Test Machine Descriptions

The PTO test machine consists of a test bench and hydraulic system that is capable of exercising the MBARI PTO at full speed and force. Figure 1 shows an (older) picture of the device and Figure 2 provides a hydraulic schematic for the test machine component of the system.

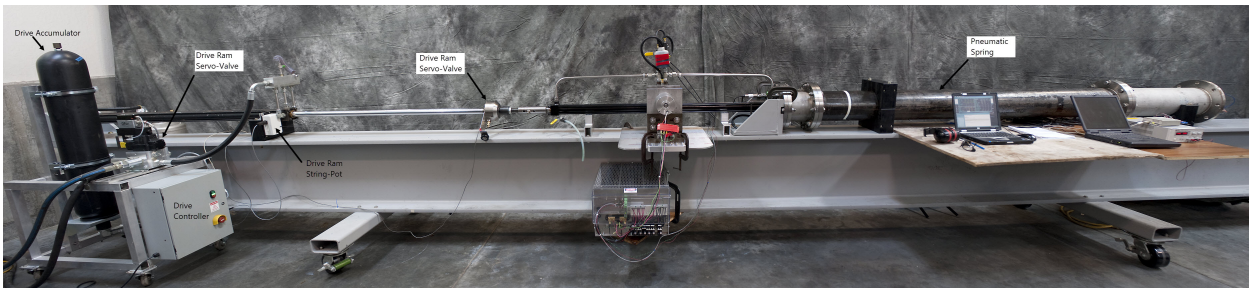

Figure 1: Annotated Photograph of Test Machine

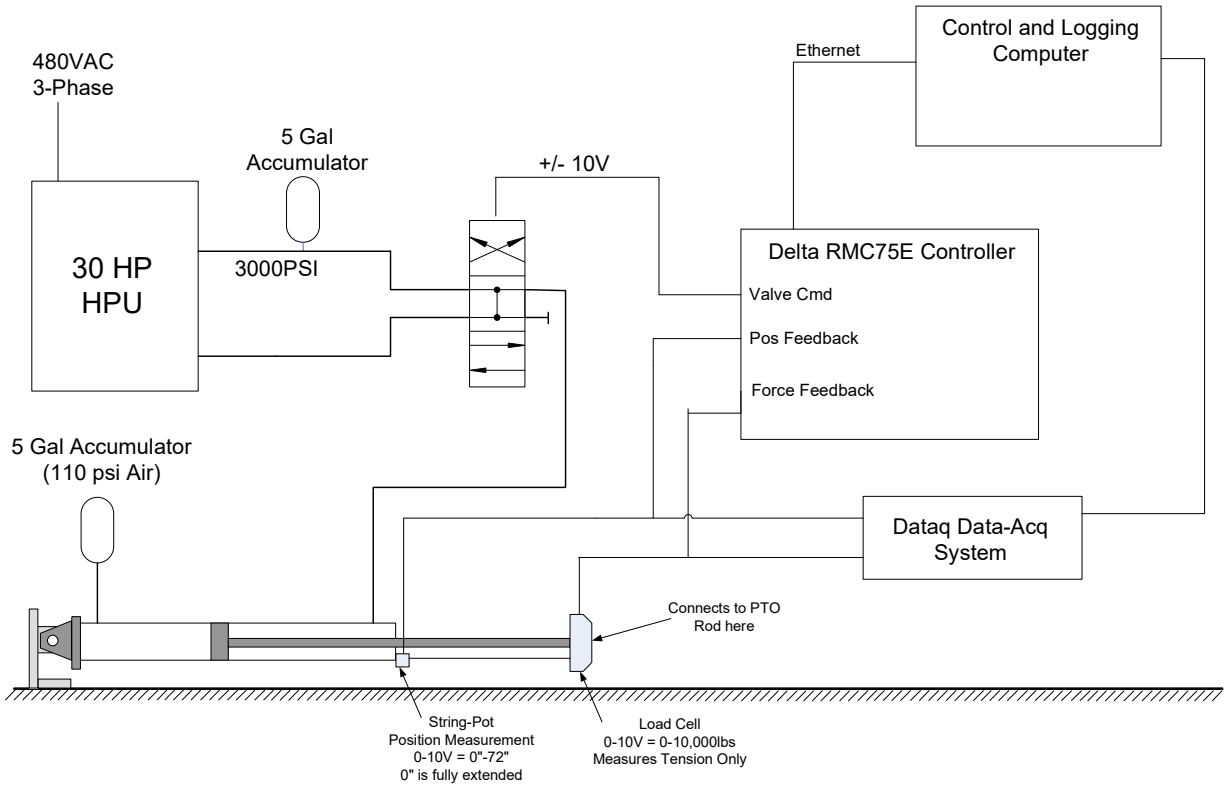

Figure 2: Test Machine Hydraulic and Sensor Diagram

Test Procedure Overview

Testing of the PTO typically involves a few steps and components.

- The PTO test machine hydraulics are controlled from the "RMCTools" software provided by Delta Computers. This windows program communicates with the RMC75E over Ethernet and can plot the feedback and performance of the system, provides tuning tools, etc. There is also a collection of MBARI-developed matlab commands that can also execute moves and download custom profiles, this can be more convenient than RMCTools in some cases
- The "Dataq" data acquisition device also has a dedicated windows software for collecting data. This program scales the voltages to engineering units, provides a moving display of values, and provides a facility to log data.
- The MBARI WEC logs all telemetry channels on its Linux computer using a program/service called "pblog". This data is stored as text files automatically while running, a new date-time stamped filename is created every hour (ex: `2018.10.04T09.43.40.csv`). Because of this, it can be convenient to restart pblog before any given test to be sure the test data is in a single file (for sub 1-hr tests).

Data Products and Required PostProcessing

Any given test generates two main data files, a .csv file on the buoy's Linux computer with a filename that indicates the date and time of the start of logging in that file, and a ".WDQ" binary file that is created by the Dataq software and which contains the test machine load cell data, position sensor data, and hydraulic pressure data in some cases.

To make these usable in matlab, there is a matlab function called "ConvertDataToMatlab" in the "shoresidesoftware" repository (https://bitbucket.org/mbari/shoresidesoftware/src/master/) This repository contains the shore-side processing used during buoy deployments, and this function converts the .csv files to two matlab .mat files, one that is a raw translation to .mat, and another that interpolates all data to a constant time-base for convenience. The function prototype is: `function [MatlabFilenames] = ConvertDataToMatlab(path,base_filename)` and takes a relative path and the base of a buoy .csv filename as input (ex: `2018.10.04T09.43.40`).

Matlab scripts are similarly used to convert the data .WDQ files to Matlab, at this time this code is called individually from each test post-processing script and there is no dedicated script to convert and save as a .mat file. This should be done soon to make this procedure more robust.

Finally, with both the Dataq and Buoy data in Matlab format, it is necessary to line these datasets up in time because they are recorded on different systems with different times. It may

be possible to improve this by utilizing computer times, but to date the ram position measurement has been used to align the data since this is measured and present in both datasets. This has been an ad-hoc procedure performed in the test data post-proc scripts to date. An improved matlab function that does this would be an improvement.

After data alignment, post-processing of the data can proceed and this is typically done by Matlab scripts that are specific to the test being performed.