EASY INSTRUCTIONS FOR OPERATING THE

CONTROLLED-KEY

COMPTOMETER

REG. U. S. PAT. OFF.

FELT & TARRANT MFG. CO.

1735 NORTH PAULINA ST.

CHICAGO, ILLINOIS

INTRODUCTION

THE COMPTOMETER is a key-driven adding and calculating machine which performs quickly and easily all forms of arithmetical figuring involving addition, multiplication, division, and subtraction.

On each key top there is a large and small figure. The large figures are used for addition and multiplication, the small figures for division and subtraction. The answer dials show the result of the calculation. The lever at the right,

CORRECTION KEY

CANCELING LEVER

SUBTRACTION CUT-OFF

DECIMAL POINTER

ANSWER DIAL
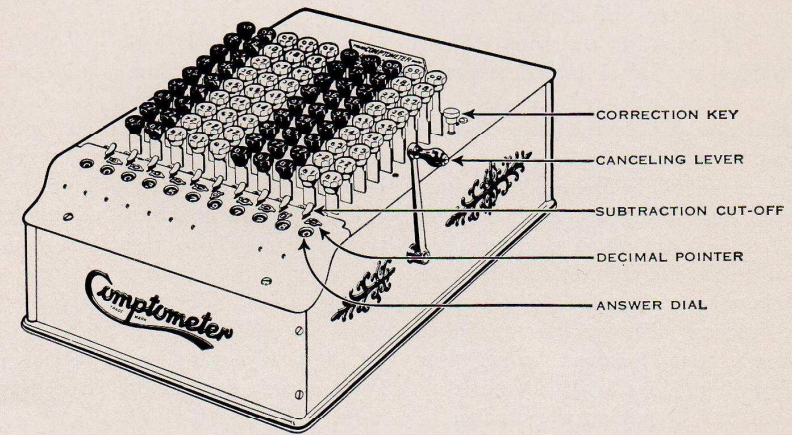
Operation is exceedingly simple—no operating lever to pull, no crank to turn, no preliminary setting of dials. Nothing to do but press the keys and read the answer—the machine does the rest.

The keyboard is arranged in eight or more columns* of nine keys each, which are grouped in alternating sections, colored green and white.

called the canceling lever, clears the answer dials. The numbered pointers are used to point off decimals. The cut-offs at the left of each column are used for subtraction. The red correction key at the upper right-hand corner releases the keyboard after the partial key stroke error has been corrected. See page 5 for proper use of correction key

*The Comptometer is manufactured in three standard sizes: 8, 10, and 12-columns. A 20-column Comptometer is also manufactured for use in heavy statistical and distribution work.

ADDITION

General Instructions

THE two columns of white keys on the right side of the keyboard are for adding units and tens of cents. The next three columns of green keys are for adding units, tens, and hundreds of dollars. The adjoining three columns of white keys are for adding thousands, tens of thousands, and hundreds of thousands, amounts. Keys farther to the left are for adding correspondingly higher denominations.

In addition always use the large figures on the keys.

Only one key should be operated at a time. For example, in adding $3.45, first press down the 3 key in the third column, then the 4 key in the second column and then the 5 key in the first column. No keys are struck for ciphers. Always lift the finger slightly off the key after each stroke. For the first few days go slowly, memorizing the keyboard and acquiring the stroke.

Remember to place the finger on the key desired and press it down until you feel it strike bottom. This push-stroke requires practice. It differs distinctly from the sharp staccato blow of the typewriter It is the easiest known stroke on the finger It eliminates the impact of hitting the key

Full Keyboard Method

Below are six columns of figures to be added. Use only the first and second finger The first finger is to be used for all figures except the right-hand figure which should be added with the second finger

Use the full keyboard, adding each item across from left to right. If you find the keyboard locked it is a positive signal of misoperation. The rule for correcting this error is explained on page 5. For the first few days go slowly Strike only one key on each depression. Speed will come later

No. 1	No. 2	No. 3	No. 4	No. 5	No. 6
41.79	91.59	79.27	42.67	21.25	96.57
18.57	78.25	65.76	58.14	15.96	5.82
21.45	451.35	413.45	87.00	43.21	68.42
4.67	6.47	135.00	45.50	87.65	102.19
432.35	5.60	223.57	235.00	1.92	79.18
14.46	12.35	86.40	57.68	218.19	517.29
5.38	38.00	240.00	68.77	93.15	61.48
432.25	913.50	33.46	433.24	37.92	43.27
165.70	42.34	5.67	700.00	479.99	197.52
540.62	78.16	41.71	307.20	45.55	37.25

Add each column and write down total obtained. Then prove at once by re-adding the column. For practice add each column at least four times. If an error is made it is usually the result of trying to go too fast.

TOUCH METHOD

THE touch method of addition provides the greatest degree of speed and accuracy and is simple and easy to learn. If the Comptometer is used for an hour or more a day the touch method is highly recommended, because it eliminates time spent in looking from the work to the keyboard. Only the lower half of the keyboard is used in touch addition, all keys are within easy reach of the fingers.

To add 6, strike 3 twice
To add 7, strike 3 and 4
To add 8, strike 4 twice
To add 9, strike 4 and 5

Upon examining the keys it will be noticed that the odd-number keys 1, 3, 5, etc., are concave. The even keys 2, 4, etc., are flat-topped. This is to facilitate touch operation.

With this in mind add the following examples. Begin at the top of each column and add down. Use the first finger for adding in the tens column only and the second finger for adding the units column only Keep each finger on its own column. Find the keys by sense of touch, as much as possible.

In adding it is necessary to acquire a smooth rhythmic stroke. Hold a pencil between the thumb and palm of the operating hand. This helps to balance the hand and the pencil is always in readiness for writing down answers.

A Comptometer improperly placed is detrimental to speed and ease of operation. It should be placed at right angles or slightly to the right of the operator with the left edge in a direct line with the center of the body The desk and the seat of the chair should be of a height to permit the feet to touch the floor and the fingers to rest comfortably on the keys.

No. 1	No. 2	No. 3	No. 4	No. 5	No. 6	No. 7
22	33	43	23	67	84	25
23	34	33	36	43	47	92
33	43	12	43	77	63	14
34	32	54	48	65	84	52
44	31	23	35	95	93	71
45	35	32	49	48	32	42
55	53	24	43	64	26	35
54	25	25	36	23	82	92
43	24	35	42	72	48	25
353	310	281	355	554	559	448

Add each column and compare the total obtained with that shown at foot of column. For practice add each column at least four times. If an error is made it is usually the result of trying to go too fast. Speed will come with a little practice.

MULTIPLICATION

Example: Multiply 1364 x 57

PLACE the first finger of the left hand on the 50 key and the first finger of the right hand on the 7 key Strike the 57 in this position as many times as the right-hand figure (4) of the multiplicand indicates. Move both fingers one column to the left and strike as many times as indicated by the second figure (6) of the multiplicand. Continue to move to the left, striking in each column the multiplier as many times as indicated by the successive figures (3—1) of the multiplicand.

In beginning multiplication confine yourself to the use of the first finger of the right hand and the first finger of the left hand.

After the fingers have been positioned on the keys representing the multiplier, strike slowly, giving each key a full push-stroke, until you feel it strike bottom. Raise the fingers slightly above the keys after each stroke. Speed will develop quickly

After placing the fingers on the proper keys, look at the example, rather than the keyboard, so that the figures will not be mis-read.

In each of the following examples use the first finger of the left hand for the tens figure of the multiplier and the first finger of the right hand for the unit figure

No. 1	No. 2	No. 3	No. 4	No. 5
24,531	12,456	5,315	23,456	84,143
35	68	64	75	79

No. 6	No. 7	No. 8	No. 9	No. 10
35,642	15,341	45,673	36,341	14,683
45	88	28	23	47

No. 11	No. 12	No. 13	No. 14	No. 15
89,986	15,366	65,418	94,345	14,312
37	15	31	63	86

No. 16	No. 17	No. 18	No. 19	No. 20
26,433	46,541	63,222	46,812	46,533
19	91	83	61	11

Example: Multiply 314 x 45

Place the first and second fingers of the right hand on the keys in the right-hand columns representing the multiplier (45), and strike as many times as indicated by the right-hand figure (4) of the multiplicand, move the fingers one column to the left and strike as many times as the second figure (1) of the multiplicand indicates. Continue to move to the left, striking as many times as the succeeding figure (3) of the multiplicand indicates.

The first and second fingers of both hands are more commonly used than any of the other fingers. A safe rule to follow is to use the longest finger for the highest number

Multiply each of the following problems, using the fingers as shown by the abbreviations in front of, and following the multiplier 1L and 2L indicate first and second fingers of the left hand. 1R and 2R indicate first and second fingers of the right hand.

Raise the fingers slightly above the keys after each stroke.

No. 1	No. 2	No. 3	No. 4	No. 5
43	13	47	83	276
1R 34 2R	2R 42 1R	1L 62 1R	1L 37 1R	1L 345 1 & 2R

No. 6	No. 7	No. 8	No. 9	No. 10
19	342	43	43	56
2R 54 1R	1L 153 2 & 1R	1L 39 1R	1L 13 1R	89 1 & 2R

No. 11	No. 12	No. 13	No. 14	No. 15
75	83	28	284	104
1R 46 2R	1L 87 1R	1L 19 1R	1L 324 1 & 2R	1L 678 1 & 2R

For practice purposes it may be convenient to split the multiplier when it contains four figures. Example Multiply 12,365 x 8,379. First multiply 12,365 by 79, leaving the result in the machine. Then multiply 12,365 by 83, starting the 83 in the fourth and third columns.

NOTE A hyphen indicates where the multiplier should be split. When multiplying with two figures, the first finger of each hand is usually used. Point off as many places from the right as there are decimals in both factors.

No. 16	No. 17	No. 18	No. 19	No. 20
67.44	245.6	5613	584.26	5362
1L 735 1 & 2R	65-35	27-18	53-78	1L .523 1 & 2R

No. 21	No. 22	No. 23	No. 24	No. 25
17465	15082	13461	13723	191.47
43–45	*1L* 31.04 *1 & 2R*	19–19	73–65	92–23

No. 26	No. 27	No. 28	No. 29	No. 30
4817	.5447	6714	3672	574.4
37–29	*1L* 625 *1 & 2R*	73–68	94–45	16–17

Large Decimal Multiplications

IN MULTIPLYING large numbers containing decimals, it is advisable to strike from the left toward the right. Hold the multiplier with its left-hand figure on the left-hand column of the machine. Strike here as many times as is shown by the left-hand figure of your multiplicand, and then move one column to the right, etc. Point off as many answer dials from the left as the sum of the whole places in the multiplicand and multiplier

Move each finger one column to the right and strike two times, one more column to the right and strike three times—then four times, then five times. The result as it stands in the answer dials is 053774820. (An eight column Comptometer was used in figuring this problem.) There are two whole places in 12.345 and one in 4.356, making together three answer dials to point off from the left of the machine, and the answer is 53.77482.

Example: Multiply 12.345 x 4.356

Hold 4356 with the 4 on the left-hand column of the machine and in this position strike once.

NOTE Hyphen in multiplier indicates where it may be split.

Examples:

No. 1	No. 2	No. 3	No. 4
346.21	14.374	2.2635	.35624
1L 4.67 *1 & 2R*	*2 & 1L* 32.78 *1 & 2R*	9.4–56	91.–47

No. 5	No. 6	No. 7	No. 8
11.463	4627.1	26.516	314.62
1L 37.8 *1 & 2R*	*1L* .846 *1 & 2R*	*2 & 1L* 21.68 *1 & 2R*	7.3–49

No. 9	No. 10	No. 11	No.12
243.82	986.4	328.64	304.69
2 & 1L 53.33 *1 & 2R*	*2 & 1L* 31.32 *2 & 1R*	16.–17	*2 & 1L* 216.7 *1 & 2R*

Three Factor Multiplication

WHEN three numbers are to be multiplied such as, 57 bolts of 12 yards each at 1.25 per yard, proceed as follows· Multiply 57 x 12 on the right of the machine. Leave the result 684 in the answer dials. Since 684 is registered in the machine once it is necessary to multiply it only 124 times more. Therefore, hold 124 with the 4 over the left-hand figure (6) of the 684. Strike the number of times indicated, six, move to the right one column and strike the number of times indicated, eight. Move one more column to the right and strike four times. The answer is $855.00. In moving from left to right, the figure in the answer dial under the 4 key shows the number of times 124 should be struck.

Examples:

No. 1	No. 2	No. 3	No. 4
345x289x.56	789x88x5.46	6452x344x.66	33x875x4.58

No. 5	No. 6	No. 7	No. 8
645x4456x.28	389x673x438	75x6489x567	372x44x8879

NOTE: Point off as many places from the right as the sum of the decimals in the three factors.

Permanent Decimal Point Multiplication

WHEN factors contain changing decimals it will be easier and faster for the operator to use a method of working the multiplications over a fixed or Permanent Decimal Point. Between the fifth and sixth column of keys, directly over Decimal Pointer No. 5, is the position known as the Permanent Decimal Point. See illustration.

Usually the price factor is held on the keyboard—dollars to the left of the Permanent Decimal Point, and cents to the right of the Permanent Decimal Point. With the price factor in this position strike it in as many times as the *unit* figure of the quantity indicates.
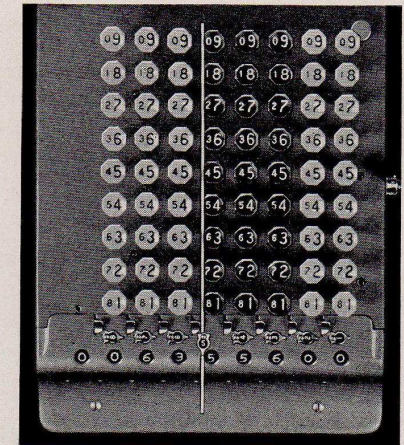
Permanent Decimal Point—this is located between the fifth and sixth column of keys, directly over Decimal Pointer No. 5.

Move price factor one column to the left for each additional whole number in the quantity, and one column to the right for each column of decimals in the quantity

Example:

345 lbs. @ $.65 per lb.   Answer $224.25

Hold price factor $.65 so that the 6 key is held in the fifth column and the 5 key in the fourth column. Strike the price factor five times for the unit figure of quantity. Move price factor one column to the left and strike it four times for the TENS figure of quantity Move price factor again one column to the left and strike

it three times for the HUNDREDS figures of the quantity—$224.25 now appears in the answer dials correctly pointed off.

Work the following problems over the Permanent Decimal Point, following the explanation in the previous paragraph.

Examples:

1.	307 hrs. @ $ .45 per hr.	=	$138.15
2.	65 doz. @ .22 per doz.	=	14.30
3.	45 tons @ 7.75 per ton	=	348.75
4.	15 days @ 4.50 per day	=	67.50
5.	241 bolts @ .67 each	=	161.47

Accumulative Multiplication Using Permanent Decimal

A RAPID and accurate method of checking and proving original multiplications is by accumulation. This method is very effective in proving payrolls, cost sheets, material requisitions, inventory sheets, invoices, etc., in fact it should be used wherever it is desired to total the products of several multiplications. To obtain the best results from accumulative multiplication, it should be performed over the fixed or Permanent Decimal Point. This Permanent Decimal Point is between the fifth and sixth columns, or as previously explained, directly over Decimal Pointer No. 5.

It is easy to remember that the sixth (white) column of keys is UNITS of DOLLARS, the fifth column is TENS of CENTS and the fourth column is UNITS of CENTS.

Example:

4¾ (4.75) yards @ $1.25
16½ (16.5) yards @ .34½
148¼ (148.25) yards @ .06¼
Accumulated Product $20.90

Hold the price $1.25 with the 1 in the sixth (white) column, the 2 in the fifth and the 5 in the fourth column. Multiply toward the right; strike four times, seven times, and five times. The answer dials show $5.9375. LEAVE THIS IN THE MACHINE.

Multiply the second item in a similar manner holding .345 with the 3 in the fifth, 4 in the fourth, and 5 in the third columns, respectively As the yardage commences in the TENS COLUMN, move the price position one column to

the left before commencing the multiplication. Strike from left to right one, six, and five times, respectively, and the accumulation in answer dials now shows $11.63. LEAVE THIS IN THE MACHINE.

For the third item hold .0625 with the 6 in the fourth column. As the yardage commences in the HUNDREDS COLUMN, move the price position two columns to the left before starting the multiplication. Strike in the keys one, four, eight, two, and five times in their respective columns. The accumulated answer of $20.895 now appears in answer dials. If at any time fingers drop off the keyboard on THE RIGHT-HAND SIDE, continue to strike with fingers that still remain on keyboard.

By the use of this method positive proof is obtained on:

(a) Each individual extension
(b) Decimal point in the final result
(c) Addition of items

Always take the *price position* on keyboard as previously explained—if the quantity has more than one whole number move the price position (before multiplying) one column to the left on the keyboard for each additional whole number in the quantity For instance, move one column to the left for 48¾, two columns for 236¾, etc.

Example No. 1

1⅛	(1.125)	yards	@ $ .48
12¼	(12.25)	yards	@ .64¾
67		yards	@ .50
6⅜	(6.375)	yards	@ 1.23
	Accumulated Total		$49.81

Example No. 2

16⅔	(16.667)	yards	@ $ .34½
172		yards	@ .06½
25¼	(25.25)	yards	@ 1.89
256		yards	@ .19
	Accumulated Total		$113.29

FIRST-TIME ACCURACY

ONLY when machine figuring becomes entirely automatic and the human element of error in operation ceases to be a factor, can there be dependable first-time accuracy in mechanical calculation.

This is evidenced by the fact that accounting offices in which first-time results are accepted without being checked or refigured, are so few as to be negligible When working against a predetermined

total such proof is, of course, unnecessary.

First-time machine figuring, however, should closely approximate absolute accuracy on all classes of figure work.

With the Comptometer it does that.

In figuring a recent inventory of a chain of 100 grocery stores, the first-time accuracy of the Comptometer was 99.551%

SUBTRACTION

SUBTRACTION is the process of finding the difference between two numbers. This is performed on the Comptometer by using the small figures on the key tops and the subtraction cut-off.

Example: 8.43—4.62.

Add 8.43 into the Comptometer

Pass the fingers of the left hand over the answer dials from right to left until there is visible an amount as great or greater than the 4.62 to be subtracted. In doing this there is first visible, 3, then 43, then 843. Hold back the cut-off (see illustration on first page) to the left of the 8.

Now, with the right hand depress the keys bearing the small figures 461 (see NOTE 1 on following page) and the result is 3.81

Example: 23.81—8.73.

Add 23.81 into the Comptometer

Pass the fingers of the left hand over the answer dials from right to left until you can see an amount (23.81) larger than 8.73. Then hold back the cut-off to the left of the 2. There is one column of keys between this cut-off and the 8.73 to be subtracted.

Depress the small cipher in this column (See RULE 4) and then the small 8-7-2, and the answer is 15.08.

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*23.81
08.72  See RULE 4
15.08
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Rules

RULE 1 Put the larger amount in the Comptometer as in adding.

RULE 2. Hold back the cut-off at the left of an amount equal to or larger than the amount to be subtracted.

RULE 3. Holding back the cut-off, depress the amount to be subtracted in small figures, less one. (See NOTE 1 on following page.)

RULE 4. If necessary to borrow, hold back the cut-off at the left of column or columns from which you borrow Depress the small cipher key in such column or columns.

Examples:

To Subtract

```
8.24  Strike large figures    *8.24
1.27  Strike small figures     1.26  See NOTE 1
6.97
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8.56  Strike large figures    *8.56
3.79  Strike small figures     3.78  See NOTE 4
4.77
```

To Subtract

```
42.75  Strike large figures   *42.75
16.95  Strike small figures    16. 4  See NOTE 4
25.80
```

```
9.50  Strike large figures    *9.50
7.04  Strike small figures     7.03  See NOTE 2
2.46
```

*Indicates where cut-off is to be held.

To Subtract

```
647.25  Strike large figures  *647.25
460.05  Strike small figures   460.04  See NOTE 2
187.20
```

```
21.43  Strike large figures   *21.43
 6.42  Strike small figures    06.41  See RULE 4
15.01
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```
170.36  Strike large figures  1*70.36
  .85  Strike small figures    00.84  See RULE 4
169.51
```

```
165.20  Strike large figures  *165.20
 89.47  Strike small figures   08 .46  See NOTE 4
 75.73
```

To Subtract

```
257.62  Strike large figures  2*57.62
 36.00  Strike small figures   35.     See NOTE 1
221.62
```

```
146.25  Strike large figures  1*46.25
 32.41  Strike small figures   32.40   See NOTE 3
113.84
```

```
65.23  Strike large figures   *65.23
31.00  Strike small figures    30.      See NOTE 3
34.23
```

```
15.60  Strike large figures   *15.60   See NOTE 4
 9.83  Strike small figures    0 .82    See RULE 4
 5.77
```

Notes

Use of Small Figures in Subtraction or Division

NOTE 1. In subtracting or dividing, use the keys with the corresponding small figures, except for the right-hand figure of value, for which one less must be used.

Right-Hand Figure of Value.

	Right-Hand Figure of Value.			
To subtract or divide with	462	127	3600	4620
Use small figures	461	126	35	461

NOTE 2. The small cipher keys should be depressed the same as any other figure when they appear between figures of value, as in 704, but should be disregarded if they are at the right of the amount, as in 7500.

To subtract or divide with	704
Use small figures	703
To subtract or divide with	7500
Use small figures	74
To subtract or divide with	46005
Use small figures	46004

To subtract or divide with	63500
Use small figures	634

NOTE 3. If the right-hand figure of value in the amount is a 1, then one less is 0, and this small cipher should be struck.

To subtract or divide with	3241
Use small figures	3240
To subtract or divide with	3100
Use small figures	30

NOTE 4. As there are no small 9 keys, pass any column which contains 9, except where 9 is the right-hand figure of value, then the small 8 is used.

|	
To subtract or divide with	8947
Use small figures	8 46
To subtract or divide with	1695
Use small figures	16 4
To subtract or divide with	983
Use small figures	82
To subtract or divide with	379
Use small figures	378

*Indicates where cut-off is to be held.

DIVISION

DIVISION on the Comptometer is even more simple than with pencil and paper Instead of estimating mentally how many times the divisor is contained, the Comptometer tells you exactly It is advisable not to attempt division until you are somewhat familiar with the use of the small figures on the keys (see page 13)
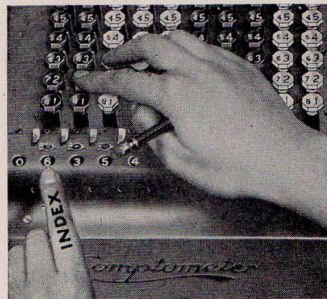
Index figure is 6.

Reduce the remainder, 96.
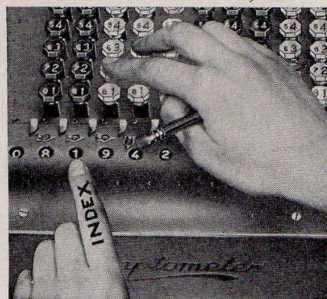
Index figure is 1.

Example: Divide 63542 by 77

Add the dividend 63542 on the left side of the keyboard and turn down Decimal Pointer to agree with the decimal point in the dividend. To establish the answer decimal point, turn down the pointer that is as many places to the left of dividend decimal pointer as there are whole number places (figures to the left of decimal point) in the divisor Place fingers on keys numbered in small figures, 76 (always hold one less than the divisor) Hold the 76 over 35 of the 635 as the first two figures, 63, are too small to contain the divisor (See upper illustration for beginning position**.**)

FIRST—*Agree with the Index.* Strike the divisor in this position as many times as indicated by the index. (The index is the figure in the register just to the left of the columns in which the divisor is held.) If the index increases, keep on striking until you agree with it.

The first index figure is 6, so strike six times, counting "one," "two," "three," "four," "five," "six," and since the index figure has increased, keep on striking—"seven." On the seventh stroke the number of strokes made agrees with the index.

SECOND—*Reduce the Remainder* (See center illustration.) Look at the amount (96) in the answer dials below the divisor keys. This amount is called the remainder As the remainder is larger than the divisor, 77, continue striking, in the same position, until the remainder is reduced to less than the divisor One more stroke and the remainder 96, is reduced to 19. The first answer figure now becomes an 8.

THIRD—*Move Divisor One Column to the Right.* Obtain the second answer figure in exactly the same manner as the first.

FIRST—*Agree with the Index* (See lower illustration page 14.) Watching the index, or register figure to the left of the columns you are about to strike, depress the divisor as many times as indicated by the index.

The index contains the figure 1, so strike once, counting "one," and as the index has increased—strike "two."

On the second stroke the number of strokes made agrees with the index.

SECOND—*Reduce the Remainder* (See upper illustration.) Look at the amount (40) in the answer dials below the divisor keys. As this remainder is already less than the divisor, 77, no more strokes are necessary The second answer figure now becomes a *2*.

THIRD—*Move the Divisor One Column to the Right.*

All answer figures are obtained in the same manner as the two previous ones.

FIRST—*Agree with the Index* (See center illustration.) Watching the index or register figure to the left of the columns we are about to strike, depress the divisor as many times as is indicated by the index. The index contains the figure 4, so strike four times, "one," "two," "three," "four," agreeing on the fourth stroke.

SECOND—*Reduce the Remainder* (See lower illustration.) Look at the amount (94) in the answer dials below the divisor keys. As this is larger than the divisor, 77, continue striking, in the same position, until the remainder is less.

One more stroke and the remainder, 94, is reduced to 17 The third answer figure becomes a 5. The complete answer now shows in the answer dials, 825, with a remainder of 17

You will note that we continued to divide until the answer figure was obtained in the register to the left of the decimal point first established. If we continued to divide, getting the answer figures to the right of the decimal point, we would get a decimal remainder

Remainder 40, is less than the divisor.

Strike four times to agree with index.
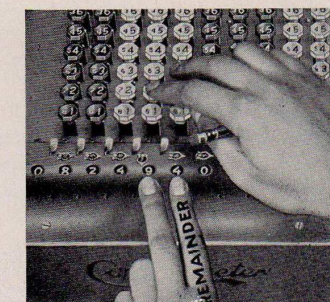

Reduce remainder 94, by striking once.

NOTE *Always hold the divisor keys with both hands.* The eyes—not the fingers—should follow the index and remainder In the illustration, one hand points to the index in the remainder because it is easier to instruct in this way

Principal Points to Remember in Division

Strike the dividend in the machine, using the large figures on the keys.

Turn down a pointer on the machine as many columns to the left of the decimal point in the dividend as there are whole number places in the divisor This will be the decimal point for the answer.

FIRST—*Agree with the Index* Strike the divisor (small figures less 1) until the number of strokes made agrees with the index. If the index contains a cipher, it will not be necessary to agree with it.

SECOND—*Reduce the Remainder* Strike the divisor until the remainder is less than the di-visor If the remainder is already less than the divisor, of course, no reducing is necessary

THIRD—*Move Divisor One Column to the Right.*

RULE FOR POINTING OFF WHEN DIVIDING BY A DECIMAL If the divisor is a decimal without zeros, the answer pointer is the same as the dividend pointer, but if the divisor has zeros like .0016, the answer pointer is as many places to the right of the dividend pointer as there are zeros immediately to the right of the decimal point in the divisor

Long Division

Easy Method for Dividing by Five or More Figures, Using Four-Place Trial Divisor and Obtaining Three Answer Figures at a Time

Example: 4567.89 ÷ 2436.65 =

RULE

Add the dividend from left to right, starting on the left side of the keyboard, and turn down decimal pointer to mark position of the dividend decimal point.

To mark the answer decimal point, turn down the pointer which is as many pointers to the left of the dividend decimal point as there are whole places in the divisor Now turn up the dividend pointer

Divide by the first four figures of the divisor, using the small figures on the keys (not taking one less) and don't stop dividing until you get the first three answer figures. After getting the third answer figure, continue to hold with the left hand the position of the two left-hand figures of the divisor

ILLUSTRATION:

Register shows 04567'89. (') indicates turned down decimal pointer

Register shows 0'456789.

Divide 0'456789 by 2436 (holding small figures 2436 with two hands) and don't stop dividing until you get the first three answer figures—187 Don't take the fingers of the left hand from keys 24.

Place fingers of right hand on columns immediately to the right of the two columns held with the left hand, on keys for the remaining unused figures* of the divisor, holding according to the small figures and one less for the extreme right-hand figure of value of the divisor. Leave left hand inactive on the keyboard.

Depress keys held by the right hand the number of times as indicated by the first of the three answer figures already obtained. Then move right hand one position to the right and strike the number of times as indicated by the second answer figure. Again move right hand one position to the right and strike the number of times indicated by the third answer figure already obtained.

The left hand remains inactive on the keyboard.

Resume holding the first four figures of divisor, with position for first two figures on the columns marked with the left hand, and the position for next two figures on columns immediately to the right.

(If remainder, in register under columns held, should be equal to or larger than the divisor, depress complete divisor once more.)

Move finger position one place to the right, and divide to get the next three answer figures, exactly the same way as the first three were obtained.

It is not necessary to strike in the remaining figures of the divisor the second time, as these figures would not affect a six-place answer

Right-hand fingers take positions on small figures 64 (65 less 1) on columns immediately to right of position held with the left hand.

From left to right, strike small figures 64 once, then move to right and strike eight times, then move to right and strike seven times. Register shows 1'87113545.

Fingers of right hand take position on small figures 36. Right and left hand now hold small figures 2436.

Remainder 1135 is not larger than 2436.

Move both hands one position to the right and divide again by 2436 to get three more answer figures.

Register shows 1'87465. Answer 1.87465.

*If it is not convenient to hold all at once with the right hand the remaining unused figures of the divisor then hold one or two of the remaining figures at a time.

COMPTOMETER *Instructions*   5126795086497551874627462753964718475139871204 73

51267950864975518746274627539647184751398712047 3 **COMPTOMETER** *Instructions*

Division Short Cut

In practical every day work, division is used a great deal in the figuring of averages and percentages. For this reason it is unnecessary in many cases to obtain more than three or four decimal places in the answer.

Example:

Sales $48,672,392
Profit   2,782,679
Find percent of profit to sales

$$\frac{\$\ 2,782,679}{\$\ 48,672,392} = .0572 \text{ or } 5\ 72\%$$

Dividing four figures of the dividend (2782) by four figures of the divisor (4867 *minus* 1) will provide an answer sufficient for practical purposes. A safe rule to follow is to hold *one more figure of the divisor* than figures desired in the answer

The carrying out of decimals beyond the actual number of places required is a needless waste of time and energy

Reciprocal Division

The use of reciprocal division in cost, payroll, and statistical work will be very helpful to the operator The simplicity of this method of division, in addition to its time-saving feature, makes its use very desirable. This method is nothing more than converting division into a multiplication process.

Multiplying any dividend by the reciprocal of its divisor produces the same answer as that obtained by actual division. To obtain the reciprocal of any number, merely divide that number into the figure 1.

Illustration:

Reciprocal of   8 is 1 ÷   8 or .125
Reciprocal of 413 is 1 ÷ 413 or .00242130   (See Payroll Example)
Reciprocal of 555 is 1 ÷ 555 or .00180180   (See Statistical Example)
Reciprocal of 755 is 1 ÷ 755 or .00132450   (See Cost Example)

Reciprocals of any number from 1 to 2,000 will be found on Reciprocal Card No. 9, and from 1 to 10,000 in Reciprocal Book, form 192.

The easiest way to do reciprocal division is to hold the dividend over Permanent Decimal Pointer No. 5, multiplying it from left to right

by the reciprocal of the divisor Always point off to the left of the Permanent Decimal Point as many places as there are whole numbers in the divisor The decimal point and preceding ciphers in the reciprocal are entirely disregarded if the problem is worked over the Permanent Decimal Point.

Example of Cost Work:

755 pieces cost $66.06. What is the average cost per piece? Answer, $.0875.
$66.06 ÷ 755 is the same as $66.06 x .0013245 (reciprocal of 755).

Hold the dividend $66.06 over Permanent Decimal Pointer No. 5 and multiply it by the reciprocal of 755. From left to right strike in the dividend one, three, two, four, and five times respectively As the divisor (755) contains three whole numbers, it requires pointing off to the left of Permanent Decimal Pointer No. 5 three places. The answer dial now shows $.0875.

Example of Payroll Work:

$35.00 earned in 41.3 hours. What is the average hourly rate? Answer, $.847.
$35.00 ÷ 41.3 is the same as $35.00 x .0024213 (reciprocal of 413)

Hold the dividend $35.00 to left of Permanent Decimal Pointer No. 5 and multiply it by the reciprocal of 413. From left to right strike in the dividend two, four, two, one, and three times respectively As the divisor (41.3) contains two whole numbers, it requires pointing off to the left of Permanent Decimal Pointer No. 5 two places. The answer dial now shows $.847

Example of Statistical Work:

Department A Sales	$104.56 =	.1884 or 18.84%
Department B Sales	75.54 =	.1361 or 13.61%
Department C Sales	344.21 =	.6202 or 62.02%
Department D Sales	22.14 =	.0399 or 3.99%
Department E Sales	8.55 =	.0154 or 1.54%
	$555.00	1.0000 100.00%

It is desired to know what percent of the total sales is represented by each department. This requires dividing each of the amounts by the total, or $555.00.

As 555 contains three whole numbers, it requires pointing off three places to the left of Permanent Decimal Pointer No. 5. Hold the first dividend, $104.56, to the left of Permanent Decimal Pointer No. 5, and multiply it by the reciprocal of 555. From left to right strike in the dividend one, eight, zero, one, and eight times respectively The answer dial shows .1884 or 18.84% In the same manner hold the other departments and multiply by the same reciprocal. To prove accuracy of the work add the re-

sults obtained, these should total 1 or 100%, as the case may be.

In the ordinary division problems found in cost, payroll, and statistical work a four-figure answer is usually sufficient. In order to obtain four-figure accuracy it will be necessary to use six figures of the reciprocal. A safe rule to follow is to use two more figures of the reciprocal than desired figure places in the answer— that is, if a four-place answer is desired use six of the reciprocal figures, if a five-place answer is desired use seven figures of the reciprocal.

With a little practice and the use of Reciprocal Card No. 9, the operator will develop speed on this simple method of division.

TABLES USED
WITH THE COMPTOMETER

THE use of tables often makes it possible for the operator to turn out more figure work in less time. Below is a list of tables which are provided, without charge, to users of the Comptometer   Operators are encouraged to send in samples of their figure work so that we can send the table best fitted for the work.

Reciprocal Table No. 9 is used for making divisions quickly and easily by multiplication in percentaging, prorating and other divisions.

Interest Table No. 237 is used for figuring interest on a 365-day basis.   The table is used for figuring anything in interest where the rates run from 1 to 12% including 4ths, 8ths, 16ths, and 32nds fractions. It gives the interest on $1000. for one day; so it is only necessary to multiply the decimal on the card by the number of days and the principal.

Insurance Cancelation Table No. 36 shows the decimal part of a year for months and days (360-day basis) on one side and on the reverse side shows the decimal part of a year for days (365-day basis).   It is used for figuring elapsed time in connection with interest or insurance.

Lumber Table No. 3 gives result of dividing 12 into any dimension up to 11⅞.   This eliminates the division by 12 which is always made in lumber figuring.

Figuring Elapsed Time Table No. 37 shows the decimal part of a year for each day (365-day basis) and is used for figuring interest, discount and insurance cancelations.   This card also shows the number of days from the first of the year and the number of days to the end of the year for any day.

Lumber Table No. 5 gives the number of board feet in pieces of various sizes.   To obtain the board feet it is only necessary to multiply the board feet shown on the table by the number of pieces.

Gross Table No. 6 gives the decimal for each fractional part of a gross and for each unit.   To find the price of 7 dozen and 6 units, or 90 units, it is only necessary to multiply the price per gross by the decimal for this quantity shown on the table. This table is used also for plate glass figuring.

Grain Table No. 7 gives the decimal part of a bushel of any number of pounds of different grains, so that in extending lbs. it is necessary only to multiply the price per bushel by the decimal part of a bushel as shown on the table.

Decimal Equivalents of Fractions Table No. 29 gives the decimal equivalents of fractions from ¼ to 63/64ths, and also 19 useful reciprocals.   This table is of particular value in bill and inventory extensions.

Payroll Table No. 35 gives the decimal part of a month for any number of days and eighths of days, so that in figuring payroll, it is only necessary to multiply the monthly rate by the decimal shown on the table, which is for a 24 to 31-day month.

Tonnage Table No. 1 gives the decimal part of a ton of any number of pounds, so it is only necessary to multiply the price per gross ton by the decimal shown on the card for the fractional part of a ton.

Discount Table No. 4 gives the net of chain discounts.   To get the net of a bill, it is necessary only to multiply the gross of the bill by the net shown on the card.

British Currency Table No. 10 gives the decimal part of a £ of any number of shillings and pence and is used in extending sterling.

Interest Table No. 33 gives the interest on $1.00 for one day for rates from ⅛% to 12⅞%.   To figure interest, it is only necessary to multiply the amount shown on the table by the principal and then by the number of days.

Cooperage Table No. 32 is used to determine how many staves of one size are equivalent to another size.

Decimal Table No. 26 is used for figuring elapsed time.   It gives the decimal part of a 360-day year up to any date.   It is a very handy table in connection with the figuring of interest or insurance.

Interest Table No. 24 gives the interest on $1.00 for different numbers of days at different rates.   To figure interest, it is only necessary to multiply the principal by the interest shown on the card.

Ten and 100 and 1000 X Inches and Fractions to Eighths Table No. 8 is used only in connection with the Engineering Model Comptometer for figuring beams, pipe, etc.   For such work as 4682 x 9⅝ inches this table is especially adapted.

Pounds, Ounces, and Drams Table No. 38 gives the decimals of a 16-oz. pound for any number of drams and ounces.   To price any part of a lb. it is only necessary to multiply the price per lb. by the decimal for the number of drams or ounces shown on the card.

British Currency Table No. 12 gives the decimal part of a £ for pence and 32nd fractions. Used for extensions in British currency.

Interest Table No. 184 gives the interest on $100. at 7% for from 1 to 364 days.   To figure interest, it is only necessary to multiply the principal by the decimal for the number of days shown on the table.

Iron and Steel Table No. 234 gives the price per 100 lbs. at from .01 to $100. per gross ton, so that when the quantity is lbs. and the price per gross ton, it is only necessary to multiply the number of lbs. by the equivalent decimal for the price per 100 lbs. shown on the table.

Quarters and Pounds of a Cwt. Table No. 22 gives the decimal equivalents of a Cwt. from ½ lb. to 3 qrs. 27 lbs.   To make an extension, one simply multiplies the price or rate by the decimal shown for the quantity.

Grain Table No. 191 gives the dockage and the net bushels per 1000 lbs. for different rates of dockage.   To find the bushels of dockage or the bushels net, it is only necessary to multiply the number of lbs. by the decimal for the rate shown on the table.   This table also gives decimals of a bushel for any number of lbs. for different grains.

Net Discount Table No. 25 shows the net left from $1.00 after discounting for the required number of days.   To get the net, it is only necessary to multiply the principal by the net shown on the table.

Weights per Foot and Inch for Rounds, Squares, etc. of Different Thicknesses Table No. 205 enables one to get the weight of a piece by simply multiplying the length by the amount shown on the table.

Quarters and Pounds of a Ton Table No. 21 gives decimal part of a ton of any number of Quarters and Pounds.   To get the price of any number of Quarters and Pounds, it is only necessary to multiply the price per ton by the amount shown on the table.

Form 1017

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