Prototype Signaling Made Easy
(sort of) With
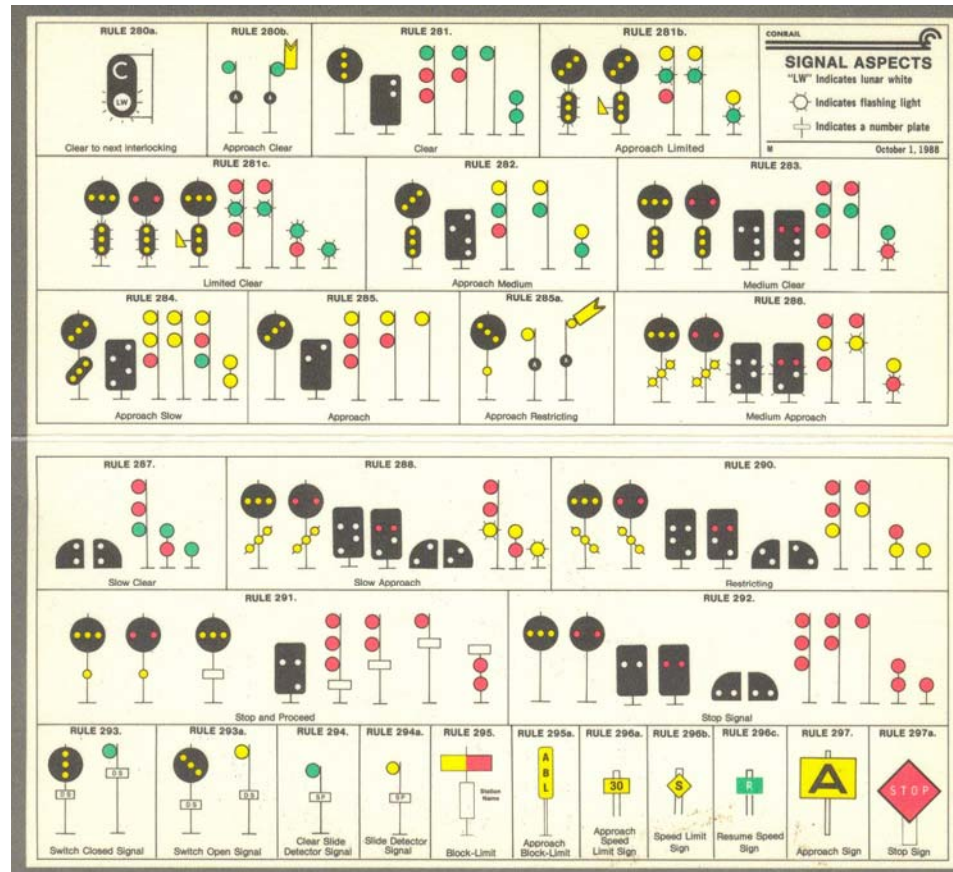## CTI Electronics© and a Computer

By Scott Russell

May 21, 2016

Prototype Signaling

- Where do I get the information?
- How prototypical do I have to be?
- How do I know what aspect for a situation?
- Do I have to use a particular type/brand signal?
- Do I have to use a particular type/brand sensor?
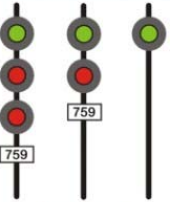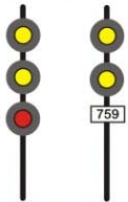- Are there questions Scott hasn't thought of?
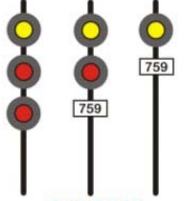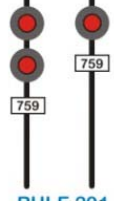
Your Prototype and Era

- Research on the Internet – Good Start: www.railroadsignals.us

- Magazines and books – 12/15 through 5/16 RMC (so far)

- NORAC Railroads - Northeast Operating Rules Advisory Committee

    - Formed in 1985 of 5 Northeast railroads; Rules adopted 1/1/87

- CROR - Canadian Railway Operating Rules

- CORA – Chicago Operating Rules Association

- GCOR – General Code of Operating Rules (Western Roads)

Examples
Conrail

Examples
D&H

SIGNAL ASPECTS
of the
DELAWARE and HUDSON RR

RULE 281 - Clear
Proceed not exceeding Normal Speed.

RULE 282 - Approach Medium
Proceed approaching the next signal at Medium Speed.

RULE 282a - Advance Approach
Proceed prepared to stop at the second signal. Trains exceeding Limited Speed must begin reduction to Limited Speed as soon as engine passes the Advance Approach signal.
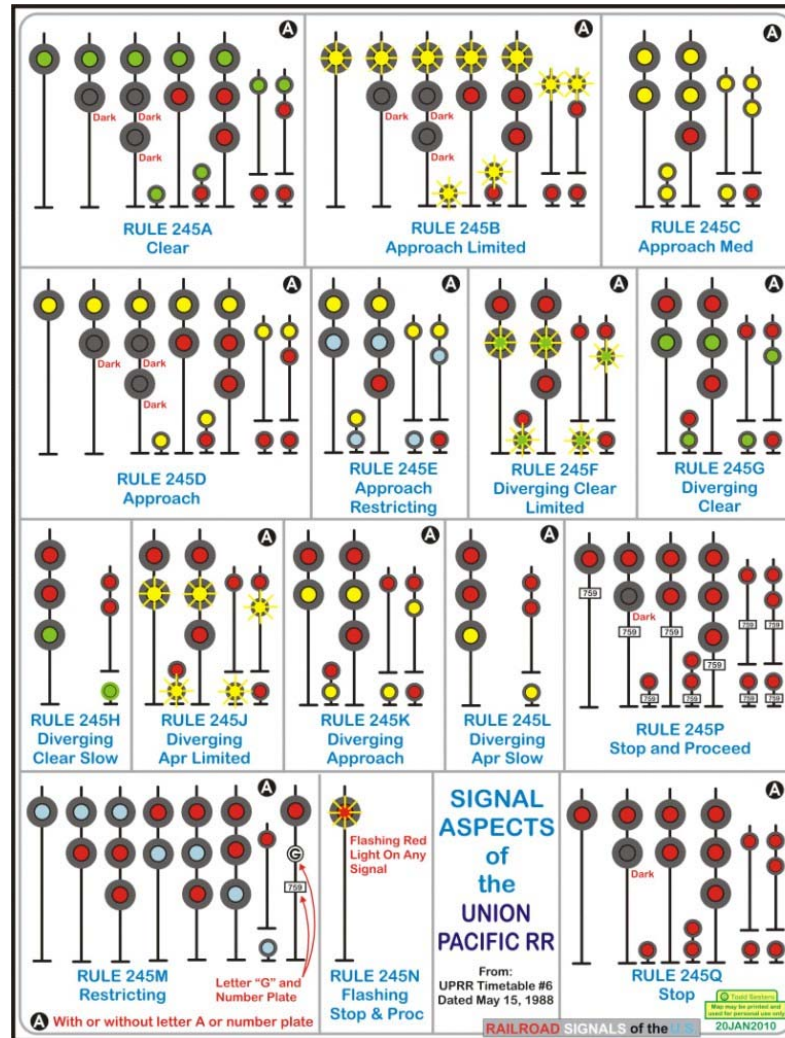
RULE 283 - Medium Clear
Proceed at Medium Speed until entire train clears all interlocking or spring switches, then proceed at Normal Speed.

RULE 283a - Medium Approach Medium
Proceed at Medium Speed until entire train clears all interlocking or spring switches, then approach the next signal at Medium Speed. Trains exceeding Medium Speed must begin reduction to Medium Speed as soon as the Medium Approach Medium signal is clearly visible.

RULE 285 - Approach
Proceed prepared to stop at the next signal. Trains exceeding Medium Speed must begin reduction to Medium Speed as soon as the engine passes the Approach Signal.

RULE 286 - Medium Approach
Proceed prepared to stop at the next signal. Trains exceeding Medium Speed must begin reduction to Medium Speed as soon as the Medium Approach signal is clearly visible.

RULE 291 - Stop and Proceed
Stop, then proceed at Restricted Speed until the entire train has passed a more favorable signal.

RULE 292 - Stop Signal
Stop.

RULE 281
Clear

RULE 282
Approach Medium

RULE 282a
Advance Approach

RULE 283
Medium Clear

RULE 283a
Medium Approach Medium

RULE 285
Approach

RULE 286
Medium Approach

RULE 291
Stop and Proceed

RULE 292
Stop

RAILROAD SIGNALS of the US

11JAN2010

Example
Union Pacific

CTI Sensor & Signal Logic Hardware

- ## USB Bridge/Serial Interface/Diplexer/Power Supply

- ## Sentry

The Sentry features 16 fixed-sensitivity sensor ports, and is compatible with all popular forms of train detection, including magnetic, IR, photocell, and current detection. It's also great for monitoring pushbuttons, motion sensors, light sensors, etc. Just $4.38 per sensor port.

$69.95

- ## SignalMan

Each Signalman controls 16 signal lights. It works with all block, searchlight, and positional signals, and can implement any signalling protocol. Also great for controlling grade crossing flashers, traffic lights, warning beacons, etc.

$69.95

-CC version for use with common cathode LED signals
-CA version for use with common anode LED signals
-BP version for use with bipolar LED signals
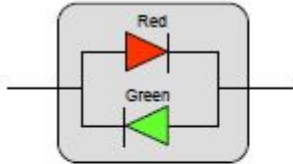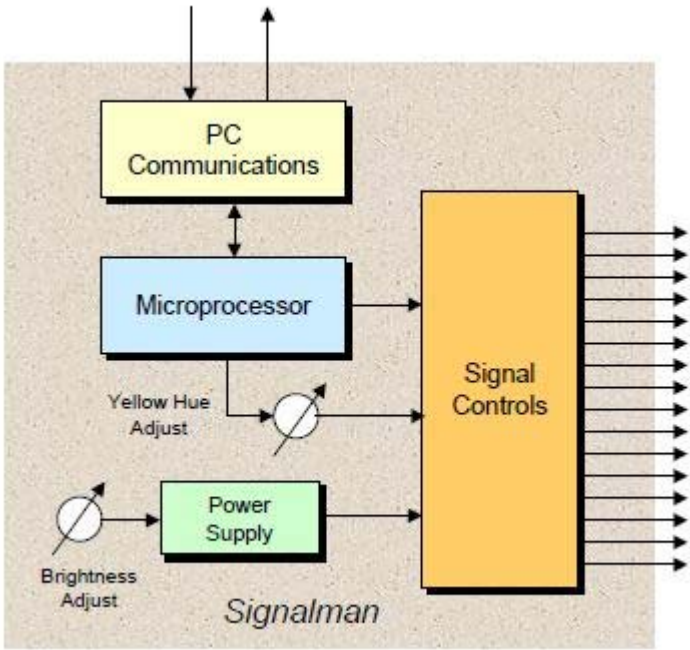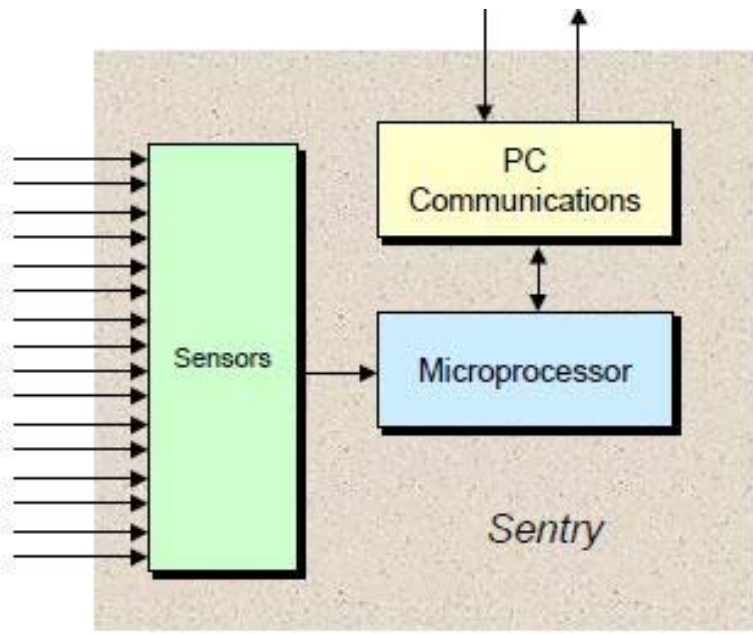-IC version for use with incandescent lamp signals

How the Network Works
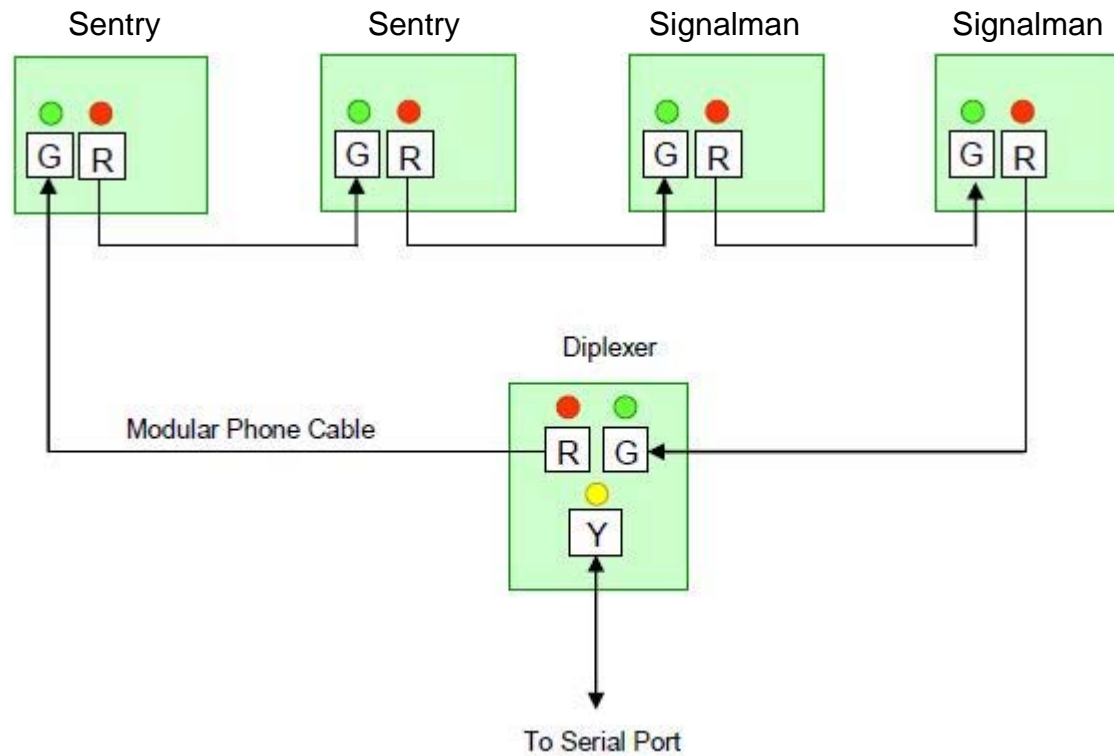
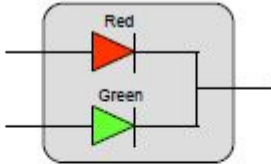This kind of network is called a "Token Ring" Network
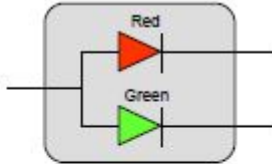
What the "Boards" Do

"Bipolar" LED

2 leads
Use -BP Signalman

"Bicolor LED"
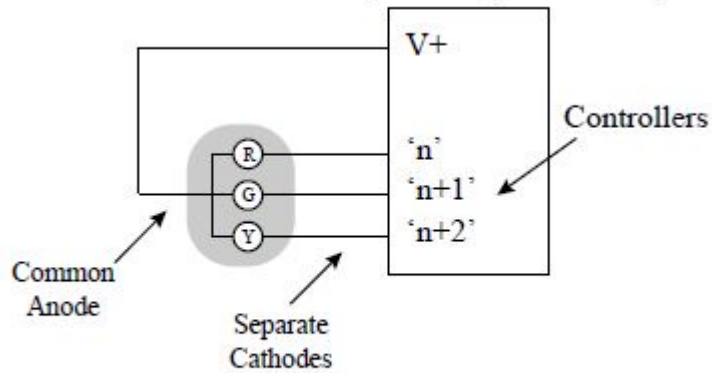(Common Cathode)

3 leads
Use -CC Signalman

"Bicolor LED"
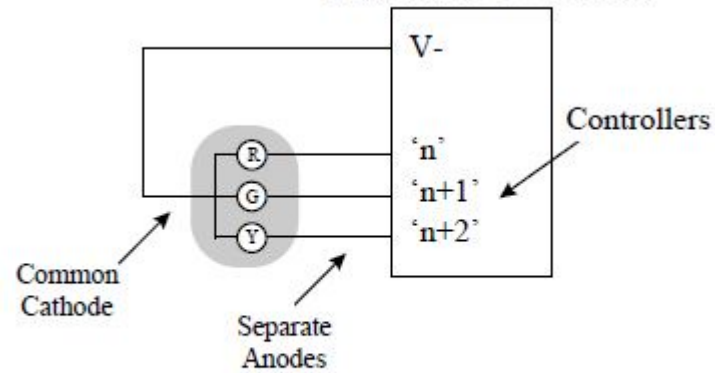(Common Anode)

3 leads
Use -CA Signalman

Hooking Up Signals

SignalMan (-CA Version)

V+

Controllers

'n'
'n+1'
'n+2'

R
G
Y

Common Anode

Separate Cathodes

Common-Anode LED-based Signal Wiring

SignalMan (-CC Version)

V-

Controllers

'n'
'n+1'
'n+2'

R
G
Y

Common Cathode

Separate Anodes

Common-Cathode LED-based Signal Wiring

SignalMan (-BP Version)

Controllers

'n'

'n+1'

R
G
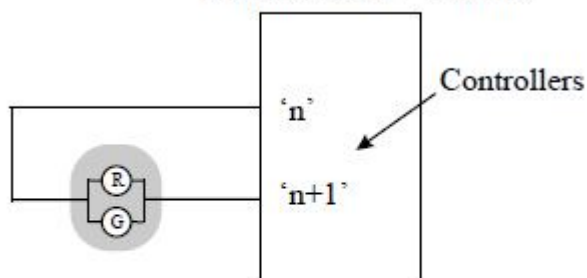
Bipolar LED-based Signal Wiring

SignalMan (-IC Version)

V+

Controllers

'n'
'n+1'
'n+2'
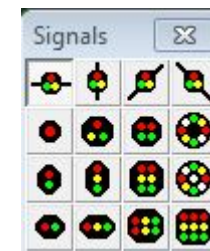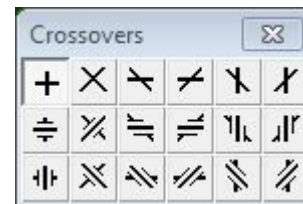
R
G
Y
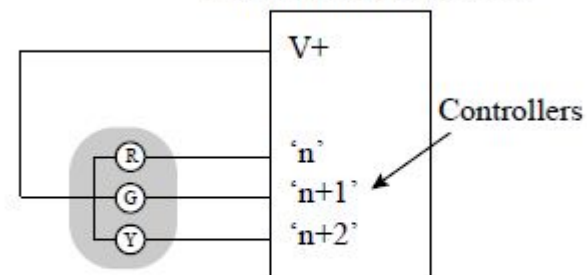
Incandescent Lamp-based Signal Wiring

Mix Signal Board Types
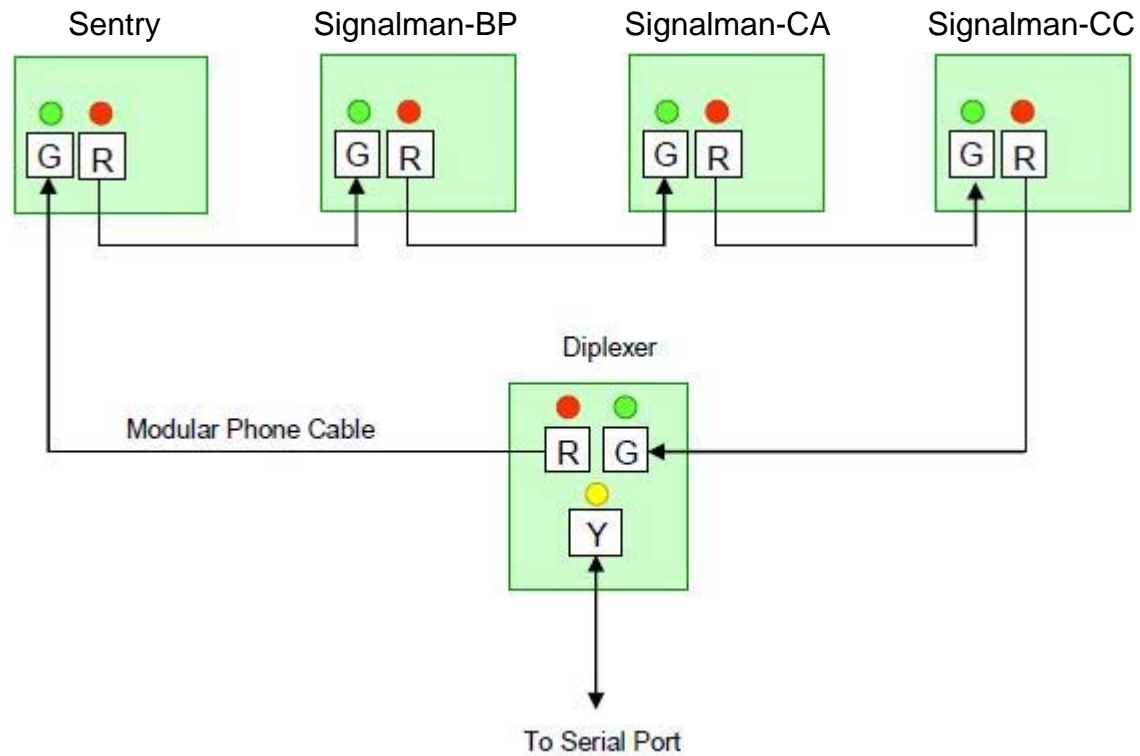
You could add one for incandescent bulb signals as well

Track Diagram Toolbars

TCL (Train Control Language)

```
Sensors: Block0, Block1, Block2, Block3, Block4, Block5, Block6, Block7, Spare, Spare, Turnout1, Crossover3, Turnout5, Turnout7, Spare, Spare

Signals: S2 (6), S4 (2), S6 (2), S8 (2) S10 (2), S12 (6), S14 (2), S16 (4), S18 (2), S20 (2), S22 (6), S24 (2), S26 (6), S28 (6), S30 (6)

Variables: B0, B1, B2, B3, B4, B5, B6, B7, T1, C3, T5, T7, TSE, TSM, TSP, TSW

Actions:

WHEN Block0=False DO                                    {B0 Occupancy Sensor or Mouse}
     $Draw Picture (5,5,1)="Off.jpg"
WHEN  {Block0=True} $LeftMouse=(5,5,1) DO
     {$Color Block (5,5,1)=Red}
     $Draw Picture (5,5,1)="On.jpg"
     B0=True
WHEN  {Block0=False} $RightMouse=(5,5,1) DO
     {$Color Block (5,5,1)=White}
     $Draw Picture (5,5,1)="Off.jpg"
     B0=False
WHEN Block1=False DO                                    {B1 Occupancy Sensor or Mouse}
     $Draw Picture (12,5,1)="Off.jpg"
WHEN  {Block1=True} $LeftMouse=(12,5,1) DO
     {$Color Block (12,5,1)=Red}
     $Draw Picture (12,5,1)="On.jpg"
     B1=True
WHEN  {Block1=False} $RightMouse=(12,5,1) DO
     {$Color Block (12,5,1)=White}
     $Draw Picture (12,5,1)="Off.jpg"
     B1=False
WHEN Block2=False DO                                    {B2 Occupancy Sensor or Mouse}
     $Draw Picture (22,5,1)="Off.jpg"
WHEN  {Block2=True} $LeftMouse=(22,5,1) DO
     {$Color Block (22,5,1)=Red}
     $Draw Picture (22,5,1)="On.jpg"
     B2=True
WHEN  {Block2=False} $RightMouse=(22,5,1) DO
     {$Color Block (22,5,1)=White}
     $Draw Picture (22,5,1)="Off.jpg"
     B2=False

WHEN Block3=False DO                                    {B3 Occupancy Sensor or Mouse}
     $Draw Picture (22,8,1)="Off.jpg"
WHEN  {Block3=True} $LeftMouse=(22,8,1) DO
     {$Color Block (22,8,1)=Red}
     $Draw Picture (22,8,1)="On.jpg"
     B3=True
WHEN  {Block3=False} $RightMouse=(22,8,1) DO
     {$Color Block (22,8,1)=White}
     $Draw Picture (22,8,1)="Off.jpg"
     B3=False
```
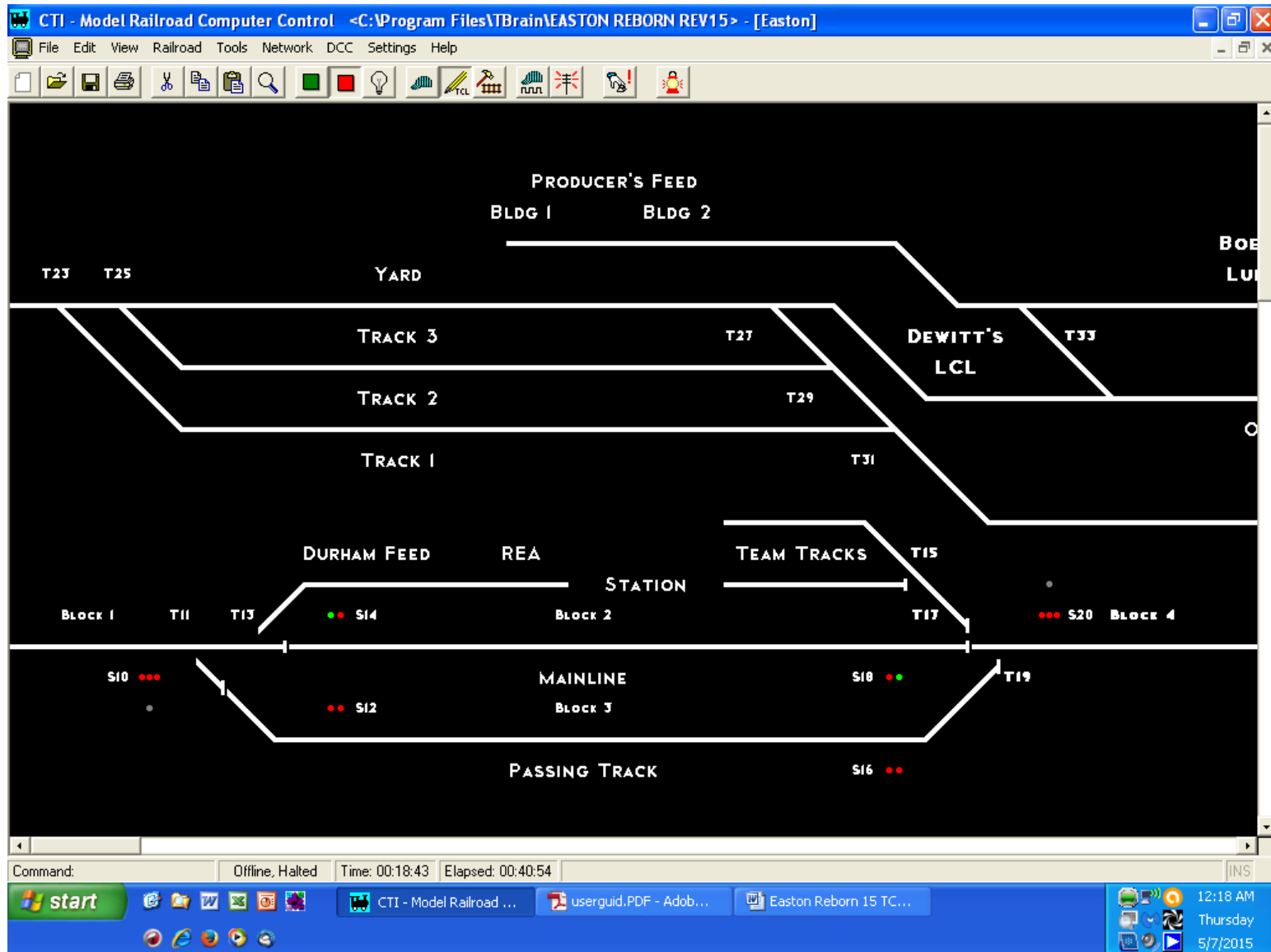
Signals for Track Plan
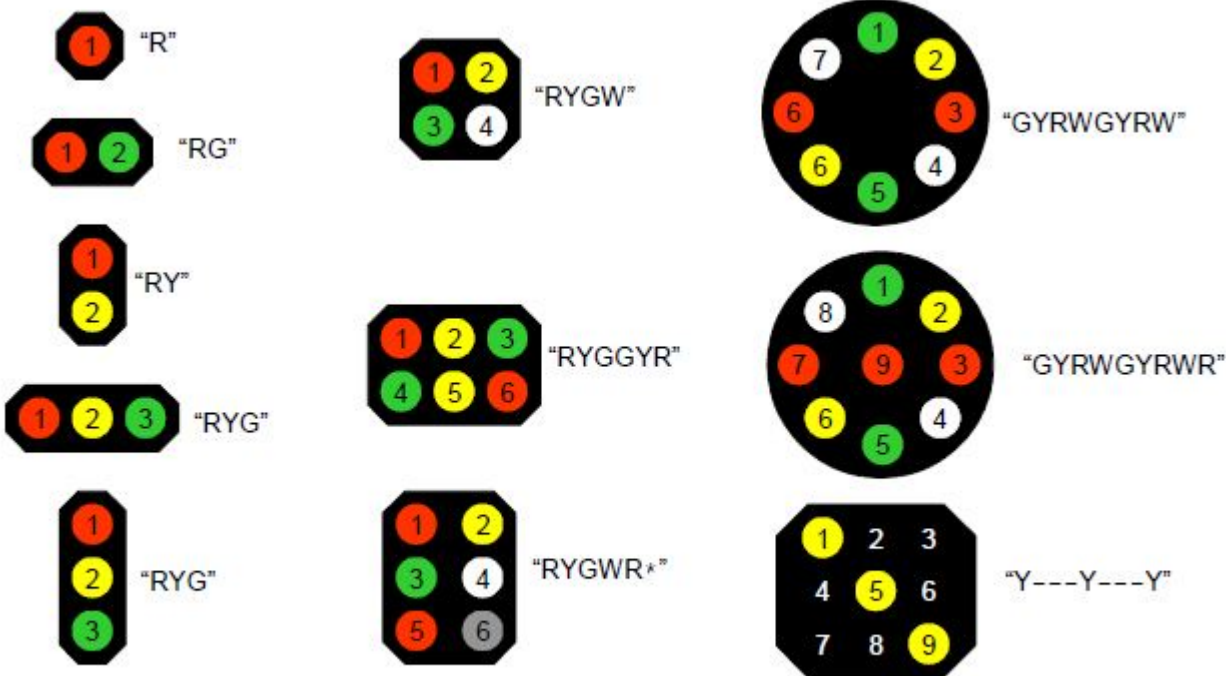
Addressable Signal Lamp Numbers and Representative Signal Control Strings

Track Diagrams

Sensors (available from CTI)

Magnetic

Dual Current Detector

InfraRed

Dual DCC Block Detector

CdS Photocell
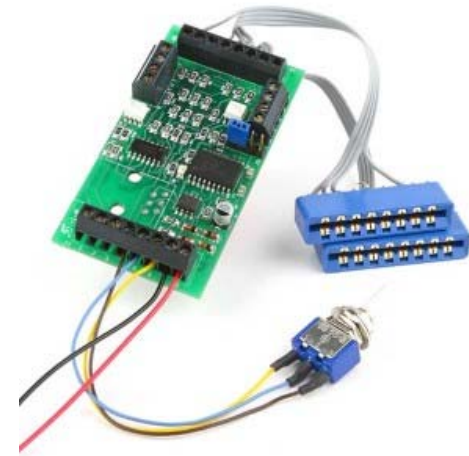
Dual 3-Rail Detector

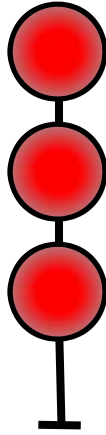# Other Sensors

Block Watcher   Tortoise (contacts)   Wabbit
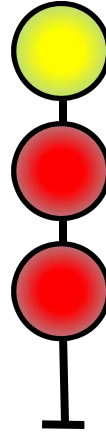
These were used on Signal Demo Layout

The End?

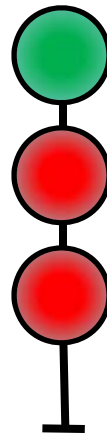Don't ⬤(red) 🟡(yellow)

⬤(red) here, ⬤(red)

⬤(red) ⬤(red) this without trepidation,

and see your way 🟢(green)

⬤(red)

⬤(red) to get started.