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"Landscapers should follow that as their minimum guideline."

When a piece of equipment is scheduled for its interval maintenance check, manufacturers suggest it should be taken out of the field and serviced according to specifications. They also urge that landscapers use only OEM or OEM-approved parts and fluids.

A preventive maintenance program *does* require an investment: make sure to stock parts that are normally used. Items, such as bearings, seals, filters, belts and oil, should be made available for scheduled maintenance intervals and emergency situations.

Each working day, a designated time should be set aside for basic preventive maintenance. Don't wait for slack time. A lubrication schedule, based on hour-meter readings—daily, weekly or monthly—should be established for all equipment.

The responsibility for each preventive maintenance function should be delegated to either a mechanic or an operator, depending on the size and structure of the landscaping operation.

Operators, working off a daily checklist, should visually check:

- fluid levels;
- air cleaner;
- blower housing;
- hoses and hydraulic lines, making sure they are not frayed nor leaking;
- belts for wear;
- radiator and transmission levels; and
- mower blades for sharpness.

They should also conduct a general clean-up.

"All of these things sound relatively simple," says George Thompson III, director of corporate communications at Briggs & Stratton, Wauwatosa, Wis., "but you'd be surprised at how many landscapers tend to do one and not the other, or don't do all of them regularly."

'3S' approach—John Oldenburg, manager of technical services at Jacobsen-Extron, Racine, Wis., advises operators to incorporate a "3S Approach" in their daily checks—"sight, sound and smell." *Sight*: look for the obvious things that could go wrong. *Sound*: listen to whether the machine is running properly or not. *Smell*: detect odors from burning electrical systems or leaky hydraulic lines.

"If you use those three things, you're going to detect a lot," points out Oldenburg. "Mark them down and give them to the appropriate person in charge of repairs, and get them taken care before it becomes a failure."

Someone—supervisor, head mechanic or technical expert—should be assigned the

EQUIPMENT: DAILY CHECKLIST

DATE _____
UNIT/SERIAL NO. _____
EMPLOYEE _____

ENGINE

- ___ Oil level
- ___ Fuel levels
- ___ Air cleaner
- ___ Blower housing
- ___ Hoses
- ___ Hydraulic lines
- ___ Belts
- ___ Water level (on water-cooled engines)
- ___ Cooling fins (on air-cooled engines)
- ___ Radiator level (riding mowers)
- ___ Transmission level (on riding mowers)

OTHER

- ___ Overall visual inspection
- ___ Blades (on mowers)
- ___ Bolts
- ___ Belts
- ___ Day-end lubrication
- ___ Day-end clean-up

responsibility to oversee the program. His responsibility should include keeping accurate service records.

However, the ultimate responsibility for the program should rest with owner, according to Mark Wagner, engineering manager of Ransomes Inc., Johnson Creek, Wis. "If the owner doesn't place any emphasis on it, the next guy down the line is not going to pay any attention to it."

If you maintain a logbook on every piece of equipment—and you should—it will provide a history of the equipment and all repairs. It can also allow you to look at costs per hour in operation. And if a unit demonstrates a consistent problem, it allows you to create a necessary parts inventory to cover emergency situations.

Notes Paul Scholten, manager of service and technical publications, engine division, the Kohler Co., Kohler, Wis.: "If there is a record of how much expense they put into it, maybe there is a piece of equipment that does the same job and has a lower maintenance cost. Another thing is that, if you have any comebacks for the manufacturers relative to the warranty, you have a permanent record."

As the saying goes: "An ounce of prevention is a pound of cure!"

—The author is a freelance writer based in Cleveland, Ohio. This is his first assignment for *LANDSCAPE MANAGEMENT*.

Preventive engine maintenance

by Tom Brink

■ Your equipment operator's manuals contain tested, proven care and maintenance procedures. Before questioning them, consider these common sense "whys" behind some of these service procedures.

Read the operator's manual. It contains nearly everything you need to know about service. You'll save time and money by reading the manual *before* working on the machine—not *afterward* to see what should have been done, or what must be redone.

Avoid over-servicing. An example of over-servicing is the air filter on diesel engines. When the air filter looks dirty on the outside, that's a sign that it's doing its job. As dirt collects within the outer portion, the air cleaner works even better. Its holes become smaller, preventing smaller particles from passing through. When the holes become clogged, the filter needs replacement. But never clean an air cleaner; always replace it.

Use proper replacements and hardware. For example, when shear bolts (soft, break-away bolts used to attach accessories) break, they free the attachment from the gear box or drive shaft. If the shear bolt is replaced with a hard bolt, the accessory remains attached even when an object becomes trapped. The unit continues to operate, and transfers stress and damage to a more expensive part of the machine.

Another example: a "will-fit" belt probably won't do the job. Even when a belt looks like it fits in the sheave correctly, it may not. If a belt is worn or too small, it will slip. Worn or wrong-sized belts can actually change the shape of the sheave itself.

Sand can also affect the sheave. Small particles grind against the sheave as they move along the belt. This damage may not be apparent when looking at the sheave from above, but can be detected by examining it from the side. A straight-edge placed against the sheave will reveal the "belly" worn in it by the sand particles.

Check the sheaves when belt problems occur, before placing the blame on the belts.

Be careful when washing. Frequent washing is important, especially for equipment exposed to fertilizers and other chemicals that can cause rust.

Wait to wash the machine until after it

WHAT → DOES WHAT

Shaking or batting oil filters.	Crumbles parts of the elements or damages rubber seals.
Blowing air through air filters.	Creates holes that allow dirt and dust to pass through them.
Using hard bolts for attachments in place of shear bolts.	Can force attachments to continue operating, transferring stress and damage to a more expensive part of the machine.
Using the wrong belt.	Can slip or change the shape of the sheave, cutting power output.
Using big hoses or power washers to wash equipment, especially when equipment is hot.	Water can leak or be forced into seals and housing cavities, contaminating oil and grease.
Not changing oil before storing.	Sludge accumulates in the bottom of the crankcase.
Operating the machine in partial choke.	Overfuels the machine and fouls the spark plugs. Cuts efficiency of cooling system, lets carbon deposits build up, fouls spark plugs.
Not keeping engine clean.	Can reduce engine cooling capacity and cause engine failure.
Using dull blades.	Makes turf look ragged and wastes engine power.
Not cleaning underside of mower decks daily—more often in wet conditions.	Alters air flow pattern in the deck, thereby lessening mowing efficiency.

—T.B.

has cooled. Use a low-pressure hose. After washing, grease all fittings to force out any water that may have accumulated in seal areas and housing cavities.

Use fresh fuel. It should be the fuel specified for the season and the machine; it should be clean and stored in a contamination-free container.

Gauge the amount of pre-mixed fuels needed so that supplies are depleted at the end of the season.

Change oil at recommended intervals. Always use the oil specified for the machine for the conditions.

Change oil before storing the machines. Even changing oil at the beginning of the season may not flush the sludge remaining at the bottom of the crankcase. You may be adding fresh oil to it.

Don't operate in partial choke. Engines are designed to function at wide-open throttle for maximum power and longest engine life.

Keep the engine clean. On air-cooled engines, the build-up of debris can reduce engine cooling capacity and cause engine failure. On liquid-cooled engines the air intake screen and cooling fins must be clean to allow air passage to the radiator.

—Tom Brink is product service coordinator for John Deere's Lawn & Grounds Care Division's Horicon (Wis.) Works.

Preventive maintenance for hand-held equipment

by Pete Fernald

Two-cycle engines

- 1) Maintain good fuel quality.
 - Avoid oxygenated gas whenever possible; if necessary, use MTBE over alcohol.
 - Follow manufacturer's fuel/oil mix ratio recommendations; use only quality oil for two-cycle engines.
 - Drain fuel tank and run carburetor dry before long-term storage (more than 30 days) to reduce potential problems with fuel filters, diaphragms and inlet needles.
- 2) Keep carburetor on spec.
 - See dealer regularly for proper adjustment, thus avoiding poor performance.

- Follow manufacturer's recommendations for appropriate fuel/oil mix ratio, and use quality oil.

3) Attend to the essentials.

- Routinely inspect for debris build-up, particularly on cooling fins and air intake ports.
- Keep all air and fuel filters clean, replacing as necessary.
- Check spark arrestor in muffler for carbon and clogging; keep mounting bolts tightly secured.
- Watch electrical system, checking for bad wiring or out-of-spec spark plug gap; replace plug annually or after 50 to 80 hours of use.

Chain saws

- 1) Don't cut with a dull chain; it causes damage to the bar, sprocket and chain itself.
- 2) Routinely check the depth gauges and lower per manufacturer's recommendation.
- 3) Clean guide bar groove and oil port to assure proper oil transfer.
- 4) Make sure the chain is properly tensioned by following manufacturer's recommendation.
- 5) Ensure the oiler is working; bar-end splatter is a good indicator of proper operation; adjust or repair as necessary.
- 6) Clean clutch drum area (especially around chain brake mechanism), removing oil and chip build-up.
- 7) Check for drive sprocket wear and lubricate clutch drum bearing.

String trimmers

- 1) Grass trimmer maintenance:
 - Routinely clean and apply fresh grease to flex-shaft cables.
 - Watch solid-shaft gear case for signs of leaks; make sure to lubricate at recommended intervals.
 - Routinely inspect blade for integrity, and keep it sharp.
- 2) Hedge trimmer maintenance:
 - Blade sharpness is most important.
 - Maintain proper blade tension following manufacturer's recommendation.
 - Lube blades daily before use.
 - Routinely inspect gearcase and lubricate as needed.

—The author is technical services manager for Shindaiwa, Inc., Tualatin, Ore.