



FMi 31, 73, 106, 201, 301 and 402 Series Transmitters

“On The Fly” Mode Switching Application Guide
Enable Switching between IBOC Only and FM + IBOC

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1 Purpose of this Document

The purpose of this document is to describe the necessary steps to setup FMi 31, 73, 106, 201, 301 and 402 Series Transmitters for "On the Fly" mode switching between **IBOC ONLY** and **FM + IBOC (Hybrid)** modes of operation.

2 Tools / Items Needed

- Personal Computer with Windows HyperTerminal Communication Program installed
- Null Modem Cable

3 Estimated Setup Time

Providing that you have the tools listed above, it will take approximately 10 minutes to complete the setup for "On The Fly" mode switching.



4 Setting the AGC Scale Factor in the FXi 60/250 Exciter

The purpose of this section is to describe the necessary steps to set the Maximum Scale Factor (Automatic Gain Control – AGC) in the FXi 60/250 Exciter. Before switching back and forth between **IBOC ONLY** and **FM + IBOC** Modes of Operation, the Maximum Scale must be set in each of these Modes to prevent overdriving PA Modules in the Transmitter. If your System shipped after May 3rd, 2005, the Maximum Scale Factor is already setup using the following procedure.

Step 1 – Ensure that your Transmitter is currently operating in either **IBOC ONLY** or **FM + IBOC** mode.

Step 2 – Ensure that the Transmitter is operating at the Transmitter’s RF Power Output (TPO) level that you would normally operate it at.

Step 3 – Next, go to the FXi Exciter GUI Main Menu and select **OPER MODE**.

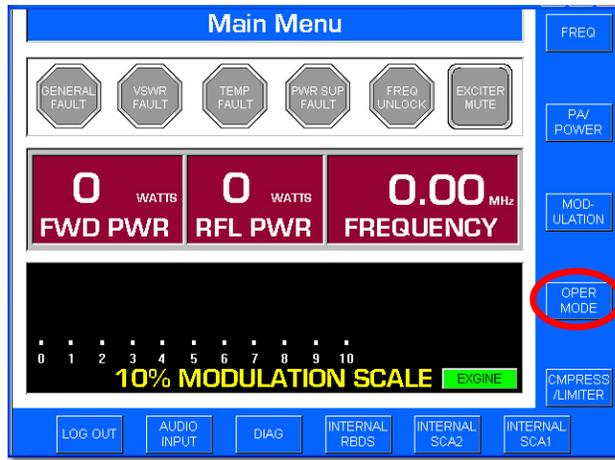


Figure 1 – FXi Main Menu

Step 4 – Select **IBOC MENU**.

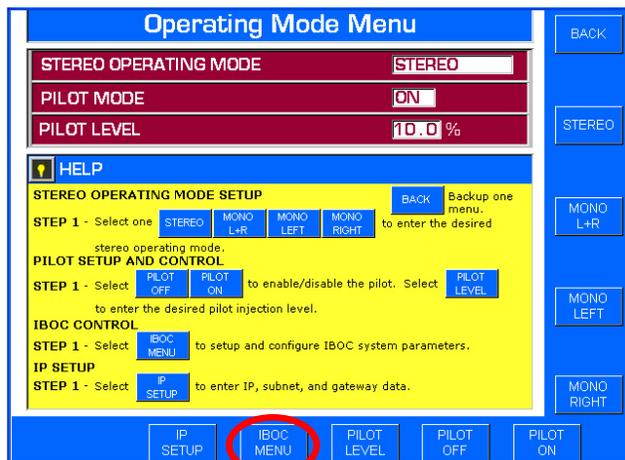


Figure 2 – Operating Mode Menu



Step 5 – Record the **IBOC OPERATING MODE** and the present **AGC SCALE** reading.

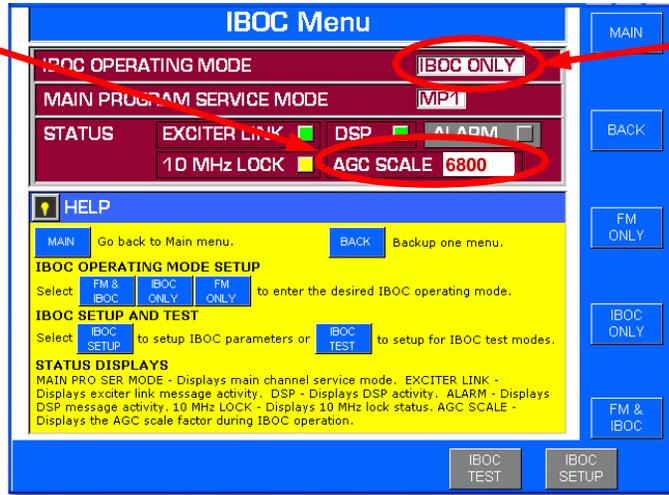
Remember, the Transmitter must be operating at the TPO level that you would normally operate it at!

Record the present AGC Scale reading.

Note: The present AGC Scale reading will appear here if the FXi 60/250 Exciter is running software v2.0.35 or newer.

If running an older version, you will need to use Hyperterminal's "e" command to see the present Scale Factor reading.

See Steps 10-21 for Hyperterminal connection instructions and 25 for the "e" command.



Note the present IBOC Operating Mode

Figure 3 – Record the AGC SCALE at Normal Operating RF Output Power

Step 6 – Increase the RF output of the transmitter in the range of 5% (minimum) to 15% (maximum) above the current TPO level of your transmitter.

Note that the smaller the increase, such as 5%, may ultimately inhibit the transmitter's ability to automatically compensate for environmental temperature variations. If your transmitter is subject to outside variations in ambient room temperature, then this may require a setting near the upper end, such as 15%, of the range.

Units shipped from the BE factory now are preset with a Max scale factor 15% above the TPO on your order. This is set at an ambient room temperature of 21C.

Step 7 – Go back to the FXi Exciter GUI Main Menu and select **OPER MODE**.

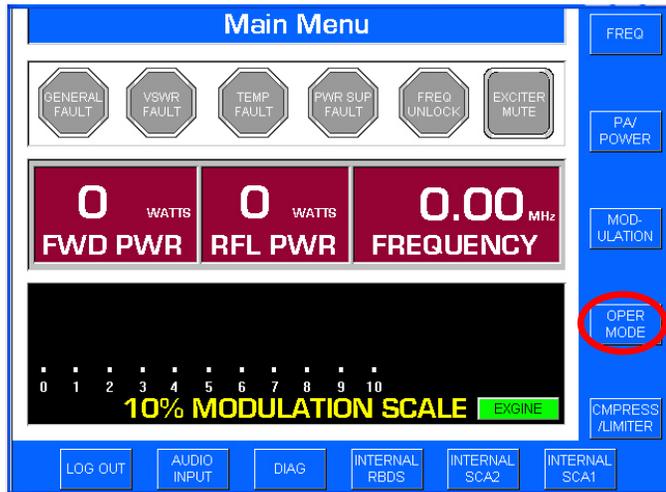


Figure 4 – FXi Main Menu



Step 8 – Select IBOC MENU.

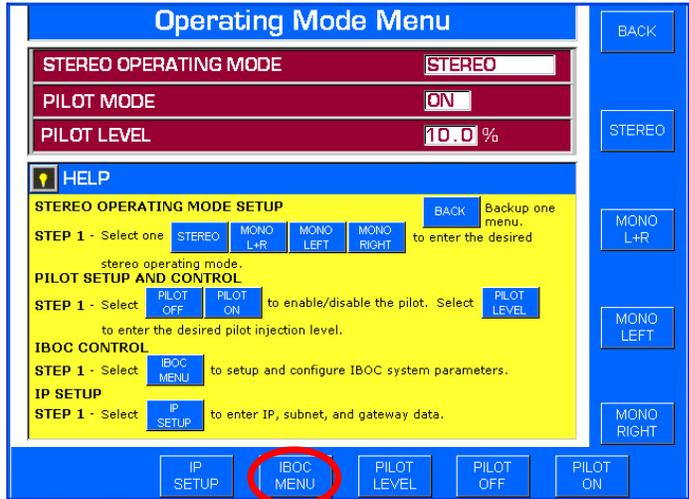
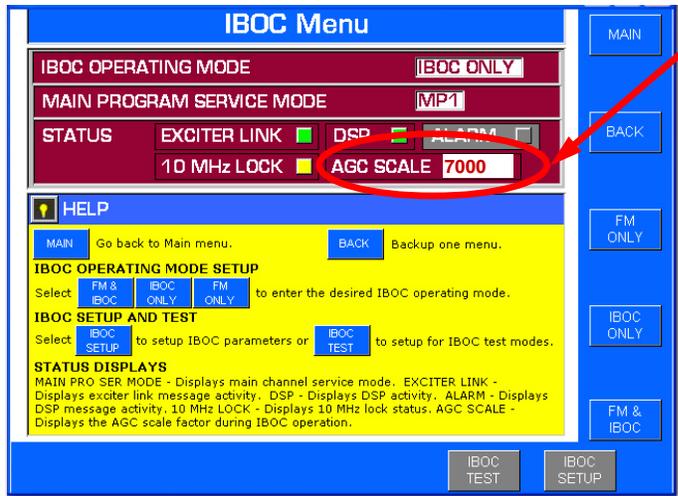


Figure 5 – Operating Mode Menu

Step 9 – Record the present AGC SCALE reading.

Remember, the transmitter must now be operating in the range of 5 - 15% above the TPO level that you would normally operate it at!



Record the present AGC Scale reading (this number should be slightly larger than the number recorded in Step 5 at Normal TPO)

Note: The present AGC Scale reading will appear here if the FXi 60/250 Exciter is running software v2.0.35 or newer.

If running an older version, you will need to use Hyperterminal's "e" command to see the present Scale Factor reading.

See Steps 10-21 for Hyperterminal connection instructions and 25 for the "e" command.

Figure 6 – Record the AGC SCALE at "5 -15% above" Normal Operating RF Output Power



Step 10 – Connect a null modem cable from a PC to the Exciter’s Serial Port J10.

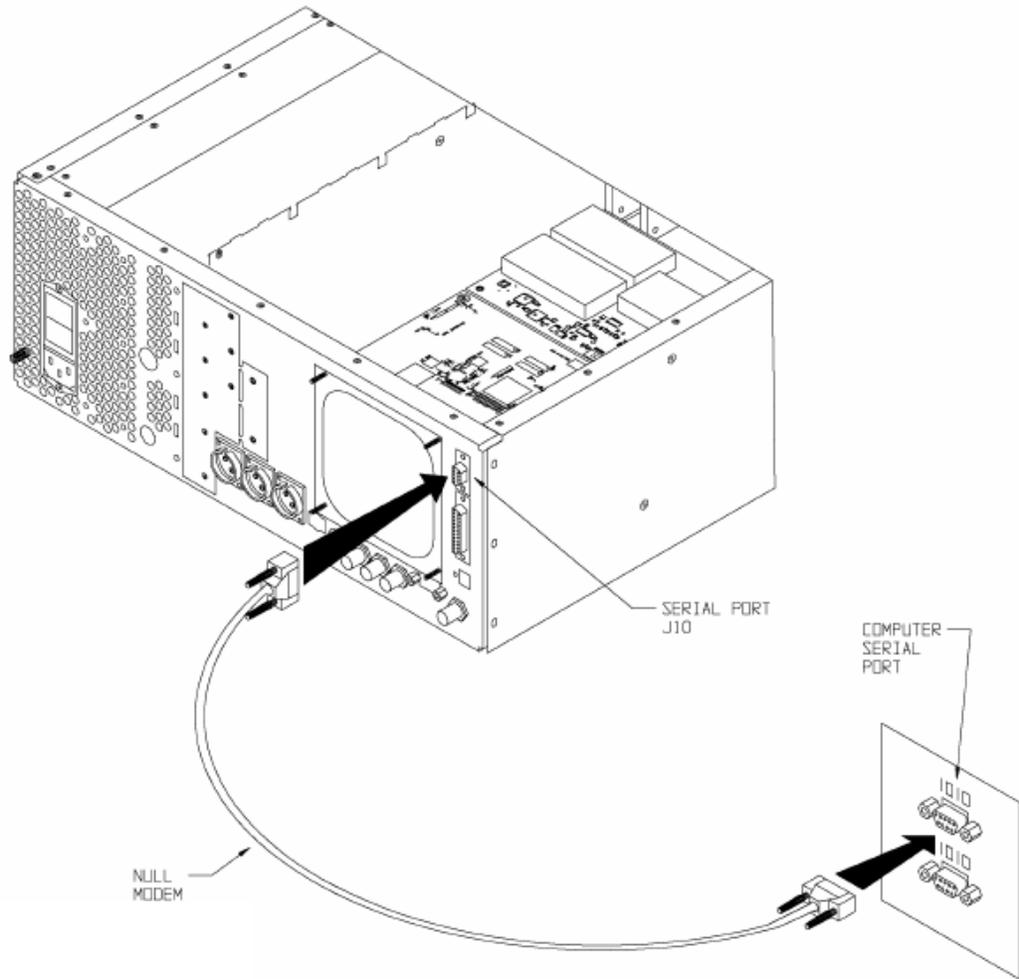


Figure 7 – PC to FXi Serial Port Null Modem Cable Connection

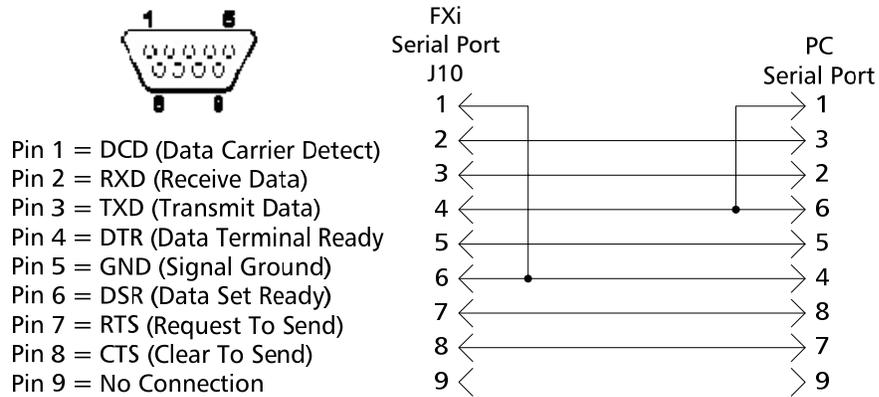


Figure 8 – Null Modem Cable Pinout



- Step 11** – From the Desktop go to: **START-> ALL PROGRAMS-> ACCESSORIES-> COMMUNICATION-> HYPERTERMINAL** and click the mouse.
- Step 12** – The HyperTerminal dialog box should now be displayed. In the **CONNECTION DESCRIPTION** box, enter the name of the shortcut that you want to be created such as *FXi Connection*.
- Step 13** – Select and click **OK**.
- Step 14** – The **CONNECT TO** dialog box will now appear. In the **CONNECT USING** dialog box, ensure that the correct COM Port is selected (typically **COM 1** is used) and then click **OK**.
- Step 15** – The **COM1 PROPERTIES** dialog box will appear. Move the cursor to the **BITS PER SECOND** dialog box and select **19200**.
- Step 16** – Move the cursor to the **DATA BITS** dialog box and select **8**.
- Step 17** – Move the cursor to the **PARITY** dialog box and select **NONE**.
- Step 18** – Move the cursor to the **STOP BITS** dialog box and select **1**.
- Step 19** – Move the cursor to the **FLOW CONTROL** dialog box and select **NONE**.
- Step 20** – Select **OK** and the HyperTerminal communication window will appear.
- Step 21** – Type “?” and the **Supplemental Command Menu** will then appear..

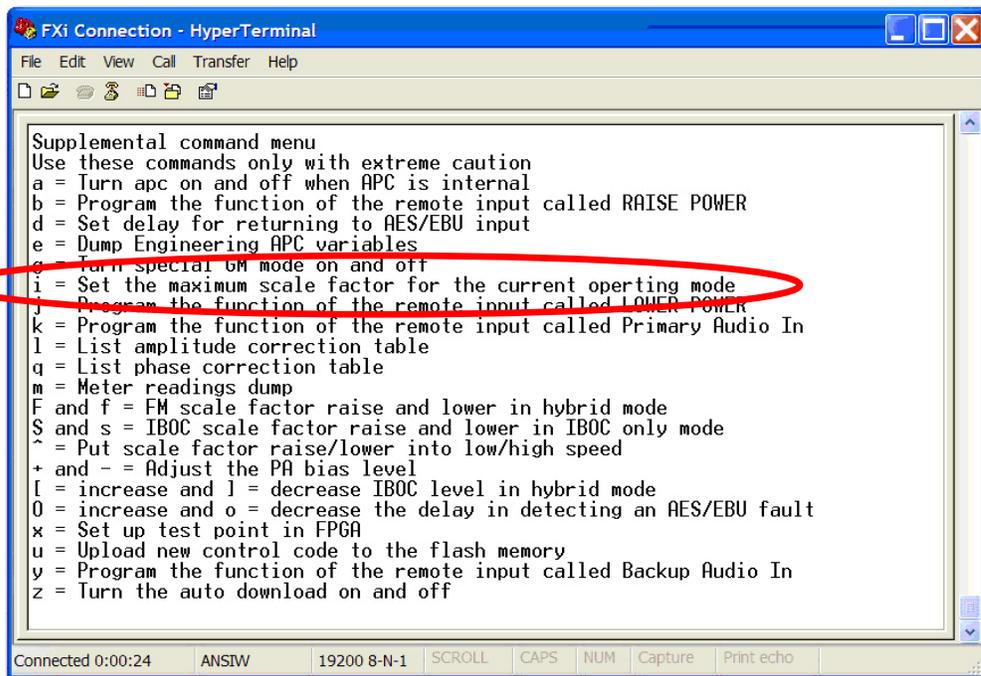


Figure 9 – HyperTerminal Supplemental Command Menu

- Step 22** – Press “i” (lower case) on the keyboard of the PC to change the scale factor of the “current” IBOC Operating Mode.

Step 23 – After pressing “i”, the following command prompt will appear. Enter the AGC Scale setting recorded in **Step 9** (7000 for this example) and press **Enter**.

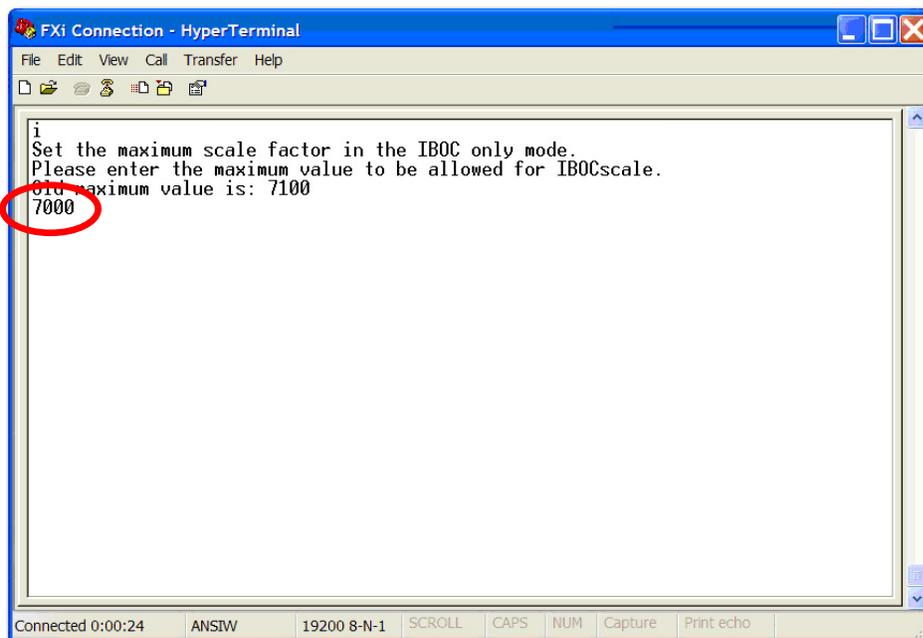


Figure 10 – “i” Command to Change Maximum Scale Factor

Step 24 – Lower the transmitter’s RF Output Power level back to where you would normally operate it at.

Step 25 – To verify that the scale factor was changed, press “e” (lower case) on the keyboard.

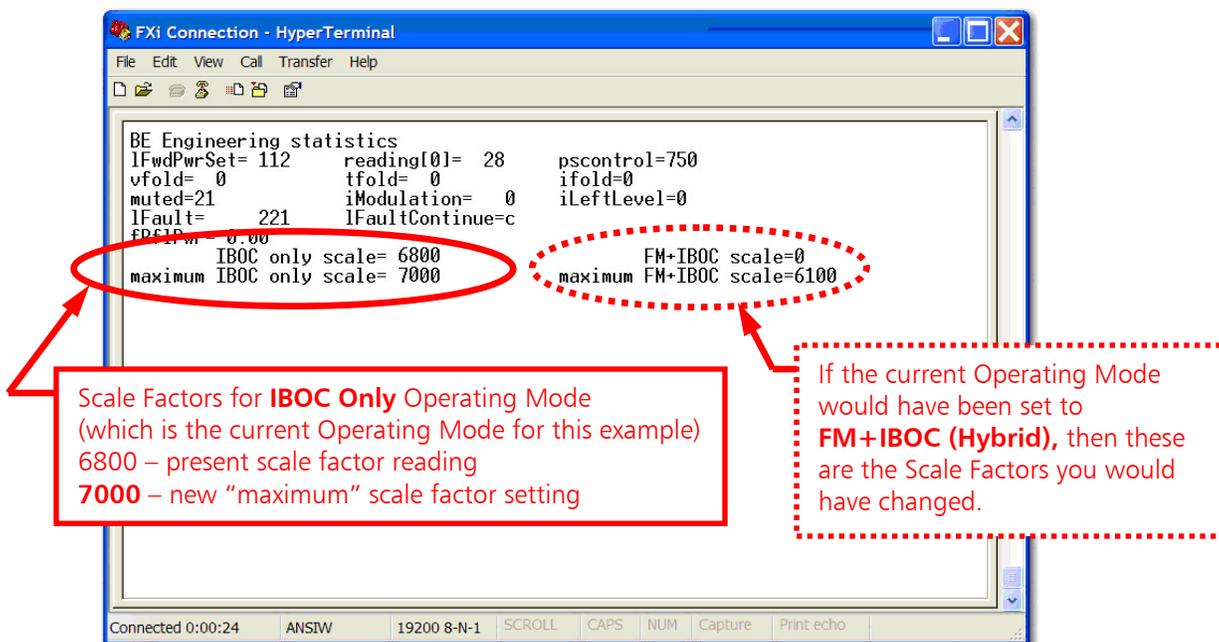


Figure 11 – “e” Command to Review Engineering Statistics

5 Switching from IBOC ONLY to FM + IBOC (Hybrid) Mode “On The Fly” Via the Front Panel GUI of the FXi Exciter

5.1 Ensure that the Maximum Scale Factors Have Been Set

Ensure that the **Maximum Scale Factor** was set in both **IBOC ONLY** and **FM + IBOC** Modes of Operation (see Section 4 of this document).

5.2 Switch the Mode of Operation from IBOC ONLY to FM + IBOC (Hybrid)

Step 1 – From the FXi Exciter GUI Main Menu, select **OPER MODE**.

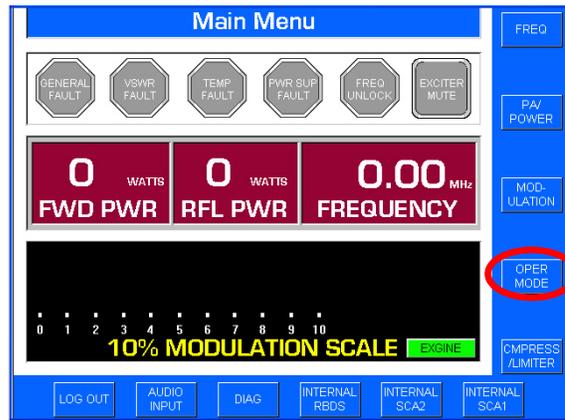


Figure 12 – FXi Main Menu

Step 2 – Select **IBOC MENU**.

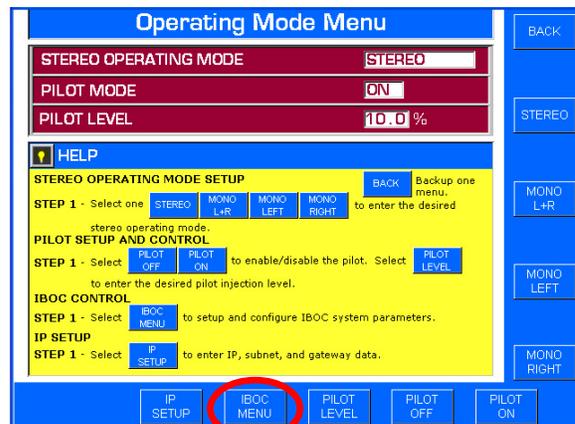


Figure 13 – Operating Mode Menu



Step 3 – In the IBOC Menu, select **FM + IBOC** (Hybrid) mode.

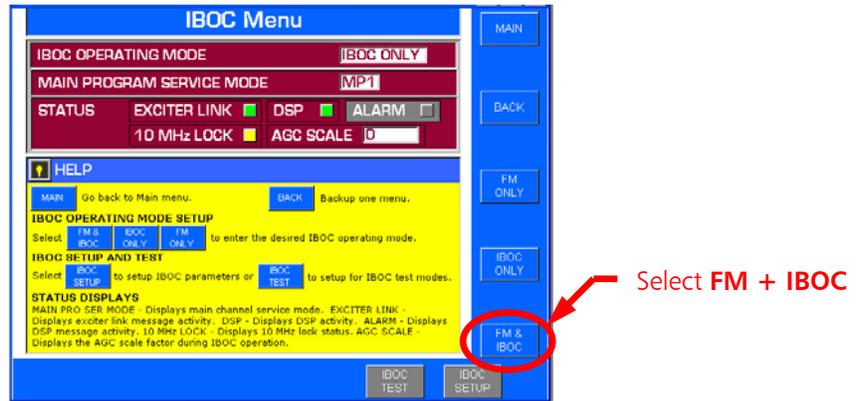


Figure 14 – FXi IBOC Menu

Step 4 – Verify that Operating Mode is now set to **FM + IBOC** (Hybrid) mode.

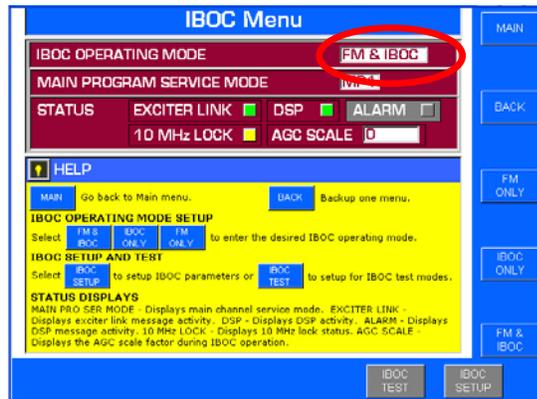


Figure 15 – FM + IBOC (Hybrid) Mode Now Selected

6 Switching from FM + IBOC (Hybrid) to IBOC ONLY Mode “On The Fly” Via the Front Panel GUI of the FXi Exciter

6.1 Ensure that the Maximum Scale Factors Have Been Set

Ensure that the **Maximum Scale Factor** was set in both **IBOC ONLY** and **FM + IBOC** Modes of Operation (see Section 4 of this document).

6.2 Switch the Mode of Operation from FM + IBOC (Hybrid) to IBOC ONLY

Step 1 – From the FXi Exciter GUI Main Menu, select **OPER MODE**.

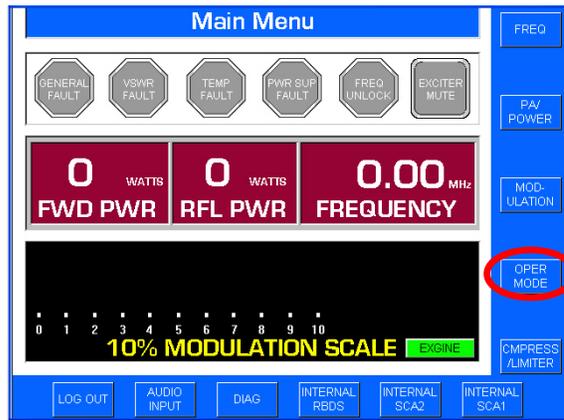


Figure 16 – FXi Main Menu

Step 2 – Select **IBOC MENU**.

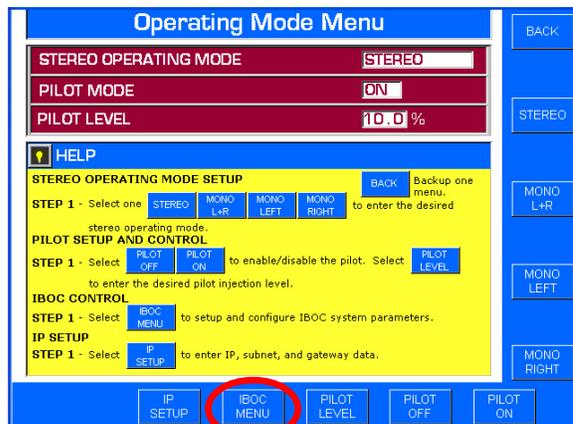


Figure 17 – Operating Mode Menu



Step 3 – In the IBOC Menu, select **IBOC ONLY** mode.

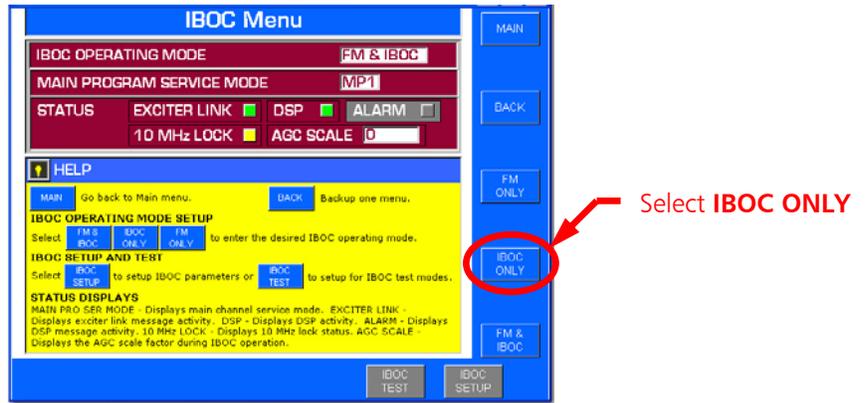


Figure 18 – Fxi IBOC Menu

Step 4 – Verify that Operating Mode is now set to **IBOC ONLY** mode.

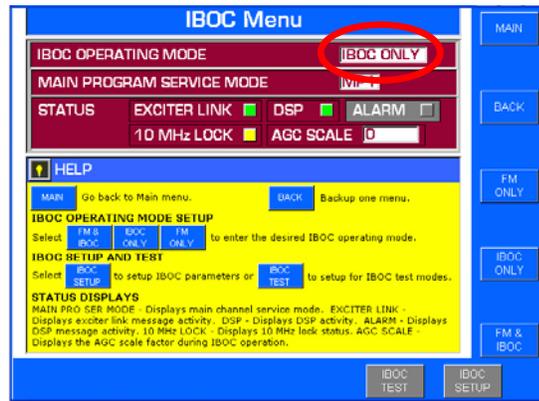


Figure 19 – IBOC ONLY Mode Now Selected



7 Switching between IBOC ONLY and FM + IBOC Modes “On The Fly” Via the Exciter’s Remote Control Connector J3

7.1 Ensure that the Maximum Scale Factors Have Been Set

Ensure that the **Maximum Scale Factor** was set in both **IBOC ONLY** and **FM + IBOC** Modes of Operation (see Section 4 of this document).

7.2 Programming J3 Pin 11

To enable “On The Fly” mode switching via remote control, J3 Pin 11 or J3 Pin 12 must be re-programmed. The default operation of J3 Pin 11 is for “remote raise power” and J3 Pin 12 is for “remote lower power” on the FXi Exciter. Since the output power of the FXi Exciter (in IBOC ONLY or FM + IBOC mode) is controlled by the FMi transmitter, either of these pins may be programmed and used to switch between IBOC ONLY and FM + IBOC modes of operation.

A positive voltage is required to activate the commands, if the factory default jumper has not been changed from providing ground to the remote common. J3 Pins 6 or 7 may be used for the positive voltage required to activate the command.

In this section J3 Pin 11 will be programmed to switch the Exciter from IBOC ONLY to FM + IBOC mode of operation.

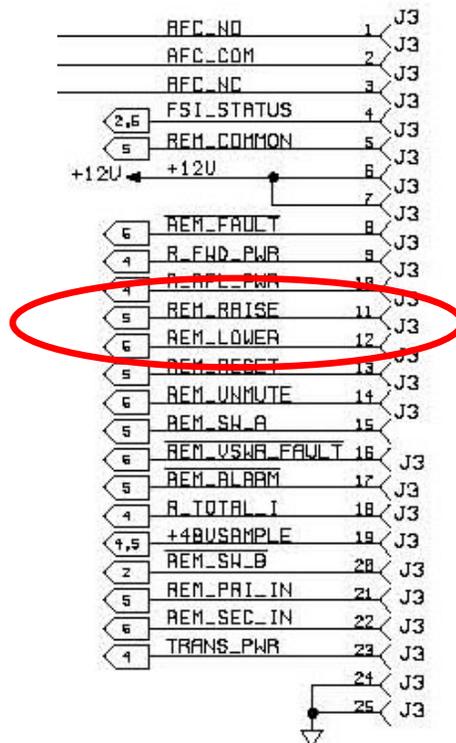


Figure 20 – FXi Remote Control Port Pinout (J3 on rear of the FXi)



Step 1 – Connect a null modem cable from a PC to the Exciter’s Serial Port J10.

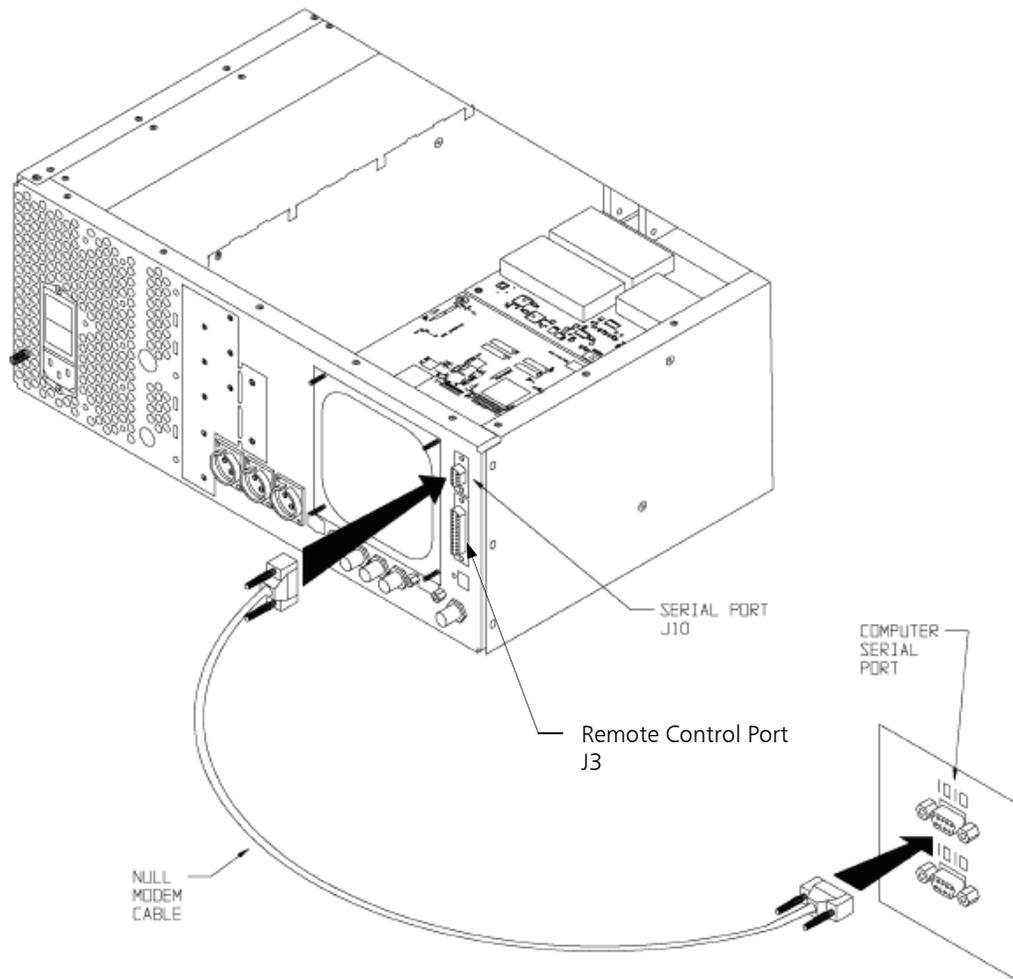


Figure 21 – PC to FXi Serial Port Null Modem Cable Connection

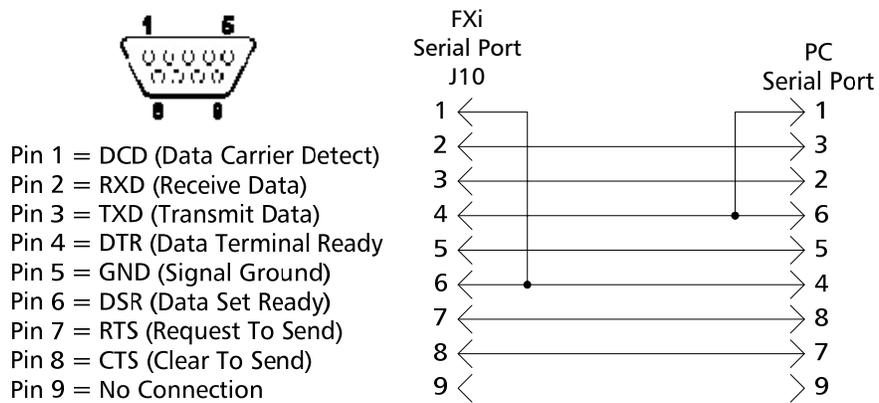


Figure 22 – Null Modem Cable Pinout

- Step 2** – From the Desktop go to: **START-> ALL PROGRAMS-> ACCESSORIES-> COMMUNICATION-> HYPERTERMINAL** and click the mouse.
- Step 3** – The HyperTerminal dialog box should now be displayed. In the **CONNECTION DESCRIPTION** box, enter the name of the shortcut that you want to be created such as *FMI Mode Change*.
- Step 4** – Select and click **OK**.
- Step 5** – The **CONNECT TO** dialog box will now appear. In the **CONNECT USING** dialog box, ensure that the correct COM Port is selected (typically **COM 1** is used) and then click **OK**.
- Step 6** – The **COM1 PROPERTIES** dialog box will appear. Move the cursor to the **BITS PER SECOND** dialog box and select **19200**.
- Step 7** – Move the cursor to the **DATA BITS** dialog box and select **8**.
- Step 8** – Move the cursor to the **PARITY** dialog box and select **NONE**.
- Step 9** – Move the cursor to the **STOP BITS** dialog box and select **1**.
- Step 10** – Move the cursor to the **FLOW CONTROL** dialog box and select **NONE**.
- Step 11** – Select **OK** and the HyperTerminal communication window will appear.
- Step 12** – Enter **Shift+?** to bring up the Supplemental command menu list as shown in Figure 6. Press “b” on the keyboard to program the function of the remote input called RAISE POWER (J3 Pin 11).

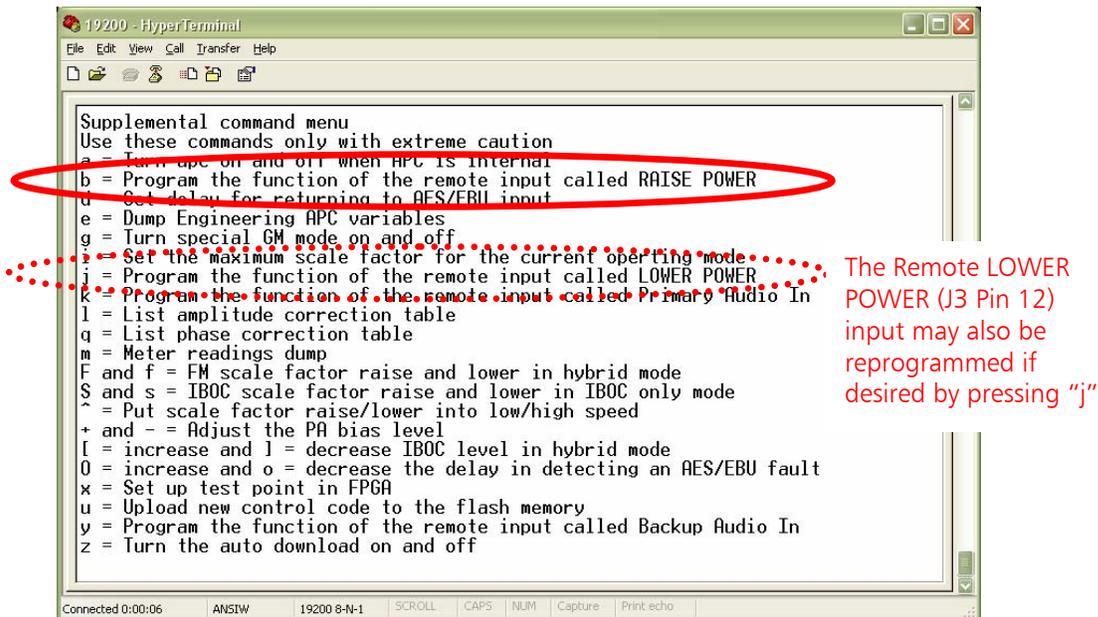


Figure 23 – HyperTerminal Supplemental Command Menu

Step 13 – There are four programming options for this remote control pin (J3 Pin 11):

1. Raise Power (factory default setting)
2. FM only mode
3. IBOC only mode
4. FM + IBOC mode

Press the “4” key on the keyboard to program this pin to be used for FM + IBOC operation.

```

19200 - HyperTerminal
File Edit View Call Transfer Help
i = Set the maximum scale factor for the current operating mode
j = Program the function of the remote input called LOWER POWER
k = Program the function of the remote input called Primary Audio In
l = List amplitude correction table
q = List phase correction table
m = Meter readings dump
F and f = FM scale factor raise and lower in hybrid mode
S and s = IBOC scale factor raise and lower in IBOC only mode
^ = Put scale factor raise/lower into low/high speed
+ and - = Adjust the PA bias level
I = increase and l = decrease IBOC level in hybrid mode
O = increase and o = decrease the delay in detecting an AES/EBU fault
x = Set up test point in FPGA
u = Upload new control code to the flash memory
y = Program the function of the remote input called Backup Audio In
z = Turn the auto download on and off

Program the function for the remote input called RAISE POWER
1. Raise power
2. FM only mode
3. IBOC only mode
4. FM+IBOC mode

Old value=1 Please enter the number desired
  
```

Figure 24 – HyperTerminal Supplemental Command Menu

Remote control J3 Pin 11 has now been programmed to tell the FXi Exciter to switch to FM + IBOC mode when activated. A positive voltage is required to activate the command if the factory default jumper has not been changed from providing ground to the remote common. J3 Pins 6 or 7 may be used for the positive voltage required to activate the command (see **Figure 20**).

Since FMi Transmitters would be normally operating in IBOC ONLY mode, providing a contact closure to this remote input pin on the Exciter will change the transmitter to operate in FM + IBOC mode. Once the contact closure is released, the transmitter will go back to IBOC ONLY mode of operation.

8 RF Customer Service Contact Information

RF Customer Service -

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