

Cirris Signature 500

Rechargeable Battery Operation

This technical note describes the different types of '9V' / "Transistor Radio" Batteries. And then discusses the requirements for Cirris Signature 500 operation and recharging.

The '9V'* / "Transistor Radio" Battery

*(The term '9 Volt Battery' is regularly, although misguidedly, used as an indicator for the size / type of battery)

Type		IEC Name	ANSI/NEDA Name	Typical Capacity (mAh)	Nominal Voltage		
Primary (disposable)	Alkaline	6LR61	1604A	565	9		
	Zinc-carbon	6F22	1604D	400			
	Lithium		1604LC	1200	~ 9.6		
Secondary (Rechargeable)	NiCd	6KR61	11604	120	7.2 (6 cell)	Some: 8.4 (7 cell)	
	NiMH	6HR61	7.2H5	175-300		7.2 (6 cell)	8.4 (7 cell)
	Lithium-ion polymer			520	~ 7.3		

As can be seen from the table above, '9V' batteries actually have different nominal voltage outputs. Particularly with the secondary/rechargeable batteries that have varied outputs based their construction chemistry and number of cells.

Tester Requirements

The Signature 500 tester charging circuit is designed to work with a 7.2 V (6 cell) Nickel Cadmium (NiCD) or Nickel Metal Hydride (NiMH) battery. It cannot be used to charge batteries with any other nominal voltage or construction chemistry.

Charge and discharge times are dependent on capacity rating (mAh) of the battery being used. The higher/larger the capacity (mAh) rating the longer it takes to charge and also longer to discharge. *Note:* Charge time will be faster with the tester OFF.

For best results use a 7.2 Volt Nickel Metal Hydride (NiMH) battery.

Cirris recommends: Interstate Battery NIC9200 7.2V NiMH Battery.

It appears that the NiMH 8.4V batteries are more commonly found as of the date of this Technical Note, but the **7.2V** batteries in either NiCD or NiMH chemistries are available, and can be purchased.


Cirris Signature 500 Approved Batteries					
			Internal Charging (in Signature 500)		External Charger
	Voltage	Chemistry	Chargeable	Jumper	Chargeable
Primary (disposable)	9V	Zinc-Carbon Carbon-Zinc	No	2-3 (ALK)	No
	9V	Alkaline	No	2-3 (ALK)	No
Secondary (rechargeable)	9V	Rechargeable Alkaline	No	2-3 (ALK)	Yes
	8.4V	NiCD	No	2-3 (ALK)	Yes
	8.4V	NiMH	No	2-3 (ALK)	Yes
	7.2V	NiCD	Yes	1-2 (NiCD)	Yes
	7.2V	<u>NiMH</u>	Yes	1-2 (NiCD)	Yes
* This table applies to the Cirris Signature 1000 LC tester also					
Back of tester must be removed to access the battery.					
Rechargeable Alkaline has no benefits – only 25% capacity can be used when trying to preserve the number of recharge cycles and battery life.					
Warning! Jumper must be set in the correct position for the battery type being used. Failure to ensure the proper setting could cause a battery to bulge, leak, or even explode. This will damage the tester and void the warranty.					

What about Lithium batteries, either Primary (disposable) or Secondary (rechargeable)?

Primary Lithium batteries offer great capacities for long battery life. However their voltage output range is wide and at its highest (9.6V +), could power on the tester's internal zener regulator. This would cause the battery to discharge at twice its normal rate. Also part of the capacity rating of the lithium battery is when the battery has discharged below the 7V minimum operating voltage point of the Signature 500 tester. Therefore they do not operate in normal circuit ranges and wouldn't provide any real improvement in capacity/long battery life. Secondary Lithium batteries have the wider voltage output range also, and they are not compatible with the internal charge circuit. Rechargeable lithium batteries cannot tolerate a trickle charge mode. This will overcharge the battery, plating the electrodes and ruin the battery. There are no benefits that can be achieved by using lithium batteries in this case.

Cirris does not approve the use of any type of Lithium battery.

'9V' / "Transistor Radio" Battery Information Table

Most Common Name / Image	Other Common Names	IEC Name	ANSI/NEDA Name	Typical Capacity (mAh)	Nominal Voltage	Terminal layout	Dimensions [mm]	Comments
<p><u>9-Volt</u></p> 	<p>PP3</p> <p>Radio battery</p> <p>Smoke Alarm (UK)</p> <p>MN1604</p> <p>Square battery</p> <p>Krona (Russia)</p> <p>Transistor battery</p> <p>6135-99-634-8080 (NSN)</p>	<p>6LR61 (alkaline)</p> <p>6F22 (carbon-zinc)</p> <p>6KR61 (NiCd)</p> <p>6HR61 (NiMH)</p>	<p>1604A (alkaline)</p> <p>1604D (carbon-zinc)</p> <p>1604LC (lithium)</p> <p>7.2H5 (NiMH)</p> <p>11604 (NiCd)</p> <p>1604M (mercury, obsolete)</p>	<p>565 (alkaline)</p> <p>400 (carbon-zinc)</p> <p>1200 (lithium)</p> <p>175–300 (NiMH)</p> <p>120 (NiCd)</p> <p>580 (mercury, obsolete)</p> <p>500 (lithium polymer rechargeable)</p>	<p>Alkaline / Carbon-Zinc: 9 V (6 cells)</p> <p>Lithium: ~ 9 V (3 cells)</p> <p>NiMH / NiCd: 7.2, 8.4, or 9.6 V (6, 7, or 8 cells)</p> <p>Mercury: (obsolete) ~ 8.4 V (6 cells)</p>	<p>Both on same end</p> <p>(+) male clasp</p> <p>(-) female clasp</p>	<p>H: 48.5</p> <p>L: 26.5</p> <p>W: 17.5</p> <p>(lithium is actually slightly larger)</p>	<p>Added to ANSI standard in 1959</p>