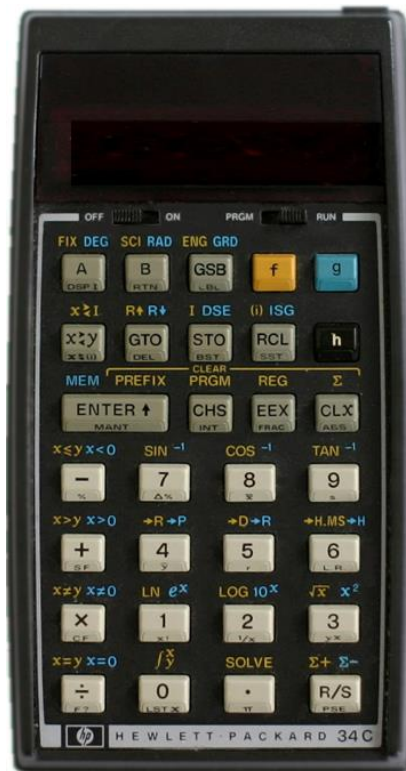


SPICE REPLACEMENT CPU BOARD



Project Design by Tony Nixon tnixon059@gmail.com
<http://www.teenix.org>

NOTE: This replacement board will not help repair a faulty display.

Disclaimer

The material contained within this project is supplied without representation or warranty of any kind. The author therefore assumes no responsibility and shall have no liability, consequential or otherwise, of any kind arising from the use of this project or any part thereof.

Table Of Contents

Caution

Some components on the circuit board may be damaged by static electricity. Always handle any of the circuit boards by the edges.

Do not exceed 5V battery voltage.

Observe correct battery polarity or damage can occur.

Features

- Supported models 31E, 32E, 33C, 34C, 37E and 38C
- Plug and play - no soldering required
- New membrane keypad assembly
- BT connectivity
- LiPo battery powered
- Internal USB battery charger, runs calculator as well
- Continuous Memory storage - 33C, 34C and 38C - requires no battery power
- Storage for 300 programs each for 33C, 34C and 38C
- Text editor for creating names for stored programs
- Decimal/Binary/Hex/Octal convertor
- Option to display program text instead of original numbers
- Battery backed real time clock with alarm, +/- 5 PPM
- Separate count up and count down timers with alarm
- Selectable DDMMYY, MMDDYY or YYMMDD date format
- Printer interface to PC, produces same font as Topcat printers
- Menu activated right switch (in case user's model does not have one)
- Selectable key debounce
- Menu selectable US or Euro display mode
- Beeper - selectable OFF, Loud or Soft
- Sleep function
- Power on model display
- Temperature display
- PC interface - transfer options and programs - compatible with Teenix Spice emulator
- Reprogrammable through serial port or PIC ICSP programmer

Installation

Installing the new CPU board is easy. It just plugs into the case and no soldering is required.

Open the battery compartment and remove the battery. Next remove the two screws as shown.



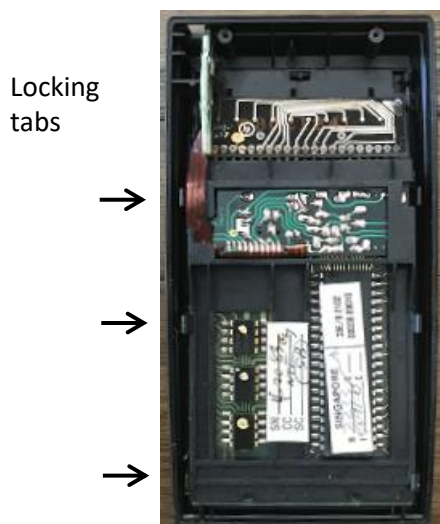
Opening the rest of the case can be a bit of a challenge. For ideas on opening it, see the Classic Notes PDF, starting at page 54, by downloading from the following link.

<http://teenix.org/ClassicNotes.pdf>

Other ideas can be obtained from the HP Calculator Forum.

<https://www.hpmuseum.org/forum/index.php>

Once opened, slide the battery connector upwards and leave it sit over the CPU board.



Locking
tabs

The CPU assembly locking tabs need to be bend outward at the three positions shown. This can be a bit difficult but you should be able to pull one tab and raise the CPU board a bit, then move on to the next tab.

Once unlocked, you should be able to rotate the CPU board upwards and remove with the battery connector..



The original CPU board can be stored in an anti-static bag or wrapped in foil.

The display module needs to be removed next. If the CPU module in the solderless type, then it can be slid upwards out of the socket assembly. If the CPU module is the soldered type, then the display needs to be unsoldered. Using a soldering iron, melt the solder on a single display pin and try to raise it away from the circuit board by using an Exacto blade or similar. The small blade edge will not draw too much heat. You may not be able to raise the pin sufficiently, so you may have to repeat the procedure with adjoining pins. Eventually it will get easier to unsolder them.

Try to remove any excess solder from the pins but avoid overheating them or the display and circuit board might be damaged. The display digits inside the module are a bit fragile and care should be exercised while handling it.



Note: The battery and charge cord are not supplied with the CPU board, but they can be purchased on Ebay or similar. The items shown were purchased from the following links.

3.7V 800mAh Lipo Battery

<https://www.ebay.com.au/itm/203755322220?var=504193343689>

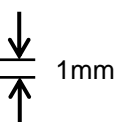
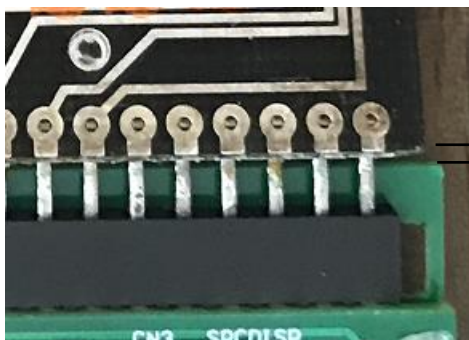
USB to 2.5mm / 0.7mm 5 Volt 5V DC Barrel Jack Plug Charging Power Cable Cord

<https://www.ebay.com.au/itm/194213845999?hash=item2d380c1bef:g:ZywAAOSwLDtfM786>

Caution: The new CPU board has static sensitive components. Handle the board only by the edges.

The display needs to be inserted into the CPU board socket first. Due to the size of display connecting pins the fit is a bit tight but they will fit in the socket. Hold the CPU board firmly in one hand away from any table tops. You don't want to put downwards pressure on the board or display.

With the other hand line up the display as shown and firmly but gently push the display into the socket.



Try pushing in one end a bit, then the other end and continue until the bottom edge of the display is parallel and about 1mm from the top edge of the CPU board.

Before continuing, you might like to strip the switch connector, and keys from the top half of the calculator case and give everything a clean in warm soapy water. Do not scrub the red display area. Gently tap the excess water from the case and pat it dry with a soft cloth and let it dry completely. The switch contact(s) can be cleaned with isopropyl alcohol or just with a tissue and soapy water. Try not to bend them.

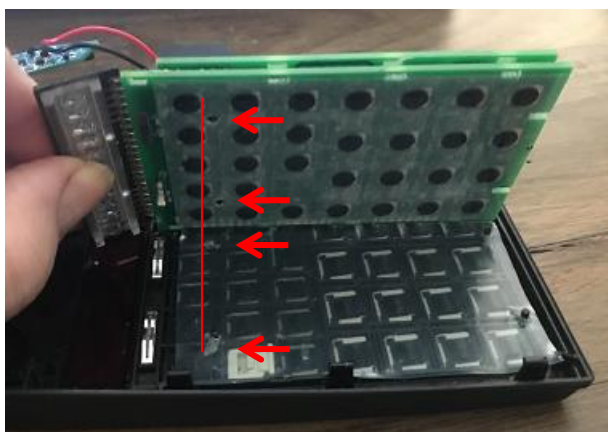
Reassemble the keyboard and switches.

Smear a small amount of electrical switch lube on the contact pads on the CPU board or use a tiny amount of Petroleum Jelly.

There is a pre-punched dust cover for the keyboard supplied in the kit. If you want to use it, just push it over the four locating holes in the top half of the case.



If desired, and originally fitted, the retaining clips can be clipped onto the new boards.



Position the CPU board as shown and make sure the far edge of the board is underneath the 3 locking tabs as far as practicable. Line up the two holes in the CPU board with the two posts in the top casing.

Be very careful with these small clips. They are old and can break easily.

Fold the CPU board down and try some gentle downward pressure, holding the board by the edges. It should snap down into place.

Try the switch operation and make sure they feel normal. Otherwise the spring contacts may have ejected from their plastic housings. If so, you will have to remove the board and try again. Push the display board down and into place. And then slide the battery connect/charge board into place. If you want battery backup for the clock to function, insert a CR-1225 3V button battery into the socket +ve side up. Reassemble the case and tighten the two screws (but not too much)



Battery

When connecting or disconnecting the battery, the calculator should be turned OFF

When connecting the battery, you must be sure that the battery connector is positioned the correct way or damage will occur once the battery is connected. There is also a small (+) marked on the circuit board. Replace the battery cover.

+ve in position shown



Charging the Battery

The battery can be charged by plugging in the USB connector into the charge socket located in the original charge port. Charging will commence as soon as the other end of the cord is plugged into an active USB socket. If the battery is being charged, a blue LED will light, and this will extinguish when charging has completed.

The calculator can be used while on charge.

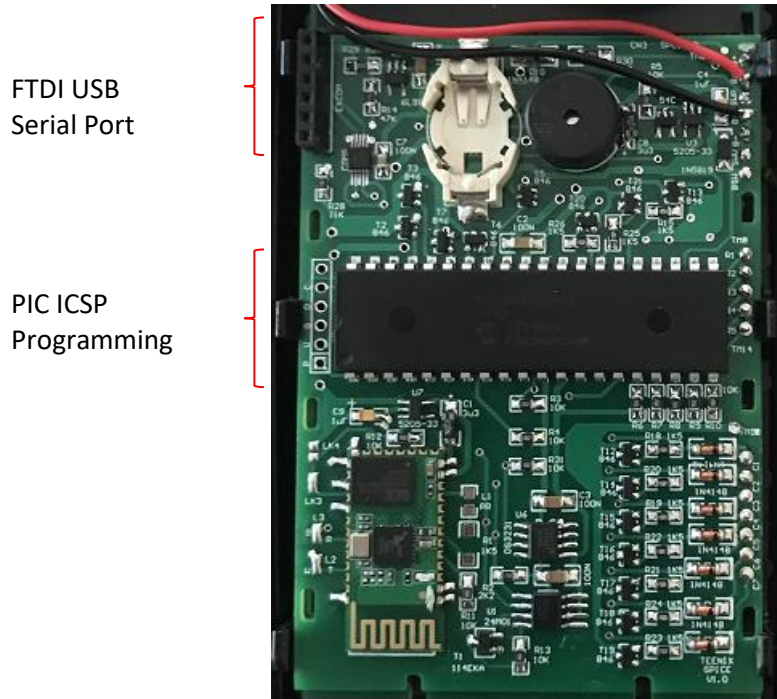
If you are one of the many who do not like charging the battery while it is in the calculator, then you can buy small multi port USB LiPo chargers cheaply on the web

If the battery is charged, turn the calculator on. The HP-31E model should be working.



Communications and Programming Connections

The new Spice CPU board can communicate to a PC running the CalcCom.exe program via a Bluetooth module or via a FTDI RS-232 serial port module.



Note: All connection to the PC RS-232 or PIC programmer should be connected or disconnected while the calculator is turned ON.

Setting up Bluetooth

An inbuilt Bluetooth Module is used for wireless communications between the calculator and a host PC when running the CalcCom.exe companion program. This will allow transferring of programs and other data between the CPU board and the PC.

The procedures for setting up Bluetooth for a particular PC may vary so it will be up to the user to follow individual requirements.

Turn on the calculator and hold the [Enter] key down for about 1 second to Enable Menu Mode. If it is not showing, press the [+] key until the [PC bth yN] item appears. Press the Left Top Row key to enable the connection. If the calculator rear case is removed, then a flashing LED should be seen on the CPU board.

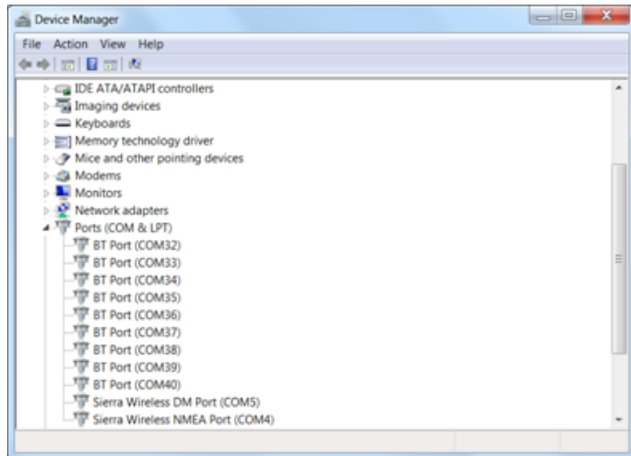
When the LED is flashing the module is hunting for a Bluetooth master and uses more power than normal, so it will be useful to establish a connection quickly to conserve battery power. Once a connection is established, the power requirements reduce considerably.

If your PC supports Bluetooth connectivity, then it will have its own set of procedures to enable Bluetooth and to find and pair to a Bluetooth device. When prompted, the password to access the calculator Bluetooth module is **0000**.

If you follow those procedures, you should find the calculator Bluetooth device named **TEENIX3x**. Allow connection to this device and the PC will set up the connection and assign a COM Port number.

The **CalCom.exe** program will need to know the COM Port that was created by the PC when the calculator Bluetooth device is paired.

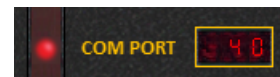
This number can be accessed from the Control Panel – Hardware and Sound – Device Manager – Ports (COM & LPT) – BT Port (COMx). X will be the Port number, which may have multiple numbers as shown in the image at right.



As many COM Port numbers can be assigned to Bluetooth, I noted the highest number first, (40 in this case), as it was probably the last to be installed.

Run **CalCom.exe** and you will get a connection error message if the operating COM Port number does not match the one assigned to the Bluetooth module.

Click the [COM PORT] label and enter the COM Port number that was noted in the above procedure. Press the PC [Enter] key. If a connection can be established, you will see a password window open. If you get an error message you will have to try another of the listed port numbers.



If a connection is established you will get a message similar to the following.

```
PC connect query - Please wait... >OK

CPU Board Type           = Spice - Model: HP-31E
Software Version         = 1
Show Model                = No
Bluetooth                 = Off
Switch Position          = N/A
Continuous Memory        = N/A
Beeper                   = Off   Soft
Program As Text           = Off
Comma Mode                = US
Display Brightness       = Low
Key Debounce              = Normal
Menu Switch              = N/A
Auto Display Off         = Off
Clock Alarm               = Off
Printer Mode              = Trace
Timers                    = Down: Off  Up: Off
```

Once this procedure is set up, future connections should establish automatically when the CalCom.exe program starts as long as...

- Bluetooth is enabled on the PC
- The COM Port number has not changed
- The calculator is turned on
- The calculator Bluetooth is enabled

When the connection is established, the LED on the CPU board will be in a steady on state.

The BI

Note: Due to possible interference, re-flashing of the CPU board cannot be accomplished via Bluetooth.

Connecting via FTDI

The FTDI USB serial port allows connection to the PC via a FTDI to USB serial converter module. These can be obtained from the internet cheaply and should come with a USB cable. If not the cables are also widely available.

This module allows re-flashing of the CPU board. It also allows transferring of programs and other data between the CPU board and the PC. The reason cable communications are used is because the Bluetooth transfers are not 100% reliable. If the connection is broken during the process, the reprogramming will not complete and the processor may cease to function.

If the FTDI board is used for the first time, a driver may need to be installed and its COM Port assignment must be known.

Important:

Before use, set the FTDI module for 3V3 communications

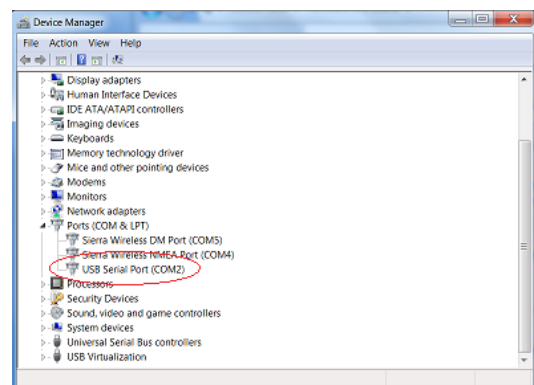
Depending on the module, this is accomplished by a slide switch or as shown, via a link. The 3V3 position should be marked on the module.



Connect the USB cable to the FTDI board and connect the other end to a free PC USB port. The module may self install the driver, but if not you will have to download a driver from the FTDI web site. See – <http://www.ftdichip.com/Drivers/D2XX.htm>

The PC will assign a COM Port number to this device and you need to know this number to configure the CalCom.exe program.

This number can be accessed from the Control Panel – Hardware and Sound – Device Manager – Ports (COM & LPT) – USB Serial Port (COMx). X will be the Port number, which is 2 in the image at right. After noting the COM Port number, the Device manager windows can be closed.



Note: The calculator needs to be turned ON before inserting the FTDI module.

The calculator back cover needs to be removed for reprogramming or re-flashing.

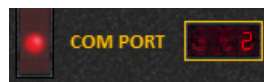
Turn the calculator ON.

Connect a USB cable into the FTDI module to start it up and insert the module into the socket on the CPU board as shown.

Caution: To avoid static damage, hold the FTDI module by the board edges.

Run the CalCom.exe program.

You will get a connection error message if the operating COM Port number does not match the one assigned to the FTDI board.



Click the COM PORT label and enter the COM Port number that was noted in the above procedure. Press the PC [Enter] key. If connection is established you will get a message similar to the list shown previously. If not, verify the COM Port number and change if necessary or check the USB and FTDI connections.

```
PC connect query - Please wait... >OK

CPU Board Type           = Spice - Model: HP-31E
Software Version         = 1
Show Model                = No
Bluetooth                 = Off
Switch Position          = N/A

etc
```

You can remove the FTDI module with the calculator power turned ON.

To avoid stress on the circuit board and Spice case, hold the calculator sides firm and with one finger on the plastic face of the PIC processor, lift the FTDI module from its socket, then disconnect the USB cable after closing CalCom.exe.

If you disconnect the USB connection while the CalCom program is running on the PC, CalCom may hang because of the lost USB/Serial connection. If this occurs, it may take some minutes to close by itself, or you can use the Task Manager to close it.

If this occurred during a re-flash, then the PIC processor may not respond. Turn the calculator OFF, especially if the display has been frozen and a display LED segment is ON and overly bright. In this case, remove the display module and a full reprogram using a PIC programmer will be required.

Caution: Do not connect the FTDI and PIC programmer at the same time.
Do not leave the FTDI module plugged in without the USB connected.
Do not remove the FTDI or disconnect the USB cable if the CalCom program is transferring information or re-flashing the CPU board.

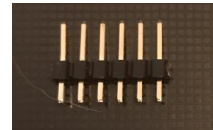
Re-Programming the PIC Processor.

If the FTDI re-flash procedure failed then the PIC processor will need to be reprogrammed by a PIC programmer. The CPU board has been designed to accept a PICkit3 programmer and do ICSP programming. Other programmers could be used if the pin connections match.

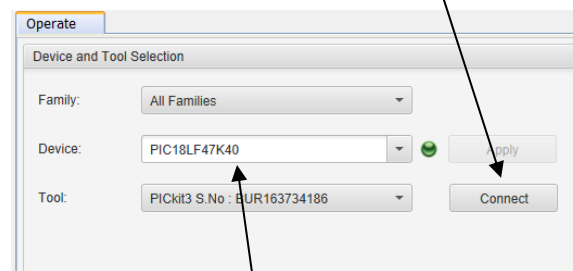
The calculator back cover needs to be removed for reprogramming or re-flashing.

Caution: Do not connect the FTDI board and PIC programmer at the same time.

You will need a copy of MPLAB IPE to control the PICkit3 and this is available as a free download from the [Microchip](http://www.microchip.com) web site. If the CPU board does not have a 6 pin male connector fitted, a 6 way IDC male connector is required to connect the PICkit3 to the CPU board. The pin spacing for this connector is 0.1". The long end should be inserted into the PICkit3.



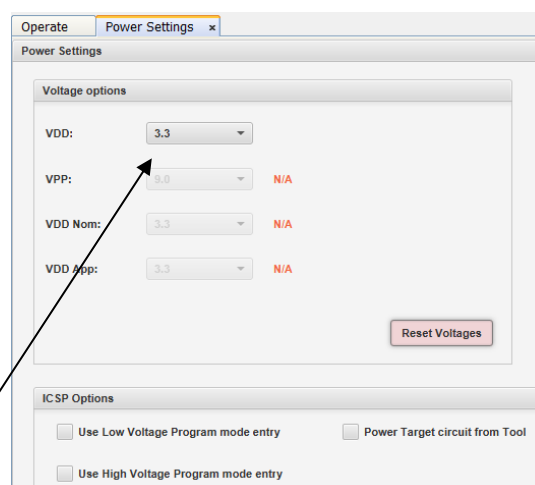
Connect the PICkit3 to a spare USB Port. Run MPLAB IPE. The [Connect] button should enable once the PICkit3 connection is made.



Set the MPLAB IPE Device to the PIC18LF47K40 using the drop down list, or type the name exactly as stated – (case sensitive)

Caution: Make sure the PIC18LF47K40 is selected or damage may occur.

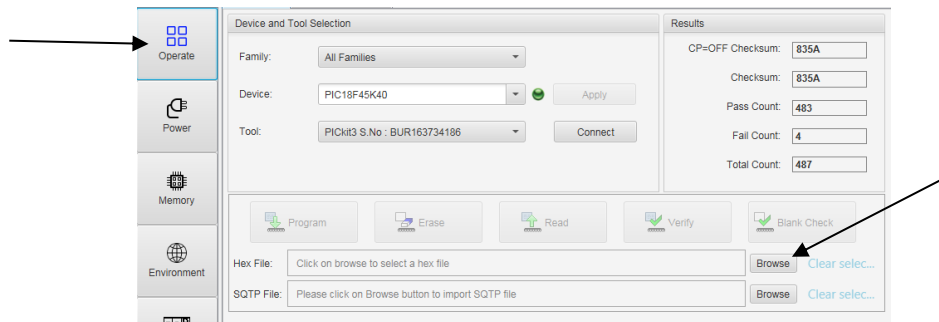
In MPLAB IPE, click the [Power] button and make sure the screen is set up as shown.



Important: Make sure the VDD selector is set to 3.3V.

Click the Operate button to get back to the main screen:

Important: Make sure you have the latest CalCom and PIC Spice firmware downloaded.



Click the [Browse] button to load the HEX file from the CalCom.exe install directory.

The file format for Spice files is HPFSPnn.hex where [nn] is the version number.

Example: HPFSP12.hex

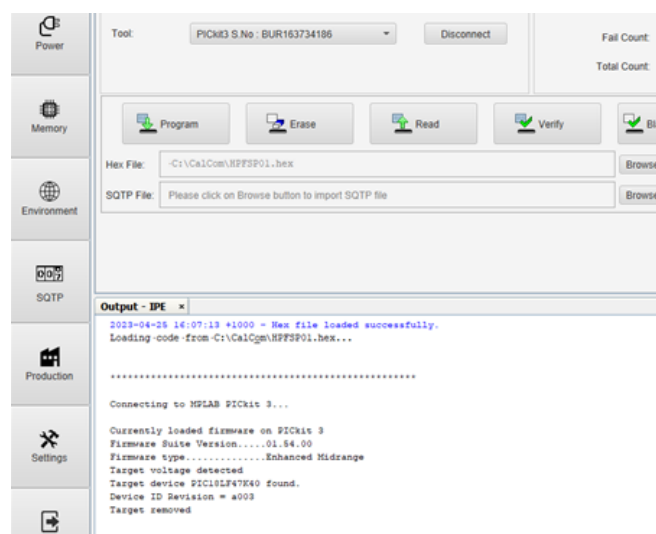
Important: The CPU board must be turned ON during programming
The right switch, iif fitted, Eg Run/Prgm, must be moved to the LEFT position.
Be careful that the battery is secure while programming.



The PICkit3 can be plugged into the holes on the circuit board using the 6 pin IDC connector as shown

During the programming process, the board will have to be held by hand with a **light** forward pressure pushing on the PICkit3 as shown so that the contact pins stay firm against the PCB hole edges. It will program ok using this method.

Press the Connect button to connect with the PIC on the CPU board.



The screen should now look similar to the above. Press Program to re-program the PIC. When programming has finished, remove the PICkit3 from the CPU board and the calculator should be functioning as a HP-31E. Turn the calculator OFF and refit the rear case half.

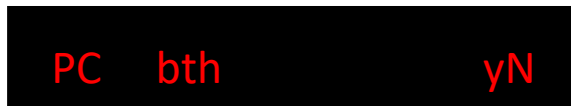
Menu Mode

The new calculator software has a menu system to let you save and recall programs and set operational options.

It is accessed by holding down the [Enter] key for about 1 second.



Depending on what model calculator is selected, you should see a new display something similar to the following.



As mentioned previously, this menu item allows you to turn the Bluetooth module on or off.

On the right side of the display are the letters **yN**.

These let you know that:

(HP-34C shown)



- To turn Bluetooth on [**y**], press the top row left key.
- To turn Bluetooth off [**N**], press the top row right key.

Some menu items have sub menus. If so, the right side of the display will have 3 bars lit.



To open the sub menu items, press the [Enter] key.

One example of a sub menu is the Beep function.



The selected option will flash. In this case, the Beep is OFF.

This menu item has three options to select from. [**OSL**]

These let you know that:

(HP-34C shown)



- To turn the Beep off [**O**], press the top row left key.
- To Beep Soft [**S**], press the top row centre key.
- To Beep Loud [**L**], press the top row right key.

Other menu items that have 2 or 3 characters on the right side of the display work the same.

Enter	Selects menu item or option.
CLx	Jump to menu root or back to calculator mode
+	Select next menu item
-	Select previous menu item

Some menus have other keys available and will be discussed under that menu topic.

Menu Structure

Switch	Lr	Right switch left or right control
		This menu item is only visible when the menu switch is ON
		Key top left Left
		Key top right Right
Program		
		Prg Stor
		Prg rEAd
		Prf tltLE
		Prg FrEE
		Prg ErAS
		blc ErAS
PC bth	yN	
Options		
		CON INI yN
		Print Nt
		Slide yN
		CALC Id yN
		Prg dIS yN
		dEbOUN HL
		US Euro UE
		bEEP OSL
		Sleep -
		dSP bri yN
dHbO		
CAL tYPE		
		HP-31E
		HP-32E
		HP-33C
		HP-34C
		HP37E
		HP38C
tENNP		
uErS-xx		
CLOC		
		Current Time
		Date
		Alarm Set
		Edit t1
		Edit dA
		Edit AL
		Edit AL0
		Edit dNNy
		Edit 1224
		Count dN
		Cd Init
		Cd StArt
		Cd PAUSE
		Count UP
		CU Init
		CU Start
		CU PAUSE
		CntrS OFF

Program This menu item is only visible for programmable models

Prg Stor The Enter key selects any of these menu items.
 Prg rEAd
 Prg FrEE
 Prg ErAS
 blc ErAS

Program Store

Enter block and program number Eg 123, press Enter. On the next display, press the top left key for an Alpha program name, or the top right key for a default name.

The default Name has the format "pgm(calc)(pgm Num)

Example "pgm34C123"

Alpha mode allows you to enter characters for the program name. The keyboard changes to the layout shown below. Note that the HP-34C is shown for explanation purposes.

Only the letters shown on the keyboard overlay can be used as these can display on a 7 segment LED display. Other characters can be used when CalCom.exe loads a program and in cases where a character cannot be displayed properly, a Decimal Point will be displayed for the character.

Control Keys

Enter Accept Alpha name or Default name if no characters entered
 CHS Alt Chars – Negative sign illuminates for Alt chars (Yellow).
 EEX Restart name – No Alt Chars (red)
 CLx Backspace or Quit

Example: Create an Alpha program name.

"CIRcLE ArEA"

Key	Character
GSB	C
RCL	I
CHS	(Alt - Yellow)
R/S	r
CHS	(Alt - Red)
GSB	C
-	L
g	E
.	(Space)
A	A
CHS	(Alt - Yellow)
R/S	r
CHS	(Alt - Red)
g	E
A	A
Enter	(Save Program)



Program Read

When Program Reading is selected, the display will show – “SCrOLL bPN”

Press the top left key for scrolling through program names or press the top right key to enter a block and program number. Press Enter when the selection is made.

In Scroll Mode, use the [+] and [-] keys to scroll up or down through the names. The names are truncated to fit in the display window and the program number will be shown on the right of the screen.

As the display can only show 10 characters and program names can have up to 20 characters, the X<>Y key toggles the program name half. The 2nd program name half has the negative mantissa sign lit

If any program storage locations are empty, then “Vacant” will be displayed along with the block and program number.

Use the 0, 1, or 2 keys to change to that block while scrolling.

Program Title

Follow the prompts similar to “Program Read and Write” and enter a new program name.

Program Free

This function displays the next free program in a block, starting the search from Program 00.

Enter a Block number 0 – 2, then press Enter.

If a free program is found, then the program number will be displayed.
If there are no free programs in the block, then “None Free” will be displayed.

Program Erase

This function will erase a single program.

You can either select to scroll through the names, or just enter a block and program number.

Press Enter to erase the program.

Block Erase

This function will erase all programs in a block.

Select a block number, 0 – 2, then press Enter. A confirmation prompt will appear. Press Enter to continue.

Note: If an error occurs while the memory IC is being accessed, the calculator will reset.
EEP ACC Err will be displayed.

PC bth	yN	Bluetooth Control Key top left ON Key top right OFF
Options		Enter selects sub menus
CON INI	yN	Confirms if you want to clear the continuous memory for the selected calculator. Key top left Initialize Key top right Don't initialize
Print	Nt	Select the printer mode for PC interface Key top left Normal Key top right Trace
Slide	yN	Activate menu driven slide switch Once activated, the switch is controlled by the menu This caters for a model with no right switch , ie. HP-31E and for example, the user wants to use a HP-34C Key top left ON Key top right OFF
CALC Id	yN	Show calculator model when first turned on Key top left Yes Key top right No
Prg dIS	yN	Show program step display in alphanumeric form Key top left Yes Key top right No
dEbOUN	LS	Key press/release debounce period Key top left Long Key top right Short
US Euro	UE	Select Spice decimal/comma display mode Key top left US Key top right European
bEEP	OSL	Set beep mode Key top left OFF Key top middle Soft Key top right Loud
Sleep	-	Sets the display sleep timer 0 = OFF, 1 – 7 = minutes before sleeping When the timer expires, the beeper will sound*, and the display will blank. The beeper will sound periodically* while the display is blanked. Any key lights the display. * If turned on.
dSP bri	HL	Set display brightness Key top left High brightness Key top right Low brightness
dHbO		Decimal/Hex/Binary/Octal conversions Enter selects sub menus

CAL tYPE	Enter selects calculator model
HP-31E	
HP-32E	
HP-33C	
HP-34C	
HP37E	
HP38C	
tENNP	Enter displays temperature in °C This temperature is read internally from an IC on the CPU board, so is not actual ambient temperature.
uErS-xx	Shows version number where xx = 01 - 99

Clock Functions

The clock menu item is only visible when the clock IC is active

The clock can be accessed easily by clicking the [-] key after activating the menu.

[ENTER]	Accepts changes
[CLx]	Discards changes

Current Time	Displays current time in 12 or 24 hour mode 12 HH MM SS A am P pm 24 HH MM SS
Date	Displays date Mode 1 DD MM YY Mode 2 MM DD YY Mode 3 YY MM DD
Alarm Set	View the time that the clock alarm will sound
Edit t1	Edit Time The time is set in 24 hour mode Enter the time as HH MM SS using the digit keys If you make a mistake, keep entering digits and they will start to overwrite the shown time after the seconds are entered.
Edit dt	Edit Date Enter the data as: DD (01 – 31) MM (01 – 12) YY (00 – 99) The year century defaults to 20.
Edit AL	Edit Clock Alarm The alarm time is set in 24 hour mode Enter the time as HH MM SS using the digit keys If you make a mistake, keep entering digits and they will start to overwrite the shown time after the seconds are entered.

Edit AL0	Turn Alarm On / Off	
	Key top left	ON
	Key top right	OFF
Edit dNNy	Set the Date Mode	
	Key top left	DD MM YY
	Key top middle	MM DD YY
	Key top right	YY MM DD
Edit 1224	Set the Time Mode	
	Key top left	12 Hour
	Key top right	24 Hour
Count dN	Enter selects sub menus	
Cd Init	Enter H MM for count down timer	
	Menu index jumps to Timer start	
CdStArt	Enter starts count down timer	
	Display shows timer count	
	CLx exits timer display mode	
Cd PAUSE	Pauses the count down timer	
Count UP	Enter selects sub menus	
CU Init	Menu index jumps to Timer start	
CUSTart	Enter starts count up timer	
	Display shows timer count	
	CLx exits timer display mode	
CU PAUSE	Pauses the count up timer	
CntrS OFF	Turns both timers OFF	

While setting the timer counts, and a mistake is made, keep entering the timer digits and they will begin to overwrite the ones already entered.

Note: Because of the way the clock IC works, the clock alarm will not sound while the count up or count down timers are active.

Note: If an error occurs while the clock IC is being accessed, the calculator will reset. **Cloc ACC Err** will be displayed.

If a clock access error does occur, then switch the calculator OFF, wait a few seconds, then turn it back on if desired. This will reset the clock IC logic, but not affect the time.

If the clock fails to function, turn the calculator OFF and remove the clock backup battery. This will reset the IC completely and the time will be lost.

Continuous Memory

The continuous memory works with all the C models, HP-33C, HP-34C and HP-38C.

The system for saving the memory requires no battery power after it has been stored and will remain stored for up to 100 years without battery power.

The storage works the same as per the owner's manual for the respective calculator model.

To make sure the memory is stored properly, do not remove the battery before turning the calculator OFF. Removing the battery before turning the calculator OFF will not save the memory.

It is possible, even in the original calculators, that Continuous Memory can be corrupted if the calculator is turned OFF if, for example, the calculator is busy running a program. It may be that a memory location was being written to at switch OFF and did not fully write. Therefore it might be a good idea to stop running a running program prior to switching off.

Printer Interface

The printer interface can use the PC as a pseudo printer.

To use the printer interface, make a connection to the PC with the Bluetooth link and start CalCom.exe.

Click on the `Printer` item and click `Write`.

Once the printer is "online", you should see the printer window appear.



The printer will function similar to the Topcat calculators with Normal or Trace modes available and it uses the same printer font.

To stop the printer, close the printer window, close CalCom.exe. If the menu is activated on the calculator, the printer will stop also.

DHBO Mode

This mode lets you view the value of the X register in Decimal, Hexadecimal, Binary and Octal. DHBO starts in DEC mode and displays contents of the X register.

Various keys have new functions in this mode, however, the Spice series can have different key layouts for different models. For explanation purposes, the HP-34C keyboard will be used.

In HEX Mode

Change Modes D H B O

Shift Binary screen left

Shift Binary screen right

Enter Exit, update X register with displayed value

CHS Transfer X register to display and set Decimal mode

EEX Exit, X register not modified

CLX Reset displayed value to 0

Number Keys

Decimal	0 – 9
Hex	0 – 9 A – F
Binary	0 and 1
Octal	0 – 7

Because of the display digits, the number range for DHBO mode is:

Decimal	999,999,999
Hex	3B9A C9FF
Binary	00111011 10111010 11001001 11111111
Octal	7 346 544 777

In Binary mode, the display is 32 digits wide. To allow full viewing of the number, the [+] and [-] keys can be used to scroll the display eight digit at a time. Markers with three horizontal bars can appear on each end of the display which indicate that the display can be scrolled left or right.

- Scroll Left

+ Scroll Right