

INSTRUCTION BOOK

The
GARBUIT-HATCH
CALCULATOR



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BY
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FOREWORD

This calculator is a precision instrument designed, engineered and manufactured to produce results exactly accurate within the limits imposed by the size and character of the device. Unlike other calculators, the GARBUTT-HATCH CALCULATOR goes beyond the point of determining the percentage of earned or return premium and makes possible the determination of a dollar and cents answer.

Like other worthwhile office equipment, this calculator requires practice and use. No typist has ever turned out a letter rapidly and accurately by the "hunt and peck" method, nor is this expected. By the same token, no one will be able to use the GARBUTT-HATCH CALCULATOR rapidly and accurately without taking the time and trouble to master the technique involved. In common with typewriters, comptometers and other time-saving office devices, the calculator will give results proportionate to the time and effort devoted to the mastery of its operation.

The calculator has been manufactured to precise limits of accuracy of one-tenth of one percent. To illustrate: In dealing with an amount or premium of \$10.00 or less, this means that the smallest graduation on any scale of the calculator represents 1c. In dealing with amounts or premiums between \$10.00 and \$100.00, the smallest graduation on the scale represents 10c. The smallest graduation on the scale represents \$1.00 when dealing with amounts or premiums between \$100.00 and \$1,000.00. It must follow then, that the dollars and cents accuracy of the calculator is dependent upon the size of the premium or amount involved. It must also be borne in mind that this accuracy is only to be achieved by careful setting, careful manipulation and exact reading. Interpolation will usually be found possible; that is, if the hair-line of the indicator arm falls between two numbers on the scale, approximation beyond the exact limitations of the calculator will be found practical. For example: If the hair-line falls half way between 246 and 247, this may be read as $246\frac{1}{2}$ or 246.5. More will be said of this later.

Let it be emphasized that study, practice and care in the operation of the calculator will produce the same results that these same attributes achieve elsewhere in business.

THE SCALES AND HOW TO READ THEM

Each scale is marked by a letter or number found immediately to the right of the index line.

SCALE "D"

Scale "D" is designed for use in multiplying and dividing numbers. It is not a conventional scale. By this we mean, first of all, that there is no Zero on this scale. You will note that it runs from 1 to 999, or from 10 to 9990, or from 100 to 99,990, depending upon the placing of the decimal. You will also note that the distance between 1 and 2 on this scale is some nine times greater than the distance between 8 and 9. For this reason, extreme care should be taken in properly setting and reading this scale, bearing constantly in mind the variation in calibration from 1 to 999. Care and practice will readily solve this problem. As with any calculator of this character, the decimal in any calculation must be placed by inspection. The figure "2" may represent .02, .2, 2, 20, 200, etc. If we multiply two by two, we read the figure "4" on the calculator. Obviously, this is the correct answer. If, however, we multiply twenty by twenty, we use the same arm setting as in multiplying 2 by 2, and we still read "4" on the calculator, but in this case, the decimal point must be differently placed to accommodate the multiples used. By inspection, we know that 20×20 does not equal "4"—nor does it equal "4000;" hence, it must be "400."

By the same line of reasoning, two multiplied by three is obviously "6." Two times thirty, using the same scale settings, also reads "6" but the decimal must be placed to show the answer as "60" rather than "6" or "600."

SCALE "P"

This scale represents a circle divided into 1000 parts. It is numbered from 1 to 100 with intermediate divisions of tenths between the printed numbers. It is used primarily in connection with the date, or calendar scales, "1," "3" and "5," and represents percentages. It is a conventional scale, reading to the nearest tenth of one percent. Intermediate readings may, of course, be estimated.

SCALE "5"

This scale is a circle divided into the months and days comprising a five year cycle. In other words, in this circular scale are shown sixty months with the days of each month being indicated by subdivisions. This scale is for use in connection with the cancellation or endorsement, pro-rate, of five year policies. It may be also used in connection with the determination of elapsed time for the computation of short rate on three and five year policies.

On the inner edge of Scale "5," numbered blocks have been drawn, each representing one month. This inner block scale is designed for use in determining elapsed time in connection with the short rate cancellation or endorsement of term policies. More will be said of this in connection with "Endorsement and Cancellation of Term Policies, Short Rate."

SCALE "3"

This scale has been divided into 36 parts, representing the months in a three year cycle, each of them being subdivided into days. This scale is for use in connection with the pro-rate endorsement or cancellation of three year term policies.

SCALE "1"

This circular scale is divided into 12 major parts, each of these being subdivided into the days of the month. It is used in connection with the pro-rate or short rate endorsement or cancellation of annual contracts. On the inner edge of Scale "1" a numbered box scale will be found. This scale is designed as a direct reading calculator of annual short rate percentages conforming to the rules of the Western Underwriters Association. More will be said of this under the section devoted to endorsement and cancellation of annual policies, short rate.

"DAY SCALE"

In addition to the foregoing scales, an inner scale, printed in red, has been provided for use in conjunction with Scale "1" to determine the number of days between any two given dates. This scale will be found useful in determining exact pro-rate

percentages from precision tables and for use in connection with annual short rate tables other than W. U. A.

Note: Experience has indicated a certain amount of difficulty in the continuous identification of any one scale in a multiple scale circular calculator. To aid the user in this respect, the GARBUTT-HATCH CALCULATOR has been printed in red and black. If the user is computing an endorsement or cancellation of a three year policy, using Scale "3," he must only note that the lettering in Scale "3" is in red ink, whereas the lettering in Scales "1" and "5," on either side of Scale "3," is in black ink. Normal care should insure against confusion of scales in reading results on this calculator.

ARM MECHANISM

The calculator may only be used by means of the arm mechanism built into it. This consists of two arms labeled "A" and "B." Arm "B" is longer than Arm "A" and projects somewhat beyond the edge of the calculator disc. Either arm may be moved independently of the other, but in using the calculator, it will *always* be necessary to move both arms at the same time without disturbing the angular distance between them. This may be accomplished—and *may only be accomplished*—by releasing the shorter arm—Arm "A"—and then moving Arm "B." It will be noted that when Arm "B," the longer arm, is moved, Arm "A," the shorter arm, will also be moved and that the angular distance set between the arms will be maintained. THIS IS A BASIC PRINCIPLE OF THIS CALCULATOR AND MUST BE CONSTANTLY BORNE IN MIND. Whenever the instructions direct the movement of both arms, this must be accomplished by moving the longer arm, Arm "B," without interference with the free motion of the shorter arm, Arm "A." If the angular distance between the arms is disturbed during this operation, resetting of the distance is necessary—otherwise, the results of any computation will be seriously erroneous.

The need for care in setting and reading the hair-lines on the arms of this calculator must be emphasized. In this connection, attention is directed to the fact that the arms should be

held firmly against the face of the calculator when any setting is made or reading is taken. Errors will result from settings or readings made if the arms are held above the surface of the calculator.

The tension on the arm mechanism has been adjusted at the factory. *Do not loosen the screw holding the arms.*

DETAILED INSTRUCTIONS FOR THE USE OF THE CALCULATOR

TERM RATES

As this process involves multiplication, Scale "D" must be used, following this procedure: Holding Arm "A" on the Index, set the hair-line on Arm "B" exactly over the required term multiple, that is, (in W.U.A. territory) 1.75 for two years; 2.5 for three years; 3.25 for four years; and 4 for five years. (NOTE: Small red figures in the "D" Scale, written in parentheses, have been placed on these settings for the convenience of the user. Appropriate settings should be used for term multiples in other jurisdictions.) Next, grasp Arm "B," and without interfering with the movement of Arm "A," move both arms until the hair-line on Arm "A" is exactly over the annual rate, using Scale "D." The term rate may then be read under the hair-line on Arm "B," still using Scale "D" (numbered in black ink). Example: Find the three year (2.5 for 3) rate when the annual rate is 24c. Holding Arm "A" on the Index, move Arm "B" to 2.5 on Scale "D;" freeing Arm "A" and using Arm "B," move Arm "A" to 24 on Scale "D." Read on Scale "D," under the hair-line on Arm "B." This reading is "6." As the annual rate was 24c, we know that 2½ times that rate cannot be 6c or \$6.00. It must be 60c, the term rate required.

COINSURANCE RATES

Exactly the same procedure should be used in determining coinsurance rates from gross rates, except that the coinsurance credit should be subtracted from 100 to determine the percentage of gross rate which should apply.

Example Gross Rate _____ 30c.

Coinsurance Credit _____ 25%
Determine net coinsurance rate.

Procedure: Subtract the credit of 25% from 100%. This leaves 75%. Hold Arm "A" on the Index and set Arm "B" on 75, using Scale "D." Releasing Arm "A" and using Arm "B," move Arm "A" to "3" on Scale "D." Read under Arm "B" on Scale "D." This reading is .225. We know that 75% of 30c is not .0225. Neither is it 2.25. Being between these two figures, it must be, and is .225—Twenty-two and one half cents.

PREMIUMS

As this also involves multiplication, Scale "D" is still employed.

Example: Rate _____ .225
Amount _____ \$6000.00
Required _____ Premium

Procedure: Hold Arm "A" on the Index. Set Arm "B" on the rate .225 on Scale "D." Releasing Arm "A," move both arms, using Arm "B," to place Arm "A" on the amount "6" on Scale "D." Read under Arm "B," Scale "D," 135. Placing the decimal as in preceding examples, we find the required premium to be \$13.50.

PRO-RATE ENDORSEMENT OR CANCELLATION OF ANNUAL OR TERM POLICIES

This procedure involves the element of time. To determine the time in force, we must use one of the time scales on the calculator. If dealing with a one year policy, use Scale "1;" if a three year policy, use Scale "3;" if a five year policy, use Scale "5." The procedure may be best illustrated by examples.

Example No. 1: A one year policy was written on January 23. It is to be cancelled, pro-rate, on March 12.

Annual Premium _____ \$14.00
Required _____ Return Premium

Procedure: Set Arm "A" on January 23 on Scale "1." Holding Arm "A" in place, set Arm "B" on March 12, also on Scale "1." Releasing Arm "A" and using Arm "B," move Arm "A" back to the Index. Read the per cent of pro-rate earned premium under Arm "B," Scale "P" (red figures) of 13.2%. Now, holding Arm "A" in place, move Arm "B" to 132 on Scale "D." Releasing Arm "A" and using Arm "B," move Arm "A" to the annual premium—\$14.00—on Scale "D," reading the earned premium under Arm "B," Scale "D." It will be noted that the hair-line on Arm "B" does not fall exactly over any line on Scale "D." It is nearest to 185. For all practical purposes, we can accept this answer as \$1.85 earned premium. The actual figure is 1.848. The return premium is, of course, \$14.00 less the earned premium of \$1.85 or 12.15.

NOTE: To arrive at Return Premium, having determined the percentage of earned premium and using the foregoing illustration, we may alternatively use the following procedure:

With Arm "A" on the Index and Arm "B" on 13.2%, Scale "P," we may move both arms, using Arm "B," to place Arm "B" on the Index. Reading in Scale "P" under Arm "A," we find that the return percentage is 86.8%. Now, holding Arm "A" on the Index and placing Arm "B" on 868 on Scale "D" and then moving both arms by the use of Arm "B" to place Arm "A" on 14, we now read the return premium directly under Arm "B," Scale "D," as half way between 121 and 122 or, by interpolation, as 1215 and placing the decimal as \$12.15. This is a short cut and must only be used after determining the earned percentage. Return percentage, pro-rate, may also be determined by computing the distance in time between the date of cancellation and the date of expiration; that

is, by setting Arm "A" on the date of cancellation and Arm "B" on the date of expiration, then following the procedure in our first example, the resultant figure will be Return Premium. DO NOT USE THIS METHOD FOR SHORT RATE.

Example No. 2: Pro-rate endorsement of a three year policy.
Rate increased from 24c to 36c

Amount—\$1200.00.

Increase in rate on September 12 in the second year of a three year policy written March 19.

Required—Pro-rate Additional Premium.

Procedure: Using Scale "3," hold Arm "A" on March 19 in the 1st year; that is, reading clockwise, in the 1st March on Scale "3." Holding this arm in that position, set Arm "B" on September 12 in the 2nd year; that is, the 2nd September reading clockwise from the Index on Scale "3." Using Arm "B," move both arms until Arm "B" is on the Index. The pro-rate percentage for the unexpired term is read on Scale "P" under Arm "A" as 50.5%. Move Arm "A" to the Index. Set Arm "B" on 505, Scale "D." Using Arm "B," move Arm "A" to 12 (representing \$1200.00, the amount of the policy) on Scale "D." Holding Arm "B" in position, move Arm "A" to the Index. Now, using Arm "B," move Arm "A" to the difference in rate (36 minus 24, or 12) on Scale "D." Read the pro-rate additional premium under Arm "B" on Scale "D" of 727, or, placing the decimal point, .727 or 73c.

ENDORSEMENT OR CANCELLATION SHORT RATE OF ANNUAL POLICIES

Again illustrating by example.

Example: A one year policy written June 14 is to be

cancelled short rate on January 12.
Annual Premium—\$64.00.

Procedure:
(W. U. A.)

Holding Arm "A" on June 14, Scale "1," set Arm "B" on January 12, Scale "1." Using Arm "B," move both arms until Arm "A" is on the Index. Read the short rate earned percentage of the premium under Arm "B" in the block scale on the inner edge of Scale "1"—75%. Deducting this from 100%, we find that the return percentage is 25%. Holding Arm "A" on the Index, set Arm "B" on 25 on Scale "D." Using Arm "B," move both arms until Arm "A" is on 64 (representing \$64.00, the amount of the annual premium), on Scale "D." Read the return premium under Arm "B" on Scale "D" of 16 or, placing the decimal, \$16.00.

Procedure:
(Other Territories)

Holding Arm "A" on June 14, Scale "1," set Arm "B" on January 12, Scale "1." Using Arm "B," move both arms until Arm "A" is on the Index. Read the number of days (212) in force under Arm "B" on the inner "Day" Scale (printed in red) and refer to appropriate Short Rate Tables on the reverse side of the Calculator.

SPECIAL INSTRUCTIONS FOR FINDING PERCENT SHORT RATE EARNED PREMIUM TWO, THREE, FOUR, OR FIVE YEAR POLICIES

1. Use Scale "5."
2. Hold Arm "A" on the commencement date of the policy in the first year following Index (clockwise).
3. Holding Arm "A" in place, move Arm "B" clockwise the correct number of years to the cancellation date of the policy.
4. Stillholding Arm "A" in place, move Arm "B" back (counter-clockwise) to the nearest month day corresponding to the

day of month at commencement date, or end of preceding month if same number does not fall in preceding month.

5. Subtract reading under Arm "A" from reading under Arm "B."
6. If cancellation date falls beyond outer mark (the very short extra hair-line) on Arm "B," add One.
7. The result is the number of months the policy has been in force. Refer to Short Rate Tables on reverse side of calculator for percentage earned or to be retained.
8. In Pacific Board Territory, follow the same method, but if cancellation date falls beyond *center* line of Arm "B," add one month to the difference between readings under Arm "A" and Arm "B" and refer to proper Short Rate Tables for percentage earned or to be retained.

Example: Comencement date: March 16, 1945.
 Cancellation date: April 18, 1946.

Procedure: Hold Arm "A" on March 16 (1945). Set Arm "B" on 2nd (clockwise) April 18 (1946), using Scale "5." Holding Arm "A," move Arm "B" back to April 16. Subtract reading under Arm "A" (3) from reading under Arm "B" (16) which is 13—the number of months the policy has been in force.

NOTE: In Pacific Board Territory, one month must be added as cancellation date falls beyond (clockwise) center line of Arm "B," hence time in force equals 14 months.

Example: Commencement date: January 31, 1942.
 Cancellation date: March 20, 1945.

Procedure: Hold Arm "A" on January 31 (1942). Set Arm "B" on 4th (clockwise) March 20 (1945). Holding Arm "A," move Arm "B" back to 28th February (end of preceding month as no 31st occurs in this month). Subtract reading under Arm "A" (1) from reading under Arm "B" (38) which is 37—

but since the date of cancellation falls beyond the outer mark on Arm "B," add One making 38, the number of months the policy has been in force.

INTEREST

This computation also involves the element of time. If we wish to find the amount of interest accruing against a principal amount of \$1700.00 at a rate of 4.2% from December 26 until March 17, we will proceed as follows:

Using Scale "1," set Arm "A" on December 26. Holding this arm in place, set Arm "B" on March 17, Scale "1." Using Arm "B," move both arms until Arm "A" is on the Index. Read under Arm "B," Scale "P," 22.2%. Holding Arm "A" on the Index, set Arm "B" on 222, Scale "D." Using Arm "B," move both arms until Arm "A" is on 42 (the annual rate of interest), Scale "D." Hold Arm "B" in place and move Arm "A" back to the Index. Using Arm "B," move both arms until Arm "A" is on 17 (the amount of principal—\$1700.00) Scale "D." Read accrued interest under Arm "B" on Scale "D" of \$15.84.

BUILDING COST ESTIMATES

Very commonly these estimates are arrived at through the use of cost per cubic foot tables. Let us assume that we have a building 26' wide, 50' long and 14' high, with a cost factor of 52c per cubic foot.

Required: Replacement value of the building.

Procedure: Hold Arm "A" on the Index. Set Arm "B" on 26, Scale "D." Using Arm "B," move both arms until Arm "A" is on 5, Scale "D." Holding Arm "B" in place, move Arm "A" to the Index. Using Arm "B," move both arms until Arm "A" is on 14, Scale "D." Hold Arm "B" in position and move Arm "A" to the Index. Using Arm "B," move both arms until Arm "A" is on 52, Scale "D." Read answer under Arm "B," Scale

"D"—\$9460. Carrying this illustration one step farther, let us reduce this figure for depreciation, assuming 24% depreciation applies. 100% minus 24% equals 76%. Hold Arm "B" in place; that is, on 9460 on Scale "D." Move Arm "A" to the Index. Using Arm "B," move both arms until Arm "A" is on 76, Scale "D." Read the depreciated value of the building under Arm "B," Scale "D"—\$7190.00.

MULTIPLICATION AND DIVISION

We have had a number of examples of multiplication in the preceding instructions and examples. If this process is not clear, however, the following examples should illustrate.

Example: Multiply 13 by 12.

Procedure: Hold Arm "A" on the Index. Set Arm "B" on 13, Scale "D." Using Arm "B," move both arms until Arm "A" is on 12, Scale "D." Read the answer—156—under Arm "B," Scale "D." Now if you want to multiply this answer by, say, 11, hold Arm "B" in place; that is, on 156, Scale "D" and set Arm "A" back to the Index. Then, using Arm "B," move both arms until Arm "A" is on 11, Scale "D." Reading the answer under Arm "B," Scale "D," it will be found slightly more than half way between 1710 and 1720, or 1716.

To divide, we use the reverse of this method.

Example: Divide 14 by 2.

Procedure: Hold Arm "A" on the Index. Set Arm "B" on the divisor; that is, on 2, Scale "D." Using Arm "B," move both arms until Arm "B" is on 14, Scale "D." The answer is read under Arm "A," on Scale "D," being 7.

GARBUTT-HATCH CALCULATOR

Price \$8.00

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