



Broadcast Electronics

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FXi 60/250 Exciter w/Exgine

Firmware Upgrade Application Guide

Updating the Exgine Card to v4.01 or Newer

597-0541-006
Revision N
February 24, 2012

FXi 60/250 Exciter w/Exgine

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Updating the Exgine Card to v4.01 or Newer

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1 Purpose of this Document

The purpose of this document is to describe the necessary steps required to upgrade **Exgine Firmware** to **v4.01** or newer. Please note that the **FXi 60/250 Controller** MUST have already been updated to **v02.00.41**.

2 Features

The following is a list of key features implemented in this release.

- Additional HD Channels
- Selection of fpga for different revisions Exgine

3 Tools / Items Needed

NOTE: For XPi 10; upgrading to v4.01 or newer on the Exgine card requires that the XPi 10 software be upgraded to v4.3.2 or newer!

For XPi 10esp; upgrading to v4.01 or newer on the Exgine card requires that the XPi 10 esp software be upgraded to v1.02 or newer!

- Exgine v4.01 (or newer) Firmware Upgrade CD (or files downloaded from the B.E. Website)
- Personal Computer with Windows HyperTerminal Communication Program installed
- Straight Thru Ethernet Cable (if connecting to the FXi via a network switch or hub)
- Crossover Ethernet Cable (if connecting directly to the FXi)
- 9 Pin Female to Female Null Modem Serial Cable (or Straight Thru with Null Modem Adapter)

4 Estimated Setup Time

Providing that you have the tools listed above, it will take approximately 15 -30 minutes to update FXi Exgine Card's firmware. The transmitter will be off of the air during this process. If rack mounted, you may need an additional person for assistance.

NOTE: This fpga firmware may not work on early revision A boards. There are two fpga selections on the firmware; if one does not work you will select the other version. If neither works you will be instructed to remove the lid to the unit to verify the revision you have. [Refer to the troubleshooting section for more information.](#)

5 Upgrading Engine Firmware to “v4.01 or Newer” via I.P.

The Engine Card has the capability to receive firmware upgrades via an I.P. connection.



NOTE: HD operation of the FXi will be off-line during the Engine Firmware Upgrade Process. After the upgrade, the Engine Card in the FXi will reset and HD operation will resume. The upgrade process takes approximately 15 - 30 minutes.

The subdirectory on the FXi Firmware Upgrade CD (or files downloaded from B.E. Website), titled “**Exgine Firmware” or v4dot01_Release”** contains the necessary files for upgrading the Engine Card.

Step 1 – Using Windows Explorer, copy all of the files from the Exgine Firmware Upgrade CD (or files downloaded from the B.E. Website) to a folder on the hard drive “C:” of the personal computer that you are planning to use for the upgrade as shown below.

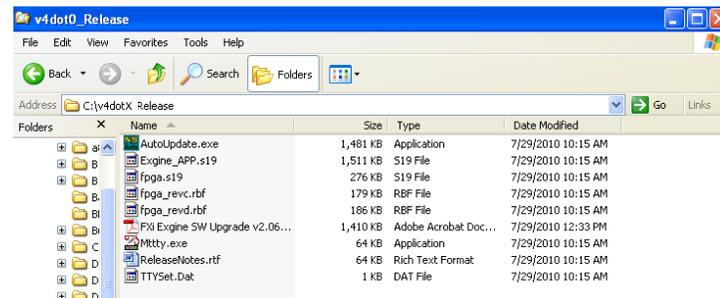


Figure 1 – FXi / Exgine Firmware Upgrade Files

Step 2 – If you have previously upgraded Exgine Firmware in your FXi to v1.20 or newer, or you have an Exciter that had the Engine Card installed at the factory, proceed to **Step 8**. If you are uncertain about the revision level of Exgine Firmware currently running in your FXi, proceed to **Step 3** to confirm.

Step 3 – Use **Steps 3a - 3f** to confirm the current revision level of Exgine Firmware in your FXi.

Step 3a – Connect a Null Modem cable (not supplied) from the Serial Port of your PC to the Exgine Serial Port J2 on the rear of the FXi.



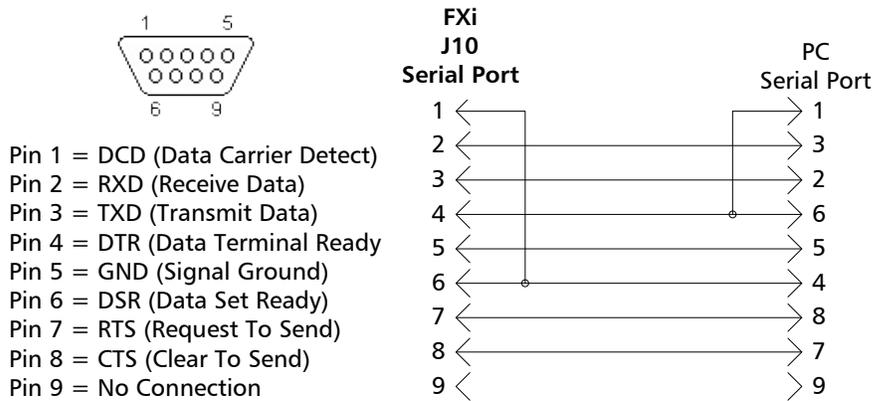
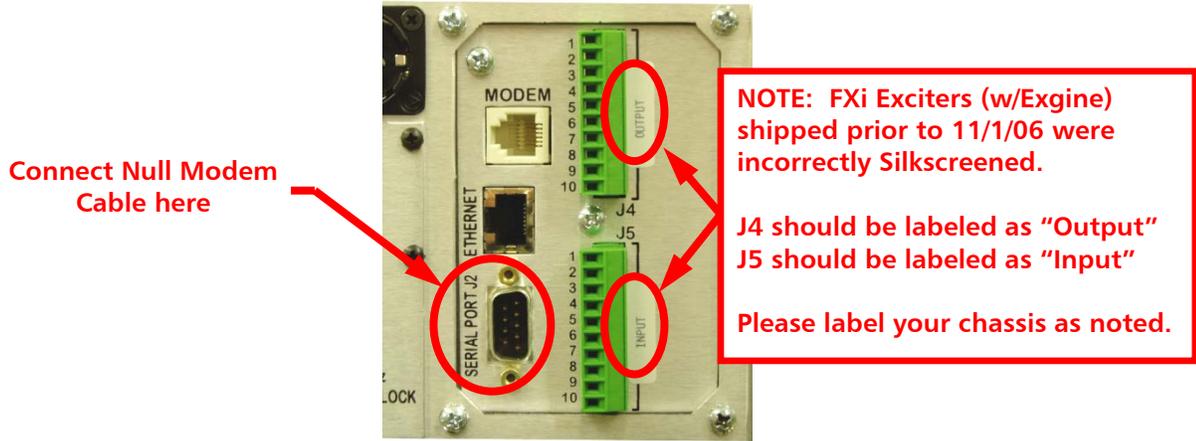


Figure 2 – Exgine Serial Port J2 / Serial Cable and Null Modem Adapter Pinouts

Step 3b – Navigate to the directory titled **Exgine Firmware v4.01X** that you copied from the Exgine Firmware Upgrade CD to your hard drive.

Step 3c – Double click on the **Mtty.exe** icon.

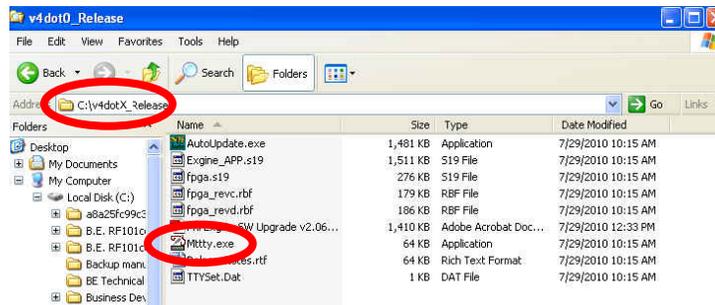


Figure 3 – FXi / Exgine Firmware Upgrade Files

Step 3d – Set the **Port (COM1 most common)**, **Baud to 115200**, **Parity to None**, **Data Bits to 8**, **Stop Bits to 1**, and then select **Connect**.



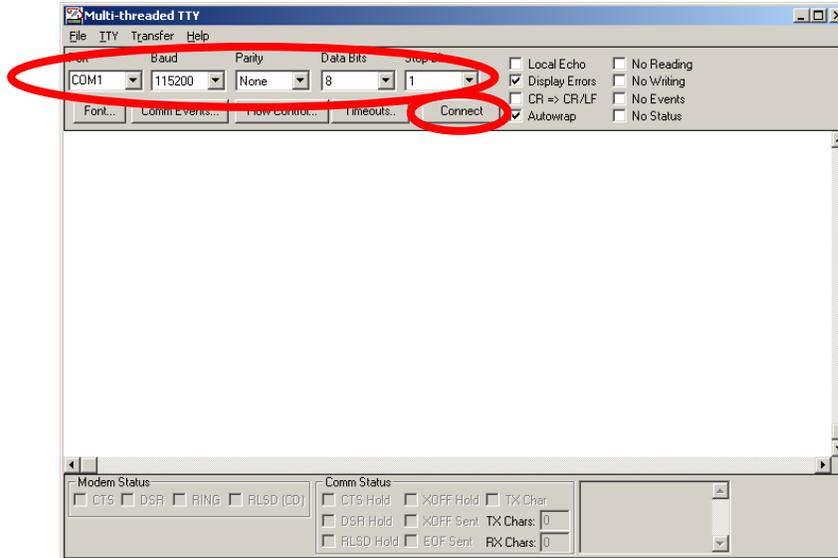


Figure 4 – Mttty Setup and Connection

Step 3e – Cycle the AC Power Switch on the rear of the FXi.

Step 3f – When the FXi is booting back up, the Mttty Application Screen on your PC will fill in with information. The revision level of the Exgine Firmware is noted behind “REV:”

If the Exgine Firmware revision level is “v1.3 or Newer”, proceed to **Step 8**.

If this Exgine Firmware revision level is “v1.2 or Older”, proceed to **Step 4**.

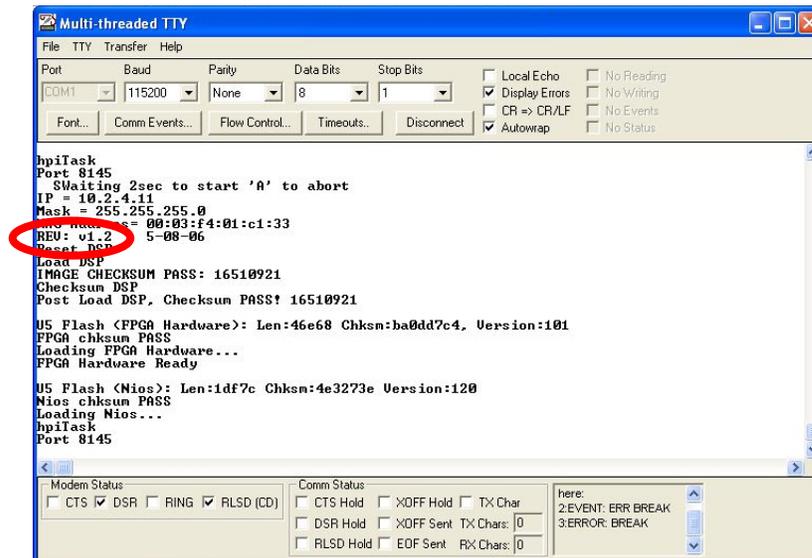


Figure 5 – Confirm Revision Level of Exgine Firmware using a Serial Connection and Mttty



Step 4 – Power OFF the FXi Exciter, disconnect all cables, and remove the FXi from the equipment rack. Using a No. 1 Phillips Screw Driver remove the top cover from the FXi.

Step 5 – To enable the download of **Engine Firmware Versions v1.20 or Newer**, re-locate **Jumper Plug P14** to **pins 1 and 2** of **J14** on the **Engine Card** as shown below.

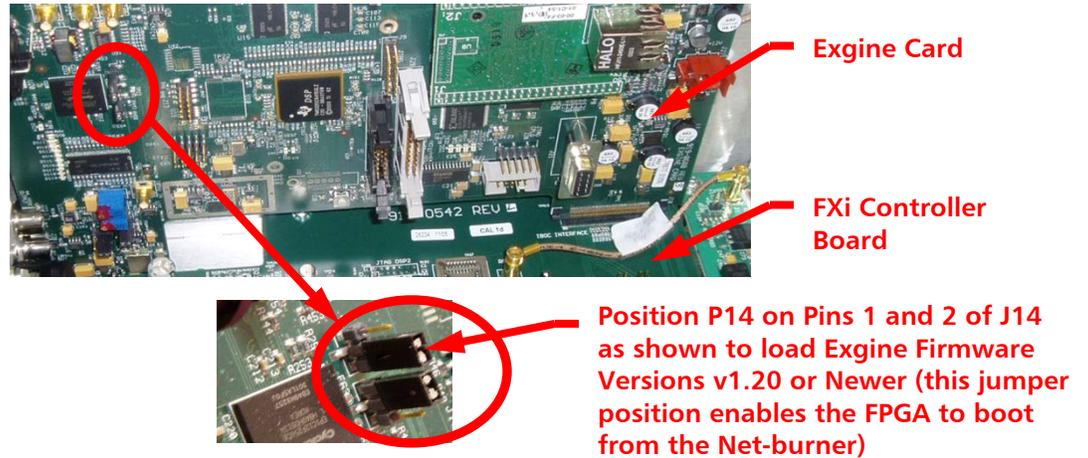


Figure 6 – Engine Card Jumper Plug P14

Step 6 – Install the top cover on the FXi, install the FXi into the equipment rack, and connect all cabling.

Step 7 – Power ON the FXi Exciter.

Step 8 – If you do not already know the I.P. Address and Subnet Mask of the FXi Exciter, use **Steps 8a - 8e** to retrieve it. If you already know the I.P. and Subnet Mask, proceed to **Step 9**.

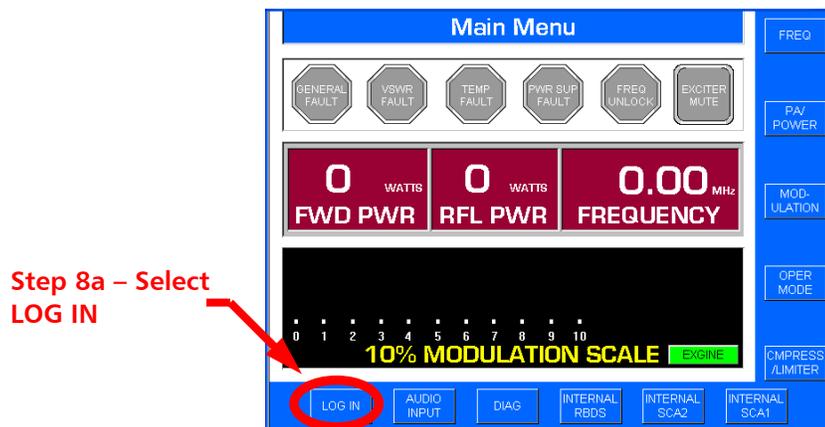
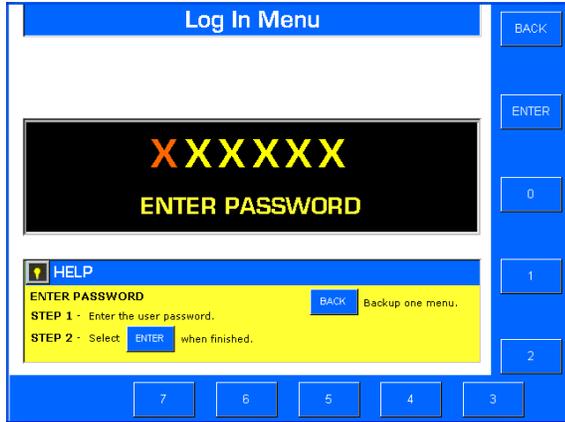
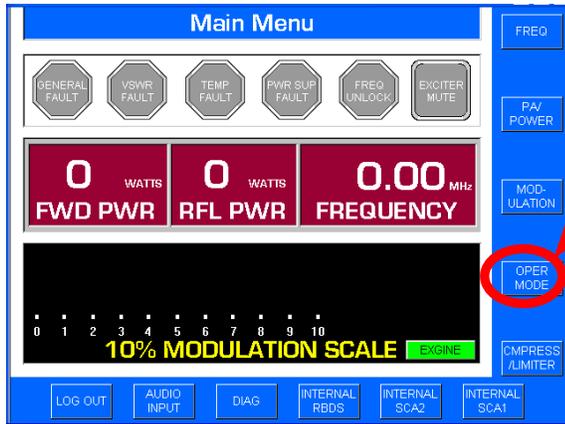


Figure 7 – FXi Exciter Main Menu Before Login



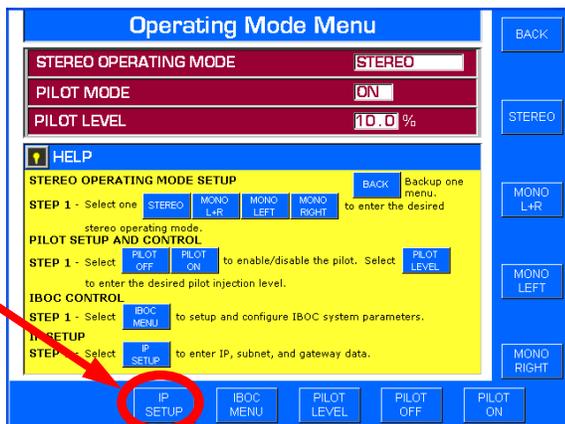
Step 8b – Using the Numeric Buttons, Enter the Password and Then Press ENTER (the default is 1 2 3 4 5 6)

Figure 8 – Login Menu



Step 8c – Select OPER MODE

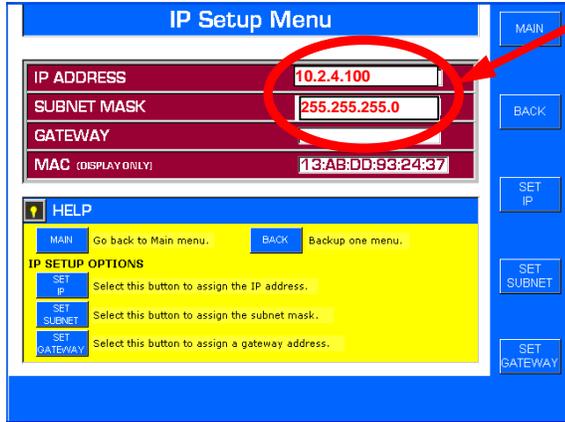
Figure 9 – Main Menu After Login



Step 8d – Select IP SETUP

Figure 10 – Operating Mode Menu





Step 8e – Note the I.P. Address and Subnet Mask of the FXi Exciter

Please note that the Factory defaults are:

IP = 10.2.4.100
Subnet = 255.255.255.0

Figure 11 – I.P. Setup Menu

Step 9 – To establish communication via I.P. with the FXi, your PC must be setup in the same I.P. family as the FXi. On your PC go to **Start -> All Programs -> Accessories -> Communications ->** and select **Network Connections**.

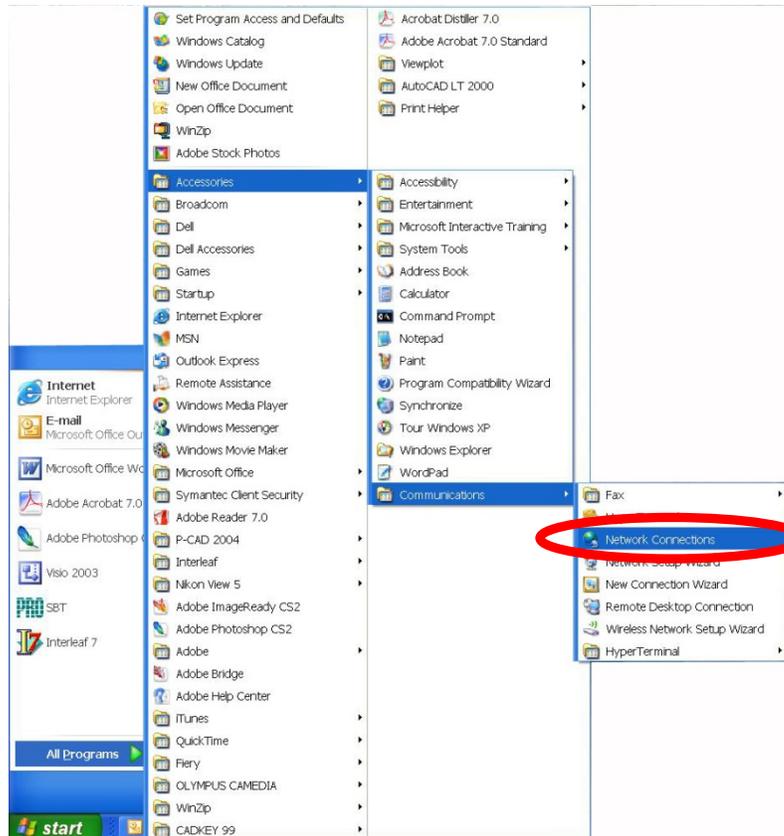


Figure 12 – Network Connection Menu Access

Step 10 – Right click on Local Area Connection and select **Properties**.



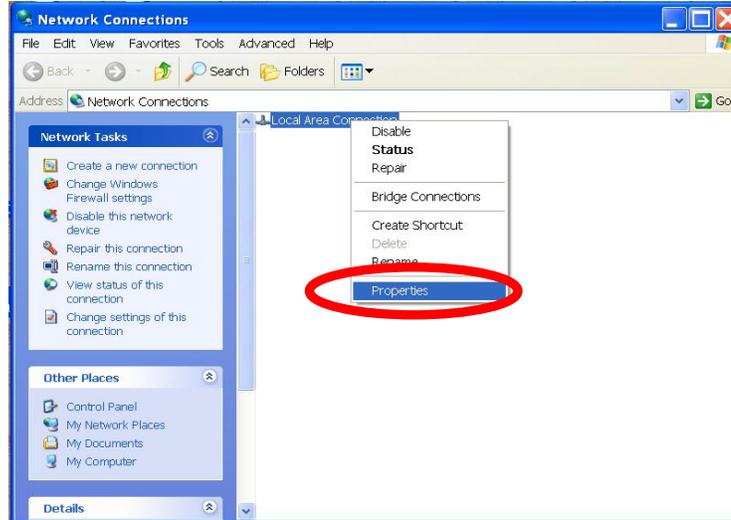


Figure 13 – Local Area Connection Properties

Step 11 – Since the I.P. address of the FXi in this example is 10.2.4.100 with a subnet mask of 255.255.255.0, we configure the PC with an IP of 10.2.4.10 and 255.255.255.0 for the Subnet Mask.

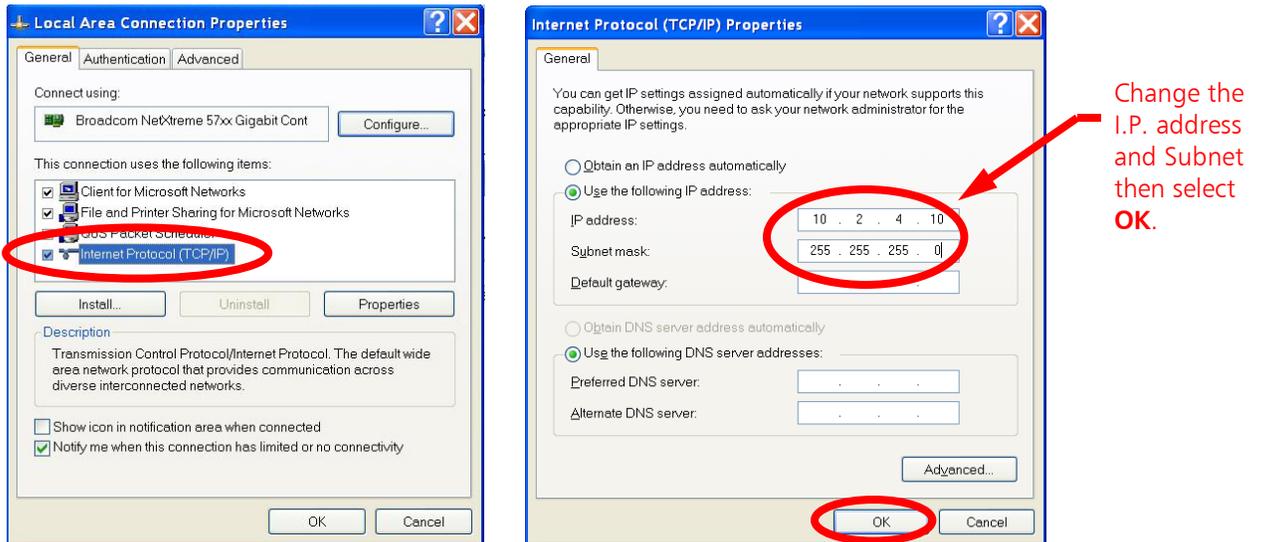


Figure 14 – Configure the IP Address of the Personal Computer

Step 12 – Ensure that the FXi is ON and operational. Connect your PC to the I.P. network that the FXi is on using a Straight Through Ethernet Cable (not supplied). If you are connecting directly to the Ethernet Port on the FXi, an Ethernet Crossover Cable is required (not supplied).

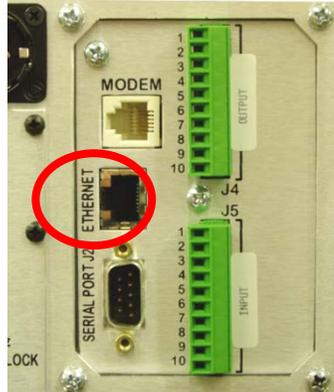


Figure 15 – Ethernet Port

Step 13 – Using Windows Explorer, navigate to the directory on the hard drive of your PC where you copied the **Exgine Firmware Upgrade CD** (or files downloaded from the B.E. Website) files to and open the folder titled **Exgine Firmware v4.01X**.

Step 14 – Next, double click on the **AutoUpdate.exe** icon.

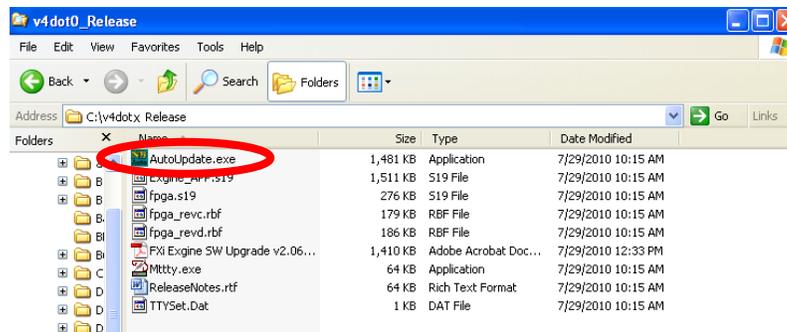


Figure 16 – Run the AutoUpdate.exe

Step 15 – The following Windows Security Alert window may appear, if so, select **Unblock**.



Figure 18 – Windows Security Alert

Step 16 – Next, enter the I.P. Address of the FXI, select the **Reboot Target when complete** check box, select the **Exgine Board (Ethernet Interface)** target check box, and then select the **Update** button.

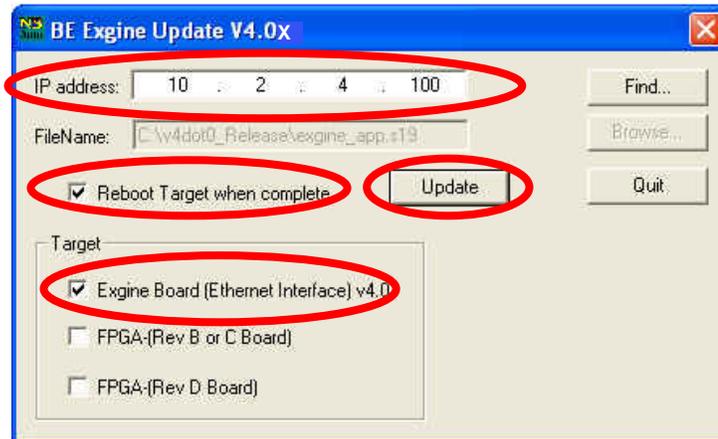


Figure 19 – BE Engine Update Menu

NOTE: When you select the **Exgine Board (Ethernet Interface)** target, flash will be burned to the netburner on the Exgine Card.

Step 17 – Once the download begins, the progress bar will appear.

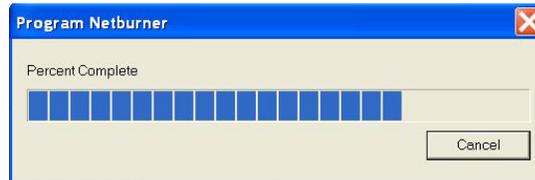


Figure 20 – Progress Bar

Step 18 – Once the download is complete, the following menu will appear and click **OK**.

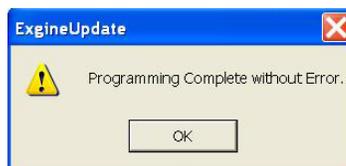


Figure 21 – Programming Complete Menu

Step 19 – Now select the **Exgine Board (FPGA)** target check box. Then select the **Update** button. Two versions are available, if your Exgine does not work with one revision, try the other. If neither work, refer to the troubleshooting section at the end of this guide.

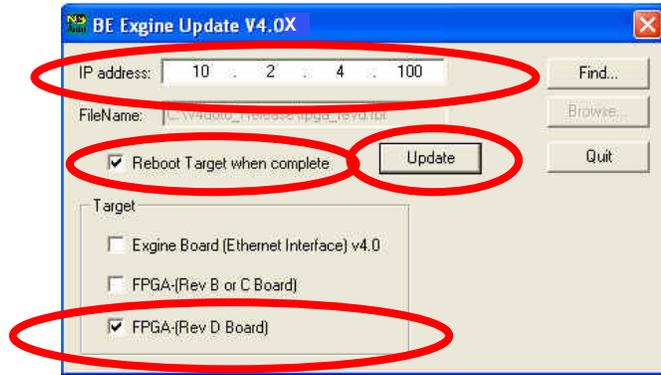


Figure 22 – BE Engine Update Menu

NOTE: When you select the **Exgine Board (FPGA)** target, flash will be burned to Flash U5 on the Exgine Card.

Step 20 – Once the download begins, the progress bar will appear.

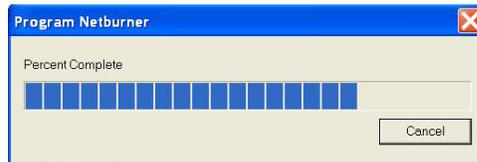


Figure 23 – Progress Bar

Step 21 – Once the download is complete, the following menu will appear and click **OK**.

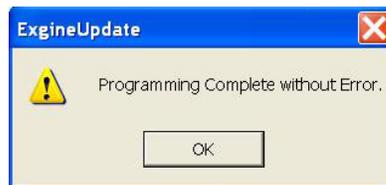


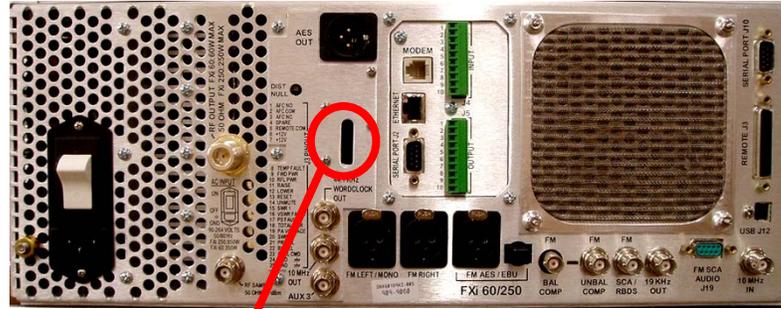
Figure 24 – Programming Complete Menu

NOTE: If upgrading Firmware via I.P. should fail, proceed to **Section 5** to upgrade via the serial port.

Step 22 – Next, power the Exciter OFF then back ON.

Step 23 – To ensure that the firmware load was in fact successful, check the Exgine Status Indicator LEDs for normal operation as shown below.

Additionally, on an HD Receiver tune to your channel(s) to confirm transmission.



Engine Status Indicators viewed through Slot in Cover Plate

DS24 – Normally ON (GREEN); Indicates that the FPGA has booted properly

DS11 – Normally OFF; will be ON (RED) only if an FPGA problem occurs or on initialization of system.

DS12 – Normally blinking at 0.673Hz rate. Indicates LVDS DMA is running.

DS17 – Normally ON (BLUE) when the 10 MHz reference signal is locked to the 0.673 Hz Ethernet Data Packet Rate. (will be OFF after Power Up until lock occurs) 8-12 hours after power up

DS6 – Normally ON (Green) after HD carriers are being output.

DS13 – Normally ON (GREEN); after synchronization.

DS14 – Normally Blinking ON / OFF (GREEN) indicating Ethernet Data Packets are being processed. Also ON when NIOS Firmware is loaded into FPGA.

DS15 – Normally ON (GREEN)

DS16 – Normally ON (GREEN); Off indicates no Ethernet data packages arriving

DS18 – Normally Blinking ON / OFF (BLUE) indicating that the 0.673 Hz Ethernet Packet Rate Signal is present

DS19 – Normally Blinking ON / OFF (BLUE) indicating that the on board 10 MHz Reference Signal is present

NOTE: DS18 & DS19 – Will be Blinking ON / OFF Simultaneously

Figure 25 – Engine Status Indicator LEDs (Normal Operation)

6 If upgrading Engine Firmware over IP fails

If upgrading firmware via an I.P. connection fails, this is an indication of corruption on the IP card. This can be restored by loading NetBurner with a serial connection and then upgrading Engine Firmware. Follow this procedure only if upgrading over IP failed. This following procedure will restore NetBurner functionality, then perform the upgrade over IP after restoration.



NOTE: HD operation of the FXi will be off-line during the Firmware Upgrade Process. After the upgrade, the Engine Card in the FXi will reset and HD operation will resume. The upgrade process takes approximately 15 - 30 minutes.



The subdirectory on the Engine Firmware Upgrade CD, titled “**Engine Firmware v4.01**” contains the necessary files for upgrading the Engine Card.

Step 1 – Using Windows Explorer, copy all of the files from the Engine Firmware Upgrade CD to a folder on the hard drive “C:” of the personal computer that you are planning to use for the upgrade.

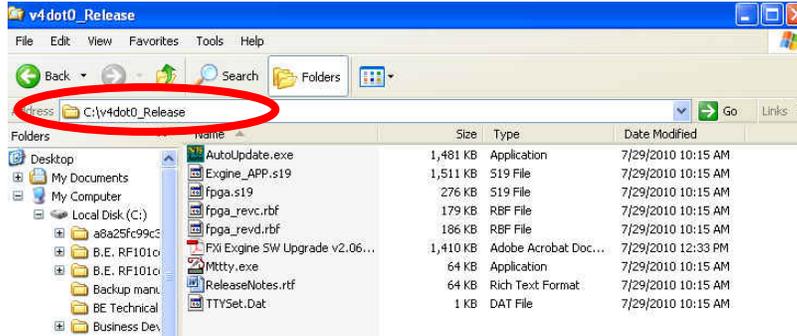


Figure 26 – FXi / Engine Firmware Upgrade Files

Step 2 – If you have previously upgraded Engine Firmware in your FXi to v1.20 or newer, or you have an Exciter that had the Engine Card installed at the factory, proceed to **Step 8**. If you are uncertain about the revision level of Engine Firmware currently running in your FXi, proceed to **Step 3** to confirm.

Step 3 – Use **Steps 3a - 3e** to confirm the current revision level of Engine Firmware in your FXi.

Step 3a – Connect a Null Modem cable (not supplied) from the Serial Port of your PC to the Engine Serial Port J2 on the rear of the FXi.

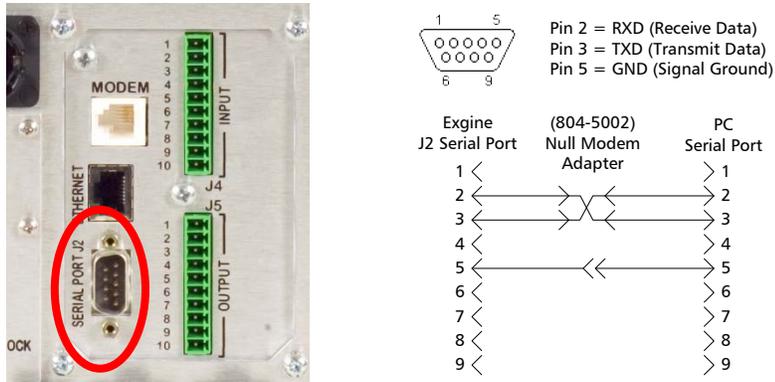


Figure 27 – Engine Serial Port J2 / Serial Cable and Null Modem Adapter Pinouts

Step 3b – Navigate to the directory titled **Engine Firmware v4.01** that you copied from the FXi Firmware Upgrade CD to your hard drive.

Step 3c – Double click on the **MTTY.exe** icon.



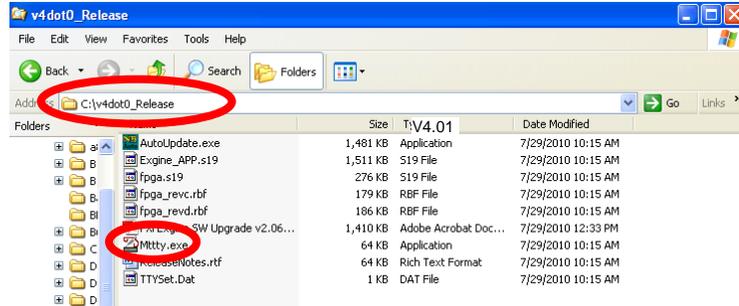


Figure 28 – FXi / Engine Firmware Upgrade Files

Step 3d – Once the **Mttty** application has been launched, turn the AC Power Switch on the rear of the FXi OFF and then back ON.

Step 3e – When the FXi is booting back up, the Mttty Application Screen on your PC will fill in with information. The revision level of the Engine Firmware is noted behind “REV:”

If the Engine Firmware revision level is “**v1.3 or Newer**”, proceed to directly **Step 8**.

If the Engine Firmware revision level is “**v1.2 or Older**”, proceed to **Step 4**.

Note: If you attempted to Upgrade Firmware via an I.P. Connection as discussed in Section 4 and have already ensured that P14 is on pins 1 and 2 of J14, proceed directly to Step 8.

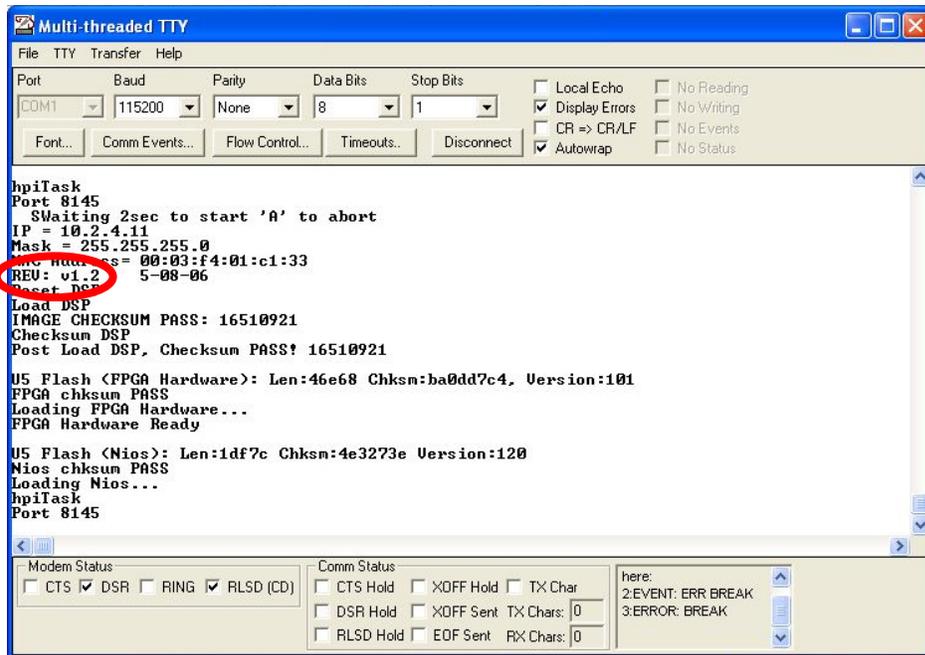


Figure 29 – Confirm Revision Level of Engine Firmware using a Serial Connection and Mttty

Step 4 – Power OFF the FXi Exciter, disconnect all cables, and remove the FXi from the equipment rack. Using a No. 1 Phillips Screw Driver remove the top cover from the FXi.



Step 5 – To enable the download of **Exgine Firmware Versions v1.20 or Newer**, re-locate **Jumper Plug P14** to **pins 1 and 2** of **J14** on the **Exgine Card** as shown below.

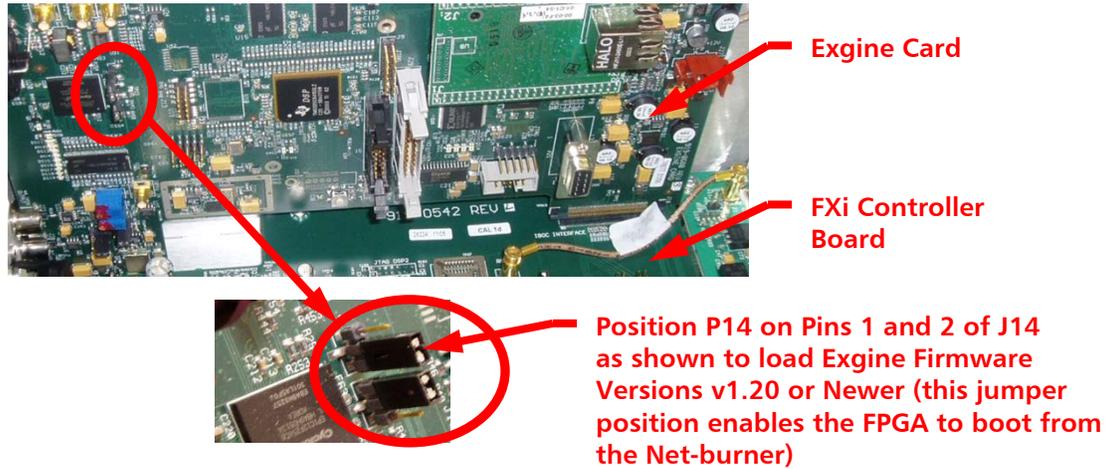


Figure 30 – Exgine Card Jumper Plug P14

Step 6 – Install the top cover on the FXi, install the FXi into the equipment rack, and connect all cabling.

Step 7 – Power ON the FXi Exciter.

Step 8 – Ensure that the FXi Exciter is ON and Operational. Connect a Null Modem Cable (not supplied) to the **Exgine Serial Port J2** on the rear of the FXi Exciter and then to the Serial Port on a Personal Computer.

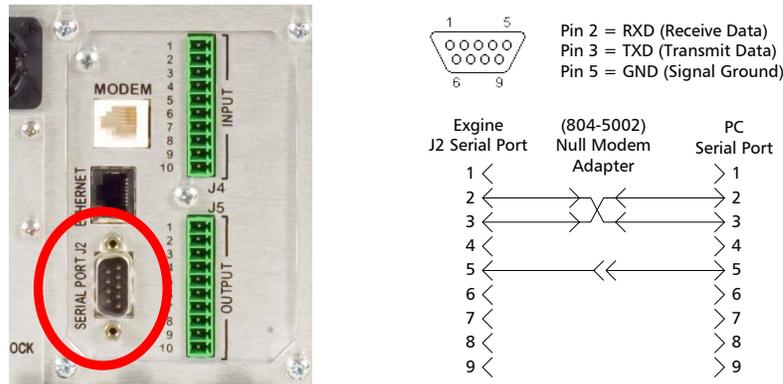


Figure 31 – Exgine Serial Port J2 / Serial Cable and Null Modem Adapter Pinouts

Step 9 – Using Windows Explorer, navigate to the directory on the hard drive of your PC where you copied the **Exgine Firmware Upgrade CD** files to and open the folder titled **Exgine Firmware v4.01X**.

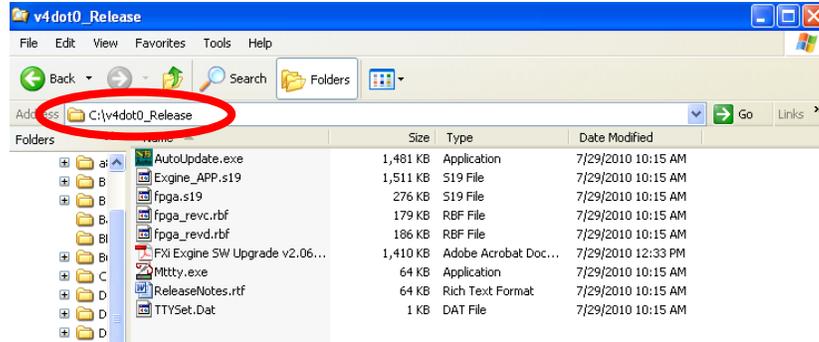


Figure 32 – Exgine Upgrade Files

Step 10 – Next, double-click on the **Mttty.app** icon.

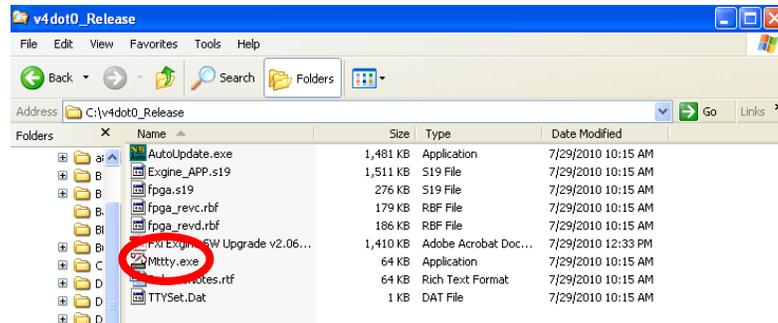


Figure 33 – Launch Mttty.exe

Step 11 – The Mttty application will launch. Ensure that the Port, Baud, Parity, Data Bits, and Stop Bits are all set as follows (these should all be defaults upon launching the application):

Port = COM1 (most common)
 Baud = 115200
 Parity = None
 Data Bits = 8
 Stop Bits = 1

Turn the AC Power Switch on the FXi OFF and then back ON. Type a **“capital” A** as soon as the **“SWaiting 2sec to start ‘A’ to abort”** message appears and the netburner **nb>** prompt will appear.



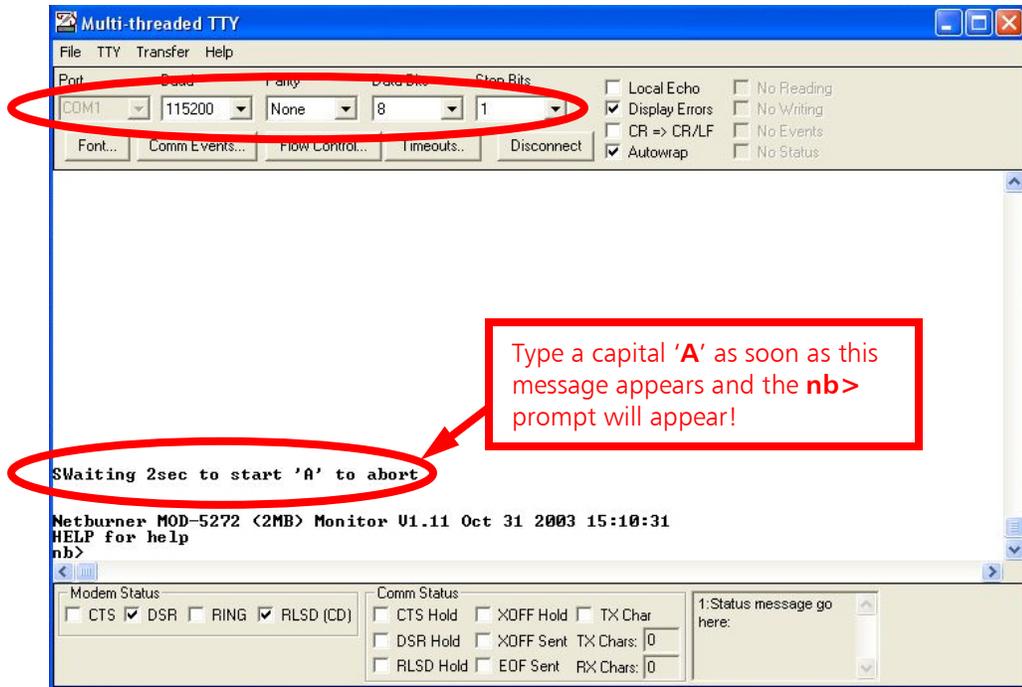


Figure 34 – Mttty Application

Step 12 – At the **nb>** prompt, type **fla** (for Flash application), then press **Enter**.

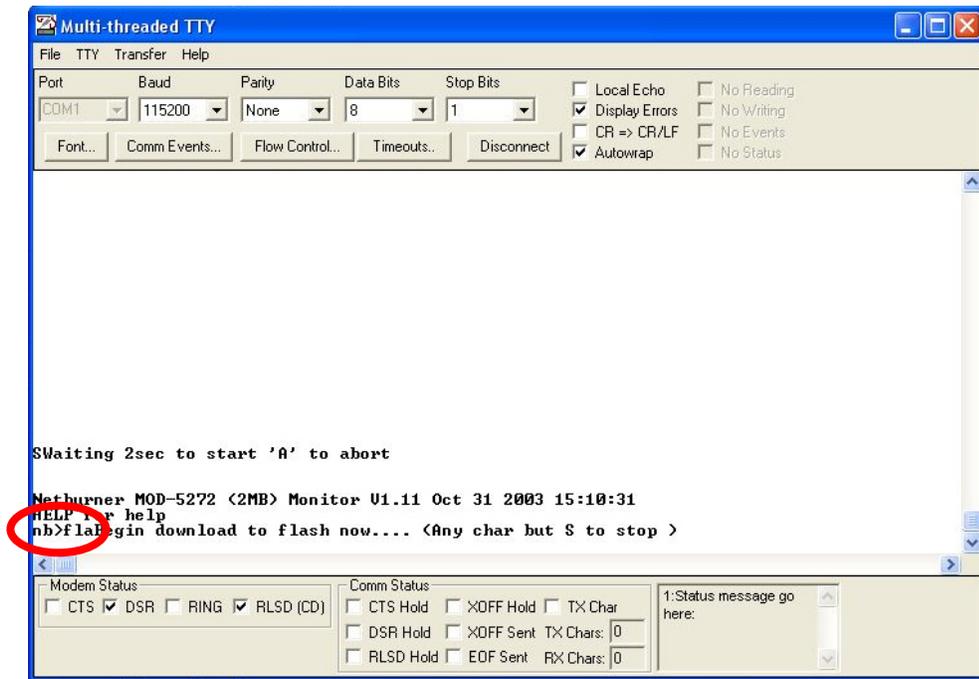


Figure 35 – nb> Prompt



Step 13 – Select Transfer -> Send File

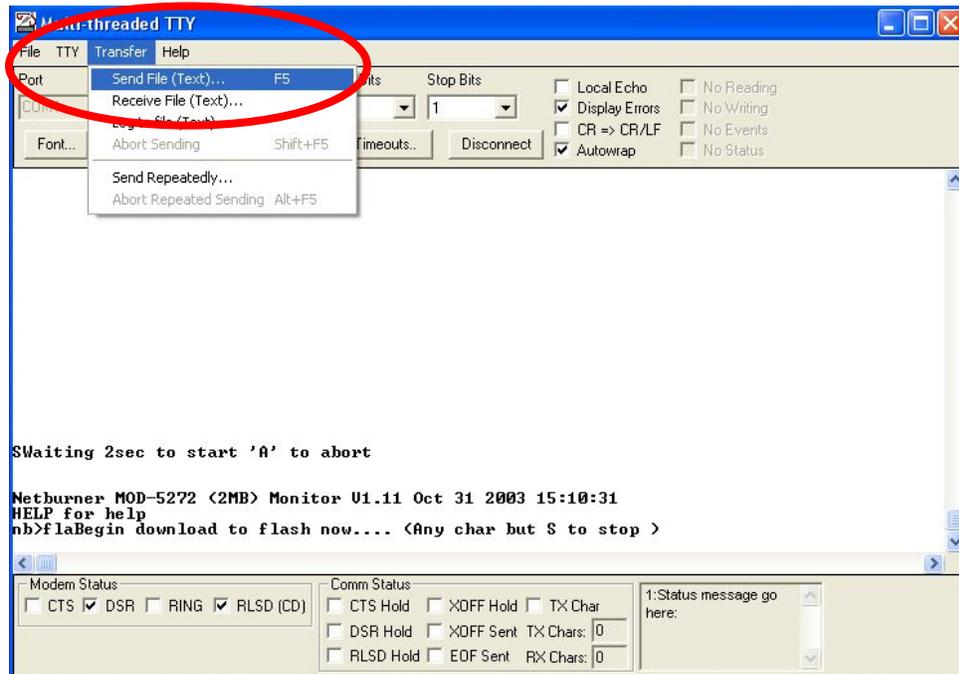


Figure 36 – Send File

Step 14 – Select Engine_APP, then select Open.

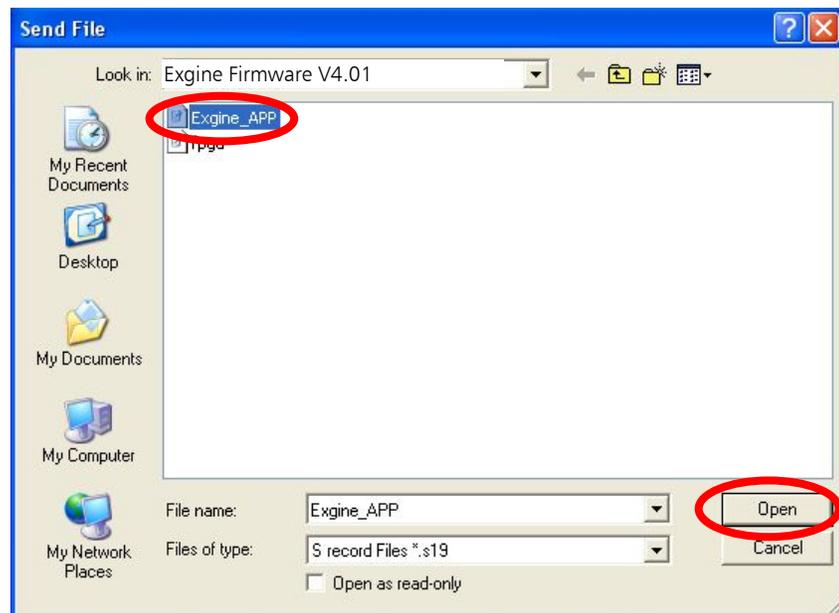


Figure 37 – Send File

Step 15 – When the download starts, the screen will look like below.



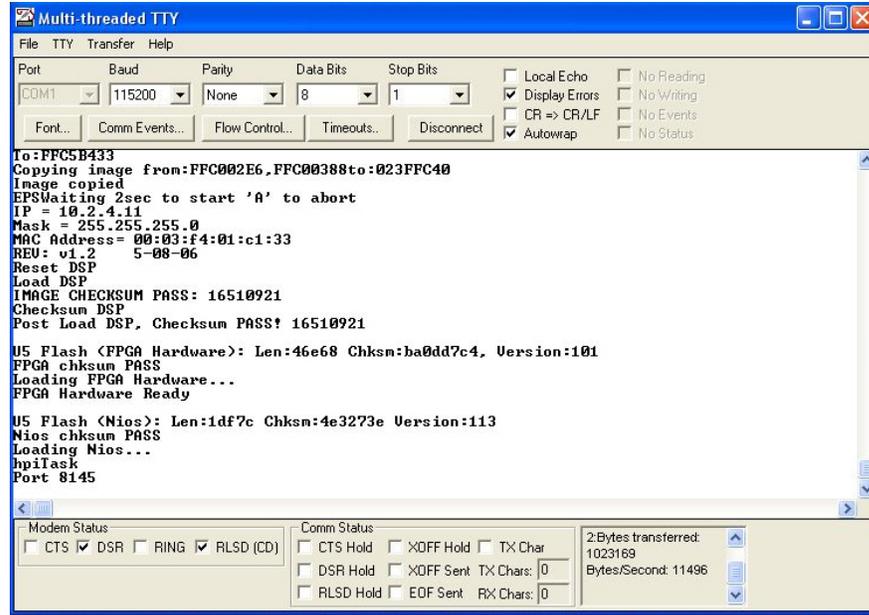


Figure 40 – Download Complete

Step 18 – Complete procedure 5: Upgrading Engine Firmware to “v4.01 or Newer” via I.P

7 Terms and Definitions

AAS	Advanced Application Services
AES/EBU	Audio Engineers Society/European Broadcast Union
AM	Amplitude Modulation
EASU	Exciter Auxiliary Service Unit
EOC	Ensemble Operations Center
FM	Frequency modulation
IBOC	In-Band On-Channel
MF	Medium Frequency
MPA	Main Program Audio
MPS	Main Program Service
PAD	Program Associated Data
QoS	Quality of Service
SIS	Station Information Service
SPS	Supplemental Program Service
VHF	Very High Frequency
WAN	Wide Area Network
LAN	Local Area Network
CM	Connection Manager
LP	Logistics Processor

IDI	Broadcast Electronics' brand name for an Importer
FSi	Broadcast Electronics' IBOC Signal Generator
FXi	Broadcast Electronics' Digital Exciter
XPi	Broadcast Electronics' Digital Exporter

Figure 42 - Terms and Definitions

8 Troubleshooting

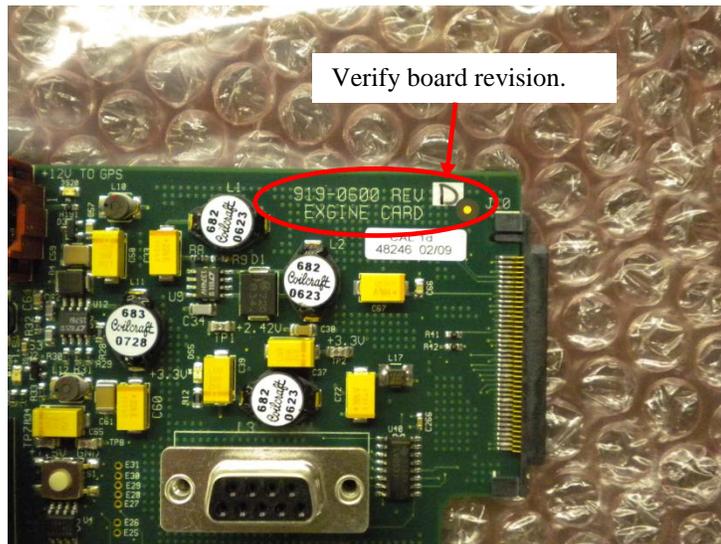
Note: Version 2.08 has made adjustments to the memory timing. While the BE engineering team has performed full regression testing on previous revisions of the 919-0600 Excine board with version 2.08, the tolerance from individual memory suppliers may lead to unexpected issues such as loss of link.

8.1 Firmware upgrade failure

If the firmware upgrade has failed or if the system does not perform as expected after the upgrade, please contact the RF Technical Services department for further instructions. Please be informed that previous versions of code are still available and can still be downloaded from the BE support website if the new revision upgrade fails.

8.2 Verify Excine board revision

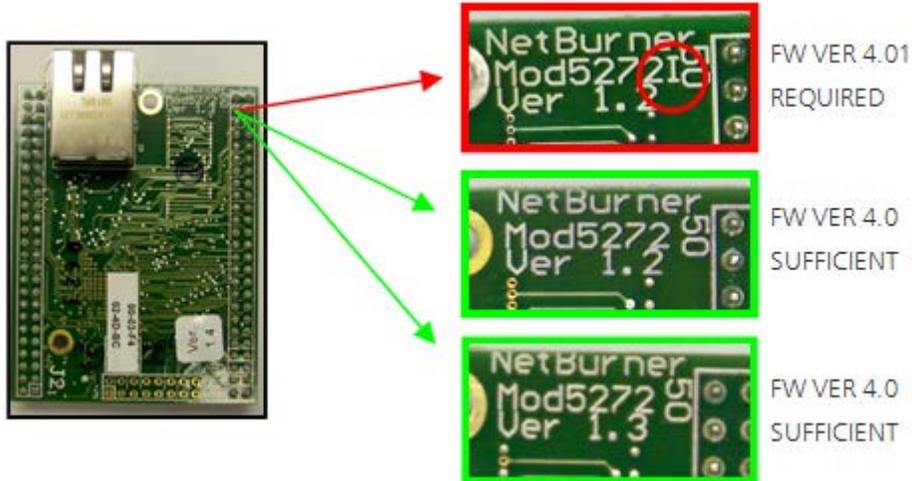
If this upgrade does not work with either fpga selection, remove the lid of the FXi and verify the board revision. The figure below illustrates a Rev D board. This fpga firmware may not work on early revision A boards.



8.3 Excine will not resynchronize after restart

If the Excine card does not resynchronize to the XPi10 or XPi esp Exporter after the Exporter has been restarted, a manual resynchronization can be forced if the AC power to the FXi 60/250 exciter is cycled off/on.

If you have experienced this issue, please inspect the hardware version of the IP interface Netburner card. If the hardware is Mod5272I Ver 1.2, the Engine card firmware must be upgraded to version 4.01 or greater. Note: Mod5272 Ver 1.2 or Ver 1.3 cards (without the I) will operate properly with Engine card firmware Ver 4.0.



9 RF Technical Services Contact Information

RF Technical Services -

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