

Quick Guide: Key Requirements for Maximizing the E7495A/B Battery Life

The E7495A/B was designed to be used on a daily basis to troubleshoot and maintain Base Stations. If you intend to operate your E7495A/B less frequently, you should be aware of its battery operation characteristics to conserve the maximum battery power.

This guide is intended to give you a quick overview of the Battery Power operation of the E7495A/B. Consult the "Working with Batteries" section of the E7495A/B Measurement Guide for complete details on the battery operation of the Test Set.

Battery Capacity:

Typical Run Time: 60 to 90 minutes per fully charged battery (depending upon the E7495A/B Test Mode being used, time varies depending upon instrument mode)

Battery Operation Issues when the E7495A/B Test Set is used infrequently:

The E7495A/B provides two "powered down" modes: Off and Standby. When the test set is operating from battery power, it continues to draw current in both "Off" and "Standby" modes. When in Standby mode, the test set draws ~70 mA per hour, and ~45 mA per hour when in Off mode.

The Test Set with a single battery loses ~18% of its battery charge per day in Off mode and ~28% per day in Standby mode. The following table shows how long a test set with a fully charged battery(s) can be in Standby or Off modes until the battery is not providing enough current to operate the test set.

Battery Current Drain

Number of Batteries Installed	Battery Capacity in Standby Mode	Battery Capacity in Off Mode
1	3.5 days*	5.4 days*
2	6.9 days*	10.8 days*

* Times noted are based on fully charged batteries operating at full capacity (if batteries are not fully charged this time is reduced by the battery charge %)

Maximizing Battery Capacity:

Keeping your Batteries Charged:

Agilent Technologies recommends that if the Test Set is not being used for an extended period of time, you should remove the batteries. Periodically checking and maintaining the batteries' charge will ensure you have sufficient battery capacity when you intend to operate the Test Set from battery power.

E7495A/B Battery Charge Times

Charge Mode	Charge Time	Conditions
External Charger *	4 hours	Part of Option 820
Inside the E7495A/B*	4 hours	With the E7495A/B in the Off Mode
Inside the E7495A/B*	8 hours	With the E7495A/B in the On Mode
* Note: can be charged with either the Ext AC Power Supply or the DC Auto Adapter		

Managing Battery Charge Cycles

The best way to maximize your Battery Run Time is to always be aware of the charge condition of your batteries and to keep them fully charged when possible. As each fully depleted battery

takes up to 4 hours to recharge on the external charger, knowing the charge condition of your batteries helps manage your instruments Battery Run Time by proactively charging the batteries. The external battery charger (available as part of Option 820) lets you charge two batteries simultaneously. Keep your External Battery Charger readily available by using it in your vehicle or in the shop will greatly help in managing your batteries charge.

Recondition the Battery when needed

Check the fuel gauge error on the System Battery Screen. If the Fuel Gauge is greater than 10%, using the left bay of the External Battery Charger, run a calibration routine as described in the “Reconditioning Your Battery” section.

Each battery contains a microchip that monitors battery usage and tracks how much capacity is available. This function can become less accurate because of temperature fluctuations, aging, self-discharge, repeated partial charging, and other factors. This inaccuracy is displayed on the System Battery Statistics screen as “Fuel Gauge Error”, and affects the instrument run time as the battery tells the instrument to shut down when the battery has less than 10 minutes of Run Time available.

Optimizing the E7495A/B to conserve battery power:

The E7495A/B “Display Intensity” and “Screen Save” settings can be set to conserve battery current draw. With the proper management of these settings you can extend the battery operating time an average of 15% per battery.

Display Intensity

The front panel backlight button allows for 5 intensity settings for the display. Setting the intensity to the lowest setting will conserve between 12 to 21% of the battery capacity, depending upon the instrument mode being used. **Display Intensity / Front panel button** *(each push of the display intensity button reduces the intensity by 15%)*

Battery Screen Save

Further battery conservation can be achieved by utilizing the **Battery Screen Save** feature. When enabled, you can set the display backlight to turn off anytime a button has not be touched anywhere from 15 seconds to 60 minutes of inactivity. When implemented, this feature allows you to conserve between 17 to 28% of the battery capacity. **Screen Save: System > Controls > Display Settings > Screen Save (Battery)** *(settable from 15 seconds to 60 minutes)*

External GPS Antenna

When using an external GPS antenna the E7495A/B provides 50 mA to the GPS Antenna connector to power the antenna. Disconnecting the GPS antenna from the E7495A/B when it is not needed will provide additional power conservation.

Additional Battery Operation detail from the E7495A/B Measurement Guide

Consult the “Working with Batteries” section of the E7495A/B Measurement Guide for complete details on the battery operation of the Test Set.

Charging Your Batteries

You can charge batteries internally or using the external battery charger (Option #820). The external charger provides much faster charging time.

Internal Charging

You can use the E7495A/B to recharge the batteries while the test set is operating or shut down. For a fully depleted battery, charging time is approximately 4 hours if the test set is shut down, 8 hours if the test set is operating. If two batteries are installed, the test set fully charges Battery 1 before charging Battery 2. During internal charging, the charge indicator blinks to indicate which battery is being charged. To charge a battery internally, simply attach the DC Auto Adapter or AC Adapter and turn on external power.

External Charging

The external battery charger (available as part of Option 820) lets you charge two batteries simultaneously. Each fully depleted battery takes up to 4 hours to recharge. You have the option of charging batteries before they become fully depleted. Doing this does not shorten battery life, but repeatedly charging a battery before it's fully discharged will impair the accuracy of its internal charge-remaining indicator (i.e. fuel gauge). When the fuel gauge error is greater than 10%, the battery should be reconditioned.

CAUTION Never use a non-SMBus charger because the battery issues commands over the SMBus to the charger to control the charge rate and voltage. Never use a modified or damaged charger.

Reconditioning with the External Battery Charger

Each battery contains a microchip that monitors battery usage and tracks how much capacity is available. This function can become less accurate because of temperature fluctuations, aging, self-discharge, repeated partial charging, and other factors. This inaccuracy is displayed on the System Battery Statistics screen as “Fuel Gauge Error”.

To ensure the accuracy of the battery's internal capacity tracking system, occasionally you need to recalibrate (i.e. recondition) the battery. Also, if a battery is short-circuited or has been discharged for a prolonged period of time, a recalibration procedure may be required. Reconditioning—also known as recalibrating—is done by fully charging the battery, fully discharging it, recharging it again, and then verifying that the error has been corrected.

To Recondition a Battery

1. Insert a battery into the left bay of the external battery charger.
2. Press the blue button labeled **Push to Recalibrate Left Battery Bay**. The charger will charge the battery fully, discharge it completely, then recharge it fully again.
The entire process can take up to 10 hours.
3. Install the battery into the test set.
4. On the System Statistics—Battery screen, verify that the battery is fully charged and reconditioned.

After reconditioning, if the battery is not fully charged or still shows more than a 10% Fuel Gauge Error reading, repeat the reconditioning procedure. If the second reconditioning does not restore a full charge and an error reading of 10% or less, the battery needs replacement. This error will affect all of the displayed battery charge indicators.

NOTE: Only calibrate your batteries when they need it. Reconditioning a battery unnecessarily will increase the cycle count and thereby reduce the battery life.

Battery Usage

How much "Running" time can I expect from the battery?

Unfortunately, there is no "100% correct" answer to this question. The total run-time of the battery is dependent on a variety of factors including temperature, backlight requirements and the Measurement Screen being used.

To ensure maximum performance of the battery, optimize your Test Set's power management features. Display settings, screen saver, and the use of standby mode, result in lower overall drain on the battery, effectively increasing the Test Sets operating time. (Refer to the E7495A/B User's Guide for more information on these features).

Typical Run Time * 90 minutes

** Run Time per battery pack using a typical user profile.*

What is the typical battery life?

The battery is designed for approximately 300 full charge/discharge cycles at room temperature and under normal rates of discharge. .

What can I do if my battery is not holding a charge?

Check the fuel gauge error on the System Battery Screen. If the Fuel Gauge is greater than 10%, run a calibration routine as described in the "Reconditioning Your Battery" section. After reconditioning, if the battery is not fully charged or still shows more than a 10% Fuel Gauge Error reading, repeat the reconditioning procedure. If the second reconditioning does not restore a full charge and an error reading of 10% or less, the battery needs replacement.

Can I use batteries from other manufacturers in my E7495A/B Test Set?

The E7495A/B uses long lasting lithium ion batteries that are *custom made* for the rugged outdoor environment conditions that Agilent Base Station Test Sets typically operate in. Replace only with NI2040AG or equivalent, Agilent-approved battery. Additional batteries are also available directly from Inspired Energy, Inc. To purchase additional or replacement batteries, visit www.inspired-energy.com, or call toll free USA 1-888-5-INSPIRE (546-7747).

E7495A/B Battery and Charger Part Numbers

Standard Supplied Accessories	
Description	Part Number
AC/DC Converter	0950-4404
NI2040AG Battery	1420-0883
Optional Accessories provided in E7495A/B Option 820	
External Dual Battery Charger	0950-4276
AC/DC Converter	0950-4404
DC Auto Adapter	0950-4412
Extra NI2040AG Battery	1420-0883

Maximizing Battery Life

The Lithium Ion battery used in the E7495A/B has a life span of approximately 300 charge cycles at room temperature, with normal charge and discharge rates. You can maximize the number of charge cycles with reasonable battery care:

Battery Do's:

- **Remove the Batteries** -- When the Test Set will not be used for an extended period of time, remove the batteries and keep them charged.
- **Keep the Batteries Clean** -- Clean the battery contacts occasionally, using a pencil eraser or alcohol and a cotton swab. Make sure no residue from the eraser or cotton swab is left on the contact points.
- **Initial Charge Cycle** -- New batteries must be trickle charged (slow charged) prior to their first use and for the first several uses. All batteries require a "break-in" period, so don't be alarmed if your battery doesn't hold a full charge right away. A new battery may show false full charge (voltage) as indicated on the charge indicators.
- **For the First Three Cycles**, please make sure to charge the battery fully and drain it fully before recharging. This will properly condition the battery and will ensure that it will operate at its maximum capacity.
- **Charge often** -- Don't try to fully discharge the battery packs frequently. This only adds strain. Several partial discharges (regular use) with frequent recharges are better for lithium-ion than one total discharge. Recharging a partially charged lithium-ion battery pack does not cause any harm because it has no "memory".
- **Periodic Full Discharge/Recharge** -- Cycle each battery through a full charge and full discharge on a regular basis, preferably monthly. Even if you use external power most of the time, you will lengthen battery life by occasionally cycling through a full discharge/recharge cycle.
- **Battery Temperature** -- Allow a battery to warm to room temperature before charging it. Temperature shock can damage the battery chemistry and in some cases cause a short circuit. Always charge batteries at temperatures between 0 and 45 degrees Celsius. (32 to 113 degrees Fahrenheit).
- **Operation Temperature** -- Operate the test set on battery power between the temperatures of -10 and +50 degrees Celsius (-14 to +122 degrees Fahrenheit). Using the batteries at lower or higher temperatures can damage the batteries and reduce operating life. Cold temperatures affect battery chemistry, reducing charge capacity.
- **Reconditioning** -- Only calibrate your batteries when they need it. Reconditioning a battery unnecessarily will increase the cycle count and thereby reduce the battery life. If a battery is short-circuited or has been discharged for a prolonged period of time, a recalibration procedure may be required.
- **Keep Batteries Charged** -- Remove the Batteries from the Test Set and charge them with the external charger when not using the Test Set. If the Batteries are left installed in the Test Set, ensure external power is applied to the Test Set to charge the batteries.
- **Battery Storage** -- Store your battery in a cool, dry, clean place. Li-Ion batteries will self-discharge during storage. Do not store batteries in a fully discharged state; remember to recharge the batteries before use.
- **Optimize Power Management** -- Ensure maximum performance of the battery by optimizing the device's power management features. Refer to the E7495A/B Measurement Guide for further details.
- **Monitor Battery Condition** -- Periodically check the charge capacity and fuel gauge error of your batteries. Periodic monitoring of the batteries charge is essential for knowing when you need to recharge your batteries so that you have enough charge to complete your tasks. Check the fuel gauge error, if the error is greater than 10%, recalibration of your battery is recommended.

Battery Don'ts:

- **Avoid heat** -- Short battery life is more likely to be caused by heat rather than charge/discharge patterns. Keep the lithium-ion battery cool.

- **Battery Storage** -- Don't charge up the battery pack just to store it away. When storing for long periods of time, keep the battery at a 30 to 50% charge level. Don't leave your rechargeable batteries dormant for extended periods. Cycle them for a full charge & discharge every so often. Even if you use AC or DC power most of the time, try to use the battery periodically to keep it fresh and healthy.
- **Don't use old batteries** -- Avoid purchasing spare lithium-ion batteries for later use. While it makes perfect sense to have extra battery packs so that you always have a fresh one charged up and ready to go, it isn't a great idea to just buy up batteries and keep them around for years before using them.