

# NTP Clock

## Entrant # eZ2947

### ZiLOG 2004 Flash Nets Cash

I have over a dozen clocks in my home. Besides the “normal” clocks there are clocks in the microwave oven, the VCRs, televisions, stove, computers, and TiVo. So why would I want to create another one? Because this one connects to the internet and synchronizes itself to an NTP time server, providing a very accurate time of day.

#### **Operation**

Operation of the NTP Clock is quite simple. To set up the NTP Clock you plug the wall wart power into the J7 power jack on the motherboard, and plug a LAN cable between the Ethernet Mini-Module LAN jack and a LAN connection that has internet access.

Optionally, the user may connect a device to the serial port on the motherboard to receive the time. Once per second the time is sent in the format YYYYMMDDHHMMSS. This can be read by any device that can receive data from an RS-232 serial port at 9600-N-8-1 settings.

When the system powers on the user is presented with a title screen momentarily, then the NTP Clock prompts the user to select their time zone from an extensive list of world wide time zones. Selection of the time zone is done with two pushbuttons that are used to move up and down the list, and an enter button to select a zone. Next the NTP Clock asks the user if they are currently observing Daylight Savings Time. The up/down buttons toggle the setting between YES and NO, and the enter button selects.

Next the NTP clock prompts the user to select a time server to synchronize with. A preprogrammed list of several NTP servers and their IP addresses are provided for the user to select from. Similar to the time zone selection, the up and down buttons select a server and the enter button makes the selection.

After the user has selected a Network Time Protocol time server, the NTP Clock uses CMX Micronet to initialize the Ethernet hardware, then obtains an IP address, gateway, and subnet mask from the LAN and displays that information on the LCD momentarily.

Next it opens a connection to an NTP server and retrieves the current time. If the time is successfully retrieved the real time clock internal to the eZ80F91 is set with the current time and the time is displayed on the LCD. If there is a problem the system falls back to the real time clock, displaying that time, and an “RTC” indicator in the top right corner of the LCD to alert the user that the time was not obtained from the NTP server.

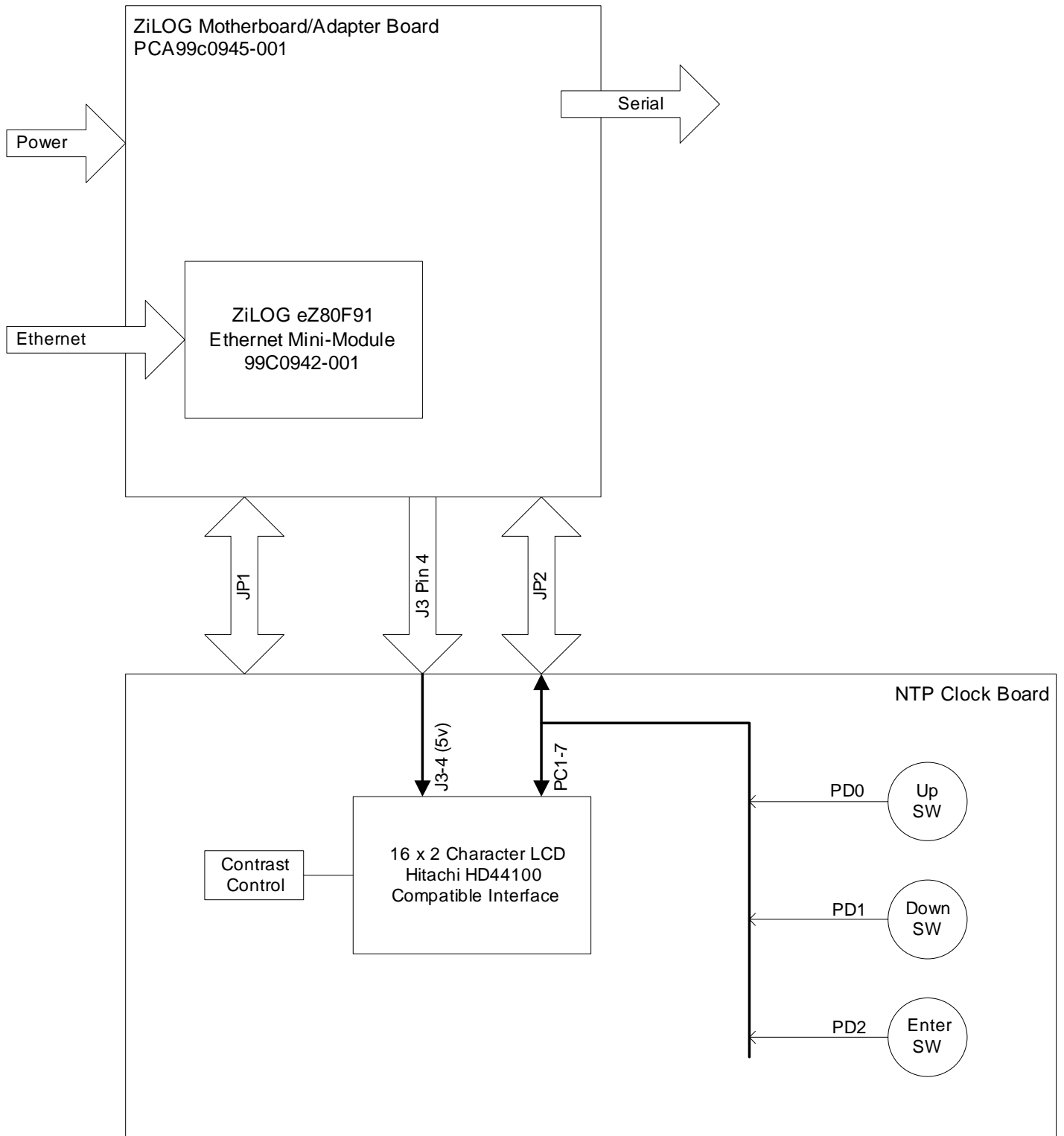
Periodically the NTP server is contacted to keep the time accurate. When this happens the LCD will momentarily show “Resynchronizing with NTP server.”

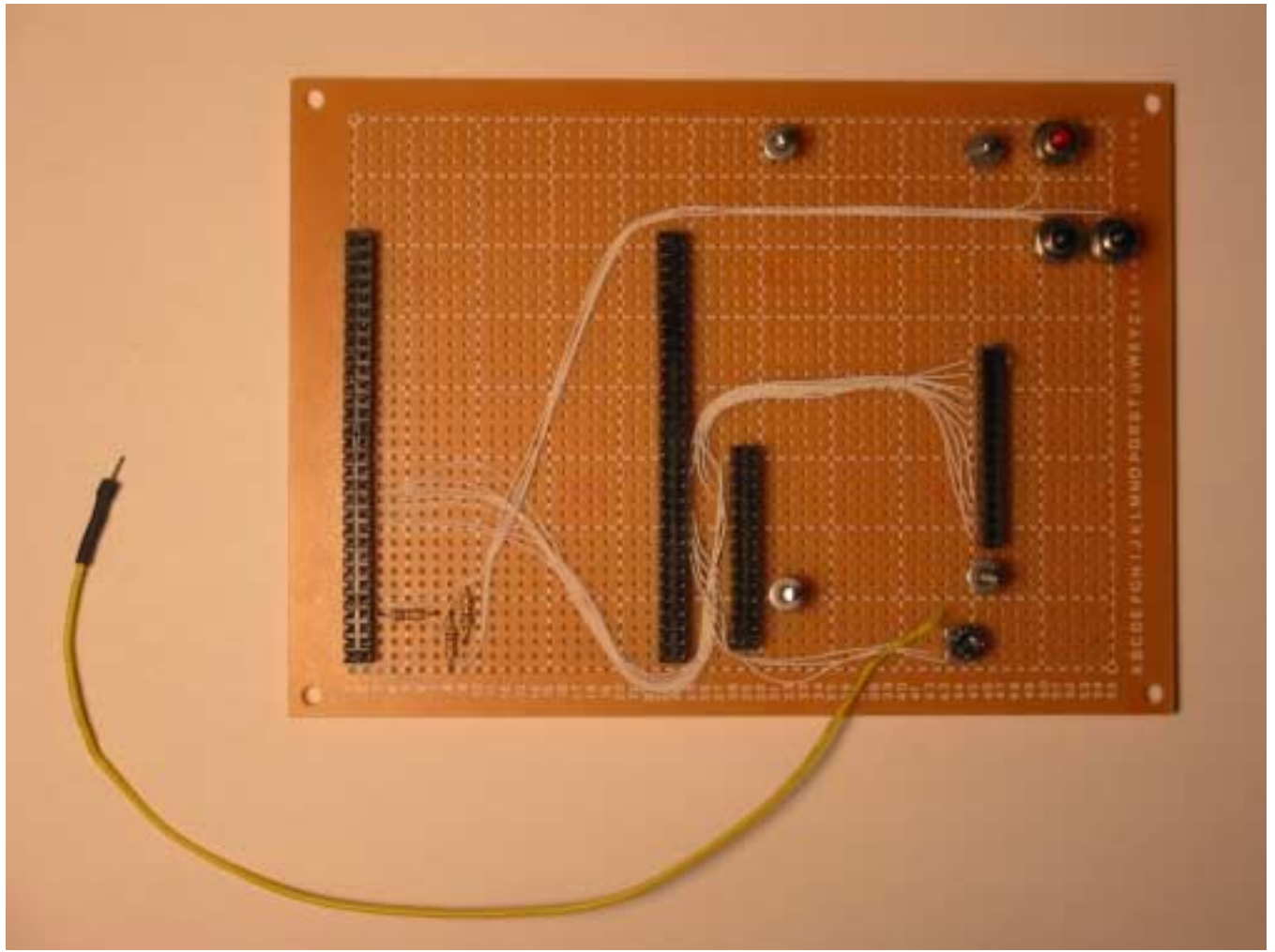
One thing to note here is that the CMX Micronet software provided is an evaluation version that times out after one hour. Therefore it is necessary to resynchronize with the NTP server far more often than is actually necessary, in order to demonstrate this function. The accuracy of the eZ80F91 real time clock is such that it would probably not be necessary to resynchronize with the NTP server for days, but since the evaluation version of Micronet times out after an hour, it is set to do so 5 times an hour.

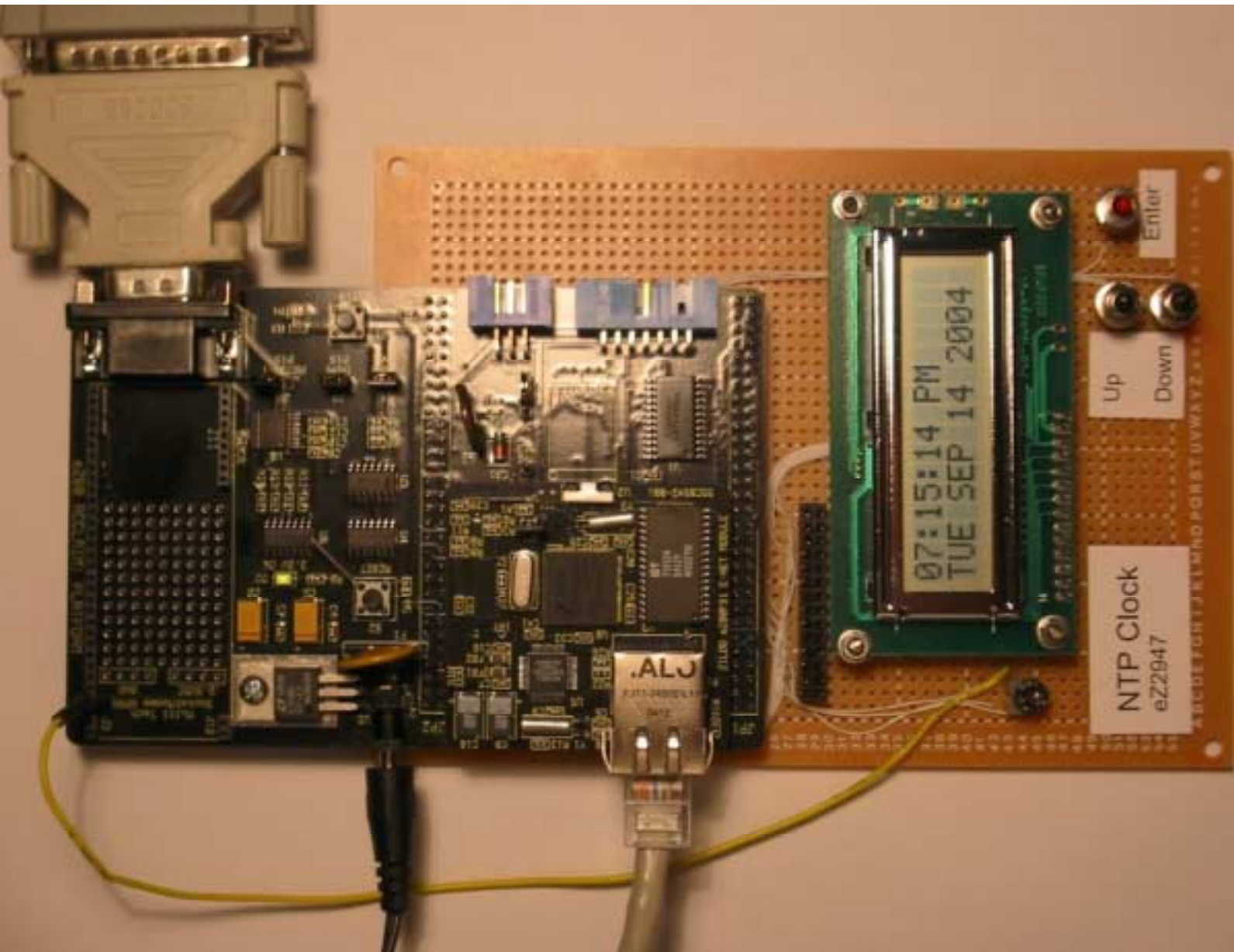
#### **Conclusion**

The NTP clock provides an interesting method to provide an accurate time indication to the user that can be used to set other clocks, provide accurate time to serial connected devices, or perhaps just win the “my clock is more accurate than yours” competition.

Block Diagram - NTP Clock  
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ZiLOG 2004 Flash Nets Cash design contest  
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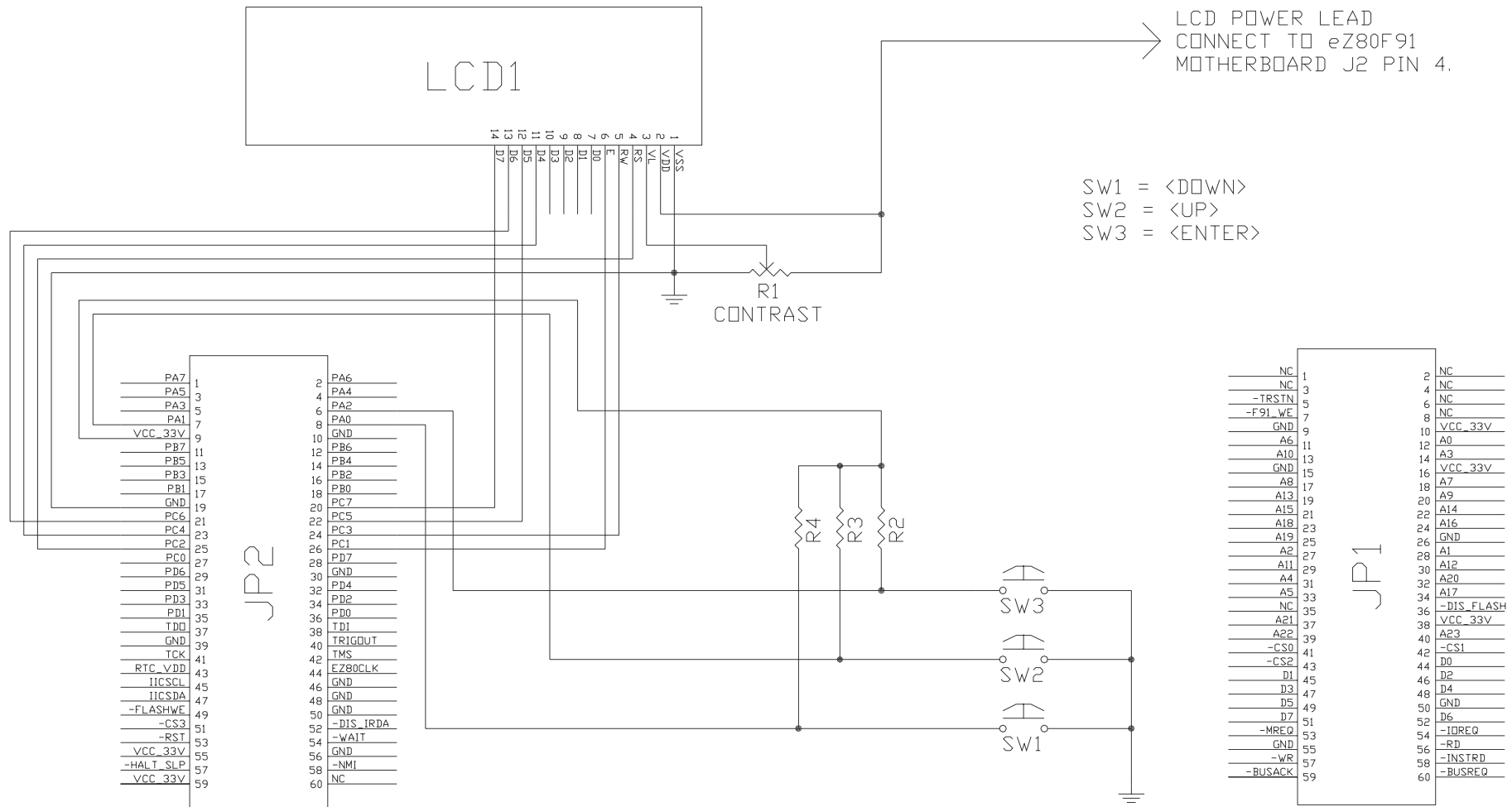
NTP Clock  
eZ2947

Up  
Down

Enter

07:15:14 PM  
TUE SEP 14 2004

.ALU



LCD1 2x16 HD44100 COMPATIBLE LCD  
 R1 10K POTENTIOMETER  
 R2-4 10K 1/4W 5% RESISTOR  
 JP1-2 FEMALE 0.1" CENTER 30x2 HEADER  
 SW1-3 NORMALLY OPEN MOMENTARY SWITCH

SCHEMATIC - NTP CLOCK  
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