HHC 2025

# Woodstock Rebirth

***Teenix's Woodstock PC Board***
***Replacement for*** models HP-21, HP-22, HP-25C, HP-27, HP-29C

Presented by: Jim Johnson

HP Handheld Conference 2025 – Orlando, FL

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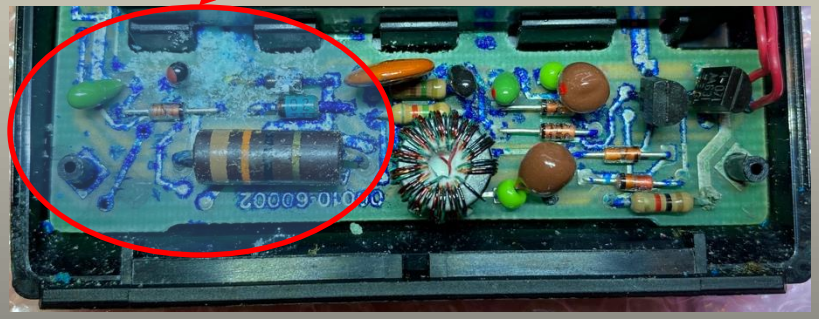
# Woodstock Replacement PC Board

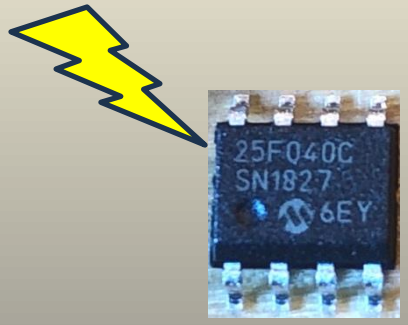
## *What is the problem?*

Many Woodstock calculators (HP-21, HP22, HP-25C, HP-27, HP-29C) have encountered problems such as battery leakage, faulty integrated circuits, electrical overstress due to connecting to a charger without a battery installed or just old age.

Corrosion



EOS




Old Age

# Woodstock Replacement PC Board

[Teenix Woodstock PCB]

## What are your Options?

- Buy another HP calc from TOS*
- Find a donor board
- Hope your pc board magically fixes itself.
- Or ……..

Front

Back

*That Other Site

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# Woodstock Replacement PC Board

## Features

- Supported models HP-21, HP-22, HP-25C, HP-27, HP-29C
- Continuous Memory storage for all models - requires no battery power
- Storage: HP-25C, **207** program files. HP29C, **360** files, either program or data
- Continuous memory has reset
- Bluetooth connectivity
- LiPo battery powered
- Turbo Mode, fast code execution
- Internal USB battery charger with charge indicator, can run calculator as well
- Text editor for creating names for stored programs
- Decimal/Binary/Hex/Octal convertor
- Option to display program text instead of original key numbers
- Real time clock with alarm, +/- 5 PPM
- Separate count up and count down timers with alarm
- Selectable DDMMYY, MMDDYY, YYMMDD or Text date format
- Clock display in numeric or text format

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# Woodstock Replacement PC Board

## Features

- Menu activated right switch (in case user's model does not have one)
- Selectable key de-bounce
- Beeper - selectable Off, Soft, or Loud
- Display setting – Bright or Dim
- Sleep Timer
- 29C printer interface via Bluetooth link to PC
- Power on model display or Current Time
- Temperature display
- Software version display
- Selectable low battery reference
- PC interface for transferring options and program
- Compatible with Teenix Woodstock emulator
- Reprogrammable via Bluetooth, USB Serial Port Module or PIC* ICSP programmer

*Note: “PIC” is a Microchip Technology, Inc. reference

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# Woodstock Replacement PC Board

## Features

- Three (3) extra programmable functions for the HP-25C
  - Beep
  - GSB 49
  - RTN
- Six (6) extra programmable functions for the HP-29C
  - Random Number (placed in X-register. Random no. from 0 -1)
  - Constants (up to 10 constants)
  - Beep
  - Data Swap (swaps the 30 registers with a secondary set of 30)
  - File access (360 files using HP-29C)
  - Notes Display
- Three built-in games, Tetris, Maze and Blackjack(21) with music and sound effects

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# Woodstock Replacement PC Board

Wouldn't it be nice to just "drop in" a new pc board and get back
Your old Woodstock calculator…… plus some nifty, new features?!

**Now you can….. With Teenix's Woodstock Replacement PC Board!**

Front

Back

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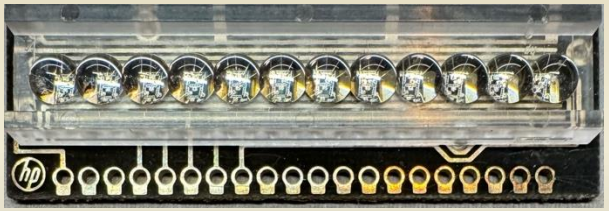
# Woodstock Replacement PC Board

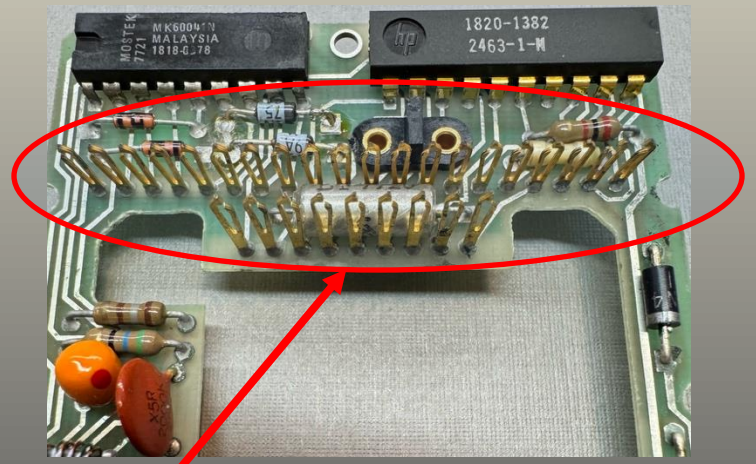
## What do you need?

Woodstock case



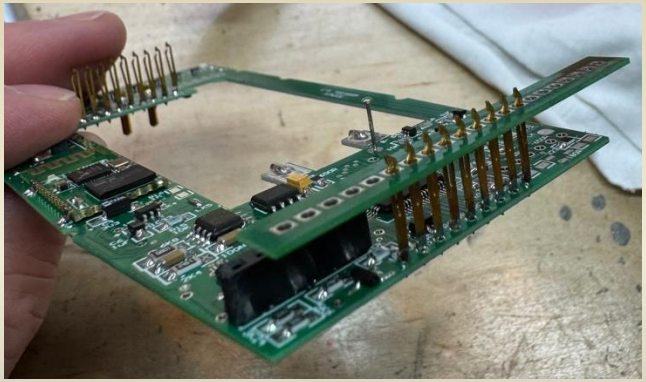
Functioning Woodstock LED display


Functioning Woodstock Keyboard

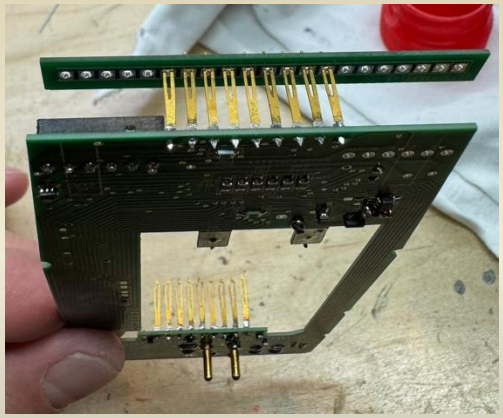



Woodstock board Interconnect pins (38) from donor board

# Woodstock Replacement PC Board
## Conversion

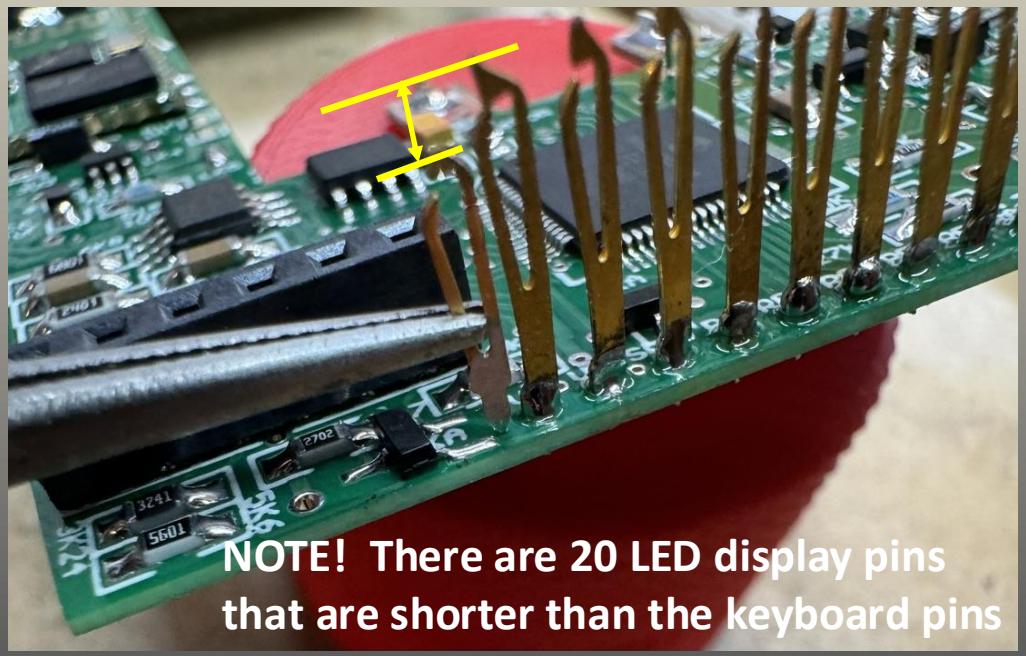


Soldering new pins
using alignment tool

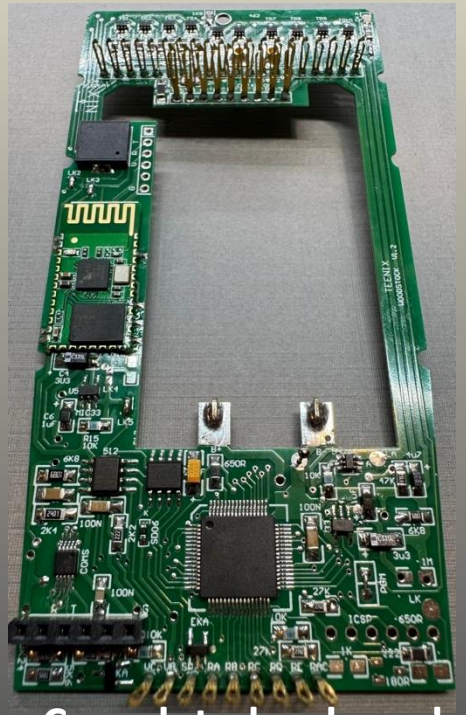


18 pins completed


Flux is your friend!



NOTE! There are 20 LED display pins
that are shorter than the keyboard pins

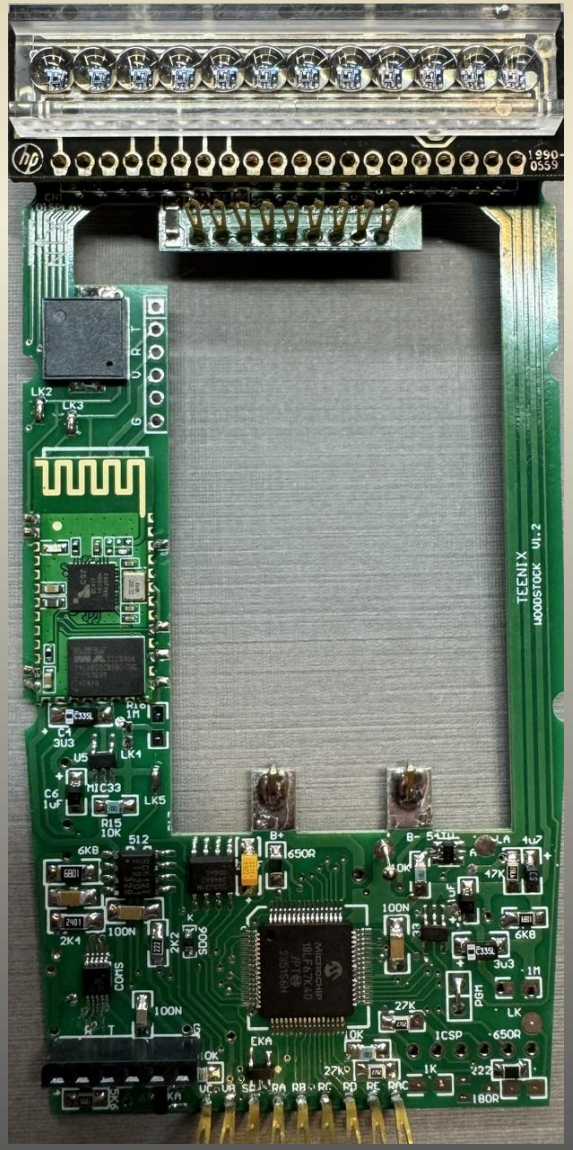


Completed pc board

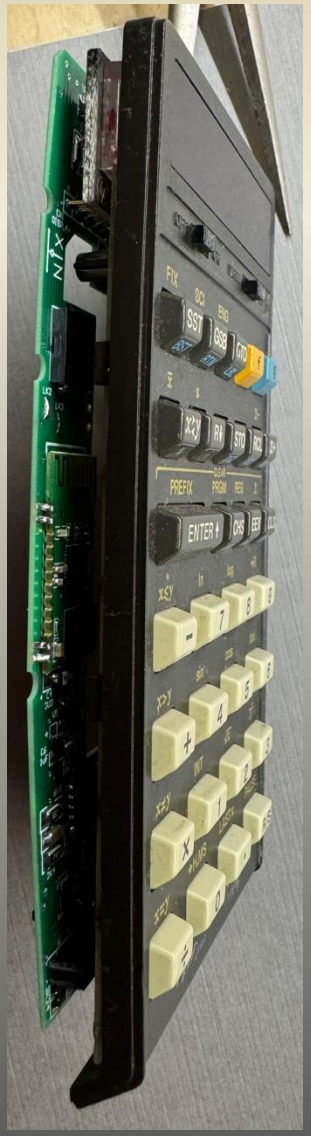
# Woodstock Replacement PC Board

## Conversion

LEDs shown attached to new board




New Woodstock board plugged into HP keyboard



# Woodstock Replacement PC Board

## LiPo Battery Case

## A WORD OF



*__Never__* attach the charger of a Woodstock series unit to a **__TEENIX calculator__** since it's not designed for the 10 VAC output of the charger. An HP AC charger connected to a TEENX Woodstock is not suitable as well as other chargers would not be suitable and could cause damage.

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# Woodstock Replacement PC Board

## LiPo Battery for Woodstock PCB

The new Woodstock CPU board battery is a LiPo type and outputs around 4V, with 800 -1,0000 mAH capacity. (example: LiPo battery model no. 802540 available from eBay/Amazon)

**Note: The original batteries cannot be used to power the new CPU board, nor can 2 x AAA batteries as the voltage will be too low to operate.**

The LiPo battery is fitted inside the original battery holder and replaces the 2 x NiCad batteries that were used. To do this, the battery holder must be disassembled. If this is not desirable, then there are replacement 3D printed holders available on the web.


Battery pc boards supplied with upgrade kit exactly fit the battery case

Connector for LiPo Battery

# Woodstock Replacement PC Board

## 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.


The right side of the display will have 3 bars lit if this menu item has sub menus. To access the sub menu, click <Enter>

<Enter> Selects menu item or option.
<CLX> Jump to root menu or back to calculator mode
+ Select next menu item
– Select previous menu item

Note: Depending on the selected calculator, some menu items may not appear.
Note: Menu mode will not start if:
- A program is running
- When Continuous Memory is reset (Display shows Error)
- There is a system error message on the display

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# Woodstock Replacement PC Board

## Menu Mode

**Menu Structure**

Root Menu

- **Program** — Programmable Models Only
- **Clock**
- **PC Bluetooth Connection**
- **Options**
- **DHBO** — Not accessible when switch in left position
- **Least Frac** — Not accessible when switch in left position
- **Temperature**
- **Games** — Not accessible when Bluetooth active
- **Version**
- **Battery Voltage**
- **Calculator Model Select**
- **Switch L R Program** — When menu switch activated

# Woodstock Replacement PC Board

## Options Sub-Menu

***Character Display -*** Allows the program steps to be displayed in **text format** on the display instead of the key locations. 

***Turbo -*** The processor will execute HP microcode instructions as fast as possible. For functions like [PAUSE] the processor will temporarily revert to normal speed.

***Calculator ID -*** Briefly shows the calculator model when the calculator powers up.

***Debounce -*** You can set a short or long key debounce delay.

***Slide Default -*** allows a menu activated right switch (i.e. HP-27 has no rt. switch)

***Clock Display-*** Digital or text clock display (i.e. qtr Past 1) 

***Clock ON –*** This option can enable or disable the clock

***PUP Clock –*** Clock displays on power-up

***Display Brightness -*** High or Low

***Sleep –*** specified in minutes (1 – 7) before display turns off

***At Sleep 1 Minute Beep –*** Calculator beep, once per minute, during sleep mode

***Beeper***

***BT LED On/Off -*** Enables/disables the right most decimal point when Bluetooth is ON

***Continuous Memory –*** Can simulate a battery reset for the 25C or 29C

***System Reset -*** Selecting [Y] for this function will reset all the memory and menu functions.

# Woodstock Replacement PC Board

## Programs

Program/Data storage addresses are in 3-digit Block Number format. Blocks are 0 – 8 and numbers are 00 – 39 for HP-29C and 00 – 22 for the HP-25C. This gives storage for 9 x 40 (360) files for the HP-29C and 9 x 23 (207) files for the HP-25C.

- ***Program Store***

Select this menu item to store a program file. If there are no steps in the program [**No Steps**] is displayed. Press any key to clear the message.

If there are steps, then you need to enter the Block and File number. When this screen pops up, enter the Block[0 – 8] and File[00 – 39] for HP-29C, [00 – 22] for HP-25C, as the address where you want the program stored and press Enter.

The following item lets you to enter a text (**Alpha**) or **Default** name for the program file.


If you chose **Alpha** then you can enter a name using the keyboard layout.*

File names can be up to 20 characters long and they scroll left as you enter characters. Press Enter to save the file.

If you choose **Def** then the filename with be saved as Pgm25(29)C_Block_Number

*Note: Keyboard layout shown later in presentation.

# Woodstock Replacement PC Board

## Programs


***Program Sub-Menu Options***

- ***Program Read –*** Select to read Program or Data file

- ***Data Store –*** used to store Data in memory locations R0 – R.5
- ***Program Title –*** use this menu item to change file name
- ***Program Free –*** used to find next free file location
- ***Program Erase –*** used to erase a single file
- ***Block Erase –*** used to erase all the files in a block. You will be asked to confirm before erasing.

# Woodstock Replacement PC Board

## DHBO-Decimal, Hexadecimal, Binary and Octal Conversions

This mode lets you view and modify 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. The HP-29 keyboard is shown but the same key positions work with other models.

In HEX Mode A B C D E

Change Modes D H B O F


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 |

Active Number Keys

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

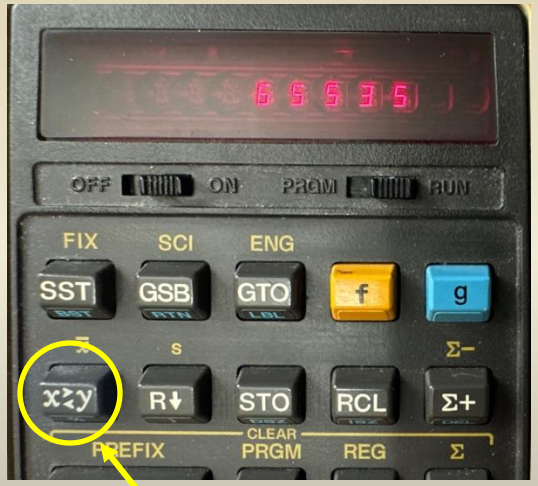
Because of the display digits, the number range for DHBO mode is:
Decimal 999,999,999
Hex 3B9A C9FF
Binary 00111011 10111010 11001001 11111111
Octal 7 346 544 777

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 digits 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.

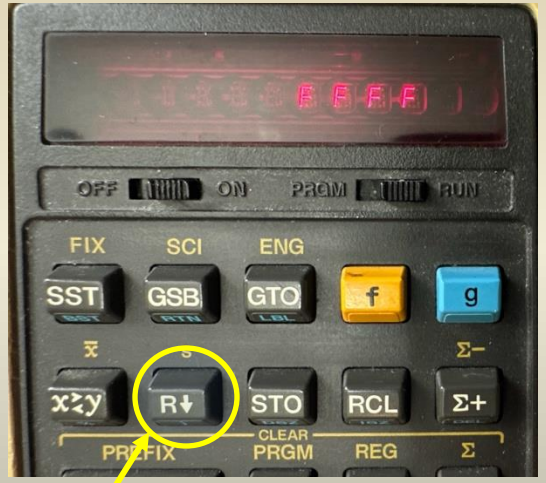

Graphics credit to Tony Nixon

# Woodstock Replacement PC Board

## DHBO-Decimal, Hexadecimal, Binary and Octal Conversions



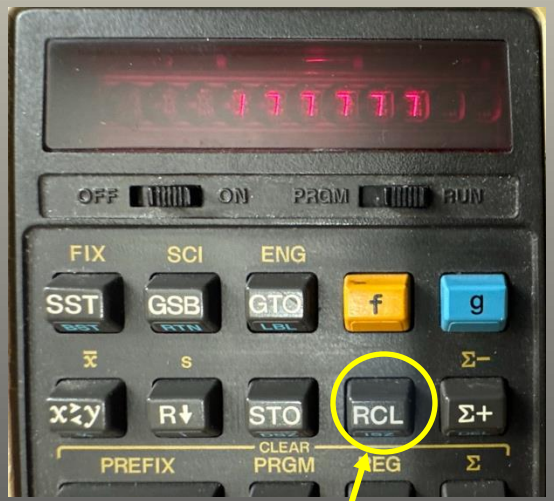

Decimal




Hexadecimal



**Binary** (use <-> <+> keys to scroll left/rt)




Octal

Note: In menu mode, calculator does not go to sleep

# Woodstock Replacement PC Board

## Least Fraction, Temperature, Model Select, L R

- **Least Fraction** menu option will reduce a fraction to its lowest denominator.
  - Enter the denominator into X and press <Enter>
  - Enter the numerator without pressing <Enter>
  - Enable menu mode by holding <Enter> key down
  - Scroll the menus until you see **LEASt FrAC** and press <Enter>
  - The new numerator will overwrite the X register
  - The new denominator will overwrite the Y register


- **Temperature** menu option will display the current temperature of one of the IC's on the CPU board. Press <Enter> to display <CLX> to exit.

- **Calculator select** menu option allows you to select: HP-21, HP-22, HP-25C, HP-27 or an HP-29C. Scroll using <+> <->. Use <Enter> to select and <CLX> to exit.

- **Switch L R** menu option for the slide switch option if the calculator does not have a 2nd slide switch. It allows the <DEG> <RAD> buttons to substitute.

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# Woodstock Replacement PC Board

## Additional Program Steps

- Three (3) extra programmable functions for the HP-25C
  - Beep
  - GSB 49
  - RTN
- Six (6) extra programmable functions for the HP-29C
  - Random Number (placed in X-register. Random no. from 0 -1)
  - Constants (up to 10 constants)
  - Beep
  - Data Swap - swaps the 30 registers with a secondary set of 30 registers
  - File access This function allows file access from the internal memory. File addresses are the same format as described for the Storage menu item. And are made up of a 3-digit number giving a maximum of 400 files to access.
  - Notes Display – 100 11-character notes via CalCom program

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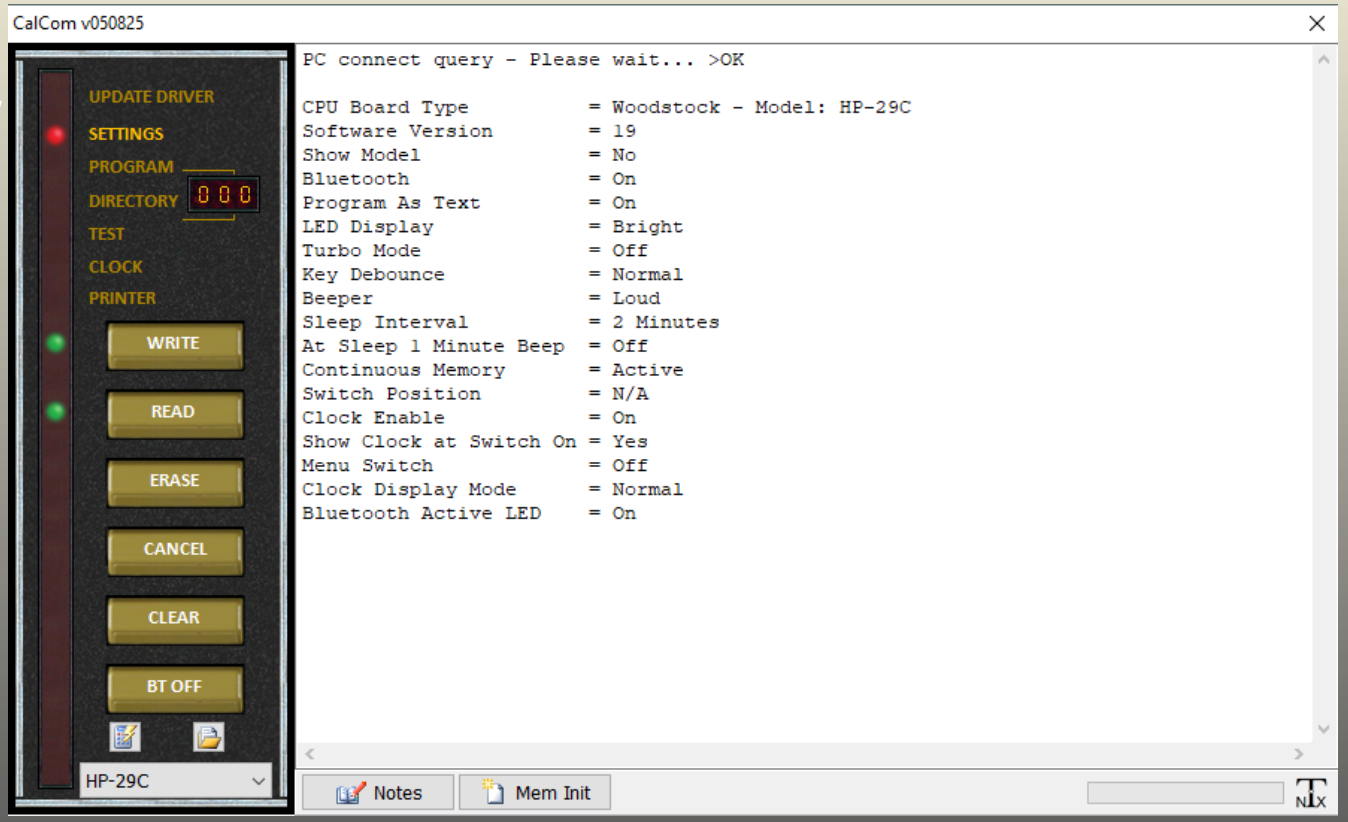
# Woodstock Replacement PC Board

## Communications

The new CPU board can communicate with a PC running the `CalcCom.exe` program via a Bluetooth module or via an FTDI RS-232 serial port module.
An built-in Bluetooth Module is used for wireless communications between the calculator and a host PC when running the `CalCom.exe` program. This will allow transferring of programs and other data between the CPU board and the PC.

When Bluetooth is ON, the decimal point in the right most digit will illuminate.


PC Window for CalCom

# Woodstock Replacement PC Board

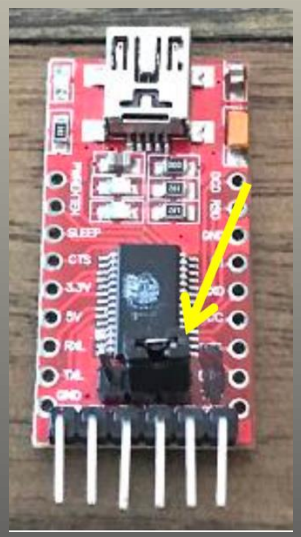
## Firmware Updates

**Re-Flashing PIC18LF67K40 Processor**

This procedure can be accomplished by using Bluetooth, the FTDI module or with a PICProgrammer. Make sure you have the latest CalCom zip file from the Teenix web site.

- Bluetooth Re-Flash – Works well but may be prone to failure due to environment.
- FTDI USB to parallel direct connection from pc to Woodstock board connector.
- PIC (Microchip) programmer (PICKit3 or PICKit5) using Microchip IPE program.

Bluetooth Wireless Connection



FTDI Board



PIC Programmers

# Woodstock Replacement PC Board

## Key Mapping

When using the HP-25C and HP-29C, the program names can be entered as a default or they can be entered as text. A basic text editor is included and when enabled the keys operate as shown in the following image. When saving a file, you will get the choice of entering a text name or a default name.


The primary characters are shown on the key faces.
The alternative characters are shown above the keys.

[**alt**] Changes between primary and alternate character sets.
[**BkS**] Deletes the current character.
[**New**] Restarts the name entry
[**Quit**] Exits file store or rename.
[**Accept**] Saves the file or new name.

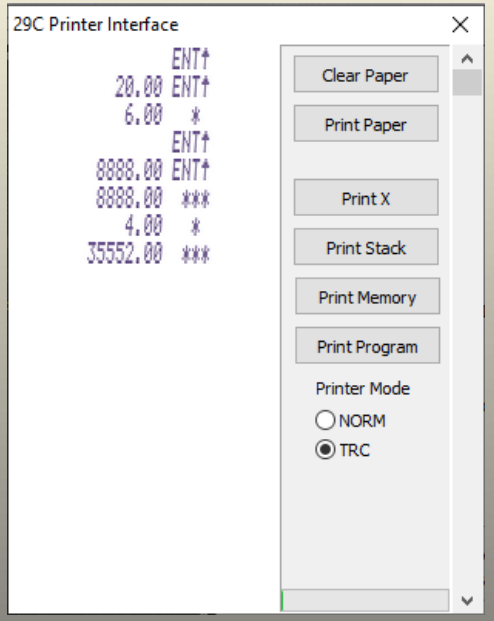
Graphics credit to Tony Nixon

# Woodstock Replacement PC Board

## Continuous Memory and Printing

- The continuous memory* works with all models.
- Non “C” models can switch the CM on or OFF.
- C models can simulate a battery reset.

A printer Interface is available and interfaces to the `CalCom` PC program via the Bluetooth module. When active, the printer will print details similar to the HP-19C printer. The font is similar to Topcat printers. The print shown was created using the CalCom program and the new HP-29C.



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# Woodstock Replacement PC Board

## Games

Games?
Yes! There are three built-in games in the Woodstock PCB.

**Tetris** using the 7-segment LED display

- Tetris elements move left to right
- 4 keys move the elements up, down, left, right
- Goal is to fill an “8”, then it disappears and all shift right
- Tetris music included! (music can be muted)

**Blackjack** (21) Card game

- Traditional “21” rules apply (no splits or wagering)

**Maze Puzzle**

- There are three (3) mazes, in a 24 x 24 grid, to solve

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# Woodstock Replacement PC Board

## Summary and Conclusions

- A Woodstock replacement board to revive an HP-21, HP-22, HP-25C, HP-27 or HP-29C
- The conversion process of installing the new board in your old calculator case.
- A new LiPo battery, fit into the old case, for the new Woodstock calculator.
- Many new Woodstock features, enhancements and a Bluetooth connection.
- Re-programmability of the Woodstock board via Bluetooth, direct connection, FTDI board or PIC programmer.

- And finally, the satisfaction of seeing that little LED display come alive again!

## What's Next??

***Coming soon***

*(from Teenix)*

# A new pc board for the HP-19C is in the works!

# Woodstock Replacement PC Board

## Acknowledgements and Credits

1. Tony Nixon (Teenix) – Woodstock Replacement PCB. (https://www.teenix.org/)
2. Wikipedia: Woodstock series of calculators.
3. Bernhard Emese (Panamatik) associated knowledge and notes about the HP25 & HP-29C.
4. Jacques Laporte extensive HP calculator power supply schematics and analysis.
5. Eric Smith's development and documentation on HP calculators. (http://www.brouhaha.com/~eric/hpcalc/)
6. Museum of HP Calculators (Dave Hicks) – various notes, comments, dialogues, photos and discussions on the Woodstock series of calculators.
7. Geoff Quickfall's documentation on Woodstock repair
8. Eric Rechlin's HPCalc.org, amazing repository of everything "HP" (https://www.hpcalc.org/)
9. Reference Tony Nixon's website to download information on the Woodstock pc board: https://www.teenix.org/
10. Włodek Mier-Jędrzejowicz's books and information on HP calculators

**Personal Collection:** HP01, HP10bII, HP12C, HP15CLE, HP17bII+, HP19C, HP21, HP25, HP29C, HP30b, HP32E, HP32SII, HP34C, HP-35, HP35S, HP41CX, HP42S HP45, HP67,HP-71B, HP97, WP34S, HP Prime, DM41X, DM42

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# Woodstock Replacement PC Board



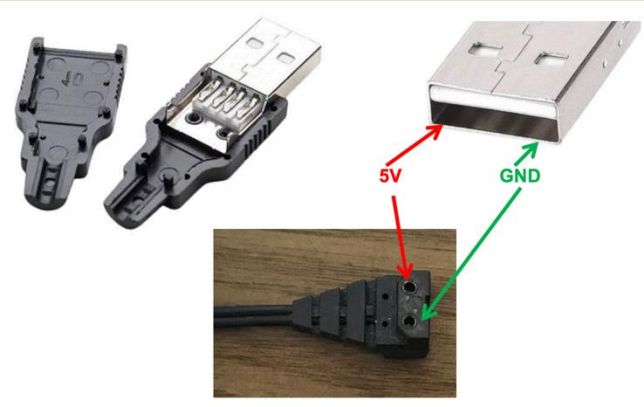
# Thank you!

 If you have any questions, you may contact Jim Johnson.
Email: jjohnson873@yahoo.com

# Woodstock Replacement PC Board

## Addendum

Other LiPo Charging Options




For more information on Charging a LiPo battery inside a Woodstock, visit:
https://www.teenix.org/

Another option is to modify an existing Woodstock charger and replace the AC transformer with an AC to DC converter as shown. The parts can be supplied as an option when purchasing the CPU board.