Take Time to Winterize

By JIM BALD
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"Pay me now or pay me much more later"--this axiom typifies the failure to prepare equipment for winter. Cold-weather woes can mean hard starts for equipment that must keep operating. And winter's woes can continue producing unseen damage to equipment you're storing until spring's arrival.

Before you put all of your equipment away for winter storage or use, then, take the time to prepare all systems to withstand the cold winter months. Most importantly, the battery and cooling system need extra protection, as does any diesel equipment in your fleet.

The battery: The engine's heart Keep your vehicles in prime condition by preparing a checklist detailing inspection procedures to carry out on each equipment's system. Tag each piece of equipment to ensure you don't overlook any steps.

On the electrical system, consider the dilemma of the battery. It--and the engine itself--operates most efficiently when the ambient temperature is 80 degrees F. But what happens when temperatures drop? At 32 degrees F, a fully charged battery has only 65 percent cranking capacity, while the engine's starting requirements increase from 100 percent to 155 percent. At 0 degrees , the fully charged battery now has only 40 percent starting ability, while the engine's starting requirements increase by 210 percent. By the time the temperature drops to -20 degrees F, a fully charged battery possesses only 18 percent of its original starting power, while the engine's starting requirements increase by 268 percent.

Based on these types of problems, it's obvious that the battery needs extra attention. Good maintenance begins with dirt-free and corrosion-free batteries. Dirt, corrosion and moisture provide a path for energy to escape from the battery. At regular intervals, then, give your battery a visual inspection. Consider the following:

Exterior and terminals: When corrosion or dirt accumulates, use a weak solution of baking soda and water to clean the battery's exterior. You may need a wire brush to scrub the terminals. Use as little of the wet solution as possible and try to keep the battery as dry as you can. Next, use an electrical-grade lubricant as a protective coating on the battery's terminals to prevent future corrosion.

Cables: The battery's cables are important too. Defective cables and poor connections are two of the top reasons for cranking problems. Keep cables and connections "bright and tight." Pay close attention to the ground connections. When parking or storing equipment for longer than 10 days at a stretch, disconnect battery ground cables to avoid discharging the battery by parasitic electrical loads.

Electrolyte levels: Make sure you always maintain the electrolyte level between the top of the battery plates and below the vent well cap opening. Be careful not to overfill. Adding too much water dilutes the electrolyte's sulfuric acid and causes a drop in the battery's charge.

Remember also, however, that a low electrolyte level can cause the exposed portions of the battery plates to dry out. When this happens, sulfate crystals form, and you can never again recharge the battery to its full capacity. Finally, never add pure acid to your battery; add only water.

Charge levels: Measuring the state of the battery's charge with a hydro- meter is mandatory in any winterizing program. Installing undercharged batteries represents 80 percent of battery warranty claims. Undercharged batteries can freeze at 18 degrees F.

A charged battery has a specific gravity (SG) hydrometer reading of 1.265. This means the liquid acid inside the battery is 1.265 times heavier than water. If a battery is 75 percent charged, the SG is 1.230. At 50 percent of full charge the SG falls to 1.200. At 25 percent full charge, it is 1.170. If the battery is completely discharged, the SG measures 1.110.

Be aware that temperature can affect the hydrometer's reading, also.

Testing: You need a load tester to measure the charge level of maintenance-free, or sealed, batteries. When testing, set the tester's load at half of the battery's cold-cranking ampere (or CCA) rating, which is imprinted on top of most batteries. Then discharge the battery at that rate for 15 seconds. If the reading is 9.6 volts or better at 70 degrees F, the battery is in good shape and does not need recharging. If the reading is below 9.6 volts, recharge the battery and test again. If the battery fails the test the second time, replace it. Watch the ambient-temperature variance because the 9.6-voltage cutoff is based on 70 degrees . Your load tester should have a chart with a temperature-corrected scale.

Storage: Store batteries--even maintenance-free types--in a cool, dry place. A cool environment slows down a battery's discharge rate; warm temperatures accelerate the discharge rate. Ideal storage conditions range from 40 to 60 degrees F.

Place batteries in an upright position during storage. Don't stack them; they are heavy, and you can physically damage batteries at the bottom of a stack. Check the bat-

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tery's state-of-charge every 30 to 45 days during storage. Recharge the battery whenever its capacity drops below 75 percent. An open-circuit reading of 12.4 volts or less means the battery is below 75 percent of full capacity.

Handling and mounting: Because vibration is the No. 1 battery killer, make sure you properly torque the battery's tie-down clamps and secure the batteries to the vehicle. One major fleet found that more than 30 percent of premature battery failures resulted from broken battery cases caused by mishandling. To avoid damaging a battery when installing or removing it, then, don't lift a battery by its terminal posts. Also, always loosen the clamping bolts on terminal cables before installing or removing a battery.

Batteries often are the victim of a bevy of other problems that cause no-starts in winter. For example, defects in the charging system--such as slipping fan belts, a faulty alternator or high resistance in the wiring--also will cause batteries to discharge. In addition, when a vehicle's electrical load exceeds its alternator's capacity, excessive battery cycling can result, which can shorten battery life. Even slow-speed driving with several accessories operating can cause battery cycling.

Conditioning cooling systems The next step in winterizing your equipment is to pressure-check the cooling system. Let's consider each aspect.

Radiator. First, check the radiator cap. Do not apply more than the cap's specified pressure. Also, check the cap for leaks. It may pay to replace the cap, but only with one having the same pressure setting.

With the engine running, look for signs of bubbles in the coolant. Engines can't tolerate any air in the system. Check that the coolant level is 1 inch over the top of the radiator core. Also check for contaminants in the system. Take care when doing so; with the engine off and cool, remove the radiator cap. Then start the engine and visually check the water running through the radiator for any contaminants.

Clean radiator fins with compressed air blown from rear to front, and use the light-from-behind method to verify that air passages are free.

Hoses. If you find contaminants in the radiator, it means hoses are deteriorating from the inside. Because hoses are the veins of the powerplant, it is important you keep them in prime shape. To check a hose, first squeeze it firmly. The rubber should be neither soft and lifeless nor hard and brittle. An overly soft hose indicates it has been exposed to oil, grease or atmospheric contamination. Soft hoses are dangerous because they can rupture or swell under pressure. Replace any soft hoses. If the hose is brittle, rather than soft, it may crack or break easily. An overly hard hose indicates the hose may be overcured by engine heat, which is the most common cause of hose failure. Replace hard hoses and change the hose's routing to a cooler route through the engine.

In addition, hoses should not rub against other engine and under-hood components. Check hose clamps for tightness, too.

Belts. Check fan belts for condition, tension and alignment. The most common problems are incorrectly sized belts, over-tensioned belts and under-tensioned belts. Under-tensioned belts are worse than over-tensioned belts because they can slip. Use a belt-tension gauge to check. As a rule of thumb, look for deflection of 0.016 inch for every 1

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PUTTING ON THE 7TH GREEN AT EDINA COUNTRY DURING THE STODOLA is Jim Johnson, superintendent at Rich Spring Golf Course. Others pictured are Tom Ramier, Brad Deyak and Jason Ruhoff.

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seconds when cranking a diesel. Then let it rest for 2 minutes before trying again. * Don't use more than a small amount of ether when attempting to crank a diesel. Too much can cause a catastrophic engine failure. * Don't use ether in combination with glow plugs--similar to spark plugs--to start a diesel. You can cause the engine to explode.

Storing power equipment What steps must you take to properly store power equipment that you won't use during the winter? On vehicles such as golf carts, garden tractors and electric-start mowers, disconnect the battery or batteries to avoid parasitic voltage loss. Don't forget that completely discharged batteries will freeze at 18 degrees F.

Small power equipment--chain saws, blowers, tillers, edgers, clippers, shredders, etc.--also need extra attention. Three musts you should follow are:

* Liberally lubricate to fight corrosion.

* Drain the gasoline tank, then operate the engine until it runs out of fuel. This practice will prevent varnish from forming inside the carburetor. Also, because diesel fuel can spoil if it gets old, micro organisms can form in it. Draining the tank and running the engine also will rid the tank of any leftover diesel fuel and keep these contaminants from building up as well.

* Do not store equipment in the same location as fertilizers or swimming-pool chemicals. These chemicals are extremely corrosive to any metal parts on your equipment.

Some people change the oil on 4-cycle engines before storing them for the winter. Normally, they require a seasonal oil change. Microorganisms don't seem to bother engine oils, so you don't need biocides to protect the oil on these types of equipment.