INVENTORS EMPORIUM

HP41CX Program Listing

Title:	Binary to decimal & decimal to binary convert
Program Label:	LBL "BIN" / 115 bytes
Version:	1.0
Date:	02/06/1990

Description

This program performs the conversion between decimal and binary numbers in both directions. There are a plethora of utilities in calculators and PDA's that do this now but way back in 1990 there weren't. The real reason is actually that this was fun to code.

Very handy for when you are messing about with digital circuits and want to check the values present on the pins of an integrated circuit.

Core Logic

The conversions are performed as follows:

Binary to decimal

The program executes a loop that dismantles the binary number, (entered as an integer to accommodate the last zero that might be present) by dividing it by 10 and then testing if the digit to the right of the decimal point is a one or zero by multiplying it by 10.

Flags are then set and cleared in an incrementing sequence as each decade of the entered integer is tested. The loop continues until all 8 flags have been set at which point the X<>F function puts the contents of the flags into the X register and from there into the result display.

Decimal to binary

This is just a matter of using the X<>F function to convert the number in the X register to its binary equivalent in flags 00-07 and then reading them out sequentially and building the result display as you go.

Had the X<>F function also been able to read a binary value directly from the X register, this program would never had been written. Perhaps I just couldn't work it out and you will come back and berate me for wasting your bandwidth with this file.

Execution

Check that **USER** mode is set as keys **A** and **B** execute labels of the same name directly. You may have to clear any assignments on those keys as well.

When you run the program you are prompted as follows:

A:B>D B:D>B Touch **A** to convert binary to decimal and **B** to convert from decimal to binary

You will then see either **ENT: BINARY** or **ENT: DECIMAL** depending on your previous selection and you enter the value and touch **R/S**.

For binary, just enter the string of one's and zero's up to 8 digits (**1 1 1 1 1 1 1 1** or **2 5 5**) and for decimal make the entry as usual with values from 1 to 255.

The results are displayed in the form **1 0 1 1 0 = 2 2** or **2 2 = 0 0 0 1 0 1 1 0**

To perform another run under the same conversion mode, enter the new value and touch **R/S**.

To save program memory, the input values are not tested to conform to the 8 digit binary or 255 decimal limits - you can add them if you are so callous as to mistreat an innocent program in such a way.

Program listing follows:

Program Listing

Line	Instruction	Comments
1	**LBL "BIN"**	
2	SF 28	
3	CF 29	
4	FIX 0	
5	"A:B>D B:D>B"	Touch **A** for binary to decimal or **B** for decimal to binary conversion
6	**PROMPT**	
7	**LBL "A"**	Binary to decimal conversion
8	"ENT: BINARY"	Touch **1** and **0** up to a limit of 8 digits
9	**PROMPT**	
10	**LBL 03**	Setup
11	STO 00	
12	STO 01	
13	.00701	Loop counter causes loop to exit after 8 flags have been set
14	STO 02	
15	CLA	
16	**LBL 01**	Binary analysis loop
17	RCL 01	
18	10	
19	/	
20	ENTER^	
21	INT	
22	STO 01	
23	RDN	
24	FRC	
25	10	
26	*	
27	X=0?	
28	CF IND 02	
29	X>0?	
30	SF IND 02	
31	ISG 02	
32	**GTO 01**	
33	X<>F	Put the contents of the flags into the x register
34	ARCL 00	
35	APPEND: "="	
36	ARCL X	
37	AVIEW	Result is displayed in the form **10110=22**
38	**STOP**	To convert another binary value, enter it and touch **R/S**
39	**GTO 03**	

Line	Instruction	Comments
40	**LBL "B"**	Decimal to binary conversion
41	"ENT: DECIMAL"	Enter a value from 1 to 255
42	**PROMPT**	
43	**LBL 04**	Setup and initial display build
44	CLA	
45	ARCL X	
46	APPEND: "="	
47	X<>F	Converts decimal value in the states of flags 00-07
48	8.00001	Decrementing loop counter
49	STO 01	
50	STO 02	
51	**LBL 02**	Read out flags 00-07
52	1	
53	ST- 01	
54	FS? IND 01	
55	1	
56	FC? IND 01	
57	0	
58	ARCL X	
59	DSE 02	
60	**GTO 02**	
61	AVIEW	Result is displayed in the form **22=00010110**
62	**STOP**	To convert another decimal value, enter it and touch **R/S**
63	**GTO 04**	
64	**END**	

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