

GETTING READY FOR SPRING: START THE SPRAYING SEASON RIGHT — DON'T BREAK DOWN IF YOU DON'T HAVE TO!

By Steve Barritt
Sales Engineer
Reinders Brothers

Every golf course superintendent knows how expensive repairs can become. To insure the maximum performance from your spraying unit you should carefully follow all manufacturer's instructions as printed in the operator's manual received with your sprayer.

A sprayer is a carefully designed and built machine that should provide many years of reliable service, if properly cared for. Neglect can cost dollars in repairs, wasted spray material and premature replacement of the sprayer. Before you start the 1988 spraying season, be sure you take time to get your unit ready. Here are some tips:

INSPECT THE TANK

One of the first things to check is the inside of the sprayer tank. If it is a metal tank, are there flecks of rust or epoxy coating that are loose and should be removed? A piece of steel wool or a steel brush along with compressed air could help remove these pesky little pluggers before they have a chance to get to the spray nozzles. If your tank is polyethylene or fiberglass, has the gasket in the withdrawal fitting deteriorated to the point that it needs replacing? Remember, how are you going to change it with several hundred gallons of water/chemical in the tank? A \$10.00 fitting with new gaskets is a lot cheaper than an hour of spraying time or a gallon of chemical.

INSPECT THE VALVE

Now, trace the suction line of your pumping system. Is there an in-line shut-off valve? Does it work? If you have to disconnect or repair the pump it is important to be able to effectively shut-off the water/chemical supply.

INSPECT LINE STRAINERS

If you have an in-line strainer before the pump itself (this is recommended unless you have a centrifugal pump in which case the strainer can be on the pressure side of the pump), is the screen still maintaining its shape and is it clean?

INSPECT THE HOSES

While we are on the subject of the

suction line, look to see if it is kinked. Have the hose ply layers separated? Is it unduly soft (a sign of chemical attack)? If it is a plastic hose — does it have any cracks? A small air leak on the suction side of the pump (caused by any cracks) will prevent it from priming successfully. Also, check for corrosion of the hose clamps.

CHECK PUMP & FITTINGS

Next, and probably the most important, is the pump itself. Check to see that the fittings feeding in and out of the pump are sound. Does the pump turn freely by hand? If it doesn't, it might be a good time to remove the end plate or volute and see what exactly is the problem. Once you have reassembled your pump it's not fair to dismiss any extra parts on your work bench as one of those unnecessary options that never worked anyway.

If you have a roller pump, look for worn rollers. Look for pits and grooves in the rotor and end plate. Too much wear prevents priming and promotes additional wear. If you have a centrifugal pump, examine the impeller. Although speed of rotation is the secret of efficient centrifugal pumps, a worn impeller should be replaced.

The next point of inspection should be the directional control valve. If this is a TeeValve type of control, you should disassemble it and check that the spring loaded shut-offs inside are not worn and that their seats are unobstructed. Even though you may have flushed your system last fall, some chemical may have salted out or formed corrosion during winter storage.

INSPECT GAUGES

Also, remove the pressure gauge and examine the tiny inlet to the gauge. This is a good place for corrosion and is next to impossible to flush clean without removing.

INSPECT THE NOZZLES

Last, the operator must check out the spray tips and strainers. Check for corrosion and obstructions. Also, make sure you are using strainers that do not restrict the flow of your tips. All nozzle

charts give a strainer mesh recommendation. Make sure that you are using the same angle and size spray tips. An 8003 is not compatible with a 730308 or a 6503. Try different angles of the spray pattern. 80, 73, and 65 degrees, require different operating height.

Once the preventive maintenance outlined above has been done, you should select the proper application rate, pressure, speed, water/chemical ratio and actually calibrate your sprayer. A tank full of expensive chemical is a sad way to find a bad hose, a leaky connection, bad seals or worn cups in the pump.

THE GRASS ROOTS DOES IT AGAIN!

By Rod Johnson

For the fourth consecutive year your newsletter *The Grass Roots* has received the highest possible award from the Golf Course Superintendents Association of America.

During GCSAA's International Conference and Show in Houston. Editor Monroe Miller received the award for the chapter newsletter judged Best Overall for Chapters with 70 or more members.

The Grass Roots has become the standard of the industry and we are all indebted to Monroe Miller for its continued success. The creative staff at Kramer Printing in Madison continue to give us superb, professional service. Furthermore, all contributing authors deserve our thanks. Please take the time to thank the many talented people who have taken of their time to insure the success of *The Grass Roots*.

Last, but not least, continue to support our advertisers. Without them it would not be possible to have the award-winning newsletter that we have.



THE 'MEN OF IRON' RESPOND

By Larry Lennert

I am a graduate student and Wisconsin Turfgrass Association sponsored Research Assistant working under Dr. Wayne Kussow at the University of Wisconsin-Madison. I am currently researching the effects of iron applications to turfgrass. In August, 1987, I mailed an "iron application questionnaire" to 120 WGCSA superintendents. This questionnaire asked for information regarding the use of iron on the turf areas these superintendents manage. I received 52 responses, and the results are presented on an expanded version of this questionnaire.

IRON APPLICATION QUESTIONNAIRE

- Do you make regular iron applications to any of the turf areas you manage?
 - 42 (81%) Yes
 - 10 (19%) No
 If yes, continue. If no, stop, but please return this questionnaire anyway.
- Which turf areas receive iron applications?
 - 42 (100%) Greens
 - 32 (76%) Tees
 - 18 (43%) Fairways
 - 3 (7%) Lawn areas
 - 2 (5%) Approaches
- What is your method(s) of application?
 - 5 (12%) Soil applied (granular)
 - 40 (95%) Foliar (spray)
- What source(s) of iron do you use?
 - 22 (52%) Ferrous sulfate
 - 14 (33%) Chelated iron
 - 4 (10%) Ferromec
 - 17 (40%) Microgreen
 - 3 (7%) Lesco Iron +
 - 2 (5%) Scotts 20-4-8 plus minors
 - 1 (2%) Nutriculture 28-8-16 with iron
 - 1 (2%) Milorganite
- For each iron source you use, list the rate of application of the SOURCE in ounces per 1000 square feet.

1 (2%)	Ferrous sulfate — 0.50 oz/M	3 (7%)	Microgreen — 1.50 oz/M
5 (12%)	Ferrous sulfate — 0.75 oz/M	3 (7%)	Microgreen — 2.00 oz/M
7 (17%)	Ferrous sulfate — 1.00 oz/M	2 (5%)	Microgreen — 3.00 oz/M
3 (7%)	Ferrous sulfate — 1.50 oz/M	1 (2%)	Microgreen — 4.00 oz/M
1 (2%)	Ferrous sulfate — 2.00 oz/M	1 (2%)	Microgreen — 6.00 oz/M
1 (2%)	Ferrous sulfate — 2.50 oz/M	1 (2%)	Ferromec — 1.50 oz/M
1 (2%)	Ferrous sulfate — 3.00 oz/M	1 (2%)	Ferromec — 2.00 oz/M
1 (2%)	Ferrous sulfate — 8.00 oz/M	1 (2%)	Ferromec — 3.00 oz/M
CHELATED IRON			
1 (2%)	Sequestrene 330 — 0.75 oz/M	1 (2%)	Lesco Iron + — 1.00 oz/M
1 (2%)	Sequestrene 330 — 1.00 oz/M	1 (2%)	Lesco Iron + — 1.50 oz/M
(5%)	Sequestrene 330 — 1.50 oz/M	1 (2%)	Lesco Iron + — 4.00 oz/M
1 (2%)	AgriPlex — 0.50 oz/M	1 (2%)	Eagle Iron — 2.50 oz/M
2 (5%)	AgriPlex — 0.75 oz/M	1 (2%)	Nutriculture — 1.00 oz/M
2 (5%)	AgriPlex — 1.00 oz/M		
1 (2%)	Share — 2.00 oz/M		
5 (5%)	Microgreen — 0.75 oz/M		
3 (7%)	Microgreen — 1.00 oz/M		
- If you make foliar applications, what spray volume do you use in gallons per acre or gallons per 1000 square feet?
 - 2 (2%) 0.5-0.6 gal/M
 - 5 (12%) 1.0-1.1 gal/M

- 4 (10%) 1.5-1.8 gal/M
- 3 (7%) 2.0 gal/M
- 7 (17%) 2.5 gal/M
- 5 (12%) 3.0 gal/M
- 4 (10%) 3.3-3.5 gal/M
- 4 (10%) 4.0 gal/M
- 2 (5%) 4.5 gal/M
- 3 (7%) 5.0 gal/M
- 1 (2%) 6.6 gal/M
- 2 (5%) 7.0 gal/M

7. For foliar applications, do you make special iron applications or add it as a tank mix to another sprayable material?

- 3 (7%) Special applications
- 41 (98%) Added to other material(s)

If added to other material(s), which material(s) do you add iron to?

- 19 (45%) Fertilizer
- 5 (12%) Herbicide
- 41 (98%) Fungicide
- 13 (31%) Insecticide
- 5 (12%) Wetting Agents

8. Do you see a "greening effect" from iron applications?

- 40 (95%) Yes
- 1 (2%) No
- 1 (2%) Sometimes

If yes, how long does this "greening effect" last?

- 12 (29%) 0-1 week
- 23 (55%) 1-2 weeks
- 2 (5%) 2-3 weeks
- 0 (0%) 3 or more weeks
- 5 (12%) It depends on how often the area is mowed

9. When do you make iron applications?

- 2 (5%) March
- 8 (19%) April
- 29 (69%) May
- 33 (79%) June
- 39 (93%) July
- 36 (86%) August
- 26 (62%) September
- 13 (31%) October

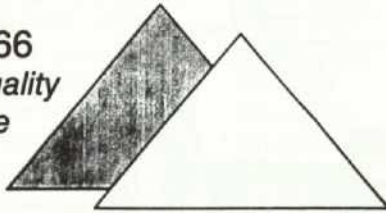
- 2 (5%) November
- 1 (2%) As needed

10. Why do you make iron applications?

- 22 (52%) A quick green-up for special events
- 37 (88%) To maintain color when using less N fertilizer
- 5 (12%) To correct for soil deficiencies
- 3 (7%) To improve winter hardiness
- 3 (7%) To improve rooting
- 2 (5%) It is applied along with other micronutrients
- 1 (2%) To reduce spray solution pH
- 1 (2%) To reduce soil pH(ferrous sulfate)
- 1 (2%) Recommended to be applied with Acti-dione

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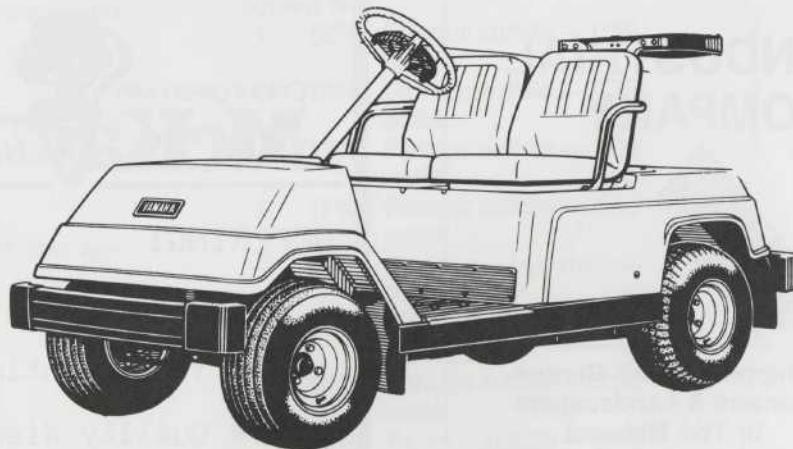
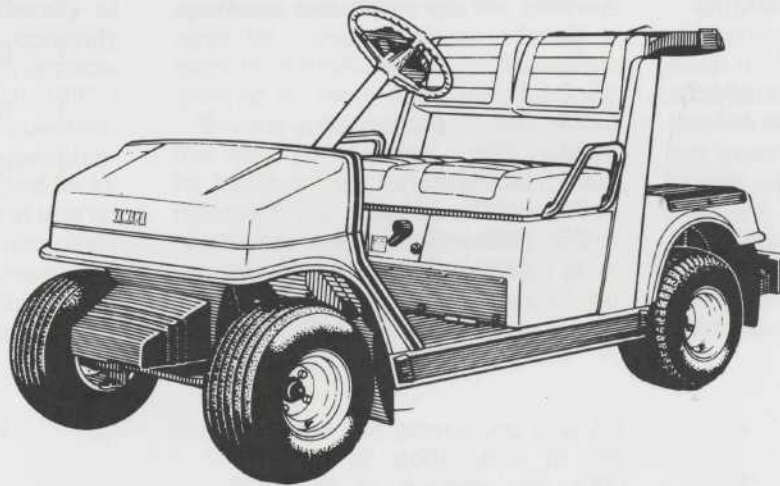
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REVISED MAP DETAILS DATES OF LAST KILLING FROST AROUND WISCONSIN

With March comes a real sense that spring is just around the corner. And with that thought comes the annual question, "When is the last frost of the passing winter season?" That date has considerable influence on early season management of golf courses.

The newly revised edition of "WISCONSIN CROPS (from planting to harvest) AND WISCONSIN WEATHER" contains a wealth of information of value to Wisconsin agriculturalists. Among the most interesting changes in this updated booklet is State Meteorologist Douglas Clark's more detailed and more accurate map that shows when residents can expect the last killing frost in the spring. That date varies from April 26th in the south to June 5th in the northern counties along Lake Superior.

Both the older map and the revised map are reproduced here. The older map shows more general areas of the last killing frost dates. The new map shows frost pockets where frosts can occur later, and more accurately, maps the boundaries of dates. Data from 1951 to 1980, gathered at 72 weather reporting stations in the state, were used to determine weather patterns as dictated by the last killing frosts.

Also, take a look at the table following — it lists probable dates of the last occurrence of 32 degrees F. in the spring at a number of locations in the state. It covers the years 1951 to 1980 only. The probabilities indicate the

likelihood of observing 32 degrees F. after the given date in the spring. The values corresponding to the 50% probability level are known as median

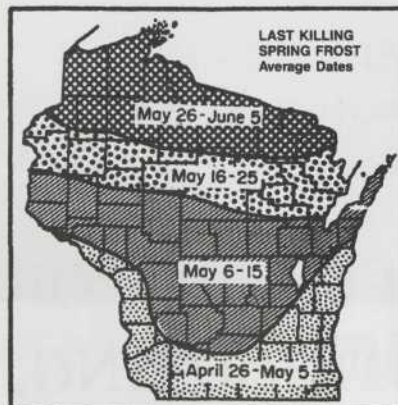
values. These values are in the middle of all observations, so that half the years have an earlier date and half have a later date.

MSM

PROBABLE DATES OF SPRING FREEZE (32°F).

Location	Spring freeze dates (mo/day)		
	80%	50%	20%
Antigo	5/13	5/23	6/03
Appleton	4/23	5/02	5/10
Ashland	5/21	6/01	6/13
Blair	5/11	5/19	6/13
Crivitz	5/13	5/23	6/02
Darlington	5/02	5/12	5/22
Fond du Lac	4/25	5/04	5/14
Grantsburg	5/07	5/20	6/02
Hillsboro	5/04	5/15	5/26
Janesville	4/20	4/28	5/06
Kenosha	4/19	4/28	5/07
Ladysmith	5/13	5/22	6/01
Lancaster	4/24	5/04	5/15
Montello	4/28	5/09	5/20
Oconto	5/07	5/16	5/24
Oshkosh	4/28	5/08	5/19
Park Falls	5/12	5/19	5/27
Prairie du Chien	4/22	5/03	5/13
Rhineland	5/12	5/19	5/25
River Falls	4/19	5/08	5/17
Sheboygan	4/19	4/25	5/02
Spooner	5/17	5/28	6/08
Stoughton	4/22	4/30	5/09
Sturgeon Bay	5/08	5/17	5/26
Watertown	4/24	5/04	5/15
Wausau	4/30	5/08	5/17
West Allis	4/16	4/23	5/01
Wisconsin Rapids	5/09	5/18	5/26

NEW MAPS DETAIL DATES OF LAST FROST



The old map by Douglas Clark.



The new map by Douglas Clark.

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any triplex. Plus, rubber-cushioned isolation mounting of the engine reduces vibration and noise for better operator comfort.

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1988 UNITED STATES GOLF ASSOCIATION REGIONAL CONFERENCE SET

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The United States Golf Association conducts a series of one-day regional conferences each year in various cities in March and April. These programs are designed to provide valuable information regarding turfgrass management for golf courses, along with other golf and club management-related subjects, to golf course superintendents, club directors, green committee chairmen, golf course owners and operators, golf professionals and clubhouse managers.

Jim Latham and Jim Farrell have announced that the conference for our region will be held at the Blythefield Country Club near Grand Rapids, Michigan (Route 1, Belmont, Michigan) on March 10, 1988. This meeting is sponsored by the USGA, the Golf Association of Michigan and the Western Michigan Golf Course Superintendents' Association. There is a \$30 per person advance registration fee which includes a luncheon. Registration at the door will be \$40 per person.

If you haven't received a mailing yet, please contact either Jim Latham or Jim Farrell:

USGA Green Section
Great Lakes Region
James M. Latham, Jr., Director
8727 North Deerwood Drive
Brown Deer, Wisconsin 53209
(414) 354-2203

USGA Regional Affairs
Mid-Continent Region
James A. Farrell, Manager
P.O. Box 616
Crystal Lake, Illinois 60014
(815) 459-5590

As you can tell from the following program, this will be an excellent educational opportunity.

8:00	Registration — Coffee & Rolls
9:00	WELCOME Roger G. Barton, President Western Michigan GCSA Belmont, Michigan
9:15	THE ALPHABET SOUP OF GOLF Jeffrey L. Rivard, Executive Director Golf Association of Michigan Farmington Hills, Michigan
9:45	SPECIES ADAPTATION TO STRESS CONDITIONS — HOW LOW THE MOWING HEIGHT? HOW HIGH THE TEMPERATURE? Mark Grundman, Turf Specialist Northrup King Company Wisconsin Rapids, Wisconsin
10:30	BREAK
10:45	EFFECTIVE COMMUNICATION AND TEACHING THROUGH IMPROVED VISUAL AIDS James A. Farrell, Manager Mid Continent Region USGA Regional Affairs Crystal Lake, Illinois
11:15	TROUBLESHOOTING PROBLEM SOIL CONDITIONS James M. Latham, Jr., Director Great Lakes Region USGA Green Section Brown Deer, Wisconsin
12:00	LUNCHEON
1:30	A NEW VIEW OF HISTORY AT THE USGA MUSEUM AND LIBRARY Janet Seagle, Librarian/Museum Curator USGA Golf House Far Hills, New Jersey
2:00	SELECTED LEGAL ISSUES OF GOLF CLUB AND GOLF COURSE MANAGEMENT Brent D. Rector, Attorney at Law Member, Blythefield Country Club Belmont, Michigan
2:30	MANAGEMENT TECHNIQUES FOR STRESS TOLERANCE — PROGRAMMING HIGH QUALITY AT LOWEST RISKS Dr. Bruce Branham, Assistant Professor Michigan State University East Lansing, Michigan
3:15	U.S. OPEN FILM "An Olympic Duel"
3:45	ADJOURN



FUELS

By Tom Harrison

Good internal combustion engine performance is dependent on many things. Fuel, air, ignition and compression are but a few of the essential components needed to make an engine function. The focus of this article is fuel and how easy it is to take the quality of fuel for granted.

The importance of fuel quality was brought to light for us when we ran into a problem in our shop about 8 years ago with poor engine performance. We were experiencing poor combustion, lack of power, carboned-up cylinder heads and a whole host of small problems that we wrote off to poor design, poor manufacture, and too stringent pollution controls. We have come to learn that 99% of our problem was poor fuel.

The quality of both our gasoline and diesel fuels had deteriorated to the point that performance was being severely affected. It wasn't a matter of our supplier selling us poor quality fuels instead of a better grade fuel; they were selling us the best they had to offer. The large petroleum companies had been gradually reducing quality to the point where the only fuels available were of a poor quality, thus causing poor engine performance.

The problem was not one which came at us real suddenly, either. The decline in performance was very subtle over several years' time. With bulk-delivered fuels you tend to watch the price rather than the octane or cetane rating. If we put the fuel in a vehicle and it starts, we think that's good enough.

The most noticeable problems began with our switch from regular to unleaded fuels. At first the octane rating was adequate, as we noticed few problems. But in 1981, evidently the octane rating started to slip to the point that gasoline engine performance became very poor. We had a 1980 Chevrolet ¾ ton pick-up with a 350 automatic. Mileage never was good, but performance slowly went downhill. Engine knock or "pinging" was our

first sign that either timing or fuels were the problem. I had the distributor rebuilt on a different curve to allow for poor fuels and emission controls but this only had a minimal effect on engine knock. Eventually I did some checking on octane ratings and realized that we had slipped to 85-87 octane fuels. We switched to premium unleaded gasoline at 91 octane and noticed a marked improvement in all our equipment. Cushman's and greensmowers all benefited from this better fuel.

In further researching our gasoline availability, we found that our supplier, Cenex Cooperatives, was now marketing two high octane gasolines. They have a premium lead-free which derives its higher octane from alcohol type sources and they offer a super unleaded of approximately the same octane derived from chemical additives. I assumed that alcohol or corn based sources would be the fuel to buy, so we stayed with the alcohol based fuels until I noticed that the marine industry had thrown up the red flag to the use of any fuels with alcohol. At first I thought their concern was for the high RPM light weight alloy cylinder heads. But after doing some checking, I found out that their concern was for the safety aspect of fuel leaking out of hardened and cracking fuel lines and getting into the bilges of boats, consequently causing a fire or explosion. The marine industry felt that alcohol caused rubber fuel line components to rapidly harden and become brittle. I have used alcohol based premium gasoline in my boats and after 24 months, I have had to replace all the fuel lines. The lines have become as hard as if they were 15 years old. I can't say that we have noticed any problems with our turf equipment, but we are looking each piece of equipment over carefully during our winter maintenance.

I wasn't sure whether to upgrade our fuel once more to super premium because I did not know whether the alcohol in our premium blend was a problem. So I called the OMC corpora-

tion in Waukegan, IL, Lawn-Boy in Tennessee, Cushman in Lincoln, NE, Briggs and Stratton in Milwaukee and Kohler in Kohler, WI. They all recommended not using any fuels with any alcohol content for only one reason and that was safety. Performance-wise, the alcohol based premiums were fine but the perceived problem of fuel line/system deterioration made them all recommend no alcohol in the fuels.

I then decided to call around and find out which oil companies are using alcohol in any of their fuels. That proved to be a tough task because no longer can you call the local Texaco, Shell, Citgo, Standard Oil jobbers. They have all pretty much gotten out of the local delivery market. Independents have taken over the local fuel deliveries. To find out what the independents were delivering was hard since some of them buy gas on the open market, thus being less than knowledgeable about their product. To the best of my knowledge, it appears that only the ag coops are offering premium fuels blended for higher octane with alcohol. All the other independents I talked to offered a premium gasoline with no alcohol additives. But they all indicated that it is a changing market. It pays to be constantly aware of what you are buying.

As I was finishing this article and tried to draw some conclusions regarding gasoline supplies and quality, the EPA, General Motors and the State of California announced a joint venture to research and promote the possible use of 100% alcohol/gasoline based fuels in southern California. The motives for the EPA and the State of California are to attain cleaner air. General Motors is cooperating because California has some terribly tough rules on vehicle emissions which do not apply to the rest of the country. GM probably feels that if a less polluting fuel can be introduced and accepted by the consumer, GM can sell the same cars in California that it sells to the rest of the country. Currently, many engine/trans-

mission options available to the rest of the nation are not available in California. All GM needs to do to make alcohol/gasohol work in their vehicles is use fuel system components that will withstand alcohol and then tune the vehicles accordingly.

Conclusions that can be made about fuels are as follows. Regular leaded gasoline as of January 1, 1988 is still legal for sale for about at least another year or so according to the EPA. When and if one chooses to switch to unleaded gasoline, the octane rating is minimal for good engine service. Premium type lead-free gasoline is worth the cost for long engine life. Whether to use premium fuel with alcohol additives or not is up to the individual user. Because I have noticed hardened fuel lines on my marine application, I will switch to premium fuel without alcohol until fuel line components are fully available that will better withstand alcohol. The concern as to whether unleaded fuel will destroy valves and valves seats in older equipment is determined by the use of the equipment. If you put a two bottom plow on your Ford 8N tractor and decide to plant soybeans amongst the *Poa annua* on the back forty, the valves on the Ford will not last. Hard, day long use of the older engines without the

lead additives will eat up the valves. If the old 8N merely pulls a sprayer or a rough mower, it should have no problems. If you are really concerned about the engines, use lead-free fuels to save the valves. All newer engines including all our single cylinder engines have hardened valves and recommend lead-free fuels.

Another fuel problem that crept up on me was the quality of diesel fuel. I always thought that fuel oil and diesel fuel were two different fuels. I believed diesel fuel had additives for cleaner burning and higher cetane (heat value) ratings and fuel oil was the basic fuel for home heating with no additives. My assumptions were only partially correct. We have a Chevrolet Blazer with a 6.2 liter diesel engine. This is a good engine but its horsepower and torque values are not particularly high. If the timing is slightly off or if a poor or blended fuel is used, performance slips quite noticeably. Performance slowly began to deteriorate on this vehicle in the last year and I did not know what the problem could be. When we blended the diesel fuel 60/40 with #1 diesel for winter driving, performance got even worse. After doing some grousing and grumbling with our fuel supplier, they enlightened me to the fact that in their language diesel

fuel and fuel oil are one and the same. There are no additives or cetane differences between the two. They do, however, offer a high grade diesel fuel with the trade name "fieldmaster diesel fuel". This has additives for control of solid pollutants and a much higher cetane rating. After about a month of using this fuel in the 6.2 liter engine the improved performance was tremendous. It was as noticeable as when I switched gasolines from regular lead-free to premium. My suppliers response to my obvious question of "why didn't you tell me about these better grades of fuels" was "we didn't think you needed anything better for lawn mowers".

Twenty years ago we could buy a good grade of regular gasoline that had a reasonable octane and was good for our engines. Premium fuel use on golf courses would have been unnecessary then. Today regular fuel has been cheapened to the point of almost being useless. Diesel fuels can vary in grades and quality also. What is important is that the buyer must beware. You must be aware of what the bulk truck is delivering and you must determine whether you think that better grades of fuels will help you in the care of your equipment.



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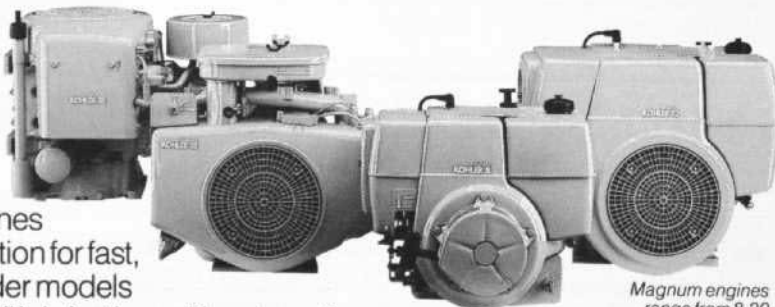
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All Magnum engines feature electronic ignition for fast, sure starts. Twin cylinder models include full pressure oil lubrication, with automotive-type oil filters. Additional features include dual element air cleaning, PosiLock™ connecting rod cap, optional Oil Sentry™ low oil sensing and a two year warranty that covers commercial use.



Magnum engines range from 8-20 H.P. in horizontal and vertical shaft designs.

We designed Magnum engines to require fewer service parts and less routine maintenance, so your equipment will spend less time in the shop and more time on the turf.

To find out how you can benefit by having Magnum engines on your equipment contact: Kohler Engine Division, Kohler Co., Kohler, WI 53044, 414-457-4441.

KOHLER
engines

Built for a hard day's work.