HHC 2025

THE RPN JOURNEY CONTINUES

Gary J. Carter

Fairview, Texas

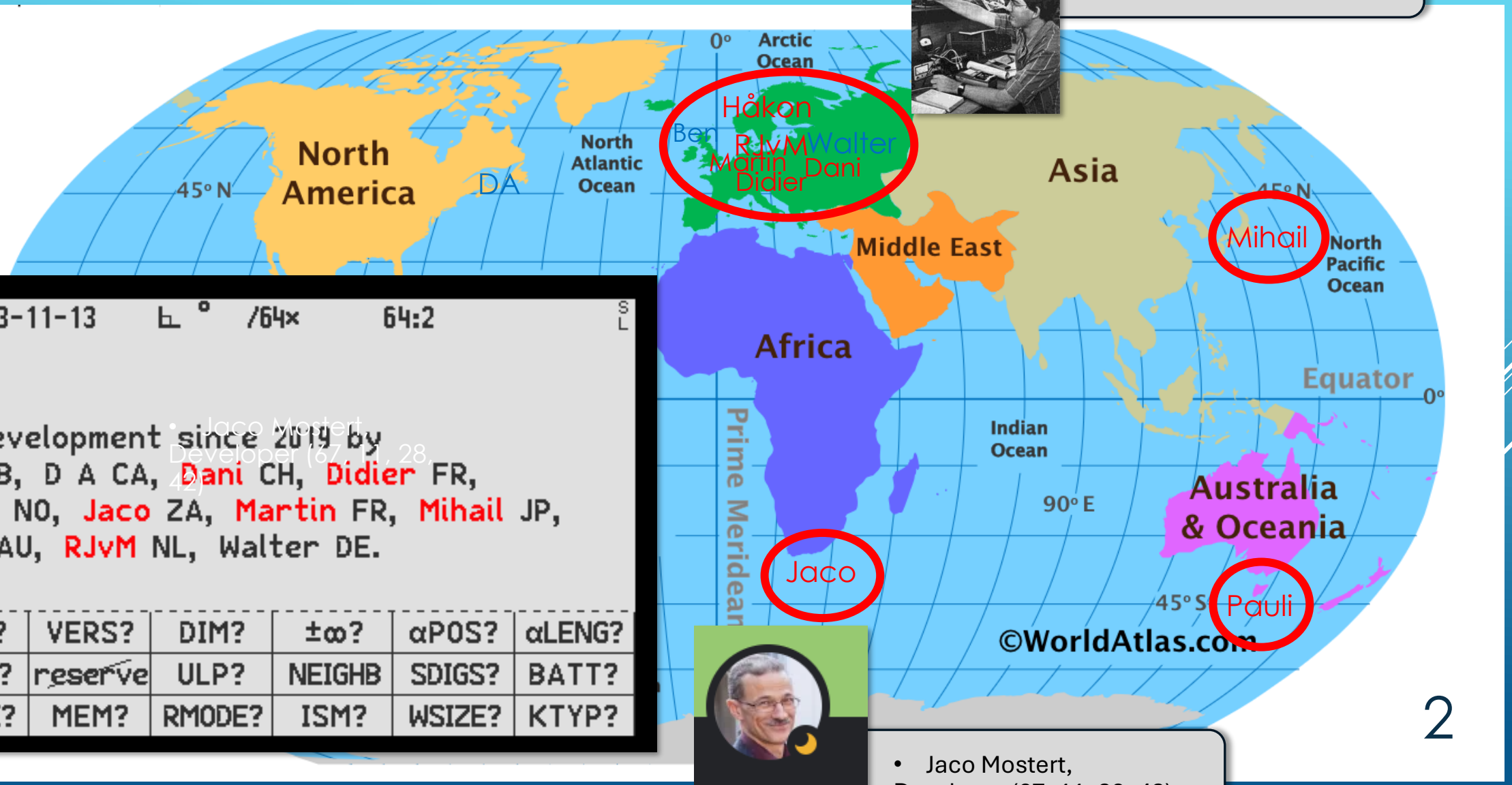
HP35, HP41c, HP16c, HP50g

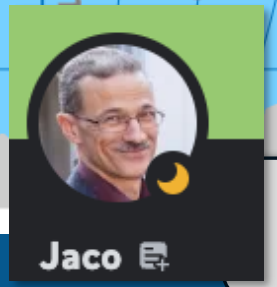
DM41x, DM32, DM42n, C47

The 47 Project Team

- Robbert van Meenen, Documentation (25, 41, 48)

- Jaco Mostert, Developer (67, 11, 28, 42)





- Jaco Mostert, Developer (67, 11, 28, 42)

What is an R47?

The next RPN scientific

The R47 is a powerful, RPN-based programmable scientific calculator with an extensive feature set. Its software has been refined over many years, born from the vision of a *dream calculator* developed by a team of engineers and mathematicians, all dedicated calculator enthusiasts.

Background and lineage

Community-developed and manufactured by SwissMicros, the R47 runs firmware that is functionally identical to that of the C47, which offers a way to transform a DM42n into a feature-rich RPN calculator using a dedicated keypad overlay.

Inspired by the HP-41C and HP-42S, the R47 builds on this foundation with a redesigned keypad featuring two shift keys, preserving a familiar feel while being entirely new in execution.

If a new, advanced RPN scientific handheld calculator were to be developed today …

… What would HP do?

What can the R47 Do?

How can you say more than 1400 features, for a calculator?

Count of Item		INCLUDE		
MainType	SubType	TRUE	FALSE	Grand Total
Command	internal	5	13	18
	nonpgm	39	4	43
	special	1		1
	strike	9	1	10
	TAM	13		13
	legacy		2	2
	PEM	23		23
	submnu	2		2
	Command	344	13	357
	cyclic ; nonpgm	1		1
	HW	6	1	7
	nonpgm ; HW	1		1
Command Total		**444**	**34**	**478**
Function	legacy	7		7
	proposal		1	1
	linked ; monadic	186		186
	legacy ; monadic	4		4
	triadic	12		12
	monadic	249	1	250
	cyclic ; monadic	3		3
	internal ; strike		1	1
	monadic ; dyadic	2		2
	dyadic	63		63
	niladic	1		1
Function Total		**527**	**3**	**530**
MENU	ASM	8		8
	internal	1	2	3
	MENU	123	4	127
	strike	2		2
	TAM	14		14
	item	17		17
	43		4	4
	47	2		2
	ASM ; legacy		2	2
	TAM ; ASM	3		3
	435		1	1
	TAM ; proposal		1	1
MENU Total		**170**	**14**	**184**
Setting	cyclic	2		2
	internal		1	1
	pgm	119	2	121
	Setting	70	16	86
	SIM	1		1
	strike	3		3
	legacy	2		2
	pgm ; deprecated		1	1
	pgm ; stack	2		2
	cyclic ; stack	1		1
	pgm ; HW	3		3
	HW	2		2
Setting Total		**205**	**20**	**225**
Grand Total		**1346**	**71**	**1417**

- high-resolution display with 4 stack levels, 3 rows of menus, and status bar always shown
- 34 digits of precision; exponents to ±6144; up to 1000 named variables
- full mathematical support for real and complex numbers (rectangular and polar)
- scientific calculator functions like trigonometry, hyperbolics, logs, and antilogs
- support for arbitrary bases from 2 to 16 and bitwise operations
- fraction support
- matrix/vector math with full screen matrix editing capability
- 2-variable statistics with best-fit modelling and basic plotting
- equation writer with support for solving, numeric integration and derivatives, and basic plotting
- time value of money operations
- keystroke programmable with tests, flags, looping, and branching
- date and time math as well as built-in clock
- built-in unit conversions and library of constants
- user-customizable keyboard and softkey-based menus
- I/O to built-in flash memory or via USB for backing up and restoring states, programs, and configuration

R47 Feature Counts

Count of Item		INCLUDE		
MainType	SubType	TRUE	FALSE	Grand Total
Command	internal	5	13	18
	nonpgm	39	4	43
	special	1		1
	strike	9	1	10
	TAM	13		13
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	cyclic ; nonpgm	1		1
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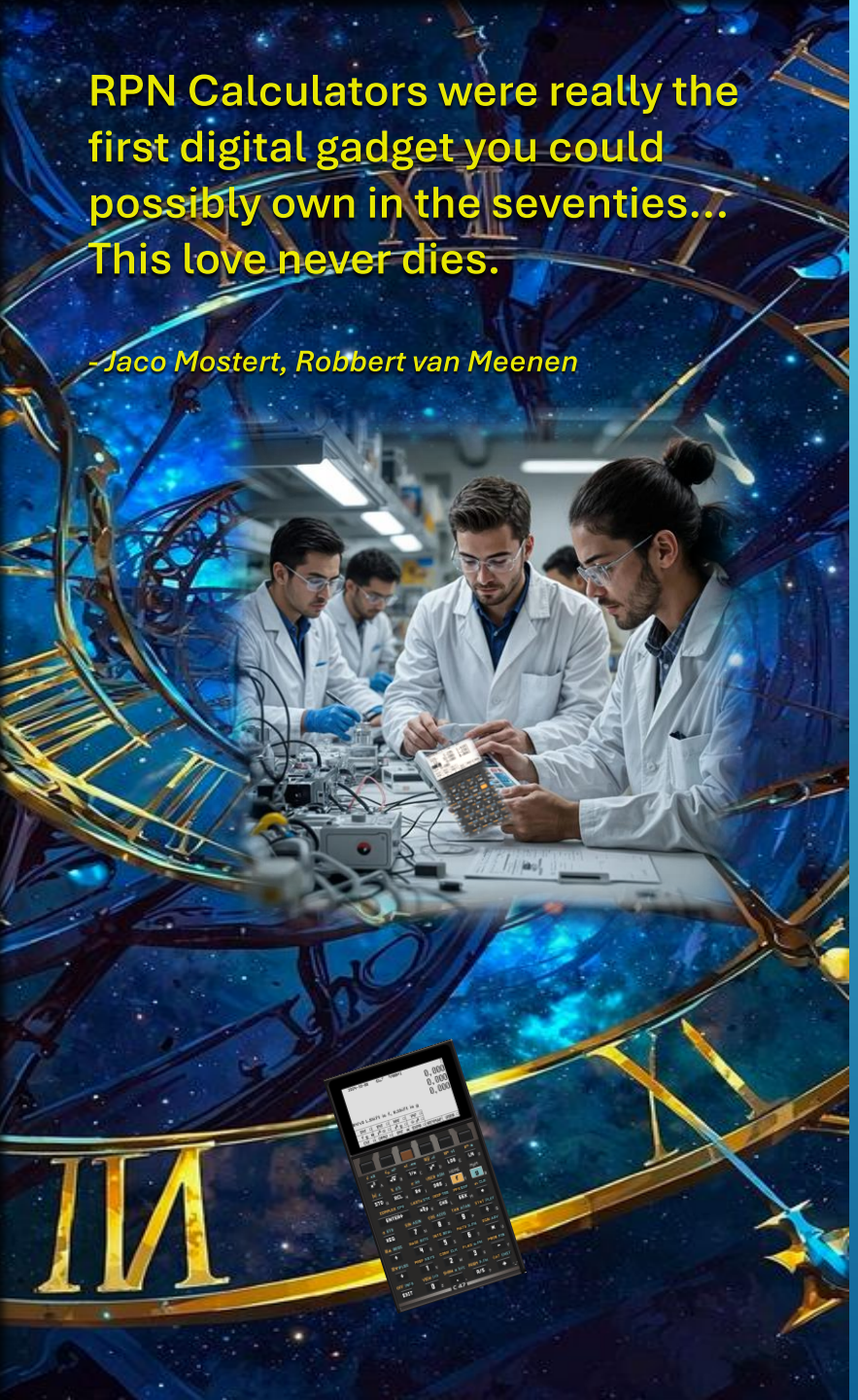
MENU	ASM	8		8
	internal	1	2	3
	MENU	123	4	127
	strike	2		2
	TAM	14		14
	item	17		17
	43		4	4
	47	2		2
	ASM ; legacy		2	2
	TAM ; ASM	3		3
	43S		1	1
	TAM ; proposal		1	1
MENU Total		170	14	184

Function	legacy	7		7
	proposal		1	1
	linked ; monadic	186		186
	legacy ; monadic	4		4
	triadic	12		12
	monadic	249	1	250
	cyclic ; monadic	3		3
	internal ; strike		1	1
	monadic ; dyadic	2		2
	dyadic	63		63
	niladic	1		1
Function Total		527	3	530

Setting	cyclic	2		2
	internal		1	1
	pgm	119	2	121
	Setting	70	16	86
	SIM	1		1
	strike	3		3
	legacy	2		2
	pgm ; deprecated		1	1
	pgm ; stack	2		2
	cyclic ; stack	1		1
	pgm ; HW	3		3
	HW	2		2
Setting Total		205	20	225



Where did R47 come from?

Evolutionary Timeline

1972
HP-35 Released
First RPN Scientific Handheld Calculator

1979
HP-41C Released
First Alphanumeric Programmable Scientific Handheld Computer

1982
HP-12C, HP-15C, HP-16C Released
Voyager Series Calculators

1987
HP-28C Released first Graphing, first CAS

1988
HP-42S Released Most Advanced Pioneer Series

2008
HP-20b Introduced

2009
Free42 Open-Source Calculator Introduced

2010
HP-30b Introduced

2011
SwissMicros Founded

2011
WP34S Open-Source Project Introduced

2015
WP34C produced on HP20b/HP-30b

2017
SwissMicros DM42 Introduced using Free42

2019
WP43C Open-Source Project Introduced targeting SwissMicros DM42

2021
WP43 Prototype on SM DM42

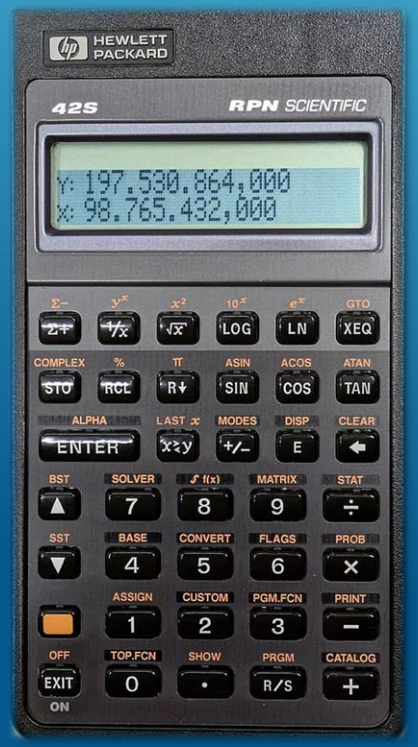
2022
C43 Open-Source Forked

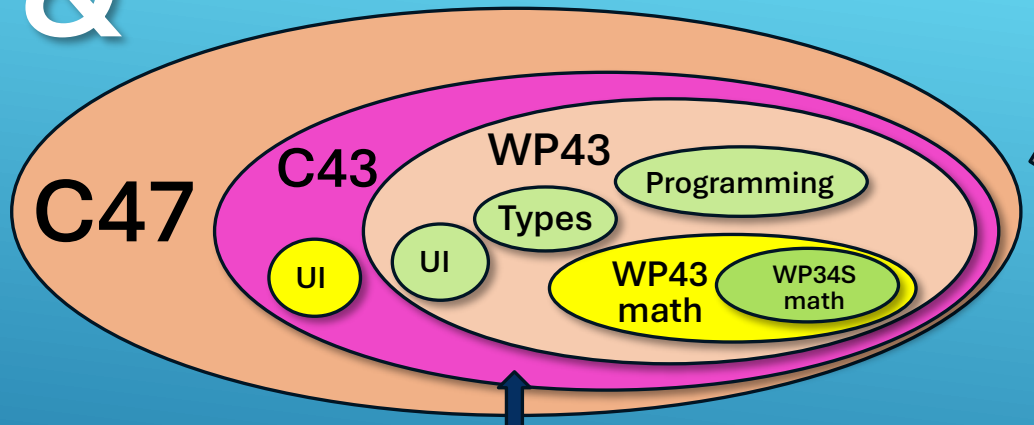
2023
C47 Developed for SwissMicros DM42 Hardware Platform

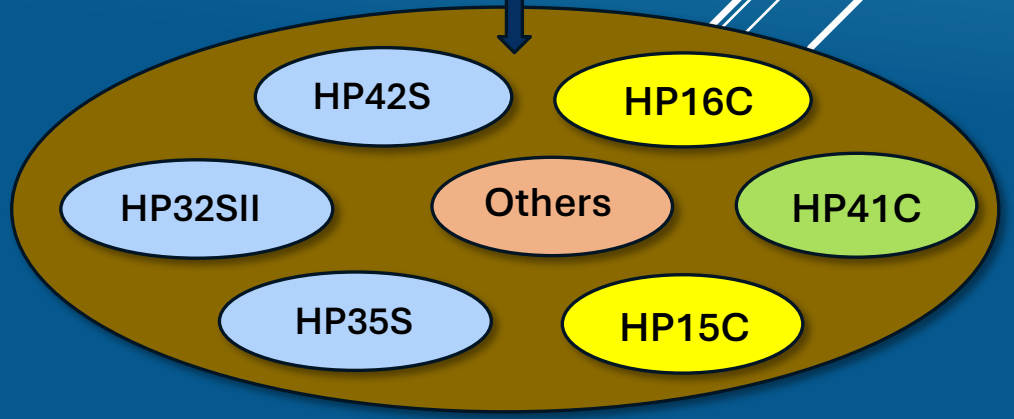
2024
Keyboard Layout Defined
R47 Prototype produced by SwissMicros

2025
R47 2nd Prototype Hardware produced by SwissMicros

Inspiration & Influence





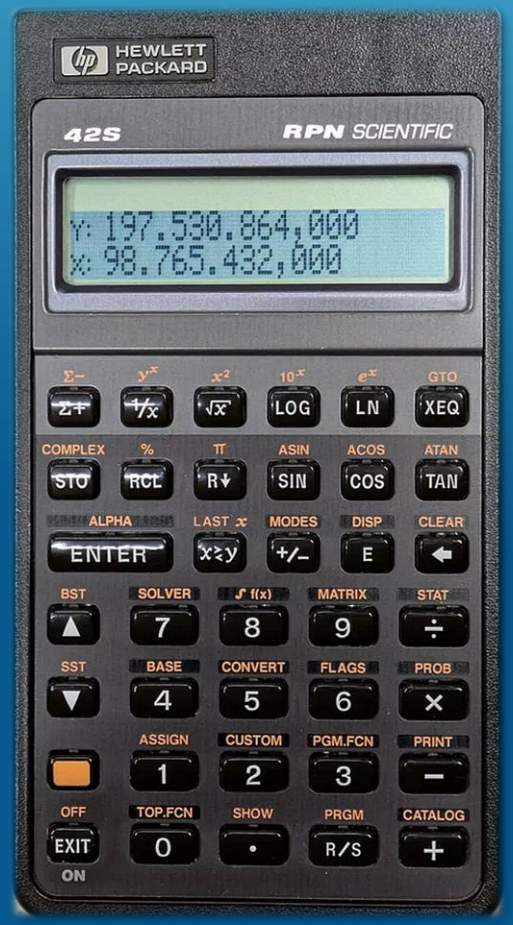


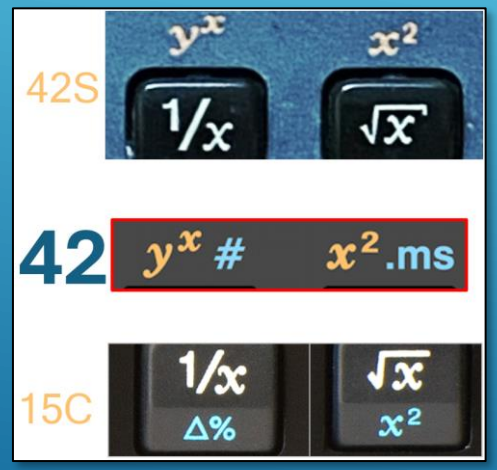
SwissMicros

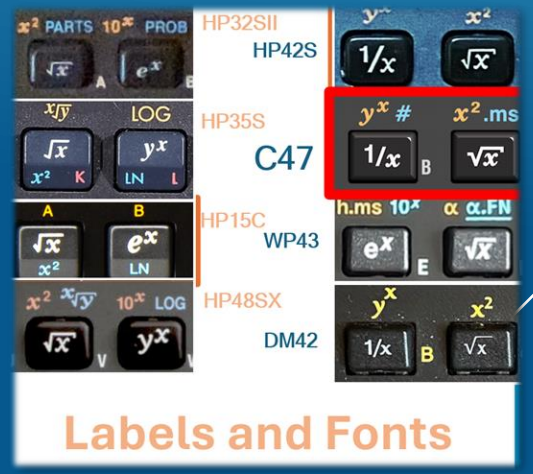
HEWLETT PACKARD

R47

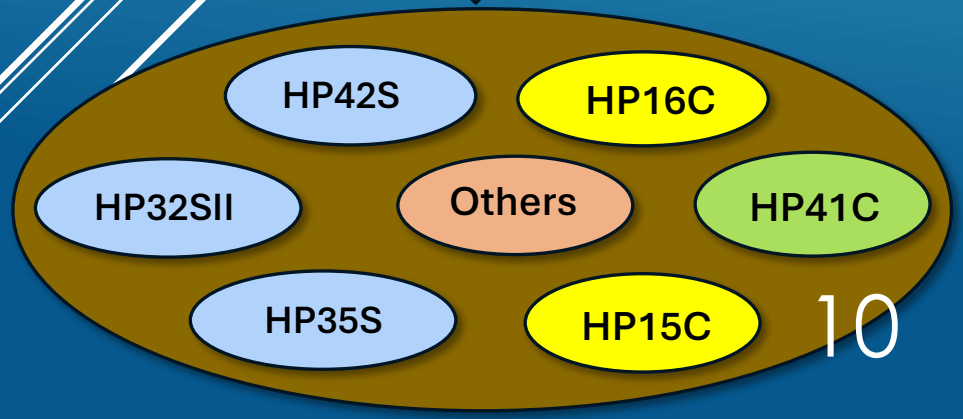
Inspiration & Influence





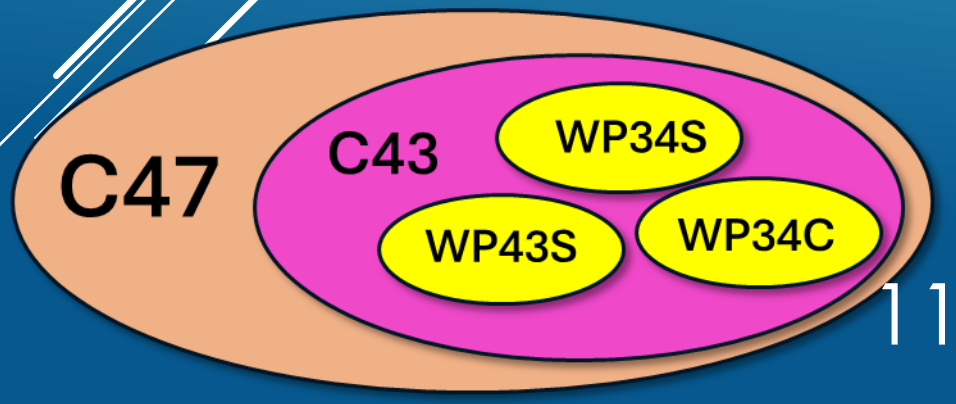


- HP41C/X - operation
- HP42S - physical appearance
- HP15C - physical appearance
- HP16C - BASE operation
- HP35S - complex entry
- HP32SII – direct entry



Inspiration & Influence

- WP34S - underlying code
- WP43S - complete system – not layout
- WP43C - operator location ÷×−+
- C43 - trying to keep compatibility
- C47 - more HP influence



Where is the 47 Family Going?

- Parallel 47 Platform
- Simultaneous Development
- Identical Software
- Perfect Synergy

- C47 – Retrofit Bezel for SM DM42
- R47 – SM Product built to 47 spec
- Smartphone App?

47 User Interface

Design and Principles

- Explainability
- Use Case and Duplication
- Conformity and Layout
- Familiarity and Ease of Use
- Style, Taste, and Rhythm
- Logic
- Separation (e.g. Radio Buttons, Check Boxes)
- Navigation (i.e. reduce up/dn)

https://47calc.com/documentation.html

How to document the 47 flexibility?

The important stuff, whatever that is

The hard to change things

Workbook:	
Sheets	85
Cells with data	1024075
Tables	0
PivotTables	32
Formulas	829711

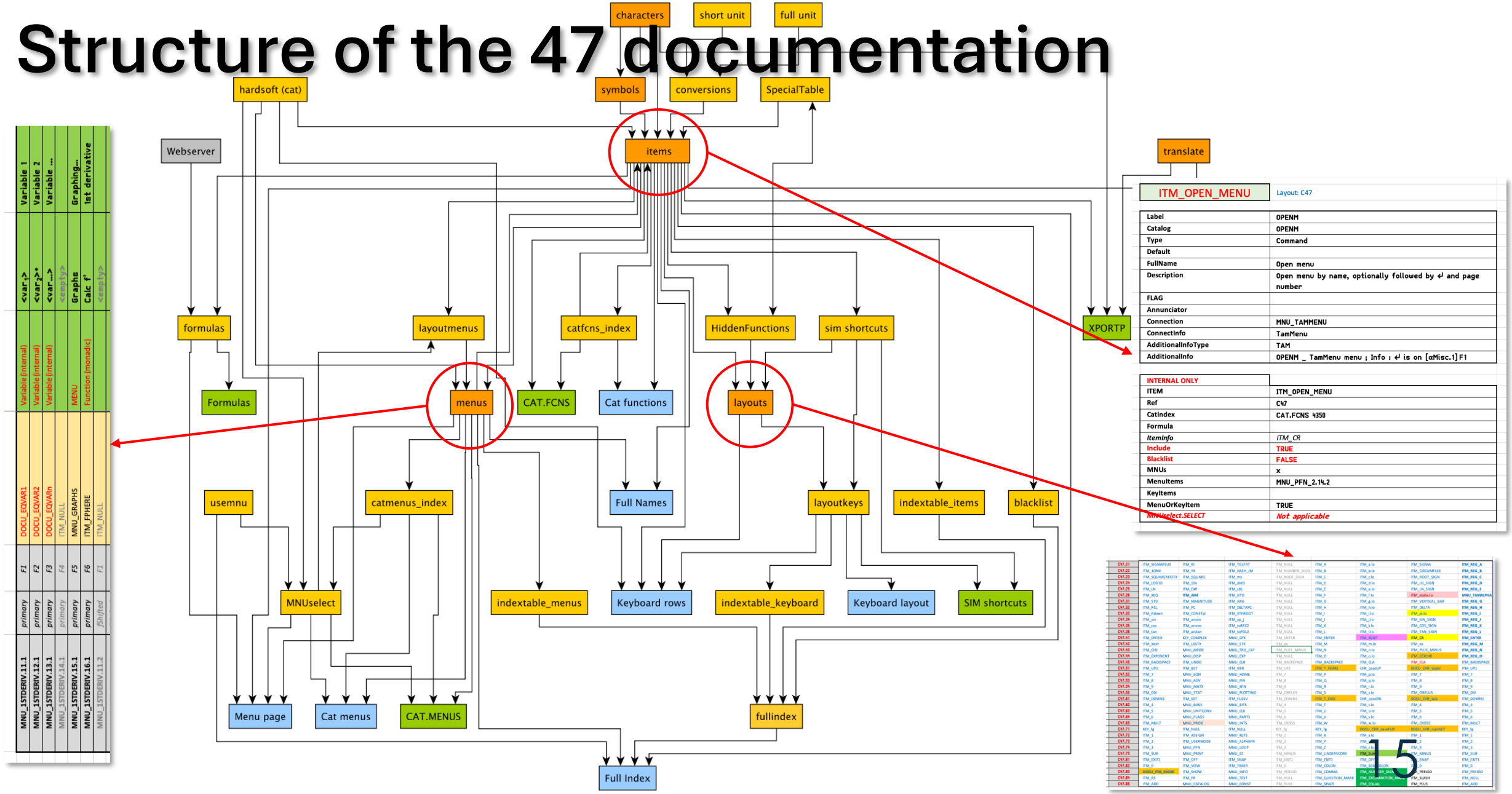
The 47 calculator has different layouts:

DM42, C47, R47, D, E, N, V47

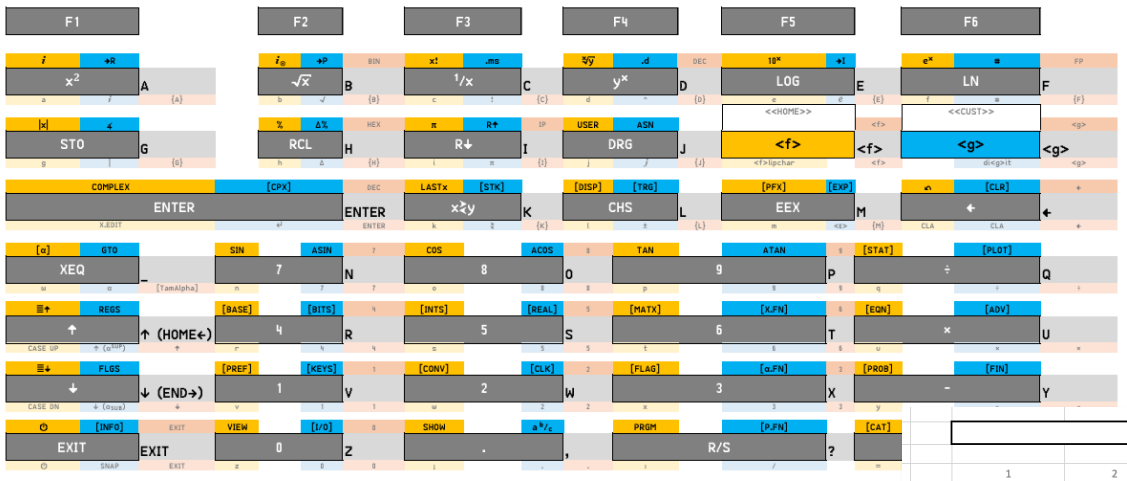
The simulator has to accomodate different PC keyboards

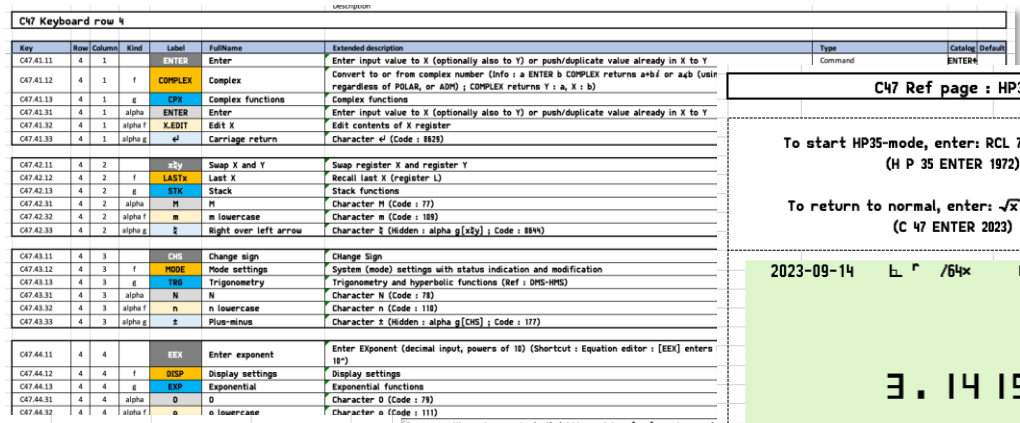
The user interface is highly customisable

Structure of the 47 documentation



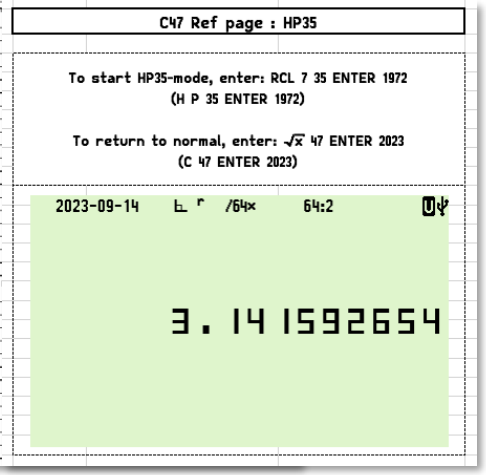
Some examples of the 47 documentation





C47 Keyboard row 4

Key	Row	Column	Kind	Label	FullName	Extended description	Type	Catalog	Default
C47.41.11	4	1		ENTER	Enter	Enter input value to X (optionally also to Y) or push/duplicate value already in X to Y	Command	ENTER4	
C47.41.12	4	1	f	COMPLEX	Complex	Convert to or from complex number (Info : a ENTER b COMPLEX returns a+bi or a∠b (usin regardless of POLAR, or ADM) ; COMPLEX returns Y : a, X : b)			
C47.41.13	4	1	g	CPX	Complex functions	Complex functions			
C47.41.31	4	1	alpha	ENTER	Enter	Enter input value to X (optionally also to Y) or push/duplicate value already in X to Y			
C47.41.32	4	1	alpha f	X.EDIT	Edit X	Edit contents of X register			
C47.41.33	4	1	alpha g	↵	Carriage return	Character ↵ (Code : 8629)			
C47.42.11	4	2		x⇄y	Swap X and Y	Swap register X and register Y			
C47.42.12	4	2	f	LASTx	Last X	Recall last X (register L)			
C47.42.13	4	2	g	STK	Stack	Stack functions			
C47.42.31	4	2	alpha	M	M	Character M (Code : 77)			
C47.42.32	4	2	alpha f	m	m lowercase	Character m (Code : 109)			
C47.42.33	4	2	alpha g	⇄	Right over left arrow	Character ⇄ (Hidden : alpha g[x⇄y] ; Code : 8644)			
C47.43.11	4	3		CHS	Change sign	CHange Sign			
C47.43.12	4	3	f	MODE	Mode settings	System (mode) settings with status indication and modification			
C47.43.13	4	3	g	TRG	Trigonometry	Trigonometry and hyperbolic functions (Ref : DMS-HMS)			
C47.43.31	4	3	alpha	N	N	Character N (Code : 78)			
C47.43.32	4	3	alpha f	n	n lowercase	Character n (Code : 110)			
C47.43.33	4	3	alpha g	±	Plus-minus	Character ± (Hidden : alpha g[CHS] ; Code : 177)			
C47.44.11	4	4		EEX	Enter exponent	Enter EXponent (decimal input, powers of 10) (Shortcut : Equation editor : [EEX] enters 10ˣ)			
C47.44.12	4	4	f	DISP	Display settings	Display settings			
C47.44.13	4	4	g	EXP	Exponential	Exponential functions			
C47.44.31	4	4	alpha	O	O	Character O (Code : 79)			
C47.44.32	4	4	alpha f	o	o lowercase	Character o (Code : 111)			



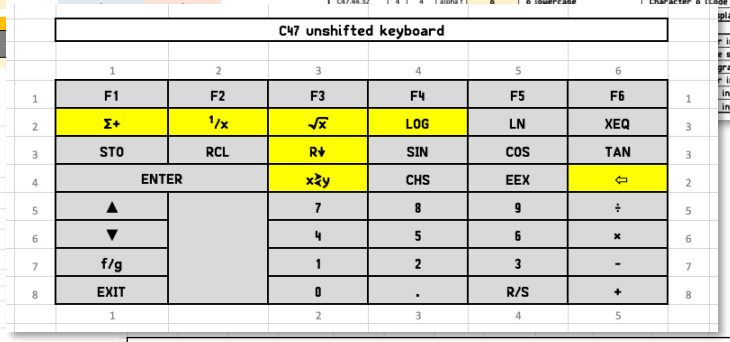
C47 Ref page : HP35

To start HP35-mode, enter: RCL 7 35 ENTER 1972
(H P 35 ENTER 1972)

To return to normal, enter: √x 47 ENTER 2023
(C 47 ENTER 2023)

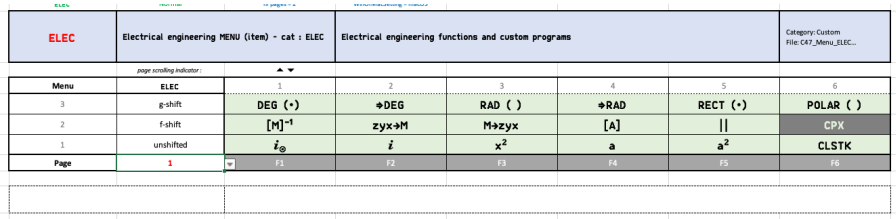
2023-09-14 /64× 64:2

3.141592654



C47 unshifted keyboard

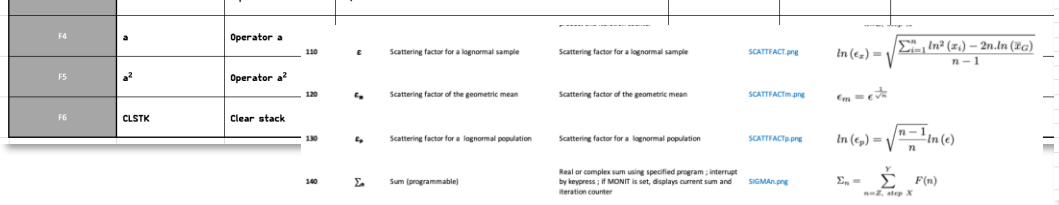
	1	2	3	4	5	6	
1	F1	F2	F3	F4	F5	F6	1
2	Σ+	1/x	√x	LOG	LN	XEQ	3
3	STO	RCL	R↓	SIN	COS	TAN	2
4	ENTER		x⇄y	CHS	EEX	⇦	5
5	▲		7	8	9	÷	6
6	▼		4	5	6	×	7
7	f/g		1	2	3	-	8
8	EXIT		0	.	R/S	+	
	1		2	3	4	5	



ELEC	Electrical engineering MENU (item) - cat : ELEC	Electrical engineering functions and custom programs	Category: Custom File: C47_Menu_ELEC...

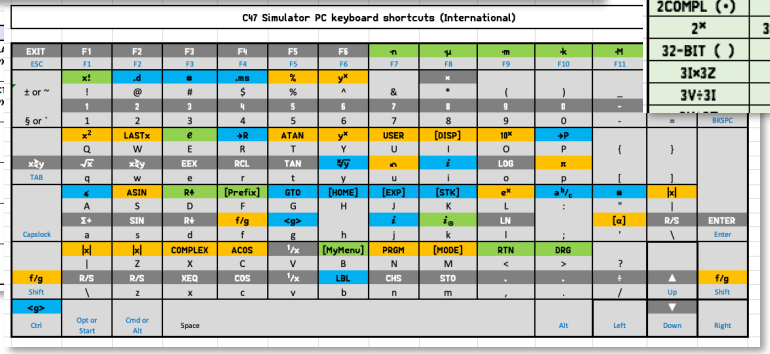
page scrolling indicator :

Menu	ELEC	1	2	3	4	5	6
3	g-shift	DEG (•)	→DEG	RAD ( )	→RAD	RECT (•)	POLAR ( )
2	f-shift	[M]⁻¹	zyx→M	M→zyx	[A]	||	CPX
1	unshifted	$i_{\circledcirc}$	i	x^2	a	a^2	CLSTK
Page	1	F1	F2	F3	F4	F5	F6



ELEC	Page 1					
F-key	Button label (complete)	Full name	Description (extended)	Type	Flag name	Additional information
F1	$i_{\circledcirc}$	Complex number (polar)	Enter complex number (polar) whether POLAR is set or not ; e.g. a $i_{\circledcirc}$ b ENTER results in a ∡ b (according to ADM)	Command	CPX.$\hat{f}$	Info : In NIM, works like CC with POLA set ; displayed according to flag CP when in RECT mode
F2	i	Complex number (rectangular)	Enter complex number (rectangular) whether RECT is set or not ; e.g. a i b ENTER results in a + b i	Command	CPX.$\hat{f}$	Info : In NIM, works like CC with REC set ; displayed according to flag CP when in RECT mode
F3	x^2	Square	Square of X	Function (monadic)		
F4	a	Operator a				
F5	a^2	Operator a^2				
F6	CLSTK	Clear stack				

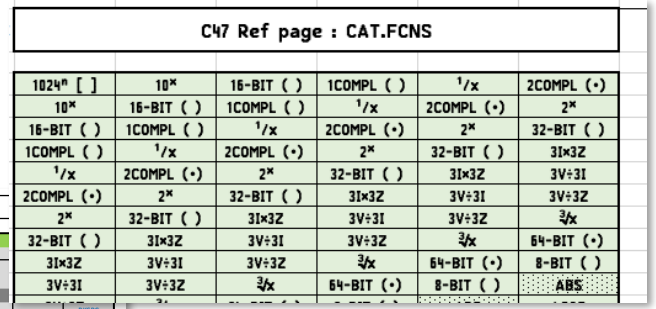
110	ε	Scattering factor for a lognormal sample	Scattering factor for a lognormal sample	SCATTFACT.png	$\ln(\epsilon_s) = \sqrt{\frac{\sum_{i=1}^{n} \ln^2(x_i) - 2n.\ln(\bar{x}_G)}{n-1}}$
120	ϵ_m	Scattering factor of the geometric mean	Scattering factor of the geometric mean	SCATTFACTm.png	$\epsilon_m = \epsilon^{\frac{1}{\sqrt{n}}}$
130	ϵ_p	Scattering factor for a lognormal population	Scattering factor for a lognormal population	SCATTFACTp.png	$\ln(\epsilon_p) = \sqrt{\frac{n-1}{n}} \ln(\epsilon)$
140	$\sum_n$	Sum (programmable)	Real or complex sum using specified program ; interrupt by keypress ; if MONIT is set, displays current sum and iteration counter	SIGMAn.png	$\Sigma_n = \sum_{n=Z,\ step\ X}^{Y} F(n)$



C47 Simulator PC keyboard shortcuts (International)

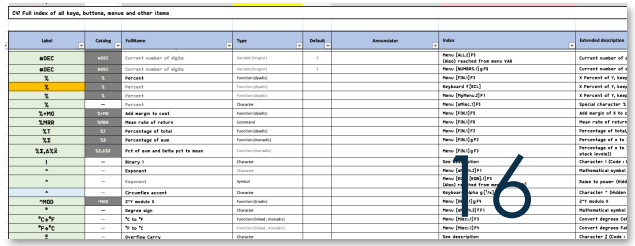
EXIT	F1	F2	F3	F4	F5	F6	·n	·µ	·m	·k	·M
ESC	F1	F2	F3	F4	F5	F6	F7	F8	F9	F10	F11
	x!	.d	■	.ms	%	yˣ		×			
± or ~	!	@	#	$	%	^	&	*	(	)	_
	1	2	3	4	5	6	7	8	9	0	-
§ or `	1	2	3	4	5	6	7	8	9	0	-
	x^2	LASTx	e	→R	ATAN	yˣ	USER	[DISP]	10ˣ	→P	
	Q	W	E	R	T	Y	U	I	O	P	{
x⇄y	√x	x⇄y	EEX	RCL	TAN	∛y	↶	i	LOG	π	
TAB	q	w	e	r	t	y	u	i	o	p	[
	∡	ASIN	R↑	[Prefix]	GTO	[HOME]	[EXP]	[STK]	eˣ	$a^b/_c$	■
	A	S	D	F	G	H	J	K	L	:	"
	Σ+	SIN	R↓	f/g	<g>		i	$i_{\circledcirc}$	LN		[α]
Capslock	a	s	d	f	g	h	j	k	l	;	'
	|x|	|x|	COMPLEX	ACOS	1/x	[MyMenu]	PRGM	[MODE]	RTN	DRG	
f/g	R/S	R/S	XEQ	COS	1/x	LBL	CHS	STO	.	.	÷
Shift	\	z	x	c	v	b	n	m	,	.	/
<g>											
Ctrl	Opt or Start	Cmd or Alt	Space							Alt	Left

=	BKSPC		
}			
|			
R/S	ENTER		
\	Enter		
▲	f/g		
Up	Shift		
▼			
Down	Right		



C47 Ref page : CAT.FCNS

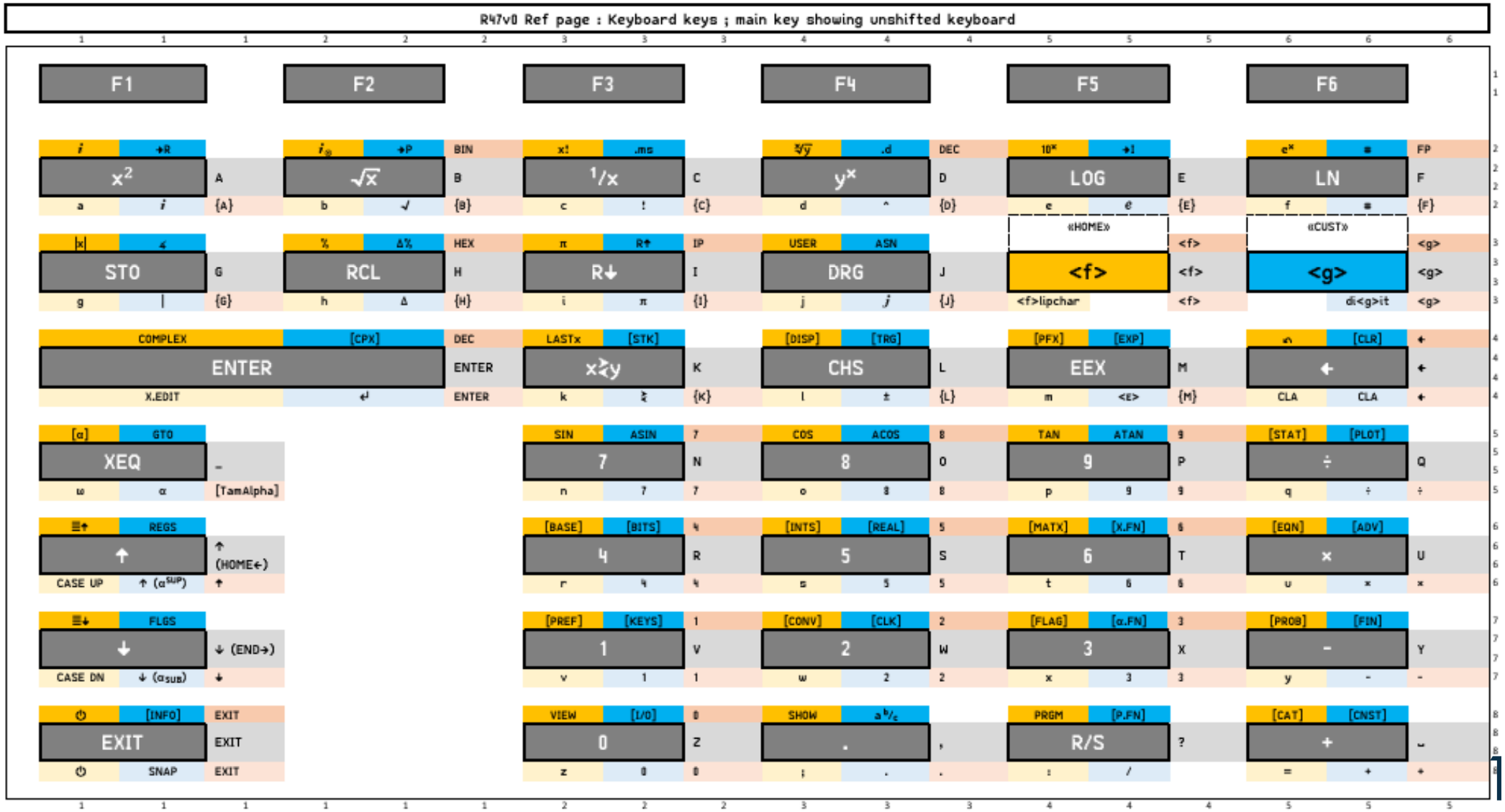
1024ⁿ [ ]	10ˣ	16-BIT ( )	1COMPL ( )	1/x	2COMPL (•)
10ˣ	16-BIT ( )	1COMPL ( )	1/x	2COMPL (•)	2ˣ
16-BIT ( )	1COMPL ( )	1/x	2COMPL (•)	2ˣ	32-BIT ( )
1COMPL ( )	1/x	2COMPL (•)	2ˣ	32-BIT ( )	3I×3Z
1/x	2COMPL (•)	2ˣ	32-BIT ( )	3I×3Z	3V÷3I
2COMPL (•)	2ˣ	32-BIT ( )	3I×3Z	3V÷3I	3V÷3Z
2ˣ	32-BIT ( )	3I×3Z	3V÷3I	3V÷3Z	∛x
32-BIT ( )	3I×3Z	3V÷3I	3V÷3Z	∛x	64-BIT (•)
3I×3Z	3V÷3I	3V÷3Z	∛x	64-BIT (•)	8-BIT ( )
3V÷3I	3V÷3Z	∛x	64-BIT (•)	8-BIT ( )	ABS



C47 Full index of all keys, buttons, menus and other items

Label	Catalog	FullName	Type	Default	Annunciator	Index	Extended description
#DEC	#DEC	Current number of digits	Variable(Integer)	3		Menu [ALL]F5	Current number of d
#DEC	#DEC	Current number of digits	Variable(Integer)	3		Menu [NUMBER]Z[g]F4	Current number of d
%	%	Percent	Function(Quadic)			Menu [F3A]F3	X Percent of Y, keep
%	%	Percent	Function(Quadic)			Keyboard f[%]	X Percent of Y, keep
%	%	Percent	Function(Quadic)			Menu [MyMenu]F1	X Percent of Y, keep
%	—	Percent	Character			Menu [Letter]F5	Special character %
%+MG	%+MG	Add margin to cost	Function(Quadic)			Menu [F3A]F3	Add margin of X to c
%MGR	%MGR	Mean rate of return	Command			Menu [F3A]F4	Mean rate of return
%T	%T	Percentage of total	Function(Quadic)			Menu [F3A]F2	Percentage of total
%Σ	%Σ	Percentage of sum	Function(Monadic)			Menu [F3A]Z[g]F2	Percentage of x to
%Σ,σ,Δ%Σ	%Σ,σ,Δ	Pct of sum and Delta pct to mean	Function(Monadic)			Menu [F3A]Z[g]F3	Percentage of x to stack levels[2]
!	—	Binary !	Character			Ser [illegible]ram	Character ! (Code :
^	—	Exponent	Character			Menu [ar[illegible]]F1	Mathematical symbol
^	—	Exponent	Symbol			Menu [Ex]: [illegible] (Ent) re[illegible]	Raise to power (Mat
^	—	Circumflex accent	Character			Keyboard [illegible] g[illegible]	Character ^ (Hidden
*MOD	*MOD	2ˣ* modulo X	Function(Dyadic)			Menu [illegible]F4	2ˣ* modulo X
°	—	Degree sign	Character			Menu [ar[illegible]]F1	Mathematical symbol
°C→°F	—	°C to °F	Function(Unital, monadic)			Menu [Menu]F3	Convert degrees Cel
°F→°C	—	°F to °C	Function(Unital, monadic)			Menu [Menu]F4	Convert degrees Fah
⇱	—	Overflow Carry	Character			See description	Character ⇱ (Code :

R47 Keyboard layout



R47 menu page description (ELEC menu p1)

ELEC	Electrical engineering MENU (item) - cat : ELEC	Electrical engineering functions and custom programs	Category: Custom File: C47_Menu_ELEC...

page scrolling indicator : ▲ ▼

Menu	ELEC	1	2	3	4	5	6
3	g-shift	DEG (•)	⇒DEG	RAD ( )	⇒RAD	RECT (•)	POLAR ( )
2	f-shift	$[M]^{-1}$	zyx→M	M→zyx	[A]	||	CPX
1	unshifted	$i_{\odot}$	i	x^2	a	a^2	CLSTK
Page	1	F1	F2	F3	F4	F5	F6

ELEC	Page 1								
F-key	Button label (complete)	Full name	Description (extended)	Type	Flag name	Additional information	Catalog	Default	Status
F1	$i_{\odot}$	Complex number (polar)	Enter complex number (polar) whether POLAR is set or not ; e.g. a $i_{\odot}$ b ENTER results in a ∡ b (according to ADM)	Command	CPXj	Info : In NIM, works like CC with POLAR set ; displayed according to flag CPXj when in RECT mode	op_$i_{\odot}$		
F2	i	Complex number (rectangular)	Enter complex number (rectangular) whether RECT is set or not ; e.g. a i b ENTER results in a + b i	Command	CPXj	Info : In NIM, works like CC with RECT set ; displayed according to flag CPXj when in RECT mode	op_i		
F3	x^2	Square	Square of X	Function (monadic)			x^2		
F4	a	Operator a	Insert value of 1 ∠ 120°	Command			op_a		
F5	a^2	Operator a^2	Insert value of 1 ∠ 240°	Command			op_a^2		
F6	CLSTK	Clear stack	Clear all stack data	Command		Hidden : long [⇦]	CLSTK		

47 Function Catalog (CAT.FCNS)

C47 Ref page : CAT.FCNS

1024^n [ ]	10^x	16-BIT ( )	1COMPL ( )	$^1/x$	2COMPL (•)
10^x	16-BIT ( )	1COMPL ( )	$^1/x$	2COMPL (•)	2^x
16-BIT ( )	1COMPL ( )	$^1/x$	2COMPL (•)	2^x	32-BIT ( )
1COMPL ( )	$^1/x$	2COMPL (•)	2^x	32-BIT ( )	3I×3Z
$^1/x$	2COMPL (•)	2^x	32-BIT ( )	3I×3Z	3V÷3I
2COMPL (•)	2^x	32-BIT ( )	3I×3Z	3V÷3I	3V÷3Z
2^x	32-BIT ( )	3I×3Z	3V÷3I	3V÷3Z	$\sqrt[3]{x}$
32-BIT ( )	3I×3Z	3V÷3I	3V÷3Z	$\sqrt[3]{x}$	64-BIT (•)
3I×3Z	3V÷3I	3V÷3Z	$\sqrt[3]{x}$	64-BIT (•)	8-BIT ( )
3V÷3I	3V÷3Z	$\sqrt[3]{x}$	64-BIT (•)	8-BIT ( )	ABS

C47 Simulator PC keyboard shortcuts (Intl)

C47 Simulator PC keyboard shortcuts (International)

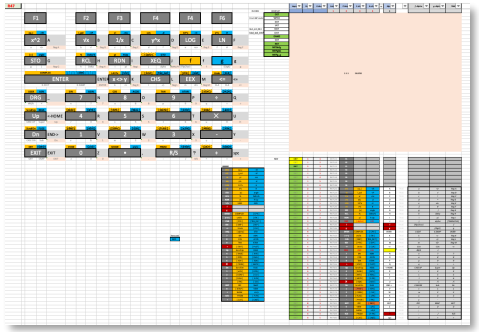
EXIT	F1	F2	F3	F4	F5	F6	·n	·µ	·m	·k	·M		
ESC	F1	F2	F3	F4	F5	F6	F7	F8	F9	F10	F11	F12	F13
	x!	.d	#	.ms	%	y^x		×				+	
± or ~	!	@	#	$	%	^	&	*	(	)	_	+	
	1	2	3	4	5	6	7	8	9	0	-	.d	⇦
§ or `	1	2	3	4	5	6	7	8	9	0	-	=	BKSPC
	x^2	LASTx	e	→R	ATAN	y^x	USER	[DISP]	10^x	→P			
	Q	W	E	R	T	Y	U	I	O	P	{	}	
x⇄y	√x	x⇄y	EEX	RCL	TAN	∛y	↶	i	LOG	π			
TAB	q	w	e	r	t	y	u	i	o	p	[	]	
	∡	ASIN	R↑	[Prefix]	GTO	[HOME]	[EXP]	[STK]	e^x	$a^b/_c$	#	|x|	
	A	S	D	F	G	H	J	K	L	:	"	|	
	Σ+	SIN	R↓	f/g	<g>		i	$i_{\odot}$	LN		[α]	R/S	ENTER
Capslock	a	s	d	f	g	h	j	k	l	;	'	\	Enter
	|x|	|x|	COMPLEX	ACOS	1/x	[MyMenu]	PRGM	[MODE]	RTN	DRG			
	|	Z	X	C	V	B	N	M	<	>	?		
f/g	R/S	R/S	XEQ	COS	1/x	LBL	CHS	STO	.	.	÷	▲	f/g
Shift	\	z	x	c	v	b	n	m	,	.	/	Up	Shift
<g>												▼	
Ctrl	Opt or Start	Cmd or Alt	Space							Alt	Left	Down	Right

47 Full index

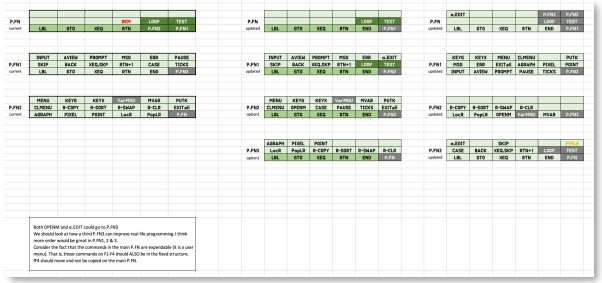
C47 Full index of all keys, buttons, menus and other items

Label	Catalog	FullName	Type	Default	Annunciator	Index	Extended description
#DEC	#DEC	Current number of digits	Variable (longint)	3		Menu [ALL.2] F5 (Also) reached from menu VAR	Current number of c
#DEC	#DEC	Current number of digits	Variable (longint)	3		Menu [NUMBRS.1] g F6	Current number of c
%	%	Percent	Function (dyadic)			Menu [FIN.1] F3	X Percent of Y, keep
%	%	Percent	Function (dyadic)			Keyboard f [RCL]	X Percent of Y, keep
%	%	Percent	Function (dyadic)			Menu [MyMenu.2] F1	X Percent of Y, keep
%	--	Percent	Character			Menu [αMisc.1] F5	Special character %
%+MG	%+MG	Add margin to cost	Function (dyadic)			Menu [FIN.1] F5	Add margin of X to c
%MRR	%MRR	Mean rate of return	Command			Menu [FIN.1] F6	Mean rate of return
%T	%T	Percentage of total	Function (dyadic)			Menu [FIN.1] F2	Percentage of total,
%Σ	%Σ	Percentage of sum	Function (monadic)			Menu [FIN.1] g F2	Percentage of x to
%Σ,Δ%x̄	%Σ,Δ%x̄	Pct of sum and Delta pct to mean	Function (monadic)			Menu [FIN.1] g F3	Percentage of x to stack levels))
1	--	Binary 1	Character			See description	Character 1 (Code :
^	--	Exponent	Character			Menu [αMath.2] F1	Mathematical symbol
^	--	Exponent	Symbol			Menu [EDIT [EQN].1] F3 (Also) reached from menu NEW [EQN]	Raise to power (Hidd
^	--	Circumflex accent	Character			Keyboard alpha g [1/x]	Character ^ (Hidden
^MOD	^MOD	Z^Y modulo X	Function (triadic)			Menu [INTS.1] g F4	Z^Y modulo X
°	--	Degree sign	Character			Menu [αMath.3] f F1	Mathematical symbol
°C→°F	--	°C to °F	Function (linked ; monadic)			Menu [Misc:.1] F3	Convert degrees Cel
°F→°C	--	°F to °C	Function (linked ; monadic)			Menu [Misc:.1] F4	Convert degrees Fal
⁰	--	Overflow Carry	Character			See description	Character ⁰ (Code :

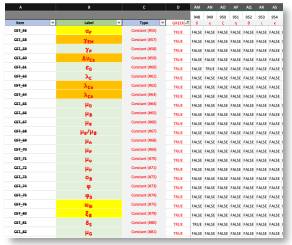
Interaction : design ⇔development ⇔doc



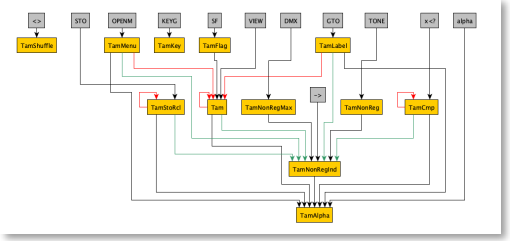
Example 1: support discussion of new keyboard layout R47



Example 2: menu redesign mockups & import into code base

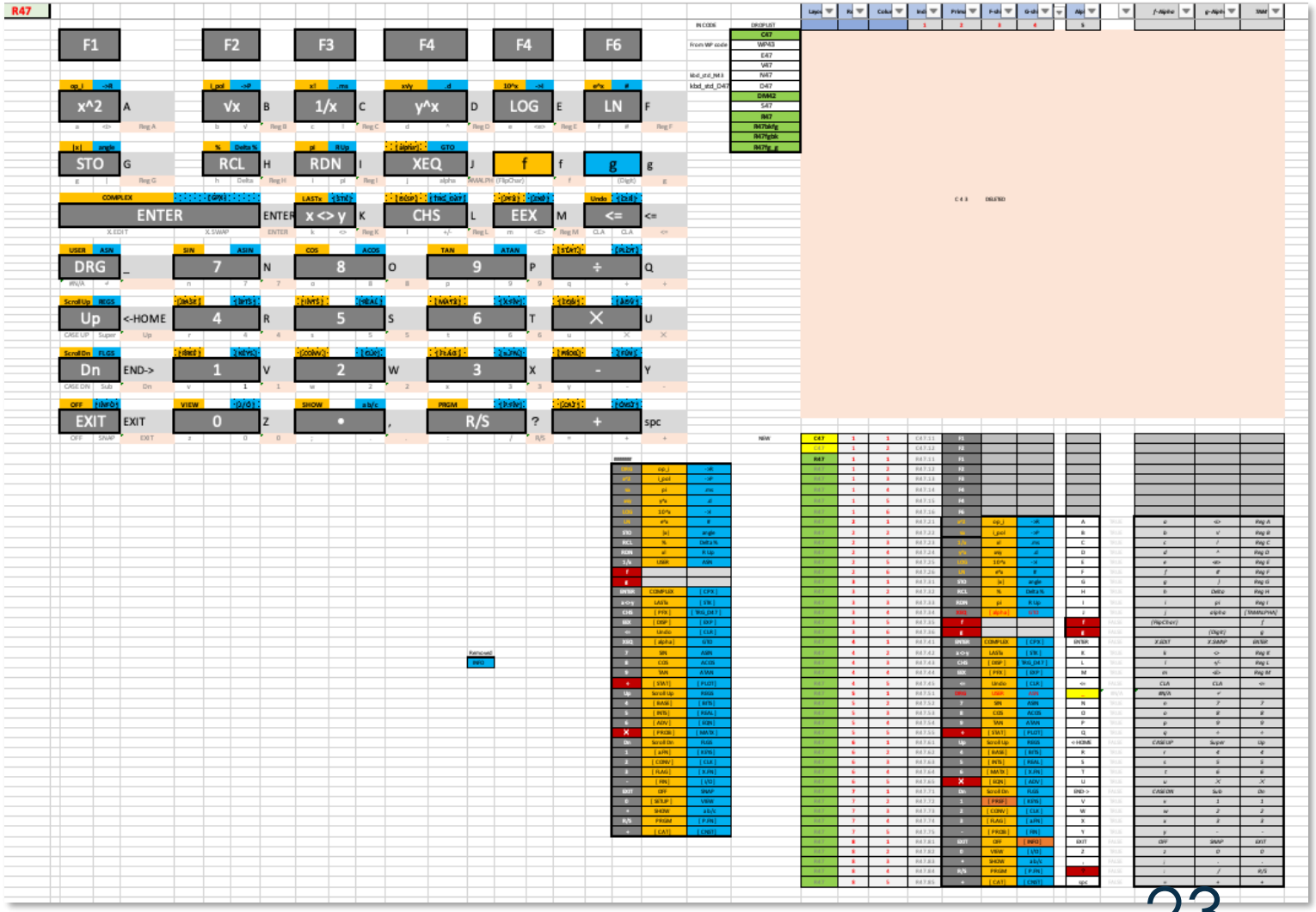


Example 3: what Greek characters to support in the simulator



Example 4: redesign TAM menu workflow

1: Support Discussion of R47 Layout



2: Menu Redesign & Import into Code Base

P.FN current				REM	LOOP	TEST
	LBL	GTO	XEQ	RTN	P.FN2	P.FN1
P.FN1 current	INPUT	AVIEW	PROMPT	MSG	ERR	PAUSE
	SKIP	BACK	XEQ.SKP	RTN+1	CASE	TICKS
	LBL	GTO	XEQ	RTN	END	P.FN2
P.FN2 current	MENU	KEYG	KEYX	VarMNU	MVAR	PUTK
	CLMENU	R-COPY	R-SORT	R-SWAP	R-CLR	EXITall
	AGRAPH	PIXEL	POINT	LocR	PopLR	P.FN

P.FN updated					LOOP	TEST
	LBL	GTO	XEQ	RTN	END	P.FN1
P.FN1 updated	INPUT	AVIEW	PROMPT	MSG	ERR	α.EDIT
	SKIP	BACK	XEQ.SKP	RTN+1	LOOP	TEST
	LBL	GTO	XEQ	RTN	END	P.FN2
P.FN2 option1	MENU	KEYG	KEYX	VarMNU	MVAR	PUTK
	CLMENU	OPENM	CASE	PAUSE	TICKS	EXITall
	LBL	GTO	XEQ	RTN	END	P.FN3
P.FN3 option1	AGRAPH	PIXEL	POINT			
	LocR	PopLR	R-COPY	R-SORT	R-SWAP	R-CLR
	LBL	GTO	XEQ	RTN	END	P.FN

P.FN updated	α.EDIT				P.FN3	P.FN2
					LOOP	TEST
	LBL	GTO	XEQ	RTN	END	P.FN1
P.FN1 updated	KEYG	KEYX	MENU	CLMENU		PUTK
	MSG	ERR	EXITall	AGRAPH	PIXEL	POINT
	INPUT	AVIEW	PROMPT	PAUSE	TICKS	P.FN2
P.FN2 updated						
	R-COPY	R-SORT	R-SWAP	R-CLR		
	LocR	PopLR	OPENM	VarMNU	MVAR	P.FN3
P.FN3 updated	α.EDIT		SKIP			PFN.R
	CASE	BACK	XEQ.SKP	RTN+1	LOOP	TEST
	LBL	GTO	XEQ	RTN	END	P.FN

Both OPENM and α.EDIT could go to P.FN3
We should look at how a third P.FN3 can improve real life programming.I think more order would be great in P.FN1, 2 & 3.
Consider the fact that the commands in the main P.FN are expendable (it is a user menu). That is, those commands on F1-F4 should ALSO be in the fixed structure.
fF4 should move and not be copied on the main P.FN.

MNU	MENU	Page	Key	Line	Index	Shift	F_key	ITEM	Status
MNU_PFN	P.FN	1	1	1	MNU_PFN.11.1	primary	F1	ITM_XEQ	
MNU_PFN	P.FN	1	2	1	MNU_PFN.12.1	primary	F2	ITM_XEQP1	
MNU_PFN	P.FN	1	3	1	MNU_PFN.13.1	primary	F3	ITM_GTO	
MNU_PFN	P.FN	1	4	1	MNU_PFN.14.1	primary	F4	ITM_LBL	
MNU_PFN	P.FN	1	5	1	MNU_PFN.15.1	primary	F5	ITM_END	
MNU_PFN	P.FN	1	6	1	MNU_PFN.16.1	primary	F6	MNU_PFN_MORE	
MNU_PFN	P.FN	1	1	2	MNU_PFN.11.2	fShifted	F1	ITM_RTN	
MNU_PFN	P.FN	1	2	2	MNU_PFN.12.2	fShifted	F2	ITM_RTNP1	
MNU_PFN	P.FN	1	3	2	MNU_PFN.13.2	fShifted	F3	ITM_CASE	
MNU_PFN	P.FN	1	4	2	MNU_PFN.14.2	fShifted	F4	ITM_SKIP	
MNU_PFN	P.FN	1	5	2	MNU_PFN.15.2	fShifted	F5	ITM_BACK	
MNU_PFN	P.FN	1	6	2	MNU_PFN.16.2	fShifted	F6	ITM_LocR	
MNU_PFN	P.FN	1	1	3	MNU_PFN.11.3	gShifted	F1	ITM_INPUT	
MNU_PFN	P.FN	1	2	3	MNU_PFN.12.3	gShifted	F2	ITM_MSG	
MNU_PFN	P.FN	1	3	3	MNU_PFN.13.3	gShifted	F3	ITM_ERR	
MNU_PFN	P.FN	1	4	3	MNU_PFN.14.3	gShifted	F4	ITM_TICKS	
MNU_PFN	P.FN	1	5	3	MNU_PFN.15.3	gShifted	F5	ITM_PAUSE	
MNU_PFN	P.FN	1	6	3	MNU_PFN.16.3	gShifted	F6	ITM_POPLR	

I	0	1	2	3	4	5
2	ITM_XEQ,	ITM_XEQP1,	ITM_GTO,	ITM_LBL,	ITM_END,	-MNU_PFN_MORE,
8	ITM_RTN,	ITM_RTNP1,	ITM_CASE,	ITM_SKIP,	ITM_BACK,	ITM_LocR,
14	ITM_INPUT,	ITM_MSG,	ITM_ERR,	ITM_TICKS,	ITM_PAUSE,	ITM_POPLR,
	,	,	,	,	,	,
	,	,	,	,	,	,
	,	,	,	,	,	,
	,	,	,	,	,	,
59						
65						
71						
78						
84						
90						

C47-codebase

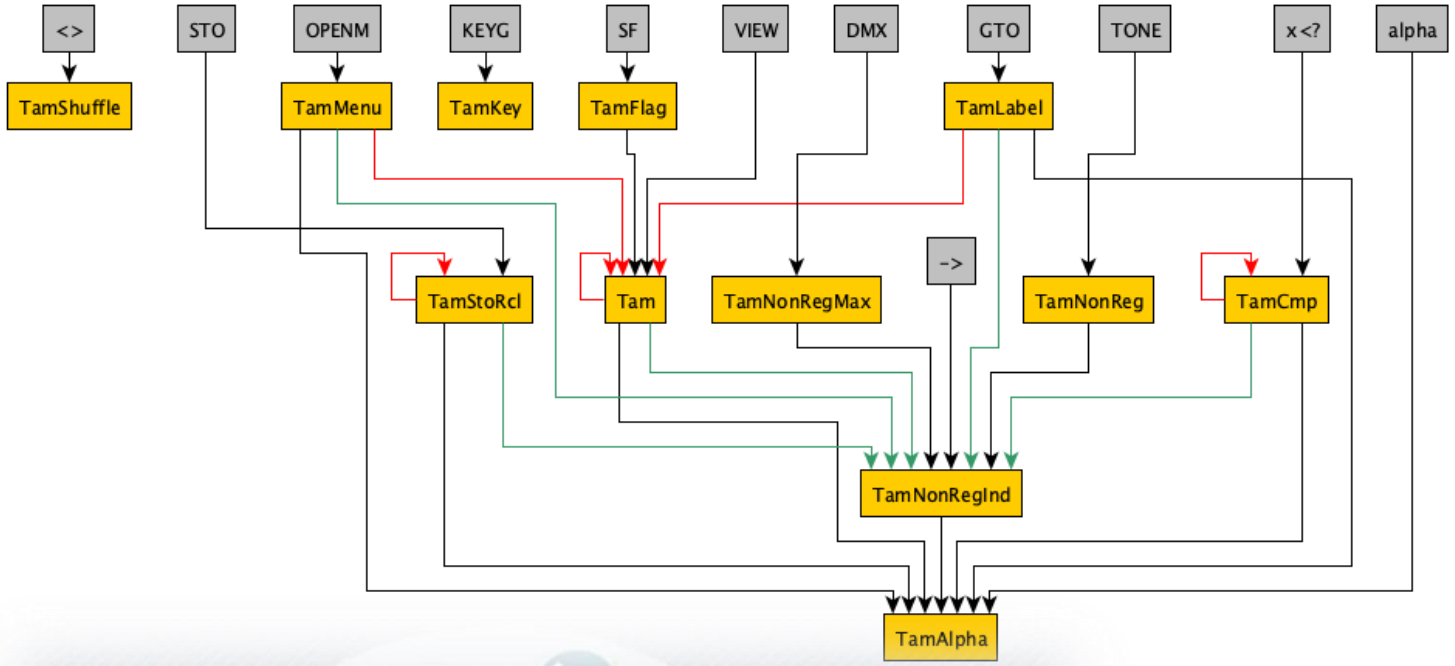
ITM_XEQ,	ITM_XEQP1,	ITM_GTO,	ITM_LBL,	ITM_END,	-MNU_PFN_MORE,
ITM_RTN,	ITM_RTNP1,	ITM_CASE,	ITM_SKIP,	ITM_BACK,	ITM_LocR,
ITM_INPUT,	ITM_MSG,	ITM_ERR,	ITM_TICKS,	ITM_PAUSE,	ITM_POPLR,
.	.	.	.	.	.
.	.	.	.	.	.
.	.	.	.	.	.

3: What Greek Characters for the Simulator

A	B	C	D	AM	AN	AO	AP	AQ	AR	AS
				948	949	950	951	952	953	954
Item	Label	Type	GREEK	δ	ε	ζ	η	θ	ι	κ
~~CST_56~~	α_F	Constant (#55)	TRUE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE
~~CST_58~~	γ_{EM}	Constant (#57)	TRUE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE
~~CST_59~~	γ_P	Constant (#58)	TRUE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE
~~CST_60~~	$\Delta\nu_{Cs}$	Constant (#59)	TRUE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE
~~CST_61~~	ε_0	Constant (#60)	TRUE	FALSE	TRUE	FALSE	FALSE	FALSE	FALSE	FALSE
~~CST_62~~	λ_C	Constant (#61)	TRUE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE
~~CST_63~~	λ_{Cn}	Constant (#62)	TRUE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE
~~CST_64~~	λ_{CP}	Constant (#63)	TRUE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE
~~CST_65~~	μ_0	Constant (#64)	TRUE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE
~~CST_66~~	μ_B	Constant (#65)	TRUE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE
~~CST_67~~	μ_e	Constant (#66)	TRUE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE
~~CST_68~~	μ_e/μ_B	Constant (#67)	TRUE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE
~~CST_69~~	μ_n	Constant (#68)	TRUE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE
~~CST_70~~	μ_P	Constant (#69)	TRUE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE
~~CST_71~~	μ_u	Constant (#70)	TRUE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE
~~CST_72~~	μ_μ	Constant (#71)	TRUE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE
~~CST_73~~	σ_B	Constant (#72)	TRUE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE
~~CST_74~~	φ	Constant (#73)	TRUE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE
~~CST_75~~	φ_0	Constant (#74)	TRUE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE
~~CST_76~~	$\omega_\oplus$	Constant (#75)	TRUE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE
~~CST_80~~	ξ_B	Constant (#79)	TRUE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE
~~CST_81~~	δ_S	Constant (#80)	TRUE	TRUE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE
~~CST_82~~	μ_G	Constant (#81)	TRUE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE

4: Redesign TAM Menu Workflow

Tam	page 1						REG
Catalog :							
menu unchanged		→	VAR	X	Y	Z	T
TamAlpha	page 1			CAPS [•]	NUM [ ]	$^{SUP}{}_{SUB}$ [ ]	
Catalog :							
menu updated		Myα	A..Ω	αMath	αMisc	αINTL	
TamCmp	page 1						
Catalog :		0.	1.				
menu unchanged		→	VAR	X	Y	Z	T
TamFlag	page 1						FLG
Catalog :							
menu unchanged		→	SYS.FL	X	Y	Z	T
TamKey	page 1	13	14	15	16	17	18
Catalog :		7	8	9	10	11	12
menu unchanged		1	2	3	4	5	6
TamLabel	page 1						
Catalog :							
menu unchanged		→	PROG	X	Y	Z	T
TamMenu	page 1						
Catalog :							
menu new		→	MENU	→X	→Y	→Z	→T
TamNonReg	page 1						
Catalog :							
menu updated		→		→X	→Y	→Z	→T
TamNonRegInd	page 1						REG
Catalog :							
menu updated			VAR	X	Y	Z	T
TamNonRegMax	page 1						
Catalog :							
menu updated		→	DMXmax	→X	→Y	→Z	→T
TamShuffle	page 1						
Catalog :							
menu unchanged				X	Y	Z	T
TamStoRcl	page 1	...EL	...IJ				REG
Catalog :		Config	Stack			Max	Min
menu unchanged		→	VAR	X	Y	Z	T



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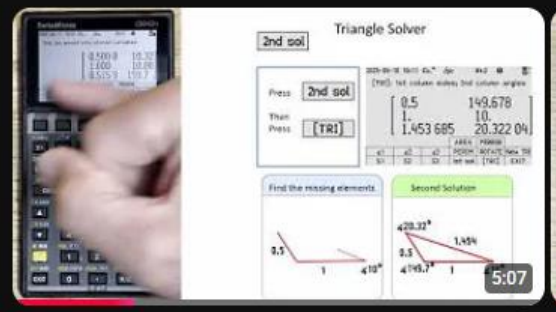

Vid 11, Triangle Solver

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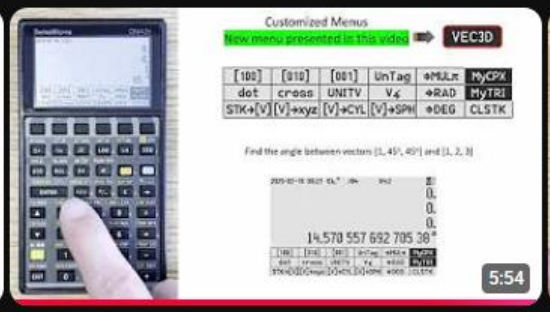

vid 9, new VEC3D menu

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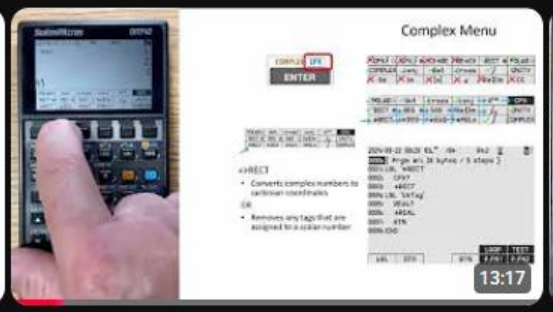

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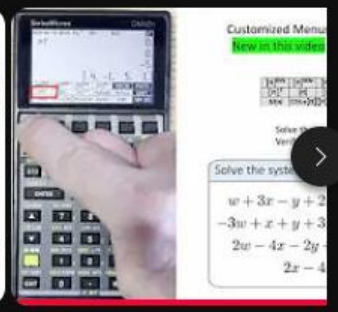

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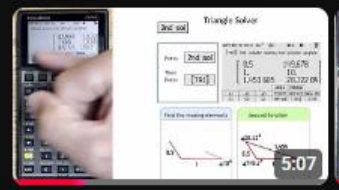

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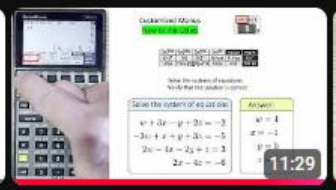

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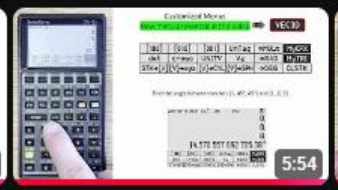

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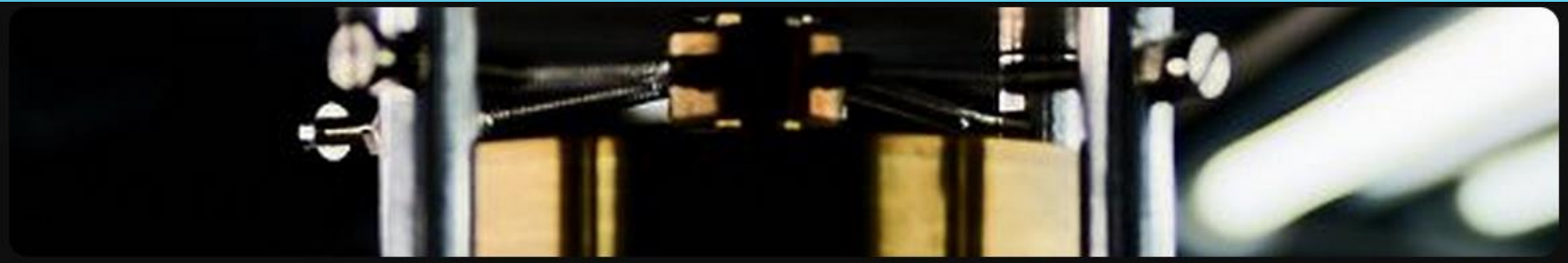

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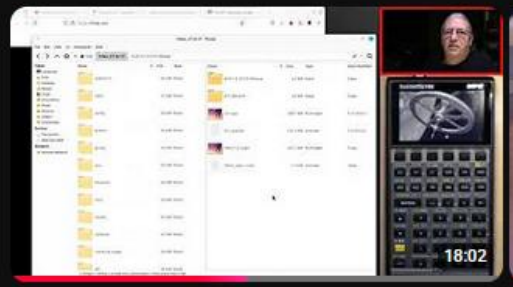

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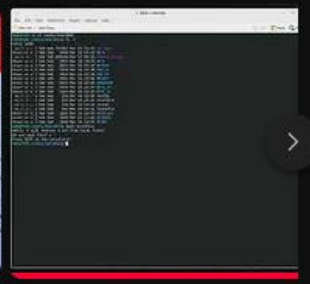

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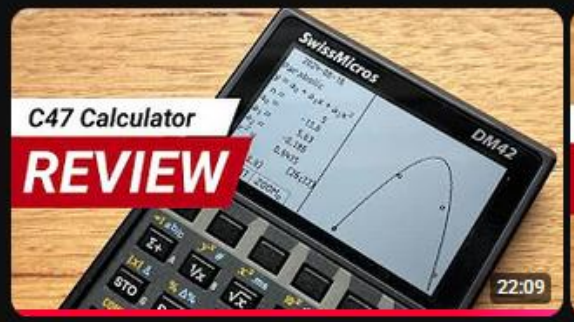

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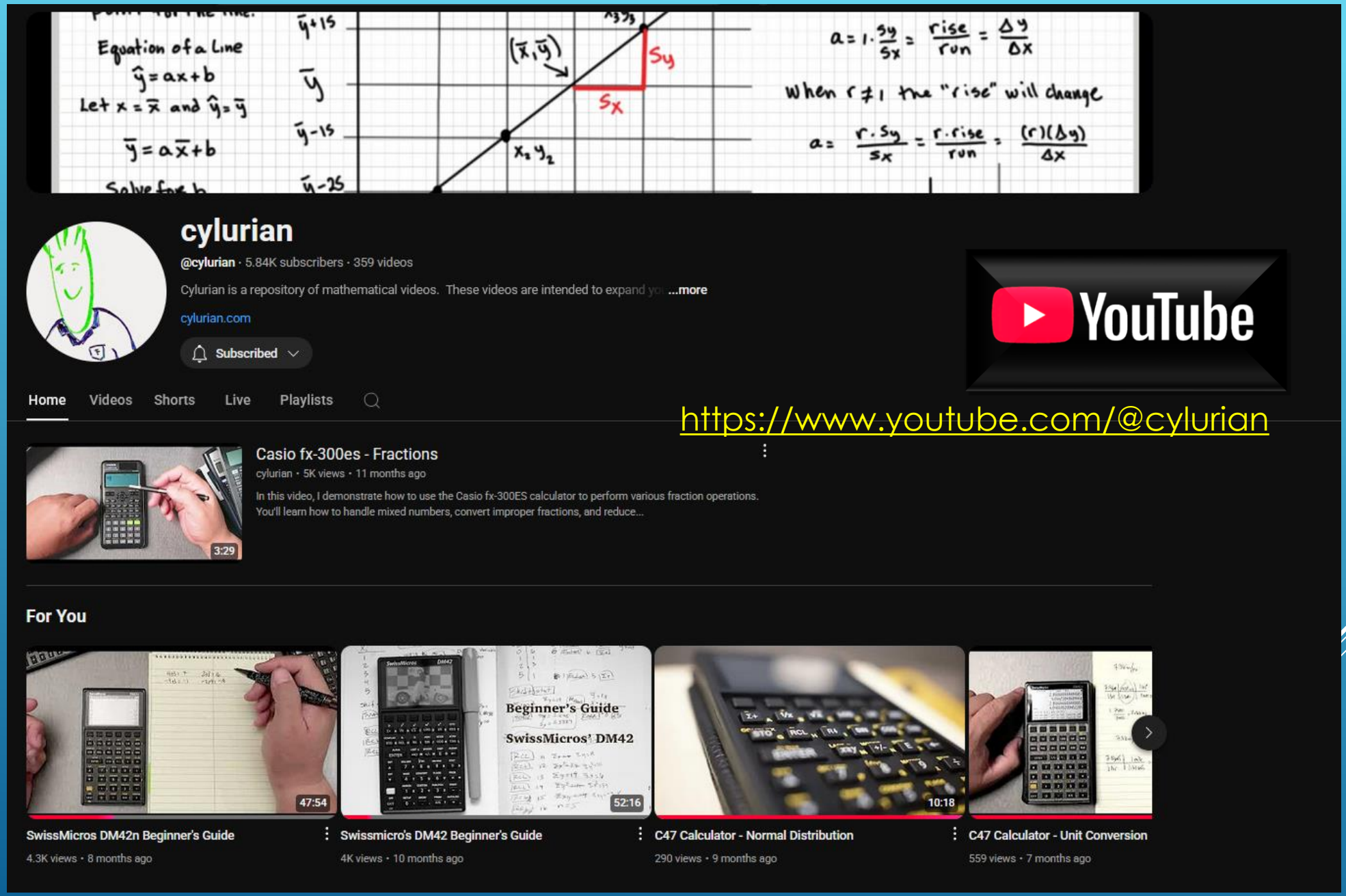

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- **Jaco Mostert** – C47 Calculator Project, Prototype R47 loan, App Notes, C47 Overlay
- **Robbert J. van Meenen** – 47 Documentation, Prototype R47 loan, HPCC 2024 PowerPoint Material
- **TeamTricky (Mike Leffel)** – YouTube Videos, 47 Source Code & Guidance for C47 Customizations
- **N.A. McBee** – YouTube Videos
- **Spiff72 (Jeffrey Roetman)** – C47 and DB50x Overlays for the DM42
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- **Miraheze** – Unofficial C47 Wiki
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- **HPCC** – Calculator Camaraderie, YouTube Videos, Datafile, RCL 20, RCL 40
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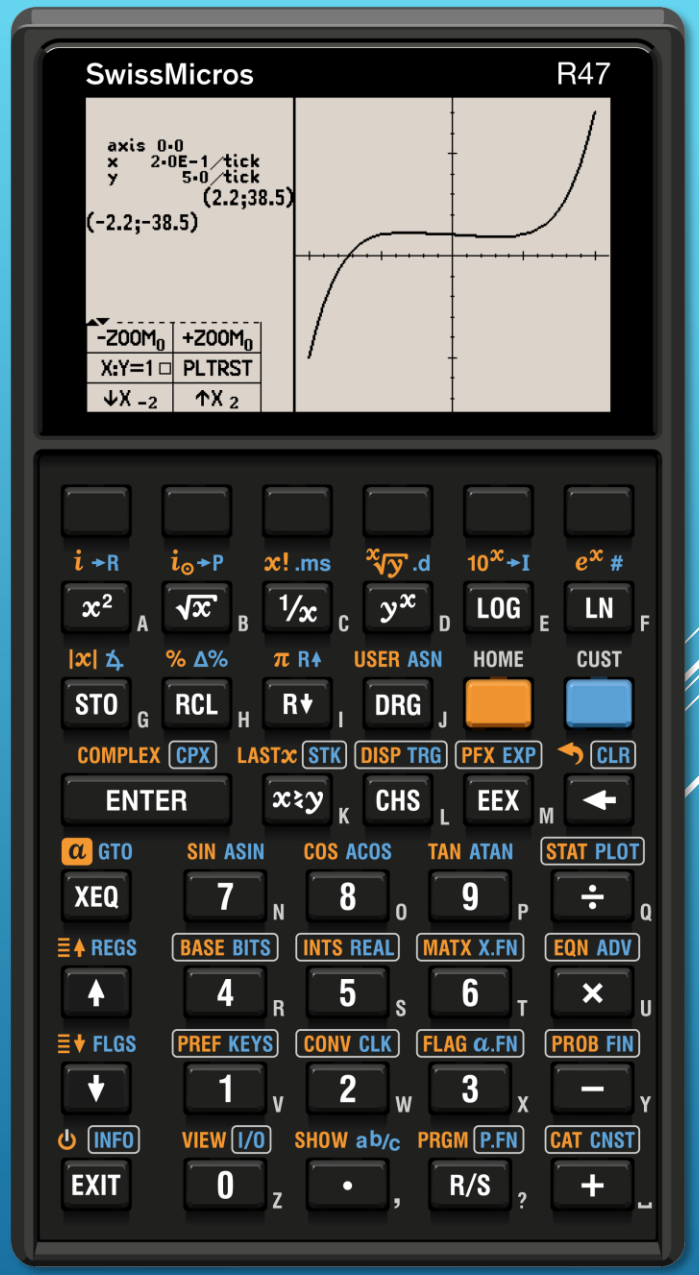
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