



3.8 Showing all permutations

Every time a key is pressed on the Enigma, a complex poly-alphabet substitution process is started. Each part of the Enigma may translate the keycode into something different until the result is shown on the lamp panel. If you are interested to know exactly how the translation process works, you should remove jumper ⑥ from J1. With this jumper removed, the **Enigma-E** will slow down and show you each permutation as and when it happens.

Here's an example. Turn on the **Enigma-E**. It is assumed that you still have the Enigma setup for the message of paragraph 3.6. Once the startup procedure has completed, the display should show **AMZ I**. Now press and hold down the letter **Q**. The following sequence will now be shown:

<--Q	You have pressed the letter Q on the keyboard,
STCR	this is passed through the Steckerbrett...
<--Q	...and translated into a Q (as there is no stecker in place for the letter Q).
<--Z	The first wheel translates the Q into a Z.
<--C	The second wheel translates the Z into a C.
<--L	The third wheel translates the C into an L
<--B	The greek wheel translates the L into a B.
UKWC	The B now enters the Umkehrwalze...
D-->	...which translates the B into a D.
Z-->	The greek wheel translates the D into a Z.
T-->	The third wheel translates the Z into a T.
P-->	The second wheel translates the T into a P.
U-->	The first wheel translates the P into a U.
STCR	The U is now passed through the Steckerbrett again...
B-->	...and translated into a B

Finally, **B** will be lit on the lamp panel and the display shows **AMZ J**

As the ETW (Eintrittswalze) is connected in a linear fashion (A, B, C, D...Z) it is left out of the equation. The arrows show the direction of the electric current. When a key is pressed, the current flows from right to left, until it hits the UKW (Umkehrwalze) where it is *reflected* back into the wheels. Next the current flows from left to right until it turns on a lamp on the lamp panel. Refer to chapter 6 for a detailed description of the working principle of the Enigma.