

Turf Nematicides: AN UPDATE

By Robert A. Dunn

Turf grasses do not generally lend themselves to many of the nematode control practices that are so useful for farmers who grow annual crops. Crop rotation and physical manipulation of the soil before planting are not often feasible for permanent sod. Nematode resistant varieties of warm-season grasses are not yet available and are never likely to cover the broad range of nematodes of turf in Florida. Biological control is a realistic dream for the future, but is not yet practical. The principal means of managing turf nematode populations, beyond manipulating the few cultural factors that are mentioned below, is application of a chemical nematicide that is registered for the purpose. With a few provisos, then, this article sets forth the current state of nematicides for established turf grasses in Florida.

Effect of turf management practices on nematode populations and sensitivity of turf to nematodes. Turf can often survive well despite the presence of moderate levels of several nematodes. In fact, there is less likely to be serious damage to turf when the population is composed of a few individuals of many different kinds of nematodes than when only a few kinds are very numerous. A moderate level of turf management, rather than extreme neglect or overuse of water and fertilizer, seems to give turf the best chance to strike a reasonable balance with the nematodes that live at its roots.

Deep, less frequent watering encourages roots to grow deep, so they can draw water and nutrients from a much greater volume of soil than could the short roots that develop with brief daily watering cycles. When the roots have access to a greater volume of soil, the turf is less susceptible to brief dry spells and the grass can recover more of the fertilizer nutrients that have been applied.

Overuse of nitrogen encourages excessively tender, lush root growth, which in turn supports maximum nematode reproduction. Under such conditions, nematode populations often become unnaturally high. The high populations may destroy roots faster than they can be replaced under the best of cultural conditions, and they will certainly wreak havoc if the artificially high level of maintenance is interrupted for any reason. Do not neglect the complete nutritional needs of turf; for instance, strong root growth depends on having adequate potassium levels.

A given level of nematodes will cause less apparent damage to turf if other sources of stress, often easier to manage, are kept to a minimum. Plant diseases, especially root rots, are often associated with nematode popu-

lations. A serious insect outbreak may dramatically reduce the reserves that turf needs to withstand nematodes. Nutrient deficiencies and soil compaction or water-logging can make turf more sensitive to nematode damage to roots. When turf is mowed too short, it is unable to manufacture enough carbohydrates to support normal root growth and replacement. Turf that is planted in too much shade will also have more trouble providing for adequate root growth.

In short, if you want to maximize your chances of developing major turf nematode problems, scalp the grass regularly, water it daily and lightly, push it with high nitrogen fertilizers but with little or no other nutrients, and ignore insect and disease problems.

Nematicides. As noted above, there are many good reasons for the importance of chemical nematicides in turf nematode management. Before discussing individual products, we should discuss some general points about turf nematicides.

Environmental hazard is a real risk that goes with use of any turf nematicide. These products are all highly toxic, water-soluble organophosphate pesticides. All can be hazardous to wildlife and fish as well as people. All will (must!) leach through the soil profile and thus present some risk of groundwater contamination. Pesticide regulations and labelling restrictions are rapidly being changed to address those problems more directly. For instance, labels of all nematicides will soon reflect potential risks to endangered wildlife species. Some nematicide labels have specific warnings concerning the risk of groundwater contamination. Failure to fully meet the requirements of any such labelling could result in civil or criminal penalties, so they must be taken very seriously. Some of these new restrictions may make it impossible to apply some or all nematicides to locations where the manager is certain that nematodes are causing serious damage to turf. Nevertheless, if the label forbids the use, the turf manager has no legal alternative but to forgo the use of the nematicide and to try to manage the nematodes by cultural manipulations.

The effects of nematicides are only *temporary*. The products that may be applied to established turf must remain in the root zone (upper soil level, usually 4-10 inches, where most roots grow) for several weeks to have maximum effect. If they are lost from that zone too early, many nematodes that were temporarily inactivated may quickly resume feeding, reproducing, and damaging turf roots. Even if nematode kill is complete in

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that zone, no treatment can reach all nematodes at all depths of the treated area. Therefore, nematodes will reinfest the turf root zone quickly after the concentration of nematicide drops below that needed to inhibit their activity. How long the chemical remains above that level is determined by a combination of many factors: physical and chemical characteristics of the nematicide, rate applied, how much water has passed through the soil profile, and soil texture, organic matter, and pH. Hence, no nematicide provides more than a limited period of relief from nematode stress. Applying a nematicide does not guarantee that turf will grow better. A nematicide can only improve turf health if:

1. nematodes that it can control were causing the problem to start with;
2. the material is used correctly;
3. other major (growth-limiting) pest and disease problems are under control;
4. all normal nutritional and environmental needs for turf growth are provided during the protected period.

Uniform penetration of soil by the dissolved active ingredient is critical for effectiveness of any nematicide. Physical soil treatments that will improve uniformity of soil penetration by water will enhance nematicide performance: aeration, vertical mowing, thatch removal, etc. should be done before applying any of these products. Soil should be moist but not saturated when the nematicide is applied, and foliage must be dry if a granular formulation is used. Follow application with 1/4 to 1/2 inch of water, as directed on the product label, to incorporate the active ingredient into the root zone.

Comments about specific nematicides beyond the notations in the table follow in this section. Note these care-

fully, and pay close attention to new labels, information released by the registrants (manufacturers), and news from regulatory agencies to be sure you are not accidentally guilty of pesticide misuse.

MOCAP® 10G will soon appear with some important label changes. New product package labels will refer to commercial turf use, but not to home lawn applications. A separate label being issued to cover only the home lawn application will identify the product as a Restricted Use Pesticide for that specific use. Therefore, Mocap 10G will not be a Restricted Use Pesticide for commercial turf or other crop uses. However, the label on the bag will not permit use on home lawns or "domestic turf," and the separate label which the applicator must have with him when using the product for home lawns will make it mandatory that anyone using it there must be a Certified Applicator.

NEMACUR® 3 is registered specifically for golf courses, with a notation that it is "not recommended for tees or greens." It is not registered for any other turf use. Its label limits it to no more than 2 applications per year, as is also the limit for NEMACUR® 10G. Application more frequently or to turf in other sites than are specifically allowed on the label is a serious violation of FIFRA. Birds are very susceptible to this chemical; every effort must be made to water it into the soil quickly after application. If the spray rig or granule spreader can cover ground much more rapidly than the irrigation system can move, slow the rate at which fairways are treated to keep close to the watering cycle, rather than risking a prolonged period of bird exposure.

NEMATICIDES FOR ESTABLISHED TURF IN FLORIDA

Product	Legal sites, methods	Amount
Mocap 10G	Commercial turf, such as golf courses, sod farms, and cemeteries; may be applied to many grass species. See note in text about application to home lawns.	4.6-6.9 lb/1000 sq ft, or 200 to 300 lb/acre.
Nemacur 10G	Golf courses, cemeteries, sod farms, industrial grounds, parkways, roadways; <i>do not use</i> on residential lawns or public recreational areas other than golf courses. Restricted Use Pesticide.	2-1/3 to 4-2/3 lb/1000 sq ft or 100 to 200 lb/acre.
Nemacur 3	Golf courses; not recommended for tees or greens. <i>Do not use</i> on residential lawns or public recreational areas other than golf courses. Do not use more than twice per year. Restricted Use Pesticide.	9-12 fl oz/1000 sq ft or 3-4 gal/acre.
Sarolex	Turf and lawns.	1.5-2.5 pt/1000 sq ft or 8.2-13.6 gal/acre.
Scotts Pro-Turf	Contains ethoprop, the same active ingredient as Mocap. For use only by professionals; <i>do not use</i> or store in or around the home.	9.2 lb/1000 sq ft or 400 lb/acre.

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Palm Beach Trade Winds



By: Mike Bailey
The Falls Country Club

Let's Hear from the Other Side

Imagine this; a lush, beautiful golf course located on a tropical island where warm breezes ruffle the coconut palms and bermudagrass is the dominant turfgrass from tee to green.

Does this sound familiar? If you live in South Florida, this is probably what you see everyday; a golf course with bermudagrass throughout. However, there has been something creeping down from the up north country; the popular rage of the bentgrass phenomenon.

It sounds sort of peculiar, does it not? A cool season turfgrass species trying to grow in a year round, warm season climate. After all, South Florida, from Jupiter across to Naples, is listed geographically as being located in Zone 10; a tropical, warm season climate, where frosts are seldom, if ever at all. However, we find ourselves discussing a situation similar to locating an Eskimo in the tropics and asking, "why are you perspiring so profusely?"

Obviously, many superintendents in South Florida have been perspiring profusely also. The fear of losing your job because you are having a difficult time growing bentgrass in South Florida has sadly been on the increase. The intent of this article is to not ridicule the concept of overseeding, yet, let us weigh the pros and cons of overseeding in a climate where perhaps, it could be best to not overseed. Yes, life does exist without bentgrass.

Now, let's hear from the other side, those courses that successfully chose to not overseed. Given the right situation, there are many benefits to not overseeding. In the South Florida climate, if your greens are relatively large (6,000 square feet or greater), constructed of good, coarse perculative sand (and obviously U.S.G.A. specs would be even better) an adequate budget (to properly maintain turf throughout the winter season), a healthy, pure stand of Tiftdwarf (that is relatively clean of offensive contaminations), and a tolerable amount of peak season play, in order to endure the foot traffic, you can successfully combat the season without overseeding.

In defense of the Bent blues, if your greens are small, poorly constructed, with excessive winter play, overseeding might be your only solution for survival. In order for this discussion to be fair, let's hope you do not fall into

this category.

Let us compare the overseeded course to the non overseeded course on a month by month basis and see who scores the highest grade. We will begin to take the test during the month of September, reason being, this is the very beginning of the snow bird season, where some of the tourists begin to come down.

THERE ARE MANY BENEFITS TO NOT OVERSEEDING IN SOUTH FLORIDA.

September: Overseed — Score B (3.0). The greens are acceptable, although fertilization has dropped off in order to slow down the aggressiveness of the Bermuda in preparation of next month's overseeding.

September: Non Overseed — Score A (4.0). The greens are probably the best they will be all year. Summer renovation is paying off, fertility is up, the greens are exceptionally healthy and ready to prepare for the winter season.

October: Overseed — Score D (1.0). Overseeding is taking place. Verticutting, topdress, establishment of the month of the year for the overseeded course. Politically, this can also be very disheartening. Members are just coming down, and getting an ill taste of aggravation. this can also be very disheartening.

October — Non Overseed — Score A (4.0). For the non-overseeded course, life is much like September. A good healthy stand of turf, that should continue to look excellent and putt relatively true for Bermudagrass. Politically, this can be a very satisfying month. Members coming down and feeling positive about the conditions of the golf course with no aggravation.

November: Overseed — Score C (2.0). Overseeding is becoming established, mowing heights are gradually being lowered and next month will be better.

November: Non Overseed — Score A (4.0). This is probably the last of the good months. Density, color and

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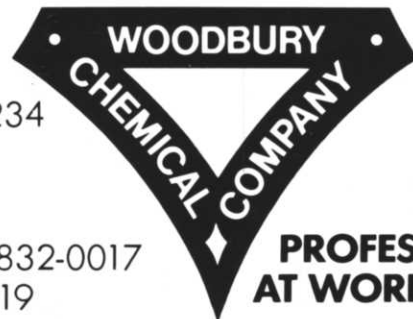
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overall putting quality should still be excellent.

December: Overseed — Score C (2.0). The greens are beginning to look better. Cooler nights and shorter days are helping the establishment of the seed. Most of the members are in-town by now, expecting excellent greens, they should be patient, realizing next month will be better.

December: Non Overseed — Score B (3.0). The greens are beginning their downward swing. The weather is not severe enough to be detrimental and overall the members are still satisfied with the product.

January: Overseed — Score B (3.0). The greens are really shining now. They should be completely established, mowing height down tight and putting excellent. If this isn't your month to excel, it wasn't worth the bother. Everybody's in town and expecting perfection.

January: Non Overseed — Score B (3.0). The greens are holding on and this will be the last good month. Fertilization is up, topdressing is aiding the growth, putting quality is still good however, the color is off and the density could be suffering because of the foot traffic.

February: Overseed — Score A (4.0). Once again this should be a good month much like January. The seed has matured and the members should be very happy.

February: Non Overseed — Score C (2.0). This will be the toughest month of the year. The greens should actually putt quite good, because of the heavier winter fertility and topdressing however color can be off. This must be the key part of educating the members — "putting for quality, not for color."

March: Overseed — Score A (4.0). This could be the last great month to cash in. Assuming the seed was a good take, and no disease has occurred, the members should be very happy.

March: Non Overseed — Score B (3.0). Assuming no frost has occurred, you're home free. The greens will be on their upward swing. Putting quality should still be quite good although color will still be slightly off.

April: Overseed — Score B (3.0). Assuming no frost has occurred, you're home free. The greens will be on their upward swing. Putting quality should still be quite good

although color will still be slightly off.

April: Non Overseed — Score B (3.0). The greens should not only putt good, but color should be improved to the point of almost looking "normal." For this given month, the greens will be equally competitive to the overseed. Members are beginning to pack up and head north with a positive feeling about the non-overseeded greens — a feeling of passing the test with a good grass.

May: Overseed — Score C (2.0). By now, the overseed will be fading out, warm soil temperatures will make it most difficult to maintain the overseed, unless extra special attention is given.

May: Non Overseed — Score B (3.0). Little effort will be needed for the month. The greens should be extremely healthy, rich in color and you're home free from here on.

June: Overseed — Score C (2.0). This can be a very difficult month. Transition can be quite poor. If the Bermuda does not fill in quickly, putting quality will not be good.

June: Non Overseed — Score A (4.0). Much like May, the greens should look good and putt as good as desired. By now, the quality of putting can be as good as the amount of effort needed to satisfy the membership. If the season is over, and play has tapered down, you can concentrate your efforts towards summer renovation.

By now, the season is over, the time is up and let's compare the scores.

	OVERSEED	NON OVERSEED
September	B - 3.0	A - 4.0
October	D - 1.0	A - 4.0
November	C - 2.0	A - 4.0
December	C - 2.0	B - 3.0
January	B - 3.0	B - 3.0
February	A - 4.0	C - 2.0
March	A - 4.0	B - 3.0
April	B - 3.0	B - 3.0
May	C - 2.0	B - 3.0
June	C - 2.0	A - 4.0
Overall Grade		
Point Average	C+ - 2.6	B - 3.3

You be the judge. Was the overseed worth it? If you're club is located in South Florida would you overseed? Month by month, its quite competitive! So competitive, the non-overseed fared rather well. Considering the additional expenses for seed, pesticides, labor and member aggravation during the establishment and transitional periods, it hardly seems worth it.

Non-overseed allows a course to stay on a more even keel throughout the season, it allows the maintenance crew to concentrate their extra labor efforts towards more course detailing. The non-overseeded course can actually look quite good from September thru June and you might even have some time to go over to the beach and let the warm, tropical, South Florida breeze, flow through your hair as you sit underneath the shade of a coconut palm. ■

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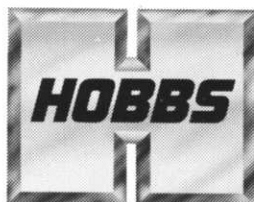
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KEEPING THOSE ANNUALS HEALTHY AND HAPPY

*By Tom Teets
Urban Horticulturist, Palm Beach County*

The winter season is an important time of year for annuals here in South Florida. Unfortunately, the annuals are frequently planted and left on their own to survive. Before long instead of being an attractive focal point of color in the landscape, they become a real eyesore. Continued care and maintenance is a necessity for successful annuals. They are not low maintenance plants.

Adequate watering, fertilizing, pruning and insect and disease control care are a must. Check the watering system frequently to maintain adequate coverage and moisture level. Most annuals cannot survive without frequent irrigation. However, water should be applied early in the morning so the leaves will dry off quickly to avoid foliar diseases.

To maintain continual growth and flowering, frequent light fertilization is desirable. Applying a granular slow release fertilizer will cut the frequency with which fertilizer is applied. Over fertilization may lead to excess foliar growth and reduced flowering. If this should occur, reduce the amount of nitrogen in the fertilizer you are using.

Light pruning and shaping may be needed to maintain the proper shape of annuals as the growing season progresses. Certain species such as marigolds, salvias and geraniums should have spent flowers pruned off to encourage continued blooming.

Annuals must be checked frequently for insects and diseases. Any problems should be promptly treated. A follow-up treatment according to labeled directions is frequently helpful. When insects become a persistent problem, granular systemic insecticides may be helpful in giving longer lasting control.

Using a regularly scheduled maintenance program on your annuals should help to increase their lifespan. ■

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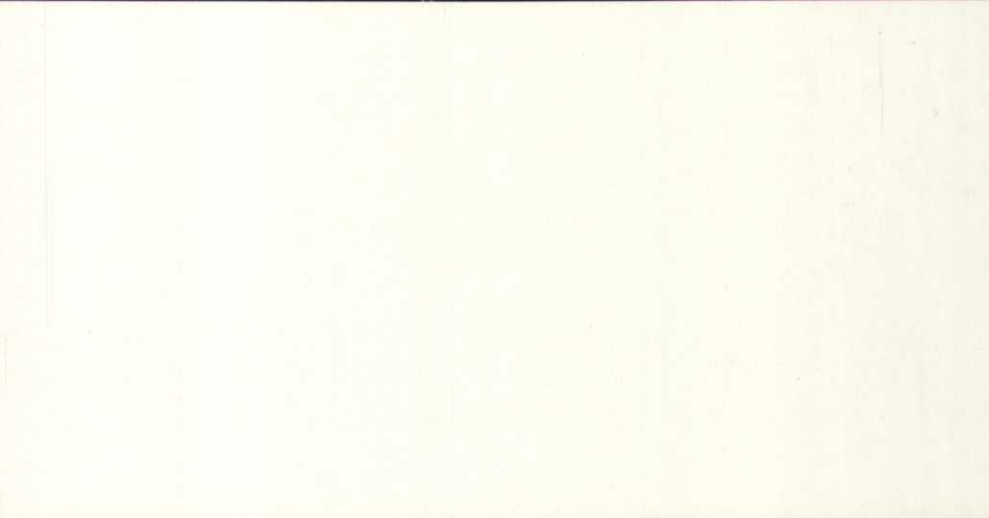
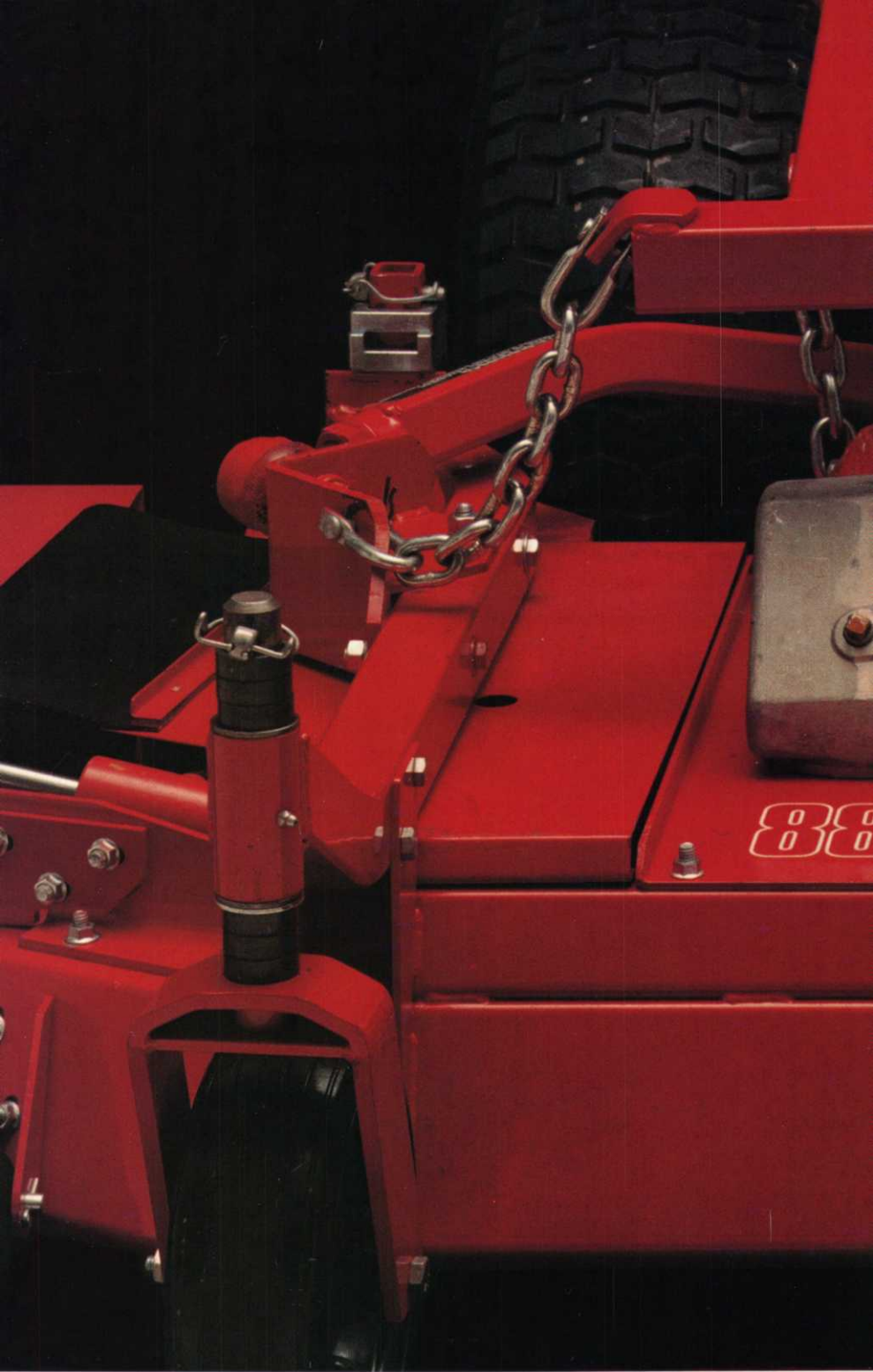
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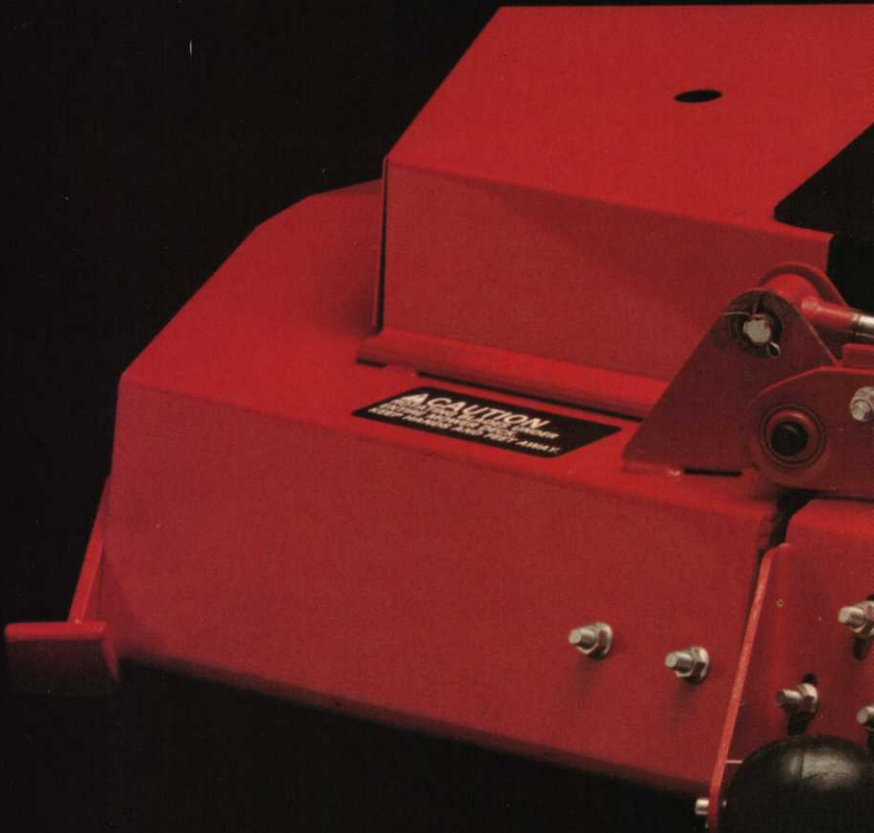
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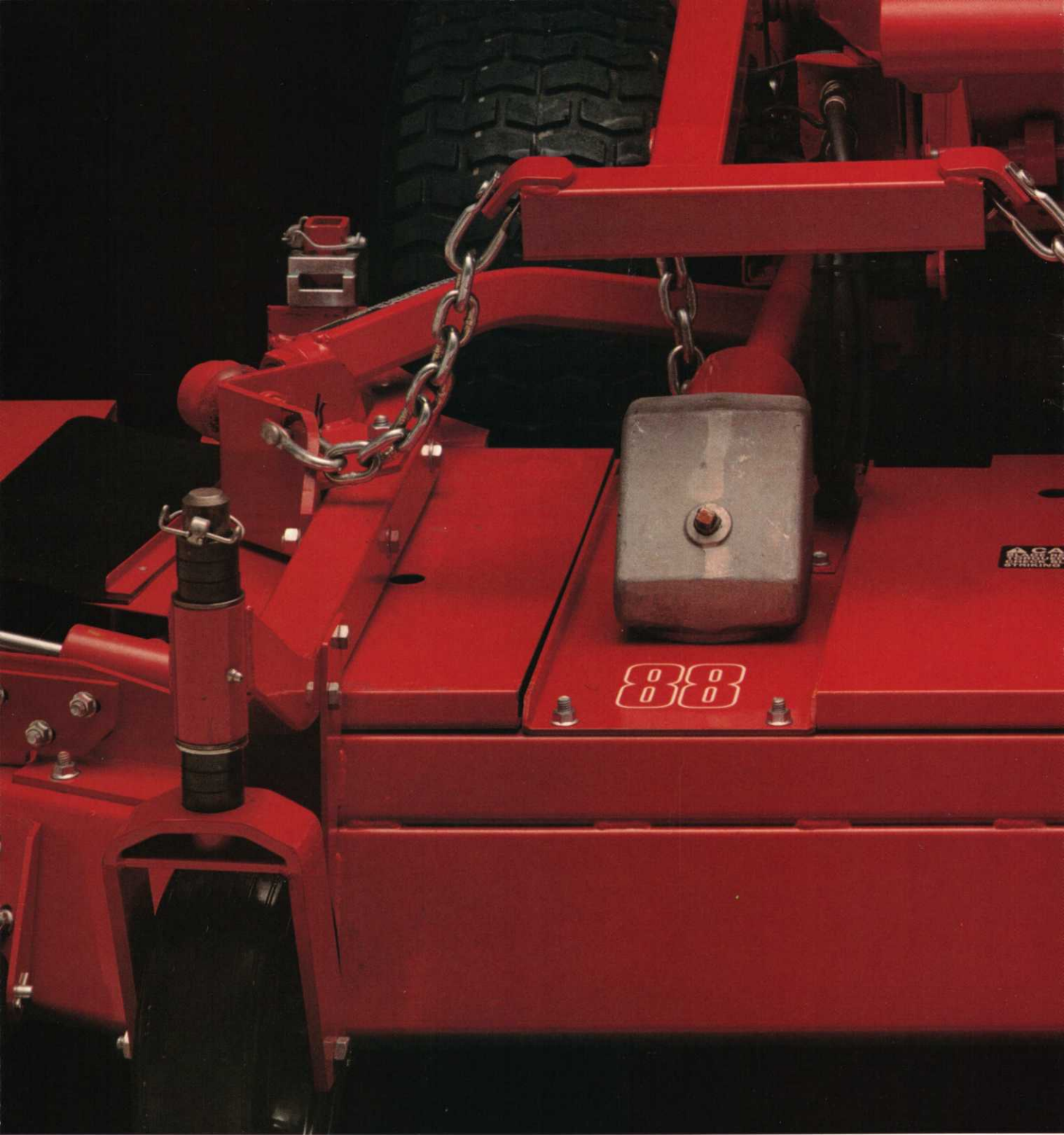




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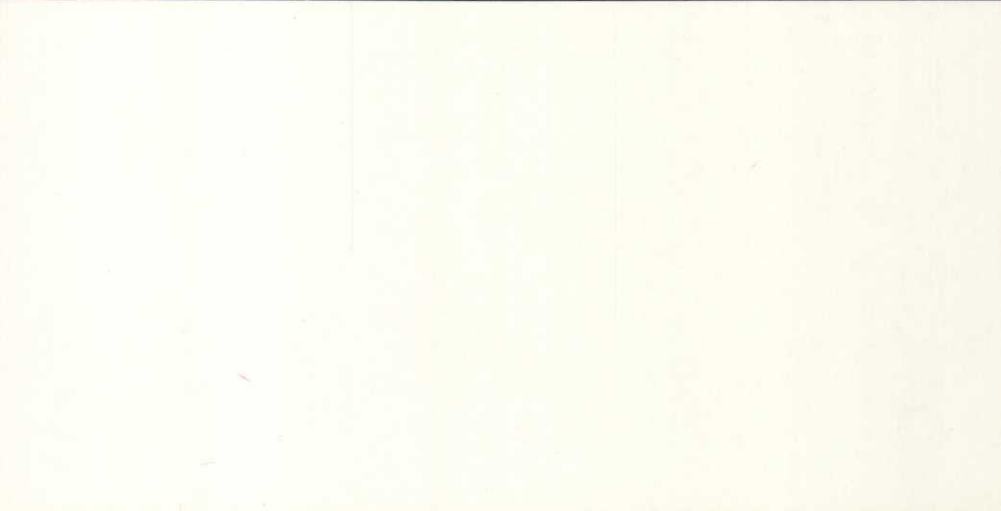
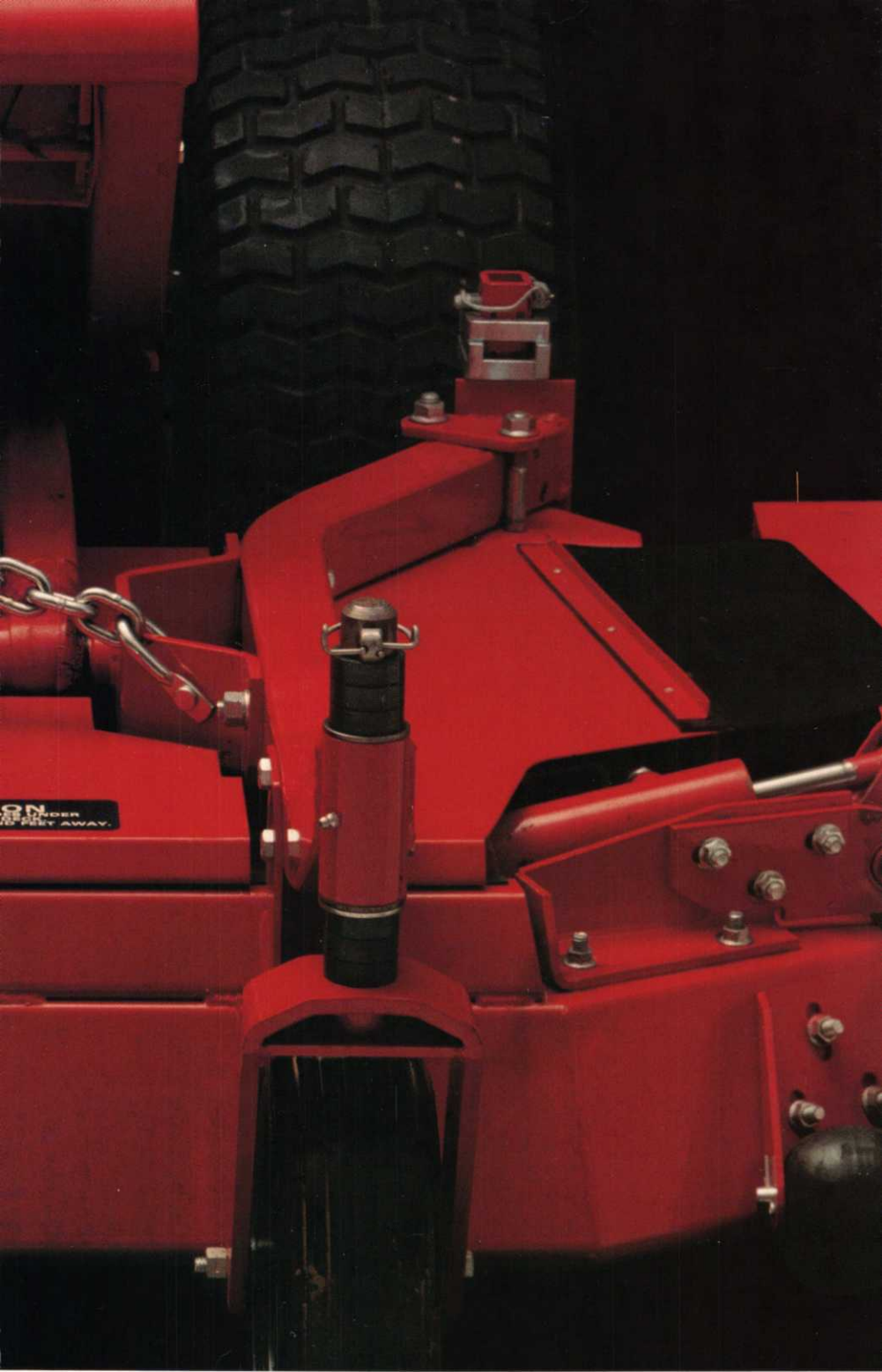
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Sarasota, FL—813/377-6777

ZAUN EQUIPMENT
Jacksonville, FL—904/387-0516
Orlando, FL—305/841-8460

GEORGIA

KOLB & CO.
Atlanta, GA—404/696-5565

ZAUN EQUIPMENT
Jacksonville, FL—904/387-0516
Orlando, FL—305/841-8460

HAWAII

PACIFIC MACHINERY
Waipahu, HI—808/677-91111
Agana, Guam

IDAHO

TURF EQUIPMENT COMPANY
Salt Lake City, UT—801/972-4164

WESTERN EQUIPMENT DIST.
Spokane, WA—509/535-9756

ILLINOIS

BECKMANN TURF & IRRIGATION
Chesterfield, MO—314/532-8880

CHICAGO TURF-IRRIGATION
Itasca, IL—312/773-5555

GTI DISTRIBUTING, INC.
Chesterfield, MO—314/537-1515

KENNEY MACHINERY CORP.
Indianapolis, IN—317/872-4793

MID-EAST POWER EQUIPMENT
Lexington, KY—606/253-0688

Nashville, TN—615/832-7725

TRI STATE TURF & IRRIGATION
Bettendorf, IA—319/332-6684

INDIANA

CENTURY EQUIPMENT
Cincinnati, OH—513/563-2460

CHICAGO TURF-IRRIGATION
Itasca, IL—312/773-5555

KENNEY MACHINERY CORP.
Indianapolis, IN—317/872-4793

Ft. Wayne, IN—219/482-2564

MID-EAST POWER EQUIPMENT
Lexington, KY—606/253-0688

IOWA

MIDWEST TURF & IRRIGATION
Omaha, NE—402/331-0500

TRI STATE TURF & IRRIGATION
Bettendorf, IA—319/332-6684

KANSAS

CHAMPION TURF EQUIPMENT
Kansas City, MO—816/333-8000

KENTUCKY

BAKER EQUIPMENT ENG. CO.
Charleston, WV—304/344-3441

CENTURY EQUIPMENT
Cincinnati, OH—513/563-2460

MID-EAST POWER EQUIPMENT
Lexington, KY—606/253-0688

Nashville, TN—615/832-7725

LOUISIANA

GOLDTHWAITE'S
Carrollton, TX—214/245-5850

Houston, TX—713/666-4233

GULF SHORE TURF SUPPLY
Pensacola, FL—904/968-0731

Baton Rouge, LA—504/272-4407

TURFAID, INC.
Memphis, TN—901/521-1191

MAINE

YERXAS, INC.
South Portland, ME—207/799-2241

MARYLAND

TURF EQUIPMENT & SUPPLY CO.
Elkridge, MD—301/796-5575

MASSACHUSETTS

BRONSON & TOWNSEND CO.
Hamden, CT—203/281-4045

GRASSLAND EQUIPMENT & IRRIGATION
Latham, NY—518/785-5841

TURF PRODUCTS CORPORATION
South Windsor, CT—203/528-9508

TURF PRODUCTS CORP./MASS
Worcester, MA—617/791-2091

MICHIGAN

CENTURY EQUIPMENT
Toledo, OH—419/865-7400

REINDERS BROTHERS, INC.
Elm Grove, WI—414/786-3300

R.L. RYERSON CO.
Menomonee Falls, WI—414/252-4333

SPARTAN DISTRIBUTORS
Sparta, MI—616/887-7301

WILKIE TURF EQUIPMENT
Pontiac, MI—313/373-8800

MINNESOTA

MTI DISTRIBUTING CO.
Plymouth, MN—612/475-2200

MISSISSIPPI

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Pensacola, FL—904-968-0731

Baton Rouge, LA—504/272-4407

TURFAID, INC.
Memphis, TN—901/521-1191

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BECKMANN TURF & IRRIGATION
Chesterfield, MO—314/532-8880

CHAMPION TURF EQUIPMENT
Kansas City, MO—816/333-8000

GTI DISTRIBUTING, INC.
Chesterfield, MO—314/537-1515

TURFAID, INC.
Memphis, TN—901/521-1191

MONTANA

MIDLAND IMPLEMENT
Billings, MT—406/248-7771

WESTERN EQUIPMENT DIST.
Spokane, WA—509/483-8665

NEBRASKA

L.L. JOHNSON DISTRIBUTING
Denver, CO—303/320-1270

MIDWEST TURF & IRRIGATION
Omaha, NE—402/331-0500

NEVADA

DUKE EQUIPMENT & IRRIGATION
Rancho Cordova, CA—916/635-3232

THE NORTON CORPORATION
North Las Vegas, NV—702/644-4066

Phoenix, AZ—602/997-2661

TURF EQUIPMENT COMPANY
Salt Lake City, UT—801/972-4164

NEW HAMPSHIRE

TURF PRODUCTS CORP./MASS.
Worcester, MA—617/791-2091

YERXAS, INC.
South Portland, ME—207/799-2241

NEW JERSEY

ELMCO DISTRIBUTORS, INC.
Parsippany, NJ—201/887-6600

PHILADELPHIA TURF COMPANY
Doylestown, PA—215/345-7200

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Somerville, NJ—201/722-9830

NEW MEXICO

SWT DISTRIBUTORS, INC.
Albuquerque, NM—505/345-8676

El Paso, TX—915/542-1671

NEW YORK

BRONSON & TOWNSEND CO.
Hamden, CT—203/281-4045

EATON EQUIPMENT CORP.
Hamburg, NY—716/649-2020

Syracuse, NY—315/457-9271

ELMCO DISTRIBUTORS, INC.
Parsippany, NJ—201/887-6600

GRASSLAND EQUIPMENT & IRRIGATION
Latham, NY—518/785-5841

STORR TRACTOR COMPANY
Bohemia, NY—516/589-5222

Somerville, NJ—201/722-9830

TURF PRODUCTS CORPORATION
South Windsor, CT—203/528-9508

NORTH CAROLINA

EAST COAST EQUIPMENT, INC.
Burlington, NC—919/227-6532

SMITH TURF & IRRIGATION
Charlotte, NC—704/393-8873

Hilton Head Isl., SC—803/681-2333

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MTI DISTRIBUTING CO.
Plymouth, MN—612/475-2200

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ALLEGHENY DISTRIBUTING, INC.
Pittsburgh, PA—412/327-4455

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Charleston, WV—304/344-3441

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Cincinnati, OH—513/563-2460

Hilliard, OH—614/771-9995

Toledo, OH—419/865-7400

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Wilsonville, OR—503/682-2711

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Salt Lake City, UT—801/972-4164

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ALLEGHENY DISTRIBUTING, INC.
Pittsburgh, PA—412/327-4455

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Hamburg, NY—716/649-2020

E. H. GRIFFITH, INC.
Pittsburgh, PA—412/271-3365

PHILADELPHIA TURF COMPANY
Doylestown, PA—215/345-7200

RHODE ISLAND

DUKE EQUIPMENT & IRRIGATION
Worcester, MA—617/791-2091

SOUTH CAROLINA

EAST COAST EQUIPMENT, INC.
Burlington, NC—919/227-6532

SMITH TURF & IRRIGATION
Charlotte, NC—704/393-8873

Hilton Head Isl., SC—803/681-2333

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MTI DISTRIBUTING
Plymouth, MN—612/475-2200

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Lexington, KY—606/253-0688

Nashville, TN—615/832-7725

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GOLDTHWAITE'S
Fort Worth, TX—817/332-1521

GOLDTHWAITE'S
Houston, TX—713/666-4233

GOLDTHWAITE'S
San Antonio, TX—512/653-9660

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El Paso, TX—915/542-1671

Albuquerque, NM—505/345-8676

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Latham, NY—518/785-5841

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Lexington, KY—606/253-0688

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Richmond, VA—804/355-7831

TURF EQUIPMENT & SUPPLY CO.
Elkridge, MD—301/796-5575

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Wilsonville, OR—503/682-2711

WESTERN EQUIPMENT DIST.
Kent, WA—206/872-8858

Spokane, WA—509/483-8665

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Charleston, WV—304/344-3441

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Pittsburgh, PA—412/271-3365

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Elkridge, MD—301/796-5575

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TAYLOR, PEARSON & CARSON (B.C.)
Vancouver, B.C.—604/433-2481

MANITOBA

WESTWARD POWER
Winnipeg, Manitoba—204/786-6091

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Saint John, N.B.—506/632-1000

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