



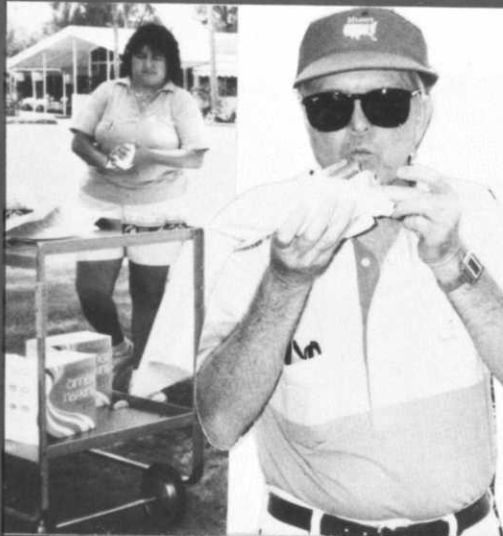
13  
371 PAR 4  
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330 HDCP 8/8

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E900











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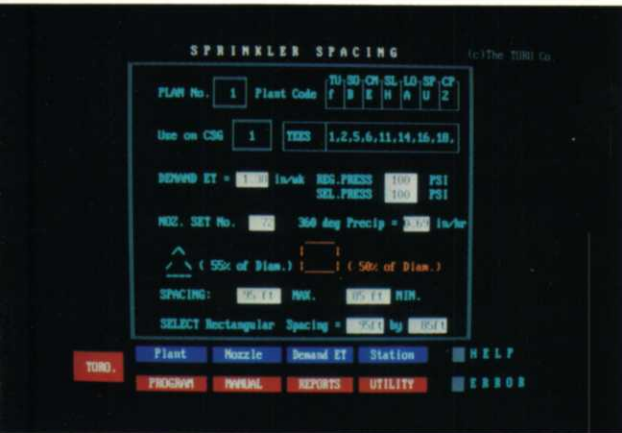
# NETWORK 8000

MODEL 198-39-88

*The new central/satellite control system that saves you energy, water, labor . . . money!*



Excellence in Irrigation®





# TORO

# NETWORK 8000

MODEL 198-39-88

Superior irrigation control translates into two major advantages: better turfgrass and substantial reductions in the use and cost of energy, water and labor.

Toro's *Network 8000* provides exactly that: demonstrably superior irrigation control. It is the first and only totally automatic irrigation control system. Just enter design, weather/climate, geographical and agronomical information. Network 8000 then *automatically* computes the operating times for all stations, based on the evapotranspiration rate, modified by any applicable rainfall\*.

Network 8000 accomplishes all of this by combining a computerized central controller with satellites of amazingly extensive stand-alone capabilities.

The central controller utilizes an IBM personal computer as the hub of the operation, including keyboard, color monitor, matrix printer and a "mouse" for easy access to all functions.

This non-dedicated central is capable of "transparent" multiple function, which provides for *simultaneous* business and irrigation program

operation. It's like getting two important pieces of equipment for the price of one!

Network 8000 provides automatic adjustment of irrigation system operation, responding to such key factors as rainfall, evapotranspiration rate, plant materials, soil types, soil compaction, geographic location, terrain slope, Ph factor and system design. A manual override is provided for all factors.

The central programmer will operate any station, set the running time, assign it to any program and set up to three repeats for any station. It can operate up to 800 satellites of 32 stations each, for a total of 25,600 stations.

Toro's new Network 8000 central provides two-way communication: it "down-loads" information to the satellites and "up-loads" information from the satellites.

Also, with this central station you enjoy the advantages of water-budgeting by means of percentage increase/decrease control (by station, by program, by CSG, or the total system), from 1% to 900%.

But this is only the beginning of the story. You have to see it perform to fully appreciate exactly what it can do for you and your irrigation. Call *The Man from Toro* for a no-obligation demonstration.

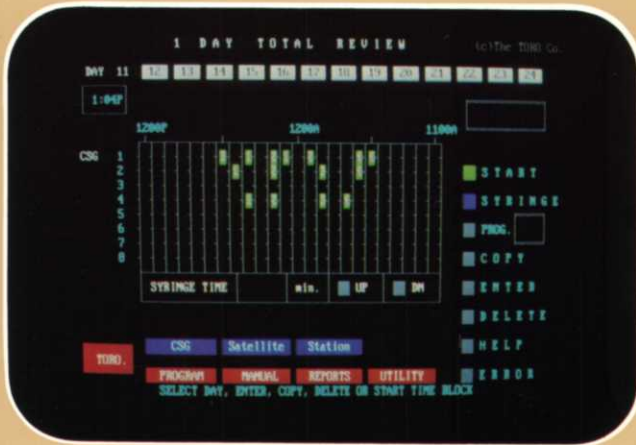
\*Requires satellite rain gauge monitoring equipment



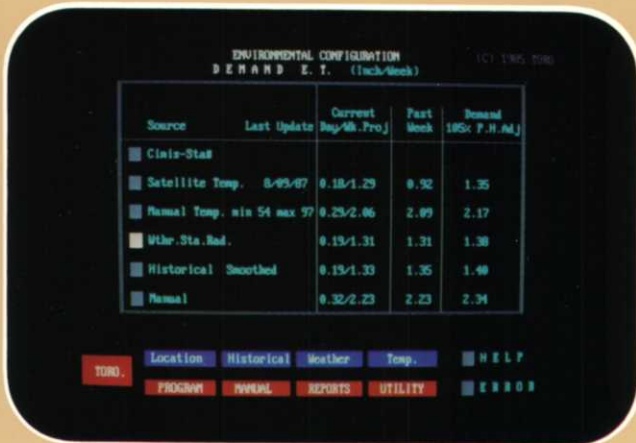
Key components to Network 8000 are the IBM personal computer, with color monitor and keyboard, operated with handy "mouse" and/or keyboard. Shown in the middle is Toro's Delay & Distribution Unit. On the right, IBM matrix printer and stand.



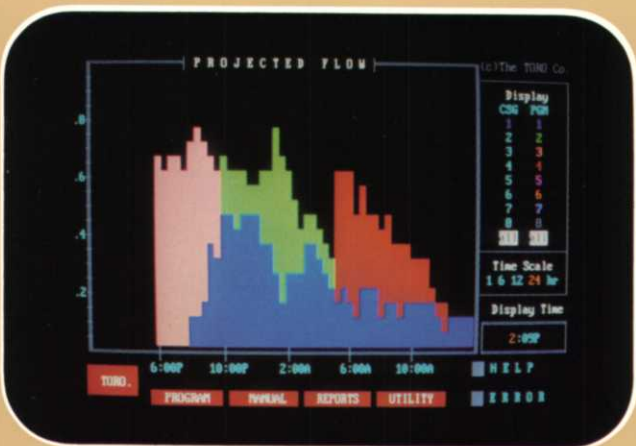
## THREE TYPICAL SCREEN DISPLAYS



*This screen quickly displays complete irrigation program for one full day, for each of 14 days in the system.*



*Such essential data as evapotranspiration rates for your specific area can be called up to help set proper program.*



*Screens such as this Projected Flow Chart can be used for fast easy-to-read reference to assure efficient operation.*



## SATELLITE CONTROLLER

Matching the Network 8000 central for advanced and innovative design is Toro's new satellite/stand-alone solid state controller, available in a stainless steel case or a green painted steel case. The satellite is a 32-station unit, with each station capable of operating three Toro electric valve-in-head solenoids.

As with the central, this new satellite offers two-way communication. It receives, stores and sends all commands generated by central. At the same time, it up-loads to the central such key factors as satellite status, air temperature\*, changes made in station timing at the satellite, and valve wire failure sensing.

Each station is capable of minute and hour timing, from 1 minute to 4 hours and 15 minutes per station, in one-minute increments.

Toro's new Network 8000 Satellite also provides water-budgeting capability, with percentage increase/decrease from 1% to 900%.

The combination of the equally amazing new satellite and central controllers make Network 8000 your first step into the 21st Century, with pay-off *now* in terms of better turfgrass at lower costs.





# NETWORK 8000

MODEL 198-39-88



- Toro's Network 8000 is the first and only totally automatic irrigation control system.
- Random access allows the central programmer to (1) operate any station; (2) set the running time; (3) assign it to any program; and (4) set up three repeats for any of the programs.
- Color monitor and graphics printer provide total program viewing and hard copy.
- Central provides status indications for each of up to 800 satellites.
- Central station provides for simultaneous business and irrigation program operation.
- Solid-state satellite may be centrally programmed or provide stand-alone capability.
- Each satellite has 32 stations which may operate as many as 4 stations simultaneously on 1 or as many as 4 programs.
- Each satellite has 8 programs available, and each program has up to 3 repeat cycles.
- Multi-manual syringe program may be set at the satellite.
- Control system has two-way communication: it "down-loads" central-created programs to satellites; "up-loads" satellite-created or stored program information to central.
- Water-budgeting provided by percentage increase/decrease of station timing. May be adjusted from 1% to 900% of the original setting for (1) each station; (2) each program; or (3) for the entire system.
- An option is offered which provides a "projected flow" screen for system as scheduled, and an "actual flow" screen when option is executed. Lets you utilize your pump station most efficiently.
- A second option makes your Network 8000 telephone compatible. A system in a non-contiguous configuration may (through modem) operate from a central location via a dial-telephone line.
- Another option is a weather station, with rain gauge. This weather station provides information for calculation of local evapotranspiration.
- Utility programs are available, too. Through a "switch closure interface," any station or satellite will control lights, fountains, water aerification devices, etc.
- And, best of all *no computerese!* You'll enjoy user-friendly operation with the mouse and/or the keyboard. Minimal keyboard entry of numbers and names is all it takes to set up the original system.

See your nearby Toro Distributor  
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# New Fertilizer Applicator for Golf Courses



**A** giant ball retriever? A mole cricket smasher? A vehicle from outer space? All these descriptions might be used by someone who sees this machine for the first time. We actually call it a TURF-A-GATOR TURF MOBILE.

This method of applying fertilizer has been used for years by ranchers and farmers, but for the first time, it is now being used to spread fertilizer on golf course fairways.

Douglas Fertilizer & Chemical, Inc. has built a small version of what some have referred to as a Big A applicator. It is a three wheel vehicle with flotation tires to minimize damage to the turf. Equipped with a 30 foot boom, it can spread liquid fertilizer suspensions in record time . . . about three minutes per fairway.

Most all grades (analysis) can be used in the TURF MOBILE, including slow release forms of nitrogen, such as nitroform and the new N-SURE 28% nitrogen with TRIAZONE.

This unique applicator assures uniform application of fertilizer fast, so there is minimum delay to golfing activities.

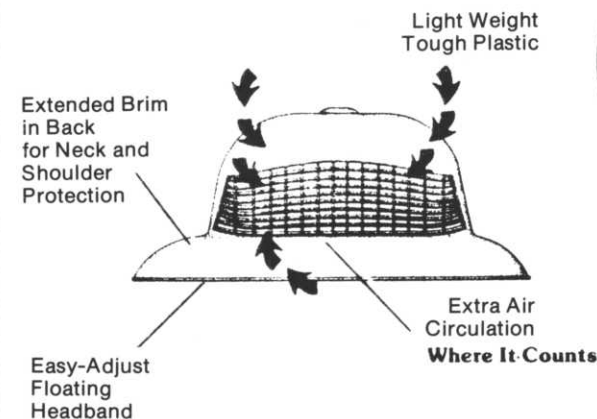
Fertilizer suspensions have been used for many years, but may be new to golf course superintendents. Fertilizer particles are suspended by the use of clay and agitation while being distributed through large spray nozzles. Uniformity is assured because of constant pressure, controlled speed and nozzle placement and design.

For more information on the TURF-A-GATOR MOBILE, please call Charles Butterworth at 407-322-0443.



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# Classification of Turfgrass Fungicides

by MONICA ELLIOTT JUHNKE

University of Florida — IFAS Fort Lauderdale Research and Education Center Fort Lauderdale, FL 33314

**T**HINK back for just a moment. If you were a golf course superintendent ten years ago and Pythium Blight was creeping across your championship course, what fungicide choices did you have? Not many! Approximately 50% of the currently available turfgrass fungicides have been registered only since 1979. Now that a superintendent has an expanded fungicide inventory, how many know *why* they select a particular fungicide for one disease but not another?

Fungi are organisms that have no chlorophyll, the substance that makes plants green and able to produce their own energy for growth. Because fungi cannot produce their own energy, they must rely on living or dead hosts for energy and growth. Some fungi are totally harmless, like mushrooms in the grocery store, while others cause plant diseases.

Fungi are composed of mycelia, thread-like bodies that usually branch as they grow in length, and reproduce by developing spores. These spores are small, independent fungal bodies which germinate to produce mycelia. A very generalized fungal life cycle alternates between mycelia and spores. Both structures can infect a plant to cause disease. In Florida, four major fungal diseases of golf course turfgrass that may be controlled with fungicides are Brown Patch, Dollar Spot, Helminthosporium Leaf/Crown Complex, and Pythium Blight/Root Rot.

Fungicides, chemicals that inhibit fungi, have two different types of names. Each fungicide has one common chemical name, but may have many brand names. The number of brand names depends on the number of companies which market that particular fungicide. When fungicides are

mentioned in this article the common name will be listed first with a brand name in parenthesis. This is not meant as an endorsement but rather a method to associate the common name with a familiar brand name.

Membranes are essential for life because they protect organisms from the outside environment; sterols are a necessary component of a membrane, any membrane. For example, cholesterol is the essential sterol in human membranes while most fungal membranes contain ergosterol. *Pythium* species are the exception since their membranes do not contain ergosterol. The EBI fungicides are systemic fungicides that inhibit the production of ergosterol. Thus, they are effective compounds when used to control ergosterol-containing fungi, such as the causal agents of Brown Patch, Dollar Spot and Helmin-

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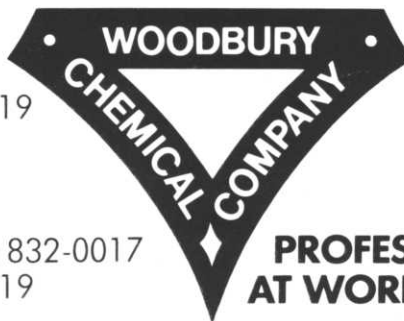
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thosporium Leaf Spot, but do *not* control Pythium diseases.

The three EBI fungicides utilized for turfgrass disease control are fenarimol (Rubigan), propiconazol (Banner) and triadimefon (Bayleton). All three systemic chemicals have curative and protective action. Bayleton has been registered for use on turfgrass in Florida for a number of years. However, Banner is newly registered for warm-season turfgrass disease control this year. Since Banner is new, be sure to read the Banner label carefully for precautionary statements.

Golf course superintendents may be more familiar with Rubigan as a herbicide for *Poa annua* control than as a fungicide. A side effect of EBI fungicides is their plant growth regulation property. This property has been exploited with Rubigan which also inhibits the production of gibberellin, a plant hormone which regulates plant cell elongation and growth. At recommended rates, *Poa annua* is sensitive to Rubigan but bermudagrass and perennial ryegrass are not.

#### GENERAL FUNGICIDE GROUPS

Fungicides are divided into different groups based on: 1.) general activity - pro-

TECTIVE OR CURATIVE; and 2.) location of that activity - contact or local systemic or systemic. A protective fungicide does not cure or eradicate fungal pathogens that have already infected the plant but does protect the plant against future pathogen activity. For example, fungal spores which are released on a leaf after a protective fungicide has been applied will be prevented from infecting that leaf. A curative fungicide, however, is capable of eradicating a fungal pathogen which has already established itself in a host plant and initiated a disease.

Contact fungicides remain on the plant surface and do not penetrate into the plant. These fungicides are normally only protective. Local-systemic fungicides remain on the plant surface but also penetrate the plant surface and move very short distances within the plant. They are also protective fungicides.

Systemic fungicides do penetrate plant surfaces (or seed coats) and then translocate (move) inside the plant. Systemic fungicides are translocated via xylem or phloem tissue. Xylem is formed from plant water conducting tubes so compounds in the xylem move in an upward direction with the water system. Phloem is

formed from tubes which move photosynthates (plant products) from leaf tissue to other plant organs (i.e. upward and downward directions). Except for fosetyl-A1 (Aliette) which is translocated in xylem and phloem, systemic fungicides are xylem-limited. In general, systemic fungicides have curative and protective activities. They often have extended residual activity. Table 1 lists the currently registered turfgrass fungicides in Florida.

#### CHEMICAL FUNGICIDE GROUPS

In addition to the general groups of fungicides discussed above, fungicides are divided into groups based on their chemical properties. Discussed below are the chemical groups of turfgrass fungicides.

##### *Benzimidazole Fungicides* (Systemic; Curative and Protective)

A second group of systemic fungicides which control turfgrass diseases other than *Pythium* is the benzimidazole (BZD) fungicides. These chemicals include benomyl (Tersan 1991) and thiophanate methyl (Fungo). BZD fungicides control plant diseases by inhibiting development of the fungal skeleton (i.e. support structures of the fungus). Like the EBI fungicides, BZD fungicides are both protective

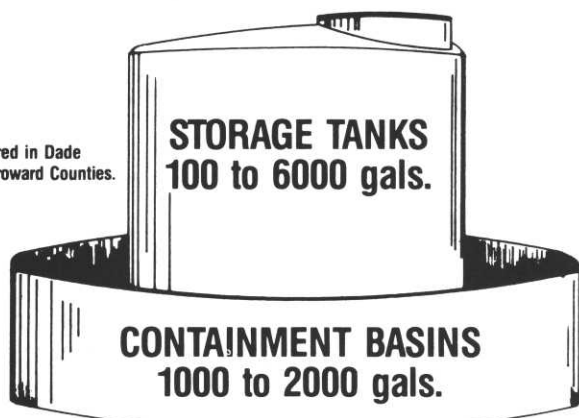
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and curative. They bind tightly to plant surfaces and degrade slowly, and therefore directly protect the plant from fungal attack via residual activity. However, BZD fungicides also penetrate plant surfaces and translocate in the xylem to provide systemic, curative action against established pathogens.

### PYTHIUM FUNGICIDES

As indicated previously, *Pythium* is a very different fungus from the other fungi that cause turfgrass diseases. A major difference is the lack of ergosterol in *Pythium* cell membranes. The five fungicides recommended for controlling *Pythium* diseases fall into three general groups based on location of activity - contact, local-systemic and systemic fungicides.

The contact fungicides are chloroneb (Terraneb) and ethazol (Koban) which were discussed previously with the aromatic hydrocarbon fungicides. They are protective compounds only, since they inhibit fungal mycelia and spores on the plant surface. The local-systemic fungicide propamocarb (Banol) does penetrate the plant surface but is degraded rapidly inside the plant so systemic effects are localized and short in duration. Metalaxyl (Subdue, Apron) and foestyl-AI (Alette)

are both systemic fungicides. Their activities, however, are very different.

Metalaxyl is formulated as Subdue for foliar applications and Apron for seed treatments. Metalaxyl easily penetrates the plant surface or seed coat and is rapidly translocated in the xylem (i.e. upward with the water stream). It has curative and protective activity and, since it moves in the xylem, protects new plant growth better than old plant tissue. Metalaxyl also has extended residual activity in plant tissue which allows you to extend the interval between spray applications.

### Aromatic Hydrocarbon Fungicides (Contact; Protective)

Aromatic hydrocarbon (AH) fungicides are contact fungicides that destroy fungal membranes inside a fungal cell. This stops the fungus from growing and spreading to more plants. Therefore, AH fungicides are classified as protective and not curative fungicides. Examples are chloroneb (Terraneb), ethazol (Koban, Terrazole) and PCNB (Terraclor). These compounds evaporate quickly (high volatility) or are sensitive to ultraviolet sunlight. Thus, they are best used as soil incorporated fungicides since the soil will provide some chemical stability.

### Dicarboximide Fungicides (Contact; Protective)

Two dicarboximide fungicides available for broad-spectrum turfgrass disease control are iprodione (Chipco 26019) and vinclozolin (Vorlan). The mechanism of action of these compounds is not entirely clear, although they appear to destroy fungal membranes and interfere with DNA synthesis. Since they stop fungi from spreading, these contact fungicides are protective in action. Although dicarboximide fungicides alone have a broad spectrum of activity, they are often mixed with other fungicides to enhance disease control.

### Ethylenebisdithiocarbamate (EBDC) Fungicides (Contact; Protective)

These contact fungicides include maneb (Tersan LSR), mancozeb (Fore) and zineb (Zineb). The EBDC fungicides are protective compounds and have been available for many years. They have no specific mechanism of action nor site of action and are active against many fungal plant pathogens. Thus, they can help to prevent the spread of many turfgrass diseases and are often combined with other fungicides to enhance disease control.

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