

Analog Output Integration in QTM (OPTIMA or GEN 5 users)

Note: Before beginning, complete the *Quick Start Guide (OPTIMA/Gen 5 users)*

Configure the 'Fully Conditioned' analog mode in NetForce

- Double click NetForce to run.
- Select **'Setup'** then **'Hardware Installation'**, and click on **'Modify'** to open the **'AMTI System Configuration'** window.
- Under **'Global Settings'**, select **'Metric Units'** for the **'Digital Outputs'**, setting. You must use metric units when integrating with Qualisys.
- Set the **'Analog Outputs'** to **'Fully Conditioned'**. If you are using an Optima system this is the only option that will work.
- For the force plate and amplifier of interest, click on the button under **'Configure'** in the list of **'Installed Amplifiers'**. This will open the **'Amplifier Configuration SN:XXXX'** window (see image below).
- The gain and excitation should have been selected already, if not return to step 6 of the *Quick Start Guide (OPTIMA/Gen5 users)*
- Once the Gain and Excitation have been set, click the **'Analog Adjust'** button. This will set the **'Analog Scale Factor'** such that the **'Analog Outputs'** for each channel match the **'Amplifier Range'** (see below). This ensures that the +/- 5V output of the amplifier corresponds to the working range of the system (defined by the gain settings).

NOTE: If your version of NetForce does not have an **'Analog Adjust'** button simply enter in values for the **'Analog Scale Factor'** and press apply. Adjust the values until the **'Analog Outputs'** are similar to the **'Amplifier Range'**

- Record the values for the **'Analog Scale Factor'** for each channel.

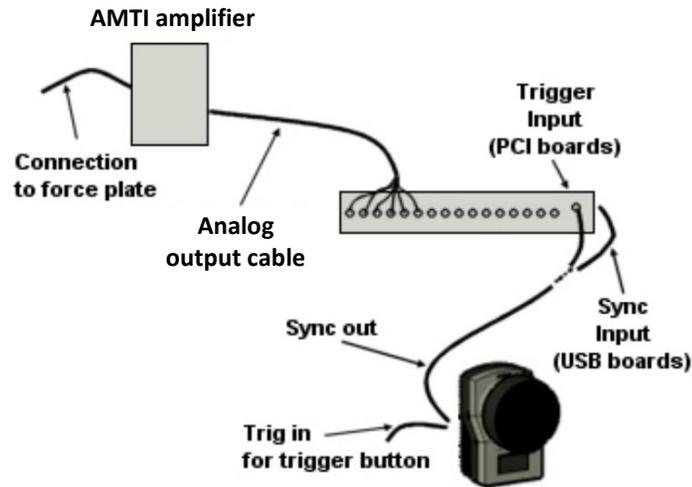
The image shows two overlapping software windows. The background window is 'AMTI System Configuration'. In the 'Global Settings' section, 'Analog Outputs' is set to 'Fully Conditioned'. The 'Installed Amplifier' table has a 'Configure' button highlighted with a red box. The foreground window is 'Amplifier Configuration SN: 2186'. It contains two main sections: 'Configuration Information' and 'Current Configuration'. The 'Configuration Information' section has a table with columns for Fx, Fy, Fz, Mx, My, and Mz, and rows for Platform Capacity, Amplifier Range, and Analog Outputs. The 'Current Configuration' section has a table with columns for Fx, Fy, Fz, Mx, My, and Mz, and rows for Excitation, Gain, Zero Setpoint, and Analog Scale Factor. The 'Analog Scale Factor' row is highlighted with a red box, and an arrow points from it to the 'Analog Adjust' button at the bottom of the window.

	Fx	Fy	Fz	Mx	My	Mz
Platform Capacity	4448.22	4448.22	8896.44	2666.44	1785.16	1333.22
Amplifier Range	715.76	720.71	5741.50	730.47	574.14	302.04
	-715.76	-720.71	-5741.50	-730.47	-574.14	-302.04
Analog Outputs	724.64	724.64	5747.13	729.93	581.40	304.88
	-724.64	-724.64	-5747.13	-729.93	-581.40	-304.88

	Fx	Fy	Fz	Mx	My	Mz
Excitation	10.0	10.0	10.0	10.0	10.0	10.0
Gain	2000	2000	1000	1000	1000	1000
Zero Setpoint	0	0	0	0	0	0
Analog Scale Factor	6.9	6.9	.87	6.85	8.6	16.4

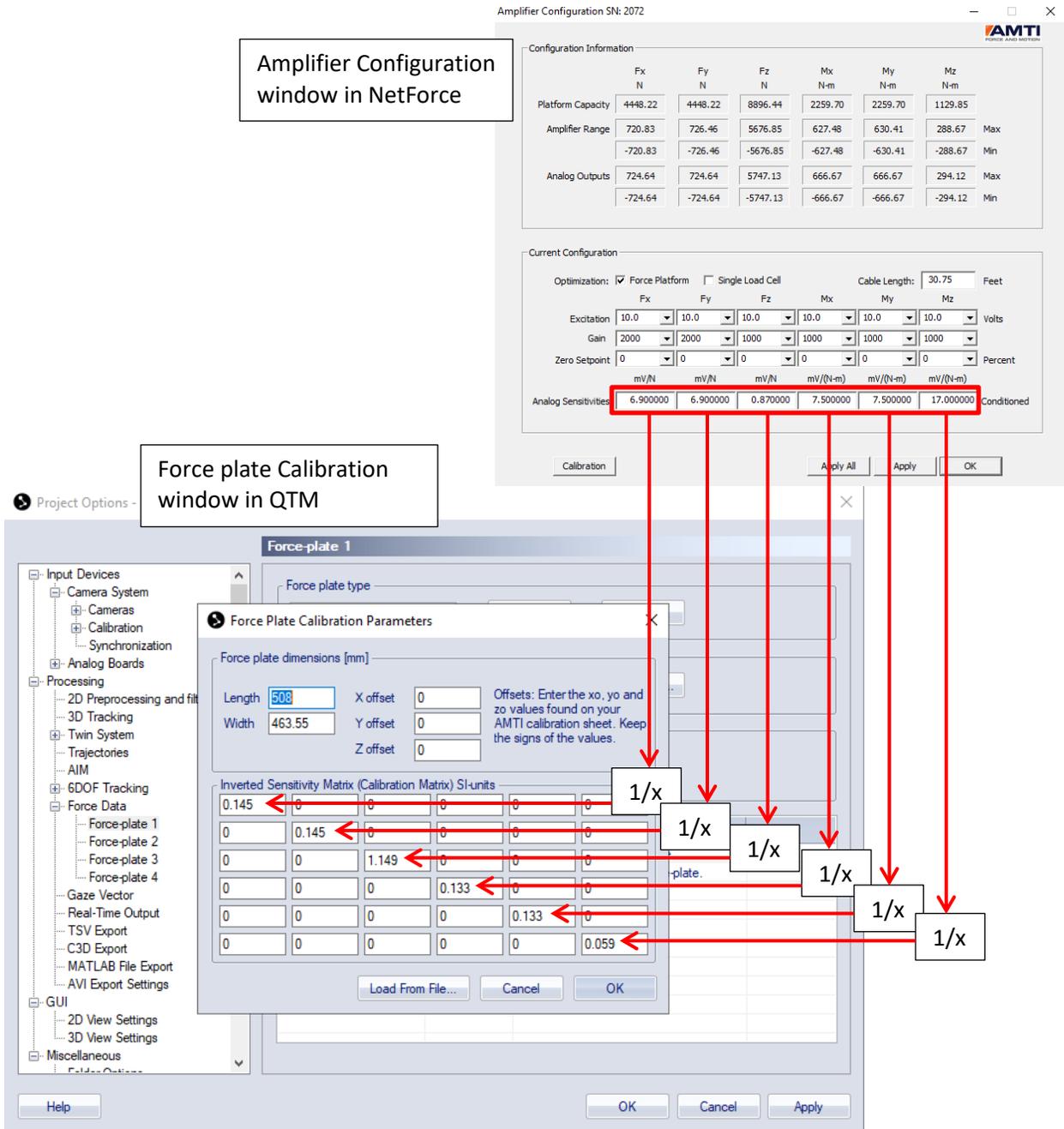
Integrate the force plate into QTM

- a. Make sure the amplifier and A/D board is connected to the motion capture system as indicated in the *Qualisys User Manual* (Page E-1). Below is a schematic of the hardware connections to the analog board.



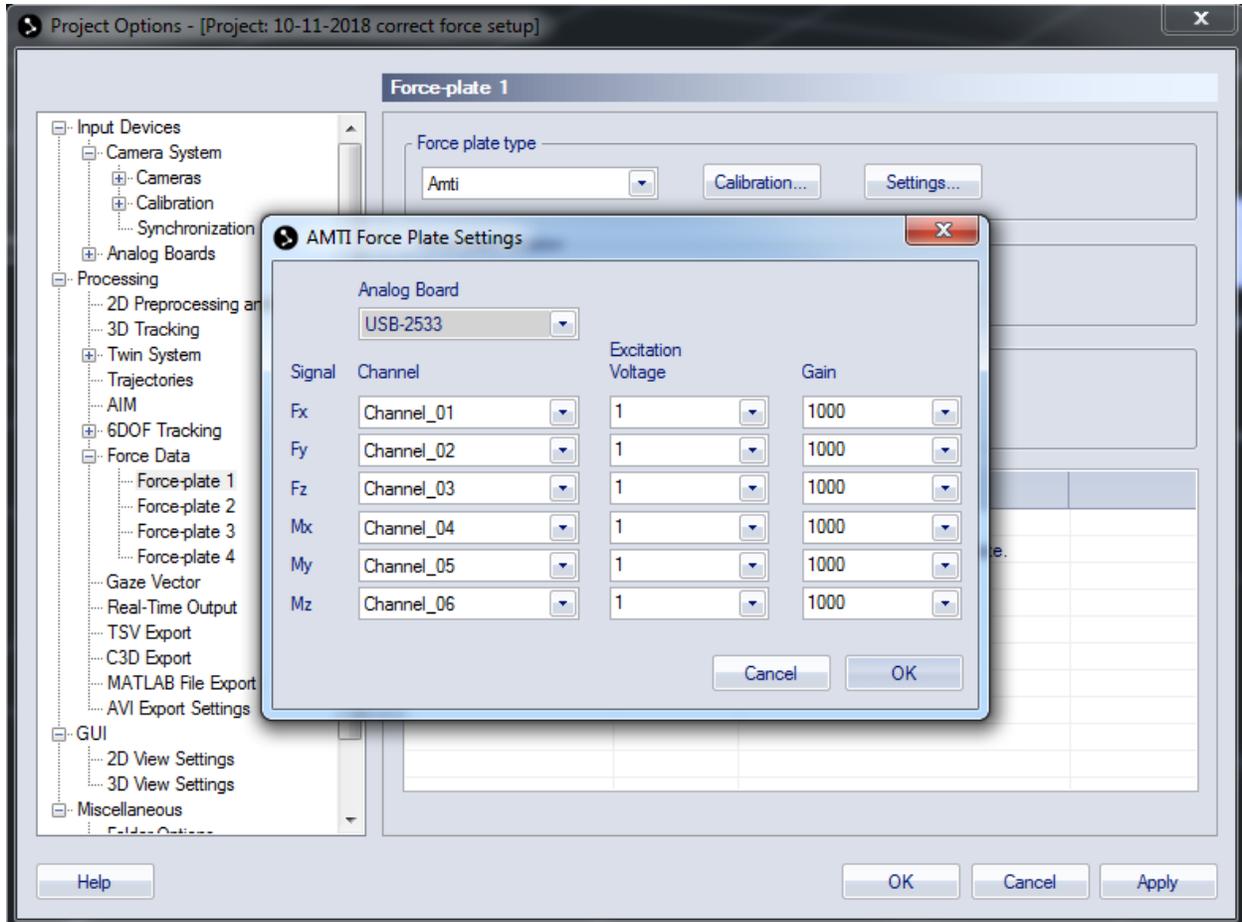
Now you need to add the force plate in QTM.

- b. In Qualisys click on **'Tools'** then **'Project Options'**
- c. Go to **'Analog Boards'**
 - i. Activate the channels connected to the force plate.
 - ii. Set the sample rate for the analog board as a multiple of the marker capture rate.
- d. Create the force plates on the **'Force data'** page in the **'Project Options'** dialog
 - i. Select the force plate type with the drop-down box ('AMTI')
 - ii. For each force plate, enter the calibration parameters
 - i. Click **'Calibration'** to go to the **'AMTI force plate calibration parameters dialog'**
 - ii. Enter the dimensions for the force plate and the offset values from your calibration files (.plt, .pdf).



- e. To fill the **'Inverted Sensitivity Matrix'**, take the inverse of each **'Analog Scale Factor'** that you recorded from NetForce, and place it along the diagonal leaving the rest of the matrix as zeros (see image above).
 - i. This will provide the correct conversion from the fully conditioned analog signal to forces and moments (for more detail on how the fully conditioned analog output mode works, consult the Technical note **Gen 5/Optima Setup and Optimization**)
- f. Once you have filled the Calibration matrix, close this window.
- g. In the **'Force plate Configuration...'** window click **'OK'**

- h.** Now open the **'Settings'** option
 - i.** Set the channels for each force based on your connections in the analog board.
 - ii.** Set the excitation voltage to 1.
 - iii.** Set the Gain to 1000.
- Note: The excitation voltage and gain values have already been defined in NetForce. By setting the Gain to 1000, this is just converting the output between volts and millivolts.



- i.** You have completed the Fully Conditioned analog integration into Qualisys.