

## **201002 Micromodem and 203004 Micromodem Coprocessor Firmware Programming Notes:**

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### **I. Micromodem Firmware:**

The firmware for the Micromodem can be programmed via two methods; Direct Cable and In-Situ.

Note that if there is a change in the number of configuration variables (the variables set with \$CCCFG), or their default values, between the old and new versions of firmware, the configuration variables will be reset to their default values when booting the new firmware for the first time. If there is no change in configuration variables between the old and new firmware, the configuration variables will not be reset from their previously saved values.

Note also that because the CTS line on COM1 is used to enter the bootloader when the modem is booting from a hard reset, Hardware Flow Control can only be enabled (\$CCCFG,HFC,1) if the Boot Serial Port has already been set to COM2 (\$CCCFG,BSP,2). The Boot Serial Port is the serial port on which the bootloader is active. The in-situ programming method is the only method which will work on COM2. Because of this limitation, Hardware Flow Control is not recommended on the Micromodem-1.

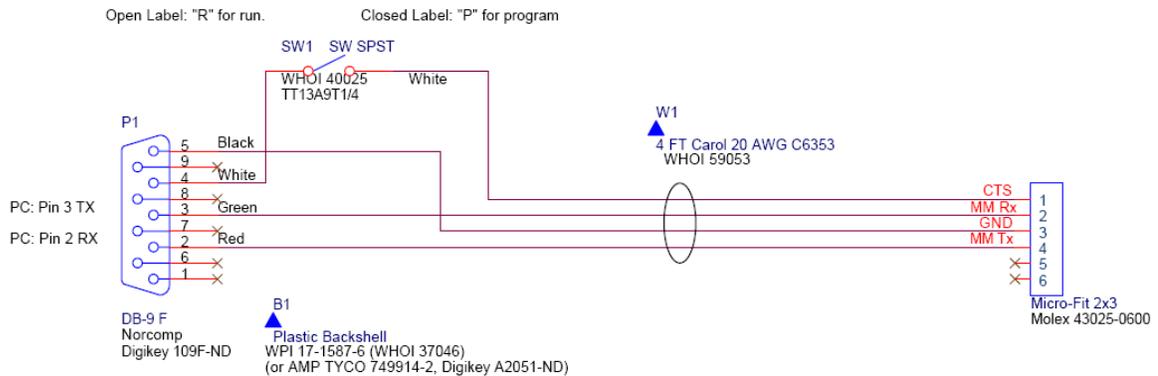
#### Hyperterminal Setup for Firmware Programming:

- Using Hyperterminal, setup a COM port with the following settings:
  - Bits per second: 19200
  - Data bits: 8
  - Parity: None
  - Stop bits: 1
  - Flow Control: None
- Under ASCII setup, deselect all except "wrap line".
- Other serial port terminal programs, such as Realterm, will also work. See last page of this document for information on using minicom in Linux.

## Direct Cable with CTS Switch:

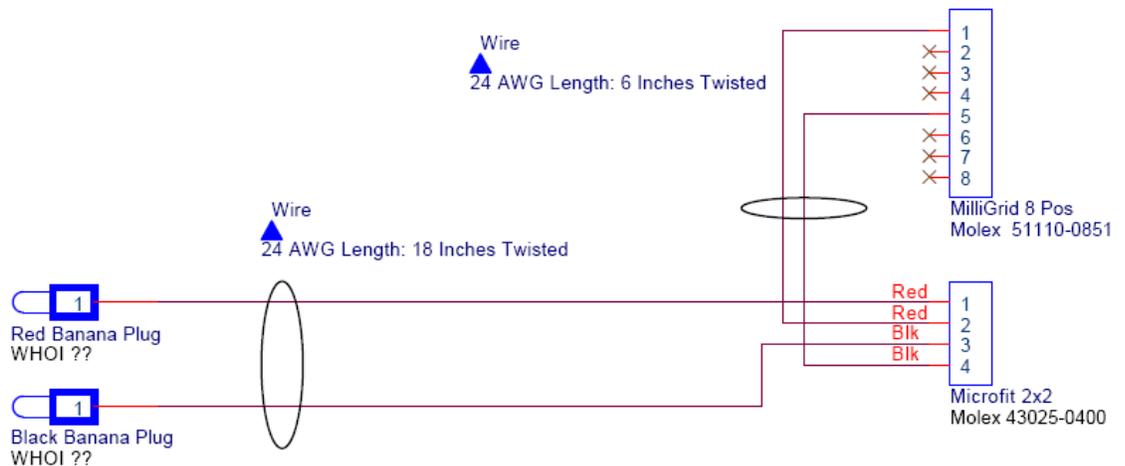
### 231001 Micromodem Lab Serial Cable with Programming Switch

When this cable is connected to the serial port of a PC and the programming switch is set to P, the CTS line to the Micromodem is held high. This cable is typically connected to JP1 (COM1) of the Micromodem.



### 231016 Micromodem and Coprocessor Lab Power Cable:

This cable is used to connect a power source to the Micromodem and Coprocessor. The input voltage should be between 5V-15V DC.



### Firmware Programming:

- With the serial cable connected to JP1 (COM1) on the Micromodem, set the programming switch to program.
- Power on the Micromodem-- the bootloader menu should appear on the terminal screen -- hit ENTER with in 10 seconds.
- Enter the following sequence to prepare the modem to accept the firmware:
  - Press D for download.
  - Press 1 for address space 1.
  - Press Y to confirm.
- Under the TRANSFER menu (Hyperterminal) select SEND TEXT FILE, under the file types menu select show all files, and then choose the appropriate firmware file (\*.dl format).
- The download will start automatically. On the screen "Downloading to Block N" (where N is an incremental number) will be displayed.
- Once the download is complete, the Micromodem will return to the bootloader menu.
- Press R to reboot, then press 1 for rebooting from space 1. This will cause the Micromodem to revert, but will enter the bootloader menu again. You can allow the 10 second timeout to expire at this point and the Micromodem should then boot from the firmware.
- If the Micromodem successfully reboots from the installed firmware the following will be displayed on the terminal screen:
  - \$CAREV,hhmmss,INIT,AUV.0.93.0.35\*xx
  - \$CAREV,hhmmss,AUV.0.93.0.35\*xx

### Additional Firmware Notes:

- In some instances there may be a corrupted block in the flash which will prevent firmware from being installed in a particular address space. If this happens it is possible to download the firmware to address space 2, 3, or 4 as listed above.
- Once the download is complete the address space which the firmware was downloaded to must be set to "active" for the Micromodem to boot from that address space.
- To set a address space to active perform the following in the bootloader menu:
  - Press A for Active
  - Press the number (i.e. 1, 2, 3, 4) of the address space where the firmware was loaded.

### In-situ programming:

A serial-only alternative to the direct cable CTS/power cycling scheme is to set the bootloader run flag, then issue the sleep command i.e.:

**\$CCCFG,BRN,1**

**\$CCMSC,<SRC>,<SRC>,0**

where <SRC> above is the modem's source address, which you can check with \$CCCFQ,SRC.

This serial command functionality is available in firmware versions 0.92.0.28 and later, and depends on features in bootloader version 1.3.2 and later.

The following capabilities are required to automate the download process:

- Micromodem power on/off control. Alternatively the sleep command can be issued to have the Micromodem reboot i.e.:  
\$CCMSC,<SRC>,<SRC>,0
- CTS line on/off direct control (different from serial port hardware flow control). Alternatively the bootloader run flag can be set before rebooting which will cause the Micromodem to enter the bootloader upon reboot i.e.: \$CCCFG,BRN,1 (available with firmware 0.92.0.28 and later, bootloader version 1.3.2 and later)
- Filesystem access (to read new Firmware ".dl" file)

Once in the bootloader menu follow the Firmware Programming instructions detailed previously in this document.

It is **critical** that after successful in-situ firmware programming you disable the bootloader run flag, i.e. **\$CCCFG,BRN,0** to prevent the modem from re-entering the bootloader on subsequent boots. By sending certain serial traffic to the bootloader, e.g. 'e1y', it would be possible to erase the firmware executable accidentally. Sending arbitrary non-NMEA strings to the bootloader more often than once every ten seconds will also prevent the modem from automatically rebooting to the modem firmware. (If the bootloader receives the '\$' character at the start of an NMEA command, it will reboot to the active executable, but it is still critical to disable the bootloader with \$CCCFG,BRN,0.)

The serial port used for the bootloader defaults to the modem's COM1 port. If you need to use the bootloader on COM2, set the Boot Serial Port (BSP) to 2 with \$CCCFG,BSP,2.

## **II. Micromodem Coprocessor Firmware via the Micromodem Bootloader:**

To upgrade the coprocessor via the Micromodem bootloader requires PLD code on the coprocessor to be v3 or greater. All 203004f boards are shipped from the factory with this code installed. All older generation hardware needs to be upgraded at WHOI. Older generation boards that have already been upgraded typically have a marking or label of some sort on chip U2.

### Micromodem Coprocessor Firmware Programming:

- With the Micromodem powered off, mount the 203004f Micromodem C67 Coprocessor to the topside of 201002 Micromodem.
- Connect the appropriate power cables to both the Micromodem and the Micromodem Coprocessor.
- Enter the Micromodem bootloader via either the Direct Cable or In-Situ methods detailed in the Micromodem Firmware section of this document.
- Enter the following sequence to prepare the modem to accept the coprocessor firmware downloader application:
  - Press D for download.
  - Press 4 for address space 4.
  - Press Y to confirm.
- Under the TRANSFER menu (Hyperterminal) select SEND TEXT FILE, under the file types menu select show all files, and then choose the coprocessor downloader application file cpflash-0-01-0-03.dl.
- The download will start automatically. On the screen "Downloading to Block N" (where N is an incremental number) will be displayed.
- Once the download is complete, the Micromodem will return to the bootloader menu.
- Press R to reboot, then press 4 for rebooting from space 4. This will cause the Micromodem to revert then begin to run the coprocessor firmware downloader application.
- Enter the following sequence to initiate the coprocessor firmware download:
  - Press D for download.
  - Press Y to confirm
- On the screen " Ready to Begin Firmware Download. Send firmware HEX file now..." will eventually be displayed. Under the TRANSFER menu (Hyperterminal) select SEND TEXT FILE, under the file types menu select show all files, and then choose the coprocessor firmware file (\*.hex format).

- When the download is complete (between 2-9 minutes) the coprocessor firmware download application menu will appear. Press X to exit the application and reboot.
- Upon reboot the a message similar to the following should be displayed on the screen:
  - \$CAREV,191417,INIT,0.93.0.35\*56
  - \$CAREV,191417,AUV,0.93.0.35\*0E
  - \$CAREV,191417,COPROC,0.10.0.48\*4F
- If the three messages are displayed then the coprocessor firmware as been successfully programmed.
- If you used the in-situ programming method, then issue the **\$CCCFG,BRN,0** command as described above in the in-situ programming section.

### Firmware Programming with Minicom in Linux:

Go into minicom's file transfer configuration menu and change the executable for "ascii" file handling from "/usr/bin/ascii-xfer -dsv" to "/bin/cat". After making this change the user does not get any feedback about how many bytes have been transferred. Instead you just have to be patient and wait a minute or two. When the cat operation completes a prompt comes up in the minicom file transfer window saying "Hit carriage return when ready".

To use the ascii-xfr program with minicom, rather than /bin/cat as described above, you would probably need to adjust the line and/or character delays (-l and -c option in ascii-xfr).

Thanks to Jim Luby and Stuart Maclean from the Applied Physics Laboratory of the University of Washington for the minicom information.