Echometer “How To” Guide

Procedure for Acquiring Dynamometer Data Using the 30K Lbs Horseshoe Load Cell

by

Echometer Company

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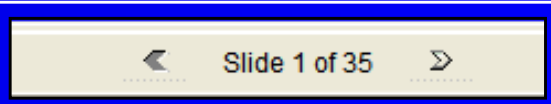


displayed at the bottom of the screen to advance through the presentation or review previous slides.

Safety Considerations

- Echometer Company recommends that whenever the Well Analyzer and associated instruments are used in the field, the user must follow all the safety procedures required by his/her Company.
- Survey the location and pumping system for any unusual and potentially unsafe conditions. Report any such condition and do not proceed with tests.

30K Lbs Horseshoe Load Cell

- Load cell is mounted on polished rod between the permanent polished rod clamp and the carrier bar.
- Highly accurate sensor measures a precise load value.
- Built-in sensor measures the acceleration of the polished rod.
- TWM program calculates velocity and position of the polished rod by integration of the acceleration signal vs. time.

Connect cables to the Well Analyzer

1. Connect master cable to MAIN INPUT plug.
2. Attach coiled cable to the end of the master cable.

Connect cable to load cell

Attach coiled cable to load cell by fully tightening the locking nut.

NOTE: If cable without locking nut is used, after installing the load cell on the polished rod, wrap cable around handle to prevent cable connector from slipping out of load cell connector.

Turn on the computer

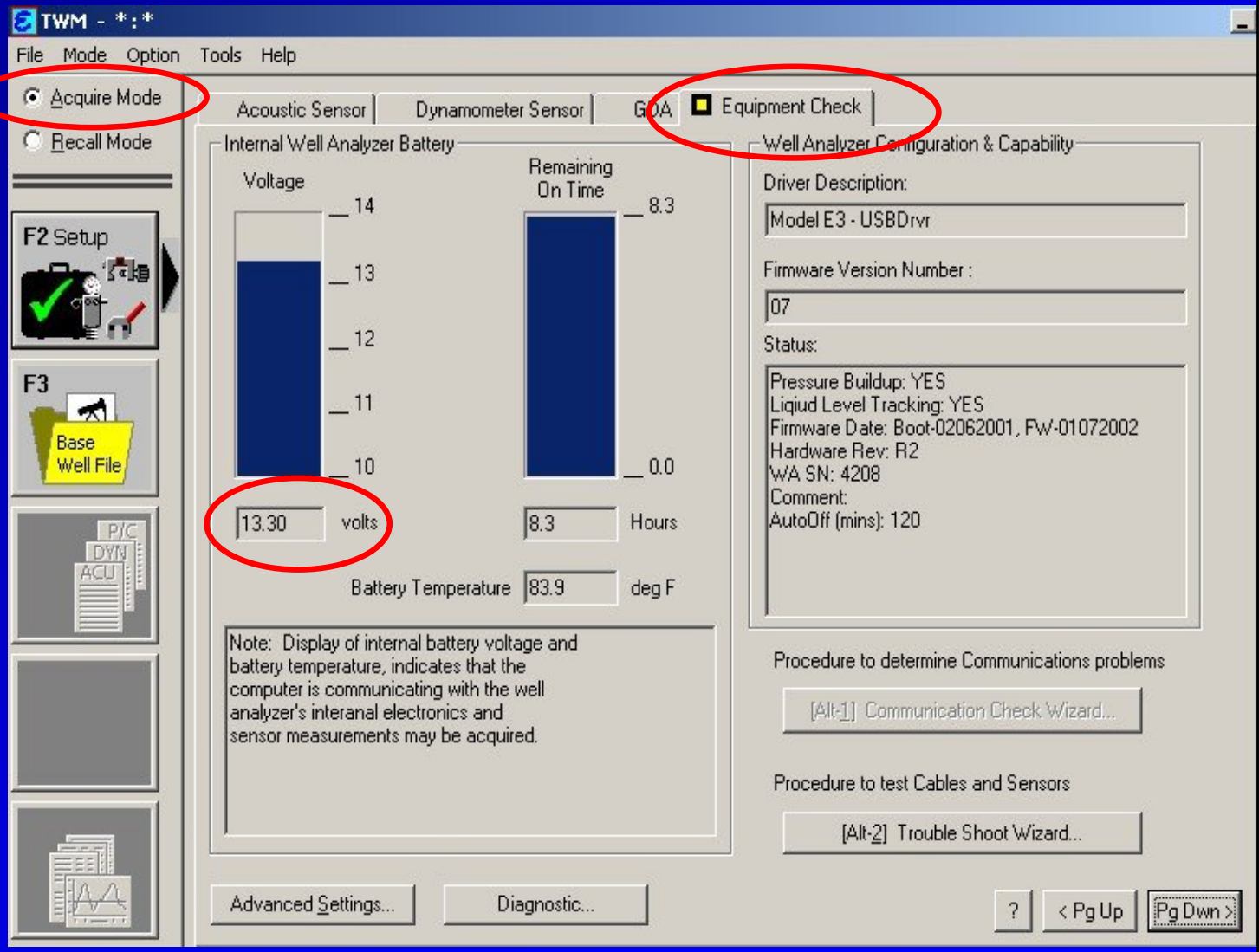
Use the USB cable or Serial cable, located at the back of the black box, to connect the Well Analyzer to the laptop.

Turn on the Well Analyzer

Green light indicates battery voltage is sufficient for proper operation.

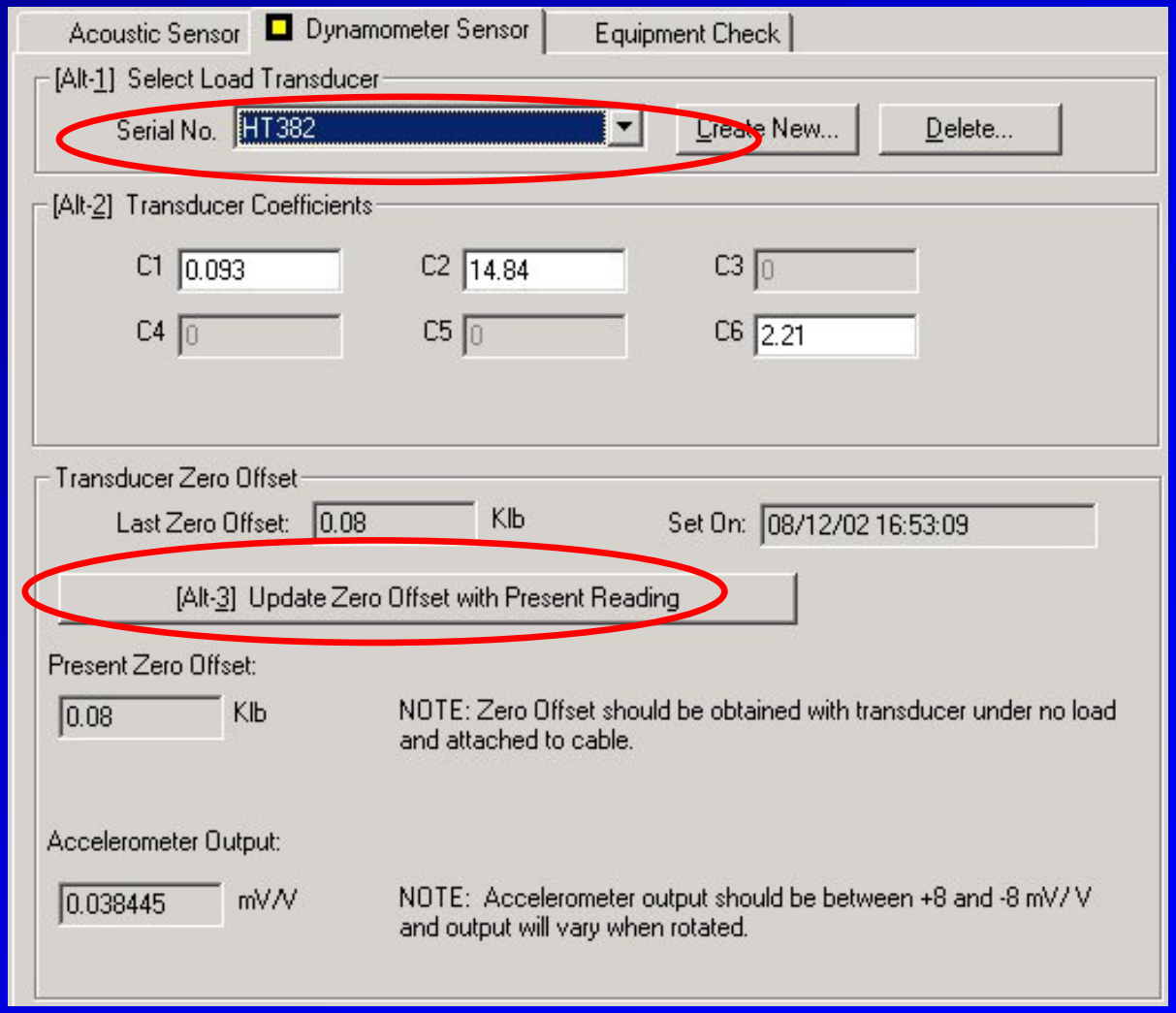
Start TWM in Acquire Mode

1. Select the Equipment Check tab.
2. The display of internal battery voltage indicates the computer is communicating with the Well Analyzer and data may be acquired.



Select the Dynamometer Sensor tab

1. Select the serial number of the Horseshoe Transducer.
2. Click button twice to acquire and update Transducer Zero Offset before installing load cell on polished rod.

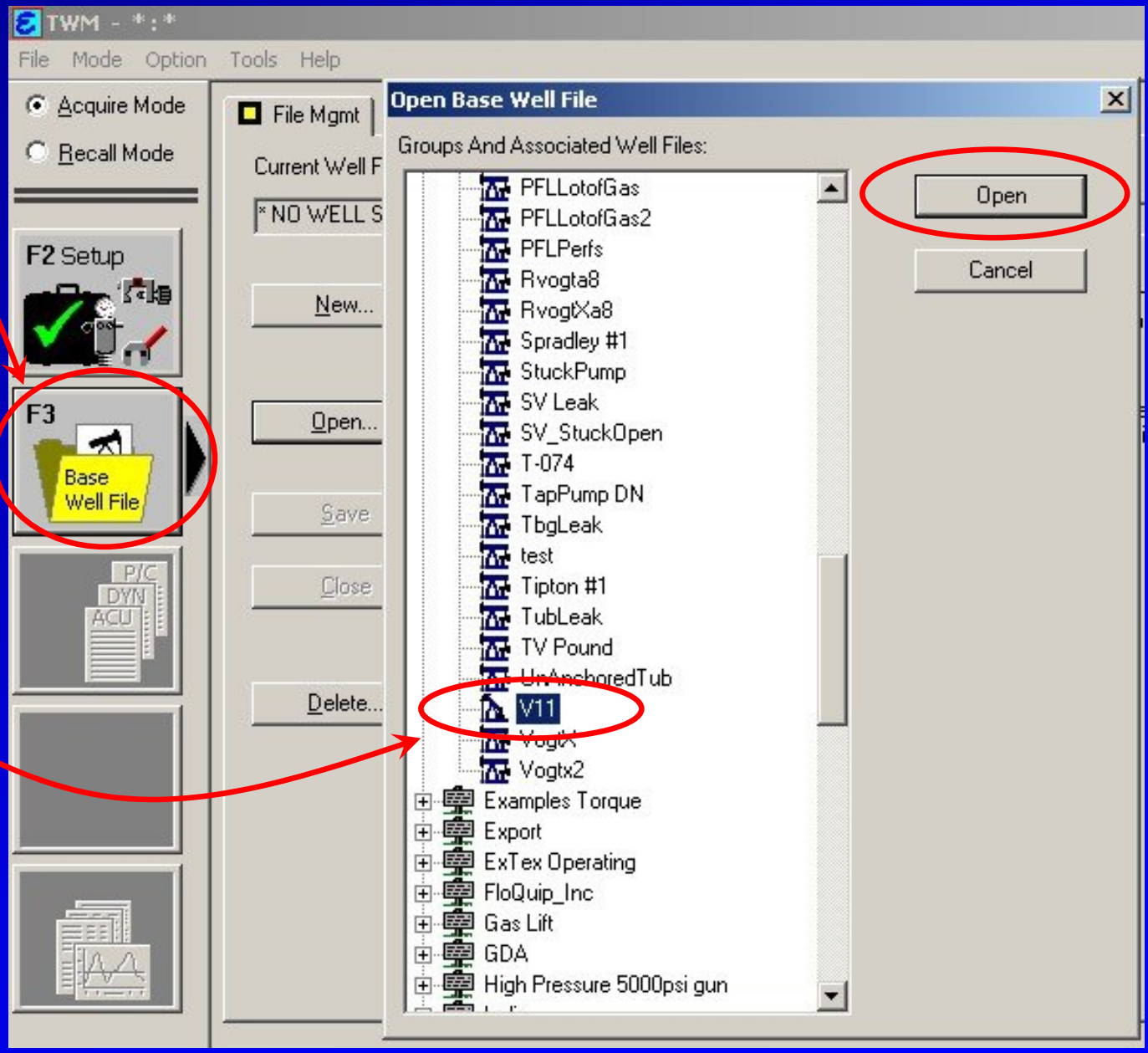


NOTE: Use “Create New”… if HT serial number is not found in the list. Make sure all coefficients are entered as typed on label.

TWM Software – F3 to Select Well

1. Select Base Well File (F3) for the well where data is to be acquired. Use New... to create a Base Well File if one does not exist.

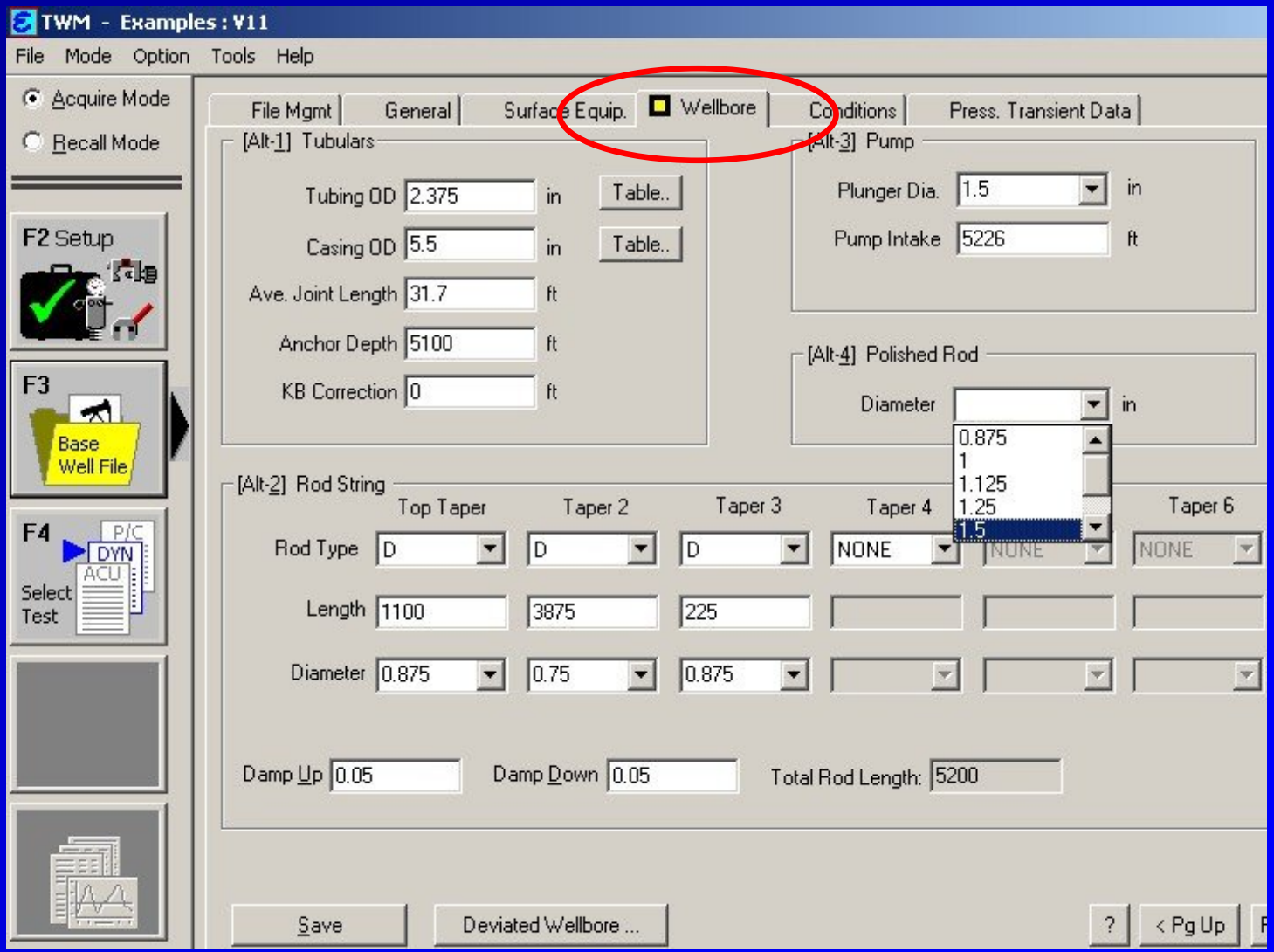
2. Select well from the list of existing wells in the specific group then click Open.



Select Wellbore Tab to Verify Data

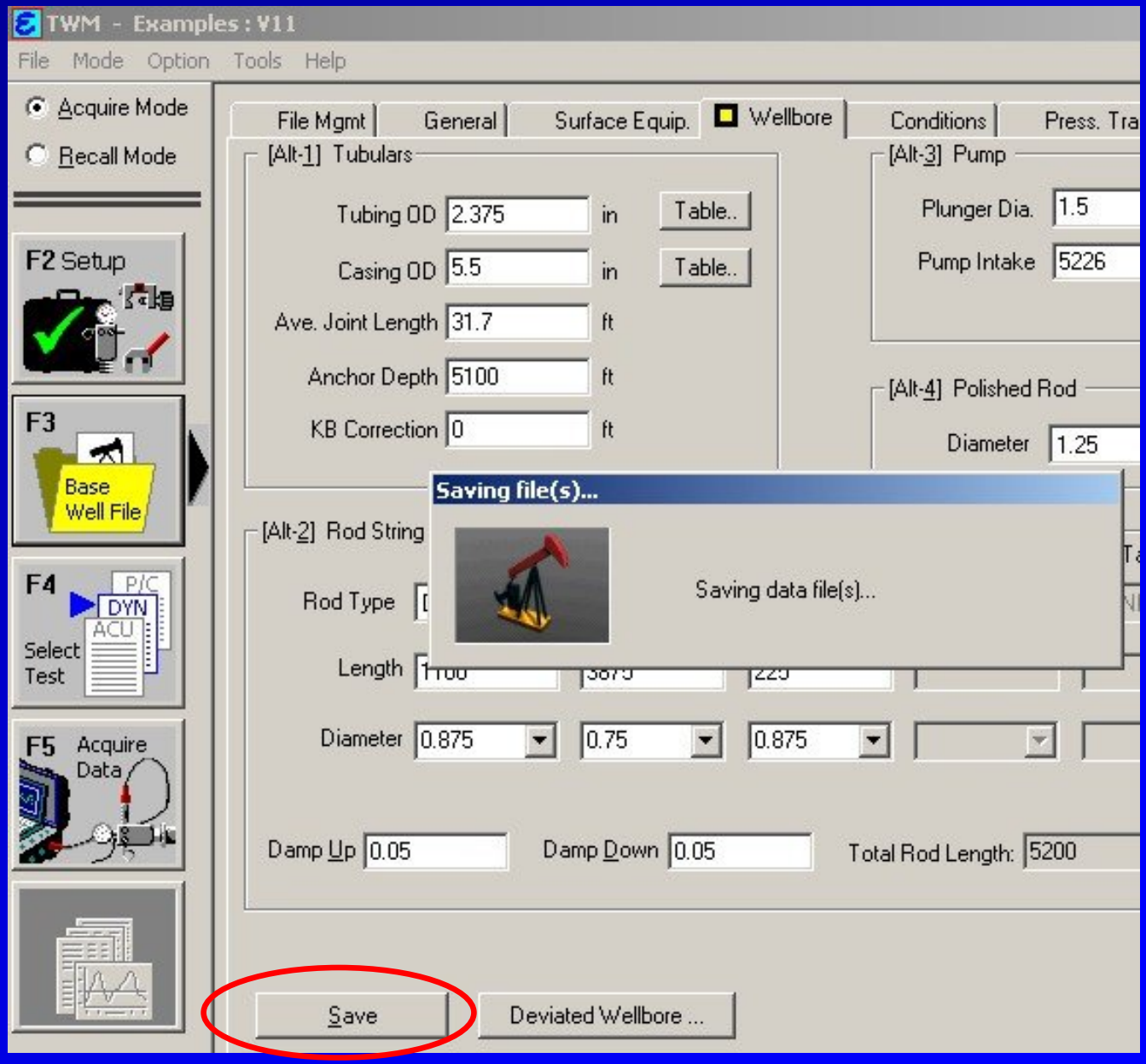
1. From the Base Well File select the Wellbore Tab and verify the data is representative for the well.

2. For HT surveys be sure to enter Rod Type, Rod Length, Rod Diameter, Pump Plunger Dia., Pump Intake Depth, Polished Rod Diameter, fluid gravities, and production rates.



Save Changes to Base Well File

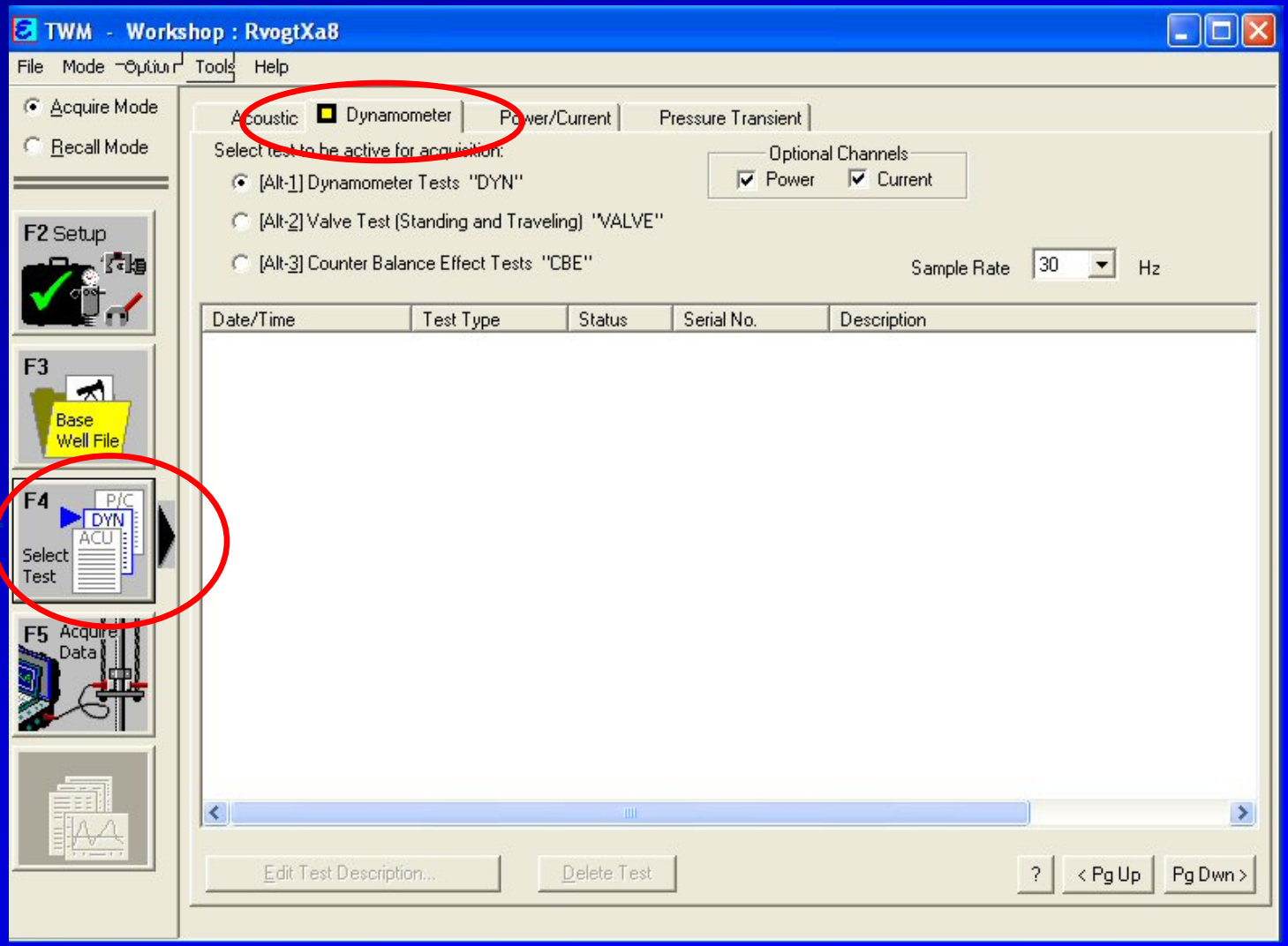
Click the Save button to be sure to record changes to the base well file.



Select Dynamometer Type of Data Acquisition

1. Tap F4 to Select Test type to be acquired.

2. Click the Dynamometer Tab to indicate that DYNO data will be acquired.



Stop the pumping unit carefully, near the bottom of the stroke

For safety purposes after stopping the unit set the brake and disconnect power.

Attach a temporary polished rod clamp below the carrier bar

- Distance between the bottom of the carrier bar and the top of the temporary clamp MUST be greater than the thickness of the 30k HT (at least 4 inches).

- At the bottom of the stroke there MUST still be room for the temporary polished rod clamp to not contact the top of the stuffing box OR the temporary clamp must be removed prior to acquiring dynamometer data.

Remove non load-bearing devices from top of stuffing box

- Remove any equipment , such as a lubricator, incapable of supporting the weight of the rod string plus the fluid load.
- The wellhead and stuffing box must be capable of supporting the weight of the rod string plus the fluid load.

Place stack-off box on wellhead

- Latch the safety chain or retainer bracket on the stack-off box to prevent it from falling off the well head when it contacts the temporary polished rod clamp.

- If a safety chain or retainer bracket is not used, then ensure the area is clear and nothing will be damaged if the stack-off box is accidentally knocked off the wellhead.

Turn ON pumping unit momentarily

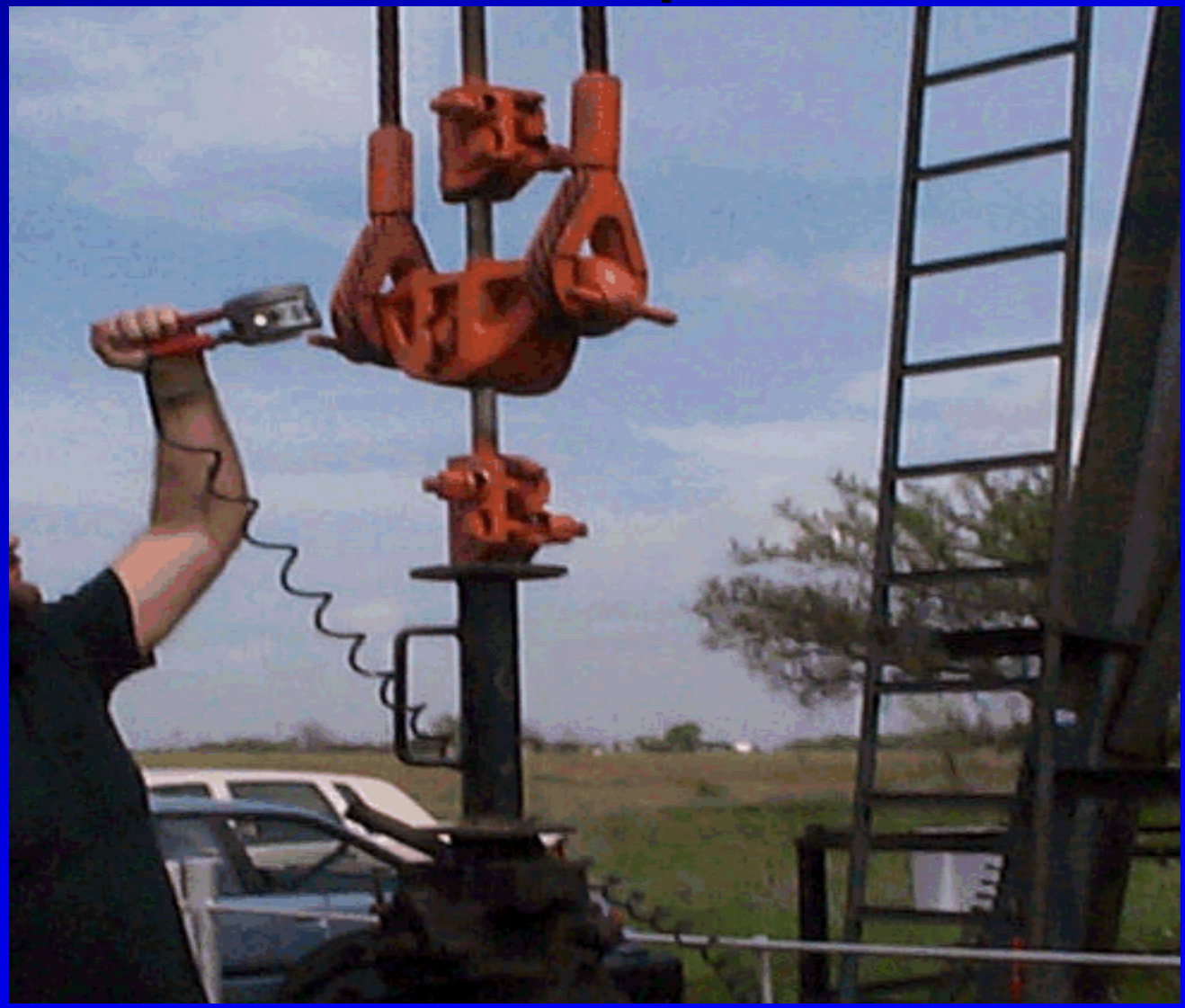
1. Release brake.
2. Use HAND switch to power motor momentarily until temporary polished rod clamp rests on stack-off box and the permanent polished rod clamp is lifted at least 4 inches above the carrier bar.
3. Turn OFF motor.
4. Set Brake.

Carefully stop the pumping unit when clamp contacts stack-off box

- For safety purposes after stopping the unit set the brake and disconnect power.
- When the temporary polished rod clamp contacts the stack-off box the weight of the rod string plus the fluid load will rest on the well head and stuffing box.
- A special stack-off box may be required if the well head or stuffing box is not capable of supporting the weight of the rod string plus the fluid load.

Place the load cell on top of the carrier bar and below the permanent polished rod clamp

- For safety reasons, NEVER place hand between carrier bar and polished rod clamp.
- The brake or temporary clamp could slip.



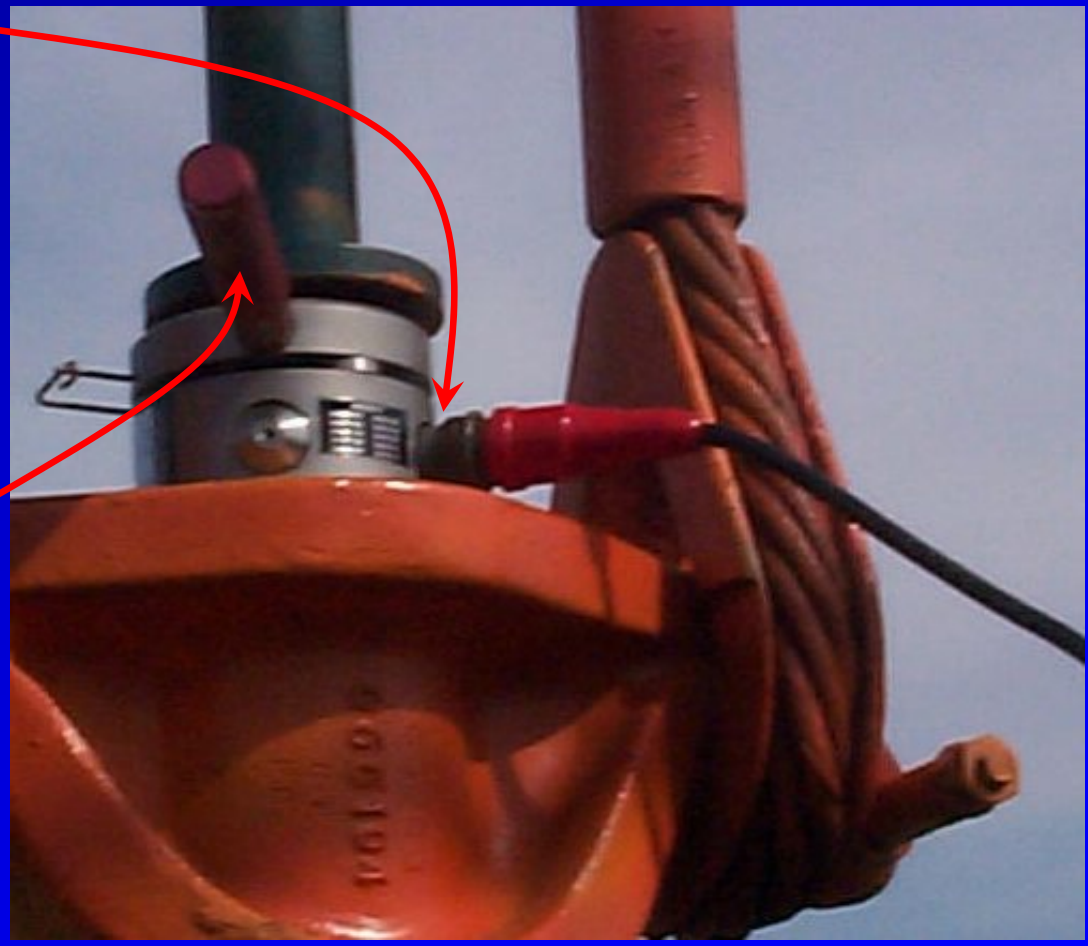
Attach safety pin to secure load cell on polished rod

- Place the 30k HT on the carrier bar below the permanent clamp and any other equipment, such as rod rotator.

- Load data errors may be generated if the carrier bar and clamp do not contact the load cell uniformly.

Use coiled cable with locking nut

- The locking nut prevents the coiled cable from vibrating loose from the plug as the polished rod travels up and down.
- If cable without locking nut is used, wrap cable around handle to prevent cable from unplugging.
- Do NOT allow the horse head to hit the handle of the 30K HT at the top of the stroke.



Prevent the coiled cable from becoming entangled in the wellhead

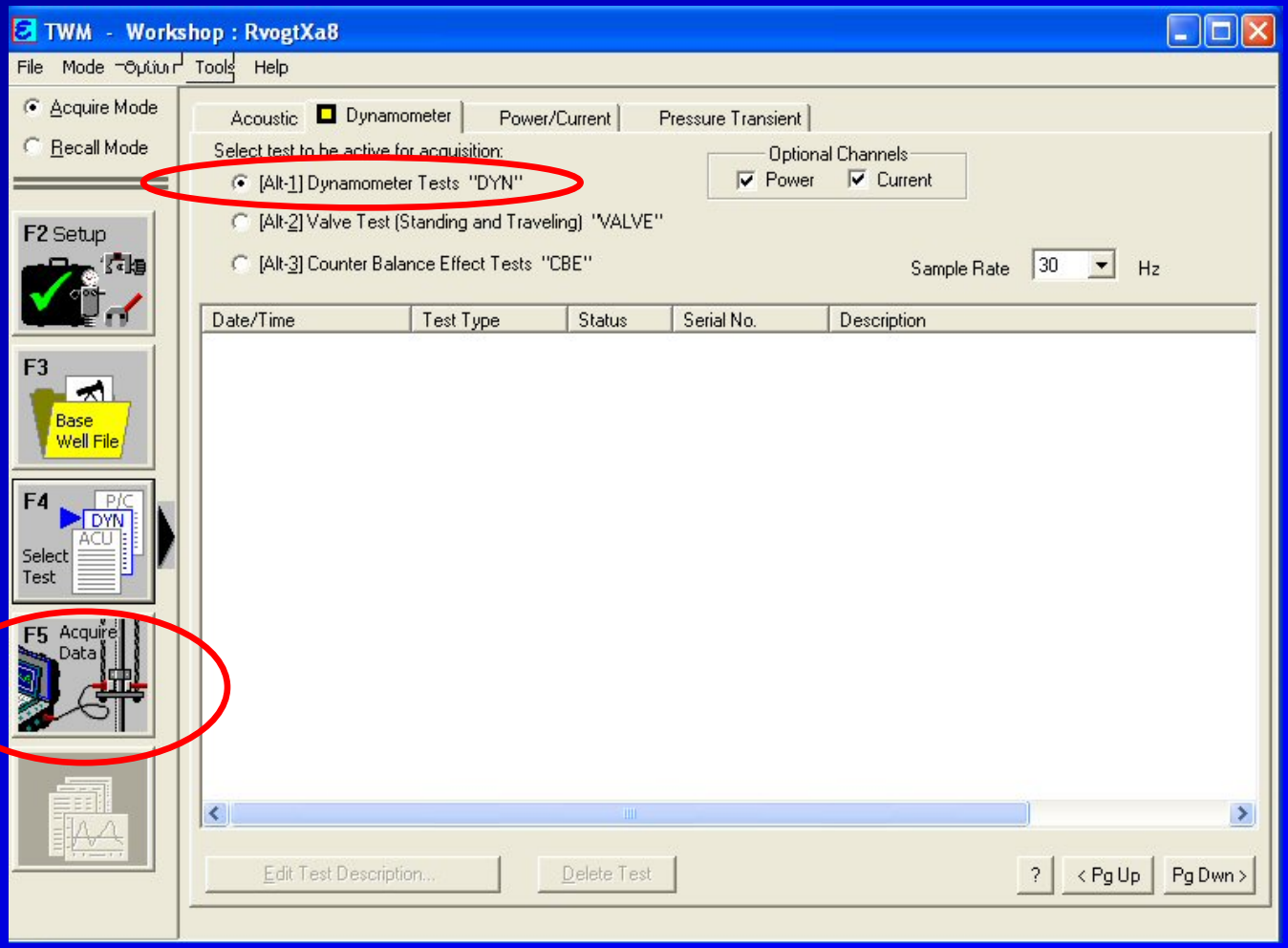
Supporting the end of the coiled cable at a high point, such as the unit's ladder, is a safe way to minimize cable stretch and protect the cable and connectors.

Carefully release the brake, transferring rod load to the load cell and carrier bar

REMOVE Stack-off Box and (if required) remove temporary polished rod clamp before restarting pumping unit.

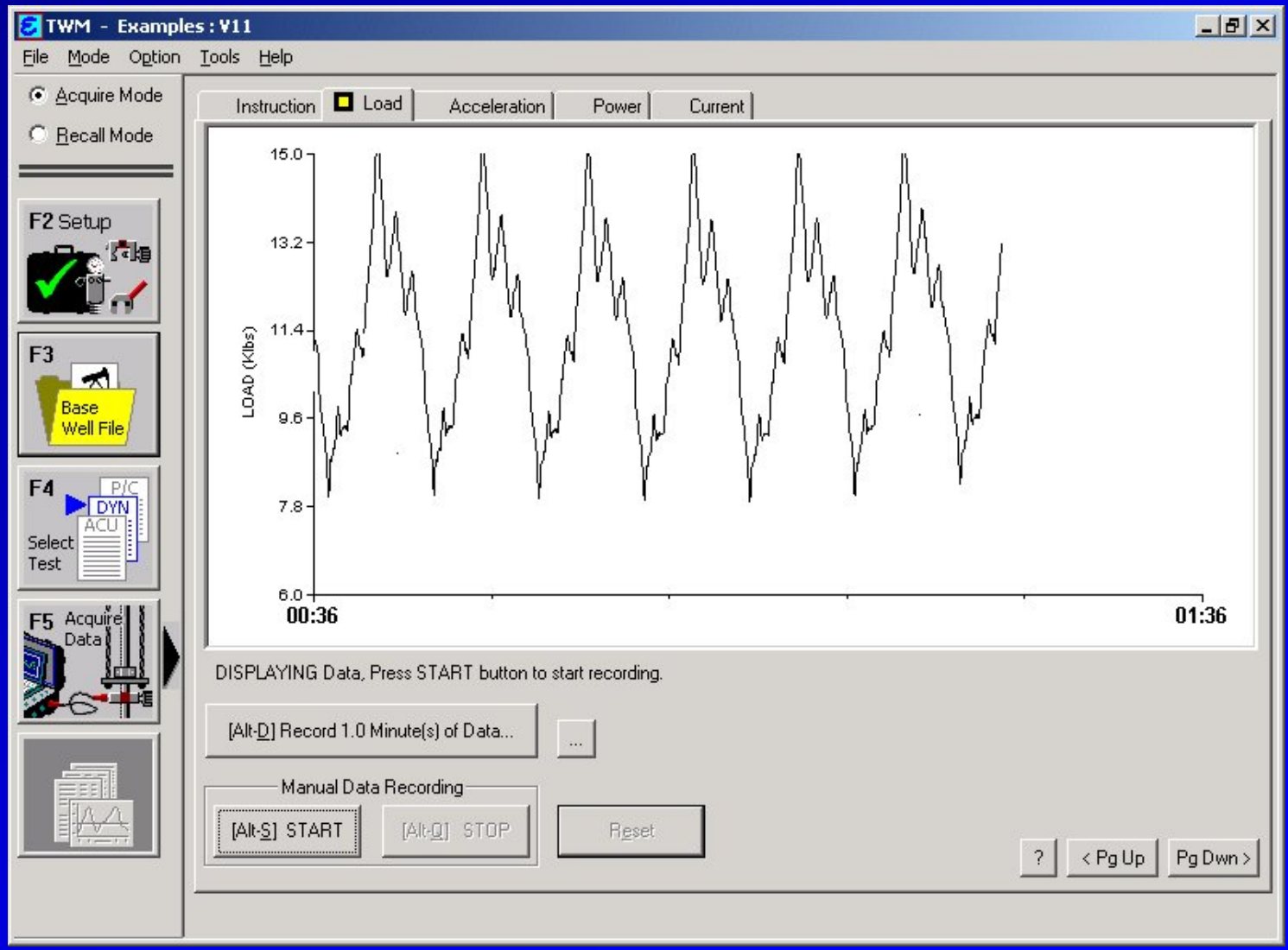
Turn ON pumping unit and return to computer

1. Select Alt-1 Dynamometer Tests “DYN”.
2. Click Acquire Data (F5).



Screen Displays Rod Load vs. Time

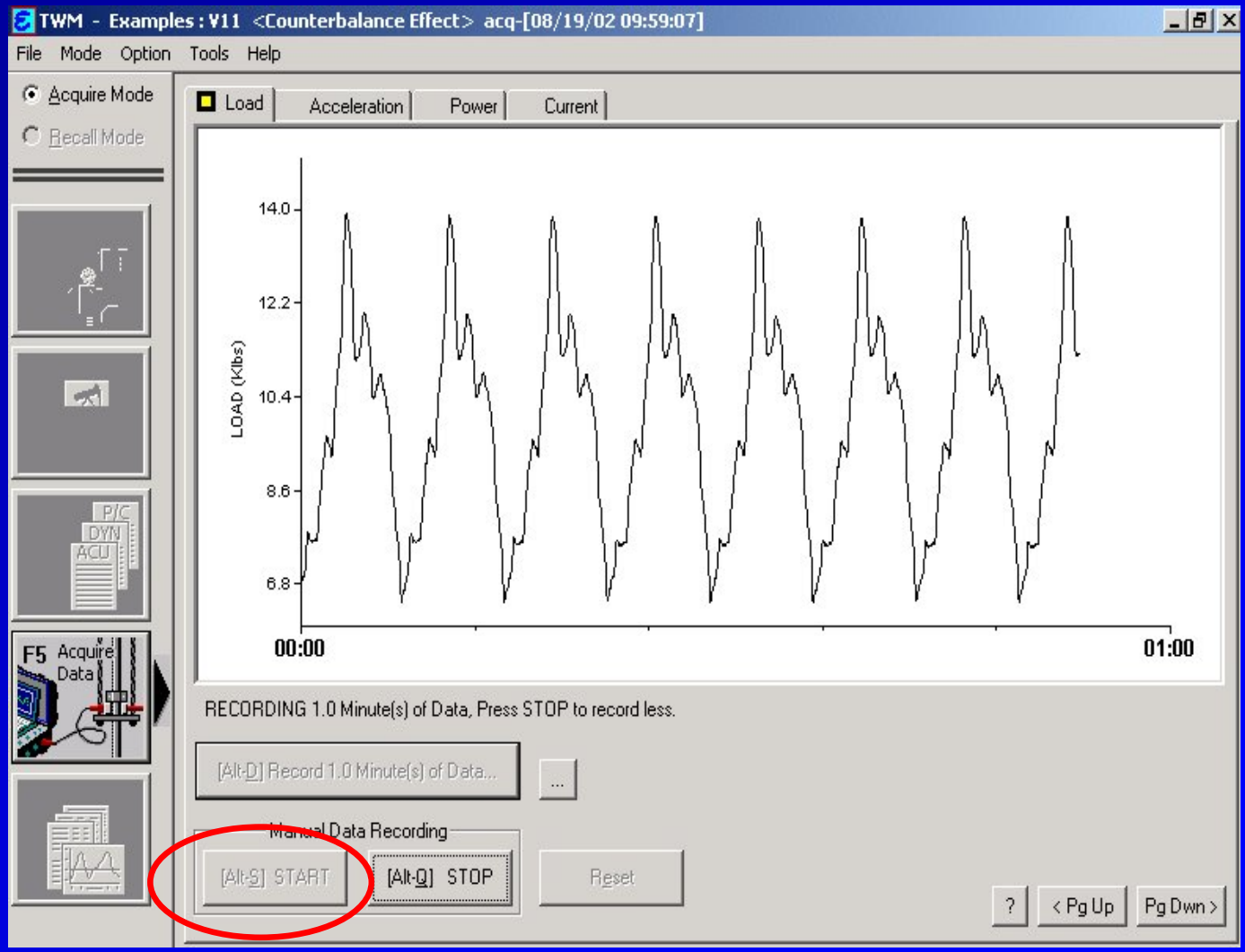
Data is only displayed but not recorded.



Start acquisition of dynamometer data

1. Click START (Alt S) to begin recording data.

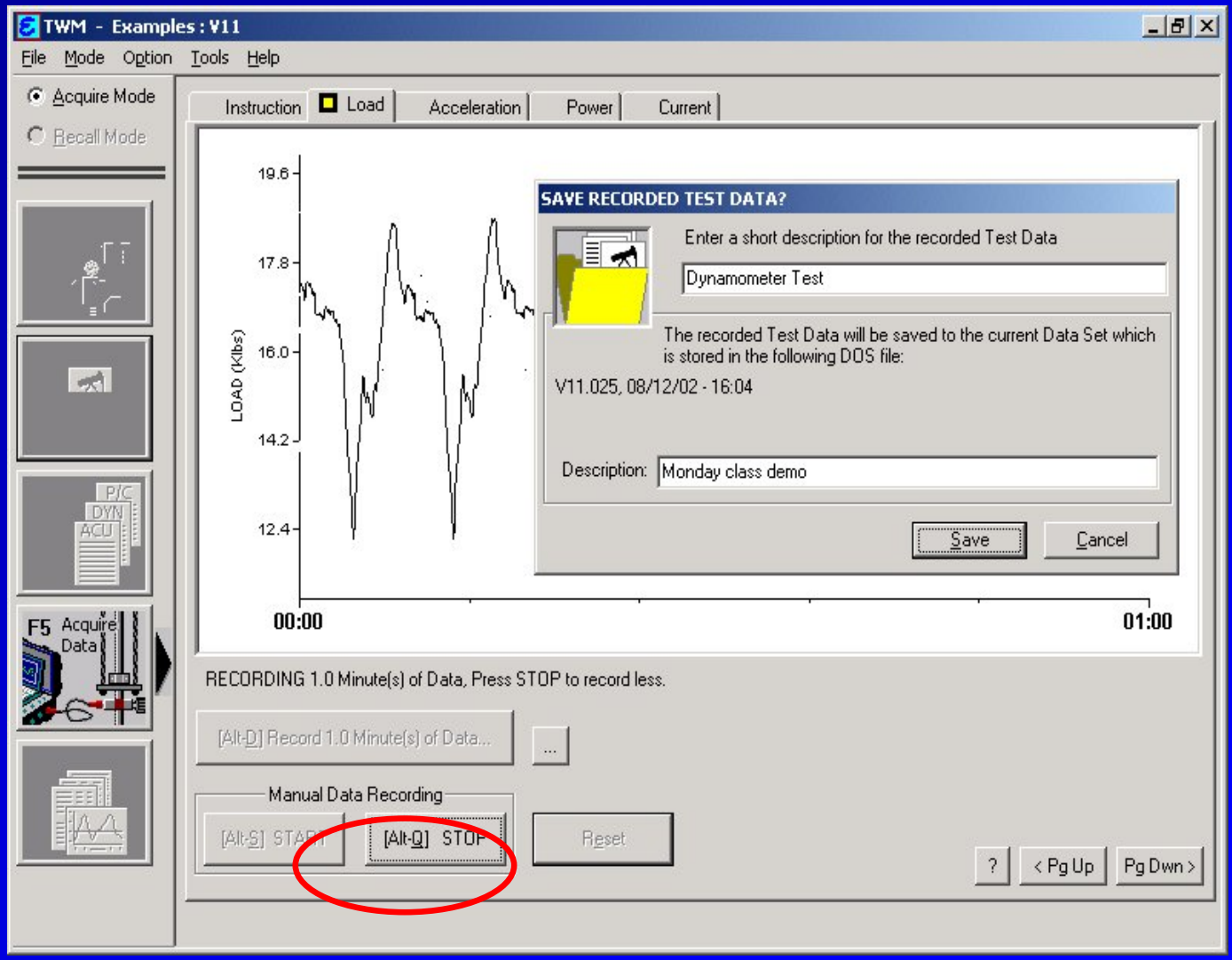
2. Continue recording until pumping unit operation has returned to normal conditions.



Stop acquisition of dynamometer data

Click STOP (Alt Q) to terminate recording data.

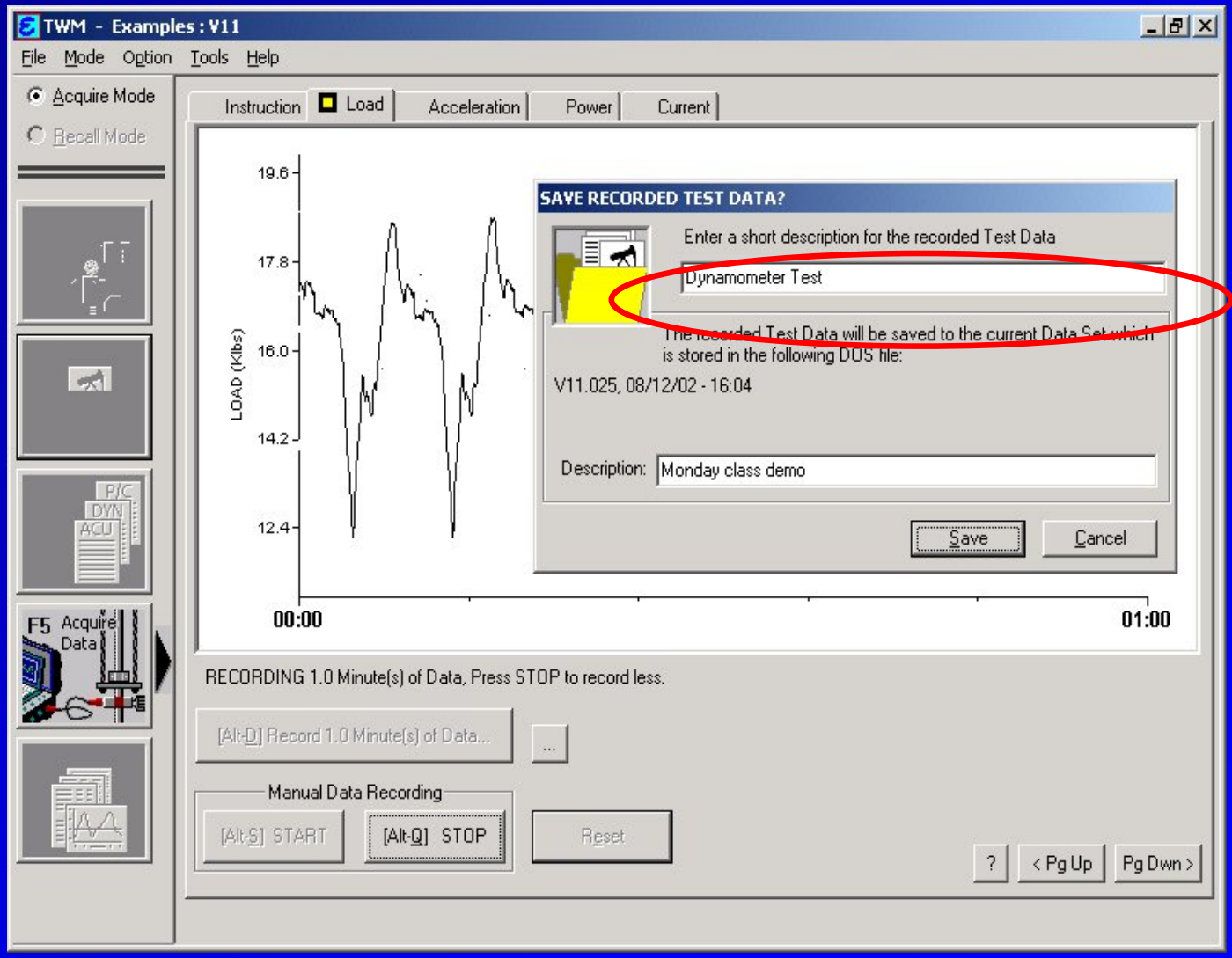
NOTE: program can record dynamometer data for long periods of time.



Save recorded data and annotate

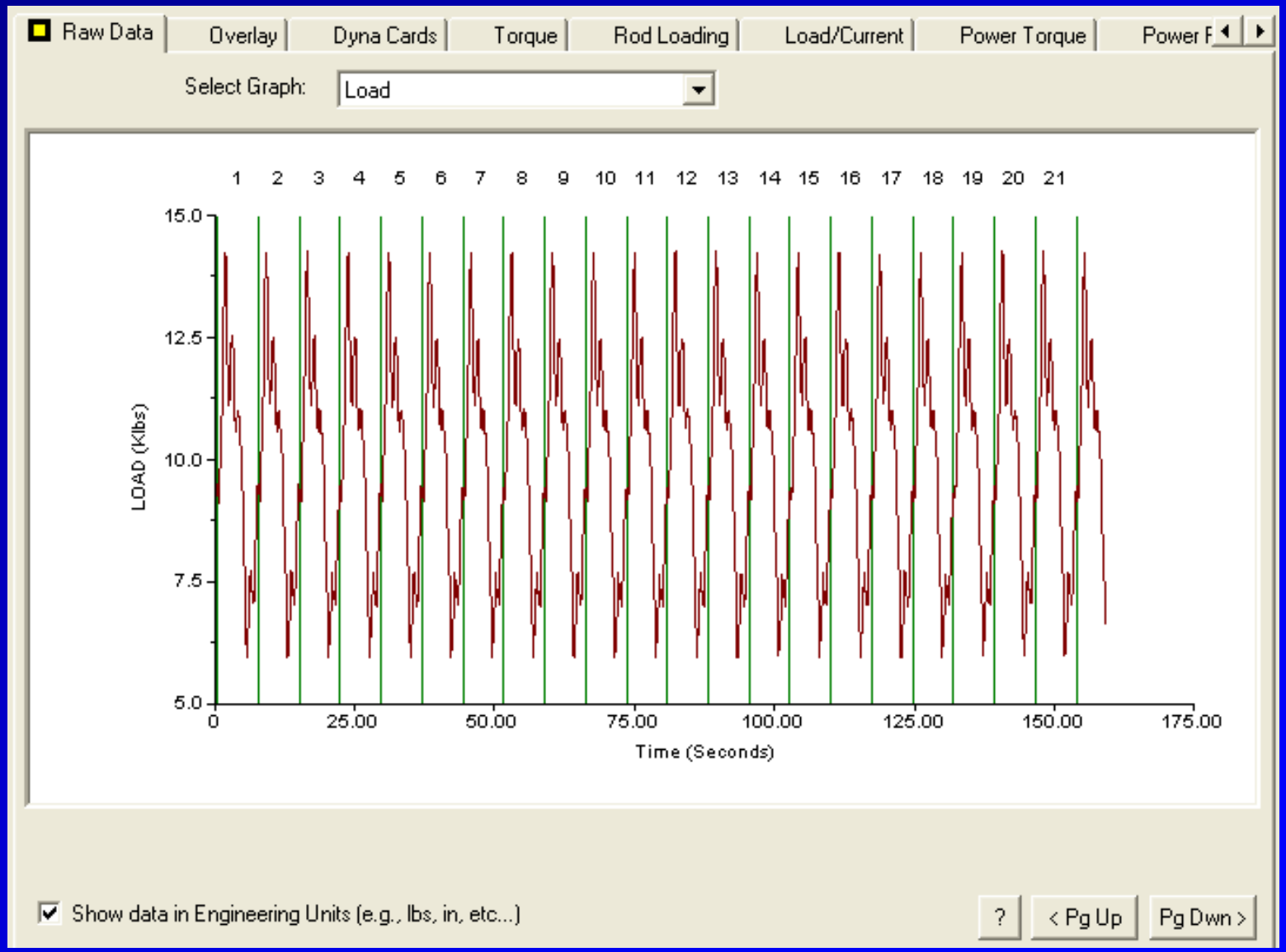
1. Enter a description of the current test to identify something unique or unusual.

2. Click SAVE to store acquired data.



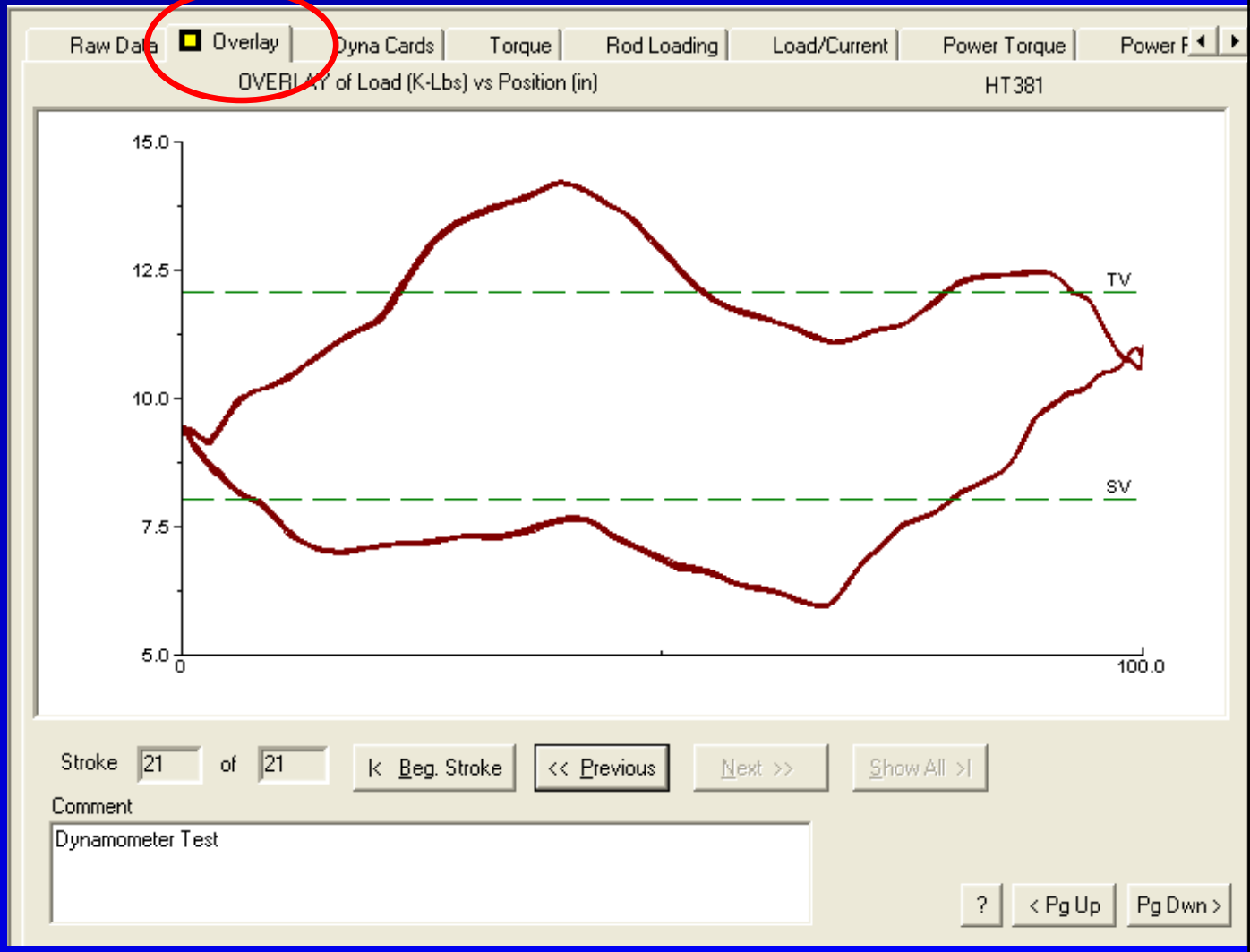
Select Analyze Data (F6)

Polished rod load is plotted vs. time.



Select Overlay tab

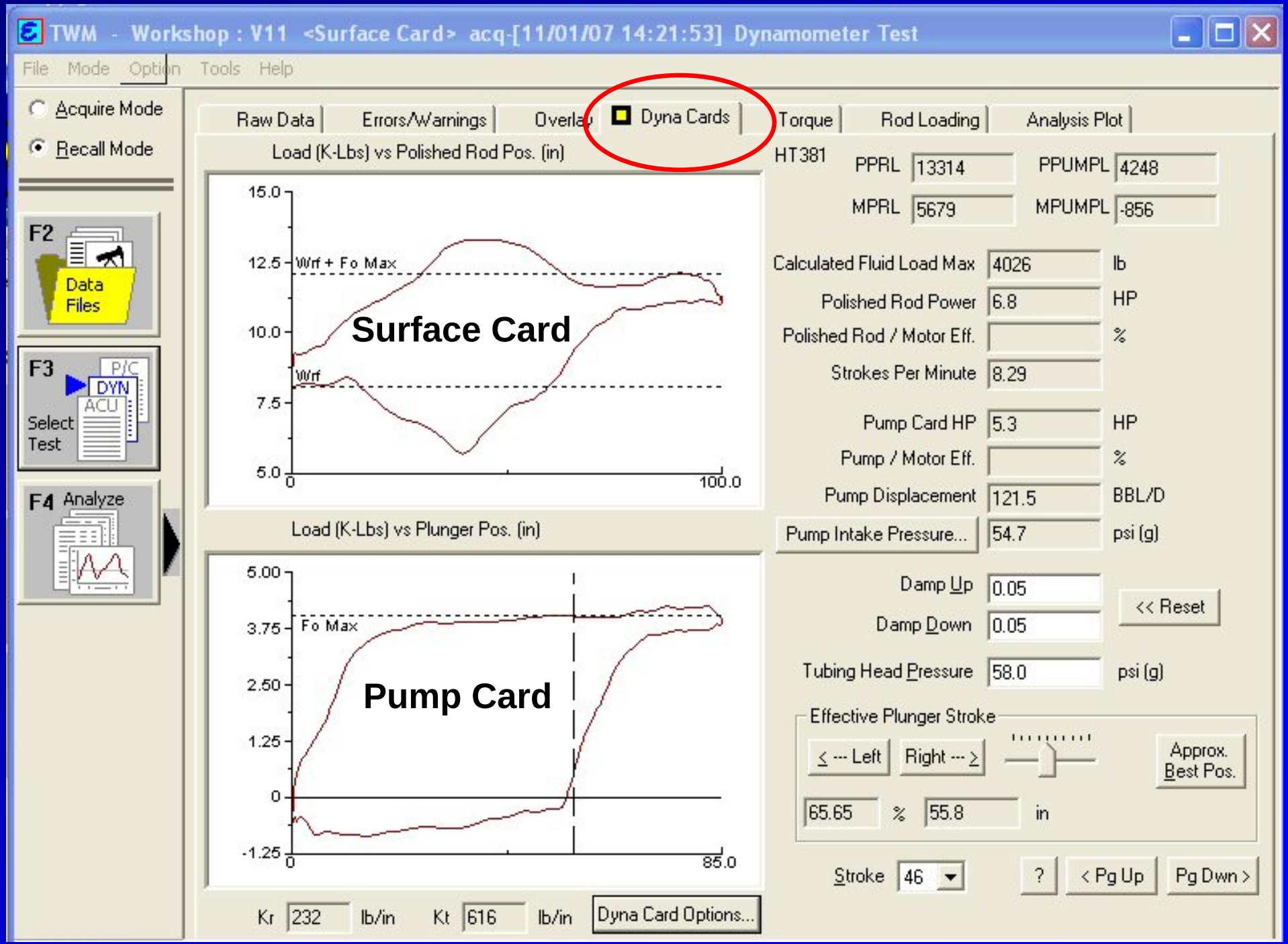
- Compare the recorded dynamometer cards by overlaying data for two or more strokes.
- Operator should verify that the data is representative of normal pumping unit operation.



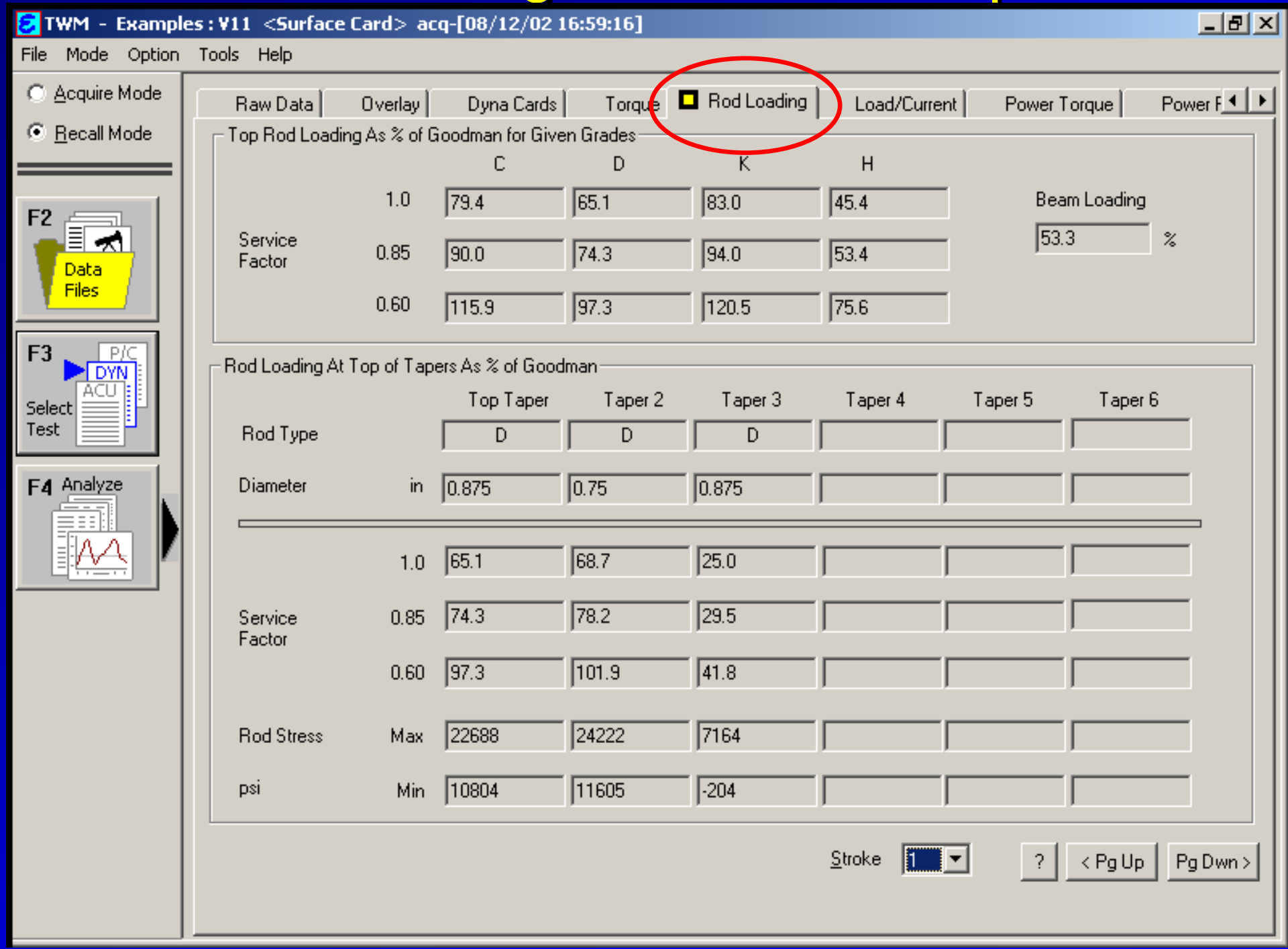
Total Well Management Questions Answered from Analysis of Dynamometer Data

1. What is the pump fillage? And pump displacement?
2. What is the pump intake pressure?
3. Is the well pumped off?
4. What is the current pumping speed?
5. Are the traveling and/or standing valves leaking?
6. What is the polished rod and pump horsepower?
7. Is the downhole gas separator (if present) operating effectively?
8. Are the maximum and minimum rod loads within limits?
9. Is the gearbox overloaded? Is the unit properly balanced?
10. What movement of the counterweights will balance the unit?

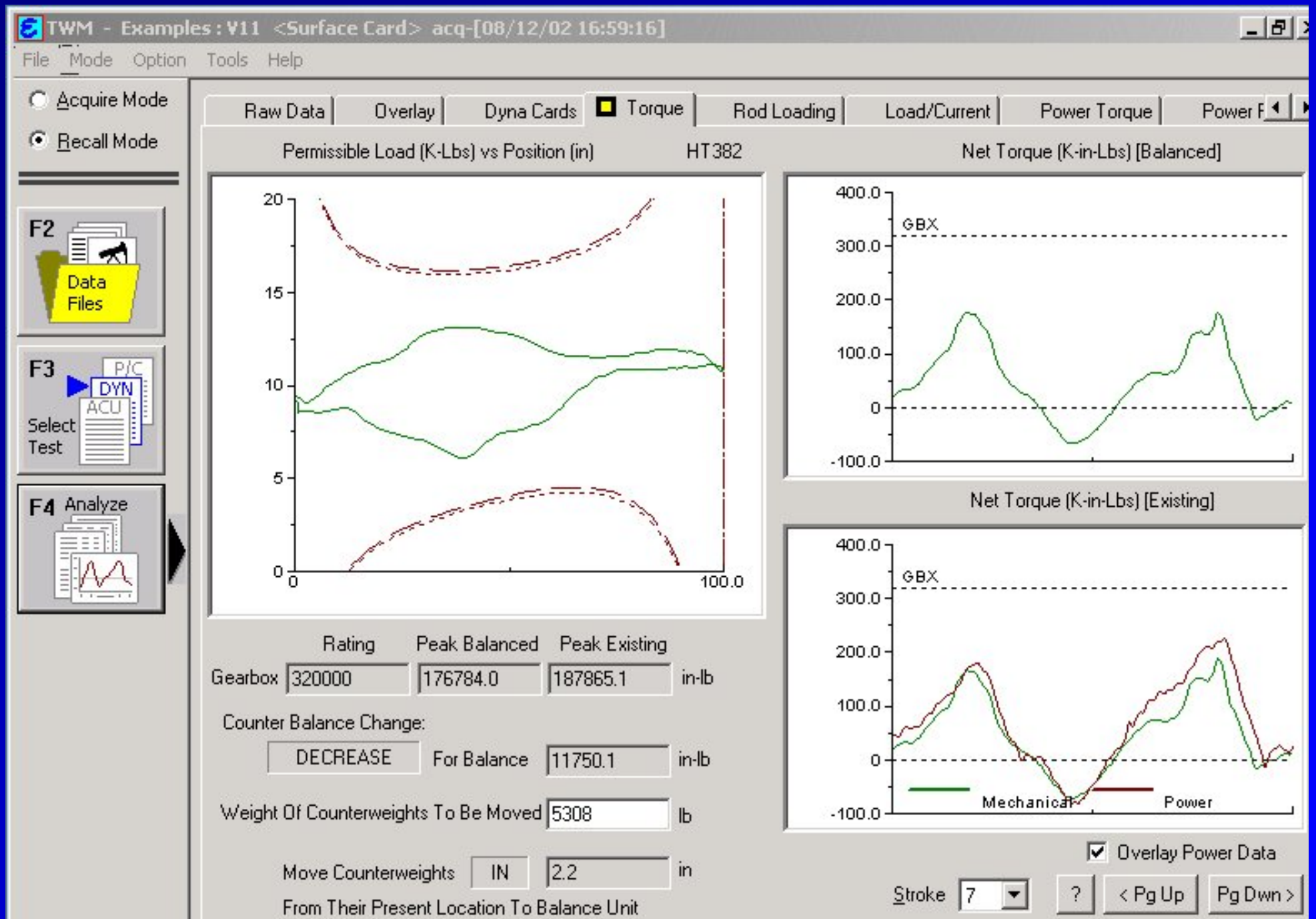
Use Dyna Cards tab to answer questions 1 to 7



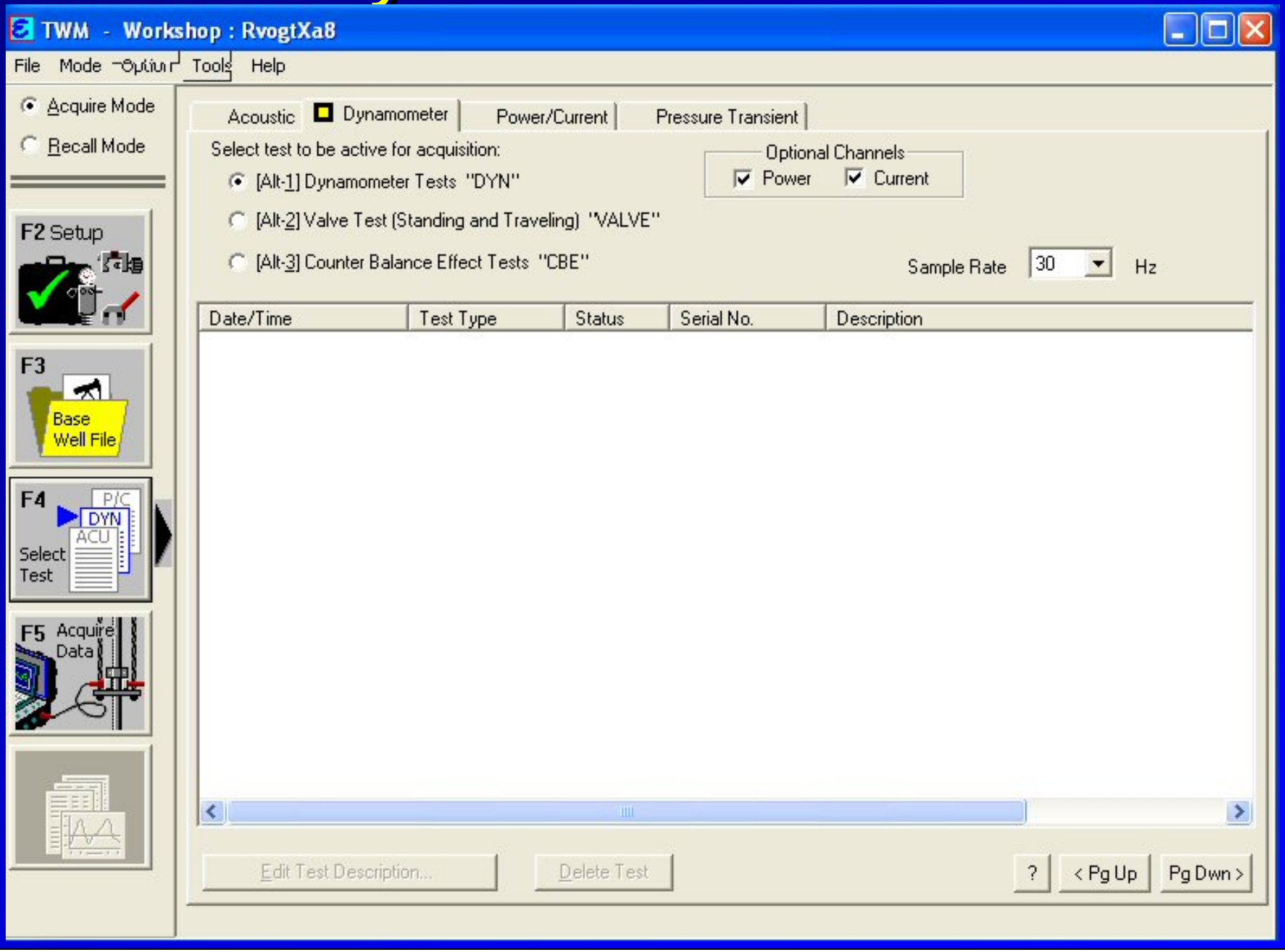
Use Rod Loading tab to answer question 8



Use Torque Tab to answer questions 9 and 10



Repeat acquisition if desired or select other dynamometer tests



At the completion of the Dynamometer Tests, the Horseshoe Transducer is removed as shown in following slides.

Stop the pumping unit carefully, near the bottom of the stroke

For safety purposes after stopping the unit set the brake and disconnect power.

Place stack-off box on wellhead

Carefully stop the pumping unit when the temporary clamp contacts stack-off box

1. Release brake
2. Use Hand switch to power motor momentarily until temporary polished rod clamp rests on stack-off box and load is transferred to the wellhead.
3. Turn OFF motor
4. Set Brake

Remove the load cell from carrier bar

For safety reasons, NEVER place hand between carrier bar and polished rod clamp.

The brake or temporary clamp could slip.

Release Brake and then Replace all polished rod attachments

Restart pumping unit

1. Verify that all valves, piping, well attachments, safety enclosures, etc. are returned to their original state.
2. Place motor switch in original position.
3. Survey location for any cables, sensors, tools etc. mistakenly forgotten.
4. End of Procedure