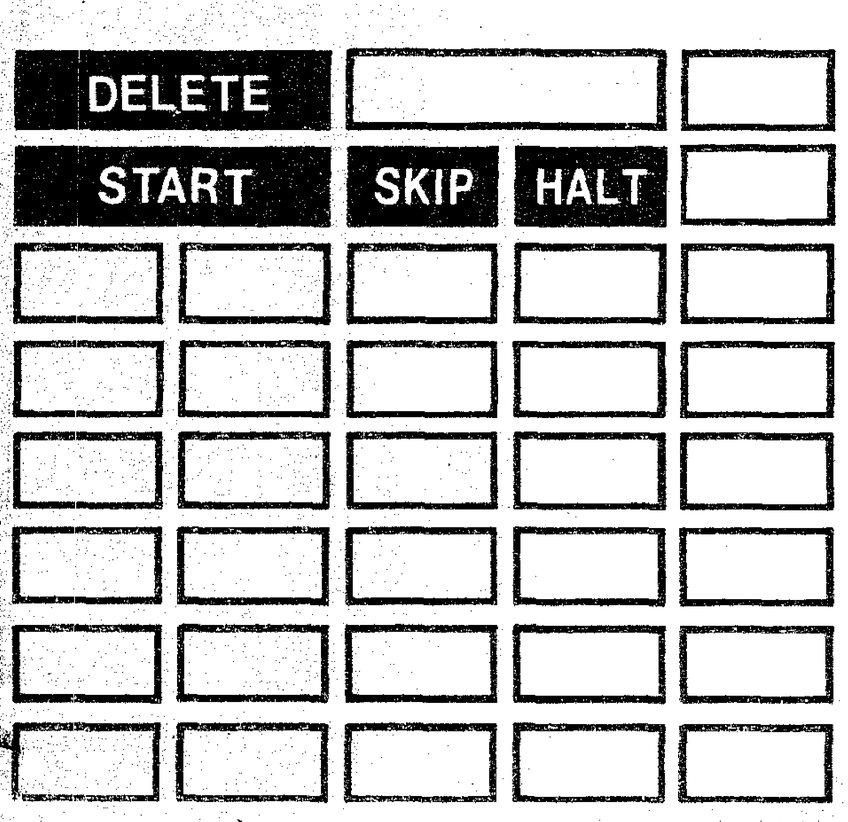
OPERATION MANUAL



CONTENTS

SPECIFICATIONS

Disply:
9-digit LED disply
Keyboard:
36 key with dome keyboard
Capacity:
*8-digit for data entry and results.
*102 steps for storing program.
Operation Mode:
Stack Algorithm
Decimal Point
Full floating
Switch:
▶ON: Power on-off switch.
N/STEP: Normal and STEP operation selecting switch.
LOAD/RUN: LOAD and RUN mode selection switch.
Negative Indicator
"-" symbol in the leftmost digit indicating negative mantissa.
Overflow/Error Indication
All zeros and decimal points light up indicating overflow or error condition.
Busy Indication
All""⊟" light up indicating program register have stored 102 steps.
OPERATION:
*Four species
*Programmable
*Memory operations (Memory store, Positive accumulation, Negative accumulation, Squares summation)
*Trigonometric functions (sin, cos, tan).
*Inverse-trigonometric functions ($\sin^{-1}$, $\cos^{-1}$, $\tan^{-1}$).
*π-constant
*Radian, degree exchangeable
*Power function(Y^X)
*Square root ($\sqrt{x}$)
*Logarithm (log, ln)

*Anti-logarithm (e^x)
*Reciprocal (1/X)
*Square (X^2)
*Change sign (+/-)
*Display and Y-register exchangeable (X↔Y)

POWER SOURCE OPERATIONS

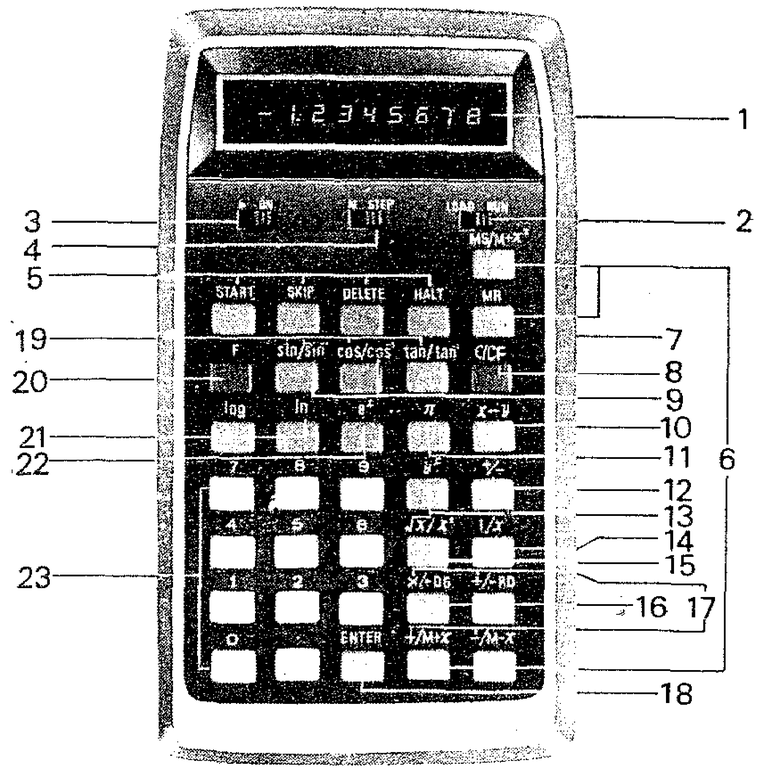
Battery Operation:

*This calculator operates on 4 pcs of UM-3 1.5V throw-away batteries or rechargeable batteries (optional).
*When installing batteries, power switch should be in off position.
*If the calculator is not used for a long time be sure to remove the batteries.
*When not in use always keep on-off switch in off position to conserve battery strength.
*In recharging processing insert rechargeable batteries into compartment and use AC adaptor attaching to household power source. Don't charge longer than 15 hours.

AC OPERATION

*To use this calculator on AC power, you must attach an AC adaptor (optional equipment) tc DC receptacle of this unit.
*Be sure to remove throw-away batteries when AC adaptor is in using.
*Be sure to secure the proper adaptor and plug, using wrong adaptor may damage your calculator.
*When using an AC adaptor, first attach to DC receptacle, then attach to AC power outlet.
*AC adaptor with output DC 6V 100 ma.
*Plug Specification:
Length:11.5m/m
Diameter: inner 2.0m/m, outer 5.5m/m
Polarity: center plus

FUNCTION of KEYS



1) Display
2) LOAD/RUN Switch
3) ON/OFF Switch
4) N/STEP Switch
5) Program Control Keys
6) Memory Operation Keys
7) AC Socket
8) Clear/Clear Function Key
9) Inverse-trigonometric functions
10) Display and Y-register exchange Key
11) π-constant Key
12) Change Sign Key
13) Power Function Key
14) Reciprocal Key
15) Square Root / Square Key
16) Radian / Degree exchange Key
17) Arithmetic Operation Keys (+ - x ÷)
18) Data Enter Key
19) Trigonometric functions
20) Function (Second label) Command Key.
21) Logarithm Function Keys
22) Anti-Logarithm Key
23) Numerical Keys

PART ONE: Stack and Memory Register

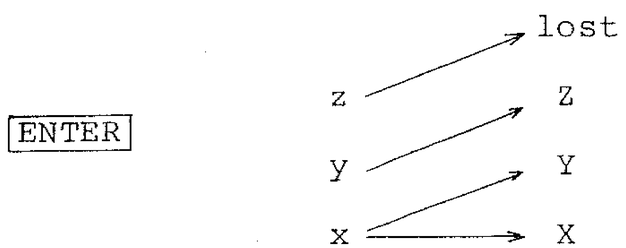
This model uses RPN (Reverse Polish Notation) operation with three registers called X, Y and Z.

They are arranged in a stack with X at the bottom, Y in the middle, and Z on the top. The contents of the X register are always displayed.

To avoid confusion between the name of a register and its contents, the register is designated by a capital (X,Y,Z,M) and the contents by a small letter (x,y,z,m).

When a number is keyed in, it goes into the display (register X). When you press [ENTER] the number is duplicated into register Y. At the same time, the contents of register Y are transferred to register Z, and the contents of register Z are transferred out of the stack, as follows:

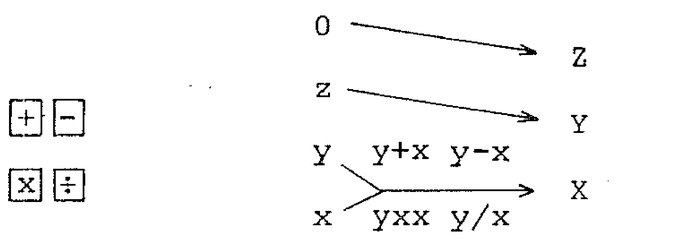
Operation Contents Register



When press [+], x is added to y, and the entire stack drop, the result display in X. The process for [−], [X], or [÷] is likewise.

The process is as follows:

Press Contents Register



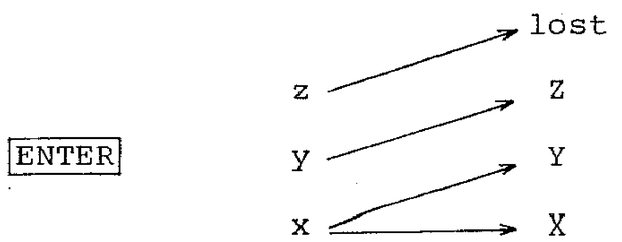
Example: (2 x 3) + (4 x 5) = 26

Operation	2	ENT	3	X	4	ENT	5	X	+
Z						6	6		
Y		2	2		6	4	4	6	
X	2	2	3	6	4	4	5	20	26

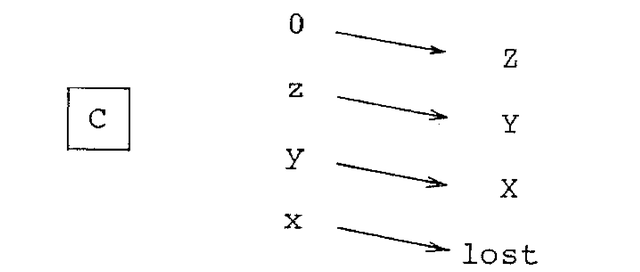
In addition to 3 stack registers, there is another memory register (M) used for storing constant, intermediate results or for accumulation(m).

Summary of Stack Operations

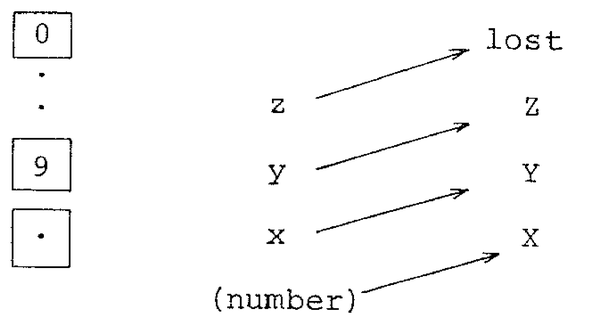
Operation Contents Registers



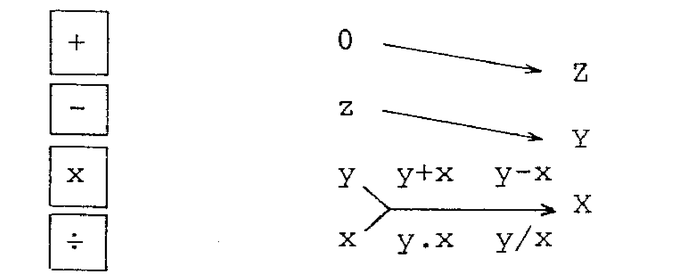
Operation Contents Registers



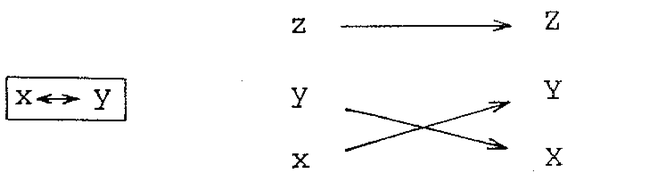
Operation Contents Registers



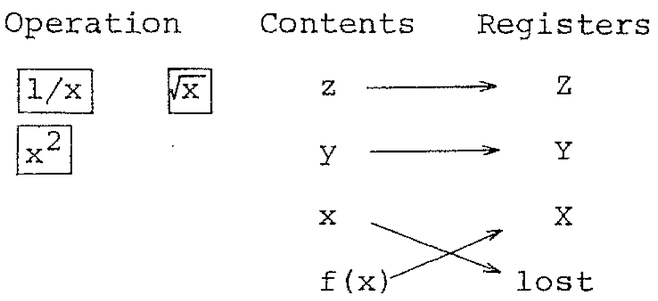
Operation Contents Registers



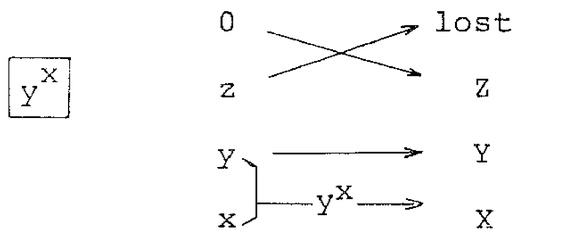
Operation Contents Registers



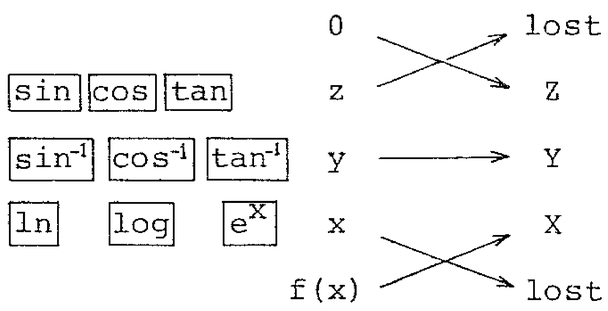
Operation Contents Registers



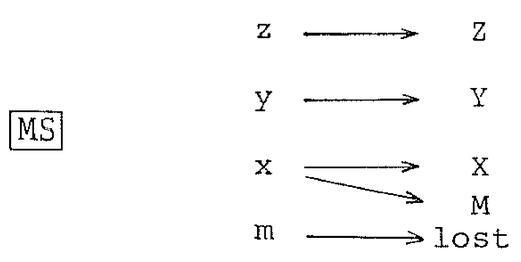
Operation Contents Registers



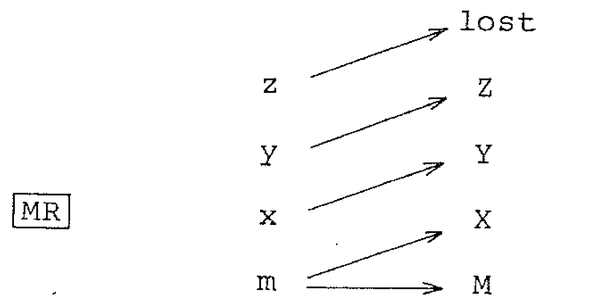
Operation Contents Registers



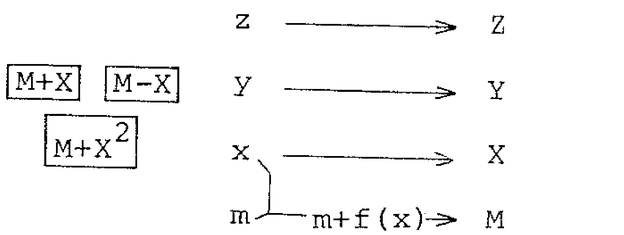
Operation Contents Registers



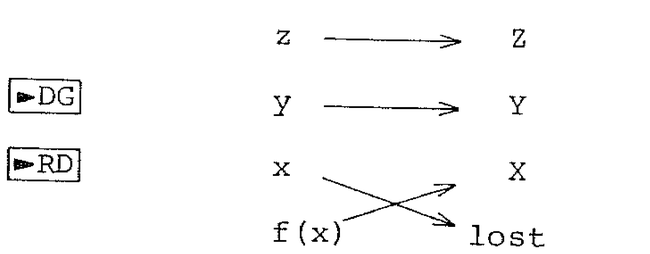
Operation Contents Registers



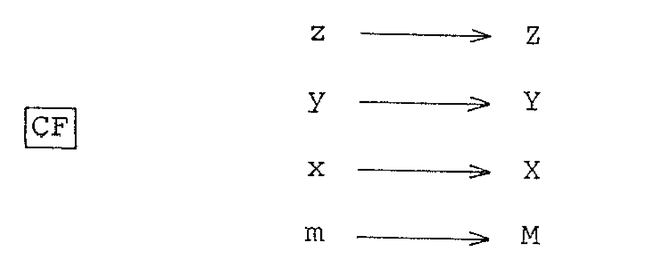
Operation Contents Registers



Operation Contents Registers

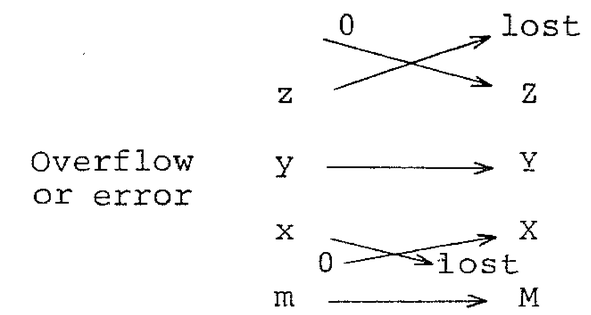


Operation Contents Registers



* CF Key reset F mode.

Operation Contents Registers



PART TWO

In order to conserve the batteries, after 20 seconds (Appr.) the contnets of display disappear and are replaced by a row of 9 decimal points. To recall the previously displayed figure depress the +/- key twice.

I) Four Basic Functions

Example: [(1 + 2) x 3 - 4] ÷ 5

Operation	Display	Description
1	1	
ENTER	1	
2	2	
+	3	1+2
3	3	
x	9	(1+2)x3
4	4	
-	5	(1+2)x3-4
5	5	
÷	1	

II) Reciprocal
Example: $\frac{1}{3-1/2}$

Operation	Display	Description
3	3	
ENTER	3.	
2	2	
1/x	.5	1/2
-	2.5	3-0.5
1/x	.4	

III) Square Root
Example: $81^{1/4}$

Operation	Display	Description
81	81	
√X	9.	
√X	3.	

IV) Square
Example: 2.5^2

Operation	Display	Description
2.5	2.5	
F	2.5	
x^2	6.25	

V) Power Function
Example 1) 2^{10}

Operation	Display	Description
2	2	
ENTER	2.	
10	10	
yx	1023.998	≒1024

Example 2) $10^{1/2.5}$

Operation	Display	Description
10	10	
ENTER	10.	
2.5	2.5	
1/X	.4	
Y^X	2.511885	

VI) Logarithm
Example 1) ln5

Operation	Display	Description
5	5	
ln	1.609438	

Example 2) log 0.03

Operation	Display	Description
.03	.03	
log	-1.522879	

VII) Anti-logarithm
Example: $e^{2.3}$

Operation	Display	Description
2.3	2.3	
e^x	9.974177	

VIII) π Constant

Operation	Display	Description
π	3.1415926	

IX) Radian / Degree exchange
Example 1) $\pi \rightarrow ?^\circ$

Operation	Display	Description
π	3.1415926	
F	3.1415926	
►DG	179.99999	$\doteq 180^\circ$

Example 2) $45^\circ \rightarrow ?$ rad

Operation	Display	Description
45	45	
F	F	
►RD	.78539815	

X) Trigonometric Function
Example 1) sin30°

Operation	Display	Description
30	30	
sin	.5	

Note: This model accept Degree as augument, if augument is radian changed to degree fist then go on the problem.

Example 2) $\cos \frac{\pi}{6}$

Operation	Display	Description
6	6	
1/x	0.16666666	
π	3.1415926	
x	0.52359874	
F	0.52359874	

Operation	Display	Description
►DG	29.999998	
cos	0.8660254	

Example 3) tan15°

Operation	Display	Description
15	15	
tan	0.2679492	

XI) Inverse-trigonometric
Example 1) $\sin^{-1}$ .3

Operation	Display	Description
.3	.3	
F	.3	
$\sin^{-1}$	17.4576	Degree

XII) X-register and Y-register exchange
Example 6 ÷ (1 + 2) = 2

Operation	Display	Description
1	1	
ENTER	1.	
2	2	

Operation	Display	Description
+	3.	1+2=3
6	6	
X⟷Y	3.	
÷	2.	

XIII) Memory Operation
A) Store constant or intermediate result

Operation	Display	Memory
10	10	?
MS	10.	10.
C	0.	10.
MR	10.	10.

Note: Depress MS Key will overwrite the contents of Memory register. Depress MR Key recall the contents of Memory register into X-register push x into Y, y into Z leave Memory unaffected.

B) Clear Memory

Operation	Display	Memory
10	10	?
MS	10.	10
0	0	10

Operation	Display	Memory
MS	0.	0
RM	0.	0.

Note: Zero overwrite the contents of Memory register and let Memory empty.

C) Accumulation
Example: $4 + 5 \times 6 + 7^2 - 12$

Operation	Display	Memory
0	0	?
MS	0.	0
4	4	0
F	4	0
M+X	4.	4.
5	5	4.
ENTER	5.	4.
6	6	4.
X	30.	4.
F	30.	4.
M+X	30.	34.
7	7	34.

Operation	Display	Memory
F	7	34.
$M+X^2$	7.	83.
12	12	83.
F	12	83.
M-X	12.	71.
MR	71.	71

PAER THREE: PROGRAM

(I) General Description
When programming, this model has two working modes, i.e. LOAD and RUN and four control keys, i.e. STRAT, SKIP, HALT and DELETE.

A. Working Modes:
LOAD: Load the program with keys.
RUN: Run the program.

B. Control Keys:

Key	LOAD	RUN
[SRART]	Clears and initializes program storage area.	Starts first program. Starts program when stropped in HALT step.
[SKIP]	Terminates current program and initializes a new one.	Skips remainder of current program and begins excution of next one.
[HALT]	Programs an operator data entry or check point in RUN mode.	
[DELETE]	Erases the last key entered. Back one step for each depression.	

(II) Rule for programming your calculator

1) Set N STEP switch to"N" (Normal Operation)

2) Set LOAD RUN switch to "LOAD" position

3) Depress [START] key

Note:
When depressing the [START] key, in the LOAD mode, all the programs being previously loaded will be cleared and the [START] command will be loaded as the first step in the program register.

4) Key in the number or function command as you desire.
5) If a varialbe to be used, depress [HALT] key first, set mode switch to "RUN" position key in a number as dummy name then reset mode switch to "LOAD" position and continue your problem
6) If want to name the program, use following key sequence
[NUMBER] [Halt] [C] at the beginning of each program.
7) Use a [HALT] step at the end of each program to terminate each program or to halt at any step to check the intermediate results at will.
8) If there are more than one program to be loaded into the calculator, use a [SKIP] step at the very beginning of each following program for entering each program.

9) If there are any wrong key sequence, depress [DELETE] key successively back to the correct ones and reload the program.

(III) Rule to execute your program
1) Set mode switch in "RUN" position.
2) Depress [START] key to execute first program
3) When halting at a variable entry, key in the variable according to the program you have entered.
4) When halting at a checking point, depressing [START] key will continue the execution of the program.
5) When at a [HALT] step, depressing [SKIP] key will cause the remaining steps of the current program to be skipped. Execution automatically begin at the start of the next program and continue to the first [HALT] step; in absence of a [HALT] step, execution will continue to the end of the program.
6) Set the N STEP switch to "STEP" position and depress [START] key to check the program step by step.

Example 1) 1+2+3+4+5

a) Programming

Operation	Mode	Display	Description
[START]	N, LOAD		
1	N, LOAD	1	
[ENTER]	N, LOAD	1	
2	N, LOAD	2	
[+]	N, LOAD	3.	

Operation	Mode	isplay	Description
3	N, LOAD	3	
[+]	N, LOAD	6.	
4	N, LOAD	4	
[+]	N, LOAD	10.	
5	N, LOAD	5	
[+]	N, LOAD	15.	

b) Execution

Operation	Mode	Display	Description
[START]	N, RUN	15.	

Example 2) $X^2 + X + 1$

a) Programming

Operation	Mode	Display	Description
[START]	N, LOAD		
[HALT]	N, LOAD		
2	N, RUN	2	enter 2 as Dummy name
[ENTER]	N, LOAD	2.	
[ENTER]	N, LOAD	2.	
[X]	N, LOAD	4.	x^2
[+]	N, LOAD	6.	$X^2+ 1$

Operation	Mode	Display	Description
1	N, LOAD	1	
[+]	N, LOAD	7.	$X^2+ X + 1$

b) Execution

Operation	Mode	Display	Description
[START]	N, RUN		
3	N, RUN	3	
[START]	N, RUN	13	$f(3)=3^2+ 3 +1 = 13$

Example 3) Repeat Exeuction Example 1 using "STEP" operation

Operation	Mode	Display	Description
[START]	STEP, RUN		
3	STEP, RUN	3	
[START]	STEP, RUN	3.	
[START]	STEP, RUN	3	
[START]	STEP, RUN	9	X^2
[START]	STEP, RUN	12	$X^2+ X$
[START]	STEP, RUN	13	$X^2+ X + 1$

Example 4) Hyperbolic Function
1) Programming

Operation	Mode	Display	Description
[START]	N, LOAD		
[HALT]	N, LOAD		
2	N, RUN	2	Dummy name for X
[e^x]	N, LOAD	7,389051	e^x
[ENTER]	N, LOAD	7.389051	
[1/X]	N. ROAD	0.13533537	e^{-x}
[MS]	N, LOAD	0.13533537	
[−]	N, LOAD	7.2537157	$e^x- e^{-x}$
2	N, LOAD	2	
[÷]	N, LOAD	3.6268578	$\frac{e^x- e^{-x}}{2}$
[HALT]	N, LOAD	3.6268578	
[SKIP]	N, LOAD	3.6268578	
[ENTER]	N, LOAD	3.6268578	
[MR]	N, LOAD	0.13533537	
[+]	N, LOAD	3.7621931	
[HALT]	N, LOAD	3.7621931	
[SKIP]	N, LOAD	3.7621937	
[÷]	N, LOAD	0.9640295	

2) Execution

Operation	Mode	Display	Description
START	N, RUN		
3	N, RUN	3	
START	N, RUN	10.017866	sinhx
SKIP	N, RUN	10.067653	coshx
SKIP	N, RUN	0.9950475	tanhx

Example 5) A=X cos Wt + Y sin Wt
B=X cos Wt - Y sin Wt
Where X = 3
Y = 2
W = π
t = 1/3

a) Program

Operation	Mode	Display	Description
C	N, LOAD	0	
START	N, LOAD	0	
HALT	N, LOAD	0	
1	N, RUN	1	Dummy name for X
EN	N, LOAD	1	
HALT	N, LOAD	1	
2	N, RUN	2	Dummy name for W

Operation	Mode	Display	Description
ENTER	N, LOAD	2.	
HALT	N, LOAD	2.	
3	N, RUN	3	Dummy name for t
X	N, LOAD	6.	Wt
MS	N, LOAD	6.	
F	N, LOAD	6.	
DG	N, LOAD	343.77468	
COS	N, LOAD	0.9601703	Cos Wt
X	N, LOAD	0.9601703	X cos Wt
RM	N, LOAD	6.	
X↔Y	N, LOAD	0.9601703	
MS	N, LOAD	0.9601703	
C	N, LOAD	6.	
HALT	N, LOAD	6.	
4	N, RUN	4	Dummy name for Y
X↔Y	N, LOAD	6.	
F	n, load	6.	
DG	N, LOAD	343.77468	
SIN	N, LOAD	-0.2794165	sin Wt
X	N, LOAD	-1.117666	Y sin Wt

Operation	Mode	Display	Description
EN	N, LOAD	-1.117666	Y sin Wt
RM	N, LOAD	0.9601703	
+	N, LOAD	-0.1574957	
HALT	N, LOAD	-0.1574957	
SKIP	N, LOAD	-0.1574957	
X↔Y	N, LOAD	-1.117666	
RM	N, LOAD	0.9601703	
X↔Y	N, LOAD	-1.117666	
-	N, LOAD	2.0778363	
HALT	N, LOAD	2.0778363	

b) Execution

Operation	Mode	Display	Description
C	N, RUN		
START	N, RUN		
3	N, RUN	3	x
START	N, RUN	3.	
π	N, RUN		w
START	N, RUN	3.1415926	
3	N, RUN	3	
1/X	N, RUN	0.33333333	t
START	N, RUN	1.0471975	

Operation	Mode	Display	Description
2	N, RUN	2	
START	N, RUN	3.2320514	A
SKIP	N, RUN	-0.2320502	B

Example:6) Borrow $5,000 at 8% per year for 6 years
How much the monthly payment is?

a) Program $PMT = \frac{pvi(1+i)^n}{(1+i)^n - 1}$

Operation	Mode	Display	Description
C	N, LOAD	0.	
START	N, LOAD	0.	
HALT	N, LOAD	0.	
2	N, RUN	2	Dummy name for interest
MS	N, LOAD	2.	
1	N, LOAD	1.	
+	N, LOAD	3.	
HALT	N, LOAD	3.	
3	N, RUN	3	Dummy name for period
Y^X	N, LOAD	27.	$(1+i)^n$
RM	N, LOAD	2.	
X↔Y	N, LOAD	27.	

Operation	Mode	Display	Description
MS	N, LOAD	27.	
X	N, LOAD	54.	$i(1+i)^n$
HALT	N, LOAD	54.	
4	N, LOAD	4	Dummy name for PV
X	N, LOAD	216.	$pvi(1+1)^n$
RM	N, LOAD	27.	
1	N, LOAD	1.	
−	N, LOAD	26.	$(1+i)^n-1$
÷	N, LOAD	8.3076923	$\frac{pvi(1+i)^n}{(1+i)^n-1}$

b) Execution

Operation	Mode	Display	Description
0.08	N, RUN	0.08	
ENTER	N, RUN	0.08	
12	N, RUN	12.	
$\frac{\%}{}$	N, RUN	0.0066666	Change interest rate per year to interest per month
START	N, RUN	1.0066666	(1+i)
6	N, RUN	6.	
ENTER	N, RUN	6.	

Operation	Mode	Display	Description
12	N, RUN	12.	
X	N, RUN	72.	
START	N, RUN	.0107566	$i(1+n)^n$
5000	N, RUN	5000	
START	N, RUN	87.666994	PMT

Appendix
Conditions for Error Indication

Function	Conditions
+, −, X, ÷	Result > 9999.9999
÷ or 1/X	$\|x\| \leqslant 0.00000001$
$\sqrt{X}$	X < 0
Y^X	$Y \leq 0$ $\ln 99999999 < X \ln Y < -28$
logX or lnX	$X \leqslant 0.00000001$
e^X	$\ln 99999999 < X < -28$
sinX or cosX	$X \geqslant 7$ radians or $\sim 401°$
$\sin^{-1}X$, $\cos^{-1}X$	X > 1
tanX	$X = \pm 90°$ or $X \geqslant 7$ radians