

HP-32SII Quick Reference

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Memory

384 bytes total memory	Variables8 bytes per variable, only if non-0, including 8 Σ register Program instructions...1.5 bytes per instruction Equations.....1.5 bytes per operation SOLVE.....33.5 bytes Numerical integrator...140 bytes
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Menus

Some function kes lead to submenus. Those keys have a gray background (ie. PARTS, PROB etc.). Within a menu the top row keys have different meanings depending on the display indicators.	
Quit menu	Press C to return to normal display Press \leftarrow to step up in the menu hierarchy
PARTS	Return parts of a number
	IP Integer part
	FP Fractional part
	ABS Absolute value
PROB	Calculate probabilities, random numbers
	Cn,r Number of combinations of r (in X) different elements selected from n (in Y) different elements. Different sequences of these r elements do <i>not</i> count separate. $C_{n,r} = n!/(r!(n-r)!)$
	Pn,r Number of permutations of r (in X) different elements selected from n (in Y) different elements. Different sequences of these r elements do count separate. $P_{n,r} = n! / (n-r)!$
	SD Use X as random seed
	R Return random number $0 \leq X < 1$
L.R.	Linear regression: Based on the entered (X,Y) points calculate a best-fit line
	x: Given a y in X this returns the estimated x-value
	y: Given a x in X this returns the estimated y-value
	r: Correlation coefficient of data points, 1=perfect fit
	m: Inclination of fitted line
	b: y-offset of fitted line
x,y	Mean values
	x: Mean of X values
	y: Mean of Y values
	xw: Weighted mean of X values where the Y values are the weight for the X values. $xw = (\Sigma xy) / \Sigma y$
s, σ	Standard deviation
	Sx: Standard deviation of X values (divider n-1)
	Sy: Standard deviation of Y values (divider n-1)

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	σ_x :	Standard deviation of X values (divider n)
	σ_y :	Standard deviation of Y values (divider n)
SUMS	Returns various sums entered with Σ +/-	
	n	r28: number of Σ -entries
	x	r29: Σx
	y	r30: Σy
	x^2	r31: Σx^2
	y^2	r32: Σy^2
	xy	r33: Σxy
MEM	Return memory information in the form of ppp,vvv where ppp is the number of bytes used for programs and vvv for variables	
	VAR	List used variables A-Z & i. Use \wedge and \vee to scroll
	PGM	List programs (labels A-Z). Use \wedge and \vee to scroll.
MODES	Select trigonometric format and decimal separator	
	DG	Degress (360, default)
	RD	Radians (2π)
	GR	Grad (400)
	.	Use dot as decimal separator
,	Use comma as decimal separator	
DISP	Control display format	
	FX	Fix 0..9, .0, .1 to select fixed-point display mode with 0..11 digits
	SC	Scientifix format
	EN	Engeneering format
	ALL	Same as fixed point format, displays all non-0 trailing digits
CLEAR	Clear various things. CLEAR has additional meanings in PRGM and EQN mode	
	x	Clear X register
	VARS	Clear all variables
	ALL	Clear all variables and programs
Σ	Clear sum/statistical registers r28..r33	
x?y	Compare X with Y register in various relations. If relational test is true, next program line will be executed, otherwise skipped	
x?0	Compare X register with 0 in various forms, see above	
BASE	Select number base	
	DEC	Decimal floating point, 12 BCD digits
	HX	Hexadecimal fixed point 55 bits
	OC	Octal
BN	Binary	
FLAGS	Manipulate flags 0..9, .0, .1. Flag usage:	
	0..3	User-flags. Status is shown on the LCD display
	5	If set program stops on overflow
	6	Set on overflow
	7, 8,	These flags control the display of fractions, see Fractions below
	9	
10	Controls the evaluation of equations in programs: Clear: Equation is evaluated and the result written to X Set: Equation is displayed using VIEW and can be edited. If a PSE follows the equation, execution resumes after 1 sec	

	11	Controls input for equation variables during program execution when an equation is evaluated, SOLVED or integrated. After the operation the flag is always cleared! Clear: Evaluation, SOLVE and integration are done with the current variable values without user input Set: Whenever a variable is encountered for the first time, the program stops, the user must provide a value and continue with R/S
	SF	Set flag 0..9, .0, .1
	CF	Clear flag 0..9, .0, .1
	FS?	Test whether flag 0..9, .0, .1 is set. If flag is set, next program line will be executed, otherwise skipped

Variables & Indirect Addressing

Menu MEM/VAR	Lists used (non-0) variables. Use ^ and v to scroll, SHOW to see all digits. Press C to quit the list mode, ← to return to the MEM menu
MEM/VAR SHOW	Display all digits of the variable
MEM/VAR CLEAR	Clear variable
STO A..Z	Store variable
RCL A..Z	Recall variable
STO +, -, x, ÷ A..Z	Register arithmetic into variable (variable changes)
RCL +, -, x, ÷ A..Z	Register arithmetic from variable (X changes)
STO i, RCL i STO +, -, x, ÷ i RCL +, -, x, ÷ i	Store value in index register i, or get index register value or do register arithmetic. Note: i is located on the decimal point key!
STO (i)	Store value in the register that is indexed by i. i=1..33 or -1.. -33 where 1..26 corresponds to variables A..Z, 27 is index register i and 28..33 are the Σ registers, i=0 is not allowed. Note: (i) is located on the R/S key
RCL (i)	Get the variable that is indexed by index register i
STO +, -, x, ÷ (i) RCL +, -, x, ÷ (i)	Register arithmetic with indirect register
X<> A..Z, i, (i)	Exchange X with the contents of a variable. Note: x<> is located on the x<>y key
VIEW A..Z, i, (i)	Display contents of a variable without overwriting the X register. Press ← to clear the display
Complex numbers	Require two variables to store the real and imaginary part. See Complex Numbers

Fractions

a.b.c	Enters fractional number a + b/c
.b.c b..c	Enters fractional number b/c
FDISP	Displays X as a fractional number. This does not affect the stored X. If a number cannot exactly be displayed as a fraction the ^ and v signs light up indicating that the true number is larger/smaller than the displayed fraction

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/c	Define X as the maximum denominator (2..4095)		
1 /c	Recall current denominator to X		
0 /c	Set maximum denominator to 4095		
Flags	A number of flags control the display of fractions:		
	7	8	9
	clear		Fractional display off
	set	clear	- Fractional display on. Optimal denominator \leq /c is selected
	set	set	clear Fractional display on. Denominator = /c and fraction is reduced
	set	set	set Fractional display on. Denominator is always = /c

Programming

Menu MEM/PGM	Lists named (labelled) programs and their length (note that one program step occupies 1.5 bytes). In this mode SHOW displays the program checksum. In this mode CLEAR clears the currently displayed program. Press C to quit the list mode, ← to return to the MEM menu
PRGM	Switches to/from program inpt mode
CLEAR PGM	Clears all programs (only available in PGM mode)
XEQ A..Z	Executes program A..Z. Can also be used in a program to call another program as a subroutine. Up to 7 subroutine calls can be nested
LBL A..Z	Defines entry point for programs A..Z. There can only be one program without labelled entry point. Labelled programs display the label character in the line number, ie. "A42". Labels must be unique.
GTO A..Z	Enters jump in PRGM mode. It is not possible to jump to line numbers! Goes to the selected program in RUN mode
GTO . A..Znn	Goes to line number nn of program A..Z in PRGM and RUN mode
GTO ..	Goes to PRGM TOP in PRGM and RUN mode
^ and v	RUN mode: Single-step and back-step. Back-stepping doesn't execute program instructions
^ and v	In PGM mode: Stepping thru the program. Hold key for scrolling
INPUT A..Z	Halt program for user input to a variable. The variable name and the current variable value will be displayed. After pressing ENTER the value can be recalculated. R/S continues execution
VIEW A..Z	Displays a variable. R/S continues execution
PSE	Halt program for 1 sec for X, variable or equation display
RTN	Return from subroutine or end top-level program
Branching	See menus x?y, x?0, menu FLAGS, DSE, ISG and equation SOLVE
DSE A..Z	Decrement and skip if equal or less. The variable must be in the form cccccc.fffii where c is th current count value, f is the comparisn (final) value and i is the decrement. If i=0 then i=1 is assumed. DSE subtracts i from c, compares with f and skips the next instruction if $c \leq f$
ISG A..Z	Increment and skip if greater. ISG adds i to c, compares with f and skips the next instruction if $c > f$

Equations	<p>Can be entered in programs, simply press EQN end enter an equation. Finish equation entry with ENTER. See "Equations" below.</p> <p>Note that flag 10 (see there) determines how equations in programs are treated.</p> <p>Assignment: Left side minus right side is calculated and stored in X. The target variable is not changed!</p> <p>Express: Expression is evaluated and stored in X</p> <p>Relation: Left side minus right side is calculated and stored in X</p>
SCRL	<p>Switch off/on equation scrolling. When in PRGM mode an equation is entered \wedge and \vee will scroll thru the equation. After SCRL \wedge and \vee will scroll thru the program</p>

Complex Numbers

X and Y	<p>These form the real (X) and imaginary (Y) part of a number. Note that the stack can only hold two complex numbers!</p>
CMLPX	<p>This prefix selects complex operations (on the STO key)</p>
+/- 1/x LN e ^x LOG 10 ^x sin cos tan	<p>Complex unary functions – there are no other unary functions!</p>
+ - x ÷ y ^x	<p>Complex binary functions – there are no other binary functions!</p>

Equations

EQN	<p>Displays the equation list. \wedge and \vee can be used to walk the list. Long equations can be shifted left/right using the SQRT and $\Sigma+$ keys, see also SCRL below. This does not work in equation entry mode.</p> <p>The following commands are only available in EQN mode!!</p>
Equation types	<p>Assignment: $V=RxRx\pi$</p> <p>Expression: $SQRT(A+B)-5$</p> <p>Relation: $3xT-5 = LN(T)^2$</p>
Equation entry	<p>Any number, function key or variable name will automatically activate equation entry mode and a block cursor is displayed at the end of the equation.</p> <p>Arguments to binary functions (ie. %CHG) must be separated by a SPACE (on the R/S key)</p>
ENTER	<p>Terminates equation entry mode –or- if not in entry mode, depending on equation type:</p> <p>Assignment: Assign result to X and to named variable on left-hand side</p> <p>Expression: Put result in X register</p> <p>Relation: Calculate left side minus right side with result in X</p> <p>During evaluation variable values will be queried. The user can keep the displayed value, enter a new value or perform a calculation to obtain a new value. Evaluation continues after R/S. Evaluation can be aborted with C</p>

XEQ	Evaluate expression depending on the type: Assignment: Calculate left side minus right side with result in X Expression: same as ENTER Relation: same as ENTER See above for variable input
←	Enters equation edit mode
SHOW	Displays the checksum of an equation
C	Leaves the equation list
CLEAR	Delete equation from list
RCL A..Z, i, (i) STO A..Z, i, (i)	Enter a variable name in an equation
()	Use brackets to group expressions within equations
SCRL	Switch off/on equation scrolling. When in EQN mode an equation is entered SQRT and $\Sigma+$ will scroll thru the equation. After SCRL these keys revert to their normal functions

Root Finding

What can be solved?	The solver finds a value for a selected variable so that: Equations/assignments: Right-hand-side = 0 Equations/expression: Expression = 0 Equations/relations: Left-hand-side minus right-hand-side = 0 Named programs: Program output in the X register = 0
Menu EQN: SOLVE A..Z, i, (i)	Solve equation for a given variable. All other variables will be queried. The value of X and of the variable that is solved for a used as starting values for the solver algorithm. As a result, the variable value which solves the equation is displayed and stored in X. Y contains the solution of the 2 nd to last evaluation step. Z contain the value of the equation at the solution point (should be 0 or close to 0)
FN = program A..Z SOLVE A..Z, i, (i)	Finds a root for a function defined in a program. The program must return a result in the X-register as a function of the variable that is solved for
Interruption	At any time the solver can be interrupted by pressing C or R/S. The variable that is solved for contains the current best guess
Program usage	SOLVE can be used from within programs. The function that is to be solved must be defined as a program. Use this sequence: FN=A..Z, SOLVE A..Z, i, (i) After SOLVE has finished the variable that is solved for contains the desired value. If no root could be found the next program step is skipped.
No nesting	SOLVE cannot find the root for a function which itself calls SOLVE or FN (the numerical integrator)

Integration

What can be integrated?	Equations/assignments: Integrates over left side minus right side Equations/expression: Integrates over the expression Equations/relations: Integrates over left side minus right side Named programs: Supplies X values to the program and integrates over the returned X values
Integration boundaries	Y register: Lower bound X register: Upper bound
Menu EQN: ∫FN A..Z, i, (i)	This integrates the given equation over the selected variable. The integration boundaries must be present in X and Y
FN = program A..Z ∫FN A..Z, i, (i)	Integrates over a function that is defined in a program. The program must return the result in the X register as a function of the integration variable
Results	Integration result in X, error estimate in Y
Accuracy	Note that the current display format settings (FX, SC, EN or ALL) affect the integration accuracy! ALL will always take the most time
Program usage	∫FN can be used from within programs. The function that is to be integrated must be defined as a program. Use this sequence: FN=A..Z, ∫FN A..Z, i, (i) The integration result is returned in the X register
No nesting	∫FN cannot integrate a function which itself calls ∫FN or SOLVE

Miscellaneous

Hold C and press + or -	Changes display contrast
x!	Works for non-integer arguments and calculates gamma(X+1)
Hyperbolic functions	To access hyperbolic and inverse hyperbolic sin, cos, tan use the HYP prefix on the R↓ key
RND	Rounds X to the currently selected precision in FX, SC and EN format. In fractional FDISP format the number will be rounded to the currently displayed fraction
SHOW	Briefly shows all digits (the mantissa) of a number
Global reset	Resets everything to defaults. Press and hold in this order: C, SQRT, Σ+