

MAKING THE MOST OF EQUIPMENT MAINTENANCE

By Bruce F. Shank, Editor

Loan institution advertising on television points out that once you get caught up on bills, someone in the family gets sick, or a storm damages your house, or your car needs EXPENSIVE REPAIR.

Maintaining complex pieces of machinery is a fear of the American public. It may be even a bigger fear of small businessmen who must maintain numbers of complex machines to provide a reliable service to customers.

Undeniably, regular maintenance prevents serious breakdowns in equipment. When a mower needs an oil change after each 25 hours of use, it is impractical to run to the equipment dealer every time. The businessman must provide for certain levels of maintenance on his own and stock the parts required for such maintenance.

Also undeniable is the responsibility of the manufacturer to make replacement parts available to purchasers of his equipment for the purpose of regular maintenance. Keeping stock of every little component of every equipment model tends to be an inefficient and complicated task for manufacturers. Inefficiency many times leads to high prices to make repair part supply profitable or at least break even.

Combine the fear of breakdown by owners with the complexity of parts supply to the manufacturer and you get a less than perfect situation. Furthermore, companies manufacturing repair parts which can be substituted for original equipment parts add to the manufacturers woes.

That's not all. Many Green Industry markets such as mowing/maintenance, cemeteries, and nurseries are forced to customize machinery made for golf courses and parks to make it fit their requirements. These businessmen doubt the concern that equipment manufacturers have for their particular business.

The result is a situation similar to paying taxes or standing in line for license plates, everyone must do it although few enjoy it.

A number of businessmen derive pleasure from maintenance planning by developing a scheme to assure efficiency or to cut repair part costs. The very challenge of beating the odds can make maintenance more palatable.

It's like waiting until the last minute to pay your taxes because you owe the government, or planning your deductions ahead of time and filing early for a rebate. You can deal with repair parts on an emergency basis or you can predict repair part needs and stock needed parts ahead of time. The same goes for the manufacturer, he can begrudgingly go about supplying repair parts or he can create a repair parts program which makes his equipment more attractive to the buyer.

While doing the research for this article we mailed a letter to every equipment manufacturer in the Green Industry. It's obvious that the com-



There are forty-five blades to sharpen on this gang mower, a true maintenance challenge.

panies responding and mentioned in this article have pride in their repair programs. They are making an effort to improve the repair parts situation.

Following are suggestions made by equipment manufacturers regarding what repair parts to stock and maintenance that can be handled by the user.

Engines

If you don't know how to repair anything else, you should learn the basics of engine maintenance. Changing points, timing, and adjusting the carburetor are necessary skills for anyone using mowers, spray equipment, edgers, and just about anything used in the Green Industry. Valve and ring work might be left to an engine specialist or dealer's repair department.

Basically, if kept clean for proper air cooling, tuned for correct operation, and religiously lubricated, an engine can last years.

Kohler Company's product service manager Paul Scholten has written numerous trade publication articles on small engine maintenance. He recommends the following service based upon hours of use:

Each Day

- check oil
- clean air intake screen
- use fresh fuel

Every 25 hours

- change oil (usually SAE 30)
- clean fuel filter
- clean air intake filter

Every 100 hours

- clean or replace spark plug, check gap (usually .025 in. for gasoline engines)

Every 500 hours

- check or replace points (gap usually .020 in.)

Dust or dry clippings from summer mowing should be cleaned from engine fins and air intake and not allowed to accumulate. The operator must be instructed as to his responsibility of engine maintenance.

Many distributors and manufacturers offer engine maintenance instruction. Each person operating a device with an engine should attend such sessions and learn to perform basic replacement and adjustment service. It is not true that point replacement takes a lot of time. With a few simple tools to simplify flywheel removal, changing points and cleaning should take no more than half an hour.

There are three theories of maintenance, one is to have a maintenance staff doing just maintenance. The second is to assign responsibility for each piece of equipment to its primary user and train the user to perform maintenance. The third way is to send everything to the dealer for maintenance.

A maintenance staff is not the most efficient use of personnel for smaller firms. Dealers will tell you of workers coming to their parts departments for simple parts just to goof off. If recognized high repair parts are stocked and each operator is responsible for maintenance of his machine and given a half hour each day to perform maintenance, none has an excuse to goof off. Furthermore there should be a sense of pride in the condition of his equipment if he is a good employee.

As always, if you would like to pass on your experiences with equipment repair and maintenance write us and we'll publish your thoughts on the subject.

A basic list of parts to stock for engines:
plenty of good SAE 30 oil
spark plugs
fuel filter element
air filter element (to use while other is being cleaned)
set of points, condenser, and rocker arm with spring, shear pins for flywheel, ignition coil

Mowers

Roy Eldred, group director of parts for the Outdoor Products Group of Toro, recommends that turf managers stock the following "wear parts":

Walk Rotaries

- cutter bars
- belts
- collection bags
- oil

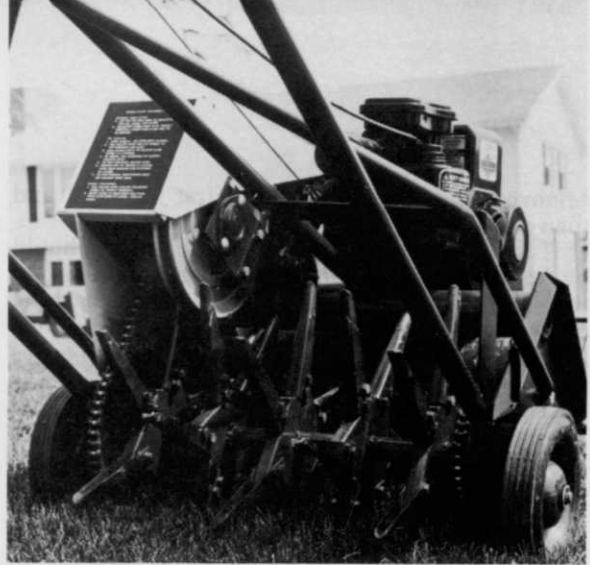
Riding Rotaries

- belts
- cutter bars
- filters for hydraulic equipment
- oil

Riding Reel Mowers

- bed knives
- bed knife screws
- belts
- oil
- filters for hydraulic equipment

Eldred says that stocking beyond these materials is wasteful and that operators should perform only that maintenance included in procedures described in the owner's manual.



Extra tines, drive belt, and core deflector should be stocked for aerifiers.

Eldred suggested that grinders, lapping machines, and blade balancers are useful additions to a maintenance department.

Sod Cutters

Ivan Vagts, Cushman-Ryan's national service manager, said sod cutters have very simple service needs. Vagts suggests owners stock one spare spark plug, a drive belt and one extra blade. He said the blade must be either 12- or 18-in. wide depending upon the model.

Aerifiers

Vagts recommends extra tines, one core deflector kit, a spark plug and drive belt for the Greensaire II. "Occasionally the tines will be damaged or break if they strike a rock underground," Vagts said. "But very little time will be lost if replacement tines are on hand since the job usually can be handled in less than five minutes."

Top Dressers

For top dressers Vagts suggests stocking connecting link assemblies and PTO roller chains. "If the link goes out the entire spreading operation can be shut down until another one is purchased," says Vagts. "I think an 80 cents investment in parts is a pretty good insurance policy."

Trucksters

Simple maintenance procedures such as oil changes help guard against field breakdowns of turf vehicles according to Vagts. Further protection can be achieved by stocking a set of points, a condenser, two extra spark plugs, an oil filter, an air cleaner element, and an alternator belt per vehicle. Special service charts are available for Cushman trucksters from Vagts, P.O. Box 82409, Lincoln, NEB, 68501.

Trenchers

Chains are the key to trencher maintenance beyond engine service. Maintenance should include checking chain tension, chain tooth wear, and using the right chain in the right circumstances.

Ditch Witch suggests lubricating chains between jobs to prolong chain life. If a chain is

removed and stored it should first be oiled and then hung in a dry place.

Tooth wear is fairly obvious and extras should be kept in stock. Chains are designed to sharpen themselves, and good chains have tungsten carbide outer edges to keep the chains sharp and to prolong life. When this coating is worn off and the tip edges become dull, teeth should be replaced.

The chain overall can wear at the links. Ditch Witch suggests the chain be removed and measured to check free play between links. This free play should not exceed 1/2-in. per foot of chain length. The way to tell is to lay the chain on the floor, push the chain together, and measure the length. Then extend the chain as far as possible and measure again. The difference between measurements should not exceed 1/2-in. per foot, or an eight foot chain should not have more than four inches of free play.

A chain designed for standard soils should not be used in rocky soil. Special chains are available for frozen and rocky soil.

Regular lubrication of moving parts and rust prevention will extend the life of heavily used trenchers. Safety shields should be kept in good order and never removed. Heavy vibration of trenching equipment requires frequent tightening of bolts.

Ditch Witch offers a free brochure on chain care. The address is Ditch Witch, Charles Machine Works, P.O. Box 66, Perry, OK 73077.

Blowers

Carl Rinker, general manager of Atwater Strong, stresses, "With liability for injury today at an all time high, do it yourself repairmen quite often are their own worst enemy."

"We strongly recommend that major service or repairs on any of our equipment be handled by capable service dealers or distributors from which the equipment was purchased."

The key to a blower is the fan. Rinker suggests stocking of handle bars, fans and fan hubs. "Servicing of our equipment," says Rinker, "should follow the service manual. The machine should be regularly oiled, greased where specified, and all fasteners should be kept tight. No safety guard provided on the equipment should be removed, permitted to deteriorate or become loose. Proper wrenches should be purchased for the fasteners on the equipment. Vice grips and pipe wrenches should not be used to remove fasteners."

Irrigation Equipment

An irrigation system is a carefully designed and balanced system. Changes to the original specifications should not be made without consulting the designer. Replacement parts must match the original specs. Rain Bird offers troubleshooting and design courses and has published four mainte-

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Tools for Maintenance

Maintenance is more controlled if a place and set of tools are available. Harley-Davidson's golf car service manager Tom Falcone suggests the following materials for a maintenance department:

Spare Parts

1. Assortment of fasteners — cotter pins, washers, lock washers, bolts and nuts.
2. Ignition keys.
3. Lubricants — engine, differential and drive flange oils, a dry silicone or graphite lubricant.
4. Tire and wheel assemblies "spares".
5. Air cleaners.
6. Spark plugs.
7. Spare batteries, 12 volt for gas cars and 6 volt for electric cars.
8. Drive and generator belts

Tools

Available from numerous manufacturers for approximately \$75 to \$85. Tool sets should minimally include:

1. Screwdrivers (several sizes, including Phillips).
2. Pliers.
3. Needle nose pliers.
4. Vice grips.
5. 10" adjustable wrench.

6. Hacksaw and supply of blades.
7. 3/8" and 1/2" ratchet drives.
8. 3/8" and 1/2" breaker bars.
9. Sockets sets, 3/8" through 15/16", 3/8" and 1/2" drives.
10. Rubber hammer.
11. Brass hammer.
12. Set of open end wrenches, 3/8" through 3/4".
13. Set screw keys.
14. Feeler gauge.
15. 3/8" electric drill and drill bits, 1/16" through 3/8".

Specialized Tools

1. Air compressor.
2. Battery load tester.
3. Cleaning solvents.
4. Compression gauge.
5. Grease gun.
6. High pressure washer.
7. Hydrometer.
8. Vehicle jack and jack stands.
9. Wheel chocks or blocks.
10. Log book — wall charts.
11. Low pressure tire gauge — 0 to 40 P.S.I.
12. Sensitive volt — ohmmeter.
13. Service and parts manuals.
14. Tachometer.
15. Towing device or trailer.

nance manuals. For more information on the seminars contact Rain Bird, 7045 N. Grand Ave., Glendora, CA 91740.

Weathermatic Div. of Telsco Industries has developed an irrigation malfunction report to help identify specific problems with an irrigation

Product Malfunction Report

I. Type of product malfunctioning:

- Control Cat. No. _____ Serial No. _____
- Rotary Cat. No. _____ Nozzle(s) _____
Sprinkler
- Electric Cat. No. _____ Size _____
Valve
- Pop-up Cat. No. _____ Nozzle _____
Spray Head
- Shrub Head Cat. No. _____
- Other (describe) _____ Cat. No. _____

II. Description of malfunction, in detail:

III. Answer the following only if control problem:

- A. Is clock programmed properly? Yes _____ No _____
Pin Position? In _____ Middle _____ Out _____
- B. Is calendar programmed properly?
Yes _____ No _____
Pin Position? In _____ Middle _____ Out _____
- C. Power switch "On"? Yes _____ No _____
- D. Rain-Stat? Yes _____ No _____ Rain-Stat cup
checked? Yes _____ No _____
Rain-State bypass attempted? Yes _____ No _____
- E. Mode switch in: Auto _____ Manual _____
Dry Index _____
- F. Power switch: Off _____ On _____
- G. 120VAC to control tested? Yes _____ No _____
- H. 24VAC tested at valve terminals?
Yes _____ No _____
- I. Is a pump wired to control? Yes _____ No _____
- J. If "Yes" to pump, is wiring done according to
Weather-matic specifications? Yes _____ No _____
- K. Will controller operate valves in manual mode?
Yes _____ No _____
- L. Tested circuit breaker? Yes _____ No _____

IV. Answer only if electric valve problem:

- A. Flow adjustment stem? Yes _____ No _____
Open? Yes _____ No _____
- B. Mainline pressure (static) _____ Actual Test?
Yes _____ No _____ If not actual test, how determined?

- C. Estimated flow in GPM? _____
- D. Was pgwe4@50 solenoid leads tested?
With meter? Yes _____ No _____ If "Yes," meter
reading _____ VAC
- E. Are diaphragm and solenoid ports clear?
Yes _____ No _____
- F. Was valve seat checked for obstructions?
Yes _____ No _____

G. Are all valves on the same control?

Yes _____ No _____ Has controller valve output
been tested? Yes _____ No _____ Reading _____

H. Approximate distance from valves to control? _____ Feet.

I. Type and size of valve wiring?

V. Answer only if rotary head problem:

- A. Pressure at head? _____ psi. How tested (Pitot
tube, pressure guage, other) _____
- B. Are sprinklers flush with ground? Yes _____
No _____ If "No," Above _____ or Below _____
- C. Are heads vertically plumb? Yes _____ No _____
- D. Was an internal assembly removed to check
for obstructions?
Yes _____ No _____ Result of inspection:
Flow tube? _____ Nozzles? _____
- E. Was a gravel sump at base of sprinkler
provided (when applicable)? Yes _____ No _____
- F. Do sprinklers show damage from mowers or
other maintenance equipment? Yes _____ No _____
- G. Does nozzle drive mechanism (impact arm or gear
drive) function properly? Yes _____ No _____
- H. If "No" to above, what did investigation show?

**I. Is problem with — Full circle? _____
Part circle? _____ Both? _____**

VI. General (A):

- A. Water source? City Main _____ Well _____ Lake or
Pond _____ Other (specify) _____
- B. Type or condition of water? Potable _____
Effluent _____ Brackish _____ Sand or Dirt _____
Other (specify) _____
- C. If cause of malfunction was determined, give a
brief description of what you found:

**D. How many of product on this project? _____
How many are malfunctioning? _____**

E. Were repairs made? Yes _____ No _____

VII. General (B):

- A. Job Name: _____
- B. Location: City _____ State _____
- C. Installer: _____
- D. Distributor: _____
- E. Date of Installation: _____
Owner: _____
- F. System Designer: _____
- G. Type of Installation: _____
(Residence, industrial plant, football field, park, etc.)

Maintenance

system. Donald Cooper, Weathermatic's customer service manager, sees the prime factor in irrigation maintenance as identifying the problem. By using the form you can help the irrigation repairman locate the problem without a time-consuming and expensive search.

Weathermatic has designed plug-in timing boards for easy replacement and has instituted a rebuild/exchange program to keep repair costs down.

Cooper recommends the following service:

Controls

Before working on controls make sure that the problem is in a control. You may have a valve problem. A majority of timing problems can be remedied by replacing the timing board. This process is simplified with plug-in timing boards.

Valves

Check for proper operation of solenoids and diaphragms. Replace as needed. Also check for leaks at all times.

Sprays

Clean or replace nozzles and bodies when plugged. Adjust to ground height.

Rotaries

Clean and flush. Adjust to ground height. If the problem is not readily discernable, replace inner assemblies and return to distributor for repair or rebuild/exchange.

Cooper recommends stocking the following spare parts:

Controls — timing board, clock motor, relays

Valves — solenoids, diaphragms, exhaust fittings

Sprays — spare nozzles and bodies

Rotaries — complete inner assemblies, strainers,

Rain Bird turf product technical manager Cozz Regele cautions that heads should be the right height for the grass and should be perpendicular to grade. Regele also cautions that wire connections be checked for corrosion regularly and that water tight fittings be used. Flushing new systems will avoid headaches later with plugging. To flush properly, cap all risers except the last one on the circuit and flush. After a thorough flushing, cap all risers except the lowest one on the circuit and flush again. On larger looped systems, Regele suggests that small sections be isolated by shutting off zone valves before flushing. Regular cleaning of filter screens should prevent plugging after thorough flushing.

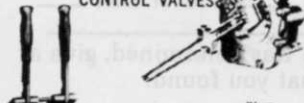
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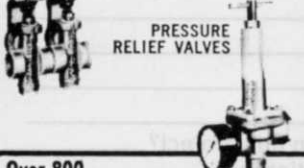
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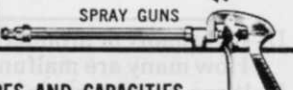
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