agrident

Evaluating contact problems of the rechargeable battery detection

In case the APR500 does not charge the batteries when connected via USB, it is possible that there are contact problems with the spring constants which are located in the battery compartment.

First of all, please check the battery info (press the <F> button, then select '*Setup*' – '*Battery Info*'):

| ```
SETUP: Battery Info
Type:NiMH  ←
Status:ok

2805mV 0mA     29°C
``` | In this case the APR500 detected rechargeable cells (-> '*NiMH*'). Both battery contacts are working properly. |
| ```
SETUP: Battery Info
Type:NiMH
Status:ok
Fast charge  ←
2951mV 358mA   31°C
``` | When connecting the reader to USB (computer or USB power supply), it should start charging the batteries. |
| ```
SETUP: Battery Info
Type:NiMH
Status:ok
Fast charge
2988mV 446mA   31°C
``` | When the Agrident supplied USB power supply is used, this is indicated by the additional power plug symbol and the charging current might be higher. |
| ```
SETUP: Battery Info
Type:disposable  ←
Status:ok

2891mV 0mA     33°C
``` | If one or more contacts of the rechargeable battery detection have problems, the type '*disposable*' is displayed. |
| ```
SETUP: Battery Info
Type:disposable  ←
Status:ok
error:no bat
2916mV 0mA     33°C
``` | This screen shows the same as before but now with the Agrident USB power supply connected. The APR500 will not charge the batteries. |

This is the working principle of the rechargeable battery detection: There are two (golden) contacts (each with three spring constants) in the battery compartment as shown below:

The Agrident provided rechargeable batteries have the insulation removed a few millimeters at the end where the negative pole of the battery is:

For rechargeable batteries (NiMH), there is the negative pole connected to the metal under the shrinking tube, for primary cells there is the positive pole. The golden contacts in the battery compartment check this and hence we can prevent that customers insert primary cells and the device tries to charge them (could result in leakage and hence in a damage of the electronics).

In case the APR500 detects the Agrident provided cells as '*disposable*', there might be contact problems at one detection contact or both. It should be checked if BOTH contacts are present and not bent or deformed in any way. They should tower above the housing enough in order to allow to contact the stripped ends of the cells. In case the contacts are okay, it is possible that a contact resistance is too high. One could try to clean the stripped ends of the cells (e.g. using steel wool or fine sandpaper).

There is a possibility to find our which of the two contacts is not working properly. Press the keys [*] [9] [1] [0] [0] [#] quickly one after the other. The display will show 10 different values where the exact meaning of each value is not important here. For the battery detection contacts, only the 3rd line is important. In the examples below, the APR500 was NOT connected to any (USB) power source. Please don't care about exact values here.

```
UB:2810   ADC:9589
UD:2833   ADC:9595
D1:0      AD2:13668
IC:0      ADC:0
TP:3019   ADC:10558
```

If the rechargeable battery detection works properly (NiMH cells detected), the value for '*D1*' should be '0' and '*AD2*' should be very high.

```
UB:2810   ADC:9572
UD:2825   ADC:9590
D1:11677  AD2:13593
IC:0      ADC:0
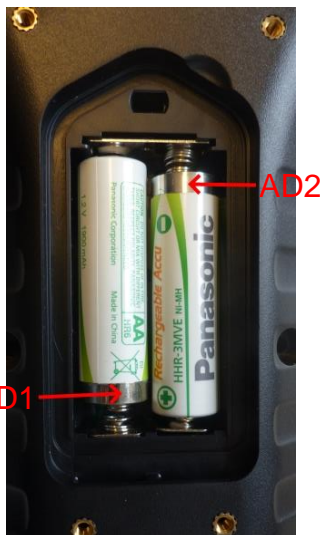TP:3021   ADC:10589
```

In this example the left contact does not detect the battery as rechargeable. The value for '*D1*' is very high.

```
UB:2811   ADC:9577
UD:2828   ADC:9596
D1:0      AD2:285
IC:0      ADC:0
TP:3019   ADC:10559
```

Here the right contact does not detect the battery as rechargeable. '*AD2*' is quite low.

```
UB:2806   ADC:9561
UD:2822   ADC:9581
D1:11676  AD2:285
IC:0      ADC:0
TP:3022   ADC:10597
```

Now the APR500 cannot detect either cell as rechargeable. The value for '*D1*' is very high and '*AD2*' is fairly low.

The terms 'left' and 'right' from above refer to the rear view (when looking into the battery compartment).

In case of a detection problem it might already be enough to turn the cells back and forth while watching the values on the display. Both cells must be completely pushed down in the battery compartment.

If the information in this document do not help to isolate and fix the problem, the device must be sent to Agrident for further analysis and repair.