Golf Industry Show

MAKE the TURN

GCSAA Education Conference
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Two Wire Systems

By Vince Nolletti
Partner & Executive Vice President
Paige Electric Co., LP
Most Common Problems with Decoder Systems

- Wire and cable faults caused by:
  - The wire insulation is damaged by rocks and sharp objects.
  - Installation knife damage to inner conductors of jacketed cables.

- Connection defects caused by:
  - The use of cheap connectors that are not waterproof.
  - Choosing “waterproof” connectors that have very little room for human error.
  - Home-made connectors

- Improper grounding, bonding and shielding

- Troubleshooting
**Decoder Cables Stripping Tools**

Removal of outer jacket should be done with the appropriate stripping tool

<table>
<thead>
<tr>
<th>Photo</th>
<th>Paige Part No.</th>
<th>For</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image1.png" alt="Photo" /></td>
<td>270041</td>
<td>Flat jacketed cable for Rain Bird systems</td>
</tr>
<tr>
<td><img src="image2.png" alt="Photo" /></td>
<td>270004</td>
<td>Round Loose-Tube™ cable for Hunter and TORO systems</td>
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</tbody>
</table>
Connectors

For Dry Locations only

For wet or damp locations
Proper Wire Connections

FOUR CRITICAL STEPS:

1. Make a good mechanical connection
2. Insulate the mechanical connection
3. Waterproof the connection
4. Insure that the connection has “strain relief”

Note:

1. This applies to bare copper wire also
2. Chose a connector that is forgiving to possible human error
Lightning striking the Space Shuttle!
GROUNDS A DECODER CONTROLLER OR INTERFACE

**TOP VIEW**

- 4" x 8' (10.2 cm x 2.4 m) GROUND PLATE W/INSULATED CONDUCTOR (Paige 182199IC)
- 6 AWG (17,2 mm²) SOLID BARE COPPER BONDING WIRE(S)
- 6 AWG SOLID COPPER, GREEN w/YELLOW STRIPE (Pre-welded to Ground Plate) (Paige 182007IC6)
- 5/8" X 10' (3 m) GROUND ROD W/INSULATED CONDUCTOR (Paige 182007IC6)

**“THE SPHERE OF INFLUENCE”**

**SIDE VIEW**

- CONTROLLER PLASTIC SWEEP ELL, 1-1/2" (40 mm) OR LARGER
- 6 AWG (17,2 mm²) SOLID BARE COPPER BONDING WIRE(S) (Paige 182199IC)
- 6 AWG SOLID COPPER, GREEN w/YELLOW STRIPE (Pre-welded to Ground Plate) (Paige 182007IC6)
- GROUND PLATE w/INSULATED CONDUCTOR (Paige 182199IC)
- EARTH CONTACT MATERIAL (Paige 1820058 [PowerSet®] or 1820059 [PowerFill®])
- 12" (30,5 cm)
- 30" (76 cm) MIN.
Grounding Decoders That Have a Grounding Wire

**TOP VIEW**

- **Decoder Cable** [Paige Electric P7313]
- **4" x 36" Ground Plate** [Paige Electric 182201IC], surrounded by 50 pounds of PowerSet® [Paige Electric 1820058]
- **Valve Box**
- **3M DBR/Y-6 [Paige Electric 270672]**
- **"Decoder-to-Solenoid" Cables**, to match decoder wire colors [Paige Electric P7351D]
- **To Solenoid #1**
- **To Solenoid #2**

**Bonding/Shielding Wire**, 10 AWG solid bare copper [Paige Electric 160465.]
Install in trench, above the Decoder Cable, as close to the surface as practical (8"-12" deep)
Grounding Decoders That Don’t Have a Grounding Wire

To Solenoid #1

"Decoder-to-Solenoid" Cables, to match decoder wire colors [Paige Electric P7351D]

Decoder Cable [Paige Electric P7350D.] Install with minimum of 24" of cover

Bonding/Shielding Wire, 10 AWG solid bare copper [Paige Electric 160465.] Install in trench, above the Decoder Cable, as close to the surface as practical (8"-12" deep)

3M DBR/Y-6 [Paige Electric 270672]

4" x 36" Ground Plate [Paige Electric 182201IC], surrounded by 50 pounds of PowerSet® [Paige Electric 1820058]
Grounding Integrated Control Systems

TOP VIEW

Valve Box

Maxi Cable [Paige Electric P7350D. ] Install with minimum of 6" of cover, but deep enough to avoid mechanical damage

ICM

3M DBR/Y-6 [Paige Electric 270672]

ICSD

3M DBR/Y-6 [Paige Electric 270672]

Bonding/Shielding Wire, 10 AWG solid bare copper [Paige Electric 160465. ] Install in trench, above the Decoder Cable, as close to the surface as practical (8"-12" deep)

4" x 36" Ground Plate [Paige Electric 182201], surrounded by 50 pounds of PowerSet® [Paige Electric 1820058]

MAKE the TURN

GCSAA Education Conference
Troubleshooting Wiring Faults

Controller diagnostics are great, but…
Typical Wiring Diagram Using Decoder Cable Fuse Devices (DCFDs)
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Ownership

Lukus Harvey
Atlanta Athletic Club
Installation & Transition

• Ease of installation
• Preconstruction meeting with other Contractors
• Installation will dictate your long term success
• Startup
• Transition from other systems
• Manufacturer training for your team
Operation

• Ease of use
• Very Responsive
• Not left in the Dark
• Clicks with Millennials!
Maintenance

• Less down time
• Less Labor
• Less Parts
• All of this = Less $$$$$$$
Warranty

• Make sure you have favorable terms
• Good Installation can make you forget you have this
Installing Golf 2 Wire

Gregg Sorensen, Project Manager, Landscapes Unlimited, Lincoln, Neb.
Installing 2 Wire Golf irrigation systems should consider what type of project you have:

- New Construction
- Remodel

The challenges of each will warrant a different approach, and may dictate where you start.
Installing Golf 2 Wire

New Construction considerations

• Is the Maintenance shop area known?
• Is that where the power will be? What is the timeline?
• Are there other spots of power and communication to start from?
• Should you plan a backup central area? A Hub?
• Will a temporary central need to be set up?
• Will additional development be occurring in the vicinity?
• Will the construction be done in phases? If so, is power and communication available for phase 1?
• Double check all zones before doing your grow in program!!
Installing Golf 2 Wire

Remodel considerations

• Space -- You can’t take down the old system control components until the new one has completely taken over. This means you will have 2 of many things, including a central computer and radio systems for a while.
• Addresses to installed heads MUST be entered in Daily to ensure that existing turf gets watered quickly.
• Watering program must be in place before heads are installed.
Installing Golf 2 Wire

Wiring techniques—

Because the wiring and splices are such a critical component, always leave plenty of extra wire where you can. While this may cut into some of your anticipated wire savings, it is worth it.
Installing Golf 2 Wire

• Wiring techniques---

For decoders at the head, leave extra wire at the heads, bundled under the swing joint arm. This will aid future maintenance. Do not strip more outer jacket than needed.
Installing Golf 2 Wire

• Wiring Techniques---

For Decoders at a Lateral Isolation valve or other remote spot from the head, leave enough wire to fully remove the decoders and work on them above ground.
Installing Golf 2 Wire

• Decoder considerations:

In situations where the decoders are in a valve box, plan ahead to make sure wiring and splices and decoders will all fit. While it is ideal to have as small a valve box as you can, you must have room to access all components.
Installing Golf 2 Wire

• Hubs---

Some 2 wire systems allow for remote hubs used in conjunction with the rest of the system. Hubs allow for sections of the system to be remotely controlled, and should be located in a convenient, out of play area. Hubs can be hard wired or radio controlled back to the central.
Installing Golf 2 Wire

- What to watch out for:
  -- Get and keep accurate address records for your 2 wire system.
  -- Back up the database daily during construction and often afterwards.
  -- Record all changes on field as-builts as well as spreadsheets.
  -- Be careful with the wiring!!!
    -- Use the same wiring guys throughout for wiring and splices
    -- Check spools before and during installation for any nicks
Installing Golf 2 Wire

Wire Damage---

• Shovels and carelessness seem to be the #1 enemy of 2-wire.
• In some areas, rodents can and will chew into 2-wire.
• These areas can be found with standard troubleshooting techniques.
Installing Golf 2 Wire

Tips for Success---

• Have a plan, and plan ahead.
• If possible, make sure the Superintendent is on board.
• Thoroughly test each head and decoder via the radio and central.
• Keep accurate records and spreadsheets.
Erik Christiansen - President
EC Design Group, Ltd.
“An Irrigation Consultant & Water Management Group”
- Certified ASIC-PIC and TCEQ #6410 Texas Irrigator

Offices:
Headquarters – West Des Moines, IA
Satellite office – Chicago, IL
Incorporated in 1993 with projects totaling close to 500 spanning all over the world
What is the most important item for a successful two-wire installation?

- Design Application(s)
- Manufacturer
- Short/Long Term Cost
- Grounding & Surge
- Cable Selection
- Region
The answer is ... the expertise and ability of the technician!
2-Wire Cable Run Examples

Standard 24VAC Wire

2-Wire Cable
2-Wire Cable Run Examples

Com Path Wiring – Surge Protection

Lateral Wiring Installation
Surge Protection and Grounding
Every 500’/1000’ and not to exceed 500’ from furthest decoder module
2-Wire Cable Run Examples

Com Path Wiring – Isolation - Surge Protection
Communication Cable – Mainline & Lateral Isolation
Lateral Wiring Installation
Surge Protection and Grounding
Every 500’/1000’ and not to exceed 500’ from farthest decoder module
2-Wire Cable Run Examples

Com Path Wiring – Isolation - Surge Protection

Communication Cable – Mainline & Lateral Isolation
Lateral Wiring Installation
Surge Protection and Grounding
Every 500’/1000’ and not to exceed 500’ from furthest decoder module
2-Wire Cable Run Examples

Com Path Wiring – Surge Protection
Looped Wiring Installation
Surge Protection and Grounding
Every 500’/1000’ and not to exceed 500’ from furthest decoder module
2-Wire Cable Run Examples

- Switch, 3 Output, Paige Electric
- Surge Protector
- Ground

Com Path Wiring – Isolation - Surge Protection
Communication Cable – Mainline & Lateral Isolation
Looped Wiring Installation
Surge Protection and Grounding
Every 500’/1000’ and not to exceed 500’ from furthest decoder module
Thank you!

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