TECHNICAL BULLETIN #08112501

CURRENT SETTING WITH MULTITRONIC II FIRING PANEL

The Multitronic II Firing Panel has been used in the perforating industry for several years. Unfortunately it seems that there is still some confusion in regards to the Voltage Adjustment and Current Settings in the software. This technical bulletin describes a recommended practise to set up the software adjustable parameters. In any case, please also refer to the edet trouble shooting guide (FP080927 Trouble Shooting Guide DYNAenergetics edet.pdf).

Short guide

1. Do voltage test when several hundred feet in the well
   Record the adjusted voltage
2. Set current values to default
3. Do a switch test
   Print switch test table or record values for plausibility check
4. Plot and compare all current values for the switches and igniters
5. Determine the min and max current values for the switches and igniters
   Readjust the current settings (Sequence A for switches and Sequence B for igniters)
6. Any errors given at a later point in time when doing a new switch test or preparing to fire a gun will indicate an error down hole
7. Record the dump file under a new name for submission as part of a failure report

Detailed description

1. After setting up the perforating string and running in hole it is recommended to do a voltage test. Record the adjusted voltage. It is not recommended to do additional voltage tests once the string is in the well. The voltage is set using the properties of a Zener Diodes in the switches. The properties of the Zener Diodes changes with temperature. A voltage test with a heated Zener Diode may result in a wrong measurement causing a too high voltage that may damage the top switch. The changed properties of the Zener Diode will not have any effect on the function of the switch.
   If the software has to be restarted please set the voltage manually to the previously determined and recorded value.
2. Set the values in the “Current Setting” window to default if you do not know the values from previous runs.
3. Perform a switch test. A switch test can be done at any time and as often as required while the perforating string is in the well. During the switch test the measured currents are displayed on the screen and a switch test table is saved by the software. This table can be viewed and printed in the menu under “View” “Switch Test Table”.
   Every time a switch test is made the values are overwritten with the new measurements. It is recommended to either print the initial switch test table or to record the values. Once this is done the values should be checked for plausibility (see 3.).
   The measured values show us the current draw of the individual perforating string components (switches and initiators). The current draw is dependant on the voltage that has been set and on any other devices run in the perforating string (such as a CCL). Further any bad insulation will cause current leaks. Generally it can be said that the current will increase with the number of switches.
   If you have set the values to default and are getting error messages during the initial switch test adjust the values accordingly so that you can perform a complete switch test.

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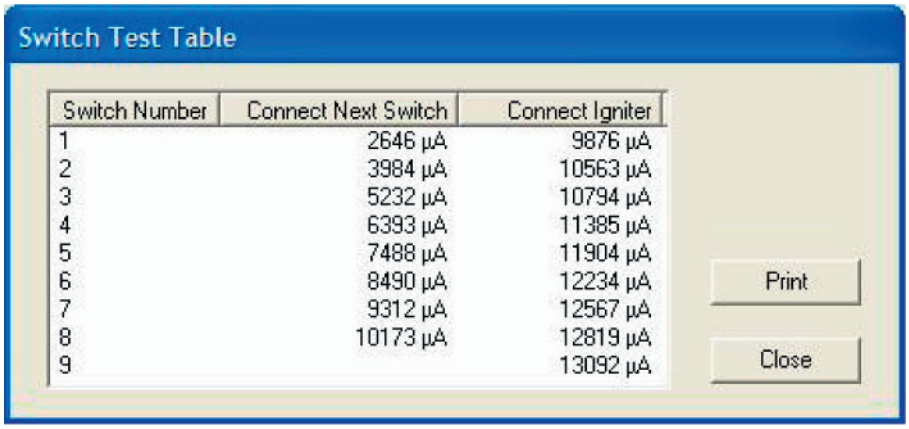
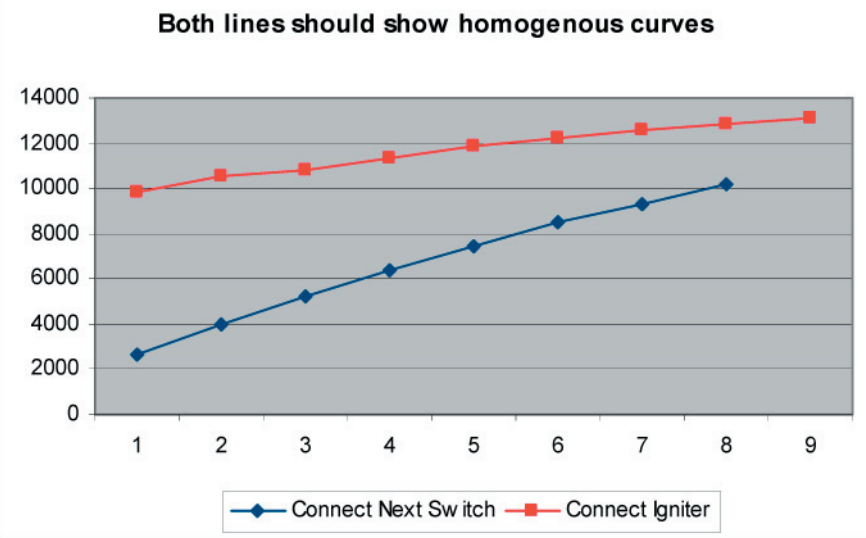
4. The measured values of the currents displayed in the switch test are used for two tasks.
   Task one is to check for plausibility. Task two will be the determination on the correct current setting.
   Task 1
   To check for plausibility the measured current values from the switch test table have to be viewed.



It is recommended to create two tables in a spreadsheet (i.e. Excel). The first table should contain the "Connect Next Switch" current values and the second table should contain the "Connect Igniter" current values. Both tables should be plotted as lines. Please see below for the above example.



What you will see is the incremental increase in current between guns. Both plotted lines should show homogenous curves. If one of the switches or detonators is malfunctioning there will be a jump in the homogenous curve. If you do have a jump in a curve this will indicate a downhole problem in the appropriate component. See example below where we have a too small current in detonator 4. Most likely this detonator is not connected.

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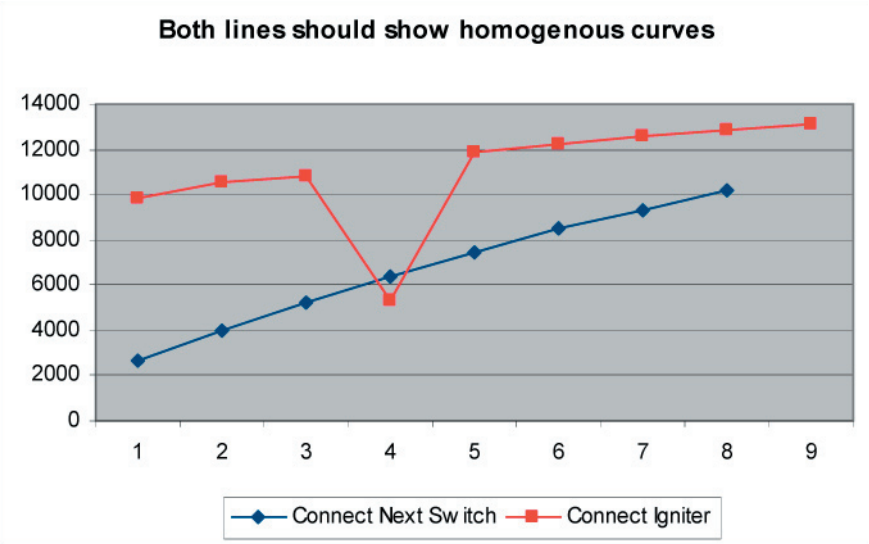

5. Task 2

   Once you have determined that the measured currents do not indicate that you have a problem you should calculate the optimum current settings. Determine the minimum and maximum current increase for the switches and igniters. To do this make the following calculations:

   - Subtract "Connect Next Switch" value of switch one from that of switch two. Increase this value by 15%. The result should be taken as your "Max current increase" value for Sequence A.
   - Subtract "Connect Next Switch" value of the second last switch from that of the last switch. Decrease this value by 15%. The result should be taken as your "Min current increase" value for Sequence A.
   - Subtract "Connect Next Switch" value from the last switch from "Connect Igniter" value of the last igniter. Decrease this value by 15%. The result should be taken as your "Min current increase" value for Sequence B.
   - Take the "Connect Next Igniter" value from the first igniter and increase this value by 15%. The result should be taken as your "Max current increase" value for Sequence B.

   These values should be taken as a guide for the current settings. Returning to the current setting window under "Settings" "Current ..." please reset the limits to those calculated as described above. The Sequence A is the sequence for the switch and the Sequence B is the sequence for the initiator. In the above example the setting should be set as following:

	Sequence A Switch	Sequence B Initiator
min Current increase	730	2480
max Current increase	1540	11360

6. With the above recommended limits for this scenario any downhole problems which might occur at a later point in time should be reported by the software if a new switch test is made.

   The error message will give an indication on where in the string the problem is. Further, analysing the error message a determination should be possible on the nature of the problem.

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7. Every time the Multitronic software is started a dump file is written and stored on the computer. The dump file is put into the folder into which the Multitronic software has been installed. The name of the dump file is "Message1.txt". The software will store a maximum of four dump files. They are numbered 1 to 4. If the software is started for a fifth or further time the software starts to overwrite the oldest file. In this dump file a record of all steps made during the job, as well as all voltage, current and settings values are recorded. If you should experience a problem please save the dump file under a new name while also recording the panel serial number, the software version used as well as a sketch of the tool string and downhole conditions. This saving should be made directly after closing the Multitronic software of the run in which the problem occurred. This way an overwriting of the file will be prevented. Please submit all of this data to DYNAenergetics by e-mail (dynawell@dynaenergetics.com). In case of any questions please call your nearest DYNAenergetics representative. You can find all necessary contact details on the DYNAenergetics web site (www.dynaenergetics.com).