EASY INSTRUCTIONS FOR OPERATING THE

omptometer **

COMPTOMETER CORPORATION

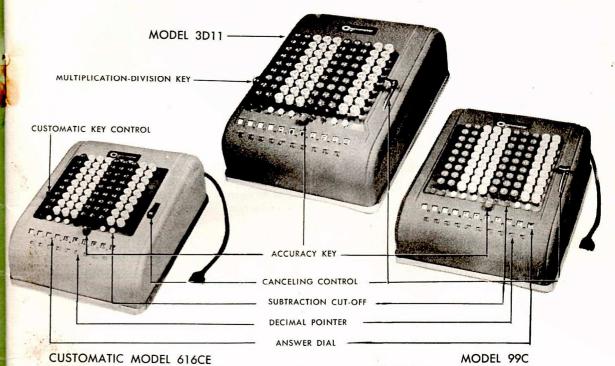
1735 NORTH PAULINA STREET

CHICAGO 22, ILLINOIS

DECIMAL EQUIVALENTS OF COMMON FRACTIONS

4	тня	61	нв	81	не	12	2THS	10	5THS
1 2 3	.25 .5 .75	1 2 3	.1667 .3333 .5	1 2 3	.125 .25 .375	1 2 3	.0833 .1667 .25	1 2 3	.0625 .125 .1875
4 .6667 5 .8333			4 5 6	.5 .625 .75	4 5 6	.3333 .4167 .5	4 5 6	.25 .3125 .375	
				7	.875	7 8 9	.5833 .6667 .75	789	.4375 .5 .5625
1 2	.0156	22 23	.3438 .3594	43	.6719 .6875	11 .9167 11		10 11 12	.625 .6875 .75
3	.0469	24 25 26	.375	46 47	.7031 .7188 .7344			13 14 15	.8125 .875 .9375
5 6	.0781	27	.4063	48	.75		32	NDS	
789	.1094 .125 .1406	28 29 30	.4375 .4531 .4688	49 50 51	.7656 .7813 .7969	1 2 3	.03125 .0625 .09375	17 18 19	.53125 .5625 .59375
10 11 12	.1563 .1719 .1875	31 32 33	.4844 .5 .5156	52 53 54	.8125 .8281 .8438	4 5 6	.125 .15625 .1875	20 21 22	.625 .65625 .6875
13 14 15	.2031 .2188 .2344	34 35 36	.5313 .5469 .5625	55 56 57	.8594 .875 .8906	7 8 9	.21875 .25 .28125	23 24 25	.71875 .75 .78125
16 17 18	.25 .2656 .2813	37 38 39	.5781 .5938 .6094	58 59 60	.9063 .9219 .9375	10 11 12	.3125 .34375 .375	26 27 28	.8125 .84375 .875
19 20 21	.2969 .3125 .3281	40 41 42	.625 .6406 .6563	61 62 63	.9531 .9688 .9844	13 14 15	.40625 .4375 .46875	29 30 31	.90625 .9375 .96875
						16	.5		

INTRODUCTION



Method of operation is the same for Models J, K, and M.

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.

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 Comptometer is available in various capacities* with each column containing 9 keys, grouped in alternating sections, colored green and ivory. On each key top 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 answer dials are cleared by touching the canceling control located at right of keyboard. The pointers below the answer dials are used to point off decimals. The cut-offs or buttons at the left of each column are used for subtraction. The Accuracy Key, located at the base of the fourth row of keys just above the answer dials, unlocks the keyboard after the incomplete key stroke has been corrected.

(See page 5 for proper use of Accuracy Key.)

*The Comptometer is manufactured in eight standard totaling capacities: 6, 8, 9, 10, 11, 12, 13 and the 21 totaling capacity Comptometer 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 depressed 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 rhythm.

Remember to place the finger on the key desired and press it down until you feel it strike bottom. Practice this push-stroke in rhythm. It differs distinctly from the sharp staccato stroke used when typing. It is the easiest known stroke on the finger. It eliminates the impact of striking the key.

Full Keyboard Method

Below are six columns of figures to be added. Use only the index and second finger. The index finger is used to operate all keys except those in the extreme right-hand column which should be touched 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 operating errors is explained on page 5. For the first few days go slowly. Speed will come later. Touch only one key at a time.

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 the total obtained. Then prove at once by re-adding the column. For practice add each column at least four times.

If misoperation occurs it is usually the result of trying to go too fast.

TOUCH METHOD

TOUCH method of addition provides the greatest degree of speed and accuracy and is simple and easy to learn. 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.

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

Upon examining the keys it will be noticed that the odd-numbered 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 an angle 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.

		(6)				
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. Practice for a full rhythmic stroke. Speed will come with practice.

3.25

.67

.45

4.82

.56

2.80

3.20

TOUCH METHOD

Adding Whole Numbers and Dollars and Cents

ADD the following three and four-figure items use the index finger for all figures except the extreme right-hand figure. The second finger is used only in adding the extreme right-hand figure. With eyes on the work-no glancing back and

forth from keyboard to work sheet-it is apparent that the danger of misreading figures is greatly reduced. The superior adaptability of the Comptometer to touch operation gives it a positive advantage in speed-with-accuracy.

No. 1	No. 2	No. 3	No. 4	No. 5	No. 6	No. 7
212	367	378	24.36	54.56	33.45	70.00
364	238	265	42.67	43.21	65.34	543.21
543	762	532	43.24	32.61	77.21	29.00
267	926	461	62.42	11.33	43.12	98.23
845	545	637	17.56	32.24	63.33	378.80
963	823	572	24.36	82.27	63.44	345.45
787	415	726	21.11	72.56	14.55	896.87
312	564	847	32.35	23.24	54.33	454.22
357	382	623	46.54	72.27	25.98	30.00
386	637	549	22.66	44.45	65.67	27.42

Add each column and write the total obtained. Then prove at once by re-adding the column. For practice add each column four times in order to fix firmly in mind the combinations used.

"Split" Method of Addition

In adding long columns it is often an advantage to split the items, adding first the cents and then the dollars. Add columns number 4, 5, 6 and 7 using this method. First add cents only, adding the tens with the first finger and the units with the second finger, leaving the total of cents in the answer dials. Then add the dollars, using the first finger for the tens and the second finger for the units. Correct selection of keys is made entirely by sense of touch. In adding column number 7 use the first finger for both hundreds and tens of dollars.

Add each column and write the total obtained. Then prove at once by re-adding the column. For practice add each column at least four times in order to fix firmly in mind the combinations used.

As previously mentioned under General Addition Instructions, a locked keyboard is a positive signal of misoperation. The rule for correcting misoperation is found on page 5.

How to use the ACCURACY KEY

The Accuracy Key is a positive system of automatic control which prevents errors caused by fumbled or incomplete key strokes. The Accuracy Key mechanism gives instant signal of misoperated keys with positive protection against such misoperations: the operator can speed up safely and be assured of accuracy.

Different model Comptometers employ slightly different methods of correcting misoperated keys. Follow the instructions below to correct misoperated keys for the model Comptometer you are using.

Comptometer Models 992, 99C and 616 Customatic IN ADDING AND SUBTRACTING

When a locked key signals a misoperation, the misoperated key will be in a semi-depressed position and the motor will continue to run. Complete the touch of the semi-depressed key and touch the Accuracy Key. Continue adding with the key that locked and signaled the misoperation.

EXAMPLE

In adding this short column intentionally press the 5 cent key part way down. On attempting to add the 3 dollar key, you find it locked. Go back to the last key touched (5). complete the stroke, touch the Accuracy Key and continue adding with the key that locked 4.82 and signaled the error (3).

IN MULTIPLICATION AND DIVISION

The Accuracy Key prevents errors from slipping into the answer without the knowledge of the operator. When a key is misoperated, the entire keyboard locks except the key or keys on which the misoperation occurred. The misoperation is indicated three ways: visually, by sound of the motor continuing to run, and by touch, in that the key or keys misoperated are held in a semi-depressed position and remain so until corrected. Complete the touch of the semi-depressed key or keys, then touch the Accuracy Key and continue through the operation.

Comptometer Model J. M. K or 3D11

The Accuracy Key mechanism gives instant signal of a misoperated key, by locking all columns except the column in which the incomplete key stroke was made; this column is left open for correction. When a key locks in adding, it is a positive signal that an incomplete key stroke was made either on the last key depressed or the key previous to the last.

RULE 1. When a key locks, always go back and try to operate the last key touched. If this key goes down, touch the Accuracy Key and continue the addition, starting on the key that locked and signaled the error.

COMPTOMETER

RULE 2. But if the last key touched is found locked, touch the Accuracy Key and add in the previous key; then continue the addition, starting on the key that locked and signaled the error.

EXAMPLE OF RULE 1

In adding this short column intentionally press the 5 cent key part way down. On attempting to add the 3 dollar key, you find it locked. Following your rule, go back and add the last key depressed (5), touch the Accuracy Key, and the correction is made. Continue adding, starting on the key that locked and signaled the error, 3.

EXAMPLE OF RULE 2

In adding this column, intentionally press the 30 key part way down. Then give the 40 key 3.75 a regular stroke. On attempting to add the 5 key, you find it locked. To correct, go back to the last key depressed (40), and you will find it locked. Following the rule, touch the Accuracy Key and add in the previous key (the 30). This completes the correction and you continue adding, beginning on key which locked and signaled the error, 5.

IN MULTIPLICATION AND DIVISION EXCEPT MODEL 3D11

When the key locks under the fingers, the positive danger signal prevents an error from slipping into an answer without the knowledge of the operator. Owing to the speed of the Comptometer addingcalculating machine it is simpler and faster to cancel and go over the problem than to stop and make the correction.

IN MULTIPLICATION AND DIVISION USING MODEL 3D11

Simply push back the multiplication and division button at left of keyboard before starting to multiply or divide. If, and when, a key is misoperated, all the keys held will lock except the key or keys misoperated. These are left open so that the operator may correct the misoperation without removing fingers from the keyboard. Touch the key or keys that can be depressed and continue operating.

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 misread.

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	<u>No. 5</u>
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
	ti de la companya de			

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.

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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. IL and 2L indicate first and second fingers of the left hand. IR 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
IR 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 IR	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
IR 46 2R	1L <mark>87</mark> 1R	IL 19 IR	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
<u>No. 26</u> 4817	<u>No. 27</u> .5447	No. 28 6714	<u>No. 29</u> 3672	No. 30 574.4

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.

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. 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.

16-17

NOTE: Hyphen in multiplier indicates where it may be split.

Examples:

<u>No. 1</u>	No. 2	No. 3	No. 4 .35624
346.21	14.374	2.2635	
1L 4.67 1 & 2R	2 & 1L 32.78 1 & 2R	9.4–56	91.–47
No. 5	No. 6	No. 7	<u>No. 8</u>
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
<u>No. 9</u> 243.82	<u>No. 10</u> 986.4	<u>No. 11</u> 328.64	<u>No. 12</u> 304.69
		16.–17	2 & 1L 216.7 1 & 2R
2 & 1L 53.33 1 & 2R	2 & 1L 31.32 2 & 1R	1017	2 & IL 210.7 1 & 2R

Three-Factor Multiplication

HEN 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

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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:

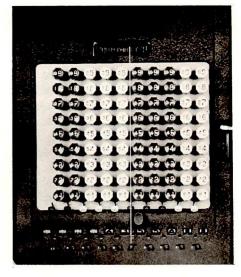
<u>NO. 1</u>	NO. 2	110.3	110.4
345 x 289 x .56	789 x 88 x 5.46	$6452 \times 344 \times .66$	$33 \times 875 \times 4.58$
<u>No. 5</u>	<u>No. 6</u>	<u>No.7</u>	No. 8
645 x 4456 x .28	389 x 673 x 438	$75 \times 6489 \times 567$	372 x 44 x 8879

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

Permanent Decimal Point Multiplication

HEN 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	ear	h	_	161 47

Accumulative Multiplication Using Permanent Decimal

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:

4³/₄ (4.75) yards @ \$1.25 16¹/₂ (16.5) yards @ .34¹/₂ 148¹/₄ (148.25) yards @ .06¹/₄ 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.

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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 48%, two columns for 236%, etc.

Example No. 1

11/8	(1.125)	yards	@	\$.48
121/4	(12.25)	yards	@	.643/4
67		yards	@	.50
63/8	(6.375)	yards	@	1.23
1	Ccumulo	ted Tota	1 5	849.81

Example No. 2

162/3	(16.667)	yards	@	\$.341/
172		yards	@	.061/
251/4	(25.25)	yards	@	1.89
256		yards	@	.19
I	Accumula	ted Tota	al \$1	13.29

CORRECT ANSWERS AT A GLANCE!



Unretouched photo actual size

Late model Comptometers have LARGE, EASY TO READ, answer dials. Approximately 40% of a calculating machine operator's figuring time is spent in reading and recording answers. Comptometer's large answer dials can be read FASTER and with less fatigue!

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" or button.

NOTE: (1) Do not hold subtraction cut-off after setting as it will return to normal automatically on Models M, 3D11, 992, 99C and Customatic. (2) Subtraction cut-offs must be held back manually while subtracting on the J. K and earlier models.

Example:

98 - 75 = 23.

Put 98 in the right of keyboard. Hold back "cut-off" or button (see note) at the left of the figure 9; depress a small 7 in the second column and a small 4 (5 less 1) in the first column — answer 23. To prove, add 75 to 23 in machine. Answer 98 agrees with amount started with.

Example:

845 - 702 = 143

Put 845 in the right of keyboard. Hold back "cut-off" or button (see note) at the left of the figure 8; depress a small 7 in the third column, a small cipher in the second column, and a small 1 (2 less 1) in the first column -- answer 143. To prove, add 702 to 143 in machine. Answer 845 agrees with amount started with.

Example:

\$28.64 - \$9.62 = \$19.02

Put 28.64 in right of keyboard. Hold back "cut-off" or button (see note) at left of figure 2. Borrow from fourth column by depressing cipher key; as there are no small 9 figures, ignore the 9 in the third column. depress small 6 in the second column and a small 1 (2 less 1) in the first column — answer \$19.02. To prove, add \$9.62 to \$19.02 in machine. Answer \$28.64 agrees with amount started with.

The processes to follow in subtraction:

- 1. Put larger amount in the Comptometer.
- 2. Hold back "cut-off" or button at the left of an amount in the register equal to or larger than the amount to be subtracted.
- 3. Holding back the "cut-off" or button depress the amount to be subtracted in small figures, less one.
- 4. If necessary to borrow, hold back the "cut-off" or button at the left of the column or columns from which you borrow. Depress the small cipher key in such column or columns.

Cipher keys are used in the amount to be subtracted if they come between figures of value, but are ignored if at the end of a number. The 9's are ignored unless they come at the end of a number when one less than nine (8) is depressed.

The apostrophe in the following problems indicates where the "cut-off" or button is to be held back.

(See Note Page 12)

1. '4.36 Add large figures	2. '8.34 Add large figures
1.25 Small figures 124	.68 Small figures 067
3.11	7.66
3. '21.43 Add large figures	4. 1'70.36 Add large figures
6.42 Small figures 0641	.85 Small figures 008
15.01	169.51
5. '65.23 Add large figures	6. '6.42 Add large figures
31.00 Small figures 30**	1.93 Small figures 1*2
34.23	4.49
7. '15.60 Add large figures	8. '48.50 Add large figures
8.83 Small figures 0882	9.60 Small figures 0*5
6.77	38.90

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.

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Rig	ght-Hai of Vo	nd Figu zlue	re
\Box	T	T	\neg
462	127	3600	4620
461	126	35	461

To subtract or divide with Use small figures

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	/04
Use small figures	703
To subtract or divide with	7500
Use small figures	74
To subtract or divide with	46005
Use small figures	46004

63500 To subtract or divide with 634 Use small figures 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. 3241 To subtract or divide with Use small figures 3240

3100 To subtract or divide with 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

billail o ib aboa.	
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
Application should be set to the set of the	

^{*}Used to designate columns in which no keys are depressed.

DIVISION

IVISION is the process of finding the number of times one number is contained in another. Although division is not used as frequently in the average office as addition and multiplication, it is, however, very important and used extensively in statistics of all kinds.

The machine method of division is more simple on the Comptometer than the mental or written process for it consists merely of a series of subtractions and the quotient, or answer figure, is a record of the number of subtractions made.

Division on the Comptometer is as simple as any other operation. The underlying principle of division is explained in the following example:

Example: 1477.63 ÷ 133

Place 147763 (the dividend) into the left side of the Comptometer using large figures.

Pull down the decimal pointer on the machine in the same position as it appears in the written dividend. (1477/63). The divisor (133) contains three DIVIDEND DECIMAL

whole numbers; that is, it has three figures to the left of its decimal point. Move your finger to the left of the dividend decimal position three places. Pull down the pointer in this position. You have now established the decimal point for your answer. (147763).

ANSWER DECIMAL

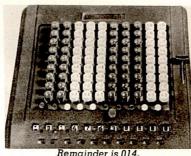


Hold 133 (the divisor) using small figures less one (132) directly over 147. Depress these divisor keys until the amount in the register dials at the base of the columns in which you are holding the divisor is less than 133.

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In this example, the remainder is 014, which is less than your divisor, 133.

Move your divisor position, held on the keyboard, one place to the right. You are now holding your divisor over 147 in the register dials.



Depress 132 (divisor figures). Remainder is 014 which is less than your divisor 133.

Move your divisor position, held on keyboard, one place to the right. You are now holding your divisor over 146 in the register dials.

Depress 132 (divisor figures). The remainder is 013 which is less than your divisor, 133,

Move your divisor position, held on keyboard, one place to the right. You are now holding your divisor over 133 in the register dials.

Depress 132 (divisor figures). The remainder is 000.

Copy your answer - 11.11.

Example: 8153.40 ÷ 254

Place 815340 (the dividend) into the left side of the Comptometer using large-numbered keys.

Locate your dividend decimal position: 8153 40

DIVIDEND DECIMAL

Establish your answer decimal point position:

ANSWER DECIMAL

Hold your divisor 254 (using small-figured keys 253) over 815 in the register dials.

Depress 253 (divisor figures) until the remainder in the register dials is less than the divisor, 254. Remainder is 053.

Move your divisor position, held on keyboard, one place to the right over 533 in the register dials.

Repeat depressing and moving until the entire problem is completed.

Answer: 32.10.

Practice Division Problems

 $4775.38 \div 226 =$ 21.13 $2326.59 \div 189 =$ 12.31 $6265.45 \div 145 =$ $95061.75 \div 175 = 543.21$ $978879.74 \div 487 = 2010.02$

When we have a problem in division such as: $194.25 \div 875$

Put 19425 (the dividend) into the Comptometer.

Establish dividend decimal point.

Point off three places to the left of the dividend decimal position to establish the answer decimal position.

Hold 875 (divisor figures), using small figures 874, over 194. 194 is less than divisor 875.

Move your divisor position, held on keyboard, one place to the right. You are now holding your divisor over 1942 in the register

This is the only difference in the operation of division you have learned so far.

Depress 874 (divisor figures) as many times as shown by the figure in the register dial at the left of the columns in which you are holding the divisor.

The figure l appears to the left of these columns.

Depress 874 (divisor figures) one time. The figure 1 changed to 2.

Depress 874 one more time to equal the figure 2. 192 (remainder figure) is less than 875.

Move your divisor position, held on keyboard, one place to the right.

The number in the register dial at the left of the columns in which you are holding the divisor is 1.

Depress 874 (divisor figures) one time. The figure 1 changed to 2.

Depress 874 (divisor figures) one more time to equal the figure 2. 175 (remainder figure) is less than 875.

Move your divisor position, held on keyboard, one place to the right.



Hold the Divisor over 1942 in the Register Dials.

The number in the register dial at the left of the columns in which you are holding the divisor is 1.

Depress 874 (divisor figures) one time.

The number 1 in the register dial at the left of the columns in which you are holding the divisor did not change.

The remainder is 875. Depress 874 (divisor figures) one time.

Answer is .222

For all practical purposes it is unnecessary to carry division beyond the fourth figure to the right of the decimal point.

POINTING OFF IN DIVISION

Pointing off on the Comptometer in division is very simple and accurate. Turn down the decimal pointer in the register to agree with the decimal point in the dividend. To establish the ANSWER DECIMAL POINT turn down the pointer as many places to the left of the dividend decimal pointer as there are figures to the left of the decimal point in the divisor. See Illustration.

Example: $134.5 \div 25 = 5.38$

Put the dividend 134.5 into the left side of keyboard. Pull down the decimal pointer between the 4 and 5 to correspond to the decimal point appearing in the dividend. As 25 is a whole number with two figures (2 and 5) we turn down the decimal pointer to the left of the dividend decimal point two places between the 1 and 3. See illustration. This simple method of establishing an accurate decimal position in the answer is found only on the Comptometer.

Drill carefully on the following problems and check your answers with those shown here.

I. $41.778 \div 45 = .9284$

3. $297.364 \div 34 = 8.746$

5. $1307.68 \div 22 = 59.44$

2. $16.7772 \div 44 = .3813$

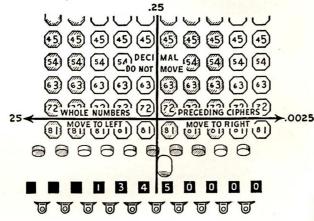
4. $2377.2 \div 56 = 42.45$

6. $89089 \div 89 = 1001$

If the divisor is a decimal without preceding ciphers the answer pointer is the same as the dividend pointer; but if the divisor has preceding ciphers like .0025 the answer pointer is as many places to the right of the dividend pointer as there are ciphers immediately to the right of the decimal point in the divisor. See illustration.

As there are no small 9 figured keys, leave blank any column which contains 9; except where 9 is the right-hand figure of value, then the small 8 key is used.

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. In the latter case, the divisor 7500 would be held as 75 less one (74).



DECIMAL POINT IN DIVIDEND

Illustration Showing Direction to Move Decimal Point in Division.

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: $4567.89 \div 2436.65 =$

Apply rules for pointing off as indicated in illustration above.

After pointing off, register shows 0'456789.

Divide by first four figures of divisor, using small figures on 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 left hand the position of the two left-hand figures of divisor.

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

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

The left hand remains inactive on keyboard.

Resume holding first four figures of divisor, with position for first two figures on the columns marked with 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 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 divisor the second time, as these figures would not affect a six-place answer.

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.

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

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.

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:

\$48,672,392 Sales Profit 2,782,679 Find percent of profit to sales = .0572 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 Reciprocal of 555 is 1 - 555 or .00180180 Reciprocal of 755 is 1 - 755 or .00132450

(See Payroll Example) (See Statistical Example) (See Cost Example)

Reciprocals (See Back Page) 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 divisions 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

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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 \div 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 o	r 18.84%
Department B Sales	75.54 =	.1361 o	r 13.61%
Department C Sales	344.21 =	.6202 o	62.02%
Department D Sales	22.14 =	.0399 o	3.99%
Department E Sales	8.55 =	.0154 o	1.54%
	\$555.00	1.0000	100.0%

It is desired to know what percent of the total sales is represented by each department. This reguires 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 results obtained; these should total 1 or 100%, as the case

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 fiveplace 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.

_	T	-						-	-										7						1100	4	200	12	00	1400	41	500	1600	1700	1800	1900
1	1	1000.000	100 10.0 01 9.90 02 9.80	0000	200 00 5.00000 01 4.97512 02 4.95050 03 4.92611	300 01 3	33333	400 01 2.50	00 500	0 2.00000	600	1.66667	700	1.42857 1.42653	800	1.25000 1.24844 1.24688	90	1.11111		1			1001	99900	1100	90909 90827	200 .83 1201 .83 1202 .83	333 136 264 136	00 .76923 01 .76864 76805	1400 .7 1401 .7 1402 .7 1403 .7 1404 .7	1429 1 1378 1 1327 1	500 .66667 501 .66622 502 .66578	1600 .62500 1601 .62461 1602 .62422 1603 .62383 1604 62344	1700 .58824 1701 .58789 1702 .58754 1703 .58720 1704 58685	1800 55556 1801 .55525 1802 .55494	5 1900 .52632 5 1901 .52604 1 1902 .52576 1 1903 .52549 2 1904 .52521
	3	500.000 333.333 250.000	03 9.70	538,	02 4.95050 03 4.92611 04 4.90196	04 3.3	31126 30033 28947	400 2.500 01 2.493 02 2.483 03 2.483 04 2.473	56 02 39 03 25 04	2 1.99203 3 1.98807 4 1.98413	02 03 04	1.66113 1.65837 1.65563	02 03 04	1.42450	03	1.24688	03	1.10988 1.10865 1.10742 1.10619					1001 1002 1003 1004	.99800 .99701 .99602	1104	90827 90744 90662 90580	203 .83 204 .83	126 136 066 136	76476	1406	1276 1. 1225 1.	503 .66534 504 66489	1603 .62383 1604 62344 1605 .62305	1703 .58720 1704 58685	1801 .55525 1802 .55494 1803 .55463 1804 .55432	1903 .52549 1904 .52521
	5 6 7	200.000 166.667 142.857	05 9.52 06 9.43 07 9.34	381 396 579	06 4.85437 07 4.83092	06 3.	27869 26797 25733	06 2.46 07 2.45	05 06	5 1.98020 6 1.97626 7 1.97239	05	1.65289	05 06	1.41844 1.41643 1.41443		1.24224 1.24069 1.23916	05	1.10497 1.10375 1.10254 1.10132		1			1005 1006 1007 1008 1009	.99502 .99404 .99305 .99206 .99106	1105 1106 1107 1108 1109	90498 90416 90334 90253 90171	206 82		76570 77 .76511 28 .76453 29 .76394	1406 .7 1406 .7 1407 .7 1408 .7 1409 .7	1174 1. 1124 1. 1073 1. 1023 1. 0972 1.	505 .66445 506 .66401 507 .66357 508 .66313	1606 62267 1607 .62229 1608 .62189	1705 .58651 1706 .58617 1707 .58582 1708 .58548 1709 .58514	1806 .55402 1806 .55371 1807 .55340 1806 .55310	2 1905 .52493 1 1906 .52466 0 1907 .52438 0 1908 .52411 0 1909 .52383
10	9	125.000 111.111 100.000	08 9.25 09 9.17	926 431	08 4.80769	08 3.3	24675	08 2.450	98 08	1.96850	08	1.64474	08	1.41243	08 09	1.23762	08	1.10132	11 00			10	1000	.99108	11109		1200 .82 1210 .82 1211 .82	713 13 645 13 576 13	9 .76394 10 .76336	1409 .7 1410 .7 1411 .7	0972 1	509 66269 510 66225 511 66181	1609 62150 1610 .62112 1611 .62073	1709 .58514 1710 .58480 1711 .58445	1810 .55249	1010 52356
		90.9091 83.3333 76.9231 71.4286		901 857 956	11 4.73934 12 4.71698 13 4.69484	11 3.1 12 3.1 13 3.1	21543 20513 19489	11 2.43 12 2.42 13 2.42 14 2.41	09 11 18 12 31 13	1 1.95695 2 1.95312 3 1.94932	11 12 13	1.63666	11 12 13	1.40647	11 12 13	1.23305 1.23153 1.23001	11 12 13	1.09769 1.09649 1.09529		1			1010 1011 1012 1013 1014	.99010 .98912 .96814 .96717 .96619	1112	89928 89847	212 .82 1213 .82 1214 .82	645 13 576 13 508 13 440 13 372 13	2 76220	1412 .7 1413 .7 1414 .7	0822 1. 0771 1. 0721 1.	512 .66138 513 .66094 514 .66050	1612 .62035 1613 .61996 1614 .61958	1710 .58480 1711 .58445 1712 .58411 1713 .58377 1714 .88343	1811 .55218 1812 .55186 1813 .55157 1814 .55127	1913 .52274
	15 16	71.4286 66.6667 62.5000 58.8235	14 8.77 15 8.66 16 8.62		14 4.67290 15 4.65116 16 4.62963 17 4.60829	14 3.1 15 3.1 16 3.1	18471 17460 16456	14 2.415 15 2.405 16 2.405	46 14 64 15 85 16	1.94553 5 1.94175 6 1.93798	15	1.62866 1.62602 1.62338	14 15 16	1.40056 1.39665 1.39470	15	1.22850 1.22699 1.22549	15	1.09290		1			1015 1016 1017 1018 1019	08522	1115	89686 89606	215 .82 1216 .82 1217 .82	305 13 237 13 169 13	6 .76046 6 .75988 7 .75930	1415 .7 1416 .7 1417 .7 1418 .7 1419 .7	0671 1 0621 1 0672 1 0672 1 0472 1	518 .66007 516 .65963 517 .65920 518 .65876	1615 .61920 1616 .61881 1617 .61843 1618 .61805 1619 61767	1715 58300	1815 .55090 1816 .55060 1817 .55030 1818 .55000	1915 .52219 1916 .52192 1917 .52165 1918 .52138
20	18	00.0006	19 8.40	336	17 4.60829 18 4.58716 19 4.56621	17 3.1 18 3.1 19 3.1	15457 14465 13480	15 2.409 16 2.400 17 2.396 18 2.393 19 2.386	08 17 34 18 63 19	7 1.93424 8 1.93050 9 1.92678	17 18 19	1.62075 1.61812 1.61551	17 18 19	1.39276	18 19	1.22549 1.22399 1.22249 1.22100	18	1.09051 1.08932 1.08814	1			20	1020	.98425 .98328 .98232 .98135	1118	89445 R9366	219 .82	18/1 B 8	18 .75873 19 .75815 20 .75758	1418 .7 1419 .7	0622 1 0472 1 0423 1	519 .65833	1618 .61805 1619 61767 1620 .61728 1621 .61690	1718 .58207 1719 .58173 1720 .58140 1721 .58106	1819 .54975	1919 .52110
20	22	45 4545	22 8 10	446	220 4.54545 21 4.52489 22 4.50450 23 4.48431	320 3.1 21 3.1 22 3.1	12500 11526 10559	21 2.375 22 2.365 23 2.366 24 2.356	95 520 30 21 67 22	1.92308 1.91939 2 1.91571	620 21 22	1.61290 1.61031 1.60772	720 21 22	1.38889 1.38696 1.38504 1.38313	21	1.21951 1.21803 1.21655	22	1.08696 1.08578 1.08460	10				1021 1023 1023 1024	.97943 .97847 .97752 .97688	1123	89206 89127 89047	1221 .81 1222 .81 1223 .81	967 13 900 12 833 13 766 13 800 13	20 .75758 21 .75700 22 .75643 23 .75586 34 .75529	1420 .7 1421 .7 1422 .7 1423 .7 1424 .7	0323 1	522 .65703 523 .65660	1620 .61728 1621 .61690 1622 .61652 1623 .61614 1624 61576	1720 .58140 1721 .58106 1722 .58072 1723 .58038 1724 56005	1821 .54918 1822 .54885 1823 .54855 1824 .54825	1920 .52083 1921 .52066 1922 .52029 1923 .52002 1924 .51975
	25	43.4783 41.6667 40.0000 38.4615	1 25 8 00	450	24 4.46429 25 4.44444 26 4.42479	24 3.0 25 3.0	08642 07692	24 2.358 25 2.358	49 24 94 25	1.90840	24	1.60256	23	1.38313 1.38122 1.37931 1.37741	24	1.21507 1.21359 1.21212 1.21065 1.20919	23 24 25	1.08342 1.08225		4			TANK	.97686 .97561 .97466 .97371	1124 1125 1126 1127	88968 88889 88810	225 .81	633 13 566 13	75472	1 1 1 4 4 mm 2	0175 11	525 65574	1625 .61538	1725 .57971	1825 .54795 1826 .64765 1827 .54735 1828 .54705	5 1924 .51975 5 1925 .51948 5 1926 .51921 5 1927 .51894 5 1928 .51867
		38.4615 37.0370 35.7143 34.4828		402 250 194	25 4.4444 26 4.42478 27 4.40529 28 4.38596 29 4.36681	27 3.0 28 3.0 29 3	05810 04878 03951	27 2.341 28 2.336 29 2 331	92 27 45 28 00 29	7 1.89753 8 1.89394 9 1.89036	27 28 29	1.59490	27 28 29	1.37552 1.37552 1.37363	28	1.20919 1.20773 1.20627	28	1.08108 1.07991 1.07875 1.07759				30	1026 1027 1028 1029	.97276	1129	88574	229 .81	367 13	.75245		0126 1 0077 1 0028 1 9979 1	526 .65531 527 .65488 528 .65445 529 65402	1629 61387	1726 .57937 1727 .57904 1728 .57870 1729 .57837	1829 .54673	5 I 1929 51840
30	30 31 32	33.3333 32.2581 31.2500	130 7.69 31 7.63 32 7.57	231 2 359 576	29 4.36681 230 4.34783 31 4.32900 32 4.31034 33 4.29185 34 4.27350	330 3.0 31 3.0 32 3.0	03030 02115 01205	31 2.320 32 2.31 33 2.300	58 530 19 31 81 32	0 1.88678 1 1.88324 2 1.87970	630 31 32	1.58730	730	1.36986 1.36799 1.36612	. 830 31 32	1.20482 1.20337 1.20192	930	1.07527					1030 1031 1033 1034	.97087 .96093 .96899 .96805 .96712	1122 .	88496 88417 88339 88261	230 .81 231 .81 222 .81 233 .81 234 .81	235 13	.75075	1430 .6 1431 .6 1432 .6 1433 .6 1434 .6	0081 1 0032 1 0734 1	\$31 .65317 \$32 .66274 \$33 .65232 \$34 .65159	1631 .61312 1632 .61275 1633 .61237	1731 .67770 1732 .57737 1733 .57703	1830 .54645 1831 .54618 1832 .54585 1833 .54555 1834 .54526	1931 .51787 5 1932 .51760 5 1933 .51733
	33 34 35	30.3030 29.4118 28.5714	33 7.51 34 7.46 35 7.40	880 269 741	33 4.29185 34 4.27350 35 4.25532	33 3.0 34 2.0 35 2.0	00300 99401 98507	33 2.309 34 2.309 35 2.298	47 33 15 34 85 35	3 1.87617 4 1.87266 5 1.86916	33 34 3 35	1 57729	34	1.36426	33 34	1.19904	33 34	1.07181	_			100	1035	.96618	1123	88106			4 .74963 15 .74906 16 .74850	1434 .6 1435 .6	9735 1	534 65159 535 65147 536 65104	1635 ALIG	1734 57670 1735 .57637 1736 .57604	1834 54526	5 1 1934 S1708
	36 37 38 30	27.7778 27.0270 26.3158 25.6410	36 7.35 37 7.29 38 7.24	294 927 638	35 4.25532 36 4.23729 37 4.21941 38 4.20168 39 4.18410	36 2.9 37 2.9 38 2.9	97619 96736 95858	36 2.29 37 2.28 38 2.28	58 36 33 37 11 38	5 1.86916 6 1.86567 7 1.86220 8 1.85876 9 1.85529	36 37 38	1.57233 1.56986 1.56740	36 37 38	1.35870 1.35685 1.35501	38	1.19617 1.19474 1.19332 1.19190	37	1.06610				40	1036 1037 1038 1039	.96432 .96330 .96246	1138	87873 87796	235 .50 1236 .80 1237 .80 1238 .80 1239 .80	710 I IJ	8 .74738 9 .74683	1439 .	9493 1	535 .65147 536 .65104 537 .65062 538 .65020 539 .64977	1636 .61125 1637 .61067 1638 .61050 1639 61013	1738 .57537 1739 .57504	1835 .54496 1836 .54406 1837 .54437 1838 .54407 1839 .54377	7 1937 .51626 7 1938 .51600 7 1939 .51573
40	40 41 42	25.0000 24.3902 23.8095	140 7.14 41 7.09 43 7.04	286 2 220 225	39 4.18410 240 4.16667 41 4.14938 42 4.13223 43 4.11523 44 4.09836	340 2.0 41 2.0	94118 93255	440 2.27: 41 2.26 42 2.26	73 540 57 41	0 1.85185 1 1.84843	640	1.56250	740 41	1.35318 1.35135 1.34953 1.34771	840	1.19048 1.18906 1.18765	940 41	1.06496 1.06383 1.06270					1040 1041 1042 1043 1044	.96154 .96061 .95060 .95877	1140 . 1141 . 1142 .	87719 87642 57566 87489	1240 .80 1241 .80 1242 .80 1243 .80 1244 .80	545 13 580 13 515 13	10 .74627 11 .74571 12 .74516	1440 .6 1441 .6 1442 .6 1443 .6 1444 .6	0748	540 .64935 541 .64893 542 .64851 543 .64809 544 .64767	1640 .60976 1641 .60938 1642 .60901 1643 .60664 1644 .60827	1740 .57471 1741 .57438 1742 .57405	1840 .54348 1841 .54318 1842 .54286 1843 .54256 1844 .54230	1940 .51546 1941 .51520 1942 .51493
	43 44	23.2558 22.7273	43 6.99 44 6.94	301 444 655	43 4.11523 44 4.09836	43 2.9 44 2.9	91545 90698	43 2.25 44 2.25 45 2.24	34 43 25 44	3 1.84162 4 1.83824	43	1.55521	43	1.34590	43	1.18624	43	1.06045					1043 1044 1045	.95785 .95694 .95602 .95511	1144	87413 1 8733A	245 80	121 134	13 .74460 14 .74405 15 .74349	1444 .6 1445 .6	9252 1 9204 1	545 64725	1645 .60790	1745 57307	1845 . 84201	9 1943 .51467 1944 51440 1 1945 .51414 1 1946 .51387 2 1947 .51361
	46 47 48	21.7391 21.2766 20.8333	46 6.84 47 6.80 48 6.75	932 272 676	45 4.08163 46 4.06504 47 4.04858 48 4.03226	46 2.8 47 2.8 48 2.8	89017 88184 87356	46 2.24 47 2.23 48 2.23 49 2 22	15 46 14 47 14 48	5 1.83150 7 1.82815 9 1.82482	46 47 48	1.54799 1.54560 1.54321	46 47 48	1.34048 1.33869 1.33690	46 47 48	1,18203 1.18064 1.17925 1.17786	46	1.05708					1048 1048 1048	.95511 .95420 .95329	1145 . 1146 . 1147 . 1148 . 1149 .	87260 87184 87108 87082	246 .80 247 .80 1248 .80 1249 80	257 134 192 134 128 134 064 134	15 .74349 16 .74294 17 .74239 18 .74184 19 74129	1445 .6 1446 .6 1447 .6 1448 .6 1449 .6	9204 1. 9156 1. 9108 1. 9061 1. 9013 1.	546 .64683 547 .64641 548 .64599 549 .64558	1645 .60790 1646 .60753 1647 .60716 1648 .60680 1649 .60643	1746 .57274 1747 .57241 1748 .57208 1749 .57176	1848 .54113 1849 .54083	3 1948 .51338 1949 .51308
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	55 56 57	18.1818 17.8571 17.5439	55 6.41 56 6.41 57 6.36	026 943	55 3.92157 56 3.90625 57 3.89105 58 3.87597 59 3.86100	55 2.6 56 2.6 57 2.6 58 2.7 59 2.7	81690 80899 80112	55 2.19 56 2.19 57 2.186 58 2.18 59 2.17	80 55 98 56 18 57	1 80180 3 1.79856 7 1.79533	55 56 57	1.52672 1.52439 1.52207	55 56 57	1.32450 1.32275 1.32100	55 56 57	1.16959 1.16822 1.16686	55 56 57	1.04712	2				1056 1057 1078 1049	.94787 .94697 .94697 .94518 .94429	1155 1156 1157 1158 1159	86580 86505 86430 86356	1255 .79 1256 .79 1257 .79 1258 .79 1259 .79	618 13 554 13 491 13	7 .73692 8 .73638	1455 .6 1456 .6 1457 .6 1458 .6 1459 .6	8729 1: 8681 1: 8634 1: 8587 1: 8540 1:	555 .64309 556 .64267 557 .64226 558 .64185 559 .64144	1655 .60423 1656 .60386 1657 .60350 1658 .60314	1765 50980 1756 .50948 1757 .56915 1758 .56863 1759 .56850	1855 .53870 1856 .53870 1857 .53850 1858 .5382 1859 .53790	8 1955 .51151 9 1956 .51125 0 1957 .51090 1 1958 .51073 2 1959 .51046
60	60	16.6667	59 6.28 160 6.25	931 000 2	59 3.86100 60 3.84615 61 8.83142	59 2 7 360 2 7			91 560	1.78571	660	1.61515	760	1.31579	860	1.16550 1.16414 1.16279 1.16144 1.16009		1.04275 1.04167 1.04058 1.03950				60	1000 1001	.94251 .94251 .94162 .94073 .93955	1160 1161	86281 86207 86133	260 .79 261 .79 262 .79 263 .79	428 13. 365 13. 302 13.	0 .73529 1 .73475	1460 .6 1461 .6	8493 1	560 .64103 561 .64001	1660 .60241 1661 .60205	1760 .56818 1761 .56786	1860 .5376. 1861 .5373.	3 1960 .51020 5 1961 .50994
	63	16.1290	62 6.17 63 6.13 64 6.09	284 497 756	62 3.81679 63 3.80228	62 2.7 63 2.7 64 2.7	76243 75482 74725	62 2 164 63 2.155 64 2.155	50 62 83 63 17 64	1.78571 1.78253 2 1.77936 3 1.77620 1.77305				1.30890	64	1.16009 1.15875 1.15741	64	1.03842					1063 1064	.94073 .94955			204 79		50 .73529 51 .73475 52 .73421 53 .73368 54 .73314	1460 .6 1461 .6 1462 .6 1463 .6 1464 .6	8399 8353 8306	562 .64020 563 .63980 564 63939	1662 .60168 1663 .60132 1664 60096	1762 .56754 1763 .56721 1764 .56689	1860 .5376. 1861 .5373. 1862 .5370. 1863 .5367. 1864 .5364.	3 1960 .510/20 5 1961 .80994 6 1962 .50968 7 1963 .80942 8 1964 .50916
	65 66 67	15.3846 15.1515 14.9254	65 6.06 66 6.02 57 5.98	061 410 802	65 3.77368 66 3.75940 67 3.74532 68 3.73134 69 3.71747	65 2.7 66 2.7 67 2.7	73973 73224 72480	65 2.150 66 2.145 67 2.141	54 65 92 66 33 67	1.76991 3 1.76678 7 1.76367	65 66 67	1.50376 1.50150 1.49925	65 66 67	1.30719 1.30548 1.30378	66	1.15607 1.15473 1.15340	67	1.03627 1.03520 1.03413	*				1066 1067 1068 1068	.93809 .93721 .93633 .93545	1165 . 1166 . 1167 . 1168 . 1169	85837 85763 85690 85616 85543	265 .79 1266 .78 1267 .78 1268 .78 1269 .78	051 136 989 136 927 136 864 136 802 136	35 .73260 36 .73206 37 .73153 38 .73099 39 .73046	1465 .6 1466 .6 1467 .6 1468 .6 1469 .6	8213 1 8166 1 8120 1 8074 1	565 .63896 566 .63857 567 .63816 568 .63776 569 .63735	1665 .60060 1666 .60024 1667 .59988 1668 .59952 1669 .59916	1765 .56657 1766 .56625 1767 .56593 1768 .56561 1769 .56529	1865 53619 1866 .63591 1867 .53562 1868 .53532 1869 53508	9 1965 .50691 1 1966 .50665 2 1967 .50639 3 1968 .50613 5 1969 .50787
70	68 69 70	14.7059 14.4928 14.2857	68 5.93 69 5.91 170 5.88	238 716 235 2	68 3.73134 69 3.71747 270 3.70370 71 3.69004 72 3.67647	68 2.7 69 2.7	71739 71003	68 2.136 69 2.133	75 68 20 69 66 570	1.76056	68 69	1.49477	68 69 770	1.30208 1.30039 1.29870	68 69 870	1.15207 1.15075 1.14943	68 69 970	1.03306 1.03199 1.03093				70	1070	.93545 .93458 .93371 .93284	1170 .	85470 85397	1270 .78	740 13	0 .72993	1470 6	8027	570 .63694 571 63654	1670 .59880	1770 .56497 1771 .56465	1869 53508 1870 .53476 1871 .53447	5 1969 .50787 3 1970 .50761 7 1971 .50736 9 1972 .50710
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80	78 79	12.8205 12.6582 12.5000	78 5.61	798	78 3.59712	78 2.6	64550	78 2.092	05 78 68 79	1.73010	78	1.47493	78	1.28535	78	1.13895 1.13766 1.13686	78 79	1.02349				80	1078 1079 1080	.92764 .92678 .92693			280 .78	125 138	78 .72569 79 72516 30 .72464	1480 6	7568 1	578 .63371 579 63331 580 .63291	1677 .59630 1678 .59595 1679 .59559 1680 59524	1778 .56243 1779 56211 1780 .56180	1879 53220 1880 53191	1979 .50531
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"	91	10.8696	92 5.20	833	3.44828 91 3.43643 92 3.42466 93 8.41297	92 2.1	55754 55102 54453	91 2.036 92 2.033 93 2.026 94 2.026	66 91 52 92 40 93	1 .69205 2 1 .68916 3 1 .68634	91 92 93	1.44718	91 92 93	1.26422 1.26263 1.26103	91 92 93	1.12233 1.12108 1.11982	91 92 93	1.00908 1.00806 1.00705	4		+ 1 2		1092	.91743 .91659 .91575 .91491 .91408	1192	83963 83893 83822	292 .77 293 .77	519 139 459 139 399 139 340 139 280 139	2 71839	1490 6 1491 .6 1492 .6 1493 .6 1494 .6	7114 1 7069 1 7024 1 6979 1 6934 1	590 .62893 591 .62854 592 62814 593 .62775 594 .62735	1690 59172 1691 59137 1692 50102 1693 59067 1694 59032	1790 .55866 1791 .55835 1792 .55804 1793 .55772 1794 55741	1891 52882 1892 52854 1893 52826 1894 52798	1991 .50226 1992 .50201 1993 .50176 1994 .50160
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