

**TRANSACTIONS OF SOCIETY OF ACTUARIES
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**ACTUARIAL NOTE: SOME $3\frac{1}{2}\%$ COMMUTATION
COLUMNS *a*-1949 TABLE**

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THE interest rate for Canadian Government Annuities is loosely tied to the yield on government bonds. In consequence, the annuity rate was moved up from 3% to $3\frac{1}{2}\%$ in April 1952. The mortality basis is the *a(f)* & *a(m)* Tables¹ rated down three years, which is not entirely satisfactory. As I wished to have a comparison with the premiums produced by the *a*-1949 Table with and without projection, I had the required $3\frac{1}{2}\%$ commutation columns worked. It seemed desirable to use the same standard of accuracy as was used for the published book so that resulting values would be strictly comparable to values at other rates of interest.

The Committee which produced the book of actuarial functions gave me a copy of "Instructions as to Formulas, Decimals, Significant Figures, etc." issued to companies working values for publication, together with the values of f_x . These instructions were followed. The work was done by one operator and checked by another operator on a different calculating machine. Only the D, N, H and J columns were worked. The F and G columns, being independent of interest, are in the book. Other columns were not required.

These columns have already had some distribution by reason of an offer made in the Reports of the Canadian Association of Actuaries. With the continuing rise in the yield on new investments, it may be that the figures are now of wider interest, whether for direct use or for testing purposes, as an extension of the book. In Canada at least, there is an upward trend in the interest rate for nonguaranteed group annuity premiums. A rate of $3\frac{1}{2}\%$ is permissible in Canada for valuation; and the return on trustee securities is somewhat higher than in the United States.

¹ The *a(f)* and *a(m)* Tables, published in 1924 by The Institute of Actuaries and The Faculty of Actuaries in Scotland, are forecast tables based on experience under immediate annuities issued by insurance companies to lives resident in Britain. The mortality rates have turned out to be too high. Compared with the *a*-1949 Table, the proportionate difference in mortality rates decreases as age increases.

a-1949 TABLE COMMUTATION COLUMNS
(H & J on Projection Scale B)
3½% INTEREST—MALE

Age <i>x</i>	<i>D_x</i>	<i>N_x</i>	<i>H_x</i>	<i>J_x</i>
10.	708. 9188	18318. 1570	10. 7691	430. 2924
11.	684. 6149	17609. 2382	10. 6627	419. 6297
12.	661. 1382	16924. 6233	10. 5586	409. 0711
13.	638. 4602	16263. 4851	10. 4565	398. 6146
14.	616. 5540	15625. 0249	10. 3564	388. 2582
15.	595. 3921	15008. 4709	10. 2580	378. 0002
16.	574. 9491	14413. 0788	10. 1612	367. 8390
17.	555. 2004	13838. 1297	10. 0658	357. 7732
18.	536. 1212	13282. 9293	9. 9716	347. 8016
19.	517. 6891	12746. 8081	9. 8785	337. 9231
20.	499. 8811	12229. 1190	9. 7863	328. 1368
21.	482. 6755	11729. 2379	9. 6948	318. 4420
22.	466. 0509	11246. 5624	9. 6036	308. 8384
23.	449. 9873	10780. 5115	9. 5127	299. 3257
24.	434. 4651	10330. 5242	9. 4220	289. 9037
25.	419. 4654	9896. 0591	9. 3313	280. 5724
26.	404. 9693	9476. 5937	9. 2403	271. 3321
27.	390. 9593	9071. 6244	9. 1488	262. 1833
28.	377. 4177	8680. 6651	9. 0566	253. 1267
29.	364. 3281	8303. 2474	8. 9635	244. 1632
30.	351. 6745	7938. 9193	8. 8694	235. 2938
31.	339. 4409	7587. 2448	8. 7741	226. 5197
32.	327. 6123	7247. 8039	8. 6773	217. 8424
33.	316. 1741	6920. 1916	8. 5789	209. 2635
34.	205. 1117	6604. 0175	8. 4786	200. 7849
35.	294. 4115	6298. 9058	8. 3763	192. 4086
36.	284. 0599	6004. 4943	8. 2718	184. 1368
37.	274. 0440	5720. 4344	8. 1648	175. 9720
38.	264. 3513	5446. 3904	8. 0552	167. 9168
39.	254. 9693	5182. 0391	7. 9427	159. 9741
40.	245. 8860	4927. 0698	7. 8272	152. 1469
41.	237. 0899	4681. 1838	7. 7085	144. 4384
42.	228. 5638	4444. 0939	7. 5849	136. 8535
43.	220. 2867	4215. 5301	7. 4538	129. 3997
44.	212. 2406	3995. 2434	7. 3134	122. 0863
45.	204. 4098	3783. 0028	7. 1622	114. 9241
46.	196. 7815	3578. 5930	6. 9995	107. 9246
47.	189. 3445	3381. 8115	6. 8248	101. 0998
48.	182. 0896	3192. 4670	6. 6381	94. 4617
49.	175. 0090	3010. 3774	6. 4397	88. 0220
50.	168. 0966	2835. 3684	6. 2301	81. 7919
51.	161. 3472	2667. 2718	6. 0100	75. 7819
52.	154. 7566	2505. 9246	5. 7822	69. 9997
53.	148. 3214	2351. 1680	5. 5460	64. 4537
54.	142. 0389	2202. 8466	5. 3043	59. 1494
55.	135. 9069	2060. 8077	5. 0565	54. 0929
56.	129. 9237	1924. 9008	4. 8057	49. 2872
57.	124. 0877	1794. 9771	4. 5511	44. 7361
58.	118. 3977	1670. 8894	4. 2960	40. 4401
59.	112. 8523	1552. 4917	4. 0394	36. 4007

a-1949 TABLE COMMUTATION COLUMNS—Continued
 (H & J on Projection Scale B)
 3½% INTEREST—MALE

Age <i>x</i>	<i>D_x</i>	<i>N_x</i>	<i>H_x</i>	<i>J_x</i>
60	107.4504	1439.6394	3.7845	32.6162
61	102.1909	1332.1890	3.5301	29.0861
62	97.06957	1229.99811	3.2811	25.8050
63	92.08020	1132.92854	3.0375	22.7675
64	87.21676	1040.84834	2.7995	19.9680
65	82.47394	953.63158	2.5672	17.4008
66	77.84695	871.15764	2.3409	15.0599
67	73.33183	793.31069	2.1230	12.9369
68	68.92533	719.97886	1.9137	11.0232
69	64.62485	651.05353	1.7133	9.3099
70	60.42879	586.42868	1.5221	7.7878
71	56.33645	525.99989	1.3404	6.4474
72	52.34815	469.66344	1.1703	5.2771
73	48.46524	417.31529	1.0120	4.2651
74	44.69010	368.85005	.8657	3.3994
75	41.02629	324.15995	.7313	2.6681
76	37.47856	283.13366	.6089	2.0592
77	34.05266	245.65510	.4999	1.5593
78	30.75544	211.60244	.4039	1.1554
79	27.59467	180.84700	.3205	.8349
80	24.57891	153.25233	.2491	.5858
81	21.71723	128.67342	.1889	.3969
82	19.01899	106.95619	.1392	.2577
83	16.49335	87.93720	.0991	.1586
84	14.14902	71.44385	.0675	.0911
85	11.99360	57.29483	.0435	.0476
86	10.03316	45.30123	.0259	.0217
87	8.271695	35.268070	.0138	.0079
88	6.710601	26.996375	.0061	.0018
89	5.348223	20.285774	.0018	.0000
90	4.179620	14.937551		
91	3.196359	10.757931		
92	2.386639	7.561572		
93	1.735601	5.174933		
94	1.225888	3.439332		
95	.8384385	2.2134445		
96	.5534228	1.3750060		
97	.3512380	.8215832		
98	.2134668	.4703452		
99	.1236763	.2568784		
100	.06796830	.13320208		
101	.03523747	.06523378		
102	.01712949	.02999631		
103	.00775562	.01286682		
104	.00324644	.00511120		
105	.00124615	.00186476		
106	.00043470	.00061861		
107	.00013644	.00018391		
108	.00003811	.00004747		
109	.00000936	.00000936		

a-1949 TABLE COMMUTATION COLUMNS
(H & J on Projection Scale B)
3½% INTEREST—FEMALE

Age <i>x</i>	<i>D_x</i>	<i>N_x</i>	<i>H_x</i>	<i>J_x</i>
10.....	708.9188	18798.1453	7.3005	310.3737
11.....	684.8149	18089.2265	7.2573	303.1164
12.....	661.5192	17404.4116	7.2120	295.9044
13.....	639.0053	16742.8924	7.1649	288.7395
14.....	617.2470	16103.8871	7.1162	281.6233
15.....	596.2188	15486.6401	7.0659	274.5574
16.....	575.8967	14890.4213	7.0141	267.5433
17.....	556.2572	14314.5246	6.9611	260.5822
18.....	537.2772	13758.2674	6.9069	253.6753
19.....	518.9351	13220.9902	6.8517	246.8236
20.....	501.2091	12702.0551	6.7955	240.0281
21.....	484.0779	12200.8460	6.7381	233.2900
22.....	467.5219	11716.7681	6.6798	226.6102
23.....	451.5218	11249.2462	6.6206	219.9896
24.....	436.0584	10797.7244	6.5604	213.4292
25.....	421.1132	10361.6660	6.4991	206.9301
26.....	406.6689	9940.5528	6.4368	200.4933
27.....	392.7081	9533.8839	6.3735	194.1198
28.....	379.2145	9141.1758	6.3091	187.8107
29.....	366.1718	8761.9613	6.2436	181.5671
30.....	353.5641	8395.7895	6.1768	175.3903
31.....	341.3765	8042.2254	6.1087	169.2816
32.....	329.5946	7700.8489	6.0392	163.2424
33.....	318.2037	7371.2543	5.9682	157.2742
34.....	307.1905	7053.0506	5.8957	151.3785
35.....	296.5415	6745.8601	5.8215	145.5570
36.....	286.2436	6449.3186	5.7455	139.8115
37.....	276.2845	6163.0750	5.6676	134.1439
38.....	266.6519	5886.7905	5.5877	128.5562
39.....	257.3341	5620.1386	5.5056	123.0506
40.....	248.3197	5362.8045	5.4213	117.6293
41.....	239.5973	5114.4848	5.3346	112.2947
42.....	231.1561	4874.8875	5.2453	107.0494
43.....	222.9856	4643.7314	5.1533	101.8961
44.....	215.0756	4420.7458	5.0584	96.8377
45.....	207.4162	4205.6702	4.9605	91.8772
46.....	199.9975	3998.2540	4.8594	87.0178
47.....	192.8100	3798.2565	4.7549	82.2629
48.....	185.8445	3605.4465	4.6469	77.6160
49.....	179.0918	3419.6020	4.5352	73.0808
50.....	172.5434	3240.5102	4.4196	68.6612
51.....	166.1902	3067.9668	4.3000	64.3612
52.....	160.0306	2901.7766	4.1787	60.1825
53.....	154.0558	2741.7460	4.0544	56.1281
54.....	148.2573	2587.6902	3.9280	52.2001
55.....	142.6263	2439.4329	3.7981	48.4020
56.....	137.1548	2296.8066	3.6656	44.7364
57.....	131.8348	2159.6518	3.5293	41.2071
58.....	126.6582	2027.8170	3.3901	37.8170
59.....	121.6172	1901.1588	3.2467	34.5703

a-1949 TABLE COMMUTATION COLUMNS—Continued

(H & J on Projection Scale B)

3½% INTEREST—FEMALE

Age <i>x</i>	<i>D_x</i>	<i>N_x</i>	<i>H_x</i>	<i>J_x</i>
60	116.7042	1779.5416	3.1002	51.4701
61	111.9115	1662.8374	2.9493	28.5208
62	107.2320	1550.9259	2.7965	25.7243
63	102.6584	1443.6939	2.6420	23.0823
64	98.18389	1341.03548	2.4858	20.5965
65	93.80167	1242.85159	2.3282	18.2683
66	89.50524	1149.04992	2.1694	16.0989
67	85.28868	1059.54468	2.0112	14.0877
68	81.14604	974.25600	1.8541	12.2336
69	77.07203	893.10996	1.6985	10.5351
70	73.06184	816.03793	1.5448	8.9903
71	69.11127	742.97609	1.3937	7.5966
72	65.21693	673.86482	1.2473	6.3493
73	61.37612	608.64789	1.1062	5.2431
74	57.58729	547.27177	.9711	4.2720
75	53.84991	489.68448	.8425	3.4295
76	50.16475	435.83457	.7210	2.7085
77	46.53413	385.66982	.6088	2.0997
78	42.96198	339.13569	.5063	1.5934
79	39.45391	296.17371	.4137	1.1797
80	36.01753	256.71980	.3313	.8484
81	32.66234	220.70227	.2591	.5893
82	29.39979	188.03993	.1970	.3923
83	26.24333	158.64014	.1447	.2476
84	23.20805	132.39681	.1018	.1458
85	20.31043	109.18876	.0677	.0781
86	17.56784	88.87833	.0417	.0364
87	14.99786	71.31049	.0229	.0135
88	12.61748	56.31263	.0104	.0031
89	10.44209	43.69515	.0031	.0000
90	8.484425	33.253057		
91	6.753430	24.768632		
92	5.253235	18.015202		
93	3.982311	12.761967		
94	2.933005	8.779656		
95	2.091521	5.846651		
96	1.438496	3.755130		
97	.9501149	2.3166343		
98	.5997435	1.3665194		
99	.3598541	.7667759		
100	.2039988	.4069218		
101	.1085234	.2029230		
102	.05376723	.09439961		
103	.02459905	.04063238		
104	.01029424	.01603333		
105	.00389871	.00573909		
106	.00132044	.00184038		
107	.00039464	.00051994		
108	.00010253	.00012530		
109	.00002277	.00002277		