- Calibrates after transducer connection
- Monitors and limits the power to the motor for safety reasons
- Constant velocity or stepped acquisition
  - During constant velocity mode, the FEC programs the Motor Controller with a motion profile consisting of a speed and a range over which this speed should be maintained.
  - During stepped acquisition, the Motor Controller sends the transducer to a position, fires a few frames, and waits to send the transducer to a different location. The Motor Controller holds the position until told to move elsewhere.
- System level identification of the module (firmware and software version) provided through the RS-232 interface

Motor Controller Circuit Description

The Galil Motor Controller is an optional daughterboard installed in the FEC PCB. The board controls the speed and location of a variety of motorized transducers and reports position information to the system in real time. The board is also responsible for monitoring and limiting the amount of power delivered to the motor to comply with safety issues.

The Omni Motor Controller is integrated onto the FEC PCB. The Omni Motor Controller is an optional feature. Not all FEC PCBs have an integrated Omni Motor Controller.

Transducers are calibrated when connected to the system. This verifies to the system the transducer range of motion and sets the position counter to the home state or that of an end-point. Once calibrated, the Motor Controller is available for position or velocity control.

The Motor Controller can be used for constant velocity acquisition or stepped acquisition. During constant velocity moves, the Motor Controller is programmed via the FEC with a motion profile consisting of a speed and range over which the speed should be maintained. While this is happening, the Krusty FPGA on the FEC is set up by the system with look-up tables to fire a

sequence. Once set up, the Krusty notifies the Motor Controller to start the transducer motor. When the transducer motor comes up to speed, the Krusty is notified that it may shoot frames and retrieve valid data from the Motor Controller.

During stepped acquisition, the desired sweep rate is too slow for a constant velocity control. At predefined thresholds, when the motor is stalled, the system calculates and initiates a series of stepped movements. The FEC sets up the motion profile as with the constant velocity control (only with a string of positions) and Krusty initiates the motion. Once the desired position is achieved, the Krusty FPGA shoots a frame and signal for the Motor Controller to move to the next position.

A second type of stepped acquisition occurs when the transducer is moved to a location and transmits a set of 2D frames. (Essentially, the transducer is being used as a directional 2D probe.) Motor Controller operation is the same for both types of stepped acquisition. The Motor Controller holds the transducer position until instructed to move elsewhere.

When not in use, the Motor Controller is shut down to reduce the chance of motor voltages appearing on the transducer connector and to reduce the possibility of noise originating from the PCB.

Signal Processing Subsystem

The Signal Processing Subsystem comprises functional blocks that operate on and modify the received signals after beamforming and before image processing. The functional blocks of the signal processing subsystem are partitioned over the following modules:

- Dual Signal Conditioning PCB (DSC)
- Unified Motherboard (UMB)