



Decoder System Troubleshooting

May 12, 2009

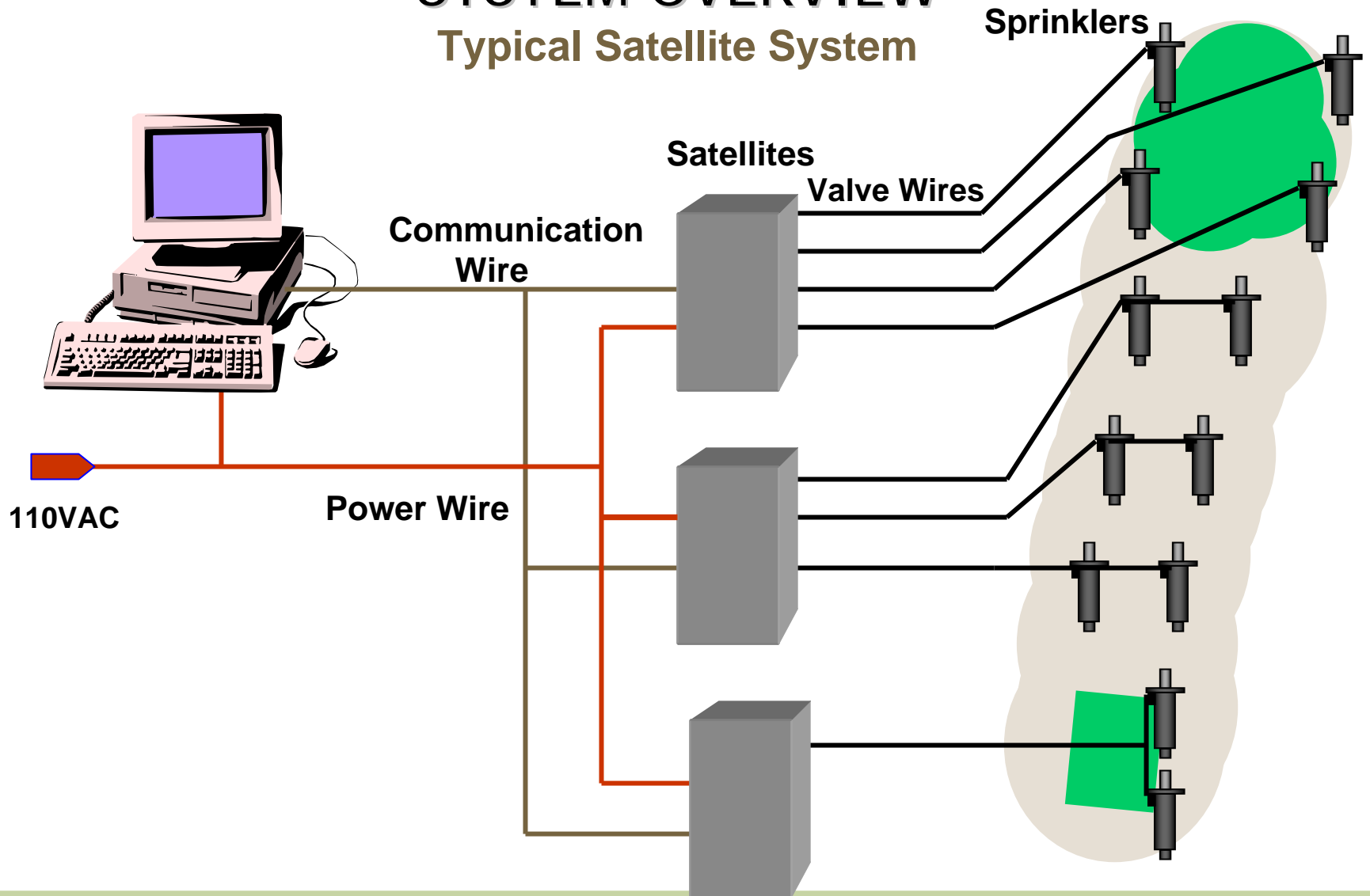
The Intelligent Use of Water.™

Agenda

- **Introductions, Overview, Webinar Suggestions**
- **Decoder vs. Satellite System**
- **Decoder Facts**
- **System Documentation**
- **Central Software Diagnostics**
- **Field Troubleshooting**

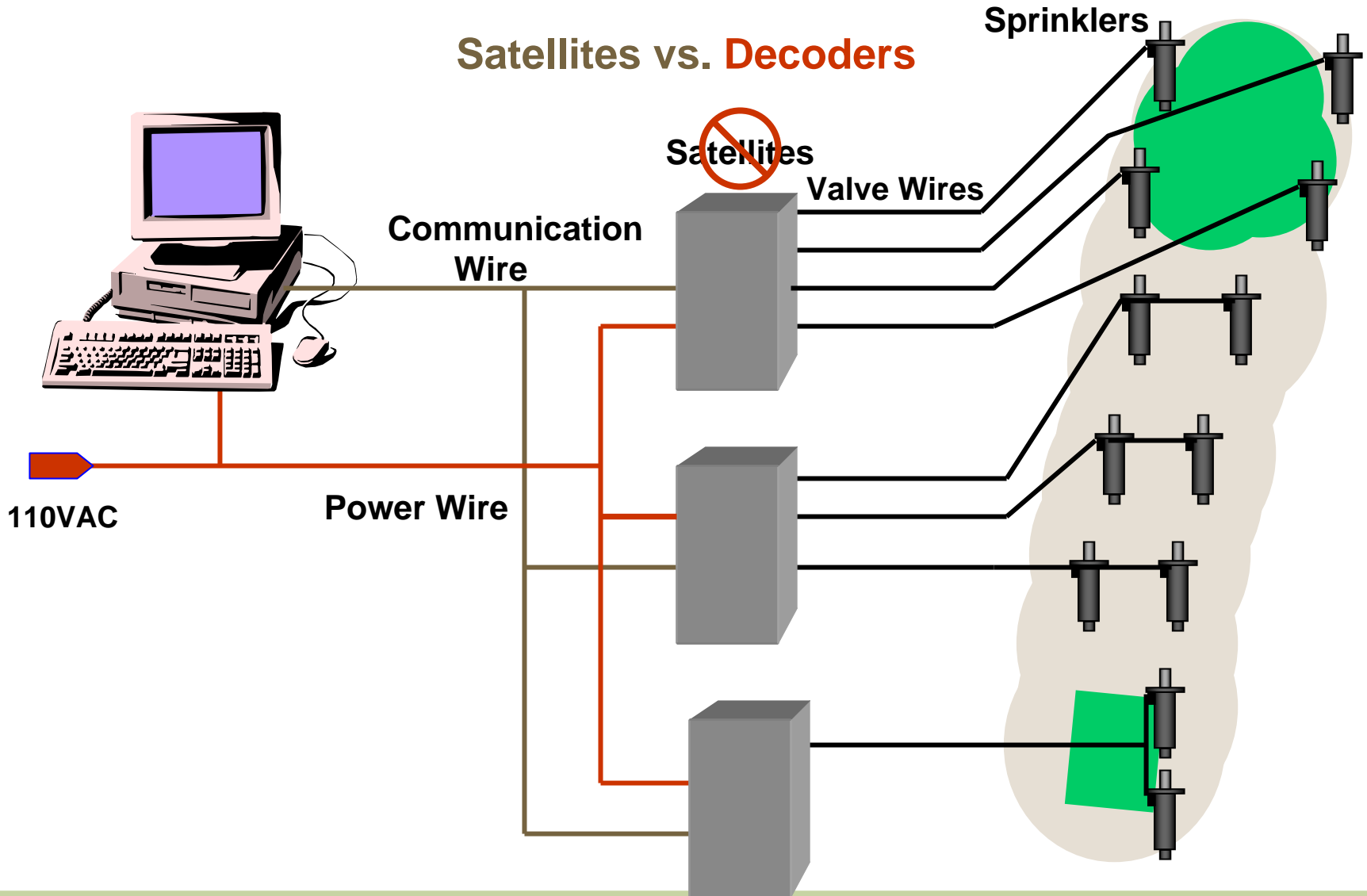
SYSTEM OVERVIEW

Typical Satellite System



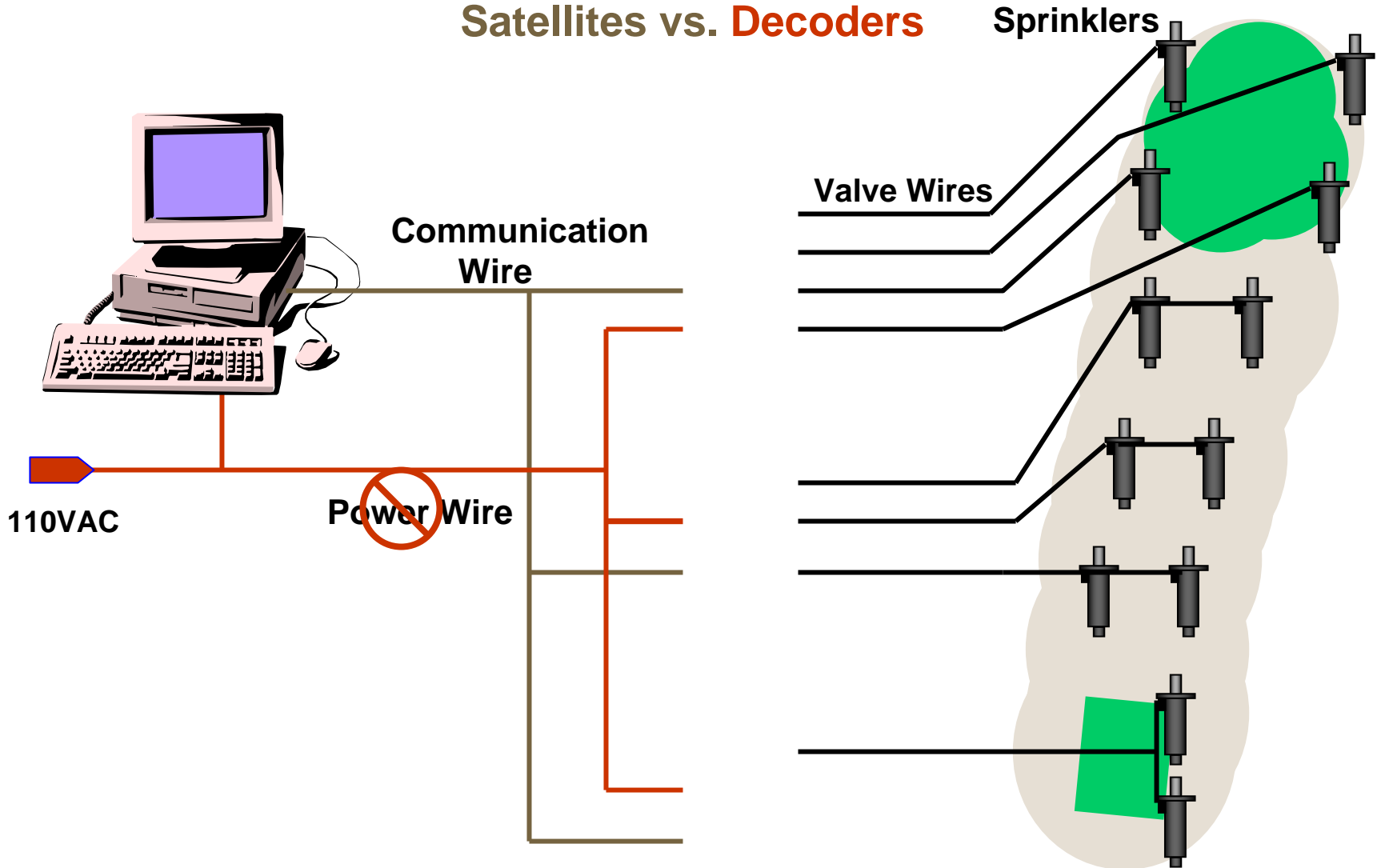
SYSTEM OVERVIEW

Satellites vs. Decoders



SYSTEM OVERVIEW

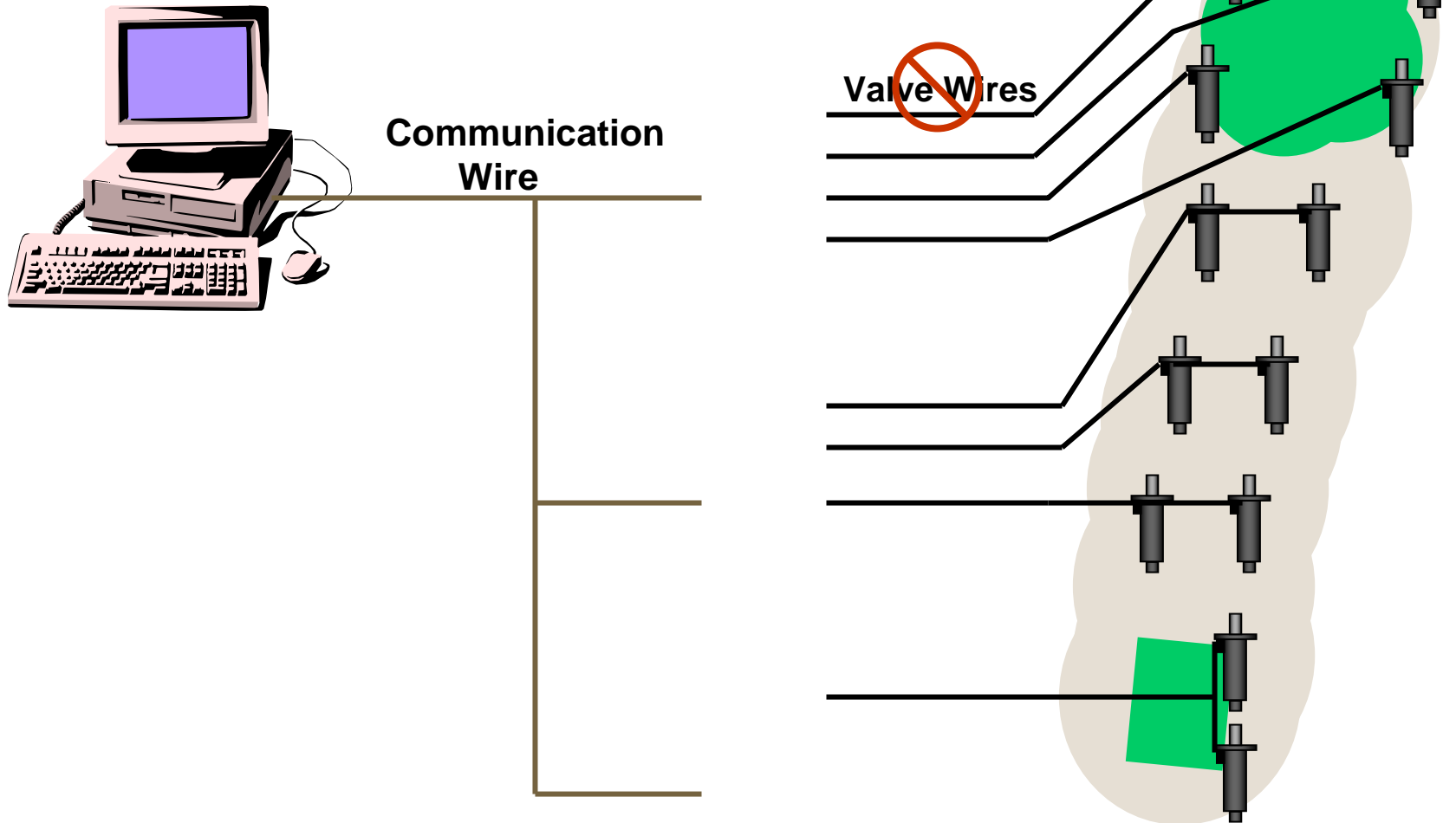
Satellites vs. **Decoders**



SYSTEM OVERVIEW

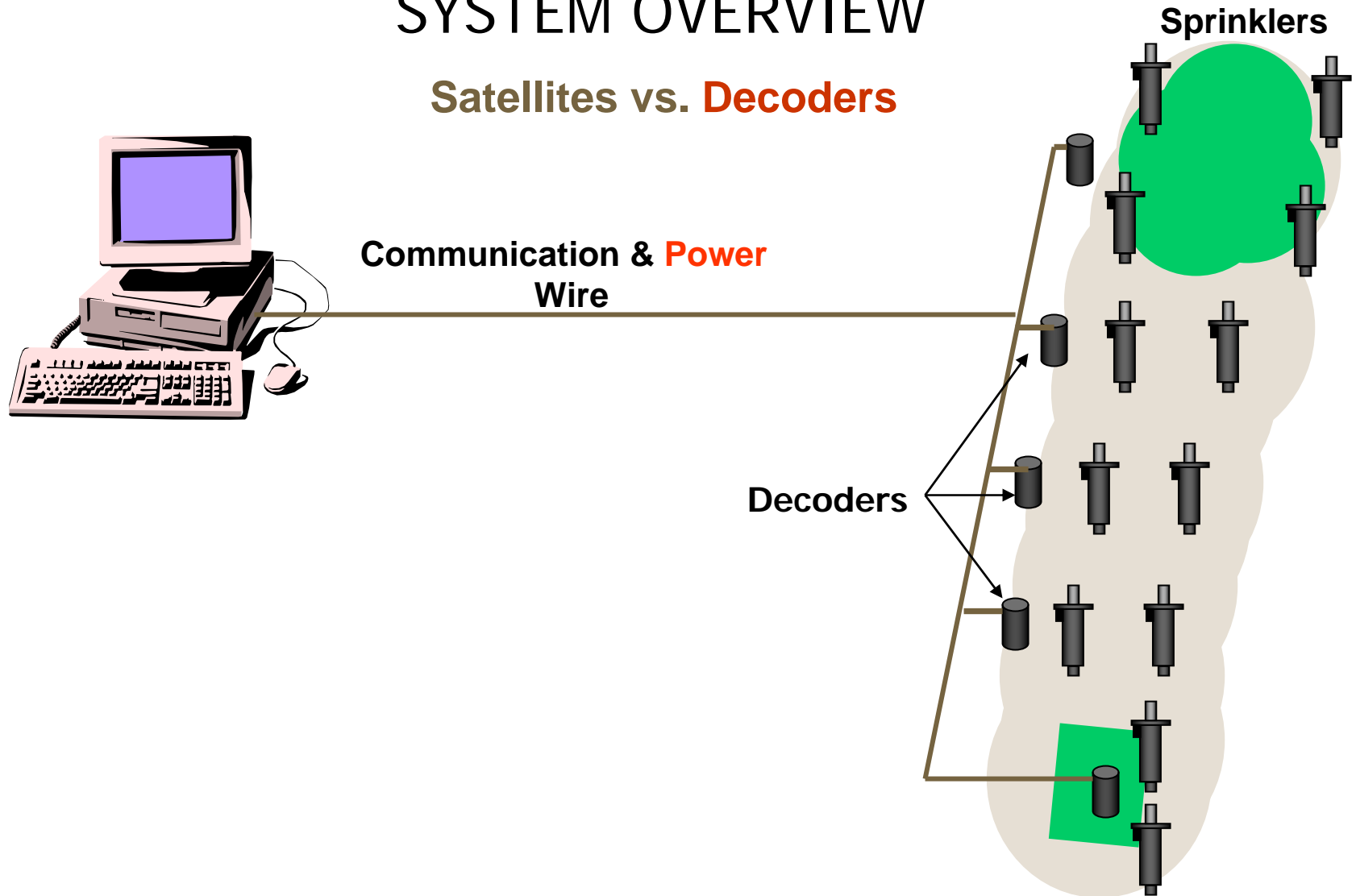
Satellites vs. **Decoders**

Sprinklers



SYSTEM OVERVIEW

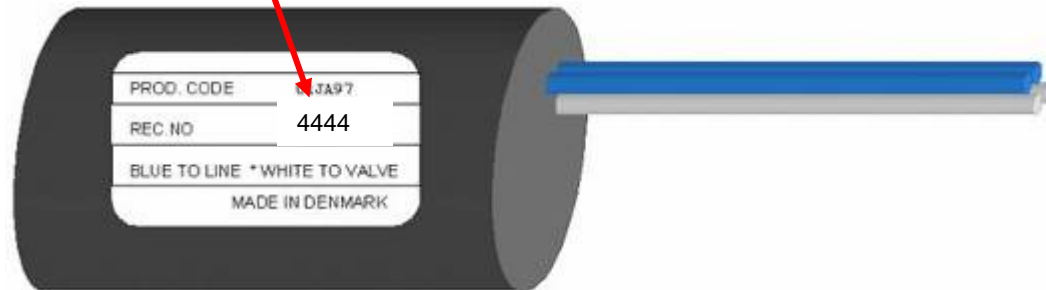
Satellites vs. **Decoders**



SYSTEM OVERVIEW

How Does A Decoder Work ?

- Each decoder has at least one address, which is activated by a unique signal from the computer on a two-wire communication path
- When an address is activated, the decoder applies voltage to the solenoid wired to that decoder address



Station Detail

Station Detail

Golf Areas: All Areas, Greens, Tees, Fairways, Approaches, Perimeters, Rough, Miscellaneous

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▶ 1G1	A	front right	2	35400	3 - FD401	1	1	11	
1G2	A	front left	2	35401	3 - FD401	1	1	11	
1G3	A	back left	2	35402	3 - FD401	1	1	11	
1G4	A	back right	2	35403	3 - FD401	1	1	11	
1T1	A	left front (front tee)	2	38540	3 - FD401	1	1	8	
1T2	A	right front (front tee)	2	38541	3 - FD401	1	1	8	
1T3	A	left back (front tee)	2	38542	3 - FD401	1	1	3	
1T4	A	right back (front tee)	2	38543	3 - FD401	1	1	3	
1T5	A	left front (back tee)	2	44151	2 - FD601	1	1	3	
1T6	A	right front (back tee)	2	44465	2 - FD601	1	1	3	
1T7	A	left back (back tee)	2	44466	2 - FD601	1	1	5	
1T8	A	right back (back tee)	2	44467	2 - FD601	1	1	5	
1T9	A	middle back (back tee)	2	44468	2 - FD601	1	1	5	
1F1	A	left head by green	2	38288	3 - FD401	1	1	11	
1F2	A	middle head by green	2	38289	3 - FD401	1	1	11	
1F3	A	right head by green	2	38290	3 - FD401	1	1	11	
1F4	A		2	39440	1 - FD102	1	1	11	

SYSTEM OVERVIEW

a) Field Decoders

FD-101



One address controls only one solenoid



FD-102



One address controls one or two solenoids simultaneously



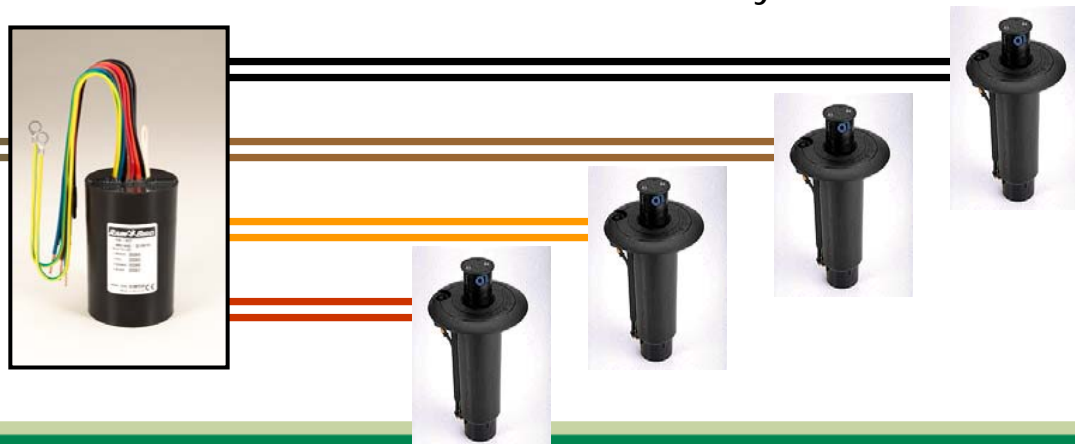
SYSTEM OVERVIEW

a) Field Decoders

FD-202 Two addresses individually control one or two solenoids/address



FD-401 Four addresses individually control one solenoid per address





DECODER SYSTEM FACTS

Field Interface Current Draw:

Maximum Electrical Output

SDI	500 mA
LDI	1100 mA
MDI	1100 mA

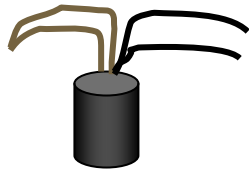
At Rest Draw

2 mA
2 mA
25 mA

(With SUP-210, 13-15 mA without)



Decoder Current Draw At Rest:



FD-101, FD-102

0.5 mA

FD-202, FD-401, FD-601

1.0 mA

Solenoid Current Draw when Active:

"Green" Coil

20 mA

"B" or G3-EZ Coil

25 mA

System Documentation

■ “Good Housekeeping Hints”

Calculate the system’s total milliamp draw

Example:

Blue Wire

- 100 FD-101 x 0.5 mA = 50 mA
- 25 FD-202 x 1.0 mA = 25 mA
- 10 FD-401 x 1.0 mA = 10 mA

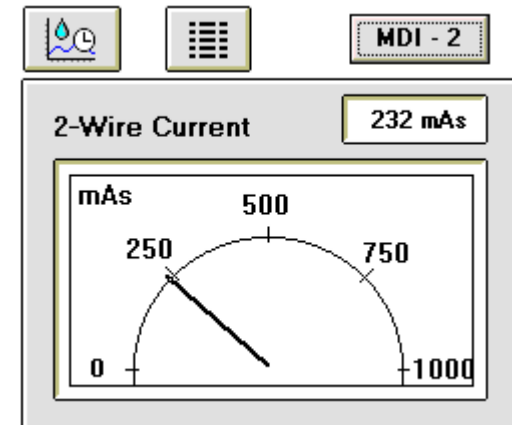
Total Blue Wire Current = 85 mA

Red Wire

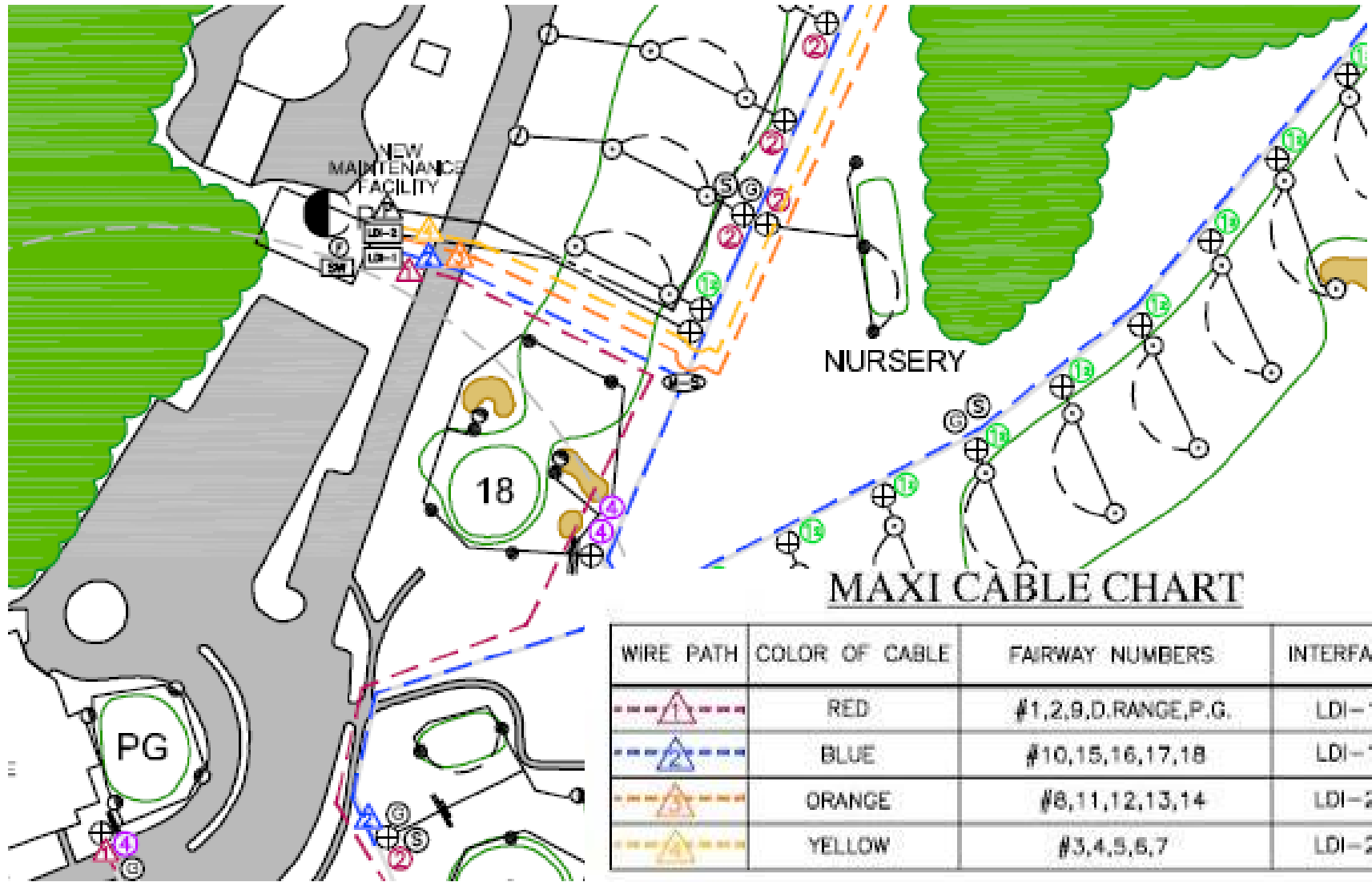
- 80 FD-102 x 0.5 mA = 40 mA
- 20 FD-202 x 1.0 mA = 20 mA
- 15 FD-601 x 1.0 mA = 15 mA

Total Red Wire Current = 75 mA

Total LDI Current = 85 + 75 = 160 mA

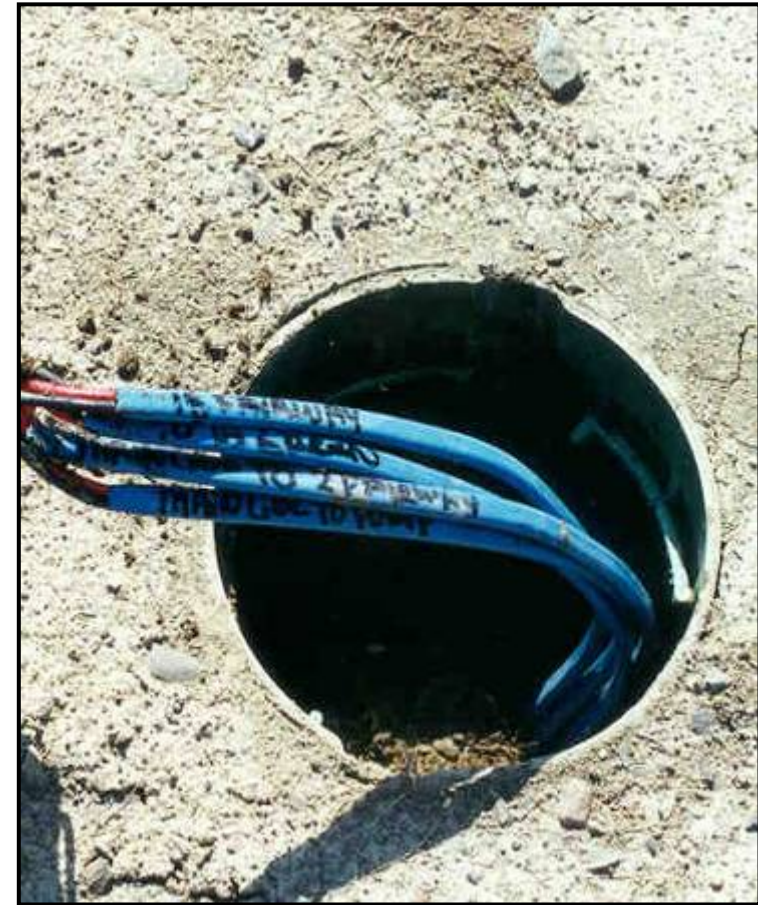
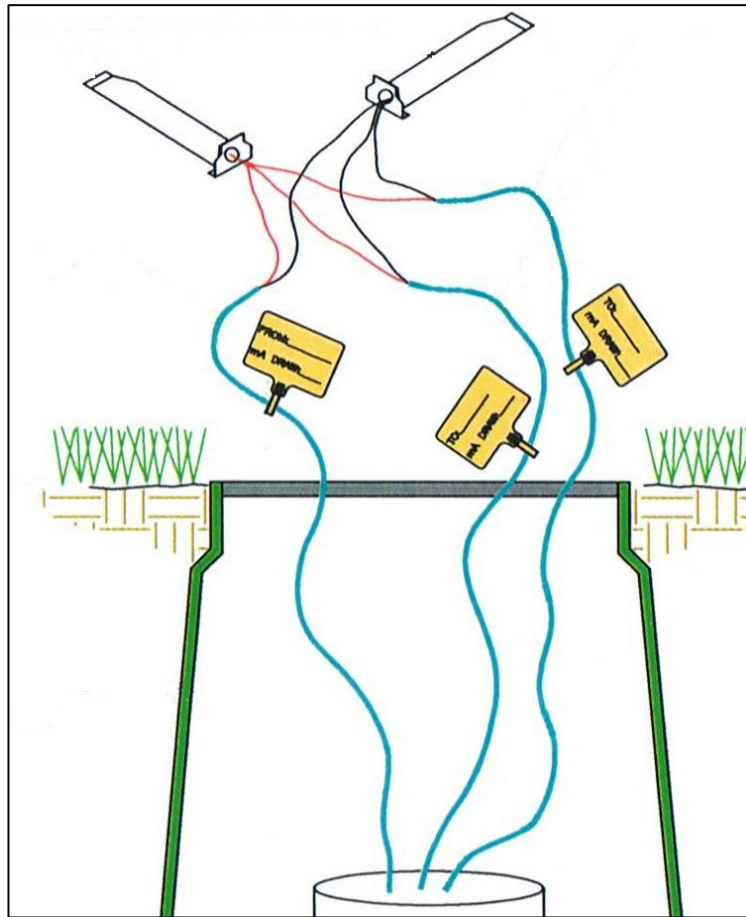
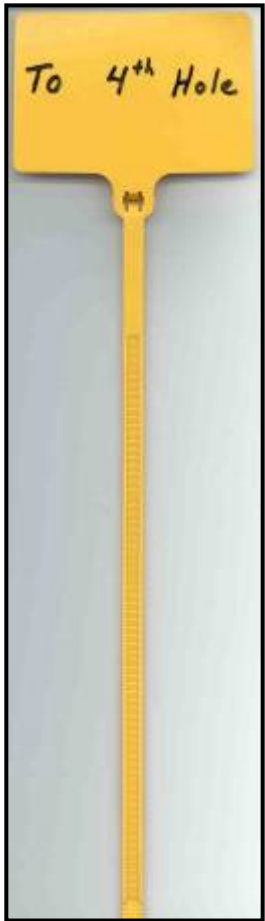


System Documentation



System Documentation

Marking Wire Splices in the field



ALWAYS DO IT!

System Documentation

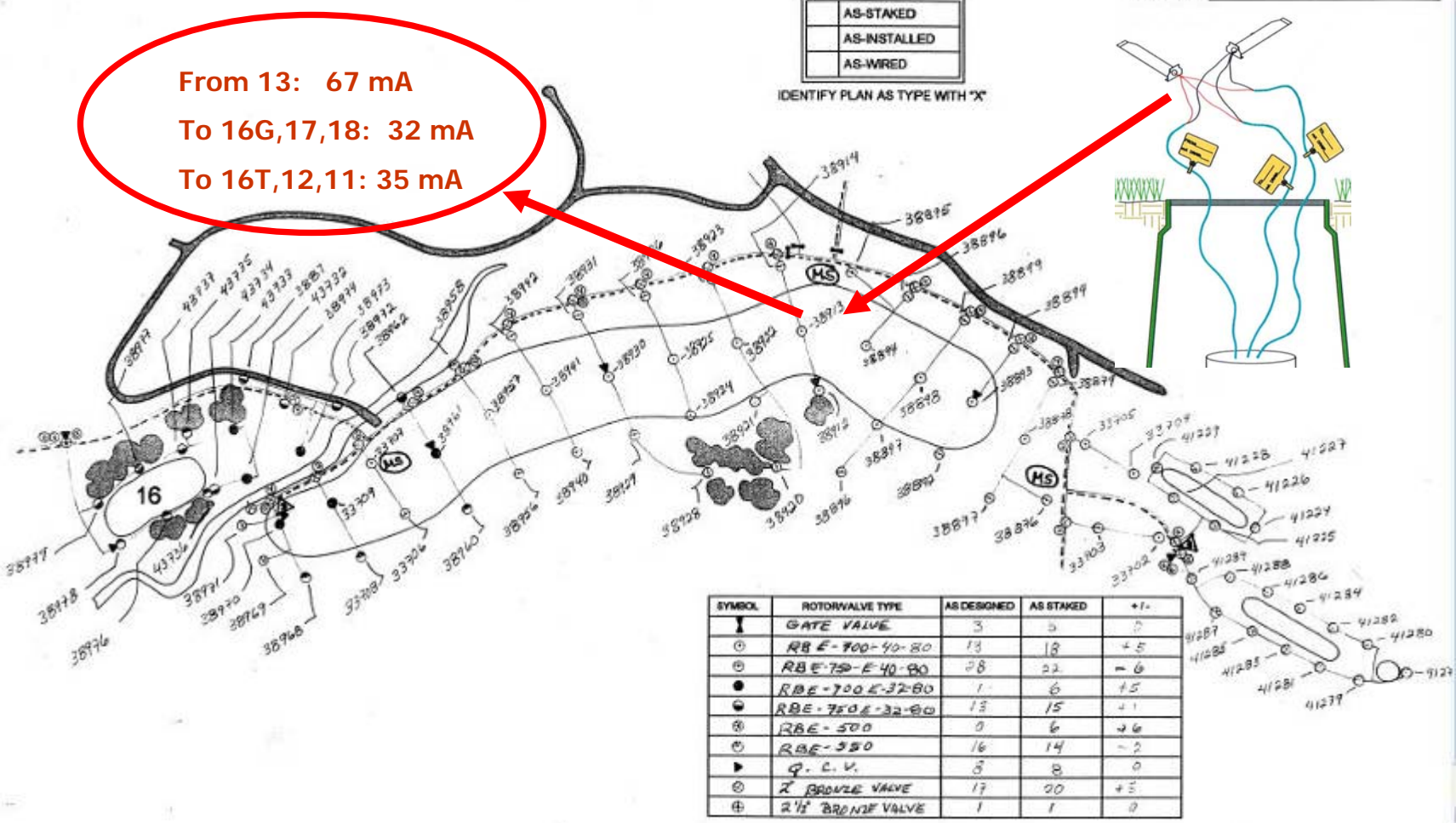
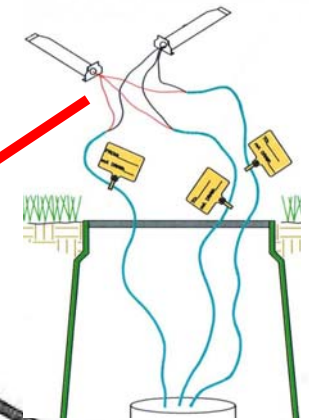
From 13: 67 mA
 To 16G,17,18: 32 mA
 To 16T,12,11: 35 mA

HOLE #16

AS-STAKED
AS-INSTALLED
AS-WIRED

IDENTIFY PLAN AS TYPE WITH 'X'

DATE: _____

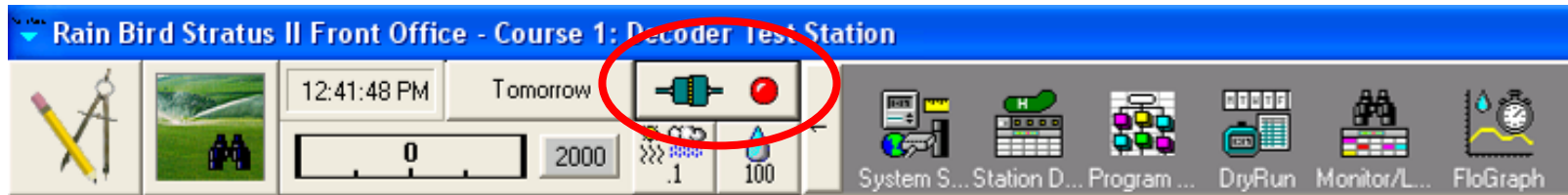


SYMBOL	ROTORVALVE TYPE	AS DESIGNED	AS STAKED	+/-
I	GATE VALVE	3	3	0
⊙	RBE-700-40-80	13	18	+5
⊕	RBE-750-E40-80	28	22	-6
●	RBE-700E-32-80	7	6	+5
⊖	RBE-750E-32-80	13	15	+1
⊗	RBE-500	0	6	+6
⊙	RBE-350	16	14	-2
▶	Q. C. V.	5	0	0
⊙	2 BRONZE VALVE	17	20	+3
⊕	2 1/2 BRONZE VALVE	1	1	0

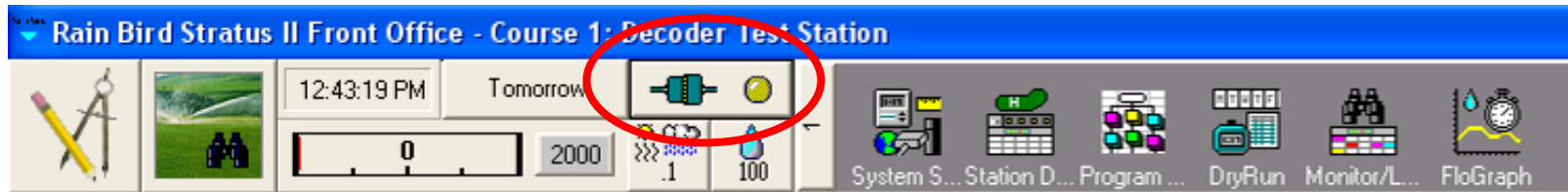
AGREED UPON: DATE: _____ CONTRACTOR REPRESENTATIVE: _____ GOLF COURSE REPRESENTATIVE: _____ OTHER: _____

+10

Central Software Diagnostics



- Check System Status – Red, connectors together good communication between PC and interface



- Check System Status – Flashing Blue to Yellow, no communication between PC and interface



- Check Power LED. If on, check com ports
- If off, test for 24 Volts AC at these points
- If no voltage, usually bad transformer

Central Software Diagnostics

Rain Bird Stratus II Front Office - Course 1: Decoder Test Station

12:46:08 PM Tomorrow

0 2000 .1 100

Print Office Password FloManager Sensors Messenger

Decoder Diagnostics

Decoder Diagnostics

On / Off Simple Solenoids Cables Thorough 60 Hz Terminate

Course 1	1	3	5	7	9	11	13	15	17	19
Tee-Box										
V1										
V2										
V3										
V4										
V5										
V6										
Rough										

2-Wire Current 115 mAs

Decoder Diagnostics

On / Off Simple Solenoids Cables Thorough 60 Hz Terminate

Course 1	1	3	5	7	9	11	13	15	17	19
Fairway										
V1	P									
V2	P									
V3	P									
V4	F									
V5	F									
V6	F									
Approach										

2-Wire Current 115 mAs

Running the On / Off Test.

Central Software Diagnostics

Course 1	1	3	5	7	9	11	13	15	17	19	
Fairway	==	==	==	==	==	==	==	==	==	==	
V1	P										
V2	P										
V3	P										
V4	F										
V5	F										
V6	F										
Approach	==	==	==	==	==	==	==	==	==	==	

■ 6 things to check for a “failed” decoder

1. Double check address
2. Missed splices – especially on new system
3. Poorly made splices – double check Maxi cable splice at decoder and also decoder output to solenoid splice
4. If there is secondary wire between decoder output and solenoid, check with meter for continuity and resistance – good solenoid should be 29 – 32 ohms
5. Solenoid may be “open” – decoder is actually good but will show fail
6. Decoder itself may simply not be functioning

Field Troubleshooting

Required Tools

- Volt – Ohm meter
- Clamp meter capable of reading down to 1/10th of a milliamp
- KING Safety Stripper
- 10 – 22 AWG Wire Stripper
- Pliers
- Indelible marker and tags
- Rain Bird DB or DBY and DBR splice kits



Field Troubleshooting

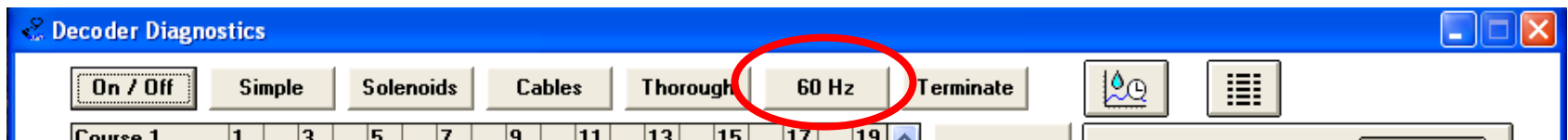
1. Break in the 2-Wire Path

Indicated in two ways from the central:

- A) Current draw is less than what it should be
- B) Nothing functions beyond a certain point on the two wire path during normal irrigation and during diagnostics

Can be found with a clamp meter but it is as simple as knowing the last place decoders work and the first place they do not on the 2-wire path

Check the splices first and then the wire



With SDI/LDI set to 60 Hz, should read 36–37 V on the wire with a volt meter

Field Troubleshooting

2. Short Circuits

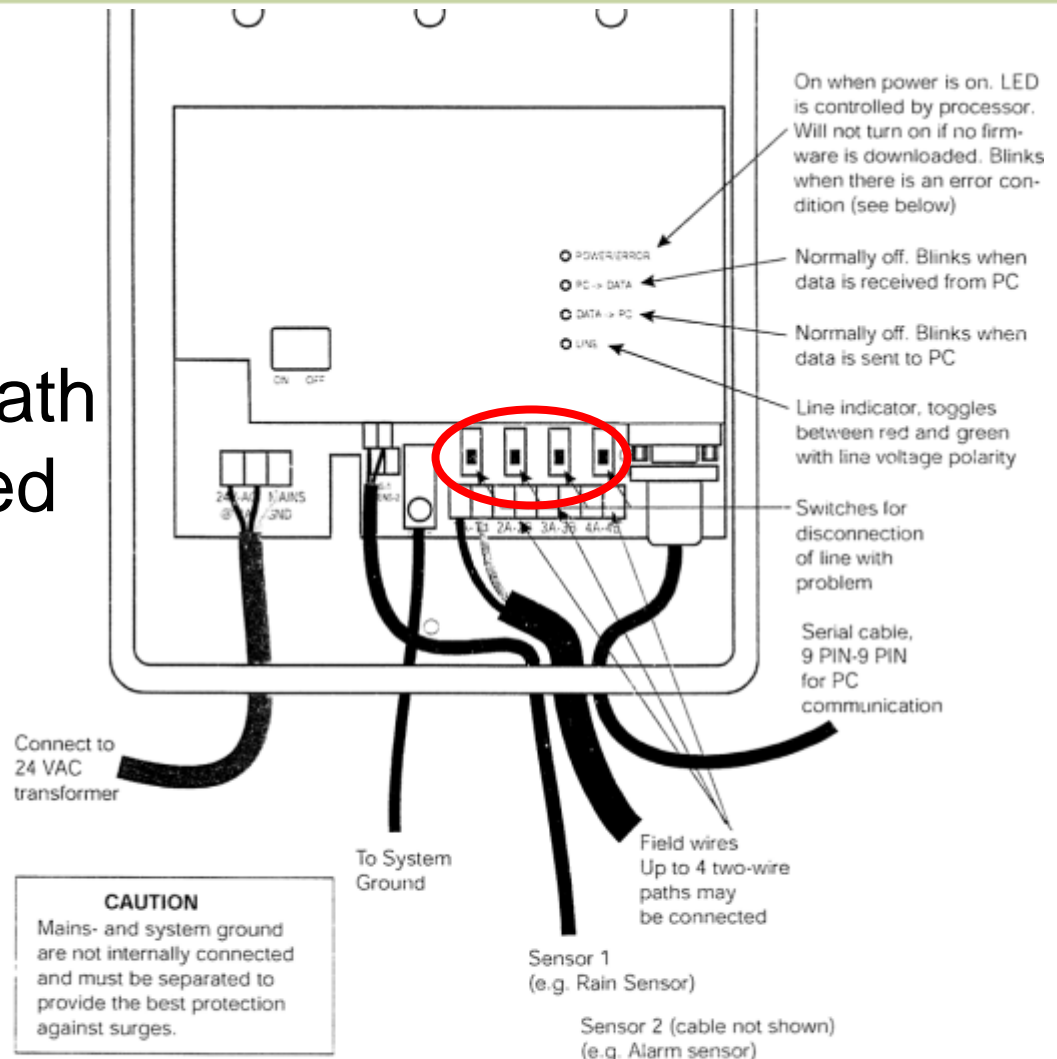
- A) Can be caused by a damaged decoder or
- B) Current between the red and black on the 2-wire path

Shorts may result in intermittent problems, parts or all of the system not working

If it is severe enough, the MDI/SDI/LDI will shut down field activity. The “field” LED on the MDI will turn off. The Power LED on the SDI/LDI will blink & the “Line” LED will be ***on*** indicating voltage below 25V.

The SDI, LDI, and MDI with firmware Version 2.18 have a current limiting feature which allows the system to be tested while in 60 Hz mode even in a shorted situation.

- Turn off wire paths one at a time until path with short is identified



During power up the LED $\dot{\bar{e}}$ will blink in sequence ending with POWER LED on for 5 seconds. During those 5 seconds the Flash boot program may be activated for download of new firmware (see special instruction).

If the POWER LED blinks it means that an error is detected by the unit. The reason for the error is indicated by the other LED $\dot{\bar{e}}$:
 -If 'DATA->PC' is on it means that line voltage has been switched off because connection to the PC is lost.
 -If 'LINE' is on it means that line voltage is below 25 V (short).

Field Troubleshooting

- Confirm excess draw with clamp meter



Field Troubleshooting

Check MSP-1 first for the short condition



"Upstream"



"Downstream"

Clamp Meters Always Read "Downstream" - Away From Central 

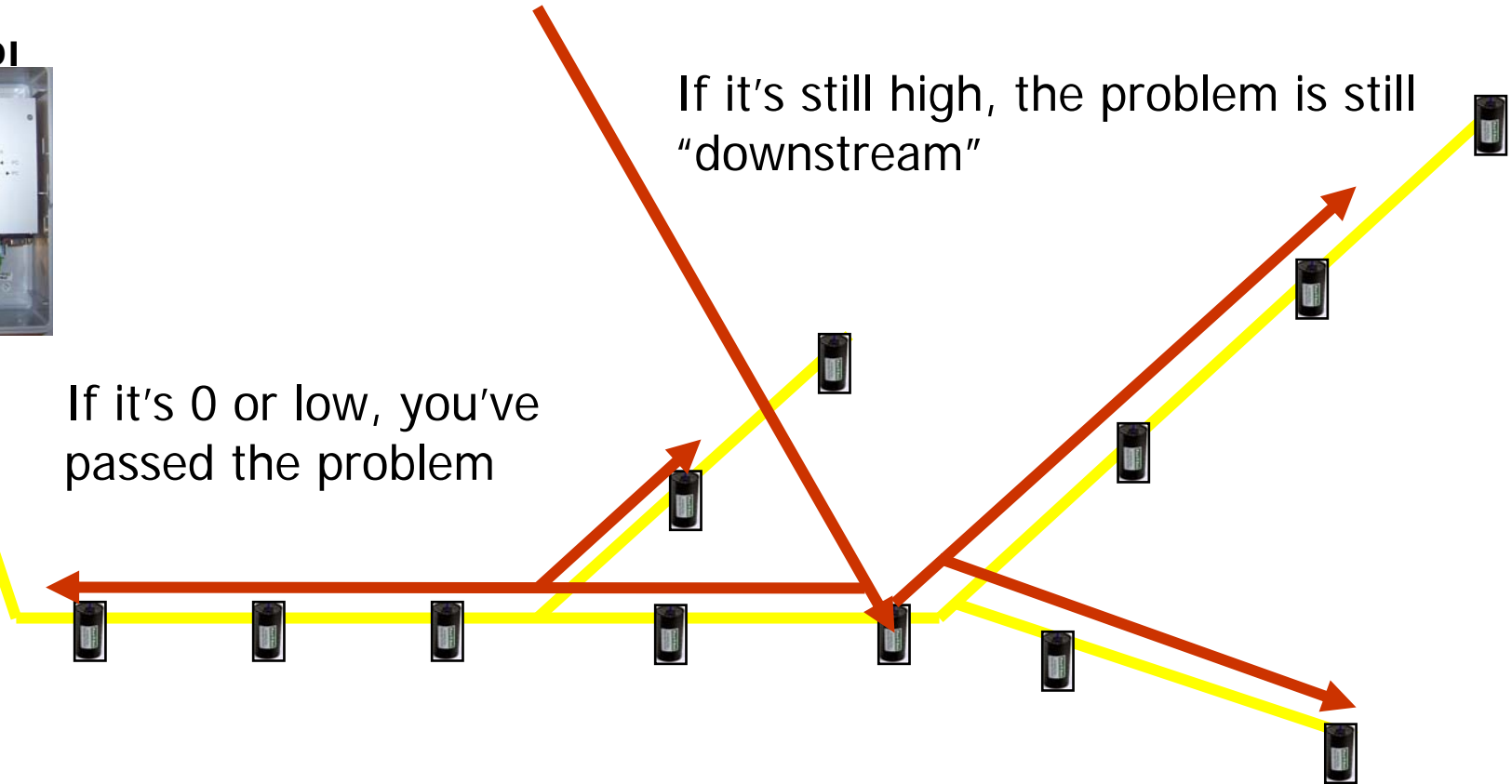
Field Troubleshooting

Choose a point halfway out the wire path to take a reading – clamp on only one conductor, red or black



If it's still high, the problem is still "downstream"

If it's 0 or low, you've passed the problem



Always remember – clamp meter reads downstream –
Away from the Central

Field Troubleshooting



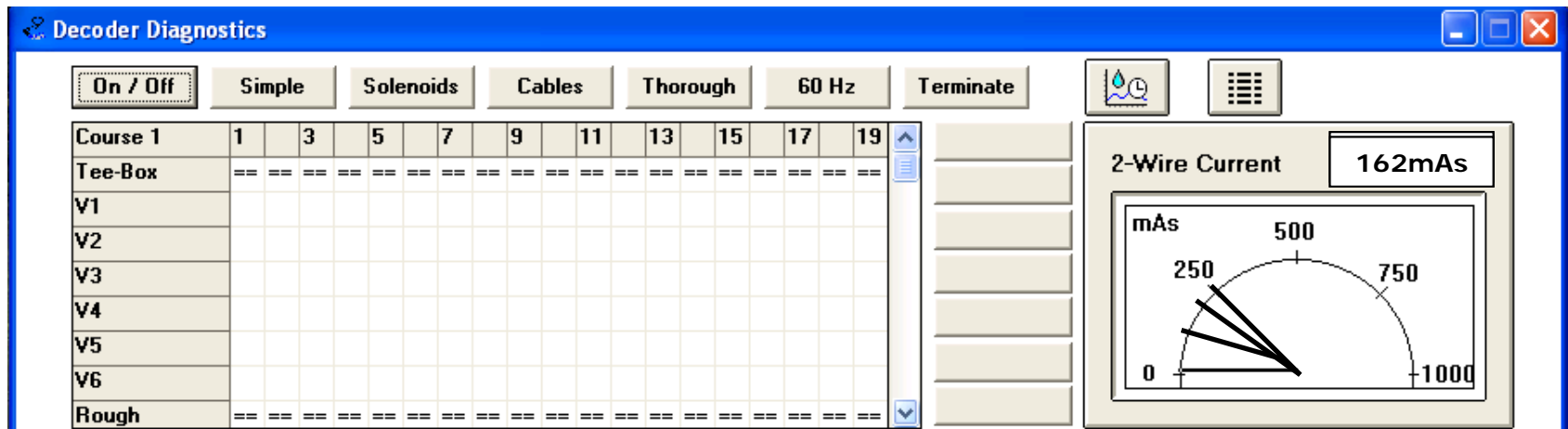
Confirming the decoder is shorted by clamping around a blue decoder wire

Field Troubleshooting

3. Earth Ground Voltage Fault

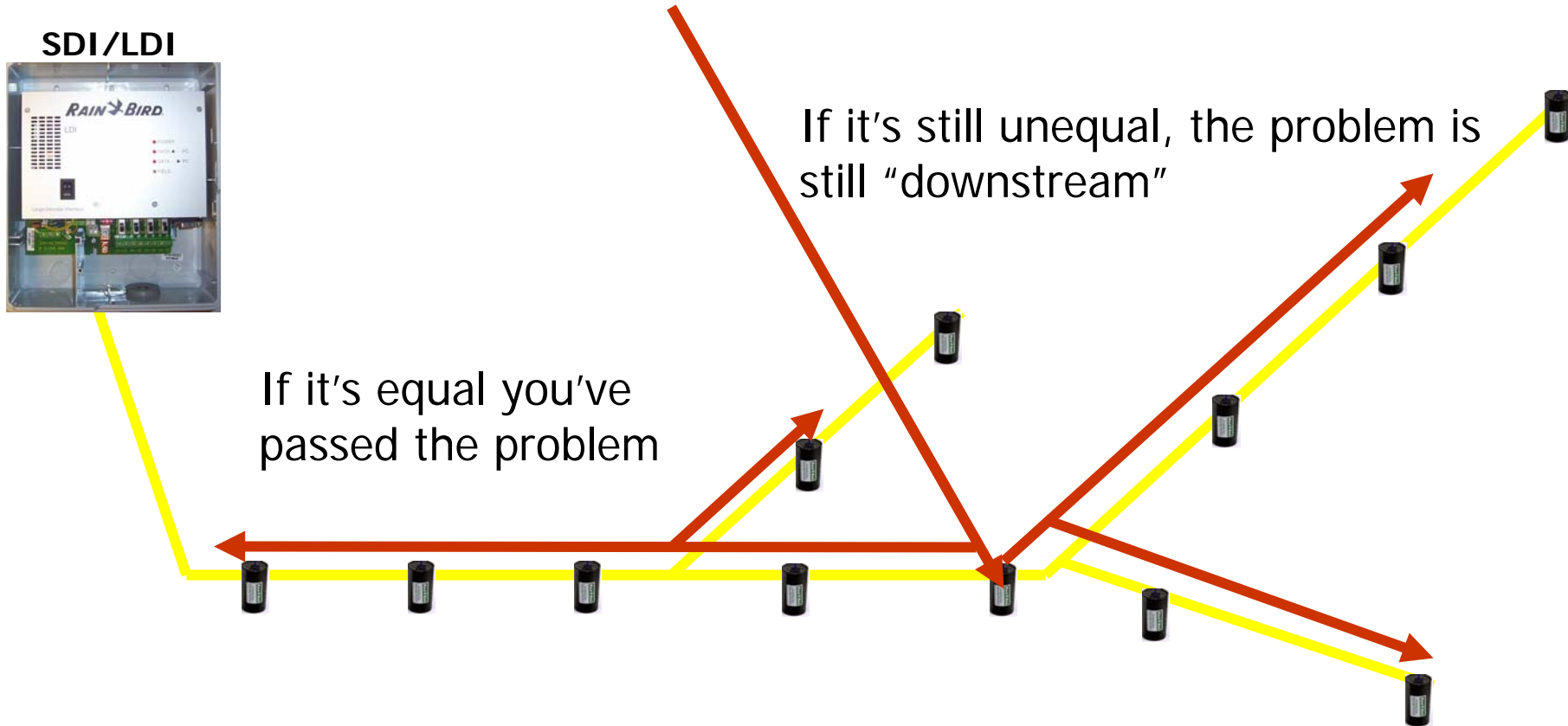
Symptoms:

- A) "Flicker" in the Field light of the SDI/LDI/MDI when no irrigation is occurring instead of the clean alternation between red and green
- B) Fluctuation in the 2-wire current draw window in decoder diagnostics
- C) Inaccurate logging



Field Troubleshooting

Choose a point that is halfway out the path to take a reading – compare the draw between red to the black



Strong Suggestions

ALL splices must be placed in a valve box for access to the wire when troubleshooting



This took several hours to find

Strong Suggestions

1. It is *critical* to protect the integrity of the wire insulation during all phases of the installation and maintenance
2. A cut in the wire insulation will eventually lead to a broken wire
3. If there is a break, there will be no control beyond that point. If there is a nick, current through the wire will “leak to ground”, which will cause erratic system operation such as logging errors or overdraw situations.

Strong Suggestions



DO NOT USE

**pocket knives, utility knives
or Romex strippers**

Strong Suggestions

Use of King Safety Stripper



Leave enough wire (~6")



Gently pull



Clip off outer jacket

Service Tools Available from GSP

- Ask your distributor for Part Numbers:
- Decoder clamp meter – P/N GSP 700405
- Zip Tie Marking Tags – P/N GSP 700402
- King Safety Stripper – P/N GSP 700404

24 Hour Replacement Decoder Service

FD-101: P/N GSP 700302

FD-102: P/N GSP 700303

FD-202: P/N GSP 700304

FD-401: P/N GSP 700305

FD-601: P/N GSP 700306

SD-210 Sensor Decoder P/N GSP 700307