



The Newsletter of the
Society of Actuaries

VOL. 26, NO. 1
JANUARY 1992

THE Actuary

Constitutional amendment ASAs of 10 or more years to vote?

by Linda B. Emory

The Society of Actuaries Board has proposed and overwhelmingly supports a constitutional amendment that would give ASAs of 10 or more calendar years voting privileges in Society elections. Such vote would be for election of officers and Board members and all other votes provided for in the constitution. This right to vote currently is reserved for Fellows. The constitution will continue to restrict the right to hold office to Fellows.

Associates are now "...entitled to be present at meetings of the Society of Actuaries, to present papers approved by the Board of Governors, and to join in discussions..." and "...append to their names the initials A.S.A." The Board resolution suggests that these limitations on ASA membership seem better suited for a student aspiring to move rapidly on to the FSA designation. All members of Sections, including ASAs, have full membership privileges within the Sections.

Why extend the right to vote?

This amendment would bring greater membership participation to long-term ASAs. These members should have equal knowledge of the issues facing the Society and our profession and be just as affected by them as Fellows.

ASAs of 10 or more years have long been required to pay the same dues as FSAs, indicating that the Board has viewed them as having attained positions of responsibility in our profession by virtue of their experience.

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Gearing up to be appointed actuaries in Canada

by W. Paul McCrossan

In October, the Finance Committee of the House of Commons approved a new Insurance Act. This act contains major changes in life insurance powers and regulation and particularly in the role of the actuary in Canada. There was no significant opposition to any of the provisions calling for an enhanced role of the appointed actuary in the legislation. In November, the Senate recommended further strengthening of the appointed actuary's legal protection, which was accepted by the House. The Senate passed the act on December 13, and it received Royal Assent later the same day. The legislation is expected to be fully in force the second quarter of 1992.

Profession's response

The Canadian Institute of Actuaries (CIA) rushed to expose standards for

the appointed actuary and for financial reporting by our members. Detailed compliance questionnaires were sent to all valuation actuaries to ensure professional compliance with our standards. Appointed actuaries will be required to do Dynamic Solvency Testing, that is, to examine the ability of the company to remain solvent under a variety of scenarios concerning economic and business volatility.

The profession has exposed a new rule of professional conduct. This would require any actuary to report a material departure from the CIA rules of conduct or standards by another actuary to the CIA unless he or she is prohibited by law or unless the two actuaries are in an adversarial position, such as giving evidence in court or negotiating an acquisition. It

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The Actuary is published monthly (except July and August) by the SOCIETY OF ACTUARIES, 475 North Martingale Road, Suite 800, Schaumburg, IL 60173-2226. Donald R. Sondergeld, President David M. Holland, VP and Secretary James F. Reiskytl, VP and Treasurer Kenneth A. McFarquhar, Director of Publications

Non-member subscriptions: students, \$6.00; others, \$15.00. Send subscriptions to: Society of Actuaries, P.O. Box 95668, Chicago, IL 60694.

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Printed on recycled paper

Editorial

Let the leaders lead again

by Irwin T. Vanderhoof

In computers, we were the leaders.

When the actuary, John Finelli, convinced the Metropolitan that it could save money on valuation by installing a Univac computer, it was only the second commercial application of a large computer.

We were the leaders then. That was almost 40 years ago.

During the fifties and sixties, we were the leaders. The insurance companies were leaders in the application of computers to massive accounting information and processing of transactions.

In the seventies, we introduced communications networks for real time access to our data bases from around the country. Sophistication grew in what could be done with our routine work using computers, and they became the standard actuarial tool. Computerized billing and even policy issue changed the nature of the business. An actuary was the logical choice for the head of the new and powerful data processing department. We were the leaders.

In the eighties, circumstances changed. The change was caused by the increasing power of computers and the many other interesting tasks that actuaries had to do. The new specialty of computer science developed, and those educated in this discipline were the logical heads of DP departments. Actuaries became interested in assets and more complex schemes for premium calculation. The profession needed more complex models; the old models would show that the products were not profitable. If that happened, we might have to raise rates and that would hurt sales and incentive compensation. So others became fascinated by the potential of computers, as we once had been. We weren't the leaders any more.

By the late eighties and into the nineties, we clearly were not at the cutting edge of the computer world. Actuaries were using computers regularly, almost continuously, but in the same way they had for 40 years – accounting, transactions, and more and

more complex computations. While we were doing the same tasks faster, increasing speed gave computers and computer networks the ability to do new kinds of work that could not have been done or even seriously considered before computers reached their current level of sophistication.

In mathematics, we now routinely read of proofs completed on computer that no one has ever checked; that no one would try to check because they involve the examination of too many thousands of cases. The four-color problem is an example.

Thousands of data bases are available now that we can access. The book review in this issue on *The Federal Data Base Finder* gives a good overview of the variety of data available from the government. Also in this issue is an "Interview with the librarian," which gives some idea of the range of information now available through computer. Some of the questions that are now answered easily would never have been attempted before the availability of the current level of computers.

The article in this issue on the work of Steven Feiner on "n-Vision" illustrates another aspect of this second (or third, or fourth) computer revolution. A book is now out on "Virtual Reality," of which "n-Vision" is an example. This is no more an idle dream than was the dream of John Finelli 40 years ago. City Bank provided the initial support for Feiner, and some major investment bankers are interested in his continuing work.

The newer generations of computers have the potential to create ways of doing things that we cannot predict currently and will allow us to do intellectual augmentation that is now only speculation. The professions that can exploit wider possibilities will be the true leaders of the future in finance. If computers can be programmed to do most kinds of intellectual work, including actuarial work, the leaders will be the individuals who truly understand their potential.

This is all by way of saluting one of the newest Sections of the Society announced in this issue. It is the Computer Section. Best wishes. Hope you can help us be the leaders again.

A possible source of low-cost liquidity

by Irwin T. Vanderhoof

In the wake of recent problems with Executive Life and Mutual Benefit, reviews of the operation of guarantee funds have become more urgent. While guarantee funds can provide assurance of eventual payments of policyholder values, they cannot immediately provide the liquidity necessary to meet these legitimate demands.

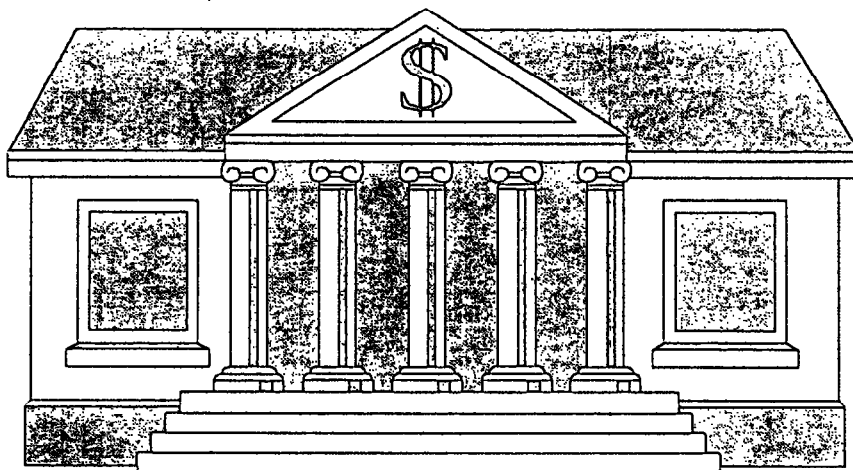
Liquidity is a separate problem from solvency, but it can be equally serious. The Charter Security companies' failure in the mid-eighties was a clear-cut example. While the insurance departments of New York and New Jersey were protesting the safety of the companies, the policyholders were demanding surrender values. The failure of the parent corporation, Charter Corporation, prompted the "run on the bank."

The illiquidity problem is not limited to these few unfortunate examples. The entire insurance industry is universally illiquid. While Charter Security had marketable assets that were under water for a short period, some companies have as much as 90% of their assets in private placements and commercial mortgages. No matter how solvent such a company is, it cannot withstand a "run."

The problem may be that the insurance industry appears to have no lender of last resort. A seemingly unlikely candidate for that role may be the Federal Home Loan Bank (FHLB) system.

Development of the FHLB

Between 1929 and 1932, 1,700 savings and loans experienced "runs" and went out of business. In 1933 the Federal Home Loan Bank system was founded to provide liquidity for the market in residential mortgages, and thereby provide liquidity for potential members of the system. Potential members were S&Ls, insurance companies, and commercial banks. Before August 1989, membership in the system meant an insurance company must subject to the additional regulation of the FHLB system. In August 1989, all regulatory authority was removed from the FHLB, and S&L supervision moved to the new Office of Thrift Supervision. Insurance



company membership now carries no burden of additional regulation.

Current status

There are 12 Home Loan Banks throughout the country. The system's assets are about \$150 billion, with capital of about \$10 billion. The system has shrunk substantially in the last few years because of the many S&Ls that have gone out of business.

Only members may borrow from the bank. Membership requires filling out an application, approval by the FHLB Finance Board, and purchasing stock in the regional Home Loan Bank. The necessary amount of stock is 1% of residential related assets or .3% of total assets. Collateralized lending is then possible in a multiple of the stock that can go up to 20 times. The banks will lend on residential mortgage type collateral including collateralized mortgage obligations. (Such assets must be at least 10% of the members' assets.) The banks also may lend, using commercial mortgages as collateral. They usually will not lend an amount more than 50% of the borrowing company's assets. They take great pride on nerves of steel in the face of a "run."

When the banks lend money to members, they raise money in the capital market as an agency of the U.S. government with the implied guarantee that this status confers. Their cost of funds is therefore only modestly above that of the treasury itself. Lending at as little as 50 bp over treasuries can provide enough profit to pay the target dividend to stockholders. The amount of the dividend depends on the profits of

the specific regional bank. The target for the system is 200 bp over the federal funds rate. Since the stock is purchasable and redeemable at par, it is financially very close to a money market instrument.

The banks offer a variety of services to nonmembers, including custodial and transactions in swaps, caps, and floors.

The FHLB system currently has five insurance companies as members. Several other companies are investigating the advantages of membership. Some regional banks are approaching the American Council of Life Insurance and a few state regulators to discuss the services they can provide to the industry. Economic factors would favor increased membership, despite some unresolved questions. These questions are whether certain requirements about the ratio of loans to stock ownership should apply to insurance companies (probably not), the recognition by the insurance regulators of the ownership of this stock, and the use of FHLB custodial services as suitable for an insurance company.

The Federal Home Loan Bank system can provide a dependable source of low-cost fixed or floating rate funds for periods of up to 20 years. In addition, the existence of the system may provide a source of liquidity necessary to make the various state guarantee funds function satisfactorily. The industry should move swiftly to investigate these possibilities.

Irwin T. Vanderhoof is president, Irwin T. Vanderhoof Consulting, Inc.

A new way to look at the world

by Faye Albert

Expansion of computer technology now enables the operator to select images that he or she finds most understandable and explainable. Not long ago, transforming worksheet data into graphic displays was time consuming and difficult. Now automatic plotting of data into charts and graphs lets number-oriented analysts do a better job of explaining numerical relationships through new ways of displaying them.

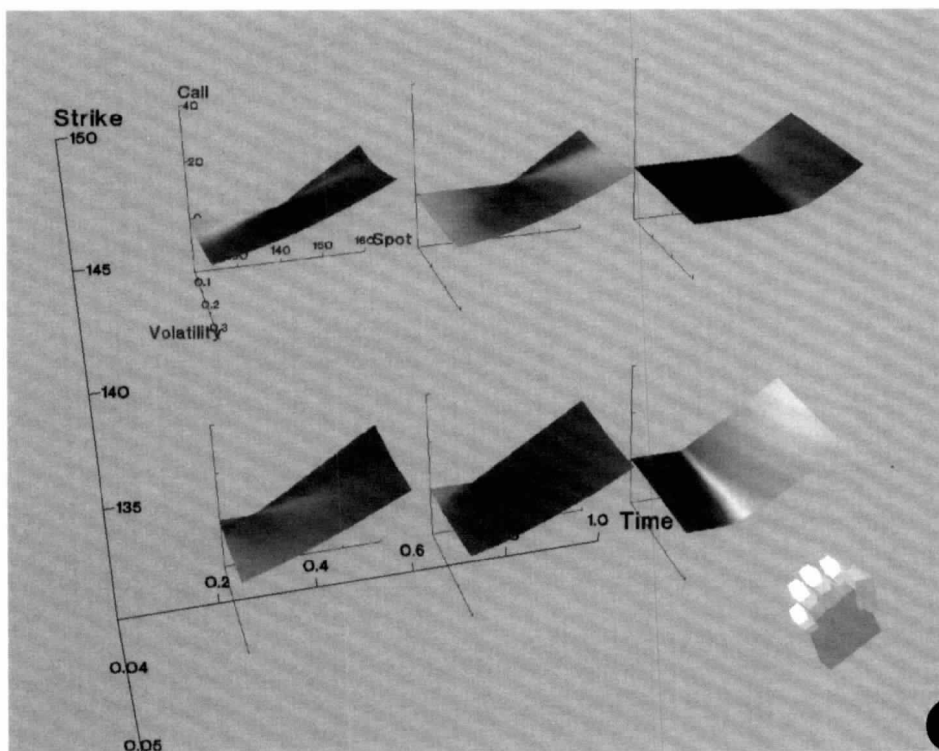
Computer hardware is continually developing and improving and now is available in three dimensions. These three-dimensional devices are not commonly available yet, but much progress has already been made in creating true three-dimensional devices for both display and interaction.

The leap into new ways of representing data or higher dimension is an exciting expansion of transforming data through computers into forms that are easier to understand. Steven Feiner and Clifford Beshers demonstrated this at the ACM Symposium on User Interface Software and Technology, Snowbird, Utah, October 3-5, 1990, on "Worlds within Worlds, Metaphors for Exploring n-Dimensional Virtual Worlds." Irwin Vanderhoof saw a later demonstration and his observations are recorded in the boxed, "Demonstration of n-Vision."

In it, n-Vision is used for exploring n-dimensional spaces with arbitrary numbers of variables. This research tries to develop interaction techniques for data that represent higher dimensional worlds and investigates ways to illustrate that data to the user in a meaningful manner.

Using this program would be a unique and exciting experience. Three-dimensional devices are used to describe higher dimensions using "worlds within worlds." Each world represents nested coordinate systems, and the user is allowed to view, experience, and manipulate heterogeneous functions associated with each world.

The operating environment is geared to use three-dimensional input and stereo display devices. The VPL



DataGlove is such a device. It is interactive and uses a magnetic sensor to capture the position and orientation of the user's hand. Data manipulation is through "boxes." These boxes are containers for presenting graphical output and capturing graphical input. Interfaces with each box are accomplished with specific tools, including magnifying boxes that provide higher resolution displays of part of the data and sensors that recognize finger gestures. Metamorphosis is one tool that turns the data hand into one or more different tools, depending on which type of data display you desire. The n-dimensions are controlled by assigning each of the n values its own control device. Although multivariate data can be displayed for more than three dimensions by using mappings of nonvisual properties to visual properties such as color, texture, and position, such displays are difficult to understand or interpret. Often, one or more of the independent variables is held constant. This eliminates consideration of the higher dimension

changes at first. Additional dimensions then are added back in a controlled manner.

The feedback from this system gives the user a better idea than a static display can of how functions behave and the consequences of changing the variables in n-dimensional space. The "worlds within worlds" metaphor encourages the user to think in terms of nested worlds, each of which is experienced as a physical space. This contrasts to generalized n-dimensional transformations and projections.

The possibility of experiencing changes among n-variables in a graphic way is novel. Expanding alternative perceptual approaches to a problem will, by definition, open new ways to look at the world. Where will these new views lead? Modeling of long-term cash flows under a variety of interest rate scenarios might be more quickly understandable using n-Vision techniques.

Faye Albert is consulting actuary, Albert Associates.

Demonstration of n-Vision

The display I saw was on a 14-inch resolution computer monitor. It was run by a high-powered work station. I saw an example of "financial visualization" where n-Vision was applied to explore the value of a portfolio of European options on foreign currency.

On the screen a three dimensional coordinate system was shown in perspective. The three dimensions were the time to maturity, the foreign interest rate, and strike price. A second three-dimensional coordinate system also was shown on the screen. The variables here were the value of the option, spot price, and volatility. The origin of the second coordinate system could be moved by movements of the VPL DataGlove. The

origin of the second coordinate system corresponded to a point on the first system, and the values represented by that point were used in the calculation of the value of the option.

The second coordinate system was rotated by the VPL DataGlove so that the surface of values of the option could be observed from all angles. The variables were changed between the two coordinate systems so that the various slopes could be seen. Several different options (calls, puts, spreads) were displayed at the same time and superimposed on one another so that the viewer could see the differences in values and the way the differences changed with changes in any of the variables.

The final step required donning the stereo goggles. These are constructed so that each lens is opaque every other 1/120 of a second alternately. The monitor display also changed so that there were two pictures shown alternately each 1/120 second. The monitor and goggles were coordinated using an infrared light beam from the controlling computer. The two displays corresponded to a left eye and right eye view of the graph under observation. The entire "world-within-world" metaphor then could be observed in three dimensions. Feiner and Beshers believe that this level of display capability will be commonly available in five years.

Irwin T. Vanderhoof

New Computer Science and International Sections

The Board of Governors has approved bylaws for two new special interest Sections: Computer Science and International.

The purpose of the Computer Science Section is to exchange information on developments in computer science that relate to the work of actuaries and to provide a central database of literature. A key role of this Section will be to exchange information with members of other Society Sections on:

- programming languages such as APL, Fortran, Basic, and C
- actuarial software used for product development, financial reporting, pension valuation, modeling, and experience studies
- spreadsheet languages, databases, and other useful software
- computer hardware, including mainframes, minicomputers, and networks
- databases for industry studies: where to find them, how to use them, and actuarial evaluations of their data content

The purpose of the International Section is to encourage the professional development of its members

who are involved in international areas of practice through activities such as meetings, seminars, research studies, and exchanging information. This Section also expects to provide assistance to foreign actuarial organizations and their members. The Section will support and complement the Society's Committee on International Relations, while providing a broader involvement of the Society membership in international issues and developments.

Notices for membership in these Sections went out with dues notices and the December *Actuary* mailing. For more information, call Judy Yore, 708-706-3573.

Replacement copy needed for library

The SOA library's copy of the *1979 Build Study* has been lost. If anyone has a copy that could be donated to the library, please call 708-706-3538 or 708-706-3575.

Appointed actuary cont'd

is recognized that in some situations, such as labor/management negotiations, the adversarial position may be permanent.

Formal designation

The appointed actuary must be formally designated by the board of the company. This requirement applies to life and property and casualty companies as well as to foreign and domestic companies. The appointed actuary must be a Fellow of the CIA. If an appointed actuary is terminated, the board must report the termination and the reason for termination to the Office of the Superintendent of Financial Institutions and select a replacement quickly. No actuary may accept an appointment without consulting his predecessor and determining whether there is a professional impediment to accepting the position.

Report of the appointed actuary

The new act sets no prescribed methods or assumptions for the appointed actuary in preparing his or her report. Rather, it relies completely on CIA standards and valuation techniques papers with the provision that the Superintendent may provide additional direction. Our standards provide that liabilities should be calculated according to the policy premium method that those in the United States might think of as GAAP basis. In all published financial statements

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Appointed actuary cont'd

of the company, the act requires the appointed actuary to report on the fairness of the results. In addition, the respective roles of the actuary and the auditor should be described in any financial reports.

The appointed actuary has the right of access at any time to all persons and records necessary for performance of his or her duties. This includes the right to information and relevant explanations. The CIA does not foresee requiring access to outside directors but only to people in management positions.

The act requires that if the appointed actuary becomes aware of any matters having material adverse effect on the financial condition of the company that he or she believes require rectification, he or she must write a report to both the CEO and the CFO. A copy of the report is sent to the board of directors. If within a suitable time no appropriate action has been taken, the appointed actuary must advise the Superintendent of Financial Institutions.

The appointed actuary must report in person to the board or to the board's audit committee at least annually on the current financial position of the company. In addition, the appointed actuary is required to report on the expected future financial condition of the company as directed by the Superintendent. For life companies, the horizon is long term. For property and casualty companies, because of the ability to change premium and renewal conditions quickly, the horizon is usually one year past the current premium renewal period. Materiality is an issue. Extensive testing is not to take place if the company has adequate surplus and the business is not too volatile.

Legal immunity

Obviously, the new act imposes considerable responsibility on the actuary. In an unsolicited brief to the Senate, the Canadian Bar Association argued that complete legal immunity should be given to the appointed actuary.

While this was not accepted, the Senate and the House agreed that "both the appointed actuary and any company employee who acted in good faith under the act should not be liable in any civil action arising therefrom."

Role in fair dividend distribution

The actuary must give an opinion about par policyholders' funds on the

equitable allocation of income and expenses. The company is required to establish a written dividend policy. In my opinion, this also will require the appointed actuary to establish a formal written surplus policy on both temporary and permanent surplus that might need to be sent to policyholders at issue. There are restrictions in the legislation that shareholder dividends shall not be paid if the actuary feels that policyholder dividends could be adversely affected. Similarly, there are restrictions against paying policyholder dividends if the required risk related capital limits are breached.

Role in certifying risk related capital

The new legislation requires that the risk related capital be established. In Canada, this is called the Minimum Continuing Capital and Surplus Requirement. The required capital is established reflecting the business risks taken on by the company. That is, the liabilities are looked at, including such contingencies as lapse, mortality, and exposure to guaranteed cash values.

In addition, capital is required according to the volatility and quality of the asset portfolio. Under our rules, only the most capably adequate companies could afford to invest in noninvestment grade securities.

This required capital must be covered by a combination of tier 1 (or permanent capital) and tier 2 capital that cannot exceed permanent capital. The rules for tier 1 and tier 2 capital follow closely the rules established under the Basle Accord for the Bank of International Settlements implemented for deposit taking institutions at the end of 1991.

The industry and the government have reached complete agreement on what is "required capital." The industry wants more items counted as tier 2 capital than the supervisors would like. The supervisory authorities have the complete backing of the Finance Committee and the Finance Department. This means that financial subsidiaries must be combined to avoid double counting of capital. In my opinion, certain types of surplus notes that are fully acceptable as capital in the United States would not be acceptable as having any tier 2 capital value in Canada. The appointed actuary must produce an opinion annually concerning the amount of the risk related capital of the enterprise and the adequacy of the capital available.

Agreement with auditors

Among our accomplishments in the past year, the CIA and the Canadian Institute of Chartered Accountants (CICA) have signed a Joint Policy Statement on the preparation of financial statements. This agreement covers reliance, communication, and disclosure between the actuary and the auditor. In particular, it governs the auditor's use of the actuary's work and allows the auditor to accept liabilities prepared by the actuary if they are prepared according to the CIA standards. The CICA explicitly accepts the CIA's liability determination standards. On accepting an appointment, the actuary must write to the auditor confirming he or she is qualified to assume the role. The actuary also must establish and disclose to the auditor and to the board materiality standards used in liability calculation.

Similarly, the actuary may use the work of the auditor on data verification. The CIA explicitly accepts the CICA standards for data verification. The Superintendent of Financial Institutions has given his full support to this agreement, and we now have a joint CIA/CICA working party examining how the Joint Policy Statement will be applied in practice.

Finally, reports of independent actuaries continue to be required in the new act on protection of policyholders in any transfer of reinsurance of blocks of business. We expect a similar report will continue to be required in merger/acquisition situations.

Meeting responsibilities

As you can see, the Canadian legislation is very wide ranging and probably involves the most responsibilities requested of the actuarial profession anywhere in the world. We have closely followed the precedents for the appointed actuary established by the Institute of Actuaries in the United Kingdom. I would like to acknowledge and thank Chris Daykin of the Government Actuaries Department of the United Kingdom for his invaluable help in answering questions posed by our legislators during their hearings. I hope the actuarial profession is up to the task given us by the Canadian legislation.

W. Paul McCrossan is president of the Canadian Institute of Actuaries and partner of Eckler Partners, Ltd.

Interview with a librarian

by Irwin T. Vanderhoof

An interview with a librarian must be undertaken with the same care usually reserved for an interview with a vampire. If the interview with a vampire goes poorly, you might get bitten. An interview with a librarian may lead to an even more painful fate—you might learn something. Take your chances, as I did, when I asked the Society of Actuaries' librarian, Donna Richardson, a few questions on November 7, 1991.

Q As I understand it, there are a variety of data bases available through the computer from which information can be easily obtained. How many would you guess are available, and how many do you routinely access?

A The first online data bases began about 20 years ago. The 1979-80 *Directory of Online Data Bases* contained 400 entries. The 1992 edition has 5,026 listed. The Society's library has two online services, Dialog and BRS, that offer more than 400 data bases. Our library searches are relatively narrow, using about 20 to 25 data bases on a regular basis.

Q What are the fields covered?

A They include aviation, medicine, business, chemistry, education, language, investments, labor, insurance, music, and current events.

Q That's quite impressive. Let's try some examples. Assuming you were connected to all possible data bases, how would you go about getting a play review for "Six Degrees of Separation?"

A A review of a current play could be found in a news/current events data base. I used Magazine Index and retrieved 10 citations and printed two. I found a review in the 2/23/91 issue of *America*, in which the reviewer gave the play a "B."

Q What about a review of "Flying Down to Rio" with Astaire and Rogers?

A Using Magills Survey of Cinema, I found one citation, listing the cast, abstract, technical personnel, and reviews.

Q Where can I get discussions of the 1989 California red wines?

A Data bases devoted to wine are not accessible by Dialog or BRS, but I found a discussion in Magazine Index in *Wine Spectator*, "Picture Rosier for '89 Harvest," 12/15/89.

Q What are some recent publications on Lyme's disease or AIDS?

A This information can be retrieved using a news, health, or medical index, depending on the perspective desired. I used the Health Periodical Index. The latest citation on Lyme's disease was in the October 1991 issue of *American Journal of Public Health*, and for AIDS, the 10/21/91 issue of *Aids Weekly* (just before the Magic Johnson announcement).

Q Any recent articles by Fisher Black on options pricing?

A I searched ABI/Inform, a business management data base, and found a paper, "Bond and Option Pricing when Short Rates Are Lognormal," in *Financial Analysts Journal*.

Q What is the frequency of the sound a bat makes for its biological radar?

A Several encyclopedias are available online. The *Academic American Encyclopedia* on CompuServe and others had the actual frequency.

Q How many national associations with a membership of more than 10,000 are located in Illinois?

A The *Encyclopedia of Associations'* data base listed purpose, address, publications, and meetings for 238 such associations.

Q Can you find a review of the audio version of Dave Barry's *Guide to Marriage and/or Sex*?

A The Book Review Index had bibliographic information on the review and a grade.

Q What are the most recent government statistics on the economy?

A A variety of data bases could contain this information. The government data bases are detailed in a directory, *The Federal Data Base Finder*, reviewed in this issue of *The Actuary*.

Q Can you retrieve the full text of a 1985 article in the *Washington Post* on EEOC?

A I found 65 articles in the *Washington Post* in 1985 that mentioned EEOC.

Q Can you locate information from the Canadian Business Index on the effects of pollution on the fish farming industry?

A I found a Canadian Business and Current Affairs data base, and 29 citations were retrieved.

Q Is there a survey on consumer coffee drinking habits?

A I found a Coffeeline data base that covers worldwide literature from 1973 to the present, with 136 English language surveys. The most recent titles were "Consumer Attitudes toward Vended Coffee," and "Federal Republic of Germany Coffee Consumption Habits."

Q Can you retrieve President Bush's address to NATO?

A I found the speech in the Federal News Service data base, which includes the full text, date of speeches, briefings, and news releases by U.S. and other officials.

Q Is there a college in New York that offers a degree in voice and has expenses of less than \$8,000 a year for state residents?

A I found full directory information in Peterson's College Data Base for six colleges that met the requirements.

Q Are there any cardiological conferences scheduled in Western Europe in the first half of 1992?

A Eventline listed 42 with full information on sponsoring organizations.

Q Where can you find any information about actuarial papers or data?

A I would have to check several data bases, including business/finance, insurance, and employee benefits files. Many actuarial journals currently are not indexed in online data bases. Journals such as the *Journal of Risk and Insurance*, *Insurance: Mathematics and Economics*, *Employee Benefits Plan Review*, and *Accountant's Magazine* are indexed, and articles can be retrieved.

Book Review

Data you never knew you needed

by Robert Johansen

The Federal Data Base Finder. A Directory of Free and Fee-Based Data Bases and Files Available from the Federal Government, Third Edition, by Matthew Lesko. Published by Information U.S.A., Kensington, MD, 1990, 301-657-1200, pp. 1v, 571, \$125 (also available on diskette, \$199 for book and diskette).

The introduction states the directory "will assist you in identifying the data bases and data files [of U.S. federal departments and agencies] by providing a description, stock number (if necessary) and address and telephone number of a person or office to contact for more information." With 571 pages, a 55-page table of contents, and a 49-page index, the book tries hard to be informative. A telephone number (toll) is provided for help and updates.

Each item is identified by its official title and a reference number followed by a short, descriptive paragraph. The book is arranged alphabetically by source, listing first the federal departments, then the independent agencies, followed by the judicial branch agencies, one executive branch agency, and then the legislative branch agencies. Items are listed by title alphabetically within each department or agency. An example of a listing under the Department of Commerce follows:

*Households by Income and Age of Householder, and Owner-Occupied Units by Value and Age of Householder
Customer Services
Bureau of the Census
Washington, DC 20233
(301) 763-4100

In this special tabulation, a small set of tabulations (age of persons, age of householder by value, age of householder by household income, aggregate value by age of householder, aggregate household income by age of householder, and aggregate income by age of persons) is presented for the following areas: states, counties and county equivalents, incorporated places and

census designated places of 2,500 or more persons, minor civil divisions, census county divisions, block numbering areas, and census tracts. The file is available on nine reels of computer tape (one reel per region) at 6250 bpi.

Since the listings under each department are not broken down by major entity, such as the Bureau of the Census in the Department of Commerce, a researcher looking for census data faces a hodgepodge of material from the many agencies in the Department of Commerce. Oddly enough, the book does not list the entities housed in each department – a researcher must know in which department a particular agency is located. Agencies like the Bureau of the Census are listed in the index together with a listing of page numbers, but the page numbers include pages in parts of the book under other departments or agencies. Further, many listings do not identify the source agency. It is strange that a book of this size intended to help locate sources of data does not take obvious steps to help those not familiar with the structure of the U.S. federal government.

Despite its shortcomings, *The Federal Data Base Finder* will be useful to any organization that occasionally needs specific government data or reports. Further, the book provides a good overview of the variety of data available from the federal government – data you never knew you needed until you read *The Federal Data Base Finder*. Even a casual review of the index is enlightening.

Despite budgetary limitations on the statistical agencies and the effects of the Paperwork Reduction Act, government data cover a wide range of subjects, are timely, controlled for accuracy, and are available free or at reasonable cost.

Other sources

Periodic listings and catalogs from agencies give more sources for government data bases and reports. Some reports are free, and others are available at nominal cost. Some that may be helpful include:

- The Office of Management and Budget lists statistical agencies in *Statistical Programs of the United States Government, Fiscal Year 1990* (202-395-7316).
- Department of the Census – *Monthly Product Announcement* (Customer Services, 301-763-4100).
- *Annual Census Catalog and Guide* lists publications in print (Government Printing Office, 202-783-3238).
- The National Center for Health Statistics (NCHS) periodically publishes a catalog of recent reports, and a monthly update is available (301-436-8500).
- The Agency for Health Care Policy and Research (AHCPR), Public Health Service, Department of Health and Human Services, reports on health care research activities (301-443-4100).
- The Statistics of Income Division, Internal Revenue Service, Department of the Treasury, publishes quarterly the *Statistics of Income Bulletin* with financial statistics and analyses of data from tax returns. For information or to receive the periodic notice, *Data Release*, write to Director, Statistics of Income Division, R:S:P Internal Revenue Service, P.O. Box 2608, Washington, DC 20013-2608.
- Economic data are available from the Bureau of the Census, the Bureau of Labor Statistics (202-523-7827), and the Bureau of Economic Analysis (202-523-0777).

Amendment cont'd

According to a recent survey, three-quarters of these ASAs are not pursuing the FSA designation. Among current long-term ASAs, more than half indicated they are in pension practice.

Many long-term ASAs are distinguished colleagues who have made and are making outstanding professional contributions. A 1990 report by Walt Rugland and Wynn Kent found that 10% of 15-year and longer ASAs were presidents, chairmen of the board, CEOs or CFOs, and another 21% were executive vice presidents, senior vice presidents, principals, chief actuaries, or managing directors.

What long-term ASAs say

The Actuary interviewed several long-term ASAs to get their views on why this right to vote would be appropriate.

Mary Hardiman Adams, ASA, associate editor of *The Actuary* and past president of the Conference of Consulting Actuaries, also has been a board member and vice president of the American Academy of Actuaries. Long interested in professional conduct matters, she currently is a member of the Joint Committee that has developed a Code of Professional Conduct for adoption by the boards of the U.S. organizations representing actuaries. She also is the current chairperson of the Pension Committee of the Actuarial Standards Board.

In the mid-fifties when I became an ASA, I was in a special situation – one of a very few women doing pension consulting. This was an era of new ventures in collective bargaining that, without the computer capabilities we have now, meant long, late hours of work. Studying for Part 6 (Life Insurance Accounting) would have jeopardized my ability to respond to this situation and to my clients' needs, and I would not have learned anything relevant to the task at hand. I don't believe the knowledge I needed in the pension field has suffered because I didn't take the Fellowship examinations. The adoption of the proposed amendment would be most welcome by me and other long-term ASAs.

Susan M. Smith, ASA, member and current Chairperson of the Pension Section Council and past member and Chairperson of the Pension Research Committee of the Society. She is a frequent speaker at Enrolled Actuaries and Society meetings.

In my view, the Society of Actuaries will have more and more ASAs in pension practice because it is becoming too difficult, especially in the changing consulting environment, to devote the time needed to pass the numerous FSA exams.

As an ASA, I believe I contribute as much to my clients as an FSA. It would be nice if that vote of confidence was shared by the Society in permitting me to vote. I think this constitutional amendment would encourage more ASAs to participate in Society of Actuaries programs.

Michael Rosenfelder, ASA, member of the Society's Professional Actuarial Specialty Guide (PASG) Committee and the Task Force on the Actuary of the Future, a past president of the Canadian Institute of Actuaries, and retired chairman of its Discipline Committee. He is a Fellow of the Institute of Actuaries in England by examination, a Fellow of the Canadian Institute of Actuaries, a member of the American Academy of Actuaries and currently acts as signing actuary for his company for Canadian and U.S. insurance regulatory purposes.

As an ASA, I, like other U.K. actuaries who make their homes in North America, receive all Society publications and have the right to attend and participate in Society meetings. These are professionally important to me. However, the proposed constitutional amendment, if adopted, would further strengthen the feeling of identification with, and provide greater opportunity to participate in, the work of the Society.

Jeff Furnish, ASA, JD, past Chairperson of the Society's Committee on Pension Research, author of the AERF award-winning TSA paper, "Pensions in our Inflationary Environment":

Voting in Society affairs for long-term ASAs is not a matter that will

affect the public's relative perception of FSAs and ASAs or an individual ASA's decision to pursue the Fellowship exams. To me, voting is the opportunity to participate in the democratic governance of the organization providing my basic credential as a consulting actuary. It just seems fairer to extend this right than to disallow it.

Relative numbers

As of December 31, 1991, there were 6,715 FSAs and 6,651 ASAs. Of the ASAs, 2,398 (36%) had attained this status before 1982. When these long-term ASAs are combined with current FSAs, they make up 26% of the total.

The trend in the numbers of 10-year ASAs as a percent of 10-year ASAs plus FSAs is given in the table below.

Year	FSAs	10-Yr. ASAs	%
1981	4,480	798	15.1
1986	5,604	1,284	18.6
1988	6,039	1,669	21.7
1990	6,453	2,194	25.4
1991	6,715	2,398	26.3

Of the current ASAs who reached this designation in 1975-1981, 74% are U.S. residents; 13%, Canadian; and 12%, "other." This compares to the following breakdown of FSAs: 80%, U.S. residents; 18%, Canadian; and 2%, "other."

Membership input solicited

The Board and the editor of *The Actuary* welcome membership views on this proposed amendment. We hope to have enough letters to the editor to crystallize membership reactions in the March issue of *The Actuary*. Letters should be received by February 1 to be considered for the March issue. The membership vote will occur after feedback on this article has been shared. An amendment to the constitution requires approval by two-thirds of the voting FSAs.

Linda B. Emory is editor of *The Actuary* and an SOA Board member. She is senior vice president – strategic development, Life Insurance Company of Georgia.

SOA supports 'firsts' in overseas education

First graduates from Nankai University

by Harold J. Ingraham, Jr.

In June 25, 1991, I had the honor of delivering the commencement address for the 15 recipients of master's degrees in actuarial science at Nankai University, Tianjin, China. Nearly 200 people attended the ceremony, including representatives from Beijing, the local government, and the People's Insurance Company of China (PICC), one of the program's sponsors. On behalf of the Society of Actuaries, I presented the school a large framed lithograph of Staple Inn and a brief summary of its history.

Several Society of Actuaries' members have served as faculty since the program began in September 1988 with North American and Chinese professors. Because of the turmoil in Tiananmen Square in June 1989, the program had to be suspended for one



Harold Ingraham, Jr. (third from right) spoke at the graduation ceremonies for the first graduates (standing) of the Nankai University's graduate program in actuarial science.

year, and then resumed in April 1990. The three-year program covered the material on the SOA Associateship syllabus and two courses in Casualty Contingencies and Loss Distributions.

Each North American professor participating taught a course for three weeks, five days a week, three hours a day. One of them, Gary Venter, said,

Continued on page 11 column

Poland's first actuaries

by Samuel H. Cox

Students who participated in the 1991 summer school at Warsaw University will become Poland's first actuaries. Although the Society of Actuaries provided textbooks, and some members have served as faculty, the actuarial summer school program is principally financed by a grant from Canadian Foreign Aid to Poland's Ministry of Finance.

Of the 12 students who began in 1990 and continued in 1991 (called Level II students), all are employed. They work in newly formed private insurance companies, in the new companies formed from PZU (the Polish state insurance company), in the supervisory department of the Ministry of Finance, or in the actuarial department of ZUS (social security). Some of the Level I students who began this summer have university degrees and

already have jobs. Others are undergraduates or graduate students in Warsaw University's economics, physics, and astronomy departments.

The summer school students had classes four hours a day for a month, and then sat for qualifying examinations that are similar to the Society of Actuaries' exams. I taught Life Contingencies I and Survival Models. The rest of the 1991 faculty included:

- Krzysztof Stroinski, University of Western Ontario, who taught Financial Mathematics and Mathematical Risk Theory
- John Mereu, University of Western Ontario, who taught Life Contingencies II
- Philip M. Booth, City University (London, England), who taught Actuarial Investment Mathematics

- Jan Kamieniecki, Bacon and Woodrow (Paris), who taught Pension Funds
- Christian Partrat, Pierre and Marie Curie University (Paris), who taught Applications of Risk Theory
- Charles Levi, Compagnie Transcontinentale de Reassurance (Paris), who taught Reinsurance
- Colin Czapiewski, Terra Nova Insurance (London, England), who taught Practical Aspects of Reinsurance

Obtaining certificates could be these students' first steps in qualifying for membership in the Polish Society of Actuaries. Stroinski registered the name in 1990. The new society's structure, however, is still developing, and there are no members. A Polish Support Group also was formed in 1990. Among other activities, the Support Group publishes a newsletter

Continued on page 11 column 1

Nankai cont'd

"Compared to a regular college pace, I was covering a week's worth of material each day. The students then had to do a week's worth of studying a night, which I was amazed to find that they did."

At the end of the teaching portions of the program, each student was required to write a thesis. Geoff Crofts and Bob Myers spent November 1990 helping each student develop theses to explore practical professional problems. Examples of topics include analysis of social security in China, a case study of property and casualty insurance rate making and reserving, and a proposal for a revised superannuation benefit for China. Before working on their theses, the Nankai students spent several weeks at the branch office of the PICC in Shenzhen, the bustling special economic zone in southern China next to Hong Kong.

In my commencement speech, I urged the graduates to form their own actuarial society as soon as possible. I told them the SOA could help them set up a constitution, bylaws, and guides to professional conduct. I also pointed out the importance of

continuing education and suggested they contact other actuarial bodies in the Far East. I stated it would be very desirable to get formal approval of their actuarial society from the proper Chinese government entity.

At the graduation ceremony, the president of Nankai University announced the establishment of the International Institute for Advanced Studies in Economic Security and Dr. Kailin Tuan, professor at Temple University, as its first director. The Institute's focus will be on teaching, research, and publication. Its goals include:

- Continuation of the graduate program in actuarial science. With SOA providing professors and thesis guidance one more time, classes for the second three-year program began in January 1992, with new students on campus since August 1991 for intensive training in English.
- Creation of an undergraduate major in actuarial science, taught by one graduate of the first program and two mathematics instructors, to begin in fall 1992.
- Creation of a new graduate program in risk management and insurance to begin fall 1992. Similar to the

actuarial science graduate program, professors recruited from North American universities will teach the courses. The goal is to prepare managers for the inevitable reform of China's insurance business, public pension plans, and social welfare programs.

- Translation and publication of actuarial science books based on textbooks and study materials supplied by the Society. These would be used in other Chinese universities, as well as by Nankai students.

The 15 new graduates have chosen to work as teachers (7), for PICC in Beijing (3), at new start-up insurance companies in Shanghai or Shenzhen (3), for the People's Bank of China (1), and for the Chinese government (1).

The second Nankai graduate program will include 21 students, including 7 "overseas" Chinese from the Philippines, Singapore, and Malaysia.

After leaving Tianjin, Dr. Tuan and I went to Shanghai, where we met separately with Fudan University officials and representatives from PICC. Fudan would like to start a graduate actuarial program similar to

Continued on page 15 column 3

Poland cont'd

This group of Warsaw University summer school students will be Poland's first actuaries. Three 1991 faculty members (center, in suits, L-R) are Kris Stroinski and John Mereu, University of Western Ontario, and Sam Cox, Michigan State.

Polish, *aktuariusz*, that is available free (address: Filtrowa 62 m 27, 02 057, Warsaw, Poland).

Teaching in this summer school was an informative and exciting

experience. The students, who were selected by mathematics and English examinations, were very bright and hard working. Each of my courses covered in about three weeks material

that usually would be covered in a three-hour semester course. Most of the students, even those working for insurance organizations, had no knowledge of open markets or private insurance. Difficulties they experienced often were more social or economic than mathematical or actuarial. This made for unusual and challenging questions from the class.

North American actuaries interested in faculty positions in future sessions of the summer school should contact Professor Stroinski at the Department of Statistics and Actuarial Science, University of Western Ontario, London, Ontario, Canada, N6A 5B9.

Samuel H. Cox is professor, Department of Finance and Insurance, Michigan State University.

Investment education strengthened

by Robert Stapleford
and Richard Mattison

In response to membership and Board level discussions, the Education and Examination Committee (E&E) of the Society of Actuaries formed a subcommittee, the Investment Course Content Committee (ICCC), in 1990 to strengthen overall investment education on the syllabus. The mandate of the committee was to develop an overall framework for investment education and, within that framework, to develop investment specialty elective courses to meet the evolving needs of the profession and those we serve.

Events leading to the mandate

In the summer of 1989, at the request of Board member Irwin Vanderhoof, Greg Carney chaired a Task Force on Investment Education. The charge of the task force was "to determine the minimum investment education needs of the actuary." The report of the task force was presented to the Board in October 1989 as part of Vanderhoof's report on "The Investment Role of the Actuary."

In the spring of 1990, the E&E Committee began formal discussions with the Investment Section Council on investment education development. In May 1990, the E&E Committee presented its preliminary plans on investment education to the Education Policy Committee. The issue of an investment specialty track was discussed, with the conclusion that we were not at a point to proceed with the development of a track. However, it was concluded that comprehensive investment education blueprints would be developed to ensure that the topics we chose for electives made sense as a whole and could fit logically in a track later. The E&E Committee was directed to proceed with its plans to strengthen the existing investment education and develop new investment electives.

Development and goals of ICCC
Members of the Investment Course Content Committee (ICCC) were recruited during the summer of 1990. The committee included five members recommended by the Investment

Course	Credits	Title	Implementation Date
220	30	Introduction to Asset Management and Corporate Finance	Existing Course Revised November 1991
V-380	20	Principles of Asset/Liability Management	November 1991
V-480	15	Advanced Asset/Liability Management	May 1992
V-485	15	Advanced Portfolio Management	November 1992
V-580	15	Corporate Finance	May 1993
V-590	10	Corporate Strategy and Solvency Management	November 1993

Section Council to represent Canadian and U.S. practices and three members from E&E. One of the committee members serves as liaison to the Canadian Institute of Actuaries, and one serves as liaison to the Investment Section Council.

The ICCC held its first meeting in September 1990. The committee set its goal as developing investment electives that will appeal to a broad range of actuarial students and would extend their risk quantification and management knowledge to the asset side of the equation.

The ICCC also reviewed the Carney task force report and developed a list of subjects that it believed should be available on our syllabus. These included:

- macroeconomics
- financial markets and asset definitions
- portfolio management and investment strategy
- tools and techniques for modeling and simulation
- product design, pricing, and valuation issues
- corporate finance
- fixed income asset management

Coverage of some of these topics, at least at a basic level, was considered essential for all actuaries and, to the extent practical, these would be covered on the required Core Investment Course (Course 220). The more advanced coverage and the basic material that would not fit on Course 220 was grouped into five new courses, providing an estimated 75 credits of investment electives.

Course development status

Over the past 18 months, the ICCC completed an extensive literature review to select material suitable for the Core Course 220 and the first two investment electives, V-380 and V-480. In addition, the committee commissioned an author to develop a macroeconomics monograph specifically for Course 220. The revised Course 220 and the new Course V-380 were part of the Fall 1991 examination schedule.

The ICCC intends to introduce a new investment elective every six months until we complete our goal of five new investment electives. The table above shows the implementation schedule.

Conclusion

With the course development work proceeding on schedule, the issue of an investment track was raised again in the summer of 1991. Bruce Moore, Education Chairperson, formed a task force including representatives from the SOA Board of Governors, Investment Section Council, Canadian Institute of Actuaries' Committee on Investments, Task Force on the Actuary of the Future, and Education and Examination members. This task force is expected to make its recommendation concerning an investment track soon.

Robert Stapleford, consulting actuary with William M. Mercer, is Investment Education General Officer and Chairperson of the Investment Course Content Committee. Richard Mattison is education actuary at the Society of Actuaries.

Changes to Canadian ILA exams

by Mike Stickney

The Education and Examination Committee plans to revise the credits for three exams which will affect the Canadian Fellowship students studying the Individual Life and Annuity (ILA) track. The planned changes are:

- Beginning with the November 1992 exam, the credits given for Course I-342C (Life Insurance Law and Taxation - Canada) will increase from 10 to 15 credits.
- Beginning with the November 1992 exam, credits given for Course I-440C (Advanced Design and Pricing - Canada) will decrease from 25 to 15 credits.
- Beginning with the May 1993 exam, the credits given for Course I-442C (Advanced Topics in Valuation and Financial Reporting - Canada) will increase from 25 to 30 credits.

The main considerations behind these changes are to give more weight in the syllabus to financial reporting and corporate taxation issues in Canada. Canadian legislation in 1992 will expand the role of the valuation actuary and, in fact, will change the name to "appointed actuary." The appointed actuary will be required to express an opinion about the ongoing solvency of a life insurance company. Previously, the valuation actuary expressed a "good and sufficient" opinion about liabilities. Because of the volume of standards emerging about the appointed actuary's expanded role, the number of credits for Course I-442C must be increased.

The E&E Committee also believes that, in the past, the subject of corporate taxation of life insurance companies has been underweighted. Therefore, the committee has decided to increase its weighting at this time.

These changes are being made in conjunction with a credit reduction for Course I-440C. In reviewing this course's syllabus, the committee decided it could eliminate much material that was not relevant to the Canadian insurance and annuity marketplace and still adequately cover the important issues in design and pricing in Canada.

Canadian ILA students still will be required to pass all three of these exams in addition to the Course I-340

exam. We recognize that some students may earn more or less than 90 required credits by passing these four exams during the next few years. As a result, students will no longer need to earn exactly 90 required credits during this transition period, but they will need to pass all four required courses. Students still must earn a total of 250 Fellowship credits. Consequently, during the transition period, the number of elective credits students need to earn will vary between 50 to 70 credits.

Mike Stickney is actuary with Seaboard Life Insurance Company and a member of the Individual Life and Annuities Course Content Committee.

Faculty positions open

Position: Tenure track assistant professor in actuarial science in the Department of Mathematics and Statistics, beginning September 1, 1992, at Simon Fraser University.

Qualifications: Ph.D. in mathematical sciences and Associateship or Fellowship in a recognized actuarial organization. Also demonstrated ability in teaching and research is required.

Duties: Conduct research in actuarial science and direct and teach in the undergraduate actuarial program.

Applications: Send applications, including an up-to-date curriculum vitae, to Katherine Heinrich, chair, Department of Mathematics and Statistics, Simon Fraser University, Burnaby, BC, V5A 1S6, Canada. Also arrange for three letters of reference to be sent directly from the referees. Deadline is February 29, 1992. In accordance with Canadian immigration requirements, this notice is directed to those who are eligible at the time of application for employment in Canada.

* * *

Position: Either tenure track assistant professor or visitor at any rank for one or two years in actuarial science,

beginning in late August 1992, at the University of Iowa.

Qualifications: Ph.D. and a commitment to excellence in teaching and research. Specialties in either life or casualty are welcome.

Applications: Send current curriculum vitae and have three letters of reference sent to Professor James Broffitt, Department of Statistics and Actuarial Science, University of Iowa, Iowa City, IA 52242. The selection process will begin February 1 and will continue until position is filled.

Research papers for Fellowship credit

by Roy Goldman

The Education and Examination Committee recently awarded 30 Fellowship credits to Hubert Mueller for his paper, "Variable Annuities in the 1980s and Beyond." This is the fifth paper approved for Fellowship credit under the Flexible Education Methods program.

His paper researches the questions: What are the benefits to the purchaser of an individual non-qualified variable annuity compared to investing in a mutual fund, and why should insurance companies make variable annuities available to prospective customers?

Copies of Mueller's paper are on file in the Society library. Members interested in reading it can contact Donna Richardson, staff librarian. This paper also will appear in *ARCH 1991.2*.

The committee would like to thank Jerome Golden, Stephen D'Arcy, and Frank Bensics, who refereed this paper. It also acknowledges John M. Fenton, who served as Mueller's supervisor and provided the committee with a review.

Students interested in the Research Papers program should consult Appendix 2 of the Fellowship Catalog. Applications for research papers can be obtained from the Society office.

Roy Goldman is Examination Chairperson of the Research Paper Committee and vice president and actuary of America for the Prudential Insurance Company.

Transactions authors profiled

Ten papers have been accepted for publication in Volume 43 of the *Transactions*. Author profiles will be a periodic feature in *The Actuary*. The following biographical sketches describe authors of four papers. The remaining authors will be profiled in later issues.

"Information Theoretic Approach to Actuarial Science: A Unification and Extension of Relevant Theory and Applications" by Patrick L. Brockett



PATRICK L. BROCKETT, not a member of the Society, is the Joseph H. Blades Professor of Insurance at the University of Texas at Austin, where he holds appointments in the departments of finance, mathematics, management science and information systems, the IC2 Institute, and the Applied Research Laboratories. Previously, Brockett served as director of the actuarial science program and held the Paul V. Montgomery Professorship in Actuarial Science at the same institution. He is a Fellow of the Institute of Mathematical Statistics and of the Royal Statistical Society, a full member of the Operations Research Society, and a member of the American Risk and Insurance Association, the American Finance Association, the American Association for the Advancement of Science, and the American Statistical Association. Brockett also is an associate editor of *Insurance: Mathematics and Economics* and serves on the Society of Actuaries' Committee on Relations with Statistical Organizations. He has published more than 65 articles. Papers published in the *Transactions* include "Optimal Ruin Calculations Using Partial Stochastic Information" and "Statistical Adjustments of Mortality Tables To Reflect Known Information," both with S. H. Cox, Jr., in Volume 36 (1984).

"Statistical Tests of the Use of the Lognormal Distribution as a Basis for Interest Rate Changes" by David N. Becker



DAVID N. BECKER, FSA 1979, is vice president of Lincoln National Corporation, a company he joined in 1975 as an actuarial student. He received a bachelor's degree in mathematics from St. Louis University, a master's degree in mathematics from Washington University, and a Ph.D. in mathematics from St. Louis University. He was the 1991 Chairperson of the Society's Individual Life Insurance and Annuity Product Development Section Council, a member of the Research Policy Committee, and Insurance Chairperson of the Project Oversight Group on the "Option Pricing Models as Alternative to Cash Flow Testing" project. His papers have appeared in *Best's Review* and *Reinsurance Reporter*. His paper, "A Generalized Profits Released Model for the Measurement of Return on Investment for Life Insurance," which appeared in Volume 40 (1988) of the *Transactions*, won the SOA Annual Prize for 1988-89.

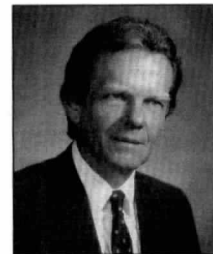
"Macro Pricing: A Comprehensive Product Development Process" by Shane A. Chalke



SHANE A. CHALKE, FSA 1982, is president of Chalke Incorporated, an actuarial and financial consulting service

he founded in 1983. He has lectured extensively in the areas of macro pricing theory and asset/liability management and has written many articles for *Best's Review*, *Life Insurance Selling*, and *Financial Planning*. Chalke is a member of the Society's Board of Governors and past Chairperson of the Individual Life Insurance and Annuity Product Development Section Council. He is coauthor of "Universal Life Nonforfeiture and Valuation: A Generalized Model" (with Michael F. Davlin), which appeared in Volume 35 (1983) of the *Transactions* and won the Annual Prize and the Triennial Prize.

"Bounds on Expected Values of Insurance Payments and Option Prices" by Samuel H. Cox, Jr.



SAMUEL H. COX, JR., FSA 1980, is the A. J. Pasant Professor of Life Insurance and Financial Services at Michigan State University, where he teaches insurance and risk management. He received a bachelor's and a master's degree in mathematics from Texas Christian University and a Ph.D. in mathematics from Louisiana State University. He taught actuarial science at the University of Nebraska-Lincoln and the University of Texas at Austin. His experience includes service with Pan American Life Insurance Company and The Wyatt Company. He is the Society's liaison representative to the American Risk and Insurance Association and a member of the Society's 1991 Committee on Papers and the Research Paper Committee. He has published papers in several journals, and two papers have appeared in the *Transactions*: "Optimal Ruin Calculations Using Partial Stochastic Information" and "Statistical Adjustment of Mortality Tables To Reflect Known Information," both with P. L. Brockett, in Volume 36 (1984).

Early-release copies of TSA papers

The following papers have been accepted for publication in Volume 43 of the *Transactions*. Members who would like to receive an early-release copy of a TSA paper before it is published in a preprint should send \$5 for each paper to the Books & Publications Department at the Society office.

John C. Maynard, "Financing Defined-Benefit Pension Plans with Indexed Benefits"

The lack of inflation protection in the benefits of many defined-benefit pension plans has been the subject of public inquiries. This paper reports on how a model plan with fully indexed benefits might be financed. It assembled economic statistics and illustrates pension plan balance sheets for various periods in the past 45 years and for a variety of funding conditions.

It applies a nontraditional approach to the balance sheet. Assets are at market value, and liabilities are expressed as the sum of a fairly fixed component and a component that varies with asset values in the form of an asset fluctuation reserve.

For the periods selected, the illustrations do not show surplus growth, which many actual plans with fully indexed benefits have shown in the 1980s.

Actuaries in the pension and academic fields, investment managers, pension regulators, and persons concerned with pension plan policy may be interested in this paper.

William A. Phillips and Stephen B. Gwin, "Reverse Mortgages"

This paper describes reverse mortgages, a widely publicized form of home equity conversion specifically suited to older Americans who need cash from their homes but still want to live in them. The paper describes the basic characteristics of a reverse mortgage and identifies the types of guarantees usually thought to be necessary for marketing tenure reverse mortgages. These guarantees create five types of risk that demand actuarial evaluation. The paper discusses methods for charging for and reducing these risks. It reviews special underwriting hazards and the need for asset reserving. Examples show how the pricing and reserving of a reverse mortgage might be accomplished.

This paper is directed at actuaries and others who are interested in reverse mortgages, but do not have much experience with them. The paper emphasizes identification and management of risks, design considerations, and the actuarial management of the reverse mortgage operation.

New additions to SOA library

The following is a partial list of additions to the SOA library. Members may borrow library books by calling the library, 708-706-3538 or 708-706-3575.

Circulating

Anderson, Buist M., *Anderson on Life Insurance*, Little Brown & Co., 1991 (uncatalogued)

The Complete Internal Revenue Code, Research Institute of America, Inc., January 1991 edition (HJ3251.R4)

Diabetes in America, U.S. Department of Health and Human Services, 1985 (uncatalogued)

Fagg, Gary, *An Introduction to Credit Life and Disability Insurance*, CLICO Management, Inc., 1990 (HG9977.F34 1990)

McGinn, Daniel F., *Corporate Retirement Plans: An Actuarial Perspective*, International Foundation of Employee Benefit Plans, 1988 (HD7105.45.U6.M374)

Reynolds, Franklin, *Canadian Insurance Practice* (HG8550.A5R49 1990)

Zucconi, Paul J., *Accounting in Life and Health Insurance Companies*, LOMA, 1987 (HG8848.Z84)

Faculty Research Papers

Conwill, Michael, *A Linear Programming Approach to Maximizing Policyholder Value*, Research Paper 90-3

Institute of Actuaries

Continuous Mortality Investigation Reports No. 10, Institute of Actuaries and the Faculty of Actuaries, 1990

Fagan, Colm, *Profit Recognition, Reporting and Analysis in Life Assurance*, presented to Staple Inn Actuarial Society, London, January 22, 1991

Freeman, Michael, *Asset Shares and Surplus Management in a Participating Fund*, presented to the Staple Inn Actuarial Society, February 19, 1991

Mehta, Shyam & John Instance, *Taxation in the Assessment of Profitability of Life Assurance Products and of Life Office Appraisal Value*, presented to the Staple Inn Actuarial Society, December 4, 1990

Pell, Marian, *Transfers of United Kingdom Long Term Business: Some Reflections*, presented to the Staple Inn Actuarial Society, February 5, 1991

Syllabus

Berenblut, Mark & Howard Rosen, *Litigation Accounting*, 1989 (uncatalogued)

Nankai cont'd

Nankai's, but no funds are available to provide room and board for North American professors.

I then went to Hong Kong and met with Cyprian Au, director of human resources at Manulife in Hong Kong, a company that is strongly supportive of the development of actuarial science in China. Manulife signed a cooperative agreement with the PICC to accept two data processing trainees and two actuarial trainees for one year.

It is not possible for Nankai students to sit for SOA Associateship exams because they cannot pay the fees. It is illegal for Chinese citizens to acquire and hold foreign currency, and the exam fees would take a large portion of their personal income. Manulife/Hong Kong has come to the rescue and stated it is willing to underwrite much of the cost of setting up an SOA exam center at Nankai University.

The Society of Actuaries can be proud of providing material support for the graduate program at Nankai. It is regarded as a very high profile program in China. To further good relations with the future Chinese actuarial training programs and its professional society, I believe the Society of Actuaries should continue to be involved as advisors.

Harold Ingraham, Jr., is Chairperson of the SOA Committee on International Relations and president of the Hemisphere Group.

FACTUARIES

by Deborah Poppel

This is another in a series of profiles of members of the Society's Board of Governors.



Name: James C. Hickman.

Current hometown: Madison, Wisconsin.

Current employer and function: Professor, Business and Statistics at the University of Wisconsin. I teach courses in actuarial science and statistics and supervise doctoral students.

Marital status: Married to Margaret for 41 years.

Children: Chuck (39 years), Don (32 years), Barb (30 years).

Birthday: August 27, 1927.

Birthplace: Indianola, Iowa.

My first job was: It was not quite my first job, but at age 16 I worked as a fire lookout and smoke chaser for the Payette National Forest. It was the best job I ever had.

I'd give anything to have met: Richard Price, eighteenth century English theologian, actuary, scientist, and politician. He was a friend of Thomas Bayes and Ben Franklin and supported the American Revolution.

The number of exams I flunked: Too many – my mind was always on too many things.

The book I recommend most often: Bruce Catton's *This Hallowed Ground*.

The movie I'd most like to own the tape of: *Lawrence of Arabia*.

Nobody would believe it if they saw me: As a contestant in a dance contest.

The TV show I stay home to watch: *Masterpiece Theater*.

If I could change one thing about myself, I'd: Have a better sense of rhythm.

When I'm feeling sorry for myself, I: Go for a walk in the university arboretum.

My fantasy is: To go on another extended backpacking trip in Colorado's San Juan Mountains.

The silliest thing I've ever done: I was the center of the hamburger squad of a small college football team. I was awful.

If I could do it over, I'd: Try to master a language other than English.

My proudest actuarial moment: Working with Newt Bowers, Hans Gerber, Don Jones, and Cecil Nesbitt on *Actuarial Mathematics*.

I'm passionate about: Margaret and backpacking, in that order.

My favorite way to spend a Sunday: Go cross-country skiing in a nearby state park, returning for soup in front of the fire.

Donated services essential

by Bern Bartels
SOA Registrar

Candidates wrote actuarial examinations at more than 200 locations in North America in November 1991. The number of candidates ranged from more than 1,200 in New York to a single candidate in Helena, Montana. Whatever the location, much work is involved in supervising the exams. The Society staff and the E&E Committee know how many hours volunteers spend before and after examinations to ensure efficient administration. The candidates realize and appreciate the amount of time spent in administering the examinations. Gratitude is the unifying emotion of all persons associated with the examinations.

At times, we have had difficulty securing the needed facilities and supervisors. Because this problem occurs occasionally, we ask that all Society members be generous with their time. We also need members to help by asking their employers to be generous with facilities. When the phone rings, and you are asked to share time or facilities with the upcoming generation of actuaries, please say, "Yes, of course, I'd be glad to help!"

Hotline to SSA

The Social Security Administration has a recording that provides information on the most recent benefit increase, national average wage, and all wage-indexed amounts such as the taxable maxima for the Social Security and Medicare (Hospital Insurance) programs and the benefit formula "bend points." The recording summarizes the information published in the *Federal Register* on October 25 in Volume 56 starting at page 55,325. Anyone interested can access this recording by dialing 410-965-3053. The recording will be updated each year, generally in mid-October.

For more information about the recording, please call Jeffrey L. Kunkel, supervisory actuary, Social Security Administration, 410-965-3013.



In reply to the October 1991 quest for the youngest successful exam taker, Mark Kinzer writes:

While I do not believe I hold any records for youthful actuarial examination success, I may come close.... I passed Part I just prior to graduating from high school....I became an ASA at the age of 21½...graduating from the University of Nebraska the same month. I obtained my FSA at the age of 23½. I passed each exam on the first attempt. I never took more than one exam per session.

* * *

The October 1991 "money puzzler" from Hans Gerber brought eight replies. The answers to the question of whether to invest all money in foreign currency varied. Richard Marker comments, "You are mixing the value of money and the exchange rates. The solution as stated for the problem ignores changes in the value of your native currency."

Marker, John Tillotson, and Doug Eckley, as well as Gerber, believe that the purchasing power is directly related to the exchange rate, so the expected gain in purchasing power does not depend on the currency chosen.

Eckley explains:

The investor should be indifferent to investing in foreign currency. The apparent expected gain is a result of relative inflation.

Take the case where, at the end of the year, £1 is worth \$2. This implies, under the economic concept of purchasing power parity, that \$1 now buys only half as much as £1. Perhaps the dollar country experienced 50% inflation and the pound country, -25%. Then the investor with \$2 at year-end has a 33% gain in purchasing power, but the investor with £.5 has a 33% loss in purchasing power. Other feasible inflation rate pairs imply nonzero inflation for the two countries taken together, in which case the gain for one investor does not exactly offset the loss for the other. If overall inflation is high enough, both investors lose.

For a discussion of purchasing power parity, see Chapter 15 of *International Finance and Open Economy Macroeconomics* by Francisco and Luis Rivera-Batiz, Macmillan Publishing, 1985.

Steve Martineau said, "If you are the country with the weaker currency, you better start up the printing press, or did you already?" He, Mark Evans, and John Morrill reason on a global basis. Morrill said:

The investor can invest all her money in a foreign currency, but she might not be able to convert it back to her own currency. Suppose George and Maggie are the only investors. George buys £100 from Maggie with \$100, and each exchange for as much of their own (original) currency as possible after the exchange rate fluctuation. Then George's expected value is \$75 + £25 and Maggie's is £75 + \$25. The reason is, of course, that in the case of a \$2 = £1 outcome, George can only buy the \$100 (for £50) and will hold £50 he cannot exchange. It also is the case for Maggie in the case of £2 = \$1 outcome. (The restriction to one investor in each currency merely is a simplification. At a 1:1 exchange, equal amounts of dollars and pounds will be exchanged initially.)

Robert Cohen believes that change rates of 1:2 (implying a gain of 100%) and 2:1 (implying a loss of 50%) are not symmetric. Richard Rink speaks of "heresy." He thinks that for one investor, the probabilities should be 1/5 and 4/5 (and not 1/2 and 1/2).

Dear Editor:

Time to face problems

Talk about rearranging the deck chairs on the Titanic.

An NAIC advisory committee has recommended a vastly expanded set of rules for calculating the MSVR. For the first time, factors are included for mortgages and real estate and a complicated judgmental amortization of certain capital gains and losses.

Why are we concerned with the MSVR when we really need limits on certain types of invested assets, notably real estate and commercial mortgages?

I realize this brings up the many-headed monster of federal versus state regulation, but let's look at our problems head on.

Gordon Leavitt

Pricing for solvency

An old story about mistakes resurfaced recently: "When a lawyer makes a mistake, you put it in jail. When a doctor makes a mistake, you bury it. But when an actuary makes a mistake, you don't find out about it for 20 years."

This is especially true of a pricing actuary. Pricing actuaries have been "pricing to competition" recently, using the vehicle of marginal unit costs. All they have to do is identify the competitive target, select the marginal unit costs that produce that target price, and then find some nice words to justify the marginal unit costs. Words like "marginal pricing" have helped. Never mind that pricing actuaries seldom test the company as a whole to see if all costs are still covered. That is someone else's responsibility. Anyway, perhaps it will take 20 years to find out if all costs have been covered.

With the increased interest in corporate solvency, we actuaries should consider changing our pricing philosophy from "pricing to competition" or "pricing to maintain market share" to "pricing for solvency," "pricing for survival," or "pricing for profitability." But how?

James L. Lewis

Continued on page 18 column 1

Dear Editor cont'd

Actuaries should examine environmental health factors

I recently attended a convention where science fiction writer Frederik Pohl lectured on the environment and the future. He and Isaac Asimov have written a nonfiction book, *Our Angry Earth*.

Pohl said some companies argue that current methods in use are substantially cheaper than the more environmentally sound methods available. The example he used was coal burning versus harnessing solar or tidal power to generate electricity. The figures the companies use exclude the costs that the government and public must pay for damage to the environment and to the health of the people as a result of coal burning and coal mining.

Pohl's point made me wonder whether our profession has considered the possible effects of environmental changes on people's health.

Associate and Fellowship exams and conference topics stress factors that change mortality and morbidity rates and the need to study all possible scenarios. No discussion is given on environmental effects on health or how a changing climate may affect lives in the future.

Recently, Nova Scotia was blanketed by smoke from another province's forest fire several hundred kilometers away, affecting people here who have respiratory problems and the older population. The government is building a coal burning plant and planning an incinerator to burn most of the garbage. This ultimately will affect the health of the people who live in the fallout area of this smoke.

On a more global scope, the thinning and deterioration of the ozone layer apparently will lead to higher instances of skin cancer and cataracts. The oil fires in Iraq that spewed clouds of smoke into the atmosphere have an unknown effect on the world's climate and its inhabitants.

Black and Skipper's *Life Insurance*, in the chapter on "The Mathematics of Health Insurance," states, "Studies of morbidity experience are based on experience that is already out of date, and since morbidity costs applicable to the future are needed, it is necessary for the actuary...to use projection or trend factors" (p. 396). A changing environment's effect on health should be considered as a

factor in predicting the morbidity costs of the future. Is our profession doing this?

Ultimately, someone will have to pay for any health costs or death benefits that will be incurred as a result of the current abuse of the environment. As actuaries, we should be studying and planning for such a plausible contingency now before such morbidity and mortality experience becomes "out of date."

Peter Robert Jarvis

RAND Health Insurance Experiment data available

As the Society's liaison to the Operations Research Society of America, I'd like to point out an article in the September 1991 issue of *Management Science*, The Journal of the Institute of Management Sciences. The article is "Simulating Health Expenditures under Alternative Insurance Plans." The simulation is from "behavioral models...developed as part of RAND's Health Insurance Experiment" to provide "estimates of the effect of insurance on use, uncontaminated by sickness or selection effects."

SOA members with little interest in the methodology of such studies sometimes want access to frequency and severity data used in the studies. Here, this elementary data is published, not in the *Management Science* article, but in various RAND studies and in the June 1987 issue of *American Economic Review*.

Any Society member wanting the abstract, introduction, and "The RAND Health Insurance Experiment" section of the *Management Science* article may contact me at my *Yearbook* address. Reprints of individual articles are not available and direct inquiries about single copies of *Management Science* may be sent to The Institute of Management Sciences, 290 Westminster Street, Providence, RI 02903.

Nathan F. Jones

About diverging appraisal values

The article by Douglas A. Eckley in the September *Actuary* prompted me to comment from my U.K. perspective:

- Surely the three actuaries should have asked the purpose of the valuation before pronouncing.
- The assumption is made that the discount rate should be equal to the risk-free rate. If the value is being produced for an investor subject to different tax rates than the market,

then the investor likely will want an after tax discount rate different from that of the market.

In any case, interest on claim reserves is not risk free and so use of a higher rate of discount than the risk-free rate is justified. This especially applies to any interest earnings assumed to come from new business.

- The concept of "risk free" needs to be considered in light of an investor's requirements. In the United Kingdom, an indexed linked gilt yield might be considered risk free to an investor seeking to match "real" liabilities but not "money" liabilities. For example, indexed linked gilts would be risky for a life office to match nonprofit nonindexed immediate annuity business.
- If the company had been operating for a year or more, a positive net worth should have built up. The zero value suggests either that the company has no ability to earn interest on claim reserves or that some other factor, such as fluctuation in claims, expense overrun, or dividend distribution, has depleted them. If no interest has been earned in the past, then this is not a good omen for assuming there will be future interest earnings to value.
- Actuary B should note that, at least in the United Kingdom, an appraisal value would, if appropriate, include an allowance for the expected value of profits from new business. Perhaps he was assuming interest on claim reserves was already included in the value of one year's new business.
- Actuary C manages to assume an infinite value for future business. In the real world (or at least in the United Kingdom), new business is valued using finite multiples that often are derived from a new business growth rate combined with an appropriately high discount rate to allow for the uncertainties inherent in new business.
- Actuary C also should know that managers of the business are not in general the owners of its profits and, if so, are not in a position to use his advice.

Howard Froggatt

Actuaries could inform public

I am a consulting pension actuary who read with interest and concern Daphne Bartlett's article in the September *Actuary* in which she

describes her anxiety over the silence of actuaries during the current public scrutiny of insurance companies. I want to thank her and encourage her in her remarks.

She offers that this silence may follow from being busy. I do not believe this, and I suspect her anxiety at least partly derives from her not quite believing it either. Most of us view ourselves as intermediaries between policymakers and consumers or clients. Some of us view ourselves as affecters and shapers of policy. What the insurance "crises" have revealed is there is a further role beyond even these — influencers of public opinion. In contemplating this role, we seem to retreat into silence.

We have made strides in gaining the respect of regulators. Congress has a higher awareness of actuaries than ever before. Many of us have educated our clients to be more sophisticated users of our services. But what has prepared us, and what will enable us to reach out to a public tempted to cash out of insurance companies whose ratings decline or that become front-page news for other reasons?

Our profession needs a public voice. I want to turn on a national news program and see an articulate and well-prepared actuary offer sound, reasonable observations on what questions should be asked of an enterprise engaged in accumulating funds during an economic downturn that are intended to cover future contingent payments. This is not easy. Others may be able to lead and persuade in this area, but actuaries are uniquely poised to do so. The trouble is we joke that we have difficulty explaining even at cocktail parties just what we do. The insurance crisis means not only that we'd better solve this small social problem, but we'd also better be prepared to deal with much larger ones. Our profession must see that its future lies not only in affecting policy but in gaining the ear of a public that is hungry to listen to common sense.

W. David Hoak

386SX computing power

I believe John Martin's letter to the editor in the October *Actuary* may misinform your readers. The letter said that the 386SX and the 386/33 have similar computing power. It also stated that the extra power of a 386/33 was overkill for actuarial applications.

My experience with running computationally intensive actuarial

software on a 16 megahertz (Mhz) 386SX with a math coprocessor shows that it takes more than twice as long to run as the same program on a 386/33 with a math coprocessor. This is what you would expect based on the clock speeds of the computers. A friend of mine recently traded in his 386SX for a 386/33, and he concluded that "SX stands for eXtra Slow!"

What Martin probably meant is that a 386SX with a math coprocessor is as fast as a 386/33 without a math coprocessor. Now that the price of the chips has plummeted, why not spend \$200 to buy a math coprocessor to triple the computational abilities of the 386/33?

Rick Groszkiewicz

Editor's note:

According to the editor's readings of PC World, the computing speed of a 386(DX) or 386SX should be roughly proportional to the clock speed. A clock of 33Mhz should run computations about one and one-half times as fast as a clock of 20 Mhz. The difference between the 386 and 386SX chips is in the input/output capacity — the SX has half the throughput of the DX. If there is significant reading of the disk, the DX will perform much better. Differences in execution speed could be related to the exact programming including the possible use of virtual memory held on the disk. By the way, the problems of faulty execution of programs are now being reported on the first 486DX/50s.

In memoriam

B. Franklin Blair FSA 1939
 Denis Legendre FSA 1976
 John L. Stearns FSA 1929
 Harold E. Tifenbach FSA 1968

* * *

In the past few months, the profession lost two of its most respected members: Harold Lawson, FSA 1933 and the 1966-67 Society of Actuaries President, and Walter L. Rugland, FSA 1945, the 1969-70 President of the American Academy of Actuaries and father of SOA's President-Elect Walter S. Rugland.

Because he was born in Canada and employed in both the United States and Canada, Lawson had a special interest in the international character of the Society's membership. He was residing in Canada when he was elected President-Elect, but by the time he took office as SOA President in 1966, he was president of Glen Falls (N.Y.) Insurance Company, part of an international group of insurance companies.

The Actuary came into existence during Lawson's term as SOA President. Almost 25 years later, his goal that this publication provide "a means for timely and frequent discussion of matters of interest to actuaries" continues to be fulfilled.

In addition to his brilliant mind and dedication to the profession, Lawson will be remembered for his extraordinary sense of humor. In his Presidential Address in 1967, he demonstrated these traits with his favorite maxim. In it, happiness is depicted as a fraction, with the numerator being what we get out of life and the denominator, what we demand of life. He quoted Carlyle who said, "...the Fraction of Life can be increased in value not so much by increasing your Numerator as by lessening your Denominator." Lawson closed his address with, "My wish for each of you...is that your quotients may all be big ones."

Walter L. Rugland was president of the Aid Association for Lutherans in Appleton, Wisconsin, for 14 years. During the time he headed AAL, the firm increased by almost four times its life insurance in force and doubled its number of employees. In retirement, Rugland continued to serve his community by founding the Community Foundation, which funded charitable civic endeavors.

Just one week before his death, the local newspaper interviewed Rugland and commented on his full life, which began in North Dakota as one of nine children of a pioneer prairie pastor. The newspaper called Rugland a "rock-solid Scandinavian who plans to get out of this world the same way he's lived — with grace and integrity."

ACTUCROSSWORD

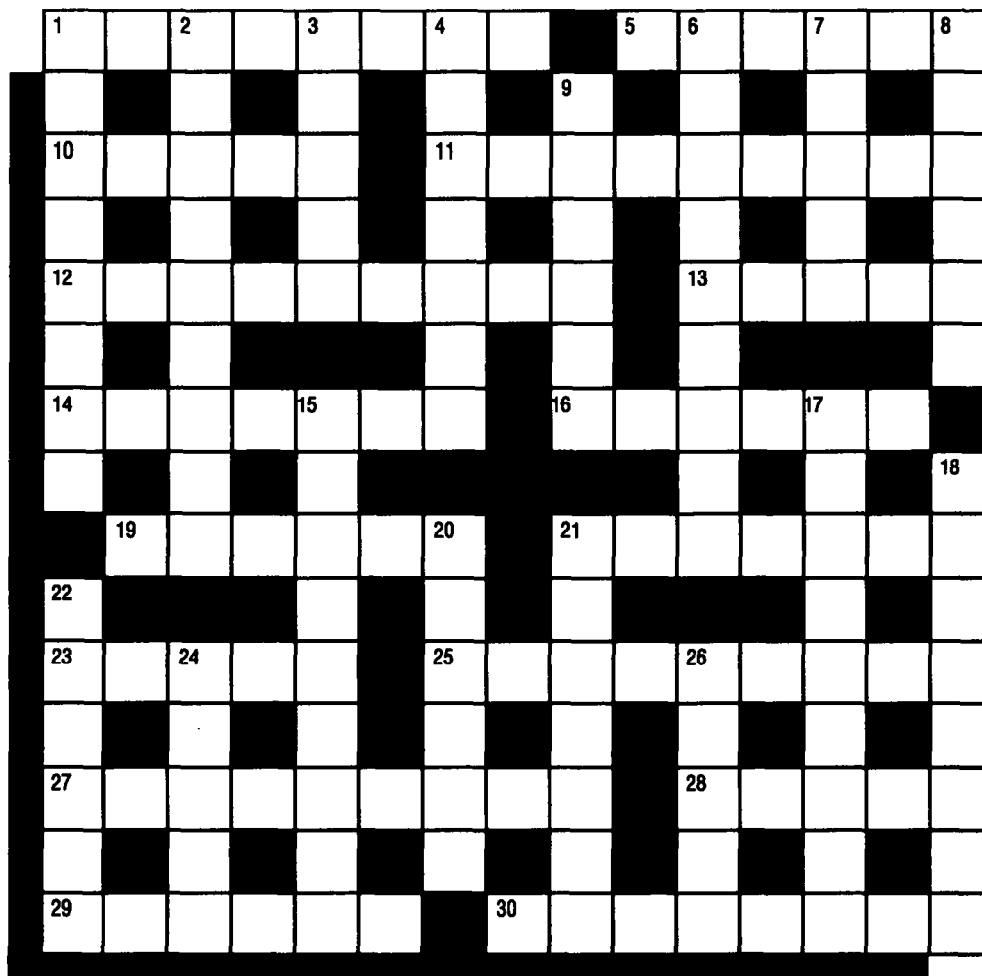
by Bob Hohertz

Across

1. Samuel, G.C.M.P.C., "Choose fuse!" (8)
5. Genuine concrete (6)
10. Novelist of stature, a dead one of course (5)
11. Soft cord boot used with ball on ground (5,4)
12. Choose actuary: less work, sweet cure (9)
13. Western rebel leader hangs around Gateshead, becomes a star (5)
14. Do *once* play piano - perfect! (7)
16. Hail fellow well met - a hockey player? (6)
19. Critic caught broken nose, right? (6)
21. Total, as Ed put on (6)
23. I, the unknown cowgirl, name the father of the horsemen (5)
25. Man engaged in rip-roaring spree may call for this server (9)
27. Fear to take hold (9)
28. Nowadays, book condensed "As You Like It" (2,3)
29. Estimate value (6)
30. Writer to run away from faithful wife (8)

Down

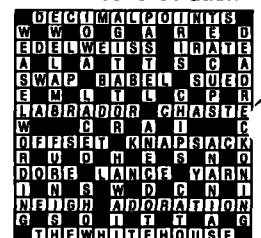
1. Even a goddess can be found among the nouveaux riches (8)
2. Fellow, king, a hood of the Knights of the Garter (9)
3. Instead of eating crow, he ate grass (5)
4. Number one state fitting back in (7)
6. Want freedom from dirty film? Try foaming cleansers (9)
7. Taking advantage of us with gin fizz... (5)
8. ...probably pleasing (6)
9. Old manuscripts show limits of policy in two of the colonies (6)
15. 'In the matter of' encompasses 'inasmuch as'? False! (9)
17. Creature, endlessly fleet, takes sick over nothing (9)
18. A bad role can become worthy of respect (8)
20. Turn head to look at deciding game (6)
21. Sailor on hogback? Cut it! (7)
22. Teach, quietly angry (6)
24. Food in place (5)
26. Skirt advertisement in "The Mother of Us All" (5)



100% Solvers - September Deas: L Abel, D Apps, J Balsam, R&M Buck, J Darnton, M&K Diede, R&J Koch, W Luther, G&D Mazaitis, J Ripps, J Schwartz, J Singer **Hohertz:** T Boehmer, P&J Borscheid, B Dibben, C Galloway, E Goral, J Grantier, C Hachemeister, P Hepokoski, D Leapman, M Lykins, M MacKinnon, G Mazaitis, R Miller, J Prescott, D Weill & G Leight **Deas and Hohertz:** W Allison, A Amodeo, D Baillie, J Braue, F Brownlee, F Clarke, J Colpitts, Mrs C Edwards, P Gollance, G Horrocks, R Maguire, J Marks, R Martin, L Migotti, B Mowrey, L Oxy, G Sherritt, H Tate, E Thompson, U of ND Math Dept, B&J Uzzell, C Walls, R Whitby, A Whiton, D Williams, F Zaret

October Deas: A Amodeo, D Apps, D Baillie, D Baldwin, L Bennett, R&M Buck, G Cameron, F Clarke, S Colpitts, B Dibben, K&M Diede, C Galloway, E Goldstick, S Harder, O Karsten, D Leapman, L Migotti, H Tate, M Vandesteeg & A White, C Walls, D Weill, R Whitby **Hohertz:** P Marks, G&D Mazaitis, J Schwartz **Deas and Hohertz:** W Allison, J Balsam, T Boehmer, M Eckman, C Godfrey, E Goral, J Grantier, P Hepokoski, B&J Koch, W Lumsden, R Martin, G Sherritt, U of ND Math Dept, A Whiton, F Zaret.

November's Solution



Send solutions to: Competition Editor, 209 N. Comanche Lane, Waukesha, WI 53188