

Lead-Acid Batteries...

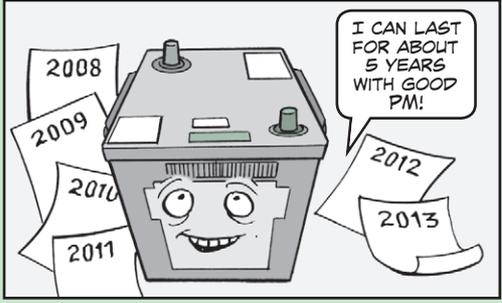
**LIFE-
SAVING
TIPS FOR THE
HAWKER!**



TREAT ME
RIGHT SO I'LL
AGE WELL!



Your Hawker Armasafe Plus (A+) batteries, NSN 6140-01-485-1472, can last for four to five years when maintained properly. But they can still become completely discharged *if* switches are left on or *if* the batteries are not properly monitored during extended use.



I CAN LAST
FOR ABOUT
5 YEARS
WITH GOOD
PM!



THE HAWKER IS
EXPENSIVE,
SO YOU WANT
TO MAKE THEM
LAST.

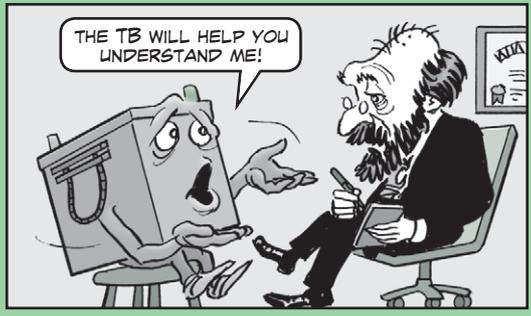


THAT
MEANS
CHECKING,
CHARGING,
AND
RECOVERING
THE
BATTERY
PROPERLY.

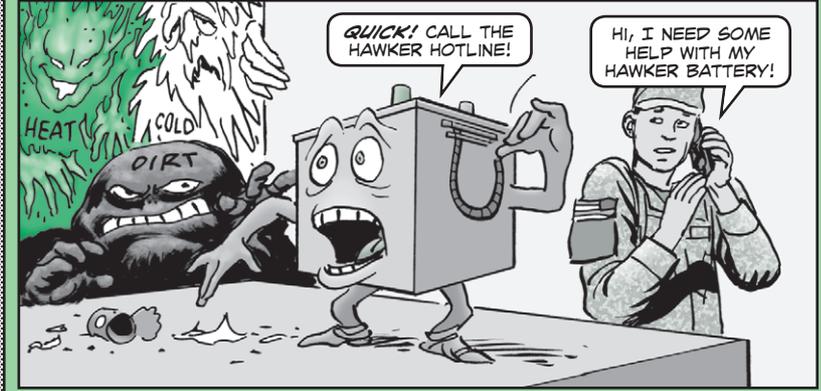
HAWKER, GET
BACK TO WORK
AND **EARN**
YOUR KEEP!

RIGHT AWAY,
CONNIE!

To help you with this, TARDEC's Team Power published TB 9-6140-252-13 in April 2007. It gives maintenance and recovery procedures for the Hawker, so eyeball it for details. And if you need help right away, call the 24-hour Hawker hotline at (877) 485-1472.



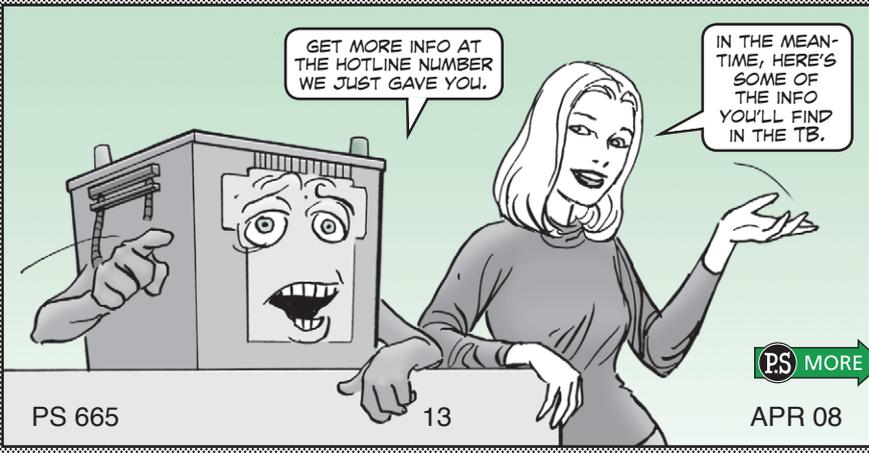
THE TB WILL HELP YOU
UNDERSTAND ME!



QUICK! CALL THE
HAWKER HOTLINE!

HI, I NEED SOME
HELP WITH MY
HAWKER BATTERY!

Battery maintenance training is available by the manufacturer of the Hawker, too, at no cost to the government! You'll be trained how to properly maintain and recover all types of lead-acid batteries.



GET MORE INFO AT
THE HOTLINE NUMBER
WE JUST GAVE YOU.

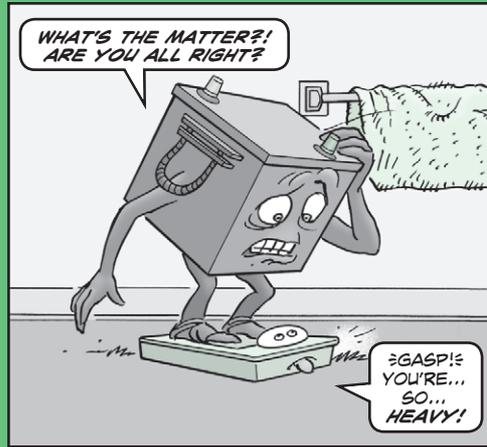
IN THE MEAN-
TIME, HERE'S
SOME OF
THE INFO
YOU'LL FIND
IN THE TB.

Battery Highlights

The Hawker A+ battery is:

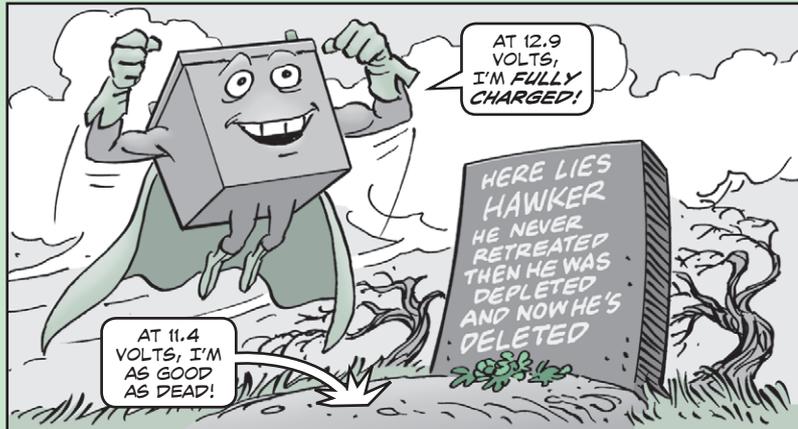
- heavy, so it requires a two-person lift
- recoverable and can be recharged multiple times from voltages as low as 0.24VDC
- a 12VDC battery with 1,225 cold cranking amps
- a valve-regulated lead-acid (VRLA) battery
- a completely sealed, absorbed glass mat (AGM) technology that contains only a small amount of electrolyte in each cell chamber

Also, *practically no maintenance beyond checking and recharging (if needed) is required*, except for removal of dust, dirt or very rare corrosion buildup on the exterior of the battery.



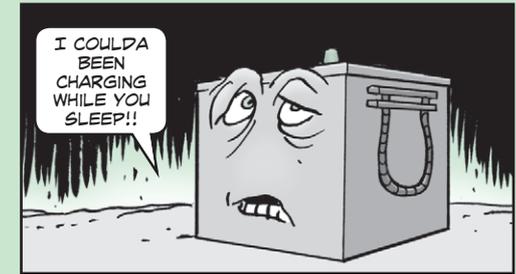
Placing New Batteries Into Service

The Hawker A+ battery's state of charge (SOC) is determined by measuring its open circuit voltage (OCV) for a "rested" battery (not charged or discharged within the last 8 hours). Even though it is called a 12-volt battery, it **must** read 12.9 volts to be 95% - 100% charged (SOC). At 11.4 volts (OCV), the Hawker is 0% charged.



Before installing or replacing a battery or set of batteries, the batteries should be charged until the OCV reaches at least 12.85VDC and the amperage meter on the charger reads less than 1 AMP for one hour. For best results, charge overnight.

If replacing one battery in a group of good, used batteries, it is best to use a used battery of the same manufacturing cycle rather than a new one, if possible. Or you should replace all batteries in the group with new batteries and redistribute the used serviceable batteries.



Before You Charge

Before charging, test the Hawker using this test equipment:

- multimeter or voltmeter that reads in 1/10th VDC increments
- battery analyzer (such as PulseTech or Midtronics brands) or load tester (any brand)

But before testing or recovering any battery, do this:

- Check the top, sides, and bottom for cracks, dents, leakage or swelling in the battery case and lid.
- Make sure terminals are not melted, bent, or damaged.
- Check to be sure vent caps are in place.

Do not attempt to replace missing vent caps. Missing caps indicate a bad cell in the battery, so the battery needs to be replaced. If a vent cap is elevated, follow the guidance in the TB.



After performing the visual inspection, test the battery for potential internal electrical damage, using a battery tester-analyzer. But if you don't have a battery analyzer, go on and charge the battery anyway.

Remember that many testers will not give a reading if OCV is less than 7VDC. If no reading is given or no internal damage is indicated, go ahead and charge. Or charge the battery for 24 hours and retest it with a multimeter and analyzer. If there's no change in voltage after that, you've got a bad battery.

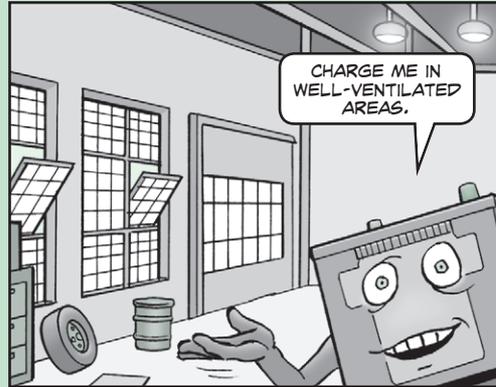
Charging the Battery

After pre-charge inspection and testing, the Hawker battery can be charged either inside or outside of the vehicle. Attach charger leads directly to the battery or through the vehicle's 24VDC NATO slave connection.

Charge your batteries in well-ventilated areas. If you don't, personnel injury or death could occur from hydrogen gas build-up or an explosion.

While charging, stop right away if you see signs of melting or swelling or if the surface of the case is too hot to touch. To avoid the risk of an explosion, **don't** handle the battery until it has cooled off for a couple hours.

If your charger is an older version and has no adjustments, it may not be compatible with AGM batteries. Closely monitor its usage to make sure it doesn't damage the batteries being charged; be aware of heat or the smell of gas.



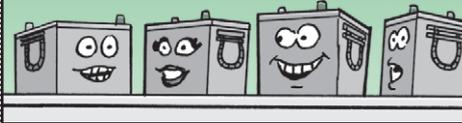
OUT OF THE VEHICLE, I CAN BE CHARGED INDIVIDUALLY...

... OR WE CAN BE CHARGED AS A GROUP.

USE THE FOLLOWING PROCEDURES...

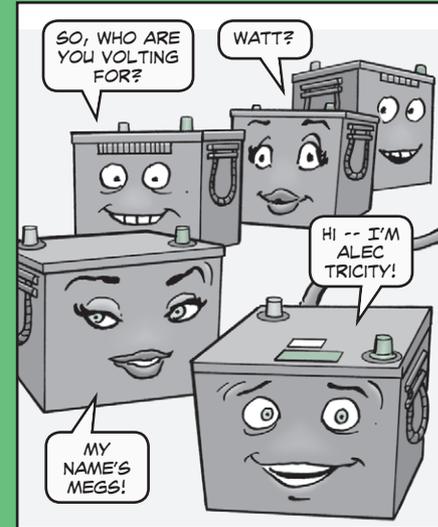


Buss Bar Multiple Battery Charging



UNITS WITH CHARGERS THAT HANDLE MORE THAN ONE BATTERY AT A TIME SHOULD...

- Group the batteries for charging by OCV ranges: 0-5.9VDC, 6.0-9.9VDC, and 10.0 or more VDC.
- Connect the batteries to a standard constant applied voltage buss bar charger set. Then adjust the output voltage to between 14.7VDC and 15.2VDC. Input voltage at the battery should be between 14.2VDC and 14.7VDC. For good connections, clamps, wiring and contacts must be tight and clean with minimal corrosion.
- Allow for at least 10 AMP charging current per battery on the buss. Higher buss charge current will help shorten the battery charge time.
- Charge batteries for 24 to 48 hours, but it won't necessarily take that long.
- Remove any battery that shows signs of excessive heat, gassing, leakage, or swelling while charging, but let it cool off first. The replacement for that battery should be one with similar OCV plus or minus 1VDC.
- Know that batteries are finished when the charge current (amp meter on charger) drops to less than 1 AMP per battery and holds there for 3 hours. For example, if 12 batteries are on buss, then overall current should be less than 12 AMP.
- Test batteries individually.

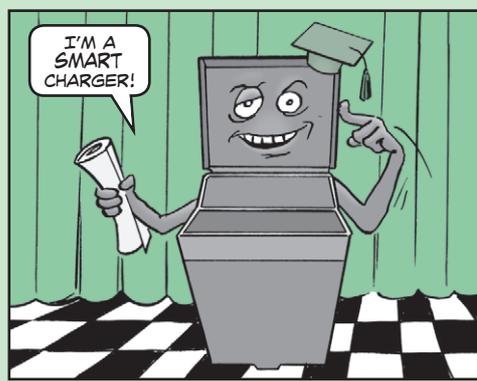


Single Battery Charging Procedures

- Units with chargers that handle only one battery at a time should:
- Connect the charger to the battery posts. Ensure both clamp connections are clean and tight.
 - Use a constant voltage charger of newer technology, if possible. It may have multiple charge settings, such as an "AGM setting". If the charger has this setting, use it.
 - If voltage is adjustable, set it between 14.2VDC and 14.7VDC. There should be at least 10 AMP current available for charging.

PS MORE

- If the battery charger doesn't have adjustments or switches (and is not a SMART Charger, like the PulseTech brand) and output voltage is greater than 15.0VDC, the battery should be closely monitored, at least every 15 minutes, during the first two hours of charging.
- If the battery shows signs of gassing, leakage, swelling, or excessive heat when touching the exterior as you charge, stop charging right away!



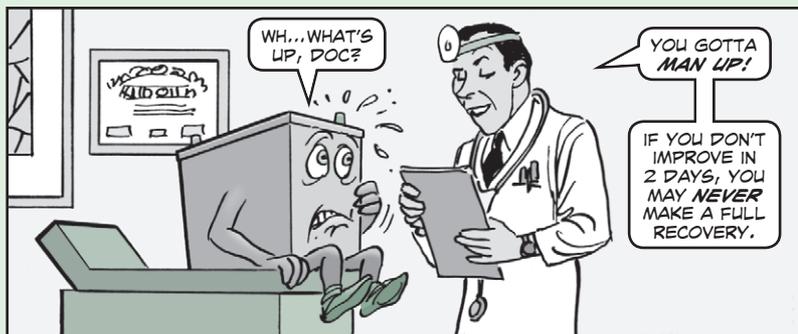
NATO Slave Receptacle (24VDC) Charging

Connecting the charger to the vehicle's NATO slave receptacle is another charging option, but ensure all current drawing devices are OFF.

Like single battery charging, it is best to use a newer constant voltage charger, with multiple charge settings. And if the charger has adjustable voltage output capabilities, set it between 28.4VDC and 29.4VDC.

If the battery charger doesn't have adjustments or switches (and is not a SMART Charger, like the PulseTech brand) and output voltage is greater than 30.0VDC, closely monitor the battery every 15 minutes during the first two hours of charging.

Charge batteries for 12 hours or longer. Severely depleted batteries (OCV less than 10VDC) can take two to three days to recharge. If OCV voltage is not improved (greater than 10VDC) after two days, it may never make a full recovery.

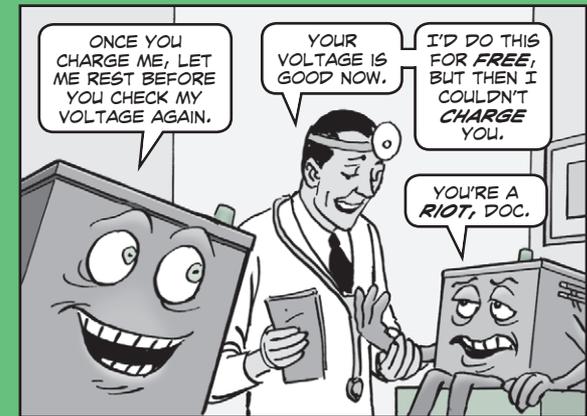


You're done charging when the charge current (amp meter on charger) drops to less than 1/2 AMP per battery and holds there for 3 hours. Automatic chargers will stop charging and give a screen reading of "Charge Complete".

Test the batteries individually.

Post-Charge Testing

You'll need to check the voltage one more time before using the batteries. But your batteries need to rest after charging. Remove the batteries from the charger and allow them to cool off overnight if possible. Batteries that are heated from charging may give incorrect readings.



If battery OCV is above 12.85VDC and load voltage is above 10.80VDC after the rest period, the battery can be reissued.

If a battery is below those readings, it needs additional charging. Battery disposal is recommended if the battery still falls below 12.85V open circuit and 10.80V loaded voltage after one additional 24-hour charging cycle.

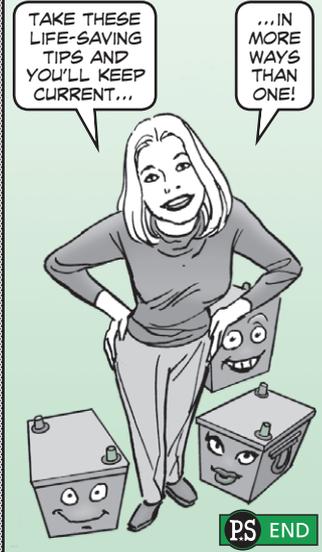
Final Note on Battery Recovery

Many batteries require several diagnostic pulsing cycles before they will take a charge. In some cases, as many as five cycles on a charger may be required to begin to break down the deposits built up on the cell plates.

Following this, you can usually connect the battery to another charger with good results. Often a rest period of several hours between charges will also give positive results.

Batteries with voltages higher than 10 volts charge without much difficulty. On the other hand, batteries with voltages between 4 and 10 volts often take multiple attempts to recover.

Once the battery begins to take current, it usually does so quickly, however. Batteries below 4 volts usually take a couple of days before the chargers can diagnose the battery condition and begin to recover the batteries.



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