Read Me First ■

Welcome to the Toro family of high quality products! Your purchase of the Toro NW 8000 Central System represents an investment in state-of-the-art technology. Now you can automatically control sophisticated irrigation systems consisting of thousands of sprinkler stations, yet retain the flexibility to manually select and control a single Toro sprinkler station, either directly from a central location, or from a field satellite.

Most users of the Toro NW 8000 Central System want to be "up and running" as quickly as possible. The Installation Guide will get you started. It has all of the basic information you need to set up your NW 8000 Central System and to connect the Central to NW 8000 Satellites.

The NW 8000 User's Guide introduces you to the operation of Toro's NW 8000 and provides detailed information about customizing the NW 8000 Central System for your irrigation needs. A computer-based tutorial provides an additional method of learning about the NW 8000.

The Toro Company has established a National Support Network (NSN) to assist you with any computer based issues that may arise. This is an annually renewable subscription service that offers extensive support for your computer based control system. Please contact your Toro Distributor for further details regarding this important service.

If you have any questions regarding the installation or operation of your NW 8000 System, please contact:
All Computer and Software questions: National Support Network 1-800-527-4248 (NSN Members)
All Toro product questions: Toro Customer Service 1-800-367-8676 (National) 1-800-255-8676 (in Calif.).

We at Toro stand behind the quality and reliability of our products and want to make sure that your experience with the NW 8000 Central System is enjoyable. Thank you for choosing TORO!

Table of Contents ■

■ Section 1

Installing Toro Network 8000 Central Controller That Includes Computer   ■

Figure 1 Network 8000 Central Control System

Computer components are for illustration purposes only and may not reflect actual computer components used.
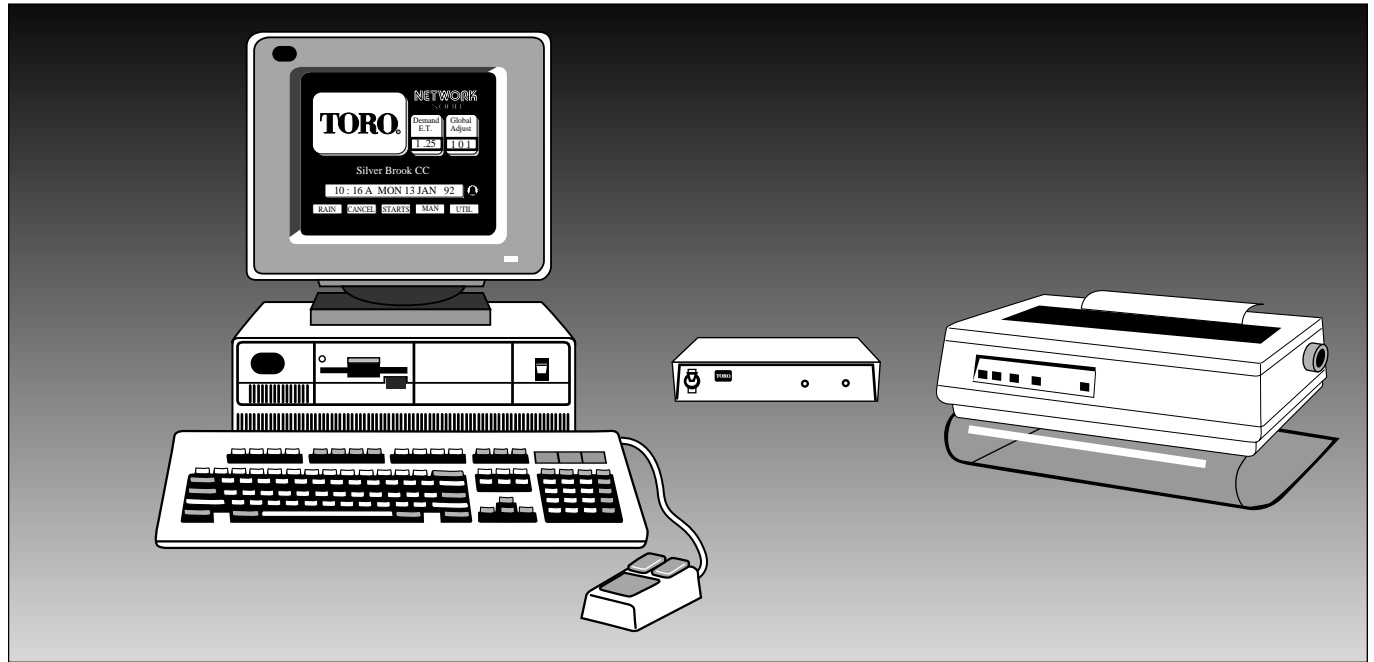
If you received your Toro NW 8000 Central System complete with computer, start here. If you received the Toro Components System only and are using a different computer, go to Section 2 "Setting Up the Toro NW 8000 System Components Package."

Before unpacking the NW 8000 Central System, you will need to decide the best location for the system. Preferably, you will need desk space area near an electrical outlet that is not being used for other purposes.

Once you have decided upon a location, please carefully unpack and inspect the contents of the five (5) boxes containing your new NW 8000 Central Control System. You should have the following equipment:

- Personal Computer with the following cards internally installed:
    Serial Network Controller (SNC) Card, Toro P/Nos. 91-0171 ISA Bus or 91-9798 MCA Bus
    Modem, w/PC Anywhere Software
- Super VGA Monitor
- Mouse
- DOS (Current Version)
- Printer, Dot Matrix
- Printer Stand (not required with an Inkjet printer)
- Printer Cable
- Surge Protection Unit (SPU), Toro P/N 35-7353
- Delay and Distribution Unit, 5 Amp, Toro P/N 35-7516
- Installation Kit, NW 8000 Central, Toro P/N 35-7428
- Software Starter Kit

(continued)

■ Procedure

1. Locate box marked "Delay and Distribution Unit". Open it carefully and remove Delay and Distribution Unit. Plug it into electrical outlet you have chosen. At this point, be sure that Delay and Distribution Unit is turned OFF.

    NOTE: Delay and Distribution Unit does not offer power line conditioning. Toro strongly recommends a separate line conditioner to protect your computer from power fluctuations and disturbances.

2. Locate System Unit and place in a suitable location that provides sufficient space at back for ventilation and attachment of various cables.

    Locate System Unit Power Cord. Attach one end to System Unit and plug 3-pronged end into Delay and Distribution Unit.

3. Locate Monitor and place in a suitable location for user interface.

    Locate Monitor Power Cord (if not permanently attached). Attach one end to Monitor and plug 3-pronged end into Delay and Distribution Unit.

    Locate Video Signal Cable on Monitor and attach to mating connector on System Unit.

4. Locate Keyboard and attach to mating connector at back of System Unit.

5. Locate Mouse and attach to mating connector at back of System Unit.

6. Locate Printer Stand and place in a suitable location for user interface. (Printer stand not required with an Inkjet printer.)

7. Locate Printer and place on top of Printer Stand.

    Locate Printer Power Cord and attach one end to Printer and plug 3-pronged end into Delay and Distribution Unit.

    Locate Printer Cable and install female end to Printer and male end to System Unit.

    Instructions for operation and use of Printer are provided in Printer Carton.

Figure 2

NOTE: Illustration depicts basic computer system connections. Refer to instructions provided by computer and peripheral equipment manufacturer for actual connections.
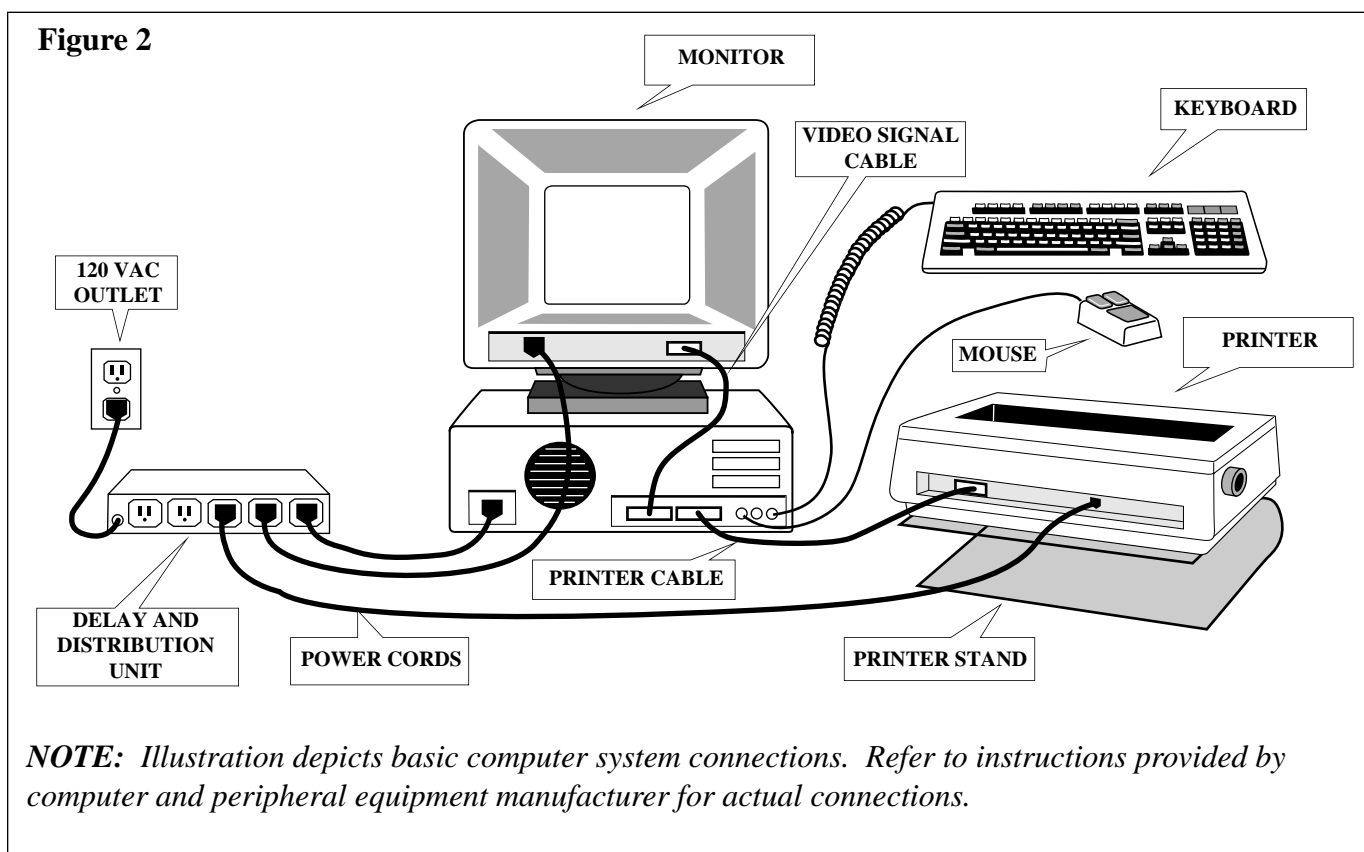
■ Turning System On

Upon completion of all hardware installation, we are now ready to turn the system On.

1. Ensure all computer hardware components are plugged into Toro Delay and Distribution Unit.

2. With Delay and Distribution Unit in Off position, switch all computer components to On position.

3. Remove all diskettes or disk drive protectors from disk drives.

4. Turn power On at Delay and Distribution Unit. After approximately 5 seconds power will be provided to all computer components and system should be powering up. At this point, you should hear System Unit's hard disk drive powering up. Shortly thereafter, you should see numbers displayed at top left of Display signifying that System Unit is performing a memory check. When this memory check is complete, the floppy drive lights will illuminate briefly because computer first tries to start up in this mode. Several messages will appear briefly on screen before main Toro NW 8000 Proprietary Rights Message screen appears. The next screen should be the Toro Logo screen.

   NOTE: If system unit does not sound as if it is on, turn system unit off, then check all power cables, starting with wall plug, to make sure that everything is properly plugged in. Then start system unit again. If system still does not power up, call your Toro representative for further instructions.

   NOTE: If you do not see Toro Logo screen when starting your system, check to see that your display monitor is On (the green light on display monitor should be illuminated). Also check to see that contrast and brightness knobs are adjusted in mid-range. Look behind monitor and verify that monitor cables are properly installed. If a cable is loose, turn Off system unit and attach monitor cables snugly.

   NOTE: After the system powers up with the Toro Logo displayed, the computer may begin beeping intermittently. This can mean two things as follows:

   A) The NW 8000 Central/Satellite system provides system status information. The system can be programmed to Beep when there is new information to review.

   Please refer to the NW 8000 Central Programming Guide for complete explanation of this feature.

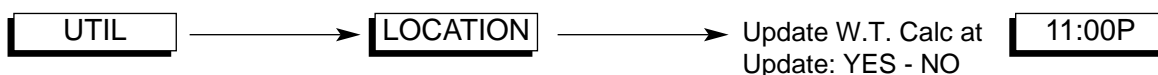   To turn off Beep, use the Mouse and select the following from the Toro Logo screen:

   | UTIL | ⟶ | LOCATION | ⟶ | "AUDIBLE ERROR" |

   When the "Audible Error" is highlighted the Beep will indicate New Message. When selected with the Mouse, "Audible Error" will change colors and the Beep will stop.

   B) The NW 8000 Central will notify the user that a satellite download is about to occur. The beeping will begin approximately 15 minutes prior to download and will increase in frequency until download.

   IMPORTANT: If you have not completed Central programming and do not wish to download to the satellites, the W.T. Calc Update should be changed to "NO" as follows:

   From the Toro Logo Screen, make the following selections with the Mouse:

   | UTIL | ⟶ | LOCATION | ⟶ | Update W.T. Calc at   11:00P |
   | | | | | Update: YES - NO |

   When the YES is highlighted, the Central will update satellite programs at the time displayed. To stop download, select "NO" with the Mouse. "NO" should now be highlighted. To resume downloading, return to this screen and select "YES".

If your irrigation installation is not complete and central will not be connected to field satellites for a

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period of time, you can prevent central from attempting to download to field satellites by selecting "No".

You are now ready to begin learning to use NW 8000 Central Control System. We would first like to invite you to explore NW 8000 tutorial training modules to obtain a good overview of system terminology and operation.

An on-screen tutorial on the Toro NW 8000 is available by exiting the Toro Logo screen. If you wish to explore the tutorial, click mouse on large red Toro Logo. The NW 8000 DOS menu should appear shortly, giving you the option of returning to the Toro NW 8000 program, beginning the tutorial, or performing DOS commands. When you exit the tutorial, you will see this same menu and can then choose the option of returning to the Toro NW 8000 program.

Upon completion of the Tutorials, please go to the Programming section of this manual to begin putting the NW 8000 Central Control System to work for you.

Installation of the Central Controller package is now finished. To complete the NW 8000 Central Control System installation, proceed to Section 3 "Completing the Toro Network 8000 Central Hardware Installation."

Section 2

Installing Toro Network 8000 Central Components Package
Into Your Own Computer ∎

Prior to receiving the components package, your Toro distributor will have been contacted by a representative of Toro's National Support Network to ensure that the hardware and software of your computer system are NW 8000 compatible. The following installation instructions assume that your computer is in good working order and compatibility has been confirmed. Please contact your Toro Distributor to verify compatibility confirmation.

Carefully unpack and inspect the contents of your new NW 8000 Central Components System. You should have the following components:

- Serial Network Controller (SNC) Card, Toro P/Nos. 91-0171 ISA Bus or 91-9798 MCA Bus
- Surge Protection Unit (SPU), Toro P/N 35-7353
- Delay and Distribution Unit, 5 Amp, Toro P/N 35-7516
- Installation Kit, NW 8000 Central, Toro P/N 35-7428
- Software Starter Kit

∎ Procedure

1. Unplug all computer components.
2. Locate box marked "Delay and Distribution Unit". Open it carefully and remove Delay and Distribution Unit. Plug it into electrical outlet you have chosen. At this point, be sure Delay and Distribution Unit is turned OFF.

   NOTE: Delay and Distribution Unit does not offer power line conditioning. Toro strongly recommends a separate line conditioner to protect your computer from power fluctuations and disturbances.

3. Locate Toro SNC Card and install into System Unit.

WARNING

THE FOLLOWING PROCEDURE REQUIRES INSTALLATION OF HARDWARE INSIDE COMPUTER SYSTEM UNIT. AVOID SHOCK HAZARD AND POSSIBLE EQUIPMENT DAMAGE BY DISCONNECTING POWER TO CONTROLLER BEFORE STARTING INSTALLATION PROCEDURES. INSTALL ALL ELECTRICAL COMPONENTS IN ACCORDANCE WITH ALL APPLICABLE LOCAL ELECTRICAL CODES. DO NOT APPLY POWER TO CONTROLLER UNTIL INSTRUCTED TO DO SO.

Please refer to your computer hardware manual for specific hardware installation instructions.

4. Plug all computer components into Delay and Distribution Unit.
5. Locate your DOS diskette and place into Drive "A" of your System Unit.

   NOTE: DOS must be installed onto the hard drive where NW 8000 will be installed.

6. Turn power to your system ON.
7. Locate NW 8000 Software Package and select diskette size most appropriate for your system.
8. With your computer displaying DOS Prompt A>, remove DOS diskette and install NW 8000 System Disk A.

(continued)

■ Procedure (continued)

9. Locate the NW 8000 Central disk instructions packaged with the software and follow the steps to install that version of software.

    The system will now prompt you to answer several questions and will provide procedures to complete the installation of the NW 8000 Software Package.

    Upon completion of Software installation, you will be given instructions for rebooting the system to initialize NW 8000 System.

    NOTE: If your system utilizes a mouse, you will have to change the AUTOEXEC.BAT file to activate the mouse. See your DOS Programming Manual.

    NOTE: After the system powers up with the Toro Logo displayed, the computer may begin beeping intermittently. This can mean two things as follows:

    A) The NW 8000 Central/Satellite system provides system status information. The system can be programmed to Beep when there is new information to review.

    Please refer to the NW 8000 Central Programming Guide for complete explanation of this feature.

    To turn off Beep, use the Mouse and select the following from the Toro Logo screen:

    | UTIL | ⟶ | LOCATION | ⟶ "AUDIBLE ERROR"

    When the "Audible Error" is highlighted the Beep will indicate New Message. When selected with the Mouse, "Audible Error" will change colors and the Beep will stop.

    B) The NW 8000 Central will notify the user that a satellite download is about to occur. The beeping will begin approximately 15 minutes prior to download and will increase in frequency until download.

    IMPORTANT: If you have not completed Central programming and do not wish to download to the satellites, the W.T. Calc Update should be changed to "NO" as follows:

    From the Toro Logo Screen, make the following selections with the Mouse:

    | UTIL | ⟶ | LOCATION | ⟶ Update W.T. Calc at | 11:00P |
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    When the YES is highlighted, the Central will update satellite programs at the time displayed. To stop download, select "NO" with the Mouse. "NO" should now be highlighted. To resume downloading, return to this screen and select "YES".

If your irrigation installation is not complete and central will not be connected to field satellites for a period of time, you can prevent central from attempting to download to field satellites by selecting "No".

You are now ready to begin learning to use NW 8000 Central Control System. We would first like to invite you to explore NW 8000 tutorial training modules to obtain a good overview of system terminology and operation.

An on-screen tutorial on the Toro NW 8000 is available by exiting the Toro Logo screen. If you wish to explore the tutorial, click mouse on large red Toro Logo. The NW 8000 DOS menu should appear shortly, giving you the option of returning to the Toro NW 8000 program, beginning the tutorial, or performing DOS commands. When you exit the tutorial, you will see this same menu and can then choose the option of returning to the Toro NW 8000 program.

Upon completion of the Tutorials, please go to the Programming section of this manual to begin putting the NW 8000 Central Control System to work for you.

Installation of the Central Controller package is now finished. To complete the NW 8000 Central Control System installation, proceed to Section 3 "Completing The Toro NW 8000 Central Hardware Installation."

Section 3

Completing the Toro Network 8000 Central Hardware Installation ∎

This section guides you through the installation of the Toro NW 8000 Surge Protection Unit (SPU), grounding, signal cable testing and connection, and connection of the SPU to the Central controller.

Take a few minutes to read through the entire installation instructions for an overview of procedures and materials required. Proper installation procedures will help assure maximum NW 8000 performance and prevention of damage to computer and/or peripheral components.

There are five steps to the completion of the Toro NW 8000 Hardware installation. These steps are:

A. Installing Surge Protection Unit and Earth Grounding Connection
B. InstallingWall Jack Assembly and Network SPU
C. Signal Cable Continuity Check
D. Signal Cable Connection to SPU
E. Connecting Toro NW 8000 Central to SPU

The following is a partial list of supplies and equipment required for installation of the Toro NW 8000 Central Surge Protection Unit (SPU), signal cable and wall jack assembly:

Tools: Digging Tools
               Phillips Head and Flat Blade Screwdrivers
               Protective Gloves
               Armored-cable Strippers
               Volt/Ohm meter and a 600 Ohm resistor
               Biddle Megger #63220 or Associate Research Vibroground Instrument

Supplies: 5/8 in. Diameter by 8 ft. Long Copper-Clad Steel Rod
               Electrical Conduit and Duplex Junction Box
               Split Bolt Connectors, #2, 14-2 (See Figure 7)
               Electric Insulation Tape
               Solid Copper Wire, 6 AWG and 12 AWG
               Clamps (for clamping grounding copper wire to ground rods)
               Toro Valve Cap (optional for ground rod) (See Figure 3)
               Shielded Cable, 30 ft., 18 AWG, 2 Twisted Pair (Supplied)

Figure 3
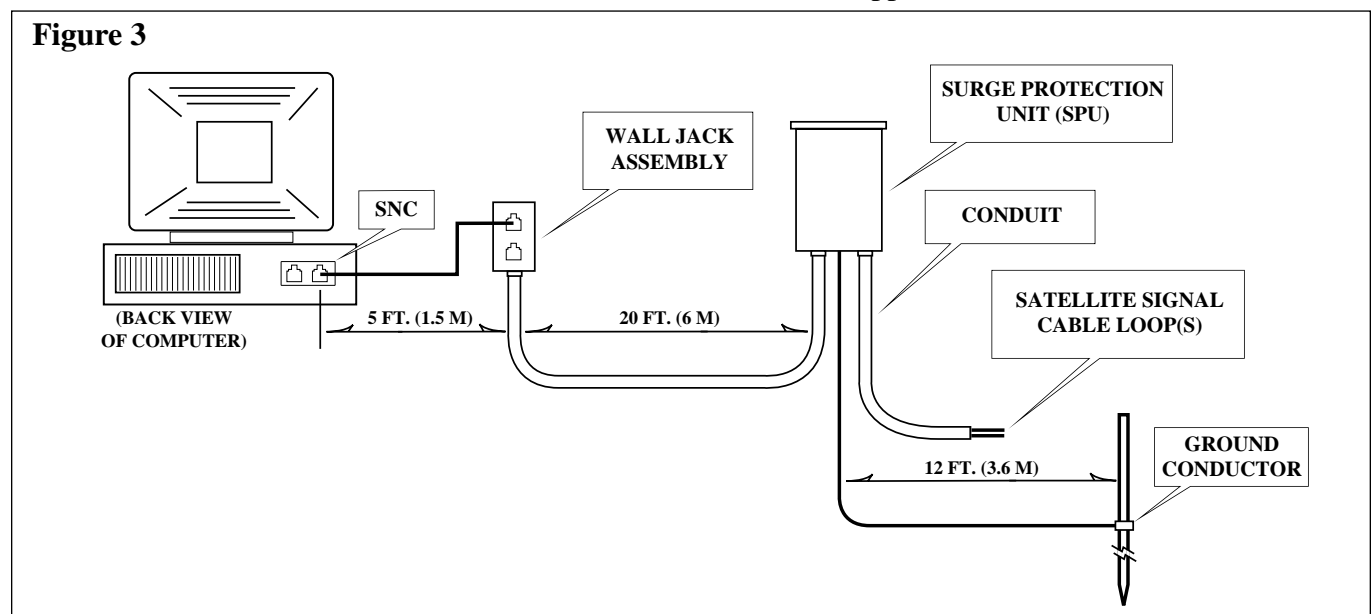
A. Installing SPU Cabinet and Earth Ground Connection ∎

1. Select an exterior wall installation site for SPU within 25' (7.6 m) of central controller and 12' (3.6 m) or less of a suitable location for earth ground conductor installation.

2. Attach SPU cabinet to wall using wood screws provided or appropriate fasteners for type of wall construction material. Ensure SPU cabinet is securely mounted to wall before continuing.

Note: To provide lightning protection for the system components, the SPU utilizes quick-reaction type surge arrestors which momentarily shunt high current and voltage loads directly to earth ground. Therefore, connection of a low resistance earth grounding conductor to the SPU chassis ground lug is required.

A grounding conductor (or conductors) with ground resistance of 10 Ohms or less must be located 12' (3.6 m) or less from SPU.

Figure 4

GROUND LUG

VALVE COVER
P/N 850-00
(OPTIONAL)

12 FT. (3.6 M) OR LESS.

6 AWG
COPPER WIRE

GROUNDING
CONDUCTOR

3. To achieve proper grounding condition, the following grounding conductor installation methods may be utilized:

   • Drive one or more 5/8" (16 mm) by 8' (2.5 m) copper clad steel rods into well moistened soil 12' (3.6 m) or less from SPU.

   • Bury one or more 1/8" x 1' x 1-1/2' (3 mm x 30.5 cm x 46 cm) copper plates in well-compacted, moistened soil 12' (3.6 m) or less from SPU.

4. Using an earth resistance testing instrument*****, measure resistance of grounding conductor(s) to ensure 10 Ohms or less.

   Note: If you are not sure of the test method or cannot attain 10 Ohms or less, contact your local Toro distributor for assistance.

5. Enlarge ground wire access hole diameter to 3/8" (10 mm) to facilitate communication cable grounding components. (See page 14).

6. Attach a length of 6 AWG (6.00 mm²)solid core non-insulated copper wire to grounding conductor(s) and route into SPU through access hole in base of cabinet. Secure wire to ground lug.

   * Megger Direct Reading Earth Resistance Testing Instrument (manufactured by James G. Biddle Company, Plymouth Meeting, PA, U.S.A.) or equivalent. Contact your local Toro distributor for availability of this device.
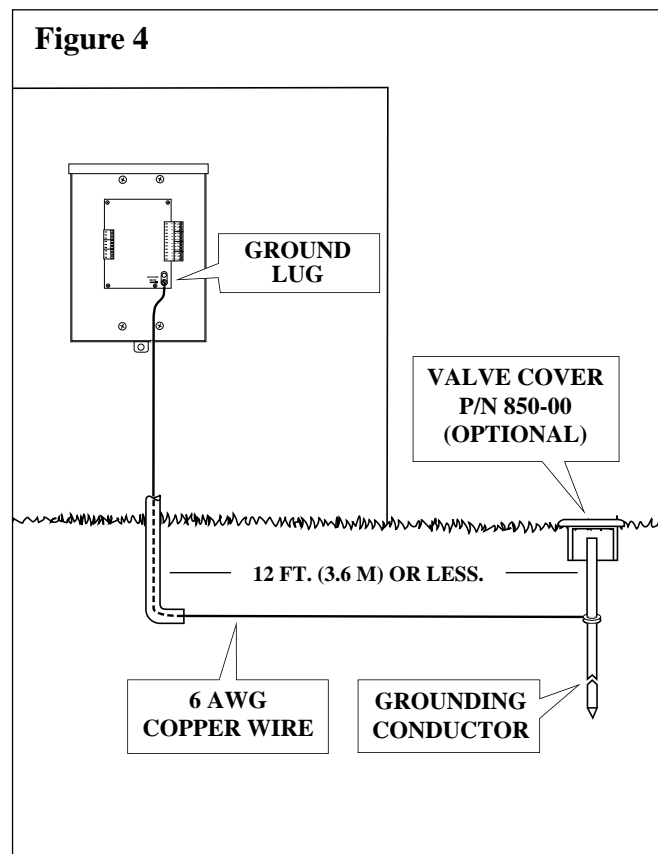
B. Wall Jack Assembly And Network SPU Installation Procedure ■

1. To enable Wall Jack assembly installation, secure a standard duplex junction box to interior wall within 5' (1.5 m) of central controller using appropriate fasteners.

2. Install approved electrical conduit from SPU cabinet to junction box.

   Note: Metal conduit is required to meet FCC class B requirements.

3. Pull shielded 18 AWG twisted pair cable (provided) through conduit from SPU to junction box. Carefully remove outer insulation jacket and foil wrap to expose approximately 6" (15 cm) of wire leads. Cut off Brown, Orange and non-insulated drain wire flush with end of foil wrap. Remove 3/8" (10 mm) of insulation from ends of Black and White wires. Locate number coding on wires and attach to Wall Jack terminals as shown in **Figure 5**.

4. Secure Wall Jack assembly to junction box.

5. Prepare cable wires (as in Step 3 above) for connection to SPU terminals, however, **do not cut drain wire**.

Figure 5

WIRE PAIR #1

CUT OFF BROWN, ORANGE AND DRAIN WIRES HERE

WIRE PAIR #1

COMM 1

COMM 2

WIRE PAIR #2

WIRE PAIR #2

DRAIN WIRE

WALL JACK ASSEMBLY

JUNCTION BOX

METAL CONDUIT

SURGE PROTECTION UNIT (SPU)

GROUND HERE

6. Secure black and white wire pairs and drain wire to terminal connector plugs in SPU as shown in **Figure 5**.

   Note: Drain wire must be attached to position 9.

   Note: Connector plugs can be removed from receptacle to facilitate wire installation as shown in Figure 5.
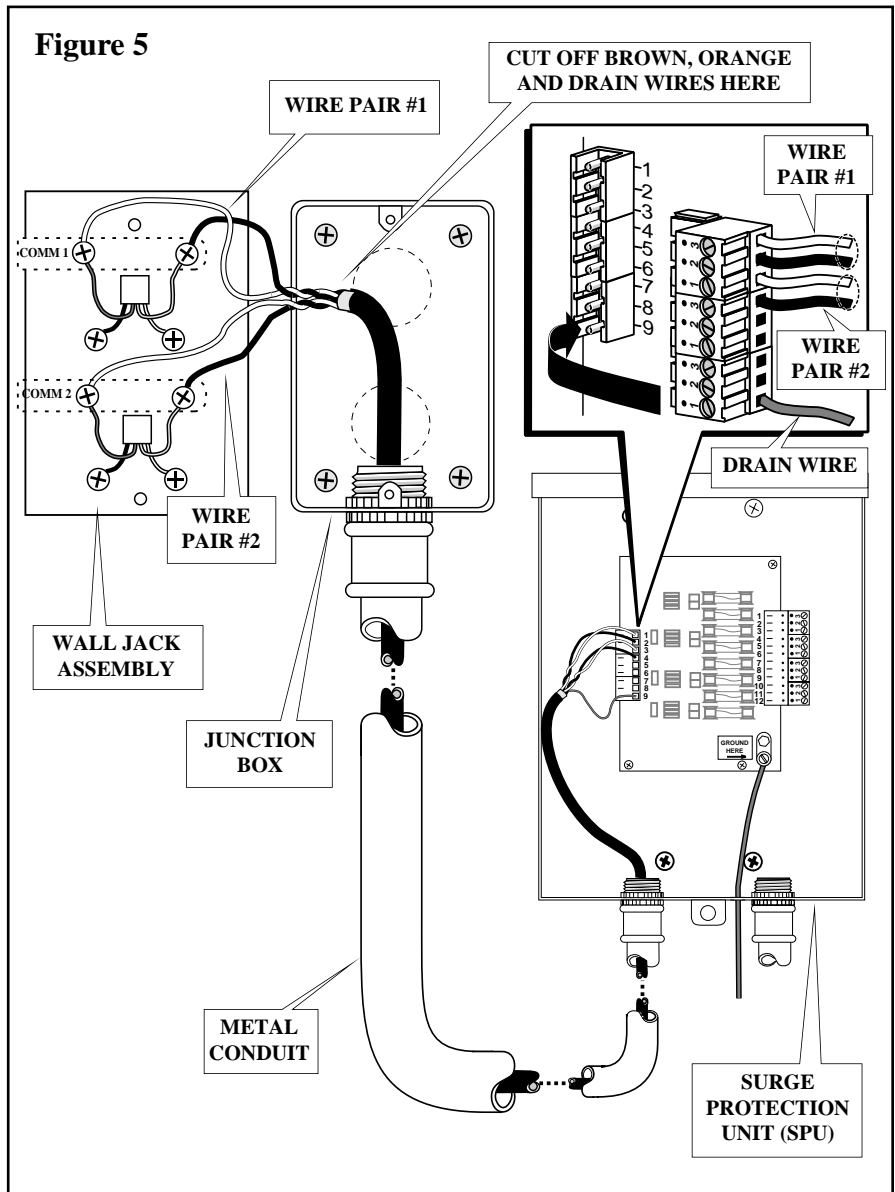
C. Signal Cable Continuity Check   ▪

     The signal cable must be tested for proper installation and continuity prior to connecting it to the SPU and satellite control units. The following test procedures will enable you to systematically determine if the signal cable has been installed properly or if a problem exists in the cable circuit.

     CAUTION – **System component damage can occur if signal cable is improperly installed.**

     A Volt/Ohm meter and a 600 Ohm resistor are required to perform the following checks:

1. Test for presence of voltage on Yellow, Gray and drain wire of each link as follows:

     Connect positive lead of voltmeter to either end of wire circuit and negative lead to an earth ground. If voltmeter indicates any significant voltage, connect a 600 Ohm resistor between open end of wire circuit and earth ground. Perform voltage test again. If voltage drops to less than one volt, the voltage is induced and will not impair operation of the signal circuit. If voltage does not drop, a direct connection to a power source exists which must be located and corrected. When all wire circuits have been tested successfully, continue to Step 2.

2. Test Yellow, Gray and drain wire circuits of each link for possible cross connection (Yellow connected to Gray etc.). Perform test as follows:

     Connect one Ohmmeter lead to Yellow wire and one lead to Gray wire; Ohmmeter should indicate an open circuit. Test drain wire with each signal wire in same manner. If Ohmmeter indicates a complete circuit, check signal wire connector plugs at each satellite location for possible crossed connection. When all wire circuits have been corrected and/or tested successfully, continue to Step 3.

3. Test signal and drain wire circuits for continuity and total resistance. Perform test as follows:

     Connect one Ohmmeter lead to each end of wire circuit to be tested. If circuit continuity is good, Ohmmeter will indicate resistance. Record resistance (Ohms) reading for future reference. If circuit is open (no resistance), check signal wire connector plugs at each satellite location for loose or improperly installed wires. When all wire circuits have been tested successfully and resistance recorded for each wire circuit, continue to Step 4.

4. Determine that measured resistance of each signal wire circuit is <u>less</u> <u>than</u> <u>or</u> <u>equal</u> <u>to</u> maximum allowable resistance. Maximum allowable resistance of 16 AWG signal wire is 7 Ω (Ohms) per 1000 feet (305 meters). Maximum allowable resistance of 18 AWG signal wire is 11.5 Ω (Ohms) per 1000 feet. Calculate as follows:

     First, find maximum allowable resistance for actual length of signal wire circuit: Divide length of circuit by 1000 feet (305 meters); multiply quotient by 7. Product equals maximum allowable resistance of circuit.

        Example – Total length of 16 AWG wire circuit is 3500 feet (1067 meters)

        3500 ft. (1067 m) ÷ 1000 ft. (305 m) = 3.5

        3.5 x 7 Ω = 24.5 Ω

     Next, compare actual circuit resistance measured in Step 3 with calculated maximum allowable Ohms. If actual resistance exceeds maximum, check signal wire for damage and/or possible break. Also check connector plugs at each satellite location for loose or improperly installed wires. If actual resistance is less than or equal to maximum, circuit is properly installed.

5. When all wire circuits have been tested successfully, connect all signal cable connector plugs at all satellite locations and go to Section D "Signal Cable Connection to SPU".

D. Signal Cable Connection to SPU ■

The following instructions assume that the Network satellite controllers have been installed and the signal cable loop is in place. If these components have not yet been installed, perform this task referring to Network 8000 Satellite Installation Instructions form No. 367-0089 before continuing.

At this point we are ready to begin connecting the Toro NW 8000 Central to the Satellites. This is done by connecting the signal cable loop(s) to the Central Surge Protection Unit (SPU).

Each satellite signal cable loop should start and end in the SPU. The following instructions refer to "signal" cables and "return" cables. The signal cable is the beginning of the loop (going out to the first satellite) and the return cable is the end of the loop (coming in from the last satellite). The following steps will guide you through the connections of these cables to the SPU.

NOTE: If you have more than one signal cable loop, repeat steps below for each loop. If desired, two separate cable loops can be attached to each Comm Path connector.
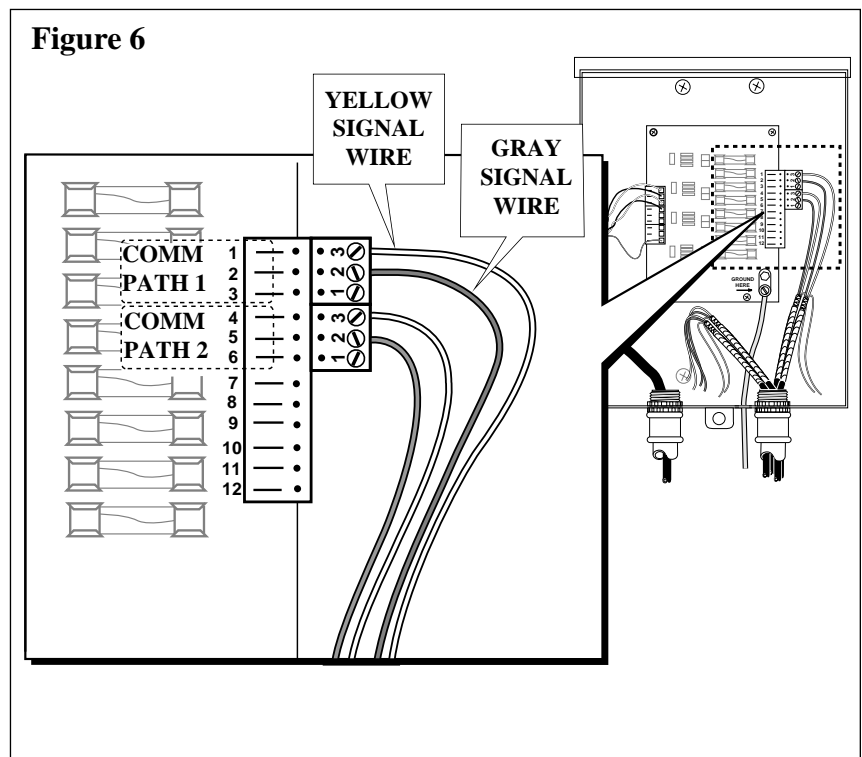
■ Procedure

1. If you have not already done so, install signal cable conduit to right side access hole in base of SPU cabinet. Route both ends of signal cable loop through conduit into SPU. Provide approximately 18" (46 cm) of each cable inside SPU to facilitate connection

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WARNING

⚠ **STAINLESS STEEL ARMOR WRAP IS VERY SHARP AND MAY BE HAZARDOUS IF NOT HANDLED PROPERLY. TO PREVENT INJURY, WEAR GLOVES AND USE EXTREME CARE WHEN WORKING WITH THIS MATERIAL.**

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2. Prepare all signal and return cables as follows: Remove outer insulation down to conduit fitting. Carefully remove armor shield and foil insulation leaving approximately 4" (10 cm) above conduit fitting.

3. Remove 3/8" (10 mm) of insulation from ends of yellow and gray signal wires. Using a small blade screwdriver, secure signal wires to connectors as shown in **Figure 6**.

(continued)
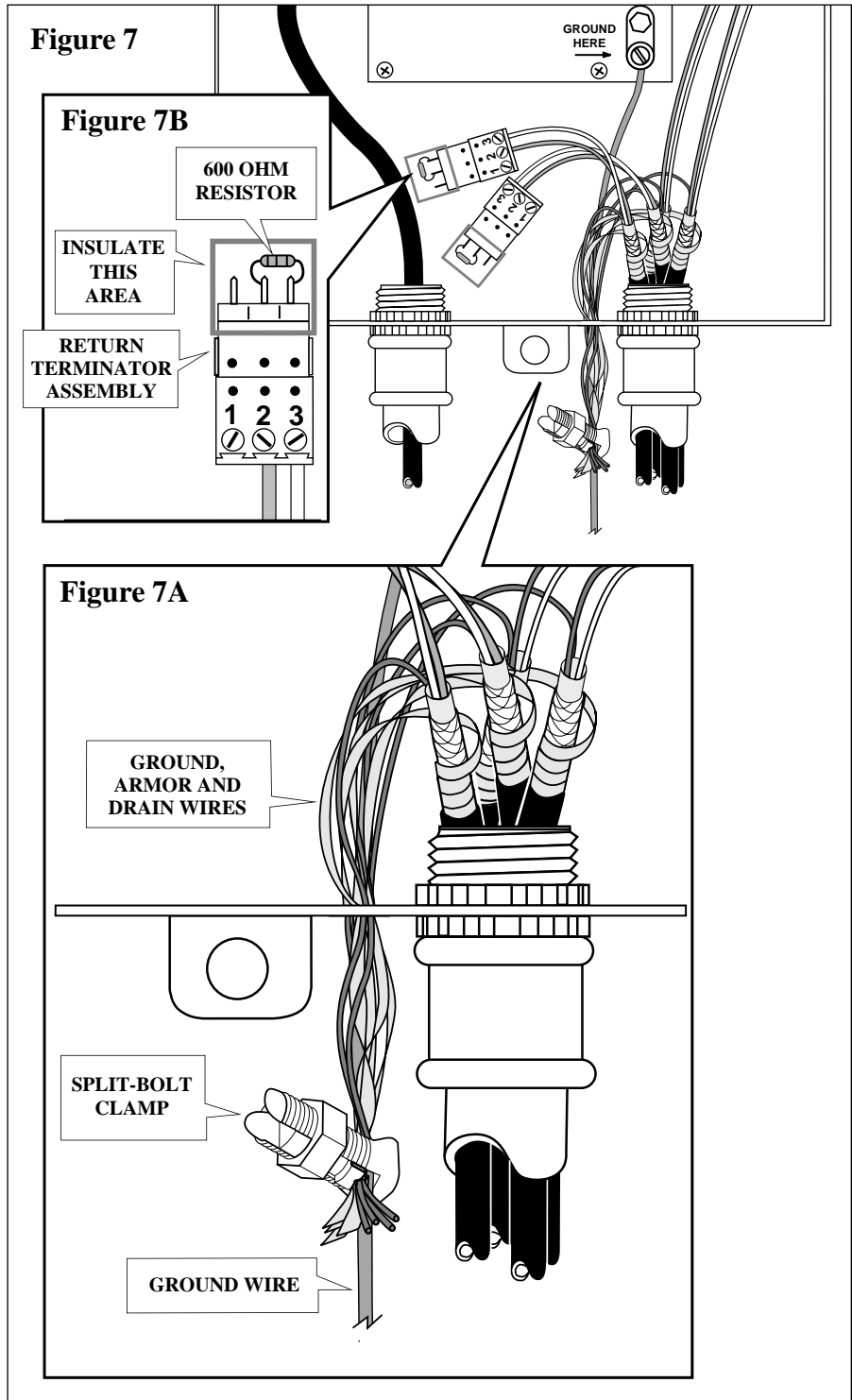
Figure 6

■ Procedure (continued)

4. Carefully unwrap remaining armor shield. Remove remaining foil insulation. Route armor and drain wires through enlarged ground wire opening in cabinet base. See **Figure 7**.

5. Using an appropriate size copper split-bolt clamp, secure all armor shields and drain wires to ground wire as shown in **Figure 7A**.

6. Secure return signal wires to return terminator assemblies provided as shown in **Figure 7B**.

   Note: Ensure 600 Ohm resistor on return terminator connects both signal wires.

7. Using electrical tape, insulate end of return terminator assembly to prevent contact with metal surfaces. See **Figure 7B**.

Figure 7

Figure 7B

GROUND HERE

600 OHM RESISTOR

INSULATE THIS AREA

RETURN TERMINATOR ASSEMBLY

1 2 3

Figure 7A

GROUND, ARMOR AND DRAIN WIRES

SPLIT-BOLT CLAMP

GROUND WIRE

E. Connecting Toro Network 8000 Central to Wall Jack Assembly ■

Once installation of the Surge Protection Unit, grounding, wall jack assembly, and signal cable is complete, you may proceed to connecting the Serial Network Controller (SNC) printed circuit board in the Toro NW 8000 Central to the wall plate. Remove the seven (7) foot modular telephone cable (one per COMM Path) from the installation kit and install the cable from the SNC jack on the rear of the computer to the appropriate wall jack receptacle as shown in **Figure 8** below.

Figure 8
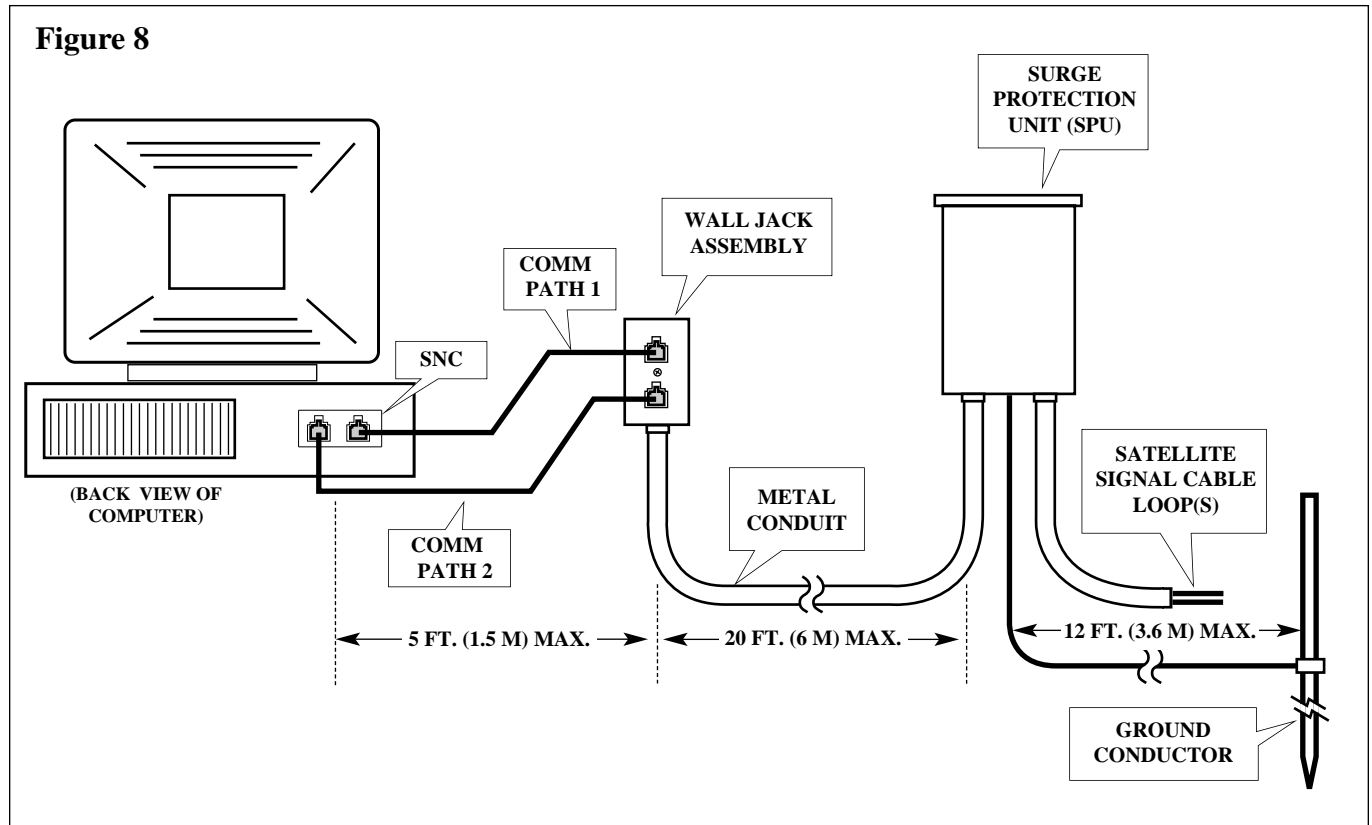
The installation of your NW 8000 Central Control System is now complete. Please refer to the Central Programming Guide, located in the Central Programming section of this manual to begin programming your system.

Thank you again for selecting Toro.

NETWORK 8000 CENTRAL CONTROL SYSTEM

inside front cover

TORO NETWORK 8000

CENTRAL CONTROL SYSTEM

Installation Guide

Version 5.0