



FXi 60/250 Exciter

Setting the Maximum Scale Factor Application Guide

Prevent Overdriving Transmitter PA Modules

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1 Purpose of this Document

The purpose of this document is to describe the necessary steps to set the Maximum Scale Factor (Automatic Gain Control – AGC) in the FXi 60/250 Exciter.

In the event that the FXi 60/250 Exciter and Transmitter stop receiving data from either an FSi 10 HD Signal Generator or XPi 10 Exporter (depending upon your HD system's architecture), the Transmitter's AGC circuitry will send a command to the Exciter to increase the AGC level. At the instant that data is restored, the Transmitter's PA Modules may be overdriven. Thus, it is necessary to set the Maximum AGC Scale Factor to a value that will prevent PA Modules from being overdriven when data is restored.

Events/items that may cause such a loss of data might include a momentarily loss of an STL link between the FSi 10 or XPi 10 and the FXi 60/250 Exciter, loss of Ethernet cable connection from the FSi 10 or XPi 10 and the FXi 60/250 Exciter, as well as rebooting of the FSi 10 or XPi 10 all while the Transmitter is enabled.

NOTE: If the transmitter is switched to FM ONLY mode of operation, it is absolutely necessary to repeat the Maximum Scale Factor Setting procedure when returning to IBOC ONLY or FM + IBOC operation!

NOTE: This application guide should ONLY be followed if the transmitter type is an FMi 31, FMi 73, FMi 106, FMi 201, FMi 301, or an FMi 402.

If the transmitter type is an FMi 703/FMi 1405, it is strongly suggested that the Transmitter be updated to the following:

Smartcore Software:

FMi 703 Transmitter running Smartcore Software v1.0.50 (or newer)

- or -

FMi 1405 Transmitter running Smartcore Software v2.1.20 (or newer)

Module Control Board Firmware:

U7 and U107 version 1.09 (or newer)

FXi 250 Firmware:

U41 on the DSP board version 2.0 (or newer)

See the following Technical Bulletins for further details:

http://www.bdcast.com/fgal/tech_bull/v1_0_51_software_update_fm10S_fmi70_BCEBUL.pdf

http://www.bdcast.com/fgal/tech_bull/v2_1_20_software_update_fm20S_fmi14_BCEBUL.pdf

Once the FMi 703 / FMi 1405 transmitter meets or exceeds these requirements, this document can be used to set the Maximum Scale Factor to 20000.



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 change an FXi 60/250's AGC Scale factor. The transmitter will remain on the air during the entire process.



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

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**.

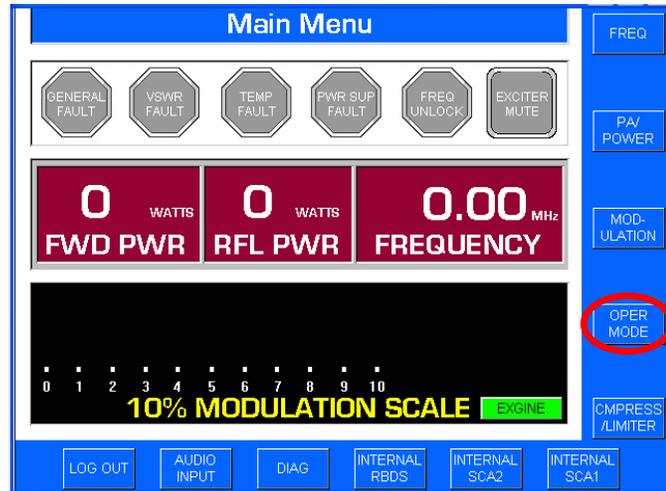


Figure 1 – FXi Main Menu

Step 4 – Select **IBOC MENU**.

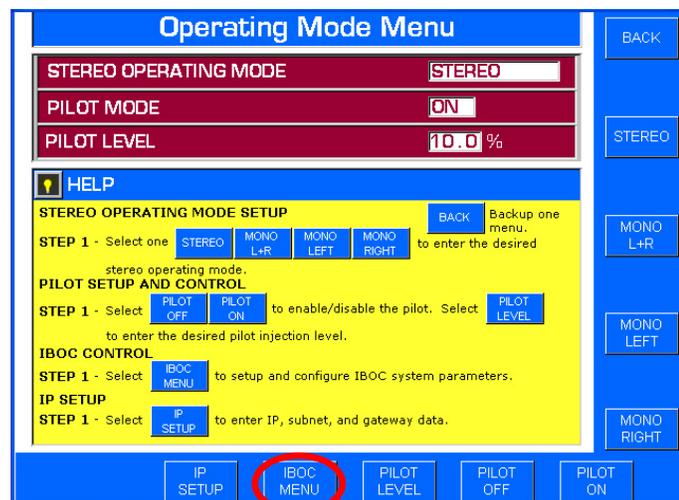


Figure 2 – Operating Mode Menu

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

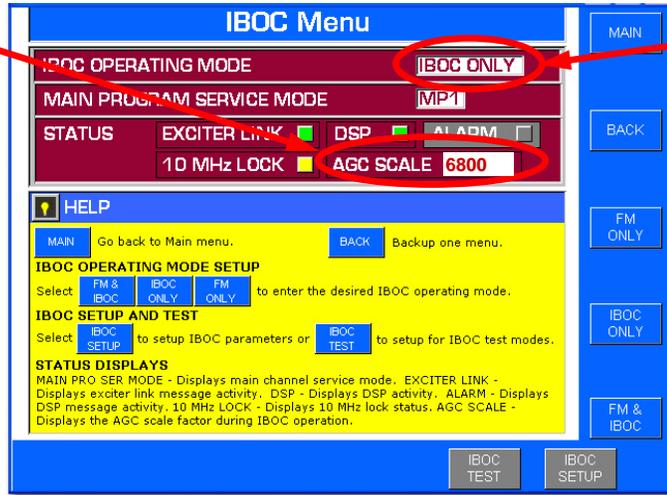
Remember, the Transmitter must be operating at the TPO level that you would normally operate it at!

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**.

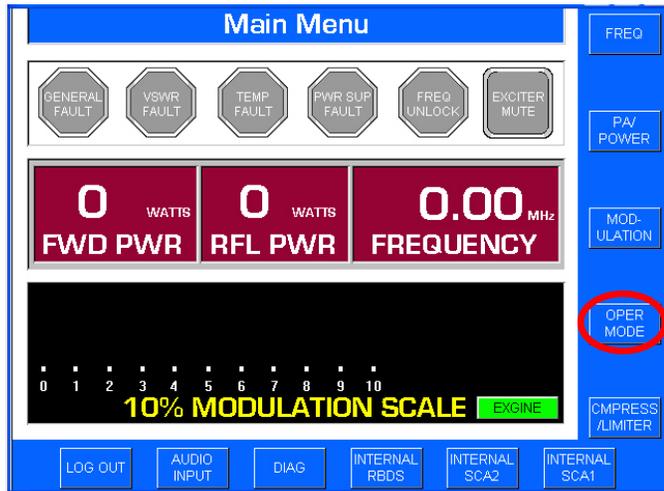


Figure 4 – FXi Main Menu



Step 8 – Select IBOC MENU.

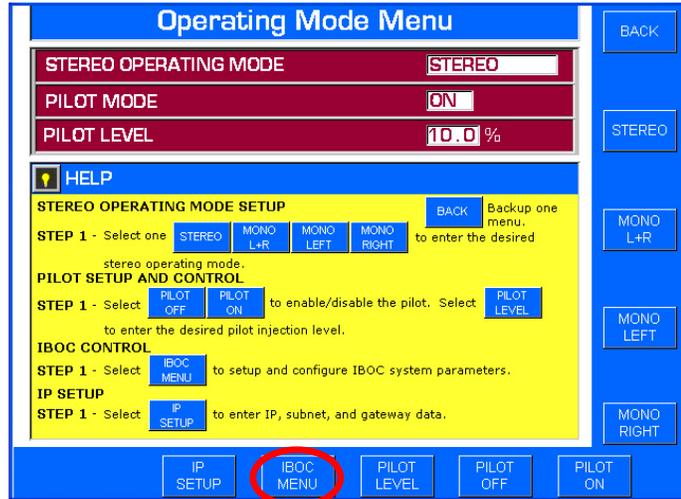


Figure 5 – Operating Mode Menu

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.

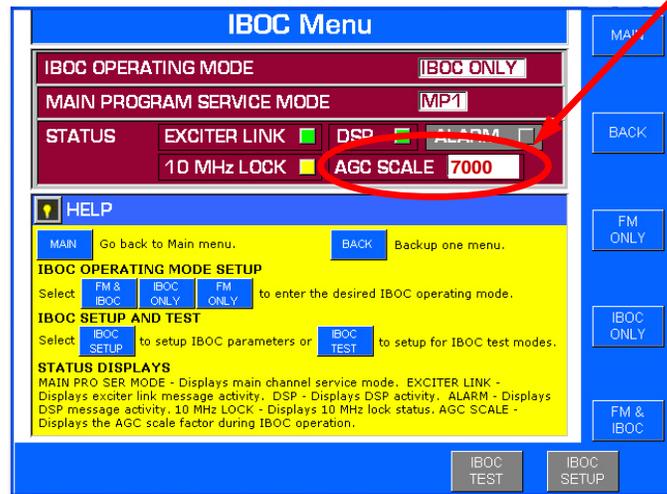


Figure 6 – Record the AGC SCALE at "5 -15% above" Normal Operating RF Output Power



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

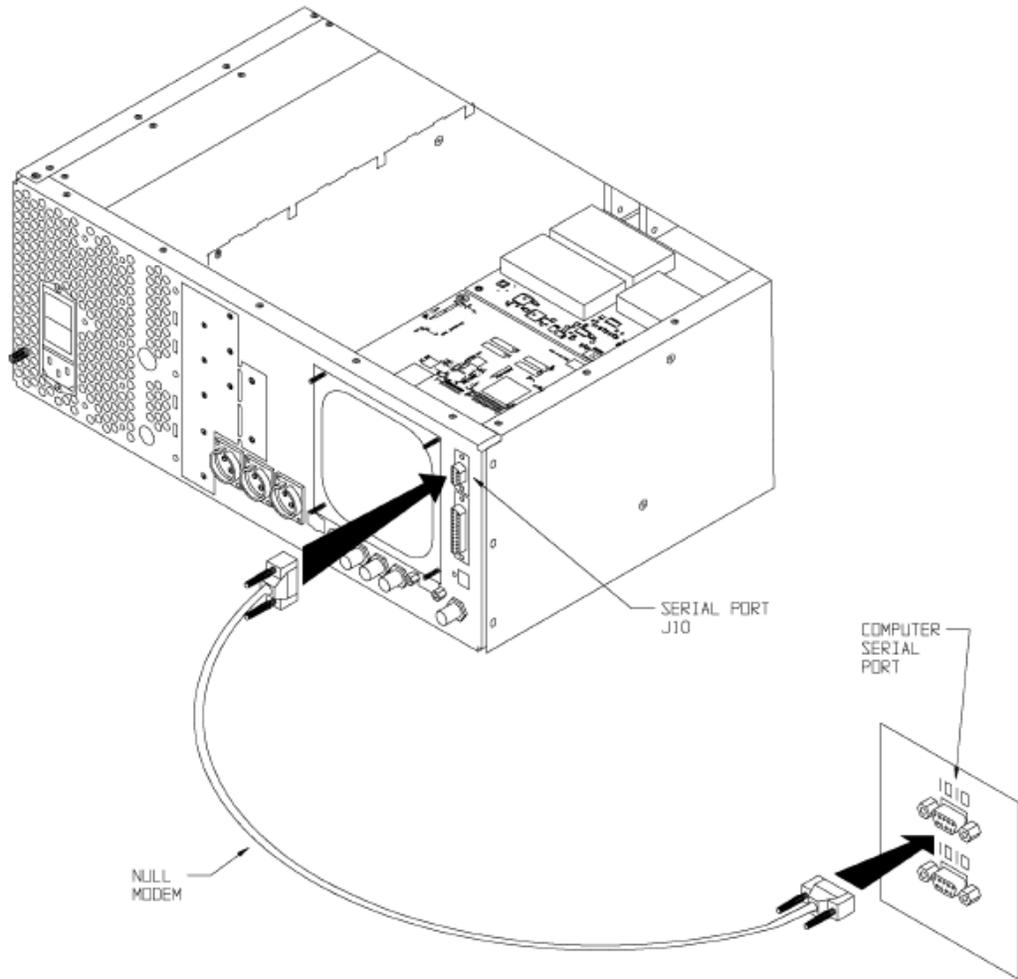


Figure 7 – PC to FXi Serial Port Null Modem Cable Connection

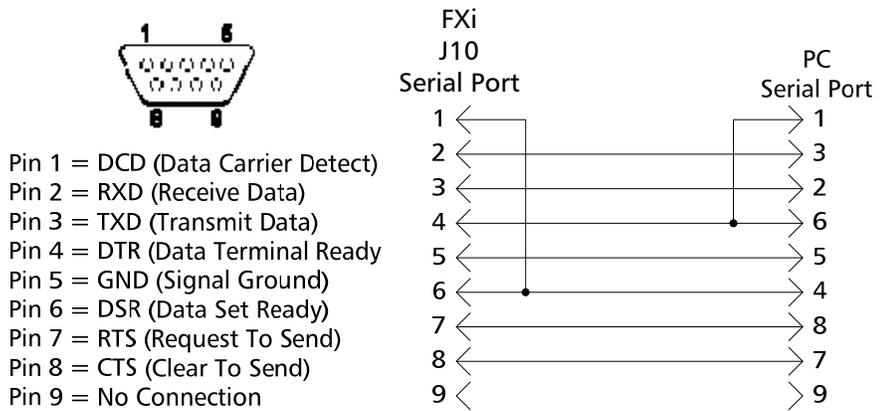
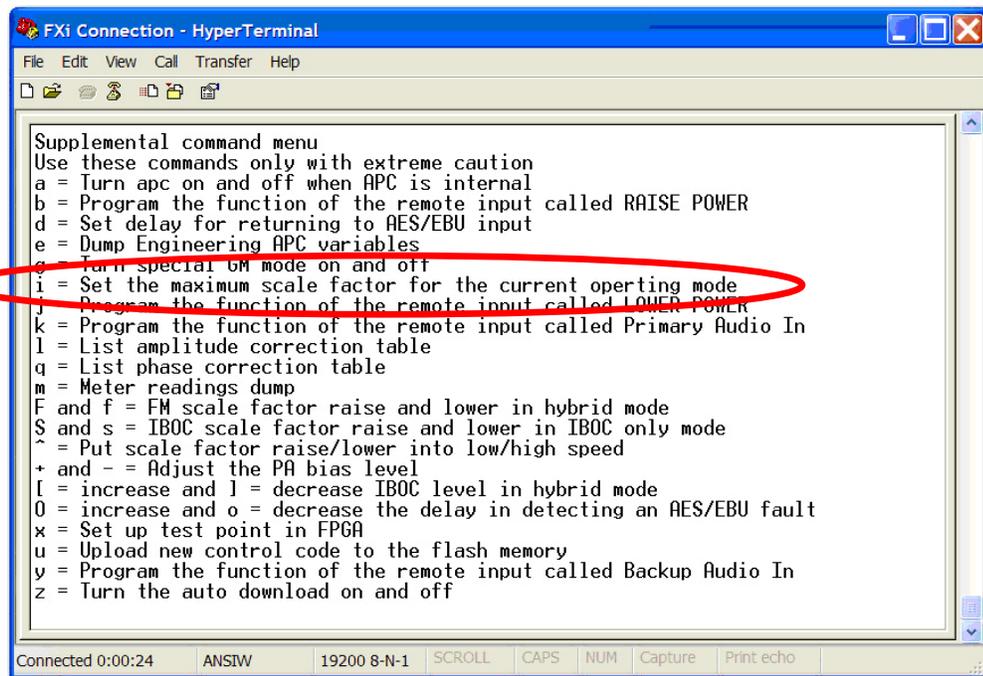


Figure 8 – Serial Cable / Null Modem Adapter Pinout



- 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..



```

FXi Connection - HyperTerminal
File Edit View Call Transfer Help
Supplemental command menu
Use these commands only with extreme caution
a = Turn apc on and off when APC is internal
b = Program the function of the remote input called RAISE POWER
d = Set delay for returning to AES/EBU input
e = Dump Engineering APC variables
g = Turn special GM mode on and off
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
$ 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

Connected 0:00:24  ANSIW  19200 8-N-1  SCROLL  CAPS  NUM  Capture  Print echo

```

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**.

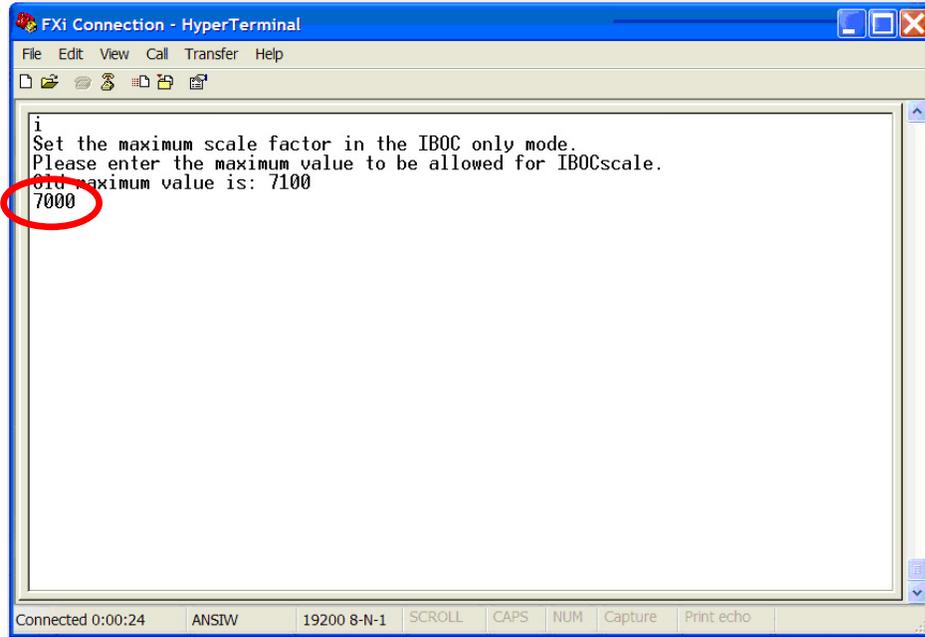


Figure 10 – “i” Command to Change Maximum Scale Factor

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.

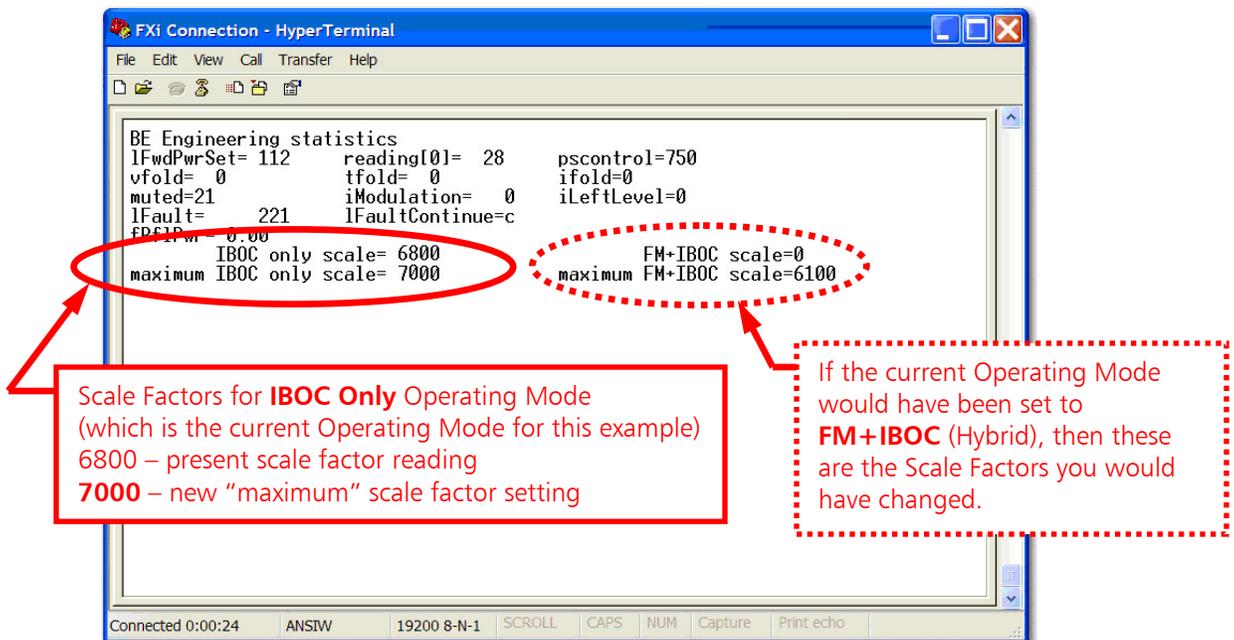


Figure 11 – “e” Command to Review Engineering Statistics

5 Related Documents

Other Application Guides that are closely related to this guide that may prove beneficial:

- FXi 60/250 U41 FW Upgrade Application Guide; 597-0541-009
- FMi 31/73/106/201/301/402 HD Spectrum Application Guide; 597-5001-002
- FMi 703/1405 HD Spectrum Tuning Application Guide; 597-1012-009
- FXi Exciter HD Injection Level Adjustment; 597-0541-010

6 RF Technical Services Contact Information

RF Technical Services -

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