

MARK 5 MEMO #017.1

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To: Mark 5 Development Group

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Subject: Programming the Mark 5A Input-Output Board

The Mark 5A Input-Output Board has two Xilinx FPGAs, one for the Input Section, and one for the Output Section. These FPGAs are programmed via separate PROMs connected to separate JTAG connectors on the board. This Memo describes one way to program these devices, using freely available software. The only special hardware required is a Xilinx "Parallel Cable" (Model:DLC7 Part Number HW-PC4) and "Parallel Cable Fly Leads" (Part Number HW-FLYLEADS) available for \$110 from any Xilinx distributor. The method described here has been tested with both the Parallel Cable III and the currently available Parallel Cable IV.

A less expensive JTAG programming cable is available for US\$19 from Digilent, Inc.

(<http://www.digilentinc.com/> or sales@digilentinc.com) You will need to make your own fly leads for this cable.

1) The first step is to download and install the "J Drive Programming Engine" (`jdrive3_setup.exe`) from the Xilinx web site: <http://www.xilinx.com/isp/jdrivefiles.htm> or <http://www.xilinx.com/isp/jdrivedownload.htm>. Install to the default directory (`C:\Jdrive`) on a Windows 95/98/Me/NT/2000 PC.

2) After installing the J Drive Engine, download the following files from the Haystack ftp directory <ftp://web.haystack.mit.edu/pub/mark5/proms/>.

```
jtag.bat
*.cmd
*.isc
*.bsd
```

3) Apply power to the I-O Board by plugging it into a PCI slot of any computer, or by connecting +5 Volts to JP5 and GND to JP8. If the three LEDs, D4, D5, and D6 do not come on, remove power immediately and diagnose the problem.

4) To program the Input Section, connect the Parallel Cable to J3 (pin 1 is Vref or Vcc, pin 9 is TMS) and execute the following command from an MS-DOS Prompt: ``jtag iba'`. After about two minutes, the message "Successful." should appear.

5) To program the Output Section, connect the Parallel Cable to J10 and execute the following command from an MS-DOS Prompt: ``jtag oba'`. After about two minutes, the message "Successful." should appear.

Note that the Parallel Cable IV may not work with the Mark5A board if ECP mode is enabled on the parallel port, depending on the speed of your CPU. I suggest "Bi-Directional" or "EPP".

If you have the Xilinx Foundation or ISE design tools, you could use the `.mcs` files with the Xilinx iMPACT software to program the PROMs.