What the Signal Team Does

The Goal of the Signal Team is to Wire the Signals, Test, and make them work.
Signal Team

1. Background
2. Read As Built Notes
3. Intermediate Signals
4. Install Enclosures
5. Signals & Push Buttons
6. Wyes
7. Sidings
8. Mainline Meet Tracks
9. Queuing Tracks
10. Witcombe
11. System Testing
12. Troubleshooting
1. Background - Four Signal Configurations

- There are 4 Signal configurations on Bi-Directional Track

- **Control Point or CP Boards** in 3 programming flavors
  - 1. **Entry to Bi-Directional Track** -- Queuing Tracks
    - Limits group(s) of train(s) to 140’ in length
  - 2. **ReEntry** -- Wyes & Sidings
    - Requires a button to be pushed to tell the system when the train is ready to leave.
  - 3. **Meet** -- Mainline Meet Tracks

- **Absolute Block Signaling or ABS Boards** (hold the LEDs in Signal Head)
  - 4. **Intermediate Signals**
    - Pairs facing opposite directions placed approximately every 600’ along the track

- ABS boards have 3 configurations
  - Master - used in one of the pair of intermediate signals
  - Slave - wired to the master, used in the other intermediate signal
  - Passive - wired to CP Board for its signal heads
1. Background - Wiring Conventions

- **Cat3 or Cat 5e Wire**
  - B = Blue
  - G = Green
  - Y = Yellow
  - O = Orange
  - R = Red
  - N = brown
  - K = black
  - W = White
  - Purple = Purple
  - Pink = Pink
  - Gray = Gray

- **Cat5 Cable**
  - Blue = Signals
  - Black = Push Buttons & 2nd Signals
  - Other Color = Track

- **Wire from Solar Panel & Battery**
  - Black = Negative
  - Red = Positive

- **Track Wiring 18 Gauge Stranded Wire**
  - 18 GA from track box to the Track
  - 18 GA Wire Nutted to a Cat5 in Signal Heads or in 2x4 Connection Boxes
  - 18 GA Crimp ring for Screw to Track
  - Use Non Fade Colors Outside:
    - R = Red, G = Green, B = Blue
1. Background - Track Polarity

- As you stand looking at a signal, the right hand rail leading away from the signal is positive.

- Coded track circuit interface sends positive polarity pulses, receives negative polarity pulses (because the polarity is different at other end)

- Think of the two rails as a loop. The current always flows counter-clockwise, no matter which end is transmitting.

- When the left side is transmitting, the bottom rail is positive and top rail is negative. The right ABS detects current flowing upward only using a diode.

- When right side is transmitting, the top rail is positive and the bottom rail is negative. The left ABS detects current flowing downward only.

- The reason for opposite polarity is so that an ABS won’t detect its own outgoing pulse.
1. Background - Signal Names - Farmersville to ByPass

Farmersville Queuing Track

Witcombe Wye

Witcombe Siding

Witcombe Nainline Meet

Schubert Wye

ByPass Queuing Track

Not to be built
2. Read As Built Notes

• Read the As Built Notes to understand where the conduit goes and any unusual things. As built notes available in the Track shop and on the internet at www.FriendsTM.org
3. Intermediate Signals

![Diagram of intermediate signals with connections and labels for ABS Slave, ABS Master, Solar Panel, Blue Cat5, 18 Gauge Wire, IJS, IJN, South, North, and Note Polarity!]

Note Polarity!
3. Intermediate Signals - Testing

• How do we test Intermediate Signals?
• 3.5 Volts between Screws
4. Install Enclosures

• Install Solar Panel
  – Post can Serve as conduit for Wire to Solar Panel
  – If Remote Solar Panel, Run 18 gauge wire to the Enclosure.

• Install CP Board
  – CP Board mounts with 1 screw
  – 2 small nails keep it from twisting
  – Newer boards allow 2 screws

• Battery Rests in Bottom of Box
5. Signals & Push Buttons

**ABS Passive**

- J3
- VBatt
- G
- R
- Y
- Gnd
- Blue
- Cat5
- White/Green  W/G
- Green  G
- Brown  N
- White/Brown  W/N
- nc

**Push Button**

- Blue - Ground Wire
- White/Blue - Push Button
- Black
- Cat5
6. Wyes - Pulled Wire & Conduit

**Cat 5 Pulls**
- Enclosure to S Signal - Blue & Other
- S Signal to S Push Button - Black
- S Signal to South End Track Box - Other
- Enclosure to N Signal - Blue & Other
- N Signal to N Push Button - Black
- N Signal to North End Track Box - Other

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6. Wyes - Bonding & Track Connections
6. Wyes - Cabling Diagram
6. Wyes - Connect CP Board

Is This Wired Right??
6. Wyes - Testing
7. Sidings - Pulled Wire

Cat 5 Pulls
- Enclosure to S Signal - Blue & Other
- S Signal to S Push Button - Black
- S Signal to South End Track Box - Other
- Enclosure to Signal - Blue & Other
- N Signal to N Push Button - Black
- N Signal to North End Track Box - Other

Blue Cat5 Wire
Black Cat5 Wire
Other color Cat5 (usually Yellow, White, or Grey)

South End North End

Push Button
2x4 Connection Box
Type T Box
Type LB Boxes to let wires out between the Rails
7. Sidings - Bonding & Track Connections
7. Sidings - Cabling Diagram
7. Sidings - Connect CP Board

Is This Wired Right??

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7. Sidings - Testing
8. Mainline Meet Track - Pulled Wire

Cat5 Pulls
• Enclosure to Signal 1 - Other
• Enclosure to Signal 2 - Blue
• Enclosure to Signal 3 - Other
• Enclosure to Signal 4 - Blue

South End

North End

Blue Cat5 Wire
Black Cat5 Wire
Other color Cat5 (usually Yellow, White, or Grey)
8. Mainline Meet Track - Bonding & Track Connections
8. Mainline Meet Track - Cabling Diagram

SB Signal 2

Vbatt + W/G
G G
R N
Y W/N
nc W/B

Rail Gnd B 18AWG
T SwS R 18AWG
T SB G 18AWG

Blue Cat5

CP Board Enclosure

SB Signal 4

W/G Vbatt +
G G
N R
W/N Y
W/B nc
B nc

W/O R 18AWG IJN +
O G 18AWG IJN -

NB Signal 1

Vbatt + W/G
G G
R N
Y W/N
nc W/B
nc B

IJS + R 18AWG
IJS - G 18AWG

Other Color Cat5

NB Signal 3

W/G Vbatt +
G G
N R
W/N Y
W/B nc
B nc

B 18AWG Rail Gnd
R 18AWG T SwN
G 18AWG T NB

Other Color Cat5

N Conduit

S Conduit
8. MMT - Connect CP Board

Is This Wired Right??

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8. Mainline Meet Track - Testing
9. Queuing Track - Pulled Wire

Cat5 Pulls
- Enclosure to Signal 2 - Black
- Enclosure to N Track Box - Other
- Enclosure to S Signal 1 - Blue & Other
- 6” Loops of wire in 2 Track Connection Boxes

Blue Cat5 Wire
Black Cat5 Wire
Other color Cat5
(usually Yellow, White, or Grey)

= 2x4 Connection Box
= Type T Box
= Type C or LB Box to let wires out between the Rails
9. Queuing Track - Bonding & Track Connections
9. Queuing Track - Cabling Diagram
9. Queuing Track - Connect CP Board

Is This Wired Right??

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9. Queuing Track - Testing
10. Witcombe - Pulled Wire

Cat5 Pulls
- Enclosure to Signal 1 - Blue & Other
- Signal 1 to Push Button - Black
- Signal 1 to South Track Box - Other
- Enclosure to Signal 2 - Blue & Other
- Signal 2 to Push Button - Black
- Signal 2 to North Track Box - Other
- Enclosure to Signal 3 - Blue & Other
- Signal 3 to Push Button - Black
- Signal 3 to South Track Box - Other
- Enclosure to Signal 4 - Blue & Other
- Signal 4 to Push Button - Black
- Signal 4 to North Track Box - Other

- 2x4 Connection Box
- Push Button
- Tees
- SW Conduit
- NW Conduit
- SS Conduit
- NS Conduit
- Storage Track

Note: The Track Team pulls all the wire that goes through an Expansion Joint. The Signal Team pulls the rest which includes all the 18 AWG except wires going from a Remote Solar Panel to the CP Board Enclosure.
10. Witcombe - Bonding & Track Connections

|| = Insulated Joint

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19. Witcombe - Connect CP Board

Is this right ?? Where does Switch Pos Sensor go ??

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10. Witcombe - Testing