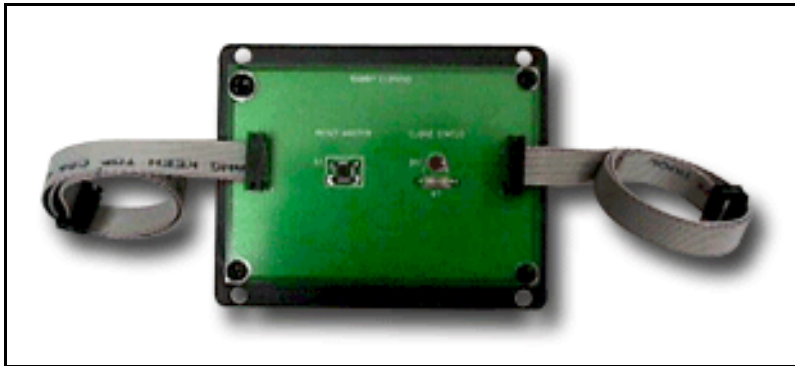


Technical Note



Rabbit 2000 Cloning Board



Introduction

The Rabbit 2000 Cloning Board is used to copy compiled software programs from one Rabbit-2000-based controller to another. This allows master programs to be loaded onto other boards without the need for a PC.

Dynamic C version 6.50 or later is needed to use the Rabbit 2000 Cloning Board.

Features and Benefits

- The Cloning Board replaces a PC as the primary tool to load programs, reduces costs and workspace
- High-speed data transfer occurs at 57,600 bps or 115,200 bps.
- Flashing LED alerts operator when cloning is complete.
- Ideal for low-volume cloning production.

Using the Rabbit 2000 Cloning Board

Set Up Master Controller

Cloning must be enabled in the master controller, which contains the program to be copied, before any cloning can be done. Follow these steps to enable cloning.

1. Connect the programming port of your master controller to a PC running Dynamic C (see Figure 1). Use the programming cable that came with the controller's Development Kit and follow the instructions in the controller user's manual.

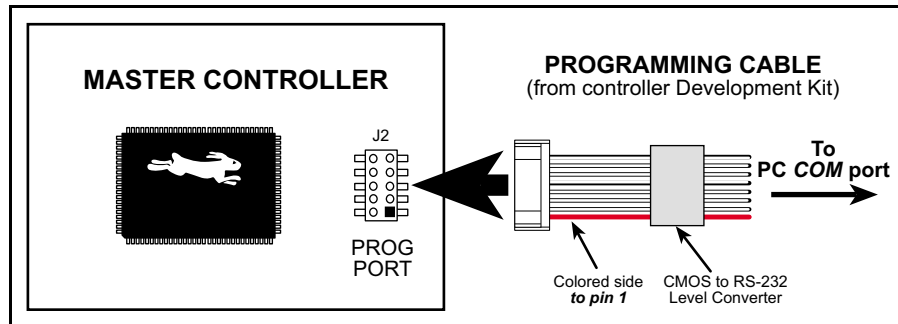


Figure 1. Enable Cloning on Master Controller

2. Apply power to the controller.
3. Start Dynamic C and open the BIOS source code file named **RABBITBIOS.C**, which can be found in the Dynamic C **BIOS** directory.
4. Change the line

```
#define ENABLECLONING 0 // set to 1 to enable cloning
```

to read:

```
#define ENABLECLONING 1 // set to 1 to enable cloning
```

Click on **File > Save** to save these changes to the BIOS.

5. Open the application program that you plan to copy.
6. Click on **No debug Compile to Target** on the **Compile** menu to recompile the application program. Wait for the "Program successfully compiled..." message to be displayed.
7. Remove power from the controller, and disconnect the programming cable from the controller's programming port.

All controllers sold by Z-World with the Rabbit 2000™ chip support cloning at 115,200 bps. If you have a different controller with a crystal that does not support the 115,200 bps baud rate, you can change the following line in the BIOS to enable cloning at 57,600 bps:

```
#define CLONINGBAUDRATE 1
    // set to 0 for 57600 baud, 1 for 115200 baud
```

to:

```
#define CLONINGBAUDRATE 0
    // set to 0 for 57600 baud, 1 for 115200 baud
```

This operation would be done as part of Step 4.

Clone Target Controller

1. Use one of the cables supplied with the Rabbit 2000 Cloning Board to connect the **MASTER** header (J1) on the Cloning Board to the programming port of your master controller. Make sure that the colored side of the cable goes to pin 1 of the header as shown in Figure 2.

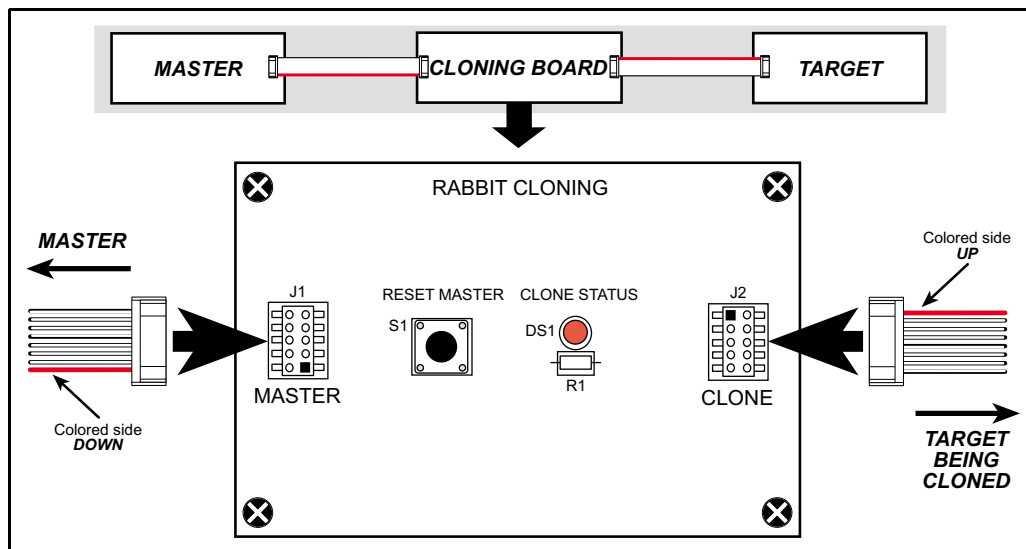


Figure 2. Cloning Cable Connections to Rabbit 2000 Cloning Board

2. Use the other cloning cable supplied with the Rabbit 2000 Cloning Board to connect the **CLONE** header (J2) on the Cloning Board to the programming port of the target controller, which will receive the program. Make sure that the colored side of the cable goes to pin 1 of the header as shown in Figure 2.
3. Apply power to both the master controller and the target controller.
4. Press the **RESET MASTER** button on the Rabbit 2000 Cloning Board. The master then sends the entire BIOS and the software program to the clone. The LED on the Cloning Board will blink several times per second while this is happening. If the LED stops blinking, an error has occurred – press the **RESET MASTER** button on the Cloning Board to try again.

5. Once cloning is complete, the LED will blink quickly in a distinctive pattern of four flashes, then pause, then four more flashes...
6. Remove power from the target controller, and unplug the cloning cable from its programming port.

The program in the cloned target controller is ready to run when the target controller is powered up. The master controller is now available to program the next target.

Technical Description

Figure 3 shows the Rabbit 2000 Cloning Board circuit and Figure 4 shows the programming port on the Rabbit 2000 chip.

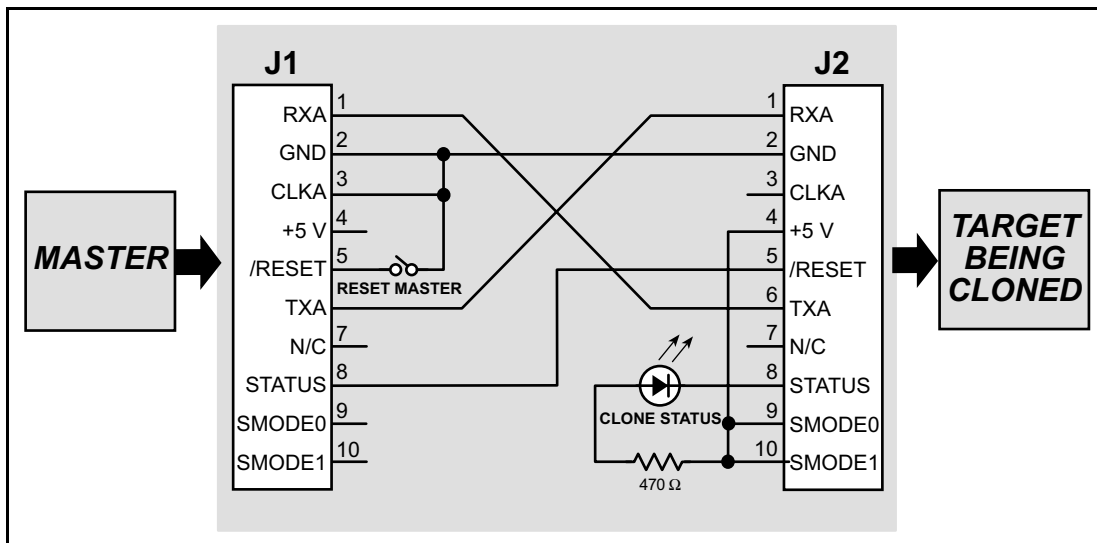


Figure 3. Rabbit 2000 Cloning Board Circuit

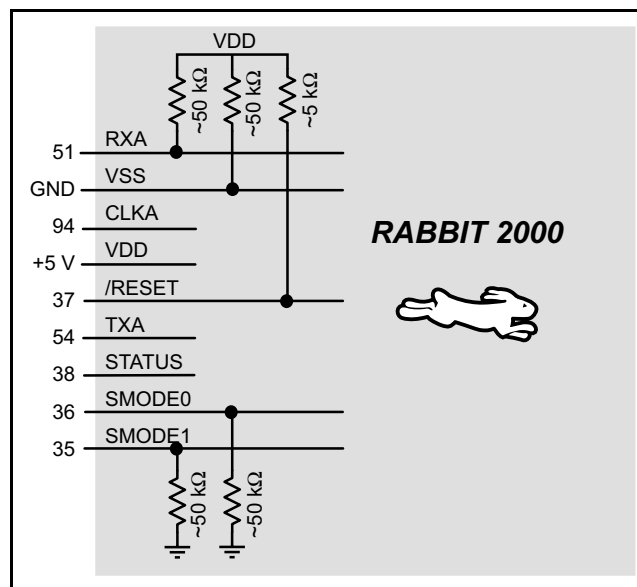


Figure 4. Rabbit 2000 Programming Port

When the Cloning Board is connected to the master controller, the master controller detects it because the signal CLKA is held low. This is detected in the BIOS when the reset ends, and the cloning support of the BIOS is invoked. The cloning program cold-boots the target system by resetting it and downloading a primary boot program. The master then sends the entire BIOS over to the clone, where the boot program receives it and stores it in RAM (just like Dynamic C does when compiling the BIOS). A CRC check of the BIOS is performed on both the master and the clone, and the results are compared. The clone is reset again, and the BIOS begins running. Finally, the master sends the application program, which is written to the flash memory. When the entire flash contents (except for the system ID block) have been transferred, the target flashes the Cloning Board LED in a distinctive way to indicate that the programming is done.

Since the BIOS supports a variety of flash types, the flash EPROM on the two controllers do not have to be identical. Cloning works between master and target controllers that have different-sized flash chips, but the master will not know the sector size of target's flash chip. Since the master copies its own universal flash driver to the target, the master BIOS must allocate a memory buffer sufficiently large to work on the target. The current implementation of cloning uses root memory for this buffer, which reduces the root memory available to the application program. The size of the buffer is given by the macro **MAX_FLASH_SECTORSIZE**. This macro is #defined near the top of the **LIB\BIOSLIB\FLASHWR.LIB** file. The default value is 1024 (4096 in older versions). The user can reduce this buffer size to the maximum of the master and target's sector sizes if root data space is a problem, or increase it to 4096 if needed. Future implementations will use **xmem** for the buffer, so root data space will not be a problem, and this macro will not be used.



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