



TT453: BATTERY BEST PRACTICE INFORMATION

2020-03-31



Electrical

APPLIES TO	SYMPTOMS
Harley-Davidson's AGM and Li-Ion 12 Volt Batteries	• Battery Maintenance • Battery Testing Equipment • Battery Charging Equipment

Reason for Revision

Refer to Table 1.

Table 1. Document History

Date	Revision Description
2020-03-31	Updating references
	* Updated TESTING EQUIPMENT - AGM : GRX-3110HD Battery Diagnostic Station, BEST PRACTICES THAT YIELD RESULTS - AGM : Battery Best Practices, CUSTOMER PERSONAL STORAGE - LI-ION, BEST PRACTICES THAT YIELD RESULTS - LI-ION, FITMENT KITS - LI-ION
	* Added VEHICLE CHARGING SYSTEM - LI-ION, FITMENT KITS - LI-ION : Table 11, WARRANTY - LI-ION
2020-02-18	Bulletin restructure to cover Lithium-Ion (Li-ion) battery information
	* Updated complete bulletin
	* Added TECHNICAL TIP GUIDE, ABSORBED GLASS MAT (AGM) BATTERIES, LITHIUM-ION (LI-ION) 12 VOLT BATTERIES
2018-08-15	Added BEST PRACTICES THAT YIELD RESULTS - AGM : Battery Best Practices & Battery Testing Best Practices, STORAGE - AGM & Table 8, Figure 1
	Update CHARGING EQUIPMENT - AGM : Table 6, STORAGE - AGM : Battery Date Codes
2017-12-01	Updated TESTING EQUIPMENT - AGM : GRX-3110HD Battery Diagnostic Station, BATTERY MAINTENANCE - AGM : Overcharging & Other Chargers & Undercharging, DEALERSHIP BATTERY MAINTENANCE - AGM : Vehicles Demonstrating BOOM! Box Audio System, VEHICLE TRANSPORT MODE (Security Systems Only) - AGM : Dealership Personnel
2017-11-16	Updated TESTING EQUIPMENT - AGM : GRX-3110HD Battery Diagnostic Station, BATTERY MAINTENANCE - AGM : Undercharging, DEALERSHIP BATTERY MAINTENANCE - AGM : Vehicles Not on Display & Parts Inventory, CUSTOMER PERSONAL STORAGE - AGM & Table 5
2016-10-05	Initial release

TECHNICAL TIP GUIDE

Table 2. AGM - Technical Tip Bulletin Guide

ABSORBED GLASS MAT (AGM) BATTERIES			
PURPOSE FOR TECH TIP		*	Operational Vehicles
TESTING EQUIPMENT - AGM		*	Non-operational
*	GRX-3110HD Battery Diagnostic Station	*	Vehicles Demonstrating BOOM! Box Audio System
*	Fluke Digital Multimeter	*	Parts Inventory
CHARGING EQUIPMENT - AGM		CUSTOMER PERSONAL STORAGE - AGM	
INITIAL BATTERY CHECK - AGM		VEHICLE TRANSPORT MODE (Security Systems Only) - AGM	
BATTERY MAINTENANCE - AGM		*	Dealership Personnel
*	Overcharging	BEST PRACTICES THAT YIELD RESULTS - AGM	
*	Other Chargers	*	Battery Best Practices
*	Undercharging	*	Battery Testing Best Practices
DEALERSHIP BATTERY MAINTENANCE - AGM		STORAGE - AGM	
*	Vehicles Not on Display	*	Battery Stocking and Sales
*	Vehicles on Display	*	Battery Date Codes

Table 3. Li-Ion - Technical Tip Bulletin Guide

LITHIUM-ION (LI-ION) 12 VOLT BATTERIES			
TESTING EQUIPMENT - LI-ION		*	Parts Inventory
*	Fluke Digital Multimeter	CUSTOMER PERSONAL STORAGE - LI-ION	
CHARGING EQUIPMENT - LI-ION		VEHICLE TRANSPORT MODE (Security Systems Only) - LI-ION	
VEHICLE CHARGING SYSTEM - LI-ION		*	Dealership Personnel
INITIAL BATTERY CHECK - LI-ION		FITMENT KITS - LI-ION	
BATTERY MAINTENANCE - LI-ION		BEST PRACTICES THAT YIELD RESULTS - LI-ION	
DEALERSHIP BATTERY MAINTENANCE - LI-ION		*	Battery Best Practices
*	Non-operational	*	Battery Testing Best Practices
*	Vehicles Demonstrating BOOM! Box Audio System	WARRANTY - LI-ION	

PURPOSE FOR TECH TIP

AGM Batteries: Tech Tip TT453 combines all battery, testing and charging information from Service Bulletins M1089, M1089A, M1290, M1329, M1391, M1404 and M1418 and Tech Tips TT342 and TT440 into one document. This also updates procedures and equipment to maintain, test or charge all Absorbed Glass Mat (AGM) batteries.

Li-Ion Batteries: To explain the benefits and clarify the usage of the Lithium LiFe batteries.

ABSORBED GLASS MAT (AGM) BATTERIES

TESTING EQUIPMENT - AGM

GRX-3110HD Battery Diagnostic Station

The HD BATTERY DIAGNOSTIC STATION (PART NUMBER: GRX-3110HD) can perform a complete diagnostic recharging and evaluation routine within 3 h. Read the instruction manual to perform battery testing. To download a copy of the GRX-3110 instruction manual in Portable Document Format (PDF), login to H-Dnet and search for GRX-3110 instruction manual.

GRX-3110HD is primarily a diagnostic tool and not recommended to provide a long-term charge.

It is important that the station has the latest software revision installed to ensure that the station performs the proper diagnostic tests. To verify for the latest version, navigate the following steps on the GRX-3110:

Push RIGHT ARROW to view PRINT/VIEW > SELECT > Push RIGHT ARROW to view VERSION INFO > SELECT

Verify current update on Service Bulletin M1391A: MIDTRONICS GRX-3110 SOFTWARE UPDATE . This service bulletin contains the current update and instructions on how to install that update.

NOTE

Login into Service Information Portal (SIP) through Google Chrome to view link.

- M1391A

Severely discharged batteries no longer need to be jump-charged to begin charging. The GRX-3110 can test and charge batteries at any beginning charge state. If the GRX-3110 determines the battery is healthy enough to accept a charge, it will begin the charging and testing session which may take up to 3 h. During this session, the battery is tested a number of times.

When the session is complete, a report displaying the test results including battery replacement indicator, charging results, state of health and a generated warranty code are available. This information can be printed at the end of the session or later if needed. However, all data will be overwritten when a new session is started.

If the battery voltage displayed on the final report is less than 12.5 V, continue to charge the battery until 100% charge is achieved before placing it in service. This "top-off" charging can be done using any Harley-Davidson approved charger. See Table 5 and Table 6 for list.

Fluke Digital Multimeter

The Digital Volt Ohm Meter (DVOM) is a hand-held device useful for basic fault finding and field service work or a bench instrument which can measure to a very high degree of accuracy.

The Fluke 78 and 88 have been discontinued but will still work for all functions needed in testing electrical circuitry. Fluke has replaced these models with the Fluke 789. See Table 4.

Table 4. Digital Multimeters

Model	Part No.	State
Fluke 78	HD-39978	Discontinued
Fluke 88	HD-39978	Discontinued
Fluke 789	HD-48650-20	Offered

CHARGING EQUIPMENT - AGM

The selection of charging equipment can vary depending on the application. Harley-Davidson recommends the following battery chargers. See Table 5 and Table 6.

Table 5. Harley-Davidson Chargers

Description		Part Number	Description	Part Number
SuperSmart 750 mA	(North and South America, except Argentina)	66000038	Global 5 AMP (Japan)	66000045
SuperSmart 800 mA		66000004	2-Bank Multi-Output	99829-09
Global 1.25 AMP (All, except Japan)		66000033	4-Bank Multi-Output	99847-09
Global 1.25 AMP (Japan)		66000034	Waterproof 800 mA (Europe)	99814-09
Global 5 AMP (Western Hem.)		66000041	Waterproof 800 mA (U.K.)	99816-09
Global 5 AMP (Europe)		66000042	Waterproof 800 mA (Australia)	99819-09
Global 5 AMP (U.K.)		66000043	Waterproof 800 mA (Japan)	99820-09
Global 5 AMP (Australia)		66000044		

Table 6. Deltran Chargers

Description	HD Part Number	Deltran Identification
10-Bank 2 AMP	66000040	021-0134

INITIAL BATTERY CHECK - AGM

Test initial battery voltage within 10 days of receipt. This applies to batteries in vehicles and replacement parts inventory.

NOTE

When battery is out of vehicle, testing is done directly across the positive and negative battery terminals.

1. Test voltage using a DVOM between main fuse [5B] terminal A and ground. If voltage is greater than or equal to 12.5 V, voltage is within normal specifications. Charge as needed to keep voltage above 12.5 V.
2. If voltage is less than 12.5 V, test battery with HD BATTERY DIAGNOSTIC STATION (PART NUMBER: GRX-3110HD), follow instructions on station and on print out.

BATTERY MAINTENANCE - AGM

When a battery is received, whether P&A or in a new vehicle, follow these guidelines. It is the dealership's responsibility to maintain new batteries above 12.5 V after initial battery check. Do not call Technical Service for warranty authorization on batteries not properly maintained at the dealership.

Overcharging

AGM type batteries are filled with the proper amount of electrolyte and then sealed. If a charger reaches too high a charge voltage (14.6 V or above), the water in the electrolyte will begin to evaporate. This water vapor is released through a one-way relief valve on the top of the battery case. Since the AGM battery is permanently sealed, the water cannot be replenished and the battery becomes permanently low on electrolyte. This can result in loss of performance and eventual battery failure. A sealed battery with concave sides is an example of one that has been overcharged and has lost electrolyte. Overcharging with chargers designed for automotive use is a major cause of battery failure.

Other Chargers

The only approved chargers for Harley-Davidson AGM batteries are the Harley-Davidson chargers dated after 2010 and Deltran chargers listed in Table 5 or Table 6. Other chargers can allow the battery voltage to climb over 14.6 V during charging causing the electrolyte in the battery to evaporate, resulting in loss of performance and eventual battery failure.

Undercharging

If a battery charger does not bring the battery to a full charge, several problems can occur:

- The rated battery capacity will not be reached and the charging system may not bring the battery to a full charge, especially in those instances where customers take short rides or ride slowly with their electrical accessories on.
- If the vehicle is stored in a cold climate, an undercharged battery can freeze and crack.
- If the vehicle is stored in a hot climate 25 °C (77 °F) or warmer, the battery will self discharge at a higher rate.
- A battery that sits in an undercharged state for a long period of time will sulfate. Sulfate hardens on the battery plates preventing proper recharge. A sulfated battery is not serviceable and must be discarded.
- Harley-Davidson and Deltran battery chargers incorporate a protection circuit that does not allow charging if the battery is below 5 V. If you encounter a very low battery, it can be connected to the GRX-3110HD.

DEALERSHIP BATTERY MAINTENANCE - AGM

Vehicles Not on Display

1. Remove main fuse when vehicle is stored.

NOTE

- *All batteries are to be tested monthly.*
 - *The battery discharges faster when the main fuse is installed. With the main fuse removed, a 100% charged battery drops to 12.5 V in approximately five months.*
2. Test battery voltage. If voltage is approximately 12.5 V, charge battery using one of the chargers in Table 5 or Table 6 until the charger indicates the battery is fully charged (12.7 V or greater).
 3. If voltage is less than 12.5 V, test battery with HD BATTERY DIAGNOSTIC STATION (PART NUMBER: GRX-3110HD), follow instructions on station and on print out.

4. If battery voltage drops below 12.5 V two months in a row, do the following:
 - a. Verify main fuse is removed. Remove if necessary.
 - b. Perform a milliampere draw test. See the Electrical Diagnostic Manual (EDM) for that vehicles platform. Repair if necessary.
 - c. If main fuse is removed and draw test passed, file a warranty claim on battery.

Vehicles on Display

NOTE

Operational vehicles have the main fuse installed and keyed ignitions unlocked.

Non-operational vehicles have the main fuse removed.

Operational vehicles on display should have a battery charger installed, every other night. Vehicles that have higher traffic or are displayed outside in 25 °C (77.0 °F) or greater should be charged nightly.

Operational Vehicles

1. Remove battery charger from the vehicle. Turn ignition ON for one minute to remove surface charge from battery, then turn ignition OFF.
2. Test battery voltage. If charging procedure above was followed and battery voltage is less than 12.5 V, test battery with the GRX-3110, follow instructions on station and on print out.

Non-operational

1. Test battery voltage. If voltage is approximately 12.5 V, charge battery using one of the chargers in Table 5 or Table 6 until the charger indicates the battery is fully charged (12.7 V or greater).
2. If voltage is less than 12.5 V, test battery with the GRX-3110, follow instructions on station and on print out.
3. If battery voltage drops below 12.5 V two months in a row, do the following:
 - a. Verify that main fuse is removed. Remove if necessary.
 - b. Perform a milliampere draw test. See the Electrical Diagnostic Manual (EDM) for that vehicles platform. Repair if necessary.
 - c. If main fuse is removed and draws test passed, file a warranty claim on battery.

Vehicles Demonstrating BOOM! Box Audio System

The vehicle that is being used to demonstrate BOOM! should be tested the same as an operational vehicle, but must have a recommended charger installed at all times. The BOOM! system draws an excessive amount of current on a vehicle that is not running. To compensate for that, a charging source **must** be connected to the vehicle.

Parts Inventory

1. Have 1 or 2 of each battery type on an Harley-Davidson approved charging station ready for retail. Rotation of first in first out batteries to replace the topped off battery when retailed.

2. Test battery voltage. If voltage is approximately 12.5 V, charge battery using one of the chargers in Table 5 or Table 6 until the charger indicates the battery is fully charged (12.7 V or greater).
3. If voltage is less than 12.5 V, test battery with the GRX-3110HD, follow instructions on station and on print out.

CUSTOMER PERSONAL STORAGE - AGM

Encourage the customer to purchase and use one of the battery chargers in Table 5 or Table 6. The battery chargers work on conventional batteries as well as the AGM type batteries. The recommended battery chargers are specifically designed for the **new** AGM type battery and provide proper charging automatically. These chargers prevent both over-charging and undercharging.

VEHICLE TRANSPORT MODE (Security Systems Only) - AGM

Transport Mode arms the security system with motion detection disabled for one ignition cycle: This allows movement of the vehicle in an armed state.

If the vehicle is being transported and was not placed in Transport Mode, the security alarm activates due to motion detection. This will eventually drain the battery.

Dealership Personnel

During a new vehicle purchase, the person familiarizing the customer with the vehicle needs to explain Transport Mode.

Upon delivery:

- Use Transport Mode if the vehicle is being transported.
- Ensure the person delivering the vehicle informs and demonstrates to the customer, the operation of Transport Mode.
- Make sure that the customer is aware that the battery is fully charged at the time of delivery to 12.7 V or higher.

Other items to consider: Training material to review.

- Battery Fact and Best Practices course 1542 is available through HDU online.
- Shop Talk issue five of 2015 has more information on battery care and products.

BEST PRACTICES THAT YIELD RESULTS - AGM

Battery Best Practices

- Use a recommended battery charger/tender on vehicles whenever possible.
- The electrical system on early model vehicles typically only required the removal of the main fuse to disconnect power to the motorcycle. Compared to the later models, the electrical systems are more complex and sometimes need extra steps to deactivate all modules before removing the main fuse. See the appropriate service manual for the correct power disconnect procedure.

- Advise the customer that they include a battery charger with the purchase of their new vehicle and make it part of the sale or offer them a special promotion. This is an opportunity to educate the customer and encourage the use of a battery charger. For 2017, all models except V-Rods have a battery charger connection incorporated into the vehicles harness. For pre 2017 models and V-Rods, a charging harness is available separately for installation.
- Anytime a vehicle experiences an extended period of non-use, such as storage, connect a battery tender to maintain battery charge. Verify the battery is fully charged before putting it back in service. If the voltage is low, perform a battery test using the HD BATTERY DIAGNOSTIC STATION (PART NUMBER: GRX-3110HD), follow instructions on station and on print out.
- If a vehicle has a security system, Harley-Davidson recommends that a battery tender be used to maintain battery charge during extended periods of non-use. If a tender is not used, remove the main fuse to prevent an unnecessary draw on the battery. Verify the power disconnect in the appropriate service manual of the vehicle the procedure is being performed on. Also, it is best to wait to activate the security system just before delivery of a new vehicle to the customer. This stops the draw of the security system on the battery when not in use.
- If a security system is purchased as an accessory, the dealer should explain to the customer the increased draw on the battery when the vehicle is armed. Also, recommend the purchase of a battery tender or charger to allow them to keep the security system active during extended periods.
- Verify new batteries are fully charged (12.7 V) before placing into service. If the battery is an over-the-counter sale, include the GRX-3110HD printout along with the sales receipt.
- When replacing a battery over-the-counter, recommend that the customer have the vehicle charging system tested to verify that it is functioning properly. A dead battery due to a failed charging system will not be covered by warranty.
- When a customer brings a battery in for testing or charging, ask the customer about the history of the battery, such as driving style, maintenance history, etc.
- Before testing a charged battery with the GRX, always allow the battery to sit for at least one hour after removing from the charger. If the battery still does not meet the test criteria, assume the battery is defective and should be replaced.
- If the battery charges and tests properly, verify the vehicle's charging system is functioning correctly. Tests should include checking for clean, tight connections at the battery terminals, ground stud connections (using proper torque values on both battery terminals and ground stud), and voltage regulator connections. Often loose connections are the cause of a charging problem.

Battery Testing Best Practices

- Enter the correct battery part number to make sure the correct Cold Cranking Amps (CCA) value is used for testing. The GRX requires this value for accurate testing.
- Verify that the battery cables are not worn or frayed. Worn cables have increased resistance which be attributed to the battery and potentially have a negative effect on some battery test results.
- Trust the initial GRX test results. Do not run more than one diagnostic charge on a battery back-to-back. Diagnostic charging changes the chemistry of the battery and subsequent results will not be as accurate due to that change.

- Avoid stopping and starting a GRX battery test after it has started, back-to-back testing can give incorrect results.
- Batteries are not to be charged or placed on a battery tender before testing on GRX. The use of battery tenders or chargers before the diagnostic charge can mask issues. Also, the battery may not be able to sustain the rise in values that is caused by increased voltage and amperage. If a customer rides the vehicle in, testing the battery with the GRX is approved.

STORAGE - AGM

To make sure maximum battery life, proper charging before storage is the most important factor. A fully charged battery is less likely to freeze, crack or sulfate. If the battery is left in the vehicle and a battery tender is NOT used, remove the main fuse to prevent parasitic loads (radio, Electronic Control Module (ECM), Body Control Module (BCM), etc.) from draining the battery during prolonged storage. Verify the power disconnect in the appropriate service manual of the vehicle the procedure is being performed on. Encourage the customer to purchase a battery tender, allowing the battery to remain connected and the security system, if equipped, to remain armed.

Battery Stocking and Sales

All Harley-Davidson dealers must maintain a fresh stock of batteries by rotating and selling them on a "first in, first out" basis. All batteries must be sold within 12 months of the date of manufacture code which appears on the battery warranty/date code label on the side of the battery.

When a new battery is sold from dealer inventory, the battery label should reflect the date of sale. To do this, peel off both the month and year dots from the warranty label. If the date of sale occurs after the 15th day of the month, advance the date to the next month. To determine the correct number to peel off for the year, reference only the last digit of the current year.

NOTE

Dealer staff must monitor voltages on batteries in inventory to verify that voltage is above 12.7 V when a battery is sold over the counter. If voltage is under 12.7 V, charge the battery before the sale.

Battery Date Codes

The battery warranty/date code label has two date codes. One is for the date of manufacture and the other is for the date of activation.

See Figure 1. The date of manufacture code contains of:

- **Old:** Single letter (1) for the month and two digits for the year (2). See Table 7 for month and Table 9 for the year.
- **New:** Two digits (3) for both the month and for the year (2). See Table 8 for month and Table 9 for the year.

The date of activation code consists of a two-letter code for the month and a single-digit code for the year.

Table 7. Old - Battery Date Codes: Month

MANUFACTURE CODE	MONTH	MANUFACTURE CODE	MONTH
A	January	G	July
B	February	H	August
C	March	J	September
D	April	K	October
E	May	L	November
F	June	M	December

Table 8. New - Battery Date Codes: Month

MANUFACTURE CODE	MONTH	MANUFACTURE CODE	MONTH
1	January	7	July
2	February	8	August
3	March	9	September
4	April	10	October
5	May	11	November
6	June	12	December

Table 9. Battery Date Codes: Year

DIGIT	YEAR		DIGIT	YEAR
15	2015		20	2020
16	2016		21	2021
17	2017		22	2022
18	2018		23	2023
19	2019		24	2024

(1) Manufacture date will have a letter and two digits. Activation year will always be a single digit.

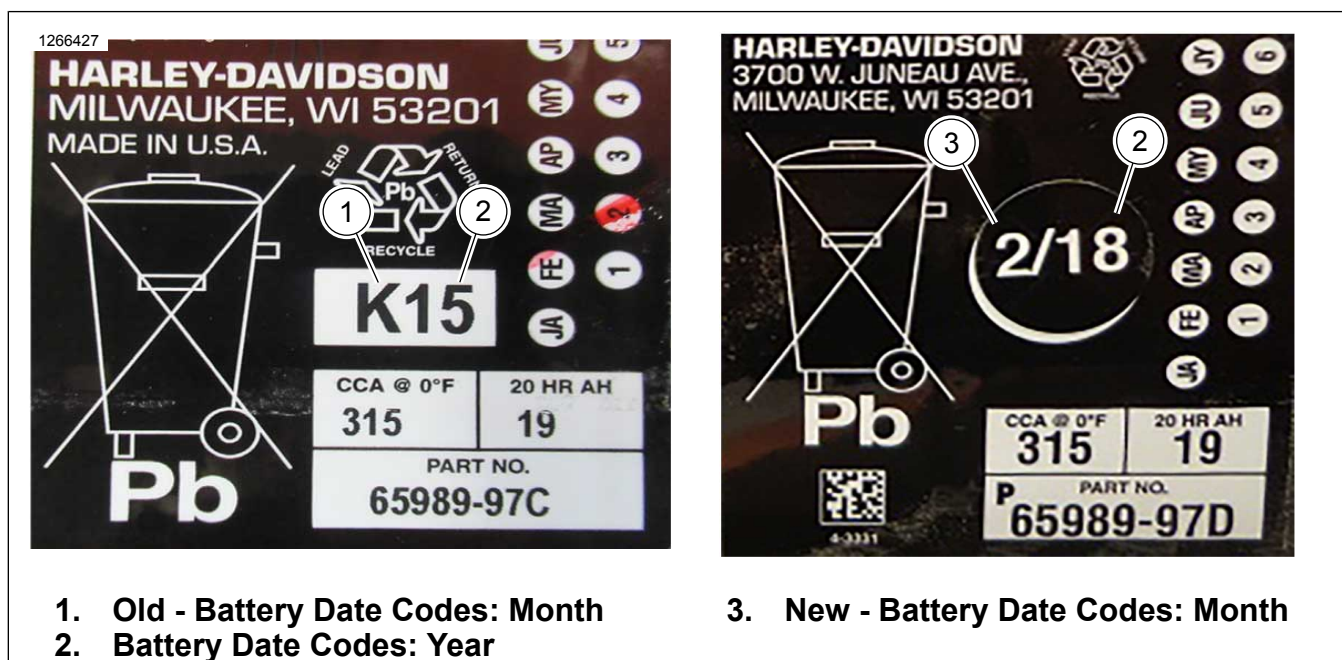


Figure 1. Battery Date Codes

LITHIUM-ION (LI-ION) 12 VOLT BATTERIES

TESTING EQUIPMENT - LI-ION

The battery status indicator that is located on top of the battery gives a general state of charge of the battery. Voltage should be checked with Digital Volt Ohm Meter (DVOM) to verify that it is fully charged before delivering to customer or installing in a vehicle.

At this time, a DVOM is the only test equipment recommended by Harley-Davidson for use with Li-ion batteries.

Fluke Digital Multimeter

DVOM is a hand-held device useful for basic fault finding and field service work or a bench instrument which can measure to a very high degree of accuracy.

The Fluke 78 and 88 have been discontinued but will still work for all functions needed in testing electrical circuitry. Fluke has replaced these models with the Fluke 789. Refer to Table 4.

CHARGING EQUIPMENT - LI-ION

Use the appropriate Harley-Davidson dual mode lithium ion charger (or equivalent) to fully charge battery to 13.4 V. Refer to Table 10.

- Standard chargers used on any Absorbed Glass Mat (AGM) battery **will not** fully charge the Li-ion battery to 13.4 V. For this reason Harley-Davidson recommends using a charger with Li-ion mode to fully charge the Li-ion battery.
- Li-ion chargers (when in Li-ion mode) are not to be used on AGM batteries. These chargers will overcharge and damage an AGM battery.

With the battery connected, all vehicles use a small amount of power even when stored. A Harley-Davidson constant monitoring battery charger or tender is recommended to maintain a full charge between rides or when a motorcycle will not be ridden for more than two weeks. The Lithium LiFe battery should be on an appropriate battery tender to ensure that the battery does not drop below 8 V.

Table 10. Harley-Davidson 800 mA Charger

Country	Part No.	Charging Time
U.S., Canada, Mexico, South America	66000181	5–9 h
Europe	66000182	
United Kingdom	66000183	
Australia	66000184	
Japan	66000185	

VEHICLE CHARGING SYSTEM - LI-ION

Changes to the vehicle charging system are not needed. The different chargers are required because the Li-ion battery charges to a higher voltage than an AGM battery. The vehicle alternator already outputs this higher voltage and does not need anything different.

INITIAL BATTERY CHECK - LI-ION

Due to some shipping regulations, Li-ion batteries are shipped at a low state-of-charge (voltages will vary). Dealers should perform the following:

- Verify battery voltage is equal to or greater than 8 V before charging battery.
 - If less than 8 V, file a warranty claim noting the voltage in the comments.
- Dealer must fully charge the battery to 13.4 V prior to sales or installation. Refer to Table 10.

NOTE

A low state-of-charge Li-ion battery may take up to 5–9 h to fully charge to 13.4 V.

BATTERY MAINTENANCE - LI-ION

The Li-ion battery should be on an appropriate battery charger or tender (see Table 10) to verify that the battery does not drop below 8 V. Between rides or when not riding the vehicle for more than two weeks, Harley-Davidson recommends a constant monitoring battery charger or tender intended for use with Li-ion batteries to maintain a fully charged battery.

DEALERSHIP BATTERY MAINTENANCE - LI-ION

Non-operational

The Li-ion battery maintains a charge longer than the AGM battery when not connected to the vehicle. Verify every six months that the battery's state of charge has not gone below 8 V.

Refer to Parts Inventory.

Vehicles Demonstrating BOOM! Box Audio System

It is not recommended to use a Li-ion battery to demonstrate any sound system. If the dealer chooses to use a Li-ion battery, verify that the battery is connected to a proper Li-ion battery tender at all times.

Parts Inventory

Must be fully charged to 13.4 V prior to sales/installation.

- Verify battery voltage is equal to or greater than 8 V before charging battery.
 - If less than 8 V, file a warranty claim noting the voltage in the comments.
- Dealer must fully charge the battery to 13.4 V prior to sales or installation. Refer to Table 10.

NOTE

A low state-of-charge Li-ion battery may take up to 5–9 h to fully charge to 13.4 V.

CUSTOMER PERSONAL STORAGE - LI-ION

The Li-ion battery can be safely stored down to -29 °C (-20 °F). The Li-ion battery loses performance at colder temperatures. Once the battery warms up the battery will have its full capacity. Refer to Table 11.

Table 11. Cool Weather CCA

Li-ion vs AGM Batteries						
CCA	Li-ion Batteries Ampere-hour (Ah)			AGM Batteries Ah		
	8	6	4	28	19	12
CCA @ -6.7 °C (20 °F)	320	240	160	405	315	225
CCA @ 15.6 °C (60 °F)	480	420	240			

Harley-Davidson recommends connecting the proper battery charger or tender for any battery that is in storage, connected or disconnected from the vehicle.

VEHICLE TRANSPORT MODE (Security Systems Only) - LI-ION

Transport Mode arms the security system, but disables motion detection, for one ignition cycle. Transport Mode allows movement of the vehicle in an armed state.

Dealership Personnel

During a new vehicle purchase, the person familiarizing the customer with the vehicle needs to explain Transport Mode.

Upon delivery:

- Use Transport Mode if the vehicle is being transported.
- Verify the person delivering the vehicle informs and demonstrates to the customer, the operation of Transport Mode.
- Verify that the customer is aware that the battery is fully charged at the time of delivery to 13.4 V.

FITMENT KITS - LI-ION

Included with the purchase of the battery is the fitment kit. Depending on the platform of the vehicle, the fitment kit will vary. Refer to Li-ion I-Sheet.

Some older motorcycles will need an additional hardware kit for the battery cables to fit correctly. Refer to Table 12.

Table 12. Hardware Kit

Years	Models	Part No.
2004-2007	Touring, CVO Touring, Touring Police, Trike	66000234
2004-2007	Softail	
2004-2013	Sportster	
2004-2017	V-Rod	

BEST PRACTICES THAT YIELD RESULTS - LI-ION

Battery Best Practices

- Dealer should help the customer to determine if the:
 - a. longer life of the Li-ion battery is desired.
 - b. Or, if the larger Ah capacity of the AGM battery is desired.
- Standard chargers used on any AGM battery **will not** fully charge the Li-ion battery to 13.4 V. For this reason Harley-Davidson recommends using a charger with Li-ion mode to fully charge the Li-ion battery.
- The electrical system on early model vehicles typically only required the removal of the main fuse to disconnect power to the motorcycle. Compared to the later models, the electrical systems are more complex and sometimes need extra steps to deactivate all modules before removing the main fuse. See the appropriate service manual for the correct power disconnect procedure.
- Li-ion chargers (when in Li-ion mode) are not to be used on AGM batteries. These chargers will overcharge and damage an AGM battery.
- **Accessory Mode Usage:** Li-ion technology provides upgrades, but with these upgrades come a reduced Ampere-hour (Ah) rating. Due to the reduced Ah rating, the battery has less overall capacity. As a result, the vehicle will need to be placed on the battery tender sooner than an AGM battery or a higher Ah capacity.
- **Heated Gear and Other P&A Add-ons:** There is no difference between the Li-ion or the AGM batteries when it comes to adding on equipment on the vehicle. When adding on any P&A electrical device, the technician should verify that the vehicle can handle the additional amperage draw on the electrical system. What determines the add-on is if the charging system can handle the additional draw and still maintain a charge to the battery, as for operating the device in accessory mode, see **Accessory Mode Usage** above.

Battery Testing Best Practices

Suspected lithium ion battery failure:

- Verify battery voltage with a DVOM.
 - **Equal to or greater than 8 V:** Fully charge battery to 13.4 V with a recommended Li-ion battery charger. Refer to Table 10.
 - **Less than 8 V:** Do not charge battery. If within the applicable warranty period, submit a warranty claim.

NOTE

Enter the state-of-charge (voltage) found when battery was tested into comment section of claim.

WARRANTY - LI-ION

- **Warranty length:** 1-year on the Li-ion batteries.
- **Warranty process:** If the battery fails the Battery Testing Best Practices above, follow the normal Parts and Accessories (P&A) over the counter warranty claim process.