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DIGEST OF DISCUSSION OF SUBJECTS OF SPECIAL INTEREST

INDIVIDUAL ORDINARY INSURANCE

Recent Experience

1. What trends have been observed in mortality among life insurance policyholders? How does recent mortality compare with that in the past few years? What are the main causes for these changes in mortality?
2. What has been the experience with policies with high early cash values, usually loan financed—their popularity, lapse experience and any replacement problems presented by them? What are their special advantages and disadvantages? What special underwriting and administrative rules apply?
3. Are pre-authorized bank check plans proving popular with agents and policyowners? Are such plans being widely accepted by banks? What features have proved most successful? What problems have arisen, and how have they been met? Is there a general trend toward increased use of various monthly premium payment modes?
4. What has been the recent experience and the trend in regard to number of policy sales per agent? Average size policy? Effect on these of programs for grading premiums, commissions or dividends by size? What is being done about the market for $1,000 to $5,000 policies?

MR. E. A. LEW said that the mortality of insured lives seemed to be reaching a plateau with little prospect of real decline in the near future barring a major breakthrough in the prevention or treatment of the principal cardiovascular-renal diseases or cancer. Population statistics support this view. He said, however, that recent trends indicated there was still some room for improvement in female mortality and suggested also that some of the decline in the mortality of insured lives may have been due to higher selection standards.

MR. F. E. ROOKE presented figures on the Canadian standard Ordinary mortality experience by 5 year age groups of about 20 Canadian and United States companies over the periods 1949–1952 and 1952–1956. While not directly comparable since they include both medical and nonmedical issues, these figures indicate improvement similar to that shown by the 1956 Society Report with improvement in most age groups over age 30 for the first 5 policy years combined and for most age groups over 40 for the 6th and subsequent policy years.

MR. A. C. WEBSTER cited the recent mortality experience of a com-

pany for the first three policy years (*TSA* X, 68). This he considered was a disturbing report and may possibly be the forerunner of an increase in mortality due perhaps to a relaxation of sound underwriting standards. Perhaps the fact that there is little chance of improvement in the male mortality might cause the underwriters to be a little more careful in their current selection.

MR. A. T. BUNYAN said that more than half of the Phoenix Mutual's paid business from their own agents and nearly all of their brokerage business is on full net level premium reserve plans; 75% to 80% of this business has maximum loans. Because of the high percentage with loans they instituted financial and other restrictions aimed at improving its quality within a few months after introduction of the plan. Total annual premiums for all life insurance, including the new issue, cannot exceed 7% of the first $10,000 of annual income plus 12% of the excess over $10,000, except where there is prospect of a material increase in income. Agents under financing are not eligible for the plan on their own lives and no contest credit is given for any insurance on the life of an agent or a member of his family. A charge-back to the manager's salary is made in the case of any policy lapsed before the end of the 4th year. They have attempted to control replacements by reducing first year commissions on the new policy in such cases. Lapse rates before the institution of these restrictive measures were twice the normal rate and have continued somewhat high since.

MR. E. A. DOUGHERTY said the lapse rate on the Union Central's Extraordinary Life plan has been twice their regular rate. To control abuses, such as use of the plan as high commission term insurance, they have changed the commission rates from 25% and nine at 10% to ten at 12½% and have instituted a financial underwriting requirement similar to that of the Phoenix. No sales are permitted on brokers or agents of other companies or their families, and the first year premiums must be paid in cash. Half of their total business in 1957 was written on this plan but the volume is lower in 1958 due to the restrictions and to the increased competition.

MR. N. L. CAMPBELL said that the National Life of Vermont first introduced a high cash value policy in 1956 and this type of plan is currently accounting for about 60% of their new business by amount and 22% by number with an average policy size of $35,000. There has been no significant difference in the lapse rate for this plan from that of the company's rate as a whole. However, they have introduced a yearly term dividend option in an effort to provide an incentive towards better persistency by leveling out the death benefit. They have put in rules to

avoid allowing a material financial benefit to agents on replacements and do not appear to have had a problem in this area. Only 50% of this business is loan-financed, probably because of this plan absorbing business that would ordinarily be sold on an Ordinary Life plan since the $15,000 minimum policy and high average size of the high cash value plan tends to give it more favorable net costs. He also felt that it would be desirable to have a relatively flat commission scale for loan-financed business, but did not think this would be practical while a large percentage of this business was being sold on a nonfinanced basis. Gradation in premiums by size might, however, make a flatter commission scale practicable by drawing off the nonfinanced business to Ordinary Life, leaving the financed policies to the high cash value plan.

Mr. Campbell went on to say that they believe that, when properly sold, there is a place for this type of policy. In determining its suitability in a particular situation, they consider if the need for life insurance protection is the fundamental motivating factor, the financial underwriting aspects of the risk, and the prospective insured's understanding of the tax situation and decreasing term nature of the coverage.

MR. W. J. NOVEMBER of the Equitable said that under their Executive contract they have followed their general policy of making the cash values commensurate with the asset shares. Even with an adjusted commission scale of 25% in the first year and nine renewals of 10%, they have found they cannot allow full reserves until after 3 to 5 years. They have not wanted to encourage loan business, and therefore they have no loan privilege in the first year and no term insurance dividend option. Probably as a result of these restrictions, this plan accounts for only about 2½% of their total volume at the moment.

MR. W. A. KELTIE said that the first year Great-West's high cash value plan was available it accounted for 23½% of their total adult U.S. sales. Analysis revealed that over half the applications were for amounts between $10,000 and $25,000 with an average of just over $12,000, that in many cases it was being sold in place of term insurance, that it was being sold to applicants of modest means who could expect little tax advantage and that in some cases it was replacing existing insurance. To eliminate the undesirable features and to confine sales to those able to benefit from and understand the applicable tax laws they have instituted rules limiting sales of $10,000 to $25,000 policies to applicants intending conventional premium payments without loans and limiting loan-financed policies to applicants with $15,000 annual income and a total premium outlay on all insurance of not more than 15% of annual income. Reduced commissions are paid on replacements. Where the replaced policy is with another company, that company is given notice to conserve its policy.

MR. C. F. B. RICHARDSON said that Mutual of New York is obtaining about 12% of its business on its high cash value plan. An underwriting rule requiring a minimum income of $15,000 appears to have been successful in screening out undesirable business. Lapse rates on the first few months of business have been satisfactory but the figures are based on a small experience.

Continuing to the next topic, Mr. Richardson said that the proportion of new business on their automatic check plan has increased from 12% in 1957 to 14% for the first 6 months of 1958. The proportion of monthly business has stayed the same, indicating that most of this business is drawn from other premium frequencies. The main problems encountered have been in getting the cooperation of the banks. Less than 1% of the checks are being returned for lack of sufficient funds and the persistency of the business has been good. They pay full commissions on bank clearance of the first check.

MR. C. M. STERNHELL, speaking on topic 3, said 10% of the New York Life's business by number and 15% by amount is being sold on their automatic check plan. They also pay the full commission to the agent with the first check. Their average policy has been about $12,000 with an average premium of about $300 per year and a first year lapse rate of 10%. The proportion of monthly business has not changed.

MR. J. R. HANSON said that 13% of the Massachusetts Mutual's new business by number and 16% by amount is currently on their Triple M plan. Since the plan's introduction the percentage of monthly business, which had been increasing, has leveled off and there has been a decrease in the proportion of annual business. The agents appear quite satisfied with the plan and they have encountered very little resistance from the banks. Commissions are annualized and paid on receipt of the first premium, except that, at the general agent's request, first year commissions will not be annualized, thus avoiding possible losses on lapsed policies. A popular feature of the plan has been payment of premiums for several policies by a single check.

The average size of Triple M policies is distinctly larger than the average size for all new issues, being about $17,000, probably because the plan is not suitable for persons with marginal checking accounts who often can only afford small policies and because of a large number of business insurance policies being placed where a monthly premium mode is preferred to avoid disturbance of the purchasing company's cash position.

MR. W. K. NICOL said that pre-authorized check plan has also proved extremely popular with his company's agents and policyholders, with a recent survey showing nearly 35% of all new policies on this mode.

However, because of various requirements this amounted to nearly 80% of the eligible policies. Acceptance by the banks has been excellent, with nearly 90% of those requested to participate since the start of the plan in 1952 agreeing to do so. Recent implied criticism of the plan on the basis of a court decision that applied to a bank draft and not to a pre-authorized check plan stimulated inquiries but has had no particular effect on the number of co-operating banks. Mr. Nicol also said that the use of a minimum monthly premium of $10 has resulted in an improvement in average policy size, that the lapse rate on monthly business has substantially improved and that the expense rates in connection with premium collection have been low. The rate of returned checks has fluctuated from 1½% to 3½%, averaging about 2%. There is some indication that this rate varies with economic conditions but the level is considered satisfactory.

MR. W. A. MERRIAM said that the Metropolitan, like other companies, had had difficulties with some banks. However, most of these are being settled satisfactorily.

MR. R. P. WALKER added that Wisconsin National has had difficulties with banks wanting agreements broader than necessary from the insurance company standpoint. A new agreement was drafted to meet the valid objections to the old one.

MR. L. M. DORN said that New York Life's agreement went as far as they felt it should, even covering the banks against some of their own mistakes, provided there were sufficient funds in the depositor's account, and they are holding to it as a standard form.

MR. C. H. WAIN questioned if the results of pre-authorized check plans would prove to be as satisfactory when and if such plans spread to other areas such as utilities and department stores.

MR. J. S. HILL made the point that when excessive premium discounts are given on these plans credit is being given in effect for a higher average policy size and there will be a double credit involved if the company is also using premium gradation by size. He also mentioned that his company had extended the plan to quarterly and semiannual and annual business, sending a carbon copy of the check to the insured as a reminder to enter it in his check book.

MR. S. P. ADAMS, discussing topic 4, stated that the number of agents, including part-time men, in the Lincoln National has increased steadily in the past few years while the amounts of insurance produced have increased even faster. However, the number of ordinary policies per year has remained almost stationary for the period of 3½ years which they investigated, resulting in a substantial increase in average policy size,

but a decrease in the number of sales per agent. The introduction of size gradation through a policy fee method in June 1957 did not seem to affect the number of sales per agent. There was a sharp increase in average size policy at the time which, however, they feel was due more to a concurrent increase in minimum size policy from $1,000 to $1,500 than to the premium grading.

MR. PAUL T. ROTTER stated that since the Mutual Benefit introduced premium gradation in four size groups in 1957 they have experienced a considerable decrease in production both by number and by amount in the lowest size group ($2,000 to $7,500). The next size group ($7,500 to $12,500) has experienced a modest reduction. However, there has been a large increase in the two larger policy size groups covering policies of $12,500 and over. Over-all, the total volume has increased substantially, while there has been a slight decrease in the number of policies sold. The average size policy has increased 29% from $9,717 to $12,492 in the first nine months as compared to the same period of the previous year and appears to be still increasing. However, there has been a decrease in average policy size within each size group. These considerations would seem to indicate a gradual upgrading in amounts applied for. While various factors (including an increase of 10% in the number of agents) undoubtedly contributed to the increase in production of about 30% over this period, Mr. Rotter felt that pricing-by-size in itself had had considerable effect in increasing their volume.

Underwriting

1. What considerations led to the recent increases by several companies in their double indemnity limits?
2. In underwriting military aviation risks, several companies now consider the type of plane being flown as more significant than the number of hours of flying. What considerations led to this change? What results have been noted since the change?
3. It has been the opinion of many that mortality in certain occupations has improved. To what extent is this opinion substantiated by observed experience and trends? Is future improvement anticipated?
4. What recent developments have occurred in underwriting impaired risks, heart cases, diabetic cases, older ages, high ratings?
5. Many individual policies are issued on a "guaranteed issue" or modified group basis:
   (*a*) To what extent are such policies being written with no connection to a pension plan? What underwriting rules and plans of insurance are used?
   (*b*) How do rates and dividends compare with regularly underwritten business? Are such policies competitive with true Group insurance rates and costs?

(*c*) What experience has developed for such business?

6. What programs have been adopted for guaranteeing insurability, *i.e.*, granting the insured an option to purchase additional insurance at some future date or dates, without evidence of insurability? What proportion of new policies include such an option? What are the advantages and disadvantages of this option? What special problems have arisen related to this option?

MR. J. R. McDONNELL stated that the New York Life recently increased their maximum amount limit for double indemnity to $150,000 for ages 20 and over. This limit takes into account only the amount of double indemnity in force in their own Company. As reasons for the change Mr. McDonnell listed a favorable double indemnity experience for a good many years, no indication of any substantial increase in accidental death rates with an increase in the amount of double indemnity coverage per life, and no indication that such an increase would carry with it any additional underwriting or claims problems.

MR. W. J. NOVEMBER felt that the recent increases in double indemnity benefits or limits were a reflection of the competitive situation which exists in the business. He personally did not see the justification for such large amounts of double indemnity coverage as were now being offered. He referred to the intercompany double indemnity study which he reported on preliminarily on the preceding day, and pointed out that the report shows evidence of higher claim rates on the larger policies. Aircraft accidents stood out as a cause of accidental death for policies of $5,000 and over. There was evidence also of a high claim rate as a result of accidental death from firearms and from motor vehicle accidents. Among women, policies of $5,000 or over gave a substantially higher claim rate than policies of less than $5,000.

MR. A. P. MORTON expressed the opinion that double indemnity is nothing more than a popular, low cost "fringe benefit" that helps sell life insurance and provides a more adequate death benefit for some people who would otherwise be underinsured. The limitations of coverage are generally understood by the public and companies have experienced claim results well within the premiums charged. The most that can be said against this benefit is that it may be used as an excuse for buying less than an aequate amount of basic insurance. However, it does present a few problems in underwriting the moral hazard. The underwriter must be especially alert for alcoholic habits, reckless driving and suggestive over-insurance where there may be inadequate financial justification.

Mr. Morton felt that the recent increase in the maximum double indemnity limit in the Prudential did little more than adjust for the decreased purchasing power of today's dollar. A new innovation in their sale

of the accidental death benefit allows up to twice the face amount of the basic insurance. They felt that this triple indemnity approach was the soundest method of meeting the currently large popular demand for this benefit and that it does not raise the difficult administrative problems of the more complicated clause which gives triple benefits for certain accidents only.

MR. W. A. MERRIAM reported that Metropolitan changed their all-company limit of $150,000 to an in-company limit of $150,000. Even though the larger cases may show higher claim rates, he felt there would be too few to affect the over-all experience noticeably.

MR. A. C. WEBSTER pointed out that in considering accidental death benefit limits the tendency of the courts to be overgenerous in their interpretation of the ADB clause should not be overlooked and that in his Company's experience the courts sometimes went to great lengths to stretch the coverage to include an accidental death not intended in the original coverage.

MR. R. E. MOYER stated that when jet planes were first used extensively, the John Hancock issued coverage to these risks only with aviation exclusion riders. They now use ratings for jet pilots that are the same as for propeller plane pilots at ages 30 and over and higher at ages under 30.

MR. F. H. DAVID listed the following reasons that have influenced companies to disregard total flying experience in classifying military pilots: (1) Recent intercompany studies have shown that Air Force pilots with at least 800 hours flying experience and those with less have experienced substantially the same aviation death rates; (2) in order to keep a simple rating schedule only the most important factors bearing on the risk are used; (3) disregarding flying experience avoids applications for reduction in ratings at a later date. On the other hand, Air Force statistics make it clear that the type of plane flown strongly affects the risk. In the period 1954–1957, the aviation death rate was 20 per 1,000 for fighter pilots compared with 7 per 1,000 for bomber pilots and 4 per 1,000 for transport pilots.

Mr. David pointed out that Air Force and Navy statistics as well as intercompany experience support the use of age as a factor in that they show a marked decrease of the aviation death rate with advancing age. Some actuaries believe, however, that differences by age chiefly reflect differences in the type of plane flown, and that rates for pilots under age 30 are higher because most fighter pilots belong to this age group. Air Force aviation accident rates analyzed both by age and by type of plane flown give a measure of support to this point of view; aviation death rates are

not available on this basis. Mr. David also mentioned that though companies rarely make distinctions between branches of service, in recent years Navy pilots have experienced considerably higher fatality rates than Air Force pilots. Some companies grant lower rates to pilots at ages 30 and over whose primary duties are of a nonflying nature but who do enough flying to maintain proficiency and qualify for flight pay.

In general, companies' rating schedules for military aviation risks are much more refined than their schedules for most other types of extra hazards. This greater refinement results from strong pressure to grant a favorable rate to any identifiable group with better-than-average experience and from companies' efforts to prevent antiselection by those engaged in the most hazardous types of flying.

MR. E. A. LEW believed that the Metropolitan was the first company to underwrite military flyers by type of plane flown and on the basis of some 12 years of experience they are satisfied with this type of underwriting. This is because for any given plane type there is usually a normal range of hours flown, so that the hours of flying are not nearly as important a factor. Because of the increasing complexity of modern planes, there is less likelihood than ever before of pilots being changed from one type of plane to another.

MR. H. F. GUNDY stated that there are difficulties in attempting to underwrite pilots in the Royal Canadian Air Force according to the type of plane being flown. The RCAF is essentially a fighter force, with the result that pilots may be transferred from one functional formation to another, depending upon the requirements of the Service at the time. A pilot of a transport plane this year may be flying a fighter plane next year. In general, it is the policy to maintain the proficiency of all pilots in the flying of fighter aircraft.

MR. F. G. WHITBREAD stated that the Lincoln National still feels that age appears to be the most important factor in underwriting military aviation risks and therefore for simplicity and lack of any conclusive evidence otherwise they have not introduced type of aircraft into their military aviation practice. Factors such as type of aircraft (jet or propeller), the purpose of the aircraft (fighter or bomber), annual flying time and duties are only temporary, and rating by these factors may lead to a large number of policy changes. Factors such as total flying time and rank tend to increase with age and a lesser amount of hazardous flying is done as age increases. Therefore all other factors are either largely dependent on age or subject to change according to changes in world conditions, political situations, federal budget restrictions and changes in military thinking and planning. The unfavorable experience with jets

and fighters undoubtedly reflects to some extent the younger ages of the pilots flying these planes. Mr. Whitbread felt that it would be interesting to have a statistical breakdown by a combination of factors such as by type of aircraft and by age and perhaps also by flying time.

MR. E. H. SWEETSER described New York Life's new military aviation program under which pilots at ages less than 30 flying in fighter-type aircraft are charged higher aviation extra premiums than those flying in other types of aircraft. No distinction is made as to whether the planes are jet or propeller driven since there was no evidence to indicate that nonfighter type planes propelled by jets are more hazardous than those driven by propellers; furthermore, practically all operational fighters today are jet propelled. Prior to the new program, their aviation extra premiums varied according to total flying experience and age and took little account of the type of plane flown. The change to the type-of-plane approach was supported by published data and their own experience; the latter indicated a significant reduction in the apparent importance of past flying experience of military pilots in all branches of service. Since the level of aviation extra premiums continues to vary inversely with the age of the proposed insured, this gives some indirect effect to past flying experience. A model office reflecting the distribution of military aviation issues by type of plane and issue age established that no age and type-of-plane group would produce a significant excess or deficiency of premiums over claims. Hence, the aviation extra premiums under the new program should support the expected claims even if a shift in the distribution of business results from the change in program.

MR. K. M. DAVIES stated that it is generally recognized that the general improvement in occupational mortality since the 1937 Occupational Study results largely from the many programs developed in the industrial fields to reduce both the accident and health hazards. This general improvement is shown in statistical data from the Interstate Commerce Commission, U.S. Labor Department, Mines Bureau, National Safety Council and the U.S. Department of Health. In 1952, the Equitable made broad reductions in their occupational rating scale, with the result that now about 35% of the occupations which were rated 20 years ago are standard. Recently they completed a study on policies issued substandard because of occupation from 1935 to 1954 observed to 1955 anniversaries. There were 44 occupational classes on which the data were sufficient to produce significant results. In 11 of these classes the 1952 reductions to standard appeared to be justified. These classes are: electric arc welders in metal industries (Code 124); electricians in electric light and power plants (Code 380); telephone and telegraph linemen

climbing poles (Code 556); railroad brakemen and conductors, except dining car conductors (Codes 601–606); locomotive engineers on railroads (Codes 612–614); locomotive firemen on railroads (Codes 617–619); commercial travelers, liquor hazard (Code 755); firemen (fire department), officers and others (Codes 827–828); constables, marshals, sheriffs, who arrest (Code 836); detectives, who arrest (Code 838); policemen, other than motorcycle, who arrest (Code 844).

In four other categories where reductions to standard had been made, the experience showed a fairly substantial excess mortality. These categories and the excess claims per $1,000 are: deliverymen on autos, whether delivering liquor or other goods (Codes 763–763x) with $4.11 excess claims; guards, watchmen, and doorkeepers, not penal institutions (Code 831) with $4.95 excess claims; hotels, restaurants, cafes and lunch rooms—keepers and managers—liquor hazard (Code 932x) with $7.51 excess claims; janitors and sextons (Code 935) with $3.30 excess claims. Mr. Davies also gave the results of their study relating to bartenders (Code 967x). This was the largest class in their study and the mortality ratio was about 190%. The excess claims amounted to $2.55 as compared to their current $2.50 extra premium.

The present expectation of the Equitable is that mortality in industries currently rated will continue to improve, but not as markedly as it has in the past since there simply is not room in the future for tremendous improvement. Mr. Davies expects to continue to find substandard mortality in industries such as the mining industry, among unskilled laborers where the hazard is primarily one of environment, among small employers in hazardous industries where safety and health programs are not vigorously promoted, and among those industries which present moral hazards.

MR. W. A. MERRIAM stated that when the Metropolitan changed ratings to standard for a large number of occupations, they felt possibly the upper limits of standard were being stretched a bit too far. Accordingly, applicants in certain occupations designated as borderline do not qualify for standard insurance unless they are nearly perfect in other respects.

MR. B. S. PAULEY related Prudential experience on cases which had been rated for occupation in each of their first two substandard classes. In the first substandard class their mortality ratio was 123% with .34 extra deaths per 1,000 and in the second substandard class it was 134% with .53 extra deaths per 1,000. The conclusion that mortality in most occupations has improved considerably is supported by industry figures which

show a continually reducing incidence of accident and morbidity. The principal factors contributing to this improvement are: advances in safety equipment and safety engineering; advances in industrial medicine with special attention to industries with dust, heat and other health hazards; influence of the labor unions in improving working conditions and particularly in raising the general economic and social status of the workers; and interest in accident and sickness prevention methods stimulated by a desire to hold down the cost of Workmen's Compensation and Group insurance. These factors continue to operate and probably will result in continuing improvement at a decelerating rate. As an offset to this, new developments such as atomic energy are introducing additional hazards and large industrial concentrations are creating catastrophe hazards from fire and explosion.

MR. ARTHUR PEDOE felt that more attention should be paid to the social grade of the worker rather than the specific work he does. In his opinion, it would be a mistake to take casual laborers, janitors and the like at standard rates because their work does not entail some specific occupational hazard. He thought that mortality by graded premium classes might replace occupational mortality studies for a few specific industries.

MR. W. V. B. HART stated that the Connecticut General checks to see that the over-all level of substandard mortality is safely within the ratings imposed by weighting the expected claims by the respective percentage rating and comparing the over-all results. If these results appear satisfactory, the company need not be too concerned if the mortality in certain small subgroups appears for the time being to be out of line either on the high side or on the low side. As companies continue to pioneer in substandard areas which have hitherto been neglected, they will still have to use clinical knowledge in their underwriting and will continue to employ analogy with better known impairments in order to supplement their own statistics and those appearing in studies such as the *1951 Impairment Study*. The Connecticut General accepts cases with known diabetes but does not accept cases with coronary history. Coronary cases, and in fact much of the high-rating business on any impairments, involve considerable additional underwriting expense, and because of the high "not taken" rate this expense has to be covered by the comparatively few policies actually placed. Whereas in the lower ratings such expense may be a legitimate charge against the standard business, since it might have been incurred by a company writing no substandard business whatever, the extra premiums at the higher ratings must provide for this extra expense, in order to be self-supporting. Mr. Hart illustrated a change from

the reluctance of a generation ago to accept insurance liberally at the older ages by the fact that his company now considers applications up to age 75 on the Ordinary Life plan. Even this reluctance in the past was unjustified, for although mortality had not yet improved at these older ages it was stable enough so that a fairly accurate price could have been put upon it. It should go without saying that the question of insurable interest at the older ages is all-important. No improvement in mortality should tempt the company to accept business unless there is a legitimate need for it, such as to cover estate taxes, and the possibility of a speculative motive should clearly be excluded.

MR. E. A. LEW said that the Metropolitan has tried to distinguish between stabilized and progressive disease in underwriting highly substandard risks, progressive disease being uninsurable. There is some difficulty here in that a doctor thinks of a prognosis in terms of 5 years at most, whereas we have to consider a much longer period of time. We should cooperate closely with the Association of Life Insurance Medical Directors and our own medical directors to clear up this rather difficult point. Mr. Lew called attention to a projected huge follow-up study by the American Cancer Society which will cover some 500,000 families throughout the country, using questionnaires similar to life insurance applications; he indicated that the findings of this study would be of value in bringing out what additional impairments, now considered uninsurable, could safely be accepted for insurance at high extra premium rates.

MR. F. G. WHITBREAD described studies that the Lincoln National has made in this area. A study of coronary and chest pain risks suggests that complete and up-to-date information is essential to underwriting this type risk and also that conditions or abnormalities which may not be regarded as particularly important in the absence of history may assume significance when there has been a history of these impairments. Since the average duration of cases in their study was only four years the results are not conclusive, as the nature of this disease suggests that death rates will increase with duration. Several studies that have been made of diabetic experience have shown the relatively favorable mortality of the early durations and the relatively unfavorable mortality characteristic of this disease at the longer durations. However, this study did bring out that additional debits should be added even when the duration of diabetes is fairly short, possibly after 5 or 6 years. Mr. Whitbread felt that there is an unwarranted tendency of some underwriters to want to decrease extra premiums with advancing age or at longer durations because of decreasing percentage mortality, overlooking the fact that the excess deaths continue to increase. The Lincoln National quotes extra

premiums at the higher ages as high as $150 to $200 per $1,000 and they have been somewhat concerned about the public relations problems which this practice may create. With markedly substandard risks, the premiums paid can exceed the face amount after a very few years and the possibilities of misunderstanding can arise very quickly.

MR. H. L. DEPRENGER gave some statistics on 32 "guaranteed issue" cases which the Continental Assurance Company issued in the United States from 1950 through 1956 for a total amount of $69,000,000. A select mortality study with mortality ratios based on the 1946–1949 Ultimate Basic Table showed results by amounts of insurance of 88% for the first policy year, 83% for years 2 and 3, and 86% for years 4 through 7. The ratios for all policy years for the three broad age groups 34 and under, 35 through 49, and 50 and over were 67%, 92% and 85%, respectively. Mortality ratios by number of policies were somewhat higher. One large group whose significant feature was absence of individual selection was studied separately because it accounted for about one-half of the total exposure by amounts of insurance. The mortality ratio of this group was 74%, compared with 102% for all other cases and 86% for the combined business. This illustrates the variance in mortality experience by group and also stresses the importance of high participation and requirements which reduce or limit individual selection.

According to Mr. DePrenger, their business is characterized by individual underwriting for occupation only, eligibility based on a $5,000 or $6,000 minimum annual salary and a maximum age limit of 60 or 65, flat amounts or amounts fixed by formula for each life, and acceptance of new entrants on a plan which precludes individual selection. The greater part (possibly 90%) of this insurance was issued on the salary allotment plan to large white-collared employee groups of well established firms. For most of these cases there was little or no contribution by the employer. The remainder was issued to smaller groups (less than 100 lives) of the same type, association groups and pension trusts. A list of eligible employees was obtained before each case was accepted and groups with an abnormally high weighted average age were declined. Participation requirements varied between 100% for small cases and 65% for very large groups. Plan of insurance was usually limited to Ordinary Life or a higher premium form and the regular nonparticipating policy series was used.

MR. MOYER described the John Hancock's "simplified issue" plan as being designed for pension and profit-sharing trust business. The characteristics of this plan are similar to those of the plan described by Mr. DePrenger. Mr. Moyer further mentioned that split dollar and key man coverage do not seem to fit into this type of underwriting.

MR. C. A. YARDLEY felt that, in addition to pension trust plans, "automatic issue" policies can also be written satisfactorily in connection with profit sharing plans and certain business insurance situations such as key man insurance and executive deferred compensation plans. With profit sharing plans the New England Life requires that insurance coverage be mandatory for all individuals involved, and in business insurance cases the method of selecting the individuals to be covered must minimize the opportunities for antiselection. Groups of doctors associated with the same clinic, split dollar cases and professional associations all present serious underwriting problems, mainly because the insured is paying a large part or all of the premium and standard lives may be reluctant to help pay for the substandard lives. Reducing commissions to make the cost for these groups more attractive is not a satisfactory solution since this would tend to cause a comparable reduction in policyholder services performed by the agent.

For automatic issue policies the New England Life uses the same premium as those for regular policies, but slightly lower dividends and reduced first year commissions. The policy form used is less liberal than that for regular policies in the change of plan and extended term insurance provisions. The mortality experience, based on more than $170 million of paid-for business, has been within the limits anticipated in setting the special dividend scale for these policies. The anticipated mortality rates were about 90% of the 1946–50 intercompany group nonhazardous experience at the young ages, graded into 80% of CSO at age 75. Mr. Yardley felt that a compilation of intercompany experience on guaranteed issue business would be extremely helpful to many members.

MR. H. G. ALLEN described the Banker's guaranteed purchase option. This option is issued as a rider at ages 0 to 37 to a new basic policy for at least $5,000 on any standard life or endowment plan maturing at age 40 or later and to any standard term plan expiring at age 65 or later. The option guarantees that an amount of insurance equal to the face amount of the original policy or $10,000, whichever is less, may be purchased on the life of the insured at standard rates and without evidence of insurability on policy anniversaries nearest the date on which the insured attains ages 25, 28, 31, 34, 37 and 40. The policy resulting from exercise of this option may be on any standard life or endowment plan available under the Company's issue rules on the option date. Disability and accidental death benefits may be included in the new policy only with the consent of the Company. The nonmedical limit has been set at $5,000 basic amount for plans with this option, although their regular nonmedical limit at the young ages is $25,000. This was done to limit the maximum amount of nonmedical insurance that could be obtained on one nonmedi-

cal application. As a maximum then, the insured may obtain $20,000 without the option and $5,000 with, resulting in a maximum nonmedical issue of $55,000 on one nonmedical application. Since the additional $30,000 nonmedical insurance purchases are spread over a long period of years and must be on a permanent plan they feel that the mortality will be satisfactory.

Mr. Allen quoted figures on his company's initial experience which showed that 33% of the eligible policies issued have included the rider, ranging from about 70% at the younger ages to 10% at the older ages. Mr. Allen had seen no evidence that prospects have used this rider as an excuse for postponing the purchase of an adequate amount of immediate protection. On the other hand, he felt that the benefit might motivate the purchase of insurance that would not otherwise be sold. Buying insurance on a planned basis makes good sense to young family men with increasing family responsibilities, to parents who are encouraged to start a more than nominal insurance program for their children, and to young professional men who cannot fulfill their ultimate insurance needs because of present limited incomes. Last but not least it makes sense to the agent selling in the young age range.

MR. S. P. ADAMS described the Lincoln National's term insurability rider as having one characteristic different from the one described by Mr. Allen. It provides decreasing term insurance of $600 per unit to age 25, decreasing $100 at that age and at each option age thereafter and expiring at age 40. They will not issue more than 10 units per life nor more than one unit per $1,000 of basic policy. Mr. Adams felt that the principal advantage to the policyholder lies in his privilege of multiplying his amount of life insurance by as much as six without regard to insurability. The disadvantage is that he may not be financially willing or able to exercise his privilege after paying for it. The decreasing term insurance element in their rider was constructed with this in mind, so as to provide something of value even though the policyholder cannot or does not exercise his right to buy new insurance. The main difficulty arises in the determination of rates for the rider. Another problem is that of promoting the sale of the rider and new policies issued under it sufficiently to keep antiselection within the limits contemplated by the rates. They have felt that reminders to the agent and the policyholder shortly before each option date will be worth the effort needed to produce them.

Policy Exhibit

1. How is the amount of insurance in force determined for policies (*a*) which involve decreasing term insurance, (*b*) which involve additional temporary level insurance?
2. Should practices be standardized?

MR. WILLIAM GOULD pointed out that there are essentially two methods of treating decreasing term insurance for Policy Exhibit purposes, by carrying either the current amount at risk or a level average amount over the term period. A survey of the practices of some 20 United States companies showed the level amount method is much the more popular, while the contrary seems to be true in Canada. In order to conform to the general practice the Metropolitan reports its Canadian business on the amount at risk basis in the Canadian Statement, but uses the level amount system in the United States Statement which shows total company figures. He felt that there are legitimate reasons for differences in company Policy Exhibit practices, adding that the important point was that the basis actually used be clearly defined to avoid misunderstanding.

MR. J. S. THOMPSON, JR. said that the practice of the New York Life is to use an average amount which remains unchanged throughout the period of the coverage as the amount of term insurance on decreasing term coverages in the Policy Exhibit. Where these coverages are provided by riders they show them in the Term Insurance column of the exhibit, but where they are an integral element of the basic policy the total insurance, including the assumed average amount of term, is included in the Whole Life and Endowment column. Because of many differences in company practices Mr. Thompson agreed that it would be inadvisable to attempt to establish rigid rules for the preparation of policy exhibit entries.

MR. C. C. KIRKPATRICK reported that while he preferred a uniform method, the American Mutual carries policies of the Family Income type at 60% of the initial amount while Mortgage Protection policies are put into the records at face amounts which decrease annually. Level term riders are shown in the Term column without a policy count, while the basic policy is carried in the Life column. Mr. Kirkpatrick disagreed with the other speakers in stating that he believed that standardization of practices throughout the industry would be desirable.

TRANSACTIONS OF SOCIETY OF ACTUARIES
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EMPLOYEE BENEFIT PLANS

Group Life Insurance

1. What methods have been developed to meet the hazards of instability and antiselection in the current underwriting of
   a) groups with relatively large amounts of Group life insurance for individual lives,
   b) small groups,
   c) associations and other nonemployer groups?
2. How does the mortality experience of such groups differ from experience reported by the Committee on Group Insurance Mortality? Should the variation, if any, be recognized in the construction of an industry-wide Group mortality table? If so, to what extent?
3. What are the characteristics and the extent of the market for new Group life insurance?
   Are we approaching the point where a large proportion of the company's new business represents transfer from other carriers? If so, what important considerations arise?

MR. H. J. STARK observed that Group insurance, in certificate amounts much larger proportionately than traditional, will cost more than the traditional type of Group insurance, but that does not necessarily make it poorer insurance. It meets another insurance need, provided the employer understands and accepts the increased cost.

There are two methods of meeting the hazards of increased antiselection and increased fluctuations in experience: careful underwriting and placing these groups in a separate dividend class. Underwriting must avoid cases with a schedule so unbalanced that it is indicated that the purchasers believe there is an abnormal hazard present. Mr. Stark outlined four methods of meeting the increased cost on business in this dividend class:

1. An increased risk charge.
2. The building up of a special reserve under the particular policy. The portion of this reserve not used to pay claims would generally be returnable if the policy cancels, whereas the risk charge is nonreturnable and therefore can be smaller.
3. A nonmedical pool where all excess amounts are pooled and the resulting experience charged pro rata to the cases participating in the pool.
4. A medical pool where a medical examination or some equivalent is used to appraise the risk on each individual. The charge to the case for each individual's excess coverage is determined by his rating, as well as by the pool experience.

Each of these methods has its merits and the Metropolitan has considered using each of them. They now use a medical pool for cases where amounts are very greatly in excess of normal maximums and a special reserve in other situations.

MISS JOSEPHINE W. BEERS reported that the Occidental will cover an individual for as much as $100,000 of insurance if certain conditions are met. Up to $20,000 over the normal limit may be issued on a nonexamined basis if:

(1) at least 25 lives are covered by the policy;
(2) not over 10% of the insurance is on any one life;
(3) not over 25% of the insurance is in force over age 60;
(4) the maximum may not exceed two and one-half times the average of the top twenty-five;
(5) the maximum may not exceed four times the lowest amount of the top twenty-five.

The remainder of the $100,000 will be issued only on an examined basis. For excess nonexamined insurance of $15,000 or more, names and dates of birth are obtained and the home office records are searched for any adverse information from Ordinary insurance, Hospital and Surgical claims, etc.

The excess amounts, whether or not issued on an examined basis, are placed in a pool for experience rating. This pool now includes 3,500 persons for $22,000,000 of insurance. The experience for the past three years has shown a claim cost about 20% higher than that on regular business. Baby Group life is also experience-rated in a separate pool. Three years' exposure on this business, amounting to $77,000,000, has shown a claim cost 20% over the regular business.

The two pools largely eliminate the risk of instability on high amounts and small groups. Miss Beers believed that the primary risk of instability is on the amounts considered by the industry to be normal amounts, arrived at through regular underwriting practices. This problem could be handled more soundly if the insurance industry would reintroduce a larger element of insurance on such groups and put less emphasis on individual case experience rating.

MR. B. N. PIKE described the pooling arrangement used by the John Hancock to meet the risks of instability and antiselection on smaller cases. For the smallest cases, the claim charge is based entirely on the average experience to be expected on this type of case over a period of years. As the case becomes larger, some weight is given to its own experience, so that the claim charge becomes a blend of the actual and ex-

pected experience, and finally the expected experience drops out of the picture entirely.

A maximum of $40,000 may be written under a sound insurance schedule. It is felt that the normal underwriting limits reflect the extent to which chance fluctuations may be absorbed within the individual case's margins. The instability inherent in amounts in excess of normal limits on both large and small cases is met either by pooling or by coinsurance of excess amounts.

Where only a small number of employees are eligible for excess insurance, the John Hancock assures itself that this class is not loaded with badly impaired lives. A simple health statement is required from each individual whose insurance exceeds twice the normal limit. There is no rejection of individual lives; that is, the case is either accepted or rejected for excess insurance.

The John Hancock has nearly 1,000 policies which involve amounts in excess of normal limits, and the underwriting practices on this class are believed to be homogeneous. These excess amounts are handled in a pool. The pooling charge has been set as a percentage of the CSO premium with an allowance for the possibility of antiselection and concentration of amounts at higher ages. The pooled experience has been 110% of what would be expected on regular amounts for comparable ages. The experience has been favorable where only a small percentage of the case's volume requires pooling. Where a large percentage of the volume is pooled, the mortality has exceeded 150% of expected.

On very large cases, there could be substantial dollar amounts of excess insurance involved, which would unduly affect the pool's experience. These excess amounts are not pooled, but are handled by a coinsurance arrangement. A special claim reserve is built up to a substantial percentage of the excess insurance through the dividend calculation in favorable claim years. When an excess amount claim occurs, the reserve is released to the credit of the case.

MR. R. J. MELLMAN reported that the Prudential had found that their experience on pooled excess amounts had been substantially better than their experience on normal amounts. The pool has been in effect for three years and now covers $40,000,000. Any significant amounts written in excess of the maximum amount charged against the case have been subject to evidence of insurability. Although the good experience may be partially due to chance fluctuation, the evidence requirements were slightly liberalized in 1958. For a limited amount in excess of normal limits a more restricted actively-at-work provision is now used in lieu of evidence

of insurability. Evidence is still required for amounts beyond this limited band. In order for an employee to become insured, he must satisfy the following conditions:

> I am actively at work for my employer on a full-time basis and physically able to perform all the duties of my occupation. I regularly work at least the number of hours in my employer's normal work week, but not less than thirty hours per week, at the employer's business establishment or other locations to which the employer's business requires me to travel. During the past three weeks I have had no absence from work on account of my own sickness or injury.

This statement has been designed to control selection. For example, the employee who is conducting business from his hospital bed would not be covered under this tighter definition of actively at work.

MR. G. N. WATSON stated that the Crown Life limits high amounts to twice annual earnings to eliminate the most flagrant cases of antiselection.

A pool is used for amounts in excess of the regular maximum, which amounts are underwritten on the basis of medical evidence. However, the maximum amount written on the basis of regular group underwriting may introduce instability in cases with relatively small volume. One claim for the normal maximum should not cause the case to be treated as a bad risk. Accordingly, the credibility formula has been modified so that the credibility reduces as the ratio of the top amount to the average amount of insurance per employee increases. This approach can allow for a ratio of 5 or even more, and is a simple modification to apply in dividend calculations.

Mr. Watson believed that the past satisfactory experience on cases of 10 to 24 lives will not be achieved without special precautions where large amounts are written. All lives in the top class are reviewed by using all information obtainable from any source and the group is declined if the risk appears outside profitable limits. The Crown Life does experience-rate small groups by applying the formula applicable to cases of 25 or more lives at two-year intervals.

Mr. Watson pointed out, in answer to section 2, that mortality experience on large amounts and on small groups may differ widely between companies as a result of varying selection standards. An intercompany mortality study would be most useful if data based on homogeneous underwriting could be collected. Such data should be excluded from the data used to construct an industry-wide group mortality table intended for regular amounts.

MR. R. G. PEARSON outlined the pooling system used by the Massa-

chusetts Mutual. The maximum individual amount which may be written on a nonmedical basis is determined by the size of the case. Claims are charged against the case to approximately $\frac{2}{3}$ of this nonmedical maximum, and any excess is charged against a pool. An additional amount up to $40,000 may be written on a medical basis on individuals not rated over Table B. These medical amounts are completely pooled.

The risk of instability, which may exist even in the absence of high amounts, is controlled by setting a maximum loss ratio applicable to the case based on the number of lives insured. Any nonpooled claims over this maximum are met from a separate pool which is supported by a charge made against each case.

The experience of small groups is controlled by strict underwriting, reasonable schedules, and complete pooling. A personal health statement is required for any insurance in excess of $10,000. Strict selection and minimum participation requirements are used in underwriting associations and other nonemployer groups. Professional associations will be considered only on plans with a level contribution for insurance decreasing by age. The experience on these groups has not been significantly different from that on standard groups.

The medically examined experience has been very good, but Mr. Pearson noted that all of this business is still in the early select years.

MR. D. M. IRWIN studied the Aetna's 1957 experience on over 200,000 lives covered under small groups and found no evidence of antiselection. Expected mortality was calculated on the 1950–54 intercompany crude death rates (*TSA* 1955 Reports, 42) by ten year age groups. The ratio of actual to expected (over-all 101%) ranged from 94% to 106% except for ages under 25 where the ratio was 117%. Because of the small number of deaths under age 25, this deviation is not considered significant.

An analysis of these cases by size of case showed no significant fluctuation of the loss ratios for any size group, including those cases below five lives.

MR. J. W. MORAN presented the experience of the New York Life on a professional association which has covered 18,000 lives for two and one-half years. The plan was designed with a uniform premium by age and with amounts of insurance scaling down sharply by age. The ratio of actual to average expected group mortality has been about 75% for ages under 47 and about 150% at ages over 47, even though the percentage of enrollment was about the same in younger and older age groups.

Mr. Moran stressed that the over-all satisfactory claims experience was possible only by reason of the sharp cutback in insurance and exposure at

higher ages, and cautioned against underwriting of professional association cases with significant amounts of insurance at older ages without evidence of insurability.

MR. C. A. SIEGFRIED expressed confidence that there are unfilled areas of real need which provide a great potential Group market. Much of this unfilled need is in companies that now have inadequate plans. The years 1954 through 1957 have seen tremendous growth, due both to labor contract negotiations and to high business activity and employment with resulting competition for workers. Despite the reduction in business activity and employment this year, Metropolitan group sales so far have been surpassed in only four other years.

There is a growing interest in plans for dealer organizations where the suppliers assist their product dealers in obtaining Group insurance protection.

Mr. Siegfried did not believe that transferred business will become the principal source of new business. There has been a greater than usual amount of transferred business recently as a result of the widespread issue of medical insurance at inadequate rates. The results of this practice are now apparent and it is hoped that this situation is a temporary one. A second reason for transferred business comes out of the purchase and sale of businesses. There is a natural desire to consolidate insurance under a single plan. This situation will continue, but is not a major source of new business.

MR. G. W. PICKERING has found that there has been an increase of interest recently in coverage for professional associations and for groups of municipal and state employees, and much activity on Creditors insurance and groups of less than 25 lives. However, the Home Life would not quote on professional associations prior to September and will not write insurance on state or municipal employee groups on an employee-pay-all basis. For the first 8 months of 1958, 93% of the Home Life's paid-for has been on single employer-employee groups. A further breakdown indicates that 11% of the paid-for resulted from schedule increases on existing cases, 27% from cases with no previous insurance, and 62% from transfer of carrier. The Home Life has experienced this large proportion of transferred business for some years. Terminations on account of transfer to other carriers amount to 26% of the transferred business acquired.

Ninety-seven percent of the new transferred business resulted either from the naming of a new broker or agent or involved a premium increase of 50% or more. Mr. Pickering outlined several important considerations on transferred business:

1. Good service must be given existing cases and benefit schedules must be kept up to date by the carrier.
2. Many of their cases transferred to other carriers have resulted from renewal underwriting action on the Accident and Health portion of the program. Many times the new carrier has not requested previous claim experience and has quoted standard rates on a substandard case. The Home Life invariably insists on obtaining previous experience before underwriting the case. Nevertheless, it still may be more economical for a policyholder to change carrier where a large deficit has been built up.
3. Some cases are lost because the policyholder desires to name a new broker to receive full first year commissions, despite the additional cost involved.
4. Business mergers are another cause of transfers.

There are many legitimate reasons for transfers, but there is an economic loss in many cases. The policyholder incurs additional acquisition costs and the insurance industry incurs the acquisition costs with no increase in the total Group insurance in force. The particular insurance company undoubtedly has higher termination rates on transfer business which causes a loss if the acquisition expense has not been liquidated before termination. The insurance company's conservation costs are also increased in attempting to prevent transfer to another carrier.

Group Major Medical Expense Benefits

1. To what extent has Major Medical Expense insurance, with or without underlying coverages, created new problems for insurance companies and other health insurance carriers, and what is being done to meet them in:
   a) their relationship with hospitals and medical profession,
   b) claim cost control,
   c) maintenance of consistency between premium rates for the various types of comprehensive and supplementary plans and other types of health insurance?

MR. A. G. WEAVER opened the discussion by stating that major medical expense insurance has helped in promoting a sound relationship with the hospitals and the medical profession for a number of reasons, among them:

1. there is the recognition by the medical profession that the public interest is served by a broad coverage which makes a higher standard of medical care financially feasible;
2. there is no interference with the administration of the hospitals and the traditional doctor-patient relationship;
3. there is freedom to choose the type, quantity, and place of medical care;
4. it is considered an answer to socialized medicine and the need for the cooperation of the medical profession is recognized.

There are a few minority criticisms of major medical coverage. Those strong supporters of Blue Cross–Blue Shield plans sometimes feel that major medical insurance will result in the downfall of hospital and doctor-sponsored programs; others feel that the expanded coverage cannot possibly succeed and the profession might be held responsible for its failure. Mr. Weaver felt that these criticisms could be countered by the fact that the competition between insurance companies and the "Blue" plans was healthy and that major medical insurance is too widely accepted to fail.

Some administrative problems in connection with major medical insurance affect the companies' relationship with hospitals and the medical profession. They must be educated to the fact that under major medical expense insurance covered expenses are limited to "necessary and reasonable charges for services and supplies recommended by a legally qualified physician or surgeon . . ." in contrast to the payment of all medical charges by hospitals and physicians up to specific limits in the earlier hospital coverages. Also, under major medical insurance there are a number of charges not recognized under earlier coverages, such as psychiatrists, private duty nurses, etc. The providers of this type of care will need to be educated in the health insurance mechanism.

Mr. Weaver went on to discuss the work of the Health Insurance Council and the valuable service it was providing in spreading the understanding of the place of insurance in financing the public's medical care and in obtaining assistance and cooperation in making health insurance more effective in meeting the public's needs. In particular he referred to the creation of state committees to work with hospital and medical organizations in carrying out the work of the Council at the local level and described in detail some of the activities of these committees. As a corollary benefit such committees have also been instrumental in creating a greater awareness of health care problems among the insurance companies.

Some of the larger companies are supplementing Health Insurance Council activities by assigning personnel to work on specific problems with doctors and hospitals in order that the provisions and benefits under health insurance coverages will be made as consistent as possible with the human relations aspect of claim cost control.

Some companies have set up internal Medical Relations Committees to coordinate the medical relations problems affecting more than one department. In the John Hancock, this Committee consists of officers from the Medical, Personal Accident and Health, Policy, Claim, Public Relations, Group, and Underwriting departments.

MR. M. D. MILLER put in a plea for the work of the Health Insurance Council and thanked those who were supporting its activities. He felt that there was a need for more companies to be aware of the work of the Council so that they could realistically determine the extent to which they would like to participate in its activities. He felt that the Council will have a bigger and more important part in the total picture regarding relations with the medical profession and hoped that all present would try to make others in their companies aware of the work of the Council.

MR. S. W. GINGERY discussed a few of the problems of controlling claim costs, which, though not new, were limited in effect by the nature of the older coverages. Provisions regarding nonduplication of benefits are important to avoid overutilization of medical facilities or malingering by families covered under more than one policy. The specific provisions vary, as does the administrative procedure, among companies. The Prudential has followed the principle of paying when the claimant is insured as an employee under their policy and would allow the other company to apply the nonduplication provision. Children would be given priority under the plan where the husband was insured. When the Prudential exercises the nonduplication provision, they pay only those eligible charges not paid by the other plan. Mr. Gingery would expect greater administrative standardization in the future and recognized that the method to be adopted might very well be that of proration among all insurers rather than a priority system. Another area of claim cost control is reflected in the efforts of insurers to reduce exorbitant charges and charges for unnecessary treatment. The policy language qualification that they are now using refers to "customary charges" which can be defined in terms of the general level of charges for services in the same area. The Prudential has also included in their policy the basic concept that the customary charge should be no greater than if there had been no insurance.

This language necessitates guides as to reasonable levels of charges that can be used by the claim administration people. Where charges appear out of line, consultation with the provider of the service usually results in either a reduction of the charge or additional information which makes the charge appear more reasonable. Even in cases where a satisfactory resolution is not reached they feel that a beneficial effect on future claim situations results. In the past year and a half the Prudential has contacted as many as 1,000 doctors concerning major medical problems. This was done mostly by personal or telephone contacts. The few discussions that were handled by mail were generally less effective. The main areas for discussions with hospitals regarding major medical expense claims were:

(1) the determination as to whether the service was actually rendered,
(2) the amount of the charge,
(3) overutilization, and
(4) hospital admission and certification of coverage problems.

Mr. Gingery seconded the feeling that it was important to work closely with the providers of medical services in order to work out the common problems.

MR. W. W. KEFFER agreed with Mr. Gingery concerning the major problems in claim cost control and that the lack of dollar limits places a greater burden on the claim administrator. He also concurred that the success of the product depended heavily on the understanding and cooperation of the hospitals and the medical profession. In the area of claim cost control, the actuary's main contributions can be in the development of standards for screening claims in the routine payment process and in the design of special studies to aid the claim administrator on problem cases. An example of the standards is the relative value schedule for administration of surgical coverages. These schedules should reflect the usual and customary charges for the given area. It is desirable to have the local medical profession help in the development of such relative value schedules. Screening procedures have the additional advantage of calling attention to troublesome accounts even before significant loss ratio statistics can be compiled. Spot auditing is also a helpful claim control tool, especially in regard to physicians' charges. It is useful in ascertaining that the services were actually provided and that the proper deductibles were satisfied.

For certain problem cases, statistical studies can help to determine the area where a reduction in claim costs might be effective. Depending upon the size of the case and the magnitude of the particular problems, some of the following studies might be valuable:

1. Segregate charges for each claim into categories comparable to those used in developing rates. Categories might include hospital room and board, hospital services, surgeon's charges, other physician's charges, laboratory and radiology fees, nursing charges, and other charges.
2. Determine the frequency of claims or claim payments for successive periods in order to develop trends.
3. Study special causes separately.
4. Identify the type of claimant and his age and income bracket.
5. Code the provider of the service.
6. Obtain a range of relative charges for various procedures.

7. List the detail charges for specific high frequency or high cost providers of services.
8. List the specific claims in categories where aggregate costs appear to be unsatisfactory, such as psychiatric care.

The value of these studies should be assessed against the cost of obtaining information. In general, some sort of claim cost control is only good business practice and this third party audit should benefit all concerned.

MR. W. A. MILLIMAN's comments were prompted by item *c* which concerned the maintenance of consistency among rates for various types of health insurance coverages. He felt the insurance companies, in experimenting with more comprehensive types of coverages, were unduly influenced by the one-year rate guarantee that had been satisfactory where rates had been based on a large body of statistical experience. While contractually the guarantees are for only one year, as a practical matter employers are making long-term employee benefit plan commitments based upon cost estimates, which in the case of comprehensive major medical insurance have recently been determined more by competitive pressures than by actuarial analysis of adequate statistics. Mr. Milliman wondered whether the companies would have yielded to this competitive pressure if they had had a more responsible attitude or if they had been required to guarantee their rates for more than twelve months. He felt that the companies might be criticized for enticing employers into cost commitments for benefit plans by use of reduced premium rates which were not based on adequate statistical experience.

MR. H. J. SAFFEIR stated that there are two major consistency problems. The first is that of consistency between the basic insurance plus supplemental major medical in relationship to the over-all comprehensive plans. There is a need for a large volume of charge data in order to determine the relative worth and effect of the various factors now considered in the premium setup. The second problem of consistency is in the area of the age, wage and geographical adjustments that have been injected into the more refined rate determination now in use. A difficulty arises from the fact that Comprehensive age and wage factors should be different from the major medical age and wage factors. Mr. Saffeir cited a simple example showing that the slope of the major medical factors should be steeper than the slope of the factors for the comprehensive coverage. He then listed some other problems for which rate makers must find solutions:

a) relative weight of the age factors at various ages;
b) relative weights of the wage factors at different wage levels;

c) area consistency, such as:
  (1) high surgical charges in low hospital areas,
  (2) serious overusage in an area,
  (3) a great number of children per family in an area;
d) full pay adjustments when modified for possible overusage;
e) the relationship between the cost for the 80% and 75% coinsurance features;
f) the consistency of the value of the deductible by region;
g) adjustments for variable accumulation periods;
h) relationship between calendar year and benefit year plans;
i) adjustments for various maximums;
j) the use of split deductibles and deductibles varying for different types of charges;
k) restrictions for certain types of nervous and mental causes.

These problems should all be capable of some satisfactory solution when a larger volume of statistics is made available.

MR. C. H. WAIN reported on the situation faced by the Prudential in California, an area that many call a hotbed of major medical problems. The vastly greater liability inherent in the major medical coverage, compared with conventional medical care coverage, is the main cause of the problems in this type of insurance. The actuary is responsible for preventing problems from developing, if possible, and for helping to solve the problems or at least alerting management as to the seriousness of the situation when problems do develop. Abuses in the Los Angeles area in regard to the concept of overly profitable hospital operations and excessive charges for certain services were cited. The problem of controlling claim costs is one that requires constant attention and the importance of quick action was stressed when unfavorable experience starts developing, either over-all or in a specific area. Mr. Wain reiterated the problem of unfairly committing prospective buyers to levels of benefits which would ultimately be extremely costly and from which it would be very difficult to back down, especially in the light of union negotiations. Mr. Wain added one more voice to the chorus stressing the importance of working closely with the providers of medical care and the immense values of this cooperation.

Group Long Term Disability Benefits

The customary Group Weekly Indemnity plan provides benefits for a maximum period of 3 months to one year. Some group plans are now being written which provide monthly loss of income benefits running for 5 years or even to age 65. With respect to such long term disability plans

(1) what morbidity and recovery rates are currently used in determining net premiums,

(2) what reserve basis is used,
(3) to what extent are benefits integrated with Social Security and early retirement programs,
(4) to what extent is experience being pooled for dividend or experience rating purposes,
(5) what underwriting and legal problems have arisen?

MR. L. C. COCHEU, JR. stated that his company, Continental Assurance, decided to go into the Group long term disability benefits field early in 1956. Although the initial requests for this type of coverage have come largely from higher salaried groups, this coverage will ultimately be widely sought and bargained for by hourly workers. The group benefit is available on a yearly renewable term basis and, hence, does not compete with his company's individual noncancelable accident and health policies which are available on a franchise basis. The yearly renewable term basis also simplifies rate-making problems.

He believed that any adverse experience should not be blamed on the rate basis, but that the underwriting and claim administration should be studied closely in the event of such adverse experience.

The rates are based on 165% of the Conference Modification of Class III experience. The resulting net premiums were loaded 5% of "gross" for claim expense, and this loaded premium was further loaded so as to produce an expected claim and claim expense ratio of 70% of premium. Premiums for females were 150% of corresponding male premiums. The volume discount is one-half of the standard discount for group accident and health. Disabled life reserves are based on 100% of the Conference Modification of Class III experience.

Mr. Cocheu went on to state that because the current demand was especially for key personnel plans, they have made no serious attempt to integrate benefits with Social Security or Workmen's Compensation, nor have they concerned themselves with early or late retirement programs. When hourly workers begin to seek the coverage, it will be necessary to consider these problems to discourage malingering. Because of the relatively small groups and the very considerable potential claim liability, it is very unrealistic to attempt any experience rating of individual groups at this time. The experience on this class of business is currently being pooled, and all of the policyholders have been so advised. No particular legal problems have been encountered to date on this business. The possibility of substantial drain on surplus was carefully considered, but by reducing the level of benefits after five years of disability or at age 60, they hope to discourage some malingering and eliminate the use of the program as a cheap way of retiring early.

MR. R. D. ALBRIGHT stated that the Provident Life and Accident has offered Group long term disability benefits on an experimental basis for about five years. Although the experience is not sufficiently mature to evaluate, there is some indication that the recent business recession has affected the experience adversely.

He agreed with Mr. Cocheu that most of the quotations to date have been directed toward key employee groups. The lack of comparative premium rates and coverage features available to the employers has affected sales in part. Also, many formal or informal salary continuance plans provide the employer with greater flexibility than is available under an insured plan.

His company is offering plans to well financed employers engaged in stable industrial and commercial activities provided there are at least 50 eligible employees, but will consider quoting on groups with as few as 25 employees if the employer has an existing group coverage with them. Mr. Albright felt that it was important to take into account any other disability benefits to which the employees may be entitled, as they intend to provide for reduction of benefits by the amount of any payments received for the same period from the following sources:

(1) group accident and sickness benefits,
(2) permanent and total disability payments under any group life insurance plan,
(3) Workmen's Compensation benefits,
(4) pension disability benefits, and
(5) cash sickness or other governmental plans, including disability benefits under the Social Security Act.

He emphasized that the definition of total disability is most important. In their policy, total disability means, during the first two years following cessation of active employment, inability to perform each and every duty of the employee's occupation. Thereafter, the employee must be unable to engage in any business or occupation or to perform any work for compensation or profit. Successive periods of total disability separated by less than six months of full-time active work will be considered as one period of disability unless the latter period of disability is due to causes entirely different from and unrelated to those of the previous disability and commences after the employee has returned to full-time active work for the employer. The standard benefit formula is 50% of the first $1,000 of basic monthly salary, grading up to $1,000 per month for employees with basic monthly salaries of $2,700 and over. The maximum monthly benefit is limited to $500 per month if the number of employees is between 25 and 49, grading up to $1,000 maximum monthly benefit if 100 or more em-

ployees are involved. If less than 50 employees are involved, the maximum benefit period is limited to 10 years for disabilities due to either accident or sickness. Between 50 and 99 lives, the accident benefit may be written to 65 and the sickness benefit to 10 years. Both accident and sickness benefits may be written to 65 if over 100 employees are insured. The plan also provides for waiver of any premiums falling due during the period when an employee is receiving monthly benefits. The policy is written with a pregnancy and war exclusion and waiting periods up to one year. Currently, the employer contribution must be at least 25% of the total premium. One year term premiums which grade upward with age are based upon the Conference Modification of Class III experience—120% for benefits of two years and under, 135% for benefits for three to five years' duration and 150% for benefit durations of five years or more.

With respect to reserves for disabled lives, for disabilities due to accident, factors have been derived from the Metropolitan's Accident Disability Table. For sickness claims, factors are based on the "90 day presumptive" disability experience for income disability on Ordinary life insurance policies' experience between 1935 and 1939, published in *TSA* 1952 Reports.

Mr. Albright concluded by stating that the large liability on individual claims in relation to total premium for the group made individual experience rating practical only in connection with plans for larger groups. Even then, substantial morbidity fluctuation reserves should be established before dividend or experience rating returns are made.

MR. H. F. HARRIGAN stated that the Metropolitan has underwritten Group long term disability benefits on several groups on an experimental basis, and they are now prepared to consider underwriting such benefits generally on those groups where the underwriting features are favorable. They expect the employer to make a substantial contribution toward the cost of providing benefits as evidence of his interest in the success of the plan.

He said that, generally, benefits should not exceed 40% of salary for all eligible employees, although the formula could be modified to grant benefits equal to 50% of salary for lower paid employees, grading down to not more than $33\frac{1}{3}\%$ of salary for higher paid employees. Alternatively, a plan providing benefits equal to 50% of salary for a limited period, such as two years, reducing to 25% of salary thereafter, will be considered. His company feels that the benefit limitations should apply to benefits from all sources and thus the formula benefits under the plan are reduced by Social Security, Workmen's Compensation and any other weekly or monthly disability benefit provided by any other plan.

The waiting period under the long term disability benefits plan is integrated with any salary continuance or temporary disability program that the employer might have. The usual waiting period is six months, although shorter waiting periods will be considered. In developing premiums for long term disability benefits, they studied experience derived from the following sources:

(1) a plan of long term disability benefits covering high paid personnel and involving approximately 4,000 lives,
(2) an Extended Disability Income policy of their Personal Accident and Sickness division,
(3) a disability benefit written in connection with some group annuity contracts,
(4) the Prolonged Illness study published by the Research Council for Economic Security, and
(5) the study of Ordinary disability benefits published in *TSA* 1952 Reports.

The premiums are on a one year term basis, vary according to age and sex of employees and are subject to annual reconsideration on the basis of developed experience. Currently interest in this type of coverage is in the area of salaried or higher paid personnel, but if past experience in major medical is duplicated, coverage will rapidly be extended to all employees.

MR. R. M. DUNCAN related that the T.I.A.A., which insures only staff members of colleges, universities, and allied groups, entered the Group long term disability benefits field last year and that the total experience is not yet large. The benefits include a cash income and, if desired, a waiver of retirement annuity premiums, both to age 65. Disability is defined as inability, by reason of sickness or injury, to engage in any occupation for which the staff member is reasonably fitted. Keeping in mind the long summer vacations of teachers and the general practice of colleges to carry disabled staff members for considerable periods of time, no benefits are paid during the first six months of disability. The maximum income benefits are the lesser of half salary or $500 per month and the maximum premium waiver benefits are the smaller of the regular retirement plan premiums or $250 per month. No conversions to individual coverage are provided in event of termination of employment. Premium rates and reserves are developed from several specialized studies of the disability experience of teachers groups, and therefore are probably not applicable for the insurance industry generally. Income benefits are integrated with both Social Security and Workmen's Compensation benefits. The policy provides that benefits will be reduced by the amount of benefits for which the staff member is covered under Social Security unless a bona fide application for Social Security benefits has been declined.

Speaking further on integration of benefits, Mr. Duncan noted that the

1958 Social Security Amendments have added dependent benefits for the first time. This raises the underwriting question of whether the dependent disability benefit should also be integrated with the group benefits. Because of the combination of relatively low expected claim frequency and potentially large benefits their general approach to experience rating is to retain a considerable amount of pooling, even for the larger groups.

Mr. Duncan concluded by touching briefly on two important problems. The first is the underwriting problem arising in those cases where benefits from individual policies are payable in addition to the benefits under the group policy. So far, no completely satisfactory solution has been found to this problem. The second is the one of rehabilitation of the disabled insured. They believe that reassurance of the disabled staff member is necessary and that a well coordinated program involving the insurer, the employer, the employee and his physician offers the best approach to rehabilitation.

Group Pensions

1. What differences of opinion arise among the various parties about the meaning of the term "actuarial soundness" in the development and funding of pension plans?
2. To what extent can "actuarial soundness" be maintained under a plan designed to recognize the purchasing power of the emerging pension?
3. Should a consulting actuary offer advice as to the methods used for the valuation of pension trust fund assets? If so, what should his recommendations be as to the valuation of the various categories of assets—bonds, common stocks, preferred stocks, etc.?
4. Does present legislation sufficiently protect the pensions which individuals rely on receiving under private pension plans?

The discussion was opened by DR. D. M. McGILL, Research Director of the Pension Research Council of the Wharton School of Finance and Commerce, University of Pennsylvania, with a description of a study being set up by the Pension Research Council entitled, "An Inquiry into the Security and Administration of Anticipated Benefits Under Private Pension Plans." Dr. McGill prefaced his discussion of this project with a short discussion of the Pension Research Council.

The Pension Research Council was established at the Wharton School in 1952 to direct research in the field of private pensions. It is currently made up of 20 persons representing insurance companies, banks, consulting actuaries, employers, labor, government, and the academic world. This council has published four books so far, including Dr. McGill's *Fundamentals of Private Pensions* and Dorrance Bronson's *Concepts of*

Actuarial Soundness in Pension Plans, and expects to publish Mortimer Spiegelman's *Medical Care for the Aged* next spring. Of course, the principal efforts at the moment are directed toward the inquiry mentioned in the previous paragraph.

Dr. McGill stated that the purpose of this project is to inquire into the security behind the accrued benefit rights under private pension plans to the end that benefits under such plans will become a more significant and dependable source of old age security. This is a study of pension plans as they are presently constituted and not necessarily as they should be. To get help from as many persons as possible, the Council broke the subject into four different areas and set up committees or task forces for each of the areas. To assure objectivity, the director of each task force was chosen from the academic world and he will be given assistance by persons representing almost all parties interested.

The first area is present governmental regulation—perhaps the least controversial, but nevertheless important. The director of this task force, Professor Edwin Patterson, is preparing a study of present governmental regulation of insurance companies, banks, actuarial consultants, and all other agencies and organizations that are active in the pension field.

The second area is standards of actuarial soundness. Dr. Carl Fischer is director of this task force charged with investigation of what is meant by actuarial soundness and how it is achieved. There are two broad approaches to be considered: certification of actuaries, a topic discussed very adequately in the Presidential Address; and consideration of whether there can be minimum standards of solvency established by law.

The third area is legal status, protection, and communication of benefit rights. Professor Benjamin Aaron is director of this task force and he has a rather difficult undertaking because there is less known in this area, perhaps, than in any other. These are a few of the topics that he will consider: employee benefit rights under current law, possibilities of preferred status to benefit claimants under private pension plans in event of termination of the pension plan with inadequate funds, the problem of locating retired employees to be sure they get their benefits, the recording of pension liabilities on employer financial statements, and the protection of employee rights against mismanagement and maladministration of funds set aside for benefit payments. This task force will also consider disclosure and disclosure legislation in some detail.

The fourth area Dr. McGill called an appraisal of the agencies of administration. Since this topic is perhaps the most delicate of the four, the Council chose Professor Ralph Blanchard, formerly Professor of Insurance at Columbia University. This choice was based on the need for someone

who was as far removed from the competitive scene as possible but still had an excellent knowledge of the subject. This task force will attempt an evaluation of how the various functions that have to be performed in connection with private pension movement can best be handled. They will consider: Should the funds which are being used to pay out benefits be handled by an insurance company as opposed to a trust company? Should an insurance company be permitted to accumulate unallocated funds similar to a trust fund before they are finally committed to the purchase of an annuity? Should they provide actuarial services to employers as a part of a D.A. or I.P.G. plan? Should they have trust powers to compete on an equal basis with trust companies? Should banks and insurance companies be permitted to participate on exactly the same basis, with trust companies pooling mortality, investments and expenses and insurance companies given full trust powers to operate just like a bank?

Each of the four task force directors will prepare a report on his particular area. Some of these may be available by the end of 1958. As project director Dr. McGill will write a master report in the form of a monograph, leaning heavily on the reports of the four task forces but focusing more sharply on the theme of the over-all study. All of these reports should be in print by the end of the summer of 1959.

As Director of the task force on area two, DR. C. H. FISCHER commented briefly on the aim of his task force. He noted that Henry Rood in the Presidential Address mentioned that a committee was working on certification of actuaries and that this task force would cooperate fully with that committee. He also pointed out that the Dorrance Bronson book mentioned by Dr. McGill goes into the question of actuarial soundness at considerable length. In chapter 2, the book gives the viewpoints of actuaries, accountants, lawyers, organized labor, management, stockholders as distinguished from management, the Internal Revenue Service, and employees as distinguished from organized labor. This book is so thorough and so comprehensive that it is difficult to find anything on the subject of actuarial soundness of pension plans that has not been considered or implied somewhere in the book.

Although actuarial soundness may be distinguished from financial strength and restrictively defined by actuaries, Dr. Fischer believed the layman who talks about actuarial soundness is usually thinking about an over-all concept, including financial strength. In considering this popular concept, we might consider three key words: money, past-service and termination. There is more to an actuarially sound plan than just the design of the plan. The required money must be forthcoming. For instance, certain state teachers' pension plans, though they may be well

designed, may be unsound if the legislatures have refused to appropriate the money necessary to make them sound.

The second word that causes a good deal of trouble is past-service. A pension agreement of an employer with his employees is made in consideration of something that the employee is doing for the benefit of the employer. Since he is doing it currently, sound accounting principles require that the employer set aside the money while the service is being performed. If a pension plan were installed when an organization was formed there would be no past service, and if the employer set aside his current service requirements each year the plan would be considered actuarially sound.

Dr. Fischer continued by pointing out that even under the ideal situation where accruals start with the organization of the company, there will usually be adjustments due to inflation. No matter what benefit scale is set up it probably will not be satisfactory a few years hence. The employer is forced to improve benefits and make them retroactive so that some will apply to past service. Thus, the employer who starts his plan with the organization may end up in the same position as the employer who installs it later. As employees near retirement, whether they came into the plan with past service or have accrued past service due to benefit changes, additional money is required. Is this additional money properly charged to surplus? Is it a cost of future production? What about this group for whom an insufficient amount was paid during the working lifetime?

Dr. Fischer believed these questions lead us to a point of equity, and to his third word which is termination. A bank or insurance company could run along completely insolvent for many years if it were not examined and no one would be the wiser. Income would cover disbursements and it is only because of the possibility of termination that it must be kept solvent. Isn't the same problem true in pension plans?

When termination comes, the money must be there. But who is to get it? If an insurance company terminates an individual policy, the policyholder is the one who is paid. When a pension plan terminates, social concepts often prevail over financial equity. The money goes first to those who are on the pension rolls and who will have had less contributed on their behalf than will many active employees. It is possible, in fact, that none of the past service liability was funded and almost all contributions were on behalf of the active employees who may receive little or nothing from the terminated trust. Thus we may ignore completely the concept of financial equity.

MR. D. C. BRONSON showed by reference to his monograph which he

wrote in 1957 on actuarial soundness a distinct preference for a rigorous definition of actuarial soundness. Briefly, his definition calls for meeting current cost (by whatever funding method) and clearing off all past service or actuarial deficiency by the time the last person with any past service credits goes over the line into retirement—this funding to be irrevocable and through a third party, insurance company or trustee. On this basis, pay-as-you-go, terminal funding, and interest only methods would not qualify, nor would a Balance Sheet Reserve basis. The existence of a guarantee by the employer concerning the solvency of the fund would not alter the results of a test for "actuarial soundness."

Although he felt there are many who would favor less rigorous definitions of actuarial soundness than he advocated, Mr. Bronson felt that we should not go off in all directions on the ground of expediency. He felt that we should stick to conservative actuarial precepts in setting up a definition of actuarial soundness. He noted that Mr. Hohaus, in his paper[1] of some 35 years ago, said "the arguments for financing a retirement plan on a reserve basis are well-known to members of this Society . . . , *i.e.*, to make provision for the liabilities arising out of his (the employer's) pension promises as the liabilities accrue and not as they mature."

Mr. Bronson did not, however, feel that the actuary must turn his back on matters of expediency or that he may not condone a lesser degree of funding when dictated by valid business reasons, or from governmental pressures, or when thrown "off base" as a result of successful union demands, or by reason of pure size and permanence of a given employer and his pension fund. We can enunciate a conservative rule and then go along with a lesser rule so long as we indicate such qualifications with respect to the lesser funding program as we deem to be prudent. Furthermore, Mr. Bronson argued that such strict standards of actuarial soundness should not become a part of governmental regulation, since this would prevent pension experiments and would put many apparently sound existing plans out of business.

MR. W. F. LUMSDEN gave two examples of what happens when a pension plan terminates, and the practical problems facing the consulting actuary in such situations even though the funding meets all the definitions of actuarial soundness. One client had plants around the country, with an agreement with his union which included a provision for a division of assets in the event of partial termination. One year after he put this agreement into effect, he decided to close one of the plants down. The assets, when divided among all employees, provided benefits only for those aged 63 and over. Since the plan had a provision that the company

[1] R. A. Hohaus, "Reinsurance of Retirement Plans," *TASA*, XXVI, 480.

would support the plan on an actuarially sound basis and another provision that any contribution would be tax deductible, the union called in an actuary. He was unable to do anything, since the company at the beginning of the year on the advice of their consulting actuary had made the maximum tax deductible contribution. The situation might have developed into an argument on actuarial soundness if the company had made a lower contribution, such as on a 30 year funding basis.

Another company negotiated a pension plan where the union asked for a plan with 30 year funding and also asked for a minimum of terminal funding—that is, a requirement that there be enough money in the fund to provide for all retiring employees. Although, as consultant, Mr. Lumsden recommended against this latter provision, warning of the problems if the plant were closed, the employer felt that there was no problem since this involved the home plant. This year, after the plan had been in effect two years, they are closing this plant and, instead of the $50,000 normal contribution, the employer is having to contribute $150,000 to meet the terminal funding provision.

MR. J. L. CLARE suggested that one way of looking at the problem of actuarial soundness would be to try to "cut the coat to fit the cloth." First, the money may be limited, by labor as well as by management—there may not be too much cloth. Then, the pensioners have need for an adequate income—the coat must be big enough. Final averaging and wage related formulas seem to be as good an initial approach as any, but pensioners also need cost of living protection. Also, the active employees need the protection of an actuarially sound plan (and the United Auto Workers Union insisted on a measure of actuarial soundness in every pension plan it negotiated). Now, if the benefits have to be geared to human needs on the one hand, and contributions have to be geared to the policies of management and the attitudes of labor on the other hand, then what is the way out?

Mr. Clare had one suggestion. He said that it was his understanding that age 65 as a retirement age was set by Bismarck in the middle 19th century as a socially attractive retirement age that would not cost Germany too much since most people would be dead by 65. He questioned whether 19th century thinking should override the needs of management on the one hand and the needs of employees on the other. He suggested that perhaps the actuarial evaluation should consider the level of retirement income needed and the monetary limitations, and produce as a result the retirement age that can be afforded. Of course, there is plenty of room for compromise in deciding how much management should contribute, how much is an adequate pension, and how to protect the pen-

sioners against rising living costs. He said he would welcome hearing from members about how such compromises should be determined, since he intends to write a paper for the Society on this subject.

MR. W. A. DREHER in his discussion referred also to Mr. Bronson's monograph. He preferred Mr. Bronson's definition of actuarial soundness, which requires funding with the objective of accumulating the present value of pension credits accrued to the date of valuation. He noted that this goal can be and in many cases should be computed without reference to the basis used to support the claim for tax deductibility of the contribution to the pension fund. He suggested that after the calculation is done for Internal Revenue purposes, a separate valuation could be done using most probable assumptions and/or another funding method.

Mr. Dreher pointed out that in practice the "actuarial soundness" of a plan depends in a large measure on the attitude of the employer toward the plan. One employer might currently make maximum contributions allowed for tax deductions and at some time in the future make contributions which increase the unfunded liability of his plan. Another employer might make minimum contributions in the first few years of a plan. If the first employer establishes the plan only because of competition for labor and maintains its qualification with the Internal Revenue Service so that such contributions are a deductible business expense, while the second employer recognizes his pension plan as a long term obligation which must be satisfied out of corporate revenues, but concludes that the money is better spent in promotion and development leading to increased profits and increased contributions to the pension plan, Mr. Dreher believed that the second pension fund is more "actuarially sound" than the first.

MR. S. J. KINGSTON introduced the probability concept into his definition of "actuarial soundness." He first gave his definition of the term "soundness" without the qualifying term "actuarial." He defined a "sound" pension plan as one "capable of paying each pension or other benefit on time." Under this definition, the "soundness" of a pension plan has meaning only with respect to the past. Using the probability concept he then defined "actuarial soundness" as:

> Actuarial soundness exists if the probability that the plan will fail to pay future benefits on time, by more than a small margin, is a low probability.

This definition is sufficiently broad to include as sound even a pension plan which almost meets the payments.

Insurance companies which contract to guarantee benefits would

naturally tend to be conservative in setting standards of actuarial soundness. An independent actuary of an uninsured plan should tend to be even more conservative than an insurance company, since the absence of contractual guarantees renders the employer's cost more sensitive to deviations in experience from the tables used in the calculations. (Ultra-conservatism is a much less costly luxury in an uninsured plan than in an insured plan, because any redundancy is recoverable without loss due to taxes and loadings which would have been paid under an insured plan.) However, whether independent or company affiliated, actuaries differ among themselves as to how small is a small margin and as to how low is a low probability.

Some employers tend to be even more conservative than actuaries, since they are morally obligated to foot the bill for the added cost if the plan becomes unsound and needs extra money to be restored to good health. However, some employers may tend to be less conservative and actually select the proposal with the lowest cost quotation without regard to its degree of actuarial soundness. Whether employers should be, or are, more or less conservative, the fact remains that actuaries and employers differ among themselves and from each other as to margins and probabilities. Employees generally do not delve too deeply into the question of actuarial soundness except to the extent that their union does so on their behalf. Unions have been involved in a big way in pension plans for only about 10 years and are generally more concerned with the amount and conditions of benefit than with actuarial soundness. However, since the employee could be harmed most by an unsound plan, it is expected that unions will eventually concern themselves with actuarial soundness and will be more conservative than actuaries or employers.

Regulatory authorities are also concerned about actuarial soundness, but this is a subject in itself. Lawyers, accountants, pension consultants, investment counselors and tax experts have differing attitudes toward actuarial soundness, but their attitudes are more or less in conformance with the principals they represent.

For the sake of discussion, Mr. Kingston asked that we assume that all parties have come to an agreement, both qualitatively and quantitatively, on the definition given above. Unfortunately, there would still be room for major differences of opinion as to the underlying actuarial assumptions. A plan might be sound if measured by the Northampton Mortality Table but not on a projected modern table. Furthermore, the investment agency may not wish to be subjected to the moral pressure of delivering an unduly high interest return, but competitive spirit might cause it to resist too conservative a goal. Similarly, the administrative agency

might not wish to be subjected to the moral pressure of delivering an unduly low expense, but competitive spirit might cause it to resist too conservative a goal. If vesting of benefits on termination is involved in a negotiated plan, the union might tend to understate turnover to reduce the apparent cost, with the converse attitude taken by the employer.

However, even if all parties have come to an agreement on the definition of actuarial soundness and the actuarial assumptions to be used, there still exist very wide differences of opinion as to the funding methods to be used. The choice of a funding method in no way affects true over-all costs, but the funding method is the controlling factor in determining how much of the eventual cost is to be paid at any particular point of time. Assume, for example, that under a given pension plan benefit payments are expected to be $10,000 at the end of every year. A funding schedule of $10,000 contributions at the end of each year would meet the obligations, as would a single initial payment of $200,000 if the interest assumption were 5%. A continuum of funding methods between these two extremes is possible of calculation. The question arises, do these mathematically equivalent funding methods possess equal degrees of actuarial soundness?

The answer to this question depends on the ability of the employer to meet the funding schedule. If an employer has fluctuating earnings the pay-as-you-go method would be unsound, yet an employer with good steady earnings from funds left in business might be more certain of meeting annual contributions than an invested pension fund. It is essential then that the actuary acquaint himself sufficiently with the business affairs of the employer, since a plan cannot be "actuarially sound" if it fails to meet its obligations because the funding schedule adopted was one which the employer probably could not maintain.

Mr. Kingston then pointed out that even if agreement is reached on margins, probabilities, actuarial assumptions and a most probable funding schedule, a plan might later become unsound. This would occur where the experience deviates unfavorably from the assumptions. Such deviation could be caused by changes in the Social Security laws, increase in rates of disability, improved mortality, increased expenses, or changes in turnover rates, hiring practices, salary scales or interest rates. Also, a change in the character of the employer's business, rendering the funding schedule no longer within his means, may cause a soundly conceived plan to become unsound. Thus measurements of the degree of actuarial soundness should be made periodically, and adjustments in actuarial assumptions, funding methods, or even benefits, might be indicated in order to preserve actuarial soundness.

Mr. Kingston also introduced section 2 with comments on two types of

plans designed to recognize the purchasing power of the emerging pension. The variable annuity permits the benefit to rise and fall in accordance with investment results, aiming at rough correspondence to changes in the cost of living. Concepts of actuarial soundness apply exactly as in any other pension plan except that the rate of interest (including growth) has no effect on actuarial soundness. The cost of living plan permits the benefit to rise and fall in accordance with changes in the cost of living, with equity investments used to offset cost increases which would otherwise result from the benefit increases. Concepts of actuarial soundness apply exactly as in any other plan except for the addition of projected increase in the cost of living as one of the actuarial assumptions.

MR. J. A. HAMILTON indicated that there are three types of pension plan which more or less gear the emerging benefit to the then purchasing power of the dollar. The most prevalent is the final average pay plan, where the unit of benefit is related to the compensation enjoyed over a short period of years immediately preceding retirement. As a practical matter, he has found that this type of plan may be maintained on a thoroughly sound actuarial basis merely by recognition of suitable forecasts of salary scales and by emphasizing that the expression of the costs of the plan as percentages of total compensation is a much more stable index than the dollar and cent equivalent.

Mr. Hamilton added that the variable annuity, since it cuts the pension strictly to fit the cloth available, might be said to stand at the apex of the pinnacle as regards actuarial soundness. He went on to discuss the cost of living pension plan, pointing out that actuarial soundness of such a plan may be a function of (1) the limitations in the degree of cost of living changes which will be recognized, (2) the extent to which future changes in the cost of living are explicitly recognized in advance in the funding, (3) the extent to which the employer is willing to commit himself to potential future adjustments in the liabilities under the plan (and the fund implementing these liabilities), and (4) to a somewhat lesser degree the expectation that a portion of the pension fund portfolio will be a source of future capital gains (or losses) to counteract potential changes in the purchasing power of the pensions provided.

MR. G. N. CALVERT stated that there is no unusual problem of actuarial soundness in variable annuity plans of the so-called equity unit type. However, in cost of living plans a new variable is introduced. The American economy has never presented insurmountable problems of the soundness of a properly designed pension plan having benefits aimed at reflecting movements of the economy. This has not been true of other economies and hence automatic safeguards and limits must be included

in a cost of living plan. In fact, the cost of living plan is designed merely to maintain the standard of living of the pensioner, not to continue his participation in the rise in living standards common to the economy as a whole.

The most convenient way to make allowance for future inflation is to drop the rate of interest used in the actuarial calculations by an amount equal to the annual rate of inflation for which it is desired to allow. To offset inflation through investment policy is another thing. The actuary would be wise to see that those responsible for the investment of funds under a cost of living plan are aware of the possibilities that exist in this area. Furthermore, no pension plan can be actuarially sound unless the employer makes adequate funding provisions, and soundness of a cost of living plan requires a funding program that distributes the input of dollars with more emphasis on the present in order to take full advantage of growth potential.

Other points which Mr. Calvert mentioned are:

a) The cost of living index is highly composite and its sluggish movements normally allow ample time to make adjustments in funding.

b) Cost of living plans may be found in practice to be merely a substitute for a whole series of plan revisions resulting from the damage caused to existing plans by inflation.

c) It may be interesting to speculate as to the extent to which fixed dollar pension plans are actuarially sound, when considered in the light of the basic purposes to be achieved by a pension plan and the present economic trend with respect to the value of the dollar.

MR. W. A. DREHER, commenting on section 3, stated that the consulting actuary should explain to his client what effect the valuation methods used by the pension trust fund have on the actuary's assumptions and the incidence of contributions. Carrying bonds of good quality at market value ignores the gradual rate at which most benefits are provided by a pension plan, and may produce unnecessary fluctuation in the contributions. If maturities are properly scheduled, a cost basis seems desirable. Amortized cost is preferable although a fairly strong argument in favor of redemption value could be made.

If common stocks are carried at cost, any capital gains will not be reflected in the contribution levels until the sale of the security. This will lead to an irregularity in contributions if past service contributions are computed according to a mechanical formula, but the frozen initial liability method would provide a dampening effect. If a stock is chosen for its growth potential and carried at cost, its yield may be so low as to produce an apparent loss when, in fact, increases in market value may off-

set interest deficiencies and the effects of salary inflation. Market valuation or a moving average of the current year's market and the preceding year's book value does not have this objection.

MR. J. K. DYER, JR. pointed out that since on uninsured plans the administrative, actuarial and investment functions are carried out by three separate and independent entities a coordinating force is necessary: this, he felt, should be the actuary. The consulting actuary should review the asset valuation methods used by the pension fund trustee, and offer his advice if he feels that there is need for guidance. However, there are no clean-cut guides for valuation available in the case of uninsured pension plans, the Internal Revenue Service having indicated that any reasonable valuation basis may be acceptable if followed consistently.

Mr. Dyer went on to say that his organization had been advising that bonds be valued on the amortized basis and stocks at original cost. He said he had been surprised to find that all but one of the major New York banks, and some banks in other large cities, had converted to original cost for bonds as well as stock. The banks had apparently taken this action since stocks had become an increasingly important part of many pension trust portfolios, and with stocks being valued at cost the greater theoretical precision involved in carrying bonds at amortized values was overshadowed and the cost thereof not justified. He went on to say that the purpose of valuing bonds on an amortized basis was to produce a more stable yield and to minimize asset value fluctuations. Instead of this purpose being overshadowed by the proportion of stocks, it becomes more important: as the proportion of investments subject to fluctuation in value increases, it is increasingly important that the remainder of the portfolio be valued on a stable basis.

In the matter of common stocks, Mr. Dyer stated that everyone seems to be pretty well agreed that original cost is the best basis to use, regardless of subsequent fluctuations in market value—an approach which he called unrealistic but rational.

Most employers who invest their pension funds to a material extent in common stocks look upon that investment as an inflation hedge, in effect prefunding supplemental pensions that may ultimately have to be provided to make the plan adequate. Current recognition of the market appreciation would not only produce undesirable fluctuations in actuarial costs, but to the extent that the market movement is upward the result would be to cut down the capacity to make current contributions under the tax deduction rules of the Internal Revenue Service.

MR. G. A. COOKE restricted his discussion to the current situation in Canada. He pointed out that the Canadian Income Tax Act makes pro-

vision for deductions from taxable income of employer and employee contributions to Registered Pension Funds or Plans—a registered plan being one accepted by the Minister for registration for the taxation year under consideration. Under the authority of this Act, the Minister of National Revenue has established certain requirements for annual registration of employer-employee pension plans. Where such pension plans are uninsured, valuations are required from a qualified actuary as of the effective date of the plan and at least every five years thereafter. The actuary is required to certify the liability for past service benefits, if any, and the current level of funding required for current and future service benefits. The assumptions to be used in the valuation are the responsibility of the actuary. However, the Department of National Revenue is asking the Department of Insurance to check uninsured plans for overfunding or underfunding and has the authority to take appropriate action where required.

Smaller uninsured pension plans may not be registered unless the plan provides for purchase of pension at retirement through the government or an insurance company. What constitutes a small plan is left to the judgment of the Department of National Revenue.

The Canadian Government does not attempt to control investments of funds of uninsured pension plans even to the extent that the percentage limitation on equity investments was removed in 1956. However, investment in the obligation or equity of the employer company or parent or subsidiary company is ruled out.

Mr. Cooke concluded that there are at least two important reasons why uninsured pension plans should be subject to more adequate supervision.

(1) The public interest requires that some restriction be placed on the investment of funds entrusted to private trusteeship. Of particular importance is the fact that many uninsured plans require or permit employee contributions, and these accumulated contributions should be protected.
(2) Many employees have come to consider employer contributions to pension plans as deferred salary or wages, especially since tax exemptions are granted to the employer companies conditional on such contributions being made irrevocably for the benefit of the employees. The employees have thus come to rely on the benefits offered or promised by uninsured pension plans and expect that reasonable protection of their interests will be given through the supervision of the pension plans.

MR. W. C. PROUTY in his discussion stated that where benefits provided under a private pension plan are fully guaranteed by an insurance company he would answer question 4 in the affirmative since insurance

companies must operate under the supervision of the various insurance departments of the states in which they do business. Under a bank trusteed plan, none of the guarantees of the various insured plans exist. Also, to different degrees the various insured funding vehicles all provide benefits for past service that are not guaranteed prior to purchase. Thus the financial security of the individuals covered depends to a degree on the employer's future ability to pay premiums or make fund deposits, on the future investment results of the plan, and on the integrity and success of the actuarial service provided.

The new Federal Disclosure Act takes into consideration the variation in the amount of guarantees available in the information that each plan administrator is required to file with respect to the plan's fiscal year—requiring the most information where the least guarantees are found. As a result of this Act, the very basic actuarial and financial operation of the plan is made public through the filing with the Secretary of Labor and is made available on request to each participant covered under the plan. Although few covered participants will be able to evaluate the material to determine their protection, and there are no regulatory features of the present law, the step from disclosure to regulation is an easy one. Perhaps here is an excellent time for the pension actuary to review the basic axiom that the actual cost of any pension program, no matter how funded and no matter what actuarial assumptions are made, is merely the sum of actual benefits paid and the actual expense of administration incurred less the actual interest earned on all funds.

General

1. What place does actuarial, economic and statistical forecasting have in:
   a) the development of a company's long term Group objectives,
   b) the determination of the organization and investment in surplus needed to meet these objectives,
   c) the control of expenses,
   d) underwriting selectivity?
2. In the funding of pensions, are the functions of insurance companies and trust companies developing along lines which tend to overlap or conflict? If so, what is the responsibility of actuaries in such situations?

MR. R. J. LEARSON confined his comments to the place of actuarial, economic and statistical forecasting for the new or relative newcomer in Group.

He felt that a company, before entering into Group business, should make an actuarial analysis of the 6 to 10 companies that have made substantial entrance into Group since World War II and then establish to its

own satisfaction why these results differ as to rates of growth in several major Group lines, development of surplus loss, and the degree of satisfaction with which these company managements view the present status of their Group operations.

It seemed apparent that making a Group operation profitable is a long-term objective in itself. If a Group operation is made profitable, other desirable goals will be reached at the same time or earlier.

The weakness of any forecasting process lies in the necessary assumptions of volume for the different products that will be sold, with their differing expense requirements and loss ratios. Economic conditions such as inflation and recession play an important part in both Casualty volume and loss ratios. Runaway trends in hospital and medical costs have made a shambles of estimates made by competent Group actuaries as recently as three or four years ago.

The necessity of substantial appreciation of the difference between Group and Ordinary or Industrial insurance is necessary before entrance into Group. Mr. Learson thought that if this is achieved, the errors in a well constructed forecast will be of minor moment.

MR. J. R. WILLIAMS stated that he felt that actuarial, economic and statistical forecasting have little place in the company's long-term Group objectives. Instead of actuarial science, plain common sense and sound business judgment need to prevail.

With regard to section 1 (*b*), actuarial, economic and statistical forecasting can play an important part. There are two main methods of establishing a Group department: namely, (1) to have a fully staffed department before the first policy is issued, and (2) to start with a very small staff and add to it as the volume of business justifies such increases. Under either method a great deal of actuarial and economic forecasting can be used in solving such problems as: (1) What volume of old and new business is needed to justify the establishment or continuance of a regional Group office? (2) Where should Group offices be located? (3) How large an investment in surplus is required?

Concerning section 1 (*c*), Mr. Williams felt that since Blue Cross has certain tax advantages over insurance companies, expenses must be kept at a low level. Insurance companies do have some offsetting advantages in that only they can offer an employer complete coverage in one package and also in that they can maintain greater equity between groups in different industries and of varying composition.

Actuarial forecasting of expense rates is helpful in the control of expenses, in ratemaking and in preparing dividend or experience rating refund formulas. Difficult problems are encountered in attempting to split

Group expenses by line of coverage. Even after making such an expense split, problems still exist in projecting such costs. Group insurance has not reached the scientific level of Ordinary business. This is largely due to the fact that inflation and rapid changes in medical usage and practice make morbidity tables an unreliable guide to future costs and to the fact that we have constantly broadened the scope of Group coverages into new and unknown fields. Along with the statistics of the past a great deal of individual judgment must be used to project trends and costs into the future.

TRANSACTIONS OF SOCIETY OF ACTUARIES
1958 VOL. 10 NO. 28

ELECTRONICS

Ordinary Insurance Data Processing

1. What progress is being made towards consolidation and integration of Ordinary procedures with electronic equipment? What principal factors control the extent to which functions can be integrated? What are the relative advantages of the various approaches now being followed?

MR. W. A. KRAEGEL reported that the Northwestern Mutual, which began programming a comprehensive daily cycle system for Ordinary insurance processing in January 1957, is now testing the computer runs, using policy data from one general agency. The system has been designed to provide routine billing and receipt forms and checks for policyholders, daily billing lists and policy status cards for the general agency, commission statements for agents, visual transaction registers, accounting and statistical totals, valuation group in-forces and reserves for the home office. When testing is completed, conversion to the new system is expected to proceed at the rate of approximately one agency per week.

Mr. Kraegel thought that the approach of any particular company to integration of functions with electronic equipment would vary with such things as the company's size, the scope and complexity of its operations, the degree of mechanization already in effect, the type of equipment it could afford and its organization structure. The approach of the Northwestern Mutual has been to devise a comprehensive system and convert all policies directly to it on an agency-by-agency basis. This has the advantage of moving directly to a smoothly coordinated system and avoids the problems inherent in the development of, and training for, successive sets of interim procedures.

MR. A. D. MURCH said that the Prudential had concluded that full integration of Ordinary procedures, while desirable as an ultimate goal, was too big a job to undertake in a single step. The first step toward this goal, which was completed for the Newark home office in January 1957, was the installation of an integrated system for premium and loan interest billing, dividend calculation, commission calculation and billing file maintenance. The second step, now being installed (it is in actual operation for a group of 180,000 policies), covers the remaining Ordinary accounting functions and the producing of a wide variety of transaction re-

ports. The third step, an integrated system for valuation and mortality work, is being tested out for installation early in 1959.

Mr. Murch thought the main factors limiting the extent to which it is feasible to integrate functions are:

a) the quality, experience, and size of the planning staff,
b) the magnitude and complexity of the conversion and installation job, and
c) the complexity of input preparation and output processing procedures required by the computer system.

MR. W. H. GILBERT said that the Minnesota Mutual is running in pilot operation a daily cycle consolidated functions Ordinary system on a group of 5,000 policies. The system performs premium, dividend and loan billing and accounting work, commission accounting, valuation and policy exhibit work. Valuations are done seriatim. It performs file maintenance, and processes lapses, reinstatements and other terminations.

To avoid passing the entire file of 600-digit master records every day, a separate file of 50-digit status records is used in the daily up-dating work. Actually, status records may be referred to several times during any one day. The master file is up-dated on a monthly basis. Some problems have been encountered in processing policies with certain billing irregularities, but it has been possible to include almost all Ordinary business within the system.

Mr. Gilbert stressed the importance of allowing adequate time to work out conversion programs and procedures, and to educate and train the home office staff, before getting into full scale operation with the computer system.

MR. J. J. FINELLI emphasized that, since computers are expensive, it is desirable to put them to productive use as soon as possible in order to achieve enough savings to defray operating costs. Mr. Finelli reported that the Metropolitan has already achieved this goal with respect to the three large-scale computing systems it has in operation. The main functions in operation on the equipment are actuarial analysis, in-force and valuation work, Ordinary premium billing, debit insurance functions, including the writing of agents' registers, and city mortgage loan accounting. At the same time, enough computing capacity is available to permit moving toward the eventual goal of completely integrated Ordinary functions.

As a step toward this eventual goal, basic premium billing records, including name and address, have been established on tape. This step has been completed, and the computers now do premium billing. Additional policy record information, and loan and dividend information, are now being constructed from original records or converted to magnetic tape

from existing files. Since some of these files are manual in form, the conversion has required about two years. Present thinking is that the ultimate consolidated functions system will be on a monthly cycle for the bulk type of processing, supplemented by daily processing for interrogations and settlements.

MR. D. H. HARRIS described the Equitable's function-by-function approach to fully integrated Ordinary procedures. Separate computer applications are now in operation for dividend, billing, and certain commission and new business work. These separate applications have been planned in such a way as to facilitate consolidation. Testing of programs to effect this consolidation has already begun.

The function-by-function approach was preferred primarily because it permitted the numerous problems of installation and transition to a computer system to be ironed out for each function separately. Functions will combine more easily after each has separately been refined in actual operation. One step which has simplified many of the problems involved in moving toward fully integrated procedures has been the formation of a single department responsible for all of the work to be integrated.

Other Procedures

1. In what other areas are electronic data processing and computing procedures now in operation or being installed? What experience has there been, and what special considerations have been found to apply, in such areas as:
   a) Group insurance and annuities,
   b) Debit insurance,
   c) policy issue,
   d) investment accounting,
   e) settlement options,
   f) actuarial studies,
   g) operations research.

MR. D. M. IRWIN reported that the Aetna has been working extensively in the Group insurance area and currently has converted about half of its Group account procedures including commission work to the IBM 705. (Commission work had been previously put on an IBM 650.) Initial development was chosen so as not to cross department lines. They are currently working on another machine on a rented-time basis.

They hope, by the first of the year, to complete the testing of the remainder of their accounting procedures, and also to start their regular billing procedures as a quite comprehensive system. In connection with the last point, they are reorganizing to get all of the functions of the billing procedure into a single department. Claim work is also planned for the 705.

MR. B. J. PRIEN stated that the New York Life has Group claim functions on a production basis on the IBM 705. Premium operations are being programmed and the commission operations will follow next.

In the claims area, weekly production runs are scheduled, producing the claim statistics on statistical data sheets—statistics of amount of claims and number of claim payments for each group broken down by coverages and various other categories.

The individual claim cards are processed in the weekly run against a master file and a history file. Current transactions of a claim are accumulated to any previous transactions of the same claim recorded on the history file, the accumulated claim amount compared with the contract benefits for the claimant as recorded on the master file, the claim coding checked for clerical error and the accumulated statistics of the policy updated on the master file. Aggregate statistics are recorded at the end of each run and data are furnished to analyze the claim experience by plan and line of coverage and to prepare Interim and Annual Statements.

MR. J. E. MATZ mentioned the start of work at the John Hancock in the administration and statistical work of Group insurance. Decentralization of the A & H claim handling has been activated, with claim approval and record creation done in the field and sent to the home office via flexowriter tapes.

MR. P. R. HUDEK discussed the development at the Minnesota Mutual of major flow charts of the Group insurance area, following a complete review of methods and procedures. Rather sweeping revisions of operations are planned, including a redrafting of policy forms and certificates. Little actual programming has been done to date and they have found the problems numerous and complex. As to pension activity, their pension unit has previously been using existing tabulating machinery efficiently, and the problem is primarily one of programming existing procedures for the computer. Programs have been developed for preparing deposit adminstration proposals, while programs for reserve calculations, valuation and premium billing are in various stages of preparation.

MR. J. W. RITCHIE mentioned that EDP procedures for Group insurance and Group annuities were in process of completion in the Sun Life.

MR. W. A. DREHER of Bowles, Andrews & Towne, presented some details of the first stage in his firm's conversion of pension plan valuations to the IBM 650. The three principal steps in this first stage, which is now in use, are:

(1) calculation of service table commutation functions,
(2) summarization of employee data cards, and
(3) computation of valuation results.

Twenty-seven different commutation columns are produced, the summarization is by sex, salary level, and quinquennial age and service groups, and valuations are provided for members' and widows' benefits on any of the usual funding methods.

MR. A. D. MURCH explained that the Prudential has installed most phases of a system of computer processing for a large segment of Debit insurance functions on the IBM 705. The major functions covered by the system are the following:

(1) classifying debit transactions and writing agents' weekly life and lapse registers;
(2) calculating agents' commissions for debit business, and writing agents' weekly commission statements for both Debit and Ordinary commissions;
(3) analyzing transactions, particularly new business issues, for both Debit and Ordinary business written by debit agents to produce various types of sales and transaction reports;
(4) screening of debit new business transactions to select those which are replacements of previous business;
(5) calculating the payroll and writing the weekly payroll vouchers for debit agents and managers. Related payroll accounting analyses and reports are also produced.

In all, there are 50 computer programs in the system which are run on a weekly basis and about 50 more which are run less frequently. Accuracy and reliability of the machine are well established, and the programs give little trouble. Input preparation, reconciliation and error adjustment have been somewhat troublesome and demand a high degree of accuracy. In all they are well satisfied with the new system.

MR. J. E. MATZ informed the meeting that John Hancock has had a long investigation of the possibility of adapting debit accounting for data processing, without, as yet, a satisfactory solution. The major difficulty lies in the fact that putting the tremendous number of collection reports into machinable form throws an extra expense into the system that cannot be overcome by savings elsewhere. He stated that it appears appreciable savings can be realized and better service rendered through data processing methods based on existing principles of debit accounting, and that their first application will be along these lines in the not too distant future.

Mr. Matz also mentioned that his company has in operation an IBM 650 issue procedure. This system picks up the approved application and

makes all premium computations and prepares the necessary policy data, using a multilith master for imprinting the policy and certain card records. They view this as an interim procedure and are looking forward to the substantial advantages of a full scale system on the UNIVAC II, which must necessarily await a redesign of the policy forms to make them machinable.

MR. J. W. RITCHIE stated that the Sun Life was about to place its bond and stock accounting on the UNIVAC II, and had for the past two years prepared its schedules for the Canadian Annual Statement on the UNIVAC I. Currently, the bond and stock master tapes are periodically up-dated and annual amortization and accrued interest calculations are done. Programs which are now being proved out provide for:

(1) semiweekly up-dating of the master record and related accounting;
(2) semiweekly production of an up-dated historical record for each security on which transactions have occurred, for insertion in a loose-leaf security ledger;
(3) monthly production of a complete departmental ledger giving an itemized listing of the month's transactions in each account together with the final balance, against which the up-to-date security ledger will be checked;
(4) monthly calculation of amortization by deducting the monthly yield rate times the book value plus accrued interest from the monthly coupon rate times the par value.

In addition, programs are being prepared for market valuation statements, book value yield statements and purchase value yield statements, monthly income due listing, and monthly accrued interest listing.

The electronic system for bonds and stocks will eliminate postings of security record cards and many manual calculations. It will be particularly helpful at year-ends in ridding them of overtime traditionally involved in the preparation of annual statement schedules.

He continued that, with regard to mortgages, their computer system handles the accounting, and many of the administrative details, of their Canadian mortgage investments. Their system for handling Canadian NHA insured loans and conventional mortgages is based on a consolidated account with flexible terms of repayment; the use of prepared tables is impracticable. Their new computer system is well adapted to handle this and supplies the mortgage offices each month with a current statement of every account. He felt that they had eliminated duplicate record-keeping (at the home office and mortgage office) and improved service to the borrower by providing, as a matter of routine, an annual statement of the movement of his account for the calendar year.

MR. C. G. GROESCHELL mentioned that the Northwestern Mutual will have a mortgage loan EDP system processing 85,000 loans with a daily cycle run, a monthly sort, and an annual run. The input for the daily cycle run will be made up of the master record tape with all pertinent data for each loan and the daily transaction tape with all accounting transactions of the day. The output of this run consists of an up-dated master record tape, a daily accounting journal and accounting controls and status reports on loans requested. At less frequent intervals this run will also put out billing notices, supplementary notices and lists.

Monthly and daily accounting journals will be sorted into master tape sequence for the month, while annually the monthly sequential outputs will be sorted into master tape sequence to become a part of the ledger record for a loan.

MR. J. E. MATZ was also pleased with the results of programming the work of mortgages, first on the IBM 650 and then on the UNIVAC.

MR. J. A. BEEKMAN explained that the Minnesota Mutual uses a Datatron 205 to process a bond amortization program providing yield rates and year-end amortized values for Schedule D of the Annual Statement. The program first calculates a rough yield, derives bond table values at the under and over five-thousandths of one percent for n and $n + 1$ periods and calculates a more accurate interest rate by making a four way interpolation. The program is preliminary to mechanically handling all bond accounting relative to Schedule D.

MR. C. G. GROESCHELL, in the only comment on section *e*, reported that his company has approximately 82,000 beneficiaries receiving payments from over 100,000 individual settlement option, annuity and retirement contracts, and some 2,500 checks are issued each day. He outlined the present system—manual, punch card and addressograph plate—for handling the various activities in these areas.

Under the proposed EDP system, all information to produce checks, tax reports and valuation totals will be on a magnetic tape file for a daily processing requiring 45 minutes to one hour. The checks will be produced one day before required mailing time, and will be punch-card checks with a tear-off stub with the breakdown of the amount shown, including the taxable portion of the total payment based on the 1954 Internal Revenue Code. Remaining balance is also shown in the case of a withdrawal under the deposit option.

Routines for change of address, name, frequency, etc., will be included, and a complete write-out of the master record for file purposes will be

available upon request. Tax reports and valuations will be provided at year end, and it is planned to mail a tax report to all individuals regardless of taxability. A net savings of ten jobs is anticipated.

MR. P. D. SLATER reported, and MR. BEEKMAN, MR. RITCHIE and MR. M. R. CUETO substantiated, considerable activity in the area of miscellaneous actuarial studies programmed for EDP methods. A long list of special projects was reported including:

asset shares;
mortality studies, including the preparation of contributions to intercompany mortality studies;
the intercompany blood pressure and build study;
the intercompany surgical study;
the intercompany Group mortality study;
lapse studies;
commutation columns;
interpolation and graduation formulas, including a program for a Whittaker-Henderson B Graduation;
test gross premiums, standard and substandard;
liability estimates;
test dividend calculations;
loan amortization schedules;
Group premium rates;
Group dividend projections; and
Group annuity experience funds and dividends.

Mr. Slater stressed the value of using actuarial students, including summer students, in this work.

MR. M. R. CUETO, in particular, discussed the New York Life's procedures for interim valuations and actuarial analysis.

Every three months, a calculation is made which determines the number of policies and amount of insurance in force, the reserve liability as of December 31 of the current year, gross and net premiums receivable, tabular cost, and reserve released, the data being subdivided according to reserve bases used for different editions of policies and by valuation cell within each reserve basis. This calculation is made not only for insurances but also for active life disability and double indemnity benefits.

The transactions, including new paid issues, which are used to up-date the valuation data at the end of each 3-month period in order to obtain the in-force at that time, are subsequently subdivided by mode or type of transaction.

For each of these groups, the same information is obtained as for the in-

force. In this way, the analysis of reserves, as given in the second page of the Gain and Loss Exhibit, may be obtained in detail for purposes of determining the effect of each group of transactions upon the development of the reserves. Moreover, it also serves to give a more reliable base for projecting results to the end of the year and acts as a control upon the final valuation at the year end. Finally, by this method, it is possible to more readily locate the cause for any fluctuations in anticipated results.

MR. J. A. BEEKMAN briefly mentioned the use of the Monte Carlo technique to determine the frequency distribution of claims in a given group of lives, using a modification of the technique described by Mr. John M. Boermeester (*TSA* VIII, 20).

Savings Resulting from Electronic Procedures

1. To what extent have savings already been realized through the use of electronic equipment? What are the factors that have significantly affected the timing and the extent of such savings? What types of application are currently regarded as having the greatest savings potential?

MR. D. H. HARRIS discussed the savings so far produced at the Equitable by the IBM 705 installed in February 1957. It is currently used for production work about 75 hours per week with the largest portion of the production time devoted to Ordinary insurance administrative procedures connected with such functions as dividends, premium billing and commissions. The resultant reduction of clerical force has been sufficient to produce savings large enough to cover all current operating costs for the equipment (including five-year amortization costs of components purchased and of the site preparation) and to pay current costs of the programming staff. Experience in his company indicates that the greatest savings can be expected from work which was not formerly mechanized at all and which could not be effectively mechanized without such large-scale equipment, but that both the systems development and the transition problems are hardest and take longest for this sort of work. Relatively smaller savings, but still very satisfactory results have developed with work partially mechanized before, for which the new equipment makes it possible to extend the scope of operations and to increase automatic control. A direct transfer of punch card operations, though it may hold unit costs at the same level, seems justified only when undertaken for transition reasons as a part of more far-reaching plans.

MR. W. J. LUTZ reported that the Minnesota Mutual had attempted, before placing an order, to project the savings which would result over a ten-year period. The projection anticipated that three years would elapse

before initial costs were recovered and from that point on increased savings will be realized building to a fairly substantial yearly figure. With a year's computer experience, he made a comparison between the first year's projection and the actual results. With regard to the basic application, the consolidated functions program, the initial costs are higher than anticipated, though perhaps it is more a matter of being hit with more costs earlier and hopefully fewer in later years. Factors contributing to this situation were: an underestimation of the amount of programming required; failure to recognize conflicts between regular duties and preparation for actuarial examinations; and modifications in the basic application—though these in most cases give greater deferred savings. On the other hand the "secondary" applications have provided savings much earlier than anticipated. The extent of these savings is not known for each application, but one job studied in detail shows twice the savings estimated. Of course, allowing these secondary applications to proceed has undoubtedly had some adverse effect on the cost projections for the primary application. A proposed application is considered worthy of computer time if it will release the monetary equivalent of at least one clerk for each hour of computer time per week. If at some future time this practice results in running out of computer time, the question will then be whether to remove applications from the existing computer or to acquire a second or a larger scale computer.

MR. H. J. STOWE stated that the Manufacturers Life has found at least two areas in the use of the IBM 650 in which there have been quite substantial clerical savings. The mortgage accounting procedure was previously highly mechanized and not much gain was expected. However, there were subtantial savings in the staff of the mortgage loan offices together with more up-to-date and better information. The other area, policy loan accounting, was entirely on a manual basis. Although conversion for this application will not be finished until the end of this year, it is apparent that the head office staff for this work will be cut in half. Mr. Stowe also mentioned the advantages he had found in using the photo-offset process for dividend illustration and rate book preparation. For example, his company has on occasion had a complete set of annuity rates in the hands of its agents within a week of the time that a change in rates was decided upon—formerly a three-month job—and with improved accuracy.

MR. J. J. FINELLI stated that the Metropolitan has been keeping records as accurately as possible for the costs of acquiring equipment, testing it, making sure it works well, recruiting, training and directing

staffs, working out procedures and converting basic records (which were usually not in machinable form and were of rather large volume). To the extent possible, his company kept track of the added costs and allocated them approximately among the various pieces of work to be converted. For each piece of work there was developed an estimated yearly amount expended for development work, programming, installation, additional extra controls involved, equipment amortization, and so on. These costs were added to the annual operating costs actually reported for such work on the various budget control analyses, including salaries, rents, etc., thereby yielding the total annual cost actually attached to the piece of work. By comparing this total annual cost with an estimate of what that annual cost would have been under the old methods (adjusted for little besides volume changes) a percentage measure was developed which attempted to reflect the degree to which operating costs increased in the early years while installing the project and decreased in later years. Mr. Finelli presented figures of this type for three broad groups which are given in Table 1.

TABLE 1

	Actuarial Operation	Premium Billing (6,000,000 Policies), Agents' Registers, City Mortgages, Home Office Weekly Payroll	Premium Accounting and Dividend Work for Ordinary (Still in Development) Also Tie-in with Others
Date Computers Acquired:	1954*	October 1956†	
Year Started on Computer:	1954	1956	1958
	Total Expense for Operation as Percentage of Former Costs by Calendar Year		
1953	115%	.....	.....
1954	120	.....	.....
1955	109	105%	103%
1956	94	134	114
1957	71	142	122
1958	67	74	141
1959	67‡	58	98
1960	52	57	46
1961	50	57	30

* UNIVAC I to be converted to UNIVAC II.

† Two additional UNIVAC I's to be converted to UNIVAC II's.

‡ Assuming full gains of the UNIVAC II being brought into the picture will not be realized until the end of 1959.

Mr. Finelli stated that the actuarial operation followed the same basic philosophy which has been applied in the past, without any of the benefits of integration which will affect this picture later.

For the third area, premium accounting and dividend work for Ordinary insurance, the work is still in development. There is a pilot operation of 35 districts (or about 4% to 5% of the total business) which has been in operation for about six months to refine the procedures. This application will not be fully installed until perhaps a year and a half or two years from now. The objective is to convert one territory at a time, perhaps somewhere around 550,000 policies every two months. The second portion of work in this project is a rather minimum tie-in with actuarial activity and premium billing activity—largely a control, which will insure that any activity recorded in the billing operation is directly tied into the same activity that affects the actuarial results, and so on.

The above cost figures reflect everything expended on electronics except an item of 10% of the total cost for training and certain research activities involved in analyzing the different machines, properly chargeable to future activities. These figures have led his company to develop a rule of thumb to the effect that one should plan to spend somewhere between 75% and 100% of one year's operating cost extra in order to get ready to use the equipment and to achieve the gains involved. Experience showed the period of amortization to be between 4 and 5 years.

Probably one of the most important factors affecting the time required to install an application, Mr. Finelli stated, was the labor involved in getting an accurate description of present procedures. This factor has varied considerably for the applications so far worked on. From the experience of 1957 his company estimates that the programmers' time is expended roughly as follows:

41% in developing the specifications of the problem—finding all the obscure details that must be provided for;

43% in developing the electronic methods required to meet those job specifications—coding, program testing and proving out;

13% in actual installation of the new application—preparing files, converting them, initial phases of operation, and that sort of thing;

3% in a miscellany of odd jobs and activities.

Another important factor having much influence on time is the training chore. Although his company once considered six months as adequate for training and developing a programmer, later experience with thirty-seven programmers in 1957 indicates that one year is more appropriate. This includes three months or so of actual operation to develop skill in handling and understanding the computer, and providing experienced reserve op-

erators. Another related matter is the need to analyze the veritable flood of new developments and new equipment in the electronics field. This together with training has accounted for something like 20% to 25% of the total cost of the electronic effort in his company so far.

Mr. Finelli next commented on the question of which areas of work to convert first. His company has developed a rough rule which states that an area of work should not be put onto an electronic basis unless one can expect to gain $200 for every hour of computer time applied to it. It is difficult to obtain a figure for the various Ordinary insurance projects because of their involved relationships, but on city mortgages the picture at the present time indicates a return of at least $600 per hour, and it may well reach $1,000 per hour. The gain from payroll is presently somewhere around $225 an hour and is expected to go within the next year to at least $750 an hour. For the agents' weekly life and lapse registers on debit business the gain presently stands at $210 per hour and is expected to reach $420 an hour within the next year. The corresponding figures for premium notice writing which has been operating for over a year are $140 per hour now and $280 per hour in the future.

Mr. Finelli concluded with an over-all picture of the results of the three computers. The first computer has just about recaptured in a period of four years all the expenditures involved in developing the procedures and in purchasing the equipment. As for the other two computers, as of the end of 1957 his company has counted on the plus side enough gain to pay for the future operating costs of the equipment. He estimates about two years more will be required to defray the additional costs involved in developing the new procedures now in process.

MR. J. E. MATZ reported that the John Hancock began useful work with a UNIVAC I about two and one-quarter years ago. During most of the time since then his company has been doing all premium billing and commission accounting for more than one and one-half million policies. The planning for performing this work on the UNIVAC II began simultaneously with the programming work for UNIVAC I. As a result, programming was ahead of anticipated UNIVAC II delivery, causing some delay to the over-all project of conversion to electronic data processing. In any event he believed that the time elapsed from the beginning of serious programming for the first application up to the point where, say, a full two shifts of productive work are being turned out on two large-scale machines is bound to be about four or five years. Because of the difficulties involved in accurate assessments of the savings, his company has adopted the practice of expressing these savings in terms of a range with a very conserva-

tive minimum figure and a somewhat optimistic maximum. The true savings are assumed to be somewhere around the midpoint of this range. Even using the minimum savings figure, quite some time ago his company passed the point at which the data processing application for Ordinary insurance premium and commission accounting was paying its own way. This initial application has reached the point where they are saving enough money to cover the nonproductive machine time and the programming costs of the remaining Ordinary insurance applications which are just beginning to reach the point of producing savings themselves. There are also several major applications outside the Ordinary insurance field now under way to multiply the improvement. He anticipated that the savings rate will probably exceed the current total costs of operating the data processing system very shortly and can then begin to pay back the initial investment in the total venture.

In considering the types of applications regarded as having the greatest savings potential, Mr. Matz indicated that the approach of his company was basically to examine those areas in which they were spending a lot of money and in which the work was machinable. This led to the selection of premium billing and commission accounting as the first area. Next in line are dividend and policy loan accounts and cash values, followed by Debit insurance, Group insurance, valuation work, mortality studies, etc. His company found that the switch-over to data processing was greatly facilitated by the degree of mechanization already achieved.

MR. M. R. CUETO stated that the New York Life has kept careful tabulations of the costs and savings associated with the large-scale electronic equipment maintained in the Actuarial Department. The costs include the items of site preparation, electronic equipment, temporary punch card equipment used during conversion, rental for space occupied by the equipment, conversion of records from punch cards to magnetic tape, and salaries and benefits for personnel involved in programming, operating and conversion. As offsets to these costs they have accumulated the following items of savings: rental value of space released, rental value of punch card equipment released, salaries and other benefits to personnel released for other work, savings from purchase of certain components over their rental costs, estimated savings from jobs on large-scale equipment as compared to cost under present methods, estimated savings in punch card equipment and personnel otherwise needed for growth of company and increased volume of work. Included also are estimated savings from jobs performed on the large-scale equipment which might not have been undertaken because of cost or time limitations using previous methods.

Mr. Cueto next compared these cumulative savings and costs for the

two-year period elapsed since their large-scale computer was installed in June 1956. Total savings have offset about 55% of total costs to date, including the heavy initial costs of conversion, programming and site preparation. At their current rate of savings, which has been increasing, it is expected that the total cost will be completely amortized within another two and one-half years. They anticipate further increases in their rate of savings because they have already charged certain costs for programming and planning work for further integration of operations and future applications yet to be put into effect. Special jobs with a great savings potential have included the preparation of dividend illustration books and rate books directly from the equipment using a photo-offset process, and the calculations for reduced paid-up or term extended insurance for individual policies that have lapsed.

MR. W. A. KRAEGEL mentioned that the Northwestern Mutual is just reaching the production stage and so cannot yet discuss savings. However, he believed that the application having the greatest savings potential is the one which involves a large volume, low-activity file, such as the Ordinary insurance application with elimination of voluminous posting and filing operations, and routine calculations.

Miscellaneous

1. What applications are in development or contemplated for computers with large random-access storage facilities? What special problems are involved in the use of these computers?
2. What uses have been found for small "desk-size" computers?
3. To what extent would it be useful for the Society to maintain reference information concerning computer programs which have been written for actuarial computing or research purposes?

MR. A. D. MURCH, discussing section 1, stated that the Prudential had earlier this year installed an IBM Ramac disc storage computer capable of storing 5 million digits of information. Their first production job, now being run daily, uses as input the punched cards from which Ordinary new business policies are prepared, and produces as output the variety of punched card records needed in their Ordinary billing, accounting and valuation operations. The discs are used to store agents' identification data. This job replaces a series of steps involving punched card equipment.

A program to calculate Ordinary cash surrender values for casework purposes is under development. In this program, the basic cash surrender values and the termination dividend tables will be stored on the discs.

Mr. Murch felt that this type of equipment is best suited for random

access to a fairly large table of data, for accumulations into a large number of categories, or for consolidating into a single process punched card screening and data rearrangement. The on-line printer is quite useful for selective printing but not for large volume work.

Two major limitations of this equipment are its relatively slow speed (the Prudential's cash surrender program has been tested at an output of 7 cards per minute) and the length of time required to load or unload completely the information stored on the discs (13 hours to load and 17 hours to unload). Frequent loading or unloading of substantial portions of the disc storage are therefore impractical.

MR. W. J. LUTZ stated that the Minnesota Mutual's computer system included 2 "bin" magnetic tape units, each of which has a capacity of 20 million decimal digits. The maximum access time is about 50 seconds; average access time on a completely random basis is about 17 seconds. Efficient assignments of locations can cut this time to a few seconds. During the Minnesota Mutual's status up-dating routine, for example, the average access time is about 2 seconds.

Mr. Lutz outlined briefly some of his company's present uses for this equipment.

1. Permanent Storage
   a) Programs are stored on one of these "bin" tape units and are read in for use by a short "trigger" program.
   b) Tables such as commutation columns or random numbers may be stored in one of these units and called for by the program.
   c) Subroutines may be borrowed from one program stored on the "bin" tape unit and used by another program.
   d) For very large programs, subroutines used infrequently are stored on one of the units and called for as they are needed.

2. Temporary Storage
   a) When program testing must be interrupted the partially "debugged" program is dumped onto one of the "bin" tape units until further testing time can be arranged.
   b) Since occasionally the drum may have to be freed for emergency use for a short period, Minnesota Mutual has started a short program to dump the contents of the drum and all registers onto one of the "bin" tape units. Another short program will restore the drum and the registers when the main program is to continue. This same dumping procedure will be used on lengthy programs to provide frequent "restart" points.

3. Status Record Keeping
   The entire contents of one of the mass-storage units has been reserved for status records. A 50 digit record giving the essentials of premium, loan and dividend status for each policy will be maintained. Regularly scheduled runs

are made, interrogating the storage for status. It is planned to convert the output from typewriter to punched cards or the printer. The emergency drum routine outlined above will be of great help in obtaining status information on "rush" cases.

In discussing section 3, Mr. Lutz recommended that a periodically published bibliography of programs developed by various companies would be the best method to provide for exchange of programs. The Society would act as a sort of "clearing house" on information.

MISS GERTRUDE A. SCHLACHTER, discussing section 2, stated that the Colonial Life has had a Burroughs E-101 desk size computer for about 9 months. About half of the available time on the machine is taken up by the preparation of the weekly field payroll for debit agents and supervisors; the balance of the time is available for actuarial department use.

The Colonial used the E-101 to calculate gross premiums, cash values, and amounts of paid-up and extended term insurance for all plans in its recent revision of Ordinary premium rates and values. All the rates and values pages of their new rate book were printed by a photo-offset process from sheets produced by the computer. The values pages were arranged so that they could be used to print policy inserts as well as pages for the rate book. Paper tape input was used in preference to keyboard input in order to make best use of the time available. This allowed them to make sure of accurate entries before the programs were actually run.

The results were very satisfastory in that the time required was about half of what would have been required by clerks using desk calculators. The Colonial IBM installation was not elaborate enough to handle a job of this kind. The photo-offset process eliminated a great deal of proofreading and was much less expensive than a type-set job.

Miss Schlachter felt that the E-101 is admirably suited for most types of actuarial calculations. The paper tape input and output overcome somewhat its limited capacity. The programming is simple and can be picked up even without benefit of formal instruction.

MR. P. W. PLUMLEY related that the Travelers has had a Burroughs E-101 for about 2 years. Their machine has a memory of 100 12-digit words and does not have paper tape input or output. The programs are set up on 8 pinboards with a total of 128 program steps. The machine operates at a lower speed than large-scale computers but is considerably less expensive. The Travelers has used the machine about 50% of the time for actuarial calculations.

Mr. Plumley stated that, in general, a good application for this machine has four characteristics:

1. The amount of input should be small relative to the amount of internal calculation and output.
2. The data should be unavailable on punched cards. Otherwise, IBM equipment would usually be more suitable.
3. The job usually will not be repetitive.
4. The E-101 is well suited for "rush" jobs since programming and testing can be done very rapidly.

The Actuarial Department has written 25 or 30 programs for the E-101, many of which are general purpose in that they can be used a number of times for various related applications. Some of these general purpose programs in use are:

1. Preparation of various commutation columns (or life single premiums and annuities), using for input a radix, a rate of interest, and a set of q_x's.
2. Calculation of asset shares and gross premiums using the method described by Mr. Hoskins in the *Transactions*.
3. Calculation of bond amortization schedules.
4. Interpolation, using the Karup-King method or the Jenkins 5th difference osculatory interpolation formula.
5. Calculation of cash values or net level premium reserves.

In addition, several special purpose programs have been written—for example, the calculation of Group major medical rates and the projection of employment patterns to make Group Annuity cost estimates.

The Travelers has found it very desirable to eliminate as much red tape as possible in setting up jobs. They have trained a number of Actuarial Department people in programming and have a very simple and informal procedure for scheduling jobs.

Mr. Plumley concluded by saying that the E-101 serves a very useful purpose by doing those calculations which are tedious if done by hand, yet not lengthy enough to call for a medium or large size computer application.

MR. J. A. BEVAN, discussing section 3, felt that, in view of the high costs of programming, unnecessary duplication of programming effort should be eliminated wherever possible.

Groups of users of similar equipment such as PACT, SHARE, GUIDE, etc., have already made progress in this direction. There is a problem in sharing programs among users of different types of equipment, but this need not be a deterrent in every case, since some companies might be willing to rent time on an appropriate computer to handle onerous programs occurring only infrequently.

A more serious problem is the variation in program requirements due

to differences in operating policies or procedures. One area where these variations are minimized is the area of intercompany mortality investigations. In the recent Build and Blood Pressure Study Mr. Bevan suspected that each contributing company wrote its own EDP program. Since the output requirements were common to all companies, mutual assistance might have reduced the programming cost. In the future it would be desirable that any Society committee collecting intercompany data should investigate the possibility of mutual assistance in assembling such data. In addition, the programs developed by the committee to summarize and analyze the data might be useful to contributing companies in analyzing their own contribution.

MR. J. W. RITCHIE suggested that consideration be given to the maintenance by the Society of reference information concerning computer programs for actuarial and research purposes. Since many companies now use the same types of equipment there is no need to wait for a universal computer language. For example, a general program for a Henderson "B" graduation would be of considerable value. Mr. Ritchie felt certain that entirely new techniques will be developed in this and other areas of actuarial work, especially by some of the younger actuaries.

Although flow charts or programs would form a useful appendix to papers describing new procedures, the resulting volume would probably be greater than is desirable for the *Transactions* and some other means of distributing such material should be provided.

This whole subject should be studied, possibly by a subcommittee of the Committee on New Recording Means and Computing Devices. A list of programs already available would, in itself, be very helpful; although a company might not be able to use the complete programs, it would often find certain parts of them useful.