

**TECHNICAL MANUAL**

**OPERATOR'S, UNIT AND  
DIRECT SUPPORT MAINTENANCE MANUAL  
(INCLUDING REPAIR PARTS AND SPECIAL TOOLS LIST)  
FOR**

**TEXAS INSTRUMENTS CALCULATOR**

**MODEL TI-5030II**

This technical manual is an authentication of the manufacturer's commercial literature and does not conform with the format and the content requirements normally associated with Army technical manuals. This technical manual does, however, contain all essential information required to operate and maintain the equipment.

**Approved for public release; distribution is unlimited.**

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**HEADQUARTERS, DEPARTMENT OF THE ARMY  
28 SEPTEMBER 1990**

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### **SUPPLEMENTARY INTRODUCTORY MATERIAL**

#### 1-1. Maintenance Forms and Records.

Department of the Army forms and procedures used for equipment maintenance will be those described by DA Pam 738-750, The Army Maintenance Management System.

#### 1-2. Reporting Errors and Recommending Improvements.

You can help improve this manual. If you find any mistakes or if you know of a way to improve the procedures, please let us know. Mail your letters, DA Form 2028 (Recommended Changes to Publications and Blank Forms), or DA Form 2028-2 located in the back of this manual, directly to: Commander, U.S. Army Troop Support Command, ATTN: AMSTR-MCTS, 4300 Goodfellow Blvd., St Louis, MO 63120-1798. A reply will be furnished to you.

#### 1-3. Destruction of Army Material to Prevent Enemy Use.

Refer to TM 750-244-3 for instructions covering the destruction of Army Material to prevent enemy use

#### 1-4. Administrative Storage of Equipment.

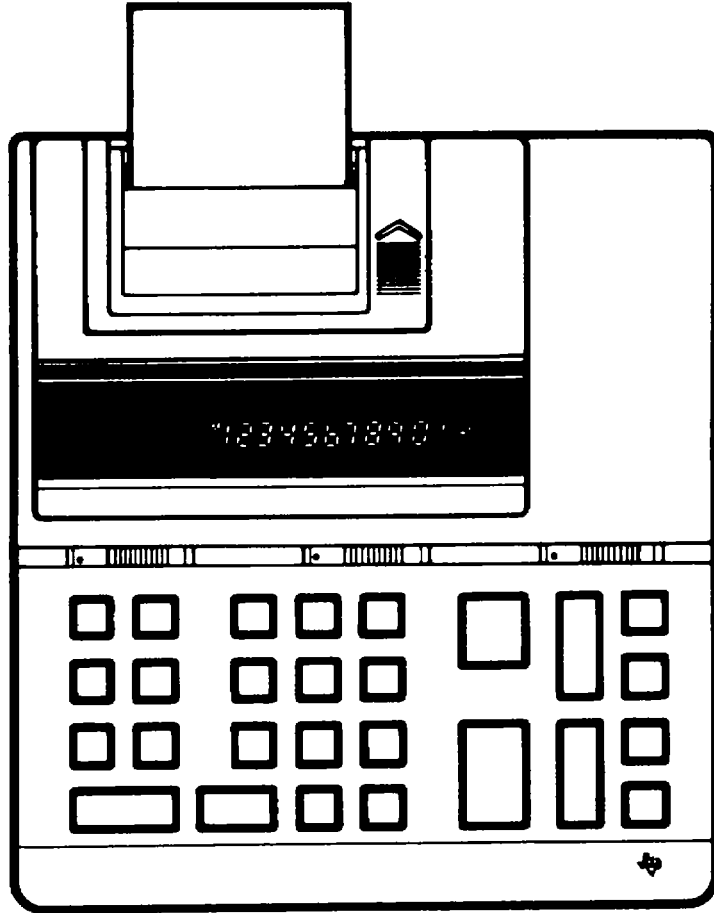
a. Placement of equipment in administrative storage should be for short periods of time when a shortage of maintenance effort exists. Items should be in mission readiness within 24 hours or within the time factors as determined by the directing authority. During the storage period appropriate maintenance records will be kept.

b. Before placing equipment in administrative storage, current preventive maintenance checks and services should be completed. Shortcomings and deficiencies should be corrected, and all modification work orders (MWO's) should be applied.

c. Storage site selection. Inside storage is preferred for items selected for administrative storage. If inside storage is not available, trucks, vans, convex containers and other containers may be used.

**i/(ii Blank)**

TEXAS INSTRUMENTS  
PRINTER DISPLAY  
TI-5030II



G U I D E B O O K

**Important**

Record the serial number from the bottom of the calculator and the purchase date in the space below. The serial number is identified by the words "SERIAL NO. " on the bottom case. Always refer to this information in correspondence.

**TI-5030 II**  
Model No

Serial No.

Purchase Date

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The TI-5030 II printer/display calculator has a built-in printer that enables you to keep a permanent record of your calculations, and the large display makes it easy to check entries and results. With its reliable solid-state design, you can operate the calculator with four "AA" alkaline batteries (sold separately) or the AC adapter included with the calculator.

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## Features

The TI-5030 II has many features that make the calculator easy to use at home or in the office.

**Full memory**—Provides four memory operations add to, subtract from, subtotal, and total the memory. Special symbols are displayed and printed to indicate memory operations.

**Independent Add Register**—Performs addition and subtraction with the familiar entry sequence of standard business machines. Multiplication and division are performed independently of any add/subtract operations in progress.

**Keyboard**—Consists of 27 touch keys including large total, subtotal, plus, minus, zero, and clear entry keys conveniently arranged on a "Touch Operator" keyboard.

**Impact Printer**—Prints up to 12 digits, convenient comma punctuation, and an audit trail. The printer uses a standard 2-1/4 inch roll of paper and can easily be switched on or off.

**Easy-to-Read Display**—Shows entries and results with up to 12 digits and convenient comma punctuation. Special symbols appear to indicate memory operations and error/overflow conditions.

**Decimal Switch**—Displays and prints results in either floating-or fixed-decimal (0, 2, or 4 decimal places) mode. The add mode enables you to enter a series of numbers containing two decimal places, such as dollars and cents, without having to enter the decimal point.

**Percent Key**—Calculates percentages, add-ons, and discounts.

**Automatic Constant**—Performs multiplication or division by a constant without reentering the constant.

**Ten-Level Keyboard Buffering**—Allows you to enter up to 10 additional digits and functions while the printer is operating.

**Two-Key Roll - Over**—Increases entry speed by allowing you to press a second key before the previously pressed key is released.

**Item Count**—Automatically prints the number of items entered into the independent add register when a total or subtotal is printed. The number of items added to or subtracted from memory is printed when a memory total or subtotal is printed.

**AC Adapter**—Provides power from any standard 110-volt electrical outlet.

Before you can operate the calculator, you must install the AC adapter that is included with your calculator or four "AA" alkaline batteries. You can then install the standard 2-1/4 inch roll of printing paper that is also included with your calculator.

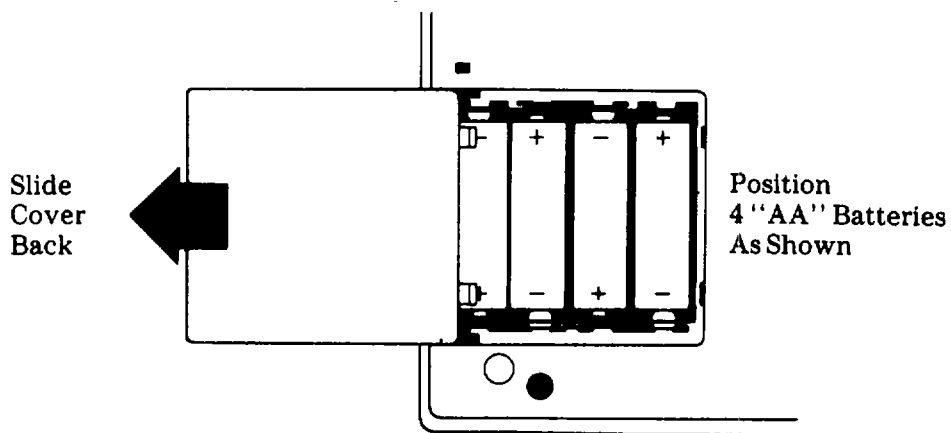
**AC Adapter Installation**

Before you install the AC adapter, set the POWER switch at the upper right side of the keyboard to the OFF position. Then plug the adapter into any convenient 110-volt electrical outlet and connect the adapter cord to the socket on the end of the calculator.

**Battery Installation**

To install four "AA" alkaline batteries, use the following procedure.

1. Set the POWER switch to the OFF position. (If the AC adapter is connected, you should unplug it before installing the batteries.)
2. Remove the battery cover from the back of the calculator. While pressing down on the front edge of the cover, slide it back and away from the calculator.



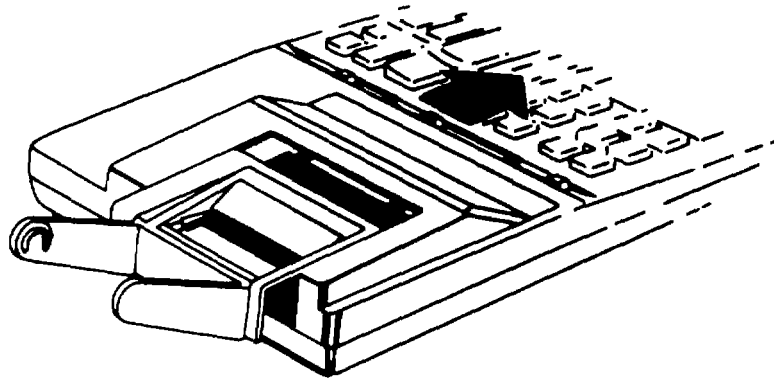
3. Position the batteries as shown in the illustration.
4. Replace the battery cover.



**Paper  
Installation**

To install the standard 2-1/4 inch roll of printing paper, use the following procedure.

1. Be sure the printer cover/paper holder is installed. If it is not, place the cover as shown in the illustration and slide it forward until it snaps into place.

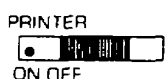


2. Set the PRINTER switch at the upper left side of the keyboard to the OFF position.
3. With the batteries installed or the AC adapter connected, set the POWER switch at the upper right side of the keyboard to the ON position.
4. Place a standard 2-1/4 inch roll of printing paper in the paper holder so that it unrolls from the bottom.
5. Cut the end of the paper squarely and insert it firmly into the printer slot located at the back of the calculator. Press the paper advance key [ t ] until the paper is in printing position.
6. Set the PRINTER switch to the ON position is..... printed.
7. You are now ready to operate the calculator.

The TI-5030 II has three switches located at the top of the keyboard: **POWER**, **PRINTER**, and **DECIMAL**. This section gives you a brief description of each switch.



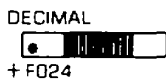
**POWER Switch**—This switch turns the calculator ON or OFF.



**PRINTER Switch**—Turns the printer ON or OFF without affecting operations in progress.

If the PRINTER is on when the POWER is turned on, AC (All Clear) is printed. However, if the POWER is on when the PRINTER is turned on,.....is printed.

**Note:** When operating the calculator without paper, set the PRINTER switch to the OFF position. This setting prevents unnecessary wear on the printer mechanism.



**DECIMAL Switch**—Selects the number of decimal places displayed and printed in the result of a calculation.

- **Add mode ( + )**—Automatically enters a decimal point to the left of the last two digits entered. All results are then displayed and printed with two decimal places.
- **Floating-decimal mode (F)**—Allows the number of decimal places to vary, depending on the result of the calculation.
- **Fixed-decimal mode (0, 2, 4)**—Fixes the number of decimal places to 0, 2, or 4.

**Addition and subtraction entries are made with the same rapid-entry style of most standard business machines. The independent add register keeps addition and subtraction entries separate from multiplication and division entries, enabling you to solve complex problems without having to write down intermediate results. Refer to "Using the Independent Add Register" for more information.**

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## Keys

The following keys are used for addition and subtraction operations.

**Number Keys [0]-[9], [00]**—Enter numbers containing up to twelve digits. For numbers between one and negative one, a zero automatically precedes the decimal, thus allowing a maximum of eleven digits to the right of the decimal. The calculator disregards any additional digits entered. Pressing 1001 has the same effect as pressing [0] twice.

**Decimal Point Key [.]** — Enters a decimal point if a decimal is not entered, the calculator automatically places a decimal point to the right of the entered number. Refer to "Add Mode Calculations" and "Fixed Decimal Calculations" for decimal positioning when the floating decimal is not desired.

**Add Key [+]**—Adds a number to the independent add register. The accumulated total is then displayed, and the number added is printed with a + to its right. The number that is added to the independent add register is the displayed number unless [+] is pressed repeatedly. See "Repeated Addition and Subtraction" for an example.

**Subtract Key [-]**—Subtracts a number from the independent add register. The accumulated total is then displayed, and the number subtracted is printed with a - to its right. The number that is subtracted from the independent add register is the displayed number unless [-] is pressed repeatedly. See "Repeated Addition and Subtraction" for an example.

**Subtotal Key [S]**—Prints the number of additions and subtractions to the independent add register, then displays and prints the subtotal in the register. A  $\diamond$  is printed to the right of the subtotal. Pressing [S] does not affect the contents of the register.

**Total Key [T]**—Prints the number of additions and subtractions to the independent add register, displays and prints the total in the register, then clears the register. An \* is printed to the right of the total.

**Clear Entry Key [CE]**—Pressing this key immediately following a numerical entry clears the entered number and allows another number to be entered in its place without affecting the independent add register. See "Correcting Entry Errors" for further explanation of the [CE] key.

**Clear Key [C]**—Clears the independent add register, any pending operations, and the display 0 C is printed. Pressing [C] also clears the calculator from an error/overflow condition.

**Example**

$$5.67 + 6 = 11.67$$

Set Switches: PRINTER (ON), DECIMAL (F)

Enter	Press	Display	Print
	[C]	0	0 C
5.67	[+]	5.67	5.67 +
6	[+]	11.67	6 +
	[T]		002.....
		11.67	11.67 *

After [T] is pressed, a new problem can be entered without manually clearing the calculator with [C].

**Example**

$$-8 + 3.21 - 4.6 = -9.39$$

Set Switches. PRINTER (ON), DECIMAL (F)

Enter	Press	Display	Print
8	[-]	-8.	8. -
3.21	[+]	-4.79	3.21 +
4.6	[-]	-9.39	4.6 -
	[T]		003.....
		-9.39	-9.39 *

**Addition and Subtraction**

If you want to print intermediate results, press the [S] key.  
Then continue with the problem.

**Example**

1.064 - 0.018 = 1.046  
1.064 - 0.018 + 1.19 = 2.236

Set Switches: PRINTER (ON), DECIMAL (F)

Enter	Press	Display	Print
1.064	[+]	1.064	1.064 +
.018	[-]	1.046	0.018 -
[S]		002.....	
		1.046	1.046 ◇
1.19	[+1]	2.236	1.19 +
	[T]	003.....	
		2.236	2.236 *

**Repeated Addition and Subtraction**

The repeat add/subtract feature of the calculator allows you to repetitively add or subtract the same number without reentering the number.

**Example**

4.59 + 4.59 + 4.59 - 6 - 6 = -1.77

Set Switches PRINTER (ON), DECIMAL (F)

Enter	Press	Display	Print
4.59	[+]	4.59	4.59 +
	[+]	9.18	4.59 +
	[+]	13.77	4.59 +
	[-]	7.77	6. -
6	[-]	1.77	6.-
	[T]	005.....	
		1.77	1.77 *

You may occasionally enter an incorrect number or press the wrong function key. At any point in a calculation, you can press [C] to clear the calculator and begin again. In many instances, however, you can easily correct an entry error without clearing the calculator.

If you enter an incorrect number, press [CE] To delete the entry. You can then enter the correct number and continue with the problem.

**Example**

49.01 + 16.55 = 65.56

Set Switches PRINTER (ON), DECIMAL (F)

Enter	Press	Display	Print
49.01	[+]	49.01	49.01 +
16.555†		16.555	
	[CE]	0.	
16.55	[+]	65.56	16.55 +
	[T]	002.....	
		65.56	65.56 *

† An extra 5 has been accidentally entered.

Unwanted entries can be effectively eliminated from the total after [ + ] or [ - ] by simply using the opposite operation to cancel the effect of the unwanted entry.

**Example**

$$49.01 + 16.55 = 65.56$$

Set Switches PRINTER (ON), DECIMAL (F)

Enter	Press	Display	Print
49.01	[+]	49.01	49.01 +
16.555	[+]	65.565	16.555 +
	[-]	49.01	16.555 -
16.55	[+]	65.56	16.55 +
	[T]	004.....	
		65.56	65.56 *

If you accidentally use [T] when you intended to use [S], the total is easily reentered into the independent add register with the [ + ] key.

**Example**

$$156 + 65 + 320 = 541$$

Set Switches PRINTER (ON), DECIMAL(F)

Enter	Press	Display	Print
156	[+]	156.	156.+
65	[+]	221.	65.+
	[T]	002.....	
		221.	221. *
	[+]	221.	221. +
320	[+]	541.	320. +
	[T]	002.....	
		541.	541. *

Multiplication and division operations are performed independently of addition and subtraction. If you are adding a column of numbers, you can perform an intermediate calculation involving [ x ], [ . ], and [ = ] without affecting the addition. Refer to "Using the Independent Add Register" later in the manual for examples.

**Keys**

The following keys are used for multiplication and division operations

**Multiply Key [ x ]**-Causes the last entered number or last result to be printed as the multiplicand with a x symbol printed to the right of the number. When you press [ x ], an intermediate multiplication or division result is displayed.

**Divide Key [ ÷ ]**--Causes the last entered number or the last result to be printed as the dividend with a symbol printed to the right of the number. When you press [ ÷ ] an intermediate multiplication or division result is displayed. Division by zero is invalid and causes -----followed by 0 \* to be printed and an arrow followed by 0 to be displayed

**Equals Key [ = ]**-Completes multiplication or division. When used following multiplication or division, the last entered or displayed number is printed as the multiplier or divisor with an = symbol printed to the right of the number. Then the result is shown in the display and printed with an asterisk to the right

**Clear Entry Key [CE]**-When used immediately following a number entry, this key clears the entered number and allows another number to be entered in its place without affecting previous entries

**Example**

24.3 x 15 = 364.5

Set Switches. PRINTER (ON), DECIMAL (F)

Enter	Press	Display	Print
24.3	[x]	24.3	24.3 x
15	[=]		15. =
		364.5	364.5 *



**Example**

$$130 - 6.5 = 20$$

Set Switches PRINTER (ON), DECIMAL (F)

Enter	Press	Display	Print
130	[+]	130.	130. -
6.5	[=]		6.5
		20.	20. *

Notice that it is not necessary to press [C] before starting a new problem when the [=] key is used.

The following example illustrates that intermediate results are displayed but not printed when solving chain calculations in multiplication and division.

**Example**

$$120 \times 50 - 30 = 200$$

Set Switches: PRINTER (ON), DECIMAL (F)

Enter	Press	Display	Print
120	[x]	120.	120. x
50	[+]	6,000	50. -
30	[=]		30. =
		200	200 *

If an Intermediate displayed result needs to be printed, press [=]. Then press the next function key and complete the problem.

**Example**

$120 \times 50 = 6,000, 6,000 \div 30 = 200$

Set Switches: PRINTER (ON), DECIMAL (F)

Enter	Press	Display	Print
120	[x]	120.	120. x
50	[=]		50. =
		6,000.	6,000. *
	[÷]	6,000.	6,000. -
30	[=]		30. =
		200.	200. *

When you enter an incorrect number, use the [CE] key to clear the entry in the same manner shown for addition and subtraction.

**Example**

$16 \div 5 \times 12 = 38.4$

Set Switches PRINTER (ON), DECIMAL (F)

Enter	Press	Display	Print
16	[÷]	16.	16. ÷
6†	[CE]	0.	
5	[x]	3.2	5. x
12	[=]		12. =
		38.4	38.4

†6 was accidentally entered.

After a numerical entry in a multiplication or division problem, you may reenter or even start a new problem without clearing the independent add register. Press [CE] once and the calculator displays 0. Press [=] and the calculator prints 0\*. You may then enter a new problem. However, if the paper tape is saved as a reference, the 0\* result should be marked as an error.

**Example**

59 x 13.6 (Start new problem) 39 ÷ 12.5 = 3.12

Set Switches PRINTER (ON), DECIMAL (F)

Enter	Press	Display	Print
59	[x]	59	59 x
13.6	[CE]	0.	
	[=]		0. =
		0.	0. *
39	[÷]	39.	39. ÷
12.5	[=]		12.5 =
		3.12	3.12 *

**Note:** If you want to clear the independent add register, press [C]. A zero is displayed and 0 C is printed.

**Entering Negative Numbers**

Negative numbers cannot be directly keyed into the calculator in multiplication and division problems. A number can be assigned a negative value as an entry to or result of the independent add register.

**Example**

$$11.32 \times (-6) \times (-5.04) = 342.3168$$

Set Switches PRINTER (ON), DECIMAL(F)

Enter	Press	Display	Print	Comments
11.32	[x]	11.32	11.32 x	1st multiplier
6	[-]	-6 -	6. -	
	[T]	001.....		
		-6.	-6 *	See note
	[x]	-67.92	-6 x	2nd multiplier
5.04	[-]	-5.04	5.04 -	
	[T]	001.....		
		-5.04	-5.04 *	See note
	[=]		-5.04 =	3rd multiplier
		342.3168	342.3168 *	Result

**Note:** The independent add register is used in this example to obtain negative multiplication or division entries with the [-][T] key sequence.

**Squaring a Number**

An entered number or result can easily be squared without reentering the number.

**Example**

125x 125= 15,625

Set Switches: PRINTER (ON), DECIMAL(F)

Enter	Press	Display	Print
125	[x]	125.	125. x
	[=]		125. =
		15,625.	15,625. *

**Reciprocals**

To find the reciprocal of a number (the number divided into 1), use the key sequence [- ][ = ] [ = ].

**Example**

$\frac{1}{8+12} = 0.05$

Enter	Press	Display	Print
8	[+]	8.	8. +
12	[+]	20.	12. +
	[T]	002.....	
		20.	20. *
	[÷]	20.	20. ÷
	[=]		20. =
		1.	1. *
	[=]		1.=
		0.05	0.05

An error condition occurs when any number is divided by zero. An overflow condition occurs when an accumulated total or result is larger than + 999999999999 (12 digits). To clear the calculator from either condition, press [CE] or [C]. If you press [CE], the independent add register retains the total stored prior to the error/overflow. If you press [C], the independent add register is cleared.

---

**Errors**

An error condition is indicated when  
 1. ----- and 0 \* are printed.  
 2. An arrow and 0 are displayed.

**Addition and Subtraction Overflow**

An overflow condition for addition and subtraction is indicated when  
 1. ----- is printed.  
 2. The first 13 digits of the answer, followed by an asterisk, are printed without commas or a decimal.  
 3. An arrow and the first 12 digits of the answer are displayed with a decimal point following the first digit.

**Example**

999,,999,999.999 + 35) = 1,000,000,000,034 (Overflow)

Set Switches: PRINTER (ON), DECIMAL (F)

Enter	Press	Display	Print
999999999999	[+]	999,999,999,999	999.999,999,999. +
35	[+]		35. +
			-----
		← 1.00000000003	1000000000034.*
	[CE]	0	
	[T]		001
		999,999,999,999	999,999,999,999

Notice that the independent add register retains 999,999,999,999 after you press [CE].

**Multiplication and Division Overflow**

An overflow condition for multiplication and division is indicated when:

1. -----is printed.
2. The first 12 digits of the answer are printed with a decimal point appearing 12 places to the left of its correct position.
3. An arrow and the first 12 digits of the answer are displayed with a decimal point appearing 12 places to the left of its correct position.

**Note:** To determine the correct position of the decimal point in the printed and displayed answer, mentally move it 12 places to the right, inserting zeros as required.

**Example**

500,000,000,123 x 2 = 1,000,000,000,246 (Overflow)  
Set Switches PRINTER (ON), DECIMAL (F)

Enter	Press	Display	Print
500000000123	[x]	500,000,000,123.	500,000,000,123.x
2	[=]		2. =
			-----
		←1.00000000024	1.00000000024 *
	[C]	0.	C

Using the Independent Add Register

The independent add register allows you to solve problems with combinations of addition, subtraction, multiplication, and division. In mixed calculations, the calculator internally keeps the results of multiplication and division entries separate from addition and subtraction entries. Thus, it allows you to save the memory for more difficult problems or for storing important numbers to be recalled later.

**Sum of Products  
 Example**

4 x 11.99 = 47.96  
 6 x 2.97 = 17.82  
 12 x 0.98 = 11.76  
 Total 77.54

Set Switch, PRINTER (ON), DECIMAL (F)

Enter	Press	Display	Print
4	[x]	4.	4.x
11.99	[=]		11.99 =
		47.96	47.96 *
	[+]	47.96	47.96 +
6	[x]	6.	6. x
2.97	[=]	2.97 =	
		17.82	17.82 *
	[+]	65.78	17.82 +
12	[x]	12.	12.x
.98	[=]	0.98 =	
		11.76	11.76 *
	[+]	77.54	11.76 +
	[T]	003.....	
		77.54	77.54



**Sum of Quotients Example**

$$\frac{1.98}{4} - \frac{4.98}{8} = -0.1275$$

Set Switches PRINTER (ON), DECIMAL (F)

Enter	Press	Display	Print
1.98	[÷]	1.98	1.98 -
4	[=]		4. =
		0.495	0.495 :
	[+]	0.495	0.495 +
4.98	[÷]	4.98	4.98 -
8	[=]		8. =
		0.6225	0.6225 *
	[-]	-0.1275	0.6225 -
	[T]		002.....
		-0.1275	-0.1275

**Product/Quotient  
of Sums  
Example**

$$\frac{(7 + 5) \times (6 - 4)}{3-12} = -2.666666666666$$

Set Switches PRINTER(ON), DECIMAL(F)

Enter	Press	Display	Print
7	[+]	7.	7. +
5	[+]	12.	5. +
	[T]	002.....	
		12.	12. *
	[X]	12.	12. x
6	[+]	6.	6. +
4	[-]	2.	4. -
	[T]	002.....	
		2.	2.*
	[÷]	24.	2. -
3	[+]	3.	3. +
12	[-]	-9.	12. -
	[T]	002.....	
		-9.	-9 *
	[=]		-9. =
		-2.666666666666	-2.666666666666 *

**Product of Sums  
Example**

$(2 + 3) \times (4 + 5) = 45$

Set Switches PRINTER (ON), DECIMAL (F)

Enter	Press	Display	Print
2	[+]	2.	2. +
3	[+]	5.	3. +
	[T]	002.....	
		5.	5. *
	[x]	5.	5. x
4	[+]	4.	4. +
5	[+]	9.	5. +
	[T]	002.....	
		9.	9. *
	[=]		9. =
		45.	45. *

**The memory enables you to solve complex problems by storing often-used numbers or results that are used in later calculations. You can then easily recall the memory content when you need it.**

---

**Keys**

The following keys are used for memory operations.

**Add to Memory [M + ]**-Adds the displayed number to the memory and prints the number with an M+ to its right. The symbol M appears on the left side of the display when the memory contains a number other than zero. If an incomplete multiplication or division problem is in the calculator, **[M = ]** completes the problem and adds the result to memory. This key does not affect the independent add register.

**Subtract from Memory [M - ]**-Subtracts the displayed number from the memory and prints the number with an M- to its right. The symbol M appears on the left side of the display when the memory contains a number other than zero. If an incomplete multiplication or division problem is in the calculator, **[M = ]** completes the problem and subtracts the result from memory. This key does not affect the independent add register.

**Memory Subtotal [MS]**-Prints the number of additions and subtractions to the memory, then displays and prints the number in memory. An MO is printed to the right of the subtotal. Pressing **[MS]** does not affect the contents of the memory.

**Memory Total [MT]**-Prints the number of additions and subtractions to the memory, displays and prints the number in memory, then clears the memory. An M\* is printed to the right of the total.

When you press **[CE]** or **[C]** to clear an error/overflow condition, the memory retains the number stored prior to the error/overflow. If you want to clear the memory, press **[MT]**.

**Important:** Remember the **[M + ]** key adds to and the **[M - ]** key subtracts from memory. It is a good practice to press **[MT]** or check that the M symbol is not displayed before beginning a new problem that uses the memory.

**Example**

$$15 + (3 \times 2 \times 6) - (9 - 2 \times 5) = 30.6$$

Set Switches PRINTER (ON), DECIMAL (F)

Enter	Press	Display	Print
	[MT]†	000.....	
		0.	0 M*
15	[M+]	M 15.	15.M+
3.2	[x]	M 3 2	3 2 x
6	[M=+]		6. =
		M 19.2	19.2M+
9	[÷]	M 9.	9. -
2.5	[M=]		2 5
		M 3.6	3.6M-
	[MT]	003.....	
		30.6	30.6M.*

† Pressing [MT] prints, the current memory total (which may not be as shown and automatically) clears the memory.

In addition to storing a number for later recall, the memory may be used to solve several parts of a problem simultaneously. The following example illustrates how the memory and independent add register can be used to solve three problems without reentering numbers or intermediate results.

**Example**

Assume you have three groups of items with each group having a separate cost per item, and you need to calculate 1) the total cost for each group, 2) the total cost of all groups, and 3) the average cost per item of all groups.

Group 1  
 Number of items = 36  
 Cost per item = \$1.95

Group 2  
 Number of items = 150  
 Cost per Item = \$.75

(Group 3  
 Number of Items = 16  
 Cost per item = \$1.29

Set Switches PRINTER (ON), DECIMAL (F)

Enter	Press	Display	Print	Comments
	[MT]†	000....		
		0.	0 M*	
36	[x]	36.	36. x	
	[+]	36.	36. +	
1.95	[M +] =		1.95 =	
		M 70.2	70.2M+	Group 1 cost
150	[x]	M 150.	150. x	
	[+]††	M 186.	150. +	
.75	[M+] =		0.75 =	
		M 112.5	112.5M+	Group 2 cost

(continued)

**Memory Operations**

Enter	Press	Display	Print	Comments
16	[x]	M 16.	16. x	
	[+]††	M 202.	16. +	
1.29	[M +=]		1.29 =	
		M 20.64	20.64M+	Group 3 cost
	[MT]	003.....		
		203.34	203.34M*	Total group cost from memory
	[÷]	203.34	203.34 ÷	
	[T]	003.....		
		202.	202. *	Total number of items from add register
	[=]		202. =	
		1.00663366336	1.00663366336 *	Average cost per item

† Pressing [MT] prints the current memory total (which may not be 0.as shown) and automatically clears the memory

†† If [+] were pressed before [x], the [x] would use the accumulated total In the add register.

The calculator always powers up using the number of decimals to which the DECIMAL switch has been set. To set the calculator to the fixed decimal mode, slide the switch to the number of decimal places desired. After an addition or subtraction key is pressed, the format of the displayed number is changed to the selected number of decimal places. In multiplication and division operations the format of a displayed number is not changed until [=] or [%] is pressed.

**Example**

$$(4.50 \times 3 - 3.50) \div 3 = 3.3333333333$$

Set Switches PRINTER (ON), DECIMAL (4)

Enter	Press	Display	Print
4.5	[x]	4.5	4.5 x
3	[=]		3. =
		13.5000	13.5000 *
	[+]	13.5000	13.5000 +
3.5	[-]	10.0000	3.5000 -
	[T]	002.....	
		10.0000	10.0000 *
	[+]	10.0000	10.0000-
3	[=]		3. =
		3.3333	3.3333 *



The add mode is convenient for the rapid entry of a series of numbers requiring two decimal places. The calculator automatically enters a decimal to the left of the last two digits entered, and all results are displayed and printed with two decimal places. For example, dollars and cents may be entered without using the [ . ] key—a considerable savings in keystrokes. To select the add mode, set the DECIMAL switch to the + position.

**Example**

$$\$3.13 + \$0.05 + \$4.56 + \$6.00 = \$13.74$$

Set Switches. PRINTER (ON), DECIMAL ( + )

Enter	Press	Display	Print
313	[+]	3.13	3.13 +
5	[+]	3.18	0.05 +
456	[+]	7.74	4.56 +
600	[+]	13.74	6.00 +
	[T]	004.....	
		13.74	13.74 *

You may override the add mode for individual entries by simply entering a decimal point where desired. If more than two digits are entered after the decimal point, the number is rounded to two decimal places when added or subtracted

The automatic constant register enables you to multiply or divide a series of numbers by a constant, without reentering the constant. For simple calculations, the first number in a multiplication operation or the second number entered in a division operation is used as a constant multiplier or divisor. The constant register has no effect on normal calculations as described thus far.

### Setting the Constant Register

The constant register is set when you perform the first calculation in a series. When you enter another number and press [=], the calculator automatically completes the problem using the number and function in the constant register. The constant is replaced when a new problem is entered or when [C] is pressed to clear the calculator.

### Example

$5 \times 3 = 15$ ,  $5 \times 4 = 20$ ,  $5 \div 95 = 4.75$

Set Switches PRINTER (ON), DECIMAL (F)

Enter	Press	Display	Print
5	[x]	5.	5. x
3	[=]		3. =
		15.	15. *
4	[=]		4. =
		20.	20. *
95	[=]		0.95. =
		4.75	4.75 *

**Example**

$66 \div 3 = 22$ ,  $-90 \div 3 = -30$ ,  $18 \div 3 = 6$

Set Switches: PRINTER (ON), DECIMAL (F)

Enter	Press	Display	Print
66	[+]	66.	66. ÷
3	[=]		3. -
		22.	22. *
90	[-]	-90.	90. -
	[T]	001.....	
		-90.	-90. *
	[=]		-90. =
		-30.	-30. *
18	[=]		18. =
		6.	6. *

For more complicated calculations, where [x] or [÷] are used more than once in a sequence, the constant register retains a composite multiplier or divisor.

The percent key enables you to calculate percentages and percentage ratios. By using the [%] key with the [ + ] and [ - ] keys, you can also calculate add-ons and discounts.

**Keys**

The percent key can be a time-saver when percentages, add-ons, discounts or ratios are calculated

**Percent Key** [%] -When this key is pressed to complete a multiplication problem, the displayed number is used as a percent value and is printed with a % symbol to its right. The percentage result is then displayed and printed, with a \* symbol printed to the right of the number. When this key completes a division problem, the calculator automatically multiplies the result by 100.

**Percent Add-on** [%] [+] -When this key sequence completes a multiplication problem, the percentage result is added to the principal amount. This sum is then displayed and printed, with a + symbol printed to the right of the number

**Percent Discount** [%] [-] -When this key sequence completes a multiplication problem, the percentage result is subtracted from the principal amount. This difference is then displayed and printed, with a +% symbol printed to the right of the number.

**Percentages Example**

4% of 453 = 18.12

Set Switches PRINTER (ON), DECIMAL(F)

Enter	Press	Display	Print
453	[x]	453.	453. x
4	[%]		4. %
		18.12	18.12 *

**Example**

$(17 +; 32 - 8) \times 15\% = 6.15$

Set Switches: PRINTER (ON), DECIMAL (F)

Enter	Press	Display	Print
17	1+]	17.	17. +
32	[+]	49.	32. +
8	[-1	41.	8.
	[T]	003.....	
		41.	41.
	[x]	41.	41. x
15	[%]		15. %
		6.15	6.15

The automatic constant can also be used with percent age calculations

**Example**

Find 2%, 15% and 25% of 495.

Set Switches PRINTER(ON), DECIMAL(F)

Enter	Press	Display	Print
495	[x]	495.	495. x
2	[%]	9.9	2. %
			9.9 *
15	[%]	74.25	15. %
			74.25 *
25	[%]	123.75	25. %
			123.75. *

**Percentage Add-on or Discount**

Following a percentage calculation with the [ + ] or [ - ] key automatically adds or subtracts the percentage from the principal amount. The principal amount is the entered number or intermediate result when the last [x] was pressed.

**Example**

1450 + 15% add-on = 1667.5

Set Switches PRINTER(ON), DECIMAL(F)

Enter	Press	Display	Print
1450	[x]	1,450	1,450. x
15	[1%]		15. %
		217.5	217.5 *
	[+]	1,667.5	1,667.5+%

**Example**

69.95 - 10% discount = 62.955

Set Switches PRINTER(ON), DECIMAL(F)

Enter	Press	Display	Print
69.95	[X]	69.95	69.95 x
10	[%]		10. %
		6.995	6.995
	[-]	62.955	62.955-%

If results are required with only two digits to the right of the decimal, the fixed decimal mode may be used. However, the floating mode is suggested for maximum accuracy in add-on or-discount problems. Any result can then be rounded to two decimal place.

**Percentage Ratios**

When the percent key is used to complete a division problem, the calculator automatically multiplies the result by 1(K)

**Example**

750 is what percent of 1,000"

Set Switches: PRINTER (ON), DECIMAL (F)

Enter	Press	Display	Print
750	[÷]	750.	750. -
1000	[%]		1,000
		75.	75. *

**Example**

29.5 is what percent of 25?

Set Switches PRINTER (ON), DECIMAL (F)

Enter	Press	Display	Print
29.5	[+]	29.5	29.5÷
25	[%]		25. %
		118.	118.*

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**Replacing Calculator Accessories**

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Additional accessories for your calculator-ink rollers, AC adapters, and standard 2-1/4 inch rolls of printing paper-may be obtained at the store where you purchased the calculator. However, if your local store is temporarily out of stock, you may order the ink rollers and the AC adapter from Texas Instruments Accessory Orders, P. O. Box 53, Lubbock, Texas 79408. An "Accessory Order Form" is included with the calculator.

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**Replacing the Batteries**

If you are not using the AC Adapter and the display becomes dim or the printer operates slowly, the batteries may need to be replaced Refer to "Battery Installation" at the beginning of this manual for the correct procedure

**Replacing the Printing Paper**

When you near the end of a roll of printing paper, a continuous stripe appears on the paper to indicate that only a few feet remain As you continue to operate the calculator, check to make certain that enough paper remains to complete your calculations

To replace the standard 2-1/4 inch roll of printing paper, use the following procedure

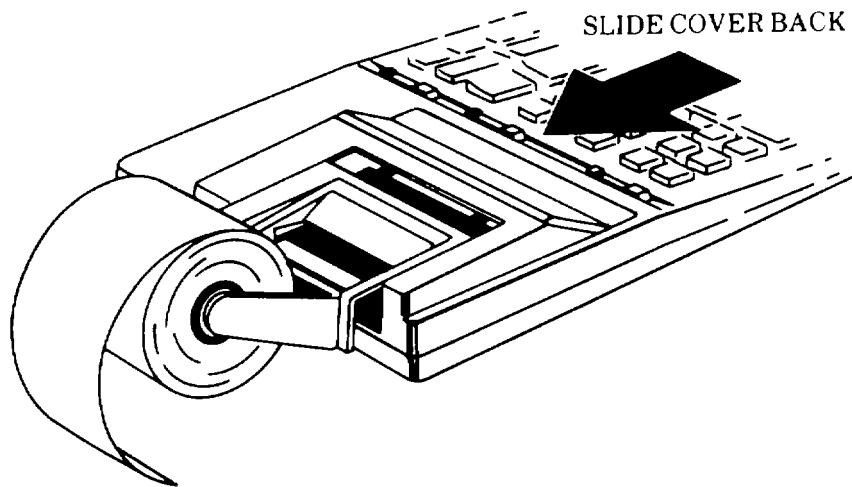
1. Set the PRINTER switch at the upper left side of the keyboard to the OFF position
2. Remove the old roll of paper from the calculator and cut or tear the paper to separate the end of the roll from the paper remaining in the printing mechanism. Press the paper advance key [t ] to run out the remaining piece of paper
3. Place the new roll of paper in the paper holder so that it unrolls from the bottom.
4. Cut the end of the paper squarely and insert it firmly into the printer slot located at the back of the calculator. Press [†] until the paper is in printing position
5. Set the PRINTER switch to the ON position is printed



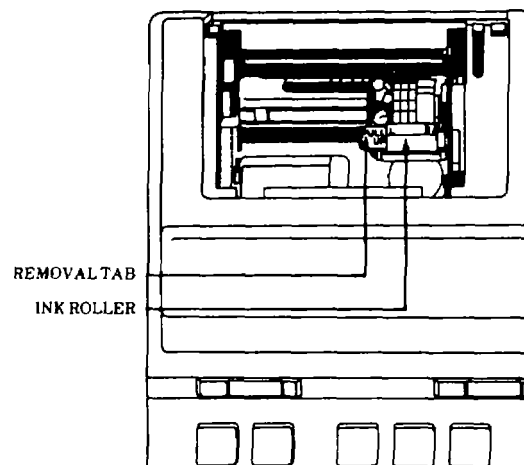
### Replacing the Ink Roller

If the printing becomes faint, you may need to replace the ink roller. Turn the calculator off and use the following procedure to install a new ink roller.

1. Remove the printer cover/paper holder. While pressing down on the front edge of the cover, slide it back and away from the calculator.



2. Remove the old ink roller by lifting it with the removal tab.



3. Insert the new Ink roller in the compartment and gently press down on the top of the roller until it snaps into place.
4. Replace the printer cover/paper holder.

**Important:** Never attempt to refill or otherwise refurbish the old Ink roller. This may damage the printing mechanism and void the calculator's warranty.

If you have difficulty with your calculator, consult the following instructions for help in correcting the problem.

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1. Be sure the POWER switch is ON. The batteries may need to be replaced, or the AC adapter may be connected incorrectly.
2. If the difficulty involves calculation errors or the calculator does not respond to keyboard entries.
  - a. Press [C]. The calculator should display 0 and print 0 C. Check the switch settings and repeat the calculations
  - b. Turn the power off for ten seconds and then back on again Repeat the calculations.
  - c. Review the operating instructions to be certain that calculations have been performed in the manner described in this book. Improper key sequences and improper switch positioning may result in incorrect answers.
3. If no printing shows on the tape.
  - a. The PRINTER switch may be in the OFF position and should be turned ON.
  - b. The ink roller may be incorrectly installed or m need of replacement.

If these procedures do not correct the difficulty, refer to the "Service Information" section of this manual.

If the solutions suggested by "In Case of Difficulty" do not correct a problem you may have with your calculator, please call or write Consumer Relations to discuss the problem.

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**For Service and  
General  
Information**

If you have questions about service or the general use of your calculator, please call Consumer Relations at:

**1-806-747-1882**

Please note that this is a toll number, and collect calls are not accepted.

You may also write to the following address:

Texas Instruments Incorporated  
Consumer Relations  
P. O. Box 53  
Lubbock, Texas 79408

Please contact Consumer Relations:

- > Before returning the calculator for service
- > For general information about using the calculator

**Express Service**

Texas Instruments offers an express service option for fast return delivery. Please call Consumer Relations for information.

**Calculator  
Accessories**

If you are unable to purchase calculator accessories (such as carrying cases or adapters) from your local dealer, you may order them from Texas Instruments. Please call Consumer Relations for information.

**Returning Your Calculator for Service**

A defective calculator will be either repaired or replaced with the same or comparable reconditioned model (at TI's option) when it is returned, postage prepaid, to a Texas Instruments Service Facility.

Texas Instruments cannot assume responsibility for loss or damage during incoming shipment. For your protection, carefully package the calculator for shipment and insure it with the carrier. Be sure to enclose the following items with your calculator:

- > Your full return address
- > Any accessories related to the problem
- > A note describing the problem you experienced
- > A copy of your sales receipt or other proof of purchase to determine warranty status

Please ship the calculator postage prepaid, COD shipments cannot be accepted.

**In-Warranty Repair**

For a calculator covered under the warranty period, no charge is made for service.

**Out-of-Warranty Repair**

A flat-rate charge by model is made for out-of-warranty service. To obtain the service charge for a particular model, call Consumer Relations before returning the product for service. (We cannot hold products in the Service Facility while providing charge information.)

**Texas Instruments Service Facilities**

U.S. Residents  
(U.S. Postal Service)  
Texas Instruments  
P.O. Box 2500  
Lubbock, Texas 79408

U.S. Residents  
(other carriers)  
Texas Instruments  
2305 N University  
Lubbock, Texas 79415

**Canadian Residents Only**

Texas Instruments  
41 Shelley Road  
Richmond Hill, Ontario, L4C 5G4

**This Texas Instruments electronic calculator warranty extends to the original consumer purchaser of the product.**

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<b>Warranty Duration</b>	This calculator is warranted to the original consumer purchaser for a period of one (1) year from the original purchase date.
<b>Warranty Coverage</b>	This calculator is warranted against defective materials or workmanship This warranty is void if the product has been damaged by accident, unreasonable use, neglect, improper service or other causes not arising out of defects in material or workmanship.
<b>Warranty Disclaimers</b>	<p>Any implied warranties arising out of this sale, including but not limited to the implied warranties of merchantability and fitness for a particular purpose, are limited in duration to the above one year period. Texas Instruments shall not be liable for loss of use of the calculator or other incidental or consequential costs, expenses, or damages incurred by the consumer or any other user.</p> <p>Some states do not allow the exclusion or limitations of Implied warranties or consequential damages, so the above limitations or exclusions may not apply to you</p>
<b>Legal Remedies</b>	This warranty gives you specific legal rights, and you may also have other rights that vary from state to state
<b>Warranty Performance</b>	<p>During the above one (1) year warranty period, your TI calculator will either be repaired or replaced with a reconditioned comparable model (at TI's option) when the product is returned, postage prepaid, to one of the Texas Instruments Service Facilities listed on page 41</p> <p>The repaired or replacement calculator will continue the warranty of the original unit or six months, whichever is longer Other than the postage requirement, no charge will be made for such repair or replacement of in-warranty calculators Out-of-warranty calculators will be charged at the rates in effect at the time the unit is received</p> <p>Texas Instruments strongly recommends that you insure the product for value, prior to mailing</p>



## APPENDIX A REFERENCES

A-1. **Scope.** This appendix contains all forms, pamphlets and technical manuals referenced in both the Air mobile and Semitrailer mounted Laboratories.

### A-2. Forms.

Recommended Changes to Publications.....	DA Form 2028
.....	DA Form 2028-2
Quality Deficiency Report .....	SF 368
Equipment Inspection and Maintenance Work Sheet .....	DA Form 2404
Hand Receipts .....	DA Form 2062

### A-3. Field Manuals.

Petroleum Testing Facilities: Laboratories and Kits .....	FM 10-72
Inspecting and Testing Petroleum Products .....	FM 10-70
ASTM Test Method Supplement to .....	FM 10-92C1/C2

### A-4. Technical Manuals.

Atlas-Copco Compressor .....	TM 10-4310-392-13&P
Alcor Jet Fuel Thermal Oxidation Tester Operating and Maintenance Manual .....	TM 10-6635-210-13&P
Bacharach Gas Alarm and Calibration Data .....	TM 10-6665-297-13&P
Brother Portable Typewriter .....	TM 10-7430-218-13&P
Chemtrix Field Ph Meter .....	TM 10-6630-237-13&P
Elkay Manufacturing 30 GPH Cooler .....	TM 10-4130-240-13&P
Emcee Micro-Separometer .....	TM 10-6640-222-13&P
Foxboro Pressure Recording Gauge.....	TM 10-6685-365-13&P
Gammon Aqua Glo Water Detector.....	TM 10-6640-221-13&P
Gammon Mini Monitor Fuel Sampling Kit .....	TM 10-6630-230-13&P
Jelrus Burn-Out Furnace.....	TM 10-6640-231-13&P
Koehler Cleveland Open Tester.....	TM 10-6630-236-13&P
Koehler Cloud and Pour Point Chamber .....	TM 10-6630-238-13&P
Koehler Copper Strip Corrosion Bomb Bath .....	TM 10-6640-220-13&P
Koehler Distillation Apparatus .....	TM 10-6630-233-13&P
Koehler Dropping Point Apparatus .....	TM 10-6635-211-13&P
Koehler Electric Pensky-Martins Tester .....	TM 10-6630-231-13&P
Koehler Foaming Characteristics Determination Apparatus.....	TM 10-6640-228-13&P
Koehler Kinematic Viscosity Bath .....	TM 10-6630-239-13&P
Koehler Tag Closed Cup Flash Tester .....	TM 10-6630-235-13&P
Lab-Line Explosion Proof Refrigerator .....	TM 10-6640-219-13&P
Lily Freezer .....	TM 10-6640-234-13&P
Millipore OM 39 Filter Holder .....	TM 10-6640-225-13&P
Millipore Vacuum Pump.....	TM 10-6640-217-13&P
Ohaus Harvard Trip Balance .....	TM 10-6670-278-13&P
Precision Gas-Oil Distillation Test Equipment .....	TM 10-6630-219-13&P
Precision General Purpose Water Bath.....	TM 10-6640-229-13&P

Precision High Temperature Bronze Block Gum Bath.....	TM 10-6630-234-13&P
Precision General Purpose Ovens.....	TM 10-6640-218-13&P
Precision Heater Instruction Manual and Parts List .....	TM 10-6640-223-13&P
Precision Oxidation Stability Bath.....	TM 10-6640-232-13&P
Precision Pensky-Martens Flash Testers .....	TM 10-6630-231-13&P
Precision Reid Vapor Pressure Bath .....	TM 10-6640-226-13&P
Precision Slo-Speed Stirrer.....	TM 10-6640-224-13&P
Precision Universal Centrifuge.....	TM 10-6640-230-13&P
Precision Universal Penetrometer.....	TM 10-6640-228-13&P
Sargent-Welch Vacuum Pump.....	TM 10-4310-391-13&P
Sartorius Analytical Balance .....	TM 10-6670-277-13&P
Scotsman Cuber.....	TM 10-6640-227-13&P
Soltec VOM-Multimeter .....	TM 10-6625-3127-13&P
Teel Self-Priming Centrifugal Pump .....	TM 10-6640-217-13&P
Teel Submersible Pump .....	TM 10-4320-320-13&P
Texas Instrument TI-5030II Calculator .....	TM 10-7420-210-13&P

**A-5. Pamphlets.**

The Army Maintenance Management System (TAMMS).....	DA Pam 738-750
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**A-6. Miscellaneous Publications.**

The Army Integrated Publishing and Printing Program.....	AR 25-30
Laboratory, Airmobile, Aviation Fuel .....	MIL-L-52733A(ME)
Apparatus, Instruments, Chemicals, Furniture, and Supplies for Industrial, Clinical, College and Government Laboratories.....	Fisher Scientific Laboratories Catalog
Petroleum-Petrochemical Testing Equipment .....	Precision Scientific Catalog



## APPENDIX B

## MAINTENANCE ALLOCATION CHART

## Section I. INTRODUCTION

B-1 **General.**

a. This section provides a general explanation of all maintenance and repair functions authorized at various maintenance categories.

b. The Maintenance Allocation Chart (MAC) in Section II designates overall authority and responsibility for the performance of maintenance functions on the Identified end item or component. The application of the maintenance functions to the end item or component will be consistent with the capacities and capabilities of the designated maintenance categories.

c. Section III lists the tools and test equipment (both special tools and common tool sets) required for each maintenance function as referenced from Section II.

d. Section IV contains supplemental instructions and explanatory notes for a particular maintenance function

B-2. **Maintenance Functions.** Maintenance functions will be limited to and defined as follows:

a. Inspect. To determine the serviceability of an item by comparing its physical, mechanical, and/or electrical characteristics with established standards through examination (e g., by sight, sound, or feel)

b. Test. To verify serviceability by measuring the mechanical, pneumatic, hydraulic, or electrical characteristics of an item and comparing those characteristics with prescribed standards

c. Service. Operations required periodically to keep an item in proper operating condition, i.e., to clean (includes decontaminate, when required), to preserve, to drain, to paint, or to replenish fuel, lubricants, chemical fluids, or gases.

d. Adjust. To maintain or regulate, within prescribed limits, by bringing into proper or exact position, or by setting the operating characteristics to specified parameters.

e. Align. To adjust specified variable elements of an item to bring about optimum or desired performance.

f. Calibrate. To determine and cause corrections to be made or to be adjusted on instruments or test, measuring, and diagnostic equipment's used in precision measurement. Consists of comparisons of two instruments, one of which is a certified standard of knob accuracy, to detect and adjust any discrepancy in the accuracy of the instrument being compared

g. Remove/Install. To remove and install the same item when required to perform service or other maintenance functions. Install may be the act of emplacing, seating, or fixing into position a spare, repair part, or module (component or assembly) in a manner to allow the proper functioning of an equipment or system.

h. Replace. To remove an unserviceable item and install a serviceable counterpart in its place. "Replace" is authorized by the MAC and is shown as the third position code of the SMR code

*i. Repair.* The application of maintenance services<sup>1</sup>, including fault location/troubleshooting,<sup>2</sup> removal/installation, and disassembly/assembly procedures<sup>3</sup> and maintenance actions<sup>4</sup>, to identify troubles and restore serviceability to an item by correcting specific damage, fault, malfunction, or failure in a part, subassembly, module (component or assembly), end item, or system

*j. Overhaul.* That maintenance effort (service/action) prescribed to restore an item to a completely serviceable/operational condition as required by maintenance standards in appropriate technical publications (i. e, DMWR). Overhaul is normally the highest degree of maintenance performed by the Army. Overhaul does not normally return an item to like-new condition.

*k. Rebuild.* Consists of those services/actions necessary for the restoration of unserviceable equipment to a like-new condition in accordance with original manufacturing standards. Rebuild is the highest degree of materiel maintenance applied to Army equipment. The rebuild operation includes the act of returning to zero those age measurements (hours/miles, etc.) considered in classifying Army equipment/components.

### B-3. Explanation Of Columns In The MAC, Section II.

*a. Column 1. Group Number.* Column 1 lists functional group code numbers, the purpose of which is to identify maintenance significant components, assemblies, subassemblies, and modules with the next higher assembly. End item group number shall be "00."

*b. Column 2. Component/Assembly.* Column 2 contains the names of components, assemblies, subassemblies, and modules for which maintenance is authorized.

*c. Column 3. Maintenance Function.* Column 3 lists the functions to be performed on the item listed in column 2. (For a detailed explanation of these functions, see paragraph B-2.)

*d. Column 4. Maintenance Category.* Column 4 specifies, by the listing of a work time figure in the appropriate subcolumn(s), the category of maintenance authorized to perform the function listed in column 3. This figure represents the active time required to perform that maintenance function at the indicated category of maintenance. If the number or complexity of the tasks within the listed maintenance function vary at different maintenance categories, appropriate work time figures will be shown for each category. The work time figure represents the average time required to restore an item (assembly, subassembly, component, module, end item, or system) to a serviceable condition under typical field operating conditions. This time includes preparation time (including any necessary disassembly/ assembly time), troubleshooting/fault location time, and quality assurance/quality control time. In addition to the time required to perform the specific tasks identified for the maintenance functions authorized in the maintenance allocation chart. The symbol designations for the various maintenance categories are as follows:

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<sup>1</sup> Services - inspect, test, service, adjust, align, calibrate, and/or replace

<sup>2</sup> Fault locate/troubleshoot - the process of investigating and detecting the cause of equipment malfunctioning, the act of isolating a fault within a system or unit under test (UUT)

<sup>3</sup> Disassemble/assemble - encompasses the step-by-step taking apart (or breakdown) of a spare/functional group coded item to the level of its least component identified as maintenance significant (i. e, assigned an SMR code) for the category of maintenance under consideration

<sup>4</sup> Actions - welding, grinding, riveting, straightening, facing, remachining, and/or resurfacing.

- C ..... Operator/Crew
- O ..... Unit Maintenance
- F ..... Direct Support Maintenance
- H ..... General Support Maintenance
- D ..... Depot Maintenance

*e. Column 5. Tools and Equipment.* Column 5 specifies, by code, those common tool sets (not individual tools) and special tools, TMDE, and support equipment required to perform the designated function.

*f. Column 6. Remarks* This column shall, when applicable, contain a letter code, in alphabetic order, which shall be keyed to the remarks contained in section IV

**B-4. Explanation Of Columns In Tool And Test Equipment Requirements, Section III.**

*a. Column 1. Reference Code.* The tool and test equipment reference code correlates with a code used in the MAC, section II, column 5.

*b. Column 2. Maintenance Category* The lowest category of maintenance authorized to use the tool or test equipment

*c. Column 3. Nomenclature.* Name or Identification of the tool or test equipment

*d. Column 4 National Stock Number.* The National stock number of the tool or test equipment

*e. Column 5. Tool Number.* The manufacturer's part number.

**B-5. Explanation Of Columns In Remarks, Section IV.**

*a. Column 1 Reference Code.* The code recorded In Column 6, Section II

*b. Column 2. Remarks.* This column lists information pertinent to the maintenance function being performed as indicated In the MAC, section II

**Section II. MAINTENANCE ALLOCATION CHART**

(1) GROUP NUMBER	(2) COMPONENT/ ASSEMBLY	(3) MAINTENANC E FUNCTION	(4)					(5) TOOLS AND EQUIPMENT	(6) REMARKS
			MAINTENANCE LEVEL						
			UNIT	DS	GS	DEPOT			
			C	O	F	H	D		
	CALCULATOR	INSPECT	0.1						
		REPLACE REPAIR		0.1		2.0		A	

**Section III. TOOL AND TEST EQUIPMENT REQUIREMENTS  
FOR  
MAINTENANCE ALLOCATION CHART**

**NOT APPLICABLE**

**Section IV. REMARKS**

REFERENCE CODE	REMARKS
A	Repair of instrument normally requires a special electronic repair activity or use of commercial vendor.

APPENDIX C

COMPONENTS OF END ITEM AND BASIC ISSUE ITEMS LISTS

NOT APPLICABLE

**APPENDIX D**  
**ADDITIONAL AUTHORIZATION LIST**

**NOT APPLICABLE**

APPENDIX E

EXPENDABLE/DURABLE SUPPLIES AND MATERIALS LIST

Section I. INTRODUCTION

E-1. **Scope.** This listing is for Informational purposes only and is not authority to requisition the listed items. These items are authorized to you by CTA 50-970, Expendable/Durable Items (except medical, class V, repair parts, and heraldic Items)

E-2. **Explanation of Columns.**

*a. Column (1) - Item Number.* This number is assigned to the entry In the listing and is referenced In the narrative instructions to Identify the material (e. g , Use cleaning compound, item 5, appendix C)

*b. Column (2) - Level.* This column identifies the lowest level of maintenance that requires the listed item.

- C - Operator/Crew
- O - Unit Maintenance
- F - Direct Support Maintenance
- H - General Support Maintenance

*c. Column (3)-National Stock Number.* This Is the National stock number assigned to the item; use it to request or requisition the item

*d. Column (4) - Description.* Indicates the Federal item name, and, if required, a description to identify the item. The last line for each Item Indicates the Commercial and Government Entity Code (CAGEC) in parentheses followed by the part number

*e. Column (5) - Unit of Measure (U/M).* Indicates the measure used In performing the actual maintenance function. This measure is expressed by a two-character alphabetical abbreviation (e.g., EA, IN, PR). If the unit of measure differs from the unit of issue, requisition the lowest unit of Issue that will satisfy your requirements.

Section II. EXPENDABLE/DURABLE SUPPLIES AND MATERIALS LIST

(1) Item Number	(2) Level	(3) National Stock Number	(4) Description	(5) U/M
	C	6135-00-043-0021	AA BATTERY	EA

By Order of the Secretary of the Army:

CARL E. VUONO  
*General, United States Army*  
*Chief of Staff*

Official:

THOMAS F. SIKORA  
*Brigadier General, United States Army*  
*The Adjutant General*

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CAREFULLY TEAR IT OUT, FOLD IT  
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PUBLICATION DATE

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NO.

PARA-  
GRAPH

FIGURE  
NO.

TABLE  
NO.

IN THIS SPACE, TELL WHAT IS WRONG  
AND WHAT SHOULD BE DONE ABOUT IT.

PRINTED NAME, GRADE OR TITLE AND TELEPHONE NUMBER

SIGN HERE

## The Metric System and Equivalents

### Linear Measure

1 centimeter = 10 millimeters = .39 inch  
 1 decimeter = 10 centimeters = 3.94 inches  
 1 meter = 10 decimeters = 39.37 inches  
 1 dekameter = 10 meters = 32.8 feet  
 1 hectometer = 10 dekameters = 328.08 feet  
 1 kilometer = 10 hectometers = 3,280.8 feet

### Weights

1 centigram = 10 milligrams = .15 grain  
 1 decigram = 10 centigrams = 1.54 grains  
 1 gram = 10 decigrams = .035 ounce  
 1 decagram = 10 grams = .35 ounce  
 1 hectogram = 10 decagrams = 3.52 ounces  
 1 kilogram = 10 hectograms = 2.2 pounds  
 1 quintal = 100 kilograms = 220.46 pounds  
 1 metric ton = 10 quintals = 1.1 short tons

### Liquid Measure

1 centiliter = 10 milliliters = .34 fl. ounce  
 1 deciliter = 10 centiliters = 3.38 fl. ounces  
 1 liter = 10 deciliters = 33.81 fl. ounces  
 1 dekaliter = 10 liters = 2.64 gallons  
 1 hectoliter = 10 dekaliters = 26.42 gallons  
 1 kiloliter = 10 hectoliters = 264.18 gallons

### Square Measure

1 sq. centimeter = 100 sq. millimeters = .155 sq. inch  
 1 sq. decimeter = 100 sq. centimeters = 15.5 sq. inches  
 1 sq. meter (centare) = 100 sq. decimeters = 10.76 sq. feet  
 1 sq. dekameter (are) = 100 sq. meters = 1,076.4 sq. feet  
 1 sq. hectometer (hectare) = 100 sq. dekameters = 2.47 acres  
 1 sq. kilometer = 100 sq. hectometers = .386 sq. mile

### Cubic Measure

1 cu. centimeter = 1000 cu. millimeters = .06 cu. inch  
 1 cu. decimeter = 1000 cu. centimeters = 61.02 cu. inches  
 1 cu. meter = 1000 cu. decimeters = 35.31 cu. feet

## Approximate Conversion Factors

To change	To	Multiply by	To change	To	Multiply by
inches	centimeters	2.540	ounce-inches	Newton-meters	.007062
feet	meters	.305	centimeters	inches	.394
yards	meters	.914	meters	feet	3.280
miles	kilometers	1.609	meters	yards	1.094
square inches	square centimeters	6.451	kilometers	miles	.621
square feet	square meters	.093	square centimeters	square inches	.155
square yards	square meters	.836	square meters	square feet	10.764
square miles	square kilometers	2.590	square meters	square yards	1.196
acres	square hectometers	.405	square kilometers	square miles	.386
cubic feet	cubic meters	.028	square hectometers	acres	2.471
cubic yards	cubic meters	.765	cubic meters	cubic feet	35.315
fluid ounces	milliliters	29.573	cubic meters	cubic yards	1.308
pints	liters	.473	milliliters	fluid ounces	.034
quarts	liters	.946	liters	pints	2.113
gallons	liters	3.785	liters	quarts	1.057
ounces	grams	28.349	liters	gallons	.264
pounds	kilograms	.454	grams	ounces	.035
short tons	metric tons	.907	kilograms	pounds	2.205
pound-feet	Newton-meters	1.356	metric tons	short tons	1.102
pound-inches	Newton-meters	.11296			

## Temperature (Exact)

°F	Fahrenheit temperature	5/9 (after subtracting 32)	Celsius temperature	°C
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