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FXi 60 / 250 Exciter

Engine Upgrade Application Guide

597-0545 Revision J
2/12/10

FXi 60 / 250 Exciter

Exgine Upgrade Application Guide

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Table of Contents

1. Upgrading to 2nd Generation HD Radio™ System Architecture	- 1 -
2. FXi 60/250 Exciter Requirements for Engine Upgrade	- 2 -
2.1. Upgrading an IBOC FXi 60/250 Exciter with the Engine Card	- 2 -
2.2. IMPORTANT! Upgrading "OLDER" IBOC FXi 60/250 Exciters.....	- 2 -
2.3. IMPORTANT! Upgrading "FM ONLY" FXi 60/250 Exciters	- 3 -
3. RF Customer Service Contact Information	- 3 -
4. Prepare for FXi Exciter Engine Upgrade.....	- 4 -
4.1. Verify Contents of Upgrade Kit (909-0600)	- 4 -
4.2. Tools / Items Needed	- 4 -
4.3. Estimated Time for System Upgrade	- 4 -
5. FXi Exciter Engine Card Upgrade.....	- 5 -
5.1. Turn the FXi Exciter AC Power Switch OFF.....	- 5 -
5.2. Disconnect all External Cables.....	- 5 -
5.3. Remove from Equipment Rack.....	- 5 -
5.4. Remove Top Cover	- 5 -
5.5. Disconnect 10 MHz Cable from the IBOC Card (919-0546)	- 5 -
5.6. Remove the IBOC Card Mounting Hardware	- 6 -
5.7. Remove the IBOC Card XLR Mounting Hardware.....	- 6 -
5.8. Remove the IBOC Card BNC Mounting Hardware.....	- 7 -
5.9. Remove the IBOC Card	- 8 -
5.10. Install the Engine Card into the FXi Exciter.....	- 8 -
5.11. Install the Engine Card Mounting Hardware.....	- 9 -
5.12. Connect 10 MHz Cable to the Engine Card	- 10 -
5.13. Install XLR Connector Outer Shell.....	- 10 -
5.14. Install Cover Plate.....	- 11 -
5.15. Install BNC Connector Hardware.....	- 11 -
5.16. Remove Filler Panel.....	- 12 -
5.17. Install Ethernet and I/O Sub-Assembly (959-0600)	- 12 -
5.18. Install 16 Pin Serial Cable (949-0610)	- 12 -
5.19. Install 26 Pin I/O Cable (949-0612)	- 13 -
5.20. Install the Ethernet Cable (949-0611)	- 13 -
5.21. Install the Top Cover.....	- 14 -
5.22. FXi Exciter Controller Software Upgrade Kit.....	- 14 -
5.23. Engine Card Software Kit	- 14 -
5.24. Ensure that the FXi is Powered ON.....	- 14 -
5.25. Configure the I.P. Address of the FXi 60 / 250	- 15 -
5.26. Install the FXi Exciter at the Transmitter Site.....	- 18 -
5.27. FXi Exciter Connections	- 18 -
5.28. Connection Diagram (Single Audio Processor).....	- 19 -
5.29. Connection Diagram (Dual Audio Processors).....	- 20 -



6. Additional Software Upgrade Information	- 21 -
7. Software Upgrade Documentation.....	- 21 -
7.1. Upgrading FXi 60/250 Exciter Controller Software	- 21 -
7.2. Upgrading FXi 60/250 Exgine Card Software	- 21 -
8. Terms and Definitions.....	- 22 -
9. Schematics.....	- 23 -
9.1. Schematic – Exgine PCB Assembly (919-0600)	- 23 -
9.2. Schematic – I/O PCB Assembly (919-0601).....	- 23 -
9.3. Schematic – Ethernet PCB Assembly (919-0602)	- 23 -





1. Upgrading to 2nd Generation HD Radio™ System Architecture

The block diagrams below illustrate 1st Generation HD Radio System Architecture (**Figure 1**) and 2nd Generation HD Radio System Architecture (**Figure 2**).

To convert from 1st Generation HD Radio™ System Architecture to 2nd Generation HD Radio™ System Architecture, the FSi 10 HD Signal Generator at the Transmitter Site must be converted to an XPi 10 Exporter and then relocated along with the Audio Processors to the Studio Site. Secondly, the Exgine Card must be installed into the FXi 60 / 250 HD Exciter at the Transmitter Site.

Note: The XPi 10, once converted, along with the Audio Processors may remain at the Transmitter Site ONLY if the LINK between the IDi 20 Data Importer and the XPi 10 Exporter is BI-DIRECTIONAL.

This document specifically describes the Upgrade of the FXi 60 / 250 Exciter with the Exgine Card.

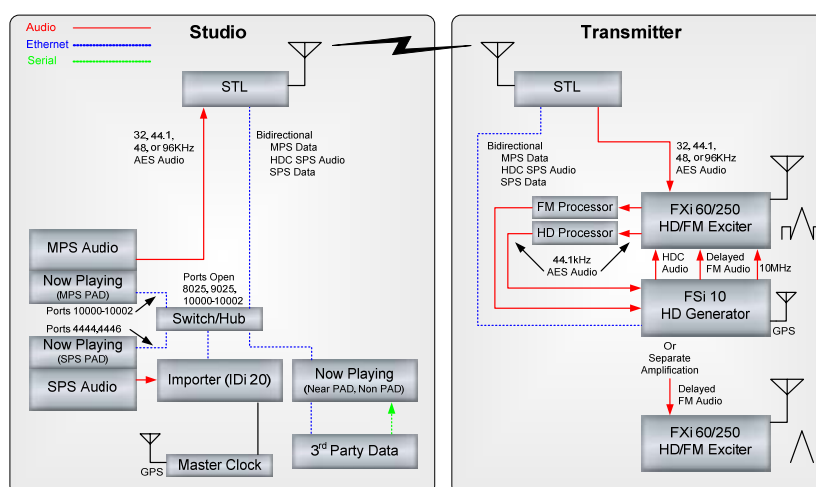


Figure 1 – 1st Generation HD Radio™ System Architecture

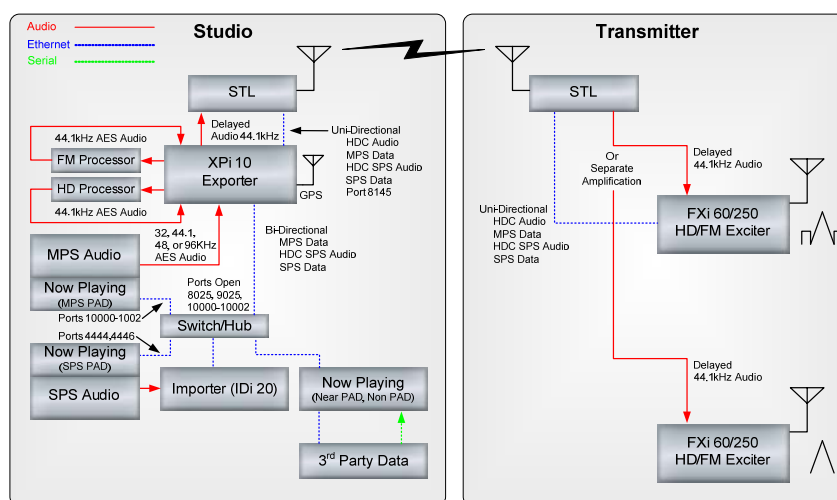


Figure 2 – 2nd Generation HD Radio™ System Architecture

2. FXi 60/250 Exciter Requirements for Engine Upgrade

2.1. Upgrading an IBOC FXi 60/250 Exciter with the Engine Card

If you have an IBOC FXi 60/250 Exciter that has the newer style rear panel (with the large cutout noted in **Figure 3**), proceed with the installation of the Engine Card using the instructions in this document.

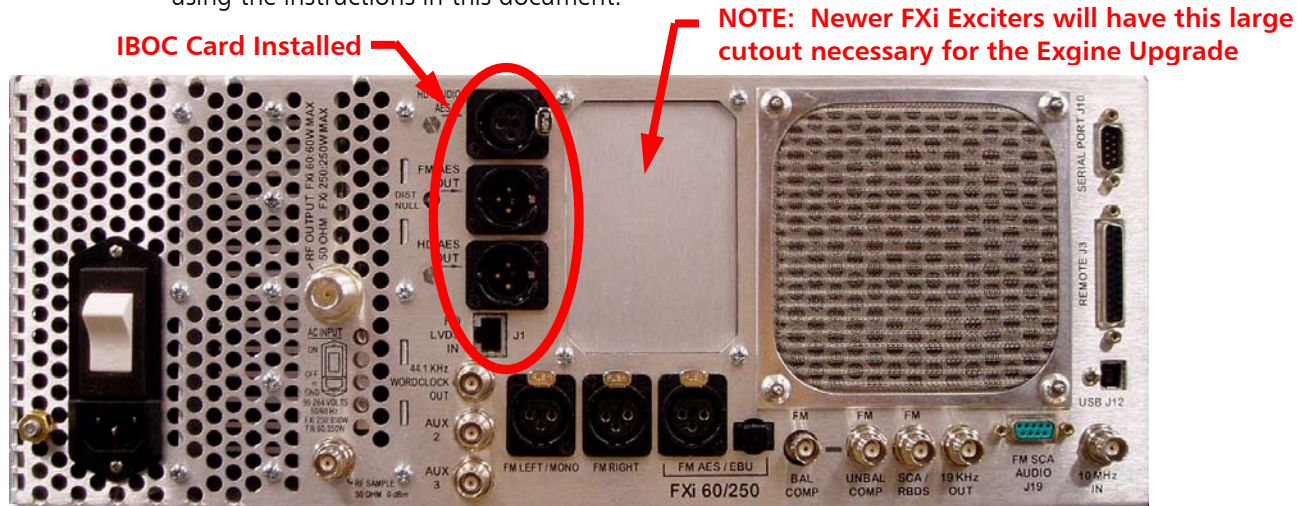


Figure 3 – IBOC FXi 60/250 Exciter (with IBOC card installed)

2.2. IMPORTANT! Upgrading “OLDER” IBOC FXi 60/250 Exciters

Some of the early FXi 60/250 Exciters that were equipped with the IBOC Card have an older style rear panel (without large cutout noted in **Figure 4**). If your FXi 60/250 Exciter has this older style rear panel, additional upgrades are required prior to the installation of the Engine Upgrade Kit! Contact RF Technical Services for Support.

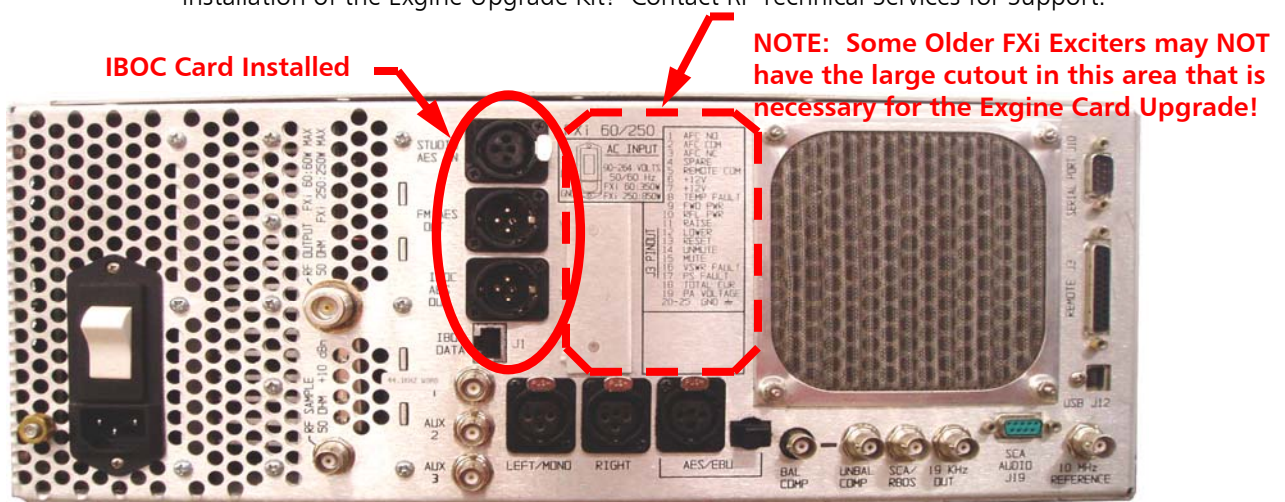


Figure 4 – FXi 60/250 Exciter Rear Panel Without Large Cutout that is Necessary for the Engine Upgrade

2.3. IMPORTANT! Upgrading “FM ONLY” FXi 60/250 Exciters

If your system is currently “FM ONLY” (no IBOC Card Installed in the FXi) contact RF Customer Service to schedule a Service Technician for the installation of the Engine Upgrade Kit into your FXi 60/250 Exciter, as well as to assist in updating your overall system for HD.

Please note that along with upgrading the FXi Exciter with the Engine Card, your transmitter may require some modifications for HD operation.

**FM ONLY! No IBOC
Card Installed**

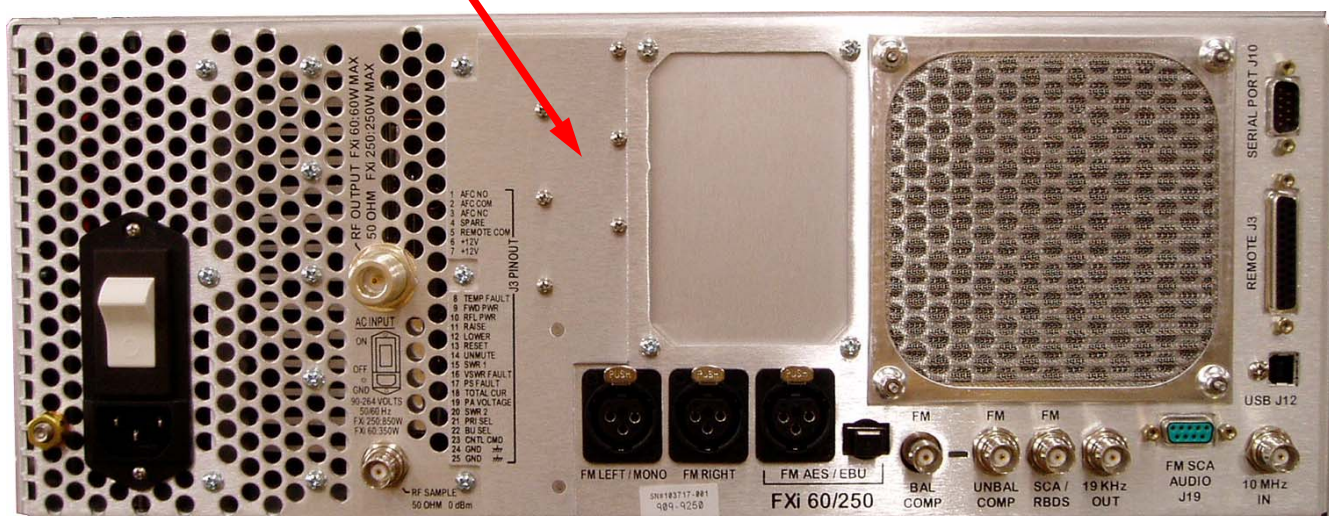


Figure 5 – FXi 60/250 FM ONLY Exciter (No IBOC Card Installed)

3. RF Technical Services Contact Information

RF Technical Services -

Telephone: (217) 224-9617

E-Mail: rfservice@bdcast.com

Fax: (217) 224-6258

www.bdcats.com

4. Prepare for FXi Exciter Engine Upgrade

4.1. Verify Contents of Upgrade Kit (909-0600)

- ☐ 597-0545 Manual, FXi 60 / 250 Engine Upgrade (this document)
- ☐ 919-0600 Assy, PCB, Engine
- ☐ 959-0600 Assy, Sub, Engine, Ethernet and I/O
 - ☐ 919-0601 Assy, PCB, I/O
 - ☐ 919-0602 Assy, PCB, Ethernet
 - ☐ 949-0600 Kit, Cable, Engine Upgrade
 - ☐ 949-0610 Assy, Cable, Serial to Engine
 - ☐ 949-0611 Assy, Cable, Ethernet to Engine
 - ☐ 949-0612 Assy, Cable, I/O to Engine
- ☐ 979-0541-011 Kit, Software, FXi, Controller (see Note below)
- ☐ 979-0545-001 Kit, Software, FXi, Engine (see Note below)
- ☐ 804-5002 Adaptor, Null Modem Cable, DB9 Male to DB9 Female
- ☐ 710-2618 Small Flat Blade Jeweler's Screwdriver

Note: Software Upgrade part numbers dependent upon revision level at time of shipment.

4.2. Tools / Items Needed

- ☐ No. 1 Phillips Screwdriver
- ☐ No. 2 Phillips Screwdriver
- ☐ Small Flat Blade Jeweler's Screwdriver (supplied in Kit)
- ☐ 9/16" Wrench or Nut Driver
- ☐ Personal Computer for Software Upgrade
- ☐ Standard Serial Cable (DB9 to DB9) (for Software Upgrades Via Serial Port)
- ☐ Adaptor, Null Modem Cable, DB9 Male to DB9 Female (supplied in Kit)
- ☐ Ethernet Straight Thru Cable (for Software Upgrades via I.P. thru a Switch or Hub)
- ☐ Ethernet Straight Crossover Cable (for Software Upgrades via I.P. directly to the FXi)

4.3. Estimated Time for System Upgrade

Providing you have the proper materials and tools listed above, it will take approximately 90 minutes to perform the 2nd Generation HD Upgrades to your system (45 minutes to convert the FSi 10 HD Signal Generator to an XPi 10 Exporter and 45 minutes to install the Engine Card into the FXi 60 / 250 Exciter).



5. FXi Exciter Engine Card Upgrade

5.1. Turn the FXi Exciter AC Power Switch OFF

Locate the AC Power Switch on the rear of the FXi Exciter and turn it OFF.

5.2. Disconnect all External Cables

Disconnect all cables from the rear of the FXi Exciter Chassis.

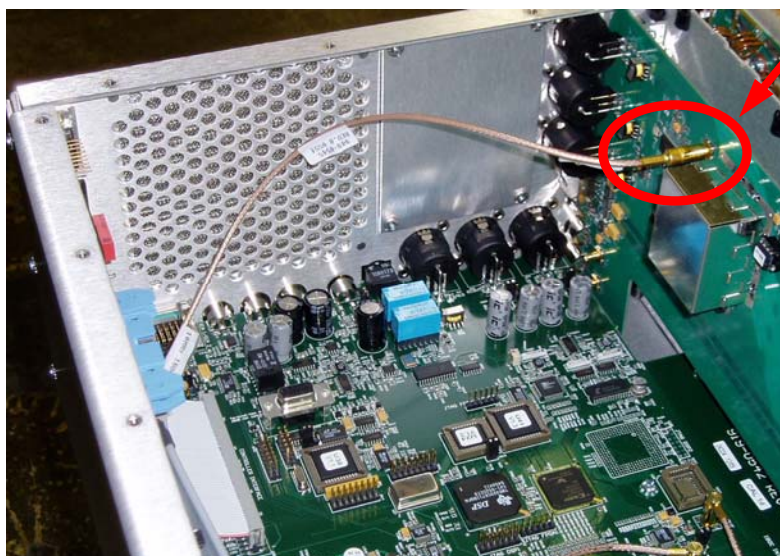
5.3. Remove from Equipment Rack

Remove the FXi from the equipment rack and place on a work bench or table.

5.4. Remove Top Cover

Remove the Top Cover screws from the FXi using a No. 1 Phillips Screw Driver.

5.5. Disconnect 10 MHz Cable from the IBOC Card (919-0546)

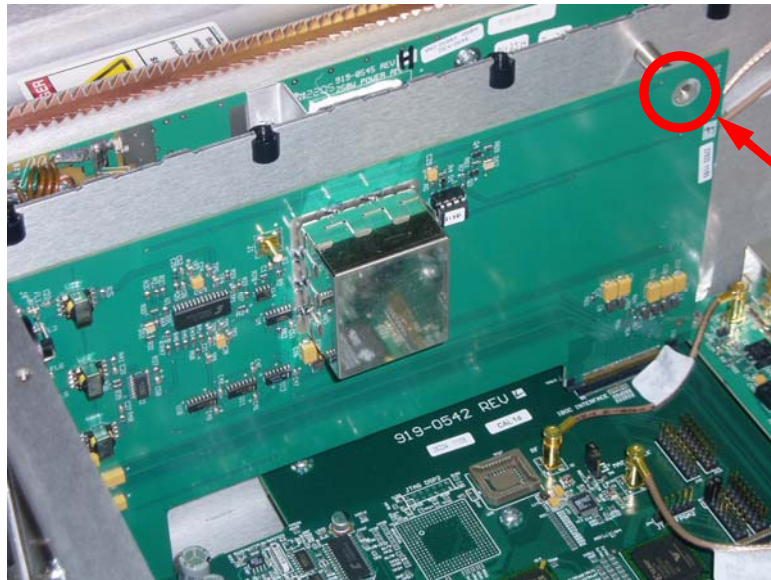


Step 1- Disconnect
the 10 MHz Cable
from J1 on the IBOC
PCB Assembly

(this cable will be
connected later to
J31 on the Engine
Card)

Figure 6 – 10 MHz Cable

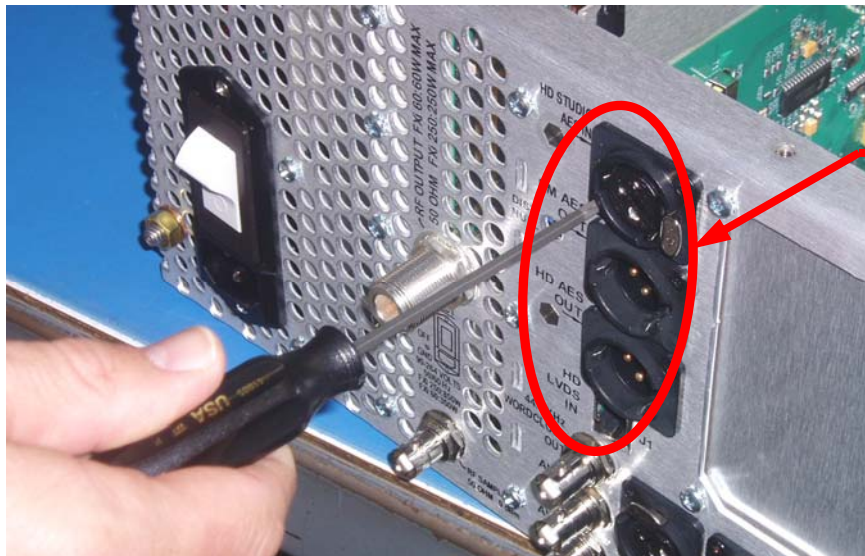
5.6. Remove the IBOC Card Mounting Hardware



Using a No. 1 Phillips Screwdriver, Remove the Mounting Screw Qty (1)

Figure 7 – IBOC Card Mounting Hardware

5.7. Remove the IBOC Card XLR Mounting Hardware



Step 1 - Using a No. 1 Phillips Screwdriver, Remove the XLR Mounting Hardware Qty (6)

Figure 8 – IBOC Card XLR Mounting Hardware

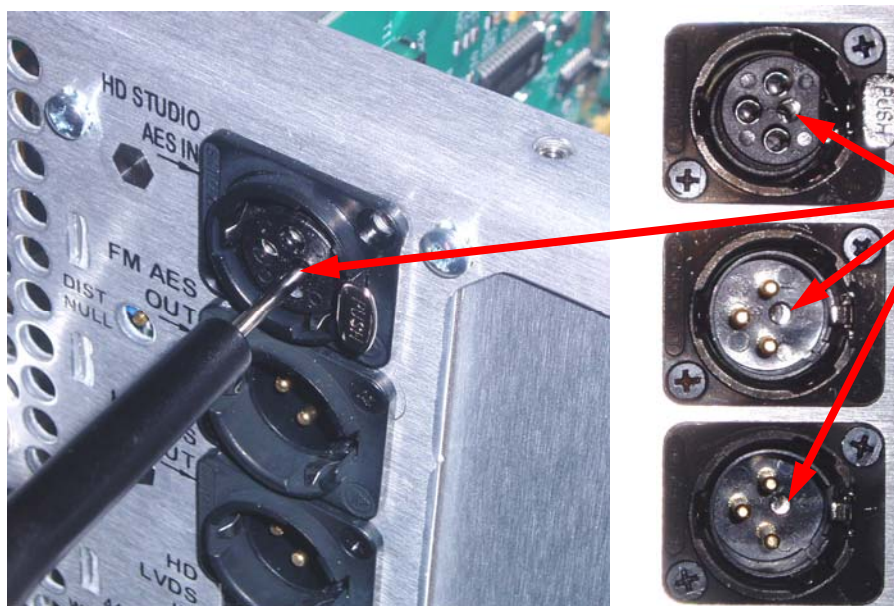


Figure 9 – Remove XLR Connector Outer Shells

5.8. Remove the IBOC Card BNC Mounting Hardware

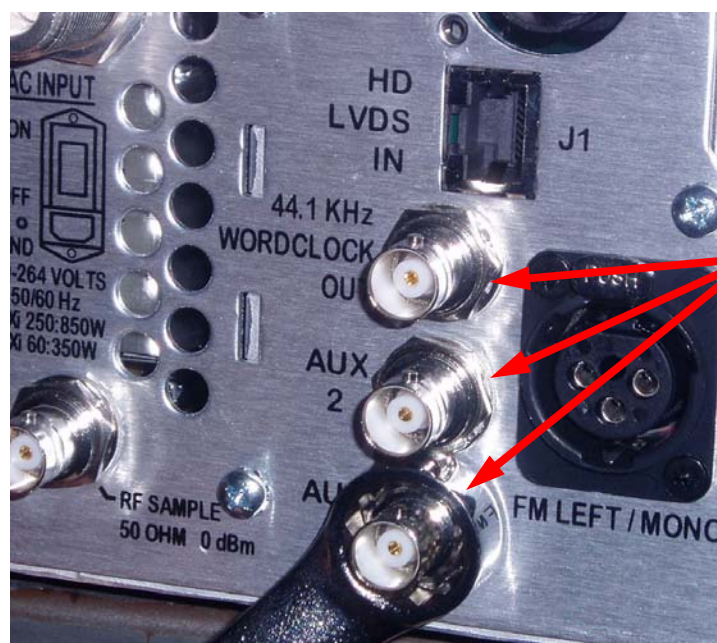
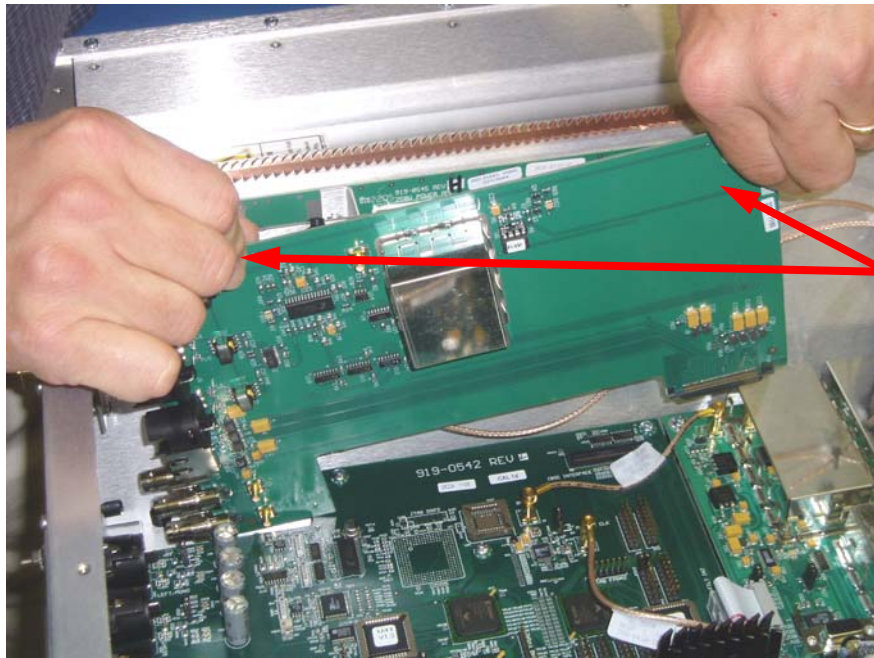


Figure 10 – Remove BNC Connector Hardware

5.9. Remove the IBOC Card



Hold the IBOC Card as Shown, And Remove from the Chassis

Figure 11 – Remove IBOC Card

5.10. Install the Exgine Card into the FXi Exciter

Step 1 – Carefully Remove the Exgine Card from the ESD Packaging.

Step 2 – Remove the Outer Shell from Exgine Card's XLR Connector by inserting a Small Flat Blade Jewelers Screw-driver and Turning the Screw Counter-Clockwise to Unlock

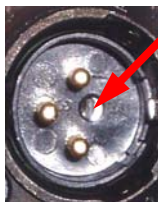
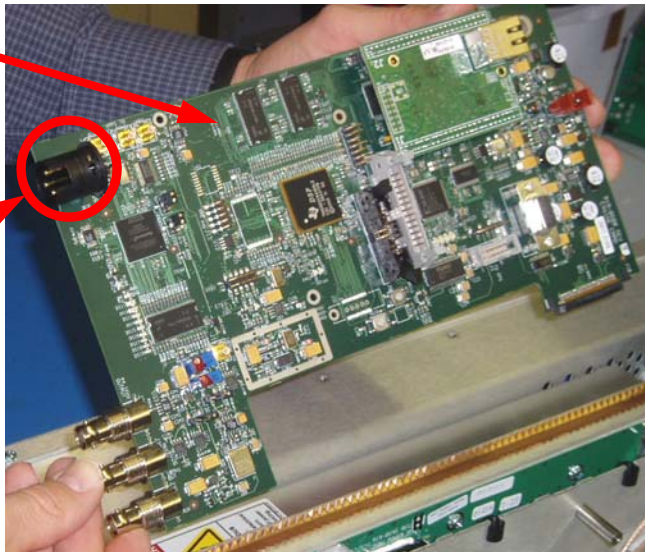


Figure 12 – Exgine Card

Step 3 – Install the Engine Card as shown Ensuring that the Card Edge is Seated into the Motherboard Connector

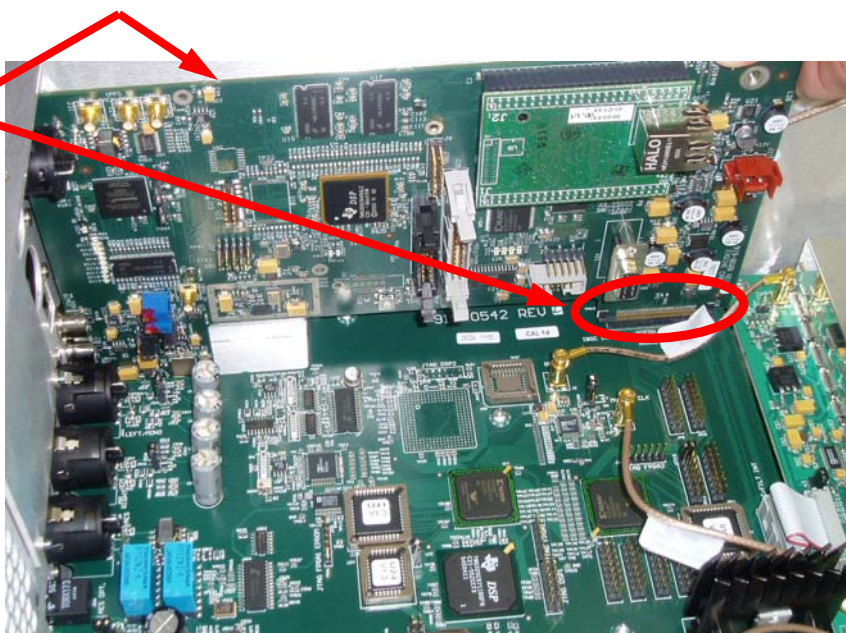
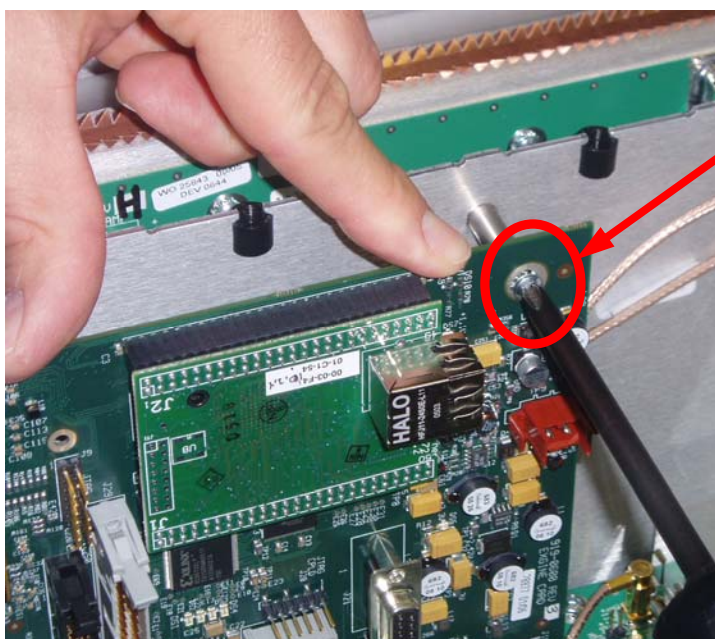


Figure 13 – Install the Engine Card into the FXi Exciter Chassis

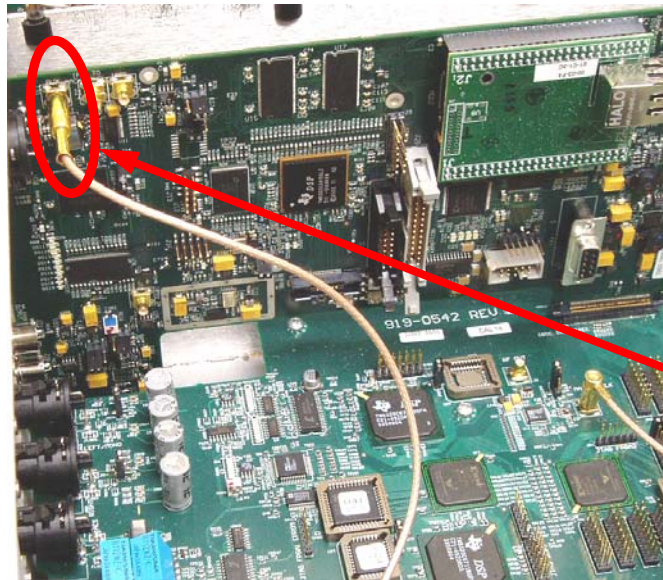
5.11. Install the Engine Card Mounting Hardware



Using a No. 1 Phillips Screw Driver Install the Mounting Screw Qty (1) that was Previously Removed

Figure 14 – Engine Card Mounting Screw

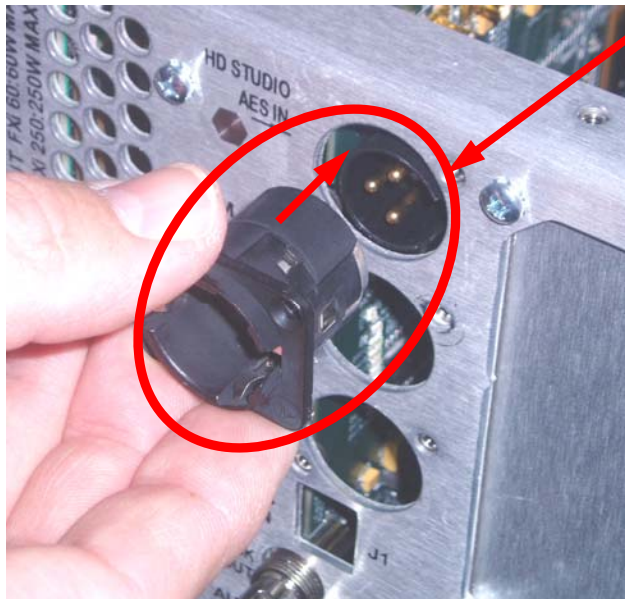
5.12. Connect 10 MHz Cable to the Engine Card



Connect the 10 MHz Cable (that was previously disconnected from the IBOC PCB) back to J31 on the Engine Card

Figure 15 – 10 MHz Cable Connection to the Engine Card

5.13. Install XLR Connector Outer Shell



Step 1 – Insert the Outer Shell that was Previously Removed from the Engine's XLR Connector

Step 2 – Insert a Small Flat Blade Jewelers Screwdriver, Lock the XLR Outer Shell by Turning the Screw Clockwise

Step 3 – Install Mounting Screws Qty (2) that were Previously Removed

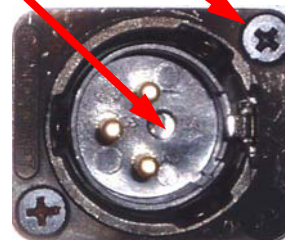
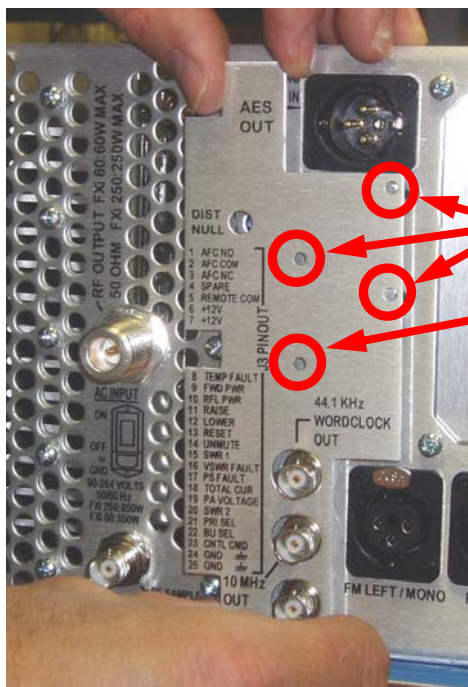


Figure 16 – Install XLR Connector Outer Shell

5.14. Install Cover Plate



Install Cover Plate and 4-40 X 3/8 PPH SEM Screws, Qty (4), From the Installation Kit

Figure 17 – Install Cover Plate

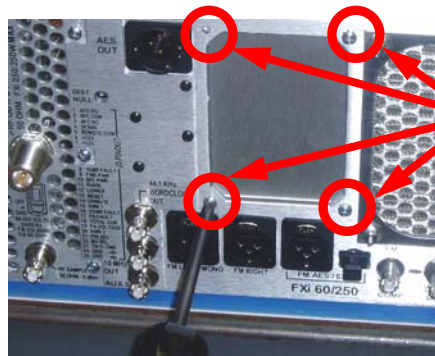
5.15. Install BNC Connector Hardware



Using a 9/16" Wrench or Nut Driver Install the Internal Tooth Washers Qty (3) and Jam Nuts Qty (3) That Were Previously Removed

Figure 18 – Install BNC Connector Hardware

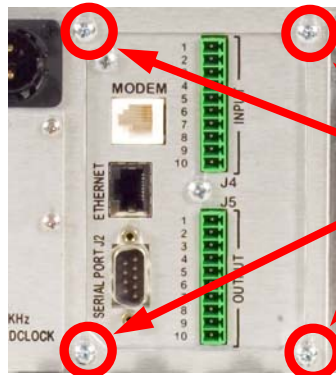
5.16. Remove Filler Panel



Using a No. 1 Phillips Screwdriver, Remove the Filler Panel Mounting Screws Qty (4)

Figure 19 – Filler Panel

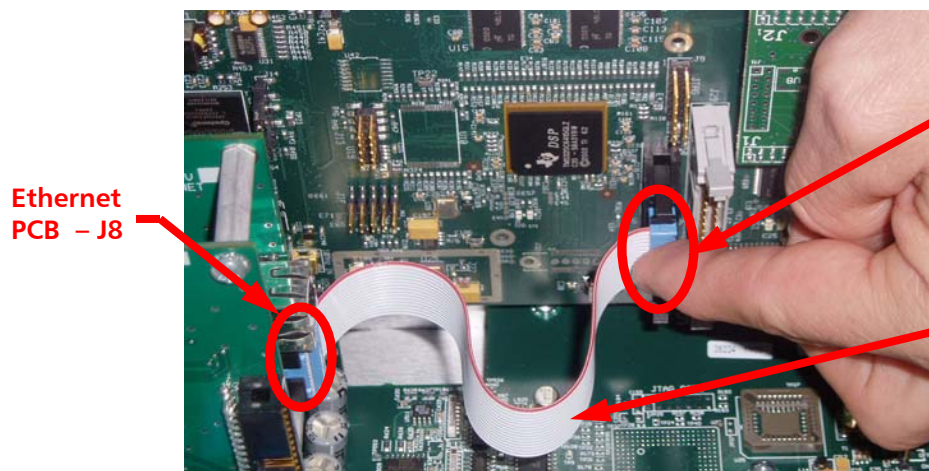
5.17. Install Ethernet and I/O Sub-Assembly (959-0600)



Using a No. 1 Phillips Screwdriver, Install the Mounting Screws Qty (4) That Were Previously Removed

Figure 20 – Ethernet and I/O Sub-Assembly (959-0600)

5.18. Install 16 Pin Serial Cable (949-0610)



Exgine Card – J8

Ethernet PCB – J8

Connect the 16 Pin Serial Cable (949-0610) to J8 on the Ethernet PCB (919-0602) and then to J8 on the Exgine Card (919-0600)

Figure 21 – Serial Cable (949-0610)

5.19. Install 26 Pin I/O Cable (949-0612)

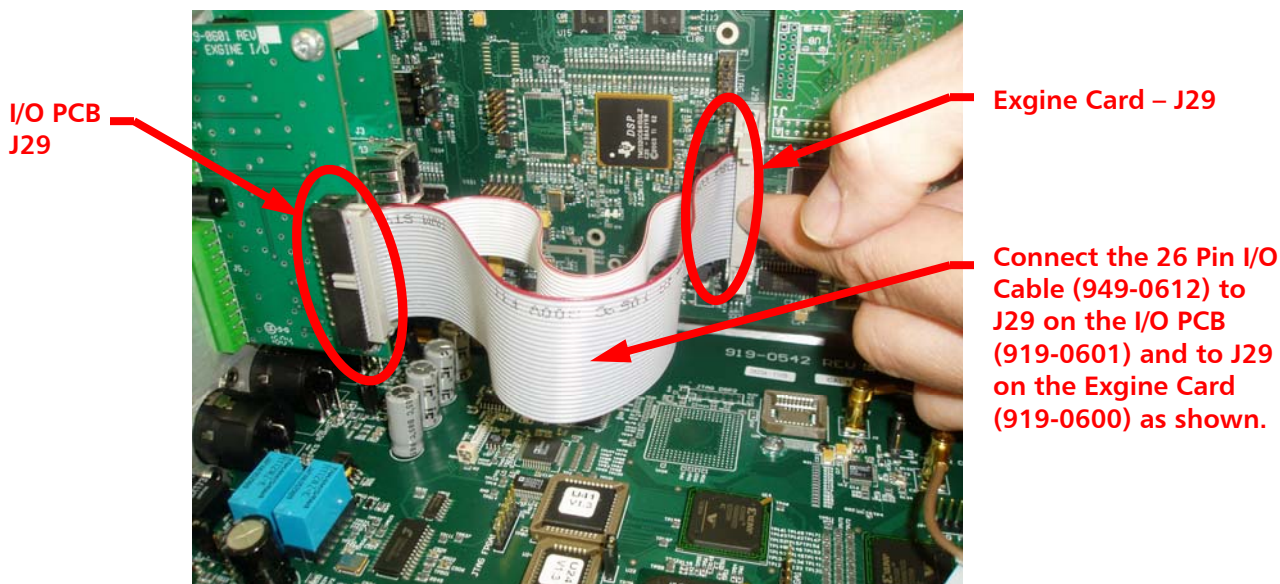


Figure 22 – I/O Cable (949-0612)

5.20. Install the Ethernet Cable (949-0611)

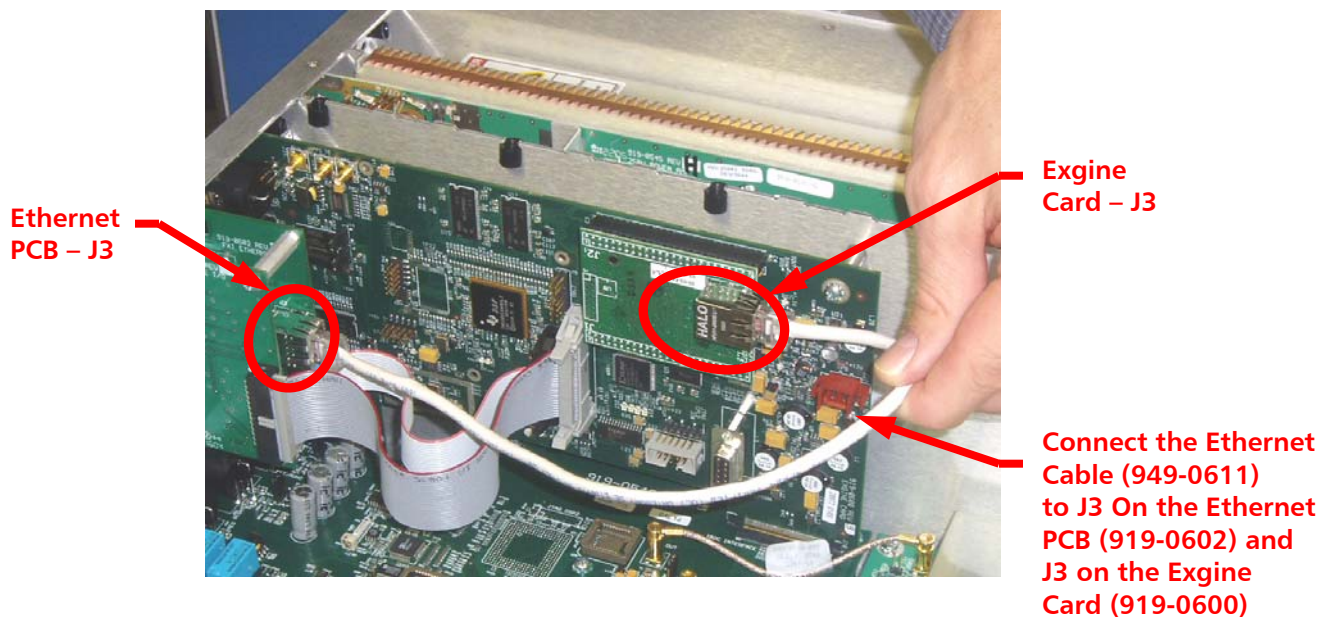


Figure 23 – Ethernet Cable

5.21. Install the Top Cover

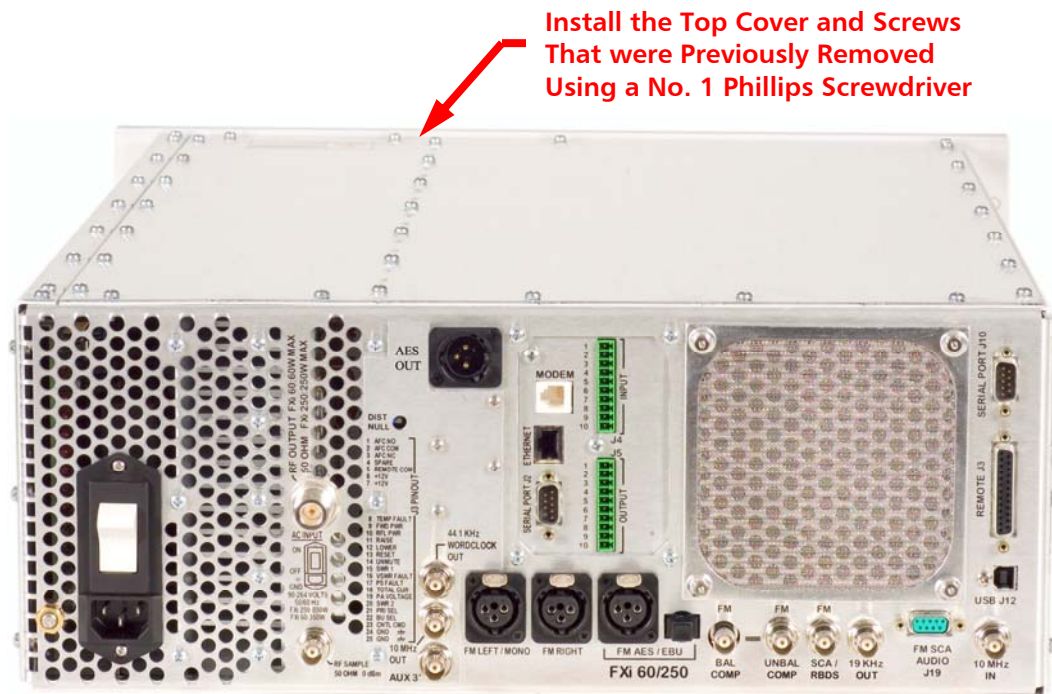


Figure 24 – FXi Exciter with / Exigne Installed (Rear View)

This completes the FXi Exciter with Exigne Hardware upgrade.

5.22. FXi Exciter Controller Software Upgrade Kit

Next, it is necessary to upgrade the **FXi Exciter's Controller Software** to ensure compatibility with the newly installed Exigne Card. Included in the **Exigne Upgrade Kit (909-0600)** is the **FXi 60/250 Exciter Controller Software Upgrade Kit (979-0541-011)**. Use the CD and instructions included in this Kit to upgrade the FXi's Controller Software.

5.23. Exigne Card Software Kit

The Exigne Card ships from the factory with the latest rev of software and should not need to be upgraded after installing the Exigne Card into the FXi. The **FXi Exigne Software Upgrade Kit (979-0545-001)** is also included in the **Exigne Upgrade Kit (909-0600)** if it is necessary to re-load the Exigne Software for some reason.

5.24. Ensure that the FXi is Powered ON

Ensure that the FXi is powered ON before proceeding.



5.25. Configure the I.P. Address of the FXi 60 / 250

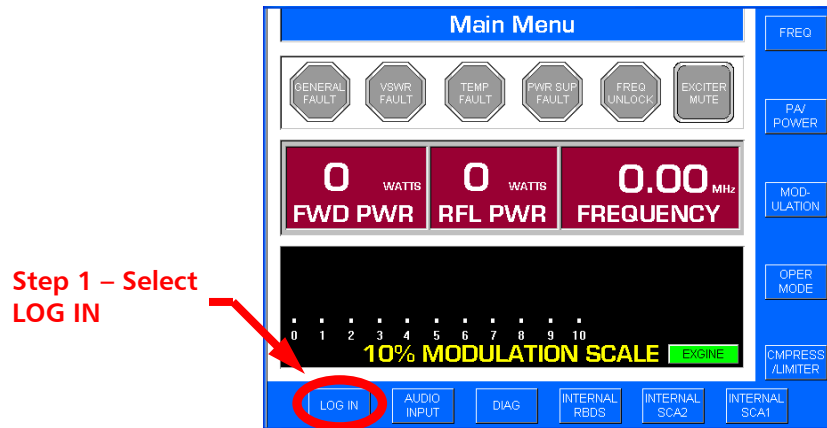
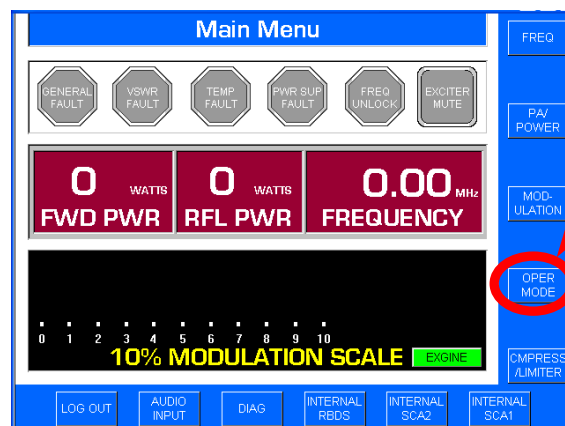


Figure 25 – Main Menu Before Login



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

Figure 26 – Login Menu



Step 3 – Select OPER MODE

NOTE: Upon Selecting This Button, Give the Exciter a Moment to Recognize the Exgine Card or Else the "I.P. Setup" will NOT be Selectable in the Next Step

Figure 27 – Main Menu After Login

Step 4 – Select IP SETUP

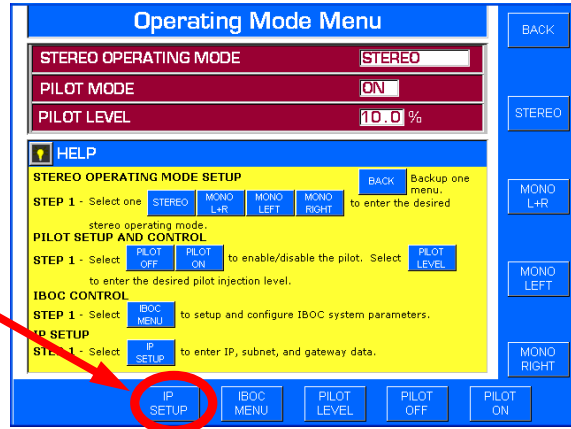


Figure 28 – Operating Mode Menu

Step 5 – Select SET IP

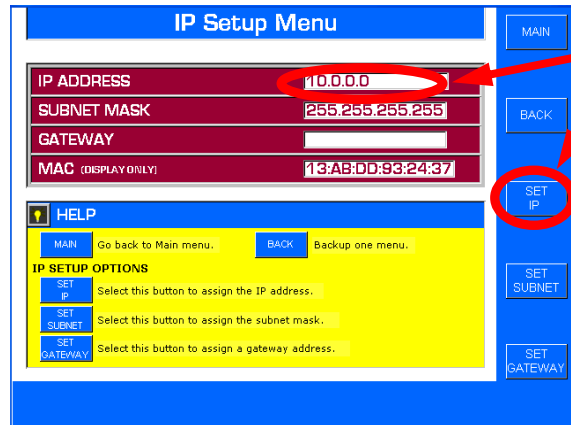


Figure 29 – I.P. Setup Menu

Step 6 – Use the Buttons Provided to Enter the I.P. Address. (Use the <ENTER/> Button To Advance to the Next Field).

Also, Be sure to press <ENTER/> When Finished or the I.P. Address will NOT be Saved.

NOTE: The XPi 10 Exporter MUST Be Configured From the Main GUI Menu Under PLATFORM-> LINK CONFIG-> with the I.P. Address of the FXi or Communication Between the XPi 10 Exporter and the FXi Exciter Will NOT be able to be Established.

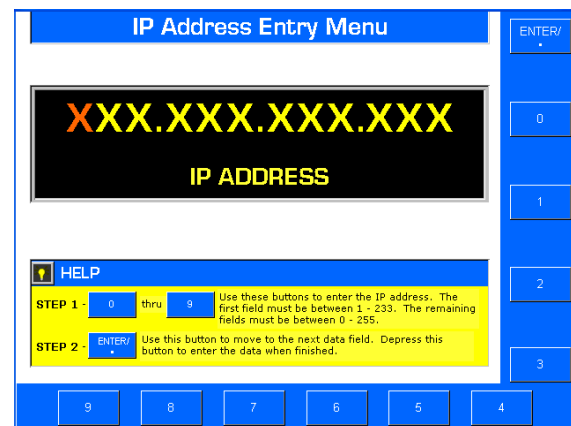


Figure 30 – I.P. Address Entry Menu



IP Setup Menu

IP ADDRESS: 10.0.0.0

SUBNET MASK: 255.255.255.255

GATEWAY:

MAC (DISPLAY ONLY): 13:AB:DD:93:24:37

HELP

MAIN: Go back to Main menu. BACK: Backup one menu.

IP SETUP OPTIONS

SET IP: Select this button to assign the IP address.

SET SUBNET: Select this button to assign the subnet mask.

SET GATEWAY: Select this button to assign a gateway address.

Buttons on the right: MAIN, BACK, SET IP, SET SUBNET, SET GATEWAY.

Step 7 – Select SET SUBNET and ENTER the Subnet Mask

Figure 31 – I.P. Setup Menu

IMPORTANT NOTE!
The MAC Address from The Engine / NetBurner Card will be Automatically Displayed Here Upon the Restart Power UP after the Installation of the Hardware / Software Upgrade!

IMPORTANT NOTE!
The XPi 10 Exporter MUST Be Configured From the Main GUI Menu Under PLATFORM-> LINK CONFIG-> With the MAC Address of the Engine / NetBurner or Communication Between the XPi 10 Exporter and the Engine Card in the FXi Exciter Will NOT be able to be Established!

IP Setup Menu

IP ADDRESS: 10.0.0.0

SUBNET MASK: 255.255.255.255

GATEWAY:

MAC (DISPLAY ONLY): 13:AB:DD:93:24:37

HELP

MAIN: Go back to Main menu. BACK: Backup one menu.

IP SETUP OPTIONS

SET IP: Select this button to assign the IP address.

SET SUBNET: Select this button to assign the subnet mask.

SET GATEWAY: Select this button to assign a gateway address.

Buttons on the right: MAIN, BACK, SET IP, SET SUBNET, SET GATEWAY.

Step 8 – If a Gateway Address Is Required, Select SET GATEWAY and Enter the Gateway

Figure 32 – I.P. Setup Menu

This completes the I.P. Address setup of the FXi Exciter.

5.26. Install the FXi Exciter at the Transmitter Site

Re-install and re-connect the FXi Exciter. **Figures 33, 34, and 35** on the following pages show the necessary connections.

5.27. FXi Exciter Connections

Figure 33 below shows the connections that should be made to the FXi Exciter at the Transmitter Site.

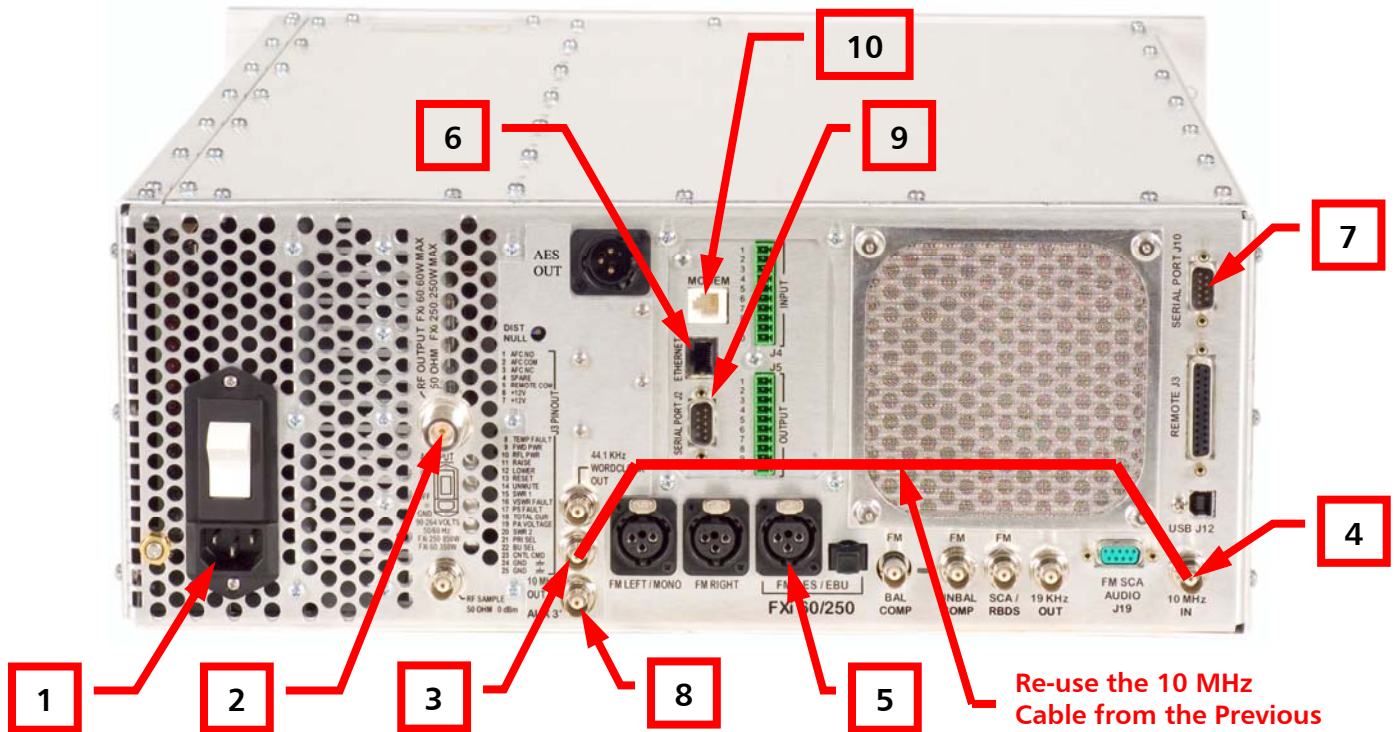


Figure 33 – FXi Exciter Connections

1. **AC POWER** – Connect to AC Power using line cord that was supplied with the FXi.
2. **RF OUTPUT** – Connect to Transmitter
3. **10 MHz OUT** – Connect to 10 MHz IN on the FXi (re-use from previous configuration)
4. **10 MHz IN** – Connect to 10 MHz OUT on the FXi (re-use from previous configuration)
5. **FM AES IN** – Connection to STL.
6. **ETHERNET** – Connect to the STL.
7. **SERIAL PORT J10** – Connects to a PC via a Null Modem Cable (not supplied) for Controller Software Upgrades.
8. **AUX 3 – 10 MHz Out** from the Exigne Card.
9. **EXGINE SERIAL PORT J2** – Connects to a PC via a Null Modem Cable (not supplied) for Engine Software Upgrades.
10. **MODEM** – Not Supported at the time of printing of this document.



Figure 34 – Connection Diagram for a Single Audio Processor



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5.29. Connection Diagram (Dual Audio Processors)

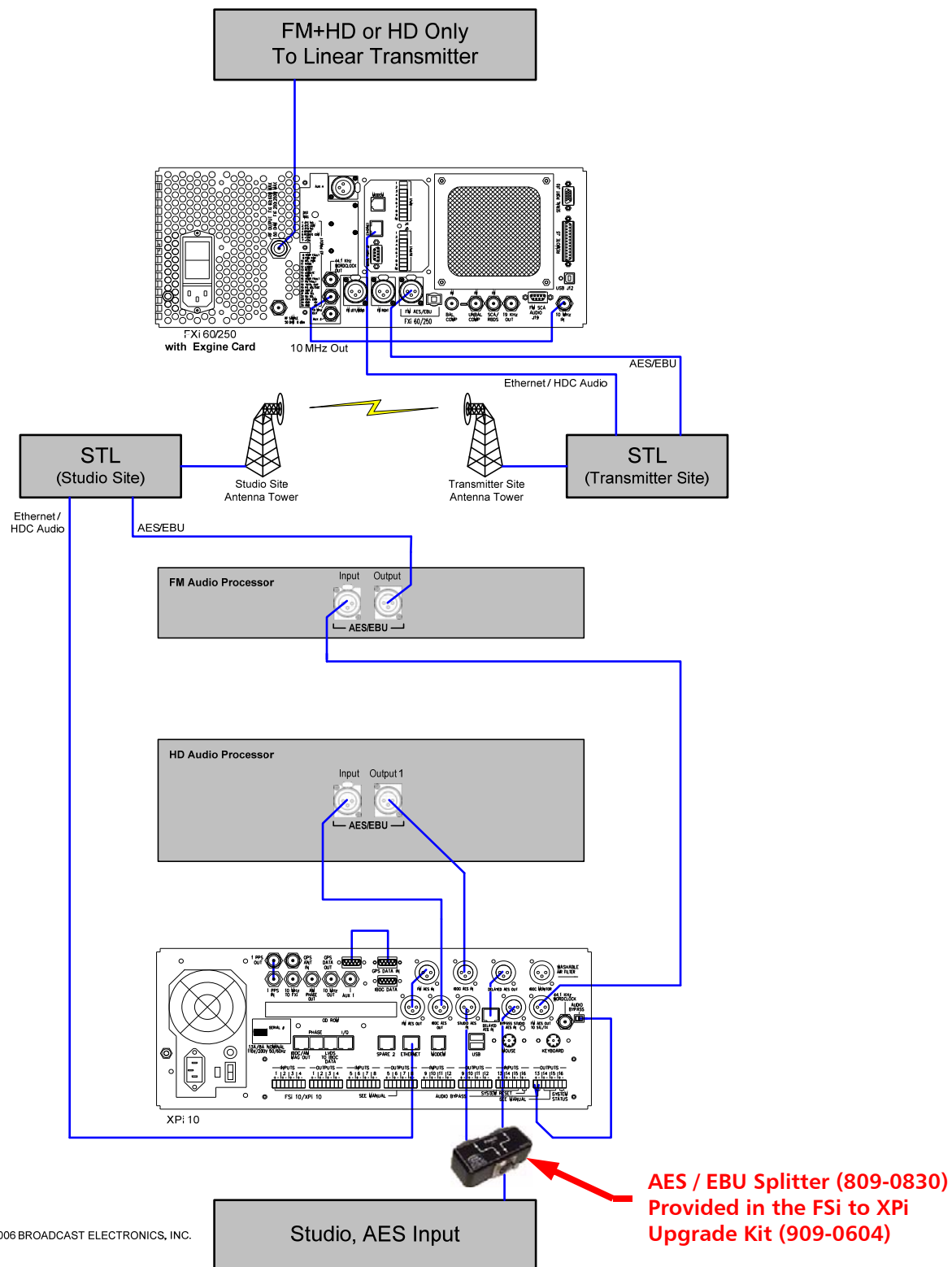


Figure 35 – Connection Diagram for Dual Audio Processors

6. Additional Software Upgrade Information

The latest versions of software for the **FXi 60/250 Exciter Controller**, and **Exgine Card** are available from the Broadcast Electronics Customer Service website under the Registered User Login section here: <http://www.bdcast.com/support/index.php>

7. Software Upgrade Documentation

The latest **FXi 60/250 Exciter Controller**, and **Exgine Card** software upgrade instructions are also available on the Broadcast Electronics Customer Service website at www.bdcast.com under the **"Support"** tab, then **"Application Guides."**

7.1. Upgrading FXi 60/250 Exciter Controller Software

Document **597-0541-005** provides detailed instructions for upgrading **Controller Board** software in the **FXi 60/250 Exciter**.

7.2. Upgrading FXi 60/250 Exgine Card Software

Document **597-0541-006** provides detailed instructions for upgrading **Exgine Card** software in the **FXi 60/250 Exciter**.

8. 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 36 - Terms and Definitions



9. Schematics

- 9.1. Schematic – Engine PCB Assembly (919-0600)
- 9.2. Schematic – I/O PCB Assembly (919-0601)
- 9.3. Schematic – Ethernet PCB Assembly (919-0602)