



## IBM ThinkPads CRC Repair using W24RF08

Assuming you have already read the eeprom and corrected the errors (you can also take advantage of our free support if you register the writer) or you have another good eeprom dump from a working laptop, to write this into eeprom proceed as follows:

### 1. Locating the eeprom. Soldering.

You don't need to unsolder the 24RF08 eeprom, just solder 3 wires to SDA, SCL and GND pins of the eeprom. There are two eeprom layouts (see interface schematics described bellow), corresponding to 8 pin or 14 pin eeproms. Locate the eeprom first according to your model (E.g. T20-23 and T30 have the eeprom underneath TP, and can be accessed by removing the RAM modules cover, no need to dismantle the laptop.) and solder the wires using a soldering iron with a fine tip. Also, you can use 0.15 - 0.20 mm enamel coated wires or similar small diameter insulated wires. These wires will be connected later to the interface.

As a tip: You can use clips to connect the wires or you can solder on the PCB traces leading to the eeprom pins. Once again, be careful and double, triple check the soldering if necessary till you are positively sure you have done the right job.

### 2. Choose and build the interface.

Since version 2.0, R24RF08 and W24RF08 are compatible with a wide range of eeprom programmers. By default, both programs set the COM port signals to use direct logic level to access I2C bus. We provide here 2 schematics that are relevant for direct logic signals and for inverse logic signals (**simple-i2cprog.pdf** and **driven-i2cprog.pdf**). Also, depending of the interface you build, you can invert the logics for SDA-In, SDA-Out, and SCL COM port signals by some command line parameters described later in this document.

**a)** The file **simple-i2cprog.pdf** contains the schematic diagram of a simple interface (known as SI-PROG) based on 2 zeners and 2 resistors. This is a classic, easy to build circuit and works with soldered or unsoldered eeproms. The purpose of the 2 zeners is to convert RS232 levels (+/- 5V) to TTL ones, needed by the eeprom. It uses direct logic signals to I2C eeprom and is powered by the COM port. However, this interface works with in-system eeproms but is dependant on the COM port current and eeprom bus impedance. W24RF08 works natively with this circuit, no need to change the lines signals with command line parameters. This circuit works pretty well with almost all Thinkpads series.

**b)** The second interface is described in **driven-i2cprog.pdf**. The circuit uses MAX 232 as a RS232 to TTL driver and its main purpose is to work with soldered eeproms. The advantage of MAX232 is the TTL outputs that are more reliable and more powerful when work with soldered, in-system eeproms (dependency free from the COM port current). Due of the internal inverters of MAX232 the interface responds to an inverse signal logic level. W24RF08 needs /x, /d, /i switches to be specified in the command line.

What these switches mean:

- /x - invert serial clock, also known as SCL;
- /d - invert serial data output, also known as SDA-Out;
- /i - invert serial data input, also known as SDA-In.

All those can be used in any combination to meet the interface specification.

### 3. How is it working:

Prepare your technician PC by connecting the interface to the COM1 port (don't connect the wires to eeprom yet). Turn on the ThinkPad and wait until the CRC error is displayed and there's no other activity like HDD access or so, connect the wires (GND first!, SDA, SCL) to the corresponding wires from the interface (attached before to COM1) and execute\*:

-for SI-PROG interface (as described in 2.a above):

**w24rf08.exe /p**

This operation will reset the Access Protection Page. Immediately after, you may perform the write operation without rebooting the laptop. Execute:

**w24rf08.exe filename.ext** where „filename.ext” is the eeprom dump given name.

Example: **w24rf08 myt40.bin**

\*If you reboot the machine, the eeprom may be protected again and you must redo the reset APP operation.

-for MAX232 driven I2C interface (as described in 2.b above):

**w24rf08.exe /p /x /d /i** where /x /d /i are command line parameters (switches) for this kind of interface.

This operation will reset the Access Protection Page. Immediately after, you may perform the write operation without rebooting the laptop. Execute:

**w24rf08.exe filename.ext /x /d /i** where „filename.ext” is the eeprom dump given name.

Example: **w24rf08 myt40.bin /x /d /i**

\*If you reboot the machine, the eeprom may be protected again and you must redo the reset APP operation.

Finally, disconnect the wires (GND last!) and turn off the ThinkPad by pressing on/off switch.

### 4. Job done.

Turn on the TP and press F1 to enter BIOS Setup. Make the necessary changes, save them and exit. Reboot the laptop again.

Remember, use 3 wires from the interface and 3 wires from eeprom! Connect them after your ThinkPad is powered and disconnect them right after you read the content, before you switch off the laptop.

For other infos regarding R24RF08, W24RF08 and IBMpass you can visit [www.allservice.ro](http://www.allservice.ro).

Victor Voinea,  
Author  
[allservice@home.ro](mailto:allservice@home.ro)