstood or forgotten.

The chairperson responsible for the meeting needs to be personally involved with each step of the meeting, or to effectively delegate responsibility to co-planners. Arrangements should be checked and rechecked as often as necessary.

Speakers should understand the nature and interests of the expected audience. Unusual or sensitive situations associated with the group should also be discussed with speakers early in the development of the program. The most important item for agreement between the speaker and the program organizers is the exact amount of time allocated for the speaker's presentation. It should be clear that this time schedule will be strictly followed.

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### *Individual careers can be enhanced by practicing good meeting skills.*

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Speakers should be informed of the progress of meeting planning, and feedback should be established in the same manner as originally discussed. All speakers' needs should be carefully discussed to assure that final arrangements are what they have requested.

All key personnel associated with the facility used for the meeting need to be clearly identified. They should be easily available prior to and during the meeting for assistance if needed. Service personnel should be briefed of the meeting schedule and expected times for refreshments. They should also be instructed not to disturb the audience while the meeting is in progress.

Room facilities and audio-visual equipment are especially important for large groups and should be designed with the needs of the major speakers in mind. Many details of facilities should be considered such as:

- Room layout for type of meeting
- Lectern location in relationship to screen and audience
- Light controls and operation
- Room temperature controls
- Water for speakers and audience
- Light on lectern and speaker
- Speaker requests
- Microphone types
- Microphone locations
- Audience microphones if needed
- Sound controls and operators
- Projectors and operators
- Screen size and location
- Pointers or light wands
- Extension cords
- Back-up visual equipment and spare bulbs

Because audio-visual equipment is prone to operating problems, it is important to carefully check out all components of each system prior to the meeting. Lighting controls should be identified and checked before the audience arrives. All projection equipment should have spare bulbs nearby. For more informal meetings, there should be at least one additional spare machine for each type of projector.

Assistance in the operation of all audio-visual equipment should be provided by those coordinating the meeting. It is advisable to assign separate operators to the room lighting system and each piece of audio-visual equipment.

Public address systems often are unreliable or inadequate. These should be checked well in advance of the start of the meeting to allow time for adjustments if needed.

### The Benefits

Even though technology may result in new methods of communication, the need for face to face discussions will continue to make meetings an important form of communication. Because much of our business as professionals incor-

porates the use of meetings, your efforts to improve this activity will be appreciated.

Individual careers can be enhanced by practicing good meeting skills. Planning, conducting and actively participating in meetings builds personal communication skills and offers opportunity to rise above the average. Leadership skills learned in this process will bring success in many other endeavors of your professional and personal life.

*Reprinted from IEEE Potentials, February 1991.* ◀

## IPCC 91

*(continued from page 1)*

reception (Tuesday evening, October 29) and entertainment to accompany the Florida luau (Thursday evening). Ron Blicq is coordinating arrangements to videotape select sessions that will provide a visual record of some of the conference's highlights. Rudy Joenk and Richie Robinson are providing the diplomatic effort needed to finalize the intricate arrangements for Dr. Lantsberg's travel between the U.S.S.R. and the U.S. to serve as our keynote speaker.

As should be evident from this summary, my anxiety has been replaced by optimism, enthusiasm, and excitement. Every week brings more tangible evidence that IPCC 91 will prove itself a worthy successor in PCS's growing history of successful conferences. However, so no one thinks I am now completely without worry, I must confess to one new concern: Are we ready to meet the challenge of hosting what is sure to be the largest attendance ever at an IPCC? I'm eager to find out!

Register early, and reserve your spot in Orlando to find out first-hand. ◀

# Hurdling the Language Barrier

*by Walt Fulcher*

While globe-trotting managers enroll in language courses in record numbers, the corporate need for experts who read and write foreign languages perfectly is more pressing than ever.

Some firms turn to the same language schools for interpretation and/or translation services. Others use professional organizations such as the American Society of Interpreters and the American Association of Language Specialists both in Washington, D.C.

The notorious language barrier is about two feet tall. It can keep you out or, with the help of competent professionals, you can step right over it.

Efficiency and courtesy go hand-in-hand when doing business in another country. What is most efficient usually reflects the best manners. For example:

- Business cards should be printed with English on one side and the host country's language on the other. The best and most economical way to do this is to fax a copy of your business card to your in country office for translation and printing. Be sure to offer your dual language card with the native language side showing.
- Correct a foreigner's English only if asked to do so. After several corrections let the other person speak without interruption.
- Finding the right interpreter is key to international business success. Interpreting is not merely a mechanical process of converting a sentence from one language to another. Rather, it is a complex art, which can be made more difficult when translating complex technical information.

## Basic Guidelines

- If you speak the language of a foreign guest, introduce American colleagues and guests while speaking his/her language. Give

their titles and explain what they do. Your guest will appreciate it.

- Make sure you retain an interpreter who understands the nature of your business and the purpose of each meeting.
- When planning an important business trip to another country, ask a colleague in that country to retain a competent interpreter for you.
- If an interpreter is not present and your foreign guest is not fluent in English, stop periodically and give a brief, clear, slowly spoken explanation in English of what has been happening.
- Do not tell off-color stories or risque anecdotes (even those that most Americans would find quite funny).

Do not hesitate to hire a professional interpreter. This is similar to hiring an attorney or an accountant. In order to get the best possible service, the interpreter must know all relevant details of a meeting agenda. Meet with your interpreter beforehand, have a full briefing and consider him or her to be a part of your team.

*Reprinted from AT&T-ICS News.* ◀

## Newsletter Schedule

The *Newsletter* publications and deadline schedule is as follows:

DEADLINE	ISSUE
May 31	July
July 26	September

Please send your contributions to me at the following address:

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412 Mt. Kemble Avenue  
Room N410-E24  
Morristown, NJ 07960  
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## Who Invited Murphy?

by Jim Watson

Who invited Murphy? (The guy who is always mumbling about the law of fate stating, "Anything that can go wrong will.") You did if you did not carefully plan each meeting detail. Nothing can be taken for granted. No matter how many meetings you may have arranged in the past. To illustrate this point, I will relate some situations I have personally observed at meetings rolled into one scenario.

### The Example

The audience arrives at the location designated in the announcement. There is no one there to unlock the door. In fact, this is the wrong room because the meeting coordinator did not follow-up with the facility planners (at a large corporation or hotel), and they have given the room to another group.

Fortunately, another room is available but there is no screen for the overhead slides. Someone is dispatched to the AV department to secure one. A few minutes later, the chairman of the meeting discovers one of the speakers needs a 35mm projector as well as an overhead machine. This requires dispatching volunteer number two.

After 20 minutes, the screen and projector arrive. Another 10 minutes goes by while inexperienced assistants attempt to set up the equipment. At last all appears ready.

Five minutes into the first presentation, the speaker requests the operator to turn on the projector. Guess what? The speaker has a wonderful black screen to demonstrate his thoughts. Of course, there is no spare bulb because, in the hurry to get the projector, no one thought of one.

Minutes pass . . . a new bulb is placed in the projector and works perfectly. The first slide hits the screen and looks . . . how shall we

put it . . . backwards. The speaker apologizes and states publicly (letting himself off the hook) that he understood this was to be a rear projector arrangement. This is your first clue that a few more (100% in fact) slides are in reverse position.

Of course, the simple solution is to just have someone turn the slides around, right? Well as Murphy would have it, a volunteer assistant with "zip" experience eagerly helps. How hard can it be? And yes, the slides now are legible . . . if the audience stands on their heads for the presentation.

The first speaker is now so upset that he gives up on the slides, on his subject and on the entire meeting. It probably is just as well. The microphone was not working properly, and since the beginning of the meeting another assistant was trying to adjust the volume. After several ear piercing feedback signals the system was finally turned off. A "ha ha" is heard from our old friend Murphy.

However, all is not lost because there is a second speaker. And, fortunately, she is planning to use the overhead projector. Although she has a strong voice and will not need the microphone, there is still one little problem. There is a very strong light on the screen which washes out the slide from the overhead. This presents another on-the-job learning experience for the volunteer assistants—who try all the switches in the room. This

unrehearsed light show provides a diversion for the audience while waiting for the speaker to continue.

Finally, the switch for the light over the screen is located and turned off. Unfortunately, this switch controls all the lights in the room, and now the speaker cannot see her notes. Time for plan B. The speaker uses the slides as her notes. Guess what? The overhead slides are so busy and small no one can read them, including the speaker. After a few unsuccessful attempts at plan B, this second presentation comes to an early death. More reinforcement data for Murphy's law.

As earlier noted, these goofs are not usually all found at a meeting. However, my experience has proven that at least one of these or some other obvious problem will occur.

A wise man once said, "If you don't know where you are going, any road will get you there." While this may be true, it is not a good philosophy when thinking about holding meetings.

Successful meetings are more than luck. Professional meetings are based on planning and communication. The road to their success is well defined. And remember, if Murphy attends, it is because he was invited by those responsible for the meeting.

*Reprinted from IEEE Potentials, February, 1991.* ◀

## CHAPTER CHATTER

### *IEEE Washington/Northern Virginia Sections Joint Chapter of the Professional Communication Society (PCS)*

**Thursday, December 5,  
1991 (Mini-Workshop)  
Technical Writing  
(tentative):**

This mini-workshop is set for Thursday, December 5, 1991, and will be lead by two of the PCS AdCom members, Nancy Corbin

(Chairman of the PCS Membership Committee and a member of our local chapter) and Ron Blicq (Chairman of the PCS Education Committee, and a PCSer from Canada). Keep this date open on your calendar . . . confirmation and more details later.

—Ronnie Rawls ◀



# What's Happening in TAB?



by *H. Troy Nagle and Fernando Aldana*

The year 1990 has seen a number of changes in the Technical Activities Board (TAB) and the Technical Activities Department (TAD). First was a new structure for TAB volunteers that places greater responsibility upon Society Presidents and increases their involvement in the decision making processes of TAB. In the new structure, five Society Presidents are now members of the TAB Administration Council. All thirty-seven Technical Society/Council Presidents actively participate in setting the goals and operating plans for TAB. They also participate in a Society Presidents' Forum/Workshop at each TAB meeting in which they select topics of interest, organize working groups, and establish action plans to accomplish their goals. The new procedures and organizational structure have created a synergistic, constructive atmosphere during the TAB meetings.

The new TAB structure has two new volunteer administrative units, the TAB Publications Products Council and the TAB Liaison Council. The Publications Products Council is an outgrowth of the very successful Book Broker program, which sells Conference Proceedings to libraries and individual IEEE members. The Council is exploring new product opportunities and services for our members, such as repackaging conference proceedings into "theme" volumes and the electronic delivery of publications to libraries and IEEE members through electronic media, such as CD-ROM. The Liaison Council is a policy coordinating body for TAB. It has catalogued all the relationships be-

tween IEEE Technical Societies and non-IEEE entities around the world.

## Increased Emphasis on Long Range Planning

Another new feature of TAB this year is its Strategic Planning and Review Committee (SPARC). This committee is composed of three past Society Presidents and three past Division Directors. It elects its own Chairperson and thereby remains very independent from the rest of the TAB volunteer structure. SPARC recommends a set of approximately 20 operating goals for TAB in any given year. TAB modifies this plan and sets milestones for its various Councils and Committee. SPARC then serves an independent evaluation role by giving TAB a performance rating at the end of the year. Another important role for SPARC is the review and evaluation of the vitality of our Technical Societies.

## 1990 Operating Goals

In 1990, TAB completed 17 of its 20 operating goals, with the remaining three being carried over into 1991. Some major accomplishments were the conversion of all magazines and some *Transactions* to electronic publishing, the development of a new conference registration software package for use by IEEE entities, and the expansion of the Computer Society office in Brussels to include TAB staff. Some ongoing major projects in TAB are a series of training videotapes describing IEEE operations for Society volunteers and paper tracking software packages for conference and journal editorial committees.

## Relocation of TAD to Piscataway

Another significant change in 1990 has been the relocation of TAD from New York City to Piscataway, NJ. The move has been accomplished with only minor disruptions in service. Every TAD staff member now has a new PC and his or her own private, electronic mailbox reachable from most of the networks in use around the world. You may address most TAB volunteers and members of the TAD staff by his or her first initial, a period, his or her last name, followed by @ieee.org (eg., t.nagle@ieee.org and f.aldana@ieee.org).

## International Activities

In September, 1990, TAB conducted a Colloquium in South America. The Colloquium was organized as a technical meeting, university/industry visits, Section/Chapter round table discussions, and a Chapter Chairs' workshop. Fourteen Technical Societies and five Sections participated in this very successful meeting.

## Plans for 1991

New goals for 1991 include the development of applications-oriented periodicals for IEEE members, a centralized conference management service for Society conferences, electronic paper submission procedures for journal and conference authors, electronic database access for Society member and financial records, and a local speakers' database for Sections and Chapters.

## Concluding Remarks

The year 1990 was a banner year for TAB. The new TAB structure is proving to be very effective in helping the Societies develop new and exciting technical initiatives for improving services for IEEE members. The 1990s will be a truly exciting decade for TAB and IEEE.

*H. Troy Nagle was 1990 IEEE Vice President for Technical Activities and Fernando Aldana is 1991 IEEE Vice President for Technical Activities. ◀*

# Writing Lab Reports

by Alan R. Bugos

Experimenting in a laboratory is probably the most effective way students can apply their engineering skills. The skills most involved in this process are organization, observation, familiarization with various equipment, working with others, writing, and communicating ideas and information. In many cases, the least developed skill is documenting the laboratory work and communicating that experience to others.

Engineers are most effective if they can clearly communicate their ideas and developments to others. For this reason, writing and documenting are essential aspects of an engineer's job. It is said that engineers spend approximately 50 to 60 percent of their time documenting their work. Many engineering students don't realize this fact and sometimes have difficulty adjusting to the large amounts of writing they're required to do as part of their jobs. Engineers in the workplace are evaluated by their communication skills, which includes both the quality and sometimes quantity of publications and technical reports.

Engineering students practice their writing in laboratory and design reports. While working as a graduate teaching assistant, I discovered many engineering students could not properly write a laboratory report.

Writing professional-quality laboratory reports can be easy. All it takes is a little time and effort to fully organize the information to be presented. This article provides some guidelines for the organization of laboratory reports. In addition, students will hopefully gain some helpful tips and suggestions for preparing their technical documents.

## The Laboratory Report

Laboratory reports usually contain

the following subsections: Title page, table of contents, list of figures, list of tables, abstract, introduction, theoretical discussion or background, experimental procedure and methodology, discussion of experimental results, conclusion or summary, acknowledgement, appendixes, and references. Depending on the length, type, or contents of the report, the writer should use good judgment as to which sections will best organize the flow of information.

Each section of the report should begin on a new page. The title of each section heading does not have to be generic, for example, Introduction, Theoretical Discussion, etc. Instead, heading titles can be customized such as Introduction to Laser Measurements or Theoretical Discussion of Thermal Noise in Operational Amplifiers. This allows the writer to develop a more interesting document.

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*Engineers are most effective if they can clearly communicate their ideas and developments to others.*

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## The Title Page

The title page is always the first page of the laboratory report. The title of the paper should indicate the subject as clearly and concisely as possible. It should be placed at the top and center of the title page. The name of the author, the date of the experimental work performed, submission date, course number and title, and the name of whom the report was prepared for should also appear on this page.

## Table of Contents and Lists of Figures/Tables

A table of contents serves as an accurate and complete guide to the entire contents of the report. It is necessary only if the report is very long. Entries in the table of contents outline should also appear as headings within the text of the

report. The table of contents contains page numbers for the entire report including Roman numerals for the prefatory pages. For example, the prefatory pages include the title page, table of contents, list of figures, list of tables, and abstract pages. These pages are numbered with lower-case Roman numerals centered at the bottom of the page. The rest of the report should use standard Arabic numerals placed in the upper right-hand margin or in the bottom center of the page.

A list of figures and a list of tables is usually included when there are many figures and tables (six or more) in the report. These two lists proceed the table of contents and give the number, title, and page reference of each figure and table in the report.

## The Abstract

Surprisingly, many junior and senior engineering students do not know how to write an abstract. An abstract is a very short, concise and to-the-point statement of what was done, how it was done, the results and the conclusions drawn. These three elements are essential to a good abstract. The abstract is not a definition of experimental purpose, a general introduction, or a statement of objectives. The abstract is meant to be a timesaving device for the reader and only contains the most critical information. Many technical professionals only scan the abstracts to determine if they want to read the entire paper. In some situations, people reading your paper may base their opinion of the work solely on the content of the abstract.

How long should an abstract be? A good rule of thumb is to make it as short as you possibly can, then cut it in half. Normally, the abstract should not be more than one paragraph or approximately 200 words. The abstract is usually written last after the main body of the documentation is completed. It summarizes the complete document in one simple paragraph without introducing any text or



terminology not included in the paper. Some sample abstracts follow:

#### EXAMPLE 1

A 15 km multimode fiber optic communications system was designed, constructed, and tested as part of the course-work required for ECE489 Electro-optics laboratory. Using a LM741 op-amp and a 555 IC linear timer, an analog signal from an AM radio was pulse-frequency modulated and used to drive an infrared LED connected to an AMP fiber optic connector. An infrared photodiode detected the optical signal which was demodulated and amplified using op-amp circuits. The output signal was compared to the original signal by means of a Tektronix oscilloscope and found to be operational within design specifications. The signal gain of the system was measured to be +20 dB within a measured frequency range of 250 Hz to 21 kHz.

#### EXAMPLE 2

A wide-band Class-B video output driver circuit is described. The circuit contains digital brightness, contrast, subcontract, and black-level inputs. The 5 volt IC dissipates 500 mW and can deliver up to 150 mA with 1 ns rise and fall times to discrete power transistors driving a CRT. The die size is  $100 \times 100 \text{ mils}^2$  and the circuit is fabricated in 8 GHz silicon bipolar technology.

### Introduction

The introduction should explain what the report concerns and why it was written. It should put the experimental work into perspective and lead the reader gracefully into the subject materials. Its length may be a few paragraphs to one or two pages depending on how much information is needed to clearly develop the theme.

### Theoretical Discussion or Background

The theoretical discussion or background section is used to develop the theoretical aspects of the experiment. The description must

make clear to the reader each step of the theoretical development. The inclusion of this section in a laboratory report is often necessary since a great deal of experimental work is performed to verify theory and vice versa.

### Experimental Procedure or Methodology

This section allows the writer to describe the procedure or methodology used for completing the experiment. It is also the place for a detailed explanation of the experimental apparatus or configuration used. If the apparatus or configuration of the experiment is being described, make sure its description is very concise and to the point. A well labeled drawing or diagram is always worth a thousand words. Many instructors do not want students to recopy verbatim the procedure of the experiment from the lab handout, but to simply summarize it in a paragraph or two.

### Discussion of Experimental Results

The discussion of experimental results section is probably the most exciting part of the report. At this point, the reader awaits the experimental results with great expectation. Here the student presents the data acquired and discusses any possible problems or sources of error encountered during the experiment. The data should be presented in reduced form, such as data tables, graphs, or charts. Raw data can be placed in the appendices. Sample calculations of your results may also be included in this section. A well-developed discussion of the overall results should follow. Comparisons can be made between the theoretical and experimental results.

### Conclusion/Summary

The conclusion and summary section provides a clearly stated closure to the report. Conclusions and summaries should indicate what is shown by this work, what is important, and what are the advantages and limitations of the

information presented. Remember that every conclusion must be based on the information described in the report. Check to ensure that the conclusion is consistent with the kind of results promised in the abstract and introduction. When applicable, this section may be used to present potential applications of the results or recommendations for future experiments. In general, conclusions and summaries in laboratory reports are one to four paragraphs long.

### Acknowledgments

This section acknowledges any technical or financial support that was provided to complete the work in the report. If the report deals with any prior work performed by others or if professors or other students have made important contributions to the paper, it should be noted in this section.

### Appendices

The appendix or appendices should follow the acknowledgments section when applicable. The appendices may contain miscellaneous calculations, mathematical details such as derivations and proofs, and computer or program sources codes. Other related information that supports the topic of the paper as developed by the writer may also be incorporated.

### References

The reference section should include a list of all bibliographical work cited in the paper. Each reference should be numbered. When referring to these references in the body of the text, the corresponding number of the reference should be placed in square brackets [4] or at the end of the sentence in superscript form.<sup>(4)</sup> The correct form for reference citations in books, journals, conference proceedings, and conference presentations is shown in the following examples:

- [1] M.R. Author, *Title of the book*, Vol. 3, New York: IEEE Press, 1989, Ch. 2, pp. 32-35.

- [2] D.R. Author, "Title of the paper," *Journal Name*, Vol. 2, pp. 455-457, July 1980.
- [3] M.S. James, et al., "Title of the paper," in *Proceedings of Conference*, 1987, pp. 5-7.
- [4] T.B. Jones, R.B. Smith and K. Miller, "Title of the paper," presented at the IEEE Conference on . . . , City, State, March 6-8, 1987.

Keep in mind the form of the reference citations may vary greatly between disciplines. Every field has their own style and form, so there may be many "correct" forms. The examples shown above are most commonly used in electrical engineering.

### Figures, Graphs, Charts and Tables

Figures, charts, data tables, and graphs are always useful since they help to clarify points made in the paper. All figures should be cited in the text of the report and should be properly labeled and captioned. Ironically, the most common error detected in laboratory reports is the failure to assign a title to figures and tables and to reference these figures in the report itself. Note that the word "Figure" is capitalized in the body of the text. For example, a complete schematic diagram of the digital pulse generator is shown in Figure 1. It's important that all

component values are labeled properly with all inputs and outputs correctly marked, including a label for each pin on the device. If an experimental configuration or apparatus is to be included in the report, make sure the drawing contains a complete schematic of the whole system and that each device or component is clearly labeled. Photographs, charts, plots and graphs are actually considered to be figures and should be labeled as such.

Provide as much information about the figure as possible without adding too much complexity for the reader. There are many engineering students who neglect to label graph axes or to provide units for the data values. Data tables or lists should be properly labeled as shown in Table 1. Note that the title reference is always placed at the top of the table.

Laser Type	Wavelength (mm)
Nitrogen	337.0
Argon	514.5
He-Ne	632.8
Ruby	694.3
Nd:YAG	1064.0
CO <sub>2</sub>	10600.0

Table 1.  
Common laser types and their wavelengths.

### Use of Computers for Developing Lab Reports

Many instructors encourage, if not require, students to investigate the advantages that computers play in wordprocessing, graphics, and document design. There are numerous software packages available which allow students to create equations, graphs, and charts, plot data, draw figures, produce 3D graphics, in addition to basic wordprocessing. Newer wordprocessors include powerful spelling and grammatical rule checkers which help increase writing proficiency. Documents and data can be stored on magnetic media making future changes and revisions possible. Most computers can produce high-resolution laser printer output which really makes a report look sharp.

Sloppy and careless work reflects an apathetic attitude. Therefore, it is important to make your work look as neat and presentable as possible. Most professors and instructors will not only find your work more attractive, but much easier to read and understand. This will win a few extra points when the instructor evaluates and grades the report. If a typewriter or computer is not available to you, the report should be neatly handwritten. It is good to get into the habit of using a computer since you will most likely use one on the job after becoming employed. Most companies provide their engineers with personal computers for documenting purposes and it is recommended that students become familiar with the operation of at least one popular wordprocessing package. Universities now provide students with easy access to personal computers at computer centers for writing reports and English papers, computation, design and drafting.

### Helpful Suggestions and Furthermore

Here are a few suggestions to keep in mind when writing laboratory reports and technical papers. When using a computer wordprocessor, keep the font type and

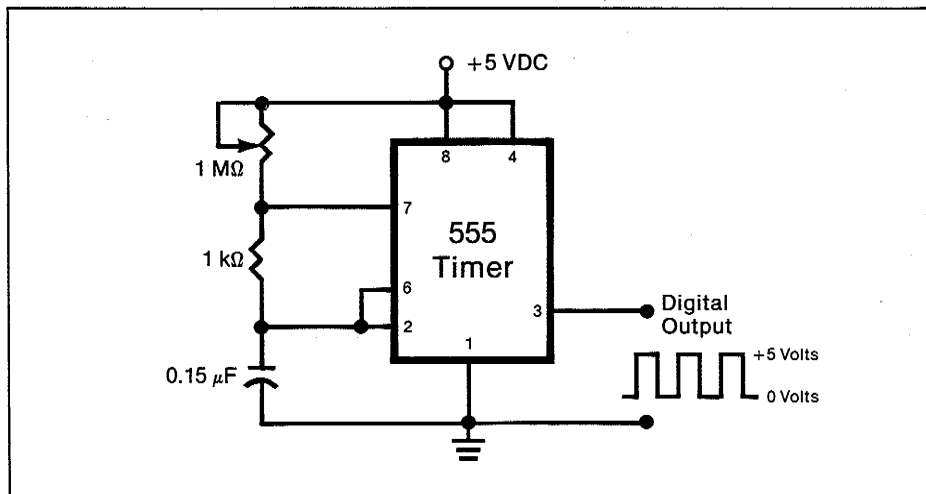


Figure 1. Circuit diagram of the digital pulse generator.

style uniform throughout the document. Too many variations of font type will cause distractions to the reader. Keep your writing as efficient and effective as possible and remember you are not writing a novel. Numbers less than 10 are always written out. If a sentence begins with a number, then it too is written out. The use of the International System of Units (SI) is advocated by the IEEE and other international technical societies. It is best to define any uncommon acronyms and abbreviations the first time they appear in the report. For example, "high-definition television (HDTV) and digital video interactive (DVI) will have a tremendous impact on the video industry of the future."

Several sources of technical writing reference material are available. The IEEE has produced two

publications which may be useful in preparing laboratory reports and technical documents. *An Author's Guide to Procedures for Processing Technical Papers*, and *Information for IEEE Transaction and Journal Authors* are available by writing to the IEEE Publishing Services Department, 345 East 47 Street, New York, NY 10017-2394. These IEEE guidelines contain complete lists of SI standard symbols, acronyms, and abbreviations. *Technical Writing*, a book written by Gordon H. Mills and John A. Walter, is available through Holt, Rinehart and Winston publishers. In addition, *The Technical Writer's Handbook: Writing with Style and Clarity*, written by Matt Young is available from University Science Books.

Writing professional-quality laboratory reports is not difficult to do.

It just takes a little time to organize the information you want to present. And once that is done, away you go. You will find that time spent doing a first-class job will be not only be rewarding to you now, but will surely benefit your career in the years to come.

### Read More About It

G.H. Mills and J.A. Walter, *Technical Writing*, 4th Edition, New York: Holt, Rinehart and Winston, 1978.

IAS Publications Department, "Author's Guide and Guide to Procedures for Processing Technical Papers," Publication of The IEEE Industry Applications Society, New York: IEEE Publishing Service, April 1987.

Reprinted from *Potentials*, February 1991. ◀

## TOOLS OF THE TRADE



by Cheryl Reimold

### Negotiation and Communication

#### Part 4: Being a Realist

When it comes to negotiation, humanity seems to fall into three groups: cynics, idealists, and realists. Cynics believe that everyone is out to bluff and cheat everyone else; the only way to survive is to bluff and cheat better than one's opponents. Idealists believe if one appeals to the good in people, they will always cooper-

ate. Realists recognize that in most negotiations people's interests really are opposed, and that it takes hard work and creativity to reconcile those conflicting interests.

If you find negotiating disagreeable, imagine what the world would be like if we all had the same interests and had the same desires. When I do that, I can see negotiation as an interesting reflection of the variety of human life.

#### Know Your Game Rules

Negotiation is one of the oldest social games; its basic rules have survived many civilizations. You have to go along with those rules to some extent. They are the "common language"—the frame people use to interpret what you say or do in a negotiation.

Here are some the things people expect when they negotiate (however subtly) with you.

#### You'll Start Higher Than You'll Settle For

People just don't expect you to start with your lowest offer. So, whatever you propose at the be-

ginning, they'll assume you will agree to less.

For example, suppose some clients ask you for a date of completion on a large project. If you start by offering your tightest deadline, the clients may press you for an even earlier date, trapping you in an impossible commitment. In the end, you may hurt not only yourself and your subordinates but also your clients, who count on you to meet the deadline.

And there is another point. Even if your first offer was a good deal, the people you're talking to may suspect that they got poor value just because there was no bargaining.

**You Will Not Be Totally Open About Your Needs, Motives, and Circumstances**  
There are several reasons "unconditional openness" is dangerous:

- It makes you vulnerable to exploitation by ruthless negotiators.
- Even if you are totally open, people will try to guess what

you're hiding—so you really haven't gained anything.

- Openness can be an important bargaining tool—if you move toward it slowly and conditionally: "I'll give you some critical information; if you do the same, I'll give you more." When you start with total openness, you deprive the other side of an incentive to reciprocate.

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*Negotiation is one of the oldest social games; its basic rules have survived many civilizations.*

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Suppose you have a difficult proposal, such as asking your colleagues to support your request for a higher budget. Instead of opening with your proposal, wait until you're sure everyone understands the reasons behind it; then they may be more willing to consider your main request. And seasoned negotiators will feel more comfortable with you because you followed the conventions of negotiation.

### **You Won't Make Concessions Without Being Asked for Them**

If you do make an unrequested concession, people will assume that you believe your request isn't reasonable. They'll see it not as a concession but as a weakness.

Say you want an extra technician. Don't mention your "backup objective" of a "technical pool," or you'll get just that. Or, say you want more detailed information included in requests for analysis submitted to your lab. Don't immediately offer to try this new format for three months. Why go through the pain of "renegotiation" three months later unless you absolutely have to?

### **The Realist View of Power**

Being a realist also means recognizing that no one but you will look out for your interests. But

often we feel we cannot defend our own interests—we just do not seem to have the power to do it.

In fact, you have several major sources of power, including:

- Sheer persistence—holding on to your important goals and pursuing them flexibly and intelligently
- Appeal to indisputable moral or scientific norms
- The power to help people—to give them what they need
- Alliance with other people.

Draw on these four sources of power, and you will move closer to your goal. If your goal is good and reasonable and you are dealing with decent people, you will eventually achieve it.

*Cheryl Reimold is author of more than 100 articles and several books, including How To Write a Million-Dollar Memo and Being a Boss. Her firm, PERC Communications (6A Dickel Rd., Scarsdale, NY 10583, telephone 914-725-1024), offers businesses in-house workshops and courses in communication, writing, negotiation, and creative problem solving.* ◀

## **Well-Timed Interviews**

Clinching a job has more to do with timing than you might think. The last candidate to be interviewed gets the job 55.8 percent of the time, according to Runzheimer International, the New York City-based management consulting firm. Applicants who are interviewed first are hired only 17.6 percent of the time. If you think you are among the first job candidates scheduled for an interview, tactfully ask to be rescheduled for a later date. Other bad times for job interviews are Mondays and quitting time.

*Reprinted from Executive Female, March/April 1991.* ◀

## **The Centre for Professional Writing**

### **I have to what?**

You've been enjoying the challenge of the project, it's finally coming together, and it's going to be a success. The only problem is the written report they've just asked for.

You know you can patch something together, but you want the report to reflect the success of the project. Where can you learn the principles of professional writing?

At the Centre for Professional Writing, we offer part-time courses, hands-on workshops, and seminars for business professionals who write reports or proposals, but who have not had any training in professional writing.

Call us to find out how training can help improve your writing skills, or send in one of your reports for a free one-page evaluation. We can also send you a list of upcoming course subjects and dates.

### **Writing That Works.**

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# Making News

## *The Right Publicity Can Turn Your Product Into a Household Word*

Things are looking good. You've launched your business, hired staff and introduced your product or service to the marketplace. It is more than likely, however, that your new software or muffin mix is not exactly a household word. So how do you get customers to ring your phone off the hook with orders? One way is through publicity. Combined with other promotional and advertising messages, publicity can be a powerful tool in building name recognition.

Publicity can be garnered through press articles, public speaking, newsletters, special events and broadcast coverage. It should not be confused with advertising, which involves paying for time or space to get your message across. In placing an ad you determine what you want to say and how often you want to say it. Getting news coverage for your business, however, is a hit-or-miss approach, with control in the hands of editors and broadcasters.

So why bother with the media? The best reason is that publicity can help attract customers. A news story usually interests readers more than an ad because they don't feel they are being sold something. "Editorial coverage in a magazine lends a credibility difficult for a paid advertisement to match," says Nancy Miller of Brown Miller Communications in Martinez, California. Often editorial coverage can result in more sales than an ad in the same publication. Ideally, however, a small business will use both publicity and advertising to get its message across.

Publicity can be useful at any stage of a business—to launch new products and services, announce new business partners or promote an event. When Kathy Nitabach introduced New York Ice Cream four years ago, she sponsored an ice cream-eating contest in Manhattan.

The premium, moderate-priced treat got major television and newspaper coverage when the world's record of nearly 3.5 pounds in 51 seconds was broken. "The ice cream is now sold in stores throughout the state," she reports.

### Research the Media

A public-relations firm can help you with your publicity needs, but even a modest fee may stretch a small company's limited budget. For entrepreneurs who want to promote themselves without outside help, here is some do-it-yourself advice.

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### *Editorial coverage in a magazine lends a credibility difficult for a paid advertisement to match.*

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The media are not limited to your local newspaper or television or radio station and may include, for example, newsletters produced by trade associations—yours as well as your customers'. You need to know which media are most likely to influence your target audience and which are likely to cover your kind of business. The public library has media source books available that list newspapers, magazines, and radio and television stations. *Gebbies All-In-One*, *New York Publicity Outlets* and *Los Angeles Publicity Outlets* are some source books you might consult.

Before approaching the media, read the publication or listen to the show that interests you to determine whether your story fits its audience. Unless your idea is extremely newsworthy, use a pitch letter rather than a phone call to present your story. The pitch letter, no more than a page in length, should convey why your story would be of interest to the media's audience. One advantage of a pitch letter is that it can be customized for each target media.

### Story Hook

Give your story a twist to make it stand out from the crowd. Some story ideas might include how your widget saves customers time and money; how new technologies used to produce your product have increased its safety or durability; or how your product or service fits new trends. While almost no one writes articles about maids these days, maid services are getting a lot of play because they are capitalizing on working women's needs.

It is always a good idea to follow up the pitch letter with a phone call. Make sure your material arrives well before a publication's deadline so the editor has time to assimilate it. Along with the pitch letter include a press release, which briefly describes your company, product or service. It should include the five W's—the who, what, when, where and why of your business. "Make your press release crisp and concise," says Alexis Parks of Media Syndicate, a Boulder, Colorado, public relations firm. "Editors want to scan an idea quickly. If they like the concept they will call for more information." She advises against blitzing the media with expensive press kits, which contain biographies, photos and background material. "Most editors dump out the contents, including the photo, and use the \$5 folder as a file."

Avoid self-promotion, a sure turn-off to the media. "Editors are not impressed with a 'gee whiz' approach. Many are looking for trend stories, so if you pitch your company in a stand-alone article, they can't use it," explains Parks. She advises that press releases be issued on a regular basis as events warrant them. Once media efforts have resulted in favorable publicity, you can maximize the coverage by sending reprints to additional media and prospective customers.

### Speak Out

Other avenues to attract publicity include tying in with charities or holding seminars. Carol Ann Wilson talked up her Divorce Plan software at attorney conventions

### ***Tips for Writing a Press Release***

- Type the release double-spaced on company letterhead, following the basic who-what-when-where-why format.
- Start with the most important information to catch the reader's attention quickly. Cover the other points in the order of their importance.
- Keep sentences short and easy to understand.
- Always name your sources of information when citing figures, trends and studies.
- Be sure to include the name and phone number of the person on your staff to contact for more information.
- Target the appropriate media. An Albuquerque business editor is not likely to use news from a New York company unless it affects local readers or national business trends.
- Address and mail your release to the appropriate department editor; for example, city desk, national news, fashion editor.
- Send a black and white, glossy photo (in focus!) and label all individuals in the picture.

and financial planning groups in Colorado. "Lawyers and financial types were very interested in hearing about my product, which helps to more equitably determine divorce settlements," she says. The speaking engagements, plus numerous articles in trade journals, paid off in sales and name recognition.

Susan Suster, a Chicago carpet designer, promoted her "twinkling" carpets by tying in with an interior

design show. "It was perfect timing. The designers wanted publicity, as did I, so by piggybacking my product with their show, we both got media attention," Suster reports. Her carpets, woven with fiber optics that light up, received national press and television coverage, she says.

In exchange for publicity, you might also consider donating products or services. Providing a floral arrangement for a fund-

raising luncheon not only offers a florist an opportunity to show off her talents, but also publicizes the donor on the invitations, programs and promotional material. You can also reach customers by supporting the Girl Scouts and service clubs in your community.

Good publicity rarely just happens. The key is planning. You should first determine your promotional objectives, then develop a strategy to achieve them. Your game plan should revolve around how you intend to deliver your message to your specific target audiences. Consider all the options and how they could best complement each other. What benefit will your company derive from public speaking, donations and such? How much will it cost? How much time will it take? The choices can go a long way toward keeping your name in front of the competition.

Name recognition cannot be built overnight. Nor will one or two notices in a local newspaper or an industry trade magazine bring instant riches or fame. But they're a start.

*Reprinted from Executive Female, March/April 1991.* ◀

## **Getting Ready for IPCC 91 Come One . . . Come All**

IPCC 91 is rapidly approaching and the Conference Committee is actively working to make this conference the best in recent memory. IPCC 91 has the right program, the right location, the right hotel and the right time of year; all for a modest cost. Attendees are encouraged to bring their families and spend Halloween at our Florida Breeze luau. Before and after the conference you can enjoy the exciting Orlando area and its many

attractions. Early planning will ensure most economical air transportation to this most competitive market. When and where:

October 30 thru November 1, 1991

The Sheraton World Resort  
10100 International Drive  
Orlando, FL 32821

For reservations:  
1-800-327-0363  
(mention IPCC 91)

### **Conference Program**

IPCC 91 will explore the premise that to engineer communications is to design for continued improvement. It will explore engineered communication from four focal points:

- 1) The Discipline—principles and standards; design; work flow; and, verification
- 2) The Practitioner—training;



organizational status and placement; growth and development; and, ethics

- 3) The Environment—tools and technology; data storage, retrieval, conversion; and, delivery problems and solutions, and,
- 4) The Consumer—audience targeting; customer orientation; schedule and budget control; and, integration of information and functions.

IPCC 91 is fortunate to be able to have as its International Keynote Speaker Dr. Henrich Lantsberg who is:

Chairman of the Professional Communication group of the Popov Society and Head of the Science Information Department, the Institute of Radio Engineering and Electronics, Academy of Sciences of the U.S.S.R.

Dr. Lantsberg will be the guest of honor at a Tuesday night recep-

tion and our keynote speaker at the Wednesday lunch. Both events are complimentary for conference attendees.

**Participants** in IPCC 91 will include leaders from the following areas: engineering and engineering management; academic/research and development communities; information/communication practitioners and managers; and, designers and suppliers of innovative communication technologies.

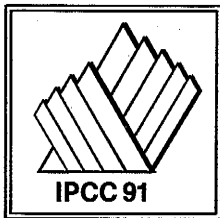
**Exhibitors** are being invited to participate in our conference and will demonstrate products and services that were designed to make our jobs easier and less complicated.

**The Sheraton World Resort** has excellent sports and recreational facilities; 3 heated pools, miniature golf course and a fitness center; all located on 28 acres of tropical retreat. It is within walking distance of Sea World. Transportation

is available at the door to all attractions. Airport shuttle to the World Resort is available at a modest cost or rent a BUDGET car for a week (rates start at just \$79 with unlimited mileage—call 1-800-772-3773 and mention IPCC 91). The special IPCC 91 room rate is only \$89 per night for up to 4 in a room and is good from October 26 through November 2.

**Conference Registration:** Checks should be made payable to IPCC 91. Included in the registration is conference attendance, admission to the exhibits area, keynote luncheon, banquet, Friday luncheon, daily continental breakfast, Tuesday evening social and a copy of the conference record.

## IPCC REGISTRATION



**Clip and MAIL to:** William Kehoe, The Johns Hopkins University, Applied Physics Laboratory, Johns Hopkins Road, Laurel, MD 20723

Fees include conference attendance, keynote luncheon, banquet, Friday luncheon, daily continental breakfast, and a copy of the conference record.

**Please make check payable to: IPCC 91**

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Check \_\_\_\_\_ IEEE/PCS member (\$225)  
 One:      Membership number \_\_\_\_\_  
             \_\_\_\_\_ Non-member (\$275)  
             \_\_\_\_\_ Non-member presenter (\$225\*)  
             \_\_\_\_\_ Student/retiree (\$112.50)

*\*Subject to acceptance of paper for conference*

### Extra Meal Tickets/Conference Records

\_\_\_\_\_ Keynote luncheon (\$17.50 each)  
 \_\_\_\_\_ Friday luncheon (\$17.50 each)  
 \_\_\_\_\_ Florida luau (\$42.50 each)  
 \_\_\_\_\_ Conference Record (\$20)

**OCT. 30  
 THROUGH  
 NOV. 1  
 1991**

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neers, scientists and managers who desire a quick introduction or refresher on the subject.

The course fee is \$215 for members and \$255 for non-members of ASM. Course materials are provided. Excess proceeds go to the general operating and the Morgan L. Williams Scholarship funds of the Washington D.C. Chapter of ASM International.

For more information call, fax, or write Joseph A. Carpenter, Jr. at (301) 975-6119; (301) 990-8729; or Building 223, Room A257, NIST, Gaithersburg, MD 20899, respectively. ◀

