



golf industry show



MAKE *the* **TURN**

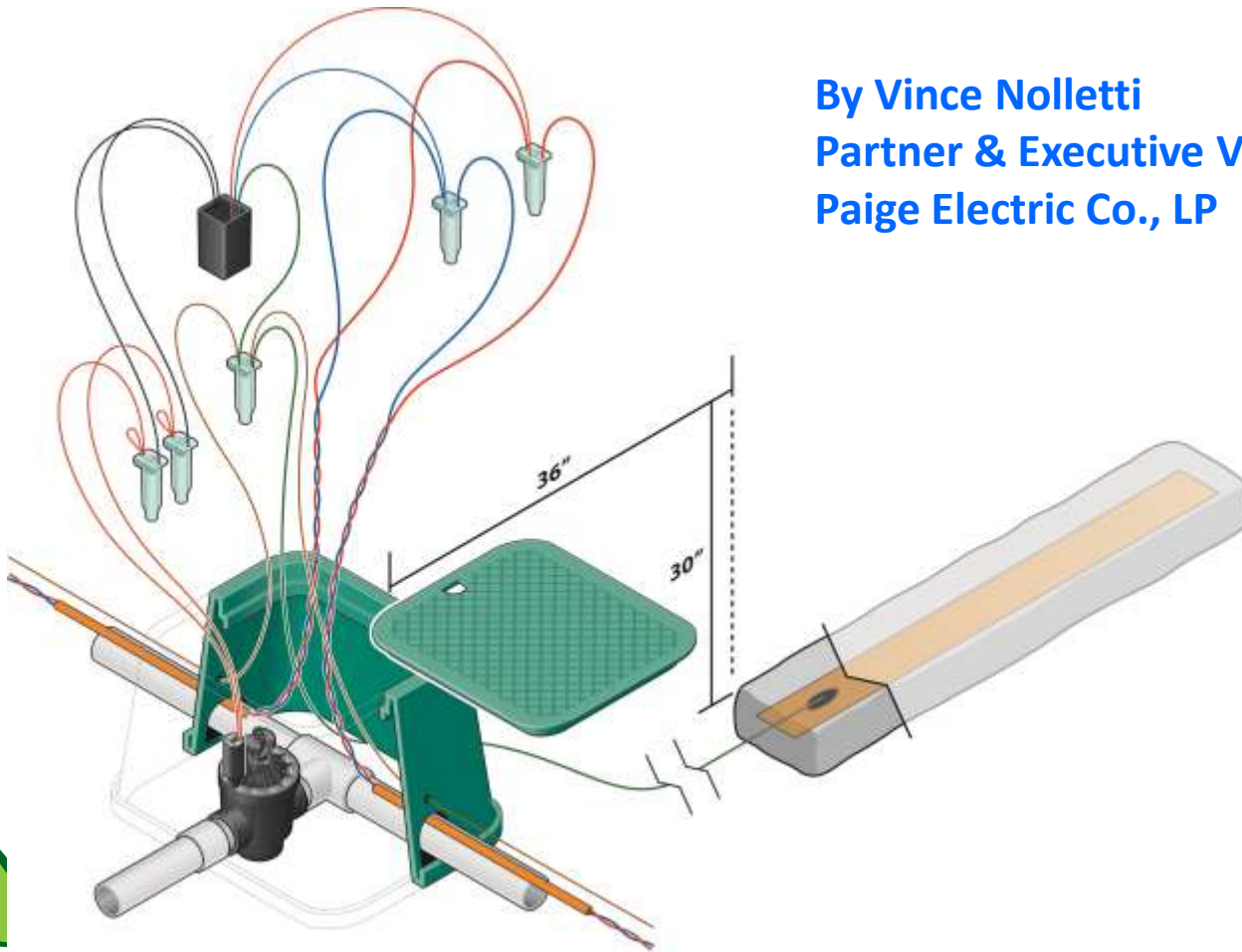
GCSAA Education Conference

February 4-9, 2017 • Orange County Convention Center



Two Wire Systems

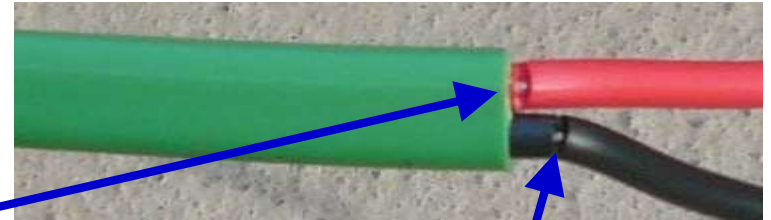
By Vince Nolletti
Partner & Executive Vice President
Paige Electric Co., LP



Most Common Problems with Decoder Systems

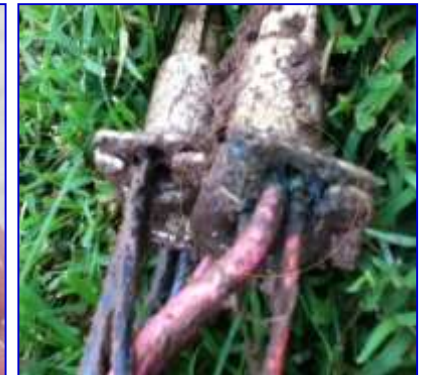
■ Wire and cable faults caused by:

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



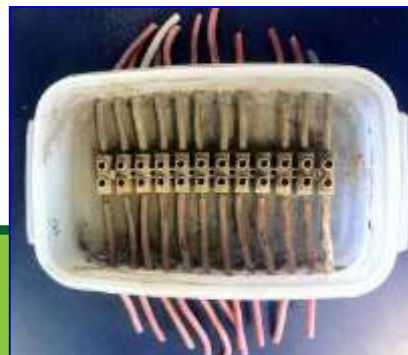
■ Connection defects caused by:

- 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

Photo	Paige Part No.	For
	270041	Flat jacketed cable for Rain Bird systems 
	270004	Round Loose-Tube™ cable for Hunter and TORO systems 

Connectors

For Dry Locations only



For wet or damp locations



Proper Wire Connections

FOUR CRITICAL STEPS:

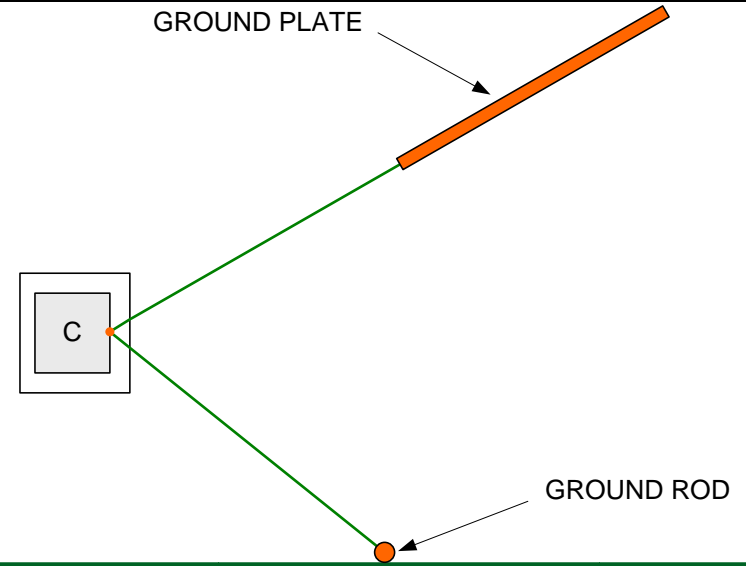
1. Make a good mechanical connection
2. Insulate the mechanical connection
3. Waterproof the connection
4. Insure that the connection has “strain relief”

Note:

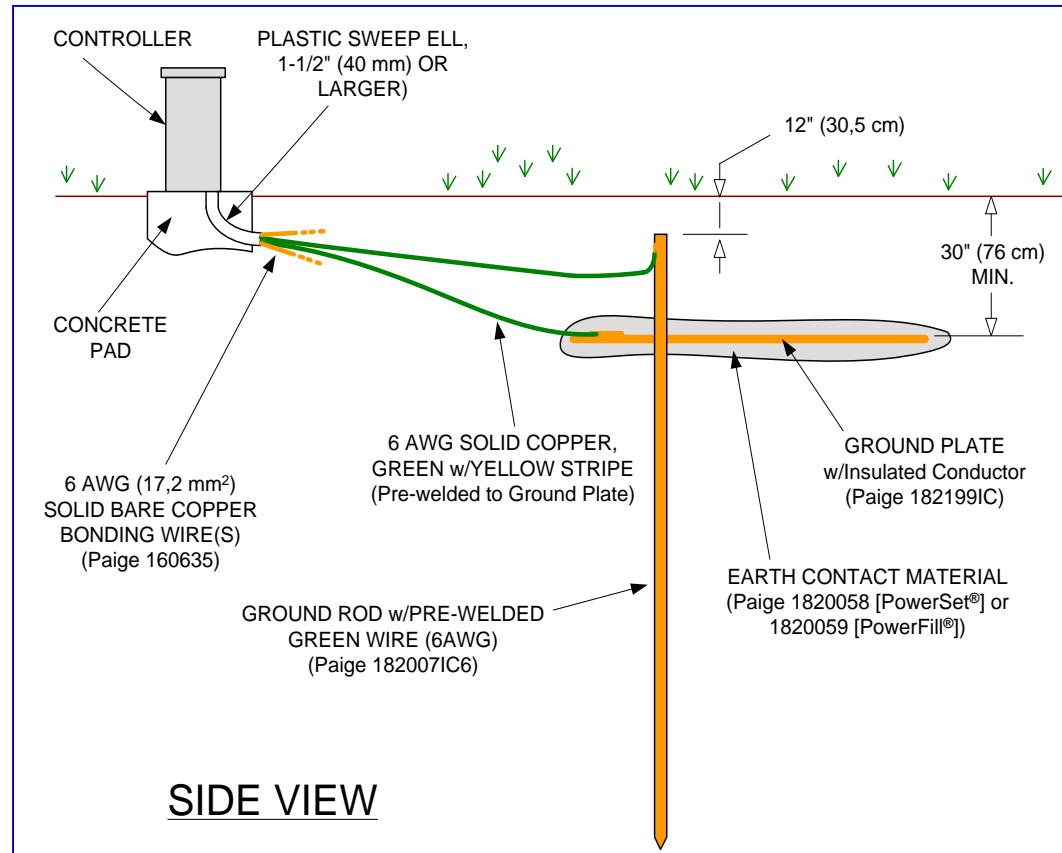
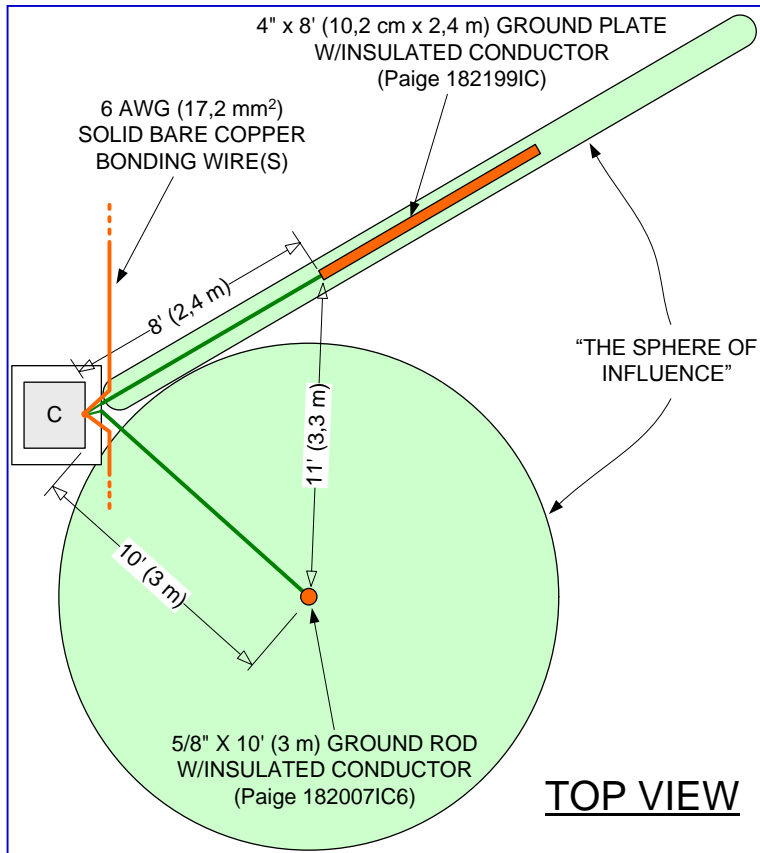
1. This applies to bare copper wire also
2. Chose a connector that is forgiving to possible human error



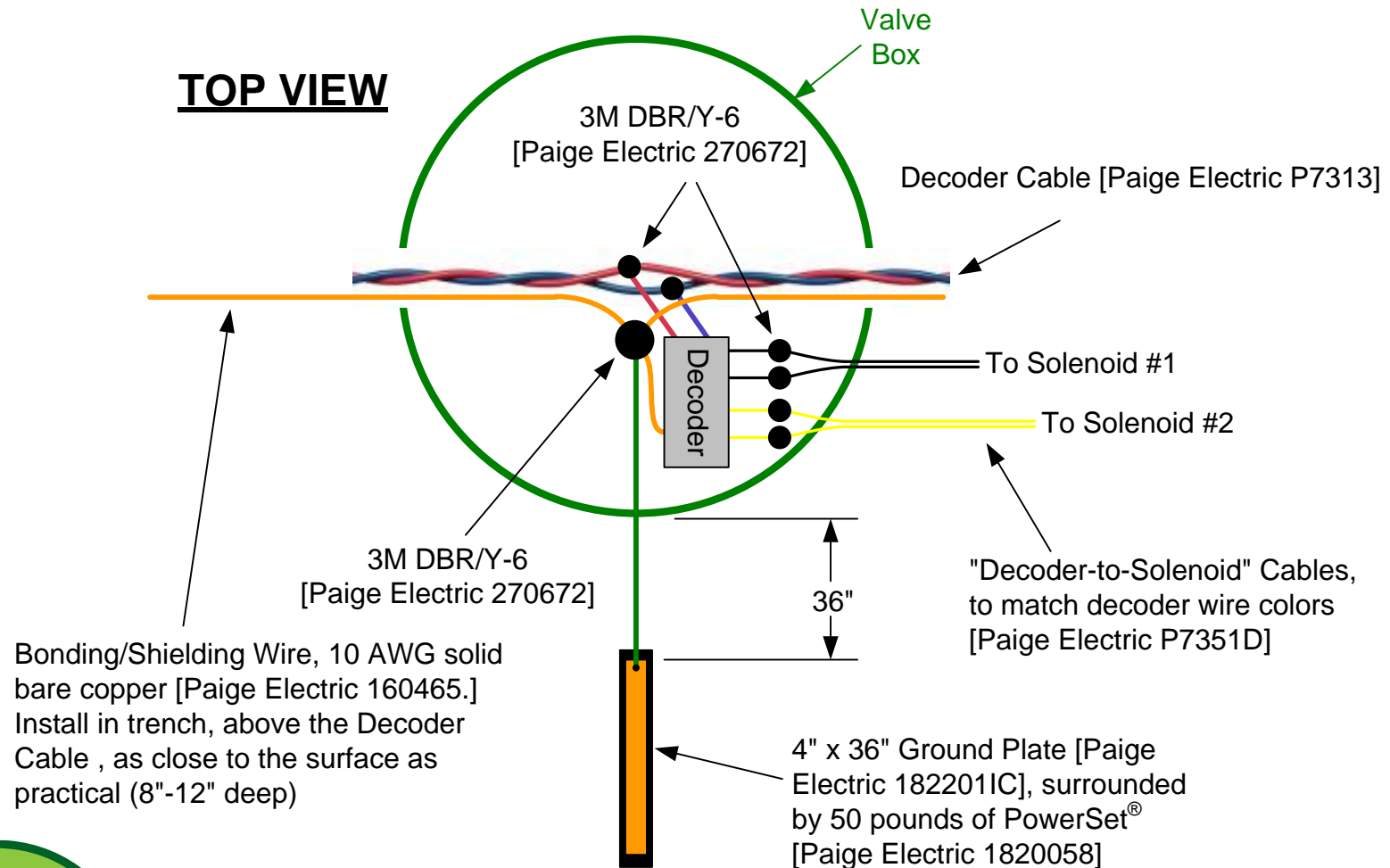
Lightning striking the Space Shuttle!



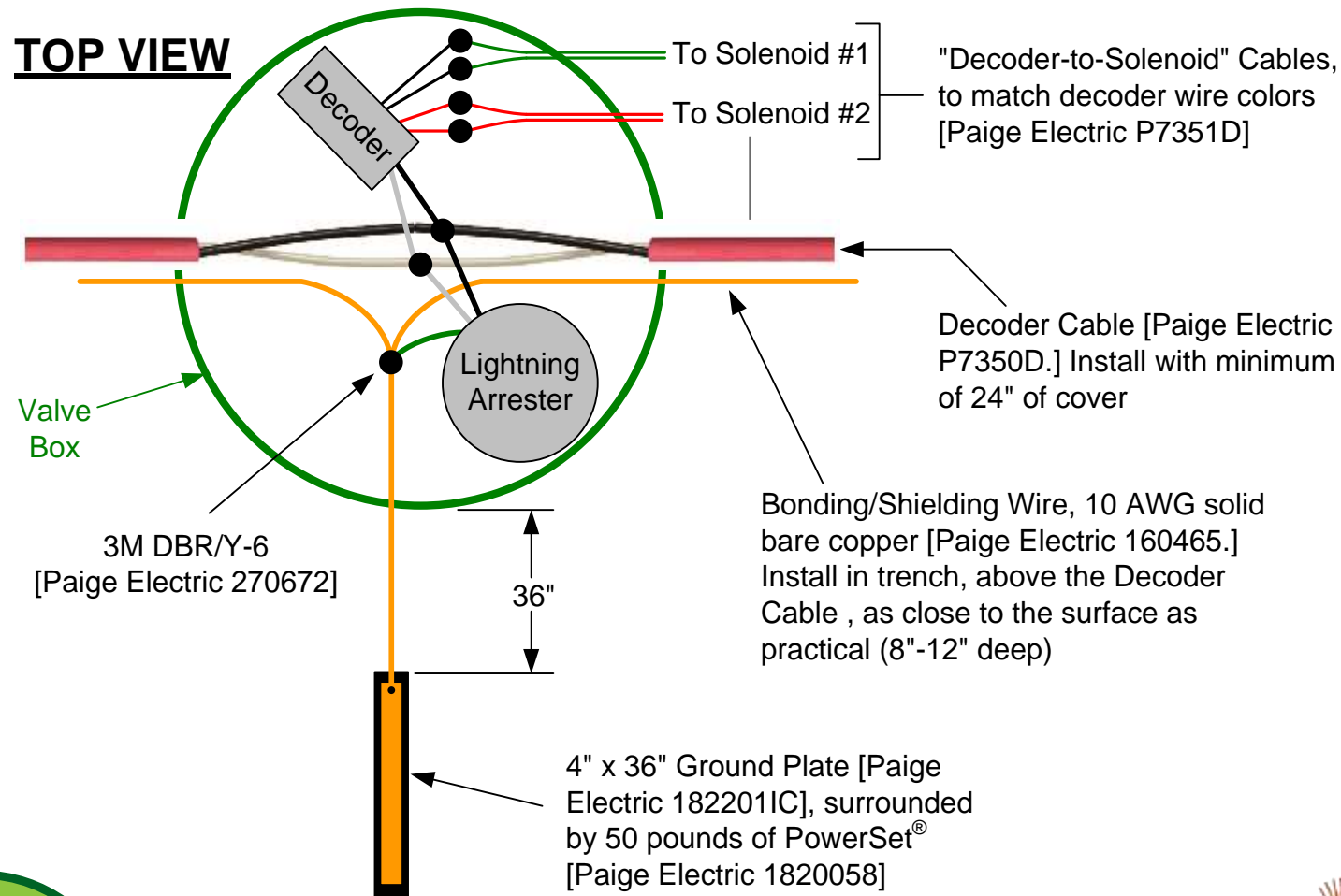
GROUNDING A DECODER CONTROLLER OR INTERFACE



Grounding Decoders That Have a Grounding Wire

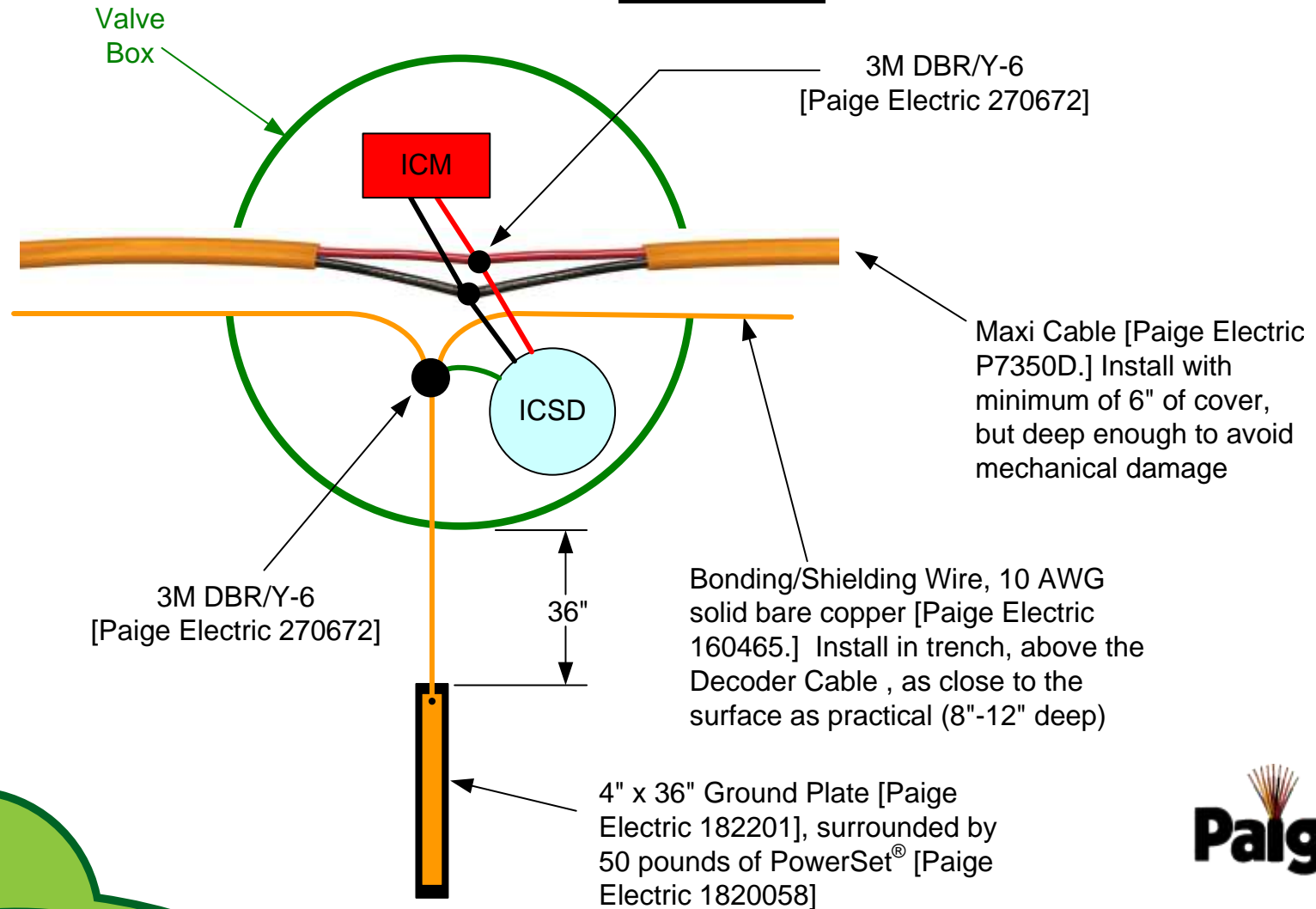


Grounding Decoders That Don't Have a Grounding Wire



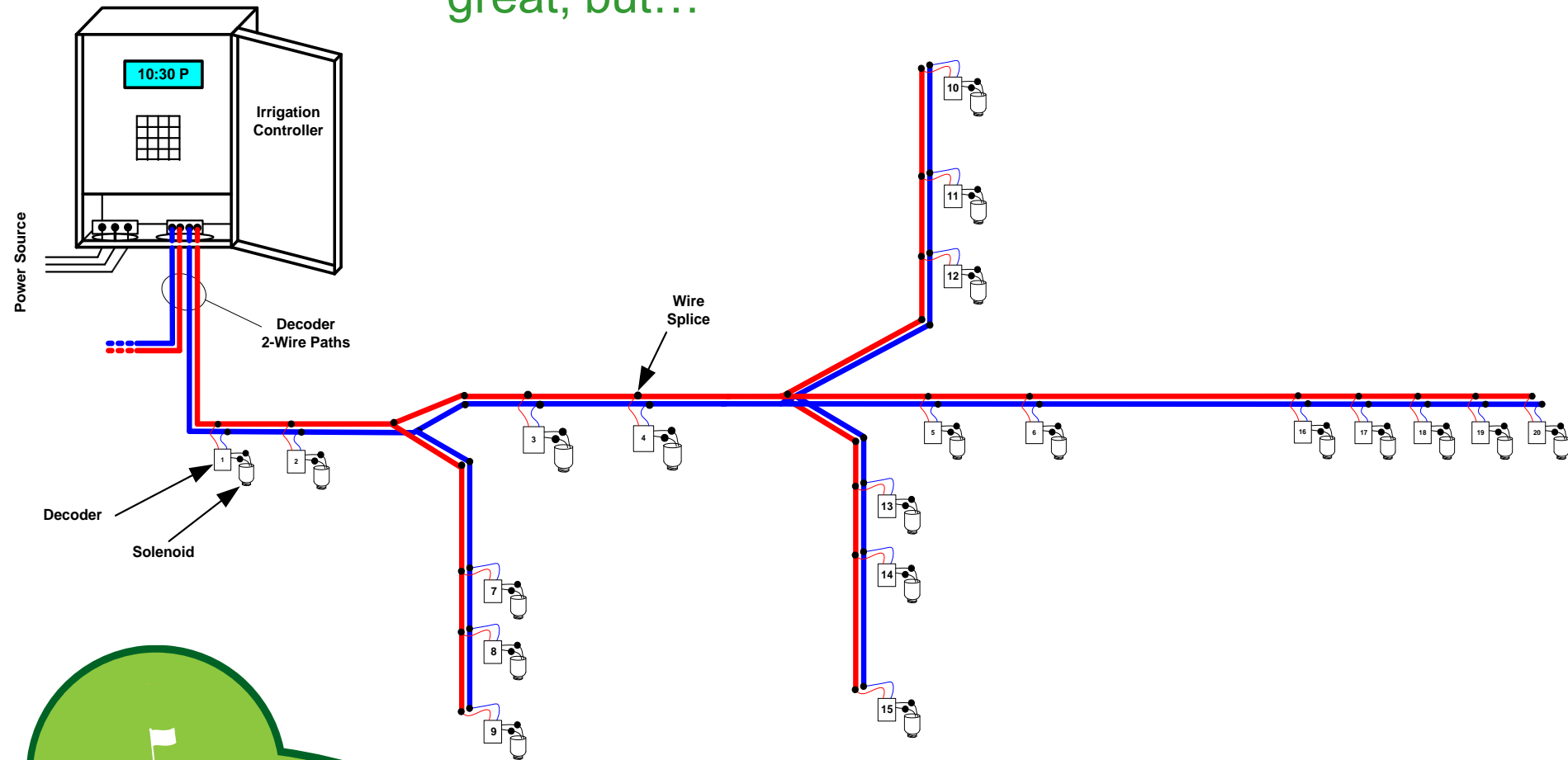
Grounding Integrated Control Systems

TOP VIEW

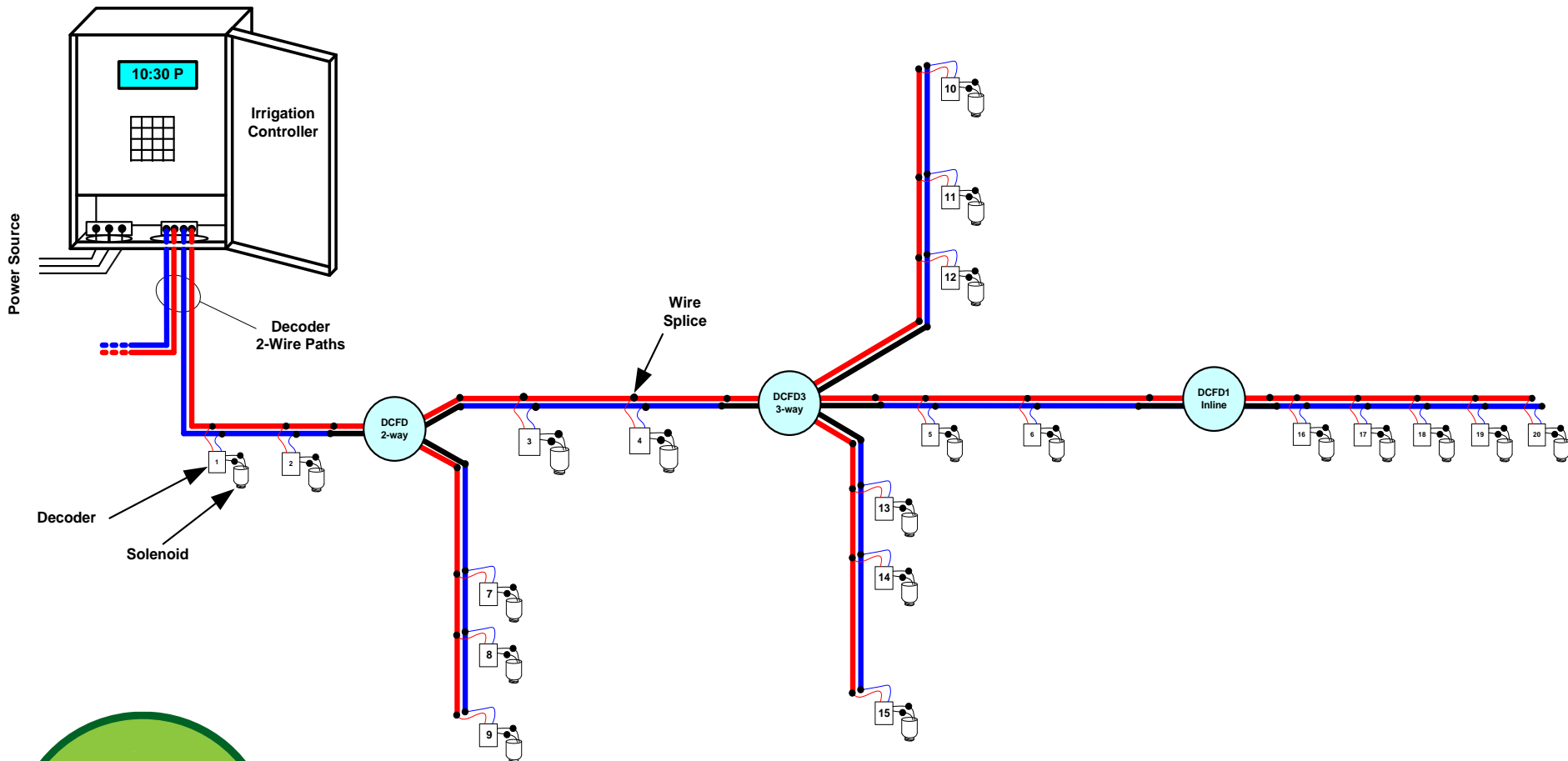


Troubleshooting Wiring Faults

Controller diagnostics are great, but...



Typical Wiring Diagram Using Decoder Cable Fuse Devices (DCFDs)



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7:00AM to 5:00PM, PST



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Ownership

Lukus Harvey
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GCSAA Education Conference

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 Golf 2 Wire

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

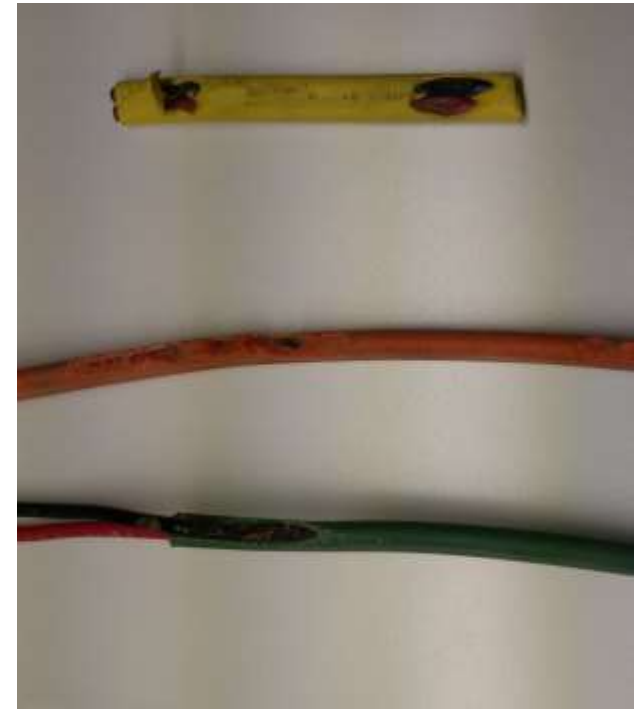
- What to watch out for:
 - Get and keep accurate address records for your 2 wire system.
 - Back up the database daily during construction and often afterwards.
 - Record all changes on field as-builts as well as spreadsheets.
 - Be careful with the wiring!!!
 - Use the same wiring guys throughout for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



ERIK CHRISTIANSEN DESIGN GROUP, LTD.

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

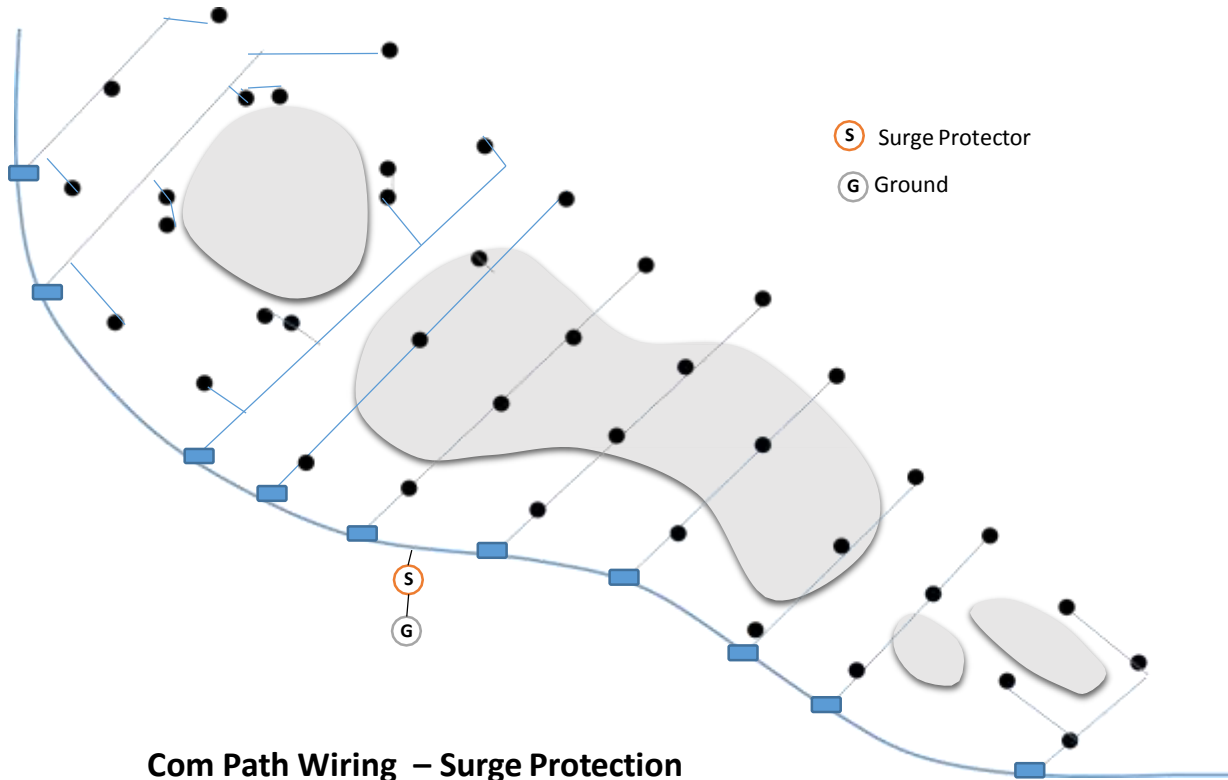


Standard 24VAC Wire



2-Wire Cable

2-Wire Cable Run Examples



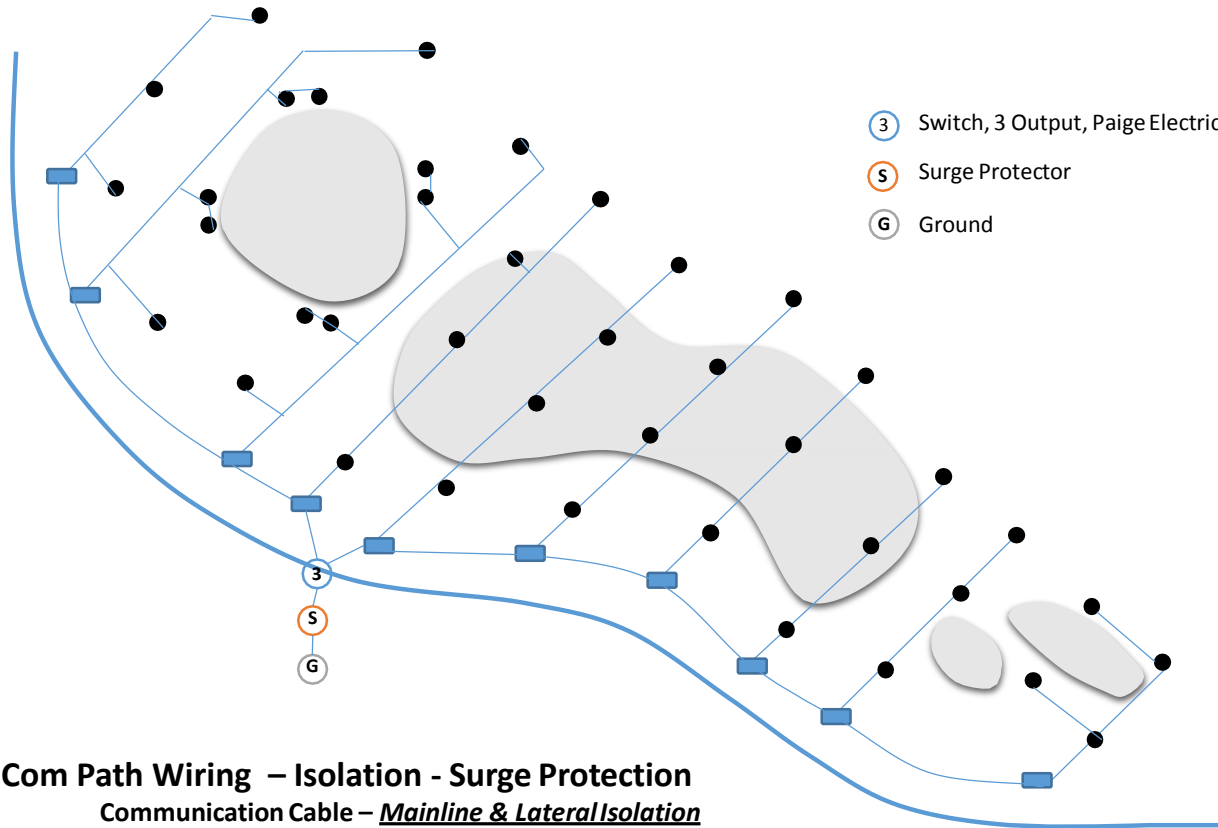
Com Path Wiring – Surge Protection

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

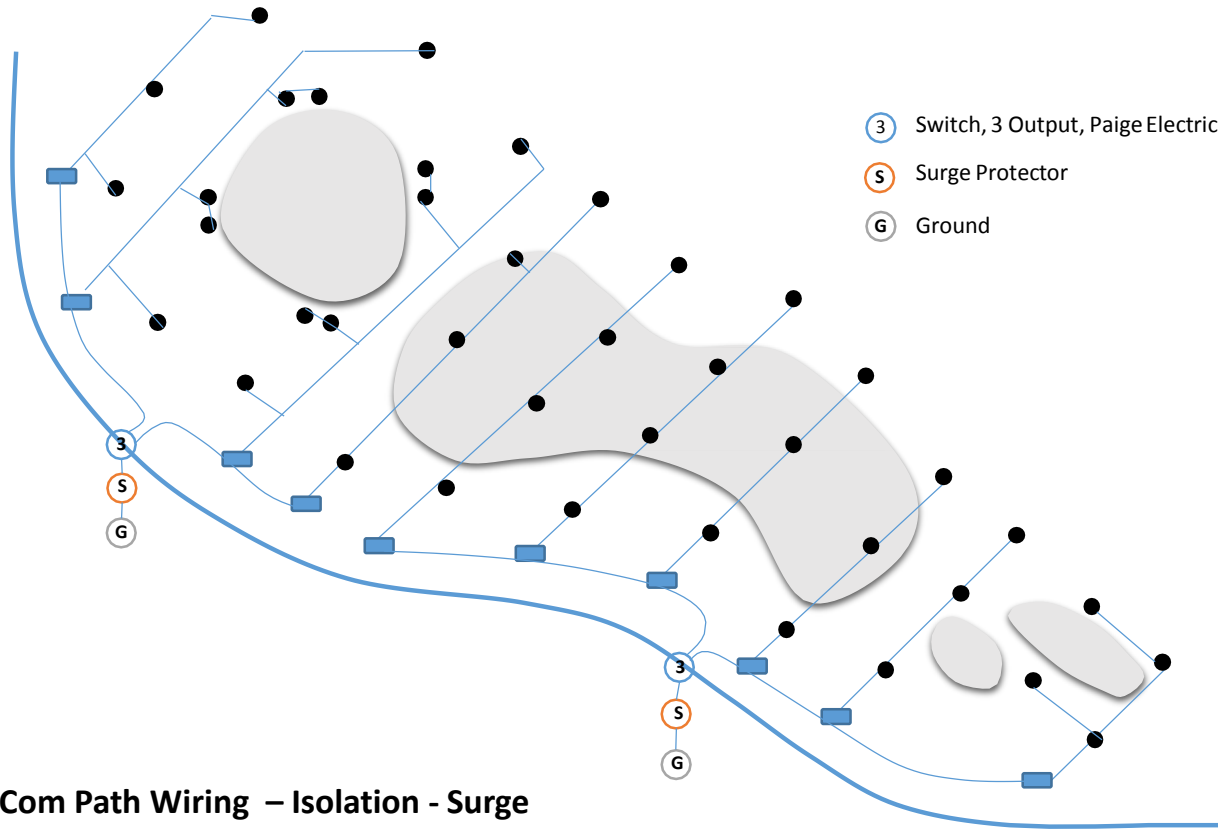
Communication Cable – Mainline & Lateral Isolation

Lateral Wiring Installation

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Communication Cable – Mainline & Lateral Isolation

Lateral Wiring Installation

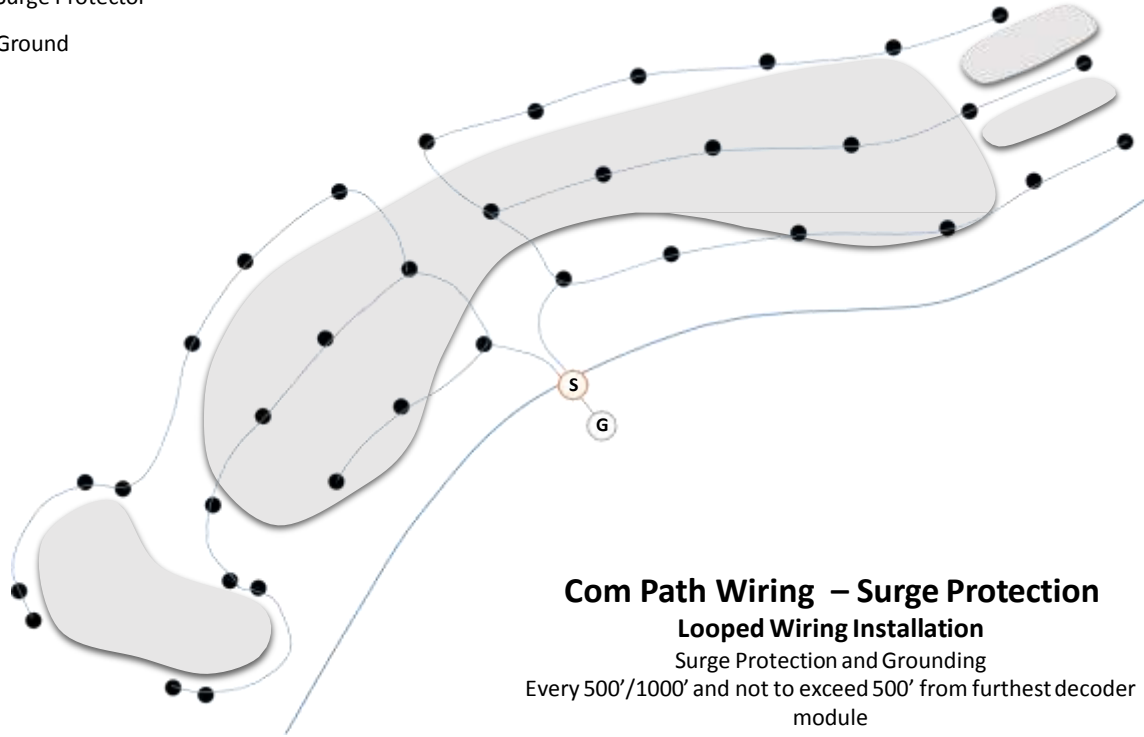
Surge Protection and Grounding

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2-Wire Cable Run Examples

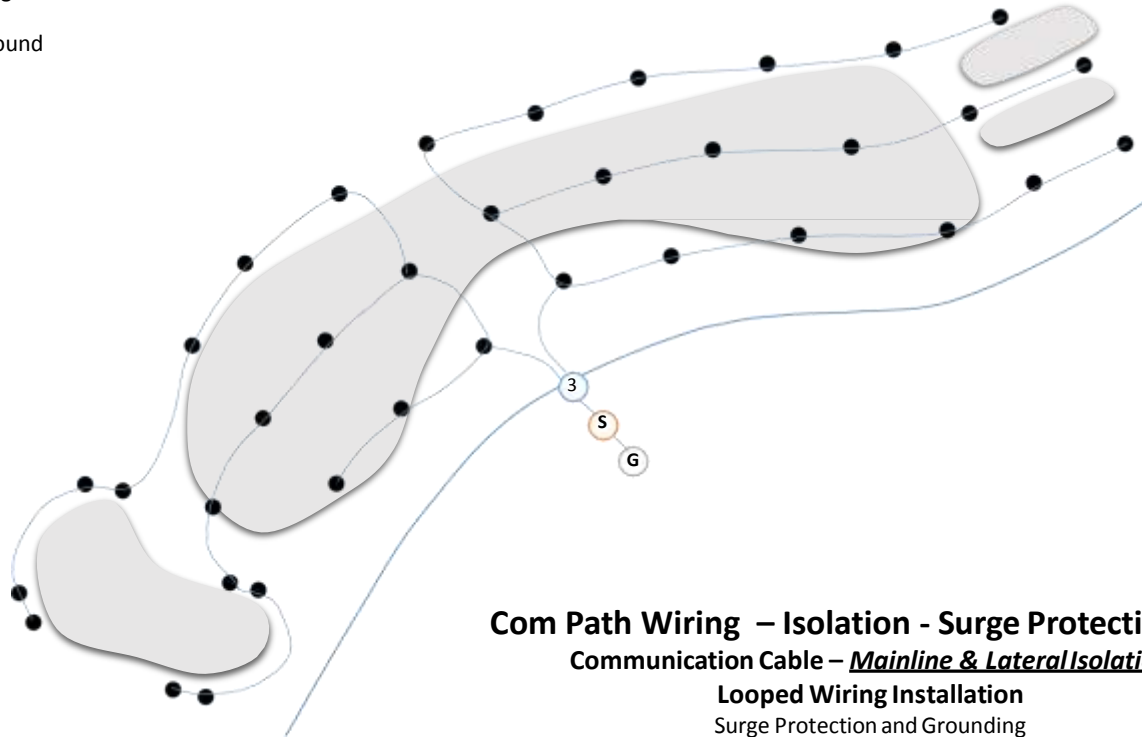
(S) Surge Protector

(G) Ground



2-Wire Cable Run Examples

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



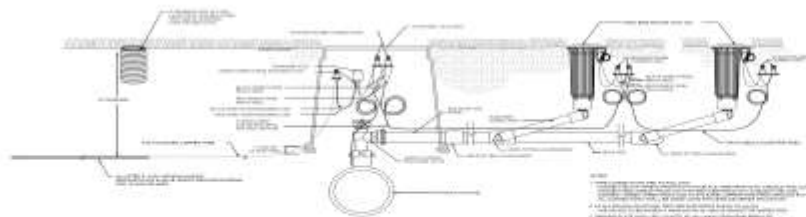
Com Path Wiring – Isolation - Surge Protection

Communication Cable – Mainline & Lateral Isolation

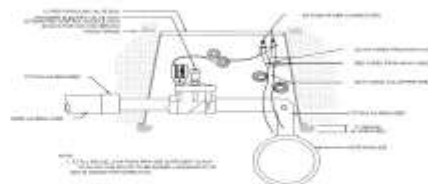
Looped Wiring Installation

Surge Protection and Grounding

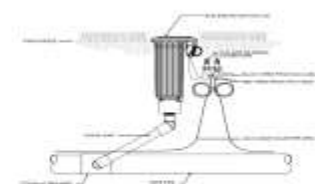
Every 500'/1000' and not to exceed 500' from furthest decoder module



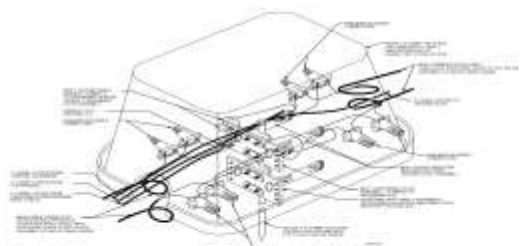
RAIN BIRD VALVE IN HEAD ROTOR WITH ICM AND X-50 SURGE DEVICE
Model 500-1000-001



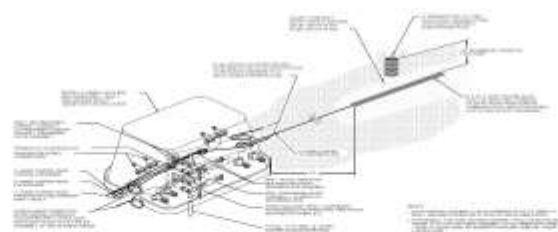
RAIN BIRD ELECTRIC VALVE WITH INTEGRATED CONTROL MODULE (ICM)
Model 500-1000-001



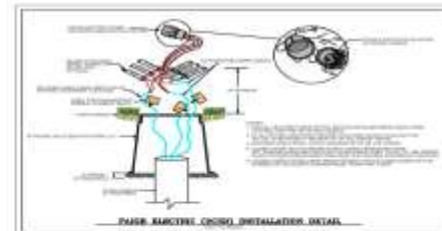
ICM WITH VALVE IN HEAD ROTOR
Model 500-1000-001



CENTRAL GROUNDING ASSEMBLY
Model 500-1000-001



TYPICAL GROUNDING GRID - CENTRAL EQUIPMENT
Model 500-1000-001



PHASE REACTOR GROUNDING SYSTEM DETAIL

Wiring schematic:

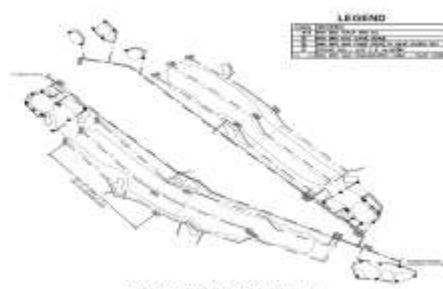


RAIN BIRD INTEGRATED CONTROL MODULE (ICM)
Model 500-1000-001



BOND WIRE FOR IC SYSTEM
Model 500-1000-001

1. THE GROUNDING WIRE SHALL BE 4" DIA. AND SHALL HAVE A 90° CORNER WIRE.
2. THE GROUNDING WIRE SHALL BE Laid IN THE TRENCH AS SHOWN AS POSSIBLE AND SHALL BE EXPOSED ABOVE THE TRENCH AS SHOWN.
3. THE GROUNDING WIRE SHALL BE Laid IN A GROOVE CUT IN THE CONCRETE SURFACE AND SHALL BE COVERED BY A 1/2" THICK CONCRETE SLAB.
4. GROUNDING WIRE OR BONDING WIRE SHALL BE INSTALLED PER AND BOND REQUIREMENTS OF ONE (1) TO TWO (2) INCHES PER FOOT OR 1/4 INCH PER INCH OF LENGTH.



TYPICAL PARKWAY LAYOUT WITH RAIN BIRD ICM - GRID PIPING
Model 500-1000-001

LEGEND	
1. ICM	2. VALVE
3. GROUNDING WIRE	4. GROUNDING ROD
5. GROUNDING PLATE	6. GROUNDING GRID
7. GROUNDING ROD	8. GROUNDING PLATE



Thank you!



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