

FREEPOINT SERVICE

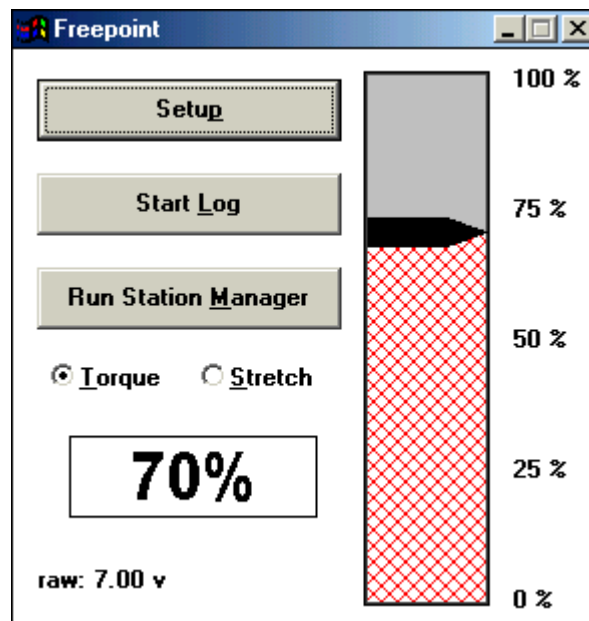
The Warrior system supports freepoint tools that require minimum DC voltage for motorized deployment. This includes Applied Electronics Bowspring and Magnetic tools and Homco tools. Other models of freepoint tools could also be setup in the Warrior system if the frequency of the transponder is known.

CAUTION: Be aware that the tool power and line termination passes through the freepoint board. This means that the freepoint board must be in the Warrior Interface panel or a jumper must be added between pins 10 and 12 on the connector for the freepoint board. Also with the freepoint board in the interface panel, the Routing codes for the system must be properly set up to allow the line to properly connect to the system. (Symptom of improper installation is having tool voltage but drawing no current in other services.)

Frequency style tools such as Homco and Gearhart do not require the use of the Freepoint Board. Signals are processed through the DSP in much the same manner as pulse type tools.

FREEPOINT CONTROL PANEL

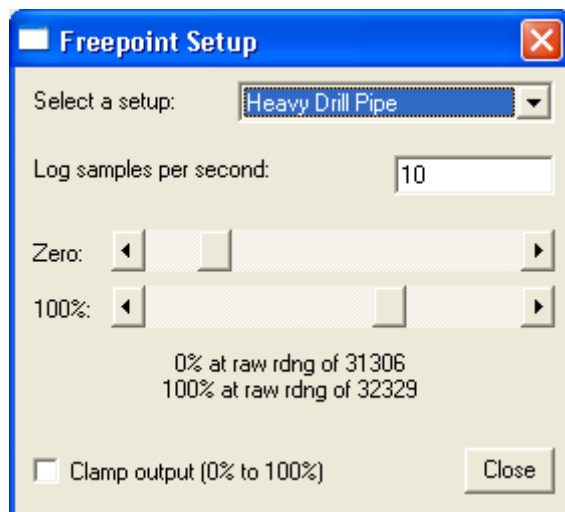
When the freepoint service is first started, the window show below will appear. This is the freepoint service control panel. It shows a graphical



representation of the freepoint output and a text output. It has selection buttons that allow one to select whether the next station is to be run is to be torque or stretch. There are three large buttons that control the freepoint tool setup, starting and stopping time log passes, and station manager access.

FREEPOINT TOOL SETUP

When the **Setup** button on the freepoint control panel is pressed, the window shown below will appear. This is the freepoint setup control panel. Up to six different setups may be saved. Which setup is used may be selected by clicking on the dropdown box and choosing from Heavy Drill Pipe, Drill Pipe,



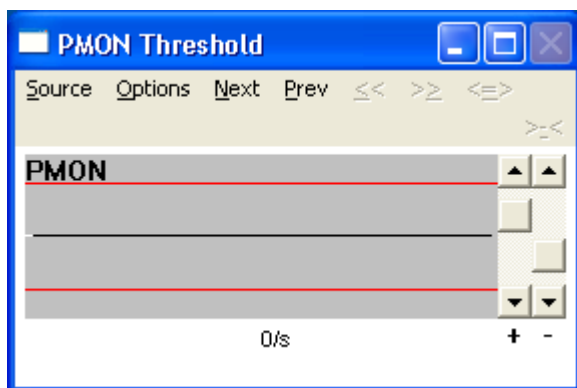
Large Casing, Small Casing, collars, and Tubing. Any changes made to the log sample rate or reading for 100% movement will be saved to the setup that has been selected.

A normal sample rate for the log should be set to 5 to 10 samples per second.

The Zero slider bar is used to set the frequency for when no torque or stretch is applied. The 100% slider bar is used to set the frequency for the maximum Torque or Stretch to be used.

There is an optional check box to clamp the freepoint output to 0% to 100% so that it does not go off of the page on the log.

Remember that the signal in the PMON (pulse monitor) window need to be discriminated properly, similar to a gamma/ neutron service.



Running the Service

Once the freepoint service has been selected and the tool lowered into the well to a depth where the casing is known to be free, the tool should be set and the output zeroed. Stretch or torque should be put on the casing and the 100% movement number adjusted to get near a 100% output reading.

This should be repeated until you are satisfied that the equipment is responding correctly in free pipe. Once satisfied, the 100% Movement number should not be changed while recording stations.

You are now ready to record the first station. Click the Start Log button on the Freepoint Control panel. The system will start recording on time. Have the rig apply torque or stretch and the output will be recorded. When you have seen the tool response, click the Stop Log button to stop the pass. The minimum and maximum freepoint readings will be entered into the Station Manager table at the encoder depth (note that since the encoder depth is used, the log cannot be simulated using the depth simulator. You can only simulate a log by using the encoder and resetting the depth before each pass).

Drop down the well to the depth that you wish to make the next pass and repeat the process. Make as many passes as desired to determine the freepoint location in the well. Each pass will have the maximum output entered into the station manager table.

The depths at which you run the stations do not have to be in descending order. You would normally start at the top of the well, and start doing stations going down. Once stuck pipe is found, you can come back up to a depth between there and your last free pipe station to refine the stuck depth. What ever order the stations are run, they will be entered into the Station Manager table in descending order.

Station Manager

As each station is run, the minimum and maximum values are placed into the station manager table. Notice that the stations can be done in any order but are placed into the table in descending depth order.

| # | Depth | Time | Min | Max | Mode | Driller | Com |
|------|---------|----------|-----|------|---------|---------|------|
| + 4 | 200.00 | 08:33:32 | 2.7 | 98.6 | Stretch | | |
| + 1 | 200.00 | 08:30:34 | 2.0 | 98.2 | Torque | | |
| + 3 | 1000.00 | 08:33:10 | 2.2 | 97.0 | Stretch | | |
| + 2 | 1000.00 | 08:30:56 | 2.0 | 97.2 | Torque | | |
| + 6 | 2000.00 | 08:34:49 | 2.0 | 95.3 | Torque | | |
| + 5 | 2000.00 | 08:34:41 | 2.0 | 94.7 | Stretch | | |
| + 10 | 2500.00 | 08:37:11 | 1.8 | 80.6 | Torque | | |
| + 9 | 2500.00 | 08:37:03 | 2.0 | 80.4 | Stretch | | |
| + 12 | 2600.00 | 08:38:14 | 1.2 | 10.0 | Stretch | 666 | test |
| + 11 | 2600.00 | 08:38:10 | 1.2 | 10.6 | Torque | | |
| + 8 | 3000.00 | 08:36:01 | 1.1 | 2.0 | Stretch | | |
| + 7 | 3000.00 | 08:35:54 | 1.0 | 2.1 | Torque | | |

| Edit Freepoint Survey Station | |
|-----------------------------------|---|
| Station # | 11, shown as 10 |
| Depth | 2600.00 ft |
| Time | Wed Oct 10 08:38:10 2001 |
| Dataset | field/well/run1/pass11/FREEP |
| <input type="checkbox"/> Disabled | |
| Minimum Value | 1.2 % <input checked="" type="radio"/> Torque |
| Maximum Value | 10.56 % <input type="radio"/> Stretch |
| Driller | |
| Comment | |

Once a station has been entered into the table. It can be viewed and edited. Any field except the station # can be edited. This can be useful to make your final presentation more acceptable. There is a check box to disable the station so that it will not be included in the final log presentation in the event that the tool slipped or something else occurred to make the station invalid.

When all of the stations have been edited as desired, the final log presentation can be made by clicking the **Generate** button, and then click the **Depth Log** button.

| Generate: |
|-----------|
| Depth Log |
| Close |

| Generate Depth Log: | |
|--|-----------------------------------|
| Destination | Database: c:\warrior\data\test.db |
| | Dataset: field/well/run1/_dlog3_ |
| | Format: FREEPD |
| <input type="checkbox"/> Logarithmic Interpolation | |
| Auto Merge | /field/well/run1/pass13/CCL |
| | Add |
| | Remove |
| | OK |
| | Cancel |

There is a check box for Logarithmic Interpolation that will produce a slight smoothing effect to the output curves. Additional curves from the same database, such as a CCL or gamma ray, can be auto merged into the output. When the **OK** button is clicked, the interactive plot will be presented on a 1/2" /100' scale.

Using the Plot Job Editor, a presentation can now be made for the customer. This will normally include a heading, the freepoint survey table, the generated depth log. The individual station passes could also be included and a tool string diagram if desired.