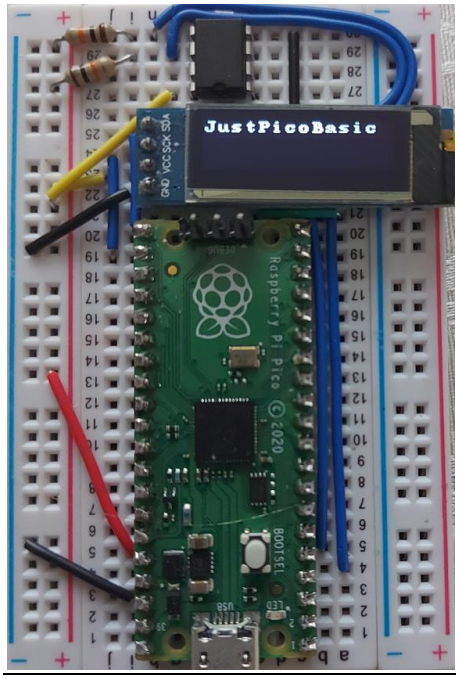
#JustPicoBasic manual

The best way to see how it works is to run a few examples: https://github.com/bgolab/JustBasic/tree/main/examples

Wiring

Hardware components: RPI PICO, OLED 0.91" I2C, EEPROM 24c64 I2C, 2x resistors 10kohm



Terminal

JustPicoBasic was tested w/ Putty and TeraTerm. Copy & Paste is supported.

COM10 - Tera Term VT

File Edit Setup Control Window Help

```
JustBasic v1.0B20
(C) 2021 bg
HW: RP2040
Running at 125000000Hz

LIMITs: SRC/LINE:8000/160, DIM/DATA:500, NAMES/NAMELENGTH:100/8, IF/FOR/WHILE:50/50/50

CLI: [L]oad, [S]ave, [C]ode, [R]un, [N]ew, [U]ser, [E]dit, @N[], [B]ye, [H]elp, [T]ech, T0, T1, T2, ?

CMDs: print, input, inkey, cls, data, read, restore, if, then, else, endif, for, to, step, next, while, endwhile, goto, gosu
b, return, rem, peek, poke, pause, rnd, abs, sin, cos, exp, log, sqr, sgn, hex$, str$, chr$, left$, mid$, right$, len, val,
int, fix, gettick, dim, pmode, dwrite, awrite, dread, aread, end, ,, ;, +, -, and, or, not, *, /, %, (, ), <, <=, >, >=, =,
<>, plot, draw, circle, lprint, lref, lcls, sm,

#c
TSENSOR=20
pmode 100, TSENSOR
for k=1 to 5
        t1k=aread(100)
        print t1k/1000,".",t1k%1000,"C"
        pause 500
next k
end

#r

Press ESC to break!

27.258C
26.790C
26.790C
26.790C
26.790C
#
```

Code formatting

You can freely format the code – can put many commands in single line, etc. Capital and small letters accepted for keyword (i.e. 'CLS' and 'cls' are the same). Names recognizes small and capital letters (i.e. 'as' is different than 'AS')

Program structure

Program Structure	Description/Comments	Example
code gosub subroutines1 end subroutines1: [subroutine1 code] return	Command 'end' has to follow the last line of the main code. Subroutines have to follow the 'end'.	print "Hi!" gosub callme end callme: print "Hi!" return

System commands

Command	Description/Comments	Example
ESC key	Break the program while Running or prevent from Loading.	
?	Shows info about the VM (ver, available commands)	
c	Show code ('SM LN 0' prevents from displaying line numbers)	
r r <code>	Run – run code from SRAM memory Run - run single line of code NOT stored in memory (ad-hoc)	r n=2 data 2, 3 s=0 for i=1 to n read a s=s+a next i print "s=", s end
n	New – clear VM memory and code	
b	Bye: PICO – reboot VM in disk mode, Windows - exist	
l s	l - Load program from EEPROM (auto.bas) s - Save program to EEPROM (auto.bas)	
ee ed	ee - EEPROM erase – to decide if required, now disabled ed - EEPROM dump – show EEPROM content	
is	I2C scan – show I2C devices on both I2C buses	
t0|t1|t2	**Program Flow Tracing**: t0 - Disable Tracing; t1 - Stepping Mode; t2 - Run with Tracing	T1|T2 - enable particular tracing mode R – run program in T1 or T2 mode
@N @N <code>	**Pico Editor.** Normally new code is appended at the end; @N delete Nth line; @N <code> insert <code> before Nth line	@3 – removes 3rd line of code @4 CLS – inserts 'CLS' before line 4

The language

MISC

Command	Description/Comments	Example
SM <entity> 1|0	System Mode command for system entities configuration. Entities: ESC (default=enabled) – enable / disable ESC key check (disable to boost perf) OLED (default=disabled) – enable OLED hw (cannot be disabled now) LN (default=enabled) – enable / disable line numbering for 'c' command	SM ESC 0 SM OLED 1 SM LN 0
REM	Comment	REM MyProc
CLS	Clear Screen	

VARIABLES (STRING arrays NOT supported yet)

-variable name: up to 8chars letter&digits starting w/ a letter(digits, '#", '$', '_', ':' accepted)

-expr: combination of INT/FLOAT and ops/brackets(+, -, *, /, %,(,)) and INT/FLOAT vars;

-sexpr: combination of string, string functions (with suffix $) and string vars (with suffix $) and '+' op

Command	Description/Comments	Example
var=expr	INT var (no suffix), name=expr, 1st-reference creates var(value=0);	sy=2*abs(-15) + a*20
var#=expr	FLOAT var (# suffix), name#=expr, 1st-reference creates var(value=0);	w#= a#-2*(2+3)+abs(-1.0)
var$=sexpr	STR var ($ suffix), name$=sexpr	v$="a"+a$+left$(str$(13),1);
DIM var(n)=expr	INT array, 1-dimension, DIM name(size); name(item)=expr	DIM a(3) a(0)=3
DIM var#(n)=expr	FLOAT array, 1-dimension, DIM name#(size); name#(item)=expr	DIM(b#(3) b#(0)=2.5

PROGRAM FLOW CONTROL

Command	Description/Comments	Example

FOR var=expr TO expr [STEP expr] [] NEXT var	if STEP[default=1] is negative var decreases; FLOAT supported; nesting supported	FOR i = 5 TO 1 STEP -1 NEXT I END
WHILE condition [code] ENDWHILE	FLOAT supported; nesting supported; AND/OR/NOT supported;	a=0 while a<5 print a a=a+1 endwhile end
IF condition THEN [code] [ELSE] [code] ENDIF	FLOAT supported; nesting supported AND/OR/NOT) supported;	if a>1 and b#>3.4 then print “ok” else print “bad” endif
label: GOTO label	label name starting with a letter, terminated by colon; up to 8 letter & digits(plus ‘_’); can be located(before or after GOTO)	k=1 again: print k k=k+1 if k<5 then goto again: endif
GOSUB label label: [code] RETURN	label can be located after END	gosub task0 end task0: print “done” return
RETURN		
END	last instruction (GOSUB labels MUST be located behind the END)	

INPUT, OUTPUT, DATA

Command	Description/Comments	Example
PRINT expr[, sexpr], [;]	Prints expr, sexpr separated by ‘,’; ‘;’ to skip NEW LINE	PRINT "6/3=", 6/3 (with NEW LINE) PRINT 1; (w/o NEW LINE because of ‘;’)
INPUT var, …	Assign int/float/str values to (array) var	INPUT a(2), d#, name$ print a(2), d#, name$
DATA expr, sexpr;	INT/FLOAT/STR supported	DATA 1.5, 2*a
READ a, b#, d$	Assign DATA specified input to vars	READ v, v#, v(), v#();
RESTORE reset data pointer		

BUILT-IN FUNCTIONS

Command	Description/Comments	Example
LEFT$$(sexpr), RIGHT$$(sexpr), MID$(sexpr), LEN(sexpr), VAL(sexpr)	Left$/right$/mid$ - trimming functions, len - string length, Val – converts string to value	k$=LEFT$("abcdefgh", 3) + "1234" PRINT VAL("-1234")+1 i=1234567 i$=MID$(STR$(i), 2, 3) PRINT i$
HEX$(expr), STR$(expr), CHR$(expr)	Hex$ – expr to hex string, Str$ - expr to string, Chr$ - expr to ascii	PRINT HEX$(NOT(0x0F)) a=65 d$=chr$(a)
SIN(expr), COS(expr), SQR(expr), EXP(expr), LOG(expr), SGN(expr), ABS(expr)	Math functions	PRINT "SQR:", SQR(5), "EXP:", EXP(1), "LOG:", LOG(2.718), "SIN:",SIN(3.14/6),"COS:",COS(3.14/3)
RND(max)	Hw-based random generator with von Neuman extractor-whitenizer	PRINT "RND: ", RND(1000)
GETTICK()	Tick number	a=gettick()
PAUSE msec	Delay (blocking) in msec	PAUSE 2*500
INKEY()	Current key (pressed), otherwise 0; non-blocking (no-wating)	
INT/FIX(expr)	QBASIC like	a=INT(1.1) b=INT(-1.1) c=FIX(1.9) d=FIX(-1.9) PRINT a, ", ", b, ", ", c, ", ", d (1, -2, 1, -1)
AND(expr,expr), OR(expr,expr), NOT(expr)		PRINT AND(0x03,0x0F) PRINT OR(0x01,0x02) PRINT HEX$(NOT(0x0F))

PICO HARDWARE SUPPORT

Command	Description/Comments	Example
PEEK(addr) POKE addr, value	Memory read / write; hex supported	REM SYSTICK SYSTCSR=0xe000e010 SYSTRVR=0xe000e014 SYSTCVR=0xe000e018 poke SYSTCSR, 0

		poke SYSTRVR, 0x1e847
		poke SYSTCSR, 5
		for k=1 to 50
		  print and(peek(SYSTCVR), 0x00FFFFFF)
		  pause 1000
		next k

PMODE pin, mode	mode: 0-IN, 1-OUT, 2-PULLUP, 3-PULLDOWN, 10-ADC, 15-PWM, 20-TSENSOR	
AREAD(pin)	Read analog pin; pins=26-29 – analog pin; pin=100 –temperature virtual pin	pmode 26, 10 voltage=aread(26) pmode 100, 20 temp= aread(100)
AWRITE pin, cycles	PWM duty=cycles/65535 cycle: 0-65535)	pmode 22, 15 awrite 22, 16000
DREAD(pin)	Read digital pin	REM explorer buttons: a, b, x, y a=12 b=13 x=14 y=15 pmode y, 0 pmode y, 2 for k=1 to 2 step 0 pause 50 print dread(y) next k
DWRITE pin, value	Write digital pin	REM explorer led - pin 25 pmode 25, 1 dwrite 25,1 pause 3000 dwrite 25,0

GRAPHIC LCD/OLED SUPPORT *(currently: OLED0.91 support)*

Command	***Description/Comments***	***Example***
SM OLED 1	Enable OLED support	
LPLOT X, Y	Draw point at X, Y	for x=0 to 127 lplot x,fix(15+15*sin(2*3.14159*x/128)) next x lref
LDRAW X, Y	Draw line from the last PLOT / DRAW X, Y	plot 10,10 ldraw 20,20 lref
LCIRCLE x, y, r	Draw circle at x, y, r	lcircle 15, 15, 10
LPRINT expr, sexpr [AT x, y]	Prints expr, sexpr separated by ‘,’; optional AT x, y (default 0,0)	lprint “2+2=”, 2+2 AT 10,10 lref
LCLS	Clear Screen	lcls
LREF	Refresh LCD (copy mem content to LCD)	lref