RoeTest – Computer Tube Tester / Tube Measuring System
## (c) - Helmut Weigl   www.roehrentest.de

Regeneration of tubes: (Starting with software version 7.1.0.0)

Preliminary note:

Many tube types are out of production since decades and are getting rare.
For this reason regeneration of tubes has again become important. The RoeTest
can supply the needed power to regenerate many receiver tubes
(up to 600V, up to 250mA). Regeneration is supported by the software. The progress
of regeneration is displayed in a graphics.
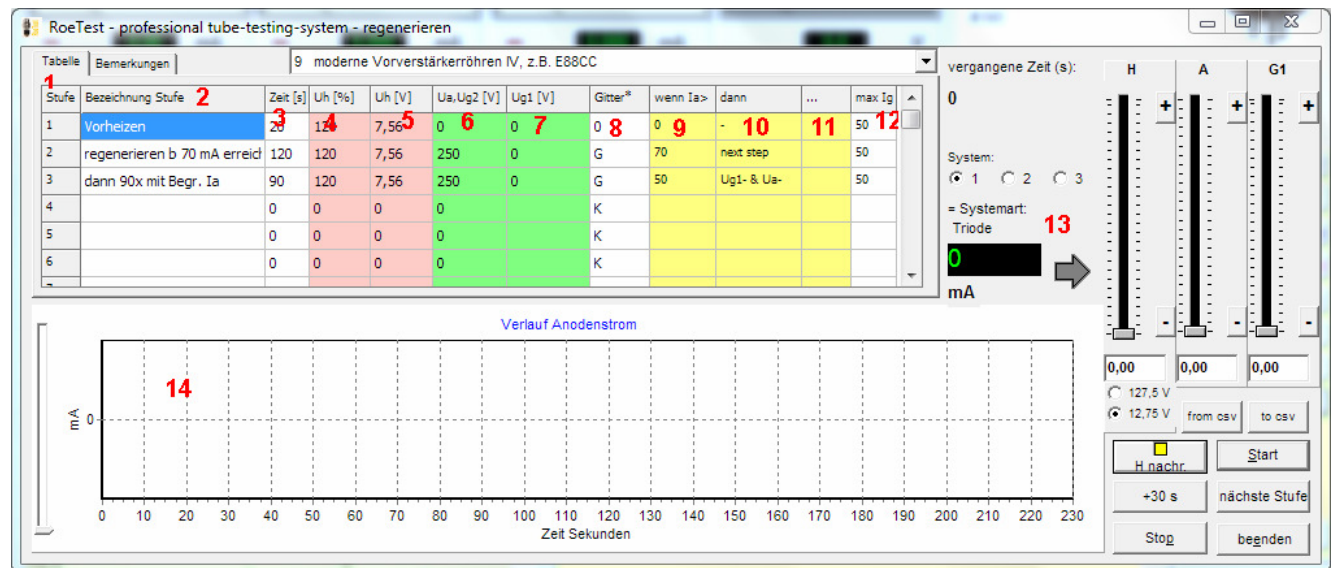
Different modes can be stored in the regeneration database. These modes can be
assigned to the specific tubes (tube database) or be selected in the regeneration window
(see picture above). In the regeneration window the data may be individually changed
(these changes are not permanently stored).

Meaning of the data in the table:

1.   Regeneration step (up to 20 Steps are possible)
2.   Name of the regeneration step (free text field)
3.   Time for the regeneration step in seconds
4.   Heating voltage %
5.   Heating voltage V (calculated from % and the nominal heater supply voltage)
6.   Anode and screen grid voltages (these two electrodes are connected to the
anode voltage source – up to 600V and up to 250mA.
When this field is left empty the last present, probably by software reduced value
will be used.
7.   Voltage G (may be connected to G1 – up to 300V and 50mA).When this field is
 left empty the last present, probably by software reduced value will be used.
8.   The grid G1 can be left unconnected (empty field) connected to ground (0) or
 to a positive voltage (G)
9.   Limit of a certain anode+screen grid current;
10. Defines what action shall be performed when the limit of anode+G2 current is
     exceeded
11. Destination of jump (regeneration step) if in column 10 "goto" has been selected
12. When exceeding this value of the G1 current the positive G1 voltage is decreased

13. Shows the sum of anode screen grid and G1 current and its tendency
14. Slider to change the graphics resolution

additional information for column 10

In column 10 can be defined what shall happen **when the anode current*) defined in column 9 is exceeded**. There are the following possibilities:

-	No action
next step	Jump to the next regeneration step
stop	Stops regeneration mode
Ua-	The anode voltage is slowly decreased until the anode current drops below the value defined in column 9.
Ug1- & Ua-	First the positive G1 voltage is slowly reduced until the anode current drops below the value defined in column 9. If the anode current is still too high next the anode voltage is reduced until the anode current drops below the value defined in column 9.
Uh-	The heater voltage is slowly reduced in steps of 0.5V until the anode current drops below the value defined in column 9.
Uh--	The heater voltage is quickly reduced in steps of 0.5V until the anode current drops below the value defined in column 9.
goto	When the anode current exceeds the value defined in column 9 a jump is done to the regeneration step defined in column 11 (conditional jump). If the current defined in column 9 is very small the jump will in practice always be taken (unconditional jump). This way you can program loops if really needed.

*) with pentodes anode and G2 are both connected to the anode voltage.

Heater voltage range

The following logic is used after starting the regeneration mode:
If the largest appearing voltage in the table is within the small range use the
small range otherwise use the large range (unless the current in the large range
is insufficient). Before starting the regenerating process the range can manually
be changed. During regeneration a change of the heater voltage range is not possible.

Storing the regeneration modes

When developing a new regeneration mode the data will be entered temporary
to the regeneration window and then tested. I intentionally have not built in a direct
storage possibility to the regeneration data base as there is the potential to erroneously
overwrite existing regeneration modes used for other tubes. Instead there is the
possibility to store the data from the regeneration table temporarily to a csv file
(and also to load those data). This way it is nevertheless possible to import the data
into the regeneration database and store the csv data either to an existing or to an
empty data set.

Regeneration process:

• Inset tube
• When using larger tubes eventually manually insert a lighting bulb into the anode and
    screen grid connection
• Load the tube data
• Go to the regeneration window
• Select desired regeneration mode
• Press button <start>
• Now the regeneration process runs automatically if not intervened manually
• (manually switch to the next step, extend step by 30 seconds or button <stop>)
• It is possible to change the voltages during the regeneration process using the sliders
• When the defined current for A or G1 is exceeded the voltages will be automatically
• reduced.
• The progress of the regeneration is shown graphically

In addition to operating the sliders and the stop button with the mouse they can
also be controlled using the keyboard:

Concerning the tubes:

Not all tubes can be regenerated. Even tubes of the same type may show different
behavior when regenerating. Here you have to try. Regeneration always includes
the risk to totally destroy the tube. But as the tube was already not usable before
not much is lost.

Please check the tube before starting for short circuits. Also watch the currents
during the regeneration process. When in doubt (too high currents) please switch
off immediately. There is the possibility for short circuits to show up when the tube
is heated.

You should watch the tube (glow of the anode plate, voltage flash over …).

I suggest that you read appropriate literature for regenerating tubes before the first try.

Keep in mind not to thermally overload the RoeTest. The **continuous currents** for
anode and screen grid shall not exceed 250mA, those for the grid connection
shall not exceed 50mA respectively.

Regeneration modes:

I have not tested the stored regeneration modes they only serve as examples. These modes would have to be refined and verified using a larger test series (who wants to perform this task?).

The modes shall be setup so that there is not an abort due to over currents (short circuit detection of the RoeTest). For larger tubes with high currents it is possible to insert lighting bulbs for current limiting. This will also reduce the power dissipation of the RoeTest.