MASSACHUSETTS WORKMEN'S COMPENSATION RATE MAKING-PRIMARY-EXCESS BASIS

by

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Workmen's Compensation Rates in Massachusetts, planned to become effective December 31, 1947, are based on classification pure premiums produced by the Primary-Excess method. Herein culminates more than two years of research on this subject. This development may well usher in a new basis of pure premium selection generally, for depending upon how satisfactorily this basis of pure premium selection works out in Massachusetts, other jurisdictions are bound to be influenced.

In this paper I will attempt to narrate the pertinent factors in this research. However, I make no pretense to originality in much of the material presented herein. The members of the Actuarial Committee of the Massachusetts Bureau individually and collectively have contributed most in the preparation of this new basis of pure premium selection.

This outline of the development of Workmen's Compensation Rates in Massachusetts on the Primary-Excess basis is the piecing together of various records and ideas expressed as research was in process. The original thought that multisplit treatment of losses could be used to advantage in the making of Workmen's Compensation Classification rates probably goes back to the period a few years before the war when the present Experience Rating Plan involving this principal was under consideration. The war effectively stopped any tangible results along this line although during the war the thought was sometimes expressed that certain weaknesses in the Standard Rate Making procedure could be overcome if, instead of dividing the losses between Serious, Non-Serious, and Medical, they could be segregated between Primary and Excess losses by classification.

Designation of Massachusetts as the state for original research on this subject was logical. One of the larger volumes of experience is here represented; no problem of ex-medical policies presented itself; tabulating research to prepare the necessary volume of losses split to Primary and Excess on punch cards could be effectively handled; and State Insurance officials early expressed an interest in the Primary-Excess method of pure premium selection.

Little need be said in explanation of the Primary-Excess split of losses since this basic idea has been so well established in the current Experience Rating Plan. All compensable Massachusetts losses below $400, indemnity and medical combined, are considered Primary losses. Above $400 all losses are split between Primary and Excess in

accordance with a geometric progression designed to produce a maximum primary of $1,200. For example, a given loss of $2,200 is divided between Primary and Excess as follows:

$$\begin{aligned}
\$2,200 &= 400 + 400 + 400 + 400 + 400 + 200 \\
\text{Primary} &= 400\ (2/3)^0 + 400\ (2/3)^1 + 400\ (2/3)^2 + 400\ (2/3)^3 + \\
&\quad 400\ (2/3)^4 + 200\ (2/3)^5 \\
&= 1\ 068 \\
\text{Excess} &= 2\ 200 - 1\ 068 = 1\ 132
\end{aligned}$$

In practice the Primary values are taken from tables which approximate the above results.

Thus the basic plan is to present the classification experience with the losses split between Primary and Excess rather than between Serious, Non-Serious, and Medical.

Of fundamental importance is the consideration that since all losses, large and small, contribute to the limited values of the Primary, substantial credibility can be assigned to Primary losses, and while little credibility can be assigned to Excess, greater average credibility can be assigned to losses split on the Primary-Excess basis than under the Standard basis, in which losses are not limited in any way, with the result that more reliable rates can be made from the same amounts of losses.

It should be emphasized at this point that the Primary-Excess method attacks the problem of producing better rate relativities by class and does not affect overall rate level. The same rate level will be produced by either method.

PRELIMINARY STUDY

Preliminary work was first attempted early in 1945 when the Standard revision of the previous fall involving policy years 1941 and 1942 was prepared on the Primary-Excess basis and the results compared. Not too much thought was given at the time to the matter of credibility., and the method used gave a high degree of credibility to the Primary losses with the result that the Primary-Excess answers more closely followed the indications of the experience than did those on the Standard basis. Such minor law amendments as required attention were reflected by flat overall factors. Even though several major questions, especially those relating to credibility and application of law amendment, were left unanswered it was generally agreed that the method merited further study. A year later it was decided that research into the Primary-Excess basis of making workmen's Compensation rates should be undertaken by the Bureau to see if solutions could be found to certain problems inherent in such a rating basis as well as to find out whether the Primary-Excess method would produce better rates than the Standard basis.

BASIC RESEARCH

In this early work certain facts became obvious. The splitting of losses to Primary and Excess portions is a Bureau job. This leaves unchanged the company reporting of data. While a high degree of care must be exercised in doing the job, a competent tabulating clerk can rapidly acquire the knowledge necessary to split a year's reporting of losses to Primary and Excess. The approximate Massachusetts annual volume of $14,000,000 losses distributed among 35,000 claims can be processed in four or five days by one tabulating clerk, assisted by a sorting clerk. Several policy years should be analyzed to provide sufficient volume for thorough study.

The experience of six full years 1939 through 1944 has been analyzed on the Primary-Excess basis in Massachusetts, the earlier years reflecting third or second reportings. The method used in accomplishing this is appended, including an explanation of cross-adding on the Tabulating Machines to combine indemnity and medical amounts on individual cases. (See Appendages 1 and 2)

Numerous tabulations were prepared to see if fundamental laws and relationships could be established from the Primary-Excess figures.

The stability of Primary figures was immediately impressive. Average case costs from year to year were very close when reviewed within Kinds of Injury and Industry Schedule. The Primary portion of individual classification pure premiums showed stability from year to year even on fairly small volumes of experience. However, the Excess portion showed no such tendencies. Attempted analyses of Excess losses from year to year by Industry Schedule and Group showed little in the way of stability. (Appendages 3, 4, and 5 represent some of the research and may prove of some value in other jurisdictions.)

CREDIBILITY ASSIGNMENT

Noting the stability of Primary average case cost throughout our tabulations, it was suggested that the use of an actual case count as the basis of credibility under the Primary-Excess method would avoid weaknesses in our present method of determining credibility from the pure premium underlying the given rate as applied to payroll. The old National experience which is primarily the base underlying the pure premium for many small classes may bear little relationship to the true credibility of the class. Also, where rate level is out of line it is hard to justify credibility calculated from such out of line pure premiums.

As a guide in determining the number of cases needed for full credibility, Mr. Perryman's paper Some Notes on Credibility (*Proceedings* Vol. XIX) was cited. His conclusions were interpreted to mean that a properly sampled volume of exposure producing 2,653 cases would on further sampling 99 times out of 100 produce within 5% of the same number of cases. Similarly 271 cases, 90 times out

of 100, would be reproduced within a variance of 10%

Committee agreement to base full Primary credibility on 250 Primary cases and full Excess credibility on 500 cases was reached after much consideration. Pertinent in this decision was agreement by the Massachusetts, New York, and National Council Actuarial Committees, in joint session in New York, that actual number of cases constitutes a simple, practical method of assigning credibility and one which gives a little more credibility to the class having higher actual than expected loss frequency.

The credibility table follows:

Credibility Based on Standard Formula

$$A = \sqrt{W^3}$$

W	$\sqrt{W^3}$	Actual No. of Cases	
		Primary Zp	Excess Ze(also Z and Zt)
100	1.0000	250	500
90	.8538	213	427
80	.7155	179	358
70	.5857	146	293
60	.4648	116	232
50	.3536	88	177
40	.2530	63	127
30	.1643	41	82
20	.0894	22	45
10	.0316	8	16
5	.0112	3	6

APPLICATION OF LAW AMENDMENTS

It was known from the beginning that one of the chief obstacles to this basis of rating would be the applying of law amendments. This phase of the research was contributed largely by one committee member and a satisfactory method of application was devised. Treatment of this matter herein is sketchy and it is hoped that this subject may engage the energies of some members of the Society to further efforts along this line.

For purposes of calculation of law amendment factors, law amendments are divided into two broad classes. Included in the first class are the law amendments which increase the percentage of weekly benefits or which increase the maximum or minimum weekly benefits. This particular type of law amendment generally can be measured by a flat percentage to apply to all sizes of losses. All other law amendments are assigned to a second classification which includes such amendments as changes in waiting periods which virtually all go

into the Primary losses or to extensions of the maximum period or amount which go largely into Excess losses.

The increased benefits of the new over the old law can be expressed in symbols as follows:

	Losses (Old Law)	Losses (Amended Law)	Loss Increase
Total	A	A'	$A'-A = \Delta A$
Primary	Ap	A'p	$A'p-Ap= \Delta Ap$
Excess	Ae	A'e	$A'e-A = \Delta Ae$

Basic Ratio $= \Delta Ap/ \Delta A$

In a series of increasing law amendments the basic ratio corresponding to an amendment increasing the law by a specific amount is greater than the basic ratio corresponding to an amendment which increases the law by greater amounts. Also the limit of the basic ratio corresponding to an amendment approaches zero as the value of the amendment becomes increasingly large and the limit of the basic ratio corresponding to a specific amendment can not exceed the "D" ratio as the value of the amendment becomes increasingly small. These principles may be stated in symbols as follows:

$\Delta Ap/ \Delta A > \Delta A'p/ \Delta A'$, where $\Delta A < \Delta A'$

Limit $\Delta Ap/ \Delta A \doteq 0$, and Limit $\Delta Ap/ \Delta A \doteq D$

$\Delta A \doteq \infty$ $\Delta A \doteq 0$

Appendage 6 shows in tabular form calculations of the effect on Primary and Excess losses produced by a law amendment increasing by 10% all temporary total losses, indemnity and medical combined. Assuming that medical benefits have not increased this is equivalent to 15.5% increase on indemnity losses. Column (12) of this exhibit shows that it would be necessary to apply a factor of 1.08659 to the Primary losses and a factor of 1.18912 to the Excess losses to bring them to the new law level. The basic ratio shown in Column (13) is .7526

Using these principles and the calculated values of many Basic Ratios a chart was constructed showing a curve for each type of injury in which the Basic Ratio is a function of the size of the law amendment. These charts based on the Massachusetts loss distributions are to be used to determine factors to be applied to Primary and Excess losses to reflect a specific law amendment.

The method by which the effect on Primary and Excess losses produced by Masaachusetts law amendments amounting to 1.207 in 1945.

Exhibit I **MASSACHUSETTS**

CLASSIFICATION EXPERIENCE
PRIMARY-EXCESS BASIS

SCH.
& GR. 182 CODE 3635 CLASS Gear Mfg. or Grinding

YEAR	PAYROLL	PRIMARY NO.	PRIMARY AMOUNT	PRIMARY P.P.	EXCESS NO.	EXCESS AMOUNT	EXCESS P.P.	TOTAL AMOUNT	TOTAL P.P.
1935-38	4 597 589	58	xxxx	xx	xx	xxxx	xx	19 015	.41
1939	1 381 655	16	4 715	.34	2	838	.06	5 553	.40
1940	2 507 514	20	5 304	.21	1	123		5 427	.21
1941	5 525 028	45	13 309	.24	3	101		13 410	.24
1942	8 607 488	65	20 617	.24	7	2 294	.03	22 911	.27
1939-42	18 021 685	146	43 945	.24	13	3 356	.02	47 301	.26
1943	14 511 574	123	43 790	.30	18	16 325	.11	60 115	.41
1944	13 257 698	79	26 982	.20	9	3 117	.02	30 099	.22
1943-44	27 769 272	202	70 772	.25	27	19 442	.07	90 214	.32
1939-44	45 790 957	348	114 717	.25	40	22 798	.05	137 515	.30
1935-44	50 388 546	406	xxxx	xx	xx	xxxx	xx	156 530	.31

"D" Ratios		PURE PREMIUMS						Zt =80
(a) Present	.90	Underlying	.47			.05		.52
(b) Pres. on Rate Level	.83	Underlying on Rate Level	.44			.09		.53
(c) Indicated 1943-44	.78	Derived 1935-44	.29			.06		.35
(d) Indicated 39-44 Z= 70	.83	Indicated 1943-44	.25	Zp=80		.07	Ze=10	.32
(e) Formula (d)Z+[(b)x(1-Z)]	.83	Formula	.26			.06		.32
(f) Proposed		Proposed						

and amounting to 1.099 in 1946. is shown (See Appendages 7 and 8.) It will be noted in the case of these two amendments that the effect on Excess losses is very substantially greater percentagewise than on Primary losses.

LIMITATION OF VALUE FOR A SINGLE ACCIDENT

A simple effective means is used for handling catastrophe cases which, at the same time, overcomes a weakness in the Standard rate making procedure. The maximum value of any accident is limited to $25,000 and in any such accident involving multiple claims the Primary value is limited to $2,400

DEVELOPMENT OF LOSSES

Positive development of losses is the rule in Massachusetts due to the nature of the law. Several policy years were analyzed to measure the effect of development under the Primary and Excess split. It was found that aggregate Primary losses continue at approximately their first reporting values with a tendency toward negative development, and such positive development as occurs, appears only on the Excess losses. Thus the development factors used in the Primary-Excess method have been to increase Excess losses and to leave Primary losses unadjusted or slightly decrease them.

EXPERIENCE PRESENTATION

Of major importance is the selection of the experience period. It may not be sufficient to proceed with only the rate level period on the Primary-Excess basis if satisfactory rates are to be developed because it is important to have adequate underlying pure premiums properly split.

The choice of alternatives lies between, (1) developing new underlying pure premiums; (2) producing satisfactory Primary or "D" ratios by means of which underlying pure premiums can be split between Primary and Excess and; (3) some combination of (1) and (2).

In Massachusetts the underlying pure premiums were not altogether satisfactory and a method was devised for simultaneously bolstering the underlyings and extending the rate level period when too little credible experience was available in the smaller classes and particularly in the Excess portion of all classes.

Into the preparation of the form for presentation of the Primary-Excess experience by classification went so much thought to obtain maximum use of available experience that detailed consideration and explanation of this form and how the experience is used, depending upon the credibility, is desirable. Classification 3635, Gear Mfg. and Grinding, is used as an example. (See Exhibit I).

MASSACHUSETTS WORKMEN'S COMPENSATION RATE MAKING-PRIMARY-EXCESS BASIS

Ten years of experience with losses converted to rate level is used in order to obtain a maximum of information about the Massachusetts experience of small classes and to improve the underlying pure permiums. No Primary-Excess split is available for policy years 1935-38; hence these are used combined for total pure premium indication. The years 1939-42 are separately presented with losses split between Primary and Excess. Rate Level years 1943-44 are shown. separately and combined and the 1939-44 combined Primary-Excess split is shown. Ten year 1935-44 total pure premium completes the experience exhibited

To establish the best possible "D" ratio information a section of the form is devoted thereto. Starting with (a) the experience rating "D" ratio for the class, on successive lines are shown; (b) Underlying "D" ratio on rate level, obtained from corresponding underlying pure premiums on rate level; (c) the indicated 1943-44 and (d) 1939-44 "D" ratios, and (e) a weighted "D" ratio obtained by weighting Underlying "D" ratio on rate level and 1939-44 "D" ratio in accordance with Credibility Z.

The pure premium section of the form warrants full explanation: (1) Underlying pure premiums split to Primary and Excess by the experience rating "D" ratio are followed by; (2) Underlying pure premiums on rate level which are obtained separately for Primary and Excess by adjusting item (1) by Industry Group rate level index numbers, calculated by dividing 1943-44 Industry Group rate level losses by corresponding expected losses, in turn obtained by multiplying underlying pure premiums by 1943-44 payrolls; (3) Derived 1935-44 pure premium, in effect a bolstered underlying, is a weighted pure premium obtained in total from the ten year 1935-44 pure premium and total underlying on rate level in accordance with credibility Zt, and split for Primary and Excess by the line (e) Formula "D" Ratio; (4) 1943-44 indicated rate level pure premiums are brought down from the upper part of the exhibit; and, (5) Formula pure premiums are obtained by weighting Indicated and Derived pure premiums in accordance with Credibility Zp and Ze.

There follows an explanation of how the Primary-Excess method utilizes the advantages of the multisplit treatment of losses in a systematic method of assembling data for deriving pure premiums compatible with good underwriting judgment. Ten years of experience is shown but is only used to the extent that a class receives less than full credibility for its latest two-year indications. Large classes are to a great extent rated on the experience of the latest two years, e.g. two-year Primary indications may receive 100% credibility and be used exactly - Excess indications may receive 40% credibility in which case the formula Excess is obtained from 40% of the two-year Excess indications and 60% of the Derived 1935-44 Excess.

For smaller classes more credibility is given to the experience of the earlier years as more reliance is placed on the Derived

1935-44 pure premium - still smaller classes rely on the Derived 1935-44 which contains a larger and larger proportion of Underlying on Rate Level as the actual amount of available experience diminishes. Thus a method is devised which gleans a maximum of worth from the Massachusetts experience available and leaves fewer classes in the non-reviewed category.

CONVERSION OF LOSSES TO RATE LEVEL

The losses for the Rate Level years 1943 and 1944 were adjusted by development and law amendment factors, and Rate Level Index numbers calculated by dividing actual losses by expected losses for each Industry Group separately for Primary, Excess, and Total. By dividing 1943-44 Index Numbers by Index Numbers of the other years, Rate Level factors were established for converting the raw losses of the earlier years to rate level. Index Numbers for 1935-38 combined and 1939-42 separately were calculated by dividing actual losses by expected losses for each Industry Group separately for Primary and Excess for the latter years but in total only for 1935-38. Expected losses in both calculations were payrolls by class multiplied by underlying pure premiums. A detailed explanation of the method used in making the factor calculations is appended. (See Appendage 9).

Tabulating methods were used to advantage throughout this work. A multiplying punch was used for extensions in order to prepare punch cards by classification for all losses converted to rate level. In this manner hand calculating was minimized and the classification experience was then run off from these punch cards directly onto the classification master sheet in "ditto". Pure premiums were calculated and these and "D" ratios inserted by typewriter. Sufficient copies were then made by the "ditto" process.

ADVANTAGES OF PRIMARY-EXCESS METHOD

Probably the biggest advantage of the Primary-Excess method is that in the Primary indications is concentrated in one spot more valid information than has previously been available for each classification, the only exceptions being the very large and the very small classes. The stability of the Primary pure premium is noticeable even where there is not a very great volume of experience and constitutes an advantage which will definitely improve the derivation of pure premiums.

Under the Standard procedure mis-assigned losses and, in Massachusetts where second reportings are used, changed status of losses on second reporting may affect selected pure premiums when corrections cause pure premium shifts between serious and non-serious portions. Under the Primary-Excess procedure the effect on the final rate of a given loss is determined entirely by its size, not by its type.

The Standard method generally provides high credibility for medical losses which occasionally results in giving undue emphasis to a single claim with unusually large medical. Single claims with medical cost as high as $35,000 have been reported in Massachusetts. The Primary-Excess method automatically avoids this difficulty.

Another advantage of the Primary-Excess method, as developed in Massachusetts, not to be overlooked is the trueing up of pure premiums by the ten-year review. This applies not only to many non-reviewed classes but also to the parts of the small reviewed classes which have too little credibility to have changed over some period of time.

In jurisdictions outside of Massachusetts it has been noted that the proposed pure premiums for some of the reviewed classes have been consistently out of line with the actual indications for a period of years. Correction of these departures may take several years under the Standard rate making procedure because of the small volume of serious, non serious, and medical experience available for an individual class in any given two-year period. Furthermore in the State of New York, the Insurance Department has called attention to the lack of any practical procedure for revising the rate relativities of the non-reviewed classes. It is believed that problems of this nature in connection with the non-reviewed or the smaller reviewed classes can be handled better under the Primary-Excess method.

COMPARISONS PRIMARY-EXCESS VS. STANDARD BASIS

It is anti-climatic to have to explain that after parallel rate revisions were prepared in the Fall of 1946, one on the Standard and one on the Primary-Excess basis as outlined, the decision that the revision should continue on the Standard basis was apart from any detailed consideration of the relative merits of the two methods and was largely based on the fact that law amendments were forcing too great an increase in rate level to complicate matters further with a change in method of establishing pure premiums.

The Primary-Excess presentation was not complete at the time this decision was reached and the problem of reconciling the formula pure premium results with the rate level indications were left as unfinished business until this past Spring when it was again decided that parallel revisions would be prepared thus allowing an opportunity to utilize the previous year's Primary-Excess formula pure premiums as underlying pure premiums and to allow class by class comparisions of Primary-Excess and Standard results through a second complete revision.

Tests indicated that the Primary-Excess formula pure premiums showed an overall variation from rate level indications of less than 1%, hence no correction was deemed necessary in their use as underlying pure premiums.

EXHIBIT II

RATE MAKING - PRIMARY-EXCESS MASSACHUSETTS

Sch. &
Group 182 Code 3635 Class Gear Mfg. or Grinding

POLICY YEAR	PAYROLL (IN HUNDREDS)	PRIMARY 60			EXCESS 10			TOTAL	
		NO.	AMOUNT	P. P.	NO.	AMOUNT	P. P.	AMOUNT	P. P.
1944	13 257 7	81	29 698	.22	11	12 037	.09	41 735	.31
1945	9 269 7	57	23 542	.25	9	2 031	.02	25 573	.27
TOTAL	22 527 4	138	53 240	.24	20	14 068	.06	67 308	.30
P. P.: Primary-Excess Underlying on Rate Level				.25			.06		.31
P. P.: Derived by Formula				.24			.06		.30
P. P.: Primary-Excess Underlying				.26			.06		.32
P. P.: Proposed									

SECOND PREPARATION OF PARALLEL REVISIONS

The presentation of the experience on the Primary-Excess basis for the current revision is straightforward and quite closely follows the standard pattern. Again, Class 3635, Gear Mfg. or Grinding, is presented. (See Exhibit II)

The rate level years 1944 and 1945 are presented separately and combined with losses adjusted for law amendment and development. The loss experience is shown for Primary, Excess, and Total with actual number of cases also shown for credibility purposes.

Primary-Excess underlying on Rate Level is obtained by adjusting the Primary-Excess Underlying for each class by the ratio of 1944-45 rate level losses by Industry Group to Corresponding Primary-Excess underlying pure premiums multiplied by 1944-45 payrolls.

Sound acturial principles dictate that final pure premiums in most instances be derived by formula calculated by weighting Primary and Excess indications and Underlying Primary and Excess pure premiums on rate level in accordance with credibility, but smooth transition from the Standard basis to the Primary-Excess method may cause some deviation from this procedure. If such deviation materializes it is suggested that formula pure premiums be carried over to the following year as the true underlying in order that expedient selections may not permanently affect the underlying.

Appendage 1

PROCEDURE FOR OBTAINING PRIMARY-EXCESS SPLIT

Loss cards for a given year are sorted for Indemnity within Medical and hand-placed into two groups, as follows:

1. Losses having a combined Indemnity plus Medical amount of $ 400 or less.

2. Losses having a combined Indemnity plus Medical amount of $ 400 or over.

The first group is summary-carded by Kind of Injury within Class, crossfooting Indemnity plus Medical losses and punching the combined amount in two fields, Incurred amount and Primary amount (undiscounted in this case).

The second group is crossfooted, case by case, and placed in a range of incurred loss amounts and the Primary Rating Value of the Incurred amount is assigned and gangpunched. These cards are then re-summary-carded, punching Incurred Amount, Primary Amount, and Excess Amount (a crossfooting of Incurred minus Primary).

From the combined summary-carded results of the first and second groups, the Primary-Excess split of losses by Kind of Injury and Classification is obtained.

Appendage 2

CROSSFOOTING ON TYPE 405 ALPHABETIC ACCOUNTING MACHINE

The following is a description of a method which will enable the adding together of two amounts punched on the same card. This method will also allow the subtraction of one amount from the other as well as the printing of net balances resulting from the adding and subtracting of any combination of plus and minus amounts. The ability of the machine to summary punch the crossfooted results is probably the most important and useful application of this device.

We wish to point out that these ideas are not entirely our own, but we do believe that we have developed them to the point where they can be of practical use in many ways. As far as we have been able to determine, no "Pointers" have been distributed by International Business Machines demonstrating this or any other similar procedure. There are, however, "Pointers" on Crossfooting which are rather limited in scope.

In instances where a sum of fields A and B is needed, the totals of fields A and B are accumulated in separate counter groups. The accumulated amount in Counter Group 2 is transferred to and combined with the amount already accumulated in Counter Group 1 when a specially inserted X-punched "trailer" card passes the lower brushes. This "trailer" card (blank except for an X punch in any available column) must follow each control change and can easily be inserted by the tabulating clerk at the time of tabulation. Care must be exercised in the placing of these "trailer" cards inasmuch as the omission of them will nullify the crossfooting operation.

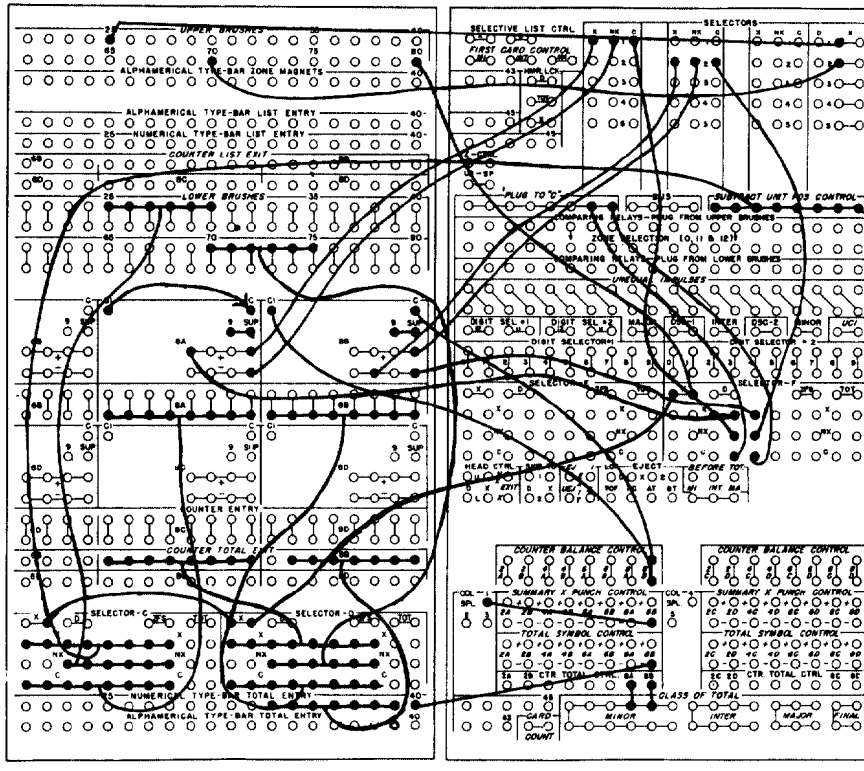
It is important for those who contemplate using this device to carefully consider certain limitations caused by the problem of inserting the "trailer" cards. Tabulations where the control breaks are frequent are naturally more cumbersome than those where control breaks occur less frequently.

An optional method may be used whereby a permanent file of X-punched "trailer" cards containing every possible combination of control information may be established. These cards may be inserted by either sorting or collating. This method would eliminate the need for the special plugging necessary to prevent the extra spacing caused by the presence of the "trailer" card.

MASS. RATING BUREAU

Appendage 2

CROSSFOOTING OF TWO AMOUNTS ON A SINGLE CARD
ON THE STANDARD TYPE 405 ALPHABETIC ACCOUNTING MACHINE



1. Plugging of X - Selector 1 adds minus cards and subtracts plus cards in Transmitting Counter 8 A.

2. Plugging of X - Selector 2 adds plus cards and subtracts minus cards in Receiving Counter 8 B.

3. Class Selector plugged to actuate Counters 8 A and 8 B by NX - 80 impulses.

4. Summary X - Punch Control plugged to designate negative amounts on Summary card when Summary punching is used.

5. All "Trailer" cards must be punched X - 80 or in some other available column to actuate Class Selectors and to cause crossfooting.

6. Had the problem been A - B = C, the Transmitting Counter 8 A would have been plugged to add by wiring directly to a Plug to "C" hub; whereas the plugging of the Receiving Counter 8 B would remain unchanged.

Appendage 3

PRIMARY-EXCESS

BY TYPE OF INJURY

ALL INDUSTRY GROUPS COMBINED

		PRIMARY				EXCESS				TOTAL		
	Payroll	No. Cases	Amount	P.P.	Av.Cl. Cost	No. Cases	Amount	P.P.	Av.Cl. Cost	Amount	P.P.	Av.Cl. Cost
DEATH												
1939	1 272 025 905	157	162 740	.01	1 037	155	363 776	.03	2 347	526 516	.04	3 354
1940	1 462 070 691	179	184 635	.01	1 031	177	464 746	.03	2 626	649 381	.04	3 628
1941	1 824 600 667	172	184 560	.01	1 073	172	423 777	.02	2 464	608 337	.03	3 537
1942	2 165 447 671	217	236 230	.01	1 089	217	584 874	.03	2 695	821 104	.04	3 784
1943	2 346 455 896	208	230 566	.01	1 108	207	732 429	.03	3 538	962 995	.04	4 630
Total	9 070 600 930	933	998 731	.01	1 070	928	2 569 602	.03	2 769	3 568 333	.04	3 825
P. T.												
1939		18	21 600	-	1 200	18	250 857	.02	13 937	272 457	.02	15 137
1940		25	29 990	-	1 200	25	307 396	.02	12 295	337 386	.02	13 495
1941		26	31 200	-	1 200	26	407 987	.02	15 692	439 187	.02	16 892
1942		27	32 400	-	1 200	27	346 966	.02	12 851	379 366	.02	14 051
1943		10	12 000	-	1 200	10	155 380	.01	15 538	167 380	.01	16 738
Total		106	127 190	-	1 200	106	1 468 586	.02	13 854	1 595 776	.02	15 054
MAJOR												
1939		473	486 770	.04	1 029	472	796 147	.06	1 687	1 282 917	.10	2 712
1940		525	544 100	.04	1 036	525	925 236	.06	1 763	1 469 336	.10	2 799
1941		570	600 550	.03	1 053	570	1 091 442	.06	1 915	1 691 992	.09	2 968
1942		682	732 340	.03	1 074	681	1 402 743	.07	2 060	2 135 083	.10	3 131
1943		744	791 570	.03	1 064	744	1 374 698	.06	1 848	2 166 268	.09	2 912
Total		2 994	3 155 330	.04	1 054	2 992	5 590 266	.06	1 867	8 745 596	.10	2 921

Appendage 3

PRIMARY-EXCESS - BY TYPE OF INJURY

ALL INDUSTRY GROUPS COMBINED

	Payroll	PRIMARY No. Cases	PRIMARY Amount	PRIMARY P.P.	PRIMARY Av.Cl. Cost	EXCESS No. Cases	EXCESS Amount	EXCESS P.P.	EXCESS Av.Cl. Cost	TOTAL Amount	TOTAL P.P.	TOTAL Av.Cl. Cost
MINOR												
1939	1 272 025 905	785	323 058	.03	412	354	42 787	-	121	365 845	.03	466
1940	1 462 070 691	918	371 780	.03	405	396	45 811	-	116	417 591	.03	455
1941	1 824 600 667	1 169	464 096	.03	397	503	48 418	-	96	512 514	.03	438
1942	2 165 447 671	1 165	472 380	.02	405	548	54 136	-	99	526 516	.02	452
1943	2 346 455 996	1 136	456 208	.02	402	541	51 421	-	95	507 629	.02	447
Total	9 070 600 930	5 173	2 087 522	.03	404	2 342	242 573	-	104	2 330 095	.03	450
TEMPORARY												
1939		19 624	3 084 250	.24	157	1 709	529 333	.04	310	3 613 583	.28	184
1940		22 102	3 362 129	.23	152	1 791	505 885	.03	282	3 868 014	.26	175
1941		27 197	4 144 479	.23	152	2 123	573 281	.03	270	4 717 760	.26	173
1942		29 346	4 611 106	.21	157	2 400	644 085	.03	268	5 255 191	.24	179
1943		30 287	5 027 807	.22	166	2 807	775 915	.03	276	5 803 722	.25	192
Total		128 556	20 229 771	.22	157	10 830	3 028 499	.04	280	23 258 270	.26	181
MEDICAL												
1939			937 150	.07		(9)	3 835	-	426	940 985	.07	
1940			1 133 948	.08		(5)	2 125	-	425	1 136 073	.08	
1941			1 385 441	.08		(13)	1 303	-	100	1 386 744	.08	
1942			1 409 449	.07		(7)	1 291	-	184	1 410 740	.07	
1943			1 326 388	.06		(6)	351	-	59	1 326 739	.06	
Total			6 192 376	.07		(40)	8 905	-	223	6 201 281	.07	

Appendage 4

PROPORTION OF MEDICAL TO INDEMNITY

BY SIZE OF LOSS GROUPINGS

POLICY YEAR 1943

Size of Indemnity	(1) Indemnity Amount	(2) Medical Amount	(3) No. of Cases	(4) Ratio (2)÷(1)
0- 49	129 315	67 632	6 682	.523
50- 99	445 014	179 284	8 642	.403
100- 149	387 238	165 782	4 533	.428
150- 199	298 224	140 444	2 549	.471
200- 249	260 444	128 413	1 754	.493
250- 299	271 287	153 850	1 554	.567
300- 349	290 093	187 238	1 489	.645
350- 399	203 203	121 635	873	.599
400- 499	304 754	169 126	1 077	.555
500- 599	218 976	109 919	606	.502
600- 699	163 311	87 129	389	.534
700- 799	138 238	66 545	274	.481
800- 899	111 106	57 304	200	.516
900- 999	88 885	40 844	138	.460
1,000- 1,199	176 561	77 267	236	.438
1,200- 1,399	168 411	64 803	180	.385
1,400- 1,599	134 016	55 060	127	.411
1,600- 1,799	139 642	37 915	104	.272
1,800- 1,999	113 835	33 402	78	.293
2,000- 2,499	321 397	104 129	195	.324
2,500- 2,999	301 233	65 534	136	.218
3,000- 3,499	293 096	80 379	117	.274
3,500- 3,999	274 662	66 922	93	.244
4,000- 4,499	253 709	43 013	70	.170
4,500- 4,999	204 326	39 453	52	.193
5,000- 5,999	650 475	90 297	140	.139
6,000- 6,999	210 487	42 741	40	.203
7,000- 7,999	185 096	28 932	29	.156
8,000- 8,999	52 000	14 802	8	.285
9,000- 9,999	36 485	10 496	5	.288
10,000-19,999	133 556	19 759	12	.148
20,000-29,999	47 791	3 274	2	.069
40,000-49,999	12 805	35 000	1	2.733
Total	7 019 671	2 588 323	32 385	.369

Appendage 5

PRIMARY-EXCESS

DISTRIBUTION OF LOSSES

BY INCURRED LOSS SIZE GROUP

POLICY YEAR 1943

Size Group	No. of Cases	Incurred	Primary Amount	Average Cost	Excess Amount	Average Cost
0- 49	6 682	196 947	196 947	29		
50- 99	8 642	624 298	624 298	72		
100- 149	4 533	553 020	553 020	122		
150- 199	2 549	438 668	438 668	172		
200- 249	1 754	388 857	388 857	222		
250- 299	1 554	425 137	425 137	274		
300- 349	1 489	477 331	477 331	321		
350- 399	873	324 838	324 838	372		
400- 449	649	272 774	269 975	416	2 799	4
450- 499	426	200 101	193 690	455	6 411	15
500- 549	330	171 206	162 300	492	8 906	27
550- 599	278	158 694	146 480	527	12 214	44
600- 699	388	248 755	222 570	574	26 185	67
700- 799	269	200 511	171 200	636	29 311	109
800- 899	205	172 682	141 340	689	31 342	153
900- 999	138	129 729	101 700	737	28 029	203
1,000- 1,099	149	154 043	115 970	778	38 073	256
1,100- 1,199	86	97 743	70 660	822	27 083	315
1,200- 1,299	93	115 859	79 910	859	35 949	387
1,300- 1,399	86	114 999	76 570	890	38 429	447
1,400- 1,499	48	69 153	44 210	921	24 943	520
1,500- 1,599	79	119 923	74 540	944	45 383	574
1,600- 1,699	33	54 072	32 060	972	22 012	667
1,700- 1,799	72	125 170	71 690	996	53 480	743
1,800- 1,899	39	71 500	39 560	1 014	31 940	819
1,900- 1,999	39	75 737	40 270	1 033	35 467	909
2,000- 2,099	68	137 199	70 950	1 043	66 249	974

Appendage 5

PRIMARY-EXCESS

DISTRIBUTION OF LOSSES

BY INCURRED LOSS SIZE GROUP

POLICY YEAR 1943

Size Group	No. of Cases	Incurred	Primary Amount	Average Cost	Excess Amount	Average Cost
2,100- 2,199	33	70 461	35 080	1 063	35 381	1 072
2,200- 2,299	47	105 558	50 640	1 077	54 918	1 168
2,300- 2,399	28	65 451	30 440	1 087	35 011	1 250
2,400- 2,499	21	51 255	23 100	1 100	28 155	1 341
2,500- 2,999	136	366 767	152 370	1 120	214 397	1 576
3,000- 3,499	117	373 475	134 770	1 152	238 705	2 040
3,500- 3,999	93	341 584	109 000	1 172	232 584	2 501
4,000- 4,499	70	296 722	82 880	1 184	213 842	3 055
4,500- 4,999	52	243 779	61 880	1 190	181 899	3 498
5,000- 5,499	102	525 529	121 380	1 190	404 149	3 962
5,500- 5,999	38	215 243	45 470	1 197	169 773	4 468
6,000- 6,999	40	253 228	48 000	1 200	205 228	5 131
7,000- 7,999	29	214 028	34 800	1 200	179 228	6 180
8,000- 8,999	8	66 802	9 600	1 200	57 202	7 150
9,000- 9,999	5	46 981	6 000	1 200	40 981	8 196
10,000-19,999	12	153 315	14 400	1 200	138 915	11 576
20,000-29,999	2	51 065	2 400	1 200	48 665	24 333
40,000-49,999	1	47 805	1 200	1 200	46 605	46 605
Total	32 385	9 607 994	6 518 151	201	3 089 843	717

Appendage 6

Example showing in tabular form the calculation of the effect on primary and excess losses produced by a law amendment increasing the indemnity losses 15.5% for the Massachusetts temporary total compensable disability.

(15.5% increase in indemnity amounts to 10.0% overall - Indem. & Med.)

Loss Size Group (1)	No. of Cases (2)	Incurred Average Loss (3)	New Average 1.10 (3) (4)	Average Primary Values Col.(3) (5)	Col.(4) (6)	Original Law (2) x (5) (7)	Amended Law (2) x (6) (8)
0- 399	117 726	-	-	Actual	Actual	$13 391 681	$14 730 849
400- 499	3 211	$ 442	$ 486	$ 430	$ 470	1 380 730	1 509 170
500- 599	1 851	544	598	510	550	944 010	1 018 050
600- 699	1 235	643	707	570	610	703 950	753 350
700- 799	830	747	822	640	680	531 200	564 400
800- 899	676	845	930	690	730	466 440	493 480
900- 999	470	948	1 043	740	780	347 800	366 600
1000 1099	386	1 034	1 137	780	820	301 080	316 520
1100-1199	268	1 143	1 257	820	860	219 760	230 480
1200 1299	223	1 247	1 372	860	900	191 780	200 700
1300 1399	202	1 350	1 485	890	930	179 780	187 860
1400-1499	147	1 451	1 596	920	960	135 240	141 120
1500-1599	161	1 532	1 685	950	980	152 950	157 780
1600 1699	98	1 644	1 808	970	1 010	95 060	98 980
1700-1799	111	1 742	1 916	990	1 030	109 890	114 330
1800-1899	67	1 839	2 023	1 010	1 050	67 670	70 350
1900-1999	65	1 938	2 132	1 030	1 060	66 950	68 900
2000 2099	86	2 027	2 230	1 050	1 070	90 300	92 020
2100-2199	55	2 148	2 363	1 060	1 090	58 300	59 950
2200 2299	59	2 244	2 468	1 080	1 100	63 720	64 900
2300-2399	49	2 341	2 575	1 090	1 110	53 410	54 390
2400-2499	37	2 448	2 693	1 100	1 120	40 700	41 440
2500-2999	162	2 714	2 985	1 120	1 140	181 440	184 680
3000-3499	124	3 184	3 502	1 150	1 170	142 600	145 080
3500 3999	78	3 695	4 065	1 170	1 180	91 260	92 040
4000 4499	41	4 166	4 583	1 180	1 190	48 380	48 790
4500-4999	34	4 686	5 155	1 190	1 190	40 460	40 460
5000-5452	38	5 140	5 654	1 190	1 200	45 220	45 600
5453 & Over	62	6 630	7 293	1 200	1 200	74 400	74 400
Total	128 552					20 216 161	21 966 669

	Old Law (9)	Amended Law (10)	Increases (11)	Ratio (10)÷(9) (12)	% Distribution of (11) (13)	% Distribution of Col.(9) (14)	Law Increase Distribution (12)÷(14) (15)
Total	$23 258 270	$25 584 097	$2 325 827	1.10000	1.0000	1.0000	1.100
Primary	20 216 161	21 966 669	1 750 508	1.08659	.7526	.8692	1.250
Excess	3 042 109	3 617 428	575 319	1.18912	.2474	.1308	9.091

Appendage 7

MASSACHUSETTS COMPENSATION LAW AMENDMENT

Calculation of Primary and Excess Loss Amendment Factors

(1)	Total Losses Old Law (2)	Amendment Factors Indemnity (3)	Ratio Indemnity Total (4)	A Indemnity Plus Medical by Type (2)/(4) (5)	Amendment in Terms of Ind. & Med. by Type 1.+[(3)-1.]x(4) (6)	Basic Ratio (from Chart) ΔAp/ΔA (7)	"D" Ratio (8)
Fatal	1 719 899	1.043	.952	1 807 000	1.041	.118	.280
		1.275			1.262	.035	.280
		1.318					
P. T.	299 375	1.286	.802	373 000	1.229	.000	.080
Major	2 730 841	1.427	.784	3 483 000	1.335	.060	.361
Minor	785 463	1.380	.724	1 085 000	1.275	.674	.896
Temp.	6 577 726	1.278	.644	10 214 000	1.179	.738	.870
Medical	7 453 382	1.000	Non Comp.	2 604 686	-	-	-
Total	19 566 686	(1.207)	(.617)	19 566 686			.7286

(1)	Ap Primary Losses (5)x(8) (9)	Δ A Increase in Total Losses (5)x[(6)-1.] (10)	Δ Ap Increase in Primary (7)x(10) (11)	Δ Ap/Ap Basic Ratio (11)/(9) (12)	Primary Amendment Factors Applied to Ap 1.+(12) (13)	Primary Amendment Factors Applied to A (13)x(8) (14)
Fatal	505 960	74 087	8 742			
		473 434	16 570			
		547 521	25 312	.050	1.050	.294
P. T.	29 840	85 417	0	0	1.000	.080
Major	1 257 363	1 166 805	70 008	.056	1.056	.381
Minor	972 160	298 375	201 105	.207	1.207	1.081
Temp.	8 886 180	1 828 306	1 349 290	.152	1.152	1.002
Non Comp. Medical	2 604 686	-	-	-	-	-
Total	14 256 189	3 926 424	1 645 715	.115	1.115	.8124

(1)	Ae Excess Losses (5)-(9) (15)	Δ Ae Increase in Excess Losses (10)-(11) (16)	Δ Ae/Ae Basic Ratio (16)/(15) (17)	Excess Amendment Factors Applied to Ae 1.+(17) (18)	Excess Amendment Factors Applied to A (18)x[1.-(8)] (19)
Fatal	1 301 040	522 209	.401	1.401	1.009
P. T.	343 160	85 417	.249	1.249	1.149
Major	2 225 637	1 096 797	.493	1.493	.954
Minor	112 840	97 270	.862	1.862	.194
Temp.	1 327 820	479 016	.361	1.361	.177
Non Comp. Medical	-	-	-	-	
Total	5 310 497	2 280 709	.429	1.429	.3878

Appendage 8

1946 MASSACHUSETTS COMPENSATION LAW AMENDMENT

Calculation of Primary and Excess Loss Amendment Factors

Type of Injury	1942-43 Losses on 1945 Level	1946 Amendment Factor	Ratio Indemnity Total	A Indemnity and Medical by Type	Amendment in Terms of Ind. & Med. by Type	Basic Ratio $\triangle A_p/\triangle A$	"D" Ratio
(1)	(2)	(3)	(4)	(2)/(4) (5)	1.+ (3)-1. x(4) (6)	(7)	(8)
Fatal	2 535 731	1.000	.963	2 633 000	1.000	-	.226
P. T.	335 552	1.086	.839	400 000	1.072	.000	.065
Major	4 600 766	1.274)	.838	5 490 000	1.230)	.033)	.285)
		1.070)			1.059)	.016)	.285)
Minor	1 053 589	1.087	.784	1 344 000	1.068	.622	.848
Temp.	9 480 263	1.089	.698	13 582 000	1.062	.731	.850
Medical	7 736 092	1.000	Non Comp.	2 292 993	-	-	-
Total	25 741 993	1.099		25 741 993			.667

(1)	A_p Primary Losses (5)x(8) (9)	$\triangle A$ Increase in Total Losses (5)x[(6)-1.] (10)	$\triangle A_p$ Increase in Primary (7)x(10) (11)	$\triangle A_p/A_p$ Basic Ratio (11)/(9) (12)	Primary Amendment Factors Applied to A_p 1.+(12) (13)	A (13)x(8) (14)
Fatal	595 058	0	-	-	1.000	.226
P. T.	26 000	28 800	0	-	1.000	.065
Major	1 564 650	1 262 700)	41 669)	.030	1.030	.294
		323 910)	5 182)			
Minor	1 139 712	91 392	56 846	.050	1.050	.890
Temp.	11 544 700	842 084	615 563	.053	1.053	.895
Non Comp. Medical	2 292 993	-	-	-	-	-
Total	17 163 113	2 548 886	719 260	.042	1.042	.695

(1)	A_e Excess Losses (5)-(9) (15)	$\triangle A_e$ Increase in Excess Losses (10)-(11) (16)	$\triangle A_e/A_e$ Basic Ratio (16)/(15) (17)	Excess Amendment Factors Applied to A_e 1.+(17) (18)	A (18)x[1.-(8)] (19)
Fatal	2 037 942	-	-	1.000	.774
P. T.	374 000	28 800	.077	1.077	1.007
Major	3 925 350	1 539 759	.392	1.392	.995
Minor	204 288	34 546	.169	1.169	.178
Temp.	2 037 300	226 521	.111	1.111	.167
Non Comp. Medical	-	-	-	-	-
Total	8 578 880	1 829 626	.213	1.213	.404

Appendage 9

PRIMARY-EXCESS

DEVELOPMENT FACTORS

Loss Ratios Policy Years 1933-1942

Policy Year	First Report Total	Fourth Report Total
1933	51.6	53.8
1934	48.2	50.0
1935	47.6	49.1
1936	45.1	46.8
1937	46.0	47.9
1938	50.0	51.4
1939	49.9	50.1*
1940	49.4	50.0*
1941	47.9	49.1*
1942	47.6	50.1*
10 Year Average	48.3	49.8

Indicated 10 Year Development

$$\frac{49.8}{48.3} = 1.031$$

*Third Report

Development of Primary Losses

Policy Year	1st - 2nd	2nd - 3rd	1st - 3rd
1941	.998		
1940	.994	.997	
1939	.995	.999	
Average	.996	x .998	= .994

DEVELOPMENT AND LAW AMENDMENT FACTORS

Policy Years 1943-1944

MASSACHUSETTS TOTAL CLASSIFICATION EXPERIENCE SCHEDULE "Z"

Policy Year	Payroll	Premium	Losses	Primary Losses	Excess Losses
1943	2 346 455 996	21 407 628	10 934 733	7 844 539	3 090 194
1944	2 346 486 429	21 040 220	11 121 318	7 893 218	3 228 100
Total	4 692 942 425	42 447 848	22 056 051	15 737 757	6 318 294
TOTAL EXCLUDED EXPERIENCE (Standard Exclusions plus new catastrophe $ 25,000 case handling)					
1943	17 938 323	860 254	350 117	187 241	162 876
1944	16 010 319	766 304	268 363	164 493	103 870
Total	33 948 642	1 626 558	618 480	351 734	266 746
DEVELOPMENT FACTORS					
1943			10 584 616	7 657 298	2 927 318
1944			10 852 955	7 728 725	3 124 230
Total			21 437 571	15 386 023	(b) 6 051 548
Development Factor			1.031	.994	(a)÷(b) 1.125
			22 102 136	15 293 707	= (a) 6 808 429

LAW AMENDMENT FACTORS

Policy Year	PRIMARY Eff. 9-1-43	Eff. 11-1-45	Eff. 9-1-46	Portion Applicable to 1944		EXCESS Eff. 9-1-43	Eff. 11-1-45	Eff. 9-1-46	Portion Applicable to 1944	
1943	1.000 x	1.115 x	1.042		= 1.162	1.016 x	1.429 x	1.213		= 1.761
1944 Prior 11-1-45		1.115 x	1.042 x	.986	= 1.146		1.429 x	1.213 x	.986	= 1.709
1944 After 11-1-45		1.000 x	1.042 x	.014	= .015		1.000 x	1.213 x	.014	= .017
					1.161					1.726

COMBINED FACTORS

Policy Year	PRIMARY Development	Law Amendment		EXCESS Development	Law Amendment	
1943	.994 x	1.162	= 1.155	1.125 x	1.761	= 1.981
1944	.994 x	1.161	= 1.154	1.125 x	1.726	= 1.942

Appendage 9

PRIMARY-EXCESS

CONVERSION OF 1943-1944 LOSSES TO RATE LEVEL

Policy Year 1943

	PRIMARY			EXCESS		
	Losses	Combined Factor	Losses at Rate Level	Losses	Combined Factor	Losses at Rate Level
Manufacturing	4 820 894	1.155	5 568 133	1 659 035	1.981	3 286 548
Construction & Erection	539 330		622 926	335 620		664 863
Commercial & Clerical	1 009 647		1 166 142	358 781		710 745
Care, Custody	462 746		534 472	200 262		396 719
All Other	749 202		865 328	348 209		689 802
Stevedoring	75 479		87 178	25 411		50 339
Total	7 657 298		8 844 179	2 927 318		5 799 016

Policy Year 1944

Manufacturing	4 772 531	1.154	5 507 501	1 667 587	1.942	3 238 454
Construction & Erection	601 919		694 615	418 300		812 339
Commercial & Clerical	1 023 716		1 181 368	390 277		757 918
Care, Custody	534 525		616 842	205 986		400 025
All Other	741 249		855 401	404 428		785 399
Stevedoring	54 785		63 222	37 652		73 120
Total	7 728 725		8 918 949	3 124 230		6 067 255

Appendage 9

PRIMARY-EXCESS

CONVERSION OF 1943-1944 LOSSES TO RATE LEVEL

Policy Years 1943-1944

	PRIMARY		EXCESS	
	(1) Losses	(2) Losses at Rate Level	(3) Losses	(4) Losses at Rate Level
Manufacturing	9 593 425	11 075 634	3 326 622	6 525 002
Construction & Erection	1 141 249	1 317 541	753 920	1 477 202
Commercial & Clerical	2 033 363	2 347 510	749 058	1 468 663
Care, Custody	997 271	1 151 314	406 248	796 744
All Other	1 490 451	1 720 729	752 637	1 475 201
Stevedoring	130 264	150 400	63 063	123 459
Total	15 386 023	17 763 128	6 051 548	11 866 271

	TOTAL		
	(5) Losses (1)+(3)	(6) Losses at Rate Level (2)+(4)	(7) Combined Factor (6)÷(5)
Manufacturing	12 920 047	17 600 636	1.362
Construction & Erection	1 895 169	2 794 743	1.475
Commercial & Clerical	2 782 421	3 816 173	1.372
Care, Custody	1 403 519	1 948 058	1.388
All Other	2 243 088	3 195 930	1.425
Stevedoring	193 327	273 859	1.417
Total	21 437 571	29 629 399	1.382

Appendage 9

PRIMARY-EXCESS

RATE LEVEL INDEX NUMBERS

Policy Years 1943-1944

	Payroll	PRIMARY Losses (Actual ÷ Expected)	PRIMARY 1943-44 Index Nos.*	EXCESS Losses (Actual ÷ Expected)	EXCESS 1943-44 Index Nos.*	TOTAL Losses (Actual ÷ Expected)	TOTAL 1943-44 Index Nos.*
Manufacturing	2 511 526 451	11 075 634 / 11 829 968	.936	6 525 002 / 3 596 785	1.814	17 600 636 / 15 426 753	1.141
Construction & Erection	140 811 689	1 317 541 / 1 905 793	.691	1 477 202 / 1 104 540	1.337	2 794 743 / 3 010 333	.928
Commercial & Clerical	1 478 725 980	2 347 510 / 2 652 018	.885	1 468 663 / 951 036	1.544	3 816 173 / 3 603 054	1.059
Care, Custody	234 900 023	1 151 314 / 1 361 787	.845	796 744 / 490 331	1.625	1 948 058 / 1 852 118	1.052
All Other	264 925 000	1 720 729 / 1 938 250	.888	1 475 201 / 799 616	1.845	3 195 930 / 2 737 866	1.167
Stevedoring	28 314 114	150 400 / 273 709	.549	123 459 / 131 192	.941	273 859 / 404 901	.676
Total	4 659 203 257	17 763 128 / 19 961 525	.890	11 866 271 / 7 073 500	1.678	29 629 399 / 27 035 025	1.096

*8-31-46 rate index numbers = 1.000

Appendage 9

PRIMARY-EXCESS

CALCULATION OF RATE LEVEL FACTORS

Policy Year 1942

		PRIMARY				EXCESS			
	(1) Payroll	(2) Losses (Actual ÷ Expected)	(3) Index Nos.	(4) 43-44 Index Nos.	(5) Rate Level Factor (4)÷(3)	(6) Losses (Actual ÷ Expected)	(7) Index Nos.	(8) 43-44 Index Nos.	(9) Rate Level Factor (8)÷(7)
Manufacturing	1 207 259 746	4 529 075 / 5 625 016	.805	.936	1.163	1 457 122 / 1 715 149	.850	1.814	2.134
Construction and Erection	83 536 526	731 251 / 1 264 478	.578	.691	1.196	524 652 / 726 978	.722	1.337	1.852
Commercial and Clerical	650 741 273	919 967 / 1 124 381	.818	.885	1.082	373 655 / 410 264	.911	1.544	1.695
Care, Custody	86 955 427	423 140 / 511 222	.828	.845	1.021	173 549 / 187 147	.927	1.625	1.753
All Other	115 051 312	711 537 / 877 225	.811	.888	1.095	348 019 / 367 408	.947	1.845	1.948
Stevedoring	7 780 985	48 107 / 75 351	.638	.549	.861	17 230 / 35 936	.479	.941	1.965
Total	2 151 325 269	7 363 077 / 9 477 673	.777	.890	1.145	2 894 227 / 3 442 882	.841	1.678	1.995

Appendage 9

PRIMARY-EXCESS

CALCULATION OF RATE LEVEL FACTORS

Policy Year 1941

		PRIMARY				EXCESS			
	(1) Payroll	(2) Losses (Actual ÷ Expected)	(3) Index Nos.	(4) 43-44 Index Nos.	(5) Rate Level Factor (4)÷(3)	(6) Losses (Actual ÷ Expected)	(7) Index Nos.	(8) 43-44 Index Nos.	(9) Rate Level Factor (8)÷(7)
Manufacturing	930 971 017	3 787 892 / 4 449 416	.851	.936	1.100	1 094 476 / 1 355 575	.807	1.814	2.248
Construction and Erection	89 695 824	942 285 / 1 351 906	.697	.691	.991	584 514 / 785 428	.744	1.337	1.797
Commercial and Clerical	608 176 020	926 878 / 1 089 655	.851	.885	1.040	350 210 / 396 512	.883	1.544	1.749
Care, Custody	76 746 842	384 424 / 454 788	.845	.845	1.000	99 373 / 166 705	.596	1.625	2.727
All Other	101 286 147	618 003 / 770 004	.803	.888	1.106	300 054 / 329 414	.911	1.845	2.025
Stevedoring	5 378 117	36 885 / 49 124	.751	.549	.731	11 286 / 23 644	.477	.941	1.973
Total	1 812 253 967	6 696 367 / 8 164 893	.820	.890	1.085	2 439 913 / 3 057 278	.798	1.678	2.103

Appendage 9

PRIMARY-EXCESS

CALCULATION OF RATE LEVEL FACTORS

Policy Year 1940

		PRIMARY				EXCESS			
	(1) Payroll	(2) Losses (Actual ÷ Expected)	(3) Index Nos.	(4) 43-44 Index Nos.	(5) Rate Level Factor (4)÷(3)	(6) Losses (Actual ÷ Expected)	(7) Index Nos.	(8) 43-44 Index Nos.	(9) Rate Level Factor (8)÷(7)
Manufacturing	657 782 429	2 608 173 / 3 158 932	.826	.936	1.133	738 835 / 966 812	.764	1.814	2.374
Construction and Erection	76 505 377	898 082 / 1 131 199	.794	.691	.870	505 531 / 635 018	.796	1.337	1.680
Commercial and Clerical	547 364 057	885 669 / 948 558	.934	.885	.948	317 793 / 346 814	.916	1.544	1.686
Care, Custody	69 514 378	368 055 / 412 514	.892	.845	.947	143 593 / 151 973	.945	1.625	1.720
All Other	84 170 876	532 227 / 607 770	.876	.888	1.014	333 962 / 268 794	1.242	1.845	1.486
Stevedoring	5 122 708	42 987 / 46 402	.926	.549	.593	14 233 / 22 088	.644	.941	1.461
Total	1 440 459 825	5 335 193 / 6 305 375	.846	.890	1.052	2 053 947 / 2 391 499	.859	1.678	1.953

Appendage 9

PRIMARY-EXCESS

CALCULATION OF RATE LEVEL FACTORS

Policy Year 1939

		PRIMARY				EXCESS			
	(1) Payroll	(2) Losses (Actual ÷ Expected)	(3) Index Nos.	(4) 43-44 Index Nos.	(5) Rate Level Factor (4)÷(3)	(6) Losses (Actual ÷ Expected)	(7) Index Nos.	(8) 43-44 Index Nos.	(9) Rate Level Factor (8)÷(7)
Manufacturing	544 338 281	2 244 200 / 2 615 948	.858	.936	1.091	784 018 / 797 759	.983	1.814	1.845
Construction and Erection	53 289 511	765 959 / 775 203	.988	.691	.699	466 391 / 447 594	1.042	1.337	1.283
Commercial and Clerical	510 968 489	829 159 / 876 385	.946	.885	.936	224 617 / 321 572	.698	1.544	2.212
Care, Custody	67 518 367	350 634 / 398 676	.879	.845	.961	120 678 / 147 568	.818	1.625	1.987
All Other	79 498 900	508 466 / 553 596	.918	.888	.967	213 169 / 246 258	.866	1.845	2.130
Stevedoring	4 627 849	36 651 / 42 010	.872	.549	.630	11 465 / 19 998	.573	.941	1.642
Total	1 260 241 397	4 735 069 / 5 261 818	.900	.890	.989	1 820 338 / 1 980 749	.919	1.678	1.826

Appendage 9

PRIMARY-EXCESS

CALCULATION OF RATE LEVEL FACTORS

Policy Years 1935-1938

TOTAL

	(1) Payroll	(2) Losses (Actual ÷ Expected)	(3) Index Nos.	(4) 1943-44 Index Nos.	(5) Rate Level Factor (4)÷(3)
Manufacturing	1 989 495 262	11 935 285 / 12 355 606	.966	1.141	1.181
Construction & Erection	193 577 421	4 947 002 / 4 464 600	1.108	.928	.838
Commercial & Clerical	1 847 044 879	4 364 090 / 4 169 094	1.047	1.059	1.011
Care, Custody	246 557 354	1 840 653 / 1 988 253	.926	1.052	1.136
All Other	294 955 806	2 963 550 / 2 890 775	1.025	1.167	1.139
Stevedoring	15 432 595	245 689 / 208 804	1.177	.676	.574
Total	4 587 063 317	26 296 269 / 26 077 132	1.008	1.096	1.087