Texas Instruments
electronic calculator
TI 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.

FEATURES AND FUNCTIONS

- Performs arithmetic in any one of three number bases.
- Integer, two's complement arithmetic is used 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 are available at each of 4 processing levels to allow you to dictate the order of interpretation of a mathematical sequence.
- Memory — Independent memory with summation to memory capability.
- Logical operations — Logical operations are provided which perform bit by bit logical operations on numbers in HEX and OCT.
- Constant mode — Allows operations with a constant number for all arithmetic and logical operations.
- Battery saver mode — Traveling decimal display and automatic turn off modes to minimize power consumption.

TIME OUT AND TURN OFF

Electronic control (as opposed to switch control) of ON and OFF allows the calculator to conserve battery power by displaying a number for only a limited length of time. The display reverts to a traveling decimal point after typically 40 to 80 seconds of non use. As soon as any key is pressed, the display is restored. One convenient method of reactivating the display is to press the base key [DEC], [HEX], [OCT] you desire. This ensures that calculations in progress are not affected and that processing continues as though nothing had happened to the display. The benefit is a substantial increase in the operating life of your battery.

If not interrupted, the traveling decimal point display continues for a period of 7 to 14 minutes and then the calculator automatically turns completely off.

At times, such as when using your calculator with the AC charger/adapter connected, you may prefer to defeat the time-out feature. A special key sequence may be used to inhibit time-out operation. With the calculator on, press the [0], [.], and [=] keys and hold them down *simultaneously*. This will completely inhibit the time-out and turn-off operation until the next time the calculator is turned off and on.

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.

[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 will have no effect.

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

[A] **through** [F] **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). When initially turned on, the calculator will be in this base. There is no special indication in the display for this base. Any displayed value will be converted to base 10 when this key is pressed.

[HEX] **Hexadecimal Base Key** — Selects the hexadecimal base (base 16). When in this base, two flags (") will appear in the upper left corner of the display. Any displayed value will be converted to base 16 when this key is pressed.

[OCT] **Octal Base Key** — Selects the octal base (base 8). When in this base, one flag (') will appear in the upper left corner of the display. Any displayed value will be 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 logical *AND* the next entered quantity to the displayed number. This key is ignored in DEC base.

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

[XOR] **Exclusive Or Key** — Instructs the calculator to logical *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 will cause a logical *left shift*, a negative quantity will cause a logical *right shift*. Since a logical *shift* is used, bits shifted into the number field will always be 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 will be 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 will be converted to the current base prior to the summation taking place. (See further discussion on page 15).

III. OPERATING INSTRUCTIONS

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

TURNING THE CALCULATOR ON

Pressing [ON/C], turns on and totally clears the calculator. Power-on condition is indicated by the presence of a lighted digit or a traveling decimal point in the display. The [OFF] key turns off the calculator. If the display is not blank after a battery has been installed, press [OFF] to reset the calculator.

The fast charge, electronic battery pack furnished with your calculator was charged at the factory before shipping. However, due to shelf-life discharging, it may require charging before initial operation. If initially or during portable operation, the display becomes dim or erratic, the battery pack needs to be charged. When fully charged, typical calculator operating time in normal use is approximately 4 hours.

With the battery pack properly installed, charging is accomplished by plugging the AC Adapter/Charger AC9132 into a convenient 115V/60HZ outlet and connecting the attached cord to the calculator socket. Approximately 4 to 6 hours of charging restores full charge to the battery pack.

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 and error. As many as 8 digits may be entered from the keyboard. All number keys pressed after the 8th are ignored.

In the decimal base, negative numbers are indicated by a floating minus sign immediately to the left of the displayed number and the decimal is displayed in its true position at all times. Leading zeroes of HEX and OCT numbers are blanked just as done 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: 

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 calcualtions in progress.

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

ERROR INDICATIONS

The following display will be given to indicate error:

-EEEEEEEE

To clear the error condition, press [ON/C] . Note the "Minus sign" which distinguishes this from the HEX number "EEEEEEEE.

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	40000000 to 37777777 (integer only)

See the detailed discussion of memory operation on page 14.

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 80000000_{16}. See detailed discussion in Table I page 10.
5. Forcing a logical operation to take place in the decimal base. See example on page 14.

BASE CONVERSIONS

The number base is selected with one of the three keys [DEC], [HEX], or [OCT]. There is no base indicator in DEC. One flag (') shows in the upper left corner of the display in OCT and two flags (") for HEX. The calculator is in DEC base on initial turn on. 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 will cause the number in the display to be converted to the new base. All pending (not yet completed) operations and memory contents are internally identified with the base in which

they were entered. The correct result in the current base will be displayed regardless of the bases in which the numbers were entered.

In OCT or HEX number base, the calculator operates in integer mode only. (The decimal point is fixed at its right most position in the display). Negative numbers are represented in this mode 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 I. When fractional decimal numbers are converted to either HEX or OCT bases, **the fractional part is truncated**, not rounded.

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
	[OCT]		
165	[DEC]	117.	$165_8 = 117_{10}$
	[HEX]	" 75.	$165_8 = 75_{16}$

ARITHMETIC OPERATIONS

Arithmetic operations may be combined with conversions.

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

Enter	Press	Display
	[HEX]	
45	[+]	" 45.
	[DEC]	69.
25	[=]	94.
	[HEX]	" 5E.

Table I.

OCTAL NUMBER MAP

OCTAL	DEC	COMMENTS
0	0	
1	1	
⋮	⋮	
37777777	8388607	Largest positive OCT number
40000000	−8388608	Largest negative OCT number
40000001	−8388607	
⋮	⋮	
77777776	−2	
77777777	−1	
0	0	

HEX NUMBER MAP

HEX	DEC	
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	

Note: Any operation or function which requires taking the two's complement of 40000000_8 or 80000000_{16} will result in an error indication. In particular, pressing [+/−] when either number is in the display will result in an error indication, as will attempting to convert these numbers to another base. 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.

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

Pressing any number key following the [=] key will automatically clear the calculator for another problem. This can be seen by continuing with the next example without pressing [C/ON].

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

Enter	Press	Display
	[OCT]	
204	[+]	' 204.
130	[÷] [HEX]	" dC.
A	[=]	" 16.

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
	[DEC]		
25.3	[X]	25.3	
7	[=]	177.1	
	[OCT]	261.	$177_{10} = 261_8$
	[DEC]	177.	Fractional part lost

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

Enter	Press	Display	Comments
	[OCT]		
7	[÷]	' 7.	
5	[=]	' 1.	Integer part only

The following example will illustrate 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
	[DEC]		
10	[−] [HEX]	" A.	
3F	[=]	"FFFFFFCb.	Negative number
	[DEC]	−53.	Signed number in DEC

Note that during arithmetic operations, the error indication will be 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
	[OCT]		
125720	[×]	' 125720.	
277	[=]	"EEEEEEEE.	40030060_8
	[ON/C]	' 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
	[OCT]		
126	[−]	' 126.	
1223	[=]	'77776703.	Negative number in two's complement.
	[+/−]	' 1075.	Absolute value.
	[1'sC]	'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	
	[HEX]		
19	[AND]	"	19.
1A	[=]	"	18.

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

Enter	Press	Display	
	[OCT]		
23	[OR]	'	23.
61	[=]	'	63.

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

Enter	Press	Display	
	[HEX]		
5	[XOR]	"	5.
3	[=]	"	6.

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

Enter	Press	Display	Comments
	[HEX]		
3	[AND]	3.	[AND] would be ignored in DEC.
5	[DEC]	5.	
	[=]	"EEEEEEEE.	Error indication given since operation cannot be completed in DEC base.

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

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

Enter	Press	Display	
	[HEX]		
25	[SHF]	"	25.
2	[=]	"	94.

Example: 64_{8} (right *shift* 2 bits) = $?_{8}$

Enter	Press	Display	
	[OCT]		
64	[SHF]	'	64.
2	[+/−] [=]	'	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 affect 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 except when the calculator is first turned on or when turned off and on. As a precaution, the first quantity should be stored using [STO], or a zero should be stored 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
	[DEC]		
100	[STO] [HEX]	" 64.	Store relative address
3F0	[+] [RCL] [=]	" 454.	Absolute address (HEX)
	[OCT]	' 2124.	
723	[+] [RCL] [=]	' 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 will be converted to the current base as necessary to ensure proper operation. Generally, this makes operation very straightforward since the number recalled will be 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 will appear in the display and the memory is left unchanged. If the base is then changed to one in which the stored number is in range, it can then be recalled intact. If overflow occurs as a result of the [SUM] operation after the conversion, the error indication appears and the contents of memory are altered. Please keep in mind that truncation of fractional decimal numbers in memory will occur 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	Comment
	[DEC]		
	[( ]	0.*	
2	[+] [( ]	2.	
3	[×]	3.	
4	[ )] [÷] [( ]	14.	Evaluation of numerator
2	[+]	2.	
5	[=]	2.	

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

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

of the 4 levels of pending operations. Exceeding either the 15 open parentheses limit or the 4 pending operation limit will cause 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] [X] [K] [3] [=] will display **6** and cause the operation [X] [2] to be stored. Then pressing [2] [=] will give the answer **4**. Likewise [2] [X] [3] [K] [=] will cause [X] [3] to be stored as the constant. The constant key can be used with the [SHF], [AND], [OR], [XOR], [÷], [X], [−], and [+] operations.

Assuming M is the repetitive (constant) number, the following sequences will 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 [X] [K] or [X] 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] will logical *AND* M to each subsequent entry.

M [OR] [K] or [OR] M [K] will logical *OR* M to each subsequent entry.

M [XOR] [K] or [XOR] M [K] will logical *exclusive OR* to each subsequent entry.

M [SHF] [K] or [SHF] M [K] will logical *shift* 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
	[HEX]		
3F0	[+] [K] [DEC]	1008.	
12	[HEX] [=]	" 3FC.	Address of instruction 12
	[DEC]	" 1020.	
65	[HEX] [=]	" 431.	Address of instruction 65
	[DEC]	1073.	
100	[HEX] [=]	" 454.	Address of instruction 100
	[DEC]	1108.	
2	[+/−] [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
	[DEC]		
	[( ] [( ]		0.*
12	[+] [HEX]	"	C.
18	[ )] [×] [OCT]	'	44.
50	[ )] [÷] [( ] [( ]	'	2640.
14	[−] [HEX]	"	C.
A	[ )] [×] [( ]	"	2.
AC	[−] [DEC]		172.
28	[=]		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
	[HEX]		
	[( ]	"	0.*
12	[OR]	"	12.
AD	[ )] [AND] [( ]	"	bF.
26	[OR]	"	26.
C	[=]	"	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
	[HEX]		
1000000	[DEC] [X]	16777216.	Enter 16^6 convert to DEC.
3.1415926	[=] [HEX]	" 3243F68.	i.e. $3.243F68_{16}$

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

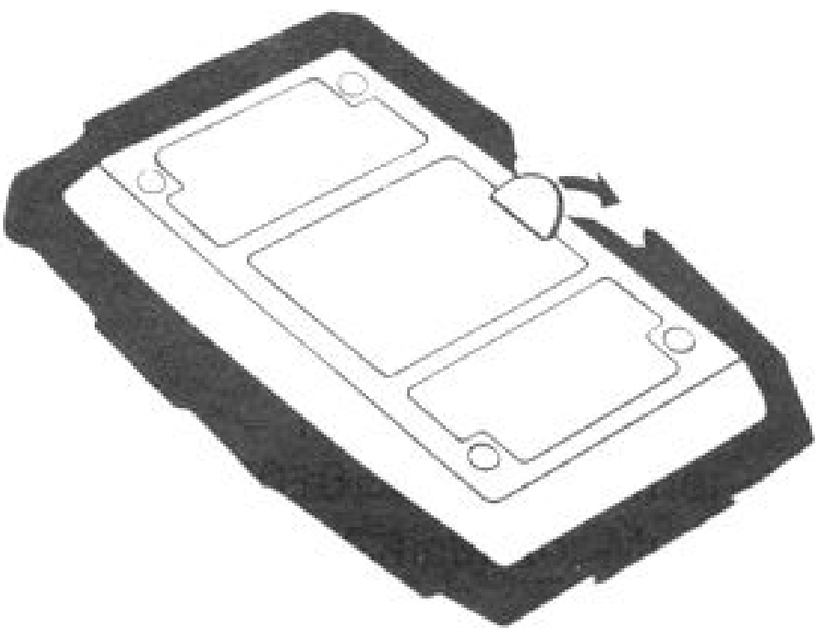
Example: Convert 2.557605_8 to DEC.

Enter	Press	Display	Comments
	[OCT]		
1000000	[STO]	1000000.	Store 8^6
2557605	[DEC]	712581.	Enter number x 8^6 and convert to DEC.
	[÷] [RCL] [=]	2.7182808	

IV. SERVICE INFORMATION

BATTERY PACK REPLACEMENT

The battery pack can be quickly and simply removed from the calculator. Hold the calculator with the keys facing down. Place a small coin (penny, dime) in the slot in the bottom of the calculator. A slight prying motion with the coin will pop the slotted end of the pack out of the calculator. Disconnect the calculator wires from the battery terminals. The pack can then be removed entirely from the calculator.



The exposed metal contacts on the battery pack are the battery terminals. Care should always be taken to prevent any metal object from coming into contact with the terminals and shorting the batteries.

To re-insert the battery pack, first, attach the connecting wires to the terminals of the battery pack. (Do not force, it will fit easily when properly oriented.) Then, place the pack into the compartment so that the small step on the end of the pack fits under the edge of the calculator bottom. A small amount of pressure on the battery pack will snap it properly into position. Again, it should fit in easily.

AC ADAPTER/CHARGER

Battery pack recharge or direct operation from standard voltage outlets is easily accomplished with the AC Adapter/Charger model AC9132 included with your calculator. The calculator cannot be overcharged; it can be operated indefinitely with the adapter/charger connected.

BATTERY OPERATION

Recharge the battery pack when the display flashes erratically or fades out.

The "fast-charge" nickel-cadmium battery pack BP-8 furnished with the calculator was charged at the factory before shipping. However, due to shelf-life discharging, it may require charging before initial operation.

With the battery pack properly installed, charging is accomplished by plugging the AC Adapter/Charger AC9132 into a convenient 115 volt/60 Hz electrical outlet and plugging the attached cord into the battery pack socket. The battery can be recharged while inside or outside of the calculator. A full charge will take approximately 4 to 6 hours.

If the calculator is left on for an extended period of time after the battery becomes discharged, the battery may be driven into deep discharge. This condition is indicated by failure of the calculator to operate after being recharged for a few minutes. The battery can usually be restored to operating condition by charging the calculator overnight. Repeated deep discharging will permanently damage the battery.

IN CASE OF DIFFICULTY

1. Check to be sure the battery pack is properly connected to the calculator and that the adapter/charger is connected to a live electrical outlet.

CAUTION: Use of other than the AC9132 Adapter/ Charger may apply improper voltage to your calculator and will cause damage.

2. Press [OFF], then the [ON/C] key. This should reset the calculator and produce a single digit in display.
3. If the display flashes erratically, fades out, gives incorrect results or is inconsistent in any way, recharge the battery. Calculator operation may be resumed after several minutes of recharging.
4. If the battery has completely discharged, charge the battery overnight.
5. Review operating instructions to be certain calculations are performed correctly.

If none of the above procedures corrects the difficulty, return the **calculator and charger** PREPAID and INSURED to the applicable SERVICE FACILITY listed on the back cover.

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

Texas Instruments Incorporated
2305 University Ave.
Lubbock, Texas 79415

For your protection the calculator must 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.

CALCULATOR EXCHANGE CENTERS

If your calculator requires service, instead of returning the unit to a service facility for repair, you may elect to

exchange the calculator for a factory-rebuilt calculator of the SAME MODEL at one of the exchange centers which have been established across the United States. A $3.00 charge will be made by the exchange center for in-warranty exchanges. Out-of-warranty exchanges will be charged at the rates in effect at the time of the exchange. Please call the Consumer Relations Department for further details and the location of the nearest exchange center.

IF YOU NEED SERVICE INFORMATION

If you need service information with your calculator, write the Consumer Relations Department at:

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

Or, call Consumer Relations at 800-858-1802 (toll-free within all contiguous United States except Texas) or 800-692-1353 (toll-free within Texas). If outside contiguous United States call 806-747-3841. (We regret that we cannot accept collect calls at this number).