Texas Instruments
electronic calculator
TI LCD Programmer

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I. INTRODUCTION

Your calculator is designed to perform fast accurate calculations in base 16 (hexadecimal), base 10 (decimal) and base 8 (octal) number systems and to provide conversions from one base to another. Small size and simple operation with arithmetic and logical operation capability make it ideally suited for applications in computer programming, operations, and study, including minicomputer and microcomputer applications. Your TI Programmer carries on the Texas Instruments tradition. Texas Instruments invented the integrated circuit, the microprocessor, and the microcomputer, which have made TI synonymous with reliability, affordability, and compactness.

Features and Functions

- Performs arithmetic in any one of the three number bases.
- Integer, two's complement arithmetic (using the [+/−] key) in OCT (base 8) and HEX (base 16).
- Signed floating point arithmetic in DEC (base 10) for use in day to day decimal computations.
- One's complement key—provides one's complement capability in OCT and HEX.
- Number conversions—converts integer numbers between base 8, base 10 and base 16.
- Parentheses—15 sets available at each of 4 processing levels to allow you to dictate the order of interpretation of a mathematical sequence.

- Constant Memory—Independent memory with summation to memory capability. Retains memory even when the calculator is turned off.
- Logical operations—Logical operations perform bit by bit logical operations on numbers in HEX and OCT.
- Constant mode—Operations with a constant number for all arithmetic and logical operations.
- Battery saver mode—APD™ Automatic power down mode to minimize power consumption.

APD™ Automatic Power Down

Electronic control (as opposed to switch control) of **[ON/C]** and **[OFF]** allows the calculator to conserve battery power by automatically powering down. The calculator automatically powers down after a period of 23 to 24 minutes of nonuse. This feature provides a substantial increase in the operating life of your batteries.

At times it is convenient to disable the automatic power down feature. To do so, depress the **[DEC]**, **[HEX]**, **[OCT]** and **[OFF]** keys simultaneously and hold them down. Next depress the **[ON/C]** key and hold it down. Release the **[DEC]**, **[HEX]**, **[OCT]**, and **[OFF]** keys and then the **[ON/C]** key. "Error" is displayed. Depress the **[ON/C]** key. The automatic power down feature is disabled and the calculator is ready for operation. When the calculator is turned off, the automatic power down feature is reactivated.

II. KEY DEFINITIONS

[ON/C] **On/Clear Key**—Initially this key applies power to the calculator. Once the calculator is turned on, pressing this key clears the display, all pending operations and the constant but does not affect the number base or the memory.

[OFF] **Off Key**—Turns the calculator off.

[CE] **Clear Entry Key**—Pressing this key clears the entered number if no function or operation key has been pressed. When pressed after an operation or a function, this key has no effect.

[0]-[9] **Number Keys**—Enters numbers 0 through 9. Digits 8 and 9 are ignored in the OCT base.

[A]-[F] **Hex Number Keys**—Enters hexadecimal numbers A through F. These keys are ignored in the DEC and OCT bases.

[·] **Decimal Point Key**—Enters a decimal point. This key is ignored in the HEX and OCT bases.

[+/−] **Change Sign Key**—In the DEC base, this key changes the sign of a number. In HEX and OCT, this key causes the two's complement of the number to be displayed.

[DEC] **Decimal Base Key**—Selects the decimal base (base 10). The DEC indicator appears in the bottom of the display. Any displayed value is converted to base 10 when this key is pressed.

[HEX] **Hexadecimal Base Key**—Selects the hexadecimal base (base 16). When in this base, HEX appears in the bottom of the display. The integer of the displayed value is converted to base 16 when this key is pressed.

[OCT] **Octal Base Key**—Selects the octal base (base 8). When in this base, OCT appears in the bottom of the display. The integer of the displayed value is converted to base 8 when this key is pressed.

[+] **Add Key**—Instructs the calculator to add the next entered quantity to the displayed number.

[−] **Subtract Key**—Instructs the calculator to subtract the next entered quantity from the displayed number.

[×] **Multiply Key**—Instructs the calculator to multiply the displayed number by the next entered quantity.

[÷] **Divide Key**—Instructs the calculator to divide the displayed number by the next entered quantity. In the HEX and OCT modes, the fractional part of the quotient is truncated.

[AND] **AND Key**—Instructs the calculator to logically AND the next entered quantity to the displayed number. This key is ignored in DEC base.

[OR] **OR Key**—Instructs the calculator to logically OR the next entered quantity to the displayed number. This key is ignored in DEC base.

[XOR] **Exclusive OR Key**—Instructs the calculator to logically exclusive OR the next entered quantity to the displayed number. This key is ignored in DEC base.

[1'sC] **One's Complement Key**—Instructs the calculator to immediately convert the displayed number to its one's complement. This is equivalent to the logical NOT function. This key is ignored in DEC base. (For two's complement, see **[+/−]** key description).

[SHF] **Shift Key**—Instructs the calculator to logical shift the displayed number by the number of bits indicated by the next entered quantity. A *positive quantity* causes a *logical left shift* and a *negative quantity* causes a *logical right shift*. Since a logical shift is used, bits shifted into the number field are always zeroes. This key is ignored in DEC base.

[=] **Equal Key**—Completes all previously entered operations and displays the result.

[(] [)] **Parentheses Keys**—Used to isolate particular arithmetic or logical expressions for execution in desired sequence.

[STO] **Store Key**—Stores the displayed quantity in the memory without removing it from the display. Any previously stored value is cleared.

[RCL] **Recall Key**—Retrieves stored data from the memory to the display. Use of this key does not clear the memory. Quantities recalled from memory are converted to the current base regardless of the base in which they were stored.

[SUM] **Sum to Memory Key**—Algebraically adds the displayed value to the contents of memory*. This key does not affect the displayed number or calculations in progress.

[K] **Constant Key**—Stores a number and its associated operation for repetitive calculations.

*Whenever a number is summed to memory, the contents of memory are converted to the current base prior to the summation taking place. (See further discussion on page 19).

III. OPERATING INSTRUCTIONS

Your calculator has been specifically designed for straightforward operation with a minimum amount of instruction necessary before you can begin solving problems.

Turning the Calculator On

Pressing **[ON/C]**, turns on and clears the calculator. Power-on condition is indicated by the presence of a displayed digit. The **[OFF]** key turns off the calculator. The Constant Memory feature causes the values in memory and the number base setting to be saved even when the calculator is turned off.

If during operation the display becomes dim or erratic, the batteries may need to be replaced. See Battery Replacement for information. If the display is not blank after the batteries have been installed, press **[OFF]** to reset the calculator.

Display Format

In addition to power-on and numerical information, the display provides indication of a negative number in decimal mode, the current number base, memory use, and error. As many as eight digits may be entered from the keyboard. All number keys pressed after the eighth are ignored.

In the decimal base, negative numbers are indicated by a floating minus sign immediately to the left of the displayed number with the decimal displayed in

its true position. Leading zeroes of HEX and OCT numbers are blanked just as in the DEC base.

The numbers 0 through F are displayed in the following fashion:

Keyboard: **0 1 2 3 4 5 6 7 8 9 A b C d E F**
Display: 0123456789AbCdEF

To distinguish between b and 6, the numbers 6 and 9 have "tails".

If an incorrect number entry is made, pressing the **[CE]** key before any non-number key clears the incorrect number without affecting any calculations in progress.

When an unwanted operation key is pressed, simply press the correct operation and continue.

Error Indications

The following display is given to indicate error:

Error

To clear the error condition, press **[ON/C]**.

An error condition is indicated in the display for the following reasons:

1. The calculation results (in display or in memory) are outside the range of the calculator in the current base. Memory contents are not converted when changing bases unless the **[RCL]** or **[SUM]** key is pressed. The range in each of the number bases is as follows:

BASE	RANGE
DEC	±.00000001 to ±99999999.
HEX	80000000 to 7FFFFFFF (integer only)
OCT	40000001 to 37777777 (integer only)

See the detailed discussion of memory operation on page 18.

2. Dividing a number by 0.
3. Attempting to use more than 4 levels of processing or to have more than 15 open parentheses at any one level.
4. Taking the two's complement of 40000000_8 or 800000000_{16}. See detailed discussion in Table 1, page 10.
5. Forcing a logical operation to take place in the decimal base. See example on page 17.

Base Conversions

The number base is selected with one of the three keys **[DEC]**, **[HEX]**, or **[OCT]**. The indicators across the bottom of the display, DEC, HEX, OCT, identify the number base presently in operation. Any number entry is interpreted as being in the base the calculator is in while the number is entered. In DEC base, the number keys **[A]** through **[F]** and the logical function keys are ignored. In OCT base, the number keys **[8]** through **[F]** and the **[·]** key are ignored. In HEX base, the **[·]** key is ignored. Changing the base causes the integer portion of the number in the display to be converted to the new base. All pending operations and memory contents are internally

identified with the base in which they were entered. The correct result in the current base is displayed regardless of the bases in which the numbers were entered.

In OCT or HEX number base, the calculator operates in integer mode only. Negative numbers are presented by their two's complement. A number map correlating the full range of numbers in HEX and OCT with their decimal equivalents is shown in Table 1. *When fractional decimal numbers are converted to either HEX or OCT bases, the fractional part is truncated, not rounded.*

Table 1.

OCTAL NUMBER MAP

OCTAL	DECIMAL	Comments
0	0	
1	1	
:	:	
:	:	
37777777	8388607	Largest positive OCT number
40000001	– 8388607	Largest negative OCT number
:	:	
:	:	
77777776	– 2	
77777777	– 1	
0	0	

HEXADECIMAL NUMBER MAP

HEXADECIMAL	DECIMAL	Comments
0	0	
1	1	
:	:	
:	:	
5F5E0FF	99999999	Largest positive HEX number which can be converted to DEC.
:	:	
:	:	
7FFFFFFF	(2,147,483,647)*	Largest positive HEX number
80000000	(– 2,147,483,648)*	Largest negative HEX number
80000001	(– 2,147,483,647)*	
:	:	
:	:	
FA0A1F01	– 99999999	Largest negative HEX number which can be converted to DEC.
FFFFFFFE	– 2	
FFFFFFFF	– 1	
0	0	

*DEC numbers in parentheses are greater than the display range of the calculator in DEC.

Note: Any operation or function which requires taking the two's complement of 40000000_8 or

80000000_{16} results in an error indication. In particular, pressing **[+/−]** when either number is in the display results in an error indication. An error indication is also given when either number is used as the second operand of a subtract or shift operation, or as either operand of a multiply or divide operation.

In the following examples, the key **[DEC]**, **[HEX]**, or **[OCT]** is used as the first step in each problem to indicate the number base to be used initially.

Conversions are quite straightforward.

Example: $165_8 = ?_{10} = ?_{16}$

Enter	Press	Display		Comments
	[ON/C] [OCT]	OCT	0	
165	**[DEC]**	DEC	117	$165_8 = 117_{10}$
	[HEX]	HEX	75	$165_8 = 75_{16}$

Arithmetic Operations

Arithmetic operations may be combined with conversions.

Example: $45_{16} + 25_{10} = ?_{16}$

Enter	Press	Display		Comments
	[ON/C] [HEX]	HEX	0	Clear display
45	**[+]**	HEX	45	
	[DEC]	DEC	69	
25	**[=]**	DEC	94	
	[HEX]	HEX	5E	

Pressing any number key following the [=] key automatically clears the calculator for another problem. This can be seen by continuing with the next example without pressing **[ON/C]**. The display contains the result of the last problem. This value is converted when a base change key is pressed. It has no effect on subsequent calculations, however.

Example: $\frac{204_8 + 130_8}{A_{16}} = ?_{16}$

Enter	Press	Display		Comments
	[OCT]	OCT	136	Conversion of last result to octal.
204	[+]	OCT	204	
130	[÷] **[HEX]**	HEX	dC	
A	[=]	HEX	16	

Although **[ON/C]** need not be pressed if equals has been used to complete calculations, it is used in the following examples to insure a clear display. Note the effect of truncation of the fractional part in HEX and OCT in the following examples:

Example: $25.3_{10} \times 7_{10} = ?_{10} = ?_8$ (Integer conversion)

Enter	Press	Display		Comments
	[ON/C] [DEC]	DEC	0	
25.3	[×]	DEC	25.3	
7	[=]	DEC	177.1	
	[OCT]	OCT	261	$177_{10} = 261_8$
	[DEC]	DEC	177	Fractional part lost

Example: $\frac{7_8}{5_8} = ?_8$ (Integer division)

Enter	Press	Display		Comments
	[ON/C] [OCT]	OCT	0	
7	**[÷]**	OCT	7	
5	**[=]**	OCT	1	Integer part only

The following example illustrates a negative number in two's complement form and also its signed DEC equivalent.

Example: $10_{10} - 3F_{16} = ?_{16} = ?_{10}$

Enter	Press	Display		Comments
	[ON/C] [DEC]	DEC	0	
10	**[−] [HEX]**	HEX	A	
3F	**[=]**	HEX	FFFFFFCb	Negative number
	[DEC]	DEC	− 53	Signed number in DEC

Note that during arithmetic operations, the error indication is given if a calculation crosses the positive/negative number boundary (positive or negative overflow).

Example: $125720_8 \times 277_8 = ?_8$

Enter	Press	Display		Comments
	[ON/C] [OCT]	OCT	0	
125720	**[×]**	OCT	125720	
277	**[=]**		Error	40030060_8
	[ON/C]	OCT	0	

The **[1'sC]** key gives the one's complement of a number and may be used to treat arithmetic operations in one's complement form. This key is equivalent to a logical NOT operator.

Example: $126_8 - 1223_8 = ?_8$ (answer to be in one's complement form)

Enter	Press	Display		Comments
	[ON/C] [OCT]	OCT	0	
126	**[−]**	OCT	126	
1223	**[=]**	OCT	77776703	Negative number in two's complement.
	[+/−]	OCT	1075	Absolute value.
	[1'sC]	OCT	77776702	Answer in one's complement form.

Logical Operations

Logical operations are included on your calculator to enhance its use in computer programming and digital logic design applications. The logical operations (SHF, AND, OR, XOR) are used between operands just like arithmetic operators. The **[1'sC]** key can also be used in a logical sense (as NOT) but it operates immediately on the display contents. All the logical operations operate on the displayed number bit by bit and are not functional in DEC.

Example: 19_{16} AND $1A_{16}$ = $?_{16}$

Enter	Press	Display	Comments
	[ON/C] [HEX]	HEX 0	
19	**[AND]**	HEX 19	
1A	**[=]**	HEX 18	

Example: 23_8 OR 61_8 = $?_8$

Enter	Press	Display	Comments
	[ON/C] [OCT]	OCT 0	
23	**[OR]**	OCT 23	
61	**[=]**	OCT 63	

Example: 5_{16} XOR 3_{16} = $?_{16}$

Enter	Press	Display	Comments
	[ON/C] [HEX]	HEX 0	
5	**[XOR]**	HEX 5	
3	**[=]**	HEX 6	

Example: 3_{16} AND 5_{10} = $?_{10}$ (Execution forced in DEC base)

Enter	Press	Display		Comments
	[ON/C] [HEX]	HEX	0	
3	**[AND]**	HEX	3	**[AND]** would be ignored in DEC.
5	**[DEC]**	DEC	5	
	[=]		Error	Error indication given since operation cannot be completed in DEC base.
	[ON/C]	DEC	0	Clear error condition.

The key sequence X **[SHF]** Y **[=]** results in a logical shift of X by Y bits. Bits shifted into the field of the result are always zero. If Y is positive, then the bits of X are shifted to the left. If Y is negative, the shift is to the right.

Example: 25_{16} (left shift 2 bits) = $?_{16}$

Enter	Press	Display		Comments
	[ON/C] [HEX]	HEX	0	
25	**[SHF]**	HEX	25	
2	**[=]**	HEX	94	

Example: 64_8 (right shift 2 bits) = $?_8$

Enter	Press	Display		Comments
	[ON/C] [OCT]	OCT	0	
64	**[SHF]**	OCT	64	
2	**[+/−] [=]**	OCT	15	

Memory

The memory keys allow numbers to be stored and retrieved at will for additional flexibility in calculations. Use of the memory does not effect any calculations in progress, so memory can be used wherever needed.

The **[STO]** key stores the displayed number in the memory without removing it from the display. Any previously stored value is overwritten.

The **[RCL]** key places the number stored in the memory in the display. Use of this key does not clear the memory.

The **[SUM]** key algebraically adds the displayed value to the memory content. This key does not affect the displayed number or calculations in progress. The **[ON/C]** key does not clear the memory. As a precaution, store the first quantity using **[STO]**, or store a zero to ensure the memory is clear before using **[SUM]**.

Example: What is the address of the instruction at line 100_{10} if the base address is $3F0_{16}$ or 723_8?

Enter	Press	Display		Comments
	[ON/C] [DEC]	DEC	0	
100	**[STO] [HEX]**	MEMORY HEX	64	Store relative address
3F0	**[+] [RCL] [=]**	MEMORY HEX	454	Absolute address (HEX)
	[OCT]	MEMORY OCT	2124	
723	**[+] [RCL] [=]**	MEMORY OCT	1067	Absolute address (OCT)

The memory contents are internally identified with the base for the number stored there. When **[RCL]** or **[SUM]** is pressed, the contents are converted to the current base as necessary to ensure proper operation. Generally, this makes operation very straightforward since the number recalled is displayed in the current base regardless of the bases in which numbers were stored or summed. When the **[RCL]** or **[SUM]** key is pressed and the number in memory is in a base different from the current base, a conversion to the current base is performed prior to any other action. In the event of overflow upon conversion, the error indication appears in the display and the memory is cleared. If overflow occurs as a result of the **[SUM]** operation after the conversion, the error indication appears and the contents of memory are cleared. Truncation of fractional decimal numbers in memory occurs if you use **[RCL]** or **[SUM]** while in HEX or OCT bases.

Parentheses

Parentheses are available to designate the order of operation execution in a problem. This is done by isolating expressions with parentheses. These isolated expressions are evaluated before being combined with the rest of the problem. Operations within a set of parentheses are performed as chain operations.

Example: $\frac{2+(3\times 4)}{2+5} = ?$

Enter	Press	Display		Comments
	[ON/C] [DEC]	DEC	0	
	[(]	DEC	0*	
2	**[+] [(]**	DEC	2	
3	**[×]**	DEC	3	
4	**[)] [÷] [(]**	DEC	14	Evaluation of numerator
2	**[+]**	DEC	2	
5	**[=]**	DEC	2	

*Previous result may be displayed if **[ON/C]** is not used.

With parentheses, 4 numbers and their pending operations may be entered. Note that the **[=]** key automatically supplies any necessary right parentheses. A maximum of 15 open parentheses can be used for each of the 4 levels of pending operations. Exceeding either the 15 open

parentheses limit or the 4 pending operations limit causes an error indication.

Constant Mode

Repetitive calculations can be simplified through use of the constant feature of the calculator. Pressing the **[K]** key causes the operation and displayed value to be stored as the constant. For example, **[2] [×] [K] [3] [=]** displays 6 and causes the number and operation **[2] [×]** to be stored. Then pressing **[2] [=]** gives the answer 4. Likewise **[2] [×] [3] [K] [=]** causes **[×] [3]** to be stored as the constant. The constant key can be used with the **[SHF]**, **[AND]**, **[OR]**, **[XOR]**, **[÷]**, **[×]**, **[−]**, and **[+]** operations.

Assuming M is the repetitive (constant) number, the following sequences enable the calculator to achieve the desired constant operation:

M **[+] [K]** or **[+]** M **[K]** adds M to each subsequent entry.

M **[−] [K]** or **[−]** M **[K]** subtracts M from each subsequent entry.

M **[×] [K]** or **[×]** M **[K]** multiplies each subsequent entry by M.

M **[÷] [K]** or **[÷]** M **[K]** divides each subsequent entry by M.

M **[AND] [K]** or **[AND]** M **[K]** performs a logical AND M on each subsequent entry.

M **[OR] [K]** or **[OR]** M **[K]** performs a logical OR M on each subsequent entry.

M **[XOR] [K]** or **[XOR]** M **[K]** performs a logical exclusive OR on each subsequent entry.
M **[SHF] [K]** or **[SHF]** M **[K]** logically shifts each subsequent entry by M bits.

Example: If the address of instruction 0 is $3F0_{16}$, what is the address of instructions 12_{10}, 65_{10}, 100_{10} and -2_{10}?

Enter	Press	Display		Comments
	[ON/C] [HEX]	HEX	0	
3F0	**[+] [K] [DEC]**	DEC	1008	
12	**[HEX] [=]**	HEX	3FC	Address of instruction 12
	[DEC]	DEC	1020	
65	**[HEX] [=]**	HEX	431	Address of instruction 65
	[DEC]	DEC	1073	
100	**[HEX] [=]**	HEX	454	Address of instruction 100
	[DEC]	DEC	1108	
2	**[+/−] [HEX]**			
	[=]	HEX	3EE	Two addresses prior to instruction 0.

Combining Operations

Guidelines:

- Operations are normally completed in sequential order. Each time **[+]**, **[−]**, **[×]**, **[÷]**, **[SHF]**, **[AND]**, **[OR]**, or **[XOR]** is pressed, the previous operation is completed.
- Parentheses specify the order in which operations are performed. The operations within each set are completed before being combined with the rest of the problem.
- The **[+/−]** key and **[1'sC]** key operate only on the displayed value, immediately replacing the displayed value with its function.

Example: $\dfrac{(12_{10} + 18_{16}) \times 50_{8}}{(14_{8} - A_{16}) \times (AC_{16} - 28_{10})} = ?_{10}$

Enter	Press	Display		Comments
	[ON/C] [DEC]	DEC	0	
	[(] [(]	DEC	0*	
12	**[+] [HEX]**	HEX	C	
18	**[)] [×] [OCT]**	OCT	44	
50	**[)] [÷] [(] [(]**	OCT	2640	
14	**[−] [HEX]**	HEX	C	
A	**[)] [×] [(]**	HEX	2	
AC	**[−] [DEC]**	DEC	172	
28	**[=]**	DEC	5	

*Previous result may be displayed if **[ON/C]** is not used.

Example: (12_{16} OR AD_{16}) AND (26_{16} OR C_{16}) = $?_{16}$

Enter	Press	Display		Comments
	[ON/C] [HEX]	HEX	0	
	[(]	HEX	0*	
12	**[OR]**	HEX	12	
Ad	**[)] [AND] [(]**	HEX	bF	
26	**[OR]**	HEX	26	
C	**[=]**	HEX	2E	

*Previous result may be displayed if **[ON/C]** is not used.

Floating Point Conversions

Since the calculator does not convert the fractional portion of decimal numbers to HEX or OCT, direct conversion of non-integers to these bases is not possible. One simple approach to accomplish this is as follows:

- Multiply the desired decimal number by some convenient power of 8 or 16 (in base 10).
- Then convert the result to the desired base (8 or 16) and place the decimal according to the power used.

Example: Convert 3.1415926_{10} to HEX.

Enter	Press	Display		Comments
	[ON/C] [HEX]	HEX	0	
1000000	**[DEC] [×]**	DEC	16777216	Enter 16^6 convert to DEC.
3.1415926	**[=] [HEX]**	HEX	3243F68	i.e. $3.243F68_{16}$

Another variation of this scheme is shown by the next example.

Example: Convert 2.557605_8 to DEC.

Enter	Press	Display		Comments
	[ON/C] [OCT]	OCT	0	
1000000	**[STO]**	MEMORY OCT	1000000	Store 8^6
2557605	**[DEC]**	MEMORY DEC	712581	Enter number and convert to DEC.
	[÷] [RCL] [=]	MEMORY DEC	2.7182808	Divide by 8^6

IV. SERVICE AND WARRANTY INFORMATION

In Case of Difficulty

1. If digits fail to appear on the display, check for improperly inserted or discharged batteries. See Battery Replacement on the following page.
2. Press **[OFF]** then **[ON/C]** and try calculation again. Review operating instructions to be certain that calculations were performed correctly.
3. When batteries are inserted into the calculator and the display does not reset, pressing **[OFF]** then **[ON/C]** resets the display and prepares the calculator for use.

If none of the above procedures corrects the difficulty, return the calculator PREPAID to the applicable SERVICE FACILITY listed under Warranty Performance.

NOTE: The P.O. Box number listed for the Lubbock Service Facility is for United States parcel post shipments only. If you use another carrier, the street address is:

Texas Instruments Incorporated
2305 University Avenue
Lubbock, TX 79415

For your protection, the calculator should be sent insured; Texas Instruments cannot assume any responsibility for loss of or damage to uninsured shipments.

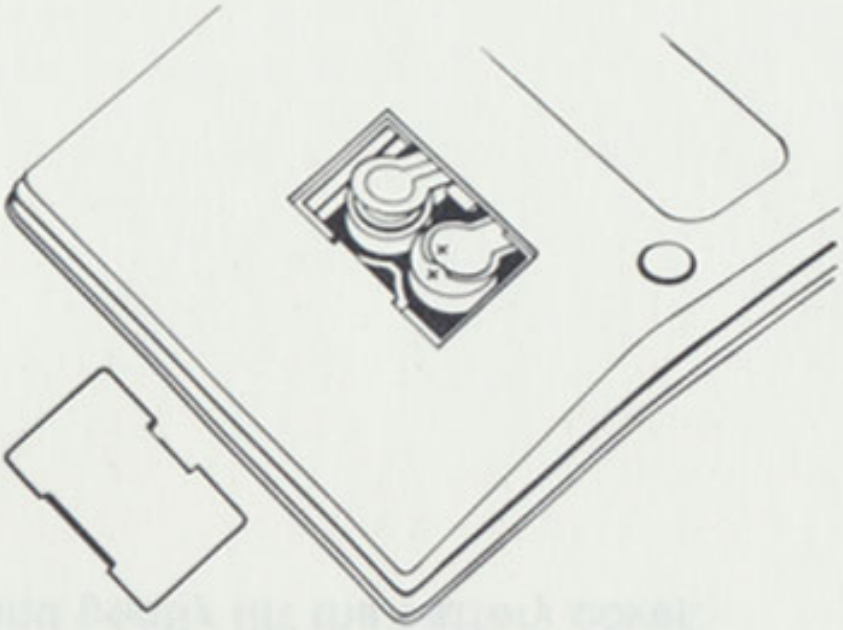
Please include information on the difficulty experienced with the calculator, as well as return address information including name, address, city, state and zip code. The shipment should be carefully packaged and adequately protected against shock and rough handling.

Battery Replacement

NOTE: The calculator cannot hold data in memory when the batteries are removed or become discharged.

The calculator uses 2 of any of the following batteries for up to 750 hours of operation: Panasonic LR-44, Ray-O-Vac RW-82, Union Carbide (Eveready) A-76, or the equivalent. For up to 2000 hours of operation use Mallory 10L14, Union Carbide (Eveready) 357, Panasonic WL-14, Toshiba G-13, Ray-O-Vac RW-42, or the equivalent.

1. Turn the calculator off. Place a small screwdriver, paper clip, or other similar instrument into the slot and gently lift the battery cover.



2. Remove the discharged batteries and install new ones as shown. Be careful not to crease the film contacts while installing the new batteries. Be sure the film contacts are positioned to lay on top of the batteries after the batteries are installed.
3. Replace the cover top edge first, then gently press until the bottom of the cover snaps into place.
4. Press **[OFF]** and **[ON/C]**. The calculator is ready to be used.

CAUTION: Do not incinerate the old batteries.

Calculator Exchange Centers

If your calculator requires service, instead of returning the unit to your dealer or to a service facility for repair, you may elect to exchange the calculator for a factory-rebuilt calculator of the

same model (or equivalent model specified by TI) by bringing the calculator in person to one of the exchange centers which have been established across the United States. No charge will be made for the exchange with proof-of-purchase during the first 90 days. The exchanged unit will be in warranty for the remainder of the original warranty period or for 6 months, whichever is longer. A handling fee will be charged for exchange after 90 days from the date of purchase. Out-of-warranty exchanges will be charged at the rates in effect at the time of the exchange. To determine if there is an exchange center in your locality, look for Texas Instruments Incorporated Exchange Center in the white pages of your telephone directory or look under the Calculator and Adding Machine heading in the yellow pages. Please call the exchange center for the availability of your model. Write the Consumer Relations Department for further details and the location of the nearest exchange center.

If You Need Service Information

If you have questions concerning calculator repair, accessory purchase or the basic functions of your calculator, please call our Consumer Relations Department at (800) 858-1802 (toll free within the contiguous United States except Texas) or (800) 692-1353 (within Texas). If outside the contiguous United States call (806) 741-2646. We regret that we cannot accept collect calls at this number.

For Technical Assistance

For technical questions such as specific calculator applications, etc., you can call (806) 747-3841. We regret that this is not a toll-free number, and we cannot accept collect calls. As an alternative, you can write to:

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

Because of the number of suggestions which come to Texas Instruments from many sources, containing both new and old ideas, Texas Instruments will consider such suggestions only if they are freely given to Texas Instruments. It is the policy of Texas Instruments to refuse to receive any suggestions in confidence. Therefore, if you wish to share your suggestions with Texas Instruments, or if you wish us to review any calculator key sequence which you have developed, please include the following in your letter:

> "All of the information forwarded herewith is presented to Texas Instruments on a nonconfidential, nonobligatory basis; no relationship, confidential or otherwise, expressed or implied, is established with Texas Instruments by this presentation. Texas Instruments may use, copyright, distribute, publish, reproduce, or dispose of the information in any way without compensation to me."

Texas Instruments Consumer Service Facilities

U. S. Residents:
Texas Instruments Service Facility
P. O. Box 2500
Lubbock, Texas 79408

Canadian customers only:
Geophysical Services Incorporated
41 Shelley Road
Richmond Hill, Ontario, Canada L4C5G4

California and Oregon: Consumers in California and Oregon may contact the following Texas Instruments offices for additional assistance or information.

Texas Instruments Consumer Service
831 South Douglas Street
El Segundo, California 90245
(213) 973-1803

Texas Instruments Consumer Service
6700 Southwest 105th St.
Kristin Square
Suite 110
Beaverton, Oregon 97005
(503) 643-6758

Notes

ONE-YEAR LIMITED WARRANTY

THIS TEXAS INSTRUMENTS ELECTRONIC CALCULATOR WARRANTY EXTENDS TO THE ORIGINAL CONSUMER PURCHASER OF THE PRODUCT.

WARRANTY DURATION: This calculator is warranted to the original consumer purchaser for a period of one year from the original purchase date.

WARRANTY COVERAGE: This calculator is warranted against defective materials or workmanship. **THIS WARRANTY DOES NOT COVER BATTERIES AND IS VOID IF THE PRODUCT HAS BEEN DAMAGED BY ACCIDENT, UNREASONABLE USE, NEGLECT, IMPROPER SERVICE OR OTHER CAUSE NOT ARISING OUT OF DEFECTS IN MATERIAL OR WORKMANSHIP.**

WARRANTY DISCLAIMERS: 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.

Some states do not allow the exclusion or limitation of implied warranties or consequential damages, so the above limitations or exclusions may not apply to you.

LEGAL REMEDIES: This warranty gives you specific legal rights, and you may also have other rights that vary from state to state.

WARRANTY PERFORMANCE: During the above one 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 a Texas Instruments Service Facility listed on page 31. In the event of replacement with a reconditioned model, the replacement product will continue the warranty of the original calculator or 6 months, whichever is longer. Other than the postage requirement, no charge will be made for such repair, adjustment, and/or replacement.

If the calculator is out of warranty, service rates in effect at the time of return will be charged. Please include information on the difficulty experienced with the calculator as well as return address information including name, address, city, state, and zip code. The shipment should be carefully packaged and adequately protected against shock and rough handling.

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