## New ZCLK 2 Calendar/Clock Package

The original ZCLK was copyrighted 1984 by FBE Research Company, Inc. However, the other popular clock alternative of the time was the SmartWatch and their internal batteries are reaching their limited life span and, being installed internally, cannot be replaced. Therefore, I hope that FBE Research will forgive my attempt to again offer a real-time clock to Z-100 owners at a fair price, and due recognition to FBE.

Note: According to the internet, on December 18, 1998, ownership of FBE Research Company, Inc., was donated to the Brockman/Smedley Charitable Remainder Unitrust. Early in 1999, the corporation was dissolved and the proceeds were invested by the trustee, the Washington State University Foundation.

Description

ZCLK was a calender/clock circuit board for the Z-100 series of desktop computers. It installs on the Z-100 main circuit board and does not require a S-100 bus expansion slot. Installation is simple and will not permanently alter the Z-100 computer.
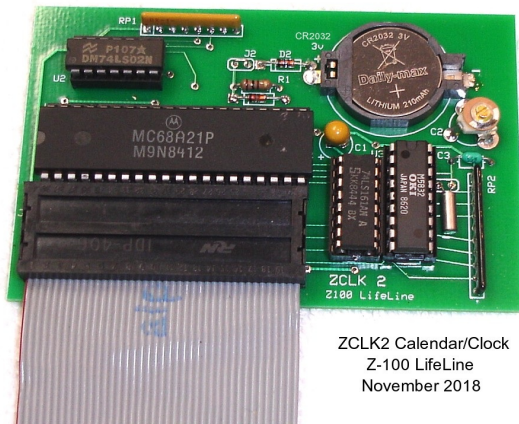
ZCLK2 Calendar/Clock
Z-100 LifeLine
November 2018

The new ZCLK2 uses the identical circuit as ZCLK, but on a redesigned circuit board. It is offered only in a model that uses a short length of flat ribbon cable to avoid interfering with the EasyPC or Gemini PC-emulator installations.

ZCLK2 shares the 68A21 Peripheral Interface Adaptor IC (U114) used by the Z-100 for the Parallel Printer Interface (and other things). With ZCLK2 installed, the ability of the computer to sense the state of the printer /ERROR line is lost. But, this is of little consequence since most software does not check for this error and, if any did, the ZCLK2 would return a no-error state. Most printers have an alternative means of indicating error conditions as well.

ZCLK2 uses the OKI Semiconductor MSM5832 microprocessor real-time clock and calender IC. The MSM5832 contains registers as follows:

TIME	MONTH	DATE	YEAR	WEEKDAY
23:59:59	12	31	99	7

A long-life CR2032 lithium battery maintains the date/time in the ZCLK2 during computer power-off periods.

ZCLK2 Circuit Board Installation

When the ZCLK2 is installed, the 68A21 Peripheral Interface Adaptor (PIA) IC (U114) on the Z-100's main circuit board is removed from its socket and installed in the socket labeled U1 on the ZCLK2 circuit board. The ZCLK2 board's ribbon cable then plugs into the PIA socket on the Z-100's main circuit board, with the ZCLK2 board extending toward the rear card cage. The board can either be laid back over its own cable, laid back over any installed PC-emulator board, or placed within the card cage, if there is room.

WARNING: Do NOT short the battery. Battery power conductors are exposed on the ZCLK2 circuit board. Do NOT lay the ZCLK2 on an electrically conductive (metallic) surface! Shorting the battery may cause it to burst or release dangerous materials.

WARNING: Some of the integrated circuits used in the ZCLK2 and in the Z-100 are sensitive to static electricity and may be permanently damaged if mishandled. To minimize the chance of damage, ground yourself by touching the computer chassis during the first three steps and proceed as carefully as possible.

Detailed installation instructions will be included with the purchase of the ZCLK2, or may be requested separately. However, a brief version follows:

1. Disassemble the Z-100, including removal of any EasyPC or Gemini PC-emulator board, if installed, to gain access to the 40-pin 68A21 integrated circuit at U114.

2. Carefully remove the 68A21 IC from its socket using an IC removal tool or a small screwdriver. Hold the IC in your hand and do not lay it down on your work surface.

3. Carefully align the pins of the 68A21 IC with the empty socket on the ZCLK2 board. Make sure that the Pin 1 end of the IC (the end with a notch or small dot in the IC) is towards the short edge of the ZCLK2 board nearest the socket. Push the 68A21 into the socket.

ZCLK2 Installation. Card Cage Shield removed for clarity.
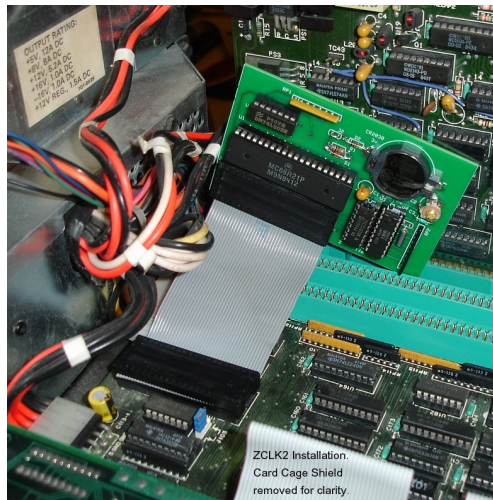
4. Position the ZCLK2 board toward the card cage and insert the ribbon connector into the empty 68A21 socket.

5. Carefully install the CR-2032 battery in the battery holder, with the positive side (+) up.

6. Reinstall any PC-emulator (Easy-PC or Gemini) board that you may have removed, using their respective procedures.

7. Rest the ZCLK2 board, now inverted, over the top of the motherboard or emulator board and insulate the two boards from each other with a layer of plastic.

This completes the installation of your ZCLK2. Now, reassemble the computer by reversing the disassembly process and proceed to the **Software Installation,** next.

Software Installation

For Z-DOS and Zenith's later MS-DOS versions (also now commonly referred to as Z-DOS):

Boot up and copy ZCLK.COM from the distribution disk onto your bootable system disk. For automatic date/time setting on bootup, your bootable system disk must have an appropriate AUTOEXEC.BAT file. If your system disk does not have this file, one is provided for you on the distribution disk. Copy it from the distribution disk to your system disk. If your system disk already has an AUTOEXEC.BAT file, use an editor (e.g., EDLIN) to add the command line "ZCLK" to the file in place of the "DATE" and "TIME" command lines, if they exist.

When the ZCLK.COM program runs, it reads the date/time from the ZCLK, sets the Z-DOS date/time, and displays the date/time on the console. Type ZCLK{RETURN} to run the program. If the date/time from the ZCLK is not acceptable to Z-DOS, the "bad" date/time error will be displayed along with a request that the ZCLK be reset.

ZCLK.COM is also used to set the correct date/time into the ZCLK and to process a Daylight Saving Time adjustment. Type ZCLK{space}{RETURN} to display operating instructions for the program. If the ZCLK contains a "bad" date or time, display and read the instructions and then set the correct date/time into the ZCLK. To set the date and time, use the command; ZCLK MM DD YY HH MM{RETURN}. For example:
     ZCLK 12 15 18 09 25{CR} (Use one space between data elements)

For PC-DOS:

The procedures are identical to those for Z-DOS, except the file to load is PC-ZCLK.COM. PC-ZCLK has the corrected I/O ports defined to access the clock. After copying PC-ZCLK.COM to the boot disk, change the name to ZCLK.COM. Note: Presently, ZCLK does not work with the Gemini PC-emulator. It does, however, work with the EasyPC emulator package. I am presently trying to address this issue with the Gemini board.

CP/M Software:

The source file for a **CP/M-86** version of ZCLK.COM is supplied on the Z-DOS/MS-DOS distribution disk.
Use the RDDOS utility program to copy the files ZCLK.A86 and READ.ME to your CP/M-86 system.
Consult the READ.ME file for details.
Note: Software for **CP/M-85** is not included with the ZCLK because CP/M-85 does NOT support a system-level date/time function.
Note: Software for **CP/M-Plus** is not presently included as it has yet to be developed.
I hope to do this as a project as soon as I can find the time.

Accuracy Adjustment

The timekeeping accuracy of the ZCLK is determined by the frequency of a quartz crystal oscillator on the ZCLK circuit board. The frequency of this oscillator may be adjusted with the trimmer capacitor (C2) on the ZCLK board. If the ZCLK is running fast, increase the capacitance by turning the trimmer capacitor clockwise. If it is running slow, decrease the capacitance by turning counter clockwise.

Replacing the Battery

Obtain a replacement CR2032 battery (a 3V lithium cell). A similar, but slightly smaller CR2025 will NOT work reliably. Gain access to the ZCLK following the procedures given earlier, and proceed as follows:

1. Insert a toothpick or similar non-conductive object into the slot at the right edge of the holder and pry the battery to the left and upwards until it clears the lip edge of the battery holder. Slide the battery out of the holder and discard.

2. Wipe the contact surfaces of the new battery with a soft, clean cloth to remove any contaminants. Slide the new battery into the slot at the left and press the battery into the holder until it clips into the right edge.

WARNING: Lithium, the active material of the battery, will burn if exposed to water. Do NOT mutilate, incinerate, or disassemble the battery. Do NOT attempt to charge the battery. Do NOT place the battery in water or heat it above 100 degrees centigrade. Do NOT solder directly to the battery.

In Case of Difficulty

So far, the only experience that I have had with ZCLK2 was two bad 74LS161's. The symptoms are bad clock bits returned; that is, the date could not be set or kept changing randomly, while the month, year and time, were fine. In the second case, the hour stayed at 10 o'clock all the time.

Here is a shot of my "Greetings" with the ZCLK date and time displayed beneath.

The ZCLK2 costs $55.00, offered only from the *"Z-100 LifeLine"*.